ALPHA & OMEGA SEMICONDUCTOR

AO7411
P-Channel Enhancement Mode Field Effect Transistor

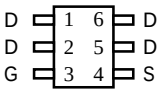
General Description

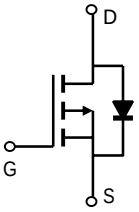
The AO7411 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications. *Standard Product AO7411 is Pb-free (meets ROHS & Sony 259 specifications). AO7411L is a Green Product ordering option. AO7411 and AO7411L are electrically identical.*

Features

V_{DS} (V) = -20V
I_D = -1.8 A (V_{GS} = -4.5V)
$R_{DS(ON)}$ < 120mΩ (V_{GS} = -4.5V)
$R_{DS(ON)}$ < 150mΩ (V_{GS} = -2.5V)
$R_{DS(ON)}$ < 200mΩ (V_{GS} = -1.8V)

SC-70-6
(SOT 323)
Top View





Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-20	V
Gate-Source Voltage		V_{GS}	±8	V
Continuous Drain Current [A]	T_A=25°C	I_D	-1.8	A
	T_A=70°C		-1.5	
Pulsed Drain Current [B]		I_{DM}	-10	
Power Dissipation [A]	T_A=25°C	P_D	0.625	W
	T_A=70°C		0.4	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	160	200	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		180	220	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	130	160	°C/W

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=-250µA, V_{GS}=0V	-20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-16V, V_{GS}=0V			-1	µA
		T_J=55°C			-5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±8V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=-250µA	-0.4	-0.55	-0.8	V
$I_{D(ON)}$	On state drain current	V_{GS}=-4.5V, V_{DS}=-5V	-10			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-4.5V, I_D=-1.8A		95	120	mΩ
		T_J=125°C		129	160	
		V_{GS}=-2.5V, I_D=-1.6A		121	150	mΩ
		V_{GS}=-1.8V, I_D=-1.0A		155	200	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-1.8A	4	7		S
V_{SD}	Diode Forward Voltage	I_S=-1A,V_{GS}=0V		-0.83	-1	V
I_S	Maximum Body-Diode Continuous Current				-0.6	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-10V, f=1MHz		524		pF
C_{oss}	Output Capacitance			93		pF
C_{rss}	Reverse Transfer Capacitance			73		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		12		Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=-4.5V, V_{DS}=-10V, I_D=-1.8A		6.24		nC
Q_{gs}	Gate Source Charge			0.52		nC
Q_{gd}	Gate Drain Charge			1.84		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-4.5V, V_{DS}=-10V, R_L=5.6Ω, R_{GEN}=3Ω		10.5		ns
t_r	Turn-On Rise Time			11.8		ns
$t_{D(off)}$	Turn-Off DelayTime			54.5		ns
t_f	Turn-Off Fall Time			24.7		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-1.8A, dI/dt=100A/µs		24.7		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-1.8A, dI/dt=100A/µs		8.2		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =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≤ 10s thermal resistance rating.

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

C. The $R_{\theta JA}$ is the sum of the thermal impedence 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 80µs pulses, duty cycle 0.5% max.

E. These tests are performed with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating. Rev3: August 2005

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

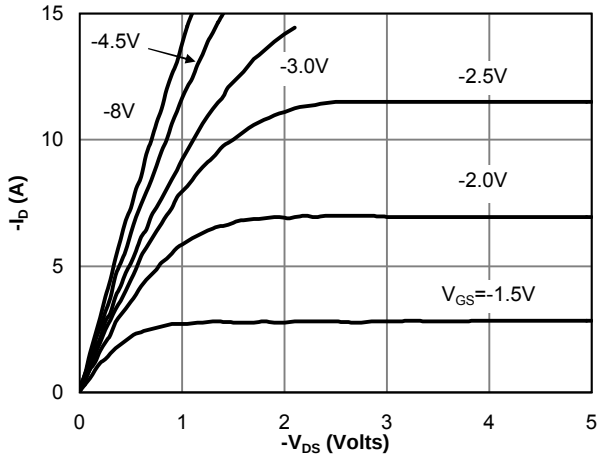


Fig 1: On-Region Characteristics

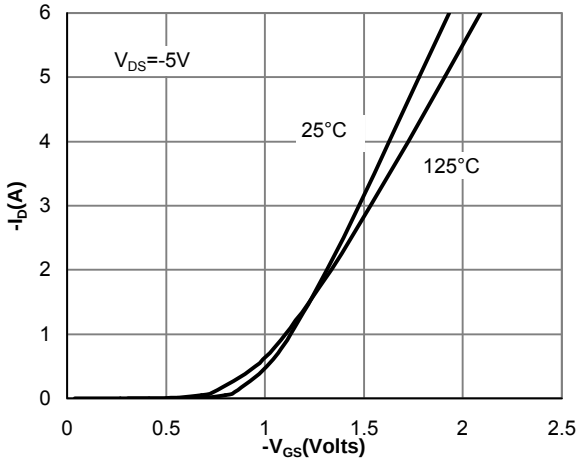


Figure 2: Transfer Characteristics

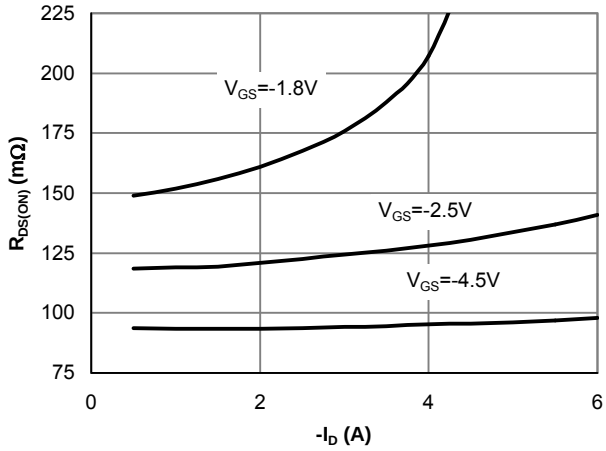


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

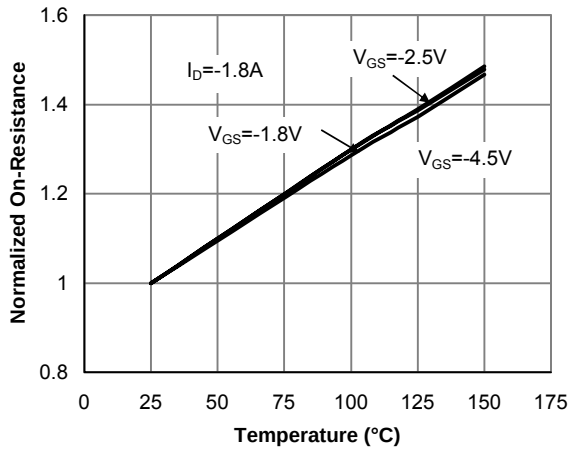


Figure 4: On-Resistance vs. Junction Temperature

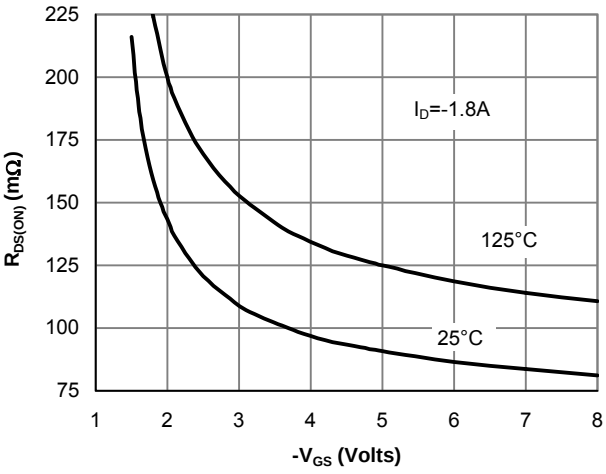


Figure 5: On-Resistance vs. Gate-Source Voltage

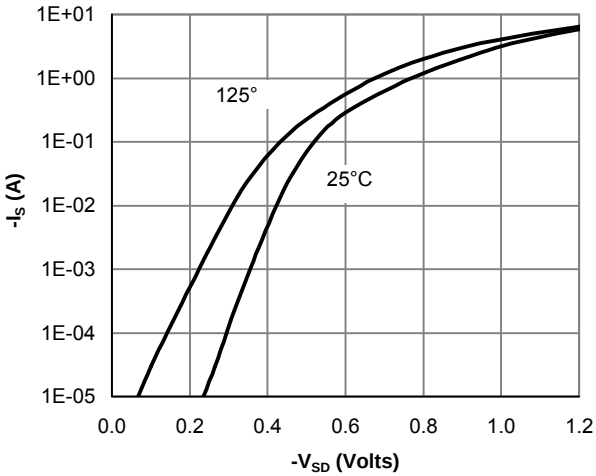


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

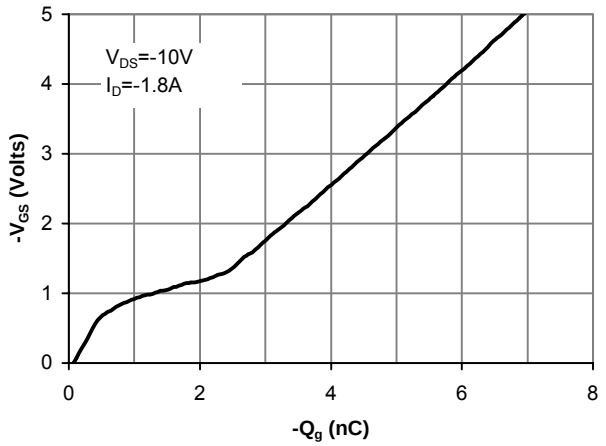


Figure 7: Gate-Charge Characteristics

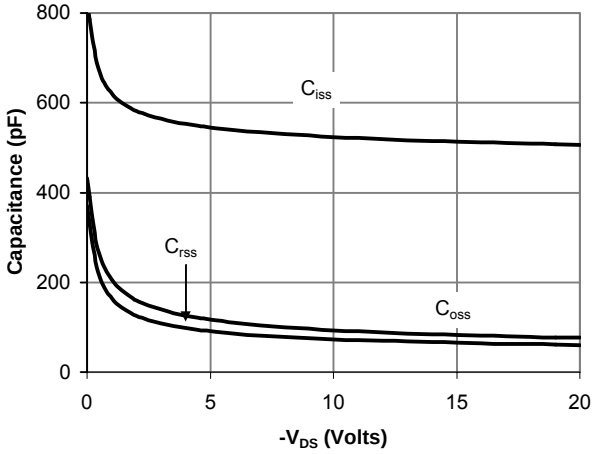


Figure 8: Capacitance Characteristics

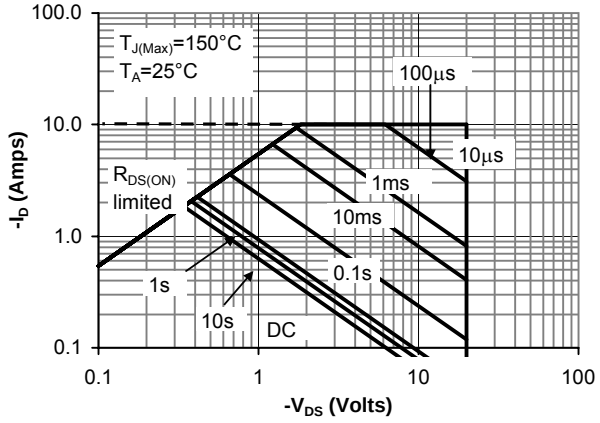


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

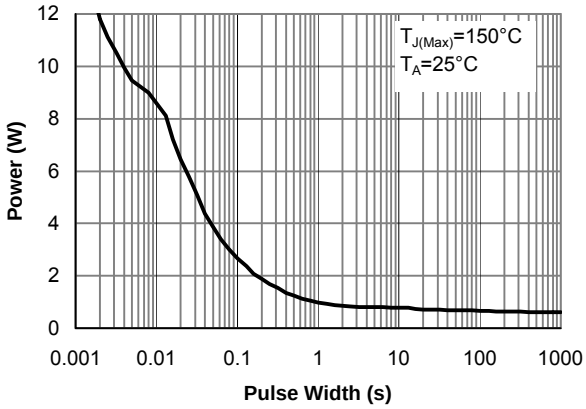


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

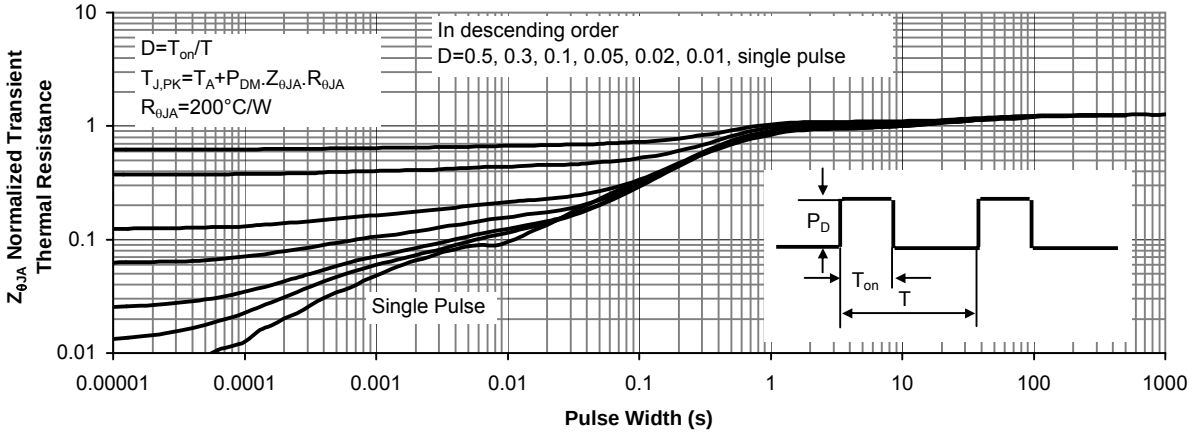
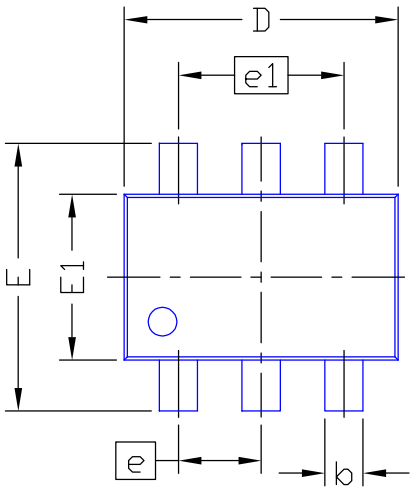
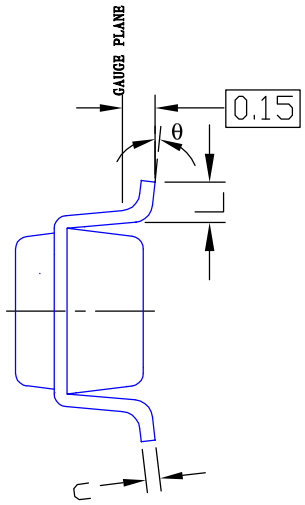
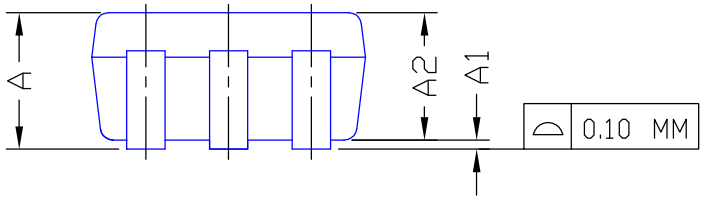


Figure 11: Normalized Maximum Transient Thermal Impedance



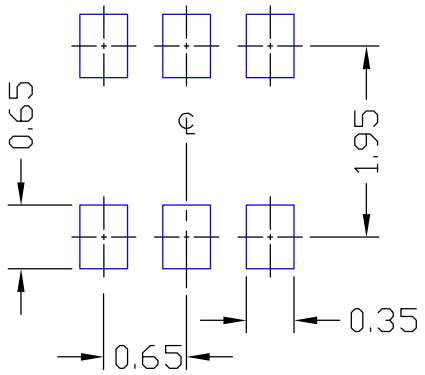




NOTE
1.ALL DIMENSIONS ARE IN MILLMETERS.
2.DIMENSIONS ARE INCLUSIVE OF PLATING.
3.PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
4.DIE IS FACING UP FOR MOLD AND FACING DOWN FOR TRIM/FORM .ie:REVERSE TRIM/FORM.
5. DIMENSION L IS MEASURED IN GAUGE PLANE.
6. CONTROLLING DIMENSION IS MILLIMETER. CONVERTED 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
θ	0°	4°	8°	0°	4°	8°

RECOMMENDATION OF LAND PATTERN



UNIT: mm

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
DECIMAL ANGULAR
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

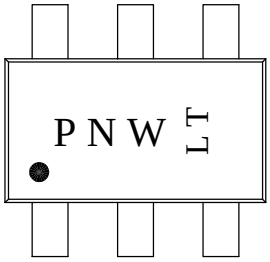
ALPHA & OMEGA SEMICONDUCTOR, LTD.

Document No.	PD-00011
Version	rev C
Title	SC-70-6L PACKAGE OUTLINE

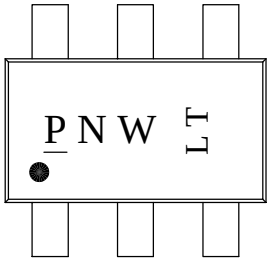
Document No.	PD-00353
Version	rev A
Title	AO7411 Marking Description

ALPHA & OMEGA SEMICONDUCTOR, LTD.

SC-70(6L) PACKAGE MARKING DESCRIPTION



Standard product



Green product

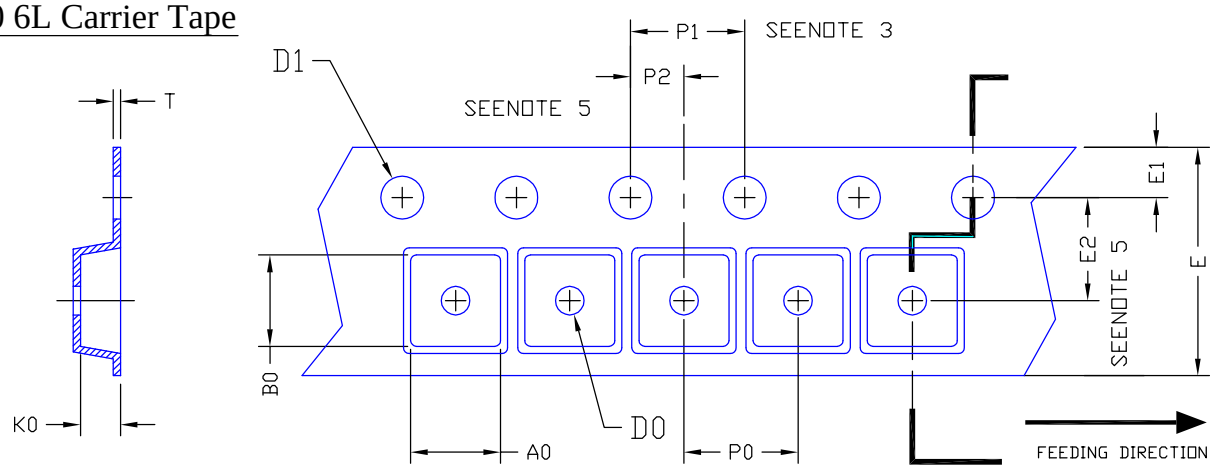
NOTE:
P - Product number code
N - Assembly&Foundry location code
W - Year and Week code
LT - Assembly lot code.

PART NO.	DESCRIPTION	CODE (P&N)
AO7411	Standard product	Y&N
AO7411L	Green product	Y&N

ALPHA & OMEGA
SEMICONDUCTOR, LTD.

SC-70 6L Tape and Reel Data

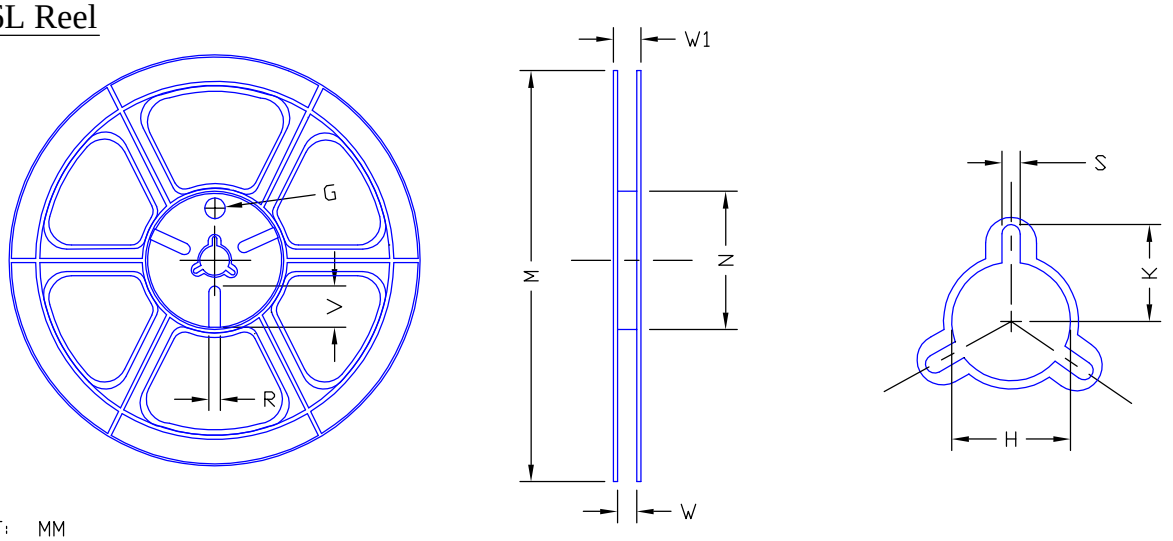
SC-70 6L Carrier Tape



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
SC-70, 6L (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 6L Reel



UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W	W1	H	K	S	G	R	V
8 mm	ø180	ø180.00 ±0.50	ø60.50	9.00 ±0.30	11.40 ±1.00	ø13.00 +0.50 −0.20	10.60	2.00 ±0.50	ø9.00	5.00	18.00

SC-70 6L Tape

Leader / Trailer & Orientation