SOP-8 Plastic-Encapsulate MOSFETS

N-Channel Enhancement Mode Power MOSFET

General Description

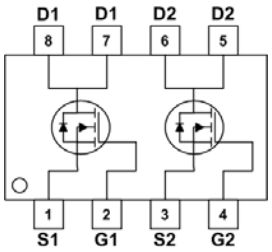
The K5814 is the highest performance trench N-ch MOSFET with extreme high cell density,which provide excellent RDSON and gate chargens for most of the synchronous buck converter applications .

The K5814 meet the RoHS and Green Product requirement,100% EAS guaranteed with full function reliability approved.

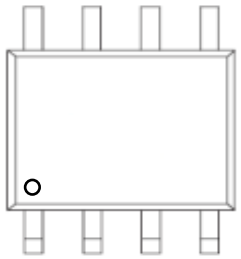
Product Summery

BVDSS	RDSON	ID
57V	17 mΩ	9A

SOP-8



Schematic diagram



Applicatio

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	57	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	9.0	A
I_D@T_C=70℃	Continuous Drain Current, V_{GS} @ 10V[1]	7.0	A
I_{DM}	Pulsed Drain Current[2]	35	A
EAS	Single Pulse Avalanche Energy[3]	23	mJ
I_{AS}	Avalanche Current	9	A
P_D@T_A=25℃	Total Power Dissipation[4]	2.0	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient [1]	---	40	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	62.5	℃/W

Electrical Characteristics (T_J=25 ,unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	57	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=8 A	---	17	20	mΩ
		V_{GS}=4.5V , I_D=7A	---	20	28	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.1	1.5	2.1	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=55V , V_{GS}=0V , T_J=25℃	---	---	1	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=5V , I_D=8A	---	30	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	2.1	---	Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=25V , V_{GS}=10V , I_D=8 A	---	23	---	nC
Q_{gs}	Gate-Source Charge		---	4.6	---	
Q_{gd}	Gate-Drain Charge		---	12	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=25V , V_{GEN}=10V , R_G=6.7Ω R_L=3Ω	---	9.6	---	ns
T_r	Rise Time		---	4.7	---	
$T_{d(off)}$	Turn-Off Delay Time		---	25.2	---	
T_f	Fall Time		---	4.7	---	
C_{iss}	Input Capacitance	V_{DS}=25V , V_{GS}=0V , f=1MHz	---	1000	---	pF
C_{oss}	Output Capacitance		---	108	---	
C_{rss}	Reverse Transfer Capacitance		---	96	---	

Guaranteed Avalanche Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy[5]	V_{DD}=25V , L=0.5mH , I_{AS}=8A	23	---	---	mJ

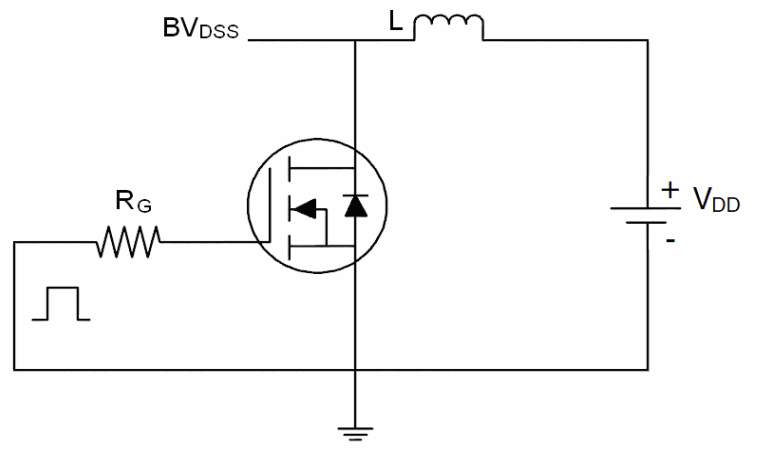
Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,6]	V_G=V_D=0V , Force Current	---	---	2	A
I_{SM}	Pulsed Source Current[2,6]		---	---	35	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=2.3A , T_J=25℃	---	0.8	1.1	V
t_{rr}	Reverse Recovery Time	IF=8A , dI/dt=100A/μs , T_J=25℃	---	6	---	nS
Q_{rr}	Reverse Recovery Charge		---	3.9	---	nC

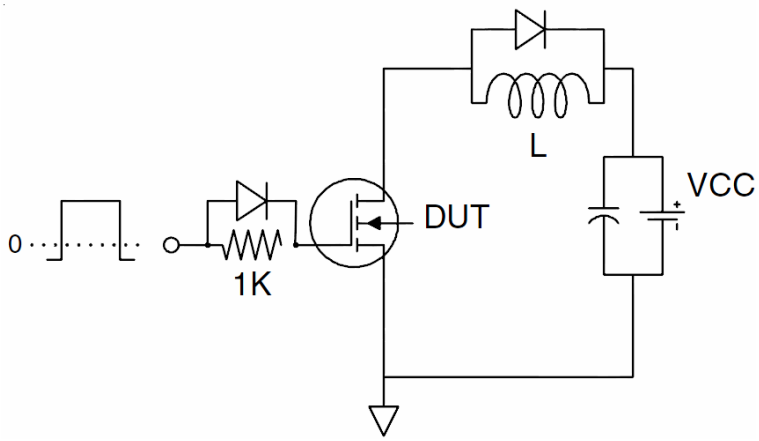
Note :
1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper,t<10sec.
2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3.The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.5mH,I_{AS}=9A
4.The power dissipation is limited by 150℃ junction temperature
5.The Min. value is 100% EAS tested guarantee.
6.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Test Circuit

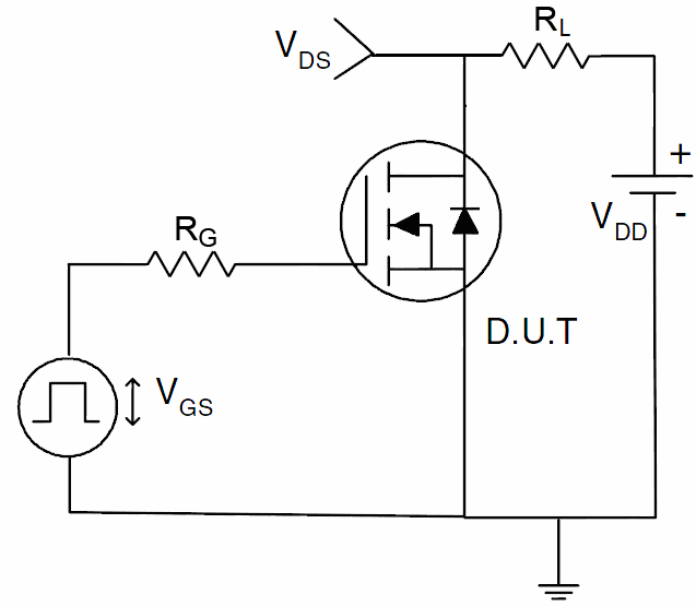
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

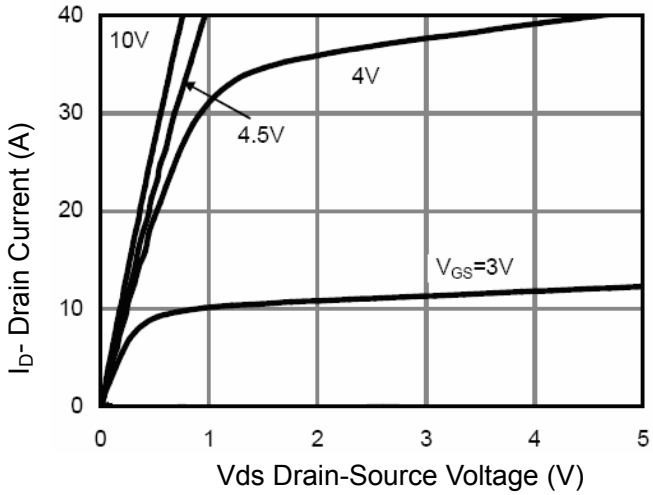


Figure 1 Output Characteristics

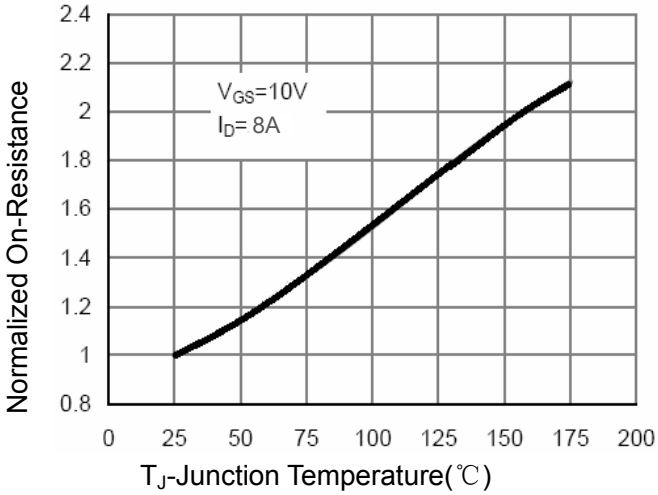


Figure 4 Rdson-Junction Temperature

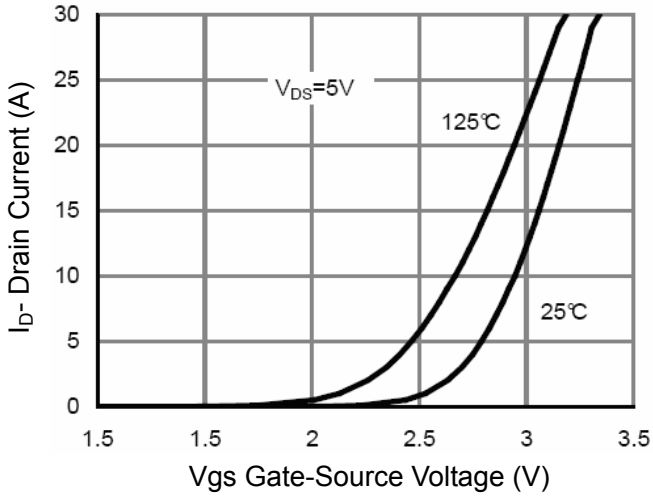


Figure 2 Transfer Characteristics

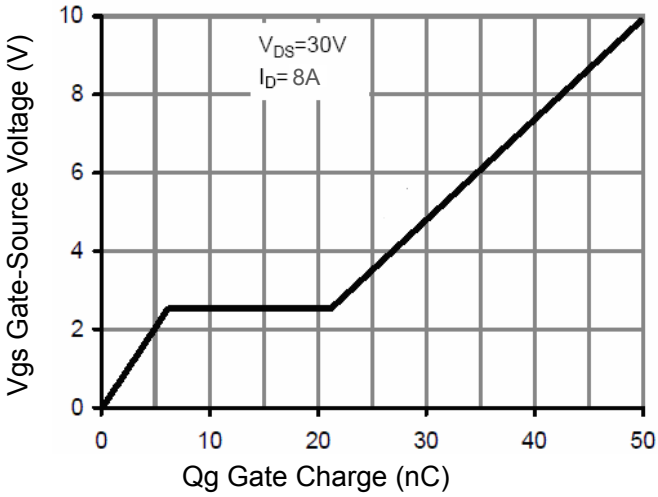


Figure 5 Gate Charge

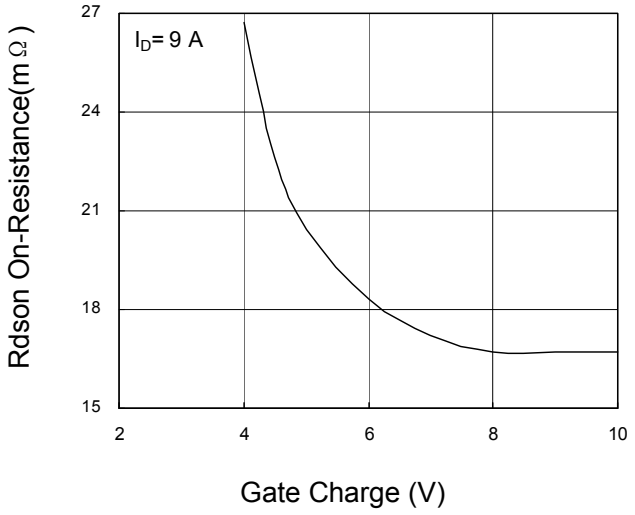


Figure 3 Rdson-Gate Charge

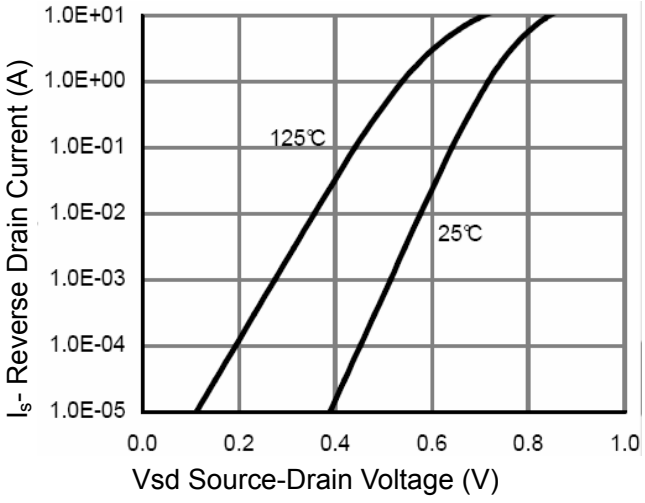


Figure 6 Source- Drain Diode Forward

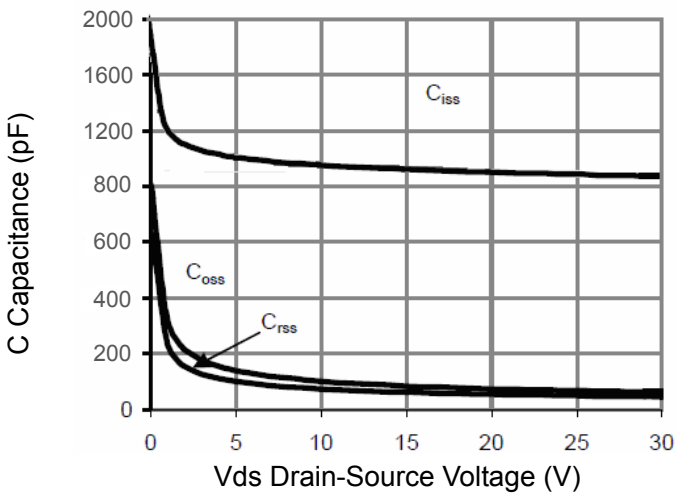


Figure 7 Capacitance vs Vds

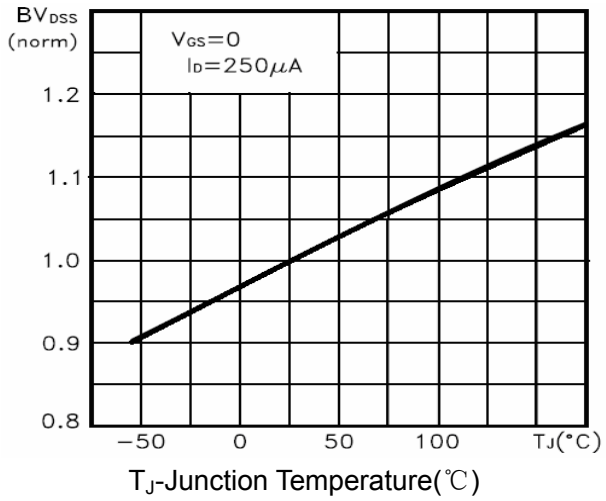


Figure 9 BV_{DSS} vs Junction Temperature

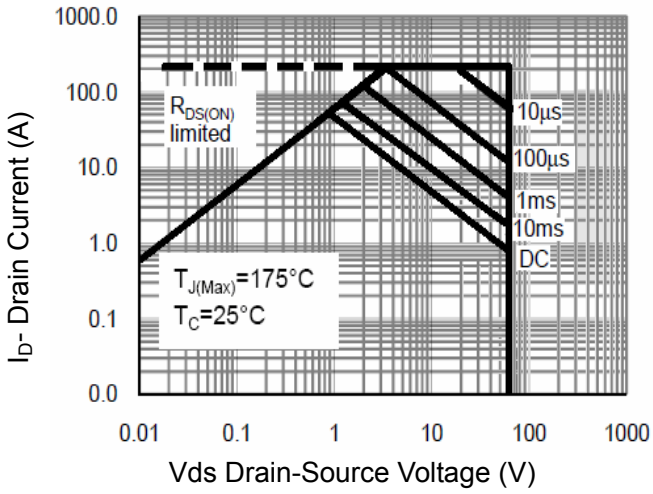


Figure 8 Safe Operation Area

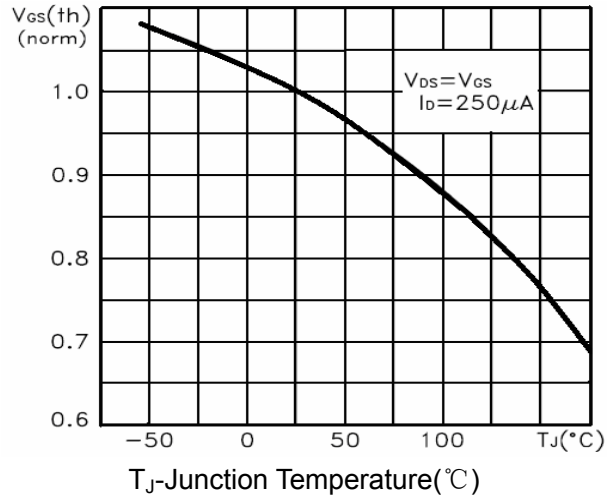


Figure 10 $V_{GS(th)}$ vs Junction Temperature

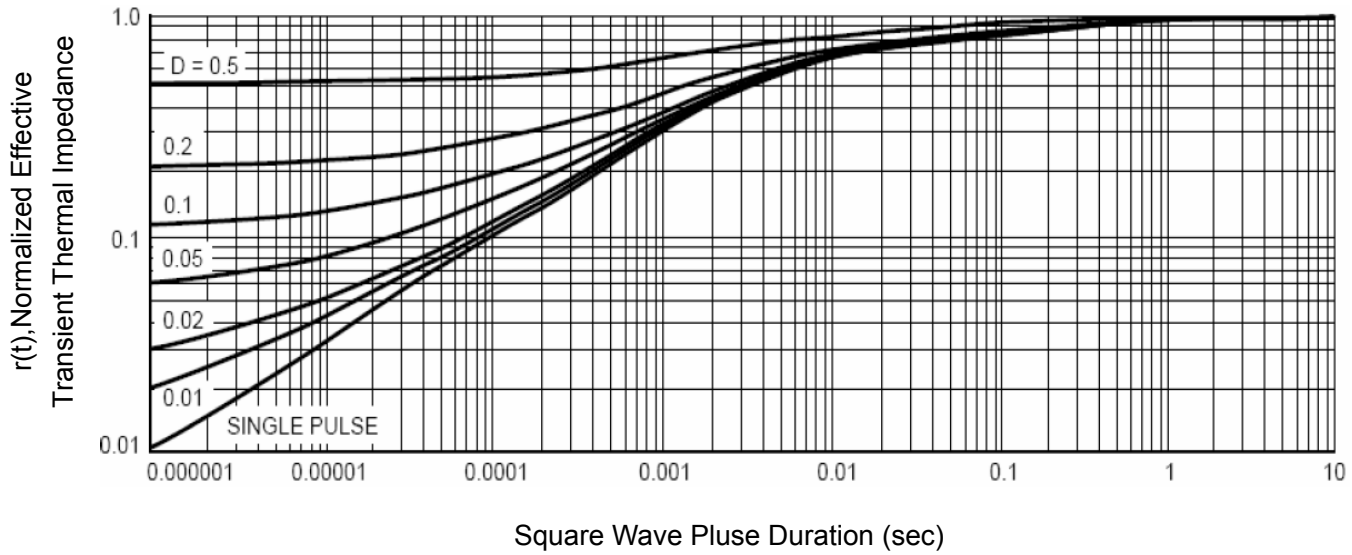
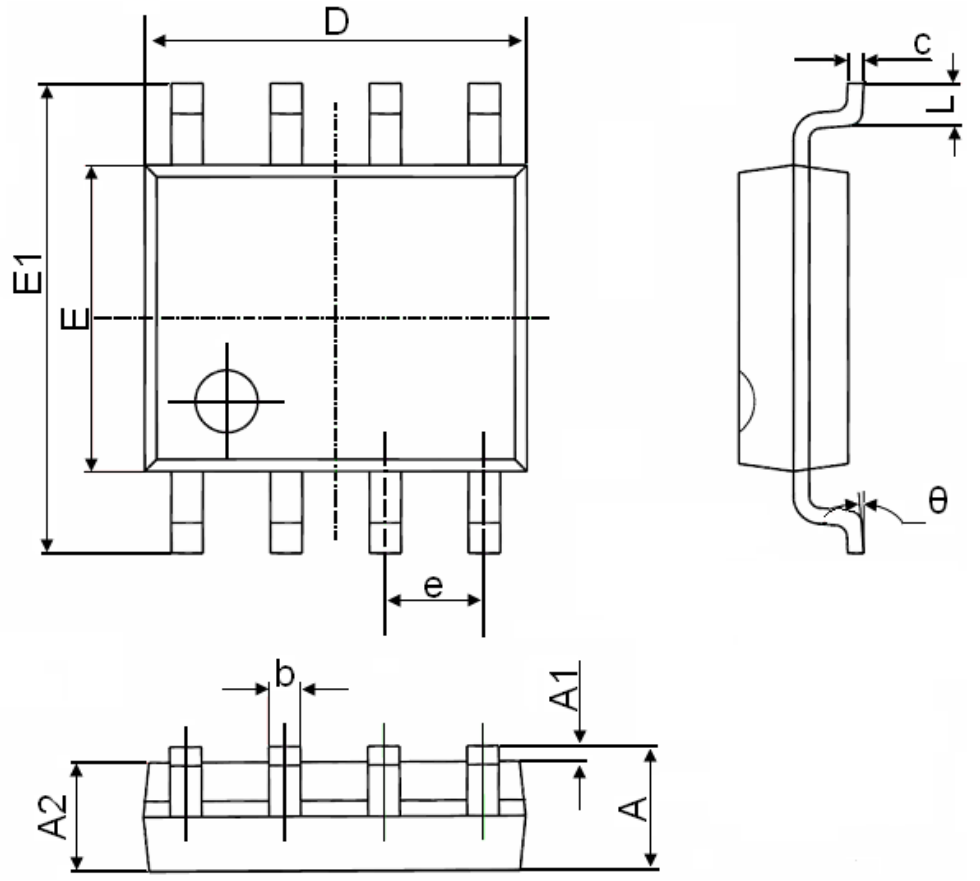


Figure 11 Normalized Maximum Transient Thermal Impedance

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
θ	0°	8°	0°	8°