



AO3406

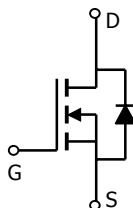
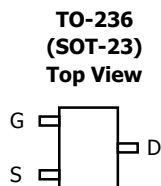
N-Channel Enhancement Mode Field Effect Transistor

General Description

The AO3406 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for use as a load switch or in PWM applications.

Features

- V_{DS} (V) = 30V
- I_D = 3.6 A
- $R_{DS(ON)} < 65m\Omega$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 105m\Omega$ ($V_{GS} = 4.5V$)



Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

| Parameter | Symbol | Maximum | Units |
|--|------------------|------------|------------|
| Drain-Source Voltage | V_{DS} | 30 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current ^A | $T_A=25^\circ C$ | 3.6 | A |
| | $T_A=70^\circ C$ | 2.9 | |
| Pulsed Drain Current ^B | I_{DM} | 15 | |
| Power Dissipation ^A | $T_A=25^\circ C$ | 1.4 | W |
| | $T_A=70^\circ C$ | 0.9 | |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 150 | $^\circ C$ |

Thermal Characteristics

| Parameter | Symbol | Typ | Max | Units |
|--|-----------------|--------------|-----|--------------|
| Maximum Junction-to-Ambient ^A | $R_{\theta JA}$ | 70 | 90 | $^\circ C/W$ |
| Maximum Junction-to-Ambient ^A | | Steady-State | 100 | |
| Maximum Junction-to-Lead ^C | $R_{\theta JL}$ | 63 | 80 | $^\circ C/W$ |

Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------------------------|---------------------------------------|--|-----|------|-----|---------------|
| STATIC PARAMETERS | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$ | 30 | | | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=24\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$ | | | 1 | μA |
| | | | | | 5 | |
| I_{GSS} | Gate-Body leakage current | $V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$ | | | 100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$ | 1 | 1.9 | 3 | V |
| $I_{D(ON)}$ | On state drain current | $V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$ | 15 | | | A |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=10\text{V}$, $I_D=3.6\text{A}$ $T_J=125^\circ\text{C}$ | | 50 | 65 | m Ω |
| | | | | 74 | 100 | |
| | | | | 75 | 105 | m Ω |
| g_{FS} | Forward Transconductance | $V_{DS}=5\text{V}$, $I_D=3.6\text{A}$ | | 7 | | S |
| V_{SD} | Diode Forward Voltage | $I_S=1\text{A}$ | | 0.79 | 1 | V |
| I_S | Maximum Body-Diode Continuous Current | | | | 2.5 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C_{iss} | Input Capacitance | $V_{GS}=0\text{V}$, $V_{DS}=15\text{V}$, $f=1\text{MHz}$ | | 288 | | pF |
| C_{oss} | Output Capacitance | | | 57 | | pF |
| C_{riss} | Reverse Transfer Capacitance | | | 39 | | pF |
| R_g | Gate resistance | $V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$ | | 3 | | Ω |
| SWITCHING PARAMETERS | | | | | | |
| $Q_g(10\text{V})$ | Total Gate Charge | $V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $I_D=3.6\text{A}$ | | 6.5 | | nC |
| $Q_g(4.5\text{V})$ | Total Gate Charge | | | 3.1 | | nC |
| Q_{gs} | Gate Source Charge | | | 1.2 | | nC |
| Q_{gd} | Gate Drain Charge | | | 1.6 | | nC |
| $t_{D(on)}$ | Turn-On DelayTime | $V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $R_L=2.2\Omega$, $R_{GEN}=3\Omega$ | | 4.6 | | ns |
| t_r | Turn-On Rise Time | | | 1.9 | | ns |
| $t_{D(off)}$ | Turn-Off DelayTime | | | 20.1 | | ns |
| t_f | Turn-Off Fall Time | | | 2.6 | | ns |
| t_{rr} | Body Diode Reverse Recovery Time | $I_F=3.6\text{A}$, $di/dt=100\text{A}/\mu\text{s}$ | | 10.2 | | ns |
| Q_{rr} | Body Diode Reverse Recovery Charge | $I_F=3.6\text{A}$, $di/dt=100\text{A}/\mu\text{s}$ | | 3.5 | | nC |

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The value in any a given application depends on the user's specific board design. The current rating is based on the $t_s \leq 10\text{s}$ thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

D. The static characteristics in Figures 1 to 6,12,14 are obtained using 80 μs pulses, duty cycle 0.5% max.

E. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The SOA curve provides a single pulse rating.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

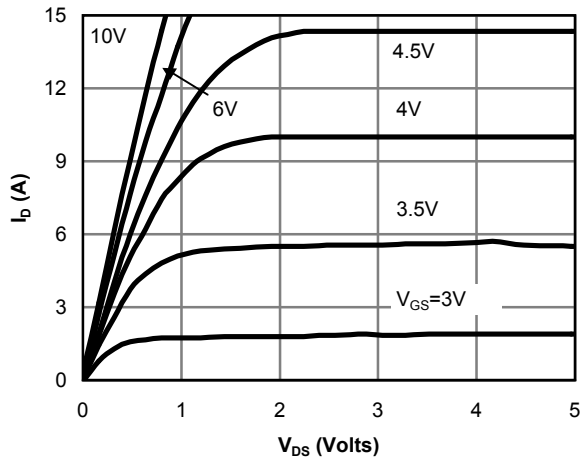


Fig 1: On-Region Characteristics

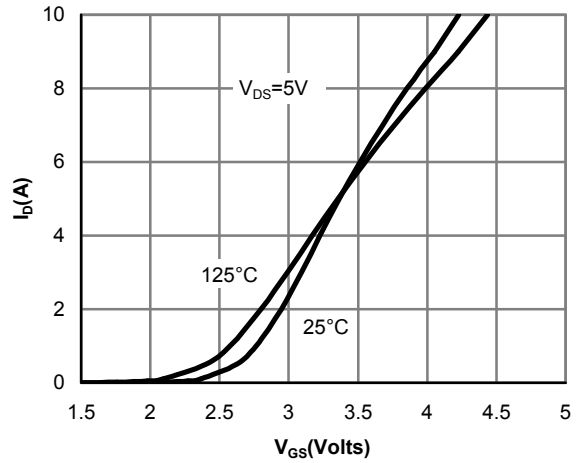


Figure 2: Transfer Characteristics

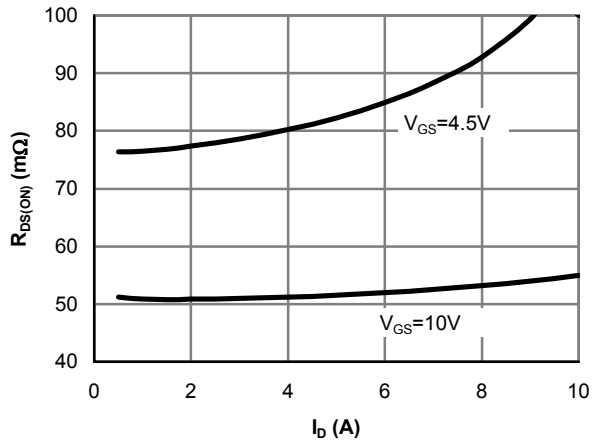


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

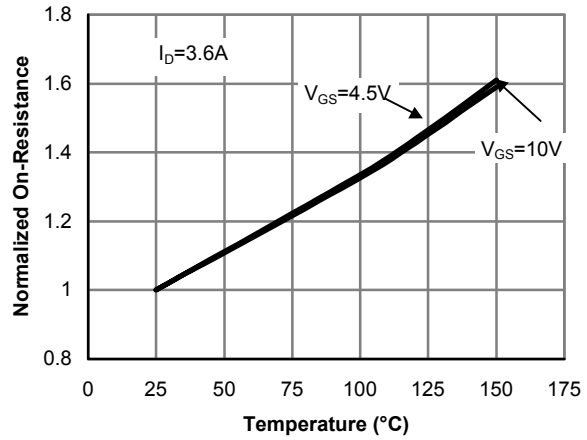


Figure 4: On-Resistance vs. Junction Temperature

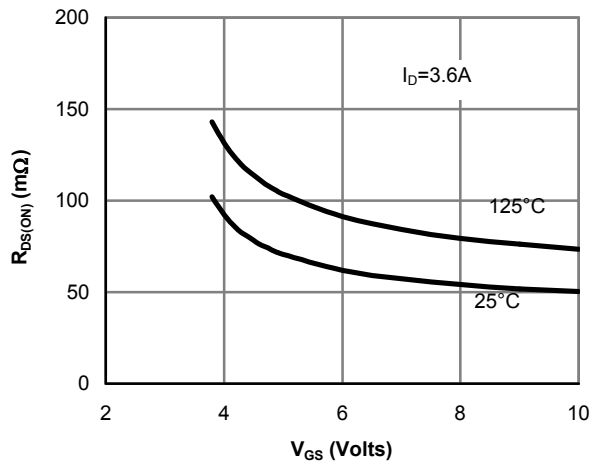


Figure 5: On-Resistance vs. Gate-Source Voltage

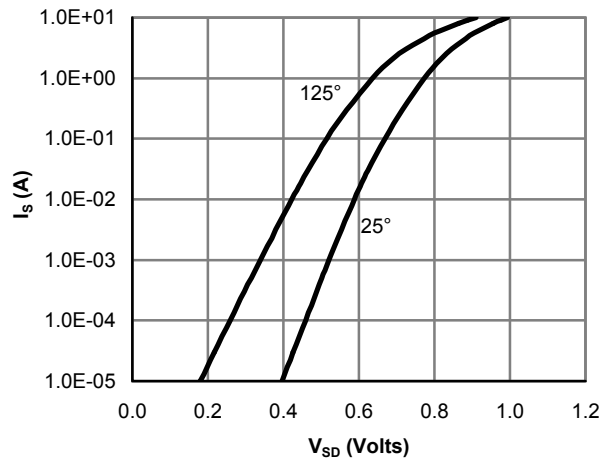


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

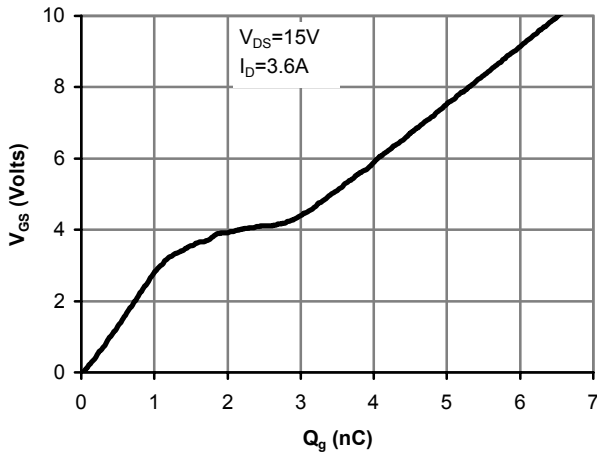


Figure 7: Gate-Charge Characteristics

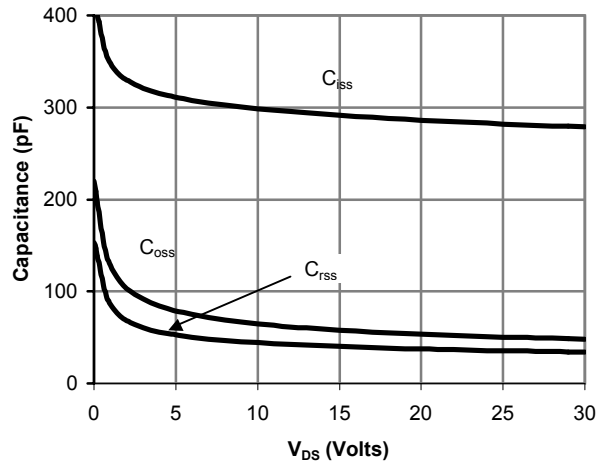


Figure 8: Capacitance Characteristics

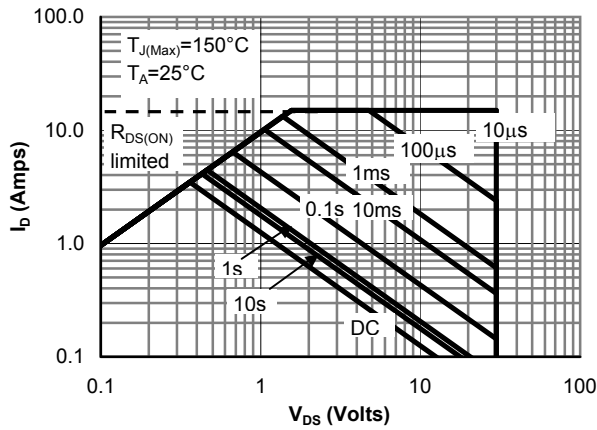


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

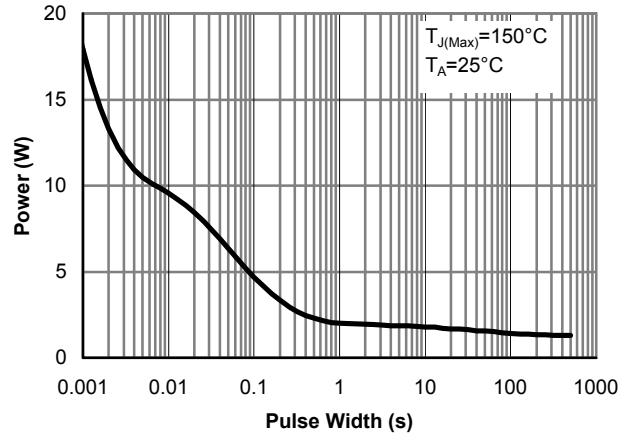


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

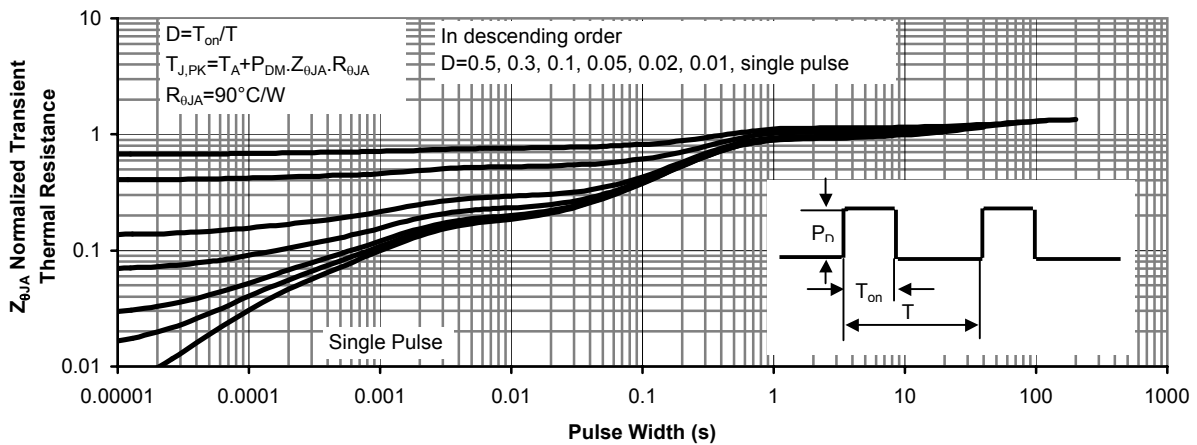
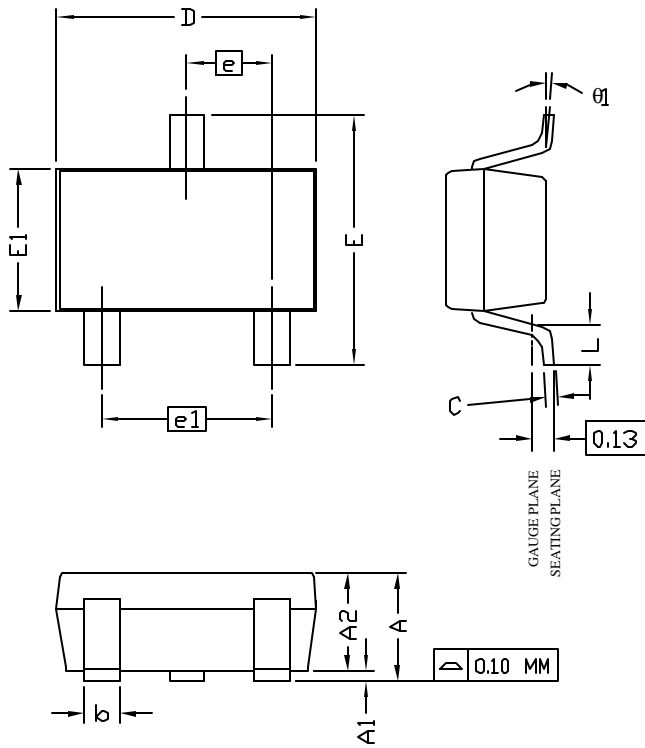


Figure 11: Normalized Maximum Transient Thermal Impedance



ALPHA & OMEGA
SEMICONDUCTOR, INC.

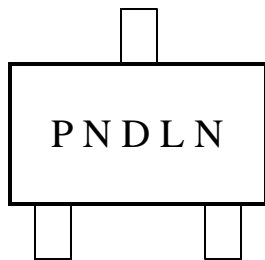
SOT-23 Package Data



| SYMBOLS | DIMENSIONS IN MILLIMETERS | | |
|------------|---------------------------|----------|------|
| | MIN | NOM | MAX |
| A | 1.00 | — | 1.25 |
| A1 | 0.00 | — | 0.10 |
| A2 | 1.00 | 1.10 | 1.15 |
| b | 0.35 | 0.40 | 0.50 |
| C | 0.10 | 0.15 | 0.25 |
| D | 2.80 | 2.90 | 3.04 |
| E | 2.60 | 2.80 | 2.95 |
| E1 | 1.40 | 1.60 | 1.80 |
| e | — | 0.95 BSC | — |
| e1 | — | 1.90 BSC | — |
| L | 0.40 | — | 0.60 |
| $\theta 1$ | 1° | 5° | 8° |

- NOTE:
- LEAD FINISH: 150 MICRONS (3.8 μ m) MIN. THICKNESS OF Tin/Lead (SOLDER) PLATED ON LEAD
 - TOLERANCE ± 0.10 mm (4 mil) UNLESS OTHERWISE SPECIFIED
 - COPLANARITY : 0.10 mm
 - DIMENSION L IS MEASURED IN GAGE PLANE

PACKAGE MARKING DESCRIPTION

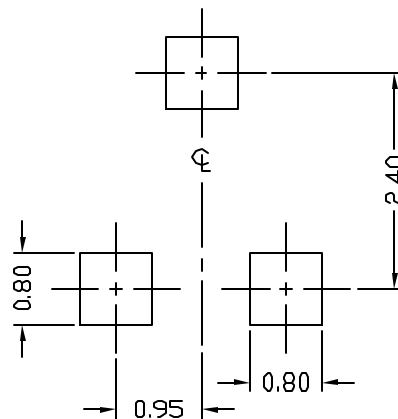


SOT-23 PART NO. CODE

| PART NO. | CODE |
|----------|------|
| AO3406 | A6 |
| | |

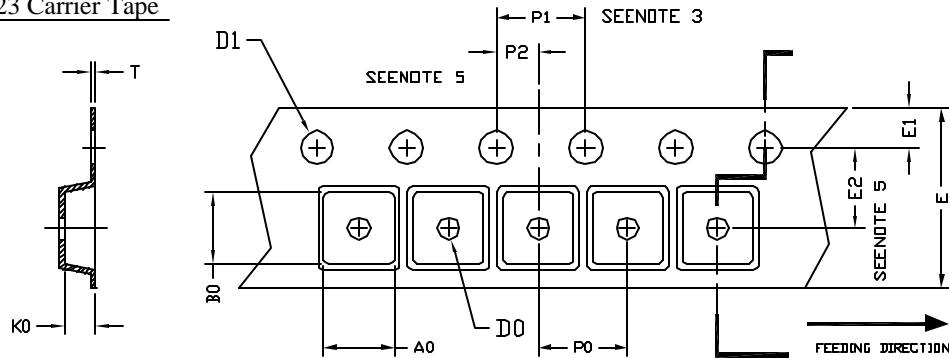
- NOTE:
- P N - PART NUMBER CODE.
 - D - YEAR AND WEEK CODE.
 - L N - ASSEMBLY LOT CODE, FAB AND ASSEMBLY LOCATION CODE.

RECOMMENDATION OF LAND PATTERN





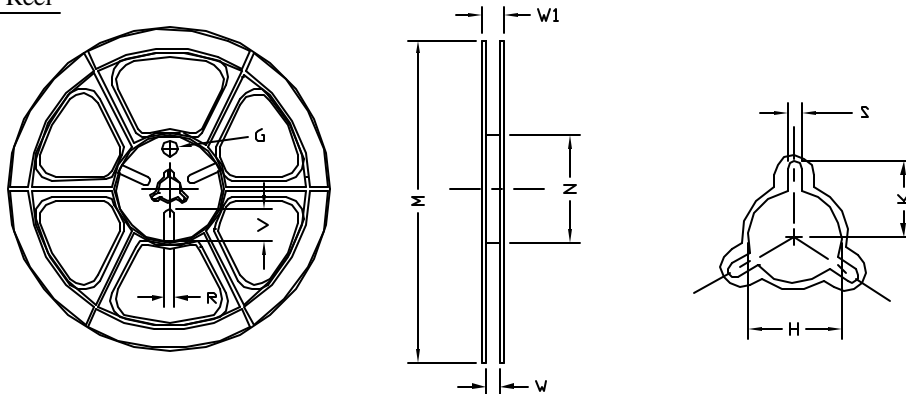
SOT-23 Carrier Tape



UNIT: MM

| PACKAGE | A0 | B0 | K0 | D0 | D1 | E | E1 | E2 | P0 | P1 | P2 | T |
|------------------|---------------|---------------|---------------|-------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| SOT-23 (8 mm) | 3.15 ±0.10 | 3.20 ±0.10 | 1.40 ±0.10 | 1.00 MIN | 1.30 +0.10 | 8.00 ±0.30 | 1.75 ±0.10 | 3.50 ±0.05 | 4.00 ±0.10 | 4.00 ±0.10 | 2.00 ±0.05 | 0.25 ±0.05 |

SOT-23 Reel



UNIT: MM

| TAPE SIZE | REEL SIZE | M | N | W | W1 | H | K | S | G | R | V |
|-----------|-----------|------------------|--------|---------------|----------------|--------------------------|-------|---------------|-------|------|-------|
| 8 mm | φ180 | φ180.00 ±0.50 | φ60.50 | 9.00 ±0.30 | 11.40 ±1.00 | φ13.00 +0.50 -0.20 | 10.60 | 2.00 ±0.50 | φ9.00 | 5.00 | 18.00 |

SOT-23 Tape

Leader / Trailer
& Orientation

