



General Description

The 2060A 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 wide variety of applications.

Features

- $V_{DS}=20V$; $I_D=60A$;
 $R_{DS(ON)}<6.5m\Omega$ @ $V_{GS}=4.5V$
 $R_{DS(ON)}<8.6m\Omega$ @ $V_{GS}=2.5V$
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

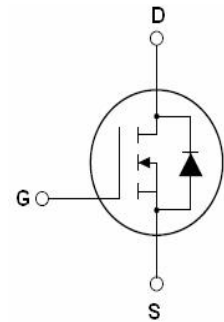
Application

- Battery Protection
- Load switch
- Power management

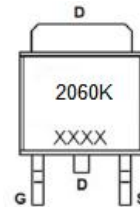
100% UIS TESTED!
100% ΔV_{ds} TESTED!



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°C)

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($T_c=25^\circ C$) (Note 1)	60	A
	Drain Current-Continuous($T_c=100^\circ C$)	42	A
$I_{DM (pluse)}$	Drain Current-Continuous@ Current-Pulsed (Note 2)	202	A
P_D	Maximum Power Dissipation($T_c=25^\circ C$)	62	W
	Maximum Power Dissipation($T_c=100^\circ C$)	38	W
E_{AS}	Avalanche energy (Note 3)	216	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 155	$^\circ C$

Table 2. Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	-	1.95	$^\circ C/W$



Table 3. Electrical Characteristics (TA=25°C 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 (T _c =25°C)		4.9	6.5	mΩ
		V _{GS} =4.5V, I _D =20A (T _c =125°C)		6.5	11	mΩ
		V _{GS} =2.5V, I _D =15A		6.2	8.6	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1.0MHz		2950		pF
C _{oss}	Output Capacitance			389		pF
C _{rss}	Reverse Transfer Capacitance			305		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		1.3		Ω
Switching Times						
t _{d(on)}	Turn-on Delay Time	V _{GS} =4.5V, V _{DS} =15V, R _L =0.75Ω, R _{GEN} =3Ω		19		nS
t _r	Turn-on Rise Time			55		nS
t _{d(off)}	Turn-Off Delay Time			78		nS
t _f	Turn-Off Fall Time			29		nS
Q _g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =10V, I _D =12A		36		nC
Q _{gs}	Gate-Source Charge			5		nC
Q _{gd}	Gate-Drain Charge			14		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		26		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, dI/dt=100A/μs		12		nC

Notes 1. The maximum current rating is package limited.

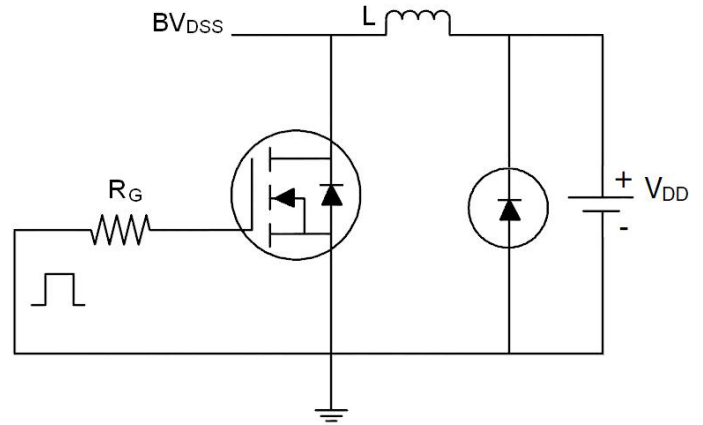
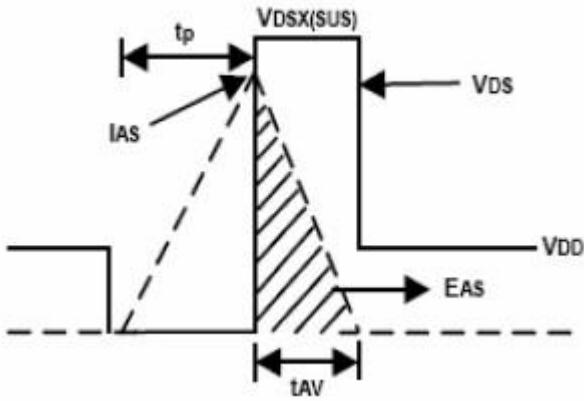
Notes 2. Repetitive Rating: Pulse width limited by maximum junction temperature

Notes 3. EAS condition: T_J=25°C, V_{DD}=30V, V_G=4.5V, R_G=25Ω,

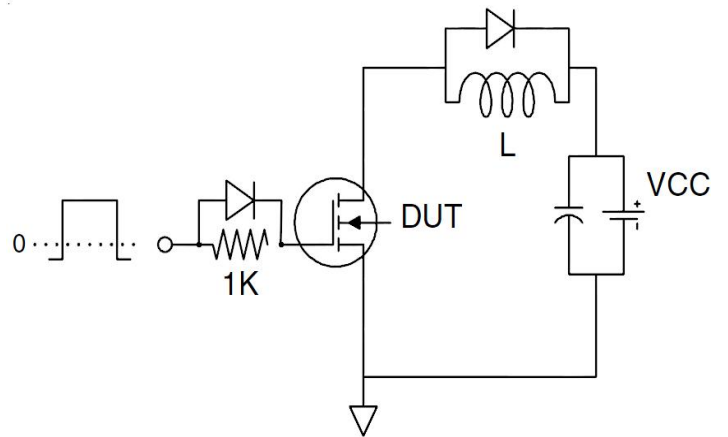
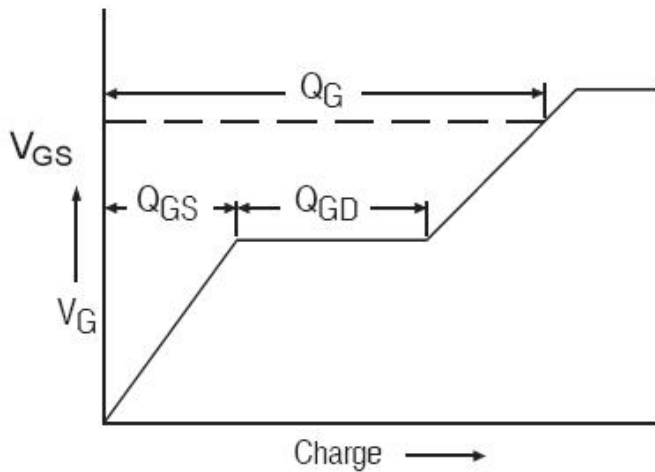


Test Circuit

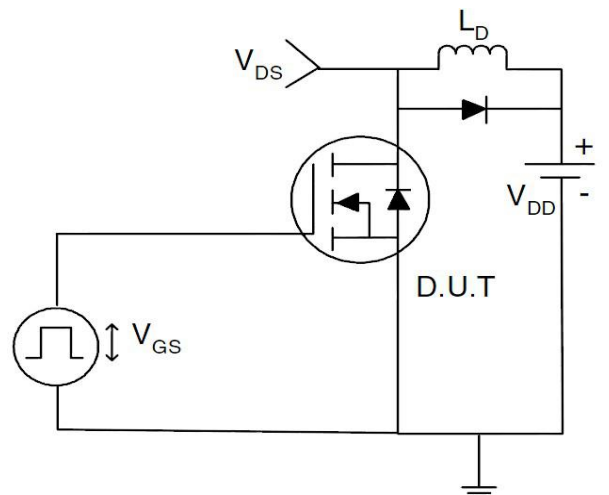
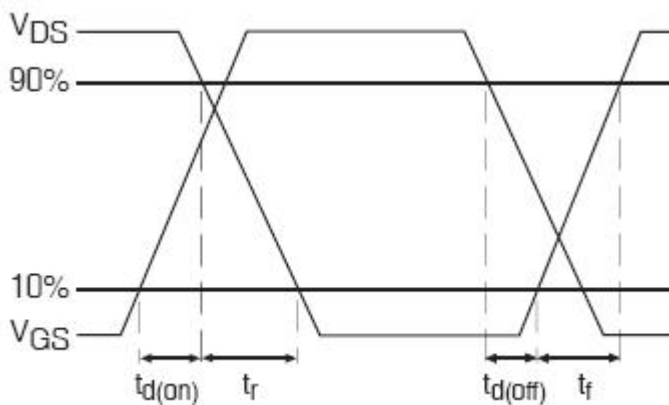
EAS Test Circuits:



Gate Charge Test Circuit:



Switch Time Test Circuit:





TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS(Curves)

Figure 1. Output Characteristics

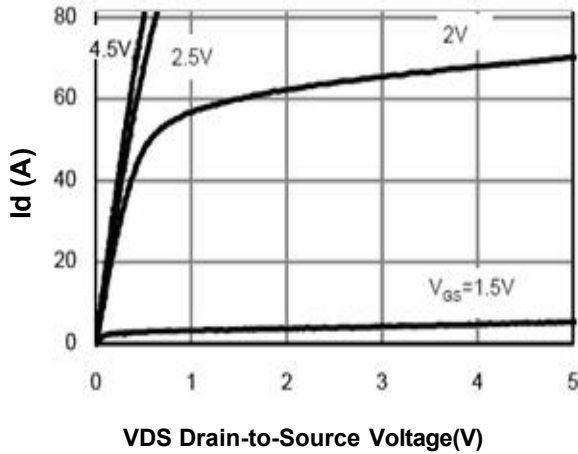


Figure 2. Transfer Characteristics

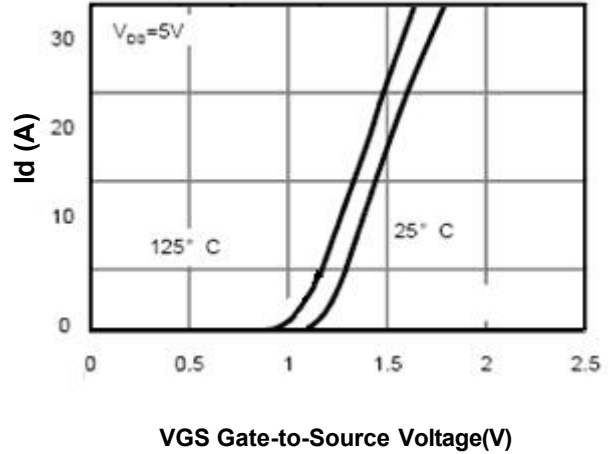


Figure 3. Max BV_{DSS} vs Junction Temperature

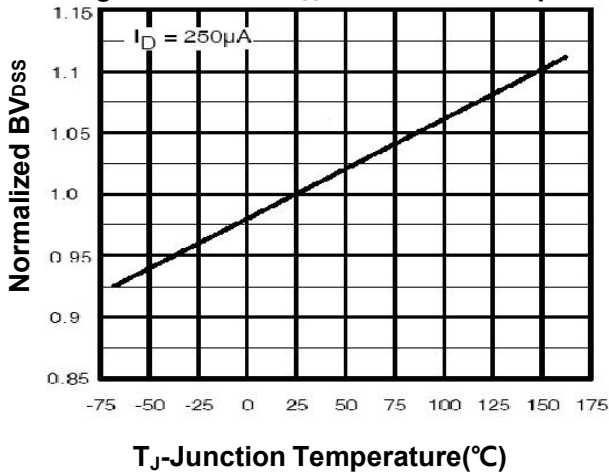


Figure 4. Drain Current

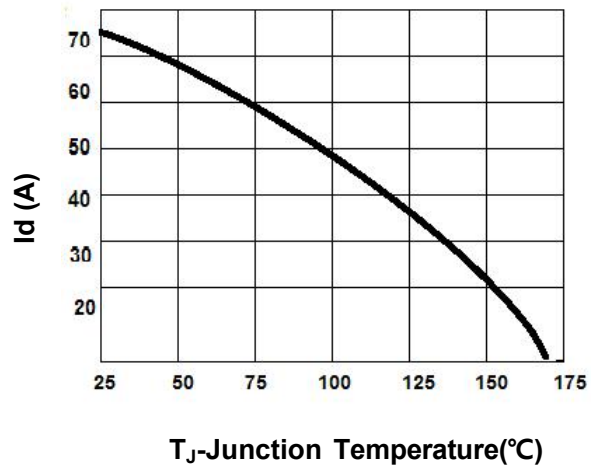


Figure 5. $V_{GS(th)}$ vs Junction Temperature

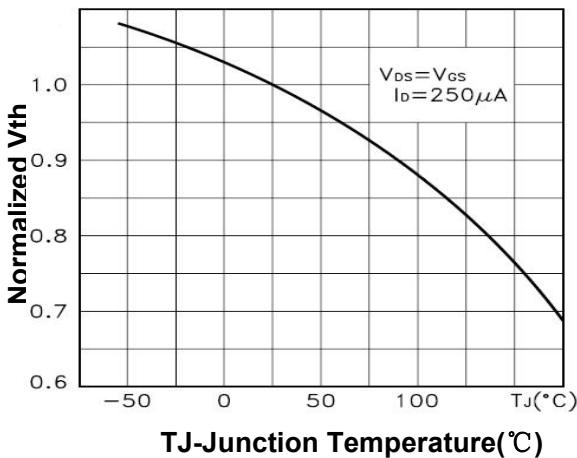


Figure 6. $R_{DS(on)}$ vs Junction Temperature

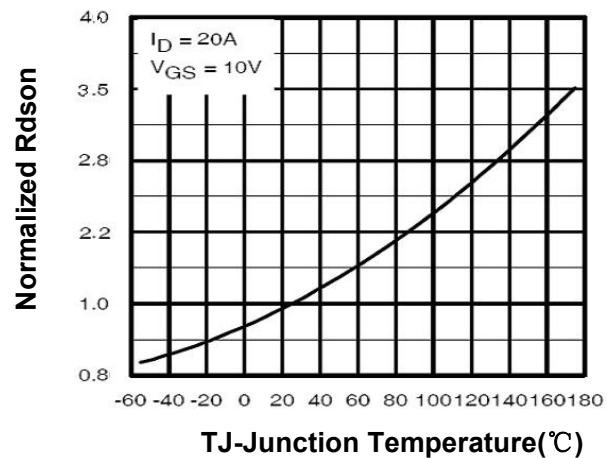




Figure 7. Gate Charge Waveforms

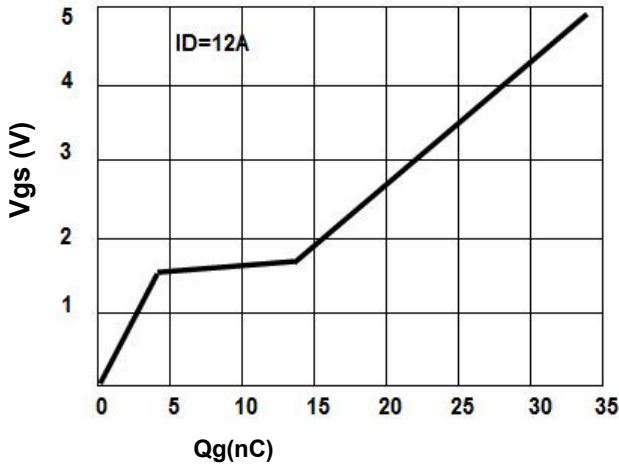


Figure 8. Capacitance

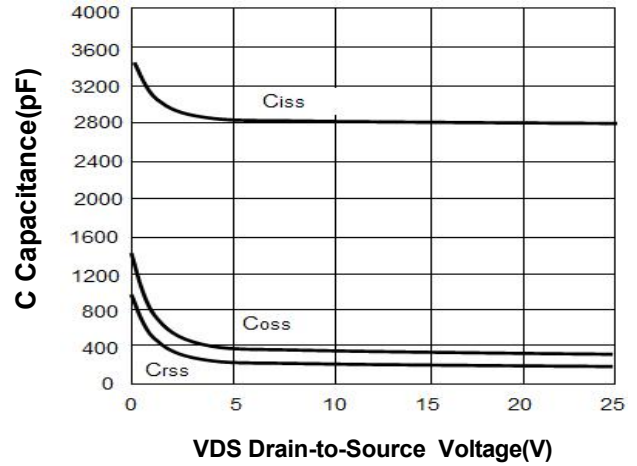


Figure 9. Body-Diode Characteristics

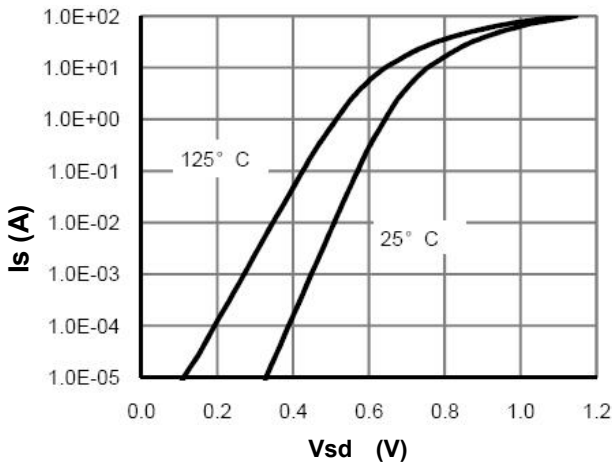


Figure 10. Maximum Safe Operating Area

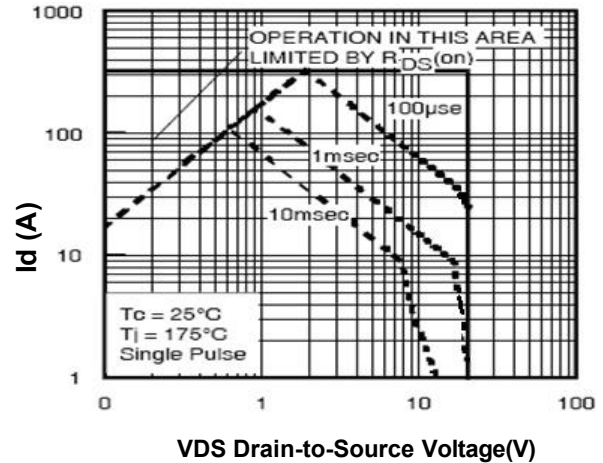
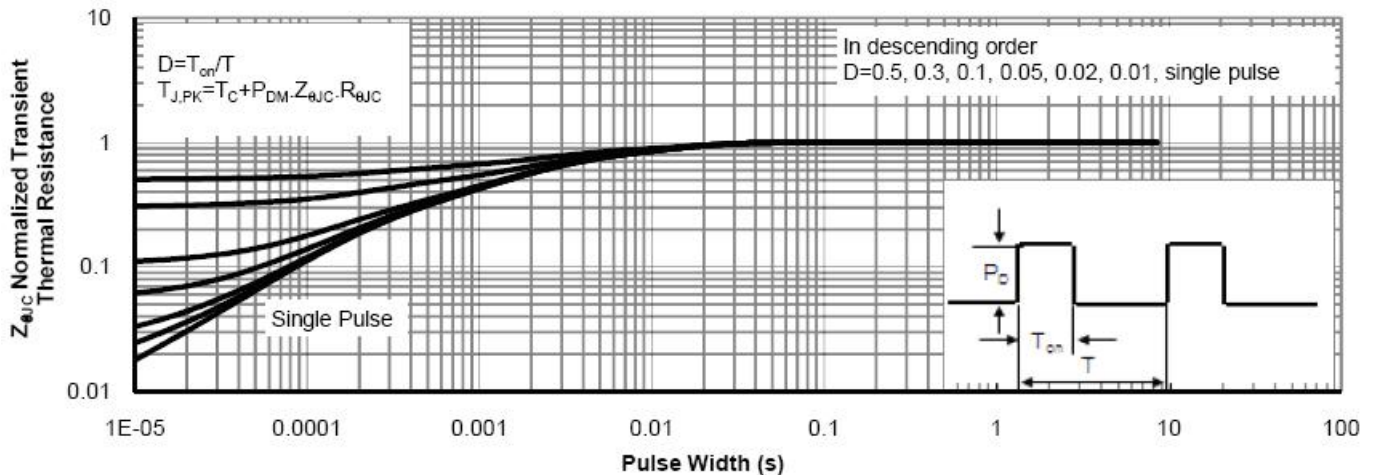
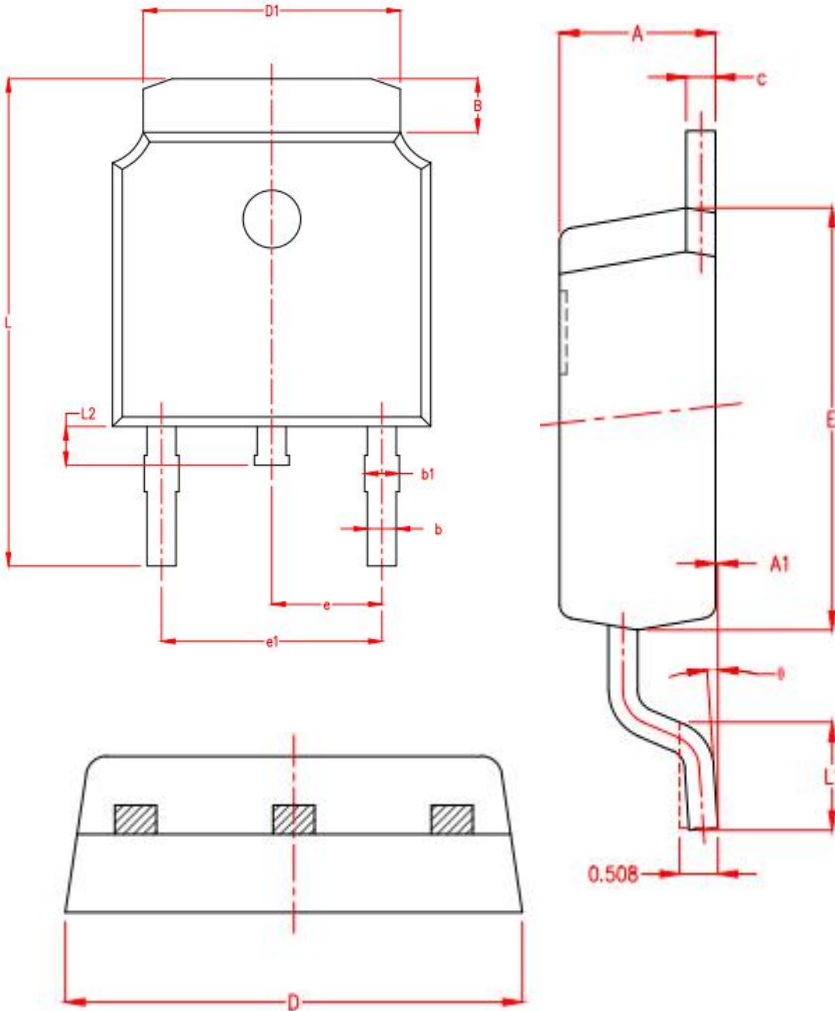


Figure 11. Normalized Maximum Transient Thermal Impedance





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°