

Keysight Technologies

FieldFox Spectrum Analyzers

9/14/18/26.5 GHz

Technical Overview



N9935A
N9936A
N9937A
N9938A



Get Keysight-quality Microwave Measurements in the Field

Every piece of gear in your field kit had to prove its worth. Measuring up and earning a spot is the driving idea behind Keysight Technologies, Inc. FieldFox microwave analyzers. They're equipped to handle routine maintenance, in-depth troubleshooting and anything in between. Better yet, FieldFox delivers Keysight-quality microwave measurements—wherever you need to go.

On land, sea and air, FieldFox is ready for a wide range of applications: satellite communications, microwave backhaul, military communications, radar systems, and more. In harsh conditions and hard-to-reach locations, FieldFox delivers precise results that are consistent with those you'd see on a benchtop analyzer. To get you out of the elements sooner, the task-driven user interface will help you finish the job faster.

FieldFox spectrum analyzers give you—and your budget—more flexibility: configure an instrument with just spectrum analysis today and add a full-band tracking generator and preamplifier and other capabilities in the future.

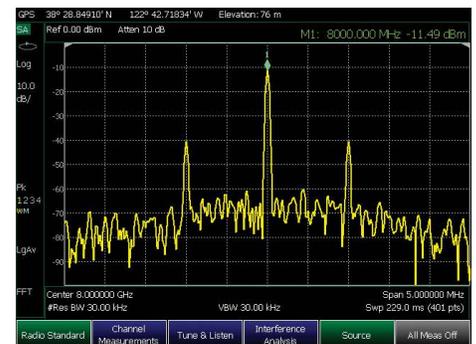
Key Measurements

Spectrum analyzer

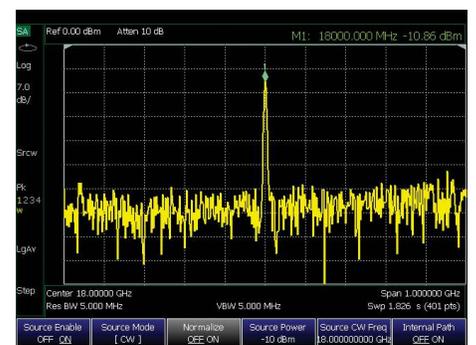
- Unprecedented amplitude accuracy (± 0.5 dB) with InstAlign¹—no warm up required
- Interference analysis with spectrogram and record and playback
- Superior spur-free dynamic range and phase noise (-111 dBc/Hz at 10 kHz offset)
- Tracking generator, independent source, and preamplifier covering the full frequency range
- 5 kHz to 26.5 GHz

Tracking generator and built-in independent signal source

- CW, CW coupled, and tracking
- Flat output power across whole frequency span, in 1 dB steps
- 30 kHz to 26.5 GHz

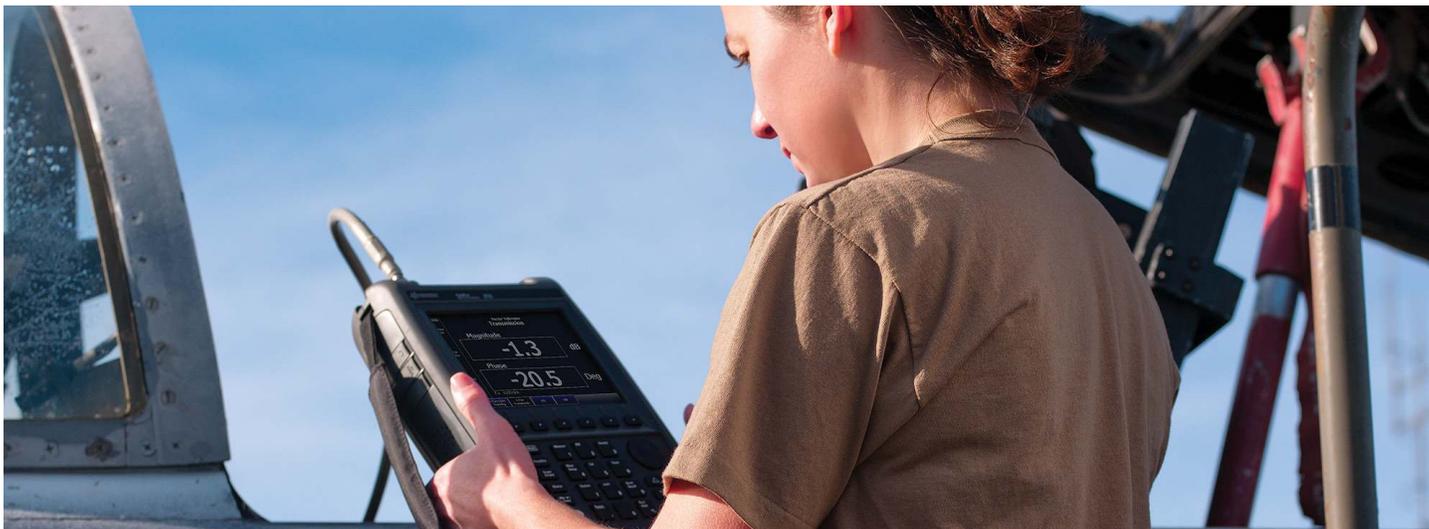


Spectrum analyzer



Add caption?????

1. With FieldFox InstAlign, internal amplitude alignments occur automatically as environmental conditions change, without any user intervention.



Add the World's Most Precise Handheld Microwave Analyzer to Your Kit



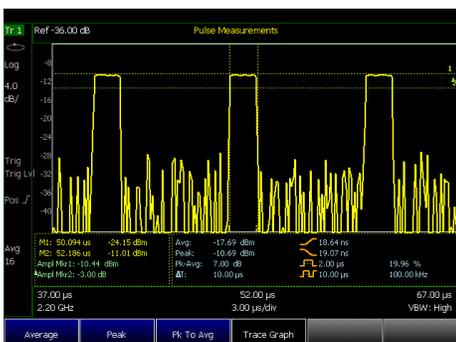
Built-in power meter

- Easy to view analog and digital display
- ± 0.5 dB accuracy with InstAlign
- 5 kHz to 26.5 GHz



Power meter using a USB power sensor

- Measure peak power and average power
- -60 to $+44$ dBm (sensor dependent)
- 9 kHz to 40 GHz (frequency range sensor dependent)



Pulse measurements using a USB peak power sensor

- Measure peak power, average power and peak to average ratio
- Pulse profile characterization with gating
- 50 MHz to 40 GHz (frequency range sensor dependent)



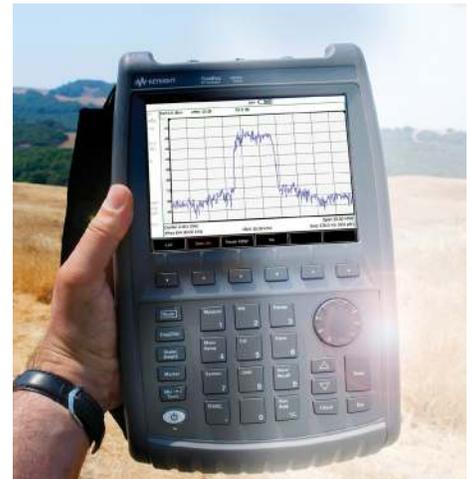
Designed for You and the Work You Do Everyday

Carry FieldFox wherever you need to go

- Kit friendly 3.0 kg or 6.6 lbs
- Large buttons are easy to operate, even when wearing gloves
- Field swappable battery lasts up to 3½ hours
- Non-slip rubber grip securely fits in your hands and won't slide off the hood of your vehicle
- Vertical “portrait” orientation makes it easy to hold and operate at the same time

Field-proof usability for better answers in less time

- Bright, low-reflection display and backlit keys enable easy viewing in direct sunlight or darkness
- Intuitive user interface is designed for your workflow, enabling measurements in fewer key presses
- One-button measurements simplify complex setups and ensure quick, accurate results with confidence
- 3-year warranty ensures field confidence—especially in harsh environments



Transflective display makes it easy to read measurements in direct sunlight



Large buttons make it easy to perform spectrum analysis measurements—even with gloves on



Rugged Enough to Meet MIL-Specs

- Completely sealed instrument enclosure provides measurement stability in harsh environments
- Specially designed connector bay protects RF connectors from damage due to drops or other external impacts (designed to withstand 4' drop on concrete surface on all 6 faces)
- Water-resistant chassis, keypad and case withstand wide temperature ranges and salty, humid environments
 - Case withstands shock and vibration
 - Wide operating temperature
–10 to +55 °C (14 to 131 °F)
 - Wide storage temperature
–51 to +71 °C (–60 to 160 °F)
- Meets MIL-PRF-28800F Class 2 requirements
- Type tested and meets MIL-STD-810G, Method 511.5, Procedure I requirements for operation in explosive environments
- Meets IEC/EN 60529 IP53 requirements for protection from dust and water



Dust-free design with no vents or fans helps extend instrument reliability

Pick up FieldFox for its Ergonomics

Portrait design and large buttons for easy operation—even with gloves on

Convenient side strap makes it easy to hold and carry

Anti-glare 6.5 inch LCD display with LED backlight

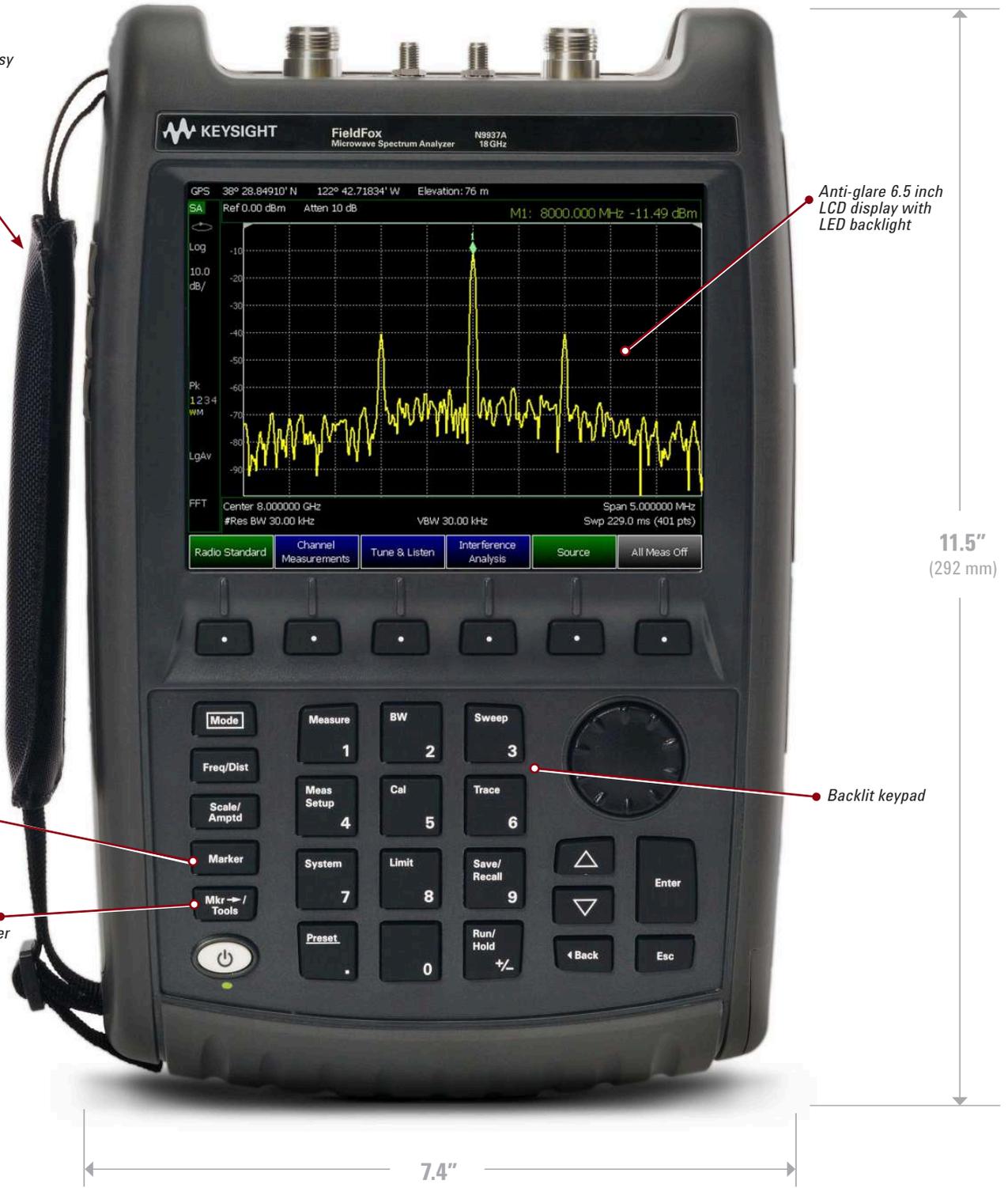
11.5"
(292 mm)

Task-driven keys are grouped to easily perform field measurements

Dedicated marker keys for quick marker function access

Backlit keypad

7.4"
(188 mm)

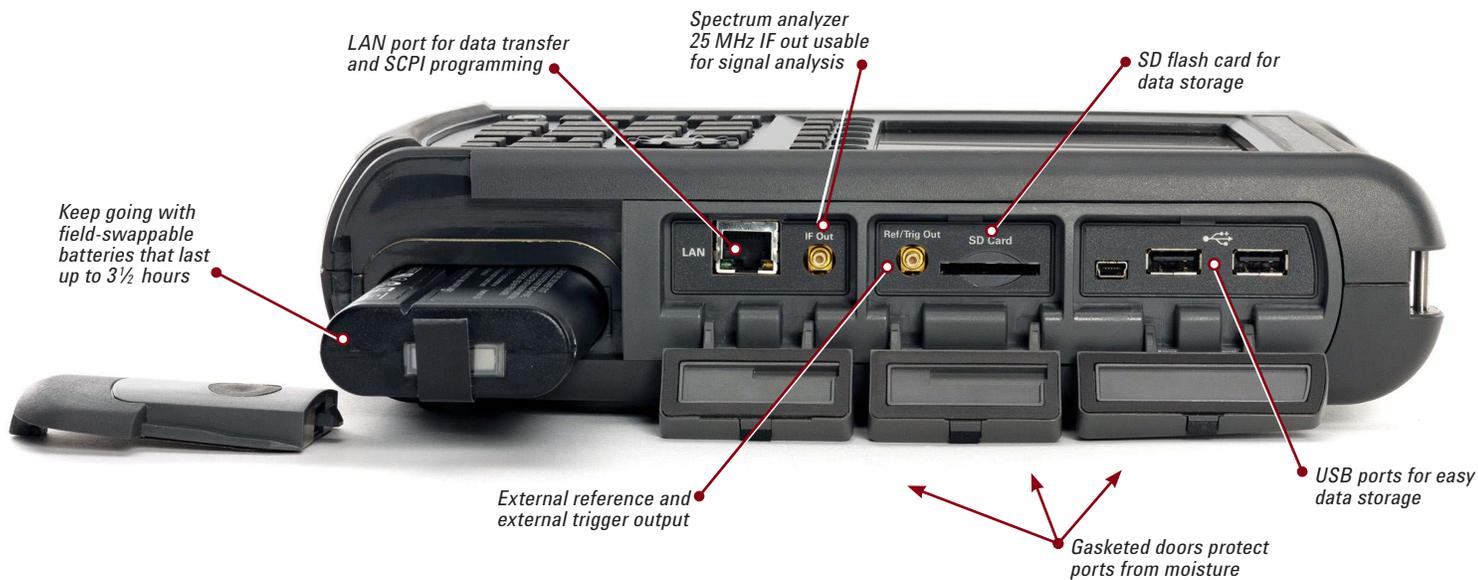


... and Depend on its Durability and Convenience

TOP



RIGHT SIDE



LEFT SIDE





Spectrum Analyzer

Spectrum analyzer

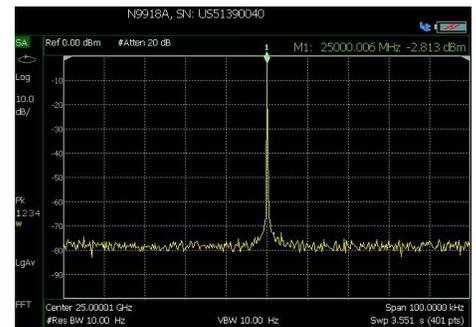
In microwave, radar, and satellite communications, and commercial microwave backhaul, engineers are responsible not only for hardware installation and maintenance, but also over-the-air signal quality. They need to regularly monitor for rogue signals and perform signal surveillance.

FieldFox's spectrum analyzer is optimized to excel in the dynamic spectral environment seen commonly in the field. In the field, users face measurement challenges such as the need to detect a low-level signal under strong signal conditions (requiring high dynamic range), or close-in small interference signals (requiring excellent phase noise). FieldFox's superior dynamic range (TOI > +15 dBm), close in phase noise (-111 dBc/Hz at 10 kHz), and fast sweep time make these challenging tasks easier.

FieldFox's spectrum analyzer also provides a full power measurement suite and complete trace and state control.

Unprecedented amplitude accuracy without instrument warm up—InstAlign

With FieldFox InstAlign, internal amplitude alignments occur automatically as the environmental conditions change, without any user intervention. This provides unprecedented amplitude accuracy up to ± 0.5 dB for spectrum analysis and power measurements. Better yet, FieldFox provides this accuracy immediately upon instrument turn on—no warm up required.



Monitor the spectrum using the FieldFox analyzers



Spectrum Analyzer

Field strength measurements

To characterize the electric and magnetic fields, the gain and loss of the antenna and cables need to be accounted for. With FieldFox, antenna factors and cable loss data can be loaded using either the front panel or the complimentary Data Link software.

Interference analyzer

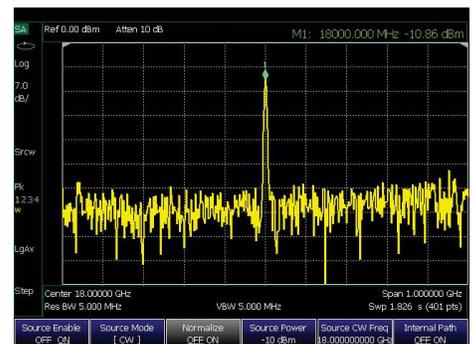
Interference can be internal or external, uplink or downlink, and has a direct impact on the Quality of Service of a communication network. FieldFox's interference analyzer is designed to identify interfering signals quickly. Spectrogram and waterfall displays detect intermittent signals or monitor signals over a period of time. Signal traces can be recorded into internal memory or external flash memory devices, and the saved traces can be played back for offline processing. It has excellent dynamic range with very fast sweep times under narrow resolution bandwidths (RBWs).

Independent signal source

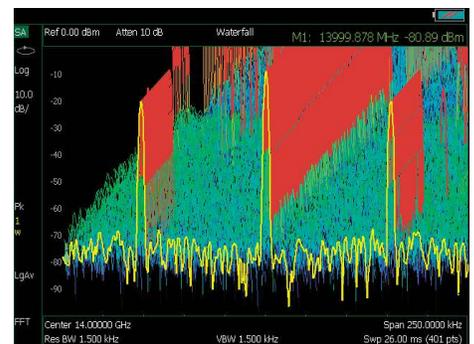
FieldFox has a built-in independent signal source, with a frequency range of 30 kHz to 26.5 GHz. The signal source can be tuned to any frequency, independent of the spectrum analyzer frequency. The signal source can be used to create a test signal to measure coverage, antenna isolation, antenna direction alignment, shielding effectiveness or attenuation, transponder and frequency offset device verification, and long cable loss measurement.

IF signal output

FieldFox provides a spectrum analyzer IF output with 25 MHz bandwidth for use as a frequency down-converter, and to perform wideband signal analysis.



Use the internal microwave signal source for transponder testing



Waterfall display makes interference hunting easier



Remote control capability with iPad or iPhone

Engineers and technicians can now remotely monitor and control their FieldFox using their iOS device such as an iPhone, iPad, or iPod Touch. FieldFox's Remote Viewer iOS app emulates the front panel of the unit, so users can simply press any FieldFox key right from their iOS device.

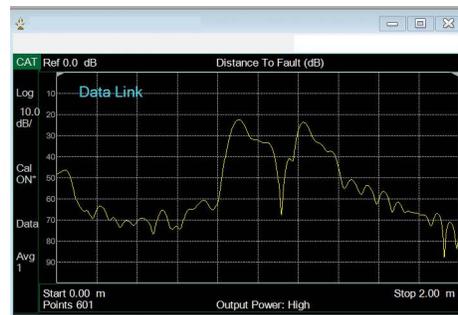


Control and view your FieldFox via your iPad

The app also allows users to instantly access technical documents such as data sheets.

FieldFox's Data Link software makes report generation and documentation easier

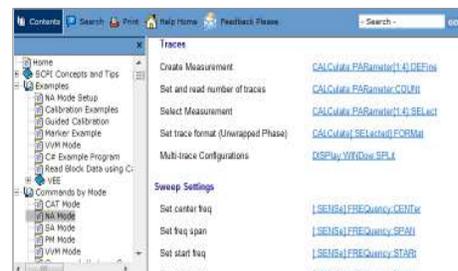
FieldFox's complimentary Data Link software provides data transfer, data definition and report generation. Markers and limit lines can be added to the traces. Cable files and antenna factors can also be loaded using Data Link.



Use the complimentary Data Link software to generate reports

Remote control via LAN and FieldFox programming

FieldFox analyzers are fully SCPI compliant and can be controlled over the LAN.



Remotely control FieldFox using SCPI over LAN

Specifications in Brief

See the FieldFox Handheld Analyzer Data Sheet for a complete listing of the specifications:

<http://literature.cdn.keysight.com/litweb/pdf/5990-9783EN.pdf>

Spectrum analyzer

The specifications in this section apply to the spectrum analyzer capabilities available in the following models:

FieldFox microwave combination analyzers: N9913A, N9914A, N9915A, N9916A, N9917A, N9918A

FieldFox microwave spectrum analyzers: N9935A, N9936A, N9937A, N9938A

Models	Frequency range	
N9913A	100 kHz to 4 GHz	Usable to 5 kHz
N9914A	100 kHz to 6.5 GHz	Usable to 5 kHz
N9915A, N9935A	100 kHz to 9 GHz	Usable to 5 kHz
N9916A, N9936A	100 kHz to 14 GHz	Usable to 5 kHz
N9917A, N9937A	100 kHz to 18 GHz	Usable to 5 kHz
N9918A, N9938A	100 kHz to 26.5 GHz	Usable to 5 kHz

The spectrum analyzer is tunable to 0 Hz or DC.

The preamplifier covers the full band with nominal gain of 20 dB.

Frequency reference: -10 to 55 °C

Accuracy	± 0.7 ppm (spec) + aging ± 0.4 ppm (typical) + aging
Accuracy, when locked to GPS	± 0.025 ppm (spec)
Aging rate	± 1 ppm/yr for 20 years (spec), will not exceed ± 3.5 ppm
Frequency span	Spec
Resolution	1 Hz
	Spec
Resolution bandwidth (RBW)	10 Hz to 5 MHz
Range (-3 dB bandwidth)	Non-zero span: 1, 1.5, 2, 3, 5, 7.5, 10 sequence < 300 kHz, 300 kHz, 1 MHz, 3 MHz, 5 MHz Zero span: 1, 3, 10 sequence
Video bandwidth (VBW)	1 Hz to 5 MHz
	Non-zero span: 1, 1.5, 2, 3, 5, 7.5, 10 sequence Zero span: RBW/VBW ≤ 100

Phase noise: Stability, SSB phase noise at 1 GHz, normalized to 1 Hz RBW

Offset	Spec (23 ± 5 °C)	Spec (-10 to 55 °C)	Typical (23 ± 5 °C)	Typical (-10 to 55 °C)
10 kHz	-106 dBc	-106 dBc	-111 dBc	-111 dBc
30 kHz	-106 dBc	-104 dBc	-108 dBc	-110 dBc
100 kHz	-100 dBc	-99 dBc	-104 dBc	-105 dBc
1 MHz	-110 dBc	-110 dBc	-113 dBc	-113 dBc
3 MHz	-119 dBc	-118 dBc	-122 dBc	-122 dBc
5 MHz	-120 dBc	-120 dBc	-123 dBc	-123 dBc

Displayed average noise level (DANL): RMS detection, log averaging, reference level of -20 dBm, normalized to 1 Hz RBW

Preamp on	Spec (23 ± 5 °C)	Spec (-10 to 55 °C)	Typical (23 ± 5 °C)	Typical (-10 to 55 °C)
2 MHz to 4.5 GHz ¹	-153 dBm	-151 dBm	-155 dBm	-154 dBm
> 4.5 to 7 GHz	-149 dBm	-147 dBm	-151 dBm	-150 dBm
> 7 to 13 GHz	-147 dBm	-145 dBm	-149 dBm	-148 dBm
> 13 to 17 GHz	-143 dBm	-141 dBm	-145 dBm	-144 dBm
> 17 to 22 GHz	-140 dBm	-139 dBm	-143 dBm	-142 dBm
> 22 to 25 GHz	-134 dBm	-132 dBm	-137 dBm	-134 dBm
> 25 to 26.5 GHz	-128 dBm	-126 dBm	-131 dBm	-129 dBm

50 MHz absolute amplitude accuracy:	50 MHz, verified with input level of 0 to -35 dBm, peak detector, 10 dB attenuation, preamplifier off, 30 kHz RBW, all settings auto-coupled, no warm-up required, -10 to 55 °C
	± 0.3 dB (spec)
	± 0.10 dB (typical)

Total absolute amplitude accuracy

Verified with input level of -10 dBm. Peak detector, 10 dB attenuation, preamplifier off, 30 kHz RBW, all settings auto-coupled, no warm-up required. Includes frequency response uncertainties.

	Spec (23 ± 5 °C)	Spec (-10 to 55 °C)	Typical (23 ± 5 °C)	Typical (-10 to 55 °C)
100 kHz to 18 GHz	± 0.8 dB	± 1.0 dB	± 0.35 dB	± 0.50 dB
> 18 GHz to 26.5 GHz	± 1.0 dB	± 1.2 dB	± 0.50 dB	± 0.60 dB

Third order intermodulation distortion (TOI)

Two -20 dBm signals, 100 kHz spacing at input mixer, -10 to 55 °C	Spec	Typical
	At 2.4 GHz, +15 dBm	< 1 GHz, +10 dBm 1 to 7.5 GHz, +15 dBm > 7.5 GHz, +21 dBm

1. Increase the noise floor 4 dB for frequencies between 2.1 and 2.8 GHz.

Tracking generator or independent source

The specifications in this section apply to the tracking generator or independent source capabilities available in the following models:

FieldFox microwave combination analyzers: N9913A, N9914A, N9915A, N9916A, N9917A, N9918A.

FieldFox microwave spectrum analyzers: N9935A, N9936A, N9937A, N9938A.

Model	Tracking generator or independent source frequency range
N9913A	30 kHz to 4 GHz
N9914A	30 kHz to 6.5 GHz
N9915A, N9935A	30 kHz to 9 GHz
N9916A, N9936A	30 kHz to 14 GHz
N9917A, N9937A	30 kHz to 18 GHz
N9918A, N9938A	30 kHz to 26.5 GHz

Dynamic range: Typical, –10 to 55 °C

Frequency	Preamp off	Preamp on
2 MHz to 2 GHz	97 dB	112 dB
> 2 to 7 GHz	93 dB	108 dB
> 7 to 11 GHz	88 dB	103 dB
> 11 to 18 GHz	79 dB	94 dB
> 18 to 21 GHz	71 dB	86 dB
> 21 to 23 GHz	55 dB	70 dB
> 23 to 25 GHz	50 dB	65 dB
> 25 to 26.5 GHz	45 dB	60 dB

Built-in power meter, Option 310

The specifications in the sections that follow apply to these FieldFox analyzers:

FieldFox microwave combination analyzers: N9913A, N9914A, N9915A, N9916A, N9917A, N9918A

FieldFox microwave spectrum analyzers: N9935A, N9936A, N9937A, N9938A

Models	Frequency range	
N9913A	100 kHz to 4 GHz	Usable to 5 kHz
N9914A	100 kHz to 6.5 GHz	Usable to 5 kHz
N9915A, N9935A	100 kHz to 9 GHz	Usable to 5 kHz
N9916A, N9936A	100 kHz to 14 GHz	Usable to 5 kHz
N9917A, N9937A	100 kHz to 18 GHz	Usable to 5 kHz
N9918A, N9938A	100 kHz to 26.5 GHz	Usable to 5 kHz

Amplitude accuracy				
	Spec (23 ± 5 °C)	Typical (23 ± 5 °C)	Spec (–10 to 55 °C)	Typical (–10 to 55 °C)
100 kHz to 18 GHz	± 0.8 dB	± 0.35 dB	± 1.0 dB	± 0.50 dB
> 18 GHz to 26.5 GHz	± 1.0 dB	± 0.50 dB	± 1.2 dB	± 0.60 dB

General information	
Calibration cycle	1 year
Weight	3.0 kg or 6.6 lbs including battery
Dimensions: H x W x D	292 x 188 x 72 mm 11.5" x 7.4" x 2.8"
Environmental	
MIL-PRF-28800F Class 2	Operating temperature Storage temperature Operating humidity Random vibration Functional shock Bench drop
MIL-STD-810G, Method 511.5	Type tested and meets Procedure I requirements for operation in explosive environments
Altitude – operating	9144 m or 30,000 ft (using battery)
Altitude – non-operating	15,240 m or 50,000 ft
Complies with European EMC directive 2004/108/EC	IEC/EN 61326–1 CISPR Pub 11 Group 1, class B, Group 1 limit of CISPR 11:203/EN 55011:2007 AS/NZS CISPR 11 ICES/NMB–001
Battery	Lithium ion, 10.8 V, 4.6 A-h, 3.5 hours (typical)
Warranty	3-year warranty standard on all FieldFox instruments

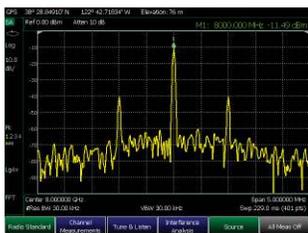
Configuration Information in Brief

See the FieldFox Configuration Guide for complete information on all FieldFox products and accessories.

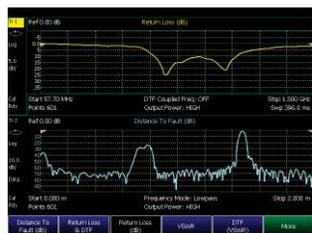
<http://literature.cdn.keysight.com/litweb/pdf/5990-9836EN.pdf>

Model	Description	Test port connector
N9935A	FieldFox microwave spectrum analyzer, 9 GHz	Type-N (f) test ports, 50 ohm
N9936A	FieldFox microwave spectrum analyzer, 14 GHz	Type-N (f) test ports, 50 ohm
N9937A	FieldFox microwave spectrum analyzer, 18 GHz	Type-N (f) test ports, 50 ohm
N9938A	FieldFox microwave spectrum analyzer, 26.5 GHz	Type-N (f) test ports, 50 ohm, 3.5 mm (m) test ports, 50 ohm (Option 100)

Options	Descriptions	Measurements/functions
Base unit for N9935/6/7/8A analyzers	Spectrum analyzer	Spectrum analysis Channel power (CHP), adjacent channel power (ACP), occupied bandwidth (OBW) AM/FM tune and listen Field strength measurements Frequency marker counter, band power marker Independent source
Option 220	Full-band tracking generator	Stimulus response/response measurements
Option 235	Preamplifier	20 dB gain nominal
Option 236	Interference analyzer and spectrogram	Spectrogram and waterfall display Record / playback
Option 302	External USB power sensor support	
Option 307	GPS receiver (receiver built-in, external antenna required)	Geo location information Lock internal reference to GPS
Option 309	DC bias variable-voltage source	+1 to 32 VDC for external bias-tee and other devices
Option 310	Built-in power meter	Built-in power measurement, using the built-in receiver, without a power sensor
Option 320	Reflection measurements (return loss, VSWR)	Cable and antenna analysis
Option 330	Pulse measurements	Requires Keysight USB peak power sensor
Option 030	Remote control capability	Remote viewing and control using iPhone, iPad, or iPod Touch



Spectrum analysis



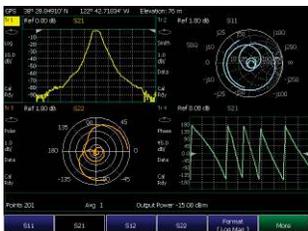
Cable and antenna analysis



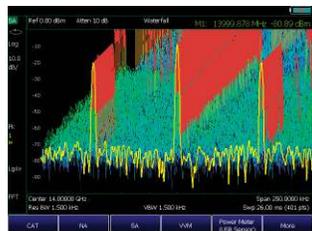
Vector voltmeter measurements



Built-in power meter



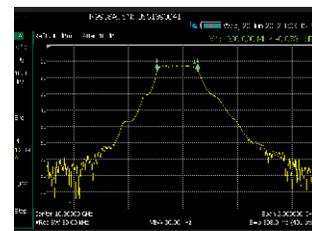
Vector network analysis



Interference analysis



Channel power measurement



Tracking generator

FieldFox Analyzers

FieldFox	RF & microwave combination analyzers	Microwave vector network analyzers	Microwave spectrum analyzers
Model number	N9913/4/5/6/7/8A	N9925/6/7/8A	N9935/6/7/8A
Maximum frequency range	4, 6.5, 9, 14, 18, 26.5 GHz	9, 14, 18, 26.5 GHz	9, 14, 18, 26.5 GHz
Cable and antenna analyzer	■	■	VSWR and reflection
Vector network analyzer	■	■	
Spectrum analyzer, Interference analyzer	■		■
Tracking generator, Independent source	■		■
Vector voltmeter	■	■	
Built-in power meter	■	■	■
Power meter with USB sensor	■	■	■
Pulse measurements	■	■	■
Remote control using iOS device	■	■	■

Accessories

The accessories shown here are a subset of the available accessories.
For a complete list, visit www.keysight.com/find/n9910x

N9910X-704 Phase stable cable

- Type-N(m) to TNC(f)
- 13 GHz



N9910X-709 Phase stable cable

- 3.5 mm(f) to 3.5 mm(f)
- 26.5 GHz



N9910X-810 Phase stable cable

- Type-N(m) to Type-N(m)
- 6 GHz



N9910X-845 Adaptor kit



N9910X-872 External battery charger



N990X-873 AC/DC adaptor



N9910X-874 Bias-tee



N9910X-875 DC car charger and adapter



Accessories

The accessories shown here are a subset of the available accessories.
For a complete list, visit www.keysight.com/find/n9910x

N9910X-860 Fixed attenuator

- 40 dB
- 100 W

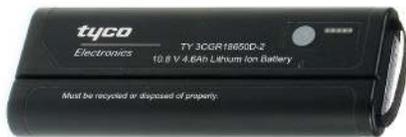


N9910X-881 Hard transit case

- FieldFox fits inside hard transit case



N9910X-870 Extra battery



N9910X-820 Directional antenna



N9910X-880 Soft transit case

- Comes standard with each FieldFox
- Includes backpack and shoulder straps



N9910X-821 Telescopic whip antenna



Carry precision with you.

Every piece of gear in your field kit had to prove its worth. Measuring up and earning a spot is the driving idea behind Keysight's FieldFox analyzers. They're equipped to handle routine maintenance, in-depth troubleshooting and anything in between. Better yet, FieldFox delivers Keysight-quality microwave measurements—wherever you need to go. Add FieldFox to your kit and carry precision with you.

Related literature	Number
<i>FieldFox Handheld Analyzers, Brochure</i>	5990-9779EN
<i>FieldFox Combination Analyzers, Technical Overview</i>	5990-9780EN
<i>FieldFox Vector Network Analyzers, Technical Overview</i>	5990-9781EN
<i>FieldFox Handheld Analyzers, Data Sheet</i>	5990-9783EN
<i>FieldFox Handheld Analyzer, Configuration Guide</i>	5990-9836EN
<i>FieldFox N9912A RF Analyzer, Technical Overview</i>	5989-8618EN
<i>FieldFox N9912A RF Analyzer, Data Sheet</i>	N9912-90006
<i>FieldFox N9923A RF Vector Network Analyzer, Technical Overview</i>	5990-5087EN
<i>FieldFox N9923A RF Vector Network Analyzer, Data Sheet</i>	5990-5363EN

Download application notes, watch videos, and learn more: www.keysight.com/find/FieldFox

myKeysight

myKeysight

www.keysight.com/find/mykeysight

A personalized view into the information most relevant to you.

Three-Year Warranty

www.keysight.com/find/ThreeYearWarranty

Keysight's commitment to superior product quality and lower total cost of ownership. The only test and measurement company with three-year warranty standard on all instruments, worldwide.

Keysight Assurance Plans

www.keysight.com/find/AssurancePlans

Up to five years of protection and no budgetary surprises to ensure your instruments are operating to specification so you can rely on accurate measurements.

www.keysight.com/go/quality

Keysight Technologies, Inc.

DEKRA Certified ISO 9001:2008

Quality Management System

Keysight Channel Partners

www.keysight.com/find/channelpartners

Get the best of both worlds: Keysight's measurement expertise and product breadth, combined with channel partner convenience.

www.keysight.com/find/FieldFox



For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

Americas

Canada	(877) 894 4414
Brazil	55 11 3351 7010
Mexico	001 800 254 2440
United States	(800) 829 4444

Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 112 929
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 6375 8100

Europe & Middle East

Austria	0800 001122
Belgium	0800 58580
Finland	0800 523252
France	0805 980333
Germany	0800 6270999
Ireland	1800 832700
Israel	1 809 343051
Italy	800 599100
Luxembourg	+32 800 58580
Netherlands	0800 0233200
Russia	8800 5009286
Spain	0800 000154
Sweden	0200 882255
Switzerland	0800 805353
	Opt. 1 (DE)
	Opt. 2 (FR)
	Opt. 3 (IT)
United Kingdom	0800 0260637

For other unlisted countries:

www.keysight.com/find/contactus

(BP-09-04-14)



This information is subject to change without notice.
© Keysight Technologies, 2012-2014
Published in USA, August 2, 2014
5990-9782EN
www.keysight.com