

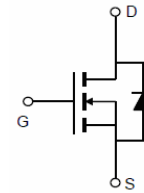
NCE N-Channel Enhancement Mode Power MOSFET

Description

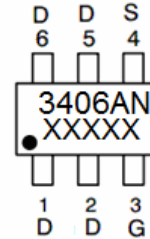
The NCE3406AN uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

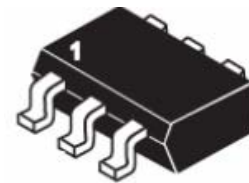
- $V_{DS} = 30V, I_D = 6A$
 $R_{DS(ON)} < 55m\Omega @ V_{GS}=2.5V$
 $R_{DS(ON)} < 39m\Omega @ V_{GS}=4.5V$
 $R_{DS(ON)} < 33m\Omega @ V_{GS}=10V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package
- PWM applications
- Load switch
- Power management



Schematic diagram



Marking and pin assignment



SOT23-6L top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
3406AN	NCE3406AN	SOT23-6L	Ø180mm	8 mm	3000 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current-Continuous	I_D	6	A
Drain Current-Pulsed ^(Note 1)	I_{DM}	27	A
Maximum Power Dissipation	P_D	2.0	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ\text{C}$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient ^(Note 2)	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
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Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu\text{A}$	30	33	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	0.7	0.9	1.4	V

Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=2.5V, I_D=4A$	-	33	55	mΩ
		$V_{GS}=4.5V, I_D=5A$	-	26	39	mΩ
		$V_{GS}=10V, I_D=6A$	-	24	33	mΩ
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=6A$	10	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{ISS}	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$	-	595	-	PF
Output Capacitance	C_{OSS}		-	39	-	PF
Reverse Transfer Capacitance	C_{RSS}		-	36	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=15V, R_L=2.5\Omega$ $V_{GS}=10V, R_{GEN}=3\Omega$	-	3.0	-	nS
Turn-on Rise Time	t_r		-	4.5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	25	-	nS
Turn-Off Fall Time	t_f		-	3.8	-	nS
Total Gate Charge	Q_g	$V_{DS}=15V, I_D=6A,$ $V_{GS}=4.5V$	-	9.3	-	nC
Gate-Source Charge	Q_{GS}		-	1.6	-	nC
Gate-Drain Charge	Q_{GD}		-	2.1	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=6A$	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	6	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics

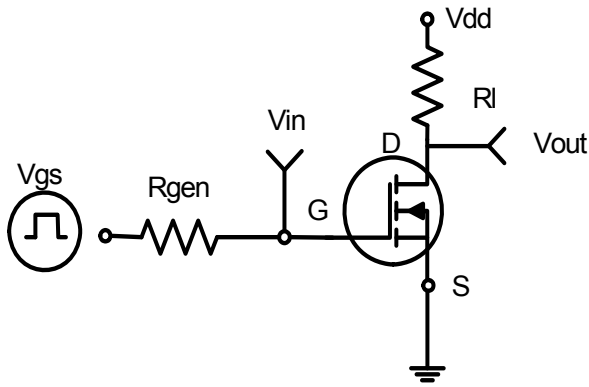


Figure 1: Switching Test Circuit

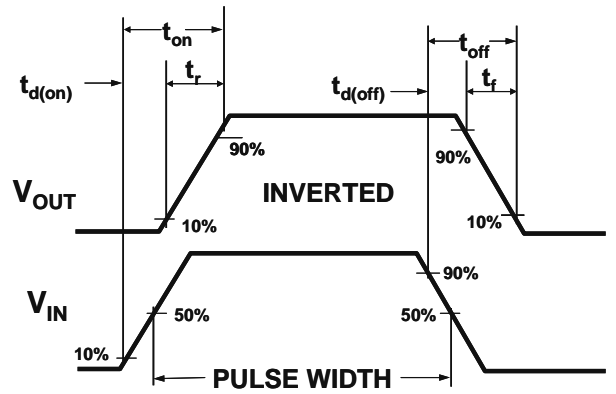
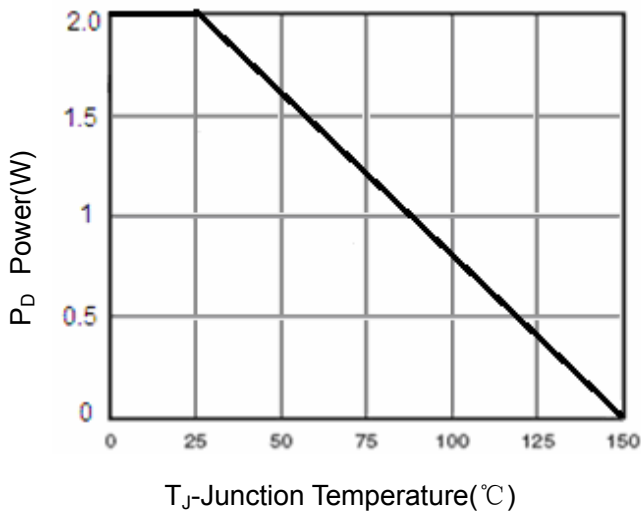
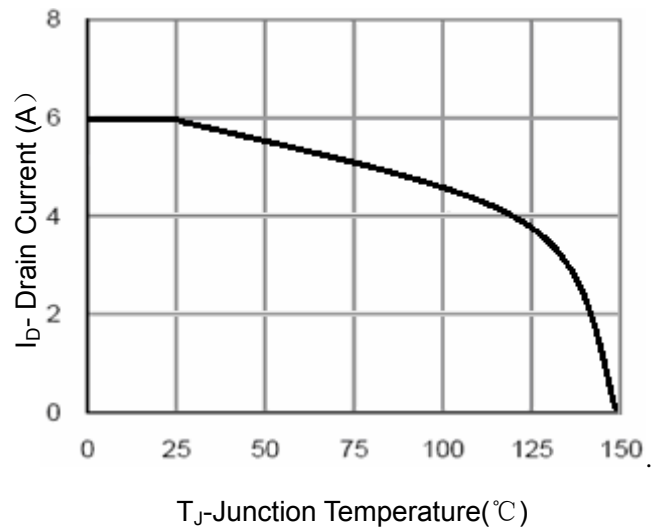


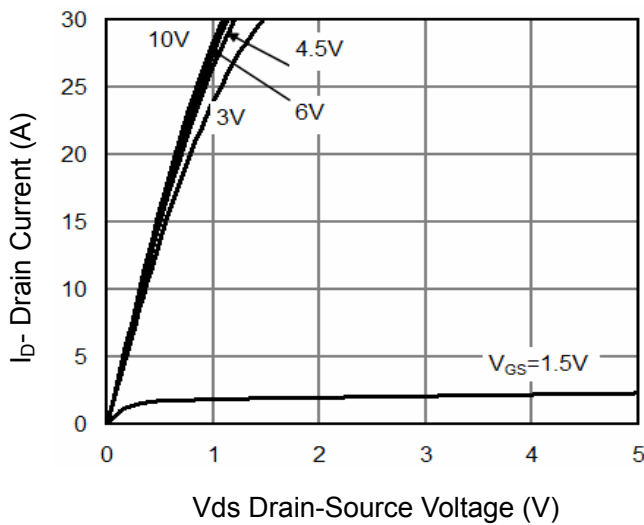
Figure 2: Switching Waveforms



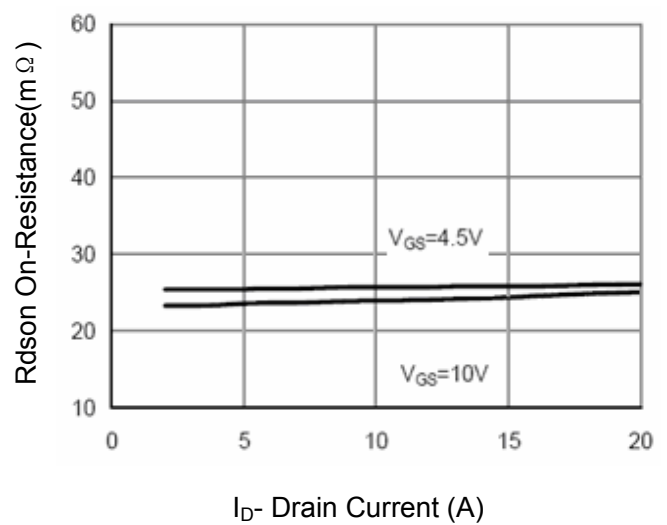
T_J-Junction Temperature(°C)
Figure 3 Power Dissipation



T_J-Junction Temperature(°C)
Figure 4 Drain Current



V_{DS} Drain-Source Voltage (V)
Figure 5 Output Characteristics



I_D Drain Current (A)
Figure 6 Drain-Source On-Resistance

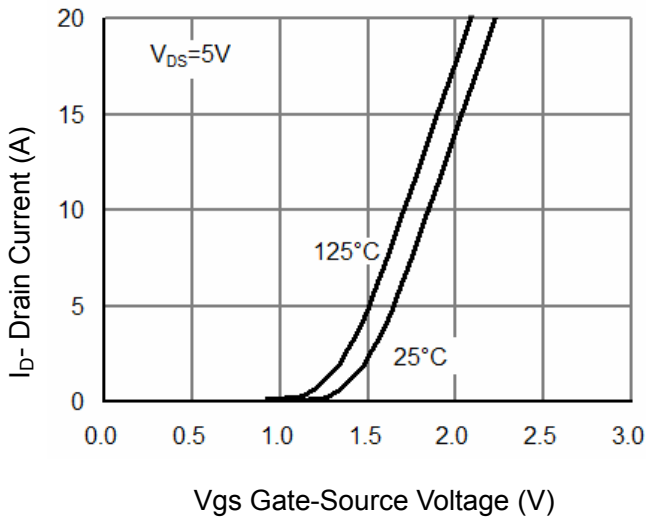


Figure 7 Transfer Characteristics

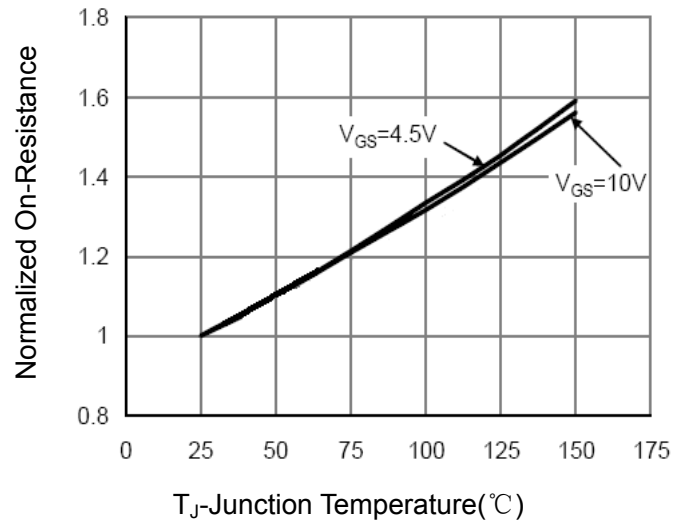


Figure 8 Drain-Source On-Resistance

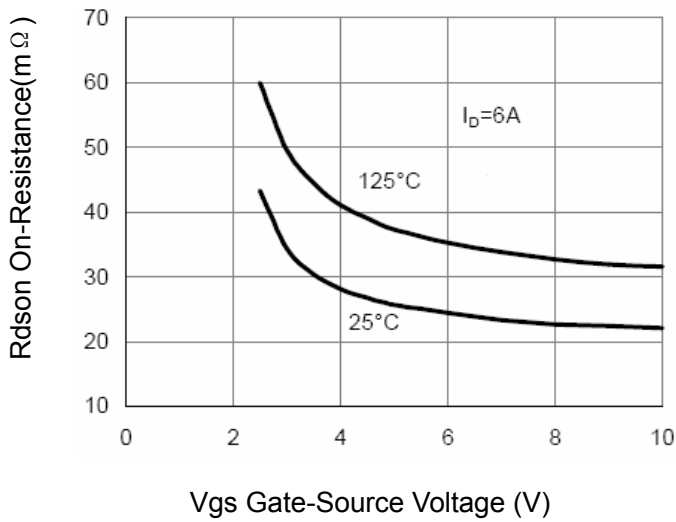


Figure 9 $R_{DS(on)}$ vs V_{GS}

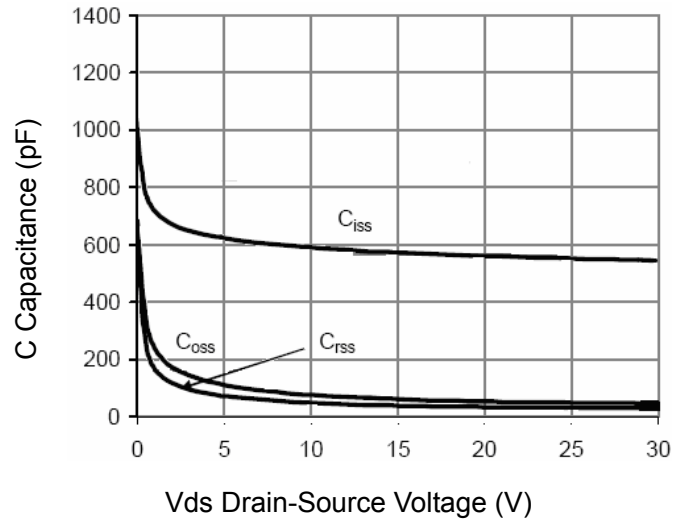


Figure 10 Capacitance vs V_{DS}

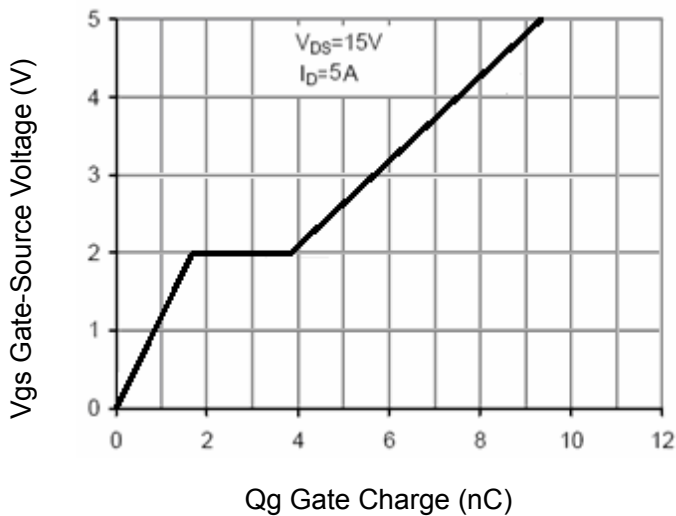


Figure 11 Gate Charge

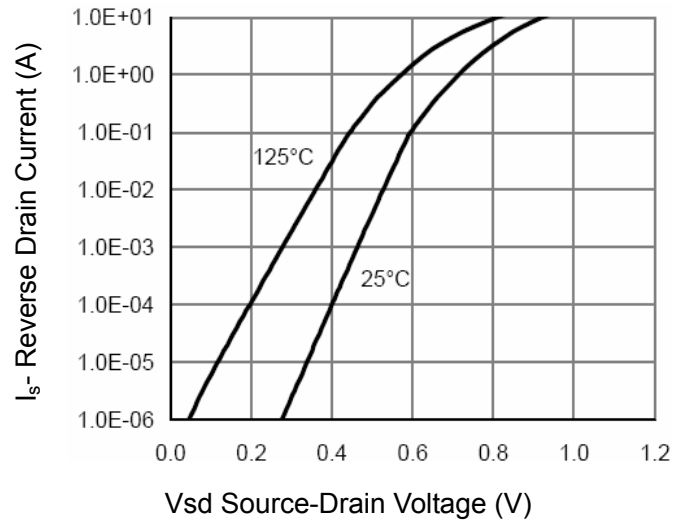


Figure 12 Source-Drain Diode Forward

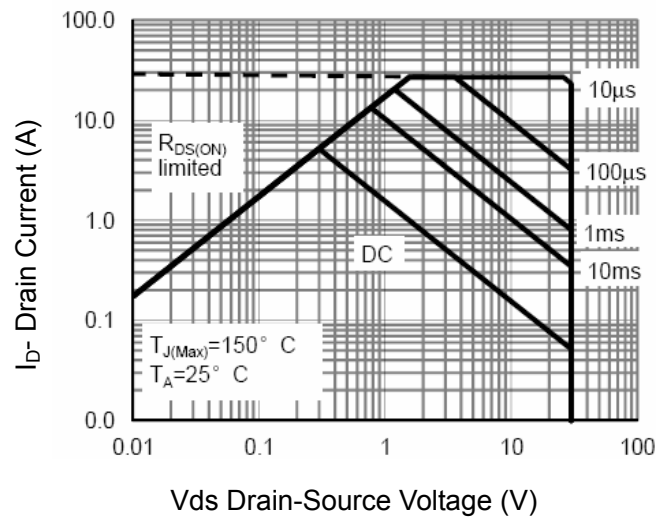


Figure 13 Safe Operation Area

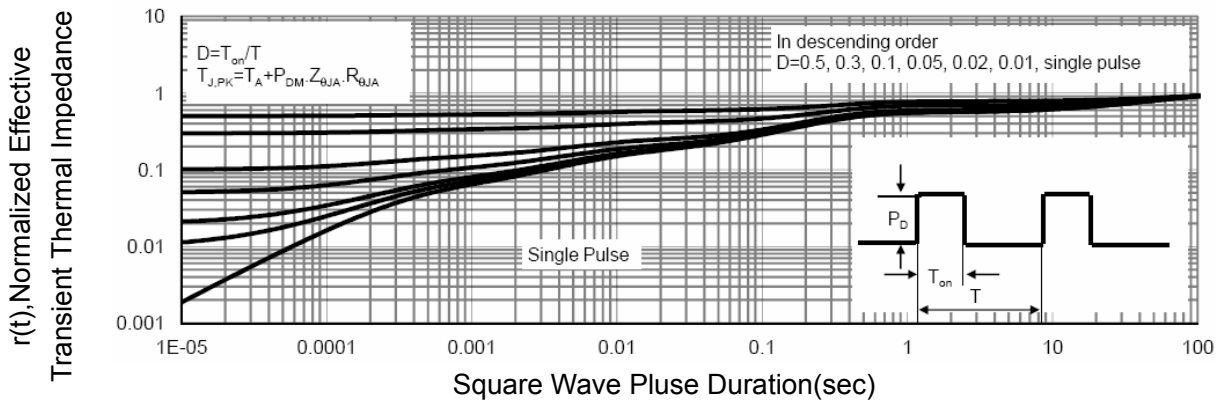
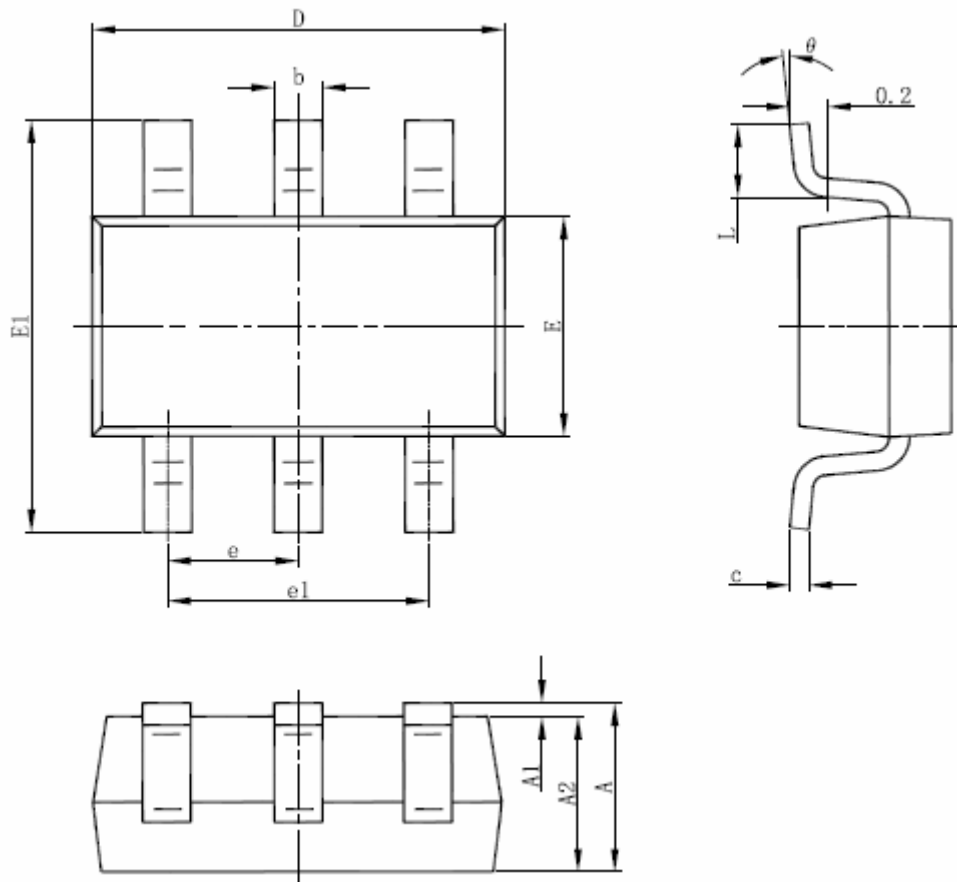
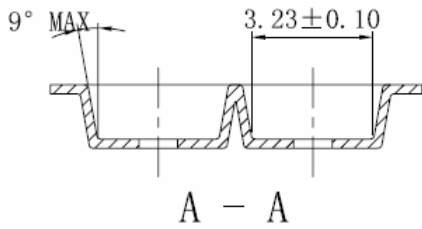
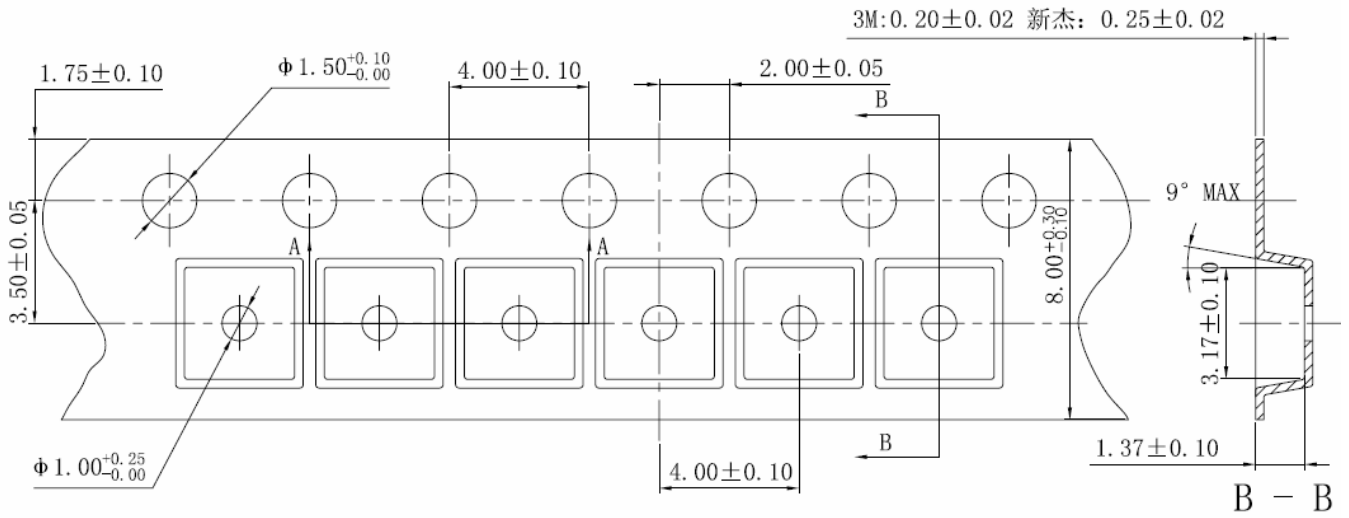


Figure 14 Normalized Maximum Transient Thermal Impedance

SOT23-6L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



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