2060K.（文件编号：S&CIC1874） N-Channel Trench Power MOSFET

General Description

The 2060K.uses advanced trench technology to provide excellent RDS(ON), low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a wide variety of applications.

Features

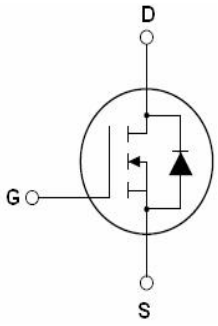
- V_{DS}=20V；I_D=60A；
  $R_{DS(ON)}$<6.0mΩ @ V_{GS}=4.5V
  $R_{DS(ON)}$<8.2mΩ @ V_{GS}=2.5V
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

Application

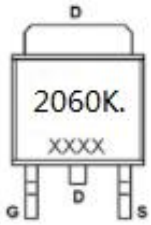
- Battery Protection
- Load switch
- Power management

100% UIS TESTED!
100% ΔVds TESTED!

TO-252(DPAK)
Top View



Schematic Diagram



Marking and pin Assignment

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
2060K.	2060K.	TO-252	325mm	16mm	2500

Table 1. Absolute Maximum Ratings (TA=25℃)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage (V_{GS}=0V）	20	V
V_{GS}	Gate-Source Voltage (V_{DS}=0V)	±12	V
I_D	Drain Current-Continuous(Tc=25℃) (Note 1)	60	A
	Drain Current-Continuous(Tc=100℃)	45	A
$I_{DM\ (pluse)}$	Drain Current-Continuous@ Current-Pulsed (Note 2)	220	A
P_D	Maximum Power Dissipation(Tc=25℃)	64	W
	Maximum Power Dissipation(Tc=100℃)	39	W
E_{AS}	Avalanche energy (Note 3)	256	mJ
T_J,T_{STG}	Operating Junction and Storage Temperature Range	-55 To 155	℃

Table 2. Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JC}$	Thermal Resistance,Junction-to-Case	-	1.85	℃/W

Table 3. Electrical Characteristics (TA=25℃unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=250μA	20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V,V_{GS}=0V			1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±12V,V_{DS}=0V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	0.45	0.7	1.0	V
g_{FS}	Forward Transconductance	V_{DS}=5V,I_D=15A		35		S
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=4.5V, I_D=20A(Tc=25℃)		4.2	6.0	mΩ
		V_{GS}=4.5V, I_D=20A (Tc=125℃)		6.0	10	mΩ
		V_{GS}=2.5V, I_D=15A		5.2	8.2	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=15V,V_{GS}=0V, f=1.0MHz		2850		pF
C_{oss}	Output Capacitance			365		pF
C_{rss}	Reverse Transfer Capacitance			285		pF
Rg	Gate resistance	V_{GS}=0V, V_{DS}=0V,f=1.0MHz		1.2		Ω
Switching Times						
$t_{d(on)}$	Turn-on Delay Time	V_{GS}=4.5V, V_{DS}=15V, R_L=0.75Ω,R_{GEN}=3Ω		18		nS
t_r	Turn-on Rise Time			52		nS
$t_{d(off)}$	Turn-Off Delay Time			76		nS
t_f	Turn-Off Fall Time			26		nS
Q_g	Total Gate Charge	V_{GS}=4.5V, V_{DS}=10V, I_D=12A		34		nC
Q_{gs}	Gate-Source Charge			4		nC
Q_{gd}	Gate-Drain Charge			13		nC
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current(Body Diode)				60	A
V_{SD}	Forward on Voltage	V_{GS}=0V,I_S=20A			1.2	V
t_{rr}	Body Diode Reverse Recovery Time	I_F=20A, dI/dt=100A/μs		24		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=20A, dI/dt=100A/μs		11		nC

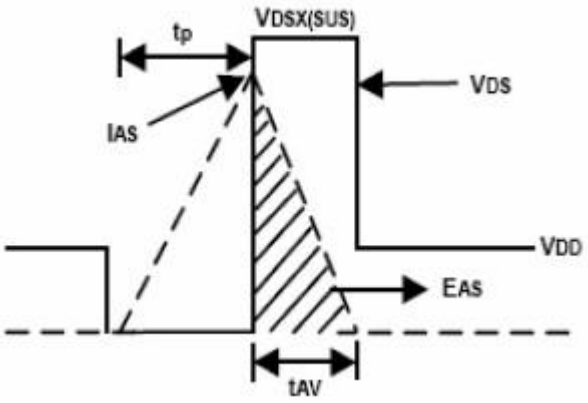
Notes 1.The maximum current rating is package limited.

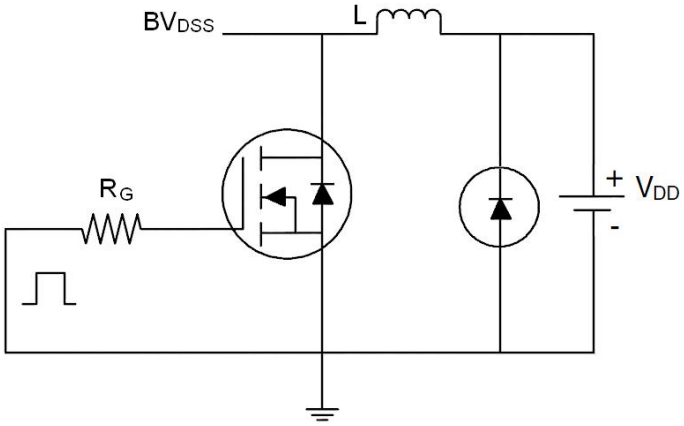
Notes 2.Repetitive Rating: Pulse width limited by maximum junction temperature

Notes 3.EAS condition: T_J=25℃,VDD=30V,V_G=4.5V, RG=25Ω,

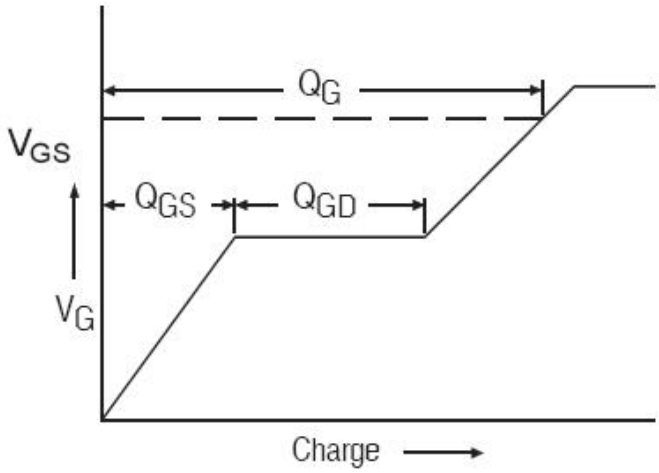
Test Circuit

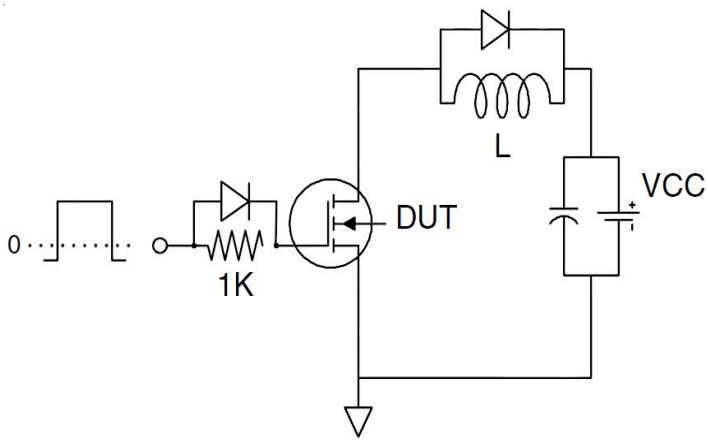
EAS Test Circuits:



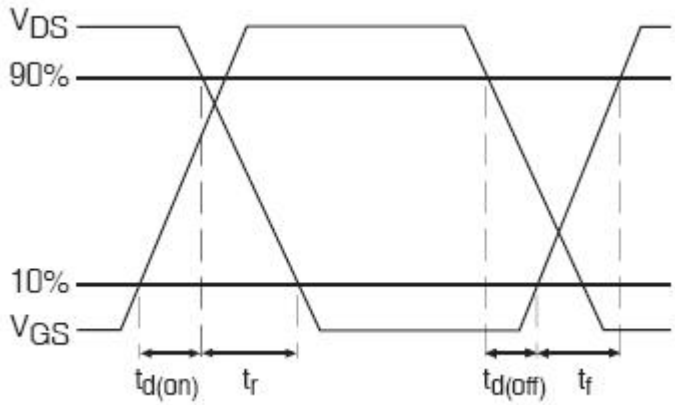


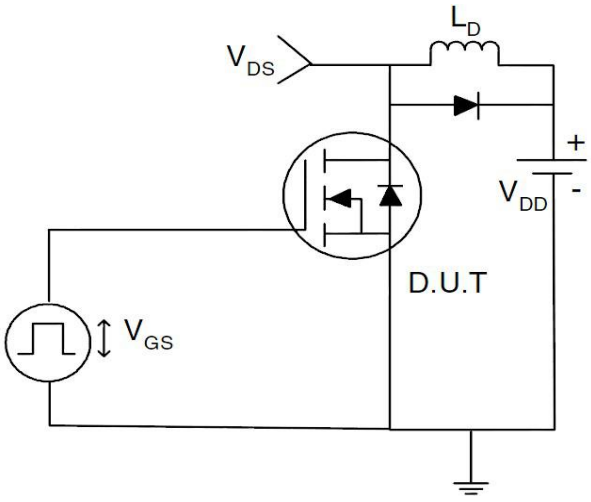
Gate Charge Test Circuit:





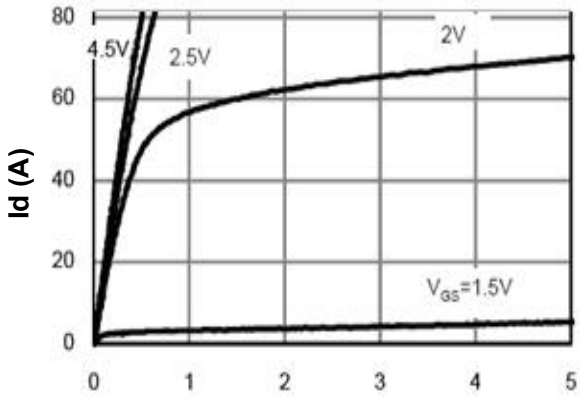
Switch Time Test Circuit：





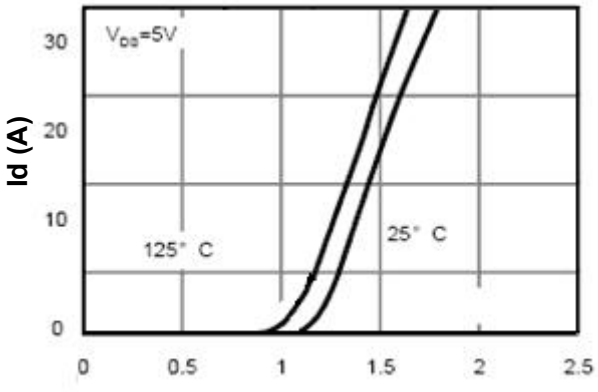
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

Figure 1. Output Characteristics



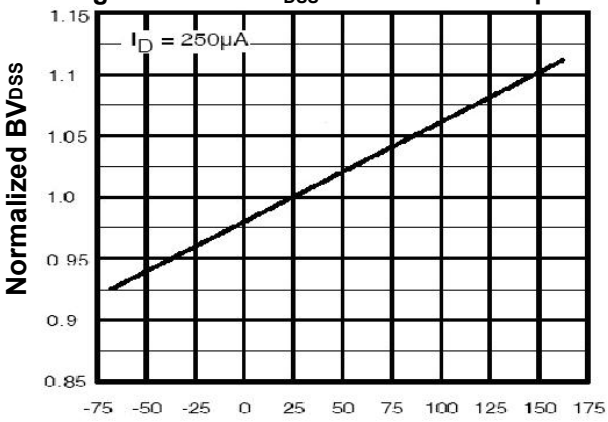
VDS Drain-to-Source Voltage(V)

Figure 2. Transfer Characteristics



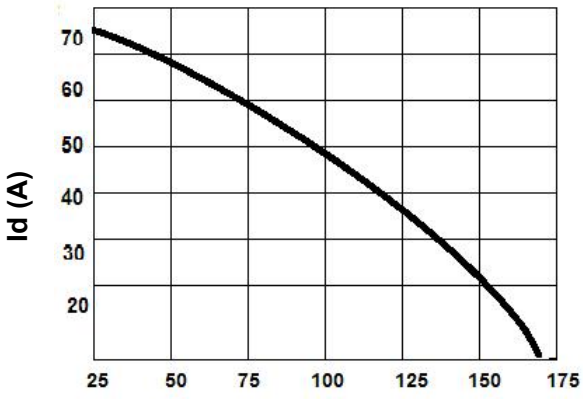
VGS Gate-to-Source Voltage(V)

Figure 3. Max BV_{DSS} vs Junction Temperature



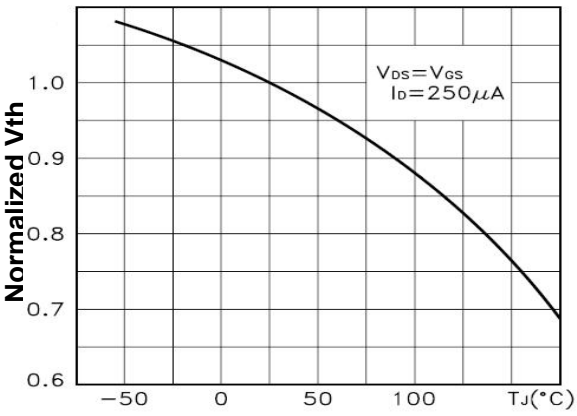
T_J-Junction Temperature(℃)

Figure 4. Drain Current



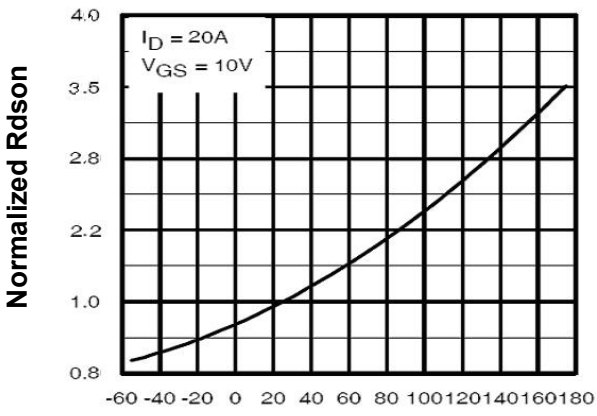
T_J-Junction Temperature(℃)

Figure 5. $V_{GS(th)}$ vs Junction Temperature



TJ-Junction Temperature(℃)

Figure 6. $R_{DS(ON)}$ vs Junction Temperature



TJ-Junction Temperature(℃)

Figure 7. Gate Charge Waveforms

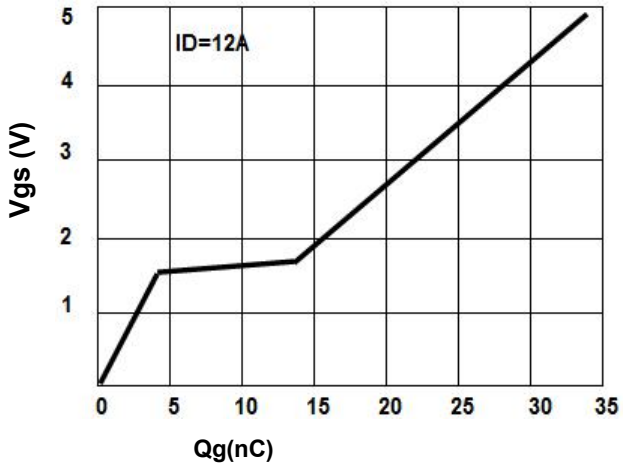


Figure 8. Capacitance

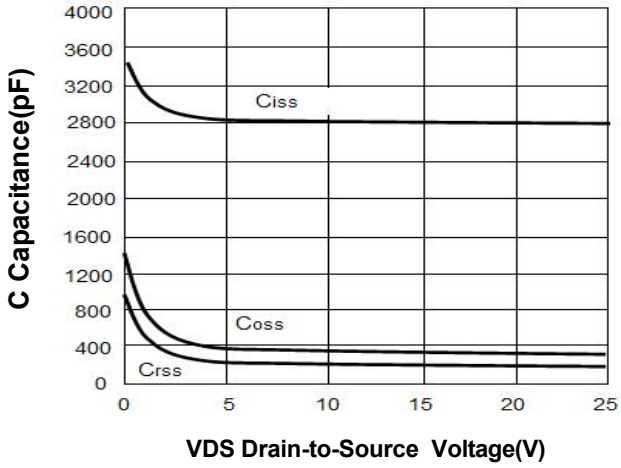


Figure 9. Body-Diode Characteristics

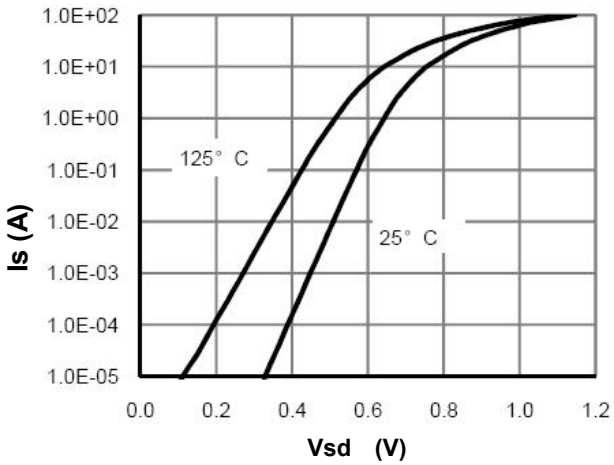


Figure 10. Maximum Safe Operating Area

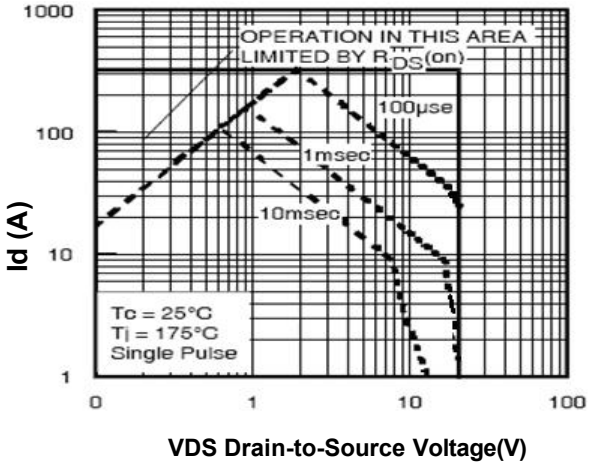
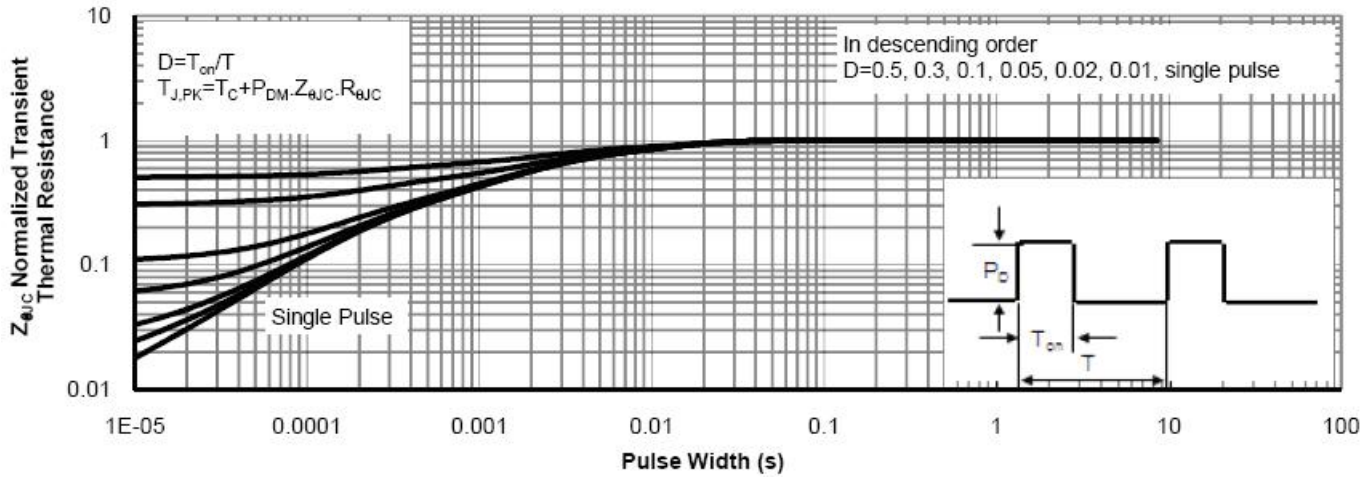
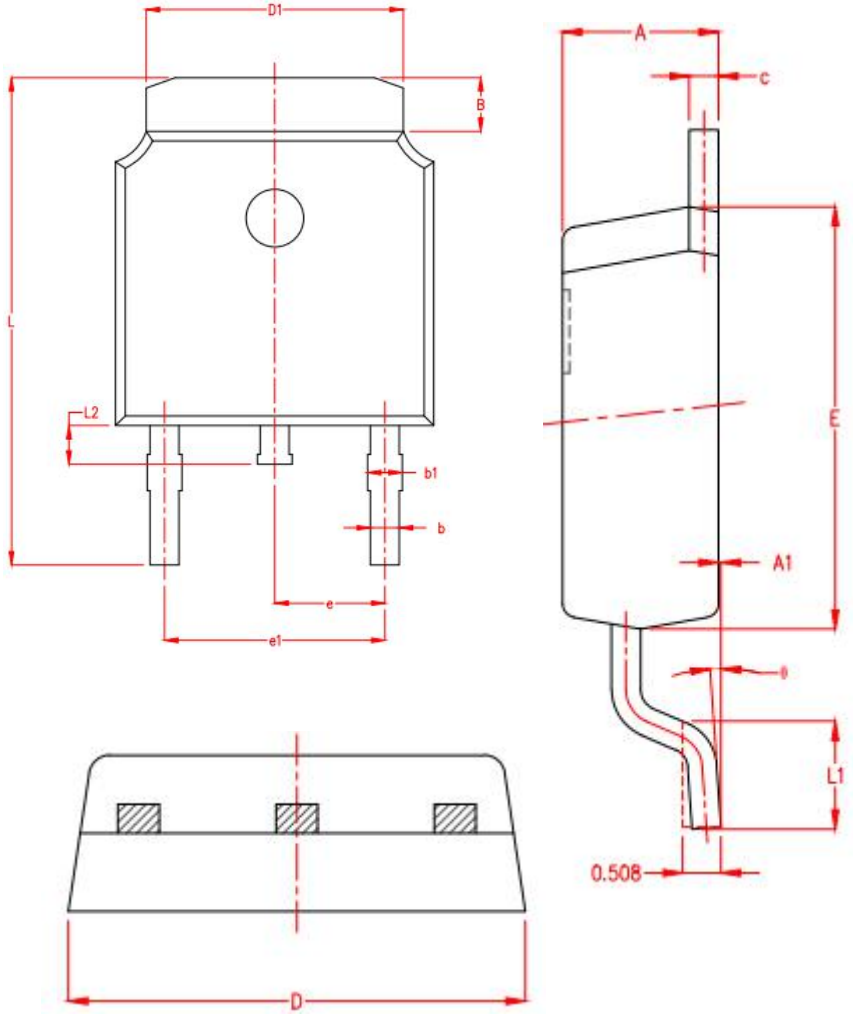


Figure 11. Normalized Maximum Transient Thermal Impedance



TO-252 Package Information



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.15	2.25	2.35
A1	0.00	0.06	0.12
B	0.96	1.11	1.26
b	0.59	0.69	0.79
b1	0.69	0.81	0.93
c	0.34	0.42	0.50
D	6.45	6.60	6.75
D1	5.23	5.33	5.43
E	5.95	6.10	6.25
e	2.286TYP.		
e1	4.47	4.57	4.67
L	9.90	10.10	10.30
L1	1.40	1.55	1.70
L2	0.60	0.80	1.00
θ	0°	4°	8°