



**ALPHA & OMEGA**  
SEMICONDUCTOR, LTD.

Rev 2: Aug 2004

**AO7403, AO7403L ( Green Product )**  
**P-Channel Enhancement Mode Field Effect Transistor**

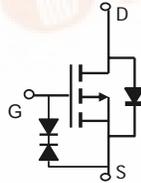
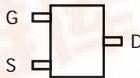
**General Description**

The AO7403 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge, and operation with gate voltages as low as 1.8V, in the small SOT323 footprint. It can be used for a wide variety of applications, including load switching, low current inverters and low current DC-DC converters. It is ESD protected to 2KV HBM. AO7403L (Green Product) is offered in a lead-free package.

**Features**

- $V_{DS} (V) = -20V$
- $I_D = -0.7A$
- $R_{DS(ON)} < 470m\Omega (V_{GS} = -4.5V)$
- $R_{DS(ON)} < 625m\Omega (V_{GS} = -2.5V)$
- $R_{DS(ON)} < 900m\Omega (V_{GS} = -1.8V)$

SC-70  
(SOT-323)  
Top View



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	V
Continuous Drain Current <sup>A</sup>	$T_A=25^\circ C$	-0.7	A
	$T_A=70^\circ C$	-0.5	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	-3	
Power Dissipation <sup>A</sup>	$T_A=25^\circ C$	0.35	W
	$T_A=70^\circ C$	0.22	
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 <sup>A</sup>	$R_{\theta JA}$	300	360	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	350	425
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	280	320	$^\circ C/W$



**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =-250μA, V <sub>GS</sub> =0V	-20			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			-1 -5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±8V			±10	μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-0.5	-0.6	-0.9	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-5V	-3			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-0.7A T <sub>J</sub> =125°C		388	470	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-0.6A		519	625	mΩ
		V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-0.5A		666	900	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-0.7A		1.7		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =-0.5A, V <sub>GS</sub> =0V		-0.86	-1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				-0.4	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-10V, f=1MHz		114		pF
C <sub>oss</sub>	Output Capacitance			17		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			14		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		12		Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-10V, I <sub>D</sub> =-0.7A		1.44		nC
Q <sub>gs</sub>	Gate Source Charge			0.14		nC
Q <sub>gd</sub>	Gate Drain Charge			0.35		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-10V, R <sub>L</sub> =14.3Ω, R <sub>GEN</sub> =3Ω		6.5		ns
t <sub>r</sub>	Turn-On Rise Time			6.5		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			18.2		ns
t <sub>f</sub>	Turn-Off Fall Time			5.5		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =-0.7A, dI/dt=100A/μs		10		ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =-0.7A, dI/dt=100A/μs		3		nC

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The value in any a given application depends on the user's specific board design. The current rating is based on the t<sub>s</sub> ≤ 10s thermal resistance rating.

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

C. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> and lead to ambient.

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

E. These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

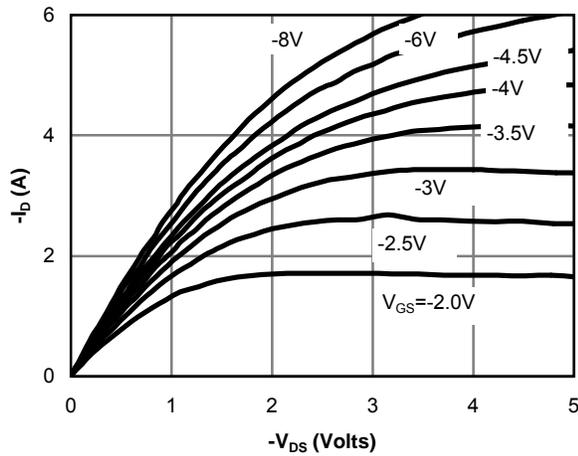


Fig 1: On-Region Characteristics

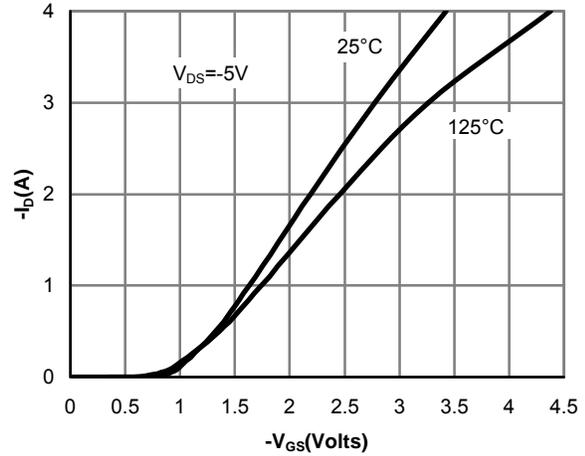


Figure 2: Transfer Characteristics

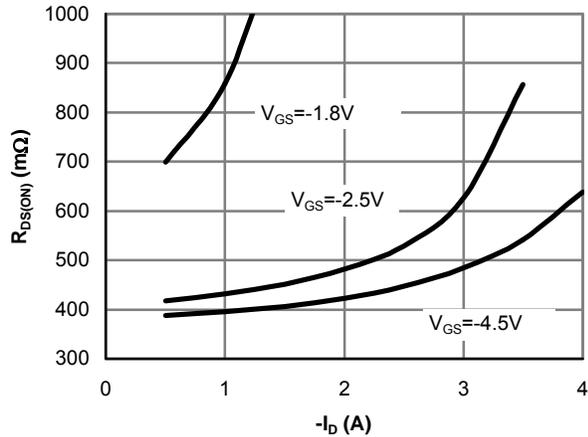


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

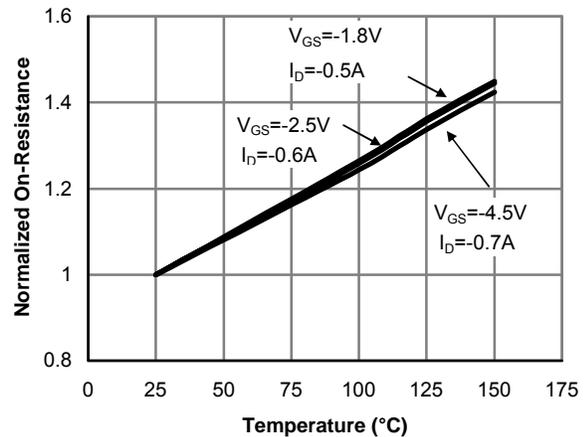


Figure 4: On-Resistance vs. Junction Temperature

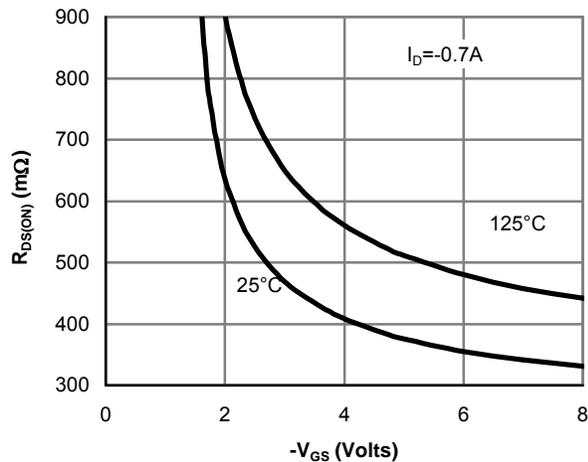


Figure 5: On-Resistance vs. Gate-Source Voltage

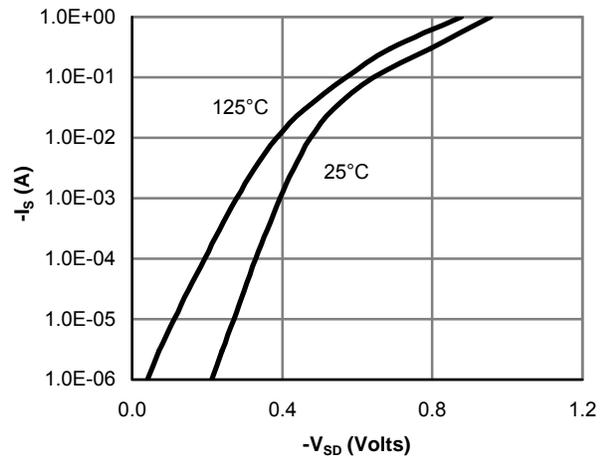
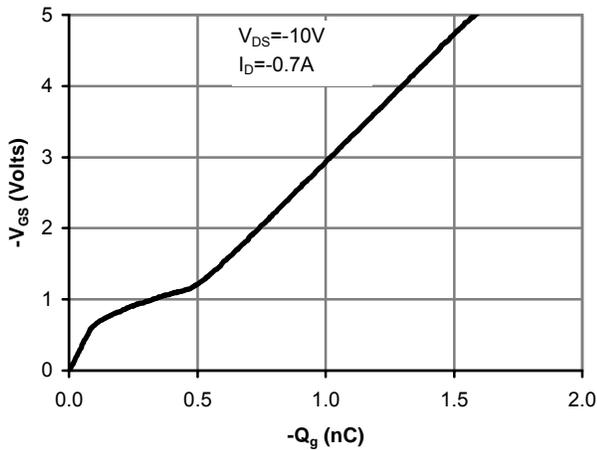
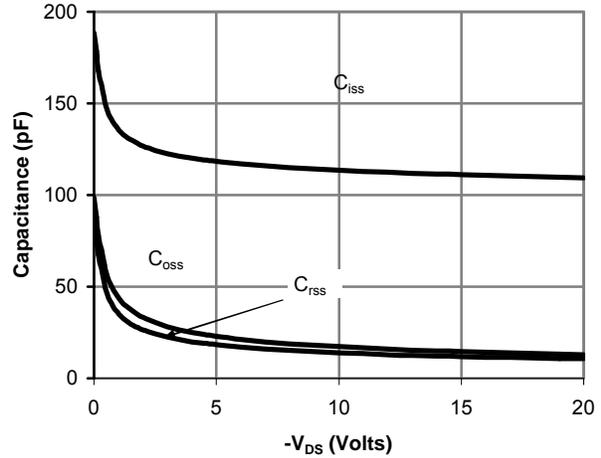


Figure 6: Body-Diode Characteristics

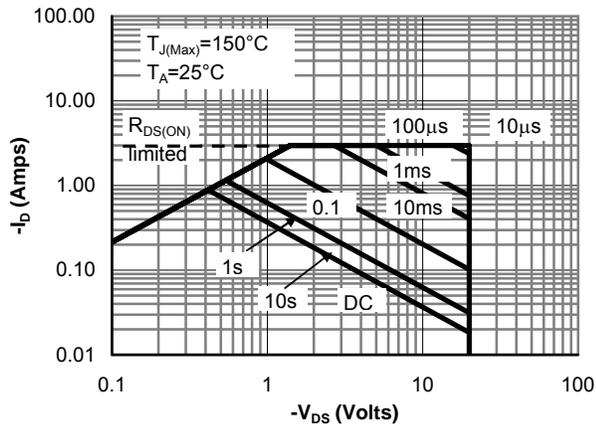
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



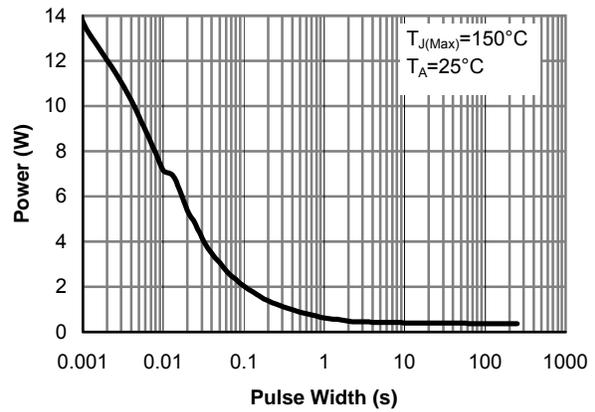
**Figure 7: Gate-Charge Characteristics**



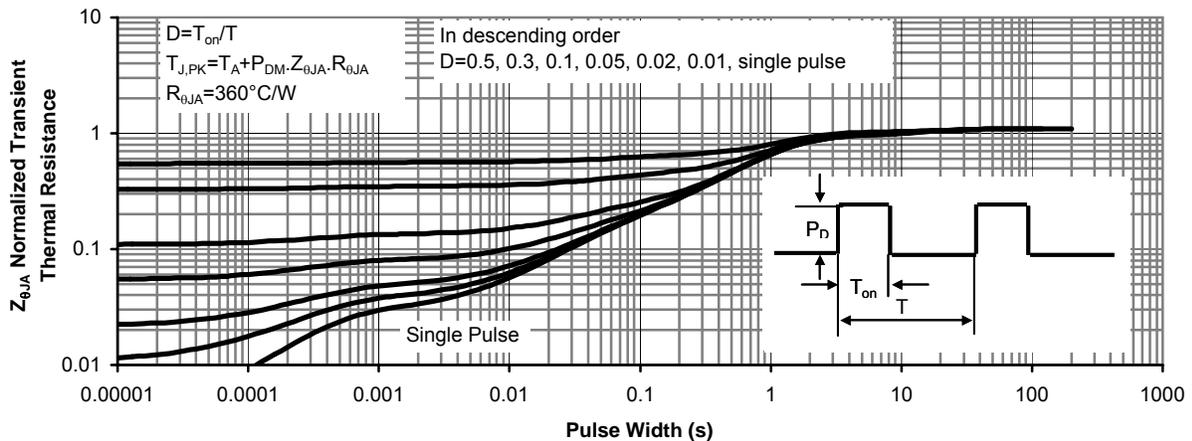
**Figure 8: Capacitance Characteristics**



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



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



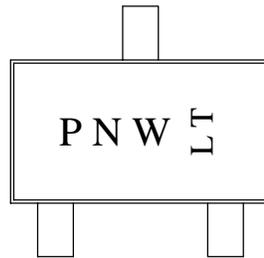
**Figure 11: Normalized Maximum Transient Thermal Impedance**



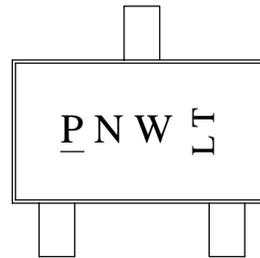
**ALPHA & OMEGA**  
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Version	rev C
Title	AO7403 Marking Description

SC-70(3L) PACKAGE MARKING DESCRIPTION



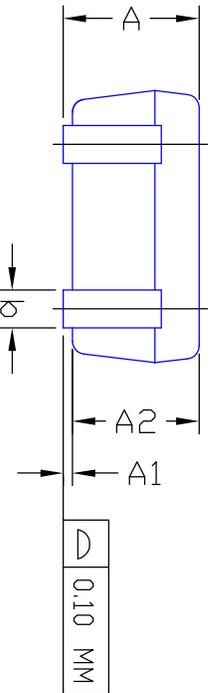
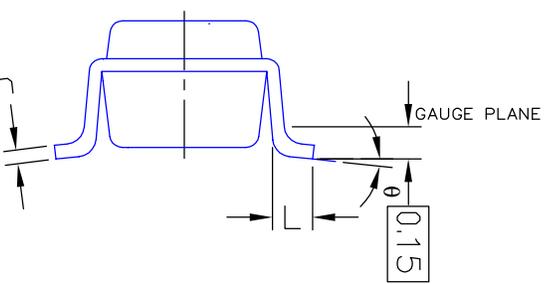
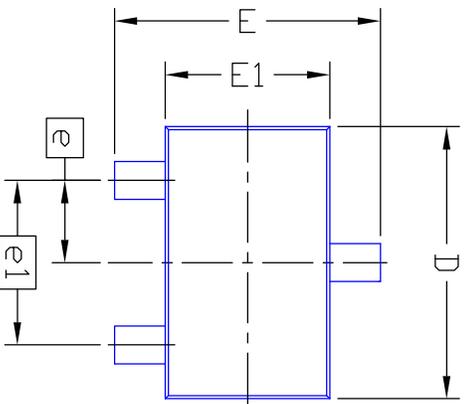
Standard product



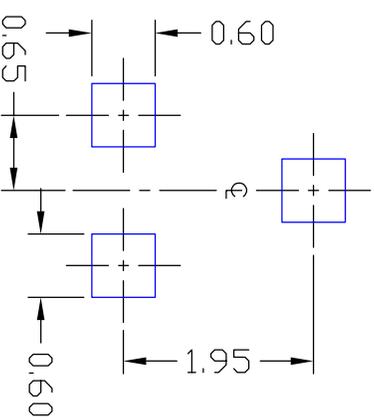
Green product

NOTE:  
P - Product number code  
N - Assembly&Foundry location code  
W - Year and Week code  
LT - Assembly lot code.

PART NO.	DESCRIPTION	CODE (P&N)
AO7403	Standard product	3&N
AO7403L	Green product	<u>3</u> &N



RECOMMENDATION OF 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. DIE IS FACING UP FOR MOLD AND FACING DOWN FOR TRIM/FORM. ie: REVERSE TRIM/FORM.
  5. DIMENSION L IS MEASURED IN GAUGE PLANE.
  6. CONTROLLING DIMENSION IS MILLIMETER. CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

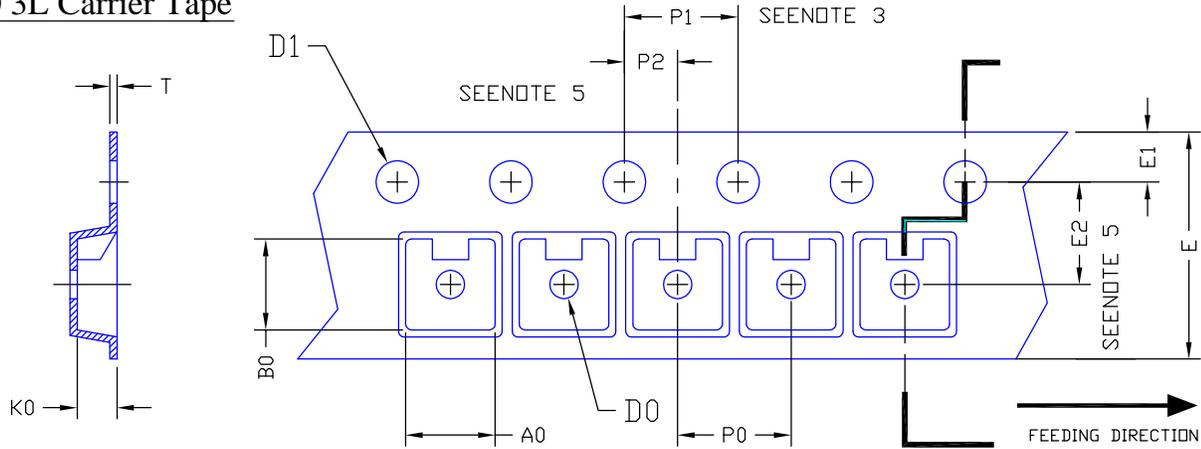
SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	---	---	1.10	---	---	0.043
A1	0.00	---	0.10	0.00	---	0.004
A2	0.7	0.9	1.00	0.028	0.035	0.039
b	0.15	---	0.30	0.006	---	0.012
c	0.08	---	0.22	0.003	---	0.009
D	1.85	2.10	2.15	0.073	0.083	0.085
E	1.80	2.30	2.40	0.071	0.091	0.094
e	0.65 BSC			0.026 BSC		
e1	1.30 BSC			0.051 BSC		
E1	1.1	1.30	1.4	0.043	0.051	0.055
L	0.26	0.36	0.46	0.010	0.014	0.018
theta	0°	4°	8°	0°	4°	8°

UNIT: mm

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES DECIMAL X.X ± X.XX ± X.XXX ± INTERPRET DIM AND TOL PER ASME Y14.5M - 1994 PRINTING IS SCALED TO FIT DO NOT SCALE DRAWING	THIRD ANGLE PROJECTION 	 <b>ALPHA &amp; OMEGA</b> SEMICONDUCTOR, LTD.
	Document No. PD-00012 Version rev C Title SC-70-3L PACKAGE OUTLINE	



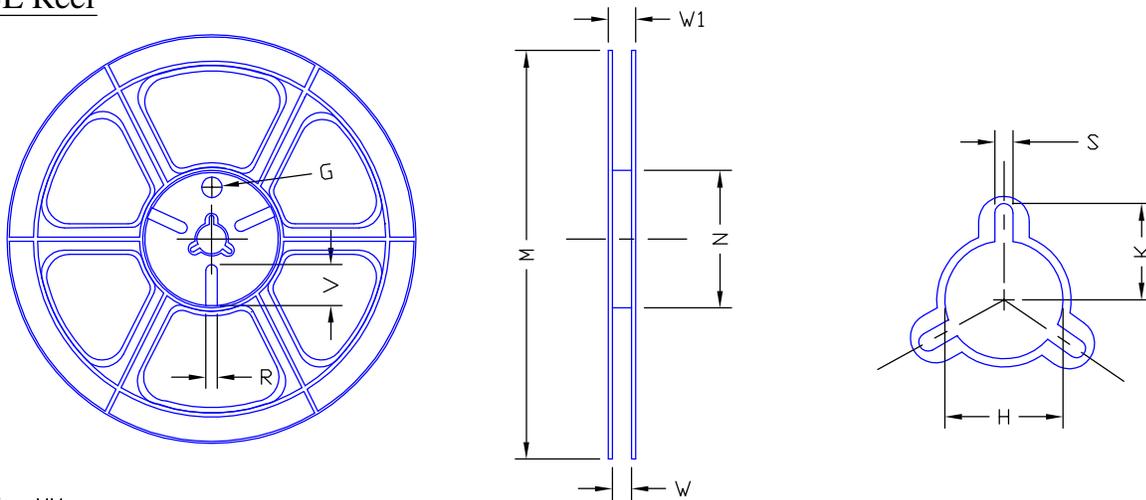
**SC-70 3L Carrier Tape**



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
SOT-23 (8 mm)	2.40 ±0.10	2.40 ±0.10	1.19 ±0.10	1.00 MIN	1.55 ±0.05	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

**SC-70 3L Reel**



UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W	W1	H	K	S	G	R	V
8 mm	∅180	∅180.00 ±0.50	∅60.50	9.00 ±0.30	11.40 ±1.00	∅13.00 +0.50 -0.20	10.60	2.00 ±0.50	∅9.00	5.00	18.00

**SC-70 3L Tape**

Leader / Trailer  
& Orientation

