QIAOXIN N-Channel Enhancement Mode Power MOSFET

Description

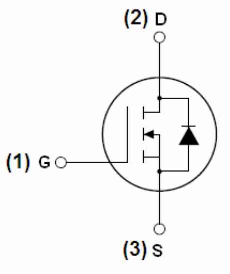
The VCRR75H21T uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in Automotive applications and a wide variety of other applications.

General Features

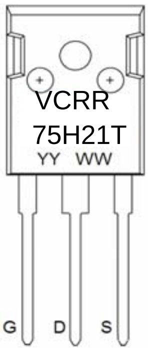
- V_{DSS} =75V,I_D =210A
  $R_{DS(ON)}$ < 4mΩ @ V_{GS}=10V
- Good stability and uniformity with high E_{AS}
- Special process technology for high ESD capability
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

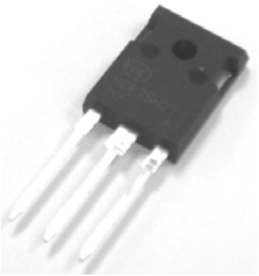
- Automotive applications
- Hard switched and high frequency circuits
- Uninterruptible power supply



Schematic diagram



Marking and pin assignment



TO-247 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package
VCRR75H21T		TO-247

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DSS}	75	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	210	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	150	A
Pulsed Drain Current	I_{DM}	840	A
Maximum Power Dissipation	P_D	330	W
Derating factor		2.2	W/℃
Single pulse avalanche energy (Note 4)	E_{AS}	2200	mJ

Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case (Note 1)	$R_{\theta JC}$	0.455	℃/W

Electrical Characteristics (TA=25℃unless otherwise noted)

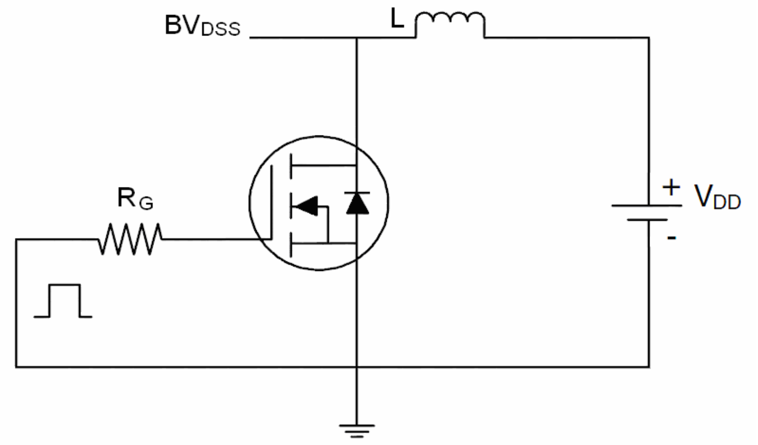
Parameter		Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V I_D=250μA	75			V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=75V,V_{GS}=0V			1	μA
Gate-Body Leakage Current		I_{GSS}	V_{GS}=±20V,V_{DS}=0V			±200	nA
On Characteristics							
Gate Threshold Voltage		$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	2	3	4	V
Drain-Source On-State Resistance	25℃	$R_{DS(ON)}$	V_{GS}=10V, I_D=40A		2.9	4	mΩ
	125℃				4.7	6.5	mΩ
Forward Transconductance		g_{FS}	V_{DS}=25V,I_D=40A	100	165		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}	TJ = 25°C, IF = 40A di/dt = 100A/μs (Note2)		48		nS
Reverse Recovery Charge		Qrr			78		nC
Forward Turn-On Time		t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

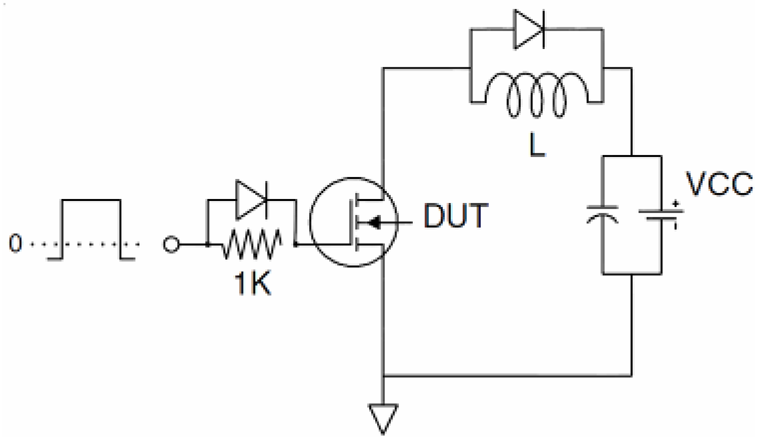
1. Surface Mounted on FR4 Board, t ≤ 10 sec.
2. Pulse Test: Pulse Width ≤ 400μs, Duty Cycle ≤ 2%.
3. EAS condition：Tj=25℃,V_{DD}=37.5V,V_G=10V,L=0.5mH,Rg=25Ω,I_{AS}=37A

Test circuit

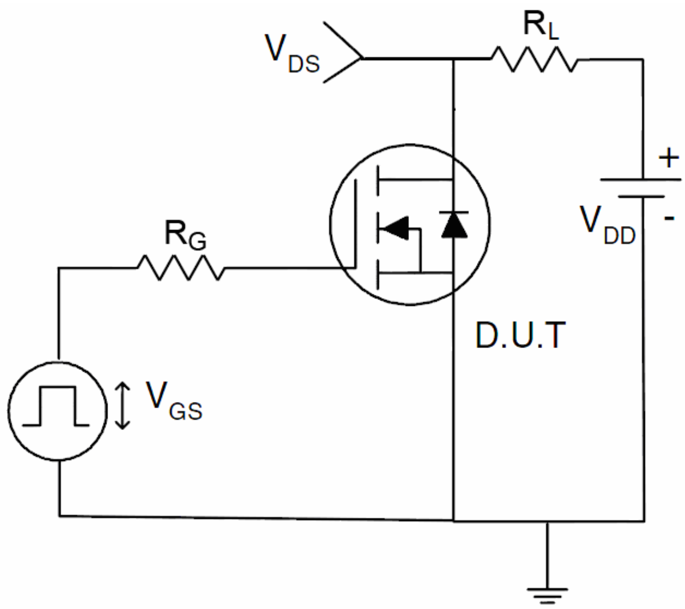
1）E_{AS} test Circuit



2）Gate charge test Circuit



3）Switch Time Test Circuit



Typical Electrical and Thermal Characteristics

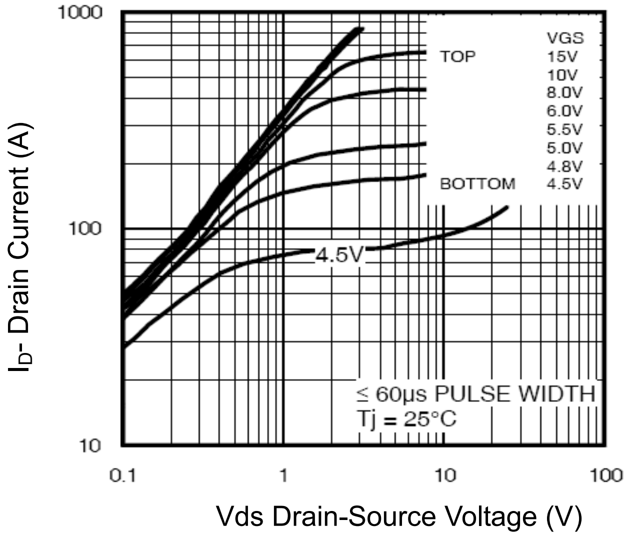


Figure 1 Output Characteristics

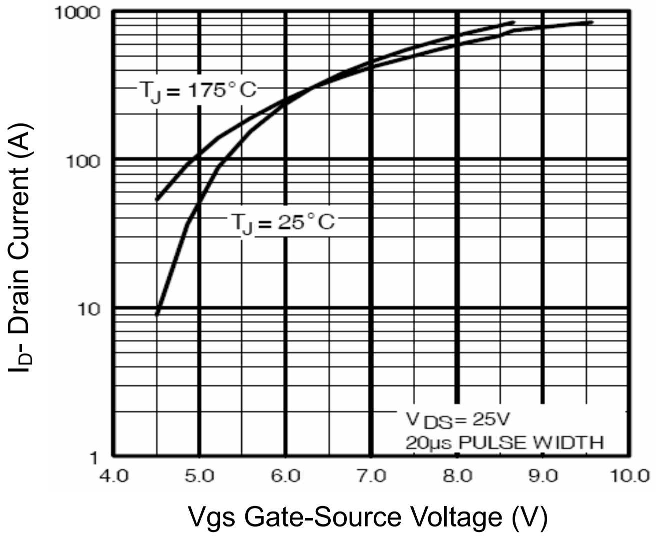


Figure 2 Transfer Characteristics

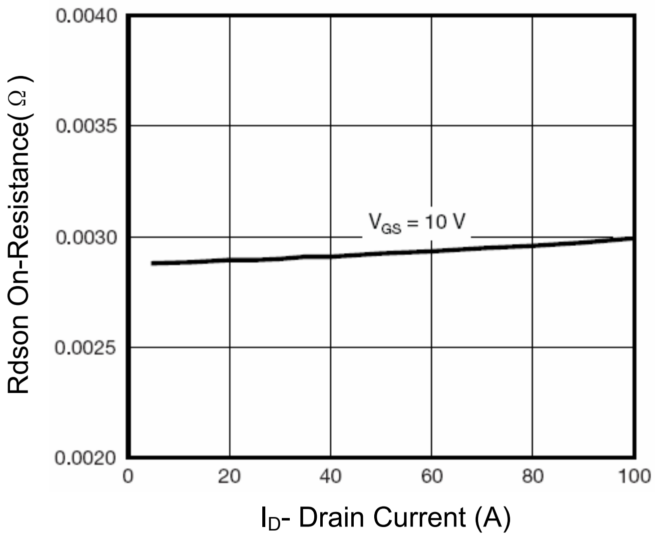


Figure 3 Rdson- Drain Current

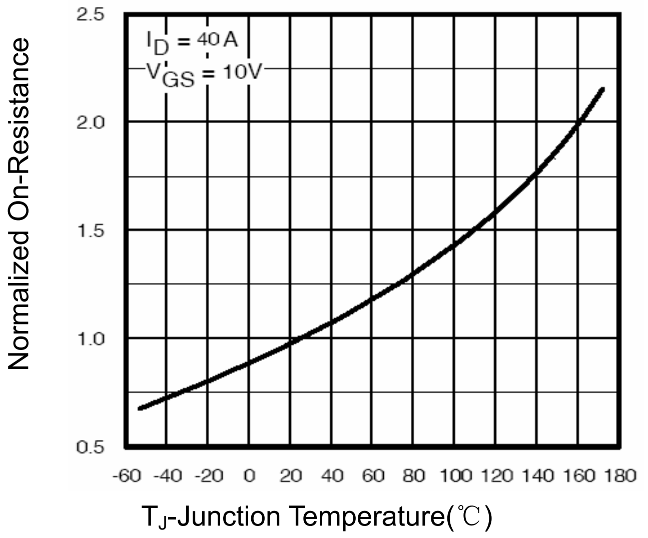


Figure 4 Rdson-JunctionTemperature

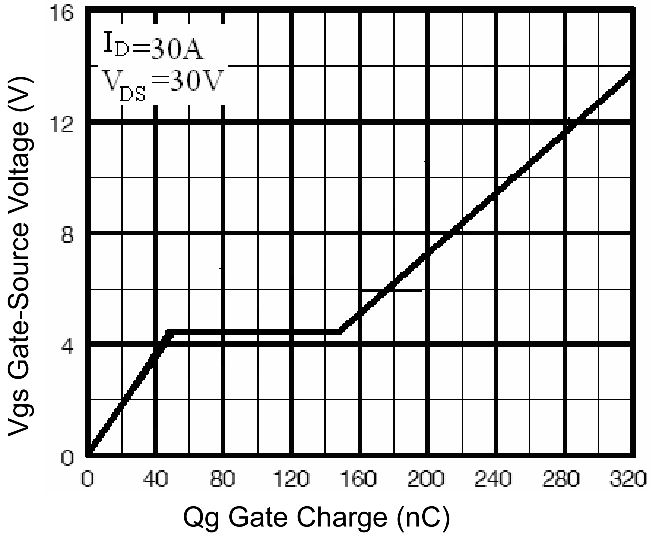


Figure 5 Gate Charge

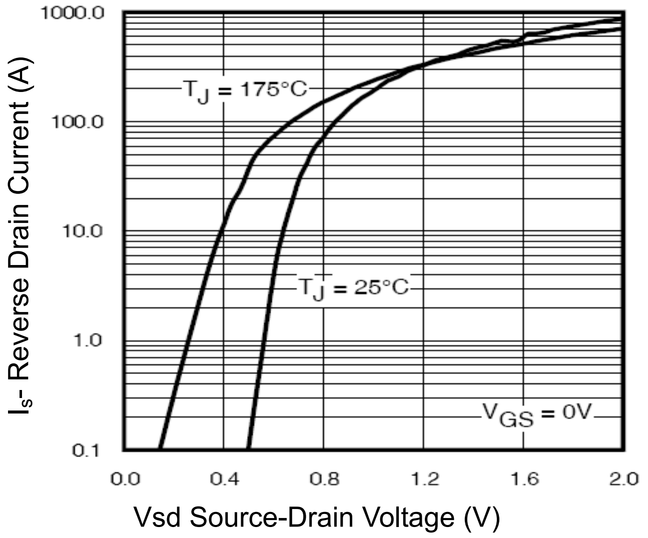


Figure 6 Source- Drain Diode Forward

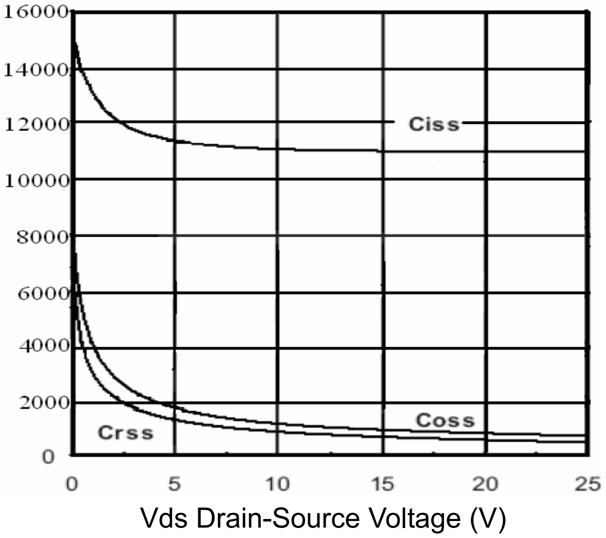


Figure 7 Capacitance vs Vds

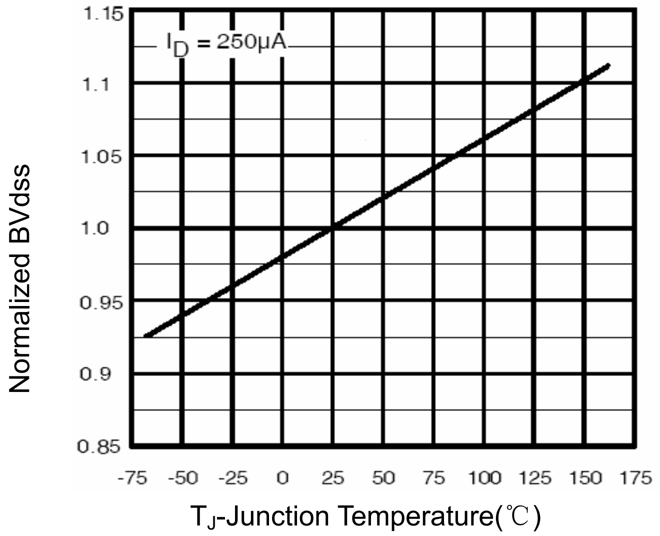


Figure 9 BV_{DSS} vs Junction Temperature

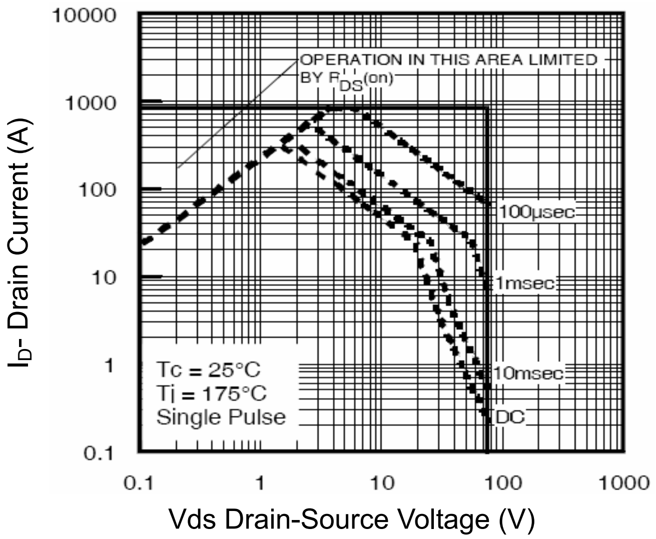


Figure 8 Safe Operation Area

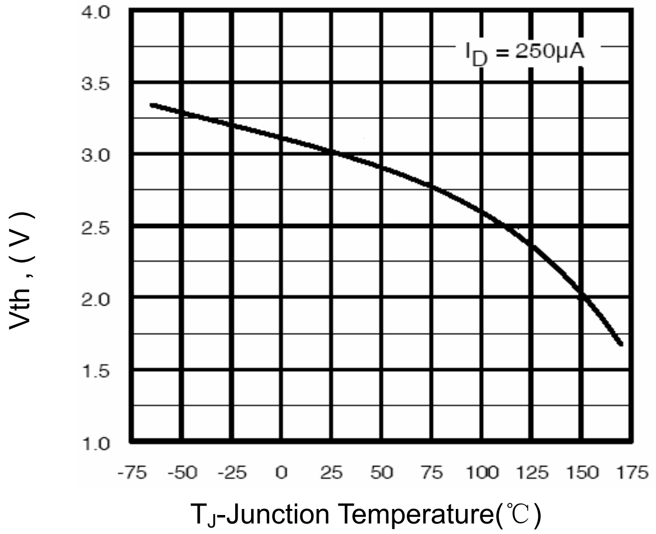


Figure 10 $V_{GS(th)}$ vs Junction Temperature

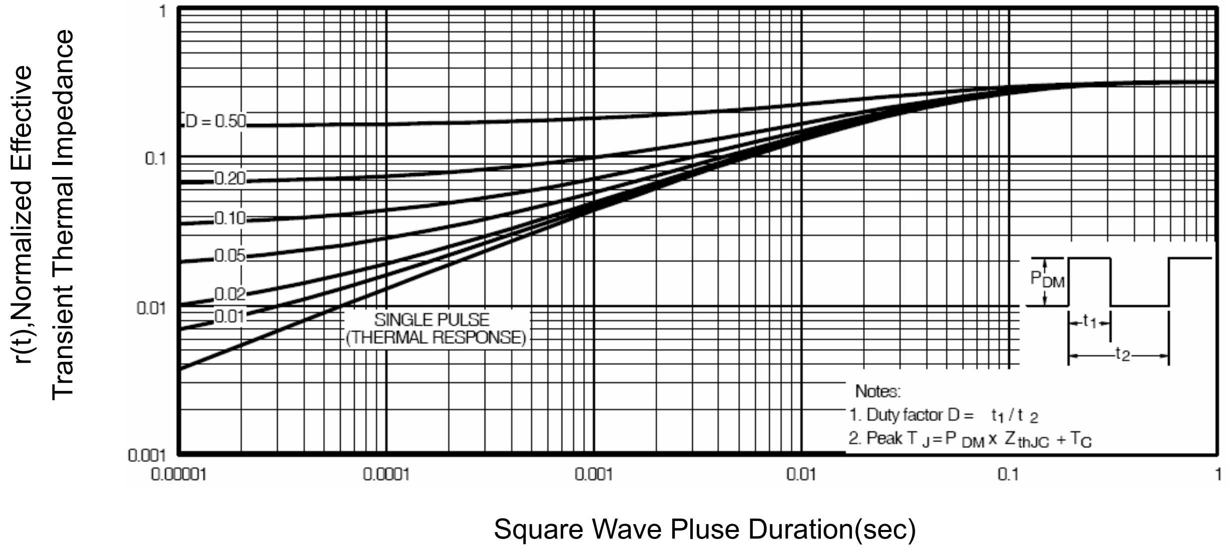
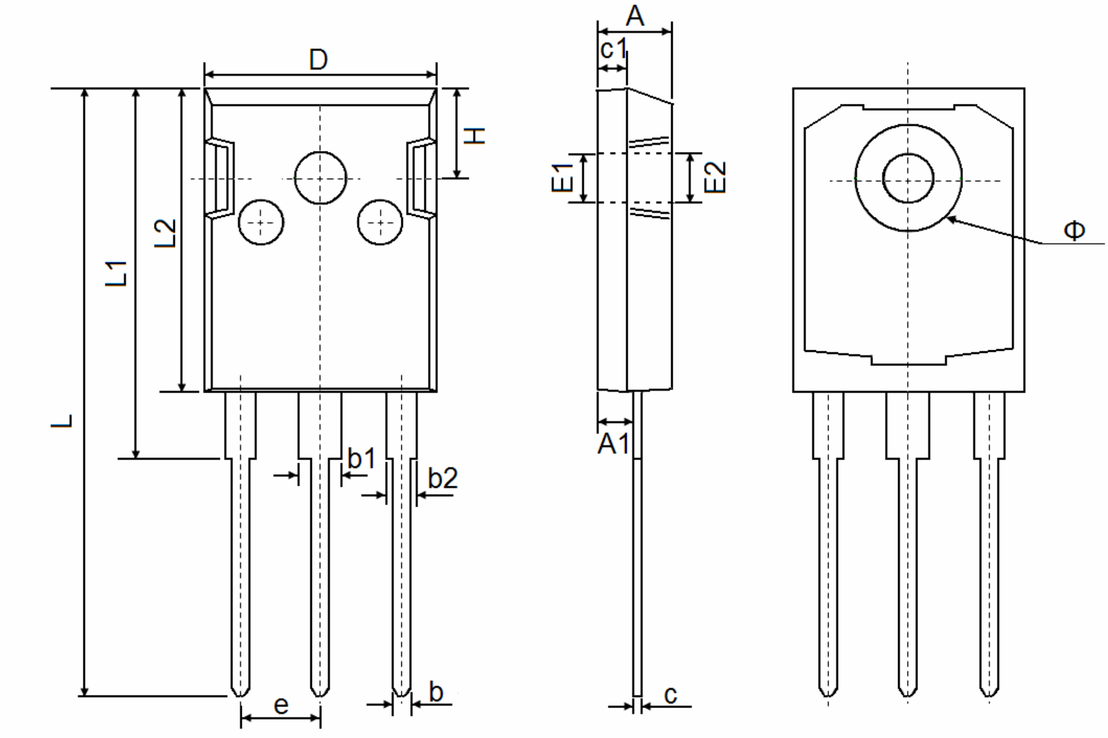


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-247 Package Information



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	

Attention