



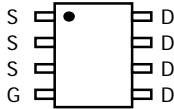
AO4420, AO4420L (Green Product)
N-Channel Enhancement Mode Field Effect Transistor

General Description

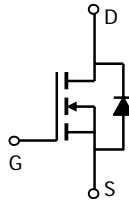
The AO4420 uses advanced trench technology to provide excellent $R_{DS(ON)}$, shoot-through immunity and body diode characteristics. This device is suitable for use as a synchronous switch in PWM applications. AO4420L is offered in a lead-free package. AO4420L (Green Product) is offered in a lead-free package.

Features

- V_{DS} (V) = 30V
- I_D = 13.7A
- $R_{DS(ON)} < 10.5m\Omega$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 12m\Omega$ ($V_{GS} = 4.5V$)



SOIC-8



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

| Parameter | Symbol | Maximum | Units |
|--|----------------|------------------------|------------------|
| Drain-Source Voltage | V_{DS} | 30 | V |
| Gate-Source Voltage | V_{GS} | ± 12 | V |
| Continuous Drain Current ^A | I_D | $T_A=25^\circ\text{C}$ | A |
| | | $T_A=70^\circ\text{C}$ | |
| Pulsed Drain Current ^B | I_{DM} | 60 | |
| Power Dissipation | P_D | $T_A=25^\circ\text{C}$ | W |
| | | $T_A=70^\circ\text{C}$ | |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 150 | $^\circ\text{C}$ |

Thermal Characteristics

| Parameter | Symbol | Typ | Max | Units | |
|--|-----------------|--------------|-----|--------------------|--------------------|
| Maximum Junction-to-Ambient ^A | $R_{\theta JA}$ | $t \leq 10s$ | 28 | 40 | $^\circ\text{C/W}$ |
| | | Steady-State | 54 | 75 | $^\circ\text{C/W}$ |
| Maximum Junction-to-Lead ^C | $R_{\theta JL}$ | 21 | 30 | $^\circ\text{C/W}$ | |

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 | $V_{DS}=24\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$ | | 0.004 | 1 | μA |
| I_{GSS} | Gate-Body leakage current | $V_{DS}=0\text{V}$, $V_{GS}=\pm 12\text{V}$ | | | 100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$ | 0.6 | 1.1 | 2 | V |
| $I_{D(ON)}$ | On state drain current | $V_{GS}=4.5\text{V}$, $V_{DS}=5\text{V}$ | 40 | | | A |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=10\text{V}$, $I_D=13.7\text{A}$ $T_J=125^\circ\text{C}$ | | 8.3 | 10.5 | $\text{m}\Omega$ |
| | | $V_{GS}=4.5\text{V}$, $I_D=12.7\text{A}$ | | 9.7 | 12 | $\text{m}\Omega$ |
| g_{FS} | Forward Transconductance | $V_{DS}=5\text{V}$, $I_D=13.7\text{A}$ | 30 | 37 | | S |
| V_{SD} | Diode Forward Voltage | $I_S=1\text{A}$, $V_{GS}=0\text{V}$ | | 0.76 | 1 | V |
| I_S | Maximum Body-Diode Continuous Current | | | | 5 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C_{iss} | Input Capacitance | $V_{GS}=0\text{V}$, $V_{DS}=15\text{V}$, $f=1\text{MHz}$ | | 3656 | 4050 | pF |
| C_{oss} | Output Capacitance | | | 256 | | pF |
| C_{rss} | Reverse Transfer Capacitance | | | 168 | | pF |
| R_g | Gate resistance | $V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$ | | 0.86 | 1.1 | Ω |
| SWITCHING PARAMETERS | | | | | | |
| $Q_g(4.5\text{V})$ | Total Gate Charge | $V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $I_D=13.7\text{A}$ | | 30.5 | 36 | nC |
| Q_{gs} | Gate Source Charge | | | 4.6 | | nC |
| Q_{gd} | Gate Drain Charge | | | 8.6 | | nC |
| $t_{D(on)}$ | Turn-On Delay Time | $V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $R_L=1.1\Omega$, $R_{GEN}=0\Omega$ | | 5.5 | 9 | ns |
| t_r | Turn-On Rise Time | | | 3.4 | 7 | ns |
| $t_{D(off)}$ | Turn-Off Delay Time | | | 49.8 | 75 | ns |
| t_f | Turn-Off Fall Time | | | 5.9 | 11 | ns |
| t_{rr} | Body Diode Reverse Recovery Time | $I_F=13.7\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$ | | 22.5 | 28 | ns |
| Q_{rr} | Body Diode Reverse Recovery Charge | $I_F=13.7\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$ | | 12.5 | 16 | nC |

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in² 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 $t \leq 10\text{s}$ 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 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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

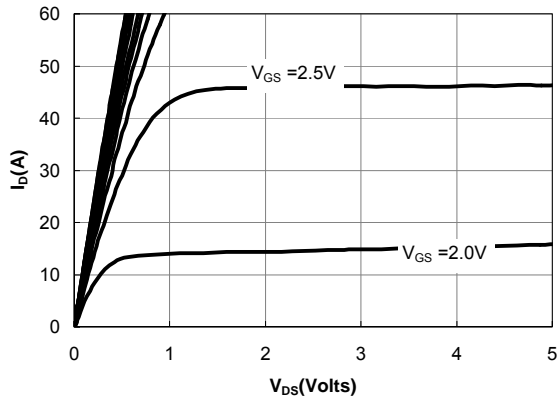


Figure 1: On-Regions Characteristics

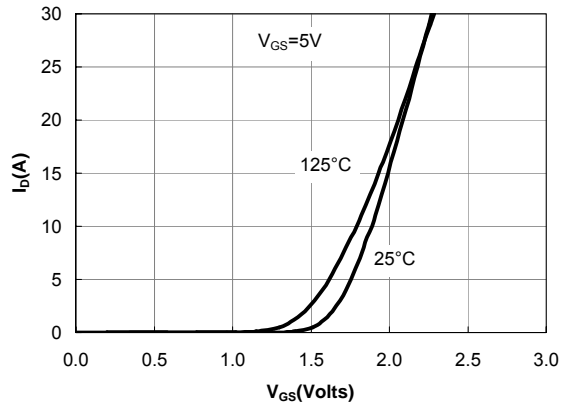


Figure 2: Transfer Characteristics

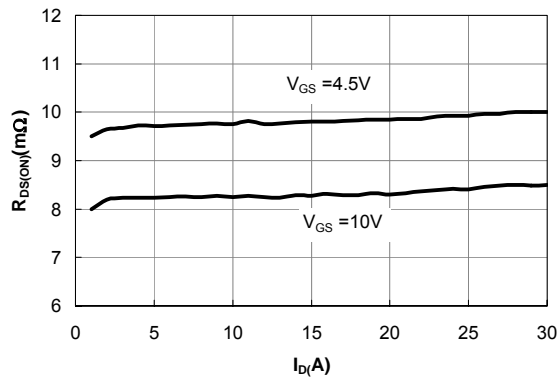


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

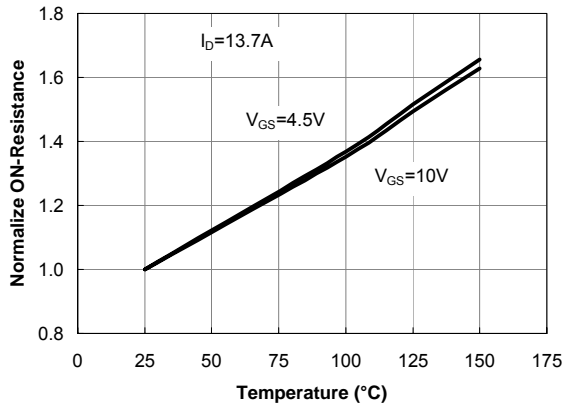


Figure 4: On-Resistance vs. Junction Temperature

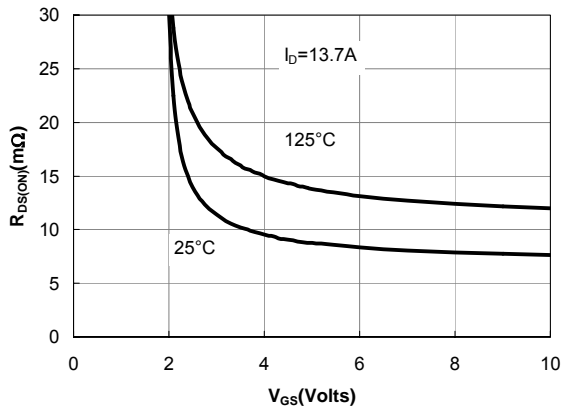


Figure 5: On-Resistance vs. Gate-Source Voltage

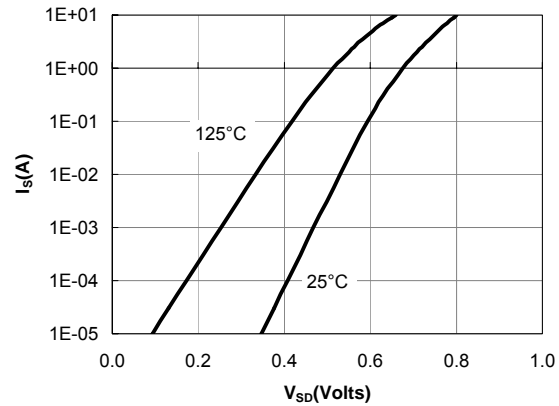


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

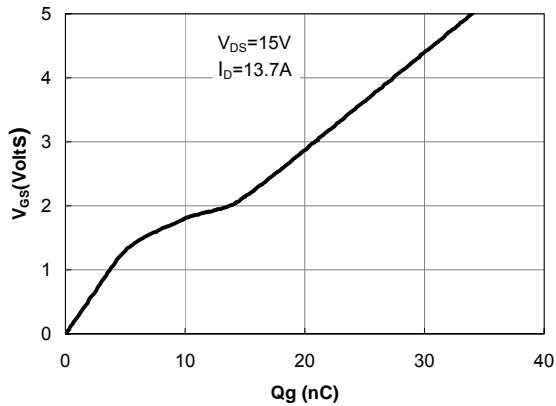


Figure 7: Gate-Charge Characteristics

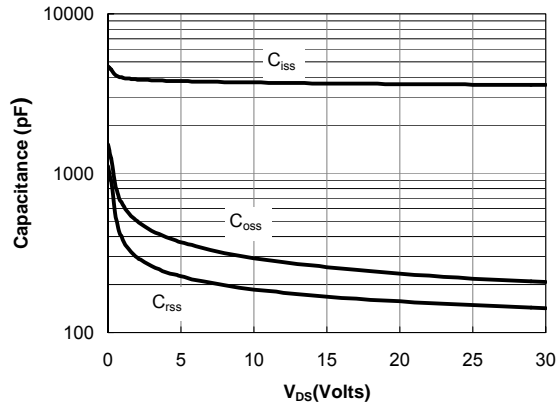


Figure 8: Capacitance Characteristics

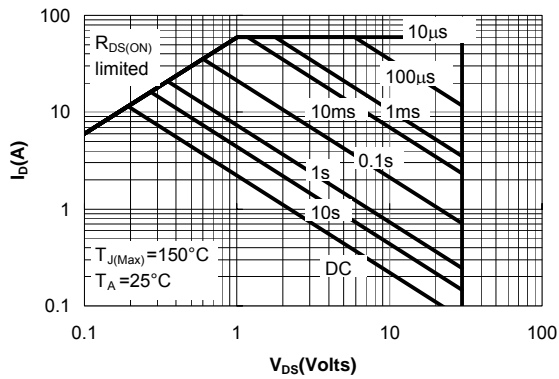


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

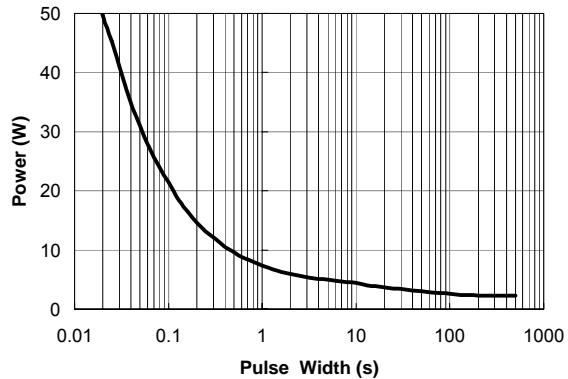


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

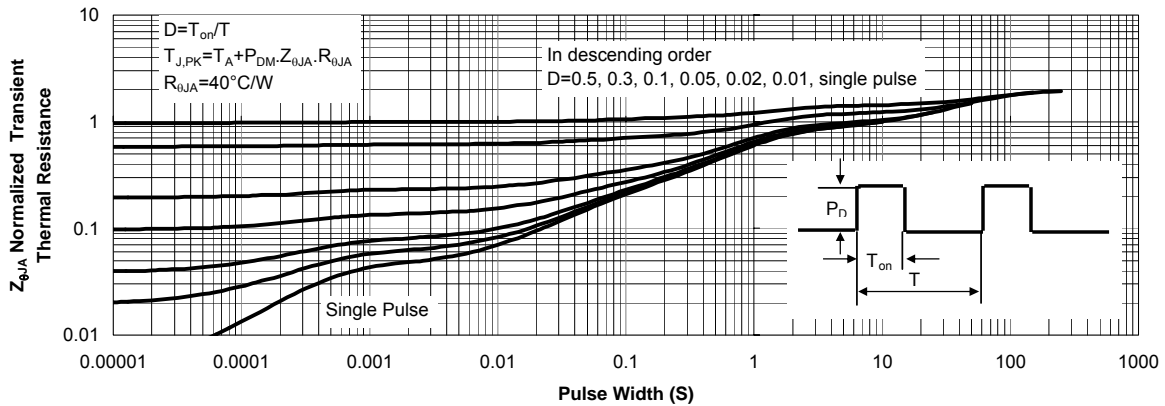


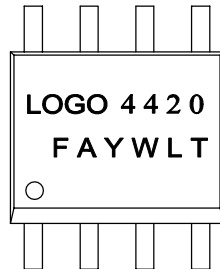
Figure 11: Normalized Maximum Transient Thermal Impedance



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| | |
|--------------|----------------------------|
| Document No. | PD-00139 |
| Version | rev C |
| Title | AO4420 Marking Description |

SO-8 PACKAGE MARKING DESCRIPTION



Standard product

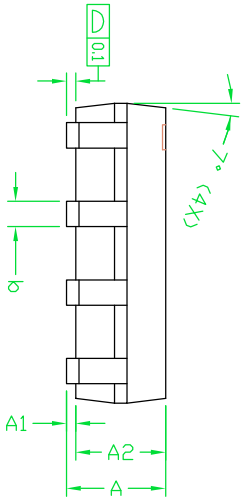
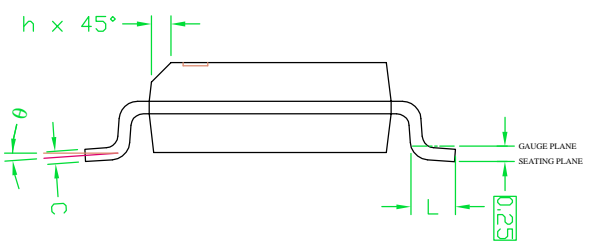
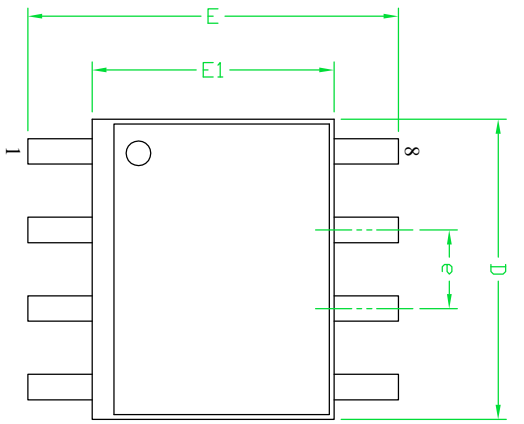


Green product

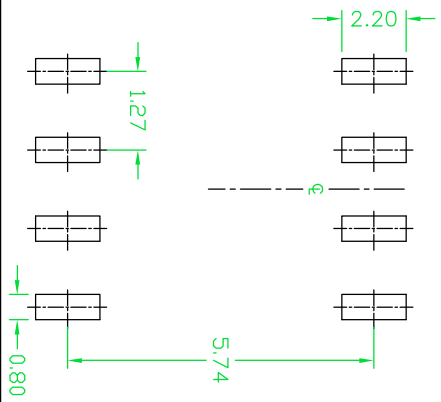
NOTE:

LOGO - AOS LOGO
4420 - PART NUMBER CODE.
F&A - FOUNDRY AND ASSEMBLY LOCATION
Y - YEAR CODE
W - WEEK CODE.
L T - ASSEMBLY LOT CODE

| PART NO. | DESCRIPTION | CODE |
|----------|------------------|-------------|
| AO4420 | Standard product | 4420 |
| AO4420L | Green product | <u>4420</u> |



RECOMMENDED LAND PATTERN



- NOTE**
1. ALL DIMENSIONS ARE IN MILLIMETERS.
 2. DIMENSIONS ARE INCLUSIVE OF PLATING.
 3. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
 4. DIMENSION L IS MEASURED IN GAUGE PLANE.
 5. CONTROLLING DIMENSION IS MILLIMETER, CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

| SYMBOLS | DIMENSIONS IN MILLIMETERS | | | DIMENSIONS IN INCHES | | |
|---------|---------------------------|------|------|----------------------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 1.35 | 1.65 | 1.75 | 0.053 | 0.065 | 0.069 |
| A1 | 0.10 | — | 0.25 | 0.004 | — | 0.010 |
| A2 | 1.25 | 1.50 | 1.65 | 0.049 | 0.059 | 0.065 |
| b | 0.31 | — | 0.51 | 0.012 | — | 0.020 |
| c | 0.17 | — | 0.25 | 0.007 | — | 0.010 |
| D | 4.80 | 4.90 | 5.00 | 0.189 | 0.193 | 0.197 |
| E1 | 3.80 | 3.90 | 4.00 | 0.150 | 0.154 | 0.157 |
| e | 1.27 BSC | | | 0.050 BSC | | |
| E | 5.80 | 6.00 | 6.20 | 0.228 | 0.236 | 0.244 |
| h | 0.25 | — | 0.50 | 0.010 | — | 0.020 |
| L | 0.40 | — | 1.27 | 0.016 | — | 0.050 |
| θ | 0° | — | 8° | 0° | — | 8° |

UNIT: mm

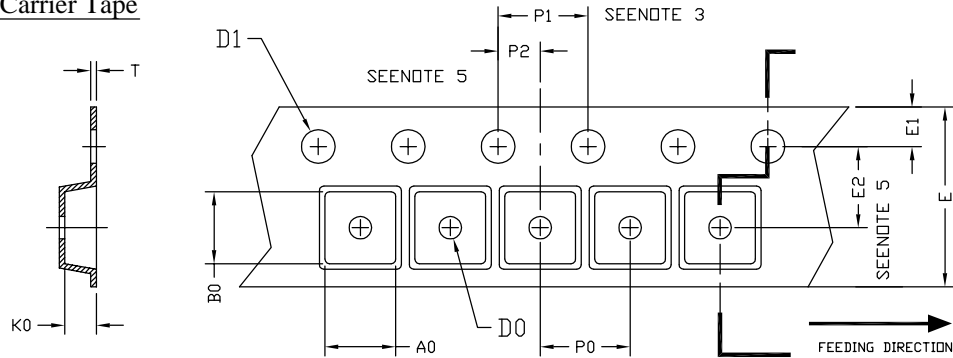
| | | |
|--|-------------------------------|--|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES DECIMAL XX ± XXX ± XXXX ± INTERPRET DIM AND TOL PER ASME Y14.5M - 1994 PRINTING IS SCALED TO FIT DO NOT SCALE DRAWING | THIRD ANGLE PROJECTION | |
| | | |



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SO-8 Tape and Reel Data

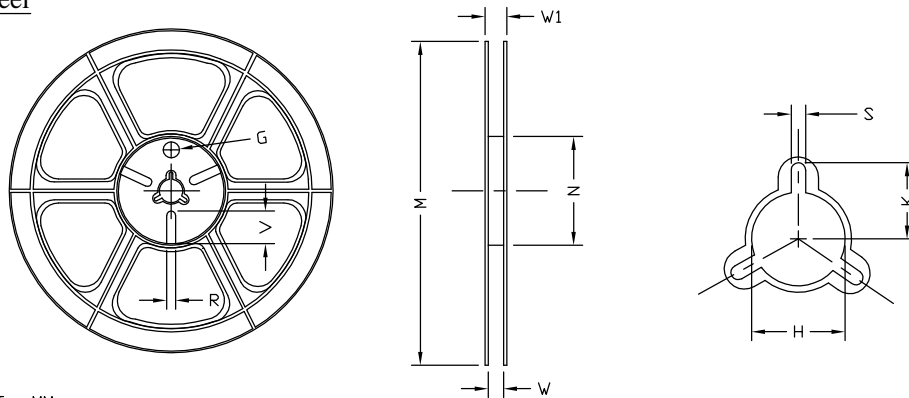
SO-8 Carrier Tape



UNIT: MM

| PACKAGE | A0 | B0 | K0 | D0 | D1 | E | E1 | E2 | P0 | P1 | P2 | T |
|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|---------------|---------------|---------------|---------------|---------------|---------------|
| SD-8 (12 mm) | 6.40 ±0.10 | 5.20 ±0.10 | 2.10 ±0.10 | 1.60 ±0.10 | 1.50 +0.10 | 12.00 ±0.30 | 1.75 ±0.10 | 5.50 ±0.05 | 8.00 ±0.10 | 4.00 ±0.10 | 2.00 ±0.05 | 0.25 ±0.05 |

SO-8 Reel



UNIT: MM

| TAPE SIZE | REEL SIZE | M | N | W | W1 | H | K | S | G | R | V |
|-----------|-----------|------------------|-----------------|----------------|----------------|--------------------------|-------|---------------|-----|-----|-----|
| 12 mm | ø330 | ø330.00 ±0.50 | ø97.00 ±0.10 | 13.00 ±0.30 | 17.40 ±1.00 | ø13.00 +0.50 -0.20 | 10.60 | 2.00 ±0.50 | --- | --- | --- |

SO-8 Tape

Leader / Trailer
& Orientation

