

# MJ N-Channel Enhancement Mode Power MOSFET

## Description

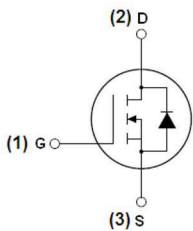
The MJ3019AS uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

## General Features

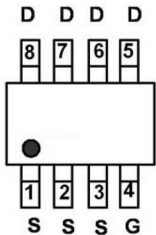
- ◆  $V_{DS} = 30V, I_D = 19A$   
 $R_{DS(ON)} < 6.2m\Omega @ V_{GS} = 10V$   
 $R_{DS(ON)} < 9m\Omega @ V_{GS} = 4.5V$
- ◆ High density cell design for ultra low  $R_{dson}$
- ◆ Fully characterized avalanche voltage and current

## Application

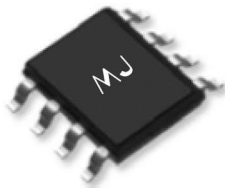
- ◆ Power switching application
- ◆ Hard Switched and High Frequency Circuits
- ◆ Uninterruptible Power Supply



Schematic diagram



Marking and pin Assignment



SOP-8 top view

## Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
MJ3019AS	MJ3019AS	SOP-8	Ø330mm	12mm	4000 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	19	A
Drain Current-Continuous( $T_A = 100^{\circ}C$ )	$I_{D(100^{\circ}C)}$	13.5	A
Pulsed Drain Current	$I_{DM}$	76	A
Maximum Power Dissipation	$P_D$	3	W
Single pulse avalanche energy <sup>(Note 5)</sup>	$E_{AS}$	210	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^{\circ}C$

## Thermal Characteristic

Thermal Resistance,Junction-to-Ambient <sup>(Note 2)</sup>	$R_{\theta JA}$	42	$^{\circ}C/W$
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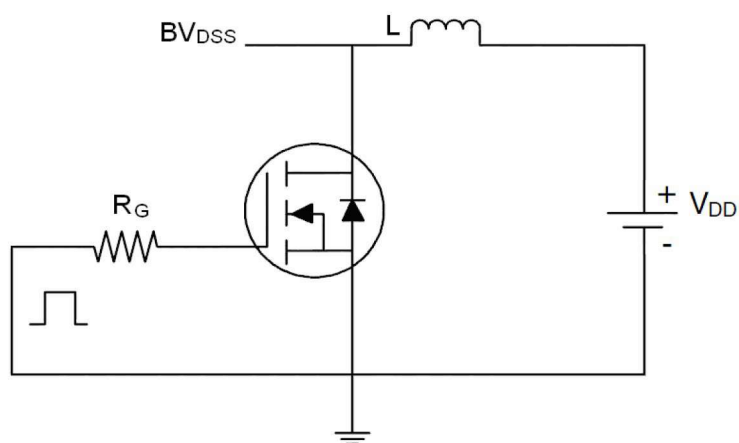
Electrical Characteristics (T<sub>A</sub>=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V,I <sub>D</sub> =250μA	30	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =30V,V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =±20V,V <sub>DS</sub> =0V	-	-	±100	nA
On Characteristics <small>(Note 3)</small>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> ,I <sub>D</sub> =250μA	0.7	1.1	1.4	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =10A	-	4.9	6.2	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	-	6.9	9	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V,I <sub>D</sub> =12A	5	-	-	S
Dynamic Characteristics <small>(Note 4)</small>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =15V,V <sub>GS</sub> =0V F=1.0MHz	-	2077	-	PF
Output Capacitance	C <sub>oss</sub>		-	300	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	249.7	-	PF
Switching Characteristics <small>(Note 4)</small>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =10V,I <sub>D</sub> =10A V <sub>GS</sub> =10V,R <sub>GEN</sub> =2.7Ω	-	20	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	15	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	60	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	10	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =15V,I <sub>D</sub> =10A V <sub>GS</sub> =10V	-	47.6	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	4.9	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	10.9	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage <small>(Note 3)</small>	V <sub>SD</sub>	V <sub>GS</sub> =0V,I <sub>S</sub> =10A	-	-	1.2	V
Diode Forward Current <small>(Note 2)</small>	I <sub>S</sub>		-	-	19	A

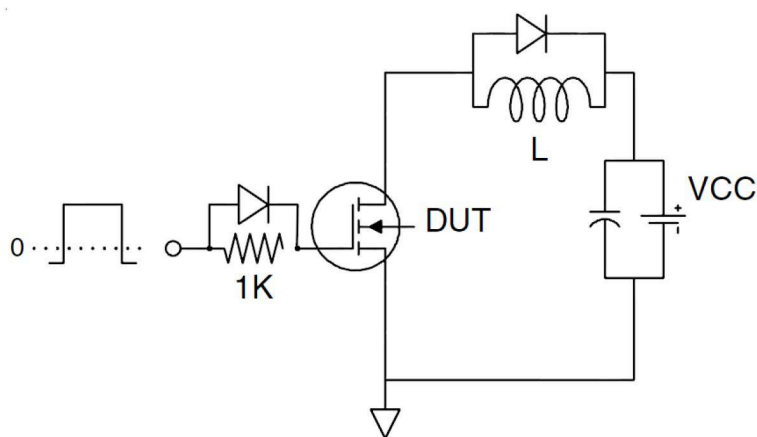
Notes:

- ① Repetitive Rating: Pulse width limited by maximum junction temperature.
- ② Surface Mounted on FR4 Board, t ≤ 10 sec.
- ③ Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- ④ Guaranteed by design, not subject to production
- ⑤ EAS condition：T<sub>J</sub>=25℃,V<sub>DD</sub>=15V,V<sub>G</sub>=10V,L=0.5mH,R<sub>g</sub>=25Ω

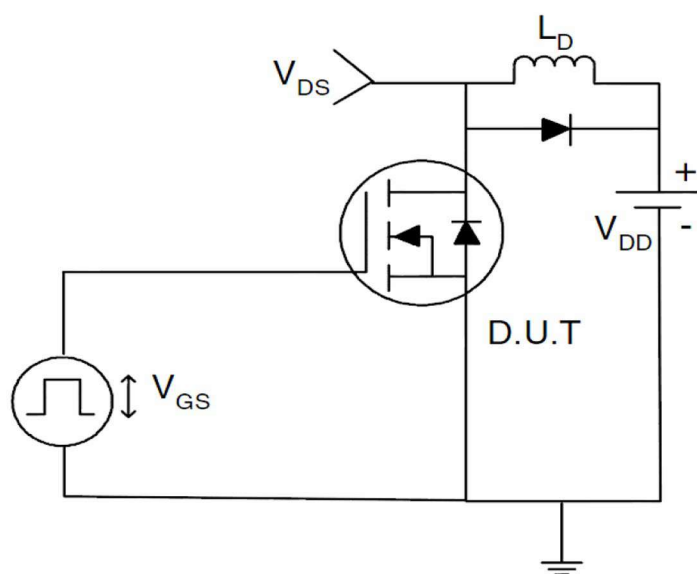
# Test circuit



EAS test Circuit

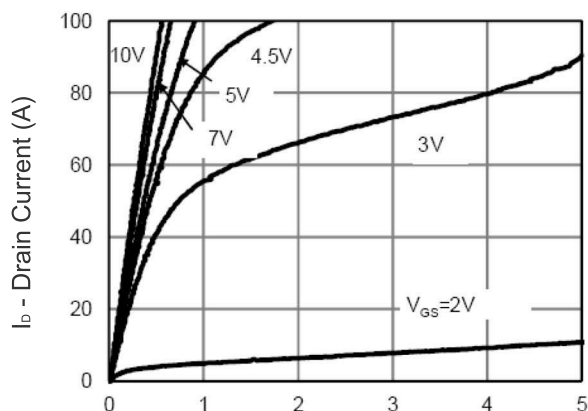


Gate charge test Circuit



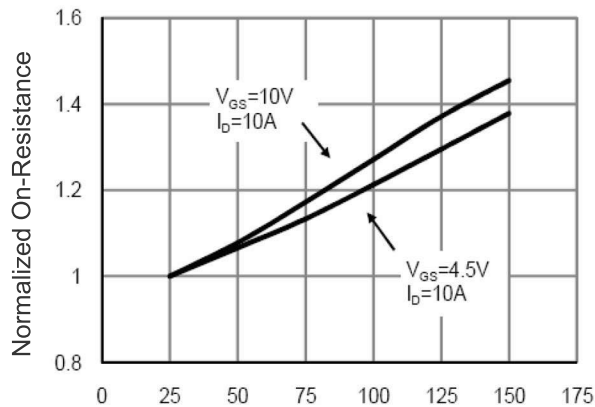
Switch Time Test Circuit

# Typical Electrical and Thermal Characteristics (Curves)



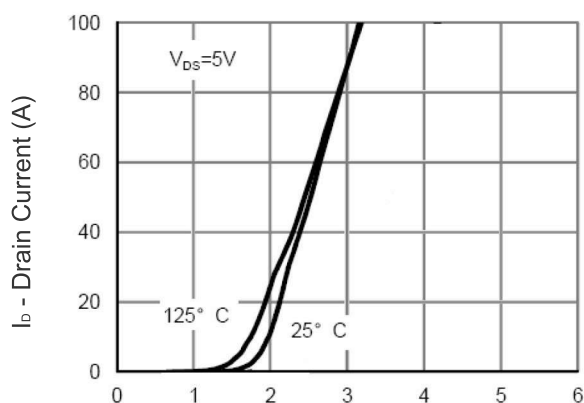
$V_{DS}$  Drain-Source Voltage (V)

Figure 1 Output Characteristics



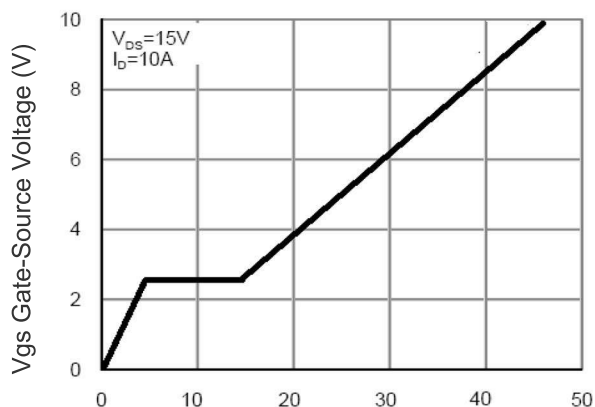
$T_J$  -Junction Temperature( $^{\circ}$ C)

Figure 4  $R_{DS(on)}$ -Junction Temperature



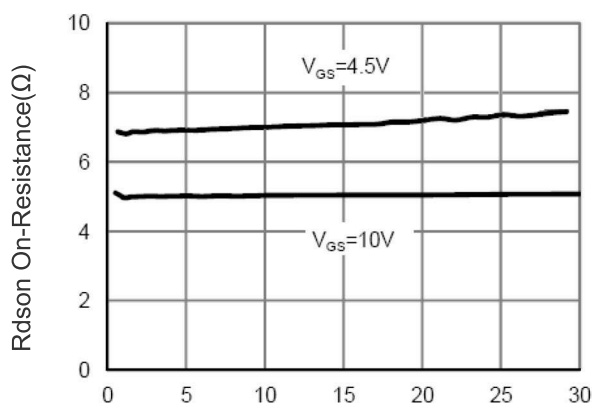
$V_{GS}$  Gate-Source Voltage (V)

Figure 2 Transfer Characteristics



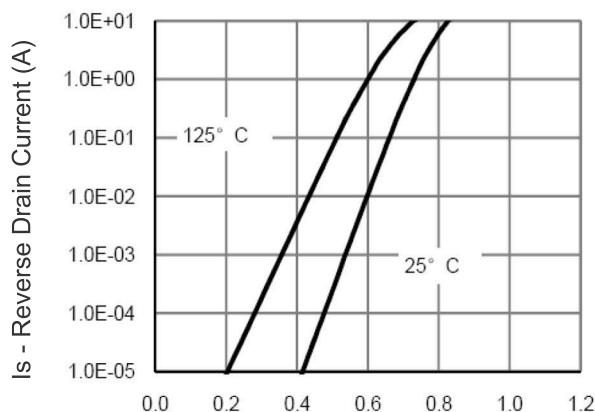
$Q_g$  Gate Charge (nC)

Figure 5 Gate Charge



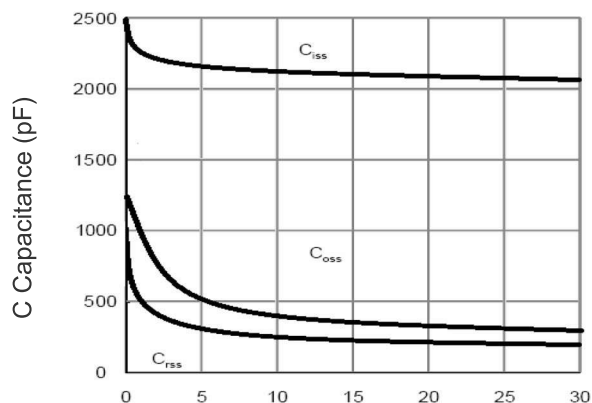
$I_D$  - Drain Current (A)

Figure 3  $R_{DS(on)}$ - Drain Current



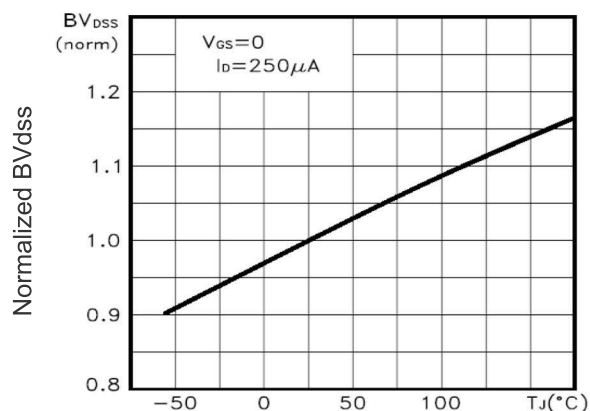
$V_{SD}$  Source-Drain Voltage (V)

Figure 6 Source- Drain Diode Forward



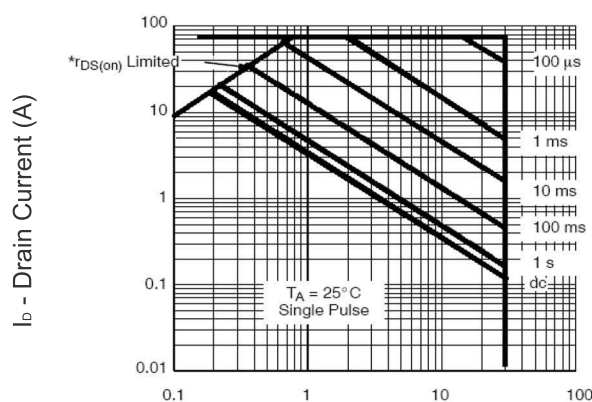
Vds Drain-Source Voltage (V)

Figure 7 Capacitance vs Vds



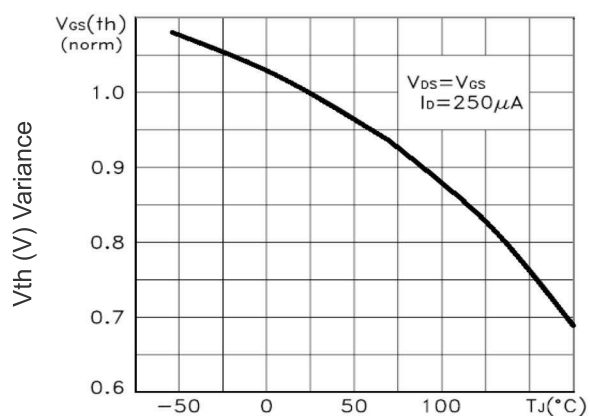
TJ -Junction Temperature(°C)

Figure 9 BV<sub>DSS</sub> vs Junction Temperature



Vds Drain-Source Voltage (V)

Figure 8 Safe Operation Area



TJ -Junction Temperature(°C)

Figure 10 V<sub>GS(th)</sub> vs Junction Temperature

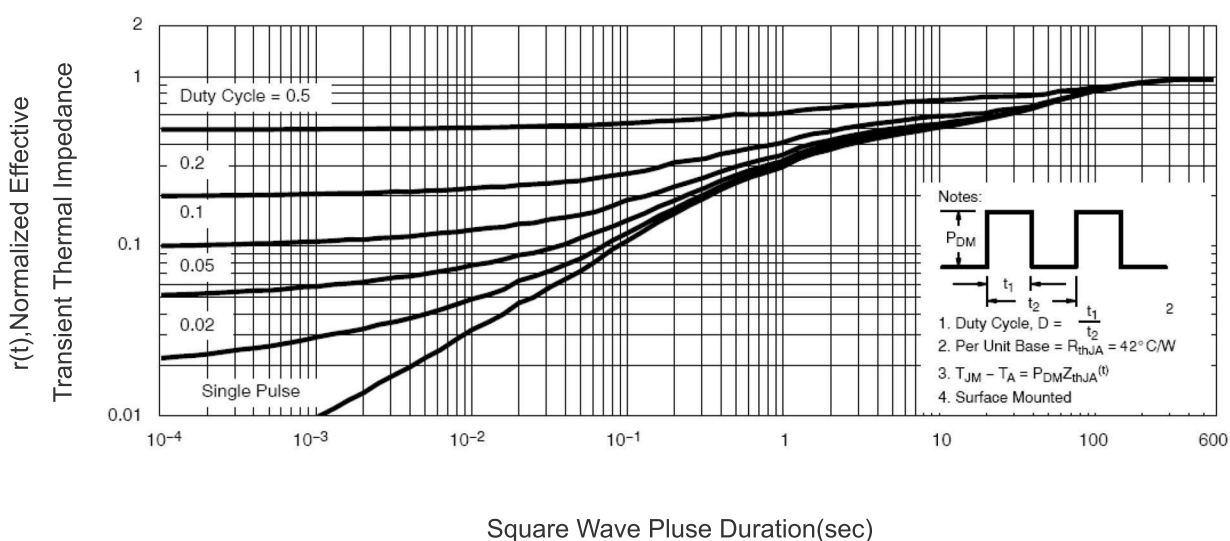
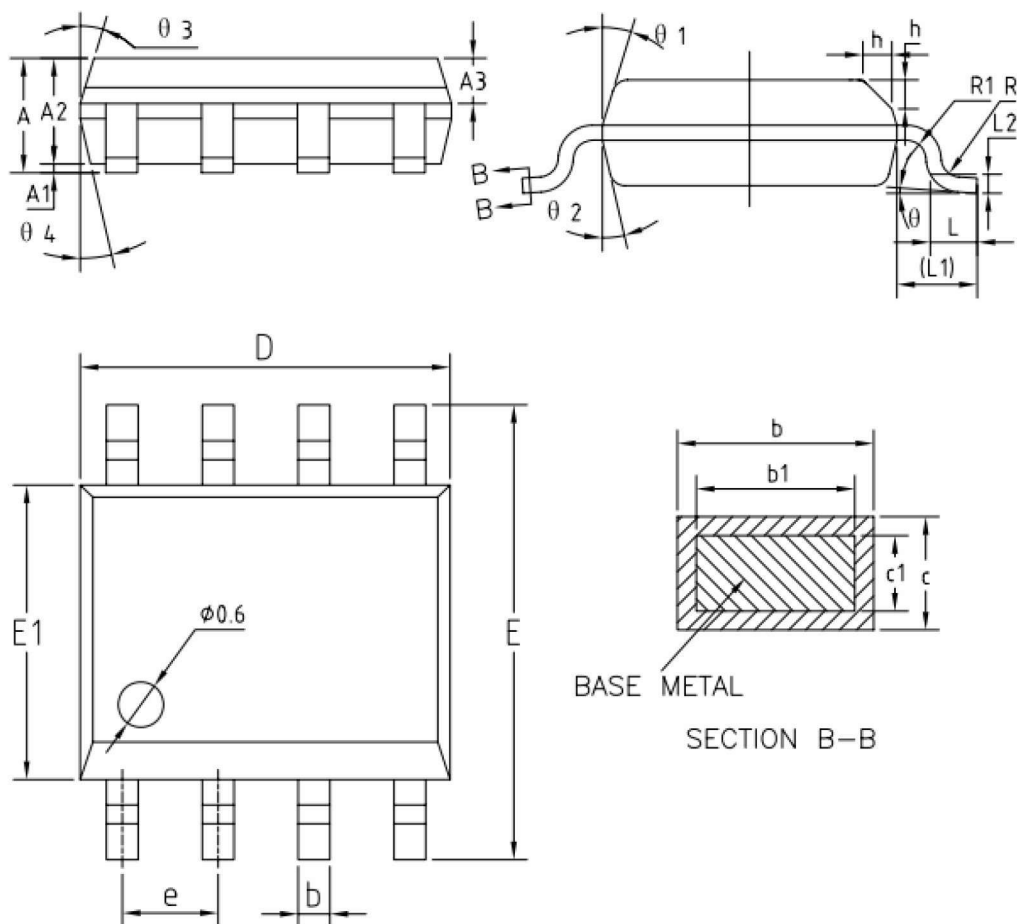


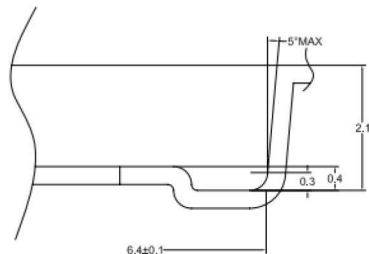
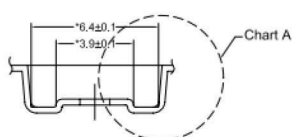
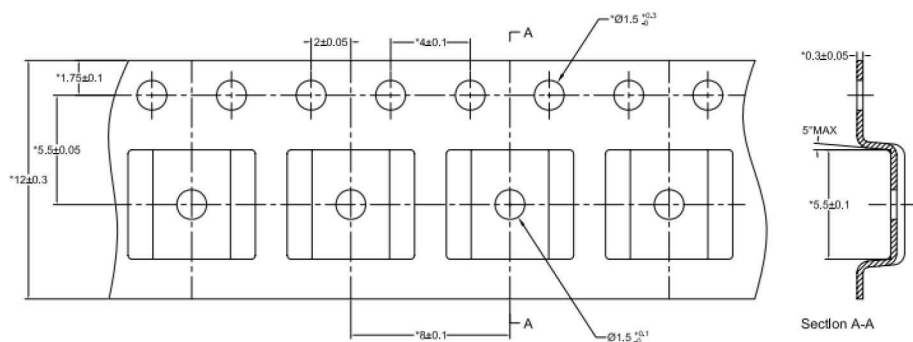
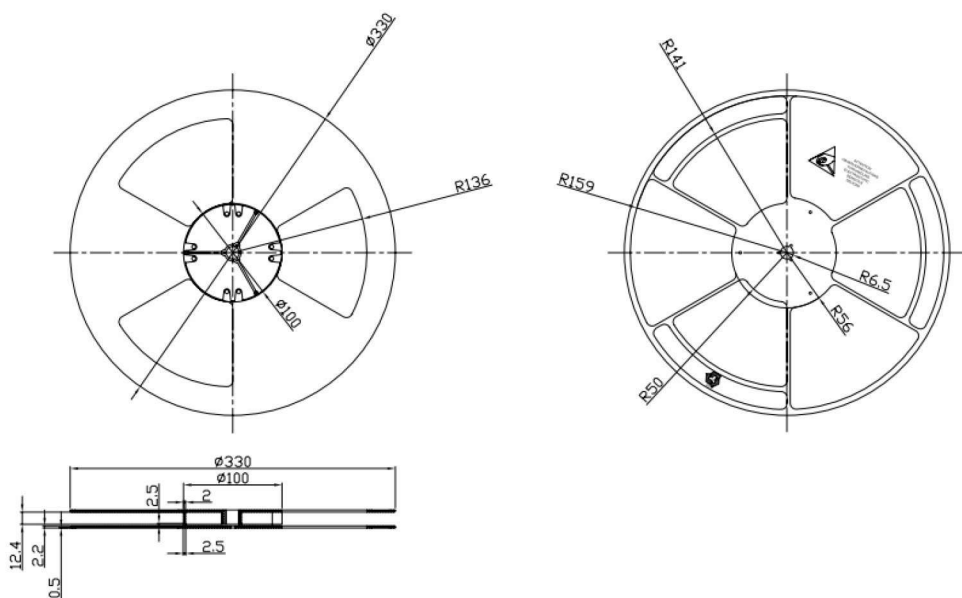
Figure 11 Normalized Maximum Transient Thermal Impedance

SOP-8 Package Information



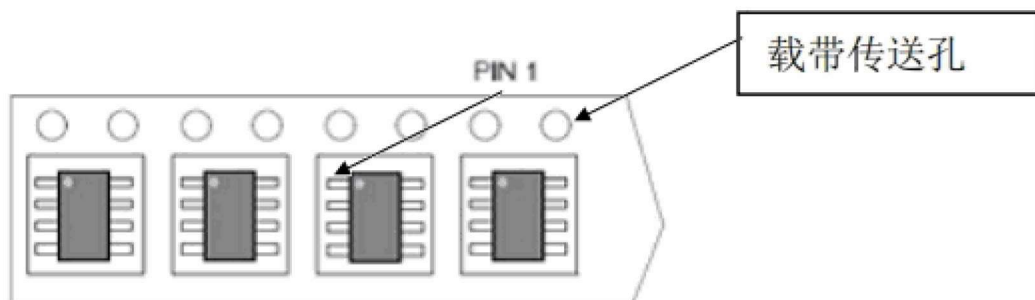
COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.15	0.25
A2	1.25	1.40	1.65
A3	0.50	0.60	0.70
b	0.38	—	0.51
b1	0.37	0.42	0.47
c	0.18	—	0.25
c1	0.17	0.20	0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.17	1.27	1.37
L	0.45	0.60	0.80
L1	1.04REF		
L2	0.25BSC		
R	0.07	—	—
R1	0.07	—	—
h	0.30	0.40	0.50
θ	0°	—	8°
θ 1	15°	17°	19°
θ 2	11°	13°	15°
θ 3	15°	17°	19°
θ 4	11°	13°	15°



NOTICE:

1. Material: Hard polystyrene
2. All DIMS IN MM
3. There must not be foreign adhesion and the state of the surface must be excellent
4. The meander of the tape is assumed with 1mm or less every 100mm between 250mm
5. A permissible difference of the accumulation pitch of the sending hole is assumed to be  $\pm 0.3$  up to 50 pitches
6. Corner R=0.3max
7. Surface resistance  $1 \times 10^5 \leq R_s \leq 1 \times 10^{12}$  OHMS/SQ
8. Key size with \*\*\*





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