

## NCE N-Channel Enhancement Mode Power MOSFET

### Description

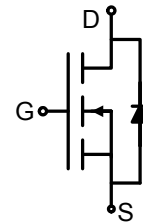
The NCE3008M uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other switching application.

### General Feature

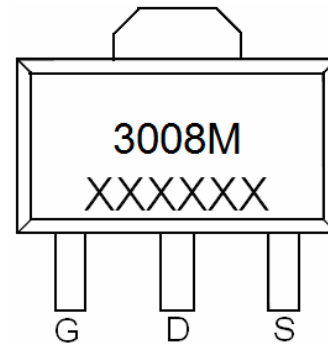
- $V_{DS} = 30V, I_D = 8A$   
 $R_{DS(ON)} < 22.5m\Omega @ V_{GS} = 10V$   
 $R_{DS(ON)} < 32m\Omega @ V_{GS} = 4.5V$
- High Power and current handling capability
- Lead free product is acquired
- Surface mount package

### Application

- Battery switch
- DC/DC converter



Schematic diagram



SOT-89 -3L top view

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
3008M	NCE3008M	SOT-89-3L	Ø180mm	12mm	1000units

### 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	$I_D$	8	A
Drain Current-Pulsed <sup>(Note 1)</sup>	$I_{DM}$	30	A
Maximum Power Dissipation	$P_D$	3.5	W
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>	$R_{\theta JA}$	35	$^\circ C/W$
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### Electrical Characteristics ( $T_A = 25^\circ C$ unless otherwise noted)

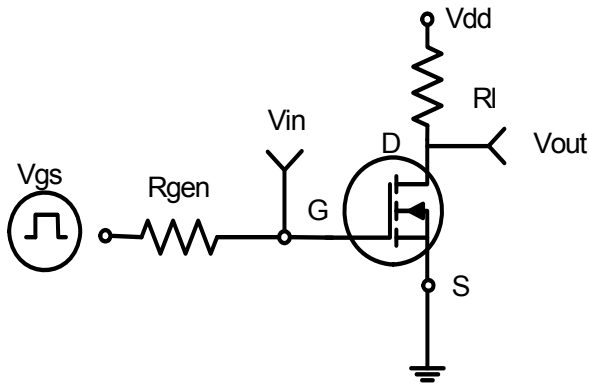
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	30	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 30V, V_{GS} = 0V$	-	-	1	$\mu A$

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.6	2.4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=8A$	-	19.8	22.5	m $\Omega$
		$V_{GS}=4.5V, I_D=6A$	-	27	31	m $\Omega$
<b>Dynamic Characteristics</b> (Note4)						
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$	-	564	-	PF
Output Capacitance	$C_{oss}$		-	75	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	66	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, I_D=1.5A$ $V_{GS}=10V, R_{GEN}=1\Omega$	-	9	-	nS
Turn-on Rise Time	$t_r$		-	10	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	15	-	nS
Turn-Off Fall Time	$t_f$		-	5	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=30V, I_D=8A,$ $V_{GS}=10V$	-	14.2	-	nC
Gate-Source Charge	$Q_{gs}$		-	1.5	-	nC
Gate-Drain Charge	$Q_{gd}$		-	3.6	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=8A$	-	-	1.2	V
Diode Forward Current (Note 2)	$I_S$		-	-	8	A

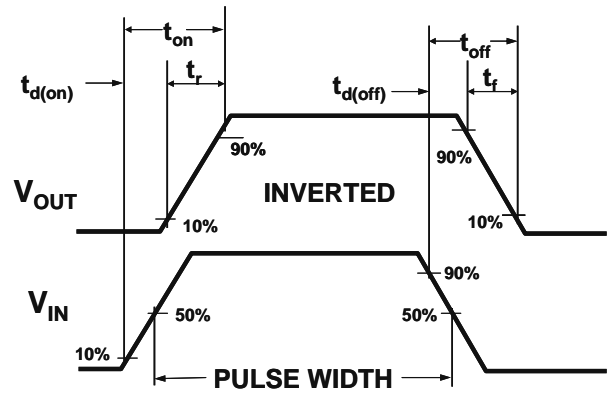
### Notes:

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

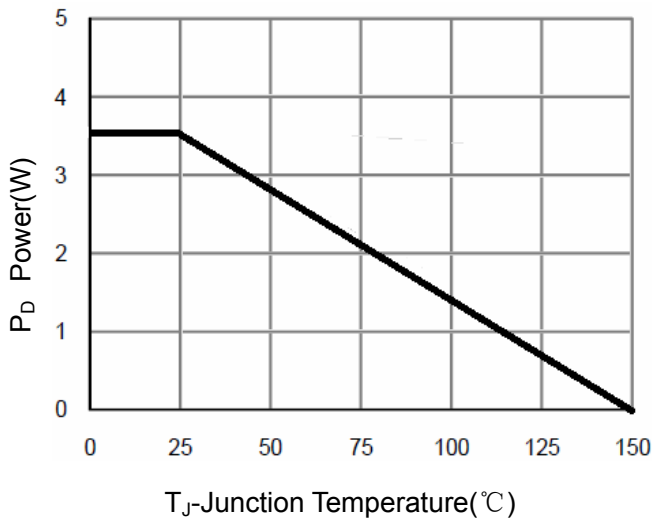
## Typical Electrical and Thermal Characteristics



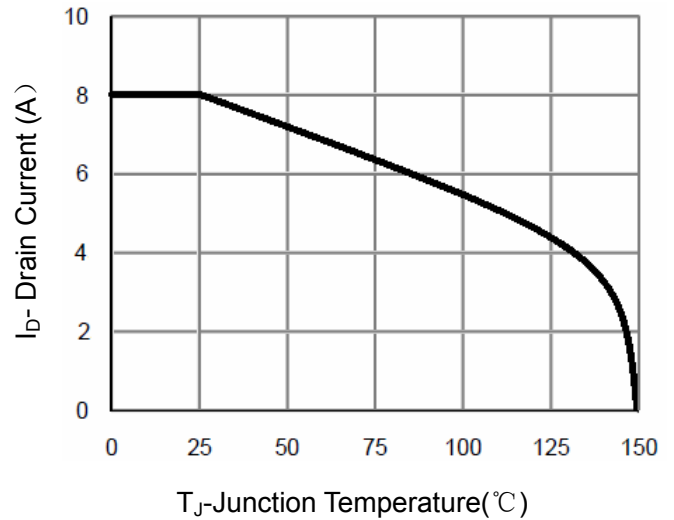
**Figure 1 Switching Test Circuit**



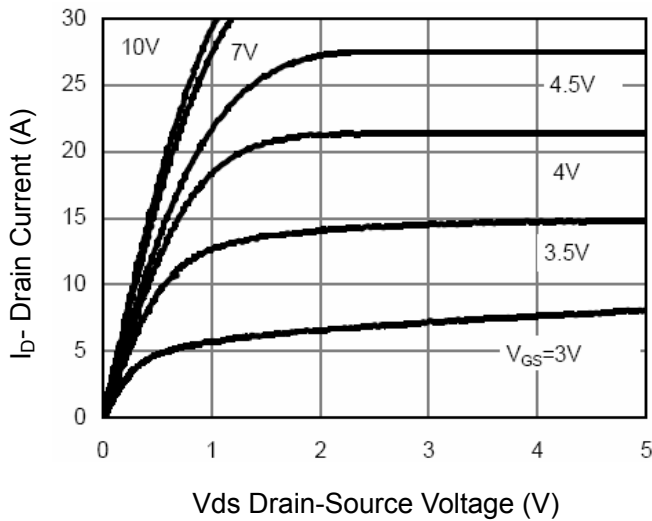
**Figure 2 Switching Waveforms**



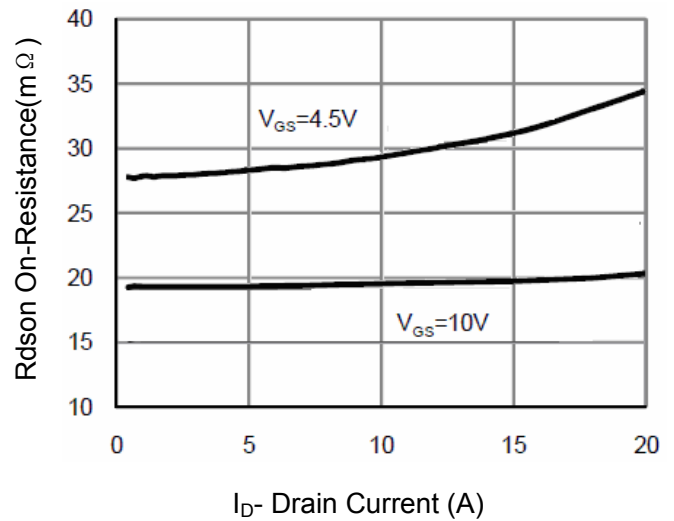
**Figure 3 Power Dissipation**



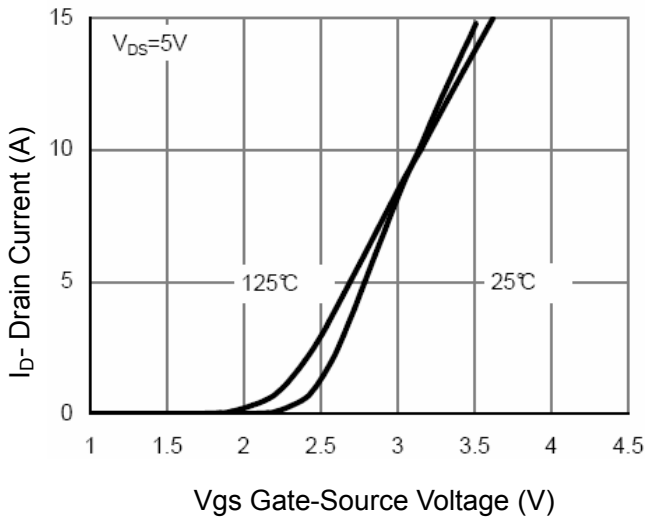
**Figure 4 Drain Current**



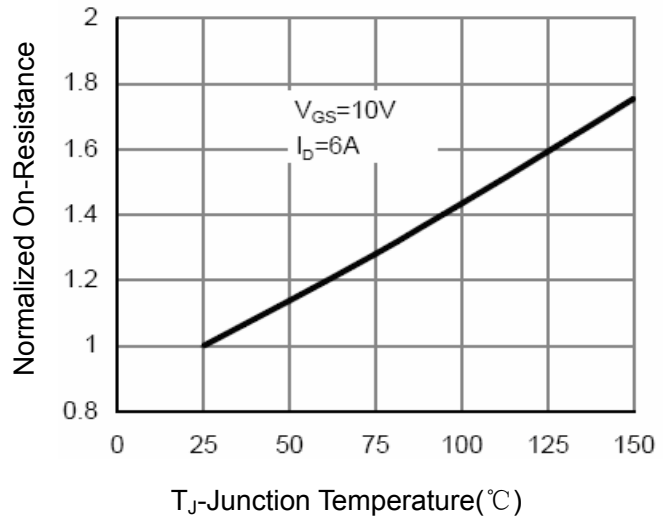
**Figure 5 Output Characteristics**



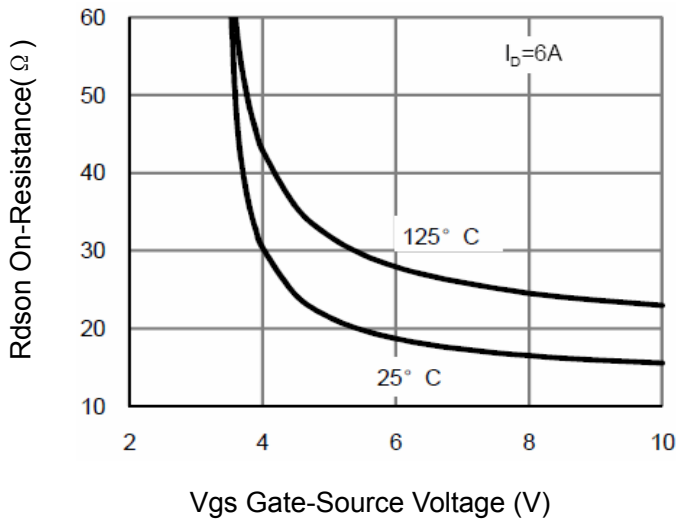
**Figure 6 Drain-Source On-Resistance**



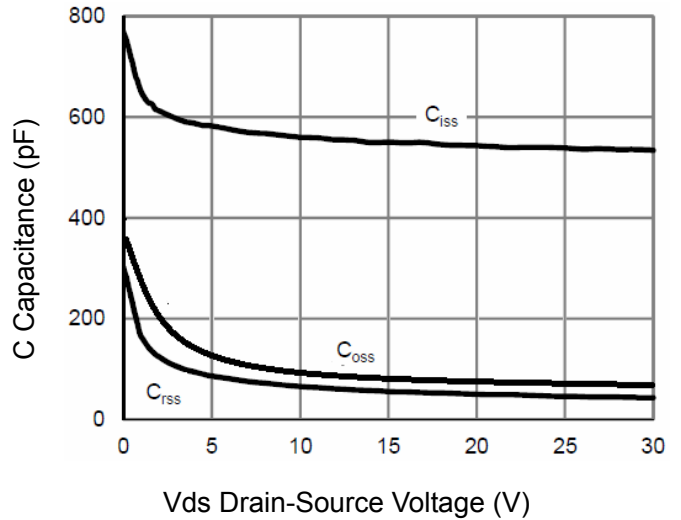
**Figure 7 Transfer Characteristics**



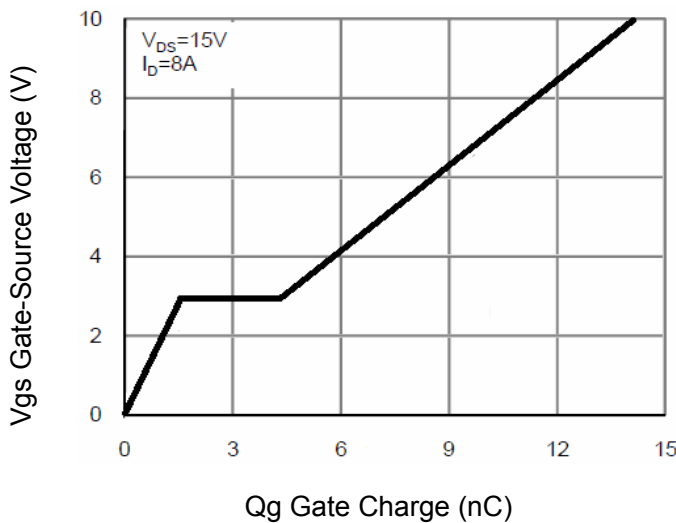
**Figure 8 Drain-Source On-Resistance**



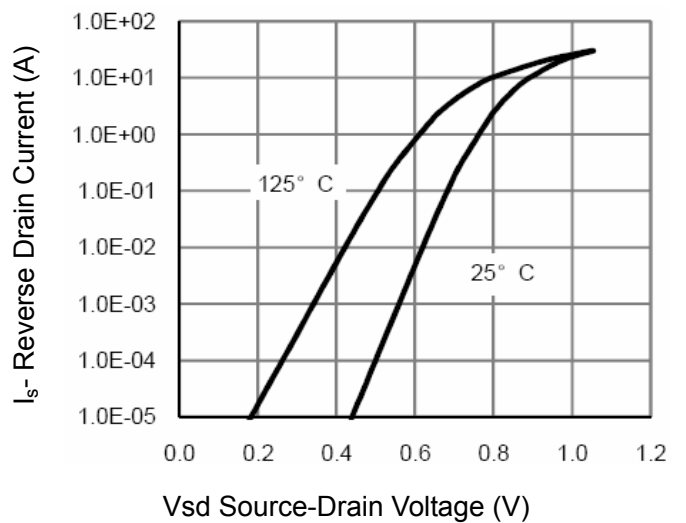
**Figure 9 Rdson vs Vgs**



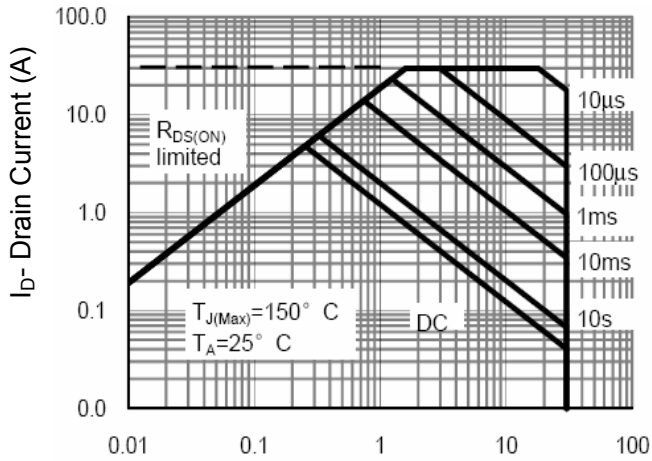
**Figure 10 Capacitance vs Vds**



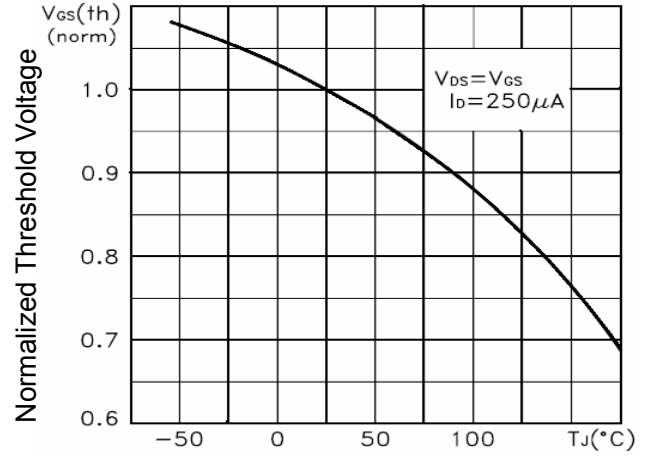
**Figure 11 Gate Charge**



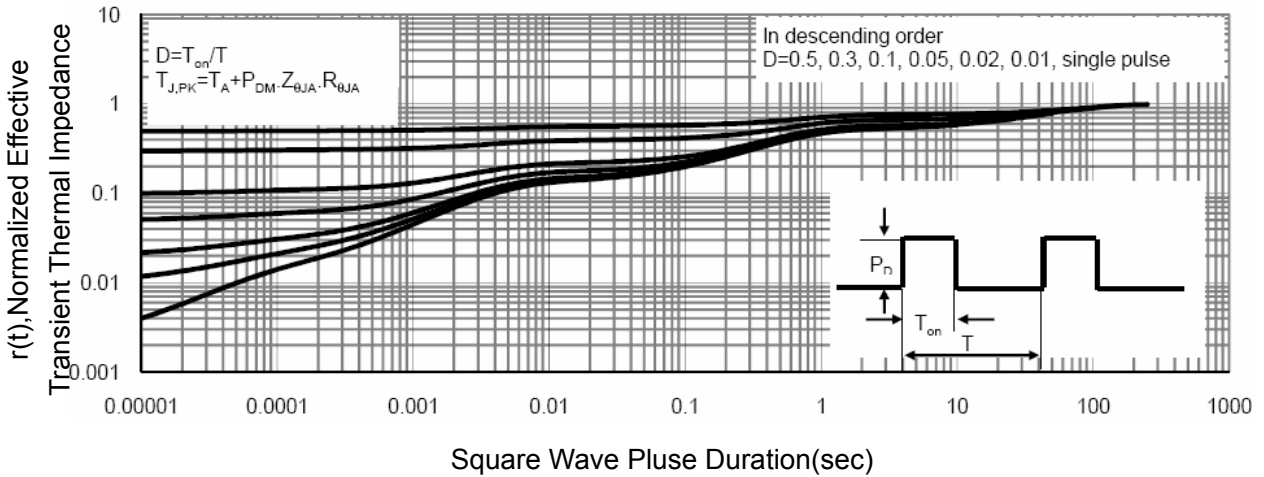
**Figure 12 Source- Drain Diode Forward**



V<sub>ds</sub> Drain-Source Voltage (V)  
**Figure 13 Safe Operation Area**

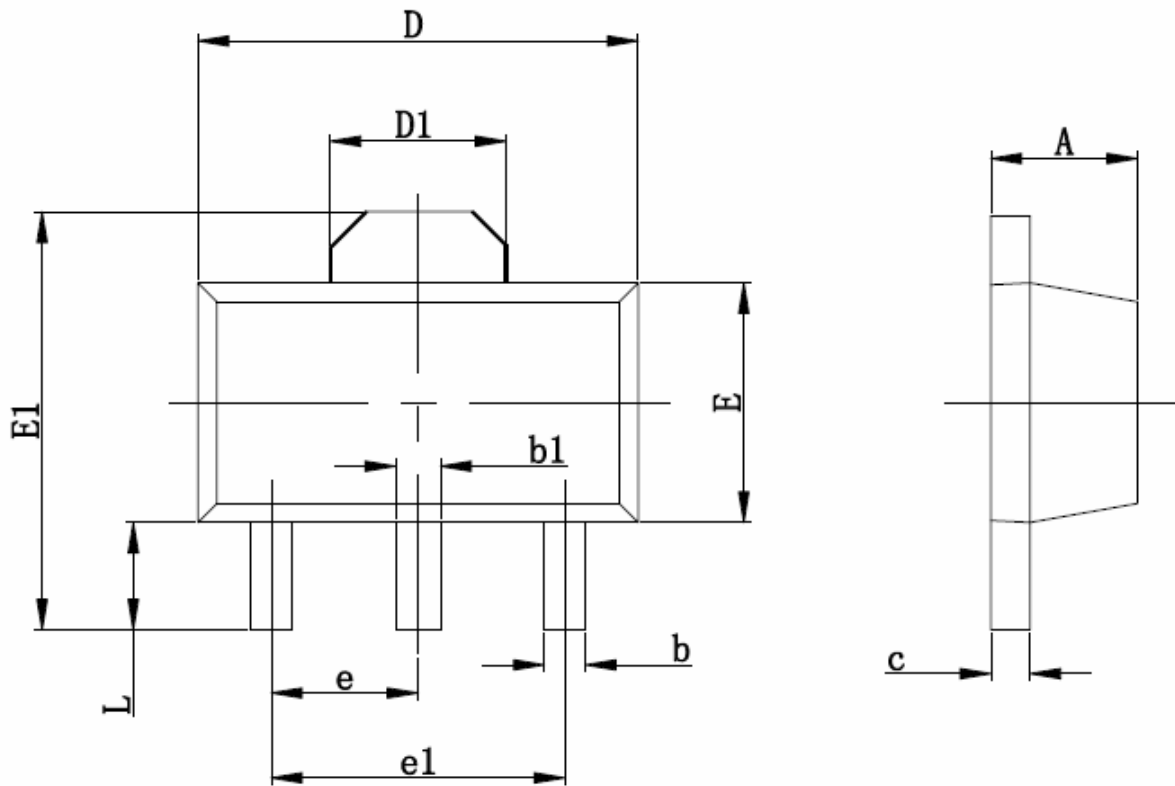


$T_J$ -Junction Temperature( $^\circ C$ )  
**Figure 14  $V_{GS(th)}$  VS Junction Temperature**



**Figure 15 Normalized Maximum Transient Thermal Impedance**

## SOT-89-3L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.350	0.520	0.013	0.197
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.350	2.550	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060TYP	
e1	3.000 TYP		0.118TYP	
L	0.900	1.100	0.035	0.047

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