

## N-Channel Enhancement Mode Power MOSFET

### Description

The HM4444 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

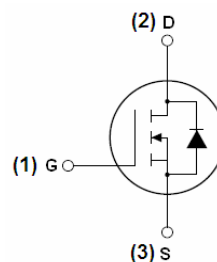
- $V_{DS} = 80V, I_D = 12.5A$   
 $R_{DS(ON)} < 16m\Omega @ V_{GS} = 10V$  (Typ: 13m $\Omega$ )
- High density cell design for ultra low  $R_{dson}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high  $E_{AS}$
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

### Application

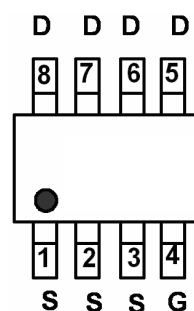
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

**100% UIS TESTED!**

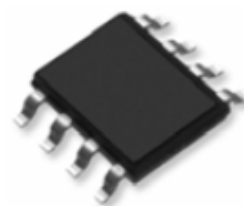
**100%  $\Delta V_{ds}$  TESTED!**



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
HM4444	HM4444	SOP-8	-		

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	80	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	12.5	A
Drain Current-Continuous( $T_C = 100^\circ C$ )	$I_D(100^\circ C)$	8.75	A
Pulsed Drain Current	$I_{DM}$	37.5	A
Maximum Power Dissipation	$P_D$	3	W
Derating factor		0.73	W/ $^\circ C$
Single pulse avalanche energy <sup>(Note 5)</sup>	$E_{AS}$	450	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 175	$^\circ C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta JC}$	1.36	$^\circ C/W$
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**Electrical Characteristics ( $T_C=25^\circ\text{C}$  unless otherwise noted)**

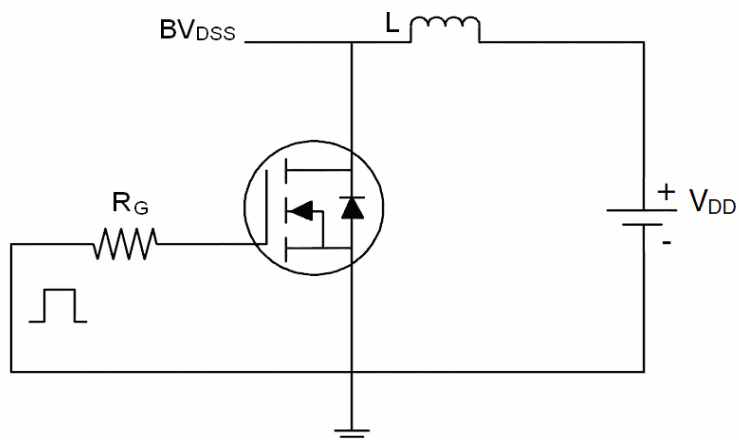
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	80	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=80V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.7	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	13	16	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=10V, I_D=20A$	28	-	-	S
<b>Dynamic Characteristics</b> (Note 4)						
Input Capacitance	$C_{ISS}$	$V_{DS}=25V, V_{GS}=0V,$ $F=1.0MHz$	-	2350	-	PF
Output Capacitance	$C_{OSS}$		-	337	-	PF
Reverse Transfer Capacitance	$C_{RSS}$		-	165	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=40V, I_D=2A, R_L=2\Omega$ $V_{GS}=10V, R_G=3\Omega$	-	12	-	nS
Turn-on Rise Time	$t_r$		-	9	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	20	-	nS
Turn-Off Fall Time	$t_f$		-	18	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=40V, I_D=20A,$ $V_{GS}=10V$	-	55	-	nC
Gate-Source Charge	$Q_{gs}$		-	13	-	nC
Gate-Drain Charge	$Q_{gd}$		-	16	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=20A$	-	-	1.2	V
Diode Forward Current	$I_S$		-	-	12.5	A
Reverse Recovery Time	$t_{rr}$	$T_J = 25^\circ\text{C}, I_F = 20A$ $di/dt = 100A/\mu s$ (Note 3)	-	21		nS
Reverse Recovery Charge	$Q_{rr}$		-	65		nC
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

**Notes:**

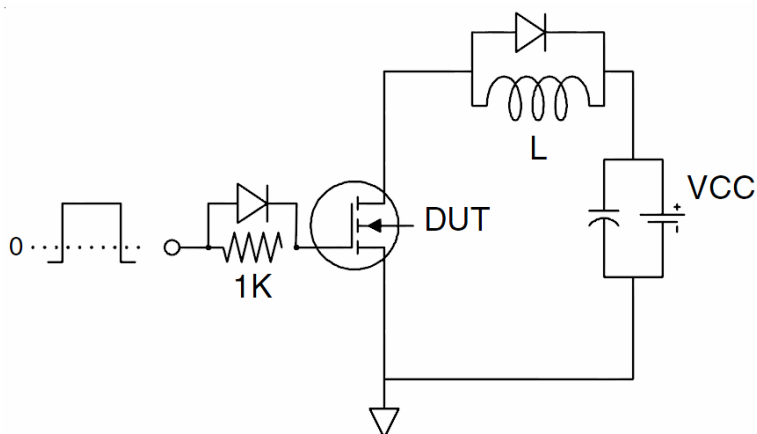
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5. EAS condition:  $T_J=25^\circ\text{C}, V_{DD}=40V, V_G=10V, L=0.5mH, R_g=25\Omega$

**Test Circuit**

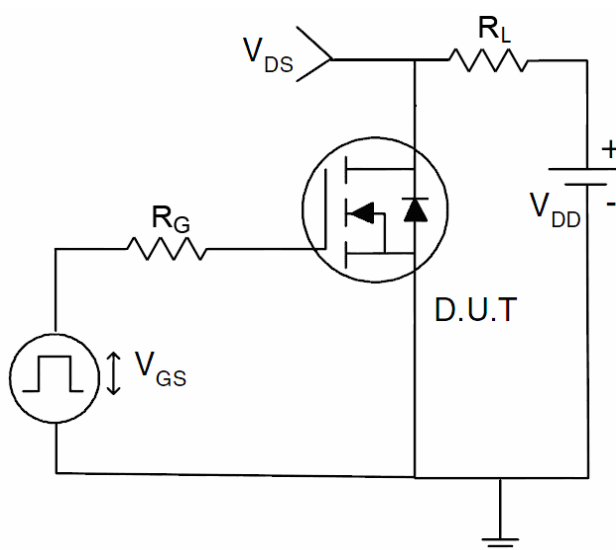
**1) E<sub>AS</sub> test Circuits**



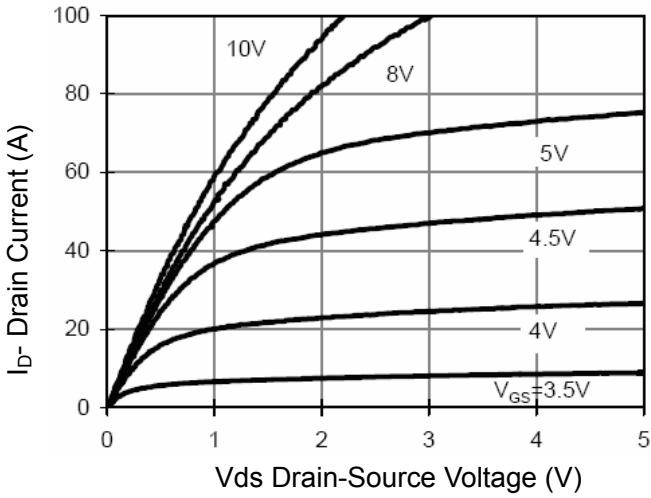
**2) Gate charge test Circuit**



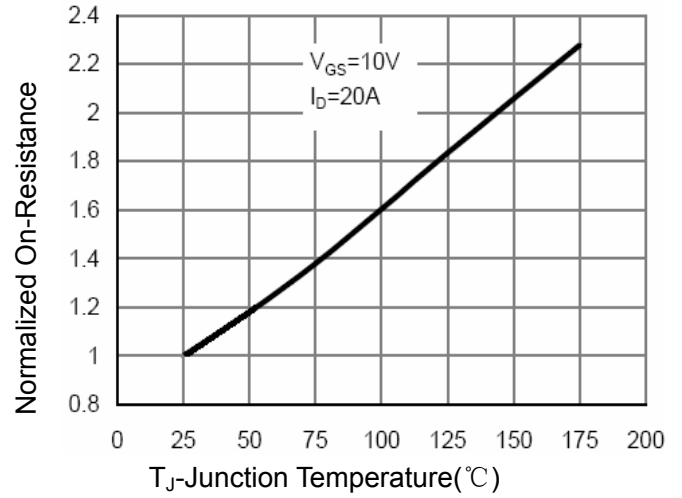
**3) Switch Time Test Circuit**



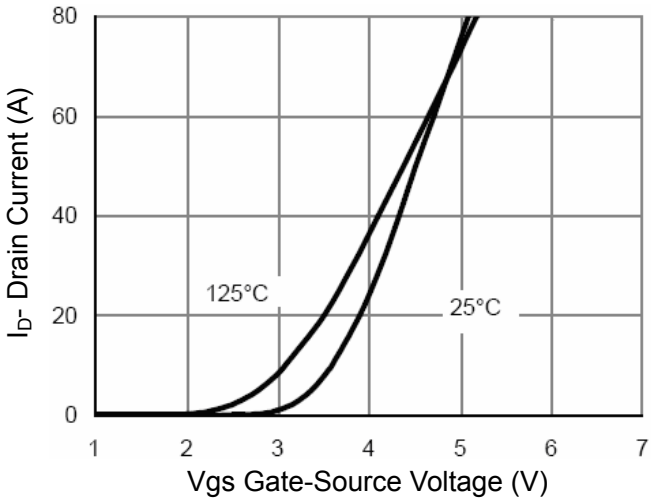
**Typical Electrical and Thermal Characteristics (Curves)**



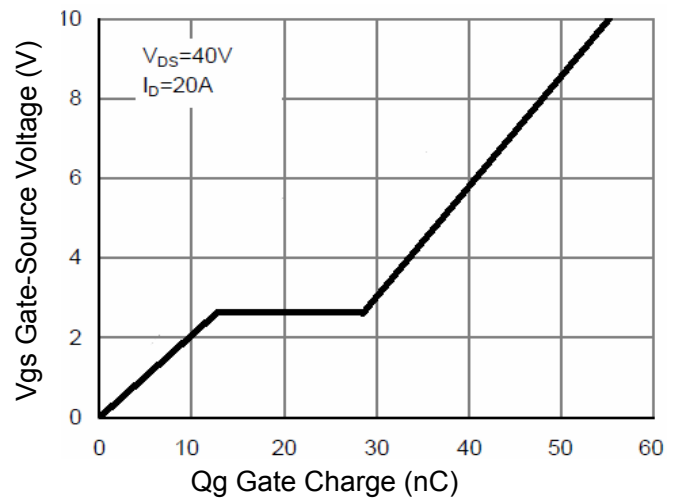
**Figure 1 Output Characteristics**



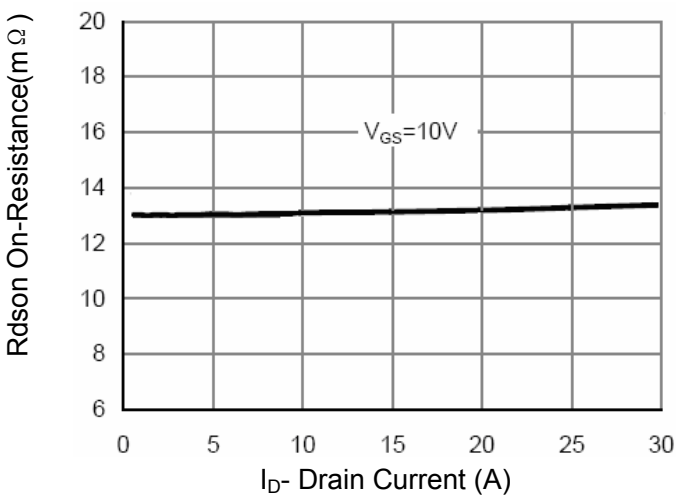
**Figure 4 Rdson-Junction Temperature**



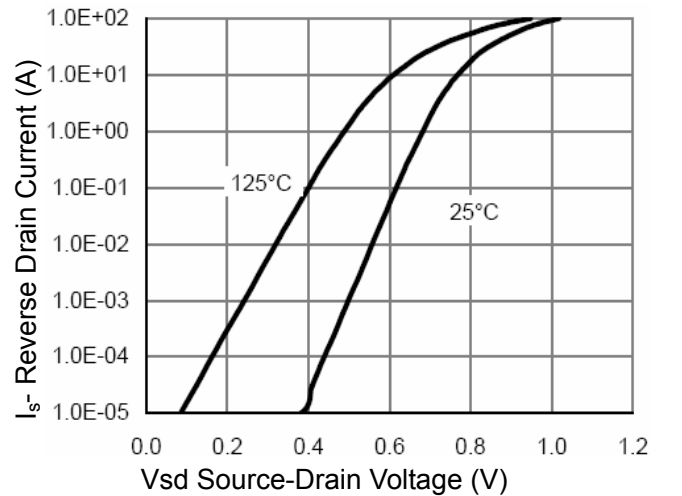
**Figure 2 Transfer Characteristics**



**Figure 5 Gate Charge**



**Figure 3 Rdson- Drain Current**



**Figure 6 Source- Drain Diode Forward**

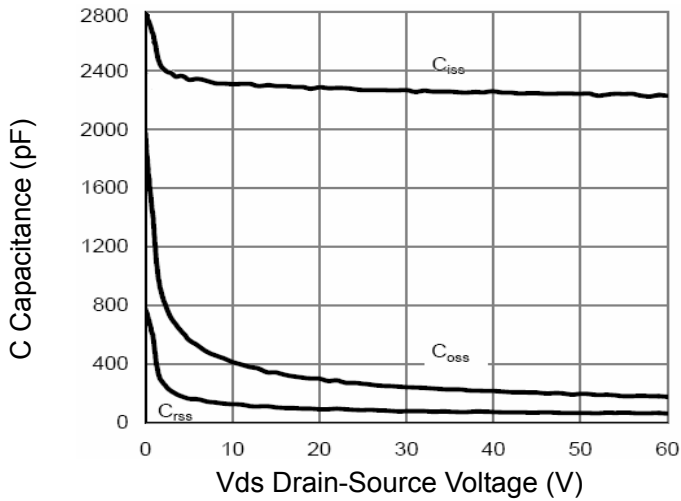


Figure 7 Capacitance vs Vds

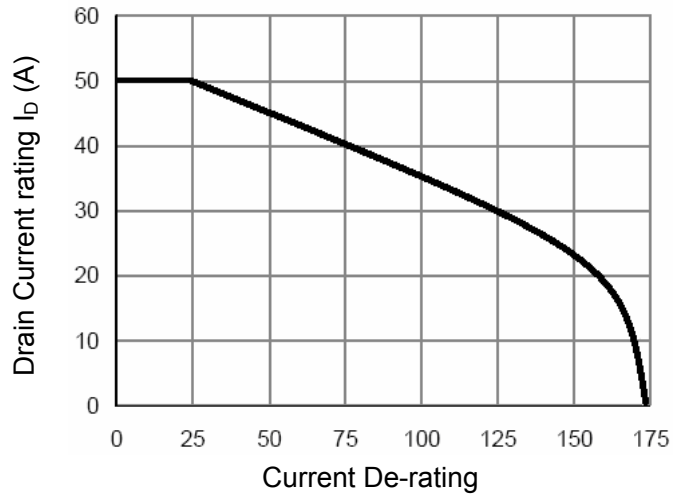


Figure 9 Drain Current vs Junction Temperature

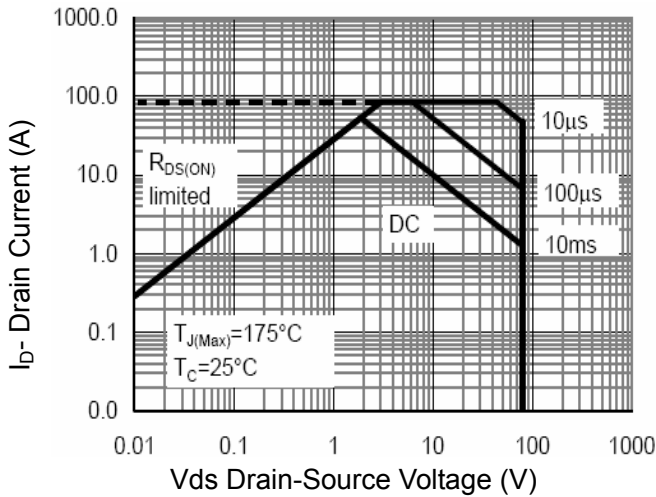


Figure 8 Safe Operation Area

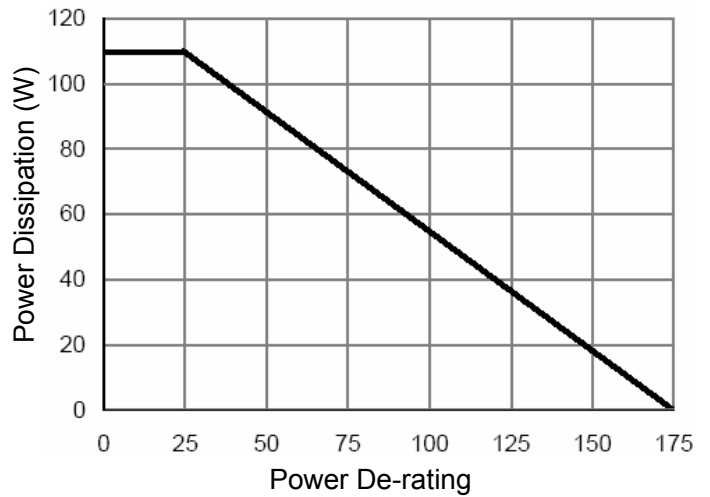


Figure 10 Power vs Junction Temperature

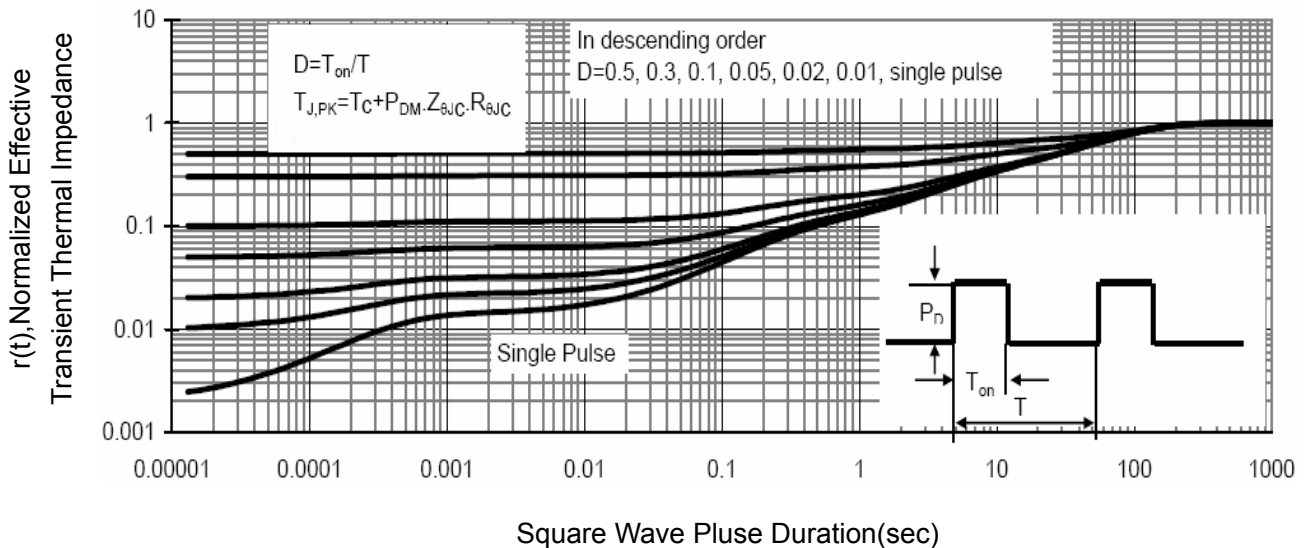
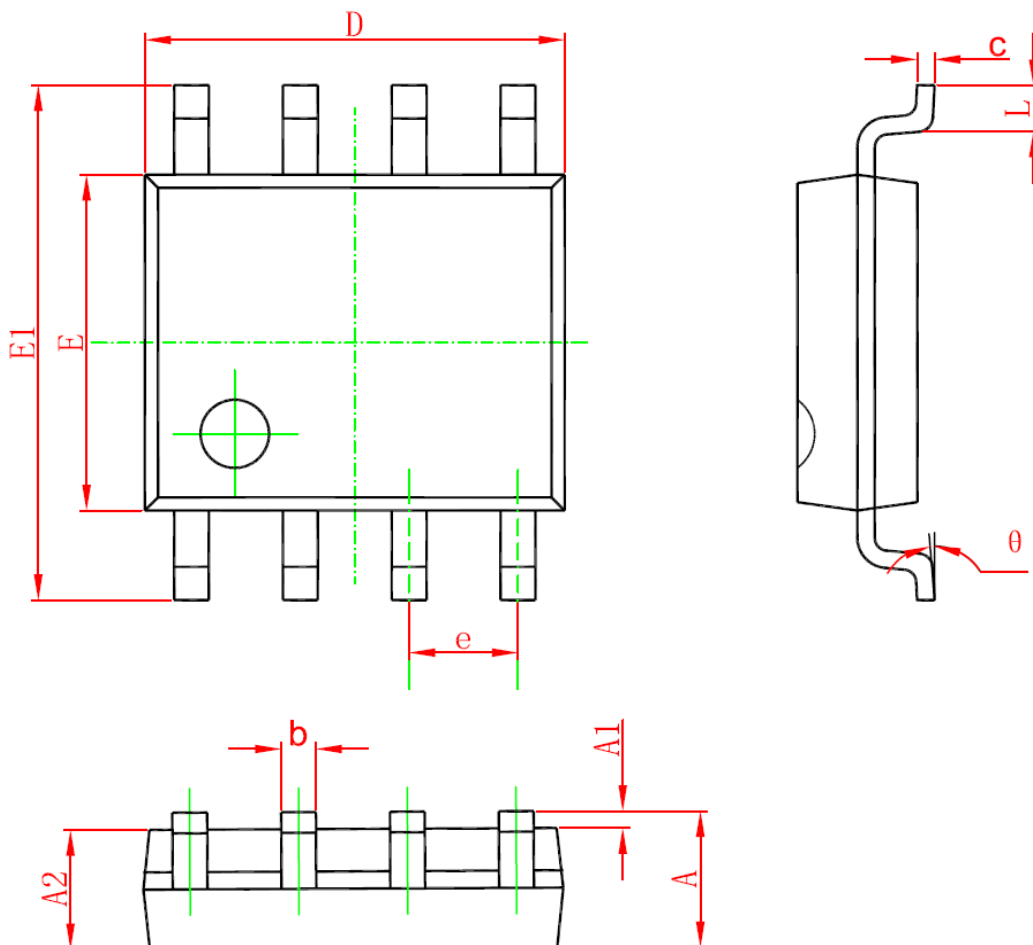


Figure 11 Normalized Maximum Transient Thermal Impedance

## SOP-8 PACKAGE IN FORMATION



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
θ	0°	8°	0°	8°

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