

Keysight X-Series Signal Analyzer

Notice: This document contains references to Agilent. Please note that Agilent's Test and Measurement business has become Keysight Technologies. For more information, go to www.keysight.com.

This help file provides documentation for the following X-Series Analyzers:
PXA Signal Analyzer N9030A
MXA Signal Analyzer N9020A
EXA Signal Analyzer N9010A
CXA Signal Analyzer N9000A

N9079A & W9079A
TDSCDMA with
HSPA/8PSK
Measurement
Application User's &
Programmer's
Reference

Notices

© Keysight Technologies, Inc.
2008-2014

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Keysight Technologies, Inc. as governed by United States and international copyright laws.

Acknowledgments

Adobe Acrobat® and Reader® are U.S. registered trademarks of Adobe Systems Incorporated.

Manual Part Number

N9079-90007

Edition

October 2014
Printed in USA
Keysight Technologies, Inc.
1400 Fountaingrove Parkway
Santa Rosa, CA 95403

Warranty

The material contained in this document is provided “as is,” and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Keysight disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Keysight shall not be liable for errors or for incidental or consequential

damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Keysight and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

Restricted Rights

Legend

If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as “Commercial computer software” as defined in DFAR 252.227-7014 (June 1995), or as a “commercial item” as defined in FAR 2.101(a) or as “Restricted computer software” as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Keysight Technologies’ standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will

receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

Safety Notices

CAUTION

A CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Table of Contents

| | |
|--|------------|
| N9079A & W9079A TDSCDMA with HSPA/8PSK Measurement Application User's & Programmer's Reference | i |
| Table of Contents | iii |
| 1 About the Analyzer | 85 |
| Installing Application Software | 86 |
| Viewing a License Key | 86 |
| Obtaining and Installing a License Key | 86 |
| Updating Measurement Application Software | 86 |
| X-Series Options and Accessories | 88 |
| Front-Panel Features | 89 |
| Display Annotations | 90 |
| Rear-Panel Features | 91 |
| Window Control Keys | 92 |
| Multi-Window | 92 |
| Zoom | 92 |
| Next Window | 93 |
| Full Screen | 94 |
| Display Enable (Remote Command Only) | 94 |
| Mouse and Keyboard Control | 96 |
| Right-Click | 96 |
| PC Keyboard | 98 |
| Instrument Security & Memory Volatility | 101 |
| 2 About the TD-SCDMA with HSPA/8PSK Measurement Application | 103 |
| What Does the TD-SCDMA with HSPA/8PSK Application Do? | 104 |
| Baseband I/Q Input Hardware Option BBA (Optional) | 105 |
| 3 Programming the Analyzer | 107 |
| What Programming Information is Available? | 108 |
| List of SCPI Commands | 109 |
| STATus Subsystem | 149 |
| Detailed Description | 151 |
| What Are Status Registers | 152 |
| What Are Status Register SCPI Commands | 152 |
| How to Use the Status Registers | 153 |
| Using a Status Register | 154 |
| Using the Service Request (SRQ) Method | 155 |
| Generating a Service Request | 155 |
| Status Register System | 156 |
| The Status Byte Register | 157 |
| Standard Event Status Register | 159 |
| Operation and Questionable Status Registers | 161 |

| | |
|---|-----|
| Operation Status Register | 161 |
| Questionable Status Register | 161 |
| STATus Subsystem Command Descriptions | 162 |
| Operation Register | 162 |
| Operation Condition Query | 162 |
| Operation Enable | 163 |
| Operation Event Query | 163 |
| Operation Negative Transition | 163 |
| Operation Positive Transition | 164 |
| Preset the Status Byte | 164 |
| Questionable Register | 165 |
| Questionable Condition | 165 |
| Questionable Enable | 165 |
| Questionable Event Query | 166 |
| Questionable Negative Transition | 166 |
| Questionable Positive Transition | 166 |
| Questionable Calibration Register | 167 |
| Questionable Calibration Condition | 167 |
| Questionable Calibration Enable | 167 |
| Questionable Calibration Event Query | 168 |
| Questionable Calibration Negative Transition | 168 |
| Questionable Calibration Positive Transition | 169 |
| Questionable Calibration Skipped Register | 169 |
| Questionable Calibration Skipped Condition | 169 |
| Questionable Calibration Skipped Enable | 170 |
| Questionable Calibration Skipped Event Query | 170 |
| Questionable Calibration Skipped Negative Transition | 171 |
| Questionable Calibration Skipped Positive Transition | 171 |
| Questionable Calibration Extended Failure Register | 171 |
| Questionable Calibration Extended Failure Condition | 172 |
| Questionable Calibration Extended Failure Enable | 172 |
| Questionable Calibration Extended Failure Event Query | 172 |
| Questionable Calibration Extended Failure Negative Transition | 173 |
| Questionable Calibration Extended Failure Positive Transition | 173 |
| Questionable Calibration Extended Needed Register | 174 |
| Questionable Calibration Extended Needed Condition | 174 |
| Questionable Calibration Extended Needed Enable | 174 |
| Questionable Calibration Extended Needed Event Query | 175 |
| Questionable Calibration Extended Needed Negative Transition | 175 |
| Questionable Calibration Extended Needed Positive Transition | 176 |
| Questionable Frequency Register | 176 |
| Questionable Frequency Condition | 176 |
| Questionable Frequency Enable | 177 |

| | |
|---|-----|
| Questionable Frequency Event Query | 177 |
| Questionable Frequency Negative Transition | 177 |
| Questionable Frequency Positive Transition | 178 |
| Questionable Integrity Register | 178 |
| Questionable Integrity Condition | 178 |
| Questionable Integrity Enable | 179 |
| Questionable Integrity Event Query | 179 |
| Questionable Integrity Negative Transition | 180 |
| Questionable Integrity Positive Transition | 180 |
| Questionable Integrity Signal Register | 180 |
| Questionable Integrity Signal Condition | 181 |
| Questionable Integrity Signal Enable | 181 |
| Questionable Integrity Signal Event Query | 182 |
| Questionable Integrity Signal Negative Transition | 182 |
| Questionable Integrity Signal Positive Transition | 182 |
| Questionable Integrity Uncalibrated Register | 183 |
| Questionable Integrity Uncalibrated Condition | 183 |
| Questionable Integrity Uncalibrated Enable | 183 |
| Questionable Integrity Uncalibrated Event Query | 184 |
| Questionable Integrity Uncalibrated Negative Transition | 184 |
| Questionable Integrity Uncalibrated Positive Transition | 185 |
| Questionable Power Register | 185 |
| Questionable Power Condition | 185 |
| Questionable Power Enable | 186 |
| Questionable Power Event Query | 186 |
| Questionable Power Negative Transition | 187 |
| Questionable Power Positive Transition | 187 |
| Questionable Temperature Register | 187 |
| Questionable Temperature Condition | 188 |
| Questionable Temperature Enable | 188 |
| Questionable Temperature Event Query | 188 |
| Questionable Temperature Negative Transition | 189 |
| Questionable Temperature Positive Transition | 189 |
| IEEE 488.2 Common Commands | 191 |
| All | 191 |
| Clear Status | 193 |
| Standard Event Status Enable | 194 |
| Standard Event Status Register Query | 194 |
| Identification Query | 195 |
| Operation Complete | 195 |
| Query Instrument Options | 196 |
| Recall Instrument State | 196 |
| *RST (Remote Command Only) | 197 |

| | |
|---|------------|
| Save Instrument State | 197 |
| Service Request Enable | 198 |
| Status Byte Query | 198 |
| Trigger | 199 |
| Self Test Query | 199 |
| Wait-to-Continue | 199 |
| 4 Input/Output Functions | 201 |
| Input/Output | 202 |
| Input/Output variables - Preset behavior | 203 |
| RF Input | 204 |
| Input Z Correction | 204 |
| RF Coupling | 205 |
| External Mixer | 206 |
| More Information | 207 |
| Ext Mix Setup | 209 |
| Mixer Presets | 214 |
| Mixer Bias | 219 |
| Cable IF Loss | 219 |
| I/Q | 220 |
| Baseband I/Q (Option BBA) | 220 |
| Baseband I/Q Remote Language Compatibility | 222 |
| I/Q Path | 223 |
| I+jQ | 224 |
| I Only | 224 |
| Q Only | 224 |
| I Setup | 225 |
| I Differential Input | 225 |
| I Input Z | 226 |
| I Skew | 226 |
| I Probe | 227 |
| Combined Differential/Input Z (Remote Command Only) | 229 |
| Q Setup | 230 |
| Q Same as I | 230 |
| Q Differential Input | 230 |
| Q Input Z | 231 |
| Q Skew | 232 |
| Q Probe | 232 |
| Reference Z | 234 |
| I/Q Cable Calibrate... | 235 |
| I/Q Probe Setup | 236 |
| Attenuation | 236 |
| Offset | 237 |
| Coupling | 237 |

| | |
|---|-----|
| Calibrate | 239 |
| Clear Calibration | 239 |
| RF Calibrator | 239 |
| 50 MHz | 240 |
| 4.8 GHz | 241 |
| Off | 241 |
| External Gain | 241 |
| Ext Preamp | 242 |
| More Information | 243 |
| MS | 243 |
| BTS | 244 |
| I Ext Gain | 245 |
| Q Ext Gain | 246 |
| Restore Input/Output Defaults | 246 |
| Corrections | 247 |
| Select Correction | 248 |
| Correction On/Off | 248 |
| Properties | 249 |
| Select Correction | 249 |
| Frequency Interpolation | 249 |
| Description | 251 |
| Comment | 251 |
| Edit | 252 |
| Navigate | 253 |
| Frequency | 253 |
| Amplitude | 253 |
| Insert Point Below | 253 |
| Delete Point | 254 |
| Delete Correction | 254 |
| Apply Corrections | 254 |
| Delete All Corrections | 254 |
| Remote Correction Data Set Commands | 255 |
| Set (Replace) Data (Remote Command Only) | 255 |
| Merge Correction Data (Remote Command Only) | 256 |
| Freq Ref In | 256 |
| Sense | 258 |
| Internal | 258 |
| External | 258 |
| Ext Ref Freq | 259 |
| External Reference Lock BW | 260 |
| External Ref Coupling | 260 |
| Output Config | 262 |
| Trig Out | 262 |

| | |
|--|-----|
| Polarity | 263 |
| Off | 263 |
| Sweeping (HSWP) | 264 |
| Measuring | 264 |
| Main Trigger | 264 |
| Gate Trigger | 264 |
| Gate | 265 |
| Source Point Trigger | 265 |
| Odd/Even Trace Point | 265 |
| Analog Out | 265 |
| More Information | 266 |
| Auto | 266 |
| Off | 267 |
| Screen Video | 267 |
| Log Video (RF Envelope, Ref=Mixer Level) | 268 |
| Linear Video (RF Envelope, Ref=Ref Level) | 269 |
| Demod Audio | 269 |
| Digital Bus | 270 |
| Bus Out On/Off | 270 |
| I/Q Cal Out | 271 |
| 1 kHz Square Wave | 271 |
| 250 kHz Square Wave | 271 |
| Off | 272 |
| Aux IF Out | 272 |
| Off | 272 |
| Second IF | 273 |
| Arbitrary IF | 273 |
| Fast Log Video | 274 |
| I/Q Guided Calibration | 274 |
| I/Q Isolation Calibration | 275 |
| Next | 275 |
| Exit | 275 |
| I/Q Isolation Calibration Time (Remote Command Only) | 275 |
| I/Q Cable Calibrate... | 276 |
| I Port | 276 |
| I-bar Port | 277 |
| Q Port | 278 |
| Q-bar Port | 279 |
| I/Q Cable Calibration Time (Remote Command Only) | 280 |
| I/Q Probe Calibration | 280 |
| I Port | 281 |
| I-bar Port | 282 |
| Q Port | 284 |

| | |
|---|------------|
| Q-bar Port | 285 |
| Show Adapter Screen | 286 |
| I/Q Probe Calibration Time (Remote Command Only) | 286 |
| Exit Confirmation | 286 |
| 5 Mode Functions | 287 |
| Mode | 288 |
| More Information | 289 |
| Spectrum Analyzer | 290 |
| Noise Figure | 291 |
| Vector Signal Analyzer (VXA) | 291 |
| Analog Demod | 291 |
| Phase Noise | 292 |
| CMMB | 292 |
| Combined WLAN | 292 |
| TD-SCDMA with HSPA/8PSK | 293 |
| IQ Analyzer (Basic) | 293 |
| GSM/EDGE/EDGE Evo | 293 |
| Combined Fixed WiMAX | 294 |
| W-CDMA with HSPA+ | 294 |
| DVB-T/H with T2 | 294 |
| EMI Receiver | 294 |
| 802.16 OFDM (Fixed WiMAX) | 295 |
| WLAN | 295 |
| 1xEV-DO | 295 |
| 802.16 OFDMA (WiMAX/WiBro) | 296 |
| 89601 VSA | 296 |
| MSR | 297 |
| cdma2000 | 297 |
| Bluetooth | 298 |
| LTE | 298 |
| SCPI Language Compatibility | 298 |
| iDEN/WiDEN/MOTOTalk | 299 |
| ISDB-T | 299 |
| Digital Cable TV | 299 |
| LTE TDD | 299 |
| Remote Language Compatibility | 300 |
| DTMB (CTTB) | 300 |
| LTE-Advanced FDD | 300 |
| LTE-Advanced TDD | 301 |
| Application Mode Number Selection (Remote Command Only) | 301 |
| Application Mode Catalog Query (Remote Command Only) | 303 |
| Application Identification (Remote Commands Only) | 303 |
| Current Application Model | 304 |

| | |
|---|-----|
| Current Application Revision | 304 |
| Current Application Options | 304 |
| Application Identification Catalog (Remote Commands Only) | 305 |
| Application Catalog Number of Entries | 305 |
| Application Catalog Model Numbers | 305 |
| Application Catalog Revision | 305 |
| Application Catalog Options | 306 |
| Detailed List of Modes | 306 |
| 1xEV-DO | 306 |
| 802.16 OFDMA (WiMAX/WiBro) | 307 |
| 802.16 OFDM (Fixed WiMAX) | 307 |
| 89601 VSA | 307 |
| Analog Demod | 308 |
| Bluetooth | 308 |
| cdma2000 | 309 |
| CMMB | 309 |
| Combined WLAN | 309 |
| Combined Fixed WiMAX | 310 |
| Digital Cable TV | 310 |
| DTMB (CTTB) | 310 |
| DVB-T/H with T2 | 310 |
| EMI Receiver | 311 |
| GSM/EDGE/EDGE Evo | 311 |
| iDEN/WiDEN/MOTOTalk | 311 |
| IQ Analyzer (Basic) | 312 |
| ISDB-T | 312 |
| LTE | 312 |
| LTE TDD | 313 |
| LTE-Advanced FDD | 313 |
| LTE-Advanced TDD | 313 |
| MSR | 314 |
| Noise Figure | 314 |
| Phase Noise | 315 |
| Real Time Spectrum Analyzer | 315 |
| Remote Language Compatibility | 315 |
| SCPI Language Compatibility | 316 |
| Spectrum Analyzer | 316 |
| TD-SCDMA with HSPA/8PSK | 316 |
| Vector Signal Analyzer (VXA) | 317 |
| W-CDMA with HSPA+ | 317 |
| WLAN | 317 |
| Global Settings | 318 |
| Global Center Freq | 318 |

| | |
|---|-----|
| Restore Defaults | 319 |
| Mode Setup | 320 |
| Radio | 320 |
| Device | 320 |
| Note: In the Spurious Emissions, the sync source of the periodic timer gate source is coupled with the radio device when the gate source is switched into the periodic timer, shown in the table below: | 321 |
| Analysis Timeslot | 321 |
| Gate Settings | 321 |
| Demod | 322 |
| Scramble Code | 323 |
| Uplink Pilot | 323 |
| Sync Type | 323 |
| More Information about Sync Type | 324 |
| Switching Point | 324 |
| Max Users for Traffic Timeslots | 325 |
| TS0 | 325 |
| TS1 | 325 |
| TS2 | 326 |
| TS3 | 326 |
| TS4 | 326 |
| TS5 | 327 |
| TS6 | 327 |
| Slot Frequency Reference | 328 |
| Code Channel Detection | 328 |
| Mod Scheme | 329 |
| More Information about Mode Scheme | 329 |
| Channel Configuration | 329 |
| Select Code Length | 329 |
| Select All Code Channels | 330 |
| Select Code Channel | 331 |
| Code Channel Status | 331 |
| Midamble Shift | 331 |
| Modulation Format | 332 |
| Phase Shift Detection | 332 |
| Phase Shift | 333 |
| Show Configuration Setup | 333 |
| Timing Reference | 333 |
| Advanced | 334 |
| Filter Alpha | 334 |
| Active Slot Threshold | 334 |
| Active Channel Threshold | 335 |
| EVM Result IQ Offset | 335 |

| | |
|---|------------|
| Mirror Frequency Spectrum | 336 |
| Normalize | 336 |
| EVM Min IQ Imbalance | 337 |
| IQ Imbalance Frequency Compensation | 337 |
| Equalizer Mode | 338 |
| RRC Filter Control | 338 |
| Noise Reduction | 338 |
| Noise Floor Extension | 339 |
| More Information | 339 |
| Restore Mode Defaults | 341 |
| HSPA/8PSK Enable | 341 |
| 6 System Functions | 343 |
| File | 344 |
| File Explorer | 344 |
| Page Setup | 345 |
| Print | 346 |
| Minimize | 346 |
| Exit | 346 |
| Maximize/Restore Down | 347 |
| Maximize | 347 |
| Restore Down | 347 |
| Print | 348 |
| System | 349 |
| Show | 349 |
| Errors | 349 |
| Previous Page | 350 |
| Next Page | 351 |
| History | 351 |
| Verbose SCPI On/Off | 351 |
| Refresh | 352 |
| Clear Error Queue | 352 |
| Input Overload Enable (Remote Command Only) | 352 |
| System | 353 |
| Show System contents (Remote Command Only) | 354 |
| Computer System description (Remote Command Only) | 354 |
| Hardware | 354 |
| LXI | 355 |
| Power On | 355 |
| Mode and Input/Output Defaults | 356 |
| User Preset | 356 |
| Last State | 357 |
| Power On Application | 357 |
| Configure Applications | 358 |

| | |
|--|-----|
| Preloading Applications | 359 |
| Access to Configure Applications utility | 359 |
| Virtual memory usage | 359 |
| Select All | 360 |
| Deselect All | 360 |
| Move Up | 360 |
| Move Down | 360 |
| Select/Deselect | 360 |
| Save Changes and Exit | 361 |
| Exit Without Saving | 361 |
| Restore Power On Defaults | 361 |
| Configure Applications - Instrument boot-up | 362 |
| Configure Applications - Windows desktop | 362 |
| Configure Applications - Remote Commands | 362 |
| Configuration list (Remote Command Only) | 363 |
| Configuration Memory Available (Remote Command Only) | 363 |
| Configuration Memory Total (Remote Command Only) | 363 |
| Configuration Memory Used (Remote Command Only) | 363 |
| Configuration Application Memory (Remote Command Only) | 364 |
| Alignments | 364 |
| Auto Align | 364 |
| Normal | 365 |
| Partial | 366 |
| Off | 366 |
| All but RF | 367 |
| Alert | 367 |
| Execute Expired Alignments (Remote Command Only) | 370 |
| Align Now | 371 |
| All | 371 |
| All but RF | 373 |
| RF | 375 |
| External Mixer | 376 |
| Show Alignment Statistics | 377 |
| Restore Align Defaults | 382 |
| Backup or Restore Align Data... | 382 |
| Alignment Data Wizard | 383 |
| Perform Backup (Remote Command Only) | 388 |
| Perform Restore (Remote Command Only) | 389 |
| Advanced | 389 |
| Characterize Preselector | 389 |
| Characterize Reference Clock | 391 |
| Characterize Noise Floor | 394 |
| Timebase DAC | 396 |

| | |
|---|-----|
| Calibrated | 396 |
| User | 396 |
| I/O Config | 397 |
| GPIB | 398 |
| GPIB Address | 398 |
| GPIB Controller | 398 |
| SCPI LAN | 399 |
| SCPI Telnet | 400 |
| SCPI Socket | 400 |
| SICL Server | 400 |
| HiSLIP Server | 401 |
| SCPI Socket Control Port (Remote Command Only) | 402 |
| Reset Web Password | 402 |
| LXI | 403 |
| LAN Reset | 403 |
| Device Identification (Remote Command Only) | 403 |
| System IDN Response | 403 |
| Factory | 404 |
| User | 404 |
| Query USB Connection (Remote Command Only) | 405 |
| USB Connection Status (Remote Command Only) | 405 |
| USB Packet Count (Remote Command Only) | 405 |
| Restore Defaults | 406 |
| Restore Input/Output Defaults | 406 |
| Restore Power On Defaults | 407 |
| Restore Align Defaults | 407 |
| Restore Misc Defaults | 408 |
| Restore Mode Defaults (All Modes) | 409 |
| All | 410 |
| Control Panel... | 411 |
| Licensing... | 412 |
| Security | 414 |
| USB | 414 |
| Read-Write | 414 |
| Read only | 414 |
| Diagnostics | 415 |
| Show Hardware Statistics | 415 |
| SCPI for Show Hardware Statistics (Remote Commands Only) | 416 |
| Internet Explorer... | 418 |
| System Remote Commands (Remote Commands Only) | 418 |
| System Powerdown (Remote Command Only) | 418 |
| List installed Options (Remote Command Only) | 419 |
| Lock the Front-panel keys (Remote Command Only) | 419 |

| | |
|---|------------|
| List SCPI Commands (Remote Command Only) | 420 |
| SCPI Version Query (Remote Command Only) | 420 |
| Date (Remote Command Only) | 420 |
| Time (Remote Command Only) | 420 |
| 7 Trigger Functions | 423 |
| Trigger | 424 |
| Trigger Source Presets | 425 |
| RF Trigger Source | 428 |
| I/Q Trigger Source | 429 |
| More Information | 430 |
| Free Run | 431 |
| Video (IF Envelope) | 432 |
| Trigger Level | 432 |
| Trig Slope | 433 |
| Trig Delay | 434 |
| External 1 | 435 |
| Trigger Level | 436 |
| Trig Slope | 436 |
| Trig Delay | 437 |
| Zero Span Delay Comp On/Off | 438 |
| External 2 | 438 |
| Trigger Level | 439 |
| Trig Slope | 439 |
| Trig Delay | 440 |
| Zero Span Delay Comp On/Off | 440 |
| RF Burst | 441 |
| Absolute Trigger Level | 442 |
| Relative Trigger Level | 443 |
| Trigger Slope | 444 |
| Trig Delay | 444 |
| Auto/Holdoff | 445 |
| Auto Trig | 445 |
| Trig Holdoff | 446 |
| Holdoff Type | 446 |
| 8 Blank Heading 1 For Flare PD import--DO NOT REMOVE FROM PD | 449 |
| 8 Burst Power (Transmit Power) | 449 |
| AMPTD Y Scale | 454 |
| Y Ref Value | 454 |
| Attenuation | 454 |
| Dual Attenuator Configurations: | 455 |
| Single Attenuator Configuration: | 456 |
| (Mech) Atten | 456 |

| | |
|--|-----|
| Attenuator Configurations and Auto/Man | 458 |
| Enable Elec Atten | 458 |
| More Information | 459 |
| Mechanical Attenuator Transition Rules | 459 |
| When the Electronic Attenuation is enabled from a disabled state: | 459 |
| Examples in the dual attenuator configuration: | 459 |
| When the Electronic Attenuation is disabled from an enabled state: | 460 |
| Using the Electronic Attenuator: Pros and Cons | 460 |
| Elec Atten | 460 |
| Adjust Atten for Min Clip | 461 |
| Pre-Adjust for Min Clip | 461 |
| Off | 462 |
| Elec Atten Only | 462 |
| Mech + Elec Atten | 463 |
| (Mech) Atten Step | 463 |
| Scale/Division | 464 |
| Presel Center | 464 |
| Proper Preselector Operation | 465 |
| Preselector Adjust | 465 |
| Y Axis Unit | 467 |
| dBm | 468 |
| dBmV | 468 |
| dBmA | 468 |
| W | 469 |
| V | 469 |
| A | 469 |
| dB μ V | 470 |
| dB μ A | 470 |
| dBpW | 470 |
| Antenna Unit | 471 |
| dB μ V/m | 471 |
| dB μ A/m | 471 |
| dB μ A | 471 |
| dBpT | 472 |
| dBG | 472 |
| None | 472 |
| μ W Path Control | 473 |
| Standard Path | 474 |
| Low Noise Path Enable | 474 |
| More Information | 475 |
| μ W Preselector Bypass | 476 |
| Internal Preamp | 477 |
| Off | 478 |

| | |
|---|-----|
| Low Band | 479 |
| Full Range | 479 |
| Ref Position | 479 |
| Auto Scaling | 480 |
| Auto Couple | 481 |
| More Information | 481 |
| Auto/Man Active Function keys | 481 |
| Auto/Man 1-of-N keys | 481 |
| BW | 483 |
| RBW Control | 483 |
| Filter Type | 483 |
| Cont (Continuous Measurement/Sweep) | 485 |
| File | 487 |
| FREQ Channel | 488 |
| Center Freq | 488 |
| Center Frequency Presets | 489 |
| RF Center Freq | 491 |
| Ext Mix Center Freq | 492 |
| I/Q Center Freq | 493 |
| CF Step | 493 |
| Input/Output | 495 |
| Marker | 496 |
| Select Marker | 496 |
| Marker Type | 496 |
| Properties | 497 |
| Select Marker | 497 |
| Relative To | 497 |
| Marker Trace | 497 |
| Couple Markers | 498 |
| All Markers Off | 499 |
| Marker X Axis Position (Remote Command Only) | 499 |
| Marker Y Axis Value (Remote Command Only) | 500 |
| Marker Function | 501 |
| Marker To | 502 |
| Meas | 503 |
| Remote Measurement Functions | 503 |
| Measurement Group of Commands | 504 |
| Current Measurement Query (Remote Command Only) | 506 |
| Limit Test Current Results (Remote Command Only) | 506 |
| Data Query (Remote Command Only) | 506 |
| Calculate/Compress Trace Data Query (Remote Command Only) | 507 |
| Calculate Peaks of Trace Data (Remote Command Only) | 512 |
| Format Data: Numeric Data (Remote Command Only) | 513 |

| | |
|---|-----|
| Format Data: Byte Order (Remote Command Only) | 514 |
| Meas Setup | 515 |
| Avg/Hold Num | 515 |
| Avg Mode | 516 |
| Avg Type | 516 |
| Threshold Lvl | 517 |
| Meas Method | 518 |
| Burst Width | 520 |
| Meas Interval (for TD-SCDMA mode) | 521 |
| Meas Preset | 521 |
| Mode | 523 |
| Mode Preset | 524 |
| How-To Preset | 525 |
| Preset Type (Remote Command Only) | 526 |
| Mode Setup | 527 |
| Peak Search | 528 |
| Print | 529 |
| Quick Save | 530 |
| Recall | 532 |
| State | 532 |
| More Information | 534 |
| From File... | 534 |
| Edit Register Names | 536 |
| Register 1 thru Register 16 | 536 |
| Register 1 thru Register 16 | 537 |
| Data (Import) | 538 |
| Capture Buffer | 538 |
| Open... | 539 |
| Restart | 540 |
| More Information | 540 |
| Save | 542 |
| State | 542 |
| To File . . . | 543 |
| Edit Register Names | 545 |
| More Information | 545 |
| Register 1 thru Register 16 | 546 |
| Register 1 thru Register 16 | 546 |
| Data (Export) | 547 |
| Measurement Results | 548 |
| Meas Results File Contents | 548 |
| Capture Buffer | 549 |
| Save As . . . | 549 |
| Screen Image | 550 |

| | |
|---|-----|
| Themes | 551 |
| 3D Color | 552 |
| 3D Monochrome | 552 |
| Flat Color | 552 |
| Flat Monochrome | 553 |
| Save As... | 553 |
| Mass Storage Catalog (Remote Command Only) | 553 |
| Mass Storage Change Directory (Remote Command Only) | 554 |
| Mass Storage Copy (Remote Command Only) | 554 |
| Mass Storage Device Copy (Remote Command Only) | 554 |
| Mass Storage Delete (Remote Command Only) | 555 |
| Mass Storage Data (Remote Command Only) | 555 |
| Mass Storage Make Directory (Remote Command Only) | 555 |
| Mass Storage Move (Remote Command Only) | 556 |
| Mass Storage Remove Directory (Remote Command Only) | 556 |
| Single (Single Measurement/Sweep) | 557 |
| More Information | 557 |
| Source | 558 |
| SPAN X Scale | 559 |
| Ref Value | 559 |
| Scale/Div | 559 |
| Ref Position | 560 |
| Auto Scaling | 560 |
| Sweep/Control | 562 |
| Pause/Resume | 562 |
| Abort (Remote Command Only) | 562 |
| System | 564 |
| Trace/Detector | 565 |
| Max Hold Trace | 565 |
| Min Hold Trace | 565 |
| Trigger | 567 |
| Free Run | 567 |
| Video | 567 |
| Trigger Level | 567 |
| Trig Slope | 567 |
| Trig Delay | 567 |
| External 1 | 567 |
| Trigger Level | 567 |
| Trig Slope | 567 |
| Trig Delay | 567 |
| Zero Span Delay Comp | 567 |
| External 2 | 567 |
| Trigger Level | 567 |

| | |
|---|------------|
| Trig Slope | 567 |
| Trig Delay | 568 |
| Zero Span Delay Comp | 568 |
| RF Burst | 568 |
| Absolute Trigger | 568 |
| Relative Trigger | 568 |
| Trig Slope | 568 |
| Trig Delay | 568 |
| Auto/Holdoff | 568 |
| Auto Trig | 568 |
| Trig Holdoff | 568 |
| Holdoff Type | 568 |
| User Preset | 569 |
| User Preset | 569 |
| User Preset All Modes | 570 |
| Save User Preset | 571 |
| View/Display | 572 |
| RF Envelope view for TX Power Measurement(Above Threshold) | 572 |
| RF Envelope view with Bar Graph for TX Power Measurement (Measured Burst Width) | 573 |
| RF Envelope view with Bar Graph for TX Power Measurement (Single TimeSlot) | 574 |
| Display | 575 |
| Annotation | 576 |
| Meas Bar On/Off | 577 |
| Screen | 577 |
| Active Function Values On/Off | 577 |
| Title | 578 |
| Change Title | 578 |
| Clear Title | 579 |
| Graticule | 580 |
| System Display Settings | 580 |
| Annotation Local Settings | 580 |
| Themes | 581 |
| Backlight | 582 |
| Backlight Intensity | 582 |
| Bar Graph | 583 |
| 9 ACP Measurement | 585 |
| AMPTD Y Scale | 597 |
| Ref Value | 597 |
| Attenuation | 597 |
| Dual Attenuator Configurations: | 598 |
| Single Attenuator Configuration: | 599 |
| (Mech) Atten | 599 |

| | |
|--|-----|
| Attenuator Configurations and Auto/Man | 601 |
| Enable Elec Atten | 601 |
| More Information | 602 |
| Mechanical Attenuator Transition Rules | 602 |
| When the Electronic Attenuation is enabled from a disabled state: | 602 |
| Examples in the dual attenuator configuration: | 602 |
| When the Electronic Attenuation is disabled from an enabled state: | 603 |
| Using the Electronic Attenuator: Pros and Cons | 603 |
| Elec Atten | 603 |
| Adjust Atten for Min Clip | 604 |
| Pre-Adjust for Min Clip | 604 |
| Off | 605 |
| Elec Atten Only | 605 |
| Mech + Elec Atten | 606 |
| (Mech) Atten Step | 606 |
| Scale/Div | 607 |
| Presel Center | 607 |
| Proper Preselector Operation | 608 |
| Preselector Adjust | 608 |
| Y Axis Unit | 610 |
| dBm | 611 |
| dBmV | 611 |
| dBmA | 611 |
| W | 612 |
| V | 612 |
| A | 612 |
| dB μ V | 613 |
| dB μ A | 613 |
| dBpW | 613 |
| Antenna Unit | 614 |
| dB μ V/m | 614 |
| dB μ A/m | 614 |
| dB μ A | 614 |
| dBpT | 615 |
| dBG | 615 |
| None | 615 |
| μ W Path Control | 616 |
| Standard Path | 617 |
| Low Noise Path Enable | 617 |
| More Information | 618 |
| μ W Preselector Bypass | 619 |
| Internal Preamp | 620 |
| Off | 621 |

Table of Contents

| | |
|---|-----|
| Low Band | 622 |
| Full Range | 622 |
| Ref Position | 622 |
| Auto Scaling | 623 |
| Auto Couple | 624 |
| More Information | 624 |
| Auto/Man Active Function keys | 624 |
| Auto/Man 1-of-N keys | 624 |
| BW | 626 |
| Res BW | 626 |
| Video BW | 627 |
| RBW Control | 629 |
| Filter Type | 629 |
| Filter BW | 630 |
| Cont (Continuous Measurement/Sweep) | 631 |
| File | 633 |
| FREQ Channel | 634 |
| Center Freq | 634 |
| Center Frequency Presets | 635 |
| RF Center Freq | 637 |
| Ext Mix Center Freq | 638 |
| I/Q Center Freq | 639 |
| CF Step | 639 |
| Input/Output | 641 |
| Marker | 642 |
| Select Marker | 642 |
| Marker Type | 642 |
| Properties | 643 |
| Select Marker | 643 |
| Relative To | 643 |
| Marker Trace | 644 |
| Couple Markers | 644 |
| Marker All Off | 645 |
| Marker X Axis Value (Remote Command only) | 645 |
| Marker X Axis Position (Remote Command only) | 646 |
| Marker Y Axis Value (Remote Command only) | 647 |
| Backward Compatibility Remote Commands | 647 |
| Marker Function | 648 |
| Marker To | 649 |
| Meas | 650 |
| Remote Measurement Functions | 650 |
| Measurement Group of Commands | 651 |
| Current Measurement Query (Remote Command Only) | 653 |

| | |
|--|-----|
| Limit Test Current Results (Remote Command Only) | 653 |
| Data Query (Remote Command Only) | 653 |
| Calculate/Compress Trace Data Query (Remote Command Only) | 654 |
| Calculate Peaks of Trace Data (Remote Command Only) | 659 |
| Format Data: Numeric Data (Remote Command Only) | 660 |
| Format Data: Byte Order (Remote Command Only) | 661 |
| Meas Setup | 662 |
| Average/Hold Number | 662 |
| Avg Mode | 663 |
| Carrier Setup (This menu is unavailable in MSR and LTE-Advanced FDD/TDD) | 663 |
| Carriers | 663 |
| Ref Carrier | 664 |
| Ref Car Freq | 665 |
| Power Ref | 666 |
| Total Power | 666 |
| PSD | 667 |
| Configure Carriers | 668 |
| Carrier | 668 |
| Carrier Pwr Present | 669 |
| Carrier Spacing | 670 |
| Measurement Noise Bandwidth | 671 |
| Method for Carrier | 672 |
| Carrier Coupling | 674 |
| Offset/Limits | 675 |
| Select Offset | 675 |
| Offset Freq | 675 |
| Integ BW | 677 |
| Offset BW | 678 |
| Res BW | 679 |
| Video BW | 680 |
| RBW Control | 681 |
| Limits | 683 |
| Select Offset | 683 |
| Abs Limit | 684 |
| Rel Lim (Car) | 685 |
| Rel Limit (PSD) | 688 |
| Fail Mask | 689 |
| Offset Side | 690 |
| Method for Offset | 691 |
| Method for Offset | 692 |
| Offset Frequency Define | 694 |
| Carrier Result | 694 |
| PhNoise Opt | 695 |

Table of Contents

| | |
|--|-----|
| PhNoise Opt Auto | 695 |
| PhNoise Opt State | 695 |
| Meas Type | 697 |
| PSD Ref | 697 |
| Limit Test | 698 |
| Noise Correction | 698 |
| Meas Preset | 699 |
| Offset RRC Weighting (Backward Compatibility SCPI) | 700 |
| Offset Filter Alpha (Backward Compatibility SCPI) | 700 |
| Method for Carrier (Backward Compatibility SCPI) | 701 |
| Mode | 703 |
| Mode Preset | 704 |
| How-To Preset | 705 |
| Preset Type (Remote Command Only) | 706 |
| Mode Setup | 707 |
| Peak Search | 708 |
| Next Peak | 708 |
| Next Pk Right | 708 |
| Next Pk Left | 709 |
| Marker Delta | 709 |
| Pk-Pk Search | 709 |
| Min Search | 709 |
| Print | 711 |
| Quick Save | 712 |
| Recall | 714 |
| State | 714 |
| More Information | 716 |
| From File... | 716 |
| Edit Register Names | 718 |
| Register 1 thru Register 16 | 718 |
| Register 1 thru Register 16 | 719 |
| Data (Import) | 720 |
| Capture Buffer | 720 |
| Open... | 721 |
| Restart | 722 |
| More Information | 722 |
| Save | 724 |
| State | 724 |
| To File . . . | 725 |
| Edit Register Names | 727 |
| More Information | 727 |
| Register 1 thru Register 16 | 728 |
| Register 1 thru Register 16 | 728 |

| | |
|---|-----|
| Data (Export) | 729 |
| Measurement Results | 730 |
| Capture Buffer | 738 |
| Save As . . . | 738 |
| Screen Image | 739 |
| Themes | 740 |
| 3D Color | 740 |
| 3D Monochrome | 741 |
| Flat Color | 741 |
| Flat Monochrome | 741 |
| Save As... | 741 |
| Mass Storage Catalog (Remote Command Only) | 742 |
| Mass Storage Change Directory (Remote Command Only) | 742 |
| Mass Storage Copy (Remote Command Only) | 742 |
| Mass Storage Device Copy (Remote Command Only) | 743 |
| Mass Storage Delete (Remote Command Only) | 743 |
| Mass Storage Data (Remote Command Only) | 743 |
| Mass Storage Make Directory (Remote Command Only) | 744 |
| Mass Storage Move (Remote Command Only) | 744 |
| Mass Storage Remove Directory (Remote Command Only) | 744 |
| Single (Single Measurement/Sweep) | 746 |
| More Information | 746 |
| Source | 747 |
| SPAN X Scale | 748 |
| Span | 748 |
| Full Span | 749 |
| Last Span | 749 |
| Sweep/Control | 751 |
| Sweep Time | 751 |
| Sweep Setup | 752 |
| Auto Sweep Time Rules | 753 |
| Pause | 753 |
| Gate | 753 |
| Gate On/Off | 754 |
| Gate View On/Off | 755 |
| Gate View Setup | 758 |
| Gate View Sweep Time | 758 |
| Gate View Start Time | 759 |
| Gate Delay | 759 |
| Gate Length | 760 |
| Gate Source | 760 |
| External 1 | 761 |
| External 2 | 763 |

| | |
|---|-----|
| RF Burst | 765 |
| Periodic Timer (Frame Trigger) | 769 |
| Control Edge/Level | 779 |
| Gate Holdoff | 780 |
| Gate Delay Compensation | 781 |
| More Information | 782 |
| Min Fast Position Query (Remote Command Only) | 783 |
| Gate Preset (Remote Command Only) | 783 |
| Gate Level (Remote Command Only) | 783 |
| Gate Polarity (Remote Command Only) | 784 |
| Points | 784 |
| System | 786 |
| Trace/Detector | 787 |
| Select Trace (Front-panel Only) | 787 |
| Trace Type | 787 |
| View/Blank | 788 |
| Detector | 789 |
| Auto | 790 |
| Detector Selection | 790 |
| Trigger | 792 |
| Free Run | 792 |
| External 1 | 792 |
| Trigger Level | 792 |
| Trig Slope | 792 |
| Trig Delay | 792 |
| Zero Span Delay Comp | 792 |
| External 2 | 792 |
| Trigger Level | 792 |
| Trig Slope | 792 |
| Trig Delay | 792 |
| Zero Span Delay Comp | 792 |
| RF Burst | 792 |
| Absolute Trigger | 792 |
| Relative Trigger | 793 |
| Trig Slope | 793 |
| Trig Delay | 793 |
| Periodic Timer | 793 |
| Period | 793 |
| Offset | 793 |
| Reset Offset Display | 793 |
| Sync Source | 793 |
| Off | 793 |
| External 1 | 793 |

| | |
|--|------------|
| External 2 | 793 |
| RF Burst | 794 |
| Trig Delay | 794 |
| Auto/Holdoff | 794 |
| Auto Trig | 794 |
| Trig Holdoff | 794 |
| Holdoff Type | 794 |
| User Preset | 795 |
| User Preset | 795 |
| User Preset All Modes | 796 |
| Save User Preset | 797 |
| View/Display | 798 |
| Spectrum Window | 800 |
| Results Window | 800 |
| Display | 803 |
| Annotation | 803 |
| Meas Bar On/Off | 804 |
| Screen | 805 |
| Active Function Values On/Off | 805 |
| Title | 806 |
| Change Title | 806 |
| Clear Title | 807 |
| Graticule | 808 |
| System Display Settings | 808 |
| Annotation Local Settings | 808 |
| Themes | 809 |
| Backlight | 810 |
| Backlight Intensity | 810 |
| Bar Graph | 811 |
| 10 Power vs Time Measurement | 813 |
| Amplitude (AMPTD) Y Scale | 818 |
| Ref Value | 818 |
| Attenuation | 818 |
| Dual Attenuator Configurations: | 819 |
| Single Attenuator Configuration: | 819 |
| (Mech) Atten | 820 |
| Attenuator Configurations and Auto/Man | 821 |
| Enable Elec Atten | 822 |
| More Information | 823 |
| Mechanical Attenuator Transition Rules | 823 |
| When the Electronic Attenuation is enabled from a disabled state: | 823 |
| Examples in the dual attenuator configuration: | 823 |
| When the Electronic Attenuation is disabled from an enabled state: | 823 |

| | |
|--|-----|
| Using the Electronic Attenuator: Pros and Cons | 824 |
| Elec Atten | 824 |
| Adjust Atten for Min Clip | 825 |
| Pre-Adjust for Min Clip | 825 |
| Off | 826 |
| Elec Atten Only | 826 |
| Mech + Elec Atten | 827 |
| (Mech) Atten Step | 827 |
| Scale/Div | 827 |
| Presel Center | 828 |
| Proper Preselector Operation | 829 |
| Preselector Adjust | 829 |
| Y Axis Unit | 830 |
| dBm | 832 |
| dBmV | 832 |
| dBmA | 832 |
| W | 833 |
| V | 833 |
| A | 833 |
| dB μ V | 834 |
| dB μ A | 834 |
| dBpW | 834 |
| Antenna Unit | 835 |
| dB μ V/m | 835 |
| dB μ A/m | 835 |
| dB μ A | 835 |
| dBpT | 836 |
| dBG | 836 |
| None | 836 |
| μ W Path Control | 837 |
| Standard Path | 838 |
| Low Noise Path Enable | 838 |
| More Information | 839 |
| μ W Preselector Bypass | 840 |
| Internal Preamp | 841 |
| Off | 842 |
| Low Band | 843 |
| Full Range | 843 |
| Ref Position | 843 |
| Auto Scale | 844 |
| Auto Couple | 845 |
| More Information | 845 |
| Auto/Man Active Function keys | 845 |

| | |
|---|-----|
| Auto/Man 1-of-N keys | 845 |
| BW | 847 |
| Cont (Continuous Measurement/Sweep) | 848 |
| File | 850 |
| FREQ Channel | 851 |
| Center Freq | 851 |
| Center Frequency Presets | 852 |
| RF Center Freq | 854 |
| Ext Mix Center Freq | 855 |
| I/Q Center Freq | 856 |
| CF Step | 856 |
| Input/Output | 858 |
| Marker | 859 |
| Select Marker | 859 |
| Select Marker | 859 |
| Marker X Axis Position (Remote Command only) | 859 |
| Marker Y Axis Value (Remote Command only) | 860 |
| Maker State (Remote Command Only) | 860 |
| Marker Type | 861 |
| Couple Markers | 862 |
| All Markers Off | 862 |
| Marker Fctn | 863 |
| Marker To | 864 |
| Meas | 865 |
| Remote Measurement Functions | 865 |
| Measurement Group of Commands | 866 |
| Current Measurement Query (Remote Command Only) | 868 |
| Limit Test Current Results (Remote Command Only) | 868 |
| Data Query (Remote Command Only) | 868 |
| Calculate/Compress Trace Data Query (Remote Command Only) | 869 |
| Calculate Peaks of Trace Data (Remote Command Only) | 874 |
| Format Data: Numeric Data (Remote Command Only) | 875 |
| Format Data: Byte Order (Remote Command Only) | 876 |
| Meas Setup | 877 |
| Avg/Hold Num | 877 |
| Avg Mode | 877 |
| Avg Type | 878 |
| Meas Interval | 878 |
| IF Gain | 879 |
| More Information about IF Gain | 879 |
| IF Gain Auto | 879 |
| IF Gain State | 880 |
| Meas Preset | 881 |

| | |
|--|-----|
| Limit Mask Selection (Remote Command only) | 881 |
| Lower Mask Absolute Amplitude Levels (Remote Command only) | 881 |
| Lower Mask Points (Remote Command only) | 882 |
| Lower Mask Relative Amplitude Levels (Remote Command only) | 882 |
| Lower Mask Time Points (Remote Command only) | 883 |
| Upper Mask Absolute Amplitude Levels (Remote Command only) | 884 |
| Upper Mask Points (Remote Command only) | 884 |
| Upper Mask Relative Amplitude Levels (Remote Command only) | 885 |
| Upper Mask Time Points (Remote Command only) | 885 |
| Mode | 887 |
| Mode Preset | 888 |
| How-To Preset | 889 |
| Preset Type (Remote Command Only) | 890 |
| Mode Setup | 891 |
| Peak Search | 892 |
| Print | 893 |
| Quick Save | 894 |
| Recall | 896 |
| State | 896 |
| More Information | 898 |
| From File... | 898 |
| Edit Register Names | 900 |
| Register 1 thru Register 16 | 900 |
| Register 1 thru Register 16 | 901 |
| Data (Import) | 902 |
| Capture Buffer | 902 |
| Open... | 903 |
| Restart | 904 |
| More Information | 904 |
| Save | 906 |
| State | 906 |
| To File . . . | 907 |
| Edit Register Names | 909 |
| More Information | 909 |
| Register 1 thru Register 16 | 910 |
| Register 1 thru Register 16 | 910 |
| Data (Export) | 911 |
| Measurement Results | 912 |
| Meas Results File Contents | 912 |
| Marker Table | 912 |
| Peak Table | 915 |
| Spectrogram | 918 |
| Capture Buffer | 922 |

| | |
|---|-----|
| Save As . . . | 923 |
| Screen Image | 923 |
| Themes | 925 |
| 3D Color | 925 |
| 3D Monochrome | 925 |
| Flat Color | 925 |
| Flat Monochrome | 926 |
| Save As... | 926 |
| Mass Storage Catalog (Remote Command Only) | 926 |
| Mass Storage Change Directory (Remote Command Only) | 927 |
| Mass Storage Copy (Remote Command Only) | 927 |
| Mass Storage Device Copy (Remote Command Only) | 927 |
| Mass Storage Delete (Remote Command Only) | 928 |
| Mass Storage Data (Remote Command Only) | 928 |
| Mass Storage Make Directory (Remote Command Only) | 928 |
| Mass Storage Move (Remote Command Only) | 929 |
| Mass Storage Remove Directory (Remote Command Only) | 929 |
| Single (Single Measurement/Sweep) | 930 |
| More Information | 930 |
| Source | 931 |
| SPAN X Scale | 932 |
| Ref Value | 932 |
| Scale/Div | 932 |
| Ref Position | 933 |
| Auto Scale | 933 |
| Sweep/Control | 935 |
| Pause/Resume | 935 |
| Abort (Remote Command Only) | 935 |
| System | 937 |
| Trace/Detector | 938 |
| Max Hold Trace | 938 |
| Min Hold Trace | 938 |
| Trigger | 939 |
| Free Run | 939 |
| Video | 939 |
| Trigger Level | 939 |
| Trig Slope | 939 |
| Trig Delay | 939 |
| External 1 | 939 |
| Trigger Level | 939 |
| Trig Slope | 939 |
| Trig Delay | 939 |
| Zero Span Delay Comp | 939 |

| | |
|---|-----|
| External 2 | 939 |
| Trigger Level | 939 |
| Trig Slope | 939 |
| Trig Delay | 940 |
| Zero Span Delay Comp | 940 |
| RF Burst | 940 |
| Absolute Trigger | 940 |
| Relative Trigger | 940 |
| Trig Slope | 940 |
| Trig Delay | 940 |
| Auto/Holdoff | 940 |
| Auto Trig | 940 |
| Trig Holdoff | 940 |
| Holdoff Type | 940 |
| User Preset | 941 |
| User Preset | 941 |
| User Preset All Modes | 942 |
| Save User Preset | 943 |
| View/Display | 944 |
| Power vs Time Measurement Results and Views | 944 |
| RF Envelope window | 945 |
| Result Metrics window | 945 |
| Display | 946 |
| Annotation | 946 |
| Meas Bar On/Off | 947 |
| Screen | 948 |
| Active Function Values On/Off | 948 |
| Title | 949 |
| Change Title | 949 |
| Clear Title | 950 |
| Graticule | 951 |
| System Display Settings | 951 |
| Annotation Local Settings | 951 |
| Themes | 952 |
| Backlight | 953 |
| Backlight Intensity | 953 |
| Trigger Lines | 954 |
| Burst Lines | 954 |
| Ramp Lines | 955 |
| Limit Mask | 955 |
| Scroll | 955 |
| Prev Page | 956 |
| Next Page | 956 |

| | |
|--|------------|
| Scroll Up | 956 |
| Scroll Down | 956 |
| First Page | 957 |
| Last Page | 957 |
| 11 Spectrum Emission Mask Measurement | 959 |
| AMPTD Y Scale | 982 |
| Ref Value | 982 |
| Attenuation | 982 |
| Dual Attenuator Configurations: | 983 |
| Single Attenuator Configuration: | 984 |
| (Mech) Atten | 984 |
| Attenuator Configurations and Auto/Man | 986 |
| Enable Elec Atten | 986 |
| More Information | 987 |
| Mechanical Attenuator Transition Rules | 987 |
| When the Electronic Attenuation is enabled from a disabled state: | 987 |
| Examples in the dual attenuator configuration: | 987 |
| When the Electronic Attenuation is disabled from an enabled state: | 988 |
| Using the Electronic Attenuator: Pros and Cons | 988 |
| Elec Atten | 988 |
| Adjust Atten for Min Clip | 989 |
| Pre-Adjust for Min Clip | 989 |
| Off | 990 |
| Elec Atten Only | 990 |
| Mech + Elec Atten | 991 |
| (Mech) Atten Step | 991 |
| Scale/Div | 992 |
| Presel Center | 992 |
| Proper Preselector Operation | 993 |
| Preselector Adjust | 993 |
| Y Axis Unit | 995 |
| dBm | 996 |
| dBmV | 996 |
| dBmA | 996 |
| W | 997 |
| V | 997 |
| A | 997 |
| dB μ V | 998 |
| dB μ A | 998 |
| dBpW | 998 |
| Antenna Unit | 999 |
| dB μ V/m | 999 |
| dB μ A/m | 999 |

Table of Contents

| | |
|--|------|
| dB μ A | 999 |
| dBpT | 1000 |
| dBG | 1000 |
| None | 1000 |
| μ W Path Control | 1001 |
| Standard Path | 1002 |
| Low Noise Path Enable | 1002 |
| More Information | 1003 |
| μ W Preselector Bypass | 1004 |
| Internal Preamp | 1005 |
| Off | 1006 |
| Low Band | 1007 |
| Full Range | 1007 |
| Ref Position | 1007 |
| Auto Scaling | 1008 |
| Auto Couple | 1009 |
| More Information | 1009 |
| Auto/Man Active Function keys | 1009 |
| Auto/Man 1-of-N keys | 1009 |
| BW | 1011 |
| Filter Type | 1011 |
| Cont (Continuous Measurement/Sweep) | 1012 |
| File | 1014 |
| FREQ Channel | 1015 |
| Center Freq | 1015 |
| Center Frequency Presets | 1016 |
| RF Center Freq | 1018 |
| Ext Mix Center Freq | 1019 |
| I/Q Center Freq | 1020 |
| CF Step | 1020 |
| Input/Output | 1022 |
| Marker | 1023 |
| Select Marker | 1023 |
| Marker Type | 1023 |
| Couple Markers | 1024 |
| All Markers Off | 1024 |
| Marker X Axis Value (Remote Command Only) | 1024 |
| Marker X Axis Position (Remote Command Only) | 1025 |
| Marker Y Axis Value (Remote Command Only) | 1026 |
| Marker Function | 1027 |
| Marker To | 1028 |
| Meas | 1029 |
| Remote Measurement Functions | 1029 |

| | |
|---|------|
| Measurement Group of Commands | 1030 |
| Current Measurement Query (Remote Command Only) | 1032 |
| Limit Test Current Results (Remote Command Only) | 1032 |
| Data Query (Remote Command Only) | 1032 |
| Calculate/Compress Trace Data Query (Remote Command Only) | 1033 |
| Calculate Peaks of Trace Data (Remote Command Only) | 1038 |
| Format Data: Numeric Data (Remote Command Only) | 1039 |
| Format Data: Byte Order (Remote Command Only) | 1040 |
| Meas Setup | 1041 |
| Avg/Hold Num | 1041 |
| Meas Type | 1041 |
| Ref Channel | 1042 |
| Integ BW | 1042 |
| Span | 1043 |
| Sweep Time | 1045 |
| Res BW | 1045 |
| Video BW | 1047 |
| VBW/RBW | 1048 |
| Power Ref (for the modes except MSR and LTE-Advanced FDD/TDD) | 1049 |
| Total Power | 1049 |
| PSD | 1050 |
| Spectrum Peak | 1051 |
| Offset/Limits | 1052 |
| Select Offset | 1052 |
| Start Freq | 1052 |
| Stop Freq | 1055 |
| Sweep Time | 1057 |
| Offset Side | 1058 |
| Res BW | 1059 |
| Meas BW | 1061 |
| Video BW | 1062 |
| VBW/RBW | 1063 |
| Limits | 1065 |
| Select Offset | 1065 |
| Abs Start | 1065 |
| Abs Stop | 1067 |
| Rel Start | 1070 |
| Rel Stop | 1072 |
| Fail Mask | 1074 |
| Offset Freq Define | 1076 |
| Limit State(Only for TD-SCDMA) | 1078 |
| Method | 1079 |
| Filter Alpha | 1079 |

Table of Contents

| | |
|---|------|
| Meas Preset | 1080 |
| Mode | 1081 |
| Mode Preset | 1082 |
| How-To Preset | 1083 |
| Preset Type (Remote Command Only) | 1084 |
| Mode Setup | 1085 |
| Peak Search | 1086 |
| Print | 1087 |
| Quick Save | 1088 |
| Recall | 1090 |
| State | 1090 |
| More Information | 1092 |
| From File... | 1092 |
| Edit Register Names | 1094 |
| Register 1 thru Register 16 | 1094 |
| Register 1 thru Register 16 | 1095 |
| Data (Import) | 1096 |
| Capture Buffer | 1096 |
| Open... | 1097 |
| Restart | 1098 |
| More Information | 1098 |
| Save | 1100 |
| State | 1100 |
| To File . . . | 1101 |
| Edit Register Names | 1103 |
| More Information | 1103 |
| Register 1 thru Register 16 | 1104 |
| Register 1 thru Register 16 | 1104 |
| Data (Export) | 1105 |
| Measurement Results | 1106 |
| Meas Results File Contents | 1106 |
| Capture Buffer | 1115 |
| Save As . . . | 1116 |
| Screen Image | 1116 |
| Themes | 1118 |
| 3D Color | 1118 |
| 3D Monochrome | 1118 |
| Flat Color | 1118 |
| Flat Monochrome | 1119 |
| Save As... | 1119 |
| Mass Storage Catalog (Remote Command Only) | 1119 |
| Mass Storage Change Directory (Remote Command Only) | 1120 |
| Mass Storage Copy (Remote Command Only) | 1120 |

| | |
|---|------|
| Mass Storage Device Copy (Remote Command Only) | 1120 |
| Mass Storage Delete (Remote Command Only) | 1121 |
| Mass Storage Data (Remote Command Only) | 1121 |
| Mass Storage Make Directory (Remote Command Only) | 1121 |
| Mass Storage Move (Remote Command Only) | 1122 |
| Mass Storage Remove Directory (Remote Command Only) | 1122 |
| Single (Single Measurement/Sweep) | 1123 |
| More Information | 1123 |
| Source | 1124 |
| Span X Scale | 1125 |
| Ref Value | 1125 |
| Scale/Div | 1125 |
| Ref Position | 1126 |
| Auto Scaling | 1126 |
| Sweep/Control | 1128 |
| Pause | 1128 |
| Gate | 1128 |
| Gate On/Off | 1128 |
| Gate View On/Off | 1129 |
| Gate View Setup | 1132 |
| Gate View Sweep Time | 1133 |
| Gate View Start Time | 1133 |
| Gate Delay | 1134 |
| Gate Length | 1134 |
| Gate Source | 1135 |
| External 1 | 1136 |
| External 2 | 1138 |
| RF Burst | 1140 |
| Periodic Timer (Frame Trigger) | 1143 |
| Control Edge/Level | 1154 |
| Gate Holdoff | 1154 |
| Gate Delay Compensation | 1156 |
| More Information | 1157 |
| Min Fast Position Query (Remote Command Only) | 1157 |
| Gate Preset (Remote Command Only) | 1158 |
| Gate Level (Remote Command Only) | 1158 |
| Gate Polarity (Remote Command Only) | 1158 |
| System | 1160 |
| Trace/Detector | 1161 |
| Trace Type | 1161 |
| Chan Detector | 1161 |
| Chan Detector Auto | 1162 |
| Chan Detector Selection | 1162 |

Table of Contents

| | |
|---|------|
| Offset Detector | 1163 |
| Offset Detector Auto | 1163 |
| Offset Detector Selection | 1164 |
| Trigger | 1165 |
| Free Run | 1165 |
| External 1 | 1165 |
| Trigger Level | 1165 |
| Trig Slope | 1165 |
| Trig Delay | 1165 |
| Zero Span Delay Comp | 1165 |
| External 2 | 1165 |
| Trigger Level | 1165 |
| Trig Slope | 1165 |
| Trig Delay | 1165 |
| Zero Span Delay Comp | 1165 |
| RF Burst | 1165 |
| Absolute Trigger | 1165 |
| Relative Trigger | 1166 |
| Trig Slope | 1166 |
| Trig Delay | 1166 |
| Periodic Timer | 1166 |
| Period | 1166 |
| Offset | 1166 |
| Reset Offset Display | 1166 |
| Sync Source | 1166 |
| Off | 1166 |
| External 1 | 1166 |
| External 2 | 1166 |
| RF Burst | 1167 |
| Trig Delay | 1167 |
| Auto/Holdoff | 1167 |
| Auto Trig | 1167 |
| Trig Holdoff | 1167 |
| Holdoff Type | 1167 |
| User Preset | 1168 |
| User Preset | 1168 |
| User Preset All Modes | 1169 |
| Save User Preset | 1170 |
| View/Display | 1171 |
| View Selection by Name (Remote Command Only) | 1171 |
| Views Selection by Number (Remote Command only) | 1172 |
| Display | 1172 |
| Annotation | 1173 |

| | |
|---------------------------------------|------|
| Meas Bar On/Off | 1174 |
| Screen | 1175 |
| Active Function Values On/Off | 1175 |
| Title | 1176 |
| Change Title | 1176 |
| Clear Title | 1177 |
| Graticule | 1178 |
| System Display Settings | 1178 |
| Annotation Local Settings | 1178 |
| Themes | 1179 |
| Backlight | 1180 |
| Backlight Intensity | 1180 |
| Abs Pwr Freq | 1181 |
| Abs Peak Pwr & Freq (Total Pwr Ref) | 1181 |
| Trace Window | 1183 |
| Results Window | 1183 |
| Abs Peak Pwr & Freq (PSD Ref) | 1183 |
| Trace Window | 1185 |
| Results Window | 1185 |
| Abs Peak Pwr & Freq (Spectrum Pk Ref) | 1185 |
| Trace Window | 1187 |
| Results Window | 1187 |
| Rel Pwr Freq | 1187 |
| Rel Peak Pwr & Freq (Total Pwr Ref) | 1187 |
| Trace Window | 1188 |
| Results Window | 1188 |
| Rel Peak Pwr & Freq (PSD Ref) | 1189 |
| Trace Window | 1189 |
| Results Window | 1190 |
| Rel Peak Pwr & Freq (Spectrum Pk Ref) | 1190 |
| Trace Window | 1191 |
| Results Window | 1191 |
| Integrated Power | 1192 |
| Integrated Power (Total Pwr Ref) | 1192 |
| Trace Window | 1194 |
| Results Window | 1194 |
| Integrated Power (PSD Ref) | 1195 |
| Trace Window | 1197 |
| Results Window | 1197 |
| Integrated Power (Spectrum Pk Ref) | 1198 |
| Trace Window | 1199 |
| Results Window | 1199 |
| Limit Lines | 1200 |

| | |
|--|------|
| 12 Spurious Emissions Measurement | 1201 |
| AMPTD Y Scale | 1204 |
| Ref Value | 1204 |
| Attenuation | 1204 |
| Dual Attenuator Configurations: | 1205 |
| Single Attenuator Configuration: | 1206 |
| (Mech) Atten | 1206 |
| Attenuator Configurations and Auto/Man | 1208 |
| Enable Elec Atten | 1208 |
| More Information | 1209 |
| Mechanical Attenuator Transition Rules | 1209 |
| When the Electronic Attenuation is enabled from a disabled state: | 1209 |
| Examples in the dual attenuator configuration: | 1209 |
| When the Electronic Attenuation is disabled from an enabled state: | 1210 |
| Using the Electronic Attenuator: Pros and Cons | 1210 |
| Elec Atten | 1210 |
| Adjust Atten for Min Clip | 1211 |
| Pre-Adjust for Min Clip | 1211 |
| Off | 1212 |
| Elec Atten Only | 1212 |
| Mech + Elec Atten | 1213 |
| (Mech) Atten Step | 1213 |
| Scale/Div | 1214 |
| Presel Center | 1214 |
| Proper Preselector Operation | 1215 |
| Preselector Adjust | 1216 |
| Y Axis Unit | 1217 |
| dBm | 1218 |
| dBmV | 1218 |
| dBmA | 1219 |
| W | 1219 |
| V | 1219 |
| A | 1219 |
| dB μ V | 1220 |
| dB μ A | 1220 |
| dBpW | 1221 |
| Antenna Unit | 1221 |
| dB μ V/m | 1221 |
| dB μ A/m | 1221 |
| dB μ A | 1222 |
| dBpT | 1222 |
| DBG | 1222 |
| None | 1223 |

| | |
|--|------|
| μW Path Control | 1223 |
| Standard Path | 1224 |
| Low Noise Path Enable | 1224 |
| More Information | 1225 |
| μW Preselector Bypass | 1226 |
| Internal Preamp | 1227 |
| Off | 1228 |
| Low Band | 1229 |
| Full Range | 1229 |
| Auto Scaling | 1229 |
| Auto Couple | 1231 |
| More Information | 1231 |
| Auto/Man Active Function keys | 1231 |
| Auto/Man 1-of-N keys | 1231 |
| BW | 1233 |
| Cont (Continuous Measurement/Sweep) | 1234 |
| File | 1236 |
| FREQ Channel | 1237 |
| Center Freq | 1237 |
| Center Frequency Presets | 1238 |
| RF Center Freq | 1240 |
| Ext Mix Center Freq | 1241 |
| I/Q Center Freq | 1242 |
| CF Step | 1242 |
| Input/Output | 1244 |
| Marker | 1245 |
| Select Marker | 1245 |
| Marker Type | 1245 |
| Properties | 1246 |
| Select Marker | 1246 |
| Relative To | 1246 |
| Couple Markers | 1247 |
| All Markers Off | 1247 |
| Marker X Axis Value (Remote Command only) | 1248 |
| Marker X Axis Position (Remote Command only) | 1248 |
| Marker Y Axis Value (Remote Command only) | 1249 |
| Marker Function | 1250 |
| Marker To | 1251 |
| Meas | 1252 |
| Remote Measurement Functions | 1252 |
| Measurement Group of Commands | 1253 |
| Current Measurement Query (Remote Command Only) | 1255 |
| Limit Test Current Results (Remote Command Only) | 1255 |

| | |
|---|------|
| Data Query (Remote Command Only) | 1255 |
| Calculate/Compress Trace Data Query (Remote Command Only) | 1256 |
| Calculate Peaks of Trace Data (Remote Command Only) | 1261 |
| Format Data: Numeric Data (Remote Command Only) | 1262 |
| Format Data: Byte Order (Remote Command Only) | 1263 |
| Meas Setup | 1264 |
| Avg/Hold Num | 1264 |
| Avg Mode | 1264 |
| Range Table | 1265 |
| Range | 1265 |
| Start Freq | 1267 |
| Stop Freq | 1268 |
| Res BW | 1269 |
| Video BW | 1271 |
| Filter Type | 1272 |
| Abs Start Limit | 1273 |
| Abs Stop Limit | 1274 |
| Peak Excursion | 1276 |
| Pk Threshold | 1276 |
| Attenuation | 1277 |
| Detector 1 | 1278 |
| Detector 2 | 1279 |
| Sweep Time | 1280 |
| Points | 1280 |
| IF Gain | 1282 |
| IF Gain Auto | 1282 |
| IF Gain State | 1283 |
| Meas Type | 1283 |
| Spur | 1284 |
| Range Preset (TD-SCDMA only) | 1285 |
| Category A (TD-SCDMA only) | 1285 |
| Category B (TD-SCDMA only) | 1286 |
| Mobile (TD-SCDMA only) | 1287 |
| Frequency Setup (TD-SCDMA only) | 1288 |
| Center Frequency of the First Carrier (Fc1) (TD-SCDMA only) | 1288 |
| Center Frequency of the Last Carrier (Fc2) (TD-SCDMA only) | 1288 |
| TDD Lower Frequency (Fl) (TD-SCDMA only) | 1289 |
| TDD Upper Frequency (Fu) (TD-SCDMA only) | 1290 |
| Center Frequency for Mobile (TD-SCDMA only) | 1290 |
| Spurious Report Mode | 1291 |
| Meas Preset | 1291 |
| Fast Spurious Meas (Remote Command only) | 1292 |
| Mode | 1293 |

| | |
|-----------------------------------|------|
| Mode Preset | 1294 |
| How-To Preset | 1295 |
| Preset Type (Remote Command Only) | 1296 |
| Mode Setup | 1297 |
| Peak Search | 1298 |
| Next Peak | 1298 |
| Next Pk Right | 1298 |
| Next Pk Left | 1299 |
| Marker Delta | 1299 |
| Pk-Pk Search | 1299 |
| Min Search | 1299 |
| Print | 1301 |
| Quick Save | 1302 |
| Recall | 1304 |
| State | 1304 |
| More Information | 1306 |
| From File... | 1306 |
| Edit Register Names | 1308 |
| Register 1 thru Register 16 | 1308 |
| Register 1 thru Register 16 | 1309 |
| Data (Import) | 1310 |
| Capture Buffer | 1310 |
| Open... | 1311 |
| Restart | 1312 |
| More Information | 1312 |
| Save | 1314 |
| State | 1314 |
| To File . . . | 1315 |
| Edit Register Names | 1317 |
| More Information | 1317 |
| Register 1 thru Register 16 | 1318 |
| Register 1 thru Register 16 | 1318 |
| Data (Export) | 1319 |
| Measurement Results | 1320 |
| Meas Results File Definition | 1320 |
| Meas Results File Example | 1322 |
| Capture Buffer | 1325 |
| Save As . . . | 1326 |
| Screen Image | 1326 |
| Themes | 1328 |
| 3D Color | 1328 |
| 3D Monochrome | 1328 |
| Flat Color | 1328 |

| | |
|---|------|
| Flat Monochrome | 1329 |
| Save As... | 1329 |
| Mass Storage Catalog (Remote Command Only) | 1329 |
| Mass Storage Change Directory (Remote Command Only) | 1330 |
| Mass Storage Copy (Remote Command Only) | 1330 |
| Mass Storage Device Copy (Remote Command Only) | 1330 |
| Mass Storage Delete (Remote Command Only) | 1331 |
| Mass Storage Data (Remote Command Only) | 1331 |
| Mass Storage Make Directory (Remote Command Only) | 1331 |
| Mass Storage Move (Remote Command Only) | 1332 |
| Mass Storage Remove Directory (Remote Command Only) | 1332 |
| Single (Single Measurement/Sweep) | 1333 |
| More Information | 1333 |
| Source | 1334 |
| Span X Scale | 1335 |
| Sweep/Control | 1336 |
| Sweep Setup | 1336 |
| Auto Sweep Time Rules | 1336 |
| Sweep Type | 1337 |
| Pause | 1337 |
| Gate | 1337 |
| Gate On/Off | 1338 |
| Gate View On/Off | 1339 |
| Gate View Setup | 1342 |
| Gate View Sweep Time | 1342 |
| Gate View Start Time | 1343 |
| Gate Delay | 1343 |
| Gate Length | 1344 |
| Gate Source | 1344 |
| External 1 | 1345 |
| External 2 | 1347 |
| RF Burst | 1349 |
| Periodic Timer (Frame Trigger) | 1353 |
| Control Edge/Level | 1363 |
| Gate Holdoff | 1364 |
| Gate Delay Compensation | 1365 |
| More Information | 1366 |
| Min Fast Position Query (Remote Command Only) | 1367 |
| Gate Preset (Remote Command Only) | 1367 |
| Gate Level (Remote Command Only) | 1367 |
| Gate Polarity (Remote Command Only) | 1368 |
| System | 1369 |
| Trace/Detector | 1370 |

| | |
|-------------------------------|------|
| Trigger | 1371 |
| Free Run | 1371 |
| External 1 | 1371 |
| Trigger Level | 1371 |
| Trig Slope | 1371 |
| Trig Delay | 1371 |
| Zero Span Delay Comp | 1371 |
| External 2 | 1371 |
| Trigger Level | 1371 |
| Trig Slope | 1371 |
| Trig Delay | 1371 |
| Zero Span Delay Comp | 1371 |
| RF Burst | 1371 |
| Absolute Trigger | 1371 |
| Relative Trigger | 1372 |
| Trig Slope | 1372 |
| Trig Delay | 1372 |
| Periodic Timer | 1372 |
| Period | 1372 |
| Offset | 1372 |
| Reset Offset Display | 1372 |
| Sync Source | 1372 |
| Off | 1372 |
| External 1 | 1372 |
| External 2 | 1372 |
| RF Burst | 1373 |
| Trig Delay | 1373 |
| Auto/Holdoff | 1373 |
| Auto Trig | 1373 |
| Trig Holdoff | 1373 |
| Holdoff Type | 1373 |
| User Preset | 1374 |
| User Preset | 1374 |
| User Preset All Modes | 1375 |
| Save User Preset | 1376 |
| View/Display | 1377 |
| Display | 1377 |
| Annotation | 1377 |
| Meas Bar On/Off | 1378 |
| Screen | 1379 |
| Active Function Values On/Off | 1379 |
| Title | 1380 |
| Change Title | 1380 |

| | |
|--|-------------|
| Clear Title | 1381 |
| Graticule | 1382 |
| System Display Settings | 1382 |
| Annotation Local Settings | 1382 |
| Themes | 1383 |
| Backlight | 1384 |
| Backlight Intensity | 1384 |
| View Selection | 1385 |
| Graph + Metrics | 1385 |
| Range Table | 1386 |
| All Ranges | 1389 |
| Range Table Selection (SCPI only command) | 1390 |
| 13 Occupied Bandwidth Measurement | 1393 |
| AMPTD Y Scale (Amplitude/Y Scale) | 1396 |
| Ref Value | 1396 |
| Attenuation | 1396 |
| Dual Attenuator Configurations: | 1397 |
| Single Attenuator Configuration: | 1398 |
| (Mech) Atten | 1398 |
| Attenuator Configurations and Auto/Man | 1400 |
| Enable Elec Atten | 1400 |
| More Information | 1401 |
| Mechanical Attenuator Transition Rules | 1401 |
| When the Electronic Attenuation is enabled from a disabled state: | 1401 |
| Examples in the dual attenuator configuration: | 1401 |
| When the Electronic Attenuation is disabled from an enabled state: | 1402 |
| Using the Electronic Attenuator: Pros and Cons | 1402 |
| Elec Atten | 1402 |
| Adjust Atten for Min Clip | 1403 |
| Pre-Adjust for Min Clip | 1403 |
| Off | 1404 |
| Elec Atten Only | 1404 |
| Mech + Elec Atten | 1405 |
| (Mech) Atten Step | 1405 |
| Scale/Div | 1406 |
| Presel Center | 1406 |
| Proper Preselector Operation | 1407 |
| Preselector Adjust | 1407 |
| Y Axis Unit | 1409 |
| dBm | 1410 |
| dBmV | 1410 |
| dBmA | 1410 |
| W | 1411 |

| | |
|-------------------------------------|------|
| V | 1411 |
| A | 1411 |
| dB μ V | 1412 |
| dB μ A | 1412 |
| dBpW | 1412 |
| Antenna Unit | 1413 |
| dB μ V/m | 1413 |
| dB μ A/m | 1413 |
| dB μ A | 1413 |
| dBpT | 1414 |
| dBG | 1414 |
| None | 1414 |
| μ W Path Control | 1415 |
| Standard Path | 1416 |
| Low Noise Path Enable | 1416 |
| More Information | 1417 |
| μ W Preselector Bypass | 1418 |
| Internal Preamp | 1419 |
| Off | 1420 |
| Low Band | 1421 |
| Full Range | 1421 |
| Ref Position | 1421 |
| Auto Scaling | 1422 |
| Auto Couple | 1423 |
| More Information | 1423 |
| Auto/Man Active Function keys | 1423 |
| Auto/Man 1-of-N keys | 1423 |
| BW | 1425 |
| Res BW | 1425 |
| Video BW | 1426 |
| Filter Type | 1427 |
| Cont (Continuous Measurement/Sweep) | 1429 |
| File | 1431 |
| FREQ Channel | 1432 |
| Center Freq | 1432 |
| Center Frequency Presets | 1433 |
| RF Center Freq | 1435 |
| Ext Mix Center Freq | 1436 |
| I/Q Center Freq | 1437 |
| CF Step | 1437 |
| Input/Output | 1439 |
| Marker | 1440 |
| Select Marker | 1440 |

| | |
|---|------|
| Select Marker | 1440 |
| Marker Type | 1440 |
| Properties | 1441 |
| Select Marker | 1441 |
| Select Marker | 1441 |
| Relative To | 1441 |
| All Markers Off | 1442 |
| Marker X Axis Value (Remote Command Only) | 1442 |
| Marker X Axis Position (Remote Command Only) | 1443 |
| Marker Y Axis Value (Remote Command Only) | 1443 |
| Backward Compatibility SCPI Commands | 1444 |
| Marker Function | 1445 |
| Marker To | 1446 |
| Meas | 1447 |
| Remote Measurement Functions | 1447 |
| Measurement Group of Commands | 1448 |
| Current Measurement Query (Remote Command Only) | 1450 |
| Limit Test Current Results (Remote Command Only) | 1450 |
| Data Query (Remote Command Only) | 1450 |
| Calculate/Compress Trace Data Query (Remote Command Only) | 1451 |
| Calculate Peaks of Trace Data (Remote Command Only) | 1456 |
| Format Data: Numeric Data (Remote Command Only) | 1457 |
| Format Data: Byte Order (Remote Command Only) | 1458 |
| Meas Setup | 1459 |
| Avg/Hold Num | 1459 |
| Avg Mode | 1460 |
| Occ BW % Pwr | 1460 |
| x dB | 1461 |
| IF Gain | 1462 |
| IF Gain Auto | 1462 |
| IF Gain State | 1462 |
| Limit (for all modes except MSR and LTE-Advanced FDD/TDD) | 1463 |
| Meas Preset | 1464 |
| Max Hold (Remote Command Only) | 1465 |
| Mode | 1466 |
| Mode Preset | 1467 |
| How-To Preset | 1468 |
| Preset Type (Remote Command Only) | 1469 |
| Mode Setup | 1470 |
| Peak Search | 1471 |
| Print | 1472 |
| Quick Save | 1473 |
| Recall | 1475 |

| | |
|---|------|
| State | 1475 |
| More Information | 1477 |
| From File... | 1477 |
| Edit Register Names | 1479 |
| Register 1 thru Register 16 | 1479 |
| Register 1 thru Register 16 | 1480 |
| Data (Import) | 1481 |
| Capture Buffer | 1481 |
| Open... | 1482 |
| Restart | 1483 |
| More Information | 1483 |
| Save | 1485 |
| State | 1485 |
| To File . . . | 1486 |
| Edit Register Names | 1488 |
| More Information | 1488 |
| Register 1 thru Register 16 | 1489 |
| Register 1 thru Register 16 | 1489 |
| Data (Export) | 1490 |
| Measurement Results | 1491 |
| Meas Results File Definition | 1491 |
| Meas Results File Example | 1492 |
| Capture Buffer | 1493 |
| Save As . . . | 1494 |
| Screen Image | 1494 |
| Themes | 1496 |
| 3D Color | 1496 |
| 3D Monochrome | 1496 |
| Flat Color | 1496 |
| Flat Monochrome | 1497 |
| Save As... | 1497 |
| Mass Storage Catalog (Remote Command Only) | 1497 |
| Mass Storage Change Directory (Remote Command Only) | 1498 |
| Mass Storage Copy (Remote Command Only) | 1498 |
| Mass Storage Device Copy (Remote Command Only) | 1498 |
| Mass Storage Delete (Remote Command Only) | 1499 |
| Mass Storage Data (Remote Command Only) | 1499 |
| Mass Storage Make Directory (Remote Command Only) | 1499 |
| Mass Storage Move (Remote Command Only) | 1500 |
| Mass Storage Remove Directory (Remote Command Only) | 1500 |
| Single (Single Measurement/Sweep) | 1501 |
| More Information | 1501 |
| Source | 1502 |

Table of Contents

| | |
|---|------|
| Span X Scale | 1503 |
| Span | 1503 |
| Full Span | 1504 |
| Last Span | 1504 |
| Sweep/Control | 1506 |
| Sweep Time | 1506 |
| Sweep Setup | 1507 |
| Auto Sweep Time Rules | 1507 |
| Pause | 1508 |
| Gate | 1508 |
| Gate On/Off | 1508 |
| Gate View On/Off | 1509 |
| Gate View Setup | 1512 |
| Gate View Sweep Time | 1513 |
| Gate View Start Time | 1513 |
| Gate Delay | 1514 |
| Gate Length | 1514 |
| Gate Source | 1515 |
| External 1 | 1516 |
| External 2 | 1518 |
| RF Burst | 1520 |
| Periodic Timer (Frame Trigger) | 1523 |
| Control Edge/Level | 1534 |
| Gate Holdoff | 1534 |
| Gate Delay Compensation | 1536 |
| More Information | 1537 |
| Min Fast Position Query (Remote Command Only) | 1537 |
| Gate Preset (Remote Command Only) | 1538 |
| Gate Level (Remote Command Only) | 1538 |
| Gate Polarity (Remote Command Only) | 1538 |
| Points | 1539 |
| System | 1541 |
| Trace/Detector | 1542 |
| Trace Type | 1542 |
| Detector | 1542 |
| Auto | 1543 |
| Detector Selection | 1543 |
| Trigger | 1545 |
| Free Run | 1545 |
| External 1 | 1545 |
| Trigger Level | 1545 |
| Trig Slope | 1545 |
| Trig Delay | 1545 |

| | |
|-------------------------------|------|
| Zero Span Delay Comp | 1545 |
| External 2 | 1545 |
| Trigger Level | 1545 |
| Trig Slope | 1545 |
| Trig Delay | 1545 |
| Zero Span Delay Comp | 1545 |
| RF Burst | 1545 |
| Absolute Trigger | 1545 |
| Relative Trigger | 1546 |
| Trig Slope | 1546 |
| Trig Delay | 1546 |
| Periodic Timer | 1546 |
| Period | 1546 |
| Offset | 1546 |
| Reset Offset Display | 1546 |
| Sync Source | 1546 |
| Off | 1546 |
| External 1 | 1546 |
| External 2 | 1546 |
| RF Burst | 1547 |
| Trig Delay | 1547 |
| Auto/Holdoff | 1547 |
| Auto Trig | 1547 |
| Trig Holdoff | 1547 |
| Holdoff Type | 1547 |
| User Preset | 1548 |
| User Preset | 1548 |
| User Preset All Modes | 1549 |
| Save User Preset | 1550 |
| View/Display | 1551 |
| Spectrum View | 1551 |
| Display | 1556 |
| Annotation | 1556 |
| Meas Bar On/Off | 1558 |
| Screen | 1558 |
| Active Function Values On/Off | 1558 |
| Title | 1559 |
| Change Title | 1559 |
| Clear Title | 1560 |
| Graticule | 1561 |
| System Display Settings | 1561 |
| Annotation Local Settings | 1561 |
| Themes | 1562 |

| | |
|--|-------------|
| Backlight | 1563 |
| Backlight Intensity | 1563 |
| 14 Power Stat CCDF Measurement | 1565 |
| AMPTD Y Scale | 1570 |
| Attenuation | 1570 |
| Dual Attenuator Configurations: | 1570 |
| Single Attenuator Configuration: | 1571 |
| (Mech) Atten | 1572 |
| Attenuator Configurations and Auto/Man | 1573 |
| Enable Elec Atten | 1573 |
| More Information | 1574 |
| Mechanical Attenuator Transition Rules | 1574 |
| When the Electronic Attenuation is enabled from a disabled state: | 1575 |
| Examples in the dual attenuator configuration: | 1575 |
| When the Electronic Attenuation is disabled from an enabled state: | 1575 |
| Using the Electronic Attenuator: Pros and Cons | 1575 |
| Elec Atten | 1576 |
| Adjust Atten for Min Clip | 1576 |
| Pre-Adjust for Min Clip | 1577 |
| Off | 1578 |
| Elec Atten Only | 1578 |
| Mech + Elec Atten | 1578 |
| (Mech) Atten Step | 1578 |
| Presel Center | 1579 |
| Proper Preselector Operation | 1580 |
| Preselector Adjust | 1580 |
| μ W Path Control | 1582 |
| Standard Path | 1583 |
| Low Noise Path Enable | 1583 |
| More Information | 1584 |
| μ W Preselector Bypass | 1585 |
| Internal Preamp | 1586 |
| Off | 1587 |
| Low Band | 1588 |
| Full Range | 1588 |
| Range | 1588 |
| Range Auto/Man | 1589 |
| I Range | 1590 |
| 1 V Peak | 1591 |
| 0.5 V Peak | 1591 |
| 0.25 V Peak | 1591 |
| 0.125 V Peak | 1591 |
| Q Range Value | 1592 |

| | |
|---|------|
| Q Same as I | 1593 |
| 1 V Peak | 1593 |
| 0.5 V Peak | 1593 |
| 0.25 V Peak | 1594 |
| 0.125 V Peak | 1594 |
| I/Q Gain Ranges | 1594 |
| 1 V Peak | 1594 |
| 0.5 V Peak | 1594 |
| 0.25 V Peak | 1594 |
| 0.125 V Peak | 1595 |
| Auto Couple | 1596 |
| More Information | 1596 |
| Auto/Man Active Function keys | 1596 |
| Auto/Man 1-of-N keys | 1596 |
| BW | 1598 |
| Info BW | 1598 |
| Cont (Continuous Measurement/Sweep) | 1600 |
| File | 1602 |
| FREQ Channel | 1603 |
| Center Freq | 1603 |
| Center Frequency Presets | 1604 |
| RF Center Freq | 1606 |
| Ext Mix Center Freq | 1607 |
| I/Q Center Freq | 1608 |
| CF Step | 1608 |
| Input/Output | 1610 |
| Marker | 1611 |
| Select Marker | 1611 |
| Marker Type | 1611 |
| Properties | 1612 |
| Select Marker | 1612 |
| Relative To | 1612 |
| Marker Trace | 1613 |
| Couple Markers | 1613 |
| All Markers Off | 1613 |
| Marker X Axis Value (Remote Command Only) | 1614 |
| Marker Y Axis Value (Remote Command Only) | 1614 |
| Marker Function | 1616 |
| Marker To | 1617 |
| Meas | 1618 |
| Remote Measurement Functions | 1618 |
| Measurement Group of Commands | 1619 |
| Current Measurement Query (Remote Command Only) | 1621 |

Table of Contents

| | |
|---|------|
| Limit Test Current Results (Remote Command Only) | 1621 |
| Data Query (Remote Command Only) | 1621 |
| Calculate/Compress Trace Data Query (Remote Command Only) | 1622 |
| Calculate Peaks of Trace Data (Remote Command Only) | 1627 |
| Format Data: Numeric Data (Remote Command Only) | 1628 |
| Format Data: Byte Order (Remote Command Only) | 1629 |
| Meas Setup | 1630 |
| Counts | 1630 |
| Meas Cycles | 1630 |
| Meas Interval (Not 1xEVDO) | 1631 |
| IF Gain | 1632 |
| IF Gain Auto | 1632 |
| IF Gain State | 1633 |
| Meas Preset | 1633 |
| Mode | 1635 |
| Mode Preset | 1636 |
| How-To Preset | 1637 |
| Preset Type (Remote Command Only) | 1638 |
| Mode Setup | 1639 |
| Peak Search | 1640 |
| Print | 1641 |
| Quick Save | 1642 |
| Recall | 1644 |
| State | 1644 |
| More Information | 1646 |
| From File... | 1646 |
| Edit Register Names | 1648 |
| Register 1 thru Register 16 | 1648 |
| Register 1 thru Register 16 | 1649 |
| Data (Import) | 1650 |
| Capture Buffer | 1650 |
| Open... | 1651 |
| Restart | 1652 |
| More Information | 1652 |
| Save | 1654 |
| State | 1654 |
| To File . . . | 1655 |
| Edit Register Names | 1657 |
| More Information | 1657 |
| Register 1 thru Register 16 | 1658 |
| Register 1 thru Register 16 | 1658 |
| Data (Export) | 1659 |
| Measurement Results | 1660 |

| | |
|---|------|
| Meas Results File Definition | 1660 |
| Meas Results File Example | 1662 |
| Capture Buffer | 1663 |
| Save As . . . | 1664 |
| Screen Image | 1664 |
| Themes | 1666 |
| 3D Color | 1666 |
| 3D Monochrome | 1666 |
| Flat Color | 1666 |
| Flat Monochrome | 1667 |
| Save As... | 1667 |
| Mass Storage Catalog (Remote Command Only) | 1667 |
| Mass Storage Change Directory (Remote Command Only) | 1668 |
| Mass Storage Copy (Remote Command Only) | 1668 |
| Mass Storage Device Copy (Remote Command Only) | 1668 |
| Mass Storage Delete (Remote Command Only) | 1669 |
| Mass Storage Data (Remote Command Only) | 1669 |
| Mass Storage Make Directory (Remote Command Only) | 1669 |
| Mass Storage Move (Remote Command Only) | 1670 |
| Mass Storage Remove Directory (Remote Command Only) | 1670 |
| Single (Single Measurement/Sweep) | 1671 |
| More Information | 1671 |
| Source | 1672 |
| Span X Scale | 1673 |
| Scale/Div | 1673 |
| Sweep/Control | 1674 |
| Pause/Resume | 1674 |
| System | 1675 |
| Trace/Detector | 1676 |
| Store Ref Trace | 1676 |
| Ref Trace | 1676 |
| Gaussian Line | 1677 |
| Trigger | 1678 |
| Free Run | 1678 |
| Video | 1678 |
| Trigger Level | 1678 |
| Trig Slope | 1678 |
| Trig Delay | 1678 |
| External 1 | 1678 |
| Trigger Level | 1678 |
| Trig Slope | 1678 |
| Trig Delay | 1678 |
| Zero Span Delay Comp | 1678 |

| | |
|---|-------------|
| External 2 | 1678 |
| Trigger Level | 1678 |
| Trig Slope | 1678 |
| Trig Delay | 1679 |
| Zero Span Delay Comp | 1679 |
| RF Burst | 1679 |
| Absolute Trigger | 1679 |
| Relative Trigger | 1679 |
| Trig Slope | 1679 |
| Trig Delay | 1679 |
| Auto/Holdoff | 1679 |
| Auto Trig | 1679 |
| Trig Holdoff | 1679 |
| Holdoff Type | 1679 |
| User Preset | 1680 |
| User Preset | 1680 |
| User Preset All Modes | 1681 |
| Save User Preset | 1682 |
| View/Display | 1683 |
| Display | 1683 |
| Annotation | 1683 |
| Meas Bar On/Off | 1684 |
| Screen | 1685 |
| Active Function Values On/Off | 1685 |
| Title | 1686 |
| Change Title | 1686 |
| Clear Title | 1687 |
| Graticule | 1688 |
| System Display Settings | 1688 |
| Annotation Local Settings | 1688 |
| Themes | 1689 |
| Backlight | 1690 |
| Backlight Intensity | 1690 |
| Slot View | 1691 |
| 15 Introduction | 1693 |
| 15 Code Domain Measurement | 1693 |
| Amplitude (AMPTD) Y Scale | 1701 |
| Ref Value | 1701 |
| Y Ref Value (I/Q Error View – Code Domain Mag Error Window) | 1701 |
| Y Ref Value (I/Q Error View – Code Domain Phase Error Window) | 1702 |
| Y Ref Value (I/Q Error View – Code Domain EVM Window) | 1702 |
| Y Ref Value (Code Domain Symbol Power Window) | 1703 |

| | |
|--|------|
| Y Ref Value (Code Domain Power Window) | 1703 |
| Y Ref Value (Code Domain Error Window) | 1704 |
| Attenuation | 1705 |
| Dual Attenuator Configurations: | 1705 |
| Single Attenuator Configuration: | 1706 |
| (Mech) Atten | 1706 |
| Attenuator Configurations and Auto/Man | 1708 |
| Enable Elec Atten | 1708 |
| More Information | 1709 |
| Mechanical Attenuator Transition Rules | 1709 |
| When the Electronic Attenuation is enabled from a disabled state: | 1709 |
| Examples in the dual attenuator configuration: | 1710 |
| When the Electronic Attenuation is disabled from an enabled state: | 1710 |
| Using the Electronic Attenuator: Pros and Cons | 1710 |
| Elec Atten | 1710 |
| Adjust Atten for Min Clip | 1711 |
| Pre-Adjust for Min Clip | 1711 |
| Off | 1712 |
| Elec Atten Only | 1713 |
| Mech + Elec Atten | 1713 |
| (Mech) Atten Step | 1713 |
| Scale/Div | 1714 |
| Y Scale/Div (I/Q Error View – Code Domain Mag Error Window) | 1714 |
| Y Scale/Div (I/Q Error View – Code Domain Phase Error Window) | 1715 |
| Y Scale/Div (I/Q Error View – Code Domain EVM Window) | 1715 |
| Y Scale/Div (Code Domain Symbol Power Window) | 1716 |
| Y Scale/Div (Code Domain Power Window) | 1716 |
| Y Scale/Div (Code Domain Error Window) | 1717 |
| Presel Center | 1718 |
| Proper Preselector Operation | 1718 |
| Preselector Adjust | 1719 |
| Y Axis Unit | 1720 |
| dBm | 1721 |
| dBmV | 1722 |
| dBmA | 1722 |
| W | 1722 |
| V | 1722 |
| A | 1723 |
| dB μ V | 1723 |
| dB μ A | 1723 |
| dBpW | 1724 |
| Antenna Unit | 1724 |
| dB μ V/m | 1724 |

| | |
|--|------|
| dB μ A/m | 1725 |
| dB μ A | 1725 |
| dBpT | 1725 |
| dBG | 1725 |
| None | 1726 |
| μ W Path Control | 1726 |
| Standard Path | 1727 |
| Low Noise Path Enable | 1728 |
| More Information | 1728 |
| μ W Preselector Bypass | 1730 |
| Internal Preamp | 1731 |
| Off | 1732 |
| Low Band | 1732 |
| Full Range | 1732 |
| Ref Position | 1733 |
| Y Ref Position (I/Q Error View – Code Domain Mag Error Window) | 1733 |
| Y Ref Position (I/Q Error View – Code Domain Phase Error Window) | 1733 |
| Y Ref Position (I/Q Error View – Code Domain EVM Window) | 1734 |
| Y Ref Position (Code Domain Symbol Power Window) | 1734 |
| Y Ref Position (Code Domain Power Window) | 1735 |
| Y Ref Position (Code Domain Error Window) | 1735 |
| Range | 1736 |
| Range Auto/Man | 1736 |
| I Range | 1737 |
| 1 V Peak | 1738 |
| 0.5 V Peak | 1739 |
| 0.25 V Peak | 1739 |
| 0.125 V Peak | 1739 |
| Q Range Value | 1739 |
| Q Same as I | 1740 |
| 1 V Peak | 1741 |
| 0.5 V Peak | 1741 |
| 0.25 V Peak | 1741 |
| 0.125 V Peak | 1741 |
| I/Q Gain Ranges | 1741 |
| 1 V Peak | 1742 |
| 0.5 V Peak | 1742 |
| 0.25 V Peak | 1742 |
| 0.125 V Peak | 1742 |
| Auto Scale | 1742 |
| Y Auto Scaling (I/Q Error View – Code Domain Mag Error Window) | 1743 |
| Y Auto Scale (I/Q Error View – Code Domain Phase Error Window) | 1743 |
| Y Auto Scale (I/Q Error View – Code Domain EVM Window) | 1744 |

| | |
|---|------|
| Y Auto Scale (Code Domain Symbol Power Window) | 1744 |
| Y Auto Scale (Code Domain Power Window) | 1745 |
| Y Auto Scale (Code Domain Error Window) | 1746 |
| Auto Couple | 1747 |
| More Information | 1747 |
| Auto/Man Active Function keys | 1747 |
| Auto/Man 1-of-N keys | 1747 |
| BW | 1749 |
| Cont (Continuous Measurement/Sweep) | 1750 |
| File | 1752 |
| FREQ/Channel | 1753 |
| Carrier Config | 1753 |
| Carriers | 1753 |
| Carrier Result | 1753 |
| CF Step | 1754 |
| Center Freq | 1755 |
| RF Center Freq | 1756 |
| I/Q Center Freq | 1756 |
| Input/Output | 1757 |
| Marker | 1758 |
| Select Marker | 1758 |
| Marker Type | 1758 |
| Properties | 1759 |
| Select Marker | 1759 |
| Relative To | 1759 |
| Marker Trace | 1760 |
| Couple Marker | 1760 |
| All Markers Off | 1761 |
| Marker Symbol Value | 1761 |
| Marker X Axis Value (Remote Command only) | 1761 |
| Marker X Axis Position (Remote Command only) | 1762 |
| Marker Y Axis Value (Remote Command only) | 1762 |
| Backward Compatibility SCPI Commands | 1763 |
| Marker Fctn | 1764 |
| Marker To | 1765 |
| Meas | 1766 |
| Remote Measurement Functions | 1766 |
| Measurement Group of Commands | 1767 |
| Current Measurement Query (Remote Command Only) | 1769 |
| Limit Test Current Results (Remote Command Only) | 1769 |
| Data Query (Remote Command Only) | 1769 |
| Calculate/Compress Trace Data Query (Remote Command Only) | 1770 |
| Calculate Peaks of Trace Data (Remote Command Only) | 1775 |

Table of Contents

| | |
|---|------|
| Format Data: Numeric Data (Remote Command Only) | 1776 |
| Format Data: Byte Order (Remote Command Only) | 1777 |
| Meas Setup | 1778 |
| Result Length | 1778 |
| Analysis Subframe | 1778 |
| Spread Code Length | 1779 |
| Code Channel | 1779 |
| Meas Preset | 1780 |
| Mode | 1781 |
| Mode Preset | 1782 |
| How-To Preset | 1783 |
| Preset Type (Remote Command Only) | 1784 |
| Mode Setup | 1785 |
| Peak Search | 1786 |
| Next Peak | 1786 |
| Next Pk Right | 1786 |
| Next Pk Left | 1786 |
| Marker Delta | 1787 |
| Pk-Pk Search | 1787 |
| Min Search | 1787 |
| Print | 1788 |
| Quick Save | 1789 |
| Recall | 1791 |
| State | 1791 |
| More Information | 1793 |
| From File... | 1793 |
| Edit Register Names | 1795 |
| Register 1 thru Register 16 | 1795 |
| Register 1 thru Register 16 | 1796 |
| Data (Import) | 1797 |
| Capture Buffer | 1797 |
| Open... | 1798 |
| Restart | 1799 |
| More Information | 1799 |
| Save | 1801 |
| State | 1801 |
| To File . . . | 1802 |
| Edit Register Names | 1804 |
| More Information | 1804 |
| Register 1 thru Register 16 | 1805 |
| Register 1 thru Register 16 | 1805 |
| Data (Export) | 1806 |
| Measurement Results | 1807 |

| | |
|---|------|
| Meas Results File Contents | 1807 |
| Marker Table | 1807 |
| Peak Table | 1810 |
| Spectrogram | 1813 |
| Capture Buffer | 1817 |
| Save As . . . | 1818 |
| Screen Image | 1818 |
| Themes | 1820 |
| 3D Color | 1820 |
| 3D Monochrome | 1820 |
| Flat Color | 1820 |
| Flat Monochrome | 1821 |
| Save As... | 1821 |
| Mass Storage Catalog (Remote Command Only) | 1821 |
| Mass Storage Change Directory (Remote Command Only) | 1822 |
| Mass Storage Copy (Remote Command Only) | 1822 |
| Mass Storage Device Copy (Remote Command Only) | 1822 |
| Mass Storage Delete (Remote Command Only) | 1823 |
| Mass Storage Data (Remote Command Only) | 1823 |
| Mass Storage Make Directory (Remote Command Only) | 1823 |
| Mass Storage Move (Remote Command Only) | 1824 |
| Mass Storage Remove Directory (Remote Command Only) | 1824 |
| Single (Single Measurement/Sweep) | 1825 |
| More Information | 1825 |
| Source | 1826 |
| SPAN X Scale | 1827 |
| Ref Value | 1827 |
| X Ref Value (I/Q Error View – Code Domain Mag Error Window) | 1827 |
| X Ref Value (I/Q Error View – Code Domain Phase Error Window) | 1827 |
| X Ref Value (I/Q Error View – Code Domain EVM Window) | 1828 |
| X Ref Value (Code Domain Symbol Power Window) | 1829 |
| X Ref Value (Code Domain Power Window) | 1829 |
| X Ref Value (Code Domain Error Window) | 1830 |
| Scale/Div | 1830 |
| X Scale/Div (I/Q Error View – Code Domain Mag Error Window) | 1830 |
| X Scale/Div (I/Q Error View – Code Domain Phase Error Window) | 1831 |
| X Scale/Div (I/Q Error View – Code Domain EVM Window) | 1831 |
| X Scale/Div (Code Domain Symbol Power Window) | 1832 |
| X Scale/Div (Code Domain Power Window) | 1833 |
| X Scale/Div (Code Domain Error Window) | 1833 |
| Ref Position | 1834 |
| X Ref Position (I/Q Error View – Code Domain Mag Error Window) | 1834 |
| X Ref Position (I/Q Error View – Code Domain Phase Error Window) | 1834 |

| | |
|--|------|
| X Ref Position (I/Q Error View – Code Domain EVM Window) | 1835 |
| X Ref Position (Code Domain Symbol Power Window) | 1835 |
| X Ref Position (Code Domain Power Window) | 1836 |
| X Ref Position (Code Domain Error Window) | 1836 |
| Auto Scale | 1837 |
| X Auto Scale (I/Q Error View – Code Domain Mag Error Window) | 1837 |
| X Auto Scale (I/Q Error View – Code Domain Phase Error Window) | 1838 |
| X Auto Scale (I/Q Error View – Code Domain EVM Window) | 1838 |
| X Auto Scale (Code Domain Symbol Power Window) | 1839 |
| Sweep/Control | 1840 |
| Pause/Resume | 1840 |
| Abort (Remote Command Only) | 1840 |
| System | 1842 |
| Trace/Detector | 1843 |
| Trigger | 1844 |
| Free Run | 1844 |
| Video | 1844 |
| Trigger Level | 1844 |
| Trig Slope | 1844 |
| Trig Delay | 1844 |
| External 1 | 1844 |
| Trigger Level | 1844 |
| Trig Slope | 1844 |
| Trig Delay | 1844 |
| Zero Span Delay Comp | 1844 |
| External 2 | 1844 |
| Trigger Level | 1844 |
| Trig Slope | 1844 |
| Trig Delay | 1845 |
| Zero Span Delay Comp | 1845 |
| RF Burst | 1845 |
| Absolute Trigger | 1845 |
| Relative Trigger | 1845 |
| Trig Slope | 1845 |
| Trig Delay | 1845 |
| Periodic Timer | 1845 |
| Period | 1845 |
| Offset | 1845 |
| Offset Adjust (Remote Command Only) | 1845 |
| Reset Offset Display | 1845 |
| Sync Source | 1845 |
| Off | 1845 |
| External 1 | 1846 |

| | |
|---|------|
| External 2 | 1846 |
| RF Burst | 1846 |
| Trig Delay | 1846 |
| Auto/Holdoff | 1846 |
| Auto Trig | 1846 |
| Trig Holdoff | 1846 |
| Holdoff Type | 1846 |
| User Preset | 1847 |
| User Preset | 1847 |
| User Preset All Modes | 1848 |
| Save User Preset | 1849 |
| View/Display | 1850 |
| Display | 1850 |
| Annotation | 1850 |
| Meas Bar On/Off | 1851 |
| Screen | 1852 |
| Active Function Values On/Off | 1852 |
| Title | 1853 |
| Change Title | 1853 |
| Clear Title | 1854 |
| Graticule | 1855 |
| System Display Settings | 1855 |
| Annotation Local Settings | 1855 |
| Themes | 1856 |
| Backlight | 1857 |
| Backlight Intensity | 1857 |
| CDP Graph & Metrics | 1858 |
| Composite | 1858 |
| Spread Code Length | 1858 |
| CDE Graph & Metrics | 1859 |
| Composite | 1859 |
| Spread Code Length | 1860 |
| I/Q Error (quad view) | 1860 |
| Code Domain | 1860 |
| Composite | 1861 |
| Spread Code Length | 1861 |
| Demod Bits | 1862 |
| Composite | 1862 |
| Spread Code Length | 1862 |
| Result Metrics | 1863 |
| Code Domain Measurement Results and Views | 1863 |
| View – CDP Graph & Metrics | 1864 |
| Code Domain Power Window | 1865 |

| | |
|---|-------------|
| Code Domain Power Summary Window | 1865 |
| View – CDE Graph & Metrics | 1866 |
| Code Domain Error Window | 1867 |
| Code Domain Power Summary Window | 1867 |
| View – I/Q Error | 1867 |
| Code Domain Magnitude Error Window | 1868 |
| Code Domain Phase Error Window | 1868 |
| Code Domain EVM Window | 1869 |
| Code Domain Result Metrics Window | 1869 |
| View – Code Domain | 1870 |
| Code Domain Power Window | 1870 |
| Code Domain Symbol Power Window | 1870 |
| I/Q Symbol Polar Vector (Constellation) Window | 1871 |
| Code Domain Result metrics Window | 1871 |
| View – Demod Bits | 1871 |
| Code Domain Power Window | 1872 |
| Code Domain Symbol Power Window | 1872 |
| Demod Bits Window | 1872 |
| View – Results Metrics | 1872 |
| Code Domain Numeric Results Window | 1873 |
| View Selection by Number (Remote Command only) | 1874 |
| 16 Introduction | 1877 |
| 16 Modulation Accuracy (Composite EVM) Measurement | 1877 |
| Amplitude (AMPTD) Y Scale | 1886 |
| Ref Value | 1886 |
| Y Ref Value (I/Q Error View – Magnitude Error Window) | 1886 |
| Y Ref Value (I/Q Error View – Phase Error Window) | 1887 |
| Y Ref Value (I/Q Error View – EVM Window) | 1887 |
| Y Ref Value (Code Domain Power and Metrics View – Code Domain Power Window) | 1888 |
| Y Ref Value (Capture Time Summary – Capture Time Data Trace Window) | 1888 |
| Attenuation | 1889 |
| Dual Attenuator Configurations: | 1889 |
| Single Attenuator Configuration: | 1890 |
| (Mech) Atten | 1890 |
| Attenuator Configurations and Auto/Man | 1892 |
| Enable Elec Atten | 1892 |
| More Information | 1893 |
| Mechanical Attenuator Transition Rules | 1893 |
| When the Electronic Attenuation is enabled from a disabled state: | 1893 |
| Examples in the dual attenuator configuration: | 1894 |
| When the Electronic Attenuation is disabled from an enabled state: | 1894 |

| | |
|---|------|
| Using the Electronic Attenuator: Pros and Cons | 1894 |
| Elec Atten | 1894 |
| Adjust Atten for Min Clip | 1895 |
| Pre-Adjust for Min Clip | 1896 |
| Off | 1896 |
| Elec Atten Only | 1897 |
| Mech + Elec Atten | 1897 |
| (Mech) Atten Step | 1897 |
| Scale/Div | 1898 |
| Y Scale/Div (I/Q Error View – Magnitude Error Window) | 1898 |
| Y Scale/Div (I/Q Error View – Phase Error Window) | 1899 |
| Y Scale/Div (I/Q Error View – EVM Window) | 1899 |
| Y Scale/Div (Code Domain Power and Metrics View – Code Domain Power Window) | 1900 |
| Y Scale/Div (Capture Time Summary View – Capture Time Data Trace Window) | 1900 |
| Presel Center | 1901 |
| Proper Preselector Operation | 1902 |
| Preselector Adjust | 1902 |
| Y Axis Unit | 1903 |
| dBm | 1905 |
| dBmV | 1905 |
| dBmA | 1905 |
| W | 1905 |
| V | 1906 |
| A | 1906 |
| dB μ V | 1906 |
| dB μ A | 1907 |
| dBpW | 1907 |
| Antenna Unit | 1907 |
| dB μ V/m | 1908 |
| dB μ A/m | 1908 |
| dB μ A | 1908 |
| dBpT | 1908 |
| dBG | 1909 |
| None | 1909 |
| μ W Path Control | 1909 |
| Standard Path | 1910 |
| Low Noise Path Enable | 1911 |
| More Information | 1912 |
| μ W Preselector Bypass | 1913 |
| Internal Preamp | 1914 |
| Off | 1915 |

Table of Contents

| | |
|--|------|
| Low Band | 1915 |
| Full Range | 1915 |
| Range | 1916 |
| Range Auto/Man | 1916 |
| I Range | 1917 |
| 1 V Peak | 1918 |
| 0.5 V Peak | 1919 |
| 0.25 V Peak | 1919 |
| 0.125 V Peak | 1919 |
| Q Range Value | 1919 |
| Q Same as I | 1920 |
| 1 V Peak | 1921 |
| 0.5 V Peak | 1921 |
| 0.25 V Peak | 1921 |
| 0.125 V Peak | 1921 |
| I/Q Gain Ranges | 1921 |
| 1 V Peak | 1922 |
| 0.5 V Peak | 1922 |
| 0.25 V Peak | 1922 |
| 0.125 V Peak | 1922 |
| Ref Position | 1922 |
| Y Ref Position (I/Q Error View – Magnitude Error Window) | 1923 |
| Y Ref Position (I/Q Error View – Phase Error Window) | 1923 |
| Y Ref Position (I/Q Error View – EVM Window) | 1923 |
| Y Ref Position (Code Domain Power and Metrics View – Code Domain Power Window) | 1924 |
| Y Ref Position (Capture Time Summary View – Capture Time Data Trace Window) | 1924 |
| Auto Scale | 1925 |
| Y Auto Scale (I/Q Error View – Magnitude Error Window) | 1925 |
| Y Auto Scale (I/Q Error View – Phase Error Window) | 1926 |
| Y Auto Scale (I/Q Error View – EVM Window) | 1926 |
| Y Auto Scale (Code Domain Power and Metrics View – Code Domain Power Window) | 1927 |
| Y Auto Scale (Capture Time Summary View – Capture Time Data Trace Window) | 1927 |
| Auto Couple | 1929 |
| More Information | 1929 |
| Auto/Man Active Function keys | 1929 |
| Auto/Man 1-of-N keys | 1929 |
| BW | 1931 |
| Cont (Continuous Measurement/Sweep) | 1932 |
| File | 1934 |

| | |
|---|------|
| FREQ/Channel | 1935 |
| Center Freq | 1935 |
| Center Frequency Presets | 1936 |
| RF Center Freq | 1938 |
| Ext Mix Center Freq | 1939 |
| I/Q Center Freq | 1940 |
| Carrier Config | 1940 |
| Carriers | 1940 |
| Carrier Result | 1941 |
| CF Step | 1941 |
| Center Freq | 1942 |
| RF Center Freq | 1943 |
| I/Q Center Freq | 1943 |
| Input/Output | 1945 |
| Marker | 1946 |
| Select Marker | 1946 |
| Marker Chip Value | 1946 |
| Marker X Axis Value (Remote Command only) | 1946 |
| Marker X Axis Position (Remote Command only) | 1947 |
| Marker Y Axis Value (Remote Command only) | 1947 |
| Backward Compatibility SCPI Commands | 1948 |
| Marker Type | 1948 |
| Properties | 1949 |
| Select Marker | 1949 |
| Relative To | 1949 |
| Marker Trace | 1950 |
| Couple Marker | 1950 |
| All Markers Off | 1951 |
| Marker Fctn | 1952 |
| Marker To | 1953 |
| Meas | 1954 |
| Remote Measurement Functions | 1954 |
| Measurement Group of Commands | 1955 |
| Current Measurement Query (Remote Command Only) | 1957 |
| Limit Test Current Results (Remote Command Only) | 1957 |
| Data Query (Remote Command Only) | 1957 |
| Calculate/Compress Trace Data Query (Remote Command Only) | 1958 |
| Calculate Peaks of Trace Data (Remote Command Only) | 1963 |
| Format Data: Numeric Data (Remote Command Only) | 1964 |
| Format Data: Byte Order (Remote Command Only) | 1965 |
| Meas Setup | 1966 |
| Avg/Hold Num | 1966 |
| Avg Mode | 1966 |

Table of Contents

| | |
|-----------------------------------|------|
| Result Length | 1967 |
| Analysis Subframe | 1968 |
| Limits | 1968 |
| RMS EVM (Composite) | 1968 |
| Peak EVM (Composite) | 1969 |
| Rho (Composite) | 1969 |
| Peak Code Domain Error | 1970 |
| Frequency Error | 1970 |
| Meas Preset | 1971 |
| Mode | 1972 |
| Mode Preset | 1973 |
| How-To Preset | 1974 |
| Preset Type (Remote Command Only) | 1975 |
| Mode Setup | 1976 |
| Peak Search | 1977 |
| Next Peak | 1977 |
| Next Pk Right | 1977 |
| Next Pk Left | 1977 |
| Marker Delta | 1978 |
| Pk-Pk Search | 1978 |
| Min Search | 1978 |
| Print | 1979 |
| Quick Save | 1980 |
| Recall | 1982 |
| State | 1982 |
| More Information | 1984 |
| From File... | 1984 |
| Edit Register Names | 1986 |
| Register 1 thru Register 16 | 1986 |
| Register 1 thru Register 16 | 1987 |
| Data (Import) | 1988 |
| Capture Buffer | 1988 |
| Open... | 1989 |
| Restart | 1990 |
| More Information | 1990 |
| Save | 1992 |
| State | 1992 |
| To File . . . | 1993 |
| Edit Register Names | 1995 |
| More Information | 1995 |
| Register 1 thru Register 16 | 1996 |
| Register 1 thru Register 16 | 1996 |
| Data (Export) | 1997 |

| | |
|---|------|
| Measurement Results | 1998 |
| Meas Results File Contents | 1998 |
| Marker Table | 1998 |
| Peak Table | 2001 |
| Spectrogram | 2004 |
| Capture Buffer | 2008 |
| Save As . . . | 2009 |
| Screen Image | 2009 |
| Themes | 2011 |
| 3D Color | 2011 |
| 3D Monochrome | 2011 |
| Flat Color | 2011 |
| Flat Monochrome | 2012 |
| Save As... | 2012 |
| Mass Storage Catalog (Remote Command Only) | 2012 |
| Mass Storage Change Directory (Remote Command Only) | 2013 |
| Mass Storage Copy (Remote Command Only) | 2013 |
| Mass Storage Device Copy (Remote Command Only) | 2013 |
| Mass Storage Delete (Remote Command Only) | 2014 |
| Mass Storage Data (Remote Command Only) | 2014 |
| Mass Storage Make Directory (Remote Command Only) | 2014 |
| Mass Storage Move (Remote Command Only) | 2015 |
| Mass Storage Remove Directory (Remote Command Only) | 2015 |
| Single (Single Measurement/Sweep) | 2016 |
| More Information | 2016 |
| Source | 2017 |
| SPAN X Scale | 2018 |
| Ref Value | 2018 |
| X Ref Value (I/Q Error View – Magnitude Error Window) | 2018 |
| X Ref Value (I/Q Error View – Phase Error Window) | 2019 |
| X Ref Value (I/Q Error View – EVM Window) | 2019 |
| X Ref Value (Code Domain Power and Metrics View – Code Domain Power Window) | 2020 |
| X Ref Value (Capture Time Summary View – Capture Time Data Trace Window) | 2020 |
| Scale/Div | 2021 |
| X Scale/Div (I/Q Error View – Magnitude Error Window) | 2021 |
| X Scale/Div (I/Q Error View – Phase Error Window) | 2021 |
| X Scale/Div (I/Q Error View – EVM Window) | 2022 |
| X Scale/Div (Code Domain Power and Metrics View – Code Domain Power Window) | 2022 |
| X Scale/Div (Capture Time Summary View – Capture Time Data Trace Window) | 2023 |

| | |
|--|------|
| Ref Position | 2023 |
| X Ref Position (I/Q Error View – Magnitude Error Window) | 2024 |
| X Ref Position (I/Q Error View – Phase Error Window) | 2024 |
| X Ref Position (I/Q Error View – EVM Window) | 2024 |
| X Ref Position (Code Domain Power and Metrics View – Code Domain Power Window) | 2025 |
| X Ref Position (Capture Time Summary View – Capture Time Data Trace Window) | 2025 |
| Auto Scale | 2026 |
| X Auto Scale (I/Q Error View – Magnitude Error Window) | 2026 |
| X Auto Scale (I/Q Error View – Phase Error Window) | 2027 |
| X Auto Scale (I/Q Error View – EVM Window) | 2027 |
| X Auto Scale (Capture Time Summary View – Capture Time Data Trace Window) | 2028 |
| Sweep/Control | 2029 |
| Pause/Resume | 2029 |
| Abort (Remote Command Only) | 2029 |
| System | 2031 |
| Trace/Detector | 2032 |
| Trigger | 2033 |
| Free Run | 2033 |
| Video | 2033 |
| Trigger Level | 2033 |
| Trig Slope | 2033 |
| Trig Delay | 2033 |
| External 1 | 2033 |
| Trigger Level | 2033 |
| Trig Slope | 2033 |
| Trig Delay | 2033 |
| Zero Span Delay Comp | 2033 |
| External 2 | 2033 |
| Trigger Level | 2033 |
| Trig Slope | 2033 |
| Trig Delay | 2034 |
| Zero Span Delay Comp | 2034 |
| RF Burst | 2034 |
| Absolute Trigger | 2034 |
| Relative Trigger | 2034 |
| Trig Slope | 2034 |
| Trig Delay | 2034 |
| Periodic Timer | 2034 |
| Period | 2034 |
| Offset | 2034 |

| | |
|---|------|
| Offset Adjust (Remote Command Only) | 2034 |
| Reset Offset Display | 2034 |
| Sync Source | 2034 |
| Off | 2034 |
| External 1 | 2035 |
| External 2 | 2035 |
| RF Burst | 2035 |
| Trig Delay | 2035 |
| Auto/Holdoff | 2035 |
| Auto Trig | 2035 |
| Trig Holdoff | 2035 |
| Holdoff Type | 2035 |
| User Preset | 2036 |
| User Preset | 2036 |
| User Preset All Modes | 2037 |
| Save User Preset | 2038 |
| View/Display | 2039 |
| Modulation Accuracy Measurement Views and Results | 2039 |
| View – I/Q Measured Polar Graph | 2040 |
| Result Metrics Window | 2040 |
| I/Q Measured Polar Vector Window | 2041 |
| View – I/Q Error | 2042 |
| Magnitude Error Window | 2043 |
| Phase Error Window | 2043 |
| EVM Window | 2043 |
| Result Metrics Window | 2044 |
| View – Code Domain Power | 2045 |
| Code Domain Power Window | 2046 |
| Code Domain Power Summary Window | 2046 |
| View – Capture Time Summary | 2047 |
| Capture Time Data Trace Window | 2048 |
| Capture Time Summary Window | 2049 |
| View – Numeric Results | 2049 |
| Numeric Results Summary Window | 2050 |
| Display | 2053 |
| Annotation | 2053 |
| Meas Bar On/Off | 2054 |
| Screen | 2055 |
| Active Function Values On/Off | 2055 |
| Title | 2056 |
| Change Title | 2056 |
| Clear Title | 2057 |
| Graticule | 2058 |

| | |
|--|-------------|
| System Display Settings | 2058 |
| Annotation Local Settings | 2058 |
| Themes | 2059 |
| Backlight | 2060 |
| Backlight Intensity | 2060 |
| View/Settings menu for I/Q Measured Polar Vector Window | 2061 |
| I/Q Polar Vec/Constln | 2061 |
| Vector & Constellation | 2061 |
| Vector | 2062 |
| Constellation | 2062 |
| I/Q Points | 2062 |
| I/Q Points Offset | 2063 |
| I/Q Rotation | 2063 |
| Interpolation | 2064 |
| Full Vector (background) | 2064 |
| I/Q Error (quad view) | 2064 |
| View/Settings menu Code Domain Power Summary Window | 2065 |
| Prev Page | 2065 |
| Next Page | 2065 |
| Scroll Down | 2066 |
| Scroll Up | 2066 |
| First Page | 2066 |
| Last Page | 2066 |
| Capture Time Summary | 2067 |
| Numeric Results | 2067 |
| View Selection by number (Remote Command only) | 2067 |
| 17 Waveform Measurement | 2069 |
| AMPTD Y Scale | 2073 |
| Ref Value (RF Envelope View) | 2073 |
| Attenuation | 2073 |
| Dual Attenuator Configurations: | 2074 |
| Single Attenuator Configuration: | 2075 |
| (Mech) Atten | 2075 |
| Attenuator Configurations and Auto/Man | 2077 |
| Enable Elec Atten | 2077 |
| More Information | 2078 |
| Mechanical Attenuator Transition Rules | 2078 |
| When the Electronic Attenuation is enabled from a disabled state: | 2078 |
| Examples in the dual attenuator configuration: | 2078 |
| When the Electronic Attenuation is disabled from an enabled state: | 2079 |
| Using the Electronic Attenuator: Pros and Cons | 2079 |
| Elec Atten | 2079 |
| Adjust Atten for Min Clip | 2080 |

| | |
|---------------------------------|------|
| Pre-Adjust for Min Clip | 2080 |
| Off | 2081 |
| Elec Atten Only | 2081 |
| Mech + Elec Atten | 2082 |
| (Mech) Atten Step | 2082 |
| Scale/Div (RF Envelope View) | 2083 |
| Presel Center | 2083 |
| Proper Preselector Operation | 2084 |
| Preselector Adjust | 2084 |
| Y Axis Unit | 2086 |
| dBm | 2087 |
| dBmV | 2087 |
| dBmA | 2087 |
| W | 2088 |
| V | 2088 |
| A | 2088 |
| dB μ V | 2089 |
| dB μ A | 2089 |
| dBpW | 2089 |
| Antenna Unit | 2090 |
| dB μ V/m | 2090 |
| dB μ A/m | 2090 |
| dB μ A | 2090 |
| dBpT | 2091 |
| dBG | 2091 |
| None | 2091 |
| μ W Path Control | 2092 |
| Standard Path | 2093 |
| Low Noise Path Enable | 2093 |
| More Information | 2094 |
| μ W Preselector Bypass | 2095 |
| Internal Preamp | 2096 |
| Off | 2097 |
| Low Band | 2098 |
| Full Range | 2098 |
| Ref Position (RF Envelope View) | 2098 |
| Auto Scaling | 2099 |
| Range | 2099 |
| Range Auto/Man | 2100 |
| I Range | 2101 |
| 1 V Peak | 2102 |
| 0.5 V Peak | 2102 |
| 0.25 V Peak | 2102 |

Table of Contents

| | |
|---|------|
| 0.125 V Peak | 2102 |
| Q Range Value | 2103 |
| Q Same as I | 2104 |
| 1 V Peak | 2104 |
| 0.5 V Peak | 2104 |
| 0.25 V Peak | 2105 |
| 0.125 V Peak | 2105 |
| I/Q Gain Ranges | 2105 |
| 1 V Peak | 2105 |
| 0.5 V Peak | 2105 |
| 0.25 V Peak | 2105 |
| 0.125 V Peak | 2106 |
| Ref Value | 2106 |
| Ref Value (RF Envelope View) | 2106 |
| Ref Value (I/Q Waveform View) | 2107 |
| Scale/Div | 2107 |
| Scale/Div (RF Envelope View) | 2107 |
| Scale/Div (I/Q Waveform View) | 2108 |
| Ref Position | 2109 |
| Ref Position (RF Envelope View) | 2109 |
| Ref Position (I/Q Waveform View) | 2109 |
| Auto Couple | 2111 |
| More Information | 2111 |
| Auto/Man Active Function keys | 2111 |
| Auto/Man 1-of-N keys | 2111 |
| BW | 2113 |
| Digital IF BW | 2113 |
| Filter Type | 2114 |
| Filter BW | 2115 |
| Filter Alpha | 2116 |
| Filter Type Bwcc | 2116 |
| Gaussian | 2117 |
| Gaussian filters | 2117 |
| Flattop | 2121 |
| Flattop Filters | 2122 |
| Channel Filter Bandwidth Bwcc (Remote Command Only) | 2123 |
| Cont (Continuous Measurement/Sweep) | 2124 |
| File | 2126 |
| FREQ/Channel | 2127 |
| Center Freq | 2127 |
| RF Center Freq | 2127 |
| I/Q Center Freq | 2128 |
| CF Step | 2128 |

| | |
|---|------|
| Input/Output | 2130 |
| Marker | 2131 |
| Select Marker | 2131 |
| Marker Type | 2131 |
| Properties | 2132 |
| Select Marker | 2132 |
| Relative To | 2132 |
| Marker Trace | 2133 |
| Couple Markers | 2133 |
| All Markers Off | 2134 |
| Marker X Axis Value (Remote Command Only) | 2134 |
| Marker X Axis Position (Remote Command Only) | 2135 |
| Marker Y Axis Value (Remote Command Only) | 2135 |
| Backward Compatibility SCPI Commands | 2136 |
| Marker -> | 2137 |
| Marker Function | 2138 |
| Select Marker | 2138 |
| Marker Function Type | 2138 |
| Band Adjust | 2139 |
| Band/Interval Span for Time Domain | 2139 |
| Band/Interval Left for Time Domain | 2140 |
| Band/Interval Right for Time Domain | 2140 |
| Meas | 2142 |
| Remote Measurement Functions | 2142 |
| Measurement Group of Commands | 2143 |
| Current Measurement Query (Remote Command Only) | 2145 |
| Limit Test Current Results (Remote Command Only) | 2145 |
| Data Query (Remote Command Only) | 2145 |
| Calculate/Compress Trace Data Query (Remote Command Only) | 2146 |
| Calculate Peaks of Trace Data (Remote Command Only) | 2151 |
| Format Data: Numeric Data (Remote Command Only) | 2152 |
| Format Data: Byte Order (Remote Command Only) | 2153 |
| Meas Setup | 2154 |
| Average/Hold Num | 2154 |
| Avg Mode | 2154 |
| Avg Type | 2155 |
| Time Avg Num | 2156 |
| Meas Time | 2156 |
| Sample Rate | 2157 |
| PhNoise Opt | 2157 |
| Auto | 2158 |
| Best Close-in P Noise | 2159 |
| Best Wide-offset P Noise | 2159 |

Table of Contents

| | |
|--|------|
| Fast Tuning | 2160 |
| Advanced | 2160 |
| ADC Dither | 2160 |
| ADC Dither Auto | 2160 |
| ADC Dither | 2161 |
| IF Gain | 2162 |
| IF Gain Auto | 2162 |
| IF Gain State | 2162 |
| IF Gain Offset | 2163 |
| Meas Preset | 2164 |
| HW Averaging | 2164 |
| Time Avg Num | 2165 |
| Sample Period (Aperture) Setting (Remote Command Only) | 2165 |
| Mode | 2166 |
| Mode Preset | 2167 |
| How-To Preset | 2168 |
| Preset Type (Remote Command Only) | 2169 |
| Mode Setup | 2170 |
| Peak Search | 2171 |
| Next Peak | 2171 |
| Min Search | 2171 |
| Print | 2173 |
| Quick Save | 2174 |
| Recall | 2176 |
| State | 2176 |
| More Information | 2178 |
| From File... | 2178 |
| Edit Register Names | 2180 |
| Register 1 thru Register 16 | 2180 |
| Register 1 thru Register 16 | 2181 |
| Data (Import) | 2182 |
| Capture Buffer | 2182 |
| Open... | 2183 |
| Restart | 2184 |
| More Information | 2184 |
| Save | 2186 |
| State | 2186 |
| To File . . . | 2187 |
| Edit Register Names | 2189 |
| More Information | 2189 |
| Register 1 thru Register 16 | 2190 |
| Register 1 thru Register 16 | 2190 |
| Data (Export) | 2191 |

| | |
|---|------|
| Meas Results | 2192 |
| Capture Buffer | 2192 |
| Save As . . . | 2192 |
| Screen Image | 2193 |
| Themes | 2194 |
| 3D Color | 2194 |
| 3D Monochrome | 2195 |
| Flat Color | 2195 |
| Flat Monochrome | 2195 |
| Save As... | 2195 |
| Mass Storage Catalog (Remote Command Only) | 2196 |
| Mass Storage Change Directory (Remote Command Only) | 2196 |
| Mass Storage Copy (Remote Command Only) | 2197 |
| Mass Storage Device Copy (Remote Command Only) | 2197 |
| Mass Storage Delete (Remote Command Only) | 2197 |
| Mass Storage Data (Remote Command Only) | 2197 |
| Mass Storage Make Directory (Remote Command Only) | 2198 |
| Mass Storage Move (Remote Command Only) | 2198 |
| Mass Storage Remove Directory (Remote Command Only) | 2199 |
| Single (Single Measurement/Sweep) | 2200 |
| More Information | 2200 |
| Source | 2201 |
| Span X Scale | 2202 |
| Ref Value | 2202 |
| Scale/Div | 2202 |
| Ref Position | 2203 |
| Auto Scaling | 2203 |
| Sweep/Control | 2205 |
| Pause/Resume | 2205 |
| Abort (Remote Command Only) | 2205 |
| System | 2207 |
| Trace/Detector | 2208 |
| Trigger | 2209 |
| Free Run | 2209 |
| Video | 2209 |
| Trigger Level | 2209 |
| Trig Slope | 2209 |
| Trig Delay | 2209 |
| External 1 | 2209 |
| Trigger Level | 2209 |
| Trig Slope | 2209 |
| Trig Delay | 2209 |
| Zero Span Delay Comp | 2209 |

| | |
|--|-------------|
| External 2 | 2209 |
| Trigger Level | 2209 |
| Trig Slope | 2209 |
| Trig Delay | 2210 |
| Zero Span Delay Comp | 2210 |
| RF Burst | 2210 |
| Absolute Trigger | 2210 |
| Relative Trigger | 2210 |
| Trig Slope | 2210 |
| Trig Delay | 2210 |
| Auto/Holdoff | 2210 |
| Auto Trig | 2210 |
| Trig Holdoff | 2210 |
| Holdoff Type | 2210 |
| User Preset | 2211 |
| User Preset | 2211 |
| User Preset All Modes | 2212 |
| Save User Preset | 2213 |
| View/Display | 2214 |
| View Selection by name (Remote Command Only) | 2214 |
| View Selection by number (Remote Command Only) | 2214 |
| Display | 2215 |
| Annotation | 2215 |
| Meas Bar On/Off | 2216 |
| Screen | 2217 |
| Active Function Values On/Off | 2217 |
| Title | 2218 |
| Change Title | 2218 |
| Clear Title | 2219 |
| Graticule | 2220 |
| System Display Settings | 2220 |
| Annotation Local Settings | 2220 |
| Themes | 2221 |
| Backlight | 2222 |
| Backlight Intensity | 2222 |
| RF Envelope | 2223 |
| I/Q Waveform | 2224 |
| 18 Monitor Spectrum Measurement | 2227 |
| AMPTD Y Scale | 2230 |
| Ref Value | 2230 |
| Attenuation | 2230 |
| Dual Attenuator Configurations: | 2231 |
| Single Attenuator Configuration: | 2231 |

| | |
|--|------|
| (Mech) Atten | 2232 |
| Attenuator Configurations and Auto/Man | 2233 |
| Enable Elec Atten | 2234 |
| More Information | 2235 |
| Mechanical Attenuator Transition Rules | 2235 |
| When the Electronic Attenuation is enabled from a disabled state: | 2235 |
| Examples in the dual attenuator configuration: | 2235 |
| When the Electronic Attenuation is disabled from an enabled state: | 2235 |
| Using the Electronic Attenuator: Pros and Cons | 2236 |
| Elec Atten | 2236 |
| Adjust Atten for Min Clip | 2237 |
| Pre-Adjust for Min Clip | 2237 |
| Off | 2238 |
| Elec Atten Only | 2238 |
| Mech + Elec Atten | 2239 |
| (Mech) Atten Step | 2239 |
| Scale/Div | 2239 |
| Presel Center | 2240 |
| Proper Preselector Operation | 2241 |
| Preselector Adjust | 2241 |
| Y Axis Unit | 2242 |
| dBm | 2244 |
| dBmV | 2244 |
| dBmA | 2244 |
| W | 2245 |
| V | 2245 |
| A | 2245 |
| dB μ V | 2245 |
| dB μ A | 2246 |
| dBpW | 2246 |
| Antenna Unit | 2247 |
| dB μ V/m | 2247 |
| dB μ A/m | 2247 |
| dB μ A | 2247 |
| dBpT | 2248 |
| dBG | 2248 |
| None | 2248 |
| μ W Path Control | 2249 |
| Standard Path | 2250 |
| Low Noise Path Enable | 2250 |
| More Information | 2251 |
| μ W Preselector Bypass | 2252 |
| Internal Preamp | 2253 |

Table of Contents

| | |
|--|------|
| Off | 2254 |
| Low Band | 2255 |
| Full Range | 2255 |
| Ref Position | 2255 |
| Auto Scaling | 2256 |
| Auto Couple | 2257 |
| More Information | 2257 |
| Auto/Man Active Function keys | 2257 |
| Auto/Man 1-of-N keys | 2257 |
| BW | 2259 |
| Res BW | 2259 |
| Video BW | 2260 |
| VBW:3dB RBW | 2262 |
| Span:3dB RBW | 2262 |
| Cont (Continuous Measurement/Sweep) | 2264 |
| File | 2266 |
| FREQ Channel | 2267 |
| Center Freq | 2267 |
| Center Frequency Presets | 2268 |
| RF Center Freq | 2270 |
| Ext Mix Center Freq | 2271 |
| I/Q Center Freq | 2272 |
| CF Step | 2272 |
| Input/Output | 2274 |
| Marker | 2275 |
| Select Marker | 2275 |
| Marker Type | 2275 |
| Properties | 2276 |
| Select Marker | 2276 |
| Relative To | 2276 |
| Marker Trace | 2276 |
| Couple Markers | 2277 |
| All Markers Off | 2277 |
| Marker X Axis Value (Remote Command only) | 2278 |
| Marker X Axis Position (Remote Command only) | 2278 |
| Marker Y Axis Value (Remote Command only) | 2279 |
| Marker Function | 2280 |
| Select Marker | 2280 |
| Marker Function Type | 2280 |
| Band Adjust | 2280 |
| Band/Interval Span for Frequency Domain | 2281 |
| Band/Interval Left for Frequency Domain | 2281 |
| Band/Interval Right for Frequency Domain | 2282 |

| | |
|---|------|
| Marker To | 2283 |
| Meas | 2284 |
| Remote Measurement Functions | 2284 |
| Measurement Group of Commands | 2285 |
| Current Measurement Query (Remote Command Only) | 2287 |
| Limit Test Current Results (Remote Command Only) | 2287 |
| Data Query (Remote Command Only) | 2287 |
| Calculate/Compress Trace Data Query (Remote Command Only) | 2288 |
| Calculate Peaks of Trace Data (Remote Command Only) | 2293 |
| Format Data: Numeric Data (Remote Command Only) | 2294 |
| Format Data: Byte Order (Remote Command Only) | 2295 |
| Meas Setup | 2296 |
| Avg/Hold Num | 2296 |
| Avg Mode | 2296 |
| Meas Preset | 2297 |
| Mode | 2298 |
| Mode Preset | 2299 |
| How-To Preset | 2300 |
| Preset Type (Remote Command Only) | 2301 |
| Mode Setup | 2302 |
| Peak Search | 2303 |
| Print | 2304 |
| Quick Save | 2305 |
| Recall | 2307 |
| State | 2307 |
| More Information | 2309 |
| From File... | 2309 |
| Edit Register Names | 2311 |
| Register 1 thru Register 16 | 2311 |
| Register 1 thru Register 16 | 2312 |
| Data (Import) | 2313 |
| Capture Buffer | 2313 |
| Open... | 2314 |
| Restart | 2315 |
| More Information | 2315 |
| Save | 2317 |
| State | 2317 |
| To File . . . | 2318 |
| Edit Register Names | 2320 |
| More Information | 2320 |
| Register 1 thru Register 16 | 2321 |
| Register 1 thru Register 16 | 2321 |
| Data (Export) | 2322 |

| | |
|---|------|
| Meas Results | 2323 |
| Capture Buffer | 2323 |
| Save As . . . | 2323 |
| Screen Image | 2324 |
| Themes | 2325 |
| 3D Color | 2325 |
| 3D Monochrome | 2326 |
| Flat Color | 2326 |
| Flat Monochrome | 2326 |
| Save As... | 2326 |
| Mass Storage Catalog (Remote Command Only) | 2327 |
| Mass Storage Change Directory (Remote Command Only) | 2327 |
| Mass Storage Copy (Remote Command Only) | 2328 |
| Mass Storage Device Copy (Remote Command Only) | 2328 |
| Mass Storage Delete (Remote Command Only) | 2328 |
| Mass Storage Data (Remote Command Only) | 2328 |
| Mass Storage Make Directory (Remote Command Only) | 2329 |
| Mass Storage Move (Remote Command Only) | 2329 |
| Mass Storage Remove Directory (Remote Command Only) | 2330 |
| Single (Single Measurement/Sweep) | 2331 |
| More Information | 2331 |
| Source | 2332 |
| Span X Scale | 2333 |
| Span | 2333 |
| IDEN Mode Span Preset for Monitor Spectrum | 2334 |
| Full Span | 2334 |
| Last Span | 2334 |
| Sweep/Control | 2336 |
| Sweep Time | 2336 |
| Pause | 2336 |
| Gate | 2337 |
| Gate On/Off | 2337 |
| Gate View On/Off | 2338 |
| Gate View Setup | 2341 |
| Gate View Sweep Time | 2342 |
| Gate View Start Time | 2342 |
| Gate Delay | 2343 |
| Gate Length | 2343 |
| Gate Source | 2344 |
| External 1 | 2345 |
| External 2 | 2347 |
| RF Burst | 2349 |
| Periodic Timer (Frame Trigger) | 2352 |

| | |
|---|------|
| Control Edge/Level | 2363 |
| Gate Holdoff | 2363 |
| Gate Delay Compensation | 2365 |
| More Information | 2366 |
| Min Fast Position Query (Remote Command Only) | 2366 |
| Gate Preset (Remote Command Only) | 2367 |
| Gate Level (Remote Command Only) | 2367 |
| Gate Polarity (Remote Command Only) | 2367 |
| Points | 2368 |
| System | 2369 |
| Trace/Detector | 2370 |
| Select Trace | 2370 |
| Trace Type | 2370 |
| Update | 2371 |
| Display | 2371 |
| Detector | 2372 |
| Auto | 2373 |
| Clear Trace | 2373 |
| Clear All Traces | 2373 |
| Trigger | 2375 |
| Free Run | 2375 |
| External 1 | 2375 |
| Trigger Level | 2375 |
| Trig Slope | 2375 |
| Trig Delay | 2375 |
| Zero Span Delay Comp | 2375 |
| External 2 | 2375 |
| Trigger Level | 2375 |
| Trig Slope | 2375 |
| Trig Delay | 2375 |
| Zero Span Delay Comp | 2375 |
| RF Burst | 2375 |
| Absolute Trigger | 2375 |
| Relative Trigger | 2376 |
| Trig Slope | 2376 |
| Trig Delay | 2376 |
| Periodic Timer | 2376 |
| Period | 2376 |
| Offset | 2376 |
| Reset Offset Display | 2376 |
| Sync Source | 2376 |
| Off | 2376 |
| External 1 | 2376 |

Table of Contents

| | |
|---|------|
| External 2 | 2376 |
| RF Burst | 2377 |
| Trig Delay | 2377 |
| Auto/Holdoff | 2377 |
| Auto Trig | 2377 |
| Trig Holdoff | 2377 |
| Holdoff Type | 2377 |
| User Preset | 2378 |
| User Preset | 2378 |
| User Preset All Modes | 2379 |
| Save User Preset | 2380 |
| View/Display | 2381 |
| View for all modes except MSR, 1xEV-DO, LTE-Advanced FDD/TDD | 2381 |
| 1xEV-DO Mode View | 2382 |
| MSR and LTE-Advanced FDD/TDD Mode Views | 2382 |
| View Selection by Name (MSR and LTE-Advanced FDD/TDD mode only) | 2383 |
| View Selection by Number (MSR and LTE-Advanced FDD/TDD mode only) | 2383 |
| Display | 2383 |
| Annotation | 2384 |
| Meas Bar On/Off | 2385 |
| Screen | 2385 |
| Active Function Values On/Off | 2385 |
| Title | 2386 |
| Change Title | 2386 |
| Clear Title | 2387 |
| Graticule | 2388 |
| System Display Settings | 2388 |
| Annotation Local Settings | 2388 |
| Themes | 2389 |
| Backlight | 2390 |
| Backlight Intensity | 2390 |

1 About the Analyzer

The X-Series signal analyzer measures and monitors complex RF and microwave signals. Analog baseband analysis is available on MXA. The analyzer integrates traditional spectrum measurements with advanced vector signal analysis to optimize speed, accuracy, and dynamic range. The analyzer has Windows 7[®] built in as an operating system, which expands its usability.

With a broad set of applications and demodulation capabilities, an intuitive user interface, outstanding connectivity and powerful one-button measurements, the analyzer is ideal for both R&D and manufacturing engineers working on cellular, emerging wireless communications, general purpose, aerospace and defense applications.

Installing Application Software

If you want to install a measurement application after your initial hardware purchase, you need only to license it. All of the available applications are loaded in your analyzer at the time of purchase.

Thus, when you purchase a new application, you will receive an entitlement certificate that you can use to obtain a license key for that application. To activate the new measurement application, enter the license key that you obtain into the Signal Analyzer.

For the latest information on Keysight Signal Analyzer measurement applications and upgrade kits, visit the following internet URL.

http://www.agilent.com/find/sa_upgrades

Viewing a License Key

Measurement applications that you purchased with your instrument have been installed and activated at the factory before shipment. The instrument requires a unique License Key for every measurement application purchased. The license key is a hexadecimal string that is specific to your measurement application, instrument model number and serial number. It enables you to install, or reactivate, that particular application.

Press **System, Show, System** to display the measurement applications that are currently licensed in your analyzer.

Go to the following location to view the license keys for the installed measurement applications:

C:\Program Files\Agilent\Licensing

You may want to keep a copy of your license key in a secure location. To do this, you can print out a copy of the display showing the license numbers. If you should lose your license key, call your nearest Keysight Technologies service or sales office for assistance.

Obtaining and Installing a License Key

If you purchase an additional application that requires installation, you will receive an "Entitlement Certificate", which may be redeemed for a license key for one instrument. To obtain your license key, follow the instructions that accompany the certificate.

Installing a license key for the selected application can be done automatically using a USB memory device. To do this, you copy the license file to the USB memory device, at the root level. Follow the instructions that come with your software installation kit.

Installing a license key can also be done manually using the built-in license management application, which may be found via the instrument front panel keys at **System, Licensing. . .**, or on-disk at:

C:\Programming Files\Agilent\Licensing

You can also use these procedures to reinstall a license key that has been accidentally deleted, or lost due to a memory failure.

Updating Measurement Application Software

All the software applications were loaded at the time of original instrument manufacture. It is a good idea to regularly update your software with the latest available version. This helps to ensure that you receive

any improvements and expanded functionality.

Because the software was loaded at the initial purchase, further additional measurement applications may now be available. If the application you are interested in licensing is not available, you will need to do a software update. (To display a list of installed applications, press **System, Show, System.**)

Check the appropriate page of the Keysight web site for the latest available software versions, according to the name of your instrument, as follows:

http://www.agilent.com/find/pxa_software

http://www.agilent.com/find/mxa_software

http://www.agilent.com/find/exa_software

http://www.agilent.com/find/cxa_software

You can load the updated software package into the analyzer from a USB drive, or directly from the internet. An automatic loading program is included with the files.

X-Series Options and Accessories

You can view an online list of available Options and Accessories for your instrument as follows:

1. Browse to one of the following URLs, according to the product name of your analyzer:

www.agilent.com/find/cxa

www.agilent.com/find/exa

www.agilent.com/find/mxa

www.agilent.com/find/pxa

2. The home page for your instrument appears (in some cases, you may see an initial splash screen containing a button named View the Webpage, which you should click to display the home page).
3. Locate the Options tab, as highlighted in the example below, which shows the home page for the MXA.



4. Click the Options tab, to display a list of available options and accessories for your instrument.

Front-Panel Features

The instrument's Front-panel features are fully detailed in the section "Front-Panel Features" (under the chapter "Front and Rear Panel Features") of the document:

[Getting Started Guide](#)

If you are viewing this information as a Help file in the instrument, then you can click on the link above to open the PDF document.

Display Annotations

Display Annotations are fully detailed under the chapter "Front and Rear Panel Features" of the document:

[Getting Started Guide](#)

If you are viewing this information as a Help file in the instrument, then you can click on the link above to open the PDF document.

Rear-Panel Features

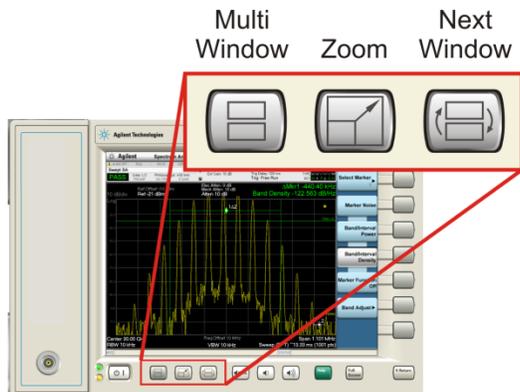
The instrument's Rear-panel features are fully detailed in the section "Rear-Panel Features" (under the chapter "Front and Rear Panel Features") of the document:

[Getting Started Guide](#)

If you are viewing this information as a Help file in the instrument, then you can click on the link above to open the PDF document.

Window Control Keys

The instrument provides three front-panel keys for controlling windows. They are Multi Window, Zoom, and Next Window. These are all “immediate action” keys.



Multi-Window



The Multi Window front-panel key will toggle you back and forth between the Normal View and the last Multi Window View (Zone Span, Trace Zoom or Spectrogram) that you were in, when using the Swept SA measurement of the Spectrum Analyzer Mode. It remembers which View you were in through a Preset. This “previous view” is set to Zone Span on a Restore Mode Defaults.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Zoom

Zoom is a toggle function. Pressing this key once increases the size of the selected window. Pressing the key again returns the window to the original size.

When Zoom is on for a window, that window will get the entire primary display area. The zoomed window, since it is the selected window, is outlined in green.

Zoom is local to each Measurement. Each Measurement remembers its Zoom state. The Zoom state of each Measurement is part of the Mode’s state.

NOTE

Data acquisition and processing for the other windows continues while a window is zoomed, as does all SCPI communication with the other windows.

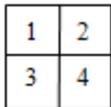
| | |
|----------------|-----------------------------|
| Remote Command | :DISPlay:WINDow:FORMat:ZOOM |
|----------------|-----------------------------|

| | |
|-----------------------|---|
| Remote Command | :DISPlay:WINDow:FORMat:TILE |
| Example | :DISP:WIND:FORM:ZOOM sets zoomed :DISP:WIND:FORM:TILE sets un-zoomed |
| Preset | TILE |
| Initial S/W Revision | Prior to A.02.00 |

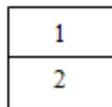
Next Window

Selects the next window of the current view. When the Next Window key is pressed, the next window in the order of precedence becomes selected. If the selected window was zoomed, the next window will also be zoomed.

The window numbers are as follows. Note that these numbers also determine the order of precedence (that is, Next Window goes from 1 to 2, then 2 to 3, etc.):



Four window display



Two window display

RTSA measurements:

Only two windows are available in the Spectrogram view under the Spectrum measurement and up to three windows are available in the Power vs. Time measurement, depending on the view set up.

| | |
|-----------------------|---|
| Remote Command | :DISPlay:WINDow[:SElect] <number> :DISPlay:WINDow[:SElect]? |
| Example | :DISP:WIND 1 |
| Preset | 1 |
| Min | 1 |
| Max | If <number> is greater than the number of windows, limit to <number of windows> |
| Initial S/W Revision | Prior to A.02.00 |

One and only one window is always selected. The selected window has the focus; this means that all window-specific key presses apply only to that window. You can tell which window is selected by the thick green border around it. If a window is not selected, its boundary is gray.

If a window in a multi-window display is zoomed it is still outlined in green. If there is only one window, the green outline is not used. This allows the user to distinguish between a zoomed window and a display with only one window.

The selected window is local to each Measurement. Each Measurement remembers which window is selected. The selected window for each Measurement is remembered in Mode state.

NOTE

When this key is pressed in Help Mode, it toggles focus between the table of contents window and the topic pane window.

Full Screen

When Full Screen is pressed the measurement window expands horizontally over the entire instrument display. The screen graticule area expands to fill the available display area.

It turns off the display of the softkey labels, however the menus and active functions still work. (Though it would obviously be very hard to navigate without the key labels displayed.) Pressing Full Screen again while Full Screen is in effect cancels Full Screen.

Note that the banner and status lines are unaffected. You can get even more screen area for your data display by turning off the Meas Bar (in the Display menu) which also turns off the settings panel.

Full Screen is a Meas Global function. Therefore it is cancelled by the Preset key.

| Key Path | Display |
|-------------------------------------|---|
| Remote Command | :DISPlay:FSCReen[:STAtE] OFF ON 0 1 :DISPlay:FSCReen[:STAtE]? |
| Preset | Unaffected by Preset but set to Off by Restore Misc Defaults or shutdown and restart |
| State Saved | Not saved in instrument state. |
| Backwards Compatibility SCPI | :DISPlay:MENU[:STAtE] OFF ON 0 1 This emulates ESA full screen functionality, which is the same as the FSCReen command in PSA except that the sense of on/off is reversed (that is, OFF means the menus are OFF, so Fullscreen is ON) and the default is ON (meaning Fullscreen is OFF). |
| Backwards Compatibility Notes | In ESA/PSA, Full Screen was turned on with a softkey, so pressing any other key turned Full Screen off. In the X-Series, because a hardkey is provided to turn this function on and off, pressing any other key no longer turns off Full Screen |
| Initial S/W Revision | Prior to A.02.00 |

Display Enable (Remote Command Only)

Turns the display on/off, including the display drive circuitry. The backlight stays lit so you can tell that the instrument is on. The display enable setting is mode global. The reasons for turning the display off are three:

- To increase speed as much as possible by freeing the instrument from having to update the display
- To reduce emissions from the display, drive circuitry
- For security purposes

If you have turned off the display:

- and you are in local operation, the display can be turned back on by pressing any key or by sending the SYSTem:DEFaults MISC command or the DISPlay:ENABle ON (neither *RST nor SYSTem:PRESet enable the display.)
- and you are in remote operation, the display can be turned back on by pressing the Local or Esc keys or by sending the SYSTem:DEFaults MISC command or the DISPlay:ENABle ON (neither *RST nor SYSTem:PRESet enable the display.)

and you are using either the SYSTem:KLOCK command or GPIB local lockout, then no front-panel key press will turn the display back on. You must turn it back on remotely.

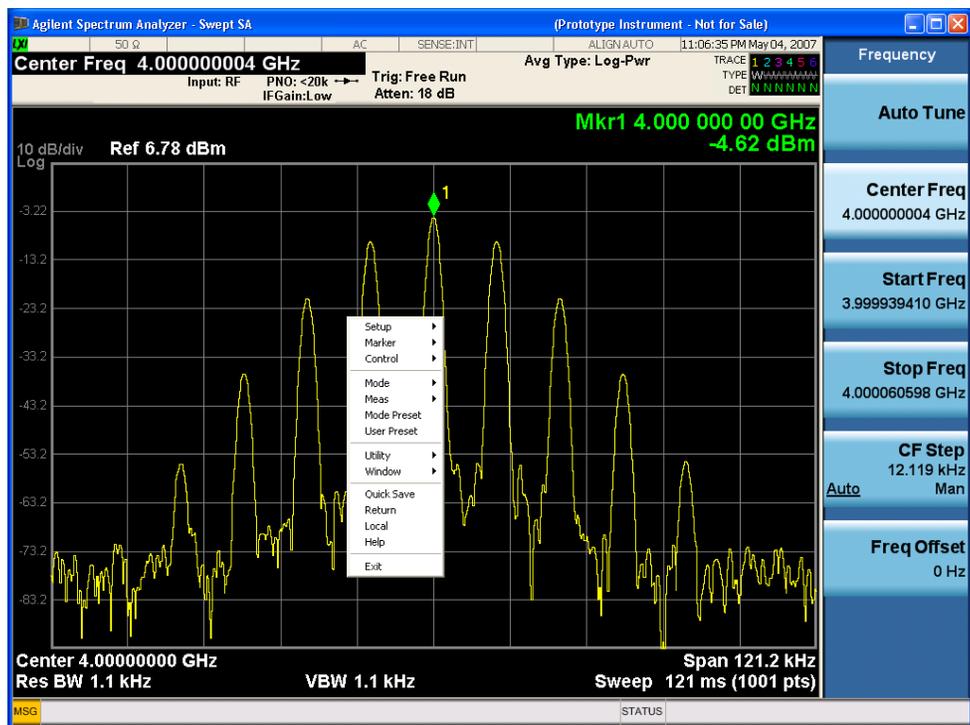
| | |
|--------------------------------------|--|
| Remote Command | :DISPlay:ENABle OFF ON 0 1 :DISPlay:ENABle? |
| Example | DISP:ENAB OFF |
| Couplings | DISP:ENAB OFF turns Backlight OFF and DISP:ENAB ON turns Backlight ON. However, settings of Backlight do not change the state of DISP:ENAB |
| Preset | On Set by SYST:DEF MISC, but Not affected by *RST or SYSTem:PRESet. |
| State Saved | Not saved in instrument state. |
| Backwards Compatibility Notes | SYST:PRES no longer turns on DISPlay:ENABle as it did in legacy analyzers |
| Initial S/W Revision | Prior to A.02.00 |

Mouse and Keyboard Control

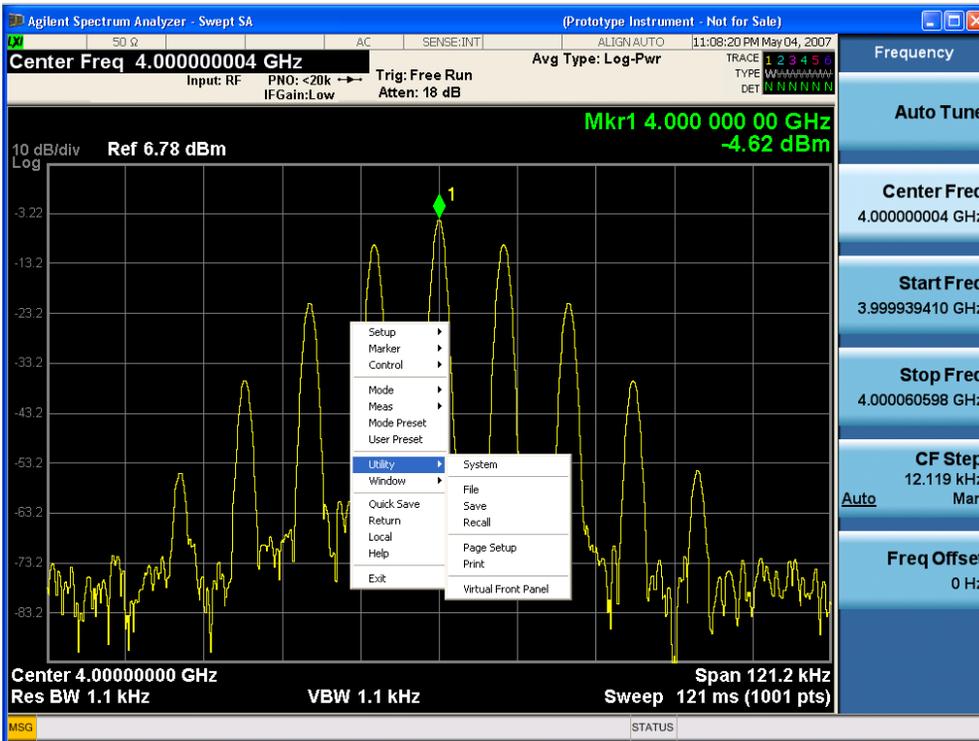
If you do not have access to the instrument front-panel, there are several ways that a mouse and PC Keyboard can give you access to functions normally accessed using the front-panel keys.

Right-Click

If you plug in a mouse and right-click on the analyzer screen, a menu will appear as below:

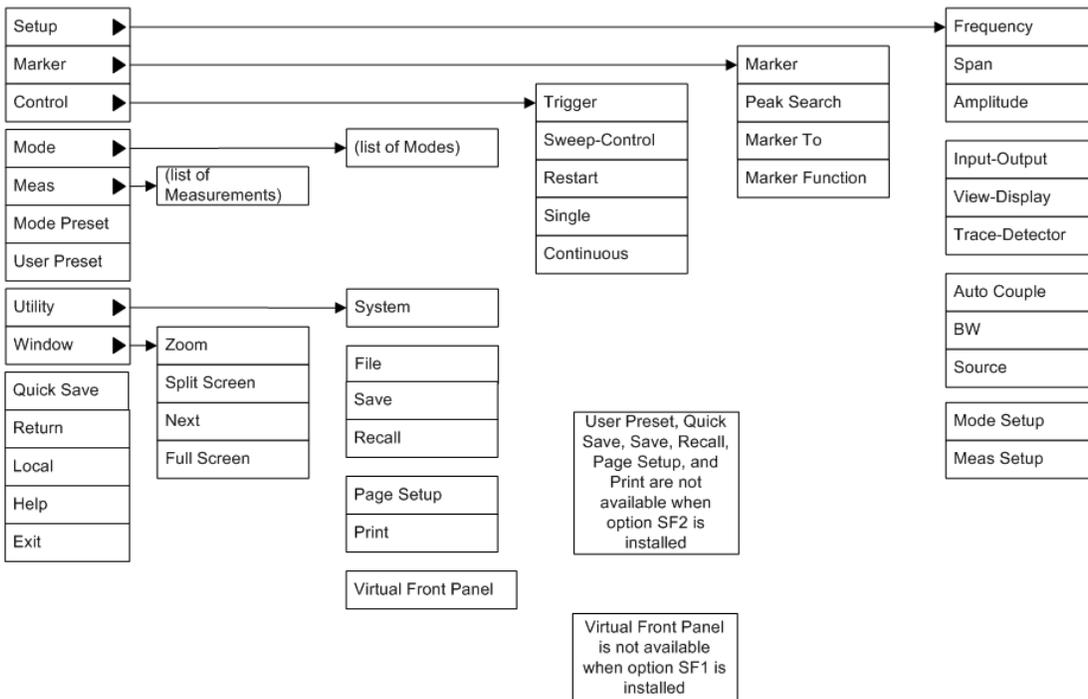


Placing the mouse on one of the rows marked with a right arrow symbol will cause that row to expand, as for example below where the mouse is hovered over the “Utility” row:



This method can be used to access any of the front-panel keys by using a mouse; as for example if you are accessing the instrument through Remote Desktop.

The array of keys thus available is shown below:



PC Keyboard

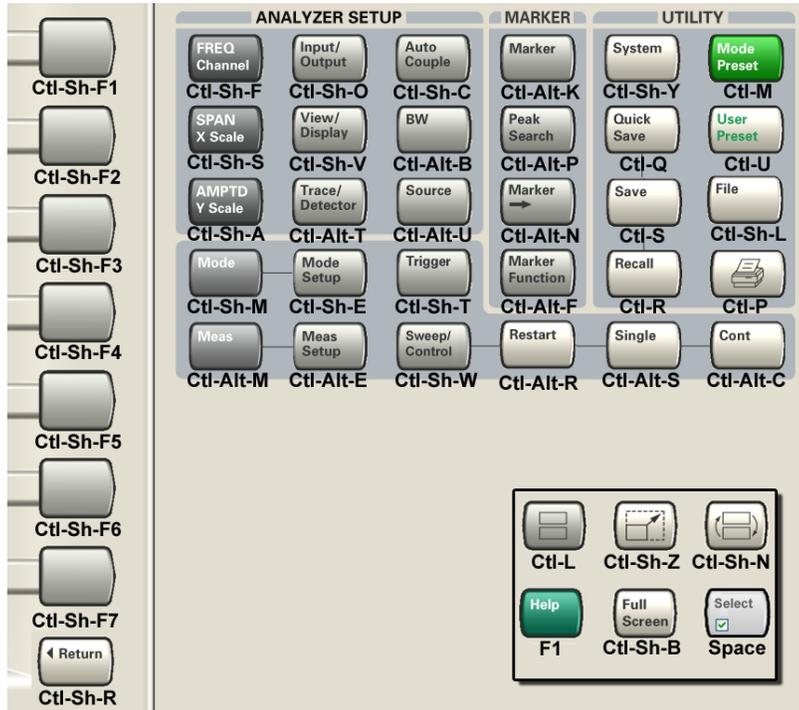
If you have a PC keyboard plugged in (or via Remote Desktop), certain key codes on the PC keyboard map to front-panel keys on the GPSA front panel. These key codes are shown below:

| Front-panel key | Key code |
|-----------------|--------------|
| Frequency | CTRL+SHIFT+F |
| Span | CTRL+SHIFT+S |
| Amplitude | CTRL+SHIFT+A |
| Input/Output | CTRL+SHIFT+O |
| View/Display | CTRL+SHIFT+V |
| Trace/Detector | CTRL+ALT+T |
| Auto Couple | CTRL+SHIFT+C |
| Bandwidth | CTRL+ALT+B |
| Source | CTRL+ALT-U |
| Marker | CTRL+ALT+K |
| Peak Search | CTRL+ALT+P |
| Marker To | CTRL+ALT+N |
| Marker Function | CTRL+ALT+F |
| System | CTRL+SHIFT+Y |
| Quick Save | CTRL+Q |
| Save | CTRL+S |
| Recall | CTRL+R |
| Mode Preset | CTRL+M |
| User Preset | CTRL+U |
| Print | CTRL+P |
| File | CTRL+SHIFT+L |
| Mode | CTRL+SHIFT+M |
| Measure | CTRL+ALT+M |
| Mode Setup | CTRL+SHIFT+E |
| Meas Setup | CTRL+ALT+E |
| Trigger | CTRL+SHIFT+T |
| Sweep/Control | CTRL+SHIFT+W |
| Restart | CTRL+ALT+R |
| Single | CTRL+ALT+S |
| Cont | CTRL+ALT+C |
| Zoom | CTRL+SHIFT+Z |
| Next Window | CTRL+SHIFT+N |
| Split Screen | CTRL+L |

| Front-panel key | Key code |
|-----------------|---------------|
| Full Screen | CTRL+SHIFT+B |
| Return | CTRL+SHIFT+R |
| Mute | Mute |
| Inc Audio | Volume Up |
| Dec Audio | Volume Down |
| Help | F1 |
| Control | CTRL |
| Alt | ALT |
| Enter | Return |
| Cancel | Esc |
| Del | Delete |
| Backspace | Backspace |
| Select | Space |
| Up Arrow | Up |
| Down Arrow | Down |
| Left Arrow | Left |
| Right Arrow | Right |
| Menu key 1 | CTRL+SHIFT+F1 |
| Menu key 2 | CTRL+SHIFT+F2 |
| Menu key 3 | CTRL+SHIFT+F3 |
| Menu key 4 | CTRL+SHIFT+F4 |
| Menu key 5 | CTRL+SHIFT+F5 |
| Menu key 6 | CTRL+SHIFT+F6 |
| Menu key 7 | CTRL+SHIFT+F7 |
| Backspace | BACKSPACE |
| Enter | ENTER |
| Tab | Tab |
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | 5 |
| 6 | 6 |
| 7 | 7 |
| 8 | 8 |
| 9 | 9 |
| 0 | 0 |

1 About the Analyzer
 Mouse and Keyboard Control

This is a pictorial view of the table:



Instrument Security & Memory Volatility

If you are using the instrument in a secure environment, you may need details of how to clear or sanitize its memory, in compliance with published security standards of the United States Department of Defense, or other similar authorities.

For X-Series analyzers, this information is contained in the document "Security Features and Document of Volatility". This document is not included in the Documentation CD, or the instrument's on-disk library, but it may be downloaded from Keysight's web site.

To obtain a copy of the document, click on or browse to the following URL:

<http://www.agilent.com/find/security>

To locate and download the document, select Model Number "N9020A", then click "Submit". Then, follow the on-screen instructions to download the file.

2 About the TD-SCDMA with HSPA/8PSK Measurement Application

This chapter provides information on using the TD-SCDMA with HSPA/8PSK Measurement Application in your Agilent Signal Analyzer.

What Does the TD-SCDMA with HSPA/8PSK Application Do?

This mode provides the following measurements of TD-SCDMA (3GPP) and HSPA/8PSK signals:

- Transmit Power
- Adjacent Channel Power (ACP)
- Power vs Time
- Spectrum Emission Mask (SEP)
- Spurious Emissions
- Occupied BW
- Power Stat CCDF
- Code Domain
- Modulation Accuracy (Composite EVM)
- IQ Waveform
- Monitor Spectrum

The analyzer automatically makes these measurements using the measurement methods and limits defined in the TD-SCDMA (3GPP) standard specifications. The detailed results displayed by the measurements enable you to analyze TD-SCDMA system performance. You may alter the measurement parameters for specialized analysis.

Baseband I/Q Input Hardware Option BBA (Optional)

Baseband I/Q Input (BBIQ) functionality is available in the TD-SCDMA with HSPA/8PSK Mode and provides the ability to analyze Baseband I/Q signal characteristics of mobile and base station transmitters.

The following measurements are available for use with the Baseband I/Q Input:

- Transmit Power
- Power Stat CCDF
- Code Domain
- Modulation Accuracy (Composite EVM)
- IQ Waveform

3 Programming the Analyzer

This section provides introductory information about the programming documentation included with your product.

- ["What Programming Information is Available?" on page 108](#)
- ["STATus Subsystem " on page 149](#)
- ["IEEE 488.2 Common Commands" on page 191](#)

What Programming Information is Available?

The X-Series Documentation can be accessed through the Additional Documentation page in the instrument Help system and is included on the Documentation DVD shipped with the instrument. It can also be found online at: http://www.agilent.com/find/mxa_manuals.

The following resources are available to help you create programs for automating your X-Series measurements:

| Resource | Description |
|---|--|
| X-Series Programmer's Guide | Provides general SCPI programming information on the following topics: <ul style="list-style-type: none">• Programming the X-Series Applications• Programming fundamentals• Programming examples Note that SCPI command descriptions for measurement applications are not in this book, but are in the User's and Programmer's Reference. |
| User's and Programmer's Reference manuals | Describes all front-panel keys and softkeys, including SCPI commands for a measurement application. Note that: <ul style="list-style-type: none">• Each measurement application has its own User's and Programmer's Reference.• The content in this manual is duplicated in the instrument's Help (the Help that you see for a key is identical to what you see in this manual). |
| Embedded Help in your instrument | Describes all front-panel keys and softkeys, including SCPI commands, for a measurement application. Note that the content that you see in Help when you press a key is identical to what you see in the User's and Programmer's Reference. |
| X-Series Getting Started Guide | Provides valuable sections related to programming including: <ul style="list-style-type: none">• Licensing New Measurement Application Software - After Initial Purchase• Configuring instrument LAN Hostname, IP Address, and Gateway Address• Using the Windows Remote Desktop to connect to the instrument remotely• Using the Embedded Web Server Telnet connection to communicate SCPI This printed document is shipped with the instrument. |
| Keysight Application Notes | Printable PDF versions of pertinent application notes. |
| Keysight VISA User's Guide | Describes the Keysight Virtual Instrument Software Architecture (VISA) library and shows how to use it to develop I/O applications and instrument drivers on Windows PCs. |

List of SCPI Commands

```

*CAL?
*CLS
*ESE <integer>
*ESE?
*ESR?
*IDN?
*OPC
*OPC?
*OPT?
*RCL <register#>
*RST
*SAV <register#>
*SRE <integer>
*SRE?
*STB?
*TRG
*TST?
*WAI
ABORT
CALCulate:ACPower:LIMit:STATe OFF | ON | 0 | 1
CALCulate:ACPower:LIMit:STATe?
CALCulate:ACPower:MARKer:AOff
CALCulate:ACPower:MARKer:COUPle[:STATe] ON | OFF | 1 | 0
CALCulate:ACPower:MARKer:COUPle[:STATe]?
CALCulate:ACPower:MARKer[1]|2|...|12:FUNction:RESult?
CALCulate:ACPower:MARKer[1]|2|...|12:MAXimum
CALCulate:ACPower:MARKer[1]|2|...|12:MAXimum:LEFT
CALCulate:ACPower:MARKer[1]|2|...|12:MAXimum:NEXT
CALCulate:ACPower:MARKer[1]|2|...|12:MAXimum:RIGHT
CALCulate:ACPower:MARKer[1]|2|...|12:MINimum
CALCulate:ACPower:MARKer[1]|2|...|12:MODE POSition | DELTA | OFF
CALCulate:ACPower:MARKer[1]|2|...|12:MODE?
CALCulate:ACPower:MARKer[1]|2|...|12:PTPeak
CALCulate:ACPower:MARKer[1]|2|...|12:REFerence <integer>
CALCulate:ACPower:MARKer[1]|2|...|12:REFerence?
CALCulate:ACPower:MARKer[1]|2|...|12:STATe OFF | ON | 0 | 1
CALCulate:ACPower:MARKer[1]|2|...|12:STATe?
CALCulate:ACPower:MARKer[1]|2|...|12:TRACe 1 | 2 | 3
CALCulate:ACPower:MARKer[1]|2|...|12:TRACe?
CALCulate:ACPower:MARKer[1]|2|...|12:X <freq>
CALCulate:ACPower:MARKer[1]|2|...|12:X?
CALCulate:ACPower:MARKer[1]|2|...|12:X:POSition <real>
CALCulate:ACPower:MARKer[1]|2|...|12:X:POSition?
CALCulate:ACPower:MARKer[1]|2|...|12:Y?
CALCulate:ACPower:OFFSet[:OUTer]:LIST:LIMit:NEGative[:UPPer]:DATA <real>,
...
CALCulate:ACPower:OFFSet[:OUTer]:LIST:LIMit:NEGative[:UPPer]:DATA?
CALCulate:ACPower:OFFSet[:OUTer]:LIST:LIMit:POSitive[:UPPer]:DATA <real>,
...
CALCulate:ACPower:OFFSet[:OUTer]:LIST:LIMit:POSitive[:UPPer]:DATA?

```

```

CALCulate:BPOWer:MARKer:AOff
CALCulate:BPOWer:MARKer[1]|2|...|12:FUNcTION:RESult?
CALCulate:BPOWer:MARKer[1]|2|...|12:MODE
CALCulate:BPOWer:MARKer[1]|2|...|12:TRACe
CALCulate:BPOWer:MARKer[1]|2|...|12:X:POSition
CALCulate:BPOWer:MARKer[1]|2|...|12:Y?
CALCulate:CDPower:MARKer:AOff
CALCulate:CDPower:MARKer:COUple[:STATE] ON | OFF | 1 | 0
CALCulate:CDPower:MARKer:COUple[:STATE]?
CALCulate:CDPower:MARKer[1]|2|...|12:FUNcTION:RESult?
CALCulate:CDPower:MARKer[1]|2|...|12:MAXimum
CALCulate:CDPower:MARKer[1]|2|...|12:MAXimum:LEFT
CALCulate:CDPower:MARKer[1]|2|...|12:MAXimum:NEXT
CALCulate:CDPower:MARKer[1]|2|...|12:MAXimum:RIGHT
CALCulate:CDPower:MARKer[1]|2|...|12:MINimum
CALCulate:CDPower:MARKer[1]|2|...|12:MODE POSition | DELTa | OFF
CALCulate:CDPower:MARKer[1]|2|...|12:MODE?
CALCulate:CDPower:MARKer[1]|2|...|12:PTPeak
CALCulate:CDPower:MARKer[1]|2|...|12:REFerence <integer>
CALCulate:CDPower:MARKer[1]|2|...|12:REFerence?
CALCulate:CDPower:MARKer[1]|2|...|12:STATE OFF | ON | 0 | 1
CALCulate:CDPower:MARKer[1]|2|...|12:STATE?
CALCulate:CDPower:MARKer[1]|2|...|12:SYMBOL <real>
CALCulate:CDPower:MARKer[1]|2|...|12:SYMBOL?
CALCulate:CDPower:MARKer[1]|2|...|12:TRACe CDPower | CDError | EVM |
MERRor | PERRor | SYMPower | POLar
CALCulate:CDPower:MARKer[1]|2|...|12:TRACe?
CALCulate:CDPower:MARKer[1]|2|...|12:X <real>
CALCulate:CDPower:MARKer[1]|2|...|12:X?
CALCulate:CDPower:MARKer[1]|2|...|12:X:POSition <real>
CALCulate:CDPower:MARKer[1]|2|...|12:X:POSition?
CALCulate:CDPower:MARKer[1]|2|...|12:Y?
CALCulate:CLIMits:FAIL?
CALCulate:DATA<n>:COMPRESS? BLOCK | CFIT | MAXimum | MINimum | MEAN |
DMEan | RMS | RMSCubed | SAMPLE | SDEVIation | PPHase[, <soffset>[,
<length>[, <roffset>[, <rlimit>]]]]
CALCulate:DATA[n]?
CALCulate:DATA[1]|2|...|6:PEAKs? <threshold>, <excursion>[, AMPLitude |
FREQuency | TIME[, ALL | GTDLine | LTDLine]]
CALCulate:DATA[1]|2|...|6:PEAKs? <threshold>, <excursion>[, AMPLitude |
FREQuency | TIME]
CALCulate:EVM:LIMit[1]|2:FERRor <real>
CALCulate:EVM:LIMit[1]|2:FERRor?
CALCulate:EVM:LIMit[1]|2:PCDE <rel_ampl>
CALCulate:EVM:LIMit[1]|2:PCDE?
CALCulate:EVM:LIMit[1]|2:PEAK <real>
CALCulate:EVM:LIMit[1]|2:PEAK?
CALCulate:EVM:LIMit[1]|2:RHO <real>
CALCulate:EVM:LIMit[1]|2:RHO?
CALCulate:EVM:LIMit[1]|2:RMS <real>
CALCulate:EVM:LIMit[1]|2:RMS?
CALCulate:EVM:MARKer:AOff

```

```

CALCulate:EVM:MARKer[1]|2|...|12:CHIP <real>
CALCulate:EVM:MARKer[1]|2|...|12:CHIP?
CALCulate:EVM:MARKer:COUple[:STATE] ON | OFF | 1 | 0
CALCulate:EVM:MARKer:COUple[:STATE]?
CALCulate:EVM:MARKer[1]|2|...|12:FUNcTION:RESult?
CALCulate:EVM:MARKer[1]|2|...|12:MAXimum
CALCulate:EVM:MARKer[1]|2|...|12:MAXimum:LEFT
CALCulate:EVM:MARKer[1]|2|...|12:MAXimum:NEXT
CALCulate:EVM:MARKer[1]|2|...|12:MAXimum:RIGHT
CALCulate:EVM:MARKer[1]|2|...|12:MINimum
CALCulate:EVM:MARKer[1]|2|...|12:MODE POSition | DELTa | OFF
CALCulate:EVM:MARKer[1]|2|...|12:MODE?
CALCulate:EVM:MARKer[1]|2|...|12:PTPeak
CALCulate:EVM:MARKer[1]|2|...|12:REFerence <integer>
CALCulate:EVM:MARKer[1]|2|...|12:REFerence?
CALCulate:EVM:MARKer[1]|2|...|12:STATE OFF | ON | 0 | 1
CALCulate:EVM:MARKer[1]|2|...|12:STATE?
CALCulate:EVM:MARKer[1]|2|...|12:TRACe POLar | MERRor | PERRor | EVM |
CDPower | CAPTime
CALCulate:EVM:MARKer[1]|2|...|12:TRACe?
CALCulate:EVM:MARKer[1]|2|...|12:X <real>
CALCulate:EVM:MARKer[1]|2|...|12:X?
CALCulate:EVM:MARKer[1]|2|...|12:X:POSition <real>
CALCulate:EVM:MARKer[1]|2|...|12:X:POSition?
CALCulate:EVM:MARKer[1]|2|...|12:Y?
CALCulate:MCPower:OFFSet:LIST:LIMit:NEGative[:UPPer]:DATA (PSAPowerSuite)
CALCulate:MCPower:OFFSet:LIST:LIMit:POSitive[:UPPer]:DATA (PSAPowerSuite)
CALCulate:MONitor:MARKer:AOff
CALCulate:MONitor:MARKer:COUple[:STATE] ON | OFF | 1 | 0
CALCulate:MONitor:MARKer:COUple[:STATE]?
CALCulate:MONitor:MARKer[1]|2|...|12:FUNcTION NOISe | BPOWer | BDENsity |
OFF
CALCulate:MONitor:MARKer[1]|2|...|12:FUNcTION?
CALCulate:MONitor:MARKer[1]|2|...|12:FUNcTION:BAND:LEFT <freq>
CALCulate:MONitor:MARKer[1]|2|...|12:FUNcTION:BAND:LEFT?
CALCulate:MONitor:MARKer[1]|2|...|12:FUNcTION:BAND:RIGHT <freq>
CALCulate:MONitor:MARKer[1]|2|...|12:FUNcTION:BAND:RIGHT?
CALCulate:MONitor:MARKer[1]|2|...|12:FUNcTION:BAND:SPAN <freq>
CALCulate:MONitor:MARKer[1]|2|...|12:FUNcTION:BAND:SPAN?
CALCulate:MONitor:MARKer[1]|2|...|12:FUNcTION:RESult?
CALCulate:MONitor:MARKer[1]|2|...|12:MAXimum
CALCulate:MONitor:MARKer[1]|2|...|12:MODE POSition | DELTa | OFF
CALCulate:MONitor:MARKer[1]|2|...|12:MODE?
CALCulate:MONitor:MARKer[1]|2|...|12:REFerence <integer>
CALCulate:MONitor:MARKer[1]|2|...|12:REFerence?
CALCulate:MONitor:MARKer[1]|2|...|12:TRACe <integer>
CALCulate:MONitor:MARKer[1]|2|...|12:TRACe?
CALCulate:MONitor:MARKer[1]|2|...|12:X <freq>
CALCulate:MONitor:MARKer[1]|2|...|12:X?
CALCulate:MONitor:MARKer[1]|2|...|12:X:POSition <real>
CALCulate:MONitor:MARKer[1]|2|...|12:X:POSition?
CALCulate:MONitor:MARKer[1]|2|...|12:Y?
CALCulate:OBWidth:LIMit:FBLimit <freq>

```

```
CALCulate:OBWidth:LIMit:FBLimit?
CALCulate:OBWidth:LIMit[:TEST] ON | OFF | 1 | 0
CALCulate:OBWidth:LIMit[:TEST]?
CALCulate:OBWidth:MARKer:AOFF
CALCulate:OBWidth:MARKer[1]|2|...|12:MAXimum
CALCulate:OBWidth:MARKer[1]|2|...|12:MODE POSition | DELTa | OFF
CALCulate:OBWidth:MARKer[1]|2|...|12:MODE?
CALCulate:OBWidth:MARKer[1]|2|...|12:REFeRence <integer>
CALCulate:OBWidth:MARKer[1]|2|...|12:REFeRence?
CALCulate:OBWidth:MARKer[1]|2|...|12:STATE OFF | ON | 0 | 1
CALCulate:OBWidth:MARKer[1]|2|...|12:STATE?
CALCulate:OBWidth:MARKer[1]|2|...|12:X <freq>
CALCulate:OBWidth:MARKer[1]|2|...|12:X?
CALCulate:OBWidth:MARKer[1]|2|...|12:X:POSition <real>
CALCulate:OBWidth:MARKer[1]|2|...|12:X:POSition?
CALCulate:OBWidth:MARKer[1]|2|...|12:Y?
CALCulate:PStatistic:MARKer:AOFF
CALCulate:PStatistic:MARKer[1]|2|...|12:FUNCTion:RESult?
CALCulate:PStatistic:MARKer[1]|2|...|12:MODE POSition | DELTa | OFF
CALCulate:PStatistic:MARKer[1]|2|...|12:MODE?
CALCulate:PStatistic:MARKer[1]|2|...|12:REFeRence <integer>
CALCulate:PStatistic:MARKer[1]|2|...|12:REFeRence?
CALCulate:PStatistic:MARKer[1]|2|...|12:TRACe MEASured | GAUSSian |
REFeRence
CALCulate:PStatistic:MARKer[1]|2|...|12:TRACe?
CALCulate:PStatistic:MARKer[1]|2|...|12:X <rel_ampl>
CALCulate:PStatistic:MARKer[1]|2|...|12:X?
CALCulate:PStatistic:MARKer[1]|2|...|12:Y?
CALCulate:PStatistic:STORE:REFeRence
CALCulate:PVTime:MARKer[1]|2|...|12:FUNCTion:RESult?
CALCulate:PVTime:MARKer[1]|2|...|12:MODE POSition | DELTa | OFF
CALCulate:PVTime:MARKer[1]|2|...|12:MODE?
CALCulate:PVTime:MARKer[1]|2|...|4[:STATE]
CALCulate:PVTime:MARKer[1]|2|...|12:STATE OFF | ON | 0 | 1
CALCulate:PVTime:MARKer[1]|2|...|12:STATE?
CALCulate:PVTime:MARKer[1]|2|...|12:X:POSition <real>
CALCulate:PVTime:MARKer[1]|2|...|12:X:POSition?
CALCulate:PVTime:MARKer[1]|2|...|12:Y?
CALCulate:SEMask:LLINE:STATE ON | OFF | 1 | 0
CALCulate:SEMask:LLINE:STATE?
CALCulate:SEMask:MARKer:AOFF
CALCulate:SEMask:MARKer:COUple[:STATE] ON | OFF | 1 | 0
CALCulate:SEMask:MARKer:COUple[:STATE]?
CALCulate:SEMask:MARKer[1]|2|...|12:FUNCTion:RESult?
CALCulate:SEMask:MARKer[1]|2|...|12:MODE POSition | OFF
CALCulate:SEMask:MARKer[1]|2|...|12:MODE?
CALCulate:SEMask:MARKer[1]|2|...|12:X <freq>
CALCulate:SEMask:MARKer[1]|2|...|12:X?
CALCulate:SEMask:MARKer[1]|2|...|12:X:POSition <real>
CALCulate:SEMask:MARKer[1]|2|...|12:X:POSition?
CALCulate:SEMask:MARKer[1]|2|...|12:Y?
CALCulate:SPURious:MARKer:AOFF
CALCulate:SPURious:MARKer:COUple[:STATE] ON | OFF | 1 | 0
```

```

CALCulate:SPURious:MARKer:COUPle[:STATe]?
CALCulate:SPURious:MARKer[1]|2|...|12:MAXimum
CALCulate:SPURious:MARKer[1]|2|...|12:MAXimum:LEFT
CALCulate:SPURious:MARKer[1]|2|...|12:MAXimum:NEXT
CALCulate:SPURious:MARKer[1]|2|...|12:MAXimum:RIGHT
CALCulate:SPURious:MARKer[1]|2|...|12:MINimum
CALCulate:SPURious:MARKer[1]|2|...|12:MODE POSition | DELTA | OFF
CALCulate:SPURious:MARKer[1]|2|...|12:MODE?
CALCulate:SPURious:MARKer[1]|2|...|12:PTPeak
CALCulate:SPURious:MARKer[1]|2|...|12:REference <integer>
CALCulate:SPURious:MARKer[1]|2|...|12:REference?
CALCulate:SPURious:MARKer[1]|2|...|12:X <freq>
CALCulate:SPURious:MARKer[1]|2|...|12:X?
CALCulate:SPURious:MARKer[1]|2|...|12:X:POSition <integer>
CALCulate:SPURious:MARKer[1]|2|...|12:X:POSition?
CALCulate:SPURious:MARKer[1]|2|...|12:Y?
CALCulate:SPURious[:RANGE][:LIST]:LIMit:ABSolute[:UPPer]:DATA[:START]
<ampl>, ...
CALCulate:SPURious[:RANGE][:LIST]:LIMit:ABSolute[:UPPer]:DATA[:START]?
CALCulate:SPURious[:RANGE][:LIST]:LIMit:ABSolute[:UPPer]:DATA:STOP <ampl>,
...
CALCulate:SPURious[:RANGE][:LIST]:LIMit:ABSolute[:UPPer]:DATA:STOP?
CALCulate:SPURious[:RANGE][:LIST]:LIMit:ABSolute[:UPPer]:DATA:STOP:AUTO
OFF|ON|0|1, ...
CALCulate:SPURious[:RANGE][:LIST]:LIMit:ABSolute[:UPPer]:DATA:STOP:AUTO?
CALCulate:TXPower:MARKer:AOff
CALCulate:TXPower:MARKer:COUPle[:STATe] ON | OFF | 1 | 0
CALCulate:TXPower:MARKer:COUPle[:STATe]?
CALCulate:TXPower:MARKer[1]|2|...|12:FUNCTion:RESult?
CALCulate:TXPower:MARKer[1]|2|...|12:MAXimum
CALCulate:TXPower:MARKer[1]|2|...|12:MODE POSition | DELTA | OFF
CALCulate:TXPower:MARKer[1]|2|...|12:MODE?
CALCulate:TXPower:MARKer[1]|2|...|12:REference <integer>
CALCulate:TXPower:MARKer[1]|2|...|12:REference?
CALCulate:TXPower:MARKer[1]|2|...|12:TRACe RFENvelope | MAXHold | MINHold
CALCulate:TXPower:MARKer[1]|2|...|12:TRACe?
CALCulate:TXPower:MARKer[1]|2|...|12:X:POSition <real>
CALCulate:TXPower:MARKer[1]|2|...|12:X:POSition?
CALCulate:TXPower:MARKer[1]|2|...|12:Y?
CALCulate:WAVEform:MARKer:AOff
CALCulate:WAVEform:MARKer:COUPle[:STATe] ON | OFF | 1 | 0
CALCulate:WAVEform:MARKer:COUPle[:STATe]?
CALCulate:WAVEform:MARKer[1]|2|...|12:FUNCTion BPower | BDENsity | OFF
CALCulate:WAVEform:MARKer[1]|2|...|12:FUNCTion?
CALCulate:WAVEform:MARKer[1]|2|...|12:FUNCTion:BAND:LEFT <time>
CALCulate:WAVEform:MARKer[1]|2|...|12:FUNCTion:BAND:LEFT?
CALCulate:WAVEform:MARKer[1]|2|...|12:FUNCTion:BAND:RIGHT <time>
CALCulate:WAVEform:MARKer[1]|2|...|12:FUNCTion:BAND:RIGHT?
CALCulate:WAVEform:MARKer[1]|2|...|12:FUNCTion:BAND:SPAN <time>
CALCulate:WAVEform:MARKer[1]|2|...|12:FUNCTion:BAND:SPAN?
CALCulate:WAVEform:MARKer[1]|2|...|12:FUNCTion:RESult?
CALCulate:WAVEform:MARKer[1]|2|...|12:MAXimum

```

3 Programming the Analyzer

List of SCPI Commands

```
CALCulate:WAVEform:MARKer[1]|2|...|12:MAXimum:NEXT
CALCulate:WAVEform:MARKer[1]|2|...|12:MINimum
CALCulate:WAVEform:MARKer[1]|2|...|12:MODE POSITION | DELTA | OFF
CALCulate:WAVEform:MARKer[1]|2|...|12:MODE?
CALCulate:WAVEform:MARKer[1]|2|...|12:REFERENCE <integer>
CALCulate:WAVEform:MARKer[1]|2|...|12:REFERENCE?
CALCulate:WAVEform:MARKer[1]|2|...|12:STATE OFF | ON | 0 | 1
CALCulate:WAVEform:MARKer[1]|2|...|12:STATE?
CALCulate:WAVEform:MARKer[1]|2|...|12:TRACE RFENvelope | I | Q | IQ
CALCulate:WAVEform:MARKer[1]|2|...|12:TRACE?
CALCulate:WAVEform:MARKer[1]|2|...|12:X <time>
CALCulate:WAVEform:MARKer[1]|2|...|12:X?
CALCulate:WAVEform:MARKer[1]|2|...|12:X:POSITION <real>
CALCulate:WAVEform:MARKer[1]|2|...|12:X:POSITION?
CALCulate:WAVEform:MARKer[1]|2|...|4:X:SPAN
CALCulate:WAVEform:MARKer[1]|2|...|12:Y?
CALibration[:ALL]
CALibration[:ALL]?
CALibration[:ALL]:NPENDING
CALibration:AUTO ALERT
CALibration:AUTO ON | PARTIAL | OFF
CALibration:AUTO?
CALibration:AUTO:ALERT TEMPERATURE | DAY | WEEK | NONE
CALibration:AUTO:ALERT?
CALibration:AUTO:MODE ALL | NRF
CALibration:AUTO:MODE?
CALibration:AUTO:TIME:OFF?
CALibration:DATA:BACKUP <filename>
CALibration:DATA:DEFAULT
CALibration:DATA:RESTORE <filename>
CALibration:EMIXER
CALibration:EMIXER?
CALibration:EXPIRED?
CALibration:FREQUENCY:REFERENCE:COARSE <integer>
CALibration:FREQUENCY:REFERENCE:COARSE
CALibration:FREQUENCY:REFERENCE:COARSE?
CALibration:FREQUENCY:REFERENCE:FINE <integer>
CALibration:FREQUENCY:REFERENCE:FINE?
CALibration:FREQUENCY:REFERENCE:MODE CALIBRATED | USER
CALibration:FREQUENCY:REFERENCE:MODE?
CALibration:IQ:FLATNESS:I
CALibration:IQ:FLATNESS:IBAR
CALibration:IQ:FLATNESS:I|IBAR|Q|QBAR:TIME?
CALibration:IQ:FLATNESS:Q
CALibration:IQ:FLATNESS:QBAR
CALibration:IQ:ISOLATION
CALibration:IQ:ISOLATION:TIME?
CALibration:IQ:PROBE:I
CALibration:IQ:PROBE:IBAR
CALibration:IQ:PROBE:I|IBAR|Q|QBAR:TIME?
CALibration:IQ:PROBE:I|Q:CLEAR
CALibration:IQ:PROBE:Q
CALibration:IQ:PROBE:QBAR
```

CALibration:NFLoor
CALibration:NFLoor?
CALibration:NRF
CALibration:NRF?
CALibration:NRF:NPENding
CALibration:REFeRence:CLOCK?
CALibration:REFeRence:CLOCK:END?
CALibration:REFeRence:CLOCK:INITialize?
CALibration:RF
CALibration:RF?
CALibration:RF:NPENding
CALibration:RFPSelector:SCHeDuler:TIME:NEXT?
CALibration:SOURce:STATE OFF | ON | 0 | 1
CALibration:SOURce:STATE?
CALibration:TEMPerature:CURRent?
CALibration:TEMPerature:LALL?
CALibration:TEMPerature:LPRe-selector?
CALibration:TEMPerature:LRF?
CALibration:TEMPerature:NFLoor?
CALibration:TEMPerature:RFPSelector:LCONducted?
CALibration:TEMPerature:RFPSelector:LRADiated?
CALibration:TIME:ELAPsed:NFLoor?
CALibration:TIME:LALL?
CALibration:TIME:LPRe-selector?
CALibration:TIME:LRF?
CALibration:TIME:NFLoor?
CALibration:TIME:REFeRence:CLOCK?
CALibration:TIME:RFPSelector:LCONducted?
CALibration:TIME:RFPSelector:LRADiated?
CALibration:YTF
CALibration:YTF?
CALibration:YTF:NPENding
CONF FSC
CONFigure?
CONFigure:ACP
CONFigure:ACP:NDEFault
CONFigure:ACPower
CONFigure:CDPower
CONFigure:CDPower
CONFigure:CDPower:NDEFault
CONFigure:EVM
CONFigure:EVM
CONFigure:EVM:NDEFault
CONFigure:MONitor
CONFigure:MONitor
CONFigure:MONitor:NDEFault
CONFigure:OBWidth
CONFigure:OBWidth
CONFigure:OBWidth:NDEFault
CONFigure:PStatistic
CONFigure:PStatistic
CONFigure:PStatistic:NDEFault
CONFigure:PVTime

```
CONFigure:PVTime
CONFigure:PVTime:NDEFault
CONFigure:SEMask
CONFigure:SEMask
CONFigure:SEMask:NDEFault
CONFigure:SPURious
CONFigure:SPURious
CONFigure:SPURious:NDEFault
CONFigure:TXPower
CONFigure:TXPower|BPOWer
CONFigure:TXPower|BPOWer:NDEFault
CONFigure:WAVeform
CONFigure:WAVeform
CONFigure:WAVeform:NDEFault
COUple ALL | NONE
DISPlay:<measurement>:ANNotation:TITLe:DATA <string>
DISPlay:<measurement>:ANNotation:TITLe:DATA?
DISPlay:ACPower:VIEW:NSElect <integer>
DISPlay:ACPower:VIEW:NSElect?
DISPlay:ACPower:VIEW[:SElect] PRESult | CINFormation
DISPlay:ACPower:VIEW[:SElect]?
DISPlay:ACPower:VIEW[1]:WINDow[1]:BGRaph OFF | ON | 0 | 1
DISPlay:ACPower:VIEW[1]:WINDow[1]:BGRaph?
DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUple 0 | 1 | OFF | ON
DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUple?
DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl>
DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOStion TOP | CENTer |
BOTTom
DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOStion?
DISPlay:ACTivefunc[:STATe] ON | OFF | 1 | 0
DISPlay:ACTivefunc[:STATe]?
DISPlay:ANNotation:MBAR[:STATe] OFF | ON | 0 | 1
DISPlay:ANNotation:MBAR[:STATe]?
DISPlay:ANNotation:SCReen[:STATe] OFF | ON | 0 | 1
DISPlay:ANNotation:SCReen[:STATe]?
DISPlay:BACKlight ON | OFF
DISPlay:BACKlight?
DISPlay:BACKlight:INTensity <integer>
DISPlay:BACKlight:INTensity?
DISPlay:CDPower:COMPOSITE OFF | ON | 0 | 1
DISPlay:CDPower:COMPOSITE?
DISPlay:CDPower:SCLength <integer>
DISPlay:CDPower:SCLength?
DISPlay:CDPower:VIEW:NSElect <integer>
DISPlay:CDPower:VIEW:NSElect?
DISPlay:CDPower:VIEW3:WINDow2:TRACe:X[:SCALe]:COUple 0 | 1 | OFF | ON
DISPlay:CDPower:VIEW3:WINDow3:TRACe:X[:SCALe]:COUple 0 | 1 | OFF | ON
DISPlay:CDPower:VIEW4|5:WINDow2:TRACe:X[:SCALe]:COUple 0 | 1 | OFF | ON
DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:X[:SCALe]:COUple 0 | 1 | OFF | ON
DISPlay:CDPower:VIEW3:WINDow3:TRACe:X[:SCALe]:COUple?
```

```

DISPlay:CDPower:VIEW3:WINDow2:TRACe:X[:SCALe]:COUPle?
DISPlay:CDPower:VIEW4|5:WINDow2:TRACe:X[:SCALe]:COUPle?
DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:X[:SCALe]:COUPle?
DISPlay:CDPower:VIEW[1]|4|5:WINDow[1]:TRACe:X[:SCALe]:PDIVision <integer>
DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:X[:SCALe]:PDIVision <integer>
DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:X[:SCALe]:PDIVision <real>
DISPlay:CDPower:VIEW3:WINDow2:TRACe:X[:SCALe]:PDIVision <real>
DISPlay:CDPower:VIEW3:WINDow3:TRACe:X[:SCALe]:PDIVision <real>
DISPlay:CDPower:VIEW4|5:WINDow2:TRACe:X[:SCALe]:PDIVision <real>
DISPlay:CDPower:VIEW4|5:WINDow2:TRACe:X[:SCALe]:PDIVision?
DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
DISPlay:CDPower:VIEW3:WINDow2:TRACe:X[:SCALe]:PDIVision?
DISPlay:CDPower:VIEW3:WINDow3:TRACe:X[:SCALe]:PDIVision?
DISPlay:CDPower:VIEW[1]|4|5:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:X[:SCALe]:RLEVel <real>
DISPlay:CDPower:VIEW3:WINDow3:TRACe:X[:SCALe]:RLEVel <real>
DISPlay:CDPower:VIEW4|5:WINDow2:TRACe:X[:SCALe]:RLEVel <real>
DISPlay:CDPower:VIEW[1]|4|5:WINDow[1]:TRACe:X[:SCALe]:RLEVel <integer>
DISPlay:CDPower:VIEW3:WINDow2:TRACe:X[:SCALe]:RLEVel <real>
DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RLEVel <integer>
DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
DISPlay:CDPower:VIEW3:WINDow2:TRACe:X[:SCALe]:RLEVel?
DISPlay:CDPower:VIEW4|5:WINDow2:TRACe:X[:SCALe]:RLEVel?
DISPlay:CDPower:VIEW[1]|4|5:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
DISPlay:CDPower:VIEW3:WINDow3:TRACe:X[:SCALe]:RLEVel?
DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
DISPlay:CDPower:VIEW4|5:WINDow2:TRACe:X[:SCALe]:RPOStion LEFT | CENTer |
RIGHT
DISPlay:CDPower:VIEW3:WINDow3:TRACe:X[:SCALe]:RPOStion LEFT | CENTer |
RIGHT
DISPlay:CDPower:VIEW3:WINDow2:TRACe:X[:SCALe]:RPOStion LEFT | CENTer |
RIGHT
DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RPOStion LEFT | CENTer |
RIGHT
DISPlay:CDPower:VIEW[1]|4|5:WINDow[1]:TRACe:X[:SCALe]:RPOStion LEFT |
CENTer | RIGHT
DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:X[:SCALe]:RPOStion LEFT | CENTer |
RIGHT
DISPlay:CDPower:VIEW3:WINDow2:TRACe:X[:SCALe]:RPOStion?
DISPlay:CDPower:VIEW4|5:WINDow2:TRACe:X[:SCALe]:RPOStion?
DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RPOStion?
DISPlay:CDPower:VIEW3:WINDow3:TRACe:X[:SCALe]:RPOStion?
DISPlay:CDPower:VIEW[1]|4|5:WINDow[1]:TRACe:X[:SCALe]:RPOStion?
DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:X[:SCALe]:RPOStion?
DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 | 1 | OFF | ON
DISPlay:CDPower:VIEW4|5:WINDow2:TRACe:Y[:SCALe]:COUPle 0 | 1 | OFF | ON
DISPlay:CDPower:VIEW[1]|4|5:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 | 1 | OFF |
ON
DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 | 1 | OFF | ON
DISPlay:CDPower:VIEW3:WINDow3:TRACe:Y[:SCALe]:COUPle 0 | 1 | OFF | ON
DISPlay:CDPower:VIEW3:WINDow2:TRACe:Y[:SCALe]:COUPle 0 | 1 | OFF | ON

```

```
DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:COUPle?
DISPlay:CDPower:VIEW[1]|4|5:WINDow[1]:TRACe:Y[:SCALE]:COUPle?
DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:Y[:SCALE]:COUPle?
DISPlay:CDPower:VIEW3:WINDow3:TRACe:Y[:SCALE]:COUPle?
DISPlay:CDPower:VIEW3:WINDow2:TRACe:Y[:SCALE]:COUPle?
DISPlay:CDPower:VIEW4|5:WINDow2:TRACe:Y[:SCALE]:COUPle?
DISPlay:CDPower:VIEW3:WINDow2:TRACe:Y[:SCALE]:PDIVision <real>
DISPlay:CDPower:VIEW[1]|4|5:WINDow[1]:TRACe:Y[:SCALE]:PDIVision <rel_ampl>
DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:Y[:SCALE]:PDIVision <real>
DISPlay:CDPower:VIEW4|5:WINDow2:TRACe:Y[:SCALE]:PDIVision <rel_ampl>
DISPlay:CDPower:VIEW3:WINDow3:TRACe:Y[:SCALE]:PDIVision <real>
DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:PDIVision <rel_ampl>
DISPlay:CDPower:VIEW4|5:WINDow2:TRACe:Y[:SCALE]:PDIVision?
DISPlay:CDPower:VIEW3:WINDow3:TRACe:Y[:SCALE]:PDIVision?
DISPlay:CDPower:VIEW3:WINDow2:TRACe:Y[:SCALE]:PDIVision?
DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:Y[:SCALE]:PDIVision?
DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:PDIVision?
DISPlay:CDPower:VIEW[1]|4|5:WINDow[1]:TRACe:Y[:SCALE]:PDIVision?
DISPlay:CDPower:VIEW4|5:WINDow2:TRACe:Y[:SCALE]:RLEVel <real>
DISPlay:CDPower:VIEW[1]|4|5:WINDow[1]:TRACe:Y[:SCALE]:RLEVel <real>
DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:RLEVel <real>
DISPlay:CDPower:VIEW3:WINDow3:TRACe:Y[:SCALE]:RLEVel <real>
DISPlay:CDPower:VIEW3:WINDow2:TRACe:Y[:SCALE]:RLEVel <real>
DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:Y[:SCALE]:RLEVel <real>
DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:RLEVel?
DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:Y[:SCALE]:RLEVel?
DISPlay:CDPower:VIEW[1]|4|5:WINDow[1]:TRACe:Y[:SCALE]:RLEVel?
DISPlay:CDPower:VIEW3:WINDow3:TRACe:Y[:SCALE]:RLEVel?
DISPlay:CDPower:VIEW3:WINDow2:TRACe:Y[:SCALE]:RLEVel?
DISPlay:CDPower:VIEW4|5:WINDow2:TRACe:Y[:SCALE]:RLEVel?
DISPlay:CDPower:VIEW3:WINDow3:TRACe:Y[:SCALE]:RPOSition TOP | CENTER |
BOTTOm
DISPlay:CDPower:VIEW[1]|4|5:WINDow[1]:TRACe:Y[:SCALE]:RPOSition TOP |
CENTer | BOTTOm
DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:Y[:SCALE]:RPOSition TOP | CENTER |
BOTTOm
DISPlay:CDPower:VIEW3:WINDow2:TRACe:Y[:SCALE]:RPOSition TOP | CENTER |
BOTTOm
DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:RPOSition TOP | CENTER |
BOTTOm
DISPlay:CDPower:VIEW4|5:WINDow2:TRACe:Y[:SCALE]:RPOSition TOP | CENTER |
BOTTOm
DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:RPOSition?
DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:Y[:SCALE]:RPOSition?
DISPlay:CDPower:VIEW3:WINDow2:TRACe:Y[:SCALE]:RPOSition?
DISPlay:CDPower:VIEW[1]|4|5:WINDow[1]:TRACe:Y[:SCALE]:RPOSition?
DISPlay:CDPower:VIEW4|5:WINDow2:TRACe:Y[:SCALE]:RPOSition?
DISPlay:CDPower:VIEW3:WINDow3:TRACe:Y[:SCALE]:RPOSition?
DISPlay:ENABLE OFF | ON | 0 | 1
DISPlay:ENABLE?
DISPlay:EVM:FVECTor[:STATE] OFF | ON | 0 | 1
DISPlay:EVM:FVECTor[:STATE]?
```

```

DISPlay:EVM:INTERpolate OFF | ON | 0 | 1
DISPlay:EVM:INTERpolate?
DISPlay:EVM:IQPoints <integer>
DISPlay:EVM:IQPoints?
DISPlay:EVM:IQPoints:OFFSet <integer>
DISPlay:EVM:IQPoints:OFFSet?
DISPlay:EVM:IQPTType VCONStln | VECTor | CONStln
DISPlay:EVM:IQPTType?
DISPlay:EVM:ROTation OFF | ON | 0 | 1
DISPlay:EVM:ROTation?
DISPlay:EVM:VIEW:NSElect <integer>
DISPlay:EVM:VIEW:NSElect?
DISPlay:EVM:VIEW2:WINDow[1]:TRACe:X[:SCALe]:COUPle 0 | 1 | OFF | ON
DISPlay:EVM:VIEW2:WINDow3:TRACe:X[:SCALe]:COUPle 0 | 1 | OFF | ON
DISPlay:EVM:VIEW2:WINDow2:TRACe:X[:SCALe]:COUPle 0 | 1 | OFF | ON
DISPlay:EVM:VIEW4:WINDow[1]:TRACe:X[:SCALe]:COUPle 0 | 1 | OFF | ON
DISPlay:EVM:VIEW4:WINDow[1]:TRACe:X[:SCALe]:COUPle?
DISPlay:EVM:VIEW2:WINDow[1]:TRACe:X[:SCALe]:COUPle?
DISPlay:EVM:VIEW2:WINDow3:TRACe:X[:SCALe]:COUPle?
DISPlay:EVM:VIEW2:WINDow2:TRACe:X[:SCALe]:COUPle?
DISPlay:EVM:VIEW2:WINDow3:TRACe:X[:SCALe]:PDIVision <real>
DISPlay:EVM:VIEW2:WINDow2:TRACe:X[:SCALe]:PDIVision <real>
DISPlay:EVM:VIEW2:WINDow[1]:TRACe:X[:SCALe]:PDIVision <real>
DISPlay:EVM:VIEW3:WINDow[1]:TRACe:X[:SCALe]:PDIVision <Integer>
DISPlay:EVM:VIEW4:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time>
DISPlay:EVM:VIEW4:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
DISPlay:EVM:VIEW2:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
DISPlay:EVM:VIEW2:WINDow3:TRACe:X[:SCALe]:PDIVision?
DISPlay:EVM:VIEW3:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
DISPlay:EVM:VIEW2:WINDow2:TRACe:X[:SCALe]:PDIVision?
DISPlay:EVM:VIEW2:WINDow2:TRACe:X[:SCALe]:RLEVel <real>
DISPlay:EVM:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RLEVel <real>
DISPlay:EVM:VIEW2:WINDow3:TRACe:X[:SCALe]:RLEVel <real>
DISPlay:EVM:VIEW4:WINDow[1]:TRACe:X[:SCALe]:RLEVel <time>
DISPlay:EVM:VIEW3:WINDow[1]:TRACe:X[:SCALe]:RLEVel <integer>
DISPlay:EVM:VIEW3:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
DISPlay:EVM:VIEW2:WINDow3:TRACe:X[:SCALe]:RLEVel?
DISPlay:EVM:VIEW4:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
DISPlay:EVM:VIEW2:WINDow2:TRACe:X[:SCALe]:RLEVel?
DISPlay:EVM:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
DISPlay:EVM:VIEW2:WINDow3:TRACe:X[:SCALe]:RPOStion LEFT | CENTER | RIGHT
DISPlay:EVM:VIEW4:WINDow[1]:TRACe:X[:SCALe]:RPOStion LEFT | CENTER |
RIGHT
DISPlay:EVM:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RPOStion LEFT | CENTER |
RIGHT
DISPlay:EVM:VIEW2:WINDow2:TRACe:X[:SCALe]:RPOStion LEFT | CENTER | RIGHT
DISPlay:EVM:VIEW3:WINDow[1]:TRACe:X[:SCALe]:RPOStion LEFT | CENTER |
RIGHT
DISPlay:EVM:VIEW2:WINDow2:TRACe:X[:SCALe]:RPOStion?
DISPlay:EVM:VIEW2:WINDow3:TRACe:X[:SCALe]:RPOStion?
DISPlay:EVM:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RPOStion?
DISPlay:EVM:VIEW3:WINDow[1]:TRACe:X[:SCALe]:RPOStion?

```

3 Programming the Analyzer

List of SCPI Commands

```
DISPlay:EVM:VIEW4:WINDow[1]:TRACe:X[:SCALe]:RPOSition?
DISPlay:EVM:VIEW4:WINDow[1]:TRACe:Y[:SCALe]:COUPLe 0 | 1 | OFF | ON
DISPlay:EVM:VIEW2:WINDow3:TRACe:Y[:SCALe]:COUPLe 0 | 1 | OFF | ON
DISPlay:EVM:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:COUPLe 0 | 1 | OFF | ON
DISPlay:EVM:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:COUPLe 0 | 1 | OFF | ON
DISPlay:EVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:COUPLe 0 | 1 | OFF | ON
DISPlay:EVM:VIEW4:WINDow[1]:TRACe:Y[:SCALe]:COUPLe?
DISPlay:EVM:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:COUPLe?
DISPlay:EVM:VIEW2:WINDow3:TRACe:Y[:SCALe]:COUPLe?
DISPlay:EVM:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:COUPLe?
DISPlay:EVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:COUPLe?
DISPlay:EVM:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl>
DISPlay:EVM:VIEW4:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl>
DISPlay:EVM:VIEW2:WINDow3:TRACe:Y[:SCALe]:PDIVision <real>
DISPlay:EVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:PDIVision <real>
DISPlay:EVM:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <real>
DISPlay:EVM:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:EVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:PDIVision?
DISPlay:EVM:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:EVM:VIEW4:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:EVM:VIEW2:WINDow3:TRACe:Y[:SCALe]:PDIVision?
DISPlay:EVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:EVM:VIEW4:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:EVM:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:EVM:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:EVM:VIEW2:WINDow3:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:EVM:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:EVM:VIEW4:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:EVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:RLEVel?
DISPlay:EVM:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:EVM:VIEW2:WINDow3:TRACe:Y[:SCALe]:RLEVel?
DISPlay:EVM:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP | CENTER |
BOTTom
DISPlay:EVM:VIEW2:WINDow3:TRACe:Y[:SCALe]:RPOSition TOP | CENTER | BOTTom
DISPlay:EVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:RPOSition TOP | CENTER | BOTTom
DISPlay:EVM:VIEW4:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP | CENTER |
BOTTom
DISPlay:EVM:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP | CENTER |
BOTTom
DISPlay:EVM:VIEW2:WINDow3:TRACe:Y[:SCALe]:RPOSition?
DISPlay:EVM:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
DISPlay:EVM:VIEW4:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
DISPlay:EVM:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
DISPlay:EVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:RPOSition?
DISPlay:FSCREEN[:STATE] OFF | ON | 0 | 1
DISPlay:FSCREEN[:STATE]?
DISPlay:MENU[:STATE] OFF | ON | 0 | 1
DISPlay:MONitor:VIEW:NSElect <integer>
DISPlay:MONitor:VIEW:NSElect?
DISPlay:MONitor:VIEW[:SElect] RTRace | CINformation
DISPlay:MONitor:VIEW[:SElect]?
DISPlay:MONitor:VIEW:WINDow:TRACe[1]|2|3:CLEAr
```

```

DISPlay:MONitor:VIEW:WINDow:TRACe:CLear:ALL
DISPlay:MONitor:VIEW:WINDow:TRACe[1]|2|3:TYPE
DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 | 1 | OFF | ON
DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE?
DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl>
DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP | CENTER |
BOTTOm
DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 | 1 | OFF | ON
DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE?
DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl>
DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP | CENTER |
BOTTOm
DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
DISPlay:PStatistic:GAUSSian[:STATe] OFF | ON | 0 | 1
DISPlay:PStatistic:GAUSSian[:STATe]?
DISPlay:PStatistic:RTRace[:STATe] OFF | ON | 0 | 1
DISPlay:PStatistic:RTRace[:STATe]?
DISPlay:PStatistic:VIEW[1]:WINDow2:TRACe:X[:SCALe]:PDIVision <rel_ampl>
DISPlay:PStatistic:VIEW[1]:WINDow2:TRACe:X[:SCALe]:PDIVision?
DISPlay:PStatistic:XSCale
DISPlay:PVTime:BLINes[:STATe]
DISPlay:PVTime:LIMit:MASK
DISPlay:PVTime:RAMP[:STATe]
DISPlay:PVTime:TRIGger[:STATe]
DISPlay:PVTime:VIEW[1]:WINDow[1]:BLINes[:STATe] ON | OFF | 1 | 0
DISPlay:PVTime:VIEW[1]:WINDow[1]:BLINes[:STATe]?
DISPlay:PVTime:VIEW[1]:WINDow[1]:LMASK ON | OFF | 1 | 0
DISPlay:PVTime:VIEW[1]:WINDow[1]:LMASK?
DISPlay:PVTime:VIEW[1]:WINDow[1]:RAMP[:STATe] ON | OFF | 1 | 0
DISPlay:PVTime:VIEW[1]:WINDow[1]:RAMP[:STATe]?
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe] ON | OFF | 1 | 0
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe]?
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe] ON | OFF | 1 | 0
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe]?
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPlE 0 | 1 | OFF | ON
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPlE?
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time>
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel <time>
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT | CENTER |
RIGHT
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOSition?
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 | 1 | OFF | ON
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE?

```

```
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl>
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOStion TOP | CENTER |
BOTTom
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOStion?
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRIGGer[:STATe] ON | OFF | 1 | 0
DISPlay:PVTime:VIEW[1]:WINDow[1]:TRIGGer[:STATe]?
DISPlay:PVTime:WINDow:TRACe:Y[:SCALe]:PDIVision
DISPlay:PVTime:WINDow:TRACe:Y[:SCALe]:RLEVel
DISPlay:SEMask:VIEW:NSElect <integer>
DISPlay:SEMask:VIEW:NSElect?
DISPlay:SEMask:VIEW[:SElect] APFReq | RPFReq | IPOWer | CINformation
DISPlay:SEMask:VIEW[:SElect]?
DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPle 0 | 1 | OFF | ON
DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPle?
DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision ?
DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision <freq>
DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel <freq>
DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOStion LEFT | CENTER |
RIGHT
DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOStion?
DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 | 1 | ON | OFF
DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle?
DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl>
DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOStion TOP | CENTER |
BOTTom
DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOStion?
DISPlay:SPURious:VIEW:RANGe[:SElect] <integer>
DISPlay:SPURious:VIEW:RANGe[:SElect]?
DISPlay:SPURious:VIEW:RANGe:TABLE <integer>
DISPlay:SPURious:VIEW:RANGe:TABLE?
DISPlay:SPURious:VIEW[:SElect] RESult | RANGe | ALL
DISPlay:SPURious:VIEW[:SElect]?
DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 | 1 | OFF | ON
DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle?
DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl>
DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:TXPower:BARGraph[:STATe] ON | OFF | 1 | 0
DISPlay:TXPower:BARGraph[:STATe]?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe] ON | OFF | 1 | 0
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe]?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe] ON | OFF | 1 | 0
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe]?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPle 0 | 1 | OFF | ON
```

```

DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPlE?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time>
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel <time>
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT | CENTer
| RIGHT
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOSition?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 | 1 | OFF | ON
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl>
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real>
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP | CENTer |
BOTTom
DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
DISPlay:WAVEform:VIEW:NSElect <integer>
DISPlay:WAVEform:VIEW:NSElect?
DISPlay:WAVEform:VIEW[:SElect] RFENvelope | IQ
DISPlay:WAVEform:VIEW[:SElect]?
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:COUPlE 0 | 1 | OFF |
ON
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:COUPlE?
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time>
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:PDIVision?
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:RLEVel <time>
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:RLEVel?
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT |
CENTer | RIGHT
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:X[:SCALe]:RPOSition?
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 | 1 | OFF |
ON
DISPlay:WAVEform:VIEW[1]|2:WINDow[1]:TRACe:Y[:SCALe]:COUPlE?
DISPlay:WAVEform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <voltage>
DISPlay:WAVEform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl>
DISPlay:WAVEform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:WAVEform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision?
DISPlay:WAVEform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <ampl>
DISPlay:WAVEform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <voltage>
DISPlay:WAVEform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:WAVEform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel?
DISPlay:WAVEform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP | CENTer
| BOTTom
DISPlay:WAVEform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP | CENTer |
BOTTom
DISPlay:WAVEform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
DISPlay:WAVEform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition?
DISPlay:WINDow[1]:ANNOtation[:ALL] OFF | ON | 0 | 1
DISPlay:WINDow[1]:ANNOtation[:ALL]?
DISPlay:WINDow:FORMat:TILE
DISPlay:WINDow:FORMat:ZOOM

```

3 Programming the Analyzer

List of SCPI Commands

```
DISPlay:WINDow[:SElect] <number>
DISPlay:WINDow[:SElect]?
DISPlay:WINDow[1]:TRACe:GRATICule:GRID[:STATE] OFF | ON | 0 | 1
DISPlay:WINDow[1]:TRACe:GRATICule:GRID[:STATE]?
FETCh:ACP[n]?
FETCh:CDPower[n]?
FETCh:EVM[n]?
FETCh:MONitor[n]?
FETCh:OBWidth:FERRor?
FETCh:OBWidth[n]?
FETCh:OBWidth:OBWidth?
FETCh:OBWidth:XDB?
FETCh:PStatistic[n]?
FETCh:PVTime[n]?
FETCh:SEMask[n]?
FETCh:SPURious[n]?
FETCh:TXPower|BPOWER[n]?
FETCh:WAVEform[n]?
FORMat:BORDER NORMAL | SWAPPED
FORMat:BORDER?
FORMat[:TRACe][:DATA] ASCii | INTeger, 32 | REAL, 32 | REAL, 64
FORMat[:TRACe][:DATA]?
GLOBal:DEFault
GLOBal:FREQuency:CENTer[:STATE] 1 | 0 | ON | OFF
GLOBal:FREQuency:CENTer[:STATE]?
HCOpy:ABORT
HCOpy[:IMMEdiate]
INITiate:ACP
INITiate:CDPower
INITiate:CONTinuous OFF | ON | 0 | 1
INITiate:CONTinuous?
INITiate:EVM
INITiate[:IMMEdiate]
INITiate:MONitor
INITiate:OBWidth
INITiate:PAUSE
INITiate:PStatistic
INITiate:PVTime
INITiate:REStart
INITiate:RESume
INITiate:SEMask
INITiate:SPURious
INITiate:TXPower|BPOWER
INITiate:WAVEform
INPut:COUPling AC | DC
INPut:COUPling?
INPut:COUPling:I|Q DC | LFR1 | LFR2
INPut:COUPling:I|Q?
INPut:IMPedance:IQ U50 | B50 | U1M | B1M
INPut:IMPedance:IQ?
INPut:IMPedance:REFerence <integer>
INPut:IMPedance:REFerence?
INPut[1]:IQ:BALanced[:STATE] OFF | ON | 0 | 1
```

```

INPut[1]:IQ:BALEnced[:STATE]?
INPut:IQ[:I]:DIFFerential OFF | ON | 0 | 1
INPut:IQ[:I]:DIFFerential?
INPut[1]:IQ[:I]:IMPedance LOW | HIGH
INPut[1]:IQ[:I]:IMPedance?
INPut:IQ:MIRROred OFF | ON | 0 | 1
INPut:IQ:MIRROred?
INPut:IQ:Q:DIFFerential OFF | ON | 0 | 1
INPut:IQ:Q:DIFFerential?
INPut[1]:IQ:Q:IMPedance LOW | HIGH
INPut[1]:IQ:Q:IMPedance?
INPut[1]:IQ:TYPE IQ | I | Q
INPut[1]:IQ:TYPE?
INPut:MIXer EXTErnal | INTernal
INPut:MIXer?
INPut:OFFSet:I|Q <voltage>
INPut:OFFSet:I|Q?
INST:NSEL 105
INST:NSEL 102
INSTrument:CATalog?
INSTrument:COUple:DEFault
INSTrument:COUple:FREQuency:CENTer ALL | NONE
INSTrument:COUple:FREQuency:CENTer?
INSTrument:NSElect <integer>
INSTrument:NSElect?
INSTrument[:SElect] 'SA' | 'PNOISE' | 'EDGE' | 'GSM' | 'BASIC'
INSTrument[:SElect] GSM
INSTrument[:SElect] SANalyzer
INSTrument[:SElect] SA | RTSA | SEQAN | EMI | BASIC | WCDMA | EDGE GSM |
WIMAXOFDMA | VSA | PNOISE | NFIGure | ADEMOD | BTooth | TDSCDMA | CDMA2K |
CDMA1XEV | LTE | LTETDD | LTEAFDD | LTEATDD | MSR | DVB | DTMB | DCATV |
ISDBT | CMMB | WLAN | CWLAN | CWIMAXOFDM | WIMAXFIXED | IDEN | RLC |
SCPILC | VSA89601
INSTrument[:SElect] REceiver
INSTrument[:SElect]?
INST:SEL LTE
INST:SEL SCPILC
INST:SEL LTETDD
INST:SEL EMI
LXI:IDENTify[:STATE] OFF | ON | 0 | 1
LXI:IDENTify[:STATE]?
MEASure:ACP[n]?
MEASure:CDPower[n]?
MEASure:EVM[n]?
MEASure:MONitor[n]?
MEASure:OBWidth:FERRor?
MEASure:OBWidth[n]?
MEASure:OBWidth:OBWidth?
MEASure:OBWidth:XDB?
MEASure:PStatistic[n]?
MEASure:PVTime[n]?
MEASure:SEMask[n]?

```

```
MEASure:SPURious[n]?
MEASure:TXPower|BPOWER[n]?
MEASure:WAVEform[n]?
MMEMory:CATalog? [<directory_name>]
MMEMory:CDIRectory [<directory_name>]
MMEMory:CDIRectory?
MMEMory:COpy <string>, <string>[, <string>, <string>]
MMEMory:COpy:DEvIce <source_string>, <dest_string>
MMEMory:DATA <file_name>, <data>
MMEMory:DATA? <file_name>
MMEMory:DELeTe <file_name>[, <directory_name>]
MMEMory:LOAD:STATe <filename>
MMEMory:LOAD:STATe 1, <filename>
MMEMory:MDIRectory <directory_name>
MMEMory:MOVE <string>, <string>[, <string>, <string>]
MMEMory:RDIRectory <directory_name>
MMEMory:REGister:STATe:LAbel <regnumber>, "label"
MMEMory:REGister:STATe:LAbel? <regnumber>
MMEMory:STORe:RESuLts <string>
MMEMory:STORe:RESuLts <string>
MMEMory:STORe:RESuLts <string>
MMEMory:STORe:RESuLts <string>
MMEMory:STORe:RESuLts <string>
MMEMory:STORe:RESuLts <string>
MMEMory:STORe:RESuLts:MTAbLe|PTAbLe|SPECTrogram <filename>
MMEMory:STORe:SCReen <filename>
MMEMory:STORe:SCReen:THEME TDColor | TDMonochrome | FCOLor | FMONochrome
MMEMory:STORe:SCReen:THEME?
MMEMory:STORe:STATe <filename>
MMEMory:STORe:STATe 1, <filename>
OUTPut:ANALog OFF | SVIdEo | LOGVIdEo | LINVIdEo | DAUDIo
OUTPut:ANALog?
OUTPut:ANALog:AUTO OFF | ON | 0 | 1
OUTPut:ANALog:AUTO?
OUTPut:AUX SIF | AIF | LOGVIdEo | OFF
OUTPut:AUX?
OUTPut:AUX:AIF <value>
OUTPut:AUX:AIF?
OUTPut:DBUS[1][:STATe] ON | OFF | 1 | 0
OUTPut:DBUS[1][:STATe]?
OUTPut:IQ:OUTPut IQ1 | IQ250 | OFF
OUTPut:IQ:OUTPut?
READ:ACP[n]?
READ:CDPower[n]?
READ:EVM[n]?
READ:MONitor[n]?
READ:OBWidth:FERRor?
READ:OBWidth[n]?
READ:OBWidth:OBWidth?
READ:OBWidth:XDB?
READ:PSTatistic[n]?
READ:PVTime[n]?
READ:SEMAsk[n]?
```

```

READ:SPURious[n]?
READ:TXPower|BPOWer[n]?
READ:WAVEform[n]?
[:SENSE]:<measurement>:TRIGger:SOURce
[:SENSE]:<measurement>:TRIGger:SOURce IF
[:SENSE]:ACPower:AVERAge:COUNT <integer>
[:SENSE]:ACPower:AVERAge:COUNT?
[:SENSE]:ACPower:AVERAge[:STATE] OFF | ON | 0 | 1
[:SENSE]:ACPower:AVERAge[:STATE]?
[:SENSE]:ACPower:AVERAge:TCONtrol EXPOntial | REPeat
[:SENSE]:ACPower:AVERAge:TCONtrol?
[:SENSE]:ACPower:BANDwidth:INTEgration
[:SENSE]:ACPower:BANDwidth[:RESolution] <freq>
[:SENSE]:ACPower:BANDwidth[:RESolution]?
[:SENSE]:ACPower:BANDwidth[:RESolution]:AUTO ON | OFF | 1 | 0
[:SENSE]:ACPower:BANDwidth[:RESolution]:AUTO?
[:SENSE]:ACPower:BANDwidth:SHAPE GAUSSian | FLATtop
[:SENSE]:ACPower:BANDwidth:SHAPE?
[:SENSE]:ACPower:BANDwidth:TYPE DB3 | DB6
[:SENSE]:ACPower:BANDwidth:TYPE?
[:SENSE]:ACPower:BANDwidth:VIDeo <freq>
[:SENSE]:ACPower:BANDwidth:VIDeo?
[:SENSE]:ACPower:BANDwidth:VIDeo:AUTO OFF | ON | 0 | 1
[:SENSE]:ACPower:BANDwidth:VIDeo:AUTO?
[:SENSE]:ACPower:BWIDth:INTEgration
[:SENSE]:ACPower:BWIDth[:RESolution]
[:SENSE]:ACPower:BWIDth:SHAPE
[:SENSE]:ACPower:BWIDth:TYPE
[:SENSE]:ACPower:BWIDth:VIDeo
[:SENSE]:ACPower:CARRier[1]|2:AUTO[:STATE] OFF | ON | 0 | 1
[:SENSE]:ACPower:CARRier[1]|2:AUTO[:STATE]?
[:SENSE]:ACPower:CARRier[1]|2:COUNT <integer>
[:SENSE]:ACPower:CARRier[1]|2:COUNT?
[:SENSE]:ACPower:CARRier[1]|2:CPSD <real>
[:SENSE]:ACPower:CARRier[1]|2:CPSD?
[:SENSE]:ACPower:CARRier[1]|2:LIST:BANDwidth[:INTEgration] <freq>, ...
[:SENSE]:ACPower:CARRier[1]|2:LIST:BANDwidth[:INTEgration]?
[:SENSE]:ACPower:CARRier[1]|2:LIST:BWIDth[:INTEgration]
[:SENSE]:ACPower:CARRier[1]|2:LIST:COUple OFF|ON|0|1, ...
[:SENSE]:ACPower:CARRier[1]|2:LIST:COUple?
[:SENSE]:ACPower:CARRier[1]|2:LIST:FILTer:ALPHa <real>, ...
[:SENSE]:ACPower:CARRier[1]|2:LIST:FILTer:ALPHa?
[:SENSE]:ACPower:CARRier[1]|2:LIST:FILTer[:RRC][:STATE] ON|OFF|1|0, ...
[:SENSE]:ACPower:CARRier[1]|2:LIST:FILTer[:RRC][:STATE]?
[:SENSE]:ACPower:CARRier[1]|2:LIST:METHod IBW | RRC, ...
[:SENSE]:ACPower:CARRier[1]|2:LIST:METHod?
[:SENSE]:ACPower:CARRier[1]|2:LIST:PPResent YES|NO, ...
[:SENSE]:ACPower:CARRier[1]|2:LIST:PPResent?
[:SENSE]:ACPower:CARRier[1]|2:LIST:WIDTh <freq>, ...
[:SENSE]:ACPower:CARRier[1]|2:LIST:WIDTh?
[:SENSE]:ACPower:CARRier[1]|2[:POWER] <real>
[:SENSE]:ACPower:CARRier[1]|2[:POWER]?
[:SENSE]:ACPower:CARRier[1]|2:RCARRier <integer>

```

```

[:SENSe]:ACPower:CARRier[1]|2:RCARrier?
[:SENSe]:ACPower:CARRier[1]|2:RCARrier:AUTO OFF | ON | 0 | 1
[:SENSe]:ACPower:CARRier[1]|2:RCARrier:AUTO?
[:SENSe]:ACPower:CARRier[1]|2:RCFRequency <freq>
[:SENSe]:ACPower:CARRier[1]|2:RCFRequency?
[:SENSe]:ACPower:CARRier[1]|2:RCFRequency:AUTO OFF | ON | 0 | 1
[:SENSe]:ACPower:CARRier[1]|2:RCFRequency:AUTO?
[:SENSe]:ACPower:CORREction:NOISE[:AUTO] OFF | ON | 0 | 1
[:SENSe]:ACPower:CORREction:NOISE[:AUTO]?
[:SENSe]:ACPower:DETEctor:AUTO ON | OFF | 1 | 0
[:SENSe]:ACPower:DETEctor:AUTO?
[:SENSe]:ACPower:DETEctor[:FUNction] AVERage | NEGative | NORMAL |
POSitive | SAMple
[:SENSe]:ACPower:DETEctor[:FUNction]?
[:SENSe]:ACPower:FILTEr[:RRC]:ALPHa <real>
[:SENSe]:ACPower:FILTEr[:RRC]:ALPHa?
[:SENSe]:ACPower:FILTEr[:RRC][:STATE] OFF | ON | 0 | 1
[:SENSe]:ACPower:FILTEr[:RRC][:STATE]?
[:SENSe]:ACPower:FREQUency:SPAN <freq>
[:SENSe]:ACPower:FREQUency:SPAN?
[:SENSe]:ACPower:FREQUency:SPAN:FULL
[:SENSe]:ACPower:FREQUency:SPAN:PREVious
[:SENSe]:ACPower:FREQUency:SYNThesis:AUTO[:STATE] OFF | ON | 0 | 1
[:SENSe]:ACPower:FREQUency:SYNThesis:AUTO[:STATE]?
[:SENSe]:ACPower:FREQUency:SYNThesis[:STATE] 1 | 2 | 3
[:SENSe]:ACPower:FREQUency:SYNThesis[:STATE]?
[:SENSe]:ACPower:LIMit[:STATE]
[:SENSe]:ACPower:OFFSet[1]|2:LIST:BWIDth[:INTEgration]
[:SENSe]:ACPower:OFFSet[1]|2:LIST:BWIDth:RESolution
[:SENSe]:ACPower:OFFSet[1]|2:LIST:BWIDth:SHAPE
[:SENSe]:ACPower:OFFSet[1]|2:LIST:BWIDth:TYPE
[:SENSe]:ACPower:OFFSet[1]|2:LIST:BWIDth:VIDeo
[:SENSe]:ACPower:OFFSet[1]|2[:OUTer]:LIST:ABSolute <real>, ...
[:SENSe]:ACPower:OFFSet[1]|2[:OUTer]:LIST:ABSolute?
[:SENSe]:ACPower:OFFSet[1]|2[:OUTer]:LIST:BANdwidth[:INTEgration] <freq>,
...
[:SENSe]:ACPower:OFFSet[1]|2[:OUTer]:LIST:BANdwidth[:INTEgration]?
[:SENSe]:ACPower:OFFSet[1]|2[:OUTer]:LIST:BANdwidth:RESolution <freq>, ...
[:SENSe]:ACPower:OFFSet[1]|2[:OUTer]:LIST:BANdwidth:RESolution?
[:SENSe]:ACPower:OFFSet[1]|2[:OUTer]:LIST:BANdwidth:RESolution:AUTO
ON|OFF|1|0, ...
[:SENSe]:ACPower:OFFSet[1]|2[:OUTer]:LIST:BANdwidth:RESolution:AUTO?
[:SENSe]:ACPower:OFFSet[1]|2[:OUTer]:LIST:BANdwidth:SHAPE
GAUSSian|FLATtop, ...
[:SENSe]:ACPower:OFFSet[1]|2[:OUTer]:LIST:BANdwidth:SHAPE?
[:SENSe]:ACPower:OFFSet[1]|2[:OUTer]:LIST:BANdwidth:TYPE DB3|DB6, ...
[:SENSe]:ACPower:OFFSet[1]|2[:OUTer]:LIST:BANdwidth:TYPE?
[:SENSe]:ACPower:OFFSet[1]|2[:OUTer]:LIST:BANdwidth:VIDeo <freq>, ...
[:SENSe]:ACPower:OFFSet[1]|2[:OUTer]:LIST:BANdwidth:VIDeo?
[:SENSe]:ACPower:OFFSet[1]|2[:OUTer]:LIST:BANdwidth:VIDeo:AUTO OFF|ON|0|1,
...
[:SENSe]:ACPower:OFFSet[1]|2[:OUTer]:LIST:BANdwidth:VIDeo:AUTO?

```

```

[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:LIST:FILTer:ALPHa <real>, ...
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:LIST:FILTer:ALPHa?
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:LIST:FILTer[:RRC][:STATe] ON|OFF|1|0,
...
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:LIST:FILTer[:RRC][:STATe]?
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:LIST[:FREQuency] <freq>, ...
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:LIST[:FREQuency]?
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:LIST:RCARrier <real>, ...
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:LIST:RCARrier?
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:LIST:RPSDensity <rel_ampl>, ...
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:LIST:RPSDensity?
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:LIST:SIDE NEGative|BOTH|POSitive, ...
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:LIST:SIDE?
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:LIST:STATe OFF|ON|0|1, ...
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:LIST:STATe?
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:LIST:TEST ABSolute|AND|OR|RELative,
...
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:LIST:TEST?
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:TYPE CTOCenter | CTOEdge | ETOCenter
| ETOEdge
[:SENSE]:ACPower:OFFSet[1]|2[:OUTer]:TYPE?
[:SENSE]:ACPower:SWEep:POINTs <integer>
[:SENSE]:ACPower:SWEep:POINTs?
[:SENSE]:ACPower:SWEep:TIME <time>
[:SENSE]:ACPower:SWEep:TIME?
[:SENSE]:ACPower:SWEep:TIME:AUTO OFF | ON | 0 | 1
[:SENSE]:ACPower:SWEep:TIME:AUTO?
[:SENSE]:ACPower:SWEep:TIME:AUTO:RULEs NORMAl | ACCuracy
[:SENSE]:ACPower:SWEep:TIME:AUTO:RULEs?
[:SENSE]:ACPower:TYPE TPRef | PSDRef
[:SENSE]:ACPower:TYPE?
[:SENSE]:ACPR:AVERAge:COUNT
[:SENSE]:ACPR:AVERAge:TCONtrol
[:SENSE]:ACPR:FILTer[:RRC]:ALPHa
[:SENSE]:ACPR:FILTer[:RRC][:STATe]
[:SENSE]:ACPR:OFFSet[1]|2:LIST:ABSolute (PSAW-CDMA, PSAcdma2000)
[:SENSE]:ACPR:OFFSet[1]|2:LIST:BANDwidth
[:SENSE]:ACPR:OFFSet[1]|2:LIST:BWIDth
[:SENSE]:ACPR:SWEep:DETEctor[:FUNction]
[:SENSE]:ACPR:TRIGger:SOURce
[:SENSE]:ACP:SWEep:BANDwidth|BWIDth[:RESolution] (PSAW-CDMA, PSAcdma2000)
[:SENSE]:BPOWER:AVERAge:COUNT
[:SENSE]:BPOWER:AVERAge:TCONtrol
[:SENSE]:BPOWER:AVERAge:TYPE
[:SENSE]:BPOWER:METhod
[:SENSE]:BPOWER:THReshold
[:SENSE]:CDPower:ANALYsis:SUBFrame <integer>
[:SENSE]:CDPower:ANALYsis:SUBFrame?
[:SENSE]:CDPower:CDCHannel <integer>
[:SENSE]:CDPower:CDCHannel?
[:SENSE]:CDPower:CINTerval
[:SENSE]:CDPower:RINTerval <integer>

```

```

[:SENSe]:CDPower:RINterval?
[:SENSe]:CDPower:SCLength <integer>
[:SENSe]:CDPower:SCLength?
[:SENSe]:CORRection:BTS[:RF]:GAIN <rel_ampl>
[:SENSe]:CORRection:BTS[:RF]:GAIN?
[:SENSe]:CORRection:BTS[:RF]:LOSS <rel_ampl>
[:SENSe]:CORRection:BTS[:RF]:LOSS?
[:SENSe]:CORRection:CSET:ALL:DELeTe
[:SENSe]:CORRection:CSET:ALL[:STATE] ON | OFF | 1 | 0
[:SENSe]:CORRection:CSET:ALL[:STATE]?
[:SENSe]:CORRection:CSET[1]|2|...|8:COMMeNt "text"
[:SENSe]:CORRection:CSET[1]|2|...|8:COMMeNt?
[:SENSe]:CORRection:CSET[1]|2|...|8:DATA <freq>, <ampl>, ...
[:SENSe]:CORRection:CSET[1]|2|...|8:DATA?
[:SENSe]:CORRection:CSET[1]|2|...|8:DATA:MERGe <freq>, <ampl>, ...
[:SENSe]:CORRection:CSET[1]|2|...|6:DELeTe
[:SENSe]:CORRection:CSET[1]|2|...|8:DESCription "text"
[:SENSe]:CORRection:CSET[1]|2|...|8:DESCription?
[:SENSe]:CORRection:CSET[1]|2|...|8[:STATE] ON | OFF | 1 | 0
[:SENSe]:CORRection:CSET[1]|2|...|8[:STATE]?
[:SENSe]:CORRection:CSET[1]|2|...|8:X:SPACing LINear | LOGarithmic
[:SENSe]:CORRection:CSET[1]|2|...|8:X:SPACing?
[:SENSe]:CORRection:IMPedance[:INPut][:MAGNitude] 50 | 75
[:SENSe]:CORRection:IMPedance[:INPut][:MAGNitude]?
[:SENSe]:CORRection:IQ:I:GAIN <rel_ampl>
[:SENSe]:CORRection:IQ:I:GAIN?
[:SENSe]:CORRection:IQ:I|Q:ATTenuation <rel_ampl>
[:SENSe]:CORRection:IQ:I|Q:ATTenuation?
[:SENSe]:CORRection:IQ:I|Q:ATTenuation:RATio <real>
[:SENSe]:CORRection:IQ:I|Q:ATTenuation:RATio?
[:SENSe]:CORRection:IQ[:I]:SKEW <seconds>
[:SENSe]:CORRection:IQ[:I]:SKEW?
[:SENSe]:CORRection:IQ:Q:GAIN <rel_ampl>
[:SENSe]:CORRection:IQ:Q:GAIN?
[:SENSe]:CORRection:IQ:Q:SKEW <seconds>
[:SENSe]:CORRection:IQ:Q:SKEW?
[:SENSe]:CORRection:MS[:RF]:GAIN <rel_ampl>
[:SENSe]:CORRection:MS[:RF]:GAIN?
[:SENSe]:CORRection:MS[:RF]:LOSS <rel_ampl>
[:SENSe]:CORRection:MS[:RF]:LOSS?
[:SENSe]:CORRection:NOISe:FLOor ON | OFF | 1 | 0
[:SENSe]:CORRection:NOISe:FLOor?
[:SENSe]:CORRection:OFFSet[:MAGNitude]
[:SENSe]:CORRection:SA[:RF]:GAIN <rel_ampl>
[:SENSe]:CORRection:SA[:RF]:GAIN?
[:SENSe]:EBWidth:AVERage:COUNT
[:SENSe]:EBWidth:FREQuency:SPAN
[:SENSe]:EBWidth:MAXHold
[:SENSe]:EBWidth:XDB
[:SENSe]:EVM:ANALysis:SUBFrame <integer>
[:SENSe]:EVM:ANALysis:SUBFrame?
[:SENSe]:EVM:AVERage:COUNT <integer>
[:SENSe]:EVM:AVERage:COUNT?

```

```

[:SENSe]:EVM:AVERAge[:STATE] OFF | ON | 0 | 1
[:SENSe]:EVM:AVERAge[:STATE]?
[:SENSe]:EVM:AVERAge:TCONTRol EXPONential | REPEat
[:SENSe]:EVM:AVERAge:TCONTRol?
[:SENSe]:EVM:CINterval
[:SENSe]:EVM:RINterval <integer>
[:SENSe]:EVM:RINterval?
[:SENSe]:FEED RF | AIQ | EMIXer
[:SENSe]:FEED IQ | IONLy | QONLy
[:SENSe]:FEED AREFERENCE
[:SENSe]:FEED?
[:SENSe]:FEED?
[:SENSe]:FEED:AREFERENCE REF50 | REF4800 | OFF
[:SENSe]:FEED:AREFERENCE?
[:SENSe]:FEED:IQ:TYPE IQ | IONLy | QONLy
[:SENSe]:FEED:IQ:TYPE?
[:SENSe]:FREQuency:CENTer <freq>
[:SENSe]:FREQuency:CENTer <freq>
[:SENSe]:FREQuency:CENTer?
[:SENSe]:FREQuency:CENTer?
[:SENSe]:FREQuency:CENTer:STEP:AUTO OFF | ON | 0 | 1
[:SENSe]:FREQuency:CENTer:STEP:AUTO ON | OFF | 1 | 0
[:SENSe]:FREQuency:CENTer:STEP:AUTO?
[:SENSe]:FREQuency:CENTer:STEP:AUTO?
[:SENSe]:FREQuency:CENTer:STEP[:INCRement] <freq>
[:SENSe]:FREQuency:CENTer:STEP[:INCRement] <freq>
[:SENSe]:FREQuency:CENTer:STEP[:INCRement]?
[:SENSe]:FREQuency:CENTer:STEP[:INCRement]?
[:SENSe]:FREQuency:EMIXer:CENTer <freq>
[:SENSe]:FREQuency:EMIXer:CENTer?
[:SENSe]:FREQuency:IQ:CENTer <freq>
[:SENSe]:FREQuency:IQ:CENTer <freq>
[:SENSe]:FREQuency:IQ:CENTer?
[:SENSe]:FREQuency:IQ:CENTer?
[:SENSe]:FREQuency:RF:CENTer <freq>
[:SENSe]:FREQuency:RF:CENTer <freq>
[:SENSe]:FREQuency:RF:CENTer?
[:SENSe]:FREQuency:RF:CENTer?
[:SENSe]:MCPower:AVERAge:COUNT (PSAPowerSuite, PSAW-CDMA, PSACdma2000)
[:SENSe]:MCPower:CARRier[1]|2:LIST:BANDwidth[:INTEgration] (PSAPowerSuite)
[:SENSe]:MCPower:CARRier[1]|2:LIST:BWIDth[:INTEgration] (PSAPowerSuite)
[:SENSe]:MCPower:CARRier[1]|2:LIST:PPResent (PSAPowerSuite)
[:SENSe]:MCPower:CARRier[1]|2:LIST:WIDTh (PSAPowerSuite)
[:SENSe]:MCPower:CARRier[1]|2[:POWER]
[:SENSe]:MCPower:FILTer[:RRC]:ALPHa
[:SENSe]:MCPower:FILTer[:RRC][:STATE]
[:SENSe]:MCPower:LIMit[:STATE]
[:SENSe]:MCPower:OFFSet[1]|2:LIST:ABSolute (PSAW-CDMA)
[:SENSe]:MCPower:OFFSet[1]|2:LIST:BANDwidth[:INTEgration] (PSAPowerSuite)
[:SENSe]:MCPower:OFFSet[1]|2:LIST:BWIDth[:INTEgration] (PSAPowerSuite)
[:SENSe]:MCPower:OFFSet[1]|2:LIST[:FREQuency] (PSAPowerSuite)
[:SENSe]:MCPower:OFFSet[1]|2:LIST:RCARRier (PSAWCDMA)
[:SENSe]:MCPower:OFFSet[1]|2:LIST:TEST

```

3 Programming the Analyzer

List of SCPI Commands

```
[ :SENSe]:MCPower:RCARrier[1]|2 (PSAPowerSuite)
[ :SENSe]:MIXer:BAND A | Q | U | V | W | NA | ND | NE | NF | NG | NJ | NK |
NQ | NU | NV | NW | NY | NEXT | DD | DF | DG | DJ | DK | DQ | DV | DW | DY
| DEXT | MA | ME | MU | MCOAX | USB
[ :SENSe]:MIXer:BAND?
[ :SENSe]:MIXer:BIAS <real>
[ :SENSe]:MIXer:BIAS?
[ :SENSe]:MIXer:BIAS:STATE OFF | ON | 0 | 1
[ :SENSe]:MIXer:BIAS:STATE?
[ :SENSe]:MIXer:CIFLoss <rel_ampl>
[ :SENSe]:MIXer:CIFLoss?
[ :SENSe]:MONitor:AVERage:COUNT <integer>
[ :SENSe]:MONitor:AVERage:COUNT?
[ :SENSe]:MONitor:AVERage[:STATE] OFF | ON | 0 | 1
[ :SENSe]:MONitor:AVERage[:STATE]?
[ :SENSe]:MONitor:AVERage:TCONtrol EXPonential | REPeat
[ :SENSe]:MONitor:AVERage:TCONtrol?
[ :SENSe]:MONitor:BANDwidth[:RESolution] <freq>
[ :SENSe]:MONitor:BANDwidth[:RESolution]?
[ :SENSe]:MONitor:BANDwidth[:RESolution]:AUTO OFF | ON | 0 | 1
[ :SENSe]:MONitor:BANDwidth[:RESolution]:AUTO?
[ :SENSe]:MONitor:BANDwidth:VIDeo <bandwidth>
[ :SENSe]:MONitor:BANDwidth:VIDeo?
[ :SENSe]:MONitor:BANDwidth:VIDeo:AUTO ON | OFF | 1 | 0
[ :SENSe]:MONitor:BANDwidth:VIDeo:AUTO?
[ :SENSe]:MONitor:BANDwidth:VIDeo:RATio <real>
[ :SENSe]:MONitor:BANDwidth:VIDeo:RATio?
[ :SENSe]:MONitor:BANDwidth:VIDeo:RATio:AUTO OFF | ON | 0 | 1
[ :SENSe]:MONitor:BANDwidth:VIDeo:RATio:AUTO?
[ :SENSe]:MONitor:BWIDth[:RESolution]
[ :SENSe]:MONitor:BWIDth:VIDeo
[ :SENSe]:MONitor:BWIDth:VIDeo:RATio
[ :SENSe]:MONitor:DETEctor:AUTO ON | OFF | 1 | 0
[ :SENSe]:MONitor:DETEctor:AUTO?
[ :SENSe]:MONitor:DETEctor[:FUNction]
[ :SENSe]:MONitor:DETEctor:TRACe AVERage | NEGative | NORMal | POSitive |
SAMPLE
[ :SENSe]:MONitor:DETEctor:TRACe?
[ :SENSe]:MONitor:FREQUency:SPAN <freq>
[ :SENSe]:MONitor:FREQUency:SPAN?
[ :SENSe]:MONitor:FREQUency:SPAN:BANDwidth[:RESolution]:RATio <integer>
[ :SENSe]:MONitor:FREQUency:SPAN:BANDwidth[:RESolution]:RATio?
[ :SENSe]:MONitor:FREQUency:SPAN:BANDwidth[:RESolution]:RATio:AUTO OFF | ON
| 0 | 1
[ :SENSe]:MONitor:FREQUency:SPAN:BANDwidth[:RESolution]:RATio:AUTO?
[ :SENSe]:MONitor:FREQUency:SPAN:BWIDth[:RESolution]:RATio
[ :SENSe]:MONitor:FREQUency:SPAN:FULL
[ :SENSe]:MONitor:FREQUency:SPAN:PREVIous
[ :SENSe]:MONitor:SWEep:POINts <integer>
[ :SENSe]:MONitor:SWEep:POINts?
[ :SENSe]:MONitor:SWEep:TIME <time>
[ :SENSe]:MONitor:SWEep:TIME?
```

```

[:SENSE]:MONitor:SWEep:TIME:AUTO OFF | ON | 0 | 1
[:SENSE]:MONitor:SWEep:TIME:AUTO?
[:SENSE]:OBwidth:AVERage:COUNT <integer>
[:SENSE]:OBwidth:AVERage:COUNT?
[:SENSE]:OBwidth:AVERage[:STATE] ON | OFF | 1 | 0
[:SENSE]:OBwidth:AVERage[:STATE]?
[:SENSE]:OBwidth:AVERage:TCONtrol EXPonential | REPeat
[:SENSE]:OBwidth:AVERage:TCONtrol?
[:SENSE]:OBwidth:BANDwidth[:RESolution] <bandwidth>
[:SENSE]:OBwidth:BANDwidth[:RESolution]?
[:SENSE]:OBwidth:BANDwidth[:RESolution]:AUTO ON | OFF | 1 | 0
[:SENSE]:OBwidth:BANDwidth[:RESolution]:AUTO?
[:SENSE]:OBwidth:BANDwidth:SHAPE GAUSSian | FLATtop
[:SENSE]:OBwidth:BANDwidth:SHAPE?
[:SENSE]:OBwidth:BANDwidth:VIDeo <bandwidth>
[:SENSE]:OBwidth:BANDwidth:VIDeo?
[:SENSE]:OBwidth:BANDwidth:VIDeo:AUTO ON | OFF | 1 | 0
[:SENSE]:OBwidth:BANDwidth:VIDeo:AUTO?
[:SENSE]:OBwidth:BWIDth[:RESolution]
[:SENSE]:OBwidth:BWIDth:SHAPE
[:SENSE]:OBwidth:BWIDth:VIDeo
[:SENSE]:OBwidth:DETEctor:AUTO ON | OFF | 1 | 0
[:SENSE]:OBwidth:DETEctor:AUTO?
[:SENSE]:OBwidth:DETEctor[:FUNction] NORMal | AVERage | POSitive | SAMPlE
| NEGative
[:SENSE]:OBwidth:DETEctor[:FUNction]?
[:SENSE]:OBwidth:FREQuency:SPAN <freq>
[:SENSE]:OBwidth:FREQuency:SPAN?
[:SENSE]:OBwidth:FREQuency:SPAN:AUTO ON | OFF | 0 | 1
[:SENSE]:OBwidth:FREQuency:SPAN:AUTO?
[:SENSE]:OBwidth:FREQuency:SPAN:FULL
[:SENSE]:OBwidth:FREQuency:SPAN:PREVious
[:SENSE]:OBwidth:IF:GAIN:AUTO[:STATE] ON | OFF | 1 | 0
[:SENSE]:OBwidth:IF:GAIN:AUTO[:STATE]?
[:SENSE]:OBwidth:IF:GAIN[:STATE] ON | OFF | 1 | 0
[:SENSE]:OBwidth:IF:GAIN[:STATE]?
[:SENSE]:OBwidth:MAXHold ON | OFF | 1 | 0
[:SENSE]:OBwidth:MAXHold?
[:SENSE]:OBwidth:PERCent <real>
[:SENSE]:OBwidth:PERCent?
[:SENSE]:OBwidth:SWEep:POINts <integer>
[:SENSE]:OBwidth:SWEep:POINts?
[:SENSE]:OBwidth:SWEep:TIME <time>
[:SENSE]:OBwidth:SWEep:TIME?
[:SENSE]:OBwidth:SWEep:TIME:AUTO OFF | ON | 0 | 1
[:SENSE]:OBwidth:SWEep:TIME:AUTO?
[:SENSE]:OBwidth:SWEep:TIME:AUTO:RULEs NORMal | ACCuracy
[:SENSE]:OBwidth:SWEep:TIME:AUTO:RULEs?
[:SENSE]:OBwidth:XDB <rel_ampl>
[:SENSE]:OBwidth:XDB?
[:SENSE]:POWer:IQ[:I]:RANGE[:UPPer] <ampl>
[:SENSE]:POWer:IQ[:I]:RANGE[:UPPer]?
[:SENSE]:POWer:IQ:Q:RANGE[:UPPer] <ampl>

```

```

[:SENSe]:POWER:IQ:Q:RANGe[:UPPer]?
[:SENSe]:POWER:IQ:RANGe:AUTO OFF | ON | 0 | 1
[:SENSe]:POWER:IQ:RANGe:AUTO?
[:SENSe]:POWER[:RF]:ATTenuation <rel_ampl>
[:SENSe]:POWER[:RF]:ATTenuation?
[:SENSe]:POWER[:RF]:ATTenuation:AUTO OFF | ON | 0 | 1
[:SENSe]:POWER[:RF]:ATTenuation:AUTO?
[:SENSe]:POWER[:RF]:ATTenuation:STEP[:INCRement] 10 dB | 2 dB
[:SENSe]:POWER[:RF]:ATTenuation:STEP[:INCRement]?
[:SENSe]:POWER[:RF]:EATTenuation <rel_ampl>
[:SENSe]:POWER[:RF]:EATTenuation?
[:SENSe]:POWER[:RF]:EATTenuation:STATE OFF | ON | 0 | 1
[:SENSe]:POWER[:RF]:EATTenuation:STATE?
[:SENSe]:POWER[:RF]:GAIN:BAND LOW | FULL
[:SENSe]:POWER[:RF]:GAIN:BAND?
[:SENSe]:POWER[:RF]:GAIN[:STATE] OFF | ON | 0 | 1
[:SENSe]:POWER[:RF]:GAIN[:STATE]?
[:SENSe]:POWER[:RF]:MMW:PADJust
[:SENSe]:POWER[:RF]:MW:PADJust
[:SENSe]:POWER[:RF]:MW:PATH STD | LNPath | MPBypass | FULL
[:SENSe]:POWER[:RF]:MW:PATH?
[:SENSe]:POWER[:RF]:MW:PRESelector[:STATE] ON | OFF | 0 | 1
[:SENSe]:POWER[:RF]:MW:PRESelector[:STATE]?
[:SENSe]:POWER[:RF]:PADJust <freq>
[:SENSe]:POWER[:RF]:PADJust?
[:SENSe]:POWER[:RF]:PADJust:PRESelector MWAVE | MMWave | EXTERNAL
[:SENSe]:POWER[:RF]:PADJust:PRESelector?
[:SENSe]:POWER[:RF]:PCENTER
[:SENSe]:POWER[:RF]:RANGe:AUTO ON | OFF | 1 | 0
[:SENSe]:POWER[:RF]:RANGe:AUTO?
[:SENSe]:POWER[:RF]:RANGe:OPTimize IMMEDIATE
[:SENSe]:POWER[:RF]:RANGe:OPTimize:ATTenuation OFF | ELECTRICAL | COMBINED
[:SENSe]:POWER[:RF]:RANGe:OPTimize:ATTenuation?
[:SENSe]:PSTATistic:BANDwidth <freq>
[:SENSe]:PSTATistic:BANDwidth?
[:SENSe]:PSTATistic:BWIDth
[:SENSe]:PSTATistic:COUNTs <integer>
[:SENSe]:PSTATistic:COUNTs?
[:SENSe]:PSTATistic:GAUSSian[:STATE]
[:SENSe]:PSTATistic:IF:GAIN:AUTO[:STATE] ON | OFF | 1 | 0
[:SENSe]:PSTATistic:IF:GAIN:AUTO[:STATE]?
[:SENSe]:PSTATistic:IF:GAIN[:STATE] ON | OFF | 1 | 0
[:SENSe]:PSTATistic:IF:GAIN[:STATE]?
[:SENSe]:PSTATistic:RTRace[:STATE]
[:SENSe]:PSTATistic:SLTView[:STATE] OFF | ON | 0 | 1
[:SENSe]:PSTATistic:SLTView[:STATE]?
[:SENSe]:PSTATistic:SRTRace
[:SENSe]:PSTATistic:SWEep:CYCLes <integer>
[:SENSe]:PSTATistic:SWEep:CYCLes?
[:SENSe]:PSTATistic:SWEep:TIME <time>
[:SENSe]:PSTATistic:SWEep:TIME?
[:SENSe]:PVTime:AVERage:COUNT <integer>
[:SENSe]:PVTime:AVERage:COUNT?

```

```

[:SENSE]:PVTime:AVERAge[:STATe] OFF | ON | 0 | 1
[:SENSE]:PVTime:AVERAge[:STATe]?
[:SENSE]:PVTime:AVERAge:TCONtrol EXPonential | REPeat
[:SENSE]:PVTime:AVERAge:TCONtrol?
[:SENSE]:PVTime:AVERAge:TYPE LOG | LPOWer | RMS | POWer
[:SENSE]:PVTime:AVERAge:TYPE?
[:SENSE]:PVTime:IF:GAIN:AUTO[:STATe] ON | OFF | 1 | 0
[:SENSE]:PVTime:IF:GAIN:AUTO[:STATe]?
[:SENSE]:PVTime:IF:GAIN[:STATe] ON | OFF | 1 | 0
[:SENSE]:PVTime:IF:GAIN[:STATe]?
[:SENSE]:PVTime:MASK:LIST:LOWer:ABSolute <ampl>, ...
[:SENSE]:PVTime:MASK:LIST:LOWer:ABSolute?
[:SENSE]:PVTime:MASK:LIST:LOWer:POINTs?
[:SENSE]:PVTime:MASK:LIST:LOWer:RELative <ampl>, ...
[:SENSE]:PVTime:MASK:LIST:LOWer:RELative?
[:SENSE]:PVTime:MASK:LIST:LOWer:TIME <time>, ...
[:SENSE]:PVTime:MASK:LIST:LOWer:TIME?
[:SENSE]:PVTime:MASK:LIST:UPPer:ABSolute <ampl>, ...
[:SENSE]:PVTime:MASK:LIST:UPPer:ABSolute?
[:SENSE]:PVTime:MASK:LIST:UPPer:POINTs?
[:SENSE]:PVTime:MASK:LIST:UPPer:RELative <rel_ampl>, ...
[:SENSE]:PVTime:MASK:LIST:UPPer:RELative?
[:SENSE]:PVTime:MASK:LIST:UPPer:TIME <time>, ...
[:SENSE]:PVTime:MASK:LIST:UPPer:TIME?
[:SENSE]:PVTime:MASK:SELEct CUSTom | STANdard
[:SENSE]:PVTime:MASK:SELEct?
[:SENSE]:PVTime:SWEep:TIME <integer>
[:SENSE]:PVTime:SWEep:TIME?
[:SENSE]:PVTime:XSCale:XPDivision
[:SENSE]:PVTime:XSCale:XRPosition
[:SENSE]:PVTime:XSCale:XRValue
[:SENSE]:RADio:CONFigure:HSDPa[:STATe] 0 | 1 | OFF | ON
[:SENSE]:RADio:CONFigure:HSDPa[:STATe]?
[:SENSE]:RADio:DEVice
[:SENSE]:RADio:STANdard:DEVice BTS | MS
[:SENSE]:RADio:STANdard:DEVice?
[:SENSE]:ROSCillator:BANDwidth WIDE | NARRow
[:SENSE]:ROSCillator:BANDwidth?
[:SENSE]:ROSCillator:COUPLing NORMAl | NACQuisition
[:SENSE]:ROSCillator:COUPLing?
[:SENSE]:ROSCillator:EXTernal:FREQuency <freq>
[:SENSE]:ROSCillator:EXTernal:FREQuency?
[:SENSE]:ROSCillator:SOURce INTernal | EXTernal
[:SENSE]:ROSCillator:SOURce?
[:SENSE]:ROSCillator:SOURce:TYPE INTernal | EXTernal | SENSE | PULSe
[:SENSE]:ROSCillator:SOURce:TYPE?
[:SENSE]:SEMask:AVERAge:COUNT <integer>
[:SENSE]:SEMask:AVERAge:COUNT?
[:SENSE]:SEMask:AVERAge[:STATe] ON | OFF | 1 | 0
[:SENSE]:SEMask:AVERAge[:STATe]?
[:SENSE]:SEMask:BANDwidth[1]|2:INTegration <bandwidth>
[:SENSE]:SEMask:BANDwidth[1]|2:INTegration?
[:SENSE]:SEMask:BANDwidth[1]|2[:RESolution] <bandwidth>

```

3 Programming the Analyzer

List of SCPI Commands

```

[:SENSe]:SEMAsk:BANDwidth[1]|2[:RESolution]?
[:SENSe]:SEMAsk:BANDwidth[1]|2[:RESolution]:AUTO OFF | ON | 1 | 0
[:SENSe]:SEMAsk:BANDwidth[1]|2[:RESolution]:AUTO?
[:SENSe]:SEMAsk:BANDwidth:SHAPE ASENse | GAUSSian | FLATtop
[:SENSe]:SEMAsk:BANDwidth:SHAPE?
[:SENSe]:SEMAsk:BANDwidth[1]|2:VIDeo <bandwidth>
[:SENSe]:SEMAsk:BANDwidth[1]|2:VIDeo?
[:SENSe]:SEMAsk:BANDwidth[1]|2:VIDeo:AUTO OFF | ON | 1 | 0
[:SENSe]:SEMAsk:BANDwidth[1]|2:VIDeo:AUTO?
[:SENSe]:SEMAsk:BANDwidth[1]|2:VIDeo:RATio
[:SENSe]:SEMAsk:BANDwidth[1]|2:VIDeo:RATio <real>
[:SENSe]:SEMAsk:BANDwidth[1]|2:VIDeo:RATio:AUTO OFF | ON | 1 | 0
[:SENSe]:SEMAsk:BANDwidth[1]|2:VIDeo:RATio:AUTO?
[:SENSe]:SEMAsk:BWIDth[1]|2[:RESolution]
[:SENSe]:SEMAsk:BWIDth[1]|2:VIDeo
[:SENSe]:SEMAsk:BWIDth[1]|2:VIDeo:RATio
[:SENSe]:SEMAsk:CARRier:AUTO[:STATE] OFF | ON | 1 | 0
[:SENSe]:SEMAsk:CARRier:AUTO[:STATE]?
[:SENSe]:SEMAsk:CARRier:CPSD <real>
[:SENSe]:SEMAsk:CARRier:CPSD?
[:SENSe]:SEMAsk:CARRier:PEAK[:POWER] <real>
[:SENSe]:SEMAsk:CARRier:PEAK[:POWER]?
[:SENSe]:SEMAsk:CARRier[:POWER] <real>
[:SENSe]:SEMAsk:CARRier[:POWER]?
[:SENSe]:SEMAsk:DETEctor:CARRier:AUTO ON | OFF | 1 | 0
[:SENSe]:SEMAsk:DETEctor:CARRier:AUTO?
[:SENSe]:SEMAsk:DETEctor:CARRier[:FUNCTION] AVERAge | NEGAtive | NORMAl |
POSitive | SAMPlE
[:SENSe]:SEMAsk:DETEctor:CARRier[:FUNCTION]?
[:SENSe]:SEMAsk:DETEctor:OFFSet:AUTO ON | OFF | 1 | 0
[:SENSe]:SEMAsk:DETEctor:OFFSet:AUTO?
[:SENSe]:SEMAsk:DETEctor:OFFSet[:FUNCTION] AVERAge | NEGAtive | NORMAl |
POSitive | SAMPlE
[:SENSe]:SEMAsk:DETEctor:OFFSet[:FUNCTION]?
[:SENSe]:SEMAsk:FILTEr[:RRC]:ALPHa <real>
[:SENSe]:SEMAsk:FILTEr[:RRC]:ALPHa?
[:SENSe]:SEMAsk:FILTEr[:RRC][:STATE] OFF | ON | 0 | 1
[:SENSe]:SEMAsk:FILTEr[:RRC][:STATE]?
[:SENSe]:SEMAsk:FREQuency[1]|2:SPAN <freq>
[:SENSe]:SEMAsk:FREQuency[1]|2:SPAN?
[:SENSe]:SEMAsk:LIMits STD | MAN
[:SENSe]:SEMAsk:LIMits?
[:SENSe]:SEMAsk:OFFSet[1]|2:LIST:BWIDth:IMULti
[:SENSe]:SEMAsk:OFFSet[1]|2:LIST:BWIDth[:RESolution]
[:SENSe]:SEMAsk:OFFSet[1]|2:LIST:BWIDth:VIDeo
[:SENSe]:SEMAsk:OFFSet[1]|2:LIST:SWEep[:TIME]
[:SENSe]:SEMAsk:OFFSet[1]|2[:OUTer]:LIST:BANDwidth:IMULti <integer>, ...
[:SENSe]:SEMAsk:OFFSet[1]|2[:OUTer]:LIST:BANDwidth:IMULti?
[:SENSe]:SEMAsk:OFFSet[1]|2[:OUTer]:LIST:BANDwidth[:RESolution]
<bandwidth>, ...
[:SENSe]:SEMAsk:OFFSet[1]|2[:OUTer]:LIST:BANDwidth[:RESolution]?

```

```

[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:BANDwidth[:RESolution]:AUTO OFF | ON | 1 | 0, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:BANDwidth[:RESolution]:AUTO?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:BANDwidth:VIDeo <freq>, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:BANDwidth:VIDeo?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:BANDwidth:VIDeo:AUTO OFF | ON | 0 | 1, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:BANDwidth:VIDeo:AUTO?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:BANDwidth:VIDeo:RATio <real>, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:BANDwidth:VIDeo:RATio?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:BANDwidth:VIDeo:RATio:AUTO OFF | ON | 0 | 1, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:BANDwidth:VIDeo:RATio:AUTO?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:FREQuency:STARt <freq>, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:FREQuency:STARt?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:FREQuency:STOP <freq>, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:FREQuency:STOP?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:SIDE BOTH | NEGative | POSitive, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:SIDE?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:STARt:ABSolute <real>, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:STARt:ABSolute?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:STARt:RCARrier <rel_ampl>, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:STARt:RCARrier?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:STARt:ON | OFF | 1 | 0, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:STARt:?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:STOP:ABSolute <real>, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:STOP:ABSolute?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:STOP:ABSolute:COUple ON | OFF | 1 | 0, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:STOP:ABSolute:COUple?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:STOP:RCARrier <rel_ampl>, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:STOP:RCARrier?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:STOP:RCARrier:COUple ON | OFF | 1 | 0, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:STOP:RCARrier:COUple?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:SWEep:TIME <time>, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:SWEep:TIME?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:SWEep:TIME:AUTO ON | OFF | 1 | 0, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:SWEep:TIME:AUTO?
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:TEST ABSolute | AND | OR | RELative, ...
[:SENSE]:SEMask:OFFSet[1]|2[:OUTer]:LIST:TEST?
[:SENSE]:SEMask:OFFSet[1]|2:TYPE CTOCenter | CTOEdge | ETOCenter | ETOEdge
[:SENSE]:SEMask:OFFSet[1]|2:TYPE?
[:SENSE]:SEMask:SWEep[1]|2:TIME <time>
[:SENSE]:SEMask:SWEep[1]|2:TIME?
[:SENSE]:SEMask:SWEep[1]|2:TIME:AUTO OFF | 0 | ON | 1
[:SENSE]:SEMask:SWEep[1]|2:TIME:AUTO?
[:SENSE]:SEMask:TYPE PSDRef | TPreF | SPRef
[:SENSE]:SEMask:TYPE?

```

```

[:SENSe]:SLOT TS0 | TS1 | TS2 | TS3 | TS4 | TS5 | TS6 | UPTS | DPTS
[:SENSe]:SLOT?
[:SENSe]:SPURious:AVERAge:COUNT <integer>
[:SENSe]:SPURious:AVERAge:COUNT?
[:SENSe]:SPURious:AVERAge[:STATe] ON | OFF | 1 | 0
[:SENSe]:SPURious:AVERAge[:STATe]?
[:SENSe]:SPURious:AVERAge:TCONTRol EXPonential | REPeat
[:SENSe]:SPURious:AVERAge:TCONTRol?
[:SENSe]:SPURious:CARRier:FREQUency:MS <freq>
[:SENSe]:SPURious:CARRier:FREQUency:MS?
[:SENSe]:SPURious:CARRier:FREQUency:START <freq>
[:SENSe]:SPURious:CARRier:FREQUency:START?
[:SENSe]:SPURious:CARRier:FREQUency:STOP <freq>
[:SENSe]:SPURious:CARRier:FREQUency:STOP?
[:SENSe]:SPURious:CATegory:A
[:SENSe]:SPURious:CATegory:B
[:SENSe]:SPURious:CATegory:MS
[:SENSe]:SPURious:FSMeas ON | OFF | 1 | 0
[:SENSe]:SPURious:FSMeas?
[:SENSe]:SPURious:IF:GAIN:AUTO[:STATe] OFF|ON|0|1, ...
[:SENSe]:SPURious:IF:GAIN:AUTO[:STATe]?
[:SENSe]:SPURious:IF:GAIN[:STATe] OFF|ON|0|1, ...
[:SENSe]:SPURious:IF:GAIN[:STATe]?
[:SENSe]:SPURious:POWer[:RF]:RANGe:AUTO
[:SENSe]:SPURious[:RANGe]:ALL:SWEep:TYPE:AUTO OFF | ON | 0 | 1
[:SENSe]:SPURious[:RANGe]:ALL:SWEep:TYPE:AUTO?
[:SENSe]:SPURious[:RANGe][:LIST]:ATTenuation <rel_ampl>, ...
[:SENSe]:SPURious[:RANGe][:LIST]:ATTenuation?
[:SENSe]:SPURious[:RANGe][:LIST]:ATTenuation:AUTO OFF|ON|0|1, ...
[:SENSe]:SPURious[:RANGe][:LIST]:ATTenuation:AUTO?
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth[:RESolution] <freq>, ...
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth[:RESolution]?
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth[:RESolution]:AUTO OFF|ON|0|1,
...
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth[:RESolution]:AUTO?
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:SHAPE GAUSSian|FLATtop, ...
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:SHAPE?
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:VIDeo <freq>, ...
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:VIDeo?
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:VIDeo:AUTO OFF|ON|0|1, ...
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth:VIDeo:AUTO?
[:SENSe]:SPURious[:RANGe][:LIST]:BWIDth[:RESolution]
[:SENSe]:SPURious[:RANGe][:LIST]:BWIDth:SHAPE
[:SENSe]:SPURious[:RANGe][:LIST]:BWIDth:VIDeo
[:SENSe]:SPURious[:RANGe][:LIST]:DETector[1][:FUNCTion]
AVERAge|NEGative|NORMal|POSitive|SAMPle|RMS, ...
[:SENSe]:SPURious[:RANGe][:LIST]:DETector2[:FUNCTion]
OFF|AVERAge|NEGative|NORMal|POSitive|SAMPle|RMS, ...
[:SENSe]:SPURious[:RANGe][:LIST]:DETector2[:FUNCTion]?
[:SENSe]:SPURious[:RANGe][:LIST]:DETector[1][:FUNCTion]?
[:SENSe]:SPURious[:RANGe][:LIST]:FREQUency:START <freq>, ...
[:SENSe]:SPURious[:RANGe][:LIST]:FREQUency:START?

```

```

[:SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STOP <freq>, ...
[:SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STOP?
[:SENSe]:SPURious[:RANGe][:LIST]:PEAK:EXCursion <rel_ampl>, ...
[:SENSe]:SPURious[:RANGe][:LIST]:PEAK:EXCursion?
[:SENSe]:SPURious[:RANGe][:LIST]:PEAK:THReshold <real>, ...
[:SENSe]:SPURious[:RANGe][:LIST]:PEAK:THReshold?
[:SENSe]:SPURious[:RANGe][:LIST]:STATe ON|OFF|1|0, ...
[:SENSe]:SPURious[:RANGe][:LIST]:STATe?
[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:POINts <integer>
[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:POINts?
[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:POINts:AUTO OFF|ON|0|1, ...
[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:POINts:AUTO?
[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME <time>, ...
[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME?
[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME:AUTO OFF|ON|0|1, ...
[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME:AUTO?
[:SENSe]:SPURious:REPT:MODE ALL | LIMTest | MMARgin
[:SENSe]:SPURious:REPT:MODE?
[:SENSe]:SPURious:SPUR <integer>
[:SENSe]:SPURious:SPUR?
[:SENSe]:SPURious:SWEep:TIME:AUTO:RULEs NORMAl | ACCuracy
[:SENSe]:SPURious:SWEep:TIME:AUTO:RULEs?
[:SENSe]:SPURious:TDD:FREQuency:STARt <freq>
[:SENSe]:SPURious:TDD:FREQuency:STARt?
[:SENSe]:SPURious:TDD:FREQuency:STOP <freq>
[:SENSe]:SPURious:TDD:FREQuency:STOP?
[:SENSe]:SPURious:TYPE EXAMine | FULL
[:SENSe]:SPURious:TYPE?
[:SENSe]:SWEep:EGATE:CONTRol EDGE | LEVel
[:SENSe]:SWEep:EGATE:CONTRol?
[:SENSe]:SWEep:EGATE:DELay <time>
[:SENSe]:SWEep:EGATE:DELay?
[:SENSe]:SWEep:EGATE:DELay:COMPensation:TYPE OFF | SETTled | GDELay
[:SENSe]:SWEep:EGATE:DELay:COMPensation:TYPE?
[:SENSe]:SWEep:EGATE:EXTernal[1]|2:LEVel <voltage>
[:SENSe]:SWEep:EGATE:EXTernal[1]|2:LEVel?
[:SENSe]:SWEep:EGATE:HOLDoff <time>
[:SENSe]:SWEep:EGATE:HOLDoff?
[:SENSe]:SWEep:EGATE:HOLDoff:AUTO OFF | ON | 0 | 1
[:SENSe]:SWEep:EGATE:HOLDoff:AUTO?
[:SENSe]:SWEep:EGATE:LENGth <time>
[:SENSe]:SWEep:EGATE:LENGth?
[:SENSe]:SWEep:EGATE:MINFast?
[:SENSe]:SWEep:EGATE:POLarity NEGative | POSitive
[:SENSe]:SWEep:EGATE:POLarity?
[:SENSe]:SWEep:EGATE:SOURce EXTernal1 | EXTernal2 | LINE | FRAME | RFBurst
[:SENSe]:SWEep:EGATE:SOURce?
[:SENSe]:SWEep:EGATE[:STATe] OFF | ON | 0 | 1
[:SENSe]:SWEep:EGATE[:STATe]?
[:SENSe]:SWEep:EGATE:TIME <time>
[:SENSe]:SWEep:EGATE:TIME?
[:SENSe]:SWEep:EGATE:VIEW ON | OFF | 1 | 0
[:SENSe]:SWEep:EGATE:VIEW?

```

3 Programming the Analyzer

List of SCPI Commands

```
[ :SENSe]:SWEep:EGATE:VIEW:START <time>
[ :SENSe]:SWEep:EGATE:VIEW:START?
[ :SENSe]:SWEep:TIME:GATE:LEVel HIGH | LOW
[ :SENSe]:SWEep:TIME:GATE:LEVel?
[ :SENSe]:TDEMod:ALPHa <real>
[ :SENSe]:TDEMod:ALPHa?
[ :SENSe]:TDEMod:CARrier:NUMber <integer>
[ :SENSe]:TDEMod:CARrier:NUMber?
[ :SENSe]:TDEMod:CARrier:RESult <integer>
[ :SENSe]:TDEMod:CARrier:RESult?
[ :SENSe]:TDEMod:CDCHannel <integer>
[ :SENSe]:TDEMod:CDCHannel?
[ :SENSe]:TDEMod:CDCHannel:ACTive <spread_code_length>, <code_channel>, 0 |
1 | OFF | ON
[ :SENSe]:TDEMod:CDCHannel:ACTive? <spread_code_length>, <code_channel>
[ :SENSe]:TDEMod:CDCHannel:DETection AUTO | MAN
[ :SENSe]:TDEMod:CDCHannel:DETection?
[ :SENSe]:TDEMod:CDCHannel:SALL 1 | 0 | ON | OFF
[ :SENSe]:TDEMod:CDCHannel:SALL?
[ :SENSe]:TDEMod:CDCHannel:SElect SINGLE | ALL
[ :SENSe]:TDEMod:CDCHannel:SElect?
[ :SENSe]:TDEMod:EVMMinimize:IQIMbalance 1 | 0 | ON | OFF
[ :SENSe]:TDEMod:EVMMinimize:IQIMbalance?
[ :SENSe]:TDEMod:EVMSResult:IQOffset STANard | EXclude
[ :SENSe]:TDEMod:EVMSResult:IQOffset?
[ :SENSe]:TDEMod:FILTer[:RRC][:STATE] OFF | ON | 0 | 1
[ :SENSe]:TDEMod:FILTer[:RRC][:STATE]?
[ :SENSe]:TDEMod:IQIMbalance:FCOMpen ON | OFF
[ :SENSe]:TDEMod:IQIMbalance:FCOMpen?
[ :SENSe]:TDEMod:MEQ OFF | NORMal | INVert
[ :SENSe]:TDEMod:MEQ?
[ :SENSe]:TDEMod:MODFormat <integer>, <integer>, AUTO | QPSK | PSK8 | QAM16
| QAM64
[ :SENSe]:TDEMod:MODFormat? <integer>, ...
[ :SENSe]:TDEMod:MODScheme:AUTO 1 | 0 | ON | OFF
[ :SENSe]:TDEMod:MODScheme:AUTO?
[ :SENSe]:TDEMod:MSHift <spread_code_length>, <code_channel>, <integer>
[ :SENSe]:TDEMod:MSHift? <spread_code_length>, <code_channel>,
[ :SENSe]:TDEMod:MXUser:TS5 <integer>
[ :SENSe]:TDEMod:MXUser:TS3 <integer>
[ :SENSe]:TDEMod:MXUser:TS1 <integer>
[ :SENSe]:TDEMod:MXUser:TS4 <integer>
[ :SENSe]:TDEMod:MXUser:TS0 <integer>
[ :SENSe]:TDEMod:MXUser:TS2 <integer>
[ :SENSe]:TDEMod:MXUser:TS6 <integer>
[ :SENSe]:TDEMod:MXUser:TS2?
[ :SENSe]:TDEMod:MXUser:TS6?
[ :SENSe]:TDEMod:MXUser:TS3?
[ :SENSe]:TDEMod:MXUser:TS4?
[ :SENSe]:TDEMod:MXUser:TS1?
[ :SENSe]:TDEMod:MXUser:TS0?
[ :SENSe]:TDEMod:MXUser:TS5?
[ :SENSe]:TDEMod:NORMalize 1 | 0 | ON | OFF
```

```

[:SENSe]:TDEMod:NORMalize?
[:SENSe]:TDEMod:PHASe:SHIFt <integer>, <integer>, <real>
[:SENSe]:TDEMod:PHASe:SHIFt? <integer>, ...
[:SENSe]:TDEMod:PHASe:SHIFt:DETection:AUTO ON | OFF | 1 | 0
[:SENSe]:TDEMod:PHASe:SHIFt:DETection:AUTO?
[:SENSe]:TDEMod:SCLength <integer>
[:SENSe]:TDEMod:SCLength?
[:SENSe]:TDEMod:SCODE <integer>
[:SENSe]:TDEMod:SCODE?
[:SENSe]:TDEMod:SPECTrum:MIRRor NORMAl | INVert
[:SENSe]:TDEMod:SPECTrum:MIRRor?
[:SENSe]:TDEMod:SREFerence PILot | MIDamble
[:SENSe]:TDEMod:SREFerence?
[:SENSe]:TDEMod:SYNC PILot | MIDamble | TRIGger
[:SENSe]:TDEMod:SYNC?
[:SENSe]:TDEMod:THReshold:CHANnel <real>
[:SENSe]:TDEMod:THReshold:CHANnel?
[:SENSe]:TDEMod:THReshold:CHANnel:AUTO ON | OFF | 0 | 1
[:SENSe]:TDEMod:THReshold:CHANnel:AUTO?
[:SENSe]:TDEMod:THReshold:SLOT <real>
[:SENSe]:TDEMod:THReshold:SLOT?
[:SENSe]:TDEMod:TREFerence DPTS | UPTS | TRIG
[:SENSe]:TDEMod:TREFerence?
[:SENSe]:TDEMod:ULSPoint <integer>
[:SENSe]:TDEMod:ULSPoint?
[:SENSe]:TDEMod:UPTS <integer>
[:SENSe]:TDEMod:UPTS?
[:SENSe]:TXPower:AVERAge:COUNT <integer>
[:SENSe]:TXPower:AVERAge:COUNT?
[:SENSe]:TXPower:AVERAge[:STATe] OFF | ON | 0 | 1
[:SENSe]:TXPower:AVERAge[:STATe]?
[:SENSe]:TXPower:AVERAge:TCONtrol EXPonential | REPeat
[:SENSe]:TXPower:AVERAge:TCONtrol?
[:SENSe]:TXPower:AVERAge:TYPE LOG | RMS
[:SENSe]:TXPower:AVERAge:TYPE LOG | MAXimum | MINimum | RMS
[:SENSe]:TXPower:AVERAge:TYPE?
[:SENSe]:TXPower:AVERAge:TYPE?
[:SENSe]:TXPower:BANDwidth:TYPE GAUSSian | FLATtop
[:SENSe]:TXPower:BANDwidth:TYPE?
[:SENSe]:TXPower:BURSt:AUTO ON | OFF | 1 | 0
[:SENSe]:TXPower:BURSt:AUTO?
[:SENSe]:TXPower:BURSt:WIDTh <time>
[:SENSe]:TXPower:BURSt:WIDTh?
[:SENSe]:TXPower:BWIDth:TYPE
[:SENSe]:TXPower:METHod THReshold | BWIDth
[:SENSe]:TXPower:METHod THReshold | BWIDth | SINGLE
[:SENSe]:TXPower:METHod?
[:SENSe]:TXPower:METHod?
[:SENSe]:TXPower:SWEep:TIME <integer>
[:SENSe]:TXPower:SWEep:TIME?
[:SENSe]:TXPower:THReshold <real>
[:SENSe]:TXPower:THReshold?
[:SENSe]:TXPower:THReshold:TYPE ABSolute | RELative

```

```

[:SENSe]:TXPower:THReshold:TYPE?
[:SENSe]:VOLTage:IQ[:I]:RANGe[:UPPer] <voltage>
[:SENSe]:VOLTage:IQ[:I]:RANGe[:UPPer]?
[:SENSe]:VOLTage:IQ:Q:RANGe[:UPPer] <voltage>
[:SENSe]:VOLTage:IQ:Q:RANGe[:UPPer]?
[:SENSe]:VOLTage:IQ:RANGe:AUTO OFF | ON | 0 | 1
[:SENSe]:VOLTage:IQ:RANGe:AUTO?
[:SENSe]:VOLTage|POWer:IQ:MIRROred OFF | ON | 0 | 1
[:SENSe]:VOLTage|POWer:IQ:MIRROred?
[:SENSe]:WAVEform:ADC:DITHer:AUTO[:STATe] OFF | ON | 0 | 1
[:SENSe]:WAVEform:ADC:DITHer:AUTO[:STATe]?
[:SENSe]:WAVEform:ADC:DITHer[:STATe] OFF | ON | 0 | 1
[:SENSe]:WAVEform:ADC:DITHer[:STATe]?
[:SENSe]:WAVEform:APERture?
[:SENSe]:WAVEform:AVERage:COUNT <integer>
[:SENSe]:WAVEform:AVERage:COUNT?
[:SENSe]:WAVEform:AVERage[:STATe] OFF | ON | 0 | 1
[:SENSe]:WAVEform:AVERage[:STATe]?
[:SENSe]:WAVEform:AVERage:TACount <integer>
[:SENSe]:WAVEform:AVERage:TACount?
[:SENSe]:WAVEform:AVERage:TCONtrol EXPonential | REPeat
[:SENSe]:WAVEform:AVERage:TCONtrol?
[:SENSe]:WAVEform:AVERage:TYPE LOG | MAXimum | MINimum | RMS | SCALar
[:SENSe]:WAVEform:AVERage:TYPE?
[:SENSe]:WAVEform:BANDwidth|BWIDth[:RESolution]:TYPE
[:SENSe]:WAVEform:BANDwidth[:RESolution]
[:SENSe]:WAVEform:BANDwidth:SHAPE
[:SENSe]:WAVEform:BWIDth[:RESolution]
[:SENSe]:WAVEform:BWIDth:SHAPE
[:SENSe]:WAVEform:DIF:BANDwidth <freq>
[:SENSe]:WAVEform:DIF:BANDwidth?
[:SENSe]:WAVEform:DIF:FILTer:ALPHa <real>
[:SENSe]:WAVEform:DIF:FILTer:ALPHa?
[:SENSe]:WAVEform:DIF:FILTer:BANDwidth <freq>
[:SENSe]:WAVEform:DIF:FILTer:BANDwidth?
[:SENSe]:WAVEform:DIF:FILTer:BANDwidth:AUTO ON | OFF | 1 | 0
[:SENSe]:WAVEform:DIF:FILTer:BANDwidth:AUTO?
[:SENSe]:WAVEform:DIF:FILTer:TYPE GAUSSian | FLATtop | SNYquist |
RSNYquist | RCOSine | RRCosine
[:SENSe]:WAVEform:DIF:FILTer:TYPE GAUSSian | FLATtop
[:SENSe]:WAVEform:DIF:FILTer:TYPE?
[:SENSe]:WAVEform:DIF:FILTer:TYPE?
[:SENSe]:WAVEform:FREQuency:SYNThesis:AUTO[:STATe] OFF | ON | 0 | 1
[:SENSe]:WAVEform:FREQuency:SYNThesis:AUTO[:STATe]?
[:SENSe]:WAVEform:FREQuency:SYNThesis[:STATe] 1 | 2 | 3
[:SENSe]:WAVEform:FREQuency:SYNThesis[:STATe]?
[:SENSe]:WAVEform:IF:GAIN:AUTO[:STATe] ON | OFF | 1 | 0
[:SENSe]:WAVEform:IF:GAIN:AUTO[:STATe]?
[:SENSe]:WAVEform:IF:GAIN:OFFSet <rel_ampl>
[:SENSe]:WAVEform:IF:GAIN:OFFSet?
[:SENSe]:WAVEform:IF:GAIN[:STATe] AUTOrange | LOW | HIGH
[:SENSe]:WAVEform:IF:GAIN[:STATe]?
[:SENSe]:WAVEform:PDITHer

```

```

[:SENSe]:WAVeform:SRATe <freq>
[:SENSe]:WAVeform:SRATe?
[:SENSe]:WAVeform:SWEep:TIME <time>
[:SENSe]:WAVeform:SWEep:TIME?
[:SENSe]:WAVeform:WBIF:ADC:DITHer
[:SENSe]:WAVeform:WBIF:FILTer:ALPHa
[:SENSe]:WAVeform:WBIF:FILTer:BANDwidth <real>
[:SENSe]:WAVeform:WBIF:FILTer:BANDwidth?
[:SENSe]:WAVeform:WBIF:FILTer[:TYPE] GAUSSian | NONE | NYQuist | RNYQuist
| RCOSine | RRCosine
[:SENSe]:WAVeform:WBIF:FILTer[:TYPE]?
STATus:OPERation:CONDition?
STATus:OPERation:ENABle <integer>
STATus:OPERation:ENABle?
STATus:OPERation[:EVENT]?
STATus:OPERation:NTRansition <integer>
STATus:OPERation:NTRansition?
STATus:OPERation:PTRansition <integer>
STATus:OPERation:PTRansition?
STATus:PRESet
STATus:QUESTionable:CALibration:CONDition?
STATus:QUESTionable:CALibration:ENABle <integer>
STATus:QUESTionable:CALibration:ENABle?
STATus:QUESTionable:CALibration[:EVENT]?
STATus:QUESTionable:CALibration:EXTended:FAILure:CONDition?
STATus:QUESTionable:CALibration:EXTended:FAILure:ENABle <integer>
STATus:QUESTionable:CALibration:EXTended:FAILure:ENABle?
STATus:QUESTionable:CALibration:EXTended:FAILure[:EVENT]?
STATus:QUESTionable:CALibration:EXTended:FAILure:NTRansition <integer>
STATus:QUESTionable:CALibration:EXTended:FAILure:NTRansition?
STATus:QUESTionable:CALibration:EXTended:FAILure:PTRansition <integer>
STATus:QUESTionable:CALibration:EXTended:FAILure:PTRansition?
STATus:QUESTionable:CALibration:EXTended:NEEDED:CONDition?
STATus:QUESTionable:CALibration:EXTended:NEEDED:ENABle <integer>
STATus:QUESTionable:CALibration:EXTended:NEEDED:ENABle?
STATus:QUESTionable:CALibration:EXTended:NEEDED[:EVENT]?
STATus:QUESTionable:CALibration:EXTended:NEEDED:NTRansition <integer>
STATus:QUESTionable:CALibration:EXTended:NEEDED:NTRansition?
STATus:QUESTionable:CALibration:EXTended:NEEDED:PTRansition <integer>
STATus:QUESTionable:CALibration:EXTended:NEEDED:PTRansition?
STATus:QUESTionable:CALibration:NTRansition <integer>
STATus:QUESTionable:CALibration:NTRansition?
STATus:QUESTionable:CALibration:PTRansition <integer>
STATus:QUESTionable:CALibration:PTRansition?
STATus:QUESTionable:CALibration:SKIPPed:CONDition?
STATus:QUESTionable:CALibration:SKIPPed:ENABle <integer>
STATus:QUESTionable:CALibration:SKIPPed:ENABle?
STATus:QUESTionable:CALibration:SKIPPed[:EVENT]?
STATus:QUESTionable:CALibration:SKIPPed:NTRansition <integer>
STATus:QUESTionable:CALibration:SKIPPed:NTRansition?
STATus:QUESTionable:CALibration:SKIPPed:PTRansition <integer>
STATus:QUESTionable:CALibration:SKIPPed:PTRansition?
STATus:QUESTionable:CONDition?

```

```
STaTus:QUEStionable:ENABle <integer>
STaTus:QUEStionable:ENABle?
STaTus:QUEStionable[:EVENT]?
STaTus:QUEStionable:FREQuency:CONDition?
STaTus:QUEStionable:FREQuency:ENABle <integer>
STaTus:QUEStionable:FREQuency:ENABle?
STaTus:QUEStionable:FREQuency[:EVENT]?
STaTus:QUEStionable:FREQuency:NTRansition <integer>
STaTus:QUEStionable:FREQuency:NTRansition?
STaTus:QUEStionable:FREQuency:PTRansition <integer>
STaTus:QUEStionable:FREQuency:PTRansition?
STaTus:QUEStionable:INTEgrity:CONDition?
STaTus:QUEStionable:INTEgrity:ENABle <integer>
STaTus:QUEStionable:INTEgrity:ENABle?
STaTus:QUEStionable:INTEgrity[:EVENT]?
STaTus:QUEStionable:INTEgrity:NTRansition <integer>
STaTus:QUEStionable:INTEgrity:NTRansition?
STaTus:QUEStionable:INTEgrity:PTRansition <integer>
STaTus:QUEStionable:INTEgrity:PTRansition?
STaTus:QUEStionable:INTEgrity:SIGNAL:CONDition?
STaTus:QUEStionable:INTEgrity:SIGNAL:ENABle <integer>
STaTus:QUEStionable:INTEgrity:SIGNAL:ENABle?
STaTus:QUEStionable:INTEgrity:SIGNAL[:EVENT]?
STaTus:QUEStionable:INTEgrity:SIGNAL:NTRansition <integer>
STaTus:QUEStionable:INTEgrity:SIGNAL:NTRansition?
STaTus:QUEStionable:INTEgrity:SIGNAL:PTRansition <integer>
STaTus:QUEStionable:INTEgrity:SIGNAL:PTRansition?
STaTus:QUEStionable:INTEgrity:UNCalibrated:CONDition?
STaTus:QUEStionable:INTEgrity:UNCalibrated:ENABle
STaTus:QUEStionable:INTEgrity:UNCalibrated:ENABle?
STaTus:QUEStionable:INTEgrity:UNCalibrated[:EVENT]?
STaTus:QUEStionable:INTEgrity:UNCalibrated:NTRansition <integer>
STaTus:QUEStionable:INTEgrity:UNCalibrated:NTRansition?
STaTus:QUEStionable:INTEgrity:UNCalibrated:PTRansition <integer>
STaTus:QUEStionable:INTEgrity:UNCalibrated:PTRansition?
STaTus:QUEStionable:NTRansition <integer>
STaTus:QUEStionable:NTRansition?
STaTus:QUEStionable:POWEr:CONDition?
STaTus:QUEStionable:POWEr:ENABle <integer>
STaTus:QUEStionable:POWEr:ENABle?
STaTus:QUEStionable:POWEr[:EVENT]?
STaTus:QUEStionable:POWEr:NTRansition <integer>
STaTus:QUEStionable:POWEr:NTRansition?
STaTus:QUEStionable:POWEr:PTRansition <integer>
STaTus:QUEStionable:POWEr:PTRansition?>
STaTus:QUEStionable:PTRansition <integer>
STaTus:QUEStionable:PTRansition?
STaTus:QUEStionable:TEMPerature:CONDition?
STaTus:QUEStionable:TEMPerature:ENABle <integer>
STaTus:QUEStionable:TEMPerature:ENABle?
STaTus:QUEStionable:TEMPerature[:EVENT]?
STaTus:QUEStionable:TEMPerature:NTRansition <integer>
STaTus:QUEStionable:TEMPerature:NTRansition?
```

```

STATus:QUEStionable:TEMPerature:PTRansition <integer>
STATus:QUEStionable:TEMPerature:PTRansition?
SYSTem:APPLication:CATalog[:NAME]?
SYSTem:APPLication:CATalog[:NAME]:COUNT?
SYSTem:APPLication:CATalog:OPTion? <model>
SYSTem:APPLication:CATalog:REVision? <model>
SYSTem:APPLication[:CURRent][:NAME]?
SYSTem:APPLication[:CURRent]:OPTion?
SYSTem:APPLication[:CURRent]:REVision?
SYSTem:COMMunicate:GPIB[1][:SELF]:ADDRes <integer>
SYSTem:COMMunicate:GPIB[1][:SELF]:ADDRes?
SYSTem:COMMunicate:GPIB[1][:SELF]:CONTROLLER[:ENABLE] ON | OFF | 0 | 1
SYSTem:COMMunicate:GPIB[1][:SELF]:CONTROLLER[:ENABLE]?
SYSTem:COMMunicate:LAN:SCPI:HISLip:ENABle OFF | ON | 0 | 1
SYSTem:COMMunicate:LAN:SCPI:HISLip:ENABle?
SYSTem:COMMunicate:LAN:SCPI:SICL:ENABle OFF | ON | 0 | 1
SYSTem:COMMunicate:LAN:SCPI:SICL:ENABle?
SYSTem:COMMunicate:LAN:SCPI:SOCKet:CONTROl?
SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle OFF | ON | 0 | 1
SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle?
SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABle OFF | ON | 0 | 1
SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABle?
SYSTem:COMMunicate:USB:CONNEction?
SYSTem:COMMunicate:USB:PACKets?
SYSTem:COMMunicate:USB:STATus?
SYSTem:CONFIgure[:SYSTem]?
SYSTem:CSYSTem?
SYSTem:DATE "<year>, <month>, <day>"
SYSTem:DATE?
SYSTem:DEFault [ALL] | ALIGn | INPut | MISC | MODes | PON
SYSTem:ERRor[:NEXT]?
SYSTem:ERRor:OVERload[:STATE] 0 | 1 | OFF | ON
SYSTem:ERRor:VERBoSe OFF | ON | 0 | 1
SYSTem:ERRor:VERBoSe?
SYSTem:HELP:HEADers?
SYSTem:HID?
SYSTem:KLOCK OFF | ON | 0 | 1
SYSTem:KLOCK?
SYSTem:LKEY <"OptionInfo">, <"LicenseInfo">
SYSTem:LKEY? <"OptionInfo">
SYSTem:LKEY:DELete <"OptionInfo">, <"LicenseInfo">
SYSTem:LKEY:LIST?
SYSTem:MRELay:COUNT?
SYSTem:OPTions?
SYSTem:PDOWN [NORMal | FORCe]
SYSTem:PON:APPLication:LLIST <stringofINSTRument:SElectnames>
SYSTem:PON:APPLication:LLIST?
SYSTem:PON:APPLication:VMEMory[:AVAILable]?
SYSTem:PON:APPLication:VMEMory:TOTAL?
SYSTem:PON:APPLication:VMEMory:USED?
SYSTem:PON:APPLication:VMEMory:USED:NAME? <INSTRument:SElectname>
SYSTem:PON:ETIME?

```

3 Programming the Analyzer

List of SCPI Commands

```
SYSTem:PON:MODE SA | BASIC | ADEMOD | NFIGURE | PNOISE | CDMA2K | TDSCDMA
| VSA | VSA89601 | WCDMA | WIMAXOFDMA
SYSTem:PON:MODE?
SYSTem:PON:TIME?
SYSTem:PON:TYPE PRESet
SYSTem:PON:TYPE MODE | USER | LAST
SYSTem:PON:TYPE?
SYSTem:PRESet
SYSTem:PRESet:TYPE FACTory | MODE | USER
SYSTem:PRESet:TYPE?
SYSTem:PRESet:USER
SYSTem:PRESet:USER:ALL
SYSTem:PRESet:USER:SAVE
SYSTem:PRINT:THEME TDColor | TDMonochrome | FCOLor | FMONochrome
SYSTem:PRINT:THEME?
SYSTem:PUP:PROcEss
SYSTem:SECurity:USB:WPRotect[:ENABLE] ON | OFF | 0 | 1
SYSTem:SECurity:USB:WPRotect[:ENABLE]?
SYSTem:SHOW OFF | ERRor | SYSTem | HARDware | LXI | HWStatistics |
ALIGNment | SOFTware | CAPplication
SYSTem:SHOW?
SYSTem:TEMPerature:HEXTreme?
SYSTem:TEMPerature:LEXTreme?
SYSTem:TIME "<hour>, <minute>, <second>"
SYSTem:TIME?
SYSTem:VERSion?
TRACe[1]|2|3:ACPower:DISPlay[:STATE] ON | OFF | 0 | 1
TRACe[1]|2|3:ACPower:DISPlay[:STATE]?
TRACe[1]|2|3:ACPower:TYPE WRITe | AVERAge | MAXHold | MINHold
TRACe[1]|2|3:ACPower:TYPE?
TRACe[1]|2|3:ACPower:UPDate[:STATE] ON | OFF | 0 | 1
TRACe[1]|2|3:ACPower:UPDate[:STATE]?
TRACe:MONitor:CLear [TRACE1] | TRACE2 | TRACE3
TRACe:MONitor:CLear:ALL
TRACe[1]|2|3:MONitor:DISPlay[:STATE] ON | OFF | 0 | 1
TRACe[1]|2|3:MONitor:DISPlay[:STATE]?
TRACe[1]|2|3:MONitor:TYPE WRITe | AVERAge | MAXHold | MINHold
TRACe[1]|2|3:MONitor:TYPE?
TRACe[1]|2|3:MONitor:UPDate[:STATE] ON | OFF | 0 | 1
TRACe[1]|2|3:MONitor:UPDate[:STATE]?
TRACe:OBWidth:TYPE WRITe | AVERAge | MAXHold | MINHold
TRACe:OBWidth:TYPE?
TRACe:SEMAsk:TYPE WRITe | AVERAge | MAXHold | MINHold
TRACe:SEMAsk:TYPE?
TRIGger:<measurement>[:SEquence]:IQ:SOURce EXTernal1 | EXTernal2 |
IMMediate | IQMag | IDEMod | QDEMod | IINPut | QINPut | AIQMag
TRIGger:<measurement>[:SEquence]:IQ:SOURce?
TRIGger:<measurement>[:SEquence]:RF:SOURce EXTernal1 | EXTernal2 |
IMMediate | LINE | FRAME | RFBurst | VIdEO | IF | ALARm | LAN | TV
TRIGger:<measurement>[:SEquence]:RF:SOURce?
```

```

TRIGger:<measurement>[:SEQuence]:SOURce EXTernal1 | EXTernal2 | IMMEDIATE
| LINE | FRAME | RFBurst | VIDEO | IF | ALARm | LAN | IQMag | IDEMod |
QDEMod | IINPut | QINPut | AIQMag | TV
TRIGger:<measurement>[:SEQuence]:SOURce?
TRIGger[:SEQuence]:ATRigger <time>
TRIGger[:SEQuence]:ATRigger?
TRIGger[:SEQuence]:ATRigger:STATE OFF | ON | 0 | 1
TRIGger[:SEQuence]:ATRigger:STATE?
TRIGger[:SEQuence]:DELay <time>
TRIGger[:SEQuence]:DELay?
TRIGger[:SEQuence]:DELay:STATE OFF | ON | 0 | 1
TRIGger[:SEQuence]:DELay:STATE?
TRIGger[:SEQuence]:EXTernal2:DELay <time>
TRIGger[:SEQuence]:EXTernal1:DELay <time>
TRIGger[:SEQuence]:EXTernal:DELay
TRIGger[:SEQuence]:EXTernal1:DELay?
TRIGger[:SEQuence]:EXTernal2:DELay?
TRIGger[:SEQuence]:EXTernal2:DELay:COMPensation OFF | ON | 0 | 1
TRIGger[:SEQuence]:EXTernal1:DELay:COMPensation OFF | ON | 0 | 1
TRIGger[:SEQuence]:EXTernal2:DELay:COMPensation?
TRIGger[:SEQuence]:EXTernal1:DELay:COMPensation?
TRIGger[:SEQuence]:EXTernal2:DELay:STATE OFF | ON | 0 | 1
TRIGger[:SEQuence]:EXTernal1:DELay:STATE OFF | ON | 0 | 1
TRIGger[:SEQuence]:EXTernal1:DELay:STATE?
TRIGger[:SEQuence]:EXTernal2:DELay:STATE?
TRIGger[:SEQuence]:EXTernal1:LEVel <level>
TRIGger[:SEQuence]:EXTernal:LEVel
TRIGger[:SEQuence]:EXTernal2:LEVel
TRIGger[:SEQuence]:EXTernal2:LEVel?
TRIGger[:SEQuence]:EXTernal1:LEVel?
TRIGger[:SEQuence]:EXTernal1:SLOPe POSitive | NEGative
TRIGger[:SEQuence]:EXTernal:SLOPe
TRIGger[:SEQuence]:EXTernal2:SLOPe POSitive | NEGative
TRIGger[:SEQuence]:EXTernal2:SLOPe?
TRIGger[:SEQuence]:EXTernal1:SLOPe?
TRIGger[:SEQuence]:FRAME:ADJust <time>
TRIGger[:SEQuence]:FRAME:EXTernal2:LEVel
TRIGger[:SEQuence]:FRAME:EXTernal1:LEVel
TRIGger[:SEQuence]:FRAME:EXTernal1:SLOPe
TRIGger[:SEQuence]:FRAME:EXTernal2:SLOPe
TRIGger[:SEQuence]:FRAME:OFFSet <time>
TRIGger[:SEQuence]:FRAME:OFFSet?
TRIGger[:SEQuence]:FRAME:OFFSet:DISPlay:RESet
TRIGger[:SEQuence]:FRAME:PERiod <time>
TRIGger[:SEQuence]:FRAME:PERiod?
TRIGger[:SEQuence]:FRAME:RFBurst:LEVel:ABSolute
TRIGger[:SEQuence]:FRAME:RFBurst:SLOPe
TRIGger[:SEQuence]:FRAME:SYNC EXTernal
TRIGger[:SEQuence]:FRAME:SYNC EXTernal1 | EXTernal2 | RFBurst | OFF
TRIGger[:SEQuence]:FRAME:SYNC?
TRIGger[:SEQuence]:FRAME:SYNC:HOLDoff <time>
TRIGger[:SEQuence]:FRAME:SYNC:HOLDoff?
TRIGger[:SEQuence]:FRAME:SYNC:HOLDoff:STATE OFF | ON | 0 | 1

```

3 Programming the Analyzer

List of SCPI Commands

```
TRIGger[:SEquence]:FRAME:SYNC:HOLDoff:STATe?
TRIGger[:SEquence]:HOLDoff <time>
TRIGger[:SEquence]:HOLDoff?
TRIGger[:SEquence]:HOLDoff:STATe OFF | ON | 0 | 1
TRIGger[:SEquence]:HOLDoff:STATe?
TRIGger[:SEquence]:HOLDoff:TYPE NORMAl | ABOVE | BELow
TRIGger[:SEquence]:HOLDoff:TYPE?
TRIGger[:SEquence]:IF:LEVel
TRIGger[:SEquence]:IF:LEVel?
TRIGger[:SEquence]:IF:SLOPe NEGative | POSitive
TRIGger[:SEquence]:IF:SLOPe?
TRIGger[:SEquence]:OFFSet <time>
TRIGger[:SEquence]:OFFSet?
TRIGger[:SEquence]:OFFSet:STATe OFF | ON | 0 | 1
TRIGger[:SEquence]:OFFSet:STATe?
TRIGger[:SEquence]:RFBurst:DELAy <time>
TRIGger[:SEquence]:RFBurst:DELAy?
TRIGger[:SEquence]:RFBurst:DELAy:STATe OFF | ON | 0 | 1
TRIGger[:SEquence]:RFBurst:DELAy:STATe?
TRIGger[:SEquence]:RFBurst:LEVel
TRIGger[:SEquence]:RFBurst:LEVel:ABSolute <ampl>
TRIGger[:SEquence]:RFBurst:LEVel:ABSolute?
TRIGger[:SEquence]:RFBurst:LEVel:RELative <rel_ampl>
TRIGger[:SEquence]:RFBurst:LEVel:RELative?
TRIGger[:SEquence]:RFBurst:LEVel:TYPE ABSolute | RELative
TRIGger[:SEquence]:RFBurst:LEVel:TYPE?
TRIGger[:SEquence]:RFBurst:SLOPe POSitive | NEGative
TRIGger[:SEquence]:RFBurst:SLOPe?
TRIGger[:SEquence]:SLOPe POSitive | NEGative
TRIGger[:SEquence]:SLOPe?
TRIGger[:SEquence]:SOURCe EXTernal
TRIGger[:SEquence]:VIDeo:DELAy <time>
TRIGger[:SEquence]:VIDeo:DELAy?
TRIGger[:SEquence]:VIDeo:DELAy:STATe OFF | ON | 0 | 1
TRIGger[:SEquence]:VIDeo:DELAy:STATe?
TRIGger[:SEquence]:VIDeo:LEVel <ampl>
TRIGger[:SEquence]:VIDeo:LEVel?
TRIGger[:SEquence]:VIDeo:SLOPe POSitive | NEGative
TRIGger[:SEquence]:VIDeo:SLOPe?
TRIGger|TRIGger1|TRIGger2[:SEquence]:OUTPut HSWP | MEASuring | MAIN | GATE
| GTRigger | OEven | SPOint | SSweep | SSETtled | S1Marker | S2Marker |
S3Marker | S4Marker | OFF
TRIGger|TRIGger1|TRIGger2[:SEquence]:OUTPut?
TRIGger|TRIGger1|TRIGger2[:SEquence]:OUTPut:POLarity POSitive | NEGative
TRIGger|TRIGger1|TRIGger2[:SEquence]:OUTPut:POLarity?
UNIT:ACPower:POWER:PSD DBMHZ | DBMMHZ
UNIT:ACPower:POWER:PSD?
UNIT:Power DBM | DBMV | DBMA | V | W | A | DBUV | DBUA | DBPW | DBUVM |
DBUAM | DBPT | DBG
UNIT:Power?
```

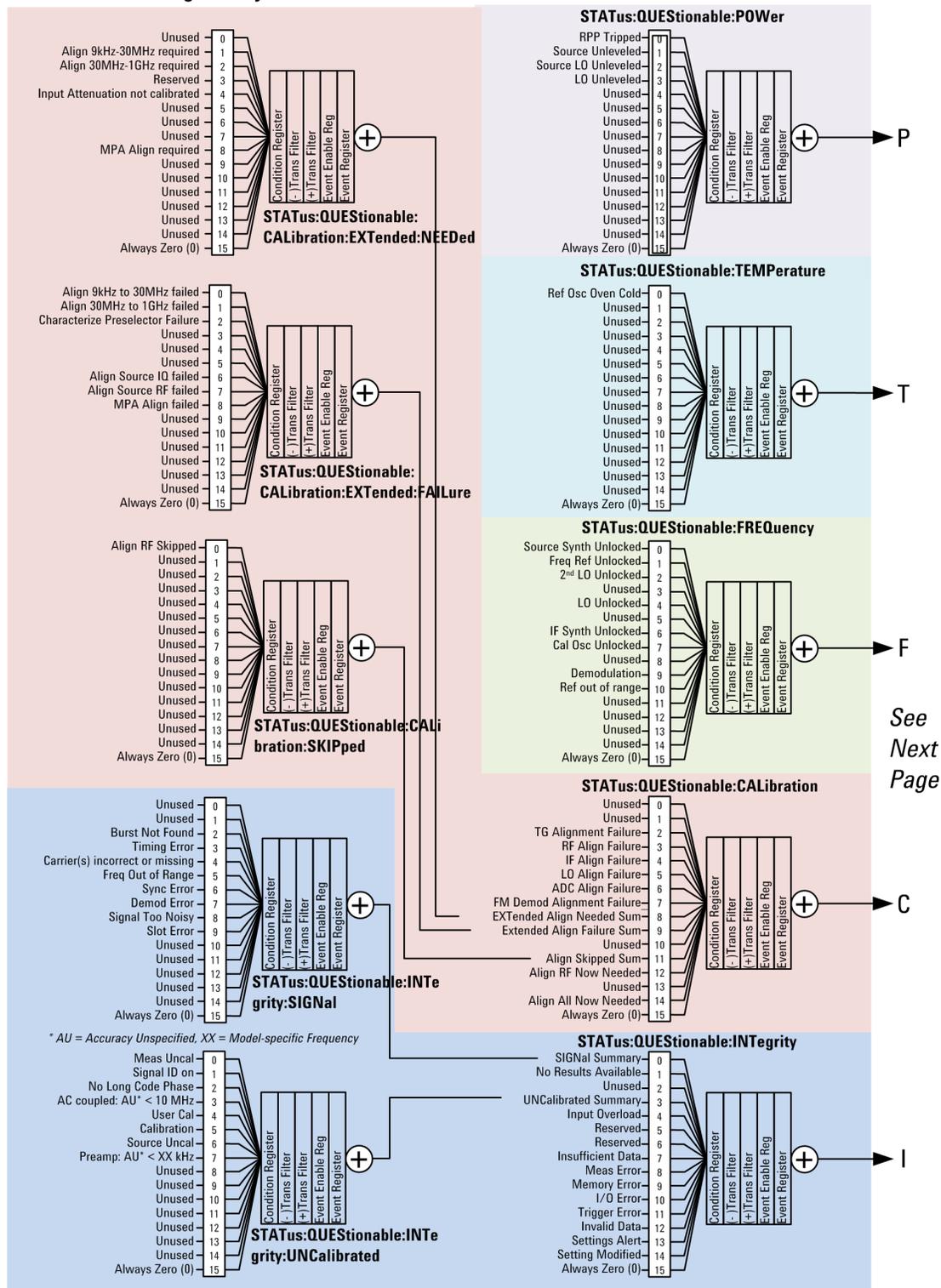
STATus Subsystem

The following diagram provides a graphical overview of the entire X-Series Status Register System.

For readability, the diagram is split into two sections:

- ["X-Series Status Register System \(1\)" on page 150](#)
- ["X-Series Status Register System \(2\)" on page 151](#)

X-Series Status Register System (1)

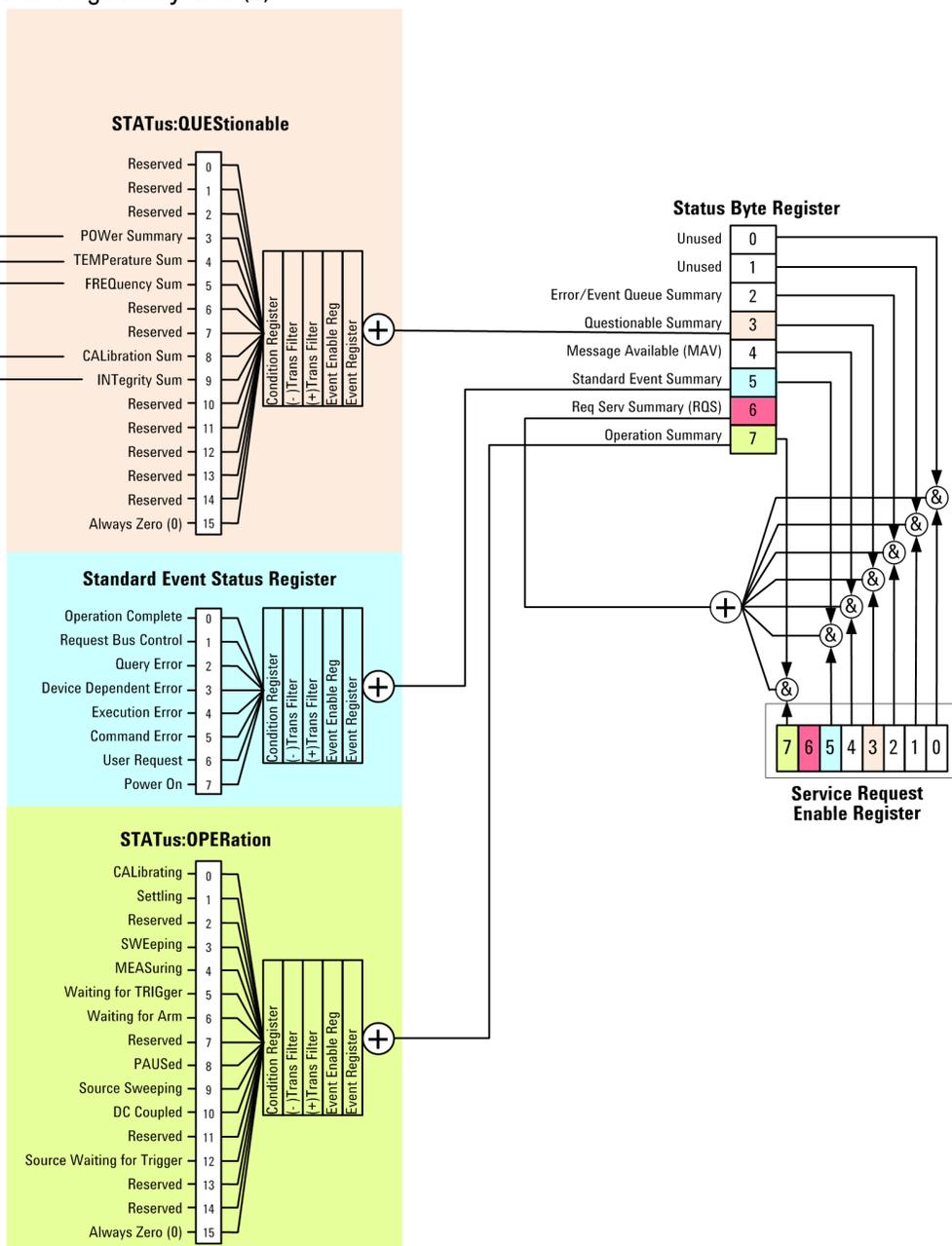


X-Series Status Register System (2)

See
Previous
Page

P
T
F

C
I



Detailed Description

The STATus subsystem remote commands set and query the status hardware registers. This system of registers monitors various events and conditions in the instrument. Software written to control the instrument may need to monitor some of these events and conditions.

NOTE

All status register commands are sequential. Most commands can be started immediately and will overlap with any existing commands that are already running. This is not true of status commands. All the commands in the spectrum analyzer are assumed to be overlapped unless a command description specifically says that it is sequential.

What Are Status Registers

The status system contains multiple registers that are arranged in a hierarchical order. The lower-level status registers propagate their data to the higher-level registers in the data structures by means of summary bits. The status byte register is at the top of the hierarchy and contains general status information for the instrument's events and conditions. All other individual registers are used to determine the specific events or conditions. For a diagram of the registers and their interconnections, see above.

The operation and questionable status registers are sets of registers that monitor the overall instrument condition. They are accessed with the STATus:OPERation and STATus:QUEStionable commands in the STATus command subsystem. Each register set is made up of five registers:

- Condition Register—It reports the real-time state of the signals monitored by this register set. There is no latching or buffering for a condition register.
- Positive Transition Register—This filter register controls which signals will set a bit in the event register when the signal makes a low to high transition (when the condition bit changes from 0 to 1).
- Negative Transition Register—This filter register controls which signals will set a bit in the event register when the signal makes a high to low transition (when the condition bit changes from 1 to 0).
- Event Register—It latches any signal state changes, in the way specified by the filter registers. Bits in the event register are never cleared by signal state changes. Event registers are cleared when read. They are also cleared by *CLS and by presetting the instrument.
- Event Enable Register—It controls which of the bits, being set in the event register, will be summarized as a single output for the register set. Summary bits are then used by the next higher register.

The STATus:QUEStionable registers report abnormal operating conditions. The status register hierarchy is:

1. The summary outputs from the six STATus:QUEStionable:<keyword> detail registers are inputs to the STATus:QUEStionable register.
2. The summary output from the STATus:QUEStionable register is an input to the Status Byte Register. See the overall system in Figure at the beginning of this section.

The STATus:OPERation register set has no summarized inputs. The inputs to the STATus:OPERation:CONDition register indicate the real time state of the instrument. The STATus:OPERation:EVENT register summary output is an input to the Status Byte Register.

What Are Status Register SCPI Commands

Most monitoring of the instrument conditions is done at the highest level using the IEEE common commands indicated below. Complete command descriptions are available in the IEEE commands section at the beginning of the language reference. Individual status registers can be set and queried using the commands in the STATus subsystem of the language reference.

- *CLS (clear status) clears the status byte by emptying the error queue and clearing all the event registers.
- *ESE, *ESE? (event status enable) sets and queries the bits in the enable register part of the standard event status register.
- *ESR? (event status register) queries and clears the event register part of the standard event status register.

- *OPC, *OPC? (operation complete) sets the standard event status register to monitor the completion of all commands. The query stops any new commands from being processed until the current processing is complete, then returns a '1'.
- *PSC, *PSC? (power-on state clear) sets the power-on state so that it clears the service request enable register and the event status enable register at power on.
- *SRE, *SRE? (service request enable) sets and queries the value of the service request enable register.
- *STB? (status byte) queries the value of the status byte register without erasing its contents.

How to Use the Status Registers

A program often needs to be able to detect and manage error conditions or changes in instrument status. There are two methods you can use to programmatically access the information in status registers:

- The polling method
- The service request (SRQ) method

In the polling method, the instrument has a passive role. It only tells the controller that conditions have changed when the controller asks the right question. In the SRQ method, the instrument takes a more active role. It tells the controller when there has been a condition change without the controller asking. Either method allows you to monitor one or more conditions.

The polling method works well if you do not need to know about changes the moment they occur. The SRQ method should be used if you must know immediately when a condition changes. To detect a change using the polling method, the program must repeatedly read the registers.

Use the SRQ method when:

- you need time-critical notification of changes
- you are monitoring more than one device which supports SRQs
- you need to have the controller do something else while waiting
- you can't afford the performance penalty inherent to polling

Use polling when:

- your programming language/development environment does not support SRQ interrupts
- you want to write a simple, single-purpose program and don't want the added complexity of setting up an SRQ handler
- To monitor a condition:
 - a. Determine which register contains the bit that reports the condition.
 - b. Send the unique SCPI query that reads that register.
 - c. Examine the bit to see if the condition has changed.

You can monitor conditions in different ways.

- Check the current instrument hardware and firmware status.

Do this by querying the condition registers which continuously monitor status. These registers represent the current state of the instrument. Bits in a condition register are updated in real time. When the condition monitored by a particular bit becomes true, the bit is set to 1. When the condition becomes false, the bit is reset to 0.

- Monitor a particular condition (bit).

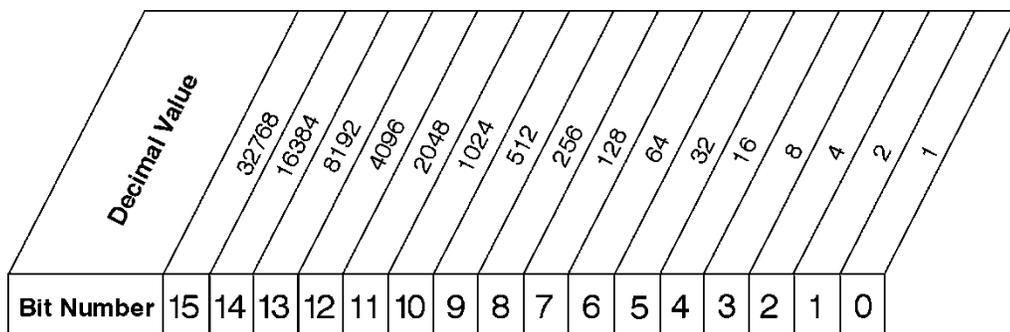
You can enable a particular bit(s), using the event enable register. The instrument will then monitor that particular condition(s). If the bit becomes true (0 to 1 transition) in the event register, it will stay set until the event register is cleared. Querying the event register allows you to detect that this condition occurred even if the condition no longer exists. The event register can only be cleared by querying it or sending the *CLS command.

- Monitor a particular type of change in a condition (bit).
 - The transition registers are preset to register if the condition goes from 0 to 1 (false to true, or a positive transition).
 - This can be changed so the selected condition is detected if the bit goes from 1 to 0 (true to false, or a negative transition).
 - It can also be set for both types of transitions occurring.
 - Or it can be set for neither transition. If both transition registers are set to 0 for a particular bit position, that bit will not be set in the event register for either type of change.

Using a Status Register

Each bit in a register is represented by a numerical value based on its location. See figure below. This number is sent with the command to enable a particular bit. If you want to enable more than one bit, you would send the sum of all the bits that you want to monitor.

Figure: Status Register Bit Values



STATus:OPERation:ENABLE < num >
 STATus:OPERation:ENABLE?

Standard Operation Event Enable Register

ck730a

Bit 15 is not used to report status.

Example 1:

1. To enable bit 0 and bit 6 of standard event status register, you would send the command *ESE 65 because $1 + 64 = 65$.

- The results of a query are evaluated in a similar way. If the *STB? command returns a decimal value of 140, ($140 = 128 + 8 + 4$) then bit 7 is true, bit 3 is true and bit 2 is true.

Example 2:

- Suppose you want to know if an Auto-trigger Timeout occurs, but you only cared about that specific condition. So you would want to know what was happening with bit 10 in the Status Questionable Integrity register, and not about any other bits.
- It's usually a good idea to start by clearing all the status registers with *CLS.
- Sending the STAT:QUES:INT:ENAB 1024 command lets you monitor only bit 10 events, instead of the default monitoring all the bits in the register. The register default is for positive transition events (0 to 1 transition). That is, when an auto-trigger timeout occurs. If instead, you wanted to know when the Auto-trigger timeout condition is cleared, then you would set the STAT:QUES:INT:PTR 0 and the STAT:QUES:INT:NTR 32767.
- So now the only output from the Status Questionable Integrity register will come from a bit 10 positive transition. That output goes to the Integrity Sum bit 9 of the Status Questionable register.
- You can do a similar thing with this register to only look at bit 9 using, STAT:QUES:ENAB 512.
- The Status Questionable register output goes to the "Status Questionable Summary" bit 3 of the Status Byte Register. The output from this register can be enabled using the *SRE 8 command.
- Finally, you would use the serial polling functionality available for the particular bus/software that you are using to monitor the Status Byte Register. (You could also use *STB? to poll the Status Byte Register.)

Using the Service Request (SRQ) Method

Your language, bus, and programming environment must be able to support SRQ interrupts. (For example, BASIC used with VXI-11.3 (GPIB over LAN). When you monitor a condition with the SRQ method, you must:

- Determine which bit monitors the condition.
- Determine how that bit reports to the request service (RQS) bit of the status byte.
- Send SCPI commands to enable the bit that monitors the condition and to enable the summary bits that report the condition to the RQS bit.
- Enable the controller to respond to service requests.

When the condition changes, the instrument sets its RQS bit. The controller is informed of the change as soon as it occurs. As a result, the time the controller would otherwise have used to monitor the condition can be used to perform other tasks. Your program determines how the controller responds to the SRQ.

Generating a Service Request

To use the SRQ method, you must understand how service requests are generated. Bit 6 of the status byte register is the request service (RQS) bit. The *SRE command is used to configure the RQS bit to report changes in instrument status. When such a change occurs, the RQS bit is set. It is cleared when the status byte register is queried using *SRE? (with a serial poll.) It can be queried without erasing the contents with *STB?.

When a register set causes a summary bit in the status byte to change from 0 to 1, the instrument can initiate the service request (SRQ) process. However, the process is only initiated if both of the following conditions are true:

- The corresponding bit of the service request enable register is also set to 1.
- The instrument does not have a service request pending. (A service request is considered to be pending between the time the instrument's SRQ process is initiated and the time the controller reads the status byte register.)

The SRQ process sets the SRQ true. It also sets the status byte's request service (RQS) bit to 1. Both actions are necessary to inform the controller that the instrument requires service. Setting the SRQ line only informs the controller that some device on the bus requires service. Setting the RQS bit allows the controller to determine which instrument requires service.

If your program enables the controller to detect and respond to service requests, it should instruct the controller to perform a serial poll when the SRQ is set true. Each device on the bus returns the contents of its status byte register in response to this poll. The device whose RQS bit is set to 1 is the device that requested service.

When you read the instrument's status byte register with a serial poll, the RQS bit is reset to 0. Other bits in the register are not affected.

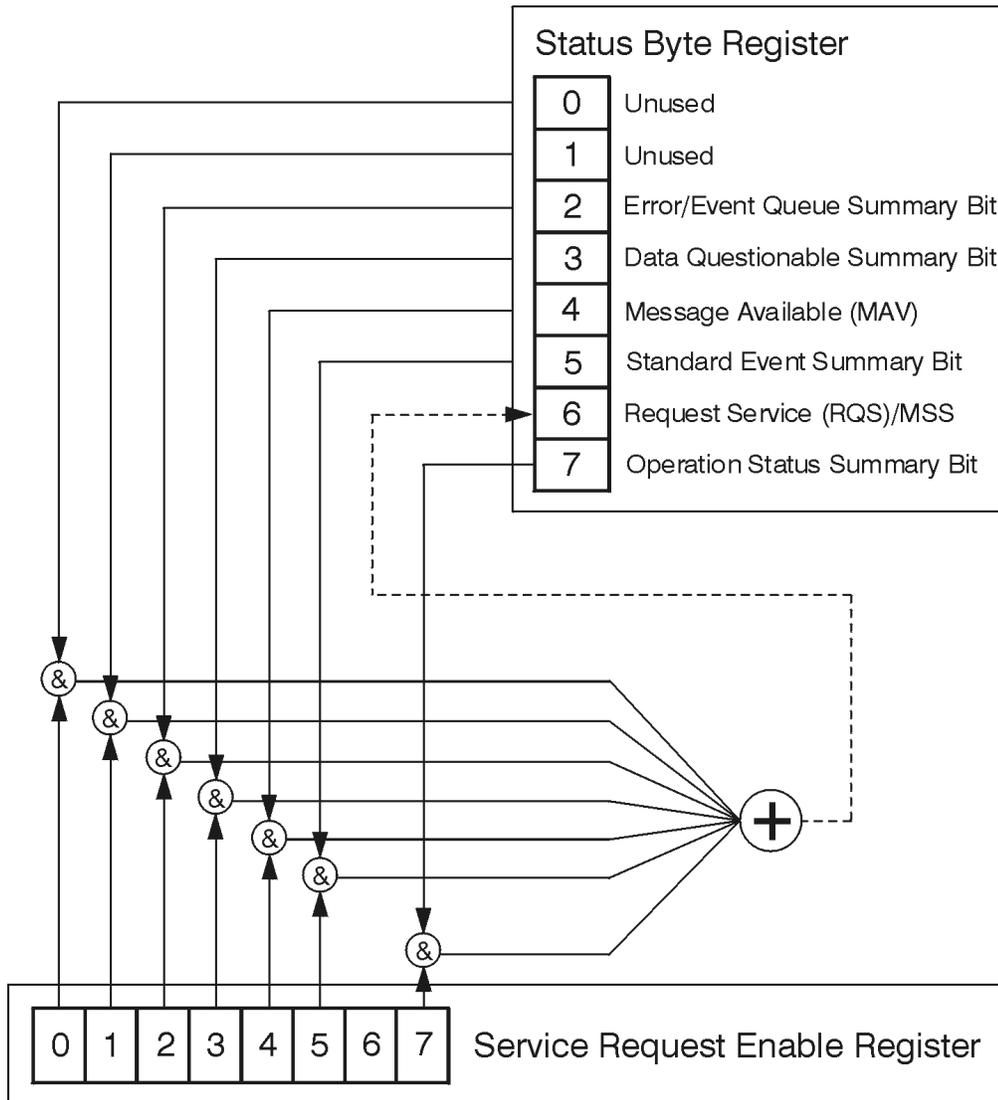
If the status register is configured to SRQ on end-of-measurement and the measurement is in continuous mode, then restarting a measurement (INIT command) can cause the measuring bit to pulse low. This causes an SRQ when you have not actually reached the "end-of-measurement" condition. To avoid this:

1. Set INITiate:CONTinuous off.
2. Set/enable the status registers.
3. Restart the measurement (send INIT).

Status Register System

The hardware status registers are combined to form the instrument status system. Specific status bits are assigned to monitor various aspects of the instrument operation and status. See the diagram of the status system above for information about the bit assignments and status register interconnections.

The Status Byte Register



ck776a

The RQS bit is read and reset by a serial poll. The same bit position (MSS) is read, non-destructively by the *STB? command. If you serial poll bit 6 it is read as RQS, but if you send *STB it reads bit 6 as MSS. For more information refer to IEEE 488.2 standards, section 11.

| | | | | | | | | | |
|-------------------|--------------------|---------------------------------------|-----------------------------------|-----------------------------------|-------------------------|--------------------------------------|-------------------------------|--------|--------|
| | Description | Standard Operation Status Summary Bit | Request Service (RQS) Summary Bit | Standard Event Status Summary Bit | Message Available (MAV) | Data Questionable Status Summary Bit | Error/Event Queue Summary Bit | Unused | Unused |
| Bit Number | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |

*STB?

Status Byte Register

ck725a

| Bit | Description |
|------|---|
| 0, 1 | These bits are always set to 0. |
| 2 | A 1 in this bit position indicates that the SCPI error queue is not empty which means that it contains at least one error message. |
| 3 | A 1 in this bit position indicates that the data questionable summary bit has been set. The data questionable event register can then be read to determine the specific condition that caused this bit to be set. |
| 4 | A 1 in this bit position indicates that the instrument has data ready in the output queue. There are no lower status groups that provide input to this bit. |
| 5 | A 1 in this bit position indicates that the standard event summary bit has been set. The standard event status register can then be read to determine the specific event that caused this bit to be set. |
| 6 | A 1 in this bit position indicates that the instrument has at least one reason to report a status change. This bit is also called the master summary status bit (MSS). |
| 7 | A 1 in this bit position indicates that the standard operation summary bit has been set. The standard operation event register can then be read to determine the specific condition that caused this bit to be set. |

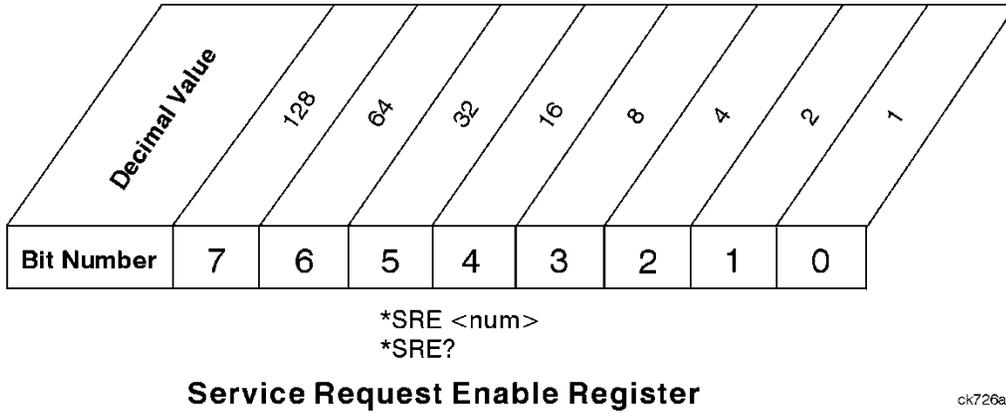
To query the status byte register, send the command *STB?. The response will be the decimal sum of the bits which are set to 1. For example, if bit number 7 and bit number 3 are set to 1, the decimal sum of the 2 bits is 128 plus 8. So the decimal value 136 is returned. The *STB command does not clear the status register.

In addition to the status byte register, the status byte group also contains the service request enable register. This register lets you choose which bits in the status byte register will trigger a service request.

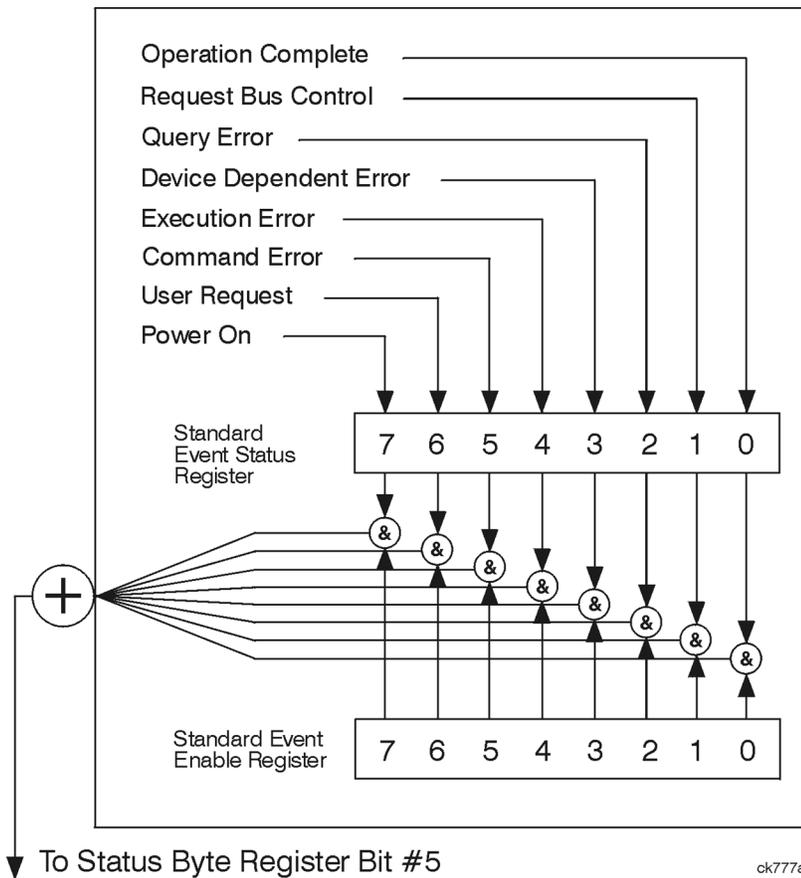
Send the *SRE <integer> command where <integer> is the sum of the decimal values of the bits you want to enable plus the decimal value of bit 6. For example, assume that you want to enable bit 7 so that whenever the standard operation status register summary bit is set to 1 it will trigger a service request. Send the command *SRE 192 (because 192 = 128 + 64). You must always add 64 (the numeric value of RQS

bit 6) to your numeric sum when you enable any bits for a service request. The command *SRE? returns the decimal value of the sum of the bits previously enabled with the *SRE <integer> command.

The service request enable register presets to zeros (0).



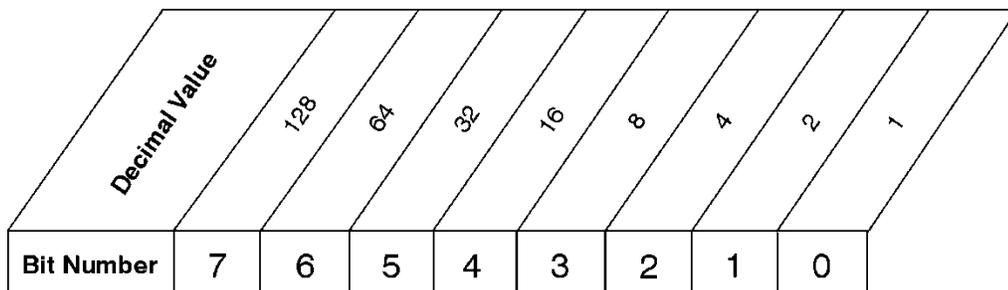
Standard Event Status Register



The standard event status register contains the following bits:

byte register will be set to 1, send the command *ESE 192 (128 + 64). The command *ESE? returns the decimal value of the sum of the bits previously enabled with the *ESE <integer> command.

The standard event status enable register presets to zeros (0).



*ESE <num>
 *ESE?

Standard Event Status Enable Register

ck728a

Operation and Questionable Status Registers

The operation and questionable status registers are registers that monitor the overall instrument condition. They are accessed with the STATUS:OPERation and STATUS:QUESTionable commands in the STATUS command subsystem. See the figure at the beginning of this chapter.

Operation Status Register

The operation status register monitors the current instrument measurement state. It checks to see if the instrument is calibrating, sweeping, or waiting for a trigger. For more information see the *OPC? command located in the IEEE Common Commands section.

| Bit | Condition | Operation |
|-----|---------------------|---|
| 0 | Calibrating | The instrument is busy executing its Align Now process |
| 3 | Sweeping | The instrument is busy taking a sweep. |
| 4 | Measuring | The instrument is busy making a measurement. Measurements often require multiple sweeps. They are initiated by keys under the MEASURE key or with the MEASure group of commands. The bit is valid for most X-Series Modes. |
| 5 | Waiting for trigger | The instrument is waiting for the trigger conditions to be met, then it will trigger a sweep or measurement. |

Questionable Status Register

The questionable status register monitors the instrument's condition to see if anything questionable has happened to it. It is looking for anything that might cause an error or a bad measurement like a hardware problem, an out of calibration situation, or a unusual signal. All the bits are summary bits from lower-level event registers.

| Bit | Condition | Operation |
|-----|-----------|-----------|
|-----|-----------|-----------|

| | | |
|---|---------------------|---|
| 3 | Power summary | The instrument hardware has detected a power unlevelled condition. |
| 4 | Temperature summary | The instrument is still warming up. |
| 5 | Frequency summary | The instrument hardware has detected an unlocked condition or a problem with the external frequency reference. |
| 8 | Calibration summary | The instrument has detected a hardware problem while doing the automatic internal alignment process. |
| 9 | Integrity summary | The instrument has detected a questionable measurement condition such as: bad timing, bad signal/data, timeout problem, signal overload, or "meas uncal". |

STATus Subsystem Command Descriptions

The STATus subsystem controls the SCPI-defined instrument status reporting structures. Each status register has a set of five commands used for querying or masking that particular register.

Numeric values for bit patterns can be entered using decimal or hexadecimal representations. (i.e. 0 to 32767 is equivalent to #H0 to #H7FFF. It is also equal to all ones, 11111111111111) See the SCPI Basics information about using bit patterns for variable parameters.

Operation Register

"Operation Condition Query" on page 162

"Operation Enable" on page 163

"Operation Event Query" on page 163

"Operation Negative Transition" on page 163

"Operation Positive Transition" on page 164

Operation Condition Query

This query returns the decimal value of the sum of the bits in the Status Operation Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

| | |
|------------------------------|------------------------------|
| Mode | All |
| Remote Command | :STATus:OPERation:CONDition? |
| Example | STAT:OPER:COND? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Operation Enable

This command determines which bits in the Operation Event register, will set the Operation Status Summary bit (bit 7) in the Status Byte Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

NOTE

The preset condition is to have all bits in this enable register set to 0. To have any Operation Events reported to the Status Byte Register, one or more bits need to be set to 1.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:OPERation:ENABle <integer> :STATus:OPERation:ENABle? |
| Example | STAT:OPER:ENAB 1 Sets the register so that Align Now operation will be reported to the Status Byte Register. |
| Preset | 0 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Operation Event Query

This query returns the decimal value of the sum of the bits in the Operation Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

| | |
|------------------------------|----------------------------|
| Mode | All |
| Remote Command | :STATus:OPERation[:EVENT]? |
| Example | STAT:OPER? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Operation Negative Transition

This command determines which bits in the Operation Condition register will set the corresponding bit in the Operation Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:OPERation:NTRansition <integer> :STATus:OPERation:NTRansition? |
| Example | STAT:OPER:NTR 1 Align Now operation complete will be reported to the Status Byte Register. |
| Preset | 0 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Operation Positive Transition

This command determines which bits in the Operation Condition register will set the corresponding bit in the Operation Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:OPERation:PTRansition <integer> :STATus:OPERation:PTRansition? |
| Example | STAT:OPER:PTR 1 Align Now operation beginning will be reported to the Status Byte Register. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Preset the Status Byte

Sets bits in most of the enable and transition registers to their default state. It presets all the Transition Filters, Enable Registers, and the Error/Event Queue Enable. It has no effect on Event Registers, Error/Event QUEUE, IEEE 488.2 ESE, and SRE Registers as described in IEEE Standard 488.2–1992, IEEE Standard Codes, Formats, Protocols, and Common Commands for Use with ANSI/IEEE Std 488.1–1987. New York, NY, 1992.

| | |
|-----------------------|------------------|
| Remote Command | :STATus:PRESet |
| Example | STAT:PRES |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Register

"Questionable Condition " on page 165

"Questionable Enable " on page 165

"Questionable Event Query " on page 166

"Questionable Negative Transition " on page 166

"Questionable Positive Transition" on page 166

Questionable Condition

This query returns the decimal value of the sum of the bits in the Questionable Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

| | |
|------------------------------|---------------------------------|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CONDition? |
| Example | STAT:QUES:COND? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Enable

This command determines which bits in the Questionable Event register will set the Questionable Status Summary bit (bit3) in the Status Byte Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

NOTE The preset condition is all bits in this enable register set to 0. To have any Questionable Events reported to the Status Byte Register, one or more bits need to be set to 1. The Status Byte Event Register should be queried after each measurement to check the Questionable Status Summary (bit 3). If it is equal to 1, a condition during the test may have made the test results invalid. If it is equal to 0, this indicates that no hardware problem or measurement problem was detected by the analyzer.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:ENABle <integer> :STATus:QUESTionable:ENABle? |
| Example | STAT:OPER:PTR 1 Align Now operation beginning will be reported to the Status Byte Register. |
| Preset | 0 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Event Query

This query returns the decimal value of the sum of the bits in the Questionable Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

| | |
|------------------------------|-------------------------------|
| Mode | All |
| Remote Command | :STATus:QUEStionable[:EVENT]? |
| Example | STAT:QUES? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Negative Transition

This command determines which bits in the Questionable Condition register will set the corresponding bit in the Questionable Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUEStionable:NTRansition <integer> :STATus:QUEStionable:NTRansition? |
| Example | STAT:QUES:NTR 16 Temperature summary 'questionable cleared' will be reported to the Status Byte Register. |
| Preset | 0 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Positive Transition

This command determines which bits in the Questionable Condition register will set the corresponding bit in the Questionable Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------|-----|
| Mode | All |
|------|-----|

| | |
|------------------------------|---|
| Remote Command | :STATus:QUESTionable:PTRansition <integer> :STATus:QUESTionable:PTRansition? |
| Example | STAT:QUES:PTR 16 Temperature summary 'questionable asserted' will be reported to the Status Byte Register. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Register

"Questionable Calibration Condition " on page 167

"Questionable Calibration Enable " on page 167

"Questionable Calibration Event Query " on page 168

"Questionable Calibration Negative Transition " on page 168

"Questionable Calibration Positive Transition " on page 169

Questionable Calibration Condition

This query returns the decimal value of the sum of the bits in the Questionable Calibration Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:CONDition? |
| Example | STAT:QUES:CAL:COND? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Enable

This command determines which bits in the Questionable Calibration Condition Register will set bits in the Questionable Calibration Event register, which also sets the Calibration Summary bit (bit 8) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:ENABLe <integer> :STATus:QUESTionable:CALibration:ENABLe? |
| Example | STAT:QUES:CAL:ENAB 16384 Can be used to query if an alignment is needed, if you have turned off the automatic alignment process. |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Event Query

This query returns the decimal value of the sum of the bits in the Questionable Calibration Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration[:EVENT]? |
| Example | STAT:QUES:CAL? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Negative Transition

This command determines which bits in the Questionable Calibration Condition register will set the corresponding bit in the Questionable Calibration Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|-----------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:NTRansition <integer> :STATus:QUESTionable:CALibration:NTRansition? |
| Example | STAT:QUES:CAL:NTR 16384 Alignment is not required. |
| Preset | 0 |
| Min | 0 |

| | |
|------------------------------|--------------------|
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Positive Transition

This command determines which bits in the Questionable Calibration Condition register will set the corresponding bit in the Questionable Calibration Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:PTRansition <integer> :STATus:QUESTionable:CALibration:PTRansition? |
| Example | STAT:QUES:CAL:PTR 16384 Alignment is required. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Skipped Register

"Questionable Calibration Skipped Condition " on page 169

"Questionable Calibration Skipped Enable " on page 170

"Questionable Calibration Skipped Event Query " on page 170

"Questionable Calibration Skipped Negative Transition " on page 171

"Questionable Calibration Skipped Positive Transition " on page 171

Questionable Calibration Skipped Condition

This query returns the decimal value of the sum of the bits in the Questionable Calibration Skipped Condition register.

NOTE

The data in this register is continuously updated and reflects the current conditions.

| | |
|-----------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:SKIpped:CONDition? |

| | |
|------------------------------|--------------------------|
| Example | STAT:QUES:CAL:SKIP:COND? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Skipped Enable

This command determines which bits in the Questionable Calibration Skipped Condition Register will set bits in the Questionable Calibration Skipped Event register, which also sets bit 11 of the Questionable Calibration Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:SKIpped:ENABle <integer> :STATus:QUESTionable:CALibration:SKIpped:ENABle? |
| Example | STAT:QUES:CAL:SKIP:ENAB 1 Can be used to query if an EMI alignment skipped condition is detected |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Skipped Event Query

This query returns the decimal value of the sum of the bits in the Questionable Calibration Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:SKIpped[:EVENT]? |
| Example | STAT:QUES:CAL:SKIP? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Skipped Negative Transition

This command determines which bits in the Questionable Calibration Skipped Condition register will set the corresponding bit in the Questionable Calibration Skipped Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUEStionable:CALibration:SKIPped:NTRansition <integer> :STATus:QUEStionable:CALibration:SKIPped:NTRansition? |
| Example | STAT:QUES:CAL:SKIP:NTR 1 Align RF skipped is not required. |
| Preset | 0 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Skipped Positive Transition

This command determines which bits in the Questionable Calibration Skipped Condition register will set the corresponding bit in the Questionable Calibration Skipped Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUEStionable:CALibration:SKIPped:PTRansition <integer> :STATus:QUEStionable:CALibration:SKIPped:PTRansition? |
| Example | STAT:QUES:CAL:SKIP:PTR 1 Align RF skipped is required. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Extended Failure Register

["Questionable Calibration Extended Failure Condition " on page 172](#)

["Questionable Calibration Extended Failure Enable " on page 172](#)

["Questionable Calibration Extended Failure Event Query " on page 172](#)

["Questionable Calibration Extended Failure Negative Transition " on page 173](#)

"Questionable Calibration Extended Failure Positive Transition " on page 173

Questionable Calibration Extended Failure Condition

This query returns the decimal value of the sum of the bits in the Questionable Calibration Extended Failure Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:EXTended:FAILure:CONDition? |
| Example | STAT:QUES:CAL:EXT:FAIL:COND? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Extended Failure Enable

This command determines which bits in the Questionable Calibration Extended Failure Condition Register will set bits in the Questionable Calibration Extended Failure Event register, which also sets bit 9 of the Questionable Calibration Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:EXTended:FAILure:ENABle <integer> :STATus:QUESTionable:CALibration:EXTended:FAILure:ENABle? |
| Example | STAT:QUES:CAL:EXT:FAIL:ENAB 1 Can be used to query if an EMI conducted alignment is needed. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Extended Failure Event Query

This query returns the decimal value of the sum of the bits in the Questionable Calibration Extended Failure Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:EXTended:FAILure[:EVENT]? |
| Example | STAT:QUES:CAL:EXT:FAIL? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Extended Failure Negative Transition

This command determines which bits in the Questionable Calibration Extended Failure Condition register will set the corresponding bit in the Questionable Calibration Extended Failure Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:EXTended:FAILure:NTRansition <integer> :STATus:QUESTionable:CALibration:EXTended:FAILure:NTRansition? |
| Example | STAT:QUES:CAL:EXT:FAIL:NTR 1 EMI conducted align failure is not required. |
| Preset | 0 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Extended Failure Positive Transition

This command determines which bits in the Questionable Calibration Extended Failure Condition register will set the corresponding bit in the Questionable Calibration Extended Failure Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|-----------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:EXTended:FAILure:PTRansition <integer> :STATus:QUESTionable:CALibration:EXTended:FAILure:PTRansition? |
| Example | STAT:QUES:CAL:EXT:FAIL:PTR 1 EMI conducted align failure is required. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |

| | |
|------------------------------|--------------------|
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Extended Needed Register

- "Questionable Calibration Extended Needed Condition " on page 174
- "Questionable Calibration Extended Needed Enable " on page 174
- "Questionable Calibration Extended Needed Event Query " on page 175
- "Questionable Calibration Extended Needed Negative Transition " on page 175
- "Questionable Calibration Extended Needed Positive Transition " on page 176

Questionable Calibration Extended Needed Condition

This query returns the decimal value of the sum of the bits in the Questionable Calibration Extended Needed Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:EXTended:NEEDed:CONDition? |
| Example | STAT:QUES:CAL:EXT:NEED:COND? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Extended Needed Enable

This command determines which bits in the Questionable Calibration Extended Needed Condition Register will set bits in the Questionable Calibration Extended Needed Event register, which also sets bit 14 of the Questionable Calibration Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

| | |
|----------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:EXTended:NEEDed:ENABle <integer> :STATus:QUESTionable:CALibration:EXTended:NEEDed:ENABle? |
| Example | STAT:QUES:CAL:EXT:NEED:ENAB 2 Can be used to query if an EMI conducted alignment is needed. |
| Preset | 32767 |
| Min | 0 |

| | |
|------------------------------|--------------------|
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Extended Needed Event Query

This query returns the decimal value of the sum of the bits in the Questionable Calibration Extended Needed Event register.

NOTE The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:EXTended:NEEDED[:EVENT]? |
| Example | STAT:QUES:CAL:EXT:NEED? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Extended Needed Negative Transition

This command determines which bits in the Questionable Calibration Extended Needed Condition register will set the corresponding bit in the Questionable Calibration Extended Needed Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:EXTended:NEEDED:NTRansition <integer> :STATus:QUESTionable:CALibration:EXTended:NEEDED:NTRansition? |
| Example | STAT:QUES:CAL:EXT:NEED:NTR 2 Align EMI conducted is not required. |
| Preset | 0 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Calibration Extended Needed Positive Transition

This command determines which bits in the Questionable Calibration Extended Needed Condition register will set the corresponding bit in the Questionable Calibration Extended Needed Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:CALibration:EXTended:NEEDed:PTRansition <integer> :STATus:QUESTionable:CALibration:EXTended:NEEDed:PTRansition? |
| Example | STAT:QUES:CAL:EXT:NEED:PTR 2 Align EMI conducted is required. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Frequency Register

"Questionable Frequency Condition " on page 176

"Questionable Frequency Enable " on page 177

"Questionable Frequency Event Query " on page 177

"Questionable Frequency Negative Transition " on page 177

"Questionable Frequency Positive Transition " on page 178

Questionable Frequency Condition

This query returns the decimal value of the sum of the bits in the Questionable Frequency Condition register.

NOTE

The data in this register is continuously updated and reflects the current conditions.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:FREquency:CONDition? |
| Example | STAT:QUES:FREQ:COND? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Frequency Enable

This command determines which bits in the Questionable Frequency Condition Register will set bits in the Questionable Frequency Event register, which also sets the Frequency Summary bit (bit 5) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUEStionable:FREQuency:ENABle <integer> :STATus:QUEStionable:FREQuency:ENABle? |
| Example | STAT:QUES:FREQ:ENAB 2 Frequency Reference Unlocked will be reported to the Frequency Summary of the Status Questionable register. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Frequency Event Query

This query returns the decimal value of the sum of the bits in the Questionable Frequency Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUEStionable:FREQuency[:EVENT]? |
| Example | STAT:QUES:FREQ? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Frequency Negative Transition

This command determines which bits in the Questionable Frequency Condition register will set the corresponding bit in the Questionable Frequency Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------|-----|
| Mode | All |
|------|-----|

| | |
|------------------------------|---|
| Remote Command | :STATus:QUESTionable:FREQuency:NTRansition <integer> :STATus:QUESTionable:FREQuency:NTRansition? |
| Example | STAT:QUES:FREQ:NTR 2 Frequency Reference 'regained lock' will be reported to the Frequency Summary of the Status Questionable register. |
| Preset | 0 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Frequency Positive Transition

This command determines which bits in the Questionable Frequency Condition register will set the corresponding bit in the Questionable Frequency Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:FREQuency:PTRansition <integer> :STATus:QUESTionable:FREQuency:PTRansition? |
| Example | STAT:QUES:FREQ:PTR 2 Frequency Reference 'became unlocked' will be reported to the Frequency Summary of the Status Questionable register. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Integrity Register

"Questionable Integrity Condition " on page 178

"Questionable Integrity Enable " on page 179

"Questionable Integrity Event Query " on page 179

"Questionable Integrity Negative Transition " on page 180

"Questionable Integrity Positive Transition " on page 180

Questionable Integrity Condition

This query returns the decimal value of the sum of the bits in the Questionable Integrity Condition register.

NOTE

The data in this register is continuously updated and reflects the current conditions.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:INTEgrity:CONDition? |
| Example | STAT:QUES:INT:COND? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Integrity Enable

This command determines which bits in the Questionable Integrity Condition Register will set bits in the Questionable Integrity Event register, which also sets the Integrity Summary bit (bit 9) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:INTEgrity:ENABle <integer> :STATus:QUESTionable:INTEgrity:ENABle? |
| Example | STAT:QUES:INT:ENAB 8 Measurement Uncalibrated Summary will be reported to the Integrity Summary of the Status Questionable register. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Integrity Event Query

This query returns the decimal value of the sum of the bits in the Questionable Integrity Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:INTEgrity[:EVENT]? |
| Example | STAT:QUES:INT? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Integrity Negative Transition

This command determines which bits in the Questionable Integrity Condition register will set the corresponding bit in the Questionable Integrity Event register when the condition register bit has a negative transition (1 to 0)

The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUEStionable:INTEgrity:NTRansition <integer> :STATus:QUEStionable:INTEgrity:NTRansition? |
| Example | STAT:QUES:INT:NTR 8 Measurement 'regained calibration' Summary will be reported to the Integrity Summary of the Status Questionable register. |
| Preset | 0 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Integrity Positive Transition

This command determines which bits in the Questionable Integrity Condition register will set the corresponding bit in the Questionable Integrity Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUEStionable:INTEgrity:PTRansition <integer> :STATus:QUEStionable:INTEgrity:PTRansition? |
| Example | STAT:QUES:INT:PTR 8 Measurement 'became uncalibrated' Summary will be reported to the Integrity Summary of the Status Questionable register. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Integrity Signal Register

"Questionable Integrity Signal Condition" on page 181

"Questionable Integrity Signal Enable" on page 181

"Questionable Integrity Signal Event Query" on page 182

"Questionable Integrity Signal Negative Transition" on page 182

"Questionable Integrity Signal Positive Transition" on page 182

Questionable Integrity Signal Condition

This query returns the decimal value of the sum of the bits in the Questionable Integrity Signal Condition register.

NOTE

The data in this register is continuously updated and reflects the current conditions.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:INTEgrity:SIGNal:CONDition? |
| Example | STAT:QUES:INT:SIGN:COND? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Integrity Signal Enable

This command determines which bits in the Questionable Integrity Signal Condition Register will set bits in the Questionable Integrity Signal Event register, which also sets the Integrity Summary bit (bit 9) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:INTEgrity:SIGNal:ENABle <integer> :STATus:QUESTionable:INTEgrity:SIGNal:ENABle? |
| Example | STAT:QUES:INT:SIGN:ENAB 4 Burst Not Found will be reported to the Integrity Summary of the Status Questionable register. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Integrity Signal Event Query

This query returns the decimal value of the sum of the bits in the Questionable Integrity Signal Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:INTEgrity:SIGNal[:EVENT]? |
| Example | STAT:QUES:INT:SIGN? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Integrity Signal Negative Transition

This command determines which bits in the Questionable Integrity Signal Condition register will set the corresponding bit in the Questionable Integrity Signal Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:INTEgrity:SIGNal:NTRansition <integer> :STATus:QUESTionable:INTEgrity:SIGNal:NTRansition? |
| Example | STAT:QUES:INT:SIGN:NTR 4 Burst found will be reported to the Integrity Summary of the Status Questionable register. |
| Preset | 0 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Integrity Signal Positive Transition

This command determines which bits in the Questionable Integrity Signal Condition register will set the corresponding bit in the Questionable Integrity Signal Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUEStionable:INTEgrity:SIGNal:PTRansition <integer> :STATus:QUEStionable:INTEgrity:SIGNal:PTRansition? |
| Example | STAT:QUES:INT:SIGN:PTR 4 Burst not found will be reported to the Integrity Summary of the Status Questionable register. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Integrity Uncalibrated Register

"Questionable Integrity Uncalibrated Condition " on page 183

"Questionable Integrity Uncalibrated Enable " on page 183

"Questionable Integrity Uncalibrated Event Query " on page 184

"Questionable Integrity Uncalibrated Negative Transition " on page 184

"Questionable Integrity Uncalibrated Positive Transition " on page 185

Questionable Integrity Uncalibrated Condition

This query returns the decimal value of the sum of the bits in the Questionable Integrity Uncalibrated Condition register.

NOTE The data in this register is continuously updated and reflects the current conditions.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUEStionable:INTEgrity:UNCalibrated:CONDition? |
| Example | STAT:QUES:INT:UNC:COND? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Integrity Uncalibrated Enable

This command determines which bits in the Questionable Integrity Uncalibrated Condition Register will set bits in the Questionable Integrity Uncalibrated Event register, which also sets the Data Uncalibrated Summary bit (bit 3) in the Questionable Integrity Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUEStionable:INTEgrity:UNCalibrated:ENABle :STATus:QUEStionable:INTEgrity:UNCalibrated:ENABle? |
| Example | STAT:QUES:INT:UNC:ENAB 1 Oversweep (Meas Uncal) will be reported to the Integrity Summary of the Status Questionable register. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Integrity Uncalibrated Event Query

This query returns the decimal value of the sum of the bits in the Questionable Integrity Uncalibrated Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUEStionable:INTEgrity:UNCalibrated[:EVENT]? |
| Example | STAT:QUES:INT:UNC? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Integrity Uncalibrated Negative Transition

This command determines which bits in the Questionable Integrity Uncalibrated Condition register will set the corresponding bit in the Questionable Integrity Uncalibrated Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|-----------------------|---|
| Mode | All |
| Remote Command | :STATus:QUEStionable:INTEgrity:UNCalibrated:NTRansition <integer> :STATus:QUEStionable:INTEgrity:UNCalibrated:NTRansition? |
| Example | STAT:QUES:INT:UNC:NTR 1 Oversweep cleared will be reported to the Integrity Summary of the Status Questionable register. |

| | |
|------------------------------|--------------------|
| Preset | 0 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Integrity Uncalibrated Positive Transition

This command determines which bits in the Questionable Integrity Uncalibrated Condition register will set the corresponding bit in the Questionable Integrity Uncalibrated Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUEStionable:INTEgrity:UNCalibrated:PTRansition <integer> :STATus:QUEStionable:INTEgrity:UNCalibrated:PTRansition? |
| Example | STAT:QUES:INT:UNC:PTR 1 Oversweep (Meas Uncal) occurred will be reported to the Integrity Summary of the Status Questionable register. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Power Register

["Questionable Power Condition " on page 185](#)

["Questionable Power Enable " on page 186](#)

["Questionable Power Event Query " on page 186](#)

["Questionable Power Negative Transition " on page 187](#)

["Questionable Power Positive Transition " on page 187](#)

Questionable Power Condition

This query returns the decimal value of the sum of the bits in the Questionable Power Condition register.

NOTE

The data in this register is continuously updated and reflects the current conditions.

| | |
|------------------------------|---------------------------------------|
| Mode | All |
| Remote Command | :STATus:QUEStionable:POWer:CONDition? |
| Example | STAT:QUES:POW:COND? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Power Enable

This command determines which bits in the Questionable Power Condition Register will set bits in the Questionable Power Event register, which also sets the Power Summary bit (bit 3) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUEStionable:POWer:ENABle <integer> :STATus:QUEStionable:POWer:ENABle? |
| Example | STAT:QUES:POW:ENAB 32 50 MHz Input Pwr too High for Cal will be reported to the Power Summary of the Status Questionable register. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Power Event Query

This query returns the decimal value of the sum of the bits in the Questionable Power Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared.

| | |
|------------------------------|-------------------------------------|
| Mode | All |
| Remote Command | :STATus:QUEStionable:POWer[:EVENT]? |
| Example | STAT:QUES:POW? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Power Negative Transition

This command determines which bits in the Questionable Power Condition register will set the corresponding bit in the Questionable Power Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:POWer:NTRansition <integer> :STATus:QUESTionable:POWer:NTRansition? |
| Example | STAT:QUES:POW:NTR 32 50 MHz Input Power became OK for Cal will be reported to the Power Summary of the Status Questionable register. |
| Preset | 0 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Power Positive Transition

This command determines which bits in the Questionable Power Condition register will set the corresponding bit in the Questionable Power Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUESTionable:POWer:PTRansition <integer> :STATus:QUESTionable:POWer:PTRansition?> |
| Example | STAT:QUES:POW:PTR 32 50 MHz Input Power became too high for Cal will be reported to the Power Summary of the Status Questionable register. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Temperature Register

"Questionable Temperature Condition" on page 188

"Questionable Temperature Enable" on page 188

"Questionable Temperature Event Query" on page 188

"Questionable Temperature Negative Transition" on page 189

"Questionable Temperature Positive Transition" on page 189

Questionable Temperature Condition

This query returns the decimal value of the sum of the bits in the Questionable Temperature Condition register.

NOTE

The data in this register is continuously updated and reflects the current conditions.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:TEMPerature:CONDition? |
| Example | STAT:QUES:TEMP:COND? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Temperature Enable

This command determines which bits in the Questionable Temperature Condition Register will set bits in the Questionable Temperature Event register, which also sets the Temperature Summary bit (bit 4) in the Questionable Register. The variable <integer> is the sum of the decimal values of the bits you want to enable.

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUESTionable:TEMPerature:ENABle <integer> :STATus:QUESTionable:TEMPerature:ENABle? |
| Example | STAT:QUES:TEMP:ENAB 1 Reference Oscillator Oven Cold will be reported to the Temperature Summary of the Status Questionable register. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Temperature Event Query

This query returns the decimal value of the sum of the bits in the Questionable Temperature Event register.

NOTE

The register requires that the associated PTR or NTR filters be set before a condition register bit can set a bit in the event register. The data in this register is latched until it is queried. Once queried, the register is cleared

| | |
|------------------------------|---|
| Mode | All |
| Remote Command | :STATus:QUEStionable:TEMPerature[:EVENT]? |
| Example | STAT:QUES:TEMP? |
| Preset | 0 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Temperature Negative Transition

This command determines which bits in the Questionable Temperature Condition register will set the corresponding bit in the Questionable Temperature Event register when the condition register bit has a negative transition (1 to 0). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|------------------------------|--|
| Mode | All |
| Remote Command | :STATus:QUEStionable:TEMPerature:NTRansition <integer> :STATus:QUEStionable:TEMPerature:NTRansition? |
| Example | STAT:QUES:TEMP:NTR 1 Reference Oscillator Oven not cold will be reported to the Temperature Summary of the Status Questionable register. |
| Preset | 0 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

Questionable Temperature Positive Transition

This command determines which bits in the Questionable Temperature Condition register will set the corresponding bit in the Questionable Temperature Event register when the condition register bit has a positive transition (0 to 1). The variable <integer> is the sum of the decimal values of the bits that you want to enable.

| | |
|-----------------------|---|
| Mode | All |
| Remote Command | :STATus:QUEStionable:TEMPerature:PTRansition <integer> :STATus:QUEStionable:TEMPerature:PTRansition? |
| Example | STAT:QUES:TEMP:PTR 1 Reference Oscillator Oven became cold will be reported to the |

| | |
|------------------------------|--|
| | Temperature Summary of the Status Questionable register. |
| Preset | 32767 |
| Min | 0 |
| Max | 32767 |
| Status Bits/OPC dependencies | Sequential command |
| Initial S/W Revision | Prior to A.02.00 |

IEEE 488.2 Common Commands

The instrument supports the following subset of IEEE 488.2 Common Commands, as defined in Chapter 10 of [IEEE Standard 488.2–1992](#). As indicated in the detailed descriptions, some of these commands correspond directly to instrument front-panel key functionality, while others are available only as remote commands.

| Command | Description |
|---------|---|
| *CAL? | Align Now "All " on page 371 |
| *CLS | "Clear Status " on page 193 |
| *ESE | "Standard Event Status Enable " on page 194 |
| *ESE? | |
| *ESR? | "Standard Event Status Register Query " on page 194 |
| *IDN? | "Identification Query " on page 195 |
| *OPC | "Operation Complete " on page 195 |
| *OPC? | |
| *OPT? | "Query Instrument Options " on page 196 |
| *RCL | "Recall Instrument State " on page 196 |
| *RST | "*RST (Remote Command Only)" on page 197 |
| *SAV | "Save Instrument State " on page 197 |
| *SRE | "Service Request Enable " on page 198 |
| *SRE? | |
| *STB? | "Status Byte Query " on page 198 |
| *TRG | "Trigger " on page 199 |
| *TST? | "Self Test Query " on page 199 |
| *WAI | "Wait-to-Continue " on page 199 |

All

(In MXE the key label is "All (plus RF Presel 20 Hz – 3.6 GHz)")Immediately executes an alignment of all subsystems In MXE, the Align Now All is followed by additionally aligning the RF Preselector section, so in MXE, the key label contains the parenthetical note "(plus RF Presel 20 Hz – 3.6 GHz)". The instrument stops any measurement currently underway, performs the alignment, then restarts the measurement from the beginning (similar to pressing the Restart key).

If an interfering user signal is present at the RF Input, the alignment is performed on all subsystems except the RF. After completion, the Error Condition message "Align skipped: 50 MHz interference" or "Align skipped: 4.8 GHz interference" is generated. In addition the Error Condition message "Align Now, RF required" is generated, and bits 11 and 12 are set in the Status Questionable Calibration register.

The query form of the remote commands (:CALibration[:ALL]? or *CAL?) invokes the alignment of all subsystems and returns a success or failure value. An interfering user signal is not grounds for failure; if the

alignment was able to succeed on all portions but unable to align the RF because of an interfering signal, the resultant will be the success value.

Successful completion of Align Now, All will clear the “Align Now, All required” Error Condition, and clear bit 14 in the Status Questionable Calibration register. It will also begin the elapsed time counter for Last Align Now, All Time, and capture the Last Align Now, All Temperature.

In the MXE, successful completion will also clear the “Align 20 Hz to 30 MHz required” Error Condition, the “Align 30 MHz to 3.6 GHz required” Error Condition, and the “Align 20 Hz to 3.6 GHz required” Error Condition, and clear bits 1 and bit 2 and clear the bit 1 in the Status Questionable Calibration Extended Needed register.

If the Align RF subsystem succeeded in aligning (no interfering signal present), the elapsed time counter begins for Last Align Now, RF Time, and the temperature is captured for the Last Align Now, RF Temperature. In addition the Error Conditions “Align skipped: 50 MHz interference” and “Align skipped: 4.8 GHz interference” are cleared, the Error Condition “Align Now, RF required” is cleared, and bits 11 and 12 are cleared in the Status Questionable Calibration register

Align Now, All can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs the Error Condition message “Align Now, All required” is generated, and bit 14 is set in the Status Questionable Condition register. This is because new alignment data may be employed for an individual subsystem, but not a cohesive set of data for all subsystems.

In many cases, you might find it more convenient to change alignments to Normal, instead of executing Align Now, All. When the Auto Align process transitions to Normal, the analyzer will immediately start to update only the alignments that have expired, thus efficiently restoring the alignment process.

| | |
|-----------------------|---|
| Key Path | System, Alignments, Align Now |
| Mode | All |
| Remote Command | :CALibration[:ALL] :CALibration[:ALL]? |
| Example | :CAL |
| Notes | :CALibration[:ALL]? returns 0 if successful :CALibration[:ALL]? returns 1 if failed :CALibration[:ALL]? is the same as *CAL? While Align Now, All is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bit 14 in the Status Questionable Calibration register. An interfering user signal is not grounds for failure of Align Now, All. However, bits 11 and 12 are set in the Status Questionable Calibration register to indicate Align Now, RF is required. An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed. |
| Couplings | Initializes the time for the Last Align Now, All Time. Records the temperature for the Last Align Now, All Temperature. |

| | |
|------------------------------|--|
| | If Align RF component succeeded, initializes the time for the Last Align Now, RF Time. If Align RF component succeeded, records the temperature for the Last Align Now, RF Temperature. |
| Status Bits/OPC dependencies | Bits 11, 12, or 14 may be set in the Status Questionable Calibration register. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|----------------------|--|
| Mode | All |
| Remote Command | *CAL? |
| Example | *CAL? |
| Notes | *CAL? returns 0 if successful *CAL? returns 1 if failed :CALibration[:ALL]? is the same as *CAL? See additional remarks described with :CALibration[:ALL]? Everything about :CALibration[:ALL]? is synonymous with *CAL? including all conditions, status register bits, and couplings |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|----------------------|--|
| Mode | All |
| Remote Command | :CALibration[:ALL]:NPENDING |
| Example | CAL:NPEN |
| Notes | :CALibration[:ALL]:NPENDING is the same as :CALibration[:ALL] including all conditions, status register bits, except this scpi command does not BLOCK the scpi session, so the user should use status register bits to query if the calibration is successfully completed or not. Typical usage is: 1) :CALibration:ALL:NPENDING (Start a calibration) 2) :STATus:OPERation:CONDition? (Check if the calibration is completed or not, If bit 0 is set, then the system is doing calibration, the user should repeat this scpi query until the bit is cleared) 3):STATus:QUEStionable:CALibration:CONDition? (Check if there are any errors/failures in previous calibration procedure |
| Initial S/W Revision | X.14.20 |

Clear Status

Clears the status byte register. It does this by emptying the error queue and clearing all bits in all of the event registers. The status byte register summarizes the states of the other registers. It is also responsible for generating service requests.

| | |
|----------|---|
| Key Path | No equivalent key. Related key System, Show Errors, Clear Error Queue |
|----------|---|

| | |
|--------------------------------------|--|
| Remote Command | *CLS |
| Example | *CLS Clears the error queue and the Status Byte Register. |
| Notes | For related commands, see the SYSTem:ERRor[:NEXT]? command. See also the STATus:PRESet command and all commands in the STATus subsystem. |
| Status Bits/OPC dependencies | Resets all bits in all event registers to 0, which resets all the status byte register bits to 0 also. |
| Backwards Compatibility Notes | In general the status bits used in the X-Series status system will be backwards compatible with ESA and PSA. However, note that all conditions will generate events that go into the event log, and some will also generate status bits. |
| Initial S/W Revision | Prior to A.02.00 |

Standard Event Status Enable

Selects the desired bits from the standard event status enable register. This register monitors I/O errors and synchronization conditions such as operation complete, request control, query error, device dependent error, status execution error, command error, and power on. The selected bits are OR'd to become a summary bit (bit 5) in the byte register which can be queried.

The query returns the state of the standard event status enable register.

| | |
|-------------------------------------|---|
| Key Path | No equivalent key. Related key System, Show Errors, Clear Error Queue |
| Remote Command | *ESE <integer> *ESE? |
| Example | *ESE 36 Enables the Standard Event Status Register to monitor query and command errors (bits 2 and 5). *ESE? Returns a 36 indicating that the query and command status bits are enabled. |
| Notes | For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands. |
| Preset | 255 |
| State Saved | Not saved in state. |
| Min | 0 |
| Max | 255 |
| Status Bits/OPC dependencies | Event Enable Register of the Standard Event Status Register. |
| Initial S/W Revision | Prior to A.02.00 |

Standard Event Status Register Query

Queries and clears the standard event status event register. (This is a destructive read.) The value returned is a hexadecimal number that reflects the current state (0/1) of all the bits in the register.

| | |
|-----------------------|-------|
| Remote Command | *ESR? |
|-----------------------|-------|

| | |
|------------------------------|---|
| Example | *ESR? Returns a 1 if there is either a query or command error, otherwise it returns a zero. |
| Notes | For related commands, see the STATus subsystem commands. |
| Preset | 0 |
| Min | 0 |
| Max | 255 |
| Status Bits/OPC dependencies | Standard Event Status Register (bits 0 - 7). |
| Initial S/W Revision | Prior to A.02.00 |

Identification Query

Returns a string of instrument identification information. The string will contain the model number, serial number, and firmware revision.

The response is organized into four fields separated by commas. The field definitions are as follows:

- Manufacturer
- Model
- Serial number
- Firmware version

| | |
|--------------------------|--|
| Key Path | No equivalent key. See related key System, Show System. |
| Remote Command | *IDN? |
| Example | *IDN? Returns instrument identification information, such as: Agilent Technologies, N9020A, US01020004, A.01.02 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | x.14.50 |

Operation Complete

The *OPC command sets bit 0 in the standard event status register (SER) to "1" when pending operations have finished, that is when all overlapped commands are complete. It does not hold off subsequent operations. You can determine when the overlapped commands have completed either by polling the OPC bit in SER, or by setting up the status system such that a service request (SRQ) is asserted when the OPC bit is set.

The *OPC? query returns a "1" after all the current overlapped commands are complete. So it holds off subsequent commands until the "1" is returned, then the program continues. This query can be used to synchronize events of other instruments on the external bus.

| | |
|-----------------------|------|
| Remote Command | *OPC |
|-----------------------|------|

| | |
|-------------------------------|--|
| | *OPC? |
| Example | INIT:CONT 0 Selects single sweeping. INIT:IMM Initiates a sweep. *OPC? Holds off any further commands until the sweep is complete. |
| Status Bits/OPC dependencies | Not global to all remote ports or front panel. *OPC only considers operation that was initiated on the same port as the *OPC command was issued from. *OPC is an overlapped command, but *OPC? is sequential. |
| Backwards Compatibility Notes | <ol style="list-style-type: none"> 1. The ESA/PSA/VSA products do not meet all the requirements for the *OPC command specified by IEEE 488.2. This is corrected for X-Series. This will sometimes cause behavior that is not backward compatible, but it will work as customers expect. 2. Commands such as, *OPC/*OPC?/*WAI/*RST used to be global. They considered front panel operation in conjunction with the GPIB functionality. Now they are evaluated on a per channel basis. That is, the various rear panel remote ports and the front panel i/o are all considered separately. Only the functionality initiated on the port where the *OPC was sent, is considered for its operation. 3. *OPC used to hold off until the operation bits were cleared. Now it holds off until all overlapping commands are completed. Also, earlier instruments did not wait for completion of all processes, only the ones identified here (in the STATus:OPERation register): Calibrating: monitored by PSA, ESA, VSA (E4406A) Sweeping: monitored by PSA, ESA, VSA (E4406A) Waiting for Trigger: monitored by PSA, ESA, VSA (E4406A) Measuring: monitored by PSA and ESA (but not in all Modes). Paused: monitored by VSA (E4406A). Printing: monitored by VSA (E4406A). Mass memory busy: monitored by VSA (E4406A). |
| Initial S/W Revision | Prior to A.02.00 |

Query Instrument Options

Returns a string of all the installed instrument options. It is a comma separated list with quotes, such as: "503,P03,PFR".

To be IEEE compliant, this command should return an arbitrary ascii variable that would not begin and end with quotes. But the quotes are needed to be backward compatible with previous SA products and software. So, the actual implementation will use arbitrary ascii. But quotes will be sent as the first and last ascii characters that are sent with the comma-separated option list.

| | |
|-----------------------|------------------|
| Remote Command | *OPT? |
| Initial S/W Revision | Prior to A.02.00 |

Recall Instrument State

This command recalls the instrument state from the specified instrument memory register.

- If the state being loaded has a newer firmware revision than the revision of the instrument, no state is recalled and an error is reported
- If the state being loaded has an equal firmware revision than the revision of the instrument, the state will be loaded.
- If the state being loaded has an older firmware revision than the revision of the instrument, the instrument will only load the parts of the state that apply to the older revision.

| | |
|-------------------------------------|--|
| Remote Command | *RCL <register #> |
| Example | *RCL 7 Recalls the instrument state that is currently stored in register 7. |
| Notes | Registers 0 through 6 are accessible from the front panel in menu keys for Recall Registers. |
| Min | 0 |
| Max | 127 |
| Status Bits/OPC dependencies | The command is sequential. |
| Initial S/W Revision | Prior to A.02.00 |

*RST (Remote Command Only)

*RST is equivalent to :SYST:PRES::INIT:CONT OFF, which is a Mode Preset in the Single measurement state. This remote command is preferred over Mode Preset remote command - :SYST:PRES, as optimal remote programming occurs with the instrument in the single measurement state.

| | |
|--------------------------------------|--|
| Remote Command | *RST |
| Example | *RST |
| Notes | Sequential Clears all pending OPC bits and the Status Byte is set to 0. |
| Couplings | A *RST will cause the currently running measurement to be aborted and cause the default measurement to be active. *RST gets the mode to a consistent state with all of the default couplings set. |
| Backwards Compatibility Notes | In legacy analyzers *RST did not set the analyzer to Single, but in the X-Series it does, for compliance with the IEEE 488.2 specification. In the X-Series, *RST does not do a *CLS (clear the status bits and the error queue). In legacy analyzers, *RST used to do the equivalent of SYSTem:PRESet, *CLS and INITiate:CONTinuous OFF. But to be 488.2 compliant, *RST in the X-Series does not do a *CLS. |
| Initial S/W Revision | Prior to A.02.00 |

Save Instrument State

This command saves the current instrument state and mode to the specified instrument memory register.

| | |
|------------------------------|--|
| Remote Command | *SAV <register #> |
| Example | *SAV 9 Saves the instrument state in register 9. |
| Notes | Registers 0 through 6 are accessible from the front panel in menu keys for Save Registers. |
| Min | 0 |
| Max | 127 |
| Status Bits/OPC dependencies | The command is sequential. |
| Initial S/W Revision | Prior to A.02.00 |

Service Request Enable

This command enables the desired bits of the service request enable register.

The query returns the value of the register, indicating which bits are currently enabled.

| | |
|------------------------------|---|
| Remote Command | *SRE <integer> *SRE? |
| Example | *SRE 22 Enables bits 1, 2, and 4 in the service request enable register. |
| Notes | For related commands, see the STATus subsystem and SYSTem:ERRor[:NEXT]? commands. |
| Preset | 0 |
| Min | 0 |
| Max | 255 |
| Status Bits/OPC dependencies | Service Request Enable Register (all bits, 0 – 7). |
| Initial S/W Revision | Prior to A.02.00 |

Status Byte Query

Returns the value of the status byte register without erasing its contents.

| | |
|------------------------------|---|
| Remote Command | *STB? |
| Example | *STB? Returns a decimal value for the bits in the status byte register. For example, if a 16 is returned, it indicates that bit 5 is set and one of the conditions monitored in the standard event status register is set. |
| Notes | See related command *CLS. |
| Status Bits/OPC dependencies | Status Byte Register (all bits, 0 – 7). |
| Initial S/W Revision | Prior to A.02.00 |

Trigger

This command triggers the instrument. Use the :TRIGger[:SEQuence]:SOURce command to select the trigger source.

| | |
|-----------------------|--|
| Key Path | No equivalent key. See related keys Single and Restart. |
| Remote Command | *TRG |
| Example | *TRG Triggers the instrument to take a sweep or start a measurement, depending on the current instrument settings. |
| Notes | See related command :INITiate:IMMediate. |
| Initial S/W Revision | Prior to A.02.00 |

Self Test Query

This query performs the internal self-test routines and returns a number indicating the success of the testing. A zero is returned if the test is successful, 1 if it fails.

| | |
|-----------------------|---|
| Remote Command | *TST? |
| Example | *TST? Runs the self-test routines and returns 0=passed, 1=some part failed. |
| Initial S/W Revision | Prior to A.02.00 |

Wait-to-Continue

This command causes the instrument to wait until all overlapped commands are completed before executing any additional commands. There is no query form for the command.

| | |
|------------------------------|---|
| Remote Command | *WAI |
| Example | INIT:CONT OFF; INIT;*WAI Sets the instrument to single sweep. Starts a sweep and waits for its completion. |
| Status Bits/OPC dependencies | Not global to all remote ports or front panel. *OPC only considers operation that was initiated on the same port as the *OPC command was issued from. |
| Initial S/W Revision | Prior to A.02.00 |

4 Input/Output Functions

Input/Output

The Input/Output features are common across multiple Modes and Measurements. These common features are described in this section. See the Measurement description for information on features that are unique.

The Input/Output key accesses the keys that control the Input/Output parameters of the instrument. In general, these are functions associated with external connections to the analyzer, either to the inputs or the outputs. Since these connections tend to be fairly stable within a given setup, in general, the input/output settings do not change when you Preset the analyzer.

Other functions related to the input/output connections, but which tend to change on a measurement by measurement basis, can be found under the Trigger and AMPTD Y Scale keys. In addition, some of the digital I/O bus configurations can be found under the System key.

NOTE

The functions in the Input/Output menu are "global" (common) to all Modes (applications). But individual Input/Output functions only appear in a Mode if they apply to that Mode. Functions that apply to a Mode but not to all measurements in the Mode may be grayed-out in some measurements.

["Input/Output variables - Preset behavior" on page 203](#)

The Input Port selection is the first menu under the Input/Output key:

| Key Path | Front-panel key |
|-------------------------------------|---|
| Remote Command | <code>[:SENSe] :FEED RF AIQ EMIXer</code> <code>[:SENSe] :FEED?</code> |
| Example | <code>:FEED RF</code> <code>:FEED?</code> |
| Couplings | The <code>[:SENSe] :FEED RF</code> command turns the calibrator OFF |
| Preset | This setting is unaffected by a Preset or power cycle. It survives a Mode Preset and mode changes. It is set to RF on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | <code>[:SENSe] :FEED AREFERENCE</code> In the PSA the calibrator was one of the inputs and selected using the AREF parameter to the same <code>:FEED</code> command that switched the inputs. In the X-Series it is controlled in a separate menu and overrides the input selection. For code compatibility the <code>[:SENSe] :FEED AREFERENCE</code> command is provided, and is aliased to <code>[:SENSe] :FEED :AREF REF50</code> , which causes the input to be switched to the 50 MHz calibrator. The <code>[:SENSe] :FEED RF</code> command switches the input back to the RF port and turns the calibrator OFF, thus providing full compatibility with the PSA calibrator function. Note that after sending this, the query <code>[:SENSe] :FEED?</code> will NOT return "AREF" but instead the currently selected input. |
| Backwards Compatibility SCPI | <code>[:SENSe] :FEED IQ IONLy QONLy</code> <code>[:SENSe] :FEED?</code> The parameters <code>IQ IONLy QONLy</code> are supported for backwards compatibility with the E44406A. <code>[:SENSe] :FEED IQ</code> aliases to <code>[:SENSe] :FEED :IQ :TYPE IQ</code> <code>[:SENSe] :FEED IONLy</code> aliases to <code>[:SENSe] :FEED :IQ :TYPE IONLy</code> |

| | |
|-------------------------------|---|
| | <p>[;SENSe]:FEED QONLY aliases to [;SENSe]:FEED:IQ:TYPE QONLY</p> <p>The query [;SENSe]:FEED? will always returns AIQ whatever the type of legacy parameters IQ IONLY QONLY has been used.</p> |
| Backwards Compatibility Notes | <p>Most of the settings in the X-Series Input/Output system, including External Gain, Amplitude Corrections settings and data, etc., are shared by all modes and are not changed by a mode switch. Furthermore, most variables in the Input/Output system key are not affected by Mode Preset. Both of these behaviors represent a departure from legacy behavior.</p> <p>In the X-Series. Input/Output settings are reset by using the "Restore Input/Output Defaults" function. They can also be reset to their default values through the System->Restore System Defaults-> In/Out Config key or through the System ->Restore System Defaults -> All key (and corresponding SCPI).</p> <p>While this matches most use cases better, it does create some code compatibility issues. For example, Amplitude Corrections are no longer turned off by a Mode Preset, but instead by using the "Restore Input/Output Defaults" key/SCPI.</p> <p>Although Input/Output settings are not part of each Mode's State, they are saved in the Save State files, so that all of the instrument settings can be recalled with Recall State, as in legacy instruments.</p> |
| Initial S/W Revision | Prior to A.02.00 |
| Remote Command | <p>:INPut:MIXer EXTernal INTernal</p> <p>:INPut:MIXer?</p> |
| Example | <p>INP:MIX INT</p> <p>INP:MIX?</p> |
| Notes | <p>In legacy analyzers you choose between the Internal mixer or an External Mixer. In the X-Series, the External Mixer is one of the choices for the Input and is selected using the FEED command (:SENSe:FEED EXTMIxer).</p> <p>For compatibility, the INPut:MIXer EXTernal INTernal legacy command is mapped as follows:</p> <ol style="list-style-type: none"> 1. When INPut:MIXer EXTernal is received, SENSe:FEED EMIXer is executed. 2. When INPut:MIXer INTernal is received, SENSe:FEED RF is executed. 3. When INPut:MIXer? is received, the response will be INT if any input other than the external mixer is selected and EXT if the external mixer is selected |
| Preset | INT |
| Backwards Compatibility Notes | <p>PSA supports the following SCPI Command :</p> <p>:INPut:MIXer:TYPE PRESelected UNPReselect</p> <p>:INPut:MIXer:TYPE?</p> <p>PXA does not support the :INPut:MIXer:TYPE command.</p> |
| Initial S/W Revision | A.08.01 |

Input/Output variables - Preset behavior

Virtually all the input/output settings are NOT a part of mode preset. They can be set to their default value

by one of the three ways:

- by using the Restore Input/Output Defaults key on the first page of the input/output menu,
- by using the System->Restore System Defaults->Input/Output Settings or,
- by using the System -> Restore System Defaults->All. Also, they survive a Preset and a Power cycle.

A very few of the Input/Output settings do respond to a Mode Preset; for example, if the Calibrator is on it turns off on a Preset, and if DC coupling is in effect it switches to AC on a Preset. These exceptions are made in the interest of reliability and usability, which overrides the need for absolute consistency. Exceptions are noted in the SCPI table for the excepted functions.

RF Input

Selects the front-panel RF input port to be the analyzer signal input. If RF is already selected, pressing this key accesses the RF input setup functions.

| | |
|---------------------------------|---|
| Key Path | Input/Output |
| Example | [:SENSe]:FEED RF |
| Couplings | The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Input to automatically switch to the RF Input. If the RF Calibrator is on, it is turned off. Subsequently disconnecting the USB Preamp from USB does not change the Input selection nor restore the previous selection. |
| Readback | The RF input port, RF coupling, and current input impedance settings appear on this key as: "XX, YY, ZZ" where XX is RF, RF2, RFIO1, RFIO2, depending on what input is selected (only appears on analyzers with multiple RF inputs) YY is AC or DC ZZ is 50Ω or 75Ω |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

Input Z Correction

Sets the input impedance for unit conversions. This affects the results when the y-axis unit is voltage or current units (dBmV, dBμV, dBμA, V, A), but not when it is power units (dBm, W). The impedance you select is for computational purposes only, since the actual impedance is set by internal hardware to 50 ohms. Setting the computational input impedance to 75 ohms is useful when using a 75 ohm to 50 ohm adapter to measure a 75 ohm device on an analyzer with a 50 ohm input impedance.

There are a variety of ways to make 50 to 75 ohm transitions, such as impedance transformers or minimum loss pads. The choice of the solution that is best for your measurement situation requires balancing the amount of loss that you can tolerate with the amount of measurement frequency range that you need. If you are using one of these pads/adaptors with the Input Z Corr function, you might also want to use the Ext Gain key. This function is used to set a correction value to compensate for the gain (loss) through your pad. This correction factor is applied to the displayed measurement values.

| | |
|----------------------|--|
| Key Path | Input/Output, RF Input |
| Remote Command | [:SENSe] :CORRection:IMPedance [:INPut] [:MAGNitude] 50 75 [:SENSe] :CORRection:IMPedance [:INPut] [:MAGNitude] ? |
| Example | CORR:IMP 75 sets the input impedance correction to 75 ohms. CORR:IMP? |
| Couplings | In the N9000A option C75, when RF Input 2 is selected, the Input Z Correction will automatically change to 75 ohms. You may then change it to whatever is desired. When the main RF Input is selected, the Input Z Correction will automatically change to 50 ohms. You may then change it to whatever is desired. |
| Preset | This is unaffected by a Preset but is set to 50 ohms on a "Restore Input/Output Defaults" or "Restore System Defaults->All" Some instruments/options may have 75 ohms available. |
| State Saved | Saved in instrument state |
| Readback | 50 Ω or 75 Ω . Current setting reads back to the RF key. |
| Initial S/W Revision | Prior to A.02.00 |

RF Coupling

Specifies alternating current (AC) or direct current (DC) coupling at the analyzer RF input port. Selecting AC coupling switches in a blocking capacitor that blocks any DC voltage present at the analyzer input. This decreases the input frequency range of the analyzer, but prevents damage to the input circuitry of the analyzer if there is a DC voltage present at the RF input.

In AC coupling mode, you can view signals below the corner frequency of the DC block, but below a certain frequency the amplitude accuracy is not specified. The frequency below which specifications do not apply is:

| X-Series Model | Lowest Freq for meeting specs when AC coupled | Lowest Freq for meeting specs when DC coupled |
|--------------------|---|---|
| N9000A-503/507 | 100 kHz | n/a |
| N9000A-C75 Input 2 | 1 MHz | n/a |
| N9000A-513/526 | 10 MHz | 9 kHz |
| N9010A | 10 MHz | 9 kHz |
| N9020A | 10 MHz | 20 Hz |
| N9030A | 10 MHz | 3 Hz |

Some amplitude specifications apply only when coupling is set to DC. Refer to the appropriate amplitude specifications and characteristics for your analyzer.

When operating in DC coupled mode, ensure protection of the analyzer input circuitry by limiting the DC part of the input level to within 200 mV of 0 Vdc. In AC or DC coupling, limit the input RF power to +30 dBm (1 Watt).

| | |
|---------------------------------|---|
| Key Path | Input/Output, RF Input |
| Remote Command | :INPut:COUPling AC DC :INPut:COUPling? |
| Example | INP:COUP DC |
| Dependencies | This key does not appear in models that are always AC coupled. When the SCPI command to set DC coupling is sent to these models, it results in the error "Illegal parameter value; This model is always AC coupled" In these models, the SCPI query INP:COUP? always returns AC. This key does not appear in models that are always DC coupled. When the SCPI command to set AC coupling is sent to these models, it results in the error "Illegal parameter value; This instrument is always DC coupled" In these models, the SCPI query INP:COUP? always returns DC. |
| Preset | AC on models that support AC coupling On models that are always DC coupled, such as millimeter wave models (frequency ranges 30 GHz and above), the preset is DC. |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

External Mixer

This key allows you to choose an External Mixer through which to apply signal input to the analyzer. When chosen, the LO/IF port becomes the input to the analyzer.

External Mixing requires option EXM. The External Mixer key will not appear unless option EXM is installed. The presence of the LO/IF connector alone does not indicate that you have Option EXM licensed. To verify that option EXM is installed, press System, Show, System.

When External Mixer is selected, the Center Freq key controls the setting of the Center Freq in external mixing, which is separate from the settings of Center Freq for the RF Input or BBIQ. Each input retains its unique settings for Center Freq. A unique SCPI command is provided solely for the external mixing Center Freq (see the Center Freq key description), which only affects the External Mixer CF, although sending the generic Center Freq command while External Mixer is selected also controls the External Mixer CF.

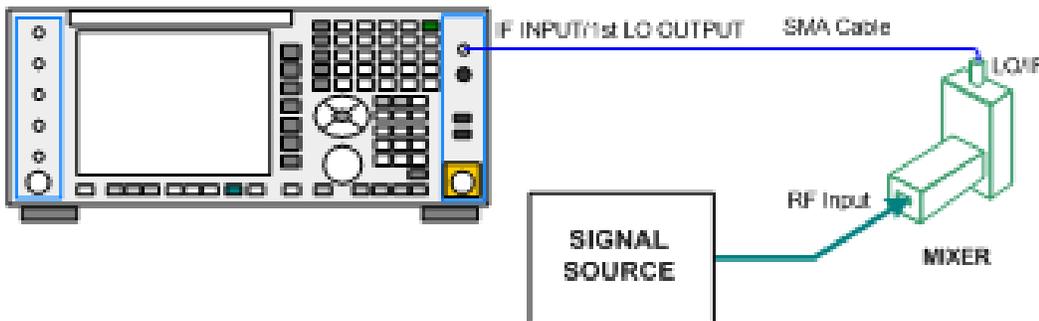
See "[More Information](#)" on page 207

| | |
|---------------------|--|
| Key Path | Input/Output |
| Example | :FEED EMIX |
| Notes | Not all measurements support the use of the External Mixer input. When External Mixer is selected in a measurement that does not support it, the "No result; Meas invalid with Ext Mixing" error condition occurs. |
| Dependencies | Unless option EXM is present, the External Mixer key is blanked, and all SCPI commands associated with menus accessed by this key return an error |

| | |
|-------------------------------|---|
| | Manual FFT mode is available with external mixing, but not with Signal ID. |
| Preset | All settings under this key are returned to their default state when Restore Input/Output Defaults is pressed. |
| State Saved | All settings under this key, and all Frequency settings, are remembered when you go out of External Mixer, so that when External Mixer is chosen again, all the external mixer functions will retain their previous settings, with the exception of Signal ID which is set to OFF (Signal ID is also set to Off unless External Mixer is the selected Input). |
| Readback Text | The readback text on this key shows the currently selected mixer, in square brackets. |
| Backwards Compatibility Notes | Unlike PSA, all external mixer settings including Center Frequency are retained when you go in and out of External Mixing. Also, Preset does not take you out of External Mixing (Restore Input/Output Defaults does). |
| Initial S/W Revision | A.08.01 |

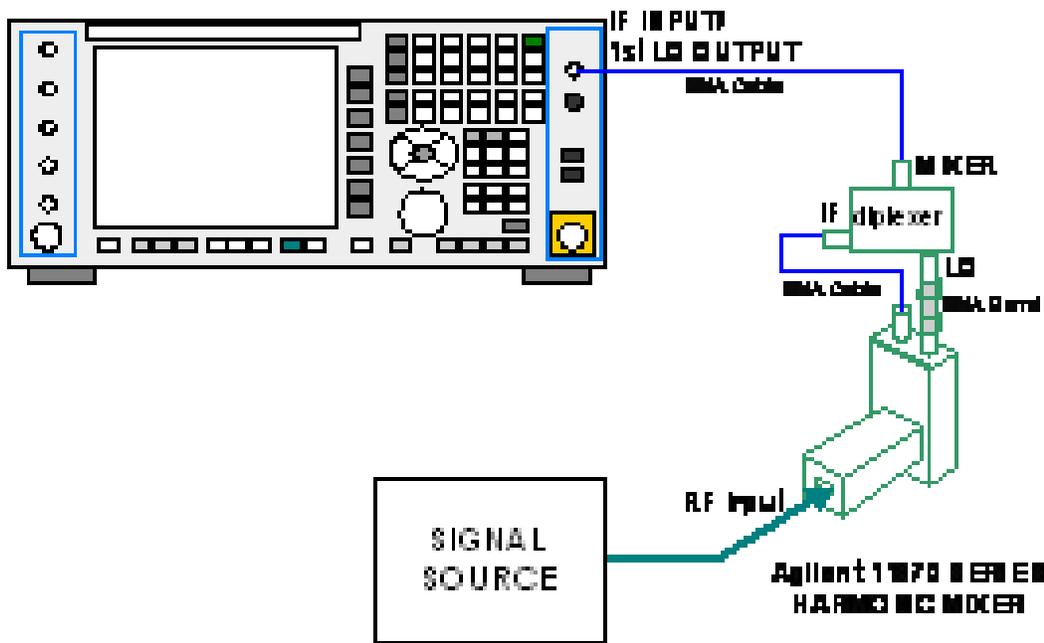
More Information

X-series analyzers have a combined LO Out/IF In connection, whereas earlier analyzers used separate ports for the LO Out and the IF in. Internal diplexers in the analyzer and the mixer simplify the connection for the user – only a single SMA cable is required.



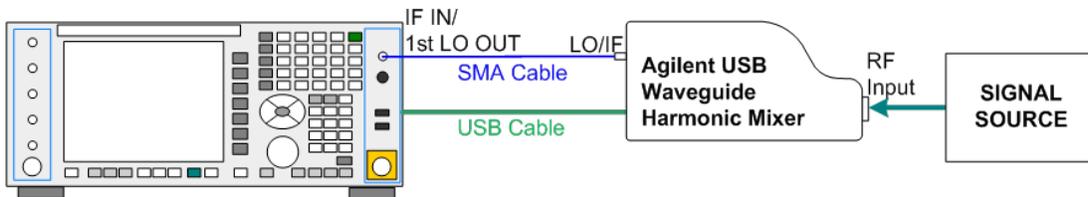
Legacy HP/Agilent and some third party mixers have separate LO In and IF out connections. This requires you to use an external diplexer to connect these mixers. A diplexer can easily be purchased for this purpose (for example, Diplexer Model # DPL.26 or # DPL.313B from OML Inc., Morgan Hill CA)

The connection diagram for such a legacy mixer is:



In addition, External Mixing in the X-Series supports the new Agilent M1970 series of Harmonic Mixers, which provide a USB connection for download of calibration data and additional control.

The connection diagram for one of the Agilent USB mixers is:



External Mixing is only supported in certain Modes and Measurements in the X-Series, as shown in the table below:

| Mode | Measurements | Sig ID (Image Suppress only) |
|-------------------|-------------------------|------------------------------|
| Spectrum Analyzer | Swept SA | Y* |
| | TOI | Y |
| | Harmonics | N |
| | Spurious Emissions | Y |
| | Channel Power | Y |
| | Occupied BW | Y |
| | ACP | Y |
| | Spectrum Emissions Mask | Y |
| | CCDF | N |

| | | |
|------------------------|------------------|---|
| | Burst Power | N |
| | List Sweep | N |
| Phase Noise | Monitor Spectrum | Y |
| | Log Plot | Y |
| | Spot Frequency | N |
| | Waveform | N |
| I/Q Analyzer | Complex Spectrum | N |
| | Waveform | N |
| Vector Signal Analyzer | Vector Analysis | N |
| | Analog Demod | N |
| | Digital Demod | N |

* the Swept SA measurement also supports Image Shift

Ext Mix Setup

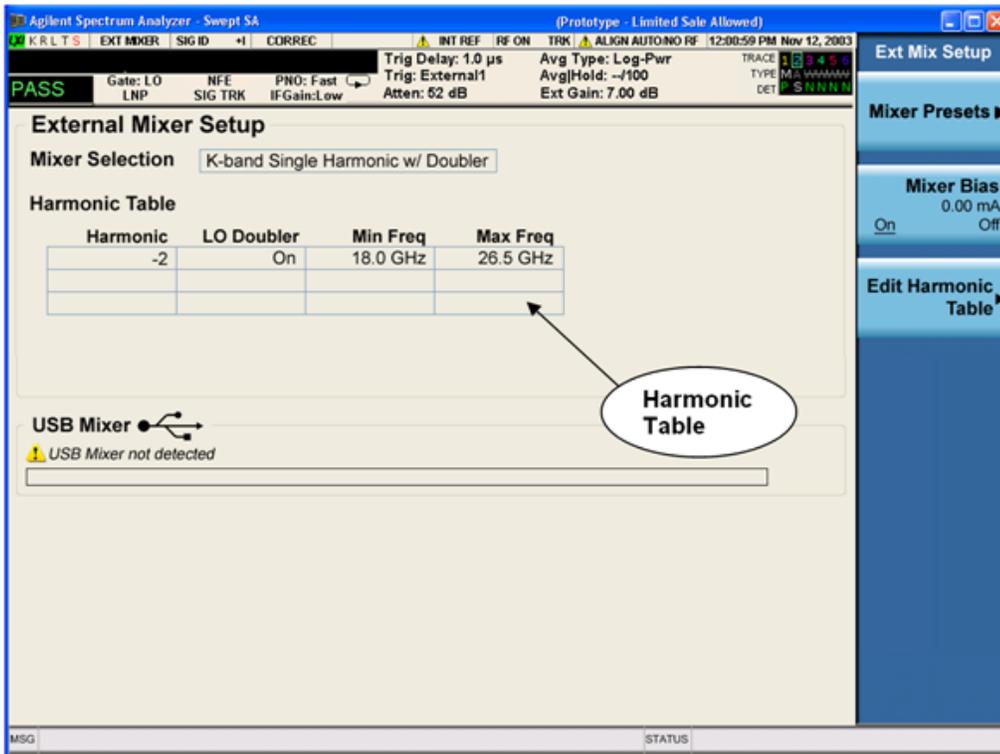
This menu lets you select the mixer type, and lets you configure your mixer (if necessary). While in this menu, and any of its submenus, the External Mixer Setup screen appears, showing you the current settings for the selected mixer. These settings may be dependent on which IF path is currently in use, whether a + or – harmonic is currently selected, etc.

To apply any amplitude correction factors needed to correct mixer flatness, you enter values into one of the Correction tables (under Input/Output, Corrections). The correction conversion loss values can be extracted from data supplied with the mixer or from manual measurements you make to determine the conversion loss. Note that the correction applied by the Correction tables is global to the analyzer; therefore you should make sure to turn off the External Mixer corrections when you are not using the External Mixer input.

NOTE

The Agilent USB Mixers automatically give their flatness data to the analyzer, and the correction is applied internally. No correction needs to be entered by the user, and the correction does not appear in the user-accessible Corrections tables. The user is free to enter additional corrections into the Correction tables under Input/Output, Corrections.

| | |
|--------------------------|---|
| Key Path | Input/Output, External Mixer |
| State Saved | All settings in the Mixer Setup are part of the Input/Output system, and hence are saved whenever State is saved. |
| Readback Text | The readback line on this key shows the currently selected mixer, in square brackets. |
| Initial S/W Revision | A.08.01 |
| Modified at S/W Revision | A.08.50 |

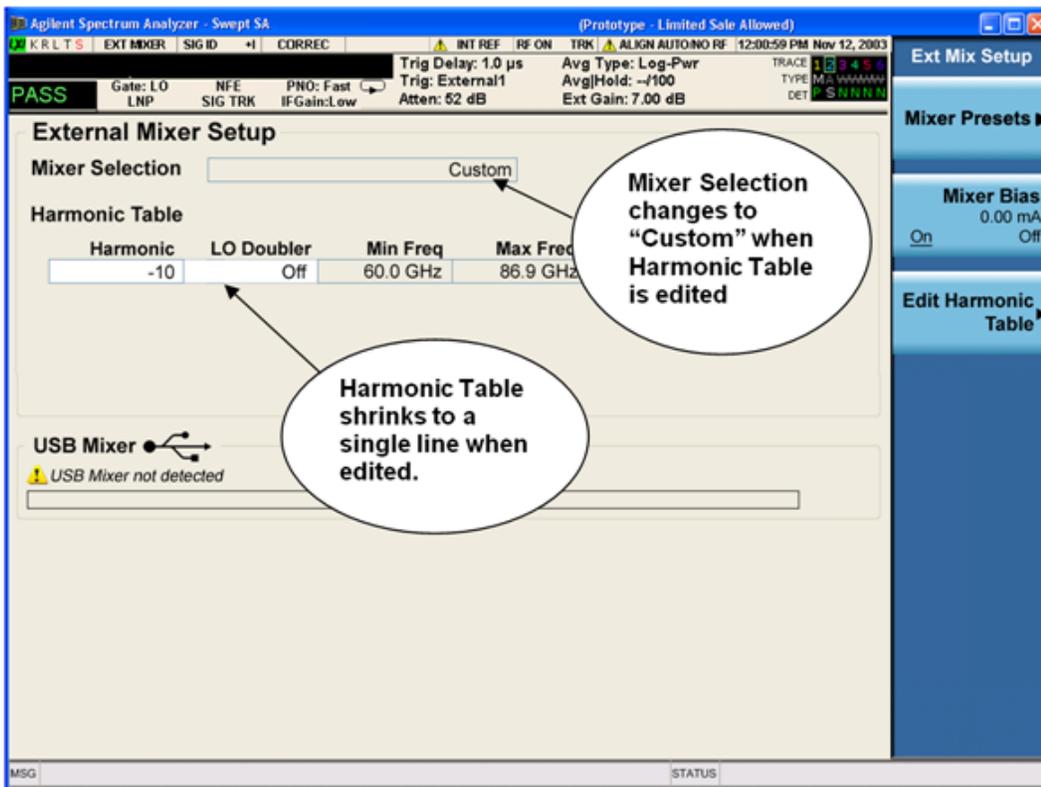


The External Mixer Setup screen looks like this

The current Mixer selection (the current or most recently connected USB Mixer, or the most recent Mixer Preset, or “Custom” if the user has modified the setup) reads out at the top of this screen.

The Harmonic Table currently being used reads out below the Mixer Selection. It shows each range being used for the current mixer. Note that a band may be made up of up to 3 ranges. Each range represents a choice of mixer harmonic and doubler state. When you select a Mixer Preset, it sets the analyzer Start and Stop frequency to the values shown in the Harmonic Table; Start Freq is set to the Min Freq for the bottom range, and Stop Freq is set to the Max Freq for the top range. In many cases you can exceed these nominal values; the absolute maximum and minimum frequency for each preset are shown in the tables that accompany the key descriptions for the Mixer Presets.

NOTE If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq – Start Freq), the analyzer uses the maximum Span the measurement allows, and sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table.



You may customize the Harmonic Table, but when you do this the analyzer goes into “single harmonic” mode. You may enter the harmonic number and whether to use the doubler or not, but now range switching is not supported, so you can only have one harmonic.

When you edit the Harmonic Table, the Mixer Selection changes to “Custom.” To change it back you must go back into the Mixer Presets menu and select a Preset.

When you edit the Harmonic Table, the nominal Min Freq and Max Freq that are available will usually be different than the Preset you were using; and the absolute frequency limits will change as well. This may result in a change to your Start and/or Stop Freq, if the current values fall outside the new range, requiring you to retune your Center Freq to get your signal back in the center.

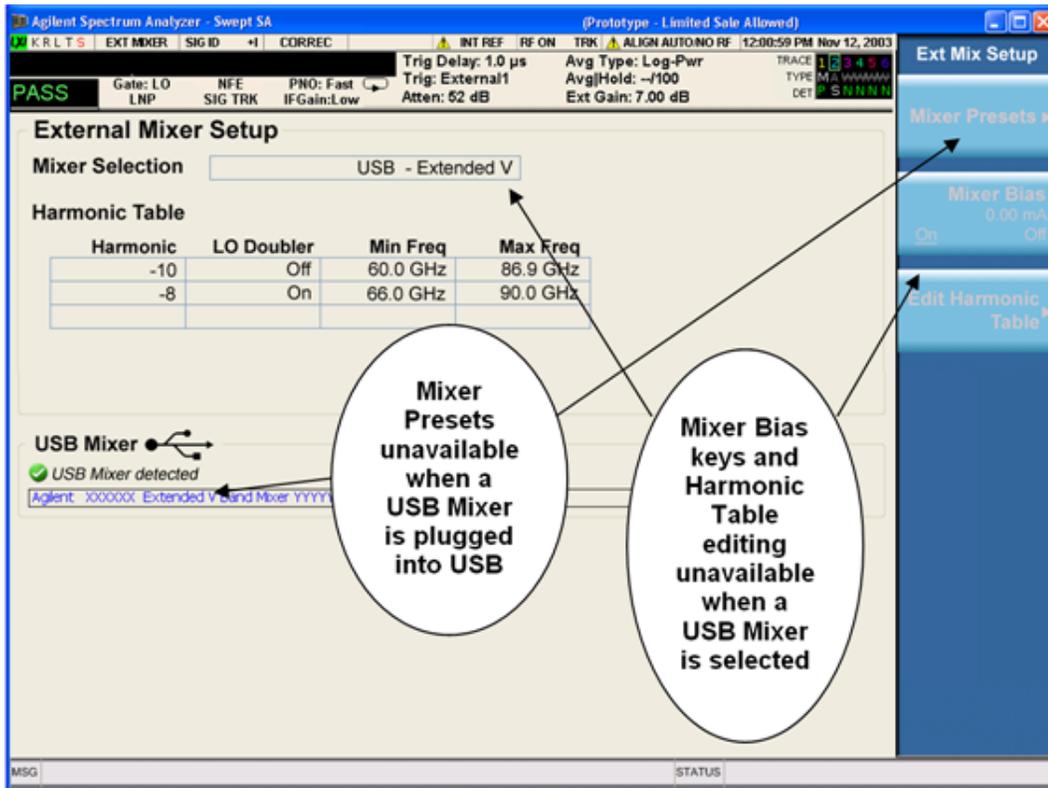
The analyzer supports the Agilent M1970 Series Harmonic Mixers with USB connection. While in External Mixing, if one of these mixers is plugged in to a USB port, it is automatically detected and displayed in the “USB Mixer” area of the setup screen, including its model number and serial number.

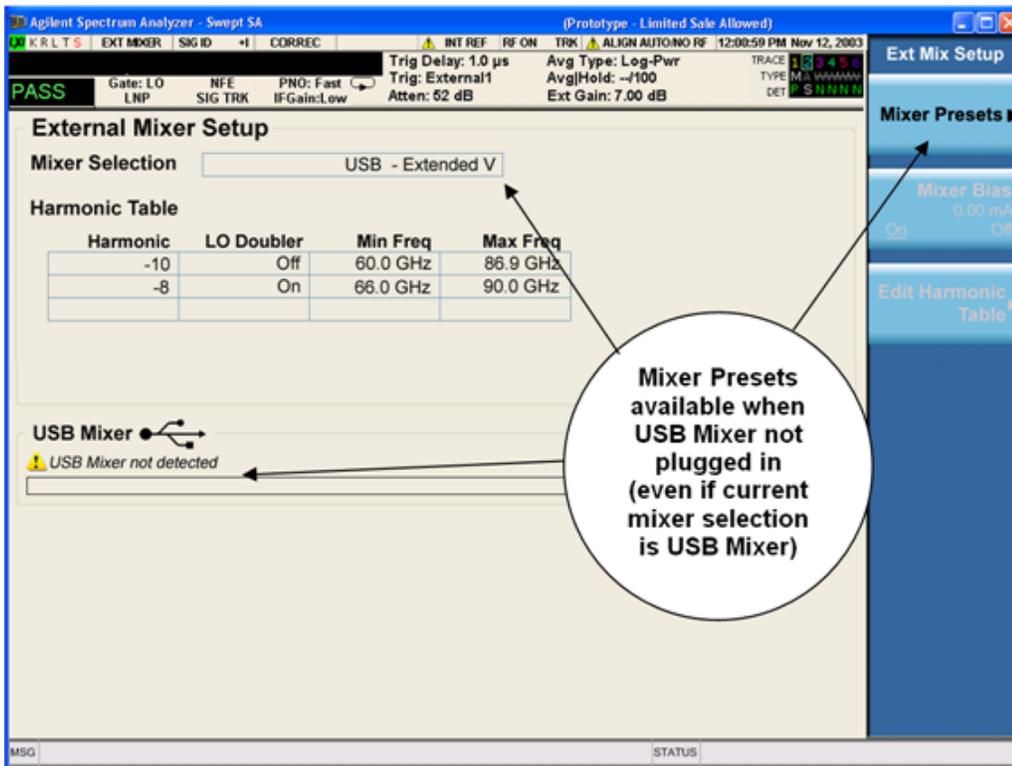
The analyzer assumes that if you plug a mixer into the USB, that is the mixer you want to use. Therefore:

1. If a USB mixer is connected to the USB port, the Mixer Presets menu is grayed out, as none of the presets make sense with a USB Mixer connected. Note that once the analyzer has acquired the USB Mixer, the mixer selection will remain if it is subsequently unplugged from the USB, allowing you to plug it back in with no change to your settings. However, once you unplug it, the Mixer Presets key will stop being grayed out, allowing you to preset to a different mixer.
2. When Restore Input/Output Defaults is performed, if an Agilent USB Mixer is plugged into the analyzer’s USB port, the Mixer Selection remains unchanged.

3. When recalling an instrument state, if an Agilent USB Mixer is plugged into the analyzer's USB port, and the Mixer Selection in the recalled state is for a USB Mixer that does not match the mixer currently plugged in, you will have to unplug your mixer and then plug it back in to get the analyzer to recognize your mixer.

As long as the selection in Ext Mixer Setup shows one of the USB mixers, both the Mixer Bias and Edit Harmonic Table keys will be grayed out.





Only one USB Mixer is supported at a time. To switch to a different USB Mixer, disconnect the one that is no longer being used prior to connecting a new one.

The Mixer Selection displayed and softkey readback for the Agilent M1970 series mixers is:

| Mixer Model | Mixer Selection display on Setup Screen | Readback on softkeys |
|---|---|-------------------------|
| Agilent M1970E: Option 001: 60 to 90 GHz Waveguide Harmonic Mixer | USB - M1970E E-Band | USB Mixer E-Band |
| Agilent M1970V Option 001: 50 to 75 GHz Waveguide Harmonic Mixer | USB - M1970V-001 V-Band | USB Mixer V-Band |
| Agilent M1970V Option 002: 50 to 80 GHz Waveguide Harmonic Mixer | USB - M1970V-002 Extended V-Band | USB Mixer Extended V |
| Agilent M1970W: 75 to 110 GHz Waveguide Harmonic Mixer | USB - M1970W W-Band | USB Mixer W-Band |

The Agilent USB mixer essentially acts as a “remote front end” and is fully calibrated over the specified frequency range, without requiring any user interaction. This is particularly useful at high mm-wave frequencies, where cable loss is typically quite large, and it is desirable to bring the front end right up to the device under test, rather than bringing the mm-wave signal to the analyzer using a lossy and uncalibrated cable or waveguide connection.

Connecting the mixer to the USB port on the analyzer switches you to External Mixing, aborts the current measurement, and initiates an alignment of the mixer. A popup message, “USB Mixer connected” appears on the display. When a USB mixer and the LO/IF cable are connected the alignment is performed. When the alignment begins, an “Aligning” popup replaces the previous message on the display. When the alignment completes, the current measurement restarts.

Mixer Presets

This menu lets you preset the mixer setup for the particular type of mixer that you are using.

These presets are divided into four groups:

- one for Agilent legacy mixers,
- three for general purpose mixers:
 - o presets that use a single harmonic and no doubling
 - o presets that use a single harmonic but double the LO
 - o presets that use multiple harmonics

Note that the IF/LO port provides a 3.8–14 GHz LO in two bands: 3.8–8.7 (LO fundamental), and 8.6–14 GHz (doubled LO).

In most cases, once you have executed the preset, you will not need to adjust any further settings.

| Key Path | Input/Output, External Mixer, Ext Mix Setup |
|-----------------------|---|
| Remote Command | [:SENSe]:MIXer:BAND A Q U V W NA ND NE NF NG NJ NK NQ NU NV NW NY NEXT DD DF DG DJ DK DQ DV DW DY DEXT MA ME MU MCOAX USB [:SENSe]:MIXer:BAND? |
| Example | :MIX:BAND A :MIX:BAND? |
| Notes | A Q U V W select Agilent 11970 mixer presets NA ND NE NF NG NJ NK NQ NU NV NW NY NEXT select single harmonic, non-doubled LO presets DD DF DG DJ DK DQ DV DW DY DEXT select single harmonic, doubled LO presets MA ME MU MCOAX select multiple harmonic presets All of these presets are detailed in their respective key descriptions The query form of this command returns the most recent preset, UNLESS the harmonic table has been edited after the preset was executed. If the harmonic table has been edited it returns CUSTOM The command USB will refresh the USB mixer connection and automatically detect the mixer band. The query form of this command returns the following if an Agilent USB Mixer is plugged into the analyzer’s USB port: USB E Agilent E-Band USB Mixer USB V Agilent V-Band USB Mixer USB VEXT Agilent Extended V-Band USB Mixer USB W Agilent W-Band USB Mixer Note that the parameters CUSTOM, USB V, USB VEXT, and USB W are query responses only, and cannot be sent TO the analyzer. |

| | |
|-------------------------------|---|
| | <p>The following cross-reference matches the mixer band designators used by Agilent to the EIA waveguide designations:</p> <p>EIAAgilentFreq Range</p> <p>WR-28 A26.5 – 40 GHz</p> <p>WR-22 Q33 – 50 GHz</p> <p>WR-19 U40 – 60 GHz</p> <p>WR-15 V50 – 75 GHz</p> <p>WR-12 E60 – 90 GHz</p> <p>WR-10 W75 – 110 GHz</p> <p>WR-8 F90 – 140 GHz</p> <p>WR-6 D110 – 170 GHz</p> <p>WR-5 G140 – 220 GHz</p> <p>WR-3 J220 – 325 GHz</p> |
| Preset | <p>When Restore Input/Output Defaults is performed, an “A” mixer preset is also issued (11970A band), unless an Agilent USB Mixer is plugged into the analyzer’s USB port, in which case the Mixer Selection remains unchanged.</p> <p>When using Agilent USB Mixers, if a Restore All Defaults (SCPI command SYSTem:DEFault) has been performed, either remove and reinsert the USB cable or press the Refresh USB Mixer Connection softkey.</p> |
| Backwards Compatibility Notes | <p>The [:SENSE]:MIXer:BAND command was used in PSA and ESA to select the mixer band. In the X-Series, only the legacy parameters A, Q, U, V, and W are honored, and they preset the analyzer to match the corresponding Agilent 11970 legacy mixer. Parameters D, E, F, G, J, K, Y, which were accepted in ESA and PSA, return an error if sent. If you are using a mixer in one of these bands, you should study the tables of presets and choose the appropriate preset to match your application. Also the USER parameter is no longer accepted, as the control model for mixer customization is very different in the X-Series.</p> |
| Initial S/W Revision | A.08.01 |
| Modified at S/W Revision | A.14.00 |

Agilent 11970

This menu allows you to preset for one of the models in the HP/Agilent 11970 series.

Because the X-Series has an LO range of 3.8 – 14 GHz, and older analyzers had an LO range of 3.0 – 6.8 GHz, the harmonic numbers used in the X-Series may differ from those used on older analyzers for the same mixers. Additionally, some of the 11970 mixers cannot be operated over their full range with the X-Series without switching harmonics. Consequently, you will find that some of the bands (A-Band, for example) are broken into two ranges for use with the X-Series.

See ["More Information" on page 216](#)

| | |
|----------------------|--|
| Key Path | Input/Output, External Mixer, Ext Mix Setup, Mixer Presets |
| Example | MIX:BAND A |
| Initial S/W Revision | A.08.01 |

More Information

Below are the 11970A presets. The 11970U and the 11970W use a single harmonic. The other three switch harmonics mid-band. Both harmonic ranges are shown in the table. None of these mixers use LO doubling.

The 11970 K-band mixer and the 11974 preselected mixer series are not supported.

| Preset | Readout in setup screen | Readback on softkeys | Range | Harm # | RF start | RF stop | RF center |
|--------|-------------------------|----------------------|-------|--------|----------|---------|-----------|
| A-band | Agilent 11970A | Agilent 11970A | 1 | -6 | 26.5 | 30.45 | 28.475 |
| | | | 2 | -8 | 30.35 | 40 | 35.175 |
| Q-band | Agilent 11970Q | Agilent 11970Q | 1 | -8 | 33 | 40.8 | 36.9 |
| | | | 2 | -10 | 39.8 | 50 | 44.9 |
| U-band | Agilent 11970U | Agilent 11970U | .. | -10 | 40 | 60 | 50 |
| V-band | Agilent 11970V | Agilent 11970V | 1 | -12 | 50 | 66 | 58 |
| | | | 2 | -14 | 53 | 75 | 64 |
| W-band | Agilent 11970W | Agilent 11970W | .. | -18 | 75 | 110 | 92.5 |

Single Harmonic

These presets choose a setup that uses a single harmonic and no doubling for the LO.

| | |
|----------------------|--|
| Key Path | Input/Output, External Mixer, Ext Mix Setup, Mixer Presets |
| Example | MIX:BAND NA |
| Initial S/W Revision | A.08.01 |

These are the presets for single harmonic operation with no doubler:

| Mixer | Readout in setup screen | Readback on softkeys | Harm # | RF start | RF stop | RF center |
|--------|------------------------------------|--------------------------|--------|----------|---------|-----------|
| K-band | K-band Single Harmonic, no doubler | Sngl harm LOx1 K-band | -4 | 18 | 26.5 | 22.25 |
| A-band | A-band Single Harmonic, no doubler | Sngl harm LOx1 A-band | -6 | 26.5 | 40 | 33.25 |
| D-band | D-band Single Harmonic, no doubler | Sngl harm LOx1 D-band | -20 | 110 | 170 | 140 |
| E-band | E-band Single Harmonic, no doubler | Sngl harm LOx1 E-band | -12 | 60 | 90 | 75 |
| F-band | F-band Single Harmonic, no doubler | Sngl harm LOx1 | -18 | 90 | 140 | 115 |

| Mixer | Readout in setup screen | Readback on softkeys | Harm # | RF start | RF stop | RF center |
|----------|--------------------------------------|----------------------------|--------|----------|---------|-----------|
| | | F-band | | | | |
| Q-band | Q-band Single Harmonic, no doubler | Sngl harm LOx1 Q-band | -6 | 33 | 50 | 41.5 |
| U-band | U-band Single Harmonic, no doubler | Sngl harm LOx1 U-band | -8 | 40 | 60 | 50 |
| V-band | V-band Single Harmonic, no doubler | Sngl harm LOx1 V-band | -10 | 50 | 75 | 62.5 |
| W-band | W-band Single Harmonic, no doubler | Sngl harm LOx1 W-band | -14 | 75 | 110 | 92.5 |
| G-band | G-band Single Harmonic, no doubler | Sngl harm LOx1 G-band | -26 | 140 | 220 | 180 |
| Y-band | Y-band Single Harmonic, no doubler | Sngl harm LOx1 Y-band | -30 | 170 | 260 | 215 |
| J-band | J-band Single Harmonic, no doubler | Sngl harm LOx1 J-band | -38 | 220 | 325 | 272.5 |
| Extended | Extended Single Harmonic, no doubler | Sngl harm LOx1 Extended | -40 | 155 | 345 | 250 |

Single Harmonic w/doubler

These presets choose a setup that uses a single harmonic and doubling for the LO.

| | |
|----------------------|--|
| Key Path | Input/Output, External Mixer, Ext Mix Setup, Mixer Presets |
| Example | MIX:BAND DW |
| Initial S/W Revision | A.08.01 |

These are the presets for single harmonic operation with LO doubling:

| Mixer | Readout in setup screen | Readback on softkeys | Harm # | RF start | RF stop | RF center |
|--------|----------------------------------|--------------------------|--------|----------|---------|-----------|
| D-band | D-band Single Harmonic w/doubler | Sngl harm LOx2 K-band | -14 | 110 | 170 | 140 |
| F-band | F-band Single Harmonic w/doubler | Sngl harm LOx2 A-band | -10 | 90 | 140 | 115 |
| G-band | G-band Single Harmonic w/doubler | Sngl harm LOx2 A-band | -16 | 140 | 220 | 180 |
| J-band | J-band Single | Sngl harm LOx2 | -24 | 220 | 325 | 272.5 |

| Mixer | Readout in setup screen | Readback on softkeys | Harm # | RF start | RF stop | RF center |
|----------|---------------------------------------|--------------------------|--------|----------|---------|-----------|
| | Harmonic w/doubler | A-band | | | | |
| K-band | K-band Single Harmonic w/doubler | Sngl harm LOx2 A-band | -2 | 18 | 26.5 | 22.25 |
| Q-band | Q-band Single Harmonic w/doubler | Sngl harm LOx2 A-band | -4 | 33 | 50 | 41.5 |
| V-band | V-band Single Harmonic w/doubler | Sngl harm LOx2 A-band | -6 | 50 | 75 | 62.5 |
| W-band | W-band Single Harmonic w/doubler | Sngl harm LOx2 A-band | -8 | 75 | 110 | 92.5 |
| Y-band | Y-band Single Harmonic w/doubler | Sngl harm LOx2 A-band | -20 | 170 | 260 | 215 |
| Extended | Extended Single Harmonic w/doubler | Sngl harm LOx2 A-band | -28 | 245 | 390 | 317.5 |

Multiple Harmonics

These presets choose a setup that uses multiple harmonics and may or may not use doubling for the LO.

| | |
|----------------------|--|
| Key Path | Input/Output, External Mixer, Ext Mix Setup, Mixer Presets |
| Example | MIX:BAND MA |
| Initial S/W Revision | A.08.01 |

These are the presets for multiple harmonic operation:

| Mixer | Readout in setup screen | Readback on softkeys | Range | Harm # | Dblr? | RF start | RF stop | RF Center |
|---------|---------------------------|-----------------------|-------|--------|-------|----------|---------|-----------|
| A-band | A-band Multiple Harmonic | Multi harm A-band | 1 | -4 | N | 26.5 | 34.1 | 30.3 |
| | | | 2 | -4 | Y | 33.1 | 40 | 36.55 |
| E-band | E-band Multiple Harmonic | Multi harm E-band | 1 | -6 | Y | 60 | 83 | 71.5 |
| | | | 2 | -8 | Y | 65 | 90 | 77.5 |
| U-band | U-band Multiple Harmonic | Multi harm U-band | 1 | -6 | N | 40 | 51.5 | 45.75 |
| | | | 2 | -6 | Y | 49.5 | 60 | 54.75 |
| Coaxial | Coaxial Multiple Harmonic | Multi harm Coaxial | 1 | -4 | N | 26.5 | 34 | 30.25 |
| | | | 2 | -4 | Y | 32.5 | 55 | 43.75 |
| | | | 3 | -6 | Y | 50 | 70 | 60 |

Mixer Bias

Adjusts an internal bias source for use with external mixers. The bias signal is present on the center conductor of the IF input connector on the front panel. The shunt current range is from -10 mA to 10 mA and it can be set whether Mixer Bias state is On or Off, but it will only be applied if it is On.

The bias remains as set if the user switches to another input (e.g., the RF Input).

| | |
|-----------------------------|--|
| Key Path | Input/Output, External Mixer, Ext Mix Setup |
| Remote Command | [:SENSe]:MIXer:BIAS <real> [:SENSe]:MIXer:BIAS? [:SENSe]:MIXer:BIAS:STATe OFF ON 0 1 [:SENSe]:MIXer:BIAS:STATe? |
| Example | :MIX:BIAS 0 :MIX:BIAS? MIX:BIAS:STAT 0 MIX:BIAS:STAT? |
| Preset | This is unaffected by Preset but is set to OFF and 0 on a "Restore Input/Output Defaults" |
| State Saved | Saved in instrument state |
| Min | -10 mA |
| Max | 10 mA |
| Initial S/W Revision | A.08.01 |

Cable IF Loss

The loss at the IF in the IF/LO cable can be compensated for with this function, by entering the loss in dB for your cable.

The cable loss will depend on the IF frequency. The IF frequency varies depending on which IF path your measurement is using. For best accuracy, characterize your cable's loss for the IF frequency or frequencies you will be using.

IF Frequencies:

10 MHz path: 322.5 MHz

25 MHz path: 322.5 MHz

40 MHz path: 250 MHz

140 MHz path: 300 MHz

| | |
|-----------------------|--|
| Key Path | Input/Output, External Mixer |
| Key Path | Input/Output, External Mixer, Calibrate Mixer |
| Remote Command | [:SENSe]:MIXer:CIFLoss <rel_amp1> [:SENSe]:MIXer:CIFLoss? |

| | |
|----------------------|---------------------------------|
| Example | :MIX:CIFL 0.23 DB :MIX:CIFL? |
| Preset | 0.26 dB |
| State Saved | Saved in instrument state |
| Min | -100 |
| Max | 100 |
| Initial S/W Revision | A.08.01 |

I/Q

This feature is not available unless the "[Baseband I/Q \(Option BBA\)](#)" on page 220 is installed.

Selects the front-panel I/Q input ports to be the analyzer signal input. If I/Q is already selected, pressing this key accesses the I/Q setup menu.

| | |
|----------------------|--|
| Key Path | Input/Output |
| Mode | BASIC, CDMA2K, EDGE GSM, TDSCDMA, VSA89601, WIMAX OFDMA, LTE, LTE TDD, LTE FDD, LTE ATDD, DCATV, DTMB (CTTB), DVB-T/H with T2, CMMB, ISDBT, WCDMA, VXA, CDMA1XEV |
| Example | FEED AIQ |
| Notes | Not all measurements support the use of the I/Q signal input. When I/Q is selected in a measurement that does not support it, the "No Result; Meas invalid with I/Q inputs" error condition message appears. This is error 135 |
| Initial S/W Revision | Prior to A.02.00 |

Baseband I/Q (Option BBA)

The Baseband I/Q functionality is a hardware option. It is option BBA. If the option is not installed, none of the I/Q functionality is enabled.

The Baseband I/Q has four input ports and one output port. The input ports are I, I-bar, Q, and Q-bar. The I and I-bar together compose the I channel and the Q and Q-bar together compose the Q channel. Each channel has two modes of operation, Single-Ended (also called "unbalanced") and Differential Input (also called "balanced"). When in Single-Ended operation, only the main port (I or Q) is used and the complementary port (I-bar or Q-bar) is ignored. When in Differential Input mode, both main and complementary ports are used.

The input settings (range, attenuation, skew, impedance, external gain) apply to the channels, not the individual ports.

The system supports a variety of 1 M Ω input passive probes as well as the Agilent 113x Series active differential probes using the Infinimax probe interface.

The Agilent 113x Series active probes can be used for both single ended and differential measurements. In either case a single connection is made for each channel (on either the I or Q input). The input is

automatically configured to 50 Ω single ended and the probe power is supplied through the Infinimax interface. The probe can be configured for a variety of input coupling and low frequency rejection modes. In addition, a wide range of offset voltages and probe attenuation accessories are supported at the probe interface. The active probe has the advantage that it does not significantly load the circuit under test, even with unity gain probing.

With passive 1 M Ω probes, the probe will introduce a capacitive load on the circuit, unless higher attenuation is used at the probe interface. Higher attenuation reduces the signal level and degrades the signal-to-noise-ratio of the measurement. Passive probes are available with a variety of attenuation values for a moderate cost. Most Agilent passive probes can be automatically identified by the system, setting the input impedance setting required as well as the nominal attenuation. For single ended measurements a single probe is used for each channel. Other passive probes can be used, with the attenuation and impedance settings configured manually.

For full differential measurements, the system supports probes on each of the four inputs. The attenuation of the probes should be the same for good common mode rejection and channel match.

Both active and passive probes in single ended and differential configurations can be calibrated. This calibration uses the Cal Out BNC connection and a probe connection accessory. The calibration achieves excellent absolute gain flatness in a probed measurement. It matches both the gain and frequency response of the I and Q channels as well as any delay skew, resulting in high accuracy in derived measurements such as Error Vector Magnitude (EVM).

When a probe is connected a status message will be displayed. The message will indicate if calibration data is available or not. Calibration data is saved for each type of probe (including "none") for each port and will be reapplied whenever that type of probe is re-connected to the same port. For probes with EEPROM identification, the calibration data will be stored based on the unique probe identifier and will reapply data for that particular probe if it is available. The data will not follow a probe from one port to another. For probes without EEPROM identification, the instrument cannot distinguish between different probes of the same type and it will use the data from the last calibration for that probe type on that port.

When in differential mode, both the main and complementary probes are expected to be of the same type.

In some situations, the I and Q channels should be configured identically. In other situations it is convenient to control them independently. Some menus have a "Q Same as I" setting that will cause the Q channel configuration to mirror the I channel configuration, avoiding the overhead of double data entry when the channels should be the same.

The output port is for calibrating the I/Q input ports, although it can also be manually controlled.

There are two types of calibrations available: cable calibration and probe calibration. The cable calibration will guide the user through connecting each input port in turn. All ports must be calibrated together. The probe calibration is done for a specific channel (I or Q). If in Single-Ended mode, only the main port is calibrated. When in Differential Input mode, the user is guided through calibrating both main and complementary ports.

The front panel I/Q port LEDs indicate the current state of that port. On (green) indicates it is active, and off (dark) indicates it is not in use. For example, the Cal Out port LED is on if and only if there is signal coming out of that port.

The input is a context and some parameters have separate values for each context. The SCPI for these parameters has an optional "[:RF|IQ]" node. If the specific context is omitted, the command acts on the current input context's value. Here are the parameters that are input context sensitive:

- Center Frequency
- Trigger Source

It is important to distinguish between the I and Q input ports and the displayed I and Q data values. The I and Q input ports feed into a digital receiver that does digital tuning and filtering. The I and Q data seen by the user (either on the display or through SCPI) corresponds to the real ("I") and the imaginary ("Q") output from the digital receiver. When the input path is I+jQ or I Only and the center frequency is 0 Hz the I input ends up in as the real output from the receiver and appears as "I" data. Likewise, when the input path is I+jQ and the center frequency is 0 Hz, the Q input ends up as the imaginary output from the receiver and appears as "Q" data. However, when the input path is Q Only, the Q input is sent to the receiver as Q+j0, so the receiver output has the Q input coming out on the real output, and so in Q Only, the signal from the Q input port appears as the "I" data. Another situation where the I and Q data do not necessarily correspond directly to the I and Q inputs is when the center frequency is non-zero. The digital processing involved in the tuning is a complex operation. This will result in I Only data appearing as both "I" and "Q" data, the same as that signal would appear if seen through the RF input port.

Baseband I/Q Remote Language Compatibility

For the Agilent E4406A VSA Series Transmitter Tester, Option B7C provided baseband I/Q inputs. Code compatibility has been provided to allow many of the commands for option B7C to function properly with the X-Series. The X-Series has hardware differences and additional capabilities (e.g., E4406A does not have independent settings of I & Q nor does it provide for probe calibrations) which make 100% compatibility impossible.

1. The following commands are supported:

:CALibration:IQ:FLATness

:INPut:IMPedance:IQ U50|B50|U1M|B1M

:INPut:IMPedance:REFerence <integer>

2. The [:SENSe]:FEED RF|IQ|IONLy|QONLy|AREFerence|IFALign command supports all parameters except IFALign. The FEED? query will return only RF|AIQ|AREF.

3. The following commands are not supported:

:CALibration:GIQ

:CALibration:IQ:CMR

:INPut:IQ:ALIGn OFF|ON|0|1

The Rohde & Schwarz FSQ-B71 also provides baseband I/Q inputs. A certain amount of code compatibility is provided in the X-Series, however hardware differences make this a somewhat limited set.

Supported:

The "<1|2>" is supported as "[1]".

INPut<1|2>:IQ:BALanced[:STATe] ON | OFF

INPut<1|2>:IQ:TYPE I | Q | IQ

INPut<1|2>:IQ:IMPedance LOW | HIGH

Not Supported:

INPut<1|2>:SElect AIQ | RF

TRACe<1|2>:IQ:DATA:FORMat COMPatible | IQBLock | IQPair>

TRACe<1|2>:IQ:DATA:MEMory? <offset samples>,<# of samples>

TRACe<1|2>:IQ:DATA?

TRACe<1|2>:IQ:SET <filter type>,<rbw>,<sample rate>,<trigger source>,<trigger slope>,<pretrigger samples>,<# of samples>

TRACe<1|2>:IQ:SRATe 10.0kHz to 81.6MHz

TRACe<1|2>:IQ[:STATe] ON|OFF

The Rohde & Schwarz FMU has the following SCPI, which is not supported (these commands start/abort the probe calibration procedure, which is manually interactive from the front panel):

CALibration:ABORT

CALibration:PROBe[:START]

I/Q Path

Selects which I/Q input channels are active. The LED next to each I/Q input port will be on when that port is active.

The analysis bandwidth for each channel is the same as that of the instrument. For example, the base N9020A has a bandwidth of 10 MHz. With I/Q input the I and Q channels would each have an analysis bandwidth of 10 MHz, giving 20 MHz of bandwidth when the I/Q Path is I+jQ. With option B25, the available bandwidth becomes 25 MHz, giving 25 MHz each to I and Q and 50 MHz to I+jQ.

I/Q voltage to power conversion processing is dependent on the I/Q Path selected.

- With I+jQ input we know that the input signal may not be symmetrical about 0 Hz, because it has a complex component. Therefore, above 0 Hz only the positive frequency information is displayed, and below 0 Hz only the negative frequency information is displayed.
- With all other Input Path selections, the input signal has no complex component and therefore is always symmetrical about 0 Hz. In this case, by convention, the power conversion shows the combined voltage for both the positive and negative frequencies. The information displayed below 0 Hz is the mirror of the information displayed above 0 Hz. This results in a power reading 6.02 dB higher (for both) than would be seen with only the positive frequency voltage. Note also that, in this case the real signal may have complex modulation embedded in it, but that must be recovered by further signal processing.

| Key Path | Input/Output, I/Q |
|-----------------------|---|
| Remote Command | [:SENSe] :FEED:IQ:TYPE IQ IONLy QONLy [:SENSe] :FEED:IQ:TYPE? |
| Example | Set the input to be both the I and Q channels, combined as I + j * Q. FEED:IQ:TYPE IQ |
| Preset | IQ |
| State Saved | Yes This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or |

| | |
|----------------------|--------------------------------|
| | "Restore System Defaults->All" |
| Range | I+jQ I Only Q Only |
| Readback Text | I+jQ I Only Q Only |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Remote Command | :INPut [1] :IQ:TYPE IQ I Q :INPut [1] :IQ:TYPE? |
| Notes | For R&S FSQ-B71 compatibility |
| Preset | IQ |
| Initial S/W Revision | Prior to A.02.00 |

I+jQ

Sets the signal input to be both the I and Q channels. The I and Q channel data will be combined as $I + j * Q$.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, I/Q Path |
| Example | Set the input to be both the I and Q channels, combined as $I + j * Q$. FEED:IQ:TYPE IQ |
| Initial S/W Revision | Prior to A.02.00 |

I Only

Sets the signal input to be only the I channel. The Q channel will be ignored. The data collected is still complex. When the center frequency is 0 the imaginary part will always be zero, but for any other center frequency both the real and imaginary parts will be significant.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, I/Q Path |
| Example | Set the input to be only the I channel. FEED:IQ:TYPE IONL |
| Initial S/W Revision | Prior to A.02.00 |

Q Only

Sets the signal input to be only the Q channel. The I channel will be ignored. The Q channel will be sent to the digital receiver block as $Q+j0$. The receiver's output is still complex. When the center frequency is 0 the imaginary part will always be zero, but for any other center frequency both the real and imaginary parts will be significant. Note that since the receiver's real output is displayed as the "I" data, when the center frequency is 0, the Q Only input appears as the "I" data.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, I/Q Path |
| Example | Set the input to be only the Q channel. FEED:IQ:TYPE QONL |
| Initial S/W Revision | Prior to A.02.00 |

I Setup

Access the channel setup parameters for the I channel.

| | |
|----------------------|-------------------|
| Key Path | Input/Output, I/Q |
| Initial S/W Revision | Prior to A.02.00 |

I Differential Input

Selects differential input on or off for the I channel. For differential input (also called balanced input), the analyzer uses both main and complementary ports. When differential input is off (also called single-ended or unbalanced input), the analyzer uses only the main port.

| | |
|-----------------------|--|
| Key Path | Input/Output, I/Q, I Setup |
| Remote Command | :INPut:IQ[:I]:DIFFerential OFF ON 0 1 :INPut:IQ[:I]:DIFFerential? |
| Example | Put the I channel in Differential Input mode INP:IQ:DIFF ON |
| Notes | When I Differential Input = On, the analyzer will check for attenuation mismatches between the I and I-bar ports. If the difference in attenuation values exceeds 0.5 dB a Settings Alert error condition, error 159 will be set. When I Differential Input = On, and IQ Path is I+jQ, the Q Differential input must also be On. Similarly, when I Differential Input = Off, and IQ Path is I+jQ, the Q Differential input must also be Off. If the states of the two inputs do not match, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Differential. |
| Couplings | Some active probes include built-in differential capability. When one of these probes is sensed, this key is disabled. Since the differential capability is handled in the probe, the Analyzer will use only the main port and the key will show that the Analyzer's Differential Input mode is Off (indicating that the complementary port is not in use). When Q Same as I is On, the value set for I will also be copied to Q. |
| Preset | Off |
| State Saved | Yes This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| Range | Off On |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Remote Command | :INPut [1] :IQ:BAALanced[:STATe] OFF ON 0 1 :INPut [1] :IQ:BAALanced[:STATe] ? |
| Notes | For R&S FSQ-B71 compatibility, with no independent settings for the I and Q channels. Therefore, it is tied only to the I channel and does not provide an equivalent for the Q channel. For proper operation of the backwards compatibility command Q Same as I should be set to On. |
| Preset | OFF |
| Initial S/W Revision | Prior to A.02.00 |

I Input Z

Selects the input impedance for the I channel. The impedance applies to both the I and I-bar ports.

The input impedance controls the hardware signal path impedance match. It is not used for converting voltage to power. The voltage to power conversion always uses the Reference Z parameter. The Reference Z parameter applies to both I and Q channels.

| | |
|-----------------------|---|
| Key Path | Input/Output, I/Q, I Setup |
| Remote Command | :INPut [1] :IQ[:I] :IMPedance LOW HIGH :INPut [1] :IQ[:I] :IMPedance? |
| Example | Set the I channel input impedance to 1 M Ω INP:IQ:IMP HIGH |
| Notes | LOW = 50 Ω , HIGH = 1 M Ω When IQ Path is I+jQ, the I Input Z setting must be the same as the Q Input Z setting. If the settings of the two inputs do not match, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Input Z. |
| Couplings | Input impedance is a built-in characteristic of a probe. Therefore, whenever a probe is sensed, this key is disabled and the value is set to match the probe. When no probe is sensed on Q and Q Same as I is On, the value set for I will also be copied to Q. |
| Preset | LOW |
| State Saved | Yes This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| Range | 50 Ω 1 M Ω |
| Initial S/W Revision | Prior to A.02.00 |

I Skew

Sets the skew factor for the I channel. The skew will shift the channel's data in time. Use this to compensate for differences in the electrical lengths of the input paths due to cabling.

| | |
|-----------------------|---|
| Key Path | Input/Output, I/Q, I Setup |
| Remote Command | [:SENSe]:CORRection:IQ[:I]:SKEW <seconds> |

| | |
|----------------------|--|
| | <code>[:SENSe] :CORRection:IQ[:I]:SKEW?</code> |
| Example | Delay the data for the I channel by 10 ns. <code>CORR:IQ:SKEW 10 ns</code> |
| Preset | 0 |
| State Saved | Yes This is unaffected by Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| Range | 0 s to 100 ns |
| Min | 0 s |
| Max | +100 ns |
| Initial S/W Revision | Prior to A.02.00 |

I Probe

Access the probe setup parameters for the I channel. See ["I/Q Probe Setup" on page 236](#).

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, I Setup |
| State Saved | No |
| Readback Text | [<I port probe id>] This is reporting the type of probe sensed on the I port. There is no parameter for overriding what is sensed. |
| Initial S/W Revision | Prior to A.02.00 |

Attenuation

The attenuation is part of the calibration data stored with the probe type and is initially the value that was returned by the last calibration. You can modify this value and any changes will be stored with the calibration data and will survive power cycles and presets. When a probe calibration is performed the attenuation value will be overwritten by the calibration.

| | |
|-----------------------|--|
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe |
| Remote Command | <code>[:SENSe] :CORRection:IQ:I Q:ATTenuation:RATio <real></code> <code>[:SENSe] :CORRection:IQ:I Q:ATTenuation:RATio?</code> |
| Example | Set the attenuation for the current I probe to 100.00:1. <code>CORR:IQ:I:ATT:RAT 100</code> |
| Notes | Each probe type has its own attenuation setting. As probes are changed the attenuation value will reflect the new probe's setting. Changing the attenuation affects only the current probe type's setting and leaves all others unchanged. When the IQ Path is I+jQ, the Q probe attenuation setting must match the I Probe attenuation setting within 1 dB. If this is not the case, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Attenuation. |

| | |
|----------------------|--|
| Preset | Each probe type has its own default. The default for the "Unknown" probe type is 1:1. |
| State Saved | Saved with probe calibration data. It survives a power cycle and is not affected by a Preset or Restore. |
| Range | 0.001 to 10000 |
| Min | 0.001 |
| Max | 10000 |
| Initial S/W Revision | Prior to A.02.00 |

This is an alternate form of the SCPI that allows input as a power instead of a ratio.

| | |
|-----------------------|--|
| Remote Command | <code>[[:SENSe]:CORRection:IQ:I Q:ATTenuation <rel_ampl></code> <code>[[:SENSe]:CORRection:IQ:I Q:ATTenuation?</code> |
| Example | Set the attenuation for the current I probe type to 100.00:1. CORR:IQ:I:ATT 20 dB |
| Range | -60 dB to +80 dB |
| Min | -60 dB |
| Max | +80 dB |
| Initial S/W Revision | Prior to A.02.00 |

Calibrate

Invokes the guided probe calibration. The guided probe calibration is context sensitive and depends on the channel (I or Q) and the Differential Input state. The calibration is only performed on the selected channel. When Differential Input is on, both the probe attached to the main port and the probe attached to the complementary port are calibrated. When Differential Input is off, only the probe attached to the main port is calibrated. See "[I/Q Guided Calibration](#)" on page 274.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling |
| Readback Text | The last calibration date, or if no calibration exists, "(empty)". Last: <cal date> <cal time> Example: Last: 8/22/2007 1:02:49 PM |
| Initial S/W Revision | Prior to A.02.00 |

Clear Calibration

Clears the calibration data for the current port and probe. It does not clear the data for other probe types or other ports. If the sensed probe has EEPROM identification, only the data for that specific probe is

cleared. After this command has completed, the probe calibration state will be the same as if no probe calibration had ever been performed for the specified channel and probe. The probe attenuation will be the default value for that probe type and the Cable Calibration frequency response corrections will be used. This command is dependent on the Differential Input state. When Differential Input is on, both the data for the probe attached to the main port and the data for the probe attached to the complementary port are cleared. When Differential Input is off, only data for the probe attached to the main port is cleared.

| | |
|-----------------------------|---|
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe |
| Remote Command | :CALibration:IQ:PROBe:I Q:CLEar |
| Example | Clear the calibration data for the I channel and the current probe (with EEPROM identification) or probe type (without EEPROM identification). :CAL:IQ:PROBe:I:CLE |
| Initial S/W Revision | Prior to A.02.00 |

Combined Differential/Input Z (Remote Command Only)

This is Remote Command only (no front panel) and is for backwards compatibility only. It combines the Differential Input and Input Z selections into a single SCPI command.

| | |
|-----------------------------|--|
| Remote Command | :INPut:IMPedance:IQ U50 B50 U1M B1M :INPut:IMPedance:IQ? |
| Example | :INPut:IMPedance:IQ U50 This is equivalent to the following two SCPI commands: :INP:IQ:DIFF OFF :INP:IQ:IMP 50 |
| Notes | Provided for E4406A code compatibility. The enum values translate as follows: U50: Differential Input = Off, Input Z = 50Ω B50: Differential Input = On, Input Z = 50Ω U1M: Differential Input = Off, Input Z = 1 MΩ B1M: Differential Input = On, Input Z = 1 MΩ This command is for backwards compatibility. It combines the Input Z (50Ω or 1 MΩ) parameter with the Differential Input (Off = "Unbalanced", On = "Balanced") parameter into a single enumeration. This backwards compatibility SCPI command was for an instrument without independent settings for the I and Q channels. Therefore, it is tied only to the I channel and does not provide an equivalent for the Q channel. For proper operation of the backwards compatibility command Q Same as I should be set to On. Also, note the subtle difference between this SCPI command and the backwards compatibility command for Input Z. The Input Z SCPI has "IQ" before "IMP" while this command has that order reversed. |
| Couplings | This command does not have an independent parameter, but instead is tied to the Differential Input and Input Z parameters. The coupling for those parameters apply to this command too. |
| Preset | U50 |
| Initial S/W Revision | Prior to A.02.00 |

Q Setup

Access the channel setup parameters for the Q channel.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q |
| Readback Text | When Q Same as I is On the readback is "Q Same as I". |
| Initial S/W Revision | Prior to A.02.00 |

Q Same as I

Many, but not all, usages require the I and Q channels have an identical setup. To simplify channel setup, the Q Same as I will cause the Q channel parameters to be mirrored from the I channel. That way you only need to set up one channel (the I channel). The I channel values are copied to the Q channel, so at the time Q Same as I is turned off the I and Q channel setups will be identical. This does not apply to Probe settings or to parameters that are determined by the probe.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, Q Setup |
| Remote Command | :INPut:IQ:MIRRored OFF ON 0 1 :INPut:IQ:MIRRored? |
| Example | Turn off the mirroring of parameters from I to Q. INP:IQ:MIRR OFF |
| Couplings | Only displayed for the Q channel. When Yes, the I channel values for some parameters are mirrored (copied) to the Q channel. However, when a parameter is determined by the type of probe and a probe is sensed, the probe setting is always used and the I channel setting is ignored. The following parameters are mirrored: Differential Input (when not determined by probe) Input Z (when not determined by probe) |
| Preset | This is unaffected by a Preset but is set to the default value (Q Same as I set to "On") on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| State Saved | Saved in instrument state |
| Range | On Off |
| Readback Text | "Q Same as I" when On, otherwise none. |
| Initial S/W Revision | Prior to A.02.00 |

Q Differential Input

Selects differential input on or off for the Q channel. For differential input (also called balanced input), the analyzer uses both the Q and Q-bar ports. When differential input is off (also called single-ended or unbalanced input), the analyzer uses only the Q port.

| | |
|----------|----------------------------|
| Key Path | Input/Output, I/Q, Q Setup |
|----------|----------------------------|

| | |
|-----------------------------|--|
| Remote Command | :INPut:IQ:Q:DIFFerential OFF ON 0 1 :INPut:IQ:Q:DIFFerential? |
| Example | Put the Q channel in Differential Input mode INP:IQ:Q:DIFF ON |
| Notes | When Differential Input = On, the analyzer will check for attenuation mismatches between the Q and Q-bar ports. If the difference in attenuation values exceeds 0.5 dB a Settings Alert error condition, error 159 will be set. When Q Differential Input = On, and IQ Path is I+jQ, the I Differential input must also be On. Similarly, when Q Differential Input = Off, and IQ Path is I+jQ, the I Differential input must also be Off. If the states of the two inputs do not match, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Differential. |
| Couplings | Some active probes include built-in differential capability. When one of these probes is sensed, this key is disabled. Since the differential capability is handled in the probe, the Analyzer will use only the main port and the key will show that the Analyzer's Differential Input mode is Off (indicating that the complementary port not in use). When a differential probe is not sensed and Q Same as I is On, the value set for I will be copied to Q. This key is disabled when Q Same as I is On. |
| Preset | Off |
| State Saved | Yes This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| Range | Off On |
| Initial S/W Revision | Prior to A.02.00 |

Q Input Z

Selects the input impedance for the Q channel. The impedance applies to both the Q and Q-bar ports.

The input impedance controls the hardware signal path impedance match. It is not used for converting voltage to power. The voltage to power conversion always uses the Reference Z parameter. The Reference Z parameter applies to both I and Q channels.

| | |
|-----------------------|---|
| Key Path | Input/Output, I/Q, Q Setup |
| Remote Command | :INPut [1] :IQ:Q:IMPedance LOW HIGH :INPut [1] :IQ:Q:IMPedance? |
| Example | Set the Q channel input impedance to 1 M Ω INP:IQ:Q:IMP HIGH |
| Notes | LOW = 50 Ω , HIGH = 1 M Ω When IQ Path is I+jQ, the I Input Z setting must be the same as the Q Input Z setting. If the settings of the two inputs do not match, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Input Z. |
| Couplings | Input impedance is a built-in characteristic of a probe. Therefore, whenever a probe is sensed, this key is disabled and the value is set to match the probe. |

| | |
|----------------------|--|
| | When no probe is sensed and Q Same as I is On, the value set for I will also be copied to Q. This key is disabled when Q Same as I is On. |
| Preset | LOW |
| State Saved | Yes This is unaffected by Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| Range | 50 Ω 1 M Ω |
| Initial S/W Revision | Prior to A.02.00 |

Q Skew

Sets the skew factor for the Q channel. The skew will shift the channel's data in time. Use this to compensate for differences in the electrical lengths of the input paths due to cabling and probes.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, Q Setup |
| Remote Command | [:SENSe] :CORRection:IQ:Q:SKEW <seconds> [:SENSe] :CORRection:IQ:Q:SKEW? |
| Example | Delay the data for the Q channel by 10 ns. CORR:IQ:Q:SKEW 10 ns |
| Preset | 0 |
| State Saved | Yes This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| Range | 0 s to 100 ns |
| Min | 0 s |
| Max | +100 ns |
| Initial S/W Revision | Prior to A.02.00 |

Q Probe

Accesses the probe setup parameters for the Q channel. See "[I/Q Probe Setup](#)" on page 236.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, Q Setup |
| State Saved | No |
| Readback Text | [<Q port probe id>] This is reporting the type of probe sensed on the Q port. There is no parameter for overriding what is sensed. |
| Initial S/W Revision | Prior to A.02.00 |

Attenuation

The attenuation is part of the calibration data stored with the probe type and is initially the value that was returned by the last calibration. You can modify this value and any changes will be stored with the calibration data and will survive power cycles and presets. When a probe calibration is performed the attenuation value will be overwritten by the calibration.

| | |
|-----------------------------|--|
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe |
| Remote Command | [:SENSe]:CORRection:IQ:I Q:ATTenuation:RATio <real> [:SENSe]:CORRection:IQ:I Q:ATTenuation:RATio? |
| Example | Set the attenuation for the current I probe to 100.00:1. CORR:IQ:I:ATT:RAT 100 |
| Notes | Each probe type has its own attenuation setting. As probes are changed the attenuation value will reflect the new probe's setting. Changing the attenuation affects only the current probe type's setting and leaves all others unchanged. When the IQ Path is I+jQ, the Q probe attenuation setting must match the I Probe attenuation setting within 1 dB. If this is not the case, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Attenuation. |
| Preset | Each probe type has its own default. The default for the "Unknown" probe type is 1:1. |
| State Saved | Saved with probe calibration data. It survives a power cycle and is not affected by a Preset or Restore. |
| Range | 0.001 to 10000 |
| Min | 0.001 |
| Max | 10000 |
| Initial S/W Revision | Prior to A.02.00 |

This is an alternate form of the SCPI that allows input as a power instead of a ratio.

| | |
|-----------------------------|--|
| Remote Command | [:SENSe]:CORRection:IQ:I Q:ATTenuation <rel_ampl> [:SENSe]:CORRection:IQ:I Q:ATTenuation? |
| Example | Set the attenuation for the current I probe type to 100.00:1. CORR:IQ:I:ATT 20 dB |
| Range | -60 dB to +80 dB |
| Min | -60 dB |
| Max | +80 dB |
| Initial S/W Revision | Prior to A.02.00 |

Calibrate

Invokes the guided probe calibration. The guided probe calibration is context sensitive and depends on the channel (I or Q) and the Differential Input state. The calibration is only performed on the selected channel. When Differential Input is on, both the probe attached to the main port and the probe attached to the

complementary port are calibrated. When Differential Input is off, only the probe attached to the main port is calibrated. See "[I/Q Guided Calibration](#)" on page 274.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling |
| Readback Text | The last calibration date, or if no calibration exists, "(empty)". Last: <cal date> <cal time> Example: Last: 8/22/2007 1:02:49 PM |
| Initial S/W Revision | Prior to A.02.00 |

Clear Calibration

Clears the calibration data for the current port and probe. It does not clear the data for other probe types or other ports. If the sensed probe has EEPROM identification, only the data for that specific probe is cleared. After this command has completed, the probe calibration state will be the same as if no probe calibration had ever been performed for the specified channel and probe. The probe attenuation will be the default value for that probe type and the Cable Calibration frequency response corrections will be used. This command is dependent on the Differential Input state. When Differential Input is on, both the data for the probe attached to the main port and the data for the probe attached to the complementary port are cleared. When Differential Input is off, only data for the probe attached to the main port is cleared.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe |
| Remote Command | :CALibration:IQ:PROBe:I Q:CLEar |
| Example | Clear the calibration data for the I channel and the current probe (with EEPROM identification) or probe type (without EEPROM identification). :CAL:IQ:PROBe:I:CLE |
| Initial S/W Revision | Prior to A.02.00 |

Reference Z

Sets the value of the impedance to be used in converting voltage to power for the I and Q channels. This does not change the hardware's path impedance (see "[I Input Z](#)" on page 226).

| | |
|----------------|---|
| Key Path | Input/Output, I/Q |
| Remote Command | :INPut:IMPedance:REFerence <integer> :INPut:IMPedance:REFerence? |
| Example | Set the I/Q reference impedance to 50 Ω INP:IMP:REF 50 |
| Preset | 50 Ω |
| State Saved | Yes |

| | |
|----------------------|---|
| | This is unaffected by a Preset but is set to the default value on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| Range | 1 Ω to 1 M Ω |
| Min | 1 Ω |
| Max | 1 M Ω |
| Initial S/W Revision | Prior to A.02.00 |

I/Q Cable Calibrate...

The I/Q cable calibration creates correction data for each of the front panel I/Q ports. This calibration data is used whenever no probe specific calibration data is available. It is important that all ports are calibrated using the same short BNC cable so that the data is comparable from port to port.

The guided calibration (front panel only) will show connection diagrams and guide you through the isolation calibration and calibrating each port. The calibration data for each port is stored separately, so as soon as a port is calibrated that data is saved and will be used. If you press "Exit" to exit the calibration process, the data for the ports already completed will still be used. It is recommended that a calibration be completed once started, or if exited, that it be properly done before the next use of the I/Q ports. The "Next" button will perform the calibration for the current port and then proceed to the next step in the calibration procedure. The "Back" button will return to the prior port in the procedure. Both keys and dialog buttons are supplied for ease of use. The dialog buttons are for mouse use and the softkeys for front panel use.

The calibration can also be done via SCPI, but no connection diagrams will be shown. You will have to make the correct connections before issuing each port calibration command. Again, it is recommended that all ports be calibrated at the same time.

The instrument state remains as it was prior to entering the calibration procedure except while a port is actually being calibrated. Once a port is calibrated it returns to the prior state. A port calibration is in process only from the time the "Next" button is pressed until the next screen is shown. For SCPI, this corresponds to the time from issuing the CAL:IQ:FLAT:I|B|Q|QB command until the operation is complete.

For example, if the prior instrument state is Cal Out = Off, Input = I+jQ, and Differential = Off, then up until the time the "Next" button is pressed the I Input and Q Input LEDs are on and the Cal Out, I-bar Input and Q-bar Input LEDs are off. Once the "Next" button is pressed for the I port calibration, only the Cal Out and I Input LEDs will be on and the others will be off. When the screen progresses to the next step ("Next" button again enabled), the prior state is restored and only the I Input and Q Input LEDs are on (Cal Out is off again).

The last calibration date and time for each port will be displayed. Any calibrations that are more than a day older than the most recent calibration will be displayed with the color amber.

| | |
|----------------------|-------------------|
| Key Path | Input/Output, I/Q |
| Initial S/W Revision | Prior to A.02.00 |

I/Q Probe Setup

The set of I/Q probe setup parameters will change based on the type of probe that is sensed. All probe types have the Attenuation parameter, and all probe types can be calibrated. The remaining parameters are only available for some probe types and will not be shown when not available. The probe type is determined by and reported for only for the I and Q ports, never the I-bar or Q-bar ports. The menu title will be "<ch>: <probe id>", where "<ch>" is either "I" or "Q" and "<probe id>" is the type of probe. For example, for the I Probe setup with an Agilent 1130A probe connected to the I port, the title will be "I: 1130A".

Probe calibration data is stored for each probe type for each channel. When no probe is sensed, the probe type "Unknown" is used, and this is also treated like a probe type with its own calibration data. When a probe is changed, the calibration data for that probe type for that port is restored. An advisory message will be displayed showing the new probe type and the calibration status. The calibration data is stored permanently (survives a power cycle) and is not affected by a Preset or any of the Restore commands. When the probe has EEPROM identification (most newer Agilent probes have this), the calibration data is stored by probe serial number and port, so if you have two probes of the same type, the correct calibration data will be used for each. For probes that do not have EEPROM identification, the calibration data is stored by probe type and port and the instrument cannot distinguish between different probes of the same type. In all cases (with or without EEPROM identification), the calibration data is port specific, so it will not follow a specific probe from port to port if the probe is moved.

The "Unknown" probe type is used whenever no probe is sensed. When no calibration data exists for "Unknown" the latest cable calibration data is used (see ["I/Q Guided Calibration " on page 274](#)).

Attenuation

The attenuation is part of the calibration data stored with the probe type and is initially the value that was returned by the last calibration. You can modify this value and any changes will be stored with the calibration data and will survive power cycles and presets. When a probe calibration is performed the attenuation value will be overwritten by the calibration.

| | |
|-----------------------------|--|
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe |
| Remote Command | [:SENSe] :CORRection:IQ:I Q:ATTenuation:RATio <real> [:SENSe] :CORRection:IQ:I Q:ATTenuation:RATio? |
| Example | Set the attenuation for the current I probe to 100.00:1. CORR:IQ:I:ATT:RAT 100 |
| Notes | Each probe type has its own attenuation setting. As probes are changed the attenuation value will reflect the new probe's setting. Changing the attenuation affects only the current probe type's setting and leaves all others unchanged. When the IQ Path is I+jQ, the Q probe attenuation setting must match the I Probe attenuation setting within 1 dB. If this is not the case, an error condition message is generated, 159;Settings Alert;I/Q mismatch:Attenuation. |
| Preset | Each probe type has its own default. The default for the "Unknown" probe type is 1:1. |
| State Saved | Saved with probe calibration data. It survives a power cycle and is not affected by a Preset or Restore. |
| Range | 0.001 to 10000 |
| Min | 0.001 |
| Max | 10000 |
| Initial S/W Revision | Prior to A.02.00 |

This is an alternate form of the SCPI that allows input as a power instead of a ratio.

| | |
|-----------------------|--|
| Remote Command | <code>[:SENSE] :CORREction:IQ:I Q:ATTenuation <rel_ampl></code> <code>[:SENSE] :CORREction:IQ:I Q:ATTenuation?</code> |
| Example | Set the attenuation for the current I probe type to 100.00:1. <code>CORR:IQ:I:ATT 20 dB</code> |
| Range | -60 dB to +80 dB |
| Min | -60 dB |
| Max | +80 dB |
| Initial S/W Revision | Prior to A.02.00 |

Offset

Some active probes have DC offset capability. When one of these probes is connected this control will be visible. The signal is adjusted for the DC offset before entering the analyzer's port. This allows for removal of a DC offset before reaching the analyzer's input port voltage limits. For example, a signal that varies 1 V peak-to-peak with a DC offset equal to the analyzer's max input voltage would exceed the input limits of the analyzer for half its cycle. Removing the DC offset allows the analyzer to correctly process the entire signal.

| | |
|-----------------------|--|
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe |
| Remote Command | <code>:INPut:OFFSet:I Q <voltage></code> <code>:INPut:OFFSet:I Q?</code> |
| Example | Remove a DC offset of -0.5 V from the I channel input. <code>INP:OFFS:I -0.5</code> |
| Notes | Only some probe types support Offset. For those that do, each probe type has its own Offset setting. As probes are changed the Offset value will reflect the new probe's setting. Changing the Offset affects only the current probe type's setting and leaves all others unchanged. |
| Preset | 0 V |
| State Saved | Saved with probe calibration data. It survives power cycle and is not affected by Preset or Restore. |
| Range | -18 V to +18 V |
| Min | -18 V |
| Max | +18 V |
| Initial S/W Revision | Prior to A.02.00 |

Coupling

Some probe types allow coupling to reject low frequencies. This will filter out the DC component of a signal that is composed of a DC bias plus some AC signal. This control is visible only for probe types that have this capability.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe |
| Remote Command | :INPut:COUPling:I Q DC LFR1 LFR2 :INPut:COUPling:I Q? |
| Example | Set the probe to low frequency rejection below 1.7 Hz. INP:COUP:I LFR1 |
| Notes | Only some probe types support Coupling. For those that do, each probe type has its own Coupling setting. As probes are changed the Coupling value will reflect the new probe's setting. Changing the Coupling affects only the current probe type's setting and leaves all others unchanged. |
| Preset | DC |
| State Saved | Saved with probe calibration data. It survives a power cycle and is not affected by a Preset or Restore. |
| Range | DC AC 1.7 Hz LFR1 AC 0.14 Hz LFR2 |
| Readback Text | DC LFR1 LFR2 |
| Initial S/W Revision | Prior to A.02.00 |

DC

Turns off low frequency rejection, allowing signals down to DC.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling |
| Example | Turn off low frequency rejection on the I channel INP:COUP:I DC |
| Initial S/W Revision | Prior to A.02.00 |

LFR1

Turns on low frequency rejection, rejecting signal component lower than 1.7 Hz.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling |
| Example | Turn on low frequency rejection on the I channel for frequencies lower than 1.7 Hz INP:COUP:I LFR1 |
| Initial S/W Revision | Prior to A.02.00 |

LFR2

Turns on low frequency rejection, rejecting signal component lower than 0.14 Hz.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling |
| Example | Turn on low frequency rejection on the I channel for frequencies lower than 0.14 Hz INP:COUP:I LFR2 |
| Initial S/W Revision | Prior to A.02.00 |

Calibrate

Invokes the guided probe calibration. The guided probe calibration is context sensitive and depends on the channel (I or Q) and the Differential Input state. The calibration is only performed on the selected channel. When Differential Input is on, both the probe attached to the main port and the probe attached to the complementary port are calibrated. When Differential Input is off, only the probe attached to the main port is calibrated. See "[I/Q Guided Calibration](#)" on page 274.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe, Coupling |
| Readback Text | The last calibration date, or if no calibration exists, "(empty)". Last: <cal date> <cal time> Example: Last: 8/22/2007 1:02:49 PM |
| Initial S/W Revision | Prior to A.02.00 |

Clear Calibration

Clears the calibration data for the current port and probe. It does not clear the data for other probe types or other ports. If the sensed probe has EEPROM identification, only the data for that specific probe is cleared. After this command has completed, the probe calibration state will be the same as if no probe calibration had ever been performed for the specified channel and probe. The probe attenuation will be the default value for that probe type and the Cable Calibration frequency response corrections will be used. This command is dependent on the Differential Input state. When Differential Input is on, both the data for the probe attached to the main port and the data for the probe attached to the complementary port are cleared. When Differential Input is off, only data for the probe attached to the main port is cleared.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, I Setup Q Setup, I Probe Q Probe |
| Remote Command | :CALibration:IQ:PROBe:I Q:CLEAr |
| Example | Clear the calibration data for the I channel and the current probe (with EEPROM identification) or probe type (without EEPROM identification). :CAL:IQ:PROBe:I:CLE |
| Initial S/W Revision | Prior to A.02.00 |

RF Calibrator

Lets you choose a calibrator signal to look at or turns the calibrator "off".

| | |
|----------------|---|
| Key Path | Input/Output |
| Remote Command | [:SENSe] :FEED:AREFERENCE REF50 REF4800 OFF [:SENSe] :FEED:AREFERENCE? |

| | |
|----------------------|---|
| Example | FEED:AREF REF50 selects the 50 MHz amplitude reference as the signal input. FEED:AREF REF4800 selects the 4.8 GHz amplitude reference as the signal input FEED:AREF OFF turns the calibrator "off" (switches back to the selected input – RF or I/Q) |
| Dependencies | Selecting an input (RF or I/Q) turns the Calibrator OFF. This is true whether the input is selected by the keys or with the [:SENSe]:FEED command. The 4.8 GHz internal reference is only available in some models and frequency range options. If the 4.8 GHz reference is not present, the 4.8 GHz softkey will be blanked, and if the REF4800 parameter is sent, the analyzer will generate an error. |
| Couplings | When one of the calibrator signals is selected, the analyzer routes that signal (an internal amplitude reference) to the analyzer, and changes the main input selection to RF so the calibrator signal can be seen. When you turn the calibrator off it does not switch back to the previously selected input. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Readback | Off, 50 MHz, 4.8 GHz |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|---|
| Remote Command | :CALibration:SOURce:STATe OFF ON 0 1 :CALibration:SOURce:STATe? |
| Notes | For ESA backwards compatibility. In the ESA the calibrator was a separate output which you connected to the input and switched on with this command. In the X-Series, the ON parameter is aliased to the [:SENSe]:FEED:AREF REF50 command and the OFF parameter is aliased to [:SENSe]:FEED:AREF OFF. When CALibration:SOURce:STATe? is received, 1 will be returned if any of the references is selected and 0 if the Calibrator is "Off" |
| Preset | OFF |
| Initial S/W Revision | Prior to A.02.00 |

50 MHz

Selects the 50 MHz internal reference as the input signal.

| | |
|----------------------|-----------------------------|
| Key Path | Input/Output, RF Calibrator |
| Example | :FEED:AREF REF50 |
| Readback | 50 MHz |
| Initial S/W Revision | Prior to A.02.00 |

4.8 GHz

Selects the 4.8 GHz internal reference as the input signal.

| | |
|--------------------------|---|
| Key Path | Input/Output, RF Calibrator |
| Example | :FEED:AREF REF4800 |
| Dependencies | The 4.8 GHz internal reference is only available in some models and frequency range options. If the 4.8 GHz reference is not present, the 4.8 GHz softkey will be blanked, and if the REF4800 parameter is sent, the analyzer will generate an error. |
| Readback | 4.8 GHz |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Off

Switches the input back to the selected input (RF or I/Q)

| | |
|----------------------|-----------------------------|
| Key Path | Input/Output, RF Calibrator |
| Example | :FEED:AREF OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

External Gain

Compensates for gain or loss in the measurement system outside the spectrum analyzer. The External Gain is subtracted from the amplitude readout (or the loss is added to the amplitude readout). So, the displayed signal level represents the signal level at the output of the device-under-test, which can be the input of an external device that provides gain or loss.

Entering an External Gain value does not affect the Reference Level, therefore the trace position on screen changes, as do all of the values represented by the trace data. Thus, the values of exported trace data, queried trace data, marker amplitudes, trace data used in calculations such as N dB points, trace math, peak threshold, etc., are all affected by External Gain. Changing the External Gain, even on a trace that is not updating, will immediately change all of the above, without new data needing to be taken.

NOTE

Changing the External Gain causes the analyzer to immediately stop the current sweep and prepare to begin a new sweep. The data will not change until the trace data updates because the offset is applied to the data as it is taken. If a trace is exported with a nonzero External Gain, the exported data will contain the trace data with the offset applied.

In the Spectrum Analyzer mode, a Preamp is the common external device providing gain or loss. In a measurement application mode like GSM or W-CDMA, the gain or loss could be from a BTS (Base Transceiver Station) or an MS (Mobile Station). So in the Spectrum Analyzer mode MS and BTS would be

grayed out and the only choice would be Ext Preamp. Similarly in some of the digital communications applications, Ext Preamp will be grayed out and you would have a choice of MS or BTS.

| | |
|----------------------|--|
| Key Path | Input/Output |
| Couplings | The Ext Preamp, MS, and BS keys may be grayed out depending on which measurement is currently selected. If any of the grayed out keys are pressed, or the equivalent SCPI command is sent, an advisory message is generated. |
| Readback | 1-of-N selection [variable] |
| Initial S/W Revision | Prior to A.02.00 |

Ext Preamp

This function is similar to the reference level offset function. Both affect the displayed signal level. Ref Lvl Offset is a mathematical offset only, no analyzer configuration is affected. Ext Preamp gain is used when determining the auto-coupled value of the Attenuator. The External Gain value and the Maximum Mixer Level settings are both part of the automatic setting equation for the RF attenuation setting. (10 dB of Attenuation is added for every 10 dB of External Gain.)

Note that the Ref Lvl Offset and Maximum Mixer Level are described in the Amplitude section. They are reset by the instrument Preset. The External Preamp Gain is reset by the "Restore Input/Output Defaults" or "Restore System Defaults->All functions. . The External Gain is subtracted from the amplitude readout so that the displayed signal level represents the signal level at the output of the device-under-test, which is the input of the external device that is providing gain or loss.

"More Information" on page 243

| | |
|------------------------------|---|
| Key Path | Input/Output, External Gain |
| Remote Command | <code>[[:SENSE]:CORRection:SA[:RF]:GAIN <rel_ampl></code> <code>[[:SENSE]:CORRection:SA[:RF]:GAIN?</code> |
| Example | CORR:SA:GAIN 10 sets the Ext Gain value to 10 dB CORR:SA:GAIN -10 sets the Ext Gain value to -10 dB (that is, an attenuation of 10 dB) |
| Notes | Does not auto return. |
| Dependencies | The reference level limits are determined in part by the External Gain/Atten, Max Mixer Level, and RF Atten. This key is grayed out in Modes that do not support External Gain |
| Preset | This is unaffected by Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| State Saved | Saved in instrument state |
| Min | -120 dB |
| Max | 120 dB |
| Readback | Preamp Gain, <Ext Gain value> dB |
| Backwards Compatibility SCPI | <code>[[:SENSE]:CORRection:OFFSet[:MAGNitude]</code> The legacy "Ext Preamp Gain" key is now called "Ext Gain" and the sub-menu has choices of Ext |

| | |
|--------------------------|--|
| | Preamp MS BTS for backwards compatibility. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

More Information

The U7227A USB Preamplifier is an accessory for the X-Series Signal Analyzer that provides gain externally, and whose gain settings are automatically loaded into the analyzer over USB whenever it is connected to one of the analyzer's USB ports.

While the USB Preamplifier is plugged into one of the analyzer's USB ports, the analyzer will consider it to be in the signal path of the RF Input and will apply the calibration data from the USB Preamp to measurements taken at the RF Input (on 2 input boxes, it will be considered to be in the signal path of RF Input 1; it is not supported for RF Input 2).

The USB Preamplifier contains its own cal data. This includes a noise trace suitable for use with NFE, for those models which support NFE. The act of connecting the Preamp to USB will cause the cal data to be downloaded from the preamp. When this happens an informational message is provided saying "Cal data loaded from USB Preamp". The analyzer will then automatically apply the calibration factors loaded from the Preamp in any measurement that supports the USB Preamp.

The External Preamp Gain setting may still be used, even though it is not required for the USB Preamp (since the USB Preamp supplies its own gain data to the analyzer which is applied automatically). Connecting the USB Preamp does not change the External Preamp Gain setting, however unless you have another gain or attenuation element in the signal path, the appropriate setting for External Preamp Gain is 0 dB.

Overload detection and reporting will apply when the USB preamplifier is connected to USB. The USB Preamplifier has its own overload detector which reports overloads to the instrument over USB. This generates an error condition, "Input Overload;USB Preamp."

If, while the USB Preamp is connected to USB, a measurement is selected that does not support the USB preamplifier, the "No result; Meas invalid with Preamp" error condition is generated.

MS

Sets an external gain/attenuation value for MS (Mobile Station) tests.

| | |
|----------------|--|
| Key Path | Input/Output, External Gain |
| Remote Command | <code>[:SENSe] :CORRection:MS[:RF]:GAIN <rel_amp1></code> <code>[:SENSe] :CORRection:MS[:RF]:GAIN?</code> |
| Example | <code>CORR:MS:GAIN 10</code> sets the Ext Gain value to 10 dB <code>CORR:MS:GAIN -10</code> sets the Ext Gain value to -10 dB (that is, a loss of 10 dB.) |
| Notes | Does not auto return. |
| Dependencies | The reference level limits are determined in part by the External Gain, Max Mixer Level, RF Atten This key is grayed out in modes that do not support MS. |
| Preset | This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore |

| | |
|-----------------------|---|
| | System Defaults->All" |
| State Saved | Saved in instrument state. |
| Min | -100 dB |
| Max | 100 dB |
| Readback | MS, <Ext Gain value> dB |
| Initial S/W Revision | Prior to A.02.00 |
| Remote Command | <code>[:SENSe] :CORRection:MS[:RF]:LOSS <rel_ampl></code> <code>[:SENSe] :CORRection:MS[:RF]:LOSS?</code> |
| Example | <code>CORR:MS:LOSS 10</code> sets the Ext Gain value to -10 dB, and subsequently querying <code>:LOSS</code> will give 10 dB <code>CORR:MS:LOSS -10</code> sets the Ext Gain value to 10 dB, and subsequently querying <code>:LOSS</code> will give -10 dB |
| Notes | A positive value of <rel_ampl> in the above command means a loss and a negative value indicates a gain. Anytime <code>:LOSS</code> is set it sets <code>:GAIN</code> to the negative value of the parameter sent. Anytime <code>:LOSS</code> is queried it gives the negative of <code>:GAIN</code> |
| Preset | This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| Min | 100 dB |
| Max | -100 dB |
| Initial S/W Revision | Prior to A.02.00 |

BTS

Sets an external attenuation value for BTS (Base Transceiver Station) tests.

| | |
|-----------------------|--|
| Key Path | Input/Output, External Gain |
| Remote Command | <code>[:SENSe] :CORRection:BTS[:RF]:GAIN <rel_ampl></code> <code>[:SENSe] :CORRection:BTS[:RF]:GAIN?</code> |
| Example | <code>CORR:BTS:GAIN 10</code> sets the Ext Gain value to 10 dB <code>CORR:BTS:GAIN -10</code> sets the Ext Gain value to -10 dB (that is, a loss of 10 dB.) |
| Notes | Does not auto return. |
| Dependencies | The reference level limits are determined in part by the External Gain, Max Mixer Level, RF Atten This key is grayed out in modes that do not support BTS. |
| Preset | This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |

| | |
|----------------------|----------------------------|
| State Saved | Saved in instrument state. |
| Min | -100 dB |
| Max | 100 dB |
| Readback | BTS, <Ext Gain value> dB |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------------|---|
| Remote Command | <code>[:SENSe] :CORRection:BTS[:RF]:LOSS <rel_ampl></code> <code>[:SENSe] :CORRection:BTS[:RF]:LOSS?</code> |
| Example | <code>CORR:BTS:LOSS 10</code> sets the Ext Gain value to -10 dB, and subsequently querying <code>:LOSS</code> will give 10 dB <code>CORR:BTS:LOSS -10</code> sets the Ext Gain value to 10 dB, and subsequently querying <code>:LOSS</code> will give -10 dB |
| Notes | A positive value of <rel_ampl> in the above command means a loss and a negative value indicates a gain. Anytime <code>:LOSS</code> is set it sets <code>:GAIN</code> to the negative value of the parameter sent. Anytime <code>:LOSS</code> is queried it gives the negative of <code>:GAIN</code> |
| Preset | This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| Min | 100 dB |
| Max | -100 dB |
| Initial S/W Revision | Prior to A.02.00 |

I Ext Gain

This function affects the I channel input. However, when Q Gain in I+jQ is set to Same as I Gain, this value is applied to both I and Q channel inputs.

| | |
|-----------------------|--|
| Key Path | Input/Output, External Gain |
| Remote Command | <code>[:SENSe] :CORRection:IQ:I:GAIN <rel_ampl></code> <code>[:SENSe] :CORRection:IQ:I:GAIN?</code> |
| Example | Set the I Ext Gain to 10 dB <code>CORR:IQ:I:GAIN 10</code> Set the I Ext Gain to -10 dB (that is, a loss of 10 dB.) <code>CORR:IQ:I:GAIN -10</code> |
| Dependencies | Not available unless option BBA is installed |
| Preset | 0 dB This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |

| | |
|----------------------|----------------------------|
| State Saved | Saved in instrument state. |
| Min | -100 dB |
| Max | 100 dB |
| Readback Text | I Gain, <I Ext Gain> dB |
| Initial S/W Revision | Prior to A.02.00 |

Q Ext Gain

This function affects the Q channel input.

| | |
|----------------------|--|
| Key Path | Input/Output, External Gain |
| Remote Command | [:SENSe] :CORRection:IQ:Q:GAIN <rel_ampl> [:SENSe] :CORRection:IQ:Q:GAIN? |
| Example | Set the Q Ext Gain to 10 dB CORR:IQ:Q:GAIN 10 Set the Q Ext Gain to -10 dB (that is, a loss of 10 dB.) CORR:IQ:Q:GAIN -10 |
| Dependencies | Not available unless option BBA is installed. |
| Preset | 0 dB This is unaffected by a Preset but is set to 0 dB on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| State Saved | Saved in instrument state |
| Min | -100 dB |
| Max | 100 dB |
| Readback Text | Q Gain, <I Ext Gain> dB |
| Initial S/W Revision | Prior to A.02.00 |

Restore Input/Output Defaults

This selection causes the group of settings and data associated with the Input/Output key to be a reset to their default values. In addition, when a Source is installed, licensed and selected, Restore Input/Output defaults will initiate a Source Preset.

This level of Restore System Defaults does not affect any other system settings or mode settings and does not cause a mode switch. All the features described in this section are reset using this key, including Input Corrections and Data (described in the Corrections section).

| | |
|----------|---|
| Key Path | Input/Output |
| Example | :SYST:DEF INP presets all the Input/Output variables to their factory default values. |

| | |
|----------------------|--|
| Notes | Refer to the Utility Functions for information about Restore System Defaults and the complete description of the :SYSTem:DEFAult INPut: command. |
| Initial S/W Revision | Prior to A.02.00 |

Corrections

This key accesses the Amplitude Corrections menu.

Amplitude Corrections arrays can be entered, sent over SCPI, or loaded from a file. They allow you to correct the response of the analyzer for various use cases. The X-series supports four separate Corrections arrays, each of which can contain up to 2000 points. They can be turned on and off individually and any or all can be on at the same time.

Trace data is in absolute units and corrections data is in relative units, but we want to be able to display trace data at the same time as corrections data. Therefore we establish a reference line to be used while building or editing a Corrections table. The reference line is halfway up the display and represents 0 dB of correction. It is labeled "0 dB CORREC". It is drawn in blue.

Corrections data is always in dB. Whatever dB value appears in the correction table represents the correction applied to that trace at that frequency. So if a table entry shows 30 dB that means we ADD 30 dB to each trace to correct it before displaying it.

In zero span, where the frequency is always the center frequency of the analyzer, we apply the (interpolated) correction for the center frequency to all points in the trace. In the event where there are two correction amplitudes at the center frequency, we apply the first one in the table.

Note that the corrections are applied as the data is taken; therefore, a trace in View (Update Off) will not be affected by changes made to the corrections table after the trace is put in View.

| | |
|--------------------------|--|
| Key Path | Input/Output, Corrections |
| Mode | SA, I/Q Analyzer, Phase Noise, VXA, RTSA, EMI Receiver, DVB-T/H, DTMB, DVB-T/H, DTMB, W-CDMA, LTE & LTE-Adv FDD, LTE & LTE-Adv TDD, Sequence Analyzer, BTooth |
| Dependencies | This key will only appear if you have the proper option installed in your instrument. Amplitude correction may not be available in all modes; if a mode does not support amplitude correction, the Corrections key should be blanked while in that mode. If an application supports corrections but the current measurement does not, then the key should be grayed out in that measurement |
| Preset | Corrections arrays are reset (deleted) by Restore Input/Output Defaults. They survive shutdown and restarting of the analyzer application, which means they will survive a power cycle. |
| Initial S/W Revision | A.02.00 |
| Modified at S/W Revision | x.14.50 |

Select Correction

Specifies the selected correction. The term "selected correction" is used throughout this document to specify which correction will be affected by the functions.

| | |
|--------------------------|---|
| Key Path | Input/Output, Corrections |
| Mode | SA, I/Q Analyzer, Phase Noise, VXA, RTSA, EMI Receiver, DVB-T/H, DTMB, DVB-T/H, DTMB, W-CDMA, LTE & LTE-Adv FDD, LTE & LTE-Adv TDD, Sequence Analyzer, BTooth |
| Notes | The selected correction is remembered even when not in the correction menu. |
| Preset | Set to Correction 1 by Restore Input/Output Defaults |
| Readback | Correction 1 Correction 2 Correction 3 Correction 4 Correction 5 Correction 6 Correction 7 Correction 8 |
| Initial S/W Revision | A.02.00 |
| Modified at S/W Revision | x.14.50 |

Correction On/Off

Turning the Selected Correction from the OFF state to the ON state allows the values in it to be applied to the data. This state transition also automatically turns on "Apply Corrections" (sets it to ON), otherwise the correction would not take effect.

A new sweep is initiated if an amplitude correction is switched on or off. Note that changing, sending or loading corrections data does NOT directly initiate a sweep, however in general these operations will turn corrections on, which DOES initiate a sweep.

| | |
|-------------------------------|--|
| Key Path | Input/Output, Corrections |
| Remote Command | [[:SENSe]:CORRection:CSET[1] 2 ... 8[:STATe] ON OFF 1 0 [:SENSe]:CORRection:CSET[1] 2 ... 8[:STATe]? |
| Example | SENS:CORR:CSET1 ON |
| Dependencies | Changing this from the OFF state to the ON state automatically turns on "Apply Corrections". Only the first correction array (Correction 1) supports antenna units. When this array is turned on, and it contains an Antenna Unit other than "None", the Y Axis Unit of the analyzer is forced to that Antenna Unit. All other Y Axis Unit choices are grayed out. Note that this means that a correction file with an Antenna Unit can only be loaded into the Corrections 1 register. Consequently only for Correction 1 does the dropdown in the Recall dialog include.ant, and if an attempt is made to load a correction file into any other Correction register which DOES contain an antenna unit, a Mass Storage error is generated. This command will generate an "Option not available" error unless you have the proper option installed in your instrument. |
| Preset | Not affected by a Preset. Set to OFF by Restore Input/Output Defaults |
| State Saved | Saved in instrument state. |
| Backwards Compatibility Notes | Unlike legacy analyzers, Preset does not turn Corrections off (Restore Input/Output Defaults does). |
| Initial S/W Revision | A.02.00 |
| Modified at S/W Revision | A.14.00 |

Properties

Accesses a menu that lets you set the properties of the selected correction.

| | |
|----------------------|---------------------------|
| Key Path | Input/Output, Corrections |
| Initial S/W Revision | A.02.00 |

Select Correction

Specifies the selected correction. The term "selected correction" is used throughout this document to specify which correction will be affected by the functions.

| | |
|--------------------------|---|
| Key Path | Input/Output, Corrections |
| Mode | SA, I/Q Analyzer, Phase Noise, VXA, RTSA, EMI Receiver, DVB-T/H, DTMB, DVB-T/H, DTMB, W-CDMA, LTE & LTE-Adv FDD, LTE & LTE-Adv TDD, Sequence Analyzer, BTooth |
| Notes | The selected correction is remembered even when not in the correction menu. |
| Preset | Set to Correction 1 by Restore Input/Output Defaults |
| Readback | Correction 1 Correction 2 Correction 3 Correction 4 Correction 5 Correction 6 Correction 7 Correction 8 |
| Initial S/W Revision | A.02.00 |
| Modified at S/W Revision | x.14.50 |

Frequency Interpolation

This setting controls how the correction values per-bucket are calculated. We interpolate between frequencies in either the logarithmic or linear scale.

This setting is handled and stored individually per correction set.

See ["Interpolation" on page 250](#)

| | |
|--------------------------|---|
| Key Path | Input/Output, Corrections, Properties |
| Remote Command | [[:SENSe]:CORRection:CSET[1] 2 ... 8:X:SPACing LINear LOGarithmic [:SENSe]:CORRection:CSET[1] 2 ... 8:X:SPACing? |
| Example | CORR:CSET:X:SPAC LIN |
| Preset | Unaffected by a Preset. Set to Linear by Restore Input/Output Defaults. |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | A.02.00 |
| Modified at S/W Revision | A.14.00 |

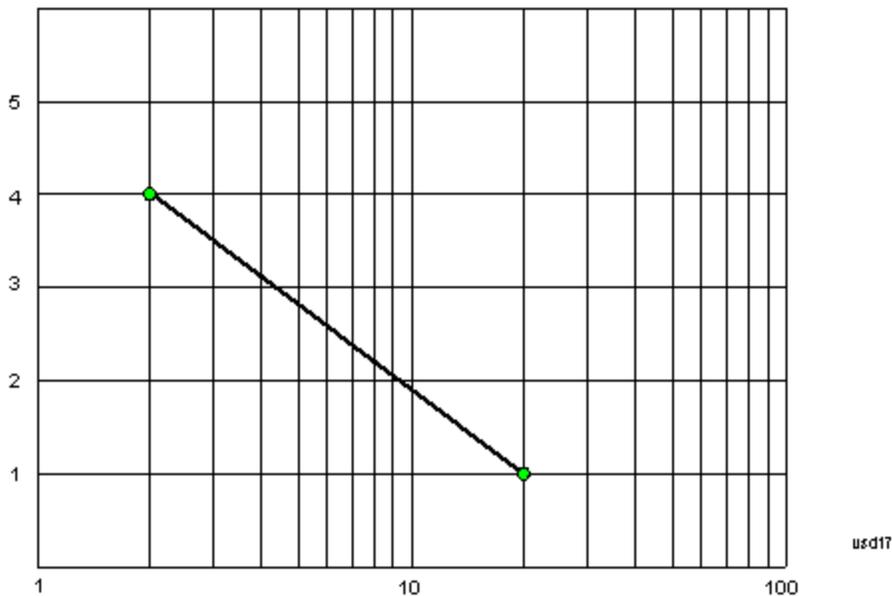
Interpolation

For each bucket processed by the application, all of the correction factors at the frequency of interest (center frequency of each bucket) are summed and added to the amplitude. All trace operations and post processing treat this post-summation value as the true signal to use.

To effect this correction, the goal, for any particular start and stop frequency, is to build a correction trace, whose number of points matches the current Sweep Points setting of the instrument, which will be used to apply corrections on a bucket by bucket basis to the data traces.

For amplitudes that lie between two user specified frequency points, we interpolate to determine the amplitude value. You may select either linear or logarithmic interpolation between the frequencies.

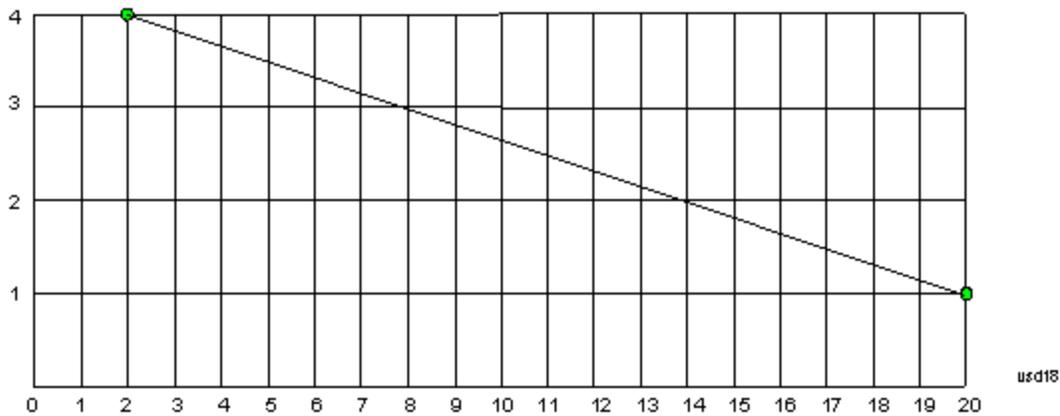
If we interpolate on a log scale, we assume that the line between the two points is a straight line on the log scale. For example, let's say the two points are (2,4) and (20,1). A straight line between them on a log scale looks like:



On a linear scale (like that of the spectrum analyzer), this translates to:



If we interpolate on a linear scale, we assume that the two points are connected by a straight line on the linear scale, as below:



The correction to be used for each bucket is taken from the interpolated correction curve at the center of the bucket.

Description

Sets an ASCII description field which will be stored in an exported file. Can be displayed in the active function area by selecting as the active function, if desired to appear in a screen capture.

| | |
|--------------------------|--|
| Key Path | Input/Output, Corrections, Properties |
| Remote Command | <code>[[:SENSe]:CORRection:CSET[1] 2 ... 8:DESCription "text"</code> <code>[[:SENSe]:CORRection:CSET[1] 2 ... 8:DESCription?</code> |
| Example | <code>:CORR:CSET1:DESC "11941A Antenna correction"</code> |
| Notes | 45 chars max; may not fit on display if max chars used |
| Preset | Unaffected by a Preset. Set to empty by Restore Input/Output Defaults |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | A.02.00 |
| Modified at S/W Revision | A.14.00 |

Comment

Sets an ASCII comment field which will be stored in an exported file. Can be displayed in the active function area by selecting as the active function, if desired to appear in a screen capture.

| | |
|----------------|--|
| Key Path | Input/Output, Corrections, Properties |
| Remote Command | <code>[[:SENSe]:CORRection:CSET[1] 2 ... 8:COMMeNt "text"</code> <code>[[:SENSe]:CORRection:CSET[1] 2 ... 8:COMMeNt?</code> |
| Example | <code>:CORR:CSET1:COMM "this is a comment"</code> |
| Notes | 60 chars max; may not fit on display if max chars used |
| Preset | Unaffected by Preset. Set to empty by Restore Input/Output Defaults |

| | |
|--------------------------|---------------------------|
| State Saved | Saved in instrument state |
| Initial S/W Revision | A.02.00 |
| Modified at S/W Revision | A.14.00 |

Edit

Invokes the integrated editing facility for this correction set.

When entering the menu, the editor window turns on, the selected correction is turned On, Apply Corrections is set to On, the amplitude scale is set to Log, and the Amplitude Correction (“Ampcor”) trace is displayed. The actual, interpolated correction trace is shown in green for the selected correction. Note that since the actual interpolated correction is shown, the correction trace may have some curvature to it. This trace represents only the correction currently being edited, rather than the total, accumulated amplitude correction for all amplitude corrections which are currently on, although the total, accumulated correction for all corrections which are turned on is still applied to the data traces.

Because corrections data is always in dB, but the Y-axis of the analyzer is in absolute units, it is necessary to establish a reference line for display of the Corrections data. The reference line is halfway up the display and represents 0 dB of correction. It is labeled “0 dB CORREC”. It is drawn in blue.

Corrections data is always in dB. Whatever dB value appears in the correction table represents the correction to be applied to that trace at that frequency. So if a table entry shows 30 dB that means we ADD 30 dB to each trace to correct it before displaying it. By definition all points are connected. If a gap is desired for corrections data, enter 0 dB.

Note that a well-designed Corrections array should start at 0 dB and end at 0 dB. This is because whatever the high end point is will be extended to the top frequency of the instrument, and whatever the low end point is will be extended down to 0 Hz. So for a Corrections array to have no effect outside its range, you should start and end the array at 0 dB.

NOTE

The table editor will only operate properly if the analyzer is sweeping, because its updates are tied to the sweep system. Thus, you should not try to use the editor in single sweep, and it will be sluggish during compute-intensive operations like narrow-span FFT sweeps.

When exiting the edit menu (by using the Return key or by pressing an instrument front-panel key), the editor window turns off and the Ampcor trace is no longer displayed; however, Apply Corrections remains On, any correction that was on while in the editor remains on, and the amplitude scale returns to its previous setting.

Corrections arrays are not affected by a Preset, because they are in the Input/Output system. They also survive shutdown and restarting of the analyzer application, which means they will survive a power cycle.

When editing a correction, the editor remembers which correction and which element in the correction array you were editing, and returns you to that correction and that element when you return to the editor after leaving it.

| | |
|----------------------|---------------------------|
| Key Path | Input/Output, Corrections |
| Initial S/W Revision | A.02.00 |

Navigate

Lets you move through the table to edit the desired point.

| | |
|----------------------|---------------------------------------|
| Key Path | Input/Output, Corrections, Edit |
| Notes | There is no value readback on the key |
| Min | 1 |
| Max | 2000 |
| Initial S/W Revision | A.02.00 |

Frequency

Lets you edit the frequency of the current row.

| | |
|----------------------|--|
| Key Path | Input/Output, Corrections, Edit |
| Notes | There is no value readback on the key. |
| Min | 0 |
| Max | 1 THz |
| Initial S/W Revision | A.02.00 |

Amplitude

Lets you edit the Amplitude of the current row.

| | |
|----------------------|--|
| Key Path | Input/Output, Corrections, Edit |
| Notes | There is no value readback on the key. |
| Min | -1000 dB |
| Max | 1000 dB |
| Initial S/W Revision | A.02.00 |

Insert Point Below

Inserts a point below the current point. The new point is a copy of the current point and becomes the current point. The new point is not yet entered into the underlying table, and the data in the row is displayed in light gray.

| | |
|----------------------|---------------------------------|
| Key Path | Input/Output, Corrections, Edit |
| Initial S/W Revision | A.02.00 |

Delete Point

Deletes the currently-selected point, whether or not that point is being edited, and selects the Navigate functionality. The point following the currently-selected point (or the point preceding if there is none) will be selected.

| | |
|----------------------|---------------------------------|
| Key Path | Input/Output, Corrections, Edit |
| Initial S/W Revision | A.02.00 |

Delete Correction

Deletes the correction values for this set. When this key is pressed a prompt is placed on the screen that says "Please press Enter or OK key to delete correction. Press ESC or Cancel to close this dialog." The deletion is only performed if you press OK or Enter.

| | |
|----------------------|--|
| Key Path | Input/Output, Corrections |
| Remote Command | [:SENSe] :CORRection:CSET [1] 2 . . . 6 :DELete |
| Example | CORR:CSET:DEL CORR:CSET1:DEL CORR:CSET4:DEL |
| Notes | Pressing this key when no corrections are present is accepted without error. |
| Initial S/W Revision | A.02.00 |

Apply Corrections

Applies amplitude corrections, which are marked as ON to the measured data. If this is set to OFF, then no amplitude correction sets will be used, regardless of their individual on/off settings. If set to ON, the corrections that are marked as ON (see "[Correction On/Off](#)" on page 248) are used.

| | |
|----------------------|--|
| Key Path | Input/Output, Corrections |
| Remote Command | [:SENSe] :CORRection:CSET:ALL [:STATe] ON OFF 1 0 [:SENSe] :CORRection:CSET:ALL [:STATe] ? |
| Example | SENS:CORR:CSET:ALL OFF This command makes sure that no amplitude corrections are applied, regardless of their individual on/off settings. |
| Preset | Not affected by Preset. Set to OFF by Restore Input/Output Defaults |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | A.02.00 |

Delete All Corrections

Erases all correction values for all 4 Amplitude Correction sets.

When this key is pressed a prompt is placed on the screen that says “Please press Enter or OK key to delete all corrections. Press ESC or Cancel to close this dialog.” The deletion is only performed if you press OK or Enter.

| | |
|----------------------|--|
| Key Path | Input/Output, Corrections |
| Remote Command | [:SENSe] :CORRection:CSET:ALL:DELeTe |
| Example | CORR:CSET:ALL:DEL |
| Initial S/W Revision | A.02.00 |

Remote Correction Data Set Commands

This section describes the remote (SCPI) commands used to put values into correction sets. See the correction / table editor section of the Input/Output section for the information on front panel entry of correction data.

["Set \(Replace\) Data \(Remote Command Only\)" on page 255](#)

["Merge Correction Data \(Remote Command Only\)" on page 256](#)

Set (Replace) Data (Remote Command Only)

The command takes an ASCII series of alternating frequency and amplitude points, each value separated by commas.

The values sent in the command will totally replace all existing correction points in the specified set.

An Ampcor array can contain 2000 points maximum.

| | |
|--------------------------|---|
| Remote Command | [:SENSe] :CORRection:CSET[1] 2 ... 8:DATA <freq>, <ampl>, . . . [:SENSe] :CORRection:CSET[1] 2 ... 8:DATA? |
| Example | CORR:CSET1:DATA 10000000, -1.0, 20000000, 1.0 This defines two correction points at (10 MHz, -1.0 dB) and (20 MHz, 1.0 dB) for correction set 1. |
| Preset | Empty after Restore Input/Output Defaults. Survives a shutdown or restart of analyzer application (including a power cycle). |
| State Saved | Saved in instrument state. |
| Min | Freq: 0 Hz Amptd: -1000 dBm |
| Max | Freq: 1 THz Amptd: +1000 dBm |
| Initial S/W Revision | A.02.00 |
| Modified at S/W Revision | A.14.00 |

Merge Correction Data (Remote Command Only)

The command takes an ASCII series of alternating frequency and amplitude points, each value separated by commas. The difference between this command and Set Data is that this merges new correction points into an existing set.

Any new point with the same frequency as an existing correction point will replace the existing point's amplitude with that of the new point.

An Ampcor array can contain 2000 total points, maximum.

| | |
|---------------------------------|---|
| Remote Command | <code>[[:SENSe]:CORRection:CSET[1] 2 ... 8:DATA:MERGe <freq>, <ampl>, ...</code> |
| Example | <code>CORR:CSET1:DATA:MERGE 15000000, -5.0, 25000000, 5.0</code> This adds two correction points at (15 MHz, -5.0 dB) and (25 MHz, 5.0 dB) to whatever values already exist in correction set 1. |
| Preset | Empty after Restore Input/Output Defaults. Survives shutdown/restart of analyzer application (including power cycle) |
| Min | Freq: 0 Hz Amptd: -1000 dBm |
| Max | Freq: 1 THz Amptd: +1000 dBm |
| Initial S/W Revision | A.02.00 |
| Modified at S/W Revision | A.14.00 |

Freq Ref In

Specifies the frequency reference as being the internal reference at the rear panel input labeled EXT REF IN, a 1 pulse per second signal at the EXT REF IN input,, external reference or sensing the presence of a signal at the EXT REF IN input.

When the frequency reference is set to internal, the internal 10 MHz reference is used even if an external reference is connected.

When the frequency reference is set to external, the instrument will use the external reference. However, if there is no external signal present, or it is not within the proper amplitude range, a condition error message is generated. When the external signal becomes valid, the error is cleared.

When the frequency reference is set to Pulse, the instrument expects a 1 pulse per second signal at the EXT REF IN input. The instrument uses this signal to adjust the frequency of the internal reference.

If Sense is selected, the instrument checks whether a signal is present at the external reference connector. If it senses a signal within 5 ppm of the External Ref Freq (as set on the External Ref Freq softkey), it will automatically switch to the external reference. If it senses a 1 pulse per second signal, it enters Pulse mode, wherein the signal is used to adjust the internal reference. When no signal is present, it automatically switches to the internal reference. No message is generated as the reference switches between pulse, external and internal. The monitoring of the external reference occurs approximately on 1 millisecond intervals, and never occurs in the middle of a measurement acquisition, only at the end of the measurement (end of the request).

If for any reason the instrument's frequency reference is not able to obtain lock, Status bit 1 in the Questionable Frequency register will be true and a condition error message is generated. When lock is regained, Status bit 1 in the Questionable Frequency register will be cleared and the condition error will be cleared.

If an external frequency reference is being used, you must enter the frequency of the external reference if it is not exactly 10 MHz. The External Ref Freq key is provided for this purpose.

| Key Path | Input/Output |
|-------------------------------|--|
| Remote Command | <code>[:SENSe] :ROSCillator :SOURce :TYPE INTernal EXTernal SENSe PULSe</code> <code>[:SENSe] :ROSCillator :SOURce :TYPE?</code> |
| Dependencies | The PULSe parameter, and support of the 1 pps signal at the EXT REF IN input, are not available in firmware prior to A.13.00. They are also not available in some model numbers. If not available, the Pulse key will be blank, and sending the PULSe parameter via SCPI will generate an error: |
| Preset | This is unaffected by a Preset but is set to SENSe on a "Restore Input/Output Defaults" or "Restore System Defaults->All". |
| State Saved | Saved in instrument state. |
| Status Bits/OPC dependencies | STATus:QUESTionable:FREQuency bit 1 set if unlocked. |
| Backwards Compatibility Notes | Freq Ref In was not saved in state in the legacy instruments. It is a part of state in the X-Series. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

| Remote Command | <code>[:SENSe] :ROSCillator :SOURce?</code> |
|-------------------------------|--|
| Notes | The query <code>[SENSe]:ROSCillator:SOURce?</code> returns the current switch setting. This means: <ol style="list-style-type: none"> 1. If it was set to SENSe but there is no external reference nor 1 pps signal so the instrument is actually using the internal reference, then this query returns INTernal and not SENSe. 2. If it was set to SENSe and there is an external reference present, the query returns EXTernal and not SENSe. 3. If it was set to SENSe and there is a 1 pps signal present, the query returns PULSe and not SENSe. 4. If it was set to EXTernal, then the query returns "EXTernal" 5. If it was set to INTernal, then the query returns "INTernal". 6. If it was set to PULSe, then the query returns "PULSe" |
| Preset | SENSe |
| Backwards Compatibility Notes | The query <code>[:SENSe] :ROSCillator :SOURce?</code> was a query-only command in ESA which always returned whichever reference the instrument was using. The instrument automatically switched to the ext ref if it was present. In PSA (which had no sensing) the command <code>[:SENSe] :ROSCillator :SOURce</code> set the reference (INT or EXT), so again its query returned the actual routing. Thus the query form of this command is 100% backwards compatible with both instruments. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------------|---|
| Remote Command | <code>[[:SENSe]:ROSCillator:SOURce INTernal EXTernal</code> |
| Notes | For PSA compatibility the command form is provided and is directly mapped to <code>[[:SENSe]:ROSCillator:SOURce:TYPE</code> |
| Initial S/W Revision | Prior to A.02.00 |

Sense

If Sense is selected, the instrument checks whether a signal is present at the external reference connector. If it senses a signal within 5 ppm of the External Ref Freq (as set on the External Ref Freq softkey), it will use this signal as an External Reference. If it senses a 1 pulse per second signal, it will use this signal to adjust the internal reference by adjusting the User setting of the Timebase DAC. When no signal is present, it automatically switches to the internal reference.

| | |
|---------------------------------|--|
| Key Path | Input/Output, Freq Ref In |
| Example | <code>:ROSC:SOUR:TYPE SENS</code> |
| Couplings | If set to SENSE and the analyzer senses a 1 pulse per second signal, it sets the System, Alignments, Timebase DAC setting to "User". This setting survives Preset and Power Cycle but is set to "Calibrated" on a System, Restore Defaults, Align or a System, Restore Defaults, All |
| Readback | Sense |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

Internal

The internal reference is used. A 1 pps signal at the EXT REF IN port, or a signal there between 1 and 50 MHz, will cause a warning triangle to appear in the settings panel next to the word "INTERNAL", but will otherwise be ignored.

| | |
|---------------------------------|----------------------------------|
| Key Path | Input/Output, Freq Ref In |
| Example | <code>:ROSC:SOUR:TYPE INT</code> |
| Readback | Internal |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

External

The external reference is used.

| | |
|----------------------|---------------------------|
| Key Path | Input/Output, Freq Ref In |
| Example | :ROSC:SOUR:TYPE EXT |
| Readback | External |
| Initial S/W Revision | Prior to A.02.00 |

Ext Ref Freq

This key tells the analyzer the frequency of the external reference. When the external reference is in use (either because the reference has been switched to External or because the Reference has been switched to Sense and there is a valid external reference present) this information is used by the analyzer to determine the internal settings needed to lock to that particular external reference signal.

For the instrument to stay locked, the value entered must be within 5 ppm of the actual external reference frequency. So it is important to get it close, or you risk an unlock condition.

Note that this value only affects the instrument's ability to lock. It does not affect any calculations or measurement results. See "Freq Offset" in the Frequency section for information on how to offset frequency values.

| | |
|-----------------------|--|
| Key Path | Input/Output, Freq Ref In |
| Remote Command | [:SENSe] :ROSCillator:EXTernal:FREQuency <freq> [:SENSe] :ROSCillator:EXTernal:FREQuency? |
| Example | ROSC:EXT:FREQ 20 MHz sets the external reference frequency to 20 MHz, but does not select the external reference. ROSC:SOUR:TYPE EXT selects the external reference. |
| Dependencies | Still available with Internal or Pulse selected, to allow setup for when External is in use. However, the setting has no effect if the Internal Reference is in use (Freq Ref In set to Internal, Pulse, or SENSE:INT or SENSE:PULSE). |
| Preset | This is unaffected by a Preset but is set to 10 MHz on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| Min | CXA: 10 MHz EXA: 10 MHz MXA: 1 MHz PXA: 1 MHz N8973B, N8974B, N8975B, or N8976B: 10 MHz |
| Max | CXA: 10 MHz EXA: 10 MHz EXA with option R13: 20 MHz MXA: 50 MHz PXA: 50 MHz |

N8973B, N8974B, N8975B, or N8976B: 10 MHz

| | |
|--------------------------|------------------|
| Default Unit | Hz |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

External Reference Lock BW

This control lets you adjust the External Reference phase lock bandwidth. This control is available in some models of the X-Series.

The PXA variable reference loop bandwidth allows an external reference to be used and have the analyzer close-in phase noise improved to match that of the reference. This could result in an improvement of tens of decibels. The choice of “Wide” or “Narrow” affects the phase noise at low offset frequencies, especially 4 to 400 Hz offset. When using an external reference with superior phase noise, we recommend setting the external reference phase-locked-loop bandwidth to wide (60 Hz), to take advantage of that superior performance. When using an external reference with inferior phase noise performance, we recommend setting that bandwidth to narrow (15 Hz). In these relationships, inferior and superior phase noise are with respect to -134 dBc/Hz at 30 Hz offset from a 10 MHz reference. Because most reference sources have phase noise behavior that falls off at a rate of 30 dB/decade, this is usually equivalent to -120 dBc/Hz at 10 Hz offset.

| | |
|--------------------------|---|
| Key Path | Input/Output, Freq Ref In |
| Scope | Mode Global |
| Remote Command | <code>[:SENSe] :ROSCillator :BANDwidth WIDE NARROW</code> <code>[:SENSe] :ROSCillator :BANDwidth ?</code> |
| Example | ROSC:BAND WIDE |
| Dependencies | Still available with Internal or Pulse selected, to allow setup for when External is in use. However, the setting has no effect if the Internal Reference is in use (Freq Ref In set to Internal, Pulse, or SENSE:INT or SENSE:PULSE). This key only appears in analyzers equipped with the required hardware. |
| Preset | This is unaffected by a Preset but is set to Narrow on a "Restore Input/Output Defaults" or "Restore System Defaults -> All" |
| State Saved | Saved in Input/Output state. |
| Initial S/W Revision | A.04.00 |
| Modified at S/W Revision | A.14.00 |

External Ref Coupling

Only appears with option ERC installed and licensed.

This function lets you couple the sweep system of the analyzer to the state of the External Reference. If Normal is selected, data acquisition proceeds regardless of the state of the External Reference. When you select Ext Ref Out Of Range Stops Acquisition, the data acquisition (sweep or measurement) stops when either the "521, External ref out of range" or the "503, Frequency Reference unlocked" error message is asserted. Note that this will only take place if the Freq Ref In selection is External.

With the acquisition stopped, the data display will stop updating (even if this occurs in the middle of a sweep or measurement) and no data will be returned to a READ? or MEASure? query; that is, these queries will not complete because the analyzer will not respond to them. Furthermore, no response will be generated to a *WAI? or *OPC? query.

Proper SCPI sequences are shown below, which will always fail to return if the acquisition stops during the requested sweep or measurement. Note that, for predictable operation of this function, it is best to operate the analyzer in single measurement mode (INIT:CONT OFF), because if operating in continuous mode, the analyzer may respond to the above queries even after the acquisition stops, with data left over from the previous acquisition.

```
:INIT:CONT OFF
```

```
:INIT:IMM;*OPC?
```

```
--
```

```
:INIT:CONT OFF
```

```
:INIT:IMM;*WAI?
```

```
--
```

```
:INIT:CONT OFF
```

```
:READ?
```

```
--
```

```
:INIT:CONT OFF
```

```
:MEASure?
```

When the acquisition ceases, in addition to the error condition(s) described above, a popup error message will be generated informing you that the acquisition has ceased due to an invalid external reference. This message will stay on the screen while the acquisition is suspended.

External reference problem.

Data acquisition suspended.

**To resume data acquisition, fix the
problem and press the Restart key**

OR

Press the following keys:

**Input/Output, More 1 of 2, Freq Ref In,
External Ref Coupling, Normal**

OR

**Input/Output, More 1 of 2,
Freq Ref In, Internal**

If you press the Restart key this message will be taken off the screen and a new acquisition will be attempted. If the External Reference problem persists the message will re-appear. You can also remove the message by changing back to the Normal setting of Sweep/Ext Ref Coupling, or by pressing Freq Ref In, Internal, or Freq Ref In, Sense, or Restore Input/Output Defaults.

The setting of External Ref Coupling is persistent across power-cycling and is not reset with a Preset. It is reset to the default state (Normal) when Restore Input/Output Defaults is invoked, which will also restart normal data acquisition.

The detection of invalid external reference is under interrupt processing. If the external reference becomes invalid then returns to valid in too short a time, no error condition will be detected or reported and therefore the acquisition will not be stopped.

| | |
|----------------------|--|
| Key Path | Input/Output, Freq Ref In |
| Mode | All |
| Remote Command | <code>[:SENSe] :ROSCillator :COUPling NORMal NACQuisition</code> <code>[:SENSe] :ROSCillator :COUPling ?</code> |
| Preset | This setting is persistent: it survives power-cycling or a Preset and is reset with Restore Input/Output defaults. |
| State Saved | Not saved in instrument state |
| Readback | Normal Stop Acq |
| Initial S/W Revision | A.02.00 |

Output Config

Accesses keys that configure various output settings, like the frequency reference output, trigger output and analog output.

| | |
|-------------------------------|--|
| Key Path | Input/Output |
| Backwards Compatibility Notes | In ESA there was not a user interface to enable the Video Output (Analog Output), Trigger Output, or Gate Output. In the X-Series each of these physical connectors requires configuration, thus the user interface has been added for X-Series, along with the potential for an output you think is always on to be switched off. |
| Initial S/W Revision | Prior to A.02.00 |

Trig Out

Select the type of output signal that will be output from the Trig 1 Out, or Trig 2 Out connectors.

| | |
|----------------|---|
| Key Path | Input/Output, Output Config |
| Remote Command | <code>:TRIGger TRIGger1 TRIGger2 [:SEQuence] :OUTPut HSWP MEASuring MAIN GATE GTRigger OEVEN SPOint SSWeep SSETtled S1Marker S2Marker S3Marker S4Marker OFF</code> <code>:TRIGger TRIGger1 TRIGger2 [:SEQuence] :OUTPut ?</code> |

| | |
|----------------------|---|
| Example | TRIG:OUTP HSWP TRIG2:OUTP GATE |
| Dependencies | The second Trigger output (Trig 2 Out) does not appear in all models; in models that do not support it, the Trig 2 Out key is blanked, and sending the SCPI command for this output generates an error, "Hardware missing; Not available for this model number" In models that do not support the Trigger 2 output, this error is returned if trying to set Trig 2 Out and a query of Trig 2 Out returns OFF. |
| Preset | Trigger 1: Sweeping (HSWP) Trigger 2: Gate This is unaffected by a Preset but is preset to the above values on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

Polarity

Sets the output to the Trig 1 Out, or Trig 2 Out, connector to trigger on either the positive or negative polarity.

| | |
|-----------------------|--|
| Key Path | Input/Output, Output Config, Trig 1/2 Output |
| Remote Command | :TRIGger TRIGger1 TRIGger2[:SEquence]:OUTPut:POLarity POSitive NEGative :TRIGger TRIGger1 TRIGger2[:SEquence]:OUTPut:POLarity? |
| Example | TRIG1:OUTP:POL POS |
| Preset | This is unaffected by a Preset but is set to POSitive on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

Off

Selects no signal to be output to the Trig 1 Out, or Trig 2 Out, connector.

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, Trig 1/2 Output |
| Example | TRIG1:OUTP OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

Sweeping (HSWP)

Selects the Sweeping Trigger signal to be output to the Trig 1 Out, or Trig 2 Out, connector when a measurement is made. This signal has historically been known as "HSWP" (High = Sweeping), and is 5 V TTL level with 50 ohm output impedance.

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, Trig 1/2 Output |
| Example | TRIG1:OUTP HSWP |
| Readback | Sweeping |
| Initial S/W Revision | Prior to A.02.00 |

Measuring

Selects the Measuring trigger signal to be output to the Trig 1 Out, or Trig 2 Out, connector. This signal is true while the Measuring status bit is true.

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, Trig 1/2 Output |
| Example | TRIG1:OUTP MEAS |
| Readback | Measuring |
| Initial S/W Revision | Prior to A.02.00 |

Main Trigger

Selects the current instrument trigger signal to be output to the Trig 1 Out, or Trig 2 Out, connector.

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, Trig 1/2 Output |
| Example | TRIG1:OUTP MAIN |
| Readback | Main Trigger |
| Initial S/W Revision | Prior to A.02.00 |

Gate Trigger

Selects the gate trigger signal to be output to the Trig 1 Out, or Trig 2 Out, connector. This is the source of the gate timing, not the actual gate signal.

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, Trig 1/2 Output |
| Example | TRIG1:OUTP GTR |
| Readback | Gate Trigger |
| Initial S/W Revision | Prior to A.02.00 |

Gate

Selects the gate signal to be output to the Trig 1 Out, or Trig 2 Out, connector. The gate signal has been delayed and its length determined by delay and length settings. When the polarity is positive, a high on the Trig 1 Out, or Trig 2 Out, represents the time the gate is configured to pass the signal.

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, Trig 1/2 Output |
| Example | TRIG1:OUTP GATE |
| Readback | Gate |
| Initial S/W Revision | Prior to A.02.00 |

Source Point Trigger

Selects the gate signal to be output to the Trig 1 Out, or Trig 2 Out, connector for use as the Point Trigger when operating an external source in Tracking mode. When Ext Trigger 1 is selected as the Point Trigger under Source, the Source Point Trigger under Trig1 Out automatically gets selected. Similarly, when Ext Trigger 2 is selected as the Point Trigger under Source, the Source Point Trigger key under Trig 2 Out automatically gets selected.

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, Trig 1/2 Output |
| Example | TRIG1:OUTP SPO |
| Readback | Source Point |
| Initial S/W Revision | Prior to A.02.00 |

Odd/Even Trace Point

Selects either the odd or even trace points as the signal to be output to the Trig 1 Out, or Trig 2 Out, connector when performing swept spectrum analysis. When the polarity is positive, this output goes high during the time the analyzer is sweeping past the first point (Point 0) and every other following trace point. The opposite is true if the polarity is negative.

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, Trig 1/2 Output |
| Example | TRIG1:OUTP OEV |
| Readback | Odd/Even |
| Initial S/W Revision | Prior to A.02.00 |

Analog Out

This menu lets you control which signal is fed to the “Analog Out” connector on the analyzer rear panel.

See ["More Information" on page 266](#)

| | |
|----------|-----------------------------|
| Key Path | Input/Output, Output Config |
|----------|-----------------------------|

| | |
|-------------------------------|--|
| Remote Command | :OUTPut:ANALog OFF SVIDeo LOGVideO LINVideO DAUDio :OUTPut:ANALog? |
| Example | OUTP:ANAL SVIDeo ! causes the analog output type to be Screen Video |
| Preset | This is unaffected by Preset but is set to DAUDio on a "Restore Input/Output Defaults" or "Restore System Defaults->All |
| Preset | OFF |
| State Saved | Saved in Input/Output State |
| Readback line | 1-of-N selection [variable] |
| Backwards Compatibility Notes | Prior to A.04.00, OFF was the default functionality except when in the Analog Demod application or with Tune and Listen, in which case it was DAUDio, and there was no selection menu. So for backwards compatibility with earlier X-Series firmware versions, Auto (:OUTP:ANAL:AUTO ON) will duplicate the prior behavior. The DNWB and SANalyzer parameters, which were legal in PSA but perform no function in the X-Series, are accepted without error. |
| Initial S/W Revision | A.04.00 |

More Information

The table below gives the range for each output.

| Analog Out | Nominal Range exc. (10% overrange) | Scale Factor | Notes |
|--------------|--|-----------------|---|
| Off | 0 V | | |
| Screen Video | 0 – 1 V open circuit | 10%/division | 8566 compatible |
| Log Video | 0 – 1 V terminated | 1/(192.66 dB/V) | dB referenced to mixer level, 1V out for -10 dBm at the mixer. |
| Linear Video | 0 – 1 V terminated | 100%/V | Linear referenced to Ref Level, 1 V out for RF envelope at the Ref Level. |
| Demod Audio | (varies with analyzer setting) | | |

Auto

Selects the Auto state for the Analog Output menu. In this state, the Analog Output will automatically be set to the most sensible setting for the current mode or measurement.

If you make a selection manually from the Analog Out menu, this selection will remain in force until you change it (or re-select Auto), even if you go to a mode or measurement for which the selected output does not apply.

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, Analog Out |
| Remote Command | OUTPut:ANALog:AUTO OFF ON 0 1 OUTPut:ANALog:AUTO? |
| Example | OUTP:ANAL:AUTO ON |
| Preset | ON |
| State Saved | Saved in Input/Output State |
| Initial S/W Revision | A.04.00 |

Off

Turns off the analog output.

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, Analog Out |
| Example | OUTP:ANAL OFF ! causes the analog output to be off |
| Readback Text | Off |
| Initial S/W Revision | A.04.00 |

Screen Video

Selects the analog output to be the screen video signal. In this mode, the pre-detector data is output to the Analog Out connector. The output looks very much like the trace displayed on the analyzer's screen, and depends on the Log/Lin display Scale, Reference Level, and dB per division, but is not influenced by the selected detector or any digital flatness corrections or trace post-processing (like Trace Averaging).

Note that this mode is similar to the Analog Output of the HP 8566 family and the Video Out (opt 124) capability of the Agilent PSA analyzer (E444x), although there are differences in the behavior.

| | |
|--------------|---|
| Key Path | Input/Output, Output Config, Analog Out |
| Example | OUTP:ANAL SVID |
| Dependencies | <p>Because the Screen Video output uses one of the two IF processing channels, only one detector is available while Screen Video is selected. All active traces will change to use the same detector as the selected trace when Screen Video is activated.</p> <p>Screen Video output is not available while any EMI Detector is selected (Quasi Peak, RMS Average or EMI Average), because these detectors use both IF processing channels. Consequently, if the user chooses an EMI Detector, there will be no Screen Video output.</p> <p>The output holds at its last value during an alignment and during a marker count. After a sweep:</p> <ul style="list-style-type: none"> • If a new sweep is to follow (as in Continuous sweep mode), the output holds at its last value during the retrace before the next sweep starts. If the analyzer is in zero-span, there is no retrace, as the analyzer remains tuned to the Center Frequency and does not sweep. Therefore, in zero-span, the output simply remains live between display updates. • If no new sweep is to follow (as in Single sweep mode), the output remains live, and continues to show the pre-detector data |

| | |
|-------------------------------|---|
| | This function depends on optional capability; the key will be blanked and the command will generate an "Option not available" error unless you have Option YAV or YAS licensed in your instrument. |
| Couplings | Screen Video output changes while in FFT Sweeps, so for measurements that use exclusively FFT Sweeps, or if the user manually chooses FFT Sweeps, the Screen Video output will look different than it does in swept mode. |
| Readback Text | Screen Video |
| Backwards Compatibility Notes | See " Backwards Compatibility: " on page 268, below. |
| Initial S/W Revision | A.04.00 |

Backwards Compatibility:

The Screen Video function is intended to be very similar to the 8566 Video Output and the PSA Option 124. However, unlike the PSA, it is not always on; it must be switched on by the Screen Video key. Also, unlike the PSA, there are certain dependencies (detailed above) – for example, the Quasi Peak Detector is unavailable when Screen Video is on.

Furthermore, the PSA Option 124 hardware was unipolar and its large range was padded to be exactly right for use as a Screen Video output. In the X-Series, the hardware is bipolar and has a wider range to accommodate the other output choices. Therefore, the outputs won't match up exactly and users may have to modify their setup when applying the X-Series in a PSA application.

Log Video (RF Envelope, Ref=Mixer Level)

Selects the analog output to be the log of the video signal. In this mode, the pre-detector data is output to the Analog Out connector with a Log scaling. The output is referenced to the current level at the mixer, does not depend on display settings like Reference Level or dB per division, and it is not influenced by the selected detector or any digital flatness corrections or trace post-processing (like Trace Averaging), but does change with input attenuation.

The output is designed so that full scale (1 V) corresponds to –10 dBm at the mixer. The full range (0–1 V) covers 192.66 dB ; thus, 0 V corresponds to –202.66 dBm at the mixer.

| | |
|--------------|---|
| Key Path | Input/Output, Output Config, Analog Out |
| Example | OUTP:ANAL LOGV |
| Dependencies | <p>Because the Log Video output uses one of the two IF processing channels, only one detector is available while Screen Video is selected. All active traces will change to use the same detector as the selected trace when Log Video is activated.</p> <p>Log Video output is not available while any EMI Detector is selected (Quasi Peak, RMS Average or EMI Average), because these detectors use both IF processing channels. Consequently, if the user chooses an EMI Detector, there will be no Log Video output.</p> <p>The output holds at its last value during an alignment, during a marker count, and during retrace (after a sweep and before the next sweep starts).</p> <p>This function depends on optional capability. The key will be blanked and the command will generate an "Option not available" error unless you have Option YAV licensed in your instrument.</p> |
| Couplings | Log Video output changes while in FFT Sweeps, so for measurements that use exclusively FFT |

| | |
|----------------------|--|
| | Sweeps, or if the user manually chooses FFT Sweeps, the Log Video output will look different than it does in swept mode. |
| Readback Text | Log Video |
| Initial S/W Revision | A.04.00 |

Linear Video (RF Envelope, Ref=Ref Level)

Selects the analog output to be the envelope signal on a linear (voltage) scale. In this mode, the pre-detector data is output to the Analog Out connector with a Linear scaling. The output is based on the current Reference Level, and is not influenced by the selected detector or any digital flatness corrections or trace post-processing (like Trace Averaging).

The scaling is set so that 1 V output occurs with an instantaneous video level equal to the reference level, and 0 V occurs at the bottom of the graticule. This scaling gives you the ability to control the gain without having another setup control for the key. But it requires you to control the look of the display (the reference level) in order to control the analog output.

This mode is ideal for looking at Amplitude Modulated signals, as the linear envelope effectively demodulates the signal.

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, Analog Out |
| Example | OUTP:ANAL LINV |
| Dependencies | <p>Because the Linear Video output uses one of the two IF processing channels, only one detector is available while Linear Video is selected. All active traces will change to use the same detector as the selected trace when Log Video is activated.</p> <p>Linear Video output is not available while any EMI Detector is selected (Quasi Peak, RMS Average or EMI Average), because these detectors use both IF processing channels. Consequently, if the user chooses an EMI Detector, there will be no Linear Video output.</p> <p>The output holds at its last value during an alignment and during a marker count and during retrace (after a sweep and before the next sweep starts).</p> <p>This function depends on optional capability; the key will be blanked and the command will generate an "Option not available" error unless you have Option YAV licensed in your instrument.</p> |
| Couplings | Linear Video output changes while in FFT Sweeps, so for measurements that use exclusively FFT Sweeps, or if the user manually chooses FFT Sweeps, the Linear Video output will look different than it does in swept mode. |
| Readback Text | Linear Video |
| Initial S/W Revision | A.04.00 |

Demod Audio

Selects the analog output to be the demodulation of the video signal.

When Demod Audio is selected, the demodulated audio signal appears at this output whenever the Analog Demod application is demodulating a signal or when Analog Demod Tune and Listen is operating in the Swept SA measurement.

When Analog Out is in the Auto state, this output is auto-selected when in the Analog Demod mode or when Analog Demod Tune and Listen is operating in the Swept SA measurement.

If any other Analog Output is manually selected when in the Analog Demod mode or when Analog Demod Tune and Listen is operating in the Swept SA measurement, a condition warning message appears.

| | |
|--------------------------|--|
| Key Path | Input/Output, Output Config, Analog Out |
| Example | OUTP:ANAL DAUD |
| Dependencies | <p>This key only appears if the Analog Demod application (N9063A), the N6141A or W6141A application, or Option EMC is installed and licensed, otherwise the key will be blanked and the command will generate an "Option not available" error.</p> <p>The output holds at its last value during an alignment and during a marker count. It is not held between sweeps, in order for Tune and Listen to work properly.</p> <p>When Demod Audio is the selected Analog Output:</p> <ul style="list-style-type: none"> • all active traces are forced to use the same detector. • CISPR detectors (QPD, EMI Avg, RMS Avg) are unavailable |
| Readback Text | Demod Audio |
| Initial S/W Revision | Prior to A.02.00 (this was the default functionality, and there was no selection) |
| Modified at S/W Revision | A.04.00 |

Digital Bus

This menu allows you to configure the LVDS connector located on the rear panel of the instrument. It is a unidirectional link of real time data at a 90 MSa/s rate. The ADC is sampling a 22.5 MHz IF.

The data that appears on this port is raw, uncorrected ADC samples, unless you have option RTL. With option RTL, you get fully corrected I/Q data.

This connector will only be active when the Narrowband IF Path is currently in use.

| | |
|----------------------|-----------------------------|
| Key Path | Input/Output, Output Config |
| Initial S/W Revision | A.04.00 |

Bus Out On/Off

When Bus Out is on, all acquisitions are streamed to the output port including acquisitions for internal purposes such as Alignment. The internal processing and routing of acquisitions continues as usual and is unaffected by the state of Bus Out.

When Bus Out is off, no signal appears on the LVDS port.

| | |
|----------------|--|
| Key Path | Input/Output, Output Config, Digital Bus |
| Scope | Mode Global |
| Remote Command | :OUTPut:DBUS[1][:STATe] ON OFF 1 0 :OUTPut:DBUS[1][:STATe]? |

| | |
|--------------------------|---|
| Example | OUTP:DBUS ON |
| Preset | This is unaffected by a Preset but is set to Off on a "Restore Input/Output Defaults" or "Restore System Defaults -> All" |
| State Saved | Saved in Input/Output State |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

I/Q Cal Out

The Baseband I/Q "Cal Out" port can be turned on with either a 1 kHz or a 250 kHz square wave. This can be turned on independent of the input selection. A Preset will reset this to Off.

| | |
|-----------------------|---|
| Key Path | Input/Output, Output Config |
| Remote Command | :OUTPut:IQ:OUTPut IQ1 IQ250 OFF :OUTPut:IQ:OUTPut? |
| Example | OUTP:IQ:OUTP IQ1 |
| Couplings | An I/Q Cable Calibration or an I/Q Probe Calibration will change the state of the Cal Out port as needed by the calibration routine. When the calibration is finished the I/Q Cal Out is restored to the pre-calibration state. |
| Preset | Off |
| State Saved | Saved in instrument state |
| Range | 1 kHz Square Wave 250 kHz Square Wave Off |
| Readback Text | 1 kHz 250 kHz Off |
| Initial S/W Revision | Prior to A.02.00 |

1 kHz Square Wave

Turns on the 1 kHz square wave signal at the Cal Out port. This choice is only available with option BBA.

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, I/Q Cal Out |
| Readback | I/Q 1kHz |
| Initial S/W Revision | Prior to A.02.00 |

250 kHz Square Wave

Turns on the 250 kHz square wave signal at the Cal Out port. This choice is only available with option BBA.

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, I/Q Cal Out |
| Readback | I/Q 250kHz |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns off the signal at the Cal Out port. This choice is only available with option BBA.

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, I/Q Cal Out |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

Aux IF Out

This menu controls the signals that appear on the SMA output on the rear panel labeled "AUX IF OUT"

The Aux IF Out functionality is only valid for RF and External Mixer inputs. When using the External Mixing path, the Aux IF Out levels (for all three Options CR3, CRP, and ALV) will be uncalibrated because the factory default Aux IF level was set to accommodate the expected IF levels for the RF path.

| | |
|-------------------------------|---|
| Key Path | Input/Output, Output Config |
| Remote Command | :OUTPut:AUX SIF AIF LOGVideo OFF :OUTPut:AUX? |
| Dependencies | The softkey does not appear in models that do not support the Aux IF Out. |
| Preset | This is unaffected by a Preset but is set to OFF on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| State Saved | Saved in Input/Output state |
| Readback line | 1-of-N selection [variable] |
| Backwards Compatibility Notes | In the PSA, the IF output has functionality equivalent to the "Second IF" function in the X-Series' Aux IF Out menu. In the X-Series, it is necessary to switch the Aux IF Out to "Second IF" to get this functionality, whereas in PSA it is always on, since there are no other choices. Hence a command to switch this function to "Second IF" will have to be added by customers migrating from PSA who use the IF Output in PSA. |
| Initial S/W Revision | A.04.00 |

Off

In this mode nothing comes out of the "AUX IF OUT" connector on the rear panel. The connector appears as an open-circuit (that is, it is not terminated in any way).

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, Aux IF Out |
| Example | OUTP:AUX OFF causes the aux output type to be off |
| Readback Text | Off |
| Initial S/W Revision | A.04.00 |

Second IF

In this mode the 2nd IF output is routed to the rear panel connector. The annotation on the key shows the current 2nd IF frequency in use in the analyzer.

The frequency of the 2nd IF depends on the current IF signal path as shown in the table below:

| IF Path Selected | Frequency of "Second IF" Output |
|------------------|---------------------------------|
| 10 MHz | 322.5 MHz |
| 25 MHz | 322.5 MHz |
| 40 MHz | 250 MHz |
| 140 MHz | 300 MHz |

The signal quality, such as signal to noise ratio and phase noise, are excellent in this mode.

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, Aux IF Out |
| Example | OUTP:AUX SIF causes the aux output type to be Second IF |
| Dependencies | Does not appear unless Option CR3 is installed. |
| Readback Text | Second IF |
| Initial S/W Revision | A.04.00 |

Arbitrary IF

In this mode the 2nd IF output is mixed with a local oscillator and mixer to produce an arbitrary IF output between 10 MHz and 75 MHz with 500 kHz resolution. The phase noise in this mode will not be as good as in Second IF mode.

The IF output frequency is adjustable, through an active function which appears on the Arbitrary IF selection key, from 10 MHz to 75 MHz with 500 kHz resolution.

The bandwidth of this IF output varies with band and center frequency, but is about 40 MHz at the -3 dB width. When the output is centered at lower frequencies in its range, signal frequencies at the bottom of the bandwidth will "fold". For example, with a 40 MHz bandwidth (20 MHz half-bandwidth), and a 15 MHz IF center, a signal -20 MHz relative to the spectrum analyzer center frequency will have a relative response of about -3 dB with a frequency 20 MHz below the 15 MHz IF center. This -5 MHz frequency will fold to become a +5 MHz signal at the IF output. Therefore, lower IF output frequencies are only useful with known band-limited signals.

| | |
|----------------------|---|
| Key Path | Input/Output, Output Config, Aux IF Out |
| Example | OUTP:AUX AIF causes the aux output type to be the Arbitrary IF |
| Dependencies | Does not appear unless Option CRP is installed. |
| Readback Text | Arbitrary IF |
| Initial S/W Revision | A.04.00 |

| | |
|----------------------|--|
| Key Path | Input/Output, Output Config, Aux IF Out |
| Scope | Mode Global |
| Remote Command | :OUTPut:AUX:AIF <value> :OUTPut:AUX:AIF? |
| Example | :OUTP:AUX:AIF 50 MHZ |
| Preset | This is unaffected by a Preset but is set to 70 MHz on a "Restore Input/Output Defaults" or "Restore System Defaults->All" |
| State Saved | Saved in Input/Output State |
| Min | 10 MHz |
| Max | 75 MHz |
| Default Unit | Hz |
| Initial S/W Revision | A.04.00 |

Fast Log Video

In this mode the 2nd IF output is passed through a log amp and the log envelope of the IF signal is sent to the rear panel. The open circuit output level varies by about 25 mV per dB, with a top-of-screen signal producing about 1.6 Volts. The output impedance is nominally 50 ohms.

This mode is intended to meet the same needs as Option E4440A-H7L Fast Rise Time Video Output on the Agilent E4440A PSA Series, allowing you to characterize pulses with fast rise times using standard measurement suites on modern digital scopes.

| | |
|----------------------|---|
| Key Path | Input/Output, Output Config, Aux IF Out |
| Example | OUTP:AUX LOGVideo causes the aux output type to be Fast Log Video |
| Dependencies | Does not appear unless Option ALV is installed. The output is off during an alignment but not during a marker count, and is not blanked during retrace (after a sweep and before the next sweep starts). |
| Readback Text | Fast Log Video |
| Initial S/W Revision | A.04.00 |

I/Q Guided Calibration

Calibrating the Baseband I/Q ports requires several steps and manual connections. The Guided Calibration will interactively step you through the required steps, displaying diagrams to help with the connections. The steps will vary depending on the setup.

In the Guided Calibration windows, the date and time of the last calibration are displayed. If any of the items listed are displayed in yellow, this indicates that the calibration for that item is inconsistent with the latest calibration, and you should complete the entire calibration process before you exit the calibration.

I/Q Isolation Calibration

The I/Q Isolation Calibration must be run before calibrating any port with either the I/Q Cable Calibration or I/Q Probe Calibration. This calibration is performed with nothing connected to any of the front panel I/Q ports. This is the first step in both the I/Q Cable Calibration and the I/Q Probe Calibration.

Next

Perform the I/Q Isolation calibration.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, I/Q Cable Calibration |
| Remote Command | :CALibration:IQ:ISOLation |
| Example | CAL:IQ:ISOL |
| Notes | All front panel I/Q ports must not be connected to anything. |
| Notes | All cables and probes should be disconnected from the I/Q ports before issuing the SCPI command. |
| State Saved | No. |
| Initial S/W Revision | Prior to A.02.00 |

Exit

Exits the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, I/Q Cable Calibration |
| Notes | Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see "Exit Confirmation" on page 286). |
| Initial S/W Revision | Prior to A.02.00 |

I/Q Isolation Calibration Time (Remote Command Only)

Returns the last date and time that the I/Q Isolation Calibration was performed. This is a remote query command only.

| | |
|----------------------|--|
| Remote Command | :CALibration:IQ:ISOLation:TIME? |
| Example | :CAL:IQ:ISOL:TIME? |
| Notes | This returns 6 integer values: year, month, day, hour, minute, second. When no calibration has been performed, all values will be 0. |
| Initial S/W Revision | A.02.00 |

I/Q Cable Calibrate...

The I/Q cable calibration creates correction data for each of the front panel I/Q ports. This calibration data is used whenever no probe specific calibration data is available. It is important that all ports are calibrated using the same short BNC cable so that the data is comparable from port to port.

The guided calibration (front panel only) will show connection diagrams and guide you through the isolation calibration and calibrating each port. The calibration data for each port is stored separately, so as soon as a port is calibrated that data is saved and will be used. If you press "Exit" to exit the calibration process, the data for the ports already completed will still be used. It is recommended that a calibration be completed once started, or if exited, that it be properly done before the next use of the I/Q ports. The "Next" button will perform the calibration for the current port and then proceed to the next step in the calibration procedure. The "Back" button will return to the prior port in the procedure. Both keys and dialog buttons are supplied for ease of use. The dialog buttons are for mouse use and the softkeys for front panel use.

The calibration can also be done via SCPI, but no connection diagrams will be shown. You will have to make the correct connections before issuing each port calibration command. Again, it is recommended that all ports be calibrated at the same time.

The instrument state remains as it was prior to entering the calibration procedure except while a port is actually being calibrated. Once a port is calibrated it returns to the prior state. A port calibration is in process only from the time the "Next" button is pressed until the next screen is shown. For SCPI, this corresponds to the time from issuing the CAL:IQ:FLAT:|I|B|Q|QB command until the operation is complete.

For example, if the prior instrument state is Cal Out = Off, Input = I+jQ, and Differential = Off, then up until the time the "Next" button is pressed the I Input and Q Input LEDs are on and the Cal Out, I-bar Input and Q-bar Input LEDs are off. Once the "Next" button is pressed for the I port calibration, only the Cal Out and I Input LEDs will be on and the others will be off. When the screen progresses to the next step ("Next" button again enabled), the prior state is restored and only the I Input and Q Input LEDs are on (Cal Out is off again).

The last calibration date and time for each port will be displayed. Any calibrations that are more than a day older than the most recent calibration will be displayed with the color amber.

| | |
|----------------------|-------------------|
| Key Path | Input/Output, I/Q |
| Initial S/W Revision | Prior to A.02.00 |

I Port

The I port calibration is performed with the front panel's I port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back

Return to the prior step in the calibration procedure.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, Q Setup, Q Probe, Calibrate |
| Initial S/W Revision | Prior to A.02.00 |

Next

Perform the I port calibration.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, I/Q Cable Calibrate... |
| Remote Command | :CALibration:IQ:FLATness:I |
| Example | CAL:IQ:FLAT:I |
| Notes | The recommended procedure is to use the same BNC cable to calibrate all I/Q ports. All I/Q ports should be calibrated sequentially during the procedure. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands. |
| Notes | The I port must be connected to the Cal Out port before issuing the SCPI command. |
| State Saved | No. |
| Initial S/W Revision | Prior to A.02.00 |

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, I/Q Cable Calibrate... |
| Notes | Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see "Exit Confirmation" on page 286). |
| Initial S/W Revision | Prior to A.02.00 |

I-bar Port

The I-bar port calibration is performed with the front panel's I-bar port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back

Return to the prior step in the calibration procedure.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, I/Q Cable Calibration |
| Notes | Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows the user to go back to a prior step to redo that calibration step. |
| Initial S/W Revision | Prior to A.02.00 |

Next

Perform the I-bar port calibration.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, I/Q Cable Calibrate... |
| Remote Command | :CALibration:IQ:FLATness:IBAR |
| Example | CAL:IQ:FLAT:IBAR |
| Notes | The recommended procedure is to use the same BNC cable to calibrate all I/Q ports. All I/Q ports should be calibrated sequentially during the procedure. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands. |
| Notes | The I-bar port must be connected to the Cal Out port before issuing the SCPI command. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, I/Q Cable Calibrate... |
| Notes | Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see "Exit Confirmation" on page 286). |
| Initial S/W Revision | Prior to A.02.00 |

Q Port

The Q port calibration is performed with the front panel's Q port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back

Return to the prior step in the calibration procedure.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, I/Q Cable Calibrate... |
| Notes | Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows the user to go back to a prior step to redo that calibration step. |
| Initial S/W Revision | Prior to A.02.00 |

Next

Perform the Q port calibration.

| | |
|-----------------------|--|
| Key Path | Input/Output, I/Q, I/Q Cable Calibrate... |
| Remote Command | :CALibration:IQ:FLATness:Q |
| Example | CAL:IQ:FLAT:Q |
| Notes | The recommended procedure is to use the same BNC cable to calibrate all I/Q ports. All I/Q ports should be calibrated sequentially during the procedure. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands. |
| Notes | The Q port must be connected to the Cal Out port before issuing the SCPI command. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, I/Q Cable Calibrate... |
| Notes | Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see "Exit Confirmation" on page 286). |
| Initial S/W Revision | Prior to A.02.00 |

Q-bar Port

The Q-bar port calibration is performed with the front panel's Q-bar port connected via a short BNC cable to the Cal Out port. The guided calibration will show a diagram of the required connections.

Back

Return to the prior step in the calibration procedure.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, I/Q Cable Calibrate... |
| Notes | Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows the user to go back to a prior step to redo that calibration step. |
| Initial S/W Revision | Prior to A.02.00 |

Next

Perform the Q-bar port calibration.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, I/Q Cable Calibrate... |
| Remote Command | :CALibration:IQ:FLATness:QBAR |
| Example | CAL:IQ:FLAT:QBAR |
| Notes | The recommended procedure is to use the same BNC cable to calibrate all I/Q ports. All I/Q ports should be calibrated sequentially during the procedure. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands. |
| Notes | The Q-bar port must be connected to the Cal Out port before issuing the SCPI command. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, I/Q Cable Calibrate... |
| Notes | Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see " Exit Confirmation " on page 286). |
| Initial S/W Revision | Prior to A.02.00 |

I/Q Cable Calibration Time (Remote Command Only)

Returns the last date and time that the I/Q Cable Calibration was performed for a specific port. This is a remote query command only.

| | |
|----------------------|--|
| Remote Command | :CALibration:IQ:FLATness:I IBAR Q QBAR:TIME? |
| Example | :CAL:IQ:FLAT:I:TIME? |
| Notes | This returns 6 integer values: year, month, day, hour, minute, second. When no calibration has been performed, all values will be 0. |
| Initial S/W Revision | A.02.00 |

I/Q Probe Calibration

The I/Q probe calibration creates correction data for one of the front panel I/Q channels. When the probe has EEPROM identification, the data is unique to that specific probe. When the probe does not have

EEPROM identification, the data will be used for all probes of the same type. The data is also unique to the channel, so calibration data for the I channel will not be used for the Q channel and vice versa.

The guided calibration (front panel only) will show connection diagrams and guide the user through the I/Q Isolation Calibration and through calibrating each port. The calibration data for each port is stored separately, so as soon as a port is calibrated that data is saved and will be used. If a user presses "Exit" to exit the calibration process, the data for the port already completed will still be used. It is recommended that a calibration be completed once started, or if exited, that it be properly done before the next use of the probe. The "Next" button will perform the calibration for the current port and then proceed to the next step in the calibration procedure. The "Back" button will return to the prior port in the procedure. Both softkeys and dialog buttons are supplied for ease of use. The dialog buttons are for mouse use and the softkeys for front panel use.

The calibration can also be done via SCPI, but no connection diagrams will be shown. The user will have to make the correct connections before issuing each port calibration command. Again, it is recommended that all ports be calibrated at the same time.

For Active probes or when Differential is Off, only the main port is calibrated, otherwise both the main and complementary ports are calibrated.

The instrument state remains as it was prior to entering the calibration procedure except while a port is actually being calibrated. Once a port is calibrated it returns to the prior state. A port calibration is in process only from the time the "Next" button is pressed until the next screen is shown. For SCPI, this corresponds to the time from issuing the CAL:IQ:PROB:|I|B|Q|QB command until the operation is complete.

For example, if the prior instrument state is Cal Out = Off, Input = I+jQ, and Differential = Off, then up until the time the "Next" button is pressed the I Input and Q Input LEDs are on and the Cal Out, I-bar Input and Q-bar Input LEDs are off. Once the "Next" button is pressed for the I port calibration, only the Cal Out and I Input LEDs will be on and the others will be off. When the screen progresses to the next step ("Next" button again enabled), the prior state is restored and only the I Input and Q Input LEDs are on (Cal Out is off again).

The last calibration date and time for each relevant port will be displayed. For passive probes with Differential On, any calibration that is more than a day older than the most recent calibration will be displayed with the color amber.

I Port

The I port calibration is performed with the probe body attached to the front panel's I port and the probe tip connected via an adapter to the Cal Out port. The guided calibration will show a diagram of the required connections.

Show Adapter

Show a connection diagram and instructions for the probe and adapter. See ["Show Adapter Screen" on page 286](#).

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, I Setup, I Probe, Calibrate |
| Notes | Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached. |
| Initial S/W Revision | Prior to A.02.00 |

Back

Return to the prior step in the calibration procedure.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, Q Setup, Q Probe, Calibrate |
| Initial S/W Revision | Prior to A.02.00 |

Next

Perform the I port calibration.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, I Setup, I Probe, Calibrate |
| Remote Command | :CALibration:IQ:PROBe:I |
| Example | CAL:IQ:PROB:I |
| Notes | The I port must be connected to the Cal Out port before issuing the SCPI command. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, I Setup, I Probe, Calibrate |
| Notes | Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see "Exit Confirmation" on page 286). |
| Initial S/W Revision | Prior to A.02.00 |

I-bar Port

The I-bar port calibration is performed with the probe body attached to the front panel's I-bar port and the probe tip connected via an adapter to the Cal Out port. The I-bar probe calibration is only available for passive probes with Differential On. The guided calibration will show a diagram of the required connections.

Show Adapter

Show a connection diagram and instructions for the probe and adapter. See ["Show Adapter Screen" on page 286](#).

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, I Setup, I Probe, Calibrate |
| Notes | Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached. |
| Initial S/W Revision | Prior to A.02.00 |

Back

Return to the prior step in the calibration procedure.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, I Setup, I Probe, Calibrate |
| Notes | Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows the user to go back to a prior step to redo that calibration step. |
| Initial S/W Revision | Prior to A.02.00 |

Next

Perform the I-bar port calibration.

| | |
|-----------------------|---|
| Key Path | Input/Output, I/Q, I Setup, I Probe, Calibrate |
| Remote Command | :CALibration:IQ:PROBe:IBar |
| Example | CAL:IQ:PROB:IB |
| Notes | The I-bar port must be connected to the Cal Out port before issuing the SCPI command. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, I Setup, I Probe, Calibrate |
| Notes | Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see "Exit Confirmation" on page 286). |
| Initial S/W Revision | Prior to A.02.00 |

Q Port

The Q port calibration is performed with the probe body attached to the front panel's Q port and the probe tip connected via an adapter to the Cal Out port. The guided calibration will show a diagram of the required connections.

Show Adapter

Show a connection diagram and instructions for the probe and adapter. See ["Show Adapter Screen" on page 286](#).

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, Q Setup, Q Probe, Calibrate |
| Notes | Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached. |
| Initial S/W Revision | Prior to A.02.00 |

Back

Return to the prior step in the calibration procedure.

| | |
|----------------------|--|
| Key Path | Input/Output, I/Q, Q Setup, Q Probe, Calibrate |
| Initial S/W Revision | Prior to A.02.00 |

Next

Perform the Q port calibration.

| | |
|-----------------------|---|
| Key Path | Input/Output, I/Q, Q Setup, Q Probe, Calibrate |
| Remote Command | :CALibration:IQ:PROB:Q |
| Example | CAL:IQ:PROB:Q |
| Notes | The Q port must be connected to the Cal Out port before issuing the SCPI command. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

| | |
|----------|--|
| Key Path | Input/Output, I/Q, Q Setup, Q Probe, Calibrate |
| Notes | Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is |

to redo the calibration step.

When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see ["Exit Confirmation" on page 286](#)).

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Q-bar Port

The Q-bar port calibration is performed with the probe body attached to the front panel's Q-bar port and the probe tip connected via an adapter to the Cal Out port. The Q-bar probe calibration is only available for passive probes with Differential On. The guided calibration will show a diagram of the required connections.

Show Adapter

Show a connection diagram and instructions for the probe and adapter. See ["Show Adapter Screen" on page 286](#).

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, Q Setup, Q Probe, Calibrate |
| Notes | Either a passive or an active probe adapter diagram will be shown, depending on the type of probe attached. |
| Initial S/W Revision | Prior to A.02.00 |

Back

Return to the prior step in the calibration procedure.

| | |
|----------------------|---|
| Key Path | Input/Output, I/Q, Q Setup, Q Probe, Calibrate |
| Notes | Using the Back button will not restore the calibration data to a prior state. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. The Back button allows the user to go back to a prior step to redo that calibration step. |
| Initial S/W Revision | Prior to A.02.00 |

Next

Perform the Q-bar port calibration.

| | |
|-----------------------|---|
| Key Path | Input/Output, I/Q, Q Setup, Q Probe, Calibrate |
| Remote Command | :CALibration:IQ:PROBe:QBar |
| Example | CAL:IQ:PROB:QB |
| Notes | The Q-bar port must be connected to the Cal Out port before issuing the SCPI command. The calibration data is saved as soon as the port is calibrated and will survive power cycles. It is not reset by any preset or restore data commands. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Exit

Exit the calibration procedure. All ports calibrated before pressing Exit will use the newly acquired calibration data.

| | |
|-----------------------------|--|
| Key Path | Input/Output, I/Q, Q Setup, Q Probe, Calibrate |
| Notes | Using the Exit button will not restore the calibration data to the state prior to entering the guided calibration. Once a port is calibrated the data is stored immediately and the only way to change it is to redo the calibration step. When the calibration may be left in an inconsistent state, a confirmation dialog will be displayed (see "Exit Confirmation" on page 286). |
| Initial S/W Revision | Prior to A.02.00 |

Show Adapter Screen

When one of the Probe Calibration Show Adapter buttons is pressed, a diagram of the probe with its adapter will be shown. Depending on the type of probe attached, either the Passive Probe Adapter or the Active Probe Adapter diagram will be shown.

I/Q Probe Calibration Time (Remote Command Only)

Return the last date and time that the I/Q Probe Calibration was performed for a specific port. This is a remote query command only.

| | |
|-----------------------------|--|
| Remote Command | :CALibration:IQ:PROBe:I IBAR Q QBAR:TIME? |
| Example | :CAL:IQ:PROB:I:TIME? |
| Notes | This returns 6 integer values: year, month, day, hour, minute, second. When no calibration has been performed, all values will be 0. The value is specific to both the port and probe, so the value will change as probes are connected or disconnected. |
| Initial S/W Revision | A.02.00 |

Exit Confirmation

When Exit is pressed during one of the calibration routines, the calibration may be in an inconsistent state with some of the ports having newly measured calibration data and others with old data. If this is the case, a dialog box will appear to confirm that the user really wants to exit. A "Yes" answer will exit the calibration procedure, leaving potentially inconsistent calibration data in place. A "No" answer will return to the calibration procedure.

5 Mode Functions

Mode

The Mode key allows you to select the available measurement applications or “Modes”. Modes are a collection of measurement capabilities packaged together to provide an instrument personality that is specific to your measurement needs. Each application software product is ordered separately by Model Number and must be licensed to be available. Once an instrument mode is selected, only the commands that are valid for that mode can be executed.

NOTE

Key operation can be different between modes. The information displayed in Help is about the current mode.

To access Help for a different Mode you must first exit Help (by pressing the Cancel (Esc) key). Then select the desired mode and re-access Help.

For more information on Modes, preloading Modes, and memory requirements for Modes, see ["More Information" on page 289](#)

| Key Path | Front-panel key |
|-------------------------------------|--|
| Remote Command | :INSTrument[:SElect] SA RTSA SEQAN EMI BASIC WCDMA EDGE GSM WIMAXOFDMA VSA PNOISE NFIGure ADEMOD BTooth TDSCDMA CDMA2K CDMA1XEV LTE LTE TDD LTEAFDD LTEATDD MSR DVB DTMB DCATV ISDBT CM MB WLAN CWLAN CWIMAXOFDM WIMAXFIXED IDEN RLC SCPI LC VSA89601 :INSTrument[:SElect]? |
| Example | :INST SA |
| Notes | The available parameters are dependent upon installed and licensed applications resident in the instrument. Parameters given here are an example, specific parameters are in the individual Application. A list of the valid mode choices is returned with the INST:CAT? Query. |
| Preset | This is unaffected by a Preset but is set on a “Restore System Defaults->All” to: For N9038A: EMI For N8973B, N8974B, N8975B, or N8976B: NFIG For all other models: SA |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :INSTrument[:SElect] GSM provided for backwards compatibility. Mapped to EDGE GSM. |
| Backwards Compatibility SCPI | :INSTrument[:SElect] SANalyzer provided for ESU compatibility. When this command is received, the analyzer aliases it to the following: INST:SEL SCPI LC This results in the analyzer being placed in SCPI Language Compatibility Mode, in order to emulate |

| | |
|-------------------------------------|---|
| | the ESU Spectrum Analyzer Mode. |
| Backwards Compatibility SCPI | :INSTrument[:SElect] RECeiver provided for ESU compatibility. When this command is received, the analyzer aliases it to the following: :INST:SEL EMI :CONF FSC This results in the analyzer being placed in the EMI Receiver Mode, running the Frequency Scan measurement, in order to emulate the ESU Receiver Mode. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.13.00 |

| | |
|-------------------------------------|--|
| Example | :INST 'SA' |
| Notes | The query is not a quoted string. It is an enumeration as indicated in the Instrument Select table above. The command must be sequential: i.e. continued parsing of commands cannot proceed until the instrument select is complete and the resultant SCPI trees are available. |
| Backwards Compatibility SCPI | :INSTrument[:SElect] 'SA' 'PNOISE' 'EDGE' 'GSM' 'BASIC' |
| Initial S/W Revision | Prior to A.02.00 |

More Information

The Mode name appears on the banner after the word “Agilent” followed by the Measurement Title. For example, for the Spectrum Analyzer mode with the Swept SA measurement running:



It is possible to specify the order in which the Modes appear in the Mode menu, using the Configure Applications utility (System, Power On, Configure Applications). It is also possible, using the same utility, to specify a subset of the available applications to load into memory at startup time, which can significantly decrease the startup time of the analyzer. During runtime, if an application that is not loaded into memory is selected (by either pressing that applications Mode key or sending that applications :INST:SEL command over SCPI), there will be a pause while the Application is loaded. During this pause a message box that says “Loading application, please wait...” is displayed.

Each application (Mode) that runs in the X-Series signal analyzers consumes virtual memory. The various applications consume varying amounts of virtual memory, and as more applications run, the memory consumption increases. Once an application is run, some of its memory remains allocated even when it is not running, and is not released until the analyzer program (xSA.exe) is shut down.

Agilent characterizes each Mode and assigns a memory usage quantity based on a conservative estimate. There is a limited amount of virtual memory available to applications (note that this is virtual memory and is independent of how much physical RAM is in the instrument). The instrument keeps track of how much

memory is being used by all loaded applications – which includes those that preloaded at startup, and all of those that have been run since startup.

When you request a Mode that is not currently loaded, the instrument looks up the memory estimate for that Mode, and adds it to the residual total for all currently loaded Modes. If there is not enough virtual memory to load the Mode, a dialog box and menu will appear that gives you four options:

1. Close and restart the analyzer program without changing your configured preloads. This may free up enough memory to load the requested Mode, depending on your configured preloads
2. Clear out all preloads and close and restart the analyzer program with only the requested application preloaded, and with that application running. This choice is guaranteed to allow you to run the requested application; but you will lose your previously configured preloads. In addition, there may be little or no room for other applications, depending on the size of the requested application.
3. Bring up the Configure Applications utility in order to reconfigure the preloaded apps to make room for the applications you want to run (this will then require restarting the analyzer program with your new configuration). This is the recommended choice because it gives you full flexibility to select exactly what you want.
4. Exit the dialog box without doing anything, which means you will be unable to load the application you requested.

In each case except 4, this will cause the analyzer software to close, and you will lose all unsaved traces and results.

If you attempt to load a mode via SCPI that will exceed memory capacity, the Mode does not load and an error message is returned:

```
-225,"Out of memory;Insufficient resources to load Mode (mode name)"
```

where “mode name” is the SCPI parameter for the Mode in question, for example, SA for Spectrum Analyzer Mode.

Spectrum Analyzer

Selects the Spectrum Analyzer mode for general purpose measurements. There are several measurements available in this mode. General spectrum analysis measurements, in swept and zero span, can be done using the first key in the Meas menu, labeled Swept SA. Other measurements in the Meas Menu are designed to perform specialized measurement tasks, including power and demod measurements.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|----------------------------|
| Example | INST:SEL SA INST:NSEL 1 |
| Initial S/W Revision | Prior to A.02.00 |

Noise Figure

The Noise Figure mode provides pre-configured measurements for making general purpose measurements of device noise figure.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-----------------------------------|
| Example | INST:SEL NFIGURE INST:NSEL 219 |
| Initial S/W Revision | Prior to A.02.00 |

Vector Signal Analyzer (VXA)

The N9064A (formerly 89601X) VXA Vector signal and WLAN modulation analysis application provides solutions for basic vector signal analysis, analog demodulation, and digital demodulation. The digital demodulation portion of N9064A allows you to perform measurements on standard-based formats such as cellular, wireless networking and digital video as well as general purpose flexible modulation analysis for wide range of digital formats, FSK to 1024QAM, with easy-to-use measurements and display tools such as constellation and eye diagram, EVM traces and up to four simultaneous displays. Analog baseband analysis is available using the MXA and PXA with option BBA. Option 3FP WLAN has been discontinued.

N9064A honors existing 89601X licenses with all features and functionalities found on X-Series software versions prior to A.06.00. Specifically:

N9064A-1 is equivalent to 89601X-205

N9064A-2 is equivalent to 89601X-AYA

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------|
| Example | INST:SEL VSA INST:NSEL 100 |
| Initial S/W Revision | Prior to A.02.00 |

Analog Demod

Selects the Analog Demod mode for making measurements of AM, FM and phase modulated signals.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------|-----------------|
| Example | INST:SEL ADEMOM |

| | |
|----------------------|------------------|
| | INST:NSEL 234 |
| Initial S/W Revision | Prior to A.02.00 |

Phase Noise

The Phase Noise mode provides pre-configured measurements for making general purpose measurements of device phase noise.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| | |
|----------------------|---------------------------------------|
| Key Path | Mode |
| Example | INST:SEL PNOISE or INST:NSEL 14 |
| Initial S/W Revision | Prior to A.02.00 |

CMMB

Selects the CMMB mode for measurements of digital video signals using this format. There are several power and demod measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| | |
|----------------------|--------------------------------|
| Key Path | Mode |
| Example | INST:SEL CMMB INST:NSEL 240 |
| Initial S/W Revision | A.03.00 |

Combined WLAN

Selects the CWLAN mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| | |
|----------------------|--------------------------------|
| Key Path | Mode |
| Example | INST:SEL CWLAN INST:NSEL 19 |
| Initial S/W Revision | A.02.00 |

TD-SCDMA with HSPA/8PSK

Selects the TD-SCDMA mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-----------------------------------|
| Example | INST:SEL TDSCDMA INST:NSEL 211 |
| Initial S/W Revision | Prior to A.02.00 |

IQ Analyzer (Basic)

The IQ Analyzer Mode makes general purpose frequency domain and time domain measurements. These measurements often use alternate hardware signal paths when compared with a similar measurement in the Signal Analysis Mode using the Swept SA measurement. These frequency domain and time domain measurements can be used to output I/Q data results when measuring complex modulated digital signals.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------|
| Example | INST:SEL BASIC INST:NSEL 8 |
| Initial S/W Revision | Prior to A.02.00 |

GSM/EDGE/EDGE Evo

Selects the GSM with EDGE mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|--------------------------|----------------------------------|
| Example | INST:SEL EDGEGSM INST:NSEL 13 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

Combined Fixed WiMAX

Selects the Combined Fixed WiMAX mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------------|
| Example | INST:SEL CWIMAXOFDM INST:NSEL 81 |
| Initial S/W Revision | A.02.00 |

W-CDMA with HSPA+

Selects the W-CDMA with HSPA+ mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------|
| Example | INST:SEL WCDMA INST:NSEL 9 |
| Initial S/W Revision | Prior to A.02.00 |

DVB-T/H with T2

Selects the DVB-T/H mode for measurements of digital video signals using this format. There are several power and demod measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|--------------------------|-------------------------------|
| Example | INST:SEL DVB INST:NSEL 235 |
| Initial S/W Revision | A.02.00 |
| Modified at S/W Revision | A.07.00 |

EMI Receiver

The EMI Receiver Mode makes EMC measurements. Several measurements are provided to aid the user in characterizing EMC performance of their systems, including looking at signals with CISPR-16 compliant

detectors, performing scans for interfering signals, and determining and charting interfering signals over time.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------|
| Example | INST:SEL EMI INST:NSEL 141 |
| Initial S/W Revision | A.07.01 |

802.16 OFDM (Fixed WiMAX)

Selects the 802.16 OFDM (Fixed WiMAX) mode. This mode allows modulation quality measurements of signals that comply with IEEE 802.16a–2003 and IEEE 802.16–2004 standards, with flexibility to measure nonstandard OFDM formats. Along with the typical digital demodulation measurement results, several additional 802.16 OFDM unique trace data formats and numeric error data results provide enhanced data analysis.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|--------------------------------------|
| Example | INST:SEL WIMAXFIXED INST:NSEL 104 |
| Initial S/W Revision | A.02.00 |

WLAN

Selects the WLAN mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|--------------------------------|
| Example | INST:SEL WLAN INST:NSEL 217 |
| Initial S/W Revision | A.09.491 |

1xEV-DO

Selects the 1xEV-DO mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-----------------------------------|
| Example | INST:SEL CDMA1XEV INST:NSEL 15 |
| Initial S/W Revision | Prior to A.02.00 |

802.16 OFDMA (WiMAX/WiBro)

Selects the OFDMA mode for general purpose measurements of WiMAX signals. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------------|
| Example | INST:SEL WIMAXOFDMA INST:NSEL 75 |
| Initial S/W Revision | Prior to A.02.00 |

89601 VSA

Selecting the 89601 VSA mode will start the 89600 VSA software. The 89600 VSA software is powerful, PC-based software, offering the industry's most sophisticated general purpose and standards specific signal evaluation and troubleshooting tools for R&D engineers. Even for proprietary and non-standard signals in SATCOM or MILCOM applications, you can make signal quality measurements with customized IQ constellation. Reach deeper into signals, gather more data on signal problems, and gain greater insight.

- Over 35 general-purpose analog and digital demodulators ranging from 2FSK to 4096QAM
- Flexible and custom IQ and OFDM signal analysis for single carrier
- Standards specific modulation analysis including:
 - Cellular: GSM/EDGE, cdma2000, W-CDMA, TD-SCDMA, LTE(FDD/TDD),
 - LTE-Advanced and more
 - Wireless networking: 802.11a/b/g, 802.11n, 802.ac, 802.16 WiMAX (fixed/mobile), WiSUN (MR-FSK PHY)
 - RFID
 - Digital satellite video and other satellite signals, radar, LMDS
 - Up to 400K bin FFT, for the highest resolution spectrum analysis

- A full suite of time domain analysis tools, including signal capture and playback, time gating, and CCDF measurements
- 20 simultaneous trace displays and the industry's most complete set of marker functions
- Easy-to-use Microsoft® Windows® graphical user interface

For more information see the Agilent 89600 Series VSA web site at www.agilent.com/find/89600vsa

To learn more about how to use the 89600 VSA running in the X-Series, after the 89600 VSA software is running, open the 89600 VSA Help and open the "About Agilent X-Series Signal Analyzer with 89600 VSA Software" help topic.

| Key Path | Mode |
|----------------------|------------------------------------|
| Example | INST:SEL VSA89601 INST:NSEL 101 |
| Initial S/W Revision | Prior to A.02.00 |

MSR

Selects the MSR mode. The MSR mode makes several measurements for Cellular Communication devices that can be configured with multiple radio formats simultaneously following the 3GPP standard of Multi-Standard Radio, including GSM/EDGE, WCDMA/HSPA+ and LTE.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------|
| Example | INST:SEL MSR INST:NSEL 106 |
| Initial S/W Revision | A.09.491 |

cdma2000

Selects the cdma2000 mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|---------------------------------|
| Example | INST:SEL CDMA2K INST:NSEL 10 |
| Initial S/W Revision | Prior to A.02.00 |

Bluetooth

Selects the Bluetooth mode for Bluetooth specific measurements. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|------------------------------|
| Example | INST:SEL BT INST:NSEL 228 |
| Initial S/W Revision | A.06.01 |

LTE

Selects the LTE mode for general purpose measurements of signals following the LTE FDD standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------|
| Example | INST:SEL LTE INST:NSEL 102 |
| Initial S/W Revision | Prior to A.02.00 |

SCPI Language Compatibility

The SCPI Language Compatibility mode provides remote language compatibility for SCPI-based instruments, such as the Rohde and Schwartz FSP and related series of spectrum analyzers.

NOTE After changing into or out of this mode, allow a 1 second delay before sending any subsequent commands.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|---|
| Example | INST:SEL SCPI LC Or INST:NSEL 270 |
| Initial S/W Revision | A.06.00 |

iDEN/WiDEN/MOTOTalk

Selects the iDEN/WiDEN/MOTOTalk mode for general purpose measurements of iDEN and iDEN-related signals. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|--------------------------------|
| Example | INST:SEL IDEN INST:NSEL 103 |
| Initial S/W Revision | A.02.00 |

ISDB-T

Selects the ISDB-T mode for measurements of digital video signals using this format. There are several power and demod measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|---------------------------------|
| Example | INST:SEL ISDBT INST:NSEL 239 |
| Initial S/W Revision | A.03.00 |

Digital Cable TV

Selects the Digital Cable TV mode for measurements of digital cable television systems. There are several power and demod measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|---------------------------------|
| Example | INST:SEL DCATV INST:NSEL 238 |
| Initial S/W Revision | A.07.00 |

LTE TDD

Selects the LTE TDD mode for general purpose measurements of signals following the LTE TDD standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|----------------------------------|
| Example | INST:SEL LTETDD INST:NSEL 105 |
| Initial S/W Revision | A.03.00 |

Remote Language Compatibility

The Remote Language Compatibility (RLC) mode provides remote command backwards compatibility for the 8560 series of spectrum analyzers, known as legacy spectrum analyzers.

NOTE After changing into or out of this mode, allow a 1 second delay before sending any subsequent commands.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------------|
| Example | INST:SEL RLC Or INST:NSEL 266 |
| Initial S/W Revision | Prior to A.02.00 |

DTMB (CTTB)

Selects the DTMB (CTTB) mode for measurements of digital video signals using this format. There are several power and demod measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|--------------------------------|
| Example | INST:SEL DTMB INST:NSEL 236 |
| Initial S/W Revision | A.02.00 |

LTE-Advanced FDD

As LTE-Advanced FDD and LTE modes are converged into one single application, the single softkey under Mode menu is designed to select the covered mode. The display mode of the LTE and LTE-Advanced FDD are distinguished by the licenses.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|-------------------------------------|--|
| Example | INST:SEL LTEAFDD INST:NSEL 107 |
| Notes | When the N9080A/80B-1FP exists, the display mode name is LTE. When the N9080A/80B-1FP and N9080B-2FP all exist, the display mode name is LTE FDD & LTE-A FDD. |
| Backwards Compatibility SCPI | INST:SEL LTE INST:NSEL 102 |
| Initial S/W Revision | A.14.00 |
| Modified at S/W Revision | A.14.50 |

LTE-Advanced TDD

As LTE-Advanced TDD and LTE TDD modes are converged into one single application, the single softkey under Mode menu is designed to select the converged mode. The display mode of the LTE TDD and LTE-Advanced TDD are distinguished by the licenses.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|-------------------------------------|--|
| Example | INST:SEL LTEATDD INST:NSEL 108 |
| Notes | When the N9082A/82B-1FP exists, the display mode name is LTE TDD. When the N9082A/82B-1FP and N9082B-2FP all exist, the display mode name is LTE TDD & LTE-A TDD. |
| Backwards Compatibility SCPI | INST:SEL LTETDD INST:NSEL 105 |
| Initial S/W Revision | A.14.00 |
| Modified at S/W Revision | A.14.50 |

Application Mode Number Selection (Remote Command Only)

Select the measurement mode by its mode number. The actual available choices depend upon which applications are installed in your instrument. The modes appear in this table in the same order they appear in the Mode menu (if the order is not changed by the Configure Applications utility found in the System, Power On menu). See "[Detailed List of Modes](#)" on page 306 for Mode details.

The Mode Number is the parameter for use with the :INSTrument:NSElect command. The Mode Parameter is the parameter for use with the :INSTrument[:SElect] command.

| Mode | Mode Number | Mode Parameter |
|-------------------------------|--------------------|-----------------------|
| Spectrum Analyzer | 1 | SA |
| Real Time Spectrum Analyzer | 107 | RTSA |
| Sequence Analyzer | 400 | SEQAN |
| EMI Receiver | 141 | EMI |
| I/Q Analyzer (Basic) | 8 | BASIC |
| WCDMA with HSPA+ | 9 | WCDMA |
| GSM/EDGE/EDGE Evo | 13 | EDGE GSM |
| 802.16 OFDMA (WiMAX/WiBro) | 75 | WIMAX OFDMA |
| Vector Signal Analyzer (VXA) | 100 | VSA |
| Phase Noise | 14 | PNOISE |
| Noise Figure | 219 | NFIGure |
| Analog Demod | 234 | ADEM0D |
| Bluetooth | 228 | BT00th |
| TD-SCDMA with HSPA/8PSK | 211 | TDSCDMA |
| cdma2000 | 10 | CDMA2K |
| 1xEV-DO | 15 | CDMA1XEV |
| LTE | 102 | LTE |
| LTE TDD | 105 | LTETDD |
| LTE-Advanced FDD | 107 | LTEAFDD |
| LTE-Advanced TDD | 108 | LTEATDD |
| MSR | 106 | MSR |
| DVB-T/H with T2 | 235 | DVB |
| DTMB (CTTB) | 236 | DTMB |
| Digital Cable TV | 238 | DCATV |
| ISDB-T | 239 | ISDBT |
| CMMB | 240 | CMMB |
| WLAN | 217 | WLAN |
| Combined WLAN | 19 | CWLAN |
| Combined Fixed WiMAX | 81 | CWIMAXOFDM |
| 802.16 OFDM (Fixed WiMAX) | 104 | WIMAXFIXED |
| iDEN/WiDEN/MotoTalk | 103 | IDEN |
| Remote Language Compatibility | 266 | RLC |
| SCPI Language Compatibility | 270 | SCPILC |
| 89601 VSA | 101 | VSA89601 |

| | |
|-----------------------------|---|
| Remote Command | :INSTRument:NSElect <integer> :INSTRument:NSElect? |
| Example | :INST:NSEL 1 |
| Notes | SA mode is 1 The command must be sequential: i.e. continued parsing of commands cannot proceed until the instrument select is complete and the resultant SCPI trees are available. |
| Preset | Not affected by Preset. Set to default mode (1 for SA mode) following Restore System Defaults. |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

Application Mode Catalog Query (Remote Command Only)

Returns a string containing a comma separated list of names of all the installed and licensed measurement modes (applications). These names can only be used with the :INSTRument[:SElect] command.

| | |
|--------------------------------------|---|
| Remote Command | :INSTRument:CATalog? |
| Example | :INST:CAT? |
| Notes | Query returns a quoted string of the installed and licensed modes separated with a comma. Example: "SA,PNOISE,WCDMA" |
| Backwards Compatibility Notes | VSA (E4406A) :INSTRument:CATalog? returned a list of installed INSTRument:SELECT items as a comma separated list of string values: "BASIC","GSM","EDGE GSM","CDMA","NADC","PDC","WCDMA","CDMA2K","CDMA1XEV","IDEN","WIDEN","WLAN","SERVICE" X-Series uses the ESA/PSA compatible query of a string contain comma separated values: "SA,PNOISE,NFIGURE,BASIC,CDMA,CDMA2K,WCDMA,CDMA1XEV,EDGE GSM,GSM,NADC,PDC,TDSCDMA,DMODULATION,WLAN" |
| Initial S/W Revision | Prior to A.02.00 |

Application Identification (Remote Commands Only)

Each entry in the Mode Menu will have a Model Number and associated information: Version, and Options.

This information is displayed in the Show System screen. The corresponding SCPI remote commands are defined here.

"Current Application Model " on page 304

"Current Application Revision" on page 304

"Current Application Options" on page 304

Current Application Model

Returns a string that is the Model Number of the currently selected application (mode).

| | |
|-----------------------------|--|
| Remote Command | :SYSTem:APPLication[:CURRent][:NAME]? |
| Example | :SYST:APPL? |
| Notes | Query returns a quoted string that is the Model Number of the currently selected application (Mode). Example: "N9060A" String length is 6 characters. |
| Preset | Not affected by Preset |
| State Saved | Not saved in state, the value will be the selected application when a Save is done. |
| Initial S/W Revision | Prior to A.02.00 |

Current Application Revision

Returns a string that is the Revision of the currently selected application (mode).

| | |
|-----------------------------|---|
| Remote Command | :SYSTem:APPLication[:CURRent]:REVision? |
| Example | :SYST:APPL:REV? |
| Notes | Query returns a quoted string that is the Revision of the currently selected application (Mode). Example: "1.0.0.0" String length is a maximum of 23 characters. (each numeral can be an integer + 3 decimal points) |
| Preset | Not affected by a Preset |
| State Saved | Not saved in state, the value will be the selected application when a Save is done. |
| Initial S/W Revision | Prior to A.02.00 |

Current Application Options

Returns a string that is the Options list of the currently selected application (Mode).

| | |
|-----------------------------|--|
| Remote Command | :SYSTem:APPLication[:CURRent]:OPTion? |
| Example | :SYST:APPL:OPT? |
| Notes | Query returns a quoted string that is the Option list of the currently selected application (Mode). The format is the name as the *OPT? or SYSTem:OPTion command: a comma separated list of option identifiers. Example: "1FP,2FP" String length is a maximum of 255 characters. |
| Preset | Not affected by a Preset |
| State Saved | Not saved in state per se, the value will be the selected application when a Save is invoked. |
| Initial S/W Revision | Prior to A.02.00 |

Application Identification Catalog (Remote Commands Only)

A catalog of the installed and licensed applications (Modes) can be queried for their identification.

"Application Catalog Number of Entries" on page 305

"Application Catalog Model Numbers" on page 305

"Application Catalog Revision" on page 305

"Application Catalog Options" on page 306

Application Catalog Number of Entries

Returns the number of installed and licensed applications (Modes).

| | |
|-----------------------|---|
| Remote Command | :SYSTem:APPLication:CATalog[:NAME]:COUNT? |
| Example | :SYST:APPL:CAT:COUN? |
| Preset | Not affected by Preset |
| State Saved | Not saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Application Catalog Model Numbers

Returns a list of Model Numbers for the installed and licensed applications (Modes).

| | |
|-----------------------|--|
| Remote Command | :SYSTem:APPLication:CATalog[:NAME]? |
| Example | :SYST:APPL:CAT? |
| Notes | Returned value is a quoted string of a comma separated list of Model Numbers. Example, if SAMS and Phase Noise are installed and licensed: "N9060A,N9068A" String length is COUNT * 7 - 1. (7 = Model Number length + 1 for comma. -1 = no comma for the 1st entry.) |
| Preset | Not affected by a Preset |
| State Saved | Not saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Application Catalog Revision

Returns the Revision of the provided Model Number.

| | |
|-----------------------|---|
| Remote Command | :SYSTem:APPLication:CATalog:REVisIon? <model> |
| Example | :SYST:APPL:CAT:REV? 'N9060A' |
| Notes | Returned value is a quoted string of revision for the provided Model Number. The revision will be a |

| | |
|----------------------|---|
| | null-string ("") if the provided Model Number is not installed and licensed. Example, if SAMS is installed and licensed: "1.0.0.0" |
| Preset | Not affected by a Preset. |
| State Saved | Not saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Application Catalog Options

Returns a list of Options for the provided Model Number

| | |
|-----------------------|---|
| Remote Command | :SYSTem:APPLication:CATalog:OPTion? <model> |
| Example | :SYST:APPL:CAT:OPT? 'N9060A' |
| Notes | Returned value is a quoted string of a comma separated list of Options, in the same format as *OPT? or :SYSTem:OPTion?. If the provided Model Number is not installed and licensed a null-string ("") will be returned. Example, if SAMS is installed and licensed: "2FP" String length is a maximum of 255 characters. |
| Preset | Not affected by a Preset |
| State Saved | Not saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Detailed List of Modes

This section contains an alphabetical list of Modes available in the X-Series, along with a brief description of each Mode.

Note that with the exception of the 89601 VSA, only licensed applications appear in the Mode menu. The 89601 will always appear, because it's licensing is handled differently.

1xEV-DO

Selects the 1xEV-DO mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| | |
|----------------------|-----------------------------------|
| Key Path | Mode |
| Example | INST:SEL CDMA1XEV INST:NSEL 15 |
| Initial S/W Revision | Prior to A.02.00 |

802.16 OFDMA (WiMAX/WiBro)

Selects the OFDMA mode for general purpose measurements of WiMAX signals. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------------|
| Example | INST:SEL WIMAXOFDMA INST:NSEL 75 |
| Initial S/W Revision | Prior to A.02.00 |

802.16 OFDM (Fixed WiMAX)

Selects the 802.16 OFDM (Fixed WiMAX) mode. This mode allows modulation quality measurements of signals that comply with IEEE 802.16a–2003 and IEEE 802.16–2004 standards, with flexibility to measure nonstandard OFDM formats. Along with the typical digital demodulation measurement results, several additional 802.16 OFDM unique trace data formats and numeric error data results provide enhanced data analysis.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|--------------------------------------|
| Example | INST:SEL WIMAXFIXED INST:NSEL 104 |
| Initial S/W Revision | A.02.00 |

89601 VSA

Selecting the 89601 VSA mode will start the 89600 VSA software. The 89600 VSA software is powerful, PC-based software, offering the industry's most sophisticated general purpose and standards specific signal evaluation and troubleshooting tools for R&D engineers. Even for proprietary and non-standard signals in SATCOM or MILCOM applications, you can make signal quality measurements with customized IQ constellation. Reach deeper into signals, gather more data on signal problems, and gain greater insight.

- Over 35 general-purpose analog and digital demodulators ranging from 2FSK to 4096QAM
- Flexible and custom IQ and OFDM signal analysis for single carrier
- Standards specific modulation analysis including:
 - Cellular: GSM/EDGE, cdma2000, W-CDMA, TD-SCDMA, LTE(FDD/TDD),
 - LTE-Advanced and more

- Wireless networking: 802.11a/b/g, 802.11n, 802.ac, 802.16 WiMAX (fixed/mobile), WiSUN (MR-FSK PHY)
- RFID
- Digital satellite video and other satellite signals, radar, LMDS
- Up to 400K bin FFT, for the highest resolution spectrum analysis
- A full suite of time domain analysis tools, including signal capture and playback, time gating, and CCDF measurements
- 20 simultaneous trace displays and the industry's most complete set of marker functions
- Easy-to-use Microsoft ® Windows ® graphical user interface

For more information see the Agilent 89600 Series VSA web site at www.agilent.com/find/89600vsa

To learn more about how to use the 89600 VSA running in the X-Series, after the 89600 VSA software is running, open the 89600 VSA Help and open the "About Agilent X-Series Signal Analyzer with 89600 VSA Software" help topic.

| Key Path | Mode |
|----------------------|------------------------------------|
| Example | INST:SEL VSA89601 INST:NSEL 101 |
| Initial S/W Revision | Prior to A.02.00 |

Analog Demod

Selects the Analog Demod mode for making measurements of AM, FM and phase modulated signals.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-----------------------------------|
| Example | INST:SEL ADEMODO INST:NSEL 234 |
| Initial S/W Revision | Prior to A.02.00 |

Bluetooth

Selects the Bluetooth mode for Bluetooth specific measurements. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------|-------------|
| Example | INST:SEL BT |

| | |
|----------------------|---------------|
| | INST:NSEL 228 |
| Initial S/W Revision | A.06.01 |

cdma2000

Selects the cdma2000 mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| | |
|----------------------|---------------------------------|
| Key Path | Mode |
| Example | INST:SEL CDMA2K INST:NSEL 10 |
| Initial S/W Revision | Prior to A.02.00 |

CMMB

Selects the CMMB mode for measurements of digital video signals using this format. There are several power and demod measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| | |
|----------------------|--------------------------------|
| Key Path | Mode |
| Example | INST:SEL CMMB INST:NSEL 240 |
| Initial S/W Revision | A.03.00 |

Combined WLAN

Selects the CWLAN mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| | |
|----------------------|--------------------------------|
| Key Path | Mode |
| Example | INST:SEL CWLAN INST:NSEL 19 |
| Initial S/W Revision | A.02.00 |

Combined Fixed WiMAX

Selects the Combined Fixed WiMAX mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------------|
| Example | INST:SEL CWIMAXOFDM INST:NSEL 81 |
| Initial S/W Revision | A.02.00 |

Digital Cable TV

Selects the Digital Cable TV mode for measurements of digital cable television systems. There are several power and demod measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|---------------------------------|
| Example | INST:SEL DCATV INST:NSEL 238 |
| Initial S/W Revision | A.07.00 |

DTMB (CTTB)

Selects the DTMB (CTTB) mode for measurements of digital video signals using this format. There are several power and demod measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|--------------------------------|
| Example | INST:SEL DTMB INST:NSEL 236 |
| Initial S/W Revision | A.02.00 |

DVB-T/H with T2

Selects the DVB-T/H mode for measurements of digital video signals using this format. There are several power and demod measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|--------------------------|-------------------------------|
| Example | INST:SEL DVB INST:NSEL 235 |
| Initial S/W Revision | A.02.00 |
| Modified at S/W Revision | A.07.00 |

EMI Receiver

The EMI Receiver Mode makes EMC measurements. Several measurements are provided to aid the user in characterizing EMC performance of their systems, including looking at signals with CISPR-16 compliant detectors, performing scans for interfering signals, and determining and charting interfering signals over time.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------|
| Example | INST:SEL EMI INST:NSEL 141 |
| Initial S/W Revision | A.07.01 |

GSM/EDGE/EDGE Evo

Selects the GSM with EDGE mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|--------------------------|----------------------------------|
| Example | INST:SEL EDGEGSM INST:NSEL 13 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

iDEN/WiDEN/MOTOTalk

Selects the iDEN/WiDEN/MOTOTalk mode for general purpose measurements of iDEN and iDEN-related signals. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|--------------------------------|
| Example | INST:SEL IDEN INST:NSEL 103 |
| Initial S/W Revision | A.02.00 |

IQ Analyzer (Basic)

The IQ Analyzer Mode makes general purpose frequency domain and time domain measurements. These measurements often use alternate hardware signal paths when compared with a similar measurement in the Signal Analysis Mode using the Swept SA measurement. These frequency domain and time domain measurements can be used to output I/Q data results when measuring complex modulated digital signals.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------|
| Example | INST:SEL BASIC INST:NSEL 8 |
| Initial S/W Revision | Prior to A.02.00 |

ISDB-T

Selects the ISDB-T mode for measurements of digital video signals using this format. There are several power and demod measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|---------------------------------|
| Example | INST:SEL ISDBT INST:NSEL 239 |
| Initial S/W Revision | A.03.00 |

LTE

Selects the LTE mode for general purpose measurements of signals following the LTE FDD standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| | |
|----------------------|-------------------------------|
| Key Path | Mode |
| Example | INST:SEL LTE INST:NSEL 102 |
| Initial S/W Revision | Prior to A.02.00 |

LTE TDD

Selects the LTE TDD mode for general purpose measurements of signals following the LTE TDD standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| | |
|----------------------|----------------------------------|
| Key Path | Mode |
| Example | INST:SEL LTETDD INST:NSEL 105 |
| Initial S/W Revision | A.03.00 |

LTE-Advanced FDD

As LTE-Advanced FDD and LTE modes are converged into one single application, the single softkey under Mode menu is designed to select the covered mode. The display mode of the LTE and LTE-Advanced FDD are distinguished by the licenses.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| | |
|-------------------------------------|--|
| Key Path | Mode |
| Example | INST:SEL LTEAFDD INST:NSEL 107 |
| Notes | When the N9080A/80B-1FP exists, the display mode name is LTE. When the N9080A/80B-1FP and N9080B-2FP all exist, the display mode name is LTE FDD & LTE-A FDD. |
| Backwards Compatibility SCPI | INST:SEL LTE INST:NSEL 102 |
| Initial S/W Revision | A.14.00 |
| Modified at S/W Revision | A.14.50 |

LTE-Advanced TDD

As LTE-Advanced TDD and LTE TDD modes are converged into one single application, the single softkey under Mode menu is designed to select the covered mode. The display mode of the LTE TDD and LTE-

Advanced TDD are distinguished by the licenses.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|-------------------------------------|--|
| Example | INST:SEL LTEATDD INST:NSEL 108 |
| Notes | When the N9082A/82B-1FP exists, the display mode name is LTE TDD. When the N9082A/82B-1FP and N9082B-2FP all exist, the display mode name is LTE TDD & LTE-A TDD. |
| Backwards Compatibility SCPI | INST:SEL LTETDD INST:NSEL 105 |
| Initial S/W Revision | A.14.00 |
| Modified at S/W Revision | A.14.50 |

MSR

Selects the MSR mode. The MSR mode makes several measurements for Cellular Communication devices that can be configured with multiple radio formats simultaneously following the 3GPP standard of Multi-Standard Radio, including GSM/EDGE, WCDMA/HSPA+ and LTE.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------|
| Example | INST:SEL MSR INST:NSEL 106 |
| Initial S/W Revision | A.09.491 |

Noise Figure

The Noise Figure mode provides pre-configured measurements for making general purpose measurements of device noise figure.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-----------------------------------|
| Example | INST:SEL NFIGURE INST:NSEL 219 |
| Initial S/W Revision | Prior to A.02.00 |

Phase Noise

The Phase Noise mode provides pre-configured measurements for making general purpose measurements of device phase noise.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|---------------------------------------|
| Example | INST:SEL PNOISE or INST:NSEL 14 |
| Initial S/W Revision | Prior to A.02.00 |

Real Time Spectrum Analyzer

The Real Time Spectrum Analyzer (RTSA) mode provides real-time signal analysis, very high probability-of-intercept for intermittent signals with appropriate triggers.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|--------------------------------------|
| Example | INST:SEL RTSA or INST:NSEL 107 |
| Initial S/W Revision | A.13.00 |

Remote Language Compatibility

The Remote Language Compatibility (RLC) mode provides remote command backwards compatibility for the 8560 series of spectrum analyzers, known as legacy spectrum analyzers.

NOTE After changing into or out of this mode, allow a 1 second delay before sending any subsequent commands.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------------|
| Example | INST:SEL RLC Or INST:NSEL 266 |
| Initial S/W Revision | Prior to A.02.00 |

SCPI Language Compatibility

The SCPI Language Compatibility mode provides remote language compatibility for SCPI-based instruments, such as the Rohde and Schwartz FSP and related series of spectrum analyzers.

NOTE After changing into or out of this mode, allow a 1 second delay before sending any subsequent commands.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|--|
| Example | INST:SEL SCPILC Or INST:NSEL 270 |
| Initial S/W Revision | A.06.00 |

Spectrum Analyzer

Selects the Spectrum Analyzer mode for general purpose measurements. There are several measurements available in this mode. General spectrum analysis measurements, in swept and zero span, can be done using the first key in the Meas menu, labeled Swept SA. Other measurements in the Meas Menu are designed to perform specialized measurement tasks, including power and demod measurements.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|----------------------------|
| Example | INST:SEL SA INST:NSEL 1 |
| Initial S/W Revision | Prior to A.02.00 |

TD-SCDMA with HSPA/8PSK

Selects the TD-SCDMA mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-----------------------------------|
| Example | INST:SEL TDSCDMA INST:NSEL 211 |
| Initial S/W Revision | Prior to A.02.00 |

Vector Signal Analyzer (VXA)

The N9064A (formerly 89601X) VXA Vector signal and WLAN modulation analysis application provides solutions for basic vector signal analysis, analog demodulation, and digital demodulation. The digital demodulation portion of N9064A allows you to perform measurements on standard-based formats such as cellular, wireless networking and digital video as well as general purpose flexible modulation analysis for wide range of digital formats, FSK to 1024QAM, with easy-to-use measurements and display tools such as constellation and eye diagram, EVM traces and up to four simultaneous displays. Analog baseband analysis is available using the MXA and PXA with option BBA. Option 3FP WLAN has been discontinued.

N9064A honors existing 89601X licenses with all features and functionalities found on X-Series software versions prior to A.06.00. Specifically:

N9064A-1 is equivalent to 89601X-205

N9064A-2 is equivalent to 89601X-AYA

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------|
| Example | INST:SEL VSA INST:NSEL 100 |
| Initial S/W Revision | Prior to A.02.00 |

W-CDMA with HSPA+

Selects the W-CDMA with HSPA+ mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------------------|-------------------------------|
| Example | INST:SEL WCDMA INST:NSEL 9 |
| Initial S/W Revision | Prior to A.02.00 |

WLAN

Selects the WLAN mode for general purpose measurements of signals following this standard. There are several measurements available in this mode.

If you are using the Help feature, this mode must be currently active to access its detailed information. If it is not active, exit the Help feature (Esc key), select the mode, and re-access Help.

| Key Path | Mode |
|----------|------|
|----------|------|

| | |
|----------------------|--------------------------------|
| Example | INST:SEL WLAN INST:NSEL 217 |
| Initial S/W Revision | A.09.491 |

Global Settings

Opens a menu that allows you to switch certain Meas Global parameters to a Mode Global state. These switches apply to all Modes that support global settings. No matter what Mode you are in when you set the “Global Center Frequency” switch to on, it applies to all Modes that support Global Settings.

| | |
|----------------------|-------------------|
| Key Path | Mode Setup |
| Initial S/W Revision | Prior to A.02.00 |

Global Center Freq

The software maintains a Mode Global value called “Global Center Freq”.

When the Global Center Freq key is switched to On in any mode, the current mode’s center frequency is copied into the Global Center Frequency, and from then on all modes that support global settings use the Global Center Frequency. So you can switch between any of these modes and the Center Freq will remain unchanged.

Adjusting the Center Freq of any mode which supports Global Settings, while Global Center Freq is On, will modify the Global Center Frequency.

When Global Center Freq is turned Off, the Center Freq of the current mode is unchanged, but now the Center Freq of each mode is once again independent.

When Mode Preset is pressed while Global Center Freq is On, the Global Center Freq is preset to the preset Center Freq of the current mode.

This function is reset to Off when the Restore Defaults key is pressed in the Global Settings menu, or when System, Restore Defaults, All Modes is pressed.

| | |
|-----------------------|--|
| Key Path | Mode Setup, Global Settings |
| Scope | Mode Global |
| Remote Command | :INSTrument:COUPle:FREQuency:CENTer ALL NONE :INSTrument:COUPle:FREQuency:CENTer? |
| Example | INST:COUP:FREQ:CENT ALL INST:COUP:FREQ:CENT? |
| Preset | Set to Off on Global Settings, Restore Defaults and System, Restore Defaults, All Modes |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Remote Command | :GLOBal:FREQuency:CENTer[:STATe] 1 0 ON OFF :GLOBal:FREQuency:CENTer[:STATe]? |
| Preset | Off |
| Initial S/W Revision | Prior to A.02.00 |

Restore Defaults

This key resets all of the functions in the Global Settings menu to Off. This also occurs when System, Restore Defaults, All Modes is pressed.

| | |
|-------------------------------------|-----------------------------|
| Key Path | Mode Setup, Global Settings |
| Remote Command | :INSTrument:COUPle:DEFault |
| Example | INST:COUP:DEF |
| Backwards Compatibility SCPI | :GLOBal:DEFault |
| Initial S/W Revision | Prior to A.02.00 |

Mode Setup

Mode Setup opens menu keys that allow you to specify parameters of the mode. These settings will be in effect for all measurements in the current mode.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Radio

Allows you to specify the device to be tested.

| | |
|----------------------|------------------|
| Key Path | Mode Setup |
| Initial S/W Revision | A.01.60 or later |

Device

Allows you to select either a base transceiver station (BTS) or a mobile station (MS) as a device under test..

| | |
|-------------------------------------|---|
| Key Path | Mode Setup, Radio |
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :RADio :STANdard :DEVice BTS MS</code> <code>[:SENSe] :RADio :STANdard :DEVice ?</code> |
| Example | <code>:RAD:STAN:DEV BTS</code> <code>:RAD:STAN:DEV?</code> |
| Couplings | In the OBW, SEM, ACP, Spurious Emissions and Monitor Spectrum measurement, when changing the radio device, the gate source is coupled as shown in the table below: Error! No bookmark name given.. |
| Preset | BTS |
| State Saved | Saved in instrument state. |
| Range | BTS MS |
| Backwards Compatibility SCPI | <code>[:SENSe] :RADio :DEVice</code> |
| Initial S/W Revision | A.01.60 or later |

Table: Device and Gate Source Couplings (SEM, OBW, ACP, Monitor Spectrum)

| Radio Device | Gate Source |
|--------------|-------------|
| BTS | EXTernal[1] |
| MS | RFBurst |

Table: Device and Gate Source Couplings (Spurious Emissions)

| Radio Device | Gate Source |
|--------------|------------------------------|
| BTS | EXTernal[1] |
| MS | FRAMe (sync source: RFBurst) |

Note: In the Spurious Emissions, the sync source of the periodic timer gate source is coupled with the radio device when the gate source is switched into the periodic timer, shown in the table below:

Table: Sync Source of the Periodic Timer Gate when the Gate Source is switched into Periodic Timer (Spurious Emissions)

| Radio Device | Sync Source of Periodic Timer Gate Source |
|--------------|---|
| BTS | EXTernal[1] |
| MS | RFBurst |

Analysis Timeslot

Sets and gets the current timeslot. The Analysis Timeslot specifies which sub-frames timeslot, within the selected Sub-frame, is used for analysis and trace data measurement results. The available selections include timeslots 0 through 6, the DwPTS and UpPTS timeslots.

| | |
|-----------------------|--|
| Key Path | Mode Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSE] :SLOT TS0 TS1 TS2 TS3 TS4 TS5 TS6 UPTS DPTS [:SENSE] :SLOT? |
| Example | :SLOT TS0 :SLOT? |
| Couplings | For all the measurements which adopt the gate sweep, the parameters gate delay and gate length are coupled with the analysis timeslot and the gate source. When changing the analysis timeslot or the gate source, the gate delay and gate length will be coupled according to the table listed below: " Gate Settings " on page 321. |
| Preset | TS0 |
| State Saved | Saved in instrument state. |
| Range | TS0 TS1 TS2 TS3 TS4 TS5 TS6 DwPTS UpPTS |
| Initial S/W Revision | A.01.60 or later |

Gate Settings

1. when the gate source is EXTernal[1] or EXTernal2 (CXA only has EXTernal[1] as to XA6.6):

| Analysis Timeslot | Gate Delay/ μ s | Gate Length/ μ s |
|-------------------|---------------------|----------------------|
| TS0 | 5000.0 | 662.5* |
| DwPTS | 700.0 | 50.0** |
| UpPTS | 825.0 | 100.0*** |
| TS1 | 950.0 | 662.5* |
| TS2 | 1625.0 | 662.5* |
| TS3 | 2300.0 | 662.5* |
| TS4 | 2975.0 | 662.5* |
| TS5 | 3650.0 | 662.5* |
| TS6 | 4325.0 | 662.5* |

2. when the gate source is RFBurst in gate-sweep measurements or Periodic Timer in spurious emissions:

| Analysis Timeslot | Gate Delay/ μ s | Gate Length/ μ s |
|-------------------|---------------------|----------------------|
| TS0 | 5000.0 | 662.5* |
| DwPTS | 5000.0 | 50.0** |
| UpPTS | 5000.0 | 100.0*** |
| TS1 | 5000.0 | 662.5* |
| TS2 | 5000.0 | 662.5* |
| TS3 | 5000.0 | 662.5* |
| TS4 | 5000.0 | 662.5* |
| TS5 | 5000.0 | 662.5* |
| TS6 | 5000.0 | 662.5* |

Note:

NOTE

The process for calculating the gate length:

* Traffic slot \Rightarrow $675 \mu\text{s} - \text{Guard period}(16\text{chips}) \Rightarrow 675 \mu\text{s} - 12.5 \mu\text{s} = 662.5 \mu\text{s}$

** Downlink Pilot \Rightarrow $75 \mu\text{s} - \text{Guard period}(32\text{chips}) \Rightarrow 75 \mu\text{s} - 25 \mu\text{s} = 50 \mu\text{s}$

*** Uplink Pilot \Rightarrow $125 \mu\text{s} - \text{Guard period}(32\text{chips}) \Rightarrow 125 \mu\text{s} - 25 \mu\text{s} = 100 \mu\text{s}$

Demod

Allows you to specify the demodulation parameters.

| Key Path | Mode Setup |
|----------------------|------------------|
| Initial S/W Revision | A.01.60 or later |

Scramble Code

Gets and sets the scramble code.

| | |
|-----------------------|---|
| Key Path | Mode Setup, Demod |
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :TDEMod:SCoDe <integer></code> <code>[:SENSe] :TDEMod:SCoDe?</code> |
| Example | <code>:TDEM:SCOD 0</code> <code>:TDEM:SCOD?</code> |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | 127 |
| Initial S/W Revision | A.01.60 or later |

Uplink Pilot

Specifies the Uplink Pilot synchronization ID sequence (SYNC-UL).

| | |
|-----------------------|--|
| Key Path | Mode Setup, Demod |
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :TDEMod:UPTS <integer></code> <code>[:SENSe] :TDEMod:UPTS?</code> |
| Example | <code>:TDEM:UPTS 0</code> <code>:TDEM:UPTS?</code> |
| Couplings | Value Range : $(\text{floor}(\text{Scramble Code}/4))*8 \sim (\text{floor}(\text{Scramble Code}/4)+1)*8-1$ |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | 255 |
| Initial S/W Revision | A.01.60 or later |

Sync Type

Sets and gets the sync type of Pilot or Midamble.

See "[More Information about Sync Type](#)" on page 324.

| | |
|----------|-------------------|
| Key Path | Mode Setup, Demod |
|----------|-------------------|

| | |
|----------------------|--|
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:SYNC PILOt MIDamble TRIGger [:SENSe] :TDEMod:SYNC? |
| Example | :TDEM:SYNC PIL :TDEM:SYNC? |
| Preset | PILOt |
| State Saved | Saved in instrument state. |
| Range | Pilot Midamble |
| Initial S/W Revision | A.01.60 or later |

More Information about Sync Type

- Pilot synchronization searches for either the Uplink Pilot or Downlink Pilot burst and then uses the location of that burst to position all of the rest of the time slots. Synchronization will fail if neither pilot burst is found or if the incorrect Uplink or Downlink Pilot Code ID is set for the Pilot burst present.
- Midamble synchronization searches for the first Uplink traffic burst, positioning it as timeslot TS1. Synchronization will fail if there are Pilot bursts present, if TS0 is present, if there are no traffic bursts present or if the incorrect Basic Midamble Code ID is set.
- Trigger synchronization deems the position of the trigger as the start of the frame of the TD-SCDMA signal.

Switching Point

Gets and sets the switching point. Switching Point is the timeslot number of the last uplink traffic timeslot. Timeslots from the following (next higher numbered) traffic timeslot through the end of the sub-frame are treated as downlink timeslots.

| | |
|----------------------|---|
| Key Path | Mode Setup, Demod |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:ULSPoint <integer> [:SENSe] :TDEMod:ULSPoint? |
| Example | :TDEM:ULSP 1 :TDEM:ULSP? |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 6 |
| Initial S/W Revision | A.01.60 or later |

Max Users for Traffic Timeslots

Gets and sets the max user value for TS0~TS6. Lets user specify the number of Maximum Users that will be associated with the timeslots specified by the Traffic Timeslots parameter.

| | |
|----------------------|-------------------|
| Key Path | Mode Setup, Demod |
| Initial S/W Revision | A.01.60 or later |

TS0

Gets and sets the max user value for TS0. Lets user specify the number of Maximum Users that will be associated with the timeslots 0.

| | |
|-----------------------|---|
| Key Path | Mode Setup, Demod, Max Users for Traffic Timeslots |
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :TDEMod:MXUser:TS0 <integer></code> <code>[:SENSe] :TDEMod:MXUser:TS0?</code> |
| Example | <code>:TDEM:MXUS:TS0 2</code> <code>:TDEM:MXUS:TS0?</code> |
| Preset | 16 |
| State Saved | Saved in instrument state. |
| Min | 2 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

TS1

Gets and sets the max user value for TS1. Lets user specify the number of Maximum Users that will be associated with the timeslots 1.

| | |
|-----------------------|---|
| Key Path | Mode Setup, Demod, Max Users for Traffic Timeslots |
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :TDEMod:MXUser:TS1 <integer></code> <code>[:SENSe] :TDEMod:MXUser:TS1?</code> |
| Example | <code>:TDEM:MXUS:TS1 2</code> <code>:TDEM:MXUS:TS1?</code> |
| Preset | 16 |
| State Saved | Saved in instrument state. |
| Min | 2 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

TS2

Gets and sets the max user value for TS2. Lets user specify the number of Maximum Users that will be associated with the timeslots 2.

| | |
|----------------------|---|
| Key Path | Mode Setup, Demod, Max Users for Traffic Timeslots |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:MXUSer:TS2 <integer> [:SENSe] :TDEMod:MXUSer:TS2? |
| Example | :TDEM:MXUS:TS2 2 :TDEM:MXUS:TS2? |
| Preset | 16 |
| State Saved | Saved in instrument state. |
| Min | 2 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

TS3

Gets and sets the max user value for TS3. Lets user specify the number of Maximum Users that will be associated with the timeslots 3.

| | |
|----------------------|---|
| Key Path | Mode Setup, Demod, Max Users for Traffic Timeslots |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:MXUSer:TS3 <integer> [:SENSe] :TDEMod:MXUSer:TS3? |
| Example | :TDEM:MXUS:TS3 2 :TDEM:MXUS:TS3? |
| Preset | 16 |
| State Saved | Saved in instrument state. |
| Min | 2 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

TS4

Gets and sets the max user value for TS4. Lets user specify the number of Maximum Users that will be associated with the timeslots 4.

| | |
|-----------------------|---|
| Key Path | Mode Setup, Demod, Max Users for Traffic Timeslots |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:MXUser:TS4 <integer> [:SENSe] :TDEMod:MXUser:TS4? |
| Example | :TDEM:MXUS:TS4 2 :TDEM:MXUS:TS4? |
| Preset | 16 |
| State Saved | Saved in instrument state. |
| Min | 2 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

TS5

Gets and sets the max user value for TS5. Lets user specify the number of Maximum Users that will be associated with the timeslots 5.

| | |
|-----------------------|---|
| Key Path | Mode Setup, Demod, Max Users for Traffic Timeslots |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:MXUser:TS5 <integer> [:SENSe] :TDEMod:MXUser:TS5? |
| Example | :TDEM:MXUS:TS5 2 :TDEM:MXUS:TS5? |
| Preset | 16 |
| State Saved | Saved in instrument state. |
| Min | 2 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

TS6

Gets and sets the max user value for TS6. Lets user specify the number of Maximum Users that will be associated with the timeslots 6.

| | |
|-----------------------|---|
| Key Path | Mode Setup, Demod, Max User for Traffic Timeslots |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:MXUser:TS6 <integer> [:SENSe] :TDEMod:MXUser:TS6? |
| Example | :TDEM:MXUS:TS6 2 |

| | |
|----------------------|----------------------------|
| | :TDEM:MXUS:TS6? |
| Preset | 16 |
| State Saved | Saved in instrument state. |
| Min | 2 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

Slot Frequency Reference

Sets and gets the slot frequency reference. Lets user specify whether the appropriate pilot timeslot or the midamble section of the timeslot will be used as the frequency and phase reference for an individual traffic timeslot.

| | |
|-----------------------|--|
| Key Path | Mode Setup, Demod |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:SREFerence PIlot MIDamble [:SENSe] :TDEMod:SREFerence? |
| Example | :TDEM:SREF PIL :TDEM:SREF? |
| Preset | MIDamble |
| State Saved | Saved in instrument state. |
| Range | Pilot Midamble |
| Initial S/W Revision | A.01.60 or later |

Code Channel Detection

Sets and gets the state of Code Channel Detection. If the current timeslot is DwPTS or UpPTS, this key will be grayed out and the value will be set to AUTO.

| | |
|-----------------------|--|
| Key Path | Mode Setup, Demod, More |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:CDCHannel:DETection AUTO MAN [:SENSe] :TDEMod:CDCHannel:DETection? |
| Example | :TDEM:CDCH:DET AUTO :TDEM:CDCH:DET? |
| Preset | AUTO |
| State Saved | Saved in instrument state. |
| Range | Auto Man |
| Initial S/W Revision | A.01.60 or later |

Mod Scheme

Sets and gets the modulation scheme. This key is only available when HSPA/8PSK Option (Option 2FP) is installed and the Enable HSPA/8PSK key is set to ON. Otherwise, it will be grayed out and the value will be set to AUTO.

See "[More Information about Mode Scheme](#)" on page 329.

| | |
|-----------------------|--|
| Key Path | Mode Setup, Demod, More |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:MODScheme:AUTO 1 0 ON OFF [:SENSe] :TDEMod:MODScheme:AUTO? |
| Example | :TDEM:MODS:AUTO ON :TDEM:MODS:AUTO? |
| Couplings | When the value is Auto, the Modulation Format Key will be grayed out. |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | Auto Man |
| Initial S/W Revision | A.01.60 or later |

More Information about Mode Scheme

If the Mod Scheme is MAN, it is you to specify the modulation format for each channel. If the Mod Scheme is Auto, the measurement will automatically detect the channel's modulation format.

If the current timeslot is DwPTS or UpPTS, this key will be grayed out and the value will be set to AUTO.

Note: The Auto mode is only applied to QPSK, 8PSK and 16QAM. For 64QAM, it only supports MAN mode.

Channel Configuration

Allows you to specify the parameters for the channel.

This key will be grayed if the "Code Channel Detection" is "AUTO" and the "Mod Scheme" is "AUTO".

| | |
|----------------------|-------------------------|
| Key Path | Mode Setup, Demod, More |
| Initial S/W Revision | A.01.60 or later |

Select Code Length

Gets and sets the select code length.

| | |
|----------|---|
| Key Path | Mode Setup, Demod, More, Channel Configuraion |
|----------|---|

| | |
|-----------------------|---|
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:SCLength <integer> [:SENSe] :TDEMod:SCLength? |
| Example | :TDEM:SCL 1 :TDEM:SCL? |
| Notes | This key is grayed out when “Code Channel Detection” and “Mod Scheme” are both AUTO. |
| Couplings | Only 1,2,4,8,16 are valid and any number will be clipped to the nearest valid number. |
| Preset | 16 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

Select All Code Channels

Gets and sets the selection mode for the code channel. If the Select All Code Channels is ON, by modifying the modulation format or the midamble shift, the user can change the values of all code channels which have the same code length and at the same time, the Select Code Channel key will be grayed out.

| | |
|-----------------------|--|
| Key Path | Mode Setup, Demod, More, Channel Configuraion |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:CDCHannel:SALL 1 0 ON OFF [:SENSe] :TDEMod:CDCHannel:SALL? |
| Example | :TDEM:CDCH:SALL ON :TDEM:CDCH:SALL? |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

| | |
|-----------------------|--|
| Remote Command | [:SENSe] :TDEMod:CDCHannel:SElect SINGLE ALL [:SENSe] :TDEMod:CDCHannel:SElect? |
| Preset | ALL |
| Initial S/W Revision | A.01.60 or later |

Select Code Channel

Gets and sets the code channel. The max value for the code Channel should be (Select Code length – 1). The Dispread Channel Code Channel is used, along with the Dispread Channel Spread Code Length, to specify the active code channel and layer used for the channel trace data measurement results. . If the Select All Code Channel is ON, this key will be grayed out.

| | |
|-----------------------|---|
| Key Path | Mode Setup, Demod, More, Channel Configuraion |
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :TDEMod:CDChannel <integer></code> <code>[:SENSe] :TDEMod:CDChannel?</code> |
| Example | <code>:TDEM:CDCH 0</code> <code>:TDEM:CDCH?</code> |
| Notes | This key is grayed out when “Code Channel Detection” and “Mod Scheme” are both AUTO. |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | Equals (Select Code length – 1) |
| Initial S/W Revision | A.01.60 or later |

Code Channel Status

Gets and sets the Code Channel Status.

| | |
|-----------------------|--|
| Key Path | Mode Setup, Demod, More, Channel Configuraion |
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :TDEMod:CDChannel:ACTive <spread_code_length>,<code_channel>,0</code> <code> 1 OFF ON</code> <code>[:SENSe] :TDEMod:CDChannel:ACTive? <spread_code_length>,<code_channel></code> |
| Example | <code>:TDEM:CDCH:ACT 1,0,ON</code> <code>:TDEM:CDCH:ACT? 1,0</code> |
| Notes | This key is grayed out when “Code Channel Detection” is AUTO. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Midamble Shift

Specifies the Midamble Shift number.

| | |
|----------------------|--|
| Key Path | Mode Setup, Demod, More, Channel Configuration |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:MSHift <spread_code_length>, <code_channel>, <integer> [:SENSe] :TDEMod:MSHift? <spread_code_length>, <code_channel> , |
| Example | :TDEM:MSH 1,0,1 :TDEM:MSH? 1,0 |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

Modulation Format

Sets and gets the modulation format. If Auto is assigned to a code channel with some spread code length, the modulation format on this code channel will be determined by the measurement.

| | |
|----------------------|---|
| Key Path | Mode Setup, Demod, More, Channel Configuraion |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:MODFormat <integer>, <integer>, AUTO QPSK PSK8 QAM16 QAM64 [:SENSe] :TDEMod:MODFormat? <integer>, <integer> |
| Example | :TDEM:MODF 1,0,AUTO :TDEM:MODF? 1,0 |
| Couplings | If the “Mod Scheme” is “AUTO”, this key will be grayed. |
| Preset | AUTO |
| State Saved | Saved in instrument state. |
| Range | Auto QPSK 8PSK 16QAM 64QAM |
| Initial S/W Revision | A.01.60 or later |

Phase Shift Detection

Toggling the auto phase shift detection.

| | |
|----------------|--|
| Key Path | Mode Setup, Demod, More, Channel Configuration, More |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:PHASe:SHIFt:DETection:AUTO ON OFF 1 0 [:SENSe] :TDEMod:PHASe:SHIFt:DETection:AUTO? |
| Example | :TDEM:PHAS:SHIF:DET:AUTO ON |

| | |
|----------------------|----------------------------|
| | :TDEM:PHAS:SHIF:DET:AUTO? |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Phase Shift

Specifies the Phase Shift.

| | |
|-----------------------|---|
| Key Path | Mode Setup, Demod, More, Channel Configuration, More |
| Mode | TD-SCDMA |
| Remote Command | [[:SENSe]:TDEMod:PHASe:SHIFt <integer>,<integer>,<real> [:SENSe]:TDEMod:PHASe:SHIFt? <integer>,<integer> |
| Example | :TDEM:PHAS:SHIF 1,0,0.0 :TDEM:PHAS:SHIF? 1,0 |
| Preset | 0.00 |
| State Saved | Saved in instrument state. |
| Min | -360.00 |
| Max | 360.00 |
| Initial S/W Revision | A.01.60 or later |

Show Configuration Setup

Shows all values of the Channel Configuration. If any other menu is displayed, this window will exit.

| | |
|----------------------|--|
| Key Path | Mode Setup, Demod, More, Channel Configuraion |
| Mode | TD-SCDMA |
| Notes | This key is grayed out when "Code Channel Detection" and "Mod Scheme" are both AUTO. |
| Initial S/W Revision | A.01.60 or later |

Timing Reference

Sets and gets the timing reference.

| | |
|-----------------------|---|
| Key Path | Mode Setup, Demod, More |
| Mode | TD-SCDMA |
| Remote Command | [[:SENSe]:TDEMod:TREFerence DPTS UPTS TRIG [:SENSe]:TDEMod:TREFerence? |

| | |
|----------------------|--------------------------------|
| Example | :TDEM:TREF DPTS :TDEM:TREF? |
| Preset | DPTS |
| State Saved | Saved in instrument state. |
| Range | DwPTS UpPTS Trigger |
| Initial S/W Revision | A.01.60 or later |

Advanced

Allows you to specify the advanced configuration parameters.

| | |
|----------------------|-------------------------|
| Key Path | Mode Setup, Demod, More |
| Initial S/W Revision | A.01.60 or later |

Filter Alpha

Sets and gets the filter alpha. You can set the measurement filter (Root-raised Cosine) alpha.

| | |
|-----------------------|--|
| Key Path | Mode Setup, Demod, More, Advanced |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:ALPHA <real> [:SENSe] :TDEMod:ALPHA? |
| Example | :TDEM:ALPH 0.22 :TDEM:ALPH? |
| Preset | 0.22 |
| State Saved | Saved in instrument state. |
| Min | 0.05 |
| Max | 1.0 |
| Initial S/W Revision | A.01.60 or later |

Active Slot Threshold

Sets and gets the active slot threshold. Lets user set the Active Slot detection threshold, dB below the slot with the largest measured power.

| | |
|-----------------------|--|
| Key Path | Mode Setup, Demod, More, Advanced |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:THReshold:SLOT <real> [:SENSe] :TDEMod:THReshold:SLOT? |

| | |
|----------------------|---------------------------------------|
| Example | :TDEM:THR:SLOT -30 :TDEM:THR:SLOT? |
| Preset | -30.000dBc |
| State Saved | Saved in instrument state. |
| Min | -120.000dBc |
| Max | 0.000dBc |
| Initial S/W Revision | A.01.60 or later |

Active Channel Threshold

Sets and gets the active slot threshold. Active Channel Threshold lets you set the threshold above which a code channel is detected active and included in the Composite Reference waveform. The units are dBc (dB below the total power within the Analysis Timeslot).

| | |
|-----------------------|--|
| Key Path | Mode Setup, Demod, More, Advanced |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:THReshold:CHANnel <real> [:SENSe] :TDEMod:THReshold:CHANnel? [:SENSe] :TDEMod:THReshold:CHANnel:AUTO ON OFF 0 1 [:SENSe] :TDEMod:THReshold:CHANnel:AUTO? |
| Example | :TDEM:THR:CHAN -30.000 :TDEM:THR:CHAN? :TDEM:THR:CHAN:AUTO OFF :TDEM:THR:CHAN:AUTO? |
| Preset | -30.000dBc ON |
| State Saved | Saved in instrument state. |
| Min | -120.000dBc |
| Max | 0.000dBc |
| Initial S/W Revision | A.01.60 or later |

EVM Result IQ Offset

Sets and gets the EVM result IQ offset.

| | |
|-----------------------|---|
| Key Path | Mode Setup, Demod, More, Advanced |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:EVMResult:IQOffset STANard EXClude [:SENSe] :TDEMod:EVMResult:IQOffset? |

| | |
|----------------------|--|
| Example | :TDEM:EVMR:IQOF STAN :TDEM:EVMR:IQOF? |
| Preset | STAN |
| State Saved | Saved in instrument state. |
| Range | Std Exclude |
| Initial S/W Revision | A.01.60 or later |

Mirror Frequency Spectrum

Sets and gets the mirror frequency spectrum value to correctly demodulate frequency spectrums that are mirrored (flipped) about the center frequency.

| | |
|-----------------------|---|
| Key Path | Mode Setup, Demod, More, Advanced |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:SPECTrum:MIRRor NORMal INVert [:SENSe] :TDEMod:SPECTrum:MIRRor? |
| Example | :TDEM:SPEC:MIRR NORM :TDEM:SPEC:MIRR? |
| Preset | NORMal |
| State Saved | Saved in instrument state. |
| Range | Normal Invert |
| Initial S/W Revision | A.01.60 or later |

Normalize

Sets and gets the normalize value. When Normalize is set to ON, the analyzer applies trace data normalization to the trace data results.

| | |
|-----------------------|--|
| Key Path | Mode Setup, Demod, More, Advanced |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:NORMalize 1 0 ON OFF [:SENSe] :TDEMod:NORMalize? |
| Example | :TDEM:NORM ON :TDEM:NORM? |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

EVM Min IQ Imbalance

Toggles the I/Q Imbalance Compensation between ON and OFF.

•ON: The measurement results for EVM, and CDP are compensated for I/Q imbalance.

•OFF: The measurement results for EVM, and CDP are not compensated for I/Q imbalance.

| | |
|----------------------|--|
| Key Path | Mode Setup, Demod, More, Advanced |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:EVMMinimize:IQIMbalance 1 0 ON OFF [:SENSe] :TDEMod:EVMMinimize:IQIMbalance? |
| Example | :TDEM:EVMM:IQIM ON :TDEM:EVMM:IQIM? |
| Notes | The softkey and the SCPI command are controlled by the N/W9079A-AFP license. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.14.00 or later |

IQ Imbalance Frequency Compensation

Toggles Frequency Compensation for IQ Imbalance measurement results (IQ Gain Imbalance, IQ Quadrature Error) for Receiver Device Under Test (DUT) between on and off.

The Compensation is not valid for Transmitter DUT.

- ON: IQ Imbalance measurement results are compensated by taking account of Frequency Offset which is added before IQ Imbalance addition on DUT.
- OFF: IQ Imbalance measurement results are not compensated for the Frequency Offset.

| | |
|----------------------|--|
| Key Path | Mode Setup, Demod, More, Advanced |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:IQIMbalance:FCOMpen ON OFF [:SENSe] :TDEMod:IQIMbalance:FCOMpen? |
| Example | TDEM:IQIM:FCOM ON TDEM:IQIM:FCOM? |
| Notes | This parameter is available only when N/W9079A-AFP license is installed. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.14.0 or later |

Equalizer Mode

Sets the Equalizer mode as follows.

- Off: Equalizer is not active.
- Normal: Equalizer is active (Mirror Frequency Spectrum is Off).
- Invert: Equalizer is active (Mirror Frequency Spectrum is On).

| | |
|----------------------|---|
| Key Path | Mode Setup, Demod, More, Advanced |
| Mode | TDSCDMA |
| Remote Command | [:SENSe] :TDEMod:MEQ OFF NORMal INVert [:SENSe] :TDEMod:MEQ? |
| Example | TDEM:MEQ OFF TDEM:MEQ? |
| Preset | Off |
| State Saved | Saved in instrument state. |
| Range | Off Normal Invert |
| Initial S/W Revision | A.14.00 |

RRC Filter Control

Allows you to change the status (ON/OFF) of the Root Raised Cosine (RRC) filter.

| | |
|----------------------|---|
| Key Path | Mode Setup, Demod, More, Advanced |
| Mode | TDSCDMA |
| Remote Command | [:SENSe] :TDEMod:FILTer [:RRC] [:STATe] OFF ON 0 1 [:SENSe] :TDEMod:FILTer [:RRC] [:STATe] ? |
| Example | TDEM:FILT ON TDEM:FILT? |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.14.50 |

Noise Reduction

Noise Reduction accesses a menu for configuring the noise compensation of the instrument. This menu only appears in models that support Noise Reduction.

| | |
|----------------------|------------|
| Key Path | Mode Setup |
| Initial S/W Revision | A.04.00 |

Noise Floor Extension

Turns on the Noise Floor Extension function. When this function is On, the expected noise power of the analyzer (derived from a factory calibration) is subtracted from the trace data. This will usually reduce the apparent noise level by about 10 dB in low band, and 8 dB in high band (>~3.6 GHz).

Noise Floor Extension works with any RBW, VBW, detector, any setting of Average Type, any amount of trace averaging, and any signal type. It is ineffective when the trace is not smoothed (smoothing processes include narrow VBWs, trace averaging, and long sweep times with the detector set to Average or Peak). It works best with extreme amounts of smoothing, and with the average detector, with the Average Type set to Power.

NOTE Noise Floor Extensions has no effect unless the RF Input is selected, therefore it does nothing when External Mixing is selected.

In those cases where the cancellation is ineffective, it nonetheless has no undesirable side-effects. There is no significant speed impact to having Noise Floor Extension on.

The best accuracy is achieved when substantial smoothing occurs in each point before trace averaging. Thus, when using the average detector, results are better with long sweep times and fewer trace averages. When using the sample detector, the VBW filter should be set narrow with less trace averaging, instead of a wide VBW filter with more trace averaging.

See "[More Information](#)" on page 339

| | |
|----------------------|--|
| Key Path | Mode Setup, Noise Reduction |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :CORRection:NOISe:FLOor ON OFF 1 0</code> <code>[:SENSe] :CORRection:NOISe:FLOor?</code> |
| Example | <code>CORR:NOIS:FLO ON</code> |
| Dependencies | This key only appears in instruments with the NFE or NF2 license installed. In all others, the key does not appear, however the SCPI command will be accepted without error (but will have no effect). |
| Couplings | When NFE is enabled in any mode manually, a prompt will be displayed reminding you to perform the Characterize Noise Floor operation if it is needed. If NFE is enabled through SCPI and a Characterize Noise Floor operation is needed, an error will be entered in the system error queue. |
| Preset | Unaffected by Mode Preset. Turned off by Restore Mode Defaults. |
| State Saved | No |
| Initial S/W Revision | A.04.00 |

More Information

The analyzer is characterized in the factory (or during a field calibration) with a model of the noise, referred to the input mixer, versus frequency in each band and path combination. Bands are 0 (low band) and 1 through 4 (high band) in a 26.5 GHz instrument, for example. Paths include normal paths, preamp paths, the electronic attenuator, etc.

In most band/path combinations, the noise can be well characterized based on just two parameters and the analyzer frequency response before compensation for frequency-dependent losses.

After the noise density at the input mixer is estimated, the effects of the input attenuator, RBW, detector, etc. are computed to get the estimated input-port-referred noise level.

In the simplest case, the measured power (signal plus analyzer noise) in each display point (bucket) is compensated by subtracting the estimated noise power, leaving just the signal power. This is the operation when the detector is Average and the Average Type is set to Power.

In other cases, operation is often not quite as good but still highly effective. With peak detection, the noise floor is estimated based on the RBW and the duration of the bucket using the same equations used in the noise marker function. The voltage of the noise is subtracted from the voltage of the observed signal-plus-noise measurement to compute the estimated signal voltage. The peak detector is one example of processing that varies with detector to give good estimates of the signal level without the analyzer noise.

For best operation, the average detector and the power scale are recommended, as already stated. Peak detection for pulsed-RF can still give excellent effectiveness. FFT analysis does not work well, and does not do NFE well, with pulsed-RF signals, so this combination is not recommended. Negative peak detection is not very useful, either. Sample detection works well, but is never better than the average detector because it doesn't smooth as well. The Normal detector is a combination of peak and negative peak behaviors, and works about as well as these.

For best operation, extreme smoothing is desirable, as already stated. Using narrow VBWs works well, but using very long bucket durations and the average detector works best. Reducing the number of trace points will make the buckets longer.

For best operation, the power scale (Average Type = Power) is optimum. When making CW measurements in the presence of noise without NFE, averaging on the decibel scale has the advantage of reducing the effect of noise. When using NFE, the NFE does an even better job than using the log scale ever could. Using NFE with the log scale is not synergistic, though; NFE with the power scale works a little better than NFE with log averaging type.

The results from NFE with internal preamp can often be lower than the theoretical noise in a signal source at room temperature, a noise density of -174 dBm/Hz. This is expected and useful behavior, because NFE is designed to report the amount of input signal that is in excess of the thermal noise, not the amount that includes the thermal noise. This can be a useful behavior because thermal noise often interferes with what you want to measure, instead of being part of what you want to measure. Note that NFE is not adequately accurate to always be able to read below kTB.

On instruments with the NF2 license installed, the calibrated Noise Floor used by Noise Floor Extensions should be refreshed periodically. Agilent recommends that the Characterize Noise Floor operation be performed after the first 500 hours of operation, and once every calendar year. The key to perform this is located in the System, Alignments, Advanced menu. If you have not done this yourself at the recommended interval, then when you turn on Noise Floor Extensions, the analyzer will prompt you to do so with a dialog that says:

"This action will take several minutes to perform. Please disconnect all cables from the RF input and press Enter to proceed. Press ESC to cancel, or Postpone to postpone for a week."

If you Cancel, you will be prompted again the next time you turn NFE on. If you postpone, you will be prompted again after a week passes and you then turn NFE on.

Restore Mode Defaults

Resets the state for the currently active mode by resetting the mode persistent settings to their factory default values, clearing mode data, and by performing a Mode Preset.

See "[Mode Preset](#)" on page 2299 in the "Common Measurement Functions" for more information.

| Key Path | Mode Setup |
|----------------------|------------------|
| Initial S/W Revision | A.01.60 or later |

HSPA/8PSK Enable

You can disable the HSPA/8PSK (Option2FP) functionality by pressing the key or sending the SCPI command, without actually uninstalling the HSPA/8PSK option.

If Option2FP is not installed or is disabled, the state will be set to OFF. If this key is set to OFF, the Modulation Scheme will be switched to AUTO and both the Modulation Scheme key and the Modulation Format key should be unavailable (grayed out).

| Key Path | Mode Setup |
|-----------------------|--|
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSE] :RADio:CONFigure:HSDPa [:STATE] 0 1 OFF ON</code> <code>[:SENSe] :RADio:CONFigure:HSDPa [:STATE] ?</code> |
| Example | <code>:RAD:CONF:HSDP:STAT OFF</code> <code>:RAD:CONF:HSDP:STAT?</code> |
| Notes | This key is active if the TD-SCDMA HSPA/8PSK option (Option 2FP) license is installed. If the license is not installed, this key will be unavailable (grayed out). |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

6 System Functions

File

Opens a menu that enables you to access various standard and custom Windows functions. Press any other front-panel key to exit

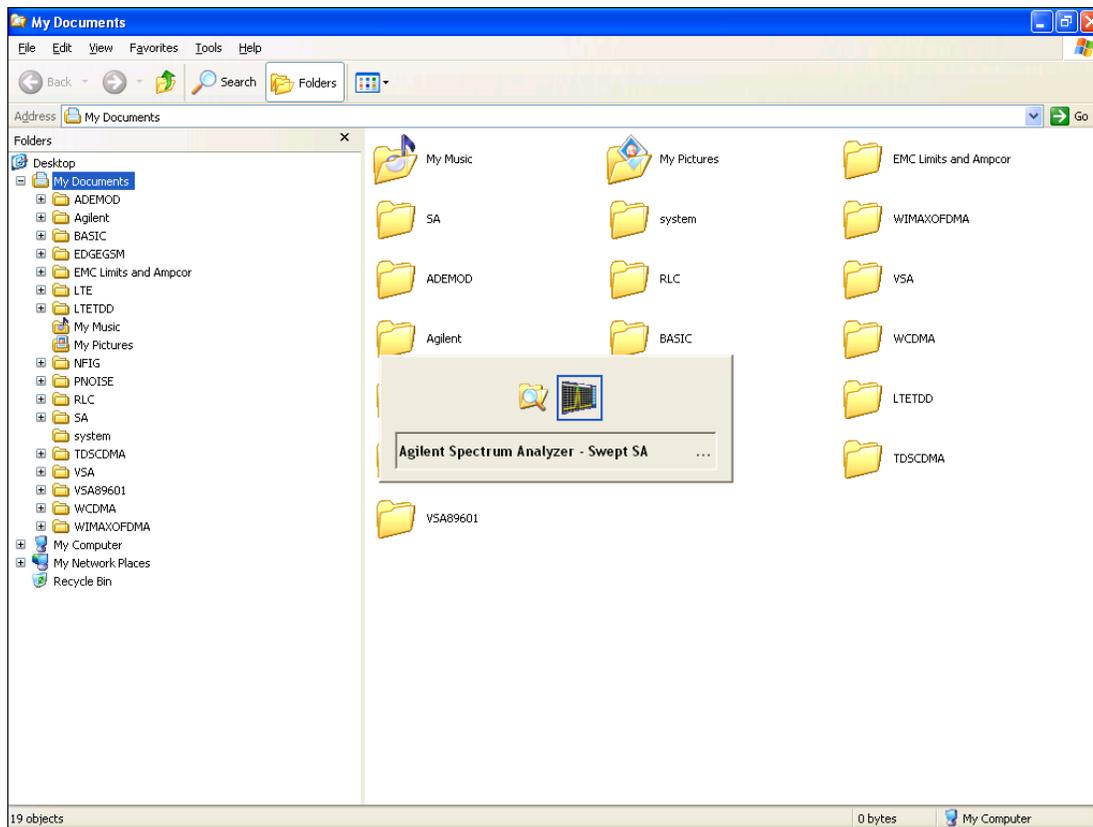
| Key Path | Front-panel key |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |

File Explorer

Opens the standard Windows File Explorer. The File Explorer opens in the My Documents directory for the current user.

The File Explorer is a separate Windows application, so to return to the analyzer once you are in the File Explorer, you may either:

Exit the File Explorer by clicking on the red X in the upper right corner, with a mouse



Or use Alt-Tab: press and hold the Alt key and press and release the Tab key until the Analyzer logo is showing in the window in the center of the screen, as shown above, then release the Alt key.

The ability to access File Explorer is not available if Option SF1 is installed.

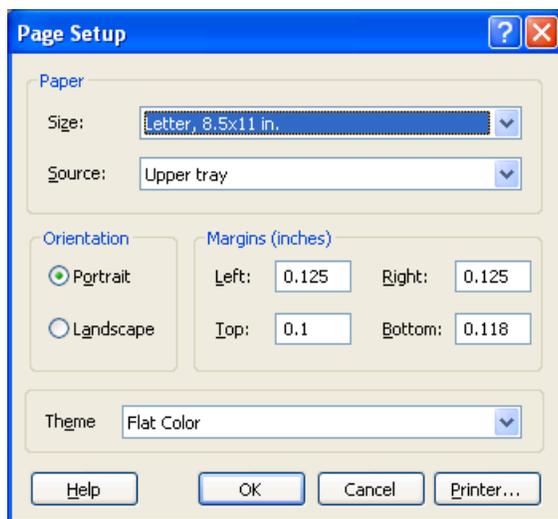
| | |
|----------------------|------------------|
| Key Path | File |
| Initial S/W Revision | Prior to A.02.00 |

Page Setup

The Page Setup key brings up a Windows Page Setup dialog that allows you to control aspects of the pages sent to the printer when the PRINT hardkey is pressed.

| | |
|----------------------|------------------|
| Key Path | File |
| Initial S/W Revision | Prior to A.02.00 |

Paper size, the printer paper source, the page orientation and the margins are all settable. Just like any standard Windows dialog, you may navigate the dialog using the front-panel keys, or a mouse. There are no SCPI commands for controlling these parameters.



Also contained in this dialog is a drop-down control that lets you select the Theme to use when printing. For more on Themes, see information under View/Display, Display, System Display Settings, Theme. The Theme control has a corresponding SCPI command.

| | |
|-----------------------|--|
| Parameter Name | Print Themes |
| Parameter Type | Enum |
| Mode | All |
| Remote Command | :SYSTem:PRINt:THEME TDCoLor TDMonochrome FCOLor FMONochrome :SYSTem:PRINt:THEME? |
| Example | :SYST:PRIN:THEM FCOL |
| Setup | :SYSTem:DEFault MISC |
| Preset | FCOL; not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and |

| | |
|----------------------|---|
| | survives subsequent running of the modes. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Print

This front-panel key is equivalent to performing a File, Print, OK. It immediately performs the currently configured Print to the Default printer.

The :HCOPY command is equivalent to pressing the PRINT key. The HCOpy:ABORt command can be used to abort a print which is already in progress. Sending HCOpy:ABORt will cause the analyzer to stop sending data to the printer, although the printer may continue or even complete the print, depending on how much data was sent to the printer before the user sent the ABORt command.

| | |
|----------------------|--------------------|
| Key Path | Front-panel key |
| Remote Command | :HCOPY[:IMMEDIATE] |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|----------------------|-------------------|
| Key Path | SCPI command only |
| Remote Command | :HCOPY:ABORt |
| Initial S/W Revision | Prior to A.02.00 |

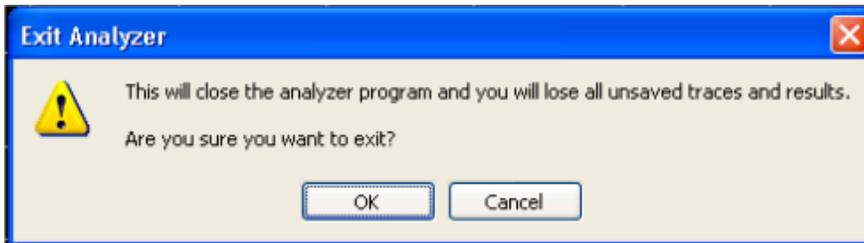
Minimize

The Minimize key causes the analyzer display to disappear down into the task bar, allowing you to see the Windows Desktop. You can use Alt-Tab (press and hold the Alt  key and press and release the Tab key) to restore the analyzer display.

| | |
|----------------------|--|
| Key Path | File |
| Mode | All |
| Notes | No equivalent remote command for this key. |
| State Saved | No |
| Initial S/W Revision | A.05.01 |

Exit

This key, when pressed, will exit the Instrument Application. A dialog box is used to confirm that you intended to exit the application:



| | |
|----------------------|--|
| Key Path | File |
| Mode | All |
| Notes | The Instrument Application will close. No further SCPI commands can be sent. Use with caution! |
| Initial S/W Revision | Prior to A.02.00 |

Maximize/Restore Down

These keys allow the Instrument Application to be maximized and then restored to its prior state. Only one of the two keys is visible at a time. When not already maximized the Maximize Application key is visible, and when maximized, the Restore Down Application key is visible and replaces the Maximize Application key.

Maximize

This key allows you to Maximize the Instrument Application, which causes the analyzer display to fill the screen. Once the application is maximized, this key is replaced by the Restore Down key.

| | |
|----------------------|--|
| Key Path | File |
| Mode | All |
| Notes | No equivalent remote command for this key. |
| State Saved | No |
| Initial S/W Revision | A.05.01 |

Restore Down

This key allows you to Restore Down the Instrument Application and reverses the action taken by Maximize. This key is only visible when the application has been maximized, and after the Restore Down action has been completed this key is replaced by the Maximize key.

| | |
|----------------------|--|
| Key Path | File |
| Mode | All |
| Notes | No equivalent remote command for this key. |
| State Saved | No |
| Initial S/W Revision | A.05.01 |

Print

This front-panel key is equivalent to performing a File, Print, OK. It immediately performs the currently configured Print to the Default printer.

The :HCOPY command is equivalent to pressing the PRINT key. The HCOPY:ABORT command can be used to abort a print which is already in progress. Sending HCOPY:ABORT will cause the analyzer to stop sending data to the printer, although the printer may continue or even complete the print, depending on how much data was sent to the printer before the user sent the ABORT command.

| | |
|-----------------------|--------------------|
| Key Path | Front-panel key |
| Remote Command | :HCOPY[:IMMEDIATE] |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|-------------------|
| Key Path | SCPI command only |
| Remote Command | :HCOPY:ABORT |
| Initial S/W Revision | Prior to A.02.00 |

System

Opens a menu of keys that access various configuration menus and dialogs.

| | |
|----------------------|--|
| Key Path | Front-panel key |
| Notes | No remote command for this key specifically. |
| Initial S/W Revision | Prior to A.02.00 |

Show

Accesses a menu of choices that enable you to select the information window you want to view.

| | |
|----------------------|--|
| Key Path | System |
| Mode | All |
| Remote Command | :SYSTem:SHOW OFF ERRor SYSTem HARDware LXI HWSTatistics ALIGNment SOFTware CAPplication :SYSTem:SHOW? |
| Example | :SYST:SHOW SYST |
| Notes | This command displays (or exits) the various System information screens. |
| Preset | OFF |
| State Saved | No |
| Range | OFF ERRor SYSTem HARDware LXI HWSTatistics ALIGNment SOFTware CAPplication |
| Initial S/W Revision | Prior to A.02.00 |

Errors

There are two modes for the Errors selection, History and Status.

The list of errors displayed in the Errors screen does not automatically refresh. You must press the Refresh key or leave the screen and return to it to refresh it.

History brings up a screen displaying the event log in chronological order, with the newest event at the top. The history queue can hold up to 100 messages (if a message has a repeat count greater than 1 it only counts once against this number of 100). Note that this count bears no relation to the size of the SCPI queue. If the queue extends onto a second page, a scroll bar appears to allow scrolling with a mouse. Time is displayed to the second.

Status brings up a screen summarizing the status conditions currently in effect. Note that the time is displayed to the second.

The fields on the Errors display are:

Type (unlabeled) - Displays the icon identifying the event or condition as an error or warning.

ID - Displays the error number.

Message - Displays the message text.

Repeat (RPT) - This field shows the number of consecutive instances of the event, uninterrupted by other events. If an event occurs 5 times with no other intervening event, the value of repeat will be 5.

If the value of Repeat is 1 the field does not display. If the value of Repeat is >1, the time and date shown are those of the most recent occurrence. If the value of repeat reaches 999,999 it stops there.

Time - Shows the most recent time (including the date) at which the event occurred.

| | |
|-------------------------------|---|
| Key Path | System, Show |
| Mode | All |
| Remote Command | :SYSTem:ERRor[:NEXT]? |
| Example | :SYST:ERR? |
| Notes | The return string has the format: “<Error Number>,<Error>” Where <Error Number> and <Error> are those shown on the Show Errors screen |
| Backwards Compatibility Notes | In some legacy analyzers, the Repeat field shows the number of times the message has repeated since the last time the error queue was cleared. In the X-Series, the Repeat field shows the number of times the error has repeated since the last intervening error. So the count may very well be different than in the past even for identical signal conditions Unlike previous analyzers, in the X-Series all errors are reported through the Message or Status lines and are logged to the event queue. They never appear as text in the graticule area (as they sometimes do in previous analyzers) and they are never displayed in the settings panel at the top of the screen (as they sometimes do, by changing color, in previous analyzers). As a consequence of the above, the user can only see one status condition (the most recently generated) without looking at the queue. In the past, at least in the Spectrum Analyzer, multiple status conditions might display on the right side of the graticule. In general, there is no backwards compatibility specified or guaranteed between the error numbers in the X-Series and those of earlier products. Error, event, and status processing code in customers' software will probably need to be rewritten to work with X-Series. In the legacy analyzers, some conditions report as errors and others simply turn on status bits. Conditions that report as errors often report over and over as long as the condition exists. In the X-series, all conditions report as start and stop events. Consequently, software that repeatedly queries for a condition error until it stops reporting will have to be rewritten for the X-series. |
| Initial S/W Revision | Prior to A.02.00 |

Previous Page

See ["Next Page" on page 351](#).

| | |
|----------------------|----------------------|
| Key Path | System, Show, Errors |
| Initial S/W Revision | Prior to A.02.00 |

Next Page

Next Page and Previous Page menu keys move you between pages of the log, if it fills more than one page. These keys are grayed out in some cases:

- If on the last page of the log, the Next Page key is grayed-out
- If on the first page of the log, the Previous Page key is grayed-out.
- If there is only one page, both keys are grayed out.

| | |
|----------------------|----------------------|
| Key Path | System, Show, Errors |
| Initial S/W Revision | Prior to A.02.00 |

History

The History and Status keys select the Errors view. The Status key has a second line that shows a number in [square brackets]. This is the number of currently open status items.

| | |
|----------------------|----------------------|
| Key Path | System, Show, Errors |
| Initial S/W Revision | Prior to A.02.00 |

Verbose SCPI On/Off

When you turn Verbose SCPI on, additional information is returned when you send the :SYSTem:ERRor? query. The additional information consists of the characters that stimulated the error. This can aid you in debugging your test programs by indicating where in the parsing of a SCPI command the instrument encountered an invalid command or query.

Specifically, with Verbose SCPI on, the SYSTem:ERRor? query is expanded to show the SCPI data received, with the indicator <Err> at the point in the stream that the error occurred.

Verbose SCPI has no effect on the Show Errors screen or front panel Message Line; it only changes the response to the :SYST:ERR? query.

See the example below, where the invalid command "SENS:BOGUS" is sent:

Normal response to :SYST:ERR (using the Telnet window):

```
SCPI> SENS:BOGUS
```

```
SCPI> SYST:ERR?
```

```
-113,"Undefined header"
```

Now after turning on Verbose SCPI:

```
SCPI> SYST:BOGUS
```

```
SCPI> SYST:ERR?
```

```
-113,"Undefined header;SYST:BOGUS<Err>"
```

| | |
|-----------------------|---|
| Key Path | System, Show, Errors |
| Mode | All |
| Remote Command | :SYSTem:ERRor:VERBoSe OFF ON 0 1 :SYSTem:ERRor:VERBoSe? |
| Example | :SYST:ERR:VERB ON |
| Preset | This is unaffected by Preset but is set to OFF on a "Restore System Defaults->Misc" |
| State Saved | No |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

Refresh

When pressed, refreshes the Show Errors display.

| | |
|----------------------|----------------------|
| Key Path | System, Show, Errors |
| Initial S/W Revision | Prior to A.02.00 |

Clear Error Queue

This clears all errors in all error queues.

Note the following:

- Clear Error Queue does not affect the current status conditions.
- Mode Preset does not clear the error queue.
- Restore System Defaults will clear all error queues.
- *CLS only clears the queue if it is sent remotely and *RST does not affect any error queue.
- Switching modes does not affect any error queues.

| | |
|----------------------|----------------------|
| Key Path | System, Show, Errors |
| Initial S/W Revision | Prior to A.02.00 |

Input Overload Enable (Remote Command Only)

Input Overload errors are reported using the Input Overload status bit (bit 12 in the Measurement Integrity status register). Input Overloads (for example, ADC Overload errors) can come and go with great frequency, generating many error events (for example, for signals just on the verge of overload), and so are not put into the SCPI error queue by default. Normally the status bit is the only way for detecting these errors remotely.

It is possible to enable Input Overload reporting to the SCPI queue, by issuing the :SYSTem:ERRor:OVERload ON command. To return to the default state, issue the :SYSTem:ERRor:OVERload OFF command. In either case, Input Overloads always set the status bit.

NOTE

For versions of firmware before A.10.01, the Input Overload was only a Warning and so was never available in the SCPI queue, although it did set the status bit. For A.10.01 and later, the Input Overload is an error and can be enabled to the SCPI queue using this command.

| | |
|----------------------|---|
| Key Path | SCPI only |
| Remote Command | :SYSTem:ERRor:OVERload[:STATe] 0 1 OFF ON |
| Example | :SYST:ERR:OVER 1 Enable overload errors |
| Preset | Set to OFF by Restore Misc Defaults (no Overload errors go to SCPI) |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | A.10.01 |

System

The System screen is formatted into three groupings: product descriptive information, options tied to the hardware, and software products:

```

<Product Name> <Product Description>
Product Number: N9020A
Serial Number: US46220924
Firmware Revision: A.01.01
Computer Name: <hostname>
Host ID: N9020A,US44220924

N9020A-503      Frequency Range to 3.6 GHz
N9020A-PFR     Precision Frequency Reference
N9020A-P03     Preamp 3.6 GHz

N9060A-2FP     Spectrum Analysis Measurement Suite  1.0.0.0
N9073A-1FP     WCDMA                                1.0.0.0
N9073A-2FP     WCDMA with HSDPA                      1.0.0.0

```

The Previous Page is grayed-out if the first page of information is presently displayed. The Next Page menu key is grayed-out if the last page of information is presently displayed.

| | |
|----------|----------------|
| Key Path | System, Show |
| Mode | All |
| Example | SYST:SHOW SYST |

| | |
|-------------------------------|--|
| Backwards Compatibility Notes | The hardware statistics that are displayed in the PSA Show System screen have been moved to a dedicated Show Hardware Statistics screen in the Service Menu. |
| Initial S/W Revision | Prior to A.02.00 |

Show System contents (Remote Command Only)

A remote command is available to obtain the contents of the Show System screen (the entire contents, not just the currently displayed page).

| | |
|-----------------------|---|
| Remote Command | :SYSTem:CONFigure [:SYSTem] ? |
| Example | :SYST:CONF? |
| Notes | The output is an IEEE Block format of the Show System contents. Each line is separated with a new-line character. |
| Initial S/W Revision | Prior to A.02.00 |

Computer System description (Remote Command Only)

A remote command is available to obtain the Computer System description. The Computer System is the operating system and patch level as reported by operating system.

| | |
|-----------------------|--|
| Remote Command | :SYSTem:CSYSem? |
| Example | :SYST:CSYS? |
| Notes | The return value is the Computer System name and service pack level. |
| Initial S/W Revision | Prior to A.12.00 |

Hardware

The show hardware screen is used to view details of the installed hardware. This information can be used to determine versions of hardware assemblies and field programmable devices, in the advent of future upgrades or potential repair needs.

The screen is formatted into two groupings: product descriptive information and hardware information. The hardware information is listed in a table format:

| | |
|-------------------------------------|--|
| Key Path | System |
| Mode | All |
| Remote Command | :SYSTem:PON:TYPE MODE USER LAST :SYSTem:PON:TYPE? |
| Example | :SYST:PON:TYPE MODE |
| Preset | This is unaffected by a Preset but is set to Mode on a “Restore System Defaults->All” |
| State Saved | No |
| Backwards Compatibility SCPI | :SYSTem:PON:TYPE PRESet the “PRESet” parameter is supported for backward compatibility only and behaves the same as MODE. |
| Backwards Compatibility Notes | The Preset Type key in legacy analyzers has been removed, and the Power On toggle key has been replaced by this 1-of-N key in the System menu. |
| Initial S/W Revision | Prior to A.02.00 |

Mode and Input/Output Defaults

When the analyzer is powered on in Mode and Input/Output Defaults, it performs a Restore Mode Defaults to all modes in the instrument and also performs a Restore Input/Output Defaults.

Persistent parameters (such as Amplitude Correction tables or Limit tables) are not affected at power on, even though they are normally cleared by Restore Input/Output Defaults and/or Restore Mode Defaults.

| | |
|----------------------|--------------------|
| Key Path | System, Power On |
| Mode | All |
| Example | SYST:PON:TYPE MODE |
| Readback Text | Defaults |
| Initial S/W Revision | Prior to A.02.00 |

User Preset

Sets Power On to User Preset. When the analyzer is powered on in User Preset, it will User Preset each mode and switch to the power-on mode. Power On User Preset will not affect any settings beyond what a normal User Preset affects.

NOTE

An instrument could never power up for the first time in User Preset.

| | |
|----------------|--------------------|
| Key Path | System, Power On |
| Mode | All |
| Example | SYST:PON:TYPE USER |
| Readback Text | User Preset |

| | |
|-------------------------------|--|
| Backwards Compatibility Notes | Power On User Preset will cause the instrument to power up in the power-on mode, not the last mode the instrument was in prior to shut down. Also, Power On User Preset will User Preset all modes. This does not exactly match legacy behavior. |
| Initial S/W Revision | Prior to A.02.00 |

Last State

Sets Power On to **Last**. When the analyzer is powered on, it will put all modes in the last state they were in prior to when the analyzer was put into Power Standby and it will wake up in the mode it was last in prior to powering off the instrument. The saving of the active mode prior to shutdown happens behind the scenes when a controlled shutdown is requested by using the front panel power Standby key or by using the remote command SYSTem:PDOWn. The non-active modes are saved as they are deactivated and recalled by Power On Last State.

NOTE

An instrument can never power up for the first time in Last.

If line power to the analyzer is interrupted, for example by pulling the line cord plug or by switching off power to a test rack, Power On Last State may not work properly. For proper operation, Power On Last State depends on you shutting down the instrument using the Standby key or the SYSTem:PDOWn SCPI command. This will ensure the last state of each mode is saved and can be recalled during a power up.

| | |
|-------------------------------|--|
| Key Path | System, Power On |
| Mode | All |
| Example | SYST:PON:TYPE LAST |
| Notes | Power on Last State only works if you have done a controlled shutdown prior to powering on in Last. If a controlled shutdown is not done when in Power On Last State, the instrument will power up in the last active mode, but it may not power up in the active mode's last state. If an invalid mode state is detected, a Mode Preset will occur. To control the shutdown under remote control use the :SYSTem:PDOWn command. |
| Readback Text | Last State |
| Backwards Compatibility Notes | It is no longer possible to power-up the analyzer in the last mode the analyzer was running with that mode in the preset state. (ESA/PSA SYST:PRESET:TYPE MODE with SYST:PON:PRESET) You can power-on the analyzer in the last mode the instrument was running in its last state (SYST:PON:TYPE LAST), or you can specify the mode to power-up in its preset state (SYST:PON:MODE <mode>). |
| Initial S/W Revision | Prior to A.02.00 |

Power On Application

Accesses a menu that lists the available Modes and lets you select which Mode is to be the power-on application.

This application is used for Power On Type “Mode and Input/Output Defaults” and Restore System Defaults All.

| | |
|-----------------------|---|
| Key Path | System, Power On |
| Mode | All |
| Remote Command | :SYSTem:PON:MODE SA BASIC ADEMOD NFIGURE PNOISE CDMA2K TDSCDMA VSA VSA89601 WCDMA WIMAXOFDMA :SYSTem:PON:MODE? |
| Example | SYST:PON:MODE SA |
| Notes | The list of possible modes (and remote parameters) to choose from is dependent on which modes are installed in the instrument. |
| Preset | This is unaffected by a Preset but is set on a "Restore System Defaults->All" to: For N9038A: EMI For all other models: SA |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Configure Applications

The Configure Applications utility can be used to:

- select applications for preload
- determine how many applications can fit in memory at one time
- specify the order of the Modes in the Mode menu.

This utility consists of a window with instructions, a set of "Select Application" checkboxes, a "fuel bar" style memory gauge, and keys that help you set up your configuration.

For more information, see the following topics:

["Preloading Applications" on page 359](#)

["Access to Configure Applications utility" on page 359](#)

["Virtual memory usage" on page 359](#)

| | |
|----------------------|---|
| Key Path | System, Power On |
| Example | :SYST:SHOW CAPP Displays the Config Applications screen |
| Initial S/W Revision | A.02.00 |

Preloading Applications

During runtime, if a Mode that is not preloaded is selected using the Mode menu or sending SCPI commands, there will be a pause while the Application is loaded. During this pause a message that says “Loading application, please wait ...” is displayed. Once loaded, the application stays loaded, so the next time you select it during a session, there is no delay.

Preloading enables you to “preload” at startup, to eliminate the runtime delay. Preloading an application will cause it to be loaded into the analyzer’s memory when the analyzer program starts up. If you do this, the delay will increase the time it takes to start up the analyzer program, but this may be preferable to having to wait the first time you select an application. Note that, once an application is loaded into memory, it cannot be unloaded without exiting and restarting the analyzer program.

Note that there are more applications available for the X-Series than can fit into Windows Virtual Memory. By allowing you to choose which licensed applications to load at startup, the Configure Applications utility allows you to make optimal use of your memory.

Access to Configure Applications utility

A version of the utility runs the first time you power up the analyzer after purchasing it from Keysight. The utility automatically configures preloads so that as many licensed applications as possible are preloaded while keeping the total estimated virtual memory usage below the limit. This auto-configuration only takes place at the very first run, and after analyzer software upgrades.

You may, at any time, manually call up the Configure Applications utility by pressing System, Power On, Configure Applications, to find a configuration that works best for you, and then restart the analyzer program.

The utility may also be called if, during operation of the analyzer, you attempt to load more applications than can fit in memory at once.

Virtual memory usage

There are more applications available for the X-Series than can fit into memory at any one time, so the Configure Applications utility includes a memory tracker that serves two purposes:

1. It will not let you preload more applications than will fit into memory at once.
2. You can determine how many of your favorite applications can reside in memory at one time.

The utility provides a graphical representation of the amount of memory (note that the memory in question here is Virtual memory and is a limitation imposed by the operating system, not by the amount of physical memory you have in your analyzer). You select applications to preload by checking the boxes on the left. Checked applications preload at startup. The colored fuel bar indicates the total memory required when all the checked applications are loaded (either preloaded or selected during runtime).

Here is what the fuel bar colors mean:

RED: the applications you have selected cannot all fit into the analyzer’s memory. You must deselect applications until the fuel bar turns yellow.

YELLOW: the applications you have selected can all fit into the analyzer’s memory, but there is less than 10% of the memory left, probably not enough to load any other applications, either via preload or by selecting a Mode while the analyzer is running..

GREEN: The indicator is green when <90% of the memory limit is consumed. This means the applications you have selected can all fit into the analyzer's memory with room to spare. You will likely be able to load one or more other applications without running out of memory.

Select All

Marks all applications in the selection list. This allows you to enable all applications licensed on the instrument for pre-loading, or is a convenience for selecting all applications in one operation and then letting you deselect individual applications.

| | |
|----------------------|--|
| Key Path | System, Power On, Configure Applications |
| Initial S/W Revision | A.02.00 |

Deselect All

Clears the marks from all applications in the selection list, except the Power On application. The Power On application cannot be eliminated from the pre-load list.

| | |
|----------------------|--|
| Key Path | System, Power On, Configure Applications |
| Initial S/W Revision | A.02.00 |

Move Up

The application list is the order that applications appear in the Mode Menu. This key enables you to shift the selected application up in the list, thus moving the selected application earlier in the Mode Menu.

| | |
|----------------------|--|
| Key Path | System, Power On, Configure Applications |
| Initial S/W Revision | A.02.00 |

Move Down

The application list is the order that applications appear in the Mode Menu. This key enables you to shift the selected application down in the list, thus moving the selected application later in the Mode Menu.

| | |
|----------------------|--|
| Key Path | System, Power On, Configure Applications |
| Initial S/W Revision | A.02.00 |

Select/Deselect

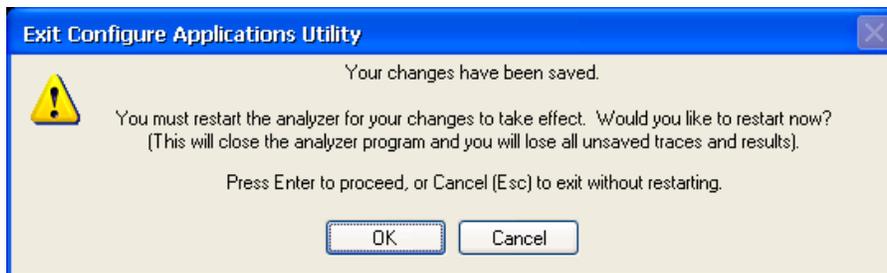
Toggles the currently highlighted application in the list.

| | |
|----------------------|--|
| Key Path | System, Power On, Configure Applications |
| Initial S/W Revision | A.02.00 |

Save Changes and Exit

Applies the configuration of the applications list. The marked applications will be pre-loaded in memory the next time the instrument application is started, and the order of the applications in the list will be the order of the applications in the Mode Menu.

After saving your changes, the analyzer asks you if you would like it to restart so that your changes can take effect (see dialog box, below). If you choose not to restart, the changes will not take effect until the next time you shut down and restart the analyzer.



| | |
|--------------------------|---|
| Key Path | System, Power On, Configure Applications |
| Remote Command | :SYSTem:PUP:PROcess |
| Example | :SYST:PUP:PROC This is the SCPI command for restarting the analyzer. You must Wait after this command for the instrument application to restart |
| Notes | The softkey will be grayed-out when the virtual memory of the selected applications exceeds 100% of the limit. |
| Notes | You cannot use *WAI or *OPC? to synchronize operation after a restart. This command stops and restarts the instrument application, thus the SCPI operation is terminated and restarted. A remote program must use fixed wait time to resume sending commands to the instrument. The wait time will be dependent upon which applications are pre-loaded. |
| Initial S/W Revision | A.02.00 |
| Modified at S/W Revision | A.04.00 |

Exit Without Saving

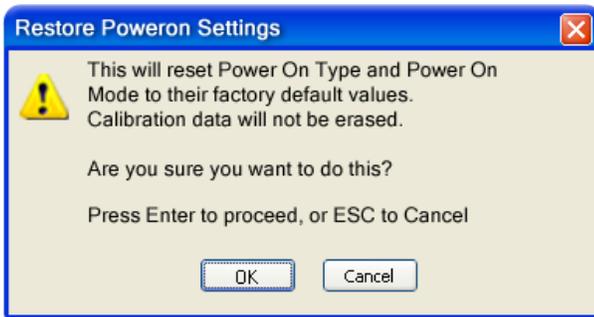
Pressing this key will exit the Configure Applications utility without saving your changes.

| | |
|--------------------------|--|
| Key Path | System, Power On, Configure Applications |
| Initial S/W Revision | A.02.00 |
| Modified at S/W Revision | A.04.00 |

Restore Power On Defaults

This selection causes the Power On Type and Power On Application settings to be a reset to their default values. This level of Restore System Defaults does not affect any other system settings, mode settings and

does not cause a mode switch. The Power On key, under the Restore System Defaults menu, causes the same action.



If you press any key other than OK or Enter, it is construed as a Cancel, because the only path that will actually cause the reset to be executed is through OK or Enter.

| | |
|----------------------|------------------|
| Key Path | System, Power On |
| Example | :SYST:DEF PON |
| Initial S/W Revision | Prior to A.02.00 |

Configure Applications - Instrument boot-up

At start-up of the analyzer program a dialog box similar to the one under the System, Power On, Configure Applications key will be displayed allowing you to choose which licensed applications are to be loaded. This dialog will only be displayed if the memory required to pre-load all of the licensed applications exceeds the Virtual Memory available.

Configure Applications - Windows desktop

The Configure Applications Utility may be run from the Windows Desktop. The utility is launched by double-



clicking the icon on the desktop, which brings-up a dialog box similar to the one under the System, Power On, Configure Applications key, allowing you to choose which licensed applications are to be loaded when the analyzer program starts up. This dialog box has mouse buttons on it that do the job the softkeys normally do in the System, Power On, Configure Applications menu.

Configure Applications - Remote Commands

The following topics provide details on using remote commands to configure the list of applications you want to load into the instrument memory or query the Virtual Memory utilization for your applications.

- "Configuration list (Remote Command Only)" on page 363
- "Configuration Memory Available (Remote Command Only)" on page 363
- "Configuration Memory Total (Remote Command Only)" on page 363
- "Configuration Memory Used (Remote Command Only)" on page 363

- "Configuration Application Memory (Remote Command Only)" on page 364

Configuration list (Remote Command Only)

This remote command is used to set or query the list of applications to be loaded in-memory.

| | |
|-----------------------------|--|
| Remote Command | :SYSTem:PON:APPLication:LLISt <string of INSTRument:SElect names> :SYSTem:PON:APPLication:LLISt? |
| Example | :SYST:PON:APPL:LLIS "SA,BASIC,WCDMA" |
| Notes | <string of INSTRument:SElect names> are from the enums of the :INSTRument:SElect command. The order of the <INSTRument:SElect names> is the order that the applications are loaded into memory, and the order that they appear in the Mode Menu. Error message -225 "Out of Memory" is reported when more applications are listed than can reside in Virtual Memory. When this occurs, the existing applications load list is unchanged. |
| Preset | Not affected by Preset |
| State Saved | Not saved in instrument state |
| Initial S/W Revision | A.02.00 |

Configuration Memory Available (Remote Command Only)

This remote command is used to query the amount of Virtual Memory remaining.

| | |
|-----------------------------|--|
| Remote Command | :SYSTem:PON:APPLication:VMEMory[:AVAIlable]? |
| Example | :SYST:PON:APPL:VMEM? |
| Preset | Not affected by Preset |
| Initial S/W Revision | A.02.00 |

Configuration Memory Total (Remote Command Only)

This remote command is used to query the limit of Virtual Memory allowed for applications.

| | |
|-----------------------------|--|
| Remote Command | :SYSTem:PON:APPLication:VMEMory:TOTal? |
| Example | :SYST:PON:APPL:VMEM:TOT? |
| Preset | Not affected by Preset |
| Initial S/W Revision | A.02.00 |

Configuration Memory Used (Remote Command Only)

This remote command is a query of the amount of Virtual Memory used by all measurement applications.

| | |
|-----------------------|---------------------------------------|
| Remote Command | :SYSTem:PON:APPLication:VMEMory:USED? |
| Example | :SYST:PON:APPL:VMEM:USED? |

| | |
|----------------------|------------------------|
| Preset | Not affected by Preset |
| Initial S/W Revision | A.02.00 |

Configuration Application Memory (Remote Command Only)

This remote command is used to query the amount of Virtual Memory a particular application consumes.

| | |
|-----------------------|--|
| Remote Command | :SYSTem:PON:APPLication:VMEMory:USED:NAME? <INSTrument:SElect name> |
| Example | :SYST:PON:APPL:VMEM:USED:NAME? CDMA2K |
| Notes | <INSTrument:SElect name> is from the enums of the :INSTrument:SElect command Value returned will be 0 (zero) if the name provided is invalid. |
| Preset | Not affected by Preset |
| Initial S/W Revision | Prior to A.02.00 |

Alignments

The Alignments Menu controls and displays the automatic alignment of the instrument, and provides the ability to restore the default alignment values.

The current setting of the alignment system is displayed in the system Settings Panel along the top of the display, including a warning icon for conditions that may cause specifications to be impacted.



| | |
|----------------------|------------------|
| Key Path | System |
| Initial S/W Revision | Prior to A.02.00 |

Auto Align

Configures the method for which the automatic background alignment is run.

Automatic background alignments are run periodically between measurement acquisitions. The instrument's software determines when alignments are to be performed to maintain warranted operation. The recommended setting for Auto Align is Normal.

An Auto Align execution cannot be aborted with the Cancel (ESC) key. To interrupt an Auto Align execution, select Auto Align Off.

| | |
|-----------------------|--|
| Key Path | System, Alignments |
| Mode | All |
| Remote Command | :CALibration:AUTO ON PARTial OFF :CALibration:AUTO? |
| Example | :CAL:AUTO ON |

| | |
|-------------------------------------|--|
| Notes | While Auto Align is executing, bit 0 of Status Operation register is set. |
| Couplings | Auto Align is set to Off if Restore Align Data is invoked. |
| Preset | This is unaffected by Preset but is set to ON upon a “Restore System Defaults->Align”. |
| State Saved | No |
| Status Bits/OPC dependencies | When Auto Align is executing, bit 0 in the Status Operational register is set. |
| Backwards Compatibility SCPI | :CALibration:AUTO ALERT Parameter ALERT is for backward compatibility only and is mapped to PARTial |
| Backwards Compatibility Notes | <ol style="list-style-type: none"> 1. ESA SCPI for Auto Align is :CALibration:AUTO <Boolean>. The command for X-Series is an enumeration. Thus the parameters of “0” and “1” are not possible in X-Series. 2. Similarly, the ESA SCPI for :CALibration:AUTO? returned the Boolean value 1 or 0, in X-Series it is an Enumeration (string). Thus, queries by customer applications into numeric variables will result in an error 3. In PSA Auto Align OFF was not completely off, it is equivalent to PARTial in X-Series. In X-Series, OFF will be fully OFF. This means users of PSA SCPI who choose OFF may see degraded performance and should migrate their software to use PARTial. |
| Initial S/W Revision | Prior to A.02.00 |

Normal

Auto Align, Normal turns on the automatic alignment of all measurement systems. The Auto Align, Normal selection maintains the instrument in warranted operation across varying temperature and over time.

If the condition “Align Now, All required” is set, transition to Auto Align, Normal will perform the required alignments and clear the “Align Now, All required” condition and then continue with further alignments as required to maintain the instrument adequately aligned for warranted operation.

When Auto Align, Normal is selected the Auto Align Off time is set to zero.

When Auto Align, Normal is selected the Settings Panel indicates ALIGN AUTO.

| | |
|------------------------------|--|
| Key Path | System, Alignments, Auto Align |
| Mode | All |
| Example | :CAL:AUTO ON |
| Notes | <p>Alignment processing as a result of the transition to Normal will be executed sequentially. Thus, *OPC? or *WAI following CAL:AUTO ON will return when the alignment processing is complete.</p> <p>The presence of an external signal may interfere with the RF portion of the alignment. If so, the Error Condition message “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference” is reported, and bit 11 is set in the Status Questionable Calibration register. After the interfering signal is removed, subsequent alignment of the RF will clear the condition, and clear bit 11 in the Status Questionable Calibration register.</p> |
| Readback Text | Normal |
| Status Bits/OPC dependencies | An interfering user signal may prevent automatic alignment of the RF subsystem. If this occurs, the Error Condition message “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz |

interference” is reported, the Status Questionable Calibration bit 11 is set, and the alignment proceeds. When a subsequent alignment of the RF subsystem succeeds, either by the next cycle of automatic alignment or from an Align Now, RF, the Error Condition and Status Questionable Calibration bit 11 are cleared.

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Partial

Auto Align, Partial disables the full automatic alignment and the maintenance of warranted operation for the benefit of improved measurement throughput. Accuracy is retained for the Resolution Bandwidth filters and the IF Passband, which is critical to FFT accuracy, demodulation, and many measurement applications. With Auto Align set to Partial, you are now responsible for maintaining warranted operation by updating the alignments when they expire. The Auto Align, Alert mechanism will notify you when alignments have expired. One solution to expired alignments is to perform the Align All, Now operation. Another is to return the Auto Align selection to Normal.

Auto Align, Partial is recommended for measurements where the throughput is so important that a few percent of improvement is more valued than an increase in the accuracy errors of a few tenths of a decibel. One good application of Auto Align, Partial would be an automated environment where the alignments can be called during overhead time when the device-under-test is exchanged.

When Auto Align, Partial is selected the elapsed time counter begins for Auto Align Off time.

When Auto Align, Partial is selected the Settings Panel indicates ALIGN PARTIAL with a warning icon. The warning icon is to inform the operator that they are responsible for maintaining the warranted operation of the instrument

| | |
|----------------------|---|
| Key Path | System, Alignments, Auto Align |
| Mode | All |
| Example | :CAL:AUTO PART |
| Notes | Auto Align Partial begins the elapsed time counter for Auto Align Off time. |
| Readback Text | Partial |
| Initial S/W Revision | Prior to A.02.00 |

Off

Auto Align, Off disables automatic alignment and the maintenance of warranted operation, for the benefit of maximum measurement throughput. With Auto Align set to Off, you are now responsible for maintaining warranted operation by updating the alignments when they expire. The Auto Align, Alert mechanism will notify you when alignments have expired. One solution to expired alignments is to perform the Align All, Now operation. Another is to return the Auto Align selection to Normal.

The Auto Align, Off setting is rarely the best choice, because Partial gives almost the same improvement in throughput while maintaining the warranted performance for a much longer time. The choice is intended for unusual circumstances such as the measurement of radar pulses where you might like the revisit time to be as consistent as possible.

When Auto Align, Off is selected the Auto Align Off time is initialized and the elapsed time counter begins.

When Auto Align, Off is selected the Settings Panel indicates ALIGN OFF with a warning icon. The warning icon is to inform the operator that they are responsible for maintaining the warranted operation of the instrument:

| | |
|----------------------|---|
| Key Path | System, Alignments, Auto Align |
| Mode | All |
| Example | :CAL:AUTO OFF |
| Notes | Auto Align Off begins the elapsed time counter for Auto Align Off time. |
| Couplings | Auto Align is set to Off if Restore Align Data is invoked. |
| Readback Text | Off |
| Initial S/W Revision | Prior to A.02.00 |

All but RF

Auto Align, All but RF, configures automatic alignment to include or exclude the RF subsystem. (Eliminating the automatic alignment of the RF subsystem prevents the input impedance from changing. The normal input impedance of 50 ohms can change to an open circuit when alignments are being used. Some devices under test do not behave acceptably under such circumstances, for example by showing instability.) When Auto Align, All but RF ON is selected, the operator is responsible for performing an Align Now, RF when RF-related alignments expire. The Auto Align, Alert mechanism will notify the operator to perform an Align Now, All when the combination of time and temperature variation is exceeded.

When Auto Align, All but RF ON is selected the Settings Panel indicates ALIGN AUTO/NO RF with a warning icon (warning icon is intended to inform the operator they are responsible for the maintaining the RF alignment of the instrument):

| | |
|-----------------------|---|
| Key Path | System, Alignments, Auto Align |
| Mode | All |
| Remote Command | :CALibration:AUTO:MODE ALL NRF :CALibration:AUTO:MODE? |
| Example | :CAL:AUTO:MODE NRF |
| Preset | This is unaffected by Preset but is set to ALL on a "Restore System Defaults->Align". |
| State Saved | No |
| Readback Text | RF or NRF |
| Initial S/W Revision | Prior to A.02.00 |

Alert

The instrument will signal an Alert when conditions exist such that you will need to perform a full alignment (for example, Align Now, All). The Alert can be configured in one of four settings; Time & Temperature, 24 hours, 7 days, or None. A confirmation is required when a selection other than Time & Temperature is chosen. This prevents accidental deactivation of alerts.

With Auto Align set to Normal, the configuration of Alert is not relevant because the instrument's software maintains the instrument in warranted operation.

| | |
|------------------------------|---|
| Key Path | System, Alignments, Auto Align |
| Mode | All |
| Remote Command | :CALibration:AUTO:ALERt TTEMperature DAY WEEK NONE :CALibration:AUTO:ALERt? |
| Example | :CAL:AUTO:ALER TTEM |
| Notes | The alert that alignment is needed is the setting of bit 14 in the Status Questionable Calibration register. |
| Preset | This is unaffected by Preset but is set to TTEMperature on a "Restore System Defaults->Align". |
| State Saved | No |
| Status Bits/OPC dependencies | The alert is the Error Condition message "Align Now, All required" and bit 14 is set in the Status Questionable Calibration register. |
| Initial S/W Revision | Prior to A.02.00 |

Time & Temperature

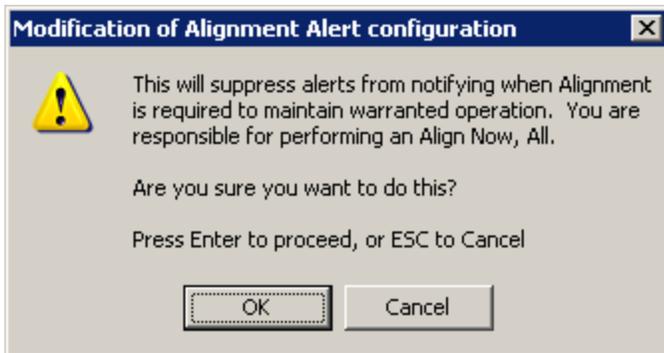
With Auto Align Alert set to Time & Temperature the instrument will signal an alert when alignments expire due to the combination of the passage of time and changes in temperature. The alert is the Error Condition message "Align Now, All required". If this choice for Alert is selected, the absence of an alert means that the analyzer alignment is sufficiently up-to-date to maintain warranted accuracy.

| | |
|------------------------------|--|
| Key Path | System, Alignments, Auto Align, Alert |
| Mode | All |
| Example | :CAL:AUTO:ALER TTEM |
| Readback Text | Time & Temp |
| Status Bits/OPC dependencies | Bit 14 is set in the Status Questionable Calibration register. |
| Initial S/W Revision | Prior to A.02.00 |

24 hours

With Auto Align Alert set to 24 Hours the instrument will signal an alert after a time span of 24 hours since the last successful full alignment (for example, Align Now, All or completion of a full Auto Align). You may choose this selection in an environment where the temperature is stable on a daily basis at a small risk of accuracy errors in excess of the warranted specifications. The alert is the Error Condition message "Align Now, All required".

For front-panel operation, confirmation is required to transition into this setting of Alert. The confirmation dialog is:



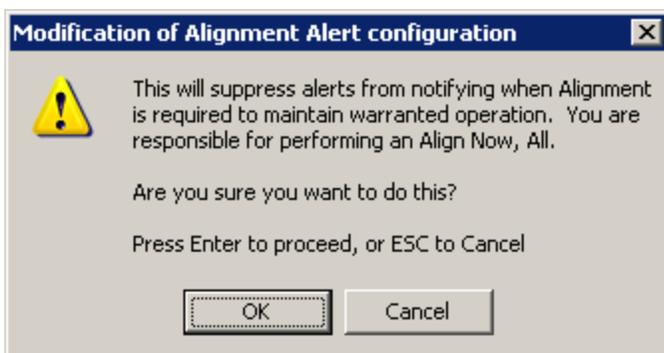
No confirmation is required when Alert is configured through a remote command.

| | |
|------------------------------|--|
| Key Path | System, Alignments, Auto Align, Alert |
| Mode | All |
| Example | :CAL:AUTO:ALER DAY |
| Readback Text | 24 hours |
| Status Bits/OPC dependencies | Bit 14 is set in the Status Questionable Calibration register. |
| Initial S/W Revision | Prior to A.02.00 |

7 days

With Auto Align Alert is set to 7 days the instrument will signal an alert after a time span of 168 hours since the last successful full alignment (for example, Align Now, All or completion of a full Auto Align). You may choose this selection in an environment where the temperature is stable on a weekly basis, at a modest risk of accuracy degradations in excess of warranted performance. The alert is the Error Condition message “Align Now, All required”.

For front panel operation, confirmation is required for the customer to transition into this setting of Alert. The confirmation dialog is:



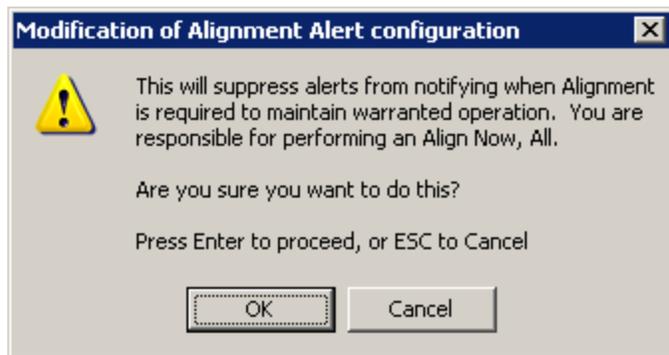
No confirmation is required when Alert is configured through a remote command.

| | |
|------------------------------|--|
| Key Path | System, Alignments, Auto Align, Alert |
| Mode | All |
| Example | :CAL:AUTO:ALER WEEK |
| Readback Text | 7 days |
| Status Bits/OPC dependencies | Bit 14 is set in the Status Questionable Calibration register. |
| Initial S/W Revision | Prior to A.02.00 |

None

With Auto Align Alert set to None the instrument will not signal an alert. This is provided for rare occasions where you are making a long measurement which cannot tolerate Auto Align interruptions, and must have the ability to capture a screen image at the end of the measurement without an alert posted to the display. Keysight does not recommend using this selection in any other circumstances, because of the risk of accuracy performance drifting well beyond expected levels without the operator being informed.

For front panel operation, confirmation is required to transition into this setting of Alert. The confirmation dialog is:



No confirmation is required when Alert is configured through a remote command.

| | |
|----------------------|---------------------------------------|
| Key Path | System, Alignments, Auto Align, Alert |
| Mode | All |
| Example | :CAL:AUTO:ALER NONE |
| Initial S/W Revision | Prior to A.02.00 |

Execute Expired Alignments (Remote Command Only)

Alignments can be expired in the situation where Auto Align is in the state of Partial or Off. This feature runs the alignments that have expired. This is different than performing an Align All, Now operation. Align All, Now performs an alignment of all subsystems regardless of whether they are needed or not, with Execute Expired Alignments, only the individual subsystems that have become due are aligned.

| | |
|----------------------|--|
| Mode | All |
| Remote Command | :CALibration:EXPIred? |
| Example | :CAL:EXP? |
| Notes | :CALibration:EXPIred? returns 0 if successful :CALibration:EXPIred? returns 1 if failed |
| Initial S/W Revision | Prior to A.02.00 |

Align Now

Accesses alignment processes that are immediate action operations. They perform complete operations and run until they are complete.

| | |
|----------------------|--------------------|
| Key Path | System, Alignments |
| Initial S/W Revision | Prior to A.02.00 |

All

(In MXE the key label is “All (plus RF Presel 20 Hz – 3.6 GHz)”)Immediately executes an alignment of all subsystems In MXE, the Align Now All is followed by additionally aligning the RF Preselector section, so in MXE, the key label contains the parenthetical note “(plus RF Presel 20 Hz – 3.6 GHz)”. The instrument stops any measurement currently underway, performs the alignment, then restarts the measurement from the beginning (similar to pressing the Restart key).

If an interfering user signal is present at the RF Input, the alignment is performed on all subsystems except the RF. After completion, the Error Condition message “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference” is generated. In addition the Error Condition message “Align Now, RF required” is generated, and bits 11 and 12 are set in the Status Questionable Calibration register.

The query form of the remote commands (:CALibration[:ALL]? or *CAL?) invokes the alignment of all subsystems and returns a success or failure value. An interfering user signal is not grounds for failure; if the alignment was able to succeed on all portions but unable to align the RF because of an interfering signal, the resultant will be the success value.

Successful completion of Align Now, All will clear the “Align Now, All required” Error Condition, and clear bit 14 in the Status Questionable Calibration register. It will also begin the elapsed time counter for Last Align Now, All Time, and capture the Last Align Now, All Temperature.

In the MXE, successful completion will also clear the “Align 20 Hz to 30 MHz required” Error Condition, the “Align 30 MHz to 3.6 GHz required” Error Condition, and the “Align 20 Hz to 3.6 GHz required” Error Condition, and clear bits 1 and bit 2 and clear the bit 1 in the Status Questionable Calibration Extended Needed register.

If the Align RF subsystem succeeded in aligning (no interfering signal present), the elapsed time counter begins for Last Align Now, RF Time, and the temperature is captured for the Last Align Now, RF Temperature. In addition the Error Conditions “Align skipped: 50 MHz interference” and “Align skipped: 4.8

GHz interference” are cleared, the Error Condition “Align Now, RF required” is cleared, and bits 11 and 12 are cleared in the Status Questionable Calibration register

Align Now, All can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs the Error Condition message “Align Now, All required” is generated, and bit 14 is set in the Status Questionable Condition register. This is because new alignment data may be employed for an individual subsystem, but not a cohesive set of data for all subsystems.

In many cases, you might find it more convenient to change alignments to Normal, instead of executing Align Now, All. When the Auto Align process transitions to Normal, the analyzer will immediately start to update only the alignments that have expired, thus efficiently restoring the alignment process.

| | |
|-------------------------------------|---|
| Key Path | System, Alignments, Align Now |
| Mode | All |
| Remote Command | :CALibration[:ALL] :CALibration[:ALL]? |
| Example | :CAL |
| Notes | :CALibration[:ALL]? returns 0 if successful :CALibration[:ALL]? returns 1 if failed :CALibration[:ALL]? is the same as *CAL? While Align Now, All is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bit 14 in the Status Questionable Calibration register. An interfering user signal is not grounds for failure of Align Now, All. However, bits 11 and 12 are set in the Status Questionable Calibration register to indicate Align Now, RF is required. An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the interfering signal removed. |
| Couplings | Initializes the time for the Last Align Now, All Time. Records the temperature for the Last Align Now, All Temperature. If Align RF component succeeded, initializes the time for the Last Align Now, RF Time. If Align RF component succeeded, records the temperature for the Last Align Now, RF Temperature. |
| Status Bits/OPC dependencies | Bits 11, 12, or 14 may be set in the Status Questionable Calibration register. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|-------------------------------|
| Mode | All |
| Remote Command | *CAL? |
| Example | *CAL? |
| Notes | *CAL? returns 0 if successful |

| | |
|-----------------------|--|
| | <p>*CAL? returns 1 if failed</p> <p>:CALibration[:ALL]? is the same as *CAL?</p> <p>See additional remarks described with :CALibration[:ALL]?</p> <p>Everything about :CALibration[:ALL]? is synonymous with *CAL? including all conditions, status register bits, and couplings</p> |
| Initial S/W Revision | Prior to A.02.00 |
| Mode | All |
| Remote Command | :CALibration[:ALL]:NPENDING |
| Example | CAL:NPEN |
| Notes | <p>:CALibration[:ALL]:NPENDING is the same as :CALibration[:ALL] including all conditions, status register bits, except this scpi command does not BLOCK the scpi session, so the user should use status register bits to query if the calibration is successfully completed or not.</p> <p>Typical usage is:</p> <ol style="list-style-type: none"> 1) :CALibration:ALL:NPENDING (Start a calibration) 2) :STATUS:OPERation:CONDition? (Check if the calibration is completed or not, If bit 0 is set, then the system is doing calibration, the user should repeat this scpi query until the bit is cleared) 3):STATUS:QUESTionable:CALibration:CONDition? (Check if there are any errors/failures in previous calibration procedure |
| Initial S/W Revision | X.14.20 |

All but RF

(In MXE the key label is “All but RF (not including RF Presel)”)

Immediately executes an alignment of all subsystems except the RF subsystem . The instrument will stop any measurement currently underway, perform the alignment, and then restart the measurement from the beginning (similar to pressing the Restart key). This can be used to align portions of the instrument that are not impacted by an interfering user input signal.

This operation might be chosen instead of All if you do not want the device under test to experience a large change in input impedance, such as a temporary open circuit at the analyzer input.

The query form of the remote commands (:CALibration:NRF?) will invoke the alignment and return a success or failure value.

Successful completion of Align Now, All but RF will clear the “Align Now, All required” Error Condition, and clear bit 14 in the Status Questionable Calibration register. If “Align Now, All required” was in effect prior to executing the All but RF, the Error Condition message “Align Now, RF required” is generated and bit 12 in the Status Questionable Calibration register is set. It will also begin the elapsed time counter for Last Align Now, All Time, and capture the Last Align Now, All Temperature.

Align Now, All but RF can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs the Error Condition message “Align Now, All required” is generated, and bit 14 is set in the Status Questionable Condition register. This is

because new alignment data may be used for an individual subsystem, but not a full new set of data for all subsystems.

In models with the RF Preselector, such as the N9038A, the “All but RF” alignment will execute an alignment of all subsystems except the RF subsystem of the Spectrum Analyzer, as well as the system gain of the RF Preselector.

| | |
|-------------------------------------|---|
| Key Path | System, Alignments, Align Now |
| Mode | All |
| Remote Command | :CALibration:NRF :CALibration:NRF? |
| Example | :CAL:NRF |
| Notes | :CALibration:NRF? returns 0 if successful :CALibration:NRF? returns 1 if failed While Align Now, All but RF is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bit 14 in the Status Questionable Calibration register and set bit 12 if invoked with “Align Now, All required”. |
| Couplings | Initializes the time for the Last Align Now, All Time. Records the temperature for the Last Align Now, All Temperature. |
| Status Bits/OPC dependencies | Bits 12 or 14 may be set in the Status Questionable Calibration register. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------------|--|
| Mode | All |
| Remote Command | :CALibration:NRF:NPENding |
| Example | CAL:NRF:NPEN |
| Notes | :CALibration:NRF:NPENding is the same as :CALibration:NRF including all conditions, status register bits, except that this scpi command does not BLOCK the scpi session, so the user should use status register bits to query if the calibration is successfully completed or not. Typical usage is: 1):CALibration:NRF:NPENding (start theAll but RF calibration) 2):STATus:OPERation:CONDition? (If bit 0 is set, then the system is doing calibration, the user should do re-query until this bit is cleared) 3):STATus:QUEStionable:CALibration:CONDition? (to check if there are any errors/failures in previous calibration procedure) |
| Initial S/W Revision | X.14.20 |

RF

(In MXE the key label is “RF Only”)

Immediately executes an alignment of the RF subsystem . The instrument stops any measurement currently underway, performs the alignment, then restarts the measurement from the beginning (similar to pressing the Restart key).

This operation might be desirable if the alignments had been set to not include RF alignments, or if previous RF alignments could not complete because of interference which has since been removed.

If an interfering user signal is present at the RF Input, the alignment will terminate and generate the Error Condition message “Align skipped: 50 MHz interference” or “Align skipped: 4.8 GHz interference”, and Error Condition “Align Now, RF required”. In addition, bits 11 and 12 will be set in the Status Questionable Calibration register.

The query form of the remote commands (:CALibration:RF?) will invoke the alignment of the RF subsystem and return a success or failure value. An interfering user signal is grounds for failure.

Successful completion of Align Now, RF will begin the elapsed time counter for Last Align Now, RF Time, and capture the Last Align Now, RF Temperature.

Align Now, RF can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. When this occurs, the Error Condition message “Align Now, RF required” is generated, and bit 12 is set in the Status Questionable Condition register. None of the new alignment data is used.

In models with the RF Preselector, such as the N9038A, the RF alignment will execute an alignment of the RF subsystem of the Spectrum Analyzer, as well as the RF subsystem on RF Preselector path.

| | |
|-----------------------|--|
| Key Path | System, Alignments, Align Now |
| Mode | All |
| Remote Command | :CALibration:RF :CALibration:RF? |
| Example | :CAL:RF |
| Notes | :CALibration:RF? returns 0 if successful :CALibration:RF? returns 1 if failed (including interfering user signal) While Align Now, RF is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion clears the Error Conditions “Align skipped: 50 MHz interference” and “Align skipped: 4800 MHz interference” and the Error Conditions “Align RF failed” and “Align Now, RF required”, and clears bits 3, 11, and 12 in the Status Questionable Calibration register. A failure encountered during alignment will generate the Error Condition message “Align RF failed” and set bit 3 in the Status Questionable Calibration register. An interfering user signal will result in bits 11 and 12 to be set in the Status Questionable Calibration register to indicate Align Now, RF is required. An interfering user supplied signal will result in the instrument requiring an Align Now, RF with the |

| | |
|------------------------------|--|
| | interfering signal removed. |
| Couplings | Initializes the time for the Last Align Now, RF Time. Records the temperature for the Last Align Now, RF Temperature. |
| Status Bits/OPC dependencies | Bits 11, 12, or 14 may be set in the Status Questionable Calibration register. |
| Initial S/W Revision | Prior to A.02.00 |
| Mode | All |
| Remote Command | :CALibration:RF:NPENding |
| Example | CAL:RF:NPEN |
| Notes | :CALibration:RF:NPENding is the same as :CALibration:RF including all conditions, status register bits, except that this scpi command does not BLOCK the scpi session, so the user should use status register bits to query if the calibration is successfully completed or not. Typical usage is: 1):CALibration:RF:NPENding (Start a RF calibration) 2):STATus:OPERation:CONDition? (If bit 0 is set, then the system is doing calibration, the user should do re-query until this bit is cleared) 3):STATus:QUEStionable:CALibration:CONDition? (to check if there are any errors/failures in previous calibration procedure) |
| Initial S/W Revision | X.14.20 |

External Mixer

Immediately executes an alignment of the External Mixer that is plugged into the USB port. The instrument stops any measurement currently underway, performs the alignment, then restarts the measurement from the beginning (similar to pressing the Restart key). As this alignment calibrates the LO power to the mixer, this is considered an LO alignment; and failure is classified as an LO alignment failure.

The query form of the remote commands (:CALibration:EMIXer?) will invoke the alignment of the External Mixer and return a success or failure value.

| | |
|----------------|---|
| Key Path | System, Alignments, Align Now |
| Mode | All |
| Remote Command | :CALibration:EMIXer :CALibration:EMIXer? |
| Example | :CAL:EMIX |
| Notes | :CAL:EMIX? returns 0 if successful :CAL:EMIX? returns 1 if failed While Align Now, Ext Mix is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. |

| | |
|------------------------------|--|
| | <p>This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command.</p> <p>A failure encountered during alignment will generate the Error Condition message “Align LO failed” and set bit 5 in the Status Questionable Calibration register. Successful completion will clear the “Align LO failed” message and bit 5 in the Status Questionable Calibration register.</p> |
| Dependencies | This key does not appear unless option EXM is present and is grayed-out unless a USB mixer is plugged in to the USB. |
| Status Bits/OPC dependencies | Bit3 may be set in the Status Questionable Calibration Extended Failure register. |
| Initial S/W Revision | A.08.00 |

Show Alignment Statistics

Shows alignment information you can use to ensure that the instrument is operating in a specific manner. The Show Alignment Statistics screen is where you can view time and temperature information.

Values which are displayed are only updated when the Show Alignment Statistics screen is invoked, they are not updated while the Show Alignment Statistics screen is being displayed. The remote commands that access this information obtain current values.

An example of the Show Alignment Statistics screen would be similar to:

| | | |
|---------------------------|---|---|
| Std Header | Product Number: N9020A Serial Number: US46340924 Firmware Revision: A.01.01 | |
| Instrument Info | Time since start-up: 300 hrs Current Temperature: +28 degC | |
| Auto Align Info | Time while Auto Align off: 90 min | |
| Std Align Now | Time since last Align Now All: 12.5 hrs Temperature since last Align Now All: -1.3 degC Time since last Align Now RF: 5 min Temperature since last Align Now RF: +0.1 degC | Times & Temperature delta. Shown as "---" if none since start-up. |
| If TG Option (Not Zorro1) | Time since last Align TG: 2.5 hrs Temperature since last Align TG: +0.2 degC | |
| Opts 508,513 526 | Last Characterize Preselector: Jun 1, 2006 15:00:00 Last Characterize Preselector Temperature: +32.1 degC | Time & Temperature 'stamp' |

A successful Align Now, RF will set the Last Align RF temperature to the current temperature, and reset the Last Align RF time. A successful Align Now, All or Align Now, All but RF will set the Last Align Now All temperature to the current temperature, and reset the Last Align Now All time. A successful Align Now, All will also reset the Last Align RF items if the RF portion of the Align Now succeeded.

| | |
|----------------------|---|
| Key Path | System, Alignments |
| Mode | All |
| Notes | The values displayed on the screen are only updated upon entry to the screen and not updated while the screen is being displayed. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :SYSTem:PON:TIME? |
| Example | :SYST:PON:TIME? |
| Notes | Value is the time since the most recent start-up in seconds. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|---|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TEMPerature:CURRent? |
| Example | :CAL:TEMP:CURR? |
| Notes | Value is in degrees Centigrade. Value is invalid if using default alignment data (Align Now, All required) |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TIME:LALL? |
| Example | :CAL:TIME:LALL? |
| Notes | Value is the elapsed time, in seconds, since the last successful Align Now, All or Align Now, All but RF was executed. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|----------|---|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
|----------|---|

| | |
|-----------------------|---|
| Mode | All |
| Remote Command | :CALibration:TEMPerature:LALL? |
| Example | :CAL:TEMP:LALL? |
| Notes | Value is in degrees Centigrade at which the last successful Align Now, All or Align Now, All but RF was executed. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|---|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TIME:LRF? |
| Example | :CAL:TIME:LRF? |
| Notes | Value is the elapsed time, in seconds, since the last successful Align Now, RF was executed, either individually or as a component of Align Now, All. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TEMPerature:LRF? |
| Example | :CAL:TEMP:LRF? |
| Notes | Value is in degrees Centigrade at which the last successful Align Now, RF was executed, either individually or as a component of Align Now, All. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TIME:LPreselector? |
| Example | :CAL:TIME:LPR? |
| Notes | Value is the date and time the last successful Characterize Preselector was executed. The date is separated from the time by a space character. Returns "" if no Characterize Preselector has ever been performed on the instrument. |
| Dependencies | In models that do not include preselectors, this command is not enabled and any attempt to set or query will yield an error. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TEMPerature:LPreselector? |
| Example | :CAL:TEMP:LPR? |
| Notes | Value is in degrees Centigrade at which the last successful Characterize Preselector was executed. |
| Dependencies | In models that do not include preselectors, this command is not enabled and any attempt to set or query will yield an error. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|---|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:AUTO:TIME:OFF? |
| Example | :CAL:AUTO:TIME:OFF? |
| Notes | Value is the elapsed time, in seconds, since Auto Align has been set to Off or Off with Alert. The value is 0 if Auto Align is ALL or NORF. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|---|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TIME:RFPSselector:LCONducted? |
| Example | :CAL:TIME:RFPS:LCON? |
| Notes | Values are the date and time the last successful Align Now, 20 Hz – 30 MHz was executed. The date is separated from the time by a semi-colon character. |
| State Saved | No |

| | |
|-----------------------|---|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TEMPerature:RFPSselector:LCONducted? |
| Example | :CAL:TEMP:RFPS:LCON? |
| Notes | Value is in degrees Centigrade at which the last successful Align Now, 20 Hz – 30 MHz was executed. |
| State Saved | No |

| | |
|-----------------------|---|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TIME:RFPSector:LRADiated? |
| Example | :CAL:TIME:RFPS:LRAD? |
| Notes | Value is the date and time the last successful Align Now, 30 MHz – 3.6 GHz was executed. The date is separated from the time by a semi-colon character. |
| State Saved | No |

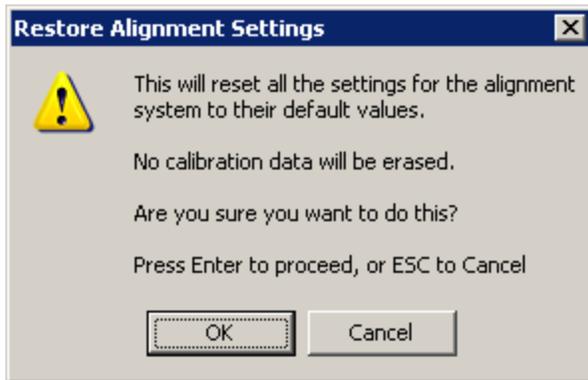
| | |
|-----------------------|---|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TEMPerature:RFPSector:LRADiated? |
| Example | :CAL:TEMP:RFPS:LRAD? |
| Notes | Value is in degrees Centigrade at which the last successful Align Now, 30 MHz – 3.6 GHz was executed. |
| State Saved | No |

| | |
|-----------------------|---|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:RFPSector:SCHeuler:TIME:NEXT? This query returns data using the following format “YYYY/MM/DD; HH:MM:SS” |
| Example | :CAL:RFPS:SCH:TIME:NEXT? |
| Notes | The next run time will be updated based on the start date/time and recurrence set by the users. “date” is representation of the date the task will run in the form of “YYYY/MM/DD” where: –YYYY is the four digit representation of year. (for example, 2009) –MM is the two digit representation of month. (for example, 01 to 12) –DD is the two digit representation of the day. (for example, 01 to 28, 29, 30 or 31 depending on the month and year) “time” is a representation of the time of day the task will run in the form of “HH:MM:SS” where: –HH is the two digit representation of the hour in 24 hour format –MM is the two digit representation of minute –SS is the two digit representation of seconds For model N9038A only. |
| State Saved | No |

Restore Align Defaults

Initializes the alignment user interface settings, not alignment data, to the factory default values. Align Now, All must be executed if the value of the Timebase DAC results in a change.

For front panel operation, you are prompted to confirm action before setting the alignment parameters to factory defaults:



The parameters affected are:

| Parameter | Setting |
|-----------------------|--|
| Timebase DAC | Calibrated |
| Timebase DAC setting | Calibrated value |
| Auto Align State | Normal (if the instrument is not operating with default alignment data, Off otherwise) |
| Auto Align All but RF | Off |
| Auto Align Alert | Time & Temperature |

| | |
|----------------------|--|
| Key Path | System, Alignments |
| Mode | All |
| Example | :SYST:DEF ALIG |
| Notes | Alignment processing that results as the transition to Auto Alignment Normal will be executed sequentially; thus *OPC? or *WAI will wait until the alignment processing is complete. |
| Initial S/W Revision | Prior to A.02.00 |

Backup or Restore Align Data...

Opens the utility for backing-up or restoring the alignment data.

Alignment data for the instrument resides on the hard drive in a database. Keysight uses high quality hard drives; however it is highly recommended the alignment data be backed-up to storage outside of the instrument. Additionally, for customers who use multiple CPU Assemblies or multiple disk drives, the

alignment that pertains to the instrument must be transferred to the resident hard drive after a CPU or hard drive is replaced. This utility facilitates backing-up and restoring the alignment data.

NOTE

This utility allows the operator to navigate to any location of the Windows file system. It is intended that the operator use a USB memory device or Mapped Network Drive to back up the alignment data to storage outside of the instrument.

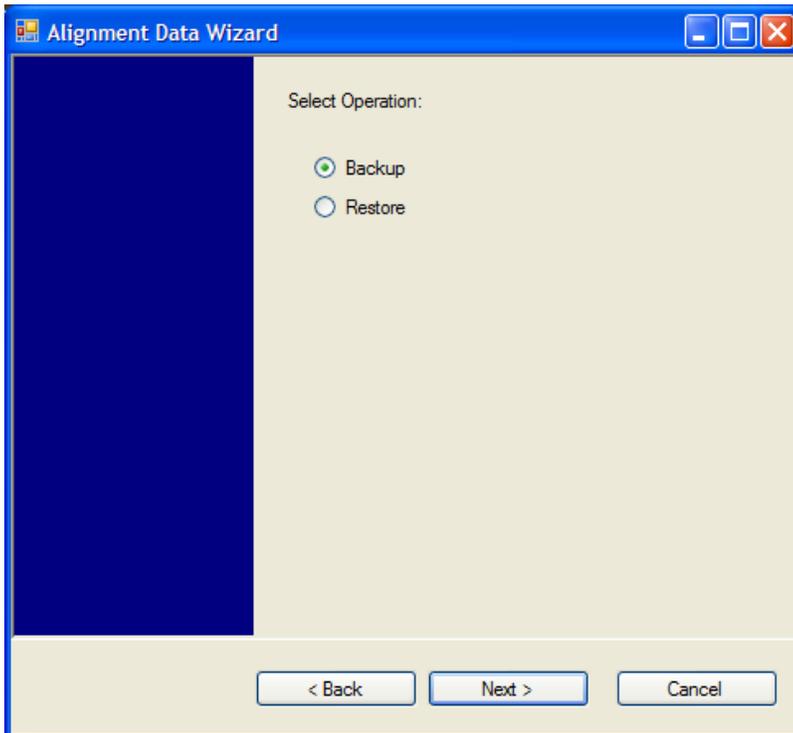
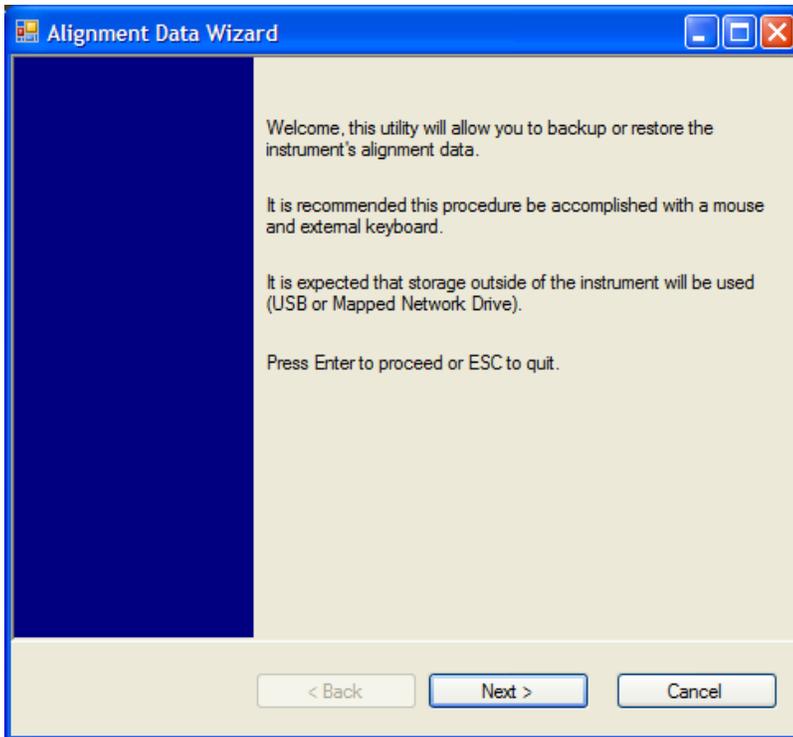
| | |
|----------------------|--------------------|
| Key Path | System, Alignments |
| Initial S/W Revision | A.02.00 |

| | |
|-----------------------|--|
| Key Path | System, Alignments |
| Mode | All |
| Remote Command | :CALibration:DATA:DEfault |
| Example | :CAL:DATA:DEF |
| Couplings | Sets Auto Align to Off. Sets bit 14 in the Status Questionable Calibration register. The Error Condition message "Align Now, All required" is generated. |
| Initial S/W Revision | Prior to A.02.00 |

Alignment Data Wizard

The Backup or Restore Alignment Data wizard guides you through the operation of backing-up or restoring the alignment data.

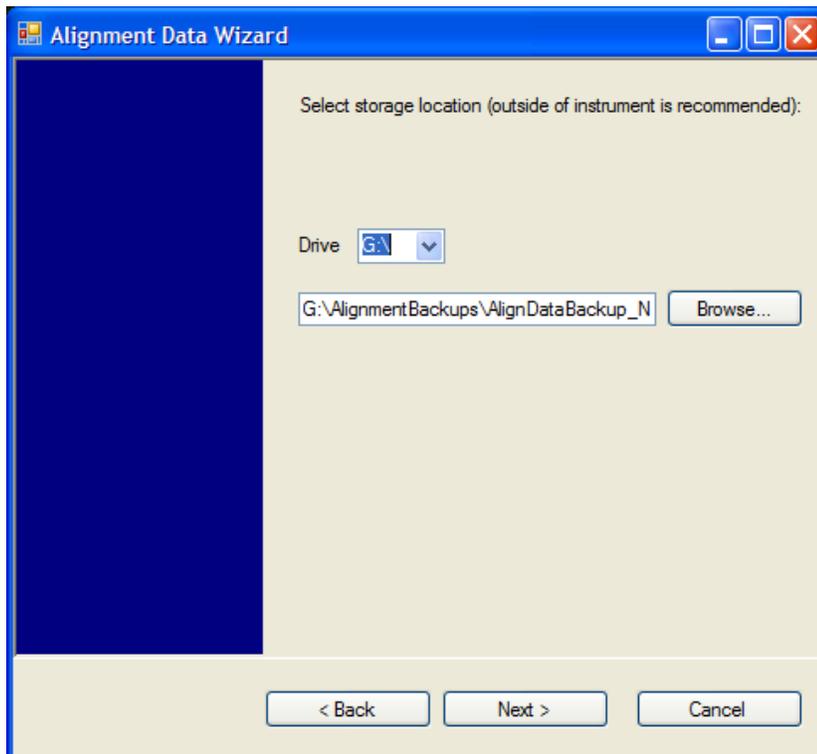
The following dialogue boxes operates without a mouse or external keyboard when you use the default file names.



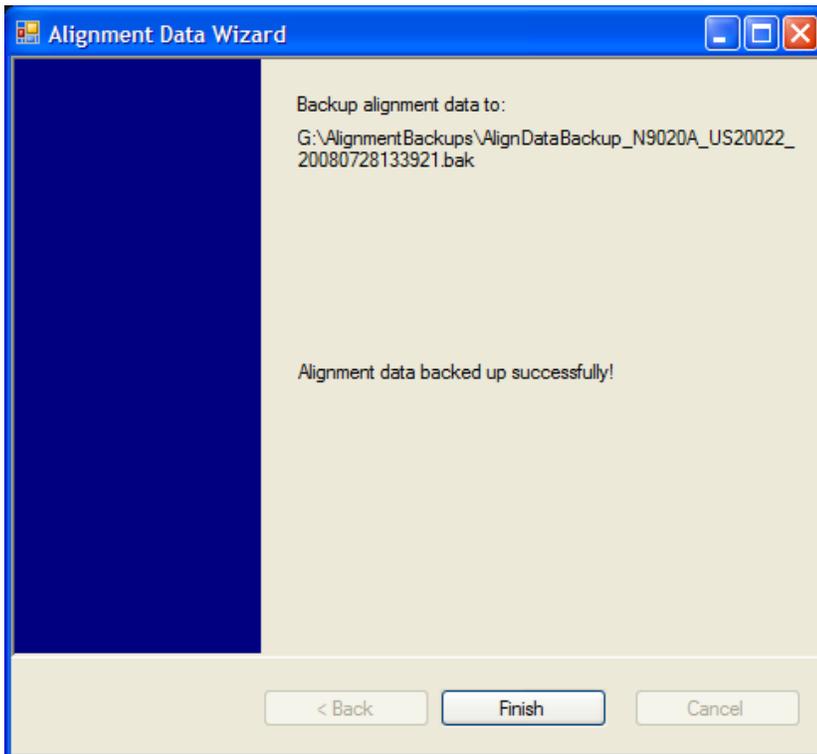
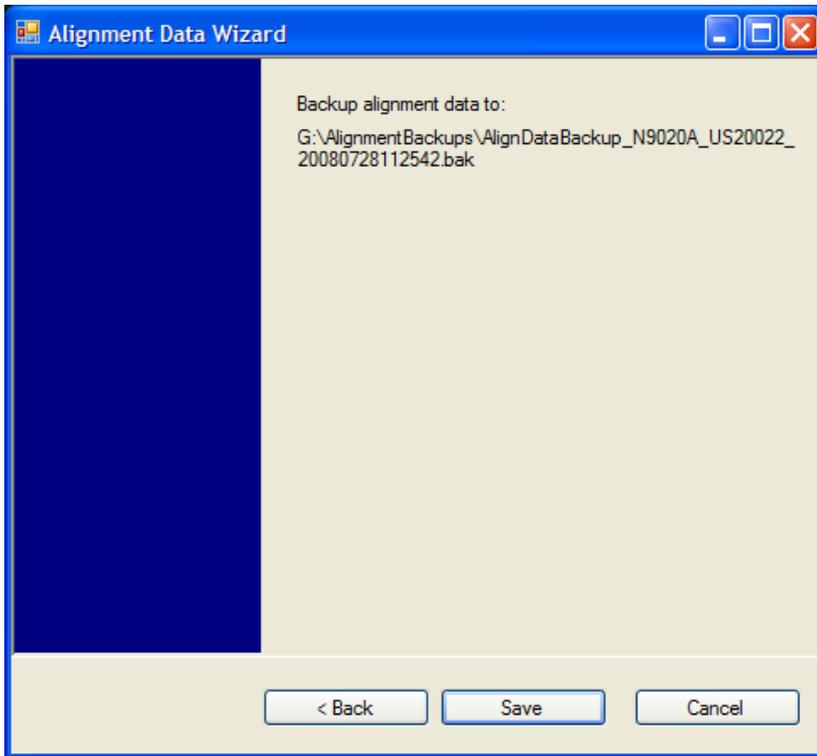
The backup screen indicates the approximate amount of space required to contain the backup file.

The default file name will be AlignDataBackup_<model number>_<serial number>_<date in YYYYMMDDHHMMSS>.bak.

The default backup location will be first drive identified as an external drive (USB or LAN) if such is available; if not, the internal D: partition will be selected.

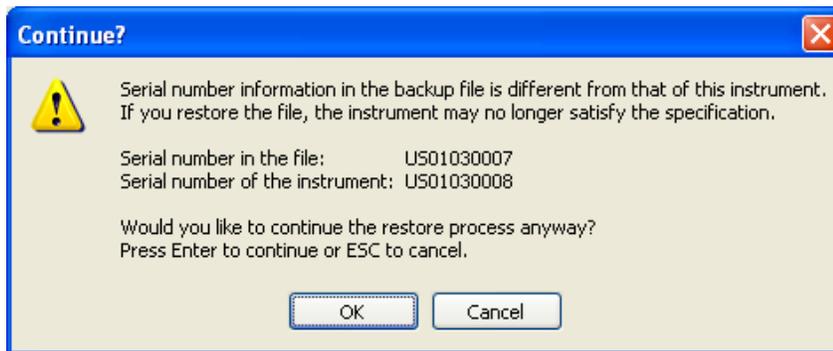


Changing the drive letter will also modify the path displayed in the box below. When this step is first loaded, the drive drop-down menu is populated with connected drives, which provide the user with write access. If there are many unreachable network drives connected to the instrument, this step can take a few seconds. If a USB drive is present, it will be selected by default. The path defaults to the AlignmentBackups folder, and a filename is automatically created in the form of AlignDataBackup_<model>_<serial number>_<date><time>. When the "Next >" button is pressed, you will be prompted to create a new folder if the chosen path does not yet exist.

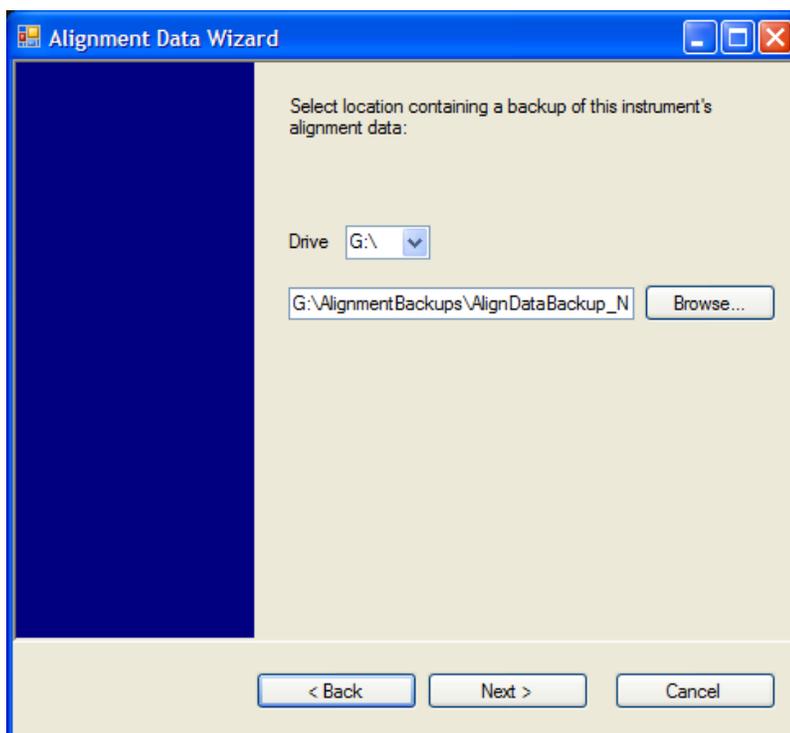


The restore operation checks the validity of the restore file using the database's built-in file validation. If the restore file is corrupt, the existing alignment data will remain in use.

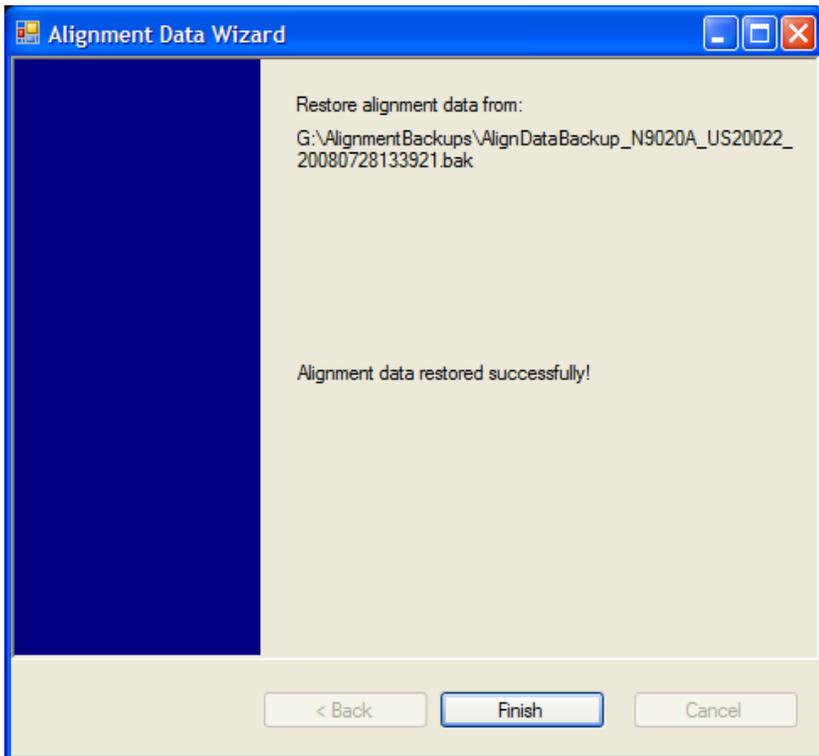
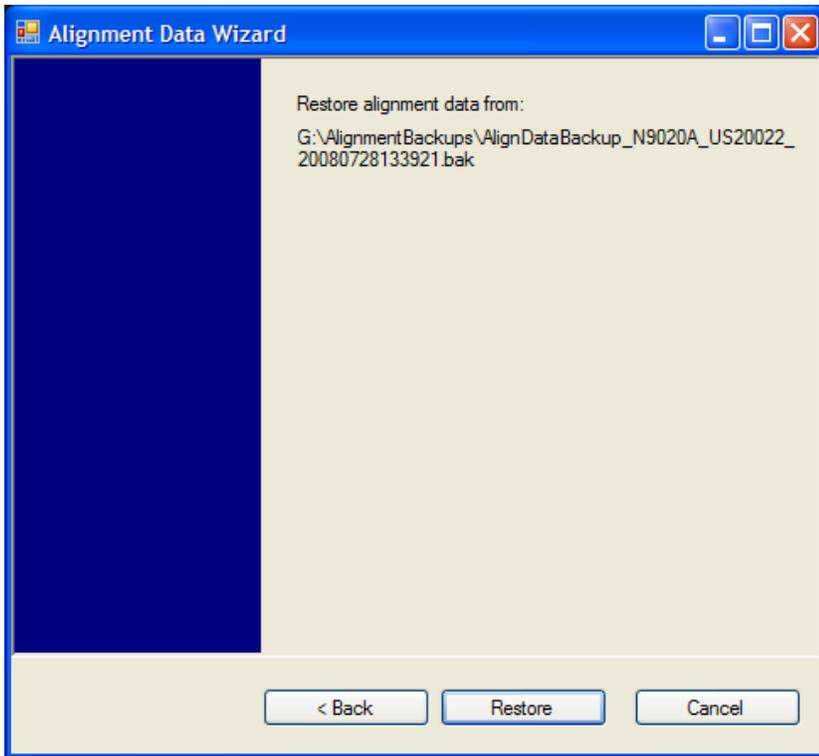
If the serial number information in the backup file being restored is different from that of the instrument, the following message appears (the serial number shown are examples):



The default restore location will be first drive identified as an external drive (USB or LAN) if such is available; if not, the internal D: partition will be selected. The default restore file will be the most recent file that matches the default backup file name format: AlignDataBackup_<model number>_<serial number>_<date>.bak



Changing the drive letter also modifies the path displayed in the box below. When this step is first loaded, the drive drop-down menu is populated with connected drives, which provide you with read access. The path defaults to the AlignBackups folder. The most recent *.bak file in the folder will also be selected by default.



Perform Backup (Remote Command Only)

Invokes an alignment data backup operation to the provided Folder.

NOTE

It is recommended that the Folder provided is outside of the instrument (USB or Mapped Network Drive).

| | |
|-----------------------|--|
| Remote Command | :CALibration:DATA:BACKup <filename> |
| Example | :CAL:DATA:BACK "F:\AlignDataBackup_N9020A_US00000001_2008140100.bak" |
| Initial S/W Revision | A.02.00 |

Perform Restore (Remote Command Only)

Invokes an alignment data restore operation from the provided filename.

| | |
|-----------------------|--|
| Remote Command | :CALibration:DATA:RESTore <filename> |
| Example | :CAL:DATA:REST "F:\ AlignDataBackup_N9020A_US00000001_2008140100.bak " |
| Initial S/W Revision | A.02.00 |

Advanced

Accesses alignment processes that are immediate action operations that perform operations that run until complete. Advanced alignments are performed on an irregular basis, or require additional operator interaction

| | |
|----------------------|--------------------|
| Key Path | System, Alignments |
| Initial S/W Revision | Prior to A.02.00 |

Characterize Preselector

The Preselector tuning curve drifts over temperature and time. Recognize that the Amplitude, Presel Center function adjusts the preselector for accurate amplitude measurements at an individual frequency. Characterize Preselector improves the amplitude accuracy by ensuring the Preselector is approximately centered at all frequencies without the use of the Amplitude, Presel Center function. Characterize Preselector can be useful in situations where absolute amplitude accuracy is not of utmost importance, and the throughput savings or convenience of not performing a Presel Center is desired. Presel Center is required prior to any measurement for best (and warranted) amplitude accuracy.

Keysight recommends that the Characterize Preselector operation be performed yearly as part of any calibration, but performing this operation every three months can be worthwhile.

Characterize Preselector immediately executes a characterization of the Preselector, which is a YIG-tuned filter (YTF). The instrument stops any measurement currently underway, performs the characterization, then restarts the measurement from the beginning (similar to pressing the Restart key).

The query form of the remote commands (:CALibration:YTF?) will invoke the alignment of the YTF subsystem and return a success or failure value.

A failure encountered during alignment will generate the Error Condition message "Characterize Preselector failure" and set bit 3 in the STATus:QUEStionable:CALibration:EXTended:FAILure status register. Successful completion of Characterize Preselector will clear this Condition. It will also begin the

elapsed time counter for Last Characterize Preselector Time, and capture the Last Characterize Preselector Temperature.

The last Characterize Preselector Time and Temperature survives across the power cycle as this operation is performed infrequently.

NOTE

The Characterize Preselector function can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. None of the new characterization data is then used. However, since the old characterization data is purged at the beginning of the characterization, you now have an uncharacterized preselector. You should re-execute this function and allow it to finish before making any further preselected measurements.

| | |
|----------------------|---|
| Key Path | System, Alignments, Advanced |
| Mode | All |
| Remote Command | :CALibration:YTF :CALibration:YTF? |
| Example | :CAL:YTF |
| Notes | :CALibration:YTF? returns 0 if successful :CALibration:YTF? returns 1 if failed (including interfering user signal) While Advanced, Characterize Preselector is performing the alignment, bit 0 in the Status Operation register is set. Completion, or termination, will clear bit 0 in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. Successful completion will clear bit 9 in the Status Questionable Calibration register. A failure encountered during alignment will generate the Error Condition message "Characterize Preselector failed" and set bit 9 in the Status Questionable Calibration register. For Options that support frequencies > 3.6 GHz only. |
| Dependencies | This key does not appear in models that do not contain preselectors. In these models the SCPI command is accepted without error but no action is taken. |
| Couplings | Initializes the time for the Last Characterize Preselector Time. Records the temperature for the Last Characterize Preselector Temperature. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|----------------|---|
| Mode | All |
| Remote Command | :CALibration:YTF:NPENding |
| Example | CAL:YTF:NPEN |
| Notes | :CALibration:YTF:NPENding is the same as :CALibration:YTF including all conditions, status register bits, except that this scpi command does not BLOCK the scpi session, so the user should use status register bits to query if the calibration is successfully completed or not. Typical usage is: 1) :CALibration:YTF:NPENding (Start a YTF calibration) |

- 2) :STATus:OPERation:CONDition? (Check if the calibration is completed or not, If bit 0 is set, then the system is doing calibration, the user should repeat this scpi query until the bit is cleared)
- 3):STATus:QUESTionable:CALibration:EXTended:FAILure:CONDition? (Check if bit 2 is set or not. If this bit is set, that means there are some errors in previous internal source calibration)

| | |
|----------------------|---------|
| Initial S/W Revision | X.14.20 |
|----------------------|---------|

Characterize Reference Clock

Characterizing the reference clock is calibrating the Reference Input Phase with the External Reference Output. This feature is only available when either option DP2 or B40 is present. It requires connecting the 10 MHz OUT to the EXT REF IN port with a BNC cable before running the characterization.

See ["Front panel guided calibration sequence" on page 392](#)

| | |
|-----------------------|---|
| Key Path | System, Alignments, Advanced |
| Mode | All |
| Remote Command | :CALibration:REFerence:CLOCk? |
| Example | :CAL:REF:CLOC:INIT? //connect cable :CAL:REF:CLOC? //disconnect cable :CAL:REF:CLOC:END? |
| Notes | :CALibration:REFerence:CLOCk? returns 0 if successful :CALibration:REFerence:CLOCk? returns 1 if failed |
| Dependencies | Option DP2 or B40 |
| Couplings | Initializes the time for the Last Characterize Reference Clock Time. Records the temperature for the Last Characterize Reference Clock Temperature. Expected to be run after :CAL:REF:CLOC:INIT, and before :CAL:REF:CLOC:END. |
| Initial S/W Revision | A.13.00 |

| | |
|-----------------------|--|
| Parameter Name | Characterize Reference Clock Initialization |
| Mode | All |
| Remote Command | :CALibration:REFerence:CLOCk:INITialize? |
| Example | :CAL:REF:CLOC:INIT? |
| Notes | :CALibration:REFerence:CLOCk:INIT? returns 0 if successful :CALibration:REFerence:CLOCk:INIT? returns 1 if failed |
| Dependencies | Option DP2 or B40 |
| Couplings | Expected to be run before sending the :CAL:REF:CLOC? command. This will stop the current measurement when it has completed (does not abort the current data acquisition), and it will prepare the instrument for the expected cabling. |

| | |
|----------------------|---------|
| Force Restart | Yes |
| Initial S/W Revision | A.12.00 |

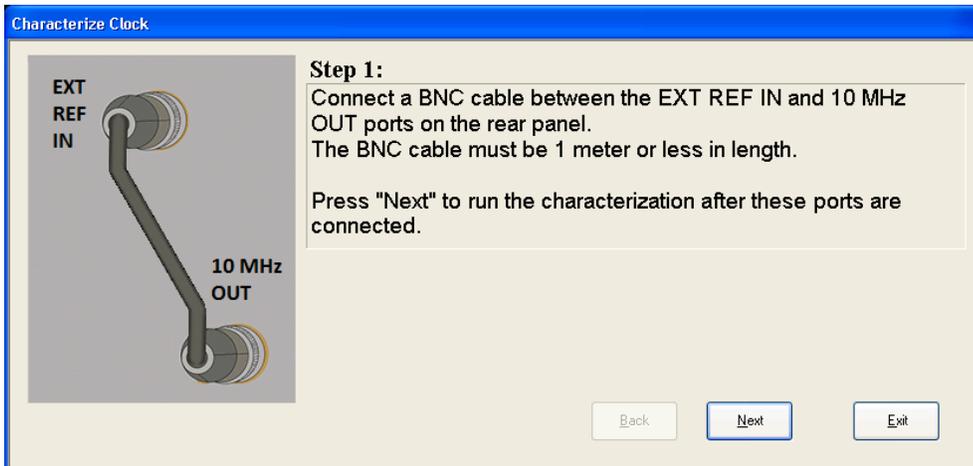
| | |
|-----------------------|--|
| Parameter Name | Characterize Reference Clock End |
| Mode | All |
| Remote Command | :CALibration:REFeRence:CLOCK:END? |
| Example | :CAL:REF:CLOC:END? |
| Notes | :CALibration:REFeRence:CLOCK:END? returns 0 if successful :CALibration:REFeRence:CLOCK:END? returns 1 if failed |
| Dependencies | Option DP2 or B40 |
| Couplings | Expected to be run after sending the :CAL:REF:CLOC? command, and after removing the cable used in that Characterize Reference Clock step. This will resume any queued measurements, and it concludes the reference clock characterization. |
| Force Restart | Yes |
| Initial S/W Revision | A.12.00 |

| | |
|-----------------------|--|
| Parameter Name | Last Characterize Reference Clock |
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Parameter Type | String |
| Mode | All |
| Remote Command | :CALibration:TIME:REFeRence:CLOCK? |
| Example | :CAL:TIME:REFeRence:CLOCK? |
| Notes | Value is the date and time the last successful Characterize Reference Clock was executed. The date is separated from the time by a space character. Returns "" if Characterize Reference Clock has never been performed on the instrument. |
| Dependencies | Option DP2 or B40 |
| State Saved | No |
| Initial S/W Revision | A.12.00 |

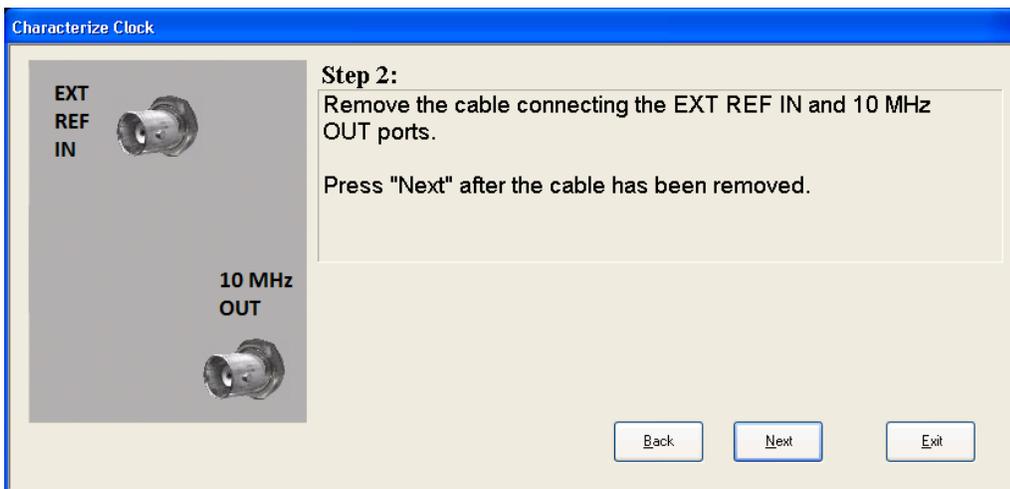
Front panel guided calibration sequence

When selecting "Characterize Reference Clock" through the front panel, the following form will be shown.

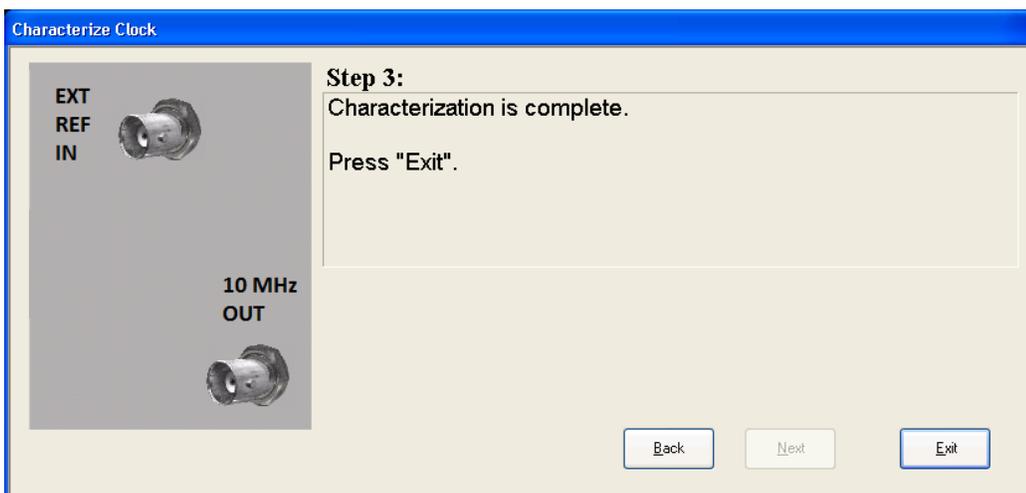
Step 1 of the guided calibration sequence:



Step 2 of the guided calibration sequence:



Step 3 of the guided calibration sequence:



Characterize Noise Floor

On instruments with the NF2 license installed, the calibrated Noise Floor used by Noise Floor Extensions should be refreshed periodically. To do this, press the Characterize Noise Floor key. When you press this key, the instrument stops any measurement currently underway, and a dialog appears with an OK and Cancel button which says:

“This action will take several minutes to perform. Please disconnect all cables from the RF input and press Enter to proceed. Press ESC to cancel.”

When you press Enter or OK, the characterization proceeds. After the characterization, the analyzer restarts the measurement from the beginning (similar to pressing the Restart key). The characterization takes many minutes to run.

The noise floor model used by NFE includes an estimation of the temperature behavior of the noise floor, but this is only an estimation. The noise floor changes little with the age of the components. However, even small changes in the estimated level of the noise floor can make large changes in the effective noise floor, because the effective noise floor is the error in the estimation of the noise floor. Keysight recommends that the Characterize Noise Floor operation be performed when the analyzer is operating at an ambient temperature that is significantly different than the ambient temperature at which this alignment was last run. In addition, Keysight recommends that the Characterize Noise Floor operation be performed after the first 500 hours of operation, and once every calendar year.

The noise floor model from the last operation of Characterize Noise Floor survives across the power cycle.

NOTE

The Characterize Noise Floor function can be interrupted by pressing the Cancel (ESC) front-panel key or remotely with Device Clear followed by the :ABORt SCPI command. None of the new characterization data is then used. However, since the old characterization data is purged at the beginning of the characterization, you now have an uncharacterized noise floor. You should re-execute this function and allow it to finish before making any further measurements with NFE. Until you do, the analyzer will display a “Characterize Noise Floor required” message and set bit 12 in the Status Questionable Calibration register (STATus:QUESTionable:CALibration:EXTended:NEEDED).

| | |
|----------------|---|
| Key Path | System, Alignments, Advanced |
| Mode | All |
| Remote Command | :CALibration:NFLoor :CALibration:NFLoor? |
| Example | :CAL:NFL |
| Notes | :CALibration:NFLoor? returns 0 if successful :CALibration:NFLoor? returns 1 if failed (including interfering user signal) While Characterize Noise Floor is performing the alignment, bit ? in the Status Operation register is set. Completion, or termination, will clear bit ? in the Status Operation register. This command is sequential; it must complete before further SCPI commands are processed. Interrupting the alignment from remote is accomplished by invoking Device Clear followed by the :ABORt command. A failure encountered during characterization will generate the Error Condition message “Characterize Noise Floor failed” message and set bit ? in the Status Questionable Calibration register. Successful completion will clear bit ? in the Status Questionable Calibration register. |
| Dependencies | This key does not appear in models that do not contain NFE. In these models the SCPI command is |

| | |
|----------------------|--|
| | accepted without error but no action is taken. |
| Couplings | Successful completion of Characterize Noise Floor will begin the elapsed time counter or the Last Characterize Noise Floor Time. |
| Initial S/W Revision | A.14.00 |

| | |
|-----------------------|--|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TIME:NFLoor? |
| Example | :CAL:TIME:NFL? |
| Notes | Value is the date and time the last successful Characterize Noise Floor was executed. The date is separated from the time by a space character. Returns "" if no Characterize Noise Floor has ever been performed on the instrument. |
| Dependencies | In models that do not include NFE, this command is not enabled and any attempt to set or query will yield an error. |
| State Saved | No |
| Initial S/W Revision | A.14.00 |

| | |
|-----------------------|---|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TEMPerature:NFLoor? |
| Example | :CAL:TEMP:NFL? |
| Notes | Value is the temperature of the last successful Characterize Noise Floor was executed. Returns "" if no Characterize Noise Floor has ever been performed on the instrument. |
| Dependencies | In models that do not include NFE, this command is not enabled and any attempt to set or query will yield an error. |
| State Saved | No |
| Initial S/W Revision | A.14.00 |

| | |
|-----------------------|---|
| Key Path | Visual annotation in the Show Alignment Statistics screen |
| Mode | All |
| Remote Command | :CALibration:TIME:ELAPsed:NFLoor? |
| Example | :CAL:TIME:ELAP:NFL? |
| Notes | Value is the elapsed time the instrument was powered-on since the last successful Characterize Noise Floor was executed. Returns "" if no Characterize Noise Floor has ever been performed on the instrument. |
| Dependencies | In models that do not include NFE, this command is not enabled and any attempt to set or query will yield an error. |

| | |
|----------------------|---------|
| State Saved | No |
| Initial S/W Revision | A.14.00 |

Timebase DAC

Allows control of the internal 10 MHz reference oscillator timebase. This may be used to adjust for minor frequency alignment between the signal and the internal frequency reference. This adjustment has no effect if the instrument is operating with an External Frequency Reference.

If the value of the Timebase DAC changes (by switching to Calibrated from User with User set to a different value, or in User with a new value entered) an alignment may be necessary. The alignment system will take appropriate action; which will either invoke an alignment or cause an Alert.

| | |
|----------------------|--|
| Key Path | System, Alignments |
| Mode | All |
| Remote Command | :CALibration:FREQuency:REFerence:MODE CALibrated USER :CALibration:FREQuency:REFerence:MODE? |
| Example | :CAL:FREQ:REF:MODE CAL |
| Notes | If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due. If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due. |
| Preset | This is unaffected by Preset but is set to CALibrated on a "Restore System Defaults->Align". |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Calibrated

Sets the Timebase DAC to the value established during factory or field calibration. The value displayed on the menu key is the calibrated value.

| | |
|----------------------|---|
| Key Path | System, Alignments, Timebase DAC |
| Mode | All |
| Example | :CAL:FREQ:REF:MODE CAL |
| Readback Text | [xxx] < where xxx is the calibrated value |
| Initial S/W Revision | Prior to A.02.00 |

User

Allows setting the Timebase DAC to a value other than the value established during the factory or field calibration. The value displayed on the menu key is the calibrated value.

| | |
|----------------------|---|
| Key Path | System, Alignments, Timebase DAC |
| Mode | All |
| Example | :CAL:FREQ:REF:MODE USER |
| Readback Text | xxx < where xxx is the Timebase DAC setting |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-------------------------------------|--|
| Key Path | System, Alignments, Timebase DAC |
| Mode | All |
| Remote Command | :CALibration:FREQuency:REFerence:FINE <integer> :CALibration:FREQuency:REFerence:FINE? |
| Example | :CAL:FREQ:REF:FINE 8191 |
| Notes | If the value of the timebase is changed the alignment system automatically performs an alignment or alerts that an alignment is due. |
| Couplings | Setting :CAL:FREQ:REF:FINE sets :CAL:FREQ:REF:MODE USER |
| Preset | This is unaffected by Preset but is set to the factory setting on a "Restore System Defaults->Align". |
| State Saved | No |
| Min | 0 |
| Max | 16383 |
| Backwards Compatibility SCPI | :CALibration:FREQuency:REFerence:COARse ESA hardware contained two DAC controls for the Timebase. In X-Series the command :CALibration:FREQuency:REFerence:FINE is the method for adjusting the timebase. The :COARse command is provided as an alias to :FINE. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Remote Command | :CALibration:FREQuency:REFerence:COARse <integer> :CALibration:FREQuency:REFerence:COARse? |
| Example | :CAL:FREQ:REF:COAR 8191 |
| Notes | This is an alias for CAL:FREQ:REF:FINE any change to COARse is reflected in FINE and vice-versa. See CAL:FREQ:REF:FINE for description of functionality. |
| Couplings | Setting :CAL:FREQ:REF:COAR sets :CAL:FREQ:REF:MODE USER |
| Initial S/W Revision | Prior to A.02.00 |

I/O Config

Activates a menu for identifying and changing the I/O configuration for remote control.

| | |
|----------------------|------------------|
| Key Path | System |
| Initial S/W Revision | Prior to A.02.00 |

GPIB

Activates a menu for configuring the GPIB I/O port.

| | |
|----------------------|--------------------|
| Key Path | System, I/O Config |
| Initial S/W Revision | A.02.00 |

GPIB Address

Select the GPIB remote address.

| | |
|----------------------|---|
| Key Path | System, I/O Config, GPIB |
| Mode | All |
| Remote Command | :SYSTem:COMMunicate:GPIB[1][:SELF]:ADDRess <integer> :SYSTem:COMMunicate:GPIB[1][:SELF]:ADDRess? |
| Example | :SYST:COMM:GPIB:ADDR 17 |
| Notes | Changing the Address on the GPIB port requires all further communication to use the new address. |
| Preset | This is unaffected by Preset but is set to 18 on a "Restore System Defaults->Misc" |
| State Saved | No |
| Range | 0 to 30 |
| Min | 0 |
| Max | 30 |
| Initial S/W Revision | Prior to A.02.00 |

GPIB Controller

Sets the GPIB port into controller or device mode. In the normal state, GPIB controller is disabled, which allows the analyzer to be controlled by a remote computer. When GPIB Controller is enabled, the instrument can run software applications that use the instrument's computer as a GPIB controller; controlling devices connected to the instrument's GPIB port.

NOTE

When GPIB Controller is enabled, the analyzer application itself cannot be controlled over GPIB. In this case it can easily be controlled via LAN or USB. The GPIB port cannot be a controller and device at the same time. Only one controller can be active on the GPIB bus at any given time. If the analyzer is the controller, an external PC cannot be a controller.

To control the instrument from the software that is performing GPIB controller operation, you can use an internal TCP/IP connection to the analyzer application. Use the address TCPIP0:localhost:inst0:INSTR to send SCPI commands to the analyzer application.

| | |
|----------|--------------------------|
| Key Path | System, I/O Config, GPIB |
|----------|--------------------------|

| | |
|-----------------------|--|
| Mode | All |
| Scope | Mode Global |
| Remote Command | :SYSTem:COMMunicate:GPIB[1][[:SELF]:CONTroller[:ENABle] ON OFF 0 1 :SYSTem:COMMunicate:GPIB[1][[:SELF]:CONTroller[:ENABle]? |
| Example | :SYST:COMM:GPIB:CONT ON Will set GPIB port to Controller |
| Notes | When the instrument becomes the Controller bit 0 in the Standard Event Status Register is set (and when the instrument relinquishes Controller capability bit 0 is cleared in the Standard Event Status Register). |
| Preset | This is unaffected by Preset but is set to OFF on a “Restore System Defaults->Misc” |
| State Saved | No |
| Range | Disabled Enabled |
| Initial S/W Revision | A.02.00 |

Disabled

Disables the GPIB Controller capability, this is the default (or normal) setting.

| | |
|----------------------|---|
| Key Path | System, I/O Config, GPIB, GPIB Controller |
| Example | :SYST:COMM:GPIB:CONT OFF Will set GPIB port to Device |
| Initial S/W Revision | A.02.00 |

Enabled

Enables the GPIB Controller capability.

| | |
|----------------------|--|
| Key Path | System, I/O Config, GPIB, GPIB Controller |
| Example | :SYST:COMM:GPIB:CONT ON Will set GPIB port to Controller |
| Initial S/W Revision | A.02.00 |

SCPI LAN

Activates a menu for identifying and changing the SCPI over a LAN configuration. There are a number of different ways to send SCPI remote commands to the instrument over LAN. It can be a problem to have multiple users simultaneously accessing the instrument over the LAN. These keys limit that somewhat by disabling the telnet, socket, and/or SICL capability.

| | |
|----------------------|--------------------|
| Key Path | System, I/O Config |
| Initial S/W Revision | Prior to A.02.00 |

SCPI Telnet

Turns the SCPI LAN telnet capability On or Off allowing you to limit SCPI access over LAN through telnet.

| | |
|----------------------|--|
| Key Path | System, I/O Config, SCPI LAN |
| Mode | All |
| Remote Command | :SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:TELNet:ENABle? |
| Example | :SYST:COMM:LAN:SCPI:TELN:ENAB OFF |
| Preset | This is unaffected by Preset but is set to ON with a “Restore System Defaults->Misc” |
| State Saved | No |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

SCPI Socket

Turns the capability of establishing Socket LAN sessions On or Off. This allows you to limit SCPI access over LAN through socket sessions.

| | |
|----------------------|--|
| Key Path | System, I/O Config, SCPI LAN |
| Mode | All |
| Remote Command | :SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:SOCKet:ENABle? |
| Example | :SYST:COMM:LAN:SCPI:SOCK:ENAB OFF |
| Preset | This is unaffected by a Preset but is set to ON with a “Restore System Defaults->Misc” |
| State Saved | No |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

SICL Server

Turns the SICL server capability On or Off, enabling you to limit SCPI access over LAN through the SICL server. (SICL IEEE 488.2 protocol.)

| Parameter | Description | Setting |
|-------------------------|---|---------|
| Maximum Connections | The maximum number of connections that can be accessed simultaneously | 5 |
| Instrument Name | The name (same as the remote SICL address) of your analyzer | inst0 |
| Instrument Logical Unit | The unique integer assigned to your analyzer when using SICL LAN | 8 |
| Emulated GPIB Name | The name (same as the remote SICL address) of the device used | gpib7 |

| | | |
|----------------------------|--|----|
| | when communicating with your analyzer | |
| Emulated GPIB Logical Unit | The unique integer assigned to your device when it is being controlled using SICL LAN | 8 |
| Emulated GPIB Address | The emulated GPIB address assigned to your transmitter tester when it is a SICL server (the same as your GPIB address) | 18 |

| | |
|-----------------------|--|
| Key Path | System, I/O Config, SCPI LAN |
| Mode | All |
| Remote Command | :SYSTem:COMMunicate:LAN:SCPI:SICL:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:SICL:ENABle? |
| Example | :SYST:COMM:LAN:SCPI:SICL:ENAB OFF |
| Preset | This is unaffected by Preset, but is set to ON with a “Restore System Defaults->Misc” |
| State Saved | No |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

HiSLIP Server

Turns the HiSLIP server capability On or Off, enabling you to limit SCPI access over LAN through the HiSLIP server.

HiSLIP stands for High Speed LAN Instrument Protocol and is part of the IVI-6.1 specification.

Here is an example of a VISA connection string used to connect to the HiSLIP Server on an X-Series Spectrum Analyzer:

```
TCPIP0::a-n9030a-93016::hislip0::INSTR
```

In the example above, hislip0 is the HiSLIP device name that VISA users must include in their HiSLIP VISA Address strings. Your HiSLIP device name may be different depending on your VISA settings.

| | |
|-----------------------|--|
| Key Path | System, I/O Config, SCPI LAN |
| Mode | All |
| Remote Command | :SYSTem:COMMunicate:LAN:SCPI:HISLip:ENABle OFF ON 0 1 :SYSTem:COMMunicate:LAN:SCPI:HISLip:ENABle? |
| Example | :SYST:COMM:LAN:SCPI:HISL:ENAB OFF |
| Preset | This is unaffected by Preset, but is set to ON with a “Restore System Defaults->Misc” |
| State Saved | No |
| Range | On Off |
| Initial S/W Revision | A.11.00 |

SCPI Socket Control Port (Remote Command Only)

Returns the TCP/IP port number of the control socket associated with the SCPI socket session. This query enables you to obtain the unique port number to open when a device clear is to be sent to the instrument. Every time a connection is made to the SCPI socket, the instrument creates a peer control socket. The port number for this socket is random. The user must use this command to obtain the port number of the control socket. To force a device clear on this socket, open the port and send the string "DCL" to the instrument.

If this SCPI command is sent to a non SCPI Socket interface, then 0 is returned.

| | |
|----------------------|--|
| Mode | All |
| Remote Command | :SYSTem:COMMunicate:LAN:SCPI:SOCKet:CONTRol? |
| Example | :SYST:COMM:LAN:SCPI:SOCK:CONT? |
| Preset | This is unaffected by Preset or "Restore System Defaults->Misc". |
| State Saved | No |
| Range | 0 to 65534 |
| Min | 0 |
| Max | 65534 |
| Initial S/W Revision | Prior to A.02.00 |

Reset Web Password

The embedded web server contains certain capability which are password protected; modifying the LAN configuration of the instrument, and access to web pages that can change the settings of the instrument. The default password from the factory is 'agilent' (without the quotes). The control provided here is the means to set the web password as the user desires, or to reset the password to the factory default.

Selecting Reset web password brings up a control for resetting the password as the user desires, or to the factory default. A keyboard is required to change the password from the factory default of 'agilent' or to set a new password that contains alphabetic characters. The control is:



If this control is entered without an external keyboard or mouse connected, you can cancel the control by pressing the Cancel (ESC) front-panel key.

| | |
|----------------------|--------------------|
| Key Path | System, I/O Config |
| Mode | All |
| Initial S/W Revision | Prior to A.02.00 |

LXI

Opens a menu that allows you to access the various LXI configuration properties.

| | |
|----------------------|--------------------|
| Key Path | System, I/O Config |
| Initial S/W Revision | Prior to A.02.00 |

LAN Reset

Resets the LAN connection.

| | |
|----------------------|-------------------------|
| Key Path | System, I/O Config, LXI |
| Initial S/W Revision | Prior to A.02.00 |

Device Identification (Remote Command Only)

Enabling the LXI device identification will place the LXI Status Indicator to the 'Identify' state. Disabling the LXI device identification will place the LXI Status Indicator to the 'No Fault' state. The LXI Status indicator is in the upper left region of the instrument's graphical user interface (.

| | |
|-----------------------|---|
| Mode | All |
| Remote Command | :LXI:IDENtify[:STATe] OFF ON 0 1 :LXI:IDENtify[:STATe]? |
| Example | :LXI:IDEN ON |
| Preset | Not part of Preset, but reset to OFF on Restore System Defaults All |
| State Saved | No |
| Range | On Off |
| Initial S/W Revision | A.12.50 |

System IDN Response

This key allows you to specify a response to the *IDN? query, or to return the analyzer to the Factory response if you have changed it.

To choose the factory-set response, press the Factory key.

To specify your own response, press the User key, and enter your desired response.

If your test software is expecting the response to indicate Agilent Technologies as the Manufacturer, you can conveniently configure the response by pressing the Agilent key.

| | |
|--------------------------|--|
| Key Path | System, I/O Config |
| Mode | All |
| Remote Command | |
| Notes | <ul style="list-style-type: none"> • This affects the response given in all Modes of the Analyzer, unless the current Mode has also specified a custom response, in which case the current Mode's custom IDN response takes precedence over the System's, but only while that Mode is the current Mode.. • It survives shutdown and restart of the software and therefore survives a power cycle |
| Preset | This is unaffected by Preset but is set to Factory on a "Restore System Defaults->Misc" |
| State Saved | No |
| Initial S/W Revision | A.06.00 |
| Modified at S/W Revision | x.14.50 |

Factory

This key selects the factory setting, for example:

"Agilent Technologies,N9020A,MY00012345,A.05.01"

where the fields are manufacturer, model number, serial number, firmware revision.

| | |
|----------------------|----------------------------------|
| Key Path | System, I/O Config, IDN Response |
| Example | :SYST:IDN:CONF FACT |
| Initial S/W Revision | A.06.0 |

User

This key allows you to specify your own response to the *IDN? query. You may enter your desired response with the Alpha Editor or a plugin PC keyboard.

When you press this key, the active function becomes the current User string with the cursor at the end. This makes it easy to edit the existing string.

If you enter a null string (for example, by clearing the User String while editing and then pressing Done) the analyzer automatically reverts to the Factory setting.

| | |
|----------------------|----------------------------------|
| Key Path | System, I/O Config, IDN Response |
| Example | :SYST:IDN:CONF USER |
| Initial S/W Revision | A.06.00 |

Query USB Connection (Remote Command Only)

Enables you to determine the speed of the USB connection.

| | |
|-----------------------|--|
| Mode | All |
| Remote Command | :SYSTem:COMMunicate:USB:CONNectioN? |
| Example | :SYST:COMM:USB:CONN? |
| Notes | NONE – Indicates no USB connection has been made. LSPeed – Indicates a USB low speed connection (1.5 Mbps). This is reserved for future use, the T+M488 protocol is not supported on low speed connections. HSPeed – Indicates that a USB high speed connection (480 Mbps) has been negotiated. FSPeed – Indicates that a USB full speed connection (12 Mbps) has been negotiated. |
| State Saved | No |
| Range | NONE LSPeed HSPeed FSPeed |
| Initial S/W Revision | Prior to A.02.00 |

USB Connection Status (Remote Command Only)

Enables you to determine the current status of the USB connection.

| | |
|-----------------------|---|
| Mode | All |
| Remote Command | :SYSTem:COMMunicate:USB:STATus? |
| Example | :SYST:COMM:USB:STAT? |
| Notes | SUSPended – Indicates that the USB bus is currently in its suspended state. The bus is in the suspended state when: <ul style="list-style-type: none"> • The bus is not connected to any controller • The controller is currently powered off • The controller has explicitly placed the USB device into the suspended state. When in the suspended state, no USB activity, including start of frame packets are received. ACTive – Indicates that the USB device is in the active state. When the device is in the active state, it is receiving periodic start of frames but it isn't necessarily receiving or transmitting data. |
| State Saved | No |
| Range | SUSPended ACTive |
| Initial S/W Revision | Prior to A.02.00 |

USB Packet Count (Remote Command Only)

Enables you to determine the number of packets received and transmitted on the USB bus.

| | |
|------|-----|
| Mode | All |
|------|-----|

| | |
|-----------------------------|---|
| Remote Command | :SYSTem:COMMunicate:USB:PACKets? |
| Example | :SYST:COMM:USB:PACK? |
| Notes | Two integers are returned. The first is the number of packets received since application invocation, the second is the number of packets transmitted since application invocation. If no packets have been received or transmitted the response is 0,0. The packet count is initialized to 0,0 when the instrument application is started. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Restore Defaults

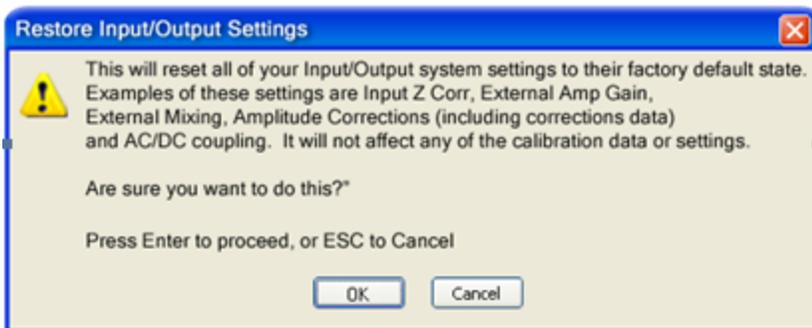
Provides incremental initialization of the system setting groups along with supporting a comprehensive reset of the entire instrument back to a factory default state. The menu selections are the groups of system settings and when one is selected, that particular group of system settings is reset back to their default values.

| | |
|-----------------------------|--|
| Key Path | System |
| Mode | All |
| Remote Command | :SYSTem:DEFault [ALL] ALIGn INPut MISC MODes PON |
| Example | SYST:DEF |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Restore Input/Output Defaults

Causes the group of settings and data associated with Input/Output front-panel key to be a reset to their default values. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. .

Confirmation is required to restore the Input/Output setting. The confirmation dialog is:



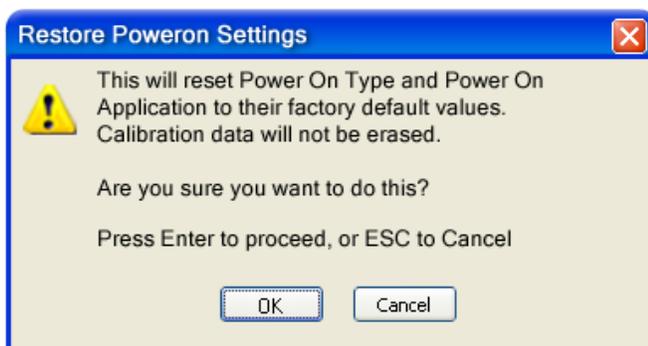
| | |
|-----------------|---------------------------------|
| Key Path | System, Restore System Defaults |
|-----------------|---------------------------------|

| | |
|----------------------|------------------|
| Example | :SYST:DEF INP |
| Initial S/W Revision | Prior to A.02.00 |

Restore Power On Defaults

This selection causes the Power On settings to be a reset to their default value. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. The Power On settings and their default values are Power On Type reset to Mode and Input/Output Defaults and Power On Application reset to whatever the factory set as its default value.

Confirmation is required to restore the factory default values. The confirmation dialog is:



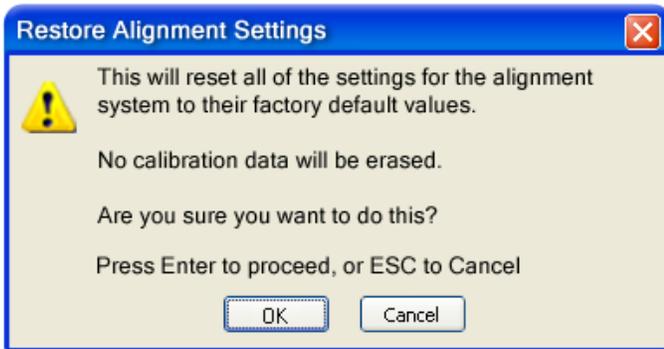
| | |
|----------------------|---------------------------------|
| Key Path | System, Restore System Defaults |
| Example | :SYST:DEF PON |
| Initial S/W Revision | Prior to A.02.00 |

Restore Align Defaults

This selection causes the Alignment system settings to be a reset to their default values. This does not affect any Alignment data stored in the system. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch.

After performing this function, it may impact the auto-alignment time of the instrument until a new alignment baseline has been established.

Confirmation is required to restore the factory default values. The confirmation dialog is:



| | |
|----------------------|---------------------------------|
| Key Path | System, Restore System Defaults |
| Example | :SYST:DEF ALIG |
| Initial S/W Revision | Prior to A.02.00 |

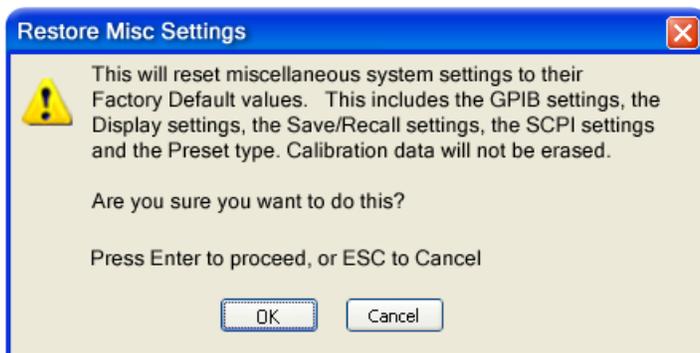
Restore Misc Defaults

This selection causes miscellaneous system settings to be reset to their default values. With this reset, you lose the GPIB address and it is reset to 18, so this should be used with caution. This level of Restore System Defaults does not affect any other system settings, mode settings and does not cause a mode switch. This miscellaneous group contains the rest of the settings that have not been part of the other Restore System Defaults groups. The following table is a complete list of settings associated with this group:

| Miscellaneous Setting | Default Value |
|-----------------------|-------------------------|
| Verbose SCPI | Off |
| The SYST:PRES:TYPE | MODE |
| Auto File Name Number | 000 |
| Save Type | State |
| State Save To | Register 1 |
| Screen Save To | SCREEN000.png |
| DISP:ENABLE | ON |
| Full Screen | Off |
| SCPI Telnet | ON |
| SCPI Socket | ON |
| SICL Server | ON |
| Softkey Language | English |
| System Annotation | ON |
| Display Theme | TDCOLOR |
| System IDN Response | Factory result of *IDN? |

| Miscellaneous Setting | Default Value |
|-------------------------------|---------------|
| System IDN Response selection | Factory |
| Display Intensity | 100 |
| Display Backlight | ON |
| GPIB Address | 18 |

Confirmation is required to restore the factory default values. The confirmation dialog is:

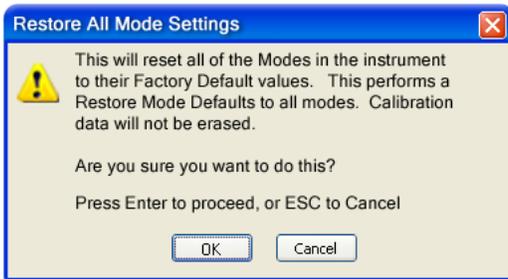


| | |
|--------------------------|---------------------------------|
| Key Path | System, Restore System Defaults |
| Example | :SYST:DEF MISC |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | x.14.50 |

Restore Mode Defaults (All Modes)

This selection resets all of the modes in the instrument back to their default state just as a Restore Mode Defaults does and it switches the instrument to the power-on mode and causes the default measurement for the power-on mode to be active. This level of Restore System Defaults does not affect any system settings, but it does affect the state of all modes and does cause a mode switch unless the instrument was already in the power-on mode.

Confirmation is required to restore the factory default values. The confirmation dialog is:

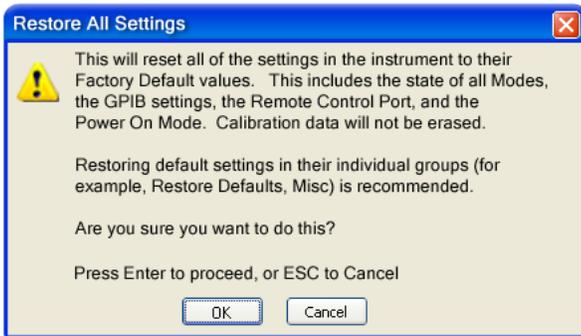


| | |
|----------------------|---|
| Key Path | System, Restore System Defaults |
| Example | :SYST:DEF MOD |
| Couplings | An All Mode will cause the currently running measurement to be aborted, mode switch to the power-on mode and activate the default measurement for the power-on mode.. It gets the mode to a consistent state with all of the default couplings set. |
| Initial S/W Revision | Prior to A.02.00 |

All

This performs a comprehensive reset of ALL analyzer settings to their factory default values. It resets all of the system setting groups, causes a Restore Mode Defaults for all modes in the instrument, and switches back to the power-on mode. It does not affect the User Preset file or any user saved files.

Confirmation is required to restore the factory default values. The confirmation dialog is:



NOTE

If you are using an Keysight USB External Mixer, then you will need to perform a Refresh USB Mixer Connection after Restoring All Defaults.

| | |
|--------------------------|---|
| Key Path | System, Restore System Defaults |
| Example | :SYST:DEF ALL |
| Notes | If using Keysight USB External Mixer, perform a Refresh USB Mixer Connection (SCPI command :MIX:BAND USB) following a Restore All Defaults. |
| Couplings | An All will cause the currently running measurement to be aborted and get all modes to a consistent state, so it is unnecessary to couple any settings. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

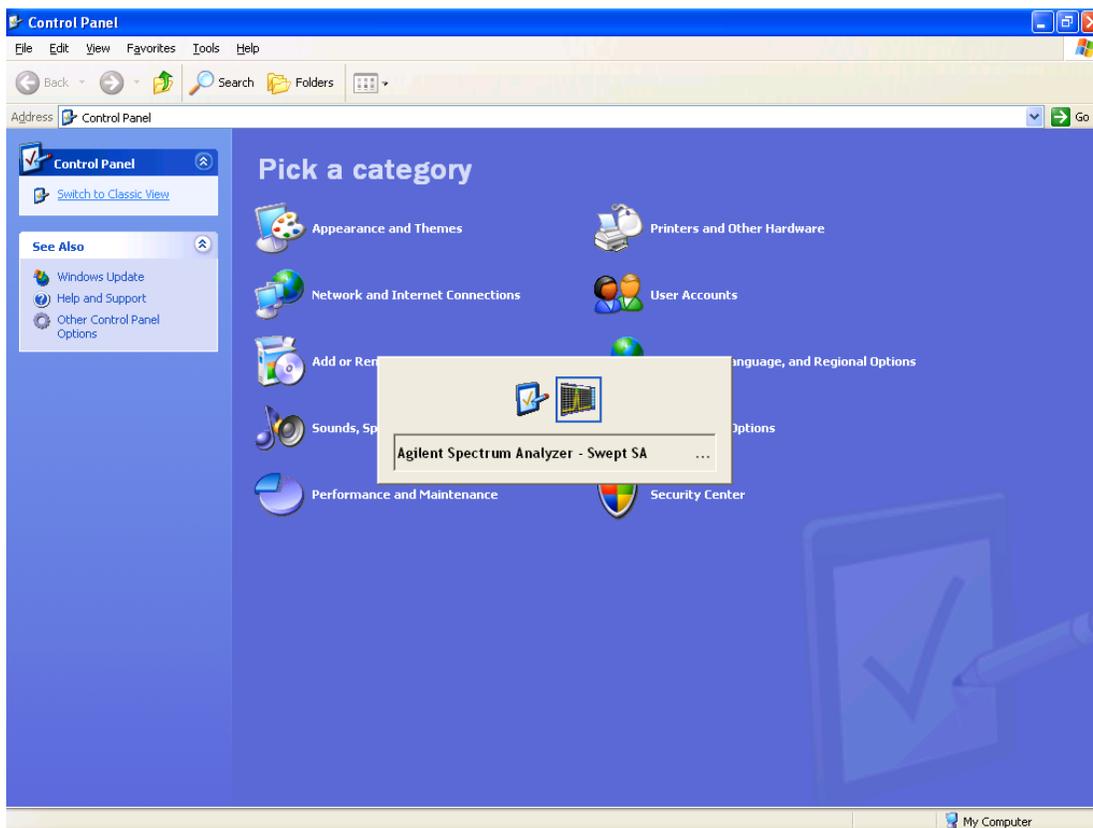
Control Panel...

Opens the Windows Control Panel. The Control Panel is used to configure certain elements of Windows that are not configured through the hardkey/softkey System menus.

NOTE This feature is not available if option SF1 is installed.

The Control Panel is a separate Windows application, so to return to the analyzer once you are in the Control Panel, you may either:

Exit the Control Panel by clicking on the red X in the upper right hand corner, with a mouse



Or use Alt-Tab: press and hold the Alt key and press and release the Tab key until the Analyzer logo is showing in the window in the center of the screen, as above, then release the Alt key.

| Key Path | System |
|----------------------|---------------------------------|
| Notes | No remote command for this key. |
| Initial S/W Revision | Prior to A.02.00 |

Licensing...

Opens the license explorer.

NOTE This feature is not available if option SF1 is installed.

For Help on this key, select Help in the menu bar at the top of the license explorer window.

| | |
|-------------------------------|---|
| Key Path | System |
| Notes | No equivalent remote command for this key. |
| Backwards Compatibility Notes | In ESA the SCPI command for displaying the Show Licenses screen is: :SYSTem:CONFigure:LKEY:STATe OFF ON 0 1:SYSTem:CONFigure:LKEY:STATe? There are no equivalent SCPI commands in the X-Series for displaying the License Explorer. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|---|
| Remote Command | :SYSTem:LKEY <"OptionInfo">, <"LicenseInfo"> |
| Example | SYST:LKEY "N9073A-1FP", "027253AD27F83CDA5673A9BA5F427FDA5E4F25AEB1017638211AC9F60D9C639FE539735909C551DE0A91" |
| Notes | The <"OptionInfo"> contains the feature and the version. You must specify the feature but can omit the version. If you omit the version, the system regards it as the latest one, since the system knows which version is supported for each feature. The <"LicenseInfo"> contains the signature, the expiration date, and serial number for transport if transportable. You must specify the signature, but you can omit the other information. If you omit the expiration date, the system regards it as permanent. If you omit the serial number, the system regards it as non-transportable. As a result, this supports reverse compatibility. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Remote Command | :SYSTem:LKEY:DElete <"OptionInfo">,<"LicenseInfo"> |
| Example | SYST:LKEY:DEL 'N9073A-1FP', "027253AD27F83CDA5673A9BA5F427FDA5E4F25AEB1017638211AC9F60D9C639FE539735909C551DE0A91" |
| Notes | The <"OptionInfo"> contains the feature and the version. You must specify the feature but can omit the version. If you omit the version, the system regards it as the latest one, if more than one version is installed. The <"LicenseInfo"> contains the signature, the expiration date, and whether or not be transportable. You must specify the signature, but you can omit the other information. If you omit the expiration date, the system regards it as permanent. If you omit the transportability, the system regards it as non-transportable. As a result, this supports reverse compatibility. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|---|
| Remote Command | :SYSTem:LKEY:LIST? |
| Notes | <p>Return Value: An <arbitrary block data> of all the installed instrument licenses. The format of each license is as follows. <Feature>,<Version>,<Signature>,<Expiration Date>,<Serial Number for Transport> Return Value Example: #3136 N9073A-1FP,1.000,B043920A51CA N9060A-2FP,1.000,4D1D1164BE64 N9020A-508,1.000,389BC042F920 N9073A-1F1,1.000,5D71E9BA814C,13-aug-2005 <arbitrary block data> is: #NMMM<data> Where: N is the number of digits that describes the number of MMM characters. For example if the data was 55 bytes, N would be 2. MMM would be the ASCII representation of the number of bytes. In the previous example, N would be 55. <data> ASCII contents of the data</p> |
| Initial S/W Revision | Prior to A.02.00 |
| Remote Command | :SYSTem:LKEY? <"OptionInfo"> |
| Example | SYST:LKEY? "N9073A-1FP" |
| Notes | <p>The <"OptionInfo"> contains the feature and the version. You must specify the feature but can omit the version. If you omit the version, the system regards it as the latest one. Return Value: <"LicenseInfo"> if the license is valid, null otherwise. <"LicenseInfo"> contains the signature, the expiration date, and serial number if transportable. Return Value Example: "B043920A51CA"</p> |
| Initial S/W Revision | Prior to A.02.00 |
| Remote Command | :SYSTem:HID? |
| Notes | Return value is the host ID as a string |
| Initial S/W Revision | Prior to A.02.00 |

Security

Accesses capabilities for operating the instrument in a security controlled environment.

| | |
|----------------------|---------|
| Key Path | System |
| Initial S/W Revision | A.04.00 |

USB

The Windows operating system can be configured to disable write access to the USB ports for users who are in a secure environment where transferring data from the instrument is prohibited. This user interface is a convenient way for the customer to disable write access to USB.

| | |
|-----------------------|---|
| Key Path | System, Security |
| Mode | All |
| Scope | Mode Global |
| Remote Command | :SYSTem:SECurity:USB:WPRotect[:ENABLE] ON OFF 0 1 :SYSTem:SECurity:USB:WPRotect[:ENABLE]? |
| Example | :SYST:SEC:USB:WPR ON Will set USB ports to Read-only |
| Notes | When the USB ports are in Read-only mode then no data can be stored to USB, including the internal USB memory used for a back-up location for the calibration data. |
| Dependencies | This key is grayed-out unless the current user has administrator privileges. |
| Preset | This is unaffected by Preset or any Restore System Defaults. An Agilent Recovery will set the USB to write protect OFF |
| State Saved | No |
| Range | Read-Write Read only |
| Initial S/W Revision | A.04.00 |

Read-Write

Selection for allowing full read-write access to the USB ports.

| | |
|----------------------|--|
| Key Path | System, Security, USB |
| Example | :SYST:SEC:USB:WPR OFF Will set USB ports to Read-Write |
| Initial S/W Revision | A.04.00 |

Read only

Selection for disabling write access to the USB ports.

| | | |
|----------------------|-----------------------|---------------------------------|
| Key Path | System, Security, USB | |
| Example | :SYST:SEC:USB:WPR ON | Will set USB ports to Read only |
| Initial S/W Revision | A.04.00 | |

Diagnostics

The Diagnostics key in the System menu gives you access to basic diagnostic capabilities of the instrument.

| | |
|----------------------|------------------|
| Key Path | System |
| Initial S/W Revision | Prior to A.02.00 |

Show Hardware Statistics

Provides a display of various hardware statistics. The statistics include the following:

- Mechanical relay cycles
- High and Low temperature extremes
- Elapsed time that the instrument has been powered-on (odometer)

The display should appear listing the statistics, product number, serial number, and firmware revision.

| Hardware Statistical Information | |
|--------------------------------------|----------|
| Agilent MXA Signal Analyzer | |
| Product Number: N9020A | |
| Serial Number: US00061145 | |
| Instrument SW Revision: A.12.00 | |
| Revision Date: 7/11/2012 12:11:10 PM | |
| | |
| Component Name | Value |
| MechAtten #1 Count Total | 457304 |
| Calibrator Switch Cycles | 105953 |
| AC/DC Switch Cycles | 114240 |
| 2 dB #1 Mechanical Atten Cycles | 112655 |
| 2 dB #2 Mechanical Atten Cycles | 124456 |
| MechAtten #2 Count Total | 472265 |
| 6 dB Mechanical Atten Cycles | 115302 |
| 10 dB Mechanical Atten Cycles | 93602 |
| 20 dB Mechanical Atten Cycles | 144781 |
| 30 dB Mechanical Atten Cycles | 118580 |
| Low Noise Path Switch | 45668 |
| Preselector Bypass Cycles | 31133 |
| High temperature operating extreme | 45.75 |
| Low temperature operating extreme | -23.9375 |
| Elapsed Time (On-Time)(hours) | 134164 |

In some CXA models this field is called "Fixed Atten"

Some CXA models omit these fields

Only shown if LNP installed

Only shown if MPB installed

The CXA models in which the AC/DC Switch field is called Fixed Atten and that omit the mechanical attenuation fields are the N9000A-503/507 models.

Modular HWs only have time and temperature information in Show Hardware Statistics.

The data will be updated only when the Show Hardware Statistics menu key is pressed, it will not be updated while the screen is displayed.

The tabular data should be directly printable.

| | |
|----------------------|---|
| Key Path | System, Diagnostics |
| Mode | All |
| Notes | The values displayed on the screen are only updated upon entry to the screen and not updated while the screen is being displayed. |
| Initial S/W Revision | Prior to A.02.00 |

SCPI for Show Hardware Statistics (Remote Commands Only)

Each of the hardware statistic items can be queried via SCPI.

- "Query the Mechanical Relay Cycle Count" on page 417
- "Query the Operating Temperature Extremes" on page 417
- "Query the Elapsed Time since 1st power on" on page 418

Query the Mechanical Relay Cycle Count

Return the count of mechanical relay cycles.

For N9038A model, there are additional 2 Mechanical Relays which are <N9038A Input2>, <N9038A Bypass>.

| | |
|--------------------------|---|
| Remote Command | :SYSTem:MRELay:COUNT? |
| Example | :SYST:MREL:COUN? |
| Notes | <p>Query Only</p> <p>The return value is a comma separated list of the individual counts for each mechanical relay.</p> <p>The position of the relays in the list is: “<Cal Signal>,<AC/DC>,<2dB #1 Atten>,<2dB #2 Atten>,<6dB Atten>,<10dB Atten>,<20dB Atten>,<30dB Atten>,<Fixed Atten>,<Low Noise Path Switch>,<Presel Bypass>,<N9038A Input2>,<N9038A Bypass>”</p> <p>Items in the list not pertaining to your particular hardware configuration will return as -999 for those items.</p> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.08.00 |

Query the Operating Temperature Extremes

Returns the low operating temperature extreme value. The value survives a power-cycle and is the temperature extreme encountered since the value was reset by the factory or service center.

| | |
|-----------------------|---|
| Mode | All |
| Remote Command | :SYSTem:TEMPerature:LEXTreme? |
| Example | :SYST:TEMP:LEXT? |
| Notes | Value is in degrees Celsius at which the lowest operating temperature has been recorded since 1st power-up. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Mode | All |
| Remote Command | :SYSTem:TEMPerature:HEXTreme? |
| Example | :SYST:TEMP:HEXT? |
| Notes | Value is in degrees Celsius at which the highest operating temperature has been recorded since 1st power-up. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Query the Elapsed Time since 1st power on

Returns the elapsed on-time in minutes since 1st power-on.

| | |
|-----------------------------|--------------------|
| Remote Command | :SYSTem:PON:ETIMe? |
| Example | :SYST:PON:ETIM? |
| Notes | Query Only |
| Initial S/W Revision | Prior to A.02.00 |

Internet Explorer...

This key launches Microsoft Internet Explorer. A mouse and external keyboard are highly desired for using Internet Explorer. When Internet Explorer is running, close Internet Explorer to return focus to the Instrument Application (or use Alt-Tab).

NOTE This feature is not available if option SF1 is installed.

| | |
|-----------------------------|--|
| Key Path | System |
| Mode | All |
| Notes | No equivalent remote command for this key. |
| Initial S/W Revision | A.05.01 |

System Remote Commands (Remote Commands Only)

The commands in this section have no front-panel key equivalent.

"System Powerdown (Remote Command Only)" on page 418

"List installed Options (Remote Command Only)" on page 419

"Lock the Front-panel keys (Remote Command Only)" on page 419

"List SCPI Commands (Remote Command Only)" on page 420

"SCPI Version Query (Remote Command Only)" on page 420

"Date (Remote Command Only)" on page 420

"Time (Remote Command Only)" on page 420

| | |
|-----------------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|-----------------------------|------------------|

System Powerdown (Remote Command Only)

| | |
|-----------------------|--|
| Remote Command | SYSTem:PDOWn [NORMal FORCe] |
| Notes | Shuts down the instrument in the normal way (NORMAL) or forced way (FORCe). In case there is |

another application with modified data pending for saving, the application prompts the user. The system waits until the user responds in the normal mode. It will go off after 20 seconds of wait in the force mode and all data will be lost.

List installed Options (Remote Command Only)

Lists the installed options that pertain to the instrument (signal analyzer). .

| | |
|-----------------------|---|
| Mode | All |
| Remote Command | :SYSTem:OPTions? |
| Example | :SYST:OPT? |
| Notes | The return string is a comma separated list of the installed options. For example: "503,P03,PFR" :SYSTem:OPTions? and *OPT? are the same. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Lock the Front-panel keys (Remote Command Only)

Disables the instrument keyboard to prevent local input when the instrument is controlled remotely. Annunciation showing a "K" for "Klock" (keyboard lock) alerts the local user that the keyboard is locked. Klock is similar to the GPIB Local Lockout function; namely that no front-panel keys are active with the exception of the Power Standby key. (The instrument is allowed to be turned-off if Klock is ON.) The Klock command is used in remote control situations where Local Lockout cannot be used.

Although primary intent of Klock is to lock-out the front panel, it will lock-out externally connected keyboards through USB. Klock has no effect on externally connected pointing devices (mice).

The front panel 'Local' key (Cancel/Esc) has no effect if Klock is ON.

| | |
|-----------------------|--|
| Mode | All |
| Remote Command | :SYSTem:KLOCK OFF ON 0 1 :SYSTem:KLOCK? |
| Example | :SYST:KLOC ON |
| Notes | Keyboard lock remains in effect until turned-off or the instrument is power-cycled |
| Preset | Initialized to OFF at startup, unaffected by Preset |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

List SCPI Commands (Remote Command Only)

Outputs a list of the valid SCPI commands for the currently selected Mode.

| | |
|-----------------------------|---|
| Remote Command | :SYSTem:HELP:HEADers? |
| Example | :SYST:HELP:HEAD? |
| Notes | The output is an IEEE Block format with each command separated with the New-Line character (hex 0x0A) |
| Initial S/W Revision | Prior to A.02.00 |

SCPI Version Query (Remote Command Only)

Returns the SCPI version number with which the instrument complies. The SCPI industry standard changes regularly. This command indicates the version used when the instrument SCPI commands were defined.

| | |
|-----------------------------|------------------|
| Remote Command | :SYSTem:VERSion? |
| Example | :SYST:VERS? |
| Initial S/W Revision | Prior to A.02.00 |

Date (Remote Command Only)

The recommended access to the Date, Time, and Time zone of the instrument is through the Windows native control (Control Panel or accessing the Task Bar). You may also access this information remotely, as shown in this command and Time (below).

Sets or queries the date in the instrument.

| | |
|-----------------------------|--|
| Mode | All |
| Remote Command | :SYSTem:DATE "<year>,<month>,<day>" :SYSTem:DATE? |
| Example | :SYST:DATE "2006,05,26" |
| Notes | <year> is the four digit representation of year. (for example, 2006) <month> is the two digit representation of year. (for example. 01 to 12) <day> is the two digit representation of day. (for example, 01 to 28, 29, 30, or 31) depending on the month and year Unless the current account has Power User or Administrator privileges, an error will be generated by this command and no action will be taken. |
| Initial S/W Revision | Prior to A.02.00 |

Time (Remote Command Only)

Sets or queries the time in the instrument.

| | |
|-----------------------|--|
| Mode | All |
| Remote Command | :SYSTem:TIME "<hour>,<minute>,<second>" :SYSTem:TIME? |
| Example | :SYST:TIME "13,05,26" |
| Notes | <hour> is the two digit representation of the hour in 24 hour format <minute> is the two digit representation of minute <second> is the two digit representation of second Unless the current account has Power User or Administrator privileges, an error will be generated by this command and no action will be taken. |
| Initial S/W Revision | Prior to A.02.00 |

7 Trigger Functions

Trigger

Accesses a menu of keys to control the selection of the trigger source and the setup of each of the trigger sources. The analyzer is designed to allow triggering from a number of different sources, for example, Free Run, Video, External, RF Burst, and so forth.

The TRIG:SOURCe command (below) will specify the trigger source for the currently selected input (RF or I/Q). If you change inputs, the new input remembers the trigger source it was last programmed to for the current measurement, and uses that trigger source. You can directly set the trigger source for each input using the TRIGger:RF:SOURce and TRIGger:IQ:SOURce commands (later in this section). When in External Mixing, the analyzer uses the RF trigger source.

Note the inclusion of the <measurement> parameter in the command below. Because each measurement remembers its own Trigger Source, the command must be qualified with the measurement name. Note that for the Swept SA measurement this is not the case; for backwards compatibility, no <measurement> parameter is used when setting the Trigger Source for the Swept SA measurement.

See ["Trigger Source Presets" on page 425](#)

See ["RF Trigger Source" on page 428](#)

See ["I/Q Trigger Source" on page 429](#)

See ["More Information" on page 430](#)

| Key Path | Front-panel key |
|-----------------------|--|
| Remote Command | <pre>:TRIGger:<measurement>[:SEquence]:SOURce EXTernal1 EXTernal2 IMMediate LINE FRAMe RFBurst VIDeo IF ALARm LAN IQMag IDEMod QDEMod IINPut QINPut AIQMag TV :TRIGger:<measurement>[:SEquence]:SOURce?</pre> <p>where <measurement> is the measurement for which you wish to set the Source (blank for the Swept SA measurement)</p> |
| Example | <pre>TRIG:ACP:SOUR EXT1</pre> <p>Selects the external 1 trigger input for the ACP measurement and the selected input</p> <pre>TRIG:SOUR VID</pre> <p>Selects video triggering for the Swept SA (SANalyzer) measurement in the Spectrum Analyzer mode. For SAN, do not use the <measurement> keyword. Only send this form in the Spectrum Analyzer mode or you will get an Undefined Header error</p> |
| Notes | <p>Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available.</p> <p>Not all trigger sources are available for each input. See the "RF Trigger Source" on page 428 and "I/Q Trigger Source" on page 429 commands for detailed information on which trigger sources are available for each input.</p> <p>Other trigger-related commands are found in the INITiate and ABORt SCPI command subsystems.</p> <p>*OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned.</p> <p>Available ranges and presets can vary from mode to mode.</p> |
| Dependencies | <p>In some models, there is no second External input. In these models, the External 2 key is blanked and</p> |

| | |
|-------------------------------------|--|
| | the EXternal2 parameter will generate a "Hardware missing; Not available for this model number" message. |
| Preset | See table below |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:SOURce EXternal For backward compatibility, the parameter EXternal is mapped to EXternal1 |
| Backwards Compatibility SCPI | [:SENSe]:<measurement>:TRIGger:SOURce This backwards compatibility alias command is provided for ESA/PSA compatibility This backwards compatibility command does not apply to the Swept SA measurement, for that just use :TRIGger:SOURce This backwards compatibility command does not apply to the monitor spectrum, log plot and spot frequency measurements |
| Backwards Compatibility SCPI | [:SENSe]:<measurement>:TRIGger:SOURce IF In earlier instruments, the parameter IF was used by apps for the video trigger, so using the IF parameter selects VIDeo triggering. Sending IF in the command causes VID to be returned to a query. |
| Backwards Compatibility SCPI | [:SENSe]:ACPr:TRIGger:SOURce This backwards Compatibility SCPI command is provided to support the same functionality as [:SENSe]:ACPr:TRIGger:SOURce (PSA W-CDMA, PSA cdma2000 and PSA 1xEVDO) due to the fact that the ACPr node conflicts with the ACPower node. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Trigger Source Presets

Here are the Trigger Source Presets for the various measurements:

| Meas | Mode | Preset for RF | Preset for IQ | Notes |
|----------|--|-----------------------------|------------------|---|
| Swept SA | SA | IMM | IQ not supported | |
| CHP | SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, DVB-T/H, DTMB, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV, MSR | IMM | IQ not supported | |
| OBW | SA, WCDMA, C2K, WIMAX OFDMA, | 1xEVDO: EXT1 others: IMM | IQ not supported | For 1xEVDO mode, the trigger source is coupled with the gate state, as well as the gate |

| | | | | |
|----------|---|---|--|--|
| | TD-SCDMA, 1xEVDO, LTE, LTETDD, CMMB, ISDB-T, MSR | | | source. When the trigger source changes to RFBurst, External1 or External2, the gate state is set to on, and the gate source is set identically with the trigger source. When the trigger source changes to IMMEDIATE, VIDEO, LINE, FRAME or IF, the gate state is set to off. |
| CCDF | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV, MSR | WIMAX OFDMA: RFBurst LTETDD: BTS: External 1 MS: Periodic Timer TD-SCDMA and 1xEV-DO: BTS: External 1 MS: RFBurst SA, WCDMA, C2K, LTE, CMMB, ISDB-T, DVB-T/H, DTMB, Digital Cable TV, MSR: IMMEDIATE | TD-SCDMA and 1xEV-DO: BTS: External 1 MS: IQMag LTETDD: BTS: External 1 MS: Periodic Timer Others: IMM | For TD-SCDMA: Trigger source is coupled with radio device. When radio device changes to BTS, trigger source will be changed to EXTERNAL1. When radio device changes to MS, trigger source will be set as RFBurst for RF or IQ Mag for BBIQ. When TriggerSource is RFBurst or IQ Mag, Measure Interval is grayed out. |
| ACP | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV, MSR | IMM | IQ not supported | |
| Tx Power | SA, GSM, TD-SCDMA | SA, GSM: RFBurst TD-SCDMA: EXTERNAL | IMM | TD-SCDMA doesn't support the Line and Periodic Timer parameters. When the mode is TD-SCDMA, if the Radio Device is switched to BTS, the value will be changed to External 1 and if the Radio device is switched to MS, the value will be changed to RFBurst |
| SPUR | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, MSR | IMM | IQ not supported | |
| SEM | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB- | 1xEVDO(BTS): EXTERNAL1 All others: IMMEDIATE | IQ not supported | |

| | T/H, DTMB, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV, MSR | | | |
|-----------|--|---|---|--|
| CDP | WCDMA | IMM | IMM | |
| RHO | WCDMA | IMM | IMM | |
| PCON | WCDMA | IMM | IMM | |
| QPSK | WCDMA, C2K, 1xEVDO | All except CDMA1xEVDO: IMMediate CDMA1xEVDO: EXT1 | IMM | |
| MON | All except SA and BASIC | IMM | IQ not supported | |
| WAV | | LTETDD: BTS: External 1 MS: Periodic Timer GSM/EDGE: RFBurst All others: IMMediate | LTETDD: BTS: External 1 MS: Periodic Timer GSM/EDGE: IQMag All others: IMMMediate | |
| PVT | WIMAXOFDMA | RFB | IMM | |
| EVM | WIMAXOFDMA, DVB-T/H, DTMB, LTE, LTETDD, CMMB, ISDB-T, Digital Cable TV | All but CMMB: IMM CMMB: Periodic Timer | All but CMMB: IMM CMMB: External 1 | LTE, LTETDD supports Free Run, Video and External 1 only. |
| SPEC | BASIC | IMM | IMM | |
| LOG Plot | PN | IMM | IQ not supported | |
| Spot Freq | PN | IMM | IQ not supported | |
| GMSK PVT | EDGE/GSM | RFB | IMM | |
| GMSK PFER | EDGE/GSM | RFB | IQMag | |
| GMSK ORFS | EDGE/GSM | RF Burst | IQ not supported | |
| EDGE PVT | EDGE/GSM | RFB | IMM | |

| | | | |
|--------------------------------|------------------|--|--|
| EDGE EVM | EDGE/GSM | RFB | IQMag |
| EDGE ORFS | EDGE/GSM | Periodic Timer | IQ not supported |
| Combined WCDMA | WCDMA | IMM | IQ not supported |
| Combined GSM | EDGE/GSM | RFB | IQ not supported |
| List Power Step | WCDMA, EDGE/GSM | IMM | IQ not supported |
| Transmit On/Off Power | LTETDD | LTETDD: BTS: External 1 MS: Periodic Timer | LTETDD: BTS: External 1 MS: Periodic Timer |
| Transmit Analysis | BLUETOOTH | RFB | IQ not supported |
| Adjacent Channel Power | BLUETOOTH | IMM | IQ not supported |
| LE In-band Emissions | BLUETOOTH | IMM | IQ not supported |
| EDR In-band Spurious Emissions | BLUETOOTH | Periodic Timer | IQ not supported |
| Conformance EVM | LTE, LTETDD, MSR | IMM | IMM |

RF Trigger Source

The RF Trigger Source command selects the trigger to be used for the specified measurement when RF is the selected input. The RF trigger source can be queried and changed even while another input is selected, but it is inactive until RF becomes the selected input.

Note the inclusion of the <measurement> parameter in the command below. Because each measurement remembers its own Trigger Source, the command must be qualified with the measurement name. Note that for the Swept SA measurement this is not the case; for backwards compatibility, no <measurement> parameter is used when setting the Trigger Source for the Swept SA measurement.

| | |
|-----------------------|--|
| Remote Command | <code>:TRIGger:<measurement>[:SEquence]:RF:SOURce EXTernal1 EXTernal2 IMMEDIATE LINE FRAME RFBurst VIDEO IF ALARm LAN TV</code> <code>:TRIGger:<measurement>[:SEquence]:RF:SOURce?</code> |
| Example | <code>TRIG:ACP:RF:SOUR EXT1</code> Selects the external 1 trigger input for the ACP measurement and the RF input |

| | |
|------------------------------|---|
| | <p>TRIG:RF:SOUR VID</p> <p>Selects video triggering for the SANalyzer measurement and the RF input. For SAN, do not use the <measurement> keyword.</p> |
| Notes | <p>Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available.</p> <p>Not all trigger sources are available for each input. For the RF Trigger Source, the following trigger sources are available:</p> <ul style="list-style-type: none"> –IMMediate - free run triggering –VIDeo - triggers on the video signal level –LINE - triggers on the power line signal –EXTernal1 (or EXTernal) - triggers on an externally connected trigger source marked “Trigger 1 In” on the rear panel –EXTernal2 - triggers on an externally connected trigger source marked “Trigger 2 In” on the front panel. In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a “Hardware missing; Not available for this model number” message –RFBurst - triggers on the bursted frame –FRAMe - triggers on the periodic timer –IF (video) - same as video, for backwards compatibility only <p>*OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned.</p> <p>Available ranges, and presets can vary from mode to mode.</p> |
| Status Bits/OPC dependencies | <p>The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears.</p> |
| Initial S/W Revision | Prior to A.02.00 |

I/Q Trigger Source

This command selects the trigger to be used for the specified measurement when I/Q (which requires option BBA) is the selected input. The I/Q trigger source can be queried and changed even while another input is selected, but it is inactive until I/Q becomes the selected input.

| | |
|-----------------------|---|
| Remote Command | <pre>:TRIGger:<measurement>[:SEquence]:IQ:SOURce EXTernal1 EXTernal2 IMMediate IQMag IDEMod QDEMod IINPut QINPut AIQMag :TRIGger:<measurement>[:SEquence]:IQ:SOURce?</pre> |
| Example | <p>TRIG:WAVeform:SOUR IQM</p> <p>Selects I/Q magnitude triggering for the IQ Waveform measurement and the I/Q input</p> |
| Notes | <p>Not all measurements have all the trigger sources available to them. Check the trigger source documentation for your specific measurement to see what sources are available.</p> <p>Not all trigger sources are available for each input. For the I/Q Trigger Source, the following trigger sources are available:</p> |

| | |
|------------------------------|--|
| | <ul style="list-style-type: none"> –IMMediate - free run triggering –EXternal1 (or EXternal) - triggers on an externally connected trigger source on the rear panel –EXternal2 - triggers on an externally connected trigger source on the front panel –IQMag - triggers on the magnitude of the I/Q signal –IDEMod - triggers on the I/Q signal's demodulated I voltage –QDEMod - triggers on the I/Q signal's demodulated Q voltage –IINPut - triggers on the I channel's ADC voltage –QINPut - triggers on the Q channel's ADC voltage –AIQMag - triggers on the magnitude of the auxiliary receiver channel I/Q signal <p>*OPC should be used after requesting data. This will hold off any subsequent changes to the selected trigger source, until after the sweep is completed and the data is returned.</p> <p>Available ranges, and from mode to mode presets can vary</p> |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

The trigger menus let you select the trigger source and trigger settings for a sweep or measurement. In triggered operation (basically, any trigger source other than Free Run), the analyzer will begin a sweep or measurement only with the selected trigger conditions are met, generally when your trigger source signal meets the specified trigger level and polarity requirements. (In FFT measurements, the trigger controls when the data acquisition begins for FFT conversion.)

For each of the trigger sources, you may define a set of operational parameters or settings which will be applied when that source is selected as the current trigger source. Examples of these settings are Trigger Level, Trigger Delay, and Trigger Slope. You may apply different settings for each source; so, for example, you could have a Trigger Level of 1v for External 1 trigger and –10 dBm for Video trigger.

Once you have established the settings for a given trigger source, they generally will remain unchanged for that trigger source as you go from measurement to measurement within a Mode (although the settings do change as you go from Mode to Mode). Furthermore, the trigger settings within a Mode are the same for the **Trigger** menu, the **Gate Source** menu, and the **Sync Source** menu that is part of the **Periodic Timer Trigger Setup** menu. That is, if **Ext1** trigger level is set to 1v in the **Trigger** menu, it will appear as 1v in both the **Gate Source** and the **Sync Source** menus. For these reasons the trigger settings commands are not qualified with the measurement name, the way the trigger source commands are.

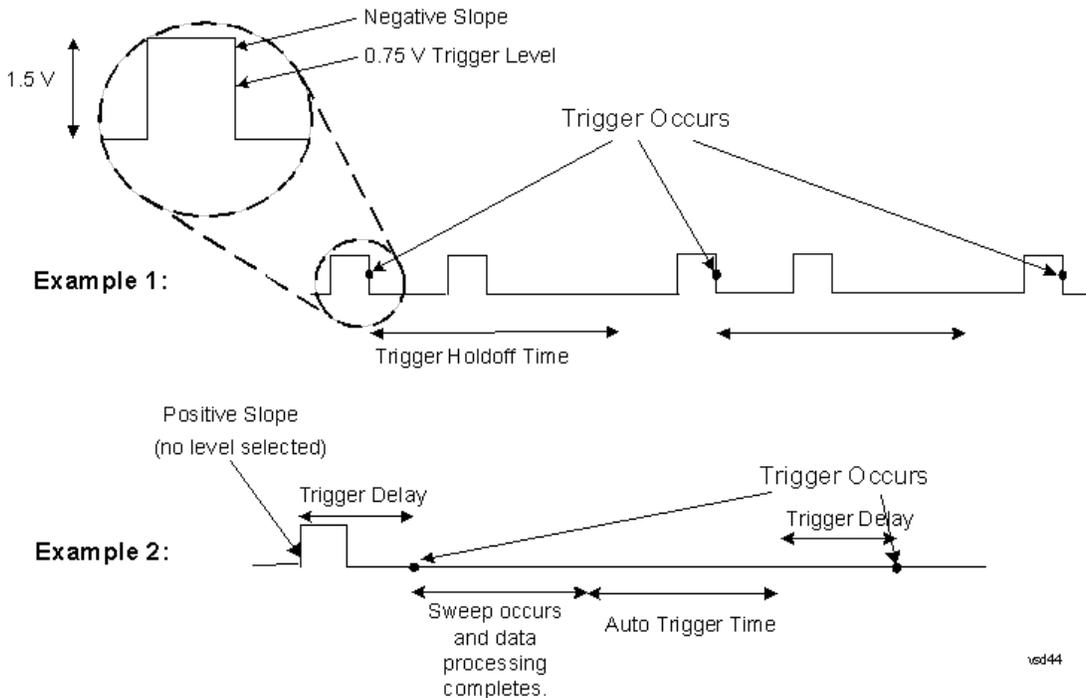
The settings setup menu can be accessed by pressing the key for the current trigger source a second time. For example, one press of Video selects the Video trigger as the source. The Video key becomes highlighted and the hollow arrow on the key turns black. Now a second press of the key takes you into the Video Trigger Setup menu.

Trigger Setup Parameters:

The following examples show trigger setup parameters using an external trigger source.

Example 1 illustrates the trigger conditions with negative slope and no trigger occurs during trigger Holdoff time.

Example 2 illustrates the trigger conditions with positive slope, trigger delay, and auto trigger time.



Free Run

Pressing this key, when it is not selected, selects free-run triggering. Free run triggering occurs immediately after the sweep/measurement is initiated.

| Key Path | Trigger |
|------------------------------|--|
| Example | TRIG:SOUR IMM Swept SA measurement TRIG:<meas>:SOUR IMM Measurements other than Swept SA |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Video (IF Envelope)

Pressing this key, when it is not selected, selects the video signal as the trigger. The Video trigger condition is met when the video signal (the filtered and detected version of the input signal, including both RBW and VBW filtering) crosses the video trigger level.

NOTE When the detector selected for all active traces is the average detector, the video signal for triggering does not include any VBW filtering.

The video trigger level is shown as a labeled line on the display. The line is displayed as long as video is the selected trigger source.

Pressing this key, when it is already selected, accesses the video trigger setup functions.

| | |
|-------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR VID Swept SA measurement TRIG:<meas>:SOUR VID Measurements other than Swept SA |
| Notes | Log Plot and Spot Frequency measurements do not support Video Trigger |
| Dependencies | Video trigger is allowed in average detector mode. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Backwards Compatibility Notes | In the past, the Average detector was not available when Video triggering was on, and consequently, functions that set the detector to average (such as Marker Noise or Band/Intvl Power) were not available when the video trigger was on. Similarly, Video triggering was not available when the detector was Average. In the X-Series, these restrictions are removed. |
| Initial S/W Revision | Prior to A.02.00 |

Trigger Level

Sets a level for the video signal trigger. When the video signal crosses this level, with the chosen slope, the trigger occurs. This level is displayed with a horizontal line only if **Video** is the selected trigger source.

| | |
|-----------------------|---|
| Key Path | Trigger, Video |
| Remote Command | :TRIGger[:SEquence]:VIDeo:LEVel <ampl> :TRIGger[:SEquence]:VIDeo:LEVel? |
| Example | TRIG:VID:LEV -40 dBm |
| Notes | When sweep type = FFT, the video trigger uses the amplitude envelope in a bandwidth wider than the FFT width as a trigger source. This might often be useful, but does not have the same relationship between the displayed trace and the trigger level as in swept triggering. Amplitude Corrections are not taken into account by the Video Trig Level. For example, if you have |

given yourself effective gain with an amplitude correction factor, the Video Trigger will not fire until you have dropped the trigger line that far below the displayed signal level, rather than simply dropping it down to the displayed signal level.

Note that other corrections, specifically External Gain and Ref Level Offset, modify the actual trace data as it is taken and therefore ARE taken into account by Trig Level.

| | |
|-------------------------------------|--|
| Couplings | This same level is used for the Video trigger source in the Trigger menu and for the Video selection in the Gate Source menu. |
| Preset | Set the Video Trigger Level -25 dBm on Preset. When the Video Trigger Level becomes the active function, if the value is off screen, set it to either the top or bottom of screen, depending on which direction off screen it was. |
| State Saved | Saved in instrument state |
| Min | -170 dBm |
| Max | +30 dBm |
| Default Unit | Depends on the current selected Y axis unit |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:IF:LEVel :TRIGger[:SEquence]:IF:LEVel? |
| Backwards Compatibility Notes | This alias is provided for backward compatibility with VSA/PSA comms apps. |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|---|
| Key Path | Trigger, Video |
| Remote Command | :TRIGger[:SEquence]:VIDeo:SLOPe POSitive NEGative :TRIGger[:SEquence]:VIDeo:SLOPe? |
| Example | TRIG:VID:SLOP NEG |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:IF:SLOPe NEGative POSitive :TRIGger[:SEquence]:IF:SLOPe? For backward compatibility with VSA/PSA comms apps |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|--------------------------------------|---|
| Remote Command | :TRIGger[:SEquence]:SLOPe POSitive NEGative :TRIGger[:SEquence]:SLOPe? |
| Example | TRIG:SLOP NEG |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility Notes | In ESA/PSA, the Trigger Slope was global to all triggers. In the X-Series, the slope can be set individually for each Trigger Source. For backward compatibility, the global SLOPe command updates all instances of trigger slope (VID, LINE, EXT1, EXT2, TV, RFB). The query returns the trigger slope setting of the currently selected trigger source. |
| Initial S/W Revision | Prior to A.02.00 |

Trig Delay

Controls a time delay during that the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in the time domain or FFT, but not in swept spans.

| | |
|--------------------------------------|---|
| Key Path | Trigger, Video |
| Remote Command | :TRIGger[:SEquence]:VIDeo:DELaY <time> :TRIGger[:SEquence]:VIDeo:DELaY? :TRIGger[:SEquence]:VIDeo:DELaY:STATe OFF ON 0 1 :TRIGger[:SEquence]:VIDeo:DELaY:STATe? |
| Example | TRIG:VID:DEL:STAT ON TRIG:VID:DEL 100 ms |
| Notes | Video trigger delay may be set to negative values, in time domain, FFT and even swept. It makes intuitive sense in time domain and works well in FFT mode where the bandwidth of the filter before the video trigger is about 1.25 span. In swept spans, negative settings of Trig Delay are treated as a zero setting within the internal hardware and the advisory message "Neg. Trig Delay unavailable in Swept Mode, zero delay used." is generated when such a delay is set. |
| Preset | Off, 1 us |
| State Saved | Saved in instrument state |
| Min | -150 ms |
| Max | +500 ms |
| Default Unit | s |
| Backwards Compatibility Notes | ! For backward compatibility with VSA/PSA comms apps :TRIGger[:SEquence]:IF:DELaY :TRIGger[:SEquence]:DELaY The legacy :TRIGger[:SEquence]:DELaY command affects the delay for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|--------------------------------------|--|
| Remote Command | :TRIGger[:SEquence]:DELay <time> :TRIGger[:SEquence]:DELay? :TRIGger[:SEquence]:DELay:STATE OFF ON 0 1 :TRIGger[:SEquence]:DELay:STATE? |
| Example | TRIG:DEL 1 ms |
| Preset | 1 us |
| State Saved | Saved in instrument state |
| Backwards Compatibility Notes | In ESA/PSA, the Trigger Delay was global to all triggers. In the X-Series, the delay can be set individually for each Trigger Source. For backward compatibility, the global DELay command updates all instances of trigger slope (VID, LINE, EXT1, EXT2) except TV and RFBurst. The query returns the trigger delay setting of the currently selected trigger source. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------------|---|
| Remote Command | :TRIGger[:SEquence]:OFFSet <time> :TRIGger[:SEquence]:OFFSet? :TRIGger[:SEquence]:OFFSet:STATE OFF ON 0 1 :TRIGger[:SEquence]:OFFSet:STATE? |
| Example | TRIG:OFFS ON TRIG:OFFS -100 ms |
| Notes | These are ESA commands for trigger offset that allowed you to use a positive or negative delay when in zero span and in a Res BW \geq 1 kHz. For ESA compatibility, X-series analyzers keep track of this offset and adds it to the Trigger Delay for VIDEo, LINE, EXTernal1 or EXTernal2 whenever the value is sent to the hardware, if in Zero Span and RBW \geq 1 kHz. |
| Preset | Off, 0 s |
| State Saved | Saved in instrument state |
| Min | -11 s |
| Max | +11 s |
| Initial S/W Revision | Prior to A.02.00 |

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

| | |
|-----------------|---|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA |

| | |
|------------------------------|--|
| Dependencies | Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 1. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

| | |
|------------------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:LEVel <level> :TRIGger[:SEquence]:EXTernal1:LEVel? |
| Example | TRIG:EXT1:LEV 0.4 V |
| Couplings | This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:LEVel For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal1:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|----------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:SLOPe POSitive NEGative |

| | |
|-------------------------------------|--|
| | :TRIGger[:SEQuence]:EXTernal1:SLOPe? |
| Example | TRIG:EXT1:SLOP NEG |
| Couplings | This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:EXTernal:SLOPe For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:FRAMe:EXTernal1:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept spans.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEQuence]:EXTernal1:DELAy <time> :TRIGger[:SEQuence]:EXTernal1:DELAy? :TRIGger[:SEQuence]:EXTernal1:DELAy:STATe OFF ON 0 1 :TRIGger[:SEQuence]:EXTernal1:DELAy:STATe? |
| Example | TRIG:EXT1:DEL:STAT ON TRIG:EXT1:DEL 100 ms |
| Notes | Video trigger delay may be set to negative values, in time domain, FFT and even swept. It makes intuitive sense in time domain and works well in FFT mode where the bandwidth of the filter before the video trigger is about 1.25 span. In swept spans, negative settings of Trig Delay are treated as a zero setting within the internal hardware and the advisory message "Neg. Trig Delay unavailable in Swept Mode, zero delay used." is generated when such a delay is set. |
| Preset | Off, 1.000 us |
| State Saved | Saved in instrument state |
| Min | -150 ms |
| Max | +500 ms |
| Default Unit | s |
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:EXTernal:DELAy For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility | The legacy :TRIGger[:SEQuence]:DELAy command affects the delay for the VID, LINE, EXT1, EXT2, |

| | |
|----------------------|---|
| Notes | and RFB triggers. The legacy :TRIGger[:SEQuence]:OFFSet command is supported for the VIDEo, LINE, EXT1, and EXT2 triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Zero Span Delay Comp On/Off

In zero span, there is a natural delay in the signal path, which comes from the RBW filter. This is usually desirable, as it allows you to trigger on events and also see those events, because the signal is delayed from the trigger event. However, in some cases it is desirable to eliminate this delay, so that trigger events line up exactly with the zero time point in zero span. You can use the Zero Span Delay Comp On/Off feature to enable or disable zero span delay compensation.

| | |
|----------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEQuence]:EXTernal1:DELay:COMPensation OFF ON 0 1 :TRIGger[:SEQuence]:EXTernal1:DELay:COMPensation? |
| Example | TRIG:EXT1:DEL:COMP ON |
| Dependencies | No effect except in zero-span, but not locked out in nonzero spans. Blanked in modes that do not support zero-span measurements. If the SCPI command is sent when the key is blanked, an error is returned: -221, "Settings conflict; Feature not supported for this measurement" In analyzers shipping N9060A, this feature requires N9060A-7FP. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | A.11.00 |

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

| | |
|--------------|---|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT2 Swept SA measurement TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message. Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 2. |

| | |
|------------------------------|--|
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:LEVel :TRIGger[:SEquence]:EXTernal2:LEVel? |
| Example | TRIG:EXT2:LEV 1.1 V |
| Couplings | This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-----------------------|--|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal2:SLOPe? |
| Example | TRIG:EXT2:SLOP NEG |
| Couplings | This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |

| | |
|-------------------------------------|--|
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:FRAMe:EXTernal2:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept spans.

| | |
|-------------------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEQuence]:EXTernal2:DELAy <time> :TRIGger[:SEQuence]:EXTernal2:DELAy? :TRIGger[:SEQuence]:EXTernal2:DELAy:STATe OFF ON 0 1 :TRIGger[:SEQuence]:EXTernal2:DELAy:STATe? |
| Example | TRIG:EXT2:DEL:STAT ON TRIG:EXT2:DEL 100 ms |
| Notes | Video trigger delay may be set to negative values, in time domain, FFT and even swept. It makes intuitive sense in time domain and works well in FFT mode where the bandwidth of the filter before the video trigger is about 1.25 span. In swept spans, negative settings of Trig Delay are treated as a zero setting within the internal hardware and the advisory message "Neg. Trig Delay unavailable in Swept Mode, zero delay used." is generated when such a delay is set. |
| Preset | Off, 1.000 us |
| State Saved | Saved in instrument state |
| Min | -150 ms |
| Max | 500 ms |
| Default Unit | s |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEQuence]:DELAy command affects the delay for the VID, LINE, EXT1, EXT2, and RFB triggers. The legacy :TRIGger[:SEQuence]:OFFSet command is supported for the VIDEo, LINE, EXT1, and EXT2 triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Zero Span Delay Comp On/Off

In zero span, there is a natural delay in the signal path, which comes from the RBW filter. This is usually desirable, as it allows you to trigger on events and also see those events, because the signal is delayed

from the trigger event. However, in some cases it is desirable to eliminate this delay, so that trigger events line up exactly with the zero time point in zero span. You can use the Zero Span Delay Comp On/Off feature to enable or disable zero span delay compensation.

| | |
|----------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:DELay:COMPensation OFF ON 0 1 :TRIGger[:SEquence]:EXTernal2:DELay:COMPensation? |
| Example | TRIG:EXT2:DEL:COMP ON |
| Dependencies | No effect except in zero-span, but not locked out in nonzero spans. Blanked in modes that do not support zero-span measurements. If the SCPI command is sent when the key is blanked, an error is returned: -221, "Settings conflict; Feature not supported for this measurement" In analyzers shipping N9060A, this feature requires N9060A-7FP. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | A.11.00 |

RF Burst

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector. Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

In some models, a variety of burst trigger circuitry is available, resulting in various available burst trigger bandwidths. The analyzer automatically chooses the appropriate trigger path based on the hardware configuration and other settings of the analyzer.

| | |
|-------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR RFB Swept SA measurement TRIG:<meas>:SOUR RFB Measurements other than Swept SA |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Backwards Compatibility Notes | The legacy command: :TRIGger[:SEquence]:RFBurst:FSElectivity[:STATe] OFF ON 0 1 is not supported in the X-Series, as the hardware to do Frequency Selective burst triggers does not exist in X-Series. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Absolute Trigger Level

Sets the absolute trigger level for the RF burst envelope.

When using the External Mixing path, the Absolute Trigger Level is uncalibrated because the factory default was set to accommodate the expected IF levels for the RF path.

| | |
|------------------------------|---|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute <ampl> :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute? |
| Example | TRIG:RFB:LEV:ABS 10 dBm sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm |
| Notes | Sending this command does not switch the setting from relative to absolute; to switch it you need to send the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command, below. Amplitude Corrections are not taken into account by the Absolute Trigger Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Absolute Trigger will not fire until you have set the trigger level that far below the displayed signal level, rather than simply to the displayed signal level. This is only true for Amplitude Corrections, not External Gain or Ref Level Offset functions. If mode is Bluetooth, the default value is -50 dBm. |
| Couplings | This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu |
| Preset | -20 dBm |
| State Saved | Saved in instrument state |
| Min | -200 dBm |
| Max | 100 dBm |
| Default Unit | depends on the current selected Y-Axis unit |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:RFBurst:LEVel:ABSolute |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

| | |
|--------------------------|---|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:TYPE ABSolute RELative :TRIGger[:SEquence]:RFBurst:LEVel:TYPE? |
| Example | TRIG:RFB:LEV:TYPE REL sets the trigger level type of the RF burst trigger to Relative. |
| Preset | ABSolute |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Relative Trigger Level

Sets the relative trigger level for the RF burst envelope.

In some models, the relative burst trigger function is implemented in hardware. In other models, without the advanced triggering hardware required, the relative burst trigger function is implemented in software in some measurements, and is unavailable in other measurements.

When implemented in software, the relative RF Burst trigger function is implemented as follows:

1. The measurement starts with the absolute RF Burst trigger setting. If it cannot get a trigger with that level, auto trigger fires and the acquisition starts anyway. After the acquisition, the measurement searches for the peak in the acquired waveform and saves it.
2. Now, in the next cycle of the measurement, the measurement determines a new absolute RF Burst level based on the peak value from the first measurement and the Relative RF Burst Trigger Level (always 0 or negative dB) set by the user. The following formula is used:
3. absolute RF Burst level = peak level of the previous acquisition + relative RF Burst level
4. If the new absolute RF Burst level differs from the previous by more than 0.5 dB, the new level is sent to the hardware; otherwise it is not updated (to avoid slowing down the acquisition)

Steps 2 and 3 repeat for subsequent measurements.

| | |
|------------------------------|---|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:RELative <rel_ampl> :TRIGger[:SEquence]:RFBurst:LEVel:RELative? |
| Example | TRIG:RFB:LEV:REL -10 dB sets the trigger level of the RF burst envelope signal to the relative level of -10 dB |
| Notes | Sending this command does not switch the setting from absolute to relative; to switch it you need to send the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command, above. The relative trigger level is not available in some measurements. In those measurements the RELative parameter, and the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command (above), will generate an error if sent. |
| Dependencies | This key is grayed out and Absolute Trigger Level selected if the required hardware is not present in your analyzer and the current measurement does not support Relative triggering. |
| Preset | -6 dB GSM: -25 dB |
| State Saved | Saved in instrument state |
| Min | -45 dB |
| Max | 0 dB |
| Default Unit | dB or dBc |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:RFBurst:LEVel This legacy command is aliased to :TRIGger[:SEquence]:RFBurst:LEVel:RELative because the PSA |

| | |
|--------------------------|------------------------------------|
| | had ONLY relative burst triggering |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:SLOPe POSitive NEGative :TRIGger[:SEquence]:RFBurst:SLOPe? |
| Example | TRIG:RFB:SLOP NEG |
| Couplings | This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:RFBurst:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Trig Delay

Controls a time delay during which the analyzer will wait to begin a sweep after meeting the trigger criteria. You can use negative delay to pre-trigger the instrument in time domain or FFT, but not in swept spans.

| | |
|-----------------------|---|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:DELAy <time> :TRIGger[:SEquence]:RFBurst:DELAy? :TRIGger[:SEquence]:RFBurst:DELAy:STATe OFF ON 0 1 :TRIGger[:SEquence]:RFBurst:DELAy:STATe? |
| Example | TRIG:RFB:DEL:STAT ON TRIG:RFB:DEL 100 ms |
| Notes | Video trigger delay may be set to negative values, in time domain, FFT and even swept. It makes intuitive sense in time domain and works well in FFT mode where the bandwidth of the filter before the video trigger is about 1.25 span. In swept spans, negative settings of Trig Delay are treated as a zero setting within the internal hardware and the advisory message "Neg. Trig Delay unavailable in Swept Mode, zero delay used." is generated when such a delay is set. |

| | |
|-------------------------------|---|
| Preset | Off, 1.000 us |
| State Saved | Saved in instrument state |
| Min | -150 ms |
| Max | 500 ms |
| Default Unit | s |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEQuence]:DELay command affects the delay for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Auto/Holdoff

Opens up a menu that lets you adjust Auto Trigger and Trigger Holdoff parameters

| | |
|----------------------|---|
| Key Path | Trigger |
| Readback line | Displays a summary of the Auto Trig and Holdoff settings, in square brackets First line: Auto Off or Auto On Second Line: "Hld" followed by: <ul style="list-style-type: none"> • If Holdoff is Off, readback Off • If Holdoff On and Type = Normal, readback value • If Holdoff On and Type = Above, readback value followed by AL • If Holdoff On and Type = Below, readback value followed by BL • If Holdoff Type selection is not supported by the current measurement, Holdoff Type is always Normal |
| Initial S/W Revision | A.02.00 |

Auto Trig

Sets the time that the analyzer will wait for the trigger conditions to be met. If they are not met after that much time, then the analyzer is triggered anyway.

| | |
|----------------|---|
| Key Path | Trigger, Auto/Holdoff |
| Remote Command | :TRIGger[:SEQuence]:ATRigger <time> :TRIGger[:SEQuence]:ATRigger? :TRIGger[:SEQuence]:ATRigger:STATe OFF ON 0 1 :TRIGger[:SEQuence]:ATRigger:STATe? |
| Example | TRIG:ATR:STAT ON TRIG:ATR 100 ms |
| Notes | The "time that the analyzer will wait" starts when the analyzer is ready for a trigger, which may be hundreds of ms after the data acquisition for a sweep is done. The "time" ends when the trigger condition is satisfied, not when the delay ends. |

| | |
|----------------------|---------------------------|
| Preset | Off, 100 ms |
| State Saved | Saved in instrument state |
| Min | 1 ms |
| Max | 100 s |
| Default Unit | s |
| Initial S/W Revision | Prior to A.02.00 |

Trig Holdoff

Sets the holdoff time between triggers. When the trigger condition is satisfied, the trigger occurs, the delay begins, and the holdoff time begins. New trigger conditions will be ignored until the holdoff time expires. For a free-running trigger, the holdoff value is the minimum time between triggers.

| | |
|-----------------------|--|
| Key Path | Trigger, Auto/Holdoff |
| Remote Command | :TRIGger[:SEquence]:HOLDoff <time> :TRIGger[:SEquence]:HOLDoff? :TRIGger[:SEquence]:HOLDoff:STATe OFF ON 0 1 :TRIGger[:SEquence]:HOLDoff:STATe? |
| Example | TRIG:HOLD:STAT ON TRIG:HOLD 100 ms |
| Dependencies | Unavailable if the selected Input is BBIQ. If this is the case, the key is grayed out if it is pressed the informational message "Feature not supported for this Input" is displayed. If the SCPI command is sent, the error "Settings conflict; Feature not supported for this Input" is generated. |
| Preset | Off, 100 ms |
| State Saved | Saved in instrument state |
| Min | 0 s |
| Max | 0.5 s |
| Default Unit | s |
| Initial S/W Revision | Prior to A.02.00 |

Holdoff Type

Lets you set the Trigger Holdoff Type.

NOTE

Holdoff Type is not supported by all measurements. If the current measurement does not support it, this key will be blank and the Holdoff Type will be Normal. If the Holdoff Type SCPI is sent while in such a measurement, the SCPI will be accepted and the setting remembered, but it will have no effect until a measurement is in force that supports Holdoff Type.

Trigger Holdoff Type functionality:

- NORMal

- This is the “oscilloscope” type of trigger holdoff, and is the setting when the Holdoff Type key does not appear. In this type of holdoff, no new trigger will be accepted until the holdoff interval has expired after the previous trigger.
- ABOVe
- If the trigger slope is positive, a trigger event is generated only if the signal characteristic of interest crosses the trigger threshold (with positive slope) and then remains above the threshold for at least the holdoff time. For negative slope, the trigger event is generated if the signal characteristic crosses the threshold (with negative slope) after having been above the threshold for at least the holdoff time. In either case, the trigger event is associated with the time the level was crossed.
- BELow
- If the trigger slope is positive, a trigger event is generated only if the signal characteristic of interest crosses the trigger threshold (with positive slope) after having been below the threshold for at least the holdoff time. For negative slope, the trigger event is generated if the signal characteristic crosses the threshold (with negative slope) and then remains below the threshold for at least the holdoff time. In either case, the trigger event is associated with the time the level was crossed.

| | |
|-----------------------------|--|
| Key Path | Trigger, Auto/Holdoff |
| Remote Command | :TRIGger[:SEquence]:HOLDoFF:TYPE NORMal ABOVe BELow :TRIGger[:SEquence]:HOLDoFF:TYPE? |
| Example | TRIG:HOLD:TYPE NORM |
| Preset | All modes but GSM/EDGE: Normal GSM/EDGE: Below |
| State Saved | Saved in instrument state |
| Initial S/W Revision | A.02.00 |

8 Blank Heading 1 For Flare PD import--DO NOT REMOVE FROM PD

8 Burst Power (Transmit Power)

The Burst Power (Transmit Power) measurement (at the base transceiver station) is used to determine the power delivered to the antenna system on the radio-frequency channel under test. The Burst Power measurement verifies the accuracy of the mean transmitted RF carrier power. This can be done across the frequency range and at each power step. For more information, see ["Transmit Power \(Burst Power\) Measurement Description" on page 453](#). For measurement results and views, see ["View/Display" on page 572](#).

This topic contains the following sections.

["Measurement Commands for Burst Power \(Transmit Power\)" on page 450](#)

["Remote Command Results for Burst Power \(Transmit Power\)" on page 451](#)

Measurement Commands for Burst Power (Transmit Power)

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section. See the SENSE:TXPower|BPOWer commands for more measurement related commands.

NOTE

The BPOWer form of the commands is included for backward compatibility only. They are not recommended for use in new designs. Use the TXPower keyword.

The following commands and queries are used to retrieve the measurement results:

```
:CONFigure:TXPower|BPOWer  
:CONFigure:TXPower|BPOWer:NDEFault  
:INITiate:TXPower|BPOWer  
:FETCh:TXPower|BPOWer[n]?  
:READ:TXPower|BPOWer[n]?  
:MEASure:TXPower|BPOWer[n]?
```

For more remote command information, see SENSE:TXPower|BPOWer commands and the section, ["Remote Measurement Functions" on page 2284](#).

Remote Command Results for Burst Power (Transmit Power)

For the queries listed above, the results returned depend on the value of n, as follows.

| n | Results Returned |
|---------------------------|--|
| 0 | Returns unprocessed I/Q trace data, as a series of comma-separated trace points, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values. |
| not specified or n = 1 | <p>Returns the following comma-separated scalar results:</p> <ol style="list-style-type: none"> 1. Sample time is a floating point number representing the time between samples when using the trace queries (n=0, 2, etc). 2. Power is the mean power (in dBm) of the power value that calculated by specified method: above the threshold or measured burst width. If averaging is on, the power is for the latest acquisition. 3. Power averaged is the power (in dBm) for N averages, if averaging is on. An average consists of N acquisitions of data which represents the current trace. If averaging is off, the value of Power averaged is the same as the Power value. 4. Number of samples is the number of data points in the captured signal. This number is useful when performing a query on the signal (i.e. when n=0, 2, etc.). 5. Threshold value is the absolute threshold level (in dBm) above which the power is calculated when Meas Method is set to Above Threshold. 6. Threshold points is the number of points that were above the threshold and were used to calculate Mean Transmit Power when Meas Method is set to Above Threshold. If Meas Method is set to Measured Burst Width, Measured Pts is returned. 7. Maximum value is the maximum peak level of the most recently acquired trace data (in dBm). 8. Minimum value is the minimum peak level of the most recently acquired trace data (in dBm). <p>Full Burst width is the burst width of this signal regardless of the parameter value set for the current Measured width. The Burst width is determined by the Threshold Lvl when Meas Method is set to Measured Burst Width. If Meas Method is set to Above Threshold Lvl, this value is 0.</p> <ol style="list-style-type: none"> 9. Full Burst width is the burst width of this signal regardless of the parameter value set for the current Measured width. The Burst width is determined by the Threshold Lvl when Meas Method is set to Measured Burst Width. If Meas Method is set to Above Threshold Lvl, this value is zero. 10. Measured width is the time length that is used to calculate Mean Transmit Power when Meas Method is set to Measured Burst Width. If Meas Method is set to Above Threshold, this value is zero. 11. Measured points is the number of points used to calculate Mean Transmit Power when Meas Method is set to Measured Burst Width. If Meas Method is set to Above Threshold, this value is 0. |
| 2 | <p>Returns comma-separated trace points of the Measure Trace data.</p> <p>These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.</p> |
| 3 | <p>Returns comma-separated trace points of the Max Hold Trace data.</p> <p>These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.</p> |

8 Burst Power (Transmit Power)

| n | Results Returned |
|---|---|
| | * This is not available in TD-SCDMA. |
| 4 | <p>Returns comma-separated trace points of the Min Hold Trace data.</p> <p>These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.</p> <p>* This is not available in TD-SCDMA.</p> |

Transmit Power (Burst Power) Measurement Description

Mobile stations and base transceiver stations must transmit enough power, with sufficient modulation accuracy, to maintain a call of acceptable quality without leaking power into frequency channels or timeslots allocated for others. The Burst Power measurement determines the average power for an RF signal burst at or above a specified threshold value or during the detected burst width. The threshold value may be absolute, or relative to the peak value of the signal. Burst width can be set automatically or manually.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. Many of the parameter values are measurement dependent. Attenuation values, and the Internal Preamp selection are measurement global, so they are common across all measurements. Functions with operation unique to this measurement are described below. See AMPTD Y Scale for more information.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Y Ref Value

Sets the absolute power reference.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | SA, GSM, TD-SCDMA |
| Remote Command | :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEVel <real> :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEVel? |
| Example | DISP:TXP:VIEW:WIND:TRAC:Y:RLEV 5dbm DISP:TXP:VIEW:WIND:TRAC:Y:RLEV? |
| Notes | You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | When Y Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets this value manually, Y Auto Scaling automatically changes to Off. |
| Preset | 10.00 |
| State Saved | Saved in instrument state. |
| Min | -250.0 |
| Max | 250.0 |
| Initial S/W Revision | Prior to A.02.00 |

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See ["Dual Attenuator Configurations:" on page 455](#)

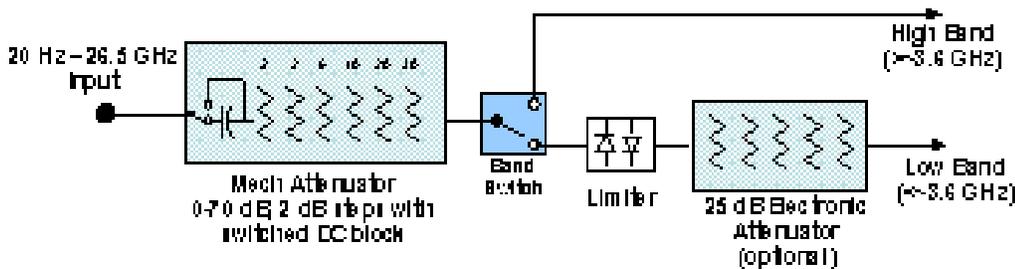
See ["Single Attenuator Configuration:" on page 456](#)

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

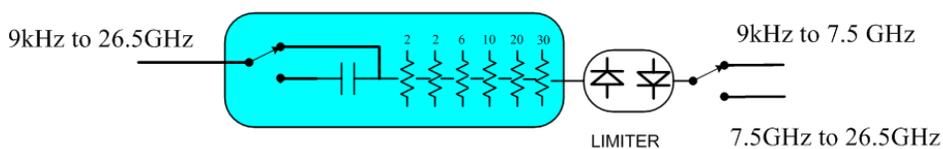
| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Dependencies | In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case. |
| Readback Line | Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2232, and "Enable Elec Atten" on page 2234 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

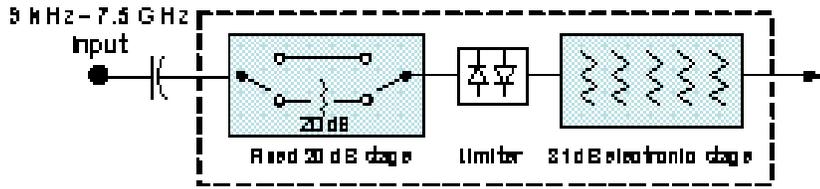


Configuration 2: Mechanical attenuator, no optional electronic attenuator



(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the “Dual Attenuator” configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See ["Attenuator Configurations and Auto/Man" on page 458](#)

| Key Path | AMPTD Y Scale, Attenuation |
|-----------------------|---|
| Remote Command | <pre>[:SENSE] : POWer [:RF] : ATTenuation <rel_ampl> [:SENSE] : POWer [:RF] : ATTenuation? [:SENSE] : POWer [:RF] : ATTenuation : AUTO OFF ON 0 1 [:SENSE] : POWer [:RF] : ATTenuation : AUTO?</pre> |
| Example | <p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of “main” attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p> |
| Dependencies | Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the |

Auto/Man selection is not available, and the Auto/Man line on the key disappears.

In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the "[Enable Elec Atten](#)" on page 2234 key description.

See "[Attenuator Configurations and Auto/Man](#)" on page 458 for more information on the Auto/Man functionality of Attenuation.

Couplings

When (Mech) Atten is in Auto, it uses the following algorithm to determine a value:

If the USB Preamp is connected to USB, use 0 dB.

Otherwise, $Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel + IF\ Gain$.

Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto.

The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).

The "IF Gain" term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.

In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.

Preset

The preset for Mech Attenuation is "Auto."

The Auto value of attenuation is:

CXA, EXA, MXA and PXA: 10 dB

State Saved

Saved in instrument state

Min

0 dB

The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.

Max

CXA N9000A-503/507: 50 dB

CXA N9000A-513/526: 70dB

EXA: 60 dB

MXA and PXA: 70 dB

In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.

Initial S/W Revision

Prior to A.02.00

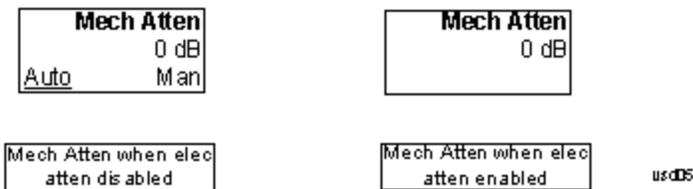
Modified at S/W Revision

A.03.00

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 460](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2233](#)

See ["More Information" on page 459](#)

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] : POWer [:RF] : EATTenuation : STATE OFF ON 0 1 [:SENSe] : POWer [:RF] : EATTenuation : STATE? |
| Example | POW:EATT:STAT ON |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out. |

If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.

If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.

If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.

The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in all measurements; in particular, it is not available in the Swept SA measurement.

| | |
|--------------------------|---|
| Couplings | Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples
- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :EATTenuation <rel_amp1></code> <code>[:SENSe] :POWer [:RF] :EATTenuation?</code> |
| Notes | Electronic Attenuation’s specification is defined only when Mechanical Attenuation is 6 dB. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the |

| | |
|--------------------------|--|
| | POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out. |
| Preset | 0 dB |
| State Saved | Saved in instrument state |
| Min | 0 dB |
| Max | Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|--------------------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize IMMEDIATE</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2237 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation OFF ELECTRical COMBined</code> |

| | |
|--------------------------|--|
| | <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code> |
| Notes | The SCPI parameter ELECtrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECtrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip |
| State Saved | Saved in instrument state |
| Range | Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------|--|
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe:AUTO?</code> |
| Notes | ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off" |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT OFF |
| Initial S/W Revision | Prior to A.02.00 |

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT ELEC |
| Initial S/W Revision | Prior to A.02.00 |

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT COMB |
| Initial S/W Revision | Prior to A.02.00 |

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] 10 dB 2 dB [:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] ? |
| Example | POW:ATT:STEP 2 |
| Notes | Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10. |
| Dependencies | Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error. |
| Couplings | When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB |
| Preset | PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA) |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Scale/Division

Enables you to enter a numeric value to change the vertical display sensitivity.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | SA, GSM, TD-SCDMA |
| Remote Command | :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl> :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision? |
| Example | DISP:TXP:VIEW:WIND:TRAC:Y:PDIV 10dB DISP:TXP:VIEW:WIND:TRAC:Y:PDIV? |
| Notes | You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | When the Y Auto Scaling is On, this value is automatically determined by the measurement result. When the user sets a value manually, Y Auton Scaling automatically changes to Off. |
| Preset | 10.00 dB |
| State Saved | Saved in instrument state. |
| Min | 0.1 dB |
| Max | 20.00 dB |
| Initial S/W Revision | Prior to A.02.00 |

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 465](#).

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Remote Command | [:SENSe]:POWer[:RF]:PCENter |
| Example | POW:PCEN |
| Notes | Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no |

| | |
|------------------------------|--|
| | <p>action is taken.</p> <ul style="list-style-type: none"> • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Couplings | <p>The active marker position determines where the centering will be attempted.</p> <p>If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.</p> |
| Status Bits/OPC dependencies | <p>When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command.</p> <p>The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.</p> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when **"Presel Center"** on page 2240 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

8 Burst Power (Transmit Power)
AMPTD Y Scale

| | |
|-------------------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :POWer [:RF] :PADJust <freq></code> <code>[:SENSe] :POWer [:RF] :PADJust?</code> |
| Example | POW:PADJ 100KHz POW:PADJ? |
| Notes | The value on the key reads out to 0.1 MHz resolution. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Preset | 0 MHz |
| State Saved | The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle. |
| Min | -500 MHz |
| Max | 500 MHz |
| Default Unit | Hz |
| Backwards Compatibility SCPI | <code>[:SENSe] :POWer [:RF] :MW :PADJust</code> <code>[:SENSe] :POWer [:RF] :MMW :PADJust</code> PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to <code>[:SENSe] :POWer [:RF] :PADJust</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |
| Remote Command | <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector MWAVE MMWave EXTERNAL</code> <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector?</code> |
| Notes | PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE |
| Initial S/W Revision | Prior to A.02.00 |

Y Axis Unit

Displays the menu keys that enable you to change the vertical (Y) axis amplitude unit. The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types. For example, if Scale Type has been set to Log, and you set Y Axis Unit to dBm, pressing Scale Type (Log) sets the Y Axis Unit to dBm. If Scale Type has been set to Lin and you set Y Axis Unit to V, pressing Scale Type (Lin) sets the Y Axis Unit to V. Pressing Scale Type (Log) again sets the Y axis unit back to dBm.

NOTE

The units of current (A, dBmA, dBuA) are calculated based on 50 ohms input impedance.

All four of the EMI units (dB μ A/m, dB μ V/m, dBG, dBpT) are treated by the instrument exactly as though they were dBuV. The user must load an appropriate correction factor using Amplitude Corrections for accurate and meaningful results.

If a SCPI command is sent to the analyzer that uses one of the EMI units as a terminator, the analyzer treats it as though DBUV had been sent as the terminator.

| | |
|----------------|---|
| Key Path | AMPTD Y Scale |
| Mode | SA |
| Scope | Meas Global |
| Remote Command | :UNIT:POWer DBM DBMV DBMA V W A DBUV DBUA DBPW DBUVM DBUAM DBPT DBG :UNIT:POWer? |
| Example | UNIT:POW dBmV UNIT:POW? |
| Notes | The Y axis unit has either logarithmic or linear characteristics. The set of units that is logarithmic consists of dBm, dBmV, dBmA, dB μ V, dB μ A, dB μ V/m, dB μ A/m, dBpT, and dBG. The set of units that are linear consists of V, W, and A. The chosen unit will determine how the reference level and all the amplitude-related outputs like trace data, marker data, etc. read out. |
| Notes | The settings of Y Axis Unit and Scale Type, affect how the data is read over the remote interface. When using the remote interface no unit is returned, so you must know what the Y axis unit is to interpret the results: Example 1, set the following: Scale Type (Log) Y Axis Unit, dBm Scale/Div, 1 dB Ref Level, 10 dBm This sets the top line to 10 dBm with each vertical division representing 1 dB. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 5 dBm and will read out remotely as 5. Example 2, set the following: Scale Type (Lin) Y Axis Unit, Volts Ref Level, 100 mV (10 mV/div) This sets the top line to 100 mV and the bottom line to 0 V, so each vertical division represents 10 mV. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 50 mV and will read out remotely as 50. |

| | |
|--------------------------|---|
| Dependencies | <p>If an amplitude correction with an Antenna Unit other than None is applied and enabled, then that antenna unit is forced and the key with that unit is the only Y Axis Unit available. All other Y Axis Unit keys are grayed out.</p> <p>If an amplitude correction with an Antenna Unit other than None is applied and enabled, and you then turn off that correction or set Apply Corrections to No, the Y Axis Unit that existed before the Antenna Unit was applied is restored.</p> |
| Couplings | The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types |
| Preset | dBm for log scale, V for linear. The true 'preset' value is dBm, since at preset the Y Scale type is set to logarithmic. |
| State Saved | Saved in instrument state |
| Readback line | 1-of-N selection |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.04.00, A.11.00 |

dBm

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBm.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBM |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmV

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmV.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmV |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmA

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmA |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

W

Sets the amplitude unit for the selected amplitude scale (log/lin) to watt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW W |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | W |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

V

Sets the amplitude unit for the selected amplitude scale (log/lin) to volt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW V |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

A

Sets the amplitude unit for the selected amplitude scale (log/lin) to Ampere.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW A |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ V

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A.

NOTE

The unit dBuA can also appear as an Antenna Unit. This will be used by customers using current probes, because current probes are often supplied with conversion tables that provide the transducer factors. When dBuA is used as an Antenna Unit the normal conversion from power to amps for dBuA (based on the analyzer input impedance) is not done, but instead the conversion is based solely on the Correction that contains the transducer factors. This is what distinguishes dBuA as a normal unit from dBuA as an antenna unit. When querying the Y-Axis unit, you can query the Antenna Unit to distinguish between regular dBuA and the dBuA antenna unit. If :CORR:CSET:ANT? returns NOC (for No Conversion), you are using a normal Y Axis dBuA. If it returns UA you are using an Antenna Unit dBuA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBpW

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpW.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBPW |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

Antenna Unit

When a Correction is turned on that uses an Antenna Unit, the Y Axis Unit changes to that Antenna Unit. All of the keys in the Y-Axis Unit menu are then greyed out, except the Antenna Unit key. The unit being used is shown on this key and is shown as selected in the submenu.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback line | Currently selected unit |
| Initial S/W Revision | A.11.00 |

dB μ V/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUVM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ V/m |
| Initial S/W Revision | A.02.00 |

dB μ A/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A/m |
| Initial S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

dBpT

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpT. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBPT |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dBpT |
| Initial S/W Revision | A.02.00 |

DBG

Sets the amplitude unit for the selected amplitude scale (log/lin) to DBG. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBG |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | DBG |
| Initial S/W Revision | A.02.00 |

None

This is selected if no Antenna Unit is currently on, however you cannot actually set this value, since it is always grayed out. The key is included simply to provide an indication on the Readback line of the Antenna Unit key when there is no Antenna Unit selected.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Readback | "None" |
| Initial S/W Revision | A.11.00 |

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, BASIC, PNOISE, VSA , LTE, LTETDD |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH? |
| Example | :POW:MW:PATH LNP Enables the Low Noise path |
| Notes | If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μW Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished. |
| Dependencies | Unavailable in BBIQ and External Mixing |
| Preset | All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB |

| | |
|--------------------------|--|
| | MPB option not present and licensed: STD |
| State Saved | Save in instrument state |
| Readback | Value selected in the submenu |
| Initial S/W Revision | A.04.00 |
| Modified at S/W Revision | A.10.00 |

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH STD |
| Readback Text | Standard Path |
| Initial S/W Revision | A.04.00 |

Low Noise Path Enable

You may choose Low Noise Path Enable, which gives a lower noise floor under some circumstances, particularly when operating in the 21–26.5 GHz region. With the Low Noise Path enabled, the low band/high band switch and microwave preamp are bypassed whenever all of the following are true:

- The analyzer is not in the Low Band, meaning:
- the start frequency is above 3.5 GHz and
- the stop frequency is above 3.6 GHz.
- the internal preamp is not installed or (if installed) is set to Off or Low Band

Note that this means that, when any part of a sweep is done in Low Band, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. Also, if the preamp is turned on, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. The only time the Low Noise Path is used is when Low Noise Path Enable is selected, the sweep is completely in High Band (> 3.6 GHz) and no preamp is in use.

See "[More Information](#)" on page 475

| | |
|----------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Measurement | Swept SA |
| Example | :POW:MW:PATH LNP |

| | |
|----------------------|--|
| Notes | <p>For measurements that use IQ acquisition, the low noise path is used when the Center Frequency is in High Band (> 3.6 GHz) and no preamp is in use.</p> <p>In other words, the rules above are modified to use only the center frequency to qualify which path to switch in.</p> <p>This is not the case for FFT's in the Swept SA measurement; they use the same rules as swept measurements.</p> |
| Dependencies | <p>Key is blanked if current mode does not support it.</p> <p>Key is grayed out if mode supports it but current measurement does not support it.</p> <p>Unless Option LNP is present and licensed, key is blank and if SCPI command sent, error -241, "Hardware missing; Option not installed" is generated.</p> |
| Readback Text | Low Noise Path Enable |
| Initial S/W Revision | A.04.00 |

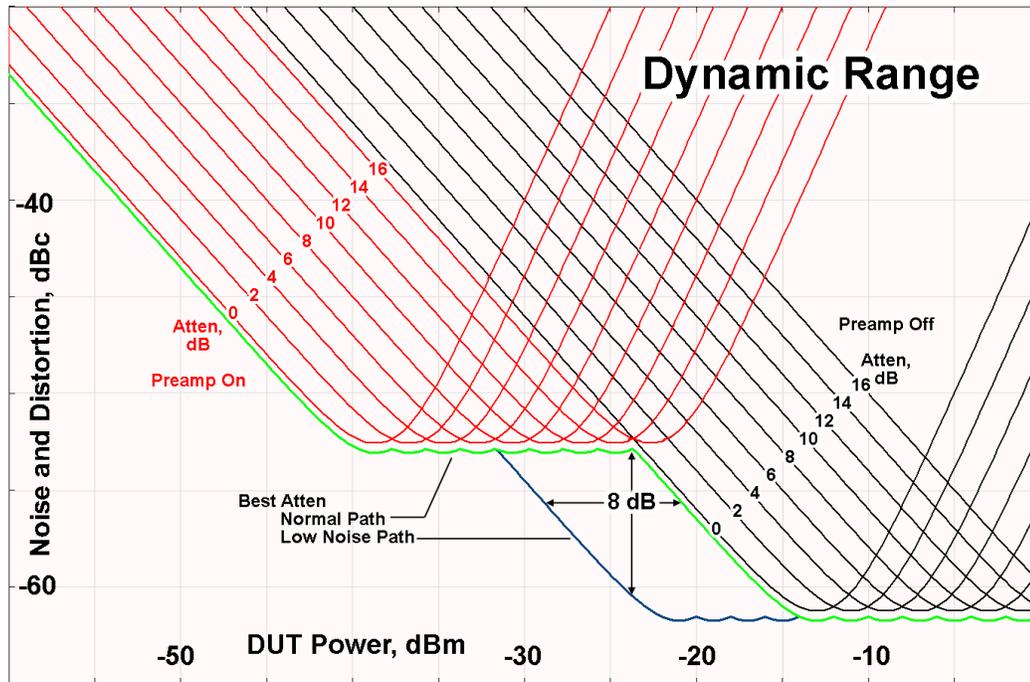
More Information

The user should understand that the Low Noise Path, while giving improved DANL, has the disadvantage of decreased TOI performance and decreased gain compression performance relative to the standard path.

The user should also understand that the bypass switch is a mechanical switch and has finite life, so if the Low Noise Path is enabled, it is possible to cause frequent cycling of this switch by frequently changing analyzer settings such that the above conditions hold true only some of the time. A user making tests of this nature should consider opting for the Standard Path, which will never throw the bypass switch, at the expense of some degraded noise performance.

The low noise path is useful for situations where the signal level is so low that the analyzer performance is dominated by noise even with 0 dB attenuation, but still high enough that the preamp option would have excessive third-order intermodulation or compression. The preamp, if purchased and used, gives better noise floor than does the "Low Noise Path." However, its compression threshold and third-order intercept are much poorer than that of the non-preamp path. There are some applications, typically for signals around -30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range

The graph below illustrates the concept. It shows, in red, the performance of an analyzer at different attenuation settings, both with the preamp on and off, in a measurement that is affected by both analyzer noise and analyzer TOI. The green shows the best available dynamic range, offset by 0.5 dB for clarity. The blue shows how the best available dynamic range improves for moderate signal levels with the low noise path switched in. In this illustration, the preamp improves the noise floor by 15 dB while degrading the third-order intercept by 30 dB, and the low noise path reduces loss by 8 dB. The attenuator step size is 2 dB.



There are other times where selecting the low noise path improves performance, too. Compression-limited measurements such as finding the nulls in a pulsed-RF spectrum can profit from the low noise path in a way similar to the TOI-limited measurement illustrated. Accuracy can be improved when the low noise path allows the optimum attenuation to increase from a small amount like 0, 2 or 4 dB to a larger amount, giving better return loss at the analyzer input. Harmonic measurements, such as second and third harmonic levels, are much improved using the low noise path because of the superiority of that path for harmonic (though not intermodulation) distortion performance.

μW Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselector is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH MPB |
| Dependencies | Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated. |
| Readback Text | μ W Preselector Bypass |
| Initial S/W Revision | A.04.00 |

| | |
|-----------------------|---|
| Remote Command | [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1 [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ? |
| Example | :POW:MW:PRES OFF Bypasses the microwave preselector |
| Notes | The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB) |
| Preset | ON |

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :GAIN [:STATe] OFF ON 0 1 [:SENSe] :POWer [:RF] :GAIN [:STATe] ? |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the |

| | |
|--|--|
| | key is not shown. The preamp is not available when the electronic/soft attenuator is enabled. |
|--|--|

| | |
|--------------------------|---|
| Couplings | The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range. Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected. Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Scope | Meas Global |
| Remote Command | [:SENSe] : POWer [:RF] : GAIN : BAND LOW FULL [:SENSe] : POWer [:RF] : GAIN : BAND ? |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated. |
| Preset | LOW |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns the internal preamp off

| | |
|----------------------|--------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

| | |
|----------------------|------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND LOW |
| Readback | Low Band |
| Initial S/W Revision | Prior to A.02.00 |

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND FULL |
| Readback | Full Range |
| Initial S/W Revision | Prior to A.02.00 |

Ref Position

Enables you to set the display reference position to either, Top, Center or Bottom.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, GSM, TD-SCDMA |
| Remote Command | :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP CENTer BOTTom :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition? |
| Example | DISP:TXP:VIEW:WIND:TRAC:Y:RPOS CENT DISP:TXP:VIEW:WIND:TRAC:Y:RPOS? |
| Notes | You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Preset | TOP |
| State Saved | Saved in instrument state. |

| | |
|----------------------|------------------|
| Range | Top Ctr Bot |
| Initial S/W Revision | Prior to A.02.00 |

Auto Scaling

Allows you to toggle the Y axis auto scaling function between On and Off.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | SA, GSM, TD-SCDMA |
| Remote Command | :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 1 OFF ON :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle? |
| Example | DISP:TXP:VIEW:WIND:TRAC:Y:COUP 0 DISP:TXP:VIEW:WIND:TRAC:Y:COUP? |
| Notes | You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When the user sets a value either Y Rel Value or Y Scale/Div manually, this parameter automatically is set to 'Off'. |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 481

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Remote Command | :COUPle ALL NONE |
| Example | :COUP ALL |
| Notes | :COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

There are two types of functions that have Auto/Manual modes.

Auto/Man Active Function keys

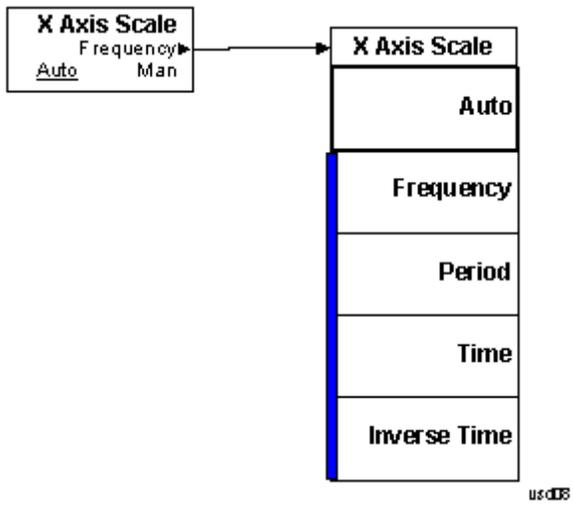
An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.

8 Burst Power (Transmit Power)
Auto Couple



BW

Accesses a menu of functions that enable you to specify and control the video and resolution bandwidths. You can also select the type of filter for the measurement and set the filter bandwidth.

NOTE If the selected mode is TD-SCDMA, this function is **not** available.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Mode | SA, EDGE/GSM |
| Initial S/W Revision | Prior to A.02.00 |

RBW Control

Accesses a menu that enables you to select the filter bandwidth and type.

| | |
|----------|----|
| Key Path | BW |
|----------|----|

Filter Type

Besides the familiar Gaussian filter shape, there are certain special filter types, such as Flat Top, that are desirable under certain conditions.

| | |
|-----------------------|---|
| Key Path | BW |
| Mode | SA, GSM |
| Remote Command | [:SENSe] :TXPower :BANDwidth :TYPE GAUSSian FLATtop [:SENSe] :TXPower :BANDwidth :TYPE ? |
| Example | TXP:BAND:TYPE GAUS TXP:BAND:TYPE ? |
| Notes | Selects the type of filter: either Gaussian or Flat (Flattop). Gaussian is the best choice when looking at the overall burst or the rising and falling edges, as it has excellent pulse response. This measurement does not trade off time domain accuracy vs. noise, just total power accuracy vs. noise level. If you want to precisely examine just the useful part of the burst, choose Flat. This is an advanced control that normally does not need to be changed. Setting this to a value other than the factory default may cause invalid measurement results. FLATtop – a filter with a flat amplitude response, which provides the best amplitude accuracy. GAUSSian – a filter with Gaussian characteristics, which provides the best pulse response. You must be in the Spectrum Analyzer mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Preset | GAUSSian |
| State Saved | Saved in instrument state. |
| Range | Gaussian (Normal) Flattop |
| Backwards | [:SENSe] :TXPower :BWIDth :TYPE |

8 Burst Power (Transmit Power)
BW

Compatibility SCPI

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous? |
| Example | :INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation |
| Preset | ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF) |
| State Saved | Saved in instrument state |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep. |
| Initial S/W Revision | Prior to A.02.00 |

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

8 Burst Power (Transmit Power)
Cont (Continuous Measurement/Sweep)

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

File

See "File" on page 344

FREQ Channel

Accesses a menu of keys that allow you to control the Frequency and Channel parameters of the instrument.

Some features in the Frequency menu are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset. For example, the Center Freq setting is the same for all measurements - it does not change as you change measurements.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 491](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 493](#)

See ["Center Frequency Presets" on page 489](#)

| | |
|----------------|--|
| Key Path | FREQ Channel |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:CENTer <freq></code> <code>[:SENSe] :FREQuency:CENTer?</code> |

| | |
|-----------------------------|--|
| Example | FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT? |
| Notes | This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated. |
| Dependencies | The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit. |
| Couplings | When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range |
| Preset | Depends on instrument maximum frequency, mode, measurement, and selected input. See "Center Frequency Presets" on page 489 and "RF Center Freq" on page 491 and Ext Mix Center Freq and "I/Q Center Freq" on page 493 . |
| State Saved | Saved in instrument state |
| Min | Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 489 and "RF Center Freq" on page 491 and "I/Q Center Freq" on page 493 . |
| Max | Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 489 and "RF Center Freq" on page 491 and "I/Q Center Freq" on page 493 . |
| Default Unit | Hz |
| Status Bits/OPC | Non-overlapped |
| Dependencies | |
| Initial S/W Revision | Prior to A.02.00 |

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

| Freq Option | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune) |
|-------------|-------------------------|--------------------------------|-----------------------------|
| | | | |

8 Burst Power (Transmit Power)
FREQ Channel

| | | | above) |
|---------------------------------------|------------|----------|--------------|
| 503 (all but N9000A) | 1.805 GHz | 3.6 GHz | 3.7 GHz |
| 503 (N9000A) | 1.505 GHz | 3.0 GHz | 3.08 GHz |
| 507 (all but N9000A) | 3.505 GHz | 7.0 GHz | 7.1 GHz |
| 507 (N9000A) | 3.755 GHz | 7.5 GHz | 7.58 GHz |
| 508 (all but N9038A) | 1.805 GHz | 3.6 GHz | 8.5 GHz |
| 508 (N9038A) | 4.205 GHz | 8.4 GHz | 8.5 GHz |
| 513 | 6.805 GHz | 13.6 GHz | 13.8 GHz |
| 526 (all but N9000A and N9038A) | 13.255 GHz | 26.5 GHz | 27.0 GHz |
| 526 (N9000A) | 13.255 GHz | 26.5 GHz | 26.55 GHz |
| 526 (N9038A) | 1.805 GHz | 3.6 GHz | 27.0 GHz |
| 532 | 16.005 GHz | 32.0 GHz | 32.5 GHz |
| 543 | 21.505 GHz | 43.0 GHz | TBD |
| 544 | 22.005 GHz | 44.0 GHz | 44.5 GHz |
| 550 | 25.005 GHz | 50.0 GHz | 51 GHz |

Input 2:

| Model | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune above) |
|----------------|----------------------------|-----------------------------------|-----------------------------------|
| N9000A opt C75 | 0.7505GHz | 1.5 GHz | 1.58 GHz |
| N9038A | 505 MHz | 1 GHz | 1.000025 GHz |

Tracking Generator Frequency Limits (N9000A only):

| Tracking Generator Option | Min Freq (clips to this freq when turn TG on and | If above this Freq, Stop Freq clipped to this Freq when | Max Freq (can't tune above) while TG |
|---------------------------------|--|---|--|
| | | | |

| | can't tune below while TG on) | TG turned on | on |
|-----|----------------------------------|--------------|----------|
| T03 | 9 kHz | 3.0 GHz | 3.08 GHz |
| T06 | 9 kHz | 6.0 GHz | 6.05 GHz |

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

| Mode | CF Preset for RF |
|-------------|------------------|
| WCDMA | 1 GHz |
| WIMAXOFDMA, | 1 GHz |
| BASIC | 1 GHz |
| ADEMOD | 1 GHz |
| VSA | 1 GHz |
| TDSCDMA | 1 GHz |
| PNOISE | 1 GHz |
| LTE | 1 GHz |
| LTETDD | 1 GHz |
| MSR | 1 GHz |
| GSM | 935.2 MHz |
| NFIGURE | 1.505 GHz |

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:RF:CENTer <freq></code> <code>[:SENSe] :FREQuency:RF:CENTer?</code> |
| Example | FREQ:RF:CENT 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Dependencies | If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of |

| | |
|--------------------------|--|
| | Source Numerator, Source Denominator and Power Sweep. |
| Preset | See table above |
| State Saved | Saved in instrument state. |
| Min | -79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source |
| Max | See table above. Basically instrument maximum frequency – 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|----------------|--|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code> |
| Example | <code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code> |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Couplings | When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup. |
| Preset | When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies. If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq – Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table. |

| | |
|----------------------|--|
| | When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz. Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz. |
| State Saved | Saved in instrument state. |
| Min | The minimum frequency in the currently selected mixer band + 5 Hz |
| Max | The maximum frequency in the currently selected mixer band – 5 Hz If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency |
| Initial S/W Revision | A.08.01 |

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:IQ:CENTer <freq></code> <code>[:SENSe] :FREQuency:IQ:CENTer?</code> |
| Example | FREQ:IQ:CENT: 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Preset | 0 Hz |
| State Saved | Saved in instrument state. |
| Min | -40.049995 MHz |
| Max | 40.049995 MHz |
| Initial S/W Revision | Prior to A.02.00 |

CF Step

Changes the step size for the center frequency and start and stop frequency functions. Once a step size has been selected and the center frequency function is active, the step keys (and the UP|DOWN parameters for Center Frequency from remote commands) change the center frequency by the step-size value. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the analyzer.

Note that the start and stop frequencies also step by the CF Step value.

8 Burst Power (Transmit Power)
 FREQ Channel

| | |
|------------------------------|--|
| Key Path | FREQ Channel |
| Remote Command | [:SENSe]:FREQuency:CENTer:STEP[:INCRement] <freq> [:SENSe]:FREQuency:CENTer:STEP[:INCRement]? [:SENSe]:FREQuency:CENTer:STEP:AUTO OFF ON 0 1 [:SENSe]:FREQuency:CENTer:STEP:AUTO? |
| Example | FREQ:CENT:STEP:AUTO ON FREQ:CENT:STEP 500 MHz FREQ:CENT UP increases the current center frequency value by 500 MHz FREQ:CENT:STEP? FREQ:CENT:STEP:AUTO? |
| Notes | Preset and Max values are depending on Hardware Options (503, 507, 508, 513, 526) |
| Notes | Preset and Max values are dependent on Hardware Options (5xx) |
| Dependencies | Freq Offset is not available in External Mixing. In this case the Freq Offset key is grayed out and shows a value of zero. It will once again be available, and show the previously set value, when you return to the RF Input. |
| Dependencies | Span, RBW, Center frequency If the electronic/soft attenuator is enabled, any attempt to change the value of the center frequency >3.6 GHz by pressing the Up-arrow key, fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. |
| Couplings | When auto-coupled in a non-zero span, the center frequency step size is set to 10% of the span. When auto-coupled in zero span, the center frequency step size is set to the equivalent -3 dB RBW value. |
| Preset | Auto ADEMOD: 1 MHz ON |
| State Saved | Saved in instrument state |
| Min | – (the maximum frequency of the instrument). That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Max | The maximum frequency of the instrument. That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Default Unit | Hz |
| Status Bits/OPC dependencies | non-overlapped |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Input/Output

See ["Input/Output" on page 202](#)

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Marker Type

Sets the marker control mode as described under Normal, Delta, Fixed and Off, below. All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

| | |
|-------------------------------------|---|
| Key Path | Marker |
| Mode | GSM, SA, TD-SCDMA |
| Remote Command | :CALCulate:TXPower:MARKer[1] 2 ... 12:MODE POSition DELTa OFF :CALCulate:TXPower:MARKer[1] 2 ... 12:MODE? |
| Example | CALC:TXP:MARK:MODE OFF CALC:TXP:MARK:MODE? |
| Notes | <p>If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area.</p> <p>Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off.</p> <p>Active Function Display: the marker X axis value entered in the active function area will display the marker value to its full entered precision.</p> <p>You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode.</p> |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | Normal Delta Off |
| Backwards Compatibility SCPI | :CALCulate:BPOWer:MARKer[1] 2 ... 12:MODE |
| Initial S/W Revision | Prior to A.02.00 |

Properties

Accesses a menu that enables you to set marker properties and to access the marker trace menu.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Relative To

Selects the marker that the selected marker will be relative to (its reference marker).

| | |
|-----------------------|--|
| Key Path | Marker, Properties |
| Mode | GSM, SA, TD-SCDMA |
| Remote Command | :CALCulate:TXPower:MARKer[1] 2 ... 12:REFerence <integer> :CALCulate:TXPower:MARKer[1] 2 ... 12:REFerence? |
| Example | CALC:TXP:MARK:REF 10 CALC:TXP:MARK:REF? |
| Notes | A marker cannot be relative to itself, so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. When queried a single value will be returned (the specified marker numbers relative marker). |
| Preset | 2 3 4 5 6 7 8 9 10 11 12 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 12 |
| Initial S/W Revision | Prior to A.02.00 |

Marker Trace

Assigns the specified marker to the designated trace.

| | |
|----------|--------------------|
| Key Path | Marker, Properties |
|----------|--------------------|

8 Burst Power (Transmit Power) Marker

| | |
|------------------------------|--|
| Mode | GSM, SA, TD-SCDMA |
| Remote Command | :CALCulate:TXPower:MARKer[1] 2 ... 12:TRACe RFENvelope MAXHold MINHold :CALCulate:TXPower:MARKer[1] 2 ... 12:TRACe? |
| Example | CALC:TXP:MARK:TRAC MAXH CALC:TXP:MARK:TRAC? |
| Notes | You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Dependencies | If Detector/Max Hold Trace is Off, Max Hold is grayed out and MAXHold parameter is not available. If Detector/Min Hold Trace is Off, Min Hold is grayed out and MINHold parameter is not available. |
| Preset | RFENvelope |
| State Saved | Saved in instrument state. |
| Range | RF Envelope Max Hold RF Envelope Min Hold RF Envelope |
| Backwards Compatibility SCPI | :CALCulate:BPOWER:MARKer[1] 2 ... 12:TRACe |
| Initial S/W Revision | Prior to A.02.00 |

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker which is not Off. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

This may result in markers going off screen.

| | |
|----------------------|--|
| Key Path | Marker |
| Mode | GSM, SA, TD-SCDMA |
| Remote Command | :CALCulate:TXPower:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:TXPower:MARKer:COUPle[:STATe]? |
| Example | CALC:TXP:MARK:COUP ON CALC:TXP:MARK:COUP? |
| Notes | You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

All Markers Off

Turns off all markers.

| | |
|-------------------------------------|--|
| Key Path | Marker |
| Mode | GSM, SA, TD-SCDMA |
| Remote Command | :CALCulate:TXPower:MARKer:AOff |
| Example | CALC:TXP:MARK:AOff |
| Notes | You must be in the Spectrum Analyzer mode, TDSCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Backwards Compatibility SCPI | :CALCulate:BPOwer:MARKer:AOff |
| Initial S/W Revision | Prior to A.02.00 |

Marker X Axis Position (Remote Command Only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal or Delta except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

| | |
|-------------------------------------|---|
| Mode | GSM, SA, TD-SCDMA |
| Remote Command | :CALCulate:TXPower:MARKer[1] 2 ... 12:X:POsition <real> :CALCulate:TXPower:MARKer[1] 2 ... 12:X:POsition? |
| Example | CALC:TXP:MARK10:X:POS 500 CALC:TXP:MARK10:X:POS? |
| Notes | The query returns the marker's absolute X Axis value in trace points if the control mode is Normal, or the offset from the marker's reference marker in trace points if the control mode is Delta. If the marker is Off the response is not a number. You must be in the Spectrum Analyzer mode, TDSCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | Max value would be changed by Sweep/Meas Time parameter value. |
| Preset | Markers are turned OFF, so Marker X Axis Value query will return a not a number (NAN). |
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Backwards Compatibility SCPI | :CALCulate:BPOwer:MARKer[1] 2 ... 12:X:POsition |
| Initial S/W Revision | Prior to A.02.00 |

Marker Y Axis Value (Remote Command Only)

Returns the marker Y Axis value in the current marker Y Axis unit.

The “result” of a marker is the value which is displayed on the second line of the Marker Result block. To properly interpret the returned value the remote programmer must also know what the analyzer’s Y-Axis Unit is set to as described below.

A marker can have up to two results, only one of which is displayed or returned on a query, as follows:

- Absolute result: every marker has an absolute result and it is simply:

For Normal and Delta markers, the Y Axis value of the trace point the marker is currently on.

The absolute result is displayed in the result block or returned on a query unless the marker control mode is Delta.

- Relative result: if a marker’s control mode is Delta, the relative result is displayed in the result block or returned on a query. This is the ratio of the Absolute Result of a delta marker to the Absolute Result of its reference marker. The ratio is expressed in dB.

| | |
|------------------------------|---|
| Mode | GSM, SA, TD-SCDMA |
| Remote Command | :CALCulate:TXPower:MARKer[1] 2 ... 12:Y? |
| Example | CALC:TXP:MARK11:Y? |
| Notes | The query returns the marker Y Axis result. If the marker is Off the response is not a number. You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Preset | 0 |
| State Saved | No |
| Backwards Compatibility SCPI | :CALCulate:TXPower:MARKer[1] 2 ... 12:FUNCTION:RESult? :CALCulate:BPOwer:MARKer[1] 2 ... 12:FUNCTION:RESult? :CALCulate:BPOwer:MARKer[1] 2 ... 12:Y? |
| Initial S/W Revision | Prior to A.02.00 |

Marker Function

There is no 'Marker Function' supported in Burst (Tx) Power, so this front-panel key displays a blank menu key when pressed.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

8 Burst Power (Transmit Power)
Marker To

Marker To

There is no 'Marker To' functionality supported in Burst (Tx) Power, so this front-panel key displays a blank menu key when pressed.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Remote Measurement Functions

This section contains the following topics:

["Measurement Group of Commands" on page 2285](#)

["Current Measurement Query \(Remote Command Only\)" on page 2287](#)

["Limit Test Current Results \(Remote Command Only\)" on page 2287](#)

["Data Query \(Remote Command Only\)" on page 2287](#)

["Calculate/Compress Trace Data Query \(Remote Command Only\)" on page 2288](#)

["Calculate Peaks of Trace Data \(Remote Command Only\)" on page 2293](#)

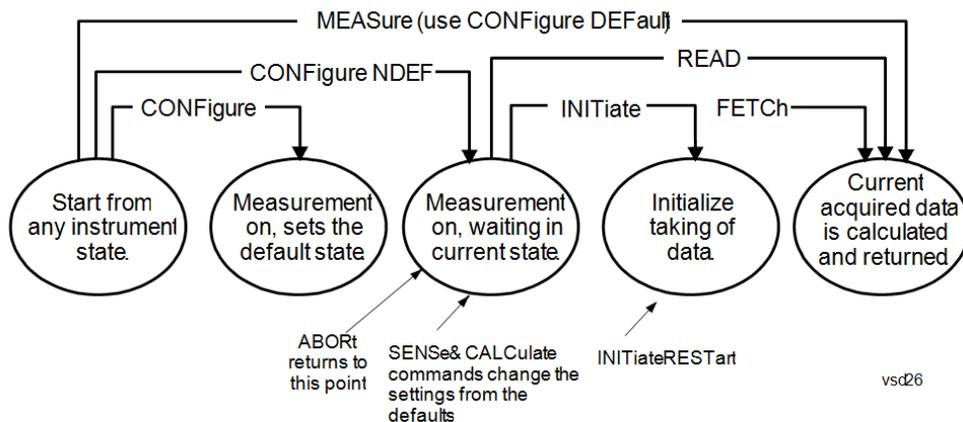
[Hardware-Accelerated Fast Power Measurement \(Remote Command Only\)](#)

["Format Data: Numeric Data \(Remote Command Only\)" on page 2294](#)

["Format Data: Byte Order \(Remote Command Only\)" on page 2295](#)

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFIgure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFIgure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTInuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTInuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
- For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
- Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
- If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
-

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

| | |
|-----------------------|-------------|
| Remote Command | :CONFigure? |
|-----------------------|-------------|

| | |
|----------------|-------|
| Example | CONF? |
|----------------|-------|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

| | |
|-----------------------|--------------------------|
| Remote Command | :CALCulate:CLIMits:FAIL? |
|-----------------------|--------------------------|

| | |
|----------------|--|
| Example | CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails. |
|----------------|--|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA[n]? |
| Notes | The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement. |
| Initial S/W Revision | Prior to A.02.00 |

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]] |
| Example | To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.) |
| Notes | The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data. |
| Initial S/W Revision | Prior to A.02.00 |

- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

NOTE If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPlE - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

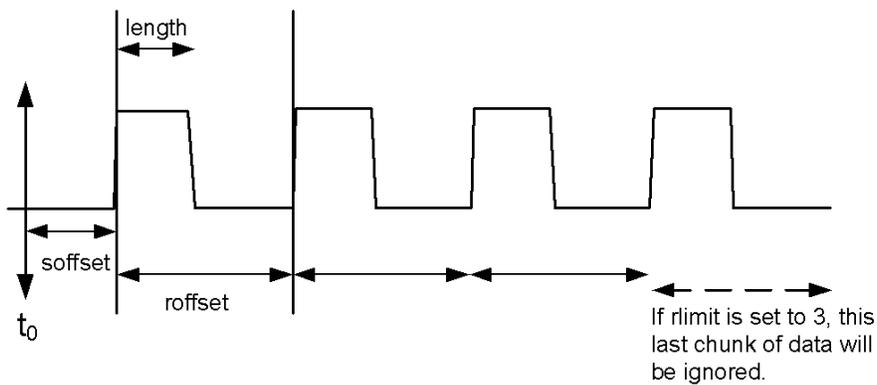
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

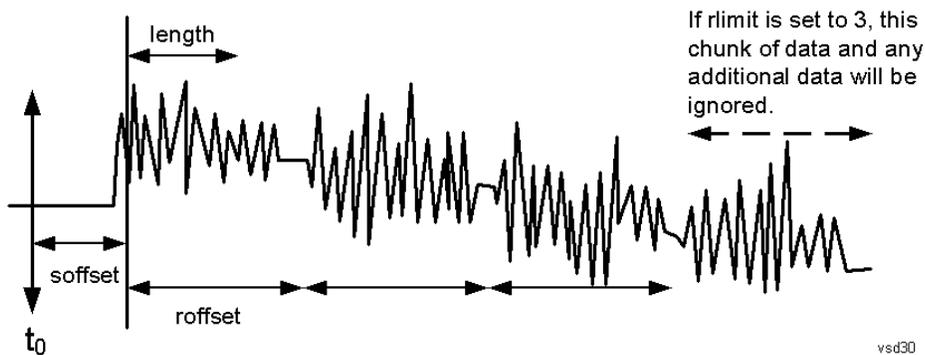
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

| | |
|-----------------------|--|
| Remote Command | <p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre> |
|-----------------------|--|

| | |
|----------------|---|
| Example | <p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p> |
|----------------|---|

| | |
|--------------|---|
| Notes | <p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p> |
|--------------|---|

excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQUency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat[:TRACe][:DATA] ASCii|INTeger,32|REAL,32 |REAL,64
:FORMat[:TRACe][:DATA]?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

Initial S/W Revision Prior to A.02.00

The specs for each output type follow:

ASCIi - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

| | |
|-----------------------------|--|
| Remote Command | :FORMat:BORDER NORMal SWAPped :FORMat:BORDER? |
| Preset | NORMal |
| Initial S/W Revision | Prior to A.02.00 |

Meas Setup

Displays the setup menu for the currently selected measurement. Many of the lower-level menu keys operate the same in all measurements. Unique functions are described below.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Avg/Hold Num

Specifies the number of data acquisition that will be averaged. After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

- On - Sets measurement averaging on.
- Off - Sets measurement averaging off.

| | |
|-------------------------------------|---|
| Key Path | Meas Setup |
| Mode | SA, GSM, TD-SCDMA |
| Remote Command | [:SENSe]:TXPower:AVERage:COUNT <integer> [:SENSe]:TXPower:AVERage:COUNT? [:SENSe]:TXPower:AVERage[:STATe] OFF ON 0 1 [:SENSe]:TXPower:AVERage[:STATe]? |
| Example | TXP:AVER:COUN 100 TXP:AVER:COUN? TXP:AVER:0 TXP:AVER? |
| Notes | You must be in the Spectrum Analyzer mode or GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. |
| Preset | 50 ON |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 10000 |
| Backwards Compatibility SCPI | [:SENSe]:BPOWer:AVERage:COUNT |
| Initial S/W Revision | Prior to A.02.00 |

Avg Mode

Selects the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

| Key | SCPI | Mode |
|-------------|-------------|--|
| Exponential | EXponential | After the average count is reached, each successive data acquisition is exponentially weighted and combined with the existing average. |
| Repeat | REPeat | After reaching the average count, the averaging is reset and a new average is started. |

| | |
|------------------------------|---|
| Key Path | Meas Setup |
| Mode | SA, GSM, TD-SCDMA |
| Remote Command | [:SENSe] :TXPower:AVERage:TCONtrol EXPonential REPeat [:SENSe] :TXPower:AVERage:TCONtrol? |
| Example | TXP:AVER:TCON REP TXP:AVER:TCON? |
| Notes | You must be in the Spectrum Analyzer mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Preset | EXponential |
| State Saved | Saved in instrument state. |
| Range | Exp Repeat |
| Backwards Compatibility SCPI | [:SENSe] :BPOWer:AVERage:TCONtrol |
| Initial S/W Revision | Prior to A.02.00 |

Avg Type

Specifies the type of trace and result averaging to use.

| Key | SCPI | Type |
|---------------------|---------|--|
| Pwr Avg (RMS) | RMS | True power averaging that is equivalent to taking the RMS value of the voltage. It is the most accurate type of averaging. |
| Log-Pwr Avg (Video) | LOG | Simulates the traditional spectrum analyzer type of averaging by averaging the log of the power. |
| None | MAXimum | The maximum values are retained during the averaging cycle. |
| None | MINimum | The minimum values are retained during the averaging cycle. |

SA, GSM Mode

| | |
|-------------------------------------|---|
| Key Path | Meas Setup |
| Mode | SA, GSM |
| Remote Command | [:SENSe] :TXPower :AVERage :TYPE LOG MAXimum MINimum RMS [:SENSe] :TXPower :AVERage :TYPE? |
| Example | TXP:AVER:TYPE LOG TXP:AVER:TYPE? |
| Notes | Maximum Minimum are selected only via SCPI. You must be in the Spectrum Analyzer or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | Selecting MAXimum MINimum force to visible Max Hold Trace or and Min Hold Trace . Measure Trace stays in RMS or Video average state. |
| Preset | RMS |
| State Saved | Saved in instrument state. |
| Range | Pwr Avg (RMS) Log-Pwr Avg(Video) Maximum Minimum |
| Backwards Compatibility SCPI | [:SENSe] :BPOwer :AVERage :TYPE |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|---|
| Key Path | Meas Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TXPower :AVERage :TYPE LOG RMS [:SENSe] :TXPower :AVERage :TYPE? |
| Example | TXP:AVER:TYPE LOG TXP:AVER:TYPE? |
| Notes | You must be in the TD-SCDMA mode. Use INSTRument:SElect to set the mode. |
| Preset | RMS |
| State Saved | Saved in instrument state. |
| Range | Pwr Avg (RMS) Log-Pwr Avg(Video) |
| Initial S/W Revision | Prior to A.02.00 |

Threshold Lvl

When Meas Method is set to Above Threshold Lvl, the mean carrier power is calculated based on the trace above the threshold level. The threshold level is displayed in dB (relative to the measured carrier) or dBm (absolute).

A green line in the grid is displayed at the y-position associated with the current threshold level value. Its state is controlled by the On/Off state of the 'Display Line' under the View/Display menu.

| | |
|------------------------------|--|
| Key Path | Meas Setup |
| Mode | SA, GSM, TD-SCDMA |
| Remote Command | [:SENSe]:TXPower:THReshold <real> [:SENSe]:TXPower:THReshold? [:SENSe]:TXPower:THReshold:TYPE ABSolute RELative [:SENSe]:TXPower:THReshold:TYPE? |
| Example | TXP:THR 0 TXP:THR? |
| Example | TXP:THR:TYPE ABS TXP:THR:TYPE? |
| Notes | You must be in the TD-SCDMA mode, Spectrum Analyzer mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. BAF SCPI Command determines whether this command is setting an absolute or a relative power level. Suffix dB and dBm are allowed, but it does not change the state of Threshold Type. Suffix may not be send. If Threshold Type is set to Relative, the positive value of Threshold level was allowed to +100dB and it treated as a negative value. Now max value of Threshold level is changed to 0dB. To keep the backward compatibility, the input from SCPI command allows to +100dB. |
| Preset | GSM: -20.0 SA: -30.0 TD-SCDMA : -60.0 RELative |
| State Saved | Saved in instrument state. |
| Min | -100 |
| Max | GSM, SA: Relative : 0dB Absolute : 100dBm TD-SCDMA: Relative : 0dB Absolute : 60dBm |
| Backwards Compatibility SCPI | [:SENSe]:BPOWer:THReshold |
| Initial S/W Revision | Prior to A.02.00 |

Meas Method

When the selected mode is SA or GSM, there are two options for this parameter: .

- **Above Threshold Level** measurement algorithm is used to capture a time record, and average only those points in the time record that exceed the user-specified threshold level. No attempt is made to

position the burst, or to calculate/display burst widths. This can be used to measure continuous signals, or bursted signals where the Measured Burst Width algorithm is too restrictive.

- **Measured Burst Width** measurement algorithm uses the threshold level to calculate the burst center, and average those points that lie within a user-specified burst width that is centered upon the burst. The burst width parameter is described in more detail below.

When the selected mode is TD-SCDMA, there is a third option:

- **Single Time Slot** measurement algorithm is to capture a single time slot record, and calculate the start and stop position of the time slot in terms of the trigger position theoretically. No attempt is made to position the burst, or to calculate/display burst widths. The burst width drawn in the screen is considered to be the theoretical width of the slot. This method is recommended to measure the mean transmit power in a single slot when trigger source is External Front/Rear while the Measured Burst Width algorithm is too restrictive.

SA, GSM mode

| Key Path | Meas Setup |
|-------------------------------------|--|
| Mode | SA, GSM |
| Remote Command | [:SENSe] :TXPower:METhod THReshold BWIDth [:SENSe] :TXPower:METhod? |
| Example | TXP:METH BWID TXP:METH? |
| Preset | THReshold |
| State Saved | Saved in instrument state. |
| Range | Above Threshold Lvl Measured Burst Width |
| Backwards Compatibility SCPI | [:SENSe] :BPOWer:METhod |
| Initial S/W Revision | Prior to A.02.00 |

| Key Path | Meas Setup |
|-----------------------|---|
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TXPower:METhod THReshold BWIDth SINGle [:SENSe] :TXPower:METhod? |
| Example | TXP:METH BWID TXP:METH? |
| Preset | SINGle |
| State Saved | Saved in instrument state. |
| Range | Threshold Lvl Measured Burst Width Single TimeSlot |
| Initial S/W Revision | Prior to A.02.00 |

Burst Width

When Burst Width Mode is set to manual, the user may enter a fixed-time value in seconds, or alternatively specify the burst width as a percentage of the last measured burst width (result in bottom-left corner of second window).

| | |
|-----------------------------|--|
| Key Path | Meas Setup |
| Mode | SA, GSM, TD-SCDMA |
| Remote Command | <pre>[:SENSe]:TXPower:BURSt:WIDTh <time> [:SENSe]:TXPower:BURSt:WIDTh? [:SENSe]:TXPower:BURSt:AUTO ON OFF 1 0 [:SENSe]:TXPower:BURSt:AUTO?</pre> |
| Example | <pre>TXP:BURS:WIDT 10 TXP:BURS:WIDT? TXP:BURS:AUTO 1 TXP:BURS:AUTO?</pre> |
| Example | <pre>TXP:BURS:AUTO 0 TXP:BURS:AUTO? TXP:BURS:AUTO 1 TXP:BURS:AUTO?</pre> |
| Notes | You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Dependencies | Burst Width will be grayed out if " Meas Method " on page 518 is set to 'Above Threshold Lvl'. |
| Couplings | <p>SA, GSM Max value depends on Sweep Time, Res BW and RBW filter type.</p> <p>TD-SCDMA: If the measure method is not "Measured Burst Width", this key will be grayed out. The default value is depending on the Burst type: If Burst Type = Traffic, Burst Width = 662.5us If Burst Type = Downlink Pilot, Burst Width = 50us If Burst Type = Uplink Pilot, Burst Width = 100us</p> |
| Preset | <p>SA, GSM: 255.6 us TD-SCDMA: 662.5us ON</p> |
| State Saved | Saved in instrument state. |
| Min | 100.0 ns |
| Max | 50 s |
| Initial S/W Revision | Prior to A.02.00 |

Meas Interval (for TD-SCDMA mode)

Sets the number of slots to be captured for each measurement. Uplink and downlink pilots each count as one slot, so setting the Meas Interval parameter to 9 will display one full subframe.

| | |
|-----------------------|---|
| Key Path | Meas Setup |
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :TXPower:SWEEP:TIME <integer></code> <code>[:SENSe] :TXPower:SWEEP:TIME?</code> |
| Example | TXP:SWE:TIME 4 TXP:SWE:TIME? |
| Notes | In Single Time Slot method, Meas Interval is set to 1 and the key is disabled automatically. You must be in the TDSCDMA mode to use this command. Use INSTRUMENT:SElect to set the mode. |
| Couplings | When device in Radio menu changes: If device is BTS, Trigger Source: External Front, Method: Single Time Slot, Measure: Continuous, Measure Time: disabled (=1); If device is MS, Trigger Source: RF Burst, Method: Measured Burst Width, Measure: Single, Measure Time: enabled. |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 18 |
| Initial S/W Revision | Prior to A.02.00 |

Meas Preset

Returns parameters for this measurement to those set by the factory.

| | |
|-----------------------|--|
| Key Path | Meas Setup |
| Mode | SA, GSM, TD-SCDMA |
| Remote Command | <code>:CONFigure:TXPower</code> |
| Example | CONF:TXP |
| Notes | You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRUMENT:SElect to set the mode. |
| Initial S/W Revision | Prior to A.02.00 |

8 Burst Power (Transmit Power)
Meas Setup

Mode

See "Mode" on page 288

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings
- See "[How-To Preset](#)" on page 525 for more information.

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :SYSTem:PRESet |
| Example | :SYST:PRES |
| Notes | *RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0. |
| Couplings | A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set. |
| Backwards Compatibility Notes | In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using |

| | |
|----------------------|------------------|
| | User Preset. |
| Initial S/W Revision | Prior to A.02.00 |

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

| Type Of Preset | SCPI Command | Front Panel Access |
|--------------------------------|--|--|
| Auto Couple | :COUPlE ALL | Auto Couple front-panel key |
| Meas Preset | :CONFIgure:<Measurement> | Meas Setup Menu |
| Mode Preset | :SYSTem:PRESet | Mode Preset (green key) |
| Restore Mode Defaults | :INSTrument:DEFault | Mode Setup Menu |
| Restore All Mode Defaults | :SYSTem:DEFault MODEs | System Menu; Restore System Default Menu |
| *RST | *RST | not possible (Mode Preset with Single) |
| Restore Input/Output Defaults | :SYSTem:DEFault INPut | System Menu; Restore System Default Menu |
| Restore Power On Defaults | :SYSTem:DEFault PON | System Menu; Restore System Default Menu |
| Restore Alignment Defaults | :SYSTem:DEFault ALIGn | System Menu; Restore System Default Menu |
| Restore Miscellaneous Defaults | :SYSTem:DEFault MISC | System Menu; Restore System Default Menu |
| Restore All System Defaults | :SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent | System Menu; Restore System Default Menu |
| User Preset | :SYSTem:PRESet:USER | User Preset Menu |
| User Preset All Modes | :SYSTem:PRESet:USER:ALL | User Preset Menu |

8 Burst Power (Transmit Power)
Mode Preset

| | | |
|----------------------|-----------------------|-------------|
| Power On Mode Preset | :SYSTem:PON:TYPE MODE | System Menu |
| Power On User Preset | :SYSTem:PON:TYPE USER | System Menu |
| Power On Last State | :SYSTem:PON:TYPE LAST | System Menu |

Preset Type (Remote Command Only)

As stated in the Backward Compatibility section, to be compatible with ESA/PSA the PRESet:TYPE command will be implemented as a no-op.

| | |
|-----------------------------|--|
| Mode | All |
| Remote Command | :SYSTem:PRESet:TYPE FACTory MODE USER :SYSTem:PRESet:TYPE? |
| Example | :SYST:PRESet:TYPE FACT |
| Notes | This command is supported for backward compatibility only. It is a no-op which does not change the behavior of any preset operation. |
| Preset | This is unaffected by Preset but is set to Mode on a "Restore System Defaults->All" |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Mode Setup

See ["Mode Setup" on page 320](#)

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace. Pressing Peak Search with the selected marker off causes the selected marker to be set to Normal, then a peak search is immediately performed.

| | |
|-----------------------------|---|
| Key Path | Front-panel key |
| Mode | GSM, SA, TD-SCDMA |
| Remote Command | :CALCulate:TXPower:MARKer[1] 2 ... 12:MAXimum |
| Example | CALC:TXP:MARK2:MAX |
| Initial S/W Revision | Prior to A.02.00 |

Print

See "Print" on page 348

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

| Type | Default Prefix | Menu |
|-----------------------|----------------|-----------------|
| State | State_ | (Save/Recall) |
| Trace + State | State_ | (Save/Recall) |
| Screen | Screen_ | (Save/Recall) |
| Amplitude Corrections | Ampcor_ | (Import/Export) |
| Traces | Trace_ | (Import/Export) |
| Limit Lines | LLine_ | (Import/Export) |
| Measurement Result | MeasR_ | (Import/Export) |
| Capture Buffer | CapBuf_ | (Import/Export) |

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as "fred.csv", then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

| | |
|----------------------|--|
| Key Path | Front-panel key |
| Notes | No remote command for this key specifically. |
| Initial S/W Revision | Prior to A.02.00 |

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

| Key Path | Front-panel key |
|-------------------------------|--|
| Notes | <p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATE <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p> |
| Backwards Compatibility Notes | <p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, "state" always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> |
| Backwards Compatibility Notes | <p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p> |
| Initial S/W Revision | Prior to A.02.00 |

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See "[More Information](#)" on page 534.

| | |
|-----------------------|--|
| Key Path | Recall |
| Mode | All |
| Remote Command | :MMEMory:LOAD:STATe <filename> |
| Example | :MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path |
| Example | MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state. |
| Notes | <p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <ul style="list-style-type: none"> • If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number. <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p> |

| | |
|-------------------------------------|---|
| | there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu. |
| Backwards Compatibility SCPI | :MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

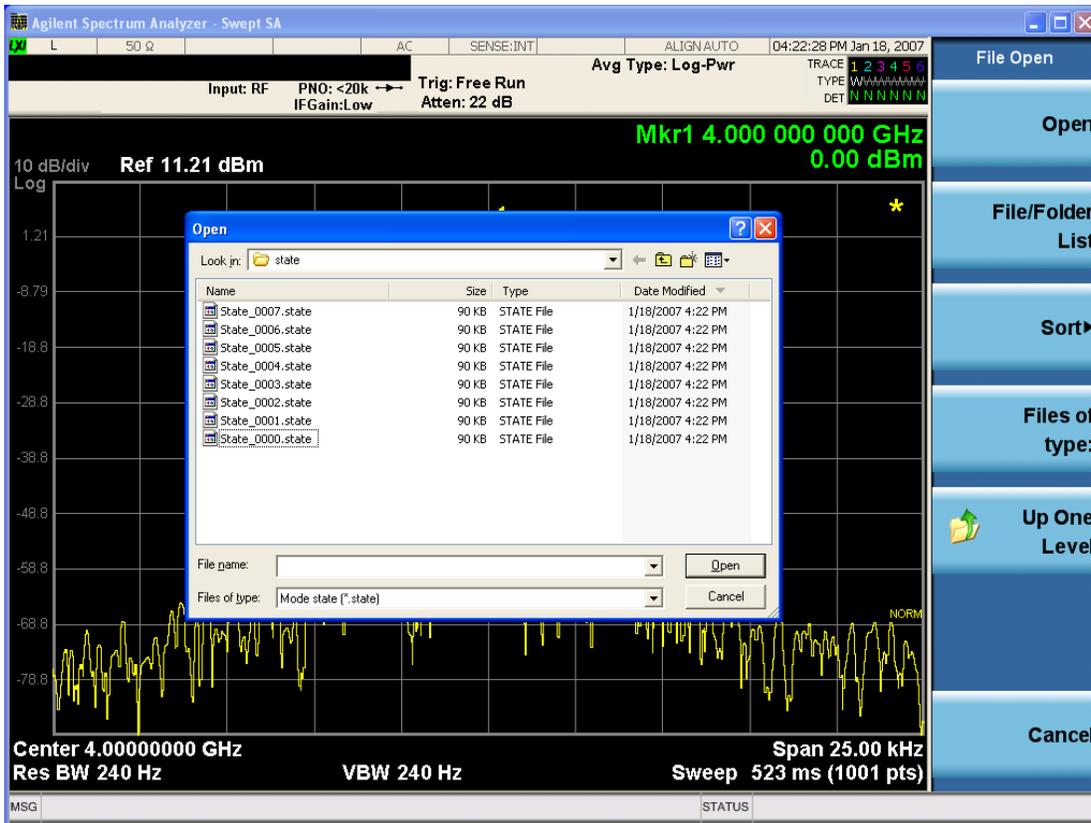
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

| | | |
|---|--|--|
| You want to recall state and one trace's data, leaving other traces unaffected. | Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed. | On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed. |
| You want to recall all traces | Save Trace+State from ALL traces. | On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved) |
| You want all traces to load exactly as they were when saved. | Save State | On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten. |

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

8 Burst Power (Transmit Power) Recall

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Notes | Brings up the Open dialog for recalling a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Mode | All |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available" |
| Initial S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|--|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|---|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1-16 from front panel, 1-128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Data (Import)

Importing a data file loads data that was previously saved from the current measurement or from other measurements and/or modes that produce compatible data files. The Import Menu only contains Data Types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by the user prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Importing Data loads measurement data from the specified file into the specified or default destination, depending on the data type selected. Selecting an Import Data menu key will not actually cause the importing to occur, since the analyzer still needs to know from where to get the data. Pressing the Open key in this menu brings up the Open dialog and Open menu that provides you with the options from where to recall the data. Once a filename has been selected or entered in the Open menu, the recall occurs as soon as the Open button is pressed.

| | |
|----------------------|--|
| Key Path | Recall |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. Some keys will be missing completely, so the key locations in the sub-menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:LOAD commands. |
| Dependencies | If a file type is not used by a certain measurement, it is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Capture Buffer

The captured data is raw data which is not processed.

| | |
|----------------------|---|
| Key Path | Recall, Data |
| Mode | TD-SCDMA |
| Example | MMEM:LOAD:CAPT "MyCaptureData.bin" This loads the file of capture data (on the default file directory path) into the instrument. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Open...

When you press "Open", the analyzer brings up a Windows dialog and a menu entitled "**File Open.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[From File...](#)" on page 2309 in Recall, State, for a full description of this dialog and menu.

| | |
|----------------------|--|
| Key Path | Recall, Data |
| Notes | The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 540

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate[:IMMEDIATE] :INITiate:RESTART |
| Example | :INIT:IMM :INIT:REST |
| Notes | :INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function. |
| Couplings | Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement. |
| Status Bits/OPC dependencies | This is an Overlapped command. The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUESTionable register bit 9 (INTegrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set. |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command `CALC:AVER:TCON UP`.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Mode | All |
| Notes | No remote command for this key specifically, but the :MMEM:STOR:STATe <filename> command is available for specific file types. An example is :MMEM:STOR:STATe <filename>. |
| Initial S/W Revision | Prior to A.02.00 |

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

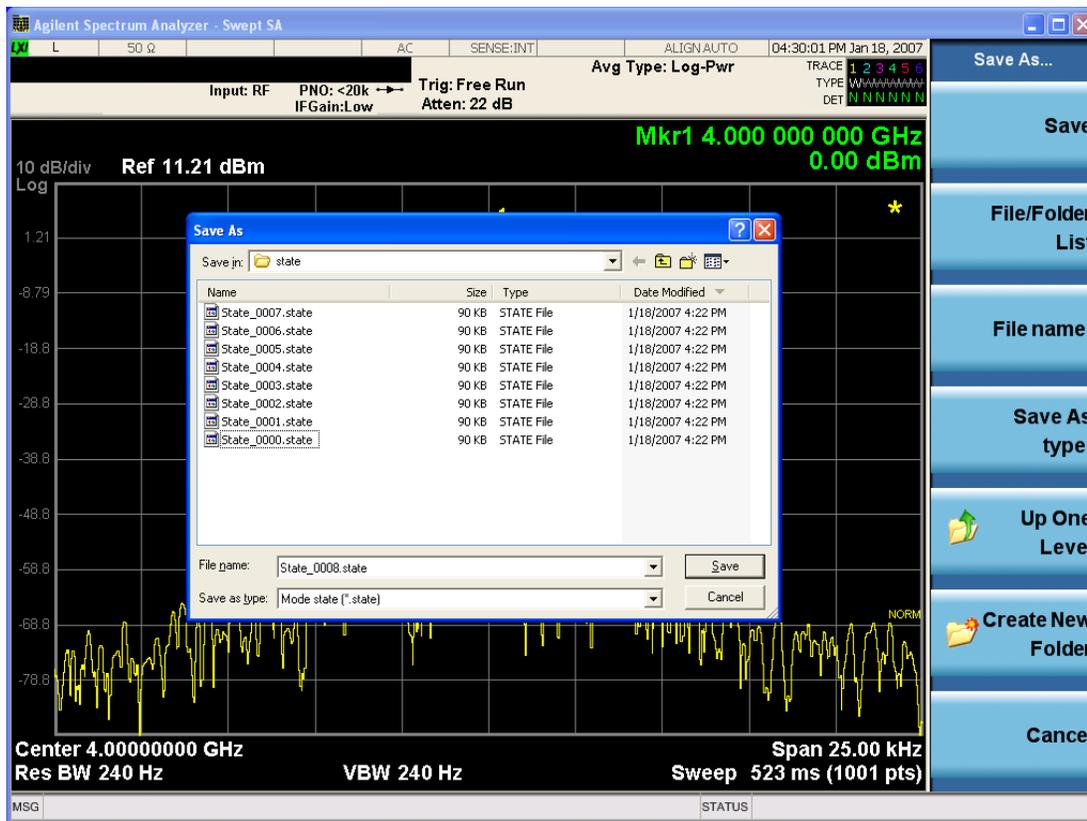
| | |
|----------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:STATe <filename> |
| Example | MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory. |
| Notes | Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key |

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

| | |
|-------------------------------------|-----------------------------------|
| Backwards Compatibility SCPI | :MMEMory:STORe:STATe 1,<filename> |
| Initial S/W Revision | Prior to A.02.00 |

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2305](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Save, State |
| Mode | All |
| Notes | Brings up Save As dialog for saving a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 545](#)

| | |
|-----------------------|--|
| Key Path | Save, State |
| Mode | All |
| Remote Command | :MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number> |
| Example | :MMEM:REG:STAT:LAB 1,"my label" |
| Notes | <reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,"" |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available" |
| Preset | The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc" |
| Initial S/W Revision | A.11.00 |

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

| | |
|----------------------|---|
| Key Path | Save |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands. |
| Dependencies | If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Measurement Results

Pressing this key selects Meas Results as the data type to be exported.

The Meas Results file contains information which describes the current state of the analyzer. It is detailed in ["Meas Results File Contents" on page 548](#) below.

| | |
|------------------------------|--|
| Key Path | Save, Data |
| Remote Command | :MMEMory:STORe:RESults <string> |
| Example | :MMEM:STOR:RES "MeasR_0000.csv" |
| Notes | <p>If the save is initiated via SCPI and the file already exists, the file will be overwritten.</p> <p>The SCPI command exports Burst Power (Transmit Power) measurement results to the file specified as the parameter in the current path. The default path is My Documents\<current mode>\data\TXP\results.</p> <p>Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.</p> <p>The SCPI parameter is a quoted string that specifies the filename. Both single and double quotes are supported for any filename parameter over SCPI.</p> |
| Dependencies | The current active measurement must be the Burst Power (Transmit Power) measurement to use this command. |
| Status Bits/OPC dependencies | Sequential – waits for the previous measurement to complete |
| Initial S/W Revision | Prior to A.02.00 |

Meas Results File Contents

A Meas Results File contains measurement results with the following information.

- File ID string, which is "MeasResult"
- Measurement ID following Mode ID, which is "SA:TXP" for example.
- Firmware rev and model number
- Option string
- Center Frequency
- TXP_InfoBw
- TXP_Used_CaptureTime

The file contains these data followed by MeasResult1 to MeasResult4 that flag the start of the measurement results. Each line of Measurement Results consists of four comma separated values from MeasResult1 value to MeasResult4 value. MeasResult1 contains the same results as MEAS/READ/FETCH:TXPower|BPower1; MeasResult2, MEAS/READ/FETCH:TXPower|BPower2;... (continues in the same manner)

Exported file is .csv file. The Meas Results file, when imported into Excel, will show the following data:

| | | | | |
|---|-------------|-------------|-------------|--|
| MeasResult | | | | |
| SA:TXP | | | | |
| A.10.53 | N9030A | | | |
| 526 ALV ATP B1X B1Y B25 B40 BBA CR3 CRP DCF DDA DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA LFE LNP MAT MPB NFE NUL P26 PFR PNC RTL RTS S40 SB1 SEC SM1 TVT YAS YAV | 1 | | | |
| Center Frequency | 1.33E+10 | | | |
| TXP_InfoBw | 3000000 | | | |
| TXP_Used_CaptureTime | 0.00064 | | | |
| MeasResult1 | MeasResult2 | MeasResult3 | MeasResult4 | |
| 0 | | | | |
| -999 | | | | |

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data which is not processed.

| | |
|----------------------|--|
| Key Path | Save, Data |
| Mode | TD-SCDMA |
| Example | MMEM:STOR:CAPT "MyCaptureData.bin" This stores the capture data in the file MyCaptureData.bin in the default directory. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Save As . . .

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\`<mode name>`\data\traces

For all of the Limit Data Files:

8 Burst Power (Transmit Power)
Save

My Documents\`<mode name>`\data\limits

For all of the Measurement Results Data Files:

My Documents\`<mode name>`\data\`<measurement name>`\results

For all of the Capture Buffer Data Files:

My Documents\`<mode name>`\data\captureBuffer

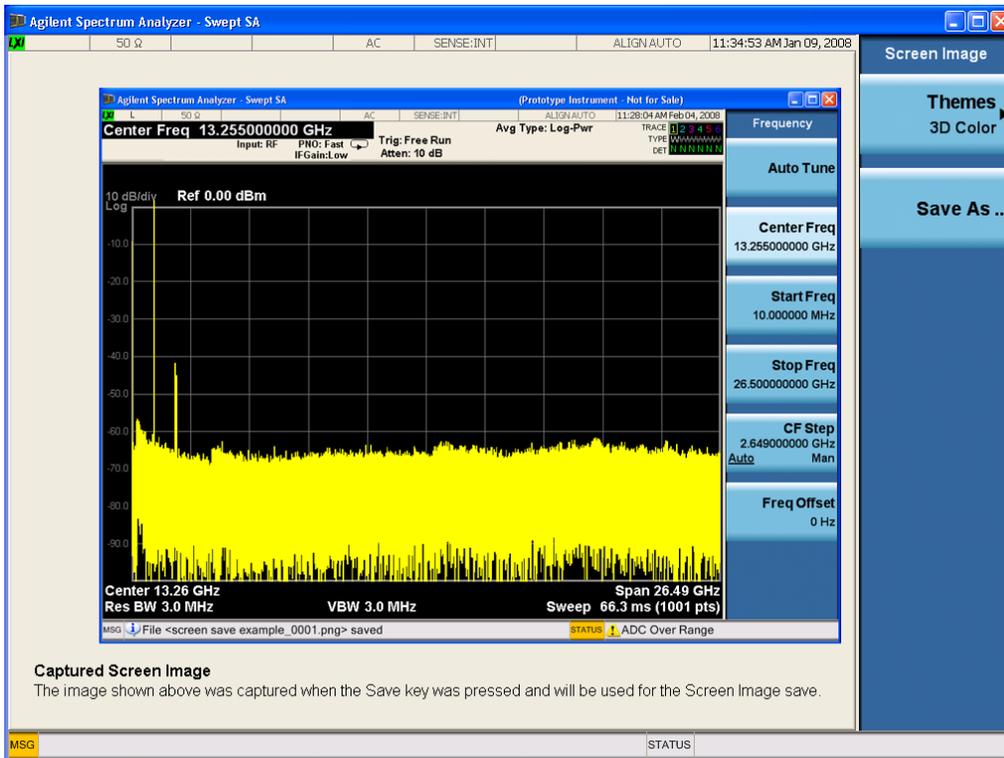
| | |
|----------------------|---|
| Key Path | Save, Data |
| Mode | All |
| Notes | The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <code><mode specific></code> Save Type. The save is performed immediately and does not wait until the measurement is complete. |
| Initial S/W Revision | Prior to A.02.00 |

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE

For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

| | |
|----------------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:SCReem <filename> |
| Example | :MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|-----------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
|-----------------|----------------------------|

| | |
|----------------------|-------------------------|
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Save As...

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File ...](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where `<mode name>` is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

| | |
|----------------------|--|
| Key Path | Save, Screen Image |
| Notes | Brings up Save As dialog for saving a Screen Image Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Catalog (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:CATalog? [<code><directory_name></code>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><code><numeric_value>,<numeric_value>,{<file_entry>}</code></p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter</p> |

| | |
|----------------------|---|
| | <p>indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:</p> <p><file_name>,<file_type>,<file_size></p> <p>As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Change Directory (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:CDIRectory [<directory_name>] :MMEMory:CDIRectory? |
| Notes | <p>The string must be a valid logical path.</p> <p>Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.</p> <p>At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.</p> <p>Query returns full path of the default directory.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Copy (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:COPY <string>,<string>[,<string>,<string>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Copies an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:COpy:DEvice <source_string>,<dest_string> |
| Notes | The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device. Valid device keywords are: SNS (smart noise source) An error is generated if the file or device is not found. |

Mass Storage Delete (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DElete <file_name>[,<directory_name>] |
| Notes | The string must be a valid logical path. Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an “access denied” error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name> |
| Notes | The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Make Directory (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MDIRectory <directory_name> |
| Notes | The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created. |

| | |
|----------------------|--|
| | This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Move (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MOVE <string>,<string>[,<string>,<string>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Remove Directory (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:RDIRECTory <directory_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See "[More Information](#)" on page 557

| | |
|-------------------------------|---|
| Key Path | Front-panel key |
| Example | :INIT:CONT OFF |
| Notes | See Cont key description. |
| Backwards Compatibility Notes | <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORt. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p> |
| Initial S/W Revision | Prior to A.02.00 |

More Information

See "[Restart](#)" on page 2315 for details on the INIT:IMMediate (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMediate does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

| Key Path | Front-panel key |
|----------|-----------------|
|----------|-----------------|

SPAN X Scale

Accesses a menu of functions that enable you set the horizontal scale parameters.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Ref Value

Enables you to set the display X reference value.

| | |
|-----------------------|--|
| Key Path | SPAN X Scale |
| Mode | SA, GSM, TD-SCDMA |
| Remote Command | :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel <time> :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel? |
| Example | DISP:TXP:VIEW:WIND:TRAC:X:RLEV 1s DISP:TXP:VIEW:WIND:TRAC:X:RLEV? |
| Notes | You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | If the X Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, X Auto Scaling automatically changes to Off. |
| Preset | 0 s |
| State Saved | Saved in instrument state. |
| Min | -10.0 s |
| Max | 10.00 s |
| Initial S/W Revision | Prior to A.02.00 |

Scale/Div

Enables you to set the display X scale/division value.

| | |
|-----------------------|--|
| Key Path | SPAN X Scale |
| Mode | SA, GSM, TD-SCDMA |
| Remote Command | :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time> :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision? |
| Example | DISP:TXP:VIEW:WIND:TRAC:X:PDIV 1ms DISP:TXP:VIEW:WIND:TRAC:X:PDIV? |
| Notes | You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | If the X Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, X Auto Scaling automatically changes to Off. |

| | |
|----------------------|----------------------------|
| Preset | 64.0 us |
| State Saved | Saved in instrument state. |
| Min | 1.00 ns |
| Max | 1.00 s |
| Initial S/W Revision | Prior to A.02.00 |

Ref Position

Enables you to set the display X reference position to Left, Center or Right.

| | |
|----------------------|---|
| Key Path | SPAN X Scale |
| Mode | SA, GSM, TD-SCDMA |
| Remote Command | :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT CENTER RIGHT :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOSition? |
| Example | DISP:TXP:VIEW:WIND:TRAC:X:RPOS LEFT DISP:TXP:VIEW:WIND:TRAC:X:RPOS? |
| Notes | You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Preset | LEFT |
| State Saved | Saved in instrument state. |
| Range | Left Ctr Right |
| Initial S/W Revision | Prior to A.02.00 |

Auto Scaling

Enables you to toggle the X auto scaling function between On and Off.

| | |
|----------------|---|
| Key Path | SPAN X Scale |
| Mode | SA, GSM, TD-SCDMA |
| Remote Command | :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPle 0 1 OFF ON :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPle? |
| Example | DISP:TXP:VIEW:WIND:TRAC:X:COUP OFF DISP:TXP:VIEW:WIND:TRAC:X:COUP? |
| Notes | You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | Upon pressing the Restart front-panel key, the scale coupling function automatically determines the scale per division and reference values based on the measurement results if this parameter is set to On. When you set a value to either X Rel Value or X Scale/Div manually, X Auto Scaling |

| | |
|----------------------|-------------------------------|
| | automatically changes to Off. |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

Sweep/Control

Accesses a menu of functions that enable you to set up and control the sweep for the current measurement. For details about this key, see "[Sweep/Control](#)" on page 2205.

| | |
|----------------------|------------------------|
| Key Path | Front-panel key |
| Mode | SA, EDGE, GSM, TDSCDMA |
| Initial S/W Revision | Prior to A.02.00 |

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing Restart, Single or Cont does a Resume.

| | |
|-----------------------|--|
| Key Path | Sweep/Control |
| Remote Command | :INITiate:PAUSE |
| Dependencies | Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Key Path | Sweep/Control |
| Remote Command | :INITiate:RESume |
| Dependencies | Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing. |
| Initial S/W Revision | Prior to A.02.00 |

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORT is sent, the alignment finishes before the abort function is performed. So ABORT does not abort an alignment.

If the analyzer is set for Continuous measurement, it sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

| | |
|-----------------------|--------|
| Remote Command | :ABORT |
|-----------------------|--------|

| | |
|------------------------------|--|
| Example | :ABOR |
| Notes | <p>If :INITiate:CONTInuous is ON, then a new continuous measurement will start immediately; with sweep (data acquisition) occurring once the trigger condition has been met.</p> <p>If :INITiate:CONTInuous is OFF, then :INITiate:IMMEDIATE is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met.</p> |
| Dependencies | <p>For continuous measurement, ABORt is equivalent to the Restart key.</p> <p>Not all measurements support the abort command.</p> |
| Status Bits/OPC dependencies | <p>The STATus:OPERation register bits 0 through 8 are cleared.</p> <p>The STATus:QUEStionable register bit 9 (INTegrity sum) is cleared.</p> <p>Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true.</p> |
| Initial S/W Revision | Prior to A.02.00 |

8 Burst Power (Transmit Power)
System

System

See "[System](#)" on page 349

Trace/Detector

Accesses a menu of functions that enable you to control the detectors for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Max Hold Trace

This key enables you to select visible/invisible Max Hold Trace.

| | |
|-----------------------|--|
| Key Path | Trace/Detector |
| Mode | SA, GSM, TD-SCDMA |
| Remote Command | :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe] ON OFF 1 0 :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe]? |
| Example | :DISP:TXP:VIEW:WIND:TRAC:MAXH ON :DISP:TXP:VIEW:WIND:TRAC:MAXH? |
| Notes | You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | Selecting [:SENSe]:TXPower:AVERage:TYPE MAXimum forces this parameter to ON. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

Min Hold Trace

This key enables you to select visible/invisible Min Hold Trace.

| | |
|-----------------------|--|
| Key Path | Trace/Detector |
| Mode | SA, GSM, TD-SCDMA |
| Remote Command | :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe] ON OFF 1 0 :DISPlay:TXPower:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe]? |
| Example | :DISP:TXP:VIEW:WIND:TRAC:MINH ON :DISP:TXP:VIEW:WIND:TRAC:MINH? |
| Notes | You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | Selecting [:SENSe]:TXPower:AVERage:TYPE MINimum forces this parameter to ON. |

8 Burst Power (Transmit Power)
Trace/Detector

| | |
|----------------------|----------------------------|
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

Trigger

See ["Trigger" on page 424](#)

Free Run

See ["Free Run " on page 431](#)

Video

See ["Video \(IF Envelope\) " on page 432](#)

Trigger Level

See ["Trigger Level " on page 432](#)

Trig Slope

See ["Trig Slope " on page 433](#)

Trig Delay

See ["Trig Delay " on page 434](#)

External 1

See ["External 1 " on page 2357](#)

Trigger Level

See ["Trigger Level " on page 2357](#)

Trig Slope

See ["Trig Slope " on page 2358](#)

Trig Delay

See ["Trig Delay " on page 437](#)

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off" on page 2346](#)

External 2

See ["External 2 " on page 2359](#)

Trigger Level

See ["Trigger Level " on page 2359](#)

Trig Slope

See ["Trig Slope " on page 2360](#)

8 Burst Power (Transmit Power)
Trigger

Trig Delay

See "[Trig Delay](#) " on page 440

Zero Span Delay Comp

See "[Zero Span Delay Comp On/Off](#)" on page 2348

RF Burst

See "[RF Burst](#) " on page 2360

Absolute Trigger

See "[Absolute Trigger Level](#)" on page 2361

Relative Trigger

See "[Relative Trigger Level](#)" on page 2350

Trig Slope

See "[Trigger Slope](#) " on page 2362

Trig Delay

See "[Trig Delay](#) " on page 444

Auto/Holdoff

See "[Auto/Holdoff](#) " on page 445

Auto Trig

See "[Auto Trig](#) " on page 445

Trig Holdoff

See "[Trig Holdoff](#) " on page 446

Holdoff Type

See "[Holdoff Type](#)" on page 446

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

| Key Path | Front-panel key |
|-------------------------------|--|
| Backwards Compatibility Notes | <p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p> |
| Initial S/W Revision | Prior to A.02.00 |

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER |
| Notes | :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed |
| Couplings | A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:ALL |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL |
| Notes | Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. |
| Couplings | A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

| | |
|-----------------------|---|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:SAVE |
| Example | :SYST:PRES:USER:SAVE |
| Notes | :SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file. |
| Initial S/W Revision | Prior to A.02.00 |

View/Display

The View/Display key opens up the View menu for the current measurement. The views that are available are specific to the current measurement selected under the Meas key. Many of the lower-level menu keys are also the same across all measurements. Unique functions are described below.

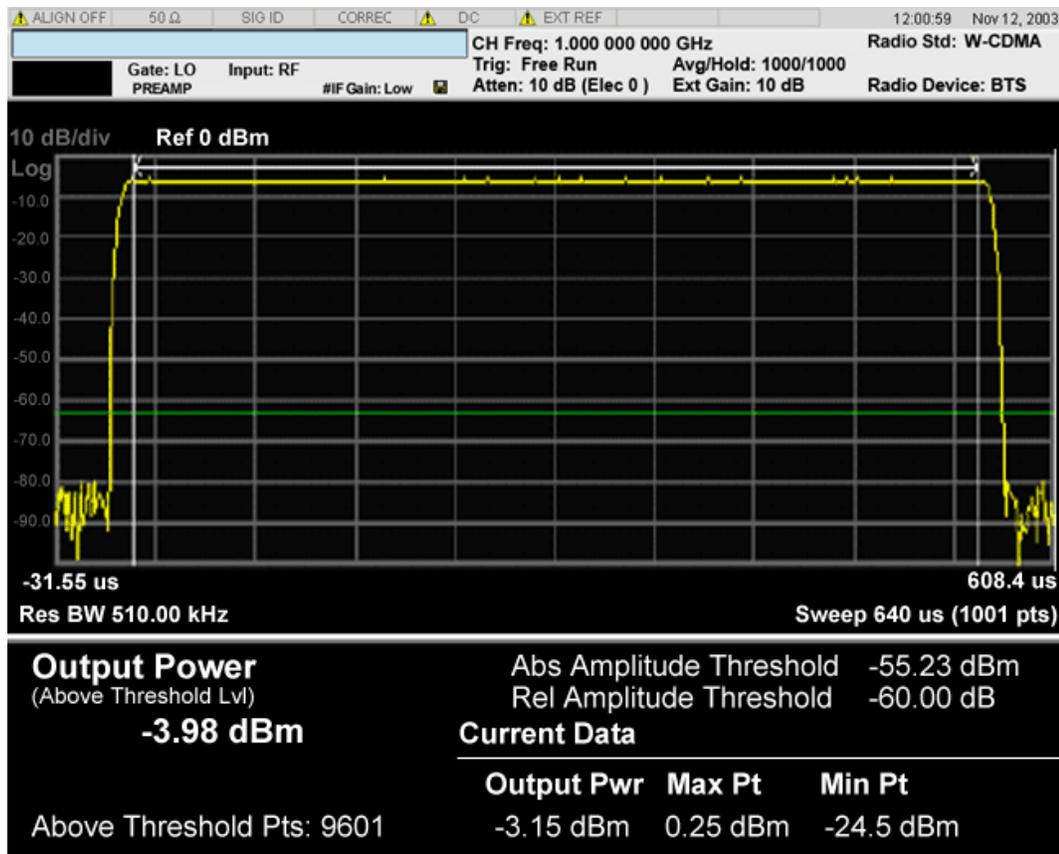
This measurement has one view, which consists of two windows.

"RF Envelope view for TX Power Measurement(Above Threshold)" on page 572

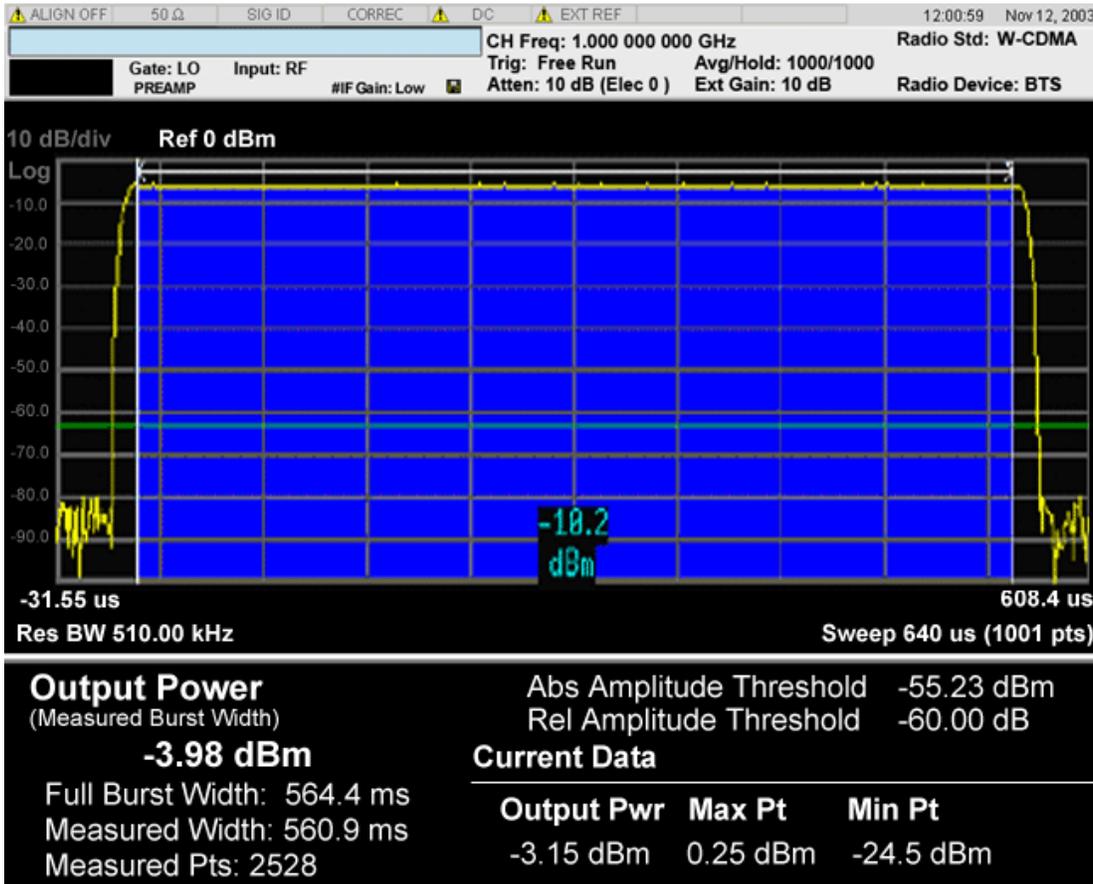
"RF Envelope view with Bar Graph for TX Power Measurement (Measured Burst Width)" on page 573

"RF Envelope view with Bar Graph for TX Power Measurement (Single TimeSlot)" on page 574

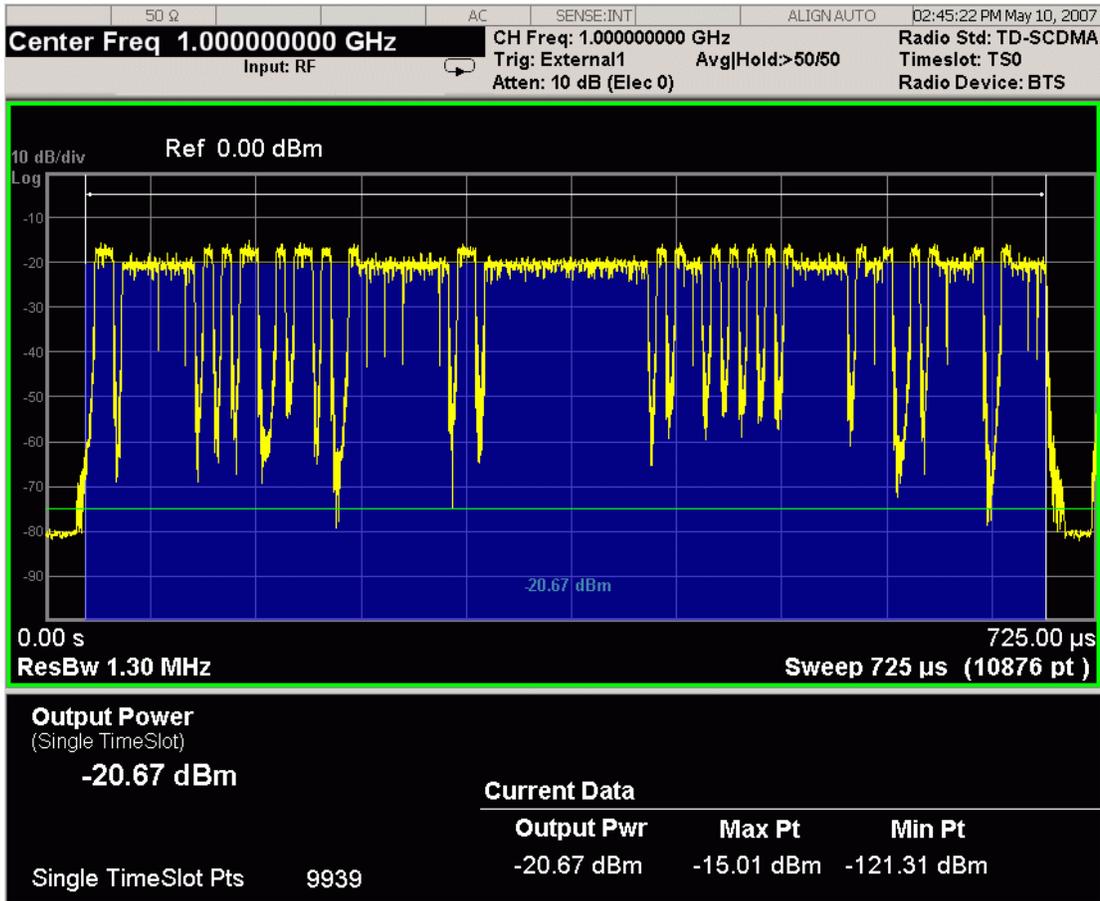
RF Envelope view for TX Power Measurement(Above Threshold)



RF Envelope view with Bar Graph for TX Power Measurement (Measured Burst Width)



RF Envelope view with Bar Graph for TX Power Measurement (Single TimeSlot)



The bar graph represents the measured portion of the trace. It is the blue bar in the second figure. Its state (On/Off) is controlled by the **Bar Graph** key under the View/Display key.

RF Envelope window

| | |
|---------------------|------------------------------------|
| Marker Operation | Yes |
| Corresponding Trace | Corrected measured trace (n=2,3,4) |

Metrics window

| Name | Corresponding Results | Display Format |
|---|--|----------------|
| Mean Transmit Power | n=1 3rd | 99.99 dBm |
| Above Threshold or Measured Burst Width | Power Value above the threshold or measured burst width for N averages, if averaging is on. An average consists of N acquisitions of data which represents the current trace. If averaging is off, the value of power averaged is the same as the Mean Transmit Power of Current Data. | |
| Full Burst Width | n=1 9th | 999.9 us |

| Name | Corresponding Results | Display Format |
|------------------------------------|--|----------------|
| | Burst width that is determined by the Threshold Lvl. | |
| Measured Width | n=1 10th Time length that is used to calculate Mean Transmit Power when Meas Method is Measured Burst Width. If Meas Method is set to Above Threshold, disappear from the window. | 999.9 us |
| Above Thresh Pts | n=1 6th Number of points that were above the threshold level and were used for the power calculation when Meas Method is Above Threshold Level. | 9999 |
| Thresh Pts | N=1 6th Number of points that were used for the power calculation when Meas Method is Measured Burst Width. | 9999 |
| Abs Amplitude Threshold | n=1 5th Threshold value is the threshold (in dBm) above which the power is calculated. | 99.99 dBm |
| Rel Amplitude Threshold | Threshold (in dB) relative to the peak carrier level above which the power is calculated | 99.99 dB |
| Mean Transmit power (Current data) | n=1 2nd Power value above the threshold or measured burst width. If averaging is on, the power is for the latest acquisition. | 99.99 dBm |
| Max Pt | n=1 7th Maximum peak level of the most recently acquired trace data. | 99.99 dBm |
| Min Pt | n=1 8th Minimum peak level of the most recently acquired trace data. | 99.99 dBm |
| Key Path | Front-panel key | |
| Mode | SA, EDGE, GSM, TDSCDMA | |
| Initial S/W Revision | Prior to A.02.00 | |

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

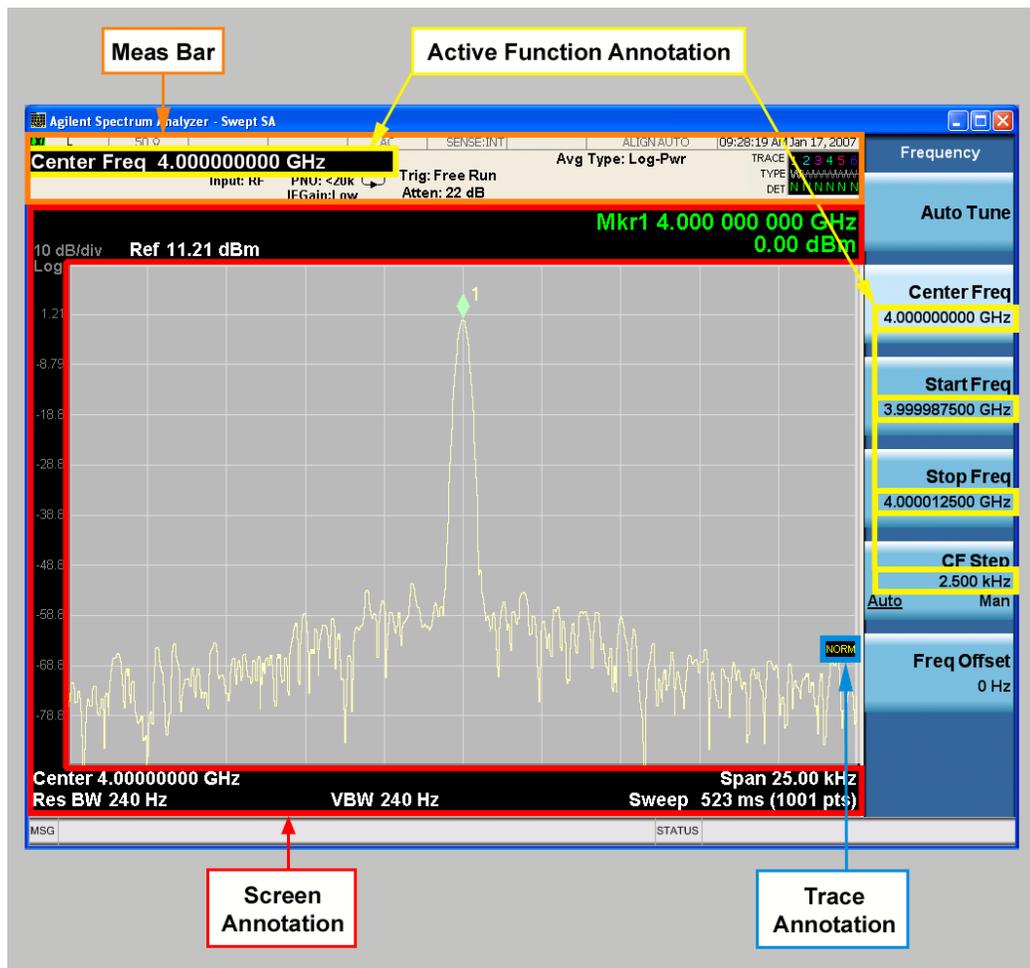
| | |
|----------------------|------------------|
| Key Path | Display |
| Key Path | View/Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

| | |
|-----------------------|--|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNotation:MBAR[:STATe] OFF ON 0 1 :DISPlay:ANNotation:MBAR[:STATe]? |
| Example | DISP:ANN:MBAR OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off. |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Screen

This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

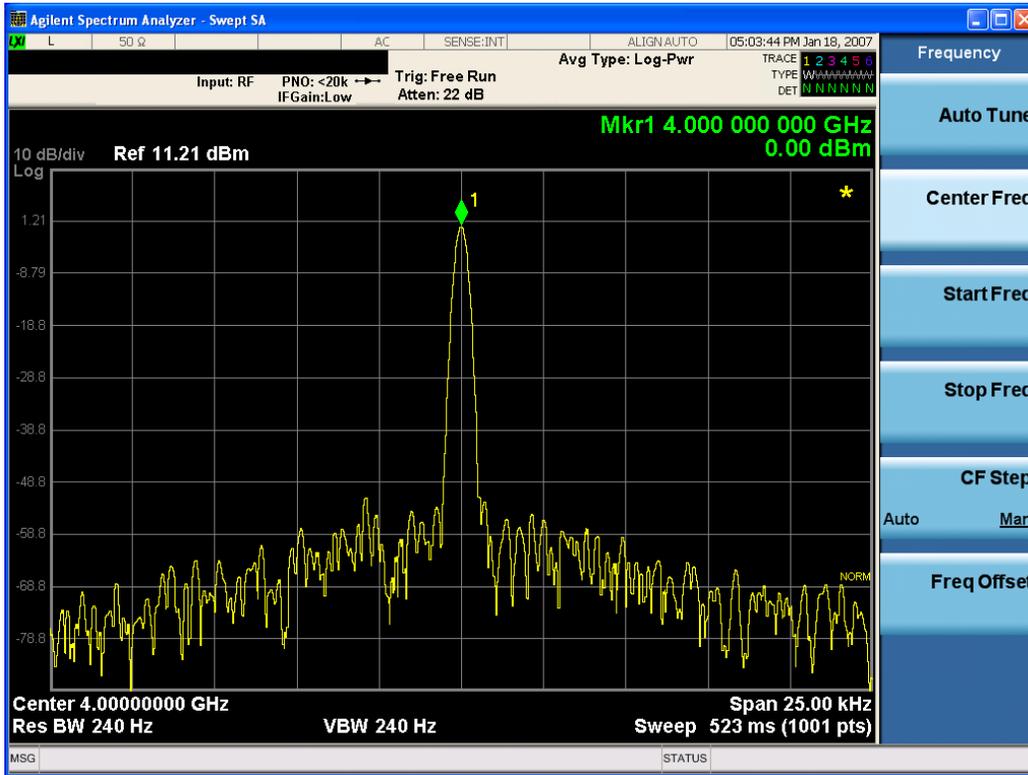
| | |
|-----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]? |
| Example | DISP:ANN:SCR OFF |
| Dependencies | Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..

8 Burst Power (Transmit Power)
View/Display



| | |
|----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE] ? |
| Example | DISP:ACT OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Title

Displays menu keys that enable you to change or clear a title on your display.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

| | |
|-----------------------|---|
| Key Path | View/Display, Display, Title |
| Mode | All |
| Remote Command | :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA? |
| Example | DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title |
| Notes | Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters. |
| Preset | No title (measurement name instead) |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Example | The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required. |
| Notes | Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted). |
| Preset | Performed on Preset. |
| Initial S/W Revision | Prior to A.02.00 |

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

| | |
|----------------------|--|
| Key Path | View/Display, Display |
| Remote Command | :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]? |
| Example | DISP:WIND:TRAC:GRAT:GRID OFF |
| Notes | The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis. |
| Preset | On |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

| | |
|-------------------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:WINDow[1]:ANNotation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNotation[:ALL]? |
| Example | :DISP:WIND:ANN OFF |
| Preset | On (Set by Restore Misc Defaults) |
| State Saved | Not saved in instrument state. |
| Backwards Compatibility Notes | The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOlor FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

| | |
|-----------------------|--|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight ON OFF :DISPlay:BACKlight? |
| Preset | ON (Set by Restore Misc Defaults) |
| Initial S/W Revision | Prior to A.02.00 |

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

| | |
|-----------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity? |
| Example | DISP:BACK:INT 50 |

| | |
|----------------------|------------------------------------|
| Preset | 100 (Set by Restore Misc Defaults) |
| Min | 0 |
| Max | 100 |
| Initial S/W Revision | Prior to A.02.00 |

Bar Graph

Enables you to select visible/invisible Bar Graph.

| | |
|-----------------------|--|
| Key Path | View/Display |
| Mode | SA, GSM, TD-SCDMA |
| Remote Command | :DISPlay:TXPower:BARGraph[:STATe] ON OFF 1 0 :DISPlay:TXPower:BARGraph[:STATe]? |
| Example | DISP:TXP:BARG ON DISP:TXP:BARG? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

8 Burst Power (Transmit Power)
View/Display

9 ACP Measurement

ACP is a measurement of the amount of interference, or power, in an adjacent frequency channel. The results are displayed as a bar graph or as spectrum data, with measurement data at specified offsets. For measurement results and views, see ["View/Display" on page 798](#).

This topic contains the following sections:

["Measurement Commands for ACP" on page 586](#)

["Remote Command Results for ACP Measurement" on page 587](#)

Measurement Commands for ACP

The following commands are used to retrieve the measurement results:

```
:CONFigure:ACP  
:CONFigure:ACP:NDEFault  
:INITiate:ACP  
:FETCh:ACP[n]?  
:READ:ACP[n]?  
:MEASure:ACP[n]?
```

For more measurement related commands, see the SENSE subsystem, and the section "[Remote Measurement Functions](#)" on page 2284.

Remote Command Results for ACP Measurement

| Condition | N | Results Returned |
|--|---------------------------|---|
| Mode = SA mode, Radio Std = None, Number of carriers = 1 and only offset A is on | Not specified or n = 1 | Returns 3 comma-separated values that correspond to: Reference carrier power, lower-adjacent channel power (dBc), and upper-adjacent channel power (dBc). |
| Mode = DTMB (CTTB) or CMMB, Radio BW = 8 MHz, Number of carriers = 1 and Meas Type = Total power reference | Not specified or n = 1 | Returns 32 comma-separated scalar results, in the following order. 1. 0.0 2. Total carrier power (dBm) 3. 0.0 4. Reference carrier power (dBm) 5. Lower offset A - relative power (dB) 6. Lower offset A - absolute power (dBm) 7. Upper offset A - relative power (dB) 8. Upper offset A - absolute power (dBm) 9. Lower offset B - relative power (dB) 10. Lower offset B - absolute power (dBm) 11. Upper offset B - relative power (dB) 12. Upper offset B - absolute power (dBm) ... 25. Lower offset F - relative power (dB) 26. Lower offset F - absolute power (dBm) 27. Upper offset F - relative power (dB) 28. Upper offset F - absolute power (dBm) 29. Inside Adjacent Channel - relative power (dB) 30. Inside Adjacent Channel - absolute power (dBm) 31. Outside Adjacent Channel - relative power (dB) 32. Outside Adjacent Channel - absolute power (dBm) If Radio Device = Exciter, the last four (29, 30, 31 and 32) results returned -999.0. If the results are not available, -999.0 is returned. Note: * Inside Adjacent Channel - absolute power: the maximum of the Lower offset A - absolute power and the Upper offset A - absolute power; ** Inside Adjacent Channel - relative power: the result of Reference carrier power subtracted from Inside Adjacent Channel - absolute power; *** Outside Adjacent Channel - absolute power: the root mean square of the absolute power of the offset B upper/lower, the offset C upper/lower and the offset D upper/lower; **** Outside Adjacent Channel - relative power: the result of Reference carrier power subtracted from Outside Adjacent Channel - absolute power; |
| Mode = DTMB (CTTB) or | not specified | Returns 32 comma-separated scalar results, in the following order. |

| Condition | N | Results Returned |
|---|---------------------------|---|
| CMMB, Radio BW = 8 MHz, Number of carriers = 1 and Meas Type = Power spectral density reference | or n = 1 | <ol style="list-style-type: none"> 1. 0.0 2. Total carrier power (dBm/Hz or dBm/MHz) 3. 0.0 4. Reference carrier power (dBm/Hz or dBm/MHz) 5. Lower offset A - relative power (dB) 6. Lower offset A - absolute power (dBm/Hz or dBm/MHz) 7. Upper offset A - relative power (dB) 8. Upper offset A - absolute power (dBm/Hz or dBm/MHz) 9. Lower offset B - relative power (dB) 10. Lower offset B - absolute power (dBm/Hz or dBm/MHz) 11. Upper offset B - relative power (dB) 12. Upper offset B - absolute power (dBm/Hz or dBm/MHz) ... 25. Lower offset F - relative power (dB) 26. Lower offset F - absolute power (dBm/Hz or dBm/MHz) 27. Upper offset F - relative power (dB) 28. Upper offset F - absolute power (dBm/Hz or dBm/MHz) 29. -999.0 30. -999.0 31. -999.0 32. -999.0 <p>The last four (29, 30, 31 and 32) results always returned -999.0. If the results are not available, -999.0 is returned.</p> |
| Meas Type = Total power reference | Not specified or n = 1 | <p>Returns 28 comma-separated scalar results, in the following order.</p> <ol style="list-style-type: none"> 1. 0.0 2. Total carrier power (dBm) 3. 0.0 4. Reference carrier power (dBm) 5. Lower offset A - relative power (dB) 6. Lower offset A - absolute power (dBm) 7. Upper offset A - relative power (dB) 8. Upper offset A - absolute power (dBm) 9. Lower offset B - relative power (dB) 10. Lower offset B - absolute power (dBm) 11. Upper offset B - relative power (dB) 12. Upper offset B - absolute power (dBm) ... 25. Lower offset F - relative power (dB) 26. Lower offset F - absolute power (dBm) |

| Condition | N | Results Returned |
|--|------------------------|--|
| | | 27. Upper offset F - relative power (dB) 28. Upper offset F - absolute power (dBm) If the results are not available, -999.0 is returned. When in MSR and LTE-Advanced FDD/TDD, this trace includes only outer offset results and their reference value(s). |
| Meas Type = Power spectral density reference | not specified or n = 1 | Returns 28 comma-separated scalar results, in the following order. 1. 0.0 2. Total carrier power (dBm/Hz or dBm/MHz) 3. 0.0 4. Reference carrier power (dBm/Hz or dBm/MHz) 5. Lower offset A - relative power (dB) 6. Lower offset A - absolute power (dBm/Hz or dBm/MHz) 7. Upper offset A - relative power (dB) 8. Upper offset A - absolute power (dBm/Hz or dBm/MHz) 9. Lower offset B - relative power (dB) 10. Lower offset B - absolute power (dBm/Hz or dBm/MHz) 11. Upper offset B - relative power (dB) 12. Upper offset B - absolute power (dBm/Hz or dBm/MHz) ... 25. Lower offset F - relative power (dB) 26. Lower offset F - absolute power (dBm/Hz or dBm/MHz) 27. Upper offset F - relative power (dB) 28. Upper offset F - absolute power (dBm/Hz or dBm/MHz) If the results are not available, -999.0 is returned. When in MSR and LTE-Advanced FDD/TDD, this trace includes only outer offset results and their reference value(s). |
| Meas Method = FAST | not specified or n = 1 | Returns 5 comma-separated results, in the following order: 1. Reference carrier - absolute power (dBm) 2. Lower offset A - absolute power (dBm) 3. Upper offset A - absolute power (dBm) 4. Lower offset B - absolute power (dBm) 5. Upper offset B - absolute power (dBm) |
| Mode = MSR , LTEAFDD, LTEATDD, Meas Type = Total power reference and Power Ref = Left & Right Carriers | Not specified or n = 1 | Returns 28 comma-separated scalar results, in the following order. 1. 0.0 2. Total carrier power (dBm) 3. Left Reference carrier power (dBm) 4. Right Reference carrier power (dBm) 5. Lower offset A - relative power (dB) 6. Lower offset A - absolute power (dBm) 7. Upper offset A - relative power (dB) |

| Condition | N | Results Returned |
|--|---------------------------|--|
| | | 8. Upper offset A - absolute power (dBm) 9. Lower offset B - relative power (dB) 10. Lower offset B - absolute power (dBm) 11. Upper offset B - relative power (dB) 12. Upper offset B - absolute power (dBm) ... 25. Lower offset F - relative power (dB) 26. Lower offset F - absolute power (dBm) 27. Upper offset F - relative power (dB) 28. Upper offset F - absolute power (dBm) If the results are not available, -999.0 is returned. |
| Mode = MSR , LTEAFDD, LTEATDD, Meas Type = Power spectral density reference and Power Ref = Left & Right Carriers | not specified or n = 1 | Returns 28 comma-separated scalar results, in the following order. 1. 0.0 2. Total carrier power (dBm/Hz or dBm/MHz) 3. Left reference carrier power (dBm/Hz or dBm/MHz) 4. Right reference carrier power (dBm/Hz or dBm/MHz) 5. Lower offset A - relative power (dB) 6. Lower offset A - absolute power (dBm/Hz or dBm/MHz) 7. Upper offset A - relative power (dB) 8. Upper offset A - absolute power (dBm/Hz or dBm/MHz) 9. Lower offset B - relative power (dB) 10. Lower offset B - absolute power (dBm/Hz or dBm/MHz) 11. Upper offset B - relative power (dB) 12. Upper offset B - absolute power (dBm/Hz or dBm/MHz) ... 25. Lower offset F - relative power (dB) 26. Lower offset F - absolute power (dBm/Hz or dBm/MHz) 27. Upper offset F - relative power (dB) 28. Upper offset F - absolute power (dBm/Hz or dBm/MHz) If the results are not available, -999.0 is returned. When in MSR and LTE-Advanced FDD/TDD, this trace includes only outer offset results and their reference value(s). |
| Meas Type = Total power reference | n = 2 | Returns 48 scalar results, in the following order: 1. Channel (1) - relative power (dB) 2. Channel (1) - absolute power (dBm) 3. Channel (2) - relative power (dB) 4. Channel (2) - absolute power (dBm) ... 23. Channel (12) - relative power (dB) 24. Channel (12) - absolute power (dBm) |

| Condition | N | Results Returned |
|--|-------|---|
| | | 25. Lower offset A - relative power (dB) 26. Lower offset A - absolute power (dBm) 27. Upper offset A - relative power (dB) 28. Upper offset A - absolute power (dBm) 29. Lower offset B - relative power (dB) 30. Lower offset B - absolute power (dBm) 31. Upper offset B - relative power (dB) 32. Upper offset B - absolute power (dBm) ... 45. Lower offset F - relative power (dB) 46. Lower offset F - absolute power (dBm) 47. Upper offset F - relative power (dB) 48. Upper offset F - absolute power (dBm) If the results are not available, -999.0 is returned. When in MSR and LTE-Advanced FDD/TDD, this trace includes only outer offset results and their reference value(s). |
| Meas Type = Power spectral density reference | n = 2 | Returns 48 scalar results, in the following order: 1. Channel (1) - relative power (dB) 2. Channel (1) - absolute power (dBm/Hz or dBm/MHz) 3. Channel (2) - relative power (dB) 4. Channel (2) - absolute power (dBm/Hz or dBm/MHz) ... 23. Channel (12) - relative power (dB) 24. Channel (12) - absolute power (dBm/Hz or dBm/MHz) 25. Lower offset A - relative power (dB) 26. Lower offset A - absolute power (dBm/Hz or dBm/MHz) 27. Upper offset A - relative power (dB) 28. Upper offset A - absolute power (dBm/Hz or dBm/MHz) 29. Lower offset B - relative power (dB) 30. Lower offset B - absolute power (dBm/Hz or dBm/MHz) 31. Upper offset B - relative power (dB) 32. Upper offset B - absolute power (dBm/Hz or dBm/MHz) ... 45. Lower offset F - relative power (dB) 46. Lower offset F - absolute power (dBm/Hz or dBm/MHz) 47. Upper offset F - relative power (dB) 48. Upper offset F - absolute power (dBm/Hz or dBm/MHz) If the results are not available, -999.0 is returned. When in MSR and LTE-Advanced FDD/TDD, this trace includes only outer offset |

| Condition | N | Results Returned |
|---|-------|---|
| Mode = DTMB (CTTB) or CMMB, Radio BW = 8 MHz and Meas Type = Total power reference | n = 3 | <p>results.</p> <hr/> <p>Returns 28 scalar values of the pass/fail (0 = passed, or 1 = failed) determined by testing the relative to the reference carrier and by testing the absolute power limit of the offset frequencies (measured as total power in dB):</p> <ol style="list-style-type: none"> 1. Lower offset A - relative limit result 2. Lower offset A - absolute limit result 3. Upper offset A - relative limit result 4. Upper offset A - absolute limit result 5. Lower offset B - relative limit result 6. Lower offset B - absolute limit result 7. Upper offset B - relative limit result 8. Upper offset B - absolute limit result <p>...</p> <ol style="list-style-type: none"> 21. Lower offset F - relative limit result 22. Lower offset F - absolute limit result 23. Upper offset F - relative limit result 24. Upper offset F - absolute limit result 25. Inside Adjacent Channel - relative limit result 26. Inside Adjacent Channel - absolute limit result 27. Outside Adjacent Channel - relative limit result 28. Outside Adjacent Channel - absolute limit result <p>If Radio Device = Exciter, the last four (25, 26, 27 and 28) results returned -999.0.</p> |
| Mode = DTMB (CTTB) or CMMB, Radio BW = 8 MHz and Meas Type = Power spectral density reference | n = 3 | <p>Returns 28 scalar values of the pass/fail (0 = passed, or 1 = failed) determined by testing the relative to the reference carrier and by testing the absolute power limit of the offset frequencies (measured as power spectral density in dB):</p> <ol style="list-style-type: none"> 1. Lower offset A - relative limit result 2. Lower offset A - absolute limit result 3. Upper offset A - relative limit result 4. Upper offset A - absolute limit result 5. Lower offset B - relative limit result 6. Lower offset B - absolute limit result 7. Upper offset B - relative limit result 8. Upper offset B - absolute limit result <p>...</p> <ol style="list-style-type: none"> 21. Lower offset F - relative limit result 22. Lower offset F - absolute limit result 23. Upper offset F - relative limit result 24. Upper offset F - absolute limit result 25. -999.0 |

| Condition | N | Results Returned |
|--|-------|--|
| | | 26. -999.0 27. -999.0 28. -999.0 The last four results always returned -999.0. |
| Meas Type = Total power reference | n = 3 | Returns 24 scalar values of the pass/fail (0 = passed, or 1 = failed) determined by testing the relative to the reference carrier and by testing the absolute power limit of the offset frequencies (measured as total power in dB): <ol style="list-style-type: none"> 1. Lower offset A - relative limit result 2. Lower offset A - absolute limit result 3. Upper offset A - relative limit result 4. Upper offset A - absolute limit result 5. Lower offset B - relative limit result 6. Lower offset B - absolute limit result 7. Upper offset B - relative limit result 8. Upper offset B - absolute limit result ... <ol style="list-style-type: none"> 21 Lower offset F - relative limit result 22 Lower offset F - absolute limit result 23 Upper offset F - relative limit result 24 Upper offset F - absolute limit result When in MSR and LTE-Advanced FDD/TDD, this trace includes only outer offset results. |
| Meas Type = Power spectral density reference | n = 3 | Returns 24 scalar values of the pass/fail (0 = passed, or 1 = failed) determined by testing the relative to the reference carrier and by testing the absolute power limit of the offset frequencies (measured as power spectral density in dB): <ol style="list-style-type: none"> 1. Lower offset A - relative limit result 2. Lower offset A - absolute limit result 3. Upper offset A - relative limit result 4. Upper offset A - absolute limit result 5. Lower offset B - relative limit result 6. Lower offset B - absolute limit result 7. Upper offset B - relative limit result 8. Upper offset B - absolute limit result ... <ol style="list-style-type: none"> 21 Lower offset F - relative limit result 22 Lower offset F - absolute limit result 23 Upper offset F - relative limit result 24 Upper offset F - absolute limit result When in MSR and LTE-Advanced FDD/TDD, this trace includes only outer offset results. |

| Condition | N | Results Returned |
|--|-------|---|
| | n = 4 | Returns <Num Pts> comma-separated scalar values representing the Y values in Trace 1 |
| | n = 5 | Returns <Num Pts> comma-separated scalar values representing the Y values in Trace 2 |
| | n = 6 | Returns <Num Pts> comma-separated scalar values representing the Y values in Trace 3 |
| Meas Type = Total power reference | n = 7 | <p>Returns (2 * Number of Carriers) scalar results, in the following order:</p> <p>The Number of Carriers is the value filled in Carriers under Carrier Setup menu. If license N9060A-5FP is enabled, max value of Number of Carriers is 18, otherwise, max value of Number of Carriers is 12. In MSR mode, max value of Number of Carriers is 100. In LTE-Advanced FDD/TDD mode, max value of number of carriers is 5.</p> <ol style="list-style-type: none"> 1. Channel (1) - relative power (dB) 2. Channel (1) - absolute power (dBm) 3. Channel (2) - relative power (dB) 4. Channel (2) - absolute power (dBm) <p>...</p> <p>2 * Number of Carriers -1. Channel (Number of Carriers) - relative power (dB)</p> <p>2 * Number of Carriers. Channel (Number of Carriers) - absolute power (dBm)</p> <p>If the results are not available, 9.91E+37 is returned.</p> |
| Meas Type = Power spectral density reference | n = 7 | <p>Returns (2 * Number of Carriers) scalar results, in the following order: The Number of Carriers is the value filled in Carriers under Carrier Setup menu.</p> <p>If license N9060A-5FP is enabled, max value of Number of Carriers is 18, otherwise, max value of Number of Carriers is 12. In MSR mode, max value of Number of Carriers is 100. In LTE-Advanced FDD/TDD mode, max value of number of carriers is 5.</p> <ol style="list-style-type: none"> 1. Channel (1) - relative power (dB) 2. Channel (1) - absolute power (dBm/Hz or dBm/MHz) 3. Channel (2) - relative power (dB) 4. Channel (2) - absolute power (dBm/Hz or dBm/MHz) <p>...</p> <p>2 * Number of Carriers -1. Channel (Number of Carriers) - relative power (dB)</p> <p>2 * Number of Carriers. Channel (Number of Carriers) - absolute power (dBm/Hz or dBm/MHz)</p> <p>If the results are not available, 9.91E+37 is returned</p> |
| Mode = MSR,LTEAFDD,LTEATDD | n = 8 | <p>Returns scalar results, in the following order:</p> <ol style="list-style-type: none"> 1. 0.0 2. Total carrier power (dBm) 3. 0.0 |

| Condition | N | Results Returned |
|-----------------------------|-------|---|
| | | <p>4. Reference carrier power (dBm, dBm/Hz or dBm/MHz)</p> <p>5. Inner Lower offset A - relative power (dB)</p> <p>6. Inner Lower offset A - absolute power (dBm, dBm/Hz or dBm/MHz)</p> <p>7. Inner Upper offset A - relative power (dB)</p> <p>8. Inner Upper offset A - absolute power (dBm, dBm/Hz or dBm/MHz)</p> <p>9. Inner Lower offset B - relative power (dB)</p> <p>10. Inner Lower offset B - absolute power (dBm, dBm/Hz or dBm/MHz)</p> <p>11. Inner Upper offset B - relative power (dB)</p> <p>12. Inner Upper offset B - absolute power (dBm, dBm/Hz or dBm/MHz)</p> <p>...</p> <p>25. Inner Lower offset F - relative power (dB)</p> <p>26. Inner Lower offset F - absolute power (dBm, dBm/Hz or dBm/MHz)</p> <p>27. Inner Upper offset F - relative power (dB)</p> <p>28. Inner Upper offset F - absolute power (dBm, dBm/Hz or dBm/MHz)</p> <p>When Power Ref is either Left & Right Carriers or Max Power Carrier in Sub-block, the first four values are</p> <p>1. 0.0</p> <p>2. Total carrier power (dBm)</p> <p>3. Reference carrier in the lower sub-block (dBm, dBm/Hz or dBm/MHz)</p> <p>4. Reference carrier in the upper sub-block (dBm, dBm/Hz or dBm/MHz)</p> <p>Unit of absolute power results.</p> <p>dBm: Meas Type = Total Pwr Ref</p> <p>dBm/Hz: Meas Type = PSD Ref, PSD Unit = dBm/Hz</p> <p>dBm/MHz: Meas Type = PSD Ref, PSD Unit = dBm/MHz</p> <p>If the results are not available, 9.91E+37 is returned.</p> |
| Mode = MSR, LTEAFDD,LTEATDD | n = 9 | <p>Returns scalar values of the pass/fail (0 = passed, or 1 = failed) determined by testing the relative to the reference carrier and by testing the absolute power limit of the offset frequencies.</p> <p>1. Inner Lower offset A - relative limit result</p> <p>2. Inner Lower offset A - absolute limit result</p> <p>3. Inner Upper offset A - relative limit result</p> <p>4. Inner Upper offset A - absolute limit result</p> <p>5. Inner Lower offset B - relative limit result</p> <p>6. Inner Lower offset B - absolute limit result</p> <p>7. Inner Upper offset B - relative limit result</p> <p>8. Inner Upper offset B - absolute limit result</p> <p>...</p> <p>21. Inner Lower offset F - relative limit result</p> <p>22. Inner Lower offset F - absolute limit result</p> <p>23. Inner Upper offset F - relative limit result</p> |

| Condition | N | Results Returned |
|--------------------------------|------------------|---|
| | | 24. Inner Upper offset F - absolute limit result |
| Mode = MSR, LTEAFDD,LTEATDD | n = 10 | <p>Returns scalar values of offset results. Numbers returned in this trace is 10 x actually measured offsets. Note that upper and lower sides of an offset are returned separately. For example, when only outer offset A is measured with offset side both, $10 \times 2 = 20$ values are returned.</p> <ol style="list-style-type: none"> 1. Inner = 1 or Outer = 2. 2. Offset A~F. (A=1, B=2, ... F=6) 3. Offset Side. Lower=1 or Upper=2 4. Relative power or relative PSD (dBc or dB) 5. Absolute power (dBm) or absolute PSD (dBm/Hz or dBm/MHz) 6. Reference power (dBm) or reference PSD (dBm/Hz or dBm/MHz) 7. Reference Index 1 8. Reference Index 2 9. 0 (Reserved) 10. 0 (Reserved) <p>...</p> <ol style="list-style-type: none"> 10(n-1)+1. Inner = 1 or Outer = 2. 10(n-1)+2. Offset A~F. (A=1, B=2, ... F=6) 10(n-1)+3. Offset Side. Lower=1 or Upper=2 10(n-1)+4. Relative power or relative PSD (dBc or dB) 10(n-1)+5. Absolute power (dBm) or absolute PSD (dBm/Hz or dBm/MHz) 10(n-1)+6. Reference power (dBm) or reference PSD (dBm/Hz or dBm/MHz) 10(n-1)+7. Reference Index 1 10(n-1)+8. Reference Index 2 10(n-1)+9. 0 (Reserved) 10(n-1)+10. 0 (Reserved) <p>Where n is number of offsets.</p> <p>Meas Type determines which type of power result is returned, i.e. power or PSD. Unit for PSD results is determined by PSD Unit.</p> <p>If result is not available, 9.91E+37 is returned.</p> |
| Key Path | Front-panel key | |
| Initial S/W Revision | Prior to A.02.00 | |
| Modified at S/W Revision | A.13.00 | |

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. The parameter values are measurement independent, except all Attenuation values and the Internal Preamp selections, which are the same across all measurements.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Ref Value

Sets the value for the absolute power reference. However, since the Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel? |
| Example | DISP:ACP:VIEW:WIND:TRAC:Y:RLEV 100 DISP:ACP:VIEW:WIND:TRAC:Y:RLEV? |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off. |
| Preset | 10dBm |
| State Saved | Saved in instrument state. |
| Min | -250.00 dBm |
| Max | 250.00 dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See "Dual Attenuator Configurations:" on page 598

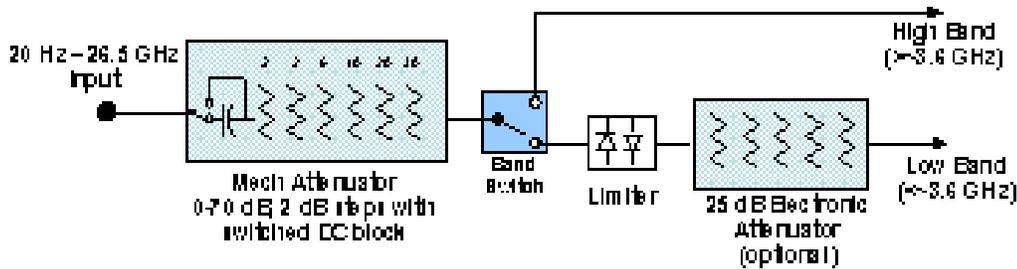
See "Single Attenuator Configuration:" on page 599

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

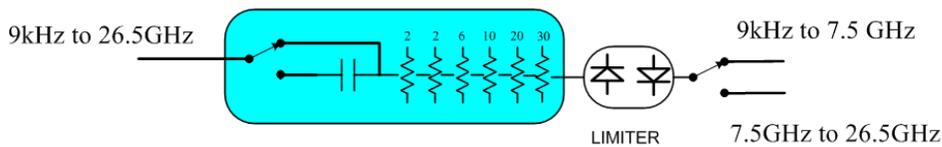
| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Dependencies | In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case. |
| Readback Line | Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2232, and " Enable Elec Atten " on page 2234 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

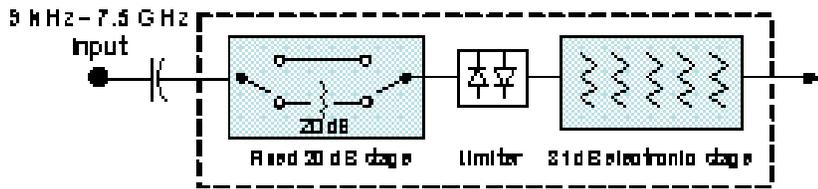


Configuration 2: Mechanical attenuator, no optional electronic attenuator

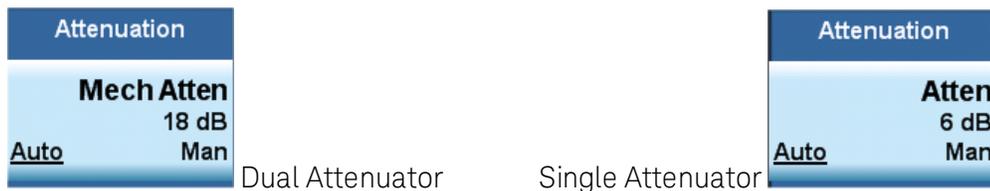


(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the “Dual Attenuator” configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See "[Attenuator Configurations and Auto/Man](#)" on page 601

| Key Path | AMPTD Y Scale, Attenuation |
|-----------------------|---|
| Remote Command | <pre>[:SENSe]:POWer[:RF]:ATTenuation <rel_amp1> [:SENSe]:POWer[:RF]:ATTenuation? [:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF ON 0 1 [:SENSe]:POWer[:RF]:ATTenuation:AUTO?</pre> |
| Example | <p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of "main" attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p> |
| Dependencies | Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the |

Auto/Man selection is not available, and the Auto/Man line on the key disappears.

In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the ["Enable Elec Atten" on page 2234](#) key description.

See ["Attenuator Configurations and Auto/Man" on page 601](#) for more information on the Auto/Man functionality of Attenuation.

Couplings

When (Mech) Atten is in Auto, it uses the following algorithm to determine a value:

If the USB Preamp is connected to USB, use 0 dB.

Otherwise, $Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel + IF\ Gain$.

Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto.

The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).

The "IF Gain" term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.

In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.

Preset

The preset for Mech Attenuation is "Auto."

The Auto value of attenuation is:

CXA, EXA, MXA and PXA: 10 dB

State Saved

Saved in instrument state

Min

0 dB

The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.

Max

CXA N9000A-503/507: 50 dB

CXA N9000A-513/526: 70dB

EXA: 60 dB

MXA and PXA: 70 dB

In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.

Initial S/W Revision

Prior to A.02.00

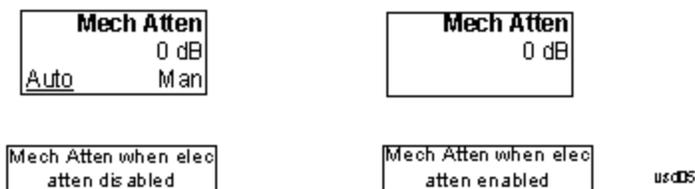
Modified at S/W Revision

A.03.00

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 603](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2233](#)

See ["More Information" on page 602](#)

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :EATTenuation :STATE OFF ON 0 1 [:SENSe] :POWer [:RF] :EATTenuation :STATE ? |
| Example | POW:EATT:STAT ON |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out. |

| | |
|--------------------------|--|
| | <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in all measurements; in particular, it is not available in the Swept SA measurement.</p> |
| Couplings | Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples
- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

| Key Path | AMPTD Y Scale, Attenuation |
|-----------------------|---|
| Remote Command | <code>[:SENSe] :POWer [:RF] :EATTenuation <rel_ampl></code> <code>[:SENSe] :POWer [:RF] :EATTenuation?</code> |
| Notes | Electronic Attenuation's specification is defined only when Mechanical Attenuation is 6 dB. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the |

| | |
|--------------------------|--|
| | POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out. |
| Preset | 0 dB |
| State Saved | Saved in instrument state |
| Min | 0 dB |
| Max | Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|--------------------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize IMMEDIATE</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2237 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation OFF ELECTRical COMBined</code> |

| | |
|--------------------------|--|
| | <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code> |
| Notes | The SCPI parameter <code>ELECTrical</code> sets this function to On in single attenuator models. The SCPI parameter <code>COMBined</code> is mapped to <code>ELECTrical</code> in single attenuator models; if you send <code>COMBined</code> , it sets the function to On and returns <code>ELEC</code> to a query. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip |
| State Saved | Saved in instrument state |
| Range | Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------|--|
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe:AUTO?</code> |
| Notes | ON aliases to "Elec Atten Only" (<code>:POW:RANG:OPT:ATT ELEC</code>) OFF aliases to "Off" (<code>:POW:RANG:OPT:ATT OFF</code>) The query <code>:POW:RANG:AUTO?</code> returns true if <code>:POW:RANG:OPT:ATT</code> is not "Off" |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | <code>:POW:RANGe:OPT:ATT OFF</code> |
| Initial S/W Revision | Prior to A.02.00 |

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT ELEC |
| Initial S/W Revision | Prior to A.02.00 |

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT COMB |
| Initial S/W Revision | Prior to A.02.00 |

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] : POWer [:RF] : ATTenuation : STEP [:INCRement] 10 dB 2 dB [:SENSe] : POWer [:RF] : ATTenuation : STEP [:INCRement] ? |
| Example | POW:ATT:STEP 2 |
| Notes | Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10. |
| Dependencies | Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error. |
| Couplings | When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB |
| Preset | PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA) |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Scale/Div

Sets the units-per-division of the vertical scale in the logarithmic display. However, since the Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

| | |
|--------------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl> :DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision? |
| Example | DISP:ACP:VIEW:WIND:TRAC:Y:PDIV 5 DISP:ACP:VIEW:WIND:TRAC:Y:PDIV? |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off. |
| Preset | 10.00 dB |
| State Saved | Saved in instrument state. |
| Min | 0.10 dB |
| Max | 20.00 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 608](#).

| | |
|----------------|---|
| Key Path | AMPTD Y Scale |
| Remote Command | [:SENSe]:POWer[:RF]:PCENter |
| Example | POW:PCEN |
| Notes | Note that the rules outlined above under the key description apply for the remote command as well |

| | |
|------------------------------|---|
| | as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Couplings | <p>The active marker position determines where the centering will be attempted.</p> <p>If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.</p> |
| Status Bits/OPC dependencies | <p>When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASURE command.</p> <p>The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.</p> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when "Presel Center" on page 2240 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the

preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

| | |
|-------------------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :POWer [:RF] :PADJust <freq></code> <code>[:SENSe] :POWer [:RF] :PADJust?</code> |
| Example | POW:PADJ 100KHz POW:PADJ? |
| Notes | The value on the key reads out to 0.1 MHz resolution. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Preset | 0 MHz |
| State Saved | The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle. |
| Min | -500 MHz |
| Max | 500 MHz |
| Default Unit | Hz |
| Backwards Compatibility SCPI | <code>[:SENSe] :POWer [:RF] :MW :PADJust</code> <code>[:SENSe] :POWer [:RF] :MMW :PADJust</code> PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to <code>[:SENSe] :POWer [:RF] :PADJust</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------|---|
| Remote Command | <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector MWAVE MMWave EXTernal</code> <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector?</code> |
| Notes | PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE |
| Initial S/W Revision | Prior to A.02.00 |

Y Axis Unit

Displays the menu keys that enable you to change the vertical (Y) axis amplitude unit. The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types. For example, if Scale Type has been set to Log, and you set Y Axis Unit to dBm, pressing Scale Type (Log) sets the Y Axis Unit to dBm. If Scale Type has been set to Lin and you set Y Axis Unit to V, pressing Scale Type (Lin) sets the Y Axis Unit to V. Pressing Scale Type (Log) again sets the Y axis unit back to dBm.

NOTE

The units of current (A, dBmA, dBuA) are calculated based on 50 ohms input impedance.

All four of the EMI units (dBμA/m, dBμV/m, dBG, dBpT) are treated by the instrument exactly as though they were dBuV. The user must load an appropriate correction factor using Amplitude Corrections for accurate and meaningful results.

If a SCPI command is sent to the analyzer that uses one of the EMI units as a terminator, the analyzer treats it as though DBUV had been sent as the terminator.

| | |
|----------------|---|
| Key Path | AMPTD Y Scale |
| Mode | SA |
| Scope | Meas Global |
| Remote Command | :UNIT:POWer DBM DBMV DBMA V W A DBUV DBUA DBPW DBUVM DBUAM DBPT DBG :UNIT:POWer? |
| Example | UNIT:POW dBmV UNIT:POW? |
| Notes | The Y axis unit has either logarithmic or linear characteristics. The set of units that is logarithmic consists of dBm, dBmV, dBmA, dBμV, dBμA, dBμV/m, dBμA/m, dBpT, and dBG. The set of units that are linear consists of V, W, and A. The chosen unit will determine how the reference level and all the amplitude-related outputs like trace data, marker data, etc. read out. |
| Notes | The settings of Y Axis Unit and Scale Type, affect how the data is read over the remote interface. When using the remote interface no unit is returned, so you must know what the Y axis unit is to interpret the results: Example 1, set the following: Scale Type (Log) Y Axis Unit, dBm Scale/Div, 1 dB Ref Level, 10 dBm This sets the top line to 10 dBm with each vertical division representing 1 dB. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 5 dBm and will read out remotely as 5. Example 2, set the following: Scale Type (Lin) Y Axis Unit, Volts Ref Level, 100 mV (10 mV/div) This sets the top line to 100 mV and the bottom line to 0 V, so each vertical division represents 10 mV. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 50 mV and will read out remotely as 50. |

| | |
|--------------------------|--|
| Dependencies | If an amplitude correction with an Antenna Unit other than None is applied and enabled, then that antenna unit is forced and the key with that unit is the only Y Axis Unit available. All other Y Axis Unit keys are grayed out. If an amplitude correction with an Antenna Unit other than None is applied and enabled, and you then turn off that correction or set Apply Corrections to No, the Y Axis Unit that existed before the Antenna Unit was applied is restored. |
| Couplings | The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types |
| Preset | dBm for log scale, V for linear. The true 'preset' value is dBm, since at preset the Y Scale type is set to logarithmic. |
| State Saved | Saved in instrument state |
| Readback line | 1-of-N selection |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.04.00, A.11.00 |

dBm

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBm.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBM |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmV

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmV.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmV |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmA

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmA |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

W

Sets the amplitude unit for the selected amplitude scale (log/lin) to watt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW W |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | W |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

V

Sets the amplitude unit for the selected amplitude scale (log/lin) to volt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW V |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

A

Sets the amplitude unit for the selected amplitude scale (log/lin) to Ampere.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW A |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ V

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A.

NOTE

The unit dBuA can also appear as an Antenna Unit. This will be used by customers using current probes, because current probes are often supplied with conversion tables that provide the transducer factors. When dBuA is used as an Antenna Unit the normal conversion from power to amps for dBuA (based on the analyzer input impedance) is not done, but instead the conversion is based solely on the Correction that contains the transducer factors. This is what distinguishes dBuA as a normal unit from dBuA as an antenna unit. When querying the Y-Axis unit, you can query the Antenna Unit to distinguish between regular dBuA and the dBuA antenna unit. If :CORR:CSET:ANT? returns NOC (for No Conversion), you are using a normal Y Axis dBuA. If it returns UA you are using an Antenna Unit dBuA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBpW

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpW.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBPW |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBpA |
| Initial S/W Revision | A.11.00 |

Antenna Unit

When a Correction is turned on that uses an Antenna Unit, the Y Axis Unit changes to that Antenna Unit. All of the keys in the Y-Axis Unit menu are then greyed out, except the Antenna Unit key. The unit being used is shown on this key and is shown as selected in the submenu.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback line | Currently selected unit |
| Initial S/W Revision | A.11.00 |

dB μ V/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUVM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ V/m |
| Initial S/W Revision | A.02.00 |

dB μ A/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A/m |
| Initial S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

dBpT

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpT. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBPT |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dBpT |
| Initial S/W Revision | A.02.00 |

dBG

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBG. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBG |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dBG |
| Initial S/W Revision | A.02.00 |

None

This is selected if no Antenna Unit is currently on, however you cannot actually set this value, since it is always grayed out. The key is included simply to provide an indication on the Readback line of the Antenna Unit key when there is no Antenna Unit selected.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Readback | "None" |
| Initial S/W Revision | A.11.00 |

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, BASIC, PNOISE, VSA , LTE, LTETDD |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH? |
| Example | :POW:MW:PATH LNP Enables the Low Noise path |
| Notes | If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μW Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished. |
| Dependencies | Unavailable in BBIQ and External Mixing |
| Preset | All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB |

| | |
|--------------------------|--|
| | MPB option not present and licensed: STD |
| State Saved | Save in instrument state |
| Readback | Value selected in the submenu |
| Initial S/W Revision | A.04.00 |
| Modified at S/W Revision | A.10.00 |

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH STD |
| Readback Text | Standard Path |
| Initial S/W Revision | A.04.00 |

Low Noise Path Enable

You may choose Low Noise Path Enable, which gives a lower noise floor under some circumstances, particularly when operating in the 21–26.5 GHz region. With the Low Noise Path enabled, the low band/high band switch and microwave preamp are bypassed whenever all of the following are true:

- The analyzer is not in the Low Band, meaning:
- the start frequency is above 3.5 GHz and
- the stop frequency is above 3.6 GHz.
- the internal preamp is not installed or (if installed) is set to Off or Low Band

Note that this means that, when any part of a sweep is done in Low Band, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. Also, if the preamp is turned on, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. The only time the Low Noise Path is used is when Low Noise Path Enable is selected, the sweep is completely in High Band (> 3.6 GHz) and no preamp is in use.

See "[More Information](#)" on page 618

| | |
|----------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Measurement | Swept SA |
| Example | :POW:MW:PATH LNP |

| | |
|----------------------|--|
| Notes | <p>For measurements that use IQ acquisition, the low noise path is used when the Center Frequency is in High Band (> 3.6 GHz) and no preamp is in use.</p> <p>In other words, the rules above are modified to use only the center frequency to qualify which path to switch in.</p> <p>This is not the case for FFT's in the Swept SA measurement; they use the same rules as swept measurements.</p> |
| Dependencies | <p>Key is blanked if current mode does not support it.</p> <p>Key is grayed out if mode supports it but current measurement does not support it.</p> <p>Unless Option LNP is present and licensed, key is blank and if SCPI command sent, error -241, "Hardware missing; Option not installed" is generated.</p> |
| Readback Text | Low Noise Path Enable |
| Initial S/W Revision | A.04.00 |

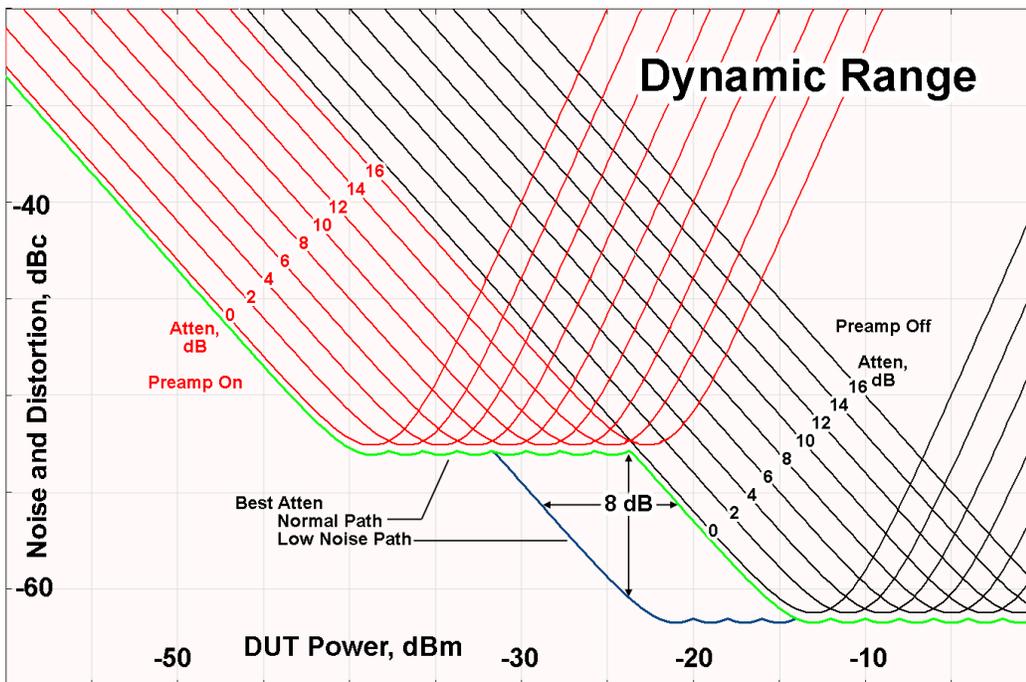
More Information

The user should understand that the Low Noise Path, while giving improved DANL, has the disadvantage of decreased TOI performance and decreased gain compression performance relative to the standard path.

The user should also understand that the bypass switch is a mechanical switch and has finite life, so if the Low Noise Path is enabled, it is possible to cause frequent cycling of this switch by frequently changing analyzer settings such that the above conditions hold true only some of the time. A user making tests of this nature should consider opting for the Standard Path, which will never throw the bypass switch, at the expense of some degraded noise performance.

The low noise path is useful for situations where the signal level is so low that the analyzer performance is dominated by noise even with 0 dB attenuation, but still high enough that the preamp option would have excessive third-order intermodulation or compression. The preamp, if purchased and used, gives better noise floor than does the "Low Noise Path." However, its compression threshold and third-order intercept are much poorer than that of the non-preamp path. There are some applications, typically for signals around -30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range

The graph below illustrates the concept. It shows, in red, the performance of an analyzer at different attenuation settings, both with the preamp on and off, in a measurement that is affected by both analyzer noise and analyzer TOI. The green shows the best available dynamic range, offset by 0.5 dB for clarity. The blue shows how the best available dynamic range improves for moderate signal levels with the low noise path switched in. In this illustration, the preamp improves the noise floor by 15 dB while degrading the third-order intercept by 30 dB, and the low noise path reduces loss by 8 dB. The attenuator step size is 2 dB.



There are other times where selecting the low noise path improves performance, too. Compression-limited measurements such as finding the nulls in a pulsed-RF spectrum can profit from the low noise path in a way similar to the TOI-limited measurement illustrated. Accuracy can be improved when the low noise path allows the optimum attenuation to increase from a small amount like 0, 2 or 4 dB to a larger amount, giving better return loss at the analyzer input. Harmonic measurements, such as second and third harmonic levels, are much improved using the low noise path because of the superiority of that path for harmonic (though not intermodulation) distortion performance.

μ W Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselector is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

| | |
|-----------------------------|--|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH MPB |
| Dependencies | Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated. |
| Readback Text | μ W Preselector Bypass |
| Initial S/W Revision | A.04.00 |

| | |
|-----------------------|---|
| Remote Command | [:SENSe] :POWeR [:RF] :MW :PRESelector [:STATe] ON OFF 0 1 [:SENSe] :POWeR [:RF] :MW :PRESelector [:STATe] ? |
| Example | :POW:MW:PRES OFF Bypasses the microwave preselector |
| Notes | The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB) |
| Preset | ON |

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWeR [:RF] :GAIN [:STATe] OFF ON 0 1 [:SENSe] :POWeR [:RF] :GAIN [:STATe] ? |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the |

key is not shown.
The preamp is not available when the electronic/soft attenuator is enabled.

| | |
|--------------------------|--|
| Couplings | <p>The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range.</p> <p>Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected.</p> <p>Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting.</p> |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Scope | Meas Global |
| Remote Command | <pre>[:SENSe] :POWer [:RF] :GAIN:BAND LOW FULL [:SENSe] :POWer [:RF] :GAIN:BAND?</pre> |
| Dependencies | <p>Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown.</p> <p>If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated.</p> |
| Preset | LOW |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns the internal preamp off

| | |
|----------------------|--------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

| | |
|----------------------|------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND LOW |
| Readback | Low Band |
| Initial S/W Revision | Prior to A.02.00 |

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND FULL |
| Readback | Full Range |
| Initial S/W Revision | Prior to A.02.00 |

Ref Position

Positions the reference level at the top, center, or bottom of the Y- scale display. Changing the reference position does not change the reference level value.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD,LTEATDD |
| Remote Command | :DISPlay:ACP:Power:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOSition TOP CENTer BOTTom :DISPlay:ACP:Power:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOSition? |
| Example | DISP:ACP:VIEW:WIND:TRAC:Y:RPOS CENT DISP:ACP:VIEW:WIND:TRAC:Y:RPOS? |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTRument:SElect to set the mode. |
| Preset | TOP |

| | |
|--------------------------|----------------------------|
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Auto Scaling

Toggles the Auto Scaling function between On and Off.

| | |
|--------------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE 0 1 OFF ON :DISPlay:ACPower:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPlE? |
| Example | DISP:ACP:VIEW:WIND:TRAC:Y:COUP ON DISP:ACP:VIEW:WIND:TRAC:Y:COUP? |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | When Auto Scaling is On and the Restart front-panel key is pressed, this function automatically determines the scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off. |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See ["More Information" on page 624](#)

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Remote Command | :COUPle ALL NONE |
| Example | :COUP ALL |
| Notes | :COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

There are two types of functions that have Auto/Manual modes.

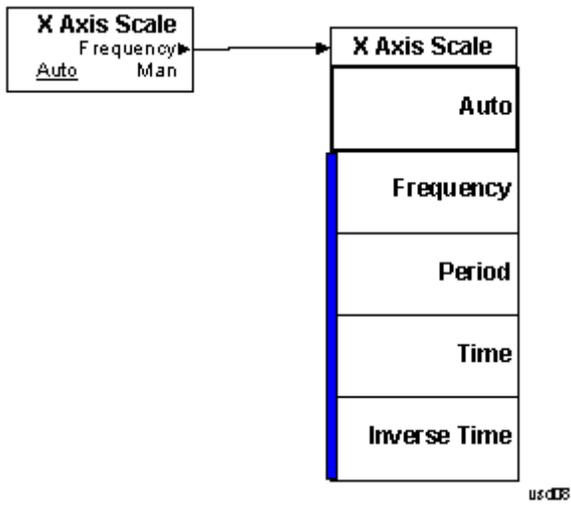
Auto/Man Active Function keys

An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.



BW

Accesses a menu of functions that enable you to specify and control the video and resolution bandwidths. You can also select the type of filter for the measurement and set the filter bandwidth.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Res BW

Sets the value of the resolution bandwidth. If an unavailable bandwidth is entered with the numeric keypad, the closest available bandwidth is selected.

LTE-Advanced FDD/TDD Auto RBW:

| Bandwidth | RBW (KHz) |
|-----------|-----------|
| 1.4MHz | 51KHz |
| 3MHz | |
| 5MHz | 100 KHz |
| 10MHz | |
| 15MHz | |
| 20MHz | |

the resolution bandwidth is predefined based on the corresponding bandwidth of the single LTE carrier, which is listed above. When ResBW mode is Auto, the narrowest RBW over the active carriers is selected for Multi-carriers.

| | |
|-----------------------|--|
| Key Path | BW |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe]:ACPower:BANDwidth[:RESolution] <freq> [:SENSe]:ACPower:BANDwidth[:RESolution]? [:SENSe]:ACPower:BANDwidth[:RESolution]:AUTO ON OFF 1 0 [:SENSe]:ACPower:BANDwidth[:RESolution]:AUTO? |
| Example | ACP:BAND 25kHz ACP:BAND? ACP:BAND:AUTO ON ACP:BAND:AUTO? |
| Notes | This key is available only in IBW mode. This parameter is preset by the Meas Method selection. Preset values are as follows: IBW: 100 kHz |

| | |
|-------------------------------------|--|
| | IBWR: 27 kHz FAST (WCDMA): 390 kHz You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Dependencies | When Meas Method is RBW or FAST, this key is grayed out and disabled. If the key is pressed, an advisory message is generated. If the equivalent remote command is sent, a "Setting conflict" warning is generated. |
| Couplings | The resolution bandwidth is coupled to the video bandwidth based on the video to resolution bandwidth ratio setting if AUTO is selected. |
| Preset | SA: 220 kHz WCDMA: 100 kHz WIMAX OFDMA: 100 kHz C2K: 15 kHz TD-SCDMA: 30 kHz 1xEVDO: 30 kHz DVB-T/H: 39 kHz DTMB (CTTB): 39 kHz ISDB-T: 39 kHz CMMB: 39 kHz LTE: 100 kHz LTETDD: 100 kHz Digital Cable TV: 39 kHz MSR: 100 kHz LTEAFDD, LTEATDD: 100kHz LTEAFDD, LTEATDD: 1 Others:0 |
| State Saved | Saved in instrument state. |
| Min | 1 Hz |
| Max | 8 MHz |
| Backwards Compatibility SCPI | [:SENSe] :ACPpower:BWIDth[:RESolution] [:SENSe] :ACP:SWEep:BWIDth BWIDth[:RESolution] (PSA W-CDMA, PSA cdma2000) |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Video BW

Changes the analyzer post-detection filter (VBW).

| | |
|----------|--|
| Key Path | BW |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, |

| | |
|-----------------------|---|
| | LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe]:ACPower:BANDwidth:VIDeo <freq> [:SENSe]:ACPower:BANDwidth:VIDeo? [:SENSe]:ACPower:BANDwidth:VIDeo:AUTO OFF ON 0 1 [:SENSe]:ACPower:BANDwidth:VIDeo:AUTO? |
| Example | ACP:BAND:VID 1kHz ACP:BAND:VID? ACP:BWID:VID:AUTO ON ACP:BWID:VID:AUTO? |
| Notes | The values shown in this table reflect the conditions after a Mode Preset. |
| Dependencies | When Meas Method is RBW or FAST, this key is grayed out and disabled. If the key is pressed, an advisory message is generated. If the equivalent remote command is sent, a "Setting conflict" warning is generated. |
| Preset | SA: 22 kHz WCDMA, WIMAX OFDMA: 1 MHz C2K: Method RBW: grayed out (1.2 MHz) Method IBW: 150 kHz TD-SCDMA: 300 kHz 1xEVDO: 300 kHz DVB-T/H: 390 kHz DTMB (CTTB): 390 kHz ISDB-T: 390 kHz CMMB: 390 kHz LTE, LTETDD, MSR: Auto LTETDD: 1 MHz Digital Cable TV: 390 kHz LTEAFDD, LTEATDD: Auto SA: ON WCDMA: OFF WIMAX OFDMA: OFF TD-SCDMA: OFF DVB-T/H: OFF DTMB (CTTB): OFF CDMA1xEVDO: OFF ISDB-T: OFF CMMB: OFF LTE, MSR: ON LTETDD: ON Digital Cable TV: OFF |

| | |
|-------------------------------------|------------------------------------|
| | LTEAFDD, LTEATDD: ON |
| State Saved | Saved in instrument state. |
| Min | 1 Hz |
| Max | 50 MHz |
| Backwards Compatibility SCPI | [:SENSe] :ACPower :BWIDth :VIDeo |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

RBW Control

Accesses a menu that enables you to select the filter bandwidth and type.

| | |
|----------------------|------------------|
| Key Path | BW |
| Initial S/W Revision | Prior to A.02.00 |

Filter Type

Selects the type of bandwidth filter that is used. The choices are Gaussian or Flat top.

| | |
|-------------------------------------|--|
| Key Path | BW, RBW Control |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :ACPower :BANDwidth :SHAPE GAUSSian FLATtop [:SENSe] :ACPower :BANDwidth :SHAPE? |
| Example | ACP:BAND:SHAP GAUS ACP:BAND:SHAP? |
| Dependencies | When Meas Method is FAST, this key is grayed out and disabled. If the key is pressed, an advisory message is generated. If the equivalent remote command is sent, a "Setting conflict" warning is generated. |
| Preset | GAUSSian C2K: FLATtop |
| State Saved | Saved in instrument state. |
| Range | Gaussian (Normal) Flattop |
| Backwards Compatibility SCPI | [:SENSe] :ACPower :BWIDth :SHAPE |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Filter BW

Selects a Gaussian filter based on its -3 dB (Normal) bandwidth or its -6 dB bandwidth.

| | |
|-------------------------------------|---|
| Key Path | BW, RBW Control |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe] :ACPower :BANDwidth :TYPE DB3 DB6</code> <code>[:SENSe] :ACPower :BANDwidth :TYPE ?</code> |
| Example | ACP:BAND:TYPE DB3 ACP:BAND:TYPE? |
| Dependencies | When Filter Type is Flattop or Meas Method is RBW or FAST, this key is grayed out and disabled. If the key is pressed, an advisory message is generated. If the equivalent remote command is sent, a "Setting conflict" warning is generated. |
| Preset | DB3 |
| State Saved | Saved in instrument state. |
| Range | -3 dB (Normal) -6 dB |
| Backwards Compatibility SCPI | <code>[:SENSe] :ACPower :BWIDth :TYPE</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous? |
| Example | :INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation |
| Preset | ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF) |
| State Saved | Saved in instrument state |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep. |
| Initial S/W Revision | Prior to A.02.00 |

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

9 ACP Measurement
Cont (Continuous Measurement/Sweep)

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

File

See "File" on page 344

FREQ Channel

Accesses a menu of keys that allow you to control the Frequency and Channel parameters of the instrument.

Some features in the Frequency menu are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset. For example, the Center Freq setting is the same for all measurements - it does not change as you change measurements.

| | |
|-----------------------------|-------------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 637](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 639](#)

See ["Center Frequency Presets" on page 635](#)

| | |
|-----------------------|--|
| Key Path | FREQ Channel |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:CENTer <freq></code> <code>[:SENSe] :FREQuency:CENTer?</code> |

| | |
|-----------------------------|--|
| Example | FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT? |
| Notes | This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated. |
| Dependencies | The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit. |
| Couplings | When operating in “swept span”, any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer’s frequency range |
| Preset | Depends on instrument maximum frequency, mode, measurement, and selected input. See "Center Frequency Presets" on page 635 and "RF Center Freq" on page 637 and Ext Mix Center Freq and "I/Q Center Freq" on page 639 . |
| State Saved | Saved in instrument state |
| Min | Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 635 and "RF Center Freq" on page 637 and "I/Q Center Freq" on page 639 . |
| Max | Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 635 and "RF Center Freq" on page 637 and "I/Q Center Freq" on page 639 . |
| Default Unit | Hz |
| Status Bits/OPC | Non-overlapped |
| Dependencies | |
| Initial S/W Revision | Prior to A.02.00 |

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

| Freq Option | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune) |
|-------------|-------------------------|--------------------------------|-----------------------------|
| | | | |

9 ACP Measurement
FREQ Channel

| | | | above) |
|---------------------------------------|------------|----------|--------------|
| 503 (all but N9000A) | 1.805 GHz | 3.6 GHz | 3.7 GHz |
| 503 (N9000A) | 1.505 GHz | 3.0 GHz | 3.08 GHz |
| 507 (all but N9000A) | 3.505 GHz | 7.0 GHz | 7.1 GHz |
| 507 (N9000A) | 3.755 GHz | 7.5 GHz | 7.58 GHz |
| 508 (all but N9038A) | 1.805 GHz | 3.6 GHz | 8.5 GHz |
| 508 (N9038A) | 4.205 GHz | 8.4 GHz | 8.5 GHz |
| 513 | 6.805 GHz | 13.6 GHz | 13.8 GHz |
| 526 (all but N9000A and N9038A) | 13.255 GHz | 26.5 GHz | 27.0 GHz |
| 526 (N9000A) | 13.255 GHz | 26.5 GHz | 26.55 GHz |
| 526 (N9038A) | 1.805 GHz | 3.6 GHz | 27.0 GHz |
| 532 | 16.005 GHz | 32.0 GHz | 32.5 GHz |
| 543 | 21.505 GHz | 43.0 GHz | TBD |
| 544 | 22.005 GHz | 44.0 GHz | 44.5 GHz |
| 550 | 25.005 GHz | 50.0 GHz | 51 GHz |

Input 2:

| Model | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune above) |
|----------------|----------------------------|-----------------------------------|-----------------------------------|
| N9000A opt C75 | 0.7505GHz | 1.5 GHz | 1.58 GHz |
| N9038A | 505 MHz | 1 GHz | 1.000025 GHz |

Tracking Generator Frequency Limits (N9000A only):

| Tracking Generator Option | Min Freq (clips to this freq when turn TG on and | If above this Freq, Stop Freq clipped to this Freq when | Max Freq (can't tune above) while TG |
|---------------------------------|--|---|--|
| | | | |

| | can't tune below while TG on) | TG turned on | on |
|-----|----------------------------------|--------------|----------|
| T03 | 9 kHz | 3.0 GHz | 3.08 GHz |
| T06 | 9 kHz | 6.0 GHz | 6.05 GHz |

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

| Mode | CF Preset for RF |
|-------------|------------------|
| WCDMA | 1 GHz |
| WIMAXOFDMA, | 1 GHz |
| BASIC | 1 GHz |
| ADEMOD | 1 GHz |
| VSA | 1 GHz |
| TDSCDMA | 1 GHz |
| PNOISE | 1 GHz |
| LTE | 1 GHz |
| LTETDD | 1 GHz |
| MSR | 1 GHz |
| GSM | 935.2 MHz |
| NFIGURE | 1.505 GHz |

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:RF:CENTer <freq></code> <code>[:SENSe] :FREQuency:RF:CENTer?</code> |
| Example | FREQ:RF:CENT 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Dependencies | If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of |

| | |
|--------------------------|--|
| | Source Numerator, Source Denominator and Power Sweep. |
| Preset | See table above |
| State Saved | Saved in instrument state. |
| Min | -79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source |
| Max | See table above. Basically instrument maximum frequency - 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|----------------|--|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code> |
| Example | <code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code> |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Couplings | When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup. |
| Preset | When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies. If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq - Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table. |

| | |
|----------------------|--|
| | When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz. Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz. |
| State Saved | Saved in instrument state. |
| Min | The minimum frequency in the currently selected mixer band + 5 Hz |
| Max | The maximum frequency in the currently selected mixer band – 5 Hz If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency |
| Initial S/W Revision | A.08.01 |

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:IQ:CENTer <freq></code> <code>[:SENSe] :FREQuency:IQ:CENTer?</code> |
| Example | FREQ:IQ:CENT: 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Preset | 0 Hz |
| State Saved | Saved in instrument state. |
| Min | -40.049995 MHz |
| Max | 40.049995 MHz |
| Initial S/W Revision | Prior to A.02.00 |

CF Step

Changes the step size for the center frequency and start and stop frequency functions. Once a step size has been selected and the center frequency function is active, the step keys (and the UP|DOWN parameters for Center Frequency from remote commands) change the center frequency by the step-size value. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the analyzer.

Note that the start and stop frequencies also step by the CF Step value.

| | |
|------------------------------|--|
| Key Path | FREQ Channel |
| Remote Command | <pre>[:SENSe] :FREQuency:CENTer:STEP[:INCRement] <freq> [:SENSe] :FREQuency:CENTer:STEP[:INCRement] ? [:SENSe] :FREQuency:CENTer:STEP:AUTO OFF ON 0 1 [:SENSe] :FREQuency:CENTer:STEP:AUTO?</pre> |
| Example | <pre>FREQ:CENT:STEP:AUTO ON FREQ:CENT:STEP 500 MHz FREQ:CENT UP increases the current center frequency value by 500 MHz FREQ:CENT:STEP? FREQ:CENT:STEP:AUTO?</pre> |
| Notes | Preset and Max values are depending on Hardware Options (503, 507, 508, 513, 526) |
| Notes | Preset and Max values are dependent on Hardware Options (5xx) |
| Dependencies | Freq Offset is not available in External Mixing. In this case the Freq Offset key is grayed out and shows a value of zero. It will once again be available, and show the previously set value, when you return to the RF Input. |
| Dependencies | Span, RBW, Center frequency If the electronic/soft attenuator is enabled, any attempt to change the value of the center frequency >3.6 GHz by pressing the Up-arrow key, fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. |
| Couplings | When auto-coupled in a non-zero span, the center frequency step size is set to 10% of the span. When auto-coupled in zero span, the center frequency step size is set to the equivalent -3 dB RBW value. |
| Preset | Auto ADEMOD: 1 MHz ON |
| State Saved | Saved in instrument state |
| Min | – (the maximum frequency of the instrument). That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Max | The maximum frequency of the instrument. That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Default Unit | Hz |
| Status Bits/OPC dependencies | non-overlapped |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Input/Output

See "Input/Output" on page 202

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement. Note that this hard key and all sub keys are unavailable when **Meas Method** is set to RBW.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection. Note that this key is unavailable when **Meas Method** is set to RBW.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Marker Type

Sets the marker control mode to Normal, Delta, Fixed or Off. All interactions and dependencies detailed under the key description are enforced when the remote command is sent. If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area.

The default active function is the active function for the currently selected marker control mode. If the current control mode is Off, there is no active function and the active function is turned off.

| | |
|----------------|---|
| Key Path | Marker |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:ACPower:MARKer[1] 2 ... 12:MODE POSition DELTa OFF :CALCulate:ACPower:MARKer[1] 2 ... 12:MODE? |
| Example | CALC:ACP:MARK2:MODE DELT CALC:ACP:MARK2:MODE? |
| Notes | If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area will display the marker value to its full entered precision. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Dependencies | This key is unavailable when Meas Method is set to RBW. |

| | |
|--------------------------|---|
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | Normal Delta Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Properties

Accesses the marker properties menu. Note that this key is unavailable when **Meas Method** is set to RBW.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection. Note that this key is unavailable when **Meas Method** is set to RBW.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Relative To

Selects the desired marker. The selected marker will be relative to its reference marker.

| | |
|-----------------------|---|
| Key Path | Marker, Properties |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:ACPpower:MARKer[1] 2 ... 12:REFerence <integer> :CALCulate:ACPpower:MARKer[1] 2 ... 12:REFerence? |
| Example | CALC:ACP:MARK2:REF 6 CALC:ACP:MARK2:REF? |
| Notes | A marker cannot be relative to itself so that choice is grayed out, and if sent from a remote command, generates error -221: "Settings conflict; marker cannot be relative to itself." When queried a single value will be returned (the specified marker numbers relative marker). You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Dependencies | This key is unavailable when Meas Method is set to RBW. |
| Preset | 2 3 4 5 6 7 8 9 10 11 12 1 |

| | |
|--------------------------|----------------------------|
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 12 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Marker Trace

Selects the trace that you want your marker to be placed on. A marker is associated with one and only one trace. This trace is used to determine the placement, result, and X Axis Scale of the marker. All markers have an associated trace, even Fixed markers; it is from that trace that they determine their attributes and behaviors, and it is to that trace that they go when they become Normal or Delta markers.

| | |
|--------------------------|--|
| Key Path | Marker, Properties |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:ACPower:MARKer[1] 2 ... 12:TRACe 1 2 3 :CALCulate:ACPower:MARKer[1] 2 ... 12:TRACe? |
| Example | CALC:ACP:MARK2:TRAC 2 CALC:ACP:MARK2:TRAC? |
| Notes | If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area will display the marker value to its full entered precision. |
| Dependencies | This key is unavailable when Meas Method is set to RBW. |
| Couplings | This is not affected by Auto Coupling. Sending the remote command causes the addressed marker to become selected. |
| Preset | All Markers Off |
| State Saved | Saved in instrument state. |
| Range | 1 2 3 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Couple Markers

When this function is On, moving any marker causes an equal X axis movement of every other marker which is not Off. By "equal X axis movement" we mean that we preserve the difference between each

marker's X axis value (in the fundamental x-axis units of the trace that marker is on) and the X axis value of the marker being moved (in the same fundamental x-axis units).

| | |
|--------------------------|--|
| Key Path | Marker |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:ACPower:MARKer:COUple[:STATE] ON OFF 1 0 :CALCulate:ACPower:MARKer:COUple[:STATE]? |
| Example | CALC:ACP:MARK:COUP ON |
| Dependencies | This key is unavailable when Meas Method is set to RBW. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Marker All Off

Turns all active markers off.

| | |
|--------------------------|--|
| Key Path | Marker |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:ACPower:MARKer:AOFF |
| Example | CALC:ACP:MARK:AOFF |
| Dependencies | This key is unavailable when Meas Method is set to RBW. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Marker X Axis Value (Remote Command only)

Sets the marker X axis value in the current marker X Axis Scale unit. This value has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value if the control mode is Normal, Delta or Fixed.

| | |
|-----------------------|--|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:ACPower:MARKer[1] 2 ... 12:X <freq> :CALCulate:ACPower:MARKer[1] 2 ... 12:X? |
| Example | CALC:ACP:MARK3:X 0 CALC:ACP:MARK3:X? |
| Notes | The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from |

| | |
|--------------------------|--|
| | the marker's reference marker if the control mode is Delta. If the marker is Off the response is not a number. |
| Dependencies | Unavailable when Meas Method is set to RBW. |
| Preset | After a preset, all Markers are turned OFF, so Marker X Axis Value query will return a not a number (NAN). |
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Marker X Axis Position (Remote Command only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal, Delta or Fixed. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

| | |
|--------------------------|---|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:ACP:Power:MARKer[1] 2 ... 12:X:POSition <real> :CALCulate:ACP:Power:MARKer[1] 2 ... 12:X:POSition? |
| Example | CALC:ACP:MARK10:X:POS 0 CALC:ACP:MARK10:X:POS? |
| Notes | The query returns the marker's absolute X Axis value in trace points if the control mode is Normal, or the offset from the marker's reference marker in trace points if the control mode is Delta. The value is returned as a real number, not an integer, corresponding to the translation from X Axis Scale units to trace points (see "Fractional Trace Points"). If the marker is Off the response is not a number. When a Marker is turned on, it is placed center of the screen on the trace. Therefore the default value depends on instrument condition, although the Preset/Default is defined as 500 (this value might be expected value when all offset is on). |
| Dependencies | Unavailable when Meas Method is set to RBW. |
| Preset | After a preset, all Markers are turned OFF, so Marker X Axis Value query will return a not a number (NAN). |
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Marker Y Axis Value (Remote Command only)

Returns the marker Y axis value in the current marker Y axis unit.

| | |
|-------------------------------------|--|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:ACPpower:MARKer[1] 2 ... 12:Y? |
| Example | CALC:ACP:MARK11:Y? |
| Notes | Since the result value is always calculated from acquisition data, the default value is arbitrary. Although the Preset/Default values are defined. |
| Dependencies | Unavailable when Meas Method is set to RBW. |
| Preset | Result dependent on markers setup and signal source. |
| State Saved | No |
| Backwards Compatibility SCPI | :CALCulate:ACPpower:MARKer[1] 2 ... 12:FUNCTION:RESult? |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Backward Compatibility Remote Commands

Sets or queries the state of a marker. Setting a marker which is off to the on state or 1 puts it in Normal mode and places it at the center of the screen.

| | |
|--------------------------|---|
| Mode | SA, WCDMA, WIMAX OFDMA, CDMA2K, TDSCDMA, CDMA1XEV, DVB, DTMB, ISDBT, CMMB, LTE, LTE-TDD, DCATV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:ACPpower:MARKer[1] 2 ... 12:STATe OFF ON 0 1 :CALCulate:ACPpower:MARKer[1] 2 ... 12:STATe? |
| Example | CALC:ACP:MARK2:STAT ON CALC:ACP:MARK2:STAT? |
| Notes | This parameter is also accessed from Marker, Properties, 1 You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Marker Function

There are no Marker Functions supported in the ACP measurement. The front-panel key will display a blank key menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Marker To

There is no Marker To functionality supported in ACP. The front-panel key will display a blank key menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Remote Measurement Functions

This section contains the following topics:

["Measurement Group of Commands" on page 2285](#)

["Current Measurement Query \(Remote Command Only\)" on page 2287](#)

["Limit Test Current Results \(Remote Command Only\)" on page 2287](#)

["Data Query \(Remote Command Only\)" on page 2287](#)

["Calculate/Compress Trace Data Query \(Remote Command Only\)" on page 2288](#)

["Calculate Peaks of Trace Data \(Remote Command Only\)" on page 2293](#)

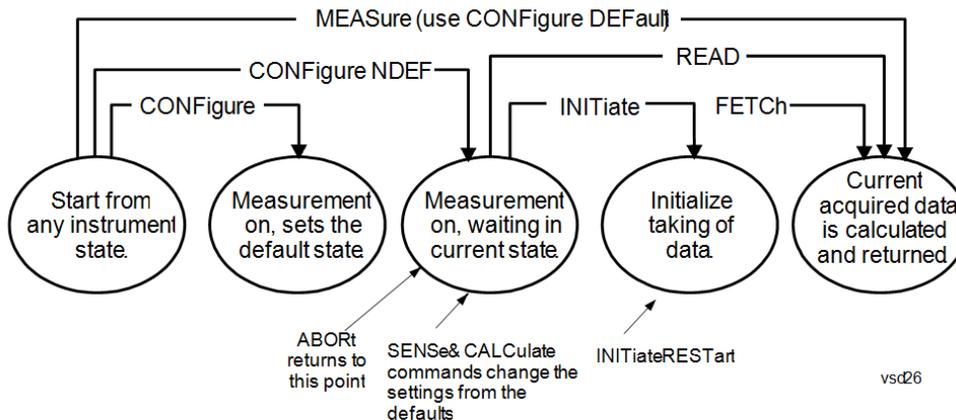
[Hardware-Accelerated Fast Power Measurement \(Remote Command Only\)](#)

["Format Data: Numeric Data \(Remote Command Only\)" on page 2294](#)

["Format Data: Byte Order \(Remote Command Only\)" on page 2295](#)

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFIGure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFigure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
-

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
-

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

| | |
|-----------------------|-------------|
| Remote Command | :CONFigure? |
|-----------------------|-------------|

| | |
|----------------|-------|
| Example | CONF? |
|----------------|-------|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

| | |
|-----------------------|--------------------------|
| Remote Command | :CALCulate:CLIMits:FAIL? |
|-----------------------|--------------------------|

| | |
|----------------|--|
| Example | CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails. |
|----------------|--|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA[n]? |
| Notes | The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement. |
| Initial S/W Revision | Prior to A.02.00 |

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]] |
| Example | To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.) |
| Notes | The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data. |
| Initial S/W Revision | Prior to A.02.00 |

- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

-

NOTE

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$DME = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$RMS = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$RMS = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPL - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

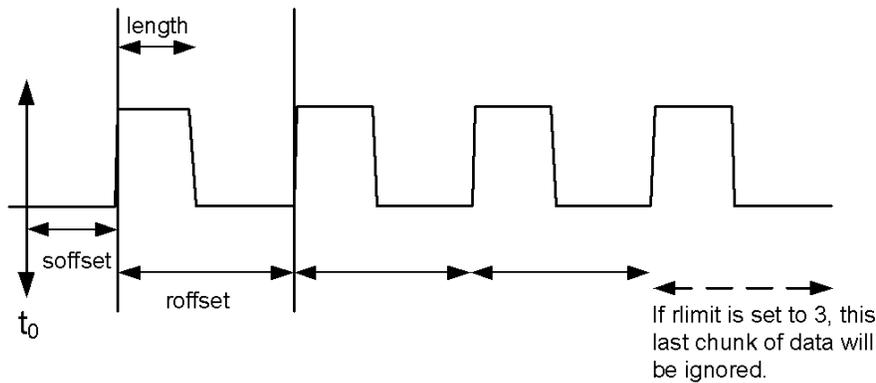
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

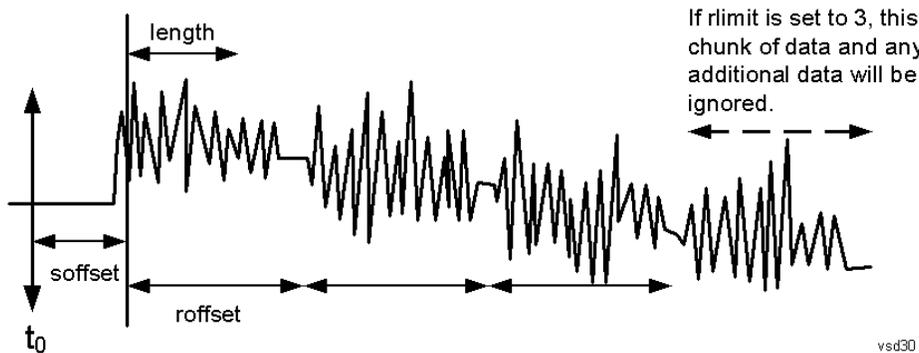
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

| | |
|-----------------------|---|
| Remote Command | <p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre> |
|-----------------------|---|

| | |
|----------------|---|
| Example | <p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p> |
|----------------|---|

| | |
|--------------|---|
| Notes | <p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p> |
|--------------|---|

excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQuency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat [:TRACe] [:DATA] ASCii | INTeger, 32 | REAL, 32 | REAL, 64
:FORMat [:TRACe] [:DATA] ?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

Initial S/W Revision Prior to A.02.00

The specs for each output type follow:

ASCIi - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPPed order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

| | |
|-----------------------------|--|
| Remote Command | :FORMat:BORDER NORMal SWAPPed :FORMat:BORDER? |
| Preset | NORMal |
| Initial S/W Revision | Prior to A.02.00 |

Meas Setup

Displays the setup menu for the currently selected measurement. The functions included in the measurement setup menu include setting the parameters for the carriers, offsets, bandwidths, measurement methods and types. This menu also allows you to turn noise correction on and off.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Average/Hold Number

Specifies the number of measurement averages used to calculate the measurement result. The average will be displayed at the end of each sweep. After the specified number of average counts, the average mode (termination control) setting determines the average action.

| | |
|-------------------------------------|---|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe]:ACPpower:AVERage:COUNT <integer> [:SENSe]:ACPpower:AVERage:COUNT? [:SENSe]:ACPpower:AVERage[:STATe] OFF ON 0 1 [:SENSe]:ACPpower:AVERage[:STATe]? |
| Example | ACP:AVER:COUN 250 ACP:AVER:COUN? ACP:AVER OFF ACP:AVER? |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Preset | 10 ON |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 1000 |
| Backwards Compatibility SCPI | [:SENSe]:ACPR:AVERage:COUNT [:SENSe]:MCPower:AVERage:COUNT (PSA Power Suite, PSA W-CDMA, PSA cdma2000) |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Avg Mode

Enables you to set the averaging mode. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

When set to Exponential (Exp) the measurement averaging continues using the specified number of averages to compute each averaged value. The average will be displayed at the end of each sweep.

When set to Repeat, the measurement resets the average counter each time the specified number of averages is reached.

| | |
|------------------------------|---|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :ACPower:AVERage:TCONtrol EXPonential REPeat [:SENSe] :ACPower:AVERage:TCONtrol? |
| Example | ACP:AVER:TCON EXP ACP:AVER:TCON? |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Preset | EXPonential |
| State Saved | Saved in instrument state. |
| Range | Exp Repeat |
| Backwards Compatibility SCPI | [:SENSe] :ACPR:AVERage:TCONtrol |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Carrier Setup (This menu is unavailable in MSR and LTE-Advanced FDD/TDD)

Accesses a menu that contains Carriers, Ref Carrier, Ref Car Freq, Ref Car Pwr and Configure Carriers.

| | |
|----------------------|------------------|
| Key Path | Meas Setup |
| Initial S/W Revision | Prior to A.02.00 |

Carriers

Specifies the number of carriers to be measured.

| | |
|----------|--|
| Key Path | Meas Setup, Carrier Setup, Configure Carriers |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV |

| | |
|---------------------------------|--|
| Remote Command | <code>[:SENSe] :ACPower :CARRier [1] 2 :COUNT <integer></code> <code>[:SENSe] :ACPower :CARRier [1] 2 :COUNT?</code> |
| Example | ACP:CARR:COUN 1 ACP:CARR:COUN? |
| Notes | Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. Note that Carrier sub op code 2 is supported only in Non-SA modes. In the SA mode, Carrier sub op code 1 is used for both BTS and MS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Dependencies | When Number of Carriers is 1, Ref Carrier is grayed out. If N9060A-5FP license is enabled, Max of Carrier is 18, otherwise, Max of Carrier is 12. |
| Couplings | Changing this parameter might affect the Span. |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | Refer to Dependencies item. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Ref Carrier

Sets the reference carrier. Relative power measurements are made from the reference carrier.

If set to Auto, the measurement selects the carrier with the highest power as the reference carrier and the Ref Carrier parameter is updated. If a value is entered when Ref Carrier Mode is set to Auto, the mode changes to Man.

If set to Man, the value that you enter for the Ref Carrier is used as the reference carrier.

| | |
|-----------------------|---|
| Key Path | Meas Setup, Carrier Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV |
| Remote Command | <code>[:SENSe] :ACPower :CARRier [1] 2 :RCARrier <integer></code> <code>[:SENSe] :ACPower :CARRier [1] 2 :RCARrier?</code> <code>[:SENSe] :ACPower :CARRier [1] 2 :RCARrier :AUTO OFF ON 0 1</code> <code>[:SENSe] :ACPower :CARRier [1] 2 :RCARrier :AUTO?</code> |
| Example | ACP:CARR:RCAR 1 ACP:CARR:RCAR? ACP:CARR:RCAR:AUTO OFF ACP:CARR:RCAR:AUTO? |

| | |
|-------------------------------------|--|
| Notes | Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. Note that Carrier sub op code 2 is supported only in Non-SA modes. In the SA mode, Carrier sub op code 1 is used for both BTS and MS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Dependencies | If there is only one carrier, this key will be grayed out. |
| Couplings | If you enter a carrier value that is currently configured as having no power present, that carrier will be changed to having power present. If you enter a ref carrier this parameter will be set to manual. |
| Preset | Auto determined |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | Number of available carriers |
| Backwards Compatibility SCPI | [:SENSe] :MCPower:RCARrier [1] 2 (PSA Power Suite) |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Ref Car Freq

Sets the reference carrier frequency.

| | |
|-----------------------|--|
| Key Path | Meas Setup, Carrier Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV |
| Remote Command | [:SENSe] :ACPpower:CARRier [1] 2 :RCFRrequency <freq> [:SENSe] :ACPpower:CARRier [1] 2 :RCFRrequency? [:SENSe] :ACPpower:CARRier [1] 2 :RCFRrequency:AUTO OFF ON 0 1 [:SENSe] :ACPpower:CARRier [1] 2 :RCFRrequency:AUTO? |
| Example | ACP:CARR:RCFR 250 MHz ACP:CARR:RCFR? ACP:CARR:RCFR:AUTO OFF ACP:CARR:RCFR:AUTO? |
| Notes | Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. Note that Carrier sub op code 2 is supported only in Non-SA modes. In the SA mode, Carrier sub op code 1 is used for both BTS and MS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |

| | |
|--------------------------|---|
| Couplings | <p>Coupled to the Center Frequency.</p> <p>If the center frequency changes, the Ref Carrier Frequency is calculated using the following three steps;</p> $\text{Ref Freq1} = \text{Ctr Freq} - (\text{Total of all Carrier Widths} / 2)$ $\text{Ref Freq2} = \text{Ref Freq1} + (\text{Total of all Carrier Widths up to Ref Carrier})$ $\text{Ref Freq} = \text{Ref Freq2} + (0.5 * \text{Carrier Width of Ref Carrier})$ <p>If reference carrier frequency changes the Center Frequency is calculated using the following three steps;</p> $\text{Ctr Freq1} = \text{Ref Freq} - (0.5 * \text{Carrier Width of Ref Carrier})$ $\text{Ctr Freq2} = \text{Ctr Freq1} - (\text{Total of all Carrier Widths up to Ref Carrier})$ $\text{Ctr Freq} = \text{Ctr Freq2} + (\text{Total of all Carrier Widths} / 2)$ <p>This ensures that the carriers are always centered on the screen.</p> <p>If there is only one carrier present the Reference Carrier Frequency will be the same as the Center Frequency.</p> |
| Preset | Calculated based on the current Center Frequency |
| State Saved | Saved in instrument state. |
| Min | -79.999995 MHz |
| Max | <p>Hardware Dependent:</p> <p>Option 503 = 3.699999995 GHz</p> <p>Option 508 = 8.499999995 GHz</p> <p>Option 513 = 13.799999995 GHz</p> <p>Option 526 = 26.999999995 GHz</p> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Power Ref

Sets the power reference in the carrier that will be used to compute the relative values for the offsets.

| | |
|--------------------------|---------------------------|
| Key Path | Meas Setup, Carrier Setup |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.04.00 |

Total Power

Sets the multi-carrier power reference.

When set to Auto, the carrier power result reflects the measured power value in the selected reference carrier.

When set to Man, the result is referenced to the last measured value, or you may specify the reference for the multi-carrier power measurement. Relative values are displayed, referenced to the “Power Reference” value.

| | |
|-------------------------------------|---|
| Key Path | Meas Setup, Carrier Setup, Power Ref |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR |
| Remote Command | [:SENSe]:ACPower:CARRier[1] 2[:POWer] <real> [:SENSe]:ACPower:CARRier[1] 2[:POWer]? [:SENSe]:ACPower:CARRier[1] 2:AUTO[:STATe] OFF ON 0 1 [:SENSe]:ACPower:CARRier[1] 2:AUTO[:STATe]? |
| Example | ACP:CARR 10 ACP:CARR? ACP:CARR:AUTO OFF ACP:CARR:AUTO? |
| Notes | Although the default value is defined, the value is recalculated by the measurement result just after measurement. Carrier sub op code: 1 for BTS, 2 for MS. Default is BTS. Carrier sub op code 2 is supported only in Non-SA modes. MS is not supported in MSR. In the SA mode, Carrier sub op code 1 is used for both BTS and MS. The Unit Terminator keys differ depending on whether or not the mode supports Y Axis Unit and also which Y Axis Unit is selected. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. Power Ref State ([:SENSe]:ACPower:CARRier[1] 2:AUTO[:STATe]) is not available in MSR mode. |
| Dependencies | This key is available only when the Meas Type is TPref. If the Meas Type is not TPref, this key is grayed out. |
| Preset | 0.0 ON |
| State Saved | Saved in instrument state. |
| Min | -200 dBm |
| Max | 200 dBm |
| Backwards Compatibility SCPI | [:SENSe]:MCPower:CARRier[1] 2[:POWer] |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.04.00, A.10.00 |

PSD

Sets the power spectral density in the carrier (main channel) that is used to compute the relative power spectral density values for the offsets when Meas Type is set to PSD Ref. When the PSD Ref state is set to Auto, this will be set to the measured carrier power spectral density.

| | |
|--------------------------|--|
| Key Path | Meas Setup, Carrier Setup, Power Ref |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR |
| Remote Command | <code>[:SENSe] :ACPower :CARRier [1] 2 :CPSD <real></code> <code>[:SENSe] :ACPower :CARRier [1] 2 :CPSD?</code> |
| Example | ACP:CARR:CPSD 25 ACP:CARR:CPSD? |
| Notes | Although the default value is defined, the value is recalculated by the measurement result just after measurement. Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. MS is not supported in MSR. Note that Carrier sub op code 2 is supported only in Non-SA modes. In the SA mode, Carrier sub op code 1 is used for both BTS and MS. You must be in the mode that includes ACP measurements to use this command. Use <code>:INSTrument:SElect</code> to set the mode. |
| Dependencies | This key is available only when the Meas Type is PSDRef. If the Meas Type is not PSDRef, this key is grayed out. |
| Couplings | The value of PSD is automatically converted when PSD Unit is changed. |
| Preset | 0.0 |
| State Saved | Saved in instrument state. |
| Min | -999 |
| Max | 999 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.04.00, A.10.00 |

Configure Carriers

Accesses a menu that contains Carrier, Carrier Pwr Present, Carrier Width and Carrier Integ BW parameters.

| | |
|----------------------|---------------------------|
| Key Path | Meas Setup, Carrier Setup |
| Initial S/W Revision | Prior to A.02.00 |

Carrier

Selects the carrier to configure for the current measurement.

| | |
|----------|--|
| Key Path | Meas Setup, Carrier Setup, Configure Carriers |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV |

| | |
|--------------------------|---|
| Couplings | Max value is the number of available carriers, so this value might change when the number of carriers is changed. |
| Preset | 1 |
| State Saved | No |
| Min | 1 |
| Max | Number of available carriers |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Carrier Pwr Present

Configures the carriers for this measurement. It allows spaces to be inserted between carriers. Carriers with the power present parameter set to Yes are carriers, and those with the power present parameter set to No are spaces. Each carrier power present is set to Yes or No. The individual carriers can be set by selecting the desired carrier on the carrier menu key using the up down arrows, the knob, or numeric keypad, then toggling the carrier power present using the carrier power present menu key.

The query for this parameter returns the current values for all of the carriers. If a carrier is defined as having no power present, the power displayed will be relative to the reference carrier, otherwise the absolute power will be displayed.

If you change the carrier power present to no and that carrier is currently configured as the reference carrier, the next carrier to the left (or the right if there are no carriers to the left) will be assigned as the reference carrier. This also applies to the scenario where there are only two carriers configured as having power present and you configure only one carrier to have no power present.

| | |
|----------------|---|
| Key Path | Meas Setup, Carrier Setup, Configure Carriers |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV |
| Remote Command | <code>[:SENSe] :ACPpower:CARRier [1] 2 :LIST:PPResent YES NO, YES NO, YES NO, YES NO, YES NO, YES NO</code> <code>[:SENSe] :ACPpower:CARRier [1] 2 :LIST:PPResent?</code> |
| Example | <code>ACP:CARR2:LIST:PPR YES</code> <code>ACP:CARR2:LIST:PPR?</code> |
| Notes | Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. Note that Carrier sub op code 2 is supported only in Non-SA modes. In the SA mode, Carrier sub op code 1 is used for both BTS and MS. When setting these values remotely, the position in the list sent corresponds to the carrier. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored. |
| Dependencies | If there is only one carrier, this key will be grayed out. |
| Couplings | Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list. |

| | |
|-------------------------------------|---|
| Preset | YES |
| State Saved | Saved in instrument state. |
| Range | Yes No |
| Backwards Compatibility SCPI | <code>[:SENSe] :MCPower :CARRier [1] 2 :LIST :PPResent</code> (PSA Power Suite) |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Carrier Spacing

Sets the width of the carrier spacing. This will be the value applied to all the current slots, whether they are carriers or spaces.

Enter each carrier spacing value individually by selecting the desired carrier on the carrier menu key using the up down arrows, the knob, or the numeric keypad, then enter the carrier width using the carrier spacing menu key.

| | |
|----------------|--|
| Key Path | Meas Setup, Carrier Setup, Configure Carriers |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV |
| Remote Command | <code>[:SENSe] :ACPpower :CARRier [1] 2 :LIST :WIDTh <freq>, <freq>, <freq>, <freq>, <freq>, <freq></code> <code>[:SENSe] :ACPpower :CARRier [1] 2 :LIST :WIDTh?</code> |
| Example | ACP:CARR2:LIST:WIDT 25kHz ACP:CARR2:LIST:WIDT? |

Notes

Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS.

Note that Carrier sub op code 2 is supported only in Non-SA modes.

In the SA mode, Carrier sub op code 1 is used for both BTS and MS.

When setting these values remotely, the position in the list sent corresponds to the carrier. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

You must be in the mode that includes ACP measurements to use this command. Use `:INSTrument:SElect` to set the mode.

| | |
|-----------|---|
| Couplings | Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list. Changing Carrier Spacing might affect the Span. |
| Preset | SA, WCDMA: 5 MHz WIMAX OFDMA: 10 MHz C2K: 1.25 MHz 1xEVDO: 1.25 MHz |

| | |
|-------------------------------------|--|
| | TD-SCDMA: 1.6 MHz DVB-T/H: 8 MHz DTMB (CTTB): 8 MHz ISDB-T: 6 MHz CMMB: 8 MHz LTE: 5 MHz LTE-TDD: 5 MHz Digital Cable TV: 8 MHz |
| State Saved | Saved in instrument state. |
| Min | 0 Hz |
| Max | 1 GHz |
| Backwards Compatibility SCPI | <code>[:SENSe] :MCPower :CARRier [1] 2 :LIST :WIDTh (PSA Power Suite)</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Measurement Noise Bandwidth

Specifies the Measurement Noise Bandwidth used to calculate the power in the carriers.

Each Measurement Noise Bandwidth value is entered individually by selecting the desired carrier on the carrier menu key using the up down arrows, the knob, or the numeric keypad. Then enter the measurement noise bandwidth using the measurement noise bandwidth key.

| | |
|----------------|---|
| Key Path | Meas Setup, Carrier Setup, Configure Carriers |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV |
| Remote Command | <pre>[:SENSe] :ACPpower :CARRier [1] 2 :LIST :BANDwidth [:INTEgration] <freq>, <freq>, <freq>, <freq>, <freq> [:SENSe] :ACPpower :CARRier [1] 2 :LIST :BANDwidth [:INTEgration] ?</pre> |
| Example | <pre>ACP:CARR2:LIST:BAND 25kHz ACP:CARR2:LIST:BAND?</pre> |
| Notes | <p>In the WCDMA mode, the preset/default value is defined as 3.84 MHz. But internally, 4.6848 MHz is used as the default value.</p> <p>Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS.</p> <p>Note that Carrier sub op code 2 is supported only in Non-SA modes.</p> <p>In the SA mode, Carrier sub op code 1 is used for both BTS and MS.</p> <p>When setting these values remotely, the position in the list sent corresponds to the carrier. Missing values are not permitted, therefore if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.</p> <p>You must be in the mode that includes ACP measurements to use this command. Use</p> |

| | |
|-------------------------------------|---|
| | :INSTRument:SElect to set the mode. |
| Couplings | Coupled to the number of carriers. When the SCPI command is sent, the number of carriers is set to the number of entries in the parameter list. |
| Preset | SA: 2 MHz WCDMA: 3.84 MHz WIMAX OFDMA: 10 MHz C2K: 1.23MHz TD-SCDMA: 1.28 MHz 1xEVDO: 1.23 MHz DVB-T/H: 7.61 MHz DTMB (CTTB): 7.56 MHz ISDB-T: 5.6 MHz CMMB: 7.512 MHz LTE, LTETDD: 4.515 MHz 4.5 MHz Digital Cable TV: 8.0 MHz |
| State Saved | Saved in instrument state. |
| Min | 10 Hz |
| Max | 1 GHz |
| Backwards Compatibility SCPI | [:SENSe] :ACPower :BANDwidth :INTEgration [:SENSe] :ACPower :BWIDth :INTEgration [:SENSe] :ACPower :CARRier [1] 2 :LIST :BWIDth [:INTEgration] [:SENSe] :MCPower :CARRier [1] 2 :LIST :BANDwidth [:INTEgration] (PSA Power Suite) [:SENSe] :MCPower :CARRier [1] 2 :LIST :BWIDth [:INTEgration] (PSA Power Suite) |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Method for Carrier

Accesses the carrier configuration method settings.

| | |
|----------------|---|
| Key Path | Meas Setup, Carrier Setup, Configure Carriers |
| Mode | SA, WCDMA, WIMAX OFDMA, TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV |
| Remote Command | [:SENSe] :ACPower :CARRier [1] 2 :LIST :FILTer [:RRC] [:STATe] ON OFF 1 0, ON OFF 1 0 [:SENSe] :ACPower :CARRier [1] 2 :LIST :FILTer [:RRC] [:STATe] ? |
| Example | ACP:CARR:LIST:FILT 0,0,0,0 ACP:CARR:LIST:FILT? |

| | |
|--------------------------|---|
| Notes | The binary values translate as follows: 1 ON = RRC Weighted 0 OFF = Integ BW Maximum of Array length depends on the number of carriers. You must be in the mode that includes ACP measurements to use this command. Use :INSTRument:SElect to set the mode. |
| Preset | SA, LTE, LTETDD: OFF WCDMA: ON WIMAX OFDMA: OFF TD-SCDMA: ON DVB-T/H: OFF DTMB (CTTB): ON ISDB-T, CMMB: OFF Digital Cable TV: OFF |
| State Saved | Saved in instrument state. |
| Range | IntegBW RRC Weight |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Filter Alpha for Carrier

Inputs the alpha value for the filter used in the current carrier configuration.

| | |
|----------------|--|
| Key Path | Meas Setup, Carrier Setup, Configure Carriers, Method, RRC Weighted |
| Mode | SA, WCDMA, WIMAX OFDMA, TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV |
| Remote Command | <code>[:SENSe] :ACPpower:CARRier [1] 2 :LIST:FILTer:ALPHa <real>, <real>, <real>, <real>, <real>, <real></code> <code>[:SENSe] :ACPpower:CARRier [1] 2 :LIST:FILTer:ALPHa?</code> |
| Example | ACP:CARR2:LIST:FILT:ALPH 0.5 ACP:CARR2:LIST:FILT:ALPH? |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTRument:SElect to set the mode. |
| Preset | 0.22 C2K: No DTMB (CTTB): 0.05 Digital Cable TV: 0.15 |
| State Saved | Saved in instrument state. |
| Min | 0.01 |
| Max | 1.0 |

| | |
|--------------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Carrier Coupling

Couples carrier settings to carrier #1. The coupled parameters are Carrier Power Present, Carrier Spacing, Measurement Noise Bandwidth, Method, and Filter Alpha.

| | |
|--------------------------|--|
| Parameter Name | Carrier Coupling |
| Key Path | Meas Setup, Carrier Setup, Configure Carriers |
| Key Type | Binary |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, 1xEVDO, TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV |
| Remote Command | [:SENSe]:ACPower:CARRier[1] 2:LIST:COUPle OFF ON 0 1, OFF ON 0 1 [:SENSe]:ACPower:CARRier[1] 2:LIST:COUPle? |
| Example | ACP:CARR:LIST:COUP OFF ACP:CARR:LIST:COUP? |
| Notes | Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. Note that Carrier sub op code 2 is supported only in Non-SA modes. In the SA mode, Carrier sub op code 1 is used for both BTS and MS. You must be in the mode that includes ACP measurements to use this command. Use :INSTRument:SElect to set the mode. |
| Couplings | When Couple is selected, the carrier settings are coupled to carrier #1. Coupled parameters are Carrier Power Present, Carrier Spacing, Measurement Noise Bandwidth, Method and Filter Alpha. When a setting is changed, the couple is set to Man automatically. Carrier #1 is always set to couple and cannot be changed. Couple/Man selection on the Carrier key is not displayed when selected carrier number is #1. |
| Preset | ON |
| Force Restart | No |
| State Saved | Saved in instrument state. |
| Range | Couple Man |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |
| Softkey Label | Carrier |

Offset/Limits

Accesses a menu of functions that contains Offset, Offset Freq/Offset To Edge, Offset Integ BW, Upper Offset Limit and Lower Offset parameters. When in the MSR and LTE-Advanced FDD/TDD mode, the softkey label changes to Outer Offset/Limits.

| | |
|--------------------------|------------------|
| Key Path | Meas Setup |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.13.00 |

Select Offset

Selects the offset to configure.

| | |
|--------------------------|--|
| Key Path | Meas Setup, Offset/Limits, Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Preset | A |
| State Saved | Saved in instrument state. |
| Range | Offset A Offset B Offset C Offset D Offset E Offset F |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.13.00 |

Offset Freq

This parameter determines the frequency difference between the center of the main channel and the center of the carrier.

Each Offset Freq state value is entered individually by selecting the desired carrier on the carrier menu key using the up down arrows, RPG or numeric keypad. Then enter the Offset Freq State using the Offset Frequency key.

The list contains up to six (6) entries, depending on the mode selected, for offset frequencies. Each offset frequency in the list corresponds to a reference bandwidth in the bandwidth list.

An offset frequency of zero turns the display of the measurement for that offset off, but the measurement is still made and reported. You can turn off (not use) specific offsets with the [:SENSe]:ACP:OFFSet:LIST:STATe command.

Turning the offset off has the same effect as setting the frequency of the offset to 0 Hz and will cause it to be removed from the results screen.

| | |
|----------|--|
| Key Path | Meas Setup, Offset/Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |

| | |
|-----------------------|--|
| Remote Command | <pre>[[:SENSe]:ACPower:OFFSet [1] 2[:OUTer]:LIST[:FREQuency] <freq>, <freq>, <freq>, <freq>, <freq>, <freq> [:SENSe]:ACPower:OFFSet [1] 2[:OUTer]:LIST[:FREQuency]? [:SENSe]:ACPower:OFFSet [1] 2[:OUTer]:LIST:STATe OFF ON 0 1, OFF ON 0 1 [:SENSe]:ACPower:OFFSet [1] 2[:OUTer]:LIST:STATe?</pre> |
| Example | <pre>ACP:OFFS1:LIST 0,0,0,0,0,0 ACP:OFFS1:LIST? ACP:OFFS2:LIST:STAT 1,1,0,0,0,0 ACP:OFFS2:LIST:STAT?</pre> |
| Notes | <p>The label for this menu key will change depending on the currently selected radio standard or mode. For cdma2000 the label for the menu key will be Offset to Edge. For all other supported standards the label will be Offset Freq.</p> <p>When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.</p> <p>Offset sub op code. 1 for BTS, 2 for MS. Default is BTS.</p> <p>Note that Offset sub op code 2 is supported only in Non-SA modes.</p> <p>In the SA mode, Offset sub op code 1 is used for both BTS and MS.</p> <p>You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.</p> |
| Couplings | <p>Changing Offset Frequency might affect the Span. See the Span key section for details.</p> |
| Preset | <pre>SA: 3 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz, 0 Hz 3 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz, 0 Hz WCDMA: 5.0 MHz, 10.0 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz 5.0 MHz, 10.0 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz WIMAX OFDMA: 10 MHz, 20 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz 10 MHz, 20 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz C2K:750KHz, 1.980 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz 885 kHz, 1.980 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz TD-SCDMA: 1.6 MHz, 3.2 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz 1.6 MHz, 3.2 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz 1xEVDO: 750KHz, 1.98MHz, 3.125MHz, 4.000MHz, 7.500MHz, 7.500MHz 885KHz, 1.98MHz, 3.125MHz, 4.000MHz, 7.500MHz, 7.500MHz DVB-T/H: 8 MHz, 16 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz 8 MHz, 16 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz DTMB (CTTB): 8 MHz, 16 MHz, 24 MHz, 32 MHz, 0 Hz, 0 Hz 8 MHz, 16 MHz, 24 MHz, 32 MHz, 0 Hz, 0 Hz ISDB-T: 6 MHz, 12 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz 6 MHz, 12 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz CMMB: 8 MHz, 16 MHz, 24 MHz, 32 MHz, 0 Hz, 0 Hz 8 MHz, 16 MHz, 24 MHz, 32 MHz, 0 Hz, 0 Hz LTE, LTETDD, MSR, LTEAFDD, LTEATDD: 5 MHz, 10 MHz, 0, 0, 0, 0 5 MHz, 10 MHz, 0, 0, 0, 0 Digital Cable TV: 8 MHz, 16 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz 8 MHz, 16 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz SA: ON, OFF, OFF, OFF, OFF, OFF ON, OFF, OFF, OFF, OFF, OFF WCDMA: ON, ON, OFF, OFF, OFF, OFF ON, ON, OFF, OFF, OFF, OFF WIMAX OFDMA: ON, ON, OFF, OFF, OFF, OFF ON, ON, OFF, OFF, OFF, OFF TD-SCDMA: ON, ON, OFF, OFF, OFF, OFF ON, ON, OFF, OFF, OFF, OFF DVB-T/H: ON, ON, OFF, OFF, OFF, OFF ON, ON, OFF, OFF, OFF, OFF</pre> |

| | |
|-------------------------------------|--|
| | DTMB (CTTB): ON, ON, OFF, OFF, OFF, OFF ON, ON, OFF, OFF, OFF, OFF CDMA1xEVDO: ON, ON, OFF, OFF, OFF, OFF ON, ON, OFF, OFF, OFF, OFF ISDB-T: ON, ON, OFF, OFF, OFF, OFF ON, ON, OFF, OFF, OFF, OFF CMMB: ON, ON, ON, ON, OFF, OFF ON, ON, ON, ON, OFF, OFF LTE, LTE-TDD, MSR, LTE-AFDD, LTE-TDD: ON, ON, OFF, OFF, OFF, OFF ON, OFF, OFF, OFF, OFF, OFF Digital Cable TV: ON, ON, OFF, OFF, OFF, OFF ON, ON, OFF, OFF, OFF, OFF |
| State Saved | Saved in instrument state. |
| Min | 0 Hz |
| Max | 500 MHz |
| Backwards Compatibility SCPI | <code>[:SENSe] :MCPower:OFFSet [1] 2 :LIST [:FREQuency]</code> (PSA Power Suite) |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.13.00 |

Integ BW

Sets the Integration Bandwidth for the offsets. Each resolution bandwidth in the list corresponds to an offset frequency in the list defined by `[:SENSe] :ACP:OFFSet [n] [:OUTer] :LIST [:FREQuency]`.

Enter each value individually by selecting the desired offset on the offset menu key using the up down arrows, the knob, or the numeric keypad, then enter the Offset Integration Bandwidth using the Offset Integration Bandwidth menu key.

You can turn off (not use) specific offsets with the `[:SENSe] :ACP:OFFSet [n] [:OUTer] :LIST:STATe` command.

| | |
|-----------------------|--|
| Key Path | Meas Setup, Offset/Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTE-AFDD, LTE-TDD |
| Remote Command | <code>[:SENSe] :ACP:OFFSet [1] 2 [:OUTer] :LIST: BANDwidth [:INTEgration]</code> <freq>, <freq>, <freq>, <freq>, <freq>, <freq> <code>[:SENSe] :ACP:OFFSet [1] 2 [:OUTer] :LIST: BANDwidth [:INTEgration] ?</code> |
| Example | ACP:OFFS2:LIST:BAND 2MHz, 2MHz, 2MHz, 2MHz, 2MHz, 2MHz ACP:OFFS2:LIST:BAND? |
| Notes | <p>When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change the second value, you must send all values up to it. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.</p> <p>Offset sub op code. 1 for BTS, 2 for MS. Default is BTS.</p> <p>Note that Offset sub op code 2 is supported only in Non-SA modes.</p> <p>In the SA mode, Offset sub op code 1 is used for both BTS and MS.</p> <p>You must be in the mode that includes ACP measurements to use this command. Use <code>:INSTrument:SElect</code> to set the mode.</p> |

| | |
|-------------------------------------|---|
| Couplings | Changing Integ BW might affect the Span. See Span section for details. |
| Preset | SA: 2 MHz, 2 MHz, 2 MHz, 2 MHz, 2 MHz, 2 MHz 2 MHz, 2 MHz, 2 MHz, 2 MHz, 2 MHz, 2 MHz WCDMA: 3.84 MHz, 3.84 MHz, 3.84 MHz, 3.84 MHz, 3.84 MHz, 3.84 MHz 3.84 MHz, 3.84 MHz, 3.84 MHz, 3.84 MHz, 3.84 MHz WIMAX OFDMA: 10 MHz, 10 MHz, 10 MHz, 10 MHz, 10 MHz, 10 MHz 10 MHz, 10 MHz, 10 MHz, 10 MHz, 10 MHz, 10 MHz C2K: 30 kHz, 30 kHz, 30 kHz, 30 kHz, 30 kHz, 30 kHz 30 kHz, 30 kHz, 30 kHz, 30 kHz, 30 kHz, 30 kHz TD-SCDMA: 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz 1xEVDO: C2K: 30 kHz, 30 kHz, 30 kHz, 30 kHz, 30 kHz, 30 kHz 30 kHz, 30 kHz, 30 kHz, 30 kHz, 30 kHz, 30 kHz DVB-T/H: 7.61 MHz, 7.61 MHz, 7.61 MHz, 7.61 MHz, 7.61 MHz, 7.61 MHz 7.61 MHz, 7.61 MHz, 7.61 MHz, 7.61 MHz, 7.61 MHz, 7.61 MHz DTMB (CTTB): 7.56 MHz, 7.56 MHz, 7.56 MHz, 7.56 MHz, 7.56 MHz, 7.56 MHz 7.56 MHz, 7.56 MHz, 7.56 MHz, 7.56 MHz, 7.56 MHz, 7.56 MHz ISDB-T: 5.6 MHz, 5.6 MHz, 5.6 MHz, 5.6 MHz, 5.6 MHz, 5.6 MHz 5.6 MHz, 5.6 MHz, 5.6 MHz, 5.6 MHz, 5.6 MHz, 5.6 MHz CMMB: 7.512 MHz, 7.512 MHz, 7.512 MHz, 7.512 MHz, 7.512 MHz, 7.512 MHz 7.512 MHz, 7.512 MHz, 7.512 MHz, 7.512 MHz, 7.512 MHz, 7.512 MHz LTE, LTEFDD, MSR, LTEAFDD, LTEATDD: 4.515 MHz, 4.515 MHz, 4.515 MHz, 4.515 MHz, 4.515 MHz, 4.515 MHz 4.5 MHz, 4.5 MHz, 4.5 MHz, 4.5 MHz, 4.5 MHz, 4.5 MHz Digital Cable TV: 8.0 MHz, 8.0 MHz, 8.0 MHz, 8.0 MHz, 8.0 MHz, 8.0 MHz 8.0 MHz, 8.0 MHz, 8.0 MHz, 8.0 MHz, 8.0 MHz, 8.0 MHz |
| State Saved | Saved in instrument state. |
| Min | 10 Hz |
| Max | 1 GHz |
| Backwards Compatibility SCPI | [:SENSe] :ACPower:OFFSet [1] 2 :LIST:BWIDth [:INTegration] [:SENSe] :ACPR:OFFSet [1] 2 :LIST:BANDwidth [:SENSe] :ACPR:OFFSet [1] 2 :LIST:BWIDth [:SENSe] :MCPower:OFFSet [1] 2 :LIST:BANDwidth [:INTegration] (PSA Power Suite) [:SENSe] :MCPower:OFFSet [1] 2 :LIST:BWIDth [:INTegration] (PSA Power Suite) |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.13.00 |

Offset BW

Accesses the offset bandwidth menu.

| | |
|----------------------|---------------------------|
| Key Path | Meas Setup, Offset/Limits |
| Initial S/W Revision | Prior to A.02.00 |

Res BW

Sets the resolution bandwidth. If an unavailable bandwidth is entered with the numeric keypad, the closest available bandwidth is selected.

| | |
|----------------|---|
| Key Path | Meas Setup, Offset/Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTEFDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | <pre>[:SENSe]:ACPower:OFFSet [1] 2[:OUTer]:LIST:BANDwidth:RESolution <freq>, <freq>, <freq>, <freq>, <freq> [:SENSe]:ACPower:OFFSet [1] 2[:OUTer]:LIST:BANDwidth:RESolution? [:SENSe]:ACPower:OFFSet [1] 2[:OUTer]:LIST:BANDwidth:RESolution:AUTO ON OFF 1 0, ON OFF 1 0 [:SENSe]:ACPower:OFFSet [1] 2[:OUTer]:LIST:BANDwidth:RESolution:AUTO?</pre> |
| Example | <pre>ACP:OFFS2:LIST:BAND:RES 220kHz, 220kHz, 220kHz, 220kHz, 220kHz, 220kHz ACP:OFFS2:LIST:BAND:RES? ACP:OFFS2:LIST:BAND:RES:AUTO 1,1,1,1,1,1 ACP:OFFS2:LIST:BAND:RES:AUTO?</pre> |
| Notes | <p>Offset sub op code. 1 for BTS, 2 for MS. Default is BTS.</p> <p>Note that Offset sub op code 2 is supported only in Non-SA modes.</p> <p>In the SA mode, Offset sub op code 1 is used for both BTS and MS.</p> <p>You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode.</p> |
| Dependencies | When Meas Method is RBW or FAST, this key is grayed out and disabled. If the key is pressed, an advisory message is generated. If the equivalent remote command is sent, a "Setting conflict" warning is generated. |
| Couplings | When Res BW Mode is AUTO, this value is exactly same as Res BW under BW key. And when this value is changed by user, Res BW Mode is also changed to Man. |
| Preset | <pre>SA: 220 kHz, 220 kHz, 220 kHz, 220 kHz, 220 kHz, 220 kHz WCDMA: 100 kHz, 100 kHz, 100 kHz, 100 kHz, 100 kHz, 100 kHz WIMAX OFDMA: 100 kHz, 100 kHz, 100 kHz, 100 kHz, 100 kHz, 100 kHz C2K: Method:RBW 30 kHz Method: IBW C2K: 15 kHz, 15 kHz, 15 kHz, 15 kHz, 15 kHz, 15 kHz 15 kHz, 15 kHz, 15 kHz, 15 kHz, 15 kHz, 15 kHz TD-SCDMA: 30 kHz, 30 kHz, 30 kHz, 30 kHz, 30 kHz, 30 kHz 1xEVDO: 30KHz, 30KHz, 30KHz, 30KHz, 30KHz, 30KHz 30KHz, 30KHz, 30KHz, 30KHz, 30KHz, 30KHz</pre> |

| | |
|-------------------------------------|--|
| | DVB-T/H: 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz DTMB (CTTB): 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz ISDB-T: 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz CMMB: 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz LTE, LTE-TDD, MSR, LTEAFDD, LTEATDD: 100 kHz, 100 kHz, 100 kHz, 100 kHz, 100kHz, 100 kHz 100 kHz, 100 kHz, 100 kHz, 100 kHz, 100 kHz, 100 kHz Digital Cable TV: 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz, 39 kHz 1, 1, 1, 1, 1, 1 |
| State Saved | Saved in instrument state. |
| Min | 1 Hz |
| Max | 8 MHz |
| Backwards Compatibility SCPI | [:SENSe] :ACPower:OFFSet [1] 2 :LIST:BWIDth:RESolution |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.13.00 |

Video BW

Enables you to change the analyzer post-detection filter (VBW).

| | |
|----------------|--|
| Key Path | Meas Setup, Offset/Limits, Offset BW |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :ACPower:OFFSet [1] 2 [:OUTer] :LIST:BWIDth:VIDeo <freq>, <freq>, <freq>, <freq>, <freq> [:SENSe] :ACPower:OFFSet [1] 2 [:OUTer] :LIST:BWIDth:VIDeo? [:SENSe] :ACPower:OFFSet [1] 2 [:OUTer] :LIST:BWIDth:VIDeo:AUTO OFF ON 0 1, OFF ON 0 1 [:SENSe] :ACPower:OFFSet [1] 2 [:OUTer] :LIST:BWIDth:VIDeo:AUTO? |
| Example | ACP:OFFS2:LIST:BWIDth:VIDeo 5MHz, 5MHz, 5MHz, 5MHz, 5MHz, 5MHz ACP:OFFS2:LIST:BWIDth:VIDeo? ACP:OFFS2:LIST:BWIDth:VIDeo:AUTO 0,0,0,0,1,1 ACP:OFFS2:LIST:BWIDth:VIDeo:AUTO? |
| Notes | The values shown in this table reflect the conditions after a Mode Preset. Offset sub op code. 1 for BTS, 2 for MS. Default is BTS. Note that Offset sub op code 2 is supported only in Non-SA modes. |

| | |
|-------------------------------------|---|
| | In the SA mode, Offset sub op code 1 is used for both BTS and MS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. . |
| Dependencies | When Meas Method is RBW or FAST, this key is grayed out and disabled. If the key is pressed, an advisory message is generated. If the equivalent remote command is sent, a "Setting conflict" warning is generated. |
| Preset | SA: 22 kHz, 22 kHz, 22 kHz, 22 kHz, 22 kHz, 22 kHz WCDMA, WIMAX OFDMA: 1 MHz, 1 MHz, 1 MHz, 1 MHz, 1 MHz, 1 MHz C2K: 150 kHz, 150 kHz, 150 kHz, 150 kHz, 150 kHz, 150 kHz 150 kHz, 150 kHz, 150 kHz, 1150 kHz, 1150 kHz, 150 kHz TD-SCDMA: 300 kHz, 300 kHz, 300 kHz, 300 kHz, 300 kHz, 300 kHz 1xEVDO: 300KHz, 300KHz, 300KHz, 300KHz, 300KHz, 300KHz 300KHz, 300KHz, 300KHz, 300KHz, 300KHz, 300KHz DVB-T/H: 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz DTMB (CTTB): 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz ISDB-T: 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz CMMB: 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz LTE, LTEFDD, MSR, LTEAFDD, LTEATDD: 1 MHz, 1 MHz, 1 MHz, 1 MHz, 1 MHz, 1 MHz Digital Cable TV: 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz, 390 kHz ON, ON, ON, ON, ON, ON |
| State Saved | Saved in instrument state. |
| Min | 1 Hz |
| Max | 50 MHz |
| Backwards Compatibility SCPI | [:SENSe] :ACPower :OFFSet [1] 2 :LIST :BWIDth :VIDeo |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.13.00 |

RBW Control

Accesses the resolution bandwidth control menu.

| | |
|----------------------|--------------------------------------|
| Key Path | Meas Setup, Offset/Limits, Offset BW |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-------------------------------------|---|
| Notes | Offset sub op code. 1 for BTS, 2 for MS. Default is BTS. Note that Offset sub op code 2 is supported only in Non-SA modes. In the SA mode, Offset sub op code 1 is used for both BTS and MS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Dependencies | When Filter Type is Flattop or Res BW Mode for the offset is Auto, this key is grayed out and disabled. Since Res BW Mode for the offset is preset to Auto on changing Meas Method to RBW or FAST, this key is grayed out and disabled too. If the key is pressed, an advisory message is generated. If the equivalent remote command is sent, a "Setting conflict" warning is generated. |
| Preset | DB3, DB3, DB3, DB3, DB3, DB3 |
| State Saved | Saved in instrument state. |
| Range | -3 dB (Normal) -6 dB |
| Backwards Compatibility SCPI | [:SENSE] :ACPower:OFFSet [1] 2 :LIST:BWIDth:TYPE |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.13.00 |

Limits

Limits key accesses a menu of functions that contains Select Offset, Abs Limit, Rel Limit and Fail Mask parameters.

| | |
|----------------------|---------------------------|
| Key Path | Meas Setup, Offset/Limits |
| Initial S/W Revision | A.03.00 |

Select Offset

Selects the offset to configure.

| | |
|--------------------------|--|
| Key Path | Meas Setup, Offset/Limits, Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Preset | A |
| State Saved | Saved in instrument state. |
| Range | Offset A Offset B Offset C Offset D Offset E Offset F |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.13.00 |

Abs Limit

Enters an absolute limit value, which sets the absolute amplitude levels to test against for each of the custom offsets. The list must contain six (6) entries. If there is more than one offset, the offset closest to the carrier channel is the first one in the list. [:SENSe]:ACP:OFFSet[n][:OUTer]:LIST:TEST selects the type of testing to be done at each offset.

You can turn off (not use) specific offsets with the [:SENSe]:ACP:OFFSet[n][:OUTer]:LIST:STATe command.

The query returns the six (6) sets of real numbers that are the current absolute amplitude test limits.

| | |
|-----------------------|---|
| Key Path | Meas Setup, Offset/Limits, Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe]:ACP:Power:OFFSet[1] 2[:OUTer]:LIST:ABSolute <real>, <real>, <real>, <real>, <real>, <real> [:SENSe]:ACP:Power:OFFSet[1] 2[:OUTer]:LIST:ABSolute? |
| Example | ACP:OFFS2:LIST:ABS -10, -10, -10, -10, -10, -10 ACP:OFFS2:LIST:ABS? |
| Notes | Offset sub op code. 1 for BTS, 2 for MS. Default is BTS. Note that Offset sub op code 2 is supported only in Non-SA modes. In the SA mode, Offset sub op code 1 is used for both BTS and MS. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | None If current mode is DTMB (CTTB) or CMMB and current device type is Transmitter, the value from position 2 to position 4 are coupled, changing any one will change the others. |
| Preset | SA: 0dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm 0dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm WCDMA: 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm C2K: 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm WIMAX OFDMA: 50,50,50,50,50,50 TD-SCDMA: 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm 1xEVDO: -27dBm, -27dBm, -13dBm, -13dBm, -13dBm, -13dBm -27dBm, -27dBm, -13dBm, -13dBm, -13dBm, -13dBm DVB-T/H: 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm DTMB (CTTB): 11.14 dBm, 11.14dBm, 11.14 dBm, 11.14 dBm, 50 dBm, 50 dBm 11.14 dBm, 11.14 dBm, 11.14 dBm, 11.14 dBm, 50 dBm, 50 dBm ISDB-T: 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm CMMB: 11.14 dBm, 11.14dBm, 11.14 dBm, 11.14 dBm, 50 dBm, 50 dBm 11.14 dBm, 11.14 dBm, 11.14 dBm, 11.14 dBm, 50 dBm, 50 dBm LTE, LTE-TDD, MSR, LTEAFDD, LTEATDD: -8.45, -8.45, -8.45, -8.45, -8.45, -8.45 -50.0, -50.0, - |

| | |
|-------------------------------------|--|
| | 50.0, -50.0, -50.0, -50.0 Digital Cable TV: 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm, 50 dBm |
| State Saved | Saved in instrument state. |
| Min | -200.0 dBm |
| Max | 50.0 dBm |
| Backwards Compatibility SCPI | <code>[[:SENSE]:ACPR:OFFSet[1] 2:LIST:ABSolute (PSA W-CDMA, PSA cdma2000)</code> <code>[[:SENSE]:MCPower:OFFSet[1] 2:LIST:ABSolute (PSA W-CDMA)</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.13.00 |

Rel Lim (Car)

Enters a relative limit value for the carrier level. This sets the amplitude levels to test against for the specified offsets.

The amplitude level is relative to the carrier amplitude. If multiple offsets are available, the list contains six (6) entries. The offset closest to the carrier channel is the first one in the list.

`[[:SENSE]:ACP:OFFSet[n][[:OUTer]:LIST:TEST` selects the type of testing to be done at each offset.

You can turn off (not use) specific offsets with the `[[:SENSE]:ACP:OFFSet[n][[:OUTer]:LIST:STATe` command.

The query returns the six (6) sets of real numbers that are the current amplitude test limits, relative to the carrier, for each offset.

Offset[n] n = 1 is base station and n = 2 is mobiles. The default is base station (1).

| | |
|----------------|--|
| Key Path | Meas Setup, Offset/Limits, Limits, |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[[:SENSE]:ACP:OFFSet[1] 2[:OUTer]:LIST:RCARrier <real>, <real>, <real>, <real>, <real>, <real></code> <code>[[:SENSE]:ACP:OFFSet[1] 2[:OUTer]:LIST:RCARrier?</code> |
| Example | <code>ACP:OFFS2:LIST:RCAR 0,0,0,0,0,0</code> <code>ACP:OFFS2:LIST:RCAR?</code> |
| Notes | Offset sub op code. 1 for BTS, 2 for MS. Default is BTS. Note that Offset sub op code 2 is supported only in Non-SA modes. In the SA mode, Offset sub op code 1 is used for both BTS and MS. You must be in the mode that includes ACP measurements to use this command. Use <code>:INSTrument:SElect</code> to set the mode. |
| Couplings | None If current mode is DTMB (CTTB) or CMMB and current device type is Transmitter, the value from |

| | |
|-------------------------------------|---|
| | position 2 to position 4 are coupled, changing any one will change the others. |
| Preset | SA: -45, -60, 0, 0, 0, 0 -45, -60, 0, 0, 0, 0 WCDMA: -44.2, -49.2, -49.2, -49.2, -49.2, -49.2 -32.2, -42.2, -42.2, -42.2, -42.2, -42.2 C2K: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 WIMAX OFDMA: -50,-60,0,0,0,0 TD-SCDMA: -40, -45, -45, -45, -45, -45 -33, -43, -43, -43, -43, -43 1xEVDO: -45, -55, -55, -55, -55, -55 -45, -55, -55, -55, -55, -55 DVB-T/H: -60, -60, 0, 0, 0, 0 -60, -60, 0, 0, 0, 0 DTMB (CTTB): -45, -60, -60, -60, 50, 50 -45, -60, -60, -60, 50, 50 ISDB-T: -60, -60, 0, 0, 0, 0 -60, -60, 0, 0, 0, 0 CMMB: -45, -60, -60, -60, 50, 50 -45, -60, -60, -60, 50, 50 LTE, LTETDD, MSR, LTEAFDD, LTEATDD: -44.2, -44.2, -44.2, -44.2, -44.2, -44.2 -29.2, -29.2, -29.2, -29.2, -29.2, -29.2 Digital Cable TV: -58, -62, -65, -73, -73, -73 -58, -62, -65, -73, -73, -73 |
| State Saved | Saved in instrument state. |
| Min | -150 |
| Max | 50.0 |
| Backwards Compatibility SCPI | [:SENSe] :MCPower :OFFSet [1] 2 :LIST :RCARrier (PSA WCDMA) |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.04.00, A.13.00 |

Positive Offset Limit (SCPI only)

Enables you to set the upper limit for the upper segment of the specified offset pair.

| | |
|----------------|--|
| Mode | SA, WCDMA, CDMA2K, WIMAXOFDMA, TDSCDMA, CDMA1XEV, DVB, DTMB, LTE, LTETDD, DCATV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:ACP:OFFSet[:OUTer]:LIST:LIMit:POSitive[:UPPer]:DATA <real>, <real>, <real>, <real>, <real>, <real> :CALCulate:ACP:OFFSet[:OUTer]:LIST:LIMit:POSitive[:UPPer]:DATA? |
| Example | CALC:ACP:OFFS:LIST:LIM:POS:DATA 0, 0, 0, 0, 0, 0 CALC:ACP:OFFS:LIST:LIM:POS:DATA? |
| Notes | SCPI only command |
| Preset | SA: -45, -60, 0, 0, 0, 0 -45, -60, 0, 0, 0, 0 WCDMA: -44.2, -49.2, -49.2, -49.2, -49.2, -49.2 -32.2, -42.2, -42.2, -42.2, -42.2, -42.2 C2K: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 WIMAX OFDMA: -50, -60, 0, 0, 0, 0 TD-SCDMA: -40, -45, -45, -45, -45, -45 -33, -43, -43, -43, -43, -43 1xEVDO: -45, -55, -55, -55, -55, -55 -45, -55, -55, -55, -55, -55 DVB-T/H: -60, -60, 0, 0, 0, 0 -60, -60, 0, 0, 0, 0 |

| | |
|-------------------------------------|--|
| | DTMB (CTTB): -45, -60, -60, -60, 0, 0 -45, -60, -60, -60, 0, 0 Digital Cable TV: -58, -62, -65, -73, -73, -73 -58, -62, -65, -73, -73, -73 LTE, LTETDD, MSR, LTEAFDD, LTEATDD: -44.2, -44.2, -44.2, -44.2, -44.2, -44.2 -29.2, -29.2, -29.2, -29.2, -29.2, -29.2 |
| State Saved | Saved in instrument state. |
| Min | -150.0 |
| Max | 50.0 |
| Backwards Compatibility SCPI | :CALCulate:MCPower:OFFSet:LIST:LIMit:POSitive[:UPPer]:DATA (PSA Power Suite) |
| Initial S/W Revision | A.04.00 |
| Modified at S/W Revision | A.13.00 |

Negative Offset Limit

Enables you to set the upper limit for the lower segment of the specified offset pair.

| | |
|-------------------------------------|--|
| Mode | SA, WCDMA, CDMA2K, WIMAXOFDMA, TDSCDMA, CDMA1XEV, DVB, DTMB, LTE, LTETDD, DCATV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:ACPower:OFFSet[:OUTer]:LIST:LIMit:NEGative[:UPPer]:DATA <real>, <real>, <real>, <real>, <real>, <real> :CALCulate:ACPower:OFFSet[:OUTer]:LIST:LIMit:NEGative[:UPPer]:DATA? |
| Example | CALC:ACP:OFFS:LIST:LIM:NEG:DATA 0, 0, 0, 0, 0, 0 CALC:ACP:OFFS:LIST:LIM:NEG:DATA? |
| Notes | SCPI only command |
| Preset | SA: -45, -60, 0, 0, 0, 0 -45, -60, 0, 0, 0, 0 WCDMA: -44.2, -49.2, -49.2, -49.2, -49.2, -49.2 -32.2, -42.2, -42.2, -42.2, -42.2, -42.2 C2K: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 WIMAX OFDMA: -50, -60, 0, 0, 0, 0 TD-SCDMA: -40, -45, -45, -45, -45, -45 -33, -43, -43, -43, -43, -43 1xEVDO: -45, -55, -55, -55, -55, -55 -45, -55, -55, -55, -55, -55 DVB-T/H: -60, -60, 0, 0, 0, 0 -60, -60, 0, 0, 0, 0 DTMB (CTTB): -45, -60, -60, -60, 0, 0 -45, -60, -60, -60, 0, 0 Digital Cable TV: -58, -62, -65, -73, -73, -73 -58, -62, -65, -73, -73, -73 LTE, LTETDD, MSR, LTEAFDD, LTEATDD: -44.2, -44.2, -44.2, -44.2, -44.2, -44.2 -29.2, -29.2, -29.2, -29.2, -29.2, -29.2 |
| State Saved | Saved in instrument state. |
| Min | -150.0 |
| Max | 50.0 |
| Backwards Compatibility SCPI | :CALCulate:MCPower:OFFSet:LIST:LIMit:NEGative[:UPPer]:DATA (PSA Power Suite) |
| Initial S/W Revision | A.04.00 |
| Modified at S/W Revision | A.13.00 |

Rel Limit (PSD)

Enters a relative limit value for the level of the power spectral density. This sets the amplitude levels to test against for any custom offsets. The amplitude level is relative to the power spectral density. If multiple offsets are available, the list contains six (6) entries. The offset closest to the carrier channel is the first one in the list.

`[[:SENSE]:ACP:OFFSet[n]:OUTer]:LIST:TEST` selects the type of testing to be done at each offset.

You can turn off (not use) specific offsets with the `[[:SENSE]:ACP:OFFSet[n]:OUTer]:LIST:STATe` command.

The query returns the six (6) sets of real numbers that are the current amplitude test limits, relative to the power spectral density, for each offset.

Offset[n] n = 1 is base station and n = 2 is mobiles. The default is base station (1).

| | |
|-----------------------|---|
| Key Path | Meas Setup, Offset/Limits, Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[[:SENSE]:ACP:OFFSet[1] 2[:OUTer]:LIST:RPSDensity <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl></code> <code>[[:SENSE]:ACP:OFFSet[1] 2[:OUTer]:LIST:RPSDensity?</code> |
| Example | <code>ACP:OFFS2:LIST:RPSD 10,10,10,10,10,10</code> <code>ACP:OFFS2:LIST:RPSD?</code> |
| Notes | Offset sub op code. 1 for BTS, 2 for MS. Default is BTS. Note that Offset sub op code 2 is supported only in Non-SA modes. In the SA mode, Offset sub op code 1 is used for both BTS and MS. You must be in the mode that includes ACP measurements to use this command. Use <code>:INSTrument:SElect</code> to set the mode. |
| Preset | SA: -28.87 dB, -43.87 dB, 0 dB, 0 dB, 0 dB, 0 dB -28.87 dB, -43.87 dB, 0 dB, 0 dB, 0 dB, 0 dB WCDMA: -44.2 dB, -49.2 dB, -49.2 dB, -49.2 dB, -49.2 dB, -49.2 dB -32.2 dB, -42.2 dB, -42.2 dB C2K: 0 dB, 0 dB, 0 dB, 0 dB, 0 dB, 0 dB 0 dB, 0 dB, 0 dB, 0 dB, 0 dB, 0 dB WIMAX OFDMA: -25,-35,0,0,0,0 TD-SCDMA: -40 dB, -45 dB, -45 dB, -45 dB, -45 dB, -45 dB -33 dB, -43 dB, -43 dB, -43 dB, -43 dB, -43 dB 1xEVDO: -45, -55, -55, -55, -55 -45, -55, -55, -55, -55, -55 DVB-T/H: -60 dB, -60 dB, 0 dB, 0 dB, 0 dB, 0 dB -60 dB, -60 dB, 0 dB, 0 dB, 0 dB, 0 dB DTMB (CTTB): 50 dB, 50 dB, 50 dB, 50 dB, 50 dB, 50 dB 50 dB, 50 dB, 50 dB, 50 dB, 50 dB, 50 dB ISDB-T: -60 dB, -60 dB, 0 dB, 0 dB, 0 dB, 0 dB -60 dB, -60 dB, 0 dB, 0 dB, 0 dB, 0 dB CMMB: 50 dB, 50 dB, 50 dB, 50 dB, 50 dB, 50 dB 50 dB, 50 dB, 50 dB, 50 dB, 50 dB, 50 dB LTE, LTETDD, MSR, LTEAFDD, LTEATDD: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 Digital Cable TV: 50 dB, 50 dB, 50 dB, 50 dB, 50 dB, 50 dB 50 dB, 50dB, 50 dB, 50 dB, 50 dB, 50 dB |

| | |
|--------------------------|----------------------------|
| State Saved | Saved in instrument state. |
| Min | -150.0 dB |
| Max | 50.0 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.13.00 |

Fail Mask

Accesses a menu that enables you to select one of the logic keys for the fail conditions between the measurement results and the test limits. The setting defines the type of testing to be done at any custom offset frequencies. The measured powers are tested against the absolute values defined with `[:SENSe]:ACP:OFFSet[n][:OUTer]:LIST:ABSolute`, or the relative values defined with `[:SENSe]:ACP:OFFSet[n][:OUTer]:LIST:RPSDensity` and `[:SENSe]:ACP:OFFSet[n][:OUTer]:LIST:RCARrier`.

You can turn off (not use) specific offsets with the `[:SENSe]:ACP:OFFSet[n][:OUTer]:LIST:STATe` command.

- Absolute – Fail is shown if one of the absolute ACP measurement results is larger than the limit for Abs Limit.
- Relative – Fail is shown if one of the relative ACP measurement results is larger than the limit for Rel Lim (Car) or Rel Lim (PSD).
- Abs AND Rel – Fail is shown if one of the absolute ACP measurement results is larger than the limit for Abs Limit AND one of the relative ACP measurement results is larger than the limit for Rel Lim (Car) or Rel Lim (PSD).
- Abs OR Rel – Fail is shown if one of the absolute ACP measurement results is larger than the limit for Abs Limit OR one of the relative ACP measurement results is larger than the limit for Rel Lim (Car) or Rel Lim (PSD).

| | |
|----------------|--|
| Key Path | Meas Setup, Offset/Limits, Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTEFDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe]:ACPower:OFFSet[1] 2[:OUTer]:LIST:TEST ABSolute AND OR RELative, ABSolute AND OR RELative, ABSolute AND OR RELative, ABSolute AND OR RELative, ABSolute AND OR RELative</code> <code>[:SENSe]:ACPower:OFFSet[1] 2[:OUTer]:LIST:TEST?</code> |
| Example | <code>ACP:OFFS2:LIST:TEST ABS, ABS, ABS, ABS, ABS, ABS</code> <code>ACP:OFFS2:LIST:TEST?</code> |
| Notes | Offset sub op code. 1 for BTS, 2 for MS. Default is BTS. Note that Offset sub op code 2 is supported only in Non-SA modes. In the SA mode, Offset sub op code 1 is used for both BTS and MS. You must be in the mode that includes ACP measurements to use this command. Use <code>:INSTrument:SElect</code> to set the mode. |
| Couplings | None |

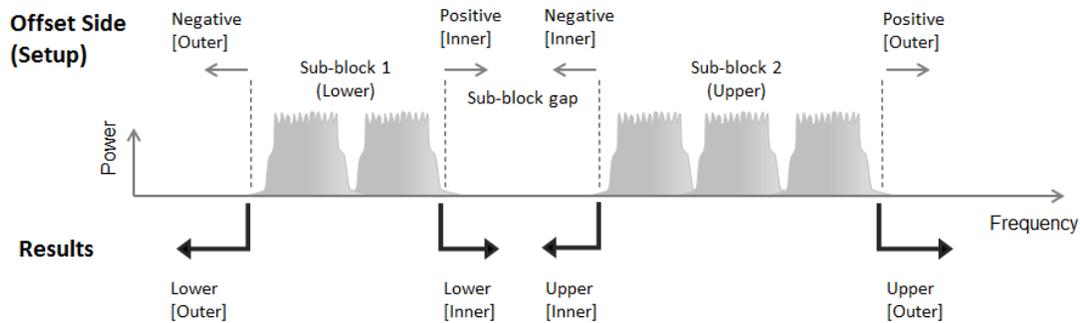
| | |
|-------------------------------------|--|
| | If current mode is DTMB (CTTB) or CMMB and current device type is Transmitter, the value from position 2 to position 4 are coupled, changing any one will change the others. |
| Preset | SA, WCDMA, C2K, TD-SCDMA: REL, REL, REL, REL, REL, REL REL, REL, REL, REL, REL, REL WIMAX OFDMA: REL, REL, REL, REL, REL, REL DVB-T/H: REL, REL, REL, REL, REL, REL DTMB (CTTB): OR,AND, AND,AND, REL, REL CDMA1xEVDO: REL, REL, ABS, REL, REL, REL REL, REL, ABS, REL, REL, REL ISDB-T : REL, REL, REL, REL, REL, REL CMMB : OR,AND, AND,AND, REL, REL LTE, LTETDD, MSR, LTEAFDD, LTEATDD: AND, AND, AND, AND, AND, AND AND, AND, AND, AND, AND, AND Digital Cable TV: REL, REL, REL, REL, REL, REL |
| State Saved | Saved in instrument state. |
| Range | Absolute Relative Abs AND Rel (fail if both fail) Abs OR Rel (fail if either fails) |
| Backwards Compatibility SCPI | [:SENSe] :MCPower :OFFSet [1] 2 :LIST :TEST |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.04.00, A13.00 |

Offset Side

Enables you to turn off (not use) specific offsets with [:SENSe]:ACPPower:OFFSet[1]|2[:Outer]:LIST:SIDE.

- NEGative - Negative (lower) sideband only
- BOTH - Both of the negative (lower) and positive (upper) sidebands
- POSitive - Positive (upper) sideband only

The figure below shows the relation between the negative/positive offset side setups and the upper/lower results in the MSR and LTE-Advanced FDD/TDD.



| | |
|----------|---|
| Key Path | Meas Setup, Offset/Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, LTE, LTETDD, |

| | |
|---------------------------------|--|
| | Digital Cable TV, MSR,LTEAFDD,LTEATDD |
| Remote Command | [[:SENSe]:ACPower:OFFSet[1] 2[:OUTer]:LIST:SIDE NEGative BOTH POSitive,NEGative BOTH POSitive,NEGative BOTH POSitive,NEGative BOTH POSitive,NEGative BOTH POSitive,NEGative BOTH POSitive [:SENSe]:ACPower:OFFSet[1] 2[:OUTer]:LIST:SIDE? |
| Example | ACP:OFFS:LIST:SIDE BOTH ACP:OFFS:LIST:SIDE? |
| Notes | OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DTMB (CTTB) mode, DVB-T/H mode, ISDB-T mode, CMMB mode, Digital Cable TV mode, 1xEVDO mode, WIMAX OFDMA mode, LTE mode, LTETDD ,LTEAFDD,LTEATDD or MSR mode to use this command. Use :INSTrument:SElect to set the mode. If you set POS or NEG in an offset, result of the inactive side will return -999. |
| Preset | BOTH, BOTH, BOTH, BOTH, BOTH, BOTH BOTH, BOTH, BOTH, BOTH, BOTH, BOTH |
| State Saved | Saved in instrument state. |
| Range | Neg Both Pos |
| Initial S/W Revision | A.03.00 |
| Modified at S/W Revision | A.13.00 |

Method for Offset

This key allows you to turn RRC filtering of each offset on or off. The value (roll off) for the filter will be set to the value of the Filter Alpha parameter.

| | |
|-----------------------|---|
| Key Path | Meas Setup, Offset/Limits |
| Mode | SA, WCDMA, WIMAX OFDMA,TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD,LTEATDD |
| Remote Command | [[:SENSe]:ACPower:OFFSet[1] 2[:OUTer]:LIST:FILTer[:RRC][:STATe] ON OFF 1 0, ON OFF 1 0 [:SENSe]:ACPower:OFFSet[1] 2[:OUTer]:LIST:FILTer[:RRC][:STATe]? |
| Example | ACP:OFFS:LIST:FILT 1,0,0 ACP:OFFS:LIST:FILT? |
| Notes | 1 ON = RRC Weighted, 0 OFF = Integ BW This parameter is not available for cdma2000 and 1xEVDO. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Preset | SA: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 WCDMA:1, 1, 1, 1, 1, 1 1, 1, 1, 1, 1, 1 C2K: NO WIMAX OFDMA: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 TD-SCDMA: 1, 1, 1, 1, 1, 1 1, 1, 1, 1, 1, 1 |

| | |
|--------------------------|--|
| | DVB-T/H: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 DTMB (CTTB): 1, 1, 1, 1, 1, 1 1, 1, 1, 1, 1, 1 ISDB-T: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 CMMB: 1, 1, 1, 1, 1, 1 1, 1, 1, 1, 1, 1 LTE: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 LTETDD: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 Digital Cable TV: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 MSR, LTEAFDD, LTEATDD: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 |
| State Saved | Saved in instrument state. |
| Range | Integ BW RRC Weighted |
| Initial S/W Revision | A.03.00 |
| Modified at S/W Revision | A.13.00 |

Method for Offset

This key allows you to turn RRC filtering of each offset on or off. The value (roll off) for the filter will be set to the value of the Filter Alpha parameter.

| | |
|----------------|--|
| Key Path | Meas Setup, Offset/Limits |
| Mode | SA, WCDMA, WIMAX OFDMA, TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | [[:SENSe]:ACPower:OFFSet [1] 2[:OUTer]:LIST:FILTer[:RRC] [:STATe] ON OFF 1 0, ON OFF 1 0, ON OFF 1 0, ON OFF 1 0, ON OFF 1 0, ON OFF 1 0 [:SENSe]:ACPower:OFFSet [1] 2[:OUTer]:LIST:FILTer[:RRC] [:STATe] ? |
| Example | ACP:OFFS:LIST:FILT 1,0,0 ACP:OFFS:LIST:FILT? |
| Notes | 1 ON = RRC Weighted, 0 OFF = Integ BW This parameter is not available for cdma2000 and 1xEVDO. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Preset | SA: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 WCDMA:1, 1, 1, 1, 1, 1 1, 1, 1, 1, 1, 1 C2K: NO WIMAX OFDMA: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 TD-SCDMA: 1, 1, 1, 1, 1, 1 1, 1, 1, 1, 1, 1 DVB-T/H: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 DTMB (CTTB): 1, 1, 1, 1, 1, 1 1, 1, 1, 1, 1, 1 ISDB-T: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 CMMB: 1, 1, 1, 1, 1, 1 1, 1, 1, 1, 1, 1 LTE: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 |

| | |
|--------------------------|--|
| | LTETDD: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 Digital Cable TV: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 MSR, LTEAFDD, LTEATDD: 0, 0, 0, 0, 0, 0 0, 0, 0, 0, 0, 0 |
| State Saved | Saved in instrument state. |
| Range | Integ BW RRC Weighted |
| Initial S/W Revision | A.03.00 |
| Modified at S/W Revision | A.13.00 |

Filter Alpha for Offset

Sets the alpha value for the RRC Filter for each offset.

| | |
|--------------------------|---|
| Key Path | Meas Setup, Offset/Limits, Method, RRC Weighted |
| Mode | SA, WCDMA, WIMAX OFDMA, TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe] :ACPower:OFFSet [1] 2 [:OUTer] :LIST:FILTer:ALPHa <real>, <real>, <real>, <real>, <real>, <real></code> <code>[:SENSe] :ACPower:OFFSet [1] 2 [:OUTer] :LIST:FILTer:ALPHa?</code> |
| Example | ACP:OFFS:LIST:FILT:ALPH 0.5, 0.5, 0.5, 0.5, 0.5, 0.5 ACP:OFFS:LIST:FILT:ALPH? |
| Notes | This parameter is not available for cdma2000 and 1xEVDO. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Preset | SA: 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 WCDMA: 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 WIMAX OFDMA: 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 C2K: NO TD-SCDMA: 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 DVB-T/H: 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 DTMB (CTTB): 0.05, 0.05, 0.05, 0.05, 0.05, 0.05 0.05, 0.05, 0.05, 0.05, 0.05, 0.05 ISDB-T: 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 CMMB: 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 LTE: 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 LTETDD: 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 Digital Cable TV: 0.15, 0.15, 0.15, 0.15, 0.15, 0.15 0.15, 0.15, 0.15, 0.15, 0.15, 0.15 MSR, LTEAFDD, LTEATDD: 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 0.22, 0.22, 0.22, 0.22, 0.22, 0.22 |
| State Saved | Saved in instrument state. |
| Min | 0.01 |
| Max | 1.00 |
| Initial S/W Revision | A.03.00 |
| Modified at S/W Revision | A.13.00 |

Offset Frequency Define

This key allows you to select “Offset” definition. Each standard defines each “Offset” from Carrier.

3GPP2 requires the “From Carrier Center to MeasBW Closer Edge” definition. LTE conformance test requires “From Carrier Edge to MeasBW Center” and/or “From Carrier Edge to MeasBW Closer Edge” definition.

- CTOCenter – From the center of the carrier closest to the adjacent channel to the center of the adjacent channel Offset Integ BW
- CTOEdge – From the center of the carrier closest to the adjacent channel to the edge of the closest adjacent channel Offset Integ BW
- ETOCenter – From Center Frequency - Carrier Spacing / 2 (for lower offset), Center Frequency + Carrier Spacing / 2 (for upper offset) of the carrier closest to the adjacent channel's to the center of the adjacent channel Offset Integ BW
- ETOEdge – From Center Frequency - Carrier Spacing / 2 (for lower offset), Center Frequency + Carrier Spacing / 2 (for upper offset) of the carrier closest to the adjacent channel's to the edge of the closest adjacent channel Offset Integ BW

| | |
|--------------------------|---|
| Key Path | Meas Setup, Offset/Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTEFDD, Digital Cable TV, MSR,LTEAFDD,LTEATDD |
| Remote Command | [[:SENSe]:ACPower:OFFSet[1] 2[:OUTer]:TYPE CTOCenter CTOEdge ETOCenter ETOEdge [:SENSe]:ACPower:OFFSet[1] 2[:OUTer]:TYPE? |
| Example | ACP:OFFS:TYPE ETOC ACP:OFFS:TYPE? |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Preset | All Except C2K and 1xEVDO: CTOCenter C2K and 1xEVDO: CTOEdge |
| State Saved | Saved in instrument state. |
| Range | Carrier Center To Meas BW Center Carrier Center To Meas BW Edge Carrier Edge To Meas BW Center Carrier Edge To Meas BW Edge |
| Initial S/W Revision | A.03.00 |
| Modified at S/W Revision | A.13.00 |

Carrier Result

Allows you to view and scroll through the carrier power results.

| | |
|----------|------------|
| Key Path | Meas Setup |
|----------|------------|

| | |
|--------------------------|--|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Couplings | This key will be grayed out if there is only one carrier. |
| Preset | 1 |
| State Saved | No |
| Min | 1 |
| Max | Number of carriers. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

PhNoise Opt

Selects the LO (local oscillator) phase noise behavior for various operating conditions.

| | |
|----------------------|------------------|
| Key Path | Meas Setup |
| Initial S/W Revision | Prior to A.02.00 |

PhNoise Opt Auto

Selects the best LO (local oscillator) phase noise behavior for the ACP measurement.

| | |
|--------------------------|--|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :ACPpower:FREQuency:SYNThesis:AUTO [:STATe] OFF ON 0 1 [:SENSe] :ACPpower:FREQuency:SYNThesis:AUTO [:STATe] ? |
| Example | ACP:FREQ:SYNT:AUTO 1 ACP:FREQ:SYNT:AUTO? |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | Auto Man |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.04.00 |

PhNoise Opt State

Selects the LO (local oscillator) phase noise behavior for various operating conditions.

| | |
|----------|------------|
| Key Path | Meas Setup |
|----------|------------|

| | |
|--------------------------|--|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :ACPpower:FREQuency:SYNTHeSis [:STATe] 1 2 3 [:SENSe] :ACPpower:FREQuency:SYNTHeSis [:STATe] ? |
| Example | ACP:FREQ:SYNT 1 ACP:FREQ:SYNT? |
| Notes | Parameter key: 1 - optimizes phase noise for close-in from the carrier. 2 - optimizes phase noise for wide-offset from the carrier. 3 - optimizes LO for tuning speed. |
| Couplings | Best Close-in Φ Noise The frequency below which the phase noise is optimized is model dependent: PXA with option EP1: [offset <140 kHz] Models with option EP2: [offset <70 kHz] CXA with option EP4: [offset <90 kHz] CXA without option EP4: n/a All other models: [offset <20 kHz] Best Wide-offset Φ Noise The frequency below which the phase noise is optimized is model dependent: PXA with option EP1: [offset >160 kHz] Models with option EP2: [offset >100 kHz] CXA with option EP4: [offset >130 kHz] CXA without option EP4: n/a All other models: [offset >30 kHz] Fast Tuning The Fast Tuning details are model dependent: CXA without option EP4: n/a PXA with option EP1: [single loop] Models with option EP2: [medium loop bandwidth] All other models: [same as Close-in] |
| Preset | Because this function is in Auto after preset, the state of this function after Preset will be automatically calculated. |
| State Saved | Saved in instrument state. |
| Range | Best Close-in Φ Noise [offset < 140 kHz] Best Wide-offset Φ Noise [offset > 160 kHz] Fast Tuning [same as Close-in] [] is model dependent. See Couplings for details. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.04.00 |

Meas Type

Changes the reference used for the measurement. This allows you to make absolute and relative power measurements of either total power or the power normalized to the measurement bandwidth.

Total Pwr Ref (TPR) sets the reference to the total carrier power. PSD Ref (PSDR) sets the reference to the power spectral density of the carrier.

| | |
|--------------------------|--|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe] :ACPower:TYPE TPref PSDRef</code> <code>[:SENSe] :ACPower:TYPE?</code> |
| Example | ACP:TYPE PSDR ACP:TYPE? |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Preset | TPRef |
| State Saved | Saved in instrument state. |
| Range | Total Power Ref PSD Ref |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

PSD Ref

Sets the unit bandwidth for Power Spectral Density. The available units are dBm/Hz and dBm/MHz.

| | |
|--------------------------|--|
| Key Path | Meas Setup |
| Mode | A, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>:UNIT:ACPower:POWer:PSD DBMHZ DBMMHZ</code> <code>:UNIT:ACPower:POWer:PSD?</code> |
| Example | UNIT:ACP:POW:PSD DBMMHZ UNIT:ACP:POW:PSD? |
| Couplings | When the PSD unit is changed, the PSD reference result of the "MEAS READ FETCH:ACP[n]?" is also changed by the PSD unit basis (in either dBm/Hz or dBm/MHz). |
| Preset | DBMHZ |
| State Saved | Saved in instrument state. |
| Range | dBm/Hz dBm/MHz |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Limit Test

Turns limit checking for each offset On or Off. The limits may be specified within the Offset menu, for each offset, both sides of the carrier. For results that fail the limit, a red F is appended. In the Combined view, the bar turns red.

| | |
|-------------------------------------|--|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:ACPower:LIMit:STATe OFF ON 0 1 :CALCulate:ACPower:LIMit:STATe? |
| Example | CALC:ACP:LIM:STAT OFF CALC:ACP:LIM:STAT? |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTRument:SElect to set the mode. |
| Preset | SA: OFF WCDMA: ON C2K: ON WIMAX OFDMA: OFF TD-SCDMA: ON 1xEVDO: ON DVB-T/H: OFF DTMB (CTTB): ON ISDB-T: OFF CMMB: ON LTE, LTETDD, MSR, LTEAFDD, LTEATDD: ON Digital Cable TV: OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Backwards Compatibility SCPI | [:SENSe] :MCPower :LIMit [:STATe] [:SENSe] :ACPower :LIMit [:STATe] |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Noise Correction

Sets the measurement noise floor correction function to On or Off. On enables measurement noise correction when the measured power in the reference channel or any offset is close to the noise floor of the analyzer. Off turns these corrections off.

In analyzers with the noise floor extensions option (option NFE) enabled, there are two ways to compensate for the analyzer noise floor: through the NFE and through this noise corrections key. The techniques are results are similar but not identical. NFE uses a model of the analyzer noise floor, adapted

to the current conditions such as center frequency, RBW and ambient temperature. The parameters of this model are measured in the factory or field calibration in a highly averaged measurement. So they are consistent. However, because the model is imperfect, the corrections are imperfect. Using NFE is very convenient; the user need not wait for the ACP noise corrections calibration to occur. The ACP NC calibration, though, has advantages of being measured very recently, at the current ambient, and the exact center frequency, with no requirement that the model be perfect. So it will often (but not always) have slightly better dynamic range. If both ACP NC is turned on and NFE is turned on, the analyzer uses only the ACP NC. When ACP NC is turned off but NFE is on, NFE is used and performance should still be excellent.

| Key Path | Meas Setup |
|--------------------------|---|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe] :ACPpower:CORRection:NOISe [:AUTO] OFF ON 0 1</code> <code>[:SENSe] :ACPpower:CORRection:NOISe [:AUTO] ?</code> |
| Example | ACP:CORR:NOIS OFF ACP:CORR:NOIS? |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Dependencies | This parameter is unavailable when Meas Method is set to RBW or Fast. |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.04.00 |

Meas Preset

Restores all the measurement parameters to their default values.

| Key Path | Meas Setup |
|--------------------------|--|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>:CONFIgure:ACPpower</code> |
| Example | CONF:ACP |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | Selecting Meas Preset will restore all measurement parameters to their default values. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Offset RRC Weighting (Backward Compatibility SCPI)

| | |
|-------------------------------------|---|
| Mode | SA, WCDMA, TD-SCDMA, WIMAX OFDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD,LTEATDD |
| Remote Command | <code>[:SENSe] :ACPower:FILTer [:RRC] [:STATe] OFF ON 0 1</code> <code>[:SENSe] :ACPower:FILTer [:RRC] [:STATe] ?</code> |
| Example | ACP:FILT OFF ACP:FILT? |
| Notes | This parameter is not available for cdma2000 and 1xEVDO The backwards Compatibility SCPI command, <code>[:SENSe] :ACPR:FILTer [:RRC] [:STATe]</code> , is provided to support same functionality as <code>[:SENSe] :ACPr:FILTer [:RRC] [:STATe]</code> (PSA W-CDMA, PSA cdma2000 and PSA 1xEVDO) due to ACPr node conflicts with ACPower node. You must be in the mode that includes ACP measurements to use this command. Use <code>:INSTrument:SElect</code> to set the mode. |
| Couplings | This command is an alias to <code>[:SENSe] :ACPower:OFFSet [1] 2 :LIST:FILTer [:RRC] [:STATe]</code> Sending the commands to set values of all offsets for BS and MS, however, sending the query always return a value of BS Offset A. |
| Preset | SA, WIMAX OFDMA, LTE, LTETDD, MSR: OFF WCDMA: ON C2K: NO TD-SCDMA: ON DVB-T/H: OFF DTMB (CTTB):ON ISDB-T: OFF CMMB: OFF Digital Cable TV: ON LTEAFDD,LTEATDD: OFF |
| State Saved | Saved in instrument state. |
| Backwards Compatibility SCPI | <code>[:SENSe] :ACPR:FILTer [:RRC] [:STATe]</code> <code>[:SENSe] :MCPower:FILTer [:RRC] [:STATe]</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Offset Filter Alpha (Backward Compatibility SCPI)

| | |
|-----------------------|---|
| Mode | SA, WCDMA, WIMAX OFDMA, TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD,LTEATDD |
| Remote Command | <code>[:SENSe] :ACPower:FILTer [:RRC] :ALPHa <real></code> <code>[:SENSe] :ACPower:FILTer [:RRC] :ALPHa ?</code> |

| | |
|-------------------------------------|---|
| Example | ACP:FILT:ALPH 0.5 ACP:FILT:ALPH? |
| Notes | This parameter is not available for cdma2000 and 1xEVDO The backwards Compatibility SCPI command, [:SENSe]:ACPR:FILTer[:RRC]:ALPHa, is provided to support same functionality as [:SENSe]:ACPr:FILTer[:RRC]:ALPHa (PSA W-CDMA, PSA cdma2000 and PSA 1xEVDO) due to ACPr node conflicts with ACPower node. You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | This command is an alias to [:SENSe]:ACPower:OFFSet[1]2:LIST:FILTer:ALPHa Sending the commands to set values of all offsets for BS and MS, however, sending the query always return a value of BS Offset A. |
| Preset | SA, WCDMA, WIMAX OFDMA, TD-SCDMA, DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, MSR: 0.22 C2K: NO DTMB (CTTB): 0.05 Digital Cable TV: 0.15 LTEAFDD,LTEATDD: 0.22 |
| State Saved | Saved in instrument state. |
| Min | 0.01 |
| Max | 1.00 |
| Backwards Compatibility SCPI | [:SENSe]:ACPR:FILTer[:RRC]:ALPHa [:SENSe]:MCPower:FILTer[:RRC]:ALPHa |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Method for Carrier (Backward Compatibility SCPI)

| | |
|-----------------------|---|
| Mode | SA, WCDMA, WIMAX OFDMA, TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR |
| Remote Command | [:SENSe]:ACPower:CARRier[1]2:LIST:METHod IBW RRC, ... [:SENSe]:ACPower:CARRier[1]2:LIST:METHod? |
| Example | ACP:CARR2:LIST:METH RRC ACP:CARR2:LIST:METH? |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. Maximum of Array length depends on the number of carriers. |
| Couplings | This command is an alias to [:SENSe]:ACPower:CARRier[1]2:LIST:FILTer[:RRC]:[STATe] The enum value translates as follows: RRC Weighted = 1 ON |

| | |
|--------------------------|---|
| | Integ BW = 0 OFF Maximum of Array length depends on the number of carriers. |
| Preset | SA: IBW WCDMA: RRC WIMAX OFDMA: IBW TD-SCDMA: RRC DVB-T/H: IBW DTMB (CTTB): RRC ISDB-T: IBW CMMB: IBW LTE, MSR: IBW LTETDD: IBW Digital Cable TV: RRC |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Mode

See "Mode" on page 288

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings
- See "[How-To Preset](#)" on page 705 for more information.

| | |
|--------------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :SYSTem:PRESet |
| Example | :SYST:PRES |
| Notes | *RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0. |
| Couplings | A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set. |
| Backwards Compatibility Notes | In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using |

| | |
|----------------------|------------------|
| | User Preset. |
| Initial S/W Revision | Prior to A.02.00 |

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

| Type Of Preset | SCPI Command | Front Panel Access |
|--------------------------------|--|--|
| Auto Couple | :COUPlE ALL | Auto Couple front-panel key |
| Meas Preset | :CONFIgure:<Measurement> | Meas Setup Menu |
| Mode Preset | :SYSTem:PRESet | Mode Preset (green key) |
| Restore Mode Defaults | :INSTrument:DEFault | Mode Setup Menu |
| Restore All Mode Defaults | :SYSTem:DEFault MODEs | System Menu; Restore System Default Menu |
| *RST | *RST | not possible (Mode Preset with Single) |
| Restore Input/Output Defaults | :SYSTem:DEFault INPut | System Menu; Restore System Default Menu |
| Restore Power On Defaults | :SYSTem:DEFault PON | System Menu; Restore System Default Menu |
| Restore Alignment Defaults | :SYSTem:DEFault ALIGn | System Menu; Restore System Default Menu |
| Restore Miscellaneous Defaults | :SYSTem:DEFault MISC | System Menu; Restore System Default Menu |
| Restore All System Defaults | :SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent | System Menu; Restore System Default Menu |
| User Preset | :SYSTem:PRESet:USER | User Preset Menu |
| User Preset All Modes | :SYSTem:PRESet:USER:ALL | User Preset Menu |

| | | |
|----------------------|-----------------------|-------------|
| Power On Mode Preset | :SYSTem:PON:TYPE MODE | System Menu |
| Power On User Preset | :SYSTem:PON:TYPE USER | System Menu |
| Power On Last State | :SYSTem:PON:TYPE LAST | System Menu |

Preset Type (Remote Command Only)

As stated in the Backward Compatibility section, to be compatible with ESA/PSA the PRESet:TYPE command will be implemented as a no-op.

| | |
|-----------------------------|--|
| Mode | All |
| Remote Command | :SYSTem:PRESet:TYPE FACTory MODE USER :SYSTem:PRESet:TYPE? |
| Example | :SYST:PRESet:TYPE FACT |
| Notes | This command is supported for backward compatibility only. It is a no-op which does not change the behavior of any preset operation. |
| Preset | This is unaffected by Preset but is set to Mode on a "Restore System Defaults->All" |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Mode Setup

See ["Mode Setup" on page 320](#)

Peak Search

Places the selected marker on the trace point with the maximum y-axis value.

| | |
|---------------------------------|--|
| Key Path | Peak Search |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD,LTEATDD |
| Remote Command | :CALCulate:ACPower:MARKer[1] 2 ... 12:MAXimum |
| Example | CALC:ACP:MARK2:MAX |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Next Peak

Moves the selected marker to the peak that has the next highest amplitude.

| | |
|---------------------------------|--|
| Key Path | Peak Search |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD,LTEATDD |
| Remote Command | :CALCulate:ACPower:MARKer[1] 2 ... 12:MAXimum:NEXT |
| Example | CALC:ACP:MARK2:MAX:NEXT |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Next Pk Right

Moves the selected marker to the nearest peak to the right of the current marker that meets all enabled peak criteria.

| | |
|---------------------------------|--|
| Key Path | Peak Search |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD,LTEATDD |
| Remote Command | :CALCulate:ACPower:MARKer[1] 2 ... 12:MAXimum:RIGHT |
| Example | CALC:ACP:MARK2:MAX:RIGH |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Next Pk Left

Moves the selected marker to the nearest peak to the left of the current marker that meets all enabled peak criteria.

| | |
|--------------------------|--|
| Key Path | Peak Search |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:ACPower:MARKer [1] 2 . . . 12:MAXimum:LEFT |
| Example | CALC:ACP:MARK2:MAX:LEFT |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Marker Delta

Sets the control mode for the selected marker to Delta mode.

See Marker Delta in the "Marker Functions" section for more information.

| | |
|----------------------|------------------|
| Key Path | Peak Search |
| Initial S/W Revision | Prior to A.02.00 |

Pk-Pk Search

Finds and displays the amplitude and frequency (or time, if in zero span) differences between the highest and lowest y-axis value.

| | |
|--------------------------|--|
| Key Path | Peak Search |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:ACPower:MARKer [1] 2 . . . 12:PTPeak |
| Example | CALC:ACP:MARK:PTP |
| Notes | Turns on the Marker Δ active function. |
| Couplings | This key is not available (key is grayed out) when Coupled Markers is on. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Min Search

Moves the selected marker to the minimum y-axis value on the current trace.

| | |
|---------------------------------|---|
| Key Path | Peak Search |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTEFDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:ACPower:MARKer[1] 2 ... 12:MINimum |
| Example | CALC:ACP:MARK:MIN |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Print

See "Print" on page 348

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

| Type | Default Prefix | Menu |
|-----------------------|----------------|-----------------|
| State | State_ | (Save/Recall) |
| Trace + State | State_ | (Save/Recall) |
| Screen | Screen_ | (Save/Recall) |
| Amplitude Corrections | Ampcor_ | (Import/Export) |
| Traces | Trace_ | (Import/Export) |
| Limit Lines | LLine_ | (Import/Export) |
| Measurement Result | MeasR_ | (Import/Export) |
| Capture Buffer | CapBuf_ | (Import/Export) |

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE

Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE

If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

| | |
|----------------------|--|
| Key Path | Front-panel key |
| Notes | No remote command for this key specifically. |
| Initial S/W Revision | Prior to A.02.00 |

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

| Key Path | Front-panel key |
|-------------------------------|--|
| Notes | <p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATE <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p> |
| Backwards Compatibility Notes | <p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, "state" always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> |
| Backwards Compatibility Notes | <p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p> |
| Initial S/W Revision | Prior to A.02.00 |

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See ["More Information" on page 716](#).

| | |
|-----------------------|--|
| Key Path | Recall |
| Mode | All |
| Remote Command | :MMEMory:LOAD:STATe <filename> |
| Example | :MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path |
| Example | MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state. |
| Notes | <p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <ul style="list-style-type: none"> • If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number. <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p> |

| | |
|-------------------------------------|---|
| | there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu. |
| Backwards Compatibility SCPI | :MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

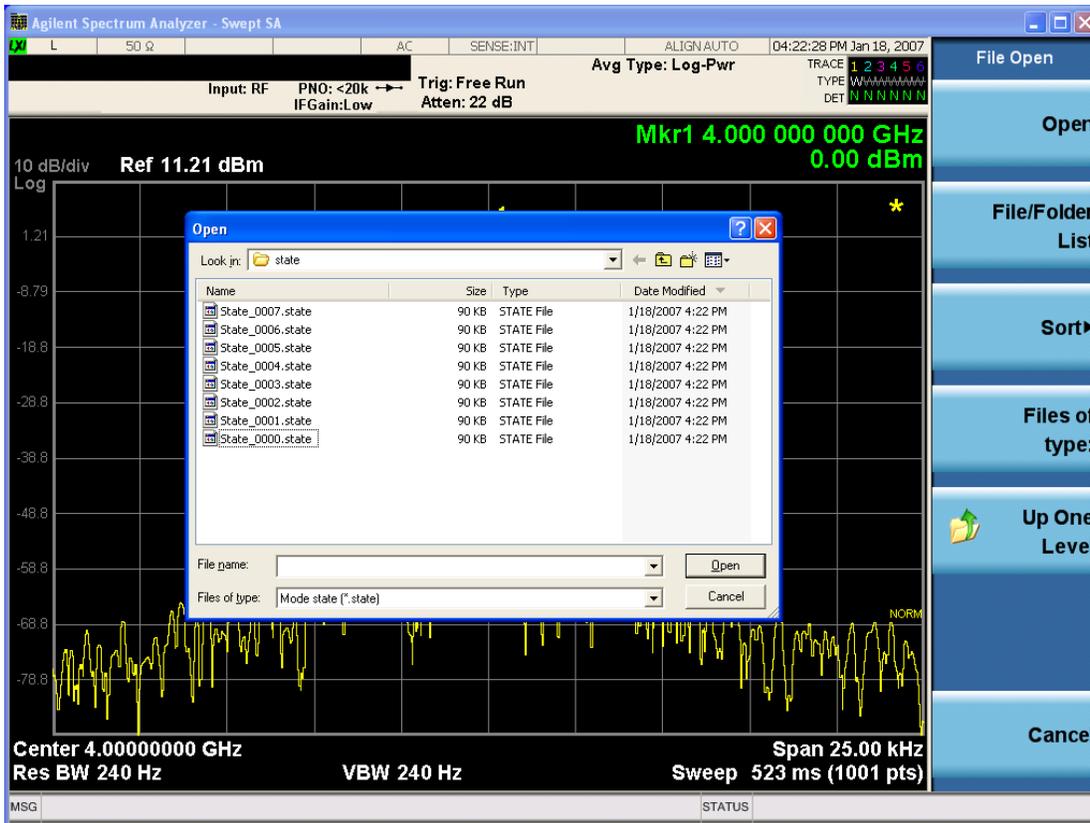
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

| | | |
|---|--|--|
| You want to recall state and one trace's data, leaving other traces unaffected. | Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed. | On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed. |
| You want to recall all traces | Save Trace+State from ALL traces. | On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved) |
| You want all traces to load exactly as they were when saved. | Save State | On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten. |

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Notes | Brings up the Open dialog for recalling a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Mode | All |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available" |
| Initial S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|--|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|---|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1-16 from front panel, 1-128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Data (Import)

Importing a data file loads data that was previously saved from the current measurement or from other measurements and/or modes that produce compatible data files. The Import Menu only contains Data Types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by the user prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Importing Data loads measurement data from the specified file into the specified or default destination, depending on the data type selected. Selecting an Import Data menu key will not actually cause the importing to occur, since the analyzer still needs to know from where to get the data. Pressing the Open key in this menu brings up the Open dialog and Open menu that provides you with the options from where to recall the data. Once a filename has been selected or entered in the Open menu, the recall occurs as soon as the Open button is pressed.

| | |
|----------------------|--|
| Key Path | Recall |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. Some keys will be missing completely, so the key locations in the sub-menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:LOAD commands. |
| Dependencies | If a file type is not used by a certain measurement, it is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Capture Buffer

The captured data is raw data which is not processed.

| | |
|----------------------|---|
| Key Path | Recall, Data |
| Mode | TD-SCDMA |
| Example | MMEM:LOAD:CAPT "MyCaptureData.bin" This loads the file of capture data (on the default file directory path) into the instrument. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Open...

When you press "Open", the analyzer brings up a Windows dialog and a menu entitled "**File Open.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[From File...](#)" on page 2309 in Recall, State, for a full description of this dialog and menu.

| | |
|----------------------|--|
| Key Path | Recall, Data |
| Notes | The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 722

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate[:IMMEDIATE] :INITiate:RESTART |
| Example | :INIT:IMM :INIT:REST |
| Notes | :INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function. |
| Couplings | Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement. |
| Status Bits/OPC dependencies | This is an Overlapped command. The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUESTionable register bit 9 (INTEgrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set. |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command `CALC:AVER:TCON UP`.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Mode | All |
| Notes | No remote command for this key specifically, but the :MMEM:STOR:STATe <filename> command is available for specific file types. An example is :MMEM:STOR:STATe <filename>. |
| Initial S/W Revision | Prior to A.02.00 |

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

| | |
|----------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:STATe <filename> |
| Example | MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory. |
| Notes | Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key |

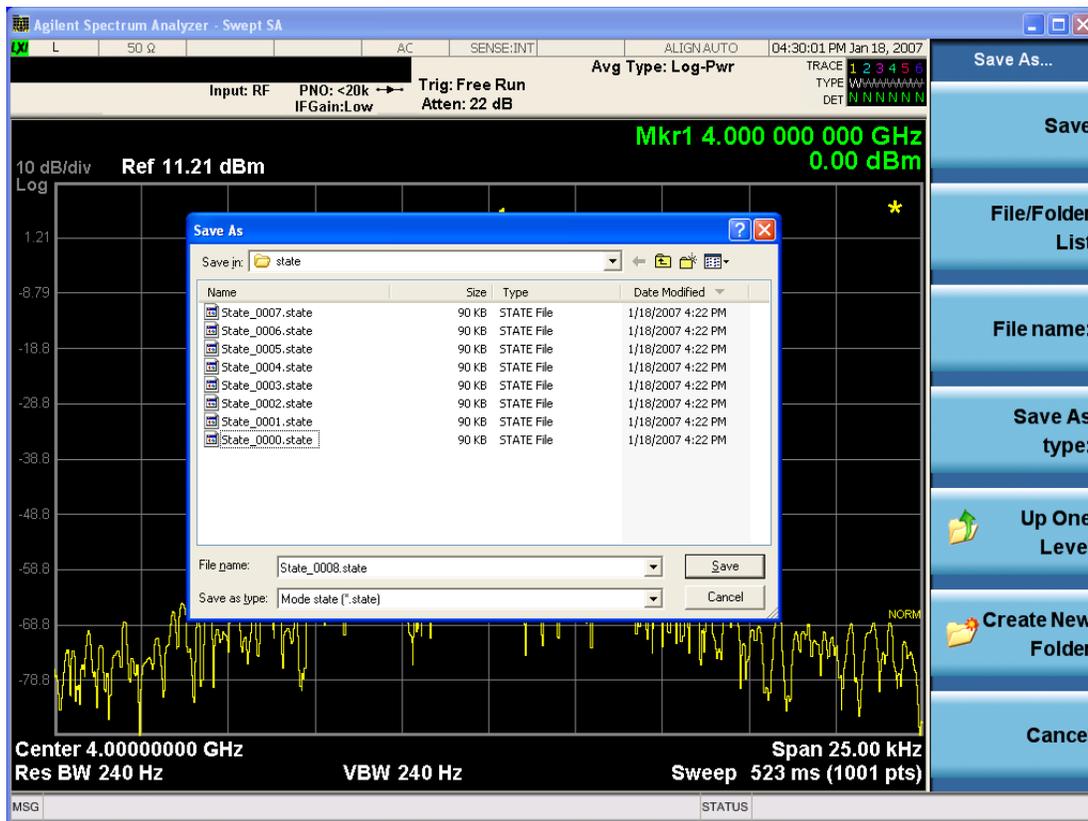
update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

| | |
|-------------------------------------|-----------------------------------|
| Backwards Compatibility SCPI | :MMEMoRY:STORe:STATe 1,<filename> |
| Initial S/W Revision | Prior to A.02.00 |

For backwards compatibility, the above syntax is supported. The "1" is simply ignored. The command is sequential.

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2305](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Save, State |
| Mode | All |
| Notes | Brings up Save As dialog for saving a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 727](#)

| | |
|-----------------------|---|
| Key Path | Save, State |
| Mode | All |
| Remote Command | :MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number> |
| Example | :MMEM:REG:STAT:LAB 1,"my label" |
| Notes | <reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,"" |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available" |
| Preset | The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc" |
| Initial S/W Revision | A.11.00 |

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

| | |
|----------------------|---|
| Key Path | Save |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands. |
| Dependencies | If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Measurement Results

Pressing this key selects Meas Results as the data type to be exported.

The Meas Results file contains information which describes the current state of the analyzer. It is detailed in Meas Result File Contents below.

| | |
|-------------------------------------|---|
| Key Path | Save, Data |
| Remote Command | :MMEMory:STORe:RESults <string> |
| Example | :MMEM:STOR:RES "MeasR_0000.csv" |
| Notes | <p>If the save is initiated via SCPI and the file already exists, the file will be overwritten.</p> <p>The SCPI command exports ACP measurement results to the file specified as the parameter in the current path. The default path is My Documents\<current mode>\data\ACP\results.</p> <p>Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.</p> <p>The SCPI parameter is a quoted string that specifies the filename. Both single and double quotes are supported for any filename parameter over SCPI.</p> |
| Dependencies | The current active measurement must be the ACP measurement to use this command. |
| Status Bits/OPC dependencies | Sequential – waits for the previous measurement to complete |
| Initial S/W Revision | Prior to A.02.00 |

Meas Results File Contents

A Meas Results File contains measurement results with the following information.

- File ID string, which is "MeasResult"
- Measurement ID following Mode ID, which is "SA:ACP" for example.
- Firmware rev and model number
- Option string
- Auto Scaling
- Auto Sweep Time Rules
- Automatic Trigger Time
- Automatic Trigger Time State
- Average Mode
- Average Number
- Average State
- Bar Graph
- Carrier Coupling
- Carrier Pwr Present

- Carrier Spacing
- Carriers
- Center Frequency
- Center Frequency Step
- Center Frequency Step State
- Detector Auto
- Detector Selection
- Electrical Atten
- Electrical Atten State
- External Array Trigger Delay
- External Array Trigger Delay State
- External Array Trigger Level
- External Array Trigger Slope
- Filter Alpha
- Filter BW
- Filter Type
- Internal Preamp
- Internal Preamp Band
- Limit Test
- Line Trigger Delay
- Line Trigger Delay State
- Line Trigger Slope
- Meas Method
- Meas Type
- Measurement Noise Bandwidth
- Mechanical Atten
- MechanicalAttenStepEnum
- Method
- Noise Correction
- Offset Abs Limit
- Offset Fail

- Offset Filter Alpha
- Offset Filter BW
- Offset Filter Type
- Offset Freq
- Offset Freq State
- Offset Integ BW
- Offset Method
- Offset Rel Lim (Car)
- Offset Rel Lim (PSD)
- Offset Res BW
- Offset Res BW Mode
- Offset Video BW
- Offset Video BW Mode
- Periodic Timer Period
- Periodic Timer Sync Source
- Periodic Timer Trigger Delay
- Periodic Timer Trigger Delay State
- Points
- Power Ref
- Power Ref State
- Preselector Adjust
- PSD Ref
- PSD Unit
- Ref Car Freq
- Ref Car Freq State
- Ref Carrier
- Ref Carrier Mode
- Ref Position
- Ref Value
- Res BW
- Res BW Mode

- RFBurst Trigger Delay
- RFBurst Trigger Delay State
- RFBurst Trigger Level Abs
- RFBurst Trigger Level Rel
- RFBurst Trigger Level Type
- RFBurst Trigger Slope
- Scale/Div
- Span
- Sweep Time
- Sweep Time Auto
- Trigger Holdoff
- Trigger Holdoff State
- Trigger Source
- Video BW
- Video BW Auto

The file contains these data followed by MeasResult1, MeasResult2, and MeasResult3 that flag the start of the measurement results. Each line of Measurement Results consists of three comma separated values, MeasResult1 value, MeasResult2 value, and MeasResult3 value. MeasResult1 contains the same result as MEAS/READ/FETCH:ACPower1; MeasResult2, MEAS/READ/FETCH:ACPower2; MeasResult3, MEAS/READ/FETCH:ACPower3.

Exported file is .csv file. The Meas Results file, when imported into Excel, will show the following data:

| MeasResult | |
|-------------|--------|
| SA:ACP | |
| A.10.53 | N9030A |
| 526 ALV ATP | 1 |
| B1X B1Y B25 | |
| B40 BBA CR3 | |
| CRP DCF DDA | |
| DP2 DRD EA3 | |
| EDP EMC EP1 | |
| ERC ESC ESP | |
| EXM FSA LFE | |
| LNP MAT MPB | |
| NFE NUL P26 | |
| PFR PNC RTL | |
| RTS S40 SB1 | |
| SEC SM1 TVT | |
| YAS YAV | |

| | | | | | | | | | | | | | |
|------------------------------------|-------------|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Auto Scaling | TRUE | | | | | | | | | | | | |
| Auto Sweep Time Rules | Accy | | | | | | | | | | | | |
| Automatic Trigger Time | 0.1 | | | | | | | | | | | | |
| Automatic Trigger Time State | FALSE | | | | | | | | | | | | |
| Average Mode | Exponential | | | | | | | | | | | | |
| Average Number | 10 | | | | | | | | | | | | |
| Average State | TRUE | | | | | | | | | | | | |
| Bar Graph | TRUE | | | | | | | | | | | | |
| Carrier Coupling | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE |
| Carrier Pwr Present | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Carrier Spacing | 5000000 | 500000 | 500000 | 500000 | 500000 | 500000 | 500000 | 500000 | 500000 | 500000 | 500000 | 500000 | 500000 |
| Carriers | 1 | | | | | | | | | | | | |
| Center Frequency | 1.33E+10 | | | | | | | | | | | | |
| Center Frequency Step | 800000 | | | | | | | | | | | | |
| Center Frequency Step State | TRUE | | | | | | | | | | | | |
| Detector Auto | TRUE | | | | | | | | | | | | |
| Detector Selection | Average | | | | | | | | | | | | |
| Electrical Atten | 0 | | | | | | | | | | | | |
| Electrical Atten State | FALSE | | | | | | | | | | | | |
| External Array Trigger Delay | 1.00E-06 | 1.00E-06 | | | | | | | | | | | |
| External Array Trigger Delay State | FALSE | FALSE | | | | | | | | | | | |
| External Array Trigger Level | 1.2 | 1.2 | | | | | | | | | | | |

| | | | | | | | | | | | | |
|------------------------------|----------|----------|----------|----------|----------|----------|--------|--------|--------|--------|--------|--------|
| External Array Trigger Slope | Positive | Positive | | | | | | | | | | |
| Filter Alpha | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 |
| Filter BW | Minus3dB | | | | | | | | | | | |
| Filter Type | Gaussian | | | | | | | | | | | |
| Internal Preamp | FALSE | | | | | | | | | | | |
| Internal Preamp Band | Low | | | | | | | | | | | |
| Limit Test | FALSE | | | | | | | | | | | |
| Line Trigger Delay | 1.00E-06 | | | | | | | | | | | |
| Line Trigger Delay State | FALSE | | | | | | | | | | | |
| Line Trigger Slope | Positive | | | | | | | | | | | |
| Meas Method | IbwSpeed | | | | | | | | | | | |
| Meas Type | TPRef | | | | | | | | | | | |
| Measurement Noise Bandwidth | 2000000 | 2000000 | 200000 | 200000 | 200000 | 200000 | 200000 | 200000 | 200000 | 200000 | 200000 | 200000 |
| Mechanical Atten | 10 | | | | | | | | | | | |
| MechanicalAttenStepEnum | S2dB | | | | | | | | | | | |
| Method | IBW | IBW | IBW | IBW | IBW | IBW | IBW | IBW | IBW | IBW | IBW | IBW |
| Noise Correction | FALSE | | | | | | | | | | | |
| Offset Abs Limit | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | |
| Offset Fail | Relative | Relative | Relative | Relative | Relative | Relative | | | | | | |
| Offset Filter Alpha | 0.22 | | | | | | | | | | | |
| Offset Filter BW | Minus3dB | Minus3dB | Minus3dB | Minus3dB | Minus3dB | Minus3dB | | | | | | |
| Offset Filter Type | Gaussian | Gaussian | Gaussian | Gaussian | Gaussian | Gaussian | | | | | | |
| Offset Freq | 3000000 | 0 | 0 | 0 | 0 | 0 | | | | | | |

| | | | | | | |
|------------------------------------|-------------------|----------|---------|---------|---------|---------|
| Offset Freq State | TRUE | FALSE | FAL SE | FAL SE | FAL SE | FAL SE |
| Offset Integ BW | 2000000 | 2000 000 | 200 000 | 200 000 | 200 000 | 200 000 |
| Offset Method | FALSE | | | | | |
| Offset Rel Lim (Car) | -45 | -60 | 0 | 0 | 0 | 0 |
| Offset Rel Lim (PSD) | -28.87 | - 43.87 | 0 | 0 | 0 | 0 |
| Offset Res BW | 220000 | 2200 00 | 220 000 | 220 000 | 220 000 | 220 000 |
| Offset Res BW Mode | TRUE | TRUE | TRU E | TRU E | TRU E | TRU E |
| Offset Video BW | 22000 | 2200 0 | 220 00 | 220 00 | 220 00 | 220 00 |
| Offset Video BW Mode | TRUE | TRUE | TRU E | TRU E | TRU E | TRU E |
| Periodic Timer Period | 0.02 | | | | | |
| Periodic Timer Sync Source | None | | | | | |
| Periodic Timer Trigger Delay | 1.00E-06 | | | | | |
| Periodic Timer Trigger Delay State | FALSE | | | | | |
| Points | 1001 | | | | | |
| Power Ref | -76.81 dBm | | | | | |
| Power Ref State | On | | | | | |
| Preselector Adjust | 0 | | | | | |
| PSD Ref | -139.82 dBm/Hz | | | | | |
| PSD Unit | DbmHz | | | | | |
| Ref Car Freq | 13.25500 0000 GHz | | | | | |
| Ref Car Freq State | On | | | | | |
| Ref Carrier | 1 | | | | | |

| | | |
|-----------------------------|---------------------------|---------------|
| Ref Carrier Mode | On | |
| Ref Position | Top | |
| Ref Value | -30 | |
| Res BW | 220000 | |
| Res BW Mode | FALSE | |
| RFBurst Trigger Delay | 1.00E-06 | |
| RFBurst Trigger Delay State | FALSE | |
| RFBurst Trigger Level Abs | -20 | |
| RFBurst Trigger Level Rel | -6 | |
| RFBurst Trigger Level Type | Absolute | |
| RFBurst Trigger Slope | Positive | |
| Scale/Div | 10 | |
| Span | 8000000 | |
| Sweep Time | 0.02 | |
| Sweep Time Auto | TRUE | |
| Trigger Holdoff | 0.1 | |
| Trigger Holdoff State | FALSE | |
| Trigger Source | Free | |
| Video BW | 22000 | |
| Video BW Auto | TRUE | |
| MeasResult1 | MeasResult 2 | Meas Result 3 |
| - 76.80585177 44559 | 0 | 1 |
| 0.084790019 950006 | - 76.80585 17744559 | 0 |

| | | |
|------------------------|------|---|
| 0.028392912 8313787 | -999 | 1 |
| | -999 | 0 |
| | -999 | 1 |

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data which is not processed.

| | |
|----------------------|--|
| Key Path | Save, Data |
| Mode | TD-SCDMA |
| Example | MMEM:STOR:CAPT "MyCaptureData.bin" This stores the capture data in the file MyCaptureData.bin in the default directory. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Save As . . .

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\<<mode name>\data\traces

For all of the Limit Data Files:

My Documents\<<mode name>\data\limits

For all of the Measurement Results Data Files:

My Documents\<<mode name>\data\<<measurement name>\results

For all of the Capture Buffer Data Files:

My Documents\<<mode name>\data\captureBuffer

| | |
|----------|---|
| Key Path | Save, Data |
| Mode | All |
| Notes | The key location is mode-dependent and will vary. |

Brings up the Save As dialog for saving a < mode specific > Save Type. The save is performed immediately and does not wait until the measurement is complete.

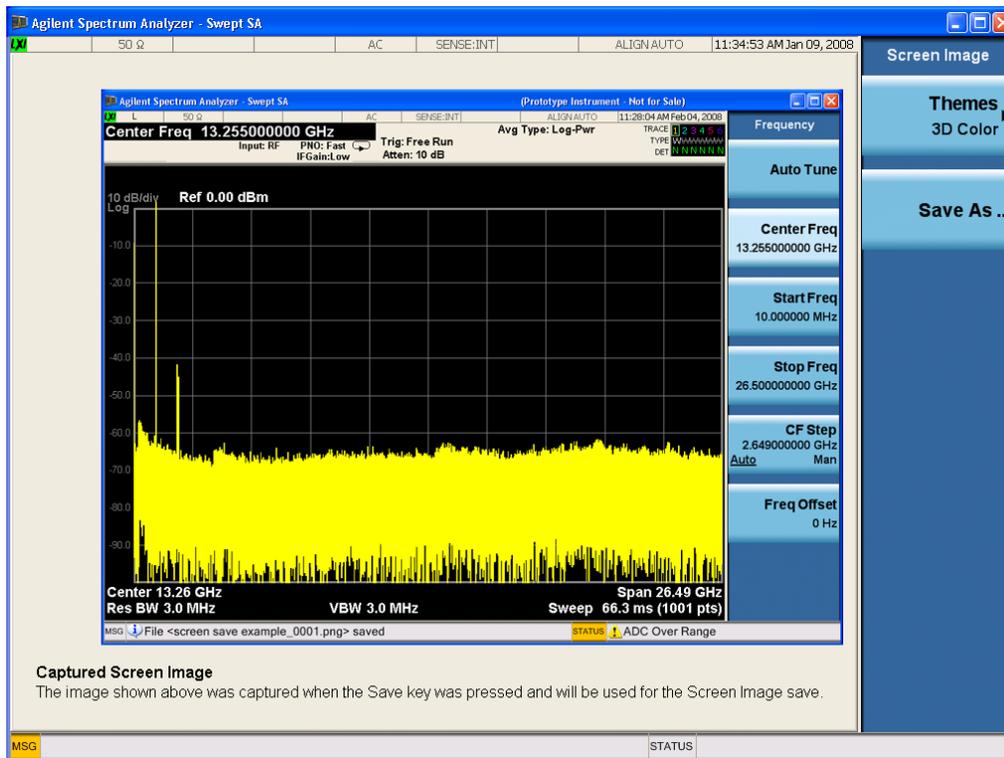
Initial S/W Revision Prior to A.02.00

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menu. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE

For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

| | |
|----------------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:SCReen <filename> |
| Example | :MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|-------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FColor FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Save As...

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File ...](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where `<mode name>` is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

| | |
|----------------------|--|
| Key Path | Save, Screen Image |
| Notes | Brings up Save As dialog for saving a Screen Image Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Catalog (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:CATalog? [<directory_name>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><numeric_value>,<numeric_value>,{<file_entry>}</p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:</p> <p><file_name>,<file_type>,<file_size></p> <p>As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Change Directory (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:CDIRectory [<directory_name>] :MMEMory:CDIRectory? |
| Notes | <p>The string must be a valid logical path.</p> <p>Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.</p> <p>At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.</p> <p>Query returns full path of the default directory.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Copy (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:COPY <string>,<string>[,<string>,<string>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Copies an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> |

The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.

This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:COpy:DEvice <source_string>,<dest_string> |
| Notes | <p>The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device.</p> <p>Valid device keywords are:</p> <p>SNS (smart noise source)</p> <p>An error is generated if the file or device is not found.</p> |

Mass Storage Delete (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DElete <file_name>[,<directory_name>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an "access denied" error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | <p>:MMEMory:DATA <file_name>,<data></p> <p>:MMEMory:DATA? <file_name></p> |
| Notes | <p>The string must be a valid logical path.</p> <p>The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data.</p> <p>The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in</p> |

| | |
|----------------------|------------------|
| | block format. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Make Directory (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MDIRectory <directory_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>Creates a new directory. The <directory_name> parameter specifies the name to be created.</p> <p>This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Move (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MOVE <string>,<string>[,<string>,<string>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Remove Directory (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:RDIRectory <directory_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See ["More Information" on page 746](#)

| | |
|-------------------------------|---|
| Key Path | Front-panel key |
| Example | :INIT:CONT OFF |
| Notes | See Cont key description. |
| Backwards Compatibility Notes | <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p> |
| Initial S/W Revision | Prior to A.02.00 |

More Information

See ["Restart" on page 2315](#) for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

| Key Path | Front-panel key |
|----------|-----------------|
|----------|-----------------|

SPAN X Scale

Accesses a menu of functions that enable you set the horizontal scale parameters.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Span

Changes the frequency range symmetrically about the center frequency.

The default (and minimum) span is calculated using the number of carriers and the carrier width where;

$$\text{Span} = (\text{Upper Carrier Freq} + (\text{max offset IBW} * (1 + \alpha)) / 2) - (\text{Lower Carrier Freq} - (\text{max offset IBW} * (1 + \alpha)) / 2)$$

The span is increased by a factor of 1 + Filter Alpha if the RRC Filter in on.

| | |
|----------------|---|
| Key Path | SPAN X Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD,LTEATDD |
| Remote Command | [:SENSe] :ACPoweR:FREQuency:SPAN <freq> [:SENSe] :ACPoweR:FREQuency:SPAN? |
| Example | ACP:FREQ:SPAN 25MHz ACP:FREQ:SPAN? |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | The span value is clipped when the carrier settings and/or the offset settings are changed. The value is changed to satisfy following formula: $\text{Span} = (\text{Upper Carrier Freq} + (\text{max offset IBW} * (1 + \alpha)) / 2) - (\text{Lower Carrier Freq} - (\text{max offset IBW} * (1 + \alpha)) / 2)$ |
| Preset | SA: 8 MHz WCDMA: 24.6848 MHz WIMAX OFDMA: 50 MHz C2K: 4.5 MHz TD-SCDMA: 8 MHz 1xEVDO: 4.05 MHz DVB-T/H: 40 MHz DTMB (CTTB): 72 MHz ISDB-T: 30 MHz CMMB: 72 MHz LTE, LTETDD, MSR: 25 MHz Digital Cable TV: 40 MHz LTEAFDD,LTEATDD: 25MHz |

| | |
|--------------------------|---|
| State Saved | Saved in instrument state. |
| Min | 10 Hz |
| Max | Hardware Dependent: Option 503 = 3.7 GHz Option 507 = 7.1 GHz Option 508 = 8.5 GHz Option 513 = 13.8 GHz Option 526 = 27.0 GHz |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Full Span

Changes the span to show the full frequency range of the spectrum analyzer.

| | |
|--------------------------|---|
| Key Path | SPAN X Scale |
| Mode | SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV |
| Remote Command | [:SENSe] :ACPower :FREQuency :SPAN :FULL |
| Example | ACP:FREQ:SPAN:FULL |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Dependencies | For MSR and LTE-Advanced FDD/TDD mode, this key is blank. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Last Span

Changes the span to the previous span setting. If no previous span value exists, then the span will remain unchanged.

| | |
|--------------------------|--|
| Key Path | SPAN X Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD,LTEATDD |
| Remote Command | [:SENSe] :ACPower :FREQuency :SPAN :PREVious |
| Example | ACP:FREQ:SPAN:PREV |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Sweep/Control

Accesses a menu of functions that enable you to set up and control the sweep time, and source.

See "[Sweep/Control](#)" on page 2205 for more information.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Sweep Time

Selects the length of time in which the spectrum analyzer sweeps the displayed frequency span. In swept spans, the sweep time varies from 1 millisecond to 2000 seconds. Additional overhead time, which impacts the sweep rate, is not calculated as part of the sweep time. In fact:

sweep rate = span/sweep time

update rate = 1/(sweep time + overhead)

sweep cycle time = sweep time + overhead

Sweep time is coupled to RBW and VBW, and is impacted by the number of sweep points, so changing those parameters may change the sweep time.

If you increase the sweep time, you increase the length of the time data captured and the number of points measured. You might need to specify a specific sweep speed to accommodate a specific condition in your transmitter. For example, you may have a burst signal and need to measure an exact portion of the burst.

Selecting a specific sweep time may result in a long measurement time since the resulting number of data points may not be the optimum 2n. Use [:SENSe]:ACP:OFFSet:LIST:SWEep:TIME to set the number of points used for measuring the offset channels for Basic and cdmaOne.

For cdma2000 and W-CDMA, this command sets the sweep time when using the sweep mode. See [:SENSe]:ACP:SWEep:TYPE

| | |
|----------------|--|
| Key Path | Sweep/Control |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe]:ACP:Power:SWEep:TIME <time> [:SENSe]:ACP:Power:SWEep:TIME? [:SENSe]:ACP:Power:SWEep:TIME:AUTO OFF ON 0 1 [:SENSe]:ACP:Power:SWEep:TIME:AUTO? |
| Example | ACP:SWE:TIME 50ms ACP:SWE:TIME? ACP:SWE:TIME:AUTO OFF ACP:SWE:TIME:AUTO? |
| Notes | This parameter is preset by Meas Method selection. Preset values are as follows: |

| | |
|--------------------------|--|
| | IBW: 29 ms IBWR: 108 ms FAST (WCDMA): 7.5 ms |
| Preset | SA, LTE, LTETDD, MSR: Automatically calculated WCDMA: 29 ms WIMAX OFDMA: Automatically calculated C2K: Automatically calculated TD-SCDMA: Automatically calculated 1xEVDO: Automatically calculated DVB-T/H: Automatically calculated DTMB (CTTB): Automatically calculated ISDB-T: Automatically calculated CMMB: Automatically calculated Digital Cable TV: Automatically calculated LTEAFDD, LTEATDD: Automatically calculated SA, LTE, LTETDD, MSR, LTEAFDD, LTEATDD: ON WCDMA: OFF C2K: OFF (method IBW) WIMAX OFDMA: ON TD-SCDMA: ON DVB-T/H: ON DTMB (CTTB): ON ISDB-T: ON CMMB: ON Digital Cable TV: ON |
| State Saved | Saved in instrument state. |
| Min | 1 ms |
| Max | 4000 s |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Sweep Setup

Accesses the sweep setup menu.

| | |
|----------------------|------------------|
| Key Path | Sweep/Control |
| Initial S/W Revision | Prior to A.02.00 |

Auto Sweep Time Rules

Switches the analyzer between normal and accuracy sweep states.

| | |
|--------------------------|---|
| Key Path | Sweep/Control, Sweep Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :ACPoweR :SWEep :TIME :AUTO :RULes NORMal ACCuracy [:SENSe] :ACPoweR :SWEep :TIME :AUTO :RULes ? |
| Example | ACP:SWE:TIME:AUTO:RUL NORM ACP:SWE:TIME:AUTO:RUL? |
| Notes | Set to Norm when Auto Couple is pressed or sent remotely. |
| Preset | SA, WCDMA, C2K, TD-SCDMA, 1xEVDO, DTMB (CTTB), LTE, LTE-TDD, MSR, LTEAFDD, LTEATDD: ACCuracy WIMAX OFDMA, DVB-T/H: NORMal ISDB-T, CMMB: NORMal Digital Cable TV: NORMal |
| State Saved | Saved in instrument state. |
| Range | Norm Accy |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Pause

Pauses a measurement after the current data acquisition is complete. When Paused, the label on the key changes to Resume. Pressing the Resume key resumes the measurement at the point where it was paused. When Paused, pressing Restart, Single, or Cont does a Resume

See "[Pause/Resume](#)" on page 2205 for more details.

| | |
|----------------------|------------------|
| Key Path | Sweep/Control |
| Initial S/W Revision | Prior to A.02.00 |

Gate

Accesses a menu that enables you to control the gating function. The Gate functionality is used to view signals best viewed by qualifying them with other events.

Gate setup parameters are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

Note that Sweep Time autocoupling rules and annotation are changed by Gate being on.

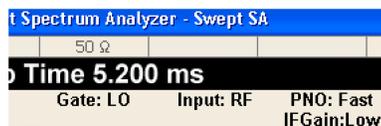
| | |
|----------------------|--|
| Key Path | Sweep/Control |
| Scope | Meas Global |
| Readback | The state and method of Gate, as [Off, LO] or [On, Video]. Note that for measurements that only support gated LO, the method is nonetheless read back, but always as LO. |
| Initial S/W Revision | Prior to A.02.00 |

Gate On/Off

Turns the gate function on and off.

When the Gate Function is on, the selected Gate Method is used along with the gate settings and the signal at the gate source to control the sweep and video system with the gate signal. Not all measurements allow every type of Gate Methods.

When Gate is on, the annunciation in the measurement bar reflects that it is on and what method is used, as seen in the following "Gate: LO" annunciator graphic.



| | |
|----------------|---|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe [:STATe] OFF ON 0 1 [:SENSe] :SWEep:EGATe [:STATe] ? |
| Example | SWE:EGAT ON SWE:EGAT? |

Dependencies

The function is unavailable (grayed out) and Off when:

- Gate Method is LO or Video and FFT Sweep Type is manually selected.
- Gate Method is FFT and Swept Sweep Type is manually selected.
- Marker Count is ON.

The following are unavailable whenever Gate is on:

- FFT under Sweep Type when Method=LO or Video or Swept under Sweep Type when Method=FFT
- Marker Count

While Gate is on, the Auto Rules for Sweep Type are modified so that the choice agrees with the Gate Method: i.e., FFT for Method = FFT and Swept for Method = LO or Video.

The Gate softkey and all SCPI under the [:SENSe]:SWEep:EGATe SCPI node are grayed out when Source Mode is Tracking with an external source. This is because the Gate circuitry is used to sync the external source. If the Tracking Source is turned on, the Gate is turned off.

When in the ACP measurement:

- When Meas Method is RBW or FAST, this function is unavailable and the key is grayed out.

| | |
|-------------------------------------|--|
| | <ul style="list-style-type: none"> • Whenever Gate is on, Meas Method, RBW or FAST is unavailable and keys for those are grayed out. • When Gate is on, Offset Res BW and Offset Video BW are ignored (if you set these values) and the measurement works as if all Offset Res BW and all Offset Video BW are coupled with the Res BW and the Video BW under the BW menu. When Gate is on, the Offset BW key in the Offset/Limit menu is grayed out. |
| Preset | Off LTETDD: On |
| State Saved | Saved in instrument state |
| Range | On Off |
| Backwards Compatibility SCPI | [:SENSe]:SWEep:TIME:GATE[:STATe] ESA compatibility |
| Backwards Compatibility Notes | In ESA, Trig Delay (On) and Gate (On) could not be active at the same time.. This dependency does not exist in PSA or in the X-Series. |
| Initial S/W Revision | Prior to A.02.00 |

Gate View On/Off

Turning on Gate View in the Swept SA measurement provides a single-window gate view display..

Turning on Gate View in other measurements shows the split-screen Gate View. In these measurements, when the Gate View is on, the regular view of the current measurement traces and results are reduced vertically to about 70% of the regular height. The Zero Span window, showing the positions of the Gate, is shown between the Measurement Bar and the reduced measurement window. By reducing the height of the measurement window, some of the annotation on the Data Display may not fit and is not shown.

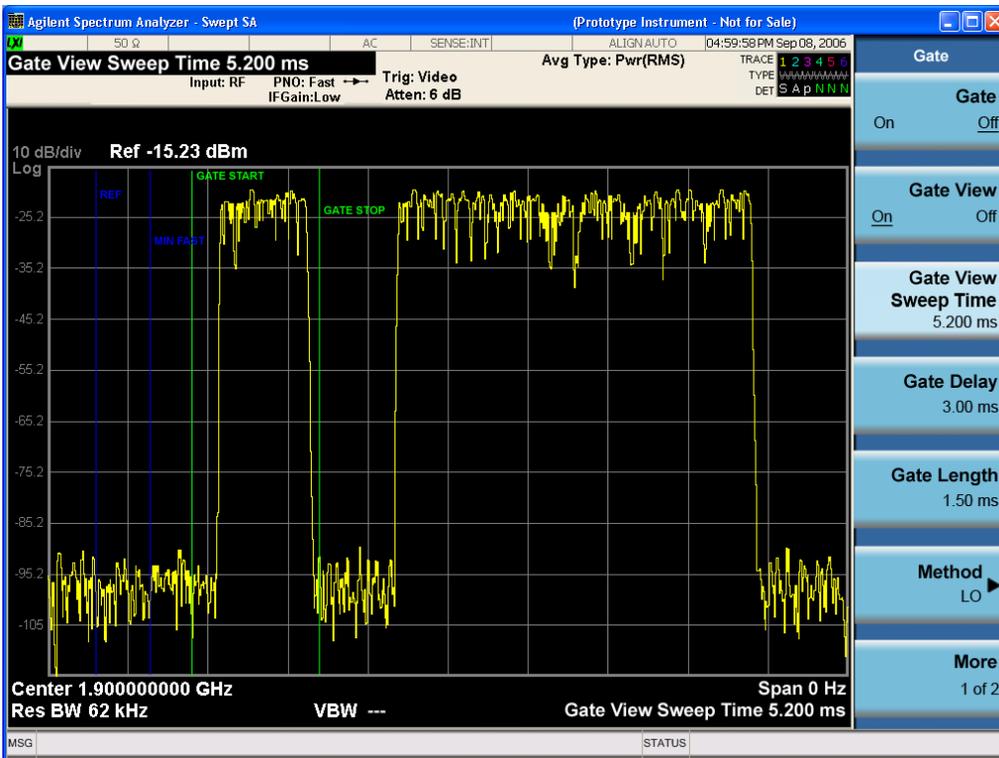
| | |
|-----------------------|---|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe]:SWEep:EGATe:VIEW ON OFF 1 0 [:SENSe]:SWEep:EGATe:VIEW? |
| Example | SWE:EGAT:VIEW ON turns on the gate view. |
| Dependencies | <p>In the Swept SA measurement:</p> <p>In Gate View, the regular Sweep Time key is grayed out . When pressed, the grayed out key puts up the informational message "Use Gate View Sweep Time in the Gate menu."</p> <p>In the other measurements:</p> <p>When you turn Gate View on, the lower window takes on the current state of the instrument. Upon leaving Gate View, the instrument takes on the state of the lower window.</p> <p>When you turn Gate View on, the upper window Sweep Time is set to the gate view sweep time.</p> |
| Couplings | <p>These couplings apply to the Swept SA measurement:</p> <ul style="list-style-type: none"> • When Gate View is turned on, the instrument is set to Zero Span. • Gate View automatically turns off whenever a Span other than Zero is selected. • Gate View automatically turns off if you press the Last Span key while in Gate View, and the instrument returns to the Span it was in before entering Gate View (even if that is Zero Span). • When Gate View is turned on, the sweep time used is the gate view sweep time. This is set |

according to the rules in section "Gate View Setup " on page 2341

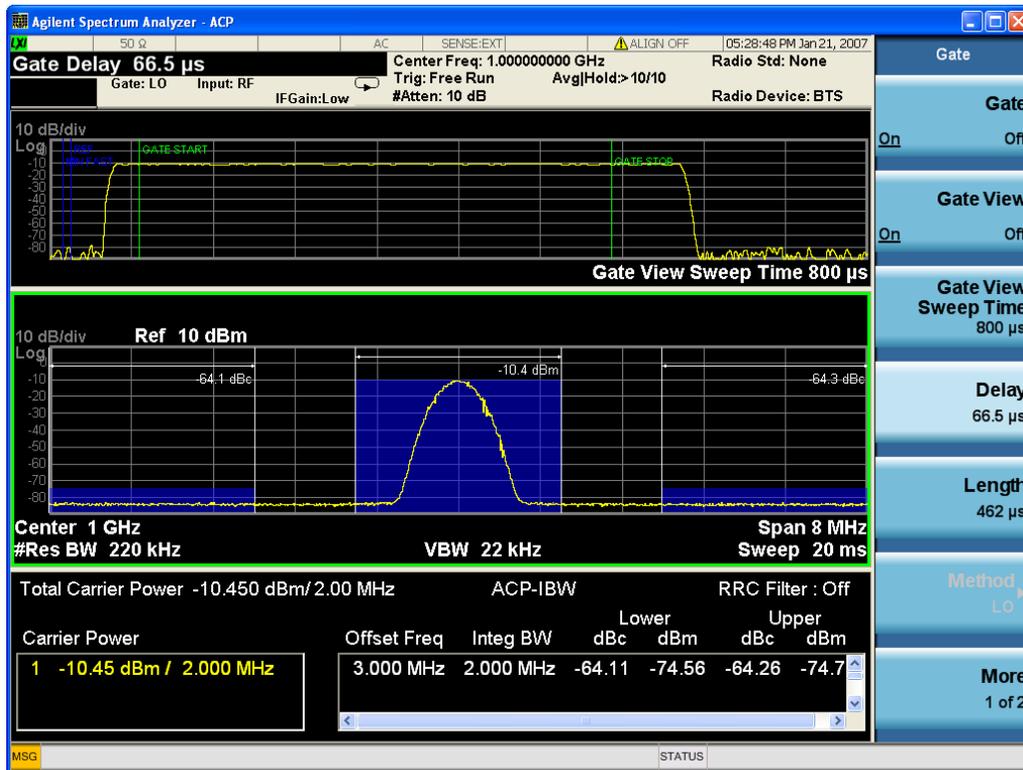
- When Gate View is turned off, Sweep Time is set to the normal Swept SA measurement sweep time.
- If Gate View is on and Gate is off, then turning on Gate turns off Gate View.

| | |
|----------------------|---------------------------|
| Preset | OFF |
| State Saved | Saved in instrument state |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

A sample of the Gate View screen in the Swept SA measurement is shown in the following graphic :



A sample of the Gate View screen in other measurements is shown in the following graphic . This example is for the ACP measurement:



Turning Gate View off returns the analyzer to the Normal measurement view.

In the Swept SA, the normal measurement view is the single-window Swept SA view. When returning to this view, the Swept SA measurement returns to the Span it was in before entering **Gate View** (even if that is Zero Span).

The **Gate View** window is triggered from the Gate Source, with zero trigger delay. Also, when updating the **Gate View** window, the Gate itself must not operate. So it is internally shut off while the gate view window is being updated. For the Swept SA measurement, this means that the Gate is internally shut off whenever the gate view window is displayed. The measurement bar and softkeys continue to show the Trigger source for the main sweep window and give no indication that the Gate is shut off or that the Gate View window is triggered from the Gate Source.

When in **Gate View**, vertical lines are displayed in the Gate View window as follows:

- Green lines are displayed at the gate edges as follows: in Edge Gate, a line is shown for Delay and one for the end of the Gate period, defined by Length. In Level Gate a line is shown only for Delay. You can adjust the position of the green lines by adjusting the gate length and the gate delay. These lines update in the Gate View window as the active function changes, even if the window is not being updated. In Gated LO and Gated Video, these lines are positioned relative to the delay reference line (not relative to 0 time). In Gated FFT, their location is relative to the left edge of the screen.
- A blue line is displayed showing the delay reference, that is, the reference point for the Gate Delay within the Zero Span window. The blue line represents where (in time) the effective location of the gate start would be if the gate were programmed to zero delay.

-

- The second blue line is labeled "MIN FAST" as shown in the figure above because it represents the minimum Gate Delay for fast Gated LO operation. This line is only displayed in Gated LO. You cannot scroll (knob) or decrement (down key) the Gate Delay to less than that represented by the position of this line, it can only be set below this position manually, although once there it can be moved freely with the knob while below the line.
- A yellow line in the Gated Video case only, is displayed at Blength, where Blength is the display point (bucket) length for the swept trace, which is given by the sweep time for that trace divided by number of Points – 1. So it is referenced to 0 time, not to the delay reference. This line is labeled NEXT PT (it is not shown in the figure above because the figure above is for Gated LO).
- The yellow line represents the edge of a display point (bucket). Normally in Gated Video, the bucket length must be selected so that it exceeds the off time of the burst. There is another way to use the analyzer in Gated Video measurements, and that is to set the bucket width much shorter than the off time of the burst. Then use the Max Hold trace function to fill in "missing" buckets more slowly. This allows you to see some of the patterns of the Gated Video results earlier, though seeing a completely filled-in spectrum later.

Gate View Setup

Accesses a menu that enables you to setup parameters relevant to the Gate View

| | |
|----------------------|---------------------|
| Key Path | Sweep/Control, Gate |
| Scope | Meas Global |
| Initial S/W Revision | A.10.00 |

Gate View Sweep Time

Controls the sweep time in the Gate View window. To provide an optimal view of the gate signal, the analyzer initializes Gate View Sweep Time based on the current settings of Gate Delay and Gate Length.

| | |
|----------------|--|
| Key Path | Sweep/Control, Gate, Gate View Setup |
| Remote Command | [:SENSe] :SWEep:EGATe:TIME <time> [:SENSe] :SWEep:EGATe:TIME? |
| Example | SWE:EGAT:TIME 500 ms |
| Dependencies | Gate View Sweep Time is initialized: <ul style="list-style-type: none"> • On Preset (after initializing delay and length). • Every time the Gate Method is set/changed. <p>Additionally, in the Swept SA measurement, whenever you do a Preset, or leave Gate View, the analyzer remembers the Gate Delay and Gate Length settings. Then, when returning to Gate View, if the current Gate Delay and/or Gate Length do not match the remembered values Gate View Sweep Time is re-initialized.</p> <ol style="list-style-type: none"> 1. Compute the location of the "gate stop" line, which you know is at time $t = t_{min} + \text{GateDelay} + \text{GateLength}$. |
| Preset | 519.3 μ s |

| | |
|----------------------|-------------------------------------|
| | WiMAX OFDMA: 5 ms GSM/EDGE: 1 ms |
| State Saved | Saved in instrument state |
| Max | 6000 s |
| Initial S/W Revision | Prior to A.02.00 |

Gate View Start Time

Controls the time at the left edge of the Gate View.

| | |
|-----------------------|---|
| Key Path | Sweep/Control, Gate, Gate View Setup |
| Remote Command | [:SENSe] :SWEep:EGATe:VIEW:STARt <time> [:SENSe] :SWEep:EGATe:VIEW:STARt? |
| Example | SWE:EGAT:VIEW:STAR 10ms |
| Notes | Units of time are required or no units; otherwise an invalid suffix error message will be generated. See error -131. |
| Preset | 0 ms |
| State Saved | Saved in instrument state |
| Min | 0 |
| Max | 500 ms |
| Initial S/W Revision | A.10.00 |

Gate Delay

Controls the length of time from the time the gate condition goes True until the gate is turned on.

| | |
|-----------------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe:DELay <time> [:SENSe] :SWEep:EGATe:DELay? |
| Example | SWE:EGAT:DELay 500ms SWE:EGAT:DELay? |
| Notes | Units of time are required or no units; otherwise an invalid suffix error message will be generated. |
| Preset | 57.7 us WiMAX OFDMA: 71 us GSM/EDGE: 600 us WLAN: 500 us |
| State Saved | Saved in instrument state |

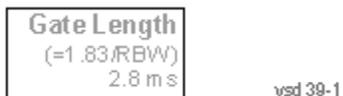
| | |
|-------------------------------------|--|
| Min | 0.0 us |
| Max | 100 s |
| Backwards Compatibility SCPI | [:SENSe]:SWEep:TIME:GATE:DELay ESA compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Length

Controls the length of time that the gate is on after it opens.

| | |
|-----------------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe]:SWEep:EGATe:LENGth <time> [:SENSe]:SWEep:EGATe:LENGth? |
| Example | SWE:EGAT:LENG 1 SWE:EGAT:LENG? |
| Notes | Units of time are required or no units; otherwise an invalid suffix error message will be generated. |
| Dependencies | |

Grayed out when Gate Method is set to FFT in which case the label changes to that shown below.



The key is also grayed out if Gate Control = Level.

| | |
|-------------------------------------|---|
| Preset | 461.6 us WiMAX OFDMA: 50 us GSM/EDGE: 200 us WLAN: 1.54 ms |
| State Saved | Saved in instrument state |
| Min | 100 ns |
| Max | 5 s |
| Backwards Compatibility SCPI | [:SENSe]:SWEep:TIME:GATE:LENGth ESA compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Source

The menus under the Gate Source key are the same as those under the Trigger key, with the exception that neither Free Run nor Video are available as Gate Source selections. However, a different SCPI command

is used to select the Gate Source (see table below) because you may independently set the Gate Source and the Trigger Source.

Any changes to the settings in the setup menus under each Gate Source selection key (for example: Trigger Level, Trigger Delay, etc.) also affect the corresponding settings under the Trigger menu keys. The SCPI commands used for these are the same for Trigger and Gate, since there is only one setting which affects both Gate and Trigger. Example: to set the Trigger Level for External 1 you use the command :TRIG:EXT1:LEV regardless of whether you are using External 1 as a Trigger Source or a Gate Source.

| | |
|-------------------------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe:SOURce EXTernal1 EXTernal2 LINE FRAME RFBurst [:SENSe] :SWEep:EGATe:SOURce? |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" error. |
| Preset | EXTernal 1 GSM/EDGE, MSR: FRAME LTETDD: EXTernal 1When Direction is Downlink, FRAME when Direction is Uplink. |
| Backwards Compatibility Notes | In ESA, there is a single Gate input port. In PSA, the Gate Source may be taken from one of two specified input ports. In the X-Series, any Trigger Source can be a Gate Source. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.14.00 |

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA |
| Dependencies | Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 1. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:LEVel <level> :TRIGger[:SEquence]:EXTernal1:LEVel? |
| Example | TRIG:EXT1:LEV 0.4 V |
| Couplings | This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:LEVel For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:EXTernal1:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal1:SLOPe? |
| Example | TRIG:EXT1:SLOP NEG |
| Couplings | This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:SLOPe For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:EXTernal1:SLOPe |
| Backwards Compatibility | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, |

| | |
|----------------------|-------------------|
| Notes | and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Zero Span Delay Comp On/Off

In zero span, there is a natural delay in the signal path, which comes from the RBW filter. This is usually desirable, as it allows you to trigger on events and also see those events, because the signal is delayed from the trigger event. However, in some cases it is desirable to eliminate this delay, so that trigger events line up exactly with the zero time point in zero span. You can use the Zero Span Delay Comp On/Off feature to enable or disable zero span delay compensation.

| | |
|----------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:DElay:COMPensation OFF ON 0 1 :TRIGger[:SEquence]:EXTernal1:DElay:COMPensation? |
| Example | TRIG:EXT1:DEL:COMP ON |
| Dependencies | No effect except in zero-span, but not locked out in nonzero spans. Blanked in modes that do not support zero-span measurements. If the SCPI command is sent when the key is blanked, an error is returned: -221, "Settings conflict; Feature not supported for this measurement" In analyzers shipping N9060A, this feature requires N9060A-7FP. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | A.11.00 |

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

| | |
|-----------------|---|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT2 Swept SA measurement TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message. Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 2. |
| State Saved | Saved in instrument state |
| Status Bits/OPC | |

| | |
|--------------------------|--|
| dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:LEVel :TRIGger[:SEquence]:EXTernal2:LEVel? |
| Example | TRIG:EXT2:LEV 1.1 V |
| Couplings | This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-----------------------|--|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal2:SLOPe? |
| Example | TRIG:EXT2:SLOP NEG |
| Couplings | This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |

| | |
|-------------------------------------|--|
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:FRAMe:EXTernal2:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Zero Span Delay Comp On/Off

In zero span, there is a natural delay in the signal path, which comes from the RBW filter. This is usually desirable, as it allows you to trigger on events and also see those events, because the signal is delayed from the trigger event. However, in some cases it is desirable to eliminate this delay, so that trigger events line up exactly with the zero time point in zero span. You can use the Zero Span Delay Comp On/Off feature to enable or disable zero span delay compensation.

| | |
|-----------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEQuence]:EXTernal2:DELAy:COMPensation OFF ON 0 1 :TRIGger[:SEQuence]:EXTernal2:DELAy:COMPensation? |
| Example | TRIG:EXT2:DEL:COMP ON |
| Dependencies | No effect except in zero-span, but not locked out in nonzero spans. Blanked in modes that do not support zero-span measurements. If the SCPI command is sent when the key is blanked, an error is returned: -221, "Settings conflict; Feature not supported for this measurement" In analyzers shipping N9060A, this feature requires N9060A-7FP. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | A.11.00 |

RF Burst

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector. Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

In some models, a variety of burst trigger circuitry is available, resulting in various available burst trigger bandwidths. The analyzer automatically chooses the appropriate trigger path based on the hardware configuration and other settings of the analyzer.

| | |
|----------------|---|
| Key Path | Trigger |
| Example | TRIG:SOUR RFB Swept SA measurement TRIG:<meas>:SOUR RFB Measurements other than Swept SA |
| State Saved | Saved in instrument state |

| | |
|-------------------------------|--|
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Backwards Compatibility Notes | The legacy command: :TRIGger[:SEQuence]:RFBurst:FSElectivity[:STATe] OFF ON 0 1 is not supported in the X-Series, as the hardware to do Frequency Selective burst triggers does not exist in X-Series. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Absolute Trigger Level

Sets the absolute trigger level for the RF burst envelope.

When using the External Mixing path, the Absolute Trigger Level is uncalibrated because the factory default was set to accommodate the expected IF levels for the RF path.

| | |
|----------------|---|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute <ampl> :TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute? |
| Example | TRIG:RFB:LEV:ABS 10 dBm sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm |
| Notes | Sending this command does not switch the setting from relative to absolute; to switch it you need to send the :TRIGger[:SEQuence]:RFBurst:LEVel:TYPE command, below. Amplitude Corrections are not taken into account by the Absolute Trigger Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Absolute Trigger will not fire until you have set the trigger level that far below the displayed signal level, rather than simply to the displayed signal level. This is only true for Amplitude Corrections, not External Gain or Ref Level Offset functions. If mode is Bluetooth, the default value is -50 dBm. |
| Couplings | This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu |
| Preset | -20 dBm |
| State Saved | Saved in instrument state |
| Min | -200 dBm |
| Max | 100 dBm |
| Default Unit | depends on the current selected Y-Axis unit |
| Backwards | :TRIGger[:SEQuence]:FRAME:RFBurst:LEVel:ABSolute |

| Compatibility SCPI | |
|---------------------------|---|
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |
| <hr/> | |
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:TYPE ABSolute RELative :TRIGger[:SEquence]:RFBurst:LEVel:TYPE? |
| Example | TRIG:RFB:LEV:TYPE REL sets the trigger level type of the RF burst trigger to Relative. |
| Preset | ABSolute |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Relative Trigger Level

Sets the relative trigger level for the RF burst envelope.

In some models, the relative burst trigger function is implemented in hardware. In other models, without the advanced triggering hardware required, the relative burst trigger function is implemented in software in some measurements, and is unavailable in other measurements.

When implemented in software, the relative RF Burst trigger function is implemented as follows:

1. The measurement starts with the absolute RF Burst trigger setting. If it cannot get a trigger with that level, auto trigger fires and the acquisition starts anyway. After the acquisition, the measurement searches for the peak in the acquired waveform and saves it.
2. Now, in the next cycle of the measurement, the measurement determines a new absolute RF Burst level based on the peak value from the first measurement and the Relative RF Burst Trigger Level (always 0 or negative dB) set by the user. The following formula is used:
3. absolute RF Burst level = peak level of the previous acquisition + relative RF Burst level
4. If the new absolute RF Burst level differs from the previous by more than 0.5 dB, the new level is sent to the hardware; otherwise it is not updated (to avoid slowing down the acquisition)

Steps 2 and 3 repeat for subsequent measurements.

| | |
|-----------------------|--|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:RELative <rel_ampl> :TRIGger[:SEquence]:RFBurst:LEVel:RELative? |
| Example | TRIG:RFB:LEV:REL -10 dB |

| | |
|-------------------------------------|---|
| | sets the trigger level of the RF burst envelope signal to the relative level of -10 dB |
| Notes | Sending this command does not switch the setting from absolute to relative; to switch it you need to send the :TRIGger[:SEQuence]:RFBurst:LEVel:TYPE command, above. The relative trigger level is not available in some measurements. In those measurements the RELative parameter, and the :TRIGger[:SEQuence]:RFBurst:LEVel:TYPE command (above), will generate an error if sent. |
| Dependencies | This key is grayed out and Absolute Trigger Level selected if the required hardware is not present in your analyzer and the current measurement does not support Relative triggering. |
| Preset | -6 dB GSM: -25 dB |
| State Saved | Saved in instrument state |
| Min | -45 dB |
| Max | 0 dB |
| Default Unit | dB or dBc |
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:RFBurst:LEVel This legacy command is aliased to :TRIGger[:SEQuence]:RFBurst:LEVel:RELative because the PSA had ONLY relative burst triggering |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEQuence]:RFBurst:SLOPe POSitive NEGative :TRIGger[:SEQuence]:RFBurst:SLOPe? |
| Example | TRIG:RFB:SLOP NEG |
| Couplings | This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:FRAME:RFBurst:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Periodic Timer (Frame Trigger)

Pressing this key, when it is not selected, selects the internal periodic timer signal as the trigger. Triggering occurrences are set by the **Period** parameter, which is modified by the **Sync Source** and **Offset**. Pressing this key, when it is already selected, accesses the periodic timer trigger setup functions.

If you do not have a sync source selected (it is Off), then the internal timer will not be synchronized with any external timing events.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR FRAM Swept SA measurement TRIG:<meas>:SOUR FRAM Measurements other than Swept SA |
| State Saved | Saved in instrument state |
| Readback | [Sync: <value of Sync Source>], for example, [Sync: External 1] |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Periodic Timer Triggering:

This feature selects the internal periodic timer signal as the trigger. Trigger occurrences are set by the **Periodic Timer** parameter, which is modified by the **Sync Source** and **Offset**.

The figure below shows the action of the periodic timer trigger. Before reviewing the figure, we'll explain some uses for the periodic trigger.

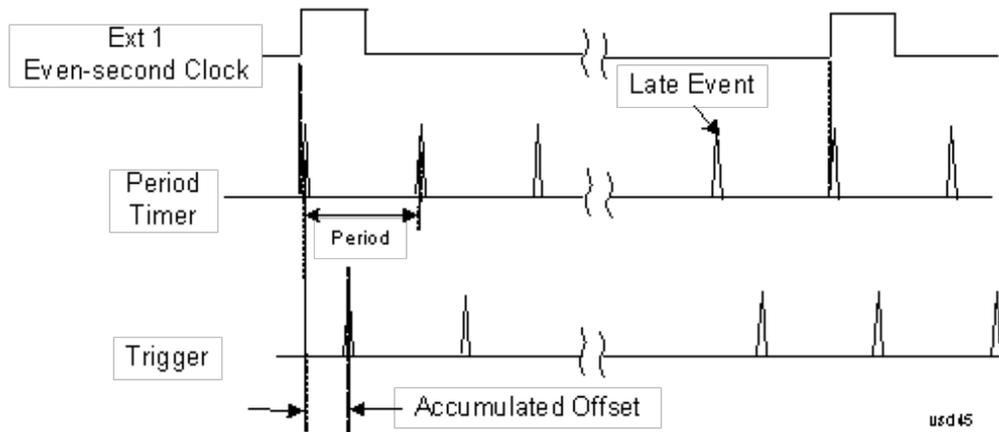
A common application is measuring periodic burst RF signals for which a trigger signal is not easily available. For example, we might be measuring a TDMA radio which bursts every 20 ms. Let's assume that the 20 ms period is very consistent. Let's also assume that we do not have an external trigger source available that is synchronized with the period, and that the signal-to-noise ratio of the signal is not high enough to provide a clean RF burst trigger at all of the analysis frequencies. For example, we might want to measure spurious transmissions at an offset from the carrier that is larger than the bandwidth of the RF burst trigger. In this application, we can set the Periodic Timer to a 20.00 ms period and adjust the offset from that timer to position our trigger just where we want it. If we find that the 20.00 ms is not exactly right, we can adjust the period slightly to minimize the drift between the period timer and the signal to be measured.

A second way to use this feature would be to use **Sync Source** temporarily, instead of **Offset**. In this case, we might tune to the signal in a narrow span and use the RF Burst trigger to synchronize the periodic timer. Then we would turn the sync source off so that it would not miss-trigger. Miss-triggering can occur when we are tuned so far away from the RF burst trigger that it is no longer reliable.

A third example would be to synchronize to a signal that has a reference time element of much longer period than the period of interest. In some CDMA applications, it is useful to look at signals with a short periodicity, by synchronizing that periodicity to the "even-second clock" edge that happens every two

seconds. Thus, we could connect the even-second clock trigger to Ext1 and use then Ext1 as the sync source for the periodic timer.

The figure below illustrates this third example. The top trace represents the even-second clock. It causes the periodic timer to synchronize with the leading edge shown. The analyzer trigger occurs at a time delayed by the accumulated offset from the period trigger event. The periodic timer continues to run, and triggers continue to occur, with a periodicity determined by the analyzer time base. The timer output (labeled "late event") will drift away from its ideal time due to imperfect matching between the time base of the signal being measured and the time base of the analyzer, and also because of imperfect setting of the period parameter. But the synchronization is restored on the next even-second clock event. ("Accumulated offset" is described in the in the **Offset** function section.)



Period

Sets the period of the internal periodic timer clock. For digital communications signals, this is usually set to the frame period of your current input signal. In the case that sync source is not set to OFF, and the external sync source rate is changed for some reason, the periodic timer is synchronized at the every external synchronization pulse by resetting the internal state of the timer circuit.

| | |
|----------------------|---|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:PERiod <time> :TRIGger[:SEquence]:FRAMe:PERiod? |
| Example | TRIG:FRAM:PER 100 ms |
| Dependencies | The invalid data indicator turns on when the period is changed, until the next sweep/measurement completes. |
| Couplings | The same period is used in the Gate Source selection of the period timer. |
| Preset | 20 ms GSM: 4.615383 |
| State Saved | Saved in instrument state |
| Min | 100.000 ns |
| Max | 559.0000 ms |
| Default Unit | S |
| Initial S/W Revision | Prior to A.02.00 |

Offset

Adjusts the accumulated offset between the periodic timer events and the trigger event. Adjusting the accumulated offset is different than setting an offset, and requires explanation.

The periodic timer is usually not synchronized with any external events, so the timing of its output events has no absolute meaning. Since the timing relative to external events (RF signals) is important, you need to be able to adjust (offset) it. However, you have no direct way to see when the periodic timer events occur. All that you can see is the trigger timing. When you want to adjust the trigger timing, you will be changing the internal offset between the periodic timer events and the trigger event. Because the absolute value of that internal offset is unknown, we will just call that the accumulated offset. Whenever the Offset parameter is changed, you are changing that accumulated offset. You can reset the displayed offset using Reset Offset Display. Changing the display does not change the value of the accumulated offset, and you can still make additional changes to accumulated offset.

To avoid ambiguity, we define that an increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.

| | |
|-----------------------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:OFFSet <time> :TRIGger[:SEquence]:FRAMe:OFFSet? |
| Example | TRIG:FRAM:OFFS 1.2 ms |
| Notes | <p>The front panel interface (for example, the knob), and this command, adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware each time the offset is updated is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value. Note that the accumulated offset value is essentially arbitrary; it represents the accumulated offset from the last time the offset was zeroed (with the Reset Offset Display key).</p> <p>Note that this command does not change the period of the trigger waveform. Note also that Offset is used only when the sync source is set to OFF, otherwise delay is used, see section Trig Delay.</p> <p>An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.</p> |
| Notes | <p>When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated with the new value. However, the actual amount sent to the hardware is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value.</p> <p>The SCPI query simply returns the value currently showing on the key.</p> |
| Dependencies | The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes. |
| Couplings | The same offset is used in the Gate Source selection of the period timer. |
| Preset | 0 s |
| State Saved | Saved in instrument state |
| Min | -10.000 s |
| Max | 10.000 s |
| Default Unit | S |
| Initial S/W Revision | Prior to A.02.00 |

Offset Adjust (Remote Command Only)

This remote command does not work at all like the related front panel keys. This command lets you advance the phase of the frame trigger by the amount you specify.

It does not change the period of the trigger waveform. If the command is sent multiple times, it advances the phase of the frame trigger an additional amount each time it is sent. Negative numbers are permitted.

| | |
|-----------------------------|--|
| Remote Command | :TRIGger[:SEquence]:FRAMe:ADJust <time> |
| Example | TRIG:FRAM:ADJ 1.2 ms |
| Notes | Note also that Offset is used only when the sync source is set to OFF, otherwise delay is used, see section Trig Delay An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event. |
| Notes | The front panel interface (for example, the knob) and the :TRIG:FRAM:OFFS command adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware is the delta value, that is, the current offset value minus the previous offset value. When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated by increasing it (or decreasing it if the value sent is negative) by the amount specified in the SCPI command. This is a "command only" SCPI command, with no query. |
| Dependencies | The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes. |
| Couplings | The same offset is used in the Gate Source selection of the period timer. |
| Preset | 0 s |
| State Saved | Saved in instrument state |
| Min | -10.000 s |
| Max | 10.000 s |
| Default Unit | S |
| Initial S/W Revision | Prior to A.02.00 |

Reset Offset Display

Resets the value of the periodic trigger offset display setting to 0.0 seconds. The current displayed trigger location may include an offset value defined with the Offset key. Pressing this key redefines the currently displayed trigger location as the new trigger point that is 0.0 s offset. The Offset key can then be used to add offset relative to this new timing.

| | |
|-----------------------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:OFFSet:DISPlay:RESet |
| Example | TRIG:FRAM:OFFS:DISP:RES |
| Initial S/W Revision | Prior to A.02.00 |

Sync Source

Selects a signal source for you to synchronize your periodic timer trigger to, otherwise you are triggering at some arbitrary location in the frame. Synchronization reduces the precision requirements on the setting of the period.

For convenience you may adjust the level and slope of the selected sync source in a conditional branch setup menu accessed from the Sync Source menu. Note that these settings match those in the **Trigger** and **Gate Source** menus; that is, each trigger source has only one value of level and slope, regardless of which menu it is accessed from.

| | |
|-------------------------------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:SYNC EXTernal1 EXTernal2 RFBurst OFF :TRIGger[:SEquence]:FRAMe:SYNC? |
| Example | TRIG:FRAM:SYNC EXT2 |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message. |
| Preset | Off GSM/EDGE, MSR,LTE,LTETDD: RFBurst |
| State Saved | Saved in instrument state |
| Readback | The current setting is read back to this key and it is also Readback to the previous Periodic Timer trigger key. |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:SYNC EXTernal For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.14.00 |

Off

Turns off the sync source for your periodic trigger. With the sync source off, the timing will drift unless the signal source frequency is locked to the analyzer frequency reference.

| | |
|-----------------------------|--------------------------------------|
| Key Path | Trigger, Periodic Timer, Sync Source |
| Example | TRIG:FRAM:SYNC OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA |
| Dependencies | Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 1. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:LEVel <level> :TRIGger[:SEquence]:EXTernal1:LEVel? |
| Example | TRIG:EXT1:LEV 0.4 V |
| Couplings | This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:LEVel For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal1:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEQuence]:EXTernal1:SLOPe POSitive NEGative :TRIGger[:SEQuence]:EXTernal1:SLOPe? |
| Example | TRIG:EXT1:SLOP NEG |
| Couplings | This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:EXTernal:SLOPe For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:FRAMe:EXTernal1:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT2 Swept SA measurement TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message. Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 2. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:LEVel :TRIGger[:SEquence]:EXTernal2:LEVel? |
| Example | TRIG:EXT2:LEV 1.1 V |
| Couplings | This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal2:SLOPe? |
| Example | TRIG:EXT2:SLOP NEG |
| Couplings | This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

RF Burst

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector. Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

In some models, a variety of burst trigger circuitry is available, resulting in various available burst trigger bandwidths. The analyzer automatically chooses the appropriate trigger path based on the hardware configuration and other settings of the analyzer.

| | |
|-------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR RFB Swept SA measurement TRIG:<meas>:SOUR RFB Measurements other than Swept SA |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Backwards Compatibility Notes | The legacy command: :TRIGger[:SEquence]:RFBurst:FSElectivity[:STATe] OFF ON 0 1 is not supported in the X-Series, as the hardware to do Frequency Selective burst triggers does not exist in X-Series. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Absolute Trigger Level

Sets the absolute trigger level for the RF burst envelope.

When using the External Mixing path, the Absolute Trigger Level is uncalibrated because the factory default was set to accommodate the expected IF levels for the RF path.

| | |
|-----------------------|--|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute <ampl> :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute? |
| Example | TRIG:RFB:LEV:ABS 10 dBm sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm |
| Notes | Sending this command does not switch the setting from relative to absolute; to switch it you need to send the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command, below. Amplitude Corrections are not taken into account by the Absolute Trigger Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Absolute Trigger will not fire until you have set the trigger level that far below the displayed signal level, rather than simply to |

| | |
|-------------------------------------|--|
| | the displayed signal level. This is only true for Amplitude Corrections, not External Gain or Ref Level Offset functions. If mode is Bluetooth, the default value is -50 dBm. |
| Couplings | This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu |
| Preset | -20 dBm |
| State Saved | Saved in instrument state |
| Min | -200 dBm |
| Max | 100 dBm |
| Default Unit | depends on the current selected Y-Axis unit |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:RFBurst:LEVel:ABSolute |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

| | |
|--------------------------|---|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:TYPE ABSolute RELative :TRIGger[:SEquence]:RFBurst:LEVel:TYPE? |
| Example | TRIG:RFB:LEV:TYPE REL sets the trigger level type of the RF burst trigger to Relative. |
| Preset | ABSolute |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-----------------------|--|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:SLOPe POSitive NEGative :TRIGger[:SEquence]:RFBurst:SLOPe? |
| Example | TRIG:RFB:SLOP NEG |
| Couplings | This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |

| | |
|-------------------------------------|--|
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:FRAMe:RFBurst:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Sync Holdoff

Sync Holdoff specifies the duration that the sync source signal must be kept false before the transition to true to be recognized as the sync timing. The periodic timer phase is aligned when the sync source signal becomes true, after the Holdoff time is satisfied.

A holdoff of 2 ms will work with most WiMAX signals, but there may be cases where the burst off duration is less than 1 ms and this value will need to be changed.

| | |
|-----------------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEQuence]:FRAMe:SYNC:HOLDoff <time> :TRIGger[:SEQuence]:FRAMe:SYNC:HOLDoff? :TRIGger[:SEQuence]:FRAMe:SYNC:HOLDoff:STATe OFF ON 0 1 :TRIGger[:SEQuence]:FRAMe:SYNC:HOLDoff:STATe? |
| Preset | On, 1.000 ms |
| State Saved | Saved in instrument state |
| Min | 0 ms |
| Max | +500 ms |
| Default Unit | s |
| Initial S/W Revision | Prior to A.02.00 |

Control Edge/Level

Sets the method of controlling the gating function from the gating signal.

Edge

In Edge triggering, the gate opens (after the Delay) on the selected edge (for example, positive) of the gate signal and closes on the alternate edge (for example, negative).

Level

In Level triggering, the gate opens (after the Delay) when the gate signal has achieved a certain level and stays open as long as that level is maintained.

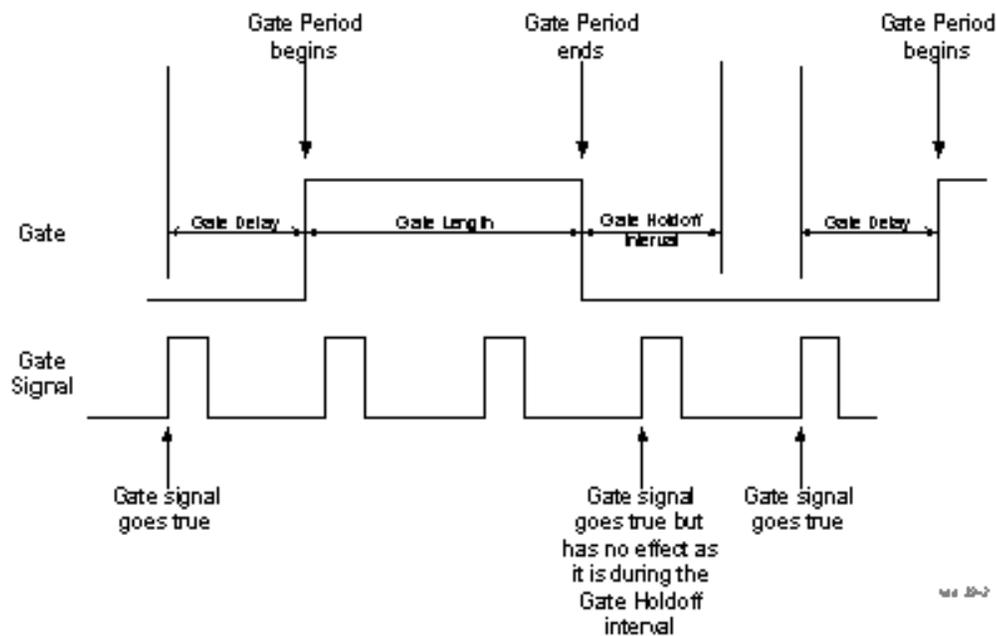
| | |
|-----------------------|---|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe]:SWEep:EGATe:CONTRol EDGE LEVEL [:SENSe]:SWEep:EGATe:CONTRol? |
| Example | SWE:EGAT:CONT EDGE |
| Dependencies | If the Gate Method is FFT the Control key is grayed out and Edge is selected. |

| | |
|-------------------------------------|--|
| | If the Gate Source is TV, Frame or Line, the Control key is grayed out and Edge is selected. |
| Preset | EDGE |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | <code>[:SENSe]:SWEep:TIME:GATE:TYPE</code> ESA Compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Holdoff

Lets you increase or decrease the wait time after a gate event ends before the analyzer will respond to the next gate signal.

After any Gate event finishes, the analyzer must wait for the sweep system to settle before it can respond to another Gate signal. The analyzer calculates a "wait time," taking into account a number of factors, including RBW and Phase Noise Optimization settings. The goal is to achieve the same accuracy when gated as in ungated operation. The figure below illustrates this concept:



When Gate Holdoff is in Auto, the wait time calculated by the analyzer is used. When Gate Time is in Manual, the user may adjust the wait time, usually decreasing it in order to achieve greater speed, but at the risk of decreasing accuracy.

When the Method key is set to Video or FFT, the Gate Holdoff function has no effect.

In measurements that do not support Auto, the value shown when Auto is selected is “---” and the manually set holdoff is returned to a query.

| | |
|----------|---------------------|
| Key Path | Sweep/Control, Gate |
|----------|---------------------|

| | |
|-----------------------------|--|
| Remote Command | <pre>[:SENSe] :SWEep:EGATe:HOLDoff <time> [:SENSe] :SWEep:EGATe:HOLDoff? [:SENSe] :SWEep:EGATe:HOLDoff:AUTO OFF ON 0 1 [:SENSe] :SWEep:EGATe:HOLDoff:AUTO?</pre> |
| Example | <pre>SWE:EGAT:HOLD 0.0002 SWE:EGAT:HOLD? SWE:EGAT:HOLD:AUTO ON SWE:EGAT:HOLD:AUTO?</pre> |
| Couplings | <p>When Gate Holdoff is Auto, the Gate Holdoff key shows the value calculated by the analyzer for the wait time.</p> <p>Pressing the Gate Holdoff key while it is in Auto and not selected, causes the key to become selected and allows the user to adjust the value. If the value is adjusted, the setting changes to Man.</p> <p>Pressing the Gate Holdoff key, while it is in Auto and selected, does not change the value of Gate Holdoff, but causes the setting to change to Man. Now the user can adjust the value.</p> <p>Pressing the key while it is in Man and selected, cause the value to change back to Auto.</p> <p>Pressing the key while it is in Man and not selected, causes the key to become selected and allows the user to adjust the value.</p> <p>When Method is set to Video or FFT, the Gate Holdoff function has no effect.</p> |
| Preset | <p>Auto</p> <p>Auto/On</p> |
| State Saved | Saved in instrument state |
| Min | 1 μsec |
| Max | 1 sec |
| Initial S/W Revision | Prior to A.02.00 |

Gate Delay Compensation

This function allows you to select an RBW-dependent value by which to adjust the gate delay, to compensate for changes in the delay caused by RBW effects.

You can select between uncompensated operation and two types of compensation, Delay Until RBW Settled and Compensate for RBW Group Delay.

See ["More Information" on page 782](#)

| | |
|-----------------------|--|
| Key Path | Sweep/Control, Gate |
| Scope | Meas Global |
| Remote Command | <pre>[:SENSe] :SWEep:EGATe:DELaY:COMPensation:TYPE OFF SETTled GDELaY [:SENSe] :SWEep:EGATe:DELaY:COMPensation:TYPE?</pre> |
| Example | <pre>SWE:EGAT:DEL:COMP:TYPE SETT SWE:EGAT:DEL:COMP:TYPE?</pre> |

| | |
|--------------------------|---|
| Notes | <p>Although this function is Meas Global, there are some measurements that do not support this function. In those measurements the operation will be Uncompensated. Going into one of those measurements will not change the Meas Global selection; it will simply display the grayed-out menu key with "Uncompensated" showing as the selection. This is a non-forceful grayout, so the SCPI command is still accepted.</p> <p>If Gate Delay Compensation is not supported at all within a particular mode, the key is not displayed, and if the SCPI command is sent while in a measurement within that mode, an "Undefined Header" message is generated.</p> <p>Measurements that do not support this function include: Swept SA</p> |
| Preset | <p>TD-SCDMA mode: Compensate for RBW Group Delay All other modes: Delay Until RBW Settled</p> |
| State Saved | Saved in instrument state |
| Range | Uncompensated Delay Until RBW Settled Compensate for RBW Group Delay |
| Readback text | Uncompensated Settled Group Delay |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.0 |

More Information

Selecting Uncompensated means that the actual gate delay is as you sets it.

Selecting Delay Until RBW Settled causes the gate delay to be increased above the user setting by an amount equal to $3.06/\text{RBW}$. This compensated delay causes the GATE START and GATE STOP lines on the display to move by the compensation amount, and the actual hardware gate delay to be increased by the same amount. All the other gate lines (for example, MIN FAST) are unaffected. If the RBW subsequently changes, the compensation is readjusted for the new RBW. The value shown on the Gate Delay key does NOT change.

Delay Until RBW Settled allows excellent measurements of gated signals, by allowing the IF to settle following any transient that affects the burst. Excellent measurements also require that the analysis region not extend into the region affected by the falling edge of the burst. Thus, excellent measurements can only be made over a width that declines with narrowing RBWs, which is achieved by decreasing the gate length below the user setting by an amount equal to $2.53/\text{RBW}$. Therefore, for general purpose compensation, you will still want to change the gate length with changes in RBW even if the gate delay is compensated. The compensated Gate Length is limited by the analyzer so that it will never go below 10% of the value shown on the Gate Length key, as otherwise the sweep times could get very long. Anytime the Gate Length and RBW values combine in such a way that this limiting takes place, a warning is displayed. For measurements which contain multiple sweeps with different RBW like SEM and SPUR, the smallest RBW is used for this limiting.

Selecting Compensate for RBW Group Delay causes the gate delay to be increased above the user setting by an amount equal to $1.81/\text{RBW}$. This compensated delay causes the GATE START, GATE STOP lines on the display to move by the compensation amount, and the actual hardware gate delay to be increased by the same amount. All the other gate lines (for example, MIN FAST) are unaffected. If the RBW

subsequently changes, the compensation is readjusted for the new RBW. The value shown on the Gate Delay key does NOT change. Compensate for RBW Group Delay also includes gate length compensation; the gate length itself is adjusted as necessary to attempt to compensate for delay effects imposed by the RBW.

Compensate for RBW Group Delay is similar to Delay Until RBW Settled, but compensates for the group delay of the RBW filter, rather than the filter settling time. As the RBW gets narrow, this can allow the settling tail of the RBW to affect the beginning part of the gated measurement, and allow the beginning of the RBW settling transient to affect the end of the gated measurement. These two effects are symmetric because the RBW response is symmetric. Because the gate length is not automatically compensated, some users might find this compensation to be more intuitive than compensation for RBW settling.

Min Fast Position Query (Remote Command Only)

This command queries the position of the MIN FAST line, relative to the delay reference (REF) line. See section "[Gate View On/Off](#)" on page 2338. If this query is sent while not in gate view, the MinFast calculation is performed based on the current values of the appropriate parameters and the result is returned. Knowing this value lets you set an optimal gate delay value for the current measurement setup.

| | |
|-----------------------------|---|
| Remote Command | <code>[:SENSe] :SWEep:EGATe:MINFast?</code> |
| Example | <code>SWE:EGAT:MIN?</code> |
| Initial S/W Revision | Prior to A.02.00 |

Gate Preset (Remote Command Only)

Presets the time-gated spectrum analysis capability.

This command sets gate parameter values to the ESA preset values, as follows:

Gate trigger type = edge

Gate polarity = positive

Gate delay = 1 us

Gate length = 1 us

| | |
|-----------------------------|---|
| Remote Command | <code>[:SENSe] :SWEep:TIME:GATE:PRESet</code> ESA Compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Level (Remote Command Only)

Sets the gate input transition point level for the external TRIGGER inputs on the front and rear panel. This is a legacy command for PSA compatibility. It is simply an alias to the equivalent trigger level command.

| | |
|-----------------------|---|
| Remote Command | <code>[:SENSe] :SWEep:EGATe:EXTernal [1] 2 :LEVel <voltage></code> <code>[:SENSe] :SWEep:EGATe:EXTernal [1] 2 :LEVel?</code> |
| Notes | This command is simply an alias to |

| | |
|----------------------|---|
| | :TRIGger[:SEQuence]:EXTernal[1]2:LEVel For details refer |
| Initial S/W Revision | Prior to A.02.00 |

Gate Polarity (Remote Command Only)

Sets the polarity for the gate signal. This setup is now done using the gate trigger's slope setting.

When Positive (Pos) is selected, a positive-going edge (Edge) or a high voltage (Level) will satisfy the gate condition, after the delay set with the Gate Delay key. When Negative (Neg) is selected, a negative-going edge (Edge) or a low voltage (Level) will satisfy the gate condition after the delay.

| | |
|-------------------------------------|---|
| Remote Command | [:SENSe] :SWEep:EGATe:POLarity NEGative POSitive [:SENSe] :SWEep:EGATe:POLarity? |
| Example | SWE:EGAT:POL NEG SWE:EGAT:POL? |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | [:SENSe] :SWEep:TIME:GATE:POLarity ESA compatibility |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|---|
| Remote Command | [:SENSe] :SWEep:TIME:GATE:LEVel HIGH LOW [:SENSe] :SWEep:TIME:GATE:LEVel? ESA compatibility |
| Preset | HIGH |
| Initial S/W Revision | Prior to A.02.00 |

Points

Sets the number of points per sweep, from 1 to 20001. The sweep time resolution setting will depend on the number of points selected.

| | |
|-----------------------|--|
| Key Path | Sweep/Control |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :ACPoweR:SWEep:POINts <integer> [:SENSe] :ACPoweR:SWEep:POINts? |
| Example | ACP:SWE:POIN 500 ACP:SWE:POIN? |

| | |
|--------------------------|--|
| Notes | Whenever the number of sweep points changes: <ul style="list-style-type: none">• All trace data is erased• Any traces with Update Off will also go to Display Off (like going from View to Blank in the older analyzers)• Sweep time is re-quantized• Any limit lines that are on will be updated• If averaging/hold is on, averaging/hold starts over |
| Couplings | Whenever the number of sweep points changes, the sweep time is re-quantized. |
| Preset | Others: 1001 DVB-T/H:2001 DTMB (CTTB): 2001 ISDB-T: 2001 CMMB: 2001 Digital Cable TV: 2001 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 20001 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

System

See "[System](#)" on page 349

Trace/Detector

Accesses a menu of functions that enable you to control the detectors for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Select Trace (Front-panel Only)

This key selects which trace the other parameters under the Trace/Detector menu will apply to.

| | |
|----------------------|--|
| Key Path | Trace/Detector |
| Notes | Front-panel only. |
| Couplings | When Meas Method is RBW or FAST, Select Trace is disabled. |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Range | 1 2 3 |
| Initial S/W Revision | Prior to A.02.00 |

Trace Type

Allows you to select the type of trace for the current measurement. The first page of this menu contains a selection of the trace type (Clear Write, Trace Average, Max Hold, Min Hold) for the selected trace.

| | |
|-----------------------|---|
| Key Path | Trace/Detector |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :TRACe [1] 2 3 :ACPoweR :TYPE WRITe AVERAge MAXHold MINHold :TRACe [1] 2 3 :ACPoweR :TYPE? |
| Example | TRAC:ACP:TYPE MINH TRAC:ACP:TYPE? |
| Notes | WRITe = Clear Write AVERAge = Average MAXHold = Maximum Hold MINHold = Minimum Hold |
| Couplings | When Detector setting is "Auto" (:SENSe]:ACPoweR:DETEctor:AUTO?), Detector is set to what the Radio Standard defaults states (see detector section below) for all conditions of Trace Type and for all traces. When set to Manual, all Traces use the same detector type. When Average State = Off then Trace Types AVERAge, MaxHold and MinHold will not function, since Averaging is required to be 'on' for them to operate. |

| | |
|--------------------------|--|
| | When Meas Method is RBW or FAST, Trace Type is disabled. |
| Preset | AVERage |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

View/Blank

Enables you to select how to view the displayed trace.

| | |
|--------------------------|--|
| Key Path | Trace/Detector |
| Mode | SA,WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD,LTEATDD |
| Notes | No remote control. Front panel only. |
| Couplings | The four states of this 1-of-N actually set two variables, Update and Display, to their four possible combinations. Trace On: Update and Display both On View: Update Off and Display On (Not implemented) Blank: Update Off and Display Off Background: Update On, Display Off (Not implemented) See tables below for detail on remote commands to control these two variables. Selecting a trace type (Clear Write, Trace Average, Max Hold, Min Hold) for a trace (pressing the key or sending the equivalent remote command) puts the trace in 'Trace On' state (Update On and Display On), even if that trace type was already selected. When Meas Method is RBW or FAST, this key is grayed out. |
| Preset | Trace On |
| State Saved | Saved in instrument state. |
| Range | Trace On Blank |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|----------------|---|
| Key Path | Trace/Detector |
| Mode | WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD,LTEATDD |
| Remote Command | :TRACe [1] 2 3 :ACPpower:UPDate [:STATe] ON OFF 0 1 :TRACe [1] 2 3 :ACPpower:UPDate [:STATe] ? |
| Example | TRAC:ACP:UPD ON TRAC:ACP:UPD? |
| Couplings | Whenever you set Update to On for any trace, the Display is set to On for that trace. When Meas Method is RBW or FAST, Trace Update is disabled. |
| Preset | 1 0 0 (On for Trace 1; Off for 2 &3) |

| | |
|--------------------------|--|
| State Saved | Saved in instrument state. |
| Range | 0 1 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |
| <hr/> | |
| Key Path | Trace/Detector |
| Mode | WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :TRACe[1] 2 3:ACPoWer:DISPlay[:STATe] ON OFF 0 1 :TRACe[1] 2 3:ACPoWer:DISPlay[:STATe]? |
| Example | TRAC:ACP:DISP ON TRAC:ACP:DISP? |
| Couplings | Whenever you set Update to On for any trace, the Display is set to On for that trace. When Meas Method is RBW or FAST, Trace Display is disabled. |
| Preset | 1 0 0 (On for Trace 1; Off for 2 & 3) |
| State Saved | Saved in instrument state. |
| Range | 0 1 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Detector

Accesses a menu of functions that enables you to control the detectors for the current measurement. Allows up to three (3) traces, but each use the same detector type choice. The following choices are available:

- Auto– the detector selected is set to AVERage, unless the Radio Standard defaults state otherwise e.g. it is set to Peak for Radio Standard = PDC when Device = both MS and BTS, and when Radio Standard = NADC and Device = MS.
- Normal–the detector determines the peak of the CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection.
- Average–the detector determines the average of the signal within the sweep points. The averaging method is Power (RMS).
- Peak–the detector determines the maximum of the signal within the sweep points.
- Sample–the detector indicates the instantaneous level of the signal at the center of the sweep points represented by each display point.
- Negative Peak–the detector determines the minimum of the signal within the sweep points.

In swept analysis, the time interval of the data collection for the display sweep points also represents a frequency interval. In FFT analysis, the sweep points represents just a frequency interval. The detector

determines the relationship between the spectrum computed by the FFT and the single data point displayed for the sweep points.

| | |
|----------------------|------------------|
| Key Path | Trace/Detector |
| Initial S/W Revision | Prior to A.02.00 |

Auto

Sets the detector for the currently selected trace to auto.

| | |
|--------------------------|--|
| Key Path | Trace/Detector |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe] :ACPower:DETECTOR:AUTO ON OFF 1 0</code> <code>[:SENSe] :ACPower:DETECTOR:AUTO?</code> |
| Example | ACP:DET:AUTO 1 ACP:DET? |
| Couplings | When Detector setting is "Auto" (<code>[:SENSe] :ACPower:DETECTOR:AUTO?</code>), Detector is set to what the Radio Standard defaults states (see detector section) for all conditions of Trace Type and for all traces. When set to Manual, all Traces use the same detector type. When Average State = Off then Trace Types AVERage, MaxHold and MinHold will not function, since Averaging is required to be 'on' for them to operate. |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | ON OFF |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Detector Selection

Selects a detector to be used by the analyzer for the current measurement. All traces will use the same detector type, similar to Monitor Spectrum measurement

| | |
|-----------------------|---|
| Key Path | Trace/Detector |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe] :ACPower:DETECTOR[:FUNCTION] AVERage NEGative NORMal POSitive SAMPlE</code> <code>[:SENSe] :ACPower:DETECTOR[:FUNCTION]?</code> |
| Example | ACP:DET NORM ACP:DET? |
| Notes | When you manually select a detector (instead of selecting Auto), that detector is used regardless of |

other analyzer settings.

The detector choices are:

- The Normal detector determines the peak of CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection.
- The Average detector determines the average of the signal within the data range. The averaging method is Power (RMS).
- The Peak detector determines the maximum of the signal within the data range.
- The Sample detector indicates the instantaneous level of the signal at the center of the data represented by each display point.
- The Negative Peak detector determines the minimum of the signal within the data range.

Because they may not find a spectral component's true peak, neither average nor sample detectors measure amplitudes of CW signals as accurately as peak or normal, but they do measure noise without the biases of peak detection.

When a detector selection is made, the menu returns to the previous menu.

| | |
|---|---|
| Couplings | <p>When Detector setting is "Auto" (:SENSe]:ACPower:DETECTOR:AUTO?), Detector is set to what the Radio Standard defaults states (see detector section) for all conditions of Trace Type and for all traces. When set to Manual, all Traces use the same detector type. When Average State = Off then Trace Types AVERage, MaxHold and MinHold will not function, since Averaging is required to be 'on' for them to operate.</p> <p>Only one detector type for all 3 traces is allowed.</p> <p>When Meas Method is RBW or FAST, Detector is disabled.</p> |
| Preset | AVERage |
| State Saved | Saved in instrument state. |
| Range | Normal Average Peak Sample Negative Peak |
| Backwards Compatibility SCPI | [:SENSe] :ACPR :SWEep :DETECTOR [:FUNCTION] |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Trigger

See ["Trigger" on page 424](#)

Free Run

See ["Free Run " on page 431](#)

External 1

See ["External 1 " on page 2357](#)

Trigger Level

See ["Trigger Level " on page 2357](#)

Trig Slope

See ["Trig Slope " on page 2358](#)

Trig Delay

See ["Trig Delay " on page 437](#)

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off" on page 2346](#)

External 2

See ["External 2 " on page 2359](#)

Trigger Level

See ["Trigger Level " on page 2359](#)

Trig Slope

See ["Trig Slope " on page 2360](#)

Trig Delay

See ["Trig Delay " on page 440](#)

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off" on page 2348](#)

RF Burst

See ["RF Burst " on page 2360](#)

Absolute Trigger

See ["Absolute Trigger Level" on page 2361](#)

Relative Trigger

See ["Relative Trigger Level" on page 2350](#)

Trig Slope

See ["Trigger Slope " on page 2362](#)

Trig Delay

See ["Trig Delay " on page 444](#)

Periodic Timer

See ["Periodic Timer \(Frame Trigger\) " on page 2352](#)

Period

See ["Period " on page 2353](#)

Offset

See ["Offset " on page 2354](#)

Reset Offset Display

See ["Reset Offset Display " on page 2356](#)

Sync Source

See ["Sync Source " on page 2356](#)

Off

See ["Off " on page 2357](#)

External 1

See ["External 1 " on page 2357](#)

Trigger Level

See ["Trigger Level " on page 2357](#)

Trig Slope

See ["Trig Slope " on page 2358](#)

External 2

See ["External 2 " on page 2359](#)

Trigger Level

See ["Trigger Level " on page 2359](#)

Trig Slope

See ["Trig Slope " on page 2360](#)

RF Burst

See ["RF Burst "](#) on page 2360

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 2361

Trig Slope

See ["Trigger Slope "](#) on page 2362

Trig Delay

See [__](#) on page X

Auto/Holdoff

See ["Auto/Holdoff "](#) on page 445

Auto Trig

See ["Auto Trig "](#) on page 445

Trig Holdoff

See ["Trig Holdoff "](#) on page 446

Holdoff Type

See ["Holdoff Type"](#) on page 446

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

| Key Path | Front-panel key |
|-------------------------------|--|
| Backwards Compatibility Notes | <p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p> |
| Initial S/W Revision | Prior to A.02.00 |

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER |
| Notes | :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed |
| Couplings | A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:ALL |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL |
| Notes | Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. |
| Couplings | A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

| | |
|-----------------------|---|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:SAVE |
| Example | :SYST:PRES:USER:SAVE |
| Notes | :SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file. |
| Initial S/W Revision | Prior to A.02.00 |

View/Display

Accesses a menu of functions that enable you to control the instrument display as well as turn the bar graph On and Off.

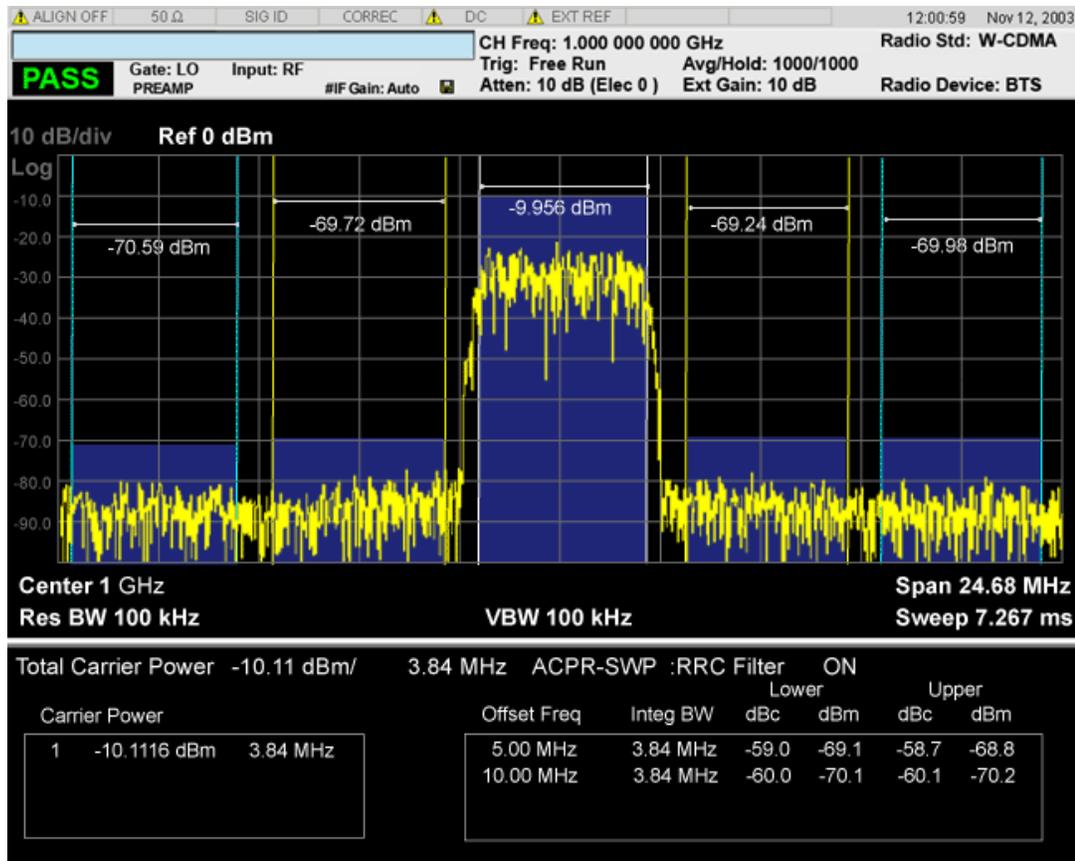
If current mode is NOT MSR and LTE-Advanced FDD/TDD mode, the front panel views only contain one view: Spectrum View.

The results of the measurement can be displayed as a single spectrum trace view or displayed with a Bar Graph trace on the spectrum trace.

The display consists of the following two windows:

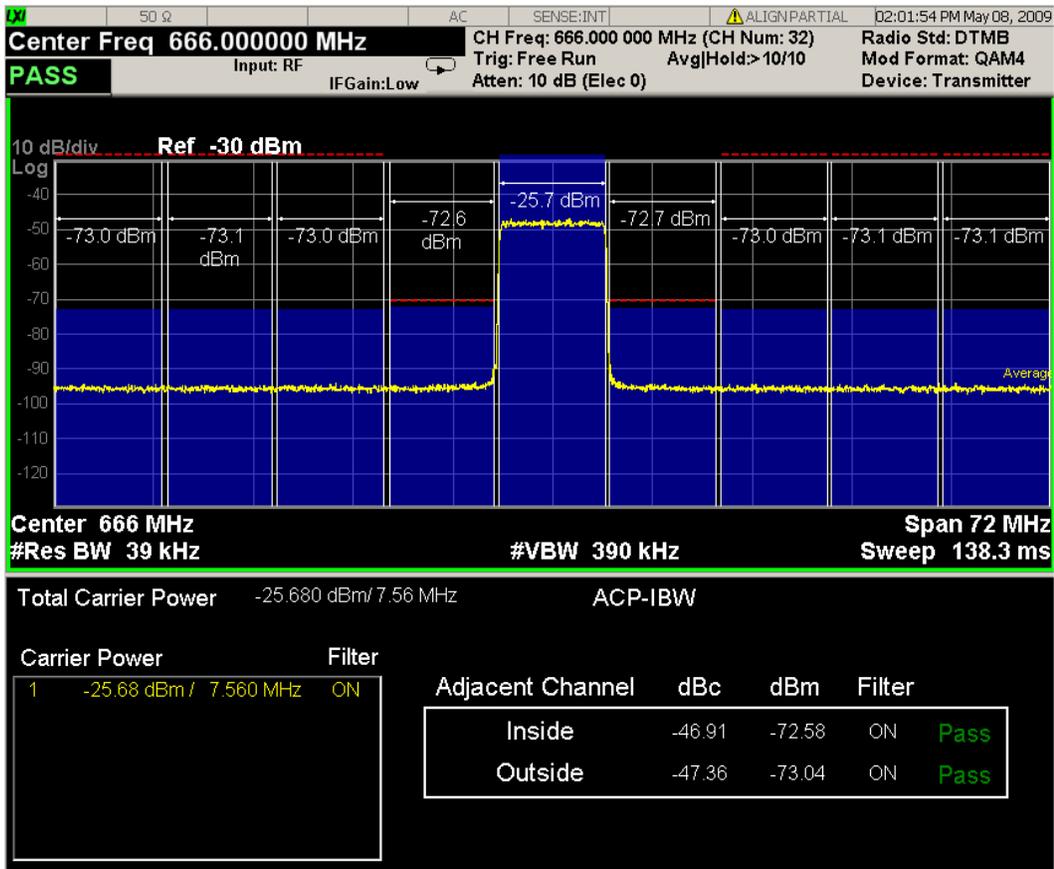
"Spectrum Window" on page 800

"Results Window" on page 800

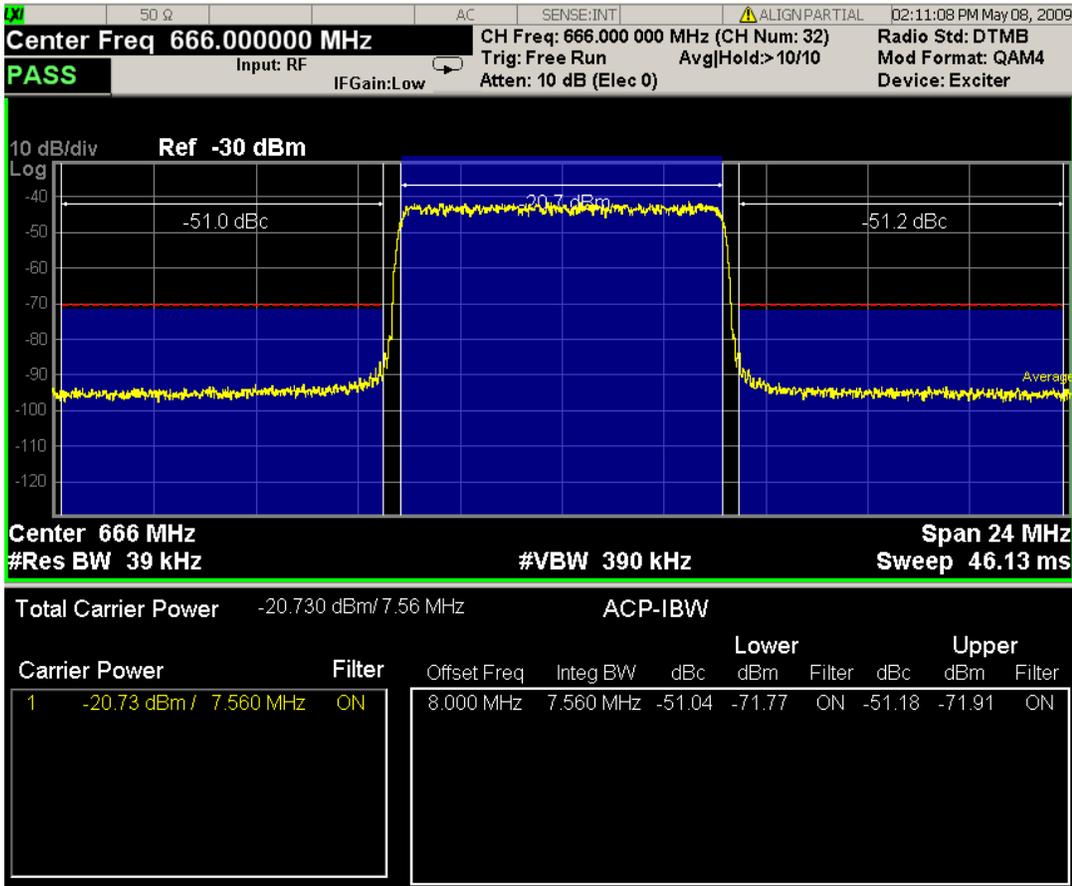


The following two views are only for DTMB (CTTB) and CMMB:

DTMB and CMMB Transmitter:



DTMB and CMMB Exciter:



Spectrum Window

When the Bar Graph is On and Limit Test is On, the color of each bar graph reflects the limit test result. When the limit test fails, the bar color is red, and when limit test passes, the bar color is blue.

When RBW is selected as the measurement method, the spectrum trace is not displayed, only the bar graph is displayed. In addition, the Bar Graph key (under the View/Display front-panel key) is set to ON and is grayed out.

The RRC Filter display item is only displayed when RRC filter is on.

Results Window

The text window displays the following results:

Total Carrier Power

This is the total power of all the carriers with carrier power present set to yes. The power is calculated by integrating across the bandwidth declared by the Carrier Integ Bw parameter for each carrier and then totaling the sums. The total integration bandwidth is shown as part of the result. This will be the total of the Carrier Integ Bw of the carriers used in calculating the total carrier power. If the RRC Filter is on, then the integration bandwidth used is $(1 + \alpha)/T$ where $T = 1/(\text{Carrier Integ Bw})$ multiplied by the number of carriers with carrier power present set to yes.

Ref Carrier Power

This is the power in the reference carrier. The power is calculated by integrating across the bandwidth declared by the Carrier Integ Bw parameter for that carrier. The integration bandwidth is shown as part of the result. This is the value of the Carrier Integ Bw for that carrier unless the RRC Filter is on, then the integration bandwidth used is the displayed value, which is $(1 + \alpha)/T$ where $T = 1/(\text{Carrier Integ Bw})$.

Carrier Power

This is the power in all the currently defined carriers. If the carrier has carrier power present, the power will be absolute. If the carrier is defined as not having power present, the power will be relative to the reference carrier. The power is calculated by integrating across the bandwidth declared by the Carrier Integ Bw parameter. The integration bandwidth is shown as part of the result. This is the value of the Carrier Integ Bw for the carrier unless the RRC Filter is on, then the integration bandwidth used is the displayed value, which is $(1 + \alpha)/T$ where $T = 1/(\text{Carrier Integ Bw})$.

As there are potentially more results than can be easily viewed on the display, a scrollable list is used to display all results. The Carrier Results menu key is used to index the carrier amplitude results. This key is grayed out unless the measurement is in single mode (as in continual measurement mode). The display is continuously updating and will not need to be accessed. The currently selected Carrier Result is displayed on the last line of the carrier power result list unless:

- The selected Carrier Result is 4 or less in normal multi carrier power results view. In this case the first 4 carrier power results will be displayed.
- The selected Carrier Result is 9 or greater in normal multi carrier power results view. In this case the last 4 carrier power results will be displayed.
- The zoom mode is selected. In this case all carrier power ranges can be displayed.

Offset Relative Power

This is the power in the offsets relative to the reference carrier. The power is calculated by integrating across the bandwidth declared by the Offset Integ Bw parameter. The offset integration bandwidth is shown as part of the result. This is the value on the Offset Integ Bw menu key unless the RRC Filter is on, then the integration bandwidth used is the displayed value, which is $(1 + \alpha)/T$ where $T = 1/(\text{Offset Integ Bw})$.

Offset Absolute Power

This is the absolute power in the offsets. The power is calculated by integrating across the bandwidth declared by the Offset Integ Bw parameter. The offset integration bandwidth is shown as part of the result. This is the value on the Offset Integ Bw menu key unless the RRC Filter is on, then the integration bandwidth used is the displayed value, which is $(1 + \alpha)/T$ where $T = 1/(\text{Offset Integ Bw})$.

Inside Adjacent Channel Power (DTMB (CTTB) and CMMB only)

This result is only valid for DTMB (CTTB) transmitter and CMMB transmitter. It contains two parts: Relative Power and Absolute Power. The power is calculated by integrating across the bandwidth (Integ Bw) at the frequency Offset A.

Inside Absolute Power = MAX (P_{Lower Offset A}, P_{Upper Offset A});

Inside Relative Power = Inside Absolute Power – Carrier Power;

Outside Adjacent Channel Absolute Power (DTMB (CTTB) and CMMB only)

This result is only valid for DTMB (CTTB) transmitter and CMMB transmitter. It contains two parts: Relative Power and Absolute Power. The power is the Root-Mean-Square of the power calculated by integrating across the bandwidth (Integ Bw) at frequency Offset B, C and D.

$$\text{Outside Absolute Power} = \sqrt{\frac{P_{\text{Lower OffsetB}}^2 + P_{\text{Upper OffsetB}}^2 + P_{\text{Lower OffsetC}}^2 + P_{\text{Upper OffsetC}}^2 + P_{\text{Lower OffsetD}}^2 + P_{\text{Upper OffsetD}}^2}{6}}$$

Outside Relative Power = Outside Absolute Power – Carrier Power;

If current mode is MSR, there are two views, Result Trace and Carrier Info.

NOTE

Y Scale/Div, Y Ref Position, Y Auto Scale, Y Ref Value and Bar Graph affect both views. For example, power bars on the traces in both views appear or disappear when Bar Graph is toggled.

View Selection by Name (MSR and LTE-Advanced FDD/TDD Only)

Selects the results view. The following SCPI command allows you to select the desired measurement view by enumeration.

| | |
|----------------------|--|
| Key Path | No equivalent front-panel key |
| Mode | MSR, LTEAFDD,LTEATDD |
| Remote Command | :DISPlay:ACPower:VIEW[:SElect] PRESult CINformation :DISPlay:ACPower:VIEW[:SElect]? |
| Example | DISP:ACP:VIEW PRES DISP:ACP:VIEW? |
| Notes | This SCPI is only available in MSR and LTE-Advanced FDD/TDD. |
| Preset | PRESult |
| State Saved | Saved in instrument state |
| Range | Power Results Carrier Info |
| Initial S/W Revision | A.10.00 |

| | |
|----------------------|---|
| Key Path | No equivalent front-panel key |
| Mode | MSR, LTEAFDD,LTEATDD |
| Remote Command | :DISPlay:ACPower:VIEW:NSElect <integer> :DISPlay:ACPower:VIEW:NSElect? |
| Example | DISP:ACP:VIEW:NSEL 1 DISP:ACP:VIEW:NSEL? |
| Notes | This SCPI is only available in MSR and LTE-Advanced FDD/TDD. |
| Preset | 1 |
| State Saved | Saved in instrument state |
| Min | 1 |
| Max | 2 |
| Initial S/W Revision | A.10.00 |

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

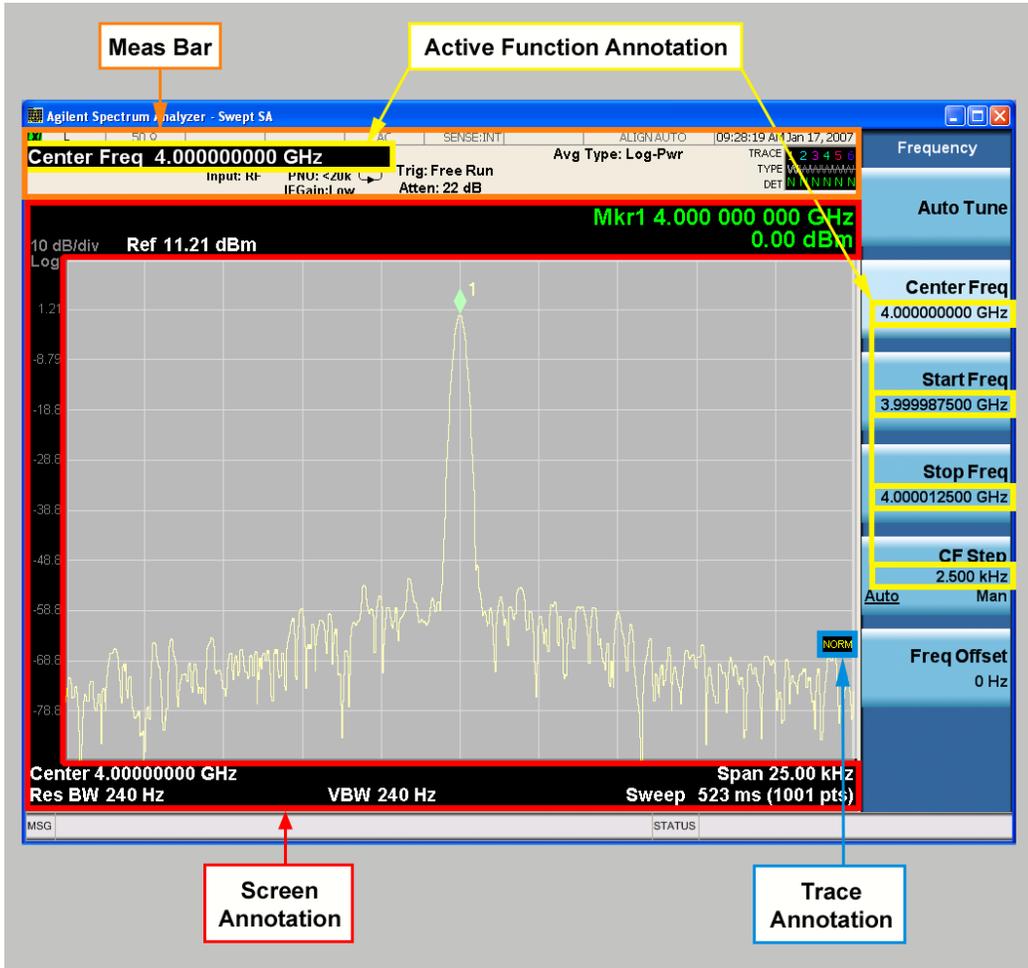
| | |
|----------------------|------------------|
| Key Path | Display |
| Key Path | View/Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

| | |
|----------------------|--|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNOtation:MBAR[:STATe] OFF ON 0 1 :DISPlay:ANNOtation:MBAR[:STATe]? |
| Example | DISP:ANN:MBAR OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off. |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Screen

This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

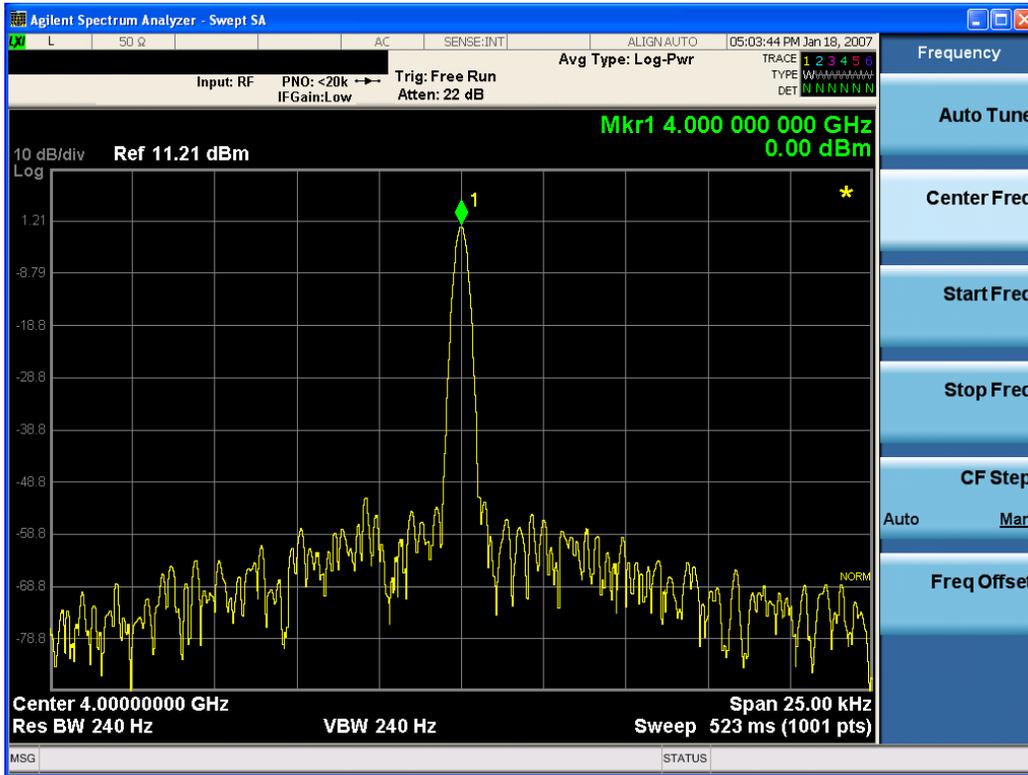
| | |
|----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]? |
| Example | DISP:ANN:SCR OFF |
| Dependencies | Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..

9 ACP Measurement
View/Display



| | |
|----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE] ? |
| Example | DISP:ACT OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Title

Displays menu keys that enable you to change or clear a title on your display.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Mode | All |
| Remote Command | :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA? |
| Example | DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title |
| Notes | Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters. |
| Preset | No title (measurement name instead) |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Example | The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required. |
| Notes | Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted). |
| Preset | Performed on Preset. |
| Initial S/W Revision | Prior to A.02.00 |

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

| | |
|----------------------|--|
| Key Path | View/Display, Display |
| Remote Command | :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]? |
| Example | DISP:WIND:TRAC:GRAT:GRID OFF |
| Notes | The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis. |
| Preset | On |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

| | |
|-------------------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:WINDow[1]:ANNotation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNotation[:ALL]? |
| Example | :DISP:WIND:ANN OFF |
| Preset | On (Set by Restore Misc Defaults) |
| State Saved | Not saved in instrument state. |
| Backwards Compatibility Notes | The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOlor FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

| | |
|-----------------------|--|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight ON OFF :DISPlay:BACKlight? |
| Preset | ON (Set by Restore Misc Defaults) |
| Initial S/W Revision | Prior to A.02.00 |

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

| | |
|-----------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity? |
| Example | DISP:BACK:INT 50 |

| | |
|----------------------|------------------------------------|
| Preset | 100 (Set by Restore Misc Defaults) |
| Min | 0 |
| Max | 100 |
| Initial S/W Revision | Prior to A.02.00 |

Bar Graph

Turns the Bar Graph On and Off.

| | |
|--------------------------|--|
| Key Path | View/Display |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:ACPower:VIEW[1]:WINDow[1]:BGRaph OFF ON 0 1 :DISPlay:ACPower:VIEW[1]:WINDow[1]:BGRaph? |
| Example | DISP:ACP:VIEW:WIND:BGR OFF DISP:ACP:VIEW:WIND:BGR? |
| Notes | You must be in the mode that includes ACP measurements to use this command. Use :INSTrument:SElect to set the mode. |
| Dependencies | When the method is RBW, this key is always set to On and grayed out. |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

10 Power vs Time Measurement

This measures the Power vs. Time of TD-SCDMA signal. You must be in the TD-CDMA mode to use these commands. For more details, see "[Power vs Time Measurement Description](#)" on page 817 below.

This topic contains the following sections.

["Remote Commands for Power vs Time"](#) on page 814

["Measurement Results for Power vs Time Measurement"](#) on page 815

Remote Commands for Power vs Time

The following commands are used to retrieve the measurement results:

:CONFigure:PVTime

:CONFigure:PVTime:NDEFault

:INITiate:PVTime

:FETCh:PVTime[n]?

:READ:PVTime[n]?

:MEASure:PVTime[n]?

Measurement Results for Power vs Time Measurement

For each result, the following heading is used to represent its format and precision.

#.Result Name (type of number) [unit] <explanation>

Type of number includes double, float and integer.

| Index n | Results Returned |
|------------------------|---|
| 0 | Returns unprocessed I/Q trace data as a series of comma-separated trace point values, in volts. The I values are listed first in each pair, using 0 through the even-indexed values. The Q values are odd-indexed values. |
| n=1 (or not specified) | <p>Returns the following comma-separated scalar results:</p> <ol style="list-style-type: none"> Sample time is a floating point number representing the time between samples of displayed trace which you can get by using the trace queries (n=2, 3, ...). Number of samples is the number of data points in the displayed trace. This number is useful when performing a query on the signal (i.e. when n=2, 3, ...). Mean Power is the mean power (in dBm) of the range specified by Analysis Time Slot and Measured Time Slots in the most recently acquired data, or in the last data acquired at the end of a set of averages. Burst width is the width of the first set of continuous active slots in the range specified by Analysis Time slot and Measured Time Slots. Trigger Diff is the time difference between the position of the trigger line and the -6 dB point of the positive slope of the start slot specified by Analysis Time Slot. Ramp up time is the time difference between 10% and 90% voltage points (relative to peak) on the positive slope of the burst, here burst has the same meaning in Burst width. Ramp down time is the time difference between 90% and 10% voltage points (relative to peak) on the negative slope of the burst, here burst has the same meaning in Burst width. Off power is measured in accordance with the TSM spec procedure. The Tx Off Power Definition, the TSM 11.21 v310 std states: “(1) Measure the RRC filtered mean power of the BTS output signal chipwise (i.e. averaged over time intervals of one chip duration) over the transmit off power period starting 11 chips before the start of the receive time slot TS $i = \text{UpPCH}$, and ending 8 chips before the next transmit time slot TS $i+4$ starts.” In order to implement a measurement algorithm which would make the Tx Off Power measurement according to the above TSM spec statement (excluding the RRC filter requirement part), and yet also be able to be applied in a general way, irrespective of the "Meas Time" and "Traffic Slot" settings, and the signals active timeslots, the following Tx Off Power algorithm will be implemented: “Measure the average power of the BTS or MS output signal over the transmit off power period region starting 1148 chips before the start of any "inactive" time slot, and ending 16 chips before any following "active" time slot. Also if there are more than one "inactive" region, then just average all the "inactive" region results. The result is averaged according to the Average Number, Average Mode, and Average Type parameter settings. If all signal timeslots are determined to be “active”, the screen result is unavailable (four dashed lines are shown). Maximum power is the maximum peak level in the range specified by Analysis Time Slot and Measured Time Slots (in dBm). Minimum power is the minimum peak level in the range specified by Analysis Time Slot and Measured Time Slots (in dBm). Actual sample time is the a floating point number representing the time between samples of uncompressed I/Q trace data, which could be get by using trace query(n=0). |

| | |
|---|---|
| | <p>12. Actual number of samples is the number of data points in the uncompressed I/Q trace data, which could be get by using trace query(n=0).</p> |
| 2 | <p>Measured Trace data This returns comma-separated floating point numbers representing the Measured Trace data (in dBm).</p> |
| 3 | <p>Measured Max Hold Trace data This returns comma-separated floating point numbers representing the Measured Max Hold Trace data (in dBm).</p> |
| 4 | <p>Measured Min Hold Trace data This returns comma-separated floating point numbers representing the Measured Min Hold Trace data (in dBm).</p> |
| 5 | <p>Upper Mask Trace data This returns comma-separated floating point numbers representing the Upper Mask Trace data (in dBm).</p> |
| 6 | <p>Lower Mask Trace data This returns comma-separated floating point numbers representing the Lower Mask Trace data (in dBm).</p> |
| 7 | <p>Averaged absolute power of the slots This returns 9 comma-separated float values representing the averaged absolute power of each time slot (in dBm). For the inactive slot, the value will be -999.</p> <ol style="list-style-type: none"> 1. Averaged absolute power of TSO 2. Averaged absolute power of DwPTS 3. Averaged absolute power of UpPTS 4. Averaged absolute power of TS1 5. Averaged absolute power of TS2 6. Averaged absolute power of TS3 7. Averaged absolute power of TS4 8. Averaged absolute power of TS5 9. Averaged absolute power of TS6 |
| 8 | <p>Width of the slots This returns 9 comma-separated float values representing the width of each time slot (in us). For the inactive slot, the value will be -999.</p> <ol style="list-style-type: none"> 1. Active signal width of TSO 2. Active signal width of DwPTS 3. Active signal width of UpPTS 4. Active signal width of TS1 5. Active signal width of TS2 6. Active signal width of TS3 7. Active signal width of TS4 8. Active signal width of TS5 9. Active signal width of TS6 |

Power vs Time Measurement Description

The Power vs Time measurement analyzes the amplitude profile and timing of the burst signal and provides a time mask for the signal. This measurement meets the requirements for testing the sections of the standards documents listed in the table below.

Table 2.1 Test name and its reference standards documents

| Document | Section | Test Name |
|----------------------------------|------------------------|---------------------------|
| 3GPP TS 34.122 V4.2.0 (2001-12) | 5.4.4 | Transmit On/Off Time Mask |
| CWTS TSM 05.05 V.3.1.0 (2002-12) | 4.1.1.5 4.1.2.4 | Transmit On/Off Power |
| 3GPP TS 34.122 V4.2.0 (2001-12) | 5.4.3 | Transmit Off Power |
| CWTS TSM 05.05 V.3.1.0 (2002-12) | 4.1.1.5.1 4.1.2.6.1 | Transmit Off Power |
| 3GPP TS 34.122 V4.2.0 (2001-12) | 5.4.2 | Minimum Output Power |
| CWTS TSM 05.05 V.3.1.0 (2002-12) | 4.1.1.3 4.1.2.3 | Minimum Output Power |
| CWTS TSM 11.21 V.3.1.0 (2002-12) | 6.5 | Transmit ON/OFF Power |

The transmitter signal is compared to a limit-line template, with standard compliant limits derived from the above specification documents. Limit pass or fail results are displayed at the completion of the measurement.

For averaged measurements, the user may specify the number of sweeps over which to average the result. This means that for an average number of 10, the power results are obtained from each trace, converted to linear (voltage squared), and then averaged with the previous average result before being displayed. The running average count and (the log of) the true averaged linear power will be displayed after each measurement sweep.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Amplitude (AMPTD) Y Scale

The AMPLITUDE Y Scale key accesses the menu to set the desired vertical scale and associated settings.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Ref Value

Sets the absolute power reference.

| | |
|-------------------------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel? |
| Example | DISP:PVT:VIEW:WIND:TRAC:Y:SCAL:RLEV 5dbm DISP:PVT:VIEW:WIND:TRAC:Y:SCAL:RLEV? |
| Couplings | When Y Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Y Auto Scale is automatically set to Off. |
| Preset | 10.00 |
| State Saved | Saved in instrument state. |
| Min | -250.0 |
| Max | 250.0 |
| Backwards Compatibility SCPI | :DISPlay:PVTime:WINDow:TRACe:Y[:SCALe]:RLEVel |
| Initial S/W Revision | A.01.60 or later |

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See ["Dual Attenuator Configurations:" on page 819](#)

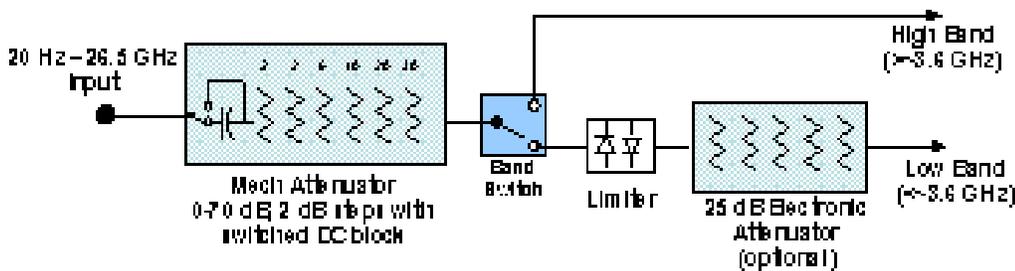
See ["Single Attenuator Configuration:" on page 819](#)

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

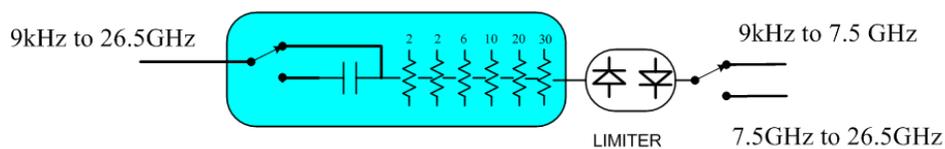
| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Dependencies | In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case. |
| Readback Line | Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2232, and " Enable Elec Atten " on page 2234 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

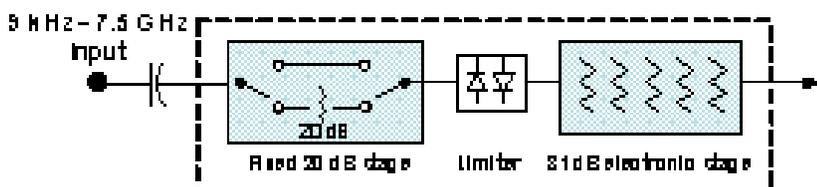


Configuration 2: Mechanical attenuator, no optional electronic attenuator



(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the "Dual Attenuator" configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See "[Attenuator Configurations and Auto/Man](#)" on page 821

| Key Path | AMPTD Y Scale, Attenuation |
|-----------------------|---|
| Remote Command | <pre>[:SENSe] : POWer [:RF] : ATTenuation <rel_ampl> [:SENSe] : POWer [:RF] : ATTenuation? [:SENSe] : POWer [:RF] : ATTenuation : AUTO OFF ON 0 1 [:SENSe] : POWer [:RF] : ATTenuation : AUTO ?</pre> |
| Example | <p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of "main" attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p> |
| Dependencies | <p>Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the Auto/Man selection is not available, and the Auto/Man line on the key disappears.</p> <p>In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the "Enable Elec Atten" on page 2234 key description.</p> <p>See "Attenuator Configurations and Auto/Man" on page 821 for more information on the Auto/Man functionality of Attenuation.</p> |
| Couplings | |

| | |
|--------------------------|--|
| | <p>When (Mech) Atten is in Auto, it uses the following algorithm to determine a value: If the USB Preamp is connected to USB, use 0 dB. Otherwise, Atten = ReferenceLevel + PreAmpGain + ExternalGain – RefLevelOffset - MaxMixerLevel + IF Gain. Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto. The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step). The “IF Gain” term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten. In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.</p> |
| Preset | <p>The preset for Mech Attenuation is “Auto.” The Auto value of attenuation is: CXA, EXA, MXA and PXA: 10 dB</p> |
| State Saved | <p>Saved in instrument state</p> |
| Min | <p>0 dB The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.</p> |
| Max | <p>CXA N9000A–503/507: 50 dB CXA N9000A–513/526: 70dB EXA: 60 dB MXA and PXA: 70 dB In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.</p> |
| Initial S/W Revision | <p>Prior to A.02.00</p> |
| Modified at S/W Revision | <p>A.03.00</p> |

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the

current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 824](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2233](#)

See ["More Information" on page 823](#)

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSE] :POWER [:RF] :EATTenuation :STATe OFF ON 0 1 [:SENSE] :POWER [:RF] :EATTenuation :STATe ? |
| Example | POW:EATT:STAT ON |
| Dependencies | <p>This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233.</p> <p>The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out.</p> <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in</p> |

| | |
|--------------------------|---|
| | all measurements; in particular, it is not available in the Swept SA measurement. |
| Couplings | Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples

- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

| | |
|----------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :EATTenuation <rel_amp1></code> <code>[:SENSe] :POWer [:RF] :EATTenuation?</code> |
| Notes | Electronic Attenuation's specification is defined only when Mechanical Attenuation is 6 dB. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out. |
| Preset | 0 dB |
| State Saved | Saved in instrument state |

| | |
|--------------------------|--|
| Min | 0 dB |
| Max | Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|--------------------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize IMMEDIATE</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2237 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation OFF ELECTrical COMBined</code> <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code> |
| Notes | The SCPI parameter ELECTrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECTrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. |

| | |
|--------------------------|--|
| | In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip |
| State Saved | Saved in instrument state |
| Range | Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------|--|
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe :AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe :AUTO?</code> |
| Notes | ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off" |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT OFF |
| Initial S/W Revision | Prior to A.02.00 |

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT ELEC |
| Initial S/W Revision | Prior to A.02.00 |

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT COMB |
| Initial S/W Revision | Prior to A.02.00 |

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :ATTenuation:STEP [:INCRement] 10 dB 2 dB [:SENSe] :POWer [:RF] :ATTenuation:STEP [:INCRement] ? |
| Example | POW:ATT:STEP 2 |
| Notes | Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10. |
| Dependencies | Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error. |
| Couplings | When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB |
| Preset | PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA) |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Scale/Div

Sets the units-per-division of the vertical scale in the logarithmic display. However, since the Auto Scale is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scale automatically changes to Off.

| | |
|------------------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl> :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision? |
| Example | DISP:PVT:VIEW:WIND:TRAC:Y:PDIV 5 dB DISP:PVT:VIEW:WIND:TRAC:Y:PDIV? |
| Couplings | When the Auto Scale is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scale automatically changes to Off. |
| Preset | 10.00 dB |
| State Saved | Saved in instrument state. |
| Min | 0.10 dB |
| Max | 20.00 dB |
| Backwards Compatibility SCPI | :DISPlay:PVTime:WINDow:TRACe:Y[:SCALe]:PDIVision |
| Initial S/W Revision | A.01.60 or later |

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 829](#).

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Remote Command | [:SENSe] :POWer [:RF] :PCENter |
| Example | POW:PCEN |
| Notes | Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. |

| | |
|------------------------------|--|
| | <ul style="list-style-type: none"> • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Couplings | <p>The active marker position determines where the centering will be attempted.</p> <p>If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.</p> |
| Status Bits/OPC dependencies | <p>When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command.</p> <p>The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.</p> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when **"Presel Center"** on page 2240 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

| | |
|----------|---------------|
| Key Path | AMPTD Y Scale |
|----------|---------------|

| | |
|-------------------------------------|---|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :POWer [:RF] :PADJust <freq></code> <code>[:SENSe] :POWer [:RF] :PADJust?</code> |
| Example | POW:PADJ 100KHz POW:PADJ? |
| Notes | The value on the key reads out to 0.1 MHz resolution. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Preset | 0 MHz |
| State Saved | The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle. |
| Min | -500 MHz |
| Max | 500 MHz |
| Default Unit | Hz |
| Backwards Compatibility SCPI | <code>[:SENSe] :POWer [:RF] :MW :PADJust</code> <code>[:SENSe] :POWer [:RF] :MMW :PADJust</code> PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to <code>[:SENSe] :POWer [:RF] :PADJust</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------|---|
| Remote Command | <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector MWAVE MMWave EXTernal</code> <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector?</code> |
| Notes | PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE |
| Initial S/W Revision | Prior to A.02.00 |

Y Axis Unit

Displays the menu keys that enable you to change the vertical (Y) axis amplitude unit. The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types. For example, if Scale Type

has been set to Log, and you set Y Axis Unit to dBm, pressing Scale Type (Log) sets the Y Axis Unit to dBm. If Scale Type has been set to Lin and you set Y Axis Unit to V, pressing Scale Type (Lin) sets the Y Axis Unit to V. Pressing Scale Type (Log) again sets the Y axis unit back to dBm.

NOTE

The units of current (A, dBmA, dBuA) are calculated based on 50 ohms input impedance.

All four of the EMI units (dB μ A/m, dB μ V/m, dBG, dBpT) are treated by the instrument exactly as though they were dBuV. The user must load an appropriate correction factor using Amplitude Corrections for accurate and meaningful results.

If a SCPI command is sent to the analyzer that uses one of the EMI units as a terminator, the analyzer treats it as though DBUV had been sent as the terminator.

| | |
|----------------|---|
| Key Path | AMPTD Y Scale |
| Mode | SA |
| Scope | Meas Global |
| Remote Command | :UNIT:POWer DBM DBMV DBMA V W A DBUV DBUA DBPW DBUVM DBUAM DBPT DBG :UNIT:POWer? |
| Example | UNIT:POW dBmV UNIT:POW? |
| Notes | The Y axis unit has either logarithmic or linear characteristics. The set of units that is logarithmic consists of dBm, dBmV, dBmA, dB μ V, dB μ A, dB μ V/m, dB μ A/m, dBpT, and dBG. The set of units that are linear consists of V, W, and A. The chosen unit will determine how the reference level and all the amplitude-related outputs like trace data, marker data, etc. read out. |
| Notes | The settings of Y Axis Unit and Scale Type, affect how the data is read over the remote interface. When using the remote interface no unit is returned, so you must know what the Y axis unit is to interpret the results: Example 1, set the following: Scale Type (Log) Y Axis Unit, dBm Scale/Div, 1 dB Ref Level, 10 dBm This sets the top line to 10 dBm with each vertical division representing 1 dB. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 5 dBm and will read out remotely as 5. Example 2, set the following: Scale Type (Lin) Y Axis Unit, Volts Ref Level, 100 mV (10 mV/div) This sets the top line to 100 mV and the bottom line to 0 V, so each vertical division represents 10 mV. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 50 mV and will read out remotely as 50. |
| Dependencies | If an amplitude correction with an Antenna Unit other than None is applied and enabled, then that antenna unit is forced and the key with that unit is the only Y Axis Unit available. All other Y Axis Unit keys are grayed out. If an amplitude correction with an Antenna Unit other than None is applied and enabled, and you then |

| | |
|--------------------------|--|
| | turn off that correction or set Apply Corrections to No, the Y Axis Unit that existed before the Antenna Unit was applied is restored. |
| Couplings | The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types |
| Preset | dBm for log scale, V for linear. The true 'preset' value is dBm, since at preset the Y Scale type is set to logarithmic. |
| State Saved | Saved in instrument state |
| Readback line | 1-of-N selection |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.04.00, A.11.00 |

dBm

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBm.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBM |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmV

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmV.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmV |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmA

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmA.

| | |
|----------------|----------------------------|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMA |

| | |
|--------------------------|---|
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmA |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

W

Sets the amplitude unit for the selected amplitude scale (log/lin) to watt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW W |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | W |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

V

Sets the amplitude unit for the selected amplitude scale (log/lin) to volt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW V |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

A

Sets the amplitude unit for the selected amplitude scale (log/lin) to Ampere.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW A |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ V

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A.

NOTE

The unit dBuA can also appear as an Antenna Unit. This will be used by customers using current probes, because current probes are often supplied with conversion tables that provide the transducer factors. When dBuA is used as an Antenna Unit the normal conversion from power to amps for dBuA (based on the analyzer input impedance) is not done, but instead the conversion is based solely on the Correction that contains the transducer factors. This is what distinguishes dBuA as a normal unit from dBuA as an antenna unit. When querying the Y-Axis unit, you can query the Antenna Unit to distinguish between regular dBuA and the dBuA antenna unit. If :CORR:CSET:ANT? returns NOC (for No Conversion), you are using a normal Y Axis dBuA. If it returns UA you are using an Antenna Unit dBuA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBpW

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpW.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBPW |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

Antenna Unit

When a Correction is turned on that uses an Antenna Unit, the Y Axis Unit changes to that Antenna Unit. All of the keys in the Y-Axis Unit menu are then greyed out, except the Antenna Unit key. The unit being used is shown on this key and is shown as selected in the submenu.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback line | Currently selected unit |
| Initial S/W Revision | A.11.00 |

dB μ V/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUVM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ V/m |
| Initial S/W Revision | A.02.00 |

dB μ A/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A/m |
| Initial S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------|--|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
|----------|--|

| | |
|----------------------|---|
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

dBpT

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpT. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBPT |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dBpT |
| Initial S/W Revision | A.02.00 |

dBG

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBG. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBG |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dBG |
| Initial S/W Revision | A.02.00 |

None

This is selected if no Antenna Unit is currently on, however you cannot actually set this value, since it is always grayed out. The key is included simply to provide an indication on the Readback line of the Antenna Unit key when there is no Antenna Unit selected.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Readback | "None" |
| Initial S/W Revision | A.11.00 |

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, BASIC, PNOISE, VSA , LTE, LTETDD |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH? |
| Example | :POW:MW:PATH LNP Enables the Low Noise path |
| Notes | If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μW Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished. |
| Dependencies | Unavailable in BBIQ and External Mixing |
| Preset | All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB |

| | |
|--------------------------|--|
| | MPB option not present and licensed: STD |
| State Saved | Save in instrument state |
| Readback | Value selected in the submenu |
| Initial S/W Revision | A.04.00 |
| Modified at S/W Revision | A.10.00 |

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH STD |
| Readback Text | Standard Path |
| Initial S/W Revision | A.04.00 |

Low Noise Path Enable

You may choose Low Noise Path Enable, which gives a lower noise floor under some circumstances, particularly when operating in the 21–26.5 GHz region. With the Low Noise Path enabled, the low band/high band switch and microwave preamp are bypassed whenever all of the following are true:

- The analyzer is not in the Low Band, meaning:
- the start frequency is above 3.5 GHz and
- the stop frequency is above 3.6 GHz.
- the internal preamp is not installed or (if installed) is set to Off or Low Band

Note that this means that, when any part of a sweep is done in Low Band, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. Also, if the preamp is turned on, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. The only time the Low Noise Path is used is when Low Noise Path Enable is selected, the sweep is completely in High Band (> 3.6 GHz) and no preamp is in use.

See "[More Information](#)" on page 839

| | |
|----------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Measurement | Swept SA |
| Example | :POW:MW:PATH LNP |

| | |
|----------------------|--|
| Notes | <p>For measurements that use IQ acquisition, the low noise path is used when the Center Frequency is in High Band (> 3.6 GHz) and no preamp is in use.</p> <p>In other words, the rules above are modified to use only the center frequency to qualify which path to switch in.</p> <p>This is not the case for FFT's in the Swept SA measurement; they use the same rules as swept measurements.</p> |
| Dependencies | <p>Key is blanked if current mode does not support it.</p> <p>Key is grayed out if mode supports it but current measurement does not support it.</p> <p>Unless Option LNP is present and licensed, key is blank and if SCPI command sent, error -241, "Hardware missing; Option not installed" is generated.</p> |
| Readback Text | Low Noise Path Enable |
| Initial S/W Revision | A.04.00 |

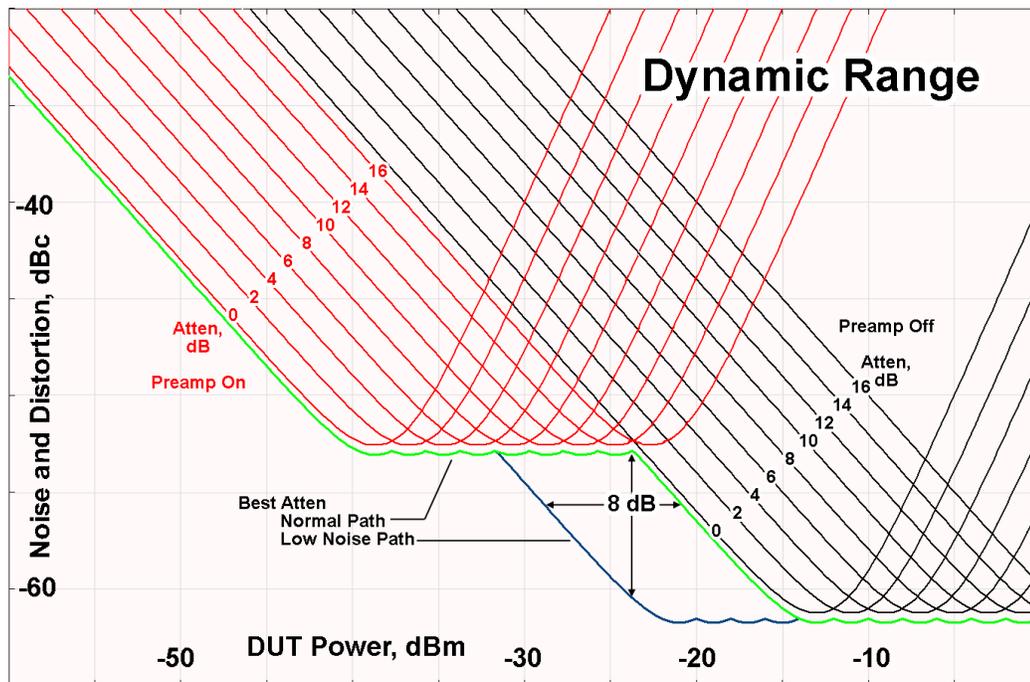
More Information

The user should understand that the Low Noise Path, while giving improved DANL, has the disadvantage of decreased TOI performance and decreased gain compression performance relative to the standard path.

The user should also understand that the bypass switch is a mechanical switch and has finite life, so if the Low Noise Path is enabled, it is possible to cause frequent cycling of this switch by frequently changing analyzer settings such that the above conditions hold true only some of the time. A user making tests of this nature should consider opting for the Standard Path, which will never throw the bypass switch, at the expense of some degraded noise performance.

The low noise path is useful for situations where the signal level is so low that the analyzer performance is dominated by noise even with 0 dB attenuation, but still high enough that the preamp option would have excessive third-order intermodulation or compression. The preamp, if purchased and used, gives better noise floor than does the "Low Noise Path." However, its compression threshold and third-order intercept are much poorer than that of the non-preamp path. There are some applications, typically for signals around -30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range

The graph below illustrates the concept. It shows, in red, the performance of an analyzer at different attenuation settings, both with the preamp on and off, in a measurement that is affected by both analyzer noise and analyzer TOI. The green shows the best available dynamic range, offset by 0.5 dB for clarity. The blue shows how the best available dynamic range improves for moderate signal levels with the low noise path switched in. In this illustration, the preamp improves the noise floor by 15 dB while degrading the third-order intercept by 30 dB, and the low noise path reduces loss by 8 dB. The attenuator step size is 2 dB.



There are other times where selecting the low noise path improves performance, too. Compression-limited measurements such as finding the nulls in a pulsed-RF spectrum can profit from the low noise path in a way similar to the TOI-limited measurement illustrated. Accuracy can be improved when the low noise path allows the optimum attenuation to increase from a small amount like 0, 2 or 4 dB to a larger amount, giving better return loss at the analyzer input. Harmonic measurements, such as second and third harmonic levels, are much improved using the low noise path because of the superiority of that path for harmonic (though not intermodulation) distortion performance.

μW Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselector is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH MPB |
| Dependencies | Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated. |
| Readback Text | μ W Preselector Bypass |
| Initial S/W Revision | A.04.00 |

| | |
|-----------------------|---|
| Remote Command | [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1 [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ? |
| Example | :POW:MW:PRES OFF Bypasses the microwave preselector |
| Notes | The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB) |
| Preset | ON |

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :GAIN [:STATe] OFF ON 0 1 [:SENSe] :POWer [:RF] :GAIN [:STATe] ? |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the |

| | |
|--|--|
| | key is not shown. The preamp is not available when the electronic/soft attenuator is enabled. |
|--|--|

| | |
|--------------------------|---|
| Couplings | The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range. Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected. Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Scope | Meas Global |
| Remote Command | [:SENSe] : POWer [:RF] : GAIN : BAND LOW FULL [:SENSe] : POWer [:RF] : GAIN : BAND ? |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated. |
| Preset | LOW |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns the internal preamp off

| | |
|----------------------|--------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

| | |
|----------------------|------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND LOW |
| Readback | Low Band |
| Initial S/W Revision | Prior to A.02.00 |

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND FULL |
| Readback | Full Range |
| Initial S/W Revision | Prior to A.02.00 |

Ref Position

Allows you to set the display reference position to the top, center, or bottom of the display.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale, More |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP CENTer BOTTom :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition? |
| Example | :DISP:PVT:VIEW:WIND:TRAC:Y:SCAL:RPOS CENT :DISP:PVT:VIEW:WIND:TRAC:Y:SCAL:RPOS? |
| Preset | TOP |
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | A.01.60 or later |

Auto Scale

Allows you to toggle the Y axis Auto Scale function between On and Off.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, More |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 1 OFF ON :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle? |
| Example | :DISP:PVT:VIEW:WIND:TRAC:Y:COUP ON :DISP:PVT:VIEW:WIND:TRAC:Y:COUP? |
| Couplings | When Auto Scale is On, and you press the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When you manually set a value for the Y Rel Value or Y Scale/Div, this parameter is automatically set to Off. |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 845

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Remote Command | :COUPle ALL NONE |
| Example | :COUP ALL |
| Notes | :COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

There are two types of functions that have Auto/Manual modes.

Auto/Man Active Function keys

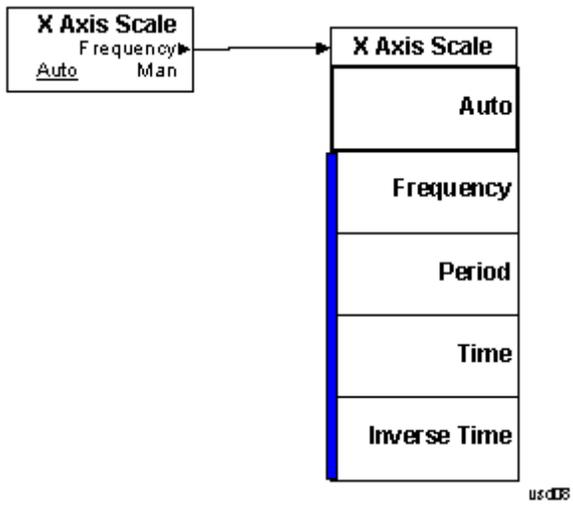
An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.

10 Power vs Time Measurement
Auto Couple



BW

Accesses a menu that allows you to control bandwidth settings.

| | |
|----------------------|------------------|
| Key Path | BW |
| Initial S/W Revision | Prior to A.02.00 |

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

| | |
|--------------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous? |
| Example | :INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation |
| Preset | ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF) |
| State Saved | Saved in instrument state |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep. |
| Initial S/W Revision | Prior to A.02.00 |

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

10 Power vs Time Measurement
File

File

See "File" on page 344

FREQ Channel

Accesses a menu of keys that allow you to control the Frequency and Channel parameters of the instrument.

Some features in the Frequency menu are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset. For example, the Center Freq setting is the same for all measurements – it does not change as you change measurements.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 854](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 856](#)

See ["Center Frequency Presets" on page 852](#)

| | |
|----------------|--|
| Key Path | FREQ Channel |
| Scope | Meas Global |
| Remote Command | [:SENSe] :FREQuency :CENTer <freq> [:SENSe] :FREQuency :CENTer? |

| | |
|-----------------------------|--|
| Example | FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT? |
| Notes | This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated. |
| Dependencies | The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit. |
| Couplings | When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range |
| Preset | Depends on instrument maximum frequency, mode, measurement, and selected input. See "Center Frequency Presets" on page 852 and "RF Center Freq" on page 854 and Ext Mix Center Freq and "I/Q Center Freq" on page 856. |
| State Saved | Saved in instrument state |
| Min | Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 852 and "RF Center Freq" on page 854 and "I/Q Center Freq" on page 856. |
| Max | Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 852 and "RF Center Freq" on page 854 and "I/Q Center Freq" on page 856. |
| Default Unit | Hz |
| Status Bits/OPC | Non-overlapped |
| Dependencies | |
| Initial S/W Revision | Prior to A.02.00 |

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

| Freq Option | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune |
|-------------|-------------------------|--------------------------------|----------------------------|
| | | | |

| | | | above) |
|---------------------------------------|------------|----------|--------------|
| 503 (all but N9000A) | 1.805 GHz | 3.6 GHz | 3.7 GHz |
| 503 (N9000A) | 1.505 GHz | 3.0 GHz | 3.08 GHz |
| 507 (all but N9000A) | 3.505 GHz | 7.0 GHz | 7.1 GHz |
| 507 (N9000A) | 3.755 GHz | 7.5 GHz | 7.58 GHz |
| 508 (all but N9038A) | 1.805 GHz | 3.6 GHz | 8.5 GHz |
| 508 (N9038A) | 4.205 GHz | 8.4 GHz | 8.5 GHz |
| 513 | 6.805 GHz | 13.6 GHz | 13.8 GHz |
| 526 (all but N9000A and N9038A) | 13.255 GHz | 26.5 GHz | 27.0 GHz |
| 526 (N9000A) | 13.255 GHz | 26.5 GHz | 26.55 GHz |
| 526 (N9038A) | 1.805 GHz | 3.6 GHz | 27.0 GHz |
| 532 | 16.005 GHz | 32.0 GHz | 32.5 GHz |
| 543 | 21.505 GHz | 43.0 GHz | TBD |
| 544 | 22.005 GHz | 44.0 GHz | 44.5 GHz |
| 550 | 25.005 GHz | 50.0 GHz | 51 GHz |

Input 2:

| Model | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune above) |
|----------------|----------------------------|-----------------------------------|-----------------------------------|
| N9000A opt C75 | 0.7505GHz | 1.5 GHz | 1.58 GHz |
| N9038A | 505 MHz | 1 GHz | 1.000025 GHz |

Tracking Generator Frequency Limits (N9000A only):

| Tracking Generator Option | Min Freq (clips to this freq when turn TG on and | If above this Freq, Stop Freq clipped to this Freq when | Max Freq (can't tune above) while TG |
|---------------------------------|--|---|--|
| | | | |

| | can't tune below while TG on) | TG turned on | on |
|-----|-------------------------------|--------------|----------|
| T03 | 9 kHz | 3.0 GHz | 3.08 GHz |
| T06 | 9 kHz | 6.0 GHz | 6.05 GHz |

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

| Mode | CF Preset for RF |
|-------------|------------------|
| WCDMA | 1 GHz |
| WIMAXOFDMA, | 1 GHz |
| BASIC | 1 GHz |
| ADEMOD | 1 GHz |
| VSA | 1 GHz |
| TDSCDMA | 1 GHz |
| PNOISE | 1 GHz |
| LTE | 1 GHz |
| LTETDD | 1 GHz |
| MSR | 1 GHz |
| GSM | 935.2 MHz |
| NFIGURE | 1.505 GHz |

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | [:SENSe] :FREQuency:RF:CENTer <freq> [:SENSe] :FREQuency:RF:CENTer? |
| Example | FREQ:RF:CENT 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Dependencies | If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of |

| | |
|--------------------------|--|
| | Source Numerator, Source Denominator and Power Sweep. |
| Preset | See table above |
| State Saved | Saved in instrument state. |
| Min | -79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source |
| Max | See table above. Basically instrument maximum frequency - 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|---|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code> |
| Example | <code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code> |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Couplings | When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup. |
| Preset | When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies. If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table ($\text{Span} = \text{Stop Freq} - \text{Start Freq}$), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table. |

| | |
|----------------------|---|
| | <p>When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz.</p> <p>Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz.</p> |
| State Saved | Saved in instrument state. |
| Min | The minimum frequency in the currently selected mixer band + 5 Hz |
| Max | <p>The maximum frequency in the currently selected mixer band – 5 Hz</p> <p>If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency</p> |
| Initial S/W Revision | A.08.01 |

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | <pre>[:SENSe] :FREQuency:IQ:CENTer <freq></pre> <pre>[:SENSe] :FREQuency:IQ:CENTer?</pre> |
| Example | FREQ:IQ:CENT: 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Preset | 0 Hz |
| State Saved | Saved in instrument state. |
| Min | -40.049995 MHz |
| Max | 40.049995 MHz |
| Initial S/W Revision | Prior to A.02.00 |

CF Step

Changes the step size for the center frequency and start and stop frequency functions. Once a step size has been selected and the center frequency function is active, the step keys (and the UP|DOWN parameters for Center Frequency from remote commands) change the center frequency by the step-size value. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the analyzer.

Note that the start and stop frequencies also step by the CF Step value.

| | |
|------------------------------|--|
| Key Path | FREQ Channel |
| Remote Command | [:SENSe]:FREQuency:CENTer:STEP[:INCRement] <freq> [:SENSe]:FREQuency:CENTer:STEP[:INCRement]? [:SENSe]:FREQuency:CENTer:STEP:AUTO OFF ON 0 1 [:SENSe]:FREQuency:CENTer:STEP:AUTO? |
| Example | FREQ:CENT:STEP:AUTO ON FREQ:CENT:STEP 500 MHz FREQ:CENT UP increases the current center frequency value by 500 MHz FREQ:CENT:STEP? FREQ:CENT:STEP:AUTO? |
| Notes | Preset and Max values are depending on Hardware Options (503, 507, 508, 513, 526) |
| Notes | Preset and Max values are dependent on Hardware Options (5xx) |
| Dependencies | Freq Offset is not available in External Mixing. In this case the Freq Offset key is grayed out and shows a value of zero. It will once again be available, and show the previously set value, when you return to the RF Input. |
| Dependencies | Span, RBW, Center frequency If the electronic/soft attenuator is enabled, any attempt to change the value of the center frequency >3.6 GHz by pressing the Up-arrow key, fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. |
| Couplings | When auto-coupled in a non-zero span, the center frequency step size is set to 10% of the span. When auto-coupled in zero span, the center frequency step size is set to the equivalent -3 dB RBW value. |
| Preset | Auto ADEMOD: 1 MHz ON |
| State Saved | Saved in instrument state |
| Min | – (the maximum frequency of the instrument). That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Max | The maximum frequency of the instrument. That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Default Unit | Hz |
| Status Bits/OPC dependencies | non-overlapped |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

10 Power vs Time Measurement
Input/Output

Input/Output

See "[Input/Output](#)" on page 202

Marker

Accesses the menu that allows you to select, set up, and control the markers for the current measurement. Sets the marker control mode as described under Normal, Delta, and Off, below. All interactions and dependencies detailed under the softkey description are enforced when the remote command is sent.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Select Marker

Accesses a menu that allows you to activate one or more markers

See Marker in the “Marker Functions” section for more information.

| | |
|----------------------|------------------|
| Key Path | Front panel key |
| Initial S/W Revision | A.01.60 or later |

Select Marker

Displays 12 markers available for selection.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Marker X Axis Position (Remote Command only)

Sets the marker X position in trace points. This allows you to enter a value in trace points rather than in X Axis Scale units. The entered value is immediately converted into the current X Axis Scale unit for setting the value of the marker. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value, if the control mode is Normal or Delta.

| | |
|-----------------------|---|
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:PVTime:MARKer[1] 2 ... 12:X:POsition <real> :CALCulate:PVTime:MARKer[1] 2 ... 12:X:POsition? |
| Example | :CALC:PVT:MARK10:X:POS 500 :CALC:PVT:MARK10:X:POS? |
| Notes | A query returns the marker's absolute X Axis value in trace points, if the control mode is Normal, or the offset from the marker's reference marker in trace points, if the control mode is Delta. If the marker is Off the response is not a number (NAN). |
| Preset | After a preset, all markers are turned Off, so a Marker X Axis Value query will return a not a number (NAN). |

| | |
|----------------------|------------------|
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | A.01.60 or later |

Marker Y Axis Value (Remote Command only)

Returns the marker Y Axis value in the current marker Y Axis unit.

The “result” of a marker is the value that is displayed on the second line of the Marker Result block. To properly interpret the returned value, you must also know how the analyzer’s Y-Axis Unit is set, as described below.

A marker can have up to two results, only one of which is displayed or returned in a query, as follows:

- Absolute result: every marker has an absolute result. For Normal and Delta markers, the Y-axis value of the trace point the marker is currently On. The absolute result is displayed in the result block or returned as a query, unless the marker control mode is Delta.
- Relative result: if a marker’s control mode is Delta, the relative result is displayed in the result block or returned in a query. This is the ratio of the Absolute Result of a delta marker to the Absolute Result of its reference marker. The ratio is expressed in dB.

| | |
|------------------------------|--|
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:PVTtime:MARKer[1] 2 ... 12:Y? |
| Example | :CALC:PVT:MARK11:Y 0 :CALC:PVT:MARK11:Y? |
| Notes | The query returns the marker Y-axis result. If the marker is Off the response is not a number (NAN). |
| Preset | 0 |
| State Saved | No |
| Backwards Compatibility SCPI | :CALCulate:PVTtime:MARKer[1] 2 ... 12:FUNCTION:RESULT? |
| Initial S/W Revision | A.01.60 or later |

Maker State (Remote Command Only)

Sets or queries the state of a marker. Setting a marker which is Off to state On, or 1, puts it in Normal mode and places it at the center of the screen.

| | |
|----------------|--|
| Mode | TDSCDMA |
| Remote Command | :CALCulate:PVTtime:MARKer[1] 2 ... 12:STATE OFF ON 0 1 :CALCulate:PVTtime:MARKer[1] 2 ... 12:STATE? |
| Example | :CALC:PVT:MARK3:STATE ON |

| | |
|-------------------------------------|---|
| | :CALC:PVT:MARK3:STATE? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Backwards Compatibility SCPI | :CALCulate:PVTime:MARKer[1] 2 ... 4[:STATe] |
| Initial S/W Revision | A.01.60 or later |

Marker Type

Sets the marker control mode. If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, the reference value of the selected marker appears on the Active Function area.

Active Function Display: Marker X-axis value

Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off.

The marker X axis value entered in the active function area will display the marker value to its full entered precision.

| | |
|-----------------------|---|
| Key Path | Marker |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:PVTime:MARKer[1] 2 ... 12:MODE POSition DELTA OFF :CALCulate:PVTime:MARKer[1] 2 ... 12:MODE? |
| Example | :CALC:PVT:MARK:MODE OFF :CALC:PVT:MARK:MODE? |
| Notes | If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears in the Active Function area. Default Active Function: the active function for the selected marker's current control mode. Note that if the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area will display the marker value to its fully entered precision. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | Normal Delta Off |
| Initial S/W Revision | A.01.60 or later |

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker which is not Off. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

This may result in markers going off screen.

| | |
|-----------------------|--|
| Key Path | Marker |
| Mode | GSM, SA, TD-SCDMA |
| Remote Command | :CALCulate:TXPower:MARKer:COUPle[:STATE] ON OFF 1 0 :CALCulate:TXPower:MARKer:COUPle[:STATE]? |
| Example | CALC:TXP:MARK:COUP ON CALC:TXP:MARK:COUP? |
| Notes | You must be in the Spectrum Analyzer mode, TD-SCDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

All Markers Off

Turns off all markers.

| | |
|-------------------------------------|--|
| Key Path | Marker |
| Mode | GSM, SA, TD-SCDMA |
| Remote Command | :CALCulate:TXPower:MARKer:AOFF |
| Example | CALC:TXP:MARK:AOFF |
| Notes | You must be in the Spectrum Analyzer mode, TDSDMA mode or GSM mode to use this command. Use INSTRument:SElect to set the mode. |
| Backwards Compatibility SCPI | :CALCulate:BPOWER:MARKer:AOFF |
| Initial S/W Revision | Prior to A.02.00 |

Marker Fctn

There are no 'Marker Functions' supported in Power vs. Time measurement. Pressing this key will display a blank menu.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Marker To

There is no 'Marker To' functionality supported in Power vs. Time so this front-panel key will display a blank menu when pressed

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Remote Measurement Functions

This section contains the following topics:

["Measurement Group of Commands" on page 2285](#)

["Current Measurement Query \(Remote Command Only\)" on page 2287](#)

["Limit Test Current Results \(Remote Command Only\)" on page 2287](#)

["Data Query \(Remote Command Only\)" on page 2287](#)

["Calculate/Compress Trace Data Query \(Remote Command Only\)" on page 2288](#)

["Calculate Peaks of Trace Data \(Remote Command Only\)" on page 2293](#)

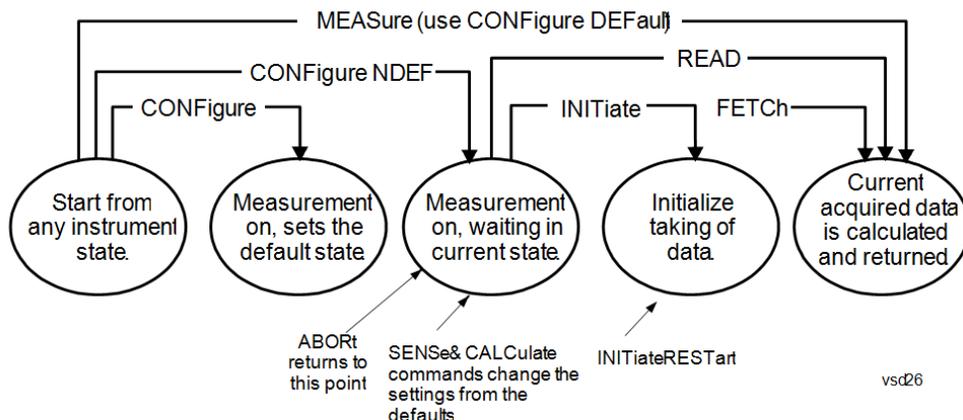
[Hardware-Accelerated Fast Power Measurement \(Remote Command Only\)](#)

["Format Data: Numeric Data \(Remote Command Only\)" on page 2294](#)

["Format Data: Byte Order \(Remote Command Only\)" on page 2295](#)

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFigure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFigure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
- For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
- Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
- If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
-

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

| | |
|-----------------------|-------------|
| Remote Command | :CONFigure? |
|-----------------------|-------------|

| | |
|----------------|-------|
| Example | CONF? |
|----------------|-------|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

| | |
|-----------------------|--------------------------|
| Remote Command | :CALCulate:CLIMits:FAIL? |
|-----------------------|--------------------------|

| | |
|----------------|--|
| Example | CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails. |
|----------------|--|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA[n]? |
| Notes | The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement. |
| Initial S/W Revision | Prior to A.02.00 |

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]] |
| Example | To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.) |
| Notes | The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data. |
| Initial S/W Revision | Prior to A.02.00 |

- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

NOTE If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPlE - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

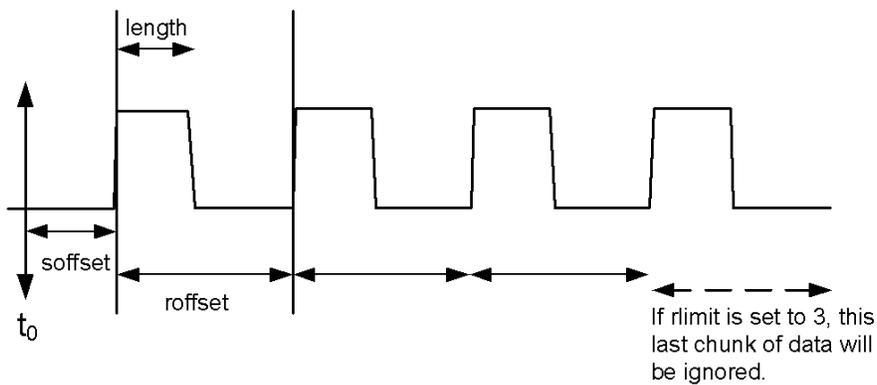
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

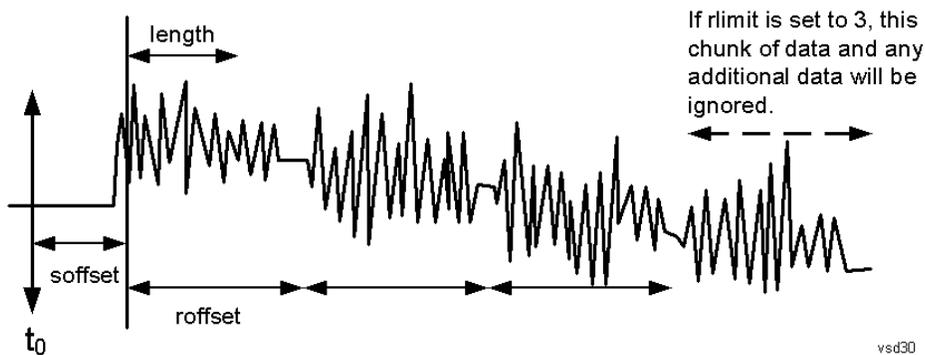
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

| | |
|-----------------------|--|
| Remote Command | <p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre> |
|-----------------------|--|

| | |
|----------------|---|
| Example | <p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p> |
|----------------|---|

| | |
|--------------|---|
| Notes | <p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p> |
|--------------|---|

excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQUency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat[:TRACe][:DATA] ASCii|INTeger,32|REAL,32 |REAL,64
:FORMat[:TRACe][:DATA]?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

Initial S/W Revision Prior to A.02.00

The specs for each output type follow:

AScii - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

| | |
|-----------------------|--|
| Remote Command | :FORMat:BORDER NORMal SWAPped :FORMat:BORDER? |
|-----------------------|--|

| | |
|---------------|--------|
| Preset | NORMal |
|---------------|--------|

| | |
|-----------------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|-----------------------------|------------------|

Meas Setup

Accesses the measurement setup menu for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Avg/Hold Num

Used to specify the number of data acquisitions that will be averaged. After the specified number of average counts, the averaging mode (termination control) setting determines the averaging action.

- On - Sets measurement averaging on.
- Off - Sets measurement averaging off.

| | |
|-----------------------|---|
| Key Path | Meas Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe]:PVTTime:AVERage:COUNT <integer> [:SENSe]:PVTTime:AVERage:COUNT? [:SENSe]:PVTTime:AVERage[:STATe] OFF ON 0 1 [:SENSe]:PVTTime:AVERage[:STATe]? |
| Example | :SENS:PVT:AVER:COUN 10 :SENS:PVT:AVER:COUN? :SENS:PVT:AVER:STAT OFF :SENS:PVT:AVER:STAT? |
| Preset | 10 OFF |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 10000 |
| Initial S/W Revision | A.01.60 or later |

Avg Mode

Selects the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached.

| | |
|-------------------------------------|--|
| KEY:Exponential SCPI:EXPonential | After the average count is reached, each successive data acquisition is exponentially weighted and combined with the existing average. |
| KEY:Repeat SCPI:REPeat | After reaching the average count, the averaging is reset and a new average is started. The default value is Exp. |

| | |
|-----------------------|---|
| Key Path | Meas Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :PVTime :AVERage :TCONtrol EXPonential REPeat [:SENSe] :PVTime :AVERage :TCONtrol ? |
| Example | :SENS:PVT:AVER:TCON REP :SENS:PVT:AVER:TCON? |
| Preset | REPeat |
| State Saved | Saved in instrument state. |
| Range | Exp Repeat |
| Initial S/W Revision | A.01.60 or later |

Avg Type

Specifies the type of trace and result averaging to use.

| | |
|--|--|
| KEY:Pwr Avg (RMS) SCPI:RMS POWer | True power averaging that is equivalent to taking the RMS value of the voltage. It is the most accurate type of averaging. |
| KEY:Log-Pwr Avg (Video) SCPI:LOG LPOWer | Simulates the traditional spectrum analyzer type of averaging by averaging the log of the power. |

| | |
|-----------------------|---|
| Key Path | Meas Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :PVTime :AVERage :TYPE LOG LPOWer RMS POWer [:SENSe] :PVTime :AVERage :TYPE ? |
| Example | :SENS:PVT:AVER:TYPE RMS :SENS:PVT:AVER:TYPE? |
| Preset | RMS |
| State Saved | Saved in instrument state. |
| Range | Pwr Avg (RMS) Log-Pwr Avg(Video) |
| Initial S/W Revision | A.01.60 or later |

Meas Interval

Specifies the measurement interval in an integer number of slots.

| | |
|----------|------------|
| Key Path | Meas Setup |
|----------|------------|

| | |
|-----------------------|---|
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :PVTime:SWEep:TIME <integer> [:SENSe] :PVTime:SWEep:TIME? |
| Example | :SENS:PVT:SWE:TIME 1 :SENS:PVT:SWE:TIME? |
| Couplings | If trigger source was set to RFBurst, this button will be grayed. |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 9 |
| Initial S/W Revision | A.01.60 or later |

IF Gain

Accesses the menu that sets ranging in the digital IF when acquiring an I/Q time record.

See "[More Information about IF Gain](#)" on page 879.

NOTE

This function is not affected by RF Input Range attenuation.

| | |
|----------------------|------------------|
| Key Path | Meas Setup |
| Initial S/W Revision | A.01.60 or later |

More Information about IF Gain

To take full advantage of the RF dynamic range of the analyzer, you can manually turn on or turn off a switched digital IF amplifier. When it is turned on, the signal will get approximately 10 dB of gain.

- Setting IF Gain to Man and selecting High Gain will turn on the digital IF amplifier and get an extra 10 dB gain.
- Setting IF Gain to Auto will activate the Auto rules for IF Gain.

These settings affect sensitivity and IF overloads.

IF Gain Auto

Activates the Auto Rules for IF Gain. When Auto is active, the IF Gain is set to High Gain under any of the following conditions:

- the input attenuator is set to 0 dB
- the preamp is turned On
- the Max Mixer Level is -20 dBm or lower

For other settings, Auto sets IF Gain to Off.

| | |
|----------------------|--|
| Key Path | Meas Setup,IF Gain |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :PVTime :IF:GAIN:AUTO [:STATe] ON OFF 1 0 [:SENSe] :PVTime :IF:GAIN:AUTO [:STATe] ? |
| Example | PVT:IF:GAIN:AUTO ON PVT:IF:GAIN:AUTO? |
| Couplings | When either the auto attenuation is active (for example, with an electrical attenuator), or the optimize mechanical attenuator range is requested, the IF Gain setting is changed using the following rule. The Auto selection sets IF Gain On under any of the following conditions: <ul style="list-style-type: none"> • the input attenuator is set to 0 dB • the preamp is turned on, • the Max Mixer Level is -20 dBm or lower. For other settings, Auto sets IF Gain to Off. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | Auto Man |
| Initial S/W Revision | A.01.60 or later |

IF Gain State

Selects the range of IF gain.

- On sets the high gain option, which allows for better noise level measurements.
- Off sets low gain when measuring large signals.

When this parameter is changed manually from front panel, IF Gain Auto will become Man.

| | |
|----------------------|---|
| Key Path | Meas Setup, IF Gain |
| Mode | SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA |
| Remote Command | [:SENSe] :PVTime :IF:GAIN [:STATe] ON OFF 1 0 [:SENSe] :PVTime :IF:GAIN [:STATe] ? |
| Example | PVT:IF:GAIN ON PVT:IF:GAIN? |
| Notes | where ON = high gain OFF = low gain |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | Low Gain (Best for Large Signals) High Gain (Best Noise Level) |
| Readback Text | Low Gain High Gain |
| Initial S/W Revision | A.01.60 or later |

Meas Preset

Returns parameters for the current measurement to those set by the factory.

| | |
|----------------------|-------------------|
| Key Path | Meas Setup, More |
| Mode | TD-SCDMA |
| Remote Command | :CONFigure:PVTime |
| Example | :CONF:PVT |
| Initial S/W Revision | A.01.60 or later |

Limit Mask Selection (Remote Command only)

Chooses whether the limit masks used will be the default, standard-compliant values or the user-defined values. When set to CUSTom, the mask used will be the one described by these programming commands:

| | |
|----------------------|---|
| Mode | TD-SCDMA |
| Remote Command | [[:SENSe]:PVTime:MASK:SElect CUSTom STANdard [:SENSe]:PVTime:MASK:SElect? |
| Example | :SENSe:PVTime:MASK:SElect CUSTom |
| Notes | Choose whether the limit masks used will be the default, standard-compliant values or the user-defined values. When set to CUSTom, the mask used will be the one described by these programming commands: [:SENSe]:PVTime:MASK:LIST:LOWer:ABSolute [:SENSe]:PVTime:MASK:LIST:UPPer:ABSolute [:SENSe]:PVTime:MASK:LIST:LOWer:RELative [:SENSe]:PVTime:MASK:LIST:UPPer:RELative [:SENSe]:PVTime:MASK:LIST:LOWer:TIME [:SENSe]:PVTime:MASK:LIST:UPPer:TIME |
| Preset | STANdard |
| State Saved | Saved in instrument state. |
| Range | CUSTom STANdard |
| Initial S/W Revision | A.01.60 or later |

Lower Mask Absolute Amplitude Levels (Remote Command only)

Specifies a power level for any mask line segments that require an absolute minimum power limit.

| | |
|----------------|--|
| Mode | TD-SCDMA |
| Remote Command | [[:SENSe]:PVTime:MASK:LIST:LOWer:ABSolute <ampl>, <ampl>, <ampl>, <ampl> |

| | |
|-----------------------------|---|
| | <code>[:SENSe] :PVTime:MASK:LIST:LOWer:ABSolute?</code> |
| Example | <code>:SENS:PVT:MASK:LIST:LOW:ABS -130, -130, -130, -130</code> <code>:SENS:PVT:MASK:LIST:LOW:ABS?</code> |
| Notes | <p>Enter a power level for any mask line segments that require an absolute minimum power limit. Each time a measurement is made the Ref Level is determined, (this is the power level of the useful part of the burst). As the power of the Ref Level changes, all of the relative mask power levels will change by the same amount. Each relative limit is then compared to the Ref Level and an equivalent absolute power level is calculated. This power level is compared to the specified absolute limit for each line segment. If this calculated relative limit is lower than the absolute limit specified, the value of the absolute limit is used for this segment. If the absolute limit is set to a very low value (-200 dBm), the calculated value of the reference limit will never be lower, and the specified relative limit will always be used for that segment. Every time point defined with PVT:MASK:LOW:TIME must have a power value defined in the same order.</p> <p>When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 4 you must send all values up to 4. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.</p> |
| Preset | -200, -200, -200, -200 |
| State Saved | Saved in instrument state. |
| Min | -200 |
| Max | 100 |
| Initial S/W Revision | A.01.60 or later |

Lower Mask Points (Remote Command only)

Query the number of elements in the lower mask. This value is determined by the number of time points entered using `[:SENSe] :PVTime:MASK:LIST:LOWer:TIME`.

| | |
|-----------------------------|---|
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :PVTime:MASK:LIST:LOWer:POINTs?</code> |
| Example | <code>:SENSe:PVTime:MASK:LIST:LOWer:POINTs?</code> |
| Notes | No corresponding command |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 25 |
| Initial S/W Revision | A.01.60 or later |

Lower Mask Relative Amplitude Levels (Remote Command only)

Sets the lower mask relative amplitude levels.

| | |
|-----------------------|--|
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :PVTime:MASK:LIST:LOWer:RELative <ampl>, <ampl>, <ampl>, <ampl> [:SENSe] :PVTime:MASK:LIST:LOWer:RELative? |
| Example | :SENS:PVT:MASK:LIST:LOW:REL 130, 130, 130 130 :SENS:PVT:MASK:LIST:LOW:REL? |
| Notes | Enter the relative power level for each horizontal line segment in the lower limit mask. There should be a power level for each time point entered using :PVTime:MASK:LIST:LOWer:TIME, and they must be entered in the same order. These power levels are all relative to the defined Reference Power Level (the average power in the useful part of the data). When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 4 you must send all values up to 4. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored. |
| Preset | 100, 100, 100, 100 |
| State Saved | Saved in instrument state. |
| Min | -200 |
| Max | 100 |
| Initial S/W Revision | A.01.60 or later |

Lower Mask Time Points (Remote Command only)

Sets lower mask time points.

| | |
|-----------------------|--|
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :PVTime:MASK:LIST:LOWer:TIME <time>, <time>, <time>, <time> [:SENSe] :PVTime:MASK:LIST:LOWer:TIME? |
| Example | :SENSe:PVTime:MASK:LIST:LOWer:TIME -1.0, -.5, 0, 0.5, 1.0 |
| Notes | Enter the value on the X-Axis at which the next segment of the mask begins. The leftmost value on the X-Axis is the value of the trigger delay (which may be positive or negative), and is shown on the display as an annotation on the X-Axis. Selecting a large time value for the first and last mask points (e.g. -1 and +1 second) guarantees a limit is defined for all measured data. When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 4 you must send all values up to 4. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored. |
| Preset | 0, 0, 0, 0 |
| State Saved | Saved in instrument state. |
| Min | -1 |
| Max | 1 |
| Initial S/W Revision | A.01.60 or later |

Upper Mask Absolute Amplitude Levels (Remote Command only)

Sets upper mask absolute amplitude levels.

| | |
|----------------------|---|
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :PVTime:MASK:LIST:UPPer:ABSolute <ampl>, <ampl>, <ampl>, <ampl></code> <code>[:SENSe] :PVTime:MASK:LIST:UPPer:ABSolute?</code> |
| Example | <code>:SENS:PVT:MASK:LIST:UPP:ABS -130, -130, -130 -130</code> <code>:SENS:PVT:MASK:LIST:UPP:ABS?</code> |
| Notes | <p>Enter a power level for any of your mask line segments that require an absolute minimum power limit in addition to its relative limit. Each time a measurement is made the Ref Level is determined. (This is the power level of the useful part of the burst, or midway between the upper/lower masks). As the power of the Ref Level changes, all of the relative mask power levels will change by the same amount. Each relative limit is then compared to the Ref Level and an equivalent absolute power level is calculated. This power level is compared to the specified absolute limit for each line segment. If this calculated relative limit is lower than the absolute limit specified, the value of the absolute limit is used for this segment. If the absolute limit is set to a very low value (-200 dBm), the calculated value of the reference limit will never be lower, and the specified relative limit will always be used for that segment. Every time point defined with PVT:MASK:LOW:TIME must have a power value defined in the same order. A comma may be used in the SCPI command as a place holder for any points where an absolute power is not specified. The default value will then be used for that segment.</p> <p>When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 4 you must send all values up to 4. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.</p> |
| Preset | -200, -200, -200, -200 |
| State Saved | Saved in instrument state. |
| Min | -200 |
| Max | 100 |
| Initial S/W Revision | A.01.60 or later |

Upper Mask Points (Remote Command only)

Query the number of elements in the upper mask. This value is determined by the number of time points entered using `[:SENSe] :PVTime:MASK:LIST:UPPer:TIME`.

| | |
|----------------------|---|
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :PVTime:MASK:LIST:UPPer:POINTs?</code> |
| Example | <code>:SENS:PVT:MASK:LIST:UPP:POIN?</code> |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 25 |
| Initial S/W Revision | A.01.60 or later |

Upper Mask Relative Amplitude Levels (Remote Command only)

Sets upper mask relative amplitude levels.

| | |
|----------------------|---|
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe]:PVTime:MASK:LIST:UPPer:RELative <rel_ampl>, <rel_ampl>, <rel_ampl>, <rel_ampl></code> <code>[:SENSe]:PVTime:MASK:LIST:UPPer:RELative?</code> |
| Example | <code>:SENS:PVT:MASK:LIST:UPP:REL -130, -130, -130 -130</code> <code>:SENS:PVT:MASK:LIST:UPP:REL?</code> |
| Notes | Enter the relative power level for each horizontal line segment in the upper limit mask. There should be a power level for each time point entered using <code>PVTime:MASK:LIST:UPPer:TIME</code> , and they must be entered in the same order. These power levels are all relative to the defined Reference Power Level (the average power in the useful part of the data). When setting these values remotely, missing values are not permitted i.e. if you want to change values 2 and 4 you must send all values up to 4. Subsequent values will remain unchanged. |
| Preset | 100, 100, 100, 100 |
| State Saved | Saved in instrument state. |
| Min | -200 |
| Max | 100 |
| Initial S/W Revision | A.01.60 or later |

Upper Mask Time Points (Remote Command only)

Sets upper mask time points.

| | |
|----------------|--|
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe]:PVTime:MASK:LIST:UPPer:TIME <time>, <time>, <time>, <time></code> <code>[:SENSe]:PVTime:MASK:LIST:UPPer:TIME?</code> |
| Example | <code>:SENS:PVT:MASK:LIST:UPP:TIME -1.0, -0.5, 0.5, 1.0</code> <code>:SENS:PVT:MASK:LIST:UPP:TIME?</code> |
| Notes | Enter the value on the X-Axis at which the next segment of the mask begins. The leftmost value on the X-Axis is the value of the trigger delay (which may be positive or negative), and is shown on the display as an annotation on the X-Axis. Selecting a large time value for the first and last mask points (e.g. -1 and +1 second) guarantees a limit is defined for all measured data. When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 4 you must send all values up to 4. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored. |
| Preset | 0, 0, 0, 0 |

10 Power vs Time Measurement
Meas Setup

| | |
|----------------------|----------------------------|
| State Saved | Saved in instrument state. |
| Min | -1.0 |
| Max | 1.0 |
| Initial S/W Revision | A.01.60 or later |

Mode

See "Mode" on page 288

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings
- See "[How-To Preset](#)" on page 889 for more information.

| | |
|--------------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :SYSTem:PRESet |
| Example | :SYST:PRES |
| Notes | *RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0. |
| Couplings | A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set. |
| Backwards Compatibility Notes | In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using |

| | |
|----------------------|------------------|
| | User Preset. |
| Initial S/W Revision | Prior to A.02.00 |

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

| Type Of Preset | SCPI Command | Front Panel Access |
|--------------------------------|--|--|
| Auto Couple | :COUPlE ALL | Auto Couple front-panel key |
| Meas Preset | :CONFIgure:<Measurement> | Meas Setup Menu |
| Mode Preset | :SYSTem:PRESet | Mode Preset (green key) |
| Restore Mode Defaults | :INSTrument:DEFault | Mode Setup Menu |
| Restore All Mode Defaults | :SYSTem:DEFault MODEs | System Menu; Restore System Default Menu |
| *RST | *RST | not possible (Mode Preset with Single) |
| Restore Input/Output Defaults | :SYSTem:DEFault INPut | System Menu; Restore System Default Menu |
| Restore Power On Defaults | :SYSTem:DEFault PON | System Menu; Restore System Default Menu |
| Restore Alignment Defaults | :SYSTem:DEFault ALIGn | System Menu; Restore System Default Menu |
| Restore Miscellaneous Defaults | :SYSTem:DEFault MISC | System Menu; Restore System Default Menu |
| Restore All System Defaults | :SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent | System Menu; Restore System Default Menu |
| User Preset | :SYSTem:PRESet:USER | User Preset Menu |
| User Preset All Modes | :SYSTem:PRESet:USER:ALL | User Preset Menu |

| | | |
|----------------------|-----------------------|-------------|
| Power On Mode Preset | :SYSTem:PON:TYPE MODE | System Menu |
| Power On User Preset | :SYSTem:PON:TYPE USER | System Menu |
| Power On Last State | :SYSTem:PON:TYPE LAST | System Menu |

Preset Type (Remote Command Only)

As stated in the Backward Compatibility section, to be compatible with ESA/PSA the PRESet:TYPE command will be implemented as a no-op.

| | |
|-----------------------------|--|
| Mode | All |
| Remote Command | :SYSTem:PRESet:TYPE FACTory MODE USER :SYSTem:PRESet:TYPE? |
| Example | :SYST:PRESet:TYPE FACT |
| Notes | This command is supported for backward compatibility only. It is a no-op which does not change the behavior of any preset operation. |
| Preset | This is unaffected by Preset but is set to Mode on a "Restore System Defaults->All" |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Mode Setup

See ["Mode Setup" on page 320](#)

Peak Search

There is no Peak Search functionality supported in Power vs. Time

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Print

See "Print" on page 348

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

| Type | Default Prefix | Menu |
|-----------------------|----------------|-----------------|
| State | State_ | (Save/Recall) |
| Trace + State | State_ | (Save/Recall) |
| Screen | Screen_ | (Save/Recall) |
| Amplitude Corrections | Ampcor_ | (Import/Export) |
| Traces | Trace_ | (Import/Export) |
| Limit Lines | LLine_ | (Import/Export) |
| Measurement Result | MeasR_ | (Import/Export) |
| Capture Buffer | CapBuf_ | (Import/Export) |

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as "fred.csv", then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE

Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE

If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

| | |
|----------------------|--|
| Key Path | Front-panel key |
| Notes | No remote command for this key specifically. |
| Initial S/W Revision | Prior to A.02.00 |

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

| Key Path | Front-panel key |
|-------------------------------|--|
| Notes | <p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATE <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p> |
| Backwards Compatibility Notes | <p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, "state" always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> |
| Backwards Compatibility Notes | <p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p> |
| Initial S/W Revision | Prior to A.02.00 |

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See ["More Information" on page 898](#).

| | |
|-----------------------|--|
| Key Path | Recall |
| Mode | All |
| Remote Command | :MMEMory:LOAD:STATe <filename> |
| Example | :MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path |
| Example | MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state. |
| Notes | <p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <ul style="list-style-type: none"> • If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number. <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p> |

| | |
|-------------------------------------|---|
| | there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu. |
| Backwards Compatibility SCPI | :MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

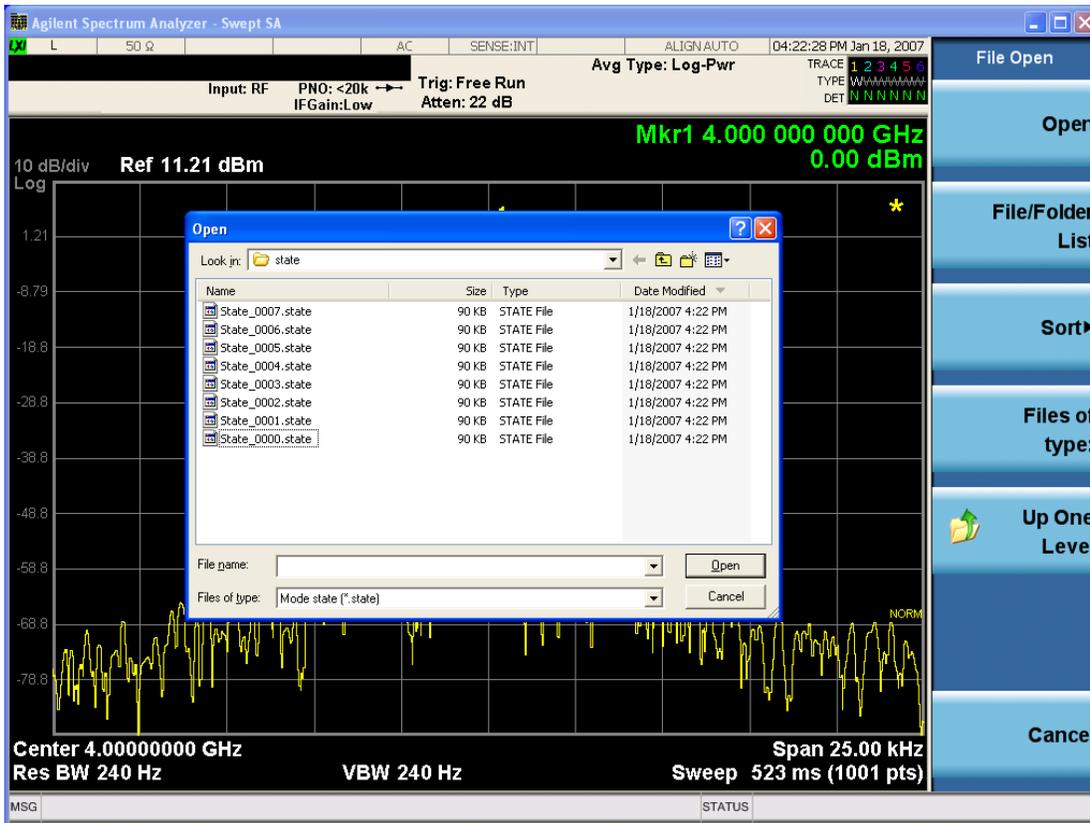
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

| | | |
|---|--|--|
| You want to recall state and one trace's data, leaving other traces unaffected. | Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed. | On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed. |
| You want to recall all traces | Save Trace+State from ALL traces. | On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved) |
| You want all traces to load exactly as they were when saved. | Save State | On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten. |

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In**; path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Notes | Brings up the Open dialog for recalling a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Mode | All |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available" |
| Initial S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|--|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|---|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1-16 from front panel, 1-128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Data (Import)

Importing a data file loads data that was previously saved from the current measurement or from other measurements and/or modes that produce compatible data files. The Import Menu only contains Data Types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by the user prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Importing Data loads measurement data from the specified file into the specified or default destination, depending on the data type selected. Selecting an Import Data menu key will not actually cause the importing to occur, since the analyzer still needs to know from where to get the data. Pressing the Open key in this menu brings up the Open dialog and Open menu that provides you with the options from where to recall the data. Once a filename has been selected or entered in the Open menu, the recall occurs as soon as the Open button is pressed.

| | |
|----------------------|--|
| Key Path | Recall |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. Some keys will be missing completely, so the key locations in the sub-menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:LOAD commands. |
| Dependencies | If a file type is not used by a certain measurement, it is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Capture Buffer

The captured data is raw data which is not processed.

| | |
|----------------------|---|
| Key Path | Recall, Data |
| Mode | TD-SCDMA |
| Example | MMEM:LOAD:CAPT "MyCaptureData.bin" This loads the file of capture data (on the default file directory path) into the instrument. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Open...

When you press "Open", the analyzer brings up a Windows dialog and a menu entitled "**File Open.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[From File...](#)" on page 2309 in Recall, State, for a full description of this dialog and menu.

| | |
|----------------------|--|
| Key Path | Recall, Data |
| Notes | The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 904

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate[:IMMEDIATE] :INITiate:RESTART |
| Example | :INIT:IMM :INIT:REST |
| Notes | :INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function. |
| Couplings | Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement. |
| Status Bits/OPC dependencies | This is an Overlapped command. The STATUS:OPERATION register bits 0 through 8 are cleared. The STATUS:QUESTIONABLE register bit 9 (INTEGRITY sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set. |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command `CALC:AVER:TCON UP`.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Mode | All |
| Notes | No remote command for this key specifically, but the :MMEM:STOR:STATe <filename> command is available for specific file types. An example is :MMEM:STOR:STATe <filename>. |
| Initial S/W Revision | Prior to A.02.00 |

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

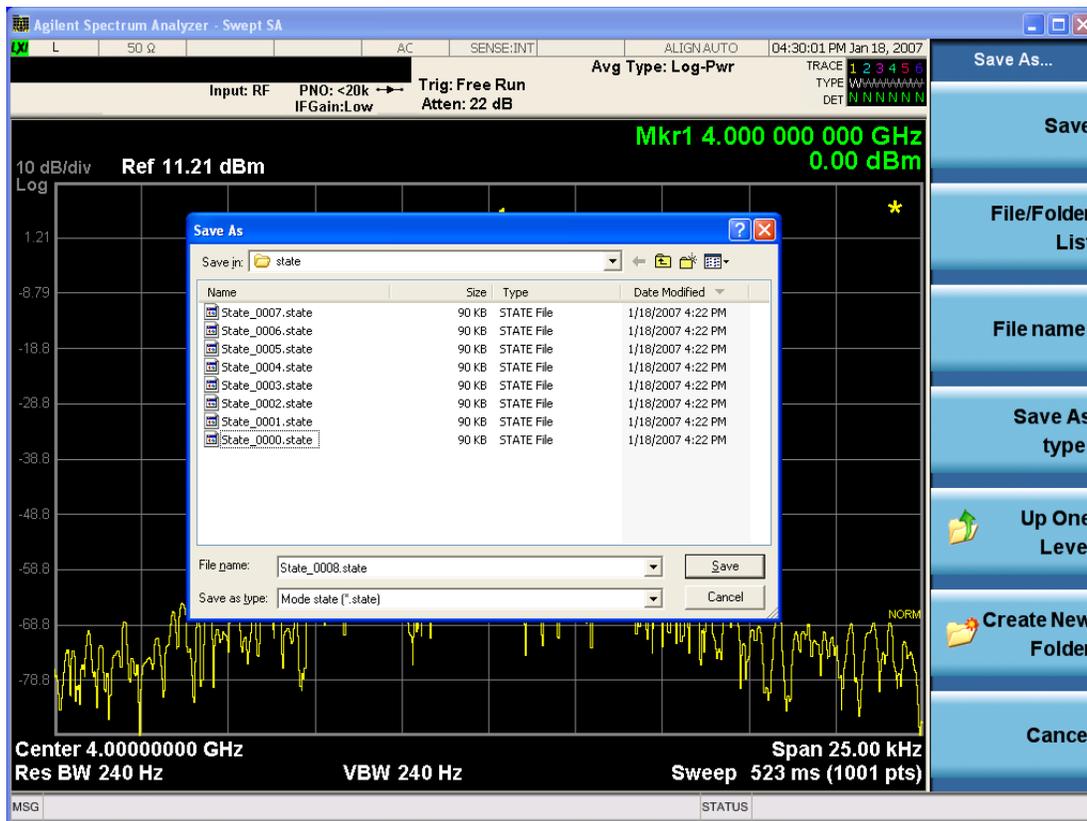
| | |
|----------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:STATe <filename> |
| Example | MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory. |
| Notes | Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key |

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

| | |
|-------------------------------------|-----------------------------------|
| Backwards Compatibility SCPI | :MMEMoRY:STORe:STATe 1,<filename> |
| Initial S/W Revision | Prior to A.02.00 |

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2305](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Save, State |
| Mode | All |
| Notes | Brings up Save As dialog for saving a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 909](#)

| | |
|-----------------------|--|
| Key Path | Save, State |
| Mode | All |
| Remote Command | :MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number> |
| Example | :MMEM:REG:STAT:LAB 1,"my label" |
| Notes | <reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,"" |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available" |
| Preset | The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc" |
| Initial S/W Revision | A.11.00 |

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1-16 from front panel, 1-128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

| | |
|----------------------|---|
| Key Path | Save |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands. |
| Dependencies | If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Measurement Results

Pressing this key selects Meas Results as the data type to be exported. Pressing the key a second time brings up the Meas Results menu, which allows you to select which **Meas Result** to save. In the Swept SA measurement, there are three types of Measurement Results files: Peak Table, Marker Table and Spectrogram.

See "[Meas Results File Contents](#)" on page 912.

See "[Marker Table](#)" on page 912.

See "[Peak Table](#)" on page 915.

See "[Spectrogram](#)" on page 918

| | |
|-----------------------------|---|
| Remote Command | :MMEMory:STORe:RESults:MTABle PTABle SPEctrogram <filename> |
| Example | :MMEM:STOR:RES:MTAB "myResults.csv" Saves the results from the current marker table to the file myResults.csv in the current path. :MMEM:STOR:RES:PTAB "myResults.csv" Saves the results from the current peak table to the file myResults.csv in the current path. :MMEM:STOR:RES:SPEC "myResults.csv" Saves the results from the current Spectrogram display to the file myResults.csv in the current path. The default path is My Documents\SA\data\SAN\results |
| Notes | If the save is initiated via SCPI, and the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over SCPI. |
| Dependencies | If a save of Marker Table results is requested and the Marker Table is not on, no file is saved and a message is generated If a save of Peak Table results is requested and the Peak Table is not on, no file is saved and a message is generated If a save of Spectrogram results is requested and the Spectrogram is not on, no file is saved and a message is generated. The Spectrogram choice only appears if option EDP is licensed. |
| Preset | Not part of Preset, but is reset to Peak Table by Restore Mode Defaults. Survives a shutdown. |
| Initial S/W Revision | Prior to A.02.00 |

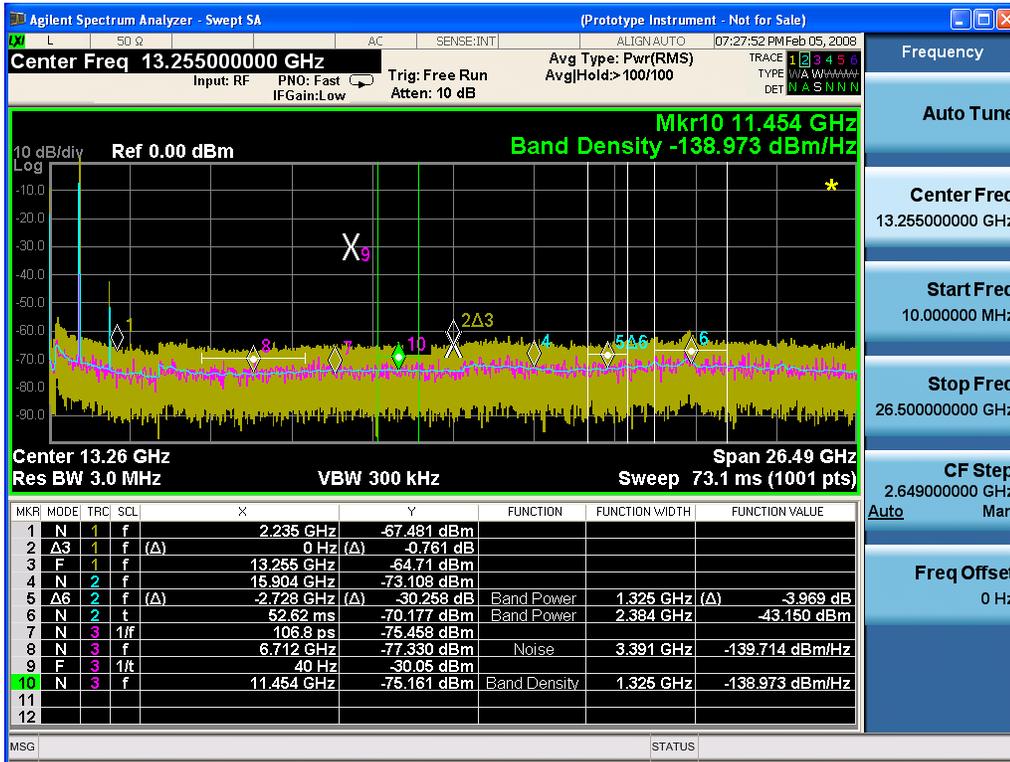
Meas Results File Contents

All files are .csv files. The following section details the data in each file type.

Marker Table

This section discusses the Marker Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:



Then the Meas Results file, when opened, would show the following data:

| | |
|------------------|------------------|
| MeasurementR | |
| result | |
| Swept SA | |
| A.01.40_R0017 | N9020A |
| 526 B25 PFR | 1 |
| P26 EA3 | |
| Result Type | Marker Table |
| Ref Level | 0 |
| Number of Points | 1001 |
| Sweep Time | 0.0662666 67 |
| Start Frequency | 10000000 |
| Stop Frequency | 26500000 000 |
| Average Count | 0 |
| Average Type | LogPower (Video) |
| RBW | 3000000 |

| | |
|--------------------------|-----------|
| RBW Filter | Gaussian |
| RBW Filter BW | 3dB |
| VBW | 3000000 |
| Sweep Type | Swept |
| X Axis Scale | Lin |
| PreAmp State | Off |
| PreAmp Band | Low |
| Trigger Source | Free |
| Trigger Level | 1.2 |
| Trigger Slope | Positive |
| Trigger Delay | 1.00E-06 |
| Phase Noise Optimization | Fast |
| Swept If Gain | Low |
| FFT If Gain | Autorange |
| RF Coupling | AC |
| FFT Width | 411900 |
| Ext Ref | 10000000 |
| Input | RF |
| RF Calibrator | Off |
| Attenuation | 10 |
| Ref Level Offset | 0 |
| External Gain | 0 |
| X Axis Units | Hz |
| Y Axis Units | dBm |

| DATA | | | | | | | | | |
|------|--------|-----|-----------|------------|---------|----------|----------------|----------------|---------------|
| MKR | MODE | TRC | SCL | X | Y | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE | FUNCTION UNIT |
| 1 | Normal | 1 | Frequency | 2.2350E+09 | -67.481 | Off | 0.0000E+00 | 0 | None |
| 2 | Delta3 | 1 | Frequency | 0.0000E+00 | -0.761 | Off | 0.0000E+00 | 0 | None |
| 3 | Fixed | 1 | Frequency | 1.3255E+10 | -64.71 | Off | 0.0000E+00 | 0 | None |
| 4 | Normal | 2 | Frequency | 1.5904E+10 | -73.1 | Off | 0.0000E+00 | 0 | None |

| 08 | | | | | | | | | |
|----|--------|---|-----------------|---------------------|-----------------|-----------------|----------------|------------------|--------|
| 5 | Delta7 | 2 | Frequency | - 2.7280E+ 09 | - 30.2 58 | Band Power | 1.3250E+ 06 | -3.969 | dB |
| 6 | Normal | 2 | Time | 5.2620E- 02 | - 70.1 77 | Band Power | 2.3840E+ 06 | -43.15 | dBm |
| 7 | Normal | 3 | Period | 1.0680E- 10 | - 75.4 58 | Off | 0.0000E+ 00 | 0 | None |
| 8 | Normal | 3 | Frequency | 6.7120E+ 09 | - 77.3 3 | Noise | 3.3910E+ 06 | - 139.71 4 | dBm/Hz |
| 9 | Fixed | 3 | Inverse Time | 4.0000E+ 01 | - 30.0 5 | Off | 0.0000E+ 00 | 0 | None |
| 10 | Normal | 3 | Frequency | 1.1454E+ 10 | - 75.1 61 | Band Density | 1.3250E+ 06 | - 138.97 3 | dBm/Hz |
| 11 | Off | 1 | Frequency | 0.0000E+ 00 | 0 | Off | 0.0000E+ 00 | 0 | None |
| 12 | Off | 1 | Frequency | 0.0000E+ 00 | 0 | Off | 0.0000E+ 00 | 0 | None |

The numbers appear in the file exactly as they appear onscreen. If it says 11.454 GHz onscreen, then in the file it is 11.454E+09.

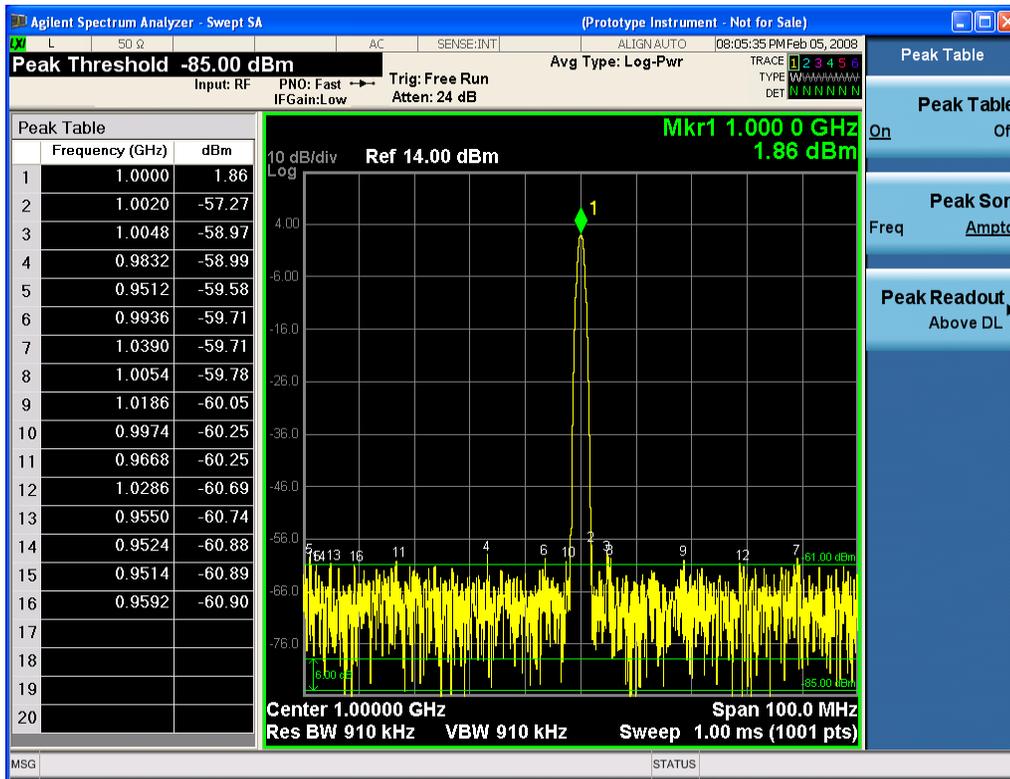
The metadata header is very similar to the metadata used in the trace data .csv files. See Trace File Contents. The only new information concerns the 1-of-N fields in the marker table itself.

Peak Table

This section discusses the Peak Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:

10 Power vs Time Measurement
Save



Then the Meas Results file, when opened, would show the header data (the same as for the Marker Table except that the Result Type is Peak Table) ending with a few fields of specific interest to Peak Table users:

- Peak Threshold
- Peak Threshold State (On|Off)
- Peak Excursion
- Peak Excursion State (On|Off)
- Display Line
- Peak Readout (All|AboveDL|BelowDL)
- Peak Sort (Freq|Amptd)

These fields are then followed by the data for the Peak Table itself.

Note that the label for the Frequency column changes to Time in 0 span.

Here is what the table for the above display looks like:

| MeasurementResult | |
|---------------------|--------|
| Swept SA | |
| A.01.40_R0017 | N9020A |
| 526 B25 PFR P26 EA3 | 1 |

| | |
|--------------------------|-----------------|
| Result Type | Peak Table |
| Ref Level | 0 |
| Number of Points | 1001 |
| Sweep Time | 0.066266667 |
| Start Frequency | 10000000 |
| Stop Frequency | 26500000000 |
| Average Count | 0 |
| Average Type | LogPower(Video) |
| RBW | 3000000 |
| RBW Filter | Gaussian |
| RBW Filter BW | 3dB |
| VBW | 3000000 |
| Sweep Type | Swept |
| X Axis Scale | Lin |
| PreAmp State | Off |
| PreAmp Band | Low |
| Trigger Source | Free |
| Trigger Level | 1.2 |
| Trigger Slope | Positive |
| Trigger Delay | 1.00E-06 |
| Phase Noise Optimization | Fast |
| Swept If Gain | Low |
| FFT If Gain | Autorange |
| RF Coupling | AC |
| FFT Width | 411900 |
| Ext Ref | 10000000 |
| Input | RF |
| RF Calibrator | Off |
| Attenuation | 10 |
| Ref Level Offset | 0 |
| External Gain | 0 |
| X Axis Units | Hz |
| Y Axis Units | dBm |
| Peak Threshold | -85 |
| Peak Threshold State | On |
| Peak Excursion | 6 |
| Peak Excursion State | On |

| | | |
|--------------|------------|-----------|
| Display Line | -61 | |
| Peak Readout | AboveDL | |
| Peak Sort | Amptd | |
| DATA | | |
| Peak | Frequency | Amplitude |
| 1 | 1.0000E+06 | 1.86 |
| 2 | 1.0020E+06 | -57.27 |
| 3 | 1.0048E+06 | -58.97 |
| 4 | 9.8320E+05 | -58.99 |
| 5 | 9.5120E+05 | -59.58 |
| 6 | 9.9360E+05 | -59.71 |
| 7 | 1.0390E+06 | -59.71 |
| 8 | 1.0054E+06 | -59.78 |
| 9 | 1.1086E+06 | -60.05 |
| 10 | 9.9740E+05 | -60.25 |
| 11 | 9.6680E+05 | -60.25 |
| 12 | 1.0286E+06 | -60.69 |
| 13 | 9.5500E+05 | -60.74 |
| 14 | 9.5240E+05 | -60.88 |
| 15 | 9.5140E+05 | -60.89 |
| 16 | 9.5920E+05 | -60.90 |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |

Spectrogram

This section discusses the Spectrogram Results file format. The Spectrogram choice only appears if option EDP is licensed.

The Spectrogram results are the same as a Trace data export, except that instead of having just one trace's data, all 300 traces appear one after the other.

Each trace has its own data mark; the data for Spectrogram Trace 0 follows the row marked DATA, the data for Spectrogram Trace 1 follows the row marked DATA1, for Spectrogram Trace 2 follows the row marked DATA2, and so on.

Each DATA row has a timestamp in the second column (as of firmware revision A.11.01). So, for example, if Trace 0 had a relative start time of 1729.523 sec, then the first DATA row would look like this:

DATA,1729.523

And if Trace 13 had a relative start time of 100.45 sec, then the fourteenth data row would look like:

DATA13,100.453

To find the absolute time for the relative timestamps of each trace, the last row before the first DATA row gives the absolute start time of the Spectrogram, in the form YYYYMMDDHHMMSS

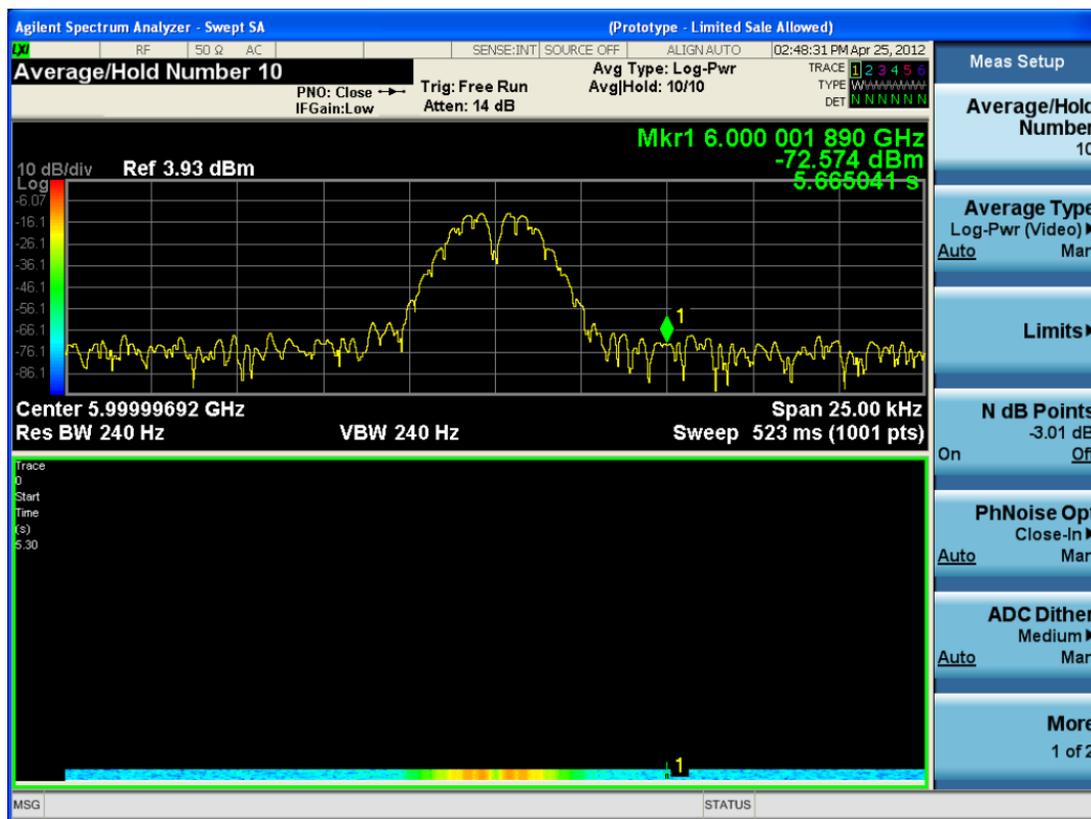
So, for example, if the absolute start time is 13:23:45:678 on January 30, 2012, this row would look like:

Start Time,20120130132345678

NOTE The resolution of the absolute time stored is 1 ms, which matches up with the fact that the fastest sweep time is also 1 ms. However, there is no specification for the absolute accuracy of the clock in the analyzer, nor is there any facility provided to allow the user to set this time to any particular degree of accuracy.

Traces that have not yet been filled in the Spectrogram display are empty; there is no DATA header for them. The file ends after the last non-empty trace.

Imagine that, at the point where a Spectrogram Meas Result is requested, the following screen is showing:



For the purpose of this example, we have set the Average/Hold Number to 10, thus we have only traces 0 thru 10. The Spectrogram was started at 02:28:08:700 pm on April 25, 2012 (that is, 700 ms after 2:28:08 pm), although the screen dump itself shows a different time, as it was taken ten minutes after the

Spectrogram data. Trace 0 is showing a start time of 5.30 seconds, meaning 5.3 seconds after the Spectrogram started (trace 10 has a start time of 0, as it was the first trace taken but has now rolled up into the tenth trace slot).

The Meas Results file, when opened, shows the header data and ten traces of trace data. Below is an extract from the result file for the above display. Note the start time of 20120425142808700 showing in the last row before the first DATA row, and the relative time of 5.299231048 showing in the first DATA row:

| Result Type | Spectrogram |
|--|--------------------|
| MeasResult | |
| Swept SA | |
| A.11.00.01 | N9020A |
| 503 508 513 526 ALL ALV B1C B1X B25 B2X B40 BAB BBA CR3 CRP DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA HBA K03 LFE MPB P03 P08 P13 P26 PFR RTL RTS S40 SB1 SEC SM1 UK6 YAS YAV | 1 |
| Segment | 0 |
| Number of Points | 1001 |
| Sweep Time | 0.523333333 |
| Start Frequency | 5999984415 |
| Stop Frequency | 6000009415 |
| Average Count | 0 |
| Average Type | LogPower(Video) |
| RBW | 240 |
| RBW Filter | Gaussian |
| RBW Filter BW | 3dB |
| VBW | 240 |
| Sweep Type | Swept |
| X Axis Scale | Lin |
| PreAmp State | Off |
| PreAmp Band | Low |
| Trigger Source | Free |
| Trigger Level | 1.2 |
| Trigger Slope | Positive |
| Trigger Delay | 0 |
| Phase Noise Optimization | Wide |
| Swept If Gain | Low |
| FFT If Gain | Autorange |
| RF Coupling | AC |

| Result Type | Spectrogram |
|-------------------|-------------------|
| FFT Width | 411900 |
| Ext Ref | 10000000 |
| Input | RF |
| RF Calibrator | Off |
| Attenuation | 14 |
| Ref Level Offset | 0 |
| External Gain | 0 |
| Trace Type | Clearwrite |
| Detector | Normal |
| Trace Math | Off |
| Trace Math Oper1 | Trace5 |
| Trace Math Oper2 | Trace6 |
| Trace Math Offset | 0 |
| Trace Name | Trace1 |
| X Axis Units | Hz |
| Y Axis Units | dBm |
| Start Time | 20120425142808700 |
| DATA | 5.299231048 |
| 5999984415 | -76.34749519 |
| 5999984440 | -77.28097006 |
| 5999984465 | -75.32317869 |
| 5999984490 | -73.64417681 |
| 5999984515 | -72.67154604 |

- o
- o
- o

| | |
|------------|--------------|
| 6000009315 | -77.94423277 |
| 6000009340 | -79.51829697 |
| 6000009365 | -78.46108961 |
| 6000009390 | -78.46108957 |
| 6000009415 | -76.59570596 |
| DATA2 | 4.708697055 |
| 5999984415 | -80.98197882 |
| 5999984440 | -80.98197879 |

Save

| | |
|------------|--------------|
| 5999984465 | -75.83142132 |
| 5999984490 | -74.02712079 |
| 5999984515 | -73.57213005 |

O
O
O

| | |
|------------|--------------|
| 6000009315 | -75.9183103 |
| 6000009340 | -79.53787488 |
| 6000009365 | -78.82602191 |
| 6000009390 | -78.82602188 |
| 6000009415 | -76.37486709 |
| DATA10 | 0 |
| 5999984415 | -75.56751112 |
| 5999984440 | -75.76485645 |
| 5999984465 | -76.67718717 |
| 5999984490 | -78.79238489 |
| 5999984515 | -83.72680212 |

O
O
O

| | |
|------------|--------------|
| 6000009315 | -71.3942461 |
| 6000009340 | -72.28308332 |
| 6000009365 | -73.92684489 |
| 6000009390 | -75.45548832 |
| 6000009415 | -75.17904815 |

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data which is not processed.

| Key Path | Save, Data |
|----------|------------|
|----------|------------|

| | |
|----------------------|--|
| Mode | TD-SCDMA |
| Example | MMEM:STOR:CAPT "MyCaptureData.bin" This stores the capture data in the file MyCaptureData.bin in the default directory. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Save As . . .

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\`<mode name>`\data\traces

For all of the Limit Data Files:

My Documents\`<mode name>`\data\limits

For all of the Measurement Results Data Files:

My Documents\`<mode name>`\data\`<measurement name>`\results

For all of the Capture Buffer Data Files:

My Documents\`<mode name>`\data\captureBuffer

| | |
|----------------------|---|
| Key Path | Save, Data |
| Mode | All |
| Notes | The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <code><mode specific></code> Save Type. The save is performed immediately and does not wait until the measurement is complete. |
| Initial S/W Revision | Prior to A.02.00 |

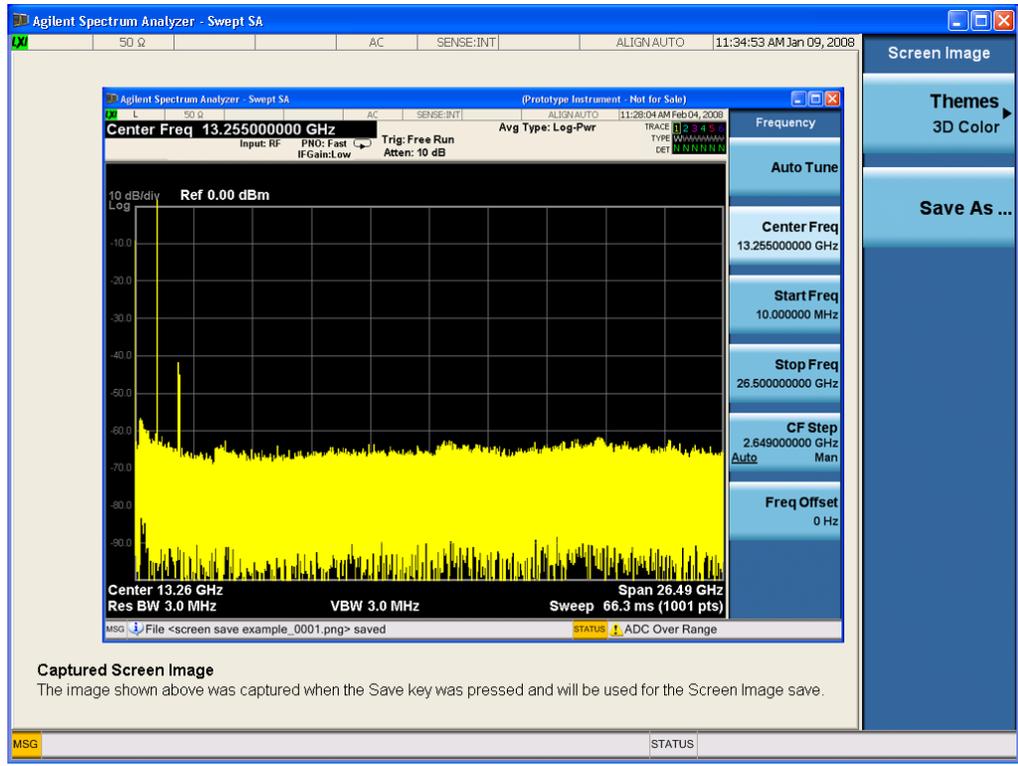
Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

10 Power vs Time Measurement
Save

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

| | |
|----------------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:SCReen <filename> |
| Example | :MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOlor FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Save As...

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "Save As." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "To File . . ." on page 2318 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where `<mode name>` is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

| | |
|----------------------|--|
| Key Path | Save, Screen Image |
| Notes | Brings up Save As dialog for saving a Screen Image Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Catalog (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:CATalog? [<code><directory_name></code>] |
| Notes | The string must be a valid logical path. Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format: <code><numeric_value>,<numeric_value>,{<file_entry>}</code> It returns two numeric parameters and as many strings as there are files and directories. The first |

parameter indicates the total amount of storage currently used in bytes. The second parameter indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:

<file_name>,<file_type>,<file_size>

As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty

Initial S/W Revision Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:CDIRectory [<directory_name>]
 :MMEMory:CDIRectory?

Notes The string must be a valid logical path.

Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.
At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.
Query returns full path of the default directory.

Initial S/W Revision Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:COPY <string>,<string> [,<string>,<string>]

Notes The string must be a valid logical path.

Copies an existing file to a new file or an existing directory to a new directory.
Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.
The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.

This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:COpy:DEvice <source_string>,<dest_string> |
| Notes | The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device. Valid device keywords are: SNS (smart noise source) An error is generated if the file or device is not found. |

Mass Storage Delete (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DELeTe <file_name>[,<directory_name>] |
| Notes | The string must be a valid logical path. Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an "access denied" error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name> |
| Notes | The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Make Directory (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MDIRectory <directory_name> |
| Notes | The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created. |

| | |
|----------------------|--|
| | This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Move (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MOVE <string>,<string>[,<string>,<string>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Remove Directory (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:RDIRECTory <directory_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See "[More Information](#)" on page 930

| | |
|-------------------------------|---|
| Key Path | Front-panel key |
| Example | :INIT:CONT OFF |
| Notes | See Cont key description. |
| Backwards Compatibility Notes | <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p> |
| Initial S/W Revision | Prior to A.02.00 |

More Information

See "[Restart](#)" on page 2315 for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no source functionality supported in the Code Domain measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

SPAN X Scale

Accesses a menu of functions that enable you set the horizontal scale parameters.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Ref Value

Allows you to set the display X reference value.

| | |
|-------------------------------------|--|
| Key Path | SPAN X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel <time> :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RLEVel? |
| Example | DISP:PVT:VIEW:WIND:TRACE:X:RLEV 1s DISP:PVT:VIEW:WIND:TRACE:X:RLEV? |
| Notes | If X Auto Scale is On, this value is automatically determined by the measurement result. When a value is set manually, X Auto Scale is automatically set to Off. |
| Couplings | See Restriction and Notes |
| Preset | 0 s |
| State Saved | Saved in instrument state. |
| Min | -10.0 s |
| Max | 10.00 s |
| Backwards Compatibility SCPI | [:SENSe]:PVTime:XSCale:XRValue |
| Initial S/W Revision | A.01.60 or later |

Scale/Div

Allows you to set the display X scale/division value.

| | |
|-----------------------|---|
| Key Path | SPAN X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time> :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:PDIVision? |
| Example | :DISP:PVT:VIEW:WIND:TRACE:X:PDIV 1ms :DISP:PVT:VIEW:WIND:TRACE:X:PDIV? |
| Notes | If X Auto Scale is set to On, this value is automatically determined by the measurement result. When a value is set manually, X Auto Scale is automatically set to Off. |

| | |
|-------------------------------------|---|
| Couplings | See Restriction and Notes |
| Preset | 1.0 ms |
| State Saved | Saved in instrument state. |
| Min | 1.00 ns |
| Max | 1.00 s |
| Backwards Compatibility SCPI | <code>[:SENSe] :PVTime :XScale :XPDivision</code> |
| Initial S/W Revision | A.01.60 or later |
| MIN/MAX/DEF Support | Yes |

Ref Position

Allows you to set the X reference position to the left, center, or right of the display.

| | |
|-------------------------------------|---|
| Key Path | SPAN X Scale |
| Mode | TD-SCDMA |
| Remote Command | <code>:DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOStion LEFT CENTER RIGHT</code> <code>:DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:RPOStion?</code> |
| Example | <code>:DISP:PVT:VIEW:WIND:TRACe:X:RPOS LEFT</code> <code>:DISP:PVT:VIEW:WIND:TRACe:X:RPOS?</code> |
| Preset | LEFT |
| State Saved | Saved in instrument state. |
| Range | Left Ctr Right |
| Backwards Compatibility SCPI | <code>[:SENSe] :PVTime :XScale :XRPosition</code> |
| Initial S/W Revision | A.01.60 or later |

Auto Scale

Allows you to toggle the X Auto Scale function between On and Off.

| | |
|-----------------------|--|
| Key Path | SPAN X Scale |
| Mode | TD-SCDMA |
| Remote Command | <code>:DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPle 0 1 OFF ON</code> <code>:DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:X[:SCALe]:COUPle?</code> |
| Example | <code>:DISP:PVT:VIEW:WIND:TRACe:X:COUP OFF</code> <code>:DISP:PVT:VIEW:WIND:TRACe:X:COUP?</code> |

| | |
|----------------------|--|
| Notes | Upon pressing the Restart front-panel key, the scale coupling function automatically determines the scale per division and reference values, based on the measurement results, if this parameter is set to On. When you manually set a value to either X Rel Value or X Scale/Div, X Auto Scale is automatically set to Off. |
| Couplings | See Restriction and Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Sweep/Control

Accesses a menu that enables you to configure the Sweep and Control functions of the analyzer, such as Sweep Time and Gating.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing Restart, Single or Cont does a Resume.

| | |
|-----------------------|--|
| Key Path | Sweep/Control |
| Remote Command | :INITiate:PAUSE |
| Dependencies | Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Key Path | Sweep/Control |
| Remote Command | :INITiate:RESume |
| Dependencies | Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing. |
| Initial S/W Revision | Prior to A.02.00 |

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORT is sent, the alignment finishes before the abort function is performed. So ABORT does not abort an alignment.

If the analyzer is set for Continuous measurement, it sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

| | |
|-----------------------|--------|
| Remote Command | :ABORT |
| Example | :ABOR |

| | |
|------------------------------|---|
| Notes | If :INITiate:CONTInuous is ON, then a new continuous measurement will start immediately, with sweep (data acquisition) occurring once the trigger condition has been met. If :INITiate:CONTInuous is OFF, then :INITiate:IMMEDIATE is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met. |
| Dependencies | For continuous measurement, ABORt is equivalent to the Restart key. Not all measurements support the abort command. |
| Status Bits/OPC dependencies | The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUEStionable register bit 9 (INTegrity sum) is cleared. Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true. |
| Initial S/W Revision | Prior to A.02.00 |

System

See "System" on page 349

Trace/Detector

Accesses a menu that allows you to control trace settings.

NOTE Max/Min Hold Traces will be held during the averaging cycle.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Max Hold Trace

This key allows you to make the Max Hold Trace visible or invisible in the display..

| | |
|-----------------------|--|
| Key Path | Trace/Detector |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe] ON OFF 1 0 :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:MAXHold[:STATe]? |
| Example | :DISP:PVT:VIEW:WIND:TRAC:MAXH ON :DISP:PVT:VIEW:WIND:TRAC:MAXH? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Min Hold Trace

This key allows you to make the Min Hold Trace visible or invisible in the display.

| | |
|-----------------------|--|
| Key Path | Trace/Detector |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe] ON OFF 1 0 :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRACe:MINHold[:STATe]? |
| Example | :DISP:PVT:VIEW:WIND:TRAC:MINH ON :DISP:PVT:VIEW:WIND:TRAC:MINH? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Trigger

See ["Trigger" on page 424](#)

Free Run

See ["Free Run " on page 431](#)

Video

See ["Video \(IF Envelope\) " on page 432](#)

Trigger Level

See ["Trigger Level " on page 432](#)

Trig Slope

See ["Trig Slope " on page 433](#)

Trig Delay

See ["Trig Delay " on page 434](#)

External 1

See ["External 1 " on page 2357](#)

Trigger Level

See ["Trigger Level " on page 2357](#)

Trig Slope

See ["Trig Slope " on page 2358](#)

Trig Delay

See ["Trig Delay " on page 437](#)

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off" on page 2346](#)

External 2

See ["External 2 " on page 2359](#)

Trigger Level

See ["Trigger Level " on page 2359](#)

Trig Slope

See ["Trig Slope " on page 2360](#)

Trig Delay

See "[Trig Delay](#) " on page 440

Zero Span Delay Comp

See "[Zero Span Delay Comp On/Off](#)" on page 2348

RF Burst

See "[RF Burst](#) " on page 2360

Absolute Trigger

See "[Absolute Trigger Level](#)" on page 2361

Relative Trigger

See "[Relative Trigger Level](#)" on page 2350

Trig Slope

See "[Trigger Slope](#) " on page 2362

Trig Delay

See "[Trig Delay](#) " on page 444

Auto/Holdoff

See "[Auto/Holdoff](#) " on page 445

Auto Trig

See "[Auto Trig](#) " on page 445

Trig Holdoff

See "[Trig Holdoff](#) " on page 446

Holdoff Type

See "[Holdoff Type](#)" on page 446

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

| Key Path | Front-panel key |
|-------------------------------|--|
| Backwards Compatibility Notes | <p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p> |
| Initial S/W Revision | Prior to A.02.00 |

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER |
| Notes | :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed |
| Couplings | A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:ALL |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL |
| Notes | Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. |
| Couplings | A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

| | |
|-----------------------|---|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:SAVE |
| Example | :SYST:PRES:USER:SAVE |
| Notes | :SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file. |
| Initial S/W Revision | Prior to A.02.00 |

View/Display

Opens the View menu for the current measurement. The views that are available are specific to the current measurement selected under the Meas key.

All Soft Keys in the “View/Display” menu work regardless of which result window currently has the focus.

For example, the scroll function works on the lower numeric result window even if the upper RF Envelope window currently has the focus.

For more information, see ["Power vs Time Measurement Results and Views" on page 944](#).

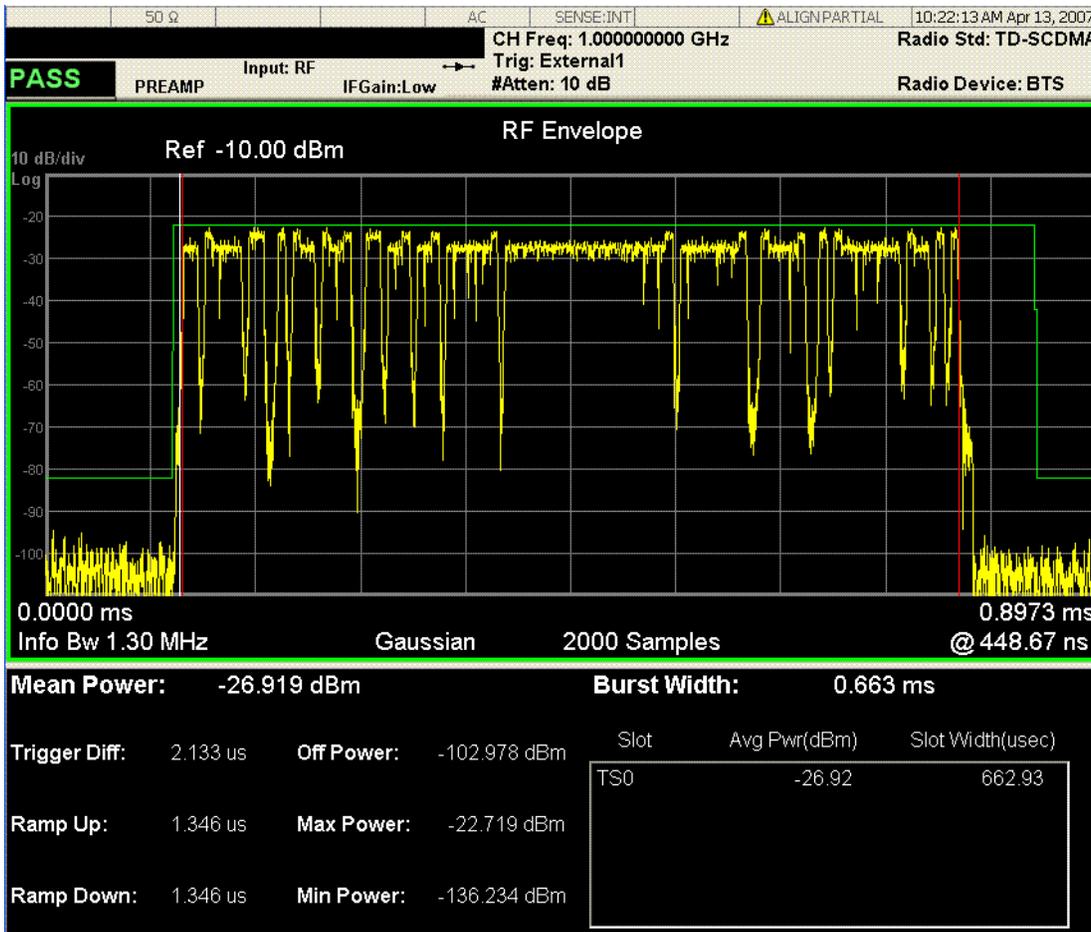
| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Power vs Time Measurement Results and Views

This measurement consists of one view, which consists of two windows.

There are two windows:

- ["RF Envelope window" on page 945](#) (upper)
- ["Result Metrics window" on page 945](#) (lower)



RF Envelope window

This table illustrates the details of RF envelope window:

| | |
|---------------------|--|
| Marker Operation | Yes |
| Corresponding Trace | Yellow: Signal wave form, n=2, 3, 4 Green: Limit mask n=5, 6 White: Trigger line Red: Burst lines Blue: Ramp up/down lines |

Result Metrics window

This table illustrates the details of metrics window:

| Name | Corresponding Results | Display Format |
|------------|-----------------------|----------------|
| Mean Power | n=1 3rd | 99.999 dBm |

| | | |
|--------------|----------|------------|
| Burst Width | n=1 4th | 99.999 ms |
| Trigger Diff | n=1 5th | 99.999 us |
| Ramp Up | n=1 6th | 99.999 us |
| Ramp Down | n=1 7th | 99.999 us |
| Off Power | n=1 8th | 99.999 dBm |
| Max Power | n=1 9th | 99.999 dBm |
| Min Power | n=1 10th | 99.999 dBm |
| Slot | N/A | AAA |
| A | n=7 | 99.99 dBm |
| Slot width | n=8 | 99.99 us |

NOTE

Slot/AvgPwr/SlotWidth section only displays measure results for active slot within display range.

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

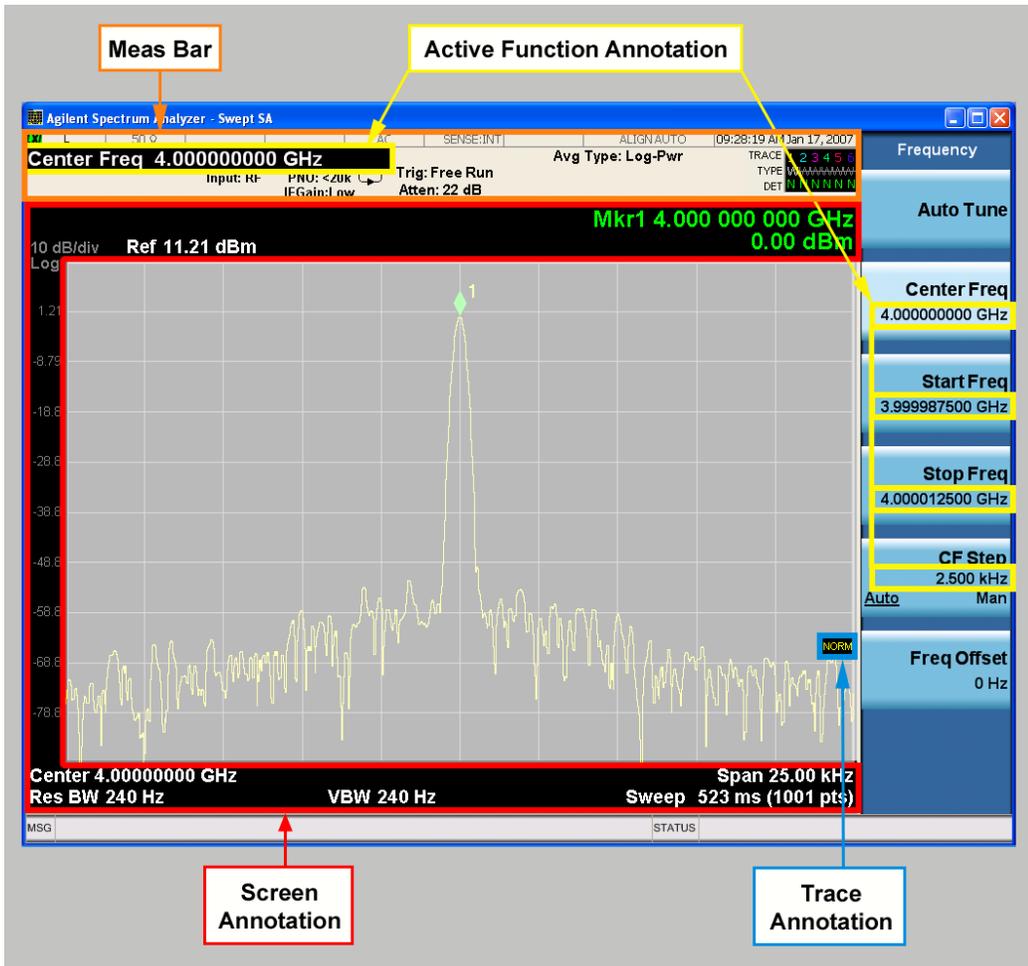
| | |
|----------------------|------------------|
| Key Path | Display |
| Key Path | View/Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

| | |
|-----------------------|--|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNotation:MBAR[:STATE] OFF ON 0 1 :DISPlay:ANNotation:MBAR[:STATE]? |
| Example | DISP:ANN:MBAR OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off. |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Screen

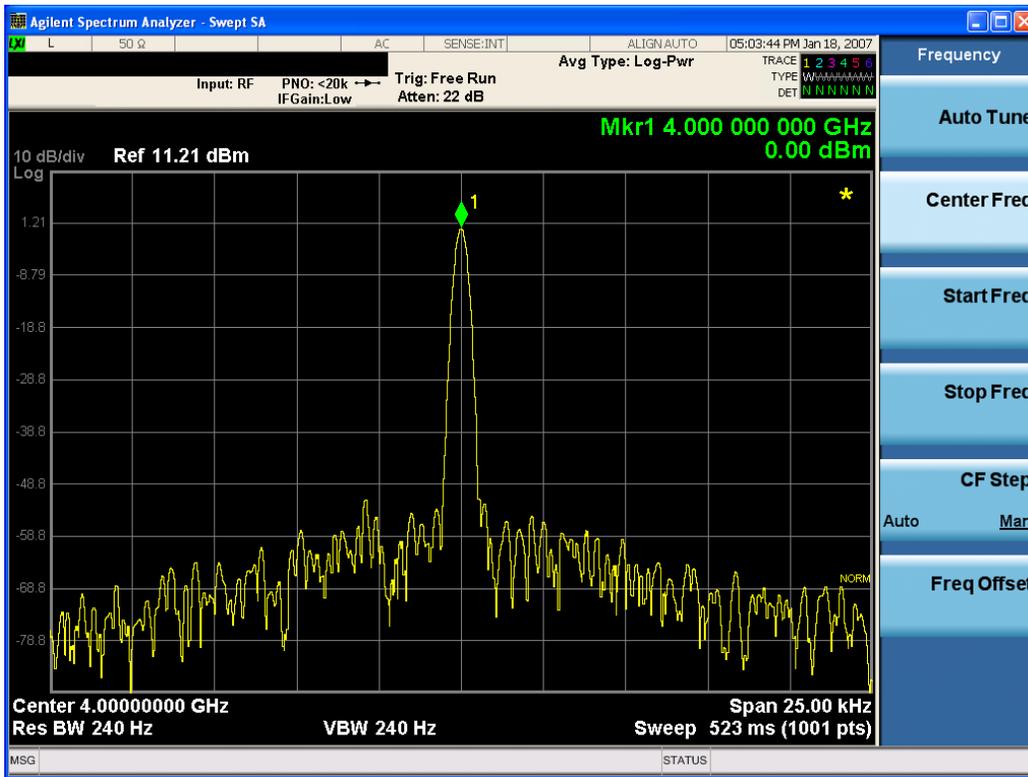
This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

| | |
|-----------------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]? |
| Example | DISP:ANN:SCR OFF |
| Dependencies | Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..



| | |
|----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE]? |
| Example | DISP:ACT OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Title

Displays menu keys that enable you to change or clear a title on your display.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Mode | All |
| Remote Command | :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA? |
| Example | DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title |
| Notes | Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters. |
| Preset | No title (measurement name instead) |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Example | The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required. |
| Notes | Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted). |
| Preset | Performed on Preset. |
| Initial S/W Revision | Prior to A.02.00 |

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

| | |
|-----------------------|--|
| Key Path | View/Display, Display |
| Remote Command | :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]? |
| Example | DISP:WIND:TRAC:GRAT:GRID OFF |
| Notes | The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis. |
| Preset | On |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

| | |
|-------------------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:WINDow[1]:ANNOtation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNOtation[:ALL]? |
| Example | :DISP:WIND:ANN OFF |
| Preset | On (Set by Restore Misc Defaults) |
| State Saved | Not saved in instrument state. |
| Backwards Compatibility Notes | The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

| | |
|-----------------------|--|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight ON OFF :DISPlay:BACKlight? |
| Preset | ON (Set by Restore Misc Defaults) |
| Initial S/W Revision | Prior to A.02.00 |

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

| | |
|-----------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity? |
| Example | DISP:BACK:INT 50 |

| | |
|----------------------|------------------------------------|
| Preset | 100 (Set by Restore Misc Defaults) |
| Min | 0 |
| Max | 100 |
| Initial S/W Revision | Prior to A.02.00 |

Trigger Lines

Turns the trigger lines On or Off.

| | |
|-------------------------------------|--|
| Key Path | View/Display |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRIGger[:STATe] ON OFF 1 0 :DISPlay:PVTime:VIEW[1]:WINDow[1]:TRIGger[:STATe]? |
| Example | :DISP:PVT:VIEW:WIND:TRIG ON :DISP:PVT:VIEW:WIND:TRIG? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Backwards Compatibility SCPI | :DISPlay:PVTime:TRIGger[:STATe] |
| Initial S/W Revision | A.01.60 or later |

Burst Lines

Turns the burst lines On or Off.

| | |
|-------------------------------------|--|
| Key Path | View/Display |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:PVTime:VIEW[1]:WINDow[1]:BLINes[:STATe] ON OFF 1 0 :DISPlay:PVTime:VIEW[1]:WINDow[1]:BLINes[:STATe]? |
| Example | :DISP:PVT:VIEW:WIND:BLIN ON :DISP:PVT:VIEW:WIND:BLIN? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Backwards Compatibility SCPI | :DISPlay:PVTime:BLINes[:STATe] |
| Initial S/W Revision | A.01.60 or later |

Ramp Lines

Turns the ramp lines On or Off.

| | |
|-------------------------------------|--|
| Key Path | View/Display |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:PVTime:VIEW[1]:WINDow[1]:RAMP[:STATe] ON OFF 1 0 :DISPlay:PVTime:VIEW[1]:WINDow[1]:RAMP[:STATe]? |
| Example | :DISP:PVT:VIEW:WIND:RAMP ON :DISP:PVT:VIEW:WIND:RAMP? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Backwards Compatibility SCPI | :DISPlay:PVTime:RAMP[:STATe] |
| Initial S/W Revision | A.01.60 or later |

Limit Mask

Turns the limit mask On or Off.

| | |
|-------------------------------------|--|
| Key Path | View/Display |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:PVTime:VIEW[1]:WINDow[1]:LMASk ON OFF 1 0 :DISPlay:PVTime:VIEW[1]:WINDow[1]:LMASk? |
| Example | :DISP:PVT:VIEW:WIND:LMAS ON :DISP:PVT:VIEW:WIND:LMAS? |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Backwards Compatibility SCPI | :DISPlay:PVTime:LIMit:MASK |

Scroll

Accesses the Scroll menu, which contains features that enable you to navigate the display.

| | |
|----------------------|------------------|
| Key Path | View/Display |
| Initial S/W Revision | A.01.60 or later |

Prev Page

Moves the display one page back to the previous page of the result metrics window.

| | |
|----------------------|----------------------|
| Key Path | View/Display, Scroll |
| Mode | TD-SCDMA |
| Initial S/W Revision | A.01.60 or later |

Next Page

Moves the display one page forward to the next page of the result metrics window.

| | |
|----------------------|----------------------|
| Key Path | View/Display, Scroll |
| Mode | TD-SCDMA |
| Initial S/W Revision | A.01.60 or later |

Scroll Up

Moves one line upward from the current line of the result metrics window.

Pressing the up arrow hard key has the same effect as this function, if no active function is shown. If an active function is shown, the up arrow hard key controls the active function, but has no effect on line movement.

Scroll up soft key and up arrow hard key will only effective when Metrics window is focused.

| | |
|----------------------|----------------------|
| Key Path | View/Display, Scroll |
| Mode | TD-SCDMA |
| Initial S/W Revision | A.01.60 or later |

Scroll Down

Moves one line downward from the current line of the result metrics window.

Pressing the down arrow hard key has the same effect as this function, if no active function is shown. If an active function is shown, the up arrow hard key controls the active function, but has no effect on line movement, as the Scroll Down function does.

The scroll down soft key and down arrow hard key are only effective when the Metrics window is focused.

| | |
|----------------------|----------------------|
| Key Path | View/Display, Scroll |
| Mode | TD-SCDMA |
| Initial S/W Revision | A.01.60 or later |

First Page

Moves the display to the first page of the result metrics window.

| | |
|----------------------|----------------------|
| Key Path | View/Display, Scroll |
| Mode | TD-SCDMA |
| Initial S/W Revision | A.01.60 or later |

Last Page

Moves the display to the last page of the result metrics window.

| | |
|----------------------|----------------------|
| Key Path | View/Display, Scroll |
| Mode | TD-SCDMA |
| Initial S/W Revision | A.01.60 or later |

11 Spectrum Emission Mask Measurement

The spectrum emission mask measures spurious signal levels in up to six pairs of offset frequencies and relates them to the carrier power. For measurement results and views, see ["View/Display" on page 1171](#).

This topic contains the following sections:

["Measurement Commands for Spectrum Emission Mask" on page 960](#)

["Remote Command Results for Spectrum Emission Mask Measurement" on page 961](#)

["Number of Offsets" on page 981](#)

Measurement Commands for Spectrum Emission Mask

Offsets that are turned off (inactive) return -999.0 when their results are queried via SCPI.

```
:CONFigure:SEMask  
:CONFigure:SEMask:NDEFault  
:INITiate:SEMask  
:FETCh:SEMask[n]?  
:MEASure:SEMask[n]?  
:READ:SEMask[n]?
```

For more measurement related commands, see the SENSE subsystem, and the section "[Remote Measurement Functions](#)" on page 2284.

Remote Command Results for Spectrum Emission Mask Measurement

The following table describes the results returned by the FETCh, MEASure, and READ queries listed above, according to the index value n:

| Modes | n | Return Value |
|--|---|--|
| All except MSR, WLAN, LTEAFDD, LTEATDD | 1 | <p>Meas Type: Total Power Reference</p> <p>Returns 82 comma-separated scalar results, in the following order:</p> <ol style="list-style-type: none"> 1. Reserved for the future use, returns -999.0 2. Absolute power at the center frequency (reference) area (dBm) 3. Reserved for the future use, returns -999.0 4. Reserved for the future use, returns -999.0 5. Peak frequency in the center frequency (reference) area (Hz) 6. Reserved for the future use, returns -999.0 7. Reserved for the future use, returns -999.0 8. Reserved for the future use, returns -999.0 9. Reserved for the future use, returns -999.0 10. Reserved for the future use, returns -999.0 11. Relative integrated power on the negative offset A (dBc) 12. Absolute integrated power on the negative offset A (dBm) 13. Relative peak power on the negative offset A (dBc) 14. Absolute peak power on the negative offset A (dBm) 15. Peak power offset frequency from the center or carrier edge frequency in the negative offset A, depending on Offset Frequency Define settings (Hz) 16. Relative integrated power on the positive offset A (dBc) 17. Absolute integrated power on the positive offset A (dBm) 18. Relative peak power on the positive offset A (dBc) 19. Absolute peak power on the positive offset A (dBm) 20. Peak power offset frequency from the center or carrier edge frequency in the positive offset A, depending on Offset Frequency Define settings (Hz) 21. Relative integrated power on the negative offset B (dBc) --- 69. Absolute peak power on the positive offset F (dBm) 70. Peak power offset frequency from the center or carrier edge frequency in the positive offset F, depending on Offset Frequency Define settings (Hz) 71. Minimum margin from limit line on the negative offset A (dB) 72. Minimum margin from limit line on the positive offset A (dB) 73. Minimum margin from limit line on the negative offset B (dB) 74. Minimum margin from limit line on the positive offset B (dB) 75. Minimum margin from limit line on the negative offset C (dB) 76. Minimum margin from limit line on the positive offset C (dB) |

| Modes | n | Return Value |
|--|---|---|
| | | 77. Minimum margin from limit line on the negative offset D (dB) 78. Minimum margin from limit line on the positive offset D (dB) 79. Minimum margin from limit line on the negative offset E (dB) 80. Minimum margin from limit line on the positive offset E (dB) 81. Minimum margin from limit line on the negative offset F (dB) 82. Minimum margin from limit line on the positive offset F (dB) |
| All except MSR, WLAN, LTEAFDD, LTEATDD | 1 | Meas Type: Power Spectral Density Reference Returns 82 comma-separated scalar results, in the following order: <ol style="list-style-type: none"> 1. Reserved for the future use, returns -999.0 2. Absolute power at the center frequency (reference) area (dBm/Hz) 3. Reserved for the future use, returns -999.0 4. Reserved for the future use, returns -999.0 5. Peak frequency in the center frequency (reference) area (Hz) 6. Reserved for the future use, returns -999.0 7. Reserved for the future use, returns -999.0 8. Reserved for the future use, returns -999.0 9. Reserved for the future use, returns -999.0 10. Reserved for the future use, returns -999.0 11. Relative integrated power on the negative offset A (dB) 12. Absolute integrated power on the negative offset A (dBm/Hz) 13. Relative peak power on the negative offset A (dB) 14. Absolute peak power on the negative offset A (dBm/Hz) 15. Peak power offset frequency from the center or carrier edge frequency in the negative offset A, depending on Offset Frequency Define settings (Hz) 16. Relative integrated power on the positive offset A (dB) 17. Absolute integrated power on the positive offset A (dBm/Hz) 18. Relative peak power on the positive offset A (dB) 19. Absolute peak power on the positive offset A (dBm/Hz) 20. Peak power offset frequency from the center or carrier edge frequency in the positive offset A, depending on Offset Frequency Define settings (Hz) 21. Relative integrated power on the negative offset B (dB) --- 69. Absolute peak power on the positive offset F (dBm/Hz) 70. Peak power offset frequency from the center or carrier edge frequency in the positive offset F, depending on Offset Frequency Define settings (Hz) 71. Minimum margin from limit line on the negative offset A (dB) 72. Minimum margin from limit line on the positive offset A (dB) 73. Minimum margin from limit line on the negative offset B (dB) 74. Minimum margin from limit line on the positive offset B (dB) |

| Modes | n | Return Value |
|--|---|--|
| | | 75. Minimum margin from limit line on the negative offset C (dB) |
| | | 76. Minimum margin from limit line on the positive offset C (dB) |
| | | 77. Minimum margin from limit line on the negative offset D (dB) |
| | | 78. Minimum margin from limit line on the positive offset D (dB) |
| | | 79. Minimum margin from limit line on the negative offset E (dB) |
| | | 80. Minimum margin from limit line on the positive offset E (dB) |
| | | 81. Minimum margin from limit line on the negative offset F (dB) |
| | | 82. Minimum margin from limit line on the positive offset F (dB) |
| All except MSR, WLAN, LTEAFDD, LTEATDD | 1 | <p>Meas Type: Spectrum Peak Reference Returns 82 comma-separated scalar results, in the following order:</p> <ol style="list-style-type: none"> 1. Reserved for the future use, returns -999.0 2. Peak power at the center frequency (reference) area (dBm) 3. Reserved for the future use, returns -999.0 4. Reserved for the future use, returns -999.0 5. Peak frequency in the center frequency (reference) area (Hz) 6. Reserved for the future use, returns -999.0 7. Reserved for the future use, returns -999.0 8. Reserved for the future use, returns -999.0 9. Reserved for the future use, returns -999.0 10. Reserved for the future use, returns -999.0 11. Reserved for the future use, returns -999.0 12. Reserved for the future use, returns -999.0 13. Relative peak power on the negative offset A (dB) 14. Absolute peak power on the negative offset A (dBm) 15. Peak power offset frequency from the center or carrier edge frequency in the negative offset A, depending on Offset Frequency Define settings (Hz) 16. Reserved for the future use, returns -999.0 17. Reserved for the future use, returns -999.0 18. Relative peak power on the positive offset A (dB) 19. Absolute peak power on the positive offset A (dBm) 20. Peak power offset frequency from the center or carrier edge frequency in the positive offset A, depending on Offset Frequency Define settings (Hz) 21. Reserved for the future use, returns -999.0 --- 69. Absolute peak power on the positive offset F (dBm) 70. Peak power offset frequency from the center or carrier edge frequency in the positive offset F, depending on Offset Frequency Define settings (Hz) 71. Minimum margin from limit line on the negative offset A (dB) 72. Minimum margin from limit line on the positive offset A (dB) |

| Modes | n | Return Value |
|--------------------------|---|---|
| | | 73. Minimum margin from limit line on the negative offset B (dB) |
| | | 74. Minimum margin from limit line on the positive offset B (dB) |
| | | 75. Minimum margin from limit line on the negative offset C (dB) |
| | | 76. Minimum margin from limit line on the positive offset C (dB) |
| | | 77. Minimum margin from limit line on the negative offset D (dB) |
| | | 78. Minimum margin from limit line on the positive offset D (dB) |
| | | 79. Minimum margin from limit line on the negative offset E (dB) |
| | | 80. Minimum margin from limit line on the positive offset E (dB) |
| | | 81. Minimum margin from limit line on the negative offset F (dB) |
| | | 82. Minimum margin from limit line on the positive offset F (dB) |
| MSR, LTEAFDD, LTEATDD | 1 | <p>Meas Type: Total Power Reference</p> <p>Returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Total Absolute power of carriers of Measure Carrier On if available. Otherwise -999.0 is returned. 2. Absolute reference power. Absolute power at the left reference carrier if Power Ref type is "Left & Right Carriers." Absolute power at the reference carrier of the left sub-block if Power Ref type is "Max Power Carrier in Sub-block." (dBm) 3. Absolute power at the right reference carrier if Power Ref type is "Left & Right Carriers." Absolute power at the reference carrier of the right sub-block if Power Ref type is "Max Power Carrier in Sub-block." Otherwise -999.0 is returned. (dBm) 4. Reserved for the future use, returns -999.0 5. Peak frequency in the ref carrier channel spacing frequency range. Peak frequency in the left ref carrier frequency range if Power Ref Type is "Left & Right Carriers." Peak frequency in the ref carrier frequency range of the left sub-block if Power Ref type is "Max Power Carrier in Sub-block." 6. Peak frequency in the right ref carrier channel spacing frequency range if Power Ref type is "Left & Right Carriers." Peak frequency in the ref carrier frequency range of the right sub-block if Power Ref type is "Max Power Carrier in Sub-block." Otherwise -999.0 is returned. 7. Reserved for the future use, returns -999.0 8. Reserved for the future use, returns -999.0 9. Reserved for the future use, returns -999.0 10. Reserved for the future use, returns -999.0 11. Relative integrated power on the negative offset A (dBc) 12. Absolute integrated power on the negative offset A (dBm) 13. Relative peak power on the negative offset A (dBc) 14. Absolute peak power on the negative offset A (dBm) 15. Peak power offset frequency from the center or carrier edge frequency in the negative offset A, depending on Offset Frequency Define settings (Hz) 16. Relative integrated power on the positive offset A (dBc) 17. Absolute integrated power on the positive offset A (dBm) |

| Modes | n | Return Value |
|------------------------------|---|---|
| | | 18. Relative peak power on the positive offset A (dBc) |
| | | 19. Absolute peak power on the positive offset A (dBm) |
| | | 20. Peak power offset frequency from the center or carrier edge frequency in the positive offset A, depending on Offset Frequency Define settings (Hz) |
| | | 21. Relative integrated power on the negative offset B (dBc) |
| | | --- |
| | | 69. Absolute peak power on the positive offset F (dBm) |
| | | 70. Peak power offset frequency from the center or carrier edge frequency in the positive offset F, depending on Offset Frequency Define settings (Hz) |
| | | 71. Minimum margin from limit line on the negative offset A (dB) |
| | | 72. Minimum margin from limit line on the positive offset A (dB) |
| | | 73. Minimum margin from limit line on the negative offset B (dB) |
| | | 74. Minimum margin from limit line on the positive offset B (dB) |
| | | 75. Minimum margin from limit line on the negative offset C (dB) |
| | | 76. Minimum margin from limit line on the positive offset C (dB) |
| | | 77. Minimum margin from limit line on the negative offset D (dB) |
| | | 78. Minimum margin from limit line on the positive offset D (dB) |
| | | 79. Minimum margin from limit line on the negative offset E (dB) |
| | | 80. Minimum margin from limit line on the positive offset E (dB) |
| | | 81. Minimum margin from limit line on the negative offset F (dB) |
| | | 82. Minimum margin from limit line on the positive offset F (dB) |
| MSR , LTEAFDD, LTEATDD | 1 | <p>Meas Type: Power Spectral Density Reference Returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Total Absolute power of carriers of Measure Carrier On if available. Otherwise -999.0 is returned. (dBm) 2. Absolute reference power. Absolute power at the left reference carrier if Power Ref type is "Left & Right Carriers." Absolute power at the reference carrier of the left sub-block if Power Ref type is "Max Power Carrier in Sub-block." (dBm/Hz) 3. Absolute power at the right reference carrier if Power Ref type is "Left & Right Carriers." Absolute power at the reference carrier of the right sub-block if Power Ref type is "Max Power Carrier in Sub-block." Otherwise -999.0 is returned. (dBm/Hz) 4. Reserved for the future use, returns -999.0 5. Peak frequency in the ref carrier channel spacing frequency range . Peak frequency in the left ref carrier frequency range if Power Ref type is "Left & Right Carriers." Peak frequency in the ref carrier frequency range of the left sub-block if Power Ref type is "Max Power Carrier in Sub-block." 6. Peak frequency in the right ref carrier channel spacing frequency range if Power Ref type is "Left & Right Carriers." Peak frequency in the ref carrier frequency range of the right sub-block if Power Ref type is "Max Power Carrier in Sub-block." Otherwise -999.0 is returned. 7. Reserved for the future use, returns -999.0 |

| Modes | n | Return Value |
|--------------------------|---|---|
| | | 8. Reserved for the future use, returns -999.0 |
| | | 9. Reserved for the future use, returns -999.0 |
| | | 10. Reserved for the future use, returns -999.0 |
| | | 11. Relative integrated power on the negative offset A (dBc) |
| | | 12. Absolute integrated power on the negative offset A (dBm/Hz) |
| | | 13. Relative peak power on the negative offset A (dBc) |
| | | 14. Absolute peak power on the negative offset A (dBm/Hz) |
| | | 15. Peak power offset frequency from the center or carrier edge frequency in the negative offset A, depending on Offset Frequency Define settings (Hz) |
| | | 16. Relative integrated power on the positive offset A (dBc) |
| | | 17. Absolute integrated power on the positive offset A (dBm/Hz) |
| | | 18. Relative peak power on the positive offset A (dBc) |
| | | 19. Absolute peak power on the positive offset A (dBm/Hz) |
| | | 20. Peak power offset frequency from the center or carrier edge frequency in the positive offset A, depending on Offset Frequency Define settings (Hz) |
| | | 21. Relative integrated power on the negative offset B (dBc) |
| | | --- |
| | | 69. Absolute peak power on the positive offset F (dBm/Hz) |
| | | 70. Peak power offset frequency from the center or carrier edge frequency in the positive offset F, depending on Offset Frequency Define settings (Hz) |
| | | 71. Minimum margin from limit line on the negative offset A (dB) |
| | | 72. Minimum margin from limit line on the positive offset A (dB) |
| | | 73. Minimum margin from limit line on the negative offset B (dB) |
| | | 74. Minimum margin from limit line on the positive offset B (dB) |
| | | 75. Minimum margin from limit line on the negative offset C (dB) |
| | | 76. Minimum margin from limit line on the positive offset C (dB) |
| | | 77. Minimum margin from limit line on the negative offset D (dB) |
| | | 78. Minimum margin from limit line on the positive offset D (dB) |
| | | 79. Minimum margin from limit line on the negative offset E (dB) |
| | | 80. Minimum margin from limit line on the positive offset E (dB) |
| | | 81. Minimum margin from limit line on the negative offset F (dB) |
| | | 82. Minimum margin from limit line on the positive offset F (dB) |
| MSR, LTEAFDD, LTEATDD | 1 | <p>Meas Type: Spectrum Peak Reference</p> <p>Returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Total Absolute power of carriers of Measure Carrier On if available. Otherwise -999.0 is returned. (dBm) 2. Peak reference power. Peak power at the left reference carrier if Power Ref type is "Left & Right Carriers." Peak power at the reference carrier of the left sub-block if Power Ref type is "Max Power Carrier in Sub-block." (dBm) |

| Modes | n | Return Value |
|-------|---|---|
| | | 3. Peak power at the right reference carrier if Power Ref type is "Left & Right Carriers." Peak power at the reference carrier of the right sub-block if Power Ref type is "Max Power Carrier in Sub-block." Otherwise -999.0 is returned. (dBm) |
| | | 4. Reserved for the future use, returns -999.0 |
| | | 5. Peak frequency in the ref carrier channel spacing frequency range. Peak frequency in the left ref carrier frequency range if Power Ref type is "Left & Right Carriers." Peak frequency in the ref carrier frequency range of the left sub-block if Power Ref type is "Max Power Carrier in Sub-block." |
| | | 6. Peak frequency in the right ref carrier channel spacing frequency range if Power Ref type is "Left & Right Carriers." Peak frequency in the ref carrier frequency range of the right sub-block if Power Ref type is "Max Power Carrier in Sub-block." Otherwise -999.0 is returned. |
| | | 7. Reserved for the future use, returns -999.0 |
| | | 8. Reserved for the future use, returns -999.0 |
| | | 9. Reserved for the future use, returns -999.0 |
| | | 10. Reserved for the future use, returns -999.0 |
| | | 11. Relative integrated power on the negative offset A (dBc) |
| | | 12. Absolute integrated power on the negative offset A (dBm) |
| | | 13. Relative peak power on the negative offset A (dBc) |
| | | 14. Absolute peak power on the negative offset A (dBm) |
| | | 15. Peak power offset frequency from the center or carrier edge frequency in the negative offset A, depending on Offset Frequency Define settings (Hz) |
| | | 16. Relative integrated power on the positive offset A (dBc) |
| | | 17. Absolute integrated power on the positive offset A (dBm) |
| | | 18. Relative peak power on the positive offset A (dBc) |
| | | 19. Absolute peak power on the positive offset A (dBm) |
| | | 20. Peak power offset frequency from the center or carrier edge frequency in the positive offset A, depending on Offset Frequency Define settings (Hz) |
| | | 21. Relative integrated power on the negative offset B (dBc) |
| | | --- |
| | | 69. Absolute peak power on the positive offset F (dBm) |
| | | 70. Peak power offset frequency from the center or carrier edge frequency in the positive offset F, depending on Offset Frequency Define settings (Hz) |
| | | 71. Minimum margin from limit line on the negative offset A (dB) |
| | | 72. Minimum margin from limit line on the positive offset A (dB) |
| | | 73. Minimum margin from limit line on the negative offset B (dB) |
| | | 74. Minimum margin from limit line on the positive offset B (dB) |
| | | 75. Minimum margin from limit line on the negative offset C (dB) |
| | | 76. Minimum margin from limit line on the positive offset C (dB) |
| | | 77. Minimum margin from limit line on the negative offset D (dB) |
| | | 78. Minimum margin from limit line on the positive offset D (dB) |
| | | 79. Minimum margin from limit line on the negative offset E (dB) |
| | | 80. Minimum margin from limit line on the positive offset E (dB) |

| Modes | n | Return Value |
|--|---|---|
| | | 81. Minimum margin from limit line on the negative offset F (dB) |
| | | 82. Minimum margin from limit line on the positive offset F (dB) |
| WLAN, with radio standard 802.11 ac (80 MHz + 80 MHz) | 1 | <p>Meas Type: Total Power Reference Returns 82 comma-separated scalar results, in the following order:</p> <ol style="list-style-type: none"> 1. Reserved for the future use, returns -999.0 2. Absolute reference power (dBm) 3. Absolute power of the carrier of which the frequency is indicated by Freq Segment 1 (dBm) 4. Absolute power of the carrier of which the frequency is indicated by Freq Segment 2 (dBm) 5. Peak frequency in the center frequency (reference) area (Hz) 6. Reserved for the future use, returns -999.0 7. Reserved for the future use, returns -999.0 8. Reserved for the future use, returns -999.0 9. Reserved for the future use, returns -999.0 10. Reserved for the future use, returns -999.0 11. Relative integrated power on the negative offset A (dBc) 12. Absolute integrated power on the negative offset A (dBm) 13. Relative peak power on the negative offset A (dBc) 14. Absolute peak power on the negative offset A (dBm) 15. Peak power offset frequency from the center or carrier edge frequency in the negative offset A, depending on Offset Frequency Define settings (Hz) 16. Relative integrated power on the positive offset A (dBc) 17. Absolute integrated power on the positive offset A (dBm) 18. Relative peak power on the positive offset A (dBc) 19. Absolute peak power on the positive offset A (dBm) 20. Peak power offset frequency from the center or carrier edge frequency in the positive offset A, depending on Offset Frequency Define settings (Hz) 21. Relative integrated power on the negative offset B (dBc) <p>---</p> <ol style="list-style-type: none"> 69. Absolute peak power on the positive offset F (dBm) 70. Peak power offset frequency from the center or carrier edge frequency in the positive offset F, depending on Offset Frequency Define settings (Hz) 71. Minimum margin from limit line on the negative offset A (dB) 72. Minimum margin from limit line on the positive offset A (dB) 73. Minimum margin from limit line on the negative offset B (dB) 74. Minimum margin from limit line on the positive offset B (dB) 75. Minimum margin from limit line on the negative offset C (dB) 76. Minimum margin from limit line on the positive offset C (dB) 77. Minimum margin from limit line on the negative offset D (dB) 78. Minimum margin from limit line on the positive offset D (dB) |

| Modes | n | Return Value |
|--|---|--|
| | | 79. Minimum margin from limit line on the negative offset E (dB) |
| | | 80. Minimum margin from limit line on the positive offset E (dB) |
| | | 81. Minimum margin from limit line on the negative offset F (dB) |
| | | 82. Minimum margin from limit line on the positive offset F (dB) |
| WLAN, with radio standard 802.11 ac (80 MHz + 80 MHz) | 1 | <p>Meas Type: Power Spectral Density Reference Returns 82 comma-separated scalar results, in the following order:</p> <ol style="list-style-type: none"> 1. Reserved for the future use, returns -999.0 2. Absolute reference power (dBm/Hz) 3. Absolute power of the carrier of which the frequency is indicated by Freq Segment 1 (dBm/Hz) 4. Absolute power of the carrier of which the frequency is indicated by Freq Segment 2 (dBm/Hz) 5. Peak frequency in the center frequency (reference) area (Hz) 6. Reserved for the future use, returns -999.0 7. Reserved for the future use, returns -999.0 8. Reserved for the future use, returns -999.0 9. Reserved for the future use, returns -999.0 10. Reserved for the future use, returns -999.0 11. Relative integrated power on the negative offset A (dB) 12. Absolute integrated power on the negative offset A (dBm/Hz) 13. Relative peak power on the negative offset A (dB) 14. Absolute peak power on the negative offset A (dBm/Hz) 15. Peak power offset frequency from the center or carrier edge frequency in the negative offset A, depending on Offset Frequency Define settings (Hz) 16. Relative integrated power on the positive offset A (dB) 17. Absolute integrated power on the positive offset A (dBm/Hz) 18. Relative peak power on the positive offset A (dB) 19. Absolute peak power on the positive offset A (dBm/Hz) 20. Peak power offset frequency from the center or carrier edge frequency in the positive offset A, depending on Offset Frequency Define settings (Hz) 21. Relative integrated power on the negative offset B (dB) --- 69. Absolute peak power on the positive offset F (dBm/Hz) 70. Peak power offset frequency from the center or carrier edge frequency in the positive offset F, depending on Offset Frequency Define settings (Hz) 71. Minimum margin from limit line on the negative offset A (dB) 72. Minimum margin from limit line on the positive offset A (dB) 73. Minimum margin from limit line on the negative offset B (dB) 74. Minimum margin from limit line on the positive offset B (dB) 75. Minimum margin from limit line on the negative offset C (dB) 76. Minimum margin from limit line on the positive offset C (dB) |

| Modes | n | Return Value |
|-------------------|---|---|
| | | 77. Minimum margin from limit line on the negative offset D (dB) 78. Minimum margin from limit line on the positive offset D (dB) 79. Minimum margin from limit line on the negative offset E (dB) 80. Minimum margin from limit line on the positive offset E (dB) 81. Minimum margin from limit line on the negative offset F (dB) 82. Minimum margin from limit line on the positive offset F (dB) |
| All | 2 | Returns the displayed frequency domain spectrum trace data separated by comma. The number of data points is 2001. |
| All | 3 | Returns the displayed frequency domain absolute limit trace data separated by comma. The number of data points is 2001. |
| All | 4 | Returns the displayed frequency domain relative limit trace data separated by comma. The number of data points is 2001. |
| All (see details) | 5 | <p>Meas Type: Total Power Reference Returns comma-separated scalar values (in dBm) of the absolute integrated power of the segment frequencies. The length of the result depends on the number of available offset (See "Number of Offsets" on page 981).</p> <ol style="list-style-type: none"> 1. Total power reference (dBm) 2. Reserved for the future use, returns -999.0 3. Absolute integrated power at negative offset frequency (A) 4. Absolute integrated power at positive offset frequency (A) <p>---</p> <ol style="list-style-type: none"> 25. Absolute integrated power at negative offset frequency (L) 26. Absolute integrated power at positive offset frequency (L) <p>In MSR and LTE-Advanced FDD/TDD mode. Returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Ref carrier power. Left ref carrier power if Power Ref type is "Left & Right Carriers." Ref carrier power of the left sub-block if Power Ref type is "Max Power Carrier in Sub-block." (dBm) 2. Right ref carrier power if Ref channel type is "Left & Right Carriers." Ref carrier power of the right sub-block if Power Ref type is "Max Power Carrier in Sub-block." Otherwise -999.0 is returned. (dBm) 3. Absolute integrated power at negative offset frequency (A) 4. Absolute integrated power at positive offset frequency (A) <p>---</p> <ol style="list-style-type: none"> 25. Absolute integrated power at negative offset frequency (L) 26. Absolute integrated power at positive offset frequency (L) <p>In WLAN mode. Returns 26 comma-separated scalar values (in dBm) of the absolute integrated power of the segment frequencies:</p> <ol style="list-style-type: none"> 1. Ref carrier power (dBm) 2. Reserved for the future use, returns -999.0 |

| Modes | n | Return Value |
|-------------------|---|---|
| | | 3. Absolute integrated power at negative offset frequency (A) 4. Absolute integrated power at positive offset frequency (A) --- 25. Absolute integrated power at negative offset frequency (L) 26. Absolute integrated power at positive offset frequency (L) If the result is not available, -999.0 is returned. The number of values returned is subject to change in future releases. |
| All (see details) | 5 | <p>Meas Type: Power Spectral Density Reference</p> <p>Returns comma-separated scalar values (in dBm/Hz) of the absolute integrated power of the segment frequencies. The length of the result depends on the number of available offset (See "Number of Offsets" on page 981).</p> <p>1. Power spectral density reference (dBm/Hz) 2. Reserved for the future use, returns -999.0 3. Absolute integrated power at negative offset frequency (A) 4. Absolute integrated power at positive offset frequency (A) ---</p> <p>25. Absolute integrated power at negative offset frequency (L) 26. Absolute integrated power at positive offset frequency (L)</p> <p>In MSR and LTE-Advanced FDD/TDD mode.</p> <p>Returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <p>1. Ref carrier power. Left ref carrier power if Power Ref type is "Left & Right Carriers" Ref carrier power of the left sub-block if Power Ref type is "Max Power Carrier in Sub-block." (dBm/Hz) 2. Right ref carrier power if Power Ref type is "Left & Right Carriers." Ref carrier power of the right sub-block if Power Ref type is "Max Power Carrier in Sub-block." Otherwise -999.0 is returned. (dBm/Hz) 3. Absolute integrated power at negative offset frequency (A) 4. Absolute integrated power at positive offset frequency (A) ---</p> <p>25. Absolute integrated power at negative offset frequency (L) 26. Absolute integrated power at positive offset frequency (L)</p> <p>In WLAN mode.</p> <p>Returns 26 comma-separated scalar values (in dBm/Hz) of the absolute integrated power of the segment frequencies:</p> <p>1. Ref carrier power (dBm/Hz) 2. Reserved for the future use, returns -999.0 3. Absolute integrated power at negative offset frequency (A) 4. Absolute integrated power at positive offset frequency (A) ---</p> <p>25. Absolute integrated power at negative offset frequency (L)</p> |

| Modes | n | Return Value |
|-------------------|---|--|
| | | <p>26. Absolute integrated power at positive offset frequency (L) If the result is not available, -999.0 is returned. The number of values returned is subject to change in future releases.</p> |
| All (see details) | 5 | <p>Meas Type: Spectrum Peak Reference Returns comma-separated scalar values (in dBm) of the absolute peak power of the segment frequencies. The length of the result depends on the number of available offset (See "Number of Offsets" on page 981).</p> <ol style="list-style-type: none"> 1. Spectrum Peak Power reference (dBm) 2. Reserved for the future use, returns -999.0 3. Absolute peak power at negative offset frequency (A) 4. Absolute peak power at positive offset frequency (A) <p>---</p> <p>25. Absolute peak power at negative offset frequency (L) 26. Absolute peak power at positive offset frequency (L) In MSR and LTE-Advanced FDD/TDD mode. Returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Spectrum Peak Power reference of ref carrier. Spectrum Peak Power reference of left ref carrier if Power Ref type is "Left & Right Carriers." Spectrum Peak Power reference of the left sub-block if Power Ref type is "Max Power Carrier in Sub-block." (dBm) 2. Spectrum Peak Power reference of right ref carrier power if Power Ref type is "Left & Right carriers." Spectrum Peak Power reference of the right sub-block if Power Ref type is "Max Power Carrier in Sub-block." Otherwise -999.0 is returned. (dBm) 3. Absolute peak power at negative offset frequency (A) 4. Absolute peak power at positive offset frequency (A) <p>---</p> <p>25. Absolute peak power at negative offset frequency (L) 26. Absolute peak power at positive offset frequency (L) If the result is not available, -999.0 is returned. The number of values returned is subject to change in future releases.</p> |
| All | 6 | <p>Meas Type: Total Power Reference Returns comma-separated scalar values (in dBc) of the integrated power relative to the carrier at the segment frequencies. The length of the result depends on the number of available offset (See "Number of Offsets" on page 981).</p> <p>When in the MSR and LTE-Advanced FDD/TDD mode, returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Reserved for the future use, returns -999.0 2. Reserved for the future use, returns -999.0 3. Relative integrated power at negative offset frequency (A) |

| Modes | n | Return Value |
|-------|---|---|
| | | <p>4. Relative integrated power at positive offset frequency (A)</p> <p>---</p> <p>25. Relative integrated power at negative offset frequency (L)</p> <p>26. Relative integrated power at positive offset frequency (L)</p> <p>If the result is not available, -999.0 is returned.</p> <p>The number of values returned is subject to change in future releases.</p> |
| All | 6 | <p>Meas Type: Power Spectral Density Reference</p> <p>Returns comma-separated scalar values (in dBc/Hz) of the integrated power relative to the carrier at the segment frequencies. The length of the result depends on the number of available offset (See "Number of Offsets" on page 981).</p> <p>When in the MSR and LTE-Advanced FDD/TDD mode, returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <p>Returns -999.0 for the offsets if in WLAN:</p> <ol style="list-style-type: none"> 1. Reserved for the future use, returns -999.0 2. Reserved for the future use, returns -999.0 3. Relative integrated power at negative offset frequency (A) 4. Relative integrated power at positive offset frequency (A) <p>---</p> <p>25. Relative integrated power at negative offset frequency (L)</p> <p>26. Relative integrated power at positive offset frequency (L)</p> <p>If the result is not available, -999.0 is returned.</p> <p>The number of values returned is subject to change in future releases.</p> |
| All | 6 | <p>Meas Type: Spectrum Peak Reference</p> <p>Returns comma-separated scalar values (in dB) of the integrated power relative to the carrier at the segment frequencies. The length of the result depends on the number of available offset (See "Number of Offsets" on page 981).</p> <p>When in the MSR and LTE-Advanced FDD/TDD mode, returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Reserved for the future use, returns -999.0 2. Reserved for the future use, returns -999.0 3. Relative peak power at negative offset frequency (A) 4. Relative peak power at positive offset frequency (A) <p>---</p> <p>25. Relative peak power at negative offset frequency (L)</p> <p>26. Relative peak power at positive offset frequency (L)</p> <p>If the result is not available, -999.0 is returned.</p> <p>The number of values returned is subject to change in future releases.</p> |
| All | 7 | |

| Modes | n | Return Value |
|-------|---|---|
| | | <p>Returns comma-separated pass/fail test results (0=passed, or 1=failed) determined by testing the minimum margin point from the limit line that is determined each offset's Limits setting. The length of the result depends on the number of available offset (See "Number of Offsets" on page 981).</p> <p>When in the MSR and LTE-Advanced FDD/TDD mode, returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Reserved for the future use, returns -999.0 2. Reserved for the future use, returns -999.0 3. At negative offset frequency (A) 4. At positive offset frequency (A) --- 25. At negative offset frequency (L) 26. At positive offset frequency (L) <p>The number of values returned is subject to change in future releases.</p> |
| All | 8 | <p>Offset Pass/Fail.</p> <p>Returns comma-separated pass/fail test results (0=passed, or 1=failed) determined by testing the minimum margin point from the limit line that is determined each offset's Limits setting. The length of the result depends on the number of available offset (See "Number of Offsets" on page 981).</p> <p>When in the MSR and LTE-Advanced FDD/TDD mode, returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <p>Note: These results (n=8) are the same as n=7 result.</p> <ol style="list-style-type: none"> 1. Reserved for the future use, returns -999.0 2. Reserved for the future use, returns -999.0 3. At negative offset frequency (A) 4. At positive offset frequency (A) --- 25. At negative offset frequency (L) 26. At positive offset frequency (L) <p>The number of values returned is subject to change in future releases.</p> |
| All | 9 | <p>Offset Peak Power Freq.</p> <p>Returns comma-separated scalar values of frequency (in Hz) that have peak power from center or carrier edge frequency in each offset, depending on Offset Frequency Define settings. The length of the result depends on the number of available offset (See "Number of Offsets" on page 981).</p> <p>When in the MSR and LTE-Advanced FDD/TDD mode, returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Reserved for the future use, returns -999.0 2. Reserved for the future use, returns -999.0 3. Negative offset frequency (A) |

| Modes | n | Return Value |
|-------|----|--|
| | | <p>4. Positive offset frequency (A)</p> <p>---</p> <p>25. Negative offset frequency (L)</p> <p>26. Positive offset frequency (L)</p> <p>If the result is not available, -999.0 is returned.</p> <p>The number of values returned is subject to change in future releases.</p> |
| All | 10 | <p>Offset Abs Peak Power.</p> <p>Returns comma-separated scalar values (in dBm) of the absolute peak power of the segment frequencies. The length of the result depends on the number of available offset (See "Number of Offsets" on page 981).</p> <p>When in the MSR and LTE-Advanced FDD/TDD mode, returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Reserved for the future use, returns -999.0 2. Reserved for the future use, returns -999.0 3. At negative offset frequency (A) 4. At positive offset frequency (A) <p>---</p> <ol style="list-style-type: none"> 25. At negative offset frequency (L) 26. At positive offset frequency (L) <p>If the result is not available, -999.0 is returned.</p> <p>The number of values returned is subject to change in future releases.</p> |
| All | 11 | <p>Offset Rel Peak Power.</p> <p>Returns comma-separated scalar values in dBc (dB if MeasType = PSD) of the peak power relative to the carrier at the segment frequencies. The length of the result depends on the number of available offset (See "Number of Offsets" on page 981).</p> <p>When in the MSR and LTE-Advanced FDD/TDD mode, returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Reserved for the future use, returns -999.0 2. Reserved for the future use, returns -999.0 3. At negative offset frequency (A) 4. At positive offset frequency (A) <p>---</p> <ol style="list-style-type: none"> 25. At negative offset frequency (L) 26. At positive offset frequency (L) <p>If the result is not available, -999.0 is returned.</p> <p>The number of values returned is subject to change in future releases.</p> |
| All | 12 | <p>Returns the power result (the peak power of the signal in the ref channel) when Meas Type is Spectrum Peak reference. Otherwise, the value returned will be -999.0.</p> <p>When in the MSR and LTE-Advanced FDD/TDD mode, returns outer offset results when Non-</p> |

| Modes | n | Return Value |
|----------------------------|----|---|
| | | <p>Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> |
| MSR, LTEAFDD, LTEATDD only | 13 | <p>Meas Type: Total Power Reference Returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Total Absolute power of carriers of Measure Carrier On if Power Ref Type is "Max Power Carrier," "Max Power Carrier in Sub-block," or "RF Bandwidth." Otherwise NaN (9.91E+37) is returned. (dBm) 2. Absolute reference power. Absolute power at the left reference carrier if Power Ref type is "Left & Right Carriers." Absolute power at the reference carrier of the left sub-block if Power Ref type is "Max Power Carrier in Sub-block." (dBm) 3. Absolute power at the right reference carrier if Power Ref type is "Left & Right Carriers." Absolute power at the reference carrier of the right sub-block if Power Ref type is "Max Power Carrier in Sub-block." Otherwise NaN (9.91E+37) is returned. (dBm) 4. Peak frequency in the measured ref carrier frequency range. Peak frequency in the left ref carrier frequency range if Power Ref type is "Left & Right Carriers." Peak frequency in the ref carrier frequency range of the left sub-block if Power Ref type is "Max Power Carrier in Sub-block." (Hz) 5. Peak frequency in the right ref carrier frequency range if Power Ref type is "Left & Right Carriers." Peak frequency in the ref carrier frequency range of the right sub-block if Power Ref type is "Max Power Carrier in Sub-block." Otherwise NaN (9.91E+37) is returned. (Hz) <p>If the result is not available, NaN (9.91E+37) is returned. The number of values returned is subject to change in future releases.</p> |
| MSR, LTEAFDD, LTEATDD only | 13 | <p>Meas Type: Power Spectral Density Reference Returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Total Absolute power of carriers of Measure Carrier On if Power Ref Type is "Max Power Carrier," "Max Power Carrier in Sub-block," or "RF Bandwidth." Otherwise NaN (9.91E+37) is returned. (dBm) 2. Absolute reference power. Absolute power at the left reference carrier if Power Ref type is "Left & Right Carriers." Absolute power at the reference carrier of the left sub-block if Power Ref type is "Max Power Carrier in Sub-block." (dBm/Hz) 3. Absolute power at the right reference carrier if Power Ref type is "Left & Right Carriers." Absolute power at the reference carrier of the right sub-block if Power Ref type is "Max Power Carrier in Sub-block." Otherwise NaN (9.91E+37) is returned. (dBm/Hz) 4. Peak frequency in the measured ref carrier frequency range. Peak frequency in the left ref carrier frequency range if Power Ref type is "Left & Right Carriers." Peak frequency in the ref carrier frequency range of the left sub-block if Power Ref type is "Max Power Carrier in Sub-block." (Hz) 5. Peak frequency in the right ref carrier frequency range if Power Ref type is "Left & Right Carriers." Peak frequency in the ref carrier frequency range of the right sub-block if Power Ref |

| Modes | n | Return Value |
|-------------------------------|----|---|
| | | <p>type is "Max Power Carrier in Sub-block." Otherwise NaN (9.91E+37) is returned. (Hz)</p> <p>If the result is not available, NaN (9.91E+37) is returned.</p> <p>The number of values returned is subject to change in future releases.</p> |
| MSR, LTEAFDD, LTEATDD only | 13 | <p>Meas Type: Power Spectrum Peak Reference</p> <p>Returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Total Absolute power of carriers of Measure Carrier On if Power Ref Type is "Max Power Carrier," "Max Power Carrier in Sub-block," or "RF Bandwidth." Otherwise NaN (9.91E+37) is returned. (dBm) 2. Peak reference power. Peak power at the left reference carrier if Power Ref type is "Left & Right Carriers." Peak power at the reference carrier of the left sub-block if Power Ref type is "Max Power Carrier in Sub-block." (dBm) 3. Peak power at the right reference carrier if Power Ref type is "Left & Right Carriers." Peak power at the reference carrier of the right sub-block if Power Ref type is "Max Power Carrier in Sub-block." Otherwise NaN (9.91E+37) is returned. (dBm) 4. Peak frequency in the measured ref carrier frequency range. Peak frequency in the left ref carrier frequency range if Power Ref type is "Left & Right Carriers." Peak frequency in the ref carrier frequency range of the left sub-block if Power Ref type is "Max Power Carrier in Sub-block." (Hz) 5. Peak frequency in the right ref carrier frequency range if Power Ref type is "Left & Right Carriers." Peak frequency in the ref carrier frequency range of the right sub-block if Power Ref type is "Max Power Carrier in Sub-block." Otherwise NaN (9.91E+37) is returned. (Hz) <p>If the result is not available, NaN (9.91E+37) is returned.</p> <p>The number of values returned is subject to change in future releases.</p> |
| All | 14 | <p>Meas Type: Total Power Reference</p> <p>Returns comma-separated scalar results, in the following order:</p> <p>When in the MSR and LTE-Advanced FDD/TDD mode, returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Relative integrated power on the negative offset A (dBc) 2. Absolute integrated power on the negative offset A (dBm) 3. Relative peak power on the negative offset A (dBc) 4. Absolute peak power on the negative offset A (dBm) 5. Peak power offset frequency from the center or carrier edge frequency in the negative offset A, depending on Offset Frequency Define settings (Hz) 6. Relative integrated power on the positive offset A (dBc) 7. Absolute integrated power on the positive offset A (dBm) 8. Relative peak power on the positive offset A (dBc) 9. Absolute peak power on the positive offset A (dBm) |

| Modes | n | Return Value |
|-------|----|--|
| | | <p>10. Peak power offset frequency from the center or carrier edge frequency in the positive offset A, depending on Offset Frequency Define settings (Hz)</p> <p>11. Relative integrated power on the negative offset B (dBc)</p> <p>---</p> <p>119. Absolute peak power on the positive offset L (dBm)</p> <p>120. Peak power offset frequency from the center or carrier edge frequency in the positive offset L, depending on Offset Frequency Define settings (Hz)</p> <p>If the result is not available, NaN (9.91 E+37) is returned.</p> <p>The length of the result depends on the number of available offset (See "Number of Offsets" on page 981).</p> <p>The number of values returned is subject to change in future releases.</p> |
| All | 14 | <p>Meas Type: Power Spectral Density Reference</p> <p>Returns comma-separated scalar results, in the following order:</p> <p>When in the MSR and LTE-Advanced FDD/TDD mode, returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Relative integrated power on the negative offset A (dB) 2. Absolute integrated power on the negative offset A (dBm/Hz) 3. Relative peak power on the negative offset A (dB) 4. Absolute peak power on the negative offset A (dBm/Hz) 5. Peak power offset frequency from the center or carrier edge frequency in the negative offset A, depending on Offset Frequency Define settings (Hz) 6. Relative integrated power on the positive offset A (dB) 7. Absolute integrated power on the positive offset A (dBm/Hz) 8. Relative peak power on the positive offset A (dB) 9. Absolute peak power on the positive offset A (dBm/Hz) 10. Peak power offset frequency from the center or carrier edge frequency in the positive offset A, depending on Offset Frequency Define settings (Hz) 11. Relative integrated power on the negative offset B (dB) <p>---</p> <p>119. Absolute peak power on the positive offset L (dBm/Hz)</p> <p>120. Peak power offset frequency from the center or carrier edge frequency in the positive offset L, depending on Offset Frequency Define settings (Hz)</p> <p>If the result is not available, NaN (9.91 E+37) is returned.</p> <p>The length of the result depends on the number of available offset (See "Number of Offsets" on page 981).</p> <p>The number of values returned is subject to change in future releases.</p> |
| All | 14 | <p>Meas Type: Spectrum Peak Reference</p> <p>Returns comma-separated scalar results, in the following order:</p> |

| Modes | n | Return Value |
|---------------|----|--|
| | | <p>When in the MSR and LTE-Advanced FDD/TDD mode, returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Reserved for the future use, returns NaN (9.91E+37) 2. Reserved for the future use, returns NaN (9.91E+37) 3. Relative peak power on the negative offset A (dB) 4. Absolute peak power on the negative offset A (dBm) 5. Peak power offset frequency from the center or carrier edge frequency in the negative offset A, depending on Offset Frequency Define settings (Hz) 6. Reserved for the future use, returns NaN (9.91E+37) 7. Reserved for the future use, returns NaN (9.91E+37) 8. Relative peak power on the positive offset A (dB) 9. Absolute peak power on the positive offset A (dBm) 10. Peak power offset frequency from the center or carrier edge frequency in the positive offset A, depending on Offset Frequency Define settings (Hz) 11. Relative integrated power on the negative offset B (dB) <p>---</p> <ol style="list-style-type: none"> 119. Absolute peak power on the positive offset L (dBm) 120. Peak power offset frequency from the center or carrier edge frequency in the positive offset L, depending on Offset Frequency Define settings (Hz) <p>If the result is not available, NaN (9.91E+37) is returned.</p> <p>The length of the result depends on the number of available offset (See "Number of Offsets" on page 981).</p> <p>The number of values returned is subject to change in future releases.</p> |
| All | 15 | <p>Meas Type: Total Power Reference</p> <p>Returns comma-separated scalar results, in the following order:</p> <p>When in the MSR and LTE-Advanced FDD/TDD mode, returns outer offset results when Non-Contiguous Meas Region is set to Outer, and returns inner offset results when it is set to Inner, in the following order.</p> <ol style="list-style-type: none"> 1. Minimum margin from limit line on the negative offset A (dB) 2. Minimum margin from limit line on the positive offset A (dB) 3. Minimum margin from limit line on the negative offset B (dB) 4. Minimum margin from limit line on the positive offset B (dB) <p>---</p> <ol style="list-style-type: none"> 23. Minimum margin from limit line on the negative offset L (dB) 24. Minimum margin from limit line on the positive offset L (dB) <p>If the result is not available, NaN (9.91E+37) is returned.</p> <p>The length of the result depends on the number of available offset (See "Number of Offsets" on page 981).</p> <p>The number of values returned is subject to change in future releases.</p> |
| MSR, LTEAFDD, | 16 | |

| Modes | n | Return Value |
|----------------------------|----------|---|
| LTEATDD only | | Returns number of carriers comma-separated scalar results, in the following order: 1. Absolute power of carrier 1 (dBm) 2. Absolute power of carrier 2 (dBm) --- number of carriers-1. Absolute power of carrier (number of carriers)-1 (dBm) number of carriers. Absolute power of carrier (number of carriers)-1 (dBm) If Measure Carrier of the corresponding carrier is no, NaN (9.91E+37) is returned. |
| WLAN only | 16 | Returns two carriers comma-separated scalar results when the radio standard is 802.11 ac 80+80 MHz. And returns NaN otherwise. 1. Absolute power of carrier segment 1 (dBm) 2. Absolute power of carrier segment 2 (dBm) |
| MSR, LTEAFDD, LTEATDD only | 17 | Returns the displayed frequency domain combined limit trace data separated by comma. Combined trace is a mixed trace of both absolute limit trace and relative limit trace according to the fail mask condition. The number of data points is 2001. |

Number of Offsets

The number of available offsets varies depending on the mode and option as below.

| Mode | The number of available offsets |
|--|--|
| MSR, LTEAFDD, LTEATDD | 12 (Offset A to L) |
| WLAN | 12 (Offset A to L) |
| Other modes with option N9060A-7FP | 12 (Offset A to L) |
| Other modes without option N9060A-7FP | 6 (Offset A to F) |

| Key Path | Meas |
|--------------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00, A.14.00 |

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. The parameter values are measurement independent except all Attenuation values and Internal Preamp selections that are measurement global.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Ref Value

Sets the value for the absolute power reference. However, since Auto Scaling defaults to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEVel <real> :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEVel? |
| Example | DISP:SEM:VIEW:WIND:TRAC:Y:RLEV 100 DISP:SEM:VIEW:WIND:TRAC:Y:RLEV? |
| Notes | You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changed to Off. |
| Preset | 10.0 dBm |
| State Saved | Saved in instrument state. |
| Min | -250 dBm |
| Max | 250 dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See "Dual Attenuator Configurations:" on page 983

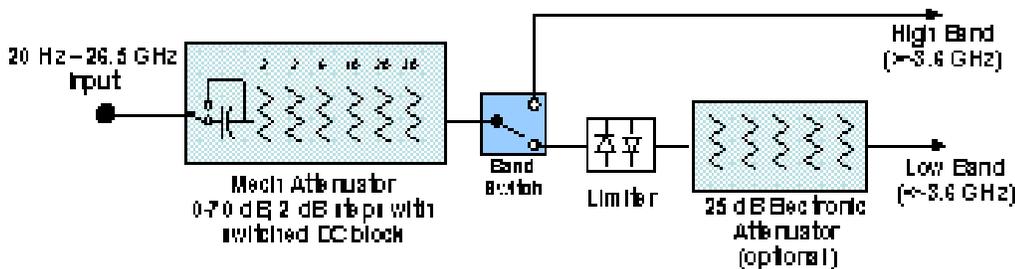
See "Single Attenuator Configuration:" on page 984

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

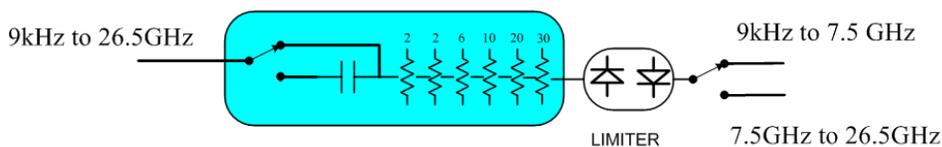
| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Dependencies | In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case. |
| Readback Line | Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2232, and "Enable Elec Atten" on page 2234 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

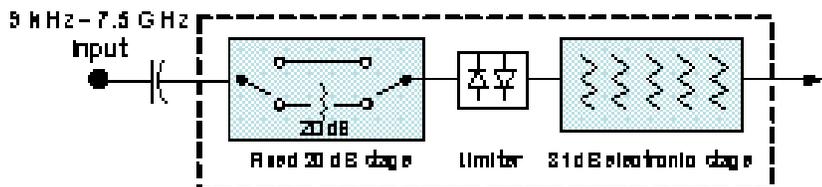


Configuration 2: Mechanical attenuator, no optional electronic attenuator



(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the “Dual Attenuator” configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See ["Attenuator Configurations and Auto/Man" on page 986](#)

| Key Path | AMPTD Y Scale, Attenuation |
|-----------------------|--|
| Remote Command | <pre>[:SENSe]:POWeR[:RF]:ATTenuation <rel_ampl> [:SENSe]:POWeR[:RF]:ATTenuation? [:SENSe]:POWeR[:RF]:ATTenuation:AUTO OFF ON 0 1 [:SENSe]:POWeR[:RF]:ATTenuation:AUTO?</pre> |
| Example | <p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of “main” attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p> |
| Dependencies | Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the |

Auto/Man selection is not available, and the Auto/Man line on the key disappears.

In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the ["Enable Elec Atten" on page 2234](#) key description.

See ["Attenuator Configurations and Auto/Man" on page 986](#) for more information on the Auto/Man functionality of Attenuation.

Couplings

When (Mech) Atten is in Auto, it uses the following algorithm to determine a value:
 If the USB Preamp is connected to USB, use 0 dB.
 Otherwise, $Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel + IF\ Gain$.
 Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto.
 The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).
 The "IF Gain" term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.
 In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.

Preset The preset for Mech Attenuation is "Auto."
 The Auto value of attenuation is:
 CXA, EXA, MXA and PXA: 10 dB

State Saved Saved in instrument state

Min 0 dB
 The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.

Max CXA N9000A-503/507: 50 dB
 CXA N9000A-513/526: 70dB
 EXA: 60 dB
 MXA and PXA: 70 dB
 In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.

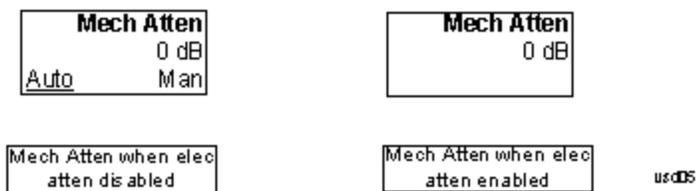
Initial S/W Revision Prior to A.02.00

Modified at S/W Revision A.03.00

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 988](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2233](#)

See ["More Information" on page 987](#)

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] : POWer [:RF] : EATTenuation : STATE OFF ON 0 1 [:SENSe] : POWer [:RF] : EATTenuation : STATE ? |
| Example | POW:EATT:STAT ON |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out. |

| | |
|--------------------------|--|
| | <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in all measurements; in particular, it is not available in the Swept SA measurement.</p> |
| Couplings | Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples
- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :EATTenuation <rel_amp1></code> <code>[:SENSe] :POWer [:RF] :EATTenuation?</code> |
| Notes | Electronic Attenuation’s specification is defined only when Mechanical Attenuation is 6 dB. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the |

| | |
|--------------------------|--|
| | POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out. |
| Preset | 0 dB |
| State Saved | Saved in instrument state |
| Min | 0 dB |
| Max | Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe :OPTimize IMMEDIATE</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2237 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe :OPTimize :ATTenuation OFF ELECTRical COMBined</code> |

| | |
|--------------------------|--|
| | <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code> |
| Notes | The SCPI parameter ELECtrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECtrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip |
| State Saved | Saved in instrument state |
| Range | Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------|--|
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe:AUTO?</code> |
| Notes | ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off" |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT OFF |
| Initial S/W Revision | Prior to A.02.00 |

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT ELEC |
| Initial S/W Revision | Prior to A.02.00 |

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT COMB |
| Initial S/W Revision | Prior to A.02.00 |

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] 10 dB 2 dB [:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] ? |
| Example | POW:ATT:STEP 2 |
| Notes | Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10. |
| Dependencies | Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error. |
| Couplings | When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB |
| Preset | PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA) |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Scale/Div

Sets the units-per-division of the vertical scale in the logarithmic display. When Auto Scaling is On, the scale per division value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

| | |
|---------------------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:SEMAsk:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl> :DISPlay:SEMAsk:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision? |
| Example | DISP:SEM:VIEW:WIND:TRAC:Y:PDIV 15dB DISP:SEM:VIEW:WIND:TRAC:Y:PDIV? |
| Notes | You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off. |
| Preset | 10 dB |
| State Saved | Saved in instrument state |
| Min | 0.10 dB |
| Max | 20.00 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 993](#).

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Remote Command | [:SENSe]:POWer[:RF]:PCENter |
| Example | POW:PCEN |
| Notes | Note that the rules outlined above under the key description apply for the remote command as well |

| | |
|------------------------------|---|
| | as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Couplings | <p>The active marker position determines where the centering will be attempted.</p> <p>If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.</p> |
| Status Bits/OPC dependencies | <p>When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command.</p> <p>The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.</p> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when **"Presel Center" on page 2240** is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the

preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

| | |
|-------------------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :PADJust <freq> [:SENSe] :POWer [:RF] :PADJust? |
| Example | POW:PADJ 100KHz POW:PADJ? |
| Notes | The value on the key reads out to 0.1 MHz resolution. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Preset | 0 MHz |
| State Saved | The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle. |
| Min | -500 MHz |
| Max | 500 MHz |
| Default Unit | Hz |
| Backwards Compatibility SCPI | [:SENSe] :POWer [:RF] :MW:PADJust [:SENSe] :POWer [:RF] :MMW:PADJust PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to [:SENSe] :POWer [:RF] :PADJust |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------------|---|
| Remote Command | [:SENSe] :POWer [:RF] :PADJust:PRESelector MWAVE MMWave EXTERNAL [:SENSe] :POWer [:RF] :PADJust:PRESelector? |
| Notes | PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE |
| Initial S/W Revision | Prior to A.02.00 |

Y Axis Unit

Displays the menu keys that enable you to change the vertical (Y) axis amplitude unit. The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types. For example, if Scale Type has been set to Log, and you set Y Axis Unit to dBm, pressing Scale Type (Log) sets the Y Axis Unit to dBm. If Scale Type has been set to Lin and you set Y Axis Unit to V, pressing Scale Type (Lin) sets the Y Axis Unit to V. Pressing Scale Type (Log) again sets the Y axis unit back to dBm.

NOTE

The units of current (A, dBmA, dBuA) are calculated based on 50 ohms input impedance.

All four of the EMI units (dBμA/m, dBμV/m, dBG, dBpT) are treated by the instrument exactly as though they were dBuV. The user must load an appropriate correction factor using Amplitude Corrections for accurate and meaningful results.

If a SCPI command is sent to the analyzer that uses one of the EMI units as a terminator, the analyzer treats it as though DBUV had been sent as the terminator.

| | |
|----------------|---|
| Key Path | AMPTD Y Scale |
| Mode | SA |
| Scope | Meas Global |
| Remote Command | :UNIT:POWer DBM DBMV DBMA V W A DBUV DBUA DBPW DBUVM DBUAM DBPT DBG :UNIT:POWer? |
| Example | UNIT:POW dBmV UNIT:POW? |
| Notes | The Y axis unit has either logarithmic or linear characteristics. The set of units that is logarithmic consists of dBm, dBmV, dBmA, dBμV, dBμA, dBμV/m, dBμA/m, dBpT, and dBG. The set of units that are linear consists of V, W, and A. The chosen unit will determine how the reference level and all the amplitude-related outputs like trace data, marker data, etc. read out. |
| Notes | The settings of Y Axis Unit and Scale Type, affect how the data is read over the remote interface. When using the remote interface no unit is returned, so you must know what the Y axis unit is to interpret the results: Example 1, set the following: Scale Type (Log) Y Axis Unit, dBm Scale/Div, 1 dB Ref Level, 10 dBm This sets the top line to 10 dBm with each vertical division representing 1 dB. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 5 dBm and will read out remotely as 5. Example 2, set the following: Scale Type (Lin) Y Axis Unit, Volts Ref Level, 100 mV (10 mV/div) This sets the top line to 100 mV and the bottom line to 0 V, so each vertical division represents 10 mV. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 50 mV and will read out remotely as 50. |

| | |
|--------------------------|--|
| Dependencies | If an amplitude correction with an Antenna Unit other than None is applied and enabled, then that antenna unit is forced and the key with that unit is the only Y Axis Unit available. All other Y Axis Unit keys are grayed out. If an amplitude correction with an Antenna Unit other than None is applied and enabled, and you then turn off that correction or set Apply Corrections to No, the Y Axis Unit that existed before the Antenna Unit was applied is restored. |
| Couplings | The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types |
| Preset | dBm for log scale, V for linear. The true 'preset' value is dBm, since at preset the Y Scale type is set to logarithmic. |
| State Saved | Saved in instrument state |
| Readback line | 1-of-N selection |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.04.00, A.11.00 |

dBm

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBm.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBM |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmV

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmV.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmV |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmA

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmA |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

W

Sets the amplitude unit for the selected amplitude scale (log/lin) to watt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW W |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | W |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

V

Sets the amplitude unit for the selected amplitude scale (log/lin) to volt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW V |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

A

Sets the amplitude unit for the selected amplitude scale (log/lin) to Ampere.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW A |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ V

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A.

NOTE

The unit dBuA can also appear as an Antenna Unit. This will be used by customers using current probes, because current probes are often supplied with conversion tables that provide the transducer factors. When dBuA is used as an Antenna Unit the normal conversion from power to amps for dBuA (based on the analyzer input impedance) is not done, but instead the conversion is based solely on the Correction that contains the transducer factors. This is what distinguishes dBuA as a normal unit from dBuA as an antenna unit. When querying the Y-Axis unit, you can query the Antenna Unit to distinguish between regular dBuA and the dBuA antenna unit. If :CORR:CSET:ANT? returns NOC (for No Conversion), you are using a normal Y Axis dBuA. If it returns UA you are using an Antenna Unit dBuA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBpW

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpW.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBPW |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

Antenna Unit

When a Correction is turned on that uses an Antenna Unit, the Y Axis Unit changes to that Antenna Unit. All of the keys in the Y-Axis Unit menu are then greyed out, except the Antenna Unit key. The unit being used is shown on this key and is shown as selected in the submenu.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback line | Currently selected unit |
| Initial S/W Revision | A.11.00 |

dB μ V/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUVM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ V/m |
| Initial S/W Revision | A.02.00 |

dB μ A/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A/m |
| Initial S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

dBpT

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpT. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBPT |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dBpT |
| Initial S/W Revision | A.02.00 |

DBG

Sets the amplitude unit for the selected amplitude scale (log/lin) to DBG. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBG |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | DBG |
| Initial S/W Revision | A.02.00 |

None

This is selected if no Antenna Unit is currently on, however you cannot actually set this value, since it is always grayed out. The key is included simply to provide an indication on the Readback line of the Antenna Unit key when there is no Antenna Unit selected.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Readback | "None" |
| Initial S/W Revision | A.11.00 |

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, BASIC, PNOISE, VSA , LTE, LTETDD |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH? |
| Example | :POW:MW:PATH LNP Enables the Low Noise path |
| Notes | If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μW Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished. |
| Dependencies | Unavailable in BBIQ and External Mixing |
| Preset | All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB |

| | |
|--------------------------|--|
| | MPB option not present and licensed: STD |
| State Saved | Save in instrument state |
| Readback | Value selected in the submenu |
| Initial S/W Revision | A.04.00 |
| Modified at S/W Revision | A.10.00 |

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH STD |
| Readback Text | Standard Path |
| Initial S/W Revision | A.04.00 |

Low Noise Path Enable

You may choose Low Noise Path Enable, which gives a lower noise floor under some circumstances, particularly when operating in the 21–26.5 GHz region. With the Low Noise Path enabled, the low band/high band switch and microwave preamp are bypassed whenever all of the following are true:

- The analyzer is not in the Low Band, meaning:
- the start frequency is above 3.5 GHz and
- the stop frequency is above 3.6 GHz.
- the internal preamp is not installed or (if installed) is set to Off or Low Band

Note that this means that, when any part of a sweep is done in Low Band, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. Also, if the preamp is turned on, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. The only time the Low Noise Path is used is when Low Noise Path Enable is selected, the sweep is completely in High Band (> 3.6 GHz) and no preamp is in use.

See "[More Information](#)" on page 1003

| | |
|----------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Measurement | Swept SA |
| Example | :POW:MW:PATH LNP |

| | |
|----------------------|--|
| Notes | <p>For measurements that use IQ acquisition, the low noise path is used when the Center Frequency is in High Band (> 3.6 GHz) and no preamp is in use.</p> <p>In other words, the rules above are modified to use only the center frequency to qualify which path to switch in.</p> <p>This is not the case for FFT's in the Swept SA measurement; they use the same rules as swept measurements.</p> |
| Dependencies | <p>Key is blanked if current mode does not support it.</p> <p>Key is grayed out if mode supports it but current measurement does not support it.</p> <p>Unless Option LNP is present and licensed, key is blank and if SCPI command sent, error -241, "Hardware missing; Option not installed" is generated.</p> |
| Readback Text | Low Noise Path Enable |
| Initial S/W Revision | A.04.00 |

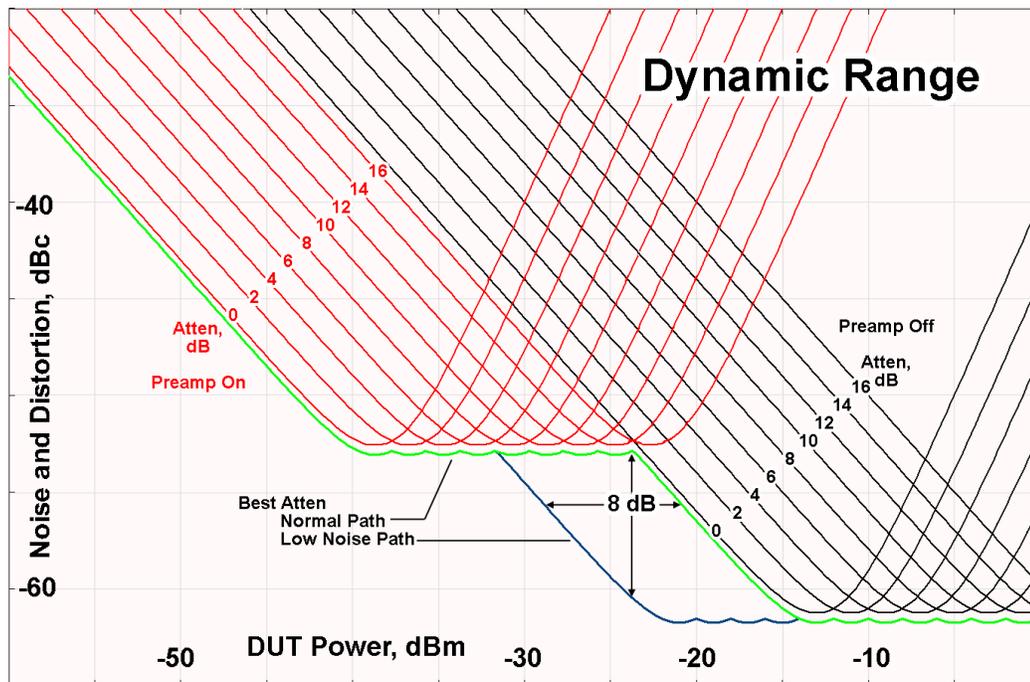
More Information

The user should understand that the Low Noise Path, while giving improved DANL, has the disadvantage of decreased TOI performance and decreased gain compression performance relative to the standard path.

The user should also understand that the bypass switch is a mechanical switch and has finite life, so if the Low Noise Path is enabled, it is possible to cause frequent cycling of this switch by frequently changing analyzer settings such that the above conditions hold true only some of the time. A user making tests of this nature should consider opting for the Standard Path, which will never throw the bypass switch, at the expense of some degraded noise performance.

The low noise path is useful for situations where the signal level is so low that the analyzer performance is dominated by noise even with 0 dB attenuation, but still high enough that the preamp option would have excessive third-order intermodulation or compression. The preamp, if purchased and used, gives better noise floor than does the "Low Noise Path." However, its compression threshold and third-order intercept are much poorer than that of the non-preamp path. There are some applications, typically for signals around -30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range

The graph below illustrates the concept. It shows, in red, the performance of an analyzer at different attenuation settings, both with the preamp on and off, in a measurement that is affected by both analyzer noise and analyzer TOI. The green shows the best available dynamic range, offset by 0.5 dB for clarity. The blue shows how the best available dynamic range improves for moderate signal levels with the low noise path switched in. In this illustration, the preamp improves the noise floor by 15 dB while degrading the third-order intercept by 30 dB, and the low noise path reduces loss by 8 dB. The attenuator step size is 2 dB.



There are other times where selecting the low noise path improves performance, too. Compression-limited measurements such as finding the nulls in a pulsed-RF spectrum can profit from the low noise path in a way similar to the TOI-limited measurement illustrated. Accuracy can be improved when the low noise path allows the optimum attenuation to increase from a small amount like 0, 2 or 4 dB to a larger amount, giving better return loss at the analyzer input. Harmonic measurements, such as second and third harmonic levels, are much improved using the low noise path because of the superiority of that path for harmonic (though not intermodulation) distortion performance.

μW Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselector is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH MPB |
| Dependencies | Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated. |
| Readback Text | μ W Preselector Bypass |
| Initial S/W Revision | A.04.00 |

| | |
|-----------------------|---|
| Remote Command | [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1 [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ? |
| Example | :POW:MW:PRES OFF Bypasses the microwave preselector |
| Notes | The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB) |
| Preset | ON |

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example ,for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :GAIN [:STATe] OFF ON 0 1 [:SENSe] :POWer [:RF] :GAIN [:STATe] ? |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the |

| | |
|--|--|
| | key is not shown. The preamp is not available when the electronic/soft attenuator is enabled. |
|--|--|

| | |
|--------------------------|---|
| Couplings | The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range. Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected. Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Scope | Meas Global |
| Remote Command | [:SENSe] : POWer [:RF] : GAIN : BAND LOW FULL [:SENSe] : POWer [:RF] : GAIN : BAND ? |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated. |
| Preset | LOW |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns the internal preamp off

| | |
|----------------------|--------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

| | |
|----------------------|------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND LOW |
| Readback | Low Band |
| Initial S/W Revision | Prior to A.02.00 |

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND FULL |
| Readback | Full Range |
| Initial S/W Revision | Prior to A.02.00 |

Ref Position

Positions the reference level at the top, center or bottom of the Y scale display. Changing the reference position does not affect the reference level value.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP CENTer BOTTom :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition? |
| Example | DISP:SEM:VIEW:WIND:TRAC:Y:RPOS BOTT DISP:SEM:VIEW:WIND:TRAC:Y:RPOS? |
| Notes | You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Preset | TOP |

| | |
|--------------------------|---------------------------|
| State Saved | Saved in instrument state |
| Range | Top Ctr Bot |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Auto Scaling

Toggles the Auto Scaling function between On and Off.

When Auto Scaling is On and the Restart front-panel key is pressed, the analyzer automatically determines the scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off.

| | |
|--------------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTEFDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 1 ON OFF :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle? |
| Example | DISP:SEM:VIEW:WIND:TRAC:Y:COUP OFF DISP:SEM:VIEW:WIND:TRAC:Y:COUP? |
| Notes | You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically determines the scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off. |
| Preset | ON |
| State Saved | Saved in instrument state |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 1009

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Remote Command | :COUPle ALL NONE |
| Example | :COUP ALL |
| Notes | :COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

There are two types of functions that have Auto/Manual modes.

Auto/Man Active Function keys

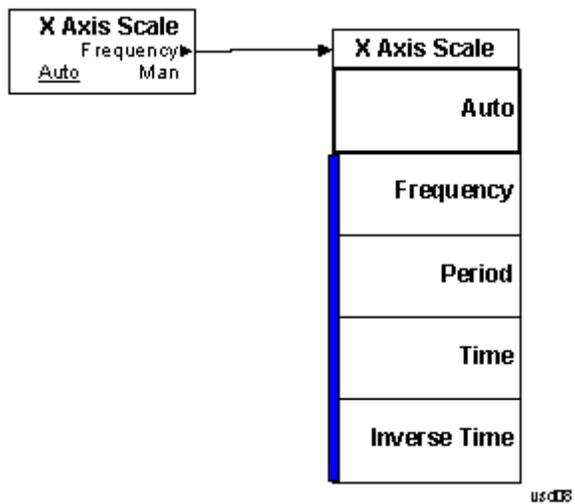
An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.

11 Spectrum Emission Mask Measurement
Auto Couple



BW

Accesses a menu of functions that enable you to select the type of filter for the measurement.

| | |
|--------------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Filter Type

Selects the type of bandwidth filter that is used in Carrier and Offsets.

When Gaussian or Flattop is selected, selected filter is applied to carriers and all offsets.

When Auto Sense is selected, filter type is automatically selected for each carriers and offsets, so that measurement speed and accuracy is optimized.

| | |
|-----------------------|--|
| Key Path | BW |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :SEMAsk :BANDwidth :SHAPE ASENse GAUSSian FLATtop [:SENSe] :SEMAsk :BANDwidth :SHAPE? |
| Example | SEM:BAND:SHAP GAUS SEM:BAND:SHAP? |
| Couplings | See the description above |
| Preset | ASENse |
| State Saved | Saved in instrument state |
| Range | Auto Sense (each offset and carrier) Gaussian (all offsets and carriers) Flattop (all offsets and carriers) |
| Initial S/W Revision | A.03.00 |

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

| | |
|--------------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous? |
| Example | :INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation |
| Preset | ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF) |
| State Saved | Saved in instrument state |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep. |
| Initial S/W Revision | Prior to A.02.00 |

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

11 Spectrum Emission Mask Measurement
File

File

See "File" on page 344

FREQ Channel

Accesses a menu of keys that allow you to control the Frequency and Channel parameters of the instrument.

Some features in the Frequency menu are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset. For example, the Center Freq setting is the same for all measurements – it does not change as you change measurements.

| | |
|-----------------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 1018](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 1020](#)

See ["Center Frequency Presets" on page 1016](#)

| | |
|-----------------------|---|
| Key Path | FREQ Channel |
| Scope | Meas Global |
| Remote Command | [:SENSe] :FREQuency :CENTer <freq> [:SENSe] :FREQuency :CENTer ? |

| | |
|-----------------------------|--|
| Example | FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT? |
| Notes | This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated. |
| Dependencies | The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit. |
| Couplings | When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range |
| Preset | Depends on instrument maximum frequency, mode, measurement, and selected input. See "Center Frequency Presets" on page 1016 and "RF Center Freq" on page 1018 and Ext Mix Center Freq and "I/Q Center Freq" on page 1020. |
| State Saved | Saved in instrument state |
| Min | Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1016 and "RF Center Freq" on page 1018 and "I/Q Center Freq" on page 1020. |
| Max | Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1016 and "RF Center Freq" on page 1018 and "I/Q Center Freq" on page 1020. |
| Default Unit | Hz |
| Status Bits/OPC | Non-overlapped |
| Dependencies | |
| Initial S/W Revision | Prior to A.02.00 |

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

| Freq Option | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune) |
|-------------|-------------------------|--------------------------------|-----------------------------|
| | | | |

| | | | above) |
|---------------------------------------|------------|----------|--------------|
| 503 (all but N9000A) | 1.805 GHz | 3.6 GHz | 3.7 GHz |
| 503 (N9000A) | 1.505 GHz | 3.0 GHz | 3.08 GHz |
| 507 (all but N9000A) | 3.505 GHz | 7.0 GHz | 7.1 GHz |
| 507 (N9000A) | 3.755 GHz | 7.5 GHz | 7.58 GHz |
| 508 (all but N9038A) | 1.805 GHz | 3.6 GHz | 8.5 GHz |
| 508 (N9038A) | 4.205 GHz | 8.4 GHz | 8.5 GHz |
| 513 | 6.805 GHz | 13.6 GHz | 13.8 GHz |
| 526 (all but N9000A and N9038A) | 13.255 GHz | 26.5 GHz | 27.0 GHz |
| 526 (N9000A) | 13.255 GHz | 26.5 GHz | 26.55 GHz |
| 526 (N9038A) | 1.805 GHz | 3.6 GHz | 27.0 GHz |
| 532 | 16.005 GHz | 32.0 GHz | 32.5 GHz |
| 543 | 21.505 GHz | 43.0 GHz | TBD |
| 544 | 22.005 GHz | 44.0 GHz | 44.5 GHz |
| 550 | 25.005 GHz | 50.0 GHz | 51 GHz |

Input 2:

| Model | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune above) |
|----------------|----------------------------|-----------------------------------|-----------------------------------|
| N9000A opt C75 | 0.7505GHz | 1.5 GHz | 1.58 GHz |
| N9038A | 505 MHz | 1 GHz | 1.000025 GHz |

Tracking Generator Frequency Limits (N9000A only):

| Tracking Generator Option | Min Freq (clips to this freq when turn TG on and | If above this Freq, Stop Freq clipped to this Freq when | Max Freq (can't tune above) while TG |
|---------------------------------|--|---|--|
| | | | |

| | can't tune below while TG on) | TG turned on | on |
|-----|----------------------------------|--------------|----------|
| T03 | 9 kHz | 3.0 GHz | 3.08 GHz |
| T06 | 9 kHz | 6.0 GHz | 6.05 GHz |

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

| Mode | CF Preset for RF |
|-------------|------------------|
| WCDMA | 1 GHz |
| WIMAXOFDMA, | 1 GHz |
| BASIC | 1 GHz |
| ADEMOD | 1 GHz |
| VSA | 1 GHz |
| TDSCDMA | 1 GHz |
| PNOISE | 1 GHz |
| LTE | 1 GHz |
| LTETDD | 1 GHz |
| MSR | 1 GHz |
| GSM | 935.2 MHz |
| NFIGURE | 1.505 GHz |

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | [:SENSe] :FREQuency:RF:CENTer <freq> [:SENSe] :FREQuency:RF:CENTer? |
| Example | FREQ:RF:CENT 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Dependencies | If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of |

| | |
|--------------------------|--|
| | Source Numerator, Source Denominator and Power Sweep. |
| Preset | See table above |
| State Saved | Saved in instrument state. |
| Min | -79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source |
| Max | See table above. Basically instrument maximum frequency - 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|---|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code> |
| Example | <code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code> |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Couplings | When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup. |
| Preset | When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies. If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table ($\text{Span} = \text{Stop Freq} - \text{Start Freq}$), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table. |

| | |
|----------------------|---|
| | <p>When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz.</p> <p>Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz.</p> |
| State Saved | Saved in instrument state. |
| Min | The minimum frequency in the currently selected mixer band + 5 Hz |
| Max | <p>The maximum frequency in the currently selected mixer band – 5 Hz</p> <p>If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency</p> |
| Initial S/W Revision | A.08.01 |

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | <pre>[:SENSe] :FREQuency:IQ:CENTer <freq></pre> <pre>[:SENSe] :FREQuency:IQ:CENTer?</pre> |
| Example | FREQ:IQ:CEN: 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Preset | 0 Hz |
| State Saved | Saved in instrument state. |
| Min | -40.049995 MHz |
| Max | 40.049995 MHz |
| Initial S/W Revision | Prior to A.02.00 |

CF Step

Changes the step size for the center frequency and start and stop frequency functions. Once a step size has been selected and the center frequency function is active, the step keys (and the UP|DOWN parameters for Center Frequency from remote commands) change the center frequency by the step-size value. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the analyzer.

Note that the start and stop frequencies also step by the CF Step value.

| | |
|------------------------------|--|
| Key Path | FREQ Channel |
| Remote Command | [:SENSe]:FREQuency:CENTer:STEP[:INCRement] <freq> [:SENSe]:FREQuency:CENTer:STEP[:INCRement]? [:SENSe]:FREQuency:CENTer:STEP:AUTO OFF ON 0 1 [:SENSe]:FREQuency:CENTer:STEP:AUTO? |
| Example | FREQ:CENT:STEP:AUTO ON FREQ:CENT:STEP 500 MHz FREQ:CENT UP increases the current center frequency value by 500 MHz FREQ:CENT:STEP? FREQ:CENT:STEP:AUTO? |
| Notes | Preset and Max values are depending on Hardware Options (503, 507, 508, 513, 526) |
| Notes | Preset and Max values are dependent on Hardware Options (5xx) |
| Dependencies | Freq Offset is not available in External Mixing. In this case the Freq Offset key is grayed out and shows a value of zero. It will once again be available, and show the previously set value, when you return to the RF Input. |
| Dependencies | Span, RBW, Center frequency If the electronic/soft attenuator is enabled, any attempt to change the value of the center frequency >3.6 GHz by pressing the Up-arrow key, fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. |
| Couplings | When auto-coupled in a non-zero span, the center frequency step size is set to 10% of the span. When auto-coupled in zero span, the center frequency step size is set to the equivalent -3 dB RBW value. |
| Preset | Auto ADEMOD: 1 MHz ON |
| State Saved | Saved in instrument state |
| Min | – (the maximum frequency of the instrument). That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Max | The maximum frequency of the instrument. That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Default Unit | Hz |
| Status Bits/OPC dependencies | non-overlapped |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

11 Spectrum Emission Mask Measurement
Input/Output

Input/Output

See "[Input/Output](#)" on page 202

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement. If there are no active markers, Marker selects marker 1, sets it to Normal and places it at the center of the display. You can turn on and control up to 12 markers.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Marker Type

Sets the marker control mode to Normal and Off. If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. The marker X axis value entered in the active function area will display the marker value to its full entered precision. If the current control mode for the measurement is Off, there is no active function and the active function is turned off.

| | |
|--------------------------|--|
| Key Path | Marker |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SEMask:MARKer[1] 2 ... 12:MODE POSition OFF :CALCulate:SEMask:MARKer[1] 2 ... 12:MODE? |
| Example | CALC:SEM:MARK:MODE POS CALC:SEM:MARK:MODE? |
| Notes | If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. Note that if the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area will display the marker value to its full entered precision. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Range | Normal Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker that is not Off. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

| | |
|--------------------------|---|
| Key Path | Marker |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SEMask:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:SEMask:MARKer:COUPle[:STATe]? |
| Example | CALC:SEM:MARK:COUP ON CALC:SEM:MARK:COUP? |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

All Markers Off

Turns all active markers off in all views.

| | |
|--------------------------|---|
| Key Path | Marker |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SEMask:MARKer:AOFF |
| Example | CALC:SEM:MARK:AOFF |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Marker X Axis Value (Remote Command Only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value if the control mode is Normal.

| | |
|----------------|--|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SEMask:MARKer[1] 2 ... 12:X <freq> |

| | |
|---------------------------------|--|
| | :CALCulate:SEMask:MARKer[1] 2 ... 12:X? |
| Example | CALC:SEM:MARK3:X 1.0 GHz CALC:SEM:MARK3:X? |
| Notes | <p>If no suffix is sent it will use the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" will be generated.</p> <p>The query returns the marker's absolute X Axis value if the control mode is Normal. The query is returned in the fundamental units for the current marker X Axis scale. If the marker is Off the response is not a number.</p> <p>When a Marker is turned on, it is placed center of the screen on the trace. Therefore the default value depends on instrument condition, although the Preset/Default is defined as 1.5 GHz.</p> |
| Preset | After a preset, , all Markers are turned OFF, , so a Marker X Axis Value query will return a not a number (NAN). |
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Marker X Axis Position (Remote Command Only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal, except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

| | |
|-----------------------|--|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SEMask:MARKer[1] 2 ... 12:X:POsition <real> :CALCulate:SEMask:MARKer[1] 2 ... 12:X:POsition? |
| Example | CALC:SEM:MARK10:X:POS 1001 CALC:SEM:MARK10:X:POS? |
| Notes | <p>The query returns the marker's absolute X Axis value in trace points if the control mode is Normal. The value is returned as a real number, not an integer, corresponding to the translation from X Axis Scale units to trace points . If the marker is Off the response is not a number.</p> <p>When a Marker is turned on, it is placed center of the screen on the trace. Therefore the default value depends on the instrument condition although the Preset/Default is defined as 6507 (this value might be the expected value when all the offsets are on).</p> |
| Preset | After a preset, , all Markers are turned OFF, , so a Marker X Axis Value query will return a not a number (NAN). |
| State Saved | No |

| | |
|--------------------------|------------------|
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Marker Y Axis Value (Remote Command Only)

Returns the marker Y Axis value in the current marker Y Axis unit.

| | |
|-------------------------------------|---|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTEFDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SEMask:MARKer[1] 2 ... 12:Y? |
| Example | CALC:SEM:MARK11:Y 10 dBm CALC:SEM:MARK11:Y? |
| Notes | Since the result value is always calculated from acquisition data, the default value is arbitrary, although the Preset/Default values is defined. |
| Preset | Result dependent on markers setup and signal source |
| State Saved | No |
| Backwards Compatibility SCPI | :CALCulate:SEMask:MARKer[1] 2 ... 12:FUNction:RESult? |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Marker Function

There are no 'Marker Functions' supported in Spectrum Emission Mask so this front-panel key displays a blank menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Marker To

There is no 'Marker To' functionality supported in Spectrum Emission Mask so this front-panel key displays a blank menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Remote Measurement Functions

This section contains the following topics:

"Measurement Group of Commands" on page 2285

"Current Measurement Query (Remote Command Only)" on page 2287

"Limit Test Current Results (Remote Command Only)" on page 2287

"Data Query (Remote Command Only)" on page 2287

"Calculate/Compress Trace Data Query (Remote Command Only)" on page 2288

"Calculate Peaks of Trace Data (Remote Command Only)" on page 2293

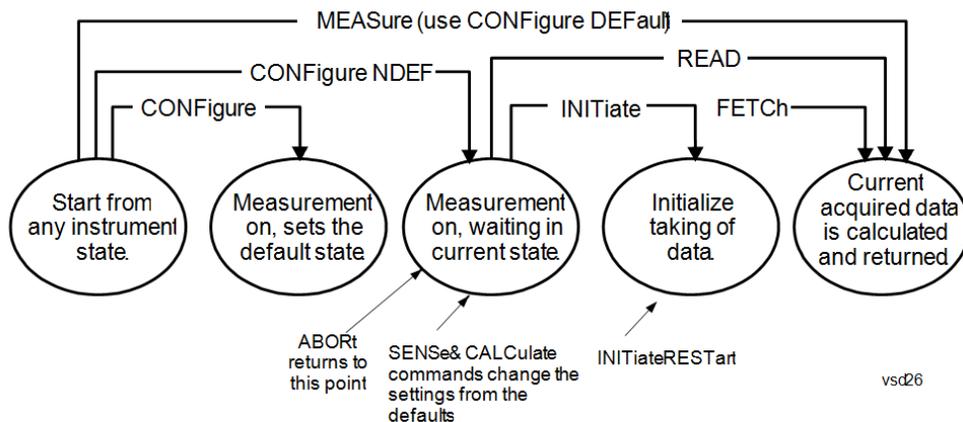
Hardware-Accelerated Fast Power Measurement (Remote Command Only)

"Format Data: Numeric Data (Remote Command Only)" on page 2294

"Format Data: Byte Order (Remote Command Only)" on page 2295

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFIgure command. Use the commands in the SENSE:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSE:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFIgure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTInuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTInuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
- For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
- Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
- If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
-

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

| | |
|-----------------------|-------------|
| Remote Command | :CONFigure? |
|-----------------------|-------------|

| | |
|----------------|-------|
| Example | CONF? |
|----------------|-------|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

| | |
|-----------------------|--------------------------|
| Remote Command | :CALCulate:CLIMits:FAIL? |
|-----------------------|--------------------------|

| | |
|----------------|--|
| Example | CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails. |
|----------------|--|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA[n]? |
| Notes | The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement. |
| Initial S/W Revision | Prior to A.02.00 |

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]] |
| Example | To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.) |
| Notes | The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data. |
| Initial S/W Revision | Prior to A.02.00 |

- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

NOTE If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPLe - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

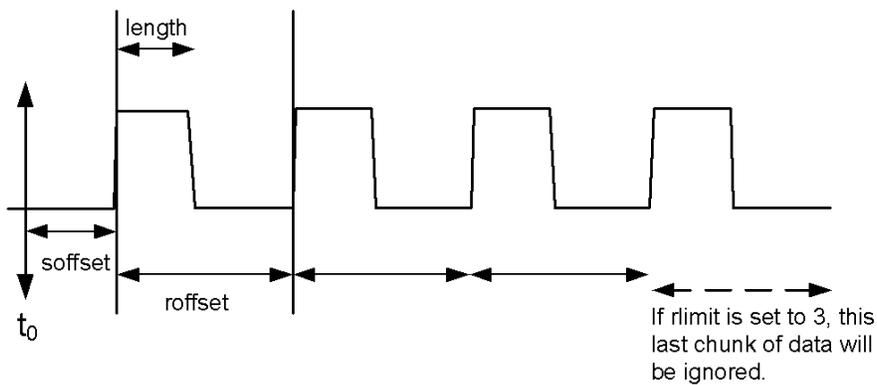
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

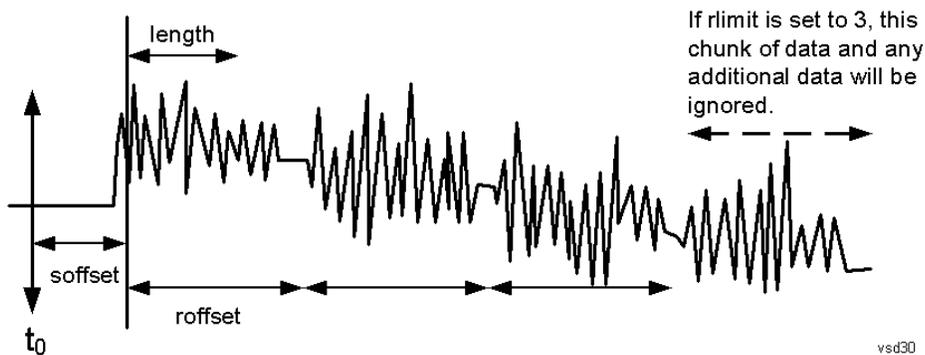
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

| | |
|-----------------------|--|
| Remote Command | <p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre> |
|-----------------------|--|

| | |
|----------------|---|
| Example | <p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p> |
|----------------|---|

| | |
|--------------|---|
| Notes | <p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p> |
|--------------|---|

excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQUency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat[:TRACe][:DATA] ASCii|INTeger,32|REAL,32 |REAL,64
:FORMat[:TRACe][:DATA]?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

Initial S/W Revision Prior to A.02.00

The specs for each output type follow:

AScii - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

| | |
|-----------------------|--|
| Remote Command | :FORMat:BORDER NORMal SWAPped :FORMat:BORDER? |
|-----------------------|--|

| | |
|---------------|--------|
| Preset | NORMal |
|---------------|--------|

| | |
|-----------------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|-----------------------------|------------------|

Meas Setup

Displays the setup menu for the currently selected measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Avg/Hold Num

Toggles averaging On or Off in addition to enabling you to set the number of measurement averages used to calculate the measurement result. The average is displayed at the end of each sweep. After the specified number of average counts, the average mode (termination control) setting determines the average action.

In the remote mode, use the Average State command to turn averaging on or off.

| | |
|--------------------------|---|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe]:SEMask:AVERage:COUNT <integer> [:SENSe]:SEMask:AVERage:COUNT? [:SENSe]:SEMask:AVERage[:STATe] ON OFF 1 0 [:SENSe]:SEMask:AVERage[:STATe]? |
| Example | SEM:AVER:COUN 100 SEM:AVER:COUN? SEM:AVER ON SEM:AVER? |
| Notes | You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Preset | 10 OFF |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 10000 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Meas Type

Accesses a menu that enables you to select one of the following measurement reference types:

- Total Pwr Ref – Sets the reference to the total carrier power and the measured data is shown in dBc and dBm.
- PSD Ref – Sets the reference to the mean power spectral density of the carrier and the measured data is shown in dB and dBm/Hz.
- Spectrum Peak Ref – Sets the reference to the spectrum peak power of the carrier and the measured data is shown in dB and dBm.

| | |
|--------------------------|---|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :SEMAsk:TYPE PSDRef TPRef SPRef [:SENSe] :SEMAsk:TYPE? |
| Example | SEM:TYPE PSDR SEM:TYPE? |
| Notes | You must be in the mode that includes SEM measurement to use this command. Use :INSTRument:SElect to set the mode. |
| Preset | SA, , WCDMA, , C2K, , TD-SCDMA, , 1xEVDO, , DTMB (CTTB), , DVB-T/H, , ISDB-T, , CMMB, , LTE, , LTETDD, , Digital Cable TV, , MSR, , LTEAFDD, , LTEATDD: TPRef WIMAX OFDMA, WLAN: SPRef |
| State Saved | Saved in instrument state. |
| Range | Total Pwr Ref PSD Ref Spectrum Peak Ref |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Ref Channel

Accesses a menu that enables you to set up the measurement parameters used to calculate the power in the reference channel.

| | |
|----------------------|------------------|
| Key Path | Meas Setup |
| Initial S/W Revision | Prior to A.02.00 |

Integ BW

Specifies the integration bandwidth used to calculate the power in the reference channel.

| | |
|----------------|--|
| Key Path | Meas Setup, Ref Channel |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN |
| Remote Command | [:SENSe] :SEMAsk:BANDwidth[1] 2:INTegration <bandwidth> [:SENSe] :SEMAsk:BANDwidth[1] 2:INTegration? |

| | |
|--------------------------|---|
| Example | SEM:BAND:INT 10 MHz SEM:BAND:INT? |
| Notes | 10% . 100% of Channel Span Parameter Value Bandwidth sub op code, 1 is for BTS, 2 for MS. Default is BTS. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Dependencies | For MSR and LTE-Advanced FDD/TDD mode, this key is blank. |
| Couplings | Cannot be higher than the channel Span. If lower than 1/10 of channel Span, then the channel Span is reduced to be 10 times the Integ BW. |
| Preset | SA: 3.84 MHz WCDMA: 3.84 MHz 3.84 MHz C2K: 1.23 MHz 1.23 MHz WIMAX OFDMA: 10 MHz 10 MHz TD-SCDMA: 1.28 MHz 1.28 MHz 1xEVDO: 1.23MHz DTMB (CTTB): 7.56MHz DVB-T/H: 7.61MHz ISDB-T: 5.6MHz CMMB: 7.512MHz LTE: 4.515MHz 4.5MHz LTETDD: 4.515MHz 4.5MHz Digital Cable TV: 6.9MHz WLAN: if Radio Std is 802.11a/g(OFDM/DSSS-OFDM)/802.11n(20 MHz)/ 802.11ac (20 MHz): 18 MHz if Radio Std is 802.11b/g(DSSS/CCK/PBCC): 22 MHz if Radio Std is 802.11n(40MHz)/ 802.11ac (40 MHz): 38 MHz if Radio Std is 802.11ac (80 MHz): 78 MHz if Radio Std is 802.11ac (160 MHz): 158 MHz if Radio Std is 802.11ac (80 MHz + 80 MHz): 78 MHz |
| State Saved | Saved in instrument state. |
| Min | 1 kHz |
| Max | 645 MHz |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Span

Specifies the span used to calculate the power in the reference channel.

| | |
|----------|-------------------------|
| Key Path | Meas Setup, Ref Channel |
|----------|-------------------------|

| | |
|--------------------------|--|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, LTE, LTETDD, CMMB, Digital Cable TV, WLAN |
| Remote Command | [:SENSe] :SEMAsk:FREQuency [1] 2 :SPAN <freq> [:SENSe] :SEMAsk:FREQuency [1] 2 :SPAN? |
| Example | SEM:FREQ:SPAN 3MHz SEM:FREQ:SPAN? |
| Notes | Frequency sub op code, 1 is for BTS, 2 for MS. Default is BTS. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Dependencies | For MSR and LTE-Advanced FDD/TDD mode, this key is blank. |
| Couplings | Range 1 kHz to 50 MHz (although restricted by Integ BW). If you set the channel Span lower than channel Integ BW, they will both track each other. As you increase the channel Span, the Integ BW will also increase if it is less than 1/10 of the channel Span. For WLAN 802.11ac (80 + 80 MHz), the channel span is coupled with the difference between the center frequencies of the two carriers. When the difference is either less than 80 MHz or greater than 565 MHz, a “setting conflict” error message is displayed. Chan Span = Carrier Spacing + Chan IntegBW; |
| Preset | SA: 5.0 MHz WCDMA: 5.0 MHz 5.0 MHz C2K: 1.25 MHz 1.25 MHz WIMAX OFDMA: 10 MHz 10 MHz TD-SCDMA: 1.6 MHz 1.6 MHz 1xEVDO: 1.25 MHz DTMB (CTTB): 10 MHz DVB-T/H: 10 MHz ISDB-T: 8 MHz CMMB: 10 MHz LTE: 5 MHz LTETDD: 5 MHz Digital Cable TV: 10 MHz WLAN: if Radio Std is 802.11a/g(OFDM/DSSS-OFDM)/802.11n(20 MHz)/ 802.11ac (20 MHz): 18 MHz if Radio Std is 802.11b/g(DSSS/CCK/PBCC): 22 MHz if Radio Std is 802.11n(40MHz)/ 802.11ac (40 MHz): 38 MHz if Radio Std is 802.11ac (80 MHz): 78 MHz if Radio Std is 802.11ac (160 MHz): 158 MHz if Radio Std is 802.11ac (80 MHz + 80 MHz): 240 MHz |
| State Saved | Saved in instrument state. |
| Min | 1 kHz |
| Max | 645 MHz |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Sweep Time

Sets the sweep time used to calculate the power in the reference channel. Sweep Time can be set manually or put in auto mode.

| | |
|--------------------------|---|
| Key Path | Meas Setup, Ref Channel |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe]:SEMask:SWEep[1] 2:TIME <time> [:SENSe]:SEMask:SWEep[1] 2:TIME? [:SENSe]:SEMask:SWEep[1] 2:TIME:AUTO OFF 0 ON 1 [:SENSe]:SEMask:SWEep[1] 2:TIME:AUTO? |
| Example | SEM:SWE:TIME 9ms SEM:SWE:TIME? SEM:SWE:TIME:AUTO OFF SEM:SWE:TIME:AUTO? |
| Notes | Sub op code, 1 is for BTS, 2 for MS. Default is BTS. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | When the time is set manually, Auto is set to OFF. Value is coupled with Channel Detector selection, Channel Resolution BW, Channel Video BW if the state is Auto. When set to Auto, the Sweep Time is automatically calculated |
| Preset | Automatically calculated ON |
| State Saved | Saved in instrument state. |
| Min | 1 ms |
| Max | 4000 s |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Res BW

Sets the resolution bandwidth used to calculate the power in the reference channel. The Channel Resolution BW can be set manually or put in to auto mode.

MSR Auto RBW:

In the MSR resolution bandwidth is predefined for each radio format. When carriers are configured with multiple radio formats, the narrowest RBW is selected.

| | | |
|--------|---------|-----|
| LTE | 1.4 MHz | 13 |
| | 3 MHz | 27 |
| | 5 MHz | 47 |
| | 10 MHz | 91 |
| | 15 MHz | 150 |
| | 20 MHz | 180 |
| W-CDMA | | 75 |
| GSM | | 30 |

In LTE-Advanced FDD/TDD, the resolution bandwidth is predefined based on the corresponding bandwidth of the single LTE carrier, which is listed above. When ResBW mode is Auto, the narrowest RBW is selected.

| | |
|-----------------------|--|
| Key Path | Meas Setup, Ref Channel |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <pre>[:SENSe]:SEMAsk:BANDwidth[1] 2[:RESolution] <bandwidth> [:SENSe]:SEMAsk:BANDwidth[1] 2[:RESolution]? [:SENSe]:SEMAsk:BANDwidth[1] 2[:RESolution]:AUTO OFF ON 1 0 [:SENSe]:SEMAsk:BANDwidth[1] 2[:RESolution]:AUTO?</pre> |
| Example | <pre>SEM:BAND 100 kHz SEM:BAND? SEM:BAND:AUTO ON SEM:BAND:AUTO?</pre> |
| Notes | <p>Bandwidth sub op code, 1 is for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode.</p> |
| Couplings | <p>When Res BW is set manually, Channel Resolution BW Mode is set to MANual.</p> <p>Value is coupled with Channel Detector selection, Channel Sweep Time, Channel Video BW.</p> <p>When set to Auto, the resolution bandwidth is automatically calculated.</p> |
| Preset | <pre>SA: 100 kHz WCDMA: 75 kHz C2K: 24 kHz WIMAX OFDMA: 100 kHz TD-SCDMA: 30 kHz 1xEVDO: 30.0 kHz DTMB (CTTB): 3.9 kHz DVB-T/H: 3.9 kHz ISDB-T: 10 kHz CMMB: 3.9 kHz</pre> |

| | |
|-------------------------------------|--|
| | LTE, , LTE4DD, , MSR, , LTEAFDD, , LTEATDD:Auto (47 kHz) Digital Cable TV: 3.9 kHz WLAN: 100 kHz ON |
| State Saved | Saved in instrument state. |
| Min | 1 Hz |
| Max | 8 MHz |
| Backwards Compatibility SCPI | [:SENSe] :SEMAsk :BWIDth [1] 2 [:RESolution] |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Video BW

Sets the video bandwidth used to calculate the power in the reference channel. The Channel Video BW can be set manually or put in to auto mode.

| | |
|-----------------------|---|
| Key Path | Meas Setup, Ref Channel |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE4DD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :SEMAsk :BANDwidth [1] 2 :VIDeo <bandwidth> [:SENSe] :SEMAsk :BANDwidth [1] 2 :VIDeo? [:SENSe] :SEMAsk :BANDwidth [1] 2 :VIDeo :AUTO OFF ON 1 0 [:SENSe] :SEMAsk :BANDwidth [1] 2 :VIDeo :AUTO? |
| Example | SEM:BAND:VID 100 kHz SEM:BAND:VID? SEM:BAND:VID:AUTO ON SEM:BAND:VID:AUTO? |
| Notes | Bandwidth sub op code, 1 is for BTS, 2 for MS. Default is BTS. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | When Video BW is set manually, Channel Video BW Mode is set to MANual Value is coupled with Channel Detector selection, Channel Sweep Time, Channel Resolution BW. When set to Auto, the video bandwidth is automatically calculated. |
| Preset | SA: 100 kHz WCDMA: 75 kHz C2K: 24 kHz WIMAX OFDMA: 30 kHz TD-SCDMA: 300 kHz 1xEVDO: 300.0 kHz |

| | |
|-------------------------------------|---|
| | DTMB (CTTB): 39 kHz DVB-T/H: 39 kHz ISDB-T: 1 kHz CMMB: 39 kHz LTE, MSR, LTEAFDD, LTEATDD: Auto LTETDD: Auto Digital Cable TV: 39 kHz WLAN: Auto ON |
| State Saved | Saved in instrument state. |
| Min | 1 Hz |
| Max | 50 MHz |
| Backwards Compatibility SCPI | [:SENSe] :SEMAsk:BWIDth [1] 2 :VIDeo |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

VBW/RBW

Sets the Video BW/Resolution BW Ratio to calculate the Channel Resolution BW and Channel Video BW. The VBW/RBW Ratio can be set manually or put in to auto mode.

| | |
|-----------------------|---|
| Key Path | Meas Setup, Ref Channel |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA mode, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :SEMAsk:BAWIDth [1] 2 :VIDeo:RATio <real> [:SENSe] :SEMAsk:BAWIDth [1] 2 :VIDeo:RATio [:SENSe] :SEMAsk:BAWIDth [1] 2 :VIDeo:RATio:AUTO OFF ON 1 0 [:SENSe] :SEMAsk:BAWIDth [1] 2 :VIDeo:RATio:AUTO? |
| Example | SEM:BAWID:VID:RAT 0.1 SEM:BAWID:VID:RAT? SEM:BAWID:VID:RAT:AUTO ON SEM:BAWID:VID:RAT:AUTO? |
| Notes | Bandwidth sub op code, 1 is for BTS, 2 for MS. Default is BTS. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | When Video BW/Res BW is set manually, Channel VBW/RBW Ratio Mode is set to MANual When set to Auto, the VBW/RBW Ratio is automatically calculated. |
| Preset | SA, WCDMA, C2K: 1.0 WIMAX OFDMA: 0.3 |

| | |
|-------------------------------------|---|
| | TD-SCDMA: 10 1xEVDO: 10.0 DTMB (CTTB): 10 DVB-T/H: 10 ISDB-T: 0.1 CMMB: 10 LTE, MSR: Auto LTEAFDD,LTEATDD:Auto LTETDD: Auto Digital Cable TV: 10 WLAN: Auto ON |
| State Saved | Saved in instrument state. |
| Min | 0.00001 |
| Max | 3000000 |
| Backwards Compatibility SCPI | [:SENSe] :SEMask:BWIDth [1] 2 :VIDeo:RATio |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Power Ref (for the modes except MSR and LTE-Advanced FDD/TDD)

Sets the power reference in the carrier that will be used to compute the relative values for the offsets.

| | |
|----------------------|-------------------------|
| Key Path | Meas Setup, Ref Channel |
| Initial S/W Revision | Prior to A.02.00 |

Total Power

Sets the power in the carrier (ref channel) that is used to compute the relative power values for the offsets. When the state is set to auto, this value is set to the measured carrier reference power. When set to manual, the result takes on the last measured value, or can be manually entered.

For WLAN 802.11ac (80 MHz + 80 MHz), the higher of the power readouts of the two carriers is used for computing the relative power values for the offset.

| | |
|-----------------------|---|
| Key Path | Meas Setup, Ref Channel, Power Ref |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :SEMask:CARRier[:POWer] <real> [:SENSe] :SEMask:CARRier[:POWer]? |

| | |
|---------------------------------|---|
| | <code>[:SENSe] :SEMAsk :CARRier :AUTO [:STATe] OFF ON 1 0</code> |
| | <code>[:SENSe] :SEMAsk :CARRier :AUTO [:STATe] ?</code> |
| Example | SEM:CARR 100dBm SEM:CARR? SEM:CARR:AUTO OFF SEM:CARR:AUTO? |
| Notes | The min and max values given are for Meas Type = Total Pwr Ref. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode.. This BAF SCPI command is available in all the Meas Type case. This BAF SCPI command is not available in MSR and LTE-Advanced FDD/TDD mode. |
| Dependencies | This "Total Power Ref" parameter is coupled with the "Meas Type" parameter. The softkey is active when Meas Type is set to Total Power Ref. Otherwise, it is grayed out. |
| Preset | Measured carrier reference power |
| State Saved | Saved in instrument state. |
| Min | -200 dBm |
| Max | 200 dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

PSD

Sets the power spectral density in the carrier that is used to compute the relative power spectral density values for the offsets when Meas Type is set to PSD Ref. When the state is set to auto, this will be set to the measured carrier power spectral density.

For WLAN 802.11ac (80 MHz + 80 MHz), the higher of the power density readouts of the two carriers is used for computing the relative PSD values for the offset.

| | |
|-----------------------|--|
| Key Path | Meas Setup, Ref Chan, Power Ref |
| Mode | SA, WCDMA, C2K , WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe] :SEMAsk :CARRier :CPSD <real></code> <code>[:SENSe] :SEMAsk :CARRier :CPSD ?</code> |
| Example | SEM:CARR:CPSD -80 SEM:CARR:CPSD? |
| Notes | Although the default value is defined, the value is recalculated by the measurement result just after completing the measurement. Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |

| | |
|--------------------------|---|
| Dependencies | See Couplings |
| Couplings | This "PSD" parameter is coupled with the "Meas Type" parameter. The key will be active if the Meas Type is set to PSD. Otherwise, it is grayed out. |
| Preset | Measured carrier PSD reference power |
| State Saved | Saved in instrument state. |
| Min | -200 |
| Max | 200 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Spectrum Peak

Sets the spectrum peak power in the carrier that is used to compute the relative power spectral density values for the offsets when Meas Type is set to Spectrum Peak. When the state is set to auto, this is set to the measured carrier spectrum peak power. When set to manual, the result takes on the last measured value, or can be manually entered

| | |
|--------------------------|--|
| Key Path | Meas Setup, Ref Channel, Power Ref |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN |
| Remote Command | <code>[:SENSe] :SEMask:CARRier:PEAK[:POWer] <real></code> <code>[:SENSe] :SEMask:CARRier:PEAK[:POWer] ?</code> |
| Example | SEM:CARR:PEAK -80 SEM:CARR:PEAK:POWER? |
| Notes | Although the default value is defined, the value is recalculated by the measurement result just after completing the measurement. Carrier sub op code. 1 for BTS, 2 for MS. Default is BTS. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Dependencies | See Couplings |
| Couplings | This "Spectrum Peak Ref" parameter is coupled with the "Meas Type" parameter. This softkey is active when the "Meas Type" is set to "Spectrum Peak Ref". Otherwise, grayout. |
| Preset | Measured carrier Spectrum Peak reference power |
| State Saved | Saved in instrument state. |
| Min | -200 |
| Max | 200 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Offset/Limits

Accesses a menu that enables you to set up the measurement parameters for offset pairs. For example, you can assign the start and stop frequencies, select the resolution bandwidth, and set the sweep time. When in the MSR and LTE-Advanced FDD/TDD mode, the softkey label changes to Outer Offset/Limits.

| | |
|--------------------------|------------------|
| Key Path | Meas Setup |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

Select Offset

Selects the offset (upper and lower) and displays the memory selection menu that enables you to store a set of parameter values for the offset, such as Start Freq, Stop Freq, Sweep Time, Res BW, Meas BW, Abs Start, and Abs Stop. Only one selection at a time is shown on this menu key label.

| | |
|--------------------------|---|
| Key Path | Meas Setup, Offset/Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Preset | A |
| Range | MSR, LTEATDD, LTEAFDD, WLAN: A B C D E F G H I J K L Other modes without option N9060A-7FP: A B C D E F Other modes with option N9060A-7FP: A B C D E F G H I J K L |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.10.00, A.11.00, A.14.00 |

Start Freq

Specifies the start frequency for the currently selected offset. Also enables you to toggle that offset between On and Off.

Missing values are not permitted; that is, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 12 values.

| | |
|----------------|--|
| Key Path | Meas Setup, Offset/Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSE] :SEMAsk:OFFSet [1] 2 [:OUTer] :LIST:FREQuency:STARt <freq>, ... [:SENSE] :SEMAsk:OFFSet [1] 2 [:OUTer] :LIST:FREQuency:STARt? [:SENSE] :SEMAsk:OFFSet [1] 2 [:OUTer] :LIST:STATE ON OFF 1 0, ... [:SENSE] :SEMAsk:OFFSet [1] 2 [:OUTer] :LIST:STATE? |
| Example | SEM:OFFS2:LIST:FREQ:STAR 2.515 MHz, , 2.715 MHz, , 3.515 MHz, , 4.00 MHz, , 8.00 MHz, , 12.50 MHz |

SEM:OFFS2:LIST:FREQ:STAR?
SEM:OFFS:LIST:STAT ON, , ON, , ON, , OFF, , OFF, , OFF
SEM:OFFS:LIST:STAT?

Notes

Comma separated list of values.
OFFSet1 is for BTS, 2 for MS. Default is BTS.
You must be in the mode that includes SEM measurement to use this command. Use
:INSTrument:SElect to set the mode.

Couplings

Coupled to Stop Freq. When the start freq goes above the stop freq, the stop freq is automatically adjusted to the start freq plus 100 Hz.
If the current mode is DVB-T/H, this value will be modified automatically according to the limit type and the output power of the transmitter which is less or more than 25 W.
If the current mode is ISDB-T, this value will be modified automatically according to the limit type.

Preset

For modes (except MSR, , LTEAFDD, , LTEATDD and WLAN) without option N9060A-7FP, , the preset value is as follows.
SA: 2.515 MHz, , 2.715 MHz, , 3.515 MHz, , 4.00 MHz, , 8.00 MHz, , 12.50 MHz
WCDMA: 2.515 MHz, , 2.715 MHz, , 3.515 MHz, , 4.000 MHz, , 8.000 MHz, , 12.50 MHz|2.515MHz, , 4.000 MHz, , 7.500 MHz, , 8.500 MHz, , 12.5 MHz, , 15 MHz
C2K: 750.0 kHz, , 780.0 kHz, , 1.980 MHz, , 3.25 MHz, , 7.0 MHz, , 7.0 MHz|885 kHz, , 1.980 MHz, , 2.250 MHz, , 8.0 MHz, , 12.0 MHz, , 12.0 MHz
WIMAX OFDMA: 4.75 MHz, 5.45 MHz, 9.75 MHz, 14.75 MHz, 19.75 MHz, 24.75 MHz|4.75 MHz, 5.45 MHz, 9.75 MHz, 14.75 MHz, 19.75 MHz, 24.75 MHz
TD-SCDMA:
81 5kHz, 1015 kHz, 1815 kHz, 2.3 MHz, , , 2.3 MHz, , 2.3 MHz |815 kHz, 1.8 MHz, 2.9 MHz, , 2.9 MHz, 2.9 MHz, , 2.9 MHz
1xEVDO: 750.0 kHz, , 780.0 kHz, , 1.98 MHz, , 3.25 MHz, , 7 MHz, , 7 MHz|885.0 kHz, , 1.98 MHz, , 1.98 MHz, , 1.98 MHz, , 1.98 MHz
DTMB (CTTB): 3.8 MHz, , 4.2 MHz, , 6 MHz, , 6 MHz, , 6 MHz, 6 MHz |6MHz, , 6MHz, , 6MHz, , 6MHz, , 6MHz, , 6MHz
DVB-T/H: 3.81 MHz, , 4.2 MHz, , 6 MHz, , 6 MHz, , 6 MHz, , 6 MHz |6MHz, , 6MHz, , 6MHz, , 6MHz, , 6MHz
ISDB-T: 2.79 MHz, , 2.86 MHz, , 3.0 MHz, , 4.36 MHz, , 6 MHz, , 6 MHz |6MHz, , 6MHz, , 6MHz, , 6MHz, , 6MHz, , 6MHz
CMMB: 3.8 MHz, , 4.2 MHz, , 8.0 MHz, , 6 MHz, , 6 MHz, , 6 MHz |6MHz, , 6MHz, , 6MHz, , 6MHz, , 6MHz, , 6MHz
LTE, , LTETDD: 50 kHz, , 5.05 MHz, , 10.5 MHz, , 15.00 MHz, , 30 MHz, , 40 MHz|15.00 kHz, 1.5 MHz, 5.5 MHz, 6.5 MHz, 10 MHz, 20MHz
Digital Cable TV: 3.8 MHz, , 4.2 MHz, , 6 MHz, , 6 MHz, , 6 MHz, , 6 MHz |6MHz, , 6MHz, , 6MHz, , 6MHz, , 6MHz, , 6MHz
When option N9060A-7FP is installed in these modes, the preset value of Offset G ~ L is the same as the Offset F value.

WLAN:
if Radio Std is 802.11a/g(OFDM/DSSS-OFDM)/802.11n(20MHz): 9 MHz, , 11 MHz, , 20 MHz, , 30

MHz, , 50 MHz, , 216 MHz

if Radio Std is 802.11b/g(DSSS/CCK/PBCC): 11 MHz, , 22 MHz, , 50 MHz, , 70 MHz, , 90 MHz, , 100 MHz

if Radio Std is 802.11n(20MHz): 9 MHz, , 11 MHz, , 20 MHz, , 30 MHz, , 50 MHz, , 100 MHz

if Radio Std is 802.11n(40MHz): 19 MHz, , 21 MHz, , 40 MHz, , 60 MHz, , 100 MHz, , 200 MHz

if Radio Std is 802.11ac(20MHz): 9 MHz, , 11 MHz, , 20 MHz, , 30 MHz

if Radio Std is 802.11ac(40MHz): 19 MHz, , 21 MHz, , 40 MHz, , 60 MHz

if Radio Std is 802.11ac(80MHz): 39 MHz, , 41 MHz, , 80 MHz, , 120 MHz

if Radio Std is 802.11ac(160MHz): 79 MHz, , 81 MHz, , 160 MHz, , 240 MHz

if Radio Std is 802.11ac(80 MHz + 80MHz): 0 MHz, , 40 MHz, , 79 MHz, , 159 MHz, , 161 MHz, , 200 MHz, , 240 MHz

MSR:15 kHz, , 215kHz, , 1.015MHz, , 1.5MHz, , 10.5MHz, , 15.00MHz, , 30MHz, , 30MHz, , 30MHz, , 30MHz, , 30MHz, , 30MHz | 15kHz, , 215kHz, , 1.015MHz, , 1.5MHz, , 10.5MHz, , 15.00MHz, , 30MHz, , 30MHz, , 30MHz, , 30MHz, , 30MHz, , 30MHz

LTEAFDD, , LTEATDD: 50 kHz, , 5.05 MHz, , 10.5 MHz, , 15.00 MHz, , 30 MHz, , 40 MHz, , 40 MHz, 40 MHz, 40 MHz, 40 MHz, 40 MHz, 40 MHz | 15.00 kHz, 1.5 MHz, 5.5 MHz, 6.5 MHz, 10 MHz, 20MHz, , 20MHz, , 20MHz, , 20MHz, , 20MHz, , 20MHz

For modes (except MSR, , LTEAFDD, , LTEATDD and WLAN) without option N9060A-7FP, , the preset value is as follows.

SA: ON, ON, ON, ON, ON, OFF

WCDMA: ON, , ON, , ON, , ON, , OFF|ON, , ON, , ON, , OFF, , OFF

C2K: ON, , ON, , ON, , OFF, , OFF, , OFF|ON, , ON, , OFF, , OFF, , OFF, , OFF

WIMAX OFDMA: ON, , ON, , ON, , OFF, , OFF, , OFF|ON, , ON, , ON, , OFF, , OFF, , OFF

TD-SCDMA: ON, , ON, , ON, , ON, , OFF, , OFF|ON, , ON, , ON, , OFF, , OFF, , OFF

1xEVDO: ON, , ON, , ON, , OFF, , OFF, , OFF| ON, , ON, , OFF, , OFF, , OFF, , OFF

DTMB (CTTB), , DVB-T/H, , CMMB, , Digital Cable TV: ON, , ON, , ON, , OFF, , OFF, , OFF

ISDB-T: ON, ON, ON, ON, OFF, OFF

LTE, , LTETDD: ON, , ON, , ON, , OFF, , OFF, , OFF|ON, ON, ON, ON, OFF, OFF

When option N9060A-7FP is installed in these modes, , the preset value of Offset G ~ L is the same as the Offset F value.

WLAN:

if Radio Std is 802.11b/g(DSSS/CCK/PBCC): ON, , ON, , OFF, , OFF

if Radio Std is 802.11a/g(OFDM/DSSS-OFDM)/802.11n(20MHz/40MHz): ON, , ON, , ON, , ON, , OFF, , OFF, , OFF, , OFF, , OFF, , OFF, , OFF

if Radio Std is 802.11ac (20 MHz/ 40 MHz/ 80 MHz/ 160 MHz): ON, , ON, , ON, , ON, , OFF, , OFF, , OFF, , OFF, , OFF, , OFF, , OFF

| | |
|--------------------------|---|
| | if Radio Std is 802.11ac (80 MHz + 80 MHz): ON, , ON, , ON, , ON, , ON, , ON, , OFF, , OFF, , OFF, , OFF, , OFF MSR:ON, , ON, , ON, , ON, , ON, , OFF, , OFF, , OFF, , OFF, , OFF, , OFF, , OFF ON, , ON, , ON, , ON, , ON, , OFF, , OFF, , OFF, , OFF, , OFF, , OFF, , OFF LTEAFDD, , LTEATDD: ON, , ON, , ON, , OFF, , OFF ON, , ON, , ON, , ON, , OFF, , OFF |
| State Saved | Saved in instrument state. |
| Min | 0 Hz |
| Max | 499.9999 MHz |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.10.00, A.11.00, A.14.00 |

Stop Freq

Specifies the stop frequency for the currently selected offset.

Missing values are not permitted; that is, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 12 values.

| | |
|----------------|---|
| Key Path | Meas Setup, Offset/Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :SEMAsk:OFFSet [1] 2 [:OUTer] :LIST:FREQuency:STOP <freq>, ... [:SENSe] :SEMAsk:OFFSet [1] 2 [:OUTer] :LIST:FREQuency:STOP? |
| Example | SEM:OFFS:LIST:FREQ:STOP 2.715 MHz, , 3.515 MHz, , 4.00 MHz, , 8.00 MHz, , 12.50 MHz, , 15.0 MHz SEM:OFFS:LIST:FREQ:STOP? |
| Notes | Comma separated list of values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | Coupled to Start Freq. When the stop freq goes below the start freq, the start freq is automatically adjusted to the stop freq minus 100 Hz. If the current mode is DVB-T/H, this value will be modified automatically according to the limit type and the output power of the transmitter which is less or more than 25 W. If the current mode is ISDB-T, this value will be modified automatically according to the limit type. |
| Preset | For modes (except MSR, , LTEAFDD, , LTEATDD and WLAN) without option N9060A-7FP, , the preset value is as follows. SA: 2.715 MHz, , 3.515 MHz, , 4.00 MHz, , 8.00 MHz, , 12.50 MHz, , 15.0 MHz WCDMA:2.715 MHz, , 3.515 MHz, , 4.000 MHz, , 8.000 MHz, , 12.50 MHz, , 15.0 MHz 3.485 MHz, , 7.500 MHz, , 8.500 MHz, , 12.00 MHz, , 15.00 MHz, , 18.0 MHz |

C2K: 780.0kHz, 1.980 MHz, 4.0 MHz, 4.0 MHz, 12.0 MHz, 12.0 MHz|1.980 MHz, 4.0 MHz, 4.0 MHz, 11.5 MHz, 14.5 MHz, 14.5 MHz

WIMAX OFDMA: 5.45 MHz, 9.75 MHz, 14.75 MHz, 19.75 MHz, 24.75 MHz, 29.75 MHz|5.45 MHz, 9.75 MHz, 14.75 MHz, 19.75 MHz, 24.75 MHz, 29.75 MHz

TD-SCDMA:

1015 kHz, 1815kHz, 2.3 MHz, 4 MHz, 4 MHz, 4 MHz|1.8 MHz, 2385 kHz, 3.5 MHz, 3.5 MHz, 3.5 MHz, 3.5 MHz

1xEVDO: 780.0 kHz, 1.98 MHz, 4.0 MHz, 4.0 MHz, 12 MHz, 12 MHz|1.98 MHz, 4.0 MHz, 4.0 MHz, 4.0 MHz, 4.0 MHz, 4.0 MHz

DTMB (CTTB): 4.2 MHz, 6 MHz, 12 MHz, 12 MHz, 12 MHz, 12 MHz|12 MHz, 12 MHz, 12 MHz, 12 MHz, 12 MHz, 12 MHz, 12 MHz

DVB-T/H: 4.2 MHz, 6 MHz, 12 MHz, 12 MHz, 12 MHz, 12 MHz|12 MHz, 12 MHz, 12 MHz, 12 MHz, 12 MHz, 12 MHz

ISDB-T: 2.86 MHz, 3.0 MHz, 4.36 MHz, 15.0 MHz, 15.0 MHz, 15.0 MHz|15MHz, 15MHz, 15MHz, 15MHz, 15MHz, 15MHz

CMMB: 4.2 MHz, 8.0 MHz, 12.0 MHz, 12.0 MHz, 12.0 MHz, 12.0 MHz|12 MHz, 12 MHz, 12 MHz, 12 MHz, 12 MHz, 12 MHz

LTE, LTETDD: 5.05 MHz, 10.05 MHz, 15 MHz, 30 MHz, 40 MHz, 50 MHz|985.0 kHz, 4.50 MHz, 5.5001 MHz, 9.50 MHz, 20 MHz, 40 MHz

Digital Cable TV: 4.2 MHz, 6.0 MHz, 12.0 MHz, 12.0 MHz, 12.0 MHz, 12.0 MHz, 12 MHz, 12 MHz, 12 MHz, 12 MHz, 12 MHz, 12 MHz

When option N9060A-7FP is installed in these modes, the preset value of Offset G ~ L is the same as the Offset F value.

WLAN:

if Radio Std is 802.11a/g(OFDM/DSSS-OFDM)/802.11n(20MHz): 11 MHz, 20 MHz, 30 MHz, 50 MHz, 100 MHz, 250 MHz

if Radio Std is 802.11b/g(DSSS/CCK/PBCC): 22 MHz, 50 MHz, 70 MHz, 90 MHz, 100 MHz, 120 MHz

if Radio Std is 802.11n(20MHz): 11 MHz, 20 MHz, 30 MHz, 50 MHz, 100 MHz, 200 MHz

if Radio Std is 802.11n(40MHz): 21 MHz, 40 MHz, 60 MHz, 100 MHz, 200 MHz, 300 MHz

if Radio Std is 802.11ac(20MHz): 11 MHz, 20 MHz, 30 MHz, 50 MHz

if Radio Std is 802.11ac(40MHz): 21 MHz, 40 MHz, 60 MHz, 100 MHz

if Radio Std is 802.11ac(80MHz): 41 MHz, 80 MHz, 120 MHz, 200 MHz

if Radio Std is 802.11ac(160MHz): 81 MHz, 160 MHz, 240 MHz, 400 MHz

if Radio Std is 802.11ac(80 MHz + 80MHz): 40 MHz, 79 MHz, 81 MHz, 161 MHz, 200 MHz, 240 MHz, 260 MHz, 260 MHz, 260 MHz, 260 MHz, 260 MHz, 260 MHz

MSR: 215kHz, 1.015MHz, 1.5MHz, 10.5MHz, 50MHz, 50MHz, 50MHz, 50MHz, 50MHz, 50MHz

| | |
|--------------------------|--|
| | 50MHz, , 50MHz, , 50MHz LTEAFDD, , LTEATDD: 5.05 MHz, , 10.05 MHz, , 15 MHz, , 30 MHz, , 40 MHz, , 50 MHz, , 50 MHz, , 50 MHz, , 50 MHz, , 50 MHz, , 50 MHz 985.0 kHz, , 4.50 MHz, , 5.5001 MHz, , 9.50 MHz, 20 MHz, , 40 MHz |
| State Saved | Saved in instrument state. |
| Min | 100 Hz |
| Max | 500 MHz |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.10.00, A.11.00, A.14.00 |

Sweep Time

Specifies the sweep time for the currently selected offset and enables you to toggle the Sweep Time mode between Auto and Man.

Missing values are not permitted; that is, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 12 values.

| | |
|----------------|---|
| Key Path | Meas Setup, Offset/Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :SEMask:OFFSet [1] 2 [:OUTer] :LIST:SWEep:TIME <time>, ... [:SENSe] :SEMask:OFFSet [1] 2 [:OUTer] :LIST:SWEep:TIME? [:SENSe] :SEMask:OFFSet [1] 2 [:OUTer] :LIST:SWEep:TIME:AUTO ON OFF 1 0, ... [:SENSe] :SEMask:OFFSet [1] 2 [:OUTer] :LIST:SWEep:TIME:AUTO? |
| Example | SEM:OFFS2:LIST:SWE:TIME 1.0 ms, , 3.4 ms, , 2.08 ms, , 1.0 ms, , 1.0 ms, , 1.0 ms SEM:OFFS2:LIST:SWE:TIME? SEM:OFFS2:LIST:SWE:TIME:AUTO ON, , ON, , ON, , ON, , OFF, , OFF SEM:OFFS2:LIST:SWE:TIME:AUTO? |
| Notes | Comma separated list of values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | When the sweep time is set manually, Sweep Time Mode is set to MANual. If the current mode is DVB-T/H, this value will be modified automatically according to the output power of the transmitter which is less or more than 25W. If the current mode is ISDB-T, this value will be modified automatically according to the limit type. |
| Preset | Automatically calculated Modes (except MSR, , LTEAFDD, , LTEATDD and WLAN) without option N9060A-7FP: ON, ON, ON, ON, ON, ON |

| | |
|-------------------------------------|---|
| | Modes (except MSR, , LTEAFDD, , LTEATDD and WLAN) with option N9060A-7FP: ON, ON WLAN: ON, ON, ON, ON, ON, ON, ON, ON, ON, , ON, ON, ON, ON, ON MSR: ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON,ON LTEAFDD, , LTEATDD: ON, ON ON, ON |
| State Saved | Saved in instrument state. |
| Min | 1 ms |
| Max | 4000 s |
| Backwards Compatibility SCPI | [:SENSE] :SEMAsk:OFFSet [1] 2 :LIST:SWEep [:TIME] |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.10.00, A.11.00, A.14.00 |

Offset Side

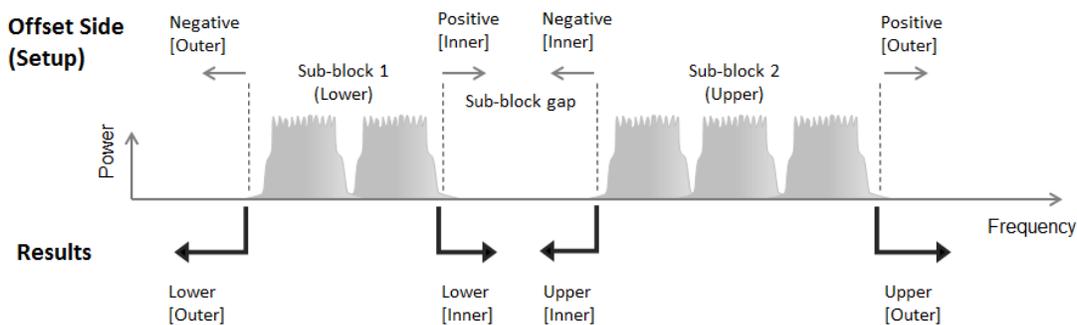
Specifies which offset side to measure.

You can turn off (not use) specific offsets with [:SENSE]:SEMAsk:OFFSet[n][:OUTer]:LIST:STATe.

- **BOTH** – Both of the negative (lower) and positive (upper) sidebands
- **NEGative** – Negative (lower) sideband only
- **POSitive** – Positive (upper) sideband only

Missing values are not permitted; that is, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 12 values.

The figure below shows the relation between the negative/positive offset side setups and the upper/lower results in the MSR and LTE-Advanced FDD/TDD.



| | |
|----------------|--|
| Key Path | Meas Setup, Offset/Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSE] :SEMAsk:OFFSet [1] 2 [:OUTer] :LIST:SIDE BOTH NEGative |

| | |
|---------------------------------|---|
| | POSitive, ... [:SENSe]:SEMask:OFFSet[1] 2[:OUTer]:LIST:SIDE? |
| Example | SEM:OFFS:LIST:SIDE BOTH, , NEG, , NEG, , POS, , POS, , POS SEM:OFFS:LIST:SIDE? |
| Notes | Comma separated list of values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Preset | Modes (except MSR, , LTEAFDD, , LTEATDD and WLAN) without option N9060A-7FP: BOTH, , BOTH, , BOTH, , BOTH, , BOTH Modes (except MSR, , LTEAFDD, , LTEATDD and WLAN) with option N9060A-7FP: BOTH, , BOTH MSR: BOTH, , BOTH LTEAFDD, LTEATDD: BOTH, , BOTH BOTH, , BOTH WLAN: BOTH, , BOTH |
| State Saved | Saved in instrument state. |
| Range | Neg Both Pos |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.10.00, A.11.00, A.14.00 |

Res BW

Specifies which Resolution BW filter to use when measuring the currently selected offset.

Offset Res BW Mode allows the instrument to determine the optimum Resolution BW filter to use when measuring the currently selected offset.. When changing the Meas BW parameter, if the Res BW needs to be changed to adhere to the rule

$(N \times \text{Res BW}) \leq (\text{Stop freq of the offset} - \text{Start freq of the offset})$,

where N is the multiplier, this setting will automatically be changed to manual.

Missing values are not permitted; that is, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 12 values.

| | |
|-----------------------|---|
| Key Path | Meas Setup, Offset/Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO mode, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe]:SEMask:OFFSet[1] 2[:OUTer]:LIST:BANDwidth[:RESolution] <bandwidth>, ... [:SENSe]:SEMask:OFFSet[1] 2[:OUTer]:LIST:BANDwidth[:RESolution]? |

| | |
|------------------|---|
| | <pre>[:SENSe] :SEMAsk:OFFSet [1] 2 [:OUTer] :LIST:BAWdth [:RESolution] :AUTO OFF ON 1 0, ... [:SENSe] :SEMAsk:OFFSet [1] 2 [:OUTer] :LIST:BAWdth [:RESolution] :AUTO?</pre> |
| Example | <pre>SEM:OFFS2:LIST:BAWdth 30.0 kHz, , 30.0 kHz, , 30.0 kHz, , 1.00 MHz, 1.00 MHz, , 1.00 MHz SEM:OFFS2:LIST:BAWdth? SEM:OFFS:LIST:BAWdth:AUTO 1,1,1,1,1,1 SEM:OFFS:LIST:BAWdth:AUTO?</pre> |
| Notes | <p>Comma separated list of values.</p> <p>OFFSet1 is for BTS, 2 for MS. Default is BTS.</p> <p>You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode.</p> |
| Couplings | <p>Coupled to Start and Stop offset and Meas BW multiplier. This parameter must adhere to the rule (N x Res BW) <= (Stop freq of the offset - Start freq of the offset), where N is the multiplier. If the multiplier is changed, the Res BW will be changed to ensure this. When set manually, Res BW Coupling is set to manual.</p> <p>The resolution bandwidth is coupled to the offset width determined by the start frequency and stop frequency.</p> |
| Preset | <p>For modes (except MSR, , LTEAFDD, , LTEATDD and WLAN) without option N9060A-7FP, , the preset value is as follows.</p> <p>SA: 30.0 kHz, , 30.0 kHz, , 30.0 kHz, , 1.00 MHz, 1.00 MHz, , 1.00 MHz</p> <p>WCDMA: 30.00 kHz, , 30.00 kHz, , 30.00 kHz, , 100.00 kHz, , 1.000 MHz, , 1.00 MHz 30.00 kHz, , 1.000 MHz, , 1.000 MHz, , 1.000 MHz, , 1.000 MHz, , 1.00 MHz</p> <p>C2K: 3.00 kHz, , 30.00 kHz, , 30.00 kHz, , 6.2 kHz, , 1.000 MHz, , 1.00 MHz 30.00 kHz, , 30.00 kHz, , 6.2 kHz, , 1.000 MHz, , 1.000 MHz, , 1.00 MHz</p> <p>WIMAX OFDMA: 100 KHz, , 100 KHz 100 KHz, , 100 KHz, , 100 KHz, , 100 KHz, , 100 KHz</p> <p>TD-SCDMA: 30 kHz, , 30 kHz, , 30 kHz, , 50 kHz, , 1 MHz, , 1 MHz 30 kHz, , 30 kHz, , 50 kHz, , 1 MHz, , 1 MHz, , 1 MHz</p> <p>1xEVDO: 30.00 kHz, , 30.00 kHz, , 30.00 kHz, , 6.2 kHz, , 1.000 MHz, , 1.000 MHz 30.00 kHz, , 30.00 kHz, , 30.00 kHz, , 30.00 kHz, , 30.00 kHz</p> <p>DTMB (CTTB), , DVB-T/H, , CMMB, , Digital Cable TV: 3.9 kHz, , 3.9 kHz 30.00 kHz, , 1.000 MHz, , 1.000 MHz, , 1.000 MHz, , 1.000 MHz, , 1.00 MHz</p> <p>ISDB-T: 10.0 kHz, , 10.0 kHz, , 10.0 kHz, , 10.0 kHz, , 10. kHz, , 10.0 kHz 30.00 kHz, , 1.000 MHz, , 1.000 MHz, , 1.000 MHz, , 1.00 MHz</p> <p>LTE, , LTETDD: 51 kHz, , 100 kHz, , 1.0 MHz, , 1.0 MHz, 1.0 MHz, , 1.0 MHz 15.0 kHz, , 510 kHz, 1.0 MHz, 1.0 MHz, 1.0 MHz, 1.0 MHz</p> <p>When option N9060A-7FP is installed in these modes, , the preset value of Offset G ~ L is the same as the Offset F value.</p> <p>-----</p> <p>WLAN: 100 KHz, , 100 KHz</p> <p>MSR: 30kHz, , 30kHz, , 30kHz, , 1.0MHz, 1.0MHz, , 1.0MHz, , 1.0MHz, , 1.0MHz, , 1.0MHz, , 1.0MHz, , 1.0MHz 30kHz, , 30kHz, , 30kHz, , 1.0MHz, 1.0MHz, , 1.0MHz, , 1.0MHz, , 1.0MHz, , 1.0MHz, , 1.0MHz</p> |

| | |
|-------------------------------------|---|
| Example | SEM:OFFS2:LIST:BAND:IMUL 1,1,1,1,1 SEM:OFFS2:LIST:BAND:IMUL? |
| Notes | Comma separated list of values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | This parameter must adhere to the rule (N x Res BW) <= (Stop freq of the offset - Start freq of the offset), where N is the multiplier. If the Res Bw is changed, the multiplier will be changed to ensure this. |
| Preset | For modes (except MSR, , LTEAFDD, , LTEATDD and WLAN) without option N9060A-7FP, , the preset value is as follows. SA: 1, 1, 1, 1, 1, 1 WCDMA: 1, , 1, , 1, , 10, , 1, , 1 1, , 1, , 1, , 1, , 1 C2K: 10, 1, 1, 1, 1, 1 1, 1, 1, 1, 1, 1 WIMAX OFDMA, , 1xEVDO: 1, , 1, , 1, , 1, , 1 1, , 1, , 1, , 1, , 1 TD-SCDMA:1, , 1, , 1, , 20, , 1, , 1 1, , 1, , 20, , 1, , 1, , 1 DTMB (CTTB), , DVB-T/H, , ISDB-T, , CMMB, , Digital Cable TV: 1, , 1, , 1, , 1, , 1 1, , 1, , 1, , 1, , 1 LTE, , LTETDD: 2, , 1, , 1, , 1, , 1, , 1 2, , 2, , 1, , 1, , 1, , 1 When option N9060A-7FP is installed in these modes, , the preset value of Offset G ~ L is the same as the Offset F value. ----- WLAN: 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1 MSR: 1, , 1, , 1, , 1, , 1, , 1, , 1, , 1, , 1, , 1 1, , 1, , 1, , 1, , 1, , 1, , 1, , 1, , 1, , 1 LTEAFDD, , LTEATDD: 2, , 1, , 1, , 1, , 1, , 1, , 1, , 1, , 1, , 1 2, , 2, , 1, , 1, , 1, , 1, , 1, , 1, , 1, , 1 1, , 1, , 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 1000 |
| Backwards Compatibility SCPI | [:SENSe] :SEMAsk:OFFSet [1] 2 :LIST:BWIDth:IMULti |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.10.00, A.11.00, A.14.00 |

Video BW

Changes the analyzer post-detection filter.

Missing values are not permitted; that is, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 12 values.

| | |
|-----------------|---------------------------|
| Key Path | Meas Setup, Offset/Limits |
|-----------------|---------------------------|

| | |
|------------------------------|---|
| Mode | SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe]:SEMask:OFFSet [1] 2[:OUTer]:LIST:BANDwidth:VIDeo <freq>, ... [:SENSe]:SEMask:OFFSet [1] 2[:OUTer]:LIST:BANDwidth:VIDeo? [:SENSe]:SEMask:OFFSet [1] 2[:OUTer]:LIST:BANDwidth:VIDeo:AUTO OFF ON 0 1, ... [:SENSe]:SEMask:OFFSet [1] 2[:OUTer]:LIST:BANDwidth:VIDeo:AUTO? |
| Example | SEM:OFFS2:LIST:BAND:VID 3.00 kHz, , 3.00 kHz, , 3.00 kHz, , 100.0 kHz, 100.0 kHz, , 100.0 kHz SEM:OFFS2:LIST:BAND:VID? SEM:OFFS2:LIST:BAND:VID:AUTO ON, , ON, , ON, , ON, , ON, , ON SEM:OFFS2:LIST:BAND:VID:AUTO? |
| Notes | Comma separated list of values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Preset | ISDB-T: 1.0kHz, , 1.0kHz, , 1.0kHz, , 1.0kHz, , 1.0kHz, , 1.0kHz Other than ISDB-T: Automatically Calculated Modes (except MSR, , LTEAFDD, , LTEATDD, , WLAN, , ISDB-T) without option N9060A-7FP: ON, , ON, , ON, , ON, , ON ON, , ON, , ON, , ON, , ON Modes (except MSR, , LTEAFDD, , LTEATDD, , WLAN, , ISDB-T) with option N9060A-7FP:ON, , ON, , ON ON, , ON ----- MSR, , LTEAFDD, , LTEATDD: ON, , ON ON, , ON WLAN: ON, , ON ON, , ON ISDB-T: OFF, , OFF, , OFF, , OFF, , OFF OFF, , OFF, , OFF, , OFF, , OFF, , OFF |
| State Saved | Saved in instrument state. |
| Min | 1 Hz |
| Max | 50 MHz |
| Backwards Compatibility SCPI | [:SENSe]:SEMask:OFFSet [1] 2:LIST:BWIDth:VIDeo |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.10.00, A.11.00, A.14.00 |

VBW/RBW

Selects the ratio between the video and resolution bandwidths.

Missing values are not permitted; that is, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 12 values.

| | |
|-----------------------|--|
| Key Path | Meas Setup, Offset/Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <pre>[:SENSe]:SEMAsk:OFFSet[1] 2[:OUTer]:LIST:BANDwidth:VIDeo:RATio <real>, ... [:SENSe]:SEMAsk:OFFSet[1] 2[:OUTer]:LIST:BANDwidth:VIDeo:RATio? [:SENSe]:SEMAsk:OFFSet[1] 2[:OUTer]:LIST:BANDwidth:VIDeo:RATio:AUTO OFF ON 0 1, ... [:SENSe]:SEMAsk:OFFSet[1] 2[:OUTer]:LIST:BANDwidth:VIDeo:RATio:AUTO?</pre> |
| Example | <pre>SEM:OFFS2:LIST:BAND:VID:RAT 0.1,,0.1,,0.1,,0.1,,0.1,,0.1 SEM:OFFS2:LIST:BAND:VID:RAT? SEM:OFFS2:LIST:BAND:VID:RAT:AUTO ON,,ON,,ON,,ON,,ON,,ON SEM:OFFS2:LIST:BAND:VID:RAT:AUTO?</pre> |
| Notes | <p>Comma separated list of values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode.</p> |
| Preset | <p>For modes (except MSR, , LTEAFDD, , LTEATDD and WLAN) without option N9060A-7FP, , the preset value is as follows.</p> <pre>SA, , WCDMA, , C2K, , LTE, , LTETDD: 0.01, , 0.01, , 0.01, , 0.01, , 0.01, , 0.01 0.01, , 0.01, , 0.01, , 0.01, , 0.01, , 0.01 WIMAX OFDMA: 0.3, , 0.3, , 0.3, , 0.3, , 0.3 TD-SCDMA: 10, , 10, , 10, , 10, , 1, , 1 10, , 10, , 10, , 1, , 1, , 1 1xEVDO: 10, , 10, , 10, , 10, , 10, , 10 10, , 10, , 10, , 10, , 10 DTMB (CTTB), , DVB-T/H, , CMMB, , Digital Cable TV: 10, , 10, , 10, , 10, , 10, , 10 10, , 10, , 10, , 10, , 10, , 10 ISDB-T: 0.1, , 0.1, , 0.1, , 0.1, , 0.1, , 0.1 10, , 10, , 10, , 10, , 10 When option N9060A-7FP is installed in these modes, , the preset value of Offset G ~ L is the same as the Offset F value. ----- WLAN: 0.3, , 0.3, , 0.3, , 0.3, , 0.3, , 0.3, , 0.3, , 0.3, , 0.3, , 0.3 MSR, , LTEAFDD, , LTEATDD: 0.01, , 0.01, , 0.01, , 0.01, , 0.01, , 0.01, , 0.01, , 0.01, , 0.01, , 0.01, 0.01, , 0.01 0.01, , 0.01, , 0.01, , 0.01, , 0.01, , 0.01, , 0.01, , 0.01, , 0.01, , 0.01, , 0.01, , 0.01 Modes (except MSR, , LTEAFDD, , LTEATDD and WLAN) without option N9060A-7FP: OFF, , OFF, , OFF, , OFF, , OFF, , OFF OFF, , OFF, , OFF, , OFF, , OFF, , OFF Modes (except MSR, , LTEAFDD, , LTEATDD and WLAN) with option N9060A-7FP: OFF, , OFF OFF, , OFF MSR, , LTEAFDD, , LTEATDD: OFF, , OFF, OFF OFF, , OFF WLAN: OFF, , OFF</pre> |

| | |
|--------------------------|---|
| State Saved | Saved in instrument state. |
| Min | 0.00001 |
| Max | 3000000 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.10.00, A.11.00, A.14.00 |

Limits

Accesses a menu that enables you to set the power limits for start and stop frequencies of the selected offsets.

| | |
|----------------------|------------------|
| Key Path | Meas Setup |
| Initial S/W Revision | Prior to A.02.00 |

Select Offset

Selects the offset (upper and lower) and displays the memory selection menu that enables you to store a set of parameter values for the offset, such as Start Freq, Stop Freq, Sweep Time, Res BW, Meas BW, Abs Start, and Abs Stop. Only one selection at a time is shown on this menu key label.

| | |
|--------------------------|---|
| Key Path | Meas Setup, Offset/Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Preset | A |
| Range | MSR, LTEATDD, LTEAFDD, WLAN: A B C D E F G H J K L Other modes without option N9060A-7FP: A B C D E F Other modes with option N9060A-7FP: A B C D E F G H J K L |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.10.00, A.11.00, A.14.00 |

Abs Start

Sets the absolute power level limit at the start frequency for the selected offset. The absolute power level limit ranges from -200 to +50 dBm.

The fail condition for each offset channel is set remotely by [:SENSe]:SEMAsk:OFFSet[n]
[:OUTer]:LIST:TEST.

You can turn off (not use) specific offset channels remotely with [:SENSe]:SEMAsk:OFFSet[n]
[:OUTer]:LIST:STATe.

The SCPI query returns values currently set to the absolute power test limits.

Missing values are not permitted; that is, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 12 values.

| | |
|-----------------------|--|
| Key Path | Meas Setup, Offset/Limit, Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :SEMAsk:OFFSet [1] 2 [:OUTer] :LIST:STARt:ABSolute <real>, ... [:SENSe] :SEMAsk:OFFSet [1] 2 [:OUTer] :LIST:STARt:ABSolute? |
| Example | SEM:OFFS2:LIST:STAR:ABS -12.50 dBm, , -12.50 dBm, , -24.50 dBm, , -11.50 dBm, , -11.50 dBm, , -11.50 dBm SEM:OFFS2:LIST:STAR:ABS? |
| Notes | Comma separated list of values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | If the current mode is DVB-T/H, this value will be modified automatically according to the limit type and the output power of the transmitter which is less or more than 25W. If the current mode is ISDB-T, this value will be modified automatically according to the limit type. |
| Preset | For modes (except MSR, , LTEAFDD, , LTEATDD and WLAN) without option N9060A-7FP, , the preset value is as follows. SA, , WIMAX OFDMA: -14.00 dBm, , -14.00 dBm, , -26.00 dBm, , -13.00 dBm, , -13.00 dBm, , -13.00 dBm WCDMA: -12.50 dBm, , -12.50 dBm, , -24.50 dBm, , -11.50 dBm, , -11.50 dBm, , -11.50 dBm -69.6 dBm, , -54.3 dBm, , -54.3 dBm, , -54.3 dBm, , -54.3 dBm C2K: -27.00 dBm, , -27.00 dBm, , -27.00 dBm, , -46.00 dBm, , -13.00 dBm, , -13.00 dBm -70.13 dBm, , -70.13 dBm, , -35.00 dBm, , -13.00 dBm, , -13.00 dBm, , -13.00 dBm TD-SCDMA: -28 dBm, , -28 dBm, , -36 dBm, , -21 dBm, , -21 dBm, , -21 dBm -71.3 dBm, , -71.3 dBm, , -56.07 dBm, , -56.07 dBm, , -56.07 dBm, , -56.07 dBm 1xEVDO: -27.0dBm, , -27.00 dBm, , -27.00 dBm, , -46.00 dBm, , -13.00 dBm, , -13.00 dBm -70.13 dBm, , -70.13 dBm DTMB (CTTB): -14.0 dBm, , -14.0 dBm, , -26.0 dBm, , -13.0 dBm, , -13.0 dBm, , -13.0 dBm -13.0 dBm, , -13.0 dBm DVB-T/H: 11.2 dBm, , -29 dBm, , -41 dBm, , -66 dBm, , -82 dBm, , -82 dBm -82 dBm, , -82 dBm, , -82 dBm, , -82 dBm, , -82 dBm ISDB-T, , CMMB, , Digital Cable TV: 50.0 dBm, , 50.0 dBm 50.0 dBm, , 50.0 dBm LTE, , LTETDD: -5.5 dBm, , -12.5 dBm, , -15.0 dBm, , -15.0 dBm, , -15.0 dBm, , -15.0 dBm -13.5 dBm, , -8.5 dBm, , -11.5 dBm, , -23.5 dBm, , -23.5 dBm, , -23.5 dBm When option N9060A-7FP is installed in these modes, , the preset value of Offset G ~ L is the same as the Offset F value. ----- WLAN: if Radio Std is 802.11a/g(OFDM/DSSS-OFDM): 16.00 dBm, , -4.00 dBm, , -12.00 dBm, , - |

| | |
|-----------------------|---|
| Remote Command | <pre>[:SENSe]:SEMAsk:OFFSet[1] 2[:OUTer]:LIST:STOP:ABSolute <real>, ... [:SENSe]:SEMAsk:OFFSet[1] 2[:OUTer]:LIST:STOP:ABSolute? [:SENSe]:SEMAsk:OFFSet[1] 2[:OUTer]:LIST:STOP:ABSolute:COUPle ON OFF 1 0, ... [:SENSe]:SEMAsk:OFFSet[1] 2[:OUTer]:LIST:STOP:ABSolute:COUPle?</pre> |
| Example | <pre>SEM:OFFS:LIST:STOP:ABS -12.50 dBm, , -24.50 dBm, , -24.50 dBm, , -11.50 dBm, , -11.50 dBm, , -11.50 dBm SEM:OFFS1:LIST:STOP:ABS? SEM:OFFS:LIST:STOP:ABS:COUP ON, , OFF, , ON, , ON, , ON, , ON SEM:OFFS:LIST:STOP:ABS:COUP?</pre> |
| Notes | <p>Comma separated list of values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode.</p> |
| Couplings | <p>Coupled to Abs Start if "Auto" is selected, that is, the Stop value is equal to the Start value. If the current mode is DVB-T/H, this value will be modified automatically according to the limit type and the output power of the transmitter which is less or more than 25W. If the current mode is ISDB-T, this value will be modified automatically according to the limit type.</p> |
| Preset | <p>For modes (except MSR, , LTEAFDD, , LTEATDD and WLAN) without option N9060A-7FP, , the preset value is as follows.</p> <pre>SA, , WIMAX OFDMA: -14.00 dBm, , -26.00 dBm, , -26.00 dBm, , -13.00 dBm, , -13.00 dBm, , - 13.00 dBm WCDMA: -12.50 dBm, , -24.50 dBm, , -24.50 dBm, , -11.50 dBm, , -11.50 dBm, , -11.50 dBm - 69.6 dBm, , -54.3 dBm C2K: -27.00 dBm, , -27.00 dBm, , -27.00 dBm, , -46.00 dBm, , -13.00 dBm, , -13.00 dBm - 70.13 dBm, , -70.13 dBm, , -35.00 dBm, , -13.00 dBm, , -13.00 dBm, , -13.00 dBm TD-SCDMA: -28 dBm, , -36 dBm, , -36 dBm, , -21 dBm, , -21 dBm, , -21 dBm -71.3 dBm, , -71.3 dBm, , -56.07 dBm, , -56.07 dBm, , -56.07 dBm, , -56.07 dBm 1xEVDO: -27dBm, , -27.00 dBm, , -27.00 dBm, , -46.00 dBm, , -13.00 dBm, , -13.00 dBm - 70.13 dBm, , -70.13 dBm DTMB (CTTB): -14.0 dBm, , -26.0 dBm, , -26.0 dBm, , -13.0 dBm, , -13.0 dBm, , -13.0 dBm - 13.0 dBm, , -13.0 dBm DVB-T/H: -29 dBm, , -41 dBm, , -66 dBm, , -82 dBm, , -82 dBm, , -82 dBm -82 dBm, , -82 dBm ISDB-TCMMB, , Digital Cable TV: 50.0 dBm, , 50.0 dBm, , 50.0 dBm, , 50.0 dBm, , 50.0 dBm 50.0 dBm, , 50.0 dBm LTE, , LTETDD:-12.5 dBm, , -12.5 dBm, , -15.0 dBm, , -15.0 dBm, , -15.0 dBm, , -15.0 dBm - 13.5 dBm, , -8.5 dBm, , -11.5 dBm, , -23.5 dBm, , -23.5 dBm, , -23.5 dBm When option N9060A-7FP is installed in these modes, , the preset value of Offset G ~ L is the same as the Offset F value. ----- WLAN:</pre> |

when frequency changed to above 5GHz:

0 dB, -20.00 dB, -28.00 dB, -40.00 dB

Preset

For modes (except MSR, LTEAFDD, LTEATDD and WLAN) without option N9060A-7FP, the preset value is as follows.

SA: -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB, -30.00 dB

WCDMA: -30.00 dB, -33.73 dB, -34.00 dB, -37.50 dB, -47.50 dB, -47.50 dB, -47.50 dB

C2K: -45.00 dB, -45.00 dB, -55.00 dB, -55.00 dB, -55.00 dB, -55.00 dB, -55.00 dB, -55.00 dB, -42.00 dB, -54.00 dB, -54.00 dB, -54.00 dB, -54.00 dB, -54.00 dB

WIMAX OFDMA: 0 dB, -25 dB, -32 dB, -50 dB, -50 dB, -50 dB

TD-SCDMA: -54.00 dB, -54.00 dB, -62.00 dB, -47.00 dB, -47.00 dB, -47.00 dB, -47.00 dB, -47.00 dB, -49.00 dB, -44.00 dB, -44.00 dB, -44.00 dB, -44.00 dB, -44.00 dB

1xEVDO: -45dBc, -45.00 dB, -55.00 dB, -55.00 dB, -55.00 dB, -55.00 dB, -55.00 dB, -55.00 dB, -42dBc, -54.00 dB, -54.00 dB, -54.00 dB, -54.00 dB, -54.00 dB

DTMB (CTTB): -32.8 dB, -83 dB, -95 dB, -120 dB

DVB-T/H: -30 dB, -30 dB

ISDB-T: -27.4 dB, -47.4 dB, -54.4 dB, XXX, 50 dB, 50 dB; XXX is coupled with the total power reference, it is -57.4 dB when $P \leq 0.025 W$, -67.4 dB when $P = 0.25 W$, $-(73.4 + 10 \log P)$ dB when $0.25 W < P < 2.5 W$ or $0.025 W < P < 0.25 W$, -77.4 dB when $P > 2.5 W$.

CMMB: -37 dB, -72 dB, -84 dB, -90 dB

LTE, LTEATDD: 0 dB, 0 dB

Digital Cable TV: 0 dB, 0 dB

When option N9060A-7FP is installed in these modes, the preset value of Offset G ~ L is the same as the Offset F value.

WLAN:

if Radio Std is 802.11a/g(OFDM/DSSS-OFDM): 0 dB, -20.00 dB, -28.00 dB, -40.00 dB, -40.00 dB, -47.00 dB

if Radio Std is 802.11b/g(DSSS/CCK/PBCC): -30 dB, -50 dB

if Radio Std is 802.11n(20MHz/40MHz): 0 dB, -20.00 dB, -28.00 dB, -45.00 dB

if Radio Std is 802.11ac (20 MHz/ 40 MHz/ 80 MHz/ 160 MHz): 0 dB, -20.00 dB, -28.00 dB, -40.00 dB

if Radio Std is 802.11ac(80 MHz + 80MHz): -40.00 dB, -28.00 dB, -20 dB, 0 dB, -20 dB, -28 dB, -40 dB, -40 dB, -40.00 dB

MSR, LTEAFDD, LTEATDD: 0 dB, 0 dB

| | |
|--------------------------|---|
| | 0 dB, , 0 dB 0 dB, , 0 dB |
| State Saved | Saved in instrument state. |
| Min | -200 dB |
| Max | 50 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.10.00, A.11.00, A.14.00 |

Rel Stop

Sets a relative power level limit at the stop frequency for the selected offset. The relative power level limit ranges from -200 to +50 dBc.

The fail condition is set remotely by [:SENSe]:SEMask:OFFSet[n][:OUTer]:LIST:TEST for each offset channel.

You can turn off (not use) specific offset channels remotely with [:SENSe]:SEMask:OFFSet[n][:OUTer]:LIST:STATe.

The SCPI query returns values currently set to the offset stop relative power limits.

Missing values are not permitted; that is, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 12 values.

| | |
|----------------|--|
| Key Path | Meas Setup, Offset/Limits, Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTE-TDD |
| Remote Command | [:SENSe]:SEMask:OFFSet[1] 2[:OUTer]:LIST:STOP:RCARrier <rel_ampl>, ... [:SENSe]:SEMask:OFFSet[1] 2[:OUTer]:LIST:STOP:RCARrier? [:SENSe]:SEMask:OFFSet[1] 2[:OUTer]:LIST:STOP:RCARrier:COUPle ON OFF 1 0, ... [:SENSe]:SEMask:OFFSet[1] 2[:OUTer]:LIST:STOP:RCARrier:COUPle? |
| Example | SEM:OFFS:LIST:STOP:RCAR -30, , -30, , -30, , -30, , -30, , -30 SEM:OFFS:LIST:STOP:RCAR? SEM:OFFS:LIST:STOP:RCAR:COUP ON, , ON, , ON, , ON, , ON SEM:OFFS:LIST:STOP:RCAR:COUP? |
| Notes | Comma separated list of values. OFFSet1 is for BTS, 2 for MS. Default is BTS. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | Coupled to Rel Start if "Auto" is selected, that is, Start is made the same as Stop. If the current mode is DVB-T/H, this value will be modified automatically according to the limit type and the output power of the transmitter which is less or more than 25W. If the current mode is ISDB-T, this value will be modified automatically according to the limit type. |

If the current mode is WLAN and radio std is 802.11n, Rel Stop limits will be set to following values when frequency changed to above 5GHz:
-20.00 dB, -28.00 dB, -40.00 dB

Preset

For modes (except MSR, , LTEAFDD, , LTEATDD and WLAN) without option N9060A-7FP, , the preset value is as follows.
SA: -30.00 dB, , -30.00 dB
WCDMA: -30.00 dB, , -30.00 dB|-48.28 dB, , -37.50 dB, , -47.50 dB, , -47.50 dB, , -47.50 dB, , -47.50 dB
C2K: -45.00 dB, , -45.00 dB, , -55.00 dB, , -55.00 dB, , -55.00 dB, , -55.00 dB|-42.00 dB, , -54.00 dB
WIMAX OFDMA: -25 dB, , -32 dB, , -50 dB, , -50 dB, , -50 dB, , -50 dB
TD-SCDMA: -54.00 dB, , -62.00 dB, , -62.00 dB, , -47.00 dB, , -47.00 dB, , -47.00 dB|-49.00 dB, , -58.945 dB, , -44.00 dB, , -44.00 dB, , -44.00 dB, , -44.00 dB
1xEVDO: -45dB, , -45.00 dB, , -55.00 dB, , -55.00 dB, , -55.00 dB, , -55.00 dB|-42dB, , -54.00 dB, , -54.00 dB, , -54.00 dB, , -54.00 dB, , -54.00 dB
DTMB (CTTB): -83 dB, , -95 dB, , -120 dB, , -120 dB, , -120 dB, , -120 dB|-120 dB, , -120 dB
DVB-T/H: -73 dB, , -85 dB, , -110 dB, , -126 dB, , -126 dB, , -126 dB|-126 dB, , -126 dB
ISDB-T: -47.4 dB, , -54.4 dB, , XXX, , 50 dB, , 50 dB, , 50 dB |50 dB, , 50 dB; XXX is coupled with the total power reference P, it is -57.4 dB when $P \leq 0.025$ W, , -67.4 dB when $P = 0.25$ W, , $-(73.4 + 10 \log P)$ dB when 0.25 W < $P \leq 2.5$ W or 0.025 W < $P < 0.25$ W, , -77.4 dB when $P > 2.5$ W.
CMMB: -72 dB, , -84 dB, , -90 dB, , -90 dB, , -90 dB, , -90 dB|-90 dB, , -90 dB
LTE, , LTETDD: 0 dB, , 0 dB
Digital Cable TV: 0 dB, , 0 dB |0 dB, , 0 dB
When option N9060A-7FP is installed in these modes, , the preset value of Offset G ~ L is the same as the Offset F value.

WLAN:
if Radio Std is 802.11a/g(OFDM/DSSS-OFDM): -20.00 dB, , -28.00 dB, , -40.00 dB, , -40.00 dB, , -47.00 dB
if Radio Std is 802.11b/g(DSSS/CCK/PBCC): -30 dB, , -50 dB
if Radio Std is 802.11n(20MHz/40MHz): -20.00 dB, , -28.00 dB, , -45.00 dB
if Radio Std is 802.11ac (20 MHz/ 40 MHz/ 80 MHz/ 160 MHz): -20.00 dB, , -28.00 dB, , -40.00 dB
if Radio Std is 802.11ac(80 MHz + 80MHz): -28.00 dB, , -20.00 dB, , 0 dB, , -20.00 dB, , -28.00

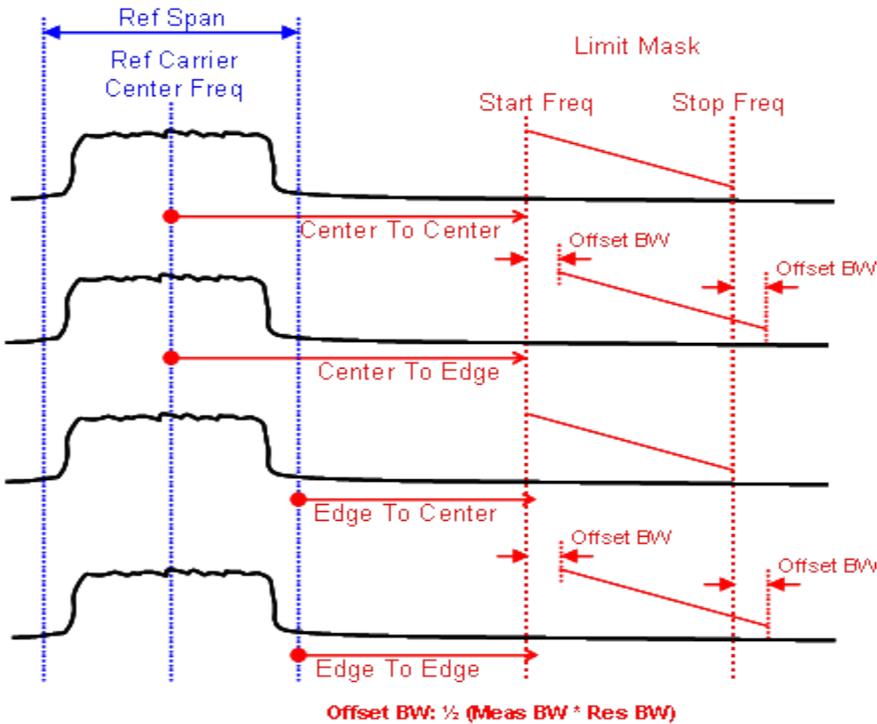
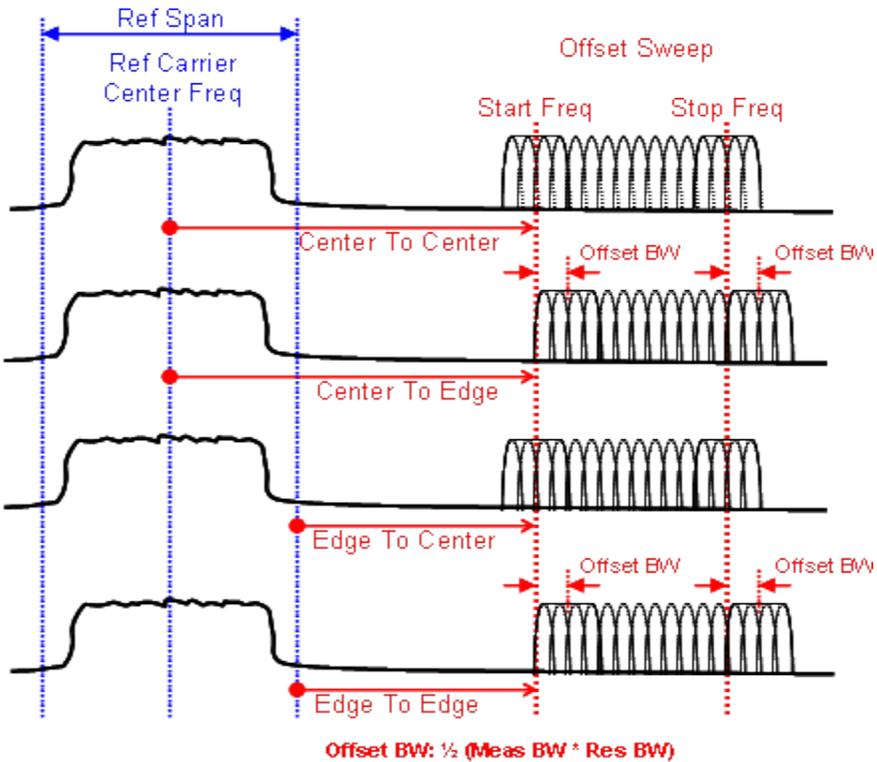
- OR checks against both limits, failing if either of the limits is broken.
- AND will only display a fail if both of the limits are broken.

The absolute or relative power limit value for each offset channel can be set remotely with [:SENSe]:SEMask:OFFSet[n][:OUTer]:LIST:ABSolute or [:SENSe]:SEMask:OFFSet[n][:OUTer]:LIST:RCARrier.

You can turn off (not use) specific offset channels remotely with [:SENSe]:SEMask:OFFSet[n][:OUTer]:LIST:STATe.

Missing values are not permitted; that is, if you want to change values 2 and 6, you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 12 values.

| Key Path | Meas Setup, Offset/Limits, Limits |
|----------------|--|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe]:SEMask:OFFSet[1] 2[:OUTer]:LIST:TEST ABSolute AND OR RELative, ... [:SENSe]:SEMask:OFFSet[1] 2[:OUTer]:LIST:TEST? |
| Example | SEM:OFFS:LIST:TEST ABS, , ABS, , ABS, , ABS, , ABS SEM:OFFS:LIST:TEST? |
| Notes | Comma separated list of values. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | None If the current mode is DVB-T/H, this value will be modified automatically according to the limit type and the output power of the transmitter which is less or more than 25W. |
| Preset | For modes (except MSR, LTEAFDD, , LTEATDD and WLAN) without option N9060A-7FP, , the preset value is as follows. SA: ABS, ABS, ABS, ABS, ABS, ABS WCDMA: ABS, , ABS, , ABS, , ABS, , ABS AND, , AND, , AND, , AND, , AND C2K: REL, , REL, , REL, , ABS, , REL, , REL AND, , AND, , ABS, , REL, , REL, , REL WIMAX OFDMA: REL, , REL, , REL, , REL, , REL REL, , REL, , REL, , REL, , REL TD-SCDMA: ABS, , ABS, , ABS, , ABS, , ABS AND, , AND, , AND, , AND, , AND 1xEVDO: REL, , REL, , REL, , ABS, , REL, , REL AND, , AND, , AND, , OR, , AND, , AND DTMB (CTTB), ISDB-T, CMMB: REL, , REL, , REL, , REL, , REL REL, , REL, , REL, , REL, , REL REL DVB-T/H: ABS, , ABS, , ABS, , ABS, , ABS ABS, , ABS, , ABS, , ABS, , ABS LTE, , LTDTDD: ABS, , ABS, , ABS, , ABS, , ABS Digital Cable TV: REL, , REL, , REL, , REL, , REL REL, , REL, , REL, , REL, , REL When option N9060A-7FP is installed in these modes, , the preset value of Offset G ~ L is the same as the Offset F value. ----- WLAN: |



| | |
|----------------------|--|
| Key Path | Meas Setup, Offset/Limits |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN |
| Remote Command | [:SENSe] :SEMAsk:OFFSet [1] 2 :TYPE CTOCenter CTOEdge ETOCenter ETOEdge [:SENSe] :SEMAsk:OFFSet [1] 2 :TYPE? |
| Example | SEM:OFFS:TYPE ETOC SEM:OFFS:TYPE? |
| Notes | You must be in the mode that includes SEM measurements to use this command. Use :INSTrument:SElect to set the mode. For the MSR and LTE-Advanced FDD/TDD mode, see Offset Freq Define (Only for MSR and LTE-Advanced FDD/TDD) . |
| Preset | SA, , WCDMA, , WIMAX OFDMA, , TD-SCDMA, , DVB-T/H, , DTMB (CTTB), , ISDB-T, , CMMB, , Digital Cable TV: CTOC C2K: CTOE 1xEVDO: CTOE LTE: ETOC LTETDD: ETOC |
| State Saved | Saved in instrument state. |
| Range | Carrier Center To Meas BW Center Carrier Center To Meas BW Edge Carrier Edge To Meas BW Center Carrier Edge To Meas BW Edge |
| Initial S/W Revision | A.03.00 |

Limit State(Only for TD-SCDMA)

The key “Limits State” is only displayed in the TD-SCDMA mode. The mask lines could be drawn in two different ways, according to the 3GPP standard for the base station when the key’s value is “Std”; or by the user-defined specifications listed in the Offset/Limits menu.

| | |
|----------------|--|
| Key Path | Meas Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :SEMAsk:LIMits STD MAN [:SENSe] :SEMAsk:LIMits? |
| Example | SEM:LIM STD SEM:LIM? |
| Notes | You must be in the TD-SCDMA mode to use this command. Use :INSTrument:SElect to set the mode. |
| Dependencies | See Couplings |
| Couplings | When the value of the “Limits” key is Std, the parameters displayed on the Offset/Limits panel will be modified depending on the carrier power, which corresponds to the measurement standard of the base station. All the keys except “Offset”, “Relative Atten”, “Offset Side” and “Limits” displayed on the |

| | |
|----------------------|---|
| | <p>“Offset/Limits” panel will be grayed out. All the keys displayed on the “Limits” panel will be grayed out as well.</p> <p>When the value of the “Limits” key is Man, all of the previous manual specifications will be restored, and the keys that were previously grayed out will be enabled again.</p> |
| Preset | MAN |
| State Saved | Saved in instrument state. |
| Range | STD MAN |
| Initial S/W Revision | Prior to A.02.00 |

Method

Sets the measurement method:

- **Integ BW**—enables you to set the channel integration bandwidth.
- **RRC Weight**—selects Root Raised Cosine (RRC) filtering of the carriers. The α value (rolloff) for the filter is set to the value of the Filter Alpha parameter.

| | |
|--------------------------|---|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, WIMAX OFDMA, TD-SCDMA, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe]:SEMask:FILTer[:RRC][:STATe] OFF ON 0 1 [:SENSe]:SEMask:FILTer[:RRC][:STATe]? |
| Example | SEM:FILT ON SEM:FILT? |
| Notes | For the C2K and 1xEVDO mode, this key is not available. 1 ON = RRC Weight, 0 OFF = IntegBW You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Dependencies | WLAN: RRC Weight is not supported when the radio standard is WLAN 802.11ac (80+80MHz). |
| Preset | SA, , WIMAX OFDMA, , DVB-T/H, , ISDB-T, , CMMB, , LTE, , LTETDD, , WLAN, , MSR, , LTEAFDD, , LTEATDD: OFF WCDMA, , TD-SCDMA, , DTMB (CTTB), , Digital Cable TV: ON |
| State Saved | Saved in instrument state. |
| Range | RRCWeight IntegBW |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Filter Alpha

Sets the alpha value for the RRC Filter.

| | |
|--------------------------|---|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, WIMAX OFDMA, TD-SCDMA, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe] :SEMAsk:FILTer [:RRC] :ALPHa <real></code> <code>[:SENSe] :SEMAsk:FILTer [:RRC] :ALPHa?</code> |
| Example | SEM:FILT:ALPH 0.3 SEM:FILT:ALPH? |
| Notes | For the C2K and 1xEVDO mode, this key is not available. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Preset | 0.22 DTMB (CTTB): 0.05 Digital Cable TV: 0.15 |
| State Saved | Saved in instrument state. |
| Min | 0.01 |
| Max | 1.0 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Meas Preset

Restores all the measurement parameters to their default values.

| | |
|--------------------------|---|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>:CONFIgure:SEMAsk</code> |
| Example | CONF:SEM |
| Notes | You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | Selecting Meas Preset will restore all measurement parameters to their default values. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Mode

See "Mode" on page 288

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings
- See "[How-To Preset](#)" on page 1083 for more information.

| | |
|--------------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :SYSTem:PRESet |
| Example | :SYST:PRES |
| Notes | *RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0. |
| Couplings | A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set. |
| Backwards Compatibility Notes | In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using |

| | |
|----------------------|------------------|
| | User Preset. |
| Initial S/W Revision | Prior to A.02.00 |

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

| Type Of Preset | SCPI Command | Front Panel Access |
|--------------------------------|--|--|
| Auto Couple | :COUPlE ALL | Auto Couple front-panel key |
| Meas Preset | :CONFIgure:<Measurement> | Meas Setup Menu |
| Mode Preset | :SYSTem:PRESet | Mode Preset (green key) |
| Restore Mode Defaults | :INSTrument:DEFault | Mode Setup Menu |
| Restore All Mode Defaults | :SYSTem:DEFault MODEs | System Menu; Restore System Default Menu |
| *RST | *RST | not possible (Mode Preset with Single) |
| Restore Input/Output Defaults | :SYSTem:DEFault INPut | System Menu; Restore System Default Menu |
| Restore Power On Defaults | :SYSTem:DEFault PON | System Menu; Restore System Default Menu |
| Restore Alignment Defaults | :SYSTem:DEFault ALIGn | System Menu; Restore System Default Menu |
| Restore Miscellaneous Defaults | :SYSTem:DEFault MISC | System Menu; Restore System Default Menu |
| Restore All System Defaults | :SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent | System Menu; Restore System Default Menu |
| User Preset | :SYSTem:PRESet:USER | User Preset Menu |
| User Preset All Modes | :SYSTem:PRESet:USER:ALL | User Preset Menu |

| | | |
|----------------------|-----------------------|-------------|
| Power On Mode Preset | :SYSTem:PON:TYPE MODE | System Menu |
| Power On User Preset | :SYSTem:PON:TYPE USER | System Menu |
| Power On Last State | :SYSTem:PON:TYPE LAST | System Menu |

Preset Type (Remote Command Only)

As stated in the Backward Compatibility section, to be compatible with ESA/PSA the PRESet:TYPE command will be implemented as a no-op.

| | |
|-----------------------------|--|
| Mode | All |
| Remote Command | :SYSTem:PRESet:TYPE FACTory MODE USER :SYSTem:PRESet:TYPE? |
| Example | :SYST:PRESet:TYPE FACT |
| Notes | This command is supported for backward compatibility only. It is a no-op which does not change the behavior of any preset operation. |
| Preset | This is unaffected by Preset but is set to Mode on a "Restore System Defaults->All" |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Mode Setup

See ["Mode Setup" on page 320](#)

Peak Search

There is no 'Peak Search' supported in Spectrum Emission Mask so this front-panel key displays a blank menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Print

See "Print" on page 348

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

| Type | Default Prefix | Menu |
|-----------------------|----------------|-----------------|
| State | State_ | (Save/Recall) |
| Trace + State | State_ | (Save/Recall) |
| Screen | Screen_ | (Save/Recall) |
| Amplitude Corrections | Ampcor_ | (Import/Export) |
| Traces | Trace_ | (Import/Export) |
| Limit Lines | LLine_ | (Import/Export) |
| Measurement Result | MeasR_ | (Import/Export) |
| Capture Buffer | CapBuf_ | (Import/Export) |

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

| | |
|----------------------|--|
| Key Path | Front-panel key |
| Notes | No remote command for this key specifically. |
| Initial S/W Revision | Prior to A.02.00 |

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

| Key Path | Front-panel key |
|-------------------------------|--|
| Notes | <p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATe <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p> |
| Backwards Compatibility Notes | <p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> |
| Backwards Compatibility Notes | <p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p> |
| Initial S/W Revision | Prior to A.02.00 |

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See "[More Information](#)" on page 1092.

| | |
|-----------------------|--|
| Key Path | Recall |
| Mode | All |
| Remote Command | :MMEMory:LOAD:STATe <filename> |
| Example | :MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path |
| Example | MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state. |
| Notes | <p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <ul style="list-style-type: none"> • If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number. <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p> |

| | |
|-------------------------------------|---|
| | there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu. |
| Backwards Compatibility SCPI | :MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

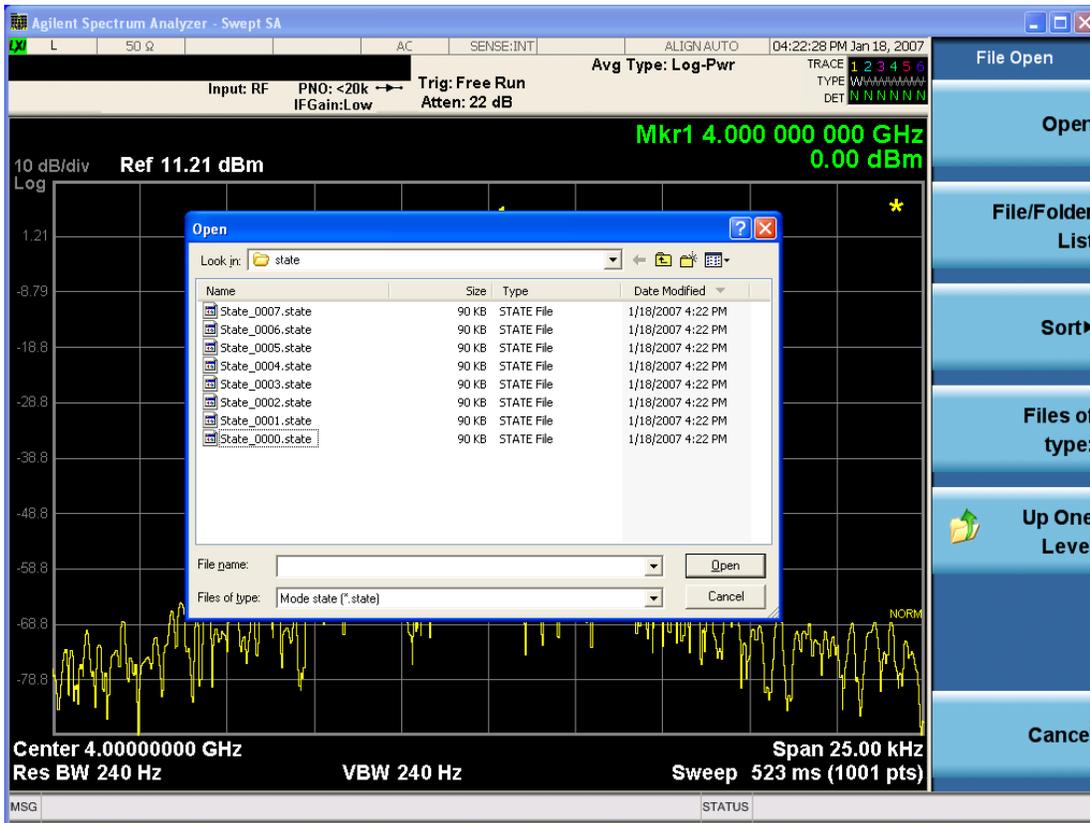
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

| | | |
|---|--|--|
| You want to recall state and one trace's data, leaving other traces unaffected. | Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed. | On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed. |
| You want to recall all traces | Save Trace+State from ALL traces. | On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved) |
| You want all traces to load exactly as they were when saved. | Save State | On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten. |

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Notes | Brings up the Open dialog for recalling a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Mode | All |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available" |
| Initial S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|--|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|---|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1-16 from front panel, 1-128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Data (Import)

Importing a data file loads data that was previously saved from the current measurement or from other measurements and/or modes that produce compatible data files. The Import Menu only contains Data Types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by the user prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Importing Data loads measurement data from the specified file into the specified or default destination, depending on the data type selected. Selecting an Import Data menu key will not actually cause the importing to occur, since the analyzer still needs to know from where to get the data. Pressing the Open key in this menu brings up the Open dialog and Open menu that provides you with the options from where to recall the data. Once a filename has been selected or entered in the Open menu, the recall occurs as soon as the Open button is pressed.

| | |
|----------------------|--|
| Key Path | Recall |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. Some keys will be missing completely, so the key locations in the sub-menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:LOAD commands. |
| Dependencies | If a file type is not used by a certain measurement, it is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Capture Buffer

The captured data is raw data which is not processed.

| | |
|----------------------|---|
| Key Path | Recall, Data |
| Mode | TD-SCDMA |
| Example | MMEM:LOAD:CAPT "MyCaptureData.bin" This loads the file of capture data (on the default file directory path) into the instrument. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Open...

When you press "Open", the analyzer brings up a Windows dialog and a menu entitled "**File Open.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[From File...](#)" on page 2309 in Recall, State, for a full description of this dialog and menu.

| | |
|----------------------|--|
| Key Path | Recall, Data |
| Notes | The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 1098

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate[:IMMEDIATE] :INITiate:RESTART |
| Example | :INIT:IMM :INIT:REST |
| Notes | :INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function. |
| Couplings | Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement. |
| Status Bits/OPC dependencies | This is an Overlapped command. The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUESTionable register bit 9 (INTegrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set. |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command `CALC:AVER:TCON UP`.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Mode | All |
| Notes | No remote command for this key specifically, but the :MMEM:STOR:STATe <filename> command is available for specific file types. An example is :MMEM:STOR:STATe <filename>. |
| Initial S/W Revision | Prior to A.02.00 |

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

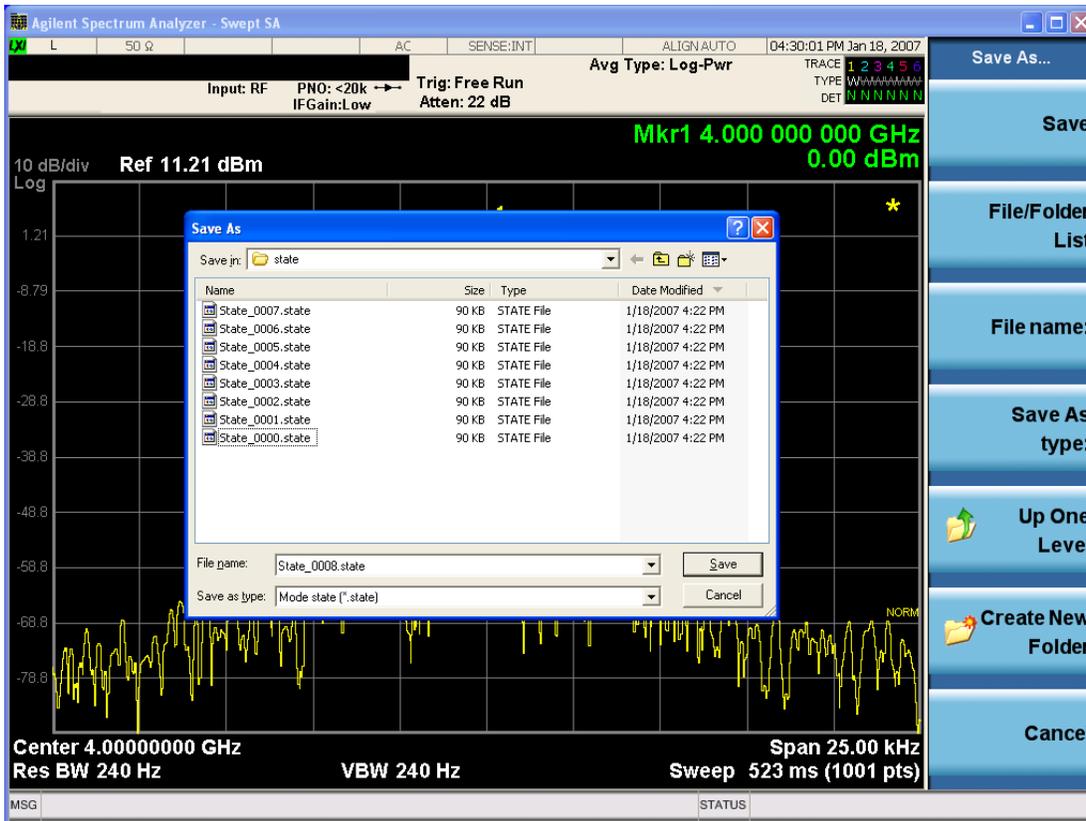
| | |
|----------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:STATe <filename> |
| Example | MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory. |
| Notes | Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key |

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

| | |
|-------------------------------------|-----------------------------------|
| Backwards Compatibility SCPI | :MMEMoRY:STORe:STATe 1,<filename> |
| Initial S/W Revision | Prior to A.02.00 |

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2305](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Save, State |
| Mode | All |
| Notes | Brings up Save As dialog for saving a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 1103](#)

| | |
|-----------------------|--|
| Key Path | Save, State |
| Mode | All |
| Remote Command | :MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number> |
| Example | :MMEM:REG:STAT:LAB 1,"my label" |
| Notes | <reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,"" |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available" |
| Preset | The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc" |
| Initial S/W Revision | A.11.00 |

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1-16 from front panel, 1-128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR "(empty)" if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

| | |
|----------------------|---|
| Key Path | Save |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands. |
| Dependencies | If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Measurement Results

Pressing this key selects Meas Results as the data type to be exported.

The Meas Results file contains information that describes the current state of the analyzer. It is detailed in "[Meas Results File Contents](#)" on page 1106 below.

| | |
|-------------------------------------|--|
| Key Path | Save, Data |
| Remote Command | :MMEMory:STORe:RESults <string> |
| Example | :MMEM:STOR:RES "MeasR_0000.csv" |
| Notes | <p>If the save is initiated via SCPI and the file already exists, the file will be overwritten.</p> <p>The SCPI command exports Spectrum Emission Mask measurement results to the file specified as the parameter in the current path. The default path is My Documents\<current mode>\data\sem\results.<="" p=""> <p>Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.</p> <p>The SCPI parameter is a quoted string that specifies the filename. Both single and double quotes are supported for any filename parameter over SCPI.</p> </current></p> |
| Dependencies | The current active measurement must be the Spectrum Emission Mask measurement to use this command. |
| Status Bits/OPC dependencies | Sequential – waits for the previous measurement to complete |
| Initial S/W Revision | Prior to A.02.00 |

Meas Results File Contents

A Meas Results File contains measurement results with the following information.

- File ID string, which is "MeasResult"
- Measurement ID following Mode ID, which is "SA:SEM" for example.
- Firmware rev and model number
- Option string
- Automatic Trigger Time
- Automatic Trigger Time State
- Center Frequency
- ChanIntegBW
- ChannelDetector
- ChannelDetectorState
- ChanPwrRefAuto
- ChanResBW

- ChanResBWAuto
- ChanSpan
- ChanSweepTime
- ChanSweepTimeAuto
- ChanVbwRbwRatio
- ChanVbwRbwRatioAuto
- ChanVideoBW
- ChanVideoBWAuto
- Electrical Atten
- Electrical Atten Bypass
- Electrical Atten State
- External1 Trigger Delay
- External1 Trigger Delay State
- External1 Trigger Level
- External1 Trigger Slope
- External2 Trigger Delay
- External2 Trigger Delay State
- External2 Trigger Level
- External2 Trigger Slope
- FilterAlpha
- Internal Preamp
- Internal Preamp Band
- Line Trigger Delay
- Line Trigger Delay State
- Line Trigger Slope
- Mechanical Atten
- Mechanical Atten Auto
- OffsetDetector
- OffsetDetectorState
- OffsetLimitAbsStartBTS
- OffsetLimitAbsStartMS

- OffsetLimitAbsStopBTS
- OffsetLimitAbsStopMS
- OffsetLimitFailMaskBTS
- OffsetLimitFailMaskMS
- OffsetLimitRelStartBTS
- OffsetLimitRelStartMS
- OffsetLimitRelStopBTS
- OffsetLimitRelStopMS
- OffsetMeasBWBTS
- OffsetMeasBWMS
- OffsetResolutionBWAUTOBTS
- OffsetResolutionBWAUTOMS
- OffsetResolutionBWBTS
- OffsetResolutionBWMS
- OffsetSideBTS
- OffsetSideMS
- OffsetStartFrequencyBTS
- OffsetStartFrequencyMS
- OffsetStateBTS
- OffsetStateMS
- OffsetStopFrequencyBTS
- OffsetStopFrequencyMS
- OffsetSweepTimeAutoBTS
- OffsetSweepTimeAutoMS
- OffsetSweepTimeBTS
- OffsetSweepTimeMS
- OffsetVbwRbwRatioAutoBTS
- OffsetVbwRbwRatioAutoMS
- OffsetVbwRbwRatioBTS
- OffsetVbwRbwRatioMS
- OffsetVideoBWAUTOBTS

- OffsetVideoBWAutoMS
- OffsetVideoBW BTS
- OffsetVideoBW MS
- PeakReference
- Periodic Timer Period
- Periodic Timer Sync Source
- Periodic Timer Trigger Delay
- Periodic Timer Trigger Delay State
- PowerReference
- PSDReference
- Radio Device
- RFBurst Trigger Delay
- RFBurst Trigger Delay State
- RFBurst Trigger Level Abs
- RFBurst Trigger Level Rel
- RFBurst Trigger Level Type
- RFBurst Trigger Slope
- RrcFilter
- SemAverageNumber
- SemAverageState
- TotalAtten
- Trigger Holdoff
- Trigger Holdoff State
- TriggerSource
- Video Trigger Delay
- Video Trigger Delay State
- Video Trigger Level
- Video Trigger Slope
- ViewSelection

The file contains these data followed by MeasResult1 to MeasResult12 that flag the start of the measurement results. Each line of Measurement Results consists of twelve comma separated values from MeasResult1 value to MeasResult12 value. MeasResult1 contains the same results as

MEAS/READ/FETCH:SEMask1; MeasResult2, MEAS/READ/FETCH:SEMask2; MeasResult3,
MEAS/READ/FETCH:SEMask3;... (continues in the same manner)

The exported file is in CSV format, with a.csv extension. The Meas Results file, when imported into Excel, shows the following data:

| MeasResult | | |
|---|-----------------|-----------------|
| SA:SEM | | |
| A.10.53 | N90 30A | |
| 526 ALV ATP B1X B1Y B25 B40 BBA CR3 CRP DCF DDA DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA LFE LNP MAT MPB NFE NUL P26 PFR PNC RTL RTS S40 SB1 SEC SM1 TVT YAS YAV | 1 | |
| Automatic Trigger Time | 0.1 | |
| Automatic Trigger Time State | FALS E | |
| Center Frequency | 1.33 E+10 | |
| ChanIntegBW | 384 000 0 | 384 000 0 |
| ChannelDetec tor | Aver age | |
| ChannelDetec torState | TRUE | |
| ChanPwrRefA uto | TRUE | |
| ChanResBW | 100 000 | 100 000 |
| ChanResBWA uto | FALS E | FALS E |
| ChanSpan | 500 000 | 500 000 |

| | | |
|-------------------------------|------------------|------------------|
| | 0 | 0 |
| ChanSweepTime | 0.00 250 7 | 0.00 250 7 |
| ChanSweepTimeAuto | TRUE | TRUE |
| ChanVbwRbwRatio | 1 | 1 |
| ChanVbwRbwRatioAuto | FALSE | FALSE |
| ChanVideoBW | 100 000 | 100 000 |
| ChanVideoBWAuto | TRUE | TRUE |
| Electrical Atten | 0 | |
| Electrical Atten Bypass | TRUE | |
| Electrical Atten State | FALSE | |
| External1 Trigger Delay | 1.00 E-06 | |
| External1 Trigger Delay State | FALSE | |
| External1 Trigger Level | 1.2 | |
| External1 Trigger Slope | Positive | |
| External2 Trigger Delay | 1.00 E-06 | |
| External2 Trigger Delay State | FALSE | |
| External2 Trigger Level | 1.2 | |
| External2 Trigger Slope | Positive | |
| FilterAlpha | 0.22 | |
| Internal Preamp | FALSE | |
| Internal Preamp Band | Low | |

| | | | | | | |
|---------------------------|----------|----------|----------|----------|----------|----------|
| Line Trigger Delay | 1.00E-06 | | | | | |
| Line Trigger Delay State | FALSE | | | | | |
| Line Trigger Slope | Positive | | | | | |
| Mechanical Atten | 10 | | | | | |
| Mechanical Atten Auto | TRUE | | | | | |
| OffsetDetector | Peak | | | | | |
| OffsetDetectorState | TRUE | | | | | |
| OffsetLimitAbsStartBTS | -14 | -14 | -26 | -13 | -13 | -13 |
| OffsetLimitAbsStartMS | -14 | -14 | -26 | -13 | -13 | -13 |
| OffsetLimitAbsStopBTS | -14 | -26 | -26 | -13 | -13 | -13 |
| OffsetLimitAbsStopMS | -14 | -26 | -26 | -13 | -13 | -13 |
| OffsetLimitFailMaskBTS | ABSolute | ABSolute | ABSolute | ABSolute | ABSolute | ABSolute |
| OffsetLimitFailMaskMS | ABSolute | ABSolute | ABSolute | ABSolute | ABSolute | ABSolute |
| OffsetLimitRelStartBTS | -30 | -30 | -30 | -30 | -30 | -30 |
| OffsetLimitRelStartMS | -30 | -30 | -30 | -30 | -30 | -30 |
| OffsetLimitRelStopBTS | -30 | -30 | -30 | -30 | -30 | -30 |
| OffsetLimitRelStopMS | -30 | -30 | -30 | -30 | -30 | -30 |
| OffsetMeasBWBTS | 1 | 1 | 1 | 1 | 1 | 1 |
| OffsetMeasBWMS | 1 | 1 | 1 | 1 | 1 | 1 |
| OffsetResolutionBWAUTOBTS | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE |
| OffsetResolutionBWAUTOMS | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE |

| | | | | | | |
|--------------------------|---------|---------|---------|----------|---------|---------|
| OffsetResolutionBWBS | 30000 | 30000 | 30000 | 1000000 | 100000 | 100000 |
| OffsetResolutionBWS | 30000 | 30000 | 30000 | 1000000 | 100000 | 100000 |
| OffsetSideBTS | Both | Both | Both | Both | Both | Both |
| OffsetSideMS | Both | Both | Both | Both | Both | Both |
| OffsetStartFrequencyBTS | 2515000 | 2715000 | 3515000 | 4000000 | 800000 | 125000 |
| OffsetStartFrequencyMS | 2515000 | 2715000 | 3515000 | 4000000 | 800000 | 125000 |
| OffsetStateBTS | TRUE | TRUE | TRUE | TRUE | TRUE | FALSE |
| OffsetStateMS | TRUE | TRUE | TRUE | TRUE | TRUE | FALSE |
| OffsetStopFrequencyBTS | 2715000 | 3515000 | 4000000 | 8000000 | 125000 | 150000 |
| OffsetStopFrequencyMS | 2715000 | 3515000 | 4000000 | 8000000 | 125000 | 150000 |
| OffsetSweepTimeAutoBTS | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE |
| OffsetSweepTimeAutoMS | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE |
| OffsetSweepTimeBTS | 0.01733 | 0.06932 | 0.04202 | 0.002053 | 0.00225 | 0.00125 |
| OffsetSweepTimeMS | 0.01733 | 0.06932 | 0.04202 | 0.002053 | 0.00225 | 0.00125 |
| OffsetVbwRbwRatioAutoBTS | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE |
| OffsetVbwRbwRatioAutoMS | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE |
| OffsetVbwRbwRatioBTS | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| OffsetVbwRbwRatioMS | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

| | | | | | | |
|--|------------------|------|------|-------|-----------|-----------|
| OffsetVideoB WAutoBTS | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE |
| OffsetVideoB WAutoMS | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE |
| OffsetVideoB WBTS | 300 | 300 | 300 | 10000 | 100 00 | 100 00 |
| OffsetVideoB WMS | 300 | 300 | 300 | 10000 | 100 00 | 100 00 |
| PeakReferenc e | - 82.9 957 | | | | | |
| Periodic Timer Period | 0.02 | | | | | |
| Periodic Timer Sync Source | None | | | | | |
| Periodic Timer Trigger Delay | 1.00 E-06 | | | | | |
| Periodic Timer Trigger Delay State | FALS E | | | | | |
| PowerReferen ce | - 73.6 966 | | | | | |
| PSDReferenc e | - 139. 54 | | | | | |
| Radio Device | Bts | | | | | |
| RFBurst Trigger Delay | 1.00 E-06 | | | | | |
| RFBurst Trigger Delay State | FALS E | | | | | |
| RFBurst Trigger Level Abs | -20 | | | | | |
| RFBurst Trigger Level Rel | -6 | | | | | |
| RFBurst Trigger Level Type | Absol ute | | | | | |
| RFBurst Trigger Slope | Posit ive | | | | | |

| | | | | | | | | | | | | |
|---------------------------|--------------|--------------|--------------|------------------|--------------|--------------|--------------|--------------|---------------|---------------|---------------|--|
| RrcFilter | FALSE | | | | | | | | | | | |
| SemAverageNumber | 10 | | | | | | | | | | | |
| SemAverageState | FALSE | | | | | | | | | | | |
| TotalAtten | 10 | | | | | | | | | | | |
| Trigger Holdoff | 0.1 | | | | | | | | | | | |
| Trigger Holdoff State | FALSE | | | | | | | | | | | |
| TriggerSource | Free | | | | | | | | | | | |
| Video Trigger Delay | 1.00E-06 | | | | | | | | | | | |
| Video Trigger Delay State | FALSE | | | | | | | | | | | |
| Video Trigger Level | -25 | | | | | | | | | | | |
| Video Trigger Slope | Positive | | | | | | | | | | | |
| Video Selection | AbsPwrFreq | | | | | | | | | | | |
| MeasResult1 | Meas Result2 | Meas Result3 | Meas Result4 | MeasResult5 | Meas Result6 | Meas Result7 | Meas Result8 | Meas Result9 | Meas Result10 | Meas Result11 | Meas Result12 | |
| -999 | - | -13 | 999 | - | -999 | -999 | -999 | -999 | -999 | -999 | -999 | |
| | 78.89359 | | | 73.6966334099879 | | | | | | | | |
| - | - | -13 | 999 | -999 | -999 | -999 | -999 | -999 | -999 | -999 | | |
| 73.6966334099879 | 78.95235 | | | | | | | | | | | |

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data which is not processed.

| | |
|----------|------------------------------------|
| Key Path | Save, Data |
| Mode | TD-SCDMA |
| Example | MMEM:STOR:CAPT "MyCaptureData.bin" |

| | |
|----------------------|---|
| | This stores the capture data in the file MyCaptureData.bin in the default directory. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Save As . . .

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\`<mode name>`\data\traces

For all of the Limit Data Files:

My Documents\`<mode name>`\data\limits

For all of the Measurement Results Data Files:

My Documents\`<mode name>`\data\`<measurement name>`\results

For all of the Capture Buffer Data Files:

My Documents\`<mode name>`\data\captureBuffer

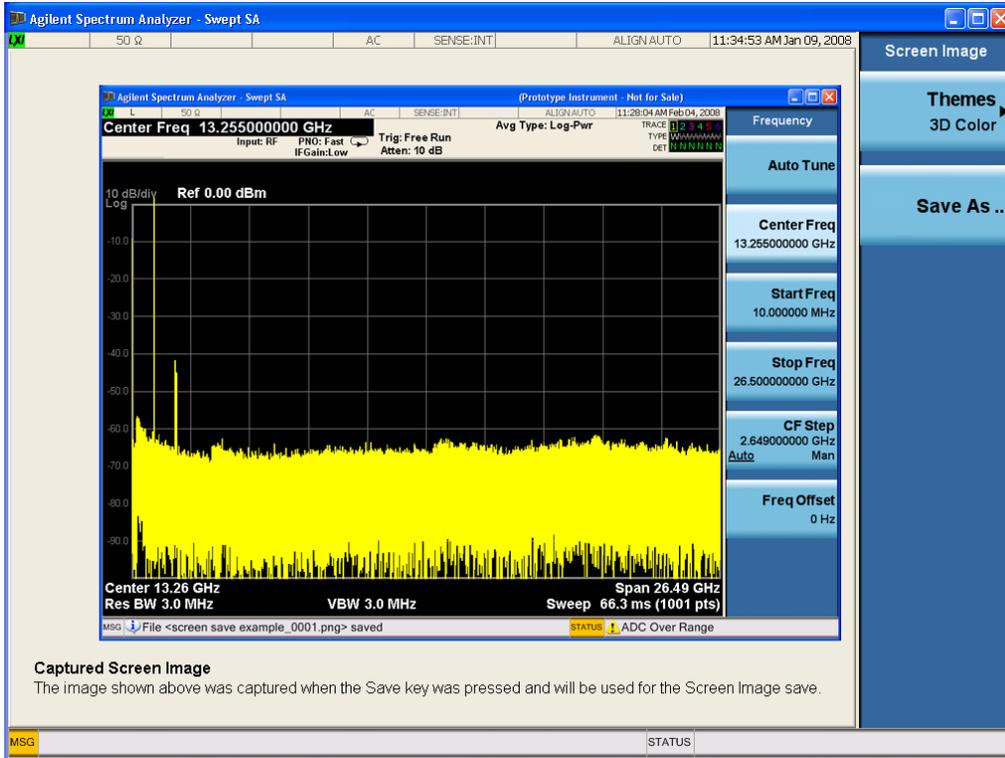
| | |
|----------------------|---|
| Key Path | Save, Data |
| Mode | All |
| Notes | The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <code><mode specific></code> Save Type. The save is performed immediately and does not wait until the measurement is complete. |
| Initial S/W Revision | Prior to A.02.00 |

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menu. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

| | |
|----------------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:SCReen <filename> |
| Example | :MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Save As...

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where `<mode name>` is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

| | |
|----------------------|--|
| Key Path | Save, Screen Image |
| Notes | Brings up Save As dialog for saving a Screen Image Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Catalog (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:CATalog? [<code><directory_name></code>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><code><numeric_value>,<numeric_value>,{<file_entry>}</code></p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first</p> |

parameter indicates the total amount of storage currently used in bytes. The second parameter indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:

<file_name>,<file_type>,<file_size>

As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty

Initial S/W Revision Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:CDIRectory [<directory_name>]
 :MMEMory:CDIRectory?

Notes The string must be a valid logical path.

Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.

At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.

Query returns full path of the default directory.

Initial S/W Revision Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:COPY <string>,<string>[,<string>,<string>]

Notes The string must be a valid logical path.

Copies an existing file to a new file or an existing directory to a new directory.

Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.

The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.

This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:COpy:DEvice <source_string>,<dest_string> |
| Notes | The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device. Valid device keywords are: SNS (smart noise source) An error is generated if the file or device is not found. |

Mass Storage Delete (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DElete <file_name>[,<directory_name>] |
| Notes | The string must be a valid logical path. Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an “access denied” error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name> |
| Notes | The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Make Directory (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MDIRectory <directory_name> |
| Notes | The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created. |

| | |
|----------------------|--|
| | This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Move (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MOVE <string>,<string>[,<string>,<string>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Remove Directory (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:RDIRECTory <directory_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See ["More Information" on page 1123](#)

| | |
|-------------------------------|---|
| Key Path | Front-panel key |
| Example | :INIT:CONT OFF |
| Notes | See Cont key description. |
| Backwards Compatibility Notes | <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p> |
| Initial S/W Revision | Prior to A.02.00 |

More Information

See ["Restart" on page 2315](#) for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

| Key Path | Front-panel key |
|----------|-----------------|
|----------|-----------------|

Span X Scale

Accesses a menu of functions that enable you to set the horizontal scale parameters.

| | |
|----------------------|-----------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.11.00 |

Ref Value

Sets the X reference value.

| | |
|-----------------------|--|
| Key Path | SPAN X Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCTV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:X[:SCALE]:RLEVel <freq> :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:X[:SCALE]:RLEVel? |
| Example | DISP:SEM:VIEW:WIND:TRAC:X:RLEV 10 DISP:SEM:VIEW:WIND:TRAC:X:RLEV? |
| Notes | You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | If Auto Scaling is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scaling automatically changes to Off. |
| Preset | 1.0 GHz |
| State Saved | Saved in instrument state. |
| Min | -1000 GHz |
| Max | 1000 GHz |
| Default Unit | Hz |
| Initial S/W Revision | A.11.00 |

Scale/Div

Sets the horizontal scale.

| | |
|-----------------------|---|
| Key Path | SPAN X Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCTV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:X[:SCALE]:PDIVision <freq> :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:X[:SCALE]:PDIVision ? |
| Example | DISP:SEM:VIEW:WIND:TRAC:X:PDIV 500 DISP:SEM:VIEW:WIND:TRAC:X:PDIV? |

| | |
|----------------------|--|
| Notes | You must be in a mode that includes the SEM measurement to use this command. Use INSTRUMENT:SElect to set the mode. |
| Couplings | If Auto Scaling is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scaling automatically changes to Off. |
| Preset | Automatically Calculated |
| State Saved | Yes Saved in instrument state. |
| Min | 1 Hz |
| Max | 10.0 GHz |
| Initial S/W Revision | A.11.00 |

Ref Position

Sets the reference position for the X axis to Left, Center or Right.

| | |
|----------------------|---|
| Key Path | SPAN X Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCTV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:X[:SCALE]:RPOsition LEFT CENTER RIGHT :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:X[:SCALE]:RPOsition? |
| Example | DISP:SEM:VIEW:WIND:TRAC:X:RPOS LEFT DISP:SEM:VIEW:WIND:TRAC:X:RPOS? |
| Notes | You must be in a mode that includes the SEM measurement to use this command. Use INSTRUMENT:SElect to set the mode. |
| Preset | CENTER |
| State Saved | Yes Saved in instrument state. |
| Range | Left Ctr Right |
| Initial S/W Revision | A.11.00 |

Auto Scaling

Toggles the scale coupling function between On and Off.

| | |
|----------------|--|
| Key Path | SPAN X Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCTV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:X[:SCALE]:COUPle 0 1 OFF ON :DISPlay:SEMask:VIEW[1]:WINDow[1]:TRACe:X[:SCALE]:COUPle? |
| Example | DISP:SEM:VIEW:WIND:TRAC:X:COUP ON |

| DISP:SEM:VIEW:WIND:TRAC:X:COUP? | |
|---------------------------------|--|
| Notes | You must be in a mode that includes the SEM measurement to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | When Auto Scaling is On and the Restart front-panel key is pressed, this function automatically determines the scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off. |
| Preset | 1 |
| State Saved | Yes Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.11.00 |

Sweep/Control

Displays a menu that enables you to set up and control the sweep time, gate method, and source of the current measurement. See ["Sweep/Control" on page 2205](#) for more information.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Pause

Pauses a measurement after the current data acquisition is complete. When Paused, the label on the key changes to Resume. Pressing the Resume key resumes the measurement at the point it was at when paused. See ["Pause/Resume" on page 2205](#) for more details.

| | |
|----------------------|------------------|
| Key Path | Sweep/Control |
| Initial S/W Revision | Prior to A.02.00 |

Gate

Accesses a menu that enables you to control the gating function. The Gate functionality is used to view signals best viewed by qualifying them with other events.

Gate setup parameters are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

Note that Sweep Time autocoupling rules and annotation are changed by Gate being on.

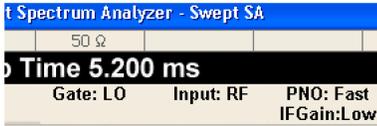
| | |
|----------------------|--|
| Key Path | Sweep/Control |
| Scope | Meas Global |
| Readback | The state and method of Gate, as [Off, LO] or [On, Video]. Note that for measurements that only support gated LO, the method is nonetheless read back, but always as LO. |
| Initial S/W Revision | Prior to A.02.00 |

Gate On/Off

Turns the gate function on and off.

When the Gate Function is on, the selected Gate Method is used along with the gate settings and the signal at the gate source to control the sweep and video system with the gate signal. Not all measurements allow every type of Gate Methods.

When Gate is on, the annunciation in the measurement bar reflects that it is on and what method is used, as seen in the following "Gate: LO" annunciator graphic.



| | |
|-------------------------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe [:STATe] OFF ON 0 1 [:SENSe] :SWEep:EGATe [:STATe] ? |
| Example | SWE:EGAT ON SWE:EGAT? |
| Dependencies | <p>The function is unavailable (grayed out) and Off when:</p> <ul style="list-style-type: none"> • Gate Method is LO or Video and FFT Sweep Type is manually selected. • Gate Method is FFT and Swept Sweep Type is manually selected. • Marker Count is ON. <p>The following are unavailable whenever Gate is on:</p> <ul style="list-style-type: none"> • FFT under Sweep Type when Method=LO or Video or Swept under Sweep Type when Method=FFT • Marker Count <p>While Gate is on, the Auto Rules for Sweep Type are modified so that the choice agrees with the Gate Method: i.e., FFT for Method = FFT and Swept for Method = LO or Video.</p> <p>The Gate softkey and all SCPI under the [:SENSe]:SWEep:EGATe SCPI node are grayed out when Source Mode is Tracking with an external source. This is because the Gate circuitry is used to sync the external source. If the Tracking Source is turned on, the Gate is turned off.</p> <p>When in the ACP measurement:</p> <ul style="list-style-type: none"> • When Meas Method is RBW or FAST, this function is unavailable and the key is grayed out. • Whenever Gate is on, Meas Method, RBW or FAST is unavailable and keys for those are grayed out. • When Gate is on, Offset Res BW and Offset Video BW are ignored (if you set these values) and the measurement works as if all Offset Res BW and all Offset Video BW are coupled with the Res BW and the Video BW under the BW menu. When Gate is on, the Offset BW key in the Offset/Limit menu is grayed out. |
| Preset | Off LTETDD: On |
| State Saved | Saved in instrument state |
| Range | On Off |
| Backwards Compatibility SCPI | [:SENSe] :SWEep:TIME:GATE[:STATe] ESA compatibility |
| Backwards Compatibility Notes | In ESA, Trig Delay (On) and Gate (On) could not be active at the same time.. This dependency does not exist in PSA or in the X-Series. |
| Initial S/W Revision | Prior to A.02.00 |

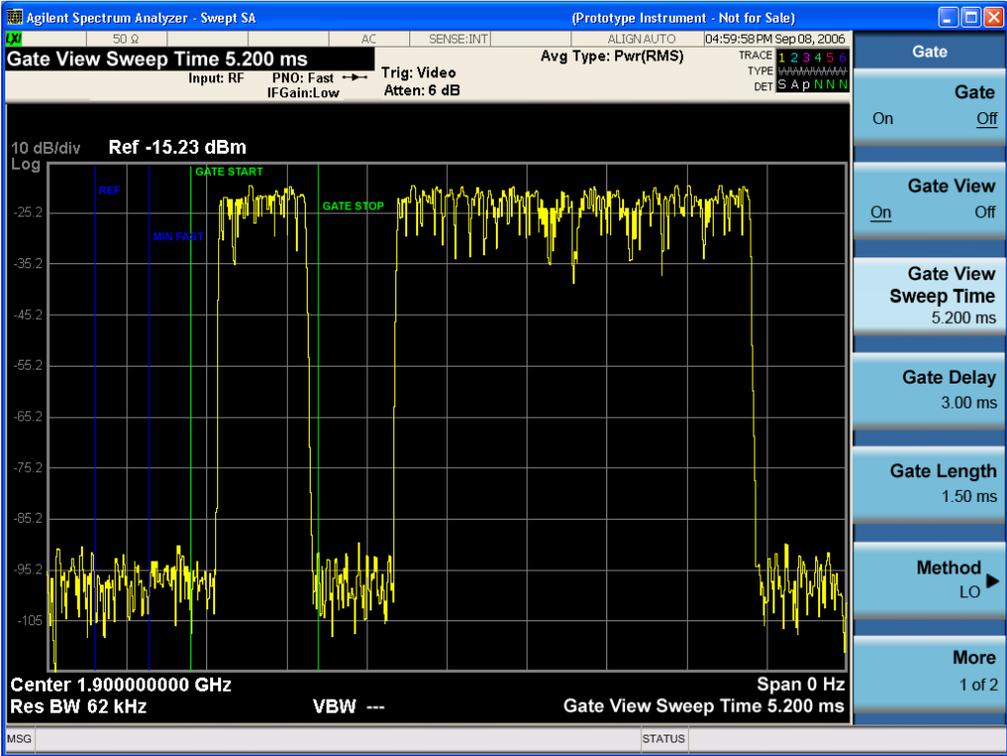
Gate View On/Off

Turning on Gate View in the Swept SA measurement provides a single-window gate view display..

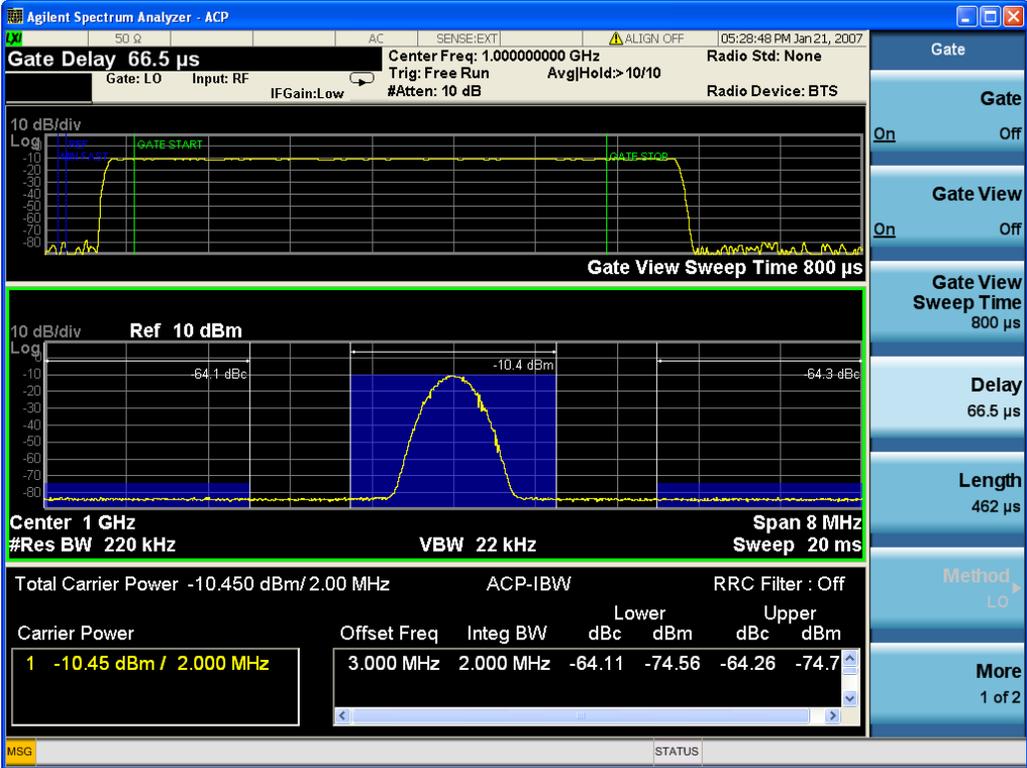
Turning on Gate View in other measurements shows the split-screen Gate View. In these measurements, when the Gate View is on, the regular view of the current measurement traces and results are reduced vertically to about 70% of the regular height. The Zero Span window, showing the positions of the Gate, is shown between the Measurement Bar and the reduced measurement window. By reducing the height of the measurement window, some of the annotation on the Data Display may not fit and is not shown.

| | |
|-----------------------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe:VIEW ON OFF 1 0 [:SENSe] :SWEep:EGATe:VIEW? |
| Example | SWE:EGAT:VIEW ON turns on the gate view. |
| Dependencies | In the Swept SA measurement: In Gate View, the regular Sweep Time key is grayed out . When pressed, the grayed out key puts up the informational message "Use Gate View Sweep Time in the Gate menu." In the other measurements: When you turn Gate View on, the lower window takes on the current state of the instrument. Upon leaving Gate View, the instrument takes on the state of the lower window. When you turn Gate View on, the upper window Sweep Time is set to the gate view sweep time. |
| Couplings | These couplings apply to the Swept SA measurement: <ul style="list-style-type: none"> • When Gate View is turned on, the instrument is set to Zero Span. • Gate View automatically turns off whenever a Span other than Zero is selected. • Gate View automatically turns off if you press the Last Span key while in Gate View, and the instrument returns to the Span it was in before entering Gate View (even if that is Zero Span). • When Gate View is turned on, the sweep time used is the gate view sweep time. This is set according to the rules in section "Gate View Setup" on page 2341 • When Gate View is turned off, Sweep Time is set to the normal Swept SA measurement sweep time. • If Gate View is on and Gate is off, then turning on Gate turns off Gate View. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

A sample of the Gate View screen in the Swept SA measurement is shown in the following graphic :



A sample of the Gate View screen in other measurements is shown in the following graphic. This example is for the ACP measurement:



Turning Gate View off returns the analyzer to the Normal measurement view.

In the Swept SA, the normal measurement view is the single-window Swept SA view. When returning to this view, the Swept SA measurement returns to the Span it was in before entering **Gate View** (even if that is Zero Span).

The **Gate View** window is triggered from the Gate Source, with zero trigger delay. Also, when updating the **Gate View** window, the Gate itself must not operate. So it is internally shut off while the gate view window is being updated. For the Swept SA measurement, this means that the Gate is internally shut off whenever the gate view window is displayed. The measurement bar and softkeys continue to show the Trigger source for the main sweep window and give no indication that the Gate is shut off or that the Gate View window is triggered from the Gate Source.

When in **Gate View**, vertical lines are displayed in the Gate View window as follows:

- Green lines are displayed at the gate edges as follows: in Edge Gate, a line is shown for Delay and one for the end of the Gate period, defined by Length. In Level Gate a line is shown only for Delay. You can adjust the position of the green lines by adjusting the gate length and the gate delay. These lines update in the Gate View window as the active function changes, even if the window is not being updated. In Gated LO and Gated Video, these lines are positioned relative to the delay reference line (not relative to 0 time). In Gated FFT, their location is relative to the left edge of the screen.
- A blue line is displayed showing the delay reference, that is, the reference point for the Gate Delay within the Zero Span window. The blue line represents where (in time) the effective location of the gate start would be if the gate were programmed to zero delay.
-
- The second blue line is labeled "MIN FAST" as shown in the figure above because it represents the minimum Gate Delay for fast Gated LO operation. This line is only displayed in Gated LO. You cannot scroll (knob) or decrement (down key) the Gate Delay to less than that represented by the position of this line, it can only be set below this position manually, although once there it can be moved freely with the knob while below the line.
- A yellow line in the Gated Video case only, is displayed at Blength, where Blength is the display point (bucket) length for the swept trace, which is given by the sweep time for that trace divided by number of Points – 1. So it is referenced to 0 time, not to the delay reference. This line is labeled NEXT PT (it is not shown in the figure above because the figure above is for Gated LO).
- The yellow line represents the edge of a display point (bucket). Normally in Gated Video, the bucket length must be selected so that it exceeds the off time of the burst. There is another way to use the analyzer in Gated Video measurements, and that is to set the bucket width much shorter than the off time of the burst. Then use the Max Hold trace function to fill in "missing" buckets more slowly. This allows you to see some of the patterns of the Gated Video results earlier, though seeing a completely filled-in spectrum later.

Gate View Setup

Accesses a menu that enables you to setup parameters relevant to the Gate View

| | |
|----------------------|---------------------|
| Key Path | Sweep/Control, Gate |
| Scope | Meas Global |
| Initial S/W Revision | A.10.00 |

Gate View Sweep Time

Controls the sweep time in the Gate View window. To provide an optimal view of the gate signal, the analyzer initializes Gate View Sweep Time based on the current settings of Gate Delay and Gate Length.

| | |
|----------------------|--|
| Key Path | Sweep/Control, Gate, Gate View Setup |
| Remote Command | [:SENSe] :SWEep:EGATe:TIME <time> [:SENSe] :SWEep:EGATe:TIME? |
| Example | SWE:EGAT:TIME 500 ms |
| Dependencies | Gate View Sweep Time is initialized: <ul style="list-style-type: none"> • On Preset (after initializing delay and length). • Every time the Gate Method is set/changed. <p>Additionally, in the Swept SA measurement, whenever you do a Preset, or leave Gate View, the analyzer remembers the Gate Delay and Gate Length settings. Then, when returning to Gate View, if the current Gate Delay and/or Gate Length do not match the remembered values Gate View Sweep Time is re-initialized.</p> <ol style="list-style-type: none"> 1. Compute the location of the "gate stop" line, which you know is at time $t = t_{min} + \text{GateDelay} + \text{GateLength}$. |
| Preset | 519.3 μ s WiMAX OFDMA: 5 ms GSM/EDGE: 1 ms |
| State Saved | Saved in instrument state |
| Max | 6000 s |
| Initial S/W Revision | Prior to A.02.00 |

Gate View Start Time

Controls the time at the left edge of the Gate View.

| | |
|----------------------|--|
| Key Path | Sweep/Control, Gate, Gate View Setup |
| Remote Command | [:SENSe] :SWEep:EGATe:VIEW:STARt <time> [:SENSe] :SWEep:EGATe:VIEW:STARt? |
| Example | SWE:EGAT:VIEW:STAR 10ms |
| Notes | Units of time are required or no units; otherwise an invalid suffix error message will be generated. See error -131. |
| Preset | 0 ms |
| State Saved | Saved in instrument state |
| Min | 0 |
| Max | 500 ms |
| Initial S/W Revision | A.10.00 |

Gate Delay

Controls the length of time from the time the gate condition goes True until the gate is turned on.

| | |
|------------------------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe:DELay <time> [:SENSe] :SWEep:EGATe:DELay? |
| Example | SWE:EGAT:DELay 500ms SWE:EGAT:DELay? |
| Notes | Units of time are required or no units; otherwise an invalid suffix error message will be generated. |
| Preset | 57.7 us WiMAX OFDMA: 71 us GSM/EDGE: 600 us WLAN: 500 us |
| State Saved | Saved in instrument state |
| Min | 0.0 us |
| Max | 100 s |
| Backwards Compatibility SCPI | [:SENSe] :SWEep:TIME:GATE:DELay ESA compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Length

Controls the length of time that the gate is on after it opens.

| | |
|----------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe:LENGth <time> [:SENSe] :SWEep:EGATe:LENGth? |
| Example | SWE:EGAT:LENG 1 SWE:EGAT:LENG? |
| Notes | Units of time are required or no units; otherwise an invalid suffix error message will be generated. |
| Dependencies | <p>Grayed out when Gate Method is set to FFT in which case the label changes to that shown below.</p>  <p>The key is also grayed out if Gate Control = Level.</p> |
| Preset | 461.6 us |

| | |
|-------------------------------------|---|
| | WiMAX OFDMA: 50 us GSM/EDGE: 200 us WLAN: 1.54 ms |
| State Saved | Saved in instrument state |
| Min | 100 ns |
| Max | 5 s |
| Backwards Compatibility SCPI | [:SENSe]:SWEep:TIME:GATE:LENGth ESA compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Source

The menus under the Gate Source key are the same as those under the Trigger key, with the exception that neither Free Run nor Video are available as Gate Source selections. However, a different SCPI command is used to select the Gate Source (see table below) because you may independently set the Gate Source and the Trigger Source.

Any changes to the settings in the setup menus under each Gate Source selection key (for example: Trigger Level, Trigger Delay, etc.) also affect the corresponding settings under the Trigger menu keys. The SCPI commands used for these are the same for Trigger and Gate, since there is only one setting which affects both Gate and Trigger. Example: to set the Trigger Level for External 1 you use the command :TRIG:EXT1:LEV regardless of whether you are using External 1 as a Trigger Source or a Gate Source.

| | |
|-------------------------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe]:SWEep:EGATe:SOURce EXTernal1 EXTernal2 LINE FRAMe RFBurst [:SENSe]:SWEep:EGATe:SOURce? |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" error. |
| Preset | EXTernal 1 GSM/EDGE, MSR: FRAMe LTETDD: EXTernal 1When Direction is Downlink, FRAMe when Direction is Uplink. |
| Backwards Compatibility Notes | In ESA, there is a single Gate input port. In PSA, the Gate Source may be taken from one of two specified input ports. In the X-Series, any Trigger Source can be a Gate Source. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.14.00 |

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA |
| Dependencies | Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 1. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:LEVel <level> :TRIGger[:SEquence]:EXTernal1:LEVel? |
| Example | TRIG:EXT1:LEV 0.4 V |
| Couplings | This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:LEVel For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:EXTernal1:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal1:SLOPe? |
| Example | TRIG:EXT1:SLOP NEG |
| Couplings | This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:SLOPe For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal1:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Zero Span Delay Comp On/Off

In zero span, there is a natural delay in the signal path, which comes from the RBW filter. This is usually desirable, as it allows you to trigger on events and also see those events, because the signal is delayed from the trigger event. However, in some cases it is desirable to eliminate this delay, so that trigger events line up exactly with the zero time point in zero span. You can use the Zero Span Delay Comp On/Off feature to enable or disable zero span delay compensation.

| | |
|-----------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:DELAy:COMPensation OFF ON 0 1 :TRIGger[:SEquence]:EXTernal1:DELAy:COMPensation? |
| Example | TRIG:EXT1:DEL:COMP ON |
| Dependencies | No effect except in zero-span, but not locked out in nonzero spans. Blanked in modes that do not support zero-span measurements. If the SCPI command is sent when the key is blanked, an error is returned: -221, "Settings conflict; Feature not supported for this measurement" In analyzers shipping N9060A, this feature requires N9060A-7FP. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | A.11.00 |

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

| | |
|-------------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT2 Swept SA measurement TRIG:< meas>:SOUR EXT2 Measurements other than Swept SA |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTERNAL2 parameter will generate a "Hardware missing; Not available for this model number" message. Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 2. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:LEVel :TRIGger[:SEquence]:EXTernal2:LEVel? |
| Example | TRIG:EXT2:LEV 1.1 V |
| Couplings | This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal2:SLOPe? |
| Example | TRIG:EXT2:SLOP NEG |
| Couplings | This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Zero Span Delay Comp On/Off

In zero span, there is a natural delay in the signal path, which comes from the RBW filter. This is usually desirable, as it allows you to trigger on events and also see those events, because the signal is delayed from the trigger event. However, in some cases it is desirable to eliminate this delay, so that trigger events line up exactly with the zero time point in zero span. You can use the Zero Span Delay Comp On/Off feature to enable or disable zero span delay compensation.

| | |
|-----------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:DELAy:COMPensation OFF ON 0 1 :TRIGger[:SEquence]:EXTernal2:DELAy:COMPensation? |
| Example | TRIG:EXT2:DEL:COMP ON |
| Dependencies | No effect except in zero-span, but not locked out in nonzero spans. Blanked in modes that do not support zero-span measurements. If the SCPI command is sent when the key is blanked, an error is returned: -221, "Settings conflict; Feature not supported for this measurement" In analyzers shipping N9060A, this feature requires N9060A-7FP. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | A.11.00 |

RF Burst

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector. Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

In some models, a variety of burst trigger circuitry is available, resulting in various available burst trigger bandwidths. The analyzer automatically chooses the appropriate trigger path based on the hardware configuration and other settings of the analyzer.

| | |
|--------------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR RFB Swept SA measurement TRIG:< meas>:SOUR RFB Measurements other than Swept SA |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Backwards Compatibility Notes | The legacy command: :TRIGger[:SEQuence]:RFBurst:FSElectivity[:STATe] OFF ON 0 1 is not supported in the X-Series, as the hardware to do Frequency Selective burst triggers does not exist in X-Series. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Absolute Trigger Level

Sets the absolute trigger level for the RF burst envelope.

When using the External Mixing path, the Absolute Trigger Level is uncalibrated because the factory default was set to accommodate the expected IF levels for the RF path.

| | |
|-----------------------|--|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute <ampl> :TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute? |
| Example | TRIG:RFB:LEV:ABS 10 dBm sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm |
| Notes | Sending this command does not switch the setting from relative to absolute; to switch it you need to send the :TRIGger[:SEQuence]:RFBurst:LEVel:TYPE command, below. Amplitude Corrections are not taken into account by the Absolute Trigger Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Absolute Trigger will not fire until you have set the trigger level that far below the displayed signal level, rather than simply to |

| | |
|-------------------------------------|--|
| | the displayed signal level. This is only true for Amplitude Corrections, not External Gain or Ref Level Offset functions. If mode is Bluetooth, the default value is -50 dBm. |
| Couplings | This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu |
| Preset | -20 dBm |
| State Saved | Saved in instrument state |
| Min | -200 dBm |
| Max | 100 dBm |
| Default Unit | depends on the current selected Y-Axis unit |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:RFBurst:LEVel:ABSolute |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

| | |
|--------------------------|---|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:TYPE ABSolute RELative :TRIGger[:SEquence]:RFBurst:LEVel:TYPE? |
| Example | TRIG:RFB:LEV:TYPE REL sets the trigger level type of the RF burst trigger to Relative. |
| Preset | ABSolute |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Relative Trigger Level

Sets the relative trigger level for the RF burst envelope.

In some models, the relative burst trigger function is implemented in hardware. In other models, without the advanced triggering hardware required, the relative burst trigger function is implemented in software in some measurements, and is unavailable in other measurements.

When implemented in software, the relative RF Burst trigger function is implemented as follows:

1. The measurement starts with the absolute RF Burst trigger setting. If it cannot get a trigger with that level, auto trigger fires and the acquisition starts anyway. After the acquisition, the measurement searches for the peak in the acquired waveform and saves it.

2. Now, in the next cycle of the measurement, the measurement determines a new absolute RF Burst level based on the peak value from the first measurement and the Relative RF Burst Trigger Level (always 0 or negative dB) set by the user. The following formula is used:
 3. absolute RF Burst level = peak level of the previous acquisition + relative RF Burst level
 4. If the new absolute RF Burst level differs from the previous by more than 0.5 dB, the new level is sent to the hardware; otherwise it is not updated (to avoid slowing down the acquisition)
- Steps 2 and 3 repeat for subsequent measurements.

| | |
|-------------------------------------|---|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:RELative <rel_ampl> :TRIGger[:SEquence]:RFBurst:LEVel:RELative? |
| Example | TRIG:RFB:LEV:REL -10 dB sets the trigger level of the RF burst envelope signal to the relative level of -10 dB |
| Notes | Sending this command does not switch the setting from absolute to relative; to switch it you need to send the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command, above. The relative trigger level is not available in some measurements. In those measurements the RELative parameter, and the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command (above), will generate an error if sent. |
| Dependencies | This key is grayed out and Absolute Trigger Level selected if the required hardware is not present in your analyzer and the current measurement does not support Relative triggering. |
| Preset | -6 dB GSM: -25 dB |
| State Saved | Saved in instrument state |
| Min | -45 dB |
| Max | 0 dB |
| Default Unit | dB or dBc |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:RFBurst:LEVel This legacy command is aliased to :TRIGger[:SEquence]:RFBurst:LEVel:RELative because the PSA had ONLY relative burst triggering |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-----------------------|---|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:SLOPe POSitive NEGative :TRIGger[:SEquence]:RFBurst:SLOPe? |

| | |
|-------------------------------------|--|
| Example | TRIG:RFB:SLOP NEG |
| Couplings | This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:FRAMe:RFBurst:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Periodic Timer (Frame Trigger)

Pressing this key, when it is not selected, selects the internal periodic timer signal as the trigger. Triggering occurrences are set by the **Period** parameter, which is modified by the **Sync Source** and **Offset**. Pressing this key, when it is already selected, accesses the periodic timer trigger setup functions.

If you do not have a sync source selected (it is Off), then the internal timer will not be synchronized with any external timing events.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR FRAM Swept SA measurement TRIG:<meas>:SOUR FRAM Measurements other than Swept SA |
| State Saved | Saved in instrument state |
| Readback | [Sync: <value of Sync Source>], for example, [Sync: External 1] |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Periodic Timer Triggering:

This feature selects the internal periodic timer signal as the trigger. Trigger occurrences are set by the **Periodic Timer** parameter, which is modified by the **Sync Source** and **Offset**.

The figure below shows the action of the periodic timer trigger. Before reviewing the figure, we'll explain some uses for the periodic trigger.

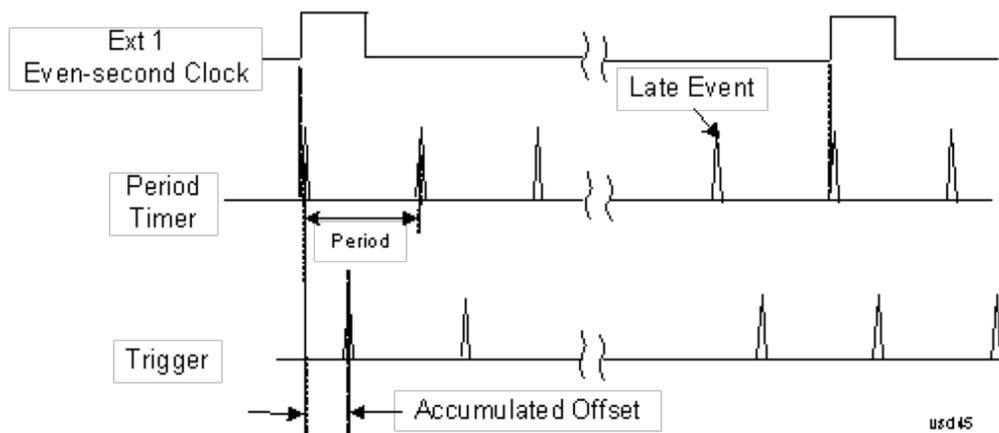
A common application is measuring periodic burst RF signals for which a trigger signal is not easily available. For example, we might be measuring a TDMA radio which bursts every 20 ms. Let's assume that the 20 ms period is very consistent. Let's also assume that we do not have an external trigger source

available that is synchronized with the period, and that the signal-to-noise ratio of the signal is not high enough to provide a clean RF burst trigger at all of the analysis frequencies. For example, we might want to measure spurious transmissions at an offset from the carrier that is larger than the bandwidth of the RF burst trigger. In this application, we can set the Periodic Timer to a 20.00 ms period and adjust the offset from that timer to position our trigger just where we want it. If we find that the 20.00 ms is not exactly right, we can adjust the period slightly to minimize the drift between the period timer and the signal to be measured.

A second way to use this feature would be to use **Sync Source** temporarily, instead of **Offset**. In this case, we might tune to the signal in a narrow span and use the RF Burst trigger to synchronize the periodic timer. Then we would turn the sync source off so that it would not miss-trigger. Miss-triggering can occur when we are tuned so far away from the RF burst trigger that it is no longer reliable.

A third example would be to synchronize to a signal that has a reference time element of much longer period than the period of interest. In some CDMA applications, it is useful to look at signals with a short periodicity, by synchronizing that periodicity to the "even-second clock" edge that happens every two seconds. Thus, we could connect the even-second clock trigger to Ext1 and use then Ext1 as the sync source for the periodic timer.

The figure below illustrates this third example. The top trace represents the even-second clock. It causes the periodic timer to synchronize with the leading edge shown. The analyzer trigger occurs at a time delayed by the accumulated offset from the period trigger event. The periodic timer continues to run, and triggers continue to occur, with a periodicity determined by the analyzer time base. The timer output (labeled "late event") will drift away from its ideal time due to imperfect matching between the time base of the signal being measured and the time base of the analyzer, and also because of imperfect setting of the period parameter. But the synchronization is restored on the next even-second clock event. ("Accumulated offset" is described in the in the **Offset** function section.)



Period

Sets the period of the internal periodic timer clock. For digital communications signals, this is usually set to the frame period of your current input signal. In the case that sync source is not set to OFF, and the external sync source rate is changed for some reason, the periodic timer is synchronized at the every external synchronization pulse by resetting the internal state of the timer circuit.

| | |
|-----------------------|---|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAME:PERiod <time> |

| | |
|----------------------|---|
| | :TRIGger[:SEquence]:FRAMe:PERiod? |
| Example | TRIG:FRAM:PER 100 ms |
| Dependencies | The invalid data indicator turns on when the period is changed, until the next sweep/measurement completes. |
| Couplings | The same period is used in the Gate Source selection of the period timer. |
| Preset | 20 ms GSM: 4.615383 |
| State Saved | Saved in instrument state |
| Min | 100.000 ns |
| Max | 559.0000 ms |
| Default Unit | S |
| Initial S/W Revision | Prior to A.02.00 |

Offset

Adjusts the accumulated offset between the periodic timer events and the trigger event. Adjusting the accumulated offset is different than setting an offset, and requires explanation.

The periodic timer is usually not synchronized with any external events, so the timing of its output events has no absolute meaning. Since the timing relative to external events (RF signals) is important, you need to be able to adjust (offset) it. However, you have no direct way to see when the periodic timer events occur. All that you can see is the trigger timing. When you want to adjust the trigger timing, you will be changing the internal offset between the periodic timer events and the trigger event. Because the absolute value of that internal offset is unknown, we will just call that the accumulated offset. Whenever the Offset parameter is changed, you are changing that accumulated offset. You can reset the displayed offset using Reset Offset Display. Changing the display does not change the value of the accumulated offset, and you can still make additional changes to accumulated offset.

To avoid ambiguity, we define that an increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.

| | |
|-----------------------|---|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:OFFSet <time> :TRIGger[:SEquence]:FRAMe:OFFSet? |
| Example | TRIG:FRAM:OFFS 1.2 ms |
| Notes | The front panel interface (for example, the knob), and this command, adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware each time the offset is updated is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value. Note that the accumulated offset value is essentially arbitrary; it represents the accumulated offset from the last time the offset was zeroed (with the Reset Offset Display key). Note that this command does not change the period of the trigger waveform. Note also that Offset is used only when the sync source is set to OFF, otherwise delay is used, see section Trig Delay . An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to |

| | |
|----------------------|--|
| | delay the timing of the trigger event. |
| Notes | When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated with the new value. However, the actual amount sent to the hardware is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value. The SCPI query simply returns the value currently showing on the key. |
| Dependencies | The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes. |
| Couplings | The same offset is used in the Gate Source selection of the period timer. |
| Preset | 0 s |
| State Saved | Saved in instrument state |
| Min | -10.000 s |
| Max | 10.000 s |
| Default Unit | S |
| Initial S/W Revision | Prior to A.02.00 |

Offset Adjust (Remote Command Only)

This remote command does not work at all like the related front panel keys. This command lets you advance the phase of the frame trigger by the amount you specify.

It does not change the period of the trigger waveform. If the command is sent multiple times, it advances the phase of the frame trigger an additional amount each time it is sent. Negative numbers are permitted.

| | |
|-----------------------|--|
| Remote Command | :TRIGger[:SEquence]:FRAMe:ADJust <time> |
| Example | TRIG:FRAM:ADJ 1.2 ms |
| Notes | Note also that Offset is used only when the sync source is set to OFF, otherwise delay is used, see section Trig Delay An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event. |
| Notes | The front panel interface (for example, the knob) and the :TRIG:FRAM:OFFS command adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware is the delta value, that is, the current offset value minus the previous offset value. When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated by increasing it (or decreasing it if the value sent is negative) by the amount specified in the SCPI command. This is a "command only" SCPI command, with no query. |
| Dependencies | The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes. |
| Couplings | The same offset is used in the Gate Source selection of the period timer. |
| Preset | 0 s |
| State Saved | Saved in instrument state |

| | |
|----------------------|------------------|
| Min | -10.000 s |
| Max | 10.000 s |
| Default Unit | S |
| Initial S/W Revision | Prior to A.02.00 |

Reset Offset Display

Resets the value of the periodic trigger offset display setting to 0.0 seconds. The current displayed trigger location may include an offset value defined with the Offset key. Pressing this key redefines the currently displayed trigger location as the new trigger point that is 0.0 s offset. The Offset key can then be used to add offset relative to this new timing.

| | |
|-----------------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:OFFSet:DISPlay:RESet |
| Example | TRIG:FRAM:OFFS:DISP:RES |
| Initial S/W Revision | Prior to A.02.00 |

Sync Source

Selects a signal source for you to synchronize your periodic timer trigger to, otherwise you are triggering at some arbitrary location in the frame. Synchronization reduces the precision requirements on the setting of the period.

For convenience you may adjust the level and slope of the selected sync source in a conditional branch setup menu accessed from the Sync Source menu. Note that these settings match those in the **Trigger** and **Gate Source** menus; that is, each trigger source has only one value of level and slope, regardless of which menu it is accessed from.

| | |
|-----------------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:SYNC EXTernal1 EXTernal2 RFBurst OFF :TRIGger[:SEquence]:FRAMe:SYNC? |
| Example | TRIG:FRAM:SYNC EXT2 |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message. |
| Preset | Off GSM/EDGE, MSR,LTE,LTETDD: RFBurst |
| State Saved | Saved in instrument state |
| Readback | The current setting is read back to this key and it is also Readback to the previous Periodic Timer trigger key. |
| Backwards | :TRIGger[:SEquence]:FRAMe:SYNC EXTernal |

| | |
|---------------------------|---|
| Compatibility SCPI | For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.14.00 |

Off

Turns off the sync source for your periodic trigger. With the sync source off, the timing will drift unless the signal source frequency is locked to the analyzer frequency reference.

| | |
|----------------------|--------------------------------------|
| Key Path | Trigger, Periodic Timer, Sync Source |
| Example | TRIG:FRAM:SYNC OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA |
| Dependencies | Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 1. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

| | |
|-----------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:LEVel <level> |

| | |
|-------------------------------------|---|
| | :TRIGger[:SEquence]:EXTernal1:LEVel? |
| Example | TRIG:EXT1:LEV 0.4 V |
| Couplings | This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:LEVel |
| Backwards Compatibility SCPI | For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal1:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|--------------------------------------|--|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal1:SLOPe? |
| Example | TRIG:EXT1:SLOP NEG |
| Couplings | This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:SLOPe |
| Backwards Compatibility SCPI | For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal1:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT2 Swept SA measurement TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTERNAL2 parameter will generate a "Hardware missing; Not available for this model number" message. Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 2. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:LEVel :TRIGger[:SEquence]:EXTernal2:LEVel? |
| Example | TRIG:EXT2:LEV 1.1 V |
| Couplings | This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal2:SLOPe? |
| Example | TRIG:EXT2:SLOP NEG |
| Couplings | This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

RF Burst

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector. Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

In some models, a variety of burst trigger circuitry is available, resulting in various available burst trigger bandwidths. The analyzer automatically chooses the appropriate trigger path based on the hardware configuration and other settings of the analyzer.

| | |
|-------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR RFB Swept SA measurement TRIG:<meas>:SOUR RFB Measurements other than Swept SA |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Backwards Compatibility Notes | The legacy command: :TRIGger[:SEquence]:RFBurst:FSElectivity[:STATe] OFF ON 0 1 is not supported in the X-Series, as the hardware to do Frequency Selective burst triggers does not exist in X-Series. |

| | |
|--------------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Absolute Trigger Level

Sets the absolute trigger level for the RF burst envelope.

When using the External Mixing path, the Absolute Trigger Level is uncalibrated because the factory default was set to accommodate the expected IF levels for the RF path.

| | |
|-------------------------------------|---|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute <ampl> :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute? |
| Example | TRIG:RFB:LEV:ABS 10 dBm sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm |
| Notes | Sending this command does not switch the setting from relative to absolute; to switch it you need to send the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command, below. Amplitude Corrections are not taken into account by the Absolute Trigger Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Absolute Trigger will not fire until you have set the trigger level that far below the displayed signal level, rather than simply to the displayed signal level. This is only true for Amplitude Corrections, not External Gain or Ref Level Offset functions. If mode is Bluetooth, the default value is -50 dBm. |
| Couplings | This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu |
| Preset | -20 dBm |
| State Saved | Saved in instrument state |
| Min | -200 dBm |
| Max | 100 dBm |
| Default Unit | depends on the current selected Y-Axis unit |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:RFBurst:LEVel:ABSolute |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

| | |
|-----------------------|---|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:TYPE ABSolute RELative :TRIGger[:SEquence]:RFBurst:LEVel:TYPE? |

| | |
|--------------------------|---|
| Example | TRIG:RFB:LEV:TYPE REL sets the trigger level type of the RF burst trigger to Relative. |
| Preset | ABSolute |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:SLOPe POSitive NEGative :TRIGger[:SEquence]:RFBurst:SLOPe? |
| Example | TRIG:RFB:SLOP NEG |
| Couplings | This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:RFBurst:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Sync Holdoff

Sync Holdoff specifies the duration that the sync source signal must be kept false before the transition to true to be recognized as the sync timing. The periodic timer phase is aligned when the sync source signal becomes true, after the Holdoff time is satisfied.

A holdoff of 2 ms will work with most WiMAX signals, but there may be cases where the burst off duration is less than 1 ms and this value will need to be changed.

| | |
|-----------------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff <time> :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff? :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff:STATe OFF ON 0 1 :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff:STATe? |
| Preset | On, 1.000 ms |

| | |
|----------------------|---------------------------|
| State Saved | Saved in instrument state |
| Min | 0 ms |
| Max | +500 ms |
| Default Unit | s |
| Initial S/W Revision | Prior to A.02.00 |

Control Edge/Level

Sets the method of controlling the gating function from the gating signal.

Edge

In Edge triggering, the gate opens (after the Delay) on the selected edge (for example, positive) of the gate signal and closes on the alternate edge (for example, negative).

Level

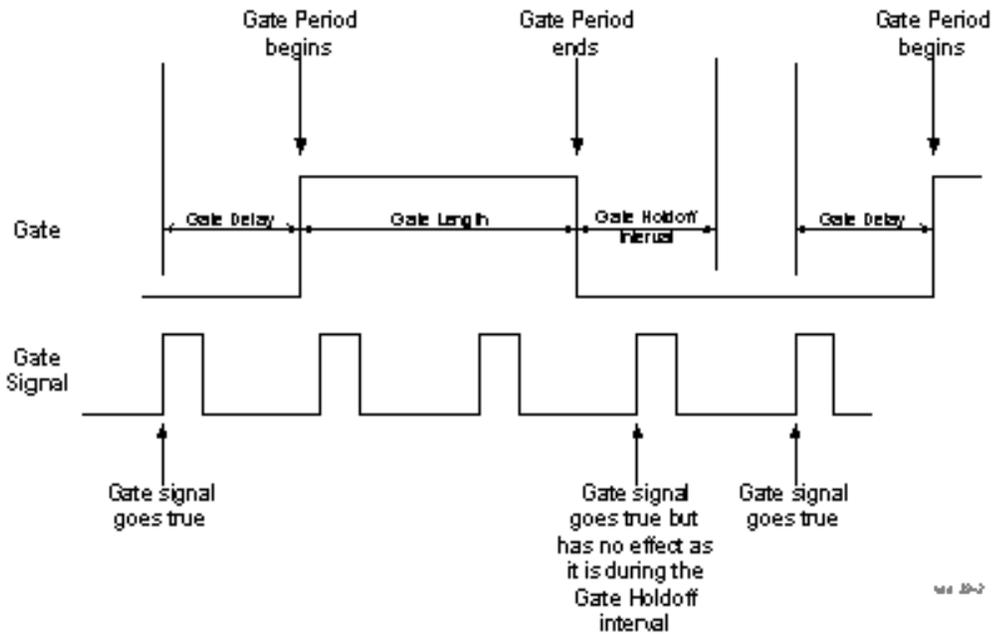
In Level triggering, the gate opens (after the Delay) when the gate signal has achieved a certain level and stays open as long as that level is maintained.

| | |
|------------------------------|---|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe:CONTRol EDGE LEVeL [:SENSe] :SWEep:EGATe:CONTRol? |
| Example | SWE:EGAT:CONT EDGE |
| Dependencies | If the Gate Method is FFT the Control key is grayed out and Edge is selected. If the Gate Source is TV, Frame or Line, the Control key is grayed out and Edge is selected. |
| Preset | EDGE |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | [:SENSe] :SWEep:TIME:GATE:TYPE ESA Compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Holdoff

Lets you increase or decrease the wait time after a gate event ends before the analyzer will respond to the next gate signal.

After any Gate event finishes, the analyzer must wait for the sweep system to settle before it can respond to another Gate signal. The analyzer calculates a "wait time," taking into account a number of factors, including RBW and Phase Noise Optimization settings. The goal is to achieve the same accuracy when gated as in ungated operation. The figure below illustrates this concept:



When Gate Holdoff is in Auto, the wait time calculated by the analyzer is used. When Gate Time is in Manual, the user may adjust the wait time, usually decreasing it in order to achieve greater speed, but at the risk of decreasing accuracy.

When the Method key is set to Video or FFT, the Gate Holdoff function has no effect.

In measurements that do not support Auto, the value shown when Auto is selected is “---” and the manually set holdoff is returned to a query.

| Key Path | Sweep/Control, Gate |
|-----------------------|--|
| Remote Command | <pre>[:SENSe] :SWEep:EGATe:HOLDoff <time> [:SENSe] :SWEep:EGATe:HOLDoff? [:SENSe] :SWEep:EGATe:HOLDoff:AUTO OFF ON 0 1 [:SENSe] :SWEep:EGATe:HOLDoff:AUTO?</pre> |
| Example | <pre>SWE:EGAT:HOLD 0.0002 SWE:EGAT:HOLD? SWE:EGAT:HOLD:AUTO ON SWE:EGAT:HOLD:AUTO?</pre> |
| Couplings | <p>When Gate Holdoff is Auto, the Gate Holdoff key shows the value calculated by the analyzer for the wait time.</p> <p>Pressing the Gate Holdoff key while it is in Auto and not selected, causes the key to become selected and allows the user to adjust the value. If the value is adjusted, the setting changes to Man.</p> <p>Pressing the Gate Holdoff key, while it is in Auto and selected, does not change the value of Gate Holdoff, but causes the setting to change to Man. Now the user can adjust the value.</p> <p>Pressing the key while it is in Man and selected, cause the value to change back to Auto.</p> <p>Pressing the key while it is in Man and not selected, causes the key to become selected and allows the user to adjust the value.</p> |

| | |
|----------------------|--|
| | When Method is set to Video or FFT, the Gate Holdoff function has no effect. |
| Preset | Auto Auto/On |
| State Saved | Saved in instrument state |
| Min | 1 µsec |
| Max | 1 sec |
| Initial S/W Revision | Prior to A.02.00 |

Gate Delay Compensation

This function allows you to select an RBW-dependent value by which to adjust the gate delay, to compensate for changes in the delay caused by RBW effects.

You can select between uncompensated operation and two types of compensation, Delay Until RBW Settled and Compensate for RBW Group Delay.

See "[More Information](#)" on page 1157

| | |
|--------------------------|---|
| Key Path | Sweep/Control, Gate |
| Scope | Meas Global |
| Remote Command | [:SENSe] :SWEep:EGATe:DELay:COMPensation:TYPE OFF SETTled GDELay [:SENSe] :SWEep:EGATe:DELay:COMPensation:TYPE? |
| Example | SWE:EGAT:DEL:COMP:TYPE SETT SWE:EGAT:DEL:COMP:TYPE? |
| Notes | Although this function is Meas Global, there are some measurements that do not support this function. In those measurements the operation will be Uncompensated. Going into one of those measurements will not change the Meas Global selection; it will simply display the grayed-out menu key with "Uncompensated" showing as the selection. This is a non-forceful grayout, so the SCPI command is still accepted. If Gate Delay Compensation is not supported at all within a particular mode, the key is not displayed, and if the SCPI command is sent while in a measurement within that mode, an "Undefined Header" message is generated. Measurements that do not support this function include: Swept SA |
| Preset | TD-SCDMA mode: Compensate for RBW Group Delay All other modes: Delay Until RBW Settled |
| State Saved | Saved in instrument state |
| Range | Uncompensated Delay Until RBW Settled Compensate for RBW Group Delay |
| Readback text | Uncompensated Settled Group Delay |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.0 |

More Information

Selecting Uncompensated means that the actual gate delay is as you sets it.

Selecting Delay Until RBW Settled causes the gate delay to be increased above the user setting by an amount equal to $3.06/\text{RBW}$. This compensated delay causes the GATE START and GATE STOP lines on the display to move by the compensation amount, and the actual hardware gate delay to be increased by the same amount. All the other gate lines (for example, MIN FAST) are unaffected. If the RBW subsequently changes, the compensation is readjusted for the new RBW. The value shown on the Gate Delay key does NOT change.

Delay Until RBW Settled allows excellent measurements of gated signals, by allowing the IF to settle following any transient that affects the burst. Excellent measurements also require that the analysis region not extend into the region affected by the falling edge of the burst. Thus, excellent measurements can only be made over a width that declines with narrowing RBWs, which is achieved by decreasing the gate length below the user setting by an amount equal to $2.53/\text{RBW}$. Therefore, for general purpose compensation, you will still want to change the gate length with changes in RBW even if the gate delay is compensated. The compensated Gate Length is limited by the analyzer so that it will never go below 10% of the value shown on the Gate Length key, as otherwise the sweep times could get very long. Anytime the Gate Length and RBW values combine in such a way that this limiting takes place, a warning is displayed. For measurements which contain multiple sweeps with different RBW like SEM and SPUR, the smallest RBW is used for this limiting.

Selecting Compensate for RBW Group Delay causes the gate delay to be increased above the user setting by an amount equal to $1.81/\text{RBW}$. This compensated delay causes the GATE START, GATE STOP lines on the display to move by the compensation amount, and the actual hardware gate delay to be increased by the same amount. All the other gate lines (for example, MIN FAST) are unaffected. If the RBW subsequently changes, the compensation is readjusted for the new RBW. The value shown on the Gate Delay key does NOT change. Compensate for RBW Group Delay also includes gate length compensation; the gate length itself is adjusted as necessary to attempt to compensate for delay effects imposed by the RBW.

Compensate for RBW Group Delay is similar to Delay Until RBW Settled, but compensates for the group delay of the RBW filter, rather than the filter settling time. As the RBW gets narrow, this can allow the settling tail of the RBW to affect the beginning part of the gated measurement, and allow the beginning of the RBW settling transient to affect the end of the gated measurement. These two effects are symmetric because the RBW response is symmetric. Because the gate length is not automatically compensated, some users might find this compensation to be more intuitive than compensation for RBW settling.

Min Fast Position Query (Remote Command Only)

This command queries the position of the MIN FAST line, relative to the delay reference (REF) line. See section ["Gate View On/Off" on page 2338](#). If this query is sent while not in gate view, the MinFast calculation is performed based on the current values of the appropriate parameters and the result is returned. Knowing this value lets you set an optimal gate delay value for the current measurement setup.

| | |
|-----------------------------|----------------------------------|
| Remote Command | [:SENSe] :SWEep:EGATe:MINFast? |
| Example | SWE:EGAT:MIN? |
| Initial S/W Revision | Prior to A.02.00 |

Gate Preset (Remote Command Only)

Presets the time-gated spectrum analysis capability.

This command sets gate parameter values to the ESA preset values, as follows:

Gate trigger type = edge

Gate polarity = positive

Gate delay = 1 us

Gate length = 1 us

| | |
|-----------------------|--|
| Remote Command | <code>[:SENSe]:SWEep:TIME:GATE:PRESet</code> ESA Compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Level (Remote Command Only)

Sets the gate input transition point level for the external TRIGGER inputs on the front and rear panel. This is a legacy command for PSA compatibility. It is simply an alias to the equivalent trigger level command.

| | |
|-----------------------|---|
| Remote Command | <code>[:SENSe]:SWEep:EGATE:EXTernal[1] 2:LEVel <voltage></code> <code>[:SENSe]:SWEep:EGATE:EXTernal[1] 2:LEVel?</code> |
| Notes | This command is simply an alias to <code>:TRIGger[:SEQuence]:EXTernal[1] 2:LEVel</code> For details refer |
| Initial S/W Revision | Prior to A.02.00 |

Gate Polarity (Remote Command Only)

Sets the polarity for the gate signal. This setup is now done using the gate trigger's slope setting.

When Positive (Pos) is selected, a positive-going edge (Edge) or a high voltage (Level) will satisfy the gate condition, after the delay set with the Gate Delay key. When Negative (Neg) is selected, a negative-going edge (Edge) or a low voltage (Level) will satisfy the gate condition after the delay.

| | |
|-------------------------------------|---|
| Remote Command | <code>[:SENSe]:SWEep:EGATE:POLarity</code> NEGative POSitive <code>[:SENSe]:SWEep:EGATE:POLarity?</code> |
| Example | <code>SWE:EGAT:POL</code> NEG <code>SWE:EGAT:POL?</code> |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | <code>[:SENSe]:SWEep:TIME:GATE:POLarity</code> ESA compatibility |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|---|
| Remote Command | <code>[:SENSe] :SWEep:TIME:GATE:LEVel HIGH LOW</code> <code>[:SENSe] :SWEep:TIME:GATE:LEVel?</code> ESA compatibility |
| Preset | HIGH |
| Initial S/W Revision | Prior to A.02.00 |

System

See "System" on page 349

Trace/Detector

Accesses a menu of functions that enable you to control trace and detector for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Trace Type

Allows you to select the type of trace for the current measurement. The menu contains a 1-of-N selection of the trace type (Clear Write, Average, Max Hold, Min Hold).

| | |
|--------------------------|---|
| Key Path | Trace/Detector |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :TRACe:SEMAsk:TYPE WRITe AVERAge MAXHold MINHold :TRACe:SEMAsk:TYPE? |
| Example | TRAC:SEM:TYPE MINH TRAC:SEM:TYPE? |
| Notes | WRITe = Clear Write AVERAge = Average MAXHold = Maximum Hold MINHold = Minimum Hold |
| Couplings | When Detector setting is "Auto" ([:SENSe]:SEMAsk:DETECTOR:AUTO?), Detector ([:SENSe]:SEMAsk:DETECTOR[:FUNCTION]?) switches aligning with the switch of this parameter: "NORMal" with WRITe (Clear Write), "AVERAge" with AVERAge, "POSitive (peak)" with MAXHold, and "NEGative (peak)" with MINHold. |
| Preset | AVERAge |
| State Saved | Saved in instrument state. |
| Range | WRITe AVERAge MAXHold MINHold |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Chan Detector

Accesses a menu of functions that enable you to control the detectors for reference channel. The following choices are available:

- Auto—the detector selected depends on marker functions, trace functions, average type, and the trace averaging function.
- Normal—the detector determines the peak of the CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection.

- Average—the detector determines the average of the signal within the sweep points. The averaging method depends upon the Average Type selection (voltage, power or log scales).
- Peak—the detector determines the maximum of the signal within the sweep points.
- Sample—the detector indicates the instantaneous level of the signal at the center of the sweep points represented by each display point.
- Negative Peak—the detector determines the minimum of the signal within the sweep points.

| | |
|----------------------|------------------|
| Key Path | Trace/Detector |
| Initial S/W Revision | Prior to A.02.00 |

Chan Detector Auto

Sets the detector to the default detection mode for the reference channel. This mode is dependent upon the current reference channel conditions.

| | |
|--------------------------|---|
| Key Path | Trace/Detector |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe] :SEMAsk:DETEctor:CARRier:AUTO ON OFF 1 0</code> <code>[:SENSe] :SEMAsk:DETEctor:CARRier:AUTO?</code> |
| Example | <code>SEM:DET:CARR:AUTO OFF</code> <code>SEM:DET:CARR:AUTO?</code> |
| Notes | See Couplings in the Trace Type section. You must be in the mode that includes SEM measurement to use this command. Use <code>:INSTRument:SElect</code> to set the mode. |
| Preset | ON |
| State Saved | Saved in instrument state |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Chan Detector Selection

Selects the detector mode for the reference channel.

| | |
|----------------|---|
| Key Path | Trace/Detector |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe] :SEMAsk:DETEctor:CARRier[:FUNctIon] AVERAge NEGAtive NORMAl</code> <code> POSitive SAMPlE</code> <code>[:SENSe] :SEMAsk:DETEctor:CARRier[:FUNctIon]?</code> |

| | |
|--------------------------|--|
| Example | SEM:DET:CARR NEG SEM:DET:CARR? |
| Notes | When you manually select a detector (instead of selecting Auto), that detector is used regardless of other analyzer settings. Note: This detector setting affects the reference channel. There is not a per trace detector. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | See Couplings in the Trace Type section. |
| Preset | AVERage |
| State Saved | Saved in instrument state. |
| Range | Normal Average Peak Sample Negative Peak |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Offset Detector

Accesses a menu of functions that enable you to control the detector for offsets. The following choices are available.

- Auto– the detector selected depends on marker functions, trace functions, average type, and the trace averaging function.
- Normal–the detector determines the peak of the CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection.
- Average–the detector determines the average of the signal within the sweep points. The averaging method depends upon the Average Type selection (voltage, power or log scales).
- Peak–the detector determines the maximum of the signal within the sweep points.
- Sample–the detector indicates the instantaneous level of the signal at the center of the sweep points represented by each display point.
- Negative Peak–the detector determines the minimum of the signal within the sweep points.

| | |
|----------------------|------------------|
| Key Path | Trace/Detector |
| Initial S/W Revision | Prior to A.02.00 |

Offset Detector Auto

Sets the detector to the default detection mode for the offsets. This mode is dependent upon the current signal conditions of the offsets.

| | |
|----------|--|
| Key Path | Trace/Detector |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, |

| | |
|---------------------------------|--|
| | LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTE-AFDD, LTE-TDD |
| Remote Command | [:SENSe] :SEMAsk:DETEctor:OFFSet:AUTO ON OFF 1 0 [:SENSe] :SEMAsk:DETEctor:OFFSet:AUTO? |
| Example | SEM:DET:OFFS:AUTO OFF SEM:DET:OFFS:AUTO? |
| Notes | See Couplings in the Trace Type section. You must be in the mode that includes SEM measurement to use this command. Use :INSTRument:SELEct to set the mode. |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Offset Detector Selection

Selects the detector mode for the offsets.

| | |
|---------------------------------|--|
| Key Path | Trace/Detector |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTE-AFDD, LTE-TDD |
| Remote Command | [:SENSe] :SEMAsk:DETEctor:OFFSet[:FUNctIon] AVERAge NEGAtive NORMAl POSitive SAMPLe [:SENSe] :SEMAsk:DETEctor:OFFSet[:FUNctIon]? |
| Example | SEM:DET:OFFS AVER SEM:DET:OFFS? |
| Notes | When you manually select a detector (instead of selecting Auto), that detector is used regardless of other analyzer settings. Note: This detector setting has effects all offsets. There is not a per trace detector. You must be in the mode that includes SEM measurement to use this command. Use :INSTRument:SELEct to set the mode. |
| Couplings | See Couplings in the Trace Type section. |
| Preset | POSitive |
| State Saved | Saved in instrument state. |
| Range | Normal Average Peak Sample Negative Peak |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Trigger

See ["Trigger" on page 424](#)

Free Run

See ["Free Run " on page 431](#)

External 1

See ["External 1 " on page 2357](#)

Trigger Level

See ["Trigger Level " on page 2357](#)

Trig Slope

See ["Trig Slope " on page 2358](#)

Trig Delay

See ["Trig Delay " on page 437](#)

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off" on page 2346](#)

External 2

See ["External 2 " on page 2359](#)

Trigger Level

See ["Trigger Level " on page 2359](#)

Trig Slope

See ["Trig Slope " on page 2360](#)

Trig Delay

See ["Trig Delay " on page 440](#)

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off" on page 2348](#)

RF Burst

See ["RF Burst " on page 2360](#)

Absolute Trigger

See ["Absolute Trigger Level" on page 2361](#)

Relative Trigger

See ["Relative Trigger Level"](#) on page 2350

Trig Slope

See ["Trigger Slope "](#) on page 2362

Trig Delay

See ["Trig Delay "](#) on page 444

Periodic Timer

See ["Periodic Timer \(Frame Trigger\) "](#) on page 2352

Period

See ["Period "](#) on page 2353

Offset

See ["Offset "](#) on page 2354

Reset Offset Display

See ["Reset Offset Display "](#) on page 2356

Sync Source

See ["Sync Source "](#) on page 2356

Off

See ["Off "](#) on page 2357

External 1

See ["External 1 "](#) on page 2357

Trigger Level

See ["Trigger Level "](#) on page 2357

Trig Slope

See ["Trig Slope "](#) on page 2358

External 2

See ["External 2 "](#) on page 2359

Trigger Level

See ["Trigger Level "](#) on page 2359

Trig Slope

See ["Trig Slope "](#) on page 2360

RF Burst

See "RF Burst " on page 2360

Absolute Trigger

See "Absolute Trigger Level" on page 2361

Trig Slope

See "Trigger Slope " on page 2362

Trig Delay

See ___ on page X

Auto/Holdoff

See "Auto/Holdoff " on page 445

Auto Trig

See "Auto Trig " on page 445

Trig Holdoff

See "Trig Holdoff " on page 446

Holdoff Type

See "Holdoff Type" on page 446

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

| Key Path | Front-panel key |
|-------------------------------|--|
| Backwards Compatibility Notes | <p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p> |
| Initial S/W Revision | Prior to A.02.00 |

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|-----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER |
| Notes | :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed |
| Couplings | A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|-----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:ALL |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL |
| Notes | Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. |
| Couplings | A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

| | |
|----------------------|---|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:SAVE |
| Example | :SYST:PRES:USER:SAVE |
| Notes | :SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file. |
| Initial S/W Revision | Prior to A.02.00 |

View/Display

Accesses a menu of functions that enable you to control the instrument display.

The following keys select how the results are displayed:

- **Abs Pwr Freq**—displays the absolute power levels in dBm and the corresponding frequencies in the text window.
- **Rel Pwr Freq**—displays the relative power levels in dBc and the corresponding frequencies in the text window.
- **Integrated Power**—displays the absolute and relative power levels integrated throughout the bandwidths between the start and stop frequencies in the text window.
- **Carrier Info**—displays the carrier configuration information with measure powers. (Only available in MSR and LTE-Advanced FDD/TDD)

["View Selection by Name \(Remote Command Only\)" on page 1171](#)

["Views Selection by Number \(Remote Command only\)" on page 1172](#)

View Selection by Name (Remote Command Only)

| Key Path | View/Display |
|--------------------------|--|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:SEMask:VIEW[:SElect] APFReq RPFReq IPOWer CINformation :DISPlay:SEMask:VIEW[:SElect]? |
| Example | DISP:SEM:VIEW IPOW DISP:SEM:VIEW? |
| Notes | You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Dependencies | In the SA mode, when "Radio Standard" is set to WLAN, IPOWer is not available and the key is grayed out. CINformation is available only in MSR and LTE-Advanced FDD/TDD mode, otherwise the key is blank. |
| Preset | SA, , WCDMA, , C2K, , TD-SCDMA, , 1xEVDO, , DTMB (CTTB), , DVB-T/H, , ISDB-T, , CMMB, , LTE, , LTE-TDD, , Digital Cable TV, , MSR, , LTEAFDD, , LTEATDD: APFReq WIMAX OFDMA, WLAN: RPFReq |
| State Saved | Saved in instrument state. |
| Range | Abs Pwr & Freq Rel Pwr & Freq Integrated Power Carrier Info |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.10.00 |

Views Selection by Number (Remote Command only)

The following numerical selections determine how the results are displayed:

1. displays the absolute power levels in dBm and the corresponding frequencies in the text window.
2. displays the relative power levels in dBc and the corresponding frequencies in the text window.
3. displays the absolute and relative power levels integrated throughout the bandwidths between the start and stop frequencies in the text window.
4. displays the carrier info table. (Only available in MSR and LTE-Advanced FDD/TDD)

| | |
|---------------------------------|--|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:SEMask:VIEW:NSElect <integer> :DISPlay:SEMask:VIEW:NSElect? |
| Example | DISP:SEM:VIEW:NSEL 2 DISP:SEM:VIEW:NSEL? |
| Notes | In the SA mode, when "Radio Standard" is set to WLAN, Option 3 is not available. Option 4 is available only in MSR and LTE-Advanced FDD/TDD mode. You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Preset | SA, , WCDMA, , C2K, , TD-SCDMA, , 1xEVDO, , DTMB (CTTB), , DVB-T/H, , ISDB-T, , CMMB, , LTE, , LTETDD, , Digital Cable TV, , MSR, , LTEAFDD, , LTEATDD: 1 WIMAX OFDMA, WLAN: 2 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | MSR, LTEAFDD, LTEATDD: 4 Other modes: 3 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.10.00 |

| | |
|-----------------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

| | |
|-----------------|---------|
| Key Path | Display |
|-----------------|---------|

| | |
|----------------------|------------------|
| Key Path | View/Display |
| Initial S/W Revision | Prior to A.02.00 |

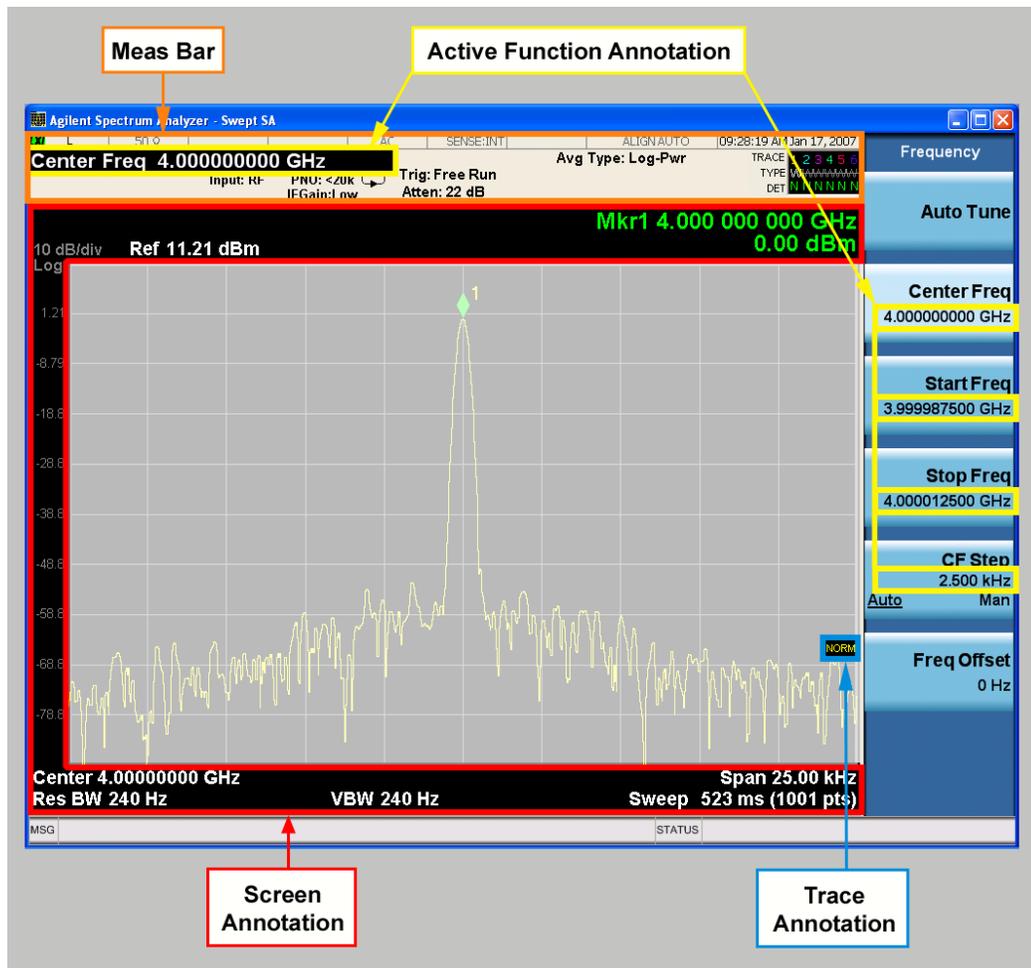
Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.

11 Spectrum Emission Mask Measurement
View/Display



| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

| | |
|----------------------|--|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNOtation:MBAR[:STATe] OFF ON 0 1 :DISPlay:ANNOtation:MBAR[:STATe]? |
| Example | DISP:ANN:MBAR OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off. |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Screen

This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

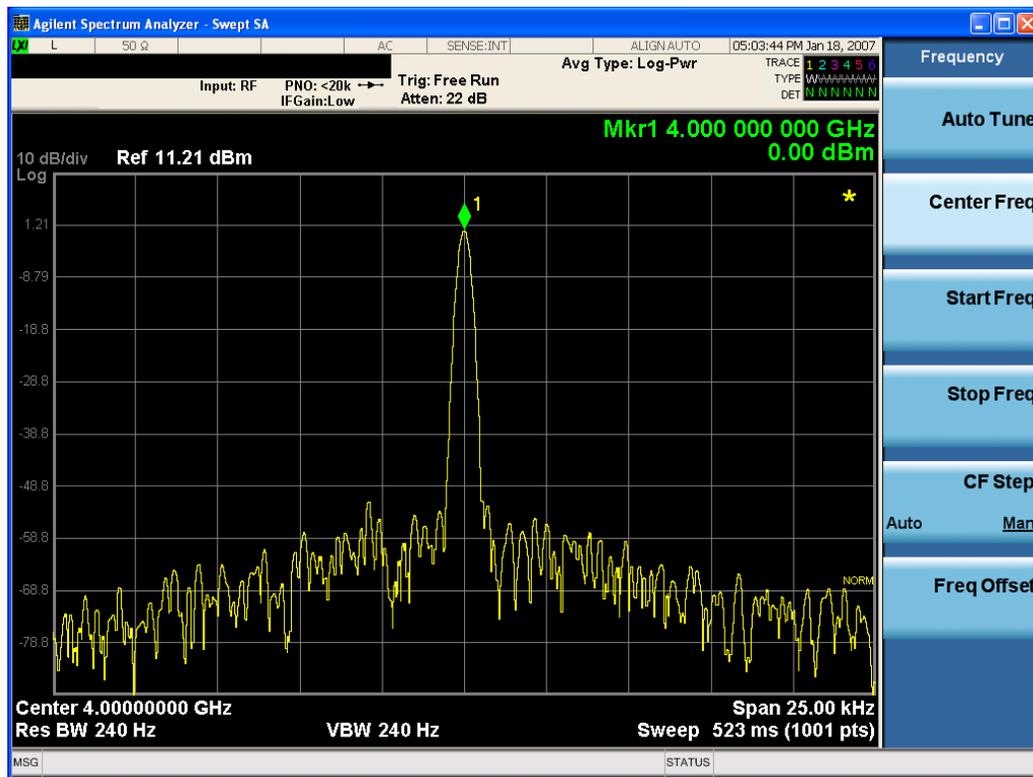
| | |
|-----------------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]? |
| Example | DISP:ANN:SCR OFF |
| Dependencies | Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..

11 Spectrum Emission Mask Measurement View/Display



| | |
|----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE] ? |
| Example | DISP:ACT OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Title

Displays menu keys that enable you to change or clear a title on your display.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

| | |
|-----------------------|---|
| Key Path | View/Display, Display, Title |
| Mode | All |
| Remote Command | :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA? |
| Example | DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title |
| Notes | Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters. |
| Preset | No title (measurement name instead) |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Example | The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required. |
| Notes | Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted). |
| Preset | Performed on Preset. |
| Initial S/W Revision | Prior to A.02.00 |

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

| | |
|----------------------|--|
| Key Path | View/Display, Display |
| Remote Command | :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]? |
| Example | DISP:WIND:TRAC:GRAT:GRID OFF |
| Notes | The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis. |
| Preset | On |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

| | |
|-------------------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:WINDow[1]:ANNotation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNotation[:ALL]? |
| Example | :DISP:WIND:ANN OFF |
| Preset | On (Set by Restore Misc Defaults) |
| State Saved | Not saved in instrument state. |
| Backwards Compatibility Notes | The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLOR FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

| | |
|-----------------------|--|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight ON OFF :DISPlay:BACKlight? |
| Preset | ON (Set by Restore Misc Defaults) |
| Initial S/W Revision | Prior to A.02.00 |

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

| | |
|-----------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity? |
| Example | DISP:BACK:INT 50 |

| | |
|----------------------|------------------------------------|
| Preset | 100 (Set by Restore Misc Defaults) |
| Min | 0 |
| Max | 100 |
| Initial S/W Revision | Prior to A.02.00 |

Abs Pwr Freq

Sets the display to the Absolute Peak Power and Frequency view. The views differ depending on the setting of the measurement type (Meas Type) under the Measurement Setup menu.

"Abs Peak Pwr & Freq (Total Pwr Ref)" on page 1181

"Abs Peak Pwr & Freq (PSD Ref)" on page 1183

"Abs Peak Pwr & Freq (Spectrum Pk Ref)" on page 1185

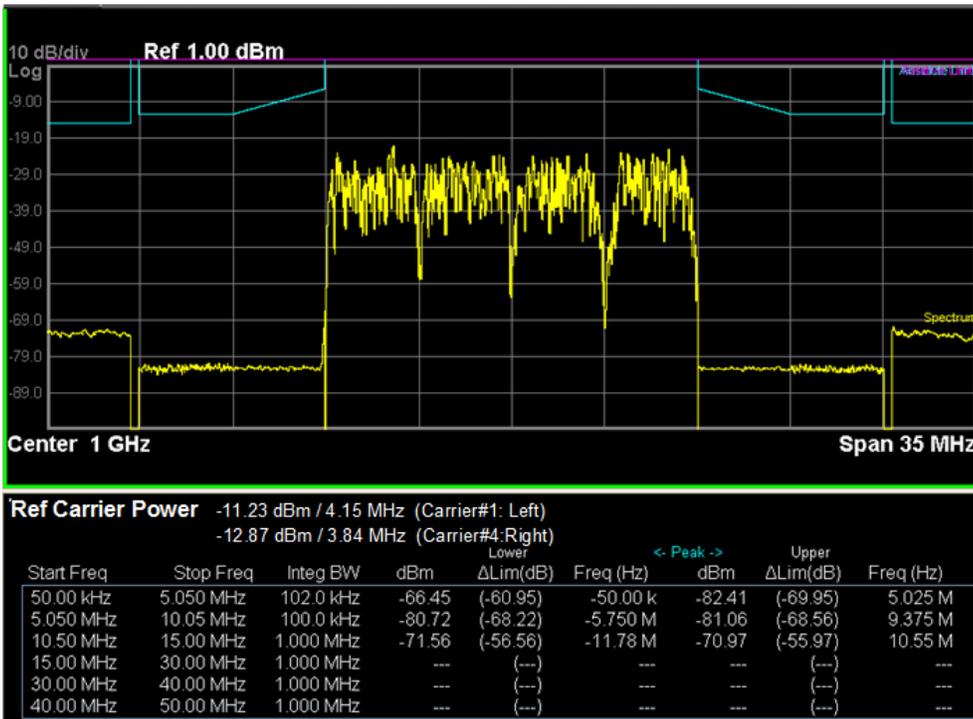
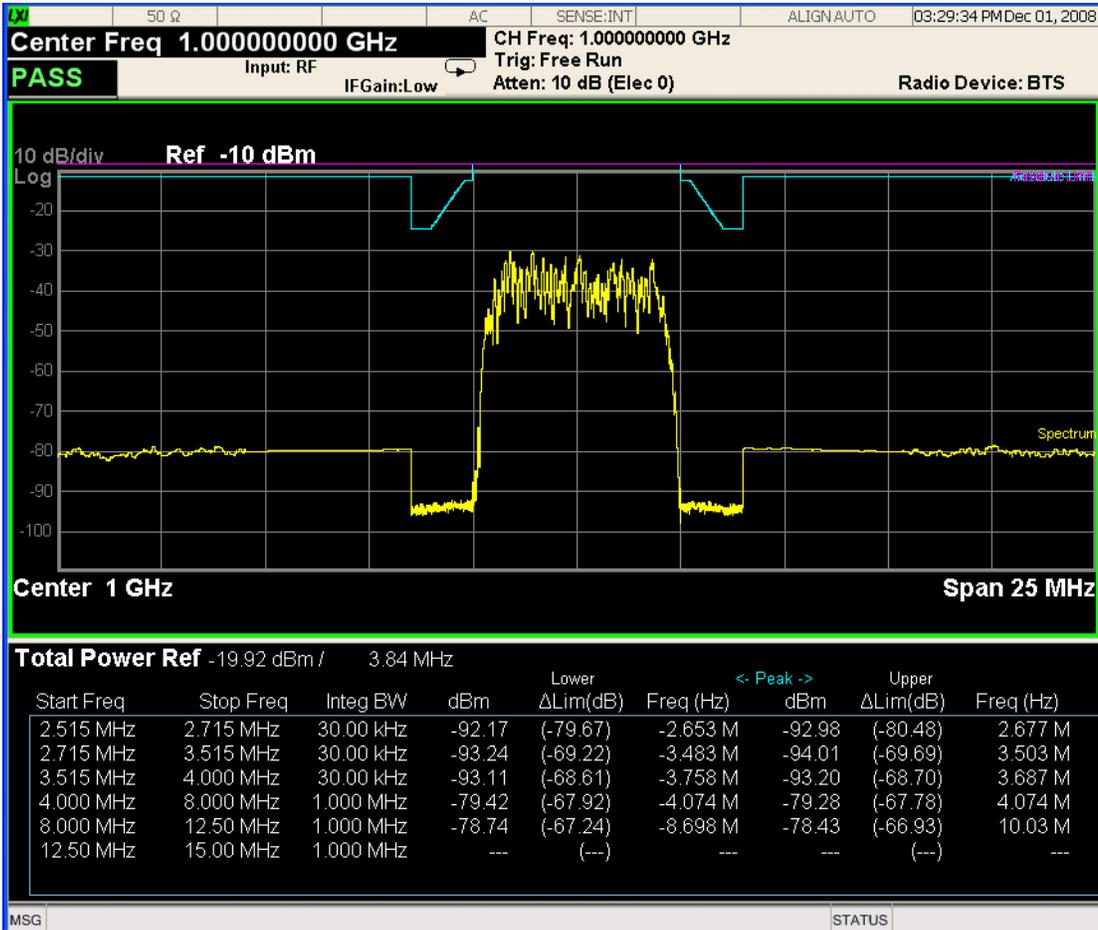
Abs Peak Pwr & Freq (Total Pwr Ref)

This view consists of the following two windows:

"Trace Window" on page 1183

"Results Window " on page 1183

11 Spectrum Emission Mask Measurement
View/Display



Trace Window

| | |
|---------------------|--|
| Corresponding Trace | yellow - Combined trace from carrier and each offset |
|---------------------|--|

Results Window

| Name | Corresponding Results |
|-------------------------|---|
| Total Pwr Ref | n=1 2nd element Absolute power at the reference area. Channel Integration Bandwidth |
| Start (Hz) | Start frequency for offset |
| Stop (Hz) | Stop frequency for offset |
| Meas BW (Hz) | Measurement bandwidth for offset |
| Lower Peak (dBm) | Absolute peak power on minimum margin point of the negative offset |
| Lower Δ lim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the negative offset |
| Lower Freq (Hz) | Frequency on minimum margin point of the negative offset |
| Upper Peak (dBm) | Absolute peak power on minimum margin point of the positive offset |
| Upper Δ lim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the positive offset |
| Upper Freq (Hz) | Frequency on minimum margin point of the positive offset |

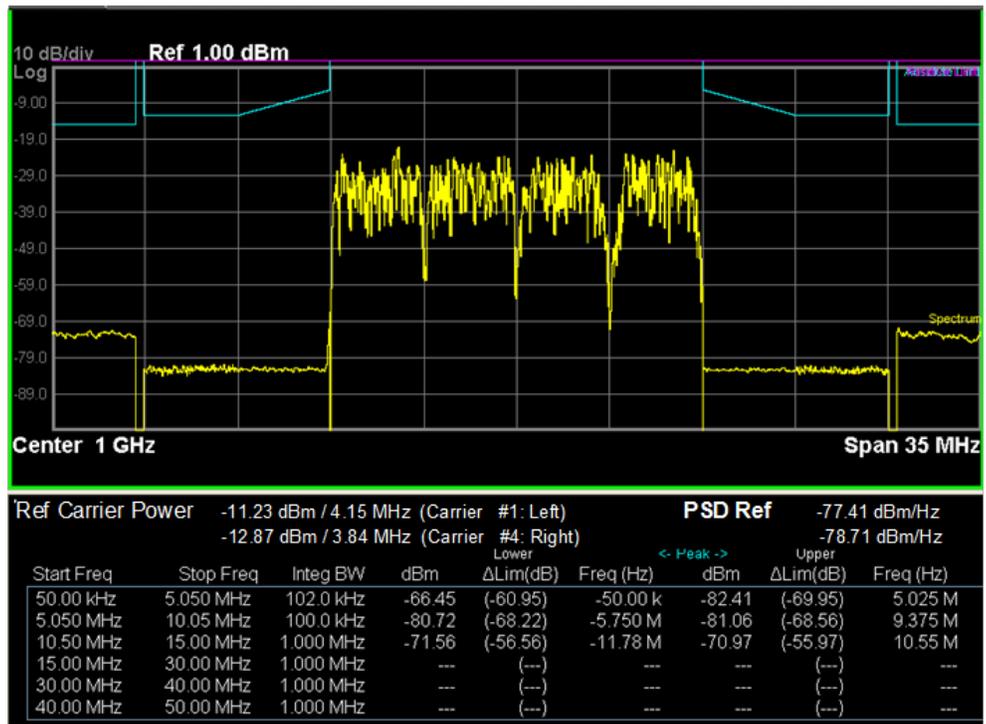
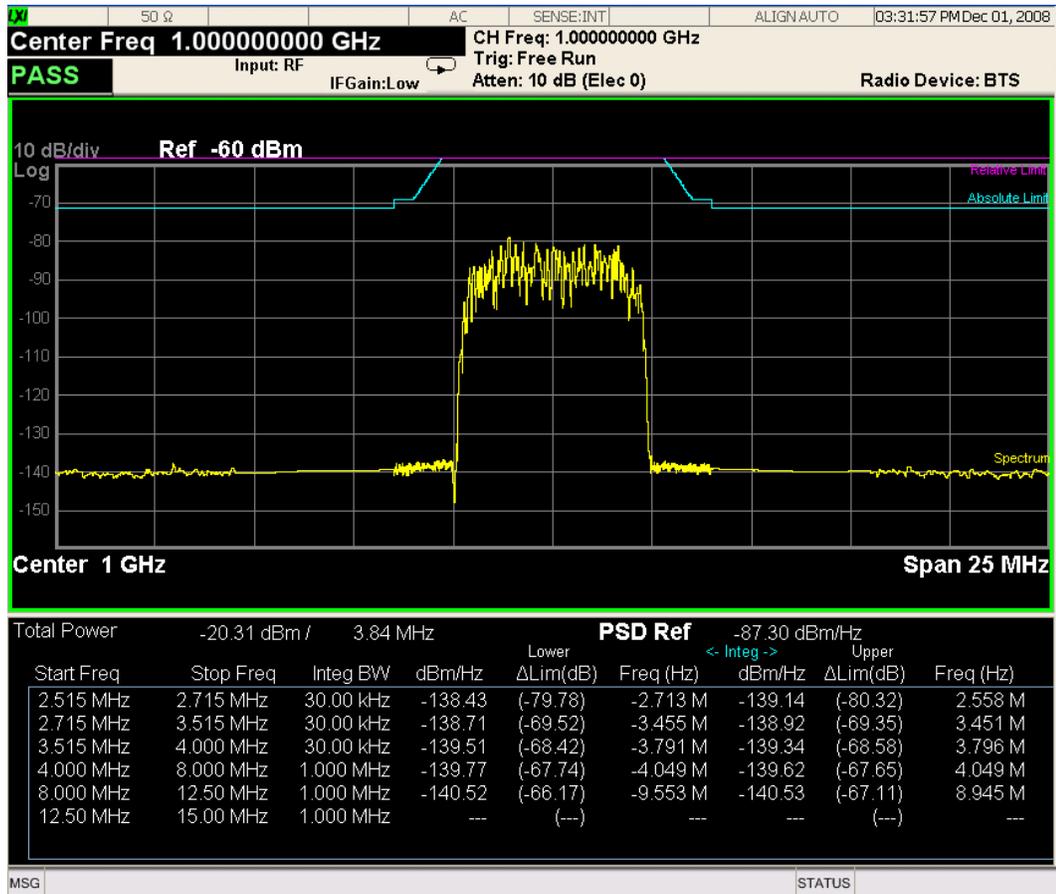
Abs Peak Pwr & Freq (PSD Ref)

This view consists of the following two windows:

"Trace Window" on page 1185

"Results Window " on page 1185

11 Spectrum Emission Mask Measurement
View/Display



Trace Window

| | |
|---------------------|--|
| Corresponding Trace | yellow - Combined trace from carrier and each offset |
|---------------------|--|

Results Window

| Name | Corresponding Results |
|-------------------------|---|
| Total Pwr | n=1 2nd element Absolute power at the reference area. |
| | Channel Integration Bandwidth |
| PSD Ref | n=5 1st element Power spectral density reference at the reference area |
| Start (Hz) | Start frequency for offset |
| Stop (Hz) | Stop frequency for offset |
| Meas BW (Hz) | Measurement bandwidth for offset |
| Lower (dBm/Hz) | Absolute power spectrum density of the negative offset |
| Lower Δ lim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the negative offset |
| Lower Freq (Hz) | Frequency on minimum margin point of the negative offset |
| Upper (dBm/Hz) | Absolute power spectrum density of the positive offset |
| Upper Δ lim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the positive offset |
| Upper Freq (Hz) | Frequency on minimum margin point of the positive offset |

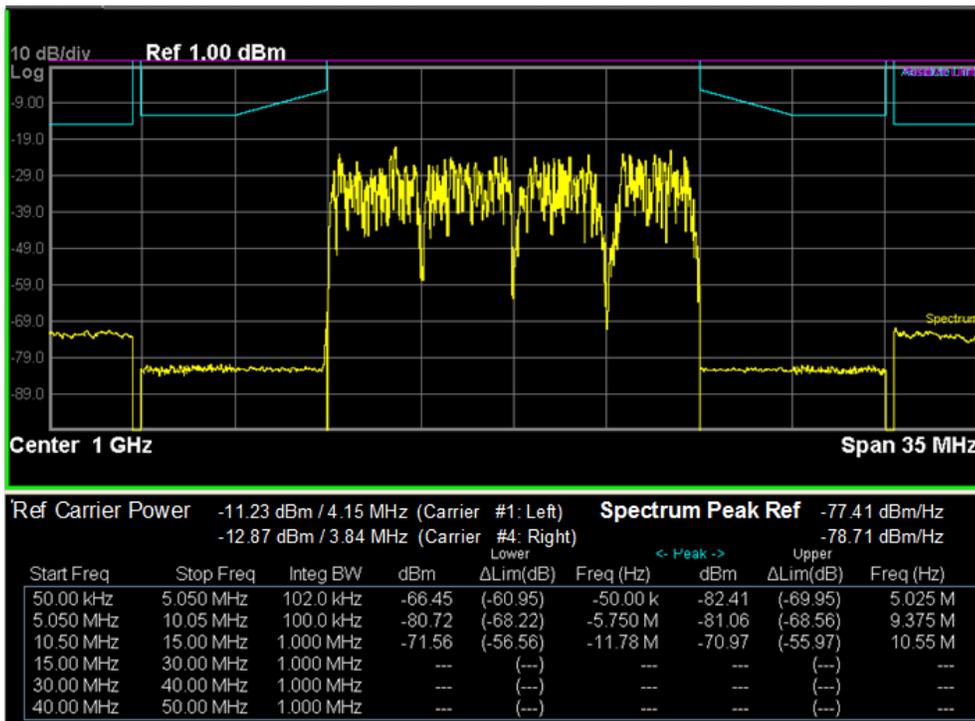
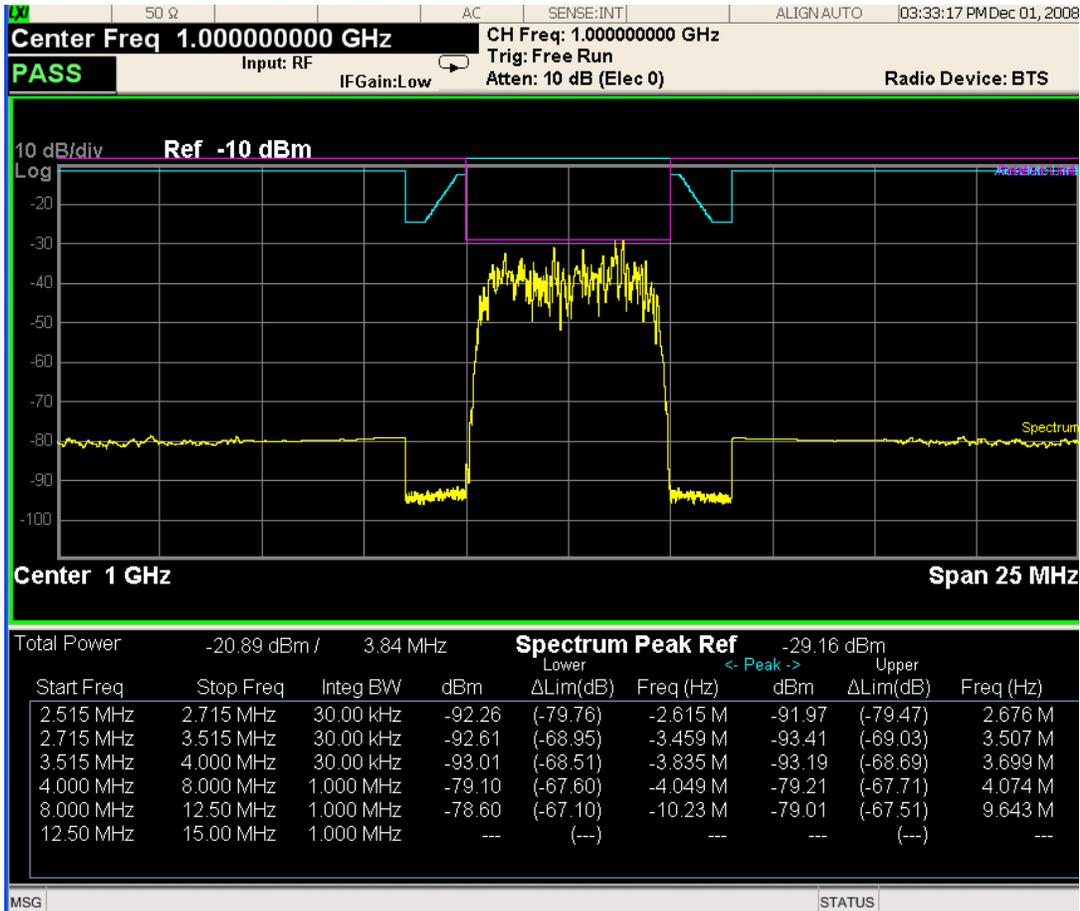
Abs Peak Pwr & Freq (Spectrum Pk Ref)

This view consists of the following two windows:

"Trace Window" on page 1185

"Results Window " on page 1185

11 Spectrum Emission Mask Measurement
View/Display



Trace Window

| | |
|---------------------|--|
| Corresponding Trace | yellow - Combined trace from carrier and each offset |
|---------------------|--|

Results Window

| Name | Corresponding Results |
|-------------------------|---|
| Total Pwr | Absolute power at the reference area. Channel Integration Bandwidth |
| Spectrum Peak Ref | n=5 1st element Spectrum peak power reference at the reference area |
| Start (Hz) | Start frequency for offset |
| Stop (Hz) | Stop frequency for offset |
| Meas BW (Hz) | Measurement bandwidth for offset |
| Lower(dBm) | Absolute peak power on minimum margin point of the negative offset |
| Lower Δ lim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the negative offset |
| Lower Freq (Hz) | Frequency on minimum margin point of the negative offset |
| Upper (dBm) | Absolute peak power on minimum margin point of the positive offset |
| Upper Δ lim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the positive offset |
| Upper Freq (Hz) | Frequency on minimum margin point of the positive offset |

| | |
|----------------------|------------------|
| Key Path | View/Display |
| Initial S/W Revision | Prior to A.02.00 |

Rel Pwr Freq

Sets the display to the Relative Peak Power and Frequency view. The views differ depending on the setting of the measurement type (Meas Type) under the Measurement Setup menu.

"Rel Peak Pwr & Freq (Total Pwr Ref)" on page 1187

"Rel Peak Pwr & Freq (PSD Ref)" on page 1189

"Rel Peak Pwr & Freq (Spectrum Pk Ref)" on page 1190

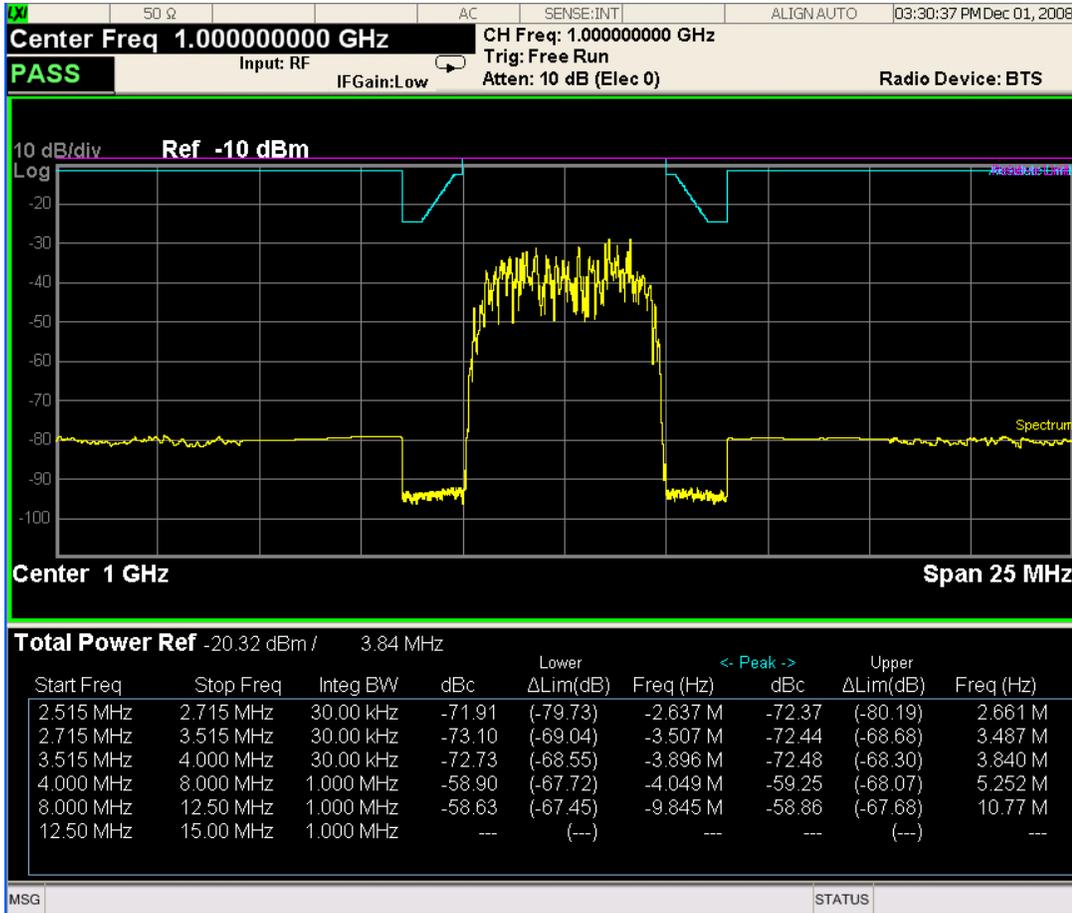
Rel Peak Pwr & Freq (Total Pwr Ref)

This view consists of the following two windows:

"Trace Window" on page 1188

"Results Window" on page 1188

11 Spectrum Emission Mask Measurement
View/Display



Trace Window

| | |
|---------------------|--|
| Corresponding Trace | yellow - Combined trace from carrier and each offset |
|---------------------|--|

Results Window

| Name | Corresponding Results |
|------------------|---|
| Total Pwr Ref | n=1 2nd element Absolute power at the reference area. |
| | Channel Integration Bandwidth |
| Start (Hz) | Start frequency for offset |
| Stop (Hz) | Stop frequency for offset |
| Meas BW (Hz) | Measurement bandwidth for offset |
| Lower Peak (dBc) | Relative peak power on minimum margin point of the negative offset |
| Lower ΔLim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the negative offset |

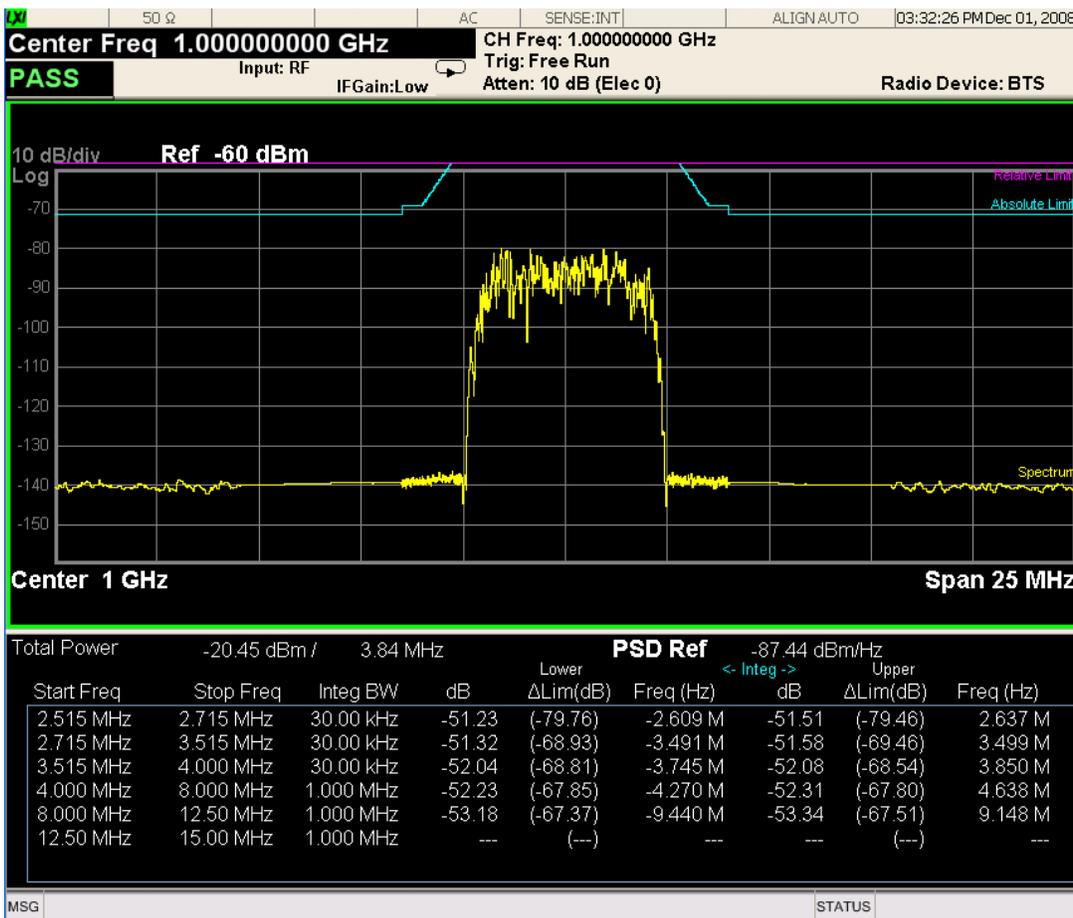
| Name | Corresponding Results |
|------------------|---|
| Lower Freq (Hz) | Frequency on minimum margin point of the negative offset |
| Upper Peak (dBc) | Relative peak power on minimum margin point of the positive offset |
| Upper ΔLim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the positive offset |
| Upper Freq (Hz) | Frequency on minimum margin point of the positive offset |

Rel Peak Pwr & Freq (PSD Ref)

This view consists of the following two windows:

"Trace Window" on page 1189

"Results Window" on page 1190



Trace Window

| | |
|---------------------|--|
| Corresponding Trace | yellow - Combined trace from carrier and each offset |
|---------------------|--|

Results Window

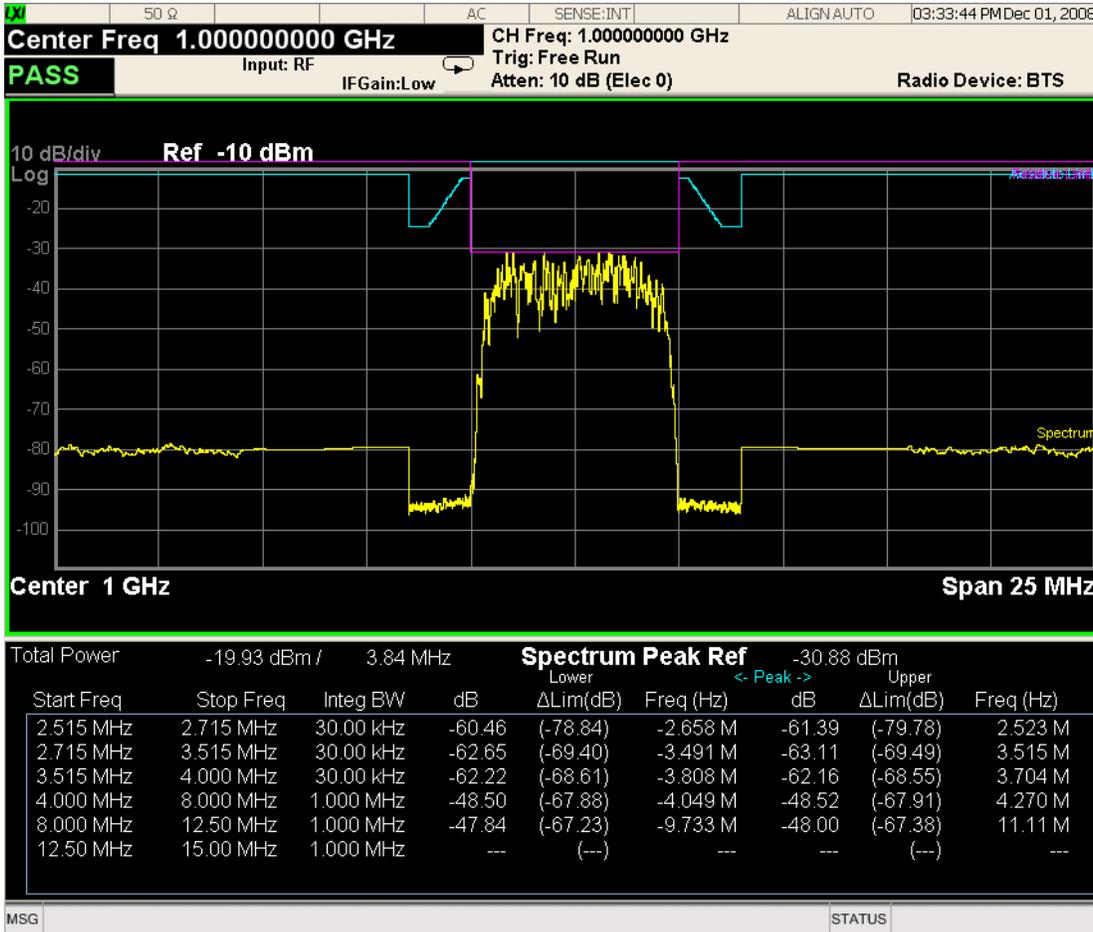
| Name | Corresponding Results |
|-------------------------|---|
| Total Pwr | n=1 2nd element Absolute power at the reference area. |
| | Channel Integration Bandwidth |
| PSD Ref | n=5 1st element Power spectral density reference at the reference area |
| Start (Hz) | Start frequency for offset |
| Stop (Hz) | Stop frequency for offset |
| Meas BW (Hz) | Measurement bandwidth for offset |
| Lower (dB) | Relative power spectrum density of the negative offset |
| Lower Δ Lim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the negative offset |
| Lower Freq (Hz) | Frequency on minimum margin point of the negative offset |
| Upper (dB) | Relative power spectrum density of the positive offset |
| Upper Δ Lim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the positive offset |
| Upper Freq (Hz) | Frequency on minimum margin point of the positive offset |

Rel Peak Pwr & Freq (Spectrum Pk Ref)

This view consists of the following two windows:

"Trace Window" on page 1188

"Results Window" on page 1188



Trace Window

Corresponding Trace yellow - Combined trace from carrier and each offset

Results Window

| Name | Corresponding Results |
|-------------------|--|
| Total Pwr | Absolute power at the reference area. |
| | Channel Integration Bandwidth |
| Spectrum Peak Ref | n=5 1st element Spectrum peak power reference at the reference area |
| Start (Hz) | Start frequency for offset |
| Stop (Hz) | Stop frequency for offset |
| Meas BW (Hz) | Measurement bandwidth for offset |
| Lower Peak (dB) | Relative peak power on minimum margin point of the negative offset |
| Lower ΔLim (dB) | Minimum margin from limit line which is decided by Fail Mask setting |

| Name | Corresponding Results |
|-------------------------|---|
| | on the negative offset |
| Lower Freq (Hz) | Frequency on minimum margin point of the negative offset |
| Upper Peak (dB) | Relative peak power on minimum margin point of the positive offset |
| Upper Δ Lim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the positive offset |
| Upper Freq (Hz) | Frequency on minimum margin point of the positive offset |

| | |
|----------------------|------------------|
| Key Path | View/Display |
| Initial S/W Revision | Prior to A.02.00 |

Integrated Power

Sets the display to the Integrated Power view. The views differ depending on the setting of the measurement type (Meas Type) under the Measurement Setup menu.

"Integrated Power (Total Pwr Ref)" on page 1192

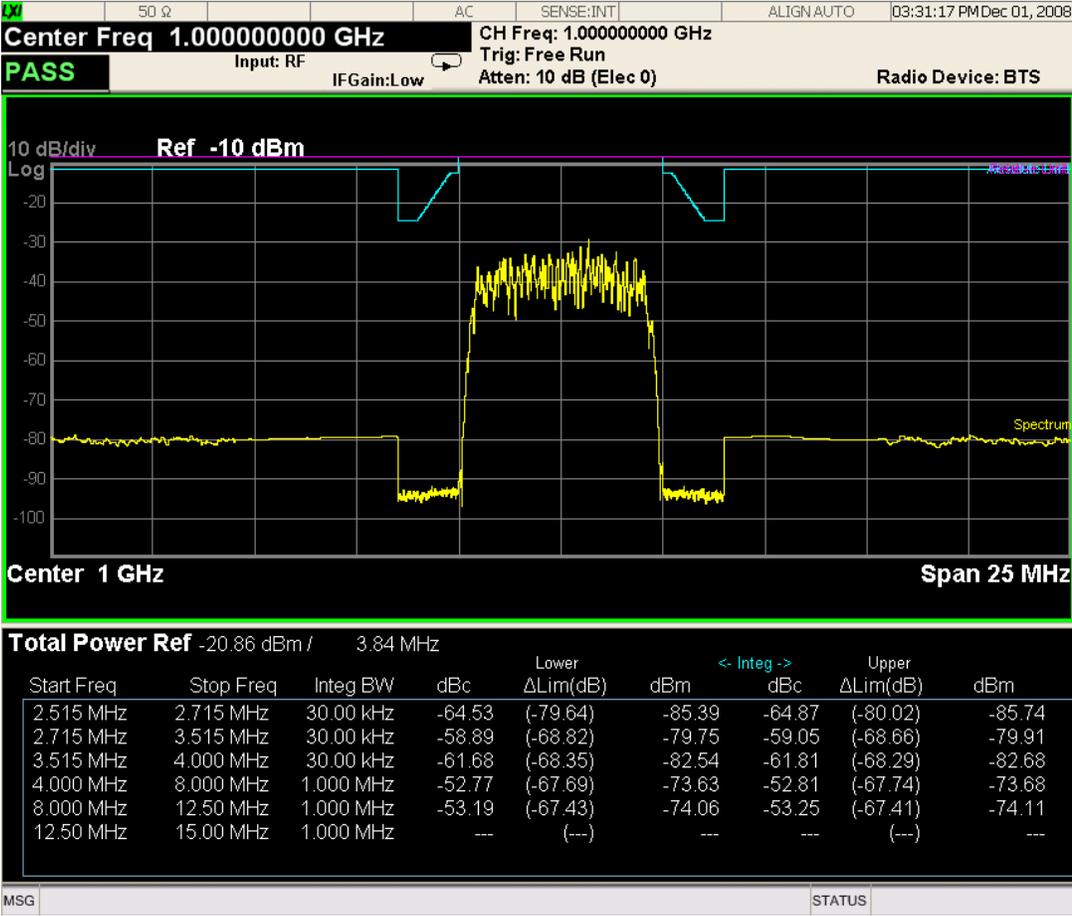
"Integrated Power (PSD Ref)" on page 1195

"Integrated Power (Spectrum Pk Ref)" on page 1198

Integrated Power (Total Pwr Ref)

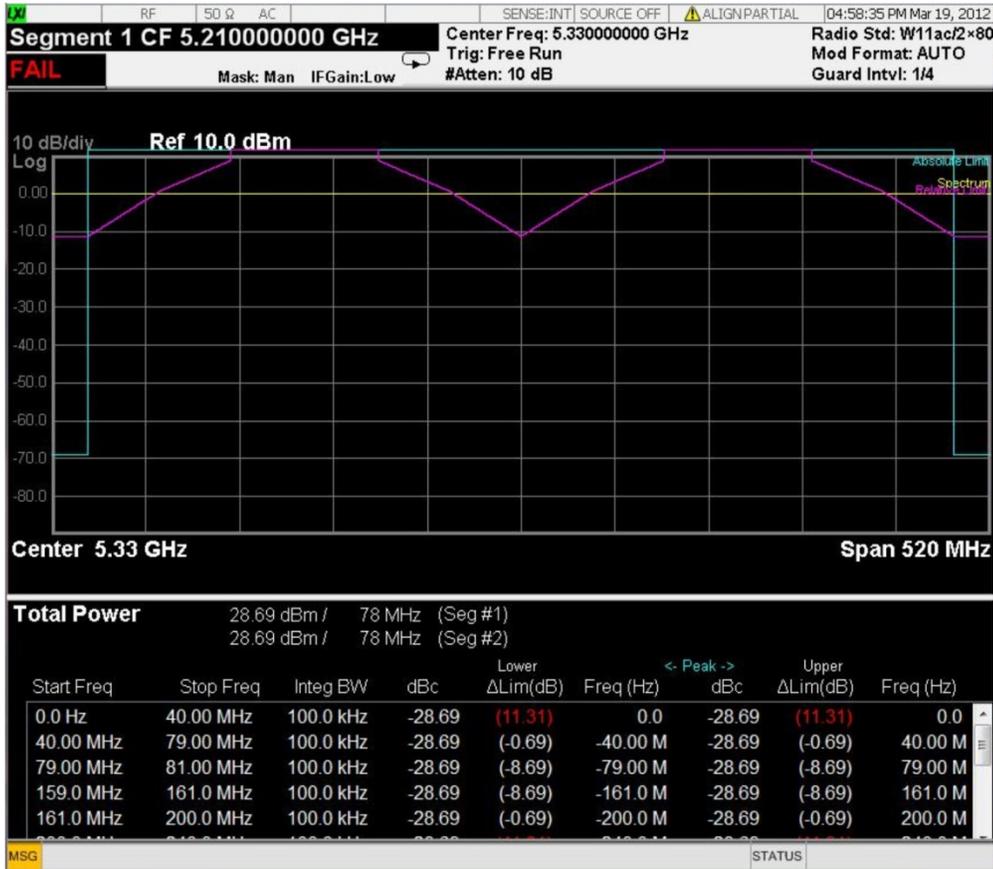
"Trace Window" on page 1194

"Results Window" on page 1194



For WLAN 802.11 ac (80 + 80 MHz), power readouts of both of the carriers are displayed in the lower result window.

11 Spectrum Emission Mask Measurement
View/Display



Trace Window

Corresponding Trace yellow - Combined trace from carrier and each offset

Results Window

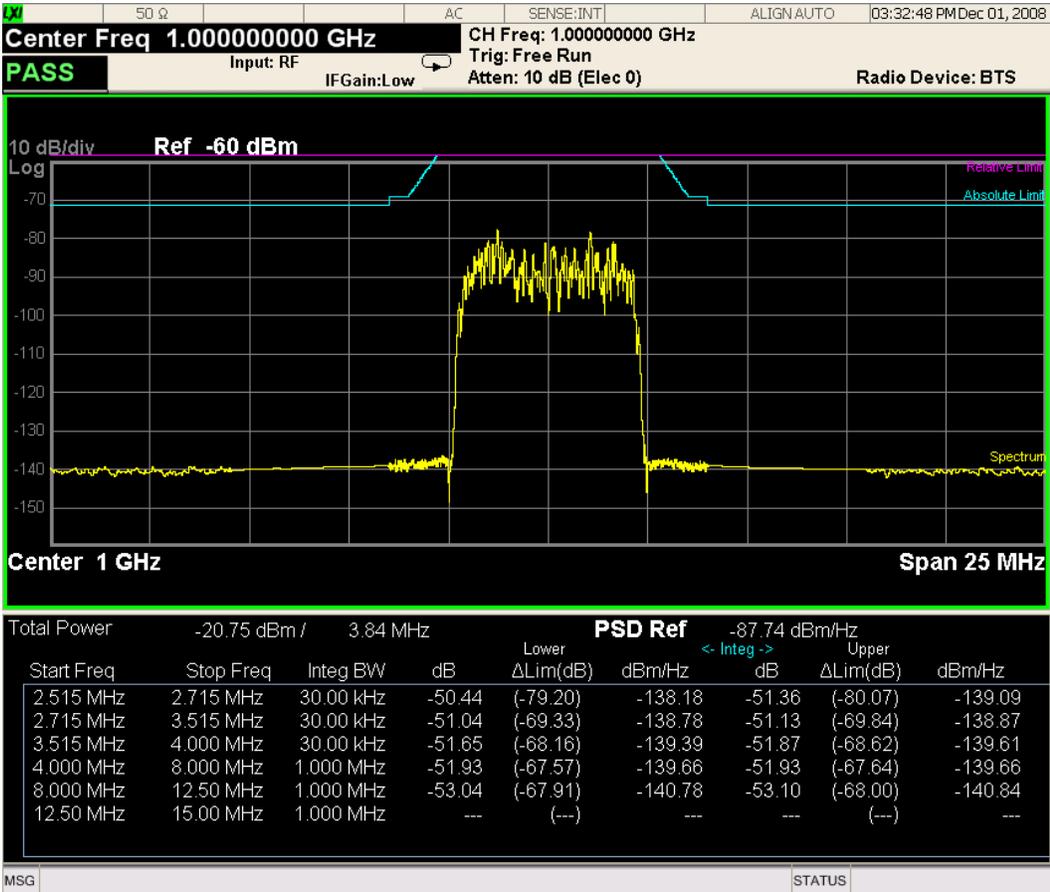
| Name | Corresponding Results |
|-------------------|---|
| Total Pwr Ref | n=1 2nd element Absolute power at the reference area. |
| | Channel Integration Bandwidth |
| Start (Hz) | Start frequency for offset |
| Stop (Hz) | Stop frequency for offset |
| Meas BW (Hz) | Measurement bandwidth for offset |
| Lower Integ (dBc) | Relative integrated power on the negative offset |
| Lower ΔLim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the negative offset |
| Lower Integ (dBm) | Absolute integrated power on the negative offset |

| Name | Corresponding Results |
|-------------------|---|
| Upper Integ (dBc) | Relative integrated power on the positive offset |
| Upper ΔLim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the positive offset |
| Upper Integ (dBm) | Absolute integrated power on the positive offset |

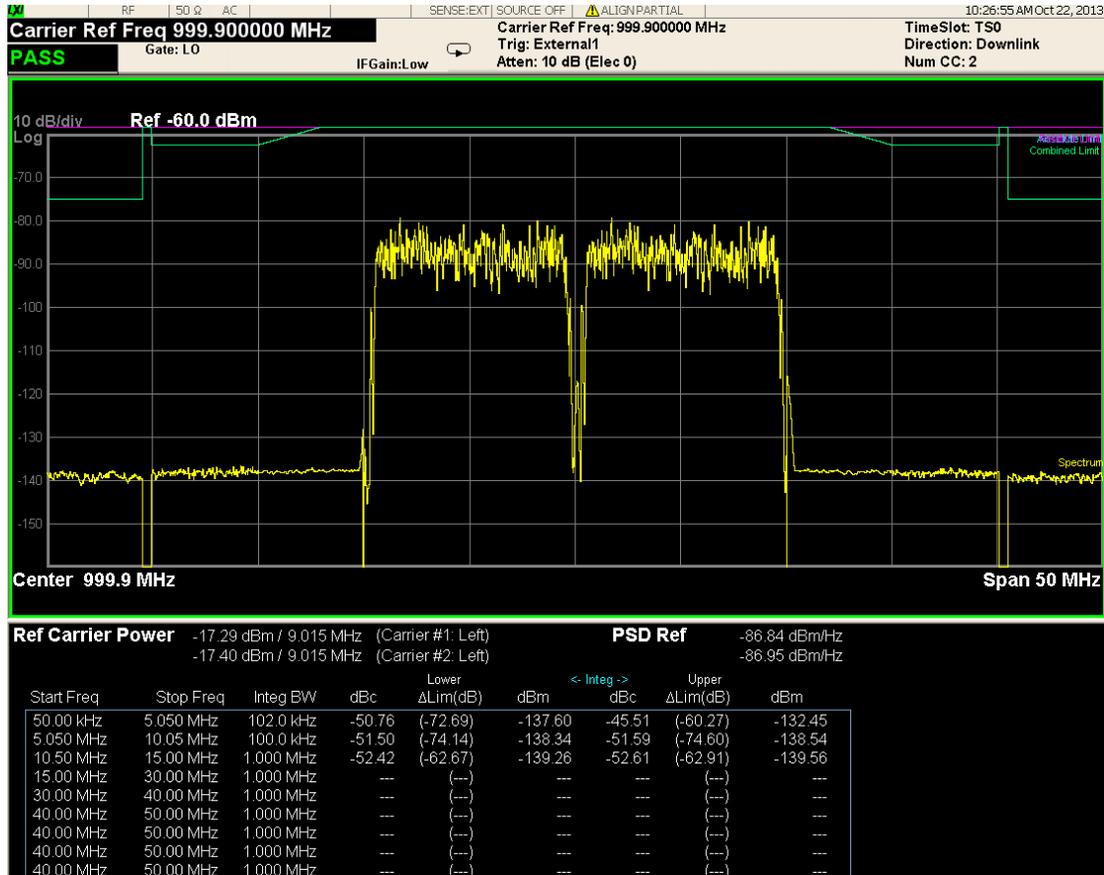
Integrated Power (PSD Ref)

"Trace Window" on page 1197

"Results Window" on page 1197



11 Spectrum Emission Mask Measurement View/Display



For WLAN 802.11ac (80 + 80 MHz), power readouts of both of the carriers are displayed in the lower result window.



Trace Window

Corresponding Trace yellow - Combined trace from carrier and each offset

Results Window

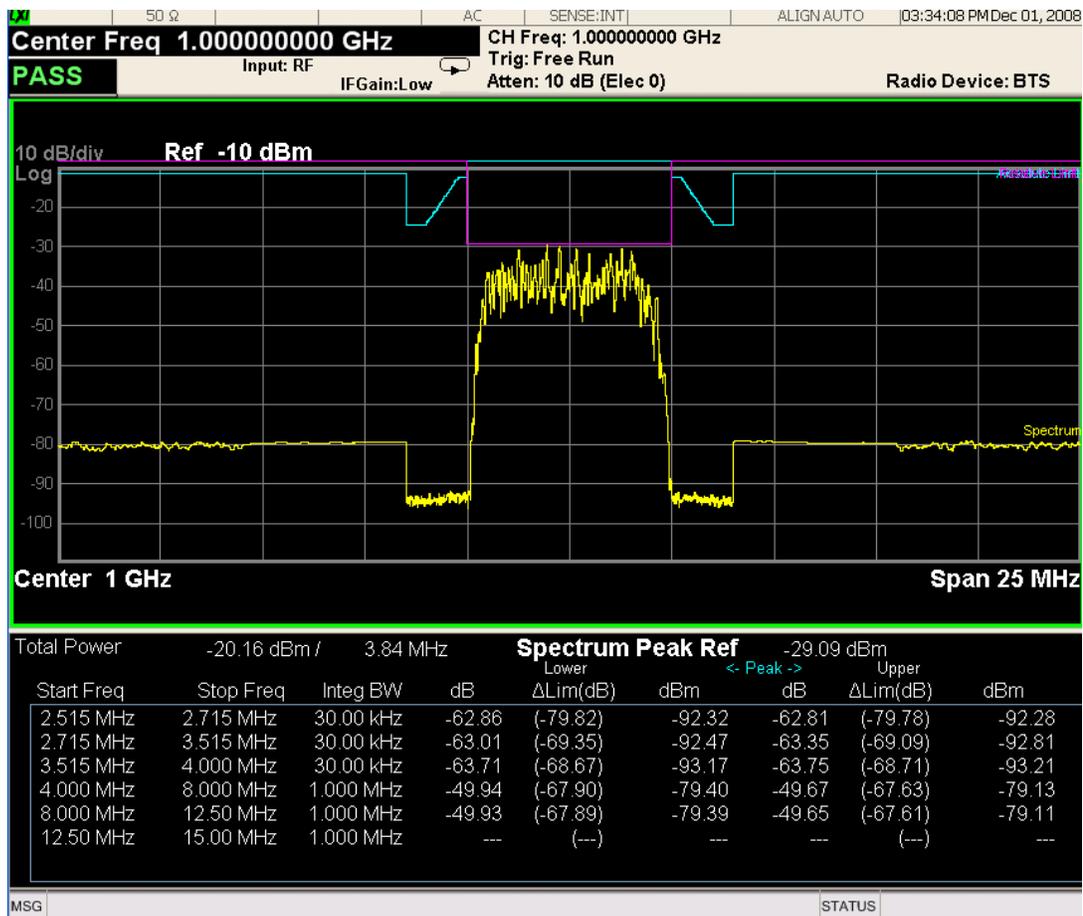
| Name | Corresponding Results |
|-----------------|---|
| Total Pwr | n=1 2nd element Absolute power at the reference area. Channel Integration Bandwidth |
| PSD Ref | n=5 1st element Power spectral density reference at the reference area |
| Start (Hz) | Start frequency for offset |
| Stop (Hz) | Stop frequency for offset |
| Meas BW (Hz) | Measurement bandwidth for offset |
| Lower (dB) | Relative power spectrum density of the negative offset |
| Lower ΔLim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the negative offset |

| Name | Corresponding Results |
|-----------------|---|
| Lower (dBm/Hz) | Absolute power spectrum density of the negative offset |
| Upper (dB) | Relative power spectrum density of the positive offset |
| Upper ΔLim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the positive offset |
| Upper (dBm/Hz) | Absolute power spectrum density of the negative offset |

Integrated Power (Spectrum Pk Ref)

"Trace Window" on page 1194

"Results Window" on page 1194



For WLAN 802.11ac (80 + 80 MHz), power readouts of both of the carriers are displayed in the lower result window.



Trace Window

Corresponding Trace yellow - Combined trace from carrier and each offset

Results Window

| Name | Corresponding Results |
|-------------------|---|
| Total Pwr | Absolute power at the reference area. |
| | Channel Integration Bandwidth |
| Spectrum Peak Ref | n=5 1st element Peak power at the reference area |
| Start (Hz) | Start frequency for offset |
| Stop (Hz) | Stop frequency for offset |
| Meas BW (Hz) | Measurement bandwidth for offset |
| Lower Peak (dB) | Relative peak power on minimum margin point of the negative offset |
| Lower Δlim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the negative offset |

| Name | Corresponding Results |
|-------------------------|---|
| Lower Peak (dBm) | Absolute peak power on minimum margin point of the negative offset |
| Upper Peak (dB) | Relative peak power on minimum margin point of the positive offset |
| Upper Δ lim (dB) | Minimum margin from limit line which is decided by Fail Mask setting on the positive offset |
| Upper Peak (dBm) | Absolute peak power on minimum margin point of the positive offset |

| | |
|----------------------|------------------|
| Key Path | View/Display |
| Initial S/W Revision | Prior to A.02.00 |

Limit Lines

Toggles the limit lines display function for the spectrum emission mask measurements On and Off.

| | |
|--------------------------|--|
| Key Path | View/Display |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, DTMB (CTTB), DVB-T/H, ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SEMask:LLINe:STATe ON OFF 1 0 :CALCulate:SEMask:LLINe:STATe? |
| Example | CALC:SEM:LLIN:STAT OFF CALC:SEM:LLIN:STAT? |
| Notes | You must be in the mode that includes SEM measurement to use this command. Use :INSTrument:SElect to set the mode. |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

12 Spurious Emissions Measurement

The Spurious Emissions measurement identifies and determines the power level of spurious emissions in certain frequency bands. For measurement results and views, see ["View/Display" on page 1377](#).

This topic contains the following sections:

["Measurement Commands for Spurious Emissions" on page 1202](#)

["Remote Command Results for Spurious Emissions Measurement" on page 1203](#)

Measurement Commands for Spurious Emissions

The following commands can be used to retrieve the measurement results:

`:CONFigure:SPURious`

`:CONFigure:SPURious:NDEFault`

`:INITiate:SPURious`

`:FETCh:SPURious [n]?`

`:READ:SPURious [n]?`

`:MEASure:SPURious [n]?`

For more measurement related commands, see the SENSE subsystem, and the section "[Remote Measurement Functions](#)" on page 2284.

Remote Command Results for Spurious Emissions Measurement

The following table describes the results returned by the FETCh, MEASure, and READ queries listed above, according to the index value n. Note that the queries are not available when viewing the Range Table.

| n | Return Value |
|----------------------|---|
| 1 (or not supplied) | Returns a variable-length (1+6*Spurs – up to 1201 entries) comma separated list containing detailed information in the following format: 1. Number of spurs in following list (Integer) 2.[Repeat the following for each spur] a.Spur # b.Range # Spur was located (Integer) c.Frequency of Spur (Hz, Float64) d.Amplitude of Spur (dBm, Float32) e.Absolute Limit (dBm, Float32) f.Pass or Fail (1 0, Boolean) |
| 2 – 21 | Returns a comma separated list of the trace data for the selected range (where range number = n – 1) using Detector 1. If selected range is not active SCPI_NAN is returned for each trace data element where SCPI_NAN = 9.91E37. |
| 22 | Returns the number of spurs found. |
| 23 – 42 | Returns a comma separated list of the trace data for the selected range (where range number = n – 22) using Detector 2. If selected range is not active or Detector 2 selection is off, SCPI_NAN is returned for each trace data element where SCPI_NAN = 9.91E37. |
| Key Path | Meas |
| Initial S/W Revision | Prior to A.02.00 |

AMPTD Y Scale

AMPTD Y Scale opens a menu of functions that enable you to modify the Amplitude parameters.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Ref Value

Sets the value for the absolute power reference. When Auto Scaling for the Y-axis is off, the measurement uses the current reference level settings. When Auto Scaling for the Y-axis is on, the analyzer will set the reference level such that the absolute limit will be positioned two divisions down from the top of the display.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | SA, WCDMA, WIMAX OFDMA, TD-SCDMA,C2k, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEVel < real> :DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEVel? |
| Example | DISP:SPUR:VIEW:WIND:TRAC:Y:RLEV -50 dBm DISP:SPUR:VIEW:WIND:TRAC:Y:RLEV? |
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, DVB-T/H mode, TD-SCDMA mode, LTE mode, LTETDD mode, WLAN mode, MSR, LTE-Advanced FDD/TDD mode or WiMAX mode to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | When the Y Auto Scaling is off, the measurement uses the current reference level settings. When the Y Auto Scaling is on, the analyzer automatically sets the reference level such that the absolute limit is positioned two divisions down from the top of the display. This is the most useful setting when searching for spurs. The algorithm used for determining the ref level is Ref Level = Absolute Limit + (2 * Scale/Div). All other reference level settings are left as the current base instrument settings. |
| Preset | 0.00 dBm |
| State Saved | Saved in instrument state. |
| Min | -250.0 dBm |
| Max | 250.0 dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single

attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See ["Dual Attenuator Configurations:" on page 1205](#)

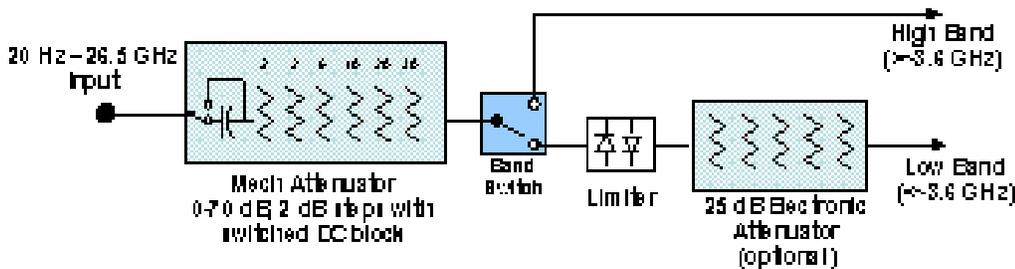
See ["Single Attenuator Configuration:" on page 1206](#)

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

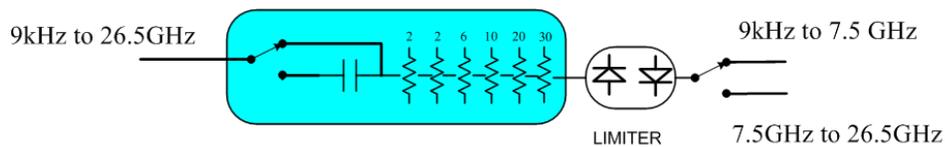
| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Dependencies | In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case. |
| Readback Line | Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2232, and " Enable Elec Atten " on page 2234 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

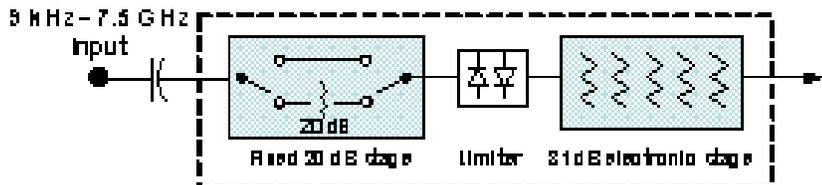


Configuration 2: Mechanical attenuator, no optional electronic attenuator



(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the “Dual Attenuator” configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See ["Attenuator Configurations and Auto/Man" on page 1208](#)

| Key Path | AMPTD Y Scale, Attenuation |
|-----------------------|--|
| Remote Command | <pre>[:SENSe]:POWeR[:RF]:ATTenuation <rel_ampl> [:SENSe]:POWeR[:RF]:ATTenuation? [:SENSe]:POWeR[:RF]:ATTenuation:AUTO OFF ON 0 1 [:SENSe]:POWeR[:RF]:ATTenuation:AUTO?</pre> |
| Example | <p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of “main” attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p> |
| Dependencies | Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the |

Auto/Man selection is not available, and the Auto/Man line on the key disappears.

In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the "[Enable Elec Atten](#)" on page 2234 key description.

See "[Attenuator Configurations and Auto/Man](#)" on page 1208 for more information on the Auto/Man functionality of Attenuation.

Couplings

When (Mech) Atten is in Auto, it uses the following algorithm to determine a value:

If the USB Preamp is connected to USB, use 0 dB.

Otherwise, $Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel + IF\ Gain$.

Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto.

The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).

The "IF Gain" term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.

In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.

Preset The preset for Mech Attenuation is "Auto."
 The Auto value of attenuation is:
 CXA, EXA, MXA and PXA: 10 dB

State Saved Saved in instrument state

Min 0 dB

The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.

Max CXA N9000A-503/507: 50 dB
 CXA N9000A-513/526: 70dB
 EXA: 60 dB
 MXA and PXA: 70 dB

In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.

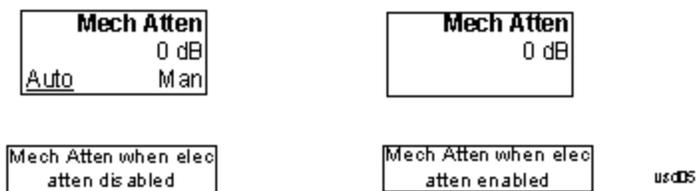
Initial S/W Revision Prior to A.02.00

Modified at S/W Revision A.03.00

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 1210](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2233](#)

See ["More Information" on page 1209](#)

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] : POWer [:RF] : EATTenuation : STATE OFF ON 0 1 [:SENSe] : POWer [:RF] : EATTenuation : STATE ? |
| Example | POW:EATT:STAT ON |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out. |

| | |
|--------------------------|--|
| | <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in all measurements; in particular, it is not available in the Swept SA measurement.</p> |
| Couplings | Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples
- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :EATTenuation <rel_amp1></code> <code>[:SENSe] :POWer [:RF] :EATTenuation?</code> |
| Notes | Electronic Attenuation’s specification is defined only when Mechanical Attenuation is 6 dB. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the |

| | |
|--------------------------|--|
| | POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out. |
| Preset | 0 dB |
| State Saved | Saved in instrument state |
| Min | 0 dB |
| Max | Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :RANGe:OPTimize IMMEDIATE |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2237 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation OFF ELECTRical COMBined |

| | |
|--------------------------|--|
| | <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code> |
| Notes | The SCPI parameter ELECtrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECtrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip |
| State Saved | Saved in instrument state |
| Range | Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------|--|
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe:AUTO?</code> |
| Notes | ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off" |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT OFF |
| Initial S/W Revision | Prior to A.02.00 |

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT ELEC |
| Initial S/W Revision | Prior to A.02.00 |

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT COMB |
| Initial S/W Revision | Prior to A.02.00 |

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] 10 dB 2 dB [:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] ? |
| Example | POW:ATT:STEP 2 |
| Notes | Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10. |
| Dependencies | Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error. |
| Couplings | When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB |
| Preset | PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA) |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Scale/Div

Sets the units per division of the vertical scale in the logarithmic display. However, since the Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

| | |
|---------------------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, DVB-T/H, LTE, LTE-TDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ ampl> :DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision? |
| Example | DISP:SPUR:VIEW:WIND:TRAC:Y:PDIV 10 dB DISP:SPUR:VIEW:WIND:TRAC:Y:PDIV? |
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, DVB-T/H mode, TD-SCDMA, LTE mode, LTE TDD mode, WLAN mode, MSR, LTE-Advanced FDD/TDD mode or WiMAX mode to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | When Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off. |
| Preset | 10.00 dB |
| State Saved | Saved in instrument state. |
| Range | 0.10 dB to 20.00 dB |
| Min | 0.10 dB |
| Max | 20.00 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 1215](#).

| | |
|-----------------|---------------|
| Key Path | AMPTD Y Scale |
|-----------------|---------------|

| | |
|-------------------------------------|---|
| Remote Command | <code>[:SENSe] :POWer [:RF] :PCENter</code> |
| Example | POW:PCEN |
| Notes | Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Couplings | <p>The active marker position determines where the centering will be attempted.</p> <p>If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.</p> |
| Status Bits/OPC dependencies | <p>When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command.</p> <p>The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.</p> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when "Presel Center" on page 2240 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

| | |
|------------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :POWer [:RF] :PADJust <freq></code> <code>[:SENSe] :POWer [:RF] :PADJust?</code> |
| Example | POW:PADJ 100KHz POW:PADJ? |
| Notes | The value on the key reads out to 0.1 MHz resolution. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Preset | 0 MHz |
| State Saved | The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle. |
| Min | -500 MHz |
| Max | 500 MHz |
| Default Unit | Hz |
| Backwards Compatibility SCPI | <code>[:SENSe] :POWer [:RF] :MW :PADJust</code> <code>[:SENSe] :POWer [:RF] :MMW :PADJust</code> PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to <code>[:SENSe] :POWer [:RF] :PADJust</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|----------------|--|
| Remote Command | <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector MWAVE MMWave EXTErnal</code> <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector?</code> |
| Notes | PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, |

to provide backward compatibility, we accept the legacy remote commands.
The command form has no effect, the query always returns MWAVE

Initial S/W Revision Prior to A.02.00

Y Axis Unit

Displays the menu keys that enable you to change the vertical (Y) axis amplitude unit. The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types. For example, if Scale Type has been set to Log, and you set Y Axis Unit to dBm, pressing Scale Type (Log) sets the Y Axis Unit to dBm. If Scale Type has been set to Lin and you set Y Axis Unit to V, pressing Scale Type (Lin) sets the Y Axis Unit to V. Pressing Scale Type (Log) again sets the Y axis unit back to dBm.

NOTE

The units of current (A, dBmA, dBuA) are calculated based on 50 ohms input impedance.

All four of the EMI units (dB μ A/m, dB μ V/m, dBG, dBpT) are treated by the instrument exactly as though they were dBuV. The user must load an appropriate correction factor using Amplitude Corrections for accurate and meaningful results.

If a SCPI command is sent to the analyzer that uses one of the EMI units as a terminator, the analyzer treats it as though DBUV had been sent as the terminator.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA |
| Scope | Meas Global |
| Remote Command | :UNIT:POWer DBM DBMV DBMA V W A DBUV DBUA DBPW DBUVM DBUAM DBPT DBG :UNIT:POWer? |

Example UNIT:POW dBmV
UNIT:POW?

Notes The Y axis unit has either logarithmic or linear characteristics. The set of units that is logarithmic consists of dBm, dBmV, dBmA, dB μ V, dB μ A, dB μ V/m, dB μ A/m, dBpT, and dBG. The set of units that are linear consists of V, W, and A. The chosen unit will determine how the reference level and all the amplitude-related outputs like trace data, marker data, etc. read out.

Notes The settings of Y Axis Unit and Scale Type, affect how the data is read over the remote interface. When using the remote interface no unit is returned, so you must know what the Y axis unit is to interpret the results:
Example 1, set the following:
Scale Type (Log)
Y Axis Unit, dBm
Scale/Div, 1 dB
Ref Level, 10 dBm
This sets the top line to 10 dBm with each vertical division representing 1 dB. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 5 dBm and will read out remotely as 5.
Example 2, set the following:

| | |
|--------------------------|--|
| | Scale Type (Lin) Y Axis Unit, Volts Ref Level, 100 mV (10 mV/div) This sets the top line to 100 mV and the bottom line to 0 V, so each vertical division represents 10 mV. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 50 mV and will read out remotely as 50. |
| Dependencies | If an amplitude correction with an Antenna Unit other than None is applied and enabled, then that antenna unit is forced and the key with that unit is the only Y Axis Unit available. All other Y Axis Unit keys are grayed out. If an amplitude correction with an Antenna Unit other than None is applied and enabled, and you then turn off that correction or set Apply Corrections to No, the Y Axis Unit that existed before the Antenna Unit was applied is restored. |
| Couplings | The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types |
| Preset | dBm for log scale, V for linear. The true 'preset' value is dBm, since at preset the Y Scale type is set to logarithmic. |
| State Saved | Saved in instrument state |
| Readback line | 1-of-N selection |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.04.00, A.11.00 |

dBm

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBm.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBM |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmV

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmV.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmV |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmA

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmA |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

W

Sets the amplitude unit for the selected amplitude scale (log/lin) to watt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW W |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | W |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

V

Sets the amplitude unit for the selected amplitude scale (log/lin) to volt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW V |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

A

Sets the amplitude unit for the selected amplitude scale (log/lin) to Ampere.

| | |
|----------|----------------------------|
| Key Path | AMPTD Y Scale, Y Axis Unit |
|----------|----------------------------|

| | |
|--------------------------|---|
| Example | UNIT:POW A |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ V

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A.

NOTE

The unit dBuA can also appear as an Antenna Unit. This will be used by customers using current probes, because current probes are often supplied with conversion tables that provide the transducer factors. When dBuA is used as an Antenna Unit the normal conversion from power to amps for dBuA (based on the analyzer input impedance) is not done, but instead the conversion is based solely on the Correction that contains the transducer factors. This is what distinguishes dBuA as a normal unit from dBuA as an antenna unit. When querying the Y-Axis unit, you can query the Antenna Unit to distinguish between regular dBuA and the dBuA antenna unit. If :CORR:CSET:ANT? returns NOC (for No Conversion), you are using a normal Y Axis dBuA. If it returns UA you are using an Antenna Unit dBuA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBpW

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpW.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBPW |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

Antenna Unit

When a Correction is turned on that uses an Antenna Unit, the Y Axis Unit changes to that Antenna Unit. All of the keys in the Y-Axis Unit menu are then greyed out, except the Antenna Unit key. The unit being used is shown on this key and is shown as selected in the submenu.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback line | Currently selected unit |
| Initial S/W Revision | A.11.00 |

dB μ V/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUVM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ V/m |
| Initial S/W Revision | A.02.00 |

dB μ A/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |

| | |
|----------------------|--------------|
| Readback | dB μ A/m |
| Initial S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

dBpT

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpT. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBPT |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dBpT |
| Initial S/W Revision | A.02.00 |

DBG

Sets the amplitude unit for the selected amplitude scale (log/lin) to DBG. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBG |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | DBG |
| Initial S/W Revision | A.02.00 |

None

This is selected if no Antenna Unit is currently on, however you cannot actually set this value, since it is always grayed out. The key is included simply to provide an indication on the Readback line of the Antenna Unit key when there is no Antenna Unit selected.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Readback | "None" |
| Initial S/W Revision | A.11.00 |

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, BASIC, PNOISE, VSA , LTE, LTETDD |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH? |
| Example | :POW:MW:PATH LNP Enables the Low Noise path |
| Notes | If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μW Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean "when the low noise path is enabled" but |

| | |
|--------------------------|--|
| | <p>when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled.</p> <p>Alignment switching ignores the settings in this menu, and restores them when finished.</p> |
| Dependencies | Unavailable in BBIQ and External Mixing |
| Preset | <p>All modes other than IQ Analyzer mode and VXA: STD</p> <p>IQ Analyzer, VXA and WLAN mode:</p> <p>MPB option present and licensed: MPB</p> <p>MPB option not present and licensed: STD</p> |
| State Saved | Save in instrument state |
| Readback | Value selected in the submenu |
| Initial S/W Revision | A.04.00 |
| Modified at S/W Revision | A.10.00 |

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH STD |
| Readback Text | Standard Path |
| Initial S/W Revision | A.04.00 |

Low Noise Path Enable

You may choose Low Noise Path Enable, which gives a lower noise floor under some circumstances, particularly when operating in the 21–26.5 GHz region. With the Low Noise Path enabled, the low band/high band switch and microwave preamp are bypassed whenever all of the following are true:

- The analyzer is not in the Low Band, meaning:
- the start frequency is above 3.5 GHz and
- the stop frequency is above 3.6 GHz.
- the internal preamp is not installed or (if installed) is set to Off or Low Band

Note that this means that, when any part of a sweep is done in Low Band, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. Also, if the preamp is turned on, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. The only time the Low Noise Path is used is when Low Noise Path Enable is selected, the sweep is completely in High Band (> 3.6 GHz) and no preamp is in use.

See "[More Information](#)" on page 1225

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Measurement | Swept SA |
| Example | :POW:MW:PATH LNP |
| Notes | <p>For measurements that use IQ acquisition, the low noise path is used when the Center Frequency is in High Band (> 3.6 GHz) and no preamp is in use.</p> <p>In other words, the rules above are modified to use only the center frequency to qualify which path to switch in.</p> <p>This is not the case for FFT's in the Swept SA measurement; they use the same rules as swept measurements.</p> |
| Dependencies | <p>Key is blanked if current mode does not support it.</p> <p>Key is grayed out if mode supports it but current measurement does not support it.</p> <p>Unless Option LNP is present and licensed, key is blank and if SCPI command sent, error -241, "Hardware missing; Option not installed" is generated.</p> |
| Readback Text | Low Noise Path Enable |
| Initial S/W Revision | A.04.00 |

More Information

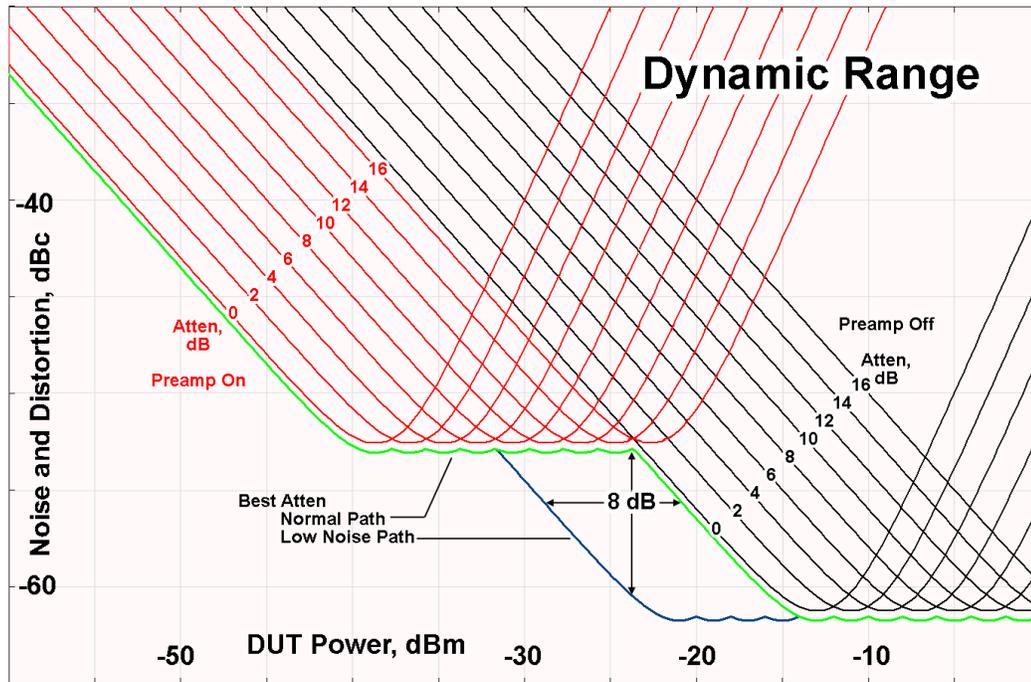
The user should understand that the Low Noise Path, while giving improved DANL, has the disadvantage of decreased TOI performance and decreased gain compression performance relative to the standard path.

The user should also understand that the bypass switch is a mechanical switch and has finite life, so if the Low Noise Path is enabled, it is possible to cause frequent cycling of this switch by frequently changing analyzer settings such that the above conditions hold true only some of the time. A user making tests of this nature should consider opting for the Standard Path, which will never throw the bypass switch, at the expense of some degraded noise performance.

The low noise path is useful for situations where the signal level is so low that the analyzer performance is dominated by noise even with 0 dB attenuation, but still high enough that the preamp option would have excessive third-order intermodulation or compression. The preamp, if purchased and used, gives better noise floor than does the "Low Noise Path." However, its compression threshold and third-order intercept are much poorer than that of the non-preamp path. There are some applications, typically for signals around -30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range

The graph below illustrates the concept. It shows, in red, the performance of an analyzer at different attenuation settings, both with the preamp on and off, in a measurement that is affected by both analyzer

noise and analyzer TOI. The green shows the best available dynamic range, offset by 0.5 dB for clarity. The blue shows how the best available dynamic range improves for moderate signal levels with the low noise path switched in. In this illustration, the preamp improves the noise floor by 15 dB while degrading the third-order intercept by 30 dB, and the low noise path reduces loss by 8 dB. The attenuator step size is 2 dB.



There are other times where selecting the low noise path improves performance, too. Compression-limited measurements such as finding the nulls in a pulsed-RF spectrum can profit from the low noise path in a way similar to the TOI-limited measurement illustrated. Accuracy can be improved when the low noise path allows the optimum attenuation to increase from a small amount like 0, 2 or 4 dB to a larger amount, giving better return loss at the analyzer input. Harmonic measurements, such as second and third harmonic levels, are much improved using the low noise path because of the superiority of that path for harmonic (though not intermodulation) distortion performance.

μW Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselector is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH MPB |
| Dependencies | Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated. |
| Readback Text | μ W Preselector Bypass |
| Initial S/W Revision | A.04.00 |

| | |
|-----------------------|---|
| Remote Command | [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1 [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ? |
| Example | :POW:MW:PRES OFF Bypasses the microwave preselector |
| Notes | The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB) |
| Preset | ON |

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

| | |
|----------|---------------|
| Key Path | AMPTD Y Scale |
|----------|---------------|

| | |
|--------------------------|---|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :POWeR [:RF] :GAIN [:STATe] OFF ON 0 1</code> <code>[:SENSe] :POWeR [:RF] :GAIN [:STATe] ?</code> |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. The preamp is not available when the electronic/soft attenuator is enabled. |
| Couplings | The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range. Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected. Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :POWeR [:RF] :GAIN :BAND LOW FULL</code> <code>[:SENSe] :POWeR [:RF] :GAIN :BAND ?</code> |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated. |
| Preset | LOW |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns the internal preamp off

| | |
|----------|--------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
|----------|--------------------------------|

| | |
|----------------------|------------------|
| Example | :POW:GAIN OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

| | |
|----------------------|------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND LOW |
| Readback | Low Band |
| Initial S/W Revision | Prior to A.02.00 |

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND FULL |
| Readback | Full Range |
| Initial S/W Revision | Prior to A.02.00 |

Auto Scaling

Toggles the Auto Scaling function between On and Off.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:COUPLe 0 1 OFF ON :DISPlay:SPURious:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:COUPLe? |

| | |
|-------------------------------------|--|
| Example | DISP:SPUR:VIEW:WIND:TRAC:Y:COUP OFF DISP:SPUR:VIEW:WIND:TRAC:Y:COUP? |
| Couplings | <p>When Auto Scaling is On and the Restart front-panel key is pressed, this function automatically determines the scale per division and reference values based on the measurement results.</p> <p>When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off.</p> <p>When the Y Auto Scaling is off, the measurement uses the current reference level settings. When the Y Auto Scaling is on, the analyzer automatically sets the reference level such that the absolute limit is positioned two divisions down from the top of the display. This is the most useful setting when searching for spurs. The algorithm used for determining the ref level is $\text{Ref Level} = \text{Absolute Limit} + (2 * \text{Scale/Div})$. All other reference level settings are left as the current base instrument settings.</p> |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Backwards Compatibility SCPI | [:SENSe] : SPURious : POWer [:RF] : RANGe : AUTO |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 1231

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Remote Command | :COUPle ALL NONE |
| Example | :COUP ALL |
| Notes | :COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

There are two types of functions that have Auto/Manual modes.

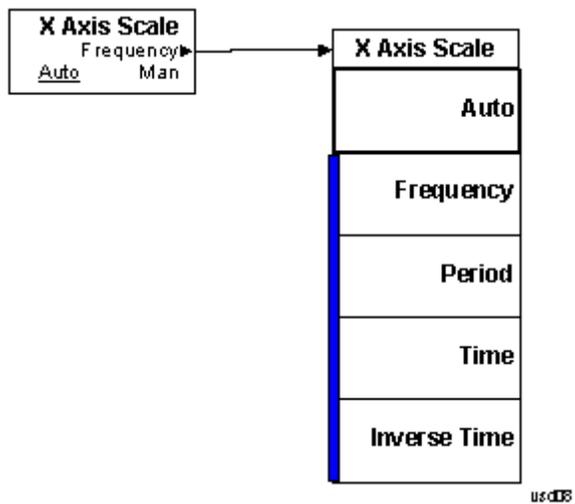
Auto/Man Active Function keys

An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.



BW

BW is unavailable in the Spurious Emissions measurement. When pressed, this key displays a blank menu.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

| | |
|--------------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous? |
| Example | :INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation |
| Preset | ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF) |
| State Saved | Saved in instrument state |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep. |
| Initial S/W Revision | Prior to A.02.00 |

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

12 Spurious Emissions Measurement
File

File

See "File" on page 344

FREQ Channel

Accesses a menu of keys that allow you to control the Frequency and Channel parameters of the instrument.

Some features in the Frequency menu are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset. For example, the Center Freq setting is the same for all measurements – it does not change as you change measurements.

| | |
|-----------------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 1240](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 1242](#)

See ["Center Frequency Presets" on page 1238](#)

| | |
|-----------------------|--|
| Key Path | FREQ Channel |
| Scope | Meas Global |
| Remote Command | [:SENSe] :FREQuency:CENTer <freq> [:SENSe] :FREQuency:CENTer? |

| | |
|-----------------------------|--|
| Example | FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT? |
| Notes | This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated. |
| Dependencies | The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit. |
| Couplings | When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range |
| Preset | Depends on instrument maximum frequency, mode, measurement, and selected input. See "Center Frequency Presets" on page 1238 and "RF Center Freq" on page 1240 and Ext Mix Center Freq and "I/Q Center Freq" on page 1242 . |
| State Saved | Saved in instrument state |
| Min | Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1238 and "RF Center Freq" on page 1240 and "I/Q Center Freq" on page 1242 . |
| Max | Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1238 and "RF Center Freq" on page 1240 and "I/Q Center Freq" on page 1242 . |
| Default Unit | Hz |
| Status Bits/OPC | Non-overlapped |
| Dependencies | |
| Initial S/W Revision | Prior to A.02.00 |

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

| Freq Option | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune) |
|-------------|-------------------------|--------------------------------|-----------------------------|
| | | | |

| | | | above) |
|---------------------------------------|------------|----------|--------------|
| 503 (all but N9000A) | 1.805 GHz | 3.6 GHz | 3.7 GHz |
| 503 (N9000A) | 1.505 GHz | 3.0 GHz | 3.08 GHz |
| 507 (all but N9000A) | 3.505 GHz | 7.0 GHz | 7.1 GHz |
| 507 (N9000A) | 3.755 GHz | 7.5 GHz | 7.58 GHz |
| 508 (all but N9038A) | 1.805 GHz | 3.6 GHz | 8.5 GHz |
| 508 (N9038A) | 4.205 GHz | 8.4 GHz | 8.5 GHz |
| 513 | 6.805 GHz | 13.6 GHz | 13.8 GHz |
| 526 (all but N9000A and N9038A) | 13.255 GHz | 26.5 GHz | 27.0 GHz |
| 526 (N9000A) | 13.255 GHz | 26.5 GHz | 26.55 GHz |
| 526 (N9038A) | 1.805 GHz | 3.6 GHz | 27.0 GHz |
| 532 | 16.005 GHz | 32.0 GHz | 32.5 GHz |
| 543 | 21.505 GHz | 43.0 GHz | TBD |
| 544 | 22.005 GHz | 44.0 GHz | 44.5 GHz |
| 550 | 25.005 GHz | 50.0 GHz | 51 GHz |

Input 2:

| Model | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune above) |
|----------------|----------------------------|-----------------------------------|-----------------------------------|
| N9000A opt C75 | 0.7505GHz | 1.5 GHz | 1.58 GHz |
| N9038A | 505 MHz | 1 GHz | 1.000025 GHz |

Tracking Generator Frequency Limits (N9000A only):

| Tracking Generator Option | Min Freq (clips to this freq when turn TG on and | If above this Freq, Stop Freq clipped to this Freq when | Max Freq (can't tune above) while TG |
|---------------------------------|--|---|--|
| | | | |

| | can't tune below while TG on) | TG turned on | on |
|-----|-------------------------------|--------------|----------|
| T03 | 9 kHz | 3.0 GHz | 3.08 GHz |
| T06 | 9 kHz | 6.0 GHz | 6.05 GHz |

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

| Mode | CF Preset for RF |
|-------------|------------------|
| WCDMA | 1 GHz |
| WIMAXOFDMA, | 1 GHz |
| BASIC | 1 GHz |
| ADEMOD | 1 GHz |
| VSA | 1 GHz |
| TDSCDMA | 1 GHz |
| PNOISE | 1 GHz |
| LTE | 1 GHz |
| LTETDD | 1 GHz |
| MSR | 1 GHz |
| GSM | 935.2 MHz |
| NFIGURE | 1.505 GHz |

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:RF:CENTer <freq></code> <code>[:SENSe] :FREQuency:RF:CENTer?</code> |
| Example | FREQ:RF:CENT 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Dependencies | If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of |

| | |
|--------------------------|--|
| | Source Numerator, Source Denominator and Power Sweep. |
| Preset | See table above |
| State Saved | Saved in instrument state. |
| Min | -79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source |
| Max | See table above. Basically instrument maximum frequency - 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code> |
| Example | <code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code> |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Couplings | When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup. |
| Preset | When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies. If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq - Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table. |

| | |
|----------------------|---|
| | <p>When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz.</p> <p>Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz.</p> |
| State Saved | Saved in instrument state. |
| Min | The minimum frequency in the currently selected mixer band + 5 Hz |
| Max | <p>The maximum frequency in the currently selected mixer band – 5 Hz</p> <p>If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency</p> |
| Initial S/W Revision | A.08.01 |

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | <pre>[:SENSe] :FREQuency:IQ:CENTer <freq></pre> <pre>[:SENSe] :FREQuency:IQ:CENTer?</pre> |
| Example | FREQ:IQ:CENT: 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Preset | 0 Hz |
| State Saved | Saved in instrument state. |
| Min | -40.049995 MHz |
| Max | 40.049995 MHz |
| Initial S/W Revision | Prior to A.02.00 |

CF Step

Changes the step size for the center frequency and start and stop frequency functions. Once a step size has been selected and the center frequency function is active, the step keys (and the UP|DOWN parameters for Center Frequency from remote commands) change the center frequency by the step-size value. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the analyzer.

Note that the start and stop frequencies also step by the CF Step value.

| | |
|------------------------------|--|
| Key Path | FREQ Channel |
| Remote Command | [:SENSe] :FREQuency:CENTer:STEP [:INCRement] <freq> [:SENSe] :FREQuency:CENTer:STEP [:INCRement] ? [:SENSe] :FREQuency:CENTer:STEP:AUTO OFF ON 0 1 [:SENSe] :FREQuency:CENTer:STEP:AUTO? |
| Example | FREQ:CENT:STEP:AUTO ON FREQ:CENT:STEP 500 MHz FREQ:CENT UP increases the current center frequency value by 500 MHz FREQ:CENT:STEP? FREQ:CENT:STEP:AUTO? |
| Notes | Preset and Max values are depending on Hardware Options (503, 507, 508, 513, 526) |
| Notes | Preset and Max values are dependent on Hardware Options (5xx) |
| Dependencies | Freq Offset is not available in External Mixing. In this case the Freq Offset key is grayed out and shows a value of zero. It will once again be available, and show the previously set value, when you return to the RF Input. |
| Dependencies | Span, RBW, Center frequency If the electronic/soft attenuator is enabled, any attempt to change the value of the center frequency >3.6 GHz by pressing the Up-arrow key, fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. |
| Couplings | When auto-coupled in a non-zero span, the center frequency step size is set to 10% of the span. When auto-coupled in zero span, the center frequency step size is set to the equivalent -3 dB RBW value. |
| Preset | Auto ADEMOD: 1 MHz ON |
| State Saved | Saved in instrument state |
| Min | – (the maximum frequency of the instrument). That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Max | The maximum frequency of the instrument. That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Default Unit | Hz |
| Status Bits/OPC dependencies | non-overlapped |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

12 Spurious Emissions Measurement
Input/Output

Input/Output

See "[Input/Output](#)" on page 202

Marker

Displays the menu keys that enable you to select, set up and control the markers for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Marker Type

Sets the marker control mode to Normal, Delta and Off. Normal enables you to activate the selected marker to read the power level and time. Delta enables you to read the differences in the power levels and time scales between the selected marker and the next marker. Off enables you to turn off the selected marker.

All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

| | |
|----------------|--|
| Key Path | Marker |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SPURious:MARKer[1] 2 ... 12:MODE POSition DELTA OFF :CALCulate:SPURious:MARKer[1] 2 ... 12:MODE? |
| Example | CALC:SPUR:MARK:MODE POS CALC:SPUR:MARK:MODE? |

Notes

If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area.

Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off.

Active Function Display: the marker X axis value entered in the active function area will display the marker value to its full entered precision.

You must be in the cdma2000 mode, 1xEV-DO mode, TD-SCDMA mode, W-CDMA mode, DVB-T/H mode, GSM/EDGE mode, LTE mode, LTE TDD mode, WLAN mode, MSR, LTE-Advanced FDD/TDD mode or WiMAX mode to use this command. Use INSTRument:SElect to set the mode.

| | |
|--------------------------|----------------------------|
| Preset | =OFF |
| State Saved | Saved in instrument state. |
| Range | Normal Delta Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Properties

Accesses the Properties menu to set certain properties of the selected marker.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Relative To

Selects the marker the selected marker will be relative to (its reference marker).

Every marker has another marker to which it is relative. This marker is referred to as the "reference marker" for that marker. This attribute is set by the Marker, Properties, Relative To key. The marker must be a Delta marker to make this attribute relevant. If it is a Delta marker, the reference marker determines how the marker is controlled and how its value is displayed. A marker cannot be relative to itself.

| | |
|-----------------------|---|
| Key Path | Marker, Properties |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTE TDD, WLAN, MSR, LTE FDD, LTE TDD |
| Remote Command | :CALCulate:SPURious:MARKer[1] 2 ... 12:REference <integer> :CALCulate:SPURious:MARKer[1] 2 ... 12:REference? |
| Example | CALC:SPUR:MARK3:REF 5 CALC:SPUR:MARK:REF? |
| Notes | A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." When queried a single value will be returned (the specified marker numbers relative marker). You must be in the Spectrum Analysis mode, GSM mode, LTE mode, LTE TDD mode, WLAN mode, MSR, LTE-Advanced FDD/TDD mode or WiMAX mode or TD-SCDMA mode to use this command. |

| | |
|--------------------------|--|
| | Use INSTRument:SElect to set the mode. |
| Preset | 2 3 4 5 6 7 8 9 10 11 12 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 12 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker which is not Off. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

| | |
|--------------------------|--|
| Key Path | Marker |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SPURious:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:SPURious:MARKer:COUPle[:STATe]? |
| Example | CALC:SPUR:MARK:COUP ON CALC:SPUR:MARK:COUP? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

All Markers Off

Turns off all markers.

| | |
|--------------------------|---|
| Key Path | Marker |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SPURious:MARKer:AOFF |
| Example | CALC:SPUR:MARK:AOFF |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Marker X Axis Value (Remote Command only)

Sets the Marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value if the control mode is Normal or Delta.

| | |
|--------------------------|---|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, DVB-T/H, LTE, LTE-TDD, WLAN, MSR, LTE-FDD, LTE-TDD |
| Remote Command | :CALCulate:SPURious:MARKer[1] 2 ... 12:X <freq> :CALCulate:SPURious:MARKer[1] 2 ... 12:X? |
| Example | CALC:SPUR:MARK2:X 25 kHz CALC:SPUR:MARK3:X? |
| Notes | If no suffix is sent it will use the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" will be generated. The query returns the absolute X Axis marker value if the control mode is Normal, or the offset from the reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off, the response is not a number. |
| Preset | 1 GHz |
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Marker X Axis Position (Remote Command only)

Sets the Marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal or Delta - except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

| | |
|----------------|--|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTE-TDD, WLAN, MSR, LTE-FDD, LTE-TDD |
| Remote Command | :CALCulate:SPURious:MARKer[1] 2 ... 12:X:POSition <integer> :CALCulate:SPURious:MARKer[1] 2 ... 12:X:POSition? |
| Example | CALC:SPUR:MARK10:X:POS 300 CALC:SPUR:MARK10:X:POS? |
| Notes | The query returns the absolute X Axis marker value in trace points if the control mode is Normal, or the offset from the reference marker in trace points if the control mode is Delta. The value is returned as a real number, not an integer, corresponding to the translation from X Axis Scale units to trace points. If the marker is Off the response is not a number. |
| Preset | 300 |

| | |
|--------------------------|------------------|
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Marker Y Axis Value (Remote Command only)

Returns the marker Y Axis value in the current marker Y Axis unit.

| | |
|--------------------------|---|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTE-TDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SPURious:MARKer[1] 2 ... 12:Y? |
| Example | CALC:SPUR:MARK11:Y? |
| Notes | If no suffix is sent, it will use the current Y Axis unit. If a suffix is sent that does not have units of absolute amplitude, an error "Invalid suffix" will be generated. |
| Preset | Depends on Y axis range of selected Trace. |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Marker Function

There are no 'Marker Functions' supported in Spurious Emissions so this front-panel key displays a blank menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Marker To

There is no 'Marker To' functionality supported in Spurious Emissions, so this front-panel key displays a blank menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Remote Measurement Functions

This section contains the following topics:

["Measurement Group of Commands" on page 2285](#)

["Current Measurement Query \(Remote Command Only\)" on page 2287](#)

["Limit Test Current Results \(Remote Command Only\)" on page 2287](#)

["Data Query \(Remote Command Only\)" on page 2287](#)

["Calculate/Compress Trace Data Query \(Remote Command Only\)" on page 2288](#)

["Calculate Peaks of Trace Data \(Remote Command Only\)" on page 2293](#)

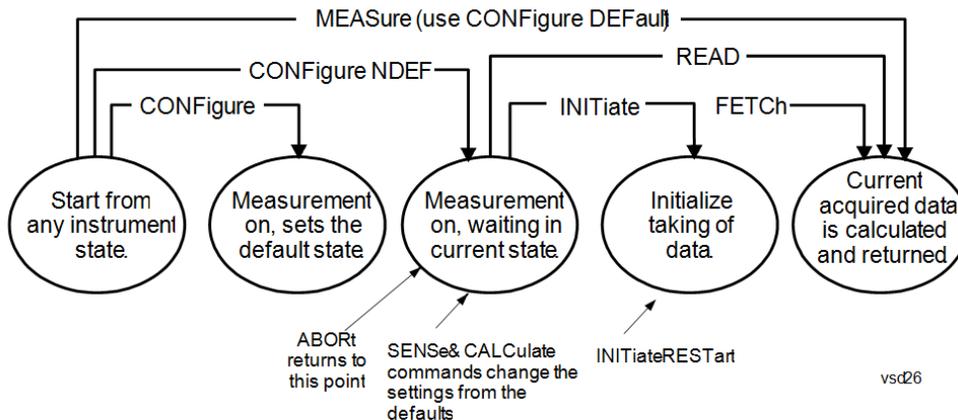
[Hardware-Accelerated Fast Power Measurement \(Remote Command Only\)](#)

["Format Data: Numeric Data \(Remote Command Only\)" on page 2294](#)

["Format Data: Byte Order \(Remote Command Only\)" on page 2295](#)

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFIGure command. Use the commands in the SENSE:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSE:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFigure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
-

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
-

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

| | |
|-----------------------|-------------|
| Remote Command | :CONFigure? |
|-----------------------|-------------|

| | |
|----------------|-------|
| Example | CONF? |
|----------------|-------|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

| | |
|-----------------------|--------------------------|
| Remote Command | :CALCulate:CLIMits:FAIL? |
|-----------------------|--------------------------|

| | |
|----------------|--|
| Example | CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails. |
|----------------|--|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA[n]? |
| Notes | The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement. |
| Initial S/W Revision | Prior to A.02.00 |

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]] |
| Example | To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.) |
| Notes | The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data. |
| Initial S/W Revision | Prior to A.02.00 |

- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

-

NOTE

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$DME = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$RMS = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$RMS = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPlE - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEVIation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

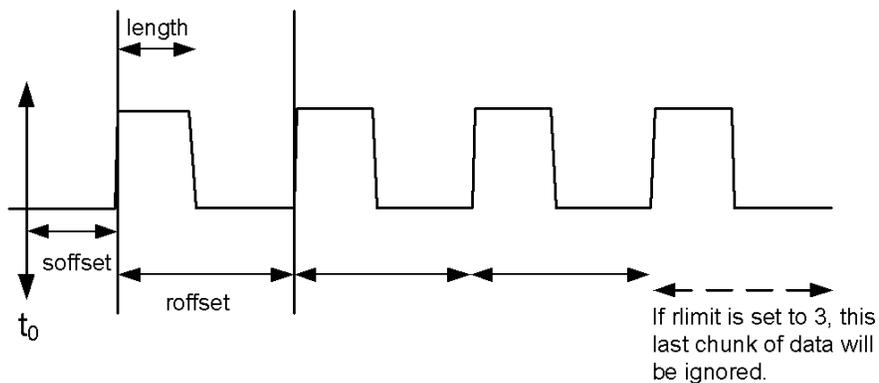
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

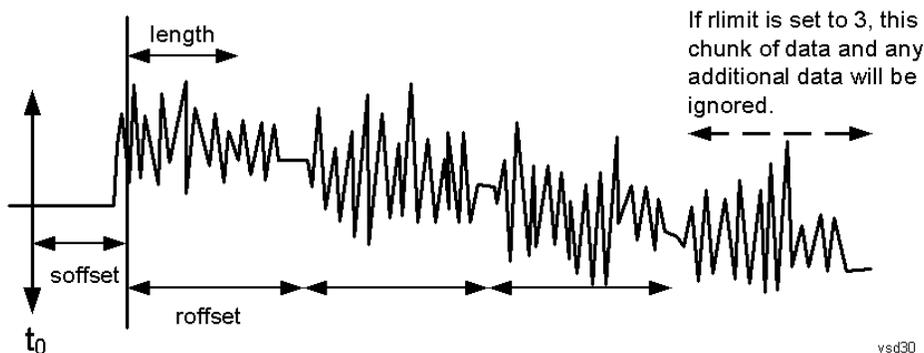
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

| | |
|-----------------------|---|
| Remote Command | <p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre> |
|-----------------------|---|

| | |
|----------------|---|
| Example | <p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p> |
|----------------|---|

| | |
|--------------|---|
| Notes | <p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p> |
|--------------|---|

excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQuency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat [:TRACe] [:DATA] ASCii | INTeger, 32 | REAL, 32 | REAL, 64
:FORMat [:TRACe] [:DATA] ?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

Initial S/W Revision Prior to A.02.00

The specs for each output type follow:

ASCIi - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPPed order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

| | |
|-----------------------------|--|
| Remote Command | :FORMat:BORDER NORMal SWAPPed :FORMat:BORDER? |
| Preset | NORMal |
| Initial S/W Revision | Prior to A.02.00 |

Meas Setup

Displays the measurement setup menu for the currently selected measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Avg/Hold Num

Specifies the number of measurement averages used to calculate the measurement result. The average is displayed at the end of each sweep.

Average State allows you to turn averaging on or off.

| | |
|--------------------------|---|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, CDMA1xEVDO, TD-SCDMA, DVB-T/H, LTE, LTE-TDD, WLAN, MSR, LTE-AFDD, LTE-TDD |
| Remote Command | [:SENSe]:SPURious:AVERage:COUNT <integer> [:SENSe]:SPURious:AVERage:COUNT? [:SENSe]:SPURious:AVERage[:STATe] ON OFF 1 0 [:SENSe]:SPURious:AVERage[:STATe]? |
| Example | SPUR:AVER:COUN 2500 SPUR:AVER:COUN? SPUR:AVER ON SPUR:AVER? |
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, DVB-T/H mode, TD-SCDMA mode, LTE mode, LTE TDD mode, WLAN mode, MSR, LTE-Advanced FDD/TDD mode or WiMAX mode to use this command. Use INSTRUMENT:SElect to set the mode. |
| Preset | 10 OFF |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 10000 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Avg Mode

Enables you to set the averaging mode.

- When set to Exponential (Exp) the measurement averaging continues using the specified number of averages to compute each averaged value. The average will be displayed at the end of each sweep.

- When set to Repeat, the measurement resets the average counter each time the specified number of averages is reached.

| | |
|--------------------------|--|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, WIMAX OFDMA, TD-SCDMA, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :SPURious:AVERage:TCONtrol EXPonential REPeat [:SENSe] :SPURious:AVERage:TCONtrol? |
| Example | SPUR:AVER:TCON REP SPUR:AVER:TCON? |
| Notes | You must be in the cdma2000 mode, TD-SCDMA mode, W-CDMA mode, DVB-T/H mode, GSM/EDGE mode, LTE mode, LTE TDD mode, WLAN mode, MSR, LTE-Advanced FDD/TDD mode or WiMAX mode to use this command. Use INSTRument:SElect to set the mode. |
| Preset | EXPonential |
| State Saved | Saved in instrument state. |
| Range | Exp Repeat |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Range Table

Enables you to set range parameters.

To change a parameter, select the appropriate menu softkey and enter the value using the numeric keypad or the knob. The analyzer settings will be updated with the new parameter values.

When the current view is the Range Table view, the selected range is highlighted and displayed in the Range Table automatically. With the normal window arrangement, up to five ranges are displayed. In the zoom mode, all 20 ranges can be displayed.

In the Range Table window, there are three tables corresponding to each page of the Range Table menu. When the Range Table key is pressed, the table of the first menu page is displayed.

The Displayed table is changed by changing the Range Table menu page. It can also be changed by a remote command. When the Range Table is changed by the command, the menu page changes accordingly if the Range Table menu is displayed.

| | |
|----------------------|------------------|
| Key Path | Meas Setup |
| Initial S/W Revision | Prior to A.02.00 |

Range

Changing the range updates the values on the other menu keys so that they reflect the settings for the selected range. If Range is turned on, it will be used as part of the measurement. If it is off, it will be excluded. A range is made up of the next fifteen parameters. This parameter can send up to 20 values. The

Start Freq

Sets the start frequency of the analyzer. This parameter can send up to 20 values. The location where the start frequency occurs in the list sent to the measurement corresponds to the range the value is associated with.

Missing values are not permitted. If you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

| | |
|----------------|---|
| Key Path | Meas Setup, Range Table |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN |
| Remote Command | [:SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STARt <freq>, <freq> [:SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STARt? |
| Example | SPUR:FREQ:STAR 9 kHz, 150 kHz, 30 MHz, 1GHz, 1.5 GHz, 1.5 GHz SPUR:FREQ:STAR? |
| Notes | You must be in cdma2000 mode, TD-SCDMA mode, W-CDMA mode, DVB-T/H, GSM/EDGE mode, LTE mode, LTE TDD mode, WLAN mode, MSR or WiMAX mode to use this command. Use INSTRument:SElect to set the mode. |
| Preset | SA, WIMAX OFDMA:+1.92000000E+009, +1.89350000E+009, +2.10000000E+009, +2.17500000E+009, +8.00000000E+008, +1.50000000E+009, +1.50000000E+009 WCDMA:9kHz, 150kHz, 30MHz, 1GHz, 2.1GHz, 2.1GHz, 2.1774GHz, 2.18GHz, 1.5GHz, 1.5GHz C2K, 1xEV-DO: 9kHz, 150kHz, 30 MHz, 1GHz, 2.5GHz, 2.5GHz, 2.5GHz, 2.5 GHz, 2.5 GHz TD-SCDMA: 9 kHz, 150 kHz, 30 MHz, 1GHz, 1.5 GHz, 1.5 GHz DVB-T/H: 9kHz, 174MHz, 400MHz, 790MHz, 862MHz, 1GHz, 1.5GHz, 1.5GHz LTE, MSR: 9 kHz, 150 kHz, 30 MHz, 1 GHz, 1.92GHz, 1.98 GHz, 2.18 GHz, 1.5 GHz LTETDD: 9 kHz, 150 kHz, 30 MHz, 1 GHz, 1.90GHz, 2.01 GHz, 2.025 GHz, 1.5 GHz WLAN: 9 kHz, 150 kHz, 30 MHz, 1 GHz, 1.5 GHz |
| State Saved | Saved in instrument state. |
| Min | -80 MHz |

| | |
|--------------------------|---|
| Max | Hardware Dependent: Option 503: 3699999990 Option 508: 8499999990 Option 513: 1379999990 Option 526: 2699999990 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Stop Freq

Sets the stop frequency of the analyzer. This parameter can send up to 20 values.

The location of where the stop frequency occurs in the list sent to the measurement corresponds to the range the value is associated with.

Missing values are not permitted. If you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

| | |
|----------------|---|
| Key Path | Meas Setup, Range Table |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, WLAN |
| Remote Command | [:SENSE] : SPURious [:RANGE] [:LIST] : FREQuency : STOP <freq>, <freq> [:SENSE] : SPURious [:RANGE] [:LIST] : FREQuency : STOP? |
| Example | SPUR:FREQ:STOP 150kHz, 30MHz, 1GHz, 2.1GHz, 2.1GHz, 2.1774GHz, 2.18GHz, 12.75GHz, 2.5GHz, 2.5GHz SPUR:FREQ:STOP? |
| Notes | You must be in cdma2000 mode, TD-SCDMA mode, W-CDMA mode, DVB-T/H, GSM/EDGE mode, LTE mode, LTE TDD mode, WLAN mode, MSR or WiMAX mode to use this command. Use INSTRument:SElect to set the mode. |
| Preset | SA, WIMAX OFDMA: +1.98000000E+009, +1.91960000E+009, +2.10150000E+009, +2.18000000E+009, +1.00000000E+009, +2.50000000E+009, +2.50000000E+009 WCDMA: 150kHz, 30MHz, 1GHz, 2.1GHz, 2.1GHz, 2.1774GHz, 2.18GHz, 12.75GHz, 2.5GHz, 2.5GHz C2K, 1xEV-DO: 150kHz, 30 MHz, 1GHz, 5GHz, 2.5GHz, 2.5GHz, 2.5GHz, 2.5 GHz, 2.5 GHz TD-SCDMA: 150kHz, 30 MHz, 1GHz, 12.75GHz, 2.5 GHz, 2.5 GHz DVB-T/H: 174MHz, 400MHz, 790MHz, 862MHz, 1GHz, 4.5GHz, 2.5GHz, 2.5GHz, 2.5GHz, 2.5GHz |

| | |
|-------------|---|
| | 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz SPUR:BAND? SPUR:BWID:AUTO ON, ON, ON, OFF, OFF, OFF, OFF, OFF, ON, ON, ON, ON, OFF, OFF, OFF, OFF, OFF, OFF, ON, ON SPUR:BWID:AUTO? |
| Notes | You must be in cdma2000 mode, TD-SCDMA mode, W-CDMA mode, DVB-T/H, GSM/EDGE mode, LTE mode, LTE TDD mode, WLAN mode, MSR, LTE-Advanced FDD/TDD mode or WiMAX mode to use this command. Use INSTRument:SElect to set the mode. |
| Preset | SA, WIMAX OFDMA:1.2MHz, 0.51MHz, 0.1MHz, 0.1MHz, 4MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz WCDMA:1kHz, 10kHz, 100kHz, 1MHz, 1MHz, 1MHz, 1MHz, 1MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz C2k, 1xEV-DO: 1kHz, 10kHz, 100kHz, 1MHz, 1MHz, 1MHz, 1MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz TD-SCDMA: 1kHz, 10kHz, 100kHz, 1MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz DVB-T/H: 100kHz, 3.9kHz, 100kHz, 3.9kHz, 100kHz, 100kHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz LTE, MSR, LTEAFDD: 1kHz, 10kHz, 100kHz, 1MHz, 100kHz, 1MHz, 1MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz LTETDD, LTEATDD: 1kHz, 10kHz, 100kHz, 1MHz, 1MHz, 1MHz, 1MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz WLAN: 1kHz, 10kHz, 100kHz, 1MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz, 3MHz SA, WIMAX OFDMA:OFF, OFF, OFF, OFF, OFF, ON, ON, ON, ON, ON WCDMA:OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON C2k, 1xEV-DO:OFF, OFF, OFF, OFF, OFF, OFF, OFF, ON, ON, ON, ON, ON,ON,ON,ON,ON,ON,ON,ON,ON TD-SCDMA: OFF, OFF, OFF, OFF, ON, ON, ON DVB-T/H: OFF, OFF, OFF, OFF, OFF, OFF, ON, ON LTE, MSR, LTEAFDD: OFF, OFF, OFF, OFF, OFF, OFF, OFF, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON LTETDD, LTEATDD: OFF, OFF, OFF, OFF, OFF, OFF, OFF, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON, ON WLAN: OFF, OFF, OFF, OFF, ON, ON |
| State Saved | Saved in instrument state. |
| Min | 1 Hz |

| | |
|-------------------------------------|--|
| Max | 8 MHz |
| Backwards Compatibility SCPI | <code>[:SENSe] :SPURious [:RANGe] [:LIST] :BWIDth [:RESolution]</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Video BW

Sets the Video BW mode of the analyzer. This can be Auto, where the analyzer determines the optimum setting, or Manual, where you determine the setting. This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted; that is, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

| | |
|----------------|---|
| Key Path | Meas Setup, Range Table |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTE-TDD, WLAN, MSR, LTE-FDD, LTE-TDD |
| Remote Command | <pre>[:SENSe] :SPURious [:RANGe] [:LIST] :BANDwidth:VIDeo <freq>, <freq> [:SENSe] :SPURious [:RANGe] [:LIST] :BANDwidth:VIDeo? [:SENSe] :SPURious [:RANGe] [:LIST] :BANDwidth:VIDeo:AUTO OFF ON 0 1, OFF ON 0 1 [:SENSe] :SPURious [:RANGe] [:LIST] :BANDwidth:VIDeo:AUTO?</pre> |
| Example | <pre>SPUR:BAND:VID 1kHz, 10kHz, 100kHz, 1MHz, 1MHz, 1MHz, 1MHz, 3MHz, 3MHz SPUR:BAND:VID? SPUR:BAND:VID:AUTO ON, ON, OFF, OFF, OFF, ON, ON, ON, OFF, OFF, OFF, OFF, OFF, OFF, OFF, ON, ON, ON, ON, ON SPUR:BAND:VID:AUTO?</pre> |
| Notes | You must be in the cdma2000 mode, 1xEV-DO mode, TD-SCDMA mode, W-CDMA mode, DVB-T/H mode, GSM/EDGE mode, LTE mode, LTE TDD mode, WLAN mode, MSR, LTE-Advanced FDD/TDD mode or WiMAX mode to use this command. Use INSTRUMENT:SElect to set the mode. |
| Preset | <p>SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H WLAN: Automatically calculated</p> <p>LTE, MSR, LTE-TDD: 4.7kHz, 47kHz, 470kHz, 5MHz, 470kHz, 5MHz, 5MHz, 300kHz, 300kHz</p> <p>LTE-TDD, LTE-TDD: 4.7kHz, 47kHz, 470kHz, 5MHz, 470kHz, 5MHz, 5MHz, 300kHz, 300kHz</p> <p>ON, ON, ON</p> |

Abs Start Limit

Determines the limit above which spurs will report a failing. If Abs Stop Limit Mode is set to Auto, this is coupled to Abs Stop Limit to make a flat limit line. If set to Man, Abs Start Limit and Abs Stop Limit can take different values to make a sloped limit line.

If the Limit Line Test parameter is off then any spurs which are found to be above the current 'Peak Excursion' will be added to the results table. From these spurs, the amplitude will be checked using the abs limit start and abs limit stop parameters and then calculate the limit. An 'F' will be appended to the amplitude value of the spur if the measured amplitude is above the limit. If the Limit Line Test is on, only the spurs whose amplitudes exceed the limit will be reported.

This parameter can send up to 20 values. The location in the list sent corresponds to the range of the associated value. Missing values are not permitted. If you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

| | |
|-----------------------|---|
| Key Path | Meas Setup, Range Table |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SPURious[:RANGE][:LIST]:LIMit:ABSolute[:UPPer]:DATA[:START] <ampl>, <ampl>, <ampl> :CALCulate:SPURious[:RANGE][:LIST]:LIMit:ABSolute[:UPPer]:DATA[:START]? |
| Example | CALC:SPUR:LIM:ABS:DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 CALC:SPUR:LIM:ABS:DATA? |
| Preset | SA, WIMAX OFDMA: -5.00000000E+001, -5.00000000E+001 WCDMA: -36dBm, -36dBm, -36dBm, -30dBm, -25dBm, -15dBm, -25dBm, -30dBm, -50dBm, -50dBm C2K, 1xEV-DO: -13 dBm, -13dBm, -13 dBm, -13 dBm, -50 dBm TD-SCDMA: -13 dBm, -13dBm, -13 dBm, -13 dBm, -50 dBm DVB-T/H: -36dBm, -82dBm, -36dBm, -76dBm, -36dBm, -30dBm, -50dBm, -50dBm LTE, MSR, LTEAFDD: -36dBm, -36dBm, -36dBm, -30dBm, -96dBm, -30dBm, -30dBm, -50dBm, |

Peak Excursion

Sets the minimum amplitude variation of signals that can be identified as peaks. If a value of 6 dB is selected, peaks that rise and fall more than 6 dB above the peak threshold value are identified.

This parameter can send up to 20 values. The location in the list sent corresponds to the range of the associated value. Missing values are not permitted. If you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

| | |
|---------------------------------|--|
| Key Path | Meas Setup, Range Table |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :SPURious [:RANGe] [:LIST] :PEAK:EXCursion <rel_ampl>, <rel_ampl> [:SENSe] :SPURious [:RANGe] [:LIST] :PEAK:EXCursion? |
| Example | SPUR:PEAK:EXC 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20 SPUR:PEAK:EXC? |
| Preset | +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000, +6.00000000E+000 |
| State Saved | Saved in instrument state. |
| Min | 0.0 dB |
| Max | 100.0 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Pk Threshold

Sets the minimum amplitude of signals that can be identified as peaks. For example, if a value of -90 dBm is selected, only peaks that rise and fall more than the peak excursion value which are above -90 dBm are identified.

This parameter can send up to 20 values. The location in the list sent corresponds to the range of the associated value. Missing values are not permitted. If you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

| | |
|-----------------------|---|
| Key Path | Meas Setup, Range Table |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :SPURious [:RANGe] [:LIST] :PEAK:THReshold <real>, <real>, <real>, |

| | |
|--------------------------|---|
| | <pre><real>, <real>, <real> [:SENSe]:SPURious[:RANGe][:LIST]:PEAK:THRshold?</pre> |
| Example | <pre>SPUR:PEAK:THR 0,0,0 SPUR:PEAK:THR?</pre> |
| Preset | <pre>-9.00000000E+001, -9.00000000E+001, -9.00000000E+001, -9.00000000E+001, - 9.00000000E+001, -9.00000000E+001, -9.00000000E+001, -9.00000000E+001</pre> |
| State Saved | Saved in instrument state. |
| Min | -200 |
| Max | 0 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.07.00 |

Attenuation

Defines attenuation value for each range.

- When Auto state is ON, attenuation value under AMPTD Y Scale is used.
- When Auto state is OFF, this value is used as mechanical attenuation value without electric attenuation.

| | |
|-----------------------|---|
| Key Path | Meas Setup, Range Table |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <pre>[:SENSe]:SPURious[:RANGe][:LIST]:ATTenuation <rel_ampl>, <rel_ampl> [:SENSe]:SPURious[:RANGe][:LIST]:ATTenuation? [:SENSe]:SPURious[:RANGe][:LIST]:ATTenuation:AUTO OFF ON 0 1, OFF ON 0 1 [:SENSe]:SPURious[:RANGe][:LIST]:ATTenuation:AUTO?</pre> |
| Example | <pre>SPUR:ATT 10dB, 10dB SPUR:ATT? SPUR:ATT:AUTO 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 SPUR:ATT:AUTO?</pre> |

Sweep Time

Sets the sweep time mode of the analyzer. This can be Auto, where the analyzer determines the optimum setting, or Manual, where you determine the setting.

This parameter can send up to 20 values. The location in the list sent corresponds to the range of the associated value. Missing values are not permitted. If you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

| | |
|--------------------------|---|
| Key Path | Meas Setup, Range Table |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <pre>[:SENSE] : SPURious [:RANGE] [:LIST] : SWEep : TIME <time>, <time> [:SENSE] : SPURious [:RANGE] [:LIST] : SWEep : TIME? [:SENSE] : SPURious [:RANGE] [:LIST] : SWEep : TIME : AUTO OFF ON 0 1, OFF ON 0 1 [:SENSE] : SPURious [:RANGE] [:LIST] : SWEep : TIME : AUTO?</pre> |
| Example | <pre>SPUR:SWE:TIME 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10 SPUR:SWE:TIME? SPUR:SWE:TIME:AUTO ON, ON SPUR:SWE:TIME:AUTO?</pre> |
| Notes | You must be in cdma2000 mode, TD-SCDMA mode, W-CDMA mode, DVB-T/H, SA mode, LTE mode, LTE TDD mode, WLAN mode, MSR, LTE-Advanced FDD/TDD mode or WiMAX mode to use this command. Use INSTRUMENT:SElect to set the mode. |
| Preset | Automatically calculated |
| State Saved | Saved in instrument state. |
| Min | 1.0E-3 |
| Max | 2.0E+3 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Points

Sets the number of points per sweep for the measurement. This parameter can send up to 20 values. The location in the list sent corresponds to the range of the associated value. Missing values are not permitted. If you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

The Points mode can be manual, where you determine the setting or auto, where the analyzer determines the number of trace points to ensure the sweep points resolution equals RBW/2. This is calculated using the following algorithm:

Points = (Stop Freq – Start Freq) / (ResBW / 2), with the computed values being clipped to a minimum of 601 and a maximum of 20001.

This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted; that is, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

| | |
|-----------------------|--|
| Key Path | Meas Setup, Range Table |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <pre>[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:POINts <integer> [:SENSe]:SPURious[:RANGe][:LIST]:SWEep:POINts? [:SENSe]:SPURious[:RANGe][:LIST]:SWEep:POINts:AUTO OFF ON 0 1, OFF ON 0 1</pre> <pre>[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:POINts:AUTO?</pre> |
| Example | <pre>SPUR:SWE:POIN 1001,1001,1001 SPUR:SWE:POIN? SPUR:SWE:POIN:AUTO ON,ON,ON SPUR:SWE:POIN:AUTO?</pre> |
| Preset | <pre>SA, WIMAX OFDMA, DVB-T/H, WLAN: +601, +601 WCDMA: 601, 2985, 9700, 1100, 601, 601, 601, 10570, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601 C2K: 601, 601, 9970, 11750, , 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601 CDMA1xEVDO: 601, 601, 9970, 11750, 601, 601, 601, 10570, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601 TD-SCDMA: 601, 5970, 19400, 20001, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601, 601 LTE, LTETDD, MSR, LTEAFDD, LTEATDD : Automatically calculated. WLAN: Automatically calculated. OFF, OFF LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD: ON, ON</pre> |
| State Saved | Saved in instrument state. |
| Min | 101 |

| Type | Single | Continuous | | |
|----------------|---|---|---|--|
| No Spurs Found | Spurs Found | No Spurs Found | Spurs Found | |
| | | | | the worst spur. |
| Full | All active ranges are measured. On completion measurement is set to idle state and the 'No Spurs' happening is displayed. | All active ranges are measured and spurs found reported. On completion the measurement is set to the idle state, displaying the trace of the last active range. | Measurement continually cycles through all active ranges. | All active ranges are measured and spurs found reported. On each cycle of the active ranges the spurs found are reset. This ensures any remote queries retrieve the trace data that matches the currently displayed results. |

| | |
|--------------------------|---|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTEFDD, LTEATDD |
| Remote Command | [:SENSe] : SPURious : TYPE EXAMine FULL [:SENSe] : SPURious : TYPE ? |
| Example | SPUR : TYPE FULL SPUR : TYPE ? |
| Preset | EXAMine |
| State Saved | Saved in instrument state. |
| Range | Examine Full |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Spur

Displays any spurs found. It is only enabled when the measurement type is set to examine and will turn on upon completion of a measurement. Once the Spur menu key has been enabled, you can view any spur. The measurement sets the analyzer to the range in which the currently selected spur was found. The range settings only changes if the spur selected is in a range which is different from the current range settings. A marker is used to identify the currently selected spur on the trace.

| | |
|-----------------------|---|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, CDMA1xEVDO, TD-SCDMA, DVB-T/H, LTE, LTEFDD, WLAN, MSR, LTEFDD, LTEATDD |
| Remote Command | [:SENSe] : SPURious : SPUR <integer> [:SENSe] : SPURious : SPUR ? |
| Example | SPUR : SPUR 55 |

| | |
|--------------------------|------------------|
| | SPUR:SPUR? |
| Preset | 1 |
| State Saved | No |
| Min | 1 |
| Max | 200 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Range Preset (TD-SCDMA only)

Sets the specific range parameters to meet the requirement of the BS mandatory limits (Category A), the BS mandatory limits (Category B) and the MS mandatory and optional limits in the TD-SCDMA mode. This key only shows up in the TD-SCDMA mode.

| | |
|----------------------|------------------|
| Key Path | Meas Setup |
| Initial S/W Revision | Prior to A.02.00 |

Category A (TD-SCDMA only)

Sets the range parameters to meet the requirement of the BS mandatory spurious emissions limits (Category A), as set out in the table below.

| Band | Maximum level | Measurement bandwidth | Note |
|-------------------|---------------|-----------------------|--|
| 9 kHz – 150 kHz | -13 dBm | 1 kHz | Bandwidth as in ITU-R SM.329-9, s4.1 |
| 150 kHz – 30 MHz | | 10 kHz | Bandwidth as in ITU-R SM.329-9, s4.1 |
| 30 MHz – 1 GHz | | 100 kHz | Bandwidth as in ITU-R SM.329-9, s4.1 |
| 1 GHz – 12,75 GHz | | 1 MHz | Upper frequency as in ITU-R SM.329-9, s2.5 table 1 |

(The requirement applies at frequencies within the specified frequency ranges which are more than 4 MHz under the first carrier frequency used or more than 4 MHz above the last carrier frequency used.)

| | |
|----------------------|---|
| Key Path | Meas Setup, Range Preset |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :SPURious:CATegory:A |
| Example | SPUR:CAT:A |
| Dependencies | This key is grayed out when the radio device is MS. |
| Initial S/W Revision | Prior to A.02.00 |

Category B (TD-SCDMA only)

Sets the range parameters to meet the requirement of the BS mandatory spurious emissions limits (Category B), as set out in the table below.

| Band | Maximum Level | Measurement Bandwidth | Note |
|--|---------------|-----------------------|---|
| 9kHz – 150kHz | -36 dBm | 1 kHz | Bandwidth as in ITU SM.329-9, s4.1 |
| 150kHz – 30MHz | - 36 dBm | 10 kHz | Bandwidth as in ITU SM.329-9, s4.1 |
| 30MHz – 1GHz | -36 dBm | 100 kHz | Bandwidth as in ITU SM.329-9, s4.1 |
| 1GHz | -30 dBm | 1 MHz | Bandwidth as in ITU SM.329-9, s4.1 |
| ↔ | | | |
| Fc1 – 19,2 MHz or Fl – 10 MHz whichever is the higher | | | |
| Fc1 – 19,2 MHz or Fl – 10 MHz whichever is the higher | -25 dBm | 1 MHz | Specification in accordance with ITU-R SM.329-9, s4.1 |
| ↔ | | | |
| Fc1 – 16 MHz or Fl – 10 MHz whichever is the higher | | | |
| Fc1 – 16 MHz or Fl – 10 MHz whichever is the higher | -15 dBm | 1 MHz | Specification in accordance with ITU-R SM.329-9, s4.1 |
| ↔ | | | |
| Fc2 + 16 MHz or Fu + 10 MHz whichever is the lower | | | |
| Fc2 + 16 MHz or Fu + 10 MHz whichever is the lower | -25 dBm | 1 MHz | Specification in accordance with ITU-R SM.329-9, s4.1 |
| ↔ | | | |
| Fc2 + 19,2 MHz or Fu + 10 MHz whichever is the lower | | | |
| Fc2 + 19,2 MHz or Fu + 10 MHz whichever is the lower | -30 dBm | 1 MHz | Bandwidth as in ITU-R SM.329-9, s4.1. Upper frequency as in ITU-R SM.329-9, s2.5 table 1 |
| ↔ | | | |
| 12,75 GHz | | | |

(The requirement applies at frequencies within the specified frequency ranges which are more than 4 MHz under the first carrier frequency used or more than 4 MHz above the last carrier frequency used.)

| | |
|-----------------------|---|
| Key Path | Meas Setup, Range Preset |
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :SPURious :CATegory :B</code> |
| Example | SPUR:CAT:B |
| Dependencies | This key is grayed out when the radio device is MS. |
| Initial S/W Revision | Prior to A.02.00 |

Mobile (TD-SCDMA only)

Sets the range parameters to meet the requirement of both the MS general and additional spurious emissions limits, as set out in the tables below.

General Spurious emissions requirements

| Frequency Bandwidth | Resolution Bandwidth | Minimum requirement |
|--|----------------------|---------------------|
| $9 \text{ kHz} \leq f < 150 \text{ kHz}$ | 1 kHz | -36 dBm |
| $150 \text{ kHz} \leq f < 30 \text{ MHz}$ | 10 kHz | -36 dBm |
| $30 \text{ MHz} \leq f < 1000 \text{ MHz}$ | 100 kHz | -36 dBm |
| $1 \text{ GHz} \leq f < 12.75 \text{ GHz}$ | 1 MHz | -30 dBm |

Additional Spurious emissions requirements

| Frequency Bandwidth | Resolution Bandwidth | Minimum requirement |
|---|----------------------|---------------------|
| $925 \text{ MHz} \leq f \leq 935 \text{ MHz}$ | 100 KHz | -67 dBm* |
| $935 \text{ MHz} < f \leq 960 \text{ MHz}$ | 100 KHz | -79 dBm* |
| $1805 \text{ MHz} \leq f \leq 1880 \text{ MHz}$ | 100 KHz | -71 dBm* |

*The measurements are made on frequencies which are integer multiples of 200 kHz.

(These requirements are only applicable for frequencies which are greater than 4 MHz away from the UE center carrier frequency.)

| | |
|-----------------------|--|
| Key Path | Meas Setup, Range Preset |
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :SPURious :CATegory :MS</code> |
| Example | SPUR:CAT:MS |
| Notes | The former command " <code>[:SENSe] :SPURious :CATegory :MOBILE</code> " is still supported. |
| Dependencies | This key is grayed out when the radio device is BTS. |
| Initial S/W Revision | Prior to A.02.00 |

Frequency Setup (TD-SCDMA only)

Sets the required frequency parameters for the calculation of the start/stop frequency of the spurious emissions limits in TD-SCDMA mode.

The measurement does not restart when changing the values of the setup parameters. These parameters are used for calculating the range start and stop frequency in the measurement only. If you are going to perform a measurement with the newly-input values,, one of the soft key in the “Range Preset” menu should also be pressed afterwards.

| | |
|----------------------|------------------|
| Key Path | Meas Setup |
| Initial S/W Revision | Prior to A.02.00 |

Center Frequency of the First Carrier (Fc1) (TD-SCDMA only)

Sets the center frequency of emission of the first carrier transmitted by the base station. This parameter is used for calculating the start/stop frequency of the range for base station when the softkey “Category A” or “Category B” under the range preset menu pressed.

| | |
|-----------------------|---|
| Key Path | Meas Setup, Freq Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] : SPURious : CARRier : FREQuency : STARt <freq> [:SENSe] : SPURious : CARRier : FREQuency : STARt ? |
| Example | SPUR:CARR:FREQ:STAR 2GHz SPUR:CARR:FREQ:STAR? |
| Notes | You must be in the TD-SCDMA mode. Use INSTRument:SElect to set the mode. |
| Couplings | Coupled with Fc2 and Fl. The value of Fc1 is always not greater than the value of Fc2, and greater than the value of Fl. The following inequality for Fl, Fc1, Fc2 and Fu is satisfied: $Fl + 0.8\text{MHz} \leq Fc1 \leq Fc2 \leq Fu - 0.8\text{MHz}$; This key is grayed-out when the radio device is MS. |
| Preset | 2.0156 GHz |
| State Saved | Saved in instrument state. |
| Min | See Coupling |
| Max | See Coupling |
| Initial S/W Revision | Prior to A.02.00 |

Center Frequency of the Last Carrier (Fc2) (TD-SCDMA only)

Sets the center frequency of emission of the last carrier transmitted by the base station. This parameter is used for calculating the start/stop frequency of the range for base station when the softkey “Category A” or “Category B” under the range preset menu pressed.

| | |
|----------|------------------------|
| Key Path | Meas Setup, Freq Setup |
|----------|------------------------|

| | |
|-----------------------|--|
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :SPURious :CARRier :FREQuency :STOP <freq> [:SENSe] :SPURious :CARRier :FREQuency :STOP? |
| Example | SPUR:CARR:FREQ:STOP 10GHz SPUR:CARR:FREQ:STOP? |
| Notes | You must be in the TD-SCDMA mode. Use INSTRument:SElect to set the mode. |
| Dependencies | This key is grayed out when the radio device is MS. |
| Couplings | Coupled with Fc1 and Fu. The value of Fc2 is always not less than the value of Fc1, and less than the value of Fu. The following inequality for Fl, Fc1, Fc2 and Fu is satisfied: $Fl + 0.8\text{MHz} \leq Fc1 \leq Fc2 \leq Fu - 0.8\text{MHz}$; |
| Preset | 2.0236 GHz |
| State Saved | Saved in instrument state. |
| Min | See Coupling |
| Max | See Coupling |
| Initial S/W Revision | Prior to A.02.00 |

TDD Lower Frequency (Fl) (TD-SCDMA only)

Sets the lower frequency of the band in which TDD operates. This parameter is used for calculating the start/stop frequency of the range for base station when the softkey “Category B” under the range preset menu pressed.

| | |
|-----------------------|---|
| Key Path | Meas Setup, Freq Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :SPURious :TDD :FREQuency :STARt <freq> [:SENSe] :SPURious :TDD :FREQuency :STARt? |
| Example | SPUR:TDD:FREQ:STAR 1GHz SPUR:TDD:FREQ:STAR? |
| Notes | You must be in the TD-SCDMA mode. Use INSTRument:SElect to set the mode. |
| Dependencies | This key is grayed out when the radio device is MS. |
| Couplings | Coupled with Fc1. The value of Fl is always less than the value of Fc1. The following inequality for Fl, Fc1, Fc2 and Fu is satisfied: $Fl + 0.8\text{MHz} \leq Fc1 \leq Fc2 \leq Fu - 0.8\text{MHz}$; |
| Preset | 2.010 GHz |
| State Saved | Saved in instrument state. |
| Min | 1.011 GHz |
| Max | See Coupling |
| Initial S/W Revision | Prior to A.02.00 |

TDD Upper Frequency (Fu) (TD-SCDMA only)

Sets the upper frequency of the band in which TDD operates. This parameter is used for calculating the start/stop frequency of the range for base station when the softkey “Category B” under the range preset menu pressed.

| | |
|-----------------------|--|
| Key Path | Meas Setup, Freq Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] : SPURious : TDD : FREQuency : STOP <freq> [:SENSe] : SPURious : TDD : FREQuency : STOP? |
| Example | SPUR:TDD:FREQ:STOP 1GHz SPUR:TDD:FREQ:STOP? |
| Notes | You must be in the TD-SCDMA mode. Use INSTRument:SElect to set the mode. |
| Dependencies | This key is grayed out when the radio device is MS. |
| Couplings | Coupled with Fc2. The value of Fu is always greater than the value of Fc2. The following inequality for Fl, Fc1, Fc2 and Fu is satisfied: $F_l + 0.8\text{MHz} \leq F_{c1} \leq F_{c2} \leq F_u - 0.8\text{MHz}$; |
| Preset | 2.025 GHz |
| State Saved | Saved in instrument state. |
| Min | See Coupling |
| Max | 3.689 GHz |
| Initial S/W Revision | Prior to A.02.00 |

Center Frequency for Mobile (TD-SCDMA only)

Sets the center frequency of the mobile. This parameter is used for calculating the start/stop frequency of the range for mobile after the softkey “Mobile” under the range preset menu pressed.

| | |
|-----------------------|---|
| Key Path | Meas Setup, Freq Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] : SPURious : CARRier : FREQuency : MS <freq> [:SENSe] : SPURious : CARRier : FREQuency : MS? |
| Example | SPUR:CARR:FREQ:MS 2GHz SPUR:CARR:FREQ:MS? |
| Notes | You must be in the TD-SCDMA mode. Use INSTRument:SElect to set the mode. The former SCPI commands “[:SENSe] : SPURious : CARRier : FREQuency : MOBil <freq>” and “[:SENSe] : SPURious : CARRier : FREQuency : MOBil?” are still supported. |
| Dependencies | This key is grayed out when the radio device is BTS. |
| Preset | 2.0204 GHz |
| State Saved | Saved in instrument state. |
| Min | 1.005 GHz |

| | |
|----------------------|------------------|
| Max | 3.695 GHz |
| Initial S/W Revision | Prior to A.02.00 |

Spurious Report Mode

Selects the spurious report mode.

- Select Limit Line Test (LIMTest) to report only spurs above the limit line. Any spurs reported will cause the measurement to fail. See Abs Start Limit for more information.
- Select All Spurs (ALL) to report all spurs detected by Peak Threshold and Peak Excursion.
- Select Minimum Margin (MMARgin) to report only the spur with the minimum margin from the limit line. For the spur above the limit, its margin is defined as the negative margin. If there are more than one spurs above the limit, only one spur with the largest negative margin is reported.

| | |
|--------------------------|---|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :SPURious:REPT:MODE ALL LIMTest MMARgin [:SENSe] :SPURious:REPT:MODE? |
| Example | SPUR:REPT:MODE LIMIT SPUR:REPT:MODE? |
| Dependencies | MMARgin is available only when option N9060A-7FP is installed. |
| Preset | ALL |
| State Saved | Saved in instrument state. |
| Range | All Spurs Limit Test Minimum Margin |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.11.00 |

Meas Preset

Restores all measurement parameters to their default values.

| | |
|--------------------------|---|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CONFigure:SPURious |
| Example | CONF:SPUR |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Fast Spurious Meas (Remote Command only)

This command is provided as the backward compatibility SCPI command of the Fast Spurious Measurement. Since this command is another representation of Spurious Report Mode, this command is coupled with the command.

When set to ON, only spurs above the limit line are reported. This is the same as Spurious Report Mode “LIMTest”.

When set to OFF, all detected spurs are reported. This is the same as Spurious Report Mode “ALL.”

| | |
|-----------------------|---|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] : SPURious : FSMeas ON OFF 1 0 [:SENSe] : SPURious : FSMeas ? |
| Example | SPUR:FSM ON SPUR:FSM ? |
| Couplings | If SPUR:REPT:MODE is ALL, this parameter is OFF. If SPUR:REPT:MODE is LIMTest, this parameter is ON. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | A.04.00 |

Mode

See "Mode" on page 288

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings
- See "[How-To Preset](#)" on page 1295 for more information.

| | |
|--------------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :SYSTem:PRESet |
| Example | :SYST:PRES |
| Notes | *RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0. |
| Couplings | A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set. |
| Backwards Compatibility Notes | In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using |

| | |
|----------------------|------------------|
| | User Preset. |
| Initial S/W Revision | Prior to A.02.00 |

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

| Type Of Preset | SCPI Command | Front Panel Access |
|--------------------------------|--|--|
| Auto Couple | :COUPlE ALL | Auto Couple front-panel key |
| Meas Preset | :CONFIgure:<Measurement> | Meas Setup Menu |
| Mode Preset | :SYSTem:PRESet | Mode Preset (green key) |
| Restore Mode Defaults | :INSTrument:DEFault | Mode Setup Menu |
| Restore All Mode Defaults | :SYSTem:DEFault MODEs | System Menu; Restore System Default Menu |
| *RST | *RST | not possible (Mode Preset with Single) |
| Restore Input/Output Defaults | :SYSTem:DEFault INPut | System Menu; Restore System Default Menu |
| Restore Power On Defaults | :SYSTem:DEFault PON | System Menu; Restore System Default Menu |
| Restore Alignment Defaults | :SYSTem:DEFault ALIGn | System Menu; Restore System Default Menu |
| Restore Miscellaneous Defaults | :SYSTem:DEFault MISC | System Menu; Restore System Default Menu |
| Restore All System Defaults | :SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent | System Menu; Restore System Default Menu |
| User Preset | :SYSTem:PRESet:USER | User Preset Menu |
| User Preset All Modes | :SYSTem:PRESet:USER:ALL | User Preset Menu |

| | | |
|----------------------|-----------------------|-------------|
| Power On Mode Preset | :SYSTem:PON:TYPE MODE | System Menu |
| Power On User Preset | :SYSTem:PON:TYPE USER | System Menu |
| Power On Last State | :SYSTem:PON:TYPE LAST | System Menu |

Preset Type (Remote Command Only)

As stated in the Backward Compatibility section, to be compatible with ESA/PSA the PRESet:TYPE command will be implemented as a no-op.

| | |
|-----------------------------|--|
| Mode | All |
| Remote Command | :SYSTem:PRESet:TYPE FACTory MODE USER :SYSTem:PRESet:TYPE? |
| Example | :SYST:PRESet:TYPE FACT |
| Notes | This command is supported for backward compatibility only. It is a no-op which does not change the behavior of any preset operation. |
| Preset | This is unaffected by Preset but is set to Mode on a "Restore System Defaults->All" |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Mode Setup

See ["Mode Setup" on page 320](#)

Peak Search

Performs a peak search and opens the Peak Search menu. The Peak Search functions allow you to define specific search criteria to determine which signals can be considered peaks, excluding unwanted signals from the search.

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace.

| | |
|---------------------------------|--|
| Key Path | Front-panel key |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, 1xEV-DO, DVB-T/H, LTE, LTE-TDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SPURious:MARKer[1 2 ... 12:MAXimum |
| Example | CALC:SPUR:MARK2:MAX |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Next Peak

Moves the selected marker to the peak that has the next highest amplitude less than the current marker value.

| | |
|---------------------------------|--|
| Key Path | Peak Search |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTE-TDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SPURious:MARKer[1 2 ... 12:MAXimum:NEXT |
| Example | CALC:SPUR:MARK2:MAX:NEXT |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Next Pk Right

Moves the selected marker to the nearest peak to the right of the current marker which meets all enabled peak criteria.

| | |
|---------------------------------|---|
| Key Path | Peak Search |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTE-TDD, WLAN |
| Remote Command | :CALCulate:SPURious:MARKer[1 2 ... 12:MAXimum:RIGHT |
| Example | CALC:SPUR:MARK2:MAX:RIGH |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Next Pk Left

Moves the selected marker to the nearest peak to the left of the current marker which meets all enabled peak criteria.

| | |
|--------------------------|---|
| Key Path | Peak Search |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SPURious:MARKer[1] 2 ... 12:MAXimum:LEFT |
| Example | CALC:SPUR:MARK2:MAX:LEFT |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Marker Delta

Performs the same function as the Delta 1-of-N selection key in the Marker menu. This sets the control mode for the selected marker to Delta mode. See the Marker section for the complete description of this function. The key is duplicated here in the Peak Search Menu to allow you to conveniently perform a peak search and change the control of the Marker mode to Delta without having to access two separate menus.

| | |
|----------------------|------------------|
| Key Path | Peak Search |
| Initial S/W Revision | Prior to A.02.00 |

Pk-Pk Search

Finds and displays the amplitude and frequency (or time, if in zero span) differences between the highest and lowest y-axis value.

| | |
|--------------------------|---|
| Key Path | Peak Search |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SPURious:MARKer[1] 2 ... 12:PTPeak |
| Example | CALC:SPUR:MARK:PTP |
| Notes | Turns on the Marker Δ |
| Dependencies | This key is not available (key is grayed-out) when Coupled Markers is on. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Min Search

Moves the selected marker to the minimum y-axis value on the current trace.

12 Spurious Emissions Measurement
Peak Search

| | |
|---------------------------------|--|
| Key Path | Peak Search |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTEFDD, LTEATDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:SPURious:MARKer[1] 2 ... 12:MINimum |
| Example | CALC:SPUR:MARK:MIN |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Print

See "Print" on page 348

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

| Type | Default Prefix | Menu |
|-----------------------|----------------|-----------------|
| State | State_ | (Save/Recall) |
| Trace + State | State_ | (Save/Recall) |
| Screen | Screen_ | (Save/Recall) |
| Amplitude Corrections | Ampcor_ | (Import/Export) |
| Traces | Trace_ | (Import/Export) |
| Limit Lines | LLine_ | (Import/Export) |
| Measurement Result | MeasR_ | (Import/Export) |
| Capture Buffer | CapBuf_ | (Import/Export) |

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

| | |
|----------------------|--|
| Key Path | Front-panel key |
| Notes | No remote command for this key specifically. |
| Initial S/W Revision | Prior to A.02.00 |

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

| Key Path | Front-panel key |
|-------------------------------|--|
| Notes | <p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATe <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p> |
| Backwards Compatibility Notes | <p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> |
| Backwards Compatibility Notes | <p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p> |
| Initial S/W Revision | Prior to A.02.00 |

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode’s settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode’s state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or “Recalled State Register <register number>” is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See "[More Information](#)" on page 1306.

| | |
|-----------------------|--|
| Key Path | Recall |
| Mode | All |
| Remote Command | :MMEMory:LOAD:STATe <filename> |
| Example | :MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path |
| Example | MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state. |
| Notes | <p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <ul style="list-style-type: none"> • If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number. <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p> |

| | |
|-------------------------------------|---|
| | there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu. |
| Backwards Compatibility SCPI | :MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

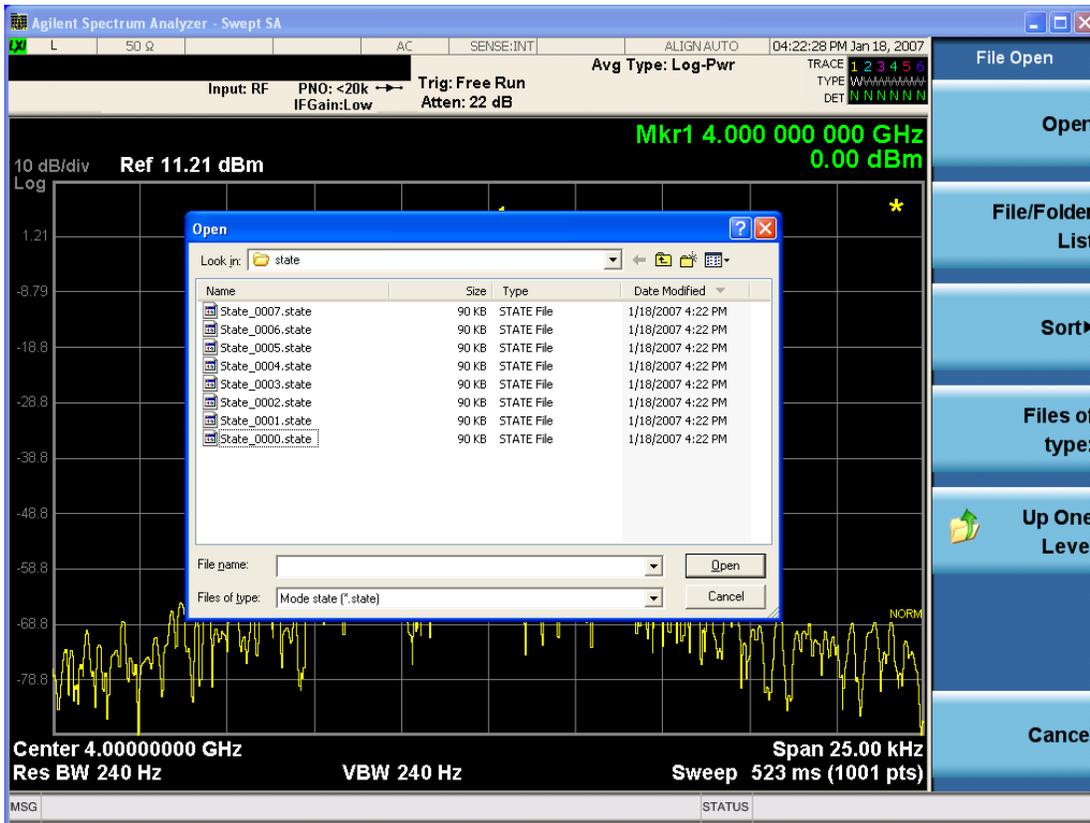
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

| | | |
|---|--|--|
| You want to recall state and one trace's data, leaving other traces unaffected. | Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed. | On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed. |
| You want to recall all traces | Save Trace+State from ALL traces. | On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved) |
| You want all traces to load exactly as they were when saved. | Save State | On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten. |

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Notes | Brings up the Open dialog for recalling a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Mode | All |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available" |
| Initial S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|--|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|---|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1-16 from front panel, 1-128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Data (Import)

Importing a data file loads data that was previously saved from the current measurement or from other measurements and/or modes that produce compatible data files. The Import Menu only contains Data Types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by the user prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Importing Data loads measurement data from the specified file into the specified or default destination, depending on the data type selected. Selecting an Import Data menu key will not actually cause the importing to occur, since the analyzer still needs to know from where to get the data. Pressing the Open key in this menu brings up the Open dialog and Open menu that provides you with the options from where to recall the data. Once a filename has been selected or entered in the Open menu, the recall occurs as soon as the Open button is pressed.

| | |
|----------------------|--|
| Key Path | Recall |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. Some keys will be missing completely, so the key locations in the sub-menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:LOAD commands. |
| Dependencies | If a file type is not used by a certain measurement, it is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Capture Buffer

The captured data is raw data which is not processed.

| | |
|----------------------|---|
| Key Path | Recall, Data |
| Mode | TD-SCDMA |
| Example | MMEM:LOAD:CAPT "MyCaptureData.bin" This loads the file of capture data (on the default file directory path) into the instrument. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Open...

When you press "Open", the analyzer brings up a Windows dialog and a menu entitled "**File Open.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[From File...](#)" on page 2309 in Recall, State, for a full description of this dialog and menu.

| | |
|----------------------|--|
| Key Path | Recall, Data |
| Notes | The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 1312

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate[:IMMEDIATE] :INITiate:RESTART |
| Example | :INIT:IMM :INIT:REST |
| Notes | :INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function. |
| Couplings | Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement. |
| Status Bits/OPC dependencies | This is an Overlapped command. The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUESTionable register bit 9 (INTegrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set. |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command `CALC:AVER:TCON UP`.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Mode | All |
| Notes | No remote command for this key specifically, but the :MMEM:STOR:STATe <filename> command is available for specific file types. An example is :MMEM:STOR:STATe <filename>. |
| Initial S/W Revision | Prior to A.02.00 |

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

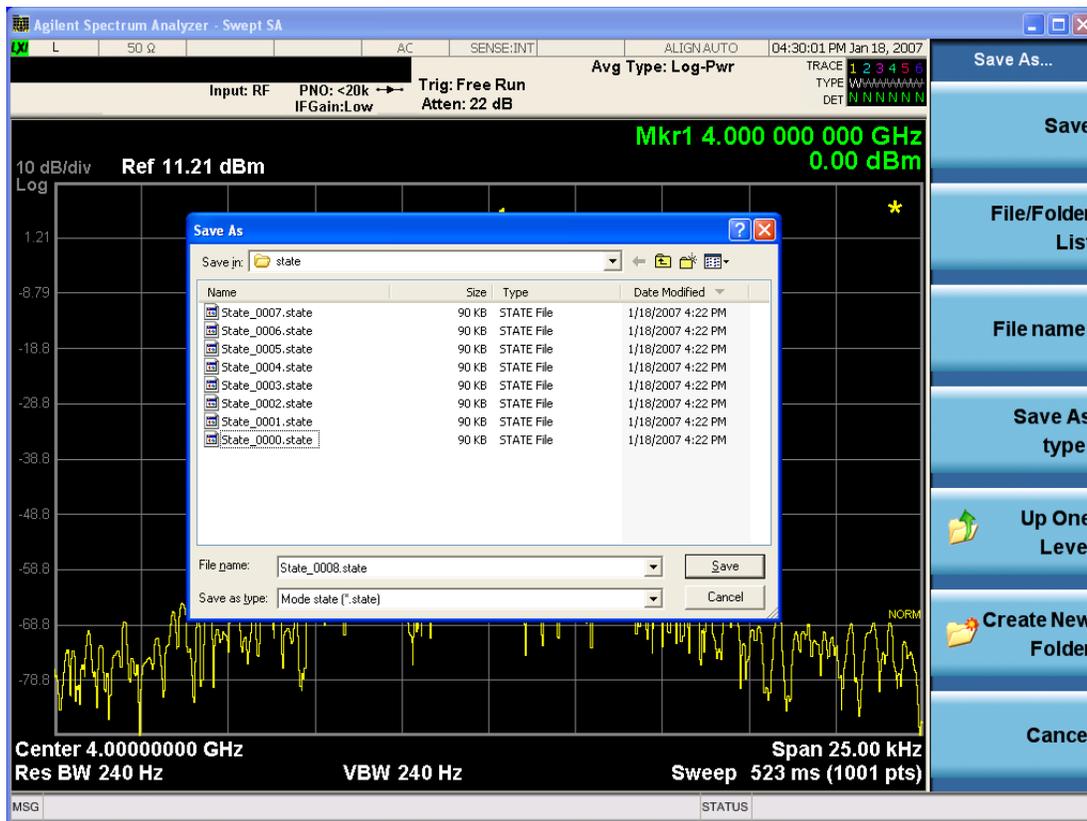
| | |
|----------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:STATe <filename> |
| Example | MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory. |
| Notes | Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key |

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

| | |
|-------------------------------------|-----------------------------------|
| Backwards Compatibility SCPI | :MMEMoRY:STORe:STATe 1,<filename> |
| Initial S/W Revision | Prior to A.02.00 |

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2305](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Save, State |
| Mode | All |
| Notes | Brings up Save As dialog for saving a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 1317](#)

| | |
|-----------------------|--|
| Key Path | Save, State |
| Mode | All |
| Remote Command | :MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number> |
| Example | :MMEM:REG:STAT:LAB 1,"my label" |
| Notes | <reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,"" |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available" |
| Preset | The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc" |
| Initial S/W Revision | A.11.00 |

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1-16 from front panel, 1-128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR "(empty)" if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

| | |
|----------------------|---|
| Key Path | Save |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands. |
| Dependencies | If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Measurement Results

Pressing this key selects Meas Results as the data type to be exported.

The Meas Results file contains measurement result sets, plus information describing the current state of the analyzer, as detailed in ["Meas Results File Definition" on page 1320](#) and ["Meas Results File Example" on page 1322](#) below.

| | |
|------------------------------|--|
| Key Path | Save, Data |
| Remote Command | :MMEMory:STORe:RESults <string> |
| Example | :MMEM:STOR:RES "MeasR_0000.csv" |
| Notes | <p>If the save is initiated via SCPI and the file already exists, the file will be overwritten.</p> <p>The SCPI command exports Spurious Emissions measurement results to the file specified as the parameter in the current path. The default path is My Documents\<current mode>\data\spur\results.<="" p=""><p>Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.</p><p>The SCPI parameter is a quoted string that specifies the filename. Both single and double quotes are supported for any filename parameter over SCPI.</p></current></p> |
| Dependencies | The current active measurement must be the Spurious Emissions measurement to use this command. |
| Status Bits/OPC dependencies | Sequential – waits for the previous measurement to complete |
| Initial S/W Revision | Prior to A.02.00 |

Meas Results File Definition

The content of a Meas Results File is defined in this section.

The first lines in the file consist of identification and instrument configuration details, as follows.

- File ID string, which is "MeasResult"
- Measurement ID following Mode ID, which is "SA:SPUR" for example.
- Firmware rev and model number
- Option string
- Abs Start Limit
- Abs Stop Limit
- Abs Stop Limit Mode
- Auto Scaling
- Auto Sweep Time Rules
- Automatic Trigger Time
- Automatic Trigger Time State

- Average Mode
- Average Number
- Average State
- Detector 1
- Detector 2
- Electrical Atten
- Electrical Atten State
- External Array Trigger Delay
- External Array Trigger Delay State
- External Array Trigger Level
- External Array Trigger Slope
- Filter Type
- IF Gain Auto
- IF Gain State
- Internal Preamp
- Internal Preamp Band
- Line Trigger Delay
- Line Trigger Delay State
- Line Trigger Slope
- Meas Type
- Mechanical Atten
- MechanicalAttenStepEnum
- Peak Excursn
- Periodic Timer Period
- Periodic Timer Sync Source
- Periodic Timer Trigger Delay
- Periodic Timer Trigger Delay State
- Pk Threshold
- Points
- Points Mode
- Range State

- Ref Value
- Res BW
- Res BW Mode
- RFBurst Trigger Delay
- RFBurst Trigger Delay State
- RFBurst Trigger Level Abs
- RFBurst Trigger Level Rel
- RFBurst Trigger Level Type
- RFBurst Trigger Slope
- Scale/Div
- Spurious Report Mode
- SpurRangeStartFrequencyArray
- SpurRangeStopFrequencyArray
- Sweep Time
- Sweep Time Mode
- Trigger Holdoff
- Trigger Holdoff State
- TriggerSource
- Video BW
- Video BW Mode

The data above is followed in the file by a line containing “MeasResult1” to “MeasResult42”. This line forms a header for each set of measurement results, which appear in subsequent lines. Each line of Measurement Results consists of 42 comma-separated values, from the MeasResult1 value to the MeasResult42 value.

The MeasResult1 set in the file corresponds to the data returned by MEAS/READ/FETCH:SPURious1; the MeasResult2 set corresponds to the data returned by MEAS/READ/FETCH:SPURious2, and so on.

The exported file is in CSV format, with a .csv extension.

Meas Results File Example

When imported into Excel, a typical Meas Results file appears as shown in the example below.

NOTE: The following table omits the columns for MeasResult11 to MeasResult42, due to lack of space.

| MeasResult | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------------|---|---|---|---|---|---|---|---|---|----|
| SA:SPUR | | | | | | | | | | |

| | | | | | | | | | | | |
|---|--------------|--------------|------|------|------|------|------|------|------|------|------|
| A.10.53 | N903 0A | | | | | | | | | | |
| 526 ALV ATP B1X B1Y B25 B40 BBA CR3 CRP DCF DDA DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA LFE LNP MAT MPB NFE NUL P26 PFR PNC RTL RTS S40 SB1 SEC SM1 TVT YAS YAV | 1 | | | | | | | | | | |
| Abs Start Limit | -50 | -50 | -50 | -50 | -50 | -50 | -50 | -50 | -50 | -50 | -50 |
| Abs Stop Limit | -50 | -50 | -50 | -50 | -50 | -50 | -50 | -50 | -50 | -50 | -50 |
| Abs Stop Limit Mode | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE |
| Auto Scaling | TRUE | | | | | | | | | | |
| Auto Sweep Time Rules | Norm | | | | | | | | | | |
| Automatic Trigger Time | 0.1 | | | | | | | | | | |
| Automatic Trigger Time State | FALSE | | | | | | | | | | |
| Average Mode | Exponential | | | | | | | | | | |
| Average Number | 10 | | | | | | | | | | |
| Average State | FALSE | | | | | | | | | | |
| Detector 1 | Peak | Peak | Peak | Peak | Peak | Peak | Peak | Peak | Peak | Peak | Peak |
| Detector 2 | Off | Off | Off | Off | Off | Off | Off | Off | Off | Off | Off |
| Electrical Atten | 0 | | | | | | | | | | |
| Electrical Atten State | FALSE | | | | | | | | | | |
| External Array Trigger Delay | 1.00 E-06 | 1.00 E-06 | | | | | | | | | |
| External Array Trigger Delay State | FALSE | FALSE | | | | | | | | | |
| External Array Trigger Level | 1.2 | 1.2 | | | | | | | | | |
| External Array Trigger Slope | Positive | Positive | | | | | | | | | |

| Filter Type | Gaussian |
|------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| IF Gain Auto | FALSE |
| IF Gain State | FALSE |
| Internal Preamp | FALSE | | | | | | | | | |
| Internal Preamp Band | Low | | | | | | | | | |
| Line Trigger Delay | 1.00E-06 | | | | | | | | | |
| Line Trigger Delay State | FALSE | | | | | | | | | |
| Line Trigger Slope | Positive | | | | | | | | | |
| Meas Type | Examine | | | | | | | | | |
| Mechanical Atten | 10 | | | | | | | | | |
| MechanicalAtten StepEnum | S2dB | | | | | | | | | |
| Peak Excursn | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Periodic Timer Period | 0.02 | | | | | | | | | |
| Periodic Timer Sync Source | None | | | | | | | | | |
| Periodic Timer Trigger Delay | 1.00E-06 | | | | | | | | | |
| Periodic Timer Trigger Delay State | FALSE | | | | | | | | | |
| Pk Threshold | -90 | -90 | -90 | -90 | -90 | -90 | -90 | -90 | -90 | -90 |
| Points | 601 | 601 | 601 | 601 | 601 | 601 | 601 | 601 | 601 | 601 |
| Points Mode | FALSE |
| Range State | TRUE | TRUE | TRUE | TRUE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE |
| Ref Value | 0 | | | | | | | | | |
| Res BW | 1200000 | 510000 | 100000 | 100000 | 400000 | 300000 | 300000 | 300000 | 300000 | 300000 |
| Res BW Mode | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | TRUE | TRUE | TRUE | TRUE |
| RFBurst Trigger Delay | 1.00E-06 | | | | | | | | | |
| RFBurst Trigger Delay State | FALSE | | | | | | | | | |
| RFBurst Trigger | -20 | | | | | | | | | |

| | | | | | | | | | | |
|------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|
| Level Abs | | | | | | | | | | |
| RFBurst Trigger Level Rel | -6 | | | | | | | | | |
| RFBurst Trigger Level Type | Absolute | | | | | | | | | |
| RFBurst Trigger Slope | Positive | | | | | | | | | |
| Scale/Div | 10 | | | | | | | | | |
| Spurious Report Mode | All | | | | | | | | | |
| SpurRangeStartFrequencyArray | 1.92E+09 | 1.89E+09 | 2.1E+09 | 2.18E+09 | 8E+08 | 1.5E+09 | 1.5E+09 | 1.5E+09 | 1.5E+09 | 1.5E+09 |
| SpurRangeStopFrequencyArray | 1.98E+09 | 1.92E+09 | 2.1E+09 | 2.18E+09 | 1E+09 | 2.5E+09 | 2.5E+09 | 2.5E+09 | 2.5E+09 | 2.5E+09 |
| Sweep Time | 0.001 | 0.001 | 0.0012 | 0.00396 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Sweep Time Mode | TRUE | TRUE |
| Trigger Holdoff | 0.1 | | | | | | | | | |
| Trigger Holdoff State | FALSE | | | | | | | | | |
| TriggerSource | Free | | | | | | | | | |
| Video BW | 120000 | 51000 | 10000 | 10000 | 390000 | 300000 | 300000 | 300000 | 300000 | 300000 |
| Video BW Mode | TRUE | TRUE |
| MeasResult1 | MeasResult2 | MeasResult3 | MeasResult4 | MeasResult5 | MeasResult6 | MeasResult7 | MeasResult8 | MeasResult9 | MeasResult10 | MeasResult11 |
| 19 | -80.27209 | -80.87862 | -90.94577 | -89.27086 | -76.77856 | 9.91E+37 | 9.91E+37 | 9.91E+37 | 9.91E+37 | 9.91E+37 |
| 1 | -78.28497 | -80.93996 | -91.00485 | -90.56063 | -76.33968 | | | | | |

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data which is not processed.

| | |
|----------|------------|
| Key Path | Save, Data |
| Mode | TD-SCDMA |

| | |
|----------------------|--|
| Example | MMEM:STOR:CAPT "MyCaptureData.bin" This stores the capture data in the file MyCaptureData.bin in the default directory. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Save As . . .

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See ["To File . . ." on page 2318](#) in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\`<mode name>`\data\traces

For all of the Limit Data Files:

My Documents\`<mode name>`\data\limits

For all of the Measurement Results Data Files:

My Documents\`<mode name>`\data\`<measurement name>`\results

For all of the Capture Buffer Data Files:

My Documents\`<mode name>`\data\captureBuffer

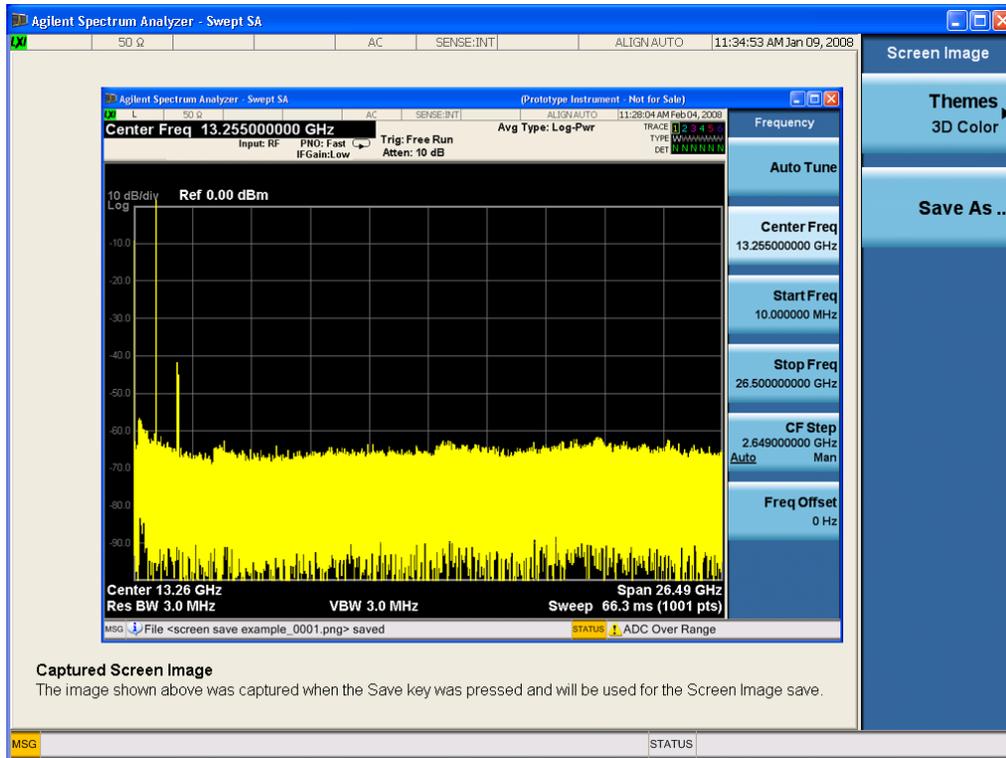
| | |
|----------------------|---|
| Key Path | Save, Data |
| Mode | All |
| Notes | The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <code><mode specific></code> Save Type. The save is performed immediately and does not wait until the measurement is complete. |
| Initial S/W Revision | Prior to A.02.00 |

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menu. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

| | |
|----------------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:SCReen <filename> |
| Example | :MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Save As...

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where `<mode name>` is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

| | |
|----------------------|--|
| Key Path | Save, Screen Image |
| Notes | Brings up Save As dialog for saving a Screen Image Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Catalog (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:CATalog? [<code><directory_name></code>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><code><numeric_value>,<numeric_value>,{<file_entry>}</code></p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first</p> |

parameter indicates the total amount of storage currently used in bytes. The second parameter indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:

<file_name>,<file_type>,<file_size>

As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty

Initial S/W Revision Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:CDIRectory [<directory_name>]
 :MMEMory:CDIRectory?

Notes The string must be a valid logical path.
 Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.
 At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.
 Query returns full path of the default directory.

Initial S/W Revision Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:COPY <string>,<string>[,<string>,<string>]

Notes The string must be a valid logical path.
 Copies an existing file to a new file or an existing directory to a new directory.
 Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.
 The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.
 This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:COpy:DEvice <source_string>,<dest_string> |
| Notes | <p>The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device.</p> <p>Valid device keywords are: SNS (smart noise source)</p> <p>An error is generated if the file or device is not found.</p> |

Mass Storage Delete (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DElete <file_name>[,<directory_name>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an “access denied” error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data.</p> <p>The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Make Directory (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MDIRectory <directory_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>Creates a new directory. The <directory_name> parameter specifies the name to be created.</p> |

| | |
|----------------------|--|
| | This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Move (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MOVE <string>,<string>[,<string>,<string>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Remove Directory (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:RDIRECTory <directory_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See ["More Information" on page 1333](#)

| | |
|-------------------------------|---|
| Key Path | Front-panel key |
| Example | :INIT:CONT OFF |
| Notes | See Cont key description. |
| Backwards Compatibility Notes | <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p> |
| Initial S/W Revision | Prior to A.02.00 |

More Information

See ["Restart" on page 2315](#) for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

| Key Path | Front-panel key |
|----------|-----------------|
|----------|-----------------|

Span X Scale

Span X Scale is unavailable in the Spurious Emissions measurement. When pressed, this key displays a blank menu.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Sweep/Control

Accesses the Sweep/Control menu keys used to set up and control the sweep time and source.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Sweep Setup

Sets the sweep functions that control the sweep state and time.

| | |
|----------------------|------------------|
| Key Path | Sweep/Control |
| Initial S/W Revision | Prior to A.02.00 |

Auto Sweep Time Rules

Switches the analyzer between normal and accuracy sweep states. Setting Auto Sweep Time to Accy will result in slower sweep times, usually about three times as long, but better amplitude accuracy for CW signals. The instrument amplitude accuracy specifications only apply when Auto Sweep Time is set to Accy.

Additional amplitude errors which occur when Auto Sweep Time is set to Norm are usually well under 0.1 dB, though this is not guaranteed. Because of the faster sweep times and still low errors, Norm is the preferred setting of Auto Sweep Time. Auto Sweep Time is set to Norm on a Preset or Auto Couple. This means that in the Preset or Auto Coupled state, instrument amplitude accuracy specifications do not apply.

| | |
|--------------------------|---|
| Key Path | Sweep/Control, Sweep Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] : SPURious : SWEep : TIME : AUTO : RULes NORMal ACCuracy [:SENSe] : SPURious : SWEep : TIME : AUTO : RULes ? |
| Example | SPUR:SWE:TIME:AUTO:RUL ACC SPUR:SWE:TIME:AUTO:RUL ? |
| Notes | In Zero Span, this key is irrelevant and inaccessible (because the whole Sweep Setup menu is grayed out), however, Sweep Setup settings can be changed remotely with no error indication. |
| Preset | NORMal |
| State Saved | Saved in instrument state. |
| Range | Norm Accy |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Sweep Type

Sets the sweep type of the spurious measurement to either Auto or Swept. When in Auto, the selections of swept type of ranges are governed by the Best Speed Sweep Type Rule, and FFT analysis might be chosen for some ranges if it speeds up the measurement.

| | |
|----------------------|---|
| Key Path | Sweep/Control, Sweep Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :SPURious [:RANGe] :ALL :SWEep :TYPE :AUTO OFF ON 0 1 [:SENSe] :SPURious [:RANGe] :ALL :SWEep :TYPE :AUTO ? |
| Example | SPUR:ALL:SWE:TYPE:AUTO 1 SPUR:ALL:SWE:TYPE:AUTO ? |
| Dependencies | This parameter is available only when option N9060A-7FP is installed. |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | Auto Swept |
| Initial S/W Revision | A.11.00 |

Pause

Pauses a measurement after the current data acquisition is complete.

When paused, the label on the key changes to Resume. Pressing Resume resumes the measurement at the point it was at when paused.

See "[Pause/Resume](#)" on page 2205 for more information.

| | |
|----------------------|------------------|
| Key Path | Sweep/Control |
| Initial S/W Revision | Prior to A.02.00 |

Gate

Accesses a menu that enables you to control the gating function. The Gate functionality is used to view signals best viewed by qualifying them with other events.

Gate setup parameters are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

Note that Sweep Time autocoupling rules and annotation are changed by Gate being on.

| | |
|----------|---------------|
| Key Path | Sweep/Control |
| Scope | Meas Global |
| Readback | |

The state and method of Gate, as [Off, LO] or [On, Video]. Note that for measurements that only support gated LO, the method is nonetheless read back, but always as LO.

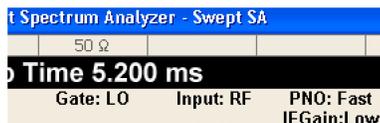
Initial S/W Revision Prior to A.02.00

Gate On/Off

Turns the gate function on and off.

When the Gate Function is on, the selected Gate Method is used along with the gate settings and the signal at the gate source to control the sweep and video system with the gate signal. Not all measurements allow every type of Gate Methods.

When Gate is on, the annunciation in the measurement bar reflects that it is on and what method is used, as seen in the following "Gate: LO" annunciator graphic.



Key Path Sweep/Control, Gate

Remote Command [:SENSe]:SWEep:EGATe[:STATe] OFF|ON|0|1
[:SENSe]:SWEep:EGATe[:STATe] ?

Example SWE:EGAT ON
SWE:EGAT?

Dependencies

The function is unavailable (grayed out) and Off when:

- Gate Method is LO or Video and FFT Sweep Type is manually selected.
- Gate Method is FFT and Swept Sweep Type is manually selected.
- Marker Count is ON.

The following are unavailable whenever Gate is on:

- FFT under Sweep Type when Method=LO or Video or Swept under Sweep Type when Method=FFT
- Marker Count

While Gate is on, the Auto Rules for Sweep Type are modified so that the choice agrees with the Gate Method: i.e., FFT for Method = FFT and Swept for Method = LO or Video.

The Gate softkey and all SCPI under the [:SENSe]:SWEep:EGATe SCPI node are grayed out when Source Mode is Tracking with an external source. This is because the Gate circuitry is used to sync the external source. If the Tracking Source is turned on, the Gate is turned off.

When in the ACP measurement:

- When Meas Method is RBW or FAST, this function is unavailable and the key is grayed out.
- Whenever Gate is on, Meas Method, RBW or FAST is unavailable and keys for those are grayed out.
- When Gate is on, Offset Res BW and Offset Video BW are ignored (if you set these values) and the

| | |
|-------------------------------------|--|
| | measurement works as if all Offset Res BW and all Offset Video BW are coupled with the Res BW and the Video BW under the BW menu. When Gate is on, the Offset BW key in the Offset/Limit menu is grayed out. |
| Preset | Off LTETDD: On |
| State Saved | Saved in instrument state |
| Range | On Off |
| Backwards Compatibility SCPI | [:SENSe]:SWEep:TIME:GATE[:STATe] ESA compatibility |
| Backwards Compatibility Notes | In ESA, Trig Delay (On) and Gate (On) could not be active at the same time.. This dependency does not exist in PSA or in the X-Series. |
| Initial S/W Revision | Prior to A.02.00 |

Gate View On/Off

Turning on Gate View in the Swept SA measurement provides a single-window gate view display..

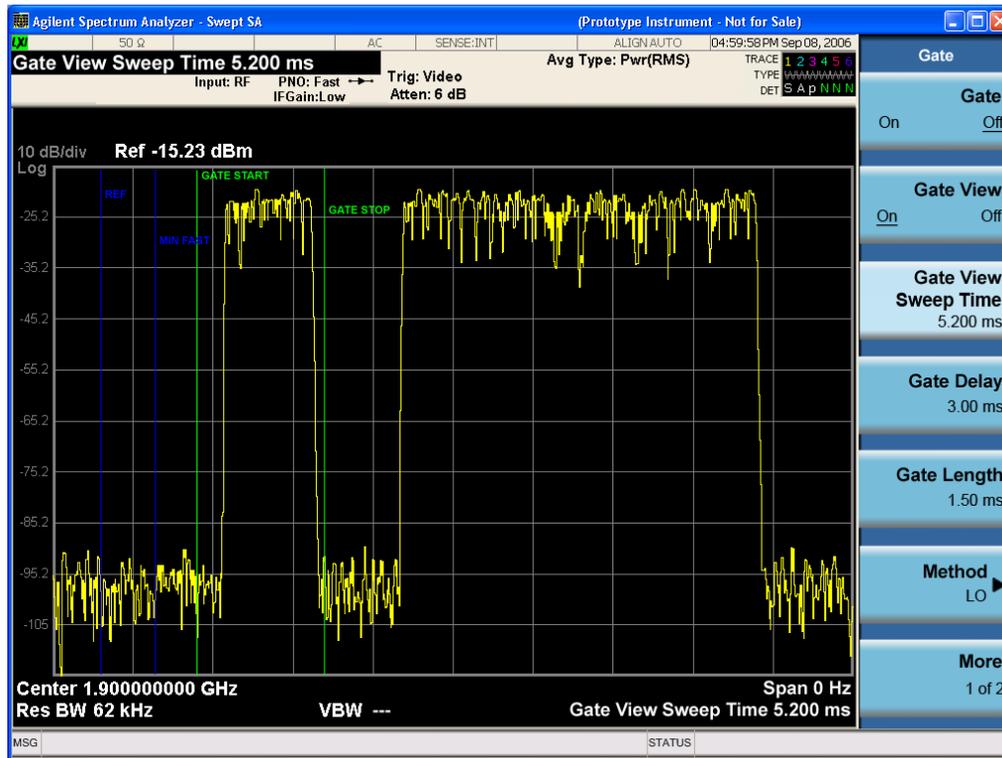
Turning on Gate View in other measurements shows the split-screen Gate View. In these measurements, when the Gate View is on, the regular view of the current measurement traces and results are reduced vertically to about 70% of the regular height. The Zero Span window, showing the positions of the Gate, is shown between the Measurement Bar and the reduced measurement window. By reducing the height of the measurement window, some of the annotation on the Data Display may not fit and is not shown.

| | |
|-----------------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe]:SWEep:EGATe:VIEW ON OFF 1 0 [:SENSe]:SWEep:EGATe:VIEW? |
| Example | SWE:EGAT:VIEW ON turns on the gate view. |
| Dependencies | In the Swept SA measurement: In Gate View, the regular Sweep Time key is grayed out . When pressed, the grayed out key puts up the informational message "Use Gate View Sweep Time in the Gate menu." In the other measurements: When you turn Gate View on, the lower window takes on the current state of the instrument. Upon leaving Gate View, the instrument takes on the state of the lower window. When you turn Gate View on, the upper window Sweep Time is set to the gate view sweep time. |
| Couplings | These couplings apply to the Swept SA measurement: <ul style="list-style-type: none"> • When Gate View is turned on, the instrument is set to Zero Span. • Gate View automatically turns off whenever a Span other than Zero is selected. • Gate View automatically turns off if you press the Last Span key while in Gate View, and the instrument returns to the Span it was in before entering Gate View (even if that is Zero Span). • When Gate View is turned on, the sweep time used is the gate view sweep time. This is set according to the rules in section "Gate View Setup " on page 2341 • When Gate View is turned off, Sweep Time is set to the normal Swept SA measurement sweep time. |

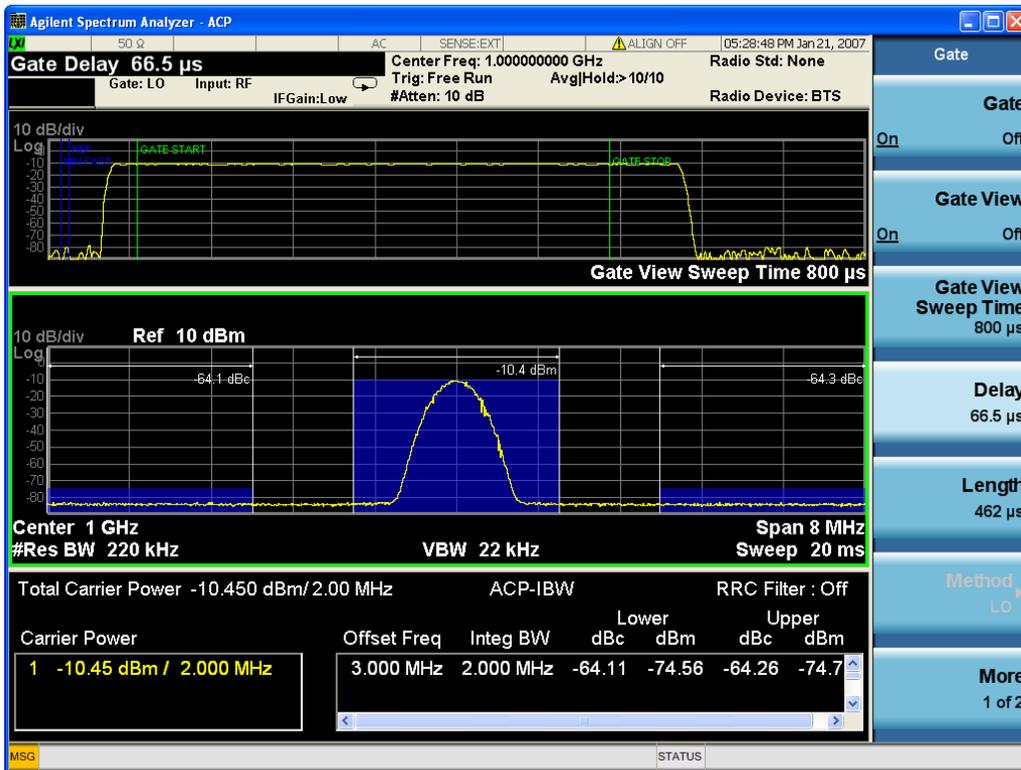
- If Gate View is on and Gate is off, then turning on Gate turns off Gate View.

| | |
|----------------------|---------------------------|
| Preset | OFF |
| State Saved | Saved in instrument state |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

A sample of the Gate View screen in the Swept SA measurement is shown in the following graphic :



A sample of the Gate View screen in other measurements is shown in the following graphic . This example is for the ACP measurement:



Turning Gate View off returns the analyzer to the Normal measurement view.

In the Swept SA, the normal measurement view is the single-window Swept SA view. When returning to this view, the Swept SA measurement returns to the Span it was in before entering **Gate View** (even if that is Zero Span).

The **Gate View** window is triggered from the Gate Source, with zero trigger delay. Also, when updating the **Gate View** window, the Gate itself must not operate. So it is internally shut off while the gate view window is being updated. For the Swept SA measurement, this means that the Gate is internally shut off whenever the gate view window is displayed. The measurement bar and softkeys continue to show the Trigger source for the main sweep window and give no indication that the Gate is shut off or that the Gate View window is triggered from the Gate Source.

When in **Gate View**, vertical lines are displayed in the Gate View window as follows:

- Green lines are displayed at the gate edges as follows: in Edge Gate, a line is shown for Delay and one for the end of the Gate period, defined by Length. In Level Gate a line is shown only for Delay. You can adjust the position of the green lines by adjusting the gate length and the gate delay. These lines update in the Gate View window as the active function changes, even if the window is not being updated. In Gated LO and Gated Video, these lines are positioned relative to the delay reference line (not relative to 0 time). In Gated FFT, their location is relative to the left edge of the screen.
- A blue line is displayed showing the delay reference, that is, the reference point for the Gate Delay within the Zero Span window. The blue line represents where (in time) the effective location of the gate start would be if the gate were programmed to zero delay.

- The second blue line is labeled "MIN FAST" as shown in the figure above because it represents the minimum Gate Delay for fast Gated LO operation. This line is only displayed in Gated LO. You cannot scroll (knob) or decrement (down key) the Gate Delay to less than that represented by the position of this line, it can only be set below this position manually, although once there it can be moved freely with the knob while below the line.
- A yellow line in the Gated Video case only, is displayed at Blength, where Blength is the display point (bucket) length for the swept trace, which is given by the sweep time for that trace divided by number of Points – 1. So it is referenced to 0 time, not to the delay reference. This line is labeled NEXT PT (it is not shown in the figure above because the figure above is for Gated LO).
- The yellow line represents the edge of a display point (bucket). Normally in Gated Video, the bucket length must be selected so that it exceeds the off time of the burst. There is another way to use the analyzer in Gated Video measurements, and that is to set the bucket width much shorter than the off time of the burst. Then use the Max Hold trace function to fill in "missing" buckets more slowly. This allows you to see some of the patterns of the Gated Video results earlier, though seeing a completely filled-in spectrum later.

Gate View Setup

Accesses a menu that enables you to setup parameters relevant to the Gate View

| | |
|----------------------|---------------------|
| Key Path | Sweep/Control, Gate |
| Scope | Meas Global |
| Initial S/W Revision | A.10.00 |

Gate View Sweep Time

Controls the sweep time in the Gate View window. To provide an optimal view of the gate signal, the analyzer initializes Gate View Sweep Time based on the current settings of Gate Delay and Gate Length.

| | |
|----------------|--|
| Key Path | Sweep/Control, Gate, Gate View Setup |
| Remote Command | [:SENSe] :SWEep:EGATe:TIME <time> [:SENSe] :SWEep:EGATe:TIME? |
| Example | SWE:EGAT:TIME 500 ms |
| Dependencies | Gate View Sweep Time is initialized: <ul style="list-style-type: none"> • On Preset (after initializing delay and length). • Every time the Gate Method is set/changed. <p>Additionally, in the Swept SA measurement, whenever you do a Preset, or leave Gate View, the analyzer remembers the Gate Delay and Gate Length settings. Then, when returning to Gate View, if the current Gate Delay and/or Gate Length do not match the remembered values Gate View Sweep Time is re-initialized.</p> <ol style="list-style-type: none"> 1. Compute the location of the "gate stop" line, which you know is at time $t = t_{min} + GateDelay + GateLength$. |
| Preset | 519.3 μ s |

| | |
|----------------------|-------------------------------------|
| | WiMAX OFDMA: 5 ms GSM/EDGE: 1 ms |
| State Saved | Saved in instrument state |
| Max | 6000 s |
| Initial S/W Revision | Prior to A.02.00 |

Gate View Start Time

Controls the time at the left edge of the Gate View.

| | |
|-----------------------|---|
| Key Path | Sweep/Control, Gate, Gate View Setup |
| Remote Command | [:SENSe] :SWEep:EGATe:VIEW:STARt <time> [:SENSe] :SWEep:EGATe:VIEW:STARt? |
| Example | SWE:EGAT:VIEW:STAR 10ms |
| Notes | Units of time are required or no units; otherwise an invalid suffix error message will be generated. See error -131. |
| Preset | 0 ms |
| State Saved | Saved in instrument state |
| Min | 0 |
| Max | 500 ms |
| Initial S/W Revision | A.10.00 |

Gate Delay

Controls the length of time from the time the gate condition goes True until the gate is turned on.

| | |
|-----------------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe:DELay <time> [:SENSe] :SWEep:EGATe:DELay? |
| Example | SWE:EGAT:DELay 500ms SWE:EGAT:DELay? |
| Notes | Units of time are required or no units; otherwise an invalid suffix error message will be generated. |
| Preset | 57.7 us WiMAX OFDMA: 71 us GSM/EDGE: 600 us WLAN: 500 us |
| State Saved | Saved in instrument state |

| | |
|-------------------------------------|--|
| Min | 0.0 us |
| Max | 100 s |
| Backwards Compatibility SCPI | [:SENSe]:SWEep:TIME:GATE:DELay ESA compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Length

Controls the length of time that the gate is on after it opens.

| | |
|-----------------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe]:SWEep:EGATe:LENGth <time> [:SENSe]:SWEep:EGATe:LENGth? |
| Example | SWE:EGAT:LENG 1 SWE:EGAT:LENG? |
| Notes | Units of time are required or no units; otherwise an invalid suffix error message will be generated. |

Dependencies

Grayed out when Gate Method is set to FFT in which case the label changes to that shown below.



The key is also grayed out if Gate Control = Level.

| | |
|-------------------------------------|---|
| Preset | 461.6 us WiMAX OFDMA: 50 us GSM/EDGE: 200 us WLAN: 1.54 ms |
| State Saved | Saved in instrument state |
| Min | 100 ns |
| Max | 5 s |
| Backwards Compatibility SCPI | [:SENSe]:SWEep:TIME:GATE:LENGth ESA compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Source

The menus under the Gate Source key are the same as those under the Trigger key, with the exception that neither Free Run nor Video are available as Gate Source selections. However, a different SCPI command

is used to select the Gate Source (see table below) because you may independently set the Gate Source and the Trigger Source.

Any changes to the settings in the setup menus under each Gate Source selection key (for example: Trigger Level, Trigger Delay, etc.) also affect the corresponding settings under the Trigger menu keys. The SCPI commands used for these are the same for Trigger and Gate, since there is only one setting which affects both Gate and Trigger. Example: to set the Trigger Level for External 1 you use the command :TRIG:EXT1:LEV regardless of whether you are using External 1 as a Trigger Source or a Gate Source.

| | |
|-------------------------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe:SOURce EXTernal1 EXTernal2 LINE FRAMe RFBurst [:SENSe] :SWEep:EGATe:SOURce? |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" error. |
| Preset | EXTernal 1 GSM/EDGE, MSR: FRAMe LTETDD: EXTernal 1When Direction is Downlink, FRAMe when Direction is Uplink. |
| Backwards Compatibility Notes | In ESA, there is a single Gate input port. In PSA, the Gate Source may be taken from one of two specified input ports. In the X-Series, any Trigger Source can be a Gate Source. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.14.00 |

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA |
| Dependencies | Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 1. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:LEVel <level> :TRIGger[:SEquence]:EXTernal1:LEVel? |
| Example | TRIG:EXT1:LEV 0.4 V |
| Couplings | This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:LEVel For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:EXTernal1:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal1:SLOPe? |
| Example | TRIG:EXT1:SLOP NEG |
| Couplings | This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:SLOPe For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:EXTernal1:SLOPe |
| Backwards Compatibility | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, |

| | |
|----------------------|-------------------|
| Notes | and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Zero Span Delay Comp On/Off

In zero span, there is a natural delay in the signal path, which comes from the RBW filter. This is usually desirable, as it allows you to trigger on events and also see those events, because the signal is delayed from the trigger event. However, in some cases it is desirable to eliminate this delay, so that trigger events line up exactly with the zero time point in zero span. You can use the Zero Span Delay Comp On/Off feature to enable or disable zero span delay compensation.

| | |
|----------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:DELay:COMPensation OFF ON 0 1 :TRIGger[:SEquence]:EXTernal1:DELay:COMPensation? |
| Example | TRIG:EXT1:DEL:COMP ON |
| Dependencies | No effect except in zero-span, but not locked out in nonzero spans. Blanked in modes that do not support zero-span measurements. If the SCPI command is sent when the key is blanked, an error is returned: -221, "Settings conflict; Feature not supported for this measurement" In analyzers shipping N9060A, this feature requires N9060A-7FP. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | A.11.00 |

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

| | |
|-----------------|---|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT2 Swept SA measurement TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message. Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 2. |
| State Saved | Saved in instrument state |
| Status Bits/OPC | |

| | |
|--------------------------|--|
| dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:LEVel :TRIGger[:SEquence]:EXTernal2:LEVel? |
| Example | TRIG:EXT2:LEV 1.1 V |
| Couplings | This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-----------------------|--|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal2:SLOPe? |
| Example | TRIG:EXT2:SLOP NEG |
| Couplings | This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |

| | |
|-------------------------------------|--|
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Zero Span Delay Comp On/Off

In zero span, there is a natural delay in the signal path, which comes from the RBW filter. This is usually desirable, as it allows you to trigger on events and also see those events, because the signal is delayed from the trigger event. However, in some cases it is desirable to eliminate this delay, so that trigger events line up exactly with the zero time point in zero span. You can use the Zero Span Delay Comp On/Off feature to enable or disable zero span delay compensation.

| | |
|-----------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:DELAy:COMPensation OFF ON 0 1 :TRIGger[:SEquence]:EXTernal2:DELAy:COMPensation? |
| Example | TRIG:EXT2:DEL:COMP ON |
| Dependencies | No effect except in zero-span, but not locked out in nonzero spans. Blanked in modes that do not support zero-span measurements. If the SCPI command is sent when the key is blanked, an error is returned: -221, "Settings conflict; Feature not supported for this measurement" In analyzers shipping N9060A, this feature requires N9060A-7FP. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | A.11.00 |

RF Burst

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector. Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

In some models, a variety of burst trigger circuitry is available, resulting in various available burst trigger bandwidths. The analyzer automatically chooses the appropriate trigger path based on the hardware configuration and other settings of the analyzer.

| | |
|----------------|---|
| Key Path | Trigger |
| Example | TRIG:SOUR RFB Swept SA measurement TRIG:<meas>:SOUR RFB Measurements other than Swept SA |
| State Saved | Saved in instrument state |

| | |
|-------------------------------|--|
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Backwards Compatibility Notes | The legacy command: :TRIGger[:SEQuence]:RFBurst:FSElectivity[:STATe] OFF ON 0 1 is not supported in the X-Series, as the hardware to do Frequency Selective burst triggers does not exist in X-Series. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Absolute Trigger Level

Sets the absolute trigger level for the RF burst envelope.

When using the External Mixing path, the Absolute Trigger Level is uncalibrated because the factory default was set to accommodate the expected IF levels for the RF path.

| | |
|----------------|---|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute <ampl> :TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute? |
| Example | TRIG:RFB:LEV:ABS 10 dBm sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm |
| Notes | Sending this command does not switch the setting from relative to absolute; to switch it you need to send the :TRIGger[:SEQuence]:RFBurst:LEVel:TYPE command, below. Amplitude Corrections are not taken into account by the Absolute Trigger Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Absolute Trigger will not fire until you have set the trigger level that far below the displayed signal level, rather than simply to the displayed signal level. This is only true for Amplitude Corrections, not External Gain or Ref Level Offset functions. If mode is Bluetooth, the default value is -50 dBm. |
| Couplings | This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu |
| Preset | -20 dBm |
| State Saved | Saved in instrument state |
| Min | -200 dBm |
| Max | 100 dBm |
| Default Unit | depends on the current selected Y-Axis unit |
| Backwards | :TRIGger[:SEQuence]:FRAME:RFBurst:LEVel:ABSolute |

| Compatibility SCPI | |
|---------------------------|---|
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |
| <hr/> | |
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:TYPE ABSolute RELative :TRIGger[:SEquence]:RFBurst:LEVel:TYPE? |
| Example | TRIG:RFB:LEV:TYPE REL sets the trigger level type of the RF burst trigger to Relative. |
| Preset | ABSolute |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Relative Trigger Level

Sets the relative trigger level for the RF burst envelope.

In some models, the relative burst trigger function is implemented in hardware. In other models, without the advanced triggering hardware required, the relative burst trigger function is implemented in software in some measurements, and is unavailable in other measurements.

When implemented in software, the relative RF Burst trigger function is implemented as follows:

1. The measurement starts with the absolute RF Burst trigger setting. If it cannot get a trigger with that level, auto trigger fires and the acquisition starts anyway. After the acquisition, the measurement searches for the peak in the acquired waveform and saves it.
2. Now, in the next cycle of the measurement, the measurement determines a new absolute RF Burst level based on the peak value from the first measurement and the Relative RF Burst Trigger Level (always 0 or negative dB) set by the user. The following formula is used:
3. absolute RF Burst level = peak level of the previous acquisition + relative RF Burst level
4. If the new absolute RF Burst level differs from the previous by more than 0.5 dB, the new level is sent to the hardware; otherwise it is not updated (to avoid slowing down the acquisition)

Steps 2 and 3 repeat for subsequent measurements.

| | |
|-----------------------|--|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:RELative <rel_ampl> :TRIGger[:SEquence]:RFBurst:LEVel:RELative? |
| Example | TRIG:RFB:LEV:REL -10 dB |

| | |
|-------------------------------------|--|
| | sets the trigger level of the RF burst envelope signal to the relative level of -10 dB |
| Notes | <p>Sending this command does not switch the setting from absolute to relative; to switch it you need to send the :TRIGger[:SEQuence]:RFBurst:LEVel:TYPE command, above.</p> <p>The relative trigger level is not available in some measurements. In those measurements the RELative parameter, and the :TRIGger[:SEQuence]:RFBurst:LEVel:TYPE command (above), will generate an error if sent.</p> |
| Dependencies | This key is grayed out and Absolute Trigger Level selected if the required hardware is not present in your analyzer and the current measurement does not support Relative triggering. |
| Preset | -6 dB GSM: -25 dB |
| State Saved | Saved in instrument state |
| Min | -45 dB |
| Max | 0 dB |
| Default Unit | dB or dBc |
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:RFBurst:LEVel |
| | This legacy command is aliased to :TRIGger[:SEQuence]:RFBurst:LEVel:RELative because the PSA had ONLY relative burst triggering |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEQuence]:RFBurst:SLOPe POSitive NEGative :TRIGger[:SEQuence]:RFBurst:SLOPe? |
| Example | TRIG:RFB:SLOP NEG |
| Couplings | This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:FRAME:RFBurst:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Periodic Timer (Frame Trigger)

Pressing this key, when it is not selected, selects the internal periodic timer signal as the trigger. Triggering occurrences are set by the **Period** parameter, which is modified by the **Sync Source** and **Offset**. Pressing this key, when it is already selected, accesses the periodic timer trigger setup functions.

If you do not have a sync source selected (it is Off), then the internal timer will not be synchronized with any external timing events.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR FRAM Swept SA measurement |
| | TRIG:<meas>:SOUR FRAM Measurements other than Swept SA |
| State Saved | Saved in instrument state |
| Readback | [Sync: <value of Sync Source>], for example, [Sync: External 1] |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Periodic Timer Triggering:

This feature selects the internal periodic timer signal as the trigger. Trigger occurrences are set by the **Periodic Timer** parameter, which is modified by the **Sync Source** and **Offset**.

The figure below shows the action of the periodic timer trigger. Before reviewing the figure, we'll explain some uses for the periodic trigger.

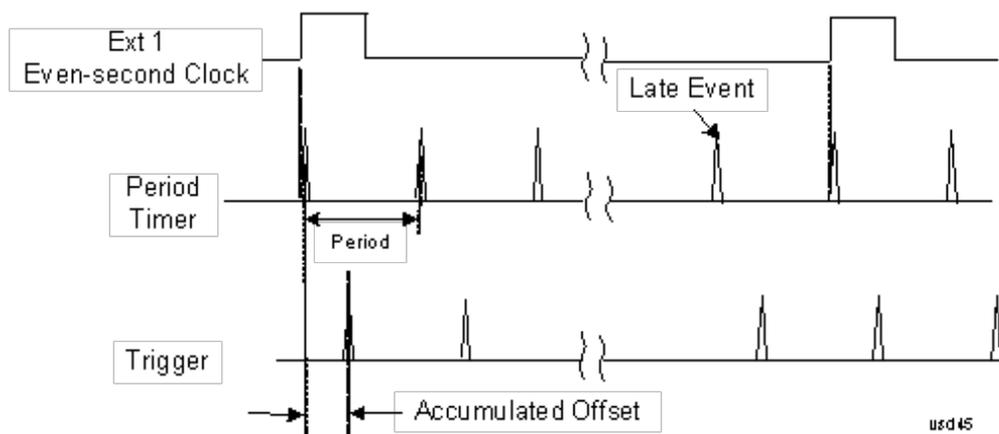
A common application is measuring periodic burst RF signals for which a trigger signal is not easily available. For example, we might be measuring a TDMA radio which bursts every 20 ms. Let's assume that the 20 ms period is very consistent. Let's also assume that we do not have an external trigger source available that is synchronized with the period, and that the signal-to-noise ratio of the signal is not high enough to provide a clean RF burst trigger at all of the analysis frequencies. For example, we might want to measure spurious transmissions at an offset from the carrier that is larger than the bandwidth of the RF burst trigger. In this application, we can set the Periodic Timer to a 20.00 ms period and adjust the offset from that timer to position our trigger just where we want it. If we find that the 20.00 ms is not exactly right, we can adjust the period slightly to minimize the drift between the period timer and the signal to be measured.

A second way to use this feature would be to use **Sync Source** temporarily, instead of **Offset**. In this case, we might tune to the signal in a narrow span and use the RF Burst trigger to synchronize the periodic timer. Then we would turn the sync source off so that it would not miss-trigger. Miss-triggering can occur when we are tuned so far away from the RF burst trigger that it is no longer reliable.

A third example would be to synchronize to a signal that has a reference time element of much longer period than the period of interest. In some CDMA applications, it is useful to look at signals with a short periodicity, by synchronizing that periodicity to the "even-second clock" edge that happens every two

seconds. Thus, we could connect the even-second clock trigger to Ext1 and use then Ext1 as the sync source for the periodic timer.

The figure below illustrates this third example. The top trace represents the even-second clock. It causes the periodic timer to synchronize with the leading edge shown. The analyzer trigger occurs at a time delayed by the accumulated offset from the period trigger event. The periodic timer continues to run, and triggers continue to occur, with a periodicity determined by the analyzer time base. The timer output (labeled "late event") will drift away from its ideal time due to imperfect matching between the time base of the signal being measured and the time base of the analyzer, and also because of imperfect setting of the period parameter. But the synchronization is restored on the next even-second clock event. ("Accumulated offset" is described in the in the **Offset** function section.)



Period

Sets the period of the internal periodic timer clock. For digital communications signals, this is usually set to the frame period of your current input signal. In the case that sync source is not set to OFF, and the external sync source rate is changed for some reason, the periodic timer is synchronized at the every external synchronization pulse by resetting the internal state of the timer circuit.

| | |
|----------------------|---|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:PERiod <time> :TRIGger[:SEquence]:FRAMe:PERiod? |
| Example | TRIG:FRAM:PER 100 ms |
| Dependencies | The invalid data indicator turns on when the period is changed, until the next sweep/measurement completes. |
| Couplings | The same period is used in the Gate Source selection of the period timer. |
| Preset | 20 ms GSM: 4.615383 |
| State Saved | Saved in instrument state |
| Min | 100.000 ns |
| Max | 559.0000 ms |
| Default Unit | S |
| Initial S/W Revision | Prior to A.02.00 |

Offset

Adjusts the accumulated offset between the periodic timer events and the trigger event. Adjusting the accumulated offset is different than setting an offset, and requires explanation.

The periodic timer is usually not synchronized with any external events, so the timing of its output events has no absolute meaning. Since the timing relative to external events (RF signals) is important, you need to be able to adjust (offset) it. However, you have no direct way to see when the periodic timer events occur. All that you can see is the trigger timing. When you want to adjust the trigger timing, you will be changing the internal offset between the periodic timer events and the trigger event. Because the absolute value of that internal offset is unknown, we will just call that the accumulated offset. Whenever the Offset parameter is changed, you are changing that accumulated offset. You can reset the displayed offset using Reset Offset Display. Changing the display does not change the value of the accumulated offset, and you can still make additional changes to accumulated offset.

To avoid ambiguity, we define that an increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.

| | |
|-----------------------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:OFFSet <time> :TRIGger[:SEquence]:FRAMe:OFFSet? |
| Example | TRIG:FRAM:OFFS 1.2 ms |
| Notes | <p>The front panel interface (for example, the knob), and this command, adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware each time the offset is updated is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value. Note that the accumulated offset value is essentially arbitrary; it represents the accumulated offset from the last time the offset was zeroed (with the Reset Offset Display key).</p> <p>Note that this command does not change the period of the trigger waveform. Note also that Offset is used only when the sync source is set to OFF, otherwise delay is used, see section Trig Delay.</p> <p>An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.</p> |
| Notes | <p>When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated with the new value. However, the actual amount sent to the hardware is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value.</p> <p>The SCPI query simply returns the value currently showing on the key.</p> |
| Dependencies | The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes. |
| Couplings | The same offset is used in the Gate Source selection of the period timer. |
| Preset | 0 s |
| State Saved | Saved in instrument state |
| Min | -10.000 s |
| Max | 10.000 s |
| Default Unit | S |
| Initial S/W Revision | Prior to A.02.00 |

Offset Adjust (Remote Command Only)

This remote command does not work at all like the related front panel keys. This command lets you advance the phase of the frame trigger by the amount you specify.

It does not change the period of the trigger waveform. If the command is sent multiple times, it advances the phase of the frame trigger an additional amount each time it is sent. Negative numbers are permitted.

| | |
|-----------------------------|--|
| Remote Command | :TRIGger[:SEquence]:FRAMe:ADJust <time> |
| Example | TRIG:FRAM:ADJ 1.2 ms |
| Notes | Note also that Offset is used only when the sync source is set to OFF, otherwise delay is used, see section Trig Delay An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event. |
| Notes | The front panel interface (for example, the knob) and the :TRIG:FRAM:OFFS command adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware is the delta value, that is, the current offset value minus the previous offset value. When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated by increasing it (or decreasing it if the value sent is negative) by the amount specified in the SCPI command. This is a "command only" SCPI command, with no query. |
| Dependencies | The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes. |
| Couplings | The same offset is used in the Gate Source selection of the period timer. |
| Preset | 0 s |
| State Saved | Saved in instrument state |
| Min | -10.000 s |
| Max | 10.000 s |
| Default Unit | S |
| Initial S/W Revision | Prior to A.02.00 |

Reset Offset Display

Resets the value of the periodic trigger offset display setting to 0.0 seconds. The current displayed trigger location may include an offset value defined with the Offset key. Pressing this key redefines the currently displayed trigger location as the new trigger point that is 0.0 s offset. The Offset key can then be used to add offset relative to this new timing.

| | |
|-----------------------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:OFFSet:DISPlay:RESet |
| Example | TRIG:FRAM:OFFS:DISP:RES |
| Initial S/W Revision | Prior to A.02.00 |

Sync Source

Selects a signal source for you to synchronize your periodic timer trigger to, otherwise you are triggering at some arbitrary location in the frame. Synchronization reduces the precision requirements on the setting of the period.

For convenience you may adjust the level and slope of the selected sync source in a conditional branch setup menu accessed from the Sync Source menu. Note that these settings match those in the **Trigger** and **Gate Source** menus; that is, each trigger source has only one value of level and slope, regardless of which menu it is accessed from.

| | |
|-------------------------------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:SYNC EXTernal1 EXTernal2 RFBurst OFF :TRIGger[:SEquence]:FRAMe:SYNC? |
| Example | TRIG:FRAM:SYNC EXT2 |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message. |
| Preset | Off GSM/EDGE, MSR,LTE,LTETDD: RFBurst |
| State Saved | Saved in instrument state |
| Readback | The current setting is read back to this key and it is also Readback to the previous Periodic Timer trigger key. |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:SYNC EXTernal For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.14.00 |

Off

Turns off the sync source for your periodic trigger. With the sync source off, the timing will drift unless the signal source frequency is locked to the analyzer frequency reference.

| | |
|-----------------------------|--------------------------------------|
| Key Path | Trigger, Periodic Timer, Sync Source |
| Example | TRIG:FRAM:SYNC OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA |
| Dependencies | Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 1. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:LEVel <level> :TRIGger[:SEquence]:EXTernal1:LEVel? |
| Example | TRIG:EXT1:LEV 0.4 V |
| Couplings | This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:LEVel For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal1:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal1:SLOPe? |
| Example | TRIG:EXT1:SLOP NEG |
| Couplings | This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:SLOPe For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal1:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT2 Swept SA measurement TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message. Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 2. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:LEVel :TRIGger[:SEquence]:EXTernal2:LEVel? |
| Example | TRIG:EXT2:LEV 1.1 V |
| Couplings | This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal2:SLOPe? |
| Example | TRIG:EXT2:SLOP NEG |
| Couplings | This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

RF Burst

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector. Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

In some models, a variety of burst trigger circuitry is available, resulting in various available burst trigger bandwidths. The analyzer automatically chooses the appropriate trigger path based on the hardware configuration and other settings of the analyzer.

| | |
|-------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR RFB Swept SA measurement TRIG:<meas>:SOUR RFB Measurements other than Swept SA |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Backwards Compatibility Notes | The legacy command: :TRIGger[:SEquence]:RFBurst:FSElectivity[:STATe] OFF ON 0 1 is not supported in the X-Series, as the hardware to do Frequency Selective burst triggers does not exist in X-Series. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Absolute Trigger Level

Sets the absolute trigger level for the RF burst envelope.

When using the External Mixing path, the Absolute Trigger Level is uncalibrated because the factory default was set to accommodate the expected IF levels for the RF path.

| | |
|-----------------------|--|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute <ampl> :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute? |
| Example | TRIG:RFB:LEV:ABS 10 dBm sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm |
| Notes | Sending this command does not switch the setting from relative to absolute; to switch it you need to send the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command, below. Amplitude Corrections are not taken into account by the Absolute Trigger Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Absolute Trigger will not fire until you have set the trigger level that far below the displayed signal level, rather than simply to |

| | |
|-------------------------------------|--|
| | the displayed signal level. This is only true for Amplitude Corrections, not External Gain or Ref Level Offset functions. If mode is Bluetooth, the default value is -50 dBm. |
| Couplings | This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu |
| Preset | -20 dBm |
| State Saved | Saved in instrument state |
| Min | -200 dBm |
| Max | 100 dBm |
| Default Unit | depends on the current selected Y-Axis unit |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:RFBurst:LEVel:ABSolute |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

| | |
|--------------------------|---|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:TYPE ABSolute RELative :TRIGger[:SEquence]:RFBurst:LEVel:TYPE? |
| Example | TRIG:RFB:LEV:TYPE REL sets the trigger level type of the RF burst trigger to Relative. |
| Preset | ABSolute |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-----------------------|--|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:SLOPe POSitive NEGative :TRIGger[:SEquence]:RFBurst:SLOPe? |
| Example | TRIG:RFB:SLOP NEG |
| Couplings | This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |

| | |
|-------------------------------------|--|
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:FRAMe:RFBurst:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Sync Holdoff

Sync Holdoff specifies the duration that the sync source signal must be kept false before the transition to true to be recognized as the sync timing. The periodic timer phase is aligned when the sync source signal becomes true, after the Holdoff time is satisfied.

A holdoff of 2 ms will work with most WiMAX signals, but there may be cases where the burst off duration is less than 1 ms and this value will need to be changed.

| | |
|-----------------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEQuence]:FRAMe:SYNC:HOLDoff <time> :TRIGger[:SEQuence]:FRAMe:SYNC:HOLDoff? :TRIGger[:SEQuence]:FRAMe:SYNC:HOLDoff:STATe OFF ON 0 1 :TRIGger[:SEQuence]:FRAMe:SYNC:HOLDoff:STATe? |
| Preset | On, 1.000 ms |
| State Saved | Saved in instrument state |
| Min | 0 ms |
| Max | +500 ms |
| Default Unit | s |
| Initial S/W Revision | Prior to A.02.00 |

Control Edge/Level

Sets the method of controlling the gating function from the gating signal.

Edge

In Edge triggering, the gate opens (after the Delay) on the selected edge (for example, positive) of the gate signal and closes on the alternate edge (for example, negative).

Level

In Level triggering, the gate opens (after the Delay) when the gate signal has achieved a certain level and stays open as long as that level is maintained.

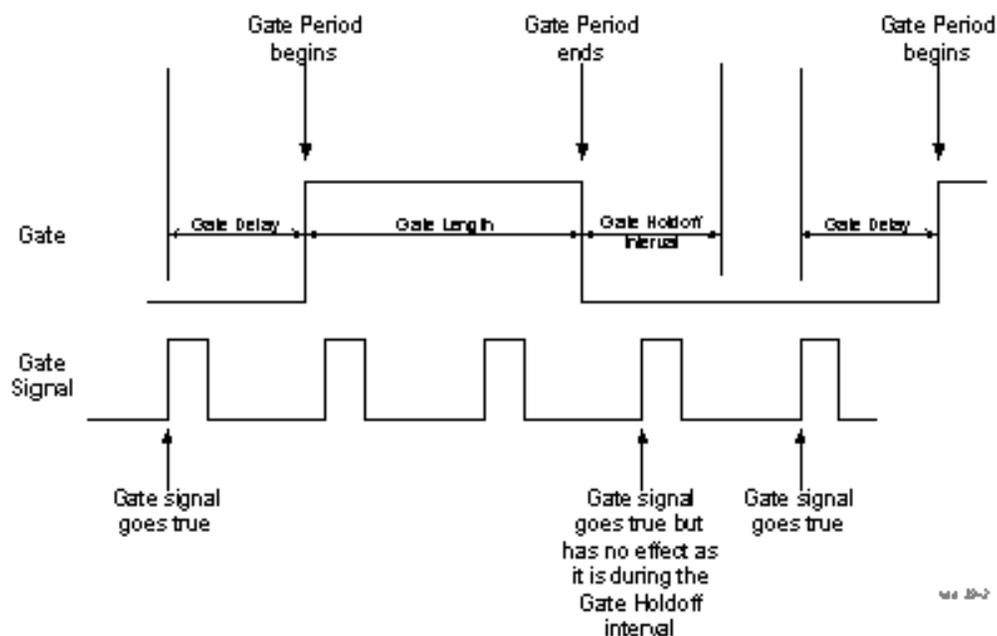
| | |
|-----------------------|---|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe]:SWEep:EGATe:CONTRol EDGE LEVEL [:SENSe]:SWEep:EGATe:CONTRol? |
| Example | SWE:EGAT:CONT EDGE |
| Dependencies | If the Gate Method is FFT the Control key is grayed out and Edge is selected. |

| | |
|-------------------------------------|--|
| | If the Gate Source is TV, Frame or Line, the Control key is grayed out and Edge is selected. |
| Preset | EDGE |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | <code>[:SENSe]:SWEep:TIME:GATE:TYPE</code> ESA Compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Holdoff

Lets you increase or decrease the wait time after a gate event ends before the analyzer will respond to the next gate signal.

After any Gate event finishes, the analyzer must wait for the sweep system to settle before it can respond to another Gate signal. The analyzer calculates a "wait time," taking into account a number of factors, including RBW and Phase Noise Optimization settings. The goal is to achieve the same accuracy when gated as in ungated operation. The figure below illustrates this concept:



When Gate Holdoff is in Auto, the wait time calculated by the analyzer is used. When Gate Time is in Manual, the user may adjust the wait time, usually decreasing it in order to achieve greater speed, but at the risk of decreasing accuracy.

When the Method key is set to Video or FFT, the Gate Holdoff function has no effect.

In measurements that do not support Auto, the value shown when Auto is selected is “---” and the manually set holdoff is returned to a query.

| | |
|----------|---------------------|
| Key Path | Sweep/Control, Gate |
|----------|---------------------|

| | |
|-----------------------------|--|
| Remote Command | <pre>[:SENSe] :SWEep:EGATe:HOLDoff <time> [:SENSe] :SWEep:EGATe:HOLDoff? [:SENSe] :SWEep:EGATe:HOLDoff:AUTO OFF ON 0 1 [:SENSe] :SWEep:EGATe:HOLDoff:AUTO?</pre> |
| Example | <pre>SWE:EGAT:HOLD 0.0002 SWE:EGAT:HOLD? SWE:EGAT:HOLD:AUTO ON SWE:EGAT:HOLD:AUTO?</pre> |
| Couplings | <p>When Gate Holdoff is Auto, the Gate Holdoff key shows the value calculated by the analyzer for the wait time.</p> <p>Pressing the Gate Holdoff key while it is in Auto and not selected, causes the key to become selected and allows the user to adjust the value. If the value is adjusted, the setting changes to Man.</p> <p>Pressing the Gate Holdoff key, while it is in Auto and selected, does not change the value of Gate Holdoff, but causes the setting to change to Man. Now the user can adjust the value.</p> <p>Pressing the key while it is in Man and selected, cause the value to change back to Auto.</p> <p>Pressing the key while it is in Man and not selected, causes the key to become selected and allows the user to adjust the value.</p> <p>When Method is set to Video or FFT, the Gate Holdoff function has no effect.</p> |
| Preset | <p>Auto</p> <p>Auto/On</p> |
| State Saved | Saved in instrument state |
| Min | 1 μ sec |
| Max | 1 sec |
| Initial S/W Revision | Prior to A.02.00 |

Gate Delay Compensation

This function allows you to select an RBW-dependent value by which to adjust the gate delay, to compensate for changes in the delay caused by RBW effects.

You can select between uncompensated operation and two types of compensation, Delay Until RBW Settled and Compensate for RBW Group Delay.

See ["More Information" on page 1366](#)

| | |
|-----------------------|--|
| Key Path | Sweep/Control, Gate |
| Scope | Meas Global |
| Remote Command | <pre>[:SENSe] :SWEep:EGATe:DELaY:COMPensation:TYPE OFF SETTled GDELaY [:SENSe] :SWEep:EGATe:DELaY:COMPensation:TYPE?</pre> |
| Example | <pre>SWE:EGAT:DEL:COMP:TYPE SETT SWE:EGAT:DEL:COMP:TYPE?</pre> |

| | |
|--------------------------|---|
| Notes | <p>Although this function is Meas Global, there are some measurements that do not support this function. In those measurements the operation will be Uncompensated. Going into one of those measurements will not change the Meas Global selection; it will simply display the grayed-out menu key with “Uncompensated” showing as the selection. This is a non-forceful grayout, so the SCPI command is still accepted.</p> <p>If Gate Delay Compensation is not supported at all within a particular mode, the key is not displayed, and if the SCPI command is sent while in a measurement within that mode, an “Undefined Header” message is generated.</p> <p>Measurements that do not support this function include: Swept SA</p> |
| Preset | <p>TD-SCDMA mode: Compensate for RBW Group Delay All other modes: Delay Until RBW Settled</p> |
| State Saved | Saved in instrument state |
| Range | Uncompensated Delay Until RBW Settled Compensate for RBW Group Delay |
| Readback text | Uncompensated Settled Group Delay |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.0 |

More Information

Selecting Uncompensated means that the actual gate delay is as you sets it.

Selecting Delay Until RBW Settled causes the gate delay to be increased above the user setting by an amount equal to $3.06/\text{RBW}$. This compensated delay causes the GATE START and GATE STOP lines on the display to move by the compensation amount, and the actual hardware gate delay to be increased by the same amount. All the other gate lines (for example, MIN FAST) are unaffected. If the RBW subsequently changes, the compensation is readjusted for the new RBW. The value shown on the Gate Delay key does NOT change.

Delay Until RBW Settled allows excellent measurements of gated signals, by allowing the IF to settle following any transient that affects the burst. Excellent measurements also require that the analysis region not extend into the region affected by the falling edge of the burst. Thus, excellent measurements can only be made over a width that declines with narrowing RBWs, which is achieved by decreasing the gate length below the user setting by an amount equal to $2.53/\text{RBW}$. Therefore, for general purpose compensation, you will still want to change the gate length with changes in RBW even if the gate delay is compensated. The compensated Gate Length is limited by the analyzer so that it will never go below 10% of the value shown on the Gate Length key, as otherwise the sweep times could get very long. Anytime the Gate Length and RBW values combine in such a way that this limiting takes place, a warning is displayed. For measurements which contain multiple sweeps with different RBW like SEM and SPUR, the smallest RBW is used for this limiting.

Selecting Compensate for RBW Group Delay causes the gate delay to be increased above the user setting by an amount equal to $1.81/\text{RBW}$. This compensated delay causes the GATE START, GATE STOP lines on the display to move by the compensation amount, and the actual hardware gate delay to be increased by the same amount. All the other gate lines (for example, MIN FAST) are unaffected. If the RBW

subsequently changes, the compensation is readjusted for the new RBW. The value shown on the Gate Delay key does NOT change. Compensate for RBW Group Delay also includes gate length compensation; the gate length itself is adjusted as necessary to attempt to compensate for delay effects imposed by the RBW.

Compensate for RBW Group Delay is similar to Delay Until RBW Settled, but compensates for the group delay of the RBW filter, rather than the filter settling time. As the RBW gets narrow, this can allow the settling tail of the RBW to affect the beginning part of the gated measurement, and allow the beginning of the RBW settling transient to affect the end of the gated measurement. These two effects are symmetric because the RBW response is symmetric. Because the gate length is not automatically compensated, some users might find this compensation to be more intuitive than compensation for RBW settling.

Min Fast Position Query (Remote Command Only)

This command queries the position of the MIN FAST line, relative to the delay reference (REF) line. See section "[Gate View On/Off](#)" on page 2338. If this query is sent while not in gate view, the MinFast calculation is performed based on the current values of the appropriate parameters and the result is returned. Knowing this value lets you set an optimal gate delay value for the current measurement setup.

| | |
|-----------------------------|---|
| Remote Command | <code>[:SENSe] :SWEep:EGATe:MINFast?</code> |
| Example | <code>SWE:EGAT:MIN?</code> |
| Initial S/W Revision | Prior to A.02.00 |

Gate Preset (Remote Command Only)

Presets the time-gated spectrum analysis capability.

This command sets gate parameter values to the ESA preset values, as follows:

Gate trigger type = edge

Gate polarity = positive

Gate delay = 1 us

Gate length = 1 us

| | |
|-----------------------------|---|
| Remote Command | <code>[:SENSe] :SWEep:TIME:GATE:PRESet</code> ESA Compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Level (Remote Command Only)

Sets the gate input transition point level for the external TRIGGER inputs on the front and rear panel. This is a legacy command for PSA compatibility. It is simply an alias to the equivalent trigger level command.

| | |
|-----------------------|---|
| Remote Command | <code>[:SENSe] :SWEep:EGATe:EXTernal [1] 2 :LEVel <voltage></code> <code>[:SENSe] :SWEep:EGATe:EXTernal [1] 2 :LEVel?</code> |
| Notes | This command is simply an alias to |

| | |
|----------------------|---|
| | :TRIGger[:SEQuence]:EXTernal[1]2:LEVel For details refer |
| Initial S/W Revision | Prior to A.02.00 |

Gate Polarity (Remote Command Only)

Sets the polarity for the gate signal. This setup is now done using the gate trigger's slope setting.

When Positive (Pos) is selected, a positive-going edge (Edge) or a high voltage (Level) will satisfy the gate condition, after the delay set with the Gate Delay key. When Negative (Neg) is selected, a negative-going edge (Edge) or a low voltage (Level) will satisfy the gate condition after the delay.

| | |
|-------------------------------------|---|
| Remote Command | [:SENSe] :SWEep:EGATe:POLarity NEGative POSitive [:SENSe] :SWEep:EGATe:POLarity? |
| Example | SWE:EGAT:POL NEG SWE:EGAT:POL? |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | [:SENSe] :SWEep:TIME:GATE:POLarity ESA compatibility |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|---|
| Remote Command | [:SENSe] :SWEep:TIME:GATE:LEVel HIGH LOW [:SENSe] :SWEep:TIME:GATE:LEVel? ESA compatibility |
| Preset | HIGH |
| Initial S/W Revision | Prior to A.02.00 |

System

See "System" on page 349

Trace/Detector

Trace/Detector is unavailable in the Spurious Emissions measurement. When pressed, this key displays a blank menu.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Trigger

See ["Trigger" on page 424](#)

Free Run

See ["Free Run " on page 431](#)

External 1

See ["External 1 " on page 2357](#)

Trigger Level

See ["Trigger Level " on page 2357](#)

Trig Slope

See ["Trig Slope " on page 2358](#)

Trig Delay

See ["Trig Delay " on page 437](#)

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off" on page 2346](#)

External 2

See ["External 2 " on page 2359](#)

Trigger Level

See ["Trigger Level " on page 2359](#)

Trig Slope

See ["Trig Slope " on page 2360](#)

Trig Delay

See ["Trig Delay " on page 440](#)

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off" on page 2348](#)

RF Burst

See ["RF Burst " on page 2360](#)

Absolute Trigger

See ["Absolute Trigger Level" on page 2361](#)

Relative Trigger

See ["Relative Trigger Level"](#) on page 2350

Trig Slope

See ["Trigger Slope "](#) on page 2362

Trig Delay

See ["Trig Delay "](#) on page 444

Periodic Timer

See ["Periodic Timer \(Frame Trigger\) "](#) on page 2352

Period

See ["Period "](#) on page 2353

Offset

See ["Offset "](#) on page 2354

Reset Offset Display

See ["Reset Offset Display "](#) on page 2356

Sync Source

See ["Sync Source "](#) on page 2356

Off

See ["Off "](#) on page 2357

External 1

See ["External 1 "](#) on page 2357

Trigger Level

See ["Trigger Level "](#) on page 2357

Trig Slope

See ["Trig Slope "](#) on page 2358

External 2

See ["External 2 "](#) on page 2359

Trigger Level

See ["Trigger Level "](#) on page 2359

Trig Slope

See ["Trig Slope "](#) on page 2360

RF Burst

See "RF Burst " on page 2360

Absolute Trigger

See "Absolute Trigger Level" on page 2361

Trig Slope

See "Trigger Slope " on page 2362

Trig Delay

See ___ on page X

Auto/Holdoff

See "Auto/Holdoff " on page 445

Auto Trig

See "Auto Trig " on page 445

Trig Holdoff

See "Trig Holdoff " on page 446

Holdoff Type

See "Holdoff Type" on page 446

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

| Key Path | Front-panel key |
|-------------------------------|--|
| Backwards Compatibility Notes | <p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p> |
| Initial S/W Revision | Prior to A.02.00 |

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|-----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER |
| Notes | :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed |
| Couplings | A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|-----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:ALL |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL |
| Notes | Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. |
| Couplings | A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

| | |
|----------------------|---|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:SAVE |
| Example | :SYST:PRES:USER:SAVE |
| Notes | :SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file. |
| Initial S/W Revision | Prior to A.02.00 |

View/Display

Accesses a menu that includes keys that enables you to control the instrument display.

For details of available views, see [View Selection](#).

For details of remote commands associated with views, see [Range Table Selection \(SCPI only command\)](#).

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

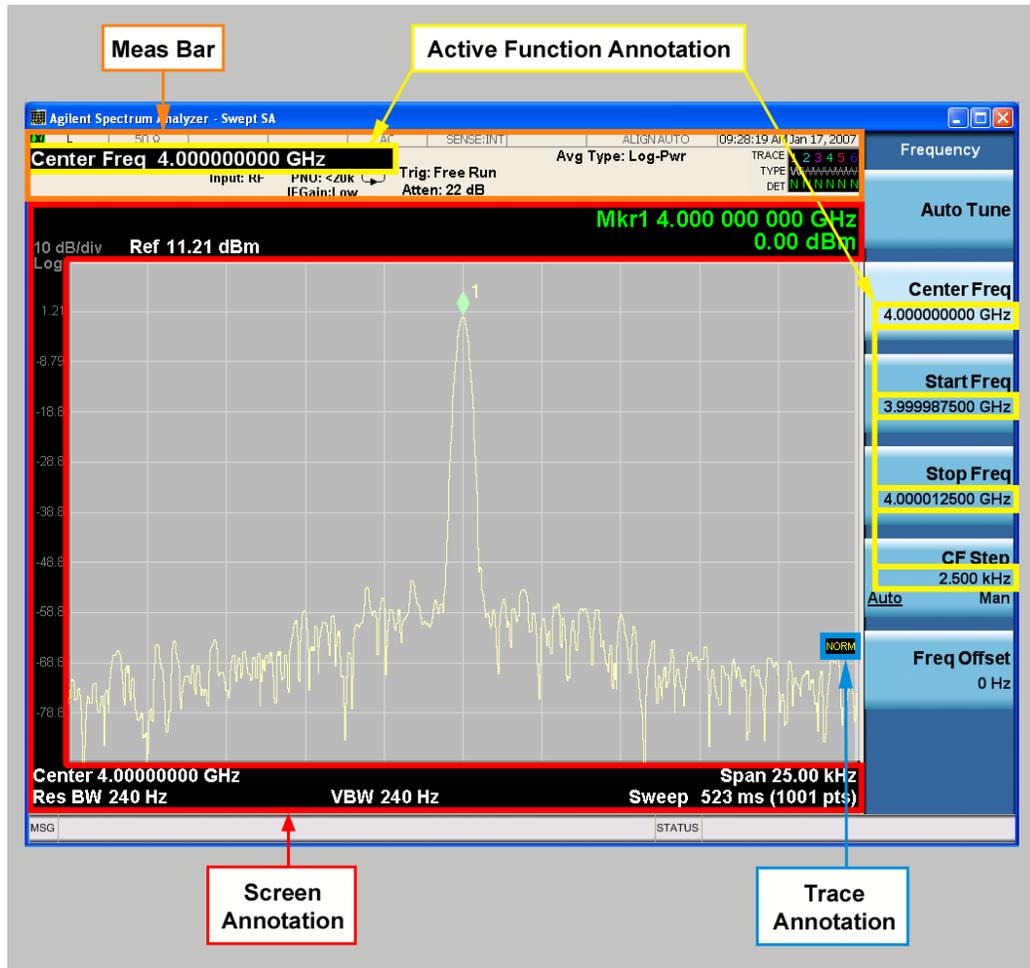
| | |
|----------------------|------------------|
| Key Path | Display |
| Key Path | View/Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

| | |
|----------------------|--|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNOtation:MBAR[:STATe] OFF ON 0 1 :DISPlay:ANNOtation:MBAR[:STATe]? |
| Example | DISP:ANN:MBAR OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off. |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Screen

This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

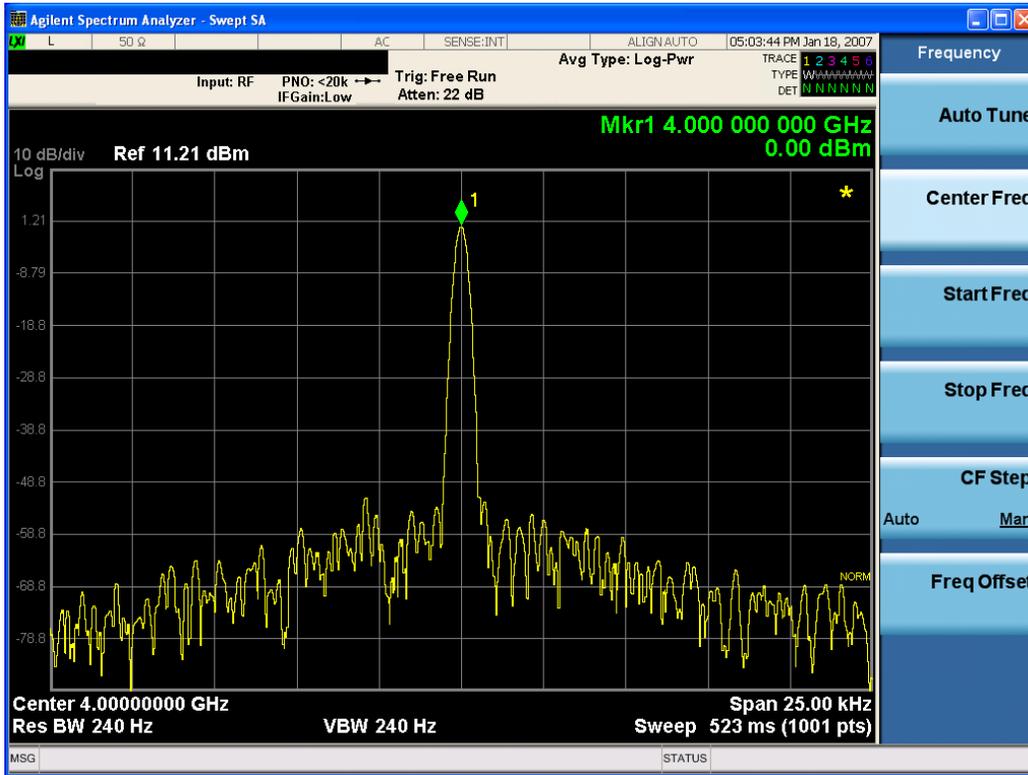
| | |
|----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]? |
| Example | DISP:ANN:SCR OFF |
| Dependencies | Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..

12 Spurious Emissions Measurement
View/Display



| | |
|----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE]? |
| Example | DISP:ACT OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Title

Displays menu keys that enable you to change or clear a title on your display.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

| | |
|-----------------------|---|
| Key Path | View/Display, Display, Title |
| Mode | All |
| Remote Command | :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA? |
| Example | DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title |
| Notes | Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters. |
| Preset | No title (measurement name instead) |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Example | The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required. |
| Notes | Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted). |
| Preset | Performed on Preset. |
| Initial S/W Revision | Prior to A.02.00 |

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

| | |
|----------------------|--|
| Key Path | View/Display, Display |
| Remote Command | :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]? |
| Example | DISP:WIND:TRAC:GRAT:GRID OFF |
| Notes | The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis. |
| Preset | On |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

| | |
|-------------------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:WINDow[1]:ANNOtation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNOtation[:ALL]? |
| Example | :DISP:WIND:ANN OFF |
| Preset | On (Set by Restore Misc Defaults) |
| State Saved | Not saved in instrument state. |
| Backwards Compatibility Notes | The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

| | |
|-----------------------|--|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight ON OFF :DISPlay:BACKlight? |
| Preset | ON (Set by Restore Misc Defaults) |
| Initial S/W Revision | Prior to A.02.00 |

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

| | |
|-----------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity? |
| Example | DISP:BACK:INT 50 |

| | |
|----------------------|------------------------------------|
| Preset | 100 (Set by Restore Misc Defaults) |
| Min | 0 |
| Max | 100 |
| Initial S/W Revision | Prior to A.02.00 |

View Selection

Selects the desired view. The following views are available:

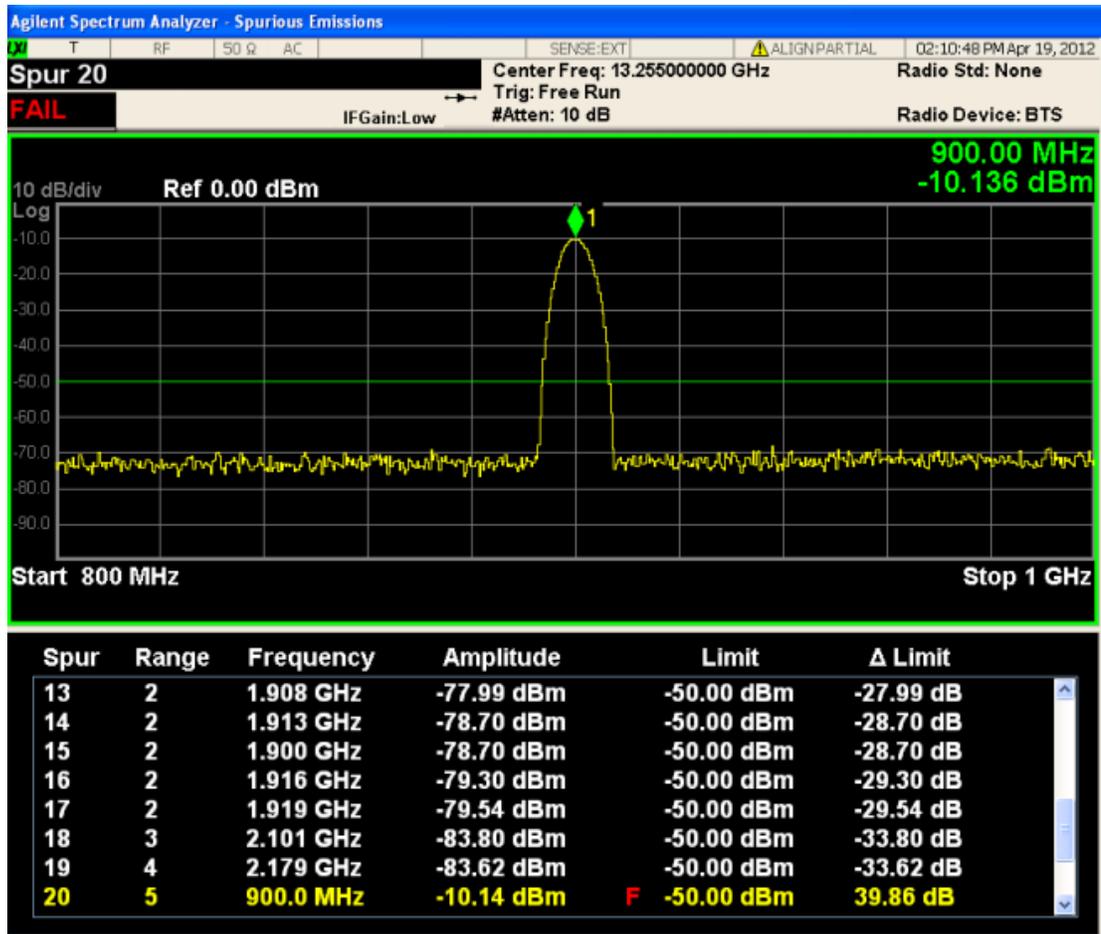
- **"Graph + Metrics" on page 1385** – The lower window displays a list of spurs detected in a measurement cycle. The upper window displays a trace of the range that contains the currently selected spur.
- **"Range Table" on page 1386** – The lower window displays settings of ranges. The upper window displays a trace of the currently selected range.
- **"All Ranges" on page 1389** – The lower window displays a list of spurs detected in a measurement cycle. The upper window displays a merged trace of all the ranges.

| | |
|--------------------------|---|
| Key Path | View/Display |
| Mode | SA, WCDMA, C2K, 1xEV-DO, WIMAX OFDMA, TD-SCDMA, DVB-T/H, LTE, LTETDD, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:SPURious:VIEW[:SElect] RESult RANGe ALL :DISPlay:SPURious:VIEW[:SElect]? |
| Example | DISP:SPUR:VIEW RANG DISP:SPUR:VIEW? |
| Notes | You must be in cdma2000 mode, TD-SCDMA mode, W-CDMA mode, DVB-T/H mode, GSM/EDGE mode, LTE mode, LTE TDD mode, LTE-Advanced FDD/TDD mode, MSR or WiMAX mode to use this command. Use INSTRument:SElect to set the mode. |
| Preset | RESult |
| State Saved | No |
| Range | Graph + Metrics Range Table All Ranges |
| Initial S/W Revision | A.10.00 |
| Modified at S/W Revision | A.11.00 |

Graph + Metrics

Select Graph + Metrics to view measurement results.

- The lower window displays a list of spurs detected in a measurement cycle. The currently selected spur, which is highlighted, can be changed by the Spur softkey in the Meas Setup menu.
- The upper window displays a trace of the range that contains the currently selected spur.



| Result | Units | Min | Max |
|-----------|-------|--------------|--------------|
| Spur | N/A | 0 | 200 |
| Range | N/A | 1 | 20 |
| Frequency | Hz | Analyzer Min | Analyzer Max |
| Amplitude | dBm | -150 | 50 |
| Limit | dBm | -150 | 50 |

The spurs listed are within the current value of the Marker Peak Excursion setting of the absolute limit. All of the spurs listed passed. Any spur that has failed the absolute limit will have an 'F' beside it.

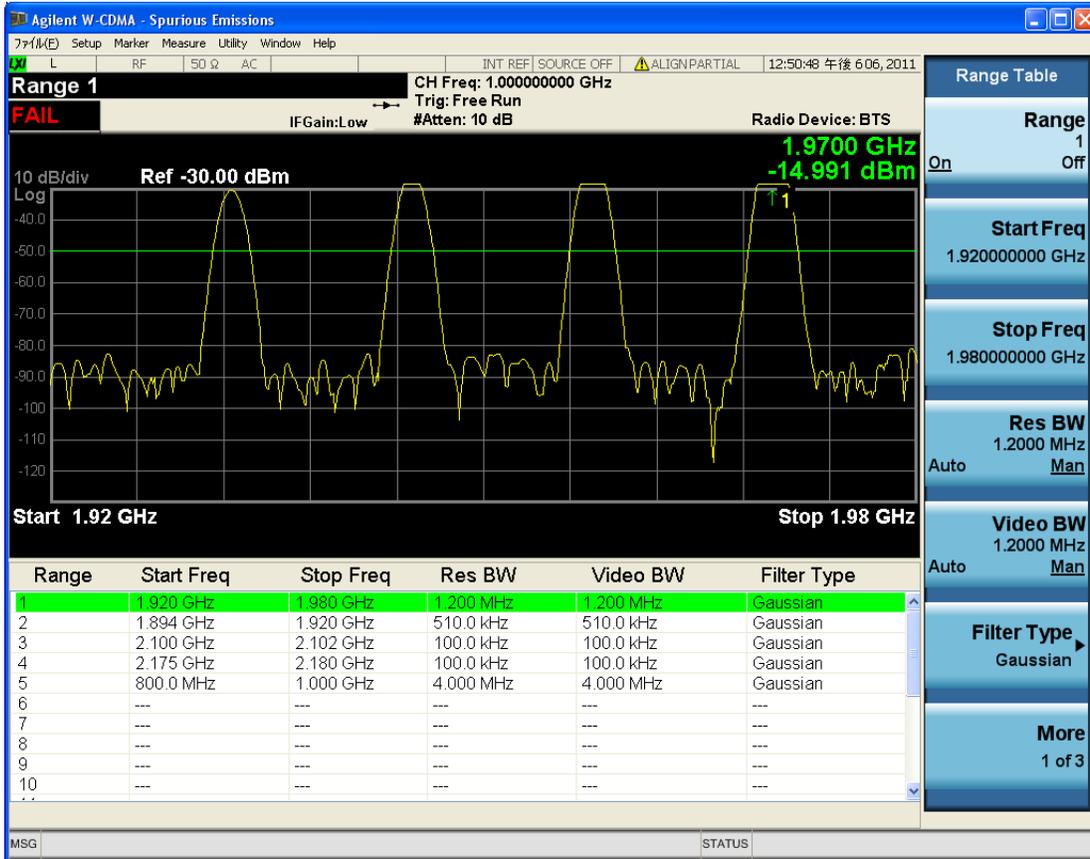
Range Table

Select Range Table to view range settings.

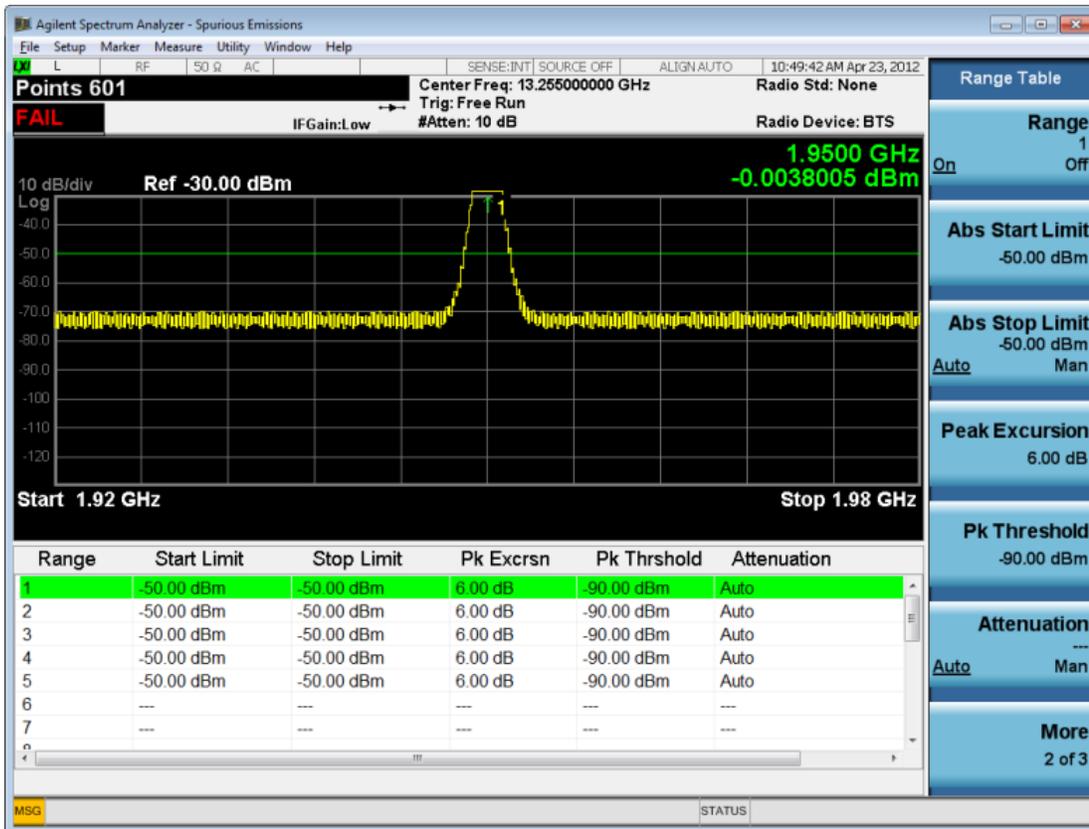
- The upper window displays a trace of the range specified by the Range key under Range Table in Meas Setup.
- The lower window displays the range setting.

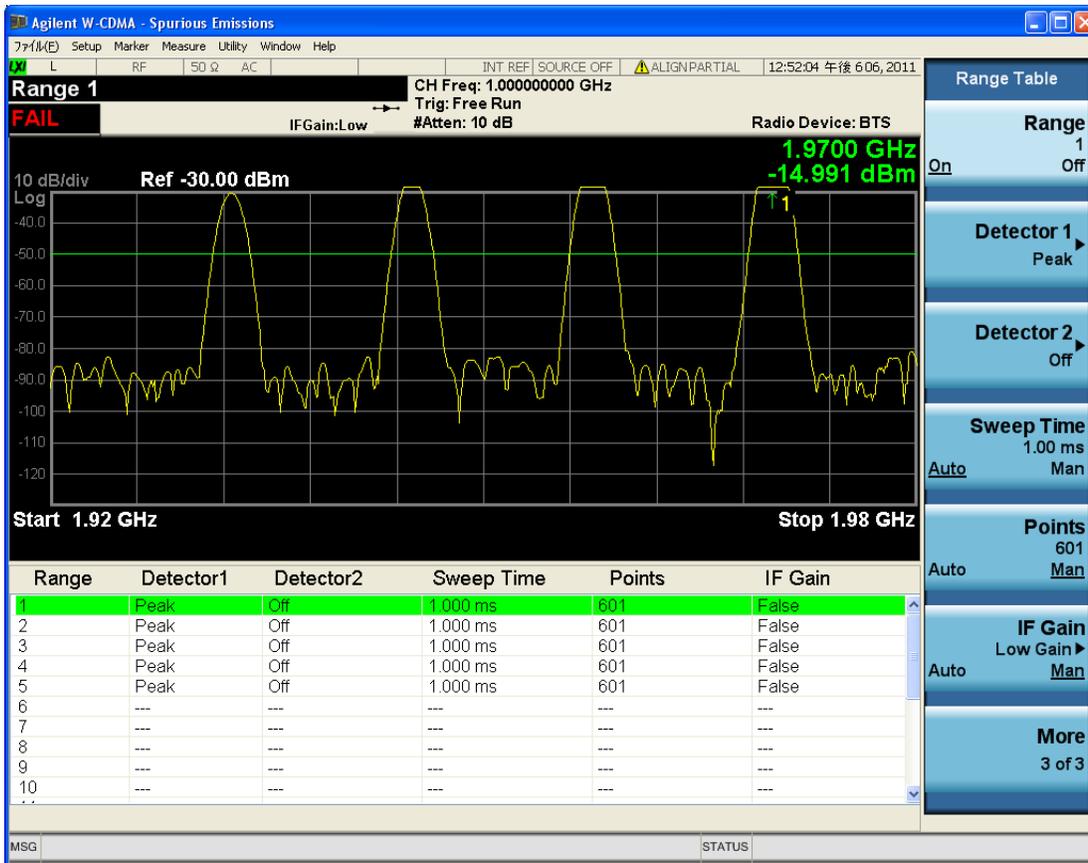
All enabled range may not be displayed with the normal window arrangement. Even in that case, the instrument always displays the highlighted line in the table. When you zoom the lower window, all 20 ranges can be displayed.

When the range state is OFF, “---” appears, to indicate the range is inactive.



12 Spurious Emissions Measurement
View/Display

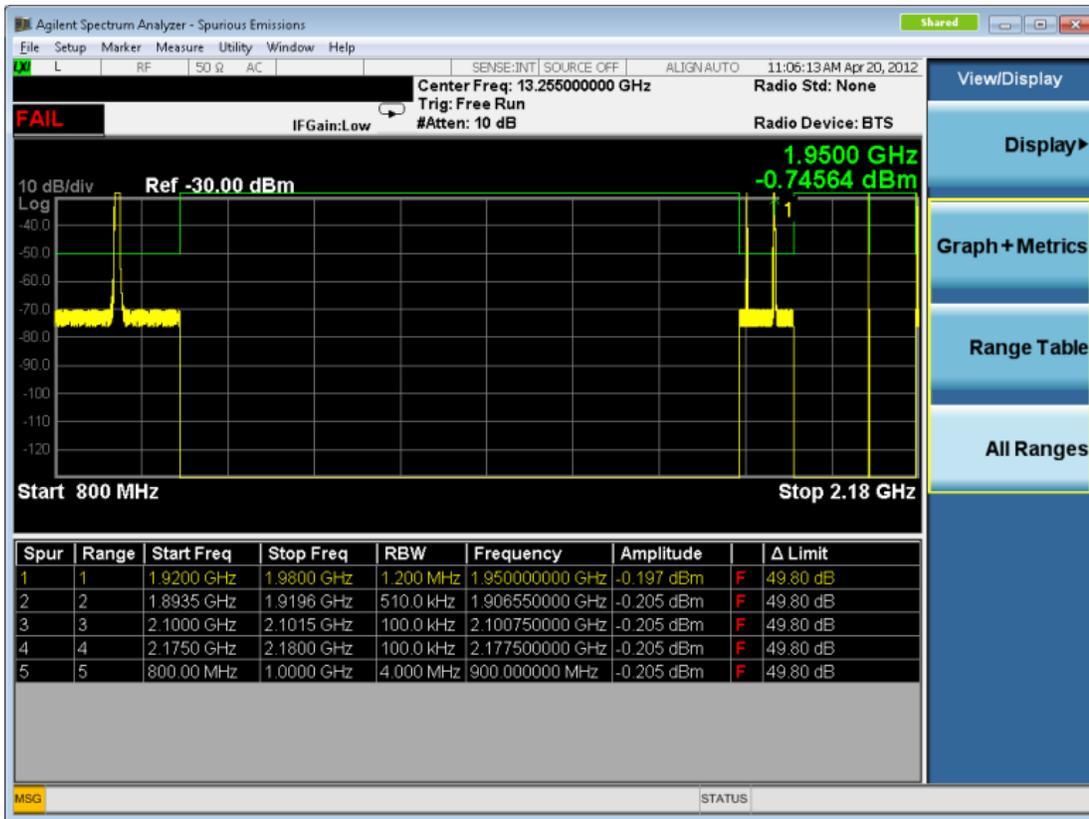




All Ranges

Select All Ranges to view measurement results for all the ranges.

- The upper window displays a merged trace of all the ranges.
- The lower window displays a list of spurs detected in a measurement cycle. The currently selected spur, which is highlighted, can be changed by the Spur softkey in the Meas Setup menu.



Range Table Selection (SCPI only command)

Switches contents of Range Table. There are three tables in the Range Table window, corresponding to each page of the Range Table menu. If the Range Table menu is displayed, this command changes the page of the Range Table menu too. Pressing the Range Table softkey always changes the current Range Table to 1.

| | |
|----------------------|--|
| Key Path | SCPI only |
| Mode | SA, WCDMA, C2K, 1xEV-DO, WIMAX OFDMA, TD-SCDMA, DVB-T/H, LTE, LTE TDD, WLAN, MSR, LTE FDD, LTE TDD |
| Remote Command | :DISPlay:SPURious:VIEW:RANGe:TABLE <integer> :DISPlay:SPURious:VIEW:RANGe:TABLE? |
| Example | DISP:SPUR:VIEW:RANG:TABL 2 DISP:SPUR:VIEW:RANG:TABL? |
| Notes | You must be in cdma2000 mode, TD-SCDMA mode, W-CDMA mode, DVB-T/H mode, GSM/EDGE mode, LTE mode, LTE TDD mode, WLAN mode, LTE-Advanced FDD/TDD mode, MSR or WiMAX mode to use this command. Use INSTRument:SElect to set the mode. |
| Preset | 1 |
| State Saved | No |
| Min | 1 |
| Max | 3 |
| Initial S/W Revision | A.10.00 |

13 Occupied Bandwidth Measurement

The Occupied Bandwidth measurement computes and displays the bandwidth occupied by a given percentage of the total mean power of a signal. For measurement results and views, see ["View/Display" on page 1551](#).

This topic contains the following sections:

["Remote Commands for Occupied Bandwidth" on page 1394](#)

["Remote Command Results for Occupied Bandwidth Measurement" on page 1395](#)

Remote Commands for Occupied Bandwidth

The following commands and queries can be used to retrieve the measurement results:

```
:CONFigure:OBWidth  
:CONFigure:OBWidth:NDEFault  
:INITiate:OBWidth  
:FETCh:OBWidth[n]?  
:MEASure:OBWidth[n]?  
:READ:OBWidth[n]?  
:FETCh:OBWidth:OBWidth?  
:MEASure:OBWidth:OBWidth?  
:READ:OBWidth:OBWidth?  
:FETCh:OBWidth:FERRor?  
:MEASure:OBWidth:FERRor?  
:READ:OBWidth:FERRor?  
:FETCh:OBWidth:XDB?  
:MEASure:OBWidth:XDB?  
:READ:OBWidth:XDB?
```

See also the section, "[Remote Measurement Functions](#)" on page 2284.

Remote Command Results for Occupied Bandwidth Measurement

The following table describes the results returned by the FETCh:OBWidth[n]?, MEASure:OBWidth[n]?, and READ:OBWidth[n]? queries listed above, according to the index value n.

| n | Results Returned |
|---|--|
| n=1 (or not specified) | Returns 7 scalar results, in the following order: 1. Occupied bandwidth - Hz 2. Total Power - dBm (Total Power will be obsolete in TD-SCDMA mode, this place will be replaced by NaN) 3. Span - Hz 4. Spectrum Trace Points - points 5. Res BW - Hz 6. Transmit Frequency Error Hz 7. x DB Bandwidth - Hz |
| 2 | Returns the frequency-domain spectrum trace (data array) for the entire frequency range being measured. |
| n = 3 (Mode = MSR, LTEAFDD, LTEATDD) | 1. Number of active carriers Returns number of active carriers within Span in Auto detected mode, otherwise the command is out of scope |

| Key Path | Meas |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |

AMPTD Y Scale (Amplitude/Y Scale)

Activates the Reference Value function and displays the Amplitude menu keys. These functions control how data on the vertical (Y) axis is displayed and control instrument settings that affect the vertical axis

See AMPTD Y Scale for more information.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Ref Value

Sets the absolute power reference value. However, since the Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

| | |
|--------------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel? |
| Example | DISP:OBW:VIEW:WIND:TRAC:Y:RLEV 125 DISP:OBW:VIEW:WIND:TRAC:Y:RLEV? |
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, ISDB-T mode, CMMB mode, BLUETOOTH mode, LTE mode, LTE TDD mode, WLAN mode, 1xEVDO mode, MSR, LTE-Advanced FDD/TDD or WIMAX OFDMA mode to use this command. Use:INSTrument:SElect to set the mode. |
| Couplings | When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off. |
| Preset | 10.00 dBm |
| State Saved | Saved in instrument state. |
| Min | -250.00 dBm |
| Max | 250.00 dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single

attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See ["Dual Attenuator Configurations:" on page 1397](#)

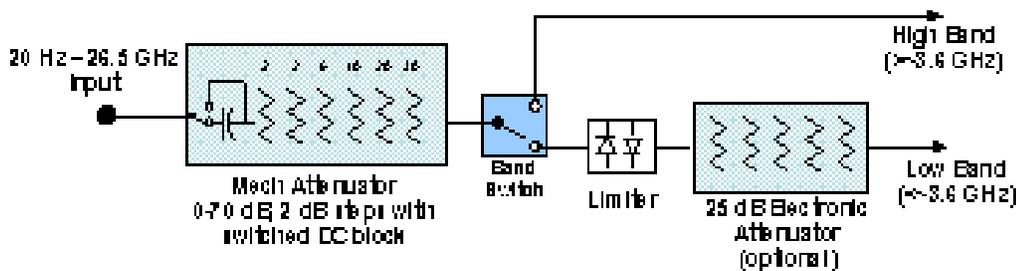
See ["Single Attenuator Configuration:" on page 1398](#)

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

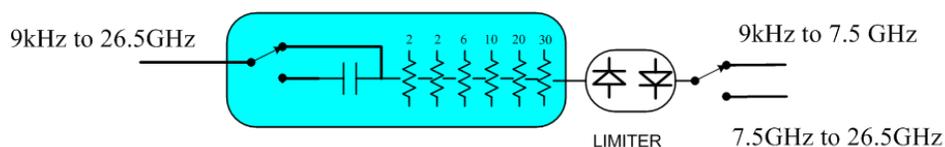
| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Dependencies | In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case. |
| Readback Line | Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2232, and " Enable Elec Atten " on page 2234 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

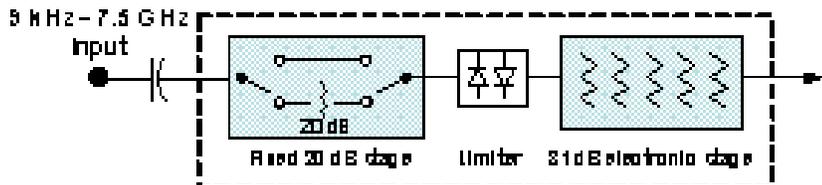


Configuration 2: Mechanical attenuator, no optional electronic attenuator



(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the “Dual Attenuator” configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See ["Attenuator Configurations and Auto/Man" on page 1400](#)

| Key Path | AMPTD Y Scale, Attenuation |
|-----------------------|---|
| Remote Command | <pre>[:SENSE] :POWER [:RF] :ATTenuation <rel_ampl> [:SENSE] :POWER [:RF] :ATTenuation? [:SENSE] :POWER [:RF] :ATTenuation:AUTO OFF ON 0 1 [:SENSE] :POWER [:RF] :ATTenuation:AUTO?</pre> |
| Example | <p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of “main” attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p> |
| Dependencies | Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the |

Auto/Man selection is not available, and the Auto/Man line on the key disappears.

In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the ["Enable Elec Atten" on page 2234](#) key description.

See ["Attenuator Configurations and Auto/Man" on page 1400](#) for more information on the Auto/Man functionality of Attenuation.

Couplings

When (Mech) Atten is in Auto, it uses the following algorithm to determine a value:
If the USB Preamp is connected to USB, use 0 dB.
Otherwise, $Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel + IF\ Gain$.

Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto.

The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).

The "IF Gain" term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.

In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.

Preset The preset for Mech Attenuation is "Auto."
The Auto value of attenuation is:
CXA, EXA, MXA and PXA: 10 dB

State Saved Saved in instrument state

Min 0 dB
The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.

Max CXA N9000A-503/507: 50 dB
CXA N9000A-513/526: 70dB
EXA: 60 dB
MXA and PXA: 70 dB
In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.

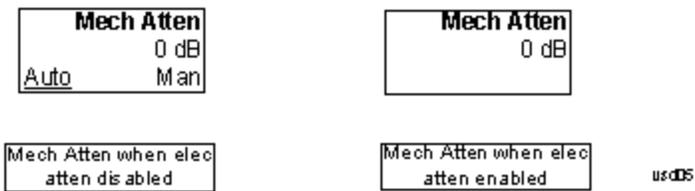
Initial S/W Revision Prior to A.02.00

Modified at S/W Revision A.03.00

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 1402](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2233](#)

See ["More Information" on page 1401](#)

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :EATTenuation :STATe OFF ON 0 1 [:SENSe] :POWer [:RF] :EATTenuation :STATe ? |
| Example | POW:EATT:STAT ON |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out. |

| | |
|--------------------------|--|
| | <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in all measurements; in particular, it is not available in the Swept SA measurement.</p> |
| Couplings | Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples
- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :EATTenuation <rel_amp1> [:SENSe] :POWer [:RF] :EATTenuation? |
| Notes | Electronic Attenuation’s specification is defined only when Mechanical Attenuation is 6 dB. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the |

| | |
|--------------------------|--|
| | POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out. |
| Preset | 0 dB |
| State Saved | Saved in instrument state |
| Min | 0 dB |
| Max | Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe :OPTimize IMMEDIATE</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2237 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe :OPTimize :ATTenuation OFF ELECTRical COMBined</code> |

| | |
|--------------------------|--|
| | <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code> |
| Notes | The SCPI parameter ELECtrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECtrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip |
| State Saved | Saved in instrument state |
| Range | Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------|--|
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe:AUTO?</code> |
| Notes | ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off" |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT OFF |
| Initial S/W Revision | Prior to A.02.00 |

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT ELEC |
| Initial S/W Revision | Prior to A.02.00 |

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT COMB |
| Initial S/W Revision | Prior to A.02.00 |

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] 10 dB 2 dB [:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] ? |
| Example | POW:ATT:STEP 2 |
| Notes | Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10. |
| Dependencies | Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error. |
| Couplings | When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB |
| Preset | PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA) |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Scale/Div

Sets the logarithmic units per vertical graticule division on the display. When the Auto Scaling is On, the Scale/Div is automatically determined by the measurement result. When you set a value manually, Auto Scaling is automatically toggled to Off.

| | |
|---------------------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_amp1> :DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision? |
| Example | DISP:OBW:VIEW:WIND:TRAC:Y:PDIV 5 DISP:OBW:VIEW:WIND:TRAC:Y:PDIV? |
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, ISDB-T mode, CMMB mode, LTE mode, LTE TDD mode, BLUETOOTH mode, WLAN mode, 1xEVDO mode, MSR, LTE-Advanced FDD/TDD or WIMAX OFDMA mode to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off. |
| Preset | 10.00 dB |
| State Saved | Saved in instrument state. |
| Min | 0.10 dB |
| Max | 20.00 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 1407](#).

| | |
|-----------------------|-----------------------------|
| Key Path | AMPTD Y Scale |
| Remote Command | [:SENSE]:POWer[:RF]:PCENTER |

| | |
|------------------------------|---|
| Example | POW:PCEN |
| Notes | Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Couplings | <p>The active marker position determines where the centering will be attempted.</p> <p>If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.</p> |
| Status Bits/OPC dependencies | <p>When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASURE command.</p> <p>The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.</p> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when "[Presel Center](#)" on page 2240 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

| | |
|-------------------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :POWer [:RF] :PADJust <freq></code> <code>[:SENSe] :POWer [:RF] :PADJust?</code> |
| Example | POW:PADJ 100KHz POW:PADJ? |
| Notes | The value on the key reads out to 0.1 MHz resolution. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Preset | 0 MHz |
| State Saved | The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle. |
| Min | -500 MHz |
| Max | 500 MHz |
| Default Unit | Hz |
| Backwards Compatibility SCPI | <code>[:SENSe] :POWer [:RF] :MW :PADJust</code> <code>[:SENSe] :POWer [:RF] :MMW :PADJust</code> PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to <code>[:SENSe] :POWer [:RF] :PADJust</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------------|---|
| Remote Command | <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector MWAVE MMWave EXTERNAL</code> <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector?</code> |
| Notes | PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE |
| Initial S/W Revision | Prior to A.02.00 |

Y Axis Unit

Displays the menu keys that enable you to change the vertical (Y) axis amplitude unit. The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types. For example, if Scale Type has been set to Log, and you set Y Axis Unit to dBm, pressing Scale Type (Log) sets the Y Axis Unit to dBm. If Scale Type has been set to Lin and you set Y Axis Unit to V, pressing Scale Type (Lin) sets the Y Axis Unit to V. Pressing Scale Type (Log) again sets the Y axis unit back to dBm.

NOTE

The units of current (A, dBmA, dBuA) are calculated based on 50 ohms input impedance.

All four of the EMI units (dB μ A/m, dB μ V/m, dBG, dBpT) are treated by the instrument exactly as though they were dBuV. The user must load an appropriate correction factor using Amplitude Corrections for accurate and meaningful results.

If a SCPI command is sent to the analyzer that uses one of the EMI units as a terminator, the analyzer treats it as though DBUV had been sent as the terminator.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA |
| Scope | Meas Global |
| Remote Command | :UNIT:POWer DBM DBMV DBMA V W A DBUV DBUA DBPW DBUVM DBUAM DBPT DBG :UNIT:POWer? |
| Example | UNIT:POW dBmV UNIT:POW? |
| Notes | The Y axis unit has either logarithmic or linear characteristics. The set of units that is logarithmic consists of dBm, dBmV, dBmA, dB μ V, dB μ A, dB μ V/m, dB μ A/m, dBpT, and dBG. The set of units that are linear consists of V, W, and A. The chosen unit will determine how the reference level and all the amplitude-related outputs like trace data, marker data, etc. read out. |
| Notes | The settings of Y Axis Unit and Scale Type, affect how the data is read over the remote interface. When using the remote interface no unit is returned, so you must know what the Y axis unit is to interpret the results: Example 1, set the following: Scale Type (Log) Y Axis Unit, dBm Scale/Div, 1 dB Ref Level, 10 dBm This sets the top line to 10 dBm with each vertical division representing 1 dB. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 5 dBm and will read out remotely as 5. Example 2, set the following: Scale Type (Lin) Y Axis Unit, Volts Ref Level, 100 mV (10 mV/div) This sets the top line to 100 mV and the bottom line to 0 V, so each vertical division represents 10 mV. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 50 mV and will |

| | |
|--------------------------|--|
| | read out remotely as 50. |
| Dependencies | If an amplitude correction with an Antenna Unit other than None is applied and enabled, then that antenna unit is forced and the key with that unit is the only Y Axis Unit available. All other Y Axis Unit keys are grayed out. If an amplitude correction with an Antenna Unit other than None is applied and enabled, and you then turn off that correction or set Apply Corrections to No, the Y Axis Unit that existed before the Antenna Unit was applied is restored. |
| Couplings | The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types |
| Preset | dBm for log scale, V for linear. The true 'preset' value is dBm, since at preset the Y Scale type is set to logarithmic. |
| State Saved | Saved in instrument state |
| Readback line | 1-of-N selection |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.04.00, A.11.00 |

dBm

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBm.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBM |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmV

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmV.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmV |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmA

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmA |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

W

Sets the amplitude unit for the selected amplitude scale (log/lin) to watt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW W |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | W |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

V

Sets the amplitude unit for the selected amplitude scale (log/lin) to volt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW V |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

A

Sets the amplitude unit for the selected amplitude scale (log/lin) to Ampere.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW A |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ V

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A.

NOTE

The unit dBuA can also appear as an Antenna Unit. This will be used by customers using current probes, because current probes are often supplied with conversion tables that provide the transducer factors. When dBuA is used as an Antenna Unit the normal conversion from power to amps for dBuA (based on the analyzer input impedance) is not done, but instead the conversion is based solely on the Correction that contains the transducer factors. This is what distinguishes dBuA as a normal unit from dBuA as an antenna unit. When querying the Y-Axis unit, you can query the Antenna Unit to distinguish between regular dBuA and the dBuA antenna unit. If :CORR:CSET:ANT? returns NOC (for No Conversion), you are using a normal Y Axis dBuA. If it returns UA you are using an Antenna Unit dBuA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBpW

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpW.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBPW |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

Antenna Unit

When a Correction is turned on that uses an Antenna Unit, the Y Axis Unit changes to that Antenna Unit. All of the keys in the Y-Axis Unit menu are then greyed out, except the Antenna Unit key. The unit being used is shown on this key and is shown as selected in the submenu.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback line | Currently selected unit |
| Initial S/W Revision | A.11.00 |

dB μ V/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUVM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ V/m |
| Initial S/W Revision | A.02.00 |

dB μ A/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A/m |
| Initial S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dBμA |
| Initial S/W Revision | A.11.00 |

dBpT

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpT. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBPT |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dBpT |
| Initial S/W Revision | A.02.00 |

DBG

Sets the amplitude unit for the selected amplitude scale (log/lin) to DBG. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBG |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | DBG |
| Initial S/W Revision | A.02.00 |

None

This is selected if no Antenna Unit is currently on, however you cannot actually set this value, since it is always grayed out. The key is included simply to provide an indication on the Readback line of the Antenna Unit key when there is no Antenna Unit selected.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Readback | "None" |
| Initial S/W Revision | A.11.00 |

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, BASIC, PNOISE, VSA , LTE, LTETDD |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH? |
| Example | :POW:MW:PATH LNP Enables the Low Noise path |
| Notes | If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μW Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished. |
| Dependencies | Unavailable in BBIQ and External Mixing |
| Preset | All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB |

| | |
|--------------------------|--|
| | MPB option not present and licensed: STD |
| State Saved | Save in instrument state |
| Readback | Value selected in the submenu |
| Initial S/W Revision | A.04.00 |
| Modified at S/W Revision | A.10.00 |

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH STD |
| Readback Text | Standard Path |
| Initial S/W Revision | A.04.00 |

Low Noise Path Enable

You may choose Low Noise Path Enable, which gives a lower noise floor under some circumstances, particularly when operating in the 21–26.5 GHz region. With the Low Noise Path enabled, the low band/high band switch and microwave preamp are bypassed whenever all of the following are true:

- The analyzer is not in the Low Band, meaning:
- the start frequency is above 3.5 GHz and
- the stop frequency is above 3.6 GHz.
- the internal preamp is not installed or (if installed) is set to Off or Low Band

Note that this means that, when any part of a sweep is done in Low Band, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. Also, if the preamp is turned on, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. The only time the Low Noise Path is used is when Low Noise Path Enable is selected, the sweep is completely in High Band (> 3.6 GHz) and no preamp is in use.

See "[More Information](#)" on page 1417

| | |
|----------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Measurement | Swept SA |
| Example | :POW:MW:PATH LNP |

| | |
|----------------------|--|
| Notes | <p>For measurements that use IQ acquisition, the low noise path is used when the Center Frequency is in High Band (> 3.6 GHz) and no preamp is in use.</p> <p>In other words, the rules above are modified to use only the center frequency to qualify which path to switch in.</p> <p>This is not the case for FFT's in the Swept SA measurement; they use the same rules as swept measurements.</p> |
| Dependencies | <p>Key is blanked if current mode does not support it.</p> <p>Key is grayed out if mode supports it but current measurement does not support it.</p> <p>Unless Option LNP is present and licensed, key is blank and if SCPI command sent, error -241, "Hardware missing; Option not installed" is generated.</p> |
| Readback Text | Low Noise Path Enable |
| Initial S/W Revision | A.04.00 |

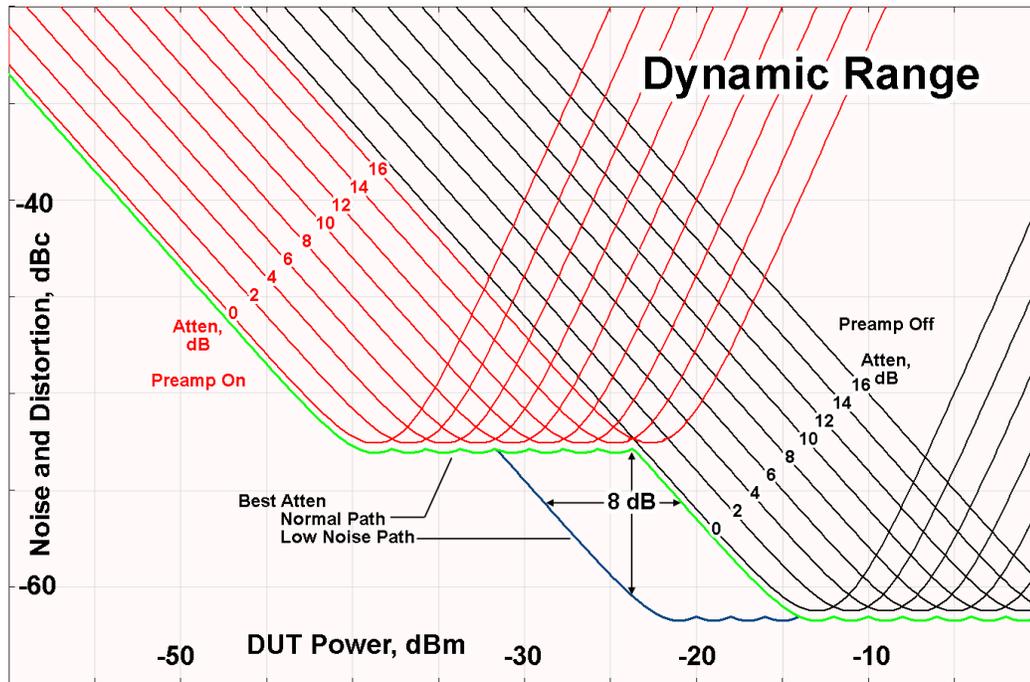
More Information

The user should understand that the Low Noise Path, while giving improved DANL, has the disadvantage of decreased TOI performance and decreased gain compression performance relative to the standard path.

The user should also understand that the bypass switch is a mechanical switch and has finite life, so if the Low Noise Path is enabled, it is possible to cause frequent cycling of this switch by frequently changing analyzer settings such that the above conditions hold true only some of the time. A user making tests of this nature should consider opting for the Standard Path, which will never throw the bypass switch, at the expense of some degraded noise performance.

The low noise path is useful for situations where the signal level is so low that the analyzer performance is dominated by noise even with 0 dB attenuation, but still high enough that the preamp option would have excessive third-order intermodulation or compression. The preamp, if purchased and used, gives better noise floor than does the "Low Noise Path." However, its compression threshold and third-order intercept are much poorer than that of the non-preamp path. There are some applications, typically for signals around -30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range

The graph below illustrates the concept. It shows, in red, the performance of an analyzer at different attenuation settings, both with the preamp on and off, in a measurement that is affected by both analyzer noise and analyzer TOI. The green shows the best available dynamic range, offset by 0.5 dB for clarity. The blue shows how the best available dynamic range improves for moderate signal levels with the low noise path switched in. In this illustration, the preamp improves the noise floor by 15 dB while degrading the third-order intercept by 30 dB, and the low noise path reduces loss by 8 dB. The attenuator step size is 2 dB.



There are other times where selecting the low noise path improves performance, too. Compression-limited measurements such as finding the nulls in a pulsed-RF spectrum can profit from the low noise path in a way similar to the TOI-limited measurement illustrated. Accuracy can be improved when the low noise path allows the optimum attenuation to increase from a small amount like 0, 2 or 4 dB to a larger amount, giving better return loss at the analyzer input. Harmonic measurements, such as second and third harmonic levels, are much improved using the low noise path because of the superiority of that path for harmonic (though not intermodulation) distortion performance.

μW Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselector is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH MPB |
| Dependencies | Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated. |
| Readback Text | μ W Preselector Bypass |
| Initial S/W Revision | A.04.00 |

| | |
|-----------------------|---|
| Remote Command | [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1 [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ? |
| Example | :POW:MW:PRES OFF Bypasses the microwave preselector |
| Notes | The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB) |
| Preset | ON |

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :GAIN [:STATe] OFF ON 0 1 [:SENSe] :POWer [:RF] :GAIN [:STATe] ? |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the |

| | |
|--|--|
| | key is not shown. The preamp is not available when the electronic/soft attenuator is enabled. |
|--|--|

| | |
|--------------------------|---|
| Couplings | The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range. Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected. Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Scope | Meas Global |
| Remote Command | [:SENSe] : POWer [:RF] : GAIN : BAND LOW FULL [:SENSe] : POWer [:RF] : GAIN : BAND ? |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated. |
| Preset | LOW |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns the internal preamp off

| | |
|----------------------|--------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

| | |
|----------------------|------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND LOW |
| Readback | Low Band |
| Initial S/W Revision | Prior to A.02.00 |

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND FULL |
| Readback | Full Range |
| Initial S/W Revision | Prior to A.02.00 |

Ref Position

Positions the reference level at the top, center or bottom of the Y Scale display. Changing the reference position does not change the reference level value.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTE-TDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOSition TOP CENTER BOTTom :DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOSition? |
| Example | DISP:OBW:VIEW:WIND:TRAC:Y:RPOS BOTT DISP:OBW:VIEW:WIND:TRAC:Y:RPOS? |
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, ISDB-T mode, CMMB mode, LTE mode, LTE TDD mode, BLUETOOTH mode, WLAN mode, 1xEVDO mode, MSR, LTE-Advanced FDD/TDD or WIMAX OFDMA mode to use this command. |

| | |
|--------------------------|--|
| | Use:INSTRument:SElect to set the mode. |
| Preset | TOP |
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Auto Scaling

Allows you to toggle the Auto Scaling function between On and Off.

| | |
|--------------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 1 OFF ON :DISPlay:OBWidth:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle? |
| Example | DISP:OBW:VIEW:WIND:TRAC:Y:COUP ON DISP:OBW:VIEW:WIND:TRAC:Y:COUP? |
| Couplings | When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically sets the scale per division to 10 dB and determines reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off. |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 1423

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Remote Command | :COUPle ALL NONE |
| Example | :COUP ALL |
| Notes | :COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

There are two types of functions that have Auto/Manual modes.

Auto/Man Active Function keys

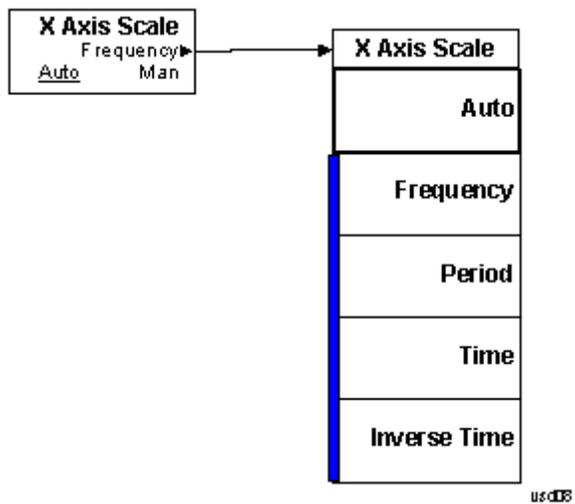
An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.

13 Occupied Bandwidth Measurement
Auto Couple



BW

Accesses a menu of functions that enable you to specify and control the video and resolution bandwidths. You can also select the type of filter for the measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Res BW

Sets the resolution bandwidth for the current measurement. If an unavailable bandwidth is entered with the numeric keypad, the closest available bandwidth is selected.

| | |
|-----------------------|---|
| Key Path | BW |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <pre>[:SENSe]:OBWidth:BANDwidth[:RESolution] <bandwidth> [:SENSe]:OBWidth:BANDwidth[:RESolution]? [:SENSe]:OBWidth:BANDwidth[:RESolution]:AUTO ON OFF 1 0 [:SENSe]:OBWidth:BANDwidth[:RESolution]:AUTO?</pre> |
| Example | <pre>OBW:BAND 250000 OBW:BAND? OBW:BAND:AUTO OFF OBW:BAND:AUTO?</pre> |
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, ISDB-T mode, CMMB mode, LTE mode, LTE TDD mode, BLUETOOTH mode, WLAN mode, 1xEVDO mode, MSR, LTE-Advanced FDD/TDD or WIMAX OFDMA mode to use this command. Use:INSTRument:SElect to set the mode. |
| Couplings | <p>Sweep time is coupled to RBW. As the RBW changes, the sweep time (if set to Auto) is changed to maintain amplitude calibration.</p> <p>Video bandwidth (VBW) is coupled to RBW. As the resolution bandwidth changes, the video bandwidth (if set to Auto) changes to maintain the ratio of VBW/RBW (10:1).</p> <p>When Res BW is set to Auto, the resolution bandwidth is auto-coupled to span. The ratio of Span/RBW is approximately 106:1 when auto coupled. When Res BW is set to Man, bandwidths are entered manually, and these bandwidths are used regardless of other analyzer settings.</p> |
| Preset | <pre>SA: Auto WCDMA: 30 kHz CDMA2K: 12 kHz WIMAX OFDMA: 100 kHz TD-SCDMA: 30 kHz 1xEVDO: 30 kHz ISDB-T: 10 kHz</pre> |

| | |
|-------------------------------------|--|
| | CMMB: 3 kHz LTE: 30 kHz LTETDD: 30 kHz BLUETOOTH:10 kHz WLAN: 100kHz MSR: 30 kHz, LTEAFDD, LTEATDD: 30 kHz SA: ON WCDMA, C2K, TD-SCDMA, WIMAX OFDMA, 1xEVDO , ISDB-T, CMMB, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD: OFF |
| State Saved | Saved in instrument state. |
| Min | 1 Hz |
| Max | 8 MHz |
| Backwards Compatibility SCPI | [:SENSe] :OBWidth:BWIDth[:RESolution] |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Video BW

Changes the analyzer post-detection filter.

| | |
|-----------------------|---|
| Key Path | BW |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <pre>[:SENSe] :OBWidth:BA NDwidth:VIDeo <bandwidth> [:SENSe] :OBWidth:BA NDwidth:VIDeo? [:SENSe] :OBWidth:BA NDwidth:VIDeo:AUTO ON OFF 1 0 [:SENSe] :OBWidth:BA NDwidth:VIDeo:AUTO?</pre> |
| Example | <pre>OBW:BA ND:VID 5 MHz OBW:BA ND:VID? OBW:BA ND:VID:AUTO ON OBW:BA ND:VID:AUTO?</pre> |
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, ISDB-T mode, CMMB mode, LTE mode, LTE TDD mode, BLUETOOTH mode, WLAN mode, 1xEVDO mode, MSR, LTE-Advanced FDD/TDD or WIMAX OFDMA mode to use this command. Use:INSTrument:SElect to set the mode. |
| Dependencies | When using the average detector with either Sweep Time set to Man, or in zero span, the VBW setting has no effect and is disabled (grayed out). |
| Couplings | Video bandwidth (VBW) is coupled to RBW. As the resolution bandwidth changes, the video bandwidth (if set to Auto) changes to maintain the ratio set by VBW/RBW. |

Sweep Time is coupled to Video Bandwidth (VBW). As the VBW is changed, the sweep time (when set to Auto) is changed to maintain amplitude calibration. This occurs because of common hardware between the two circuits, even though the Video BW filter is not actually “in-circuit” when the detector is set to Average. Because the purpose of the average detector and the VBW filter are the same, either can be used to reduce the variance of the result.

Although the VBW filter is not “in-circuit” when using the average detector, the Video BW key can have an effect on (Auto) sweep time, and is not disabled. In this case, reducing the VBW setting increases the sweep time, which increases the averaging time, producing a lower-variance trace.

When the video bandwidth is AUTO coupled, the video bandwidth value is set to:

Resolution Bandwidth * Video Bandwidth to Resolution Bandwidth Ratio

| | |
|-------------------------------------|---|
| Preset | SA, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD: Auto WCDMA: 300 kHz CDMA2K:120 kHz WIMAX OFDMA: 1 MHz TD-SCDMA: 300 kHz 1xEVDO: 300 kHz ISDB-T: 300 Hz CMMB: 3 kHz BLUETOOTH: 30 kHz ON ISDB-T, CMMB: OFF |
| State Saved | Saved in instrument state. |
| Min | 1 Hz |
| Max | 50 MHz |
| Backwards Compatibility SCPI | [:SENSe] :OBWidth :BWIDth :VIDeo |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Filter Type

Allows you to select the type of filter to be used for the current measurement. Besides the Gaussian filter shape, there are certain special filter types, such as Flat Top, that are desirable under certain conditions.

| | |
|-----------------------|--|
| Key Path | BW |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :OBWidth :BANDwidth :SHAPE GAUSSian FLATtop [:SENSe] :OBWidth :BANDwidth :SHAPE? |
| Example | OBW:BAND:SHAP GAUS |

| | |
|---|----------------------------------|
| | OBW:BAND:SHAP? |
| Preset | GAUSSian |
| State Saved | Saved in instrument state. |
| Range | Gaussian Flattop |
| Backwards Compatibility SCPI | [:SENSe] :OBWidth:BWIDth:SHAPE |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous? |
| Example | :INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation |
| Preset | ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF) |
| State Saved | Saved in instrument state |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep. |
| Initial S/W Revision | Prior to A.02.00 |

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

13 Occupied Bandwidth Measurement Cont (Continuous Measurement/Sweep)

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

File

See "File" on page 344

FREQ Channel

Accesses a menu of keys that allow you to control the Frequency and Channel parameters of the instrument.

Some features in the Frequency menu are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset. For example, the Center Freq setting is the same for all measurements - it does not change as you change measurements.

| | |
|-----------------------------|-------------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 1435](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 1437](#)

See ["Center Frequency Presets" on page 1433](#)

| | |
|-----------------------|--|
| Key Path | FREQ Channel |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:CENTer <freq></code> <code>[:SENSe] :FREQuency:CENTer?</code> |

| | |
|-----------------------------|--|
| Example | FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT? |
| Notes | This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated. |
| Dependencies | The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit. |
| Couplings | When operating in “swept span”, any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer’s frequency range |
| Preset | Depends on instrument maximum frequency, mode, measurement, and selected input. See "Center Frequency Presets" on page 1433 and "RF Center Freq" on page 1435 and Ext Mix Center Freq and "I/Q Center Freq" on page 1437 . |
| State Saved | Saved in instrument state |
| Min | Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1433 and "RF Center Freq" on page 1435 and "I/Q Center Freq" on page 1437 . |
| Max | Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1433 and "RF Center Freq" on page 1435 and "I/Q Center Freq" on page 1437 . |
| Default Unit | Hz |
| Status Bits/OPC | Non-overlapped |
| Dependencies | |
| Initial S/W Revision | Prior to A.02.00 |

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

| Freq Option | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune) |
|-------------|-------------------------|--------------------------------|-----------------------------|
| | | | |

13 Occupied Bandwidth Measurement
FREQ Channel

| | | | above) |
|---------------------------------------|------------|----------|--------------|
| 503 (all but N9000A) | 1.805 GHz | 3.6 GHz | 3.7 GHz |
| 503 (N9000A) | 1.505 GHz | 3.0 GHz | 3.08 GHz |
| 507 (all but N9000A) | 3.505 GHz | 7.0 GHz | 7.1 GHz |
| 507 (N9000A) | 3.755 GHz | 7.5 GHz | 7.58 GHz |
| 508 (all but N9038A) | 1.805 GHz | 3.6 GHz | 8.5 GHz |
| 508 (N9038A) | 4.205 GHz | 8.4 GHz | 8.5 GHz |
| 513 | 6.805 GHz | 13.6 GHz | 13.8 GHz |
| 526 (all but N9000A and N9038A) | 13.255 GHz | 26.5 GHz | 27.0 GHz |
| 526 (N9000A) | 13.255 GHz | 26.5 GHz | 26.55 GHz |
| 526 (N9038A) | 1.805 GHz | 3.6 GHz | 27.0 GHz |
| 532 | 16.005 GHz | 32.0 GHz | 32.5 GHz |
| 543 | 21.505 GHz | 43.0 GHz | TBD |
| 544 | 22.005 GHz | 44.0 GHz | 44.5 GHz |
| 550 | 25.005 GHz | 50.0 GHz | 51 GHz |

Input 2:

| Model | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune above) |
|----------------|----------------------------|-----------------------------------|-----------------------------------|
| N9000A opt C75 | 0.7505GHz | 1.5 GHz | 1.58 GHz |
| N9038A | 505 MHz | 1 GHz | 1.000025 GHz |

Tracking Generator Frequency Limits (N9000A only):

| Tracking Generator Option | Min Freq (clips to this freq when turn TG on and | If above this Freq, Stop Freq clipped to this Freq when | Max Freq (can't tune above) while TG |
|---------------------------------|--|---|--|
| | | | |

| | can't tune below while TG on) | TG turned on | on |
|-----|-------------------------------|--------------|----------|
| T03 | 9 kHz | 3.0 GHz | 3.08 GHz |
| T06 | 9 kHz | 6.0 GHz | 6.05 GHz |

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

| Mode | CF Preset for RF |
|-------------|------------------|
| WCDMA | 1 GHz |
| WIMAXOFDMA, | 1 GHz |
| BASIC | 1 GHz |
| ADEMOD | 1 GHz |
| VSA | 1 GHz |
| TDSCDMA | 1 GHz |
| PNOISE | 1 GHz |
| LTE | 1 GHz |
| LTETDD | 1 GHz |
| MSR | 1 GHz |
| GSM | 935.2 MHz |
| NFIGURE | 1.505 GHz |

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:RF:CENTer <freq></code> <code>[:SENSe] :FREQuency:RF:CENTer?</code> |
| Example | FREQ:RF:CENT 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Dependencies | If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of |

| | |
|--------------------------|--|
| | Source Numerator, Source Denominator and Power Sweep. |
| Preset | See table above |
| State Saved | Saved in instrument state. |
| Min | -79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source |
| Max | See table above. Basically instrument maximum frequency – 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|----------------|--|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code> |
| Example | <code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code> |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Couplings | When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup. |
| Preset | When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies. If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq – Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table. |

| | |
|----------------------|--|
| | When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz. Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz. |
| State Saved | Saved in instrument state. |
| Min | The minimum frequency in the currently selected mixer band + 5 Hz |
| Max | The maximum frequency in the currently selected mixer band – 5 Hz If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency |
| Initial S/W Revision | A.08.01 |

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|----------------------|--|
| Scope | Meas Global |
| Remote Command | [:SENSe] :FREQuency:IQ:CENTer <freq> [:SENSe] :FREQuency:IQ:CENTer? |
| Example | FREQ:IQ:CENT: 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Preset | 0 Hz |
| State Saved | Saved in instrument state. |
| Min | -40.049995 MHz |
| Max | 40.049995 MHz |
| Initial S/W Revision | Prior to A.02.00 |

CF Step

Changes the step size for the center frequency and start and stop frequency functions. Once a step size has been selected and the center frequency function is active, the step keys (and the UP|DOWN parameters for Center Frequency from remote commands) change the center frequency by the step-size value. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the analyzer.

Note that the start and stop frequencies also step by the CF Step value.

| | |
|------------------------------|--|
| Key Path | FREQ Channel |
| Remote Command | [:SENSe]:FREQuency:CENTer:STEP[:INCRement] <freq> [:SENSe]:FREQuency:CENTer:STEP[:INCRement]? [:SENSe]:FREQuency:CENTer:STEP:AUTO OFF ON 0 1 [:SENSe]:FREQuency:CENTer:STEP:AUTO? |
| Example | FREQ:CENT:STEP:AUTO ON FREQ:CENT:STEP 500 MHz FREQ:CENT UP increases the current center frequency value by 500 MHz FREQ:CENT:STEP? FREQ:CENT:STEP:AUTO? |
| Notes | Preset and Max values are depending on Hardware Options (503, 507, 508, 513, 526) |
| Notes | Preset and Max values are dependent on Hardware Options (5xx) |
| Dependencies | Freq Offset is not available in External Mixing. In this case the Freq Offset key is grayed out and shows a value of zero. It will once again be available, and show the previously set value, when you return to the RF Input. |
| Dependencies | Span, RBW, Center frequency If the electronic/soft attenuator is enabled, any attempt to change the value of the center frequency >3.6 GHz by pressing the Up-arrow key, fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. |
| Couplings | When auto-coupled in a non-zero span, the center frequency step size is set to 10% of the span. When auto-coupled in zero span, the center frequency step size is set to the equivalent -3 dB RBW value. |
| Preset | Auto ADEMOD: 1 MHz ON |
| State Saved | Saved in instrument state |
| Min | – (the maximum frequency of the instrument). That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Max | The maximum frequency of the instrument. That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Default Unit | Hz |
| Status Bits/OPC dependencies | non-overlapped |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Input/Output

See ["Input/Output" on page 202](#)

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays the menu keys that enable you to select, set up and control the markers for the current measurement

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection.

| | |
|----------------------|--------------------|
| Key Path | Marker, Properties |
| Initial S/W Revision | Prior to A.02.00 |

Marker Type

Sets the marker control mode to Normal, Delta or Off, If the selected marker is Off, pressing Marker sets it to Normal and places a single marker at the center of the display. At the same time, Marker X Axis Value appears on the Active Function area.

| | |
|-----------------------|--|
| Key Path | Marker |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:OBWidth:MARKer[1] 2 ... 12:MODE POSition DELTa OFF :CALCulate:OBWidth:MARKer[1] 2 ... 12:MODE? |
| Example | CALC:OBW:MARK:MODE POS CALC:OBW:MARK:MODE? |
| Notes | If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area displays the marker value to its full entered precision. |

| | |
|--------------------------|----------------------------|
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | Normal Delta Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Properties

Accesses the marker properties menu.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays the menu keys that enable you to select, set up and control the markers for the current measurement

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection.

| | |
|----------------------|--------------------|
| Key Path | Marker, Properties |
| Initial S/W Revision | Prior to A.02.00 |

Relative To

Selects the desired marker. The selected marker will be relative to its reference marker.

| | |
|-----------------------|--|
| Key Path | Marker, Properties |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:OBWidth:MARKer[1] 2 ... 12:REFerence <integer> :CALCulate:OBWidth:MARKer[1] 2 ... 12:REFerence? |
| Example | CALC:OBW:MARK:REF 2 |

| | |
|--------------------------|--|
| | CALC:OBW:MARK:REF? |
| Notes | A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." When queried a single value is returned (the specified marker numbers relative marker). You must be in the Spectrum Analysis mode, WCDMA mode, TD-SCDMA mode, 1xEVDO mode, WIMAX OFDMA mode ISDB-T mode, WLAN mode, CMMB mode, LTE mode, LTETDD mode or BLUETOOTH mode to use this command. Use:INSTrument:SElect to set the mode. |
| Preset | 2 3 4 5 6 7 8 9 10 11 12 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 12 |
| Readback | Current selected relative to marker number. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

All Markers Off

Turns off all markers.

| | |
|--------------------------|--|
| Key Path | Marker |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:OBWidth:MARKer:AOff |
| Example | CALC:OBW:MARK:AOff |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Marker X Axis Value (Remote Command Only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off.

| | |
|-----------------------|--|
| Key Path | SCPI only |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:OBWidth:MARKer[1] 2 ... 12:X <freq> :CALCulate:OBWidth:MARKer[1] 2 ... 12:X? |
| Example | CALC:OBW:MARK3:X 0 CALC:OBW:MARK3:X? |
| Notes | The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from |

| | |
|--------------------------|---|
| | the marker's reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency. |
| Preset | After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN). |
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Marker X Axis Position (Remote Command Only)

Sets the marker X position in trace points. It has no effect if the control mode is Off.

| | |
|--------------------------|--|
| Key Path | SCPI only |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:OBWidth:MARKer[1] 2 ... 12:X:POSition <real> :CALCulate:OBWidth:MARKer[1] 2 ... 12:X:POSition? |
| Example | CALC:OBW:MARK10:X:POS 0 CALC:OBW:MARK10:X:POS? |
| Notes | The query returns the marker's absolute X Axis value in trace points if the control mode is Normal, or the offset from the marker's reference marker in trace points if the control mode is Delta. |
| Preset | After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN). |
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Marker Y Axis Value (Remote Command Only)

Returns the marker Y Axis value in the current marker Y Axis unit.

| | |
|-----------------------|--|
| Key Path | SCPI only |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:OBWidth:MARKer[1] 2 ... 12:Y? |

| | |
|--------------------------|--|
| Example | CALC:OBW:MARK11:Y? |
| Preset | Result dependent on Markers setup and signal source. |
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Backward Compatibility SCPI Commands

Sets or queries the state of a marker. Setting a marker which is OFF to state ON or 1 puts it in Normal mode and places it at the center of the screen.

| | |
|--------------------------|--|
| Key Path | SCPI only |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:OBWidth:MARKer[1] 2 ... 12:STATe OFF ON 0 1 :CALCulate:OBWidth:MARKer[1] 2 ... 12:STATe? |
| Example | CALC:OBW:MARK3:STAT ON CALC:OBW:MARK3:STAT? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Marker Function

There are no 'Marker Functions' supported in this measurement. When pressed, this key displays a blank menu.

| | |
|----------------------|------------------|
| Key Path | Front panel key |
| Initial S/W Revision | Prior to A.02.00 |

Marker To

There is no 'Marker To' functionality supported in this measurement. When pressed, this key displays a blank menu.

| | |
|----------------------|------------------|
| Key Path | Front panel key |
| Initial S/W Revision | Prior to A.02.00 |

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Remote Measurement Functions

This section contains the following topics:

["Measurement Group of Commands" on page 2285](#)

["Current Measurement Query \(Remote Command Only\)" on page 2287](#)

["Limit Test Current Results \(Remote Command Only\)" on page 2287](#)

["Data Query \(Remote Command Only\)" on page 2287](#)

["Calculate/Compress Trace Data Query \(Remote Command Only\)" on page 2288](#)

["Calculate Peaks of Trace Data \(Remote Command Only\)" on page 2293](#)

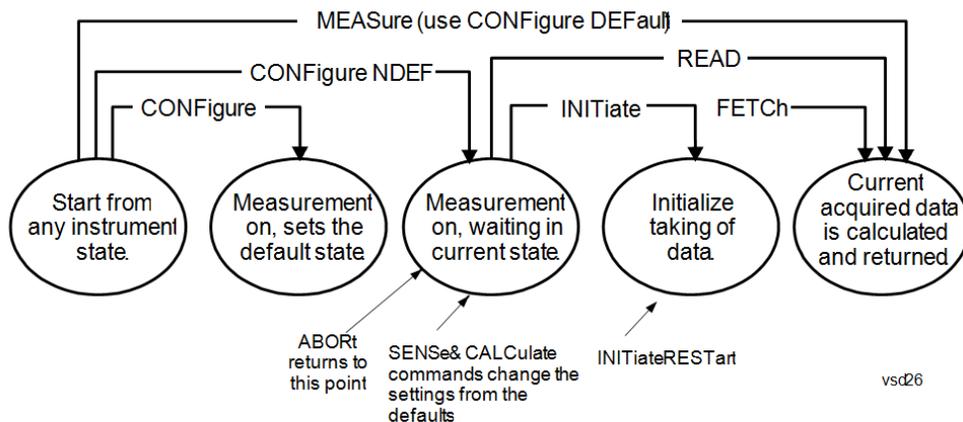
[Hardware-Accelerated Fast Power Measurement \(Remote Command Only\)](#)

["Format Data: Numeric Data \(Remote Command Only\)" on page 2294](#)

["Format Data: Byte Order \(Remote Command Only\)" on page 2295](#)

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFIgure command. Use the commands in the SENSE:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSE:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFIgure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTInuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTInuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
-

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
-

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

| | |
|-----------------------|-------------|
| Remote Command | :CONFigure? |
|-----------------------|-------------|

| | |
|----------------|-------|
| Example | CONF? |
|----------------|-------|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

| | |
|-----------------------|--------------------------|
| Remote Command | :CALCulate:CLIMits:FAIL? |
|-----------------------|--------------------------|

| | |
|----------------|--|
| Example | CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails. |
|----------------|--|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA[n]? |
| Notes | The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement. |
| Initial S/W Revision | Prior to A.02.00 |

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]] |
| Example | To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.) |
| Notes | The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data. |
| Initial S/W Revision | Prior to A.02.00 |

- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

NOTE If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$MEAN = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPLe - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

Sample Trace Data - Constant Envelope

(See below for explanation of variables.)

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

| | |
|-----------------------|--|
| Remote Command | <p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre> |
|-----------------------|--|

| | |
|----------------|---|
| Example | <p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p> |
|----------------|---|

| | |
|--------------|---|
| Notes | <p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p> |
|--------------|---|

excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQUency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

| | |
|-------------------------------|---|
| Remote Command | :FORMat[:TRACe][:DATA] ASCii INTeger,32 REAL,32 REAL,64 :FORMat[:TRACe][:DATA]? |
| Notes | The query response is: ASCii: ASC,8 REAL,32: REAL,32 REAL,64: REAL,64 INTeger,32: INT,32 When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm). The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block. |
| Dependencies | Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL). Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number". |
| Preset | ASCii |
| Backwards Compatibility Notes | Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32. |
| Initial S/W Revision | Prior to A.02.00 |

The specs for each output type follow:

AScii - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

| | |
|-----------------------------|--|
| Remote Command | :FORMat:BORDER NORMal SWAPped :FORMat:BORDER? |
| Preset | NORMal |
| Initial S/W Revision | Prior to A.02.00 |

Meas Setup

Displays the setup menu for the current measurement. The measurement setup parameters include the number of measurement averages used to calculate the measurement result and the averaging mode. The setup menu also includes the option to reset the measurement settings to their factory defaults.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Avg/Hold Num

Specifies the number of measurement averages used when calculating the measurement result. The average is displayed at the end of each sweep.

Initiates an averaging routine that averages the sweep points in a number of successive sweeps, resulting in trace smoothing.

After the specified number of average counts, the average mode (termination control) setting determines the average action.

| | |
|-----------------------|---|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe]:OBWidth:AVERage:COUNT <integer> [:SENSe]:OBWidth:AVERage:COUNT? [:SENSe]:OBWidth:AVERage[:STATe] ON OFF 1 0 [:SENSe]:OBWidth:AVERage[:STATe]? |
| Example | OBW:AVER:COUN 1500 OBW:AVER:COUN? OBW:AVER ON OBW:AVER? |
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, ISDB-T mode, CMMB mode, LTE mode, LTE TDD mode, BLUETOOTH mode, WLAN mode, 1xEVDO mode, MSR, LTE-Advanced FDD/TDD or WIMAX OFDMA mode to use this command. Use:INSTRument:SELEct to set the mode. |
| Couplings | None Averaging state is coupled to Max Hold. If Max Hold is changed from Off to On, Averaging state is automatically set to On. |
| Preset | 10 ON |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 10000 |

| | |
|-------------------------------------|--|
| Backwards Compatibility SCPI | <code>[:SENSe] :EBWidth :AVERage :COUnT</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Avg Mode

Enables you to set the averaging mode.

- When set to Exponential (Exp) the measurement averaging continues using the specified number of averages to compute each averaged value. The average is displayed at the end of each sweep.
- When set to Repeat, the measurement resets the average counter each time the specified number of averages is reached.

| | |
|--------------------------|--|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA , 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe] :OBWidth :AVERage :TCONtrol EXPonential REPeat</code> <code>[:SENSe] :OBWidth :AVERage :TCONtrol ?</code> |
| Example | OBW:AVER:TCON REP OBW:AVER:TCON? |
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, ISDB-T mode, CMMB mode, LTE mode, LTE TDD mode, BLUETOOTH mode, WLAN mode, 1xEVDO mode, MSR, LTE-Advanced FDD/TDD or WIMAX OFDMA mode to use this command. Use:INSTrument:SELEct to set the mode. |
| Preset | EXP |
| State Saved | Saved in instrument state. |
| Range | Exp Repeat |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Occ BW % Pwr

Assigns the percentage of the total power that is measured within the Occupied Bandwidth for the current measurement. The resulting Occupied Bandwidth limits are displayed by markers placed on the frequencies of the specified percentage.

| | |
|-----------------------|--|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe] :OBWidth :PERCent <real></code> |

| | |
|--------------------------|---|
| | <code>[:SENSe] :OBWidth :PERCent ?</code> |
| Example | OBW:PERC 75 OBW:PERC? |
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, ISDB-T mode, CMMB mode, LTE mode, LTE TDD mode, BLUETOOTH mode, WLAN mode, 1xEVDO mode, MSR, LTE-Advanced FDD/TDD or WIMAX OFDMA mode to use this command. Use:INSTRument:SElect to set the mode. If Mode is BLUETOOTH, the key will be grayed out. |
| Preset | 99.00 |
| State Saved | Saved in instrument state. |
| Min | 10 |
| Max | 99.99 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

x dB

Sets the x dB value used for the "x dB bandwidth" result that measures the bandwidth between two points on the signal which is x dB down from the highest signal point within the OBW Span.

| | |
|-------------------------------------|--|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTE TDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe] :OBWidth :XDB <rel_ampl></code> <code>[:SENSe] :OBWidth :XDB ?</code> |
| Example | OBW:XDB -20 OBW:XDB? |
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, ISDB-T mode, CMMB mode, LTE mode, LTE TDD mode, BLUETOOTH mode, WLAN mode, 1xEVDO mode, MSR, LTE-Advanced FDD/TDD or WIMAX OFDMA mode to use this command. Use:INSTRument:SElect to set the mode. |
| Preset | -26.0 dB BLUETOOTH: -20.0 dB. |
| State Saved | Saved in instrument state. |
| Min | -100.0 dB |
| Max | -0.1 dB |
| Backwards Compatibility SCPI | <code>[:SENSe] :EBWidth :XDB</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

IF Gain

The IF Gain key can be used to set the IF Gain function to Auto, Low Gain or High Gain. These settings affect sensitivity and IF overloads.

This only applies to the RF input. It does not apply to baseband I/Q input.

| | |
|----------------------|--|
| Key Path | Meas Setup, IF Gain |
| Dependencies | The IF Gain keys (FFT IF Gain and Swept IF Gain) have no effect when the U7227A USB Preamplifier is connected. This is not annotated or reflected on any softkey; there are no keys grayed out nor any SCPI locked out. The analyzer simply behaves as though both FFT IF Gain and Swept IF Gain are set to Low regardless of the setting on the keys. |
| Initial S/W Revision | Prior to A.02.00 |

IF Gain Auto

Activates the Auto Rules for IF Gain. When Auto is active, the IF Gain is set to High Gain under and of the following conditions:

- the input attenuator is set to 0 dB
- the preamp is turned On and the frequency range is under 3.6 GHz

For other settings, Auto sets the IF Gain to Low Gain.

| | |
|--------------------------|---|
| Key Path | Meas Setup, IF Gain |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :OBWidth :IF :GAIN :AUTO [:STATe] ON OFF 1 0 [:SENSe] :OBWidth :IF :GAIN :AUTO [:STATe] ? |
| Example | OBW:IF:GAIN:AUTO OFF OBW:IF:GAIN:AUTO? |
| Couplings | When the auto attenuation exists (for example, with electrical attenuator), the IF Gain setting is changed as following rule. Auto sets IF Gain to High Gain under any of the following conditions: the input attenuator is set to 0 dB, or the preamp is turned on and the frequency range is less than 3.6 GHz. For other settings, Auto sets IF Gain to Low Gain. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | Off On |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

IF Gain State

Selects the range of the IF Gain.

| | |
|--------------------------|---|
| Key Path | Meas Setup, IF Gain |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe]:OBWidth:IF:GAIN[:STATe] ON OFF 1 0</code> <code>[:SENSe]:OBWidth:IF:GAIN[:STATe]?</code> |
| Example | OBW:IF:GAIN ON OBW:IF:GAIN? |
| Notes | Where ON = high gain OFF = low gain |
| Couplings | When the auto attenuation exists (for example, with electrical attenuator), the IF Gain setting is changed as following rule. Auto sets IF Gain to High Gain under any of the following conditions: the input attenuator is set to 0 dB, or the preamp is turned on and the frequency range is less than 3.6 GHz. For other settings, Auto sets IF Gain to Low Gain. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | Low Gain High Gain |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Limit (for all modes except MSR and LTE-Advanced FDD/TDD)

Enables you to turn on or off limit checking at the specified frequency. For results that fail the limit test, a red FAIL appears in the measure bar.

| | |
|-----------------------|--|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN |
| Remote Command | <code>:CALCulate:OBWidth:LIMit:FBLimit <freq></code> <code>:CALCulate:OBWidth:LIMit:FBLimit?</code> <code>:CALCulate:OBWidth:LIMit[:TEST] ON OFF 1 0</code> <code>:CALCulate:OBWidth:LIMit[:TEST]?</code> |
| Example | CALC:OBW:LIM:FBL 50 kHz CALC:OBW:LIM:FBL? CALC:OBW:LIM OFF CALC:OBW:LIM? |
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, ISDB-T mode, CMMB mode, LTE mode, LTE TDD mode, BLUETOOTH mode, WLAN mode, 1xEVDO mode or WIMAX OFDMA mode to use this command. Use:INSTrument:SElect to set the mode. |

| | |
|--------------------------|---|
| Preset | SA, WCDMA: 5 MHz C2K: 1.48 MHz WIMAX OFDMA: 10 MHz TD-SCDMA: 1.6 MHz 1xEVDO: 1.48 MHz ISDB-T: 5.7 MHz CMMB: 7.512 MHz LTE, LTETDD: 5 MHz BLUETOOTH: 1 MHz WLAN: If Radio Std is 802.11a/g(OFDM/DSSS-OFDM): 20MHz If Radio Std is 802.11b: 25 MHz If Radio Std is 802.11n(20MHz): 20 MHz If Radio Std is 802.11n(40MHz): 40 MHz If Radio Std is 802.11ac(20MHz): 20 MHz If Radio Std is 802.11ac(40MHz): 40 MHz If Radio Std is 802.11ac(80MHz): 80 MHz If Radio Std is 802.11ac(160MHz): 160 MHz SA: OFF WCDMA, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD: ON |
| State Saved | Saved in instrument state. |
| Min | 1 kHz |
| Max | Depends on instrument maximum frequency. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Meas Preset

Restores all measurement parameters to their default values.

| | |
|--------------------------|--|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CONFigure:OBWidth |
| Example | CONF:OBW |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Max Hold (Remote Command Only)

When On, Max Hold displays and holds the maximum responses of the current measurement. Turn Max Hold to Off to disable the maximum hold feature.

| | |
|-------------------------------------|---|
| Key Path | SCPI Only |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe] :OBwidth:MAXHold ON OFF 1 0</code> <code>[:SENSe] :OBwidth:MAXHold?</code> |
| Example | OBW:MAXH ON OBW:MAXH? |
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, ISDB-T mode, CMMB mode, LTE mode, LTE TDD mode, BLUETOOTH mode, WLAN mode, 1xEVDO mode, MSR, LTE-Advanced FDD/TDD or WIMAX OFDMA mode to use this command. Use:INSTrument:SElect to set the mode. |
| Couplings | Max Hold is coupled to Average/Hold state. The Max Hold function is activated only if Average state is On. If Max Hold is changed to On when Average state is Off, Average state is automatically set to On. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Backwards Compatibility SCPI | <code>[:SENSe] :EBwidth:MAXHold</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

13 Occupied Bandwidth Measurement
Mode

Mode

See "[Mode](#)" on page 288

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings
- See "[How-To Preset](#)" on page 1468 for more information.

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :SYSTem:PRESet |
| Example | :SYST:PRES |
| Notes | *RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0. |
| Couplings | A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set. |
| Backwards Compatibility Notes | In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using |

| | |
|----------------------|------------------|
| | User Preset. |
| Initial S/W Revision | Prior to A.02.00 |

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

| Type Of Preset | SCPI Command | Front Panel Access |
|--------------------------------|--|--|
| Auto Couple | :COUPle ALL | Auto Couple front-panel key |
| Meas Preset | :CONFigure:<Measurement> | Meas Setup Menu |
| Mode Preset | :SYSTem:PRESet | Mode Preset (green key) |
| Restore Mode Defaults | :INSTrument:DEFault | Mode Setup Menu |
| Restore All Mode Defaults | :SYSTem:DEFault MODes | System Menu; Restore System Default Menu |
| *RST | *RST | not possible (Mode Preset with Single) |
| Restore Input/Output Defaults | :SYSTem:DEFault INPUt | System Menu; Restore System Default Menu |
| Restore Power On Defaults | :SYSTem:DEFault PON | System Menu; Restore System Default Menu |
| Restore Alignment Defaults | :SYSTem:DEFault ALIGN | System Menu; Restore System Default Menu |
| Restore Miscellaneous Defaults | :SYSTem:DEFault MISC | System Menu; Restore System Default Menu |
| Restore All System Defaults | :SYSTem:DEFault [ALL] :SYSTem:PRESet:PERsistent | System Menu; Restore System Default Menu |
| User Preset | :SYSTem:PRESet:USER | User Preset Menu |
| User Preset All Modes | :SYSTem:PRESet:USER:ALL | User Preset Menu |

| | | |
|----------------------|-----------------------|-------------|
| Power On Mode Preset | :SYSTem:PON:TYPE MODE | System Menu |
| Power On User Preset | :SYSTem:PON:TYPE USER | System Menu |
| Power On Last State | :SYSTem:PON:TYPE LAST | System Menu |

Preset Type (Remote Command Only)

As stated in the Backward Compatibility section, to be compatible with ESA/PSA the PRESet:TYPE command will be implemented as a no-op.

| | |
|-----------------------|--|
| Mode | All |
| Remote Command | :SYSTem:PRESet:TYPE FACTory MODE USER :SYSTem:PRESet:TYPE? |
| Example | :SYST:PRESet:TYPE FACT |
| Notes | This command is supported for backward compatibility only. It is a no-op which does not change the behavior of any preset operation. |
| Preset | This is unaffected by Preset but is set to Mode on a "Restore System Defaults->All" |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Mode Setup

See "[Mode Setup](#)" on page 320

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace. Pressing Peak Search with the selected marker off causes the selected marker to be set to Normal, then a peak search is immediately performed.

| | |
|--------------------------|--|
| Key Path | Front panel key |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :CALCulate:OBWidth:MARKer[1] 2 ... 12:MAXimum |
| Example | CALC:OBW:MARK2:MAX |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

13 Occupied Bandwidth Measurement
Print

Print

See "[Print](#)" on page 348

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

| Type | Default Prefix | Menu |
|-----------------------|----------------|-----------------|
| State | State_ | (Save/Recall) |
| Trace + State | State_ | (Save/Recall) |
| Screen | Screen_ | (Save/Recall) |
| Amplitude Corrections | Ampcor_ | (Import/Export) |
| Traces | Trace_ | (Import/Export) |
| Limit Lines | LLine_ | (Import/Export) |
| Measurement Result | MeasR_ | (Import/Export) |
| Capture Buffer | CapBuf_ | (Import/Export) |

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE

Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE

If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

| | |
|----------------------|--|
| Key Path | Front-panel key |
| Notes | No remote command for this key specifically. |
| Initial S/W Revision | Prior to A.02.00 |

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

| Key Path | Front-panel key |
|-------------------------------|--|
| Notes | <p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATe <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p> |
| Backwards Compatibility Notes | <p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> |
| Backwards Compatibility Notes | <p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p> |
| Initial S/W Revision | Prior to A.02.00 |

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See ["More Information" on page 1477](#).

| | |
|-----------------------|--|
| Key Path | Recall |
| Mode | All |
| Remote Command | :MMEMory:LOAD:STATe <filename> |
| Example | :MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path |
| Example | MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state. |
| Notes | <p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <ul style="list-style-type: none"> • If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number. <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p> |

| | |
|-------------------------------------|---|
| | there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu. |
| Backwards Compatibility SCPI | :MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

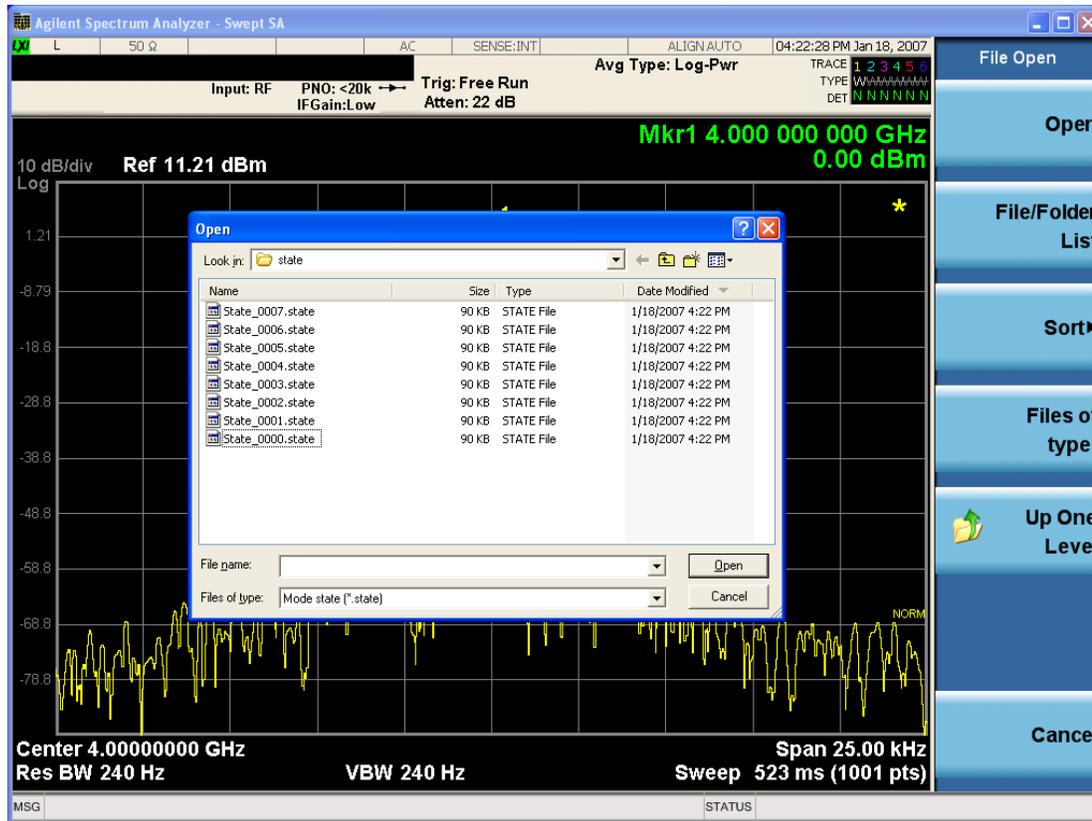
The following table describes the Trace Save and Recall possibilities:

| | | |
|---|--|--|
| You want to recall state and one trace's data, leaving other traces unaffected. | Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed. | On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed. |
| You want to recall all traces | Save Trace+State from ALL traces. | On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved) |
| You want all traces to load exactly as they were when saved. | Save State | On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten. |

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

13 Occupied Bandwidth Measurement Recall



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Notes | Brings up the Open dialog for recalling a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Mode | All |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available" |
| Initial S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|---------------------------------|--|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|---|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Data (Import)

Importing a data file loads data that was previously saved from the current measurement or from other measurements and/or modes that produce compatible data files. The Import Menu only contains Data Types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by the user prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Importing Data loads measurement data from the specified file into the specified or default destination, depending on the data type selected. Selecting an Import Data menu key will not actually cause the importing to occur, since the analyzer still needs to know from where to get the data. Pressing the Open key in this menu brings up the Open dialog and Open menu that provides you with the options from where to recall the data. Once a filename has been selected or entered in the Open menu, the recall occurs as soon as the Open button is pressed.

| | |
|----------------------|--|
| Key Path | Recall |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. Some keys will be missing completely, so the key locations in the sub-menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:LOAD commands. |
| Dependencies | If a file type is not used by a certain measurement, it is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Capture Buffer

The captured data is raw data which is not processed.

| | |
|----------------------|---|
| Key Path | Recall, Data |
| Mode | TD-SCDMA |
| Example | MMEM:LOAD:CAPT "MyCaptureData.bin" This loads the file of capture data (on the default file directory path) into the instrument. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Open...

When you press "Open", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[From File...](#)" on page 2309 in Recall, State, for a full description of this dialog and menu.

| | |
|----------------------|--|
| Key Path | Recall, Data |
| Notes | The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 1483

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate[:IMMEDIATE] :INITiate:RESTART |
| Example | :INIT:IMM :INIT:REST |
| Notes | :INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function. |
| Couplings | Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement. |
| Status Bits/OPC dependencies | This is an Overlapped command. The STATUS:OPERation register bits 0 through 8 are cleared. The STATUS:QUESTIONable register bit 9 (INTEgrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set. |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command **CALC:AVER:TCON UP**.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Mode | All |
| Notes | No remote command for this key specifically, but the :MMEM:STORe command is available for specific file types. An example is :MMEM:STOR:STATe <filename>. |
| Initial S/W Revision | Prior to A.02.00 |

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

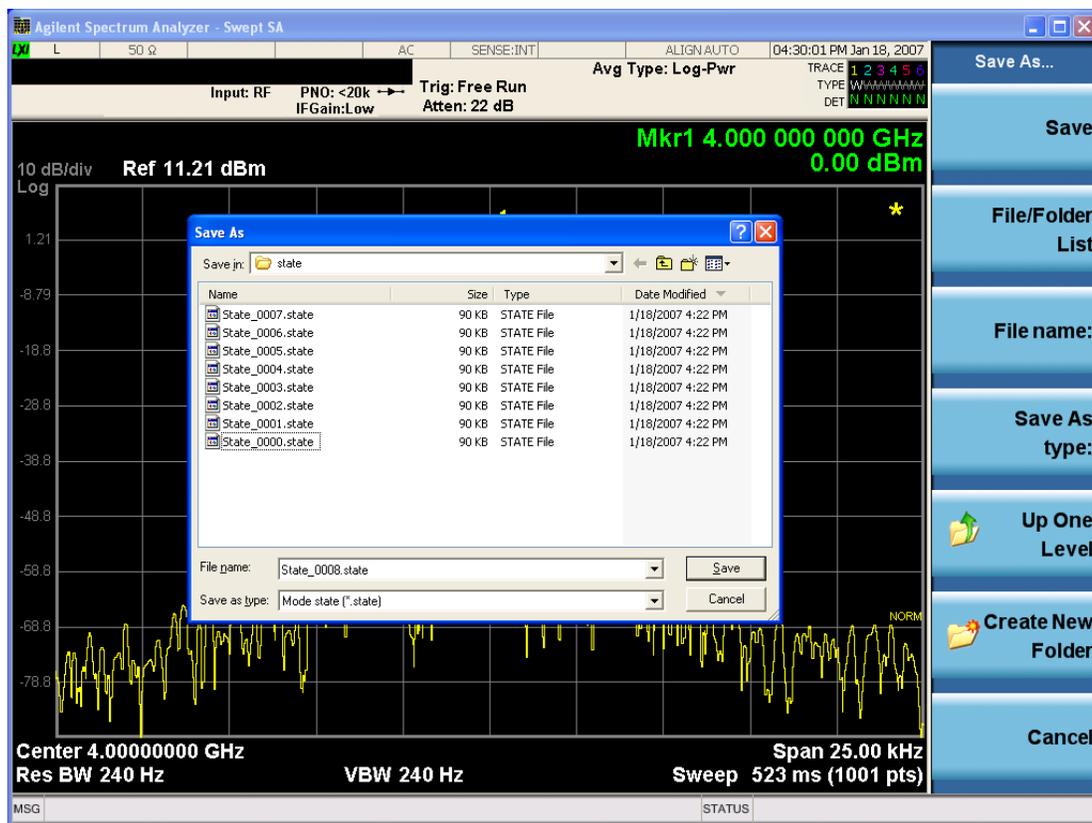
where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

| | |
|----------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:STATe <filename> |
| Example | MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory. |
| Notes | Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key |

| | |
|-------------------------------------|---|
| | update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away. |
| Backwards Compatibility SCPI | :MMEMory:STORe:STATe 1,<filename> |
| Initial S/W Revision | Prior to A.02.00 |

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “Save As.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2305](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Save, State |
| Mode | All |
| Notes | Brings up Save As dialog for saving a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 1488](#)

| | |
|-----------------------|--|
| Key Path | Save, State |
| Mode | All |
| Remote Command | :MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number> |
| Example | :MMEM:REG:STAT:LAB 1,"my label" |
| Notes | <reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,"" |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available" |
| Preset | The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc" |
| Initial S/W Revision | A.11.00 |

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1-16 from front panel, 1-128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

| | |
|----------------------|---|
| Key Path | Save |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands. |
| Dependencies | If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Measurement Results

Pressing this key selects Meas Results as the data type to be exported.

The Meas Results file contains measurement result sets, plus information describing the current state of the analyzer, as detailed in ["Meas Results File Definition" on page 1491](#) and ["Meas Results File Example" on page 1492](#) below.

| | |
|------------------------------|--|
| Key Path | Save, Data |
| Remote Command | :MMEMory:STORe:RESults <string> |
| Example | :MMEM:STOR:RES "MeasR_0000.csv" |
| Notes | <p>If the save is initiated via SCPI and the file already exists, the file will be overwritten.</p> <p>The SCPI command exports Occupied Bandwidth measurement results to the file specified as the parameter in the current path. The default path is My Documents\<current mode>\data\OBW\results.</p> <p>Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.</p> <p>The SCPI parameter is a quoted string that specifies the filename. Both single and double quotes are supported for any filename parameter over SCPI.</p> |
| Dependencies | The current active measurement must be the Occupied Bandwidth measurement to use this command. |
| Status Bits/OPC dependencies | Sequential – waits for the previous measurement to complete |
| Initial S/W Revision | Prior to A.02.00 |

Meas Results File Definition

The content of a Meas Results File is defined in this section.

The first lines in the file consist of identification and instrument configuration details, as follows.

- File ID string, which is "MeasResult"
- Measurement ID following Mode ID, which is "SA:OBW" for example.
- Firmware rev and model number
- Option string
- Auto Sweep Time Rules
- Average Mode
- Average Number
- Average State
- Center Frequency
- Detector
- Electrical Atten

- Electrical Atten State
- IFGain
- IFGainAuto
- Internal Preamp
- Internal Preamp Band
- Limit
- Limit State
- Max Hold
- Mechanical Atten
- MechanicalAttenStepEnum
- OBW Percent Pwr
- Resolution Band Width
- Resolution Bandwidth Shape
- Span
- Sweep Points
- Sweep Time
- Sweep Time Auto
- TriggerSource
- Video Bandwidth
- x DB

The data above is followed in the file by a line containing “MeasResult1” and “MeasResult2”. This line forms a header for each set of measurement results, which appear in subsequent lines. Each line of Measurement Results consists of two comma-separated values, for MeasResult1 and MeasResult2 respectively.

The MeasResult1 set in the file corresponds to the data returned by MEAS|READ|FETCh:OBWidth1, and the MeasResult2 set corresponds to the data returned by MEAS|READ|FETCh:OBWidth2.

The exported file is in CSV format, with a .csv extension.

Meas Results File Example

When imported into Microsoft Excel, a typical Meas Results CSV file appears as shown in the example below.

MeasResult

SA:OBW

| | |
|---|-------------------|
| A.10.53 | N9030A |
| 526 ALV ATP B1X B1Y B25 B40 BBA CR3 CRP DCF DDA DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA LFE LNP MAT MPB NFE NUL P26 PFR PNC RTL RTS S40 SB1 SEC SM1 TVT YAS YAV | 1 |
| Auto Sweep Time Rules | Normal |
| Average Mode | Exponential |
| Average Number | 10 |
| Average State | TRUE |
| Center Frequency | 1.33E+10 |
| Detector | Average |
| IFGain | FALSE |
| IFGainAuto | FALSE |
| Internal Preamp | FALSE |
| Internal Preamp Band | Low |
| Limit | 5000000 |
| Limit State | FALSE |
| Max Hold | FALSE |
| OBW Percent Pwr | 99 |
| Resolution Band Width | 27000 |
| Resolution Bandwidth Shape | Gaussian |
| Span | 3000000 |
| Sweep Points | 1001 |
| Sweep Time | 0.004933 |
| Sweep Time Auto | TRUE |
| TriggerSource | Free |
| Video Bandwidth | 270000 |
| x DB | -26 |
| MeasResult1 | MeasResult2 |
| 2971020.10835045 | -94.3702543927405 |
| -74.9741251886604 | -94.1447790390963 |

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data which is not processed.

| | |
|----------------------|--|
| Key Path | Save, Data |
| Mode | TD-SCDMA |
| Example | MMEM:STOR:CAPT "MyCaptureData.bin" This stores the capture data in the file MyCaptureData.bin in the default directory. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Save As . . .

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See ["To File . . ." on page 2318](#) in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\<<mode name>\data\traces

For all of the Limit Data Files:

My Documents\<<mode name>\data\limits

For all of the Measurement Results Data Files:

My Documents\<<mode name>\data\<<measurement name>\results

For all of the Capture Buffer Data Files:

My Documents\<<mode name>\data\captureBuffer

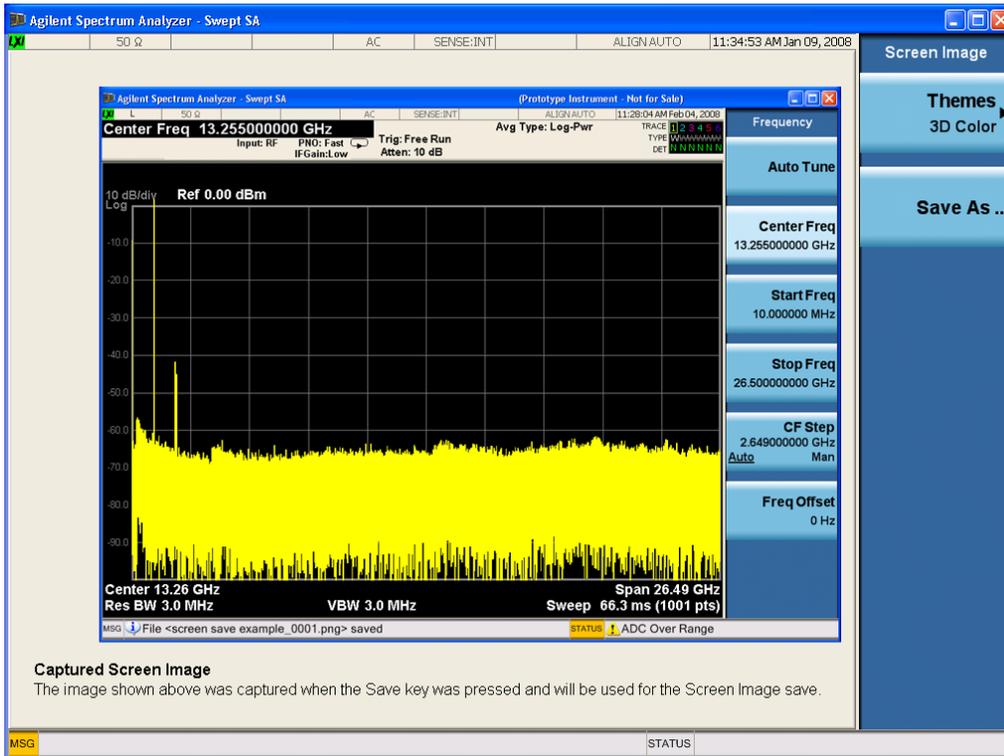
| | |
|----------------------|--|
| Key Path | Save, Data |
| Mode | All |
| Notes | The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <mode specific> Save Type. The save is performed immediately and does not wait until the measurement is complete. |
| Initial S/W Revision | Prior to A.02.00 |

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

| | |
|----------------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:SCReem <filename> |
| Example | :MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Save As...

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where `<mode name>` is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

| | |
|----------------------|--|
| Key Path | Save, Screen Image |
| Notes | Brings up Save As dialog for saving a Screen Image Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Catalog (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:CATalog? [<code><directory_name></code>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><code><numeric_value>,<numeric_value>,{<file_entry>}</code></p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first</p> |

parameter indicates the total amount of storage currently used in bytes. The second parameter indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:

<file_name>,<file_type>,<file_size>

As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty

Initial S/W Revision Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:CDIRectory [<directory_name>]
 :MMEMory:CDIRectory?

Notes The string must be a valid logical path.
 Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.
 At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.
 Query returns full path of the default directory.

Initial S/W Revision Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:COPY <string>,<string>[,<string>,<string>]

Notes The string must be a valid logical path.
 Copies an existing file to a new file or an existing directory to a new directory.
 Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.
 The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.
 This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:COpy:DEvice <source_string>,<dest_string> |
| Notes | <p>The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device.</p> <p>Valid device keywords are: SNS (smart noise source)</p> <p>An error is generated if the file or device is not found.</p> |

Mass Storage Delete (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DElete <file_name>[,<directory_name>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an “access denied” error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data.</p> <p>The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Make Directory (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MDIRectory <directory_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>Creates a new directory. The <directory_name> parameter specifies the name to be created.</p> |

| | |
|----------------------|--|
| | This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Move (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MOVE <string>,<string>[,<string>,<string>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Remove Directory (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:RDIRECTory <directory_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See "[More Information](#)" on page 1501

| | |
|-------------------------------|---|
| Key Path | Front-panel key |
| Example | :INIT:CONT OFF |
| Notes | See Cont key description. |
| Backwards Compatibility Notes | <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p> |
| Initial S/W Revision | Prior to A.02.00 |

More Information

See "[Restart](#)" on page 2315 for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

| Key Path | Front-panel key |
|----------|-----------------|
|----------|-----------------|

Span X Scale

Activates the Span function and displays the menu of span functions. The parameter values are measurement independent.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Span

Set the frequency of the occupied bandwidth span for the current measurement.

| | |
|-----------------------|---|
| Key Path | Span X Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe]:OBWidth:FREQuency:SPAN <freq> [:SENSe]:OBWidth:FREQuency:SPAN? [:SENSe]:OBWidth:FREQuency:SPAN:AUTO ON OFF 0 1 [:SENSe]:OBWidth:FREQuency:SPAN:AUTO? |
| Example | OBW:FREQ:SPAN 2.4 MHz OBW:FREQ:SPAN? OBW:FREQ:SPAN:AUTO 0 OBW:FREQ:SPAN:AUTO? |
| Notes | Span Auto Detector ([:SENSe]:OBWidth:FREQuency:SPAN:AUTO) is only available in MSR and LTE-Advanced FDD/TDD mode. The BAF SCPI is MSR and LTE-Advanced FDD/TDD only. |
| Couplings | When changing the Occupied Bandwidth Span, the Resolution Bandwidth and Video Bandwidth are set to AUTO to prevent the span from clipping. This is only available in MSR and LTE-Advanced FDD/TDD mode. |
| Preset | SA: 3 MHz WCDMA: 10 MHz WIMAX OFDMA: 20 MHz CDMA2K: 2 MHz TD-SCDMA: 4.8 MHz 1xEVDO: 3.75 MHz ISDB-T: 20 MHz CMMB: 8 MHz LTE, LTETDD, LTEAFDD, LTEATDD: 10 MHz BLUETOOTH:2 MHz WLAN: If Radio Std is 802.11a/g 802.11n(20MHz) 802.11ac(20MHz): 25 MHz If Radio Std is 802.11b: 30MHz |

| | |
|-------------------------------------|---|
| | If Radio Std is 802.11n(40MHz), 802.11ac (40MHz): 50 MHz If Radio Std is 802.11ac(80MHz): 100MHz If Radio Std is 802.11ac(160MHz): 200MHz MSR: 20MHz ON |
| State Saved | Saved in instrument state. |
| Min | 100 Hz |
| Max | Hardware Maximum Span |
| Backwards Compatibility SCPI | [:SENSe] :EBWidth:FREQuency:SPAN |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.10.00, A.14.00 |

Full Span

Changes the Occupied Bandwidth Span to show the full frequency range of the analyzer. When using external mixing, it changes the displayed frequency span to the frequency range specified for the selected external mixing band.

| | |
|--------------------------|--|
| Key Path | Span X Scale |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :OBWidth:FREQuency:SPAN:FULL |
| Example | OBW:FREQ:SPAN:FULL |
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode,ISDB-T mode, CMMB mode, LTE mode, LTE TDD mode, BLUETOOTH mode, WLAN mode, cdma2000 mode, MSR or WIMAX OFDMA mode to use this command. Use:INSTrument:SElect to set the mode. |
| Dependencies | For MSR and LTE-Advanced FDD/TDD mode, this key is blank. In order to keep backwards compatible with the legacy LTE FDD/TDD, the scpi command is supported in LTE & LTE-A converged application. |
| Couplings | Selecting full span changes the measurement span value. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Last Span

Changes the measurement frequency span to previous measurement span setting. If there is no existing previous span value then the span remains unchanged.

| | |
|----------|--------------|
| Key Path | Span X Scale |
|----------|--------------|

| | |
|--------------------------|---|
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :OBWidth:FREQuency:SPAN:PREVious |
| Example | OBW:FREQ:SPAN:PREV |
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode, ISDB-T mode, CMMB mode, LTE mode, LTE TDD mode, BLUETOOTH mode, WLAN mode, cdma2000 mode, MSR, LTE-Advanced FDD/TDD or WIMAX OFDMA mode to use this command. Use:INSTrument:SElect to set the mode. |
| Couplings | Selecting last span changes the measurement span value. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Sweep/Control

Displays a menu of functions that enable you to set up and control the sweep time and source for the current measurement.

For details about this key, see ["Sweep/Control" on page 2205](#).

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Sweep Time

Selects the length of time in which the spectrum analyzer sweeps the displayed frequency span. Additional overhead time, which impacts the sweep rate, is not calculated as part of the sweep time. In fact:

- sweep rate = span/sweep time
- update rate = 1/(sweep time + overhead)
- sweep cycle time = sweep time + overhead

Sweep time is coupled to RBW and VBW, and is impacted by the number of sweep points, so changing those parameters may change the sweep time.

This function is not available when the selected input is I/Q.

| | |
|----------------|---|
| Key Path | Sweep/Control |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :OBWidth :SWEep :TIME <time> [:SENSe] :OBWidth :SWEep :TIME? [:SENSe] :OBWidth :SWEep :TIME :AUTO OFF ON 0 1 [:SENSe] :OBWidth :SWEep :TIME :AUTO? |
| Example | OBW:SWE:TIME 50 ms OBW:SWE:TIME? OBW:SWE:TIME:AUTO ON OBW:SWE:TIME:AUTO? |
| Couplings | When you manually change the Time, this state automatically goes to 'Man'. |
| Preset | SA, WIMAX OFDMA, C2K, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD: Automatically Calculated WCDMA: 32.6 ms SA, WIMAX OFDMA, C2K, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, WLAN, MSR, LTEAFDD, LTEATDD: ON WCDMA: OFF |
| State Saved | Saved in instrument state. |

| | |
|--------------------------|------------------|
| Min | 1 ms |
| Max | 4000 s |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Sweep Setup

Accesses the sweep setup settings for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Sweep/Control |
| Initial S/W Revision | Prior to A.02.00 |

Auto Sweep Time Rules

Switches the analyzer between normal and accuracy sweep states.

Setting Auto Sweep Time to Accy results in slower sweep times, usually about three times as long, but better amplitude accuracy for CW signals. The instrument amplitude accuracy specifications only apply when Auto Sweep Time is set to Accy.

Additional amplitude errors which occur when Auto Sweep Time is set to Norm are usually well under 0.1 dB, though this is not guaranteed. Because of the faster sweep times and still low errors, Norm is the preferred setting of Auto Sweep Time. Auto Sweep Time is set to Norm on a Preset or Auto Couple. This means that in the Preset or Auto Coupled state, instrument amplitude accuracy specifications do not apply.

| | |
|--------------------------|--|
| Key Path | Sweep/Control, Sweep Setup |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | [:SENSe] :OBWidth :SWEep :TIME :AUTO :RULEs NORMal ACCuracy [:SENSe] :OBWidth :SWEep :TIME :AUTO :RULEs ? |
| Example | OBW:SWE:TIME:AUTO:RUL NORM OBW:SWE:TIME:AUTO:RUL? |
| Notes | Set to Norm when Auto Couple is pressed or sent remotely. |
| Preset | NORMal |
| State Saved | Saved in instrument state. |
| Range | Norm Accy |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Pause

Pauses the measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume resumes the measurement at the point where it had been paused.

See "[Pause/Resume](#)" on page 2205 for more information.

| | |
|----------------------|------------------|
| Key Path | Sweep/Control |
| Initial S/W Revision | Prior to A.02.00 |

Gate

Accesses a menu that enables you to control the gating function. The Gate functionality is used to view signals best viewed by qualifying them with other events.

Gate setup parameters are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

Note that Sweep Time autocoupling rules and annotation are changed by Gate being on.

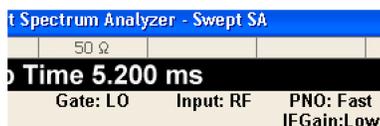
| | |
|----------------------|--|
| Key Path | Sweep/Control |
| Scope | Meas Global |
| Readback | The state and method of Gate, as [Off, LO] or [On, Video]. Note that for measurements that only support gated LO, the method is nonetheless read back, but always as LO. |
| Initial S/W Revision | Prior to A.02.00 |

Gate On/Off

Turns the gate function on and off.

When the Gate Function is on, the selected Gate Method is used along with the gate settings and the signal at the gate source to control the sweep and video system with the gate signal. Not all measurements allow every type of Gate Methods.

When Gate is on, the annunciation in the measurement bar reflects that it is on and what method is used, as seen in the following "Gate: LO" annunciator graphic.



| | |
|----------------|---|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATE [:STATe] OFF ON 0 1 |

| | |
|-------------------------------------|--|
| | [:SENSe] :SWEep:EGATe [:STATe] ? |
| Example | SWE:EGAT ON SWE:EGAT? |
| Dependencies | <p>The function is unavailable (grayed out) and Off when:</p> <ul style="list-style-type: none"> • Gate Method is LO or Video and FFT Sweep Type is manually selected. • Gate Method is FFT and Swept Sweep Type is manually selected. • Marker Count is ON. <p>The following are unavailable whenever Gate is on:</p> <ul style="list-style-type: none"> • FFT under Sweep Type when Method=LO or Video or Swept under Sweep Type when Method=FFT • Marker Count <p>While Gate is on, the Auto Rules for Sweep Type are modified so that the choice agrees with the Gate Method: i.e., FFT for Method = FFT and Swept for Method = LO or Video.</p> <p>The Gate softkey and all SCPI under the [:SENSe]:SWEep:EGATe SCPI node are grayed out when Source Mode is Tracking with an external source. This is because the Gate circuitry is used to sync the external source. If the Tracking Source is turned on, the Gate is turned off.</p> <p>When in the ACP measurement:</p> <ul style="list-style-type: none"> • When Meas Method is RBW or FAST, this function is unavailable and the key is grayed out. • Whenever Gate is on, Meas Method, RBW or FAST is unavailable and keys for those are grayed out. • When Gate is on, Offset Res BW and Offset Video BW are ignored (if you set these values) and the measurement works as if all Offset Res BW and all Offset Video BW are coupled with the Res BW and the Video BW under the BW menu. When Gate is on, the Offset BW key in the Offset/Limit menu is grayed out. |
| Preset | Off LTETDD: On |
| State Saved | Saved in instrument state |
| Range | On Off |
| Backwards Compatibility SCPI | [:SENSe]:SWEep:TIME:GATE[:STATe] ESA compatibility |
| Backwards Compatibility Notes | In ESA, Trig Delay (On) and Gate (On) could not be active at the same time.. This dependency does not exist in PSA or in the X-Series. |
| Initial S/W Revision | Prior to A.02.00 |

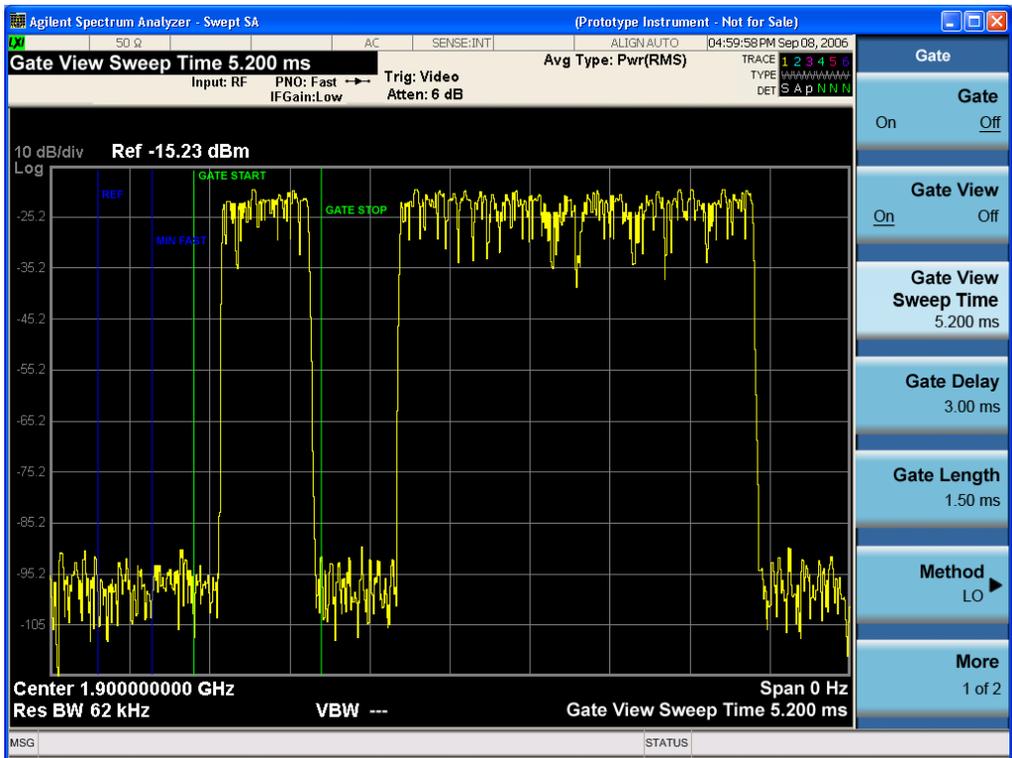
Gate View On/Off

Turning on Gate View in the Swept SA measurement provides a single-window gate view display..

Turning on Gate View in other measurements shows the split-screen Gate View. In these measurements, when the Gate View is on, the regular view of the current measurement traces and results are reduced vertically to about 70% of the regular height. The Zero Span window, showing the positions of the Gate, is shown between the Measurement Bar and the reduced measurement window. By reducing the height of the measurement window, some of the annotation on the Data Display may not fit and is not shown.

| | |
|----------------------|---|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe:VIEW ON OFF 1 0 [:SENSe] :SWEep:EGATe:VIEW? |
| Example | SWE:EGAT:VIEW ON turns on the gate view. |
| Dependencies | In the Swept SA measurement: In Gate View, the regular Sweep Time key is grayed out . When pressed, the grayed out key puts up the informational message "Use Gate View Sweep Time in the Gate menu." In the other measurements: When you turn Gate View on, the lower window takes on the current state of the instrument. Upon leaving Gate View, the instrument takes on the state of the lower window. When you turn Gate View on, the upper window Sweep Time is set to the gate view sweep time. |
| Couplings | These couplings apply to the Swept SA measurement: <ul style="list-style-type: none"> • When Gate View is turned on, the instrument is set to Zero Span. • Gate View automatically turns off whenever a Span other than Zero is selected. • Gate View automatically turns off if you press the Last Span key while in Gate View, and the instrument returns to the Span it was in before entering Gate View (even if that is Zero Span). • When Gate View is turned on, the sweep time used is the gate view sweep time. This is set according to the rules in section "Gate View Setup " on page 2341 • When Gate View is turned off, Sweep Time is set to the normal Swept SA measurement sweep time. • If Gate View is on and Gate is off, then turning on Gate turns off Gate View. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

A sample of the Gate View screen in the Swept SA measurement is shown in the following graphic :



A sample of the Gate View screen in other measurements is shown in the following graphic. This example is for the ACP measurement:



Turning Gate View off returns the analyzer to the Normal measurement view.

In the Swept SA, the normal measurement view is the single-window Swept SA view. When returning to this view, the Swept SA measurement returns to the Span it was in before entering **Gate View** (even if that is Zero Span).

The **Gate View** window is triggered from the Gate Source, with zero trigger delay. Also, when updating the **Gate View** window, the Gate itself must not operate. So it is internally shut off while the gate view window is being updated. For the Swept SA measurement, this means that the Gate is internally shut off whenever the gate view window is displayed. The measurement bar and softkeys continue to show the Trigger source for the main sweep window and give no indication that the Gate is shut off or that the Gate View window is triggered from the Gate Source.

When in **Gate View**, vertical lines are displayed in the Gate View window as follows:

- Green lines are displayed at the gate edges as follows: in Edge Gate, a line is shown for Delay and one for the end of the Gate period, defined by Length. In Level Gate a line is shown only for Delay. You can adjust the position of the green lines by adjusting the gate length and the gate delay. These lines update in the Gate View window as the active function changes, even if the window is not being updated. In Gated LO and Gated Video, these lines are positioned relative to the delay reference line (not relative to 0 time). In Gated FFT, their location is relative to the left edge of the screen.
- A blue line is displayed showing the delay reference, that is, the reference point for the Gate Delay within the Zero Span window. The blue line represents where (in time) the effective location of the gate start would be if the gate were programmed to zero delay.
-
- The second blue line is labeled "MIN FAST" as shown in the figure above because it represents the minimum Gate Delay for fast Gated LO operation. This line is only displayed in Gated LO. You cannot scroll (knob) or decrement (down key) the Gate Delay to less than that represented by the position of this line, it can only be set below this position manually, although once there it can be moved freely with the knob while below the line.
- A yellow line in the Gated Video case only, is displayed at Blength, where Blength is the display point (bucket) length for the swept trace, which is given by the sweep time for that trace divided by number of Points - 1. So it is referenced to 0 time, not to the delay reference. This line is labeled NEXT PT (it is not shown in the figure above because the figure above is for Gated LO).
- The yellow line represents the edge of a display point (bucket). Normally in Gated Video, the bucket length must be selected so that it exceeds the off time of the burst. There is another way to use the analyzer in Gated Video measurements, and that is to set the bucket width much shorter than the off time of the burst. Then use the Max Hold trace function to fill in "missing" buckets more slowly. This allows you to see some of the patterns of the Gated Video results earlier, though seeing a completely filled-in spectrum later.

Gate View Setup

Accesses a menu that enables you to setup parameters relevant to the Gate View

| | |
|----------------------|---------------------|
| Key Path | Sweep/Control, Gate |
| Scope | Meas Global |
| Initial S/W Revision | A.10.00 |

Gate View Sweep Time

Controls the sweep time in the Gate View window. To provide an optimal view of the gate signal, the analyzer initializes Gate View Sweep Time based on the current settings of Gate Delay and Gate Length.

| | |
|-----------------------------|--|
| Key Path | Sweep/Control, Gate, Gate View Setup |
| Remote Command | [:SENSe] :SWEep:EGATe:TIME <time> [:SENSe] :SWEep:EGATe:TIME? |
| Example | SWE:EGAT:TIME 500 ms |
| Dependencies | Gate View Sweep Time is initialized: <ul style="list-style-type: none"> • On Preset (after initializing delay and length). • Every time the Gate Method is set/changed. <p>Additionally, in the Swept SA measurement, whenever you do a Preset, or leave Gate View, the analyzer remembers the Gate Delay and Gate Length settings. Then, when returning to Gate View, if the current Gate Delay and/or Gate Length do not match the remembered values Gate View Sweep Time is re-initialized.</p> <ol style="list-style-type: none"> 1. Compute the location of the "gate stop" line, which you know is at time $t = t_{min} + \text{GateDelay} + \text{GateLength}$. |
| Preset | 519.3 μ s WiMAX OFDMA: 5 ms GSM/EDGE: 1 ms |
| State Saved | Saved in instrument state |
| Max | 6000 s |
| Initial S/W Revision | Prior to A.02.00 |

Gate View Start Time

Controls the time at the left edge of the Gate View.

| | |
|-----------------------------|--|
| Key Path | Sweep/Control, Gate, Gate View Setup |
| Remote Command | [:SENSe] :SWEep:EGATe:VIEW:STARt <time> [:SENSe] :SWEep:EGATe:VIEW:STARt? |
| Example | SWE:EGAT:VIEW:STAR 10ms |
| Notes | Units of time are required or no units; otherwise an invalid suffix error message will be generated. See error -131. |
| Preset | 0 ms |
| State Saved | Saved in instrument state |
| Min | 0 |
| Max | 500 ms |
| Initial S/W Revision | A.10.00 |

Gate Delay

Controls the length of time from the time the gate condition goes True until the gate is turned on.

| | |
|------------------------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe:DELay <time> [:SENSe] :SWEep:EGATe:DELay? |
| Example | SWE:EGAT:DELay 500ms SWE:EGAT:DELay? |
| Notes | Units of time are required or no units; otherwise an invalid suffix error message will be generated. |
| Preset | 57.7 us WiMAX OFDMA: 71 us GSM/EDGE: 600 us WLAN: 500 us |
| State Saved | Saved in instrument state |
| Min | 0.0 us |
| Max | 100 s |
| Backwards Compatibility SCPI | [:SENSe] :SWEep:TIME:GATE:DELay ESA compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Length

Controls the length of time that the gate is on after it opens.

| | |
|----------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe:LENGth <time> [:SENSe] :SWEep:EGATe:LENGth? |
| Example | SWE:EGAT:LENG 1 SWE:EGAT:LENG? |
| Notes | Units of time are required or no units; otherwise an invalid suffix error message will be generated. |
| Dependencies | <p>Grayed out when Gate Method is set to FFT in which case the label changes to that shown below.</p>  <p>The key is also grayed out if Gate Control = Level.</p> |
| Preset | 461.6 us |

| | |
|-------------------------------------|---|
| | WiMAX OFDMA: 50 us GSM/EDGE: 200 us WLAN: 1.54 ms |
| State Saved | Saved in instrument state |
| Min | 100 ns |
| Max | 5 s |
| Backwards Compatibility SCPI | [:SENSe]:SWEep:TIME:GATE:LENGth ESA compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Source

The menus under the Gate Source key are the same as those under the Trigger key, with the exception that neither Free Run nor Video are available as Gate Source selections. However, a different SCPI command is used to select the Gate Source (see table below) because you may independently set the Gate Source and the Trigger Source.

Any changes to the settings in the setup menus under each Gate Source selection key (for example: Trigger Level, Trigger Delay, etc.) also affect the corresponding settings under the Trigger menu keys. The SCPI commands used for these are the same for Trigger and Gate, since there is only one setting which affects both Gate and Trigger. Example: to set the Trigger Level for External 1 you use the command :TRIG:EXT1:LEV regardless of whether you are using External 1 as a Trigger Source or a Gate Source.

| | |
|-------------------------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe]:SWEep:EGATe:SOURce EXTernal1 EXTernal2 LINE FRAME RFBurst [:SENSe]:SWEep:EGATe:SOURce? |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" error. |
| Preset | EXTernal 1 GSM/EDGE, MSR: FRAME LTETDD: EXTernal 1When Direction is Downlink, FRAME when Direction is Uplink. |
| Backwards Compatibility Notes | In ESA, there is a single Gate input port. In PSA, the Gate Source may be taken from one of two specified input ports. In the X-Series, any Trigger Source can be a Gate Source. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.14.00 |

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA |
| Dependencies | Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 1. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:LEVel <level> :TRIGger[:SEquence]:EXTernal1:LEVel? |
| Example | TRIG:EXT1:LEV 0.4 V |
| Couplings | This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:LEVel For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:EXTernal1:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal1:SLOPe? |
| Example | TRIG:EXT1:SLOP NEG |
| Couplings | This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:SLOPe For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal1:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Zero Span Delay Comp On/Off

In zero span, there is a natural delay in the signal path, which comes from the RBW filter. This is usually desirable, as it allows you to trigger on events and also see those events, because the signal is delayed from the trigger event. However, in some cases it is desirable to eliminate this delay, so that trigger events line up exactly with the zero time point in zero span. You can use the Zero Span Delay Comp On/Off feature to enable or disable zero span delay compensation.

| | |
|-----------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:DELAy:COMPensation OFF ON 0 1 :TRIGger[:SEquence]:EXTernal1:DELAy:COMPensation? |
| Example | TRIG:EXT1:DEL:COMP ON |
| Dependencies | No effect except in zero-span, but not locked out in nonzero spans. Blanked in modes that do not support zero-span measurements. If the SCPI command is sent when the key is blanked, an error is returned: -221, "Settings conflict; Feature not supported for this measurement" In analyzers shipping N9060A, this feature requires N9060A-7FP. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | A.11.00 |

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

| | |
|-------------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT2 Swept SA measurement TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message. Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 2. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:LEVel :TRIGger[:SEquence]:EXTernal2:LEVel? |
| Example | TRIG:EXT2:LEV 1.1 V |
| Couplings | This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------|--|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal2:SLOPe? |
| Example | TRIG:EXT2:SLOP NEG |
| Couplings | This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Zero Span Delay Comp On/Off

In zero span, there is a natural delay in the signal path, which comes from the RBW filter. This is usually desirable, as it allows you to trigger on events and also see those events, because the signal is delayed from the trigger event. However, in some cases it is desirable to eliminate this delay, so that trigger events line up exactly with the zero time point in zero span. You can use the Zero Span Delay Comp On/Off feature to enable or disable zero span delay compensation.

| | |
|----------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:DELAy:COMPensation OFF ON 0 1 :TRIGger[:SEquence]:EXTernal2:DELAy:COMPensation? |
| Example | TRIG:EXT2:DEL:COMP ON |
| Dependencies | No effect except in zero-span, but not locked out in nonzero spans. Blanked in modes that do not support zero-span measurements. If the SCPI command is sent when the key is blanked, an error is returned: -221, "Settings conflict; Feature not supported for this measurement" In analyzers shipping N9060A, this feature requires N9060A-7FP. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | A.11.00 |

RF Burst

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector. Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

In some models, a variety of burst trigger circuitry is available, resulting in various available burst trigger bandwidths. The analyzer automatically chooses the appropriate trigger path based on the hardware configuration and other settings of the analyzer.

| | |
|--------------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR RFB Swept SA measurement TRIG:< meas>:SOUR RFB Measurements other than Swept SA |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Backwards Compatibility Notes | The legacy command: :TRIGger[:SEQuence]:RFBurst:FSElectivity[:STATe] OFF ON 0 1 is not supported in the X-Series, as the hardware to do Frequency Selective burst triggers does not exist in X-Series. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Absolute Trigger Level

Sets the absolute trigger level for the RF burst envelope.

When using the External Mixing path, the Absolute Trigger Level is uncalibrated because the factory default was set to accommodate the expected IF levels for the RF path.

| | |
|-----------------------|--|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute <ampl> :TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute? |
| Example | TRIG:RFB:LEV:ABS 10 dBm sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm |
| Notes | Sending this command does not switch the setting from relative to absolute; to switch it you need to send the :TRIGger[:SEQuence]:RFBurst:LEVel:TYPE command, below. Amplitude Corrections are not taken into account by the Absolute Trigger Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Absolute Trigger will not fire until you have set the trigger level that far below the displayed signal level, rather than simply to |

| | |
|-------------------------------------|--|
| | the displayed signal level. This is only true for Amplitude Corrections, not External Gain or Ref Level Offset functions. If mode is Bluetooth, the default value is -50 dBm. |
| Couplings | This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu |
| Preset | -20 dBm |
| State Saved | Saved in instrument state |
| Min | -200 dBm |
| Max | 100 dBm |
| Default Unit | depends on the current selected Y-Axis unit |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:RFBurst:LEVel:ABSolute |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

| | |
|--------------------------|---|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:TYPE ABSolute RELative :TRIGger[:SEquence]:RFBurst:LEVel:TYPE? |
| Example | TRIG:RFB:LEV:TYPE REL sets the trigger level type of the RF burst trigger to Relative. |
| Preset | ABSolute |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Relative Trigger Level

Sets the relative trigger level for the RF burst envelope.

In some models, the relative burst trigger function is implemented in hardware. In other models, without the advanced triggering hardware required, the relative burst trigger function is implemented in software in some measurements, and is unavailable in other measurements.

When implemented in software, the relative RF Burst trigger function is implemented as follows:

1. The measurement starts with the absolute RF Burst trigger setting. If it cannot get a trigger with that level, auto trigger fires and the acquisition starts anyway. After the acquisition, the measurement searches for the peak in the acquired waveform and saves it.

2. Now, in the next cycle of the measurement, the measurement determines a new absolute RF Burst level based on the peak value from the first measurement and the Relative RF Burst Trigger Level (always 0 or negative dB) set by the user. The following formula is used:
 3. absolute RF Burst level = peak level of the previous acquisition + relative RF Burst level
 4. If the new absolute RF Burst level differs from the previous by more than 0.5 dB, the new level is sent to the hardware; otherwise it is not updated (to avoid slowing down the acquisition)
- Steps 2 and 3 repeat for subsequent measurements.

| | |
|-------------------------------------|---|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:RELative <rel_ampl> :TRIGger[:SEquence]:RFBurst:LEVel:RELative? |
| Example | TRIG:RFB:LEV:REL -10 dB sets the trigger level of the RF burst envelope signal to the relative level of -10 dB |
| Notes | Sending this command does not switch the setting from absolute to relative; to switch it you need to send the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command, above. The relative trigger level is not available in some measurements. In those measurements the RELative parameter, and the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command (above), will generate an error if sent. |
| Dependencies | This key is grayed out and Absolute Trigger Level selected if the required hardware is not present in your analyzer and the current measurement does not support Relative triggering. |
| Preset | -6 dB GSM: -25 dB |
| State Saved | Saved in instrument state |
| Min | -45 dB |
| Max | 0 dB |
| Default Unit | dB or dBc |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:RFBurst:LEVel This legacy command is aliased to :TRIGger[:SEquence]:RFBurst:LEVel:RELative because the PSA had ONLY relative burst triggering |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-----------------------|---|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:SLOPe POSitive NEGative :TRIGger[:SEquence]:RFBurst:SLOPe? |

| | |
|-------------------------------------|--|
| Example | TRIG:RFB:SLOP NEG |
| Couplings | This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:FRAMe:RFBurst:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Periodic Timer (Frame Trigger)

Pressing this key, when it is not selected, selects the internal periodic timer signal as the trigger. Triggering occurrences are set by the **Period** parameter, which is modified by the **Sync Source** and **Offset**. Pressing this key, when it is already selected, accesses the periodic timer trigger setup functions.

If you do not have a sync source selected (it is Off), then the internal timer will not be synchronized with any external timing events.

| Key Path | Trigger |
|------------------------------|--|
| Example | TRIG:SOUR FRAM Swept SA measurement TRIG:<meas>:SOUR FRAM Measurements other than Swept SA |
| State Saved | Saved in instrument state |
| Readback | [Sync: <value of Sync Source>], for example, [Sync: External 1] |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Periodic Timer Triggering:

This feature selects the internal periodic timer signal as the trigger. Trigger occurrences are set by the **Periodic Timer** parameter, which is modified by the **Sync Source** and **Offset**.

The figure below shows the action of the periodic timer trigger. Before reviewing the figure, we'll explain some uses for the periodic trigger.

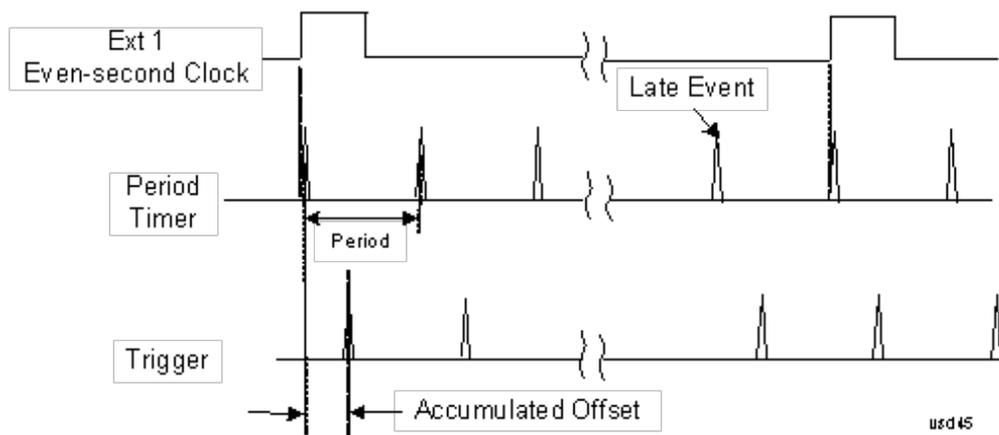
A common application is measuring periodic burst RF signals for which a trigger signal is not easily available. For example, we might be measuring a TDMA radio which bursts every 20 ms. Let's assume that the 20 ms period is very consistent. Let's also assume that we do not have an external trigger source

available that is synchronized with the period, and that the signal-to-noise ratio of the signal is not high enough to provide a clean RF burst trigger at all of the analysis frequencies. For example, we might want to measure spurious transmissions at an offset from the carrier that is larger than the bandwidth of the RF burst trigger. In this application, we can set the Periodic Timer to a 20.00 ms period and adjust the offset from that timer to position our trigger just where we want it. If we find that the 20.00 ms is not exactly right, we can adjust the period slightly to minimize the drift between the period timer and the signal to be measured.

A second way to use this feature would be to use **Sync Source** temporarily, instead of **Offset**. In this case, we might tune to the signal in a narrow span and use the RF Burst trigger to synchronize the periodic timer. Then we would turn the sync source off so that it would not miss-trigger. Miss-triggering can occur when we are tuned so far away from the RF burst trigger that it is no longer reliable.

A third example would be to synchronize to a signal that has a reference time element of much longer period than the period of interest. In some CDMA applications, it is useful to look at signals with a short periodicity, by synchronizing that periodicity to the "even-second clock" edge that happens every two seconds. Thus, we could connect the even-second clock trigger to Ext1 and use then Ext1 as the sync source for the periodic timer.

The figure below illustrates this third example. The top trace represents the even-second clock. It causes the periodic timer to synchronize with the leading edge shown. The analyzer trigger occurs at a time delayed by the accumulated offset from the period trigger event. The periodic timer continues to run, and triggers continue to occur, with a periodicity determined by the analyzer time base. The timer output (labeled "late event") will drift away from its ideal time due to imperfect matching between the time base of the signal being measured and the time base of the analyzer, and also because of imperfect setting of the period parameter. But the synchronization is restored on the next even-second clock event. ("Accumulated offset" is described in the in the **Offset** function section.)



Period

Sets the period of the internal periodic timer clock. For digital communications signals, this is usually set to the frame period of your current input signal. In the case that sync source is not set to OFF, and the external sync source rate is changed for some reason, the periodic timer is synchronized at the every external synchronization pulse by resetting the internal state of the timer circuit.

| | |
|-----------------------|---|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAME:PERiod <time> |

| | |
|----------------------|---|
| | :TRIGger[:SEquence]:FRAMe:PERiod? |
| Example | TRIG:FRAM:PER 100 ms |
| Dependencies | The invalid data indicator turns on when the period is changed, until the next sweep/measurement completes. |
| Couplings | The same period is used in the Gate Source selection of the period timer. |
| Preset | 20 ms GSM: 4.615383 |
| State Saved | Saved in instrument state |
| Min | 100.000 ns |
| Max | 559.0000 ms |
| Default Unit | S |
| Initial S/W Revision | Prior to A.02.00 |

Offset

Adjusts the accumulated offset between the periodic timer events and the trigger event. Adjusting the accumulated offset is different than setting an offset, and requires explanation.

The periodic timer is usually not synchronized with any external events, so the timing of its output events has no absolute meaning. Since the timing relative to external events (RF signals) is important, you need to be able to adjust (offset) it. However, you have no direct way to see when the periodic timer events occur. All that you can see is the trigger timing. When you want to adjust the trigger timing, you will be changing the internal offset between the periodic timer events and the trigger event. Because the absolute value of that internal offset is unknown, we will just call that the accumulated offset. Whenever the Offset parameter is changed, you are changing that accumulated offset. You can reset the displayed offset using Reset Offset Display. Changing the display does not change the value of the accumulated offset, and you can still make additional changes to accumulated offset.

To avoid ambiguity, we define that an increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.

| | |
|-----------------------|---|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:OFFSet <time> :TRIGger[:SEquence]:FRAMe:OFFSet? |
| Example | TRIG:FRAM:OFFS 1.2 ms |
| Notes | The front panel interface (for example, the knob), and this command, adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware each time the offset is updated is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value. Note that the accumulated offset value is essentially arbitrary; it represents the accumulated offset from the last time the offset was zeroed (with the Reset Offset Display key). Note that this command does not change the period of the trigger waveform. Note also that Offset is used only when the sync source is set to OFF, otherwise delay is used, see section Trig Delay . An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to |

| | |
|----------------------|--|
| | delay the timing of the trigger event. |
| Notes | When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated with the new value. However, the actual amount sent to the hardware is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value. The SCPI query simply returns the value currently showing on the key. |
| Dependencies | The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes. |
| Couplings | The same offset is used in the Gate Source selection of the period timer. |
| Preset | 0 s |
| State Saved | Saved in instrument state |
| Min | -10.000 s |
| Max | 10.000 s |
| Default Unit | S |
| Initial S/W Revision | Prior to A.02.00 |

Offset Adjust (Remote Command Only)

This remote command does not work at all like the related front panel keys. This command lets you advance the phase of the frame trigger by the amount you specify.

It does not change the period of the trigger waveform. If the command is sent multiple times, it advances the phase of the frame trigger an additional amount each time it is sent. Negative numbers are permitted.

| | |
|-----------------------|--|
| Remote Command | :TRIGger[:SEquence]:FRAMe:ADJust <time> |
| Example | TRIG:FRAM:ADJ 1.2 ms |
| Notes | Note also that Offset is used only when the sync source is set to OFF, otherwise delay is used, see section Trig Delay An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event. |
| Notes | The front panel interface (for example, the knob) and the :TRIG:FRAM:OFFS command adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware is the delta value, that is, the current offset value minus the previous offset value. When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated by increasing it (or decreasing it if the value sent is negative) by the amount specified in the SCPI command. This is a "command only" SCPI command, with no query. |
| Dependencies | The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes. |
| Couplings | The same offset is used in the Gate Source selection of the period timer. |
| Preset | 0 s |
| State Saved | Saved in instrument state |

| | |
|----------------------|------------------|
| Min | -10.000 s |
| Max | 10.000 s |
| Default Unit | S |
| Initial S/W Revision | Prior to A.02.00 |

Reset Offset Display

Resets the value of the periodic trigger offset display setting to 0.0 seconds. The current displayed trigger location may include an offset value defined with the Offset key. Pressing this key redefines the currently displayed trigger location as the new trigger point that is 0.0 s offset. The Offset key can then be used to add offset relative to this new timing.

| | |
|-----------------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:OFFSet:DISPlay:RESet |
| Example | TRIG:FRAM:OFFS:DISP:RES |
| Initial S/W Revision | Prior to A.02.00 |

Sync Source

Selects a signal source for you to synchronize your periodic timer trigger to, otherwise you are triggering at some arbitrary location in the frame. Synchronization reduces the precision requirements on the setting of the period.

For convenience you may adjust the level and slope of the selected sync source in a conditional branch setup menu accessed from the Sync Source menu. Note that these settings match those in the **Trigger** and **Gate Source** menus; that is, each trigger source has only one value of level and slope, regardless of which menu it is accessed from.

| | |
|-----------------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:SYNC EXTernal1 EXTernal2 RFBurst OFF :TRIGger[:SEquence]:FRAMe:SYNC? |
| Example | TRIG:FRAM:SYNC EXT2 |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message. |
| Preset | Off GSM/EDGE, MSR,LTE,LTETDD: RFBurst |
| State Saved | Saved in instrument state |
| Readback | The current setting is read back to this key and it is also Readback to the previous Periodic Timer trigger key. |
| Backwards | :TRIGger[:SEquence]:FRAMe:SYNC EXTernal |

| | |
|---------------------------|---|
| Compatibility SCPI | For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.14.00 |

Off

Turns off the sync source for your periodic trigger. With the sync source off, the timing will drift unless the signal source frequency is locked to the analyzer frequency reference.

| | |
|----------------------|--------------------------------------|
| Key Path | Trigger, Periodic Timer, Sync Source |
| Example | TRIG:FRAM:SYNC OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA |
| Dependencies | Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 1. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

| | |
|-----------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:LEVel <level> |

| | |
|-------------------------------------|---|
| | :TRIGger[:SEquence]:EXTernal1:LEVel? |
| Example | TRIG:EXT1:LEV 0.4 V |
| Couplings | This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:LEVel For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal1:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|--------------------------------------|--|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal1:SLOPe? |
| Example | TRIG:EXT1:SLOP NEG |
| Couplings | This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:SLOPe For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal1:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT2 Swept SA measurement TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTERNAL2 parameter will generate a "Hardware missing; Not available for this model number" message. Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 2. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:LEVel :TRIGger[:SEquence]:EXTernal2:LEVel? |
| Example | TRIG:EXT2:LEV 1.1 V |
| Couplings | This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal2:SLOPe? |
| Example | TRIG:EXT2:SLOP NEG |
| Couplings | This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

RF Burst

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector. Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

In some models, a variety of burst trigger circuitry is available, resulting in various available burst trigger bandwidths. The analyzer automatically chooses the appropriate trigger path based on the hardware configuration and other settings of the analyzer.

| | |
|-------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR RFB Swept SA measurement TRIG:<meas>:SOUR RFB Measurements other than Swept SA |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Backwards Compatibility Notes | The legacy command: :TRIGger[:SEquence]:RFBurst:FSElectivity[:STATe] OFF ON 0 1 is not supported in the X-Series, as the hardware to do Frequency Selective burst triggers does not exist in X-Series. |

| | |
|--------------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Absolute Trigger Level

Sets the absolute trigger level for the RF burst envelope.

When using the External Mixing path, the Absolute Trigger Level is uncalibrated because the factory default was set to accommodate the expected IF levels for the RF path.

| | |
|-------------------------------------|---|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute <ampl> :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute? |
| Example | TRIG:RFB:LEV:ABS 10 dBm sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm |
| Notes | Sending this command does not switch the setting from relative to absolute; to switch it you need to send the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command, below. Amplitude Corrections are not taken into account by the Absolute Trigger Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Absolute Trigger will not fire until you have set the trigger level that far below the displayed signal level, rather than simply to the displayed signal level. This is only true for Amplitude Corrections, not External Gain or Ref Level Offset functions. If mode is Bluetooth, the default value is -50 dBm. |
| Couplings | This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu |
| Preset | -20 dBm |
| State Saved | Saved in instrument state |
| Min | -200 dBm |
| Max | 100 dBm |
| Default Unit | depends on the current selected Y-Axis unit |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:RFBurst:LEVel:ABSolute |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

| | |
|-----------------------|---|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:TYPE ABSolute RELative :TRIGger[:SEquence]:RFBurst:LEVel:TYPE? |

| | |
|--------------------------|---|
| Example | TRIG:RFB:LEV:TYPE REL sets the trigger level type of the RF burst trigger to Relative. |
| Preset | ABSolute |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:SLOPe POSitive NEGative :TRIGger[:SEquence]:RFBurst:SLOPe? |
| Example | TRIG:RFB:SLOP NEG |
| Couplings | This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:RFBurst:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Sync Holdoff

Sync Holdoff specifies the duration that the sync source signal must be kept false before the transition to true to be recognized as the sync timing. The periodic timer phase is aligned when the sync source signal becomes true, after the Holdoff time is satisfied.

A holdoff of 2 ms will work with most WiMAX signals, but there may be cases where the burst off duration is less than 1 ms and this value will need to be changed.

| | |
|-----------------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff <time> :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff? :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff:STATE OFF ON 0 1 :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff:STATE? |
| Preset | On, 1.000 ms |

| | |
|----------------------|---------------------------|
| State Saved | Saved in instrument state |
| Min | 0 ms |
| Max | +500 ms |
| Default Unit | s |
| Initial S/W Revision | Prior to A.02.00 |

Control Edge/Level

Sets the method of controlling the gating function from the gating signal.

Edge

In Edge triggering, the gate opens (after the Delay) on the selected edge (for example, positive) of the gate signal and closes on the alternate edge (for example, negative).

Level

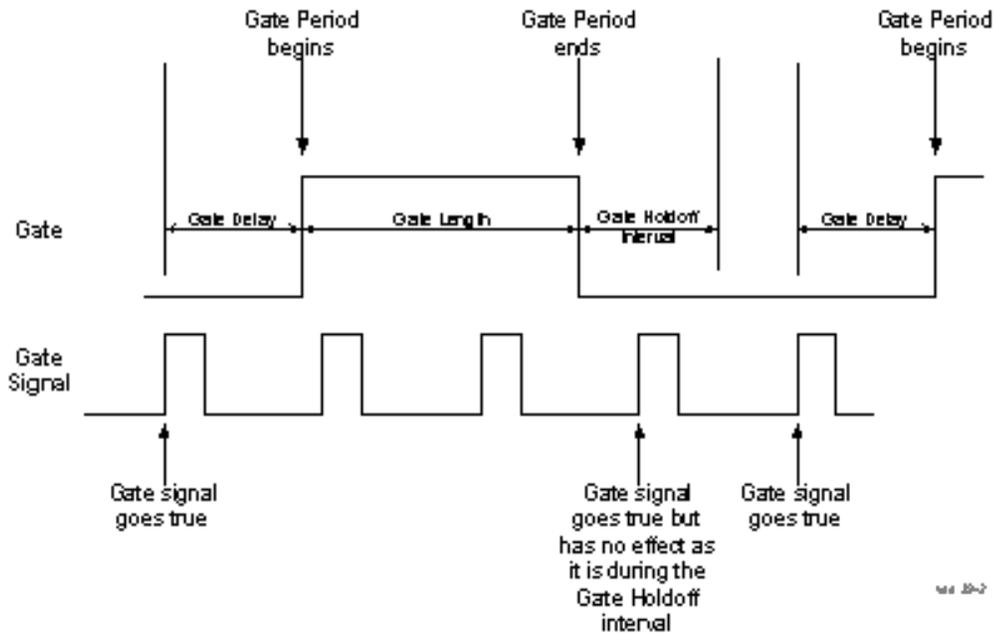
In Level triggering, the gate opens (after the Delay) when the gate signal has achieved a certain level and stays open as long as that level is maintained.

| | |
|------------------------------|---|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe:CONTRol EDGE LEVeL [:SENSe] :SWEep:EGATe:CONTRol? |
| Example | SWE:EGAT:CONT EDGE |
| Dependencies | If the Gate Method is FFT the Control key is grayed out and Edge is selected. If the Gate Source is TV, Frame or Line, the Control key is grayed out and Edge is selected. |
| Preset | EDGE |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | [:SENSe] :SWEep:TIME:GATE:TYPE ESA Compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Holdoff

Lets you increase or decrease the wait time after a gate event ends before the analyzer will respond to the next gate signal.

After any Gate event finishes, the analyzer must wait for the sweep system to settle before it can respond to another Gate signal. The analyzer calculates a "wait time," taking into account a number of factors, including RBW and Phase Noise Optimization settings. The goal is to achieve the same accuracy when gated as in ungated operation. The figure below illustrates this concept:



When Gate Holdoff is in Auto, the wait time calculated by the analyzer is used. When Gate Time is in Manual, the user may adjust the wait time, usually decreasing it in order to achieve greater speed, but at the risk of decreasing accuracy.

When the Method key is set to Video or FFT, the Gate Holdoff function has no effect.

In measurements that do not support Auto, the value shown when Auto is selected is “---” and the manually set holdoff is returned to a query.

| Key Path | Sweep/Control, Gate |
|-----------------------|--|
| Remote Command | <pre>[:SENSe] :SWEep:EGATe:HOLDoff <time> [:SENSe] :SWEep:EGATe:HOLDoff? [:SENSe] :SWEep:EGATe:HOLDoff:AUTO OFF ON 0 1 [:SENSe] :SWEep:EGATe:HOLDoff:AUTO?</pre> |
| Example | <pre>SWE:EGAT:HOLD 0.0002 SWE:EGAT:HOLD? SWE:EGAT:HOLD:AUTO ON SWE:EGAT:HOLD:AUTO?</pre> |
| Couplings | <p>When Gate Holdoff is Auto, the Gate Holdoff key shows the value calculated by the analyzer for the wait time.</p> <p>Pressing the Gate Holdoff key while it is in Auto and not selected, causes the key to become selected and allows the user to adjust the value. If the value is adjusted, the setting changes to Man.</p> <p>Pressing the Gate Holdoff key, while it is in Auto and selected, does not change the value of Gate Holdoff, but causes the setting to change to Man. Now the user can adjust the value.</p> <p>Pressing the key while it is in Man and selected, cause the value to change back to Auto.</p> <p>Pressing the key while it is in Man and not selected, causes the key to become selected and allows the user to adjust the value.</p> |

| | |
|----------------------|--|
| | When Method is set to Video or FFT, the Gate Holdoff function has no effect. |
| Preset | Auto Auto/On |
| State Saved | Saved in instrument state |
| Min | 1 µsec |
| Max | 1 sec |
| Initial S/W Revision | Prior to A.02.00 |

Gate Delay Compensation

This function allows you to select an RBW-dependent value by which to adjust the gate delay, to compensate for changes in the delay caused by RBW effects.

You can select between uncompensated operation and two types of compensation, Delay Until RBW Settled and Compensate for RBW Group Delay.

See "[More Information](#)" on page 1537

| | |
|--------------------------|---|
| Key Path | Sweep/Control, Gate |
| Scope | Meas Global |
| Remote Command | [:SENSe] :SWEep:EGATe:DELay:COMPensation:TYPE OFF SETTled GDElay [:SENSe] :SWEep:EGATe:DELay:COMPensation:TYPE? |
| Example | SWE:EGAT:DEL:COMP:TYPE SETT SWE:EGAT:DEL:COMP:TYPE? |
| Notes | Although this function is Meas Global, there are some measurements that do not support this function. In those measurements the operation will be Uncompensated. Going into one of those measurements will not change the Meas Global selection; it will simply display the grayed-out menu key with "Uncompensated" showing as the selection. This is a non-forceful grayout, so the SCPI command is still accepted. If Gate Delay Compensation is not supported at all within a particular mode, the key is not displayed, and if the SCPI command is sent while in a measurement within that mode, an "Undefined Header" message is generated. Measurements that do not support this function include: Swept SA |
| Preset | TD-SCDMA mode: Compensate for RBW Group Delay All other modes: Delay Until RBW Settled |
| State Saved | Saved in instrument state |
| Range | Uncompensated Delay Until RBW Settled Compensate for RBW Group Delay |
| Readback text | Uncompensated Settled Group Delay |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.0 |

More Information

Selecting Uncompensated means that the actual gate delay is as you sets it.

Selecting Delay Until RBW Settled causes the gate delay to be increased above the user setting by an amount equal to $3.06/\text{RBW}$. This compensated delay causes the GATE START and GATE STOP lines on the display to move by the compensation amount, and the actual hardware gate delay to be increased by the same amount. All the other gate lines (for example, MIN FAST) are unaffected. If the RBW subsequently changes, the compensation is readjusted for the new RBW. The value shown on the Gate Delay key does NOT change.

Delay Until RBW Settled allows excellent measurements of gated signals, by allowing the IF to settle following any transient that affects the burst. Excellent measurements also require that the analysis region not extend into the region affected by the falling edge of the burst. Thus, excellent measurements can only be made over a width that declines with narrowing RBWs, which is achieved by decreasing the gate length below the user setting by an amount equal to $2.53/\text{RBW}$. Therefore, for general purpose compensation, you will still want to change the gate length with changes in RBW even if the gate delay is compensated. The compensated Gate Length is limited by the analyzer so that it will never go below 10% of the value shown on the Gate Length key, as otherwise the sweep times could get very long. Anytime the Gate Length and RBW values combine in such a way that this limiting takes place, a warning is displayed. For measurements which contain multiple sweeps with different RBW like SEM and SPUR, the smallest RBW is used for this limiting.

Selecting Compensate for RBW Group Delay causes the gate delay to be increased above the user setting by an amount equal to $1.81/\text{RBW}$. This compensated delay causes the GATE START, GATE STOP lines on the display to move by the compensation amount, and the actual hardware gate delay to be increased by the same amount. All the other gate lines (for example, MIN FAST) are unaffected. If the RBW subsequently changes, the compensation is readjusted for the new RBW. The value shown on the Gate Delay key does NOT change. Compensate for RBW Group Delay also includes gate length compensation; the gate length itself is adjusted as necessary to attempt to compensate for delay effects imposed by the RBW.

Compensate for RBW Group Delay is similar to Delay Until RBW Settled, but compensates for the group delay of the RBW filter, rather than the filter settling time. As the RBW gets narrow, this can allow the settling tail of the RBW to affect the beginning part of the gated measurement, and allow the beginning of the RBW settling transient to affect the end of the gated measurement. These two effects are symmetric because the RBW response is symmetric. Because the gate length is not automatically compensated, some users might find this compensation to be more intuitive than compensation for RBW settling.

Min Fast Position Query (Remote Command Only)

This command queries the position of the MIN FAST line, relative to the delay reference (REF) line. See section "[Gate View On/Off](#)" on page 2338. If this query is sent while not in gate view, the MinFast calculation is performed based on the current values of the appropriate parameters and the result is returned. Knowing this value lets you set an optimal gate delay value for the current measurement setup.

| | |
|-----------------------------|----------------------------------|
| Remote Command | [:SENSe] :SWEep:EGATe:MINFast? |
| Example | SWE:EGAT:MIN? |
| Initial S/W Revision | Prior to A.02.00 |

Gate Preset (Remote Command Only)

Presets the time-gated spectrum analysis capability.

This command sets gate parameter values to the ESA preset values, as follows:

Gate trigger type = edge

Gate polarity = positive

Gate delay = 1 us

Gate length = 1 us

| | |
|-----------------------|--|
| Remote Command | <code>[:SENSe]:SWEep:TIME:GATE:PRESet</code> ESA Compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Level (Remote Command Only)

Sets the gate input transition point level for the external TRIGGER inputs on the front and rear panel. This is a legacy command for PSA compatibility. It is simply an alias to the equivalent trigger level command.

| | |
|-----------------------|---|
| Remote Command | <code>[:SENSe]:SWEep:EGATE:EXTernal[1] 2:LEVel <voltage></code> <code>[:SENSe]:SWEep:EGATE:EXTernal[1] 2:LEVel?</code> |
| Notes | This command is simply an alias to <code>:TRIGger[:SEQuence]:EXTernal[1] 2:LEVel</code> For details refer |
| Initial S/W Revision | Prior to A.02.00 |

Gate Polarity (Remote Command Only)

Sets the polarity for the gate signal. This setup is now done using the gate trigger's slope setting.

When Positive (Pos) is selected, a positive-going edge (Edge) or a high voltage (Level) will satisfy the gate condition, after the delay set with the Gate Delay key. When Negative (Neg) is selected, a negative-going edge (Edge) or a low voltage (Level) will satisfy the gate condition after the delay.

| | |
|-------------------------------------|---|
| Remote Command | <code>[:SENSe]:SWEep:EGATE:POLarity</code> NEGative POSitive <code>[:SENSe]:SWEep:EGATE:POLarity?</code> |
| Example | <code>SWE:EGAT:POL</code> NEG <code>SWE:EGAT:POL?</code> |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | <code>[:SENSe]:SWEep:TIME:GATE:POLarity</code> ESA compatibility |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|---|
| Remote Command | <code>[:SENSe] :SWEep:TIME:GATE:LEVel HIGH LOW</code> <code>[:SENSe] :SWEep:TIME:GATE:LEVel?</code> ESA compatibility |
| Preset | HIGH |
| Initial S/W Revision | Prior to A.02.00 |

Points

Sets the number of points per sweep. The resolution of setting the sweep time depends on the number of points selected. The current value of points is displayed parenthetically, next to the sweep time in the lower-right corner of the display.

| | |
|---------------------------------|---|
| Key Path | Sweep/Control |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | <code>[:SENSe] :OBWidth:SWEep:POINts <integer></code> <code>[:SENSe] :OBWidth:SWEep:POINts?</code> |
| Example | OBW:SWE:POIN 1500 OBW:SWE:POIN? |
| Notes | This function is not available when signal identification is set to On (external mixing). Affected by: log sweep Grayed out in measurements that don't support swept Blanked in modes that do not support swept. Whenever the number of sweep points change: - All trace data is erased - Any traces with Update Off also go to Display Off (like going from View to Blank in the older analyzers) - Sweep time is re-quantized - Any limit lines that are on are updated - If averaging/hold is on, averaging/hold starts over |
| Couplings | Whenever the number of sweep points change, the sweep time is re-quantized. |
| Preset | LTE, LTETDD, MSR, LTEAFDD, LTEATDD: 2001 Other: 1001 |
| State Saved | Saved in instrument state. |
| Min | 101 |
| Max | 20001 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

System

See "System" on page 349

Trace/Detector

Accesses a menu of functions that enable you to control the detectors for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Trace Type

Allows you to select the type of trace you want to use for the current measurement.

The first page of this menu contains a 1-of-N selection of the trace type (Clear Write, Average, Max Hold, Min Hold) for the selected trace.

| | |
|--------------------------|---|
| Key Path | Trace/Detector |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTETDD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |
| Remote Command | :TRACe:OBWidth:TYPE WRITe AVERAge MAXHold MINHold :TRACe:OBWidth:TYPE? |
| Example | TRAC:OBW:TYPE MINH TRAC:OBW:TYPE? |
| Notes | WRITe = Clear Write AVERAge = Average MAXHold = Maximum Hold MINHold = Minimum Hold |
| Couplings | When Detector setting is "Auto" (:SENSe]:OBWidth:DETEctor:AUTO?), Detector (:SENSe]:OBWidth:DETEctor[:FUNctIon]?) switches aligning with the switch of this parameter: "NORMal" with WRITe (Clear Write), "AVERAge" with AVERAge, "POSitive (peak)" with MAXHold, and "NEGative (peak)" with MINHold. |
| Preset | AVERAge BLUETOOTH: MAX HOLD. |
| State Saved | Saved in instrument state. |
| Range | WRITe AVERAge MAXHold MINHold |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Detector

Accesses a menu of functions that enables you to control the detectors for the current measurement. The following choices are available:

- **Auto**– the detector selected depends on marker functions, trace functions, average type, and the trace averaging function.

- **Normal**–the detector determines the peak of the CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection.
- **Average**–the detector determines the average of the signal within the sweep points. The averaging method depends upon the Average Type selection (voltage, power or log scales).
- **Peak (Positive)**–the detector determines the maximum of the signal within the sweep points.
- **Sample**–the detector indicates the instantaneous level of the signal at the center of the sweep points represented by each display point.
- **Negative Peak**–the detector determines the minimum of the signal within the sweep points.

| | |
|----------------------|------------------|
| Key Path | Detector |
| Initial S/W Revision | Prior to A.02.00 |

Auto

When the detector choice is Auto, the analyzer selects the detector. The selected detector depends on marker functions, trace functions, and trace averaging functions for the current measurement.

| | |
|--------------------------|---|
| Key Path | Trace/Detector |
| Remote Command | [[:SENSe]:OBWidth:DETECTOR:AUTO ON OFF 1 0 [:SENSe]:OBWidth:DETECTOR:AUTO? |
| Example | OBW:DET:AUTO ON OBW:DET:AUTO? |
| Couplings | When Detector setting is “Auto” ([[:SENSe]:OBWidth:DETECTOR:AUTO?]), Detector ([[:SENSe]:OBWidth:DETECTOR[:FUNCTION]?]) switches aligning with the switch of this parameter: “NORMal” with Clear Write, “AVERage” with AVERage, “POSitive (peak)” with MAXHold, and “NEGative (peak)” with MINHold. |
| Preset | ON ISDB-T: OFF |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Detector Selection

Allows you to select a specific detector for the current measurement. When the detector choice is Auto, the analyzer selects the detector. The selected detector depends on marker functions, trace functions, and trace averaging functions for the current measurement.

| | |
|----------|--|
| Key Path | Trace/Detector |
| Mode | SA, WCDMA, C2K, WIMAX OFDMA, TD-SCDMA, 1xEVDO, ISDB-T, CMMB, LTE, LTE4DD, BLUETOOTH, WLAN, MSR, LTEAFDD, LTEATDD |

| | |
|---------------------------------|--|
| Remote Command | [[:SENSe]:OBWidth:DETEctor[:FUNction] NORMal AVERage POSitive SAMPlE NEGative [:SENSe]:OBWidth:DETEctor[:FUNction]? |
| Example | OBW:DET NORM OBW:DET? |
| Notes | <p>When you manually select a detector (instead of selecting Auto), that detector is used regardless of other analyzer settings.</p> <p>The detector choices are:</p> <p>The Normal detector determines the peak of CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection.</p> <p>The Average detector determines the average of the signal within the sweep points. The averaging method is Power Average (RMS).</p> <p>The Peak detector determines the maximum of the signal within the sweep points.</p> <p>The Sample detector indicates the instantaneous level of the signal at the center of the sweep points represented by each display point.</p> <p>The Negative Peak detector determines the minimum of the signal within the sweep points.</p> |
| Couplings | When Detector setting is "Auto" ([:SENSe]:OBWidth:DETEctor:AUTO?), Detector ([:SENSe]:OBWidth:DETEctor[:FUNction]?) switches aligning with the switch of this parameter: "NORMal" with Clear Write, "AVERage" with AVERage, "POSitive (peak)" with MAXHold, and "NEGative (peak)" with MINHold. |
| Preset | AVERage ISDB-T: Peak BLUETOOTH: Peak |
| State Saved | Saved in instrument state. |
| Range | Normal Average Peak Sample Negative Peak |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Trigger

See ["Trigger" on page 424](#)

Free Run

See ["Free Run " on page 431](#)

External 1

See ["External 1 " on page 2357](#)

Trigger Level

See ["Trigger Level " on page 2357](#)

Trig Slope

See ["Trig Slope " on page 2358](#)

Trig Delay

See ["Trig Delay " on page 437](#)

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off" on page 2346](#)

External 2

See ["External 2 " on page 2359](#)

Trigger Level

See ["Trigger Level " on page 2359](#)

Trig Slope

See ["Trig Slope " on page 2360](#)

Trig Delay

See ["Trig Delay " on page 440](#)

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off" on page 2348](#)

RF Burst

See ["RF Burst " on page 2360](#)

Absolute Trigger

See ["Absolute Trigger Level" on page 2361](#)

Relative Trigger

See ["Relative Trigger Level"](#) on page 2350

Trig Slope

See ["Trigger Slope "](#) on page 2362

Trig Delay

See ["Trig Delay "](#) on page 444

Periodic Timer

See ["Periodic Timer \(Frame Trigger\) "](#) on page 2352

Period

See ["Period "](#) on page 2353

Offset

See ["Offset "](#) on page 2354

Reset Offset Display

See ["Reset Offset Display "](#) on page 2356

Sync Source

See ["Sync Source "](#) on page 2356

Off

See ["Off "](#) on page 2357

External 1

See ["External 1 "](#) on page 2357

Trigger Level

See ["Trigger Level "](#) on page 2357

Trig Slope

See ["Trig Slope "](#) on page 2358

External 2

See ["External 2 "](#) on page 2359

Trigger Level

See ["Trigger Level "](#) on page 2359

Trig Slope

See ["Trig Slope "](#) on page 2360

RF Burst

See "RF Burst " on page 2360

Absolute Trigger

See "Absolute Trigger Level" on page 2361

Trig Slope

See "Trigger Slope " on page 2362

Trig Delay

See ___ on page X

Auto/Holdoff

See "Auto/Holdoff " on page 445

Auto Trig

See "Auto Trig " on page 445

Trig Holdoff

See "Trig Holdoff " on page 446

Holdoff Type

See "Holdoff Type" on page 446

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

| Key Path | Front-panel key |
|-------------------------------|--|
| Backwards Compatibility Notes | <p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p> |
| Initial S/W Revision | Prior to A.02.00 |

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|-----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER |
| Notes | :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed |
| Couplings | A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|-----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:ALL |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL |
| Notes | Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. |
| Couplings | A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

| | |
|----------------------|---|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:SAVE |
| Example | :SYST:PRES:USER:SAVE |
| Notes | :SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file. |
| Initial S/W Revision | Prior to A.02.00 |

View/Display

Accesses a menu of functions that enable you to set the view and display parameters for the current measurement.

There is a single results view available for this measurement. For more details, and samples of screen content for each supported mode, see "[Spectrum View](#)" on page 1551 below.

The following result descriptions are available:

Occupied Bandwidth

The occupied bandwidth result is $f_2 - f_1$, where f_1 and f_2 are calculated.

Total Power

The total power is the power integrated in the specified span setting.

Transmit Freq Error

The transmit freq error (transmit frequency error) result is calculated as the difference between $(f_2+f_1)/2$ and the tuned center frequency of the signal, where f_1 and f_2 are calculated.

x dB Bandwidth

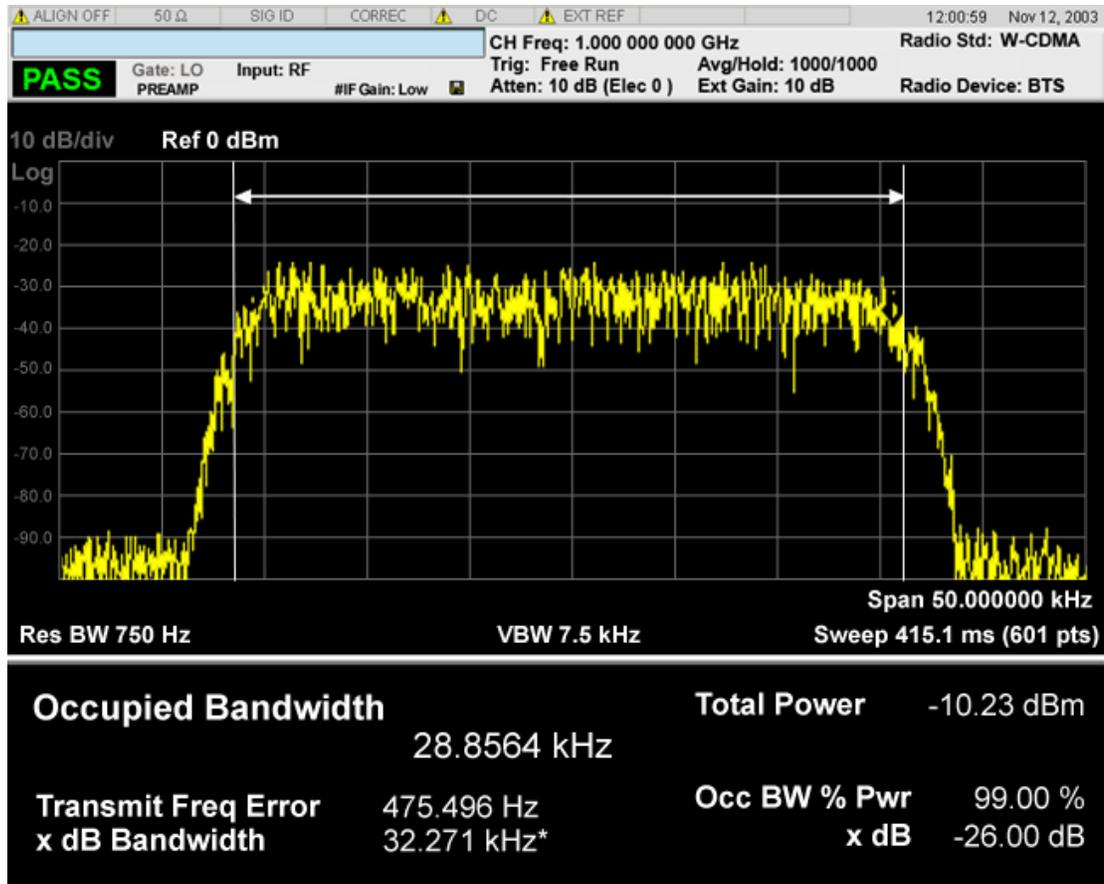
The x dB result is a bandwidth measured between two points on the signal which are a certain number of dBs down from the highest signal point within the OBW Span. For example, If the 'x dB' parameter is set to -26 dB, and the 'Occupied BW Span' is set to 10 MHz, then the maximum signal power level is first determined from the 10 MHz wide trace sweep. Next, the two furthest frequencies below (x_{db_f1}) and above (x_{db_f2}) the frequency of the maximum level occurrence are found where the signal level is 26 dB below the peak level. This calculation also uses linear interpolation to find the lower and upper carrier boundary point within the width of a sweep point (the span divided by the number of sweep points).

The x dB bandwidth is calculated to be $x_{db_f2} - x_{db_f1}$.

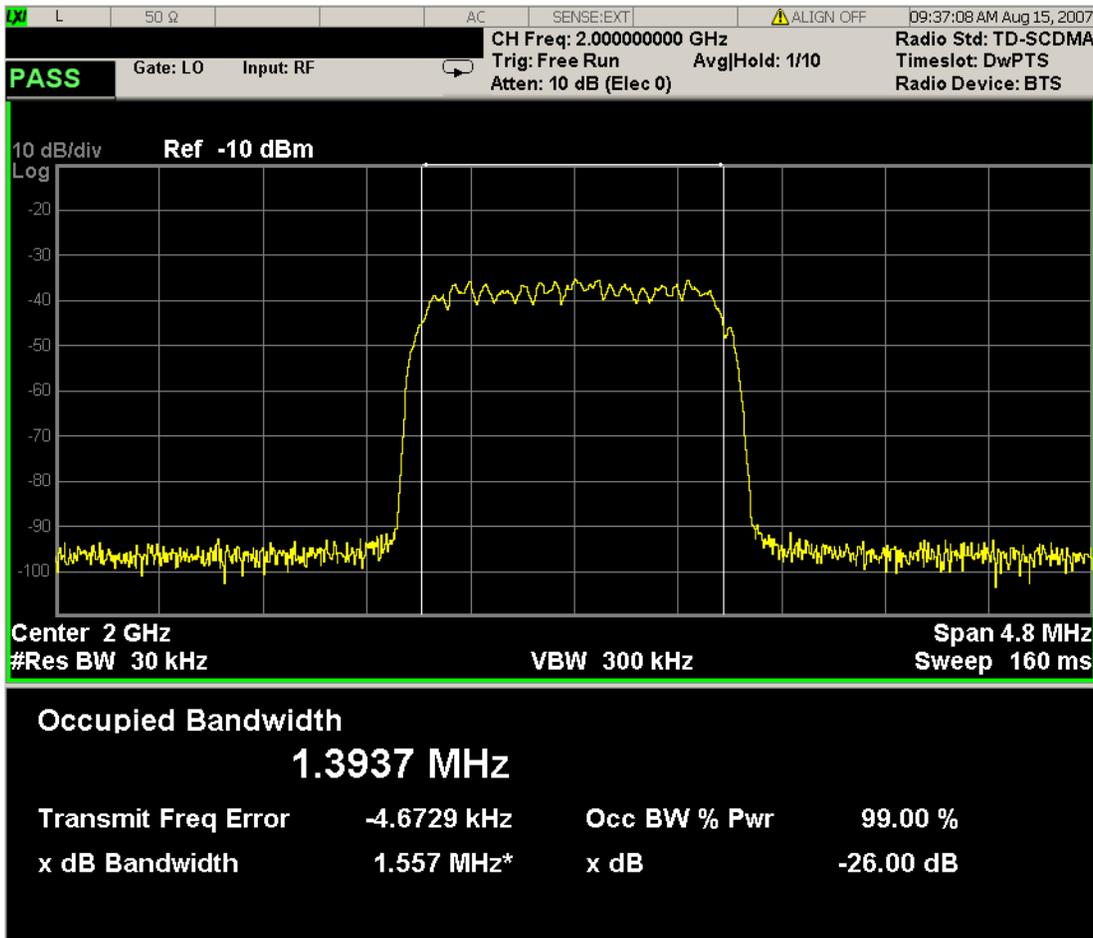
Spectrum View

For SA, WCDMA, C2K, 1xEVDO, WIMAX OFDMA, WLAN modes:

13 Occupied Bandwidth Measurement
View/Display

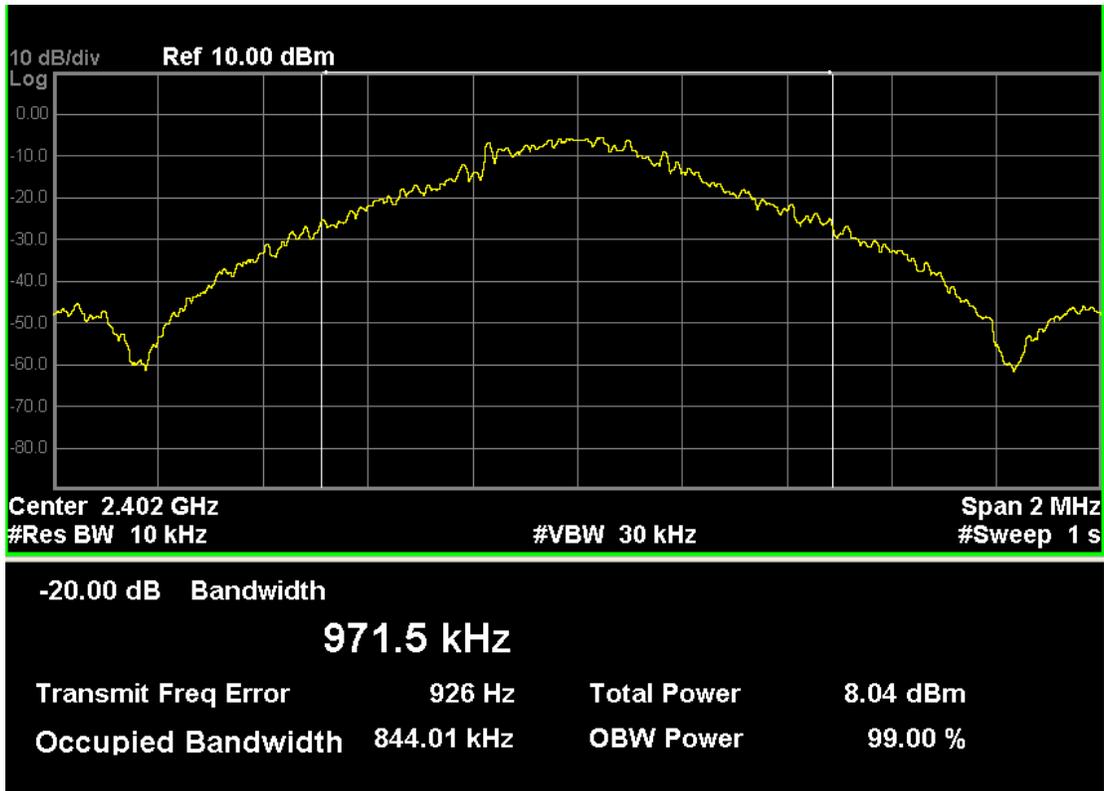


For TD-SCDMA mode only:

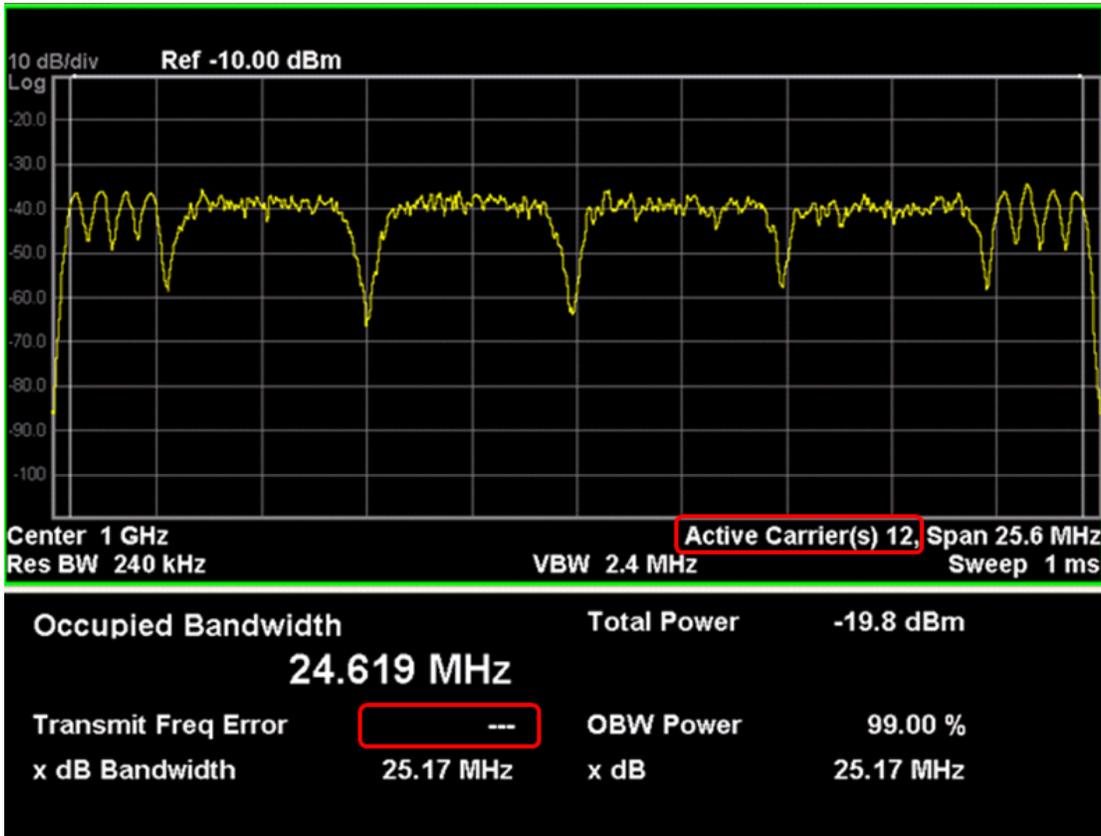


For Bluetooth mode only:

13 Occupied Bandwidth Measurement
View/Display



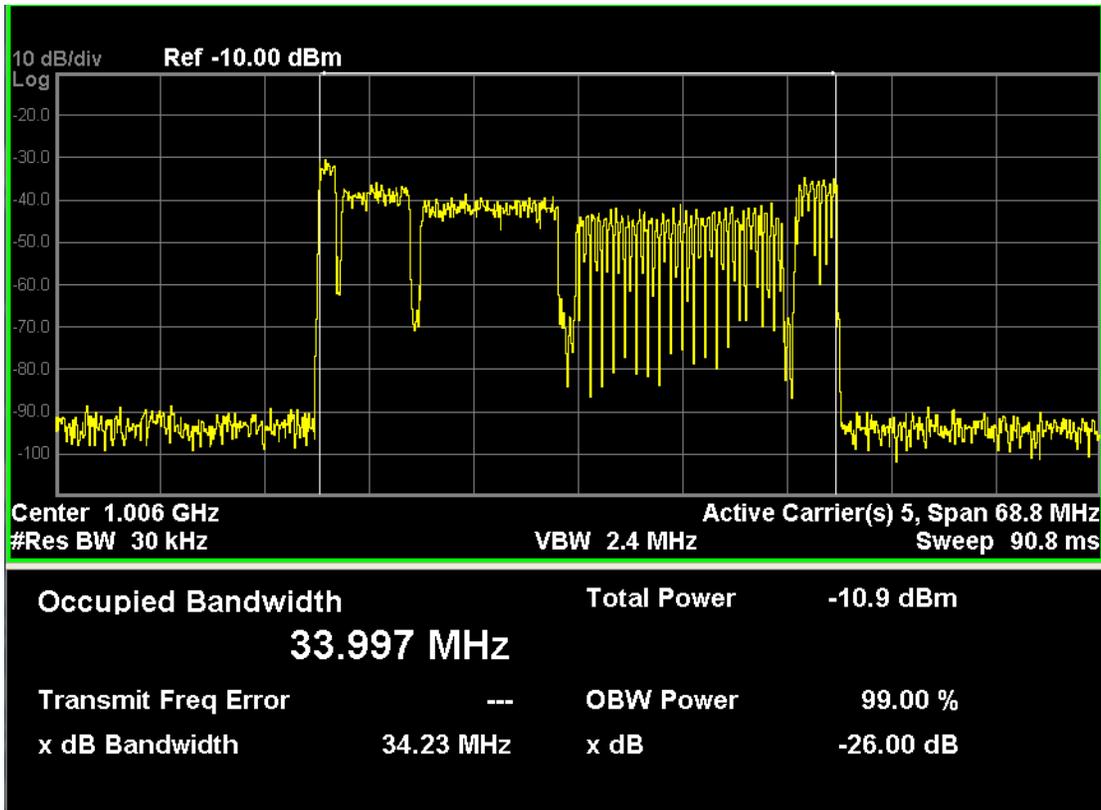
For MSR mode only:



The number of active carriers is displayed. Since span is determined from detected carriers in auto mode, it is necessary to show how many carriers are identified as active., as highlighted above.

When there is one active carrier, Transmit Freq Error is displayed. Otherwise, “---” is displayed, as shown above.

For LTE-Advanced FDD/TDD mode only:



The number of active carriers is displayed to show how many carriers are identified as active in auto detected mode of span, otherwise “-” is displayed to indicate that it is out of scope.

When there is one active carrier, Transmit Freq Error is displayed. Otherwise, “---” is displayed.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

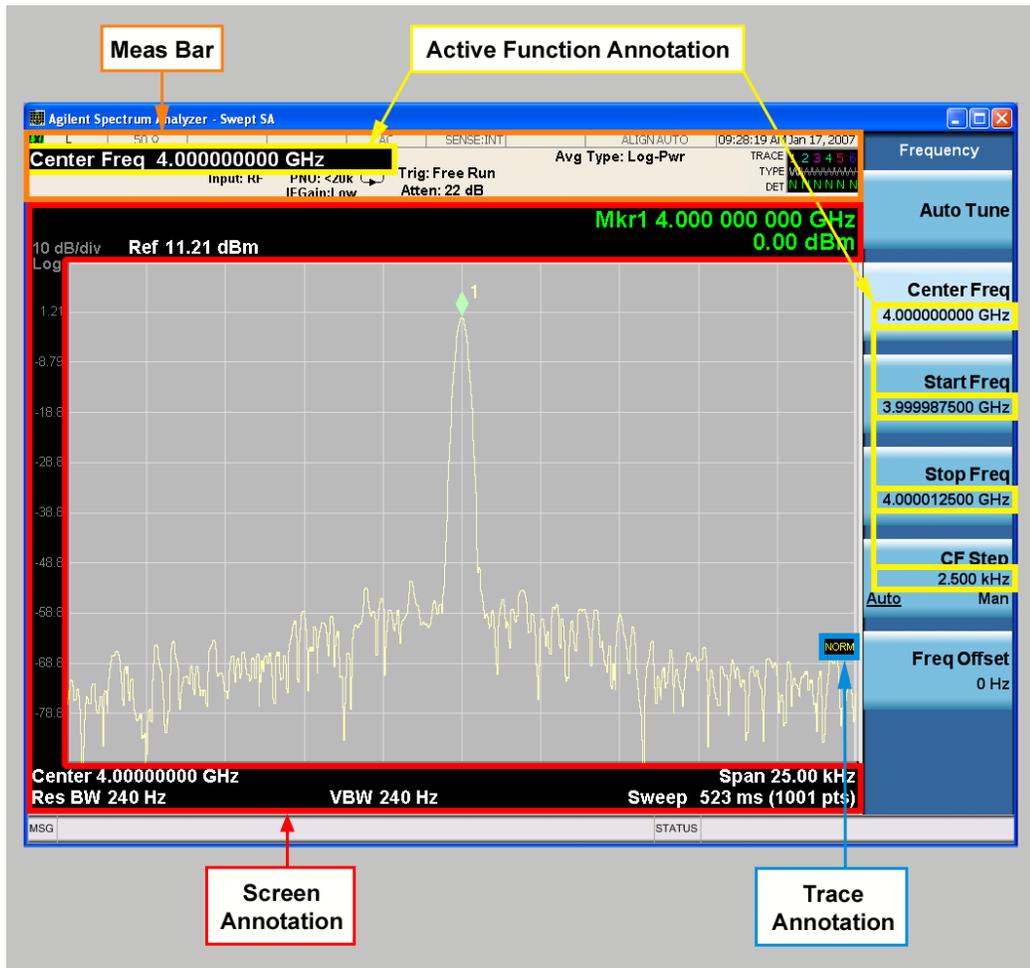
| | |
|----------------------|------------------|
| Key Path | Display |
| Key Path | View/Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

| | |
|----------------------|--|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNotation:MBAR[:STATe] OFF ON 0 1 :DISPlay:ANNotation:MBAR[:STATe]? |
| Example | DISP:ANN:MBAR OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off. |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Screen

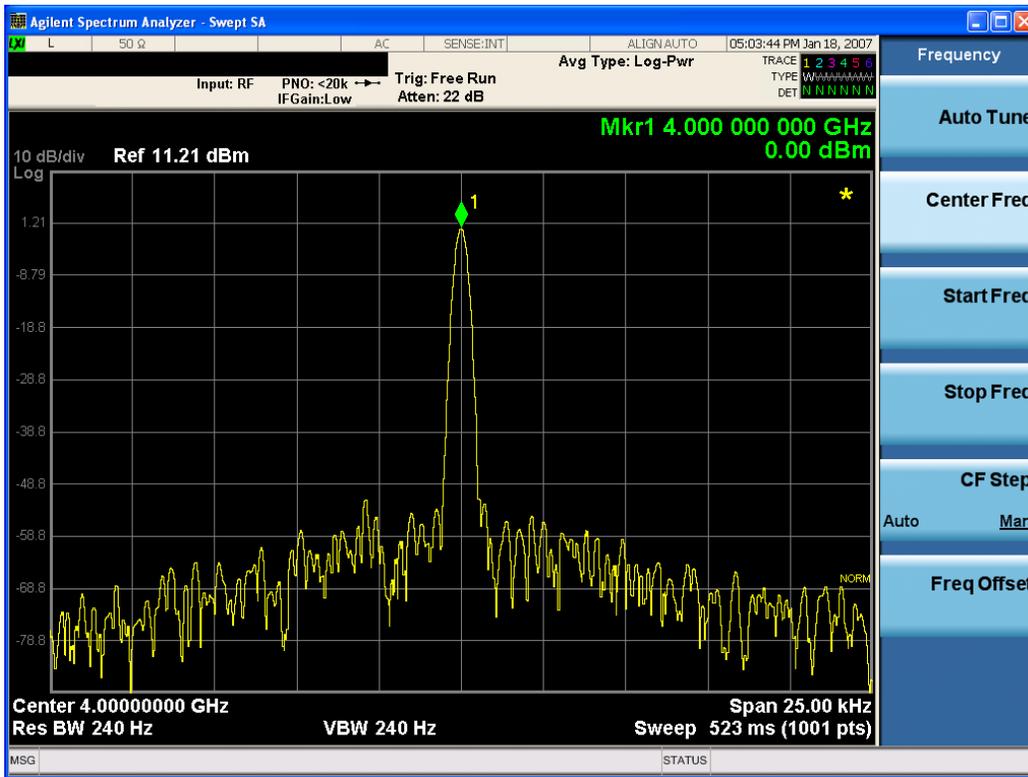
This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]? |
| Example | DISP:ANN:SCR OFF |
| Dependencies | Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..



| | |
|----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE]? |
| Example | DISP:ACT OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Title

Displays menu keys that enable you to change or clear a title on your display.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Mode | All |
| Remote Command | :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA? |
| Example | DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title |
| Notes | Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters. |
| Preset | No title (measurement name instead) |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Example | The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required. |
| Notes | Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted). |
| Preset | Performed on Preset. |
| Initial S/W Revision | Prior to A.02.00 |

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

| | |
|----------------------|--|
| Key Path | View/Display, Display |
| Remote Command | :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]? |
| Example | DISP:WIND:TRAC:GRAT:GRID OFF |
| Notes | The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis. |
| Preset | On |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

| | |
|-------------------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:WINDow[1]:ANNotation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNotation[:ALL]? |
| Example | :DISP:WIND:ANN OFF |
| Preset | On (Set by Restore Misc Defaults) |
| State Saved | Not saved in instrument state. |
| Backwards Compatibility Notes | The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

| | |
|-----------------------|--|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight ON OFF :DISPlay:BACKlight? |
| Preset | ON (Set by Restore Misc Defaults) |
| Initial S/W Revision | Prior to A.02.00 |

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

| | |
|-----------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity? |
| Example | DISP:BACK:INT 50 |

13 Occupied Bandwidth Measurement
View/Display

| | |
|----------------------|------------------------------------|
| Preset | 100 (Set by Restore Misc Defaults) |
| Min | 0 |
| Max | 100 |
| Initial S/W Revision | Prior to A.02.00 |

14 Power Stat CCDF Measurement

Many of the digitally modulated signals now look noise-like in the time and frequency domain. This means that statistical measurements of the signals can be a useful characterization. The Power Complementary Cumulative Distribution Function (CCDF) curves characterize the higher level power statistics of a digitally modulated signal. The curves can be useful in determining design parameters for digital communications systems.

For more details, see ["Power Stat CCDF Measurement Description" on page 1569](#).

For measurement results and views, see [View/Display](#).

This topic contains the following sections:

["Measurement Commands for Power Stat CCDF" on page 1566](#)

["Remote Command Results for Power Stat CCDF" on page 1567](#)

["Power Stat CCDF Measurement Description" on page 1569](#)

Measurement Commands for Power Stat CCDF

The following commands and queries can be used to retrieve the measurement results:

`:CONFigure:PSStatistic`

`:CONFigure:PSStatistic:NDEFault`

`:INITiate:PSStatistic`

`:FETCh:PSStatistic[n]?`

`:READ:PSStatistic[n]?`

`:MEASure:PSStatistic[n]?`

For more measurement related commands, see the SENSE subsystem, and the section "[Remote Measurement Functions](#)" on page 2284.

Remote Command Results for Power Stat CCDF

The following table describes the results returned by the FETCh, MEASure, and READ queries listed above, according to the index value n.

| n | Results Returned |
|-----------------------|---|
| 0 | Returns unprocessed I/Q trace data, as a series of trace point values, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values, |
| not specified or 1 | Returns 10 scalar results: <ol style="list-style-type: none"> 1. Average input power (in dBm) 2. Probability at the average input power level (in %) 3. Power level that has 10% of the power 4. Power level that has 1% of the power 5. Power level that has 0.1% of the power 6. Power level that has 0.01% of the power 7. Power level that has 0.001% of the power 8. Power level that has 0.0001% of the power 9. Peak power (in dB) 10.Count |
| 2 | Returns a series of 5001 floating point numbers (in percent) that represent the current measured power stat trace. This is the probability at particular power levels (average power), in the following order: <ol style="list-style-type: none"> 1. Probability at 0.0 dB power 2. Probability at 0.01 dB power 3. Probability at 0.02 dB power ... 5000. Probability at 49.9 dB power 5001. Probability at 50.0 dB power |
| 3 | Returns a series of 5001 floating point numbers (in percent) that represent the Gaussian trace. This is the probability at particular power levels (average power), in the following order: <ol style="list-style-type: none"> 1. Probability at 0.0 dB power 2. Probability at 0.01 dB power 3. Probability at 0.02 dB power ... 5000. Probability at 49.9 dB power 5001. Probability at 50.0 dB power |
| 4 | Returns a series of 5001 floating point numbers (in percent) that represent the user-definable reference trace. This is the probability at particular power levels (average power), in the following order: <ol style="list-style-type: none"> 1. Probability at 0.0 dB power 2. Probability at 0.01 dB power 3. Probability at 0.02 dB power ... 5000. Probability at 49.9 dB power 5001. Probability at 50.0 dB power |

Power Stat CCDF Measurement Description

The power statistics CCDF measurement can be affected by many factors. For example, modulation filtering, modulation format, combining the multiple signals at different frequencies, number of active codes, and correlation between symbols on different codes with spread spectrum systems will all affect measurement results. These factors are all related to modulation and signal parameters. External factors such as signal compression and expansion by nonlinear components, group delay distortion from filtering, and power control within the observation interval also affect the measurement.

The power measured in power statistics CCDF curves is actually instantaneous envelope power defined by the equation:

$$P = (I^2 + Q^2) / Z_0$$

where I & Q are the quadrature voltage components of the waveform, and Z_0 is the characteristic impedance.

A CCDF curve is defined by how much time the waveform spends at or above a given power level. The percent of time the signal spends at or above the level defines the probability for that particular power level. For capturing a lower probability down to 0.0001%, this measurement is made in the single mode by pressing Single. To make the power statistics CCDF measurement, the instrument uses digital signal processing (DSP) to sample the input signal in the channel bandwidth. The Gaussian distribution line as the band-limited Gaussian noise CCDF reference line, the user-definable reference trace, and the currently measured trace can be displayed on a semi-log graph. If the currently measured trace is above the user reference trace, it means that the higher peak power levels against the average power are included in the input signal.

| Key Path | Meas |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. The parameter values are measurement independent except all Attenuation values, and the Internal Preamp selection, which are the same across all measurements.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See "[Dual Attenuator Configurations:](#)" on page 1570

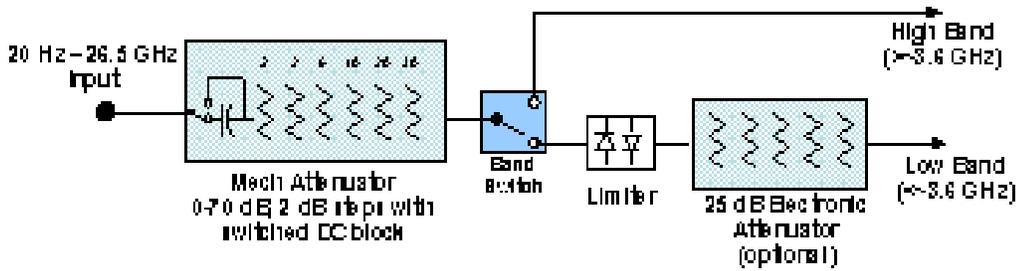
See "[Single Attenuator Configuration:](#)" on page 1571

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

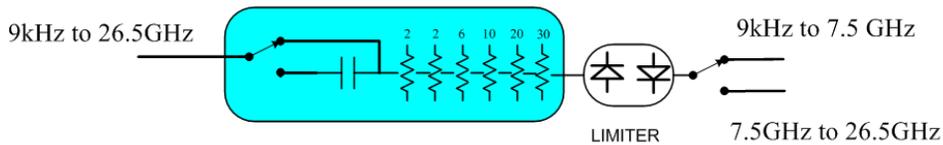
| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Dependencies | In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case. |
| Readback Line | Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2232, and " Enable Elec Atten " on page 2234 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

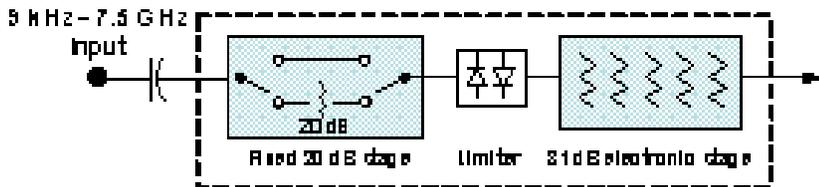


Configuration 2: Mechanical attenuator, no optional electronic attenuator



(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the “Dual Attenuator” configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



Dual Attenuator



Single Attenuator

In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See "[Attenuator Configurations and Auto/Man](#)" on page 1573

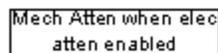
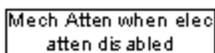
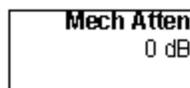
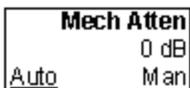
| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <pre>[:SENSE] :POWER [:RF] :ATTenuation <rel_ampl> [:SENSE] :POWER [:RF] :ATTenuation? [:SENSE] :POWER [:RF] :ATTenuation:AUTO OFF ON 0 1 [:SENSE] :POWER [:RF] :ATTenuation:AUTO?</pre> |
| Example | <p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of “main” attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p> |
| Dependencies | <p>Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the Auto/Man selection is not available, and the Auto/Man line on the key disappears.</p> <p>In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the "Enable Elec Atten" on page 2234 key description.</p> <p>See "Attenuator Configurations and Auto/Man" on page 1573 for more information on the Auto/Man functionality of Attenuation.</p> |
| Couplings | <p>When (Mech) Atten is in Auto, it uses the following algorithm to determine a value:</p> <p>If the USB Preamp is connected to USB, use 0 dB.</p> <p>Otherwise, $Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel + IF\ Gain$.</p> <p>Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto.</p> <p>The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).</p> <p>The “IF Gain” term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.</p> <p>In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.</p> |
| Preset | <p>The preset for Mech Attenuation is “Auto.”</p> <p>The Auto value of attenuation is:</p> <p>CXA, EXA, MXA and PXA: 10 dB</p> |

| | |
|--------------------------|--|
| State Saved | Saved in instrument state |
| Min | 0 dB The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased. |
| Max | CXA N9000A-503/507: 50 dB CXA N9000A-513/526: 70dB EXA: 60 dB MXA and PXA: 70 dB In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



usdB

Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible

for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 1575](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2233](#)

See ["More Information" on page 1574](#)

| | |
|---------------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :EATTenuation :STATe OFF ON 0 1 [:SENSe] :POWer [:RF] :EATTenuation :STATe ? |
| Example | POW:EATT:STAT ON |
| Dependencies | <p>This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233.</p> <p>The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out.</p> <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in all measurements; in particular, it is not available in the Swept SA measurement.</p> |
| Couplings | Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information

below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples
- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical

attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :EATTenuation <rel_ampl> [:SENSe] :POWer [:RF] :EATTenuation? |
| Notes | Electronic Attenuation's specification is defined only when Mechanical Attenuation is 6 dB. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no "electronic attenuator" there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a "soft" attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The "soft" attenuation is treated as an addition to the "main" attenuation value set by the Atten softkey or the POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out. |
| Preset | 0 dB |
| State Saved | Saved in instrument state |
| Min | 0 dB |
| Max | Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :RANGe:OPTimize IMMEDIATE |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2237 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|--------------------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation OFF ELECTrical COMBined [:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation? |
| Notes | The SCPI parameter ELECTrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECTrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip |
| State Saved | Saved in instrument state |
| Range | Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|----------------|--|
| Remote Command | [:SENSe] :POWer [:RF] :RANGe:AUTO ON OFF 1 0 [:SENSe] :POWer [:RF] :RANGe:AUTO? |
| Notes | ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) |

| | |
|----------------------|--|
| | OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off" |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT OFF |
| Initial S/W Revision | Prior to A.02.00 |

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT ELEC |
| Initial S/W Revision | Prior to A.02.00 |

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT COMB |
| Initial S/W Revision | Prior to A.02.00 |

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :ATTenuation:STEP [:INCRement] 10 dB 2 dB [:SENSe] :POWer [:RF] :ATTenuation:STEP [:INCRement] ? |
| Example | POW:ATT:STEP 2 |
| Notes | Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10. |
| Dependencies | Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error. |
| Couplings | When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB |
| Preset | PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA) |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 1580](#).

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Remote Command | [:SENSe] :POWer [:RF] :PCENter |
| Example | POW:PCEN |
| Notes | Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command. |
| Dependencies | • Grayed out if the microwave preselector is off.) |

| | |
|------------------------------|---|
| | <ul style="list-style-type: none">• If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken.• Grayed out if entirely in Band 0.• Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0.• Grayed out in the Spectrogram View. |
| Couplings | <p>The active marker position determines where the centering will be attempted.</p> <p>If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.</p> |
| Status Bits/OPC dependencies | <p>When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command.</p> <p>The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.</p> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when "Presel Center" on page 2240 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

| | |
|-------------------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :POWer [:RF] :PADJust <freq></code> <code>[:SENSe] :POWer [:RF] :PADJust?</code> |
| Example | POW:PADJ 100KHz POW:PADJ? |
| Notes | The value on the key reads out to 0.1 MHz resolution. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Preset | 0 MHz |
| State Saved | The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle. |
| Min | -500 MHz |
| Max | 500 MHz |
| Default Unit | Hz |
| Backwards Compatibility SCPI | <code>[:SENSe] :POWer [:RF] :MW :PADJust</code> <code>[:SENSe] :POWer [:RF] :MMW :PADJust</code> PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to <code>[:SENSe] :POWer [:RF] :PADJust</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |
| Remote Command | <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector MWAVE MMWave EXTernal</code> <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector?</code> |
| Notes | PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE |
| Initial S/W Revision | Prior to A.02.00 |

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, BASIC, PNOISE, VSA , LTE, LTETDD |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH? |
| Example | :POW:MW:PATH LNP Enables the Low Noise path |
| Notes | If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μW Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished. |
| Dependencies | Unavailable in BBIQ and External Mixing |
| Preset | All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB |

| | |
|--------------------------|--|
| | MPB option not present and licensed: STD |
| State Saved | Save in instrument state |
| Readback | Value selected in the submenu |
| Initial S/W Revision | A.04.00 |
| Modified at S/W Revision | A.10.00 |

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH STD |
| Readback Text | Standard Path |
| Initial S/W Revision | A.04.00 |

Low Noise Path Enable

You may choose Low Noise Path Enable, which gives a lower noise floor under some circumstances, particularly when operating in the 21–26.5 GHz region. With the Low Noise Path enabled, the low band/high band switch and microwave preamp are bypassed whenever all of the following are true:

- The analyzer is not in the Low Band, meaning:
- the start frequency is above 3.5 GHz and
- the stop frequency is above 3.6 GHz.
- the internal preamp is not installed or (if installed) is set to Off or Low Band

Note that this means that, when any part of a sweep is done in Low Band, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. Also, if the preamp is turned on, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. The only time the Low Noise Path is used is when Low Noise Path Enable is selected, the sweep is completely in High Band (> 3.6 GHz) and no preamp is in use.

See "[More Information](#)" on page 1584

| | |
|----------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Measurement | Swept SA |
| Example | :POW:MW:PATH LNP |

| | |
|----------------------|--|
| Notes | <p>For measurements that use IQ acquisition, the low noise path is used when the Center Frequency is in High Band (> 3.6 GHz) and no preamp is in use.</p> <p>In other words, the rules above are modified to use only the center frequency to qualify which path to switch in.</p> <p>This is not the case for FFT's in the Swept SA measurement; they use the same rules as swept measurements.</p> |
| Dependencies | <p>Key is blanked if current mode does not support it.</p> <p>Key is grayed out if mode supports it but current measurement does not support it.</p> <p>Unless Option LNP is present and licensed, key is blank and if SCPI command sent, error -241, "Hardware missing; Option not installed" is generated.</p> |
| Readback Text | Low Noise Path Enable |
| Initial S/W Revision | A.04.00 |

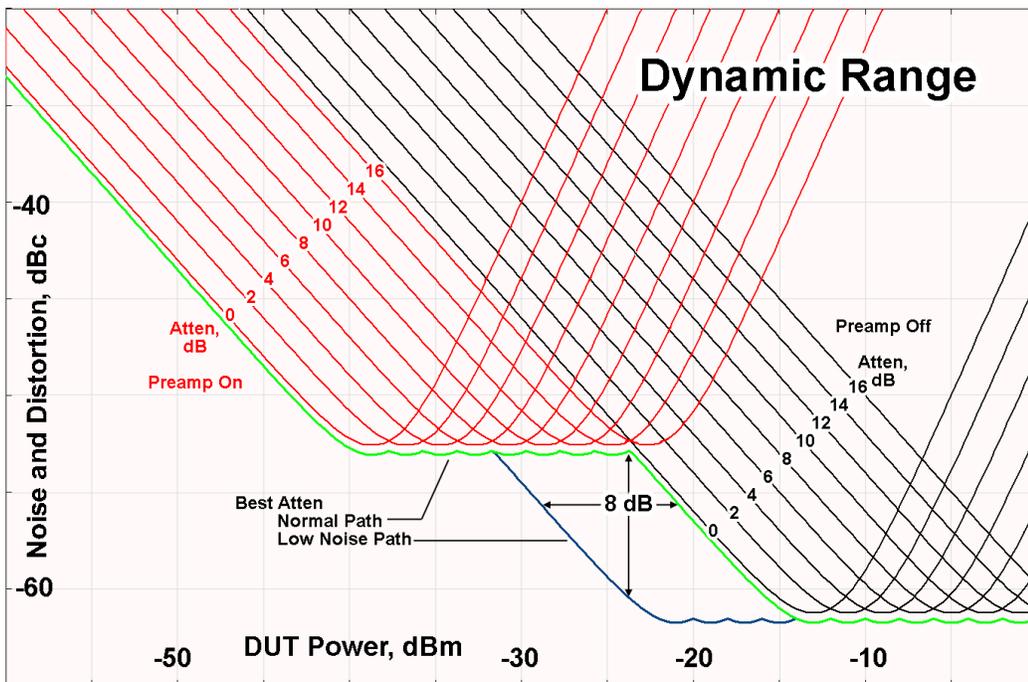
More Information

The user should understand that the Low Noise Path, while giving improved DANL, has the disadvantage of decreased TOI performance and decreased gain compression performance relative to the standard path.

The user should also understand that the bypass switch is a mechanical switch and has finite life, so if the Low Noise Path is enabled, it is possible to cause frequent cycling of this switch by frequently changing analyzer settings such that the above conditions hold true only some of the time. A user making tests of this nature should consider opting for the Standard Path, which will never throw the bypass switch, at the expense of some degraded noise performance.

The low noise path is useful for situations where the signal level is so low that the analyzer performance is dominated by noise even with 0 dB attenuation, but still high enough that the preamp option would have excessive third-order intermodulation or compression. The preamp, if purchased and used, gives better noise floor than does the "Low Noise Path." However, its compression threshold and third-order intercept are much poorer than that of the non-preamp path. There are some applications, typically for signals around -30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range

The graph below illustrates the concept. It shows, in red, the performance of an analyzer at different attenuation settings, both with the preamp on and off, in a measurement that is affected by both analyzer noise and analyzer TOI. The green shows the best available dynamic range, offset by 0.5 dB for clarity. The blue shows how the best available dynamic range improves for moderate signal levels with the low noise path switched in. In this illustration, the preamp improves the noise floor by 15 dB while degrading the third-order intercept by 30 dB, and the low noise path reduces loss by 8 dB. The attenuator step size is 2 dB.



There are other times where selecting the low noise path improves performance, too. Compression-limited measurements such as finding the nulls in a pulsed-RF spectrum can profit from the low noise path in a way similar to the TOI-limited measurement illustrated. Accuracy can be improved when the low noise path allows the optimum attenuation to increase from a small amount like 0, 2 or 4 dB to a larger amount, giving better return loss at the analyzer input. Harmonic measurements, such as second and third harmonic levels, are much improved using the low noise path because of the superiority of that path for harmonic (though not intermodulation) distortion performance.

μW Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselector is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH MPB |
| Dependencies | Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated. |
| Readback Text | μ W Preselector Bypass |
| Initial S/W Revision | A.04.00 |

| | |
|-----------------------|---|
| Remote Command | [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1 [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ? |
| Example | :POW:MW:PRES OFF Bypasses the microwave preselector |
| Notes | The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB) |
| Preset | ON |

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :GAIN [:STATe] OFF ON 0 1 [:SENSe] :POWer [:RF] :GAIN [:STATe] ? |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the |

| | |
|--|--|
| | key is not shown. The preamp is not available when the electronic/soft attenuator is enabled. |
|--|--|

| | |
|-----------|--|
| Couplings | <p>The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range.</p> <p>Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected.</p> <p>Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting.</p> |
|-----------|--|

| | |
|--------------------------|---------------------------|
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Scope | Meas Global |
| Remote Command | [:SENSe]:POWer[:RF]:GAIN:BAND LOW FULL [:SENSe]:POWer[:RF]:GAIN:BAND? |
| Dependencies | <p>Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown.</p> <p>If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated.</p> |
| Preset | LOW |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns the internal preamp off

| | |
|----------------------|--------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

| | |
|----------------------|------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND LOW |
| Readback | Low Band |
| Initial S/W Revision | Prior to A.02.00 |

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND FULL |
| Readback | Full Range |
| Initial S/W Revision | Prior to A.02.00 |

Range

This key is only available when I/Q is the selected input. It replaces the Attenuation key in that case.

Each input channel (I and Q) has four internal gain ranges. The maximum allowed voltage in each gain range is slightly more than the nominal value, so the break point between ranges is a couple of millivolts higher than the nominal (setting a peak voltage of 0.502 mV will still map to the 0.5 V Peak range).

| Gain Setting | Volts RMS | Volts Peak | Volts Peak - Peak | dBm (50Ω) | Break Point |
|--------------|-----------|------------|-------------------|-----------|--------------|
| 0 dB | 0.7071 | 1.0 | 2.0 | 10 | n/a |
| 6 dB | 0.3536 | 0.5 | 1.0 | 4 | 0.502 V Peak |
| 12 dB | 0.1768 | 0.25 | 0.5 | -2 | 0.252 V Peak |
| 18 dB | 0.0884 | 0.125 | 0.25 | -8 | 0.127 V Peak |

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale |
| Notes | Visible only when the selected input is I/Q. |
| State Saved | No |
| Readback Text | When Range is Auto, "[Auto]" When Range is Man and I & Q are the same, "[<range value>]" When Range is Man and I & Q are different: "[: <I range value> Q: <Q range value>]" See I Range and Q Range for the <range value> enumeration definition. |
| Initial S/W Revision | Prior to A.02.00 |

Range Auto/Man

The Auto setting for Range causes the range to be set based on the Y Scale settings. When Range is "Auto", the I & Q Range are set based on the top of the Y Scale when the Y scale is in dB units (for example, power), or to the max(abs(top), abs(bottom)) when the Y scale reference is not at the top of the screen.

Not all measurements support Range Auto/Man. If Auto is not supported in the current measurement, this key is grayed out and shows "Man" and MAN is returned to a SCPI query, but this does NOT change the Auto/Man setting for Range. When you go to a measurement that supports Auto, it goes back to Auto if it was previously in Auto mode.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale, Range |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe]:VOLTage:IQ:RANGe:AUTO OFF ON 0 1</code> <code>[:SENSe]:VOLTage:IQ:RANGe:AUTO?</code> |
| Example | Put the I Range and Q Range in manual. <code>VOLT:IQ:RANG:AUTO OFF</code> |
| Dependencies | If Auto is not supported, sending the SCPI command will generate an error. |
| Couplings | When in Auto, both I Range and Q Range are set to the same value, computed as follows: Maximum absolute value is computed for the Y Scale. The top and bottom of the graph are computed based on Ref Value, Scale/Div, and Ref Position. Formula: $Y_{Max} = \max(\text{abs}(\text{top}), \text{abs}(\text{bottom}))$. The I Range and Q Range are then set to YMax. |
| Preset | ON |
| State Saved | Saved in instrument state |
| Range | Auto Man |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Remote Command | <code>[:SENSe]:POWer:IQ:RANGe:AUTO OFF ON 0 1</code> <code>[:SENSe]:POWer:IQ:RANGe:AUTO?</code> |
|-----------------------|--|

| | |
|----------------------|--|
| Example | Put the I Range and Q Range in manual. POW:IQ:RANG:AUTO OFF |
| Notes | The POW:IQ:RANG:AUTO is an alternate form of the VOLT:IQ:RANG:AUTO command. This is to maintain consistency with I Range and Q Range, which support both the POWer and VOLTage forms of the command. |
| Preset | ON |
| Range | Auto Man |
| Initial S/W Revision | Prior to A.02.00 |

I Range

This is the internal gain range for the I channel when Input Path is I Only or I and I/Q, and it is used for both the I and Q channels when the Input Path is I+jQ. See "[I/Q Gain Ranges](#)" on page 2105.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale, Range |
| Remote Command | [:SENSe] :VOLTage :IQ [:I] :RANGe [:UPPer] <voltage> [:SENSe] :VOLTage :IQ [:I] :RANGe [:UPPer] ? |
| Example | Set the I Range to 0.5 V Peak VOLT:IQ:RANG 0.5 V |
| Notes | The numeric entries are mapped to the smallest gain range whose break point is greater than or equal to the value, or 1 V Peak if the value is greater than 1 V. |
| Couplings | When Q Same as I is On, the I Range value will be copied to the Q Range. Changing the value will also set Range = Man. |
| Preset | 1 V Peak |
| State Saved | Saved in instrument state |
| Range | 1 V Peak 0.5 V Peak 0.25 V Peak 0.125 V Peak |
| Min | 0.125 V |
| Max | 1 V |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Remote Command | [:SENSe] :POWer :IQ [:I] :RANGe [:UPPer] <ampl> [:SENSe] :POWer :IQ [:I] :RANGe [:UPPer] ? |
| Example | Set the I Range to 0.5 V Peak when Reference Z is 50Ω, and to 1.0 V Peak when Reference Z is 75Ω. POW:IQ:RANG 4 dBm |
| Notes | The POWer form of the command is provided for convenience. It maps to the same underlying gain range parameter as the VOLTage form of the command. The Reference Z (not the I channel Input Z) is used to convert the power to peak voltage, which is then used to set the I Range as with the VOLTage form of the command. The power values of the 4 |

range states (1V Peak, 0.5V Peak, 0.25V Peak, and 0.125V Peak) will vary with Reference Z. Here are some examples:

50Ω: 10, 4, -2, -8
75Ω: 8.2, 2.2, -3.8, -9.8
600Ω: -0.8, -6.8, -12.8, -18.9

| | |
|----------------------|-------------------|
| Preset | 10.0 dBm |
| Range | -20 dBm to 10 dBm |
| Min | -20 dBm |
| Max | 10 dBm |
| Initial S/W Revision | Prior to A.02.00 |

1 V Peak

Set the channel gain state to 1 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.5 V Peak

Set the channel gain state to 0.5 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.25 V Peak

Set the channel gain state to 0.25 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.125 V Peak

Set the channel gain state to 0.125 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

Q Range Value

This is the internal gain range for the Q channel. See "[I/Q Gain Ranges](#)" on page 2105. The Q Range only applies to Input Path Q Only and Ind I/Q. For input I+jQ the I Range determines both I and Q channel range settings.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, Range |
| Remote Command | <code>[:SENSe] :VOLTage:IQ:Q:RANGe[:UPPer] <voltage></code> <code>[:SENSe] :VOLTage:IQ:Q:RANGe[:UPPer] ?</code> |
| Example | Set the Q Range to 0.5 V Peak <code>VOLT:IQ:Q:RANG 0.5 V</code> |
| Notes | The numeric entries are mapped to the smallest gain range whose break point is greater than or equal to the value, or 1 V Peak if the value is greater than 1 V. The Q Range is only used for Input Path Q Only and Ind I/Q. For input I+jQ the I Range determines both I and Q channel range settings. |
| Couplings | When Q Same as I is On, the I Range value will be copied to the Q Range and the range value keys are disabled. Changing the value will also set Range = Man. |
| Preset | 1 V Peak |
| State Saved | Saved in instrument state |
| Range | 1 V Peak 0.5 V Peak 0.25 V Peak 0.125 V Peak |
| Min | 0.125 V |
| Max | 1 V |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|----------------|--|
| Remote Command | <code>[:SENSe] :POWer:IQ:Q:RANGe[:UPPer] <ampl></code> <code>[:SENSe] :POWer:IQ:Q:RANGe[:UPPer] ?</code> |
| Example | Will set the Q Range to 0.5 V Peak when Reference Z is 50Ω, and to 1.0 V Peak when Reference Z is 75Ω. <code>POW:IQ:Q:RANG 4 dBm</code> |
| Notes | The POWER form of the command is provided for convenience. It maps to the same underlying gain range parameter as the VOLTage form of the command. The Reference Z (not the Q channel Input Z) is used to convert the power to peak voltage, which is then used to set the Q Range as with the VOLTage form of the command. The power values of the 4 range states (1V Peak, 0.5V Peak, 0.25V Peak, and 0.125V Peak) will vary with Reference Z. Here are some examples: 50Ω: 10, 4, -2, -8 75Ω: 8.2, 2.2, -3.8, -9.8 600Ω: -0.8, -6.8, -12.8, -18.9 |
| Preset | 10.0 dBm |
| Range | -20 dBm to 10 dBm |

| | |
|----------------------|------------------|
| Min | -20 dBm |
| Max | 10 dBm |
| Initial S/W Revision | Prior to A.02.00 |

Q Same as I

Many, but not all, usages require the I and Q channels to have an identical setup. To simplify channel setup, the Q Same as I will cause the Q channel range to be mirrored from the I channel. That way you only need to set up one channel (the I channel). The I channel values are copied to the Q channel, so at the time Q Same as I is Off, the I and Q channel setups will be identical.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, Range, Q Range |
| Remote Command | [:SENSE] :VOLTage POWer:IQ:MIRRored OFF ON 0 1 [:SENSE] :VOLTage POWer:IQ:MIRRored? |
| Example | Turn off the mirroring of I Range to Q Range. VOLT:IQ:MIRR OFF POW:IQ:MIRR OFF |
| Couplings | When On, the I Range value is mirrored (copied) to the Q Range. |
| Preset | On |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Readback Text | "Q Same as I" when On, otherwise none. |
| Initial S/W Revision | Prior to A.02.00 |

1 V Peak

Set the channel gain state to 1 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.5 V Peak

Set the channel gain state to 0.5 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.25 V Peak

Set the channel gain state to 0.25 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.125 V Peak

Set the channel gain state to 0.125 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

I/Q Gain Ranges

See the following sections:

["1 V Peak" on page 2105](#)

["0.5 V Peak" on page 2105](#)

["0.25 V Peak" on page 2105](#)

["0.125 V Peak" on page 2106](#)

1 V Peak

Set the channel gain state to 1 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.5 V Peak

Set the channel gain state to 0.5 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.25 V Peak

Set the channel gain state to 0.25 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.125 V Peak

Set the channel gain state to 0.125 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 1596

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Remote Command | :COUPLe ALL NONE |
| Example | :COUP ALL |
| Notes | :COUPLe ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

There are two types of functions that have Auto/Manual modes.

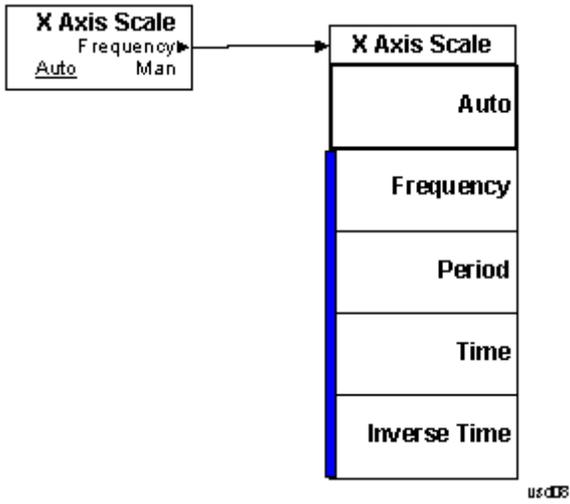
Auto/Man Active Function keys

An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.



BW

Opens the BW menu, which contains keys to control the information bandwidth functions of the instrument.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Info BW

Allows you to enter a frequency value to set the channel bandwidth that will be used for data acquisition.

| | |
|----------------|--|
| Key Path | BW |
| Mode | SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEATDD, LTEAFDD |
| Remote Command | [:SENSe] :PStatistic :BANDwidth <freq> [:SENSe] :PStatistic :BANDwidth? |
| Example | PST:BAND 8 MHz PST:BAND? |
| Couplings | WiMAX OFDMA: The default value depends on the Radio Standard selection.. |
| Preset | SA, WCDM: 5 MHz C2K:1.5 MHz 1xEV-DO:1.3 MHz WiMAX OFDMA: Hardware Dependent No Option = 10 MHz WB (25 MHz or wider) = 25 MHz TD-SCDMA: 1.3 MHz DVB-T/H, DTMB (CTTB): 8 MHz ISDB-T: 6 MHz CMMB: 8 MHz LTE, LTETDD, LTEATDD, LTEAFDD: 6 MHz Digital Cable TV: 8MHz WLAN: Hardware Dependent No option = 10 MHz Option B25 = 25 MHz Option B40: if Radio Std is 802.11a/b/g/n(20MHz) = 25 MHz if Radio Std is 802.11n(40MHz) = 40 MHz if Radio Std is 802.11ac(20MHz) = 25 MHz if Radio Std is 802.11ac(40MHz) = 40 MHz Option B1X: if Radio Std is 802.11ac(80MHz) = 80 MHz |

| | |
|---|---|
| | Option B1Y: if Radio Std is 802.11ac(160MHz) = 160 MHz MSR: same as max value |
| State Saved | Saved in instrument state. |
| Min | 10.0 kHz |
| Max | Hardware Dependent: RF Input: No Option = 10 MHz WB (25MHz or wider) = Hardware Option Limit I/Q Input (for I+jQ): No Option = 20 MHz Option B25 = 50 MHz |
| Backwards Compatibility SCPI | [:SENSe] :PStatistic:BWIDth |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.06.00 |

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

| | |
|--------------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous? |
| Example | :INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation |
| Preset | ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF) |
| State Saved | Saved in instrument state |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep. |
| Initial S/W Revision | Prior to A.02.00 |

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

14 Power Stat CCDF Measurement
File

File

See "File" on page 344

FREQ Channel

Accesses a menu of keys that allow you to control the Frequency and Channel parameters of the instrument.

Some features in the Frequency menu are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset. For example, the Center Freq setting is the same for all measurements – it does not change as you change measurements.

| | |
|-----------------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 1606](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 1608](#)

See ["Center Frequency Presets" on page 1604](#)

| | |
|-----------------------|---|
| Key Path | FREQ Channel |
| Scope | Meas Global |
| Remote Command | [:SENSe] :FREQuency :CENTer <freq> [:SENSe] :FREQuency :CENTer ? |

| | |
|-----------------------------|--|
| Example | FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT? |
| Notes | This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated. |
| Dependencies | The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit. |
| Couplings | When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range |
| Preset | Depends on instrument maximum frequency, mode, measurement, and selected input. See "Center Frequency Presets" on page 1604 and "RF Center Freq" on page 1606 and Ext Mix Center Freq and "I/Q Center Freq" on page 1608. |
| State Saved | Saved in instrument state |
| Min | Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1604 and "RF Center Freq" on page 1606 and "I/Q Center Freq" on page 1608. |
| Max | Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1604 and "RF Center Freq" on page 1606 and "I/Q Center Freq" on page 1608. |
| Default Unit | Hz |
| Status Bits/OPC | Non-overlapped |
| Dependencies | |
| Initial S/W Revision | Prior to A.02.00 |

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

| Freq Option | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune) |
|-------------|-------------------------|--------------------------------|-----------------------------|
| | | | |

| | | | above) |
|---------------------------------------|------------|----------|--------------|
| 503 (all but N9000A) | 1.805 GHz | 3.6 GHz | 3.7 GHz |
| 503 (N9000A) | 1.505 GHz | 3.0 GHz | 3.08 GHz |
| 507 (all but N9000A) | 3.505 GHz | 7.0 GHz | 7.1 GHz |
| 507 (N9000A) | 3.755 GHz | 7.5 GHz | 7.58 GHz |
| 508 (all but N9038A) | 1.805 GHz | 3.6 GHz | 8.5 GHz |
| 508 (N9038A) | 4.205 GHz | 8.4 GHz | 8.5 GHz |
| 513 | 6.805 GHz | 13.6 GHz | 13.8 GHz |
| 526 (all but N9000A and N9038A) | 13.255 GHz | 26.5 GHz | 27.0 GHz |
| 526 (N9000A) | 13.255 GHz | 26.5 GHz | 26.55 GHz |
| 526 (N9038A) | 1.805 GHz | 3.6 GHz | 27.0 GHz |
| 532 | 16.005 GHz | 32.0 GHz | 32.5 GHz |
| 543 | 21.505 GHz | 43.0 GHz | TBD |
| 544 | 22.005 GHz | 44.0 GHz | 44.5 GHz |
| 550 | 25.005 GHz | 50.0 GHz | 51 GHz |

Input 2:

| Model | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune above) |
|----------------|----------------------------|-----------------------------------|-----------------------------------|
| N9000A opt C75 | 0.7505GHz | 1.5 GHz | 1.58 GHz |
| N9038A | 505 MHz | 1 GHz | 1.000025 GHz |

Tracking Generator Frequency Limits (N9000A only):

| Tracking Generator Option | Min Freq (clips to this freq when turn TG on and | If above this Freq, Stop Freq clipped to this Freq when | Max Freq (can't tune above) while TG |
|---------------------------------|--|---|--|
| | | | |

| | can't tune below while TG on) | TG turned on | on |
|-----|----------------------------------|--------------|----------|
| T03 | 9 kHz | 3.0 GHz | 3.08 GHz |
| T06 | 9 kHz | 6.0 GHz | 6.05 GHz |

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

| Mode | CF Preset for RF |
|-------------|------------------|
| WCDMA | 1 GHz |
| WIMAXOFDMA, | 1 GHz |
| BASIC | 1 GHz |
| ADEMOD | 1 GHz |
| VSA | 1 GHz |
| TDSCDMA | 1 GHz |
| PNOISE | 1 GHz |
| LTE | 1 GHz |
| LTETDD | 1 GHz |
| MSR | 1 GHz |
| GSM | 935.2 MHz |
| NFIGURE | 1.505 GHz |

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:RF:CENTer <freq></code> <code>[:SENSe] :FREQuency:RF:CENTer?</code> |
| Example | FREQ:RF:CENT 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Dependencies | If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of |

| | |
|--------------------------|--|
| | Source Numerator, Source Denominator and Power Sweep. |
| Preset | See table above |
| State Saved | Saved in instrument state. |
| Min | -79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source |
| Max | See table above. Basically instrument maximum frequency - 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code> |
| Example | <code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code> |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Couplings | When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup. |
| Preset | When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies. If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq - Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table. |

| | |
|----------------------|---|
| | <p>When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz.</p> <p>Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz.</p> |
| State Saved | Saved in instrument state. |
| Min | The minimum frequency in the currently selected mixer band + 5 Hz |
| Max | The maximum frequency in the currently selected mixer band – 5 Hz If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency |
| Initial S/W Revision | A.08.01 |

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | <pre>[:SENSe] :FREQuency:IQ:CENTer <freq></pre> <pre>[:SENSe] :FREQuency:IQ:CENTer?</pre> |
| Example | FREQ:IQ:CENT: 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Preset | 0 Hz |
| State Saved | Saved in instrument state. |
| Min | -40.049995 MHz |
| Max | 40.049995 MHz |
| Initial S/W Revision | Prior to A.02.00 |

CF Step

Changes the step size for the center frequency and start and stop frequency functions. Once a step size has been selected and the center frequency function is active, the step keys (and the UP|DOWN parameters for Center Frequency from remote commands) change the center frequency by the step-size value. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the analyzer.

Note that the start and stop frequencies also step by the CF Step value.

| | |
|------------------------------|--|
| Key Path | FREQ Channel |
| Remote Command | [:SENSe]:FREQuency:CENTer:STEP[:INCRement] <freq> [:SENSe]:FREQuency:CENTer:STEP[:INCRement]? [:SENSe]:FREQuency:CENTer:STEP:AUTO OFF ON 0 1 [:SENSe]:FREQuency:CENTer:STEP:AUTO? |
| Example | FREQ:CENT:STEP:AUTO ON FREQ:CENT:STEP 500 MHz FREQ:CENT UP increases the current center frequency value by 500 MHz FREQ:CENT:STEP? FREQ:CENT:STEP:AUTO? |
| Notes | Preset and Max values are depending on Hardware Options (503, 507, 508, 513, 526) |
| Notes | Preset and Max values are dependent on Hardware Options (5xx) |
| Dependencies | Freq Offset is not available in External Mixing. In this case the Freq Offset key is grayed out and shows a value of zero. It will once again be available, and show the previously set value, when you return to the RF Input. |
| Dependencies | Span, RBW, Center frequency If the electronic/soft attenuator is enabled, any attempt to change the value of the center frequency >3.6 GHz by pressing the Up-arrow key, fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. |
| Couplings | When auto-coupled in a non-zero span, the center frequency step size is set to 10% of the span. When auto-coupled in zero span, the center frequency step size is set to the equivalent -3 dB RBW value. |
| Preset | Auto ADEMOD: 1 MHz ON |
| State Saved | Saved in instrument state |
| Min | – (the maximum frequency of the instrument). That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Max | The maximum frequency of the instrument. That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Default Unit | Hz |
| Status Bits/OPC dependencies | non-overlapped |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

14 Power Stat CCDF Measurement
Input/Output

Input/Output

See "[Input/Output](#)" on page 202

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Accesses a menu that allows you to select one of 12 markers for control and function

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Marker Type

Sets the marker control mode to Normal, Delta, Fixed or Off.

If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area.

The Active function for the selected marker's current control mode is the default active function. If the current control mode is Off, there is no active function and the active function is turned off. The active function display is the marker X axis value entered in the active function area, which displays the marker value to its full entered precision.

All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

| | |
|----------------|--|
| Key Path | Marker |
| Mode | SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTE-TDD, LTE-FDD |
| Remote Command | :CALCulate:PStatistic:MARKer[1] 2 ... 12:MODE POSition DELTA OFF :CALCulate:PStatistic:MARKer[1] 2 ... 12:MODE? |
| Example | CALC:PST:MARK:MODE POS CALC:PST:MARK:MODE? |
| Notes | If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area displays the marker value to its full entered precision. |

| | |
|--------------------------|----------------------------|
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | Normal Delta Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Properties

Accesses the marker properties menu.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Accesses a menu that allows you to select one of 12 markers for control and function

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Relative To

Sets the reference marker that the selected marker will be relative to.

| | |
|--------------------------|---|
| Key Path | Marker, Properties |
| Mode | SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTETDD, Digital Cable TV, WLAN, MSR, LTEATDD, LTEAFDD |
| Remote Command | :CALCulate:PStatistic:MARKer[1] 2 ... 12:REFerence <integer> :CALCulate:PStatistic:MARKer[1] 2 ... 12:REFerence? |
| Example | CALC:PST:MARK:REF 3 CALC:PST:MARK:REF? |
| Notes | A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." When queried a single value will be returned (the specified marker numbers relative marker). |
| Preset | 2 3 4 5 6 7 8 9 10 11 12 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 12 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Marker Trace

Assigns the specified marker to the designated trace. The trace choices are:

- Measured
- Gaussian
- Reference

| | |
|--------------------------|--|
| Key Path | Marker |
| Mode | SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTE-TDD, LTE-FDD |
| Remote Command | :CALCulate:PStatistic:MARKer[1] 2 ... 12:TRACe MEASured GAUSSian REFerence :CALCulate:PStatistic:MARKer[1] 2 ... 12:TRACe? |
| Example | CALC:PST:MARK3:TRAC MEAS CALC:PST:MARK:TRACE? |
| Preset | MEASured |
| State Saved | Saved in instrument state. |
| Range | Measured Gaussian Reference |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Couple Markers

When this function is on, moving any marker causes an equal X axis movement of every other marker that is not off. By “equal X axis movement” we mean that we preserve the difference between each marker’s X axis value (in the fundamental x-axis units of the trace that marker is on) and the X axis value of the marker being moved (in the same fundamental x-axis units).

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

All Markers Off

Turns off all markers.

| | |
|----------------|--|
| Key Path | Marker, More |
| Mode | SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTE-TDD, LTE-FDD |
| Remote Command | :CALCulate:PStatistic:MARKer:AOff |

| | |
|--------------------------|--------------------|
| Example | CALC:PST:MARK:AOFF |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Marker X Axis Value (Remote Command Only)

Sets the marker X Axis value in the current marker X Axis Scale unit. This function has no effect if the control mode is Off, but is the remote command equivalent of entering an X value if the control mode is Normal or Delta.

| | |
|--------------------------|---|
| Mode | SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTE-TDD, LTE-FDD |
| Remote Command | :CALCulate:PStatistic:MARKer[1] 2 ... 12:X <rel_ampl> :CALCulate:PStatistic:MARKer[1] 2 ... 12:X? |
| Example | CALC:PST:MARK3:X 0 CALC:PST:MARK3:X? |
| Notes | If no suffix is sent, it will use the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" will be generated. If the specified marker is Fixed and a Marker Function is on, error -221 "Settings conflict; cannot adjust Fixed marker while Marker Function is on" is generated. The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from the marker's reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off the response is not a number. |
| Preset | After a preset, all Markers are turned OFF, so Marker X Axis Value query will return a not a number (NAN). |
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Marker Y Axis Value (Remote Command Only)

Queries the marker Y Axis value in the current marker Y Axis unit.

| | |
|-----------------------|--|
| Mode | SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTE-TDD, LTE-FDD |
| Remote Command | :CALCulate:PStatistic:MARKer[1] 2 ... 12:Y? |
| Example | CALC:PST:MARK11:Y? |
| Notes | The query returns the marker Y-axis result, if the control mode is Normal, or Delta. If the marker is |

| | |
|---|--|
| | Off the response is not a number. |
| Preset | 0 |
| State Saved | No |
| Backwards Compatibility SCPI | :CALCulate:PSStatistic:MARKer[1] 2 ... 12:FUNCTION:RESult? |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Marker Function

There are no 'Marker Functions' supported in Power Stat CCDF measurement. The front-panel key displays a blank menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Marker To

There is no 'Marker To' functionality supported in Power Stat CCDF measurement. The front-panel key displays a blank menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Remote Measurement Functions

This section contains the following topics:

["Measurement Group of Commands" on page 2285](#)

["Current Measurement Query \(Remote Command Only\)" on page 2287](#)

["Limit Test Current Results \(Remote Command Only\)" on page 2287](#)

["Data Query \(Remote Command Only\)" on page 2287](#)

["Calculate/Compress Trace Data Query \(Remote Command Only\)" on page 2288](#)

["Calculate Peaks of Trace Data \(Remote Command Only\)" on page 2293](#)

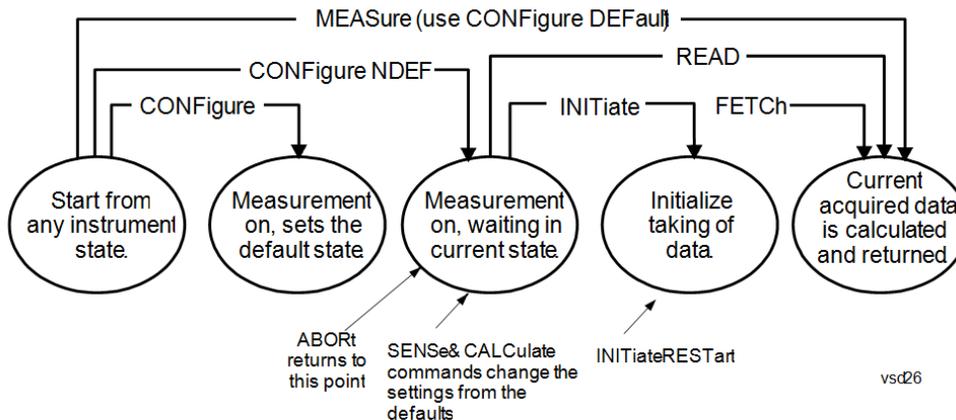
[Hardware-Accelerated Fast Power Measurement \(Remote Command Only\)](#)

["Format Data: Numeric Data \(Remote Command Only\)" on page 2294](#)

["Format Data: Byte Order \(Remote Command Only\)" on page 2295](#)

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFIgure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFIgure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
-

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
-

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

| | |
|-----------------------|-------------|
| Remote Command | :CONFigure? |
|-----------------------|-------------|

| | |
|----------------|-------|
| Example | CONF? |
|----------------|-------|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

| | |
|-----------------------|--------------------------|
| Remote Command | :CALCulate:CLIMits:FAIL? |
|-----------------------|--------------------------|

| | |
|----------------|--|
| Example | CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails. |
|----------------|--|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA[n]? |
| Notes | The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement. |
| Initial S/W Revision | Prior to A.02.00 |

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEViation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]] |
| Example | To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.) |
| Notes | The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data. |
| Initial S/W Revision | Prior to A.02.00 |

- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

-

NOTE

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPlE - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEVIation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

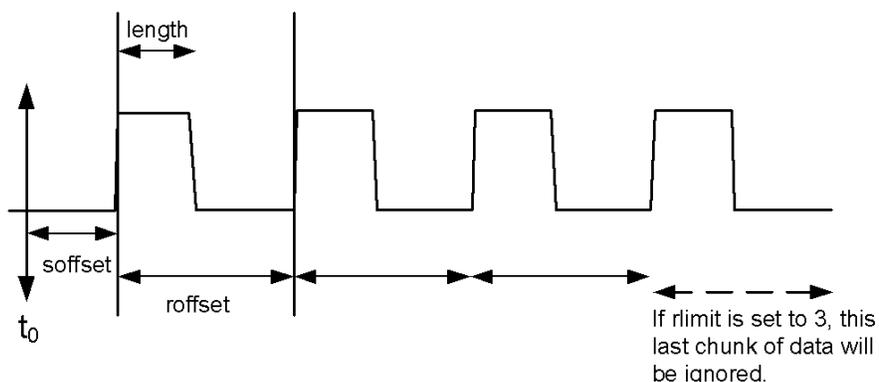
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

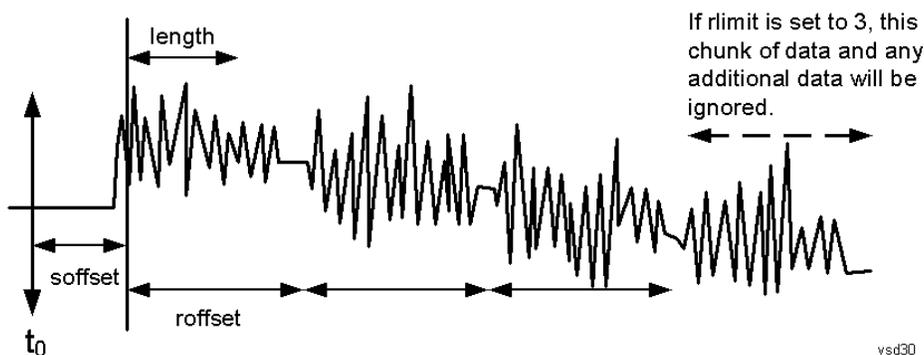
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

| | |
|-----------------------|---|
| Remote Command | <p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre> |
|-----------------------|---|

| | |
|----------------|---|
| Example | <p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p> |
|----------------|---|

| | |
|--------------|---|
| Notes | <p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p> |
|--------------|---|

excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQuency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat [:TRACe] [:DATA] ASCii | INTeger, 32 | REAL, 32 | REAL, 64
:FORMat [:TRACe] [:DATA] ?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

Initial S/W Revision Prior to A.02.00

The specs for each output type follow:

ASCIi - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

| | |
|-----------------------------|--|
| Remote Command | :FORMat:BORDER NORMal SWAPped :FORMat:BORDER? |
| Preset | NORMal |
| Initial S/W Revision | Prior to A.02.00 |

Meas Setup

Accesses the functions that allow you to change the settings for your measurement requirements.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Counts

Sets the accumulated number of sampling points for data acquisition. The range is 1.000 kpt (k point) to 2.00000 Gpt (G point) with 1 kpt resolution. Counts couples to Meas Cycles. When the value for counts is changed, the Meas Cycles value will be $(\text{Counts} / \text{SamplingFrequency} * \text{MeasInterval})$.

| | |
|--------------------------|---|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTE-TDD, LTEAFDD |
| Remote Command | <code>[[:SENSE]:PStatistic:COUNTs <integer></code> <code>[[:SENSE]:PStatistic:COUNTs?</code> |
| Example | PST:COUN 5001 PST:COUN? |
| Couplings | This value is coupled to Meas Cycles. When Counts is changed, the MeasCycles value will be $(\text{Counts} / \text{SamplingFrequency} * \text{MeasInterval})$. TD-SCDMA: When Counts is changed, the MeasCycles value will be $(\text{Counts} / (\text{Sampling Frequency} * \text{Time duration of measured time slots} / 5 \text{ msec}))$, Time duration of measured time slots is determined by Analysis Time Slot and Measure Interval. |
| Preset | 10000000 |
| State Saved | Saved in instrument state. |
| Min | 1000 |
| Max | 2000000000 |
| Default Unit | Kpt |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Meas Cycles

Set the number of measurement cycles to calculate power statistic data. This number couples to Counts. The Counts value is $(\text{MeasCycles} * \text{Sampling Frequency} * \text{MeasInterval})$.

When the counts value cannot be divided by $(\text{Sampling Frequency} * \text{MeasInterval})$, this value is displayed as a decimal fraction.

| | |
|----------|------------|
| Key Path | Meas Setup |
|----------|------------|

| | |
|--------------------------|--|
| Mode | SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTE-TDD, LTE-FDD |
| Remote Command | [:SENSe] :PStatistic:SWEep:CYCLes <integer> [:SENSe] :PStatistic:SWEep:CYCLes? |
| Example | PST:SWE:CYCL 1001 PST:SWE:CYCL? |
| Notes | . |
| Couplings | The Counts value will be (MeasCycles * Sampling Frequency * MeasInterval). TD-SCDMA: The Counts value will be (MeasCycles * Sampling Frequency * Time duration of measured time slots / 5 msec), Time duration of measured time slots is determined by Analysis Time Slot and Measure Interval. |
| Preset | Depends on the sampling frequency. |
| Min | 1 |
| Max | Depends on the sampling frequency. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Meas Interval (Not 1xEVDO)

Sets the number of data points to be used as the measurement interval. This value couples to Counts. The Counts value is (MeasCycles * Sampling Frequency * MeasInterval).

| | |
|-----------------------|---|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTE-TDD, LTE-FDD |
| Remote Command | [:SENSe] :PStatistic:SWEep:TIME <time> [:SENSe] :PStatistic:SWEep:TIME? |
| Example | PST:SWE:TIME 2 ms PST:SWE:TIME? |
| Couplings | The Counts value will be (MeasCycles * Sampling Frequency * MeasInterval). WiMAX OFDMA: The default value depends on Radio Device status. TD-SCDMA: The Counts value will be (MeasCycles * Sampling Frequency * Time duration of measured time slots / 5 msec), Time duration of measured time slots is determined by Analysis Time Slot and Measure Interval. When TriggerSource is RFBurst, this button is grayed. |
| Preset | Others: 1.0 ms TD-SCDMA: 1 slot LTE-TDD, LTE-FDD: 500 us |
| Min | Others: 50.0 us TD-SCDMA: 1 slot |

| | |
|--------------------------|-------------------------------------|
| Max | Others: 10.0 ms TD-SCDMA: 9 slot |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

IF Gain

Sets the IF Gain function to Auto, Low Gain or High Gain. These settings affect sensitivity and IF overloads. This only applies to the RF input. It does not apply to baseband I/Q input.

| Key Path | Meas Setup |
|----------------------|--|
| Dependencies | The IF Gain keys (FFT IF Gain and Swept IF Gain) have no effect when the U7227A USB Preamplifier is connected. This is not annotated or reflected on any softkey; there are no keys grayed out nor any SCPI locked out. The analyzer simply behaves as though both FFT IF Gain and Swept IF Gain are set to Low regardless of the setting on the keys. |
| Initial S/W Revision | Prior to A.02.00 |

IF Gain Auto

Activates the Auto Rules for IF Gain When Auto is active, the IF Gain is set to High Gain under any of the following conditions:

- the input attenuator is set to 0 dB
- the preamp is turned On
- the Max Mixer Level is -20 dBm or lower

For other settings, Auto sets IF Gain to Off.

| Key Path | Meas Setup, IF Gain |
|-----------------------|--|
| Mode | SA, WCDMA, C2K, WiMAX OFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTE-TDD, LTE-FDD |
| Remote Command | <code>[[:SENSE]:PSTatic:IF:GAIN:AUTO[:STATE] ON OFF 1 0</code> <code>[[:SENSE]:PSTatic:IF:GAIN:AUTO[:STATE]?</code> |
| Example | PST:IF:GAIN:AUTO ON PST:IF:GAIN:AUTO? |
| Notes | IF Gain only applies to the RF input. It does not apply to baseband I/Q input. |
| Couplings | When either the auto attenuation is active (for example, with electrical attenuator), or the optimize mechanical attenuator range is requested, the IF Gain setting is changed using the following rule. The Auto selection sets IF Gain On under any of the following conditions: <ul style="list-style-type: none"> • the input attenuator is set to 0 dB • the preamp is turned on, |

| | |
|--------------------------|--|
| | <ul style="list-style-type: none"> the Max Mixer Level is -20 dBm or lower. For other settings, Auto sets IF Gain to Off. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | Auto Man |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

IF Gain State

Selects the range of IF gain. On sets the high gain option, which allows for better noise level measurements and Off sets low gain when measuring large signals.

| | |
|--------------------------|--|
| Key Path | Meas Setup, IF Gain |
| Mode | SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTE-TDD, LTEAFDD |
| Remote Command | <code>[[:SENSE]:PStatistic:IF:GAIN[:STATE] ON OFF 1 0</code> <code>[[:SENSE]:PStatistic:IF:GAIN[:STATE]?</code> |
| Example | PST:IF:GAIN ON PST:IF:GAIN? |
| Notes | IF Gain only applies to the RF input. It does not apply to baseband I/Q input. where ON = high gain OFF = low gain |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | Low Gain (Best for Large Signals) High Gain (Best Noise Level) |
| Readback Text | Low Gain High Gain |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Meas Preset

Restores all measurement settings to their default values.

| | |
|-----------------------|--|
| Key Path | Meas Setup |
| Mode | SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTE-TDD, LTEAFDD |
| Remote Command | <code>:CONFigure:PStatistic</code> |
| Example | CONF:PST |

| | |
|--------------------------|--|
| Notes | You must be in the Spectrum Analysis mode, W-CDMA mode, cdma2000 mode, TD-SCDMA mode, DVB-T/H mode, DTMB (CTTB) mode, SDB-T mode, CMMB mode, Digital Cable TV mode or WIMAXOFDMA mode to use this command. Use :INSTrument:SElect to set the mode. |
| Couplings | Selecting Meas Preset will restore all measurement parameters to their default values. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Mode

See "Mode" on page 288

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings
- See "[How-To Preset](#)" on page 1637 for more information.

| | |
|--------------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :SYSTem:PRESet |
| Example | :SYST:PRES |
| Notes | *RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0. |
| Couplings | A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set. |
| Backwards Compatibility Notes | In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using |

| | |
|----------------------|------------------|
| | User Preset. |
| Initial S/W Revision | Prior to A.02.00 |

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

| Type Of Preset | SCPI Command | Front Panel Access |
|--------------------------------|--|--|
| Auto Couple | :COUPlE ALL | Auto Couple front-panel key |
| Meas Preset | :CONFIgure:<Measurement> | Meas Setup Menu |
| Mode Preset | :SYSTem:PRESet | Mode Preset (green key) |
| Restore Mode Defaults | :INSTrument:DEFault | Mode Setup Menu |
| Restore All Mode Defaults | :SYSTem:DEFault MODEs | System Menu; Restore System Default Menu |
| *RST | *RST | not possible (Mode Preset with Single) |
| Restore Input/Output Defaults | :SYSTem:DEFault INPut | System Menu; Restore System Default Menu |
| Restore Power On Defaults | :SYSTem:DEFault PON | System Menu; Restore System Default Menu |
| Restore Alignment Defaults | :SYSTem:DEFault ALIGn | System Menu; Restore System Default Menu |
| Restore Miscellaneous Defaults | :SYSTem:DEFault MISC | System Menu; Restore System Default Menu |
| Restore All System Defaults | :SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent | System Menu; Restore System Default Menu |
| User Preset | :SYSTem:PRESet:USER | User Preset Menu |
| User Preset All Modes | :SYSTem:PRESet:USER:ALL | User Preset Menu |

| | | |
|----------------------|-----------------------|-------------|
| Power On Mode Preset | :SYSTem:PON:TYPE MODE | System Menu |
| Power On User Preset | :SYSTem:PON:TYPE USER | System Menu |
| Power On Last State | :SYSTem:PON:TYPE LAST | System Menu |

Preset Type (Remote Command Only)

As stated in the Backward Compatibility section, to be compatible with ESA/PSA the PRESet:TYPE command will be implemented as a no-op.

| | |
|-----------------------------|--|
| Mode | All |
| Remote Command | :SYSTem:PRESet:TYPE FACTory MODE USER :SYSTem:PRESet:TYPE? |
| Example | :SYST:PRESet:TYPE FACT |
| Notes | This command is supported for backward compatibility only. It is a no-op which does not change the behavior of any preset operation. |
| Preset | This is unaffected by Preset but is set to Mode on a "Restore System Defaults->All" |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Mode Setup

See ["Mode Setup" on page 320](#)

Peak Search

There is no 'Peak Search' functionality supported in Power Stat CCDF measurement. The front-panel key displays a blank menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Print

See "Print" on page 348

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

| Type | Default Prefix | Menu |
|-----------------------|----------------|-----------------|
| State | State_ | (Save/Recall) |
| Trace + State | State_ | (Save/Recall) |
| Screen | Screen_ | (Save/Recall) |
| Amplitude Corrections | Ampcor_ | (Import/Export) |
| Traces | Trace_ | (Import/Export) |
| Limit Lines | LLine_ | (Import/Export) |
| Measurement Result | MeasR_ | (Import/Export) |
| Capture Buffer | CapBuf_ | (Import/Export) |

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as "fred.csv", then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

| | |
|----------------------|--|
| Key Path | Front-panel key |
| Notes | No remote command for this key specifically. |
| Initial S/W Revision | Prior to A.02.00 |

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

| Key Path | Front-panel key |
|-------------------------------|--|
| Notes | <p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATE <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p> |
| Backwards Compatibility Notes | <p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, "state" always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> |
| Backwards Compatibility Notes | <p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p> |
| Initial S/W Revision | Prior to A.02.00 |

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode’s settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode’s state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or “Recalled State Register <register number>” is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See "[More Information](#)" on page 1646.

| | |
|-----------------------|--|
| Key Path | Recall |
| Mode | All |
| Remote Command | :MMEMory:LOAD:STATe <filename> |
| Example | :MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path |
| Example | MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state. |
| Notes | <p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <ul style="list-style-type: none"> • If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number. <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p> |

| | |
|-------------------------------------|---|
| | there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu. |
| Backwards Compatibility SCPI | :MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

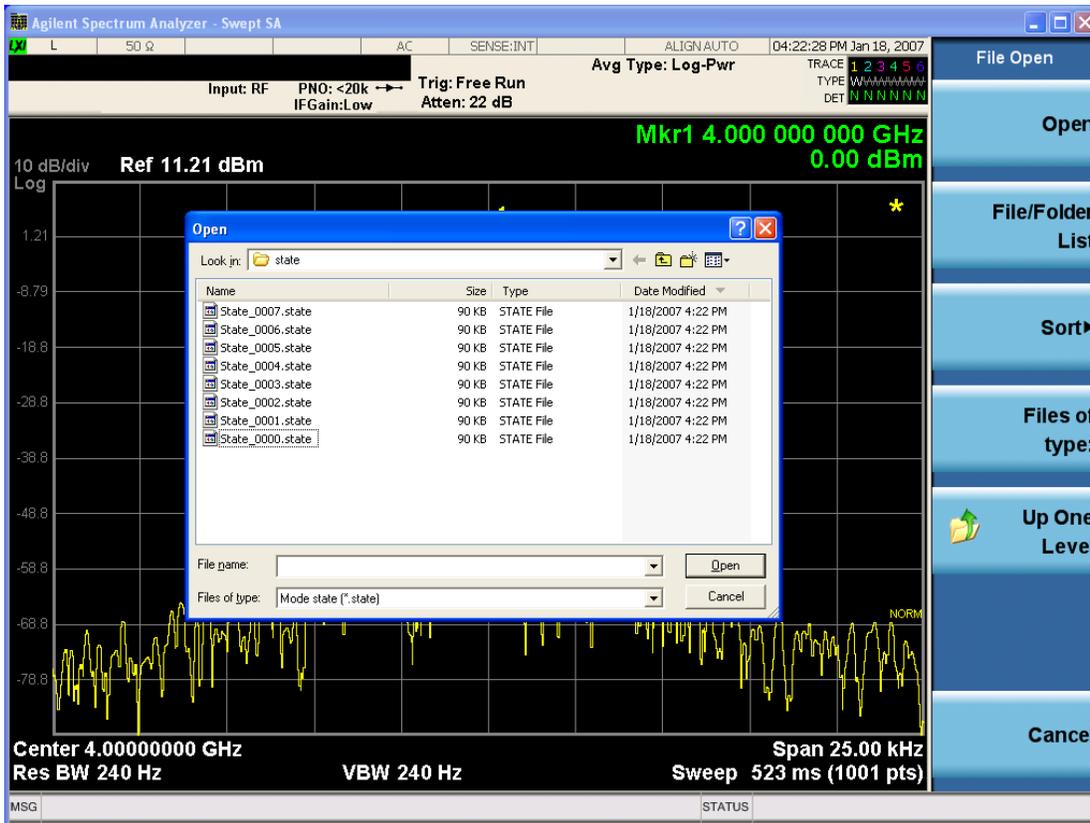
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

| | | |
|---|--|--|
| You want to recall state and one trace's data, leaving other traces unaffected. | Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed. | On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed. |
| You want to recall all traces | Save Trace+State from ALL traces. | On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved) |
| You want all traces to load exactly as they were when saved. | Save State | On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten. |

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Notes | Brings up the Open dialog for recalling a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Mode | All |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available" |
| Initial S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|--|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|--|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1-16 from front panel, 1-128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Data (Import)

Importing a data file loads data that was previously saved from the current measurement or from other measurements and/or modes that produce compatible data files. The Import Menu only contains Data Types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by the user prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Importing Data loads measurement data from the specified file into the specified or default destination, depending on the data type selected. Selecting an Import Data menu key will not actually cause the importing to occur, since the analyzer still needs to know from where to get the data. Pressing the Open key in this menu brings up the Open dialog and Open menu that provides you with the options from where to recall the data. Once a filename has been selected or entered in the Open menu, the recall occurs as soon as the Open button is pressed.

| | |
|----------------------|--|
| Key Path | Recall |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. Some keys will be missing completely, so the key locations in the sub-menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:LOAD commands. |
| Dependencies | If a file type is not used by a certain measurement, it is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Capture Buffer

The captured data is raw data which is not processed.

| | |
|----------------------|---|
| Key Path | Recall, Data |
| Mode | TD-SCDMA |
| Example | MMEM:LOAD:CAPT "MyCaptureData.bin" This loads the file of capture data (on the default file directory path) into the instrument. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Open...

When you press "Open", the analyzer brings up a Windows dialog and a menu entitled "**File Open.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[From File...](#)" on page 2309 in Recall, State, for a full description of this dialog and menu.

| | |
|----------------------|--|
| Key Path | Recall, Data |
| Notes | The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 1652

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate[:IMMEDIATE] :INITiate:RESTART |
| Example | :INIT:IMM :INIT:REST |
| Notes | :INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function. |
| Couplings | Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement. |
| Status Bits/OPC dependencies | This is an Overlapped command. The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUESTionable register bit 9 (INTegrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set. |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command `CALC:AVER:TCON UP`.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Mode | All |
| Notes | No remote command for this key specifically, but the :MMEM:STOR:STATe <filename> command is available for specific file types. An example is :MMEM:STOR:STATe <filename>. |
| Initial S/W Revision | Prior to A.02.00 |

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

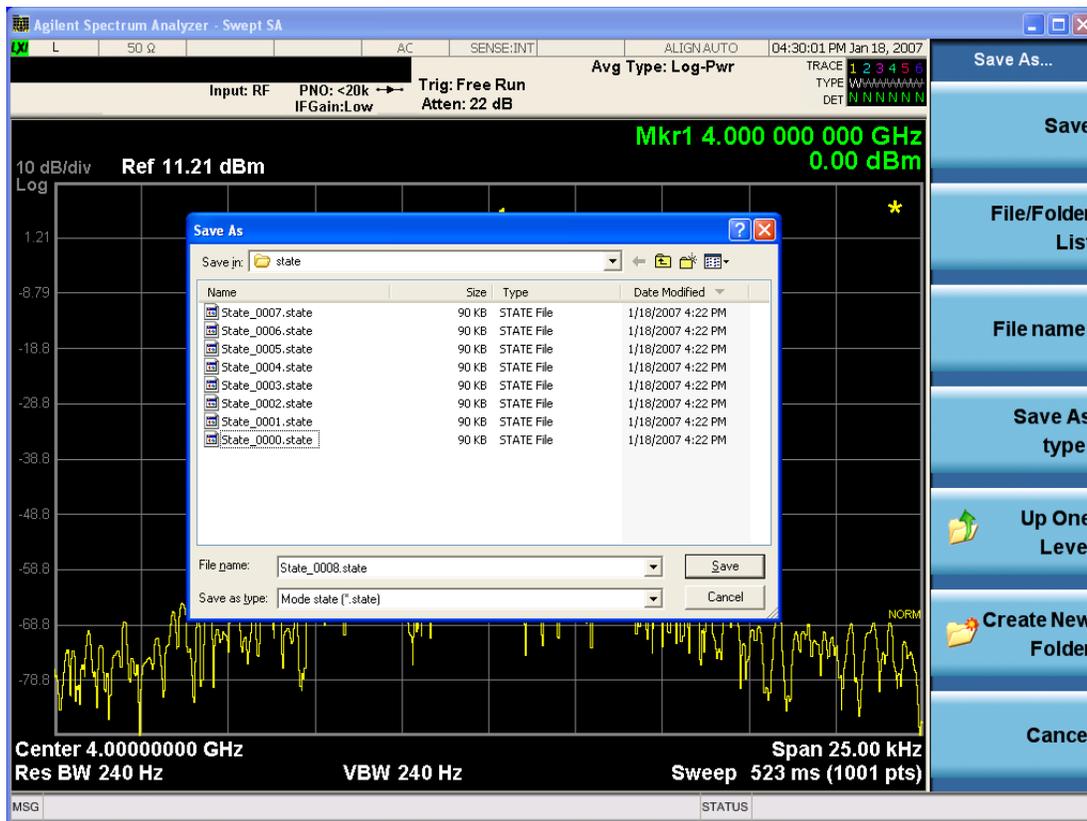
| | |
|----------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:STATe <filename> |
| Example | MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory. |
| Notes | Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key |

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

| | |
|-------------------------------------|-----------------------------------|
| Backwards Compatibility SCPI | :MMEMoRY:STORe:STATe 1,<filename> |
| Initial S/W Revision | Prior to A.02.00 |

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2305](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Save, State |
| Mode | All |
| Notes | Brings up Save As dialog for saving a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 1657](#)

| | |
|-----------------------|--|
| Key Path | Save, State |
| Mode | All |
| Remote Command | :MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number> |
| Example | :MMEM:REG:STAT:LAB 1,"my label" |
| Notes | <reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,"" |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available" |
| Preset | The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc" |
| Initial S/W Revision | A.11.00 |

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1-16 from front panel, 1-128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

| | |
|----------------------|---|
| Key Path | Save |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands. |
| Dependencies | If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Measurement Results

Pressing this key selects Meas Results as the data type to be exported.

The Meas Results file contains measurement result sets, plus information describing the current state of the analyzer, as detailed in ["Meas Results File Definition" on page 1660](#) and ["Meas Results File Example" on page 1662](#) below.

| | |
|-------------------------------------|---|
| Key Path | Save, Data |
| Remote Command | :MMEMory:STORe:RESults <string> |
| Example | :MMEM:STOR:RES "MeasR_0000.csv" |
| Notes | <p>If the save is initiated via SCPI and the file already exists, the file will be overwritten.</p> <p>The SCPI command exports Power Stat CCDF measurement results to the file specified as the parameter in the current path. The default path is My Documents\<current mode="">\data\PST\results. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.</current></p> <p>The SCPI parameter is a quoted string that specifies the filename. Both single and double quotes are supported for any filename parameter over SCPI.</p> |
| Dependencies | The current active measurement must be the Power Stat CCDF measurement to use this command. |
| Status Bits/OPC dependencies | Sequential – waits for the previous measurement to complete |
| Initial S/W Revision | Prior to A.02.00 |

Meas Results File Definition

The content of a Meas Results File is defined in this section.

The first lines in the file consist of identification and instrument configuration details, as follows.

- File ID string, which is "MeasResult"
- Measurement ID following Mode ID, which is "SA:PST" for example.
- Firmware rev and model number
- Option string
- Automatic Trigger Time
- Automatic Trigger Time State
- CcdfCurrentCounts
- Center Frequency
- Center Frequency Step
- Center Frequency Step State
- Counts
- Electrical Atten

- Electrical Atten State
- External Array Trigger Delay
- External Array Trigger Delay State
- External Array Trigger Level
- External Array Trigger Slope
- Gaussian Line
- IF Gain Auto
- IF Gain State
- Info BW
- Internal Preamp
- Internal Preamp Band
- Line Trigger Delay
- Line Trigger Delay State
- Line Trigger Slope
- Meas Cycles
- MeasInterval
- Mechanical Atten
- MechanicalAttenStepEnum
- Periodic Timer Period
- Periodic Timer Sync Source
- Periodic Timer Trigger Delay
- Periodic Timer Trigger Delay State
- Preselector Adjust
- Ref Trace
- RFBurst Trigger Delay
- RFBurst Trigger Delay State
- RFBurst Trigger Level Abs
- RFBurst Trigger Level Rel
- RFBurst Trigger Level Type
- RFBurst Trigger Slope
- Scale/Div

- Trigger Holdoff
- Trigger Holdoff State
- TriggerSource

The data above is followed in the file by a line containing “MeasResult1” to “MeasResult4”. This line forms a header for each set of measurement results, which appear in subsequent lines. Each line of Measurement Results consists of 4 comma-separated values, from the MeasResult1 value to the MeasResult4 value.

The MeasResult1 set in the file corresponds to the data returned by MEAS|READ|FETCh:PStatistic1; the MeasResult2 set corresponds to the data returned by MEAS|READ|FETCh:PStatistic2, and so on.

The exported file is in CSV format, with a .csv extension.

Meas Results File Example

When imported into Microsoft Excel, a typical Meas Results CSV file appears as shown in the example below.

| | | | |
|---|----------|----------|--|
| MeasResult | | | |
| SA:PST | | | |
| A.10.53 | N9030A | | |
| 526 ALV ATP B1X B1Y B25 B40 BBA CR3 CRP DCF DDA DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA LFE LNP MAT MPB NFE NUL P26 PFR PNC RTL RTS S40 SB1 SEC SM1 TVT YAS YAV | 1 | | |
| Automatic Trigger Time | 0.1 | | |
| Automatic Trigger Time State | FALSE | | |
| CcdfCurrentCounts | 6087500 | | |
| Center Frequency | 1.33E+10 | | |
| Center Frequency Step | 5000000 | | |
| Center Frequency Step State | TRUE | | |
| Counts | 10000000 | | |
| Electrical Atten | 0 | | |
| Electrical Atten State | FALSE | | |
| External Array Trigger Delay | 1.00E-06 | 1.00E-06 | |
| External Array Trigger Delay State | FALSE | FALSE | |
| External Array Trigger Level | 1.2 | 1.2 | |
| External Array Trigger Slope | Positive | Positive | |

| | | | |
|------------------------------------|------------------|------------------|-------------|
| Gaussian Line | TRUE | | |
| IF Gain AUto | FALSE | | |
| IF Gain State | FALSE | | |
| Info BW | 5000000 | | |
| Internal Preamp | FALSE | | |
| Internal Preamp Band | Low | | |
| Line Trigger Delay | 1.00E-06 | | |
| Line Trigger Delay State | FALSE | | |
| Line Trigger Slope | Positive | | |
| Meas Cycles | 1600 | | |
| MeasInterval | 0.001 | | |
| Mechanical Atten | 10 | | |
| MechanicalAttenStepEnum | S2dB | | |
| Periodic Timer Period | 0.02 | | |
| Periodic Timer Sync Source | None | | |
| Periodic Timer Trigger Delay | 1.00E-06 | | |
| Periodic Timer Trigger Delay State | FALSE | | |
| Preselector Adjust | 0 | | |
| Ref Trace | FALSE | | |
| RFBurst Trigger Delay | 1.00E-06 | | |
| RFBurst Trigger Delay State | FALSE | | |
| RFBurst Trigger Level Abs | -20 | | |
| RFBurst Trigger Level Rel | -6 | | |
| RFBurst Trigger Level Type | Absolute | | |
| RFBurst Trigger Slope | Positive | | |
| Scale/Div | 2 | | |
| Trigger Holdoff | 0.1 | | |
| Trigger Holdoff State | FALSE | | |
| TriggerSource | Free | | |
| MeasResult1 | MeasResult2 | MeasResult3 | MeasResult4 |
| -73.0651058869747 | 36.9712197125257 | 36.7879441171442 | |
| 36.9712197125257 | 36.8850431211499 | 36.7032368203129 | |

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data which is not processed.

| | |
|----------------------|--|
| Key Path | Save, Data |
| Mode | TD-SCDMA |
| Example | MMEM:STOR:CAPT "MyCaptureData.bin" This stores the capture data in the file MyCaptureData.bin in the default directory. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Save As . . .

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\<<mode name>\data\traces

For all of the Limit Data Files:

My Documents\<<mode name>\data\limits

For all of the Measurement Results Data Files:

My Documents\<<mode name>\data\<<measurement name>\results

For all of the Capture Buffer Data Files:

My Documents\<<mode name>\data\captureBuffer

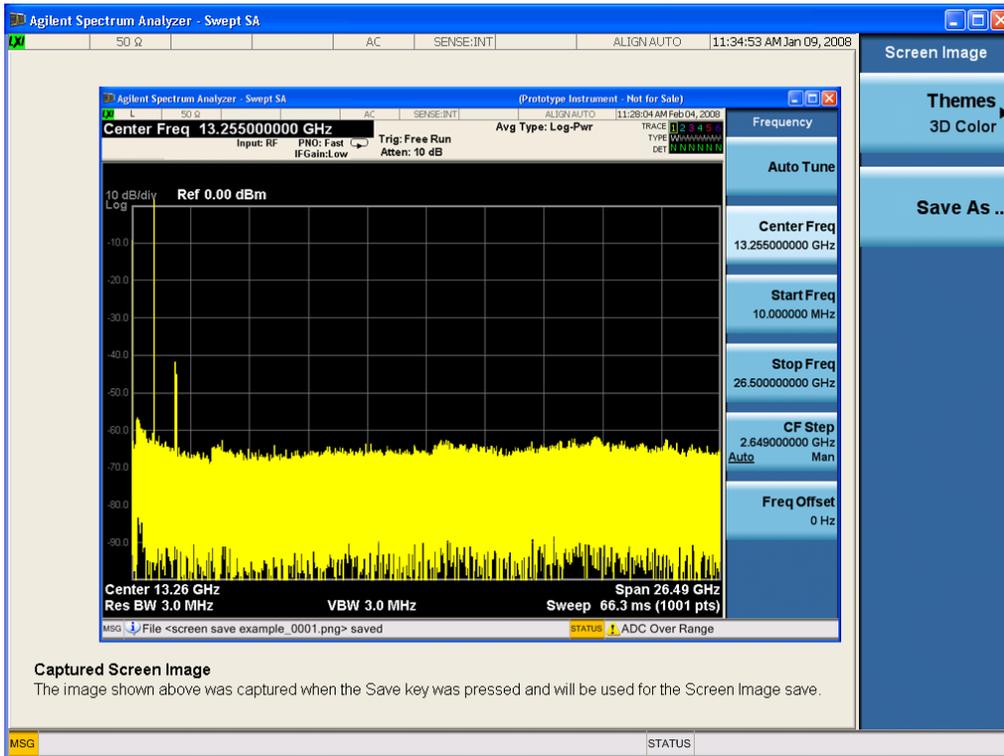
| | |
|----------------------|--|
| Key Path | Save, Data |
| Mode | All |
| Notes | The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <mode specific> Save Type. The save is performed immediately and does not wait until the measurement is complete. |
| Initial S/W Revision | Prior to A.02.00 |

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE

For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

| | |
|----------------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:SCReem <filename> |
| Example | :MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Save As...

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where `<mode name>` is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

| | |
|----------------------|--|
| Key Path | Save, Screen Image |
| Notes | Brings up Save As dialog for saving a Screen Image Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Catalog (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:CATalog? [<code><directory_name></code>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><code><numeric_value>,<numeric_value>,{<file_entry>}</code></p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first</p> |

parameter indicates the total amount of storage currently used in bytes. The second parameter indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:

<file_name>,<file_type>,<file_size>

As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty

Initial S/W Revision Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:CDIRectory [<directory_name>]
 :MMEMory:CDIRectory?

Notes The string must be a valid logical path.

Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.

At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.

Query returns full path of the default directory.

Initial S/W Revision Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:COPY <string>,<string>[,<string>,<string>]

Notes The string must be a valid logical path.

Copies an existing file to a new file or an existing directory to a new directory.

Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.

The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.

This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:COpy:DEvice <source_string>,<dest_string> |
| Notes | The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device. Valid device keywords are: SNS (smart noise source) An error is generated if the file or device is not found. |

Mass Storage Delete (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DElete <file_name>[,<directory_name>] |
| Notes | The string must be a valid logical path. Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an “access denied” error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DATA <file_name>,<data> :MMEMory:DATA? <file_name> |
| Notes | The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Make Directory (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MDIRectory <directory_name> |
| Notes | The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created. |

| | |
|----------------------|--|
| | This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Move (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MOVE <string>,<string>[,<string>,<string>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Remove Directory (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:RDIRECTory <directory_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See ["More Information" on page 1671](#)

| | |
|-------------------------------|---|
| Key Path | Front-panel key |
| Example | :INIT:CONT OFF |
| Notes | See Cont key description. |
| Backwards Compatibility Notes | <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p> |
| Initial S/W Revision | Prior to A.02.00 |

More Information

See ["Restart" on page 2315](#) for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

| Key Path | Front-panel key |
|----------|-----------------|
|----------|-----------------|

Span X Scale

The SPAN X Scale key accesses the menu to set the desired horizontal scale.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Scale/Div

Enables you to enter a time value to change the horizontal scale.

| | |
|-------------------------------------|---|
| Key Path | Span X Scale |
| Mode | SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR,, LTE-TDD, LTE-FDD |
| Remote Command | :DISPlay:PStatistic:VIEW[1]:WINDow2:TRACe:X[:SCALE]:PDIVision <rel_ ampl> :DISPlay:PStatistic:VIEW[1]:WINDow2:TRACe:X[:SCALE]:PDIVision? |
| Example | DISP:PST:VIEW:WIND2:TRAC:X:PDIV 10 DISP:PST:VIEW:WIND2:TRAC:X:PDIV? |
| Notes | CCDF measurement has the trace display only at Window 2. |
| Couplings | See Notes |
| Preset | 2.00 |
| State Saved | Saved in instrument state. |
| Min | 0.1 |
| Max | 20 |
| Backwards Compatibility SCPI | :DISPlay:PStatistic:XScale |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Sweep/Control

Enables you to pause the power statistics CCDF measurement after the current data acquisition is complete. When Paused, the label on the menu key changes to Resume. Press Resume to resume the measurement where it was when it was paused.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Pause/Resume

Pauses a measurement after the current data acquisition is complete. When Paused, the label on the key changes to Resume. Press Resume to resume the measurement where it was when it was paused. See ["Pause/Resume" on page 2205](#) for details.

| | |
|----------------------|------------------|
| Key Path | Sweep/Control |
| Initial S/W Revision | Prior to A.02.00 |

System

See "System" on page 349

Trace/Detector

Accesses a menu of functions that enable you to control the storage and manipulation of the reference trace, as well as controls the display of the trace data.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Store Ref Trace

Copies the currently measured curve as the user-definable reference trace. The captured data remains until the other mode is chosen. Pressing this key also refreshes the reference trace.

No query command is available.

| | |
|-------------------------------------|--|
| Key Path | Trace/Detector |
| Mode | SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTE-TDD, LTE-FDD |
| Remote Command | :CALCulate:PSTatistic:STORe:REFerence |
| Example | CALC:PST:STOR:REF |
| Backwards Compatibility SCPI | [:SENSe]:PSTatistic:SRTRace |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00 |

Ref Trace

Toggles the reference trace display between On and Off.

| | |
|-------------------------------------|--|
| Key Path | Trace/Detector |
| Mode | SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTE-TDD, LTE-FDD |
| Remote Command | :DISPlay:PSTatistic:RTRace[:STATe] OFF ON 0 1 :DISPlay:PSTatistic:RTRace[:STATe]? |
| Example | DISP:PST:RTR OFF DISP:PST:RTR? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Backwards Compatibility SCPI | [:SENSe]:PSTatistic:RTRace[:STATe] |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.04.00 |

Gaussian Line

Toggles the Gaussian trace display between On and Off.

| | |
|-------------------------------------|--|
| Key Path | Trace/Detector |
| Mode | SA, WCDMA, C2K, WIMAXOFDMA, TD-SCDMA, 1xEV-DO, DVB-T/H, DTMB (CTTB), ISDB-T, CMMB, LTE, LTE-TDD, Digital Cable TV, WLAN, MSR, LTE-TDD, LTE-FDD |
| Remote Command | :DISPlay:PStatistic:GAUSSian[:STATe] OFF ON 0 1 :DISPlay:PStatistic:GAUSSian[:STATe]? |
| Example | DISP:PST:GAUS OFF DISP:PST:GAUS? |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Backwards Compatibility SCPI | [:SENSe]:PStatistic:GAUSSian[:STATe] |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.03.00, A.04.00 |

Trigger

See ["Trigger" on page 424](#)

Free Run

See ["Free Run " on page 431](#)

Video

See ["Video \(IF Envelope\) " on page 432](#)

Trigger Level

See ["Trigger Level " on page 432](#)

Trig Slope

See ["Trig Slope " on page 433](#)

Trig Delay

See ["Trig Delay " on page 434](#)

External 1

See ["External 1 " on page 2357](#)

Trigger Level

See ["Trigger Level " on page 2357](#)

Trig Slope

See ["Trig Slope " on page 2358](#)

Trig Delay

See ["Trig Delay " on page 437](#)

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off" on page 2346](#)

External 2

See ["External 2 " on page 2359](#)

Trigger Level

See ["Trigger Level " on page 2359](#)

Trig Slope

See ["Trig Slope " on page 2360](#)

Trig Delay

See "Trig Delay " on page 440

Zero Span Delay Comp

See "Zero Span Delay Comp On/Off" on page 2348

RF Burst

See "RF Burst " on page 2360

Absolute Trigger

See "Absolute Trigger Level" on page 2361

Relative Trigger

See "Relative Trigger Level" on page 2350

Trig Slope

See "Trigger Slope " on page 2362

Trig Delay

See "Trig Delay " on page 444

Auto/Holdoff

See "Auto/Holdoff " on page 445

Auto Trig

See "Auto Trig " on page 445

Trig Holdoff

See "Trig Holdoff " on page 446

Holdoff Type

See "Holdoff Type" on page 446

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

| Key Path | Front-panel key |
|-------------------------------|--|
| Backwards Compatibility Notes | <p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p> |
| Initial S/W Revision | Prior to A.02.00 |

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|-----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER |
| Notes | :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed |
| Couplings | A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|-----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:ALL |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL |
| Notes | Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. |
| Couplings | A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

| | |
|----------------------|---|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:SAVE |
| Example | :SYST:PRES:USER:SAVE |
| Notes | :SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file. |
| Initial S/W Revision | Prior to A.02.00 |

View/Display

The View/Display key opens the Display Menu (common to most measurements) and the View menu for the current measurement.

Some measurements have simple View menus, or even no View menu, others provide many different Views.

Views are different ways of looking at data, usually different ways of looking at the same data, often when the data represents a time record that is being digitally processed with an FFT and/or other digital signal processing algorithms.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

| | |
|----------------------|------------------|
| Key Path | Display |
| Key Path | View/Display |
| Initial S/W Revision | Prior to A.02.00 |

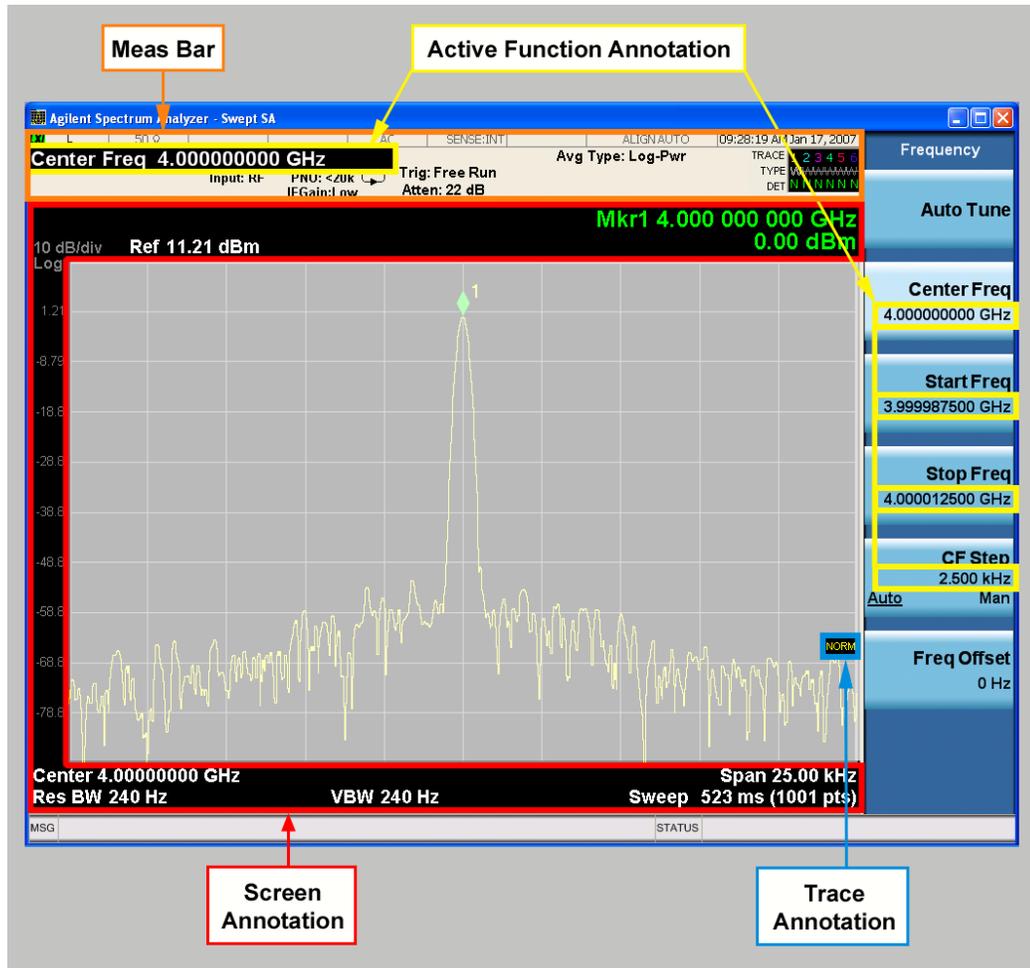
Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.

14 Power Stat CCDF Measurement
View/Display



| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

| | |
|----------------------|--|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNOtation:MBAR[:STATe] OFF ON 0 1 :DISPlay:ANNOtation:MBAR[:STATe]? |
| Example | DISP:ANN:MBAR OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off. |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Screen

This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

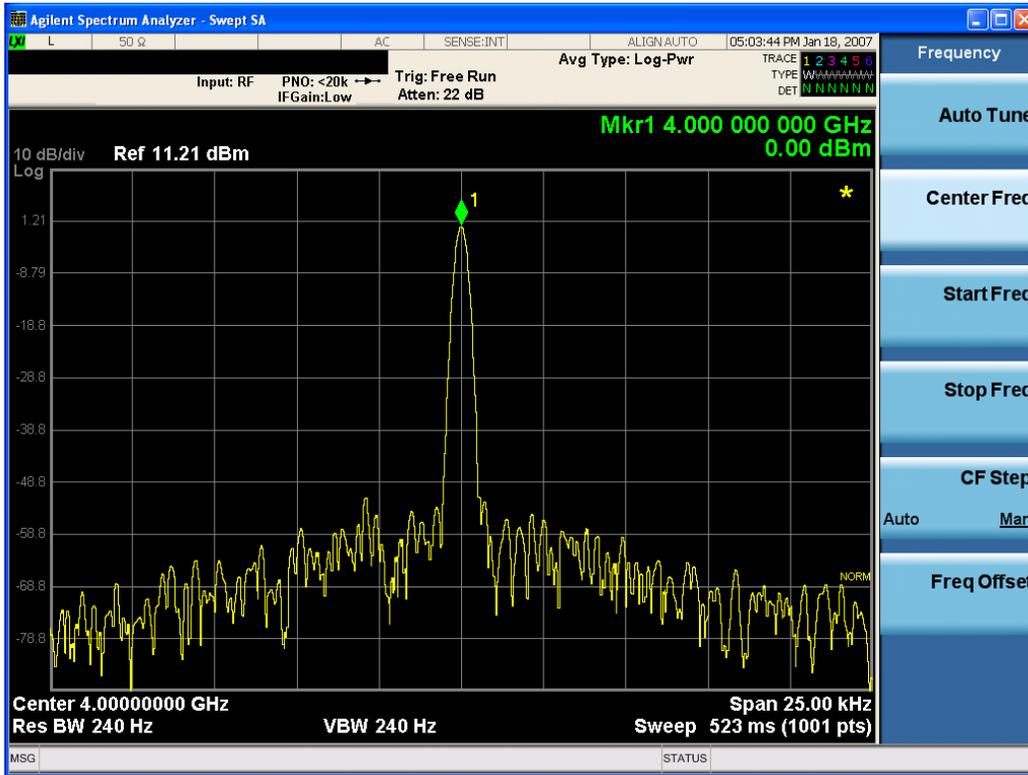
| | |
|-----------------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]? |
| Example | DISP:ANN:SCR OFF |
| Dependencies | Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..

14 Power Stat CCDF Measurement
View/Display



| | |
|----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE] ? |
| Example | DISP:ACT OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Title

Displays menu keys that enable you to change or clear a title on your display.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

| | |
|-----------------------|---|
| Key Path | View/Display, Display, Title |
| Mode | All |
| Remote Command | :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA? |
| Example | DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title |
| Notes | Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters. |
| Preset | No title (measurement name instead) |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Example | The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required. |
| Notes | Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted). |
| Preset | Performed on Preset. |
| Initial S/W Revision | Prior to A.02.00 |

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

| | |
|----------------------|--|
| Key Path | View/Display, Display |
| Remote Command | :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]? |
| Example | DISP:WIND:TRAC:GRAT:GRID OFF |
| Notes | The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis. |
| Preset | On |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

| | |
|-------------------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:WINDow[1]:ANNotation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNotation[:ALL]? |
| Example | :DISP:WIND:ANN OFF |
| Preset | On (Set by Restore Misc Defaults) |
| State Saved | Not saved in instrument state. |
| Backwards Compatibility Notes | The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOlor FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

| | |
|-----------------------|--|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight ON OFF :DISPlay:BACKlight? |
| Preset | ON (Set by Restore Misc Defaults) |
| Initial S/W Revision | Prior to A.02.00 |

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

| | |
|-----------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity? |
| Example | DISP:BACK:INT 50 |

| | |
|----------------------|------------------------------------|
| Preset | 100 (Set by Restore Misc Defaults) |
| Min | 0 |
| Max | 100 |
| Initial S/W Revision | Prior to A.02.00 |

Slot View

Switch between normal CCDF view and Slot view with additional wave window, this is available only under TD-SCDMA, LTE TDD or LTE-Advanced TDD mode.

| | |
|-----------------------|--|
| Key Path | View/Display |
| Mode | TD-SCDMA,LTETDD, LTEATDD |
| Remote Command | [[:SENSE]:PStatistic:SLTView[:STATE] OFF ON 0 1 [:SENSE]:PStatistic: SLTView[:STATE]? |
| Example | PST:SLTV OFF PST:SLTV? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

15 Introduction

15 Code Domain Measurement

The Code Domain Measurement provides the code domain analysis of a TD-SCDMA signal. It is an analysis-oriented measurement rather than a conformance test. For more details, see "[Code Domain Measurement Description](#)" on page 1700 below.

This topic contains the following sections.

["Remote Commands for Code Domain"](#) on page 1694

["Measurement Results for Code Domain Measurement"](#) on page 1695

Remote Commands for Code Domain

The following commands are used to retrieve the measurement results:

The general functionality of CONFIGure, FETCh, MEASure, and READ are described at the beginning of this section.

:CONFIgure:CDPower

:CONFIgure:CDPower:NDEFault

:FETCh:CDPower [n] ?

:INITiate:CDPower

:MEASure:CDPower [n] ?

:READ:CDPower [n] ?

Measurement Results for Code Domain Measurement

For each result, the following heading is used to represent its format and precision.

#.Result Name (type of number) [unit] <explanation>

Type of number includes double, float and integer.

| Index: n | Results Returned |
|---------------------------|--|
| 0 | Returns unprocessed I/Q trace data, as a series of comma-separated trace points, in volts. The I values are listed first in each pair, using the even-indexed values. The Q values are the odd-indexed values. If no data is captured, one NaN will be returned. |
| not specified or n = 1 | <p>Returns the following 24 comma-separated scalar results:</p> <p>NOTE When the measurement fails to get results, such as: failing to in synchronization or the slot under test is DwPTS/UpPTS or inactive, all the following scalar results will be unavailable and return NaN.</p> <ol style="list-style-type: none"> 1. RMS EVM: (double) [percent] 2. The RMS-averaged EVM of de-spreaded symbols in the specified code (spreading code length and code channel), timeslot and sub-frame. 3. Peak EVM: (double) [percent] The peak symbol EVM in the specified code (spreading code length and code channel), timeslot and sub-frame. 4. Peak position of peak EVM: (float) [symbol] The index of symbol which has the maximum EVM in the specified code channel, timeslot and sub-frame. 5. Rms Mag Error: (double) [percent] The RMS-averaged magnitude error of de-spreaded symbols in the specified code (spreading code length and code channel), timeslot and sub-frame. 6. Peak Mag Error: (double) [percent] The peak symbol Mag Error in the specified code (spreading code length and code channel), timeslot and sub-frame. 7. Peak position of peak Mag Error: (float) [symbol] The index of symbol which has the maximum magnitude error in the specified code channel, timeslot and sub-frame. 8. Rms Phase Error: (double) [deg] The RMS-averaged phase error of de-spreaded symbols in the specified code (spreading code length and code channel), timeslot and sub-frame. 9. Peak Phase Error: (double) [deg] The peak symbol Phase Error in the specified code (spreading code length and code channel), timeslot and sub-frame. 10. Peak position of peak phase Error: (float) [symbol] The index of symbol which has the with maximum phase error in the specified code channel, timeslot and sub-frame. 11. Code Phase Error: (double) [deg] The phase offset of the code channel relative to the DwPTS pilot time slot. 12. Number of Active Channels: (float) [NA] |

The number of active channels in the specified timeslot and sub-frame.

13. Total Data Power: (double) [dBm]

The total data power of the selected timeslot and sub-frame. It is the power used to normalize CDP and CDE.

14. Code Domain Power(dBm): (double) [dBm]

The absolute signal power of specified code channel.

15. Code Domain Power(dB): (double) [dB]

The signal power of specified code channel normalized to the total signal power.

16. Code Domain Error (dBm): (double) [dBm]

The code domain error of the specified code channel.

17. Code Domain Error(dB): (double) [dB]

The code domain error of the specified code channel.

18. Peak Active CDE (double) [dB]

The peak CDE in dB among the active channel in the specified timeslot.

19. Spreading Code Length of Peak Active CDE: (float) [NA]

The spreading code length of peak active CDE in the specified timeslot and sub-frame.

20. Code Channel No. of Peak Active CDE: (float) [NA]

The code channel No. of peak active CDE in the specified timeslot and sub-frame.

21. Peak CDE (double) [dB]

The peak CDE in dB among all the channel in the specified timeslot.

22. Spreading Code Length of Peak CDE: (float) [NA]

The spreading code length of peak CDE in the specified timeslot and sub-frame.

23. Code Channel No. of Peak CDE: (float) [NA]

The code channel No. of peak CDE in the specified timeslot and sub-frame.

24. Number of Midamble Shifts: (float) [NA]

The number of midamble shifts detected in the specified timeslot.

25. Mod Detection: (float)[NA]

The modulation mod has been detected. 0 stands for QPSK, 1 stands for 8PSK, 2 stands for 16QAM and 3 for 64QAM.

2 Code Length Vector (float) [NA]

Return the vector containing information of the spreading code length of each code channel, active or inactive, in the specified timeslot.

There are 16 numbers in this vector. When composite is ON, the code lengths in the vector are determined by the code length of all active channels and set to 16 for the inactive channels. When composite is OFF, the code lengths are all the same to be the spread code length in display.

If the code length is less than the max spreading code length 16, the length value in the vector is duplicated (16/spreading code length) times. The purpose of this vector is providing the code length information for each value in Active Flag Vector, Un-normalized Code Domain Power Vector, Normalized Code Domain Power Vector, Un-normalized Code Domain Error Vector, and Normalized Code Domain Error Vector.

Its data are lined according to the increasing code index,

Example:

Configuration1: There are five active code channels in one timeslot, C16(0), C8(1), C16(5), C4(2) and C8(7). Like this,



And the yellow block denotes inactive channel.

So the values in this vector should be {16, 16, 8, 8, 16, 16, 16, 16, 4, 4, 4, 4, 16, 16, 8, 8}.

Note: When the measurement fails to get synchronization or the slot under test is DwPTS/UpPTS or inactive, and so on, 16 NaN will be returned.

3 **Active Flag Vector (float) [NA]**

Return the vector containing information whether or not the specified channel is active, as a series of comma-separated points. "1" denotes active, and "0" denotes inactive.

There are 16 numbers in this vector. If the channel's code length (indicated by the value on the same position within the Code Length Vector) is less than the max spreading code length 16, the flag is duplicated (16/spreading code length) times. Its data are lined according to the increasing code index.

Take Configuration 1 for example, the values in this vector should be {1, 0, 1, 1, 0, 1, 0, 0, 1, 1, 1, 1, 0, 0, 1, 1}.

Note: When the measurement fails to get synchronization or the slot under test is DwPTS/UpPTS or inactive, and so on, all the flags in this vector will be 0.0.

4 **Unnormalized Code Domain Power Vector (float) [dBm]**

Return the vector containing unnormalized CDP information for the specified code channel, as a series of comma-separated points.

There are 16 numbers in this vector. If the channel's code length (indicated by the value on the same position within the Code Length Vector) is less than the max spreading code length 16, the power is duplicated (16/spreading code length) times. Its data are lined according to the increasing code index.

Take Configuration 1 for example, the values in this vector should be {P1, Px, P2, P2, Px, P3, Px, Px, P4, P4, P4, P4, Px, Px, P5, P5}. Px is the power on code channel C16(x).

Note: When the measurement fails to get the result, such as: failing to in synchronization or the slot under test is DwPTS/UpPTS or inactive, 16 NaN will be returned.

5 **Normalized Code Domain Power Vector (float) [dB]**

Return the vector containing normalized CDP information for the specified code channel, as a series of comma-separated points.

There are 16 numbers in this vector. If the channel's code length (indicated by the value on the same position within the Code Length Vector) is less than the max spreading code length 16, the power is duplicated (16/spreading code length) times. Its data are lined according to the increasing code index.

Take Configuration 1 for example, the values in this vector should be {P1, Px, P2, P2, Px, P3, Px, Px, P4, P4, P4, P4, Px, Px, P5, P5}. Px is the power on code channel C16(x).

... ..

Note: When the measurement fails to get the result, such as: failing to in synchronization or the slot under test is DwPTS/UpPTS or inactive, 16 NaN will be returned.

6 **Unnormalized Code Domain Error Vector (float) [dBm]**

Return the vector containing unnormalized CDE information for the specified code channel, as a series of comma-separated points.

There are 16 numbers in this vector. If the channel's code length (indicated by the value on the same position within the Code Length Vector) is less than the max spreading code length 16, the error is duplicated (16/spreading code length) times. Its data are lined according to the increasing code index.

Take Configuration 1 for example, the values in this vector should be {E1, Ex, E2, E2, Ex, E3, Ex, Ex, E4, E4, E4,

| | |
|----|---|
| | <p>E4, Ex, Ex, E5, E5}. Ex is the power on code channel C16(x).</p> <p>Note: When the measurement fails to get the result, such as: failing to in synchronization or the slot under test is DwPTS/UpPTS or inactive, 16 NaN will be returned.</p> |
| 7 | <p>Normalized Code Domain Error Vector (float) [dB]</p> <p>Return the vector containing normalized CDE information for the specified code channel, as a series of comma-separated points.</p> <p>There are 16 numbers in this vector. If the active channel's code length (specified by the value on the same position within the Code Length Vector) is less than the max spreading code length 16, the error is duplicated (16/spreading code length) times. Its data are lined according to the increasing code index.</p> <p>Take Configuration 1 for example, the values in this vector should be {E1, Ex, E2, E2, Ex, E3, Ex, Ex, E4, E4, E4, E4, Ex, Ex, E5, E5}. Ex is the power on code channel C16(x).</p> <p>Note: When the measurement fails to get the result, such as: failing to in synchronization or the slot under test is DwPTS/UpPTS or inactive, 16 NaN will be returned.</p> |
| 8 | <p>Symbol Magnitude Error Vector (float) [percent]</p> <p>Return symbol magnitude error vector for the specified code channel and spread code length, as a series of comma-separated points.</p> <p>The length of the vector depends on the number of symbols in the code channel. The maximum length is 704.</p> <p>Note: When the measurement fails to get the result, such as: failing to in synchronization or the slot under test is DwPTS/UpPTS or inactive, one NaN will be returned.</p> |
| 9 | <p>Symbol Phase Error Vector (float) [deg]</p> <p>Return symbol phase error vector for the specified code channel and spread code length, as a series of comma-separated points.</p> <p>The length of the vector depends on the number of symbols in the code channel. The maximum length is 704.</p> <p>Note: When the measurement fails to get the result, such as: failing to in synchronization or the slot under test is DwPTS/UpPTS or inactive, one NaN will be returned.</p> |
| 10 | <p>Symbol EVM Vector (float) [percent]</p> <p>Return symbol EVM vector for the specified code channel and spread code length, as a series of comma-separated points.</p> <p>The length of the vector depends on the number of symbols in the code channel. The maximum length is 704.</p> <p>Note: When the measurement fails to get the result, such as: failing to in synchronization or the slot under test is DwPTS/UpPTS or inactive, one NaN will be returned.</p> |
| 11 | <p>Unnormalized I/Q Symbol Polar Vector (float) [volts]</p> <p>Return unnormalized I/Q data of demod symbols in the specified code channel (Code Length) and code layer (Spread Code Length), as a series of comma-separated points. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.</p> <p>The length of the vector depends on the number of symbols in the code channel.</p> <p>Note: When the measurement fails to get the result, such as: failing to in synchronization or the slot under test is DwPTS/UpPTS or inactive, one NaN will be returned.</p> |
| 12 | <p>Normalized I/Q Symbol Polar Vector (float) [NA]</p> <p>Return normalized I/Q data of demod symbols in the specified code channel (Code Length) and code layer (Spread Code Length), as a series of comma-separated points. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.</p> <p>The length of the vector depends on the number of symbols in the code channel.</p> |

| | |
|----|---|
| | Note: When the measurement fails to get the result, such as: failing to in synchronization or the slot under test is DwPTS/UpPTS or inactive, one NaN will be returned. |
| 13 | <p>Symbol Power Vector (float) [dBm]</p> <p>Return symbol power vector for the specified code channel and spread code length, as a series of comma-separated points.</p> <p>The length of the vector depends on the number of symbols in the code channel.</p> <p>Note: When the measurement fails to get the result, such as: failing to in synchronization or the slot under test is DwPTS/UpPTS or inactive, one NaN will be returned.</p> |
| 14 | <p>Demod Bits Vector (float) [NA]</p> <p>Return the vector containing the demod binary bits for each symbol in the specified code channel, as a series of comma-separated trace points.</p> <p>The length depends on the number of bits in the specified code channel.</p> <p>Note: When the measurement fails to get the result, such as: failing to in synchronization or the slot under test is DwPTS/UpPTS or inactive, this vector will be unavailable, and one NaN will be returned.</p> |
| 15 | <p>Midamble Shift Vector (float) [NA]</p> <p>Return the vector containing the midamble shift detected in the specified timeslot, as a series of comma-separated trace points.</p> <p>The length depends on the number of detected midamble shifts in the specified timeslot, it can be gotten by querying the scalar result [24], Number of User.</p> <p>Note: When there is no midamble shift existing in the analyzed timeslot, or when the measurement fails to get the result, such as: failing to in synchronization or the slot under test is DwPTS/UpPTS or inactive, this vector will be unavailable, and one NaN will be returned.</p> |

Code Domain Measurement Description

Code Domain measurement provides all the properties/methods for demodulating and analyzing a 3GPP N-TDD 1.28Mcps, TD-SCDMA, modulated signal according to the user specified sub-frame, time slot, code channel and spread code length. It can descramble, despread and demodulate TD-SCDMA modulated signals both uplink and downlink directions to provide the power data and error data for an individual code channel and layer for a specified timeslot and sub-frame. These results comprise of Channel EVM, Channel Magnitude Error, Channel Phase Error, Channel Code Phase Error, Modulation Format, Channel CDP and Channel CDE.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Amplitude (AMPTD) Y Scale

The AMPLITUDE Y Scale key accesses the menu to set the desired vertical scale and associated settings.

Default numbers are independent for each window.

See Front Panel Key in the "Common Measurement Functions" for more information.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Ref Value

This key allows you to set the display reference. Since the Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

This key is only available in Code Domain EVM Window, Code Domain Mag Error Window, Code Domain Phase Error Window, Code Domain Power Window, Code Domain Error Window and Code Domain Symbol Power Window.

| | |
|----------------------|------------------|
| Key Path | AMPTD Y Scale |
| Initial S/W Revision | A.01.60 or later |

Y Ref Value (I/Q Error View – Code Domain Mag Error Window)

This key sets the reference value in the Code Domain Mag Error window.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:Y[:SCALE]:RLEVel <real> :DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:Y[:SCALE]:RLEVel? |
| Example | DISP:CDP:VIEW3:WIND:TRAC:Y:RLEV 0.0 DISP:CDP:VIEW3:WIND:TRAC:Y:RLEV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW3: I/Q Error View WINDow[1]: Code Domain Mag Error Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | 0.0 |
| State Saved | Saved in instrument state. |
| Min | 0.0 |
| Max | 500.0 |
| Initial S/W Revision | A.01.60 or later |

Y Ref Value (I/Q Error View –Code Domain Phase Error Window)

This key sets the reference value in the Code Domain Phase Error window.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow2:TRACe:Y[:SCALE]:RLEVel <real> :DISPlay:CDPower:VIEW3:WINDow2:TRACe:Y[:SCALE]:RLEVel? |
| Example | DISP:CDP:VIEW3:WIND2:TRAC:Y:RLEV 0.0 DISP:CDP:VIEW3:WIND2:TRAC:Y:RLEV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW3 : I/Q Error View WINDow2: Code Domain Phase Error Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | 0.0 |
| State Saved | Saved in instrument state. |
| Min | 0.0 |
| Max | 10000.0 |
| Initial S/W Revision | A.01.60 or later |

Y Ref Value (I/Q Error View – Code Domain EVM Window)

This key sets the reference value in the Code Domain EVM window.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow3:TRACe:Y[:SCALE]:RLEVel <real> :DISPlay:CDPower:VIEW3:WINDow3:TRACe:Y[:SCALE]:RLEVel? |
| Example | DISP:CDP:VIEW3:WIND3:TRAC:Y:RLEV 0.0 DISP:CDP:VIEW3:WIND3:TRAC:Y:RLEV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW3 : I/Q Error View WINDow3: Code Domain EVM Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | 0.0 |
| State Saved | Saved in instrument state. |
| Min | 0.0 |

| | |
|----------------------|------------------|
| Max | 500.0 |
| Initial S/W Revision | A.01.60 or later |

Y Ref Value (Code Domain Symbol Power Window)

This key sets the reference value in the Code Domain Symbol Power window.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW4 5:WINDow2:TRACe:Y[:SCALE]:RLEVel <real> :DISPlay:CDPower:VIEW4 5:WINDow2:TRACe:Y[:SCALE]:RLEVel? |
| Example | DISP:CDP:VIEW4:WIND2:TRAC:Y:RLEV 0.0 DISP:CDP:VIEW4:WIND2:TRAC:Y:RLEV? DISP:CDP:VIEW5:WIND2:TRAC:Y:RLEV 0.0 DISP:CDP:VIEW5:WIND2:TRAC:Y:RLEV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW4 : Code Domain View VIEW5 : Demod Bits View WINDow2: Code Domain Symbol Power Window on Code Domain View or Demod Bits View |
| Couplings | See Restriction and Notes |
| Preset | 0.0 |
| State Saved | Saved in instrument state. |
| Min | -250.0 |
| Max | 250.0 |
| Initial S/W Revision | A.01.60 or later |

Y Ref Value (Code Domain Power Window)

This key sets the power reference value for the power results in the Code Domain Power window.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW[1] 4 5:WINDow[1]:TRACe:Y[:SCALE]:RLEVel <real> :DISPlay:CDPower:VIEW[1] 4 5:WINDow[1]:TRACe:Y[:SCALE]:RLEVel? |
| Example | DISP:CDP:VIEW:WIND:TRAC:Y:RLEV 0.0 DISP:CDP:VIEW:WIND:TRAC:Y:RLEV? DISP:CDP:VIEW4:WIND:TRAC:Y:RLEV 0.0 DISP:CDP:VIEW4:WIND:TRAC:Y:RLEV? |

| | |
|----------------------|---|
| | DISP:CDP:VIEW5:WIND:TRAC:Y:RLEV 0.0 DISP:CDP:VIEW5:WIND:TRAC:Y:RLEV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. Couple with Normalize: If Normalize is On, the Unit is dB; Otherwise, the Unit is dBm VIEW[1] : CDP Graph and Metrics View VIEW4 : Code Domain View VIEW5 : Demod Bits View WINDow[1]: Code Domain Power Window on CDP Graph and Metrics View or Code Domain View, Demod Bits View |
| Preset | 0.0 |
| State Saved | Saved in instrument state. |
| Min | -250.0 |
| Max | 250.0 |
| Initial S/W Revision | A.01.60 or later |

Y Ref Value (Code Domain Error Window)

This key sets the power reference value for the power results in the Code Domain Error window.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:RLEVel <real> :DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:RLEVel? |
| Example | DISP:CDP:VIEW2:WIND:TRAC:Y:RLEV 0.0 DISP:CDP:VIEW2:WIND:TRAC:Y:RLEV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. Couple with Normalize: If Normalize is On, the Unit is dB; Otherwise, the Unit is dBm VIEW2 : CDE Graph and Metrics View WINDow[1]: Code Domain Error windows on CDE Graph and Metrics View |
| Preset | 0.0 |
| State Saved | Saved in instrument state. |
| Min | -250.0 |
| Max | 250.0 |
| Initial S/W Revision | A.01.60 or later |

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See ["Dual Attenuator Configurations:" on page 1705](#)

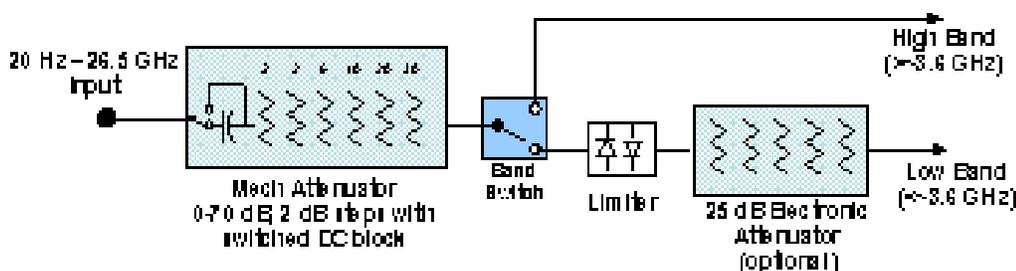
See ["Single Attenuator Configuration:" on page 1706](#)

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

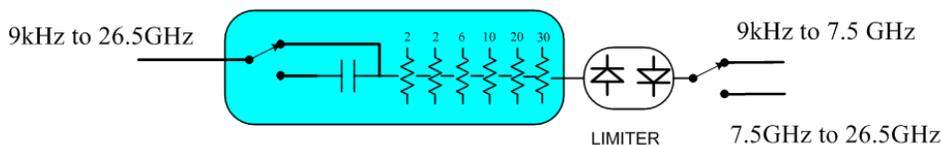
| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Dependencies | In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case. |
| Readback Line | Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2232, and " Enable Elec Atten " on page 2234 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

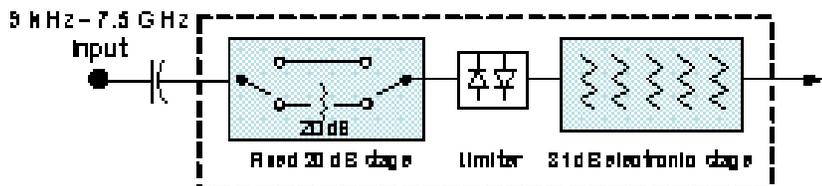


Configuration 2: Mechanical attenuator, no optional electronic attenuator



(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the “Dual Attenuator” configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See "[Attenuator Configurations and Auto/Man](#)" on page 1708

| | |
|----------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :ATTenuation <rel_amp1> |

```
[ :SENSe ] :POWer [ :RF ] :ATTenuation?
[ :SENSe ] :POWer [ :RF ] :ATTenuation:AUTO OFF|ON|0|1
[ :SENSe ] :POWer [ :RF ] :ATTenuation:AUTO?
```

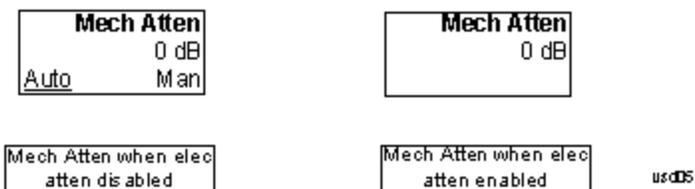
| | |
|----------------|--|
| Example | <p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of “main” attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p> |
| Dependencies | <p>Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the Auto/Man selection is not available, and the Auto/Man line on the key disappears.</p> <p>In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the "Enable Elec Atten" on page 2234 key description.</p> <p>See "Attenuator Configurations and Auto/Man" on page 1708 for more information on the Auto/Man functionality of Attenuation.</p> |
| Couplings | <p>When (Mech) Atten is in Auto, it uses the following algorithm to determine a value:</p> <p>If the USB Preamp is connected to USB, use 0 dB.</p> <p>Otherwise, $Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel + IF\ Gain$.</p> <p>Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto.</p> <p>The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).</p> <p>The “IF Gain” term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.</p> <p>In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.</p> |
| Preset | <p>The preset for Mech Attenuation is “Auto.”</p> <p>The Auto value of attenuation is:</p> <p>CXA, EXA, MXA and PXA: 10 dB</p> |
| State Saved | <p>Saved in instrument state</p> |
| Min | <p>0 dB</p> <p>The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.</p> |
| Max | <p>CXA N9000A–503/507: 50 dB</p> <p>CXA N9000A–513/526: 70dB</p> |

| | |
|--------------------------|--|
| | EXA: 60 dB MXA and PXA: 70 dB In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 1710](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2233](#)

See ["More Information" on page 1709](#)

| | |
|----------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :EATTenuation:STATe OFF ON 0 1 |

| [:SENSe]:POWer[:RF]:EATTenuation:STATe? | |
|---|---|
| Example | POW:EATT:STAT ON |
| Dependencies | <p>This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233.</p> <p>The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out.</p> <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in all measurements; in particular, it is not available in the Swept SA measurement.</p> |
| Couplings | Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled

- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples
- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :EATTenuation <rel_ampl> [:SENSe] :POWer [:RF] :EATTenuation? |
| Notes | Electronic Attenuation's specification is defined only when Mechanical Attenuation is 6 dB. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no "electronic attenuator" there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a "soft" attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The "soft" attenuation is treated as an addition to the "main" attenuation value set by the Atten softkey or the POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out. |
| Preset | 0 dB |
| State Saved | Saved in instrument state |
| Min | 0 dB |
| Max | Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :RANGe:OPTimize IMMEDIATE |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under ["Adjust Atten for Min Clip" on page 2237](#) each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the

first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|---------------------------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation OFF ELECtrical COMBined</code> <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code> |
| Notes | The SCPI parameter ELECtrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECtrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip |
| State Saved | Saved in instrument state |
| Range | Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------------|--|
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe:AUTO?</code> |
| Notes | ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off" |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT OFF |
| Initial S/W Revision | Prior to A.02.00 |

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT ELEC |
| Initial S/W Revision | Prior to A.02.00 |

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT COMB |
| Initial S/W Revision | Prior to A.02.00 |

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

| | |
|----------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] 10 dB 2 dB [:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] ? |
| Example | POW:ATT:STEP 2 |
| Notes | Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10. |
| Dependencies | Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error. |

| | |
|--------------------------|---|
| Couplings | When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB |
| Preset | PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA) |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Scale/Div

This key allows you to enter a numeric value to change the vertical display sensitivity.

This key is only available in Code Domain EVM Window, Code Domain Mag Error Window, Code Domain Phase Error Window, Code Domain Power Window, Code Domain Error Window and Code Domain Symbol Power Window.

| | |
|----------------------|------------------|
| Key Path | AMPTD Y Scale |
| Initial S/W Revision | A.01.60 or later |

Y Scale/Div (I/Q Error View – Code Domain Mag Error Window)

This key sets the sensitivity of measurement result in the Code Domain Mag Error window.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:Y[:SCALE]:PDIVision <real> :DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:Y[:SCALE]:PDIVision? |
| Example | DISP:CDP:VIEW3:WIND:TRAC:Y:PDIV 10.0 DISP:CDP:VIEW3:WIND:TRAC:Y:PDIV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW3: I/Q Error View WINDow[1]: Code Domain Mag Error Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | 0.1 |
| State Saved | Saved in instrument state. |
| Min | 0.1 |
| Max | 50.0 |
| Initial S/W Revision | A.01.60 or later |

Y Scale/Div (I/Q Error View – Code Domain Phase Error Window)

This key sets the sensitivity of measurement result in the Code Domain Phase Error window.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow2:TRACe:Y[:SCALe]:PDIVision <real> :DISPlay:CDPower:VIEW3:WINDow2:TRACe:Y[:SCALe]:PDIVision? |
| Example | DISP:CDP:VIEW3:WIND2:TRAC:Y:PDIV 10.0 DISP:CDP:VIEW3:WIND2:TRAC:Y:PDIV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW3 : I/Q Error View WINDow2: Code Domain Phase Error Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | 0.1 |
| State Saved | Saved in instrument state. |
| Min | 0.1 |
| Max | 1000.0 |
| Initial S/W Revision | A.01.60 or later |

Y Scale/Div (I/Q Error View – Code Domain EVM Window)

This key sets the sensitivity of measurement result in the Code Domain EVM window.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow3:TRACe:Y[:SCALe]:PDIVision <real> :DISPlay:CDPower:VIEW3:WINDow3:TRACe:Y[:SCALe]:PDIVision? |
| Example | DISP:CDP:VIEW3:WIND3:TRAC:Y:PDIV 10.0 DISP:CDP:VIEW3:WIND3:TRAC:Y:PDIV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW3 : I/Q Error View WINDow3: Code Domain EVM Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | 0.1 |
| State Saved | Saved in instrument state. |
| Min | 0.1 |

| | |
|----------------------|------------------|
| Max | 50.0 |
| Initial S/W Revision | A.01.60 or later |

Y Scale/Div (Code Domain Symbol Power Window)

This key sets the sensitivity of measurement result in the Code Domain Symbol Power window.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW4 5:WINDow2:TRACe:Y[:SCALE]:PDIVision <rel_ampl> :DISPlay:CDPower:VIEW4 5:WINDow2:TRACe:Y[:SCALE]:PDIVision? |
| Example | DISP:CDP:VIEW4:WIND2:TRAC:Y:PDIV 10.0 dB DISP:CDP:VIEW4:WIND2:TRAC:Y:PDIV? DISP:CDP:VIEW5:WIND2:TRAC:Y:PDIV 10.0 dB DISP:CDP:VIEW5:WIND2:TRAC:Y:PDIV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW4 : Code Domain View VIEW5 : Demod Bits View WINDow2: Code Domain Symbol Power Window on Code Domain View or Demod Bits View |
| Couplings | See Restriction and Notes |
| Preset | 10.0 |
| State Saved | Saved in instrument state. |
| Min | 0.1 |
| Max | 20.0 |
| Initial S/W Revision | A.01.60 or later |

Y Scale/Div (Code Domain Power Window)

This key sets the sensitivity of the power results in the Code Domain Power window.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW[1] 4 5:WINDow[1]:TRACe:Y[:SCALE]:PDIVision <rel_ampl> :DISPlay:CDPower:VIEW[1] 4 5:WINDow[1]:TRACe:Y[:SCALE]:PDIVision? |
| Example | DISP:CDP:VIEW:WIND:TRAC:Y:PDIV 10.0 dB DISP:CDP:VIEW:WIND:TRAC:Y:PDIV? DISP:CDP:VIEW4:WIND:TRAC:Y:PDIV 10.0 dB |

| | |
|----------------------|--|
| | DISP:CDP:VIEW4:WIND:TRAC:Y:PDIV? DISP:CDP:VIEW5:WIND:TRAC:Y:PDIV 10.0 dB DISP:CDP:VIEW5:WIND:TRAC:Y:PDIV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW[1] : CDP Graph and Metrics View VIEW4 : Code Domain View VIEW5 : Demod Bits View WINDow[1]: Code Domain Power Window on CDP Graph and Metrics View or Code Domain View, Demod Bits View |
| Couplings | See Restriction and Notes |
| Preset | 10.0 |
| State Saved | Saved in instrument state. |
| Min | 0.1 |
| Max | 20.0 |
| Initial S/W Revision | A.01.60 or later |

Y Scale/Div (Code Domain Error Window)

This key sets the sensitivity of the power results in the Code Domain Error window.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl> :DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision? |
| Example | DISP:CDP:VIEW2:WIND:TRAC:Y:PDIV 10.0 DISP:CDP:VIEW2:WIND:TRAC:Y:PDIV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW2 : CDE Graph and Metrics View WINDow[1]: Code Domain Error windows on CDE Graph and Metrics View |
| Couplings | See Restriction and Notes |
| Preset | 10.0 |
| State Saved | Saved in instrument state. |
| Min | 0.1 |
| Max | 20.0 |
| Initial S/W Revision | A.01.60 or later |

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 1718](#).

| | |
|------------------------------|---|
| Key Path | AMPTD Y Scale |
| Remote Command | [:SENSe] :POWer [:RF] :PCENter |
| Example | POW:PCEN |
| Notes | Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Couplings | <p>The active marker position determines where the centering will be attempted.</p> <p>If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.</p> |
| Status Bits/OPC dependencies | <p>When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command.</p> <p>The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.</p> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when "Presel Center" on page 2240 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

| | |
|------------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :POWer [:RF] :PADJust <freq></code> <code>[:SENSe] :POWer [:RF] :PADJust?</code> |
| Example | <code>POW:PADJ 100KHz</code> <code>POW:PADJ?</code> |
| Notes | The value on the key reads out to 0.1 MHz resolution. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Preset | 0 MHz |
| State Saved | The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle. |
| Min | -500 MHz |
| Max | 500 MHz |
| Default Unit | Hz |
| Backwards Compatibility SCPI | <code>[:SENSe] :POWer [:RF] :MW:PADJust</code> <code>[:SENSe] :POWer [:RF] :MMW:PADJust</code> |

| | |
|--------------------------|--|
| | PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to [:SENSe]:POWer[:RF]:PADJust |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------|---|
| Remote Command | [:SENSe]:POWer[:RF]:PADJust:PRESelector MWAVE MMWave EXTERNAL [:SENSe]:POWer[:RF]:PADJust:PRESelector? |
| Notes | PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE |
| Initial S/W Revision | Prior to A.02.00 |

Y Axis Unit

Displays the menu keys that enable you to change the vertical (Y) axis amplitude unit. The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types. For example, if Scale Type has been set to Log, and you set Y Axis Unit to dBm, pressing Scale Type (Log) sets the Y Axis Unit to dBm. If Scale Type has been set to Lin and you set Y Axis Unit to V, pressing Scale Type (Lin) sets the Y Axis Unit to V. Pressing Scale Type (Log) again sets the Y axis unit back to dBm.

NOTE

The units of current (A, dBmA, dBuA) are calculated based on 50 ohms input impedance.

All four of the EMI units (dBuA/m, dBuV/m, dBG, dBpT) are treated by the instrument exactly as though they were dBuV. The user must load an appropriate correction factor using Amplitude Corrections for accurate and meaningful results.

If a SCPI command is sent to the analyzer that uses one of the EMI units as a terminator, the analyzer treats it as though DBUV had been sent as the terminator.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA |
| Scope | Meas Global |
| Remote Command | :UNIT:POWer DBM DBMV DBMA V W A DBUV DBUA DBPW DBUVM DBUAM DBPT DBG :UNIT:POWer? |
| Example | UNIT:POW dBmV UNIT:POW? |
| Notes | The Y axis unit has either logarithmic or linear characteristics. The set of units that is logarithmic consists of dBm, dBmV, dBmA, dBuV, dBuA, dBuV/m, dBuA/m, dBpT, and dBG. The set of units that are linear consists of V, W, and A. The chosen unit will determine how the reference level and all the amplitude-related outputs like trace data, marker data, etc. read out. |

| | |
|--------------------------|---|
| Notes | <p>The settings of Y Axis Unit and Scale Type, affect how the data is read over the remote interface. When using the remote interface no unit is returned, so you must know what the Y axis unit is to interpret the results:</p> <p>Example 1, set the following: Scale Type (Log) Y Axis Unit, dBm Scale/Div, 1 dB Ref Level, 10 dBm</p> <p>This sets the top line to 10 dBm with each vertical division representing 1 dB. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 5 dBm and will read out remotely as 5.</p> <p>Example 2, set the following: Scale Type (Lin) Y Axis Unit, Volts Ref Level, 100 mV (10 mV/div)</p> <p>This sets the top line to 100 mV and the bottom line to 0 V, so each vertical division represents 10 mV. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 50 mV and will read out remotely as 50.</p> |
| Dependencies | <p>If an amplitude correction with an Antenna Unit other than None is applied and enabled, then that antenna unit is forced and the key with that unit is the only Y Axis Unit available. All other Y Axis Unit keys are grayed out.</p> <p>If an amplitude correction with an Antenna Unit other than None is applied and enabled, and you then turn off that correction or set Apply Corrections to No, the Y Axis Unit that existed before the Antenna Unit was applied is restored.</p> |
| Couplings | The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types |
| Preset | dBm for log scale, V for linear. The true 'preset' value is dBm, since at preset the Y Scale type is set to logarithmic. |
| State Saved | Saved in instrument state |
| Readback line | 1-of-N selection |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.04.00, A.11.00 |

dBm

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBm.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBM |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmV

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmV.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmV |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmA

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmA |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

W

Sets the amplitude unit for the selected amplitude scale (log/lin) to watt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW W |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | W |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

V

Sets the amplitude unit for the selected amplitude scale (log/lin) to volt.

| | |
|----------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW V |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |

| | |
|--------------------------|------------------|
| Readback | V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

A

Sets the amplitude unit for the selected amplitude scale (log/lin) to Ampere.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW A |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ V

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A.

NOTE

The unit dBuA can also appear as an Antenna Unit. This will be used by customers using current probes, because current probes are often supplied with conversion tables that provide the transducer factors. When dBuA is used as an Antenna Unit the normal conversion from power to amps for dBuA (based on the analyzer input impedance) is not done, but instead the conversion is based solely on the Correction that contains the transducer factors. This is what distinguishes dBuA as a normal unit from dBuA as an antenna unit. When querying the Y-Axis unit, you can query the Antenna Unit to distinguish between regular dBuA and the dBuA antenna unit. If :CORR:CSET:ANT? returns NOC (for No Conversion), you are using a normal Y Axis dBuA. If it returns UA you are using an Antenna Unit dBuA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBpW

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpW.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBPW |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

Antenna Unit

When a Correction is turned on that uses an Antenna Unit, the Y Axis Unit changes to that Antenna Unit. All of the keys in the Y-Axis Unit menu are then greyed out, except the Antenna Unit key. The unit being used is shown on this key and is shown as selected in the submenu.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback line | Currently selected unit |
| Initial S/W Revision | A.11.00 |

dB μ V/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUVM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ V/m |
| Initial S/W Revision | A.02.00 |

dB μ A/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A/m |
| Initial S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

dBpT

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpT. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBPT |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dBpT |
| Initial S/W Revision | A.02.00 |

dBG

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBG. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBG |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | DBG |
| Initial S/W Revision | A.02.00 |

None

This is selected if no Antenna Unit is currently on, however you cannot actually set this value, since it is always grayed out. The key is included simply to provide an indication on the Readback line of the Antenna Unit key when there is no Antenna Unit selected.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Readback | "None" |
| Initial S/W Revision | A.11.00 |

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

| | |
|----------|--------------------------------------|
| Key Path | AMPTD Y Scale |
| Mode | SA, BASIC, PNOISE, VSA , LTE, LTETDD |

| | |
|--------------------------|---|
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH? |
| Example | :POW:MW:PATH LNP Enables the Low Noise path |
| Notes | If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μ W Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished. |
| Dependencies | Unavailable in BBIQ and External Mixing |
| Preset | All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB MPB option not present and licensed: STD |
| State Saved | Save in instrument state |
| Readback | Value selected in the submenu |
| Initial S/W Revision | A.04.00 |
| Modified at S/W Revision | A.10.00 |

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH STD |
| Readback Text | Standard Path |
| Initial S/W Revision | A.04.00 |

Low Noise Path Enable

You may choose Low Noise Path Enable, which gives a lower noise floor under some circumstances, particularly when operating in the 21–26.5 GHz region. With the Low Noise Path enabled, the low band/high band switch and microwave preamp are bypassed whenever all of the following are true:

- The analyzer is not in the Low Band, meaning:
- the start frequency is above 3.5 GHz and
- the stop frequency is above 3.6 GHz.
- the internal preamp is not installed or (if installed) is set to Off or Low Band

Note that this means that, when any part of a sweep is done in Low Band, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. Also, if the preamp is turned on, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. The only time the Low Noise Path is used is when Low Noise Path Enable is selected, the sweep is completely in High Band (> 3.6 GHz) and no preamp is in use.

See "[More Information](#)" on page 1728

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Measurement | Swept SA |
| Example | :POW:MW:PATH LNP |
| Notes | For measurements that use IQ acquisition, the low noise path is used when the Center Frequency is in High Band (> 3.6 GHz) and no preamp is in use. In other words, the rules above are modified to use only the center frequency to qualify which path to switch in. This is not the case for FFT's in the Swept SA measurement; they use the same rules as swept measurements. |
| Dependencies | Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Unless Option LNP is present and licensed, key is blank and if SCPI command sent, error -241, "Hardware missing; Option not installed" is generated. |
| Readback Text | Low Noise Path Enable |
| Initial S/W Revision | A.04.00 |

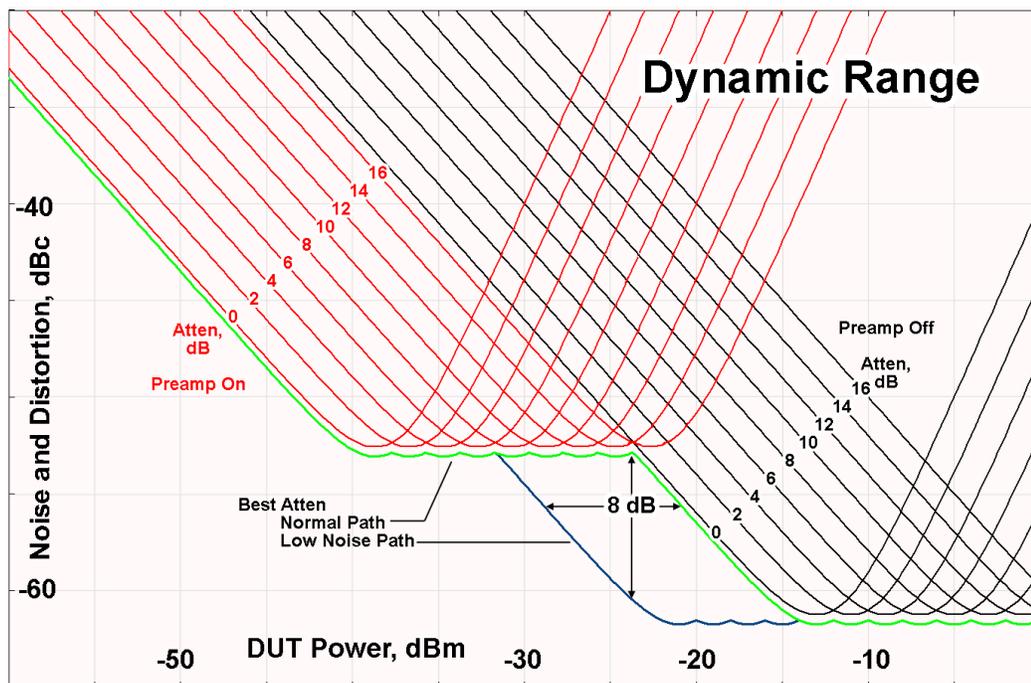
More Information

The user should understand that the Low Noise Path, while giving improved DANL, has the disadvantage of decreased TOI performance and decreased gain compression performance relative to the standard path.

The user should also understand that the bypass switch is a mechanical switch and has finite life, so if the Low Noise Path is enabled, it is possible to cause frequent cycling of this switch by frequently changing analyzer settings such that the above conditions hold true only some of the time. A user making tests of this nature should consider opting for the Standard Path, which will never throw the bypass switch, at the expense of some degraded noise performance.

The low noise path is useful for situations where the signal level is so low that the analyzer performance is dominated by noise even with 0 dB attenuation, but still high enough that the preamp option would have excessive third-order intermodulation or compression. The preamp, if purchased and used, gives better noise floor than does the “Low Noise Path.” However, its compression threshold and third-order intercept are much poorer than that of the non-preamp path. There are some applications, typically for signals around -30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range

The graph below illustrates the concept. It shows, in red, the performance of an analyzer at different attenuation settings, both with the preamp on and off, in a measurement that is affected by both analyzer noise and analyzer TOI. The green shows the best available dynamic range, offset by 0.5 dB for clarity. The blue shows how the best available dynamic range improves for moderate signal levels with the low noise path switched in. In this illustration, the preamp improves the noise floor by 15 dB while degrading the third-order intercept by 30 dB, and the low noise path reduces loss by 8 dB. The attenuator step size is 2 dB.



There are other times where selecting the low noise path improves performance, too. Compression-limited measurements such as finding the nulls in a pulsed-RF spectrum can profit from the low noise path in a way similar to the TOI-limited measurement illustrated. Accuracy can be improved when the low noise path allows the optimum attenuation to increase from a small amount like 0, 2 or 4 dB to a larger amount, giving better return loss at the analyzer input. Harmonic measurements, such as second and third harmonic levels, are much improved using the low noise path because of the superiority of that path for harmonic (though not intermodulation) distortion performance.

μW Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselector is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, μW Path Control |
| Example | :POW:MW:PATH MPB |
| Dependencies | Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated. |
| Readback Text | μW Preselector Bypass |
| Initial S/W Revision | A.04.00 |

| | |
|----------------|---|
| Remote Command | <code>[:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1</code> <code>[:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ?</code> |
| Example | :POW:MW:PRES OFF Bypasses the microwave preselector |
| Notes | The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB) |
| Preset | ON |

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWeR [:RF] :GAIN [:STATe] OFF ON 0 1 [:SENSe] :POWeR [:RF] :GAIN [:STATe] ? |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. The preamp is not available when the electronic/soft attenuator is enabled. |
| Couplings | The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range. Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected. Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

| | |
|----------------|---|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWeR [:RF] :GAIN :BAND LOW FULL [:SENSe] :POWeR [:RF] :GAIN :BAND ? |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band |

| | |
|----------------------|--|
| | parameter is to LOW instead of FULL, and an "Option not installed" message is generated. |
| Preset | LOW |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns the internal preamp off

| | |
|----------------------|--------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

| | |
|----------------------|------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND LOW |
| Readback | Low Band |
| Initial S/W Revision | Prior to A.02.00 |

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND FULL |
| Readback | Full Range |
| Initial S/W Revision | Prior to A.02.00 |

Ref Position

This key allows you to set the display reference position to either Top, Ctr (center), or Bot (Bottom).

This key is only available in Code Domain EVM Window, Code Domain Mag Error Window, Code Domain Phase Error Window, Code Domain Power Window, Code Domain Error Window and Code Domain Symbol Power Window.

| | |
|----------------------|------------------|
| Key Path | AMPTD Y Scale |
| Initial S/W Revision | A.01.60 or later |

Y Ref Position (I/Q Error View – Code Domain Mag Error Window)

This key sets the reference position of the vertical axis in the Code Domain Mag Error window.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP CENTer BOTTom :DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:RPOSition? |
| Example | DISP:CDP:VIEW3:WIND:TRAC:Y:RPOS TOP DISP:CDP:VIEW3:WIND:TRAC:Y:RPOS? |
| Notes | VIEW3: I/Q Error View WINDow[1]: Code Domain Mag Error Window on I/Q Error View |
| Preset | CENTer |
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | A.01.60 or later |

Y Ref Position (I/Q Error View – Code Domain Phase Error Window)

This sets the reference position of the vertical axis in the Code Domain Phase Error window.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow2:TRACe:Y[:SCALe]:RPOSition TOP CENTer BOTTom :DISPlay:CDPower:VIEW3:WINDow2:TRACe:Y[:SCALe]:RPOSition? |
| Example | DISP:CDP:VIEW3:WIND2:TRAC:Y:RPOS TOP DISP:CDP:VIEW3:WIND2:TRAC:Y:RPOS? |
| Notes | VIEW3 : I/Q Error View |

| | |
|----------------------|---|
| | WINDow2: Code Domain Phase Error Window on I/Q Error View |
| Preset | CENTer |
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | A.01.60 or later |

Y Ref Position (I/Q Error View – Code Domain EVM Window)

This key sets the reference position of the vertical axis in the Code Domain EVM window.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow3:TRACe:Y[:SCALE]:RPOSition TOP CENTer BOTTom :DISPlay:CDPower:VIEW3:WINDow3:TRACe:Y[:SCALE]:RPOSition? |
| Example | DISP:CDP:VIEW3:WIND3:TRAC:Y:RPOS TOP DISP:CDP:VIEW3:WIND3:TRAC:Y:RPOS? |
| Notes | VIEW3 : I/Q Error View WINDow3: Code Domain EVM Window on I/Q Error View |
| Preset | BOTTom |
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | A.01.60 or later |

Y Ref Position (Code Domain Symbol Power Window)

This key sets the reference position of the vertical axis in the Code Domain Symbol Power window.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW4 5:WINDow2:TRACe:Y[:SCALE]:RPOSition TOP CENTer BOTTom :DISPlay:CDPower:VIEW4 5:WINDow2:TRACe:Y[:SCALE]:RPOSition? |
| Example | DISP:CDP:VIEW4:WIND2:TRAC:Y:RPOS TOP DISP:CDP:VIEW4:WIND2:TRAC:Y:RPOS? DISP:CDP:VIEW5:WIND2:TRAC:Y:RPOS TOP DISP:CDP:VIEW5:WIND2:TRAC:Y:RPOS? |
| Notes | VIEW4 : Code Domain View VIEW5 : Demod Bits View |

| | |
|----------------------|---|
| | WINDow2: Code Domain Symbol Power Window on Code Domain View or Demod Bits View |
| Preset | CENTer |
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | A.01.60 or later |

Y Ref Position (Code Domain Power Window)

This key sets the reference position of the vertical in the Code Domain Power window.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW[1] 4 5:WINDow[1]:TRACe:Y[:SCALE]:RPOSition TOP CENTER BOTTom :DISPlay:CDPower:VIEW[1] 4 5:WINDow[1]:TRACe:Y[:SCALE]:RPOSition? |
| Example | DISP:CDP:VIEW:WIND:TRAC:Y:RPOS TOP DISP:CDP:VIEW:WIND:TRAC:Y:RPOS? DISP:CDP:VIEW4:WIND:TRAC:Y:RPOS TOP DISP:CDP:VIEW4:WIND:TRAC:Y:RPOS? DISP:CDP:VIEW5:WIND:TRAC:Y:RPOS TOP DISP:CDP:VIEW5:WIND:TRAC:Y:RPOS? |
| Notes | VIEW[1]: CDP Graph and Metrics View VIEW4 : Code Domain View VIEW5 : Demod Bits View WINDow[1]: Code Domain Power Window on CDP Graph and Metrics View or Code Domain View, Demod Bits View |
| Preset | TOP |
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | A.01.60 or later |

Y Ref Position (Code Domain Error Window)

This key sets the reference position of the vertical in the Code Domain Error window.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:RPOSition TOP CENTER BOTTom :DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:RPOSition? |

| | |
|-----------------------------|--|
| Example | DISP:CDP:VIEW2:WIND:TRAC:Y:RPOS TOP DISP:CDP:VIEW2:WIND:TRAC:Y:RPOS? |
| Notes | VIEW2 : CDE Graph and Metrics View WINDow[1]: Code Domain Error windows on CDE Graph and Metrics View |
| Preset | TOP |
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | A.01.60 or later |

Range

This key is only available when I/Q is the selected input. It replaces the Attenuation key in that case.

Each input channel (I and Q) has four internal gain ranges. The maximum allowed voltage in each gain range is slightly more than the nominal value, so the break point between ranges is a couple of millivolts higher than the nominal (setting a peak voltage of 0.502 mV will still map to the 0.5 V Peak range).

| Gain Setting | Volts RMS | Volts Peak | Volts Peak - Peak | dBm (50Ω) | Break Point |
|--------------|-----------|------------|-------------------|-----------|--------------|
| 0 dB | 0.7071 | 1.0 | 2.0 | 10 | n/a |
| 6 dB | 0.3536 | 0.5 | 1.0 | 4 | 0.502 V Peak |
| 12 dB | 0.1768 | 0.25 | 0.5 | -2 | 0.252 V Peak |
| 18 dB | 0.0884 | 0.125 | 0.25 | -8 | 0.127 V Peak |

| | |
|-----------------------------|---|
| Key Path | AMPTD Y Scale |
| Notes | Visible only when the selected input is I/Q. |
| State Saved | No |
| Readback Text | When Range is Auto, "[Auto]" When Range is Man and I & Q are the same, "<range value>" When Range is Man and I & Q are different: "[: <I range value> Q: <Q range value>]" See I Range and Q Range for the <range value> enumeration definition. |
| Initial S/W Revision | Prior to A.02.00 |

Range Auto/Man

The Auto setting for Range causes the range to be set based on the Y Scale settings. When Range is "Auto", the I & Q Range are set based on the top of the Y Scale when the Y scale is in dB units (for example, power), or to the max(abs(top), abs(bottom)) when the Y scale reference is not at the top of the screen.

Not all measurements support Range Auto/Man. If Auto is not supported in the current measurement, this key is grayed out and shows “Man” and MAN is returned to a SCPI query, but this does NOT change the Auto/Man setting for Range. When you go to a measurement that supports Auto, it goes back to Auto if it was previously in Auto mode.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, Range |
| Scope | Meas Global |
| Remote Command | [:SENSe] :VOLTage:IQ:RANGe:AUTO OFF ON 0 1 [:SENSe] :VOLTage:IQ:RANGe:AUTO? |
| Example | Put the I Range and Q Range in manual. VOLT:IQ:RANG:AUTO OFF |
| Dependencies | If Auto is not supported, sending the SCPI command will generate an error. |
| Couplings | When in Auto, both I Range and Q Range are set to the same value, computed as follows: Maximum absolute value is computed for the Y Scale. The top and bottom of the graph are computed based on Ref Value, Scale/Div, and Ref Position. Formula: YMax = max(abs(top), abs(bottom)). The I Range and Q Range are then set to YMax. |
| Preset | ON |
| State Saved | Saved in instrument state |
| Range | Auto Man |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|----------------------|--|
| Remote Command | [:SENSe] :POWer:IQ:RANGe:AUTO OFF ON 0 1 [:SENSe] :POWer:IQ:RANGe:AUTO? |
| Example | Put the I Range and Q Range in manual. POW:IQ:RANG:AUTO OFF |
| Notes | The POW:IQ:RANG:AUTO is an alternate form of the VOLT:IQ:RANG:AUTO command. This is to maintain consistency with I Range and Q Range, which support both the POWER and VOLTage forms of the command. |
| Preset | ON |
| Range | Auto Man |
| Initial S/W Revision | Prior to A.02.00 |

I Range

This is the internal gain range for the I channel when Input Path is I Only or I and I/Q, and it is used for both the I and Q channels when the Input Path is I+jQ. See "[I/Q Gain Ranges](#)" on page 2105.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale, Range |
| Remote Command | [:SENSe] :VOLTage:IQ[:I]:RANGe[:UPPer] <voltage> [:SENSe] :VOLTage:IQ[:I]:RANGe[:UPPer] ? |

| | |
|----------------------|--|
| Example | Set the I Range to 0.5 V Peak VOLT:IQ:RANG 0.5 V |
| Notes | The numeric entries are mapped to the smallest gain range whose break point is greater than or equal to the value, or 1 V Peak if the value is greater than 1 V. |
| Couplings | When Q Same as I is On, the I Range value will be copied to the Q Range. Changing the value will also set Range = Man. |
| Preset | 1 V Peak |
| State Saved | Saved in instrument state |
| Range | 1 V Peak 0.5 V Peak 0.25 V Peak 0.125 V Peak |
| Min | 0.125 V |
| Max | 1 V |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|---|
| Remote Command | <code>[:SENSe] :POWer :IQ [:I] :RANGe [:UPPer] <ampl></code> <code>[:SENSe] :POWer :IQ [:I] :RANGe [:UPPer] ?</code> |
|-----------------------|---|

| | |
|----------------------|--|
| Example | Set the I Range to 0.5 V Peak when Reference Z is 50Ω, and to 1.0 V Peak when Reference Z is 75Ω. POW:IQ:RANG 4 dBm |
| Notes | The POWER form of the command is provided for convenience. It maps to the same underlying gain range parameter as the VOLTage form of the command. The Reference Z (not the I channel Input Z) is used to convert the power to peak voltage, which is then used to set the I Range as with the VOLTage form of the command. The power values of the 4 range states (1V Peak, 0.5V Peak, 0.25V Peak, and 0.125V Peak) will vary with Reference Z. Here are some examples: 50Ω: 10, 4, -2, -8 75Ω: 8.2, 2.2, -3.8, -9.8 600Ω: -0.8, -6.8, -12.8, -18.9 |
| Preset | 10.0 dBm |
| Range | -20 dBm to 10 dBm |
| Min | -20 dBm |
| Max | 10 dBm |
| Initial S/W Revision | Prior to A.02.00 |

1 V Peak

Set the channel gain state to 1 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.5 V Peak

Set the channel gain state to 0.5 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.25 V Peak

Set the channel gain state to 0.25 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.125 V Peak

Set the channel gain state to 0.125 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

Q Range Value

This is the internal gain range for the Q channel. See "[I/Q Gain Ranges](#)" on page 2105. The Q Range only applies to Input Path Q Only and Ind I/Q. For input I+jQ the I Range determines both I and Q channel range settings.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale, Range |
| Remote Command | [:SENSe] :VOLTage:IQ:Q:RANGe[:UPPer] <voltage> [:SENSe] :VOLTage:IQ:Q:RANGe[:UPPer] ? |
| Example | Set the Q Range to 0.5 V Peak VOLT:IQ:Q:RANG 0.5 V |
| Notes | The numeric entries are mapped to the smallest gain range whose break point is greater than or equal to the value, or 1 V Peak if the value is greater than 1 V. The Q Range is only used for Input Path Q Only and Ind I/Q. For input I+jQ the I Range determines both I and Q channel range settings. |
| Couplings | When Q Same as I is On, the I Range value will be copied to the Q Range and the range value keys are disabled. Changing the value will also set Range = Man. |
| Preset | 1 V Peak |

| | |
|----------------------|--|
| State Saved | Saved in instrument state |
| Range | 1 V Peak 0.5 V Peak 0.25 V Peak 0.125 V Peak |
| Min | 0.125 V |
| Max | 1 V |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Remote Command | <code>[:SENSe] :POWer:IQ:Q:RANGe[:UPPer] <ampl></code> <code>[:SENSe] :POWer:IQ:Q:RANGe[:UPPer]?</code> |
| Example | Will set the Q Range to 0.5 V Peak when Reference Z is 50Ω, and to 1.0 V Peak when Reference Z is 75Ω. POW:IQ:Q:RANG 4 dBm |
| Notes | The POWER form of the command is provided for convenience. It maps to the same underlying gain range parameter as the VOLTage form of the command. The Reference Z (not the Q channel Input Z) is used to convert the power to peak voltage, which is then used to set the Q Range as with the VOLTage form of the command. The power values of the 4 range states (1V Peak, 0.5V Peak, 0.25V Peak, and 0.125V Peak) will vary with Reference Z. Here are some examples: 50Ω: 10, 4, -2, -8 75Ω: 8.2, 2.2, -3.8, -9.8 600Ω: -0.8, -6.8, -12.8, -18.9 |
| Preset | 10.0 dBm |
| Range | -20 dBm to 10 dBm |
| Min | -20 dBm |
| Max | 10 dBm |
| Initial S/W Revision | Prior to A.02.00 |

Q Same as I

Many, but not all, usages require the I and Q channels to have an identical setup. To simplify channel setup, the Q Same as I will cause the Q channel range to be mirrored from the I channel. That way you only need to set up one channel (the I channel). The I channel values are copied to the Q channel, so at the time Q Same as I is Off, the I and Q channel setups will be identical.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale, Range, Q Range |
| Remote Command | <code>[:SENSe] :VOLTage POWer:IQ:MIRRored OFF ON 0 1</code> <code>[:SENSe] :VOLTage POWer:IQ:MIRRored?</code> |
| Example | Turn off the mirroring of I Range to Q Range. VOLT:IQ:MIRR OFF POW:IQ:MIRR OFF |

| | |
|----------------------|---|
| Couplings | When On, the I Range value is mirrored (copied) to the Q Range. |
| Preset | On |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Readback Text | "Q Same as I" when On, otherwise none. |
| Initial S/W Revision | Prior to A.02.00 |

1 V Peak

Set the channel gain state to 1 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.5 V Peak

Set the channel gain state to 0.5 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.25 V Peak

Set the channel gain state to 0.25 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.125 V Peak

Set the channel gain state to 0.125 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

I/Q Gain Ranges

See the following sections:

["1 V Peak" on page 2105](#)

"0.5 V Peak" on page 2105

"0.25 V Peak" on page 2105

"0.125 V Peak" on page 2106

1 V Peak

Set the channel gain state to 1 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.5 V Peak

Set the channel gain state to 0.5 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.25 V Peak

Set the channel gain state to 0.25 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.125 V Peak

Set the channel gain state to 0.125 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

Auto Scale

This key allows you to toggle the scale coupling function between On and Off.

NOTE

This key is only available in Code Domain EVM Window, Code Domain Mag Error Window, Code Domain Phase Error Window, Code Domain Power Window, Code Domain Error Window and Code Domain Symbol Power Window.

When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off.

| | |
|----------------------|------------------|
| Key Path | AMPTD Y Scale |
| Initial S/W Revision | A.01.60 or later |

Y Auto Scaling (I/Q Error View – Code Domain Mag Error Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results for the vertical axis in the Code Domain Mag Error window.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 1 OFF ON :DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:COUPle? |
| Example | DISP:CDP:VIEW3:WIND:TRAC:Y:COUP ON DISP:CDP:VIEW3:WIND:TRAC:Y:COUP? |
| Notes | When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. VIEW3: I/Q Error View WINDow[1]: Code Domain Mag Error Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Y Auto Scale (I/Q Error View – Code Domain Phase Error Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results for the vertical axis in the Code Domain Phase Error window.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow2:TRACe:Y[:SCALe]:COUPle 0 1 OFF ON :DISPlay:CDPower:VIEW3:WINDow2:TRACe:Y[:SCALe]:COUPle? |
| Example | DISP:CDP:VIEW3:WIND2:TRAC:Y:COUP ON DISP:CDP:VIEW3:WIND2:TRAC:Y:COUP? |
| Notes | When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. |

| | |
|----------------------|---|
| | VIEW3 : I/Q Error View WINDow2: Code Domain Phase Error Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Y Auto Scale (I/Q Error View – Code Domain EVM Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results for the vertical axis in Code Domain EVM window.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow3:TRACe:Y[:SCALE]:COUPlE 0 1 OFF ON :DISPlay:CDPower:VIEW3:WINDow3:TRACe:Y[:SCALE]:COUPlE? |
| Example | DISP:CDP:VIEW3:WIND3:TRAC:Y:COUP ON DISP:CDP:VIEW3:WIND3:TRAC:Y:COUP? |
| Notes | When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. VIEW3 : I/Q Error View WINDow3: Code Domain EVM Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Y Auto Scale (Code Domain Symbol Power Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results for the vertical axis in Code Domain Symbol Power window.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW4 5:WINDow2:TRACe:Y[:SCALE]:COUPlE 0 1 OFF ON :DISPlay:CDPower:VIEW4 5:WINDow2:TRACe:Y[:SCALE]:COUPlE? |

| | |
|-----------------------------|--|
| Example | DISP:CDP:VIEW4:WIND2:TRAC:Y:COUP ON DISP:CDP:VIEW4:WIND2:TRAC:Y:COUP? DISP:CDP:VIEW5:WIND2:TRAC:Y:COUP ON DISP:CDP:VIEW5:WIND2:TRAC:Y:COUP? |
| Notes | When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. VIEW4 : Code Domain View VIEW5 : Demod Bits View WINDow2: Code Domain Symbol Power Window on Code Domain View or Demod Bits View |
| Couplings | See Restriction and Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Y Auto Scale (Code Domain Power Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results in the Code Domain Power window.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW[1] 4 5:WINDow[1]:TRACe:Y[:SCALE]:COUPle 0 1 OFF ON :DISPlay:CDPower:VIEW[1] 4 5:WINDow[1]:TRACe:Y[:SCALE]:COUPle? |
| Example | DISP:CDP:VIEW:WIND:TRAC:Y:COUP ON DISP:CDP:VIEW:WIND:TRAC:Y:COUP? DISP:CDP:VIEW4:WIND:TRAC:Y:COUP ON DISP:CDP:VIEW4:WIND:TRAC:Y:COUP? DISP:CDP:VIEW5:WIND:TRAC:Y:COUP ON DISP:CDP:VIEW5:WIND:TRAC:Y:COUP? |
| Notes | When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. VIEW[1] : CDP Graph and Metrics View VIEW4 : Code Domain View VIEW5 : Demod Bits View WINDow[1]: Code Domain Power Window on CDP Graph and Metrics View or Code Domain View, Demod Bits View |

| | |
|----------------------|----------------------------|
| Couplings | See Restriction and Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Y Auto Scale (Code Domain Error Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results in the Code Domain Error window.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 1 OFF ON :DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:COUPle? |
| Example | DISP:CDP:VIEW2:WIND:TRAC:Y:COUP ON DISP:CDP:VIEW2:WIND:TRAC:Y:COUP? |
| Notes | When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. VIEW2 : CDE Graph and Metrics View WINDow[1]: Code Domain Error windows on CDE Graph and Metrics View |
| Couplings | See Restriction and Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 1747

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Remote Command | :COUPle ALL NONE |
| Example | :COUP ALL |
| Notes | :COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

There are two types of functions that have Auto/Manual modes.

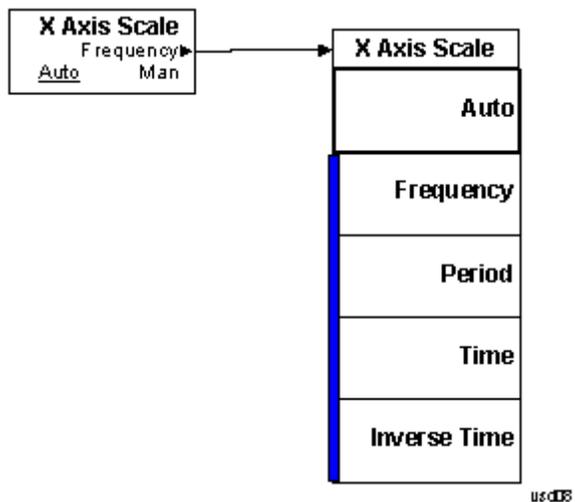
Auto/Man Active Function keys

An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.



BW

There is no BW functionality supported in the Code Domain measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

| | |
|--------------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous? |
| Example | :INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation |
| Preset | ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF) |
| State Saved | Saved in instrument state |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep. |
| Initial S/W Revision | Prior to A.02.00 |

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

15 Code Domain Measurement
File

File

See "File" on page 344

FREQ/Channel

The key accesses a menu allowing you to set Frequency parameters for the current measurement. All measurements in TD-SCDMA mode have the same menu structure under FREQ/Channel key.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Carrier Config

Allows you to adjust the carrier config parameters.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Carriers

Sets the total carriers that present in the signal.

| | |
|-----------------------|---|
| Key Path | Freq/Channel |
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :TDEMod:CARrier:NUMber <integer></code> <code>[:SENSe] :TDEMod:CARrier:NUMber?</code> |
| Example | <code>:TDEM:CAR:NUM 1</code> <code>:TDEM:CAR:NUM?</code> |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 15 |
| Initial S/W Revision | A.01.60 or later |

Carrier Result

Sets the carrier to be analyzed.

| | |
|-----------------------|---|
| Key Path | Freq/Channel |
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :TDEMod:CARrier:RESult <integer></code> <code>[:SENSe] :TDEMod:CARrier:RESult?</code> |
| Example | <code>:TDEM:CAR:RES 1</code> |

| | |
|----------------------|----------------------------|
| | :TDEM:CAR:RES? |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 15 |
| Initial S/W Revision | A.01.60 or later |

CF Step

Changes the step size for the center frequency and start and stop frequency functions. Once a step size has been selected and the center frequency function is active, the step keys (and the UP|DOWN parameters for Center Frequency from remote commands) change the center frequency by the step-size value. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the analyzer.

Note that the start and stop frequencies also step by the CF Step value.

| | |
|-----------------------|--|
| Key Path | FREQ Channel |
| Remote Command | [:SENSe]:FREQuency:CENTer:STEP[:INCRement] <freq> [:SENSe]:FREQuency:CENTer:STEP[:INCRement]? [:SENSe]:FREQuency:CENTer:STEP:AUTO OFF ON 0 1 [:SENSe]:FREQuency:CENTer:STEP:AUTO? |
| Example | FREQ:CENT:STEP:AUTO ON FREQ:CENT:STEP 500 MHz FREQ:CENT UP increases the current center frequency value by 500 MHz FREQ:CENT:STEP? FREQ:CENT:STEP:AUTO? |
| Notes | Preset and Max values are depending on Hardware Options (503, 507, 508, 513, 526) |
| Notes | Preset and Max values are dependent on Hardware Options (5xx) |
| Dependencies | Freq Offset is not available in External Mixing. In this case the Freq Offset key is grayed out and shows a value of zero. It will once again be available, and show the previously set value, when you return to the RF Input. |
| Dependencies | Span, RBW, Center frequency If the electronic/soft attenuator is enabled, any attempt to change the value of the center frequency >3.6 GHz by pressing the Up-arrow key, fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. |
| Couplings | When auto-coupled in a non-zero span, the center frequency step size is set to 10% of the span. When auto-coupled in zero span, the center frequency step size is set to the equivalent -3 dB RBW value. |

| | |
|------------------------------|--|
| Preset | Auto ADEMOD: 1 MHz ON |
| State Saved | Saved in instrument state |
| Min | – (the maximum frequency of the instrument). That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Max | The maximum frequency of the instrument. That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Default Unit | Hz |
| Status Bits/OPC dependencies | non-overlapped |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Center Freq

The front panel displays and sets the Center Freq for the selected input. Changing the selected input will update the displayed value to match. The SCPI will also get or set Center Freq for the selected input.

See also:

["RF Center Freq" on page 1756](#)

["I/Q Center Freq" on page 1756](#)

| | |
|-----------------------|---|
| Mode | TDSCDMA |
| Remote Command | <code>[:SENSe] :FREQuency:CENTer <freq></code> <code>[:SENSe] :FREQuency:CENTer?</code> |
| Example | FREQ:CENT 30 MHz |
| Notes | This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT |
| Preset | Varies with selected input (see RF Center Freq and I/Q Center Freq) |
| State Saved | Varies with selected input (see RF Center Freq and I/Q Center Freq) |
| Min | Varies with selected input (see RF Center Freq and I/Q Center Freq) |
| Max | Varies with selected input (see RF Center Freq and I/Q Center Freq) |
| Initial S/W Revision | A.01.60 or later |

RF Center Freq

SCPI command for specifying the RF Center Frequency. This will always access the RF value, even when the selected input is not RF. The front panel always uses the Freq Center (Selected Input).

| | |
|-----------------------|--|
| Mode | TDSCDMA |
| Remote Command | [:SENSe] :FREQuency:RF:CENTer <freq> [:SENSe] :FREQuency:RF:CENTer? |
| Example | FREQ:RF:CENT 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Preset | 1.0 GHz |
| State Saved | Saved in instrument state. |
| Min | -79.999995 MHz |
| Max | Hardware Dependent: Opt503 = 3.699999995 GHz Opt508 = 8.499999995 GHz Opt513 = 13.799999995 GHz Opt526 = 26.999999995 GHz |
| Initial S/W Revision | A.01.60 or later |

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This will always access the I/Q value, even when the selected input is not I/Q. The front panel always uses the Freq Center (Selected Input).

| | |
|-----------------------|--|
| Mode | TDSCDMA |
| Remote Command | [:SENSe] :FREQuency:IQ:CENTer <freq> [:SENSe] :FREQuency:IQ:CENTer? |
| Example | FREQ:IQ:CENT: 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Preset | 0 Hz |
| State Saved | Saved in instrument state. |
| Min | -39.999995 MHz |
| Max | 39.999995 MHz |
| Initial S/W Revision | A.01.60 or later |

Input/Output

See "Input/Output" on page 202

Marker

Accesses the menu that allows you to select, set up, and control the markers for the current measurement. Sets the marker control mode as described under Normal, Delta, and Off, below. All interactions and dependencies detailed under the softkey description are enforced when the remote command is sent.

| | |
|----------------------|------------------|
| Key Path | Front Panel Key |
| Initial S/W Revision | A.01.60 or later |

Select Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front Panel |
| Initial S/W Revision | A.01.60 or later |

Marker Type

Sets the marker control mode. If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, reference value of the selected marker appears on the Active Function area.

Active Function Display: Marker X-axis value

Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off.

The marker X axis value entered in the active function area will display the marker value to its full entered precision.

Sets the marker control mode as described under Normal, Delta and Off, below. All interactions and dependencies detailed under the key description are enforced when the remote command is sent.

| | |
|----------------|---|
| Key Path | Marker |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:CDPower:MARKer[1] 2 ... 12:MODE POSition DELTA OFF :CALCulate:CDPower:MARKer[1] 2 ... 12:MODE? |
| Example | CALC:CDP:MARK:MODE POS CALC:CDP:MARK:MODE? |
| Notes | If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. |

| | |
|----------------------|---|
| | Active Function Display: Marker X-axis value the marker X axis value entered in the active function area will display the marker value to its full entered precision. NORMal is changed to POSition in the new SA. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | Normal Delta Off |
| Initial S/W Revision | A.01.60 or later |

Properties

Accesses a menu that enables you to select a relative maker and marker trace

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | A.01.60 or later |

Select Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front Panel |
| Initial S/W Revision | A.01.60 or later |

Relative To

Selects the marker the selected marker will be relative to (its reference marker).

| | |
|-----------------------|--|
| Key Path | Marker, Properties |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:CDPower:MARKer[1] 2 ... 12:REFerence <integer> :CALCulate:CDPower:MARKer[1] 2 ... 12:REFerence? |
| Example | CALC:CDP:MARK:REF 4 CALC:CDP:MARK:REF? |
| Notes | A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." When queried a single value will be returned (the specified marker numbers relative marker). A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." |

| | |
|----------------------|----------------------------|
| Preset | 2 3 4 5 6 7 8 9 10 11 12 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 12 |
| Initial S/W Revision | A.01.60 or later |

Marker Trace

Assigns the specified marker to the designated trace.

| | |
|-----------------------|--|
| Key Path | Marker,Properties |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:CDPower:MARKer[1] 2 ... 12:TRACe CDPower CDError EVM MERRor PERRor SYMPower POLar :CALCulate:CDPower:MARKer[1] 2 ... 12:TRACe? |
| Example | CALC:CDP:MARK:TRACE EVM CALC:CDP:MARK:TRACE? |
| Preset | EVM |
| State Saved | Saved in instrument state. |
| Range | Code Domain Power Code Domain Error EVM Phase Error Mag Error Code Domain Symbol Power Polar |
| Initial S/W Revision | A.01.60 or later |

Couple Marker

Toggles the state of the markers to be coupled On or Off. When this function is true (On), moving any marker causes an equal X-axis movement of every other marker except those located to the polar trace, and Chip value of the marker located to the polar trace, which is not Off. "Equal X Axis movement" refers to the difference between each marker's X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units). This may result in markers going offscreen

| | |
|-----------------------|--|
| Key Path | Marker |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:CDPower:MARKer:COUple[:STATe] ON OFF 1 0 :CALCulate:CDPower:MARKer:COUple[:STATe]? |
| Example | CALC:CDP:MARK:COUP ON CALC:CDP:MARK:COUP? |
| Preset | OFF |
| State Saved | Saved in instrument state. |

| | |
|----------------------|------------------|
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

All Markers Off

Turns off all markers.

| | |
|-----------------------|--------------------------------|
| Key Path | Marker |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:CDPower:MARKer:AOff |
| Example | CALC:CDP:MARK:AOff |
| Initial S/W Revision | A.01.60 or later |

Marker Symbol Value

Sets the marker symbol value in the current marker for the trace of I/Q symbol polar trace, EVM trace, Mag Error trace and Phase Error trace. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value if the control mode is Normal.

| | |
|-----------------------|--|
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:CDPower:MARKer[1] 2 ... 12:SYMBOL <real> :CALCulate:CDPower:MARKer[1] 2 ... 12:SYMBOL? |
| Example | CALC:CDP:MARK:SYMB 1.0 CALC:CDP:MARK:SYMB? |
| Notes | The query returns the marker's 'symbols' value in the trace if the control mode is Normal The query is returned in 'chips'. If the marker is Off the response is not a number (NAN). |
| Preset | 0 |
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | A.01.60 or later |

Marker X Axis Value (Remote Command only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value if the control mode is Normal or Delta.

| | |
|-----------------------|--|
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:CDPower:MARKer[1] 2 ... 12:X <real> :CALCulate:CDPower:MARKer[1] 2 ... 12:X? |

| | |
|----------------------|--|
| Example | CALC:CDP:MARK3:X 0.0 CALC:CDP:MARK3:X? |
| Preset | After a preset, all Markers are turned OFF, so Marker X Axis Value query will return a not a number (NAN). |
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | A.01.60 or later |

Marker X Axis Position (Remote Command only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal or Delta - except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

| | |
|-----------------------|--|
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:CDPower:MARKer[1] 2 ... 12:X:POSition <real> :CALCulate:CDPower:MARKer[1] 2 ... 12:X:POSition? |
| Example | CALC:CDP:MARK10:X:POS 0.0 CALC:CDP:MARK10:X:POS? |
| Notes | The query returns the marker's absolute X Axis value in trace points if the control mode is Normal, or the offset from the marker's reference marker in trace points if the control mode is Delta. The value is returned as a real number, not an integer, corresponding to the translation from X Axis Scale units to trace points (see "Fractional Trace Points", above). If the marker is Off the response is not a number. |
| Preset | After a preset, all Markers are turned OFF, so Marker X Axis Value query will return a not a number (NAN). |
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | A.01.60 or later |

Marker Y Axis Value (Remote Command only)

Queries the marker Y Axis value in the current marker Y Axis unit.

| | |
|-----------------------|--|
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:CDPower:MARKer[1] 2 ... 12:Y? |

| | |
|-------------------------------------|--|
| Example | CALC:CDP:MARK11:Y? |
| Preset | Result dependant on markers setup and signal source |
| State Saved | No |
| Backwards Compatibility SCPI | :CALCulate:CDPower:MARKer[1] 2 ... 12:FUNCTION:RESult? |
| Initial S/W Revision | A.01.60 or later |

Backward Compatibility SCPI Commands

Sets or queries the state of a marker. Setting a marker which is OFF to state ON or 1 puts it in Normal mode and places it at the center of the screen.

| | |
|-----------------------|--|
| Mode | TDSCDMA |
| Remote Command | :CALCulate:CDPower:MARKer[1] 2 ... 12:STATe OFF ON 0 1 :CALCulate:CDPower:MARKer[1] 2 ... 12:STATe? |
| Example | CALC:CDP:MARK3:STATe ON CALC:CDP:MARK3:STAT? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Marker Fctn

There are no Marker Function operations supported in the Code Domain measurement. The front-panel key will display a blank menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front panel key |
| Initial S/W Revision | A.01.60 or later |

Marker To

There are no Marker To operations supported in the Code Domain measurement. The front-panel key will display a blank menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front panel key |
| Initial S/W Revision | A.01.60 or later |

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Remote Measurement Functions

This section contains the following topics:

["Measurement Group of Commands" on page 2285](#)

["Current Measurement Query \(Remote Command Only\)" on page 2287](#)

["Limit Test Current Results \(Remote Command Only\)" on page 2287](#)

["Data Query \(Remote Command Only\)" on page 2287](#)

["Calculate/Compress Trace Data Query \(Remote Command Only\)" on page 2288](#)

["Calculate Peaks of Trace Data \(Remote Command Only\)" on page 2293](#)

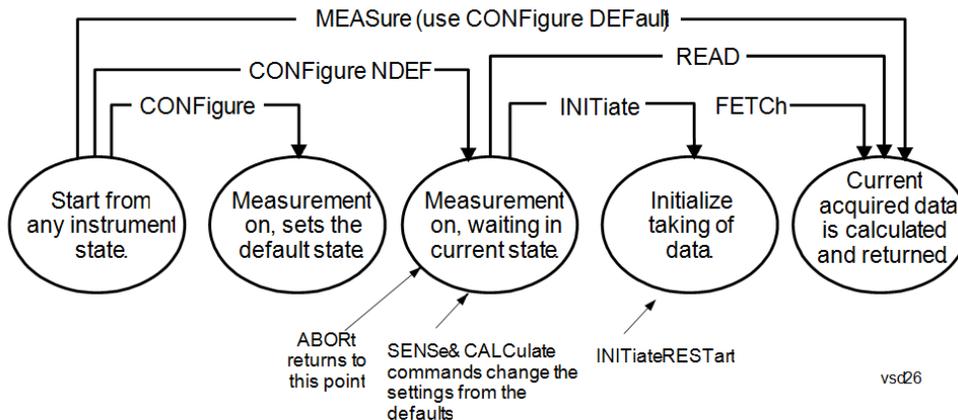
[Hardware-Accelerated Fast Power Measurement \(Remote Command Only\)](#)

["Format Data: Numeric Data \(Remote Command Only\)" on page 2294](#)

["Format Data: Byte Order \(Remote Command Only\)" on page 2295](#)

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFigure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFigure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
-

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
-

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

| | |
|-----------------------|-------------|
| Remote Command | :CONFigure? |
|-----------------------|-------------|

| | |
|----------------|-------|
| Example | CONF? |
|----------------|-------|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

| | |
|-----------------------|--------------------------|
| Remote Command | :CALCulate:CLIMits:FAIL? |
|-----------------------|--------------------------|

| | |
|----------------|--|
| Example | CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails. |
|----------------|--|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA[n]? |
| Notes | The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement. |
| Initial S/W Revision | Prior to A.02.00 |

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]] |
| Example | To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.) |
| Notes | The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data. |
| Initial S/W Revision | Prior to A.02.00 |

- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

-

NOTE

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPlE - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

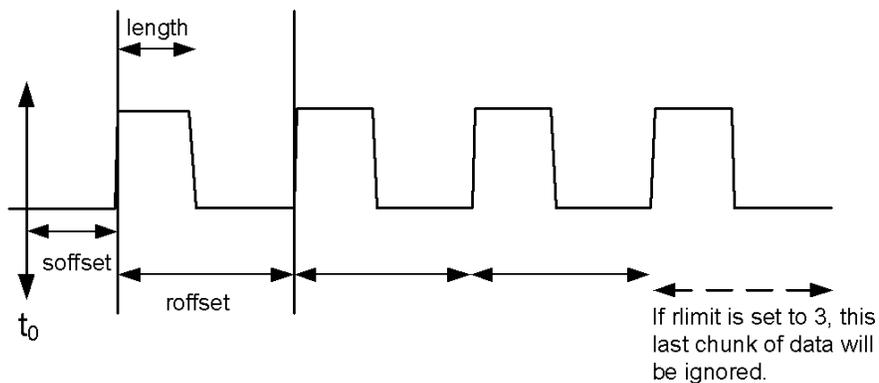
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

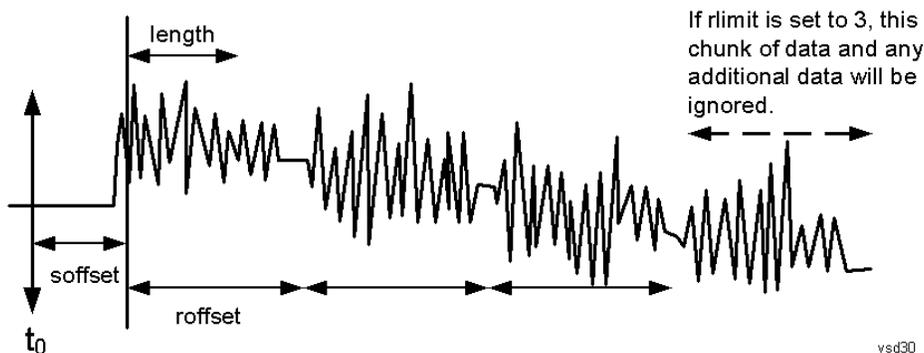
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

| | |
|-----------------------|---|
| Remote Command | <p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre> |
|-----------------------|---|

| | |
|----------------|---|
| Example | <p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p> |
|----------------|---|

| | |
|--------------|---|
| Notes | <p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p> |
|--------------|---|

excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQuency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat [:TRACe] [:DATA] ASCii|INTeger,32|REAL,32 |REAL,64
:FORMat [:TRACe] [:DATA] ?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

Initial S/W Revision Prior to A.02.00

The specs for each output type follow:

ASCIi - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPPed order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

| | |
|-----------------------------|--|
| Remote Command | :FORMat:BORDER NORMal SWAPPed :FORMat:BORDER? |
| Preset | NORMal |
| Initial S/W Revision | Prior to A.02.00 |

Meas Setup

This menu displays the measurement setup menu for the Code Domain Measurement when the **Code Domain** Measurement key has been selected in the Measure menu.

| | |
|----------------------|------------------|
| Key Path | Front panel key |
| Initial S/W Revision | A.01.60 or later |

Result Length

Sets and gets the result length in terms of sub-frames. It is the number of sub-frames user intends to analyze. For example, when it is necessary to estimate the S1/S2 phase on DwPTS, Result Length should be set to a number no less than 4.

| | |
|-------------------------------------|---|
| Key Path | Meas Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :CDPower:RINTerval <integer> [:SENSe] :CDPower:RINTerval? |
| Example | :CDP:RINT 1 :CDP:RINT? |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 12 |
| Backwards Compatibility SCPI | [:SENSe] :CDPower:CINTerval |
| Initial S/W Revision | A.01.60 or later |

Analysis Subframe

Specifies which sub-frames, within the acquired Result Length, is used for analysis and trace data measurement results. The available selections should include the acquired sub-frames. If the specified sub-frame is larger than the number of sub-frames within the Result Length, the Analysis Sub-frame will be specified the last sub-frame within the Result Length.

| | |
|-----------------------|---|
| Key Path | Meas Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :CDPower:ANALysis:SUBFrame <integer> [:SENSe] :CDPower:ANALysis:SUBFrame? |
| Example | :CDP:ANAL:SUBF 0 :CDP:ANAL:SUBF? |

| | |
|----------------------|---|
| Couplings | Coupling with the Result Length. Analysis Subframe should be less than Result Length. IF(Analysis Subframe >= Result Length) Analysis Subframe = (Result Length - 1); ENDIF |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | See Coupling |
| Initial S/W Revision | A.01.60 or later |

Spread Code Length

Lets you set the Spread Code Length. The Spread Code Length is used along with the Code Channel to specify the active code layer and channel used for the measurement results (including: IQ Meas Time, Mag Error, Phase Error and Symbol trace or Error trace data results).

| | |
|-----------------------|---|
| Key Path | Meas Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :CDPower:SCLength <integer> [:SENSe] :CDPower:SCLength? |
| Example | :CDP:SCL 1 :CDP:SCL? |
| Couplings | Only 1, 2, 4, 8, 16 are valid and any number will be clipped to the nearest valid number. |
| Preset | 16 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

Code Channel

Lets you set the Code Channel to be analyzed. The Code Channel is used along with the Spread Code Length to specify the active code channel and layer used for the measurement results (Including: IQ Meas Time, Mag Error, Phase Error and Symbol trace or Error trace data results).

| | |
|-----------------------|---|
| Key Path | Meas Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :CDPower:CDChannel <integer> |

| | |
|----------------------|--|
| | <code>[:SENSe] :CDPower:CDCHannel?</code> |
| Example | <code>:CDP:CDCH 1</code> <code>:CDP:CDCH?</code> |
| Couplings | This value only can be set to 0~ Spread Code Length-1. |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | Equals (Spread Code Length - 1) |
| Initial S/W Revision | A.01.60 or later |

Meas Preset

This will set the measure setup parameters for the currently selected measurement only, to the factory defaults.

| | |
|-----------------------|---|
| Key Path | Meas Setup |
| Mode | TD-SCDMA |
| Remote Command | <code>:CONFigure:CDPower</code> |
| Example | <code>:CONFigure:CDPower</code> |
| Couplings | Selecting measurement preset will restore all measurement parameters to their default values for the current measurement. |
| Initial S/W Revision | A.01.60 or later |

Mode

See "Mode" on page 288

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings
- See "[How-To Preset](#)" on page 1783 for more information.

| | |
|--------------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :SYSTem:PRESet |
| Example | :SYST:PRES |
| Notes | *RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0. |
| Couplings | A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set. |
| Backwards Compatibility Notes | In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using |

| | |
|----------------------|------------------|
| | User Preset. |
| Initial S/W Revision | Prior to A.02.00 |

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

| Type Of Preset | SCPI Command | Front Panel Access |
|--------------------------------|--|--|
| Auto Couple | :COUPlE ALL | Auto Couple front-panel key |
| Meas Preset | :CONFIgure:<Measurement> | Meas Setup Menu |
| Mode Preset | :SYSTem:PRESet | Mode Preset (green key) |
| Restore Mode Defaults | :INSTrument:DEFault | Mode Setup Menu |
| Restore All Mode Defaults | :SYSTem:DEFault MODEs | System Menu; Restore System Default Menu |
| *RST | *RST | not possible (Mode Preset with Single) |
| Restore Input/Output Defaults | :SYSTem:DEFault INPut | System Menu; Restore System Default Menu |
| Restore Power On Defaults | :SYSTem:DEFault PON | System Menu; Restore System Default Menu |
| Restore Alignment Defaults | :SYSTem:DEFault ALIGn | System Menu; Restore System Default Menu |
| Restore Miscellaneous Defaults | :SYSTem:DEFault MISC | System Menu; Restore System Default Menu |
| Restore All System Defaults | :SYSTem:DEFault [ALL] :SYSTem:PRESet:PERSistent | System Menu; Restore System Default Menu |
| User Preset | :SYSTem:PRESet:USER | User Preset Menu |
| User Preset All Modes | :SYSTem:PRESet:USER:ALL | User Preset Menu |

| | | |
|----------------------|-----------------------|-------------|
| Power On Mode Preset | :SYSTem:PON:TYPE MODE | System Menu |
| Power On User Preset | :SYSTem:PON:TYPE USER | System Menu |
| Power On Last State | :SYSTem:PON:TYPE LAST | System Menu |

Preset Type (Remote Command Only)

As stated in the Backward Compatibility section, to be compatible with ESA/PSA the PRESet:TYPE command will be implemented as a no-op.

| | |
|-----------------------------|--|
| Mode | All |
| Remote Command | :SYSTem:PRESet:TYPE FACTory MODE USER :SYSTem:PRESet:TYPE? |
| Example | :SYST:PRESet:TYPE FACT |
| Notes | This command is supported for backward compatibility only. It is a no-op which does not change the behavior of any preset operation. |
| Preset | This is unaffected by Preset but is set to Mode on a "Restore System Defaults->All" |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Mode Setup

See ["Mode Setup" on page 320](#)

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace.

| | |
|-----------------------------|---|
| Key Path | Front panel key |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:CDPower:MARKer[1] 2 ... 12:MAXimum |
| Example | CALC:CDP:MARK2:MAX |
| Initial S/W Revision | A.01.60 or later |

Next Peak

Moves the selected marker to the peak that has the next highest amplitude less than the marker's current value.

| | |
|-----------------------------|--|
| Key Path | Peak Search |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:CDPower:MARKer[1] 2 ... 12:MAXimum:NEXT |
| Example | CALC:CDP:MARK2:MAX:NEXT |
| Initial S/W Revision | A.01.60 or later |

Next Pk Right

Moves the selected marker to the nearest peak right of the current marker which meets all enabled peak criteria.

| | |
|-----------------------------|---|
| Key Path | Peak Search |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:CDPower:MARKer[1] 2 ... 12:MAXimum:RIGHT |
| Example | CALC:CDP:MARK2:MAX:RIGH |
| Initial S/W Revision | A.01.60 or later |

Next Pk Left

Moves the selected marker to the nearest peak left of the current marker which meets all enabled peak criteria.

| | |
|-----------------------|--|
| Key Path | Peak Search |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:CDPower:MARKer[1] 2 ... 12:MAXimum:LEFT |

| | |
|----------------------|-------------------------|
| Example | CALC:CDP:MARK2:MAX:LEFT |
| Initial S/W Revision | A.01.60 or later |

Marker Delta

Sets the control mode for the selected marker to Delta mode.

| | |
|----------------------|------------------|
| Key Path | Peak Search |
| Initial S/W Revision | A.01.60 or later |

Pk-Pk Search

Finds and displays the amplitude and frequency (or time, if in zero span) differences between the highest and lowest y-axis value.

| | |
|-----------------------|---|
| Key Path | Peak Search |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:CDPower:MARKer [1] 2 ... 12:PTPeak |
| Example | CALC:CDP:MARK:PTP |
| Notes | Turns on the Marker Δ active function. |
| Couplings | This key is not available (key is grayed out) when Coupled Markers is on. |
| Initial S/W Revision | A.01.60 or later |

Min Search

Moves the selected marker to the minimum y-axis value on the current trace.

| | |
|-----------------------|--|
| Key Path | Peak Search |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:CDPower:MARKer [1] 2 ... 12:MINimum |
| Example | CALC:CDP:MARK:MIN |
| Initial S/W Revision | A.01.60 or later |

15 Code Domain Measurement
Print

Print

See "[Print](#)" on page 348

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

| Type | Default Prefix | Menu |
|-----------------------|----------------|-----------------|
| State | State_ | (Save/Recall) |
| Trace + State | State_ | (Save/Recall) |
| Screen | Screen_ | (Save/Recall) |
| Amplitude Corrections | Ampcor_ | (Import/Export) |
| Traces | Trace_ | (Import/Export) |
| Limit Lines | LLine_ | (Import/Export) |
| Measurement Result | MeasR_ | (Import/Export) |
| Capture Buffer | CapBuf_ | (Import/Export) |

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

| | |
|----------------------|--|
| Key Path | Front-panel key |
| Notes | No remote command for this key specifically. |
| Initial S/W Revision | Prior to A.02.00 |

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

| Key Path | Front-panel key |
|-------------------------------|--|
| Notes | <p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATe <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p> |
| Backwards Compatibility Notes | <p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, "state" always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> |
| Backwards Compatibility Notes | <p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p> |
| Initial S/W Revision | Prior to A.02.00 |

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See "[More Information](#)" on page 1793.

| | |
|-----------------------|--|
| Key Path | Recall |
| Mode | All |
| Remote Command | :MMEMory:LOAD:STATe <filename> |
| Example | :MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path |
| Example | MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state. |
| Notes | <p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <ul style="list-style-type: none"> • If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number. <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p> |

| | |
|-------------------------------------|---|
| | there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu. |
| Backwards Compatibility SCPI | :MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

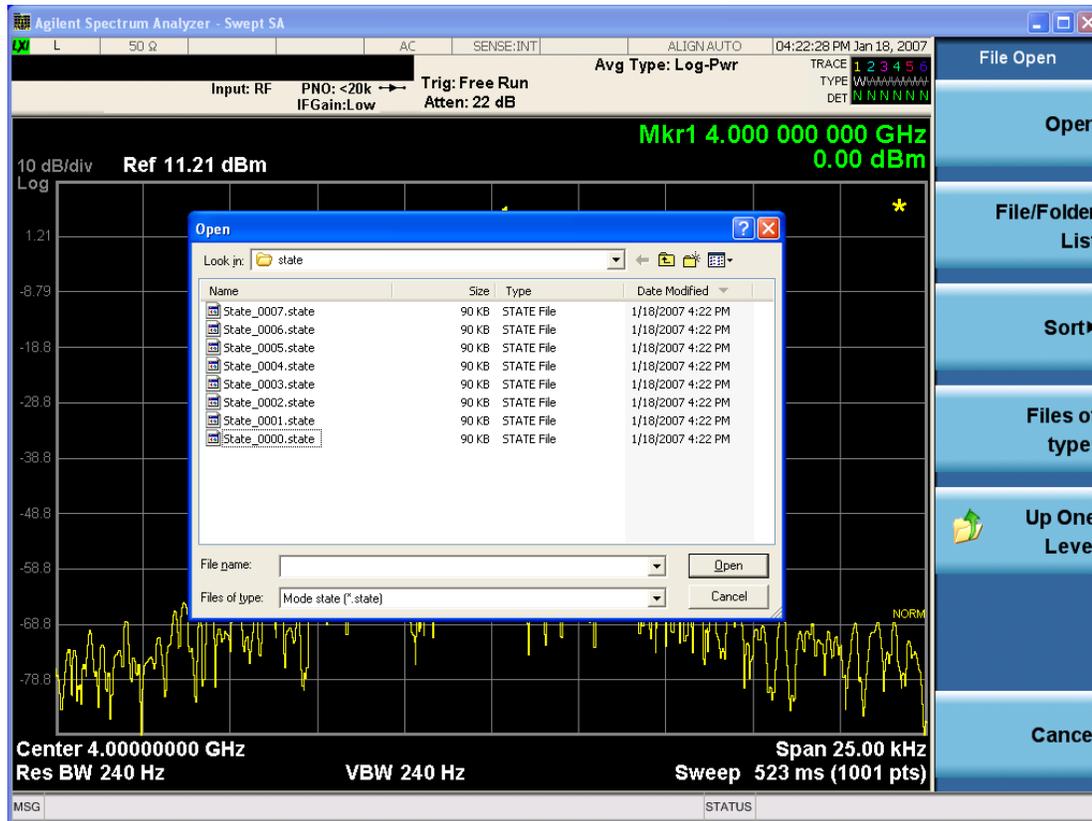
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

| | | |
|---|--|--|
| You want to recall state and one trace's data, leaving other traces unaffected. | Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed. | On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed. |
| You want to recall all traces | Save Trace+State from ALL traces. | On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved) |
| You want all traces to load exactly as they were when saved. | Save State | On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten. |

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Notes | Brings up the Open dialog for recalling a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Mode | All |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available" |
| Initial S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|---------------------------------|--|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|---|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Data (Import)

Importing a data file loads data that was previously saved from the current measurement or from other measurements and/or modes that produce compatible data files. The Import Menu only contains Data Types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by the user prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Importing Data loads measurement data from the specified file into the specified or default destination, depending on the data type selected. Selecting an Import Data menu key will not actually cause the importing to occur, since the analyzer still needs to know from where to get the data. Pressing the Open key in this menu brings up the Open dialog and Open menu that provides you with the options from where to recall the data. Once a filename has been selected or entered in the Open menu, the recall occurs as soon as the Open button is pressed.

| | |
|----------------------|--|
| Key Path | Recall |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. Some keys will be missing completely, so the key locations in the sub-menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:LOAD commands. |
| Dependencies | If a file type is not used by a certain measurement, it is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Capture Buffer

The captured data is raw data which is not processed.

| | |
|----------------------|---|
| Key Path | Recall, Data |
| Mode | TD-SCDMA |
| Example | MMEM:LOAD:CAPT "MyCaptureData.bin" This loads the file of capture data (on the default file directory path) into the instrument. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Open...

When you press "Open", the analyzer brings up a Windows dialog and a menu entitled "**File Open.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[From File...](#)" on page 2309 in Recall, State, for a full description of this dialog and menu.

| | |
|----------------------|--|
| Key Path | Recall, Data |
| Notes | The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 1799

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate[:IMMEDIATE] :INITiate:RESTART |
| Example | :INIT:IMM :INIT:REST |
| Notes | :INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function. |
| Couplings | Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement. |
| Status Bits/OPC dependencies | This is an Overlapped command. The STATUS:OPERation register bits 0 through 8 are cleared. The STATUS:QUESTIONable register bit 9 (INTEgrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set. |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Mode | All |
| Notes | No remote command for this key specifically, but the :MMEM:STORe command is available for specific file types. An example is :MMEM:STOR:STATe <filename>. |
| Initial S/W Revision | Prior to A.02.00 |

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<>mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

| | |
|----------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:STATe <filename> |
| Example | MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory. |
| Notes | Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key |

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

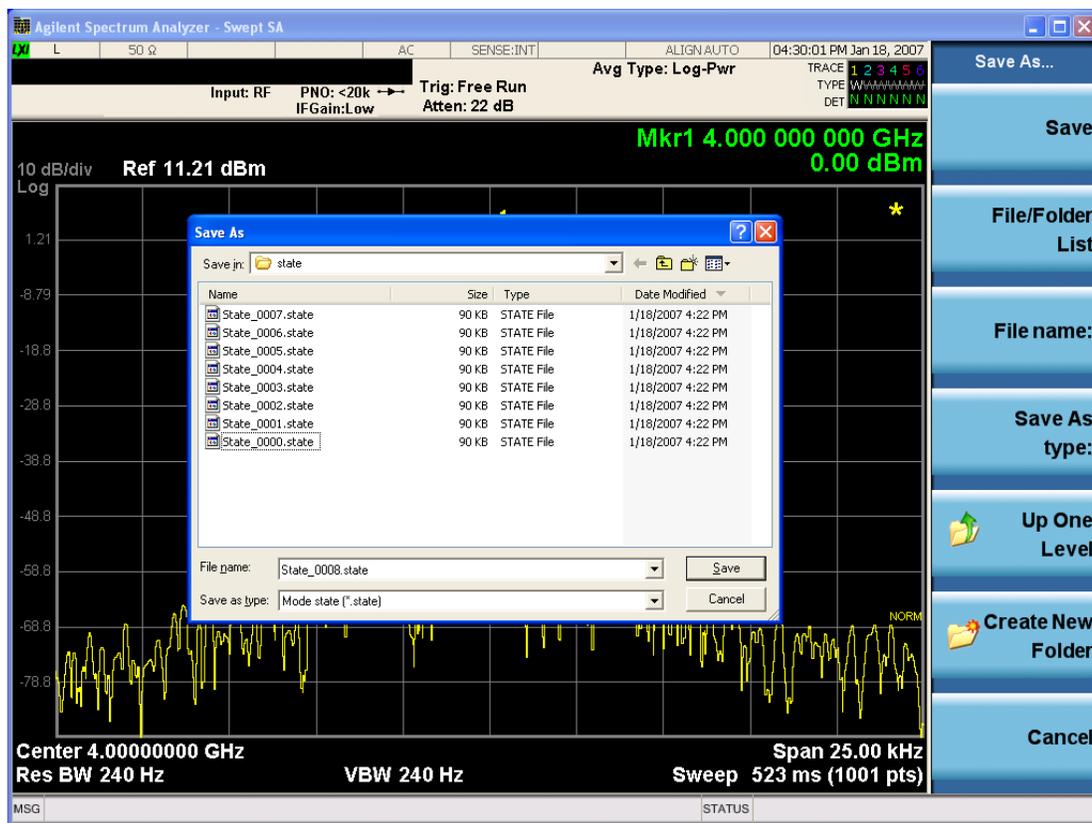
Backwards Compatibility SCPI :MMEMory:STORe:STATe 1,<filename>

For backwards compatibility, the above syntax is supported. The "1" is simply ignored. The command is sequential.

Initial S/W Revision Prior to A.02.00

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “Save As.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2305](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Save, State |
| Mode | All |
| Notes | Brings up Save As dialog for saving a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 1804](#)

| | |
|-----------------------|--|
| Key Path | Save, State |
| Mode | All |
| Remote Command | :MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number> |
| Example | :MMEM:REG:STAT:LAB 1,"my label" |
| Notes | <reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,"" |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available" |
| Preset | The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc" |
| Initial S/W Revision | A.11.00 |

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1-16 from front panel, 1-128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

| | |
|----------------------|---|
| Key Path | Save |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands. |
| Dependencies | If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Measurement Results

Pressing this key selects Meas Results as the data type to be exported. Pressing the key a second time brings up the Meas Results menu, which allows you to select which **Meas Result** to save. In the Swept SA measurement, there are three types of Measurement Results files: Peak Table, Marker Table and Spectrogram.

See "Meas Results File Contents" on page 1807.

See "Marker Table" on page 1807.

See "Peak Table" on page 1810.

See "Spectrogram" on page 1813

| | |
|-----------------------------|---|
| Remote Command | :MMEMory:STORe:RESults:MTABle PTABle SPEctrogram <filename> |
| Example | :MMEM:STOR:RES:MTAB "myResults.csv" Saves the results from the current marker table to the file myResults.csv in the current path. :MMEM:STOR:RES:PTAB "myResults.csv" Saves the results from the current peak table to the file myResults.csv in the current path. :MMEM:STOR:RES:SPEC "myResults.csv" Saves the results from the current Spectrogram display to the file myResults.csv in the current path. The default path is My Documents\SA\data\SAN\results |
| Notes | If the save is initiated via SCPI, and the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over SCPI. |
| Dependencies | If a save of Marker Table results is requested and the Marker Table is not on, no file is saved and a message is generated If a save of Peak Table results is requested and the Peak Table is not on, no file is saved and a message is generated If a save of Spectrogram results is requested and the Spectrogram is not on, no file is saved and a message is generated. The Spectrogram choice only appears if option EDP is licensed. |
| Preset | Not part of Preset, but is reset to Peak Table by Restore Mode Defaults. Survives a shutdown. |
| Initial S/W Revision | Prior to A.02.00 |

Meas Results File Contents

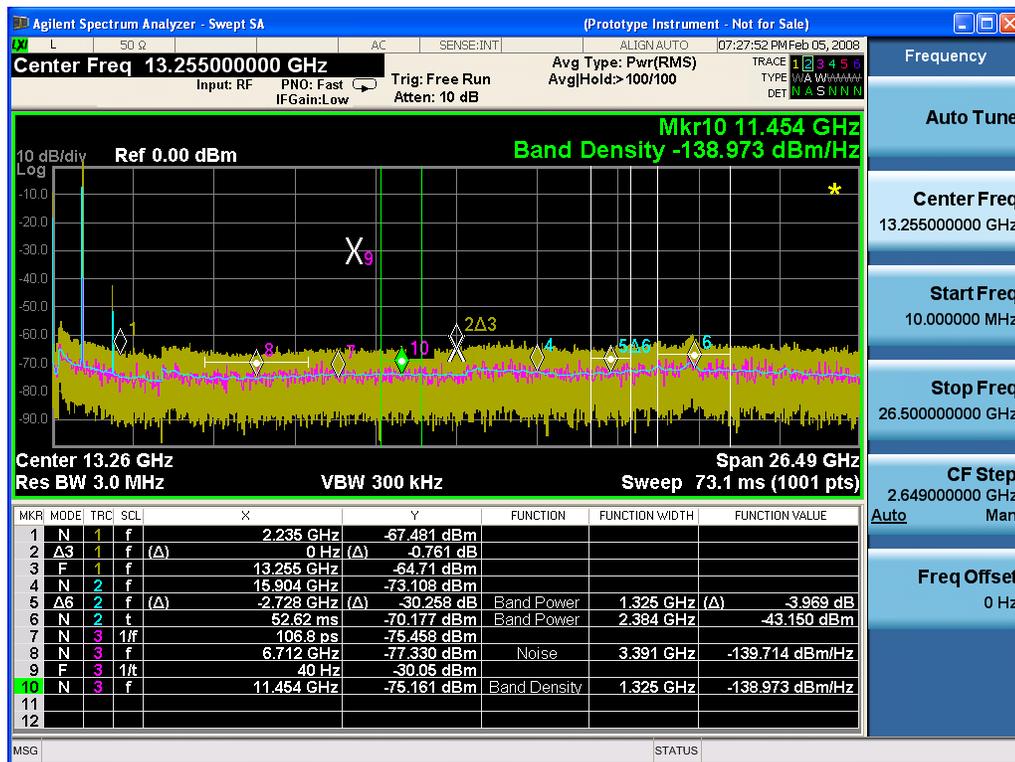
All files are .csv files. The following section details the data in each file type.

Marker Table

This section discusses the Marker Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:

15 Code Domain Measurement
Save



Then the Meas Results file, when opened, would show the following data:

| | |
|-------------------|------------------|
| MeasurementResult | |
| Swept SA | |
| A.01.40_R0017 | N9020A |
| 526 B25 PFR | 1 |
| P26 EA3 | |
| Result Type | Marker Table |
| Ref Level | 0 |
| Number of Points | 1001 |
| Sweep Time | 0.0662666 67 |
| Start Frequency | 10000000 |
| Stop Frequency | 26500000 000 |
| Average Count | 0 |
| Average Type | LogPower (Video) |
| RBW | 3000000 |

| | |
|--------------------------|-----------|
| RBW Filter | Gaussian |
| RBW Filter BW | 3dB |
| VBW | 3000000 |
| Sweep Type | Swept |
| X Axis Scale | Lin |
| PreAmp State | Off |
| PreAmp Band | Low |
| Trigger Source | Free |
| Trigger Level | 1.2 |
| Trigger Slope | Positive |
| Trigger Delay | 1.00E-06 |
| Phase Noise Optimization | Fast |
| Swept If Gain | Low |
| FFT If Gain | Autorange |
| RF Coupling | AC |
| FFT Width | 411900 |
| Ext Ref | 10000000 |
| Input | RF |
| RF Calibrator | Off |
| Attenuation | 10 |
| Ref Level Offset | 0 |
| External Gain | 0 |
| X Axis Units | Hz |
| Y Axis Units | dBm |

| DATA | | | | | | | | | |
|------|--------|------|------------|------------|----------|-----------|-----------------|-----------------|----------------|
| MKR | MODE | TR C | SCL | X | Y | FUNCTI ON | FUNCTIO N WIDTH | FUNCTI ON VALUE | FUNCTI ON UNIT |
| 1 | Normal | 1 | Freque ncy | 2.2350E+09 | - 67.481 | Off | 0.0000E+00 | 0 | None |
| 2 | Delta3 | 1 | Freque ncy | 0.0000E+00 | - 0.761 | Off | 0.0000E+00 | 0 | None |
| 3 | Fixed | 1 | Freque ncy | 1.3255E+10 | - 64.71 | Off | 0.0000E+00 | 0 | None |
| 4 | Normal | 2 | Freque ncy | 1.5904E+10 | - 73.1 | Off | 0.0000E+00 | 0 | None |

| 08 | | | | | | | | | |
|----|--------|---|-----------------|---------------------|-----------------|-----------------|----------------|------------------|--------|
| 5 | Delta7 | 2 | Frequ ncy | - 2.7280E+ 09 | - 30.2 58 | Band Power | 1.3250E+ 06 | -3.969 | dB |
| 6 | Normal | 2 | Time | 5.2620E- 02 | - 70.1 77 | Band Power | 2.3840E+ 06 | -43.15 | dBm |
| 7 | Normal | 3 | Period | 1.0680E- 10 | - 75.4 58 | Off | 0.0000E+ 00 | 0 | None |
| 8 | Normal | 3 | Frequ ncy | 6.7120E+ 09 | - 77.3 3 | Noise | 3.3910E+ 06 | - 139.71 4 | dBm/Hz |
| 9 | Fixed | 3 | Inverse Time | 4.0000E+ 01 | - 30.0 5 | Off | 0.0000E+ 00 | 0 | None |
| 10 | Normal | 3 | Frequ ncy | 1.1454E+ 10 | - 75.1 61 | Band Density | 1.3250E+ 06 | - 138.97 3 | dBm/Hz |
| 11 | Off | 1 | Frequ ncy | 0.0000E+ 00 | 0 | Off | 0.0000E+ 00 | 0 | None |
| 12 | Off | 1 | Frequ ncy | 0.0000E+ 00 | 0 | Off | 0.0000E+ 00 | 0 | None |

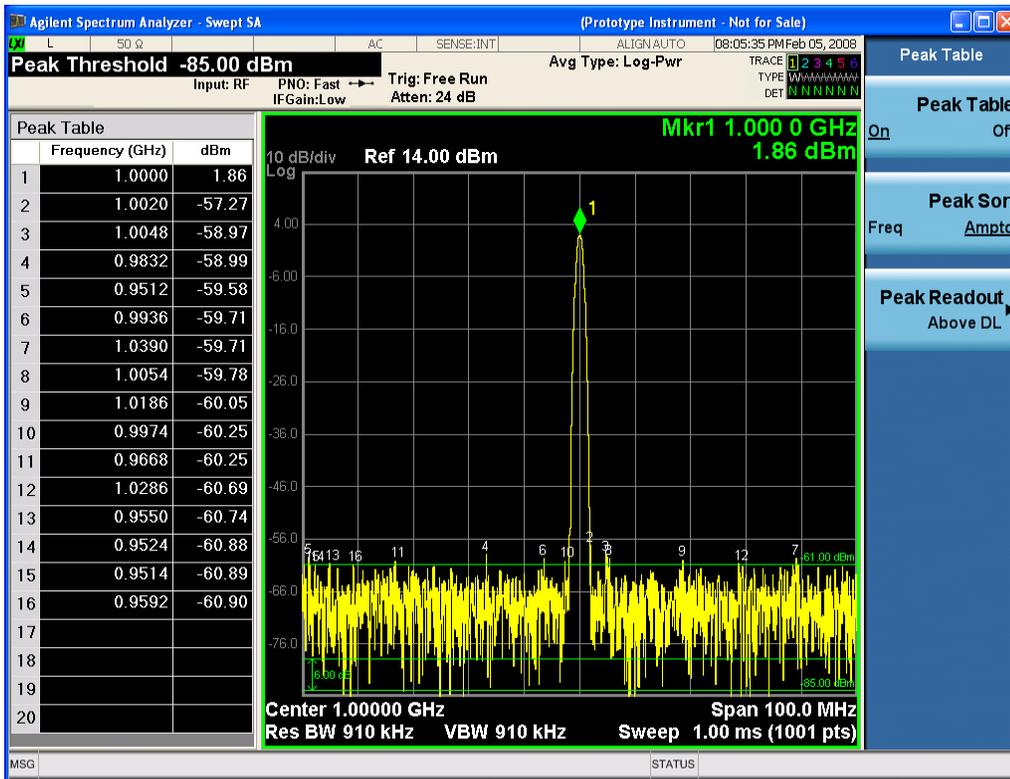
The numbers appear in the file exactly as they appear onscreen. If it says 11.454 GHz onscreen, then in the file it is 11.454E+09.

The metadata header is very similar to the metadata used in the trace data .csv files. See Trace File Contents. The only new information concerns the 1-of-N fields in the marker table itself.

Peak Table

This section discusses the Peak Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:



Then the Meas Results file, when opened, would show the header data (the same as for the Marker Table except that the Result Type is Peak Table) ending with a few fields of specific interest to Peak Table users:

- Peak Threshold
- Peak Threshold State (On|Off)
- Peak Excursion
- Peak Excursion State (On|Off)
- Display Line
- Peak Readout (All|AboveDL|BelowDL)
- Peak Sort (Freq|Amptd)

These fields are then followed by the data for the Peak Table itself.

Note that the label for the Frequency column changes to Time in 0 span.

Here is what the table for the above display looks like:

| MeasurementResult | |
|---------------------|--------|
| Swept SA | |
| A.01.40_R0017 | N9020A |
| 526 B25 PFR P26 EA3 | 1 |

| | |
|--------------------------|-----------------|
| Result Type | Peak Table |
| Ref Level | 0 |
| Number of Points | 1001 |
| Sweep Time | 0.066266667 |
| Start Frequency | 10000000 |
| Stop Frequency | 26500000000 |
| Average Count | 0 |
| Average Type | LogPower(Video) |
| RBW | 3000000 |
| RBW Filter | Gaussian |
| RBW Filter BW | 3dB |
| VBW | 3000000 |
| Sweep Type | Swept |
| X Axis Scale | Lin |
| PreAmp State | Off |
| PreAmp Band | Low |
| Trigger Source | Free |
| Trigger Level | 1.2 |
| Trigger Slope | Positive |
| Trigger Delay | 1.00E-06 |
| Phase Noise Optimization | Fast |
| Swept If Gain | Low |
| FFT If Gain | Autorange |
| RF Coupling | AC |
| FFT Width | 411900 |
| Ext Ref | 10000000 |
| Input | RF |
| RF Calibrator | Off |
| Attenuation | 10 |
| Ref Level Offset | 0 |
| External Gain | 0 |
| X Axis Units | Hz |
| Y Axis Units | dBm |
| Peak Threshold | -85 |
| Peak Threshold State | On |
| Peak Excursion | 6 |
| Peak Excursion State | On |

| | | |
|--------------|------------|-----------|
| Display Line | -61 | |
| Peak Readout | AboveDL | |
| Peak Sort | Amptd | |
| DATA | | |
| Peak | Frequency | Amplitude |
| 1 | 1.0000E+06 | 1.86 |
| 2 | 1.0020E+06 | -57.27 |
| 3 | 1.0048E+06 | -58.97 |
| 4 | 9.8320E+05 | -58.99 |
| 5 | 9.5120E+05 | -59.58 |
| 6 | 9.9360E+05 | -59.71 |
| 7 | 1.0390E+06 | -59.71 |
| 8 | 1.0054E+06 | -59.78 |
| 9 | 1.1086E+06 | -60.05 |
| 10 | 9.9740E+05 | -60.25 |
| 11 | 9.6680E+05 | -60.25 |
| 12 | 1.0286E+06 | -60.69 |
| 13 | 9.5500E+05 | -60.74 |
| 14 | 9.5240E+05 | -60.88 |
| 15 | 9.5140E+05 | -60.89 |
| 16 | 9.5920E+05 | -60.90 |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |

Spectrogram

This section discusses the Spectrogram Results file format. The Spectrogram choice only appears if option EDP is licensed.

The Spectrogram results are the same as a Trace data export, except that instead of having just one trace's data, all 300 traces appear one after the other.

Each trace has its own data mark; the data for Spectrogram Trace 0 follows the row marked DATA, the data for Spectrogram Trace 1 follows the row marked DATA1, for Spectrogram Trace 2 follows the row marked DATA2, and so on.

Each DATA row has a timestamp in the second column (as of firmware revision A.11.01). So, for example, if Trace 0 had a relative start time of 1729.523 sec, then the first DATA row would look like this:

DATA,1729.523

And if Trace 13 had a relative start time of 100.45 sec, then the fourteenth data row would look like:

DATA13,100.453

To find the absolute time for the relative timestamps of each trace, the last row before the first DATA row gives the absolute start time of the Spectrogram, in the form YYYYMMDDHHMMSS

So, for example, if the absolute start time is 13:23:45:678 on January 30, 2012, this row would look like:

Start Time,20120130132345678

NOTE The resolution of the absolute time stored is 1 ms, which matches up with the fact that the fastest sweep time is also 1 ms. However, there is no specification for the absolute accuracy of the clock in the analyzer, nor is there any facility provided to allow the user to set this time to any particular degree of accuracy.

Traces that have not yet been filled in the Spectrogram display are empty; there is no DATA header for them. The file ends after the last non-empty trace.

Imagine that, at the point where a Spectrogram Meas Result is requested, the following screen is showing:



For the purpose of this example, we have set the Average/Hold Number to 10, thus we have only traces 0 thru 10. The Spectrogram was started at 02:28:08:700 pm on April 25, 2012 (that is, 700 ms after 2:28:08 pm), although the screen dump itself shows a different time, as it was taken ten minutes after the

Spectrogram data. Trace 0 is showing a start time of 5.30 seconds, meaning 5.3 seconds after the Spectrogram started (trace 10 has a start time of 0, as it was the first trace taken but has now rolled up into the tenth trace slot).

The Meas Results file, when opened, shows the header data and ten traces of trace data. Below is an extract from the result file for the above display. Note the start time of 20120425142808700 showing in the last row before the first DATA row, and the relative time of 5.299231048 showing in the first DATA row:

| Result Type | Spectrogram |
|--|--------------------|
| MeasResult | |
| Swept SA | |
| A.11.00.01 | N9020A |
| 503 508 513 526 ALL ALV B1C B1X B25 B2X B40 BAB BBA CR3 CRP DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA HBA K03 LFE MPB P03 P08 P13 P26 PFR RTL RTS S40 SB1 SEC SM1 UK6 YAS YAV | 1 |
| Segment | 0 |
| Number of Points | 1001 |
| Sweep Time | 0.523333333 |
| Start Frequency | 5999984415 |
| Stop Frequency | 6000009415 |
| Average Count | 0 |
| Average Type | LogPower(Video) |
| RBW | 240 |
| RBW Filter | Gaussian |
| RBW Filter BW | 3dB |
| VBW | 240 |
| Sweep Type | Swept |
| X Axis Scale | Lin |
| PreAmp State | Off |
| PreAmp Band | Low |
| Trigger Source | Free |
| Trigger Level | 1.2 |
| Trigger Slope | Positive |
| Trigger Delay | 0 |
| Phase Noise Optimization | Wide |
| Swept If Gain | Low |
| FFT If Gain | Autorange |
| RF Coupling | AC |

| Result Type | Spectrogram |
|-------------------|-------------------|
| FFT Width | 411900 |
| Ext Ref | 10000000 |
| Input | RF |
| RF Calibrator | Off |
| Attenuation | 14 |
| Ref Level Offset | 0 |
| External Gain | 0 |
| Trace Type | Clearwrite |
| Detector | Normal |
| Trace Math | Off |
| Trace Math Oper1 | Trace5 |
| Trace Math Oper2 | Trace6 |
| Trace Math Offset | 0 |
| Trace Name | Trace1 |
| X Axis Units | Hz |
| Y Axis Units | dBm |
| Start Time | 20120425142808700 |
| DATA | 5.299231048 |
| 5999984415 | -76.34749519 |
| 5999984440 | -77.28097006 |
| 5999984465 | -75.32317869 |
| 5999984490 | -73.64417681 |
| 5999984515 | -72.67154604 |

o
o
o

| | |
|------------|--------------|
| 6000009315 | -77.94423277 |
| 6000009340 | -79.51829697 |
| 6000009365 | -78.46108961 |
| 6000009390 | -78.46108957 |
| 6000009415 | -76.59570596 |
| DATA2 | 4.708697055 |
| 5999984415 | -80.98197882 |
| 5999984440 | -80.98197879 |

| | |
|------------|--------------|
| 5999984465 | -75.83142132 |
| 5999984490 | -74.02712079 |
| 5999984515 | -73.57213005 |

-
-
-

| | |
|------------|--------------|
| 6000009315 | -75.9183103 |
| 6000009340 | -79.53787488 |
| 6000009365 | -78.82602191 |
| 6000009390 | -78.82602188 |
| 6000009415 | -76.37486709 |
| DATA10 | 0 |
| 5999984415 | -75.56751112 |
| 5999984440 | -75.76485645 |
| 5999984465 | -76.67718717 |
| 5999984490 | -78.79238489 |
| 5999984515 | -83.72680212 |

-
-
-

| | |
|------------|--------------|
| 6000009315 | -71.3942461 |
| 6000009340 | -72.28308332 |
| 6000009365 | -73.92684489 |
| 6000009390 | -75.45548832 |
| 6000009415 | -75.17904815 |

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data which is not processed.

| Key Path | Save, Data |
|----------|------------|
|----------|------------|

| | |
|----------------------|--|
| Mode | TD-SCDMA |
| Example | MMEM:STOR:CAPT "MyCaptureData.bin" This stores the capture data in the file MyCaptureData.bin in the default directory. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Save As . . .

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\`<mode name>`\data\traces

For all of the Limit Data Files:

My Documents\`<mode name>`\data\limits

For all of the Measurement Results Data Files:

My Documents\`<mode name>`\data\`<measurement name>`\results

For all of the Capture Buffer Data Files:

My Documents\`<mode name>`\data\captureBuffer

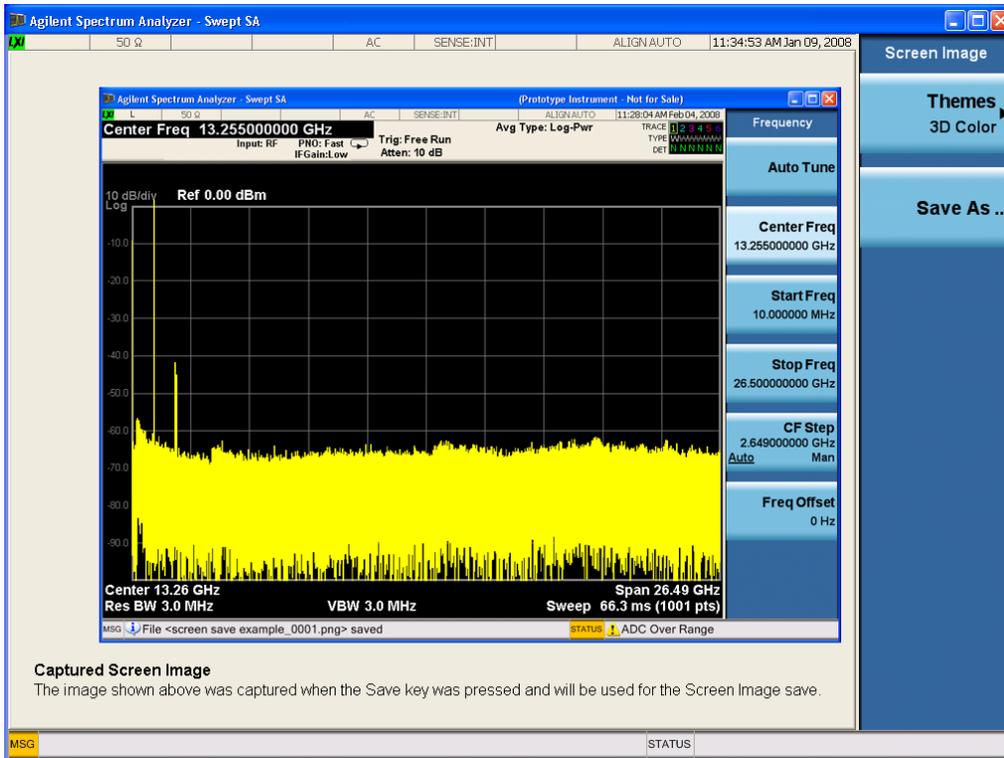
| | |
|----------------------|---|
| Key Path | Save, Data |
| Mode | All |
| Notes | The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <code><mode specific></code> Save Type. The save is performed immediately and does not wait until the measurement is complete. |
| Initial S/W Revision | Prior to A.02.00 |

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menu. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

| | |
|----------------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:SCReen <filename> |
| Example | :MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|-------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Save As...

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where `<mode name>` is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

| | |
|----------------------|--|
| Key Path | Save, Screen Image |
| Notes | Brings up Save As dialog for saving a Screen Image Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Catalog (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:CATalog? [<code><directory_name></code>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><code><numeric_value>,<numeric_value>,{<file_entry>}</code></p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first</p> |

parameter indicates the total amount of storage currently used in bytes. The second parameter indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:

<file_name>,<file_type>,<file_size>

As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty

Initial S/W Revision Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:CDIRectory [<directory_name>]
 :MMEMory:CDIRectory?

Notes The string must be a valid logical path.

Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.

At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.

Query returns full path of the default directory.

Initial S/W Revision Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:COPY <string>,<string>[,<string>,<string>]

Notes The string must be a valid logical path.

Copies an existing file to a new file or an existing directory to a new directory.

Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.

The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.

This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:COpy:DEvice <source_string>,<dest_string> |
| Notes | <p>The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device.</p> <p>Valid device keywords are: SNS (smart noise source)</p> <p>An error is generated if the file or device is not found.</p> |

Mass Storage Delete (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DElete <file_name>[,<directory_name>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an “access denied” error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data.</p> <p>The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Make Directory (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MDIRectory <directory_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>Creates a new directory. The <directory_name> parameter specifies the name to be created.</p> |

| | |
|----------------------|--|
| | This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Move (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MOVE <string>,<string>[,<string>,<string>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Remove Directory (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:RDIRECTory <directory_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See "[More Information](#)" on page 1825

| | |
|-------------------------------|---|
| Key Path | Front-panel key |
| Example | :INIT:CONT OFF |
| Notes | See Cont key description. |
| Backwards Compatibility Notes | <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p> |
| Initial S/W Revision | Prior to A.02.00 |

More Information

See "[Restart](#)" on page 2315 for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no source functionality supported in the Code Domain measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

SPAN X Scale

The SPAN X Scale key accesses the menu to set the desired horizontal scale and associated settings of window.

Code Domain EVM, Code Domain Mag Error, Code Domain Phase Error and Code Domain Symbol Power window have the same SPAN/X Scale menu. Code Domain Power and Code Domain Error window have the same menu. For all of the other windows this menu is empty.

| | |
|----------------------|------------------|
| Key Path | Front panel key |
| Initial S/W Revision | A.01.60 or later |

Ref Value

This key allows you to set the display reference. This key is only available in Code Domain EVM Window, Code Domain Mag Error Window, Code Domain Phase Error Window, Code Domain Symbol Power Window, Code Domain Power Window and Code Domain Error Window.

X Ref Value (I/Q Error View – Code Domain Mag Error Window)

This key sets the symbol reference value on the horizontal axis in the Code Domain Mag Error window.

| | |
|-----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:X[:SCALE]:RLEVel <real> :DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:X[:SCALE]:RLEVel? |
| Example | DISP:CDP:VIEW3:WIND:TRAC:X:RLEV 0 DISP:CDP:VIEW3:WIND:TRAC:X:RLEV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW3 : I/Q Error View WINDow[1]: Code Domain Mag Error Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | 1000 |
| Initial S/W Revision | A.01.60 or later |

X Ref Value (I/Q Error View – Code Domain Phase Error Window)

This key sets the symbol reference value on the horizontal axis in the Code Domain Phase Error window.

| | |
|----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow2:TRACe:X[:SCALE]:RLEVel <real> :DISPlay:CDPower:VIEW3:WINDow2:TRACe:X[:SCALE]:RLEVel? |
| Example | DISP:CDP:VIEW3:WIND2:TRAC:X:RLEV 0 DISP:CDP:VIEW3:WIND2:TRAC:X:RLEV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW3 : I/Q Error View WINDow2: Code Domain Phase Error Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | 1000 |
| Initial S/W Revision | A.01.60 or later |

X Ref Value (I/Q Error View – Code Domain EVM Window)

This key sets the symbol reference value on the horizontal axis in the Code Domain EVM Window.

| | |
|----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow3:TRACe:X[:SCALE]:RLEVel <real> :DISPlay:CDPower:VIEW3:WINDow3:TRACe:X[:SCALE]:RLEVel? |
| Example | DISP:CDP:VIEW3:WIND3:TRAC:X:RLEV 0 DISP:CDP:VIEW3:WIND3:TRAC:X:RLEV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW3 : I/Q Error View WINDow3: Code Domain EVM Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | 1000 |
| Initial S/W Revision | A.01.60 or later |

X Ref Value (Code Domain Symbol Power Window)

This key sets the symbol reference value on the horizontal axis in the Code Domain Symbol Power Window.

| | |
|-----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW4 5:WINDow2:TRACe:X[:SCALE]:RLEVel <real> :DISPlay:CDPower:VIEW4 5:WINDow2:TRACe:X[:SCALE]:RLEVel? |
| Example | DISP:CDP:VIEW4:WIND2:TRAC:X:RLEV 0 DISP:CDP:VIEW4:WIND2:TRAC:X:RLEV? DISP:CDP:VIEW5:WIND2:TRAC:X:RLEV 0 DISP:CDP:VIEW5:WIND2:TRAC:X:RLEV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW4 : Code Domain View VIEW5 : Demod Bits View WINDow2: Code Domain Symbol Power Window on Code Domain View or Demod Bits View |
| Couplings | See Restriction and Notes |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | 1000 |
| Initial S/W Revision | A.01.60 or later |

X Ref Value (Code Domain Power Window)

This key sets the code reference value on the horizontal axis in the Code Domain Power window.

| | |
|-----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW[1] 4 5:WINDow[1]:TRACe:X[:SCALE]:RLEVel <integer> :DISPlay:CDPower:VIEW[1] 4 5:WINDow[1]:TRACe:X[:SCALE]:RLEVel? |
| Example | DISP:CDP:VIEW:WIND:TRAC:X:RLEV 0 DISP:CDP:VIEW:WIND:TRAC:X:RLEV? DISP:CDP:VIEW4:WIND:TRAC:X:RLEV 0 DISP:CDP:VIEW4:WIND:TRAC:X:RLEV? DISP:CDP:VIEW5:WIND:TRAC:X:RLEV 0 DISP:CDP:VIEW5:WIND:TRAC:X:RLEV? |
| Notes | VIEW[1] : CDP Graph and Metrics View VIEW4 : Code Domain View |

| | |
|----------------------|---|
| | VIEW5 : Demod Bits View WINDow[1]: Code Domain Power Window on CDP Graph and Metrics View or Code Domain View, Demod Bits View |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

X Ref Value (Code Domain Error Window)

This key sets the code reference value on the horizontal axis in the Code Domain Error window.

| | |
|-----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:X[:SCALE]:RLEVel <integer> :DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:X[:SCALE]:RLEVel? |
| Example | DISP:CDP:VIEW2:WIND:TRAC:X:RLEV 0.0 DISP:CDP:VIEW2:WIND:TRAC:X:RLEV? |
| Notes | VIEW2 : CDE Graph and Metrics View WINDow[1]: Code Domain Error windows on CDE Graph and Metrics View |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

Scale/Div

This key is for X Scale/Div control. This key is only available in Code Domain EVM Window, Code Domain Mag Error Window, Code Domain Phase Error Window, Code Domain Symbol Power Window, Code Domain Power Window and Code Domain Error Window.

X Scale/Div (I/Q Error View – Code Domain Mag Error Window)

This key sets the horizontal scale by changing a symbol value per division in the Code Domain Mag Error window.

| | |
|----------|--------------|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |

| | |
|-----------------------------|---|
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:X[:SCALe]:PDIVision <real> :DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:X[:SCALe]:PDIVision? |
| Example | DISP:CDP:VIEW3:WIND:TRAC:X:PDIV 100.0 DISP:CDP:VIEW3:WIND:TRAC:X:PDIV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW3: I/Q Error View WINDow[1]: Code Domain Mag Error Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | 4.4 |
| State Saved | Saved in instrument state. |
| Min | 0.2 |
| Max | 1000.0 |
| Initial S/W Revision | A.01.60 or later |

X Scale/Div (I/Q Error View – Code Domain Phase Error Window)

This key sets the horizontal scale by changing a symbol value per division in the Code Domain Phase Error window.

| | |
|-----------------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow2:TRACe:X[:SCALe]:PDIVision <real> :DISPlay:CDPower:VIEW3:WINDow2:TRACe:X[:SCALe]:PDIVision? |
| Example | DISP:CDP:VIEW3:WIND2:TRAC:X:PDIV 100.0 DISP:CDP:VIEW3:WIND2:TRAC:X:PDIV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW3: I/Q Error View WINDow2: Code Domain Phase Error Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | 4.4 |
| State Saved | Saved in instrument state. |
| Min | 0.2 |
| Max | 1000.0 |
| Initial S/W Revision | A.01.60 or later |

X Scale/Div (I/Q Error View – Code Domain EVM Window)

This key sets the horizontal scale by changing a symbol value per division in Code Domain EVM window.

| | |
|-----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow3:TRACe:X[:SCALE]:PDIVision <real> :DISPlay:CDPower:VIEW3:WINDow3:TRACe:X[:SCALE]:PDIVision? |
| Example | DISP:CDP:VIEW3:WIND3:TRAC:X:PDIV 100.0 DISP:CDP:VIEW3:WIND3:TRAC:X:PDIV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW3: I/Q Error View WINDow3: Code Domain EVM Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | 4.4 |
| State Saved | Saved in instrument state. |
| Min | 0.2 |
| Max | 1000.0 |
| Initial S/W Revision | A.01.60 or later |

X Scale/Div (Code Domain Symbol Power Window)

This key sets the horizontal scale by changing a symbol value per division in Code Domain Symbol Power window.

| | |
|-----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW4 5:WINDow2:TRACe:X[:SCALE]:PDIVision <real> :DISPlay:CDPower:VIEW4 5:WINDow2:TRACe:X[:SCALE]:PDIVision? |
| Example | DISP:CDP:VIEW4:WIND2:TRAC:X:PDIV 100.0 DISP:CDP:VIEW4:WIND2:TRAC:X:PDIV? DISP:CDP:VIEW5:WIND2:TRAC:X:PDIV 100.0 DISP:CDP:VIEW5:WIND2:TRAC:X:PDIV? |
| Notes | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. VIEW4: Code Domain View VIEW5: Demod Bits View WINDow2: Code Domain Symbol Power Window on Code Domain View or Demod Bits View |
| Couplings | See Restriction and Notes |
| Preset | 4.4 |
| State Saved | Saved in instrument state. |
| Min | 0.2 |

| | |
|----------------------|------------------|
| Max | 1000.0 |
| Initial S/W Revision | A.01.60 or later |

X Scale/Div (Code Domain Power Window)

This key sets the horizontal scale by changing a code value per division in the Code Domain Power window.

| | |
|-----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW[1] 4 5:WINDow[1]:TRACe:X[:SCALE]:PDIVision <integer> :DISPlay:CDPower:VIEW[1] 4 5:WINDow[1]:TRACe:X[:SCALE]:PDIVision? |
| Example | DISP:CDP:VIEW:WIND:TRAC:X:PDIV 16 DISP:CDP:VIEW:WIND:TRAC:X:PDIV? DISP:CDP:VIEW4:WIND:TRAC:X:PDIV 16 DISP:CDP:VIEW4:WIND:TRAC:X:PDIV? DISP:CDP:VIEW5:WIND:TRAC:X:PDIV 16 DISP:CDP:VIEW5:WIND:TRAC:X:PDIV? |
| Notes | VIEW[1]: CDP Graph and Metrics View VIEW4: Code Domain View VIEW5: Demod Bits View WINDow[1]: Code Domain Power Window on CDP Graph and Metrics View or Code Domain View, Demod Bits View |
| Preset | 16 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

X Scale/Div (Code Domain Error Window)

This key sets the horizontal scale by changing a code value per division in the Code Domain Error window.

| | |
|-----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:X[:SCALE]:PDIVision <integer> :DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:X[:SCALE]:PDIVision? |
| Example | DISP:CDP:VIEW2:WIND:TRAC:X:PDIV 16 DISP:CDP:VIEW2:WIND:TRAC:X:PDIV? |

| | |
|----------------------|---|
| Notes | VIEW2: CDE Graph and Metrics View WINDow[1]: Code Domain Error windows on CDE Graph and Metrics View |
| Preset | 16 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

Ref Position

This key allows you to set the display reference position to Left, Ctr (center), or Right. This key is only available in Code Domain EVM Window, Code Domain Mag Error Window, Code Domain Phase Error Window, Code Domain Symbol Power Window, Code Domain Power Window and Code Domain Error Window.

X Ref Position (I/Q Error View – Code Domain Mag Error Window)

This key sets the X axis reference position in the Code Domain Mag Error window.

| | |
|----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:X[:SCALE]:RPOSition LEFT CENTER RIGHT :DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:X[:SCALE]:RPOSition? |
| Example | DISP:CDP:VIEW3:WIND:TRAC:X:RPOS LEFT DISP:CDP:VIEW3:WIND:TRAC:X:RPOS? |
| Notes | VIEW3 : I/Q Error View WINDow[1]: Code Domain Mag Error Window on I/Q Error View |
| Preset | LEFT |
| State Saved | Saved in instrument state. |
| Range | Left Ctr Right |
| Initial S/W Revision | A.01.60 or later |

X Ref Position (I/Q Error View – Code Domain Phase Error Window)

This key sets the X axis reference position in the Code Domain Phase Error window.

| | |
|----------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow2:TRACe:X[:SCALE]:RPOSition LEFT CENTER RIGHT |

| | |
|----------------------|---|
| | :DISPlay:CDPower:VIEW3:WINDow2:TRACe:X[:SCALe]:RPOSition? |
| Example | DISP:CDP:VIEW3:WIND2:TRAC:X:RPOS LEFT DISP:CDP:VIEW3:WIND2:TRAC:X:RPOS? |
| Notes | VIEW3 : I/Q Error View WINDow2: Code Domain Phase Error Window on I/Q Error View |
| Preset | LEFT |
| State Saved | Saved in instrument state. |
| Range | Left CtrjRight |
| Initial S/W Revision | A.01.60 or later |

X Ref Position (I/Q Error View – Code Domain EVM Window)

This key sets the X axis reference position in the Code Domain EVM window.

| | |
|-----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow3:TRACe:X[:SCALe]:RPOSition LEFT CENTER RIGHT :DISPlay:CDPower:VIEW3:WINDow3:TRACe:X[:SCALe]:RPOSition? |
| Example | DISP:CDP:VIEW3:WIND3:TRAC:X:RPOS LEFT DISP:CDP:VIEW3:WIND3:TRAC:X:RPOS? |
| Notes | VIEW3 : I/Q Error View WINDow3: Code Domain EVM Window on I/Q Error View |
| Preset | LEFT |
| State Saved | Saved in instrument state. |
| Range | Left CtrjRight |
| Initial S/W Revision | A.01.60 or later |

X Ref Position (Code Domain Symbol Power Window)

This key sets the X axis reference position in the Code Domain Symbol Power window.

| | |
|-----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW4 5:WINDow2:TRACe:X[:SCALe]:RPOSition LEFT CENTER RIGHT :DISPlay:CDPower:VIEW4 5:WINDow2:TRACe:X[:SCALe]:RPOSition? |
| Example | DISP:CDP:VIEW4:WIND2:TRAC:X:RPOS LEFT DISP:CDP:VIEW4:WIND2:TRAC:X:RPOS? |

| | |
|----------------------|--|
| | DISP:CDP:VIEW5:WIND2:TRAC:X:RPOS LEFT DISP:CDP:VIEW5:WIND2:TRAC:X:RPOS? |
| Notes | VIEW4 : Code Domain View VIEW5 : Demod Bits View WINDow2: Code Domain Symbol Power Window on Code Domain View or Demod Bits View |
| Preset | LEFT |
| State Saved | Saved in instrument state. |
| Range | Left Ctr Right |
| Initial S/W Revision | A.01.60 or later |

X Ref Position (Code Domain Power Window)

This key sets the X axis reference position in the Code Domain Power window.

| | |
|-----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW[1] 4 5:WINDow[1]:TRACe:X[:SCALE]:RPOSition LEFT CENTer RIGHT :DISPlay:CDPower:VIEW[1] 4 5:WINDow[1]:TRACe:X[:SCALE]:RPOSition? |
| Example | DISP:CDP:VIEW:WIND:TRAC:X:RPOS LEFT DISP:CDP:VIEW:WIND:TRAC:X:RPOS? DISP:CDP:VIEW4:WIND:TRAC:X:RPOS LEFT DISP:CDP:VIEW4:WIND:TRAC:X:RPOS? DISP:CDP:VIEW5:WIND:TRAC:X:RPOS LEFT DISP:CDP:VIEW5:WIND:TRAC:X:RPOS? |
| Notes | VIEW[1] : CDP Graph and Metrics View VIEW4 : Code Domain View VIEW5 : Demod Bits View WINDow[1]: Code Domain Power Window on CDP Graph and Metrics View or Code Domain View, Demod Bits View |
| Preset | LEFT |
| State Saved | Saved in instrument state. |
| Range | Left Ctr Right |
| Initial S/W Revision | A.01.60 or later |

X Ref Position (Code Domain Error Window)

This key sets the X axis reference position in the Code Domain Error window.

| | |
|----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT CENTER RIGHT :DISPlay:CDPower:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RPOSition? |
| Example | DISP:CDP:VIEW2:WIND:TRAC:X:RPOS LEFT DISP:CDP:VIEW2:WIND:TRAC:X:RPOS? |
| Notes | VIEW2 : CDE Graph and Metrics View WINDow[1]: Code Domain Error windows on CDE Graph and Metrics View |
| Preset | LEFT |
| State Saved | Saved in instrument state. |
| Range | Left Ctr Right |
| Initial S/W Revision | A.01.60 or later |

Auto Scale

This key allows you to toggle the scale coupling function between On and Off. This key is only available in Code Domain EVM Window, Code Domain Mag Error Window, Code Domain Phase Error Window and Code Domain Symbol Power Window.

X Auto Scale (I/Q Error View – Code Domain Mag Error Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results in the Code Domain Mag Error window.

| | |
|----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:X[:SCALe]:COUPlE 0 1 OFF ON :DISPlay:CDPower:VIEW3:WINDow[1]:TRACe:X[:SCALe]:COUPlE? |
| Example | DISP:CDP:VIEW3:WIND:TRAC:X:COUP ON DISP:CDP:VIEW3:WIND:TRAC:X:COUP? |
| Notes | When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. VIEW3 : I/Q Error View WINDow[1]: Code Domain Mag Error Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

X Auto Scale (I/Q Error View – Code Domain Phase Error Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results in the Code Domain Phase Error window.

| | |
|----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow2:TRACe:X[:SCALe]:COUPle 0 1 OFF ON :DISPlay:CDPower:VIEW3:WINDow2:TRACe:X[:SCALe]:COUPle? |
| Example | DISP:CDP:VIEW3:WIND2:TRAC:X:COUP ON DISP:CDP:VIEW3:WIND2:TRAC:X:COUP? |
| Notes | When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. VIEW3 : I/Q Error View WINDow2: Code Domain Phase Error Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

X Auto Scale (I/Q Error View – Code Domain EVM Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results in the Code Domain EVM window.

| | |
|----------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW3:WINDow3:TRACe:X[:SCALe]:COUPle 0 1 OFF ON :DISPlay:CDPower:VIEW3:WINDow3:TRACe:X[:SCALe]:COUPle? |
| Example | DISP:CDP:VIEW3:WIND3:TRAC:X:COUP ON DISP:CDP:VIEW3:WIND3:TRAC:X:COUP? |
| Notes | When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. VIEW3 : I/Q Error View WINDow3: Code Domain EVM Window on I/Q Error View |
| Couplings | See Restriction and Notes |
| Preset | ON |

| | |
|----------------------|----------------------------|
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

X Auto Scale (Code Domain Symbol Power Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results in the Code Domain Symbol Power window.

| | |
|----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW4 5:WINDow2:TRACe:X[:SCALe]:COUPle 0 1 OFF ON :DISPlay:CDPower:VIEW4 5:WINDow2:TRACe:X[:SCALe]:COUPle? |
| Example | DISP:CDP:VIEW4:WIND2:TRAC:X:COUP ON DISP:CDP:VIEW4:WIND2:TRAC:X:COUP? DISP:CDP:VIEW5:WIND2:TRAC:X:COUP ON DISP:CDP:VIEW5:WIND2:TRAC:X:COUP? |
| Notes | When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. VIEW4 : Code Domain View VIEW5 : Demod Bits View WINDow2: Code Domain Symbol Power Window on Code Domain View or Demod Bits View |
| Couplings | See Restriction and Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Sweep/Control

Accesses a menu that enables you to configure the Sweep and Control functions of the analyzer, such as Sweep Time and Gating.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing Restart, Single or Cont does a Resume.

| | |
|-----------------------|--|
| Key Path | Sweep/Control |
| Remote Command | :INITiate:PAUSE |
| Dependencies | Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Key Path | Sweep/Control |
| Remote Command | :INITiate:RESume |
| Dependencies | Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing. |
| Initial S/W Revision | Prior to A.02.00 |

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORT is sent, the alignment finishes before the abort function is performed. So ABORT does not abort an alignment.

If the analyzer is set for Continuous measurement, it sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

| | |
|-----------------------|--------|
| Remote Command | :ABORT |
| Example | :ABOR |

| | |
|------------------------------|--|
| Notes | <p>If :INITiate:CONTinuous is ON, then a new continuous measurement will start immediately; with sweep (data acquisition) occurring once the trigger condition has been met.</p> <p>If :INITiate:CONTinuous is OFF, then :INITiate:IMMediate is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met.</p> |
| Dependencies | <p>For continuous measurement, ABORt is equivalent to the Restart key.</p> <p>Not all measurements support the abort command.</p> |
| Status Bits/OPC dependencies | <p>The STATus:OPERation register bits 0 through 8 are cleared.</p> <p>The STATus:QUEStionable register bit 9 (INTEgrity sum) is cleared.</p> <p>Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true.</p> |
| Initial S/W Revision | <p>Prior to A.02.00</p> |

15 Code Domain Measurement
System

System

See ["System" on page 349](#)

Trace/Detector

There is no trace/detector functionality supported in this measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Trigger

See ["Trigger" on page 424](#)

Free Run

See ["Free Run " on page 431](#)

Video

See ["Video \(IF Envelope\) " on page 432](#)

Trigger Level

See ["Trigger Level " on page 432](#)

Trig Slope

See ["Trig Slope " on page 433](#)

Trig Delay

See ["Trig Delay " on page 434](#)

External 1

See ["External 1 " on page 2357](#)

Trigger Level

See ["Trigger Level " on page 2357](#)

Trig Slope

See ["Trig Slope " on page 2358](#)

Trig Delay

See ["Trig Delay " on page 437](#)

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off" on page 2346](#)

External 2

See ["External 2 " on page 2359](#)

Trigger Level

See ["Trigger Level " on page 2359](#)

Trig Slope

See ["Trig Slope " on page 2360](#)

Trig Delay

See ["Trig Delay "](#) on page 440

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off"](#) on page 2348

RF Burst

See ["RF Burst "](#) on page 2360

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 2361

Relative Trigger

See ["Relative Trigger Level"](#) on page 2350

Trig Slope

See ["Trigger Slope "](#) on page 2362

Trig Delay

See ["Trig Delay "](#) on page 444

Periodic Timer

See ["Periodic Timer \(Frame Trigger\) "](#) on page 2352

Period

See ["Period "](#) on page 2353

Offset

See ["Offset "](#) on page 2354

Offset Adjust (Remote Command Only)

See ["Offset Adjust \(Remote Command Only\)"](#) on page 2355

Reset Offset Display

See ["Reset Offset Display "](#) on page 2356

Sync Source

See ["Sync Source "](#) on page 2356

Off

See ["Off "](#) on page 2357

External 1

See "[External 1](#)" on page 2357

Trigger Level

See "[Trigger Level](#)" on page 2357

Trig Slope

See "[Trig Slope](#)" on page 2358

External 2

See "[External 2](#)" on page 2359

Trigger Level

See "[Trigger Level](#)" on page 2359

Trig Slope

See "[Trig Slope](#)" on page 2360

RF Burst

See "[RF Burst](#)" on page 2360

Absolute Trigger

See "[Absolute Trigger Level](#)" on page 2361

Trig Slope

See "[Trigger Slope](#)" on page 2362

Trig Delay

See ___ on page X

Auto/Holdoff

See "[Auto/Holdoff](#)" on page 445

Auto Trig

See "[Auto Trig](#)" on page 445

Trig Holdoff

See "[Trig Holdoff](#)" on page 446

Holdoff Type

See "[Holdoff Type](#)" on page 446

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

| Key Path | Front-panel key |
|-------------------------------|--|
| Backwards Compatibility Notes | <p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p> |
| Initial S/W Revision | Prior to A.02.00 |

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER |
| Notes | :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed |
| Couplings | A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:ALL |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL |
| Notes | Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. |
| Couplings | A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

| | |
|-----------------------|---|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:SAVE |
| Example | :SYST:PRES:USER:SAVE |
| Notes | :SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file. |
| Initial S/W Revision | Prior to A.02.00 |

View/Display

The View/Display key opens up the View menu for the current measurement. The views that are available are specific to the current measurement selected under the Meas key.

For more information, see ["Code Domain Measurement Results and Views" on page 1863](#).

| | |
|----------------------|------------------|
| Key Path | Front panel key |
| Initial S/W Revision | A.01.60 or later |

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

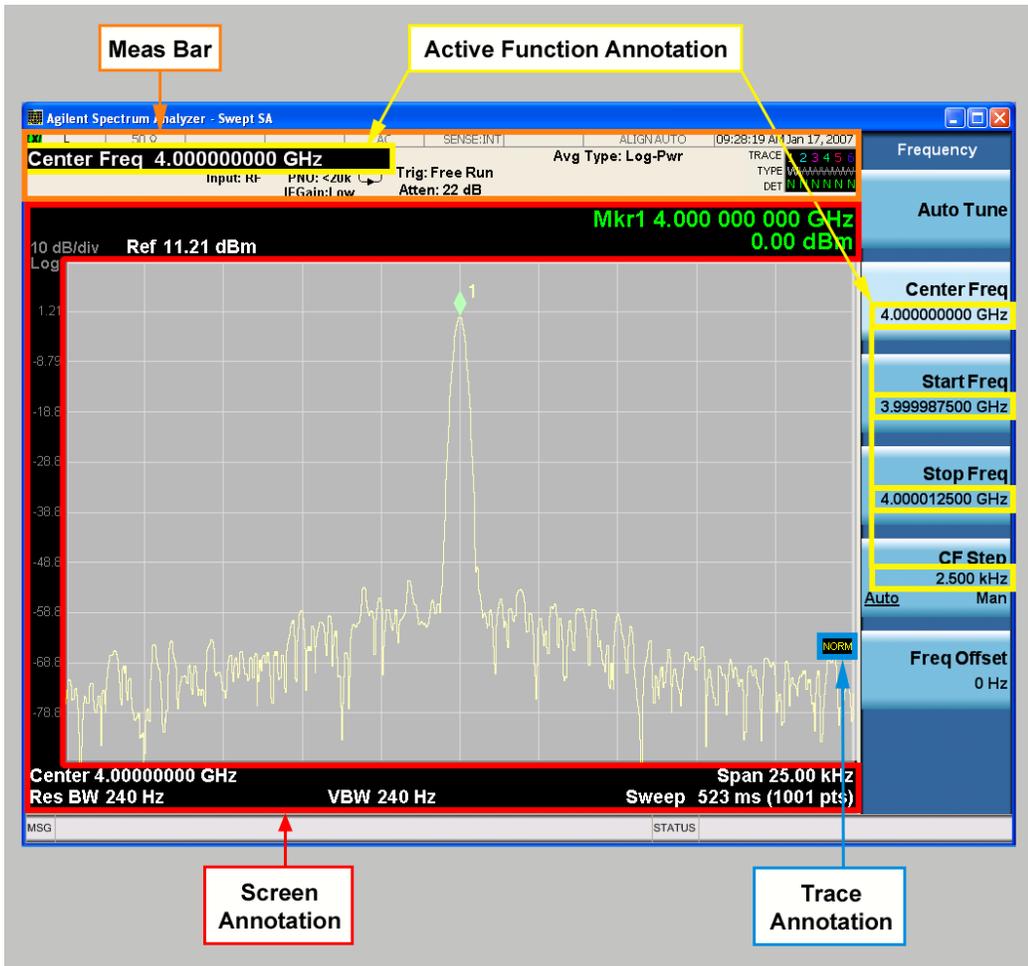
| | |
|----------------------|------------------|
| Key Path | Display |
| Key Path | View/Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

| | |
|-----------------------|--|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNotation:MBAR[:STATE] OFF ON 0 1 :DISPlay:ANNotation:MBAR[:STATE]? |
| Example | DISP:ANN:MBAR OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off. |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Screen

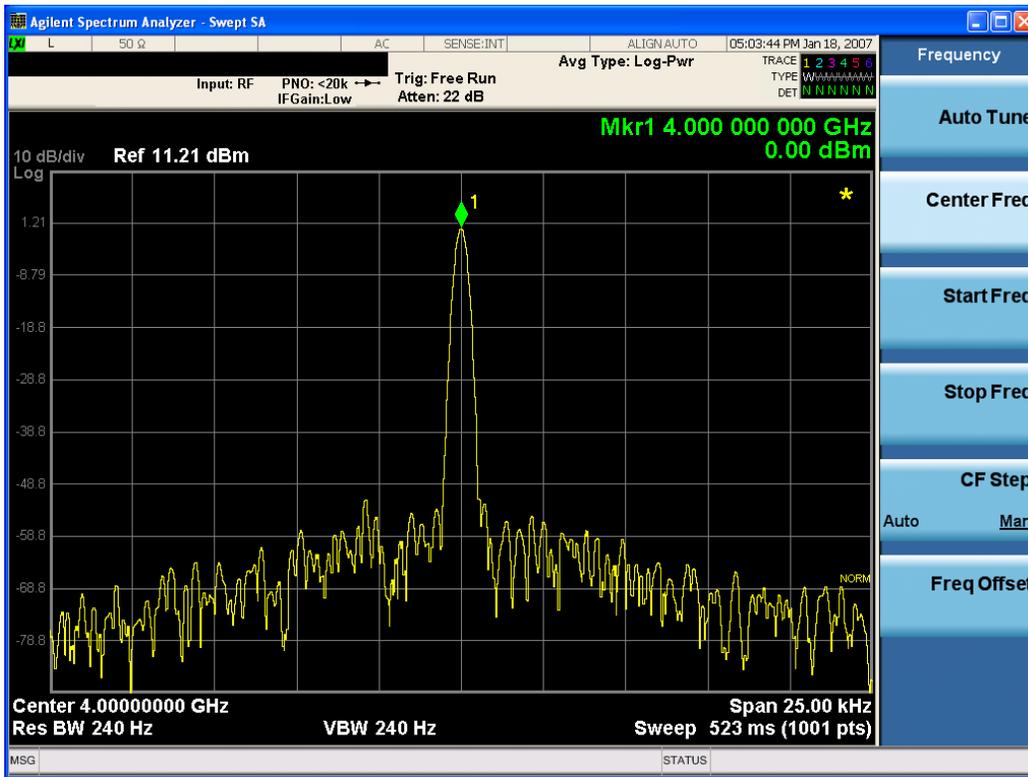
This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

| | |
|-----------------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]? |
| Example | DISP:ANN:SCR OFF |
| Dependencies | Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..



| | |
|----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE]? |
| Example | DISP:ACT OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Title

Displays menu keys that enable you to change or clear a title on your display.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Mode | All |
| Remote Command | :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA? |
| Example | DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title |
| Notes | Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters. |
| Preset | No title (measurement name instead) |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Example | The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required. |
| Notes | Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted). |
| Preset | Performed on Preset. |
| Initial S/W Revision | Prior to A.02.00 |

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

| | |
|-----------------------|--|
| Key Path | View/Display, Display |
| Remote Command | :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]? |
| Example | DISP:WIND:TRAC:GRAT:GRID OFF |
| Notes | The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis. |
| Preset | On |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

| | |
|-------------------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:WINDow[1]:ANNOtation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNOtation[:ALL]? |
| Example | :DISP:WIND:ANN OFF |
| Preset | On (Set by Restore Misc Defaults) |
| State Saved | Not saved in instrument state. |
| Backwards Compatibility Notes | The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReem:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReem:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

| | |
|-----------------------|--|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight ON OFF :DISPlay:BACKlight? |
| Preset | ON (Set by Restore Misc Defaults) |
| Initial S/W Revision | Prior to A.02.00 |

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

| | |
|-----------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity? |
| Example | DISP:BACK:INT 50 |

| | |
|----------------------|------------------------------------|
| Preset | 100 (Set by Restore Misc Defaults) |
| Min | 0 |
| Max | 100 |
| Initial S/W Revision | Prior to A.02.00 |

CDP Graph & Metrics

Selects a combination view of the code domain power graph and the summary data.

| | |
|----------------------|--|
| Key Path | View/Display |
| Example | :DISPlay:CDPower:VIEW CDPGraph :DISPlay:CDP:VIEW? |
| Initial S/W Revision | A.01.60 or later |

Composite

Specifies whether the composite CDP/CDE is displayed. If composite is on, it displays CDP/CDE of all active channels on its own spread code length in red color, and inactive channels in yellow color. Otherwise, it displays CDP/CDE of all the channels on the spread code length specified by the second key under this menu in yellow color.

| | |
|-----------------------|---|
| Key Path | View/Display, CDP Graph & Metrics, CompositeView/Display, CDE Graph & Metrics, CompositeView/Display, Code Domain, CompositeView/Display, Demod Bits, Composite |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:COMPOSITE OFF ON 0 1 :DISPlay:CDPower:COMPOSITE? |
| Example | :DISP:CDP:COMP ON :DISP:CDP:COMP? |
| Couplings | If composite is on, the spread code length key followed it will be grayed out. |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Spread Code Length

Selects the active Spread Code Length for the CDP/CDE trace data. This parameter has no other effect except for the display of the CDP and CDE trace when composite is off. So if Composite is set to On, the Spread Code Length key will be grayed out.

| | |
|-----------------------|---|
| Key Path | View/Display, CDP Graph & Metics, CompositeView/Display, CDE Graph & Metics, CompositeView/Display, Code Domain, CompositeView/Display, Demod Bits, Composite |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:SCLength <integer> :DISPlay:CDPower:SCLength? |
| Example | :DISP:CDP:SCL 1 :DISP:CDP:SCL? |
| Couplings | Only 1, 2, 4, 8, 16 are valid and any number will be clipped to the nearest valid number. |
| Preset | 16 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

CDE Graph & Metrics

Selects a combination view of the code domain power graph and the summary data.

| | |
|----------------------|--|
| Key Path | View/Display |
| Example | :DISPlay:CDPower:VIEW CDEGraph :DISPlay:CDP:VIEW? |
| Initial S/W Revision | A.01.60 or later |

Composite

Specifies whether the composite CDP/CDE is displayed. If composite is on, it displays CDP/CDE of all active channels on its own spread code length in red color, and inactive channels in yellow color. Otherwise, it displays CDP/CDE of all the channels on the spread code length specified by the second key under this menu in yellow color.

| | |
|-----------------------|---|
| Key Path | View/Display, CDP Graph & Metics, CompositeView/Display, CDE Graph & Metics, CompositeView/Display, Code Domain, CompositeView/Display, Demod Bits, Composite |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:COMPOSITE OFF ON 0 1 :DISPlay:CDPower:COMPOSITE? |
| Example | :DISP:CDP:COMP ON :DISP:CDP:COMP? |
| Couplings | If composite is on, the spread code length key followed it will be grayed out. |
| Preset | ON |

| | |
|----------------------|----------------------------|
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Spread Code Length

Selects the active Spread Code Length for the CDP/CDE trace data. This parameter has no other effect except for the display of the CDP and CDE trace when composite is off. So if Composite is set to On, the Spread Code Length key will be grayed out.

| | |
|----------------------|---|
| Key Path | View/Display, CDP Graph & Metics, CompositeView/Display, CDE Graph & Metics, CompositeView/Display, Code Domain, CompositeView/Display, Demod Bits, Composite |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:SCLength <integer> :DISPlay:CDPower:SCLength? |
| Example | :DISP:CDP:SCL 1 :DISP:CDP:SCL? |
| Couplings | Only 1, 2, 4, 8, 16 are valid and any number will be clipped to the nearest valid number. |
| Preset | 16 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

I/Q Error (quad view)

Provides a combination view of magnitude error, phase error, symbol EVM and the summary data.

| | |
|----------------------|---|
| Key Path | View/Display |
| Example | :DISPlay:CDPower:VIEW IQERror :DISPlay:CDPower:VIEW? |
| Initial S/W Revision | A.01.60 or later |

Code Domain

Provides a combination view of the code domain power, symbol power, I/Q symbol polar vector and the summary data.

| | |
|----------|--------------|
| Key Path | View/Display |
|----------|--------------|

| | |
|----------------------|---|
| Example | :DISPlay:CDPower:VIEW CDOMain :DISPlay:CDPower:VIEW? |
| Initial S/W Revision | A.01.60 or later |

Composite

Specifies whether the composite CDP/CDE is displayed. If composite is on, it displays CDP/CDE of all active channels on its own spread code length in red color, and inactive channels in yellow color. Otherwise, it displays CDP/CDE of all the channels on the spread code length specified by the second key under this menu in yellow color.

| | |
|-----------------------|---|
| Key Path | View/Display, CDP Graph & Metics, CompositeView/Display, CDE Graph & Metics, CompositeView/Display, Code Domain, CompositeView/Display, Demod Bits, Composite |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:COMPOSITE OFF ON 0 1 :DISPlay:CDPower:COMPOSITE? |
| Example | :DISP:CDP:COMP ON :DISP:CDP:COMP? |
| Couplings | If composite is on, the spread code length key followed it will be grayed out. |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Spread Code Length

Selects the active Spread Code Length for the CDP/CDE trace data. This parameter has no other effect except for the display of the CDP and CDE trace when composite is off. So if Composite is set to On, the Spread Code Length key will be grayed out.

| | |
|-----------------------|---|
| Key Path | View/Display, CDP Graph & Metics, CompositeView/Display, CDE Graph & Metics, CompositeView/Display, Code Domain, CompositeView/Display, Demod Bits, Composite |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:SCLength <integer> :DISPlay:CDPower:SCLength? |
| Example | :DISP:CDP:SCL 1 :DISP:CDP:SCL? |
| Couplings | Only 1, 2, 4, 8, 16 are valid and any number will be clipped to the nearest valid number. |
| Preset | 16 |

| | |
|----------------------|----------------------------|
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

Demod Bits

Provides a combination view of the graphs for the code domain power and symbol power, and the I/Q demodulated bit stream data for the symbol power slots selected by the measurement interval and measurement offset.

| | |
|----------------------|---|
| Key Path | View/Display |
| Example | :DISPlay:CDPower:VIEW DBITs :DISPlay:CDPower:VIEW? |
| Initial S/W Revision | A.01.60 or later |

Composite

Specifies whether the composite CDP/CDE is displayed. If composite is on, it displays CDP/CDE of all active channels on its own spread code length in red color, and inactive channels in yellow color. Otherwise, it displays CDP/CDE of all the channels on the spread code length specified by the second key under this menu in yellow color.

| | |
|-----------------------|---|
| Key Path | View/Display, CDP Graph & Metics, CompositeView/Display, CDE Graph & Metics, CompositeView/Display, Code Domain, CompositeView/Display, Demod Bits, Composite |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:COMPOSITE OFF ON 0 1 :DISPlay:CDPower:COMPOSITE? |
| Example | :DISP:CDP:COMP ON :DISP:CDP:COMP? |
| Couplings | If composite is on, the spread code length key followed it will be grayed out. |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Spread Code Length

Selects the active Spread Code Length for the CDP/CDE trace data. This parameter has no other effect except for the display of the CDP and CDE trace when composite is off. So if Composite is set to On, the

Spread Code Length key will be grayed out.

| | |
|-----------------------|---|
| Key Path | View/Display, CDP Graph & Metics, CompositeView/Display, CDE Graph & Metics, CompositeView/Display, Code Domain, CompositeView/Display, Demod Bits, Composite |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:SCLength <integer> :DISPlay:CDPower:SCLength? |
| Example | :DISP:CDP:SCL 1 :DISP:CDP:SCL? |
| Couplings | Only 1, 2, 4, 8, 16 are valid and any number will be clipped to the nearest valid number. |
| Preset | 16 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

Result Metrics

Provides a view of the measurement summary data..

| | |
|----------------------|--|
| Key Path | View/Display |
| Example | :DISPlay:CDPower:VIEW RESMetrics :DISPlay:CDPower:VIEW? |
| Initial S/W Revision | A.01.60 or later |

Code Domain Measurement Results and Views

The Code Domain measurement consists of six views. The default view is CDP Graph & Metrics.

| NO. | View | NO. of Windows | Window No. | Window |
|-----|--|--------------------|------------|---|
| 1 | VIEW[1] "View - CDP Graph & Metrics" on page 1864 | Dual (Vertical) | WINDow[1] | "Code Domain Power Window" on page 1865 |
| | | | WINDow2 | "Code Domain Power Summary Window" on page 1865 |
| 2 | VIEW2 "View - CDE Graph & Metrics" on page 1866 | Dual (Vertical) | WINDow[1] | "Code Domain Error Window" on page 1867 |
| | | | WINDow2 | "Code Domain Power Summary Window" on page 1867 |
| 3 | VIEW3 "View - I/Q Error" on | Quad | WINDow[1] | "Code Domain Magnitude Error Window" on page 1868 |

| | | | | |
|---|--|--------|-----------|---|
| | page 1867 | | WINDow2 | "Code Domain Phase Error Window" on page 1868 |
| | | | WINDow3 | "Code Domain EVM Window" on page 1869 |
| | | | WINDow4 | "Code Domain Result Metrics Window" on page 1869 |
| 4 | VIEW4 "View – Code Domain" on page 1870 | Quad | WINDow[1] | "Code Domain Power Window" on page 1870 |
| | | | WINDow2 | "Code Domain Symbol Power Window" on page 1870 |
| | | | WINDow3 | "I/Q Symbol Polar Vector (Constellation) Window" on page 1871 |
| | | | WINDow4 | "Code Domain Result metrics Window" on page 1871 |
| 5 | VIEW5 "View – Demod Bits" on page 1871 | Triple | WINDow[1] | "Code Domain Power Window" on page 1872 |
| | | | WINDow2 | "Code Domain Symbol Power Window" on page 1870 |
| | | | WINDow3 | "Demod Bits Window" on page 1872 |
| 6 | VIEW6 "View – Results Metrics" on page 1872 | Single | WINDow[1] | "Code Domain Numeric Results Window" on page 1873 |

View – CDP Graph & Metrics

There are two windows, "Code Domain Power Window" on page 1865 (top) and "Code Domain Power Summary Window" on page 1865 (down).



Code Domain Power Window

Provides a list of all channel codes within the code set with their power separately.

| | |
|---------------------|---|
| Marker Trace | Yes |
| Corresponding Trace | Code Domain Power vs. code trace of the selected timeslot. Coupled with normalize: if normalize is set off, un-normalized power vs. code trace in dBm will be displayed (n=4); If normalize is set on, normalized power vs. code trace in dB will be displayed (n=5) |

Code Domain Power Summary Window

This window provides the total power, number of active channels, and a table of active channel codes with their powers (in dB and dBm) and CDE separately.

| Name | Corresponding Results | Format |
|------|---|--------------------------------|
| Slot | The slot under measurement within the analyzed sub-frame TS0, DwPTS, UpPTS, TS1, TS2, TS3, TS4, TS5, TS6 | TSi, (i=0, 1, ..., 6) DwPTS |

| | | UpPTS |
|---------------------------|--|---|
| Total Data Power | n=1 12th Total data part power of the selected time slot | -99.99 dBm |
| Number of Active Channels | n=1 11th Number of active channels in the selected time slot | 99 |
| Pk CDE | n=1 17th Peak hold Peak Code Domain Error (all the code channels, including active and inactive, in average cycle) of the selected timeslot | 99.99 dB |
| Pk CDE Position | n=1 18th Code length of peak hold Peak CDE (in average cycle) of the selected timeslot, X of SX(Y); n=1 19th Code index of peak hold Peak CDE (in average cycle) of the selected timeslot, Y of SX(Y) | SX(Y) X: OVFSF code length (1,2,4,8,16) Y: OVFSF code index (0, ... X-1) |
| Pk Act CDE | n=1 20th Peak hold Peak Active CDE (active code channels, in average cycle) of the selected timeslot | 99.99 dB |
| Pk Active CDE Position | n=1 21st Code length of peak hold Peak Active CDE (in average cycle) of the selected timeslot, X of SX(Y); n=1 22nd Code index of peak hold Peak Active CDE (in average cycle) of the selected timeslot, Y of SX(Y) | SX(Y) X: OVFSF code length (1,2,4,8,16) Y: OVFSF code index (0, ... X-1) |
| Code | Spread code number list of active channels | SX(Y), X: OVFSF code length (1,2,4,8,16) Y: OVFSF code index (0, ... X-1) |
| Abs CDP (dBm) | Absolute power list of active code channels in dBm | 99.99 |
| Number of Midamble Shifts | n=1 23rd The number of midamble shift detected in a timeslot. | 99 |
| Midamble Shift (k) List | n=15 All of the midamble shifts. | mi, mi, mi,,, i: The midamble shift |

View – CDE Graph & Metrics

There are two windows, "[Code Domain Error Window](#)" on page 1867 (top) and "[Code Domain Power Summary Window](#)" on page 1867 (down).



Code Domain Error Window

Provides a list of all channel codes within the code set with their power separately.

| | |
|---------------------|---|
| Marker Trace | Yes |
| Corresponding Trace | If Normalize is Off, the trace is unnormalized Code Domain Error vs. Code Channel(dBm) (n=6), otherwise the trace is normalized Code Domain Error vs. Code Channel(dB)(n=7) |

Code Domain Power Summary Window

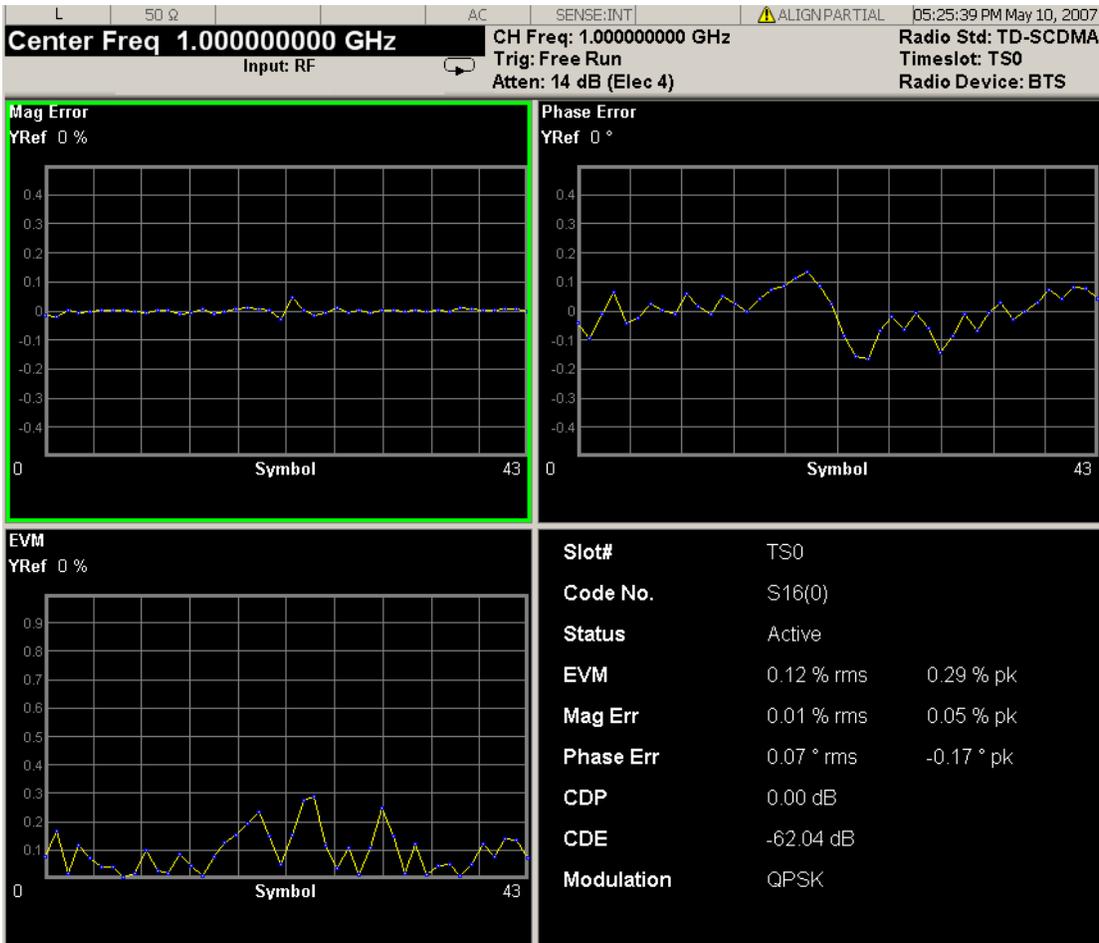
Shows code domain power summary as the same as those of "Code Domain Power Summary Window" on page 1865.

View – I/Q Error

There are four windows in this view:

- "Code Domain Magnitude Error Window" on page 1868
- "Code Domain Phase Error Window" on page 1868

- "Code Domain EVM Window" on page 1869
- "Code Domain Result Metrics Window" on page 1869



Code Domain Magnitude Error Window

This window provides magnitude error vs. symbol results in the selected analyze timeslot.

| | |
|---------------------|----------------------------------|
| Marker Trace | Yes |
| Corresponding Trace | Mag Error vs. Symbol trace (n=8) |

Code Domain Phase Error Window

This window provides phase error vs. symbol results in the selected analyze timeslot.

| | |
|---------------------|------------------------------------|
| Marker Trace | Yes |
| Corresponding Trace | Phase Error vs. Symbol trace (n=9) |

Code Domain EVM Window

This window provides EVM result vs. symbol results in the selected analyze timeslot.

| | |
|---------------------|-----------------------------|
| Marker Trace | Yes |
| Corresponding Trace | EVM vs. Symbol trace (n=10) |

Code Domain Result Metrics Window

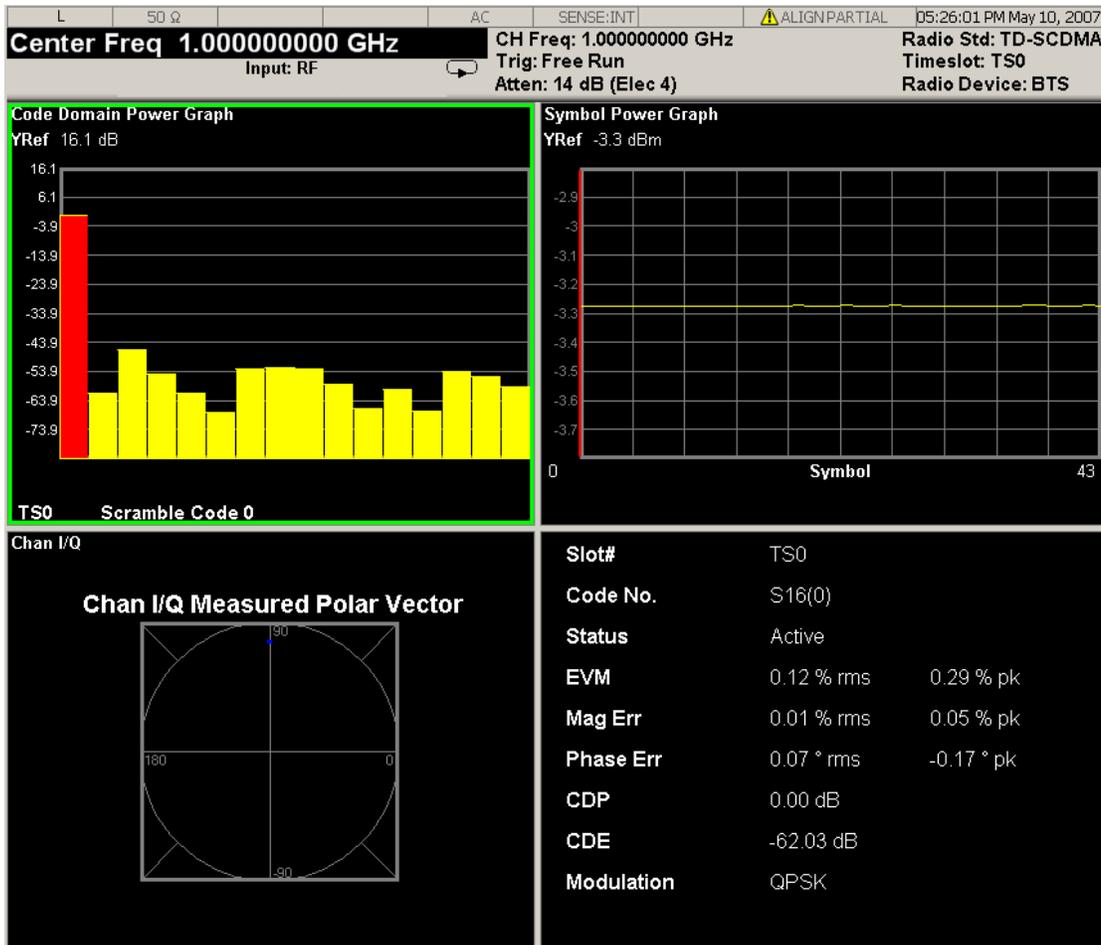
This window provides code domain result metrics.

| Name | Corresponding Results | Format |
|-----------------------|---|---|
| Slot# | The slot under measurement within the analyzed sub-frame TS0, DwPTS, UpPTS, TS1, TS2, TS3, TS4, TS5, TS6 | TSi, (i=0, 1, ..., 6) DwPTS UpPTS |
| Code No. | The code No. and level under measurement within the analyzed sub-frame and time slot. | SX(Y) X: spreading code length (1,2,4,8,16) Y: code channel number (0 .. X-1) |
| Code Status | The status of the code channel. | Active, Inactive |
| Rms EVM | n=1 1st The rms symbol EVM | 99.99 % rms |
| Peak EVM | n=1 2nd The peak symbol EVM | 99.99 % pk |
| Rms Mag Error | n=1 4th The rms symbol mag error | 99.99 % rms |
| Peak Mag Error | n=1 5th The peak symbol mag error | 99.99 % pk |
| Rms Phase Error | n=1 7th The rms symbol phase error | 99.99 °rms |
| Peak Phase Error | n=1 8th The peak symbol phase error | 99.99 °pk |
| Code Domain Power(dB) | n=1 14th The power of the code channel in dB | 99.99 dB |
| Code Domain Error(dB) | n=1 16th The error of the code channel in dB | 99.99 dB |
| Modulation | n=1 24th The modulation mode has been detected. | QPSK, 8PSK,16QAM, 64QAM |

View – Code Domain

There are four windows in this view:

- "Code Domain Power Window" on page 1870
- "Code Domain Symbol Power Window" on page 1870
- "I/Q Symbol Polar Vector (Constellation) Window" on page 1871
- "Code Domain Result metrics Window" on page 1871



Code Domain Power Window

Shows code domain power graph the same as that of "Code Domain Power Window" on page 1865.

Code Domain Symbol Power Window

This window provides symbol power vs. time results.

| | |
|---------------------|---------------------|
| Marker Trace | Yes |
| Corresponding Trace | Symbol Power (n=13) |

I/Q Symbol Polar Vector (Constellation) Window

| | |
|---------------------|--|
| Marker Trace | Yes |
| Corresponding Trace | If Normalize is Off, the trace is un-normalized I/Q Symbol Polar Vector(n=11), otherwise it is normalized I/Q Symbol Polar Vector (n=12) |

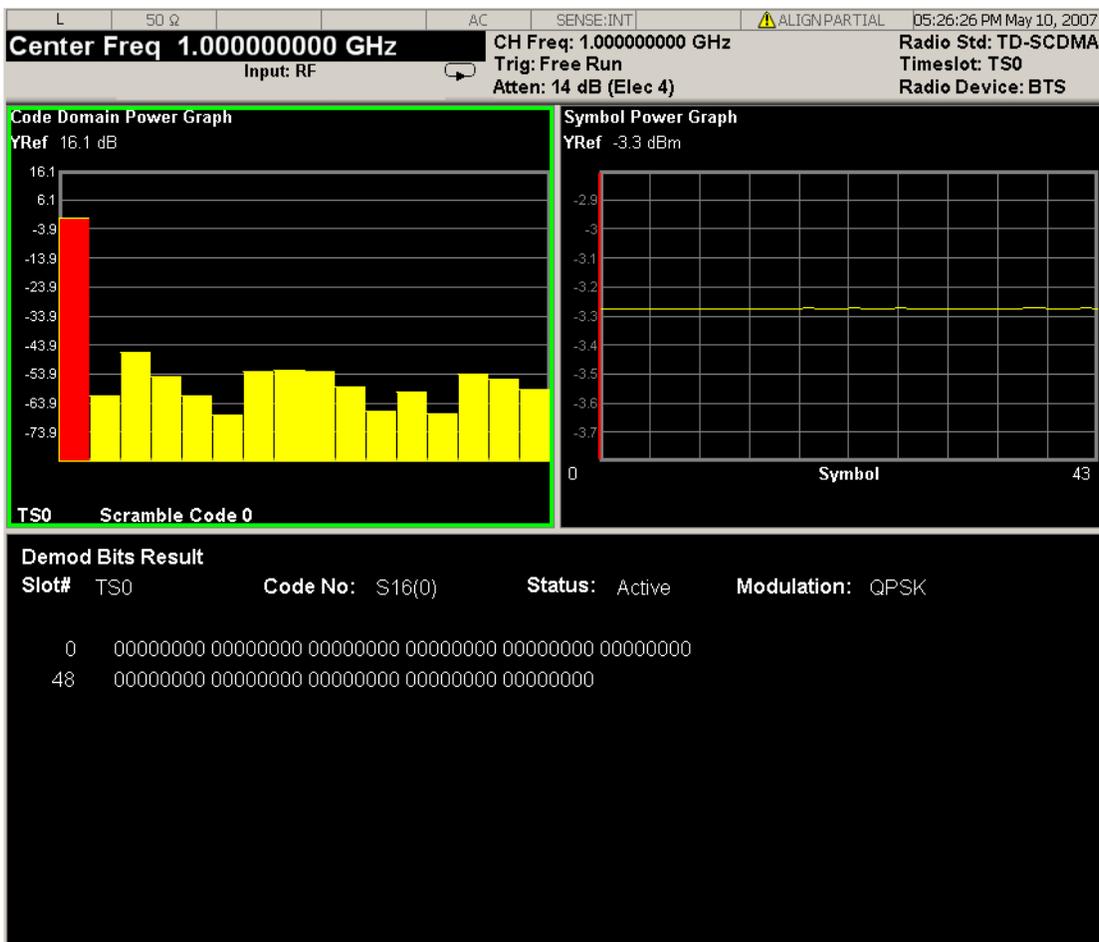
Code Domain Result metrics Window

Shows code domain result metrics window the same as those of "Code Domain Result Metrics Window" on page 1869.

View – Demod Bits

There three windows in this view:

- "Code Domain Power Window" on page 1872
- "Code Domain Symbol Power Window" on page 1872
- "Demod Bits Window" on page 1872



Code Domain Power Window

Shows code domain power graph the same as that of ["Code Domain Power Window" on page 1865](#).

Code Domain Symbol Power Window

Shows code domain power graph the same as that of ["Code Domain Symbol Power Window" on page 1870](#).

Demod Bits Window

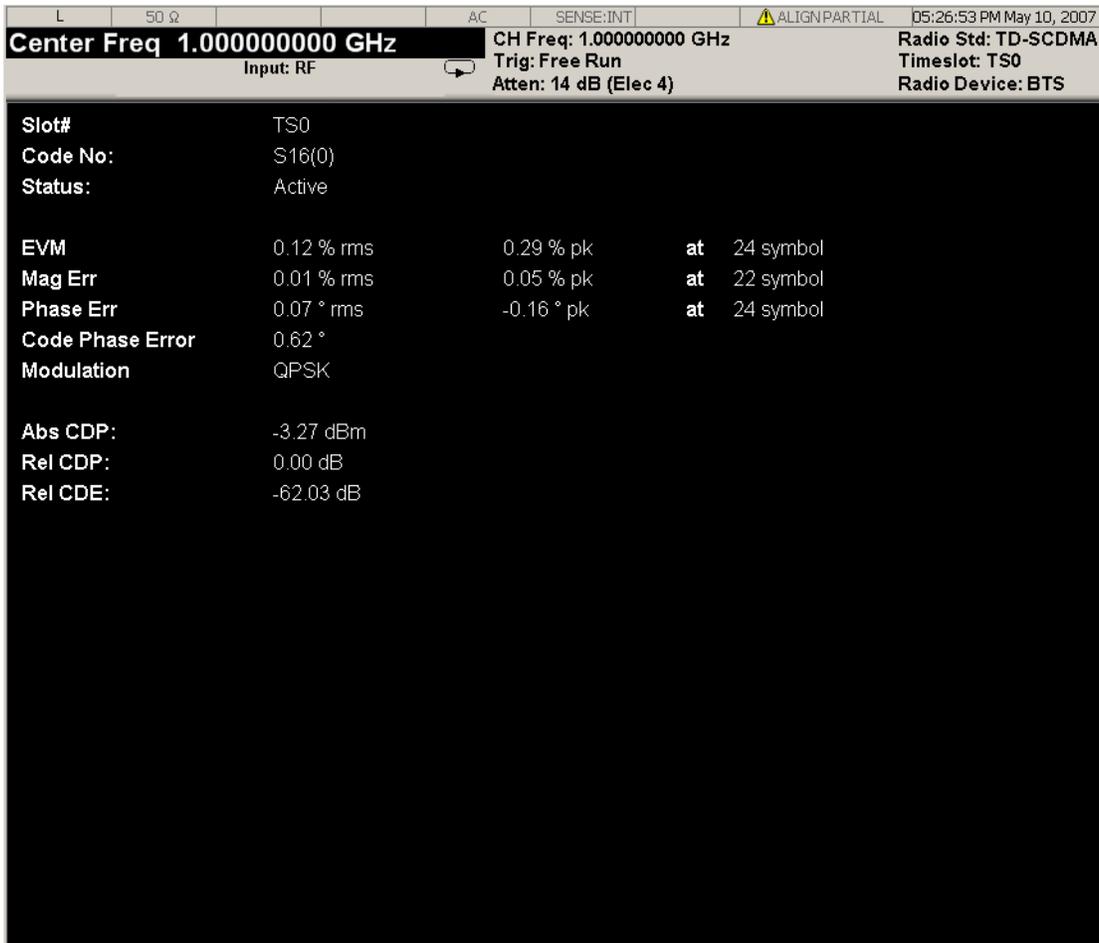
| | |
|---------------------|-------------------|
| Marker Trace | No |
| Corresponding Trace | Demod bits (n=14) |

This window also shows the following results.

| Name | Corresponding Results | Format |
|-------------|---|---|
| Slot# | The slot under measurement within the analyzed sub-frame TS0, DwPTS, UpPTS, TS1, TS2, TS3, TS4, TS5, TS6 | TSi, (i=0, 1, ..., 6) DwPTS UpPTS |
| Code No. | The code No. and level under measurement within the analyzed sub-frame and time slot. | SX(Y) X: spreading code length (1,2,4,8,16) Y: code channel number (0 .. X-1) |
| Code Status | The status of the code channel. | Active, Inactive |
| Modulation | n=1 24th The modulation mode has been detected. | QPSK, 8PSK, 16QAM, 64QAM |

View – Results Metrics

There is one window, ["Code Domain Numeric Results Window" on page 1873](#), which shows the summary of code domain result metrics.



Code Domain Numeric Results Window

This window shows the results summary window.

| Name | Corresponding Results | Format |
|-------------|---|---|
| Slot# | The slot under measurement within the analyzed sub-frame TS0, DwPTS, UpPTS, TS1, TS2, TS3, TS4, TS5, TS6 | TSi, (i=0, 1, ..., 6) DwPTS UpPTS |
| Code No. | The code No. and level under measurement within the analyzed sub-frame and time slot. | SX(Y) X: spreading code length (1,2,4,8,16) Y: code channel number (0 .. X-1) |
| Code Status | The status of the code channel. | Active, Inactive |
| Rms EVM | n=1 1st The rms symbol EVM | 99.99 % rms |
| Peak EVM | n=1 2nd The peak symbol EVM | 99.99 % pk |

| | | |
|-----------------------------------|--|-------------------------|
| Peak position of peak EVM | n=1 3rd The symbol number with the peak symbol EVM | 999 |
| Rms Mag Error | n=1 4th The rms symbol mag error | 99.99 % rms |
| Peak Mag Error | n=1 5th The peak symbol mag error | 99.99 % pk |
| Peak position of peak Mag Error | n=1 6th The symbol number with the peak mag error | 999 |
| Rms Phase Error | n=1 7th The rms symbol phase error | 99.99 °rms |
| Peak Phase Error | n=1 8th The peak symbol phase error | 99.99 °pk |
| Peak position of peak phase Error | n=1 9th The symbol number with the peak phase error | 999 |
| Code Phase Error | n=1 10th The phase error of the code channel | 99.99 ° |
| Code Domain Power (dBm) | n=1 13th The power of the code channel in dBm | 99.99 dBm |
| Code Domain Power(dB) | n=1 14th The power of the code channel in dB | 99.99 dB |
| Code Domain Error(dB) | n=1 16th The error of the code channel | 99.99 dB |
| Modulation | n=1 24th The modulation mode has been detected. | QPSK, 8PSK,16QAM, 64QAM |

View Selection by Number (Remote Command only)

Allows you to select the desired measurement view from the following selections by Remote Commands:

1CDP Graph & Metrics – provides a combination view of the code domain power graph and the summary data.

2CDE Graph & Metrics – provides a combination view of the code domain power graph and the code domain error.

3I/Q Error – provides a combination view of magnitude error, phase error, symbol EVM and the summary data.

4Code Domain – provides a combination view of the code domain power, symbol power, I/Q symbol polar vector and the summary data.

5Demod Bits – provides a combination view of the graphs for the code domain power and symbol power, and the I/Q demodulated bit stream data for the symbol power slots selected by the measurement interval and measurement offset.

6Result Metrics – provides a view of the measurement summary data.

| | |
|-----------------------------|---|
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:CDPower:VIEW:NSElect <integer> :DISPlay:CDPower:VIEW:NSElect? |
| Example | DISP:CDP:VIEW:NSEL 1 DISP:CDP:VIEW:NSEL? |
| Notes | Meaning of the numeric values: 1: CDP Graph & Metrics View 2: CDE Graph & Metrics View 3: IQ Error View 4: Code Domain View 5: Demod Bits View 6: Result Metrics View |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 6 |
| Initial S/W Revision | A.01.60 or later |

16 Introduction

16 Modulation Accuracy (Composite EVM) Measurement

TD-SCDMA Modulation Accuracy Measurement provides the properties/methods for measuring the composite errors in TD-SCDMA transmitter. For more details, see "[Modulation Accuracy Measurement Description](#)" on page 1885 below.

This topic contains the following sections:

["Remote Commands for Modulation Accuracy"](#) on page 1878

["Measurement Results for Modulation Accuracy Measurement"](#) on page 1879

Remote Commands for Modulation Accuracy

The following commands are used to retrieve the measurement results:

The general functionality of CONFigure, FETCh, MEASure, and READ are described at the beginning of this section.

CONFigure:EVM

CONFigure:EVM:NDEFault

FETCh:EVM[n]?

INITiate:EVM

MEASure:EVM[n]?

READ:EVM[n]?

Measurement Results for Modulation Accuracy Measurement

For each result, the following heading is used to represent its format and precision.

#.Result Name (type of number) [unit] <explanation>

Type of number includes double, float and integer.

| Index: n | Results Returned |
|----------------------|--|
| 0 | <p>I/Q Capture Data Trace (float) [volt] <2 * capture interval in second * sample rate></p> <p>Returns unprocessed I/Q trace data of Capture Interval, as a series of trace point values, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values. The sample rate is 3.75MHz in this measurement.</p> <p>If no data is captured, one NaN will be returned.</p> |
| 1 (or not specified) | <p>Returns the following 34 comma-separated scalar results, in the following order:</p> <ol style="list-style-type: none"> 1. Rho (Average) (float) [NA] Averaged composite Rho (in average cycle) in the selected timeslot and sub-frame. 2. Rho (Peak Hold) (float) [NA] Peak/Maximum composite Rho (in average cycle) in the selected timeslot and sub-frame. 3. RMS EVM (Average) (float) [% rms] Averaged composite RMS EVM (in average cycle) in the selected timeslot and sub-frame. 4. RMS EVM (Peak Hold) (float) [% rms] Peak/Maximum composite RMS EVM (in average cycle) in the selected timeslot and sub-frame. 5. Peak EVM (Average) (float) [% pk] Averaged composite peak EVM (in average cycle) in the selected timeslot and sub-frame. 6. Peak EVM (Peak Hold) (float) [% pk] Peak/Maximum composite peak EVM (in average cycle) in the selected timeslot and sub-frame. 7. RMS Magnitude Error (Average) (float) [% rms] Averaged composite RMS magnitude error (in average cycle) in the selected timeslot and sub-frame. 8. RMS Magnitude Error (Peak Hold) (float) [% rms] Peak/Maximum composite RMS magnitude error (in average cycle) in the selected timeslot and sub-frame. 9. Peak Magnitude Error (Average) (float) [% pk] Averaged composite peak magnitude error in the selected timeslot and sub-frame. 10. Peak Magnitude Error (Peak Hold) (float) [% pk] Peak/Maximum composite peak magnitude error in the selected timeslot and sub-frame. 11. RMS Phase Error (Average) (float) [° rms] Averaged composite RMS phase error (in average cycle) in the selected timeslot and sub-frame. 12. RMS Phase Error (Peak Hold) (float) [° rms] Peak/Maximum composite RMS phase error (in average cycle) in the selected timeslot and sub-frame. 13. Peak Phase Error (Average) (float) [° pk] Averaged composite peak phase error (in average cycle) in the selected timeslot and sub-frame. 14. Peak Phase Error (Peak Hold) (float) [° pk] |

-
- Peak/Maximum composite peak phase error (in average cycle) in the selected timeslot and sub-frame.
15. Peak CDE (Average) (float) [dB]
 Averaged Peak code domain error of all code channels (in average cycle), including active code channels and inactive code channels.
 When DwPTS or UpPTS is selected, NaN will be returned.
16. Peak CDE (Peak Hold) (float) [dB]
 Peak/Maximum Peak code domain error of all code channels (in average cycle), including active code channels and inactive code channels.
 When DwPTS or UpPTS is selected, NaN will be returned.
17. Peak Active CDE (Average) (float) [dB]
 Averaged Peak Code Domain Error of active code channels (in average cycle).
 If no active channel is detected, NaN will be returned.
 When DwPTS or UpPTS is selected, NaN will be returned.
18. Peak Active CDE (Peak Hold) (float) [dB]
 Peak/Maximum Peak Code Domain Error of active code channels (in average cycle).
 If no active channel is detected, NaN will be returned.
 When DwPTS or UpPTS is selected, NaN will be returned.
19. Frequency Error (Average) (float) [Hz]
 Averaged composite frequency error (in average cycle) in the selected timeslot and sub-frame.
20. Frequency Error (Peak Hold) (float) [Hz]
 Peak/Maximum composite frequency error (in average cycle) in the selected timeslot and sub-frame.
21. IQ Offset (Average) (float) [dB]
 Averaged composite IQ offset (in average cycle) in the selected timeslot and sub-frame.
22. IQ Offset (Peak Hold) (float) [dB]
 Peak/Maximum composite IQ offset (in average cycle) in the selected timeslot and sub-frame.
23. Quad Error (Average) (float) [°]
 Averaged composite Quad Error (in average cycle) in the selected timeslot and sub-frame.
24. Quad Error (Peak Hold) (float) [°]
 Peak/Maximum composite Quad Error (in average cycle) in the selected timeslot and sub-frame.
25. Gain Imbalance (Average) (float) [dB]
 Averaged composite gain imbalance (in average cycle) in the selected timeslot and sub-frame.
26. Gain Imbalance (Peak Hold) (float) [dB]
 Peak/Maximum composite gain imbalance (in average cycle) in the selected timeslot and sub-frame.
27. Time Offset (Average) (float) [chips]
 Averaged composite timing error (in average cycle) in chips, relative to the timing reference (DwPTS/UpPTS/Trig)
28. Time Offset (Peak Hold) (float) [chips]
 Peak/Maximum composite timing error (in average cycle) in chips, relative to the timing reference (DwPTS/UpPTS/Trig)
29. Position of Peak CDE – Code Length (Peak Hold) (float) [NA]
 Code channel number of Peak/Maximum Peak CDE (in average cycle) is SX(Y). X is the OVFSF code length (1,2,4,8,16), Y is the OVFSF code index (0, ... X-1). OVFSF code length X is returned.
-

| | |
|---|---|
| | <p>When DwPTS or UpPTS is selected, NaN will be returned.</p> <p>30. Position of Peak CDE – Code Index (Peak Hold) (float) [NA]</p> <p>Code channel number of Peak/Maximum Peak CDE (in average cycle) is SX(Y). X is the OVFSF code length (1,2,4,8,16), Y is the OVFSF code index (0, ..., X-1). OVFSF Code index Y is returned.</p> <p>When DwPTS or UpPTS is selected, NaN will be returned.</p> <p>31. Position of Peak Active CDE – Code Length (Peak Hold) (float) [NA]</p> <p>Code channel number of Peak/Maximum Peak Active CDE (in average cycle) is SX(Y). X is the OVFSF length (1,2,4,8,16), Y is the OVFSF code index (0, ..., X-1). OVFSF code length X is returned.</p> <p>If no active channel is detected, NaN will be returned.</p> <p>When DwPTS or UpPTS is selected, NaN will be returned.</p> <p>32. Position of Peak Active CDE – Code Index (Peak Hold) (float) [NA]</p> <p>Code channel number of Peak/Maximum Peak Active CDE (in average cycle) is SX(Y). X is the OVFSF code length (1,2,4,8,16), Y is the OVFSF code index (0, ..., X-1). OVFSF code index Y is returned.</p> <p>If no active channel is detected, NaN will be returned.</p> <p>When DwPTS or UpPTS is selected, NaN will be returned.</p> <p>33. Number of Active Channels (float) [NA]</p> <p>Number of active channels in the selected timeslot and sub-frame.</p> <p>34. Total Data Power (float) [dBm]</p> <p>The total data part power of the selected timeslot and sub-frame.</p> |
| 2 | <p>Filtered Analysis Sub-frame Data Trace (float) [Volt] <2*4*6432></p> <p>Return I/Q trace data of RRC filtered selected analysis sub-frame, as a series of trace point values, in volts. There are 4 I/Q pair samples per chip. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.</p> <p>There are 6400 chips in a sub-frame. There are extra 16 chips at the head the sub-frame and extra 16 chips at the end of the sub-frame.</p> |
| 3 | <p>Un-normalized I/Q Measured Polar Data Trace (float) [Volt] <2*848></p> <p>Return unprocessed I/Q trace data of selected timeslot and sub-frame, as a series of trace point values, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.</p> <p>When the analyzed time slot is inactive, one NaN will be returned.</p> |
| 4 | <p>Normalized I/Q Measured Polar Data Trace (float) [dB] <2*848></p> <p>Return unprocessed I/Q trace data of selected timeslot and sub-frame, as a series of trace point values, in dB. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values.</p> <p>When the analyzed time slot is inactive, one NaN will be returned.</p> |
| 5 | <p>Magnitude Error vs. Chip Trace (float) [dB] <848></p> <p>Return composite magnitude error vs. chip data, as a series of comma-separated trace points. The result is a series of floating point numbers.</p> <p>When the analyzed time slot is inactive, one NaN will be returned.</p> |
| 6 | <p>Phase Error vs. Chip Trace (float) [dB] <848></p> <p>Return composite phase error vs. chip data, as a series of comma-separated trace points. The result is a series of floating point numbers.</p> <p>When the analyzed time slot is inactive, one NaN will be returned.</p> |

| | |
|----|--|
| 7 | <p>EVM vs. Chip Trace (float) [dB] <848></p> <p>Return composite EVM error vs. chip data, as a series of comma-separated trace points. The result is a series of floating point numbers.</p> <p>When the analyzed time slot is inactive, one NaN will be returned.</p> |
| 8 | <p>Code Length Vector (float) [NA] <16></p> <p>Return the vector containing information of the spreading code length of each code channel, active or inactive, in the specified timeslot.</p> <p>There are 16 numbers in this vector. For the active channel, if its code length is less than the max spreading code length 16, the filled length value is duplicated (16/spreading code length) times. For the inactive channel, it is set to 16. The purpose of this vector is providing the code length information for each value in Active Flag Vector, Un-normalized Code Domain Power Vector, Normalized Code Domain Power Vector, Un-normalized Code Domain Error Vector, and Normalized Code Domain Error Vector.</p> <p>Its data are lined according to the increasing code index,</p> <p>Example:</p> <p>Configuration1: There are five active code channels in one timeslot, C16(0), C8(1), C16(5), C4(2) and C8(7). Like this,</p>  <p>And the yellow block denotes inactive channel.</p> <p>So the values in this vector should be {16, 16, 8, 8, 16, 16, 16, 16, 4, 4, 4, 4, 16, 16, 8, 8}.</p> <p>Note: When the measurement fails to get synchronization or the slot under test is DwPTS/UpPTS or inactive, and so on, 16 NaN will be returned.</p> |
| 9 | <p>Channel Active Flag Vector (float) [NA] <16></p> <p>Return the vector containing information whether or not the specified channel is active, as a series of comma-separated points. "1" denotes active, and "0" denotes inactive.</p> <p>There are 16 numbers in this vector. If the active channel's code length (specified by the value on the same position within the Code Length Vector) is less than the max spreading code length 16, the flag is duplicated (16/spreading code length) times. Its data are lined according to the increasing code index.</p> <p>Take Configuration 1 for example, the values in this vector should be {1, 0, 1, 1, 0, 1, 0, 0, 1, 1, 1, 1, 0, 0, 1, 1}.</p> <p>Note: When the measurement fails to get synchronization or the slot under test is DwPTS/UpPTS or inactive, and so on, all the flags in this vector are 0.0.</p> |
| 10 | <p>Un-normalized Code Domain Power Trace (float) [dBm] <16></p> <p>Return the vector containing un-normalized CDP information for the specified code channel, as a series of comma-separated points.</p> <p>There are 16 numbers in this vector. If the active channel's code length (specified by the value on the same position within the Code Length Vector) is less than the max spreading code length 16, the power is duplicated (16/spreading code length) times. Its data are lined according to the increasing code index.</p> <p>Take Configuration 1 for example, the values in this vector should be {P1, Px, P2, P2, Px, P3, Px, Px, P4, P4, P4, P4, Px, Px, P5, P5}. Px is the power on code channel C16(x).</p> <p>Note: When the measurement fails to get the result, such as: failing to in synchronization or the slot under test is DwPTS/UpPTS or inactive, 16 NaN will be returned.</p> |
| 11 | <p>Normalized Code Domain Power Trace (float) [dB] <16></p> <p>Return the vector containing normalized CDP information for the specified code channel, as a series of</p> |

comma-separated points.

There are 16 numbers in this vector. If the active channel's code length (specified by the value on the same position within the Code Length Vector) is less than the max spreading code length 16, the power is duplicated (16/spreading code length) times. Its data are lined according to the increasing code index.

Take Configuration 1 for example, the values in this vector should be {P1, Px, P2, P2, Px, P3, Px, Px, P4, P4, P4, P4, Px, Px, P5, P5}. Px is the power on code channel C16(x).

... ..

Note: When the measurement fails to get the result, such as: failing to in synchronization or the slot under test is DwPTS/UpPTS or inactive, 16 NaN will be returned.

| | |
|----|---|
| 12 | <p>Normalized Code Domain Error Trace (float) [dB] <16 ></p> <p>Return the vector containing normalized CDE information for the specified code channel, as a series of comma-separated points.</p> <p>There are 16 numbers in this vector. If the active channel's code length (specified by the value on the same position within the Code Length Vector) is less than the max spreading code length 16, the error is duplicated (16/spreading code length) times. Its data are lined according to the increasing code index.</p> <p>Take Configuration 1 for example, the values in this vector should be {E1, Ex, E2, E2, Ex, E3, Ex, Ex, E4, E4, E4, E4, Ex, Ex, E5, E5}. Ex is the power on code channel C16(x).</p> <p>Note: When the measurement fails to get the result, such as: failing to in synchronization or the slot under test is DwPTS/UpPTS or inactive, 16 NaN will be returned.</p> |
| 13 | <p>Total Power vs. Timeslots Trace (float) [dBm] <9></p> <p>Return absolute power measurement of composite signals for each timeslot within the analyzed sub-frame. The sequence of timeslot is TS0, DwPTS, UpPTS, TS1, TS2, TS3, TS4, TS5, and TS6</p> <p>Note: When the measurement fails, such as: failing to in synchronization, 9 NaN will be returned.</p> |
| 14 | <p>Midamble Power vs. Timeslots Trace (float) [dBm] <9></p> <p>Return absolute power measurement of composite midamble signals for each timeslot within the analyzed sub-frame. The sequence of timeslot is TS0, DwPTS, UpPTS, TS1, TS2, TS3, TS4, TS5, and TS6.</p> <p>The midamble power of DwPTS/UpPTS returned is same as the total power of DwPTS/UpPTS.</p> <p>Note: When the measurement fails, such as: failing to in synchronization, 9 NaN will be returned.</p> |
| 15 | <p>Data Power 1 vs. Timeslots Trace (float) [dBm] <9></p> <p>Return absolute power measurement of composite data signals before midamble for each timeslot within the analyzed sub-frame. The sequence of timeslot is TS0, DwPTS, UpPTS, TS1, TS2, TS3, TS4, TS5, and TS6.</p> <p>The data power of DwPTS/UpPTS returned is same as the total power of DwPTS/UpPTS.</p> <p>Note: When the measurement fails, such as: failing to in synchronization, 9 NaN will be returned.</p> |
| 16 | <p>Data Power 2 vs. Timeslots Trace (float) [dBm] <9></p> <p>Return absolute power measurement of composite data signals after midamble for each timeslot within the analyzed sub-frame. The sequence of timeslot is TS0, DwPTS, UpPTS, TS1, TS2, TS3, TS4, TS5, and TS6.</p> <p>The data power of DwPTS/UpPTS returned is same as the total power of DwPTS/UpPTS.</p> <p>Note: When the measurement fails, such as: failing to in synchronization, 9 NaN will be returned.</p> |
| 17 | <p>Time Offset vs. Timeslots Trace (float) [chips] <9></p> <p>Return the difference in time (in chips) between the measured and ideal start times for each timeslot within the analyzed sub-frame relative to the specified time reference. The sequence of the timeslots is TS0, DwPTS, UpPTS, TS1, TS2, TS3, TS4, TS5, and TS6, totally 9 timeslots.</p> <p>Either the DwPTS, UpPTS, or Trigger Point as the time reference can be set as Timing Ref in Demod</p> |

| | |
|----|--|
| | <p>parameters</p> <p>Note: When the measurement fails, such as: failing to in synchronization or the Timing Ref not exist, 9 NaN will be returned.</p> |
| 18 | <p>Limit PASS/FAIL Trace (float) [NA] <5></p> <p>Return the PASS/FAIL (0/1) message of the current selected device (BTS or MS) in the sequence of:</p> <p>1st, Composite RMS EVM</p> <p>2nd, Composite Peak EVM</p> <p>3rd, Composite Rho</p> <p>4th, Peak CDE</p> <p>5th, Composite Frequency Error</p> <p>Coupled with device. When the current device is set BTS, the trace indicates the limit Pass/Fail of BTS; When the device is set MS, the trace indicates the limit Pass/Fail of MS.</p> <p>Note: When the measurement fails, such as: failing to in synchronization, all the values in this vector will be 1.0.</p> |
| 19 | <p>Time Slot Active Flag Trace (float) [NA] <9></p> <p>Return the Active/Inactive (1/0) message of the 9 time slots within the selected analysis sub-frame. The sequence of the timeslots is TS0, DwPTS, UpPTS, TS1, TS2, TS3, TS4, TS5, and TS6.</p> <p>Note: When the measurement fails to get synchronization, all the values in this vector will be NaN.</p> |

Modulation Accuracy Measurement Description

Modulation Accuracy Measurement provides the properties/methods for measuring the composite errors in TD-SCDMA transmitter. Composite signal here means all the code channels. The results comprise of Rho, EVM, Magnitude Error, Phase Error, Peak CDE, Peak Active CDE, Freq error, IQ offset, Quad Error, Gain Imbalance, and Timing Offset, etc..

| | |
|----------------------|------------------|
| Key Path | Meas |
| Initial S/W Revision | A.01.60 or later |

Amplitude (AMPTD) Y Scale

The AMPLITUDE Y Scale key accesses the menu to set the desired vertical scale and associated settings.

Default numbers are independent for each window.

See Front Panel Key in the "Common Measurement Functions" for more information.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Ref Value

This key allows you to set the display Y reference value. The key is active in EVM Window, Magnitude Error Window, Phase Error Window, Code Domain Power Window, and Capture Time Data Trace Window.

| | |
|----------------------|------------------|
| Key Path | AMPTD Y Scale |
| Initial S/W Revision | A.01.60 or later |

Y Ref Value (I/Q Error View – Magnitude Error Window)

This key sets the reference value in the Magnitude Error window.

| | |
|-----------------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:EVM:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RLEVel? |
| Example | DISP:EVM:VIEW2:WIND:TRAC:Y:RLEV 0.0 DISP:EVM:VIEW2:WIND:TRAC:Y:RLEV? |
| Notes | VIEW2 : I/Q Error View WINDow[1]: Mag Error Window on I/Q Error View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | 0.0 |
| State Saved | Saved in instrument state. |
| Min | 0.0 |
| Max | 1000.0 |
| Initial S/W Revision | A.01.60 or later |

Y Ref Value (I/Q Error View – Phase Error Window)

This key sets the reference value in the phase error window.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow2:TRACe:Y[:SCALE]:RLEVel <real> :DISPlay:EVM:VIEW2:WINDow2:TRACe:Y[:SCALE]:RLEVel? |
| Example | DISP:EVM:VIEW2:WIND2:TRAC:Y:RLEV 0.0 DISP:EVM:VIEW2:WIND2:TRAC:Y:RLEV? |
| Notes | VIEW2 : I/Q Error View WINDow2: Phase Error Window on I/Q Error View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | 0.0 |
| State Saved | Saved in instrument state. |
| Min | 0.0 |
| Max | 1000.0 |
| Initial S/W Revision | A.01.60 or later |

Y Ref Value (I/Q Error View – EVM Window)

This key sets the reference value in the EVM window.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow3:TRACe:Y[:SCALE]:RLEVel <real> :DISPlay:EVM:VIEW2:WINDow3:TRACe:Y[:SCALE]:RLEVel? |
| Example | DISP:EVM:VIEW2:WIND3:TRAC:Y:RLEV 0.0 DISP:EVM:VIEW2:WIND3:TRAC:Y:RLEV? |
| Notes | VIEW2 : I/Q Error View WINDow3: EVM Window on I/Q Error View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | 0.0 |
| State Saved | Saved in instrument state. |
| Min | 0.0 |
| Max | 1000.0 |
| Initial S/W Revision | A.01.60 or later |

Y Ref Value (Code Domain Power and Metrics View – Code Domain Power Window)

This key sets the power reference value for the power results in the Code Domain Power window.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:EVM:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:RLEVel? |
| Example | DISP:EVM:VIEW3:WIND:TRAC:Y:RLEV 0.0 DISP:EVM:VIEW3:WIND:TRAC:Y:RLEV? |
| Notes | VIEW3 : Code Domain Power and Metrics View WINDow[1]: Code Domain Power and Metrics Window on Code Domain Power View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. Coupled with Normalize: If Normalize is On, the Unit is dB; Otherwise, the Unit is dBm |
| Couplings | See Notes |
| Preset | 0.0 |
| State Saved | Saved in instrument state. |
| Min | -1000.0 |
| Max | 1000.0 |
| Initial S/W Revision | A.01.60 or later |

Y Ref Value (Capture Time Summary – Capture Time Data Trace Window)

This key sets the reference value of the results in the Capture Time Data Trace window.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW4:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:EVM:VIEW4:WINDow[1]:TRACe:Y[:SCALe]:RLEVel? |
| Example | DISP:EVM:VIEW4:WIND:TRAC:Y:RLEV 0.0 DISP:EVM:VIEW4:WIND:TRAC:Y:RLEV? |
| Notes | VIEW4 : Capture Time Summary View WINDow[1]: Capture Time Data Trace Window on Capture Time Summary View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | 0.0 |
| State Saved | Saved in instrument state. |

| | |
|----------------------|------------------|
| Min | -1000.0 |
| Max | 1000.0 |
| Initial S/W Revision | A.01.60 or later |

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See ["Dual Attenuator Configurations:" on page 1889](#)

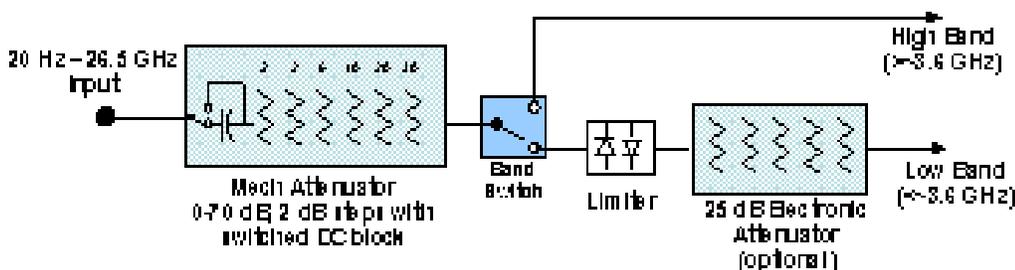
See ["Single Attenuator Configuration:" on page 1890](#)

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

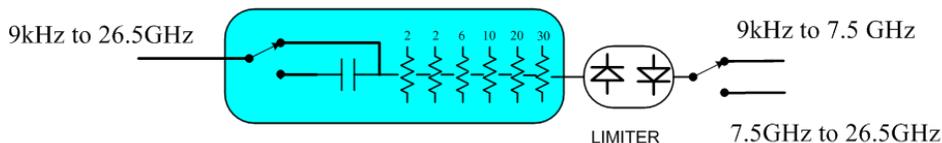
| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Dependencies | In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case. |
| Readback Line | Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2232, and " Enable Elec Atten " on page 2234 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

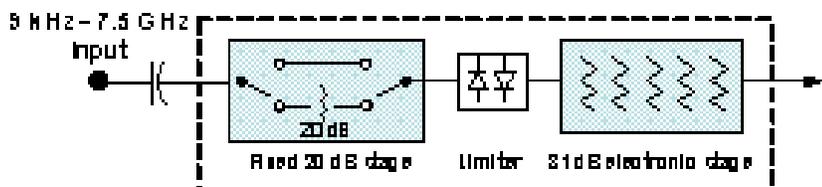


Configuration 2: Mechanical attenuator, no optional electronic attenuator



(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the “Dual Attenuator” configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See "[Attenuator Configurations and Auto/Man](#)" on page 1892

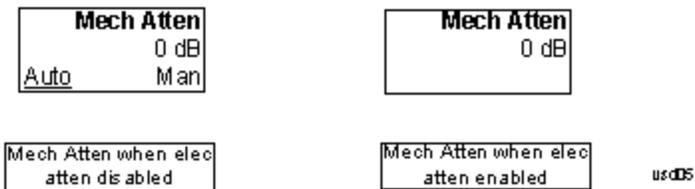
| | |
|----------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <pre>[:SENSe]:POWer[:RF]:ATTenuation <rel_amp1> [:SENSe]:POWer[:RF]:ATTenuation? [:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF ON 0 1 [:SENSe]:POWer[:RF]:ATTenuation:AUTO?</pre> |
| Example | <p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of “main” attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p> |
| Dependencies | <p>Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the Auto/Man selection is not available, and the Auto/Man line on the key disappears.</p> <p>In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the "Enable Elec Atten" on page 2234 key description.</p> <p>See "Attenuator Configurations and Auto/Man" on page 1892 for more information on the Auto/Man functionality of Attenuation.</p> |
| Couplings | <p>When (Mech) Atten is in Auto, it uses the following algorithm to determine a value:</p> <p>If the USB Preamp is connected to USB, use 0 dB.</p> <p>Otherwise, $Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel + IF\ Gain$.</p> <p>Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto.</p> <p>The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).</p> <p>The “IF Gain” term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.</p> <p>In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.</p> |
| Preset | <p>The preset for Mech Attenuation is “Auto.”</p> <p>The Auto value of attenuation is:</p> <p>CXA, EXA, MXA and PXA: 10 dB</p> |
| State Saved | Saved in instrument state |
| Min | <p>0 dB</p> <p>The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.</p> |

| | |
|--------------------------|---|
| Max | CXA N9000A-503/507: 50 dB CXA N9000A-513/526: 70dB EXA: 60 dB MXA and PXA: 70 dB In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 1894](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2233](#)

See ["More Information" on page 1893](#)

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :EATTenuation:STATe OFF ON 0 1 [:SENSe] :POWer [:RF] :EATTenuation:STATe? |
| Example | POW:EATT:STAT ON |
| Dependencies | <p>This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233.</p> <p>The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out.</p> <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in all measurements; in particular, it is not available in the Swept SA measurement.</p> |
| Couplings | Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved

- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples
- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single

attenuator is integrated into the single Atten key.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer[:RF]:EATTenuation <rel_ampl> [:SENSe] :POWer[:RF]:EATTenuation? |
| Notes | Electronic Attenuation's specification is defined only when Mechanical Attenuation is 6 dB. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no "electronic attenuator" there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a "soft" attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The "soft" attenuation is treated as an addition to the "main" attenuation value set by the Atten softkey or the POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out. |
| Preset | 0 dB |
| State Saved | Saved in instrument state |
| Min | 0 dB |
| Max | Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|--------------------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer[:RF]:RANGe:OPTimize IMMEDIATE |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "Adjust Atten for Min Clip" on page 2237 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|---------------------------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation OFF ELEctrical COMBined</code> <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code> |
| Notes | The SCPI parameter ELEctrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELEctrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip |
| State Saved | Saved in instrument state |
| Range | Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------------|--|
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe:AUTO?</code> |
| Notes | ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off" |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT OFF |
| Initial S/W Revision | Prior to A.02.00 |

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT ELEC |
| Initial S/W Revision | Prior to A.02.00 |

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT COMB |
| Initial S/W Revision | Prior to A.02.00 |

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

| | |
|----------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWer [:RF] :ATTenuation:STEP [:INCRement] 10 dB 2 dB [:SENSe] :POWer [:RF] :ATTenuation:STEP [:INCRement] ? |
| Example | POW:ATT:STEP 2 |
| Notes | Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10. |

| | |
|--------------------------|---|
| Dependencies | Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error. |
| Couplings | When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB |
| Preset | PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA) |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Scale/Div

This key allows you to set Y Scale/Div. This key is active in EVM Window, Mag Error Window, Phase Error Window, Code Domain Power Window, and Capture Time Data Trace Window.

| | |
|----------------------|------------------|
| Key Path | AMPTD Y Scale |
| Initial S/W Revision | A.01.60 or later |

Y Scale/Div (I/Q Error View – Magnitude Error Window)

This key sets the sensitivity of measurement result in the Magnitude Error window.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:PDIVision <real> :DISPlay:EVM:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:PDIVision? |
| Example | DISP:EVM:VIEW2:WIND:TRAC:Y:PDIV 10.0 DISP:EVM:VIEW2:WIND:TRAC:Y:PDIV? |
| Notes | VIEW2 : I/Q Error View WINDow[1]: Mag Error Window on I/Q Error View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | 0.1 |
| State Saved | Saved in instrument state. |
| Min | 0.1 |
| Max | 100.0 |
| Initial S/W Revision | A.01.60 or later |

Y Scale/Div (I/Q Error View – Phase Error Window)

This key sets the sensitivity of measurement result in the Phase Error window.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:PDIVision <real> :DISPlay:EVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:PDIVision? |
| Example | DISP:EVM:VIEW2:WIND2:TRAC:Y:PDIV 10.0 DISP:EVM:VIEW2:WIND2:TRAC:Y:PDIV? |
| Notes | VIEW2 : I/Q Error View WINDow2: Phase Error Window on I/Q Error View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | 0.1 |
| State Saved | Saved in instrument state. |
| Min | 0.1 |
| Max | 1000.0 |
| Initial S/W Revision | A.01.60 or later |

Y Scale/Div (I/Q Error View – EVM Window)

This key sets the sensitivity of measurement result in the EVM window.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow3:TRACe:Y[:SCALe]:PDIVision <real> :DISPlay:EVM:VIEW2:WINDow3:TRACe:Y[:SCALe]:PDIVision? |
| Example | DISP:EVM:VIEW2:WIND3:TRAC:Y:PDIV 10.0 DISP:EVM:VIEW2:WIND3:TRAC:Y:PDIV? |
| Notes | VIEW2 : I/Q Error View WINDow3: EVM Window on I/Q Error View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | 0.1 |
| State Saved | Saved in instrument state. |
| Min | 0.1 |

| | |
|----------------------|------------------|
| Max | 100.0 |
| Initial S/W Revision | A.01.60 or later |

Y Scale/Div (Code Domain Power and Metrics View – Code Domain Power Window)

This key sets the sensitivity of the power results in the Code Domain Power window.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW3:WINDow[1]:TRACe:Y[:SCALE]:PDIVision <rel_ampl> :DISPlay:EVM:VIEW3:WINDow[1]:TRACe:Y[:SCALE]:PDIVision? |
| Example | DISP:EVM:VIEW3:WIND:TRAC:Y:PDIV 10.0 dB DISP:EVM:VIEW3:WIND:TRAC:Y:PDIV? |
| Notes | VIEW3 : Code Domain Power and Metrics View WINDow[1]: Code Domain Power and Metrics Window on Code Domain Power View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | 10.0 |
| State Saved | Saved in instrument state. |
| Min | 0.1 |
| Max | 50.0 |
| Initial S/W Revision | A.01.60 or later |

Y Scale/Div (Capture Time Summary View – Capture Time Data Trace Window)

This key sets the sensitivity of the results in the Capture Time Data Trace window.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW4:WINDow[1]:TRACe:Y[:SCALE]:PDIVision <rel_ampl> :DISPlay:EVM:VIEW4:WINDow[1]:TRACe:Y[:SCALE]:PDIVision? |
| Example | DISP:EVM:VIEW4:WIND:TRAC:Y:PDIV 10.0 dB DISP:EVM:VIEW4:WIND:TRAC:Y:PDIV? |
| Notes | VIEW4 : Capture Time Summary View WINDow[1]: Capture Time Data Trace Window on Capture Time Summary View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |

| | |
|----------------------|----------------------------|
| Preset | 10.0 |
| State Saved | Saved in instrument state. |
| Min | 0.1 |
| Max | 50.0 |
| Initial S/W Revision | A.01.60 or later |

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 1902](#).

| | |
|------------------------------|---|
| Key Path | AMPTD Y Scale |
| Remote Command | [:SENSe] :POWer [:RF] :PCENter |
| Example | POW:PCEN |
| Notes | Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Couplings | The active marker position determines where the centering will be attempted. If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed. |
| Status Bits/OPC dependencies | When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command. The Measuring bit should remain set while this command is operating and should not go false until |

the subsequent sweep/measurement has completed.

| | |
|--------------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when "Presel Center" on page 2240 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :PADJust <freq> [:SENSe] :POWer [:RF] :PADJust? |
| Example | POW:PADJ 100KHz POW:PADJ? |
| Notes | The value on the key reads out to 0.1 MHz resolution. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. |

- Grayed out in the Spectrogram View.

| | |
|-------------------------------------|---|
| Preset | 0 MHz |
| State Saved | The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle. |
| Min | -500 MHz |
| Max | 500 MHz |
| Default Unit | Hz |
| Backwards Compatibility SCPI | [:SENSe]:POWer[:RF]:MW:PADJust [:SENSe]:POWer[:RF]:MMW:PADJust PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to [:SENSe]:POWer[:RF]:PADJust |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------|---|
| Remote Command | [:SENSe]:POWer[:RF]:PADJust:PRESelector MWAVe MMWave EXTernal [:SENSe]:POWer[:RF]:PADJust:PRESelector? |
| Notes | PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE |
| Initial S/W Revision | Prior to A.02.00 |

Y Axis Unit

Displays the menu keys that enable you to change the vertical (Y) axis amplitude unit. The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types. For example, if Scale Type has been set to Log, and you set Y Axis Unit to dBm, pressing Scale Type (Log) sets the Y Axis Unit to dBm. If Scale Type has been set to Lin and you set Y Axis Unit to V, pressing Scale Type (Lin) sets the Y Axis Unit to V. Pressing Scale Type (Log) again sets the Y axis unit back to dBm.

NOTE

The units of current (A, dBmA, dBuA) are calculated based on 50 ohms input impedance.

All four of the EMI units (dB μ A/m, dB μ V/m, dBG, dBpT) are treated by the instrument exactly as though they were dBuV. The user must load an appropriate correction factor using Amplitude Corrections for accurate and meaningful results.

If a SCPI command is sent to the analyzer that uses one of the EMI units as a terminator, the analyzer treats it as though DBUV had been sent as the terminator.

| | |
|----------|---------------|
| Key Path | AMPTD Y Scale |
|----------|---------------|

| | |
|--------------------------|---|
| Mode | SA |
| Scope | Meas Global |
| Remote Command | :UNIT:POWer DBM DBMV DBMA V W A DBUV DBUA DBPW DBUVM DBUAM DBPT DBG :UNIT:POWer? |
| Example | UNIT:POW dBmV UNIT:POW? |
| Notes | The Y axis unit has either logarithmic or linear characteristics. The set of units that is logarithmic consists of dBm, dBmV, dBmA, dB μ V, dB μ A, dB μ V/m, dB μ A/m, dBpT, and dBG. The set of units that are linear consists of V, W, and A. The chosen unit will determine how the reference level and all the amplitude-related outputs like trace data, marker data, etc. read out. |
| Notes | The settings of Y Axis Unit and Scale Type, affect how the data is read over the remote interface. When using the remote interface no unit is returned, so you must know what the Y axis unit is to interpret the results: Example 1, set the following: Scale Type (Log) Y Axis Unit, dBm Scale/Div, 1 dB Ref Level, 10 dBm This sets the top line to 10 dBm with each vertical division representing 1 dB. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 5 dBm and will read out remotely as 5. Example 2, set the following: Scale Type (Lin) Y Axis Unit, Volts Ref Level, 100 mV (10 mV/div) This sets the top line to 100 mV and the bottom line to 0 V, so each vertical division represents 10 mV. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 50 mV and will read out remotely as 50. |
| Dependencies | If an amplitude correction with an Antenna Unit other than None is applied and enabled, then that antenna unit is forced and the key with that unit is the only Y Axis Unit available. All other Y Axis Unit keys are grayed out. If an amplitude correction with an Antenna Unit other than None is applied and enabled, and you then turn off that correction or set Apply Corrections to No, the Y Axis Unit that existed before the Antenna Unit was applied is restored. |
| Couplings | The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types |
| Preset | dBm for log scale, V for linear. The true 'preset' value is dBm, since at preset the Y Scale type is set to logarithmic. |
| State Saved | Saved in instrument state |
| Readback line | 1-of-N selection |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.04.00, A.11.00 |

dBm

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBm.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBM |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmV

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmV.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmV |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmA

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmA |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

W

Sets the amplitude unit for the selected amplitude scale (log/lin) to watt.

| | |
|----------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW W |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |

| | |
|--------------------------|------------------|
| Readback | W |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

V

Sets the amplitude unit for the selected amplitude scale (log/lin) to volt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW V |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

A

Sets the amplitude unit for the selected amplitude scale (log/lin) to Ampere.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW A |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ V

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A.

NOTE

The unit dBuA can also appear as an Antenna Unit. This will be used by customers using current probes, because current probes are often supplied with conversion tables that provide the transducer factors. When dBuA is used as an Antenna Unit the normal conversion from power to amps for dBuA (based on the analyzer input impedance) is not done, but instead the conversion is based solely on the Correction that contains the transducer factors. This is what distinguishes dBuA as a normal unit from dBuA as an antenna unit. When querying the Y-Axis unit, you can query the Antenna Unit to distinguish between regular dBuA and the dBuA antenna unit. If :CORR:CSET:ANT? returns NOC (for No Conversion), you are using a normal Y Axis dBuA. If it returns UA you are using an Antenna Unit dBuA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBpW

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpW.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBPW |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

Antenna Unit

When a Correction is turned on that uses an Antenna Unit, the Y Axis Unit changes to that Antenna Unit. All of the keys in the Y-Axis Unit menu are then greyed out, except the Antenna Unit key. The unit being used is shown on this key and is shown as selected in the submenu.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback line | Currently selected unit |
| Initial S/W Revision | A.11.00 |

dB μ V/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUVM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ V/m |
| Initial S/W Revision | A.02.00 |

dB μ A/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A/m |
| Initial S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

dBpT

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpT. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBPT |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dBpT |
| Initial S/W Revision | A.02.00 |

dBG

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBG. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBG |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dBG |
| Initial S/W Revision | A.02.00 |

None

This is selected if no Antenna Unit is currently on, however you cannot actually set this value, since it is always grayed out. The key is included simply to provide an indication on the Readback line of the Antenna Unit key when there is no Antenna Unit selected.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Readback | "None" |
| Initial S/W Revision | A.11.00 |

μ W Path Control

The μ W Path Control functions include the μ W Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μ W Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μ W Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μ W

Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

| | |
|---------------------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | SA, BASIC, PNOISE, VSA , LTE, LTETDD |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH? |
| Example | :POW:MW:PATH LNP Enables the Low Noise path |
| Notes | If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μ W Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished. |
| Dependencies | Unavailable in BBIQ and External Mixing |
| Preset | All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB MPB option not present and licensed: STD |
| State Saved | Save in instrument state |
| Readback | Value selected in the submenu |
| Initial S/W Revision | A.04.00 |
| Modified at S/W Revision | A.10.00 |

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH STD |
| Readback Text | Standard Path |
| Initial S/W Revision | A.04.00 |

Low Noise Path Enable

You may choose Low Noise Path Enable, which gives a lower noise floor under some circumstances, particularly when operating in the 21–26.5 GHz region. With the Low Noise Path enabled, the low band/high band switch and microwave preamp are bypassed whenever all of the following are true:

- The analyzer is not in the Low Band, meaning:
- the start frequency is above 3.5 GHz and
- the stop frequency is above 3.6 GHz.
- the internal preamp is not installed or (if installed) is set to Off or Low Band

Note that this means that, when any part of a sweep is done in Low Band, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. Also, if the preamp is turned on, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. The only time the Low Noise Path is used is when Low Noise Path Enable is selected, the sweep is completely in High Band (> 3.6 GHz) and no preamp is in use.

See "[More Information](#)" on page 1912

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Measurement | Swept SA |
| Example | :POW:MW:PATH LNP |
| Notes | For measurements that use IQ acquisition, the low noise path is used when the Center Frequency is in High Band (> 3.6 GHz) and no preamp is in use. In other words, the rules above are modified to use only the center frequency to qualify which path to switch in. This is not the case for FFT's in the Swept SA measurement; they use the same rules as swept measurements. |
| Dependencies | Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Unless Option LNP is present and licensed, key is blank and if SCPI command sent, error -241, "Hardware missing; Option not installed" is generated. |
| Readback Text | Low Noise Path Enable |
| Initial S/W Revision | A.04.00 |

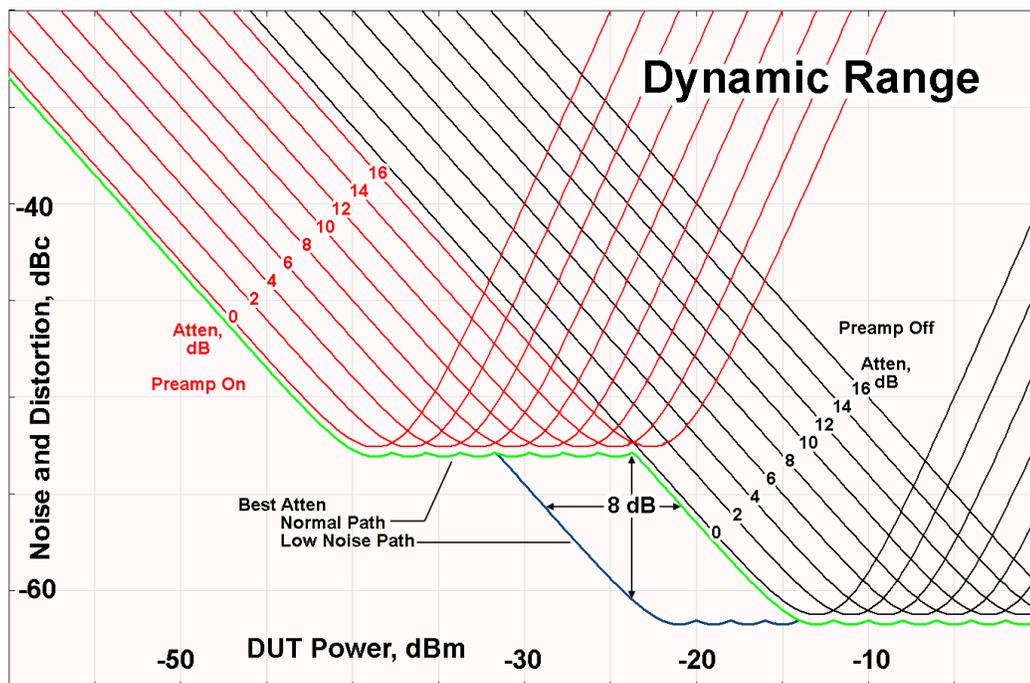
More Information

The user should understand that the Low Noise Path, while giving improved DANL, has the disadvantage of decreased TOI performance and decreased gain compression performance relative to the standard path.

The user should also understand that the bypass switch is a mechanical switch and has finite life, so if the Low Noise Path is enabled, it is possible to cause frequent cycling of this switch by frequently changing analyzer settings such that the above conditions hold true only some of the time. A user making tests of this nature should consider opting for the Standard Path, which will never throw the bypass switch, at the expense of some degraded noise performance.

The low noise path is useful for situations where the signal level is so low that the analyzer performance is dominated by noise even with 0 dB attenuation, but still high enough that the preamp option would have excessive third-order intermodulation or compression. The preamp, if purchased and used, gives better noise floor than does the “Low Noise Path.” However, its compression threshold and third-order intercept are much poorer than that of the non-preamp path. There are some applications, typically for signals around -30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range

The graph below illustrates the concept. It shows, in red, the performance of an analyzer at different attenuation settings, both with the preamp on and off, in a measurement that is affected by both analyzer noise and analyzer TOI. The green shows the best available dynamic range, offset by 0.5 dB for clarity. The blue shows how the best available dynamic range improves for moderate signal levels with the low noise path switched in. In this illustration, the preamp improves the noise floor by 15 dB while degrading the third-order intercept by 30 dB, and the low noise path reduces loss by 8 dB. The attenuator step size is 2 dB.



There are other times where selecting the low noise path improves performance, too. Compression-limited measurements such as finding the nulls in a pulsed-RF spectrum can profit from the low noise path in a way similar to the TOI-limited measurement illustrated. Accuracy can be improved when the low noise path allows the optimum attenuation to increase from a small amount like 0, 2 or 4 dB to a larger amount, giving better return loss at the analyzer input. Harmonic measurements, such as second and third harmonic levels, are much improved using the low noise path because of the superiority of that path for harmonic (though not intermodulation) distortion performance.

μW Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselect is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

| | |
|-----------------------------|--|
| Key Path | AMPTD Y Scale, μW Path Control |
| Example | :POW:MW:PATH MPB |
| Dependencies | Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated. |
| Readback Text | μW Preselector Bypass |
| Initial S/W Revision | A.04.00 |
| Remote Command | [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1 [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ? |

| | |
|----------------|---|
| Example | :POW:MW:PRES OFF Bypasses the microwave preselector |
| Notes | The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB) |
| Preset | ON |

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

| | |
|---------------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWeR [:RF] :GAIN [:STATe] OFF ON 0 1 [:SENSe] :POWeR [:RF] :GAIN [:STATe] ? |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. The preamp is not available when the electronic/soft attenuator is enabled. |
| Couplings | The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range. Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected. Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :POWer [:RF] :GAIN:BAND LOW FULL</code> <code>[:SENSe] :POWer [:RF] :GAIN:BAND?</code> |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated. |
| Preset | LOW |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns the internal preamp off

| | |
|----------------------|--------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | <code>:POW:GAIN OFF</code> |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | <code>:POW:GAIN ON</code> <code>:POW:GAIN:BAND LOW</code> |
| Readback | Low Band |
| Initial S/W Revision | Prior to A.02.00 |

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND FULL |
| Readback | Full Range |
| Initial S/W Revision | Prior to A.02.00 |

Range

This key is only available when I/Q is the selected input. It replaces the Attenuation key in that case.

Each input channel (I and Q) has four internal gain ranges. The maximum allowed voltage in each gain range is slightly more than the nominal value, so the break point between ranges is a couple of millivolts higher than the nominal (setting a peak voltage of 0.502 mV will still map to the 0.5 V Peak range).

| Gain Setting | Volts RMS | Volts Peak | Volts Peak - Peak | dBm (50Ω) | Break Point |
|--------------|-----------|------------|-------------------|-----------|--------------|
| 0 dB | 0.7071 | 1.0 | 2.0 | 10 | n/a |
| 6 dB | 0.3536 | 0.5 | 1.0 | 4 | 0.502 V Peak |
| 12 dB | 0.1768 | 0.25 | 0.5 | -2 | 0.252 V Peak |
| 18 dB | 0.0884 | 0.125 | 0.25 | -8 | 0.127 V Peak |

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale |
| Notes | Visible only when the selected input is I/Q. |
| State Saved | No |
| Readback Text | When Range is Auto, "[Auto]" When Range is Man and I & Q are the same, "[<range value>]" When Range is Man and I & Q are different: "[: <I range value> Q: <Q range value>]" See I Range and Q Range for the <range value> enumeration definition. |
| Initial S/W Revision | Prior to A.02.00 |

Range Auto/Man

The Auto setting for Range causes the range to be set based on the Y Scale settings. When Range is "Auto", the I & Q Range are set based on the top of the Y Scale when the Y scale is in dB units (for example, power), or to the max(abs(top), abs(bottom)) when the Y scale reference is not at the top of the screen.

Not all measurements support Range Auto/Man. If Auto is not supported in the current measurement, this key is grayed out and shows “Man” and MAN is returned to a SCPI query, but this does NOT change the Auto/Man setting for Range. When you go to a measurement that supports Auto, it goes back to Auto if it was previously in Auto mode.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, Range |
| Scope | Meas Global |
| Remote Command | [:SENSe] :VOLTage:IQ:RANGe:AUTO OFF ON 0 1 [:SENSe] :VOLTage:IQ:RANGe:AUTO? |
| Example | Put the I Range and Q Range in manual. VOLT:IQ:RANG:AUTO OFF |
| Dependencies | If Auto is not supported, sending the SCPI command will generate an error. |
| Couplings | When in Auto, both I Range and Q Range are set to the same value, computed as follows: Maximum absolute value is computed for the Y Scale. The top and bottom of the graph are computed based on Ref Value, Scale/Div, and Ref Position. Formula: YMax = max(abs(top), abs(bottom)). The I Range and Q Range are then set to YMax. |
| Preset | ON |
| State Saved | Saved in instrument state |
| Range | Auto Man |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|----------------------|--|
| Remote Command | [:SENSe] :POWer:IQ:RANGe:AUTO OFF ON 0 1 [:SENSe] :POWer:IQ:RANGe:AUTO? |
| Example | Put the I Range and Q Range in manual. POW:IQ:RANG:AUTO OFF |
| Notes | The POW:IQ:RANG:AUTO is an alternate form of the VOLT:IQ:RANG:AUTO command. This is to maintain consistency with I Range and Q Range, which support both the POWER and VOLTage forms of the command. |
| Preset | ON |
| Range | Auto Man |
| Initial S/W Revision | Prior to A.02.00 |

I Range

This is the internal gain range for the I channel when Input Path is I Only or I and I/Q, and it is used for both the I and Q channels when the Input Path is I+jQ. See "[I/Q Gain Ranges](#)" on page 2105.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale, Range |
| Remote Command | [:SENSe] :VOLTage:IQ[:I]:RANGe[:UPPer] <voltage> [:SENSe] :VOLTage:IQ[:I]:RANGe[:UPPer] ? |

| | |
|----------------------|--|
| Example | Set the I Range to 0.5 V Peak VOLT:IQ:RANG 0.5 V |
| Notes | The numeric entries are mapped to the smallest gain range whose break point is greater than or equal to the value, or 1 V Peak if the value is greater than 1 V. |
| Couplings | When Q Same as I is On, the I Range value will be copied to the Q Range. Changing the value will also set Range = Man. |
| Preset | 1 V Peak |
| State Saved | Saved in instrument state |
| Range | 1 V Peak 0.5 V Peak 0.25 V Peak 0.125 V Peak |
| Min | 0.125 V |
| Max | 1 V |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|---|
| Remote Command | <code>[:SENSe] :POWer :IQ [:I] :RANGe [:UPPer] <ampl></code> <code>[:SENSe] :POWer :IQ [:I] :RANGe [:UPPer] ?</code> |
|-----------------------|---|

| | |
|----------------------|--|
| Example | Set the I Range to 0.5 V Peak when Reference Z is 50Ω, and to 1.0 V Peak when Reference Z is 75Ω. POW:IQ:RANG 4 dBm |
| Notes | The POWER form of the command is provided for convenience. It maps to the same underlying gain range parameter as the VOLTage form of the command. The Reference Z (not the I channel Input Z) is used to convert the power to peak voltage, which is then used to set the I Range as with the VOLTage form of the command. The power values of the 4 range states (1V Peak, 0.5V Peak, 0.25V Peak, and 0.125V Peak) will vary with Reference Z. Here are some examples: 50Ω: 10, 4, -2, -8 75Ω: 8.2, 2.2, -3.8, -9.8 600Ω: -0.8, -6.8, -12.8, -18.9 |
| Preset | 10.0 dBm |
| Range | -20 dBm to 10 dBm |
| Min | -20 dBm |
| Max | 10 dBm |
| Initial S/W Revision | Prior to A.02.00 |

1 V Peak

Set the channel gain state to 1 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.5 V Peak

Set the channel gain state to 0.5 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.25 V Peak

Set the channel gain state to 0.25 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.125 V Peak

Set the channel gain state to 0.125 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

Q Range Value

This is the internal gain range for the Q channel. See "[I/Q Gain Ranges](#)" on page 2105. The Q Range only applies to Input Path Q Only and Ind I/Q. For input I+jQ the I Range determines both I and Q channel range settings.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale, Range |
| Remote Command | [:SENSe] :VOLTage:IQ:Q:RANGe[:UPPer] <voltage> [:SENSe] :VOLTage:IQ:Q:RANGe[:UPPer] ? |
| Example | Set the Q Range to 0.5 V Peak VOLT:IQ:Q:RANG 0.5 V |
| Notes | The numeric entries are mapped to the smallest gain range whose break point is greater than or equal to the value, or 1 V Peak if the value is greater than 1 V. The Q Range is only used for Input Path Q Only and Ind I/Q. For input I+jQ the I Range determines both I and Q channel range settings. |
| Couplings | When Q Same as I is On, the I Range value will be copied to the Q Range and the range value keys are disabled. Changing the value will also set Range = Man. |
| Preset | 1 V Peak |

| | |
|----------------------|--|
| State Saved | Saved in instrument state |
| Range | 1 V Peak 0.5 V Peak 0.25 V Peak 0.125 V Peak |
| Min | 0.125 V |
| Max | 1 V |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Remote Command | <code>[:SENSe] :POWer:IQ:Q:RANGe[:UPPer] <ampl></code> <code>[:SENSe] :POWer:IQ:Q:RANGe[:UPPer]?</code> |
|-----------------------|--|

| | |
|----------------|---|
| Example | Will set the Q Range to 0.5 V Peak when Reference Z is 50Ω, and to 1.0 V Peak when Reference Z is 75Ω. POW:IQ:Q:RANG 4 dBm |
|----------------|---|

| | |
|-------|--|
| Notes | The POWER form of the command is provided for convenience. It maps to the same underlying gain range parameter as the VOLTage form of the command. The Reference Z (not the Q channel Input Z) is used to convert the power to peak voltage, which is then used to set the Q Range as with the VOLTage form of the command. The power values of the 4 range states (1V Peak, 0.5V Peak, 0.25V Peak, and 0.125V Peak) will vary with Reference Z. Here are some examples: 50Ω: 10, 4, -2, -8 75Ω: 8.2, 2.2, -3.8, -9.8 600Ω: -0.8, -6.8, -12.8, -18.9 |
|-------|--|

| | |
|----------------------|-------------------|
| Preset | 10.0 dBm |
| Range | -20 dBm to 10 dBm |
| Min | -20 dBm |
| Max | 10 dBm |
| Initial S/W Revision | Prior to A.02.00 |

Q Same as I

Many, but not all, usages require the I and Q channels to have an identical setup. To simplify channel setup, the Q Same as I will cause the Q channel range to be mirrored from the I channel. That way you only need to set up one channel (the I channel). The I channel values are copied to the Q channel, so at the time Q Same as I is Off, the I and Q channel setups will be identical.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale, Range, Q Range |
| Remote Command | <code>[:SENSe] :VOLTage POWer:IQ:MIRRored OFF ON 0 1</code> <code>[:SENSe] :VOLTage POWer:IQ:MIRRored?</code> |
| Example | Turn off the mirroring of I Range to Q Range. VOLT:IQ:MIRR OFF POW:IQ:MIRR OFF |

| | |
|----------------------|---|
| Couplings | When On, the I Range value is mirrored (copied) to the Q Range. |
| Preset | On |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Readback Text | "Q Same as I" when On, otherwise none. |
| Initial S/W Revision | Prior to A.02.00 |

1 V Peak

Set the channel gain state to 1 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.5 V Peak

Set the channel gain state to 0.5 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.25 V Peak

Set the channel gain state to 0.25 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.125 V Peak

Set the channel gain state to 0.125 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

I/Q Gain Ranges

See the following sections:

["1 V Peak" on page 2105](#)

["0.5 V Peak" on page 2105](#)

["0.25 V Peak" on page 2105](#)

["0.125 V Peak" on page 2106](#)

1 V Peak

Set the channel gain state to 1 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.5 V Peak

Set the channel gain state to 0.5 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.25 V Peak

Set the channel gain state to 0.25 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.125 V Peak

Set the channel gain state to 0.125 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

Ref Position

This key allows you to set the display reference position to either Top, Ctr (center), or Bot (Bottom). The key is active in EVM Window, Magnitude Error Window, Phase Error Window, Code Domain Power Window, and Capture Time Data Trace Window.

| | |
|----------------------|------------------|
| Key Path | AMPTD Y Scale |
| Initial S/W Revision | A.01.60 or later |

Y Ref Position (I/Q Error View – Magnitude Error Window)

This key sets the reference position of the vertical axis in the Magnitude Error window.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP CENTer BOTTom :DISPlay:EVM:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:RPOSition? |
| Example | DISP:EVM:VIEW2:WIND:TRAC:Y:RPOS TOP DISP:EVM:VIEW2:WIND:TRAC:Y:RPOS? |
| Notes | VIEW2 : I/Q Error View WINDow[1]: Mag Error Window on I/Q Error View |
| Preset | CENTer |
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | A.01.60 or later |

Y Ref Position (I/Q Error View – Phase Error Window)

This sets the reference position of the vertical axis in the Phase Error window.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:RPOSition TOP CENTer BOTTom :DISPlay:EVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:RPOSition? |
| Example | DISP:EVM:VIEW2:WIND2:TRAC:Y:RPOS TOP DISP:EVM:VIEW2:WIND2:TRAC:Y:RPOS? |
| Notes | VIEW2 : I/Q Error View WINDow2: Phase Error Window on I/Q Error View |
| Preset | CENTer |
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | A.01.60 or later |

Y Ref Position (I/Q Error View – EVM Window)

This key sets the reference position of the vertical axis in the EVM window.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow3:TRACe:Y[:SCALe]:RPOSition TOP CENTer BOTTom :DISPlay:EVM:VIEW2:WINDow3:TRACe:Y[:SCALe]:RPOSition? |
| Example | DISP:EVM:VIEW2:WIND3:TRAC:Y:RPOS TOP DISP:EVM:VIEW2:WIND3:TRAC:Y:RPOS? |
| Notes | VIEW2 : I/Q Error View WINDow3: EVM Window on I/Q Error View |
| Preset | BOTTom |
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | A.01.60 or later |

Y Ref Position (Code Domain Power and Metrics View – Code Domain Power Window)

This key sets the reference position of the vertical in the Code Domain Power window.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP CENTer BOTTom :DISPlay:EVM:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:RPOSition? |
| Example | DISP:EVM:VIEW3:WIND:TRAC:Y:RPOS TOP DISP:EVM:VIEW3:WIND:TRAC:Y:RPOS? |
| Notes | VIEW3 : Code Domain Power and Metrics View WINDow[1]: Code Domain Power and Metrics Window on Code Domain Power View |
| Preset | TOP |
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | A.01.60 or later |

Y Ref Position (Capture Time Summary View – Capture Time Data Trace Window)

This key sets the reference position of the vertical axis in the capture time data trace window.

| | |
|----------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW4:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP CENTer |

| | |
|-----------------------------|---|
| | BOTTom :DISPlay:EVM:VIEW4:WINDow[1]:TRACe:Y[:SCALe]:RPOStion? |
| Example | DISP:EVM:VIEW4:WIND:TRAC:Y:RPOS TOP DISP:EVM:VIEW4:WIND:TRAC:Y:RPOS? |
| Notes | VIEW4 : Capture Time Summary View WINDow[1]: Capture Time Data Trace Window on Capture Time Summary View |
| Preset | TOP |
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | A.01.60 or later |

Auto Scale

Toggles the Auto Scale function between On and Off. When Auto Scale is On, it will result in automatically determining scale per division and reference values based on the measurement results.

When you set a value to either Scale/Div or Ref Value manually, Auto Scale automatically changes to Off.

| | |
|-----------------------------|------------------|
| Key Path | AMPTD Y Scale |
| Initial S/W Revision | A.01.60 or later |

Y Auto Scale (I/Q Error View – Magnitude Error Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results for the vertical axis in the Magnitude Error window.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 1 OFF ON :DISPlay:EVM:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:COUPle? |
| Example | DISP:EVM:VIEW2:WIND:TRAC:Y:COUP ON DISP:EVM:VIEW2:WIND:TRAC:Y:COUP? |
| Notes | VIEW2 : I/Q Error View WINDow[1]: Mag Error Window on I/Q Error View When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |

| | |
|----------------------|------------------|
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Y Auto Scale (I/Q Error View – Phase Error Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results for the vertical axis in the Phase Error window.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:COUPle 0 1 OFF ON :DISPlay:EVM:VIEW2:WINDow2:TRACe:Y[:SCALe]:COUPle? |
| Example | DISP:EVM:VIEW2:WIND2:TRAC:Y:COUP ON DISP:EVM:VIEW2:WIND2:TRAC:Y:COUP? |
| Notes | VIEW2 : I/Q Error View WINDow2: Phase Error Window on I/Q Error View When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Y Auto Scale (I/Q Error View – EVM Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results for the vertical axis in EVM window.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow3:TRACe:Y[:SCALe]:COUPle 0 1 OFF ON :DISPlay:EVM:VIEW2:WINDow3:TRACe:Y[:SCALe]:COUPle? |
| Example | DISP:EVM:VIEW2:WIND3:TRAC:Y:COUP ON DISP:EVM:VIEW2:WIND3:TRAC:Y:COUP? |
| Notes | VIEW2 : I/Q Error View WINDow3: EVM Window on I/Q Error View When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set |

| | |
|----------------------|--|
| | a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Y Auto Scale (Code Domain Power and Metrics View – Code Domain Power Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results in the Code Domain Power window.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 1 OFF ON :DISPlay:EVM:VIEW3:WINDow[1]:TRACe:Y[:SCALe]:COUPle? |
| Example | DISP:EVM:VIEW3:WIND:TRAC:Y:COUP ON DISP:EVM:VIEW3:WIND:TRAC:Y:COUP? |
| Notes | VIEW3 : Code Domain Power and Metrics View WINDow[1]: Code Domain Power and Metrics Window on Code Domain Power View When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Y Auto Scale (Capture Time Summary View – Capture Time Data Trace Window)

When Auto Scale is On, this function automatically displays the scale per division and reference value results in the Capture Time Data Trace window.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW4:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 1 OFF ON :DISPlay:EVM:VIEW4:WINDow[1]:TRACe:Y[:SCALe]:COUPle? |
| Example | DISP:EVM:VIEW4:WIND:TRAC:Y:COUP ON |

| | |
|----------------------|---|
| | DISP:EVM:VIEW4:WIND:TRAC:Y:COUP? |
| Notes | VIEW4 : Capture Time Summary View WINDow[1]: Capture Time Data Trace Window on Capture Time Summary View When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 1929

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Remote Command | :COUPle ALL NONE |
| Example | :COUP ALL |
| Notes | :COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

There are two types of functions that have Auto/Manual modes.

Auto/Man Active Function keys

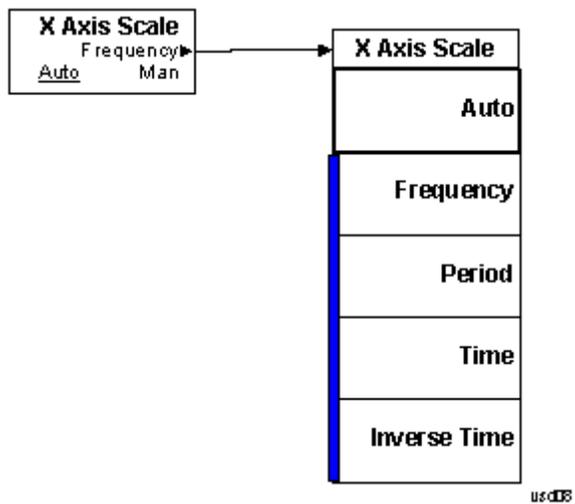
An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.

16 Modulation Accuracy (Composite EVM) Measurement
Auto Couple



BW

There is no BW functionality supported in the Modulation Accuracy measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

| | |
|--------------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous? |
| Example | :INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation |
| Preset | ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF) |
| State Saved | Saved in instrument state |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep. |
| Initial S/W Revision | Prior to A.02.00 |

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

16 Modulation Accuracy (Composite EVM) Measurement
File

File

See "File" on page 344

FREQ/Channel

The key accesses a menu allowing you to set Frequency parameters for the current measurement. All measurements in TD-SCDMA mode have the same menu structure under FREQ/Channel key.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 1938](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 1940](#)

See ["Center Frequency Presets" on page 1936](#)

| | |
|-----------------------|---|
| Key Path | FREQ Channel |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency :CENTer <freq></code> <code>[:SENSe] :FREQuency :CENTer ?</code> |
| Example | FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT? |
| Notes | This command sets either the RF or I/Q Center Frequency depending on the selected input. |

| | |
|----------------------|--|
| | <p>For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated.</p> |
| Dependencies | <p>The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit.</p> |
| Couplings | <p>When operating in “swept span”, any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer’s frequency range</p> |
| Preset | <p>Depends on instrument maximum frequency, mode, measurement, and selected input. See "Center Frequency Presets" on page 1936 and "RF Center Freq" on page 1938 and Ext Mix Center Freq and "I/Q Center Freq" on page 1940.</p> |
| State Saved | <p>Saved in instrument state</p> |
| Min | <p>Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1936 and "RF Center Freq" on page 1938 and "I/Q Center Freq" on page 1940.</p> |
| Max | <p>Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 1936 and "RF Center Freq" on page 1938 and "I/Q Center Freq" on page 1940.</p> |
| Default Unit | <p>Hz</p> |
| Status Bits/OPC | <p>Non-overlapped</p> |
| Dependencies | |
| Initial S/W Revision | <p>Prior to A.02.00</p> |

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

| Freq Option | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune above) |
|-------------------------|-------------------------|--------------------------------|--------------------------------------|
| 503 (all but N9000A) | 1.805 GHz | 3.6 GHz | 3.7 GHz |
| 503 (N9000A) | 1.505 GHz | 3.0 GHz | 3.08 GHz |

| | | | |
|---------------------------------------|------------|----------|--------------|
| 507 (all but N9000A) | 3.505 GHz | 7.0 GHz | 7.1 GHz |
| 507 (N9000A) | 3.755 GHz | 7.5 GHz | 7.58 GHz |
| 508 (all but N9038A) | 1.805 GHz | 3.6 GHz | 8.5 GHz |
| 508 (N9038A) | 4.205 GHz | 8.4 GHz | 8.5 GHz |
| 513 | 6.805 GHz | 13.6 GHz | 13.8 GHz |
| 526 (all but N9000A and N9038A) | 13.255 GHz | 26.5 GHz | 27.0 GHz |
| 526 (N9000A) | 13.255 GHz | 26.5 GHz | 26.55 GHz |
| 526 (N9038A) | 1.805 GHz | 3.6 GHz | 27.0 GHz |
| 532 | 16.005 GHz | 32.0 GHz | 32.5 GHz |
| 543 | 21.505 GHz | 43.0 GHz | TBD |
| 544 | 22.005 GHz | 44.0 GHz | 44.5 GHz |
| 550 | 25.005 GHz | 50.0 GHz | 51 GHz |

Input 2:

| Model | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune above) |
|----------------|----------------------------|-----------------------------------|-----------------------------------|
| N9000A opt C75 | 0.7505GHz | 1.5 GHz | 1.58 GHz |
| N9038A | 505 MHz | 1 GHz | 1.000025 GHz |

Tracking Generator Frequency Limits (N9000A only):

| Tracking Generator Option | Min Freq (clips to this freq when turn TG on and can't tune below while TG on) | If above this Freq, Stop Freq clipped to this Freq when TG turned on | Max Freq (can't tune above) while TG on |
|---------------------------------|--|---|--|
| T03 | 9 kHz | 3.0 GHz | 3.08 GHz |
| T06 | 9 kHz | 6.0 GHz | 6.05 GHz |

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

| Mode | CF Preset for RF |
|-------------|------------------|
| WCDMA | 1 GHz |
| WIMAXOFDMA, | 1 GHz |
| BASIC | 1 GHz |
| ADEMOD | 1 GHz |
| VSA | 1 GHz |
| TDSCDMA | 1 GHz |
| PNOISE | 1 GHz |
| LTE | 1 GHz |
| LTETDD | 1 GHz |
| MSR | 1 GHz |
| GSM | 935.2 MHz |
| NFIGURE | 1.505 GHz |

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | [:SENSe] :FREQuency:RF:CENTer <freq> [:SENSe] :FREQuency:RF:CENTer? |
| Example | FREQ:RF:CENT 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Dependencies | If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of Source Numerator, Source Denominator and Power Sweep. |
| Preset | See table above |
| State Saved | Saved in instrument state. |
| Min | -79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source |
| Max | See table above. Basically instrument maximum frequency – 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum |

| | |
|--------------------------|--|
| | frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | [:SENSe] :FREQuency:EMIXer:CENTer <freq> [:SENSe] :FREQuency:EMIXer:CENTer? |
| Example | :FREQ:EMIX:CENT 60 GHz :FREQ:EMIX:CENT? |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Couplings | When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup. |
| Preset | When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies. If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table (Span=Stop Freq – Start Freq), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table. When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz. Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz. |
| State Saved | Saved in instrument state. |
| Min | The minimum frequency in the currently selected mixer band + 5 Hz |

| | |
|----------------------|---|
| Max | The maximum frequency in the currently selected mixer band – 5 Hz If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency |
| Initial S/W Revision | A.08.01 |

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:IQ:CENTer <freq></code> <code>[:SENSe] :FREQuency:IQ:CENTer?</code> |
| Example | FREQ:IQ:CEN: 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Preset | 0 Hz |
| State Saved | Saved in instrument state. |
| Min | -40.049995 MHz |
| Max | 40.049995 MHz |
| Initial S/W Revision | Prior to A.02.00 |

Carrier Config

Allows you to adjust the carrier config parameters.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Carriers

Sets the total carriers that present in the signal.

| | |
|-----------------------|---|
| Key Path | Freq/Channel |
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :TDEMod:CARrier:NUMber <integer></code> <code>[:SENSe] :TDEMod:CARrier:NUMber?</code> |
| Example | :TDEM:CAR:NUM 1 |

| | |
|----------------------|----------------------------|
| | :TDEM:CAR:NUM? |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 15 |
| Initial S/W Revision | A.01.60 or later |

Carrier Result

Sets the carrier to be analyzed.

| | |
|-----------------------|---|
| Key Path | Freq/Channel |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :TDEMod:CARrier:RESult <integer> [:SENSe] :TDEMod:CARrier:RESult? |
| Example | :TDEM:CAR:RES 1 :TDEM:CAR:RES? |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 15 |
| Initial S/W Revision | A.01.60 or later |

CF Step

Changes the step size for the center frequency and start and stop frequency functions. Once a step size has been selected and the center frequency function is active, the step keys (and the UP|DOWN parameters for Center Frequency from remote commands) change the center frequency by the step-size value. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the analyzer.

Note that the start and stop frequencies also step by the CF Step value.

| | |
|-----------------------|--|
| Key Path | FREQ Channel |
| Remote Command | [:SENSe] :FREQuency:CENTer:STEP[:INCRement] <freq> [:SENSe] :FREQuency:CENTer:STEP[:INCRement]? [:SENSe] :FREQuency:CENTer:STEP:AUTO OFF ON 0 1 [:SENSe] :FREQuency:CENTer:STEP:AUTO? |
| Example | FREQ:CENT:STEP:AUTO ON FREQ:CENT:STEP 500 MHz |

| | |
|------------------------------|--|
| | FREQ:CENT UP increases the current center frequency value by 500 MHz FREQ:CENT:STEP? FREQ:CENT:STEP:AUTO? |
| Notes | Preset and Max values are depending on Hardware Options (503, 507, 508, 513, 526) |
| Notes | Preset and Max values are dependent on Hardware Options (5xx) |
| Dependencies | Freq Offset is not available in External Mixing. In this case the Freq Offset key is grayed out and shows a value of zero. It will once again be available, and show the previously set value, when you return to the RF Input. |
| Dependencies | Span, RBW, Center frequency If the electronic/soft attenuator is enabled, any attempt to change the value of the center frequency >3.6 GHz by pressing the Up-arrow key, fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. |
| Couplings | When auto-coupled in a non-zero span, the center frequency step size is set to 10% of the span. When auto-coupled in zero span, the center frequency step size is set to the equivalent -3 dB RBW value. |
| Preset | Auto ADEM0D: 1 MHz ON |
| State Saved | Saved in instrument state |
| Min | - (the maximum frequency of the instrument). That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Max | The maximum frequency of the instrument. That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Default Unit | Hz |
| Status Bits/OPC dependencies | non-overlapped |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Center Freq

The front panel displays and sets the Center Freq for the selected input. Changing the selected input will update the displayed value to match. The SCPI will also get or set Center Freq for the selected input.

See also:

["RF Center Freq" on page 1943](#)

"I/Q Center Freq" on page 1943

| | |
|-----------------------|---|
| Mode | TDSCDMA |
| Remote Command | [:SENSe] :FREQuency:CENTer <freq> [:SENSe] :FREQuency:CENTer? |
| Example | FREQ:CENT 30 MHz |
| Notes | This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT |
| Preset | Varies with selected input (see RF Center Freq and I/Q Center Freq) |
| State Saved | Varies with selected input (see RF Center Freq and I/Q Center Freq) |
| Min | Varies with selected input (see RF Center Freq and I/Q Center Freq) |
| Max | Varies with selected input (see RF Center Freq and I/Q Center Freq) |
| Initial S/W Revision | A.01.60 or later |

RF Center Freq

SCPI command for specifying the RF Center Frequency. This will always access the RF value, even when the selected input is not RF. The front panel always uses the Freq Center (Selected Input).

| | |
|-----------------------|--|
| Mode | TDSCDMA |
| Remote Command | [:SENSe] :FREQuency:RF:CENTer <freq> [:SENSe] :FREQuency:RF:CENTer? |
| Example | FREQ:RF:CENT 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Preset | 1.0 GHz |
| State Saved | Saved in instrument state. |
| Min | -79.999995 MHz |
| Max | Hardware Dependent: Opt503 = 3.699999995 GHz Opt508 = 8.499999995 GHz Opt513 = 13.799999995 GHz Opt526 = 26.999999995 GHz |
| Initial S/W Revision | A.01.60 or later |

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This will always access the I/Q value, even when the selected input is not I/Q. The front panel always uses the Freq Center (Selected Input).

| | |
|----------------------|--|
| Mode | TDSCDMA |
| Remote Command | [:SENSe] :FREQuency:IQ:CENTer <freq> [:SENSe] :FREQuency:IQ:CENTer? |
| Example | FREQ:IQ:CENt: 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Preset | 0 Hz |
| State Saved | Saved in instrument state. |
| Min | -39.999995 MHz |
| Max | 39.999995 MHz |
| Initial S/W Revision | A.01.60 or later |

Input/Output

See "Input/Output" on page 202

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front Panel Key |
| Initial S/W Revision | A.01.60 or later |

Select Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front Panel |
| Initial S/W Revision | A.01.60 or later |

Marker Chip Value

Sets the marker Chip value in the current marker for the I/Q Polar, EVM, Mag Error and Phase Error trace. It has no effect if the control mode is Off, or the trace is not I/Q Polar, EVM, Mag Error and Phase Error, but if the control mode is Normal, this is the SCPI equivalent of entering a Chip value.

| | |
|-----------------------|---|
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:MARKer[1] 2 ... 12:CHIP <real> :CALCulate:EVM:MARKer[1] 2 ... 12:CHIP? |
| Example | CALC:EVM:MARK:CHIP 0 CALC:EVM:MARK:CHIP? |
| Notes | The query returns the marker's 'chips' value in the trace if the control mode is Normal. The query is returned in 'chips'. If the marker is Off the response is not a number (NAN). |
| Preset | 0 |
| Preset | 0 |
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | A.01.60 or later |

Marker X Axis Value (Remote Command only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value if the control mode is Normal or Delta.

| | |
|-----------------------|--|
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:MARKer[1] 2 ... 12:X <real> |

| | |
|-----------------------------|---|
| | :CALCulate:EVM:MARKer[1] 2 ... 12:X? |
| Example | CALC:EVM:MARK3:X 0.0 CALC:EVM:MARK3:X? |
| Notes | The marker X Axis value has no unit suffix. For capture time data trace, the unit is second. The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from the marker's reference marker if the control mode is Delta. The query is returned without unit suffix. |
| Preset | 0 |
| Preset | After a preset, all Markers are turned OFF, so Marker X Axis Value query will return a not a number (NAN). |
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | A.01.60 or later |

Marker X Axis Position (Remote Command only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal or Delta - except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

| | |
|-----------------------------|--|
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:MARKer[1] 2 ... 12:X:POSition <real> :CALCulate:EVM:MARKer[1] 2 ... 12:X:POSition? |
| Example | CALC:EVM:MARK10:X:POS 0.0 CALC:EVM:MARK10:X:POS? |
| Preset | 0 |
| Preset | After a preset, all Markers are turned OFF, so Marker X Axis Value query will return a not a number (NAN). |
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | A.01.60 or later |

Marker Y Axis Value (Remote Command only)

Queries the marker Y Axis value in the current marker Y Axis unit.

| | |
|-------------|----------|
| Mode | TD-SCDMA |
|-------------|----------|

| | |
|-------------------------------------|---|
| Remote Command | :CALCulate:EVM:MARKer [1] 2 ... 12:Y? |
| Example | CALC:EVM:MARK11:Y? |
| Preset | Result dependant on markers setup and signal source |
| State Saved | No |
| Backwards Compatibility SCPI | :CALCulate:EVM:MARKer [1] 2 ... 12:FUNCTION:RESult? |
| Initial S/W Revision | A.01.60 or later |

Backward Compatibility SCPI Commands

Sets or queries the state of a marker. Setting a marker which is OFF to state ON or 1 puts it in Normal mode and places it at the center of the screen.

| | |
|-----------------------------|--|
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:MARKer [1] 2 ... 12:STATe OFF ON 0 1 :CALCulate:EVM:MARKer [1] 2 ... 12:STATe? |
| Example | CALC:EVM:MARK3:STATe ON CALC:EVM:MARK3:STAT? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Marker Type

Sets the marker control mode. If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, reference value of the selected marker appears on the Active Function area.

Active Function Display: Marker X-axis value

Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off.

The marker X axis value entered in the active function area will display the marker value to its full entered precision.

| | |
|-----------------------|--|
| Key Path | Marker |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:MARKer [1] 2 ... 12:MODE POSition DELTA OFF :CALCulate:EVM:MARKer [1] 2 ... 12:MODE? |
| Example | CALC:EVM:MARK:MODE POS |

| CALC:EVM:MARK:MODE? | |
|----------------------|--|
| Notes | <p>If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area.</p> <p>Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off.</p> <p>Active Function Display: Marker X-axis value</p> <p>the marker X axis value entered in the active function area will display the marker value to its full entered precision.</p> <p>NORMal is used by PSA, POSition is used by X-series analyzers.</p> |
| Preset | =OFF |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | Normal Delta Off |
| Initial S/W Revision | A.01.60 or later |

Properties

Accesses a menu that enables you to select a relative maker and marker trace

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | A.01.60 or later |

Select Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front Panel |
| Initial S/W Revision | A.01.60 or later |

Relative To

Selects the marker the selected marker will be relative to (its reference marker).

| | |
|-----------------------|---|
| Key Path | Marker, Properties |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:MARKer [1] 2 ... 12:REFerence <integer> :CALCulate:EVM:MARKer [1] 2 ... 12:REFerence? |
| Example | CALC:EVM:MARK:REF 4 CALC:EVM:MARK:REF? |

| | |
|----------------------|---|
| Notes | When queried a single value will be returned (the specified marker numbers relative marker). A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." |
| Preset | 2 3 4 5 6 7 8 9 10 11 12 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 12 |
| Initial S/W Revision | A.01.60 or later |

Marker Trace

Assigns the specified marker to the designated trace.

| | |
|----------------------|--|
| Key Path | Marker,Properties |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:MARKer[1] 2 ... 12:TRACe POLar MERRor PERRor EVM CDPower CAPTime :CALCulate:EVM:MARKer[1] 2 ... 12:TRACe? |
| Example | CALC:EVM:MARK:TRACE EVM CALC:EVM:MARK:TRACE? |
| Preset | EVM |
| State Saved | Saved in instrument state. |
| Range | Polar Mag Error Phase Error EVM Code Domain Power Capture Time |
| Initial S/W Revision | A.01.60 or later |

Couple Marker

Toggles the state of the markers to be coupled On or Off. When this function is true (On), moving any marker causes an equal X-axis movement of every other marker except those located to the polar trace, and Chip value of the marker located to the polar trace, which is not Off. "Equal X Axis movement" refers to the difference between each marker's X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units). This may result in markers going offscreen

| | |
|----------------|--|
| Key Path | Marker |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:EVM:MARKer:COUPle[:STATe]? |
| Example | CALC:EVM:MARK:COUP ON CALC:EVM:MARK:COUP? |

| | |
|----------------------|----------------------------|
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

All Markers Off

Turns off all markers.

| | |
|-----------------------|----------------------------|
| Key Path | Marker |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:MARKer:AOFF |
| Example | CALC:EVM:MARK:AOFF |
| Initial S/W Revision | A.01.60 or later |

Marker Fctn

There are no Marker Function operations supported in the Modulation Accuracy measurement. The front-panel key will display a blank menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front panel key |
| Initial S/W Revision | A.01.60 or later |

Marker To

There are no Marker To operations supported in the Modulation Accuracy measurement. The front-panel key will display a blank menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front panel key |
| Initial S/W Revision | A.01.60 or later |

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Remote Measurement Functions

This section contains the following topics:

["Measurement Group of Commands" on page 2285](#)

["Current Measurement Query \(Remote Command Only\)" on page 2287](#)

["Limit Test Current Results \(Remote Command Only\)" on page 2287](#)

["Data Query \(Remote Command Only\)" on page 2287](#)

["Calculate/Compress Trace Data Query \(Remote Command Only\)" on page 2288](#)

["Calculate Peaks of Trace Data \(Remote Command Only\)" on page 2293](#)

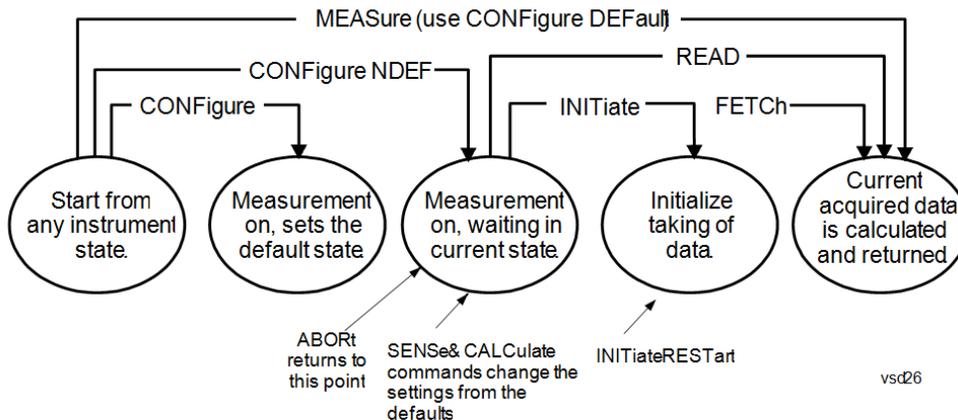
[Hardware-Accelerated Fast Power Measurement \(Remote Command Only\)](#)

["Format Data: Numeric Data \(Remote Command Only\)" on page 2294](#)

["Format Data: Byte Order \(Remote Command Only\)" on page 2295](#)

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFIgure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFIgure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
-

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
-

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

| | |
|-----------------------|-------------|
| Remote Command | :CONFigure? |
|-----------------------|-------------|

| | |
|----------------|-------|
| Example | CONF? |
|----------------|-------|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

| | |
|-----------------------|--------------------------|
| Remote Command | :CALCulate:CLIMits:FAIL? |
|-----------------------|--------------------------|

| | |
|----------------|--|
| Example | CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails. |
|----------------|--|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA[n]? |
| Notes | The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement. |
| Initial S/W Revision | Prior to A.02.00 |

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]] |
| Example | To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.) |
| Notes | The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data. |
| Initial S/W Revision | Prior to A.02.00 |

- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

-

NOTE

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPlE - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector (n=0) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

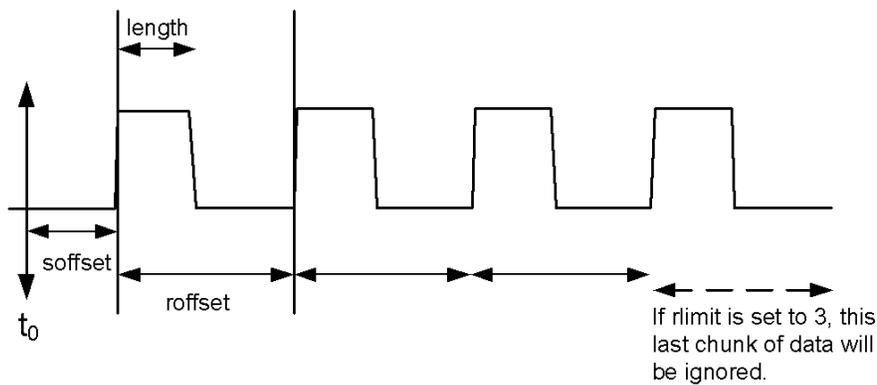
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

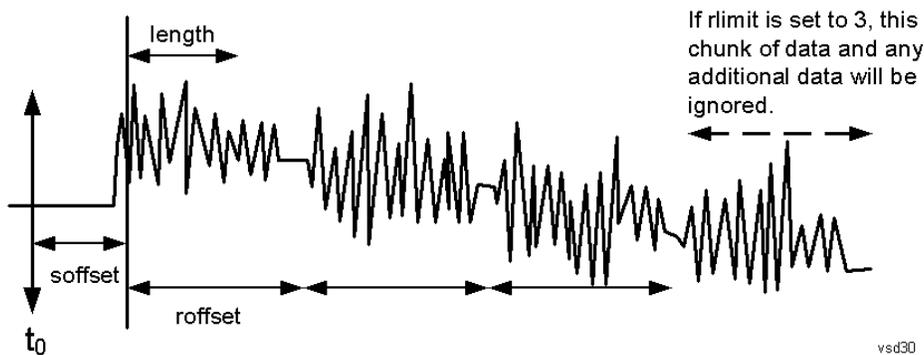
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

| | |
|-----------------------|---|
| Remote Command | <p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLline LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre> |
|-----------------------|---|

| | |
|----------------|---|
| Example | <p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p> |
|----------------|---|

| | |
|--------------|---|
| Notes | <p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p> |
|--------------|---|

excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQuency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat [:TRACe] [:DATA] ASCii | INTeger, 32 | REAL, 32 | REAL, 64
:FORMat [:TRACe] [:DATA] ?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

Initial S/W Revision Prior to A.02.00

The specs for each output type follow:

ASCIi - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

| | |
|-----------------------------|--|
| Remote Command | :FORMat:BORDER NORMal SWAPped :FORMat:BORDER? |
| Preset | NORMal |
| Initial S/W Revision | Prior to A.02.00 |

Meas Setup

This key displays the measurement setup menu for the Modulation Accuracy measurement when the Modulation Accuracy measurement is selected in the Measure menu.

| | |
|----------------------|------------------|
| Key Path | Front panel key |
| Initial S/W Revision | A.01.60 or later |

Avg/Hold Num

This key sets the number that will be averaged. After the specified number (average counts) have been averaged, the averaging mode (termination control) setting determines the averaging action.

| | |
|-----------------------|--|
| Key Path | Meas Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :EVM:AVERage:COUNT <integer> [:SENSe] :EVM:AVERage:COUNT? [:SENSe] :EVM:AVERage [:STATe] OFF ON 0 1 [:SENSe] :EVM:AVERage [:STATe] ? |
| Example | EVM:AVER:COUN 100 EVM:AVER:COUN? EVM:AVER OFF EVM:AVER? |
| Preset | 25 ON |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 8192 |
| Initial S/W Revision | A.01.60 or later |

Avg Mode

This key selects the type of termination control used for the averaging function. This determines the averaging action after the specified number of data acquisitions (average count) is reached. You can select between the Exp (exponential) and Repeat averaging modes. This selection only affects the averaging result after the number of N averages is reached. You can use the Avg/Hold Num key to set N.

| | |
|--------------------------|---|
| KEYExponential averaging | When Measure is set at Cont, data acquisitions will continue indefinitely. |
| SCPIEXPponential | After N averages, exponential averaging is used with a weighting factor of N (the displayed average count stops at N). Exponential averaging weights new data more than old data, which allows tracking of slow-changing signals. |

| | |
|-----------------------------------|--|
| KEYRepeat averaging SCPIREPeat | When Measure is set at Cont, data acquisitions will continue indefinitely. After N averages is reached, all previous result data is cleared and the average count is set back to 1. This is equivalent to being in Measure Single and pressing the Restart key when the Single measurement finishes. |
|-----------------------------------|--|

| | |
|-----------------------|---|
| Key Path | Meas Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :EVM:AVERage:TCONtrol EXPonential REPeat [:SENSe] :EVM:AVERage:TCONtrol ? |
| Example | EVM:AVER:TCON EXP EVM:AVER:TCON ? |
| Preset | EXPonential |
| State Saved | Saved in instrument state. |
| Range | Exp Repeat |
| Initial S/W Revision | A.01.60 or later |

Result Length

Sets the result length in terms of sub-frames. It is the number of sub-frame user intends to analyze. For example, when it is necessary to estimate the S1/S2 phase on DwPTS, Result Length should be set to a number no less than 4.

| | |
|-------------------------------------|--|
| Key Path | Meas Setup |
| Mode | TD-SCDMA |
| Remote Command | [:SENSe] :EVM:RINTerval <integer> [:SENSe] :EVM:RINTerval ? |
| Example | :EVM:RINT 1 :EVM:RINT ? |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 12 |
| Backwards Compatibility SCPI | [:SENSe] :EVM:CINTerval |
| Initial S/W Revision | A.01.60 or later |

Analysis Subframe

Specifies which sub-frame, within the acquired Result Length, is used for analysis and trace data measurement results. The available selections should include the acquired sub-frames.

| | |
|----------------------|---|
| Key Path | Meas Setup |
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :EVM:ANALysis:SUBFrame <integer></code> <code>[:SENSe] :EVM:ANALysis:SUBFrame?</code> |
| Example | <code>:EVM:ANAL:SUBF 0</code> <code>:EVM:ANAL:SUBF?</code> |
| Couplings | Coupling with the Result Length. Analysis Subframe should be less than Result Length. IF(Analysis Subframe >= Result Length) Analysis Subframe = (Result Length - 1); ENDIF |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | See Coupling |
| Initial S/W Revision | A.01.60 or later |

Limits

It allows you to set the limit lines which determine the Pass/Fail status of the specified results.

| | |
|----------------------|------------------|
| Key Path | Meas Setup |
| Initial S/W Revision | A.01.60 or later |

RMS EVM (Composite)

This key allows you to set the limit of composite RMS EVM measurement result. The default RMS EVM limit for BTS is 12.5%, which is defined in 3GPP TS 25.142, 6.8.1. The default RMS EVM limit for MS is 17.5%, which is defined in 3GPP TS34.122, 5.7.1. When the average RMS EVM result exceeds the limit, a red FAIL indicator appears in the PASS/FAIL window. When the average RMS EVM result is less than the limit, a green PASS indicator appears in the PASS/FAIL window.

| | |
|----------------|--|
| Key Path | Meas Setup, Limits |
| Mode | TD-SCDMA |
| Remote Command | <code>:CALCulate:EVM:LIMit[1] 2:RMS <real></code> <code>:CALCulate:EVM:LIMit[1] 2:RMS?</code> |

| | |
|----------------------|---|
| Example | :CALC:EVM:LIM1:RMS 1.0 :CALC:EVM:LIM1:RMS? |
| Notes | LIMit[1]: BTS RMS EVM LIMit2: MS RMS EVM |
| Couplings | Coupling with Mode Setup, Radio, Device: If BTS is selected, the default value is 12.5; If MS is selected, the default value is 17.5. |
| Preset | 12.5 17.5 |
| State Saved | Saved in instrument state. |
| Min | 0.0 |
| Max | 100.0 |
| Initial S/W Revision | A.01.60 or later |

Peak EVM (Composite)

This key allows you to set the limit for composite peak EVM measurement result.

| | |
|-----------------------|--|
| Key Path | Meas Setup, Limits |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:LIMit[1] 2:PEAK <real> :CALCulate:EVM:LIMit[1] 2:PEAK? |
| Example | :CALC:EVM:LIM1:PEAK 100.0 :CALC:EVM:LIM1:PEAK? |
| Notes | LIMit[1]: BTS Peak EVM LIMit2: MS Peak EVM |
| Preset | 200.0 |
| State Saved | Saved in instrument state. |
| Min | 0.0 |
| Max | 200.0 |
| Initial S/W Revision | A.01.60 or later |

Rho (Composite)

This key allows you to set the limit for composite Rho measurement result.

| | |
|-----------------------|--|
| Key Path | Meas Setup, Limits |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:LIMit[1] 2:RHO <real> :CALCulate:EVM:LIMit[1] 2:RHO? |

| | |
|-----------------------------|---|
| Example | :CALC:EVM:LIM1:RHO 0.9 :CALC:EVM:LIM1:RHO? |
| Notes | LIMit[1]: BTS Rho LIMit2: MS Rho |
| Preset | 0.50000 |
| State Saved | Saved in instrument state. |
| Min | 0.0 |
| Max | 1.0 |
| Initial S/W Revision | A.01.60 or later |

Peak Code Domain Error

This key allows you to set the Peak Code Domain Error limit in dB. The default value for BTS is -28 dB, which is defined in 3GPP TS25.142, 6.8.2. The default value for MS is -21.0 dB, which is defined in 3GPP TS34.122, 5.7.2.

| | |
|-----------------------------|--|
| Key Path | Meas Setup, Limits |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:LIMit[1] 2:PCDE <rel_amp1> :CALCulate:EVM:LIMit[1] 2:PCDE? |
| Example | :CALC:EVM:LIM1:PCDE -10.0 dB :CALC:EVM:LIM1:PCDE? |
| Notes | LIMit[1]: BTS Peak CDE LIMit2: MS Peak CDE |
| Couplings | Coupling with Mode Setup, Radio, Device: If BTS is selected, the default value is -28.0; If MS is selected, the default value is -21.0 |
| Preset | -28.0 -21.0 |
| State Saved | Saved in instrument state. |
| Min | -100.0 |
| Max | 0.0 |
| Initial S/W Revision | A.01.60 or later |

Frequency Error

This key sets a frequency error limit to warn you if the measured average frequency error value exceeds a limit. The default value for BTS is 0.05ppm (relative to carrier frequency) defined in 3GPP TS25.142, 6.3.2. The default value for MS is 0.1ppm (relative to carrier frequency) defined in 3GPP TS34.122, 5.3.2.

| | |
|-----------------------|--|
| Key Path | Meas Setup, Limits |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:LIMit[1] 2:FERRor <real> :CALCulate:EVM:LIMit[1] 2:FERRor? |
| Example | :CALC:EVM:LIM1:FERR 0.005 :CALC:EVM:LIM1:FERR? |
| Notes | LIMit[1]: BTS Frequency Error LIMit2: MS Frequency Error |
| Couplings | Coupling with Mode Setup, Radio, Device: If BTS is selected, the default value is 0.05; If MS is selected, the default value is 0.1. |
| Preset | 0.050 0.100 |
| State Saved | Saved in instrument state. |
| Min | 0.000 |
| Max | 2.000 |
| Initial S/W Revision | A.01.60 or later |

Meas Preset

This key allows users to restore all the measurement settings to their defaults.

This will set the measure setup parameters for the currently selected measurement only, to the factory defaults.

| | |
|-----------------------|---|
| Key Path | Meas Setup |
| Mode | TD-SCDMA |
| Remote Command | :CONFigure:EVM |
| Example | :CONFigure:EVM |
| Couplings | Selecting measurement preset will restore all measurement parameters to their default values for the current measurement. |
| Initial S/W Revision | A.01.60 or later |

16 Modulation Accuracy (Composite EVM) Measurement
Mode

Mode

See "[Mode](#)" on page 288

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings
- See "[How-To Preset](#)" on page 1974 for more information.

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :SYSTem:PRESet |
| Example | :SYST:PRES |
| Notes | *RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0. |
| Couplings | A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set. |
| Backwards Compatibility Notes | In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using |

| | |
|----------------------|------------------|
| | User Preset. |
| Initial S/W Revision | Prior to A.02.00 |

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

| Type Of Preset | SCPI Command | Front Panel Access |
|--------------------------------|--|--|
| Auto Couple | :COUPle ALL | Auto Couple front-panel key |
| Meas Preset | :CONFigure:<Measurement> | Meas Setup Menu |
| Mode Preset | :SYSTem:PRESet | Mode Preset (green key) |
| Restore Mode Defaults | :INSTrument:DEFault | Mode Setup Menu |
| Restore All Mode Defaults | :SYSTem:DEFault MODes | System Menu; Restore System Default Menu |
| *RST | *RST | not possible (Mode Preset with Single) |
| Restore Input/Output Defaults | :SYSTem:DEFault INPUt | System Menu; Restore System Default Menu |
| Restore Power On Defaults | :SYSTem:DEFault PON | System Menu; Restore System Default Menu |
| Restore Alignment Defaults | :SYSTem:DEFault ALIGN | System Menu; Restore System Default Menu |
| Restore Miscellaneous Defaults | :SYSTem:DEFault MISC | System Menu; Restore System Default Menu |
| Restore All System Defaults | :SYSTem:DEFault [ALL] :SYSTem:PRESet:PERsistent | System Menu; Restore System Default Menu |
| User Preset | :SYSTem:PRESet:USER | User Preset Menu |
| User Preset All Modes | :SYSTem:PRESet:USER:ALL | User Preset Menu |

| | | |
|----------------------|-----------------------|-------------|
| Power On Mode Preset | :SYSTem:PON:TYPE MODE | System Menu |
| Power On User Preset | :SYSTem:PON:TYPE USER | System Menu |
| Power On Last State | :SYSTem:PON:TYPE LAST | System Menu |

Preset Type (Remote Command Only)

As stated in the Backward Compatibility section, to be compatible with ESA/PSA the PRESet:TYPE command will be implemented as a no-op.

| | |
|-----------------------|--|
| Mode | All |
| Remote Command | :SYSTem:PRESet:TYPE FACTory MODE USER :SYSTem:PRESet:TYPE? |
| Example | :SYST:PREs:TYPE FACT |
| Notes | This command is supported for backward compatibility only. It is a no-op which does not change the behavior of any preset operation. |
| Preset | This is unaffected by Preset but is set to Mode on a “Restore System Defaults->All” |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Mode Setup

See "[Mode Setup](#)" on page 320

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace.

| | |
|-----------------------|--|
| Key Path | Front panel key |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:MARKer [1] 2 . . . 12:MAXimum |
| Example | CALC:EVM:MARK2:MAX |
| Initial S/W Revision | A.01.60 or later |

Next Peak

Moves the selected marker to the peak that has the next highest amplitude less than the marker's current value.

| | |
|-----------------------|---|
| Key Path | Peak Search |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:MARKer [1] 2 . . . 12:MAXimum:NEXT |
| Example | CALC:EVM:MARK2:MAX:NEXT |
| Initial S/W Revision | A.01.60 or later |

Next Pk Right

Moves the selected marker to the nearest peak right of the current marker which meets all enabled peak criteria.

| | |
|-----------------------|--|
| Key Path | Peak Search |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:MARKer [1] 2 . . . 12:MAXimum:RIGHT |
| Example | CALC:EVM:MARK2:MAX:RIGH |
| Initial S/W Revision | A.01.60 or later |

Next Pk Left

Moves the selected marker to the nearest peak left of the current marker which meets all enabled peak criteria.

| | |
|-----------------------|---|
| Key Path | Peak Search |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:MARKer [1] 2 . . . 12:MAXimum:LEFT |

| | |
|----------------------|-------------------------|
| Example | CALC:EVM:MARK2:MAX:LEFT |
| Initial S/W Revision | A.01.60 or later |

Marker Delta

Sets the control mode for the selected marker to Delta mode. See in the "Common Measurement Functions" for more information.

| | |
|----------------------|------------------|
| Key Path | Peak Search |
| Initial S/W Revision | A.01.60 or later |

Pk-Pk Search

Finds and displays the amplitude and frequency (or time, if in zero span) differences between the highest and lowest y-axis value.

| | |
|-----------------------|---|
| Key Path | Peak Search |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:MARKer [1] 2 . . . 12:PTPeak |
| Example | CALC:EVM:MARK:PTP |
| Notes | Turns on the Marker Δ active function. |
| Couplings | This key is not available (key is grayed out) when Coupled Markers is on. |
| Initial S/W Revision | A.01.60 or later |

Min Search

Moves the selected marker to the minimum y-axis value on the current trace.

| | |
|-----------------------|--|
| Key Path | Peak Search |
| Mode | TD-SCDMA |
| Remote Command | :CALCulate:EVM:MARKer [1] 2 . . . 12:MINimum |
| Example | CALC:EVM:MARK:MIN |
| Initial S/W Revision | A.01.60 or later |

Print

See "Print" on page 348

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

| Type | Default Prefix | Menu |
|-----------------------|----------------|-----------------|
| State | State_ | (Save/Recall) |
| Trace + State | State_ | (Save/Recall) |
| Screen | Screen_ | (Save/Recall) |
| Amplitude Corrections | Ampcor_ | (Import/Export) |
| Traces | Trace_ | (Import/Export) |
| Limit Lines | LLine_ | (Import/Export) |
| Measurement Result | MeasR_ | (Import/Export) |
| Capture Buffer | CapBuf_ | (Import/Export) |

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as "fred.csv", then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE

Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE

If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

| | |
|----------------------|--|
| Key Path | Front-panel key |
| Notes | No remote command for this key specifically. |
| Initial S/W Revision | Prior to A.02.00 |

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

| Key Path | Front-panel key |
|-------------------------------|--|
| Notes | <p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATE <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p> |
| Backwards Compatibility Notes | <p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> |
| Backwards Compatibility Notes | <p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p> |
| Initial S/W Revision | Prior to A.02.00 |

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode’s settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode’s state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or “Recalled State Register <register number>” is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See "[More Information](#)" on page 1984.

| | |
|-----------------------|--|
| Key Path | Recall |
| Mode | All |
| Remote Command | :MMEMory:LOAD:STATe <filename> |
| Example | :MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path |
| Example | MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state. |
| Notes | <p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <ul style="list-style-type: none"> • If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number. <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p> |

| | |
|-------------------------------------|---|
| | there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu. |
| Backwards Compatibility SCPI | :MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

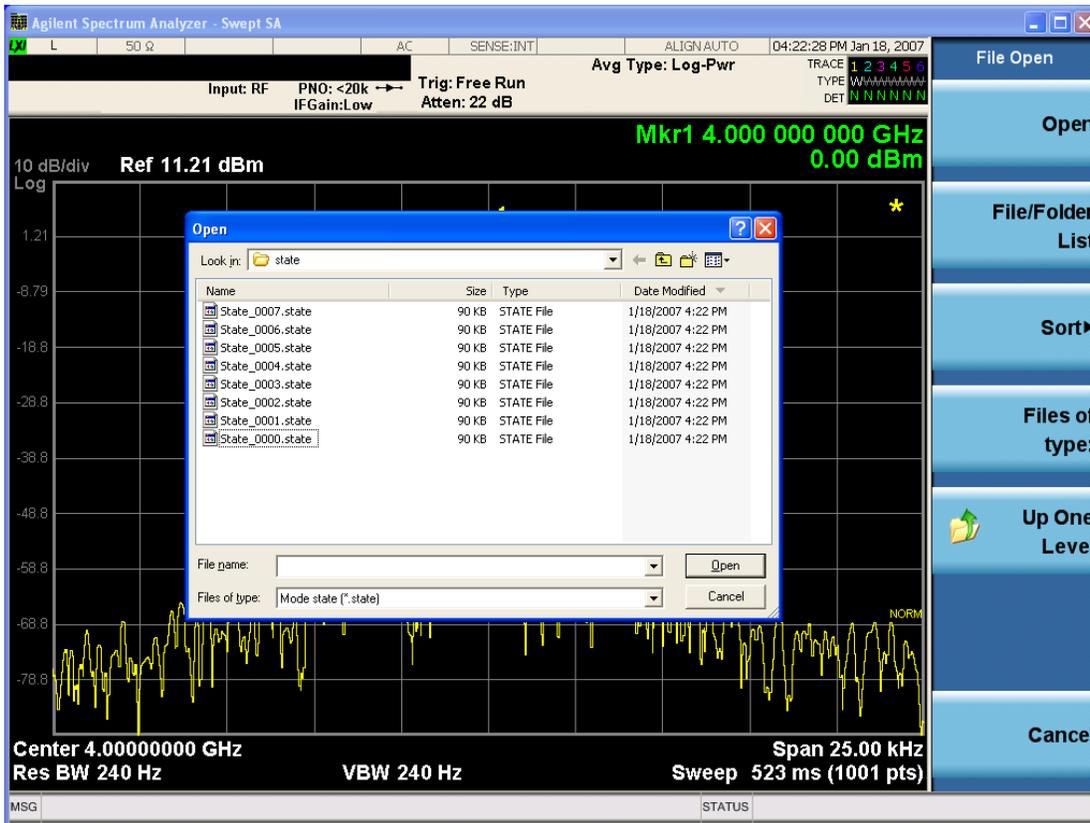
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

| | | |
|---|--|--|
| You want to recall state and one trace's data, leaving other traces unaffected. | Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed. | On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed. |
| You want to recall all traces | Save Trace+State from ALL traces. | On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved) |
| You want all traces to load exactly as they were when saved. | Save State | On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten. |

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Notes | Brings up the Open dialog for recalling a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Mode | All |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available" |
| Initial S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|--|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|--|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1-16 from front panel, 1-128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Data (Import)

Importing a data file loads data that was previously saved from the current measurement or from other measurements and/or modes that produce compatible data files. The Import Menu only contains Data Types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by the user prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Importing Data loads measurement data from the specified file into the specified or default destination, depending on the data type selected. Selecting an Import Data menu key will not actually cause the importing to occur, since the analyzer still needs to know from where to get the data. Pressing the Open key in this menu brings up the Open dialog and Open menu that provides you with the options from where to recall the data. Once a filename has been selected or entered in the Open menu, the recall occurs as soon as the Open button is pressed.

| | |
|----------------------|--|
| Key Path | Recall |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. Some keys will be missing completely, so the key locations in the sub-menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:LOAD commands. |
| Dependencies | If a file type is not used by a certain measurement, it is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Capture Buffer

The captured data is raw data which is not processed.

| | |
|----------------------|---|
| Key Path | Recall, Data |
| Mode | TD-SCDMA |
| Example | MMEM:LOAD:CAPT "MyCaptureData.bin" This loads the file of capture data (on the default file directory path) into the instrument. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Open...

When you press "Open", the analyzer brings up a Windows dialog and a menu entitled "**File Open.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[From File...](#)" on page 2309 in Recall, State, for a full description of this dialog and menu.

| | |
|----------------------|--|
| Key Path | Recall, Data |
| Notes | The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 1990

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate[:IMMEDIATE] :INITiate:RESTART |
| Example | :INIT:IMM :INIT:REST |
| Notes | :INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function. |
| Couplings | Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement. |
| Status Bits/OPC dependencies | This is an Overlapped command. The STATUS:OPERATION register bits 0 through 8 are cleared. The STATUS:QUESTIONABLE register bit 9 (INTEGRITY sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set. |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command `CALC:AVER:TCON UP`.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Mode | All |
| Notes | No remote command for this key specifically, but the :MMEM:STORe command is available for specific file types. An example is :MMEM:STOR:STATe <filename>. |
| Initial S/W Revision | Prior to A.02.00 |

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

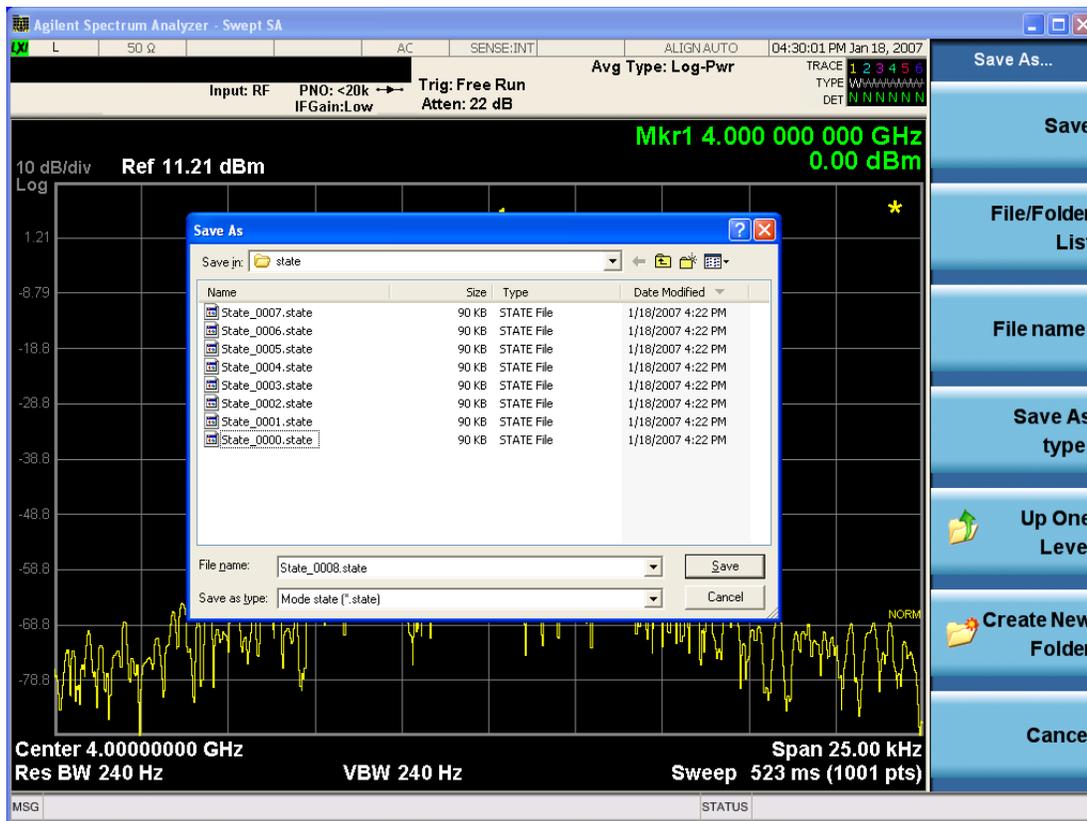
| | |
|----------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:STATe <filename> |
| Example | MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory. |
| Notes | Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key |

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

| | |
|-------------------------------------|-----------------------------------|
| Backwards Compatibility SCPI | :MMEMoRY:STORe:STATe 1,<filename> |
| Initial S/W Revision | Prior to A.02.00 |

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2305](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Save, State |
| Mode | All |
| Notes | Brings up Save As dialog for saving a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 1995](#)

| | |
|-----------------------|--|
| Key Path | Save, State |
| Mode | All |
| Remote Command | :MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number> |
| Example | :MMEM:REG:STAT:LAB 1,"my label" |
| Notes | <reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,"" |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available" |
| Preset | The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc" |
| Initial S/W Revision | A.11.00 |

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

| | |
|----------------------|---|
| Key Path | Save |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands. |
| Dependencies | If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Measurement Results

Pressing this key selects Meas Results as the data type to be exported. Pressing the key a second time brings up the Meas Results menu, which allows you to select which **Meas Result** to save. In the Swept SA measurement, there are three types of Measurement Results files: Peak Table, Marker Table and Spectrogram.

See "[Meas Results File Contents](#)" on page 1998.

See "[Marker Table](#)" on page 1998.

See "[Peak Table](#)" on page 2001.

See "[Spectrogram](#)" on page 2004

| | |
|-----------------------------|---|
| Remote Command | :MMEMory:STORe:RESults:MTABle PTABle SPEctrogram <filename> |
| Example | :MMEM:STOR:RES:MTAB "myResults.csv" Saves the results from the current marker table to the file myResults.csv in the current path. :MMEM:STOR:RES:PTAB "myResults.csv" Saves the results from the current peak table to the file myResults.csv in the current path. :MMEM:STOR:RES:SPEC "myResults.csv" Saves the results from the current Spectrogram display to the file myResults.csv in the current path. The default path is My Documents\SA\data\SAN\results |
| Notes | If the save is initiated via SCPI, and the file already exists, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade. Both single and double quotes are supported for any filename parameter over SCPI. |
| Dependencies | If a save of Marker Table results is requested and the Marker Table is not on, no file is saved and a message is generated If a save of Peak Table results is requested and the Peak Table is not on, no file is saved and a message is generated If a save of Spectrogram results is requested and the Spectrogram is not on, no file is saved and a message is generated. The Spectrogram choice only appears if option EDP is licensed. |
| Preset | Not part of Preset, but is reset to Peak Table by Restore Mode Defaults. Survives a shutdown. |
| Initial S/W Revision | Prior to A.02.00 |

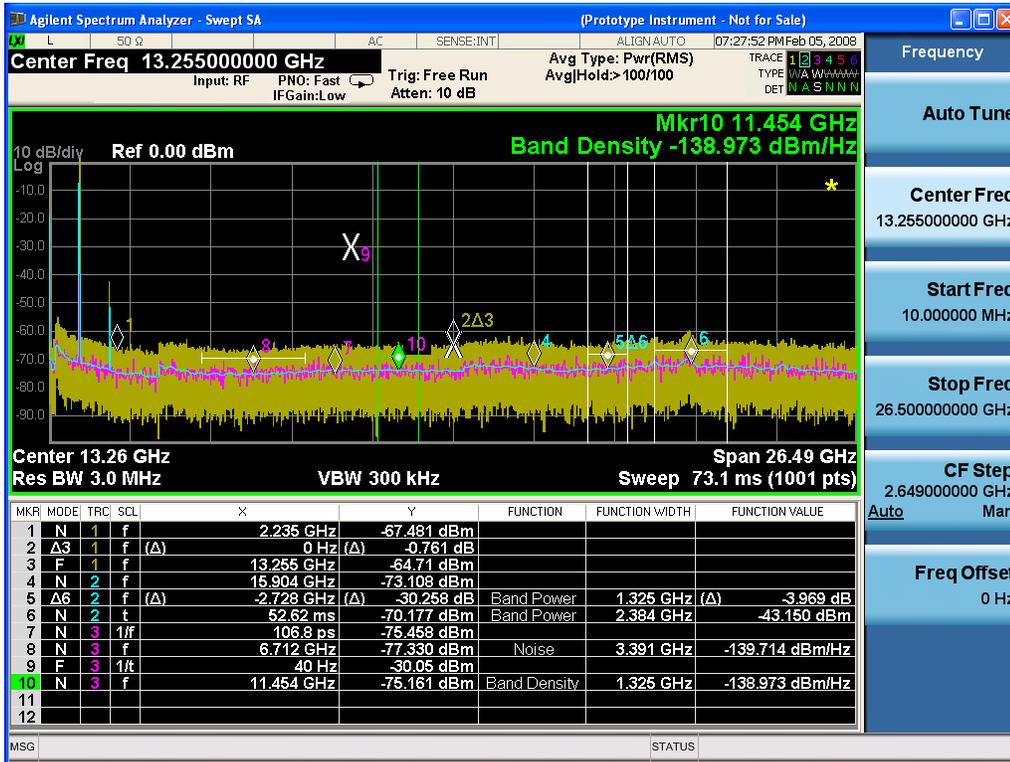
Meas Results File Contents

All files are .csv files. The following section details the data in each file type.

Marker Table

This section discusses the Marker Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:



Then the Meas Results file, when opened, would show the following data:

| | |
|------------------|---------------------|
| MeasurementR | |
| result | |
| Swept SA | |
| A.01.40_R0017 | N9020A |
| 526 B25 PFR | 1 |
| P26 EA3 | |
| Result Type | Marker Table |
| Ref Level | 0 |
| Number of Points | 1001 |
| Sweep Time | 0.0662666 67 |
| Start Frequency | 10000000 |
| Stop Frequency | 26500000 000 |
| Average Count | 0 |
| Average Type | LogPower (Video) |
| RBW | 3000000 |

Save

| | |
|--------------------------|-----------|
| RBW Filter | Gaussian |
| RBW Filter BW | 3dB |
| VBW | 3000000 |
| Sweep Type | Swept |
| X Axis Scale | Lin |
| PreAmp State | Off |
| PreAmp Band | Low |
| Trigger Source | Free |
| Trigger Level | 1.2 |
| Trigger Slope | Positive |
| Trigger Delay | 1.00E-06 |
| Phase Noise Optimization | Fast |
| Swept If Gain | Low |
| FFT If Gain | Autorange |
| RF Coupling | AC |
| FFT Width | 411900 |
| Ext Ref | 10000000 |
| Input | RF |
| RF Calibrator | Off |
| Attenuation | 10 |
| Ref Level Offset | 0 |
| External Gain | 0 |
| X Axis Units | Hz |
| Y Axis Units | dBm |

DATA

| MKR | MODE | TRC | SCL | X | Y | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE | FUNCTION UNIT |
|-----|--------|-----|-----------|------------|---------|----------|----------------|----------------|---------------|
| 1 | Normal | 1 | Frequency | 2.2350E+09 | -67.481 | Off | 0.0000E+00 | 0 | None |
| 2 | Delta3 | 1 | Frequency | 0.0000E+00 | -0.761 | Off | 0.0000E+00 | 0 | None |
| 3 | Fixed | 1 | Frequency | 1.3255E+10 | -64.71 | Off | 0.0000E+00 | 0 | None |
| 4 | Normal | 2 | Frequency | 1.5904E+10 | -73.1 | Off | 0.0000E+00 | 0 | None |

| 08 | | | | | | | | | |
|----|--------|---|-----------------|---------------------|-----------------|-----------------|----------------|------------------|--------|
| 5 | Delta7 | 2 | Freque ncy | - 2.7280E+ 09 | - 30.2 58 | Band Power | 1.3250E+ 06 | -3.969 | dB |
| 6 | Normal | 2 | Time | 5.2620E- 02 | - 70.1 77 | Band Power | 2.3840E+ 06 | -43.15 | dBm |
| 7 | Normal | 3 | Period | 1.0680E- 10 | - 75.4 58 | Off | 0.0000E+ 00 | 0 | None |
| 8 | Normal | 3 | Freque ncy | 6.7120E+ 09 | - 77.3 3 | Noise | 3.3910E+ 06 | - 139.71 4 | dBm/Hz |
| 9 | Fixed | 3 | Inverse Time | 4.0000E+ 01 | - 30.0 5 | Off | 0.0000E+ 00 | 0 | None |
| 10 | Normal | 3 | Freque ncy | 1.1454E+ 10 | - 75.1 61 | Band Density | 1.3250E+ 06 | - 138.97 3 | dBm/Hz |
| 11 | Off | 1 | Freque ncy | 0.0000E+ 00 | 0 | Off | 0.0000E+ 00 | 0 | None |
| 12 | Off | 1 | Freque ncy | 0.0000E+ 00 | 0 | Off | 0.0000E+ 00 | 0 | None |

The numbers appear in the file exactly as they appear onscreen. If it says 11.454 GHz onscreen, then in the file it is 11.454E+09.

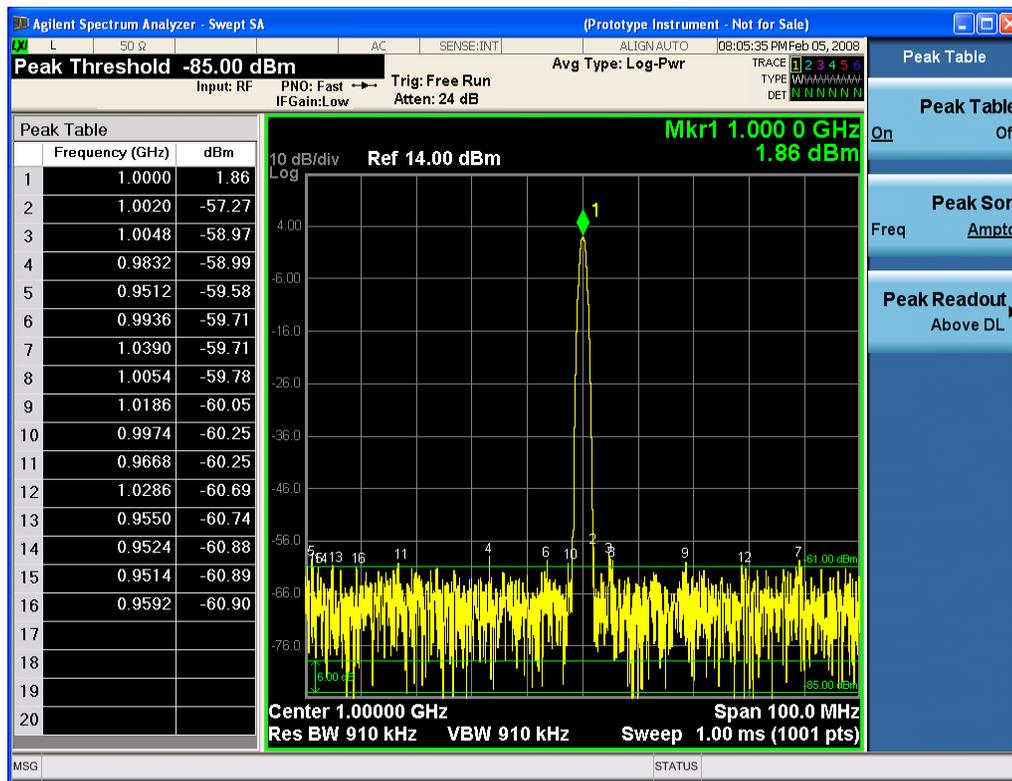
The metadata header is very similar to the metadata used in the trace data .csv files. See Trace File Contents. The only new information concerns the 1-of-N fields in the marker table itself.

Peak Table

This section discusses the Peak Table Meas Results file format.

Imagine that, at the point where a Marker Table Meas Result is requested, the following screen is showing:

16 Modulation Accuracy (Composite EVM) Measurement
Save



Then the Meas Results file, when opened, would show the header data (the same as for the Marker Table except that the Result Type is Peak Table) ending with a few fields of specific interest to Peak Table users:

- Peak Threshold
- Peak Threshold State (On|Off)
- Peak Excursion
- Peak Excursion State (On|Off)
- Display Line
- Peak Readout (All|AboveDL|BelowDL)
- Peak Sort (Freq|Amptd)

These fields are then followed by the data for the Peak Table itself.

Note that the label for the Frequency column changes to Time in 0 span.

Here is what the table for the above display looks like:

| MeasurementResult | |
|---------------------|--------|
| Swept SA | |
| A.01.40_R0017 | N9020A |
| 526 B25 PFR P26 EA3 | 1 |

| | |
|--------------------------|-----------------|
| Result Type | Peak Table |
| Ref Level | 0 |
| Number of Points | 1001 |
| Sweep Time | 0.066266667 |
| Start Frequency | 10000000 |
| Stop Frequency | 26500000000 |
| Average Count | 0 |
| Average Type | LogPower(Video) |
| RBW | 3000000 |
| RBW Filter | Gaussian |
| RBW Filter BW | 3dB |
| VBW | 3000000 |
| Sweep Type | Swept |
| X Axis Scale | Lin |
| PreAmp State | Off |
| PreAmp Band | Low |
| Trigger Source | Free |
| Trigger Level | 1.2 |
| Trigger Slope | Positive |
| Trigger Delay | 1.00E-06 |
| Phase Noise Optimization | Fast |
| Swept If Gain | Low |
| FFT If Gain | Autorange |
| RF Coupling | AC |
| FFT Width | 411900 |
| Ext Ref | 10000000 |
| Input | RF |
| RF Calibrator | Off |
| Attenuation | 10 |
| Ref Level Offset | 0 |
| External Gain | 0 |
| X Axis Units | Hz |
| Y Axis Units | dBm |
| Peak Threshold | -85 |
| Peak Threshold State | On |
| Peak Excursion | 6 |
| Peak Excursion State | On |

| | | |
|--------------|------------|-----------|
| Display Line | -61 | |
| Peak Readout | AboveDL | |
| Peak Sort | Amptd | |
| DATA | | |
| Peak | Frequency | Amplitude |
| 1 | 1.0000E+06 | 1.86 |
| 2 | 1.0020E+06 | -57.27 |
| 3 | 1.0048E+06 | -58.97 |
| 4 | 9.8320E+05 | -58.99 |
| 5 | 9.5120E+05 | -59.58 |
| 6 | 9.9360E+05 | -59.71 |
| 7 | 1.0390E+06 | -59.71 |
| 8 | 1.0054E+06 | -59.78 |
| 9 | 1.1086E+06 | -60.05 |
| 10 | 9.9740E+05 | -60.25 |
| 11 | 9.6680E+05 | -60.25 |
| 12 | 1.0286E+06 | -60.69 |
| 13 | 9.5500E+05 | -60.74 |
| 14 | 9.5240E+05 | -60.88 |
| 15 | 9.5140E+05 | -60.89 |
| 16 | 9.5920E+05 | -60.90 |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |

Spectrogram

This section discusses the Spectrogram Results file format. The Spectrogram choice only appears if option EDP is licensed.

The Spectrogram results are the same as a Trace data export, except that instead of having just one trace's data, all 300 traces appear one after the other.

Each trace has its own data mark; the data for Spectrogram Trace 0 follows the row marked DATA, the data for Spectrogram Trace 1 follows the row marked DATA1, for Spectrogram Trace 2 follows the row marked DATA2, and so on.

Each DATA row has a timestamp in the second column (as of firmware revision A.11.01). So, for example, if Trace 0 had a relative start time of 1729.523 sec, then the first DATA row would look like this:

DATA,1729.523

And if Trace 13 had a relative start time of 100.45 sec, then the fourteenth data row would look like:

DATA13,100.453

To find the absolute time for the relative timestamps of each trace, the last row before the first DATA row gives the absolute start time of the Spectrogram, in the form YYYYMMDDHHMMSS

So, for example, if the absolute start time is 13:23:45:678 on January 30, 2012, this row would look like:

Start Time,20120130132345678

NOTE The resolution of the absolute time stored is 1 ms, which matches up with the fact that the fastest sweep time is also 1 ms. However, there is no specification for the absolute accuracy of the clock in the analyzer, nor is there any facility provided to allow the user to set this time to any particular degree of accuracy.

Traces that have not yet been filled in the Spectrogram display are empty; there is no DATA header for them. The file ends after the last non-empty trace.

Imagine that, at the point where a Spectrogram Meas Result is requested, the following screen is showing:



For the purpose of this example, we have set the Average/Hold Number to 10, thus we have only traces 0 thru 10. The Spectrogram was started at 02:28:08:700 pm on April 25, 2012 (that is, 700 ms after 2:28:08 pm), although the screen dump itself shows a different time, as it was taken ten minutes after the

Spectrogram data. Trace 0 is showing a start time of 5.30 seconds, meaning 5.3 seconds after the Spectrogram started (trace 10 has a start time of 0, as it was the first trace taken but has now rolled up into the tenth trace slot).

The Meas Results file, when opened, shows the header data and ten traces of trace data. Below is an extract from the result file for the above display. Note the start time of 20120425142808700 showing in the last row before the first DATA row, and the relative time of 5.299231048 showing in the first DATA row:

| Result Type | Spectrogram |
|--|--------------------|
| MeasResult | |
| Swept SA | |
| A.11.00.01 | N9020A |
| 503 508 513 526 ALL ALV B1C B1X B25 B2X B40 BAB BBA CR3 CRP DP2 DRD EA3 EDP EMC EP1 ERC ESC ESP EXM FSA HBA K03 LFE MPB P03 P08 P13 P26 PFR RTL RTS S40 SB1 SEC SM1 UK6 YAS YAV | 1 |
| Segment | 0 |
| Number of Points | 1001 |
| Sweep Time | 0.523333333 |
| Start Frequency | 5999984415 |
| Stop Frequency | 6000009415 |
| Average Count | 0 |
| Average Type | LogPower(Video) |
| RBW | 240 |
| RBW Filter | Gaussian |
| RBW Filter BW | 3dB |
| VBW | 240 |
| Sweep Type | Swept |
| X Axis Scale | Lin |
| PreAmp State | Off |
| PreAmp Band | Low |
| Trigger Source | Free |
| Trigger Level | 1.2 |
| Trigger Slope | Positive |
| Trigger Delay | 0 |
| Phase Noise Optimization | Wide |
| Swept If Gain | Low |
| FFT If Gain | Autorange |
| RF Coupling | AC |

| Result Type | Spectrogram |
|-------------------|-------------------|
| FFT Width | 411900 |
| Ext Ref | 10000000 |
| Input | RF |
| RF Calibrator | Off |
| Attenuation | 14 |
| Ref Level Offset | 0 |
| External Gain | 0 |
| Trace Type | Clearwrite |
| Detector | Normal |
| Trace Math | Off |
| Trace Math Oper1 | Trace5 |
| Trace Math Oper2 | Trace6 |
| Trace Math Offset | 0 |
| Trace Name | Trace1 |
| X Axis Units | Hz |
| Y Axis Units | dBm |
| Start Time | 20120425142808700 |
| DATA | 5.299231048 |
| 5999984415 | -76.34749519 |
| 5999984440 | -77.28097006 |
| 5999984465 | -75.32317869 |
| 5999984490 | -73.64417681 |
| 5999984515 | -72.67154604 |

- o
- o
- o

| | |
|------------|--------------|
| 6000009315 | -77.94423277 |
| 6000009340 | -79.51829697 |
| 6000009365 | -78.46108961 |
| 6000009390 | -78.46108957 |
| 6000009415 | -76.59570596 |
| DATA2 | 4.708697055 |
| 5999984415 | -80.98197882 |
| 5999984440 | -80.98197879 |

| | |
|------------|--------------|
| 5999984465 | -75.83142132 |
| 5999984490 | -74.02712079 |
| 5999984515 | -73.57213005 |

O
O
O

| | |
|------------|--------------|
| 6000009315 | -75.9183103 |
| 6000009340 | -79.53787488 |
| 6000009365 | -78.82602191 |
| 6000009390 | -78.82602188 |
| 6000009415 | -76.37486709 |
| DATA10 | 0 |
| 5999984415 | -75.56751112 |
| 5999984440 | -75.76485645 |
| 5999984465 | -76.67718717 |
| 5999984490 | -78.79238489 |
| 5999984515 | -83.72680212 |

O
O
O

| | |
|------------|--------------|
| 6000009315 | -71.3942461 |
| 6000009340 | -72.28308332 |
| 6000009365 | -73.92684489 |
| 6000009390 | -75.45548832 |
| 6000009415 | -75.17904815 |

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data which is not processed.

| | |
|----------|------------|
| Key Path | Save, Data |
|----------|------------|

| | |
|----------------------|--|
| Mode | TD-SCDMA |
| Example | MMEM:STOR:CAPT "MyCaptureData.bin" This stores the capture data in the file MyCaptureData.bin in the default directory. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Save As . . .

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\`<mode name>`\data\traces

For all of the Limit Data Files:

My Documents\`<mode name>`\data\limits

For all of the Measurement Results Data Files:

My Documents\`<mode name>`\data\`<measurement name>`\results

For all of the Capture Buffer Data Files:

My Documents\`<mode name>`\data\captureBuffer

| | |
|----------------------|---|
| Key Path | Save, Data |
| Mode | All |
| Notes | The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <code><mode specific></code> Save Type. The save is performed immediately and does not wait until the measurement is complete. |
| Initial S/W Revision | Prior to A.02.00 |

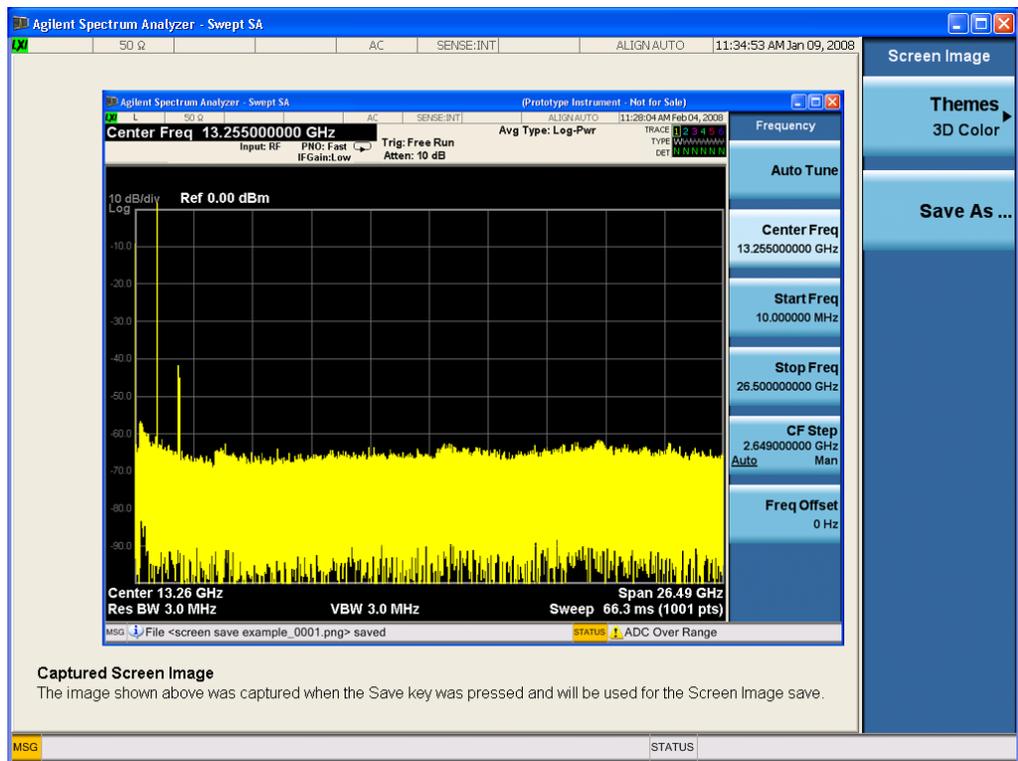
Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

16 Modulation Accuracy (Composite EVM) Measurement
Save

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

| | |
|----------------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:SCReem <filename> |
| Example | :MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOlor FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Save As...

When you press “Save As”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where `<mode name>` is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

| | |
|----------------------|--|
| Key Path | Save, Screen Image |
| Notes | Brings up Save As dialog for saving a Screen Image Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Catalog (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:CATalog? [<code><directory_name></code>] |
| Notes | The string must be a valid logical path. Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format: <code><numeric_value>,<numeric_value>,{<file_entry>}</code> It returns two numeric parameters and as many strings as there are files and directories. The first |

parameter indicates the total amount of storage currently used in bytes. The second parameter indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:

<file_name>,<file_type>,<file_size>

As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty

Initial S/W Revision Prior to A.02.00

Mass Storage Change Directory (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:CDIRectory [<directory_name>]
 :MMEMory:CDIRectory?

Notes The string must be a valid logical path.

Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.
At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.
Query returns full path of the default directory.

Initial S/W Revision Prior to A.02.00

Mass Storage Copy (Remote Command Only)

Key path SCPI Only

Remote Command :MMEMory:COPY <string>,<string> [,<string>,<string>]

Notes The string must be a valid logical path.

Copies an existing file to a new file or an existing directory to a new directory.
Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.
The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.

This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:COpy:DEvice <source_string>,<dest_string> |
| Notes | The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device. Valid device keywords are: SNS (smart noise source) An error is generated if the file or device is not found. |

Mass Storage Delete (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DELeTe <file_name>[,<directory_name>] |
| Notes | The string must be a valid logical path. Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an "access denied" error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name> |
| Notes | The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Make Directory (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MDIRectory <directory_name> |
| Notes | The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created. |

| | |
|----------------------|--|
| | This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Move (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MOVE <string>,<string>[,<string>,<string>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Moves an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Remove Directory (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:RDIRECTory <directory_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See ["More Information" on page 2016](#)

| | |
|-------------------------------|---|
| Key Path | Front-panel key |
| Example | :INIT:CONT OFF |
| Notes | See Cont key description. |
| Backwards Compatibility Notes | <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p> |
| Initial S/W Revision | Prior to A.02.00 |

More Information

See ["Restart" on page 2315](#) for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no source functionality in the Modulation Accuracy measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

SPAN X Scale

The SPAN X Scale key accesses the menu to set the desired horizon scale and associated settings of window.

It specifies SPAN X Scale setting when EVM, Magnitude Error, Phase Error, Code Domain Power, or Capture Time Data Trace Window is active.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Ref Value

This key allows you to set the display X reference value. The key is active in EVM Window, Magnitude Error Window, Phase Error Window, Code Domain Power Window, and Capture Time Data Trace Window.

| | |
|----------------------|------------------|
| Key Path | Span X Scale |
| Initial S/W Revision | A.01.60 or later |

X Ref Value (I/Q Error View – Magnitude Error Window)

This key sets the chip reference value on the horizontal axis in the Magnitude Error window.

| | |
|----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow[1]:TRACe:X[:SCALE]:RLEVel <real> :DISPlay:EVM:VIEW2:WINDow[1]:TRACe:X[:SCALE]:RLEVel? |
| Example | DISP:EVM:VIEW2:WIND:TRAC:X:RLEV 0.0 DISP:EVM:VIEW2:WIND:TRAC:X:RLEV? |
| Notes | VIEW2 : I/Q Error View WINDow[1]: Mag Error Window on I/Q Error View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | 1000 |
| Initial S/W Revision | A.01.60 or later |

X Ref Value (I/Q Error View – Phase Error Window)

This key sets the chip reference value on the horizontal axis in the phase error window.

| | |
|-----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow2:TRACe:X[:SCALE]:RLEVel <real> :DISPlay:EVM:VIEW2:WINDow2:TRACe:X[:SCALE]:RLEVel? |
| Example | DISP:EVM:VIEW2:WIND2:TRAC:X:RLEV 0.0 DISP:EVM:VIEW2:WIND2:TRAC:X:RLEV? |
| Notes | VIEW2 : I/Q Error View WINDow2: Phase Error Window on I/Q Error View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | 1000 |
| Initial S/W Revision | A.01.60 or later |

X Ref Value (I/Q Error View – EVM Window)

This key sets the chip reference value on the horizontal axis in the EVM Window.

| | |
|-----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow3:TRACe:X[:SCALE]:RLEVel <real> :DISPlay:EVM:VIEW2:WINDow3:TRACe:X[:SCALE]:RLEVel? |
| Example | DISP:EVM:VIEW2:WIND3:TRAC:X:RLEV 0.0 DISP:EVM:VIEW2:WIND3:TRAC:X:RLEV? |
| Notes | VIEW2 : I/Q Error View WINDow3: EVM Window on I/Q Error View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | 1000 |
| Initial S/W Revision | A.01.60 or later |

X Ref Value (Code Domain Power and Metrics View – Code Domain Power Window)

This key sets the code reference value on the horizontal axis in the Code Domain Power window.

| | |
|----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW3:WINDow[1]:TRACe:X[:SCALE]:RLEVel <integer> :DISPlay:EVM:VIEW3:WINDow[1]:TRACe:X[:SCALE]:RLEVel? |
| Example | DISP:EVM:VIEW3:WIND:TRAC:X:RLEV 0 DISP:EVM:VIEW3:WIND:TRAC:X:RLEV? |
| Notes | VIEW3 : Code Domain Power and Metrics View WINDow[1]: Code Domain Power and Metrics Window on Code Domain Power View |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

X Ref Value (Capture Time Summary View – Capture Time Data Trace Window)

This key sets the time reference value on the horizontal axis in the Capture Time Data Trace window.

| | |
|----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW4:WINDow[1]:TRACe:X[:SCALE]:RLEVel <time> :DISPlay:EVM:VIEW4:WINDow[1]:TRACe:X[:SCALE]:RLEVel? |
| Example | DISP:EVM:VIEW4:WIND:TRAC:X:RLEV 0.0 ms DISP:EVM:VIEW4:WIND:TRAC:X:RLEV? |
| Notes | VIEW4 : Capture Time Summary View WINDow[1]: Capture Time Data Trace Window on Capture Time Summary View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | 0.000 s |
| State Saved | Saved in instrument state. |
| Min | 0.000 s |
| Max | 60.0 ms |
| Initial S/W Revision | A.01.60 or later |

Scale/Div

Following is for X Scale/Div control. The key is active in EVM Window, Magnitude Error Window, Phase Error Window, Code Domain Power Window, and Capture Time Data Trace Window.

| | |
|----------------------|------------------|
| Key Path | Span X Scale |
| Initial S/W Revision | A.01.60 or later |

X Scale/Div (I/Q Error View – Magnitude Error Window)

This key sets the horizontal scale by changing a chip value per division in the Magnitude Error window.

| | |
|-----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow[1]:TRACe:X[:SCALe]:PDIVision <real> :DISPlay:EVM:VIEW2:WINDow[1]:TRACe:X[:SCALe]:PDIVision? |
| Example | DISP:EVM:VIEW2:WIND:TRAC:X:PDIV 100.0 DISP:EVM:VIEW2:WIND:TRAC:X:PDIV? |
| Notes | VIEW2 : I/Q Error View WINDow[1]: Magnitude Error Window on I/Q Error View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | 84.8 |
| State Saved | Saved in instrument state. |
| Min | 0.1 |
| Max | 1000.0 |
| Initial S/W Revision | A.01.60 or later |

X Scale/Div (I/Q Error View – Phase Error Window)

This key sets the horizontal scale by changing a chip value per division in the phase error window.

| | |
|-----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow2:TRACe:X[:SCALe]:PDIVision <real> :DISPlay:EVM:VIEW2:WINDow2:TRACe:X[:SCALe]:PDIVision? |
| Example | DISP:EVM:VIEW2:WIND2:TRAC:X:PDIV 100.0 DISP:EVM:VIEW2:WIND2:TRAC:X:PDIV? |
| Notes | VIEW2 : I/Q Error View WINDow2: Phase Error Window on I/Q Error View |

| | |
|----------------------|---|
| | If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | 84.8 |
| State Saved | Saved in instrument state. |
| Min | 0.1 |
| Max | 1000.0 |
| Initial S/W Revision | A.01.60 or later |

X Scale/Div (I/Q Error View – EVM Window)

This key sets the horizontal scale by changing a chip value per division in EVM window.

| | |
|----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow3:TRACe:X[:SCALe]:PDIVision <real> :DISPlay:EVM:VIEW2:WINDow3:TRACe:X[:SCALe]:PDIVision? |
| Example | DISP:EVM:VIEW2:WIND3:TRAC:X:PDIV 100.0 DISP:EVM:VIEW2:WIND3:TRAC:X:PDIV? |
| Notes | VIEW2 : I/Q Error View WINDow3: EVM Window on I/Q Error View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | 84.8 |
| State Saved | Saved in instrument state. |
| Min | 0.1 |
| Max | 1000.0 |
| Initial S/W Revision | A.01.60 or later |

X Scale/Div (Code Domain Power and Metrics View – Code Domain Power Window)

This key sets the horizontal scale by changing a code value per division in the Code Domain Power window.

| | |
|----------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW3:WINDow[1]:TRACe:X[:SCALe]:PDIVision <Integer> :DISPlay:EVM:VIEW3:WINDow[1]:TRACe:X[:SCALe]:PDIVision? |
| Example | DISP:EVM:VIEW3:WIND:TRAC:X:PDIV 16 |

| | |
|----------------------|---|
| | DISP:EVM:VIEW3:WIND:TRAC:X:PDIV? |
| Notes | VIEW3 : Code Domain Power and Metrics View WINDow[1]: Code Domain Power Window on Code Domain Power and Metrics View |
| Preset | 16 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 16 |
| Initial S/W Revision | A.01.60 or later |

X Scale/Div (Capture Time Summary View – Capture Time Data Trace Window)

This key sets the horizontal scale by changing a time value per division in Capture Time Data Trace window.

| | |
|-----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW4:WINDow[1]:TRACe:X[:SCALe]:PDIVision <time> :DISPlay:EVM:VIEW4:WINDow[1]:TRACe:X[:SCALe]:PDIVision? |
| Example | DISP:EVM:VIEW4:WIND:TRAC:X:PDIV 1.0 ms DISP:EVM:VIEW4:WIND:TRAC:X:PDIV? |
| Notes | VIEW4 : Capture Time Summary View WINDow[1]: Capture Time Data Trace Window on Capture Time Summary View If Auto Scale is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | 100.0 us |
| State Saved | Saved in instrument state. |
| Min | 100.0 us |
| Max | 10 ms |
| Initial S/W Revision | A.01.60 or later |

Ref Position

This key allows you to set the display reference position to either Left, Ctr (center), or Right. The key is active in EVM Window, Mag Error Window, Phase Error Window, Code Domain Power Window, and Capture Time Data Trace Window.

| | |
|----------------------|------------------|
| Key Path | Span X Scale |
| Initial S/W Revision | A.01.60 or later |

X Ref Position (I/Q Error View – Magnitude Error Window)

This key sets the X axis reference position in the Magnitude Error window.

| | |
|-----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT CENTer RIGHT :DISPlay:EVM:VIEW2:WINDow[1]:TRACe:X[:SCALe]:RPOSition? |
| Example | DISP:EVM:VIEW2:WIND:TRAC:X:RPOS LEFT DISP:EVM:VIEW2:WIND:TRAC:X:RPOS? |
| Notes | VIEW2 : I/Q Error View WINDow[1]: Mag Error Window on I/Q Error View |
| Preset | LEFT |
| State Saved | Saved in instrument state. |
| Range | Left Ctr Right |
| Initial S/W Revision | A.01.60 or later |

X Ref Position (I/Q Error View – Phase Error Window)

This key sets the X axis reference position in the phase error window.

| | |
|-----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow2:TRACe:X[:SCALe]:RPOSition LEFT CENTer RIGHT :DISPlay:EVM:VIEW2:WINDow2:TRACe:X[:SCALe]:RPOSition? |
| Example | DISP:EVM:VIEW2:WIND2:TRAC:X:RPOS LEFT DISP:EVM:VIEW2:WIND2:TRAC:X:RPOS? |
| Notes | VIEW2 : I/Q Error View WINDow2: Phase Error Window on I/Q Error View |
| Preset | LEFT |
| State Saved | Saved in instrument state. |
| Range | Left Ctr Right |
| Initial S/W Revision | A.01.60 or later |

X Ref Position (I/Q Error View – EVM Window)

This key sets the X axis reference position in the EVM window.

| | |
|-----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow3:TRACe:X[:SCALe]:RPOSition LEFT CENTer RIGHT :DISPlay:EVM:VIEW2:WINDow3:TRACe:X[:SCALe]:RPOSition? |
| Example | DISP:EVM:VIEW2:WIND3:TRAC:X:RPOS LEFT DISP:EVM:VIEW2:WIND3:TRAC:X:RPOS? |
| Notes | VIEW2 : I/Q Error View WINDow3: EVM Window on I/Q Error View |
| Preset | LEFT |
| State Saved | Saved in instrument state. |
| Range | Left Ctr Right |
| Initial S/W Revision | A.01.60 or later |

X Ref Position (Code Domain Power and Metrics View – Code Domain Power Window)

This key sets the X axis reference position in the Code Domain Power window.

| | |
|-----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW3:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT CENTer RIGHT :DISPlay:EVM:VIEW3:WINDow[1]:TRACe:X[:SCALe]:RPOSition? |
| Example | DISP:EVM:VIEW3:WIND:TRAC:X:RPOS LEFT DISP:EVM:VIEW3:WIND:TRAC:X:RPOS? |
| Notes | VIEW3 : Code Domain Power and Metrics View WINDow[1]: Code Domain Power Window on Code Domain Power and Metrics View |
| Preset | LEFT |
| State Saved | Saved in instrument state. |
| Range | Left Ctr Right |
| Initial S/W Revision | A.01.60 or later |

X Ref Position (Capture Time Summary View – Capture Time Data Trace Window)

This key sets the X axis reference position in the Capture Time Data Trace window.

| | |
|-----------------------|--|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW4:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT CENTer |

| | |
|-----------------------------|---|
| | RIGHT :DISPlay:EVM:VIEW4:WINDow[1]:TRACe:X[:SCALe]:RPOSition? |
| Example | DISP:EVM:VIEW4:WIND:TRAC:X:RPOS LEFT DISP:EVM:VIEW4:WIND:TRAC:X:RPOS? |
| Notes | VIEW4 : Capture Time Summary View WINDow[1]: Capture Time Data Trace Window on Capture Time Summary View |
| Preset | LEFT |
| State Saved | Saved in instrument state. |
| Range | Left Ctr Right |
| Initial S/W Revision | A.01.60 or later |

Auto Scale

This key allows you to toggle the scale coupling function between On and Off. The key is active in Mag Error Window, Phase Error Window, EVM Window, and Capture Time Data Trace Window.

| | |
|-----------------------------|------------------|
| Key Path | Span X Scale |
| Initial S/W Revision | A.01.60 or later |

X Auto Scale (I/Q Error View – Magnitude Error Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results in the Magnitude Error window.

| | |
|-----------------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow[1]:TRACe:X[:SCALe]:COUPlE 0 1 OFF ON :DISPlay:EVM:VIEW2:WINDow[1]:TRACe:X[:SCALe]:COUPlE? |
| Example | DISP:EVM:VIEW2:WIND:TRAC:X:COUP ON DISP:EVM:VIEW2:WIND:TRAC:X:COUP? |
| Notes | VIEW2 : I/Q Error View WINDow[1]: Mag Error Window on I/Q Error View When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

X Auto Scale (I/Q Error View – Phase Error Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results in the Phase Error window.

| | |
|----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow2:TRACe:X[:SCALE]:COUPle 0 1 OFF ON :DISPlay:EVM:VIEW2:WINDow2:TRACe:X[:SCALE]:COUPle? |
| Example | DISP:EVM:VIEW2:WIND2:TRAC:X:COUP ON DISP:EVM:VIEW2:WIND2:TRAC:X:COUP? |
| Notes | VIEW2 : I/Q Error View WINDow2: Phase Error Window on I/Q Error View When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

X Auto Scale (I/Q Error View – EVM Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results in the EVM window.

| | |
|----------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW2:WINDow3:TRACe:X[:SCALE]:COUPle 0 1 OFF ON :DISPlay:EVM:VIEW2:WINDow3:TRACe:X[:SCALE]:COUPle? |
| Example | DISP:EVM:VIEW2:WIND3:TRAC:X:COUP ON DISP:EVM:VIEW2:WIND3:TRAC:X:COUP? |
| Notes | VIEW2 : I/Q Error View WINDow3: EVM Window on I/Q Error View When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | ON |

| | |
|----------------------|----------------------------|
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

X Auto Scale (Capture Time Summary View – Capture Time Data Trace Window)

When Auto Scale is On, it will result in automatically displaying the scale per division and reference value results in the Capture Time Data Trace window.

| | |
|-----------------------|---|
| Key Path | Span X Scale |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW4:WINDow[1]:TRACe:X[:SCALE]:COUPle 0 1 OFF ON :DISPlay:EVM:VIEW4:WINDow[1]:TRACe:X[:SCALE]:COUPle? |
| Example | DISP:EVM:VIEW4:WIND:TRAC:X:COUP ON DISP:EVM:VIEW4:WIND:TRAC:X:COUP? |
| Notes | VIEW4 : Capture Time Summary View WINDow[1]: Capture Time Data Trace Window on Capture Time Summary View When this parameter is set to On, it will activate the scale coupling function that automatically determines scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scale is automatically set to Off. |
| Couplings | See Notes |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Sweep/Control

Accesses a menu that enables you to configure the Sweep and Control functions of the analyzer, such as Sweep Time and Gating.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing Restart, Single or Cont does a Resume.

| | |
|-----------------------|--|
| Key Path | Sweep/Control |
| Remote Command | :INITiate:PAUSE |
| Dependencies | Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Key Path | Sweep/Control |
| Remote Command | :INITiate:RESume |
| Dependencies | Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing. |
| Initial S/W Revision | Prior to A.02.00 |

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORT is sent, the alignment finishes before the abort function is performed. So ABORT does not abort an alignment.

If the analyzer is set for Continuous measurement, it sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

| | |
|-----------------------|--------|
| Remote Command | :ABORT |
| Example | :ABOR |

| | |
|------------------------------|--|
| Notes | <p>If :INITiate:CONTInuous is ON, then a new continuous measurement will start immediately, with sweep (data acquisition) occurring once the trigger condition has been met.</p> <p>If :INITiate:CONTInuous is OFF, then :INITiate:IMMEDIATE is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met.</p> |
| Dependencies | <p>For continuous measurement, ABORt is equivalent to the Restart key.</p> <p>Not all measurements support the abort command.</p> |
| Status Bits/OPC dependencies | <p>The STATus:OPERation register bits 0 through 8 are cleared.</p> <p>The STATus:QUEStionable register bit 9 (INTegrity sum) is cleared.</p> <p>Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true.</p> |
| Initial S/W Revision | Prior to A.02.00 |

System

See "System" on page 349

Trace/Detector

There is no trace/detector functionality supported in the Modulation Accuracy measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Trigger

See ["Trigger" on page 424](#)

Free Run

See ["Free Run " on page 431](#)

Video

See ["Video \(IF Envelope\) " on page 432](#)

Trigger Level

See ["Trigger Level " on page 432](#)

Trig Slope

See ["Trig Slope " on page 433](#)

Trig Delay

See ["Trig Delay " on page 434](#)

External 1

See ["External 1 " on page 2357](#)

Trigger Level

See ["Trigger Level " on page 2357](#)

Trig Slope

See ["Trig Slope " on page 2358](#)

Trig Delay

See ["Trig Delay " on page 437](#)

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off" on page 2346](#)

External 2

See ["External 2 " on page 2359](#)

Trigger Level

See ["Trigger Level " on page 2359](#)

Trig Slope

See ["Trig Slope " on page 2360](#)

Trig Delay

See ["Trig Delay "](#) on page 440

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off"](#) on page 2348

RF Burst

See ["RF Burst "](#) on page 2360

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 2361

Relative Trigger

See ["Relative Trigger Level"](#) on page 2350

Trig Slope

See ["Trigger Slope "](#) on page 2362

Trig Delay

See ["Trig Delay "](#) on page 444

Periodic Timer

See ["Periodic Timer \(Frame Trigger\) "](#) on page 2352

Period

See ["Period "](#) on page 2353

Offset

See ["Offset "](#) on page 2354

Offset Adjust (Remote Command Only)

See ["Offset Adjust \(Remote Command Only\)"](#) on page 2355

Reset Offset Display

See ["Reset Offset Display "](#) on page 2356

Sync Source

See ["Sync Source "](#) on page 2356

Off

See ["Off "](#) on page 2357

External 1

See "External 1 " on page 2357

Trigger Level

See "Trigger Level " on page 2357

Trig Slope

See "Trig Slope " on page 2358

External 2

See "External 2 " on page 2359

Trigger Level

See "Trigger Level " on page 2359

Trig Slope

See "Trig Slope " on page 2360

RF Burst

See "RF Burst " on page 2360

Absolute Trigger

See "Absolute Trigger Level" on page 2361

Trig Slope

See "Trigger Slope " on page 2362

Trig Delay

See ___ on page X

Auto/Holdoff

See "Auto/Holdoff " on page 445

Auto Trig

See "Auto Trig " on page 445

Trig Holdoff

See "Trig Holdoff " on page 446

Holdoff Type

See "Holdoff Type" on page 446

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

| Key Path | Front-panel key |
|-------------------------------|--|
| Backwards Compatibility Notes | <p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p> |
| Initial S/W Revision | Prior to A.02.00 |

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|-----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER |
| Notes | :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed |
| Couplings | A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|-----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:ALL |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL |
| Notes | Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. |
| Couplings | A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

| | |
|----------------------|---|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:SAVE |
| Example | :SYST:PRES:USER:SAVE |
| Notes | :SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file. |
| Initial S/W Revision | Prior to A.02.00 |

View/Display

The View/Display key opens up the View/Display menu for the current measurement. The views that are available are specific to the current measurement selected under the Meas key.

For more information, see ["Modulation Accuracy Measurement Views and Results" on page 2039](#).

| | |
|----------------------|------------------|
| Key Path | Front panel key |
| Initial S/W Revision | A.01.60 or later |

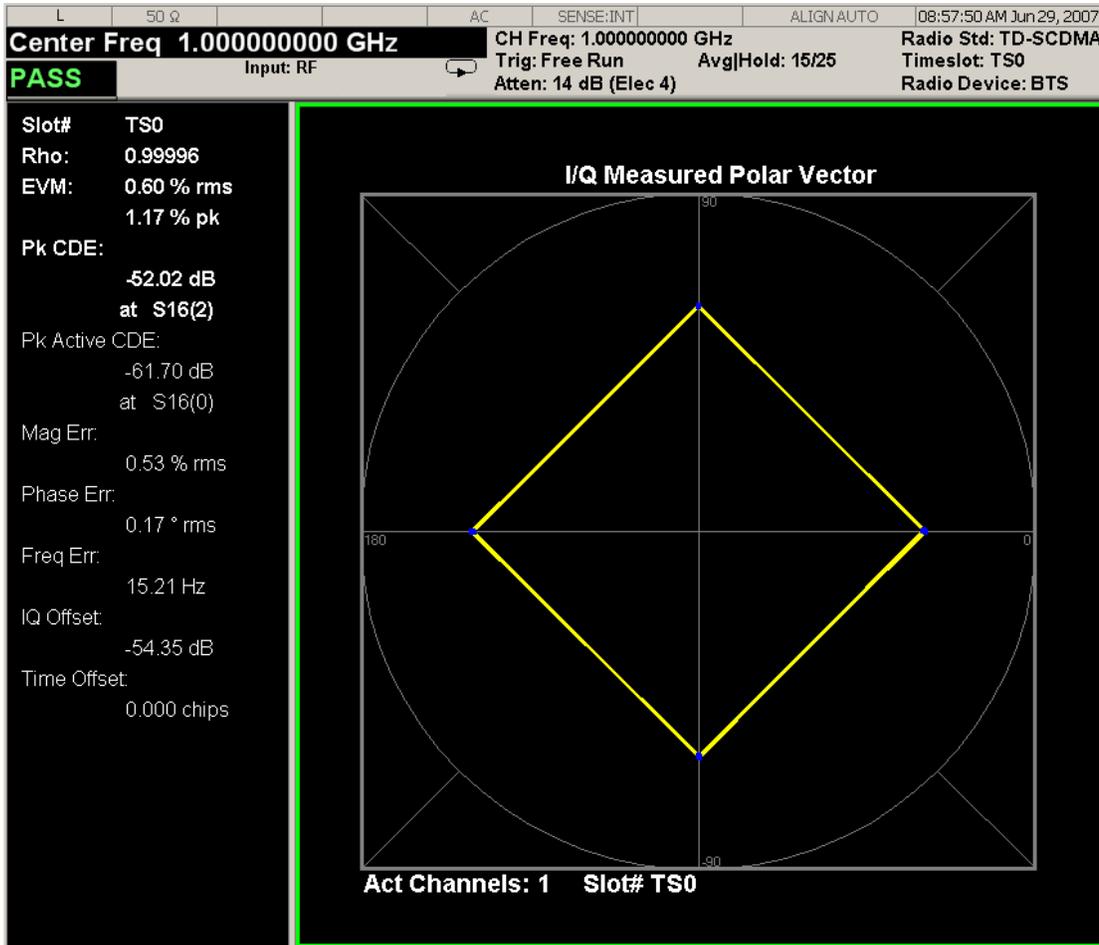
Modulation Accuracy Measurement Views and Results

The Mod Accuracy measurement consists of five views. The default view is I/Q Measured Polar Graph (left/right).

| NO. | View | NO. of Windows | Window No. | Window |
|-----|---|-------------------|------------|---|
| 1 | VIEW[1] "View – I/Q Measured Polar Graph" on page 2040 | Dual (Horizontal) | WINDow[1] | "Result Metrics Window" on page 2040 |
| | | | WINDow2 | "I/Q Measured Polar Vector Window" on page 2041 |
| 2 | VIEW2 "View – I/Q Error" on page 2042 | Quad | WINDow[1] | "Magnitude Error Window" on page 2043 |
| | | | WINDow2 | "Phase Error Window" on page 2043 |
| | | | WINDow3 | "EVM Window" on page 2043 |
| | | | WINDow4 | "Result Metrics Window" on page 2044 |
| 3 | VIEW3 "View – Code Domain Power" on page 2045 | Dual (Vertical) | WINDow[1] | "Code Domain Power Window" on page 2046 |
| | | | WINDow2 | "Code Domain Power Summary Window" on page 2046 |
| 4 | VIEW4 "View – Capture Time Summary" on page 2047 | Dual (Vertical) | WINDow[1] | "Capture Time Data Trace Window" on page 2048 |
| | | | WINDow2 | "Capture Time Summary Window" on page 2049 |
| 5 | VIEW5 "View – Numeric Results" on page 2049 | Single | WINDow[1] | "Numeric Results Summary Window" on page 2050 |

View – I/Q Measured Polar Graph

There are two windows: "Result Metrics Window" on page 2040 (left) and "I/Q Measured Polar Vector Window" on page 2041 (right).



Result Metrics Window

Modulation Accuracy Result Metrics are listed in the following table.

| Name | Corresponding Results | Format |
|---------|---|--|
| Slot | Number of current timeslot which is under measurement | TS _i , (i=0, 1, ..., 6) DwPTS UpPTS |
| Rho | n=1, 1st Averaged composite Rho (in average cycle) of the selected timeslot | 9.9999 |
| RMS EVM | n=1 3rd Averaged composite RMS EVM (in average cycle) of the selected timeslot | 99.99 % rms |
| Pk EVM | n=1 6th Peak hold composite Peak EVM (in average cycle) of the selected timeslot | 99.99 % pk |

| | | |
|------------------------|--|--|
| Pk CDE | n=1 16th Peak hold Peak Code Domain Error (of all the code channels, including active and inactive, in average cycle) of the selected timeslot | 99.99 dB |
| Pk CDE Position | n=1 29th Code length of peak hold Peak CDE (in average cycle) of the selected timeslot, X of SX(Y); n=1 30th Code index of peak hold Peak CDE (in average cycle) of the selected timeslot, Y of SX(Y) | SX(Y) X: OVVSF code length (1,2,4,8,16) Y: OVVSF code index (0, ... X-1) |
| Pk Active CDE | n=1 18th Peak hold Peak Active CDE (of active code channels, in average cycle) of the selected timeslot | 99.99 dB |
| Pk Active CDE Position | n=1 31st Code length of peak hold Peak Active CDE (in average cycle) of the selected timeslot, X of SX(Y); n=1 32nd Code index of peak hold Peak Active CDE (in average cycle) of the selected timeslot, Y of SX(Y) | SX(Y) X: OVVSF code length (1,2,4,8,16) Y: OVVSF code index (0, ... X-1) |
| RMS Mag Err | n=1 7th Averaged composite RMS Magnitude Error (in average cycle) of the selected timeslot | 99.99 % rms |
| RMS Phase Err | n=1 11th Averaged composite RMS Phase Error (in average cycle) of the selected timeslot | 99.99 ° rms |
| Freq Err | n=1 19th Averaged composite Frequency Error (in average cycle) of the selected timeslot | 99.99 Hz |
| IQ Offset | n=1 21st Averaged composite IQ Offset (in average cycle) of the selected timeslot | 99.99 dB |
| Time Offset | n=1 27th Averaged composite timing error (in average cycle) of the selected timeslot, relative to the timing reference (DwPTS/UpPTS/Trig) | 99.999 chips |

I/Q Measured Polar Vector Window

This window provides composite IQ polar vector.

NOTE Note 1: No marker operation supported in this window.

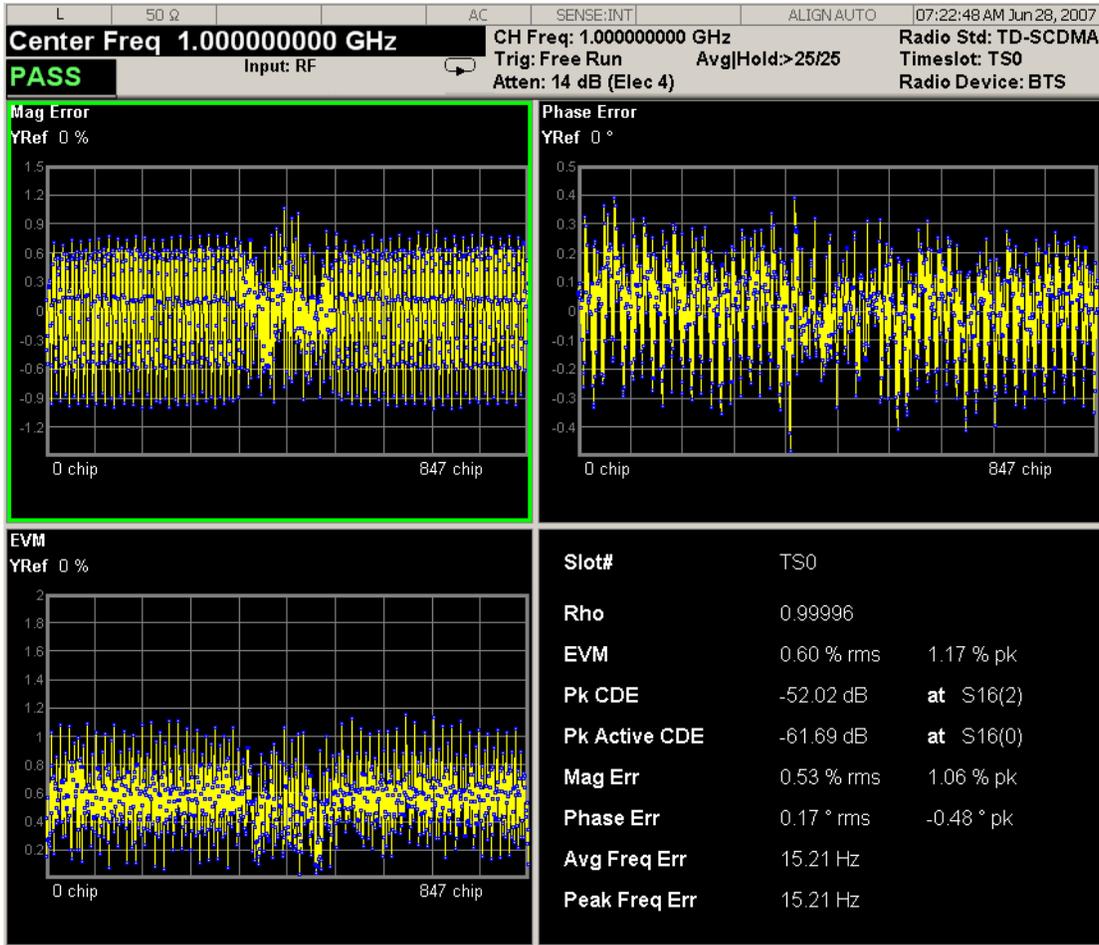
| Name | Corresponding Results | Format |
|-------------------------|--|--------------------------------|
| Composite Constellation | The I/Q polar trace of measured input data within the selected timeslot. Coupled with normalize: | Vector/Constellation Vector |

| | | |
|-----------------|---|--|
| | <p>If normalize is set off, un-normalized input I/Q data will be displayed (n=3);</p> <p>If normalize is set on, normalized input I/Q data will be displayed (n=4);</p> <p>The length displayed is defined by I/Q Points.</p> | Constellation |
| Active Channels | n=1 33rd Number of active code channels of the selected timeslot | 99 |
| Slot | Number of current timeslot which is under measurement | TS _i , (i=0, 1, ..., 6) DwPTS UpPTS |

View – I/Q Error

There are four windows in this view:

1. "Magnitude Error Window" on page 2043 (top left)
2. "Phase Error Window" on page 2043 (top right)
3. "EVM Window" on page 2043 (bottom left)
4. "Result Metrics Window" on page 2044 (bottom right)



Magnitude Error Window

This window provides magnitude error vs. chip results in the selected analyze timeslot.

| | |
|---------------------|---|
| Marker Trace | Yes |
| Corresponding Trace | Magnitude Error vs. Chip trace of the selected timeslot (n=5) |

Phase Error Window

This window provides phase error vs. chip results in the selected analyze timeslot.

| | |
|---------------------|---|
| Marker Trace | Yes |
| Corresponding Trace | Phase Error vs. Chip trace of the selected timeslot (n=6) |

EVM Window

This window provides EVM vs. chip results in the selected analyze timeslot.

| | |
|---------------------|---|
| Marker Trace | Yes |
| Corresponding Trace | EVM vs. Chip trace of the selected timeslot (n=7) |

Result Metrics Window

This window provides modulation accuracy result metrics.

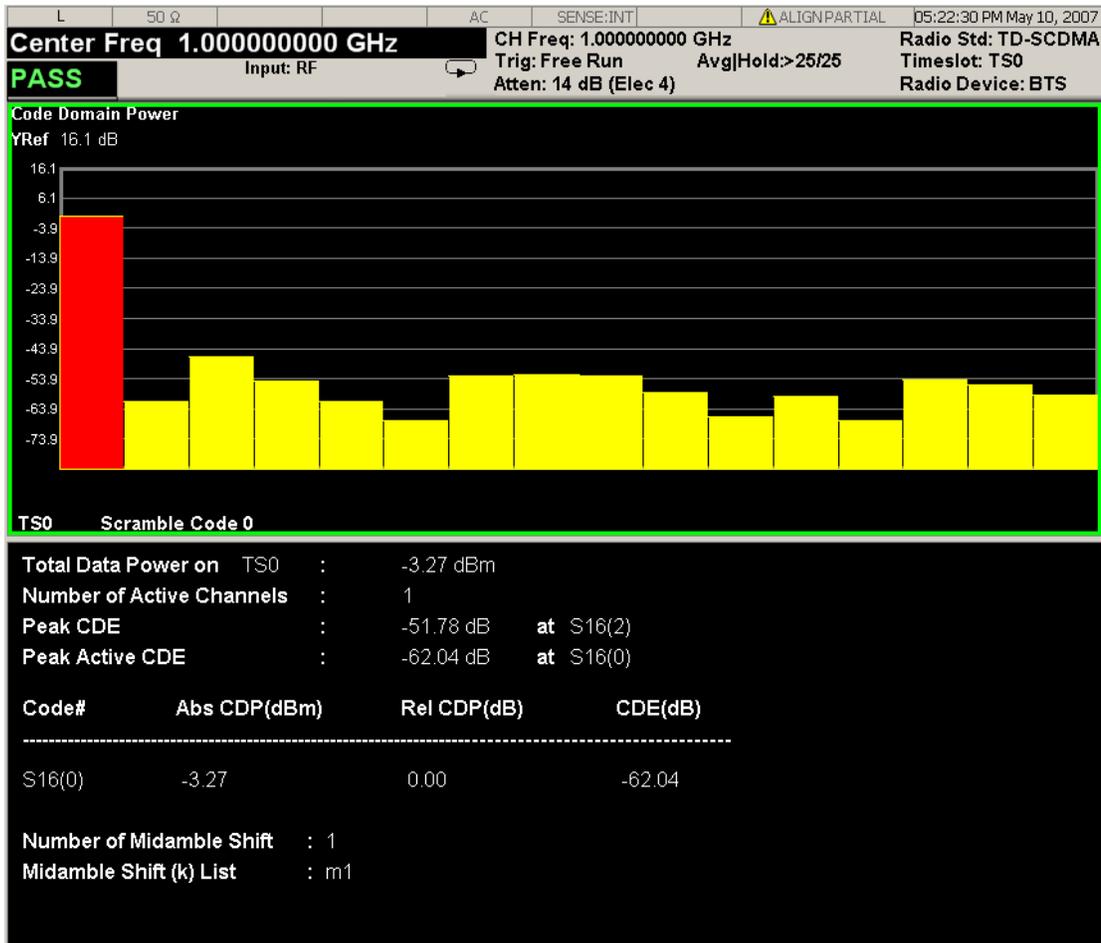
| Name | Corresponding Results | Format |
|------------------------|--|---|
| Slot | The slot under measurement within the analyzed sub-frame TS0, DwPTS, UpPTS, TS1, TS2, TS3, TS4, TS5, TS6 | TSi, (i=0, 1, ..., 6) DwPTS UpPTS |
| Rho | n=1 1st Averaged composite Rho (in average cycle) of the selected timeslot | 9.99999 |
| RMS EVM | n=1 3rd Averaged composite RMS EVM (in average cycle) of the selected timeslot | 99.99 % rms |
| Pk EVM | n=1 6th Peak hold composite Peak EVM (in average cycle) of the selected timeslot | 99.99 % pk |
| Pk CDE | n=1 16th Peak hold Peak Code Domain Error (all the code channels, including active and inactive, in average cycle) of the selected timeslot | 99.99 dB |
| Pk CDE Position | n=1 29th Code length of peak hold Peak CDE (in average cycle) of the selected timeslot, X of SX(Y); n=1 30th Code index of peak hold Peak CDE (in average cycle) of the selected timeslot, Y of SX(Y) | SX(Y) X: OVFSF code length (1,2,4,8,16) Y: OVFSF code index (0, ... X-1) |
| Pk Act CDE | n=1 18th Peak hold Peak Active CDE (active code channels, in average cycle) of the selected timeslot | 99.99 dB |
| Pk Active CDE Position | n=1 31st Code length of peak hold Peak Active CDE (in average cycle) of the selected timeslot, X of SX(Y); n=1 32nd Code index of peak hold Peak Active CDE (in average cycle) of the selected timeslot, Y of SX(Y) | SX(Y) X: OVFSF code length (1,2,4,8,16) Y: OVFSF code index (0, ... X-1) |
| RMS Mag Err | n=1 7th Averaged composite RMS Magnitude Error (in average cycle) of the selected timeslot | 99.99 % rms |
| Pk Mag Err | n=1 9th Averaged composite Peak Magnitude Error (in average cycle) in the selected timeslot and | 99.99 % pk |

| | | |
|---------------|---|-------------|
| | sub-frame n=1 10th Peak hold composite Peak Magnitude Error (in average cycle) in the selected timeslot and sub-frame | |
| RMS Phase Err | n=1 11th Averaged composite RMS Phase Error (in average cycle) of the selected timeslot | 99.99 ° rms |
| Pk Phase Err | n=1 13th Averaged composite Peak Phase Error (in average cycle) in the selected timeslot and sub-frame n=1 14th Peak hold composite Peak Phase Error (in average cycle) in the selected timeslot and sub-frame | 99.99 ° pk |
| Avg Freq Err | n=1 19th Averaged composite Frequency Error (in average cycle) in the selected timeslot and sub-frame | 99.99 Hz |
| Peak Freq Err | n=1 20th Peak hold composite Frequency Error (in average cycle) in the selected timeslot and sub-frame | 99.99 Hz |

View – Code Domain Power

There are two windows in this view:

1. ["Code Domain Power Window" on page 2046](#) (Top)
2. ["Code Domain Power Summary Window" on page 2046](#) (Down)



Code Domain Power Window

This window provides a list of all channel codes within the code set with their power separately.

| | |
|---------------------|---|
| Marker Trace | Yes |
| Corresponding Trace | Code Domain Power vs. code trace of the selected timeslot. Coupled with normalize: if normalize is set off, un-normalized power vs. code trace in dBm will be displayed (n=10); If normalize is set on, normalized power vs. code trace in dB will be displayed (n=11) |

Code Domain Power Summary Window

This window provides the total power, number of active channels, and a table of active channel codes with their powers (in dB and dBm) and CDE separately.

| Name | Corresponding Results | Format |
|------|---|--------------------------------|
| Slot | The slot under measurement within the analyzed sub-frame TS0, DwPTS, UpPTS, TS1, TS2, TS3, TS4, TS5, TS6 | TSi, (i=0, 1, ..., 6) DwPTS |

| | | UpPTS |
|---------------------------|--|---|
| Total Data Power | n=1 34th Total data part power of the selected time slot | -99.99 dBm |
| Number of Active Channels | n=1 33rd Number of active channels in the selected time slot | 99 |
| Pk CDE | n=1 16th Peak hold Peak Code Domain Error (all the code channels, including active and inactive, in average cycle) of the selected timeslot | 99.99 dB |
| Pk CDE Position | n=1 29th Code length of peak hold Peak CDE (in average cycle) of the selected timeslot, X of SX(Y); n=1 30th Code index of peak hold Peak CDE (in average cycle) of the selected timeslot, Y of SX(Y) | SX(Y) X: OVFSF code length (1,2,4,8,16) Y: OVFSF code index (0, ... X-1) |
| Pk Act CDE | n=1 18th Peak hold Peak Active CDE (active code channels, in average cycle) of the selected timeslot | 99.99 dB |
| Pk Active CDE Position | n=1 31st Code length of peak hold Peak Active CDE (in average cycle) of the selected timeslot, X of SX(Y); n=1 32nd Code index of peak hold Peak Active CDE (in average cycle) of the selected timeslot, Y of SX(Y) | SX(Y) X: OVFSF code length (1,2,4,8,16) Y: OVFSF code index (0, ... X-1) |
| Code | Spread code number list of active channels | SX(Y), X: OVFSF code length (1,2,4,8,16) Y: OVFSF code index (0, ... X-1) |
| Abs CDP (dBm) | Absolute power list of active code channels in dBm | 99.99 |
| Rel CDP (dB) | Normalized Power list of active code channels in dB | 99.99 |
| Rel CDE (dB) | Normalized Code domain error list of active code channels | 99.99 |
| Number of Midamble Shifts | The number of midamble shift detected in a timeslot. | 99 |
| Midamble Shift (k) List | All of the midamble shifts detected in a timeslot. | mi, mi, mi,,, i: The midamble shift |

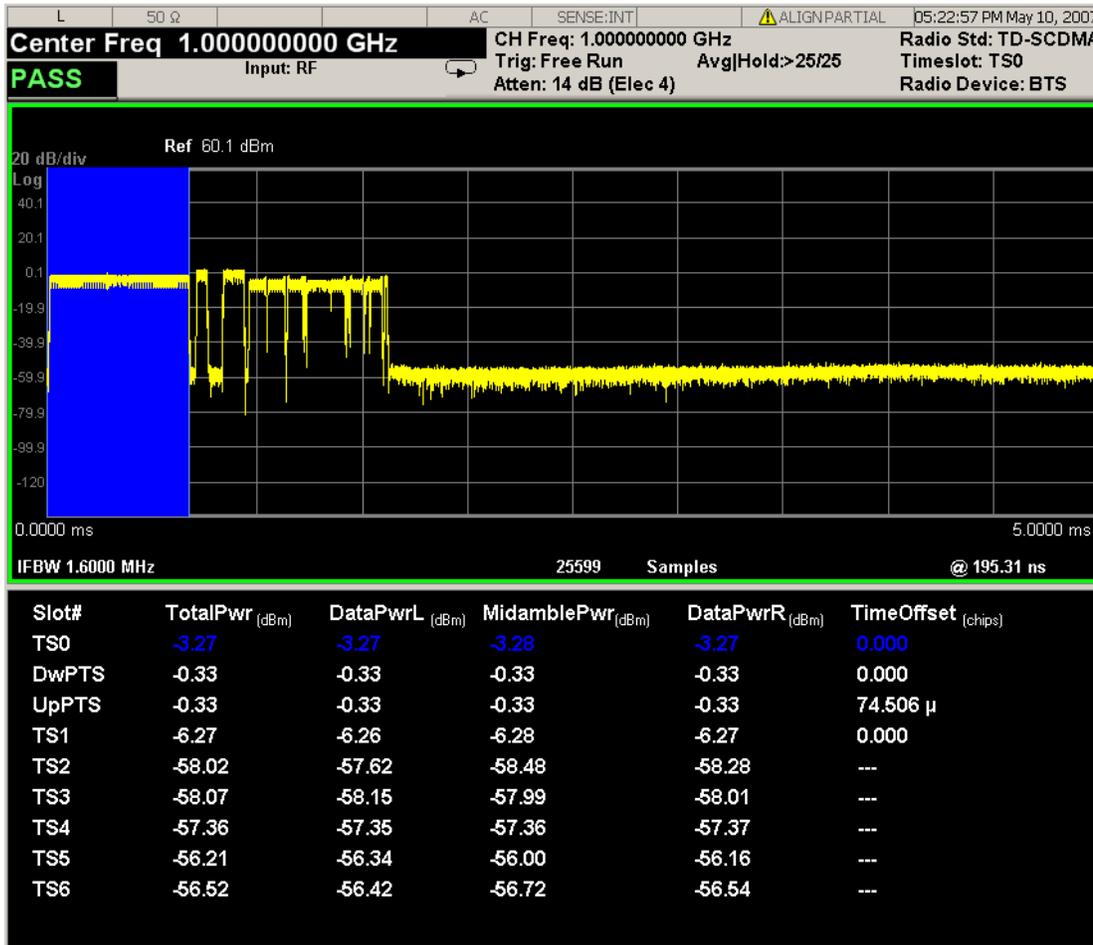
View – Capture Time Summary

There are two windows in this view:

1. ["Capture Time Data Trace Window" on page 2048](#) (Top)
2. ["Capture Time Summary Window" on page 2049](#) (Down)

The Time trace shows the pre-demodulation time record data. The Capture Interval parameter determines the amount of time data that is displayed. The selected timeslot is marked out by lines.

The summary window at the bottom lists total power, left data power, midamble power, right data power and timing error of each time slot within the analysis sub-frame (TS0, DwPTS, UpPTS, TS1, TS2, TS3, TS4, TS5, TS6).



Capture Time Data Trace Window

This window shows RF envelope of raw time domain data waveform within the capture interval. The selected timeslot is marked out by blue bar.

| | |
|---------------------|--|
| Marker Trace | Yes |
| Corresponding Trace | RF Envelope of Captured data vs. time trace The selected timeslot is marked out by two lines at the time boundary |

Capture Time Summary Window

This window provides a table of total power, left data power, midamble power, right data power and timing error for each timeslot within the analyzed sub-frame.

| Name | Corresponding Results | Format |
|-------------|--|---|
| Slot | The slot under measurement within the analyzed sub-frame. TS0, DwPTS, UpPTS, TS1, TS2, ..., TS6 | TSi, (i=0, 1, ..., 6) DwPTS UpPTS |
| TotalPwr | Total power of each slot within the analysis sub-frame (n=13) | 99.99 |
| DataPwrL | Power of data before midamble (left hand data) of each slot within the analysis sub-frame (n=15) | 99.99 |
| MidamblePwr | Midamble power of each slot within the analysis sub-frame (n=14) | 99.99 |
| DataPwrR | Power of data after midamble (right hand data) of each slot within the analysis sub-frame (n=16) | 99.99 |
| Time Offset | Timing error of each slot within the analysis sub-frame (n=17) | 99.999 |

View – Numeric Results

There is one window "[Numeric Results Summary Window](#)" on page 2050, which shows the summary of modulation accuracy result metrics.



Numeric Results Summary Window

This window shows the results summary window.

| Name | Corresponding Results | Format |
|---------|---|-------------|
| Rho | n=1 1st | 9.99999 |
| | Averaged composite Rho (in average cycle) in the selected timeslot and sub-frame | |
| RMS EVM | n=1 2nd | |
| | Peak hold composite Rho (in average cycle) in the selected timeslot and sub-frame | |
| RMS EVM | n=1 3rd | 99.99 % rms |
| | Averaged composite RMS EVM (in average cycle) in the selected timeslot and sub-frame | |
| Pk EVM | n=1 4th | |
| | Peak hold composite RMS EVM (in average cycle) in the selected timeslot and sub-frame | |
| Pk EVM | n=1 5th | 99.99 % pk |

| | | |
|------------------------|---|--|
| | Averaged composite Peak EVM (in average cycle) in the selected timeslot and sub-frame n=1 6th Peak hold composite Peak EVM (in average cycle) in the selected timeslot and sub-frame | |
| Pk CDE | n=1 15th Averaged Peak Code Domain Error (of all the code channels, including active and inactive, in average cycle) in the selected timeslot and sub-frame n=1 16th Peak hold Peak Code Domain Error (of all the code channels, including active and inactive, in average cycle) in the selected timeslot and sub-frame | 99.99 dB |
| Pk CDE Position | n=1 29th Code length of peak hold Peak CDE (in average cycle) of the selected timeslot, X of SX(Y); n=1 30th Code index of peak hold Peak CDE (in average cycle) of the selected timeslot, Y of SX(Y) | SX(Y) X: OVFSF code length (1,2,4,8,16) Y: OVFSF code index (0, ... X-1) |
| Pk Active CDE | n=1 17th Averaged Peak Active Code Domain Error (of all the code channels, including active and inactive, in average cycle) in the selected timeslot and sub-frame n=1 18th Peak hold Peak Active Code Domain Error (of all the code channels, including active and inactive, in average cycle) in the selected timeslot and sub-frame | 99.99 dB |
| Pk Active CDE Position | n=1 31st Code length of peak hold Peak Active CDE (in average cycle) of the selected timeslot, X of SX(Y); n=1 32nd Code index of peak hold Peak Active CDE (in average cycle) of the selected timeslot, Y of SX(Y) | SX(Y) X: OVFSF code length (1,2,4,8,16) Y: OVFSF code index (0, ... X-1) |
| RMS Mag Err | n=1 7th Averaged composite RMS Magnitude Error (in average cycle) in the selected timeslot and sub-frame n=1 8th Peak hold composite RMS Magnitude Error (in average cycle) in the selected timeslot and sub-frame | 99.99 % rms |
| Pk Mag Err | n=1 9th Averaged composite Peak Magnitude Error (in average cycle) in the selected timeslot and sub-frame n=1 10th | 99.99 % pk |

| | | |
|---------------|---|--------------|
| | Peak hold composite Peak Magnitude Error (in average cycle) in the selected timeslot and sub-frame | |
| RMS Phase Err | n=1 11th Averaged composite RMS Phase Error (in average cycle) in the selected timeslot and sub-frame n=1 12th Peak hold composite RMS Phase Error (in average cycle) in the selected timeslot and sub-frame | 99.99 ° rms |
| Pk Phase Err | n=1 13th Averaged composite Peak Phase Error (in average cycle) in the selected timeslot and sub-frame n=1 14th Peak hold composite Peak Phase Error (in average cycle) in the selected timeslot and sub-frame | 99.99 ° pk |
| Freq Err | n=1 19th Averaged composite Frequency Error (in average cycle) in the selected timeslot and sub-frame n=1 20th Peak hold composite Frequency Error (in average cycle) in the selected timeslot and sub-frame | 99.99 Hz |
| IQ Offset | n=1 21st Averaged composite IQ Offset (in average cycle) in the selected timeslot and sub-frame n=1 22nd Peak hold composite IQ Offset (in average cycle) in the selected timeslot and sub-frame | 99.99 dB |
| Quad Err | n=1 23rd Averaged composite Quad Error (in average cycle) in the selected timeslot and sub-frame n=1 24th Peak hold composite Quad Error (in average cycle) in the selected timeslot and sub-frame | 99.99 ° |
| IQ Imb | n=1 25th Averaged composite IQ Imbalance (in average cycle) in the selected timeslot and sub-frame n=1 26th Peak hold composite IQ Imbalance (in average cycle) in the selected timeslot and sub-frame | 99.99 dB |
| Time Offset | n=1 27th Averaged composite Time Offset (in average cycle) in the selected timeslot and sub-frame, relative to the timing reference (DwPTS/UpPTS/Trig) n=1 28th | 99.999 chips |

Peak hold composite Time Offset (in average cycle) in the selected timeslot and sub-frame, relative to the timing reference (DwPTS/UpPTS/Trig)

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

| | |
|----------------------|------------------|
| Key Path | Display |
| Key Path | View/Display |
| Initial S/W Revision | Prior to A.02.00 |

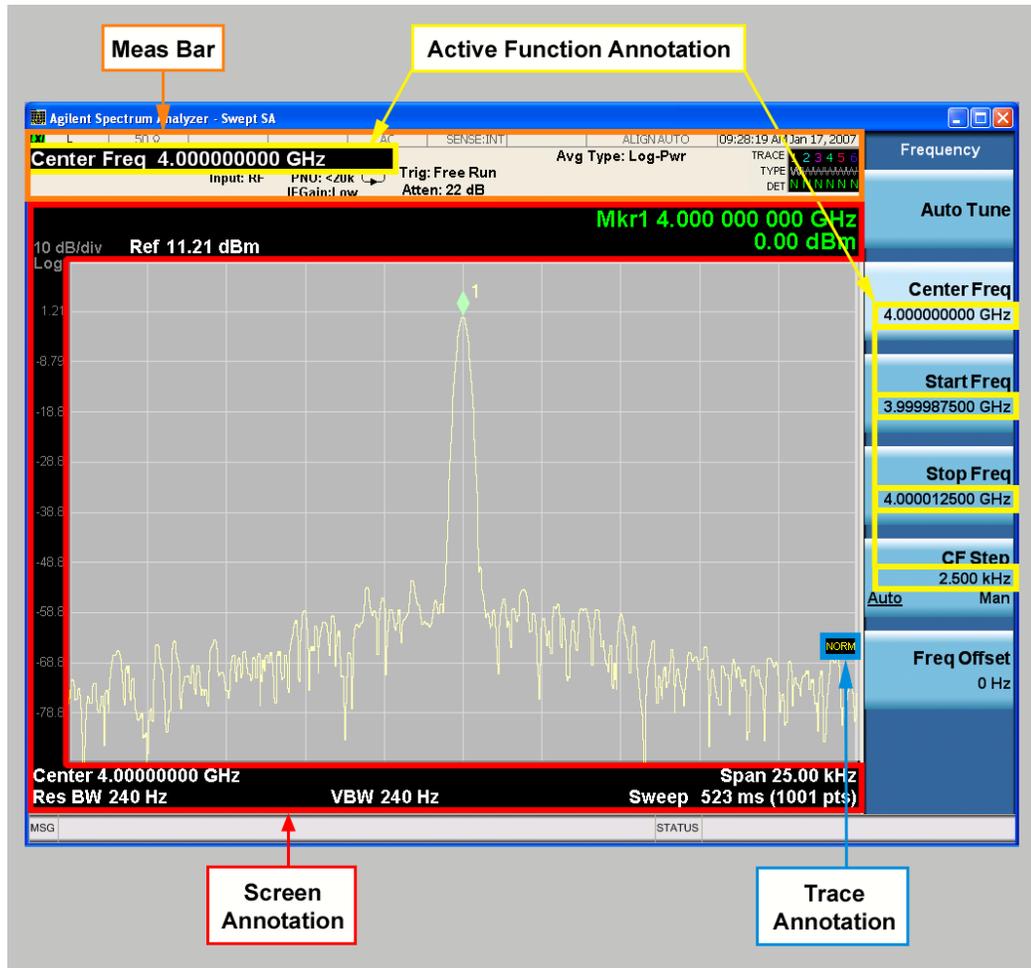
Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.

16 Modulation Accuracy (Composite EVM) Measurement
View/Display



| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

| | |
|----------------------|--|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNOtation:MBAR[:STATe] OFF ON 0 1 :DISPlay:ANNOtation:MBAR[:STATe]? |
| Example | DISP:ANN:MBAR OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off. |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Screen

This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

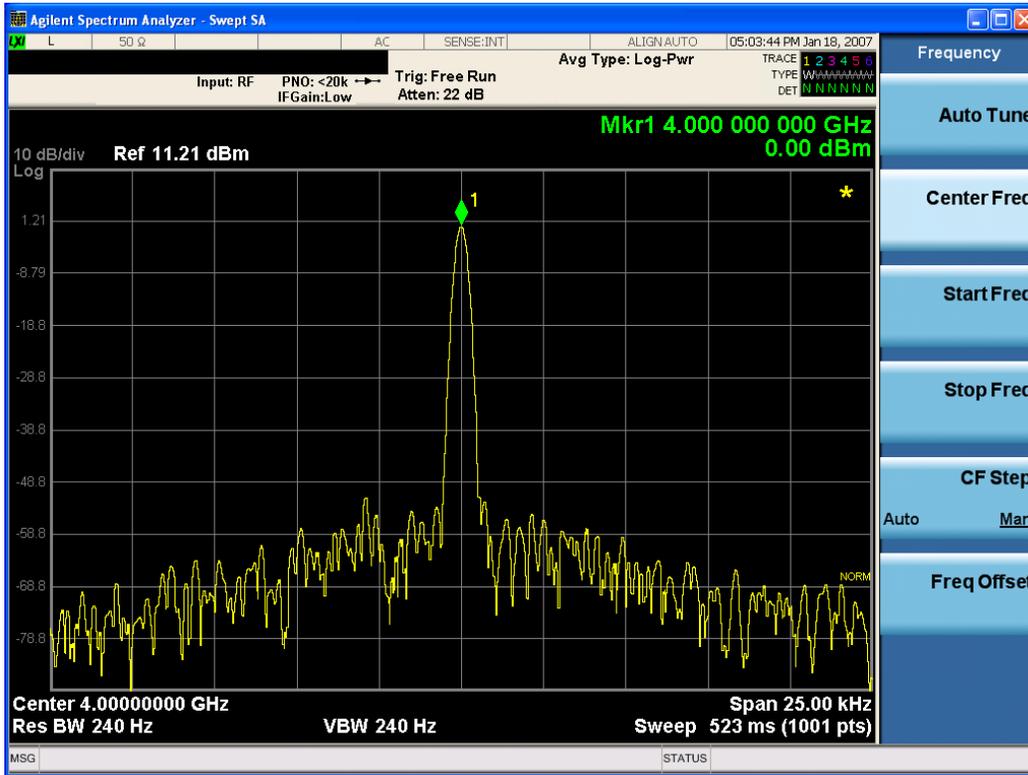
| | |
|----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]? |
| Example | DISP:ANN:SCR OFF |
| Dependencies | Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..

16 Modulation Accuracy (Composite EVM) Measurement
View/Display



| | |
|----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE]? |
| Example | DISP:ACT OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Title

Displays menu keys that enable you to change or clear a title on your display.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Mode | All |
| Remote Command | :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA? |
| Example | DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title |
| Notes | Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters. |
| Preset | No title (measurement name instead) |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Example | The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required. |
| Notes | Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted). |
| Preset | Performed on Preset. |
| Initial S/W Revision | Prior to A.02.00 |

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

| | |
|----------------------|--|
| Key Path | View/Display, Display |
| Remote Command | :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]? |
| Example | DISP:WIND:TRAC:GRAT:GRID OFF |
| Notes | The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis. |
| Preset | On |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

| | |
|-------------------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:WINDow[1]:ANNotation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNotation[:ALL]? |
| Example | :DISP:WIND:ANN OFF |
| Preset | On (Set by Restore Misc Defaults) |
| State Saved | Not saved in instrument state. |
| Backwards Compatibility Notes | The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLOR FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

| | |
|-----------------------|--|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight ON OFF :DISPlay:BACKlight? |
| Preset | ON (Set by Restore Misc Defaults) |
| Initial S/W Revision | Prior to A.02.00 |

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

| | |
|-----------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity? |
| Example | DISP:BACK:INT 50 |

| | |
|----------------------|------------------------------------|
| Preset | 100 (Set by Restore Misc Defaults) |
| Min | 0 |
| Max | 100 |
| Initial S/W Revision | Prior to A.02.00 |

View/Settings menu for I/Q Measured Polar Vector Window

Modify display settings for the polar graph.

| | |
|----------------------|------------------|
| Key Path | Front Panel |
| Initial S/W Revision | A.01.60 or later |

I/Q Polar Vec/Constln

Selects from one of the three polar display types the format of the Polar Graph display. You can select one of the following formats:

- Vector & Constellation
- Vector
- Constellation

| | |
|-----------------------|--|
| Key Path | View/Display, I/Q Measured Polar Graph |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:IQPTtype VCONstln VECTor CONStln :DISPlay:EVM:IQPTtype? |
| Example | :DISP:EVM:IQPT VCON :DISP:EVM:IQPT? |
| Notes | Three polar display types: <ul style="list-style-type: none"> • Vec&Constln: Sets the view to display both the vector and constellation diagrams • Vector: Sets the view to display an I/Q polar vector diagram • Constellation: Sets the view to display the constellation diagram |
| Preset | VCONstln |
| Initial S/W Revision | A.01.60 or later |

Vector & Constellation

Sets the view to display both the vector and constellation diagrams.

| | |
|----------|--|
| Key Path | View/Display, I/Q Measured Polar Graph, I/Q Polar Vec/Constl |
|----------|--|

| | |
|----------------------|--|
| Example | :DISPlay:EVM:IQPTType VCONStIn :DISPlay:EVM:IQPTType? |
| Initial S/W Revision | A.01.60 or later |

Vector

Sets the view to display an I/Q polar vector diagram.

| | |
|----------------------|--|
| Key Path | View/Display, I/Q Measured Polar Graph, I/Q Polar Vec/Constl |
| Example | :DISPlay:EVM:IQPTType VECTOr :DISPlay:EVM:IQPTType? |
| Initial S/W Revision | A.01.60 or later |

Constellation

Sets the view to display the constellation diagram.

| | |
|----------------------|--|
| Key Path | View/Display, I/Q Measured Polar Graph, I/Q Polar Vec/Constl |
| Example | :DISPlay:EVM:IQPTType CONSTIn :DISPlay:EVM:IQPTType? |
| Initial S/W Revision | A.01.60 or later |

I/Q Points

This key specifies the total number of I/Q points displayed during each measurement interval in the I/Q measured Polar Vector Graph.

| | |
|-----------------------|---|
| Key Path | View/Display, I/Q Measured Polar Graph, I/Q Points |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:IQPoints <integer> :DISPlay:EVM:IQPoints? |
| Example | :DISP:EVM:IQP 80 :DISP:EVM:IQP? |
| Notes | I/Q Points + I/Q Points Offset \leq 848. If the I/Q Points defined is larger than the 848, the I/Q Points will be set 848. |
| Couplings | See Notes. |
| Preset | 848 |
| State Saved | Saved in instrument state. |
| Min | 1 |

| | |
|----------------------|------------------|
| Max | 848 |
| Initial S/W Revision | A.01.60 or later |

I/Q Points Offset

This key specifies an offset from the first I/Q point in the I/Q Polar diagrams. If you choose to display only a subset of the I/Q points, this subset of displayed points is offset from the first I/Q point.

| | |
|-----------------------|---|
| Key Path | View/Display, I/Q Measured Polar Graph, I/Q Points Offset |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:IQPoints:OFFSet <integer> :DISPlay:EVM:IQPoints:OFFSet? |
| Example | :DISP:EVM:IQP:OFFS 14 :DISP:EVM:IQP:OFFS? |
| Notes | I/Q Points + I/Q Points Offset \leq 848. If I/Q Points Offset > (848 - I/Q Points), I/Q Points Offset is set (848 - I/Q Points). |
| Couplings | See Notes. |
| Preset | 0 chip |
| State Saved | Saved in instrument state. |
| Min | 0 chip |
| Max | 847 chips |
| Initial S/W Revision | A.01.60 or later |

I/Q Rotation

Specifies whether or not the 45 degrees rotation is applied to the I/Q constellation.

| | |
|-----------------------|--|
| Key Path | View/Display, I/Q Measured Polar Graph, I/Q Rotation |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:ROtation OFF ON 0 1 :DISPlay:EVM:ROtation? |
| Example | :DISP:EVM:ROT ON :DISP:EVM:ROT? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Interpolation

This key specifies whether the input I/Q data should be interpolated.

| | |
|-----------------------|--|
| Key Path | View/Display, I/Q Measured Polar Graph, Interpolation |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:INTerpolate OFF ON 0 1 :DISPlay:EVM:INTerpolate? |
| Example | :DISP:EVM:INT ON :DISP:EVM:INT? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

Full Vector (background)

When Full Vector is off, the I/Q data is displayed from (I/Q Offset + 1), with length I/Q Points, in the selected timeslot and sub-frame. The points before (I/Q Offset + 1) will not be displayed.

When Full Vector is on, the trace will show all the I/Q vector in the selected timeslot and sub-frame, the hidden portion (the points before the I/Q offset) is displayed in gray.

| | |
|-----------------------|--|
| Key Path | View/Display, I/Q Measured Polar Graph, Full Vector |
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:FVEctor[:STATe] OFF ON 0 1 :DISPlay:EVM:FVEctor[:STATe]? |
| Example | :DISP:EVM:FVEC ON :DISP:EVM:FVEC? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | A.01.60 or later |

I/Q Error (quad view)

Selects a combination view of a magnitude error, phase error, EVM graphs, and the summary error data.

| | |
|----------------------|---|
| Key Path | View/Display |
| Example | :DISPlay:EVM:VIEW ERRor :DISPlay:EVM:VIEW? |
| Initial S/W Revision | A.01.60 or later |

View/Settings menu Code Domain Power Summary Window

If the Code Domain Power Summary window in the Code Domain Power view is active, the View/Display key accesses the menu that enables the following controls to read the active channel list:

- Prev Page - Returns one page back to the previous page of measurement results.
- Next Page - Moves one page forward to the next page of measurement results.
- Scroll Up - Moves one line upward from the current page of measurement results each time the key is pressed.
- Scroll Down - Moves one line downward from the current page of measurement results each time the key is pressed.
- First Page - Moves from the current page to the first page of measurement results.
- Last Page - Moves from the current page to the last page of measurement results.

| | |
|----------------------|---|
| Key Path | View/Display, CDP Graph & Metics, Composite (Summary window selected)View/Display, CDE Graph & Metics, Composite (Summary window selected)View/Display, Code Domain (Summary window selected)View/Display, Demod Bits |
| Initial S/W Revision | A.01.60 or later |

Prev Page

Moves one page back to the previous page of the measurement results.

| | |
|----------------------|---|
| Key Path | View/Display, CDP Graph & Metics, Composite (Summary window selected)View/Display, CDE Graph & Metics, Composite (Summary window selected)View/Display, Code Domain (Summary window selected)View/Display, Demod Bits |
| Notes | No SCPI |
| Initial S/W Revision | A.01.60 or later |

Next Page

Moves one page forward to the previous page of the measurement results.

| | |
|----------------------|---|
| Key Path | View/Display, CDP Graph & Metics, Composite (Summary window selected)View/Display, CDE Graph & Metics, Composite (Summary window selected)View/Display, Code Domain (Summary window selected)View/Display, Demod Bits |
| Notes | No SCPI |
| Initial S/W Revision | A.01.60 or later |

Scroll Down

Moves one line downward from the current page of the measurement results by each press.

| | |
|----------------------|---|
| Key Path | View/Display, CDP Graph & Metics, Composite (Summary window selected)View/Display, CDE Graph & Metics, Composite (Summary window selected)View/Display, Code Domain (Summary window selected)View/Display, Demod Bits |
| Notes | No SCPI |
| Initial S/W Revision | A.01.60 or later |

Scroll Up

Moves one line up from the current page of the measurement results by each press.

| | |
|----------------------|---|
| Key Path | View/Display, CDP Graph & Metics, Composite (Summary window selected)View/Display, CDE Graph & Metics, Composite (Summary window selected)View/Display, Code Domain (Summary window selected)View/Display, Demod Bits |
| Notes | No SCPI |
| Initial S/W Revision | A.01.60 or later |

First Page

Moves from the current page to the first page of the measurement results by each press.

| | |
|----------------------|---|
| Key Path | View/Display, CDP Graph & Metics, Composite (Summary window selected)View/Display, CDE Graph & Metics, Composite (Summary window selected)View/Display, Code Domain (Summary window selected)View/Display, Demod Bits |
| Notes | No SCPI |
| Initial S/W Revision | A.01.60 or later |

Last Page

Moves from the current page to the last page of the measurement results by each press.

| | |
|----------------------|---|
| Key Path | View/Display, CDP Graph & Metics, Composite (Summary window selected)View/Display, CDE Graph & Metics, Composite (Summary window selected)View/Display, Code Domain (Summary window selected)View/Display, Demod Bits |
| Notes | No SCPI |
| Initial S/W Revision | A.01.60 or later |

Capture Time Summary

Selects a combination view of a Capture Time Data Trace window and a summary data window.

| | |
|----------------------|---|
| Key Path | View/Display |
| Example | :DISPlay:EVM:VIEW SUMMary :DISPlay:EVM:VIEW? |
| Initial S/W Revision | A.01.60 or later |

Numeric Results

Provides a table of the modulation accuracy summary data such as, peak and rms EVM, magnitude error, phase error, frequency error, code domain power, and so forth in a text window, in terms of averaged and detected peak/maximum value in the average cycle.

| | |
|----------------------|--|
| Key Path | View/Display |
| Example | :DISPlay:EVM:VIEW NRESults :DISPlay:EVM:VIEW? |
| Initial S/W Revision | A.01.60 or later |

View Selection by number (Remote Command only)

Allows you to select the desired measurement view from the following selections by Remote Commands:

- 1I/Q Measured Polar Graph
- 2I/Q Error (quad view).
- 3Code Domain Power
- 4Capture Time Summary
- 5Numeric Results.

| | |
|-----------------------|--|
| Mode | TD-SCDMA |
| Remote Command | :DISPlay:EVM:VIEW:NSElect <integer> :DISPlay:EVM:VIEW:NSElect? |
| Example | DISP:EVM:VIEW:NSEL 1 DISP:EVM:VIEW:NSEL? |
| Notes | Meaning of the numeric values: 1 = I/Q Measured Polar Graph View 2 = I/Q Error View 3 = Code Domain View 4 = Capture Time Summary View 5 = Numeric Results View |

16 Modulation Accuracy (Composite EVM) Measurement
View/Display

| | |
|----------------------|----------------------------|
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 5 |
| Initial S/W Revision | A.01.60 or later |

17 Waveform Measurement

The waveform measurement is a generic measurement for viewing the input signal waveforms in the time domain. This measurement represents how the instrument performs the zero span functionality found in traditional spectrum analyzers. For more details, see ["Waveform Measurement Description" on page 2072](#) below.

This topic contains the following sections:

["Measurement Commands for Waveform" on page 2070](#)

["Remote Command Results for the Waveform Measurement" on page 2071](#)

Measurement Commands for Waveform

The general functionality of CONFigure, INITiate, FETCh, MEASure, and READ are described at this section.

:CONFigure:WAVEform

:CONFigure:WAVEform:NDEFault

:INITiate:WAVEform

:FETCh:WAVEform[n]?

:MEASure:WAVEform[n]?

:READ:WAVEform[n]?

For more measurement related commands, see the SENSE subsystem, and the section "[Remote Measurement Functions](#)" on page 2284.

Remote Command Results for the Waveform Measurement

The following table denotes the returned results from the FETCh|MEASure|READ commands:

| n | Results Returned |
|---|--|
| 0 | Returns unprocessed I/Q trace data, as a series of trace point values, in volts. The I values are listed first in each pair, using the 0 through even-indexed values. The Q values are the odd-indexed values. |
| 1 | <p>Returns the following scalar results:</p> <ol style="list-style-type: none"> 1. Sample Time is a floating point number representing the time between samples when using the trace queries (n=0, 2, and so forth). 2. Mean Power is the mean power (in dBm). This is the power across the entire trace. If averaging is on, the power is for the latest acquisition. 3. Mean Power Averaged is the power (in dBm) for N averages, if averaging is on. This is the power across the entire trace. If averaging is on, the power is for the latest acquisition. If averaging is off, the value of the mean power averaged is the same as the value of the mean power. 4. Number of samples is the number of data points in the captured signal. This number is useful when performing a query on the signal (i.e. when n=0, 2, etc.). 5. Peak-to-mean ratio has units of dB. This is the ratio of the maximum signal level to the mean power. Valid values are only obtained with averaging turned off. If averaging is on, the peak-to-mean ratio is calculated using the highest peak value, rather than the displayed average peak value. 6. Maximum value is the maximum of the most recently acquired data (in dBm). 7. Minimum value is the minimum of the most recently acquired data (in dBm). |
| 2 | Returns trace point values of the entire captured signal envelope trace data. These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the number of samples. The period between the samples is defined by the sample time. |

Waveform Measurement Description

Also available under the basic Waveform measurement is an I/Q window, which shows the I and Q signal waveforms in parameters of voltage versus time to disclose the voltages that comprise the complex modulated waveform of a digital signal.

The waveform measurement can also be used to perform general purpose power measurements to a high degree of accuracy.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Ref Value (RF Envelope View)

Sets the Y Scale reference value (in dBm) when the RF Envelope View is active. By default, the measurement determines the reference value with Auto Scaling. Entering a reference value manually turns Auto Scaling off.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,LTEATDD, LTEAFDD |
| Remote Command | :DISPlay:WAVeform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEVel <ampl> :DISPlay:WAVeform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RLEVel? |
| Example | DISP:WAV:VIEW:WIND:TRAC:Y:RLEV -50 dBm DISP:WAV:VIEW:WIND:TRAC:Y:RLEV? |
| Notes | You must be in the mode that includes Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | When Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off. |
| Preset | 10.00 dBm |
| State Saved | Saved in instrument state. |
| Range | -250.00 dBm to 250.00 dBm |
| Min | -250.00 dBm |
| Max | 250.00 dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See "[Dual Attenuator Configurations:](#)" on page 2074

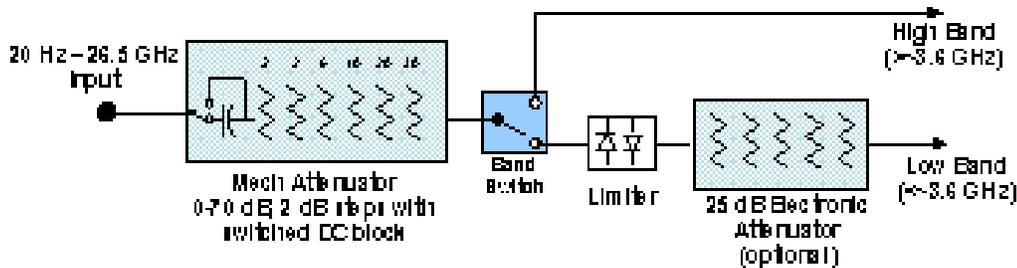
See "Single Attenuator Configuration:" on page 2075

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

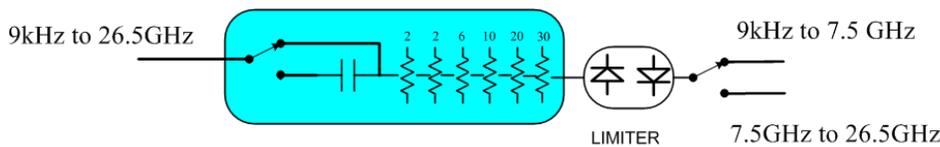
| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Dependencies | In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case. |
| Readback Line | Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2232, and " Enable Elec Atten " on page 2234 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

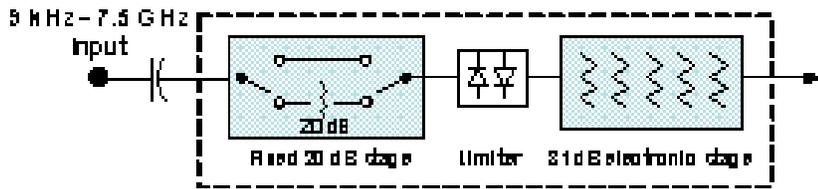


Configuration 2: Mechanical attenuator, no optional electronic attenuator



(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the “Dual Attenuator” configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See "[Attenuator Configurations and Auto/Man](#)" on page 2077

| Key Path | AMPTD Y Scale, Attenuation |
|-----------------------|---|
| Remote Command | <pre>[:SENSe]:POWer[:RF]:ATTenuation <rel_amp1> [:SENSe]:POWer[:RF]:ATTenuation? [:SENSe]:POWer[:RF]:ATTenuation:AUTO OFF ON 0 1 [:SENSe]:POWer[:RF]:ATTenuation:AUTO?</pre> |
| Example | <p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of "main" attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p> |
| Dependencies | Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the |

Auto/Man selection is not available, and the Auto/Man line on the key disappears.

In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the ["Enable Elec Atten" on page 2234](#) key description.

See ["Attenuator Configurations and Auto/Man" on page 2077](#) for more information on the Auto/Man functionality of Attenuation.

Couplings

When (Mech) Atten is in Auto, it uses the following algorithm to determine a value:

If the USB Preamp is connected to USB, use 0 dB.

Otherwise, $Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel + IF\ Gain$.

Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto.

The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step).

The "IF Gain" term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten.

In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.

Preset The preset for Mech Attenuation is "Auto."
 The Auto value of attenuation is:
 CXA, EXA, MXA and PXA: 10 dB

State Saved Saved in instrument state

Min 0 dB

The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.

Max CXA N9000A-503/507: 50 dB
 CXA N9000A-513/526: 70dB
 EXA: 60 dB
 MXA and PXA: 70 dB

In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.

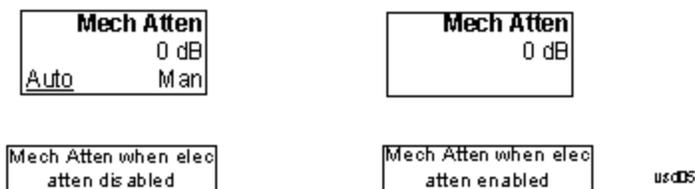
Initial S/W Revision Prior to A.02.00

Modified at S/W Revision A.03.00

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the “main” attenuation; and the attenuation that is set by the SCPI command POW:EATT as the “soft” attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 2079](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2233](#)

See ["More Information" on page 2078](#)

| | |
|----------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSE] :POWER [:RF] :EATTenuation:STATE OFF ON 0 1 [:SENSE] :POWER [:RF] :EATTenuation:STATE? |
| Example | POW:EATT:STAT ON |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out. |

| | |
|--------------------------|--|
| | <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in all measurements; in particular, it is not available in the Swept SA measurement.</p> |
| Couplings | Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples
- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

| Key Path | AMPTD Y Scale, Attenuation |
|-----------------------|---|
| Remote Command | <code>[:SENSe] :POWer [:RF] :EATTenuation <rel_ampl></code> <code>[:SENSe] :POWer [:RF] :EATTenuation?</code> |
| Notes | Electronic Attenuation's specification is defined only when Mechanical Attenuation is 6 dB. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the |

| | |
|--------------------------|--|
| | POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out. |
| Preset | 0 dB |
| State Saved | Saved in instrument state |
| Min | 0 dB |
| Max | Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe :OPTimize IMMEDIATE</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under ["Adjust Atten for Min Clip" on page 2237](#) each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe :OPTimize :ATTenuation OFF ELECTRical COMBined</code> |

| | |
|--------------------------|--|
| | <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code> |
| Notes | The SCPI parameter <code>ELECTrical</code> sets this function to On in single attenuator models. The SCPI parameter <code>COMBined</code> is mapped to <code>ELECTrical</code> in single attenuator models; if you send <code>COMBined</code> , it sets the function to On and returns <code>ELEC</code> to a query. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip |
| State Saved | Saved in instrument state |
| Range | Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------|--|
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe:AUTO?</code> |
| Notes | ON aliases to "Elec Atten Only" (<code>:POW:RANG:OPT:ATT ELEC</code>) OFF aliases to "Off" (<code>:POW:RANG:OPT:ATT OFF</code>) The query <code>:POW:RANG:AUTO?</code> returns true if <code>:POW:RANG:OPT:ATT</code> is not "Off" |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | <code>:POW:RANGe:OPT:ATT OFF</code> |
| Initial S/W Revision | Prior to A.02.00 |

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT ELEC |
| Initial S/W Revision | Prior to A.02.00 |

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT COMB |
| Initial S/W Revision | Prior to A.02.00 |

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] : POWer [:RF] : ATTenuation : STEP [:INCRement] 10 dB 2 dB [:SENSe] : POWer [:RF] : ATTenuation : STEP [:INCRement] ? |
| Example | POW:ATT:STEP 2 |
| Notes | Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10. |
| Dependencies | Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error. |
| Couplings | When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB |
| Preset | PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA) |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Scale/Div (RF Envelope View)

Sets the scale per division for the RF Envelope result waveform (time domain) measurements in the graph window.

| | |
|--------------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, LTEATDD, LTEAFDD |
| Remote Command | :DISPlay:WAVeform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ ampl> :DISPlay:WAVeform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision? |
| Example | DISP:WAV:VIEW:WIND:TRAC:Y:PDIV 5 DISP:WAV:VIEW:WIND:TRAC:Y:PDIV? |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRUMENT:SElect to set the mode. |
| Couplings | When Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off. |
| Preset | 10.00 dB |
| State Saved | Saved in instrument state. |
| Range | 0.10 dB to 20.00 dB |
| Min | 0.10 dB |
| Max | 20.00 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 2084](#).

| | |
|----------------|-----------------------------|
| Key Path | AMPTD Y Scale |
| Remote Command | [:SENSe]:POWer[:RF]:PCENter |

| | |
|-------------------------------------|---|
| Example | POW:PCEN |
| Notes | Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Couplings | <p>The active marker position determines where the centering will be attempted.</p> <p>If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed.</p> |
| Status Bits/OPC dependencies | <p>When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASure command.</p> <p>The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed.</p> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when "Presel Center" on page 2240 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

| | |
|-------------------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :POWer [:RF] :PADJust <freq></code> <code>[:SENSe] :POWer [:RF] :PADJust?</code> |
| Example | POW:PADJ 100KHz POW:PADJ? |
| Notes | The value on the key reads out to 0.1 MHz resolution. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Preset | 0 MHz |
| State Saved | The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle. |
| Min | -500 MHz |
| Max | 500 MHz |
| Default Unit | Hz |
| Backwards Compatibility SCPI | <code>[:SENSe] :POWer [:RF] :MW :PADJust</code> <code>[:SENSe] :POWer [:RF] :MMW :PADJust</code> PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to <code>[:SENSe] :POWer [:RF] :PADJust</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------------|---|
| Remote Command | <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector MWAVE MMWave EXTERNAL</code> <code>[:SENSe] :POWer [:RF] :PADJust :PRESelector?</code> |
| Notes | PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE |
| Initial S/W Revision | Prior to A.02.00 |

Y Axis Unit

Displays the menu keys that enable you to change the vertical (Y) axis amplitude unit. The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types. For example, if Scale Type has been set to Log, and you set Y Axis Unit to dBm, pressing Scale Type (Log) sets the Y Axis Unit to dBm. If Scale Type has been set to Lin and you set Y Axis Unit to V, pressing Scale Type (Lin) sets the Y Axis Unit to V. Pressing Scale Type (Log) again sets the Y axis unit back to dBm.

NOTE

The units of current (A, dBmA, dBuA) are calculated based on 50 ohms input impedance.

All four of the EMI units (dBµA/m, dBµV/m, dBG, dBpT) are treated by the instrument exactly as though they were dBuV. The user must load an appropriate correction factor using Amplitude Corrections for accurate and meaningful results.

If a SCPI command is sent to the analyzer that uses one of the EMI units as a terminator, the analyzer treats it as though DBUV had been sent as the terminator.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA |
| Scope | Meas Global |
| Remote Command | :UNIT:POWer DBM DBMV DBMA V W A DBUV DBUA DBPW DBUVM DBUAM DBPT DBG :UNIT:POWer? |
| Example | UNIT:POW dBmV UNIT:POW? |
| Notes | The Y axis unit has either logarithmic or linear characteristics. The set of units that is logarithmic consists of dBm, dBmV, dBmA, dBµV, dBµA, dBµV/m, dBµA/m, dBpT, and dBG. The set of units that are linear consists of V, W, and A. The chosen unit will determine how the reference level and all the amplitude-related outputs like trace data, marker data, etc. read out. |
| Notes | The settings of Y Axis Unit and Scale Type, affect how the data is read over the remote interface. When using the remote interface no unit is returned, so you must know what the Y axis unit is to interpret the results: Example 1, set the following: Scale Type (Log) Y Axis Unit, dBm Scale/Div, 1 dB Ref Level, 10 dBm This sets the top line to 10 dBm with each vertical division representing 1 dB. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 5 dBm and will read out remotely as 5. Example 2, set the following: Scale Type (Lin) Y Axis Unit, Volts Ref Level, 100 mV (10 mV/div) This sets the top line to 100 mV and the bottom line to 0 V, so each vertical division represents 10 mV. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 50 mV and will |

| | |
|--------------------------|--|
| | read out remotely as 50. |
| Dependencies | If an amplitude correction with an Antenna Unit other than None is applied and enabled, then that antenna unit is forced and the key with that unit is the only Y Axis Unit available. All other Y Axis Unit keys are grayed out. If an amplitude correction with an Antenna Unit other than None is applied and enabled, and you then turn off that correction or set Apply Corrections to No, the Y Axis Unit that existed before the Antenna Unit was applied is restored. |
| Couplings | The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types |
| Preset | dBm for log scale, V for linear. The true 'preset' value is dBm, since at preset the Y Scale type is set to logarithmic. |
| State Saved | Saved in instrument state |
| Readback line | 1-of-N selection |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.04.00, A.11.00 |

dBm

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBm.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBM |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmV

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmV.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmV |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmA

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmA |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

W

Sets the amplitude unit for the selected amplitude scale (log/lin) to watt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW W |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | W |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

V

Sets the amplitude unit for the selected amplitude scale (log/lin) to volt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW V |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

A

Sets the amplitude unit for the selected amplitude scale (log/lin) to Ampere.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW A |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ V

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A.

NOTE

The unit dBuA can also appear as an Antenna Unit. This will be used by customers using current probes, because current probes are often supplied with conversion tables that provide the transducer factors. When dBuA is used as an Antenna Unit the normal conversion from power to amps for dBuA (based on the analyzer input impedance) is not done, but instead the conversion is based solely on the Correction that contains the transducer factors. This is what distinguishes dBuA as a normal unit from dBuA as an antenna unit. When querying the Y-Axis unit, you can query the Antenna Unit to distinguish between regular dBuA and the dBuA antenna unit. If :CORR:CSET:ANT? returns NOC (for No Conversion), you are using a normal Y Axis dBuA. If it returns UA you are using an Antenna Unit dBuA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBpW

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpW.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBPW |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBpA |
| Initial S/W Revision | A.11.00 |

Antenna Unit

When a Correction is turned on that uses an Antenna Unit, the Y Axis Unit changes to that Antenna Unit. All of the keys in the Y-Axis Unit menu are then greyed out, except the Antenna Unit key. The unit being used is shown on this key and is shown as selected in the submenu.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback line | Currently selected unit |
| Initial S/W Revision | A.11.00 |

dB μ V/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUVM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ V/m |
| Initial S/W Revision | A.02.00 |

dB μ A/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A/m |
| Initial S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

dBpT

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpT. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBPT |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dBpT |
| Initial S/W Revision | A.02.00 |

dBG

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBG. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBG |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dBG |
| Initial S/W Revision | A.02.00 |

None

This is selected if no Antenna Unit is currently on, however you cannot actually set this value, since it is always grayed out. The key is included simply to provide an indication on the Readback line of the Antenna Unit key when there is no Antenna Unit selected.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Readback | "None" |
| Initial S/W Revision | A.11.00 |

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, BASIC, PNOISE, VSA , LTE, LTETDD |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH? |
| Example | :POW:MW:PATH LNP Enables the Low Noise path |
| Notes | If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μW Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished. |
| Dependencies | Unavailable in BBIQ and External Mixing |
| Preset | All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB |

| | |
|--------------------------|--|
| | MPB option not present and licensed: STD |
| State Saved | Save in instrument state |
| Readback | Value selected in the submenu |
| Initial S/W Revision | A.04.00 |
| Modified at S/W Revision | A.10.00 |

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH STD |
| Readback Text | Standard Path |
| Initial S/W Revision | A.04.00 |

Low Noise Path Enable

You may choose Low Noise Path Enable, which gives a lower noise floor under some circumstances, particularly when operating in the 21–26.5 GHz region. With the Low Noise Path enabled, the low band/high band switch and microwave preamp are bypassed whenever all of the following are true:

- The analyzer is not in the Low Band, meaning:
- the start frequency is above 3.5 GHz and
- the stop frequency is above 3.6 GHz.
- the internal preamp is not installed or (if installed) is set to Off or Low Band

Note that this means that, when any part of a sweep is done in Low Band, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. Also, if the preamp is turned on, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. The only time the Low Noise Path is used is when Low Noise Path Enable is selected, the sweep is completely in High Band (> 3.6 GHz) and no preamp is in use.

See "[More Information](#)" on page 2094

| | |
|----------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Measurement | Swept SA |
| Example | :POW:MW:PATH LNP |

| | |
|----------------------|--|
| Notes | <p>For measurements that use IQ acquisition, the low noise path is used when the Center Frequency is in High Band (> 3.6 GHz) and no preamp is in use.</p> <p>In other words, the rules above are modified to use only the center frequency to qualify which path to switch in.</p> <p>This is not the case for FFT's in the Swept SA measurement; they use the same rules as swept measurements.</p> |
| Dependencies | <p>Key is blanked if current mode does not support it.</p> <p>Key is grayed out if mode supports it but current measurement does not support it.</p> <p>Unless Option LNP is present and licensed, key is blank and if SCPI command sent, error -241, "Hardware missing; Option not installed" is generated.</p> |
| Readback Text | Low Noise Path Enable |
| Initial S/W Revision | A.04.00 |

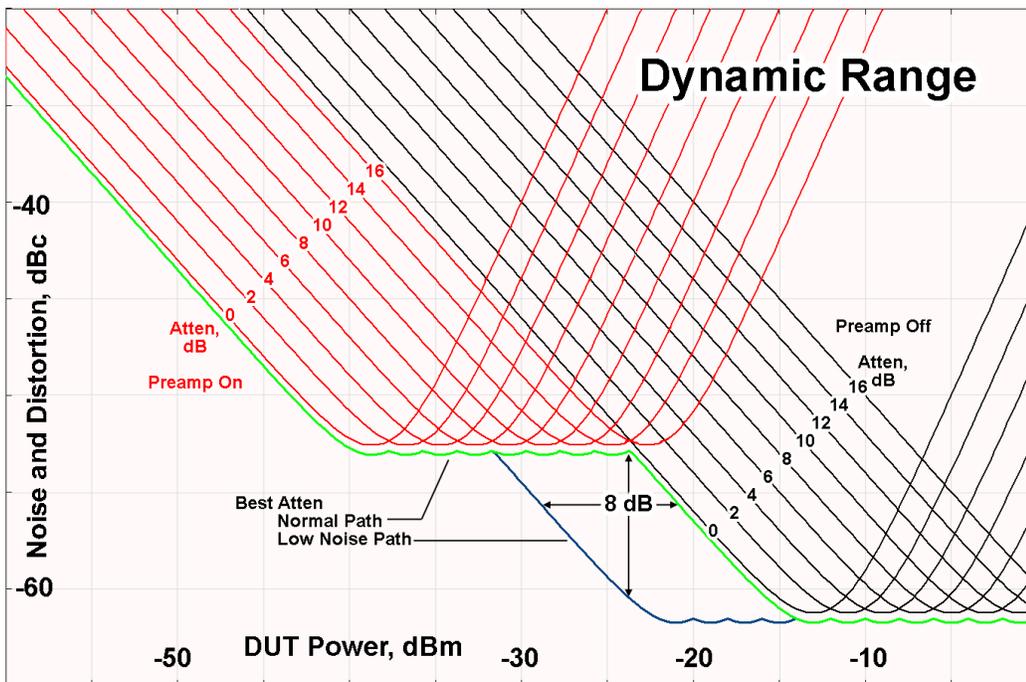
More Information

The user should understand that the Low Noise Path, while giving improved DANL, has the disadvantage of decreased TOI performance and decreased gain compression performance relative to the standard path.

The user should also understand that the bypass switch is a mechanical switch and has finite life, so if the Low Noise Path is enabled, it is possible to cause frequent cycling of this switch by frequently changing analyzer settings such that the above conditions hold true only some of the time. A user making tests of this nature should consider opting for the Standard Path, which will never throw the bypass switch, at the expense of some degraded noise performance.

The low noise path is useful for situations where the signal level is so low that the analyzer performance is dominated by noise even with 0 dB attenuation, but still high enough that the preamp option would have excessive third-order intermodulation or compression. The preamp, if purchased and used, gives better noise floor than does the "Low Noise Path." However, its compression threshold and third-order intercept are much poorer than that of the non-preamp path. There are some applications, typically for signals around -30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range

The graph below illustrates the concept. It shows, in red, the performance of an analyzer at different attenuation settings, both with the preamp on and off, in a measurement that is affected by both analyzer noise and analyzer TOI. The green shows the best available dynamic range, offset by 0.5 dB for clarity. The blue shows how the best available dynamic range improves for moderate signal levels with the low noise path switched in. In this illustration, the preamp improves the noise floor by 15 dB while degrading the third-order intercept by 30 dB, and the low noise path reduces loss by 8 dB. The attenuator step size is 2 dB.



There are other times where selecting the low noise path improves performance, too. Compression-limited measurements such as finding the nulls in a pulsed-RF spectrum can profit from the low noise path in a way similar to the TOI-limited measurement illustrated. Accuracy can be improved when the low noise path allows the optimum attenuation to increase from a small amount like 0, 2 or 4 dB to a larger amount, giving better return loss at the analyzer input. Harmonic measurements, such as second and third harmonic levels, are much improved using the low noise path because of the superiority of that path for harmonic (though not intermodulation) distortion performance.

μ W Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselector is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

| | |
|-----------------------------|--|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH MPB |
| Dependencies | Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated. |
| Readback Text | μ W Preselector Bypass |
| Initial S/W Revision | A.04.00 |

| | |
|-----------------------|---|
| Remote Command | [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1 [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ? |
| Example | :POW:MW:PRES OFF Bypasses the microwave preselector |
| Notes | The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB) |
| Preset | ON |

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :GAIN [:STATe] OFF ON 0 1 [:SENSe] :POWer [:RF] :GAIN [:STATe] ? |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the |

| | |
|--|--|
| | key is not shown. The preamp is not available when the electronic/soft attenuator is enabled. |
|--|--|

| | |
|--------------------------|--|
| Couplings | <p>The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range.</p> <p>Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected.</p> <p>Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting.</p> |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Scope | Meas Global |
| Remote Command | [:SENSe]:POWer[:RF]:GAIN:BAND LOW FULL [:SENSe]:POWer[:RF]:GAIN:BAND? |
| Dependencies | <p>Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown.</p> <p>If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated.</p> |
| Preset | LOW |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns the internal preamp off

| | |
|----------------------|--------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

| | |
|----------------------|------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND LOW |
| Readback | Low Band |
| Initial S/W Revision | Prior to A.02.00 |

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND FULL |
| Readback | Full Range |
| Initial S/W Revision | Prior to A.02.00 |

Ref Position (RF Envelope View)

Positions the reference level at the top, center or bottom of the Y Scale display. Changing the reference position does not change the reference level value.

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, LTEATDD, LTEAFDD |
| Remote Command | :DISPlay:WAVeform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOSition TOP CENTER BOTTom :DISPlay:WAVeform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOSition? |
| Example | DISP:WAV:VIEW:WIND:TRAC:Y:RPOS CENT DISP:WAV:VIEW:WIND:TRAC:Y:RPOS? |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | TOP |

| | |
|--------------------------|----------------------------|
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Auto Scaling

Toggles the Auto Scaling function between On and Off. When the Restart front-panel key is pressed, this function automatically determines the scale per division and reference values based on the measurement results.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,LTEATDD, LTEAFDD |
| Remote Command | :DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALE]:COUPle 0 1 OFF ON :DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:Y[:SCALE]:COUPle? |
| Example | DISP:WAV:VIEW:WIND:TRAC:Y:COUP OFF DISP:WAV:VIEW:WIND:TRAC:Y:COUP? |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | When Auto Scaling is On, upon pressing the Restart front-panel key, this function automatically switches the scale per division and reference values into the defaults. When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Range

This key is only available when I/Q is the selected input. It replaces the Attenuation key in that case.

Each input channel (I and Q) has four internal gain ranges. The maximum allowed voltage in each gain range is slightly more than the nominal value, so the break point between ranges is a couple of millivolts higher than the nominal (setting a peak voltage of 0.502 mV will still map to the 0.5 V Peak range).

| Gain Setting | Volts RMS | Volts Peak | Volts Peak - Peak | dBm (50Ω) | Break Point |
|--------------|-----------|------------|-------------------|-----------|-------------|
| 0 dB | 0.7071 | 1.0 | 2.0 | 10 | n/a |

| | | | | | |
|-------|--------|-------|------|----|--------------|
| 6 dB | 0.3536 | 0.5 | 1.0 | 4 | 0.502 V Peak |
| 12 dB | 0.1768 | 0.25 | 0.5 | -2 | 0.252 V Peak |
| 18 dB | 0.0884 | 0.125 | 0.25 | -8 | 0.127 V Peak |

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale |
| Notes | Visible only when the selected input is I/Q. |
| State Saved | No |
| Readback Text | When Range is Auto, "[Auto]" When Range is Man and I & Q are the same, "[<range value>]" When Range is Man and I & Q are different: "[: <I range value> Q: <Q range value>]" See I Range and Q Range for the <range value> enumeration definition. |
| Initial S/W Revision | Prior to A.02.00 |

Range Auto/Man

The Auto setting for Range causes the range to be set based on the Y Scale settings. When Range is "Auto", the I & Q Range are set based on the top of the Y Scale when the Y scale is in dB units (for example, power), or to the max(abs(top), abs(bottom)) when the Y scale reference is not at the top of the screen.

Not all measurements support Range Auto/Man. If Auto is not supported in the current measurement, this key is grayed out and shows "Man" and MAN is returned to a SCPI query, but this does NOT change the Auto/Man setting for Range. When you go to a measurement that supports Auto, it goes back to Auto if it was previously in Auto mode.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Range |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe]:VOLTage:IQ:RANGe:AUTO OFF ON 0 1</code> <code>[:SENSe]:VOLTage:IQ:RANGe:AUTO?</code> |
| Example | Put the I Range and Q Range in manual. <code>VOLT:IQ:RANG:AUTO OFF</code> |
| Dependencies | If Auto is not supported, sending the SCPI command will generate an error. |
| Couplings | When in Auto, both I Range and Q Range are set to the same value, computed as follows: Maximum absolute value is computed for the Y Scale. The top and bottom of the graph are computed based on Ref Value, Scale/Div, and Ref Position. Formula: $Y_{Max} = \max(\text{abs}(\text{top}), \text{abs}(\text{bottom}))$. The I Range and Q Range are then set to YMax. |
| Preset | ON |
| State Saved | Saved in instrument state |
| Range | Auto Man |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------------|--|
| Remote Command | <code>[:SENSe] :POWeR :IQ :RANGe :AUTO OFF ON 0 1</code> <code>[:SENSe] :POWeR :IQ :RANGe :AUTO ?</code> |
| Example | Put the I Range and Q Range in manual. <code>POW:IQ:RANG:AUTO OFF</code> |
| Notes | The <code>POW:IQ:RANG:AUTO</code> is an alternate form of the <code>VOLT:IQ:RANG:AUTO</code> command. This is to maintain consistency with I Range and Q Range, which support both the <code>POWeR</code> and <code>VOLTage</code> forms of the command. |
| Preset | ON |
| Range | Auto Man |
| Initial S/W Revision | Prior to A.02.00 |

I Range

This is the internal gain range for the I channel when Input Path is I Only or I and I/Q, and it is used for both the I and Q channels when the Input Path is I+Q. See "[I/Q Gain Ranges](#)" on page 2105.

| | |
|-----------------------------|--|
| Key Path | AMPTD Y Scale, Range |
| Remote Command | <code>[:SENSe] :VOLTagE :IQ [:I] :RANGe [:UPPer] <voltage></code> <code>[:SENSe] :VOLTagE :IQ [:I] :RANGe [:UPPer] ?</code> |
| Example | Set the I Range to 0.5 V Peak <code>VOLT:IQ:RANG 0.5 V</code> |
| Notes | The numeric entries are mapped to the smallest gain range whose break point is greater than or equal to the value, or 1 V Peak if the value is greater than 1 V. |
| Couplings | When Q Same as I is On, the I Range value will be copied to the Q Range. Changing the value will also set Range = Man. |
| Preset | 1 V Peak |
| State Saved | Saved in instrument state |
| Range | 1 V Peak 0.5 V Peak 0.25 V Peak 0.125 V Peak |
| Min | 0.125 V |
| Max | 1 V |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|---|
| Remote Command | <code>[:SENSe] :POWeR :IQ [:I] :RANGe [:UPPer] <ampl></code> <code>[:SENSe] :POWeR :IQ [:I] :RANGe [:UPPer] ?</code> |
| Example | Set the I Range to 0.5 V Peak when Reference Z is 50Ω, and to 1.0 V Peak when Reference Z is 75Ω. <code>POW:IQ:RANG 4 dBm</code> |
| Notes | The <code>POWeR</code> form of the command is provided for convenience. It maps to the same underlying gain |

range parameter as the VOLTage form of the command.

The Reference Z (not the I channel Input Z) is used to convert the power to peak voltage, which is then used to set the I Range as with the VOLTage form of the command. The power values of the 4 range states (1V Peak, 0.5V Peak, 0.25V Peak, and 0.125V Peak) will vary with Reference Z. Here are some examples:

50Ω: 10, 4, -2, -8

75Ω: 8.2, 2.2, -3.8, -9.8

600Ω: -0.8, -6.8, -12.8, -18.9

| | |
|----------------------|-------------------|
| Preset | 10.0 dBm |
| Range | -20 dBm to 10 dBm |
| Min | -20 dBm |
| Max | 10 dBm |
| Initial S/W Revision | Prior to A.02.00 |

1 V Peak

Set the channel gain state to 1 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.5 V Peak

Set the channel gain state to 0.5 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.25 V Peak

Set the channel gain state to 0.25 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.125 V Peak

Set the channel gain state to 0.125 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

Q Range Value

This is the internal gain range for the Q channel. See "[I/Q Gain Ranges](#)" on page 2105. The Q Range only applies to Input Path Q Only and Ind I/Q. For input I+jQ the I Range determines both I and Q channel range settings.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, Range |
| Remote Command | [:SENSe] :VOLTage:IQ:Q:RANGe [:UPPer] <voltage> [:SENSe] :VOLTage:IQ:Q:RANGe [:UPPer] ? |
| Example | Set the Q Range to 0.5 V Peak VOLT:IQ:Q:RANG 0.5 V |
| Notes | The numeric entries are mapped to the smallest gain range whose break point is greater than or equal to the value, or 1 V Peak if the value is greater than 1 V. The Q Range is only used for Input Path Q Only and Ind I/Q. For input I+jQ the I Range determines both I and Q channel range settings. |
| Couplings | When Q Same as I is On, the I Range value will be copied to the Q Range and the range value keys are disabled. Changing the value will also set Range = Man. |
| Preset | 1 V Peak |
| State Saved | Saved in instrument state |
| Range | 1 V Peak 0.5 V Peak 0.25 V Peak 0.125 V Peak |
| Min | 0.125 V |
| Max | 1 V |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|----------------|--|
| Remote Command | [:SENSe] :POWer:IQ:Q:RANGe [:UPPer] <amp;#1> [:SENSe] :POWer:IQ:Q:RANGe [:UPPer] ? |
| Example | Will set the Q Range to 0.5 V Peak when Reference Z is 50Ω, and to 1.0 V Peak when Reference Z is 75Ω. POW:IQ:Q:RANG 4 dBm |
| Notes | The POWER form of the command is provided for convenience. It maps to the same underlying gain range parameter as the VOLTage form of the command. The Reference Z (not the Q channel Input Z) is used to convert the power to peak voltage, which is then used to set the Q Range as with the VOLTage form of the command. The power values of the 4 range states (1V Peak, 0.5V Peak, 0.25V Peak, and 0.125V Peak) will vary with Reference Z. Here are some examples: 50Ω: 10, 4, -2, -8 75Ω: 8.2, 2.2, -3.8, -9.8 600Ω: -0.8, -6.8, -12.8, -18.9 |
| Preset | 10.0 dBm |

| | |
|----------------------|-------------------|
| Range | -20 dBm to 10 dBm |
| Min | -20 dBm |
| Max | 10 dBm |
| Initial S/W Revision | Prior to A.02.00 |

Q Same as I

Many, but not all, usages require the I and Q channels to have an identical setup. To simplify channel setup, the Q Same as I will cause the Q channel range to be mirrored from the I channel. That way you only need to set up one channel (the I channel). The I channel values are copied to the Q channel, so at the time Q Same as I is Off, the I and Q channel setups will be identical.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Range, Q Range |
| Remote Command | [:SENSe] :VOLTage POWer : IQ : MIRRored OFF ON 0 1 [:SENSe] :VOLTage POWer : IQ : MIRRored ? |
| Example | Turn off the mirroring of I Range to Q Range. VOLT:IQ:MIRR OFF POW:IQ:MIRR OFF |
| Couplings | When On, the I Range value is mirrored (copied) to the Q Range. |
| Preset | On |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Readback Text | "Q Same as I" when On, otherwise none. |
| Initial S/W Revision | Prior to A.02.00 |

1 V Peak

Set the channel gain state to 1 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.5 V Peak

Set the channel gain state to 0.5 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.25 V Peak

Set the channel gain state to 0.25 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.125 V Peak

Set the channel gain state to 0.125 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

I/Q Gain Ranges

See the following sections:

["1 V Peak" on page 2105](#)

["0.5 V Peak" on page 2105](#)

["0.25 V Peak" on page 2105](#)

["0.125 V Peak" on page 2106](#)

1 V Peak

Set the channel gain state to 1 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.5 V Peak

Set the channel gain state to 0.5 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.25 V Peak

Set the channel gain state to 0.25 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

0.125 V Peak

Set the channel gain state to 0.125 Volt Peak.

| | |
|----------------------|----------------------------------|
| Key Path | AMPTD Y Scale, I Range Q Range |
| Initial S/W Revision | Prior to A.02.00 |

Ref Value

Sets the absolute power reference value. However, since Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

This functionality depends on the selected view:

- ["Ref Value \(RF Envelope View\)" on page 2106](#)
- ["Ref Value \(I/Q Waveform View\)" on page 2107](#)

Ref Value (RF Envelope View)

Sets the Y Scale reference value (in dBm) when the RF Envelope View is active. By default, the measurement determines the reference value with Auto Scaling. Entering a reference value manually turns Auto Scaling off.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, LTEATDD, LTEAFDD |
| Remote Command | :DISPlay:WAVeform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <ampl> :DISPlay:WAVeform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel? |
| Example | DISP:WAV:VIEW:WIND:TRAC:Y:RLEV -50 dBm DISP:WAV:VIEW:WIND:TRAC:Y:RLEV? |
| Notes | You must be in the mode that includes Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | When Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off. |
| Preset | 10.00 dBm |
| State Saved | Saved in instrument state. |
| Range | -250.00 dBm to 250.00 dBm |
| Min | -250.00 dBm |
| Max | 250.00 dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Ref Value (I/Q Waveform View)

Sets the Y Scale reference value (in volts) when the I/Q Waveform View is active. By default, the measurement determines the reference value with Auto Scaling. Entering a reference value manually turns Auto Scaling off.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDB-T, CMMB, LTE, LTETDD, DCATV, WLAN, LTEATDD, LTEAFDD |
| Remote Command | :DISPlay:WAVeform:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:RLEVel <voltage> :DISPlay:WAVeform:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:RLEVel? |
| Example | DISP:WAV:VIEW2:WIND:TRAC:Y:RLEV 25 V DISP:WAV:VIEW2:WIND:TRAC:Y:RLEV? |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | When Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off. |
| Preset | 0 V |
| State Saved | Saved in instrument state. |
| Min | -250 V |
| Max | 250 V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Scale/Div

Sets the units per division of vertical scale in the logarithmic display. However, since Auto Scaling is defaulted to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

This functionality depends on the selected view:

- ["Scale/Div \(RF Envelope View\)" on page 2107](#)
- ["Scale/Div \(I/Q Waveform View\)" on page 2108](#)

Scale/Div (RF Envelope View)

Sets the scale per division for the RF Envelope result waveform (time domain) measurements in the graph window.

| | |
|----------------|---|
| Key Path | AMPTD Y Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, LTEATDD, LTEAFDD |
| Remote Command | :DISPlay:WAVeform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:PDIVision <rel_ |

| | |
|---------------------------------|--|
| | <pre> ampl> :DISPlay:WAVeform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision? </pre> |
| Example | <pre> DISP:WAV:VIEW:WIND:TRAC:Y:PDIV 5 DISP:WAV:VIEW:WIND:TRAC:Y:PDIV? </pre> |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | When Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off. |
| Preset | 10.00 dB |
| State Saved | Saved in instrument state. |
| Range | 0.10 dB to 20.00 dB |
| Min | 0.10 dB |
| Max | 20.00 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Scale/Div (I/Q Waveform View)

Sets the scale per division for the I/Q signal waveform graph.

| | |
|---------------------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, LTEATDD, LTEAFDD |
| Remote Command | <pre> :DISPlay:WAVeform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <voltage> :DISPlay:WAVeform:VIEW2:WINDow[1]:TRACe:Y[:SCALe]:PDIVision? </pre> |
| Example | <pre> DISP:WAV:VIEW2:WIND:TRAC:Y:PDIV 25mV DISP:WAV:VIEW2:WIND:TRAC:Y:PDIV? </pre> |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | When Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off. |
| Preset | 100.0 mV |
| State Saved | Saved in instrument state. |
| Min | 1.0 nV |
| Max | 20 V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Ref Position

Positions the reference level at the top, center or bottom of the Y Scale display. Changing the reference position does not change the reference level value.

This functionality depends on the selected view:

- "Ref Position (RF Envelope View)" on page 2109
- "Ref Position (I/Q Waveform View)" on page 2109

Ref Position (RF Envelope View)

Positions the reference level at the top, center or bottom of the Y Scale display. Changing the reference position does not change the reference level value.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTEADD, DCATV, WLAN,LTEATDD, LTEAFDD |
| Remote Command | :DISPlay:WAVeform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOSition TOP CENTER BOTTom :DISPlay:WAVeform:VIEW[1]:WINDow[1]:TRACe:Y[:SCALE]:RPOSition? |
| Example | DISP:WAV:VIEW:WIND:TRAC:Y:RPOS CENT DISP:WAV:VIEW:WIND:TRAC:Y:RPOS? |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | TOP |
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Ref Position (I/Q Waveform View)

Positions the reference level at the top, center or bottom of the Y Scale display. Changing the reference position does not change the reference level value.

| | |
|----------------|---|
| Key Path | AMPTD Y Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTEADD, DCATV, WLAN,LTEATDD, LTEAFDD |
| Remote Command | :DISPlay:WAVeform:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:RPOSition TOP CENTER BOTTom :DISPlay:WAVeform:VIEW2:WINDow[1]:TRACe:Y[:SCALE]:RPOSition? |
| Example | DISP:WAV:VIEW2:WIND:TRAC:Y:RPOS CENT DISP:WAV:VIEW2:WIND:TRAC:Y:RPOS? |

| | |
|--------------------------|--|
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | CENT |
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 2111

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Remote Command | :COUPle ALL NONE |
| Example | :COUP ALL |
| Notes | :COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

There are two types of functions that have Auto/Manual modes.

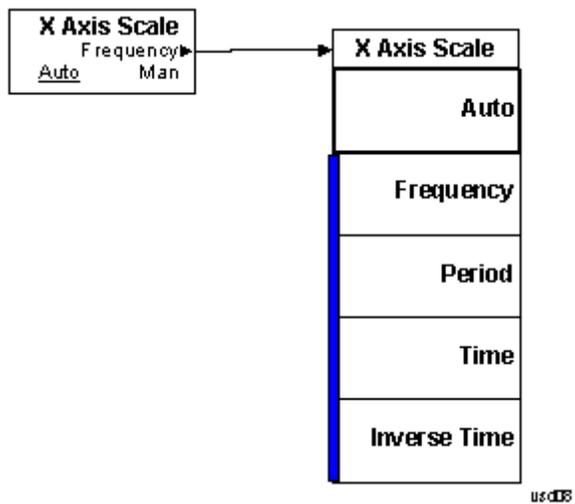
Auto/Man Active Function keys

An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.



BW

Accesses a menu that enables you to control the information bandwidth functions of the instrument. You can also select the filter type for the measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Digital IF BW

Enables you to set the Digital IF (formerly Info BW) bandwidth of the instrument.

| | |
|----------------------|---|
| Key Path | BW |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TD-SCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR, LTEATDD, LTEAFDD |
| Remote Command | <code>[:SENSe] :WAVeform :DIF :BANDwidth <freq></code> <code>[:SENSe] :WAVeform :DIF :BANDwidth?</code> |
| Example | WAV:DIF:BAND 1kHz WAV:DIF:BAND? |
| Notes | Max value depends on the IF Path Selection |
| Remote Command Notes | You must be in a mode that includes the Waveform measurements to use this command. Use INSTRUMENT:SElect to set the mode. |
| Dependencies | For applications that have the IF Path Selection menu such as the BASIC mode, if IF Path Auto is OFF, the maximum value depends on which IF Path is currently selected. If 10 MHz, 25 MHz, 40 MHz, 85 MHz, 125 MHz, 140 MHz or 160 MHz paths are selected, the maximum value of this parameter will be 10, 25, 40, 85, 125, 140 or 160 MHz, respectively. If IF Path Auto is ON, the maximum value will be the maximum Digital IF BW available in the instrument regardless of the current IF Path Selection. For example, if the instrument has the options B25, B40, and B1X installed, the maximum available Digital IF BW of the instrument is 140 MHz. Thus, if IF Path Auto is ON and IF Path Selection is 25 MHz, the maximum Digital IF BW is not limited to 25 MHz but is 140 MHz. |
| Preset | All except the following list: 100 kHz GSM/EDGE: 510 kHz TDSCDMA: 1.3 MHz 1xEVD0: 1.3 MHz DVB-T/H: 8.0 MHz DTMB (CTTB): 8.0 MHz ISDB-T: 6.0 MHz CMMB: 8.0 MHz Digital Cable TV: 8 MHz LTEAFDD, LTEATDD: 6 MHz LTETDD: 6 MHz |

| | |
|-------------------------------------|--|
| | WLAN: Hardware Dependent No option = 10 MHz Option B25 = 25 MHz Option B40: if Radio Std is 802.11a/b/g/n(20MHz) = 25 MHz if Radio Std is 802.11n(40MHz) = 40 MHz if Radio Std is 802.11ac(20MHz) = 25 MHz if Radio Std is 802.11ac(40MHz) = 40 MHz Option B1X: if Radio Std is 802.11ac(80MHz) = 80 MHz Option B1Y: if Radio Std is 802.11ac(160MHz) = 160 MHz |
| State Saved | Saved in instrument state. |
| Min | 10 Hz |
| Max | Hardware Dependent: RF Input: No Option = 10 MHz Option B25 = 25 MHz Option B40 = 40 MHz Option B85 = 85.0 MHz Option B1A = 125.0 MHz Option B1X = 140 MHz Option B1Y = 160 MHz I/Q Input: No Option = 10 MHz per channel (20 MHz for I+jQ) Option B25 = 25 MHz per channel (50 MHz for I+jQ) Option S40 = 40 MHz per channel (80 MHz for I+jQ) |
| Backwards Compatibility SCPI | [:SENSE]:WAVEform:BWIDth[:RESolution] |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.13.00 |

Filter Type

Selects the type of bandwidth filter that is used.

Besides the Gaussian filter shape, a variety of other filter types are available with variable alpha settings for maximum control over the filter shape..

| | |
|----------|--|
| Key Path | BW |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, |

| | |
|-------------------------------------|---|
| | CMMB, LTE, LTE40, DCATV, WLAN, MSR,,LTE40, LTEAFDD |
| Remote Command | [:SENSe]:WAVeform:DIF:FILTer:TYPE GAUSSian FLATtop [:SENSe]:WAVeform:DIF:FILTer:TYPE? (With DIF40 and/or WBDIF) [:SENSe]:WAVeform:DIF:FILTer:TYPE GAUSSian FLATtop SNYQuist RSNYquist RCOSine RRCosine [:SENSe]:WAVeform:DIF:FILTer:TYPE? |
| Example | WAV:DIF:FILT:TYPE GAUS WAV:DIF:FILT:TYPE? |
| Remote Command Notes | You must be in a mode that includes the Waveform measurements to use this command. Use INSTRument:SElect to set the mode. |
| Dependencies | Gaussian and Flattop are available in all DIF configurations. For the other filter types, the filters are only available when Option DP2, B40, or wider IF Bandwidth option is installed. |
| Preset | BASIC with DP2, B40, or wider IF Bandwidth option: FLATtop All other apps: GAUSSian |
| State Saved | Saved in instrument state. |
| Range | Gaussian FlatTop When Option DP2, B40, or wider IF Bandwidth option is installed, the range is as follows. Gaussian Flattop Short nyquist Root Short Nquist Raised Cosine Root RaisedCosine |
| Backwards Compatibility SCPI | [:SENSe]:WAVeform:BANDwidth:SHApe [:SENSe]:WAVeform:BWIDth:SHApe [:SENSe]:WAVeform:BANDwidth BWIDth[:RESolution]:TYPE |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.13.00 |

Filter BW

This feature is only available when Option DP2, B40, or wider IF Bandwidth option is installed.

| | |
|-----------------------|--|
| Key Path | BW |
| Mode | BASIC |
| Remote Command | [:SENSe]:WAVeform:DIF:FILTer:BANDwidth <freq> [:SENSe]:WAVeform:DIF:FILTer:BANDwidth? [:SENSe]:WAVeform:DIF:FILTer:BANDwidth:AUTO ON OFF 1 0 [:SENSe]:WAVeform:DIF:FILTer:BANDwidth:AUTO? |
| Example | WAV:DIF:FILT:BAND 1MHz WAV:DIF:FILT:BAND? WAV:DIF:FILT:BAND:AUTO 0 |

| | |
|----------------------|---|
| | WAV:DIF:FILT:BAND:AUTO? |
| Notes | You must be in the IQ Analyzer (Basic) mode to use this command. Use INSTRUMENT:SElect to set the mode. |
| Dependencies | This feature is only available when Option DP2, B40, or wider IF Bandwidth option is installed. |
| Couplings | Sets the same value as the current Digital IF BW value upon a preset or when Channel Filter Bandwidth Auto is ON. |
| Preset | Same value as Digital IF BW ON |
| State Saved | Saved in instrument state. |
| Min | 10 Hz |
| Max | Clipped to the current Digital IF BW value. |
| Initial S/W Revision | A.04.00, A.13.00 |

Filter Alpha

Sets the filter alpha for the DIF filter. This feature is only available when Option DP2, B40, or wider IF Bandwidth option is installed.

| | |
|-------------------------------------|---|
| Key Path | BW |
| Mode | BASIC |
| Remote Command | [:SENSe] :WAVeform:DIF:FILTer:ALPHa <real> [:SENSe] :WAVeform:DIF:FILTer:ALPHa? |
| Example | WAV:DIF:FILT:ALPH 0.5 WAV:DIF:FILT:ALPH? |
| Notes | You must be in the IQ Analyzer (Basic) mode to use this command. Use INSTRUMENT:SElect to set the mode. |
| Dependencies | This feature is only available when Option DP2, B40, or wider IF Bandwidth option is installed. |
| Preset | 0.2 |
| State Saved | Saved in instrument state. |
| Min | 0.01 |
| Max | 1.00 |
| Backwards Compatibility SCPI | [:SENSe] :WAVeform:WBIF:FILTer:ALPHa |
| Modified at S/W Revision | A.13.00 |

Filter Type Bwcc

This parameter is strictly for Bwcc purposes.

| | |
|-----------------------|--|
| Remote Command | <code>[:SENSe] :WAVeform:WBIF:FILTer[:TYPE] GAUSSian NONE NYQuist RNYQuist RCOSine RRCosine</code> <code>[:SENSe] :WAVeform:WBIF:FILTer[:TYPE] ?</code> |
| Preset | BASIC with Option DP2, B40, or wider IF Bandwidth option: FLATtop All other apps: GAUSSian |

Gaussian

When Option DP2, B40, or wider IF Bandwidth option is installed, the capability for arbitrary Digital IF bandwidths is available. However, for instruments without DP2, B40, or wider IF Bandwidth option, the selectable Gaussian filter bandwidths are predetermined as shown in the following list. There are 160 Info BWs (RBWs) arranged in a 24-per-decade sequence from 1 Hz through 3 MHz, plus the 4, 5, 6 and 8 MHz settings.

The following table list all 160 Gaussian filter types

Gaussian filters

| Normal (-3 dB) | -6 dB | Noise | Impulse |
|---------------------------|--------------|--------------|----------------|
| 1.0 Hz | 1.41 Hz | 1.06 Hz | 1.49 Hz |
| 1.1 Hz | 1.55 Hz | 1.16 Hz | 1.63 Hz |
| 1.2 Hz | 1.69 Hz | 1.27 Hz | 1.77 Hz |
| 1.3 Hz | 1.83 Hz | 1.37 Hz | 1.92 Hz |
| 1.5 Hz | 2.11 Hz | 1.59 Hz | 2.22 Hz |
| 1.6 Hz | 2.25 Hz | 1.69 Hz | 2.37 Hz |
| 1.8 Hz | 2.53 Hz | 1.90 Hz | 2.66 Hz |
| 2.0 Hz | 2.81 Hz | 2.12 Hz | 2.96 Hz |
| 2.2 Hz | 3.09 Hz | 2.33 Hz | 3.25 Hz |
| 2.4 Hz | 3.38 Hz | 2.54 Hz | 3.55 Hz |
| 2.7 Hz | 3.80 Hz | 2.86 Hz | 3.99 Hz |
| 3.0 Hz | 4.22 Hz | 3.17 Hz | 4.44 Hz |
| 3.3 Hz | 4.64 Hz | 3.49 Hz | 4.88 Hz |
| 3.6 Hz | 5.06 Hz | 3.81 Hz | 5.32 Hz |
| 3.9 Hz | 5.49 Hz | 4.12 Hz | 5.77 Hz |
| 4.3 Hz | 6.05 Hz | 4.55 Hz | 6.36 Hz |
| 4.7 Hz | 6.61 Hz | 4.97 Hz | 6.95 Hz |
| 5.1 Hz | 7.17 Hz | 5.39 Hz | 7.54 Hz |
| 5.6 Hz | 7.87 Hz | 5.92 Hz | 8.27 Hz |
| 6.2 Hz | 8.72 Hz | 6.56 Hz | 9.17 Hz |

| | | | |
|--------|---------|---------|---------|
| 6.8 Hz | 9.55 Hz | 7.18 Hz | 10.0 Hz |
| 7.5 Hz | 10.5 Hz | 7.93 Hz | 11.1 Hz |
| 8.2 Hz | 11.5 Hz | 8.66 Hz | 12.1 Hz |
| 9.1 Hz | 12.8 Hz | 9.64 Hz | 13.5 Hz |
| 10 Hz | 14.0 Hz | 10.6 Hz | 14.8 Hz |
| 11 Hz | 15.4 Hz | 11.6 Hz | 16.2 Hz |
| 12 Hz | 16.9 Hz | 12.7 Hz | 17.7 Hz |
| 13 Hz | 18.3 Hz | 13.7 Hz | 19.2 Hz |
| 15 Hz | 21.1 Hz | 15.9 Hz | 22.2 Hz |
| 16 Hz | 22.5 Hz | 16.9 Hz | 23.7 Hz |
| 18 Hz | 25.3 Hz | 19.1 Hz | 26.6 Hz |
| 20 Hz | 28.1 Hz | 21.1 Hz | 29.5 Hz |
| 22 Hz | 30.9 Hz | 23.2 Hz | 32.5 Hz |
| 24 Hz | 33.8 Hz | 25.4 Hz | 35.5 Hz |
| 27 Hz | 38.0 Hz | 28.6 Hz | 40.0 Hz |
| 30 Hz | 42.3 Hz | 31.8 Hz | 44.5 Hz |
| 33 Hz | 46.3 Hz | 34.8 Hz | 48.7 Hz |
| 36 Hz | 50.7 Hz | 38.1 Hz | 53.3 Hz |
| 39 Hz | 54.9 Hz | 41.3 Hz | 57.7 Hz |
| 43 Hz | 60.5 Hz | 45.5 Hz | 63.6 Hz |
| 47 Hz | 66.1 Hz | 49.7 Hz | 69.5 Hz |
| 51 Hz | 71.7 Hz | 53.9 Hz | 75.3 Hz |
| 56 Hz | 78.9 Hz | 59.3 Hz | 83.0 Hz |
| 62 Hz | 87.3 Hz | 65.6 Hz | 91.7 Hz |
| 68 Hz | 95.5 Hz | 71.8 Hz | 100 Hz |
| 75 Hz | 106 Hz | 79.4 Hz | 111 Hz |
| 82 Hz | 115 Hz | 86.8 Hz | 121 Hz |
| 91 Hz | 128 Hz | 96.4 Hz | 135 Hz |
| 100 Hz | 141 Hz | 106 Hz | 148 Hz |
| 110 Hz | 154 Hz | 116 Hz | 162 Hz |
| 120 Hz | 169 Hz | 127 Hz | 178 Hz |
| 130 Hz | 183 Hz | 137 Hz | 192 Hz |
| 150 Hz | 211 Hz | 159 Hz | 222 Hz |
| 160 Hz | 225 Hz | 169 Hz | 237 Hz |
| 180 Hz | 253 Hz | 190 Hz | 266 Hz |
| 200 Hz | 281 Hz | 211 Hz | 295 Hz |
| 220 Hz | 309 Hz | 232 Hz | 325 Hz |

| | | | |
|---------|----------|----------|----------|
| 240 Hz | 337 Hz | 254 Hz | 355 Hz |
| 270 Hz | 380 Hz | 286 Hz | 400 Hz |
| 300 Hz | 422 Hz | 317 Hz | 444 Hz |
| 330 Hz | 463 Hz | 348 Hz | 487 Hz |
| 360 Hz | 507 Hz | 381 Hz | 533 Hz |
| 390 Hz | 550 Hz | 413 Hz | 578 Hz |
| 430 Hz | 605 Hz | 455 Hz | 636 Hz |
| 470 Hz | 662 Hz | 498 Hz | 696 Hz |
| 510 Hz | 718 Hz | 540 Hz | 755 Hz |
| 560 Hz | 789 Hz | 593 Hz | 829 Hz |
| 620 Hz | 872 Hz | 655 Hz | 916 Hz |
| 680 Hz | 958 Hz | 720 Hz | 1.01 kHz |
| 750 Hz | 1.06 kHz | 794 Hz | 1.11 kHz |
| 820 Hz | 1.15 kHz | 866 Hz | 1.21 kHz |
| 910 Hz | 1.28 kHz | 964 Hz | 1.35 kHz |
| 1.0 kHz | 1.41 kHz | 1.06 kHz | 1.48 kHz |
| 1.1 kHz | 1.55 kHz | 1.17 kHz | 1.63 kHz |
| 1.2 kHz | 1.69 kHz | 1.27 kHz | 1.78 kHz |
| 1.3 kHz | 1.83 kHz | 1.38 kHz | 1.93 kHz |
| 1.5 kHz | 2.11 kHz | 1.59 kHz | 2.22 kHz |
| 1.6 kHz | 2.26 kHz | 1.70 kHz | 2.37 kHz |
| 1.8 kHz | 2.54 kHz | 1.91 kHz | 2.67 kHz |
| 2.0 kHz | 2.82 kHz | 2.12 kHz | 2.96 kHz |
| 2.2 kHz | 3.10 kHz | 2.33 kHz | 3.26 kHz |
| 2.4 kHz | 3.38 kHz | 2.54 kHz | 3.56 kHz |
| 2.7 kHz | 3.80 kHz | 2.86 kHz | 4.00 kHz |
| 3.0 kHz | 4.23 kHz | 3.18 kHz | 4.44 kHz |
| 3.3 kHz | 4.65 kHz | 3.49 kHz | 4.89 kHz |
| 3.6 kHz | 5.06 kHz | 3.81 kHz | 5.32 kHz |
| 3.9 kHz | 5.48 kHz | 4.12 kHz | 5.76 kHz |
| 4.3 kHz | 6.07 kHz | 4.56 kHz | 6.38 kHz |
| 4.7 kHz | 6.62 kHz | 4.98 kHz | 6.96 kHz |
| 5.1 kHz | 7.16 kHz | 5.38 kHz | 7.53 kHz |
| 5.6 kHz | 7.87 kHz | 5.92 kHz | 8.27 kHz |
| 6.2 kHz | 8.74 kHz | 6.57 kHz | 9.18 kHz |
| 6.8 kHz | 9.58 kHz | 7.20 kHz | 10.1 kHz |
| 7.5 kHz | 10.5 kHz | 7.92 kHz | 11.1 kHz |

| | | | |
|---------|----------|----------|----------|
| 8.2 kHz | 11.5 kHz | 8.66 kHz | 12.1 kHz |
| 9.1 kHz | 12.8 kHz | 9.64 kHz | 13.5 kHz |
| 10 kHz | 14.1 kHz | 10.6 kHz | 14.8 kHz |
| 11 kHz | 15.4 kHz | 11.6 kHz | 16.2 kHz |
| 12 kHz | 16.9 kHz | 12.7 kHz | 17.8 kHz |
| 13 kHz | 18.3 kHz | 13.7 kHz | 19.2 kHz |
| 15 kHz | 21.2 kHz | 15.9 kHz | 22.3 kHz |
| 16 kHz | 22.4 kHz | 16.8 kHz | 23.5 kHz |
| 18 kHz | 25.2 kHz | 19.0 kHz | 26.5 kHz |
| 20 kHz | 28.4 kHz | 21.3 kHz | 29.8 kHz |
| 22 kHz | 31.2 kHz | 23.4 kHz | 32.8 kHz |
| 24 kHz | 33.8 kHz | 25.4 kHz | 35.6 kHz |
| 27 kHz | 38.1 kHz | 28.7 kHz | 40.1 kHz |
| 30 kHz | 42.1 kHz | 31.7 kHz | 44.3 kHz |
| 33 kHz | 46.8 kHz | 35.2 kHz | 49.2 kHz |
| 36 kHz | 50.1 kHz | 37.7 kHz | 52.7 kHz |
| 39 kHz | 54.8 kHz | 41.2 kHz | 57.6 kHz |
| 43 kHz | 61.1 kHz | 46.0 kHz | 64.3 kHz |
| 47 kHz | 66.2 kHz | 49.8 kHz | 69.6 kHz |
| 51 kHz | 72.3 kHz | 54.3 kHz | 76.0 kHz |
| 56 kHz | 79.5 kHz | 59.8 kHz | 83.6 kHz |
| 62 kHz | 86.3 kHz | 64.9 kHz | 90.8 kHz |
| 68 kHz | 96.5 kHz | 72.6 kHz | 101 kHz |
| 75 kHz | 106 kHz | 79.7 kHz | 111 kHz |
| 82 kHz | 114 kHz | 86.0 kHz | 120 kHz |
| 91 kHz | 129 kHz | 97.3 kHz | 136 kHz |
| 100 kHz | 140 kHz | 105 kHz | 147 kHz |
| 110 kHz | 154 kHz | 116 kHz | 162 kHz |
| 120 kHz | 169 kHz | 127 kHz | 178 kHz |
| 130 kHz | 182 kHz | 137 kHz | 192 kHz |
| 150 kHz | 210 kHz | 158 kHz | 221 kHz |
| 160 kHz | 223 kHz | 168 kHz | 235 kHz |
| 180 kHz | 253 kHz | 190 kHz | 266 kHz |
| 200 kHz | 280 kHz | 211 kHz | 295 kHz |
| 220 kHz | 308 kHz | 232 kHz | 324 kHz |
| 240 kHz | 336 kHz | 253 kHz | 353 kHz |
| 270 kHz | 380 kHz | 286 kHz | 400 kHz |

| | | | |
|---------|----------|----------|----------|
| 300 kHz | 420 kHz | 316 kHz | 441 kHz |
| 330 kHz | 467 kHz | 352 kHz | 491 kHz |
| 360 kHz | 506 kHz | 380 kHz | 532 kHz |
| 390 kHz | 550 kHz | 414 kHz | 578 kHz |
| 430 kHz | 599 kHz | 451 kHz | 629 kHz |
| 470 kHz | 660 kHz | 497 kHz | 693 kHz |
| 510 kHz | 715 kHz | 538 kHz | 750 kHz |
| 560 kHz | 786 kHz | 592 kHz | 826 kHz |
| 620 kHz | 867 kHz | 653 kHz | 912 kHz |
| 680 kHz | 952 kHz | 717 kHz | 1.00 MHz |
| 750 kHz | 1.05 MHz | 791 kHz | 1.10 MHz |
| 820 kHz | 1.14 MHz | 859 kHz | 1.19 MHz |
| 910 kHz | 1.27 MHz | 960 kHz | 1.34 MHz |
| 1.0 MHz | 1.40 MHz | 1.06 MHz | 1.47 MHz |
| 1.1 MHz | 1.53 MHz | 1.15 MHz | 1.61 MHz |
| 1.2 MHz | 1.66 MHz | 1.26 MHz | 1.75 MHz |
| 1.3 MHz | 1.80 MHz | 1.36 MHz | 1.89 MHz |
| 1.5 MHz | 2.06 MHz | 1.56 MHz | 2.17 MHz |
| 1.6 MHz | 2.19 MHz | 1.66 MHz | 2.29 MHz |
| 1.8 MHz | 2.51 MHz | 1.91 MHz | 2.63 MHz |
| 2.0 MHz | 2.75 MHz | 2.10 MHz | 2.88 MHz |
| 2.2 MHz | 3.00 MHz | 2.30 MHz | 3.14 MHz |
| 2.4 MHz | 3.30 MHz | 2.54 MHz | 3.45 MHz |
| 2.7 MHz | 3.63 MHz | 2.81 MHz | 3.78 MHz |
| 3.0 MHz | 4.09 MHz | 3.18 MHz | 4.22 MHz |
| 4 MHz | 5.30 MHz | 4.23 MHz | 5.30 MHz |
| 5 MHz | 5.78 MHz | 4.81 MHz | 5.41 MHz |
| 6 MHz | 6.31 MHz | 5.50 MHz | 5.82 MHz |
| 8 MHz | 8.07 MHz | 7.21 MHz | 6.90 MHz |

Flattop

When Option DP2, B40, or wider IF Bandwidth option is installed, the capability for arbitrary Digital IF bandwidths is available. However, for instruments without Option DP2, B40 or wider IF Bandwidth option, the selectable Flattop filter bandwidths are predefined as shown in the following table. There are 134 Digital IF BWs (RBWs).

The table in the section "[Flattop Filters](#)" on page 2122 lists all 134 Flattop filter types.

Flattop Filters

| | | | |
|---------|---------|---------|---------|
| 3.0 Hz | 3.3 Hz | 3.6 Hz | 3.9 Hz |
| 4.3 Hz | 4.7 Hz | 5.1 Hz | 5.6 Hz |
| 6.2 Hz | 6.8 Hz | 7.5 Hz | 8.2 Hz |
| 9.1 Hz | 10 Hz | 11 Hz | 12 Hz |
| 13 Hz | 15 Hz | 16 Hz | 18 Hz |
| 20 Hz | 22 Hz | 24 Hz | 27 Hz |
| 30 Hz | 33 Hz | 36 Hz | 39 Hz |
| 43 Hz | 47 Hz | 51 Hz | 56 Hz |
| 62 Hz | 68 Hz | 75 Hz | 82 Hz |
| 91 Hz | 100 Hz | 110 Hz | 120 Hz |
| 130 Hz | 150 Hz | 160 Hz | 180 Hz |
| 200 Hz | 220 Hz | 240 Hz | 270 Hz |
| 300 Hz | 330 Hz | 360 Hz | 390 Hz |
| 430 Hz | 470 Hz | 510 Hz | 560 Hz |
| 620 Hz | 680 Hz | 750 Hz | 820 Hz |
| 910 Hz | 1.0 kHz | 1.1 kHz | 1.2 kHz |
| 1.3 kHz | 1.5 kHz | 1.6 kHz | 1.8 kHz |
| 2.0 kHz | 2.2 kHz | 2.4 kHz | 2.7 kHz |
| 3.0 kHz | 3.3 kHz | 3.6 kHz | 3.9 kHz |
| 4.3 kHz | 4.7 kHz | 5.1 kHz | 5.6 kHz |
| 6.2 kHz | 6.8 kHz | 7.5 kHz | 8.2 kHz |
| 9.1 kHz | 10 kHz | 11 kHz | 12 kHz |
| 13 kHz | 15 kHz | 16 kHz | 18 kHz |
| 20 kHz | 22 kHz | 24 kHz | 27 kHz |
| 30 kHz | 33 kHz | 36 kHz | 39 kHz |
| 43 kHz | 47 kHz | 51 kHz | 56 kHz |
| 62 kHz | 68 kHz | 75 kHz | 82 kHz |
| 91 kHz | 100 kHz | 110 kHz | 120 kHz |
| 130 kHz | 150 kHz | 160 kHz | 180 kHz |
| 200 kHz | 220 kHz | 240 kHz | 270 kHz |
| 300 kHz | 330 kHz | 390 kHz | 430 kHz |
| 510 kHz | 620 kHz | 750 kHz | 1.0 MHz |
| 1.5 MHz | 3.0 MHz | 4 MHz | 5 MHz |
| 6 MHz | 8 MHz | | |

Channel Filter Bandwidth Bwcc (Remote Command Only)

This is the backward compatibility command for Channel Filter Bandwidth.

| | |
|--------------------------|---|
| Mode | BASIC |
| Remote Command | [:SENSe] :WAVeform:WBIF:FILTer:BANDwidth <real> [:SENSe] :WAVeform:WBIF:FILTer:BANDwidth? |
| Example | WAV:WBIF:FILT:BAND 0.3 WAV:WBIF:FILT:BAND? |
| Notes | You must be in the IQ Analyzer (Basic) mode to use this command. Use INSTRument:SElect to set the mode. |
| Dependencies | This feature is only available when Option DP2, B40, or wider IF Bandwidth option is installed. |
| Couplings | The value is determined by the following equation. $\text{ChannelFilterBwBwcc} = (\text{ChannelFilterBw} / (\text{DigitalIFBw} * \text{OverSampleRatio}))$ |
| Preset | 0.8 |
| State Saved | Saved in instrument state. |
| Min | 0.01 |
| Max | 1.0 |
| Initial S/W Revision | A.04.00 |
| Modified at S/W Revision | A.13.00 |

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

| | |
|--------------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous? |
| Example | :INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation |
| Preset | ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF) |
| State Saved | Saved in instrument state |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep. |
| Initial S/W Revision | Prior to A.02.00 |

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

17 Waveform Measurement
File

File

See "File" on page 344

FREQ/Channel

The key accesses a menu allowing you to set Frequency parameters for the current measurement. All measurements in TD-SCDMA mode have the same menu structure under FREQ/Channel key.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | A.01.60 or later |

Center Freq

The front panel displays and sets the Center Freq for the selected input. Changing the selected input will update the displayed value to match. The SCPI will also get or set Center Freq for the selected input.

See also:

["RF Center Freq" on page 2127](#)

["I/Q Center Freq" on page 2128](#)

| | |
|-----------------------|---|
| Mode | TDSCDMA |
| Remote Command | <code>[:SENSe] :FREQuency:CENTer <freq></code> <code>[:SENSe] :FREQuency:CENTer?</code> |
| Example | FREQ:CENT 30 MHz |
| Notes | This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT |
| Preset | Varies with selected input (see RF Center Freq and I/Q Center Freq) |
| State Saved | Varies with selected input (see RF Center Freq and I/Q Center Freq) |
| Min | Varies with selected input (see RF Center Freq and I/Q Center Freq) |
| Max | Varies with selected input (see RF Center Freq and I/Q Center Freq) |
| Initial S/W Revision | A.01.60 or later |

RF Center Freq

SCPI command for specifying the RF Center Frequency. This will always access the RF value, even when the selected input is not RF. The front panel always uses the Freq Center (Selected Input).

| | |
|-----------------------|--|
| Mode | TDSCDMA |
| Remote Command | <code>[:SENSe] :FREQuency:RF:CENTer <freq></code> <code>[:SENSe] :FREQuency:RF:CENTer?</code> |
| Example | FREQ:RF:CENT 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |

| | |
|----------------------|---|
| Preset | 1.0 GHz |
| State Saved | Saved in instrument state. |
| Min | -79.999995 MHz |
| Max | Hardware Dependent: Opt503 = 3.699999995 GHz Opt508 = 8.499999995 GHz Opt513 = 13.799999995 GHz Opt526 = 26.999999995 GHz |
| Initial S/W Revision | A.01.60 or later |

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This will always access the I/Q value, even when the selected input is not I/Q. The front panel always uses the Freq Center (Selected Input).

| | |
|-----------------------|--|
| Mode | TDSCDMA |
| Remote Command | <code>[:SENSe] :FREQuency:IQ:CENTer <freq></code> <code>[:SENSe] :FREQuency:IQ:CENTer?</code> |
| Example | FREQ:IQ:CENT: 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Preset | 0 Hz |
| State Saved | Saved in instrument state. |
| Min | -39.999995 MHz |
| Max | 39.999995 MHz |
| Initial S/W Revision | A.01.60 or later |

CF Step

Changes the step size for the center frequency.

When CF Step State is manual (Man), the STEP values for Center Frequency is the same value as that of the CF Step. When CF Step State is changed to Auto, the value will be changed to 1.6MHz automatically.

| | |
|-----------------------|--|
| Key Path | FREQ/Channel |
| Mode | TD-SCDMA |
| Remote Command | <code>[:SENSe] :FREQuency:CENTer:STEP[:INCRement] <freq></code> <code>[:SENSe] :FREQuency:CENTer:STEP[:INCRement]?</code> <code>[:SENSe] :FREQuency:CENTer:STEP:AUTO ON OFF 1 0</code> <code>[:SENSe] :FREQuency:CENTer:STEP:AUTO?</code> |

| | |
|----------------------|---|
| Example | FREQ:CENT:STEP 100KHZ FREQ:CENT:STEP? FREQ:CENT:STEP:AUTO OFF FREQ:CENT:STEP:AUTO? |
| Preset | 1.6MHz ON |
| State Saved | Saved in instrument state. |
| Min | 1.0 kHz |
| Max | 1 GHz |
| Initial S/W Revision | A.01.60 or later |

17 Waveform Measurement
Input/Output

Input/Output

See "[Input/Output](#)" on page 202

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Marker Type

Sets the marker control mode to Normal, Delta, Fixed or Off. All interactions and dependencies detailed under the key description are enforced when the remote command is sent. If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, the Marker X Axis Value appears on the Active Function area.

The default active function is the active function for the currently selected marker control mode. If the current control mode is Off, there is no active function and the active function is turned off.

| | |
|----------------|--|
| Key Path | Marker |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTE4DD, DCATV, WLAN,,LTEATDD, LTEAFDD |
| Remote Command | :CALCulate:WAVeform:MARKer[1] 2 ... 12:MODE POSITION DELTa OFF :CALCulate:WAVeform:MARKer[1] 2 ... 12:MODE? |
| Example | CALC:WAV:MARK:MODE OFF CALC:WAV:MARK:MODE? |
| Notes | If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area displays the marker value to its full entered precision. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | OFF |
| State Saved | Saved in instrument state. |

| | |
|--------------------------|------------------|
| Range | Normal Delta Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Properties

Accesses the marker properties menu.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Relative To

Selects the marker that the selected marker is relative to (its *reference marker*).

| | |
|--------------------------|--|
| Key Path | Marker, Properties |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD |
| Remote Command | :CALCulate:WAVeform:MARKer[1] 2 ... 12:REFerence <integer> :CALCulate:WAVeform:MARKer[1] 2 ... 12:REFerence? |
| Example | CALC:WAV:MARK:REF 8 CALC:WAV:MARK:REF? |
| Notes | A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." When queried a single value is returned (the specified marker numbers relative marker). You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | 2 3 4 5 6 7 8 9 10 11 12 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 12 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Marker Trace

Assigns the specified marker to the designated trace.

| | |
|--------------------------|--|
| Key Path | Marker |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD |
| Remote Command | :CALCulate:WAVeform:MARKer[1] 2 ... 12:TRACe RFENvelope I Q IQ :CALCulate:WAVeform:MARKer[1] 2 ... 12:TRACe? |
| Example | CALC:WAV:MARK:TRAC RFEN CALC:WAV:MARK:TRAC? |
| Notes | Assigns the specified marker to the designated trace. The IQ selection is for backward compatibility purposes. It is recommended that the users use the I and/or Q selection instead. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | RFEN |
| State Saved | Saved in instrument state. |
| Range | RF Envelope I Q IQ |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Couple Markers

Toggles the state of the markers to be coupled On or Off. When this function is true (On), moving any marker causes an equal X-axis movement of every other marker which is not Off. "Equal X-axis movement" refers to the difference between each marker's X-Axis value (in the fundamental x-axis units of the trace that marker is on) and the X-Axis value of the marker being moved (in the same fundamental x-axis units) are preserved.

| | |
|----------------|---|
| Key Path | Marker |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD |
| Remote Command | :CALCulate:WAVeform:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:WAVeform:MARKer:COUPle[:STATe]? |
| Example | CALC:WAV:MARK:COUP ON CALC:WAV:MARK:COUP ON |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | OFF |

| | |
|--------------------------|----------------------------|
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

All Markers Off

Turns off all markers.

| | |
|--------------------------|--|
| Key Path | Marker |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,LTEATDD, LTEAFDD |
| Remote Command | :CALCulate:WAVeform:MARKer:AOFF |
| Example | CALC:WAV:MARK:AOFF |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Marker X Axis Value (Remote Command Only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value if the control mode is Normal or Delta.

| | |
|----------------|---|
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD |
| Remote Command | :CALCulate:WAVeform:MARKer[1] 2 ... 12:X <time> :CALCulate:WAVeform:MARKer[1] 2 ... 12:X? |
| Example | CALC:WAV:MARK:X 50 ms CALC:WAV:MARK:X? |
| Notes | If no suffix is sent, uses the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" is generated. If the specified marker is Fixed and a Marker Function is on, error -221 "Settings conflict; cannot adjust Fixed marker while Marker Function is on" is generated. The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from the marker's reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off the response is not a number. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | 0 |

| | |
|--------------------------|--|
| Preset | After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN). |
| State Saved | No |
| Min | (9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Marker X Axis Position (Remote Command Only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal or Delta. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

| | |
|--------------------------|---|
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD |
| Remote Command | :CALCulate:WAVeform:MARKer[1] 2 ... 12:X:POSition <real> :CALCulate:WAVeform:MARKer[1] 2 ... 12:X:POSition? |
| Example | CALC:WAV:MARK:X:POS 500 CALC:WAV:MARK:X:POS? |
| Notes | The query returns the marker's absolute X Axis value in trace points if the control mode is Normal or the offset from the marker's reference marker in trace points if the control mode is Delta. The value is returned as a real number, not an integer, corresponding to the translation from X Axis Scale units to trace points. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | 0 |
| Preset | After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN). |
| State Saved | No |
| Min | (9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Marker Y Axis Value (Remote Command Only)

Queries the marker Y Axis value in the current marker Y Axis unit.

| | |
|------|---|
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD |
|------|---|

| | |
|-------------------------------------|--|
| Remote Command | :CALCulate:WAVeform:MARKer[1] 2 ... 12:Y? |
| Example | CALC:WAV:MARK11:Y? |
| Notes | <p>When the marker is on, IQ waveform returns I and Q values.</p> <p>Case #1 - Trace RF, I or Q: returns a single double value.</p> <p>>:CALC:WAV:MARK1:Y? -2.402406506109E+001</p> <p>Case #2 - Trace IQ: returns a double array of two values, the first is I, and the second is Q.</p> <p>>:CALC:WAV:MARK1:Y? -3.006944493834E-003,+9.9870666467354E-004</p> <p>The IQ selection is for backward compatibility purposes. It is recommended that the users use the I and/or Q selection instead.</p> <p>You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode.</p> |
| Preset | Result dependent on the marker setup and signal source. |
| State Saved | No |
| Backwards Compatibility SCPI | :CALCulate:WAVeform:MARKer[1] 2 ... 12:FUNction:RESult? |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Backward Compatibility SCPI Commands

Sets or queries the state of a marker. Setting a marker that is OFF to state ON or 1 puts it in Normal mode and places it at the center of the screen.

| | |
|---------------------------------|--|
| Mode | BASIC, PNOISE, WCDMA, CDMA2K, EDGE GSM, WIMAX OFDMA, TDSCDMA, CDMA1XEV, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN |
| Remote Command | :CALCulate:WAVeform:MARKer[1] 2 ... 12:STATe OFF ON 0 1 :CALCulate:WAVeform:MARKer[1] 2 ... 12:STATe? |
| Example | CALC:WAV:MARK:STAT ON CALC:WAV:MARK:STAT? |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Marker ->

There is no 'Marker ->' functionality supported in Waveform measurements. The front-panel key displays a blank menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Marker Function

Accesses a menu of marker functions that perform post-processing operations on markers based on the measurement specifications. Marker functions are distinct from measurement functions, which automatically perform complex sequences of setup, data acquisition, and display operations in order to measure specified signal characteristics. Marker Functions are specified for each individual marker and may be turned on individually for each marker.

The Marker Function menu controls which marker functions are turned on and allows you to adjust the setup parameters for each function. These parameters include the following, but only one parameter can be assigned to a given marker:

- Marker Noise
- BandInterval Power
- Band/Interval Density
- Marker Function Off

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Marker Function Type

Sets the marker control function type to, Marker Noise, Band/Interval Power, Band Interval Density, or Marker Function Off

| | |
|----------------|---|
| Key Path | Marker Function |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD |
| Remote Command | :CALCulate:WAVeform:MARKer[1] 2 ... 12:FUNction BPower BDENsity OFF :CALCulate:WAVeform:MARKer[1] 2 ... 12:FUNction? |
| Example | CALC:WAV:MARK:FUNC BPOW CALC:WAV:MARK:FUNC? |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | OFF |

| | |
|--------------------------|---|
| State Saved | Saved in instrument state. |
| Range | Band/Interval Power Band Interval Density Marker Function Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Band Adjust

Accesses a menu that enables you to set the frequency span width and the left and right edge, or time values, for the band or interval of the selected marker.

| | |
|----------------------|------------------|
| Key Path | Marker Function |
| Initial S/W Revision | Prior to A.02.00 |

Band/Interval Span for Time Domain

Sets the width of the frequency span for the selected marker.

| | |
|-------------------------------------|--|
| Key Path | Marker Function |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,LTEATDD, LTEAFDD |
| Remote Command | :CALCulate:WAVEform:MARKer[1] 2 ... 12:FUNCTION:BAND:SPAN <time> :CALCulate:WAVEform:MARKer[1] 2 ... 12:FUNCTION:BAND:SPAN? |
| Example | CALC:WAV:MARK:FUNC:BAND:SPAN 20 ms CALC:WAV:MARK:FUNC:BAND:SPAN? |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRUMENT:SElect to set the mode. |
| Couplings | Changing the Band/Interval Span necessarily changes the Band/Interval Left and Band/Interval Right values |
| Preset | 0 |
| Preset | 10% of Meas Time |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | 100 s |
| Backwards Compatibility SCPI | :CALCulate:WAVEform:MARKer[1] 2 ... 4:X:SPAN |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Band/Interval Left for Time Domain

Sets the left edge frequency or time value for the band of the selected marker.

| Key Path | Marker Function |
|--------------------------|---|
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD |
| Remote Command | :CALCulate:WAVeform:MARKer[1] 2 ... 12:FUNCTion:BAND:LEFT <time> :CALCulate:WAVeform:MARKer[1] 2 ... 12:FUNCTion:BAND:LEFT? |
| Example | CALC:WAV:MARK12:FUNC:BAND:LEFT 1 s CALC:WAV:MARK12:FUNC:BAND:LEFT? |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | Changing the Band/Interval Left necessarily changes the Band/Interval Span and Band/Interval Right values |
| Preset | 0 |
| Preset | 5% of Meas Time |
| State Saved | Saved in instrument state. |
| Min | 0 |
| Max | 100 s |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Band/Interval Right for Time Domain

Sets the right edge frequency or time value for the band of the selected marker.

| Key Path | Marker Function |
|-----------------------|--|
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN,,LTEATDD, LTEAFDD |
| Remote Command | :CALCulate:WAVeform:MARKer[1] 2 ... 12:FUNCTion:BAND:RIGHT <time> :CALCulate:WAVeform:MARKer[1] 2 ... 12:FUNCTion:BAND:RIGHT? |
| Example | CALC:WAV:MARK12:FUNC:BAND:RIGH 1 s CALC:WAV:MARK12:FUNC:BAND:RIGH? |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | Changing the Band/Interval Left necessarily changes the Band/Interval Span and Band/Interval Right values |
| Preset | 0 |
| Preset | 5% of Meas Time |
| State Saved | Saved in instrument state. |

| | |
|--------------------------|------------------|
| Min | 0 |
| Max | 100 s |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Remote Measurement Functions

This section contains the following topics:

["Measurement Group of Commands" on page 2285](#)

["Current Measurement Query \(Remote Command Only\)" on page 2287](#)

["Limit Test Current Results \(Remote Command Only\)" on page 2287](#)

["Data Query \(Remote Command Only\)" on page 2287](#)

["Calculate/Compress Trace Data Query \(Remote Command Only\)" on page 2288](#)

["Calculate Peaks of Trace Data \(Remote Command Only\)" on page 2293](#)

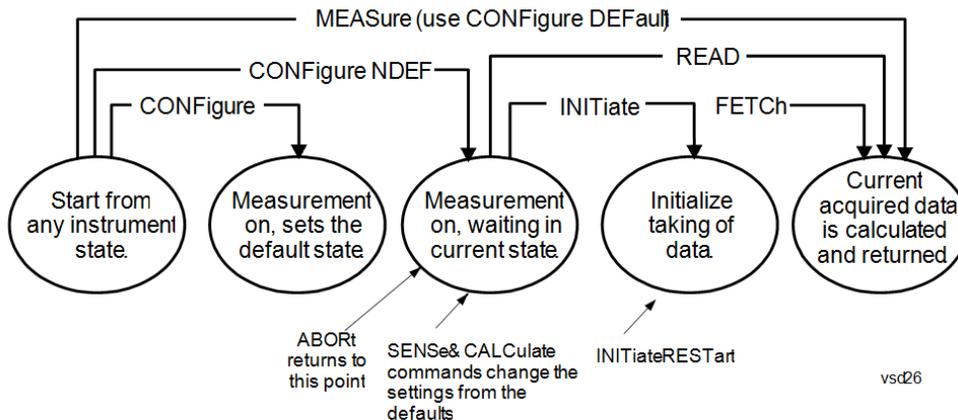
[Hardware-Accelerated Fast Power Measurement \(Remote Command Only\)](#)

["Format Data: Numeric Data \(Remote Command Only\)" on page 2294](#)

["Format Data: Byte Order \(Remote Command Only\)" on page 2295](#)

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFigure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFigure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
-

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
-

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

| | |
|-----------------------|-------------|
| Remote Command | :CONFigure? |
|-----------------------|-------------|

| | |
|----------------|-------|
| Example | CONF? |
|----------------|-------|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

| | |
|-----------------------|--------------------------|
| Remote Command | :CALCulate:CLIMits:FAIL? |
|-----------------------|--------------------------|

| | |
|----------------|--|
| Example | CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails. |
|----------------|--|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA[n]? |
| Notes | The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement. |
| Initial S/W Revision | Prior to A.02.00 |

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]] |
| Example | To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.) |
| Notes | The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data. |
| Initial S/W Revision | Prior to A.02.00 |

- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

-

NOTE

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$\text{DME} = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPlE - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEViation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

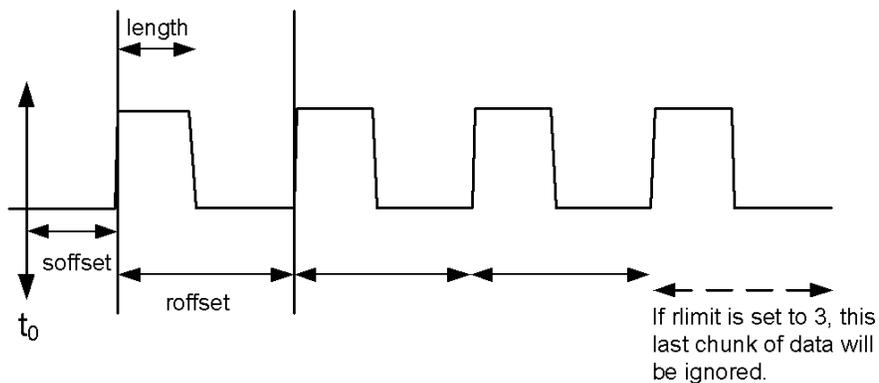
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

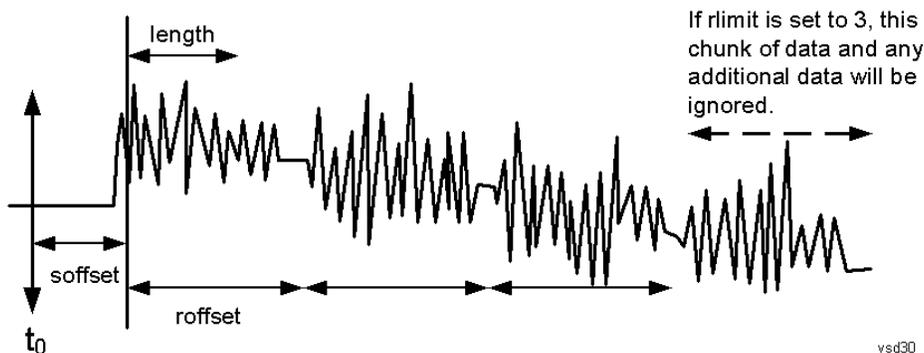
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

| | |
|-----------------------|---|
| Remote Command | <p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre> |
|-----------------------|---|

| | |
|----------------|---|
| Example | <p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p> |
|----------------|---|

| | |
|--------------|---|
| Notes | <p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p> |
|--------------|---|

excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQuency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat [:TRACe] [:DATA] ASCii | INTeger, 32 | REAL, 32 | REAL, 64
:FORMat [:TRACe] [:DATA] ?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

Initial S/W Revision Prior to A.02.00

The specs for each output type follow:

ASCIi - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

| | |
|-----------------------------|--|
| Remote Command | :FORMat:BORDER NORMal SWAPped :FORMat:BORDER? |
| Preset | NORMal |
| Initial S/W Revision | Prior to A.02.00 |

Meas Setup

Displays the setup menu keys that enable you to control the parameters for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Average/Hold Num

Sets the number of sweeps (average counts) that are averaged. After the specified number of sweeps, the averaging mode (terminal control) setting determines the averaging action.

| | |
|--------------------------|---|
| Key Path | Meas Setup |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | [:SENSe]:WAVeform:AVErAge:COUNt <integer> [:SENSe]:WAVeform:AVErAge:COUNt? [:SENSe]:WAVeform:AVErAge[:STATe] OFF ON 0 1 [:SENSe]:WAVeform:AVErAge[:STATe]? |
| Example | WAV:AVER:COUN 1001 WAV:AVER:COUN? WAV:AVER ON WAV:AVER? |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | 10 OFF |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 20001 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Avg Mode

Enables you to set the averaging mode.

- When set to Exponential (Exp) the measurement averaging continues using the specified number of averages to compute each averaged value. The average is displayed at the end of each sweep.
- When set to Repeat, the measurement resets the average counter each time the specified number of averages is reached.

| | |
|--------------------------|---|
| Key Path | Meas Setup |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | [:SENSe] :WAVeform:AVERage:TCONtrol EXPonential REPeat [:SENSe] :WAVeform:AVERage:TCONtrol? |
| Example | WAV:AVER:TCON REP WAV:AVER:TCON? |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | EXPonential |
| State Saved | Saved in instrument state. |
| Range | Exp Repeat |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Avg Type

Selects the type of averaging.

| | |
|--------------------------|---|
| Key Path | Meas Setup |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | [:SENSe] :WAVeform:AVERage:TYPE LOG MAXimum MINimum RMS SCALar [:SENSe] :WAVeform:AVERage:TYPE? |
| Example | WAV:AVER:TYPE RMS WAV:AVER:TYPE? |
| Notes | The SCPI selection of MAX and MIN are kept for BWCC, but they are removed from the front panel access because they are not an Average function. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | RMS |
| State Saved | Saved in instrument state. |
| Range | Pwr Avg(RMS) Log-Pwr Avg(Video) Voltage Avg |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Time Avg Num

Sets the number of HW averages to be executed per each data acquisition.

| | |
|-----------------------|---|
| Key Path | Meas Setup |
| Mode | BASIC |
| Remote Command | [:SENSe] :WAVeform:AVERage:TACount <integer> [:SENSe] :WAVeform:AVERage:TACount? |
| Example | WAV:AVER:TAC 10WAV:AVER:TAC? |
| Notes | This feature is only available when Option DP2, B40, or wider IF Bandwidth option is installed. |
| Preset | 1 |
| State Saved | Saved in instrument state |
| Min | 1 |
| Max | 65535 |
| Default Unit | Enter |

Meas Time

Sets how long the measurement is performed. X Scale only changes the representation of the display.

| | |
|--------------------------|--|
| Key Path | Meas Setup |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | [:SENSe] :WAVeform:SWEep:TIME <time> [:SENSe] :WAVeform:SWEep:TIME? |
| Example | WAV:SWE:TIME 50 ms WAV:SWE:TIME? |
| Notes | Specifies and returns how long the measurement is performed. It is the time record length of the measurement waveform. The Max time may be reduced when the sample frequency is high due to the memory limitation. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | All except the following list: 2.000000 ms LTEAFDD, LTEATDD: 10 ms LTETDD: 10 ms |
| State Saved | Saved in instrument state. |
| Range | 1.000 (s to 100.00 s |
| Min | 1.000 us |
| Max | 3200 s |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.14.00 |

Sample Rate

Enables you to set an arbitrary sample rate for the acquired data to be processed.

| | |
|--------------------------|---|
| Key Path | Meas Setup |
| Mode | BASIC |
| Remote Command | [:SENSe] :WAVeform:SRATe <freq> [:SENSe] :WAVeform:SRATe? |
| Example | WAV:SRAT 1.3636 MHz |
| Notes | Command and query available when Option DP2, B40, or wider IF Bandwidth option is installed. For other configuration, only query is available. |
| Couplings | The coupling between Sample Rate and IF BW depends on Physics implementation. |
| Preset | 125.0 kHz |
| Min | 12.5 Hz |
| Max | <ul style="list-style-type: none"> • (For Option DP2, B40 or wider IF Bandwidth option) • Digital IF 10 MHz path: 12.5 MHz • Digital IF 25 MHz path: 31.25 MHz • Digital IF 40 MHz path: 50 MHz • Option B85 85 MHz path: 106.25 MHz • Option B1A 125 MHz path: 156.25 MHz • Option B1X 140 MHz path: 175 MHz • Option B1Y 160 MHz path: 200 MHz • (For all other configuration) • 10 MHz path: 15 MHz • Option B25 25 MHz path: 45 MHz |
| Modified at S/W Revision | 13.00 |

PhNoise Opt

Selects the LO (local oscillator) phase noise behavior for various desired operating conditions.

| | |
|----------------|--|
| Key Path | Meas Setup |
| Remote Command | [:SENSe] :WAVeform:FREQuency:SYNThesis [:STATe] 1 2 3 [:SENSe] :WAVeform:FREQuency:SYNThesis [:STATe] ? |
| Example | WAV:FREQ:SYNT 2 Selects optimization for best wide offset phase noise |
| Notes | Parameter: 1 optimizes phase noise for small frequency offsets from the carrier. 2 optimizes phase noise for wide frequency offsets from the carrier. 3 optimizes LO for tuning speed |

| | |
|--------------------------|--|
| | (In PXA, the local oscillator hardware provides for extra-low phase noise at the expense of some speed.) |
| Dependencies | Does not appear in all models. The key is blank in those models, but the SCPI command is accepted for compatibility (although no action is taken). |
| Preset | Because this function is in Auto after preset, and because Digital IF BW after preset < 150 kHz for MXA/EXA and > 400 kHz for PXA the state of this function after Preset will be 1 for MXA/EXA and 2 for PXA. |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Min | 1 |
| Max | 3 |
| Initial S/W Revision | Prior to A.07.00 |
| Modified at S/W Revision | A.07.00 |

Auto

Selects the LO (local oscillator) phase noise behavior to optimize dynamic range and speed for various instrument operating conditions.

The X-Series has two grades of LO; a high performance LO that gives the best phase noise performance; and a medium-performance LO that gives excellent performance.

In models with the high performance LO, Auto will choose:

| | Best Close in Phase Noise | Best Wide-offset Phase Noise |
|-----------|---------------------------|------------------------------|
| Filter BW | ≤ 400 kHz | > 400 kHz |

In models with the medium-performance LO, Auto will choose:

| | Best Close in Phase Noise | Best Wide-offset Phase Noise |
|-----------|---------------------------|------------------------------|
| Filter BW | ≤ 150 kHz | >150 kHz |

Note that Fast Tuning will not be selected when in Auto.

| | |
|----------------------|---|
| Key Path | Meas Setup, PhNoise Opt |
| Remote Command | [:SENSe] :WAVeform:FREQuency:SYNThesis:AUTO[:STATe] OFF ON 0 1 [:SENSe] :WAVeform:FREQuency:SYNThesis:AUTO[:STATe] ? |
| Example | WAV:FREQ:SYNT:AUTO ON |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.07.00 |

Best Close-in P Noise

The LO phase noise is optimized for smaller offsets from the carrier, at the expense of phase noise farther out.

| | |
|----------------------|--|
| Key Path | Meas Setup, PhNoise Opt |
| Example | WAV:FREQ:SYNT 1 |
| Couplings | <p>The frequency below which the phase noise is optimized is model dependent:</p> <ul style="list-style-type: none"> • CXA: n/a • EXA: [offset \leq150 kHz] • MXA: [offset \leq150 kHz] • PXA: [offset \leq400 kHz] |
| Readback | <p>Close-in.</p> <p>If manually selected, “Man” will be underlined. The actual frequency offset within which noise is optimized is shown with in square brackets, as this can vary depending on the hardware set in use. For example, in some analyzers this annotation appears as [offset <150 kHz]</p> |
| Initial S/W Revision | Prior to A.07.00 |

Best Wide-offset P Noise

The LO phase noise is optimized for wider offsets from the carrier. Closer offsets are compromised and the throughput of measurements (especially remote measurements where the center frequency is changing rapidly), is reduced.

| | |
|----------------------|--|
| Key Path | Meas Setup, PhNoise Opt |
| Example | WAV:FREQ:SYNT 2 |
| Couplings | <p>The frequency below which the phase noise is optimized is model dependent:</p> <p>CXA: n/a</p> <p>EXA: [offset >150 kHz]</p> <p>MXA: [offset >150 kHz]</p> <p>PXA: [offset >400 kHz]</p> |
| Readback | <p>Wide-offset.</p> <p>If manually selected, “Man” will be underlined. The actual frequency offset beyond which noise is optimized is shown with in square brackets, as this can vary depending on the hardware set in use. For example, in some analyzers this annotation appears as [offset >150 kHz]</p> |
| Initial S/W Revision | Prior to A.07.00 |

Fast Tuning

In this mode, the LO behavior compromises phase noise at many offsets from the carrier in order to allow rapid measurement throughput when changing the center frequency. The term “fast tuning” refers to the time it takes to move the local oscillator to the start frequency and begin a capture; this setting does not impact the actual measurement time in any way.

| | |
|----------------------|--|
| Key Path | Meas Setup, PhNoise Opt |
| Example | WAV:FREQ:SYNT 3 |
| State Saved | Saved in instrument state. |
| Readback | Fast Tuning. If manually selected the “Man” will be underlined. |
| Initial S/W Revision | Prior to A.07.00 |

Advanced

Accesses a menu of advanced functions that are used for specific applications. These settings should not be changed for most measurements.

| | |
|----------------------|------------------|
| Key Path | Meas Setup |
| Initial S/W Revision | Prior to A.02.00 |

ADC Dither

Accesses the ADC Dither control menu.

| | |
|----------------------|----------------------|
| Key Path | Meas Setup, Advanced |
| Initial S/W Revision | Prior to A.02.00 |

ADC Dither Auto

Sets ADC dithering to automatically select whether dithering is needed.

| | |
|-----------------------|---|
| Key Path | Meas Setup, Advanced, ADC Dither |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | [:SENSe] :WAVeform:ADC:DITHer:AUTO [:STATe] OFF ON 0 1 [:SENSe] :WAVeform:ADC:DITHer:AUTO [:STATe] ? |
| Example | WAV:ADC:DITH:AUTO ON WAV:ADC:DITH:AUTO? |
| Notes | The dither function improves linearity for low level signals, at the expense of a higher noise floor. You must be in a mode that includes the Waveform measurement to use this command. Use |

| | |
|--------------------------|------------------------------------|
| | INSTrument:SElect to set the mode. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

ADC Dither

Toggles the dither function On and Off. The dither function improves linearity for low level signals, at the expense of a higher noise floor.

The reduced clipping-to-noise ratio results in higher noise, because the clipping level of the ADC relative to the front terminals remains unchanged with the introduction of dither. The enhanced linearity is mostly improved scale fidelity.

With dither on, the third-order distortions are usually invisible for mixer levels below -35 dBm. With dither off, these distortions can be visible, with typical power levels of -110 dBm referred to the mixer. Detection nonlinearity can reach 1 dB for dither off at mixer levels around -70 dBm and lower, while the specified nonlinearity is many times smaller with dither on.

| | |
|------------------------------|---|
| Key Path | Meas Setup, Advanced, ADC Dither |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | [:SENSe] :WAVeform:ADC:DITHer [:STATe] OFF ON 0 1 [:SENSe] :WAVeform:ADC:DITHer [:STATe] ? |
| Example | WAV:ADC:DITH ON WAV:ADC:DITH? |
| Notes | The dither function improves linearity for low level signals, at the expense of a higher noise floor. . You must be in a mode that includes the Waveform measurement to use this command. Use INSTrument:SElect to set the mode. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | Auto Man |
| Backwards Compatibility SCPI | [:SENSe] :WAVeform:WBIF:ADC:DITHer [:SENSe] :WAVeform:PDITHer |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

IF Gain

Accesses the keys to select the IF Gain settings.

When in Autorange mode, the IF checks its range once for data acquisition, to provide the best signal to noise ratio. You can specify the range for the best speed, and optimize for noise or for large signals.

When the IF Gain is set to Autorange, the IF Gain is set to High initially for each chunk of data. The data is then acquired. If the IF overloads, then the IF Gain is set to Low and the data is re-acquired. Because of this operation, the Autorange setting uses more measurement time as the instrument checks/resets its range. You can get faster measurement speed by forcing the range to either the high or low gain setting. But you must know that your measurement conditions will not overload the IF (in the high gain range) and that your signals are well above the noise floor (for the low gain range), and that the signals are not changing.

When Digital Bus Out (under the Input/Output menu) is ON, the IF Gain State Autorange selection is not allowed. Thus, in this case, IF Gain State will be set to Low.

This only applies to the RF input. It does not apply to baseband I/Q input.

| | |
|----------------------|----------------------|
| Key Path | Meas Setup, Advanced |
| Initial S/W Revision | Prior to A.02.00 |

IF Gain Auto

Activates the auto rules for IF Gain

| | |
|--------------------------|---|
| Key Path | Meas Setup, Advanced, IF Gain |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | [:SENSe] :WAVeform:IF:GAIN:AUTO [:STATe] ON OFF 1 0 [:SENSe] :WAVeform:IF:GAIN:AUTO [:STATe] ? |
| Example | WAV:IF:GAIN:AUTO ON WAV:IF:GAIN:AUTO? |
| Notes | This only applies to the RF input. It does not apply to baseband I/Q input. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

IF Gain State

Selects the range of IF gain.

| | |
|--------------------------|---|
| Key Path | Meas Setup, Advanced, IF Gain |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTE4DD, DCATV, WLAN, MSR, LTE4DD, LTE4FDD |
| Remote Command | [:SENSe] :WAVeform:IF:GAIN [:STATe] AUToRange LOW HIGH [:SENSe] :WAVeform:IF:GAIN [:STATe] ? |
| Example | WAV:IF:GAIN HIGH WAV:IF:GAIN? |
| Notes | This only applies to the RF input and does not apply to baseband I/Q input. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRUMENT:SElect to set the mode. If the user tries to select Autorange while Digital Bus Out is ON, an error message -221 "Settings conflict; "IF Gain Autorange not allowed when Digital Bus Out is ON" is displayed. |
| Couplings | If the user tries to select Autorange via SCPI while Digital Bus Out is ON, an error message -224, "Illegal parameter value; "IF Gain Autorange not allowed when Digital Bus Out is on" is displayed. If the user tries to select Autorange via front panel while Digital Bus Out is ON, an advisory message "IF Gain Autorange not allowed when Digital Bus Out is on" is displayed. |
| Preset | LOW |
| State Saved | Saved in instrument state. |
| Range | Autorange (Slower Follows Signals) Low (Best for Large Signals) High (Best Noise Level) |
| Readback Text | Autorange Low High |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

IF Gain Offset

Sets the IF Gain offset in 2 dB step from -6 dB to +6 dB. Increasing the gain can increase the amplitude of small signals as long as you do not overdrive the hardware. Wideband gain should usually be adjusted after setting the input attenuation.

Internally, the IF Gain value will change based on the current configuration of the hardware. If you choose to offset this value, you may do so with this parameter. The value specified is not an absolute value but relative to the current internal IF Gain setting.

For example:

IF Gain Low + IF Gain Offset +4 dB = Total IF Gain of +4 dB (0 + 4 = 4)

IF Gain High + IF Gain Offset +4 dB = Total IF Gain of +14 dB (10 + 4 = 14)

IF Gain Low + IF Gain Offset -6 dB = Total IF Gain of -6 dB (0 - 6 = -6)

IF Gain High + IF Gain Offset -6 dB = Total IF Gain of +6 dB (10 - 6 = 4)

The total IF Gain range when IF Gain Offset is available is a minimum of $0 - 6 = -6$ dB and a maximum of $10 + 6 = 16$ dB. The available IF Gain depends on the IF Path and center frequency. The maximum IF Gain may not be achievable at all times depending on the configuration.

| | |
|----------------|---|
| Key Path | Meas Setup, Advanced |
| Remote Command | <code>[:SENSe] :WAVeform:IF:GAIN:OFFSet <rel_ampl ></code> <code>[:SENSe] :WAVeform:IF:GAIN:OFFSet?</code> |
| Example | WAV:IF:GAIN:OFFS 2 Sets the IF Gain offset to 2 |
| Preset | 0 |
| State Saved | Saved in instrument state. |
| Min | -6 |
| Max | +6 |
| Default Unit | dB |

Meas Preset

Restores all the measurement parameters to their default values.

| | |
|--------------------------|---|
| Key Path | Meas Setup |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | <code>:CONFigure:WAVeform</code> |
| Example | CONF:WAV |
| Notes | Restore default values of all parameters. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

HW Averaging

Changes the number of time averages is to be made using hardware. This averaging is much faster than the standard averaging done in software. The hardware averaging is done on the complex voltage time trace data before any measurement application averaging is done. Both types of averaging (HW and SW) can be done on the same measurement data.

When time averaging is being done in HW, each trace update represents N fresh data acquisitions averaged together, where N is the number of averages. You cannot access the individual time data. Note that in the spectrum measurement this averaging is done prior to the standard averaging done within the application. Thus the yellow trace in this measurement shows the result of the time averaging. Subsequent averaging is orthogonal to this hardware based time averaging and its result is seen as the blue trace in this and other applications.

So it is possible to turn off the averaging within the application but still have the HW averaging set to a certain number. In other words, turning averaging off within the measurement will not affect HW averaging. If HW averaging needs to be turned off, simply set the HW Averaging parameter to 1.

Since it is time averaging, a trigger source something other than Free Run should be used to avoid cancelling out the signal to be measured. It is most useful for a periodic signal with known periods.

Time Avg Num

Sets the number of HW averages to be executed per each data acquisition.

| | |
|-----------------------|---|
| Key Path | Meas Setup |
| Mode | BASIC |
| Remote Command | [:SENSe] :WAVeform:AVERage:TACount <integer> [:SENSe] :WAVeform:AVERage:TACount? |
| Example | WAV:AVER:TAC 10WAV:AVER:TAC? |
| Notes | This feature is only available when Option DP2, B40, or wider IF Bandwidth option is installed. |
| Preset | 1 |
| State Saved | Saved in instrument state |
| Min | 1 |
| Max | 65535 |
| Default Unit | Enter |

Sample Period (Aperture) Setting (Remote Command Only)

Returns the time between samples (sample period or aperture).

| | |
|-----------------------|--|
| Mode | BASIC |
| Remote Command | [:SENSe] :WAVeform:APERture? |
| Example | WAV:APER? |
| Notes | Query only. |
| Couplings | Coupled to Sample Rate by the following equation. Sample Period = 1/(Sample Rate) |
| Preset | 1/(Sample Rate Default) |
| Min | 1/(Max Sample Rate) |
| Max | 1/(Min Sample Rate) |

17 Waveform Measurement
Mode

Mode

See "[Mode](#)" on page 288

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings
- See "[How-To Preset](#)" on page 2168 for more information.

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :SYSTem:PRESet |
| Example | :SYST:PRES |
| Notes | *RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0. |
| Couplings | A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set. |
| Backwards Compatibility Notes | In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using |

| | |
|----------------------|------------------|
| | User Preset. |
| Initial S/W Revision | Prior to A.02.00 |

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

| Type Of Preset | SCPI Command | Front Panel Access |
|--------------------------------|--|--|
| Auto Couple | :COUPle ALL | Auto Couple front-panel key |
| Meas Preset | :CONFigure:<Measurement> | Meas Setup Menu |
| Mode Preset | :SYSTem:PRESet | Mode Preset (green key) |
| Restore Mode Defaults | :INSTrument:DEFault | Mode Setup Menu |
| Restore All Mode Defaults | :SYSTem:DEFault MODes | System Menu; Restore System Default Menu |
| *RST | *RST | not possible (Mode Preset with Single) |
| Restore Input/Output Defaults | :SYSTem:DEFault INPUt | System Menu; Restore System Default Menu |
| Restore Power On Defaults | :SYSTem:DEFault PON | System Menu; Restore System Default Menu |
| Restore Alignment Defaults | :SYSTem:DEFault ALIGN | System Menu; Restore System Default Menu |
| Restore Miscellaneous Defaults | :SYSTem:DEFault MISC | System Menu; Restore System Default Menu |
| Restore All System Defaults | :SYSTem:DEFault [ALL] :SYSTem:PRESet:PERsistent | System Menu; Restore System Default Menu |
| User Preset | :SYSTem:PRESet:USER | User Preset Menu |
| User Preset All Modes | :SYSTem:PRESet:USER:ALL | User Preset Menu |

| | | |
|----------------------|-----------------------|-------------|
| Power On Mode Preset | :SYSTem:PON:TYPE MODE | System Menu |
| Power On User Preset | :SYSTem:PON:TYPE USER | System Menu |
| Power On Last State | :SYSTem:PON:TYPE LAST | System Menu |

Preset Type (Remote Command Only)

As stated in the Backward Compatibility section, to be compatible with ESA/PSA the PRESet:TYPE command will be implemented as a no-op.

| | |
|-----------------------|--|
| Mode | All |
| Remote Command | :SYSTem:PRESet:TYPE FACTory MODE USER :SYSTem:PRESet:TYPE? |
| Example | :SYST:PRESet:TYPE FACT |
| Notes | This command is supported for backward compatibility only. It is a no-op which does not change the behavior of any preset operation. |
| Preset | This is unaffected by Preset but is set to Mode on a "Restore System Defaults->All" |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Mode Setup

See "[Mode Setup](#)" on page 320

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace and accesses a menu that enables you to select to do a next peak or minimum peak search.

| | |
|--------------------------|---|
| Key Path | Front-panel key |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | :CALCulate:WAVeform:MARKer[1] 2 ... 12:MAXimum |
| Example | CALC:WAV:MARK2:MAX |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Next Peak

Moves the selected marker to the next highest local maximum with a value less than that of the current marker.

| | |
|--------------------------|---|
| Key Path | Peak Search |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | :CALCulate:WAVeform:MARKer[1] 2 ... 12:MAXimum:NEXT |
| Example | CALC:WAV:MARK:MAX:NEXT |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Min Search

Moves the selected marker to the minimum y-axis value on the current trace.

| | |
|-----------------------|---|
| Key Path | Peak Search |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | :CALCulate:WAVeform:MARKer[1] 2 ... 12:MINimum |
| Example | CALC:WAV:MARK:MIN |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |

17 Waveform Measurement
Peak Search

| | |
|--------------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Print

See "Print" on page 348

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

| Type | Default Prefix | Menu |
|-----------------------|----------------|-----------------|
| State | State_ | (Save/Recall) |
| Trace + State | State_ | (Save/Recall) |
| Screen | Screen_ | (Save/Recall) |
| Amplitude Corrections | Ampcor_ | (Import/Export) |
| Traces | Trace_ | (Import/Export) |
| Limit Lines | LLine_ | (Import/Export) |
| Measurement Result | MeasR_ | (Import/Export) |
| Capture Buffer | CapBuf_ | (Import/Export) |

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE

Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE

If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

| | |
|----------------------|--|
| Key Path | Front-panel key |
| Notes | No remote command for this key specifically. |
| Initial S/W Revision | Prior to A.02.00 |

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

| Key Path | Front-panel key |
|-------------------------------|--|
| Notes | <p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATe <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p> |
| Backwards Compatibility Notes | <p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> |
| Backwards Compatibility Notes | <p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p> |
| Initial S/W Revision | Prior to A.02.00 |

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See "[More Information](#)" on page 2178.

| | |
|-----------------------|--|
| Key Path | Recall |
| Mode | All |
| Remote Command | :MMEMory:LOAD:STATe <filename> |
| Example | :MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path |
| Example | MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state. |
| Notes | <p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <ul style="list-style-type: none"> • If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number. <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p> |

| | |
|-------------------------------------|---|
| | there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu. |
| Backwards Compatibility SCPI | :MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

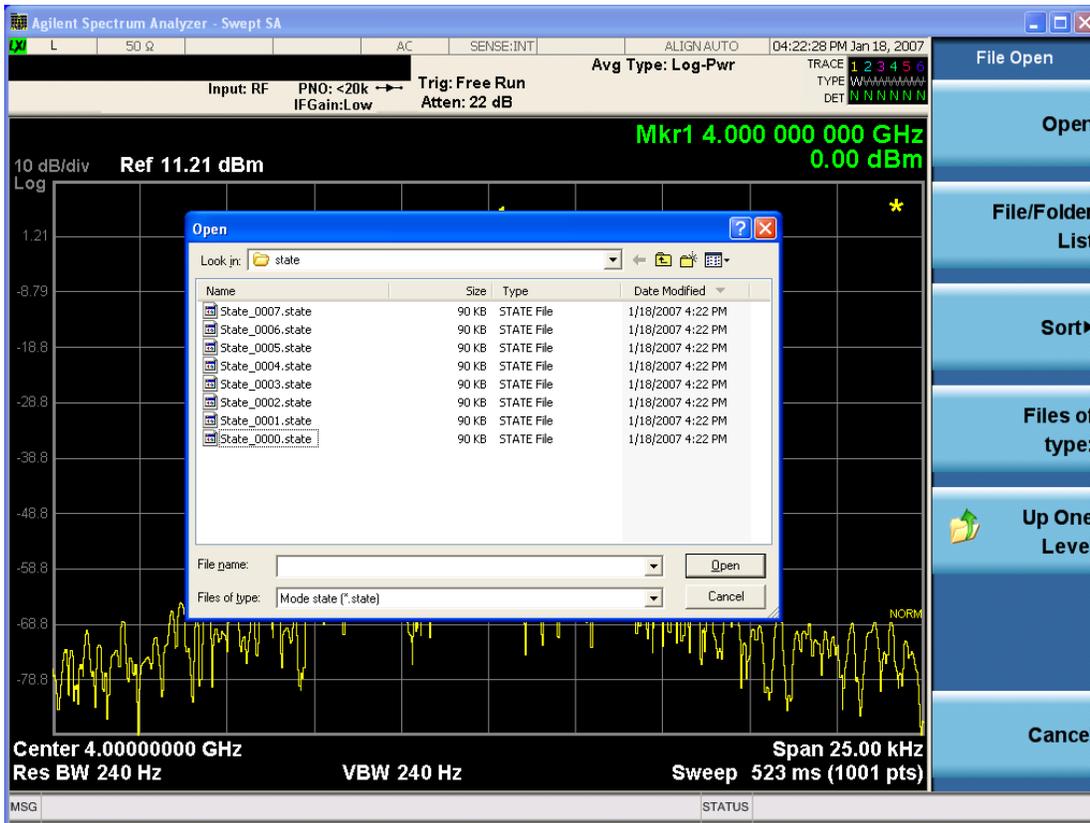
In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

The following table describes the Trace Save and Recall possibilities:

| | | |
|---|--|--|
| You want to recall state and one trace's data, leaving other traces unaffected. | Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed. | On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed. |
| You want to recall all traces | Save Trace+State from ALL traces. | On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved) |
| You want all traces to load exactly as they were when saved. | Save State | On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten. |

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Notes | Brings up the Open dialog for recalling a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Mode | All |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available" |
| Initial S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|--|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|---|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1-16 from front panel, 1-128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Data (Import)

Importing a data file loads data that was previously saved from the current measurement or from other measurements and/or modes that produce compatible data files. The Import Menu only contains Data Types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by the user prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Importing Data loads measurement data from the specified file into the specified or default destination, depending on the data type selected. Selecting an Import Data menu key will not actually cause the importing to occur, since the analyzer still needs to know from where to get the data. Pressing the Open key in this menu brings up the Open dialog and Open menu that provides you with the options from where to recall the data. Once a filename has been selected or entered in the Open menu, the recall occurs as soon as the Open button is pressed.

| | |
|----------------------|--|
| Key Path | Recall |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. Some keys will be missing completely, so the key locations in the sub-menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:LOAD commands. |
| Dependencies | If a file type is not used by a certain measurement, it is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Capture Buffer

The captured data is raw data which is not processed.

| | |
|----------------------|---|
| Key Path | Recall, Data |
| Mode | TD-SCDMA |
| Example | MMEM:LOAD:CAPT "MyCaptureData.bin" This loads the file of capture data (on the default file directory path) into the instrument. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Open...

When you press "Open", the analyzer brings up a Windows dialog and a menu entitled "**File Open.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[From File...](#)" on page 2309 in Recall, State, for a full description of this dialog and menu.

| | |
|----------------------|--|
| Key Path | Recall, Data |
| Notes | The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 2184

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate[:IMMEDIATE] :INITiate:RESTART |
| Example | :INIT:IMM :INIT:REST |
| Notes | :INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function. |
| Couplings | Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement. |
| Status Bits/OPC dependencies | This is an Overlapped command. The STATus:OPERation register bits 0 through 8 are cleared. The STATus:QUESTionable register bit 9 (INTegrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set. |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command `CALC:AVER:TCON UP`.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Mode | All |
| Notes | No remote command for this key specifically, but the :MMEM:STOR:STATe <filename> command is available for specific file types. An example is :MMEM:STOR:STATe <filename>. |
| Initial S/W Revision | Prior to A.02.00 |

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

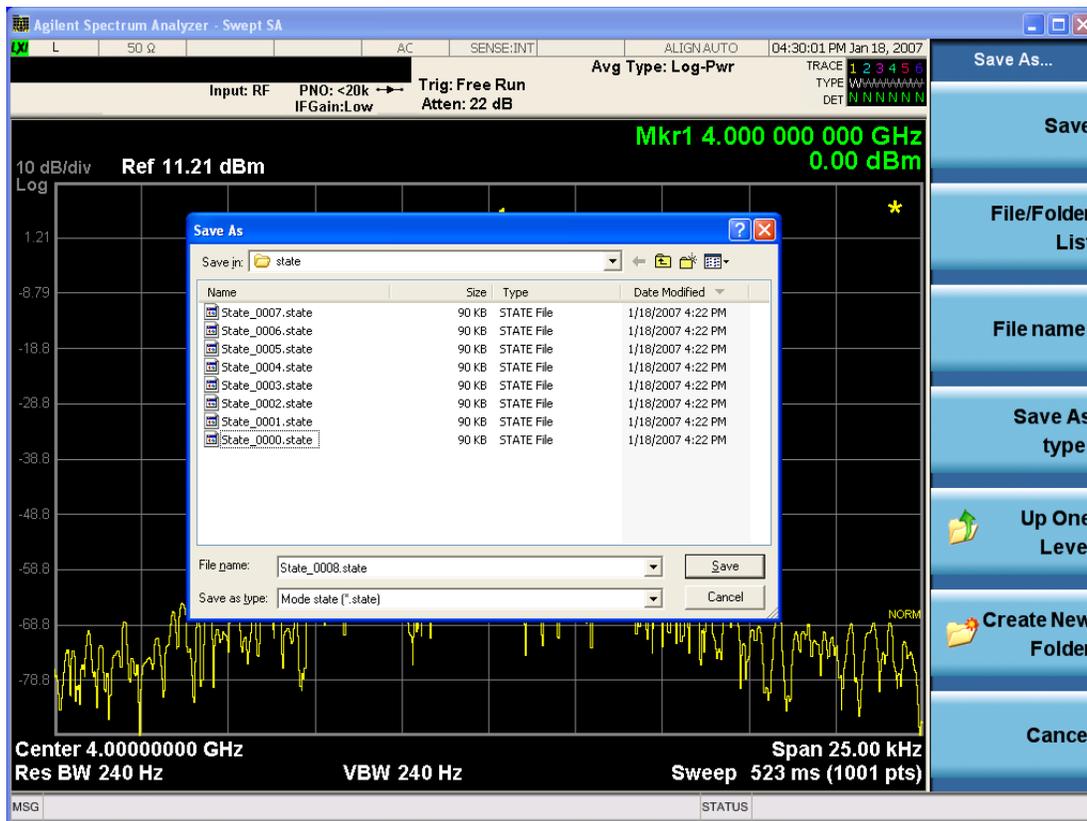
| | |
|----------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:STATe <filename> |
| Example | MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory. |
| Notes | Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key |

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

| | |
|-------------------------------------|-----------------------------------|
| Backwards Compatibility SCPI | :MMEMoRY:STORe:STATe 1,<filename> |
| Initial S/W Revision | Prior to A.02.00 |

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “**Save As.**” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2305](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Save, State |
| Mode | All |
| Notes | Brings up Save As dialog for saving a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 2189](#)

| | |
|-----------------------|--|
| Key Path | Save, State |
| Mode | All |
| Remote Command | :MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number> |
| Example | :MMEM:REG:STAT:LAB 1,"my label" |
| Notes | <reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,"" |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available" |
| Preset | The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc" |
| Initial S/W Revision | A.11.00 |

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

| | |
|----------------------|---|
| Key Path | Save |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands. |
| Dependencies | If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Meas Results

| | |
|----------------------|---|
| Key Path | Save, Data |
| Mode | TD-SCDMA |
| Example | MMEM:STOR:RES "MyResultsFile.csv" This stores the measurement results data in the file MyResultsFile.xml in the default directory. |
| Initial S/W Revision | A.11.00 |

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data which is not processed.

| | |
|----------------------|--|
| Key Path | Save, Data |
| Mode | TD-SCDMA |
| Example | MMEM:STOR:CAPT "MyCaptureData.bin" This stores the capture data in the file MyCaptureData.bin in the default directory. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Save As . . .

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\<<mode name>\data\traces

For all of the Limit Data Files:

My Documents\<<mode name>\data\limits

For all of the Measurement Results Data Files:

My Documents\<<mode name>\data\<<measurement name>\results

For all of the Capture Buffer Data Files:

My Documents\<<mode name>\data\captureBuffer

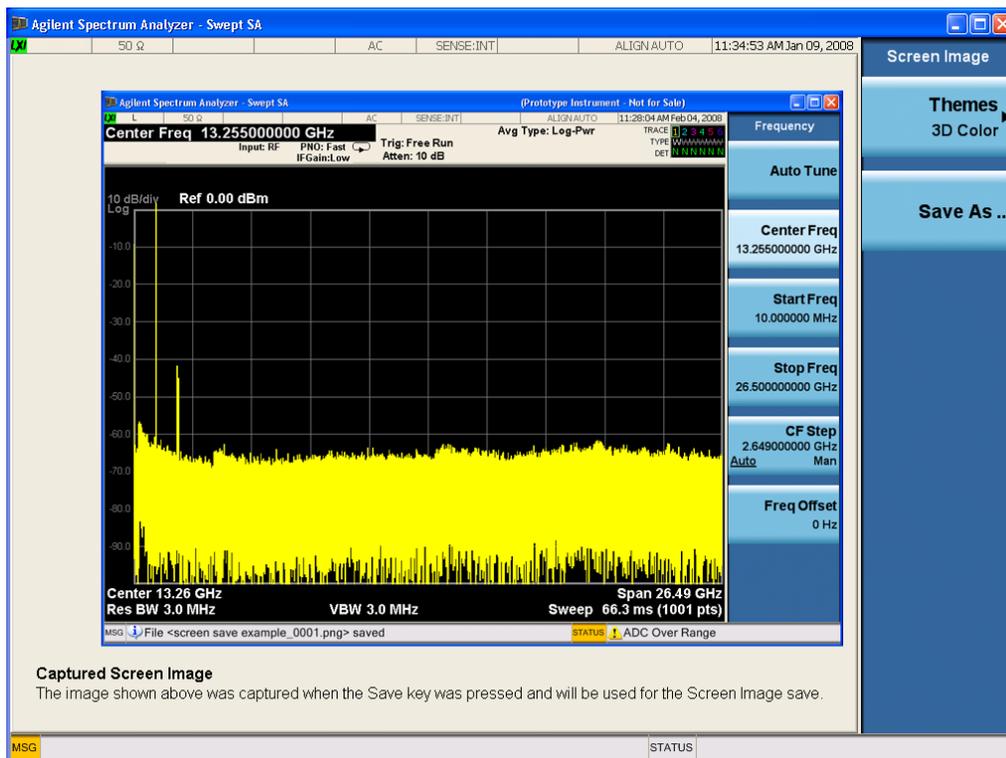
| | |
|----------------------|--|
| Key Path | Save, Data |
| Mode | All |
| Notes | The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <mode specific> Save Type. The save is performed immediately and does not wait until the measurement is complete. |
| Initial S/W Revision | Prior to A.02.00 |

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE

For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

| | |
|----------------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:SCReem <filename> |
| Example | :MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|-------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReem:THEMe TDColor TDMonochrome FCOLor FMONochrome :MMEMory:STORe:SCReem:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|----------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |

| | |
|----------------------|------------------|
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Save As...

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

| | |
|----------------------|--|
| Key Path | Save, Screen Image |
| Notes | Brings up Save As dialog for saving a Screen Image Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Catalog (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:CATalog? [<directory_name>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format:</p> <p><numeric_value>,<numeric_value>,{<file_entry>}</p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list:</p> <p><file_name>,<file_type>,<file_size></p> <p>As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Change Directory (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:CDIRectory [<directory_name>] :MMEMory:CDIRectory? |
| Notes | <p>The string must be a valid logical path.</p> <p>Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.</p> <p>At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.</p> <p>Query returns full path of the default directory.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Copy (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:COpy <string>,<string>[,<string>,<string>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Copies an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:COpy:DEvice <source_string>,<dest_string> |
| Notes | <p>The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device.</p> <p>Valid device keywords are:</p> <p>SNS (smart noise source)</p> <p>An error is generated if the file or device is not found.</p> |

Mass Storage Delete (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DElete <file_name>[,<directory_name>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an "access denied" error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name> |
| Notes | The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Make Directory (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MDIRectory <directory_name> |
| Notes | The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created. This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Move (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MOVE <string>,<string>[,<string>,<string>] |
| Notes | The string must be a valid logical path. Moves an existing file to a new file or an existing directory to a new directory. Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination. The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists. This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Remove Directory (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | <code>:MMEMory:RDIRECTory <directory_name></code> |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See ["More Information" on page 2200](#)

| | |
|-------------------------------|---|
| Key Path | Front-panel key |
| Example | :INIT:CONT OFF |
| Notes | See Cont key description. |
| Backwards Compatibility Notes | <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p> |
| Initial S/W Revision | Prior to A.02.00 |

More Information

See ["Restart" on page 2315](#) for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

| Key Path | Front-panel key |
|----------|-----------------|
|----------|-----------------|

Span X Scale

Accesses a menu of functions that enable you to set the horizontal scale parameters.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Ref Value

Sets the reference value for time on the horizontal axis. When Auto Scaling is set to On, the displayed plots use a Scale/Div value determined by the analyzer, based on the measurement result.

| | |
|--------------------------|--|
| Key Path | SPAN X Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | :DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALE]:RLEVel <time> :DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALE]:RLEVel? |
| Example | DISP:WAV:VIEW:WIND:TRAC:X:RLEV 10 ms DISP:WAV:VIEW:WIND:TRAC:X:RLEV? |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | If Auto Scaling is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scaling automatically changes to Off. |
| Preset | 0.00 s |
| State Saved | Saved in instrument state. |
| Min | -1.000 s |
| Max | 10.00 s |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Scale/Div

Sets the horizontal scale by changing a time value per division.

| | |
|----------------|--|
| Key Path | SPAN X Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | :DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALE]:PDIVision <time> :DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALE]:PDIVision? |
| Example | DISP:WAV:VIEW:WIND:TRAC:X:PDIV 500 us DISP:WAV:VIEW:WIND:TRAC:X:PDIV? |

| | |
|--------------------------|--|
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRUMENT:SElect to set the mode. |
| Couplings | If Auto Scaling is set to On, this value is automatically determined by the measurement result. When you set this value manually, Auto Scaling automatically changes to Off. |
| Preset | All except the following list: 200.0 us LTEAFDD, LTEATDD: 1.000 ms LTETDD: 1.000 ms |
| State Saved | Saved in instrument state. |
| Min | 1.000 ns |
| Max | 320 s |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.14.00 |

Ref Position

Sets the reference position for the X axis to Left, Center or Right.

| | |
|--------------------------|--|
| Key Path | SPAN X Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | :DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALe]:RPOSition LEFT CENTER RIGHT :DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALe]:RPOSition? |
| Example | DISP:WAV:VIEW:WIND:TRAC:X:RPOS LEFT DISP:WAV:VIEW:WIND:TRAC:X:RPOS? |
| Notes | Allows you to set the reference position to Left, Ctr (center) or Right. You must be in a mode that includes the Waveform measurement to use this command. Use INSTRUMENT:SElect to set the mode. |
| Preset | LEFT |
| State Saved | Saved in instrument state. |
| Range | Left Ctr Right |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Auto Scaling

Toggles the scale coupling function between On and Off.

| | |
|---------------------------------|--|
| Key Path | SPAN X Scale |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CM MB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | :DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALE]:COUPle 0 1 OFF ON :DISPlay:WAVeform:VIEW[1] 2:WINDow[1]:TRACe:X[:SCALE]:COUPle? |
| Example | DISP:WAV:VIEW:WIND:TRAC:X:COUP ON DISP:WAV:VIEW:WIND:TRAC:X:COUP? |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Couplings | When Auto Scaling is On and the Restart front-panel key is pressed, this function automatically determines the scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off. |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Sweep/Control

Accesses a menu that enables you to configure the Sweep and Control functions of the analyzer, such as Sweep Time and Gating.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Pause/Resume

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume un-pauses the measurement. When you are Paused, pressing Restart, Single or Cont does a Resume.

| | |
|-----------------------|--|
| Key Path | Sweep/Control |
| Remote Command | :INITiate:PAUSE |
| Dependencies | Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing. |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Key Path | Sweep/Control |
| Remote Command | :INITiate:RESume |
| Dependencies | Grayed out in Measurements that do not support Pausing. Blanked in Modes that do not support Pausing. |
| Initial S/W Revision | Prior to A.02.00 |

Abort (Remote Command Only)

This command is used to stop the current measurement. It aborts the current measurement as quickly as possible, resets the sweep and trigger systems, and puts the measurement into an "idle" state. If the analyzer is in the process of aligning when ABORT is sent, the alignment finishes before the abort function is performed. So ABORT does not abort an alignment.

If the analyzer is set for Continuous measurement, it sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is set for Single measurement, it remains in the "idle" state until an :INIT:IMM command is received.

| | |
|-----------------------|--------|
| Remote Command | :ABORt |
| Example | :ABOR |

| | |
|------------------------------|--|
| Notes | <p>If :INITiate:CONTInuous is ON, then a new continuous measurement will start immediately, with sweep (data acquisition) occurring once the trigger condition has been met.</p> <p>If :INITiate:CONTInuous is OFF, then :INITiate:IMMEDIATE is used to start a single measurement; with sweep (data acquisition) occurring once the trigger condition has been met.</p> |
| Dependencies | <p>For continuous measurement, ABORt is equivalent to the Restart key.</p> <p>Not all measurements support the abort command.</p> |
| Status Bits/OPC dependencies | <p>The STATus:OPERation register bits 0 through 8 are cleared.</p> <p>The STATus:QUEStionable register bit 9 (INTegrity sum) is cleared.</p> <p>Since all the bits that feed into OPC are cleared by the ABORt, the ABORt will cause the *OPC query to return true.</p> |
| Initial S/W Revision | Prior to A.02.00 |

System

See "System" on page 349

Trace/Detector

There is no Trace/Detector functionality supported in the Waveform measurement. The front-panel key displays a blank menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Trigger

See ["Trigger" on page 424](#)

Free Run

See ["Free Run " on page 431](#)

Video

See ["Video \(IF Envelope\) " on page 432](#)

Trigger Level

See ["Trigger Level " on page 432](#)

Trig Slope

See ["Trig Slope " on page 433](#)

Trig Delay

See ["Trig Delay " on page 434](#)

External 1

See ["External 1 " on page 2357](#)

Trigger Level

See ["Trigger Level " on page 2357](#)

Trig Slope

See ["Trig Slope " on page 2358](#)

Trig Delay

See ["Trig Delay " on page 437](#)

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off" on page 2346](#)

External 2

See ["External 2 " on page 2359](#)

Trigger Level

See ["Trigger Level " on page 2359](#)

Trig Slope

See ["Trig Slope " on page 2360](#)

Trig Delay

See ["Trig Delay "](#) on page 440

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off"](#) on page 2348

RF Burst

See ["RF Burst "](#) on page 2360

Absolute Trigger

See ["Absolute Trigger Level"](#) on page 2361

Relative Trigger

See ["Relative Trigger Level"](#) on page 2350

Trig Slope

See ["Trigger Slope "](#) on page 2362

Trig Delay

See ["Trig Delay "](#) on page 444

Auto/Holdoff

See ["Auto/Holdoff "](#) on page 445

Auto Trig

See ["Auto Trig "](#) on page 445

Trig Holdoff

See ["Trig Holdoff "](#) on page 446

Holdoff Type

See ["Holdoff Type"](#) on page 446

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

| Key Path | Front-panel key |
|-------------------------------|--|
| Backwards Compatibility Notes | <p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p> |
| Initial S/W Revision | Prior to A.02.00 |

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER |
| Notes | :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed |
| Couplings | A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:ALL |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL |
| Notes | Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. |
| Couplings | A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

| | |
|-----------------------|---|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:SAVE |
| Example | :SYST:PRES:USER:SAVE |
| Notes | :SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file. |
| Initial S/W Revision | Prior to A.02.00 |

View/Display

Accesses a menu of functions that enable you to set up and control the display parameters for the current measurement.

This topic contains the following sections:

["View Selection by name \(Remote Command Only\)" on page 2214](#)

["View Selection by number \(Remote Command Only\)" on page 2214](#)

View Selection by name (Remote Command Only)

Selects the results view.

| | |
|--------------------------|---|
| Key Path | View/Display |
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | :DISPlay:WAVeform:VIEW[:SElect] RFENvelope IQ :DISPlay:WAVeform:VIEW[:SElect]? |
| Example | DISP:WAV:VIEW RFEN DISP:WAV:VIEW? |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | RFENvelope |
| State Saved | Saved in instrument state. |
| Range | RF Envelope Q Waveform |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

View Selection by number (Remote Command Only)

Displays the numeric values of the measurement results.

| | |
|-----------------------|---|
| Mode | BASIC, PNOISE, WCDMA, C2K, GSM, WIMAXOFDMA, TDSCDMA, 1XEVD0, DVB, DTMB, ISDBT, CMMB, LTE, LTETDD, DCATV, WLAN, MSR,LTEATDD, LTEAFDD |
| Remote Command | :DISPlay:WAVeform:VIEW:NSElect <integer> :DISPlay:WAVeform:VIEW:NSElect? |
| Example | DISP:WAV:VIEW:NSEL 1 DISP:WAV:VIEW:NSEL? |
| Notes | You must be in a mode that includes the Waveform measurement to use this command. Use INSTRument:SElect to set the mode. |
| Preset | 1 |
| State Saved | Saved in instrument state. |

| | |
|--------------------------|------------------|
| Min | 1 |
| Max | 2 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

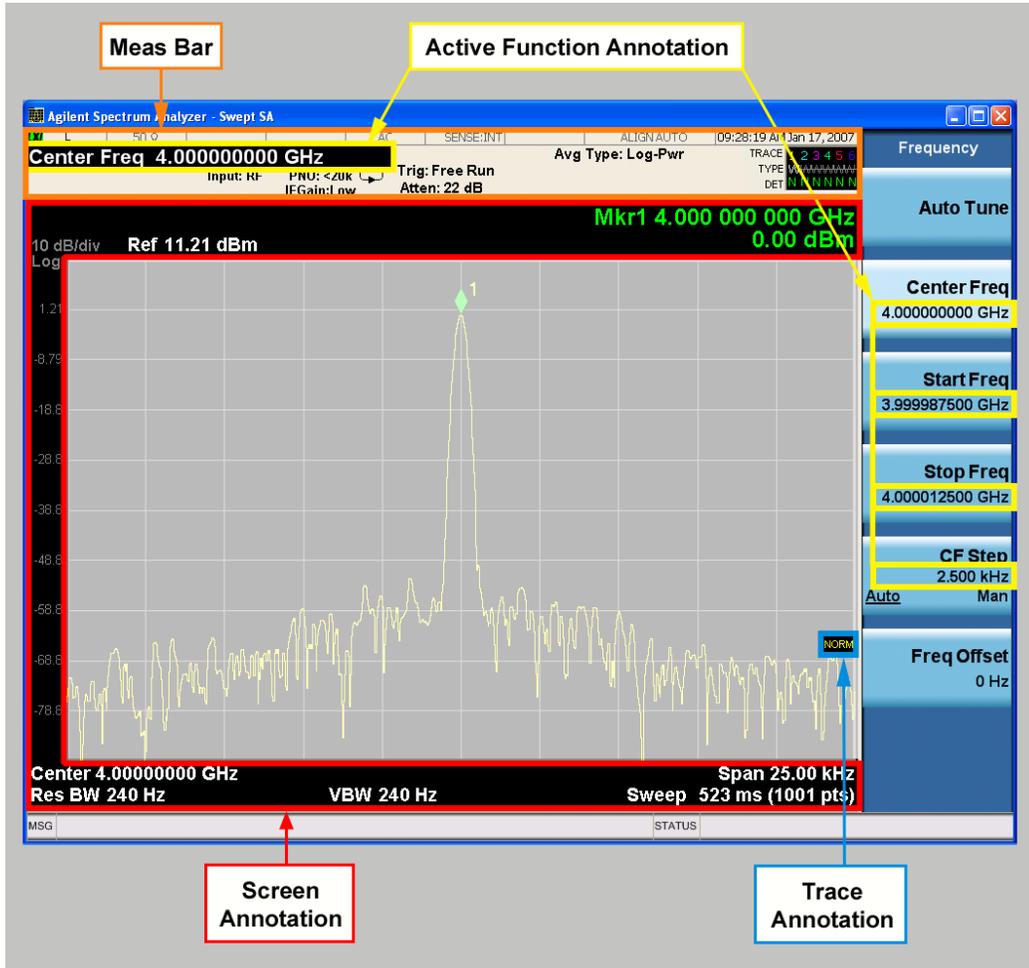
| | |
|----------------------|------------------|
| Key Path | Display |
| Key Path | View/Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

| | |
|----------------------|--|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNOtation:MBAR[:STATe] OFF ON 0 1 :DISPlay:ANNOtation:MBAR[:STATe]? |
| Example | DISP:ANN:MBAR OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off. |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Screen

This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

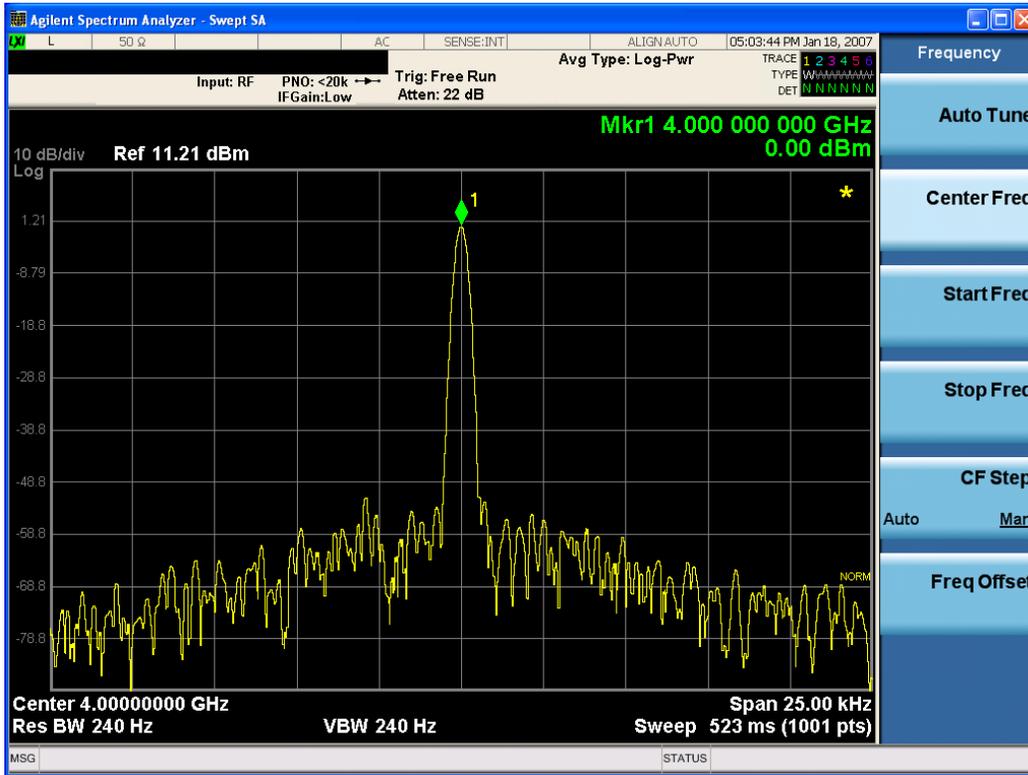
| | |
|-----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]? |
| Example | DISP:ANN:SCR OFF |
| Dependencies | Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..

17 Waveform Measurement
View/Display



| | |
|----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE] ? |
| Example | DISP:ACT OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Title

Displays menu keys that enable you to change or clear a title on your display.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Mode | All |
| Remote Command | :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA? |
| Example | DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title |
| Notes | Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters. |
| Preset | No title (measurement name instead) |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Example | The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required. |
| Notes | Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted). |
| Preset | Performed on Preset. |
| Initial S/W Revision | Prior to A.02.00 |

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

| | |
|----------------------|--|
| Key Path | View/Display, Display |
| Remote Command | :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]? |
| Example | DISP:WIND:TRAC:GRAT:GRID OFF |
| Notes | The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis. |
| Preset | On |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

| | |
|-------------------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:WINDow[1]:ANNotation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNotation[:ALL]? |
| Example | :DISP:WIND:ANN OFF |
| Preset | On (Set by Restore Misc Defaults) |
| State Saved | Not saved in instrument state. |
| Backwards Compatibility Notes | The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOlor FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

| | |
|-----------------------|--|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight ON OFF :DISPlay:BACKlight? |
| Preset | ON (Set by Restore Misc Defaults) |
| Initial S/W Revision | Prior to A.02.00 |

Backlight Intensity

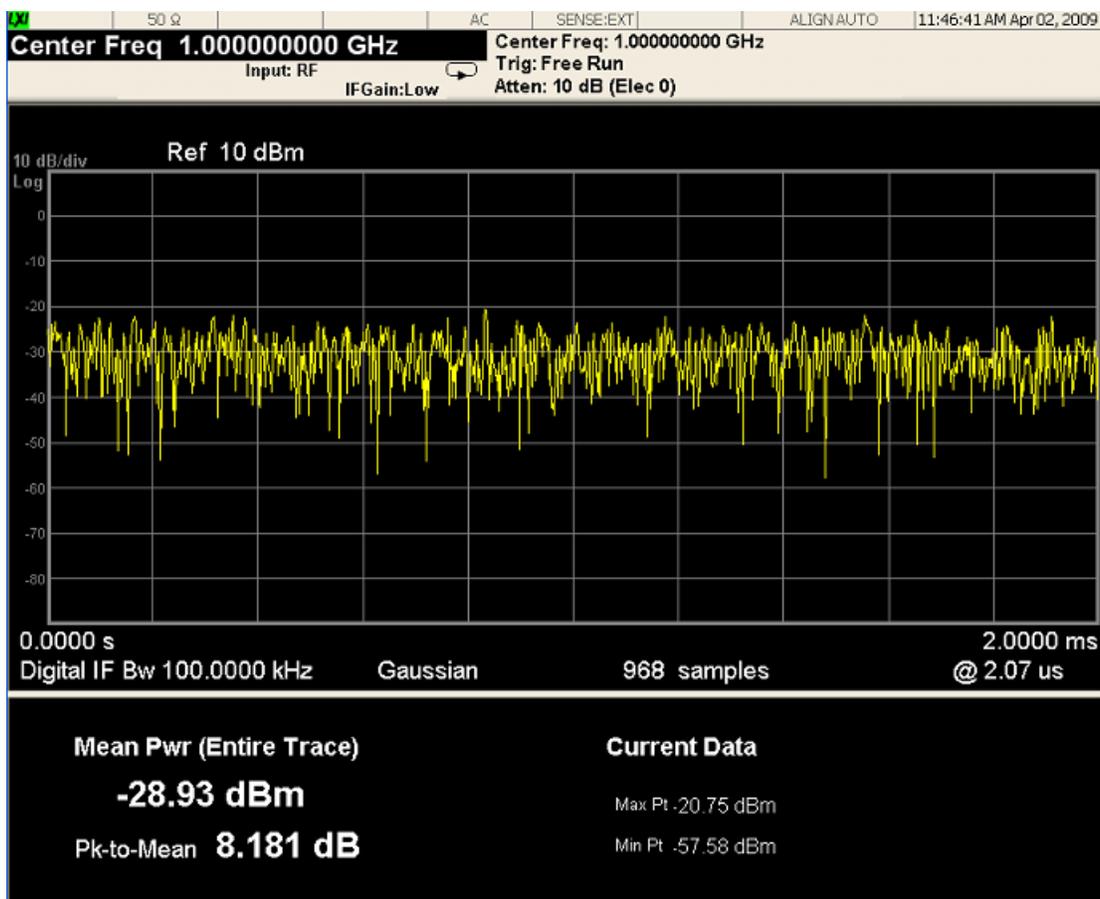
An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

| | |
|-----------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity? |
| Example | DISP:BACK:INT 50 |

| | |
|----------------------|------------------------------------|
| Preset | 100 (Set by Restore Misc Defaults) |
| Min | 0 |
| Max | 100 |
| Initial S/W Revision | Prior to A.02.00 |

RF Envelope

This view shows an example of the RF Envelope result for the waveform (time domain) measurements in the graph window. The measured values for the mean power and peak-to-mean power are shown in the text window.



Numeric Results

| Name | Type | Description | Unit | Format |
|----------|---------|--|------|-----------|
| Mean Pwr | Float64 | The mean power (dBm). This is either the power across the entire trace, or the power between markers if the markers are enabled. | dBm | XX.XX dBm |

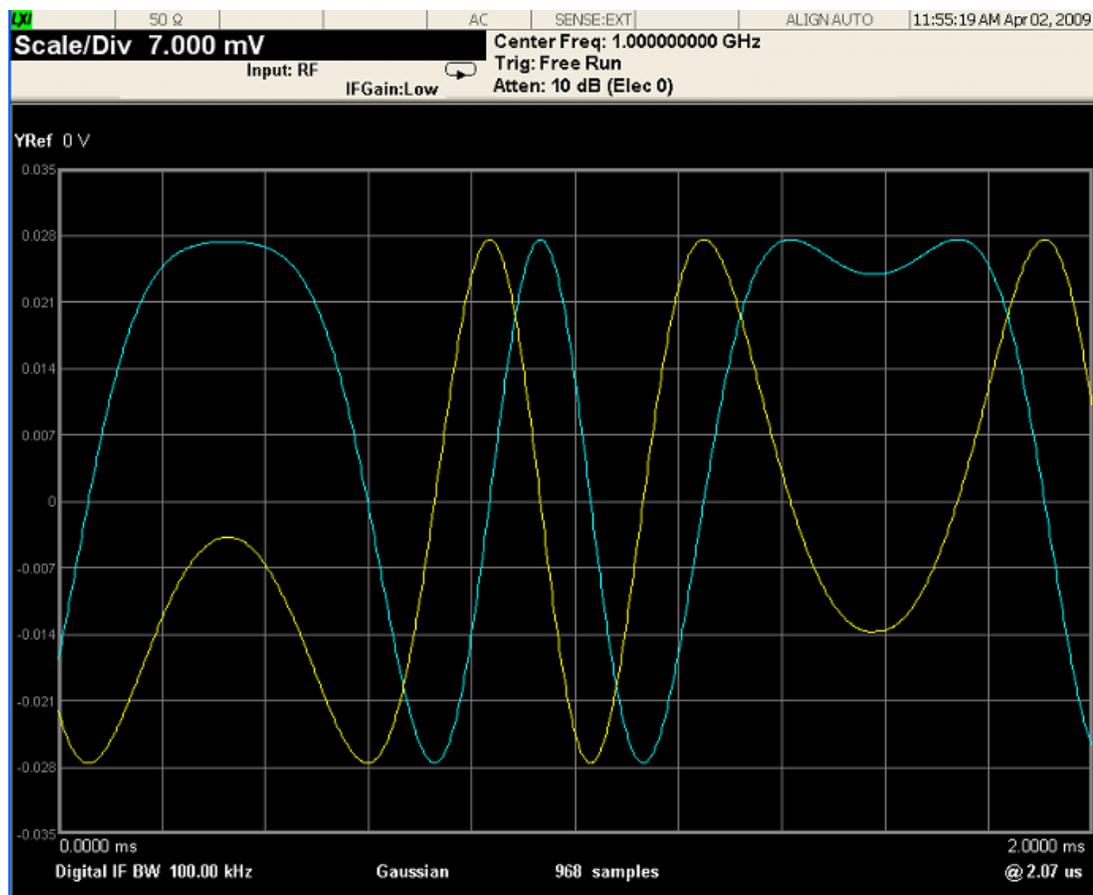
| Name | Type | Description | Unit | Format |
|------------|---------|--|------|-----------|
| Pk-to-Mean | Float64 | This is the ratio of the maximum signal level to the mean power. | dB | XX.XX dB |
| Max Pt | Float64 | The maximum of the most recently acquired data. | dBm | XX.XX dBm |
| Min Pt | Float64 | The minimum of the most recently acquired data. | dBm | XX.XX dBm |

Key Path View/Display

Initial S/W Revision Prior to A.02.00

I/Q Waveform

This view shows the I and Q signal waveforms in parameters of voltage versus time.



Key Path View/Display

Initial S/W Revision Prior to A.02.00

18 Monitor Spectrum Measurement

The monitor spectrum measurement is used as a quick, convenient means of looking at the entire spectrum. While the look and feel are similar to the Spectrum Analyzer mode, the functionality is greatly reduced for easy operation. The main purpose of the measurement is to show the spectrum. The default span should cover an appropriate frequency range of the application.

For measurement results and views, see ["View/Display" on page 2381](#).

This topic contains the following sections:

["Measurement Commands for Monitor Spectrum" on page 2228](#)

["Remote Command Results for Monitor Spectrum Measurement" on page 2229](#)

Measurement Commands for Monitor Spectrum

The following commands can be used to retrieve the measurement results:

`:CONFigure:MONitor`

`:CONFigure:MONitor:NDEFault`

`:INITiate:MONitor`

`:FETCh:MONitor[n]?`

`:READ:MONitor[n]?`

`:MEASure:MONitor[n]?`

For more measurement related commands, see the SENSE subsystem, and the section "[Remote Measurement Functions](#)" on page 2284.

Remote Command Results for Monitor Spectrum Measurement

The following table describes the results returned by the queries listed above, according to the index value n .

| n | Results Returned |
|----------------------|---|
| 1 (or not specified) | Returns trace1 data with comma separated floating numbers |
| 2 | Returns trace2 data with comma separated floating numbers |
| 3 | Returns trace3 data with comma separated floating numbers |

| | |
|----------------------|------------------|
| Key Path | Meas |
| Initial S/W Revision | Prior to A.02.00 |

AMPTD Y Scale

Accesses a menu of functions that enable you to set the vertical scale parameters. These functions control how data on the vertical (Y) axis is displayed and control instrument settings that affect the vertical axis.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Ref Value

Sets the absolute power reference value. However, since Auto Scaling defaults to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | All except SA and BASIC |
| Remote Command | :DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel <real> :DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RLEVel? |
| Example | DISP:MON:VIEW:WIND:TRAC:Y:RLEV 2.0 DISP:MON:VIEW:WIND:TRAC:Y:RLEV? |
| Couplings | When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off. |
| Preset | 10.00 dBm |
| State Saved | Saved in instrument state. |
| Min | -250.00 dBm |
| Max | 250.00 dBm |
| Initial S/W Revision | Prior to A.02.00 |

Attenuation

This menu controls the attenuator functions and interactions between the attenuation system components.

There are two attenuator configurations in the X-Series. One is a dual attenuator configuration consisting of a mechanical attenuator and an optional electronic attenuator. The other configuration uses a single attenuator with combined mechanical and electronic sections that controls all the attenuation functions. Different models in the X-Series come with different configurations.

See ["Dual Attenuator Configurations:" on page 2231](#)

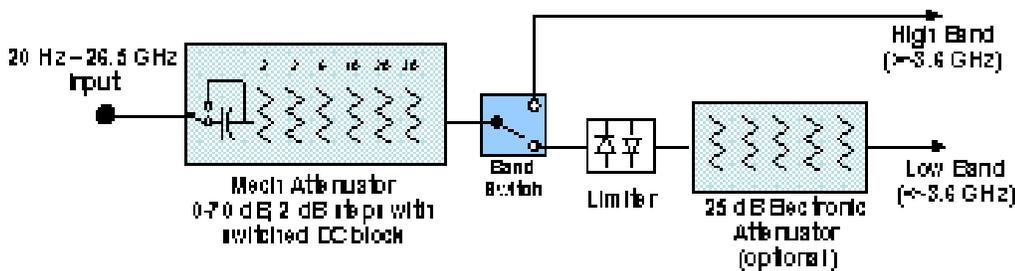
See ["Single Attenuator Configuration:" on page 2231](#)

Most Attenuation settings are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

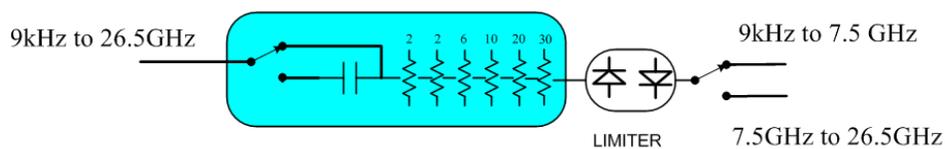
| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Dependencies | In measurements that support the I/Q inputs, this key is unavailable when I/Q is the selected input, and is replaced by the Range key in that case. |
| Readback Line | Contains a summary in [] brackets of the current total attenuation. See the descriptions of the , " (Mech) Atten " on page 2232, and " Enable Elec Atten " on page 2234 keys for more detail on the contributors to the total attenuation. Note that when "Pre-Adjust for Min Clip" is on, this value can change at the start of every measurement. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Dual Attenuator Configurations:

Configuration 1: Mechanical attenuator + optional electronic attenuator

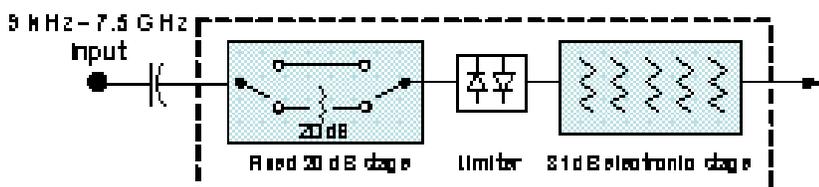


Configuration 2: Mechanical attenuator, no optional electronic attenuator



(note that Configuration 2 is not strictly speaking a dual-section attenuator, since there is no electronic section available. However, it behaves exactly like Configuration 1 without the Electronic Attenuator option EA3, therefore for the sake of this document it is grouped into the "Dual Attenuator" configuration)

Single Attenuator Configuration:



You can tell which attenuator configuration you have by pressing the Attenuation key, which (in most Modes) opens the Attenuation menu. If the first key in the Attenuation menu says Mech Atten you have the dual attenuator configuration. If the first key says Atten you have the single attenuator configuration.



In the single attenuator configuration, you control the attenuation with a single control, as the fixed stage has only two states. In the dual attenuator configuration, both stages have significant range so you are given separate control of the mechanical and electronic attenuator stages.

When you have the dual attenuator configuration, you may still have only a single attenuator, because unless option EA3 (the Electronic Attenuator option) is available, and you purchase it, you will have only the mechanical attenuator.

(Mech) Atten

This key is labeled Mech Atten in dual attenuator models and Atten in single attenuator models. In the dual attenuator configuration, this key only affects the mechanical attenuator.

This key lets you modify the attenuation applied to the RF input signal path. This value is normally auto coupled to the Ref Level, the Internal Preamp Gain, any External Gain that is entered, and the Max Mixer Level, as described in the table below.

See "[Attenuator Configurations and Auto/Man](#)" on page 2233

| Key Path | AMPTD Y Scale, Attenuation |
|-----------------------|--|
| Remote Command | <pre>[:SENSe] : POWer [:RF] : ATTenuation <rel_ampl></pre> <pre>[:SENSe] : POWer [:RF] : ATTenuation?</pre> <pre>[:SENSe] : POWer [:RF] : ATTenuation : AUTO OFF ON 0 1</pre> <pre>[:SENSe] : POWer [:RF] : ATTenuation : AUTO?</pre> |
| Example | <p>POW:ATT 20</p> <p>Dual attenuator configuration: sets the mechanical attenuator to 20 dB</p> <p>Single attenuator mode: sets the main attenuation to 20 dB (see below for definition of "main" attenuation).</p> <p>If the attenuator was in Auto, it sets it to Manual.</p> |
| Dependencies | <p>Some measurements do not support the Auto setting of (Mech) Atten. In these measurements, the Auto/Man selection is not available, and the Auto/Man line on the key disappears.</p> <p>In dual attenuator configurations, when the electronic attenuator is enabled, the mechanical attenuator has no auto setting and the Auto/Man line on the key disappears. The state of Auto/Man is remembered and restored when the electronic attenuator is once again disabled. This is described in more detail in the "Enable Elec Atten" on page 2234 key description.</p> <p>See "Attenuator Configurations and Auto/Man" on page 2233 for more information on the Auto/Man functionality of Attenuation.</p> |
| Couplings | |

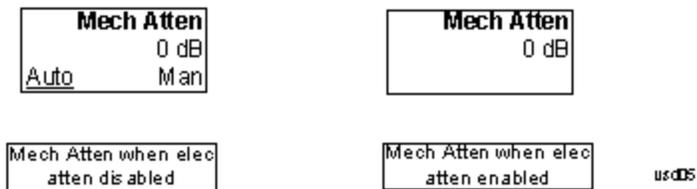
| | |
|--------------------------|--|
| | <p>When (Mech) Atten is in Auto, it uses the following algorithm to determine a value: If the USB Preamp is connected to USB, use 0 dB. Otherwise, $Atten = ReferenceLevel + PreAmpGain + ExternalGain - RefLevelOffset - MaxMixerLevel + IF\ Gain$. Limit this value to be between 6 dB and the Max value. No value below 6 dB can ever be chosen by Auto. The resulting value is rounded up to the largest value possible given the attenuation step setting. That is, 50.01 dB would change to 60 dB (for a 10 dB attenuation step). The "IF Gain" term in the equation above is either 0 dB or +10 dB, depending on the settings of FFT IF Gain, Swept IF Gain, max Ref Level and the Auto/Man setting of Mech Atten. In External Mixing and BBIQ, where the Attenuator is not in the signal path, the Attenuator setting changes as described above when (Mech) Atten is in Auto, but no changes are made to the actual attenuator hardware setting until the input is changed back to the RF Input.</p> |
| Preset | <p>The preset for Mech Attenuation is "Auto." The Auto value of attenuation is: CXA, EXA, MXA and PXA: 10 dB</p> |
| State Saved | <p>Saved in instrument state</p> |
| Min | <p>0 dB The attenuation set by this key cannot be decreased below 6 dB with the knob or step keys. To get to a value below 6 dB it has to be directly entered from the keypad or via SCPI. This protects from adjusting the attenuation to a dangerously small value which can put the instrument at risk of damage to input circuitry. However, if the current mechanical attenuation is below 6 dB it can be increased with the knob and step keys, but not decreased.</p> |
| Max | <p>CXA N9000A-503/507: 50 dB CXA N9000A-513/526: 70dB EXA: 60 dB MXA and PXA: 70 dB In the single attenuator configuration, the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB.</p> |
| Initial S/W Revision | <p>Prior to A.02.00</p> |
| Modified at S/W Revision | <p>A.03.00</p> |

Attenuator Configurations and Auto/Man

As described in the Attenuation key description, there are two distinct attenuator configurations available in the X-Series, the single attenuator and dual attenuator configurations. In dual attenuator configurations, we have the mechanical attenuation and the electronic attenuation, and the current total attenuation is the sum of the electronic + mechanical attenuation. In single attenuator configurations, we refer to the attenuation set using the (Mech) Atten key (or POW:ATT SCPI) as the "main" attenuation; and the attenuation that is set by the SCPI command POW:EATT as the "soft" attenuation (the POW:EATT command is honored even in the single attenuator configuration, for compatibility purposes). Then the

current total attenuation is the sum of the main + soft attenuation. See the Elec Atten key description for more on “soft” attenuation.

In the dual attenuator configuration, when the electronic attenuator is enabled, there is no Auto/Man functionality for the mechanical attenuator, and the third line of the key label (the Auto/Man line) disappears:



Enable Elec Atten

Enables the Electronic Attenuator.

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear. These advantages primarily aid in remote operation and are negligible for front panel use. See ["Using the Electronic Attenuator: Pros and Cons" on page 2236](#) for a detailed discussion of the pros and cons of using the electronic attenuator.

For the single attenuator configuration, for SCPI backwards compatibility, the “soft” attenuation feature replaces the dual attenuator configuration’s electronic attenuator. All the same couplings and limitations apply. See ["Attenuator Configurations and Auto/Man" on page 2233](#)

See ["More Information" on page 2235](#)

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | [:SENSe] :POWeR [:RF] :EATTenuation :STATe OFF ON 0 1 [:SENSe] :POWeR [:RF] :EATTenuation :STATe ? |
| Example | POW:EATT:STAT ON |
| Dependencies | <p>This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233.</p> <p>The electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable above 3.6 GHz. Therefore, if the Stop Frequency of the analyzer is > 3.6 GHz then the Enable Elec Atten key will be OFF and grayed out.</p> <p>If the Internal Preamp is on, meaning it is set to Low Band or Full, the electronic attenuator (and the “soft” attenuation function provided in single attenuator configurations) is unavailable. In this case the Enable Elec Atten key will be OFF and grayed out.</p> <p>If either of the above is true, if the SCPI command is sent, an error indicating that the electronic attenuator is unavailable will be sent.</p> <p>If the electronic/soft Attenuator is enabled, then the Stop Freq of the analyzer is limited to 3.6 GHz and the Internal Preamp is unavailable.</p> <p>The SCPI-only “soft” electronic attenuation for the single-attenuator configuration is not available in</p> |

| | |
|--------------------------|---|
| | all measurements; in particular, it is not available in the Swept SA measurement. |
| Couplings | Enabling and disabling the Electronic Attenuator affects the setting of the Mechanical Attenuator (in dual attenuator configurations). This is described in more detail below this table. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support the electronic attenuator |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

More Information

Mechanical Attenuator Transition Rules

When the Electronic Attenuator is enabled, the Mechanical Attenuator transitions to a state that has no Auto function. Below are the rules for transitioning the Mechanical Attenuator. NOTE that the information below ONLY applies to the dual attenuator configurations, and ONLY when the Electronic Attenuator is installed:

When the Electronic Attenuation is enabled from a disabled state:

- The Mechanical Attenuator is initialized to 10 dB (this is its optimal performance setting). You can then set it as desired with SCPI, numeric keypad, step keys, or knob, and it behaves as it normally would in manual mode
- The Auto/Man state of (Mech) Atten is saved
- The Auto/Man line on the (Mech) Atten key disappears and the auto rules are disabled
- The Electronic Attenuator is set to 10 dB less than the previous value of the Mechanical Attenuator, within the limitation that it must stay within the range of 0 to 24 dB of attenuation.

Examples in the dual attenuator configuration:

- Mech Atten at 20 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 10 dB. New total attenuation equals the value before Elec Atten enabled.
- Mech Atten at 0 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 0 dB. New total attenuation does not equal the value before Elec Atten enabled.
- Mech Atten at 40 dB. Elec Atten enabled, Mech Atten set to 10 dB, and Elec Atten set to 24 dB. New total attenuation does not equal the value before Elec Atten enabled.

When the Electronic Attenuation is disabled from an enabled state:

- The Elec Atten key is grayed out
- The Auto/Man state of (Mech) Atten is restored
- If now in Auto, (Mech) Atten recouples

- If now in Man, (Mech) Atten is set to the value of total attenuation that existed before the Elec Atten was disabled. The resulting value is rounded up to the smallest value possible given the (Mech) Atten Step setting - (That is, 57 dB changes to 58 dB when (Mech) Atten Step is 2 dB.)

Using the Electronic Attenuator: Pros and Cons

The electronic attenuator offers finer steps than the mechanical attenuator, has no acoustical noise, is faster, and is less subject to wear.

The “finer steps” advantage of the electronic attenuator is beneficial in optimizing the alignment of the analyzer dynamic range to the signal power in the front panel as well as remote use. Thus, you can achieve improved relative signal measurement accuracy. Compared to a mechanical attenuator with 2 dB steps, the 1 dB resolution of the electronic attenuator only gives better resolution when the odd-decibel steps are used. Those odd-decibel steps are less accurately calibrated than the even-decibel steps, so one tradeoff for this superior relative accuracy is reduced absolute amplitude accuracy.

Another disadvantage of the electronic attenuator is that the spectrum analyzer loses its “Auto” setting, making operation less convenient.

Also, the relationship between the dynamic range specifications (TOI, SHI, compression and noise) and instrument performance are less well-known with the electrical attenuator. With the mechanical attenuator, TOI, SHI and compression threshold levels increase dB-for-dB with increasing attenuation, and the noise floor does as well. With the electronic attenuator, there is an excess attenuation of about 1 to 3 dB between 0 and 3.6 GHz, making the effective TOI, SHI, and so forth, less well known. Excess attenuation is the actual attenuation relative to stated attenuation. Excess attenuation is accounted for in the analyzer calibration

Elec Atten

Controls the Electronic Attenuator in dual attenuator configurations. This key does not appear in single attenuator configurations, as the control of both the mechanical and electronic stages of the single attenuator is integrated into the single Atten key.

| | |
|----------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :EATTenuation <rel_amp1></code> <code>[:SENSe] :POWer [:RF] :EATTenuation?</code> |
| Notes | Electronic Attenuation's specification is defined only when Mechanical Attenuation is 6 dB. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. It does not appear in models with the Single Attenuator configuration, as in the single attenuator configuration there is no “electronic attenuator” there is only a single integrated attenuator (which has both a mechanical and electronic stage). However, in the single attenuator configuration, EATT SCPI commands are accepted for compatibility with other X-series instruments and set a “soft” attenuation as described in "Attenuator Configurations and Auto/Man" on page 2233 . The “soft” attenuation is treated as an addition to the “main” attenuation value set by the Atten softkey or the POW:ATT SCPI command and affects the total attenuation displayed on the Attenuation key and the Meas Bar. When Enable Elec Atten is off or grayed out, the Elec Atten key is grayed out. |
| Preset | 0 dB |
| State Saved | Saved in instrument state |

| | |
|--------------------------|--|
| Min | 0 dB |
| Max | Dual attenuator configuration: 24 dB Single attenuator configuration: the total of ATT and EATT cannot exceed 50 dB, so if the EATT is set to 24 dB first, the main attenuation cannot be greater than 26 dB and will be reduced accordingly; if the main attenuator is set to 40 dB first, EATT cannot be greater than 10 dB |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Adjust Atten for Min Clip

Sets the combination of mechanical and electronic attenuation and gain based on the current measured signal level so that clipping will be at a minimum.

This is an "immediate action" function, that is, it executes once, when the key is pressed.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|--------------------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize IMMEDIATE</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Pre-Adjust for Min Clip

If this function is on, it does the adjustment described under "[Adjust Atten for Min Clip](#)" on page 2237 each time a measurement restarts. Therefore, in Continuous measurement mode, it only executes before the first measurement.

In dual attenuator models, you can set Elec+Mech Atten, in which case both attenuators participate in the autoranging, or Elec Atten Only, in which case the mechanical attenuator does not participate in the autoranging. This latter case results in less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation OFF ELECTrical COMBined</code> <code>[:SENSe] :POWer [:RF] :RANGe:OPTimize:ATTenuation?</code> |
| Notes | The SCPI parameter ELECTrical sets this function to On in single attenuator models. The SCPI parameter COMBined is mapped to ELECTrical in single attenuator models; if you send COMBined, it sets the function to On and returns ELEC to a query. |
| Dependencies | This key only appears in Dual Attenuator models with an Electronic Attenuator installed. |

| | |
|--------------------------|--|
| | In instruments with Dual Attenuator model, when Enable Elec Atten is off or grayed out, the Pre-Adjust for Min Clip key is grayed out. |
| Preset | OFF for Swept SA measurement; ON for all other measurements that support Pre-Adjust for Min Clip |
| State Saved | Saved in instrument state |
| Range | Dual attenuator models: Off Elec Atten Only Mech + Elec Atten Single attenuator models: Off On |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------|--|
| Remote Command | <code>[:SENSe] :POWer [:RF] :RANGe :AUTO ON OFF 1 0</code> <code>[:SENSe] :POWer [:RF] :RANGe :AUTO?</code> |
| Notes | ON aliases to "Elec Atten Only" (:POW:RANG:OPT:ATT ELEC) OFF aliases to "Off" (:POW:RANG:OPT:ATT OFF) The query :POW:RANG:AUTO? returns true if :POW:RANG:OPT:ATT is not "Off" |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns Pre-Adjust for Min Clip off. This is the default setting.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANG:OPT:ATT OFF |
| Initial S/W Revision | Prior to A.02.00 |

Elec Atten Only

Selects only the electric attenuator to participate in auto ranging. This offers less wear on the mechanical attenuator and is usually faster.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANG:OPT:ATT ELEC |
| Initial S/W Revision | Prior to A.02.00 |

Mech + Elec Atten

In dual attenuator models, this selects both attenuators participate in the autoranging.

This key is grayed out in measurements that do not support this functionality. The spectrum analyzer measurement, Swept SA, does not support this functionality.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Attenuation, Pre-Adjust for Min Clip |
| Example | :POW:RANGe:OPT:ATT COMB |
| Initial S/W Revision | Prior to A.02.00 |

(Mech) Atten Step

This controls the step size used when making adjustments to the input attenuation.

This key is labeled Mech Atten Step in dual attenuator models and Atten Step in single attenuator models. In the dual attenuator configuration, this key only affects the step size of the mechanical attenuator.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Attenuation |
| Remote Command | <code>[:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] 10 dB 2 dB</code> <code>[:SENSe] :POWer [:RF] :ATTenuation :STEP [:INCRement] ?</code> |
| Example | POW:ATT:STEP 2 |
| Notes | Note this feature works like a 1-N choice from the front panel, but it takes a specific value (in dB) when used remotely. The only valid values are 2 and 10. |
| Dependencies | Blanked in CXA and EXA if option FSA (2 dB steps) is not present. If blanked, attempts to set it via SCPI will yield an error. |
| Couplings | When the attenuation step size changes, the current mechanical attenuation value is adjusted (if necessary) to be quantized to the new step size. That is, if step is set to 10 dB, mech atten is increased if necessary so it is a multiple of 10 dB |
| Preset | PXA and MXA: 2 dB EXA and CXA: 10 dB (2 dB with option FSA) |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Scale/Div

Sets the logarithmic units per vertical graticule division on the display. However, since the Auto Scaling defaults to On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | All except SA and BASIC |
| Remote Command | :DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision <rel_ampl> :DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:PDIVision? |
| Example | DISP:MON:VIEW:WIND:TRAC:Y:PDIV 5.0 dB DISP:MON:VIEW:WIND:TRAC:Y:PDIV? |
| Couplings | When the Auto Scaling is On, this value is automatically determined by the measurement result. When you set a value manually, Auto Scaling automatically changes to Off. |
| Preset | 10.00 dB |
| State Saved | Saved in instrument state. |
| Min | 0.10 dB |
| Max | 20.00 dB |
| Initial S/W Revision | Prior to A.02.00 |

Presel Center

When this key is pressed, the centering of the preselector filter is adjusted to optimize the amplitude accuracy at the frequency of the selected marker. If the selected marker is not on when Presel Center is pressed, the analyzer will turn on the selected marker, perform a peak search, and then perform centering on the marker's center frequency. If the selected marker is already on and between the start and stop frequencies of the analyzer, the analyzer performs the preselector calibration on that marker's frequency. If the selected marker is already on, but outside the frequency range between Start Freq and Stop Freq, the analyzer will first perform a peak search, and then perform centering on the marker's center frequency.

The value displayed on the Presel Adjust key will change to reflect the new preselector tuning (see Presel Adjust).

A number of considerations should be observed to ensure proper operation. See ["Proper Preselector Operation" on page 2241](#).

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Remote Command | [:SENSe]:POWer[:RF]:PCENter |
| Example | POW:PCEN |
| Notes | Note that the rules outlined above under the key description apply for the remote command as well as the key. The result of the command is dependent on marker position, and so forth. Any message shown by the key press is also shown in response to the remote command. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if the microwave preselector is off.) • If the selected marker's frequency is below Band 1, advisory message 0.5001 is generated and no action is taken. • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. |

- Grayed out in the Spectrogram View.

| | |
|------------------------------|---|
| Couplings | The active marker position determines where the centering will be attempted. If the analyzer is in a measurement such as averaging when centering is initiated, the act of centering the preselector will restart averaging but the first average trace will not be taken until the centering is completed. |
| Status Bits/OPC dependencies | When centering the preselector, *OPC will not return true until the process is complete and a subsequent measurement has completed, nor will results be returned to a READ or MEASURE command. The Measuring bit should remain set while this command is operating and should not go false until the subsequent sweep/measurement has completed. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Proper Preselector Operation

A number of considerations should be observed to ensure proper operation:

1. If the selected marker is off, the analyzer will turn on a marker, perform a peak search, and adjust the preselector using the selected marker's frequency. It uses the "highest peak" peak search method unqualified by threshold or excursion, so that there is no chance of a 'no peak found' error. It continues with that peak, even if it is the peak of just noise. Therefore, for this operation to work properly, there should be a signal on screen in a preselected range for the peak search to find.
2. If the selected marker is already on, the analyzer will attempt the centering at that marker's frequency. There is no preselector for signals below about 3.6 GHz, therefore if the marker is on a signal below 3.6 GHz, no centering will be attempted and an advisory message generated
3. In some models, the preselector can be bypassed. If it is bypassed, no centering will be attempted in that range and a message will be generated.

Preselector Adjust

Allows you to manually adjust the preselector filter frequency to optimize its response to the signal of interest. This function is only available when "Presel Center" on page 2240 is available.

For general purpose signal analysis, using Presel Center is recommended. Centering the filter minimizes the impact of long-term preselector drift. Presel Adjust can be used instead to manually optimize the preselector. One application of manual optimization would be to peak the preselector response, which both optimizes the signal-to-noise ratio and minimizes amplitude variations due to small (short-term) preselector drifting.

| | |
|----------------|--|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :POWer [:RF] :PADJust <freq></code> |

| | |
|-------------------------------------|---|
| | <code>[:SENSe] : POWer [:RF] : PADJust ?</code> |
| Example | POW:PADJ 100KHz POW:PADJ? |
| Notes | The value on the key reads out to 0.1 MHz resolution. |
| Dependencies | <ul style="list-style-type: none"> • Grayed out if microwave preselector is off.) • Grayed out if entirely in Band 0. • Blank in models that do not include a preselector, such as option 503. If the SCPI is sent in these instruments, it is accepted without error, and the query always returns 0. • Grayed out in the Spectrogram View. |
| Preset | 0 MHz |
| State Saved | The Presel Adjust value set by Presel Center, or by manually adjusting Presel Adjust, is not saved in instrument state, and does not survive a Preset or power cycle. |
| Min | -500 MHz |
| Max | 500 MHz |
| Default Unit | Hz |
| Backwards Compatibility SCPI | <code>[:SENSe] : POWer [:RF] : MW : PADJust</code> <code>[:SENSe] : POWer [:RF] : MMW : PADJust</code> PSA had multiple preselectors, but the X-Series has only one. These commands simply alias to <code>[:SENSe] : POWer [:RF] : PADJust</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

| | |
|-----------------------------|---|
| Remote Command | <code>[:SENSe] : POWer [:RF] : PADJust : PRESelector MWAVE MMWave EXTERNAL</code> <code>[:SENSe] : POWer [:RF] : PADJust : PRESelector ?</code> |
| Notes | PSA had multiple preselectors, and you could select which preselector to adjust. Since the X-Series has only one mm/uW preselector, the preselector selection softkey is no longer available. However, to provide backward compatibility, we accept the legacy remote commands. The command form has no effect, the query always returns MWAVE |
| Initial S/W Revision | Prior to A.02.00 |

Y Axis Unit

Displays the menu keys that enable you to change the vertical (Y) axis amplitude unit. The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types. For example, if Scale Type has been set to Log, and you set Y Axis Unit to dBm, pressing Scale Type (Log) sets the Y Axis Unit to dBm. If Scale Type has been set to Lin and you set Y Axis Unit to V, pressing Scale Type (Lin) sets the Y Axis Unit to V. Pressing Scale Type (Log) again sets the Y axis unit back to dBm.

NOTE

The units of current (A, dBmA, dBuA) are calculated based on 50 ohms input impedance.

All four of the EMI units (dB μ A/m, dB μ V/m, dBG, dBpT) are treated by the instrument exactly as though they were dBuV. The user must load an appropriate correction factor using Amplitude Corrections for accurate and meaningful results.

If a SCPI command is sent to the analyzer that uses one of the EMI units as a terminator, the analyzer treats it as though DBUV had been sent as the terminator.

| | |
|----------------|---|
| Key Path | AMPTD Y Scale |
| Mode | SA |
| Scope | Meas Global |
| Remote Command | :UNIT:POWer DBM DBMV DBMA V W A DBUV DBUA DBPW DBUVM DBUAM DBPT DBG :UNIT:POWer? |
| Example | UNIT:POW dBmV UNIT:POW? |
| Notes | The Y axis unit has either logarithmic or linear characteristics. The set of units that is logarithmic consists of dBm, dBmV, dBmA, dB μ V, dB μ A, dB μ V/m, dB μ A/m, dBpT, and dBG. The set of units that are linear consists of V, W, and A. The chosen unit will determine how the reference level and all the amplitude-related outputs like trace data, marker data, etc. read out. |
| Notes | The settings of Y Axis Unit and Scale Type, affect how the data is read over the remote interface. When using the remote interface no unit is returned, so you must know what the Y axis unit is to interpret the results: Example 1, set the following: Scale Type (Log) Y Axis Unit, dBm Scale/Div, 1 dB Ref Level, 10 dBm This sets the top line to 10 dBm with each vertical division representing 1 dB. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 5 dBm and will read out remotely as 5. Example 2, set the following: Scale Type (Lin) Y Axis Unit, Volts Ref Level, 100 mV (10 mV/div) This sets the top line to 100 mV and the bottom line to 0 V, so each vertical division represents 10 mV. Thus, if a point on trace 1 is on the fifth graticule line from the top, it represents 50 mV and will read out remotely as 50. |
| Dependencies | If an amplitude correction with an Antenna Unit other than None is applied and enabled, then that antenna unit is forced and the key with that unit is the only Y Axis Unit available. All other Y Axis Unit keys are grayed out. If an amplitude correction with an Antenna Unit other than None is applied and enabled, and you then turn off that correction or set Apply Corrections to No, the Y Axis Unit that existed before the Antenna Unit was applied is restored. |
| Couplings | The analyzer retains the entered Y Axis Unit separately for both Log and Lin amplitude scale types |

| | |
|--------------------------|--|
| Preset | dBm for log scale, V for linear. The true 'preset' value is dBm, since at preset the Y Scale type is set to logarithmic. |
| State Saved | Saved in instrument state |
| Readback line | 1-of-N selection |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00, A.04.00, A.11.00 |

dBm

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBm.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBM |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBm |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmV

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmV.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmV |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBmA

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBmA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBMA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dBmA |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

W

Sets the amplitude unit for the selected amplitude scale (log/lin) to watt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW W |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | W |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

V

Sets the amplitude unit for the selected amplitude scale (log/lin) to volt.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW V |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

A

Sets the amplitude unit for the selected amplitude scale (log/lin) to Ampere.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW A |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ V

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V.

| | |
|----------|----------------------------|
| Key Path | AMPTD Y Scale, Y Axis Unit |
|----------|----------------------------|

| | |
|--------------------------|---|
| Example | UNIT:POW DBUV |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ V |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A.

NOTE

The unit dBuA can also appear as an Antenna Unit. This will be used by customers using current probes, because current probes are often supplied with conversion tables that provide the transducer factors. When dBuA is used as an Antenna Unit the normal conversion from power to amps for dBuA (based on the analyzer input impedance) is not done, but instead the conversion is based solely on the Correction that contains the transducer factors. This is what distinguishes dBuA as a normal unit from dBuA as an antenna unit. When querying the Y-Axis unit, you can query the Antenna Unit to distinguish between regular dBuA and the dBuA antenna unit. If :CORR:CSET:ANT? returns NOC (for No Conversion), you are using a normal Y Axis dBuA. If it returns UA you are using an Antenna Unit dBuA.

| | |
|--------------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBUA |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |

dBpW

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpW.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Example | UNIT:POW DBPW |
| Dependencies | Grayed out if an Amplitude Correction with an Antenna Unit is ON. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

Antenna Unit

When a Correction is turned on that uses an Antenna Unit, the Y Axis Unit changes to that Antenna Unit. All of the keys in the Y-Axis Unit menu are then greyed out, except the Antenna Unit key. The unit being used is shown on this key and is shown as selected in the submenu.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback line | Currently selected unit |
| Initial S/W Revision | A.11.00 |

dB μ V/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ V/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUVM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ V/m |
| Initial S/W Revision | A.02.00 |

dB μ A/m

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A/m. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A/m |
| Initial S/W Revision | A.02.00 |

dB μ A

Sets the amplitude unit for the selected amplitude scale (log/lin) to dB μ A. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------|--|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
|----------|--|

| | |
|----------------------|---|
| Example | UNIT:POW DBUAM |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dB μ A |
| Initial S/W Revision | A.11.00 |

dBpT

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBpT. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBPT |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dBpT |
| Initial S/W Revision | A.02.00 |

dBG

Sets the amplitude unit for the selected amplitude scale (log/lin) to dBG. This is an antenna unit, and this key is grayed out unless a Correction with this Antenna Unit selected is ON. If this is the case, all of the other Antenna Units are grayed out.

| | |
|----------------------|---|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Example | UNIT:POW DBG |
| Dependencies | Grayed out if no Amplitude Correction with an Antenna Unit is on. |
| Readback | dBG |
| Initial S/W Revision | A.02.00 |

None

This is selected if no Antenna Unit is currently on, however you cannot actually set this value, since it is always grayed out. The key is included simply to provide an indication on the Readback line of the Antenna Unit key when there is no Antenna Unit selected.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, Y Axis Unit, Antenna Unit |
| Readback | "None" |
| Initial S/W Revision | A.11.00 |

μW Path Control

The μW Path Control functions include the μW Preselector Bypass (Option MPB) and Low Noise Path (Option LNP) controls in the High Band path circuits.

When the μW Preselector is bypassed, the user has better flatness, but will be subject to spurs from out of band interfering signals. When the Low Noise Path is enabled, the analyzer automatically switches around certain circuitry in the high frequency bands which can contribute to noise, when it is appropriate based on other analyzer settings.

For most applications, the preset state is Standard Path, which gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear out in the hardware switches. For applications that utilize the wideband IF paths, the preset state is the μW Preselector Bypass path, if option MPB is present. This is because, when using a wideband IF such as the 140 MHz IF, the μW Preselector's bandwidth can be narrower than the available IF bandwidth, causing degraded amplitude flatness and phase linearity, so it is desirable to bypass the preselector in the default case.

Users may choose Low Noise Path Enable. It gives a lower noise floor, especially in the 21–26.5 GHz region, though without improving many measures of dynamic range, and without giving the best possible noise floor. The preamp, if purchased and used, gives better noise floor than does the Low Noise Path, however its compression threshold and third-order intercept are much poorer than that of the non-preamp Low Noise Path. There are some applications, typically for signals around –30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | SA, BASIC, PNOISE, VSA , LTE, LTETDD |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :MW:PATH STD LNPath MPBypass FULL [:SENSe] :POWer [:RF] :MW:PATH? |
| Example | :POW:MW:PATH LNP Enables the Low Noise path |
| Notes | If a Presel Center is performed, the analyzer will momentarily switch to the Standard Path, regardless of the setting of μW Path Control The DC Block will always be switched in when the low noise path is switched in, to protect succeeding circuitry from DC. Note that this does not mean “when the low noise path is enabled” but when, based on the Low Noise Path rules, the path is actually switched in. This can happen when the selection is Low Noise Path Enable . In the case where the DC Block is switched in the analyzer is now AC coupled. However, if the user has selected DC coupling, the UI will still behave as though it were DC coupled, including all annunciation, warnings, status bits, and responses to SCPI queries. This is because, based on other settings, the analyzer could switch out the low noise path at any time and hence go back to being DC coupled. Alignment switching ignores the settings in this menu, and restores them when finished. |
| Dependencies | Unavailable in BBIQ and External Mixing |
| Preset | All modes other than IQ Analyzer mode and VXA: STD IQ Analyzer, VXA and WLAN mode: MPB option present and licensed: MPB |

| | |
|--------------------------|--|
| | MPB option not present and licensed: STD |
| State Saved | Save in instrument state |
| Readback | Value selected in the submenu |
| Initial S/W Revision | A.04.00 |
| Modified at S/W Revision | A.10.00 |

Standard Path

This path gives the best remote-control throughput, minimizes acoustic noise from switching and minimizes the risk of wear in the hardware switches, particularly in remote test scenarios where both low band and high band setups will follow in rapid succession.

In this path, the bypass of the low band/high band switch and microwave preamp is never activated, which can cause some noise degradation but preserves the life of the bypass switch.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH STD |
| Readback Text | Standard Path |
| Initial S/W Revision | A.04.00 |

Low Noise Path Enable

You may choose Low Noise Path Enable, which gives a lower noise floor under some circumstances, particularly when operating in the 21–26.5 GHz region. With the Low Noise Path enabled, the low band/high band switch and microwave preamp are bypassed whenever all of the following are true:

- The analyzer is not in the Low Band, meaning:
- the start frequency is above 3.5 GHz and
- the stop frequency is above 3.6 GHz.
- the internal preamp is not installed or (if installed) is set to Off or Low Band

Note that this means that, when any part of a sweep is done in Low Band, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. Also, if the preamp is turned on, the Low Noise Path is not used, whether or not the Low Noise Path Enable is selected in the user interface. The only time the Low Noise Path is used is when Low Noise Path Enable is selected, the sweep is completely in High Band (> 3.6 GHz) and no preamp is in use.

See "[More Information](#)" on page 2251

| | |
|----------------|-------------------------------------|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Measurement | Swept SA |
| Example | :POW:MW:PATH LNP |

| | |
|----------------------|--|
| Notes | <p>For measurements that use IQ acquisition, the low noise path is used when the Center Frequency is in High Band (> 3.6 GHz) and no preamp is in use.</p> <p>In other words, the rules above are modified to use only the center frequency to qualify which path to switch in.</p> <p>This is not the case for FFT's in the Swept SA measurement; they use the same rules as swept measurements.</p> |
| Dependencies | <p>Key is blanked if current mode does not support it.</p> <p>Key is grayed out if mode supports it but current measurement does not support it.</p> <p>Unless Option LNP is present and licensed, key is blank and if SCPI command sent, error -241, "Hardware missing; Option not installed" is generated.</p> |
| Readback Text | Low Noise Path Enable |
| Initial S/W Revision | A.04.00 |

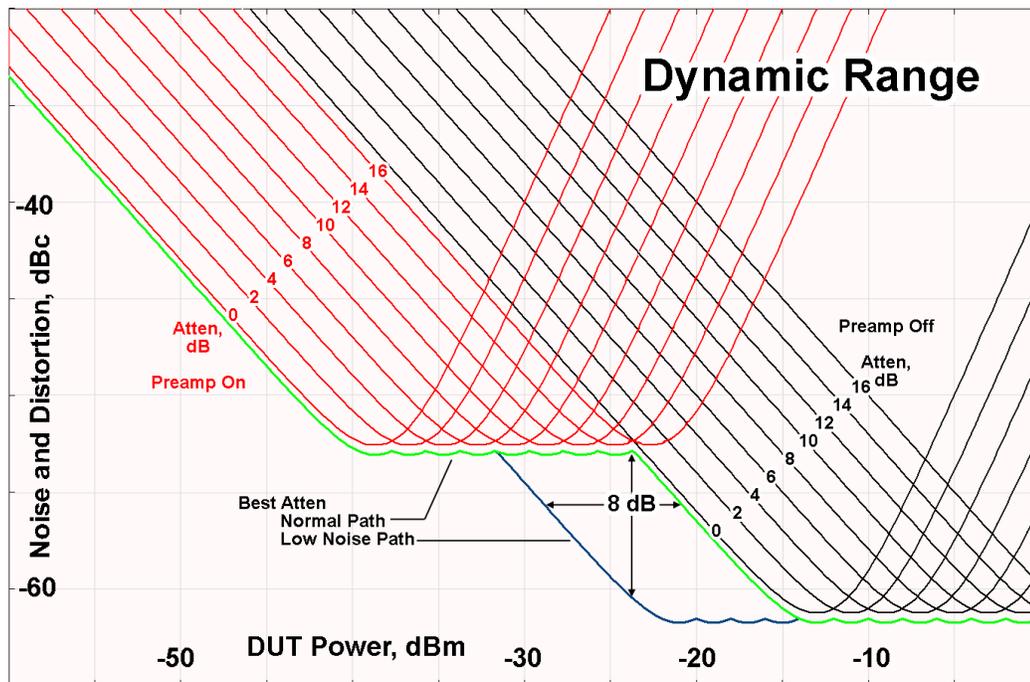
More Information

The user should understand that the Low Noise Path, while giving improved DANL, has the disadvantage of decreased TOI performance and decreased gain compression performance relative to the standard path.

The user should also understand that the bypass switch is a mechanical switch and has finite life, so if the Low Noise Path is enabled, it is possible to cause frequent cycling of this switch by frequently changing analyzer settings such that the above conditions hold true only some of the time. A user making tests of this nature should consider opting for the Standard Path, which will never throw the bypass switch, at the expense of some degraded noise performance.

The low noise path is useful for situations where the signal level is so low that the analyzer performance is dominated by noise even with 0 dB attenuation, but still high enough that the preamp option would have excessive third-order intermodulation or compression. The preamp, if purchased and used, gives better noise floor than does the "Low Noise Path." However, its compression threshold and third-order intercept are much poorer than that of the non-preamp path. There are some applications, typically for signals around -30 dBm, for which the third-order dynamic range of the standard path is good enough, but the noise floor is not low enough even with 0 dB input attenuation. When the third-order dynamic range of the preamp path is too little and the noise floor of the standard path is too high, the Low Noise Path can provide the best dynamic range

The graph below illustrates the concept. It shows, in red, the performance of an analyzer at different attenuation settings, both with the preamp on and off, in a measurement that is affected by both analyzer noise and analyzer TOI. The green shows the best available dynamic range, offset by 0.5 dB for clarity. The blue shows how the best available dynamic range improves for moderate signal levels with the low noise path switched in. In this illustration, the preamp improves the noise floor by 15 dB while degrading the third-order intercept by 30 dB, and the low noise path reduces loss by 8 dB. The attenuator step size is 2 dB.



There are other times where selecting the low noise path improves performance, too. Compression-limited measurements such as finding the nulls in a pulsed-RF spectrum can profit from the low noise path in a way similar to the TOI-limited measurement illustrated. Accuracy can be improved when the low noise path allows the optimum attenuation to increase from a small amount like 0, 2 or 4 dB to a larger amount, giving better return loss at the analyzer input. Harmonic measurements, such as second and third harmonic levels, are much improved using the low noise path because of the superiority of that path for harmonic (though not intermodulation) distortion performance.

μW Preselector Bypass

This key toggles the preselector bypass switch for band 1 and higher. When the microwave preselector is on, the signal path is preselected. When the microwave preselector is off, the signal path is not preselected. The preselected path is the normal path for the analyzer.

The preselector is a tunable bandpass filter which prevents signals away from the frequency of interest from combining in the mixer to generate in-band spurious signals (images). The consequences of using a preselector filter are its limited bandwidth, the amplitude and phase ripple in its passband, and any amplitude and phase instability due to center frequency drift.

Option MPB or pre-selector bypass provides an unpreselected input mixer path for certain X-Series signal analyzers with frequency ranges above 3.6 GHz. This signal path allows a wider bandwidth and less amplitude variability, which is an advantage when doing modulation analysis and broadband signal analysis. The disadvantage is that, without the preselector, image signals will be displayed. Another disadvantage of bypassing the preselector is increased LO emission levels at the front panel input port.

Image responses are separated from the real signal by twice the 1st IF. For IF Paths of 10 MHz and 25 MHz, the 1st IF is 322.5 MHz, so the image response and the real signal will be separated by 645 MHz. The 1st IF will be different for other IF Path settings. When viewing a real signal and its corresponding image response in internal mixing, the image response will be to the left of the real signal.

Also, the image response and the real signal typically have the same amplitude and exhibit the same shape factor.

However, if Option FS1, Fast Sweep Capability, is enabled, the image response in the Swept SA measurement will appear lower in amplitude and have a much wider shape factor compared to the real signal.

| | |
|----------------------|--|
| Key Path | AMPTD Y Scale, μ W Path Control |
| Example | :POW:MW:PATH MPB |
| Dependencies | Key is blanked if current mode does not support it. Key is grayed out if mode supports it but current measurement does not support it. Key is blank unless Option MPB is present and licensed. If SCPI command sent when MPB not present, error -241, "Hardware missing; Option not installed" is generated. |
| Readback Text | μ W Preselector Bypass |
| Initial S/W Revision | A.04.00 |

| | |
|-----------------------|---|
| Remote Command | [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ON OFF 0 1 [:SENSe] :POWer [:RF] :MW:PRESelector [:STATe] ? |
| Example | :POW:MW:PRES OFF Bypasses the microwave preselector |
| Notes | The ON parameter sets the STD path (:POW:MW:PATH STD) The OFF parameter sets path MPB (:POW:MW:PATH MPB) |
| Preset | ON |

Internal Preamp

Accesses a menu of keys that control the internal preamps. Turning on the preamp gives a better noise figure, but a poorer TOI to noise floor dynamic range. You can optimize this setting for your particular measurement.

The instrument takes the preamp gain into account as it sweeps. If you sweep outside of the range of the preamp the instrument will also account for that. The displayed result will always reflect the correct gain.

For some measurements, when the preamp is on and any part of the displayed frequency range is below the lowest frequency for which the preamp has specifications, a warning condition message appears in the status line. For example, for a preamp with a 9 kHz lowest specified frequency: "Preamp: Accy unspec'd below 9 kHz".

| | |
|-----------------------|---|
| Key Path | AMPTD Y Scale |
| Scope | Meas Global |
| Remote Command | [:SENSe] :POWer [:RF] :GAIN [:STATe] OFF ON 0 1 [:SENSe] :POWer [:RF] :GAIN [:STATe] ? |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the |

| | |
|--|--|
| | key is not shown. The preamp is not available when the electronic/soft attenuator is enabled. |
|--|--|

| | |
|--------------------------|---|
| Couplings | The act of connecting the U7227A USB Preamplifier to one of the analyzer's USB ports will cause the Internal Preamp to be switched on. When this happens an informational message will be generated: "Internal Preamp turned on for optimal operation with USB Preamp." Note that if the Internal Preamp was already on, there will be no change to the setting, but if it was Off it will be switched On, to Full Range. Note that this same action occurs when the SA mode is selected while the USB Preamp is connected to one of the analyzer's USB ports, if it is the first time that the SA mode has run since powerup, or if the last time the SA mode was running the USB Preamp was NOT connected. Subsequently disconnecting the USB Preamp from USB does not change the Internal Preamp setting nor restore the previous setting. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.14.00 |

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Scope | Meas Global |
| Remote Command | [:SENSe] : POWer [:RF] : GAIN : BAND LOW FULL [:SENSe] : POWer [:RF] : GAIN : BAND ? |
| Dependencies | Preamp is not available on all hardware platforms. If the preamp is not present or is unlicensed, the key is not shown. If a POW:GAIN:BAND FULL command is sent when a low band preamp is available, the preamp band parameter is to LOW instead of FULL, and an "Option not installed" message is generated. |
| Preset | LOW |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

Off

Turns the internal preamp off

| | |
|----------------------|--------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

Low Band

Sets the internal preamp to use only the low band.

The frequency range of the installed (optional) low-band preamp is displayed in square brackets on the Low Band key label.

| | |
|----------------------|------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND LOW |
| Readback | Low Band |
| Initial S/W Revision | Prior to A.02.00 |

Full Range

Sets the internal preamp to use its full range. The low band (0–3.6 GHz or 0–3GHz, depending on the model) is supplied by the low band preamp and the frequencies above low band are supplied by the high band preamp.

The frequency range of the installed (optional) preamp is displayed in square brackets on the Full Range key label. If the high band option is not installed the Full Range key does not appear.

| | |
|----------------------|-------------------------------------|
| Key Path | AMPTD Y Scale, Internal Preamp |
| Example | :POW:GAIN ON :POW:GAIN:BAND FULL |
| Readback | Full Range |
| Initial S/W Revision | Prior to A.02.00 |

Ref Position

Positions the reference level at the top, center or bottom of the Y Scale display. Changing the reference position does not change the reference level value.

| | |
|-----------------------|--|
| Key Path | AMPTD Y Scale |
| Mode | All except SA and BASIC |
| Remote Command | :DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition TOP CENTer BOTTom :DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:RPOSition? |
| Example | DISP:MON:VIEW:WIND:TRAC:Y:RPOS CENT DISP:MON:VIEW:WIND:TRAC:Y:RPOS? |
| Preset | TOP |
| State Saved | Saved in instrument state. |
| Range | Top Ctr Bot |
| Initial S/W Revision | Prior to A.02.00 |

Auto Scaling

Toggles the Auto Scaling function between On and Off.

| | |
|-----------------------------|---|
| Key Path | AMPTD Y Scale |
| Mode | All except SA and BASIC |
| Remote Command | :DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle 0 1 OFF ON :DISPlay:MONitor:VIEW[1]:WINDow[1]:TRACe:Y[:SCALe]:COUPle? |
| Example | DISP:MON:VIEW:WIND:TRAC:Y:COUP ON DISP:MON:VIEW:WIND:TRAC:Y:COUP? |
| Couplings | When Auto Scaling is On, and the Restart front-panel key is pressed, this function automatically determines the scale per division and reference values based on the measurement results. When you set a value to either Scale/Div or Ref Value manually, Auto Scaling automatically changes to Off. |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

Auto Couple

The Auto Couple feature provides a quick and convenient way to automatically couple multiple instrument settings. This helps ensure accurate measurements and optimum dynamic range. When the Auto Couple feature is activated, either from the front panel or remotely, all parameters of the current measurement that have an Auto/Manual mode are set to Auto mode and all measurement settings dependent on (or coupled to) the Auto/Man parameters are automatically adjusted for optimal performance.

However, the Auto Couple key actions are confined to the current measurement only. It does not affect other measurements in the mode, and it does not affect markers, marker functions, or trace or display attributes.

See "[More Information](#)" on page 2257

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Remote Command | :COUPle ALL NONE |
| Example | :COUP ALL |
| Notes | :COUPle ALL puts all Auto/Man parameters in Auto mode (equivalent to pressing the Auto Couple key). :COUPLE NONE puts all Auto/Man parameters in manual mode. It decouples all the coupled instrument parameters and is not recommended for making measurements. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

There are two types of functions that have Auto/Manual modes.

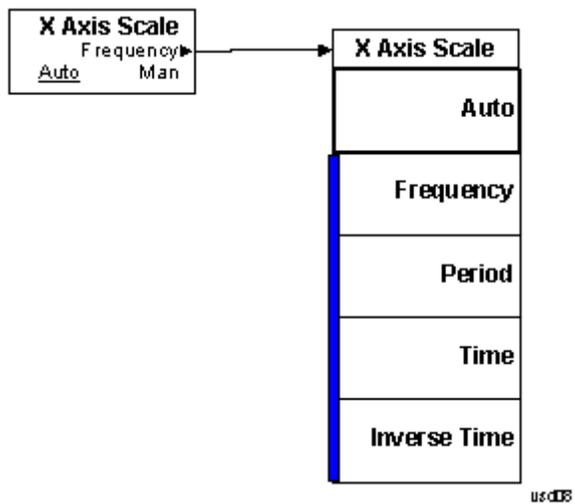
Auto/Man Active Function keys

An Auto/Man toggle key controls the binary state associated with an instrument parameter by toggling between Auto (where the parameter is automatically coupled to the other parameters it is dependent upon) and Man (where the parameter is controlled independent of the other parameters), as well as making the parameter the active function. The current mode is indicated on the softkey with either Auto or Man underlined as illustrated below.



Auto/Man 1-of-N keys

An Auto/Man 1-of-N key allows you to manually pick from a list of parameter values, or place the function in Auto, in which case the value is automatically selected (and indicated) as shown below. If in Auto, Auto is underlined on the calling key. If in manual operation, manual is indicated on the calling key. But the calling key does not actually toggle the function, it simply opens the menu.



BW

Accesses a menu that enables you to specify the resolution bandwidth functions that control the bandwidth and filter selection.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Res BW

Sets the resolution bandwidth for the current measurement. If an unavailable bandwidth is entered with the numeric keypad, the closest available bandwidth is selected.

| | |
|-----------------------|--|
| Key Path | BW |
| Mode | All except SA and BASIC |
| Remote Command | [:SENSe]:MONitor:BANDwidth[:RESolution] <freq> [:SENSe]:MONitor:BANDwidth[:RESolution]? [:SENSe]:MONitor:BANDwidth[:RESolution]:AUTO OFF ON 0 1 [:SENSe]:MONitor:BANDwidth[:RESolution]:AUTO? |
| Example | MON:BAND 2.4 MHz MON:BAND? MON:BAND:AUTO ON MON:BAND:AUTO? |
| Preset | WCDMA: Automatically calculated WIMAX OFDMA: 100kHz C2K: Automatically calculated BLUETOOTH: Automatically calculated PN: Automatically calculated GSM/EDGE: Automatically calculated TD-SCDMA: Automatically calculated 1xEVDO: 30kHz DVB-T/H: 3.9kHz DTMB (CTTB): 3.9kHz ISDB-T: 3.9kHz CMMB: 3.9kHz LTE: 100 kHz LTETDD: 100 kHz Digital Cable TV: 3.9kHz WLAN: 100 kHz MSR: Automatically calculated LTEAFDD, LTEATDD: 100kHz |

| | |
|-------------------------------------|--|
| | WCDMA: ON |
| | WIMAX: OFF |
| | C2K: ON |
| | BLUETOOTH: ON |
| | PN: ON |
| | GSM/EDGE: ON |
| | TD-SCDMA: ON |
| | 1xEVDO: ON |
| | DVB-T/H: OFF |
| | DTMB (CTTB): OFF |
| | ISDB-T: OFF |
| | CMMB: OFF |
| | LTE:OFF |
| | LTETDD: OFF |
| | Digital Cable TV: OFF |
| | WLAN: OFF |
| | MSR: ON |
| | LTEAFDD, LTEATDD: OFF |
| State Saved | Saved in instrument state. |
| Min | 1.0 Hz |
| Max | 8.0 MHz |
| Backwards Compatibility SCPI | <code>[[:SENSE]:MONitor:BWIDth[:RESolution]</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |
| Modified at S/W Revision | A.03.00 |

Video BW

Changes the analyzer post-detection filter.

| | |
|-----------------------|---|
| Key Path | BW |
| Mode | All except SA and BASIC |
| Remote Command | <code>[[:SENSE]:MONitor:BANDwidth:VIDeo <bandwidth></code> <code>[[:SENSE]:MONitor:BANDwidth:VIDeo?</code> <code>[[:SENSE]:MONitor:BANDwidth:VIDeo:AUTO ON OFF 1 0</code> <code>[[:SENSE]:MONitor:BANDwidth:VIDeo:AUTO?</code> |
| Example | MON:BAND:VID 10 MHz MON:BAND:VID? MON:BAND:VID:AUTO OFF |

| | MON:BAND:VID:AUTO? |
|-------------|--|
| Preset | WCDMA: Automatically calculated WIMAX OFDMA: 1 MHz C2K: Automatically calculated BLUETOOTH: Automatically calculated PN: Automatically calculated GSM/EDGE: Automatically calculated TD-SCDMA: Automatically calculated 1xEVDO: 300kHz DVB-T/H: 39kHz DTMB (CTTB): 39kHz ISDB-T: 39kHz CMMB: 39kHz LTE: 1 MHz LTETDD: 1 MHz Digital Cable TV: 39kHz WLAN: 1 MHz MSR: Automatically calculated LTEAFDD, LTEATDD: 1 MHz WCDMA: ON WIMAX: OFF C2K: ON BLUETOOTH: ON PN: ON GSM/EDGE: ON TD-SCDMA: ON 1xEVDO: ON DVB-T/H: OFF DTMB (CTTB): OFF ISDB-T: OFF CMMB: OFF LTE: OFF LTETDD: OFF Digital Cable TV: OFF WLAN: OFF MSR: ON LTEAFDD, LTEATDD: OFF |
| State Saved | Saved in instrument state. |
| Min | 1 Hz |
| Max | 50 MHz |

| | |
|-------------------------------------|---|
| Backwards Compatibility SCPI | <code>[:SENSe] :MONitor :BWIDth :VIDeo</code> |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |
| Modified at S/W Revision | A.03.00 |

VBW:3dB RBW

Selects the ratio between the video bandwidth and the equivalent 3 dB resolution bandwidth to be used for setting the VBW when VBW is in Auto.

| | |
|-------------------------------------|--|
| Key Path | BW |
| Mode | All except SA and BASIC |
| Remote Command | <code>[:SENSe] :MONitor :BANDwidth :VIDeo :RATio <real></code> <code>[:SENSe] :MONitor :BANDwidth :VIDeo :RATio?</code> <code>[:SENSe] :MONitor :BANDwidth :VIDeo :RATio :AUTO OFF ON 0 1</code> <code>[:SENSe] :MONitor :BANDwidth :VIDeo :RATio :AUTO?</code> |
| Example | MON:BAND:VID:RAT 2 MON:BAND:VID:RAT? MON:BAND:VID:RAT:AUTO 0 MON:BAND:VID:RAT:AUTO? |
| Preset | 1 ON |
| State Saved | Saved in instrument state. |
| Min | 0.00001 |
| Max | 3000000 |
| Backwards Compatibility SCPI | <code>[:SENSe] :MONitor :BWIDth :VIDeo :RATio</code> |
| Initial S/W Revision | Prior to A.02.00 |

Span:3dB RBW

Selects the ratio between span and resolution bandwidth.

The default setting is Auto with a Span:3 dB RBW ratio of 106:1. You can manually change this ratio by pressing the key, entering a new value, and pressing Enter.

| | |
|-----------------------|---|
| Key Path | BW |
| Mode | All except SA and BASIC |
| Remote Command | <code>[:SENSe] :MONitor :FREQuency :SPAN :BANDwidth [:RESolution] :RATio <integer></code> |

```
[ :SENSe ] :MONitor :FREQuency :SPAN :BANDwidth [ :RESolution ] :RATio?
[ :SENSe ] :MONitor :FREQuency :SPAN :BANDwidth [ :RESolution ] :RATio :AUTO OFF |
ON | 0 | 1
[ :SENSe ] :MONitor :FREQuency :SPAN :BANDwidth [ :RESolution ] :RATio :AUTO?
```

Example

```
MON:FREQ:SPAN:BAND:RAT 200
MON:FREQ:SPAN:BAND:RAT?
MON:FREQ:SPAN:BAND:RAT:AUTO ON
MON:FREQ:SPAN:BAND:RAT:AUTO?
```

Preset 106
ON

State Saved Saved in instrument state.

Min 2

Max 10000

Backwards Compatibility SCPI [:SENSe] :MONitor :FREQuency :SPAN :BWIDth [:RESolution] :RATio

Initial S/W Revision Prior to A.02.00

Modified at S/W Revision A.04.00

Cont (Continuous Measurement/Sweep)

Sets the analyzer for Continuous measurement operation. The single/continuous state is Meas Global so the setting will affect all measurements. If you are Paused, pressing Cont does a Resume.

| | |
|--------------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate:CONTinuous OFF ON 0 1 :INITiate:CONTinuous? |
| Example | :INIT:CONT 0 puts analyzer in Single measurement operation. :INIT:CONT 1 puts analyzer in Continuous measurement operation |
| Preset | ON (Note that SYST:PRESet sets INIT:CONT to ON but *RST sets INIT:CONT to OFF) |
| State Saved | Saved in instrument state |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, there is no Cont hardkey, instead there is a Sweep Single/Cont key. In these analyzers, switching the Sweep Single/Cont key from Single to Cont restarts averages (displayed average count reset to 1), but does not restart Max Hold and Min Hold. The X-Series has Single and Cont keys in place of the SweepSingleCont key. In the X-Series, if in single measurement, the Cont key (and INIT:CONT ON) switches to continuous measurement, but never restarts a measurement and never resets a sweep. |
| Initial S/W Revision | Prior to A.02.00 |

In Swept SA Measurement (Spectrum Analysis Mode):

The analyzer takes repetitive sweeps, averages, measurements, etc., when in Continuous mode. When the average count reaches the Average/Hold Number the count stops incrementing, but the analyzer keeps sweeping. See the Trace/Detector section for the averaging formula used both before and after the Average/Hold Number is reached. The trigger condition must be met prior to each sweep. The type of trace processing for multiple sweeps, is set under the Trace/Detector key, with choices of Trace Average, Max Hold, or Min Hold.

In Other Measurements/Modes:

With Avg/Hold Num (in the Meas Setup menu) set to Off or set to On with a value of 1, a sweep is taken after the trigger condition is met; and the analyzer continues to take new sweeps after the current sweep has completed and the trigger condition is again met. However, with Avg/Hold Num set to On with a value >1, multiple sweeps (data acquisitions) are taken for the measurement. The trigger condition must be met prior to each sweep. The sweep is not stopped when the average count k equals the number N set for Avg/Hold Num is reached, but the number k stops incrementing. A measurement average usually applies to all traces, marker results, and numeric results. But sometimes it only applies to the numeric results.

If the analyzer is in Single measurement, pressing the Cont key does not change k and does not cause the sweep to be reset; the only action is to put the analyzer into Continuous measurement operation.

If it is already in continuous sweep:

the INIT:CONT 1 command has no effect

the INIT:CONT 0 command will place the analyzer in Single Sweep but will have no effect on the current sequence until $k = N$, at which point the current sequence will stop and the instrument will go to the idle state.

18 Monitor Spectrum Measurement
File

File

See "File" on page 344

FREQ Channel

Accesses a menu of keys that allow you to control the Frequency and Channel parameters of the instrument.

Some features in the Frequency menu are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset. For example, the Center Freq setting is the same for all measurements – it does not change as you change measurements.

| | |
|-----------------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Center Freq

Sets the frequency that corresponds to the horizontal center of the graticule (when frequency Scale Type is set to linear). While adjusting the Center Frequency the Span is held constant, which means that both Start Frequency and Stop Frequency will change.

Pressing Center Freq also sets the frequency entry mode to Center/Span. In Center/Span mode, the center frequency and span values are displayed below the graticule, and the default active function in the Frequency menu is Center Freq.

The center frequency setting is the same for all measurements within a mode, that is, it is Meas Global. Some modes are also able to share a Mode Global center frequency value. If this is the case, the Mode will have a Global Settings key in its Mode Setup menu.

The Center Freq function sets (and queries) the Center Frequency for the currently selected input. If your analyzer has multiple inputs, and you select another input, the Center Freq changes to the value for that input. SCPI commands are available to directly set the Center Freq for a specific input.

Center Freq is remembered as you go from input to input. Thus you can set a Center Freq of 10 GHz with the RF Input selected, change to BBIQ and set a Center Freq of 20 MHz, then switch to External Mixing and set a Center Freq of 60 GHz, and when you go back to the RF Input the Center Freq will go back to 10 GHz; back to BBIQ and it is 20 MHz; back to External Mixing and it is 60 GHz.

See ["RF Center Freq" on page 2270](#)

See [Ext Mix Center Freq](#)

See ["I/Q Center Freq" on page 2272](#)

See ["Center Frequency Presets" on page 2268](#)

| | |
|-----------------------|--|
| Key Path | FREQ Channel |
| Scope | Meas Global |
| Remote Command | [:SENSe] :FREQuency:CENTer <freq> [:SENSe] :FREQuency:CENTer? |

| | |
|-----------------------------|--|
| Example | FREQ:CENT 50 MHz FREQ:CENT UP changes the center frequency to 150 MHz if you use FREQ:CENT:STEP 100 MHz to set the center frequency step size to 100 MHz FREQ:CENT? |
| Notes | This command sets either the RF or I/Q Center Frequency depending on the selected input. For RF input it is equivalent to FREQ:RF:CENT For I/Q input it is equivalent to FREQ:IQ:CENT Preset and Max values are dependent on Hardware Options (5xx) If no terminator (e.g. MHz) is sent the terminator Hz is used. If a terminator with unit other than Frequency is used, an invalid suffix error message is generated. |
| Dependencies | The Center Frequency can be limited by Start or Stop Freq limits, if the Span is so large that Start or Stop reach their limit. |
| Couplings | When operating in "swept span", any value of the Center Frequency or Span that is within the frequency range of the analyzer is allowed when the value is being set through the front panel numeric key pad or the SCPI command. The other parameter is forced to a different value if needed, to keep the Start and the Stop Frequencies within the analyzer's frequency range |
| Preset | Depends on instrument maximum frequency, mode, measurement, and selected input. See "Center Frequency Presets" on page 2268 and "RF Center Freq" on page 2270 and Ext Mix Center Freq and "I/Q Center Freq" on page 2272. |
| State Saved | Saved in instrument state |
| Min | Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 2268 and "RF Center Freq" on page 2270 and "I/Q Center Freq" on page 2272. |
| Max | Depends on instrument maximum frequency, mode, measurement, and selected input.. See "Center Frequency Presets" on page 2268 and "RF Center Freq" on page 2270 and "I/Q Center Freq" on page 2272. |
| Default Unit | Hz |
| Status Bits/OPC | Non-overlapped |
| Dependencies | |
| Initial S/W Revision | Prior to A.02.00 |

Center Frequency Presets

The following table provides the Center Frequency Presets for the Spectrum Analyzer mode, and the Max Freq, for the various frequency options:

| Freq Option | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune) |
|-------------|-------------------------|--------------------------------|-----------------------------|
| | | | |

| | | | above) |
|---------------------------------------|------------|----------|--------------|
| 503 (all but N9000A) | 1.805 GHz | 3.6 GHz | 3.7 GHz |
| 503 (N9000A) | 1.505 GHz | 3.0 GHz | 3.08 GHz |
| 507 (all but N9000A) | 3.505 GHz | 7.0 GHz | 7.1 GHz |
| 507 (N9000A) | 3.755 GHz | 7.5 GHz | 7.58 GHz |
| 508 (all but N9038A) | 1.805 GHz | 3.6 GHz | 8.5 GHz |
| 508 (N9038A) | 4.205 GHz | 8.4 GHz | 8.5 GHz |
| 513 | 6.805 GHz | 13.6 GHz | 13.8 GHz |
| 526 (all but N9000A and N9038A) | 13.255 GHz | 26.5 GHz | 27.0 GHz |
| 526 (N9000A) | 13.255 GHz | 26.5 GHz | 26.55 GHz |
| 526 (N9038A) | 1.805 GHz | 3.6 GHz | 27.0 GHz |
| 532 | 16.005 GHz | 32.0 GHz | 32.5 GHz |
| 543 | 21.505 GHz | 43.0 GHz | TBD |
| 544 | 22.005 GHz | 44.0 GHz | 44.5 GHz |
| 550 | 25.005 GHz | 50.0 GHz | 51 GHz |

Input 2:

| Model | CF after Mode Preset | Stop Freq after Mode Preset | Max Freq (can't tune above) |
|----------------|----------------------------|-----------------------------------|-----------------------------------|
| N9000A opt C75 | 0.7505GHz | 1.5 GHz | 1.58 GHz |
| N9038A | 505 MHz | 1 GHz | 1.000025 GHz |

Tracking Generator Frequency Limits (N9000A only):

| Tracking Generator Option | Min Freq (clips to this freq when turn TG on and | If above this Freq, Stop Freq clipped to this Freq when | Max Freq (can't tune above) while TG |
|---------------------------------|--|---|--|
| | | | |

| | can't tune below while TG on) | TG turned on | on |
|-----|-------------------------------|--------------|----------|
| T03 | 9 kHz | 3.0 GHz | 3.08 GHz |
| T06 | 9 kHz | 6.0 GHz | 6.05 GHz |

The following table shows the Center Frequency Presets for modes other than Spectrum Analyzer:

| Mode | CF Preset for RF |
|-------------|------------------|
| WCDMA | 1 GHz |
| WIMAXOFDMA, | 1 GHz |
| BASIC | 1 GHz |
| ADEMOD | 1 GHz |
| VSA | 1 GHz |
| TDSCDMA | 1 GHz |
| PNOISE | 1 GHz |
| LTE | 1 GHz |
| LTETDD | 1 GHz |
| MSR | 1 GHz |
| GSM | 935.2 MHz |
| NFIGURE | 1.505 GHz |

RF Center Freq

SCPI command for specifying the RF Center Frequency. This command will set the Center Frequency to be used when the RF input is selected, even if the RF input is not the input that is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | [:SENSe] :FREQuency:RF:CENTer <freq> [:SENSe] :FREQuency:RF:CENTer? |
| Example | FREQ:RF:CENT 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Dependencies | If the electronic/soft attenuator is enabled, any attempt to set Center Frequency such that the Stop Frequency would be >3.6 GHz fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. If Source Mode is set to Tracking, and the Max or Min Center Freq is therefore limited by the limits of the source, a warning message is generated, “Data out of range;clipped to source max/min” if these limits are exceeded. Note that for an external source, these limits can be affected by the settings of |

| | |
|--------------------------|--|
| | Source Numerator, Source Denominator and Power Sweep. |
| Preset | See table above |
| State Saved | Saved in instrument state. |
| Min | -79.999995 MHz, unless Source Mode is set to Tracking, in which case it is limited by the minimum frequency of the Source |
| Max | See table above. Basically instrument maximum frequency - 5 Hz. Note that, if the Source Mode is set to Tracking, the effective instrument maximum frequency may be limited by the source maximum frequency. If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Ext Mix Center Freq

SCPI command for specifying the External Mixer Center Frequency. This command will set the Center Frequency to be used when the External Mixer is selected, even if the External Mixer input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|---|
| Scope | Meas Global |
| Remote Command | <code>[:SENSe] :FREQuency:EMIXer:CENTer <freq></code> <code>[:SENSe] :FREQuency:EMIXer:CENTer?</code> |
| Example | <code>:FREQ:EMIX:CENT 60 GHz</code> <code>:FREQ:EMIX:CENT?</code> |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Couplings | When returning to External Mixing after having been switched to one of the other inputs (e.g., RF), you will come back into the settings that you had when you left External Mixing. So you will come back to the band you were in with the Center Frequency that you had. However, Span is not an input-dependent parameter, therefore you will bring the span over from the other input. Therefore, the analyzer comes back with the span from the previous input, limited as necessary by the current mixer setup. |
| Preset | When a Mode Preset is performed while in External Mixing, the Start frequency of the current Mode is set to the nominal Min Freq of the lowest harmonic range in the Harmonic Table for the current mixer setup. Similarly, the Stop frequency of the current Mode is set to the nominal Max Freq of the highest harmonic range in the Harmonic Table. The Center Freq thus presets to the point arithmetically equidistant from these two frequencies. If the current measurement has a limited Span available to it, and cannot achieve the Span shown in the table ($\text{Span} = \text{Stop Freq} - \text{Start Freq}$), the analyzer uses the maximum Span the measurement allows, and still sets the Center Freq to the midpoint of the Start and Stop Freq values in the Harmonic Table. |

| | |
|----------------------|---|
| | <p>When Restore Input/Output Defaults is performed, the mixer presets to the 11970A, whose Start and Stop frequencies are 26.5 and 40 GHz respectively. The center of these two frequencies is 33.25 GHz.</p> <p>Therefore, after a Restore Input/Output Defaults, if you go into External Mixing and do a Mode Preset while in the Spectrum Analyzer Mode, the resulting Center Freq is 33.25 GHz.</p> |
| State Saved | Saved in instrument state. |
| Min | The minimum frequency in the currently selected mixer band + 5 Hz |
| Max | <p>The maximum frequency in the currently selected mixer band – 5 Hz</p> <p>If the knob or step keys are being used, also depends on the value of the other three interdependent parameters Span, Start Frequency and Stop Frequency</p> |
| Initial S/W Revision | A.08.01 |

I/Q Center Freq

SCPI command for specifying the I/Q Center Frequency. This command will set the Center Frequency to be used when the I/Q input is selected, even if the I/Q input is not the input which is selected at the time the command is sent. Note that the Center Freq function in the Frequency menu on the front panel always applies to the currently selected input.

| | |
|-----------------------|--|
| Scope | Meas Global |
| Remote Command | <pre>[:SENSe] :FREQuency:IQ:CENTer <freq></pre> <pre>[:SENSe] :FREQuency:IQ:CENTer?</pre> |
| Example | FREQ:IQ:CENT: 30 MHz |
| Notes | This command is the same in all modes, but the parameter is Measurement Global. So the value is independent in each mode and common across all the measurements in the mode. |
| Preset | 0 Hz |
| State Saved | Saved in instrument state. |
| Min | -40.049995 MHz |
| Max | 40.049995 MHz |
| Initial S/W Revision | Prior to A.02.00 |

CF Step

Changes the step size for the center frequency and start and stop frequency functions. Once a step size has been selected and the center frequency function is active, the step keys (and the UP|DOWN parameters for Center Frequency from remote commands) change the center frequency by the step-size value. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the analyzer.

Note that the start and stop frequencies also step by the CF Step value.

| | |
|------------------------------|--|
| Key Path | FREQ Channel |
| Remote Command | [:SENSe] :FREQuency:CENTer:STEP [:INCRement] <freq> [:SENSe] :FREQuency:CENTer:STEP [:INCRement] ? [:SENSe] :FREQuency:CENTer:STEP:AUTO OFF ON 0 1 [:SENSe] :FREQuency:CENTer:STEP:AUTO? |
| Example | FREQ:CENT:STEP:AUTO ON FREQ:CENT:STEP 500 MHz FREQ:CENT UP increases the current center frequency value by 500 MHz FREQ:CENT:STEP? FREQ:CENT:STEP:AUTO? |
| Notes | Preset and Max values are depending on Hardware Options (503, 507, 508, 513, 526) |
| Notes | Preset and Max values are dependent on Hardware Options (5xx) |
| Dependencies | Freq Offset is not available in External Mixing. In this case the Freq Offset key is grayed out and shows a value of zero. It will once again be available, and show the previously set value, when you return to the RF Input. |
| Dependencies | Span, RBW, Center frequency If the electronic/soft attenuator is enabled, any attempt to change the value of the center frequency >3.6 GHz by pressing the Up-arrow key, fails and results in an advisory message. If the equivalent SCPI command is sent, this same message is generated as part of a “-221, Settings conflict” warning. |
| Couplings | When auto-coupled in a non-zero span, the center frequency step size is set to 10% of the span. When auto-coupled in zero span, the center frequency step size is set to the equivalent -3 dB RBW value. |
| Preset | Auto ADEMOD: 1 MHz ON |
| State Saved | Saved in instrument state |
| Min | - (the maximum frequency of the instrument). That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Max | The maximum frequency of the instrument. That is, 27 GHz max freq instrument has a CF step range of +/- 27 GHz. Note that this is the maximum frequency given the current settings of the instrument, so in External Mixing, for example, it is the maximum frequency of the current mixer band. |
| Default Unit | Hz |
| Status Bits/OPC dependencies | non-overlapped |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

18 Monitor Spectrum Measurement
Input/Output

Input/Output

See "[Input/Output](#)" on page 202

Marker

Accesses a menu that enables you to select, set up and control the markers for the current measurement.

For remote-only commands associated with Marker functionality, see:

- "Marker X Axis Value (Remote Command only)" on page 2278
- "Marker X Axis Position (Remote Command only)" on page 2278
- "Marker Y Axis Value (Remote Command only)" on page 2279

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Marker Type

Sets the marker control mode to Normal, Delta or Off. If the selected marker is Off, pressing Marker sets it to Normal and places a single marker at the center of the display. At the same time, Marker X Axis Value appears on the Active Function area.

| | |
|----------------------|--|
| Key Path | Marker |
| Mode | All except SA and BASIC |
| Remote Command | :CALCulate:MONitor:MARKer[1] 2 ... 12:MODE POSition DELTa OFF :CALCulate:MONitor:MARKer[1] 2 ... 12:MODE? |
| Example | CALC:MON:MARK:MODE POS CALC:MON:MARK:MODE? |
| Notes | If the selected marker is Off, pressing Marker sets it to Normal and places it at the center of the screen on the trace determined by the Marker Trace rules. At the same time, Marker X Axis Value appears on the Active Function area. Default Active Function: the active function for the selected marker's current control mode. If the current control mode is Off, there is no active function and the active function is turned off. Active Function Display: the marker X axis value entered in the active function area displays the marker value to its full entered precision. |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | Normal Delta Off |
| Initial S/W Revision | Prior to A.02.00 |

Properties

Accesses a menu that enables you to select the active marker, the reference marker and the trace for the current measurement.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Relative To

Selects the desired marker. The selected marker is relative to its reference marker.

| | |
|----------------------|---|
| Key Path | Marker, Properties |
| Mode | All except SA and BASIC |
| Remote Command | :CALCulate:MONitor:MARKer[1] 2 ... 12:REFerence <integer> :CALCulate:MONitor:MARKer[1] 2 ... 12:REFerence? |
| Example | CALC:MON:MARK2:REF 1 CALC:MON:MARK2:REF? |
| Notes | A marker cannot be relative to itself so that choice is grayed out, and if sent from SCPI generates error -221: "Settings conflict; marker cannot be relative to itself." When queried a single value is returned (the specified marker number's relative marker). |
| Preset | 2 3 4 5 6 7 8 9 10 11 12 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 12 |
| Initial S/W Revision | Prior to A.02.00 |

Marker Trace

Assigns the specified marker to the designated trace.

| | |
|----------|-------------------------|
| Key Path | Marker, Properties |
| Mode | All except SA and BASIC |

| | |
|-----------------------|---|
| Remote Command | :CALCulate:MONitor:MARKer[1] 2 ... 12:TRACe <integer> :CALCulate:MONitor:MARKer[1] 2 ... 12:TRACe? |
| Example | CALC:MON:MARK:TRAC 1 CALC:MON:MARK:TRAC? |
| Preset | 1 |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 3 |
| Initial S/W Revision | Prior to A.02.00 |

Couple Markers

When this function is true, moving any marker causes an equal X Axis movement of every other marker that is not Off. By “equal X Axis movement” we mean that we preserve the difference between each marker’s X Axis value (in the fundamental x-axis units of the trace that marker is on) and the X Axis value of the marker being moved (in the same fundamental x-axis units).

| | |
|-----------------------|--|
| Key Path | Marker |
| Mode | All except SA and BASIC |
| Remote Command | :CALCulate:MONitor:MARKer:COUPle[:STATe] ON OFF 1 0 :CALCulate:MONitor:MARKer:COUPle[:STATe]? |
| Example | CALC:MON:MARK:COUP ON CALC:MON:MARK:COUP? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

All Markers Off

Turns off all markers on the current measurement.

| | |
|-----------------------|--------------------------------|
| Key Path | Marker |
| Mode | All except SA and BASIC |
| Remote Command | :CALCulate:MONitor:MARKer:AOFF |
| Example | CALC:MON:MARK:AOFF |
| Initial S/W Revision | Prior to A.02.00 |

Marker X Axis Value (Remote Command only)

Sets the marker X Axis value in the current marker X Axis Scale unit. It has no effect if the control mode is Off, but is the SCPI equivalent of entering an X value if the control mode is Normal or Delta.

| | |
|----------------------|---|
| Mode | All except SA and BASIC |
| Remote Command | :CALCulate:MONitor:MARKer[1] 2 ... 12:X <freq> :CALCulate:MONitor:MARKer[1] 2 ... 12:X? |
| Example | CALC:MON:MARK3:X 0 CALC:MON:MARK3:X? |
| Notes | If no suffix is sent, uses the fundamental units for the current marker X Axis Scale. If a suffix is sent that does not match the current marker X Axis Scale unit, an error "Invalid suffix" is generated. The query returns the marker's absolute X Axis value if the control mode is Normal, or the offset from the marker's reference marker if the control mode is Delta. The query is returned in the fundamental units for the current marker X Axis scale: Hz for Frequency and Inverse Time, seconds for Period and Time. If the marker is Off the response is not a number. |
| Preset | After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN). |
| State Saved | No |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |

Marker X Axis Position (Remote Command only)

Sets the marker X position in trace points. It has no effect if the control mode is Off, but is the SCPI equivalent of entering a value if the control mode is Normal or Delta – except in trace points rather than X Axis Scale units. The entered value is immediately translated into the current X Axis Scale units for setting the value of the marker.

| | |
|----------------|---|
| Mode | All except SA and BASIC |
| Remote Command | :CALCulate:MONitor:MARKer[1] 2 ... 12:X:POSition <real> :CALCulate:MONitor:MARKer[1] 2 ... 12:X:POSition? |
| Example | CALC:MON:MARK:X:POS 0 CALC:MON:MARK:X:POS? |
| Notes | The query returns the marker's absolute X Axis value in trace points if the control mode is Normal, or the offset from the marker's reference marker in trace points if the control mode is Delta. The value is returned as a real number, not an integer, corresponding to the translation from X Axis Scale units to trace points. If the marker is Off the response is not a number. |
| Preset | After a preset, all markers are turned OFF, so Marker X Axis Value query returns a not a number (NAN). |
| State Saved | No |
| Min | -9.9E+37 |

| | |
|----------------------|------------------|
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |

Marker Y Axis Value (Remote Command only)

Returns the marker Y Axis value in the current marker.

| | |
|---|--|
| Mode | All except SA and BASIC |
| Remote Command | :CALCulate:MONitor:MARKer[1] 2 ... 12:Y? |
| Example | CALC:MON:MARK11:Y? |
| Preset | Result dependent on markers setup and signal source |
| Backwards Compatibility SCPI | :CALCulate:MONitor:MARKer[1] 2 ... 12:FUNction:RESult? |
| Initial S/W Revision | Prior to A.02.00 |

Marker Function

Accesses special marker functions such as marker noise, and power in a specified bandwidth or time interval.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Select Marker

Displays 12 markers available for selection.

| | |
|----------------------|------------------|
| Key Path | Marker |
| Initial S/W Revision | Prior to A.02.00 |

Marker Function Type

Sets the marker control function type to one of the following:

| | |
|----------|-----------------------|
| NOISe | Marker Noise |
| BPOWer | Band/Interval Power |
| BDENsity | Band Interval Density |
| OFF | Marker Function Off |

| | |
|-----------------------|--|
| Key Path | Marker Function |
| Mode | All except SA and BASIC |
| Remote Command | :CALCulate:MONitor:MARKer[1] 2 ... 12:FUNction NOISe BPOWer BDENsity OFF :CALCulate:MONitor:MARKer[1] 2 ... 12:FUNction? |
| Example | CALC:MON:MARK:FUNC NOISCALC:MON:MARK:FUNC? |
| Preset | OFF |
| State Saved | Saved in instrument state. |
| Range | Marker Noise Band/Interval Power Band Interval Density Marker Function Off |
| Initial S/W Revision | Prior to A.02.00 |

Band Adjust

Accesses a menu that enables you to set the frequency span width and the left and right edge, or time values, for the band or interval of the selected marker.

| | |
|----------------------|------------------|
| Key Path | Marker Function |
| Initial S/W Revision | Prior to A.02.00 |

Band/Interval Span for Frequency Domain

Sets the width of the frequency span for the selected marker.

| | |
|-----------------------|--|
| Key Path | Marker Function |
| Mode | All except SA and BASIC |
| Remote Command | :CALCulate:MONitor:MARKer[1] 2 ... 12:FUNCtion:BAND:SPAN <freq> :CALCulate:MONitor:MARKer[1] 2 ... 12:FUNCtion:BAND:SPAN? |
| Example | CALC:MON:MARK12:FUNC:BAND:SPAN 20 MHz CALC:MON:MARK12:FUNC:BAND:SPAN? |
| Couplings | Changing the Band/Interval Span necessarily changes the Band/Interval Left and Band/Interval Right values. |
| Preset | Depends on X axis range of selected Trace. |
| State Saved | Saved in instrument state. |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |

Band/Interval Left for Frequency Domain

Sets the left edge frequency or time value for the band of the selected marker.

| | |
|-----------------------|--|
| Key Path | Marker Function |
| Mode | All except SA and BASIC |
| Remote Command | :CALCulate:MONitor:MARKer[1] 2 ... 12:FUNCtion:BAND:LEFT <freq> :CALCulate:MONitor:MARKer[1] 2 ... 12:FUNCtion:BAND:LEFT? |
| Example | CALC:MON:MARK12:FUNC:BAND:LEFT 20 GHz CALC:MON:MARK12:FUNC:BAND:LEFT? |
| Couplings | Changing the Band/Interval Left necessarily changes the Band/Interval Span value. |
| Preset | Depends on X axis range of selected Trace. |
| State Saved | Saved in instrument state. |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |

Band/Interval Right for Frequency Domain

Sets the right edge frequency or time value for the band of the selected marker.

| | |
|-----------------------------|--|
| Key Path | Marker Function |
| Mode | All except SA and BASIC |
| Remote Command | :CALCulate:MONitor:MARKer[1] 2 ... 12:FUNCTion:BAND:RIGHT <freq> :CALCulate:MONitor:MARKer[1] 2 ... 12:FUNCTion:BAND:RIGHT? |
| Example | CALC:MON:MARK12:FUNC:BAND:RIGH 20 GHz CALC:MON:MARK12:FUNC:BAND:RIGH? |
| Couplings | Changing the Band/Interval Right necessarily changes the Band/Interval Span value. |
| Preset | Depends on X axis range of selected Trace. |
| State Saved | Saved in instrument state. |
| Min | -9.9E+37 |
| Max | 9.9E+37 |
| Initial S/W Revision | Prior to A.02.00 |

Marker To

There is no 'Marker To' functionality supported in Monitor Spectrum. The front-panel key displays a blank menu when pressed.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Meas

The information in this section is common to all measurements. For key and remote command information for a specific measurement, refer to the section that describes the measurement of interest.

Measurements available under the Meas key are specific to the current Mode.

When viewing Help for measurements, note the following:

NOTE

Operation for some keys differs between measurements. The information displayed in Help pertains to the current measurement. To see how a key operates in a different measurement, exit Help (press the Cancel Esc key), select the measurement, then reenter Help (press the Help key) and press that key.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Remote Measurement Functions

This section contains the following topics:

["Measurement Group of Commands" on page 2285](#)

["Current Measurement Query \(Remote Command Only\)" on page 2287](#)

["Limit Test Current Results \(Remote Command Only\)" on page 2287](#)

["Data Query \(Remote Command Only\)" on page 2287](#)

["Calculate/Compress Trace Data Query \(Remote Command Only\)" on page 2288](#)

["Calculate Peaks of Trace Data \(Remote Command Only\)" on page 2293](#)

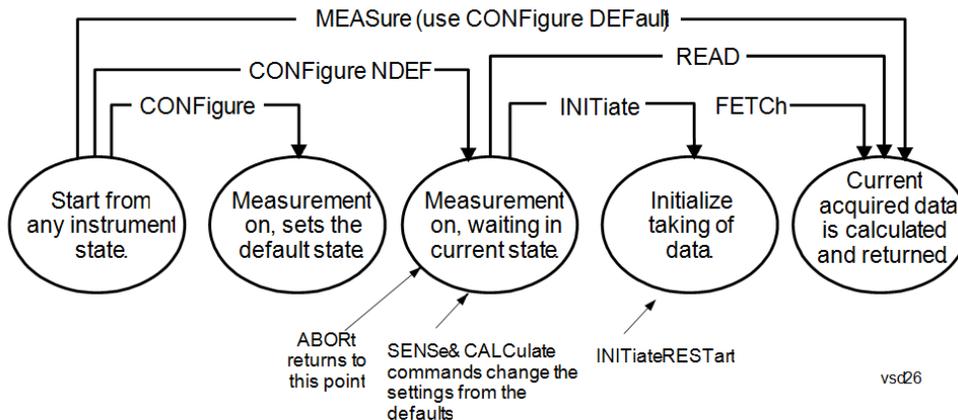
[Hardware-Accelerated Fast Power Measurement \(Remote Command Only\)](#)

["Format Data: Numeric Data \(Remote Command Only\)" on page 2294](#)

["Format Data: Byte Order \(Remote Command Only\)" on page 2295](#)

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Measurement Group of Commands



Measure Commands:

:MEASure:<measurement>[n]?

This is a fast single-command way to make a measurement using the factory default instrument settings. These are the settings and units that conform to the Mode Setup settings (e.g. radio standard) that you have currently selected.

- Stops the current measurement (if any) and sets up the instrument for the specified measurement using the factory defaults
- Initiates the data acquisition for the measurement
- Blocks other SCPI communication, waiting until the measurement is complete before returning results.
- If the function does averaging, it is turned on and the number of averages is set to 10.
- After the data is valid it returns the scalar results, or the trace data, for the specified measurement. The type of data returned may be defined by an [n] value that is sent with the command.
- The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available.
- ASCII is the default format for the data output. (Older versions of Spectrum Analysis and Phase Noise mode measurements only use ASCII.) The binary data formats should be used for handling large blocks of data since they are smaller and faster than the ASCII format. Refer to the FORMat:DATA command for more information.

If you need to change some of the measurement parameters from the factory default settings you can set up the measurement with the CONFigure command. Use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to change the settings. Then you can use the READ? command to initiate the measurement and query the results.

If you need to repeatedly make a given measurement with settings other than the factory defaults, you can use the commands in the SENSe:<measurement> and CALCulate:<measurement> subsystems to set up the measurement. Then use the READ? command to initiate the measurement and query results.

Measurement settings persist if you initiate a different measurement and then return to a previous one. Use READ:<measurement>? if you want to use those persistent settings. If you want to go back to the default settings, use MEASure:<measurement>?.

Configure Commands:

:CONFigure:<measurement>

This command stops the current measurement (if any) and sets up the instrument for the specified measurement using

the factory default instrument settings. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON. If you change any measurement settings after using the CONFigure command, the READ command can be used to initiate a measurement without changing the settings back to their defaults.

In the Swept SA measurement in Spectrum Analyzer mode the CONFigure command also turns the averaging function on and sets the number of averages to 10 for all measurements.

:CONFigure: <measurement>: NDEFault stops the current measurement and changes to the specified measurement. It does not change the settings to the defaults. It does not initiate the taking of measurement data unless INIT:CONTinuous is ON.

The CONFigure? query returns the current measurement name.

The CONFigure:CATalog? query returns a quoted string of all licensed measurement names in the current mode. For example, "SAN, CHP, OBW, ACP, PST, TXP, SPUR, SEM, LIST".

Fetch Commands:

:FETCh:<measurement>[n]?

This command puts selected data from the most recent measurement into the output buffer. Use FETCh if you have already made a good measurement and you want to return several types of data (different [n] values, for example, both scalars and trace data) from a single measurement. FETCh saves you the time of re-making the measurement. You can only FETCh results from the measurement that is currently active, it will not change to a different measurement. An error message is reported if a measurement other than the current one is specified.

If you need to get new measurement data, use the READ command, which is equivalent to an INITiate followed by a FETCh.

The scalar measurement results will be returned if the optional [n] value is not included, or is set to 1. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used for handling large blocks of data since they are smaller and transfer faster than the ASCII format. (FORMat:DATA)

FETCh may be used to return results other than those specified with the original READ or MEASure command that you sent.

INITiate Commands:

:INITiate:<measurement>

This command is not available for measurements in all the instrument modes:

- Initiates a trigger cycle for the specified measurement, but does not output any data. You must then use the FETCh<meas> command to return data. If a measurement other than the current one is specified, the instrument will switch to that measurement and then initiate it.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. If you send INIT:ACP? it will change from channel power to ACP and will initiate an ACP measurement.
 - Does not change any of the measurement settings. For example, if you have previously started the ACP measurement and you send INIT:ACP? it will initiate a new ACP measurement using the same instrument settings as the last time ACP was run.
 - If your selected measurement is currently active (in the idle state) it triggers the measurement, assuming the trigger conditions are met. Then it completes one trigger cycle. Depending upon the measurement and the number of averages, there may be multiple data acquisitions, with multiple trigger events, for one full trigger cycle. It also holds off additional commands on GPIB until the acquisition is complete.
-

READ Commands:

:READ:<measurement>[n]?

- Does not preset the measurement to the factory default settings. For example, if you have previously initiated the ACP
-

measurement and you send READ:ACP? it will initiate a new measurement using the same instrument settings.

- Initiates the measurement and puts valid data into the output buffer. If a measurement other than the current one is specified, the instrument will switch to that measurement before it initiates the measurement and returns results.
 - For example, suppose you have previously initiated the ACP measurement, but now you are running the channel power measurement. Then you send READ:ACP? It will change from channel power back to ACP and, using the previous ACP settings, will initiate the measurement and return results.
 - Blocks other SCPI communication, waiting until the measurement is complete before returning the results
 - If the optional [n] value is not included, or is set to 1, the scalar measurement results will be returned. If the [n] value is set to a value other than 1, the selected trace data results will be returned. See each command for details of what types of scalar results or trace data results are available. The binary data formats should be used when handling large blocks of data since they are smaller and faster than the ASCII format. (FORMat:DATA)
-

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Current Measurement Query (Remote Command Only)

This command returns the name of the measurement that is currently running.

| | |
|-----------------------|-------------|
| Remote Command | :CONFigure? |
|-----------------------|-------------|

| | |
|----------------|-------|
| Example | CONF? |
|----------------|-------|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Limit Test Current Results (Remote Command Only)

Queries the status of the current measurement limit testing. It returns a 0 if the measured results pass when compared with the current limits. It returns a 1 if the measured results fail any limit tests.

| | |
|-----------------------|--------------------------|
| Remote Command | :CALCulate:CLIMits:FAIL? |
|-----------------------|--------------------------|

| | |
|----------------|--|
| Example | CALC:CLIM:FAIL? queries the current measurement to see if it fails the defined limits. Returns a 0 or 1: 0 it passes, 1 it fails. |
|----------------|--|

| | |
|----------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
|----------------------|------------------|

Data Query (Remote Command Only)

Returns the designated measurement data for the currently selected measurement and subopcode.

n = any valid subopcode for the current measurement. See the measurement command results table for your current measurement, for information about what data is returned for the subopcodes.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. (See the format command descriptions under Input/Output in the Analyzer Setup section.)

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA[n]? |
| Notes | The return trace depends on the measurement. In CALCulate:<meas>:DATA[n], n is any valid subopcode for the current measurement. It returns the same data as the FETCH:<measurement>? query where <measurement> is the current measurement. |
| Initial S/W Revision | Prior to A.02.00 |

Calculate/Compress Trace Data Query (Remote Command Only)

Returns compressed data for the currently selected measurement and sub-opcode [n].

n = any valid sub-opcode for that measurement. See the MEASure:<measurement>? command description of your specific measurement for information on the data that can be returned.

The data is returned in the current Y Axis Unit of the analyzer. The command is used with a sub-opcode <n> (default=1) to specify the trace. With trace queries, it is best if the analyzer is not sweeping during the query. Therefore, it is generally advisable to be in Single Sweep, or Update=Off.

This command is used to compress or decimate a long trace to extract and return only the desired data. A typical example would be to acquire N frames of GSM data and return the mean power of the first burst in each frame. The command can also be used to identify the best curve fit for the data.

| | |
|-----------------------------|---|
| Remote Command | :CALCulate:DATA<n>:COMPRESS? BLOCK CFIT MAXimum MINimum MEAN DMEan RMS RMSCubed SAMPLE SDEVIation PPHase [,<soffset> [,<length>[,<roffset>[,<rlimit>]]]] |
| Example | To query the mean power of a set of GSM bursts: Supply a signal that is a set of GSM bursts. Select the IQ Waveform measurement (in IQ Analyzer Mode). Set the sweep time to acquire at least one burst. Set the triggers such that acquisition happens at a known position relative to a burst. Then query the mean burst levels using, CALC:DATA2:COMP? MEAN, 24e-6, 526e-6 (These parameter values correspond to GSM signals, where 526e-6 is the length of the burst in the slot and you just want 1 burst.) |
| Notes | The command supports 5 parameters. Note that the last 4 (<soffset>, <length>, <roffset>, <rlimit>) are optional. But these optional parameters must be entered in the specified order. For example, if you want to specify <length>, then you must also specify <soffset>. See details below for a definition of each of these parameters. This command uses the data in the format specified by FORMat:DATA, returning either binary or ASCII data. |
| Initial S/W Revision | Prior to A.02.00 |

- BLOCK or block data - returns all the data points from the region of the trace data that you specify. For example, it could be used to return the data points of an input signal over several timeslots, excluding the portions of the trace data that you do not want. (This is x,y pairs for trace data and I,Q pairs for complex data.)

- CFIT or curve fit - applies curve fitting routines to the data. <soffset> and <length> are required to define the data that you want. <roffset> is an optional parameter for the desired order of the curve equation. The query will return the following values: the x-offset (in seconds) and the curve coefficients ((order + 1) values).

MIN, MAX, MEAN, DME, RMS, RMSC, SAMP, SDEV and PPH return one data value for each specified region (or <length>) of trace data, for as many regions as possible until you run out of trace data (using <roffset> to specify regions). Or they return the number of regions you specify (using <rlimit>) ignoring any data beyond that.

- MINimum - returns the minimum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the minimum magnitude of the I/Q pairs is returned.
- MAXimum - returns the maximum data point (y value) for the specified region(s) of trace data. For I/Q trace data, the maximum magnitude of the I/Q pairs is returned.
- MEAN - returns a single value that is the arithmetic mean of the data point values (in dB/ dBm) for the specified region(s) of trace data. For I/Q trace data, the mean of the magnitudes of the I/Q pairs is returned. See the following equations.

-

NOTE

If the original trace data is in dB, this function returns the arithmetic mean of those log values, not log of the mean power which is a more useful value. The mean of the log is the better measurement technique when measuring CW signals in the presence of noise. The mean of the power, expressed in dB, is useful in power measurements such as Channel Power. To achieve the mean of the power, use the RMS option.

Equation 1

Mean Value of Data Points for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 2

Mean Value of I/Q Data Pairs for Specified Region(s)

$$\text{MEAN} = \frac{1}{n} \sum_{X_i \in \text{region}(s)} |X_i|$$

where $|X_i|$ is the magnitude of an I/Q pair, and n is the number of I/Q pairs in the specified region(s).

- DMEan - returns a single value that is the mean power (in dB/ dBm) of the data point values for the specified region(s) of trace data. See the following equation:

Equation 3

DMEan Value of Data Points for Specified Region(s)

$$DME = 10 \times \log_{10} \left(\frac{1}{n} \sum_{X_i \in \text{region}(s)} 10^{\frac{X_i}{10}} \right)$$

- RMS - returns a single value that is the average power on a root-mean-squared voltage scale (arithmetic rms) of the data point values for the specified region(s) of trace data. See the following equation.

NOTE

For I/Q trace data, the rms of the magnitudes of the I/Q pairs is returned. See the following equation. This function is very useful for I/Q trace data. However, if the original trace data is in dB, this function returns the rms of the log values which is not usually needed.

Equation 4

RMS Value of Data Points for Specified Region(s)

$$RMS = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i^2}$$

where X_i is a data point value, and n is the number of data points in the specified region(s).

Equation 5

RMS Value of I/Q Data Pairs for Specified Region(s)

$$RMS = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region(s).

Once you have the rms value for a region of trace data (linear or I/Q), you may want to calculate the mean power. You must convert this rms value (peak volts) to power in dBm:

$$10 \times \log[10 \times (\text{rms value})^2]$$

- SAMPlE - returns the first data value (x,y pair) for the specified region(s) of trace data. For I/Q trace data, the first I/Q pair is returned.
- SDEVIation - returns a single value that is the arithmetic standard deviation for the data point values for the specified region(s) of trace data. See the following equation.
- For I/Q trace data, the standard deviation of the magnitudes of the I/Q pairs is returned. See the following equation.

Equation 6

Standard Deviation of Data Point Values for Specified Region(s)

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (X_i - \bar{X})^2}$$

where X_i is a data point value, \bar{X} is the arithmetic mean of the data point values for the specified region (s), and n is the number of data points in the specified region(s).

$$\text{SDEV} = \sqrt{\frac{1}{n} \sum_{X_i \in \text{region}(s)} (|X_i| - \bar{X})^2}$$

where $|X_i|$ is the magnitude of an I/Q pair, \bar{X} is the mean of the magnitudes for the specified region(s), and n is the number of data points in the specified region(s).

- PPHase - returns the x,y pairs of both rms power (dBm) and arithmetic mean phase (radian) for every specified region and frequency offset (Hz). The number of pairs is defined by the specified number of regions. This parameter can be used for I/Q vector ($n=0$) in Waveform (time domain) measurement and all parameters are specified by data point in PPHase.

The rms power of the specified region may be expressed as:

$$\text{Power} = 10 \times \log [10 \times (\text{RMS I/Q value})] + 10.$$

The RMS I/Q value (peak volts) is:

$$\sqrt{\frac{1}{n} \sum_{X_i \in \text{region}} X_i X_i^*}$$

where X_i is the complex value representation of an I/Q pair, X_i^* its conjugate complex number, and n is the number of I/Q pairs in the specified region.

The arithmetic mean phase of the specified region may be expressed as:

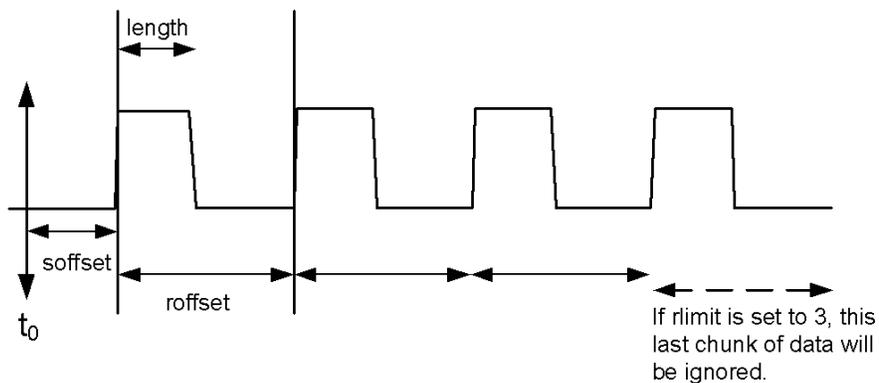
$$\frac{1}{n} \sum_{Y_i \in \text{region}} Y_i$$

where Y_i is the unwrapped phase of I/Q pair with applying frequency correction and n is the number of I/Q pairs in the specified region.

The frequency correction is made by the frequency offset calculated by the arithmetic mean of every specified region's frequency offset. Each frequency offset is calculated by the least square method against the unwrapped phase of I/Q pair.

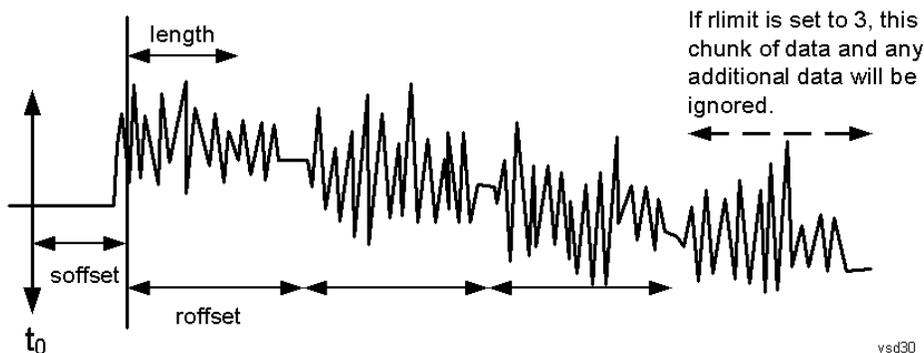
Sample Trace Data - Constant Envelope

(See below for explanation of variables.)



Sample Trace Data - Not Constant Envelope

(See below for explanation of variables.)



<soffset> - start offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It specifies the amount of data at the beginning of the trace that will be ignored before the decimation process starts. It is the time or frequency change from the start of the trace to the point where you want to start using the data. The default value is zero.

<length> - is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines how much data will be compressed into one value. This parameter has a default value equal to the current trace length.

<roffset> - repeat offset is an optional real number. (It is in seconds for time-domain traces, and is a dimensionless index 0 to Npoints - 1, for frequency-domain traces). It defines the beginning of the next field of trace elements to be compressed. This is relative to the beginning of the previous field. This parameter has a default value equal to the <length> variable. Note that this parameter is used for a completely different purpose when curve fitting (see CFIT above).

<rlimit> - repeat limit is an optional integer. It specifies the number of data items that you want returned. It will ignore any additional items beyond that number. You can use the Start offset and the Repeat limit to pick out exactly what part of the data you want to use. The default value is all the data.

Calculate Peaks of Trace Data (Remote Command Only)

Returns a list of all the peaks for the currently selected measurement and sub-opcode [n]. The peaks must meet the requirements of the peak threshold and excursion values.

n = any valid sub-opcode for the current measurement. See the MEASure:<measurement> command description of your specific measurement for information on the data that can be returned.

The command can only be used with specific sub-opcodes with measurement results that are trace data. Both real and complex traces can be searched, but complex traces are converted to magnitude in dBm. In many measurements the sub-opcode n=0, is the raw trace data which cannot be searched for peaks. And Sub-opcode n=1, is often calculated results values which also cannot be searched for peaks.

This command uses the data setting specified by the FORMat:BORDER and FORMat:DATA commands and can return real or ASCII data. If the format is set to INT,32, it returns REAL,32 data.

The command has four types of parameters:

- Threshold (in dBm)
- Excursion (in dB)
- Sorting order (amplitude, frequency, time)
- Optional in some measurements: Display line use (all, > display line, < display line)

| | |
|-----------------------|---|
| Remote Command | <p>For Swept SA measurement:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME[,ALL GTDLLine LTDLine]]</pre> <p>For most other measurements:</p> <pre>:CALCulate:DATA[1] 2 ... 6:PEAKs? <threshold>,<excursion>[,AMPLitude FREQuency TIME]</pre> |
|-----------------------|---|

| | |
|----------------|---|
| Example | <p>Example for Swept SA measurement in Spectrum Analyzer Mode:</p> <p>CALC:DATA4:PEAK? -40, 10, FREQ, GTDL This will identify the peaks of trace 4 that are above -40 dBm, with excursions of at least 10 dB. The peaks are returned in order of increasing frequency, starting with the lowest frequency. Only the peaks that are above the display line are returned.</p> <p>Query Results 1:</p> <p>With FORMat:DATA REAL, 32 selected, it returns a list of floating-point numbers. The first value in the list is the number of peak points that are in the following list. A peak point consists of two values: a peak amplitude followed by its corresponding frequency (or time).</p> <p>If no peaks are found the peak list will consist of only the number of peaks, (0).</p> |
|----------------|---|

| | |
|--------------|---|
| Notes | <p><n> - is the trace that will be used</p> <p><threshold> - is the level below which trace data peaks are ignored. Note that the threshold value is required and is always used as a peak criterion. To effectively disable the threshold criterion for this command, provide a substantially low threshold value such as -200 dBm. Also note that the threshold value used in this command is independent of and has no effect on the threshold value stored under the Peak Criteria menu.</p> <p><excursion> - is the minimum amplitude variation (rise and fall) required for a signal to be identified as peak. Note that the excursion value is required and is always used as a peak criterion. To effectively disable the excursion criterion for this command, provide the minimum value of 0.0 dB. Also note that the excursion value used in this command is independent of and has no effect on the</p> |
|--------------|---|

excursion value stored under the Peak Criteria menu.

Values must be provided for threshold and excursion. The sorting and display line parameters are optional (defaults are AMPLitude and ALL).

Note that there is always a Y-axis value for the display line, regardless of whether the display line state is on or off. It is the current Y-axis value of the display line which is used by this command to determine whether a peak should be reported

Sorting order:

AMPLitude - lists the peaks in order of descending amplitude, with the highest peak first (default if optional parameter not sent)

FREQuency - lists the peaks in order of occurrence, left to right across the x-axis.

TIME - lists the peaks in order of occurrence, left to right across the x-axis.

Peaks vs. Display Line:

ALL - lists all of the peaks found (default if optional parameter not sent).

GTDLine (greater than display line) - lists all of the peaks found above the display line.

LTDLine (less than display line) - lists all of the peaks found below the display line.

Initial S/W Revision Prior to A.02.00

Format Data: Numeric Data (Remote Command Only)

This command specifies the format of the trace data input and output. It specifies the formats used for trace data during data transfer across any remote port. It affects only the data format for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]?, :CALCulate:DATA[n]? and FETCh:SANalyzer [n]? commands and queries.

Remote Command :FORMat [:TRACe] [:DATA] ASCii | INTeger, 32 | REAL, 32 | REAL, 64
:FORMat [:TRACe] [:DATA] ?

Notes The query response is:
ASCii: ASC,8
REAL,32: REAL,32
REAL,64: REAL,64
INTeger,32: INT,32

When the numeric data format is REAL or ASCii, data is output in the current Y Axis unit. When the data format is INTeger, data is output in units of m dBm (.001 dBm).

The INT,32 format returns binary 32-bit integer values in internal units (m dBm), in a definite length block.

Dependencies Sending a data format spec with an invalid number (for example, INT,48) generates no error. The analyzer simply uses the default (8 for ASCii, 32 for INTeger, 32 for REAL).

Sending data to the analyzer which does not conform to the current FORMat specified, results in an error. Sending ASCII data when a definite block is expected generates message -161 "Invalid Block Data" and sending a definite block when ASCII data is expected generates message -121 "Invalid Character in Number".

Preset ASCii

Backwards Compatibility Notes Note that the INT,32 format is only applicable to the command, TRACe:DATA. This preserves backwards compatibility for the Swept SA measurement. For all other commands/queries which honor FORMat:DATA, if INT,32 is sent the analyzer will behave as though it were set to REAL,32.

Initial S/W Revision Prior to A.02.00

The specs for each output type follow:

ASCIi - Amplitude values are in ASCII, in the current Y Axis Unit, one ASCII character per digit, values separated by commas, each value in the form:

SX.YYYYYEsZZ

Where:

S = sign (+ or -)

X = one digit to left of decimal point

Y = 5 digits to right of decimal point

E = E, exponent header

s = sign of exponent (+ or -)

ZZ = two digit exponent

REAL,32 - Binary 32-bit real values in the current Y Axis Unit, in a definite length block.

REAL,64 - Binary 64-bit real values in the current Y Axis Unit, in a definite length block.

Format Data: Byte Order (Remote Command Only)

This command selects the binary data byte order for data transfer and other queries. It controls whether binary data is transferred in normal or swapped mode. This command affects only the byte order for setting and querying trace data for the :TRACe[:DATA], TRACe[:DATA]? , :CALCulate:DATA[n]? and FETCh:SANalyzer[n]? commands and queries.

By definition any command that says it uses FORMat:DATA uses any format supported by FORMat:DATA.

The NORMal order is a byte sequence that begins with the most significant byte (MSB) first, and ends with the least significant byte (LSB) last in the sequence: 1|2|3|4. SWAPped order is when the byte sequence begins with the LSB first, and ends with the MSB last in the sequence: 4|3|2|1.

| | |
|-----------------------------|--|
| Remote Command | :FORMat:BORDER NORMal SWAPped :FORMat:BORDER? |
| Preset | NORMal |
| Initial S/W Revision | Prior to A.02.00 |

Meas Setup

Displays the setup menu for the current measurement. The measurement setup parameters include the number of measurement averages used to calculate the measurement result and the averaging mode. The setup menu also includes the option to reset the measurement settings to their factory defaults.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Avg/Hold Num

Specifies the number of measurement averages used when calculating the measurement result. The average is displayed at the end of each sweep.

After the specified number of average counts, the averaging mode (terminal control) setting determines the averaging action.

| | |
|----------------------|---|
| Key Path | Meas Setup |
| Mode | All except SA and BASIC |
| Remote Command | [:SENSe]:MONitor:AVERage:COUNT <integer> [:SENSe]:MONitor:AVERage:COUNT? [:SENSe]:MONitor:AVERage[:STATe] OFF ON 0 1 [:SENSe]:MONitor:AVERage[:STATe]? |
| Example | MON:AVER:COUN 25 MON:AVER:COUN? MON:AVER ON MON:AVER? |
| Preset | 10 OFF |
| State Saved | Saved in instrument state. |
| Min | 1 |
| Max | 1000 |
| Initial S/W Revision | Prior to A.02.00 |

Avg Mode

Toggles the average mode between exponential (Exp) and Repeat.

- **Exp**– continues measurement averaging, using the specified number of averages to compute each averaged value. The average is displayed at the end of each sweep.
- **Repeat**– causes the measurement to reset the average counter each time the specified number of averages is reached.

| | |
|-----------------------|--|
| Key Path | Meas Setup |
| Mode | All except SA and BASIC |
| Remote Command | [:SENSe]:MONitor:AVERage:TCONtrol EXPonential REPeat [:SENSe]:MONitor:AVERage:TCONtrol? |
| Example | MON:AVER:TCON EXP MON:AVER:TCON? |
| Preset | EXPonential |
| State Saved | Saved in instrument state. |
| Range | ExpRepeat |
| Initial S/W Revision | Prior to A.02.00 |

Meas Preset

Restores all the measurement parameters to their default values.

| | |
|-----------------------|-------------------------|
| Key Path | Meas Setup |
| Mode | All except SA and BASIC |
| Remote Command | :CONFigure:MONitor |
| Example | CONF:MON |
| Initial S/W Revision | Prior to A.02.00 |

18 Monitor Spectrum Measurement
Mode

Mode

See "[Mode](#)" on page 288

Mode Preset

Returns the active mode to a known state.

Mode Preset does the following for the currently active mode:

- Aborts the currently running measurement.
- Brings up the default menu for the mode, with no active function.
- Sets measurement Global settings to their preset values for the active mode only.
- Activates the default measurement.
- Brings up the default menu for the mode.
- Clears the input and output buffers.
- Sets Status Byte to 0.

Mode Preset does not:

- Cause a mode switch
- Affect mode persistent settings
- Affect system settings
- See "[How-To Preset](#)" on page 2300 for more information.

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :SYSTem:PRESet |
| Example | :SYST:PRES |
| Notes | *RST is preferred over :SYST:PRES for remote operation. *RST does a Mode Preset, as done by the :SYST:PRES command, and it sets the measurement mode to Single measurement rather than Continuous for optimal remote control throughput. Clears all pending OPC bits. The Status Byte is set to 0. |
| Couplings | A Mode Preset aborts the currently running measurement, activates the default measurement, and gets the mode to a consistent state with all of the default couplings set. |
| Backwards Compatibility Notes | In the X-Series, the legacy "Factory Preset" has been replaced with Mode Preset, which only presets the currently active mode, not the entire instrument. In the X-Series, the way to preset the entire instrument is by using System, Restore System Defaults All, which behaves essentially the same way as restore System Defaults does on ESA and PSA. There is also no "Preset Type" as there is on the PSA. There is a green Mode Preset front-panel key that does a Mode Preset and a white-with-green-letters User Preset front-panel key that does a User Preset. The old PRESet:TYPE command is ignored (without generating an error), and SYST:PRES without a parameter does a Mode Preset, which should cover most backward code compatibility issues. The settings and correction data under the Input/Output front-panel key (examples: Input Z Corr, Ext Amp Gain, etc.) are no longer part of any Mode, so they will not be preset by a Mode Preset. They are preset using Restore Input/Output Defaults, Restore System Defaults All. Note that because User Preset does a Recall State, and all of these settings are saved in State, they ARE recalled when using |

| | |
|----------------------|------------------|
| | User Preset. |
| Initial S/W Revision | Prior to A.02.00 |

How-To Preset

The table below shows all possible presets, their corresponding SCPI commands and front-panel access (key paths). Instrument settings depend on the current measurement context. Some settings are local to the current measurement, some are global (common) across all the measurements in the current mode, and some are global to all the available modes. In a similar way, restoring the settings to their preset state can be done within the different contexts.

Auto Couple - is a measurement local key. It sets all Auto/Man parameter couplings in the measurement to Auto. Any Auto/Man selection that is local to other measurements in the mode will not be affected.

Meas Preset - is a measurement local key. Meas Preset resets all the variables local to the current measurement except the persistent ones.

Mode Preset - resets all the current mode's measurement local and measurement global variables except the persistent ones.

Restore Mode Defaults - resets ALL the Mode variables (and all the Meas global and Meas local variables), including the persistent ones.

| Type Of Preset | SCPI Command | Front Panel Access |
|--------------------------------|--|--|
| Auto Couple | :COUPle ALL | Auto Couple front-panel key |
| Meas Preset | :CONFigure:<Measurement> | Meas Setup Menu |
| Mode Preset | :SYSTem:PRESet | Mode Preset (green key) |
| Restore Mode Defaults | :INSTrument:DEFault | Mode Setup Menu |
| Restore All Mode Defaults | :SYSTem:DEFault MODEs | System Menu; Restore System Default Menu |
| *RST | *RST | not possible (Mode Preset with Single) |
| Restore Input/Output Defaults | :SYSTem:DEFault INPUt | System Menu; Restore System Default Menu |
| Restore Power On Defaults | :SYSTem:DEFault PON | System Menu; Restore System Default Menu |
| Restore Alignment Defaults | :SYSTem:DEFault ALIGN | System Menu; Restore System Default Menu |
| Restore Miscellaneous Defaults | :SYSTem:DEFault MISC | System Menu; Restore System Default Menu |
| Restore All System Defaults | :SYSTem:DEFault [ALL] :SYSTem:PRESet:PERsistent | System Menu; Restore System Default Menu |
| User Preset | :SYSTem:PRESet:USER | User Preset Menu |
| User Preset All Modes | :SYSTem:PRESet:USER:ALL | User Preset Menu |

| | | |
|----------------------|-----------------------|-------------|
| Power On Mode Preset | :SYSTem:PON:TYPE MODE | System Menu |
| Power On User Preset | :SYSTem:PON:TYPE USER | System Menu |
| Power On Last State | :SYSTem:PON:TYPE LAST | System Menu |

Preset Type (Remote Command Only)

As stated in the Backward Compatibility section, to be compatible with ESA/PSA the PRESet:TYPE command will be implemented as a no-op.

| | |
|-----------------------|--|
| Mode | All |
| Remote Command | :SYSTem:PRESet:TYPE FACTory MODE USER :SYSTem:PRESet:TYPE? |
| Example | :SYST:PRESet:TYPE FACT |
| Notes | This command is supported for backward compatibility only. It is a no-op which does not change the behavior of any preset operation. |
| Preset | This is unaffected by Preset but is set to Mode on a "Restore System Defaults->All" |
| State Saved | No |
| Initial S/W Revision | Prior to A.02.00 |

Mode Setup

See "[Mode Setup](#)" on page 320

Peak Search

Places the selected marker on the trace point with the maximum y-axis value for that marker's trace. Pressing Peak Search with the selected marker off causes the selected marker to be set to Normal, then a peak search is immediately performed.

| | |
|-----------------------------|---|
| Key Path | Front-panel key |
| Mode | All except SA and BASIC |
| Remote Command | :CALCulate:MONitor:MARKer[1] 2 ... 12:MAXimum |
| Example | CALC:MON:MARK2:MAX |
| Initial S/W Revision | Prior to A.02.00 |

18 Monitor Spectrum Measurement
Print

Print

See ["Print" on page 348](#)

Quick Save

The Quick Save front-panel key repeats the most recent save that was performed from the Save menu, with the following exceptions:

- Register saves are not remembered as Saves for the purpose of the Quick Save function
- If the current measurement does not support the last non-register save that was performed, an informational message is generated, “File type not supported for this measurement”

Quick Save repeats the last type of qualified save (that is, a save qualified by the above criteria) in the last save directory by creating a unique filename using the Auto File Naming algorithm described below.

If Quick Save is pressed after startup and before any qualified Save has been performed, the Quick Save function performs a Screen Image save using the current settings for Screen Image saves (current theme, current directory), which then becomes the “last save” for the purpose of subsequent Quick Saves.

The Auto File Naming feature automatically generates a file name for use when saving a file. The filename consists of a prefix and suffix separated by a dot, as is standard for the Windows® file system. A default prefix exists for each of the available file types:

| Type | Default Prefix | Menu |
|-----------------------|----------------|-----------------|
| State | State_ | (Save/Recall) |
| Trace + State | State_ | (Save/Recall) |
| Screen | Screen_ | (Save/Recall) |
| Amplitude Corrections | Ampcor_ | (Import/Export) |
| Traces | Trace_ | (Import/Export) |
| Limit Lines | LLine_ | (Import/Export) |
| Measurement Result | MeasR_ | (Import/Export) |
| Capture Buffer | CapBuf_ | (Import/Export) |

A four digit number is appended to the prefix to create a unique file name. The numbering sequence starts at 0000 within each Mode for each file type and updates incrementally to 9999, then wraps to 0000 again. It remembers where it was through a Mode Preset and when leaving and returning to the Mode. It is reset by Restore Misc Defaults and Restore System Defaults and subsequent running of the instrument application. So, for example, the first auto file name generated for State files is State_0000.state. The next is State_0001, and so forth.

One of the key features of Auto File Name is that we guarantee that the Auto File Name will never conflict with an existing file. The algorithm looks for the next available number. If it gets to 9999, then it looks for holes. If it find no holes, that is no more numbers are available, it gives an error.

For example, if when we get to State_0010.state there is already a State_0010.state file in the current directory, it advances the counter to State_0011.state to ensure that no conflict will exist (and then it verifies that State_0011.state also does not exist in the current directory and advances again if it does, and so forth).

If you enter a file name for a given file type, then the prefix becomes the filename you entered instead of the default prefix, followed by an underscore. The last four letters (the suffix) are the 4-digit number.

For example, if you save a measurement results file as “fred.csv”, then the next auto file name chosen for a measurement results save will be fred_0000.csv.

NOTE

Although 0000 is used in the example above, the number that is used is actually the current number in the Meas Results sequence, that is, the number that would have been used if you had not entered your own file name.

NOTE

If the filename you entered ends with _dddd, where d=any number, making it look just like an auto file name, then the next auto file name picks up where you left off with the suffix being dddd + 1.

| | |
|----------------------|--|
| Key Path | Front-panel key |
| Notes | No remote command for this key specifically. |
| Initial S/W Revision | Prior to A.02.00 |

Recall

The Recall menu lets you choose what you want to recall, and where you want to recall it from. Among the types of files you can recall are **States and Traces**. In addition, an Import (Data) option lets you recall a number of data types stored in CSV files (as used by Excel and other spreadsheet programs).

The default paths for Recall are data type dependent and are the same as for the Save key.

| Key Path | Front-panel key |
|-------------------------------|--|
| Notes | <p>No remote command for this key specifically, but the :MMEM:LOAD command is available for specific file types. An example is :MMEM:LOAD:STATe <filename>.</p> <p>If you try to recall a State file for a mode that is not licensed or not available in the instrument, an error message will occur and the state will not change.</p> |
| Backwards Compatibility Notes | <p>In legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly (since User Preset is actually loading a state), it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> |
| Backwards Compatibility Notes | <p>Recall for the X-Series supports backward compatibility in the sense that you can recall a state file from any X-Series model number and any version of X-Series software. This is only possible if part of the recalling process goes through a limiting step after recalling the mode settings, at least for settings that may vary with version number, model number, option and license differences. If you try to recall a state file onto an instrument with less capability than what was available on the instrument during the save, the recall will ignore the state it doesn't support and it will limit the recalled setting to what it allows.</p> <p>Example: if the saved state includes preamp ON, but the recalling instrument does not have a preamp; the preamp is limited to OFF. Conversely, if you save a state without a preamp, the preamp is OFF in the state file. When this saved file is recalled on an instrument with a licensed preamp, the preamp is changed to OFF. Another example is if the saved state has center frequency set to 20 GHz, but the instrument recalling the saved state is a different model and only supports 13.5 GHz. In this case, the center frequency is limited along with any other frequency based settings. Since the center frequency can't be preserved in this case, the recall limiting tries to at least preserve span to keep the measurement setup as intact as possible.</p> <p>It may be appropriate to issue a warning if the state is limited on the recall; warnings do not go out to SCPI so this would only affect the manual user.</p> <p>Note that there is no state file compatibility outside of the X-Series. For example, you cannot recall a state file from ESA or PSA.</p> |
| Initial S/W Revision | Prior to A.02.00 |

State

The Recall State menu lets you choose a register or file from which to recall the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings that were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the

additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, GPIB address) are not affected by either a Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

Since each state file is only for one Mode, the settings for other Modes are unaffected when it is loaded. Recall State will cause a mode switch if the state being recalled is not from the current active mode.

After the recall completes, the message "File <filename> recalled" or "Recalled State Register <register number>" is displayed.

For rapid recalls, the State menu lists 16 registers that you can choose from to recall. Pressing a Register key initiates the recall. You can also select a file from which to recall.

The default path for all State Files is:

My Documents\<<mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

See ["More Information" on page 2309](#).

| | |
|-----------------------|--|
| Key Path | Recall |
| Mode | All |
| Remote Command | :MMEMory:LOAD:STATe <filename> |
| Example | :MMEM:LOAD:STAT "myState.state" This recalls the file myState.state on the default path |
| Example | MMEM:LOAD:STAT "MyStateFile.state" This loads the state file data (on the default file directory path) into the instrument state. |
| Notes | <p>When you pick a file to recall, the analyzer first verifies that the file is recallable in the current instrument by checking the software version and model number of the instrument. If everything matches, a full recall proceeds by aborting the currently running measurement, clearing any pending operations, and then loading the State from the saved state file. You can open state files from any mode, so recalling a State file switches to the mode that was active when the save occurred. After switching to the mode of the saved state file, mode settings and data (if any for the mode) are loaded with values from the saved file. The saved measurement of the mode becomes the newly active measurement and the data relevant to the measurement (if there is any) is recalled.</p> <ul style="list-style-type: none"> • If there is a mismatch between file version or model number or instrument version or model number, the recall function tries to recall as much as possible and returns a warning message. It may limit settings that differ based on model number, licensing or version number. <p>After recalling the state, the Recall State function does the following:</p> <ul style="list-style-type: none"> • Makes the saved measurement for the mode the active measurement. • Clears the input and output buffers. • Status Byte is set to 0. • Executes a *CLS <p>If the file specified is empty an error is generated. If the specified file does not exist, another error is generated. If there is a mismatch between the file and the proper file type, an error is generated. If</p> |

| | |
|-------------------------------------|---|
| | there is a mismatch between file version or model number or instrument version or model number, a warning is displayed. Then it returns to the State menu and File Open dialog goes away. After the Recall, the analyzer exits the Recall menu and returns to the previous menu. |
| Backwards Compatibility SCPI | :MMEMory:LOAD:STATe 1,<filename> For backwards compatibility, the above syntax is supported. The "1" is simply ignored. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

In measurements that support saving Traces, for example, Swept SA, the Trace data is saved along with the State in the State file. When recalling the State, the Trace data is recalled as well. Traces are recalled exactly as they were stored, including the writing mode and update and display modes. If a Trace was updating and visible when the State was saved, it will come back updating and visible, and its data will be rewritten right away. When you use State to save and recall traces, any trace whose data must be preserved should be placed in View or Blank mode before saving.

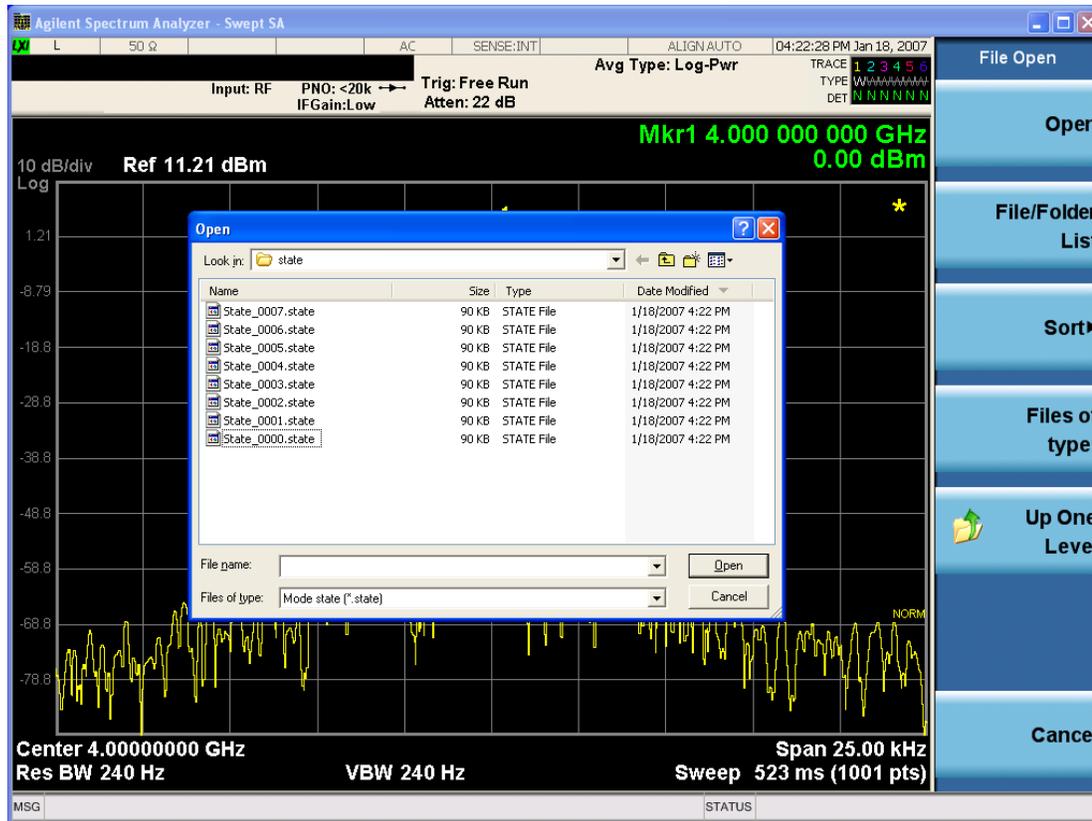
The following table describes the Trace Save and Recall possibilities:

| | | |
|---|--|--|
| You want to recall state and one trace's data, leaving other traces unaffected. | Save Trace+State from 1 trace. Make sure that no other traces are updating (they should all be in View or Blank mode) when the save is performed. | On Recall, specify the trace you want to load the one trace's data into. This trace will load in View. All other traces' data will be unaffected, although their trace mode will be as it was when the state save was performed. |
| You want to recall all traces | Save Trace+State from ALL traces. | On Recall, all traces will come back in View (or Blank if they were in Blank or Background when saved) |
| You want all traces to load exactly as they were when saved. | Save State | On recall, all traces' mode and data will be exactly as they were when saved. Any traces that were updating will have their data immediately overwritten. |

From File...

When you press "From File", the analyzer brings up a Windows dialog and a menu entitled "File Open." This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

18 Monitor Spectrum Measurement Recall



Listed below are the functions of the various fields in the dialog, and the corresponding softkeys:

Open

Performs the recall of the specified file. While the recall is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Look In.

Look In

The Look In field shows the path from which the file will be recalled and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Look In field** first uses the last path from the Save As dialog **Save In:** path for that same file type. There is no softkey for directly navigating to the Look In field, but you can use the left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

Sort

Accesses a menu that enables you to sort the files within the File Open dialog. Only one sorting type can be selected at a time and the sorting happens immediately. The sorting types are By Date, By Name, By extension, and By Size.

Files of Type

This field shows the file suffix for the type of file you have selected to recall. For example, if you navigated here while recalling State, "Mode state (*.state)" is in the field. If you navigated here while recalling Trace, ""Mode state (*.trace)" is in the field. If you navigated here while importing a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown menu, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Open** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Notes | Brings up the Open dialog for recalling a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

For more information and the SCPI command, see Edit Register Names under the Save, State function.

| | |
|----------------------|---|
| Key Path | Recall, State |
| Mode | All |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending the SCPI command generates an error, -221, "Settings conflict;Option not available" |
| Initial S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last

modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|--|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State, Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Register 1 thru Register 16

Selecting any one of these register keys causes the State of the mode from the specified Register to be recalled. Each of the register keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key under Save, State to enter custom names for each register.

Registers are shared by all modes, so recalling from any one of the registers will cause a mode switch to the mode that was active when the save to the Register occurred.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *RCL command.

After the recall completes, the message "Register <register number> recalled" appears in the message bar. If you are in the Spectrum Analyzer Mode, and you are recalling a register that was saved in the Spectrum Analyzer Mode, then after the recall, you will still be in the Recall Register menu. If the Recall causes you to switch modes, then after the Recall, you will be in the Frequency menu.

If a requested register is empty an error is generated.

| | |
|--------------------------|---|
| Key Path | Recall, State |
| Example | *RCL 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Save, State,Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | Prior to A.11.00 |

Data (Import)

Importing a data file loads data that was previously saved from the current measurement or from other measurements and/or modes that produce compatible data files. The Import Menu only contains Data Types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by the user prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Importing Data loads measurement data from the specified file into the specified or default destination, depending on the data type selected. Selecting an Import Data menu key will not actually cause the importing to occur, since the analyzer still needs to know from where to get the data. Pressing the Open key in this menu brings up the Open dialog and Open menu that provides you with the options from where to recall the data. Once a filename has been selected or entered in the Open menu, the recall occurs as soon as the Open button is pressed.

| | |
|----------------------|--|
| Key Path | Recall |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. Some keys will be missing completely, so the key locations in the sub-menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:LOAD commands. |
| Dependencies | If a file type is not used by a certain measurement, it is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Capture Buffer

The captured data is raw data which is not processed.

| | |
|----------------------|---|
| Key Path | Recall, Data |
| Mode | TD-SCDMA |
| Example | MMEM:LOAD:CAPT "MyCaptureData.bin" This loads the file of capture data (on the default file directory path) into the instrument. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Open...

When you press "Open", the analyzer brings up a Windows dialog and a menu entitled "**File Open.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[From File...](#)" on page 2309 in Recall, State, for a full description of this dialog and menu.

| | |
|----------------------|--|
| Key Path | Recall, Data |
| Notes | The key location is mode-dependent and will vary. Brings up Open dialog for recalling a <mode specific> Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Restart

The Restart function restarts the current sweep, or measurement, or set of averaged/held sweeps or measurements. If you are Paused, pressing Restart does a Resume.

The Restart function is accessed in several ways:

- Pressing the Restart key
- Sending the remote command INIT:IMMEDIATE
- Sending the remote command INIT:RESTART

See "[More Information](#)" on page 2315

| | |
|-------------------------------|--|
| Key Path | Front-panel key |
| Remote Command | :INITiate[:IMMEDIATE] :INITiate:RESTART |
| Example | :INIT:IMM :INIT:REST |
| Notes | :INITiate:RESTART and :INITiate:IMMEDIATE perform exactly the same function. |
| Couplings | Resets average/hold count k. For the first sweep overwrites all active (update=on) traces with new current data. For application modes, it resets other parameters as required by the measurement. |
| Status Bits/OPC dependencies | This is an Overlapped command. The STATUS:OPERation register bits 0 through 8 are cleared. The STATUS:QUESTIONable register bit 9 (INTEgrity sum) is cleared. The SWEEPING bit is set. The MEASURING bit is set. |
| Backwards Compatibility Notes | For Spectrum Analysis mode in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart trace averages (displayed average count reset to 1) for a trace in Clear Write, but did not restart Max Hold and Min Hold. In the X-Series, the Restart hardkey and the INITiate:RESTART command restart not only Trace Average, but MaxHold and MinHold traces as well. For wireless comms modes in ESA and PSA, the Restart hardkey and the INITiate:RESTART command restart every measurement, which includes all traces and numeric results. There is no change to this operation. |
| Initial S/W Revision | Prior to A.02.00 |

More Information

The **Restart** function first aborts the current sweep/measurement as quickly as possible. It then resets the sweep and trigger systems, sets up the measurement and initiates a new data measurement sequence with a new data acquisition (sweep) taken once the trigger condition is met.

If the analyzer is in the process of aligning when **Restart** is executed, the alignment finishes before the restart function is performed.

Even when set for Single operation, multiple sweeps may be taken when Restart is pressed (for example, when averaging/holding is on). Thus when we say that **Restart** "restarts a measurement," we may mean:

- It restarts the current sweep
- It restarts the current measurement
- It restarts the current set of sweeps if any trace is in Trace Average, Max Hold or Min Hold
- It restarts the current set of measurements if Averaging, or Max Hold, or Min Hold is on for the measurement
- depending on the current settings.

With **Average/Hold Number** (in **Meas Setup** menu) set to 1, or Averaging off, or no trace in Trace Average or Hold, a single sweep is equivalent to a single measurement. A single sweep is taken after the trigger condition is met; and the analyzer stops sweeping once that sweep has completed. However, with **Average/Hold Number** >1 and at least one trace set to **Trace Average, Max Hold, or Min Hold (SA Measurement)** or **Averaging on (most other measurements)**, multiple sweeps/data acquisitions are taken for a single measurement. The trigger condition must be met prior to each sweep. The sweep is stopped when the average count k equals the number N set for **Average/Hold Number**. A measurement average usually applies to all traces, marker results, and numeric results; but sometimes it only applies to the numeric results.

Once the full set of sweeps has been taken, the analyzer will go to idle state. To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Save

The Save menu lets you choose what you want to save and where you want to save it. Among the types of files you can save are **States**, **Traces**, and **Screen Images**. In addition, an Export (Data) option lets you save a number of data types as CSV files for easy import into Excel and other spreadsheet programs.

| | |
|----------------------|---|
| Key Path | Front-panel key |
| Mode | All |
| Notes | No remote command for this key specifically, but the :MMEM:STORe command is available for specific file types. An example is :MMEM:STOR:STATe <filename>. |
| Initial S/W Revision | Prior to A.02.00 |

State

The Save State menu lets you choose a register or file for saving the state.

The content of a state file includes all of the settings and data required to return the analyzer as closely as possible to the Mode it was in, with the exact settings which were in place, when the save occurred. The Mode settings in each state file include the settings that are affected by Mode Preset, as well as the additional settings affected by Restore Mode Defaults; all of the Mode's settings. In addition, all of the settings of the Input/Output system are included, even though they are outside of the Mode's state, because they are needed to restore the complete setup. Persistent System settings (for example, Verbose SCPI) are not affected by either Mode Preset or Restore Mode Defaults, nor are they included in a saved State file.

After the save completes, the message "File <filename> saved" or "State Register <register number> saved" is displayed.

For rapid saving, the State menu lists 16 registers to save to. Pressing a Register key initiates the save. You can also select a file to save to.

The default path for all State Files is:

My Documents\<>mode name>\state

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

| | |
|----------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:STATe <filename> |
| Example | MMEM:STOR:STATe "MyStateFile.state" This stores the current instrument state data in the file MyStateFile.state in the default directory. |
| Notes | Both single and double quotes are supported for any filename parameter over remote. After saving to a register, that register's menu key is updated with the date the time, unless a custom label has been entered for that key. After saving to a register, you remain in the Save State menu, so that you can see the Register key |

update. After saving to a file, the analyzer automatically returns to the previous menu and any Save As dialog goes away.

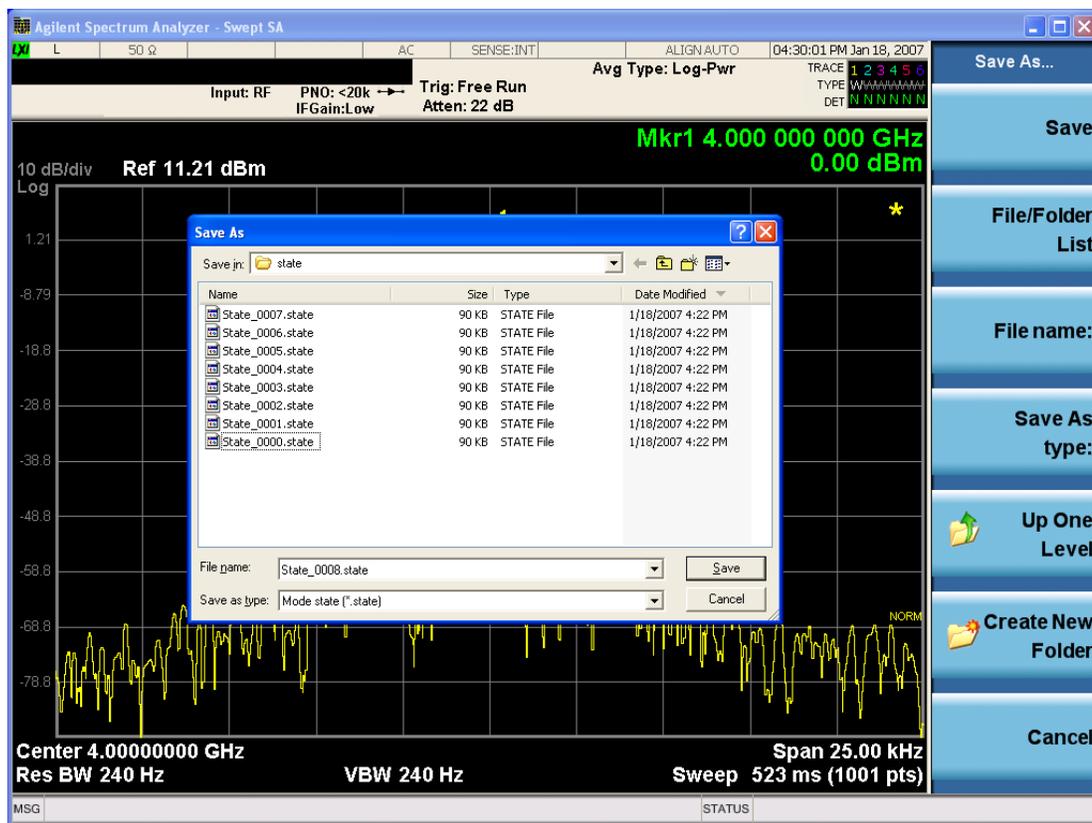
Backwards Compatibility SCPI :MMEMory:STORe:STATe 1,<filename>

For backwards compatibility, the above syntax is supported. The "1" is simply ignored. The command is sequential.

Initial S/W Revision Prior to A.02.00

To File . . .

When you press “To File”, the analyzer brings up a Windows dialog and a menu entitled “Save As.” This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.



The Listed below

are the functions of the various fields in the dialog, and the corresponding softkeys:

Save

Performs the save to the specified file of the selected type. If the file already exists, a dialog will appear that allows you to replace the existing file by selecting OK, or you can Cancel the request. If you select OK, the file will be overwritten. Using the C: drive is strongly discouraged, since it runs the risk of being overwritten during an instrument software upgrade.

While the save is being performed, the floppy icon appears briefly in the Meas bar.

File/Folder List

Enables you to navigate to the center of the dialog that contains the list of files and folders. Once here you can get information about the file and use the tab keys to navigate to the other fields in the dialog, such as Save In.

Save In

The Save In field shows the path to which the file will be saved and allows you to change the path using the up and down arrow keys to navigate to other paths; the Enter key to open a directory; and the Backspace key to go back one directory. The **Save In field** defaults to the default path for this type of file and remembers the last path you used to save this type of file. There is no softkey for directly navigating to the Save In field but you can use left tab to get here from the File/Folder List.

User specified paths are remembered when you leave and return to a Mode and are reset back to the default using Restore Mode Defaults.

File Name

The File Name field is initially loaded with an automatically generated filename specific to the appropriate Save Type. The automatically generated filename is guaranteed not to conflict with any filename currently in the directory. You may replace or modify this filename using the File Name key. See the ["Quick Save " on page 2305](#) documentation for more on the automatic file naming algorithm.

When you press the File Name key the analyzer displays the Alpha Editor. Use the knob to choose the letter to add and the front-panel Enter key to add the letter to the file name. The BK character moves you back and the FW character moves you forward in the filename. The Select key on the front panel generates a space character. When you are done entering the filename press the Done softkey. This returns back to the **File Open** dialog and menu, but does not cause the save to occur.

Save As Type

This field shows the file suffix for the type of file you have selected to save. For example, if you navigated here while saving State, "Mode state (*.state)" is in the field. If you navigated here from saving Trace, ""Mode state (*.trace)" is in the field. If you navigated here while exporting a trace data file, "Trace Data (*.csv)" is in the field. For some file types, there is more than one choice in the dropdown, which you can select by using the up and down arrow keys and Enter.

Up One Level

This key corresponds to the icon of a folder with the up arrow that is in the tool bar of the dialog. When pressed, it causes the file and folder list to navigate up one level in the directory structure. The Backspace key does the same thing.

Create New Folder

This key corresponds to the icon of a folder with the "*" that is in the tool bar of the dialog. When pressed, a new folder is created in the current directory with the name **New Folder** and you can enter a new folder name using the Alpha Editor.

Cancel

This key corresponds to the Cancel selection in the dialog. It causes the current **Save As** request to be cancelled. The ESC key does the same thing.

| | |
|----------------------|---|
| Key Path | Save, State |
| Mode | All |
| Notes | Brings up Save As dialog for saving a State Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Edit Register Names

You may enter a custom name on any of the Register keys, to help you remember what you are using that state to save. To do this, press the Edit Register Names key, choose the register whose name you wish to edit, and then enter the desired label using the Alpha Editor or an external PC keyboard.

The maximum number of characters that can be added is 30. In most cases, 30 characters will fit on two lines of the key.

See ["More Information" on page 2320](#)

| | |
|-----------------------|--|
| Key Path | Save, State |
| Mode | All |
| Remote Command | :MMEMory:REGister:STATe:LABel <reg number>,"label" :MMEMory:REGister:STATe:LABel? <reg number> |
| Example | :MMEM:REG:STAT:LAB 1,"my label" |
| Notes | <reg number> is an integer from 1 to 16. If the SCPI specifies an invalid register number an error message is generated, -222,"Data out of range;Invalid register label number" "label" is a string from 0 to 30 characters in length. If a label exceeds 30 characters, an error message is generated, -150,"String data error;Label clipped to 30 characters" "label" of length 0 erases the custom label and restores the default (time and date) label. E.g.: :MMEM:REG:STAT:LAB 1,"" |
| Dependencies | N9060A-7FP or N9060B-2FP license required to edit the register names. When the feature is not licensed, sending this command generates an error, -221,"Settings conflict;Option not available" |
| Preset | The names are unaffected by Preset or power cycle but are set to the default label (time and date) on a "Restore System Defaults->Misc" |
| Initial S/W Revision | A.11.00 |

More Information

When you edit one of the register names, the time and date field will be replaced by the custom name.

If you delete all the characters in the custom name, it restores the default (time and date).

The register names are stored within the state files, but they are not part of the instrument state; that is, once you have edited a register name, loading a new state will not change that register name. Another consequence of this is that the names will be persistent through a power cycle. Also, if a named state file is transferred to another analyzer, it will bring its custom name along with it.

If you try to edit the name of an empty register, the analyzer will first save the state to have a file to put the name in. If you load a named state file into an analyzer with older firmware it will ignore the metadata.

The *SAV and *RCL commands will not be affected by the custom register names, nor will the MMEM commands.

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1–16 from front panel, 1–128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Register 1 thru Register 16

Selecting any one of these register menu keys causes the State of the currently active mode to be saved to the specified Register. The registers are provided for rapid saving and recalling, since you do not need to specify a filename or navigate to a file. Each of the register menu keys annotates whether it is empty or at what date and time it was last modified. In addition, you can use the Edit Register Names key to enter custom names for each register.

Although these 16 registers are the only registers available from the front panel, there are 128 state registers available in the instrument. Registers 17–128 are only available from the SCPI interface, using the *SAV command.

There is one set of 128 state registers in the instrument, not one set for each Mode. When a state is saved, the Mode it was saved from is saved with it; then when it is recalled, the instrument switches to that Mode.

After the save completes, the corresponding register menu key annotation is updated with the date and time and the message "Register <register number> saved" is displayed.

| | |
|--------------------------|---|
| Key Path | Save, State |
| Mode | All |
| Example | *SAV 1 |
| Range | 1-16 from front panel, 1-128 from SCPI |
| Readback | Date and time with seconds resolution are displayed on the key OR A custom name of up to 30 characters entered using the Edit Register Names key OR “(empty)” if no prior save operation has been performed to this register. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.00 |

Data (Export)

Exporting a data file stores data from the current measurement to mass storage files. The Export Menu only contains data types that are supported by the current measurement.

Since the commonly exported data files are in .csv format, the data can be edited by you prior to importing. This allows you to export a data file, manipulate the data in Excel (the most common PC Application for manipulating .csv files) and then import it.

Selecting an Export Data menu key will not actually cause the exporting to occur, since the analyzer still needs to know where you wish to save the data. Pressing the Save As key in this menu brings up the Save As dialog and Save As menu that allows you to specify the destination file and directory. Once a filename has been selected or entered in the Open menu, the export will occur as soon as the Save key is pressed.

| | |
|----------------------|---|
| Key Path | Save |
| Mode | All |
| Notes | The menu is built from whatever data types are available for the mode. So the key locations in the sub menu will vary. No SCPI command directly controls the Data Type that this key controls. The Data Type is included in the MMEM:STORe commands. |
| Dependencies | If a file type is not used by a certain measurement, that type is grayed out for that measurement. The key for a file type will not show at all if there are no measurements in the Mode that support it. |
| Preset | Is not affected by a Preset or shutdown, but is reset during Restore Mode Defaults |
| Readback | The data type that is currently selected |
| Initial S/W Revision | Prior to A.02.00 |

Meas Results

| | |
|----------------------|---|
| Key Path | Save, Data |
| Mode | TD-SCDMA |
| Example | MMEM:STOR:RES "MyResultsFile.csv" This stores the measurement results data in the file MyResultsFile.xml in the default directory. |
| Initial S/W Revision | A.11.00 |

Capture Buffer

Capture Buffer functionality is not available for all measurements. The captured data is raw data which is not processed.

| | |
|----------------------|--|
| Key Path | Save, Data |
| Mode | TD-SCDMA |
| Example | MMEM:STOR:CAPT "MyCaptureData.bin" This stores the capture data in the file MyCaptureData.bin in the default directory. |
| Dependencies | In case the capture buffer data is not available from the selected measurement, the key will be grayed out. |
| Initial S/W Revision | A.11.00 |

Save As . . .

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for saving files is:

For all of the Trace Data Files:

My Documents\`<mode name>`\data\traces

For all of the Limit Data Files:

My Documents\`<mode name>`\data\limits

For all of the Measurement Results Data Files:

My Documents\`<mode name>`\data\`<measurement name>`\results

For all of the Capture Buffer Data Files:

My Documents\`<mode name>`\data\captureBuffer

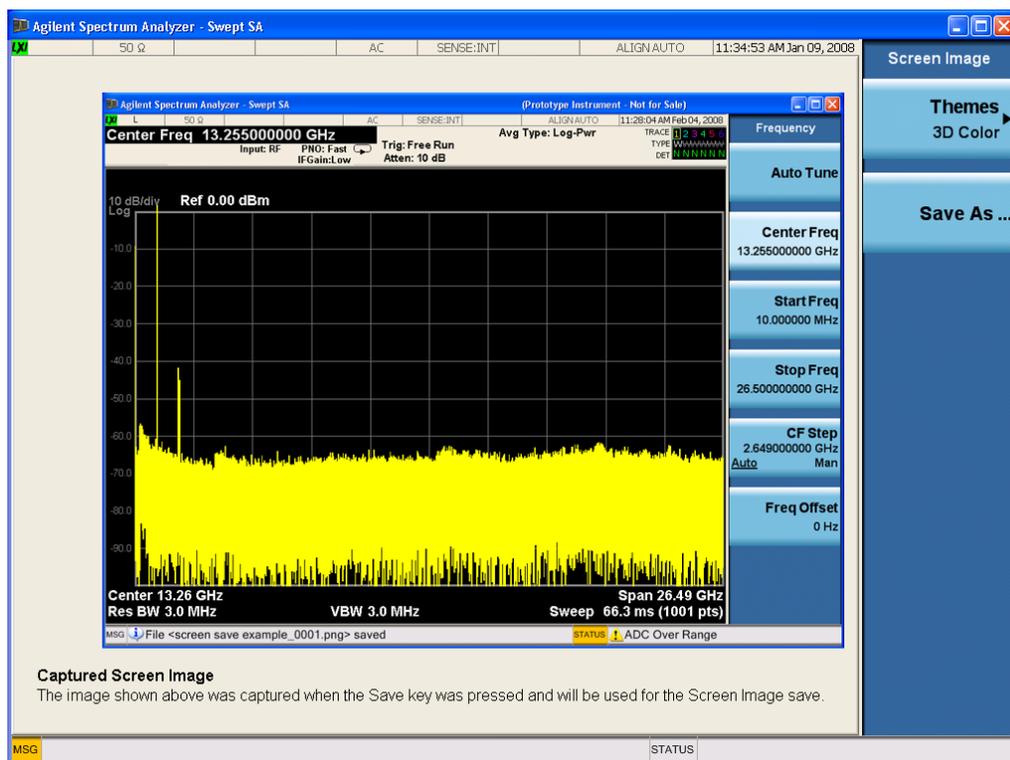
| | |
|----------------------|--|
| Key Path | Save, Data |
| Mode | All |
| Notes | The key location is mode-dependent and will vary. Brings up the Save As dialog for saving a <mode specific> Save Type. The save is performed immediately and does not wait until the measurement is complete. |
| Initial S/W Revision | Prior to A.02.00 |

Screen Image

Pressing Screen Image accesses a menu of functions that enable you to specify a format and location for the saved screen image. It brings up a menu that allows you to specify the color scheme of the Screen Image (Themes) or navigate to the Save As dialog to perform the actual save.

Screen Image files contain an exact representation of the analyzer display. They cannot be loaded back onto the analyzer, but they can be loaded into your PC for use in many popular applications.

The image to be saved is actually captured when the Save front panel key is pressed, and kept in temporary storage to be used if you ask for a Screen Image save. When the Screen Image key is pressed, a "thumbnail" of the captured image is displayed, as shown below:



When you continue on into the Save As menu and complete the Screen Image save, the image depicted in the thumbnail is the one that gets saved, showing the menus that were on the screen before going into the Save menus. The save is performed immediately and does not wait until the measurement is complete.

After you have completed the save, the Quick Save front-panel key lets you quickly repeat the last save performed, using an auto-named file, with the current screen data.

NOTE

For versions previous to A.01.55, if you initiate a screen image save by navigating through the Save menus, the image that is saved will contain the Save menu softkeys, not the menus and the active function that were on the screen when you first pressed the Save front panel key.

| | |
|----------------------|--|
| Key Path | Save |
| Mode | All |
| Remote Command | :MMEMory:STORe:SCReem <filename> |
| Example | :MMEM:STOR:SCR "myScreen.png" This stores the current screen image in the file MyScreenFile.png in the default directory. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|-------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReem:THEMe TDColor TDMonochrome FCOLOR FMONochrome :MMEMory:STORe:SCReem:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|----------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |

| | |
|----------------------|------------------|
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Save As...

When you press "Save As", the analyzer brings up a Windows dialog and a menu entitled "**Save As.**" This menu allows you to navigate to the various fields in the Windows dialog without using a keyboard or mouse. The Tab and Arrow keys can also be used for dialog navigation.

See "[To File . . .](#)" on page 2318 in Save, State for a full description of this dialog and menu.

The default path for Screen Images is

My Documents\`<mode name>`\screen.

where <mode name> is the parameter used to select the mode with the INST:SEL command (for example, SA for the Spectrum Analyzer).

| | |
|----------------------|--|
| Key Path | Save, Screen Image |
| Notes | Brings up Save As dialog for saving a Screen Image Save Type |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Catalog (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:CATalog? [<directory_name>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Queries disk usage information (drive capacity, free space available) and obtains a list of files and directories in a specified directory in the following format: <numeric_value>,<numeric_value>,{<file_entry>}</p> <p>It returns two numeric parameters and as many strings as there are files and directories. The first parameter indicates the total amount of storage currently used in bytes. The second parameter indicates the total amount of storage available, also in bytes. The <file_entry> is a string. Each <file_entry> indicates the name, type, and size of one file in the directory list: <file_name>,<file_type>,<file_size></p> <p>As the windows file system has an extension that indicates file type, <file_type> is always empty. <file_size> provides the size of the file in bytes. For directories, <file_entry> is surrounded by square brackets and both <file_type> and <file_size> are empty</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Change Directory (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:CDIRectory [<directory_name>] :MMEMory:CDIRectory? |
| Notes | <p>The string must be a valid logical path.</p> <p>Changes the default directory for a mass memory file system. The <directory_name> parameter is a string. If no parameter is specified, the directory is set to the *RST value.</p> <p>At *RST, this value is set to the default user data storage area, that is defined as System.Environment.SpecialFolder.Personal.</p> <p>Query returns full path of the default directory.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Copy (Remote Command Only)

| | |
|----------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:COpy <string>,<string>[,<string>,<string>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Copies an existing file to a new file or an existing directory to a new directory.</p> <p>Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination.</p> <p>The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists.</p> <p>This command will generate an "access denied" error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |

Mass Storage Device Copy (Remote Command Only)

This command transfers data to/from a file and a peripheral device.

| | |
|----------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:COpy:DEvice <source_string>,<dest_string> |
| Notes | <p>The strings must be a valid logical path or a valid device keyword. If the dest_string is a device keyword, the data is copied from the source file to the device. If the source_string is a device keyword, the data is copied to the source file from the device.</p> <p>Valid device keywords are:</p> <p>SNS (smart noise source)</p> <p>An error is generated if the file or device is not found.</p> |

Mass Storage Delete (Remote Command Only)

| | |
|----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DElete <file_name>[,<directory_name>] |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a file from the specified directory. The <file_name> parameter specifies the file name to be removed. This command will generate an "access denied" error if the file is in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Data (Remote Command Only)

Creates a file containing the specified data OR queries the data from an existing file.

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:DATA <file_name>, <data> :MMEMory:DATA? <file_name> |
| Notes | The string must be a valid logical path. The command form is MMEMory:DATA <file_name>,<data>. It loads <data> into the file <file_name>. <data> is in 488.2 block format. <file_name> is string data. The query form is MMEMory:DATA? <file_name> with the response being the associated <data> in block format. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Make Directory (Remote Command Only)

| | |
|-----------------------|---|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MDIRectory <directory_name> |
| Notes | The string must be a valid logical path. Creates a new directory. The <directory_name> parameter specifies the name to be created. This command will generate an “access denied” error if the new directory would be in a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Move (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:MOVE <string>,<string>[,<string>,<string>] |
| Notes | The string must be a valid logical path. Moves an existing file to a new file or an existing directory to a new directory. Two forms of parameters are allowed. The first form has two parameters. In this form, the first parameter specifies the source, and the second parameter specifies the destination. The second form has four parameters. In this form, the first and third parameters specify the source. The second and fourth parameters specify the directories. The first pair of parameters specifies the source. The second pair specifies the destination. An error is generated if the source doesn't exist or the destination file already exists. This command will generate an “access denied” error if the destination is a restricted folder (e.g., C:\Windows) and the current user does not have Power User or Administrator privileges. |
| Initial S/W Revision | Prior to A.02.00 |

Mass Storage Remove Directory (Remote Command Only)

| | |
|-----------------------|--|
| Key path | SCPI Only |
| Remote Command | :MMEMory:RDIRectory <directory_name> |
| Notes | <p>The string must be a valid logical path.</p> <p>Removes a directory. The <directory_name> parameter specifies the directory name to be removed. All files and directories under the specified directory shall also be removed.</p> <p>This command will generate an “access denied” error if the folder is a restricted folder (e.g., C:\Windows) or is in a restricted folder and the current user does not have Power User or Administrator privileges.</p> |
| Initial S/W Revision | Prior to A.02.00 |

Single (Single Measurement/Sweep)

Sets the analyzer for Single measurement operation. The single/continuous state is Meas Global, so the setting will affect all the measurements. If you are Paused, pressing Single does a Resume.

See ["More Information" on page 2331](#)

| | |
|-------------------------------|---|
| Key Path | Front-panel key |
| Example | :INIT:CONT OFF |
| Notes | See Cont key description. |
| Backwards Compatibility Notes | <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey and the INITiate:IMM switched from continuous measurement to single measurement and restarted sweeps and averages (displayed average count reset to 1), but did not restart Max Hold and Min Hold. In the X-Series, the Single hardkey and the INITiate:IMM command initiate a sweep/ measurement/ average sequence/hold sequence including MaxHold and MinHold.</p> <p>For Spectrum Analysis mode in ESA and PSA, the Single hardkey restarted the sweep regardless of whether or not you were in an active sweep or sweep sequence. In the X-Series, Restart does this but Single only restarts the sweep or sweep sequence if you are in the idle state.</p> <p>INIT[:IMM] in ESA & PSA Spectrum Analysis Mode does an implied ABORT. In some other PSA Modes, INIT[:IMM] is ignored if not in the idle state. . The X-Series follows the ESA/PSA SA Mode model, which may cause some Modes to have compatibility problems.</p> |
| Initial S/W Revision | Prior to A.02.00 |

More Information

See ["Restart" on page 2315](#) for details on the INIT:IMMEDIATE (Restart) function.

If you are already in single sweep, the INIT:CONT OFF command has no effect.

If you are already in Single Sweep, then pressing the Single key in the middle of a sweep does not restart the sweep or sequence. Similarly, pressing the Single key does not restart the sweep or sequence if the sweep is not in the idle state (for example, if you are taking a very slow sweep, or the analyzer is waiting for a trigger). Instead, it results in a message. "Already in Single, press Restart to initiate a new sweep or sequence". Even though pressing the Single key in the middle of a sweep does not restart the sweep, sending INIT:IMMEDIATE does reset it.

To take one more sweep without resetting the average count, increment the average count by 1, by pressing the step up key while **Average/Hold Number** is the active function, or sending the remote command CALC:AVER:TCON UP.

Source

There is no Source control functionality for this measurement. When this key is pressed, the screen either displays a blank menu, or the previously-selected menu remains unchanged.

| Key Path | Front-panel key |
|----------|-----------------|
|----------|-----------------|

Span X Scale

Accesses a menu of functions that enable you to set the horizontal scale parameters.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Span

Changes the frequency range symmetrically about the center frequency.

For details of WiDEN preset values, see ["IDEN Mode Span Preset for Monitor Spectrum" on page 2334](#).

| | |
|-----------------------|---|
| Key Path | Span X Scale |
| Mode | All except SA, BASIC |
| Remote Command | [:SENSe] :MONitor:FREQuency:SPAN <freq> [:SENSe] :MONitor:FREQuency:SPAN? |
| Example | MON:FREQ:SPAN 1 MHz MON:FREQ:SPAN? |
| Couplings | Changing the span causes the resolution bandwidth to change automatically, and affects data acquisition time. |
| Preset | WCDMA: 10.0 MHz WIMAX OFDMA: 50.0 MHz C2K: 2.5MHz PN: 1.0 MHz GSM/EDGE: 1.0 MHz TD-SCDMA: 3.2 MHz 1xEVDO: 2.0MHz DVB-T/H: 10.0MHz DTMB (CTTB): 10.0MHz ISDB-T: 10.0MHz CMMB: 10.0MHz LTE: 50 MHz LTETDD: 50 MHz IDEN: See the table below Digital Cable TV: 10.0MHz WLAN: If Radio Std is 802.11a/b/g 802.11n(20MHz) 802.11ac(20MHz): 25 MHz If Radio Std is 802.11n(40MHz), 802.11ac (40MHz): 50 MHz If Radio Std is 802.11ac(80MHz): 100MHz If Radio Std is 802.11ac(160MHz): 200MHz |

| | |
|--------------------------|--|
| | MSR: 20.0 MHz LTEAFDD, LTEATDD: 20.0MHz |
| State Saved | Saved in instrument state. |
| Min | 10 Hz |
| Max | Hardware Dependent: Option 503 = 3.7 GHz Option 507 = 7.1GHz Option 508 = 8.5 GHz Option 513 = 13.8 GHz Option 526 = 27.0 GHz |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.02.00 |
| Modified at S/W Revision | A.03.00 |

IDEN Mode Span Preset for Monitor Spectrum

| iDEN Slot Format | WiDEN Slot Format 25kHz | WiDEN Slot Format 50kHz | WiDEN Slot Format 75kHz | WiDEN Slot Format 100kHz | WiDEN Slot Format 50kHz Out |
|------------------|-------------------------|-------------------------|-------------------------|--------------------------|-----------------------------|
| 60kHz | 60kHz | 85kHz | 110kHz | 135kHz | 135kHz |

Full Span

Changes the Span to show the full frequency range of the analyzer.

| | |
|-----------------------|--|
| Key Path | Span X Scale |
| Mode | All except SA and BASIC |
| Remote Command | [:SENSe] :MONitor:FREQuency:SPAN:FULL |
| Example | MON:FREQ:SPAN:FULL |
| Couplings | Sets the span to the full frequency range, and adjusts the center frequency accordingly. |
| Initial S/W Revision | Prior to A.02.00 |

Last Span

Changes the measurement span to the span setting of the previous measurement. If there is no existing previous span value, then the span remains unchanged.

| | |
|----------|--------------|
| Key Path | Span X Scale |
|----------|--------------|

| | |
|-----------------------|---|
| Mode | All except SA and BASIC |
| Remote Command | [:SENSe] :MONitor :FREQuency :SPAN :PREVious |
| Example | MON:FREQ:SPAN:PREV |
| Couplings | Selecting last span changes the measurement span value. |
| Initial S/W Revision | Prior to A.02.00 |

Sweep/Control

Access a menu of functions that enable you to set up and control the sweep time for the current measurement

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Sweep Time

Selects the length of time in which the spectrum analyzer sweeps the displayed frequency span. Additional overhead time is required by the analyzer. It impacts the sweep rate, but is not calculated as part of the sweep time. Reducing the sweep time increases the rate of sweeps.

| | |
|-----------------------|--|
| Key Path | Sweep/Control |
| Mode | All except SA and BASIC |
| Remote Command | [:SENSe]:MONitor:SWEep:TIME <time> [:SENSe]:MONitor:SWEep:TIME? [:SENSe]:MONitor:SWEep:TIME:AUTO OFF ON 0 1 [:SENSe]:MONitor:SWEep:TIME:AUTO? |
| Example | MON:SWE:TIME 100 ms MON:SWE:TIME? MON:SWE:TIME:AUTO ON MON:SWE:TIME:AUTO? |
| Preset | Automatically Calculated |
| State Saved | Saved in instrument state. |
| Min | 1 ms |
| Max | 4000 s |
| Initial S/W Revision | Prior to A.02.00 |
| MIN/MAX/DEF Support | Yes |

Pause

Pauses a measurement after the current data acquisition is complete.

When Paused, the label on the key changes to Resume. Pressing Resume continues the measurement at the point where it had been paused.

See "[Pause/Resume](#)" on page 2205 under Sweep/Control for more information.

| | |
|----------------------|------------------|
| Key Path | Sweep/Control |
| Initial S/W Revision | Prior to A.02.00 |

Gate

Accesses a menu that enables you to control the gating function. The Gate functionality is used to view signals best viewed by qualifying them with other events.

Gate setup parameters are the same for all measurements – they do not change as you change measurements. Settings like these are called “Meas Global” and are unaffected by Meas Preset.

Note that Sweep Time autocoupling rules and annotation are changed by Gate being on.

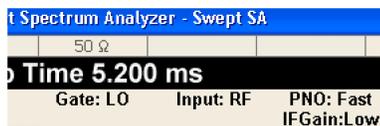
| | |
|----------------------|--|
| Key Path | Sweep/Control |
| Scope | Meas Global |
| Readback | The state and method of Gate, as [Off, LO] or [On, Video]. Note that for measurements that only support gated LO, the method is nonetheless read back, but always as LO. |
| Initial S/W Revision | Prior to A.02.00 |

Gate On/Off

Turns the gate function on and off.

When the Gate Function is on, the selected Gate Method is used along with the gate settings and the signal at the gate source to control the sweep and video system with the gate signal. Not all measurements allow every type of Gate Methods.

When Gate is on, the annunciation in the measurement bar reflects that it is on and what method is used, as seen in the following "Gate: LO" annunciator graphic.



| | |
|----------------|---|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe [:STATe] OFF ON 0 1 [:SENSe] :SWEep:EGATe [:STATe] ? |
| Example | SWE:EGAT ON SWE:EGAT? |
| Dependencies | The function is unavailable (grayed out) and Off when: |

- Gate Method is LO or Video and FFT Sweep Type is manually selected.
- Gate Method is FFT and Swept Sweep Type is manually selected.
- Marker Count is ON.

The following are unavailable whenever Gate is on:

- FFT under Sweep Type when Method=LO or Video or Swept under Sweep Type when Method=FFT
- Marker Count

While Gate is on, the Auto Rules for Sweep Type are modified so that the choice agrees with the Gate Method: i.e., FFT for Method = FFT and Swept for Method = LO or Video.

The Gate softkey and all SCPI under the [:SENSE]:SWEep:EGATe SCPI node are grayed out when Source Mode is Tracking with an external source. This is because the Gate circuitry is used to sync the external source. If the Tracking Source is turned on, the Gate is turned off.

When in the ACP measurement:

- When Meas Method is RBW or FAST, this function is unavailable and the key is grayed out.
- Whenever Gate is on, Meas Method, RBW or FAST is unavailable and keys for those are grayed out.
- When Gate is on, Offset Res BW and Offset Video BW are ignored (if you set these values) and the measurement works as if all Offset Res BW and all Offset Video BW are coupled with the Res BW and the Video BW under the BW menu. When Gate is on, the Offset BW key in the Offset/Limit menu is grayed out.

| | |
|-------------------------------------|--|
| Preset | Off LTETDD: On |
| State Saved | Saved in instrument state |
| Range | On Off |
| Backwards Compatibility SCPI | [:SENSe]:SWEep:TIME:GATE[:STATe] ESA compatibility |
| Backwards Compatibility Notes | In ESA, Trig Delay (On) and Gate (On) could not be active at the same time.. This dependency does not exist in PSA or in the X-Series. |
| Initial S/W Revision | Prior to A.02.00 |

Gate View On/Off

Turning on Gate View in the Swept SA measurement provides a single-window gate view display..

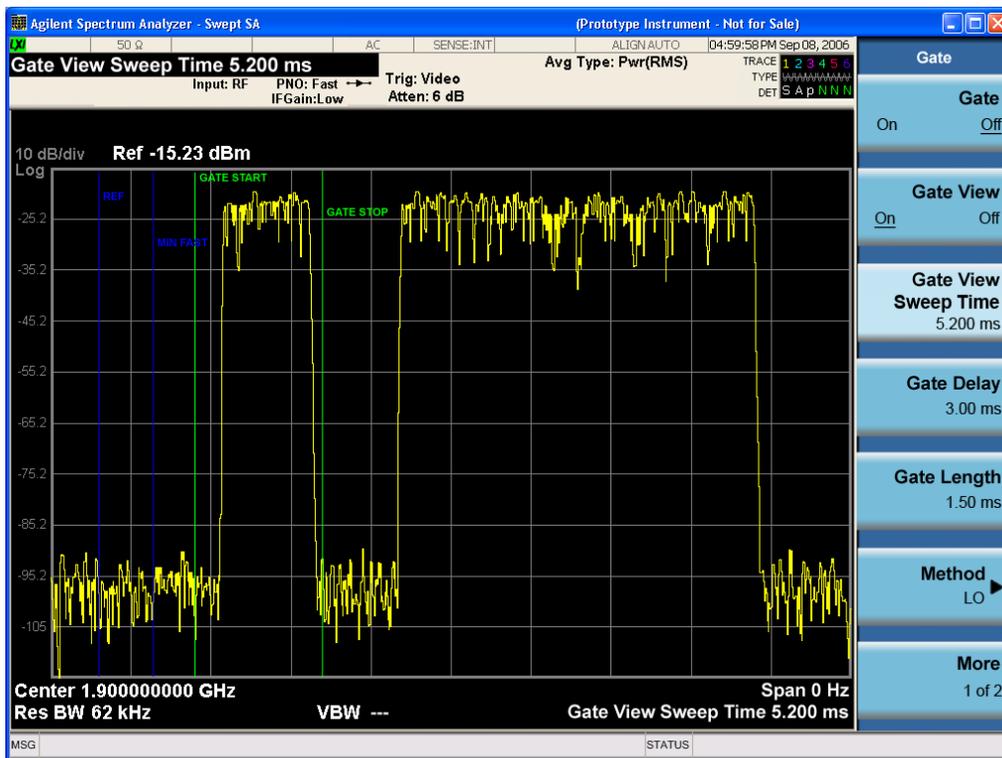
Turning on Gate View in other measurements shows the split-screen Gate View. In these measurements, when the Gate View is on, the regular view of the current measurement traces and results are reduced vertically to about 70% of the regular height. The Zero Span window, showing the positions of the Gate, is shown between the Measurement Bar and the reduced measurement window. By reducing the height of the measurement window, some of the annotation on the Data Display may not fit and is not shown.

| | |
|-----------------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe]:SWEep:EGATe:VIEW ON OFF 1 0 [:SENSe]:SWEep:EGATe:VIEW? |

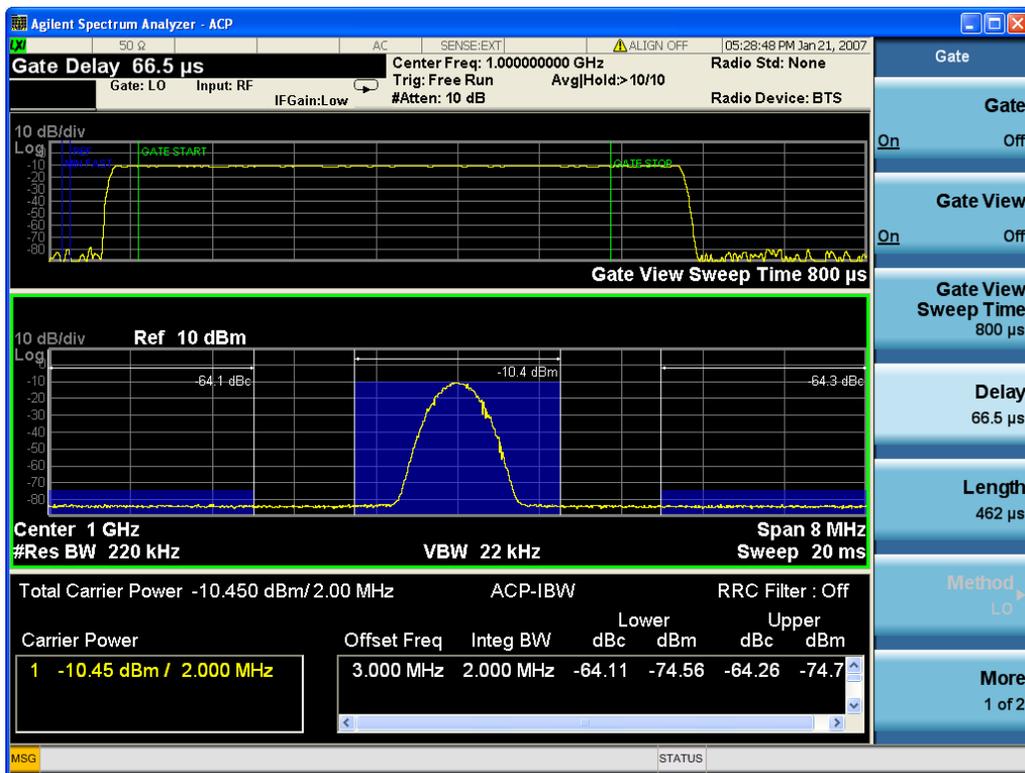
| | |
|----------------------|---|
| Example | SWE:EGAT:VIEW ON turns on the gate view. |
| Dependencies | <p>In the Swept SA measurement:</p> <p>In Gate View, the regular Sweep Time key is grayed out . When pressed, the grayed out key puts up the informational message "Use Gate View Sweep Time in the Gate menu."</p> <p>In the other measurements:</p> <p>When you turn Gate View on, the lower window takes on the current state of the instrument. Upon leaving Gate View, the instrument takes on the state of the lower window.</p> <p>When you turn Gate View on, the upper window Sweep Time is set to the gate view sweep time.</p> |
| Couplings | <p>These couplings apply to the Swept SA measurement:</p> <ul style="list-style-type: none"> • When Gate View is turned on, the instrument is set to Zero Span. • Gate View automatically turns off whenever a Span other than Zero is selected. • Gate View automatically turns off if you press the Last Span key while in Gate View, and the instrument returns to the Span it was in before entering Gate View (even if that is Zero Span). • When Gate View is turned on, the sweep time used is the gate view sweep time. This is set according to the rules in section "Gate View Setup" on page 2341 • When Gate View is turned off, Sweep Time is set to the normal Swept SA measurement sweep time. • If Gate View is on and Gate is off, then turning on Gate turns off Gate View. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Range | On Off |
| Initial S/W Revision | Prior to A.02.00 |

A sample of the Gate View screen in the Swept SA measurement is shown in the following graphic :

18 Monitor Spectrum Measurement Sweep/Control



A sample of the Gate View screen in other measurements is shown in the following graphic. This example is for the ACP measurement:



Turning Gate View off returns the analyzer to the Normal measurement view.

In the Swept SA, the normal measurement view is the single-window Swept SA view. When returning to this view, the Swept SA measurement returns to the Span it was in before entering **Gate View** (even if that is Zero Span).

The **Gate View** window is triggered from the Gate Source, with zero trigger delay. Also, when updating the **Gate View** window, the Gate itself must not operate. So it is internally shut off while the gate view window is being updated. For the Swept SA measurement, this means that the Gate is internally shut off whenever the gate view window is displayed. The measurement bar and softkeys continue to show the Trigger source for the main sweep window and give no indication that the Gate is shut off or that the Gate View window is triggered from the Gate Source.

When in **Gate View**, vertical lines are displayed in the Gate View window as follows:

- Green lines are displayed at the gate edges as follows: in Edge Gate, a line is shown for Delay and one for the end of the Gate period, defined by Length. In Level Gate a line is shown only for Delay. You can adjust the position of the green lines by adjusting the gate length and the gate delay. These lines update in the Gate View window as the active function changes, even if the window is not being updated. In Gated LO and Gated Video, these lines are positioned relative to the delay reference line (not relative to 0 time). In Gated FFT, their location is relative to the left edge of the screen.
- A blue line is displayed showing the delay reference, that is, the reference point for the Gate Delay within the Zero Span window. The blue line represents where (in time) the effective location of the gate start would be if the gate were programmed to zero delay.
-
- The second blue line is labeled "MIN FAST" as shown in the figure above because it represents the minimum Gate Delay for fast Gated LO operation. This line is only displayed in Gated LO. You cannot scroll (knob) or decrement (down key) the Gate Delay to less than that represented by the position of this line, it can only be set below this position manually, although once there it can be moved freely with the knob while below the line.
- A yellow line in the Gated Video case only, is displayed at Blength, where Blength is the display point (bucket) length for the swept trace, which is given by the sweep time for that trace divided by number of Points – 1. So it is referenced to 0 time, not to the delay reference. This line is labeled NEXT PT (it is not shown in the figure above because the figure above is for Gated LO).
- The yellow line represents the edge of a display point (bucket). Normally in Gated Video, the bucket length must be selected so that it exceeds the off time of the burst. There is another way to use the analyzer in Gated Video measurements, and that is to set the bucket width much shorter than the off time of the burst. Then use the Max Hold trace function to fill in "missing" buckets more slowly. This allows you to see some of the patterns of the Gated Video results earlier, though seeing a completely filled-in spectrum later.

Gate View Setup

Accesses a menu that enables you to setup parameters relevant to the Gate View

| | |
|----------------------|---------------------|
| Key Path | Sweep/Control, Gate |
| Scope | Meas Global |
| Initial S/W Revision | A.10.00 |

Gate View Sweep Time

Controls the sweep time in the Gate View window. To provide an optimal view of the gate signal, the analyzer initializes Gate View Sweep Time based on the current settings of Gate Delay and Gate Length.

| | |
|-----------------------------|--|
| Key Path | Sweep/Control, Gate, Gate View Setup |
| Remote Command | [:SENSe] :SWEep:EGATe:TIME <time> [:SENSe] :SWEep:EGATe:TIME? |
| Example | SWE:EGAT:TIME 500 ms |
| Dependencies | Gate View Sweep Time is initialized: <ul style="list-style-type: none"> • On Preset (after initializing delay and length). • Every time the Gate Method is set/changed. <p>Additionally, in the Swept SA measurement, whenever you do a Preset, or leave Gate View, the analyzer remembers the Gate Delay and Gate Length settings. Then, when returning to Gate View, if the current Gate Delay and/or Gate Length do not match the remembered values Gate View Sweep Time is re-initialized.</p> <ol style="list-style-type: none"> 1. Compute the location of the "gate stop" line, which you know is at time $t = t_{min} + \text{GateDelay} + \text{GateLength}$. |
| Preset | 519.3 μ s WiMAX OFDMA: 5 ms GSM/EDGE: 1 ms |
| State Saved | Saved in instrument state |
| Max | 6000 s |
| Initial S/W Revision | Prior to A.02.00 |

Gate View Start Time

Controls the time at the left edge of the Gate View.

| | |
|-----------------------------|--|
| Key Path | Sweep/Control, Gate, Gate View Setup |
| Remote Command | [:SENSe] :SWEep:EGATe:VIEW:STARt <time> [:SENSe] :SWEep:EGATe:VIEW:STARt? |
| Example | SWE:EGAT:VIEW:STAR 10ms |
| Notes | Units of time are required or no units; otherwise an invalid suffix error message will be generated. See error -131. |
| Preset | 0 ms |
| State Saved | Saved in instrument state |
| Min | 0 |
| Max | 500 ms |
| Initial S/W Revision | A.10.00 |

Gate Delay

Controls the length of time from the time the gate condition goes True until the gate is turned on.

| | |
|------------------------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe:DELay <time> [:SENSe] :SWEep:EGATe:DELay? |
| Example | SWE:EGAT:DELay 500ms SWE:EGAT:DELay? |
| Notes | Units of time are required or no units; otherwise an invalid suffix error message will be generated. |
| Preset | 57.7 us WiMAX OFDMA: 71 us GSM/EDGE: 600 us WLAN: 500 us |
| State Saved | Saved in instrument state |
| Min | 0.0 us |
| Max | 100 s |
| Backwards Compatibility SCPI | [:SENSe] :SWEep:TIME:GATE:DELay ESA compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Length

Controls the length of time that the gate is on after it opens.

| | |
|----------------|---|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe:LENGth <time> [:SENSe] :SWEep:EGATe:LENGth? |
| Example | SWE:EGAT:LENG 1 SWE:EGAT:LENG? |
| Notes | Units of time are required or no units; otherwise an invalid suffix error message will be generated. |
| Dependencies | <p>Grayed out when Gate Method is set to FFT in which case the label changes to that shown below.</p> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p>Gate Length (=1.83/RBW) 2.8 ms</p> </div> <p style="margin-left: 20px;">vsd 39-1</p> <p>The key is also grayed out if Gate Control = Level.</p> |
| Preset | 461.6 us |

| | |
|-------------------------------------|---|
| | WiMAX OFDMA: 50 us GSM/EDGE: 200 us WLAN: 1.54 ms |
| State Saved | Saved in instrument state |
| Min | 100 ns |
| Max | 5 s |
| Backwards Compatibility SCPI | [:SENSe]:SWEep:TIME:GATE:LENGth ESA compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Source

The menus under the Gate Source key are the same as those under the Trigger key, with the exception that neither Free Run nor Video are available as Gate Source selections. However, a different SCPI command is used to select the Gate Source (see table below) because you may independently set the Gate Source and the Trigger Source.

Any changes to the settings in the setup menus under each Gate Source selection key (for example: Trigger Level, Trigger Delay, etc.) also affect the corresponding settings under the Trigger menu keys. The SCPI commands used for these are the same for Trigger and Gate, since there is only one setting which affects both Gate and Trigger. Example: to set the Trigger Level for External 1 you use the command :TRIG:EXT1:LEV regardless of whether you are using External 1 as a Trigger Source or a Gate Source.

| | |
|-------------------------------|--|
| Key Path | Sweep/Control, Gate |
| Remote Command | <pre>[:SENSe]:SWEep:EGATE:SOURce EXTernal1 EXTernal2 LINE FRAME RFBurst [:SENSe]:SWEep:EGATE:SOURce?</pre> |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" error. |
| Preset | EXTernal 1 GSM/EDGE, MSR: FRAME LTETDD: EXTernal 1When Direction is Downlink, FRAME when Direction is Uplink. |
| Backwards Compatibility Notes | In ESA, there is a single Gate input port. In PSA, the Gate Source may be taken from one of two specified input ports. In the X-Series, any Trigger Source can be a Gate Source. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.14.00 |

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA |
| Dependencies | Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 1. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:LEVel <level> :TRIGger[:SEquence]:EXTernal1:LEVel? |
| Example | TRIG:EXT1:LEV 0.4 V |
| Couplings | This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:LEVel For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:EXTernal1:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|--------------------------------------|--|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal1:SLOPe? |
| Example | TRIG:EXT1:SLOP NEG |
| Couplings | This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:SLOPe For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:EXTernal1:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Zero Span Delay Comp On/Off

In zero span, there is a natural delay in the signal path, which comes from the RBW filter. This is usually desirable, as it allows you to trigger on events and also see those events, because the signal is delayed from the trigger event. However, in some cases it is desirable to eliminate this delay, so that trigger events line up exactly with the zero time point in zero span. You can use the Zero Span Delay Comp On/Off feature to enable or disable zero span delay compensation.

| | |
|-----------------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:DELay:COMPensation OFF ON 0 1 :TRIGger[:SEquence]:EXTernal1:DELay:COMPensation? |
| Example | TRIG:EXT1:DEL:COMP ON |
| Dependencies | No effect except in zero-span, but not locked out in nonzero spans. Blanked in modes that do not support zero-span measurements. If the SCPI command is sent when the key is blanked, an error is returned: -221, "Settings conflict; Feature not supported for this measurement" In analyzers shipping N9060A, this feature requires N9060A-7FP. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | A.11.00 |

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT2 Swept SA measurement TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message. Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 2. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:LEVel :TRIGger[:SEquence]:EXTernal2:LEVel? |
| Example | TRIG:EXT2:LEV 1.1 V |
| Couplings | This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|--------------------------------------|--|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal2:SLOPe? |
| Example | TRIG:EXT2:SLOP NEG |
| Couplings | This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Zero Span Delay Comp On/Off

In zero span, there is a natural delay in the signal path, which comes from the RBW filter. This is usually desirable, as it allows you to trigger on events and also see those events, because the signal is delayed from the trigger event. However, in some cases it is desirable to eliminate this delay, so that trigger events line up exactly with the zero time point in zero span. You can use the Zero Span Delay Comp On/Off feature to enable or disable zero span delay compensation.

| | |
|-----------------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:DELay:COMPensation OFF ON 0 1 :TRIGger[:SEquence]:EXTernal2:DELay:COMPensation? |
| Example | TRIG:EXT2:DEL:COMP ON |
| Dependencies | No effect except in zero-span, but not locked out in nonzero spans. Blanked in modes that do not support zero-span measurements. If the SCPI command is sent when the key is blanked, an error is returned: -221, "Settings conflict; Feature not supported for this measurement" In analyzers shipping N9060A, this feature requires N9060A-7FP. |
| Preset | OFF |
| State Saved | Saved in instrument state |
| Initial S/W Revision | A.11.00 |

RF Burst

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector. Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

In some models, a variety of burst trigger circuitry is available, resulting in various available burst trigger bandwidths. The analyzer automatically chooses the appropriate trigger path based on the hardware configuration and other settings of the analyzer.

| | |
|-------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR RFB Swept SA measurement TRIG:<meas>:SOUR RFB Measurements other than Swept SA |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Backwards Compatibility Notes | The legacy command: :TRIGger[:SEQuence]:RFBurst:FSElectivity[:STATe] OFF ON 0 1 is not supported in the X-Series, as the hardware to do Frequency Selective burst triggers does not exist in X-Series. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Absolute Trigger Level

Sets the absolute trigger level for the RF burst envelope.

When using the External Mixing path, the Absolute Trigger Level is uncalibrated because the factory default was set to accommodate the expected IF levels for the RF path.

| | |
|-----------------------|--|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute <amp1> :TRIGger[:SEQuence]:RFBurst:LEVel:ABSolute? |
| Example | TRIG:RFB:LEV:ABS 10 dBm sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm |
| Notes | Sending this command does not switch the setting from relative to absolute; to switch it you need to send the :TRIGger[:SEQuence]:RFBurst:LEVel:TYPE command, below. Amplitude Corrections are not taken into account by the Absolute Trigger Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Absolute Trigger will not fire until you have set the trigger level that far below the displayed signal level, rather than simply to |

| | |
|-------------------------------------|--|
| | the displayed signal level. This is only true for Amplitude Corrections, not External Gain or Ref Level Offset functions. If mode is Bluetooth, the default value is -50 dBm. |
| Couplings | This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu |
| Preset | -20 dBm |
| State Saved | Saved in instrument state |
| Min | -200 dBm |
| Max | 100 dBm |
| Default Unit | depends on the current selected Y-Axis unit |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:RFBurst:LEVel:ABSolute |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

| | |
|--------------------------|---|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:TYPE ABSolute RELative :TRIGger[:SEquence]:RFBurst:LEVel:TYPE? |
| Example | TRIG:RFB:LEV:TYPE REL sets the trigger level type of the RF burst trigger to Relative. |
| Preset | ABSolute |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Relative Trigger Level

Sets the relative trigger level for the RF burst envelope.

In some models, the relative burst trigger function is implemented in hardware. In other models, without the advanced triggering hardware required, the relative burst trigger function is implemented in software in some measurements, and is unavailable in other measurements.

When implemented in software, the relative RF Burst trigger function is implemented as follows:

1. The measurement starts with the absolute RF Burst trigger setting. If it cannot get a trigger with that level, auto trigger fires and the acquisition starts anyway. After the acquisition, the measurement searches for the peak in the acquired waveform and saves it.

2. Now, in the next cycle of the measurement, the measurement determines a new absolute RF Burst level based on the peak value from the first measurement and the Relative RF Burst Trigger Level (always 0 or negative dB) set by the user. The following formula is used:
 3. absolute RF Burst level = peak level of the previous acquisition + relative RF Burst level
 4. If the new absolute RF Burst level differs from the previous by more than 0.5 dB, the new level is sent to the hardware; otherwise it is not updated (to avoid slowing down the acquisition)
- Steps 2 and 3 repeat for subsequent measurements.

| | |
|-------------------------------------|---|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:RELative <rel_ampl> :TRIGger[:SEquence]:RFBurst:LEVel:RELative? |
| Example | TRIG:RFB:LEV:REL -10 dB sets the trigger level of the RF burst envelope signal to the relative level of -10 dB |
| Notes | Sending this command does not switch the setting from absolute to relative; to switch it you need to send the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command, above. The relative trigger level is not available in some measurements. In those measurements the RELative parameter, and the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command (above), will generate an error if sent. |
| Dependencies | This key is grayed out and Absolute Trigger Level selected if the required hardware is not present in your analyzer and the current measurement does not support Relative triggering. |
| Preset | -6 dB GSM: -25 dB |
| State Saved | Saved in instrument state |
| Min | -45 dB |
| Max | 0 dB |
| Default Unit | dB or dBc |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:RFBurst:LEVel This legacy command is aliased to :TRIGger[:SEquence]:RFBurst:LEVel:RELative because the PSA had ONLY relative burst triggering |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-----------------------|---|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:SLOPe Positive NEGative :TRIGger[:SEquence]:RFBurst:SLOPe? |

| | |
|-------------------------------------|--|
| Example | TRIG:RFB:SLOP NEG |
| Couplings | This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:FRAMe:RFBurst:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Periodic Timer (Frame Trigger)

Pressing this key, when it is not selected, selects the internal periodic timer signal as the trigger. Triggering occurrences are set by the **Period** parameter, which is modified by the **Sync Source** and **Offset**. Pressing this key, when it is already selected, accesses the periodic timer trigger setup functions.

If you do not have a sync source selected (it is Off), then the internal timer will not be synchronized with any external timing events.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR FRAM Swept SA measurement TRIG:<meas>:SOUR FRAM Measurements other than Swept SA |
| State Saved | Saved in instrument state |
| Readback | [Sync: <value of Sync Source>], for example, [Sync: External 1] |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Periodic Timer Triggering:

This feature selects the internal periodic timer signal as the trigger. Trigger occurrences are set by the **Periodic Timer** parameter, which is modified by the **Sync Source** and **Offset**.

The figure below shows the action of the periodic timer trigger. Before reviewing the figure, we'll explain some uses for the periodic trigger.

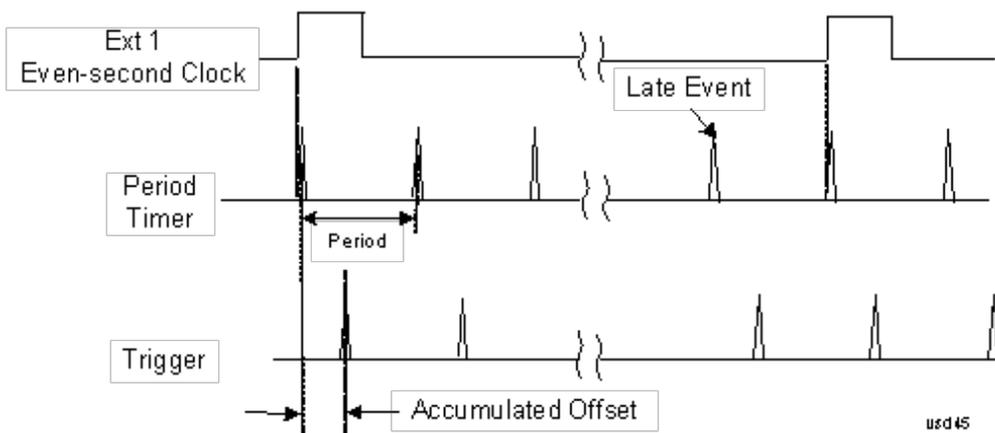
A common application is measuring periodic burst RF signals for which a trigger signal is not easily available. For example, we might be measuring a TDMA radio which bursts every 20 ms. Let's assume that the 20 ms period is very consistent. Let's also assume that we do not have an external trigger source

available that is synchronized with the period, and that the signal-to-noise ratio of the signal is not high enough to provide a clean RF burst trigger at all of the analysis frequencies. For example, we might want to measure spurious transmissions at an offset from the carrier that is larger than the bandwidth of the RF burst trigger. In this application, we can set the Periodic Timer to a 20.00 ms period and adjust the offset from that timer to position our trigger just where we want it. If we find that the 20.00 ms is not exactly right, we can adjust the period slightly to minimize the drift between the period timer and the signal to be measured.

A second way to use this feature would be to use **Sync Source** temporarily, instead of **Offset**. In this case, we might tune to the signal in a narrow span and use the RF Burst trigger to synchronize the periodic timer. Then we would turn the sync source off so that it would not miss-trigger. Miss-triggering can occur when we are tuned so far away from the RF burst trigger that it is no longer reliable.

A third example would be to synchronize to a signal that has a reference time element of much longer period than the period of interest. In some CDMA applications, it is useful to look at signals with a short periodicity, by synchronizing that periodicity to the "even-second clock" edge that happens every two seconds. Thus, we could connect the even-second clock trigger to Ext1 and use then Ext1 as the sync source for the periodic timer.

The figure below illustrates this third example. The top trace represents the even-second clock. It causes the periodic timer to synchronize with the leading edge shown. The analyzer trigger occurs at a time delayed by the accumulated offset from the period trigger event. The periodic timer continues to run, and triggers continue to occur, with a periodicity determined by the analyzer time base. The timer output (labeled "late event") will drift away from its ideal time due to imperfect matching between the time base of the signal being measured and the time base of the analyzer, and also because of imperfect setting of the period parameter. But the synchronization is restored on the next even-second clock event. ("Accumulated offset" is described in the **Offset** function section.)



Period

Sets the period of the internal periodic timer clock. For digital communications signals, this is usually set to the frame period of your current input signal. In the case that sync source is not set to OFF, and the external sync source rate is changed for some reason, the periodic timer is synchronized at the every external synchronization pulse by resetting the internal state of the timer circuit.

| | |
|-----------------------|---|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:PERIOD <time> |

| | |
|-----------------------------|---|
| | :TRIGger[:SEquence]:FRAMe:PERiod? |
| Example | TRIG:FRAM:PER 100 ms |
| Dependencies | The invalid data indicator turns on when the period is changed, until the next sweep/measurement completes. |
| Couplings | The same period is used in the Gate Source selection of the period timer. |
| Preset | 20 ms GSM: 4.615383 |
| State Saved | Saved in instrument state |
| Min | 100.000 ns |
| Max | 559.0000 ms |
| Default Unit | S |
| Initial S/W Revision | Prior to A.02.00 |

Offset

Adjusts the accumulated offset between the periodic timer events and the trigger event. Adjusting the accumulated offset is different than setting an offset, and requires explanation.

The periodic timer is usually not synchronized with any external events, so the timing of its output events has no absolute meaning. Since the timing relative to external events (RF signals) is important, you need to be able to adjust (offset) it. However, you have no direct way to see when the periodic timer events occur. All that you can see is the trigger timing. When you want to adjust the trigger timing, you will be changing the internal offset between the periodic timer events and the trigger event. Because the absolute value of that internal offset is unknown, we will just call that the accumulated offset. Whenever the Offset parameter is changed, you are changing that accumulated offset. You can reset the displayed offset using Reset Offset Display. Changing the display does not change the value of the accumulated offset, and you can still make additional changes to accumulated offset.

To avoid ambiguity, we define that an increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event.

| | |
|-----------------------|---|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:OFFSet <time> :TRIGger[:SEquence]:FRAMe:OFFSet? |
| Example | TRIG:FRAM:OFFS 1.2 ms |
| Notes | The front panel interface (for example, the knob), and this command, adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware each time the offset is updated is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value. Note that the accumulated offset value is essentially arbitrary; it represents the accumulated offset from the last time the offset was zeroed (with the Reset Offset Display key). Note that this command does not change the period of the trigger waveform. Note also that Offset is used only when the sync source is set to OFF, otherwise delay is used, see section Trig Delay . An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to |

| | |
|----------------------|--|
| | delay the timing of the trigger event. |
| Notes | When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated with the new value. However, the actual amount sent to the hardware is the delta value, that is, the current accumulated offset value minus the previous accumulated offset value. The SCPI query simply returns the value currently showing on the key. |
| Dependencies | The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes. |
| Couplings | The same offset is used in the Gate Source selection of the period timer. |
| Preset | 0 s |
| State Saved | Saved in instrument state |
| Min | -10.000 s |
| Max | 10.000 s |
| Default Unit | S |
| Initial S/W Revision | Prior to A.02.00 |

Offset Adjust (Remote Command Only)

This remote command does not work at all like the related front panel keys. This command lets you advance the phase of the frame trigger by the amount you specify.

It does not change the period of the trigger waveform. If the command is sent multiple times, it advances the phase of the frame trigger an additional amount each time it is sent. Negative numbers are permitted.

| | |
|-----------------------|--|
| Remote Command | :TRIGger[:SEquence]:FRAMe:ADJust <time> |
| Example | TRIG:FRAM:ADJ 1.2 ms |
| Notes | Note also that Offset is used only when the sync source is set to OFF, otherwise delay is used, see section Trig Delay An increase in the "offset" parameter, either from the knob or the SCPI adjust command, serves to delay the timing of the trigger event. |
| Notes | The front panel interface (for example, the knob) and the :TRIG:FRAM:OFFS command adjust the accumulated offset, which is shown on the active function display. However, the actual amount sent to the hardware is the delta value, that is, the current offset value minus the previous offset value. When the SCPI command is sent the value shown on the key (and the Active Function, if this happens to be the active function) is updated by increasing it (or decreasing it if the value sent is negative) by the amount specified in the SCPI command. This is a "command only" SCPI command, with no query. |
| Dependencies | The invalid data indicator turns on when the offset is changed, until the next sweep/measurement completes. |
| Couplings | The same offset is used in the Gate Source selection of the period timer. |
| Preset | 0 s |
| State Saved | Saved in instrument state |

| | |
|----------------------|------------------|
| Min | -10.000 s |
| Max | 10.000 s |
| Default Unit | S |
| Initial S/W Revision | Prior to A.02.00 |

Reset Offset Display

Resets the value of the periodic trigger offset display setting to 0.0 seconds. The current displayed trigger location may include an offset value defined with the Offset key. Pressing this key redefines the currently displayed trigger location as the new trigger point that is 0.0 s offset. The Offset key can then be used to add offset relative to this new timing.

| | |
|----------------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:OFFSet:DISPlay:RESet |
| Example | TRIG:FRAM:OFFS:DISP:RES |
| Initial S/W Revision | Prior to A.02.00 |

Sync Source

Selects a signal source for you to synchronize your periodic timer trigger to, otherwise you are triggering at some arbitrary location in the frame. Synchronization reduces the precision requirements on the setting of the period.

For convenience you may adjust the level and slope of the selected sync source in a conditional branch setup menu accessed from the Sync Source menu. Note that these settings match those in the **Trigger** and **Gate Source** menus; that is, each trigger source has only one value of level and slope, regardless of which menu it is accessed from.

| | |
|----------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAMe:SYNC EXTernal1 EXTernal2 RFBurst OFF :TRIGger[:SEquence]:FRAMe:SYNC? |
| Example | TRIG:FRAM:SYNC EXT2 |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message. |
| Preset | Off GSM/EDGE, MSR,LTE,LTETDD: RFBurst |
| State Saved | Saved in instrument state |
| Readback | The current setting is read back to this key and it is also Readback to the previous Periodic Timer trigger key. |
| Backwards | :TRIGger[:SEquence]:FRAMe:SYNC EXTernal |

| | |
|---------------------------|---|
| Compatibility SCPI | For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00, A.14.00 |

Off

Turns off the sync source for your periodic trigger. With the sync source off, the timing will drift unless the signal source frequency is locked to the analyzer frequency reference.

| | |
|----------------------|--------------------------------------|
| Key Path | Trigger, Periodic Timer, Sync Source |
| Example | TRIG:FRAM:SYNC OFF |
| Readback | Off |
| Initial S/W Revision | Prior to A.02.00 |

External 1

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 1 input connector on the rear panel.

Pressing this key, when it is already selected, accesses the external 1 trigger setup menu.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT1 Swept SA measurement TRIG:<meas>:SOUR EXT1 Measurements other than Swept SA |
| Dependencies | Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 1. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |

Trigger Level

Sets the value where the external 1 trigger input will trigger a new sweep/measurement.

| | |
|-----------------------|---|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:LEVel <level> |

| | |
|-------------------------------------|---|
| | :TRIGger[:SEquence]:EXTernal1:LEVel? |
| Example | TRIG:EXT1:LEV 0.4 V |
| Couplings | This same level is used for the Ext1 trigger source in the Trigger menu, for the Ext1 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext1 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:LEVel |
| Backwards Compatibility SCPI | For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal1:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, External 1 |
| Remote Command | :TRIGger[:SEquence]:EXTernal1:SLOPe POSitive NEGative :TRIGger[:SEquence]:EXTernal1:SLOPe? |
| Example | TRIG:EXT1:SLOP NEG |
| Couplings | This same slope is used in the Ext1 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:EXTernal:SLOPe |
| Backwards Compatibility SCPI | For backward compatibility, the parameter EXTernal is mapped to EXTernal1 |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal1:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

External 2

Pressing this key, when it is not selected, selects an external input signal as the trigger. A new sweep/measurement will start when the external trigger condition is met using the external 2 input connector. The external trigger 2 input connector is on the rear panel.

Pressing this key, when it is already selected, accesses the external 2 trigger setup menu.

| | |
|------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR EXT2 Swept SA measurement TRIG:<meas>:SOUR EXT2 Measurements other than Swept SA |
| Dependencies | In some models, there is no second External input. In these models, the External 2 key is blanked and the EXTernal2 parameter will generate a "Hardware missing; Not available for this model number" message. Grayed out if in use by Point Trigger in the Source Setup menu. Forced to Free Run if already selected and Point Trigger is set to External 2. |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.03.00 |

Trigger Level

Sets the value where the external 2 trigger input will trigger a new sweep/measurement.

| | |
|-------------------------------------|---|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEquence]:EXTernal2:LEVel :TRIGger[:SEquence]:EXTernal2:LEVel? |
| Example | TRIG:EXT2:LEV 1.1 V |
| Couplings | This same level is used for the Ext2 trigger source in the Trigger menu, for the Ext2 selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the Ext2 selection in the Gate Source menu. |
| Preset | 1.2 V |
| State Saved | Saved in instrument state |
| Min | -5 V |
| Max | 5 V |
| Default Unit | V |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAMe:EXTernal2:LEVel |
| Initial S/W Revision | Prior to A.02.00 |

Trig Slope

Controls the trigger polarity. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|--------------------------------------|--|
| Key Path | Trigger, External 2 |
| Remote Command | :TRIGger[:SEQuence]:EXTernal2:SLOPe POSitive NEGative :TRIGger[:SEQuence]:EXTernal2:SLOPe? |
| Example | TRIG:EXT2:SLOP NEG |
| Couplings | This same slope is used in the Ext2 selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEQuence]:FRAMe:EXTernal2:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEQuence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

RF Burst

Pressing this key, when it is not selected, selects the RF Burst as the trigger. A new sweep/measurement will start when an RF burst envelope signal is identified from the signal at the RF Input connector. Pressing this key, when it is already selected, accesses the RF Burst trigger setup menu.

In some models, a variety of burst trigger circuitry is available, resulting in various available burst trigger bandwidths. The analyzer automatically chooses the appropriate trigger path based on the hardware configuration and other settings of the analyzer.

| | |
|--------------------------------------|--|
| Key Path | Trigger |
| Example | TRIG:SOUR RFB Swept SA measurement TRIG:<meas>:SOUR RFB Measurements other than Swept SA |
| State Saved | Saved in instrument state |
| Status Bits/OPC dependencies | The Status Operation Register bit 5 "Waiting for Trigger" is set at the same time as the Sweeping or Measuring bit is set. It is cleared when the trigger actually occurs (that is, after the trigger event occurs and all the applicable trigger criteria have been met). A corresponding pop-up message ("Waiting for trigger") is generated if no trigger signal appears after approximately 2 sec. This message goes away when a trigger signal appears. |
| Backwards Compatibility Notes | The legacy command: :TRIGger[:SEQuence]:RFBurst:FSElectivity[:STATe] OFF ON 0 1 is not supported in the X-Series, as the hardware to do Frequency Selective burst triggers does not exist in X-Series. |

| | |
|--------------------------|------------------|
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Absolute Trigger Level

Sets the absolute trigger level for the RF burst envelope.

When using the External Mixing path, the Absolute Trigger Level is uncalibrated because the factory default was set to accommodate the expected IF levels for the RF path.

| | |
|-------------------------------------|---|
| Key Path | Trigger, RF Burst |
| Scope | Meas Global |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute <ampl> :TRIGger[:SEquence]:RFBurst:LEVel:ABSolute? |
| Example | TRIG:RFB:LEV:ABS 10 dBm sets the trigger level of the RF burst envelope signal to the absolute level of 10 dBm |
| Notes | Sending this command does not switch the setting from relative to absolute; to switch it you need to send the :TRIGger[:SEquence]:RFBurst:LEVel:TYPE command, below. Amplitude Corrections are not taken into account by the Absolute Trigger Level. For example, if you have given yourself effective gain with an amplitude correction factor, the Absolute Trigger will not fire until you have set the trigger level that far below the displayed signal level, rather than simply to the displayed signal level. This is only true for Amplitude Corrections, not External Gain or Ref Level Offset functions. If mode is Bluetooth, the default value is -50 dBm. |
| Couplings | This same level is used for the RF Burst trigger source in the Trigger menu, for the RF Burst selection in the Periodic Timer sync source (in the Trigger menu and in the Gate Source menu), and also for the RF Burst selection in the Gate Source menu |
| Preset | -20 dBm |
| State Saved | Saved in instrument state |
| Min | -200 dBm |
| Max | 100 dBm |
| Default Unit | depends on the current selected Y-Axis unit |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:RFBurst:LEVel:ABSolute |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

| | |
|-----------------------|---|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:LEVel:TYPE ABSolute RELative :TRIGger[:SEquence]:RFBurst:LEVel:TYPE? |

| | |
|--------------------------|---|
| Example | TRIG:RFB:LEV:TYPE REL sets the trigger level type of the RF burst trigger to Relative. |
| Preset | ABSolute |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.04.00 |

Trigger Slope

It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

| | |
|-------------------------------------|--|
| Key Path | Trigger, RF Burst |
| Remote Command | :TRIGger[:SEquence]:RFBurst:SLOPe POSitive NEGative :TRIGger[:SEquence]:RFBurst:SLOPe? |
| Example | TRIG:RFB:SLOP NEG |
| Couplings | This same slope is used in the RF Burst selection for the trigger source in the Trigger menu and for the period timer sync source (in the Trigger menu and in the Gate Source menu). |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | :TRIGger[:SEquence]:FRAME:RFBurst:SLOPe |
| Backwards Compatibility Notes | The legacy :TRIGger[:SEquence]:SLOPe command affects the slopes for the VID, LINE, EXT1, EXT2, and RFB triggers. |
| Initial S/W Revision | Prior to A.02.00 |

Sync Holdoff

Sync Holdoff specifies the duration that the sync source signal must be kept false before the transition to true to be recognized as the sync timing. The periodic timer phase is aligned when the sync source signal becomes true, after the Holdoff time is satisfied.

A holdoff of 2 ms will work with most WiMAX signals, but there may be cases where the burst off duration is less than 1 ms and this value will need to be changed.

| | |
|-----------------------|--|
| Key Path | Trigger, Periodic Timer |
| Remote Command | :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff <time> :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff? :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff:STATE OFF ON 0 1 :TRIGger[:SEquence]:FRAME:SYNC:HOLDoff:STATE? |
| Preset | On, 1.000 ms |

| | |
|----------------------|---------------------------|
| State Saved | Saved in instrument state |
| Min | 0 ms |
| Max | +500 ms |
| Default Unit | s |
| Initial S/W Revision | Prior to A.02.00 |

Control Edge/Level

Sets the method of controlling the gating function from the gating signal.

Edge

In Edge triggering, the gate opens (after the Delay) on the selected edge (for example, positive) of the gate signal and closes on the alternate edge (for example, negative).

Level

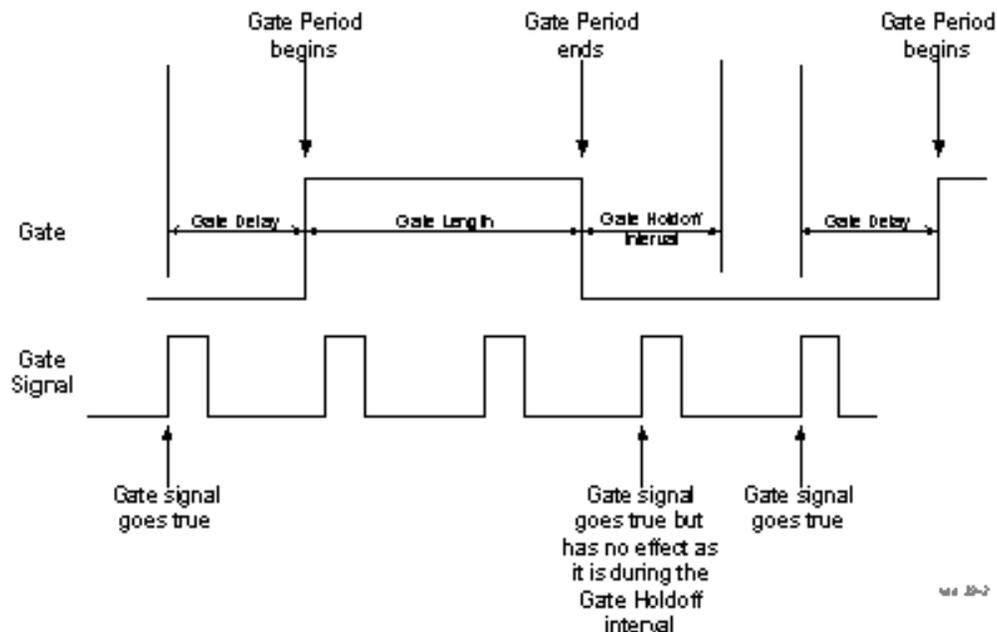
In Level triggering, the gate opens (after the Delay) when the gate signal has achieved a certain level and stays open as long as that level is maintained.

| | |
|------------------------------|---|
| Key Path | Sweep/Control, Gate |
| Remote Command | [:SENSe] :SWEep:EGATe:CONTRol EDGE LEVe1 [:SENSe] :SWEep:EGATe:CONTRol? |
| Example | SWE:EGAT:CONT EDGE |
| Dependencies | If the Gate Method is FFT the Control key is grayed out and Edge is selected. If the Gate Source is TV, Frame or Line, the Control key is grayed out and Edge is selected. |
| Preset | EDGE |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | [:SENSe] :SWEep:TIME:GATE:TYPE ESA Compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Holdoff

Lets you increase or decrease the wait time after a gate event ends before the analyzer will respond to the next gate signal.

After any Gate event finishes, the analyzer must wait for the sweep system to settle before it can respond to another Gate signal. The analyzer calculates a "wait time," taking into account a number of factors, including RBW and Phase Noise Optimization settings. The goal is to achieve the same accuracy when gated as in ungated operation. The figure below illustrates this concept:



When Gate Holdoff is in Auto, the wait time calculated by the analyzer is used. When Gate Time is in Manual, the user may adjust the wait time, usually decreasing it in order to achieve greater speed, but at the risk of decreasing accuracy.

When the Method key is set to Video or FFT, the Gate Holdoff function has no effect.

In measurements that do not support Auto, the value shown when Auto is selected is “---” and the manually set holdoff is returned to a query.

| Key Path | Sweep/Control, Gate |
|-----------------------|--|
| Remote Command | <pre>[:SENSe] :SWEep:EGATe:HOLDoff <time> [:SENSe] :SWEep:EGATe:HOLDoff? [:SENSe] :SWEep:EGATe:HOLDoff:AUTO OFF ON 0 1 [:SENSe] :SWEep:EGATe:HOLDoff:AUTO?</pre> |
| Example | <pre>SWE:EGAT:HOLD 0.0002 SWE:EGAT:HOLD? SWE:EGAT:HOLD:AUTO ON SWE:EGAT:HOLD:AUTO?</pre> |
| Couplings | <p>When Gate Holdoff is Auto, the Gate Holdoff key shows the value calculated by the analyzer for the wait time.</p> <p>Pressing the Gate Holdoff key while it is in Auto and not selected, causes the key to become selected and allows the user to adjust the value. If the value is adjusted, the setting changes to Man.</p> <p>Pressing the Gate Holdoff key, while it is in Auto and selected, does not change the value of Gate Holdoff, but causes the setting to change to Man. Now the user can adjust the value.</p> <p>Pressing the key while it is in Man and selected, cause the value to change back to Auto.</p> <p>Pressing the key while it is in Man and not selected, causes the key to become selected and allows the user to adjust the value.</p> |

| | |
|----------------------|--|
| | When Method is set to Video or FFT, the Gate Holdoff function has no effect. |
| Preset | Auto Auto/On |
| State Saved | Saved in instrument state |
| Min | 1 μ sec |
| Max | 1 sec |
| Initial S/W Revision | Prior to A.02.00 |

Gate Delay Compensation

This function allows you to select an RBW-dependent value by which to adjust the gate delay, to compensate for changes in the delay caused by RBW effects.

You can select between uncompensated operation and two types of compensation, Delay Until RBW Settled and Compensate for RBW Group Delay.

See ["More Information" on page 2366](#)

| | |
|--------------------------|---|
| Key Path | Sweep/Control, Gate |
| Scope | Meas Global |
| Remote Command | [:SENSe] :SWEep:EGATe:DELaY:COMPensation:TYPE OFF SETTled GDELaY [:SENSe] :SWEep:EGATe:DELaY:COMPensation:TYPE? |
| Example | SWE:EGAT:DEL:COMP:TYPE SETT SWE:EGAT:DEL:COMP:TYPE? |
| Notes | Although this function is Meas Global, there are some measurements that do not support this function. In those measurements the operation will be Uncompensated. Going into one of those measurements will not change the Meas Global selection; it will simply display the grayed-out menu key with “Uncompensated” showing as the selection. This is a non-forceful grayout, so the SCPI command is still accepted. If Gate Delay Compensation is not supported at all within a particular mode, the key is not displayed, and if the SCPI command is sent while in a measurement within that mode, an “Undefined Header” message is generated. Measurements that do not support this function include: Swept SA |
| Preset | TD-SCDMA mode: Compensate for RBW Group Delay All other modes: Delay Until RBW Settled |
| State Saved | Saved in instrument state |
| Range | Uncompensated Delay Until RBW Settled Compensate for RBW Group Delay |
| Readback text | Uncompensated Settled Group Delay |
| Initial S/W Revision | Prior to A.02.00 |
| Modified at S/W Revision | A.11.0 |

More Information

Selecting Uncompensated means that the actual gate delay is as you sets it.

Selecting Delay Until RBW Settled causes the gate delay to be increased above the user setting by an amount equal to $3.06/RBW$. This compensated delay causes the GATE START and GATE STOP lines on the display to move by the compensation amount, and the actual hardware gate delay to be increased by the same amount. All the other gate lines (for example, MIN FAST) are unaffected. If the RBW subsequently changes, the compensation is readjusted for the new RBW. The value shown on the Gate Delay key does NOT change.

Delay Until RBW Settled allows excellent measurements of gated signals, by allowing the IF to settle following any transient that affects the burst. Excellent measurements also require that the analysis region not extend into the region affected by the falling edge of the burst. Thus, excellent measurements can only be made over a width that declines with narrowing RBWs, which is achieved by decreasing the gate length below the user setting by an amount equal to $2.53/RBW$. Therefore, for general purpose compensation, you will still want to change the gate length with changes in RBW even if the gate delay is compensated. The compensated Gate Length is limited by the analyzer so that it will never go below 10% of the value shown on the Gate Length key, as otherwise the sweep times could get very long. Anytime the Gate Length and RBW values combine in such a way that this limiting takes place, a warning is displayed. For measurements which contain multiple sweeps with different RBW like SEM and SPUR, the smallest RBW is used for this limiting.

Selecting Compensate for RBW Group Delay causes the gate delay to be increased above the user setting by an amount equal to $1.81/RBW$. This compensated delay causes the GATE START, GATE STOP lines on the display to move by the compensation amount, and the actual hardware gate delay to be increased by the same amount. All the other gate lines (for example, MIN FAST) are unaffected. If the RBW subsequently changes, the compensation is readjusted for the new RBW. The value shown on the Gate Delay key does NOT change. Compensate for RBW Group Delay also includes gate length compensation; the gate length itself is adjusted as necessary to attempt to compensate for delay effects imposed by the RBW.

Compensate for RBW Group Delay is similar to Delay Until RBW Settled, but compensates for the group delay of the RBW filter, rather than the filter settling time. As the RBW gets narrow, this can allow the settling tail of the RBW to affect the beginning part of the gated measurement, and allow the beginning of the RBW settling transient to affect the end of the gated measurement. These two effects are symmetric because the RBW response is symmetric. Because the gate length is not automatically compensated, some users might find this compensation to be more intuitive than compensation for RBW settling.

Min Fast Position Query (Remote Command Only)

This command queries the position of the MIN FAST line, relative to the delay reference (REF) line. See section ["Gate View On/Off" on page 2338](#). If this query is sent while not in gate view, the MinFast calculation is performed based on the current values of the appropriate parameters and the result is returned. Knowing this value lets you set an optimal gate delay value for the current measurement setup.

| | |
|-----------------------------|---|
| Remote Command | <code>[:SENSe] :SWEep:EGATe:MINFast?</code> |
| Example | <code>SWE:EGAT:MIN?</code> |
| Initial S/W Revision | Prior to A.02.00 |

Gate Preset (Remote Command Only)

Presets the time-gated spectrum analysis capability.

This command sets gate parameter values to the ESA preset values, as follows:

Gate trigger type = edge

Gate polarity = positive

Gate delay = 1 us

Gate length = 1 us

| | |
|-----------------------|---|
| Remote Command | <code>[[:SENSe]:SWEep:TIME:GATE:PRESet</code> ESA Compatibility |
| Initial S/W Revision | Prior to A.02.00 |

Gate Level (Remote Command Only)

Sets the gate input transition point level for the external TRIGGER inputs on the front and rear panel. This is a legacy command for PSA compatibility. It is simply an alias to the equivalent trigger level command.

| | |
|-----------------------|---|
| Remote Command | <code>[[:SENSe]:SWEep:EGATE:EXTernal[1] 2:LEVel <voltage></code> <code>[[:SENSe]:SWEep:EGATE:EXTernal[1] 2:LEVel?</code> |
| Notes | This command is simply an alias to <code>:TRIGger[:SEQUence]:EXTernal[1] 2:LEVel</code> For details refer |
| Initial S/W Revision | Prior to A.02.00 |

Gate Polarity (Remote Command Only)

Sets the polarity for the gate signal. This setup is now done using the gate trigger's slope setting.

When Positive (Pos) is selected, a positive-going edge (Edge) or a high voltage (Level) will satisfy the gate condition, after the delay set with the Gate Delay key. When Negative (Neg) is selected, a negative-going edge (Edge) or a low voltage (Level) will satisfy the gate condition after the delay.

| | |
|-------------------------------------|---|
| Remote Command | <code>[[:SENSe]:SWEep:EGATE:POLarity NEGative POSitive</code> <code>[[:SENSe]:SWEep:EGATE:POLarity?</code> |
| Example | <code>SWE:EGAT:POL NEG</code> <code>SWE:EGAT:POL?</code> |
| Preset | POSitive |
| State Saved | Saved in instrument state |
| Backwards Compatibility SCPI | <code>[[:SENSe]:SWEep:TIME:GATE:POLarity</code> ESA compatibility |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|---|
| Remote Command | <code>[:SENSe] :SWEep:TIME:GATE:LEVel HIGH LOW</code> <code>[:SENSe] :SWEep:TIME:GATE:LEVel?</code> ESA compatibility |
| Preset | HIGH |
| Initial S/W Revision | Prior to A.02.00 |

Points

Sets the number of points per sweep. The resolution of setting the sweep time depends on the number of points selected. If Preset is selected, the number of points per sweep defaults to 1001. The current value of points is displayed parenthetically, next to the sweep time in the lower right corner of the display.

| | |
|-----------------------|---|
| Key Path | Sweep/Control |
| Mode | All except SA and BASIC |
| Remote Command | <code>[:SENSe] :MONitor:SWEep:POINts <integer></code> <code>[:SENSe] :MONitor:SWEep:POINts?</code> |
| Example | <code>:MON:SWE:POIN 1000</code> <code>:MON:SWE:POIN?</code> |
| Couplings | Whenever the number of sweep points changes, the sweep time is re-quantized. |
| Preset | 1001 |
| State Saved | Saved in instrument state. |
| Range | 1 to 20001 |
| Min | 1 |
| Max | 20001 |
| Initial S/W Revision | Prior to A.02.00 |

System

See "System" on page 349

Trace/Detector

Accesses a menu that enables you to control the display, storage, detection and manipulation of trace data. Each trace is comprised of a series of data points in which X and Y axis information is stored. The analyzer updates the information for the active trace with each sweep of the current measurement.

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Select Trace

Allows you to select which trace you want to use for the current measurement. You can select one of three traces. Monitor Spectrum supports 3 traces, numbered 1 through 3.

| | |
|----------------------|---|
| Key Path | Trace/Detector |
| Mode | All except SA and BASIC |
| Preset | Trace 1 |
| State Saved | The number of the selected trace is saved in Instrument State |
| Initial S/W Revision | Prior to A.02.00 |

Trace Type

Allows you to select the type of trace you want to use for the current measurement. You can assign a trace type to one of the three available traces.

The first page of this menu contains a 1-of-N selection of the trace type for the selected trace:

| | |
|---------|-------------|
| WRITe | Clear Write |
| AVERAge | Average |
| MAXHold | Max Hold |
| MINHold | Min Hold |

| | |
|-----------------------|---|
| Key Path | Trace/Detector |
| Mode | All except SA and BASIC |
| Remote Command | :TRACe[1] 2 3:MONitor:TYPE WRITe AVERAge MAXHold MINHold :TRACe[1] 2 3:MONitor:TYPE? |
| Example | TRAC:MON:TYPE WRIT TRAC:MON:TYPE? |
| Preset | WRITe |
| State Saved | Saved in instrument state. |

| | |
|-------------------------------------|--|
| Range | WRITE AVERage MAXHold MINHold for traces 1 through 3 |
| Backwards Compatibility SCPI | :DISPlay:MONitor:VIEW:WINDow:TRACe [1] 2 3 :TYPE |
| Initial S/W Revision | Prior to A.02.00 |

Update

Toggles a trace state between Update and Off. The Off selection makes the trace inactive (or a *stored trace*). This does not affect whether the trace is visible or not. To change the trace visibility, see "[Display](#)" on page 2371.

| | |
|-----------------------|--|
| Key Path | Trace/Detector |
| Mode | All except SA and BASIC |
| Remote Command | :TRACe [1] 2 3 :MONitor:UPDate[:STATe] ON OFF 0 1 :TRACe [1] 2 3 :MONitor:UPDate[:STATe]? |
| Example | TRAC3:MON:UPD OFF TRAC3:MON:UPD? |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | On Off(View) |
| Initial S/W Revision | Prior to A.02.00 |

Display

Controls the visibility of a trace. When set to Blank, traces do not display nor appear on printouts but are otherwise unaffected. They may be queried and markers may be placed on them.

| | |
|-----------------------|--|
| Key Path | Trace/Detector |
| Mode | All except SA and BASIC |
| Remote Command | :TRACe [1] 2 3 :MONitor:DISPlay[:STATe] ON OFF 0 1 :TRACe [1] 2 3 :MONitor:DISPlay[:STATe]? |
| Example | TRAC:MON:DISP ON TRAC:MON:DISP? |
| Preset | ON OFF OFF |
| State Saved | Saved in instrument state. |
| Range | Show Blank |
| Initial S/W Revision | Prior to A.02.00 |

Detector

Accesses a menu of functions that enable you to control the detectors for the current measurement. The following choices are available:

- **Auto** – the detector selected depends on marker functions, trace functions, average type, and the trace averaging function. See "[Auto](#)" on page 2373.
- **Normal** – the detector determines the peak of the CW-like signals, and it yields alternating maximums and minimums of noise-like signals. This is also referred to as Rosenfell detection.
- **Average** – the detector determines the average of the signal within the sweep points. The averaging method depends upon the Average Type selection (voltage, power or log scales).
- **Peak** – the detector determines the maximum of the signal within the sweep points.
- **Sample** – the detector indicates the instantaneous level of the signal at the center of the sweep points represented by each display point.
- **Negative Peak** – the detector determines the minimum of the signal within the sweep points.

In swept analysis, the time interval of the data collection for the display sweep points also represents a frequency interval. In FFT analysis, the sweep points represent just a frequency interval. The detector determines the relationship between the spectrum computed by the FFT and the single data point displayed for the sweep points.

| | |
|---------------------------------|--|
| Key Path | Trace/Detector |
| Mode | All except SA and BASIC |
| Remote Command | <code>[:SENSe] :MONitor:DETEctor:TRACe AVERage NEGative NORMal POSitive SAMPle [:SENSe] :MONitor:DETEctor:TRACe?</code> |
| Example | <code>MON:DET:TRAC NORM MON:DET:TRAC?</code> |
| Notes | The query returns a name that corresponds to the detector type as shown below. String Returned - Definition <ul style="list-style-type: none"> • NORM - Normal • AVER - Average • POS - Peak • SAMP - Sample • NEG - Negative Peak |
| Couplings | When the Detector choice is Auto, the detector selected depends on average type. |
| Preset | NORMal |
| State Saved | Saved in instrument state. |
| Range | Normal Average(RMS) Peak Sample Negative Peak |
| Backwards Compatibility SCPI | <code>[:SENSe] :MONitor:DETEctor [:FUNction]</code> |
| Initial S/W Revision | Prior to A.02.00 |

Auto

Sets the detector for the currently selected trace to Auto. When the detector choice is Auto, the analyzer selects the detector. The selected detector depends on marker functions, trace functions, and trace averaging functions for the current measurement.

| | |
|-----------------------|---|
| Key Path | Trace/DetectorTrace/Detector, Detector |
| Mode | All except SA and BASIC |
| Remote Command | <code>[:SENSe] :MONitor :DETECTOR :AUTO ON OFF 1 0</code> <code>[:SENSe] :MONitor :DETECTOR :AUTO ?</code> |
| Example | <code>MON:DET:AUTO OFF</code> <code>MON:DET:AUTO ?</code> |
| Couplings | When the Detector choice is Auto, the detector selected depends on average state and trace type. |
| Preset | ON |
| State Saved | Saved in instrument state. |
| Range | Auto Man |
| Initial S/W Revision | Prior to A.02.00 |

Clear Trace

Clears the selected trace from the display.

| | |
|-----------------------|--|
| Key Path | Trace/Detector |
| Mode | All except SA and BASIC |
| Remote Command | <code>:TRACe :MONitor :CLEAr [TRACE1] TRACE2 TRACE3</code> |
| Example | <code>TRAC:MON:CLE</code> |
| Initial S/W Revision | Prior to A.02.00 |

| | |
|-----------------------|--|
| Mode | All except SA and BASIC |
| Remote Command | <code>:DISPlay :MONitor :VIEW :WINDow :TRACe [1] 2 3 :CLEAr</code> |
| Example | <code>DISP:MON:VIEW:WIND:TRAC:CLE</code> |
| Initial S/W Revision | Prior to A.02.00 |

Clear All Traces

Clears all traces from the display.

| | |
|----------|-------------------------|
| Key Path | Trace/Detector |
| Mode | All except SA and BASIC |

| | |
|---|--|
| Remote Command | :TRACe:MONitor:CLEar:ALL |
| Example | TRAC:MON:CLE:ALL |
| Backwards Compatibility SCPI | :DISPlay:MONitor:VIEW:WINDow:TRACe:CLEar:ALL |
| Initial S/W Revision | Prior to A.02.00 |

Trigger

See ["Trigger" on page 424](#)

Free Run

See ["Free Run " on page 431](#)

External 1

See ["External 1 " on page 2357](#)

Trigger Level

See ["Trigger Level " on page 2357](#)

Trig Slope

See ["Trig Slope " on page 2358](#)

Trig Delay

See ["Trig Delay " on page 437](#)

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off" on page 2346](#)

External 2

See ["External 2 " on page 2359](#)

Trigger Level

See ["Trigger Level " on page 2359](#)

Trig Slope

See ["Trig Slope " on page 2360](#)

Trig Delay

See ["Trig Delay " on page 440](#)

Zero Span Delay Comp

See ["Zero Span Delay Comp On/Off" on page 2348](#)

RF Burst

See ["RF Burst " on page 2360](#)

Absolute Trigger

See ["Absolute Trigger Level" on page 2361](#)

Relative Trigger

See ["Relative Trigger Level"](#) on page 2350

Trig Slope

See ["Trigger Slope "](#) on page 2362

Trig Delay

See ["Trig Delay "](#) on page 444

Periodic Timer

See ["Periodic Timer \(Frame Trigger\) "](#) on page 2352

Period

See ["Period "](#) on page 2353

Offset

See ["Offset "](#) on page 2354

Reset Offset Display

See ["Reset Offset Display "](#) on page 2356

Sync Source

See ["Sync Source "](#) on page 2356

Off

See ["Off "](#) on page 2357

External 1

See ["External 1 "](#) on page 2357

Trigger Level

See ["Trigger Level "](#) on page 2357

Trig Slope

See ["Trig Slope "](#) on page 2358

External 2

See ["External 2 "](#) on page 2359

Trigger Level

See ["Trigger Level "](#) on page 2359

Trig Slope

See ["Trig Slope "](#) on page 2360

RF Burst

See "RF Burst " on page 2360

Absolute Trigger

See "Absolute Trigger Level" on page 2361

Trig Slope

See "Trigger Slope " on page 2362

Trig Delay

See ___ on page X

Auto/Holdoff

See "Auto/Holdoff " on page 445

Auto Trig

See "Auto Trig " on page 445

Trig Holdoff

See "Trig Holdoff " on page 446

Holdoff Type

See "Holdoff Type" on page 446

User Preset

Accesses a menu that gives you the following three choices:

- User Preset – recalls a state previously saved using the Save User Preset function.
- User Preset All Modes – presets all of the modes in the analyzer
- Save User Preset– saves the current state for the current mode

| Key Path | Front-panel key |
|-------------------------------|--|
| Backwards Compatibility Notes | <p>User Preset is actually loading a state, and in legacy analyzers, it was possible to load a state without affecting the trace data, limit lines or correction data. Similarly it was possible to do a User Preset without affecting the trace data, limit lines or correction data.</p> <p>In the X-Series, “state” always includes all of this data; so whenever state is loaded, or User Preset is executed, all of the traces, limit lines and corrections are affected. Although this differs from previous behavior, it is desirable behavior, and should not cause adverse issues for users.</p> <p>On ESA and PSA, User Preset affected the entire instrument’s state. In the X-Series, User Preset only recalls the state for the active mode. There is a User Preset file for each mode. User Preset can never cause a mode switch as it can in legacy analyzers. If you want to recall all modes to their user preset file state, you will need to do a User Preset after mode switching into each mode.</p> <p>User Preset recalls mode state which can now include data like traces; whereas on ESA and PSA, User Preset did not affect data.</p> |
| Initial S/W Revision | Prior to A.02.00 |

User Preset

User Preset sets the state of the currently active mode back to the state that was previously saved for this mode using the Save User Preset menu key or the SCPI command, SYST:PRES:USER:SAV. It not only recalls the Mode Preset settings, but it also recalls all of the mode persistent settings, and the Input/Output system setting that existed at the time Save User Preset was executed.

If a Save User Preset has not been done at any time, User Preset recalls the default user preset file for the currently active mode. The default user preset files are created if, at power-on, a mode detects there is no user preset file. There will never be a scenario when there is no user preset file to restore. For each mode, the default user preset state is the same state that would be saved if a Save User Preset is performed in each mode right after doing a Restore Mode Default and after a Restore Input/Output Defaults.

The User Preset function does the following:

- Aborts the currently running measurement.
- Sets the mode State to the values defined by Save User Preset.
- Makes the saved measurement for the currently running mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|-----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER |
| Notes | :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. Clears all pending OPC bits. The Status Byte is set to 0. Pressing the User Preset front-panel key while already in the User Preset menu will cause the User Preset to get executed |
| Couplings | A user preset will cause the currently running measurement to be aborted and cause the saved measurement to be active. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

User Preset All Modes

Recalls all of the User Preset files for each mode, switches to the power-on mode, and activates the saved measurement from the power-on mode User Preset file.

NOTE

When the instrument is secured, all of the user preset files are converted back to their default user preset files.

The User Preset function does the following:

- Aborts the currently running measurement.
- Switches the Mode to the power-on mode.
- Restores the User Preset files for each mode.
- Makes the saved measurement for the power-on mode the active measurement.
- Brings up the saved menu for the power-on mode.
- Clears the input and output buffers.
- Sets the Status Byte to 0.

| | |
|-----------------------|--|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:ALL |
| Example | :SYST:PRES:USER:SAVE:SYST:PRES:USER:ALL |
| Notes | Clears all pending OPC bits. The Status Byte is set to 0. :SYST:PRES:USER:SAVE is used to save the current state as the user preset state. |
| Couplings | A user preset will cause the currently running measurement to be aborted, cause a mode switch to the power-on mode, and cause the saved measurement to be active in the power-on mode. Recalling a User Preset file has the same issues that recalling a Save State file has. Some settings may need to be limited and therefore re-coupled, since the capabilities of the mode may have changes when the User Preset file was last saved. |
| Initial S/W Revision | Prior to A.02.00 |

Save User Preset

Saves the currently active mode and its State. You can recall this User Preset file by pressing the User Preset menu key or sending the SYST:PRES:USER remote command. This same state is also saved by the Save State function.

| | |
|----------------------|---|
| Key Path | User Preset |
| Remote Command | :SYSTem:PRESet:USER:SAVE |
| Example | :SYST:PRES:USER:SAVE |
| Notes | :SYST:PRES:SAVE creates the same file as if the user requested a *SAV or a MMEM:STOR:STAT, except User Preset Save does not allow the user to specify the filename or the location of the file. |
| Initial S/W Revision | Prior to A.02.00 |

View/Display

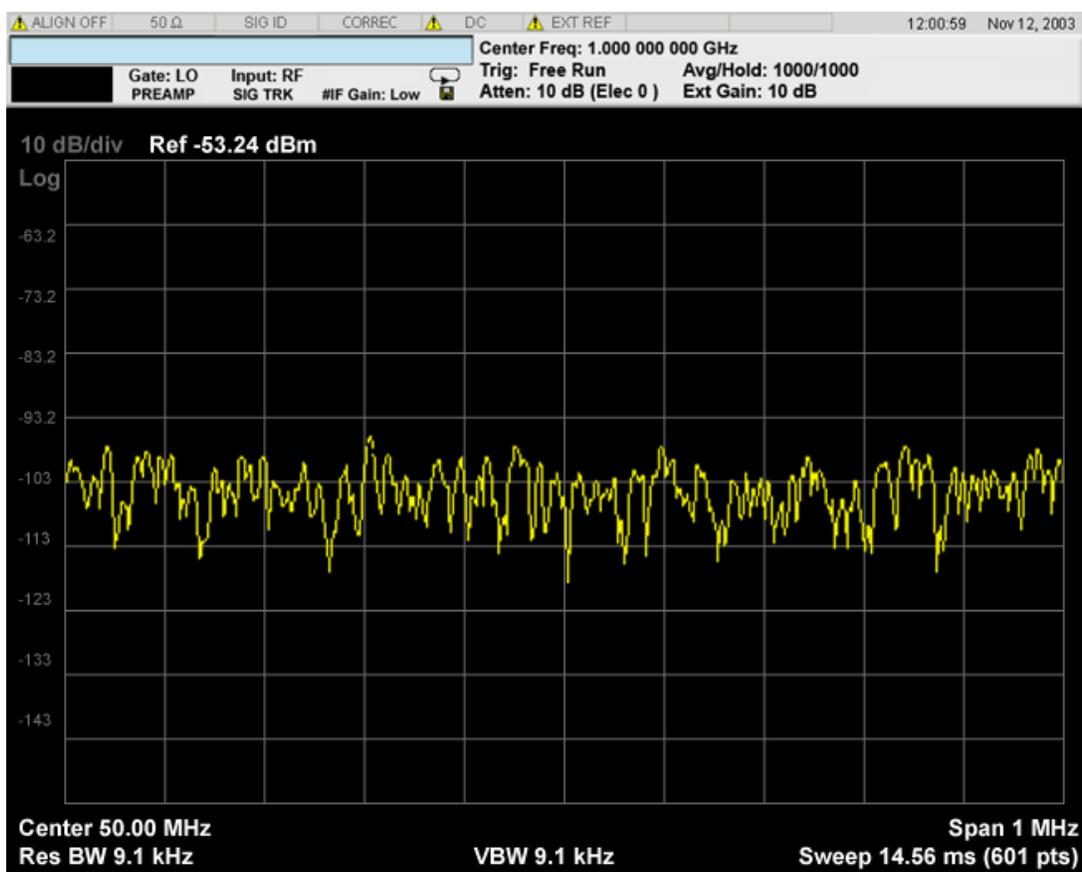
Accesses a menu of functions that enable you to control certain functions related to the display of the analyzer.

The available views and related commands depend on the currently-selected mode. This section includes the following topics:

- ["View for all modes except MSR, 1xEV-DO, LTE-Advanced FDD/TDD" on page 2381](#), LTE-Advanced FDD/TDD
- ["1xEV-DO Mode View" on page 2382](#)
- ["MSR and LTE-Advanced FDD/TDD Mode Views" on page 2382](#)
- ["View Selection by Name \(MSR and LTE-Advanced FDD/TDD mode only\)" on page 2383](#)
- ["View Selection by Number \(MSR and LTE-Advanced FDD/TDD mode only\)" on page 2383](#)

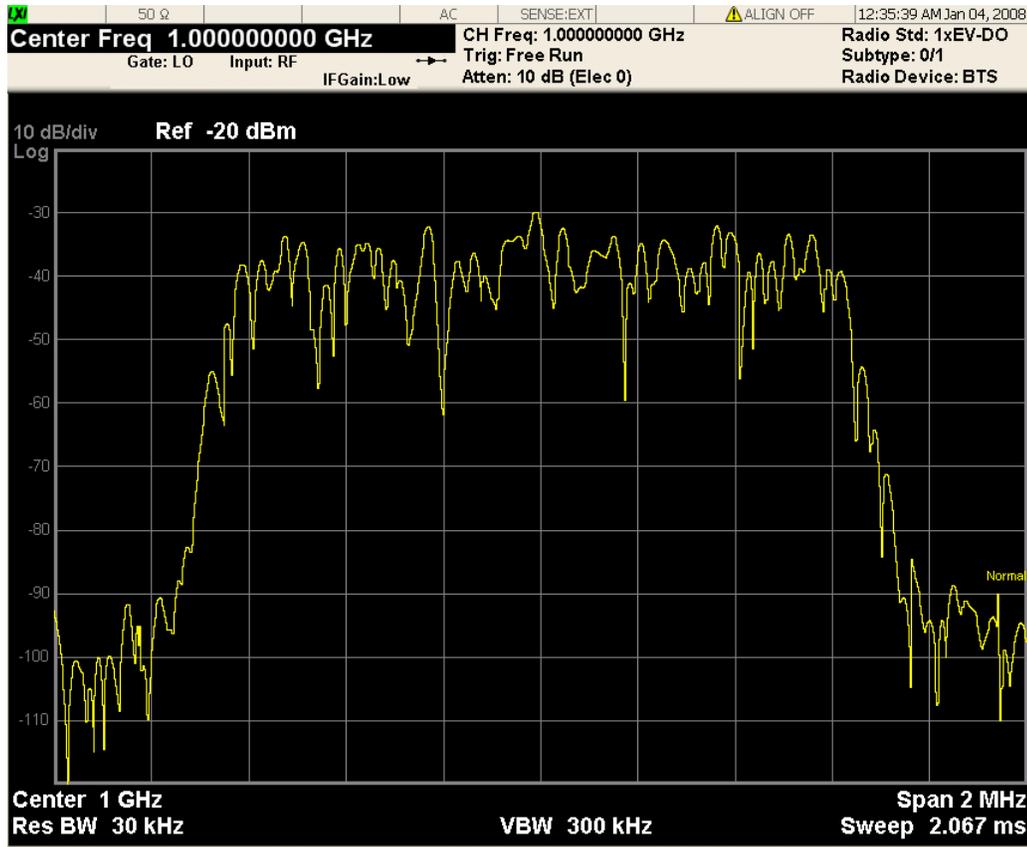
View for all modes except MSR, 1xEV-DO, LTE-Advanced FDD/TDD

When the current mode is **not** MSR, LTE-Advanced FDD/TDD or 1xEV-DO, there is a single trace view for this measurement, as shown below:



1xEV-DO Mode View

When the current mode is 1xEV-DO, a single view is available, as shown in the example below:



The measurement has no results, but has a number of features that make it flexible and simple to use.

MSR and LTE-Advanced FDD/TDD Mode Views

When the current mode is MSR and LTE-Advanced FDD/TDD, there are two views, Result Trace and Carrier Info, as described in the table below. The Result Trace view is the same as the common Monitor Spectrum view in other modes. Carrier Info is available on the spectrum trace.

| | |
|---------------------|---|
| Result Trace | <p>The spectrum trace and power bars are displayed in the upper window. Carrier and offset powers are summarized in the lower window.</p> <p>For more details, see Result Trace (MSR and LTE-Advanced FDD/TDD mode only).</p> |
| Carrier Info | <p>Carrier center frequency can be displayed in either offset or absolute frequency depending on Carrier Freq. The table can be scrolled by Select Carrier in the Config Carriers menu. The highlighted row changes as Select Carrier is changed. The highlighted row and Select Carrier are not coupled.</p> <p>For more details, see Carrier Info (MSR and LTE-Advanced FDD/TDD mode only).</p> |

View Selection by Name (MSR and LTE-Advanced FDD/TDD mode only)

| | |
|-----------------------|---|
| Key Path | Display |
| Mode | MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:MONitor:VIEW[:SElect] RTRace CINformation :DISPlay:MONitor:VIEW[:SElect]? |
| Example | DISP:MON:VIEW RTR DISP:MON:VIEW? |
| Preset | RTRace |
| State Saved | Saved in instrument state |
| Range | Power Results Carrier Info |
| Initial S/W Revision | A.10.00 |

View Selection by Number (MSR and LTE-Advanced FDD/TDD mode only)

| | |
|-----------------------|---|
| Key Path | DISP:MON:VIEW |
| Mode | MSR, LTEAFDD, LTEATDD |
| Remote Command | :DISPlay:MONitor:VIEW:NSElect <integer> :DISPlay:MONitor:VIEW:NSElect? |
| Example | DISP:MON:VIEW:NSEL 1 DISP:MON:VIEW:NSEL? |
| Preset | 1 |
| State Saved | Saved in instrument state |
| Min | 1 |
| Max | 2 |
| Initial S/W Revision | A.10.00 |

| | |
|----------------------|------------------|
| Key Path | Front-panel key |
| Initial S/W Revision | Prior to A.02.00 |

Display

The Display menu is common to most measurements, and is used for configuring items on the display. Some Display menu settings apply to all the measurements in a mode, and some only to the current measurement. Those under the System Display Settings key apply to all measurements in all modes.

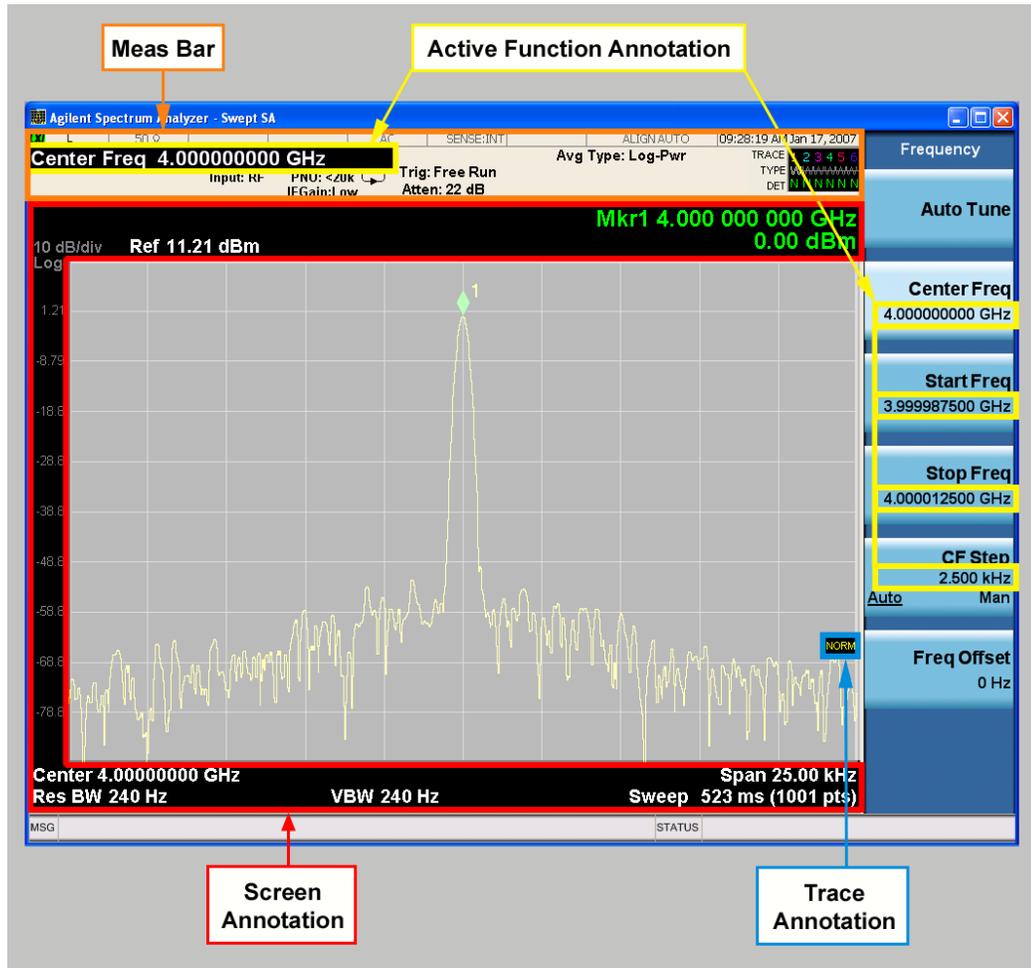
| | |
|----------------------|------------------|
| Key Path | Display |
| Key Path | View/Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation

Turns on and off various parts of the display annotation. The annotation is divided up into four categories:

1. Meas Bar: This is the measurement bar at the top of the screen. It does not include the settings panel or the Active Function. Turning off the Meas Bar turns off the settings panel and the Active Function. When the Meas Bar is off, the graticule area expands to fill the area formerly occupied by the Meas Bar.
2. Screen Annotation: this is the annotation and annunciation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) This does NOT include the marker number or the N dB result. When off, the graticule expands to fill the entire graticule area.
3. Trace annotation: these are the labels on the traces, showing their detector (or their math mode).
4. Active Function annotation: this is the active function display in the meas bar, and all of the active function values displayed on softkeys.

See the figure below. Each type of annotation can be turned on and off individually.



| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Meas Bar On/Off

This function turns the Measurement Bar on and off, including the settings panel. When off, the graticule area expands to fill the area formerly occupied by the Measurement Bar.

| | |
|----------------------|--|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNotation:MBAR[:STATe] OFF ON 0 1 :DISPlay:ANNotation:MBAR[:STATe]? |
| Example | DISP:ANN:MBAR OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off. |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Screen

This controls the display of the annunciation and annotation around the graticule, including any annotation on lines (such as the display line, the threshold line, etc.) and the y-axis annotation. This does NOT include marker annotation (or the N dB result). When off, the graticule expands to fill the entire graticule area, leaving only the 1.5% gap above the graticule as described in the Trace/Detector chapter.

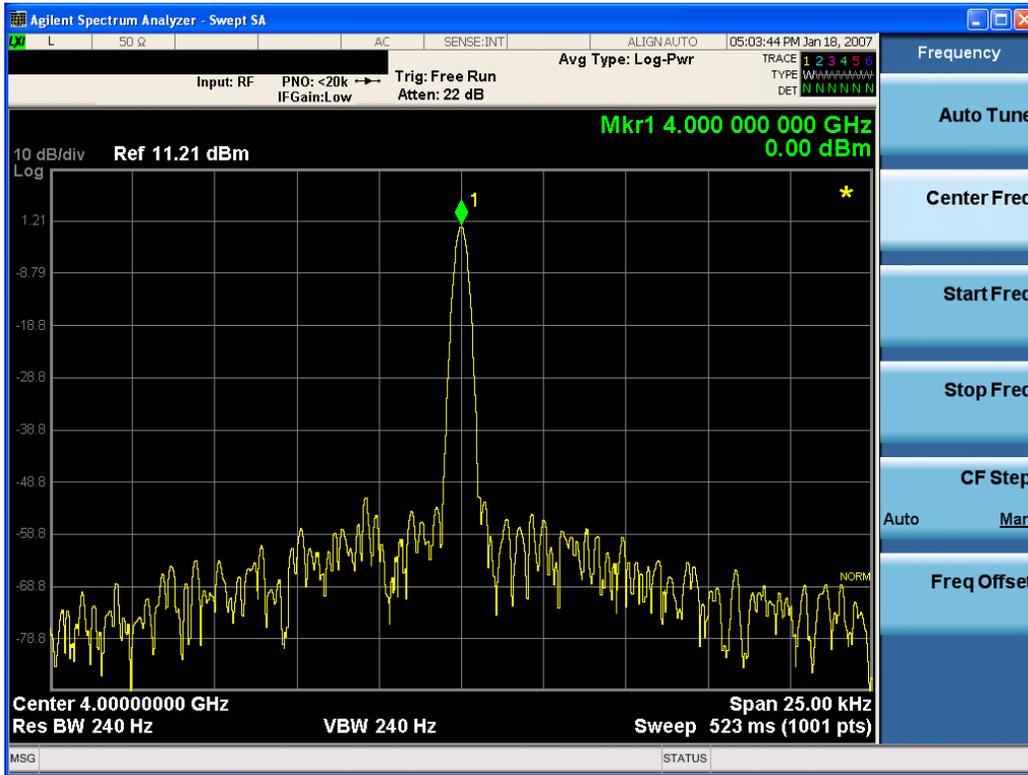
| | |
|----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ANNotation:SCReen[:STATe] OFF ON 0 1 :DISPlay:ANNotation:SCReen[:STATe]? |
| Example | DISP:ANN:SCR OFF |
| Dependencies | Grayed-out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Active Function Values On/Off

Turns on and off the active function display in the Meas Bar, and all of the active function values displayed on the softkeys.

Note that all of the softkeys that have active functions have these numeric values blanked when this function is on. This is a security feature..

18 Monitor Spectrum Measurement
View/Display



| | |
|----------------------|---|
| Key Path | View/Display, Display, Annotation |
| Remote Command | :DISPlay:ACTivefunc[:STATE] ON OFF 1 0 :DISPlay:ACTivefunc[:STATE] ? |
| Example | DISP:ACT OFF |
| Dependencies | Grayed out and forced to OFF when System Display Settings, Annotation is set to Off. |
| Preset | On This should remain Off through a Preset when System DisplaySettings, Annotation is set to Off |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Title

Displays menu keys that enable you to change or clear a title on your display.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Change Title

Writes a title into the "measurement name" field in the banner, for example, "Swept SA".

Press Change Title to enter a new title through the alpha editor. Press Enter or Return to complete the entry. Press ESC to cancel the entry and preserve your existing title.

The display title will replace the measurement name. It remains for this measurement until you press Change Title again, or you recall a state, or a Preset is performed. A title can also be cleared by pressing Title, Clear Title.

NOTE

Notice the inclusion of the <measurement> parameter in the command below. Because each measurement remembers the Display Title, the command must be qualified with the measurement name. For the Swept SA measurement this is not the case; no <measurement> parameter is used when changing the Display Title for the Swept SA measurement.

| | |
|-----------------------|---|
| Key Path | View/Display, Display, Title |
| Mode | All |
| Remote Command | :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> :DISPlay:<measurement>:ANNotation:TITLe:DATA? |
| Example | DISP:ANN:TITL:DATA "This Is My Title" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "This Is My Title" This example is for Measurements other than Swept SA. Both set the title to: This Is My Title |
| Notes | Pressing this key cancels any active function. When a title is edited the previous title remains intact (it is not cleared) and the cursor goes at the end so that characters can be added or BKSP can be used to go back over previous characters. |
| Preset | No title (measurement name instead) |
| State Saved | Saved in instrument state. |
| Initial S/W Revision | Prior to A.02.00 |

Clear Title

Clears a title from the front-panel display. Once cleared, the title cannot be retrieved. After the title is cleared, the current Measurement Name replaces it in the title bar.

| | |
|----------------------|---|
| Key Path | View/Display, Display, Title |
| Example | The following commands clear the title and restore the measurement's original title: DISP:ANN:TITL:DATA "" This example is for the Swept SA measurement in the Spectrum Analyzer mode. The SANalyzer <measurement> name is not used. DISP:ACP:ANN:TITL:DATA "" This example is for ACP; in measurements other than Swept SA the measurement name is required. |
| Notes | Uses the :DISPlay:<measurement>:ANNotation:TITLe:DATA <string> command with an empty string (in the Swept SA, the <measurement> is omitted). |
| Preset | Performed on Preset. |
| Initial S/W Revision | Prior to A.02.00 |

Graticule

Pressing Graticule turns the display graticule On or Off. It also turns the graticule y-axis annotation on and off.

| | |
|----------------------|--|
| Key Path | View/Display, Display |
| Remote Command | :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe] OFF ON 0 1 :DISPlay:WINDow[1]:TRACe:GRATicule:GRID[:STATe]? |
| Example | DISP:WIND:TRAC:GRAT:GRID OFF |
| Notes | The graticule is the set of horizontal and vertical lines that make up the grid/divisions for the x-axis and y-axis. |
| Preset | On |
| State Saved | Saved in instrument state |
| Initial S/W Revision | Prior to A.02.00 |

System Display Settings

These settings are "Mode Global" – they affect all modes and measurements and are reset only by Restore Misc Defaults or Restore System Defaults under System.

| | |
|----------------------|-----------------------|
| Key Path | View/Display, Display |
| Initial S/W Revision | Prior to A.02.00 |

Annotation Local Settings

This is a Mode Global override of the meas local annotation settings. When it is All Off, it forces ScreenAnnotation, Meas Bar, Trace, and Active Function Values settings to be OFF for all measurements in all modes. This provides the security based "annotation off" function of previous analyzers; hence it uses the legacy SCPI command.

When it is All Off, the Screen, Meas Bar, Trace, and Active Function Values keys under the Display, Annotation menu are grayed out and forced to Off. When Local Settings is selected, you are able to set the local annotation settings on a measurement by measurement basis.

| | |
|-------------------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:WINDow[1]:ANNOtation[:ALL] OFF ON 0 1 :DISPlay:WINDow[1]:ANNOtation[:ALL]? |
| Example | :DISP:WIND:ANN OFF |
| Preset | On (Set by Restore Misc Defaults) |
| State Saved | Not saved in instrument state. |
| Backwards Compatibility Notes | The WINDow parameter and optional subopcode is included for backwards compatibility but ignored – all windows are equally affected. |
| Initial S/W Revision | Prior to A.02.00 |

Themes

Accesses a menu of functions that enable you to choose the theme to be used when saving the screen image.

The **Themes** option is the same as the **Themes** option under the **Display** and **Page Setup** dialogs. It allows you to choose between themes to be used when saving the screen image.

| | |
|--------------------------------------|---|
| Key Path | Save, Screen Image |
| Remote Command | :MMEMory:STORe:SCReen:THEMe TDColor TDMonochrome FCOLOR FMONochrome :MMEMory:STORe:SCReen:THEMe? |
| Example | :MMEM:STOR:SCR:THEM TDM |
| Preset | 3D Color; Is not part of Preset, but is reset by Restore Misc Defaults or Restore System Defaults All and survives subsequent running of the modes. |
| Readback | 3D Color 3D Mono Flat Color Flat Mono |
| Backwards Compatibility Notes | In ESA and PSA we offer the choice of "Reverse Bitmap" or "Reverse Metafile" when saving screen images. This is much like the "Flat Color" theme available in X-Series. Also, if you selected Reverse Bitmap AND a black & white screen image, that would be much like "Flat Monochrome". In other words, each of the X-Series themes has a similar screen image type in ESA/PSA. But they are not identical. |
| Initial S/W Revision | Prior to A.02.00 |

3D Color

Selects a standard color theme with each object filled, shaded and colored as designed.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDC |
| Readback | 3D Color |
| Initial S/W Revision | Prior to A.02.00 |

3D Monochrome

Selects a format that is like 3D color but shades of gray are used instead of colors.

| | |
|-----------------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM TDM |
| Readback | 3D Mono |
| Initial S/W Revision | Prior to A.02.00 |

Flat Color

Selects a format that is best when the screen is to be printed on an ink printer.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FCOL |
| Readback | Flat Color |
| Initial S/W Revision | Prior to A.02.00 |

Flat Monochrome

Selects a format that is like Flat Color. But only black is used (no colors, not even gray), and no fill.

| | |
|----------------------|----------------------------|
| Key Path | Save, Screen Image, Themes |
| Example | MMEM:STOR:SCR:THEM FMON |
| Readback | Flat Mono |
| Initial S/W Revision | Prior to A.02.00 |

Backlight

Accesses the display backlight on/off keys. This setting may interact with settings under the Windows "Power" menu.

When the backlight is off, pressing ESC, TAB, SPACE, ENTER, UP, DOWN, LEFT, RIGHT, DEL, BKSP, CTRL, or ALT turns the backlight on without affecting the application. Pressing any other key will turn backlight on and could potentially perform the action as well.

| | |
|-----------------------|--|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight ON OFF :DISPlay:BACKlight? |
| Preset | ON (Set by Restore Misc Defaults) |
| Initial S/W Revision | Prior to A.02.00 |

Backlight Intensity

An active function used to set the backlight intensity. It goes from 0 to 100 where 100 is full on and 0 is off. This value is independent of the values set under the Backlight on/off key.

| | |
|-----------------------|---|
| Key Path | View/Display, Display, System Display Settings |
| Remote Command | :DISPlay:BACKlight:INTensity <integer> :DISPlay:BACKlight:INTensity? |
| Example | DISP:BACK:INT 50 |

| | |
|----------------------|------------------------------------|
| Preset | 100 (Set by Restore Misc Defaults) |
| Min | 0 |
| Max | 100 |
| Initial S/W Revision | Prior to A.02.00 |

