

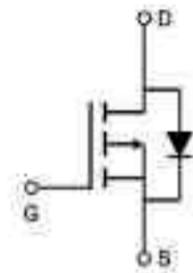
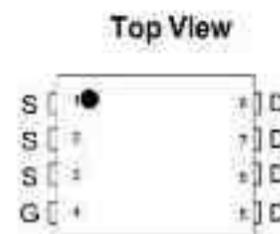
## -60V P - Channel MOSFET

### Description

-60V /-4A Power MOSFET

Very low on-resistance  $R_{DS(on)}$  @  $V_{GS}=4.5V$

Pb-free lead plating; RoHS compliant

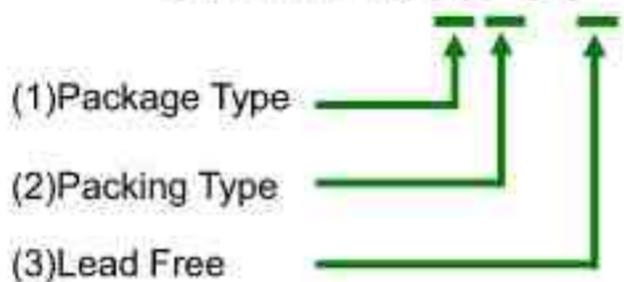


### General Features

$V_{DS}$	-60	V
$R_{DS(on),TYP@VGS=10V}$	91.0	m $\Omega$
$R_{DS(on),TYP@VGS=4.5}$	143.0	m $\Omega$
$I_D$	-4	A

- High power and current handing capability
- Lead free product is acquired
- Surface mount package

### ◆ Ordering Information

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
SM4441PRL	SM4441PRG	SOP-8	S	S	S	G	D	D	D	D	Tape Reel
<b>SM4441 X X X</b> 			(1) P: SOP-8 (2) R: Tape Reel (3) G: Halogen Free: L: Lead Free								



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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	-4.0	A
Drain Current-Pulsed <sup>(Note 1)</sup>	$I_{DM}$	-6.4	A
Maximum Power Dissipation	$P_D$	3.1	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^{\circ}\text{C}$

a:Fused current that based on wire numbers and diameter

b:Repetitive Rating: Pulse width limited by the maximum junction temperature

c:1-in<sup>2</sup> 2oz Cu PCB board

## ◆ Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ , unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-60	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-60V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> <sup>(Note 3)</sup>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.5	-2.3	-3	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-6.2A$	-	91.0	130.0	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-5V, I_D=-6.2A$	-	58	-	S
<b>Dynamic Characteristics</b> <sup>(Note 4)</sup>						
Input Capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=-15V, f=1MHz$	-	930	-	PF
Output Capacitance	$C_{oss}$		-	85	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	35	-	PF
<b>Switching Characteristics</b> <sup>(Note 4)</sup>						
Turn-on Delay Time	$t_{d(on)}$	$V_{GS}=-10V, V_{DS}=-15V, R_L=0.75\Omega, R_{GEN}=3\Omega$	-	13.5	-	nS
Turn-on Rise Time	$t_r$		-	10.8	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	37.8	-	nS
Turn-Off Fall Time	$t_f$		-	12.15	-	nS
Total Gate Charge	$Q_g$	$V_{GS}=-10V, V_{DS}=-15V, I_D=-4A$	-	8	-	nC
Gate-Source Charge	$Q_{gs}$		-	2.24	-	nC
Gate-Drain Charge	$Q_{gd}$		-	3.2	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note 3)</sup>	$V_{SD}$	$I_S=-1A, V_{GS}=0V$	-	-	-1	V

Note: Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycles  $\leq 2\%$

d: Guaranteed by design: not subject to production testing

## Typical Electrical and Thermal Characteristics

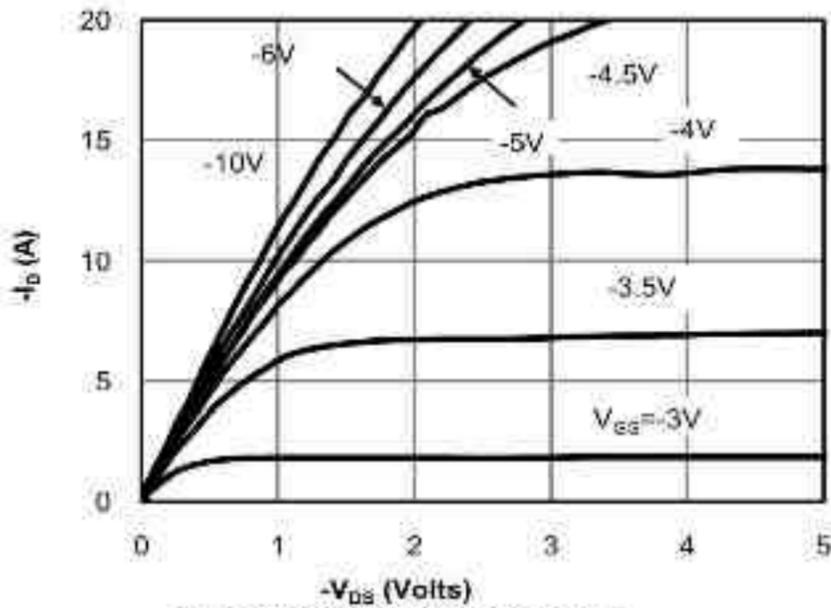


Fig 1: On-Region Characteristics

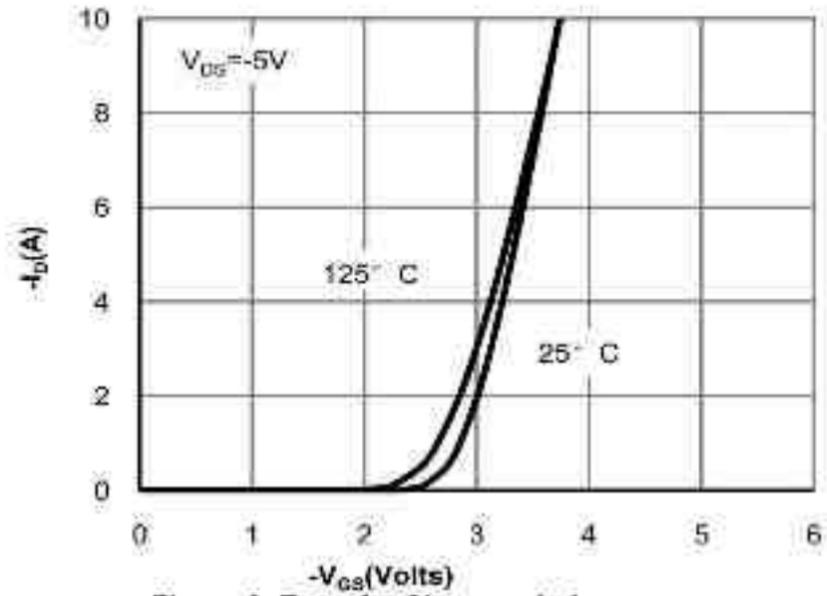


Figure 2: Transfer Characteristics

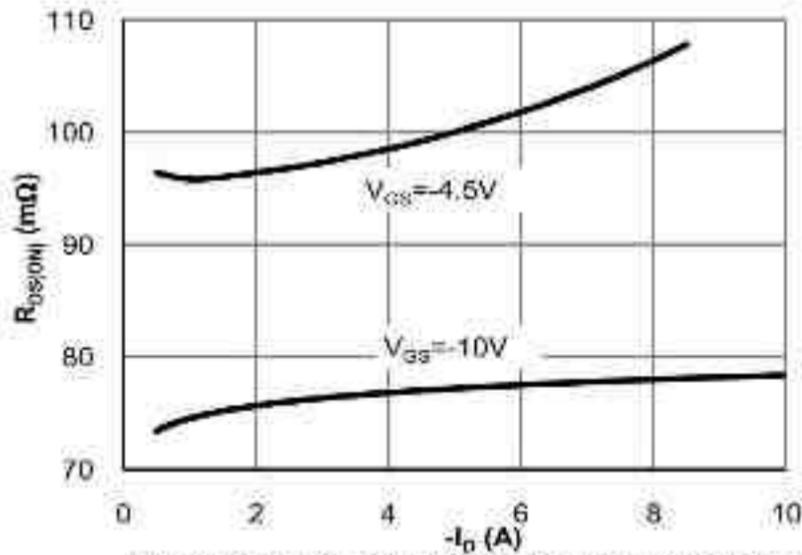


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

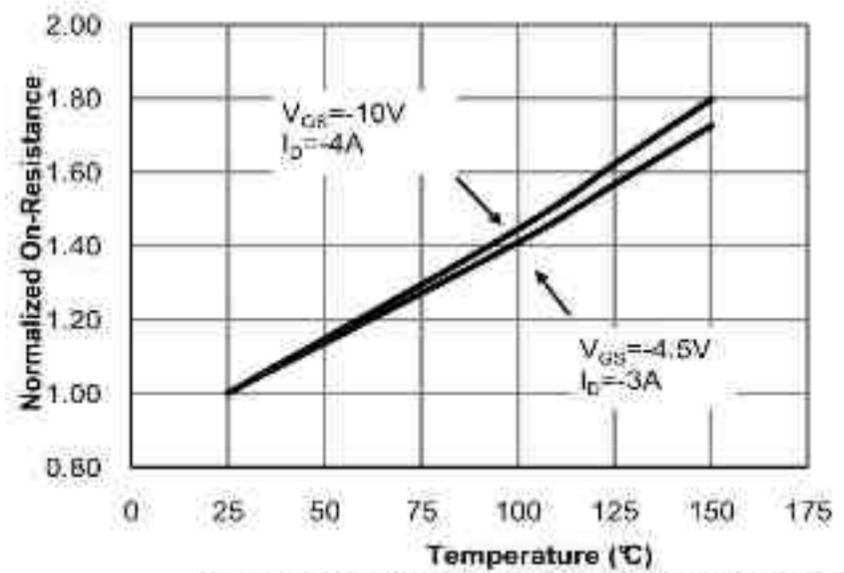


Figure 4: On-Resistance vs. Junction Temperature

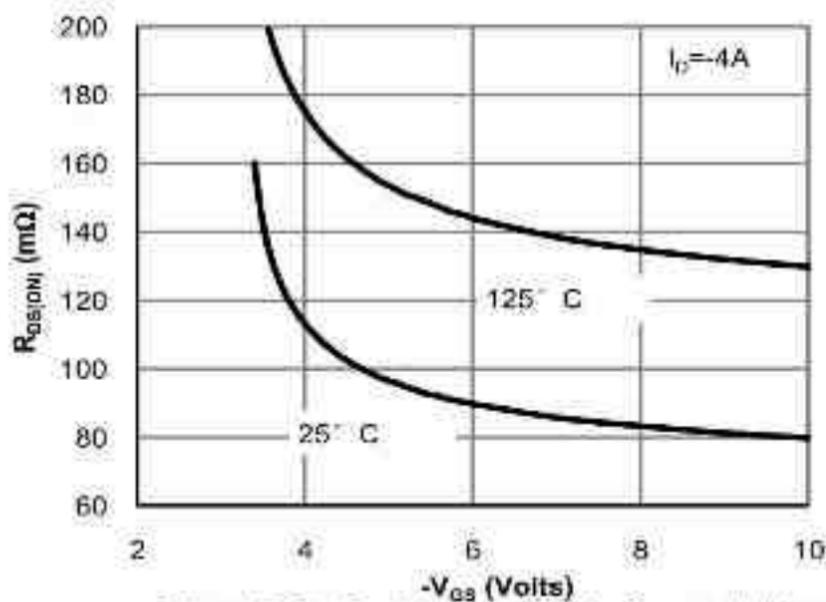


Figure 5: On-Resistance vs. Gate-Source Voltage

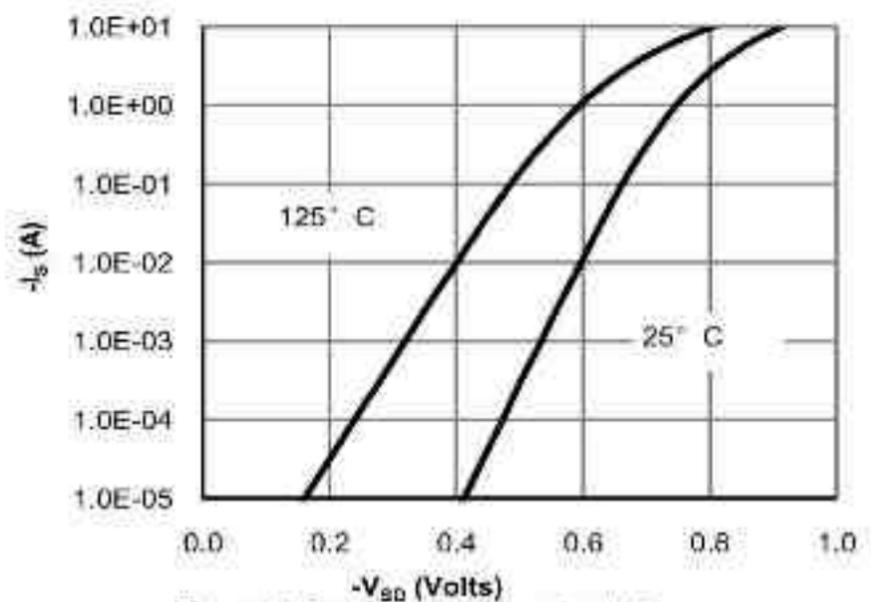


Figure 6: Body-Diode Characteristics

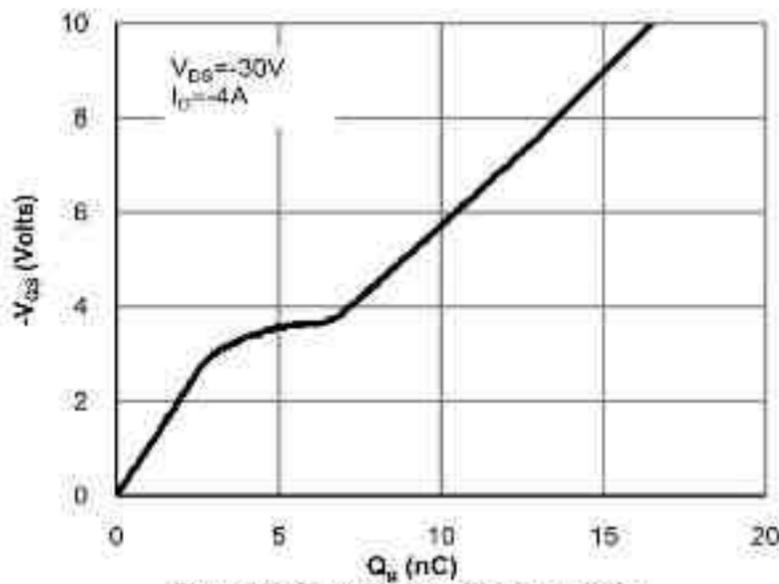


Figure 7: Gate-Charge Characteristics

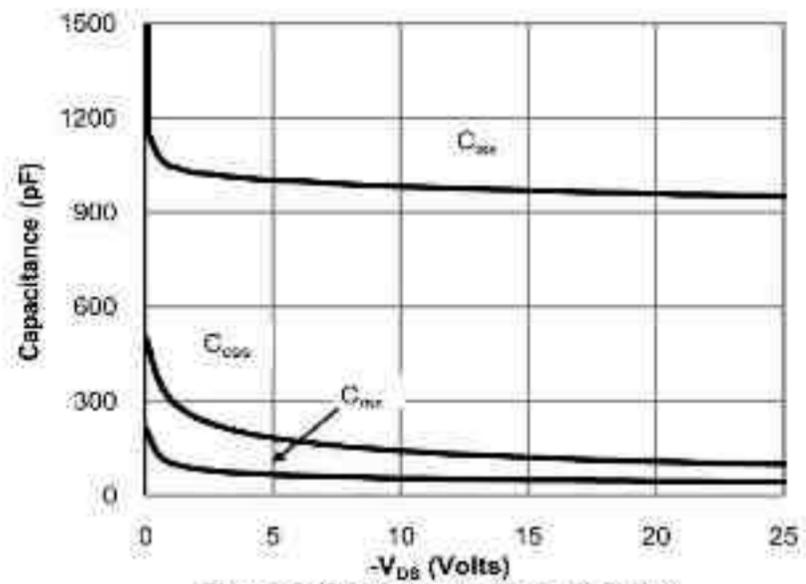


Figure 8: Capacitance Characteristics

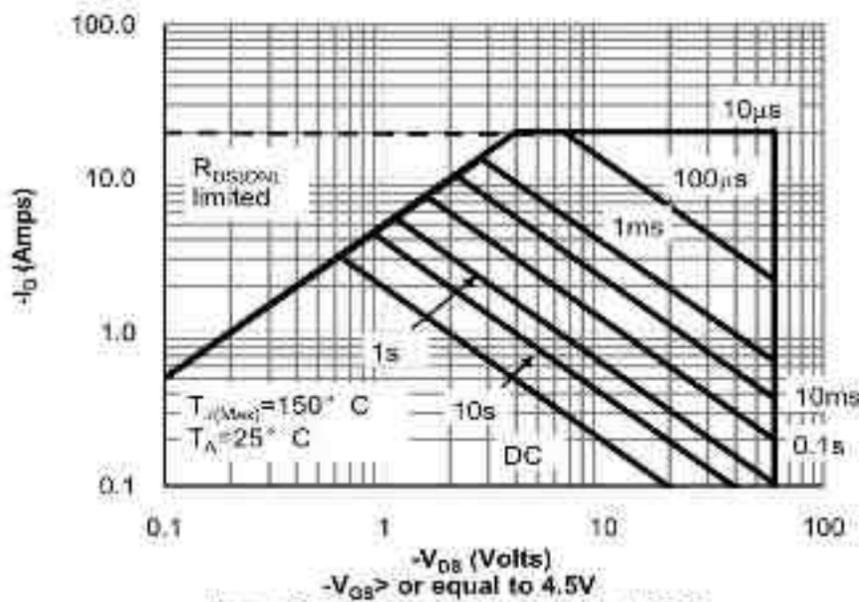


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

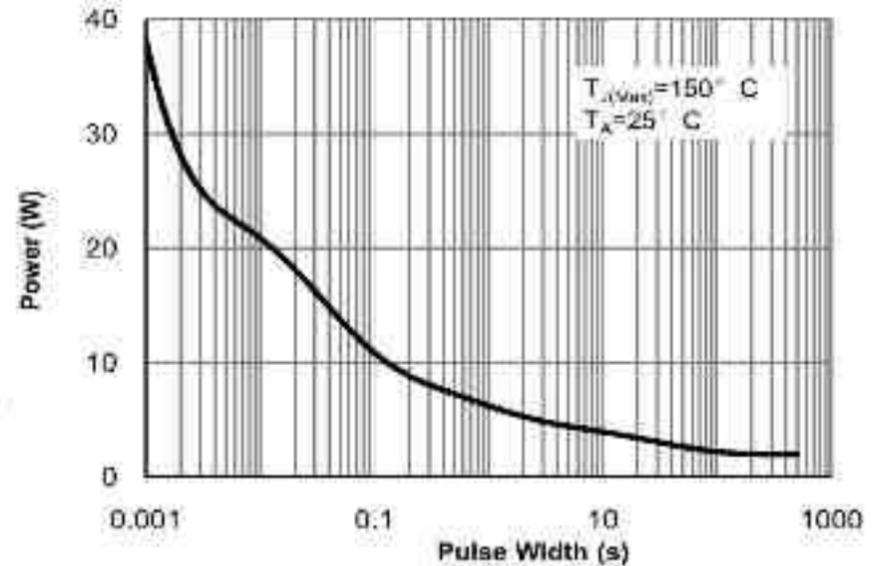


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

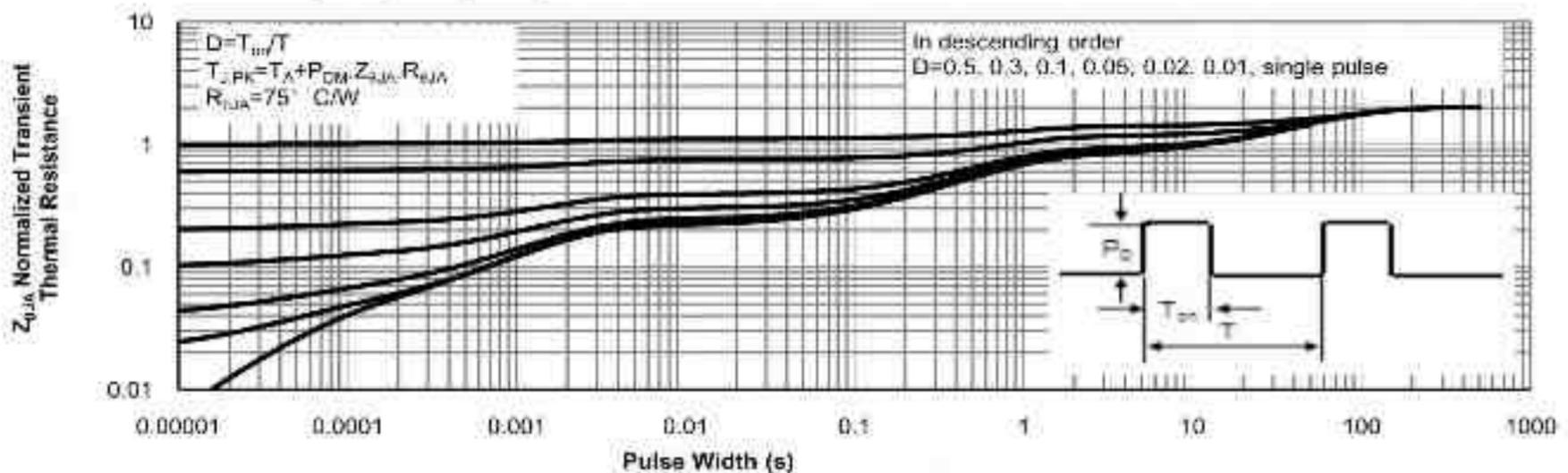
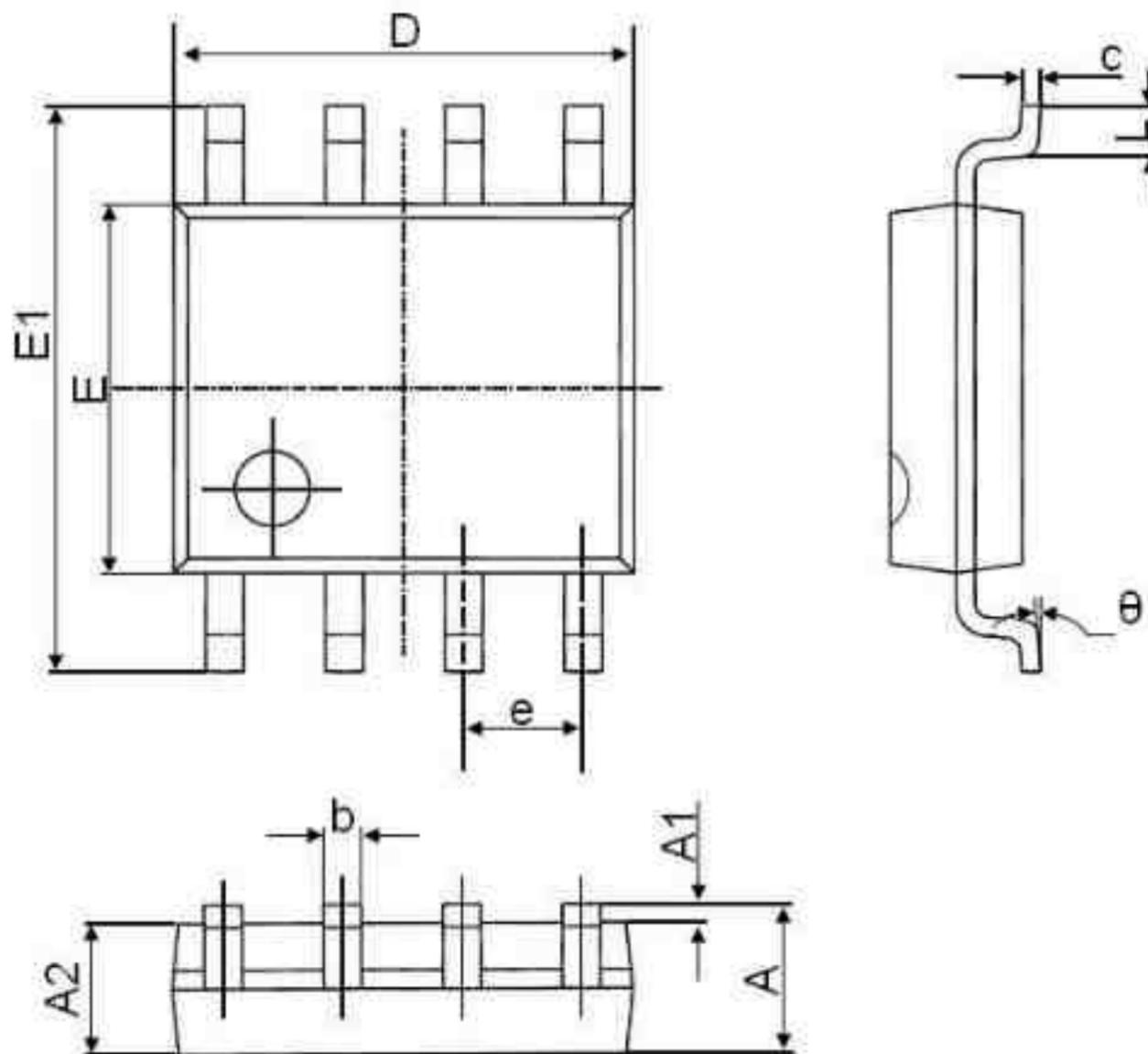


Figure 11: Normalized Maximum Transient Thermal Impedance

## SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
$\theta$	0°	8°	0°	8°