

Description

The RST85H21T uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in automotive applications and a wide variety of other applications.

General Features

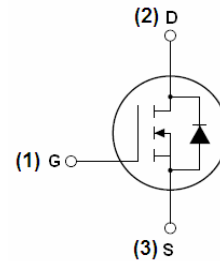
- $V_{DSS} = 85V, I_D = 210A$
 $R_{DS(ON)} < 3.5m\Omega @ V_{GS} = 10V$
- Good stability and uniformity with high E_{AS}
- Special process technology for high ESD capability
- High density cell design for ultra low $R_{ds(on)}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

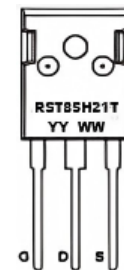
- Automotive applications
- Hard switched and high frequency circuits
- Uninterruptible power supply

100% UIS TESTED!

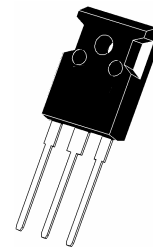
100% ΔV_{ds} TESTED!



Schematic diagram



Marking and pin assignment



TO-247 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
RST85H21T	RST85H21T	TO-247	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DSS}	85	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	210	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D (100^\circ C)$	150	A
Pulsed Drain Current	I_{DM}	850	A
Maximum Power Dissipation	P_D	330	W
Derating factor		2.2	W/ $^\circ C$
Single pulse avalanche energy ^(Note 3)	E_{AS}	2200	mJ
Peak Diode Recovery dv/dt ^(Note 4)	dv/dt	5	V/ns
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 1)	$R_{\theta JC}$	0.45	$^{\circ}\text{C/W}$
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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	85	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =85V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±200	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2	3	4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =40A	-	2.9	3.5	mΩ
Forward Transconductance	g _{FS}	V _{DS} =10V, I _D =20A	35	-	-	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, F=1.0MHz	-	11000	-	PF
Output Capacitance	C _{oss}		-	914	-	PF
Reverse Transfer Capacitance	C _{rss}		-	695	-	PF
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =30V, I _D =2A, R _L =15Ω V _{GS} =10V, R _G =2.5Ω	-	23	-	nS
Turn-on Rise Time	t _r		-	190	-	nS
Turn-Off Delay Time	t _{d(off)}		-	130	-	nS
Turn-Off Fall Time	t _f		-	120	-	nS
Total Gate Charge	Q _g	ID=30A, VDD=30V, VGS=10V	-	250	-	nC
Gate-Source Charge	Q _{gs}		-	48	-	nC
Gate-Drain Charge	Q _{gd}		-	98	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =40A	-	-	1.2	V
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = 40A di/dt = 100A/μs ^(Note2)	-	63	-	nS
Reverse Recovery Charge	Q _{rr}		-	98	-	nC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

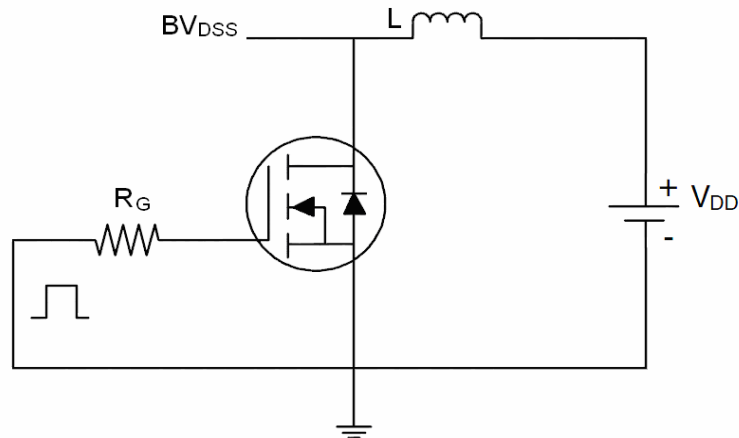
Notes:

1. Surface Mounted on FR4 Board, $t \leq 10$ sec.
2. Pulse Test: Pulse Width $\leq 400\mu s$, Duty Cycle $\leq 2\%$.
3. EAS condition: $T_J=25^{\circ}\text{C}, V_{DD}=42.5V, V_G=10V, L=2mH, R_G=25\Omega, I_{AS}=37A$
4. $I_{SD} \leq 125A, di/dt \leq 260A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 175^{\circ}\text{C}$

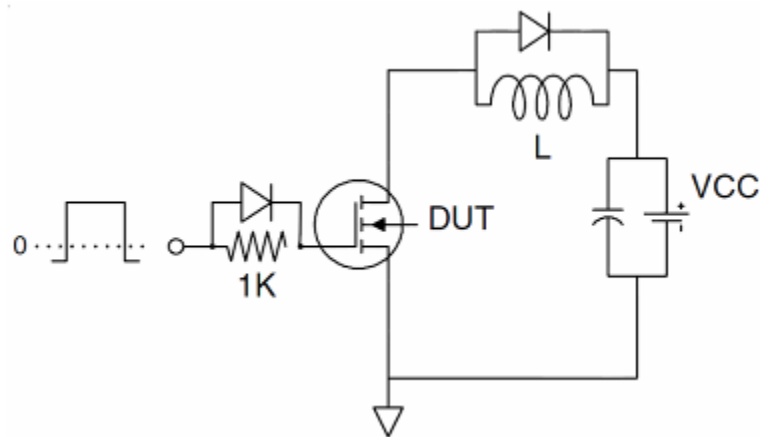
Test Circuit

Pb Free Product

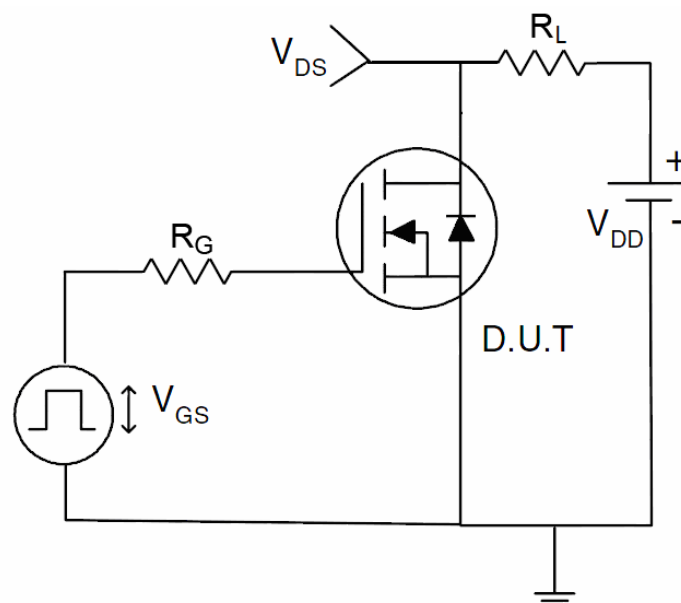
1) E_{AS} test Circuit



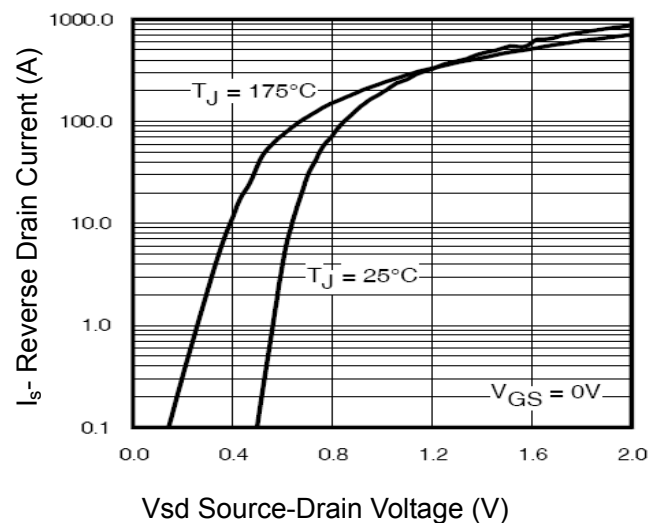
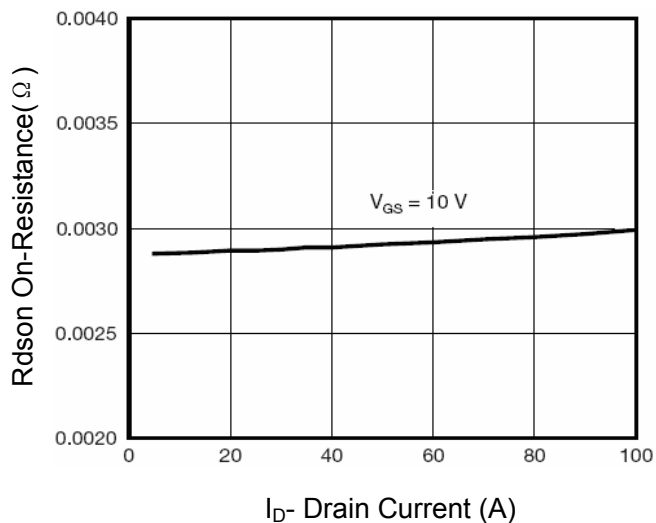
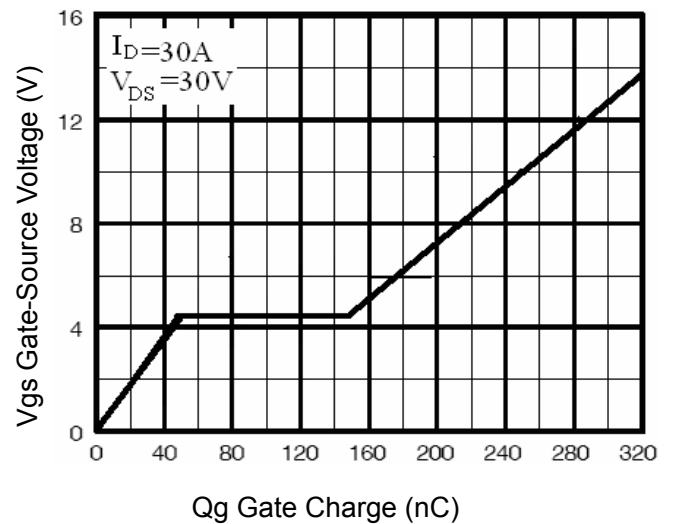
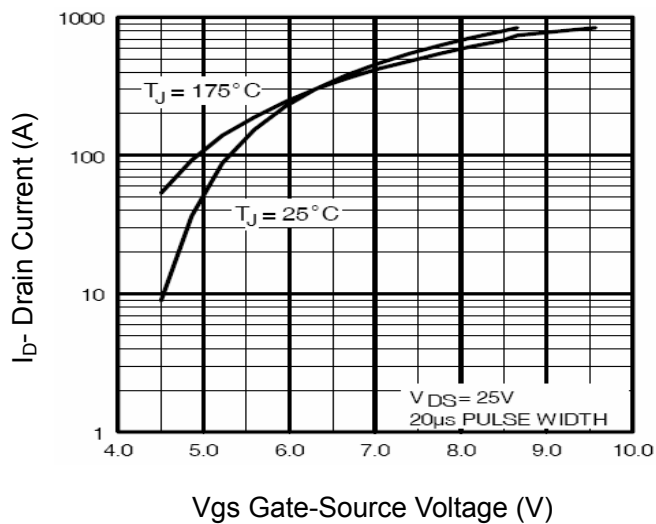
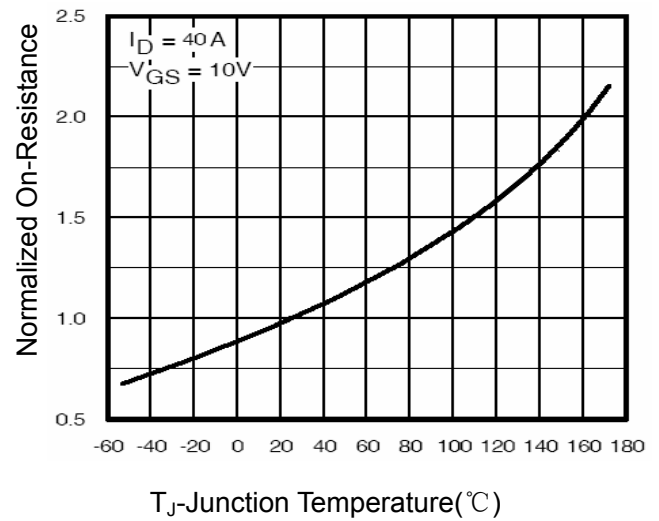
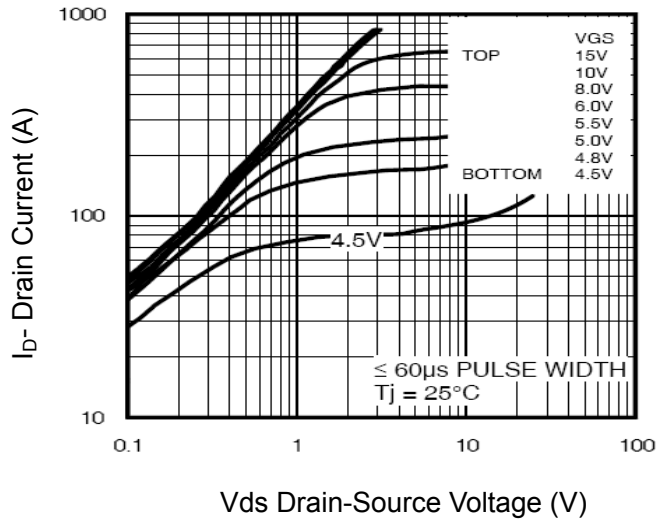
2) Gate charge test Circuit



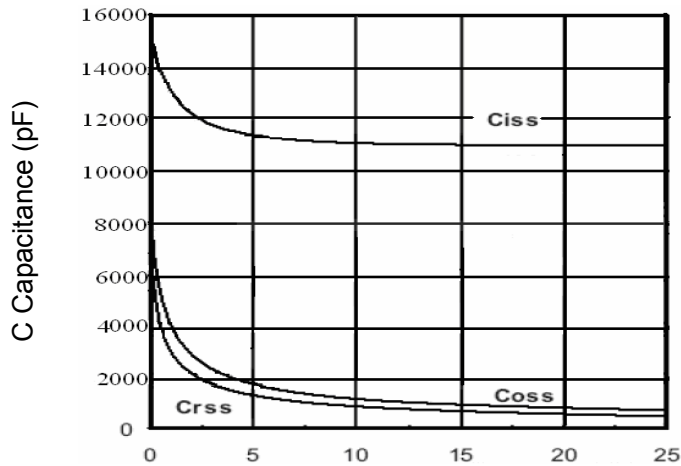
3) Switch Time Test Circuit



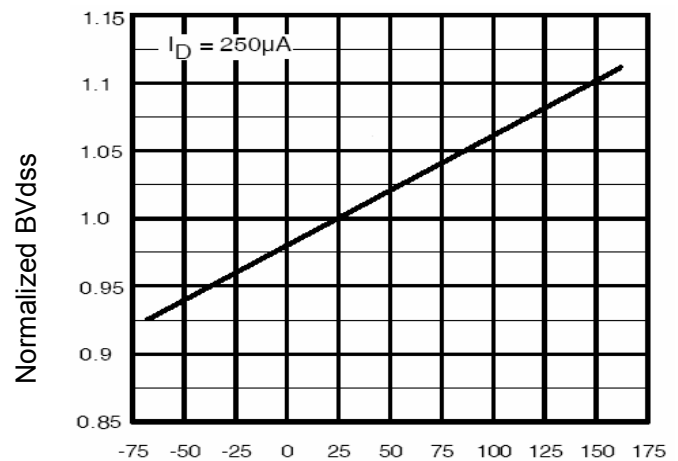
Typical Electrical and Thermal Characteristics

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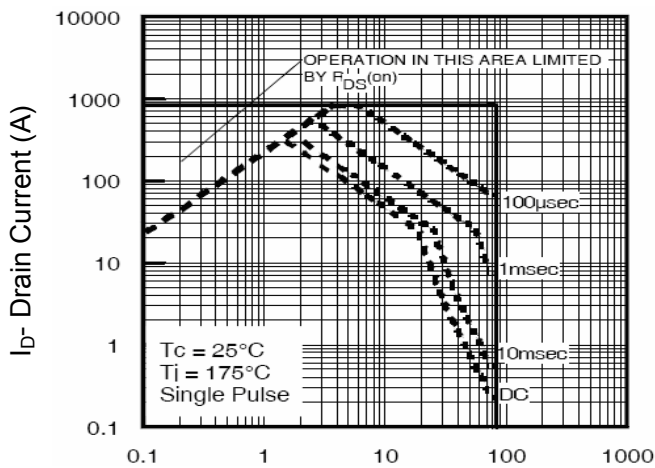
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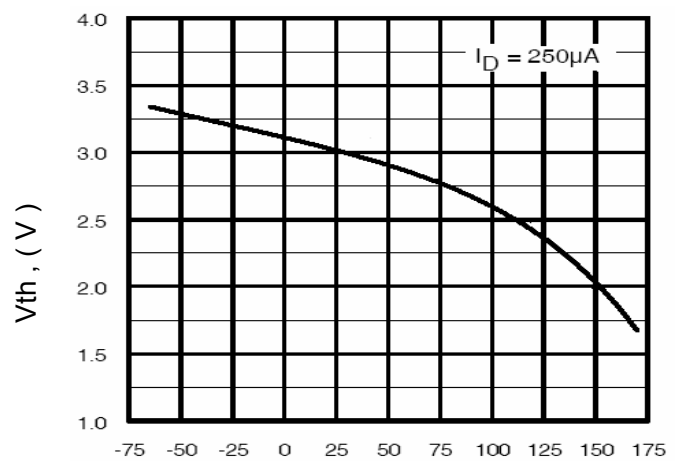
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



TJ-Junction Temperature(°C)
Figure 9 BV_{DSS} vs Junction Temperature



Vds Drain-Source Voltage (V)
Figure 8 Safe Operation Area



TJ-Junction Temperature(°C)
Figure 10 V_{GS(th)} vs Junction Temperature

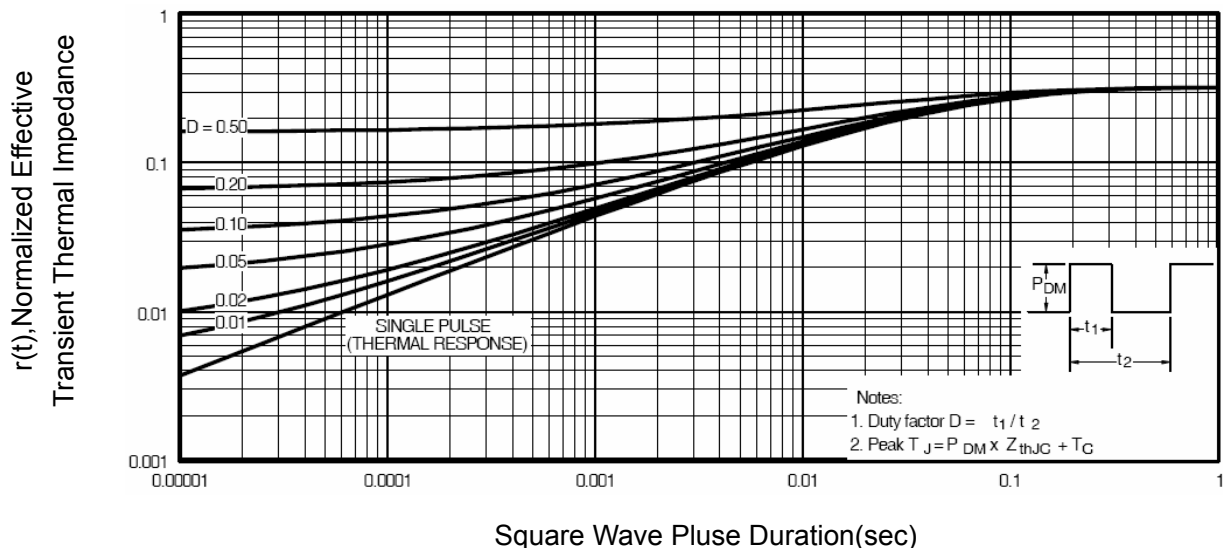
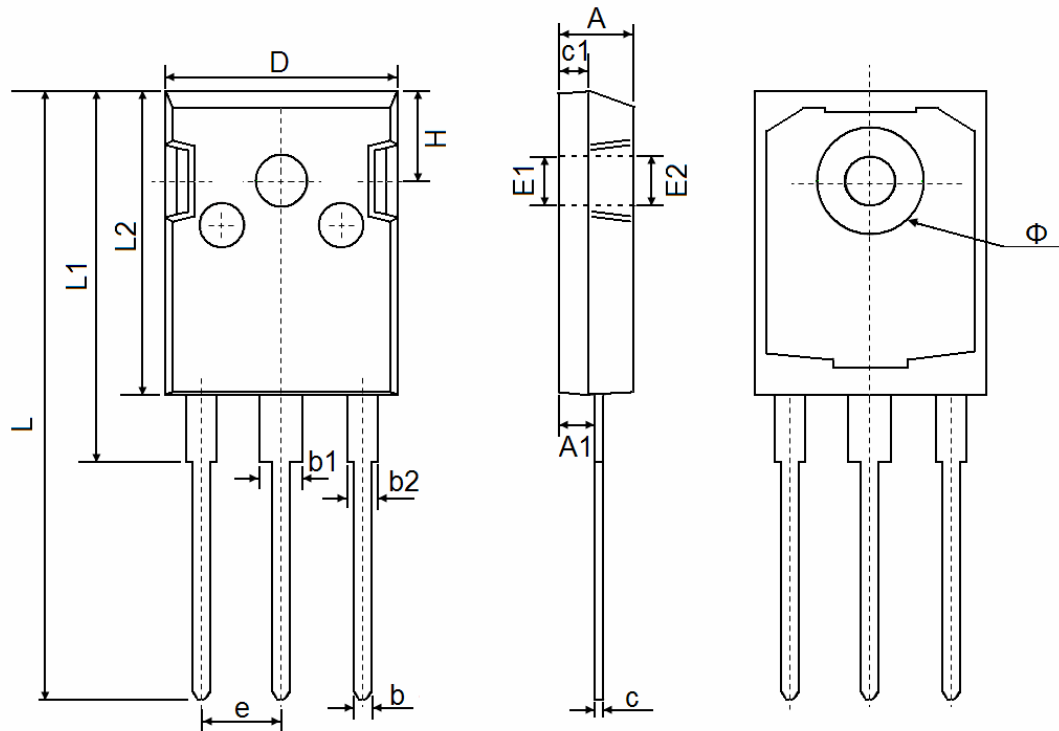


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-247 Package Information
Pb Free Product


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
E1	3.500 REF		0.138 REF	
E2	3.600 REF		0.142 REF	
L	40.900	41.300	1.610	1.626
L1	24.800	25.100	0.976	0.988
L2	20.300	20.600	0.799	0.811
Φ	7.100	7.300	0.280	0.287
e	5.450 TYP		0.215 TYP	
H	5.980 REF		0.235 REF	