

Pb Free Product

Description

The RST6020A 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

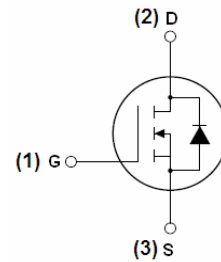
- $V_{DS} = 60V, I_D = 20A$
 $R_{DS(ON)} < 35m\Omega @ V_{GS} = 10V$
 $R_{DS(ON)} < 40m\Omega @ V_{GS} = 4.5V$
- High density cell design for ultra low $R_{DS(ON)}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

Application

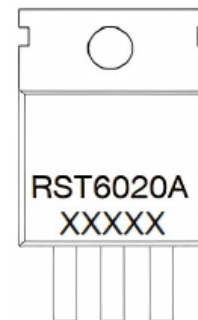
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

100% UIS TESTED!

100% ΔV_{DS} TESTED!



Schematic diagram



Marking and pin assignment



TO-220-3L top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
RST6020A	RST6020A	TO-220-3L	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	20	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D (100^\circ C)$	14	A
Pulsed Drain Current	I_{DM}	60	A
Maximum Power Dissipation	P_D	45	W
Derating factor		0.3	W/ $^\circ C$
Single pulse avalanche energy (Note 5)	E_{AS}	72	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

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Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	3.3	°C/W
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Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =60V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.2	1.6	2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =20A	-	24	35	mΩ
		V _{GS} =4.5V, I _D =20A		30	40	
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =5A	11	-	-	S
Dynamic Characteristics ^(Note4)						
Input Capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V, F=1.0MHz	-	590	-	PF
Output Capacitance	C _{oss}		-	70	-	PF
Reverse Transfer Capacitance	C _{rss}		-	64	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =30V, I _D =2A, V _{GS} =10V, R _G =3Ω	-	6	-	nS
Turn-on Rise Time	t _r		-	6.1	-	nS
Turn-Off Delay Time	t _{d(off)}		-	17	-	nS
Turn-Off Fall Time	t _f		-	3	-	nS
Total Gate Charge	Q _g	V _{DS} =30V, I _D =10A, V _{GS} =10V	-	25.3		nC
Gate-Source Charge	Q _{gs}		-	4.7		nC
Gate-Drain Charge	Q _{gd}		-	6.1		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V _{SD}	V _{GS} =0V, I _S =20A	-		1.2	V
Diode Forward Current ^(Note 2)	I _S		-	-	20	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F =20A di/dt = 100A/μs ^(Note3)	-	29.5	-	nS
Reverse Recovery Charge	Q _{rr}		-	50	-	nC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

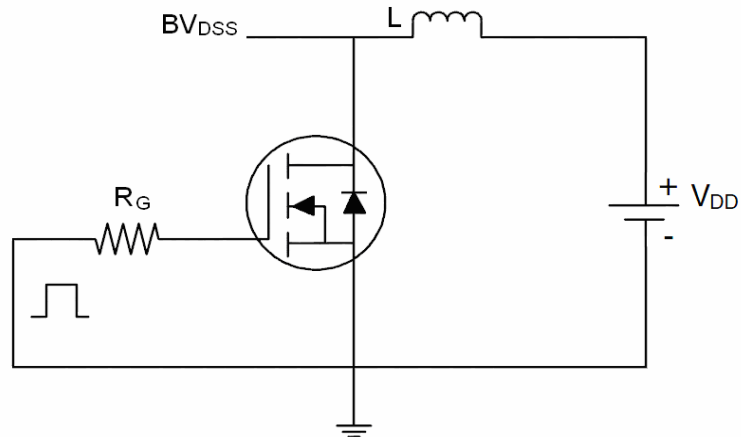
Notes:

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. E_{AS} condition: $T_J=25^{\circ}\text{C}$, $V_{DD}=30V$, $V_G=10V$, $L=0.5mH$, $R_g=25\Omega$

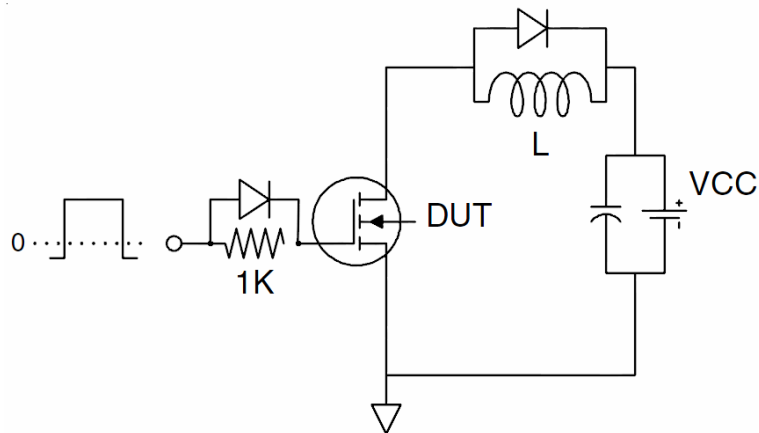
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Test Circuit

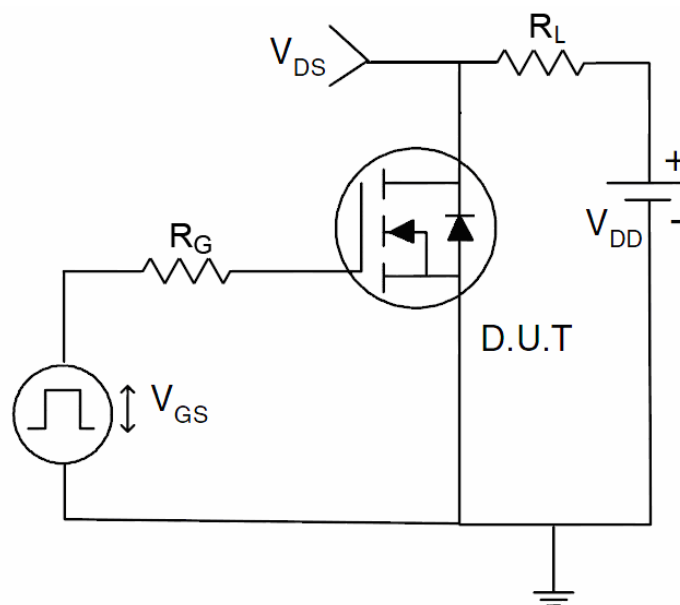
1) E_{AS} test Circuit

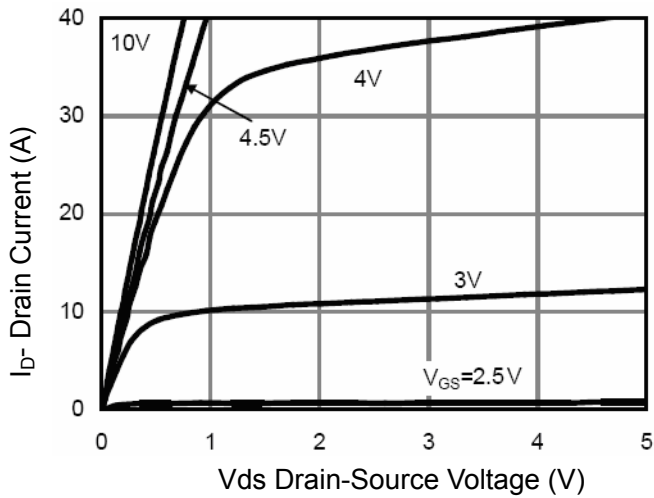
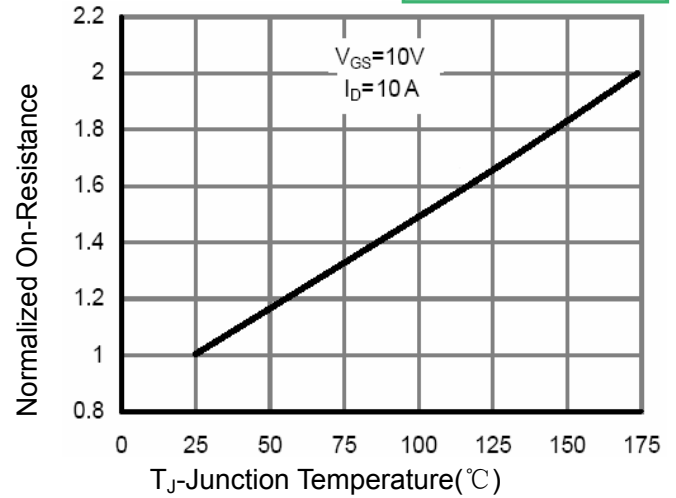
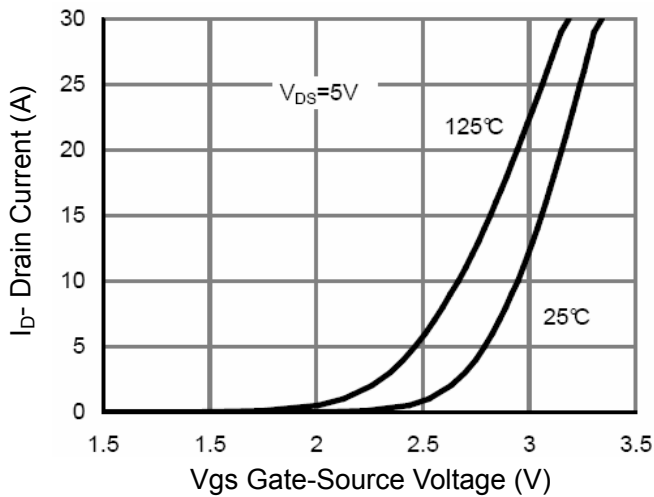
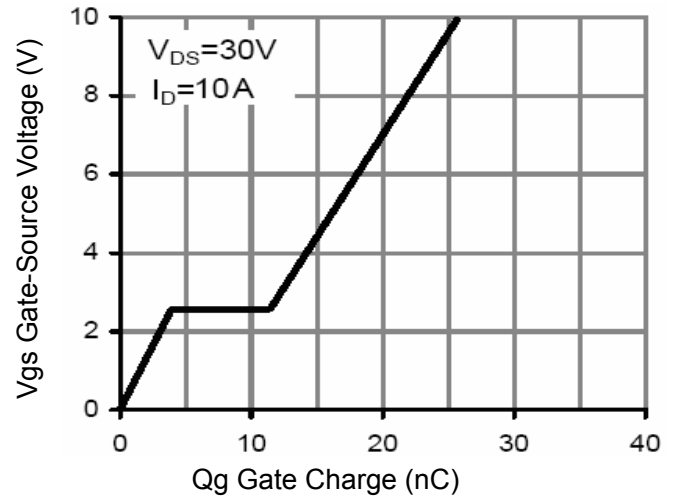
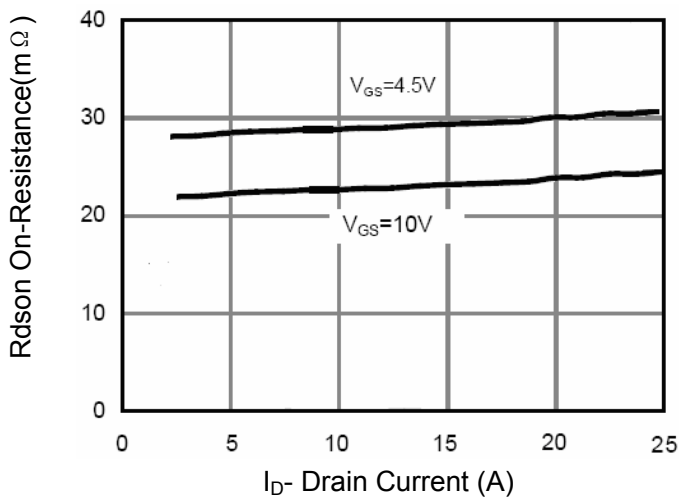
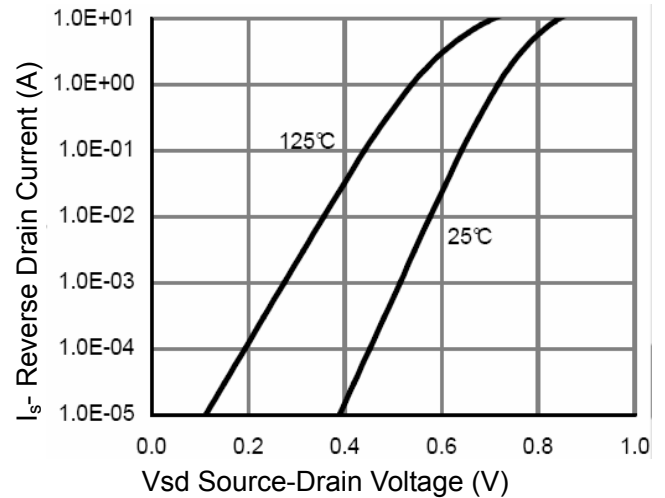


2) Gate charge test Circuit



3) Switch Time Test Circuit



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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

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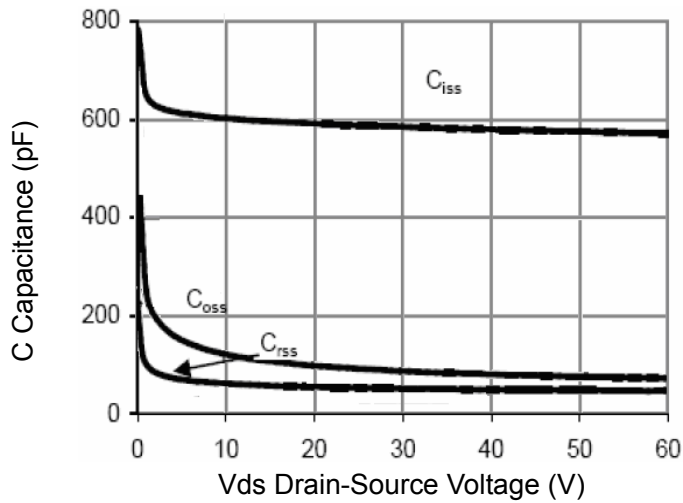


Figure 7 Capacitance vs Vds

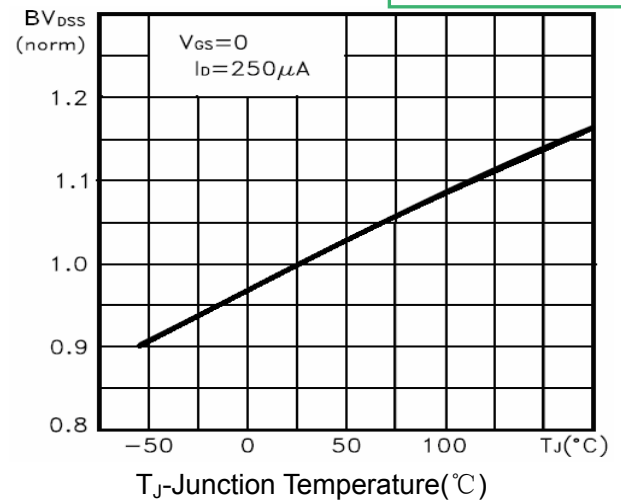


Figure 9 BV_{DSS} vs Junction Temperature

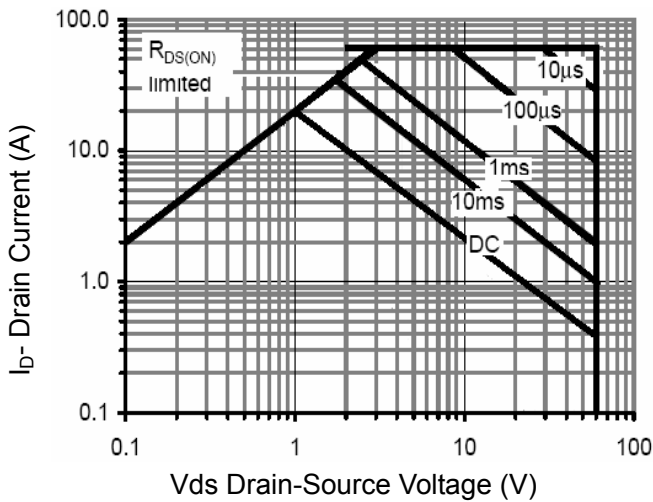


Figure 8 Safe Operation Area

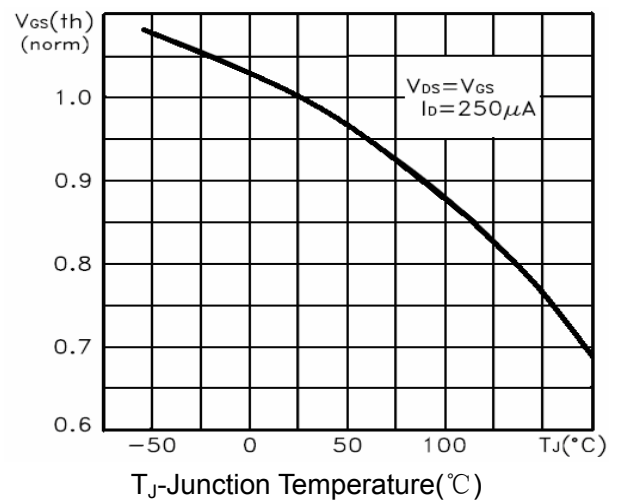


Figure 10 $V_{GS(th)}$ vs Junction Temperature

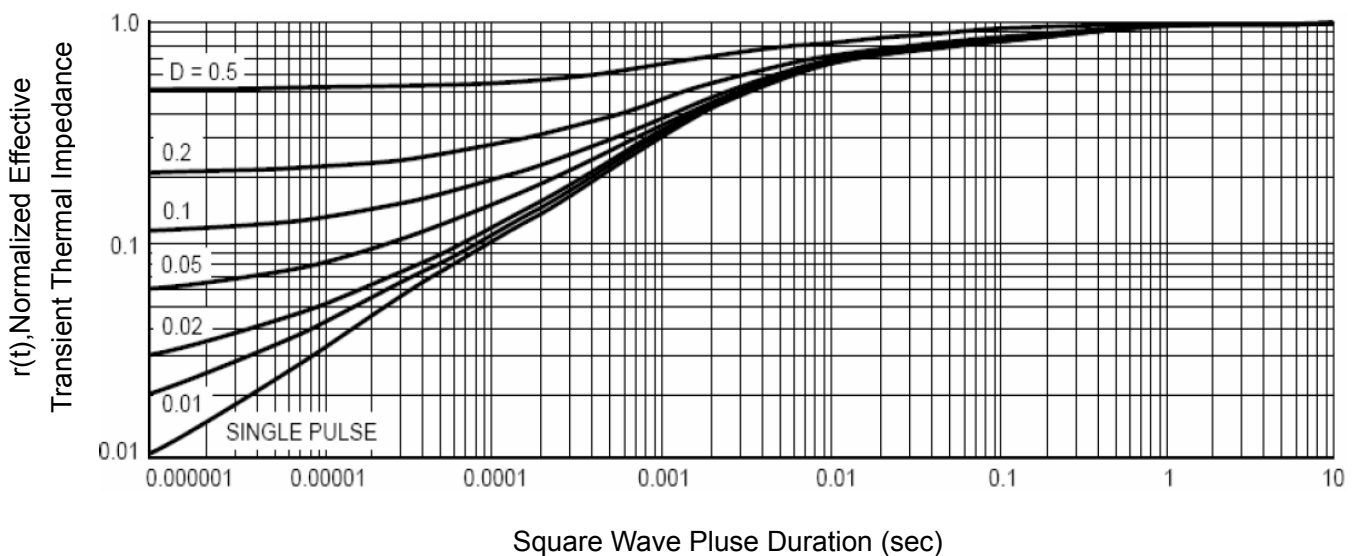
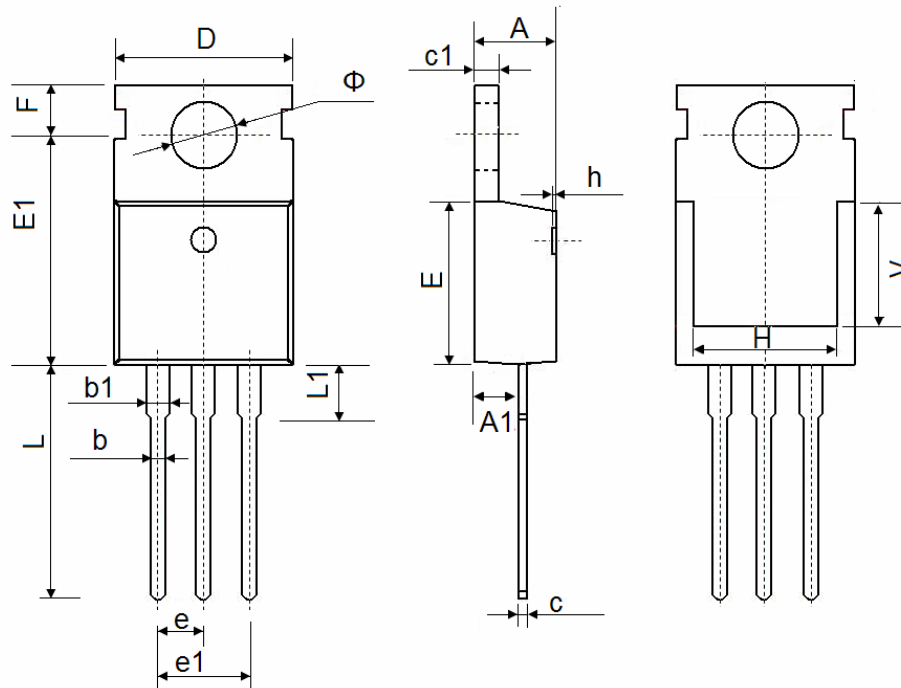


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220-3L Package Information
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Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 REF.		0.295 REF.	
Φ	3.400	3.800	0.134	0.150