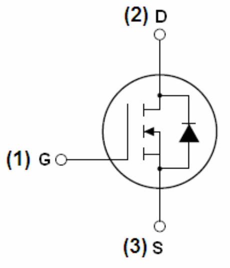
FNK N-Channel Enhancement Mode Power MOSFET

Description

The FNK01NS12T 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.



Schematic diagram

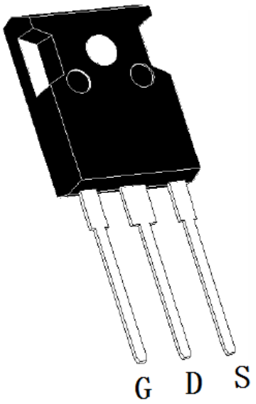
General Features

- V_{DS} =100V,I_D =120A
  $R_{DS(ON)}$ <4.2mΩ @ V_{GS}=10V (Typ:3.3mΩ)

- High density cell design for ultra low Rdson
- 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



TO-247 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
FNK01NS12T	FNK01NS12T	TO-247	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	120	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	92	A
Pulsed Drain Current	I_{DM}	480	A
Maximum Power Dissipation	P_D	285	W
Derating factor		1.9	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	390	mJ

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

Thermal Characteristic

Thermal Resistance,Junction-to-Case$^{(Note\ 2)}$	$R_{θJC}$	0.53	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

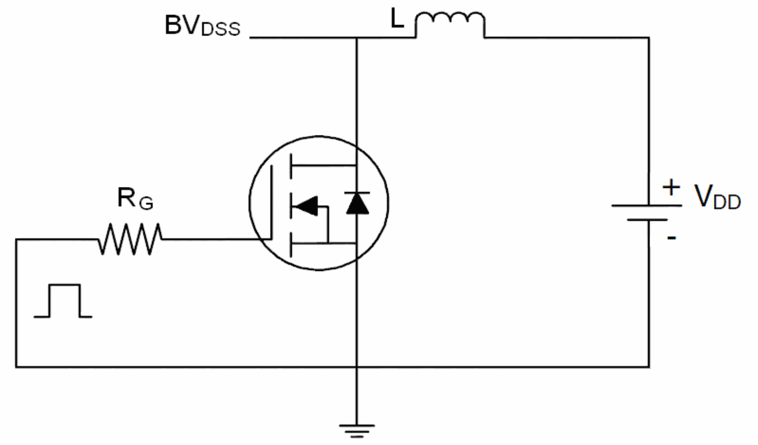
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=100V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics $^{(Note\ 3)}$						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	2	3.0	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A	-	3.3	4.2	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=20A	40	-	-	S
Dynamic Characteristics $^{(Note4)}$						
Input Capacitance	C_{lss}	V_{DS}=25V,V_{GS}=0V, F=1.0MHz	-	7775	-	PF
Output Capacitance	C_{oss}		-	2920	-	PF
Reverse Transfer Capacitance	C_{rss}		-	275	-	PF
Switching Characteristics $^{(Note\ 4)}$						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=50V, R_L=2.5Ω V_{GS}=10V,R_{GEN}=3Ω	-	31	-	nS
Turn-on Rise Time	t_r		-	24	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	45	-	nS
Turn-Off Fall Time	t_f		-	27	-	nS
Total Gate Charge	Q_g	V_{DS}=50V,I_D=65A, V_{GS}=10V	-	170	-	nC
Gate-Source Charge	Q_{gs}		-	38	-	nC
Gate-Drain Charge	Q_{gd}		-	65	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage $^{(Note\ 3)}$	V_{SD}	V_{GS}=0V,I_S=40A	-	0.85	1.2	V
Diode Forward Current $^{(Note\ 2)}$	I_S		-	-	130	A
Reverse Recovery Time	t_{rr}	TJ = 25°C, IF =20A di/dt = 100A/μs$^{(Note3)}$	-	65	-	nS
Reverse Recovery Charge	Qrr		-	110	-	nC

Notes:

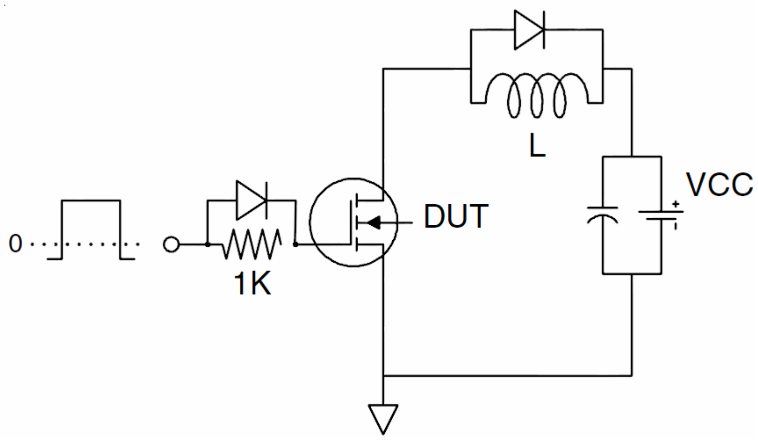
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition:Tj=25℃,V_{DD}=50V,V_G=10V,L=1mH,Rg=25Ω

Test Circuit

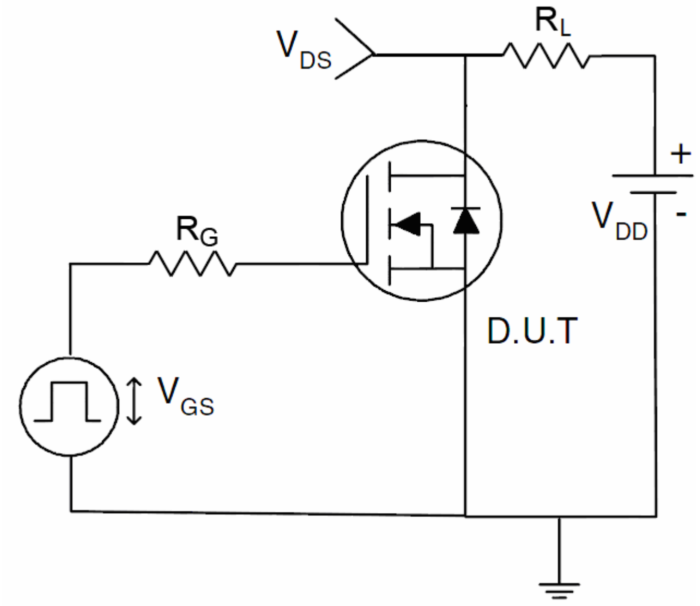
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

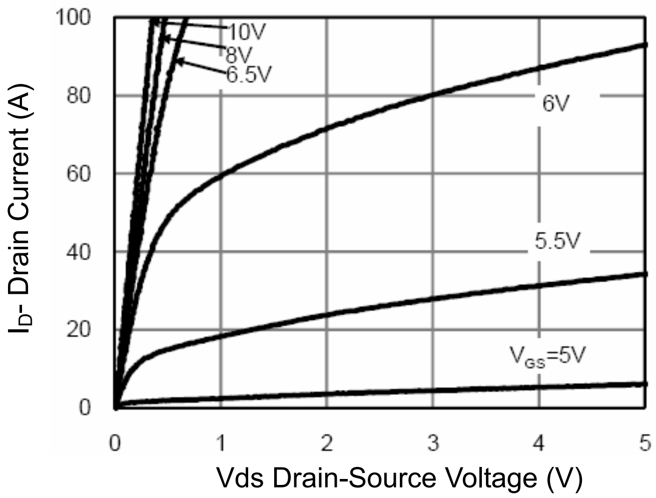


Figure 1 Output Characteristics

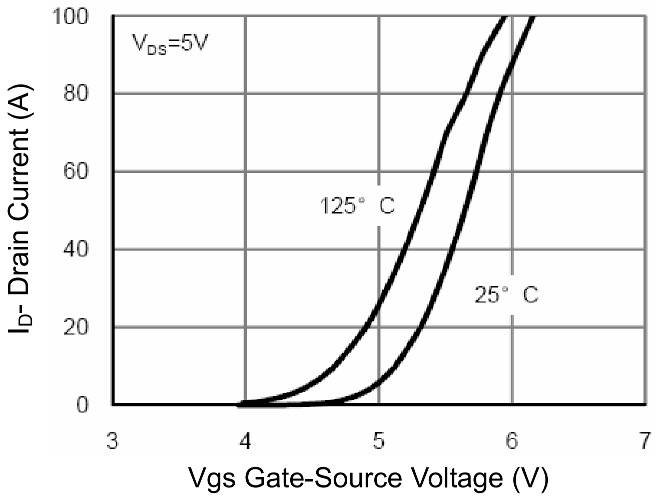


Figure 2 Transfer Characteristics

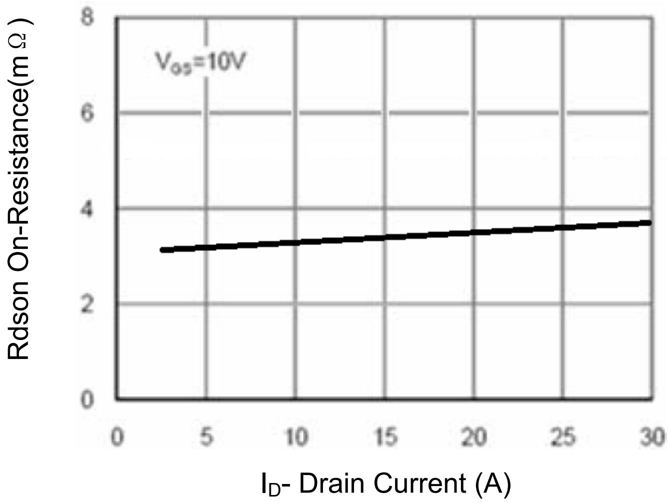


Figure 3 Rdson- Drain Current

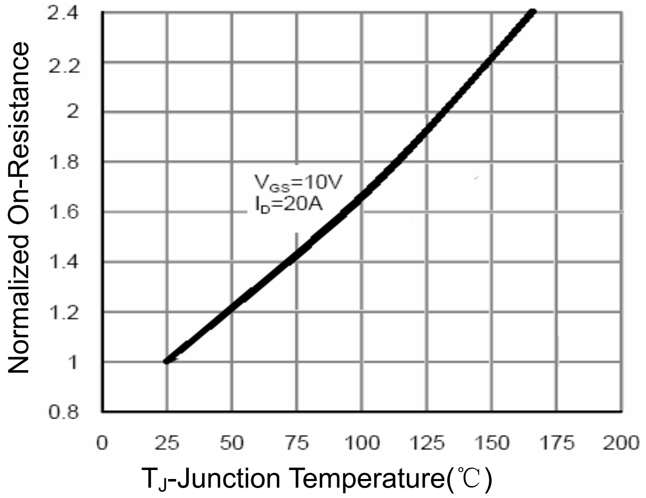


Figure 4 Rdson-JunctionTemperature

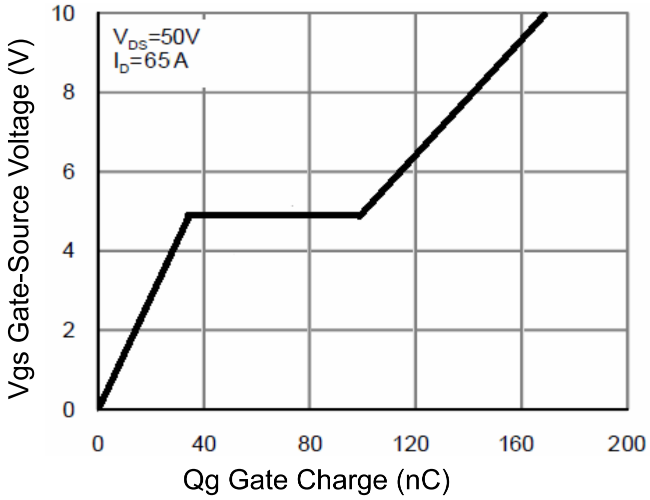


Figure 5 Gate Charge

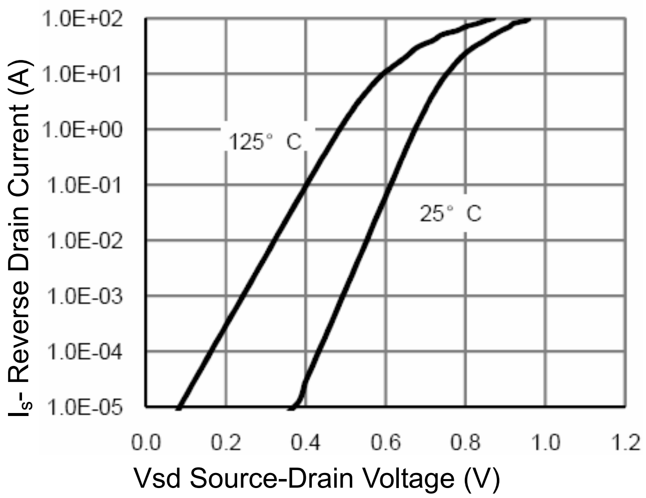


Figure 6 Source- Drain Diode Forward

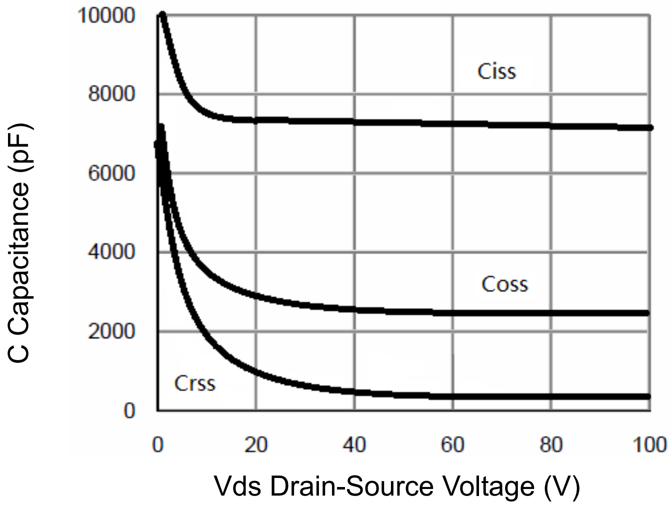


Figure 7 Capacitance vs Vds

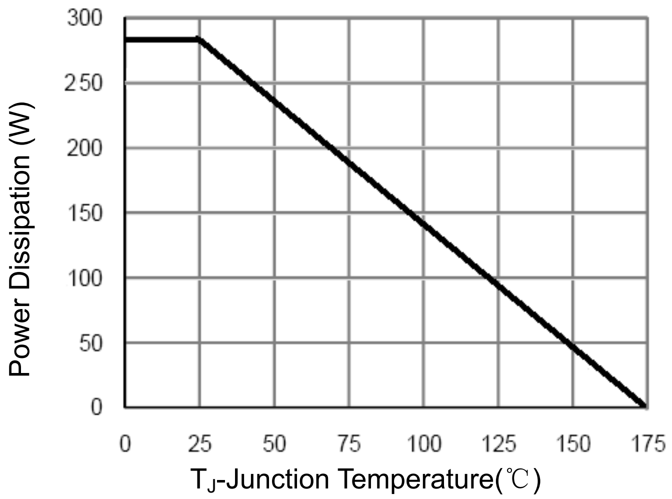


Figure 9 BV_{DSS} vs Junction Temperature

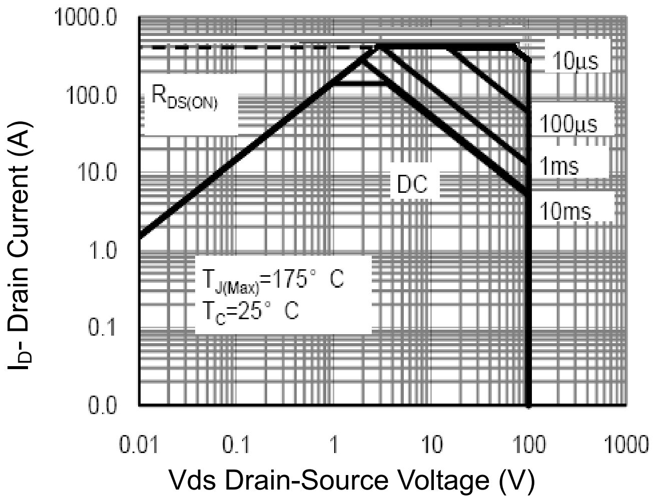


Figure 8 Safe Operation Area

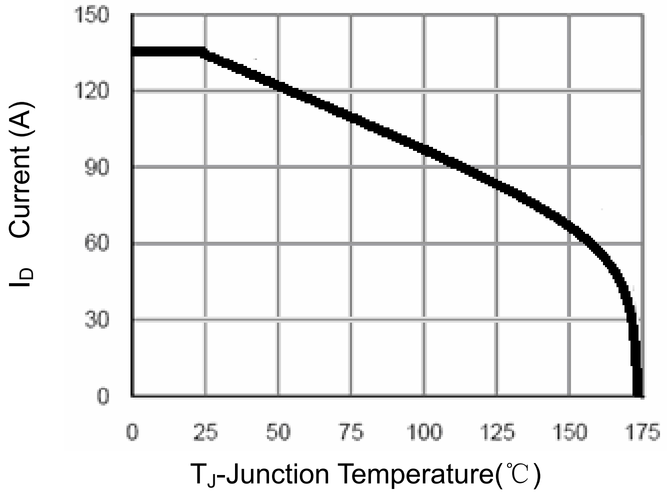


Figure 10 ID Current- JunctionTemperature

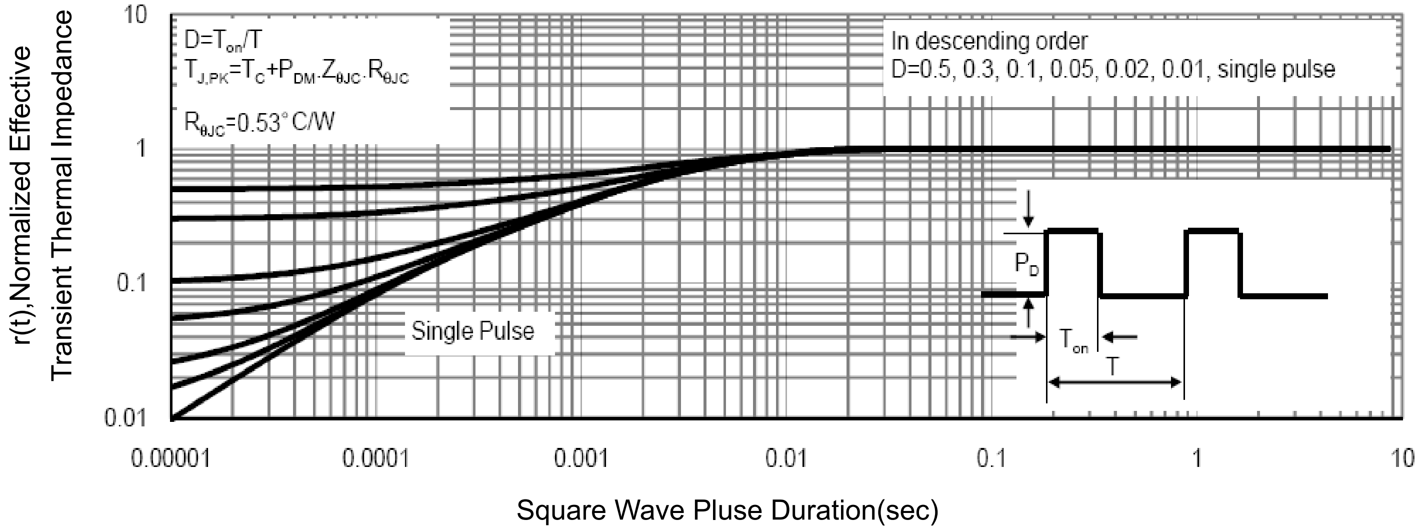
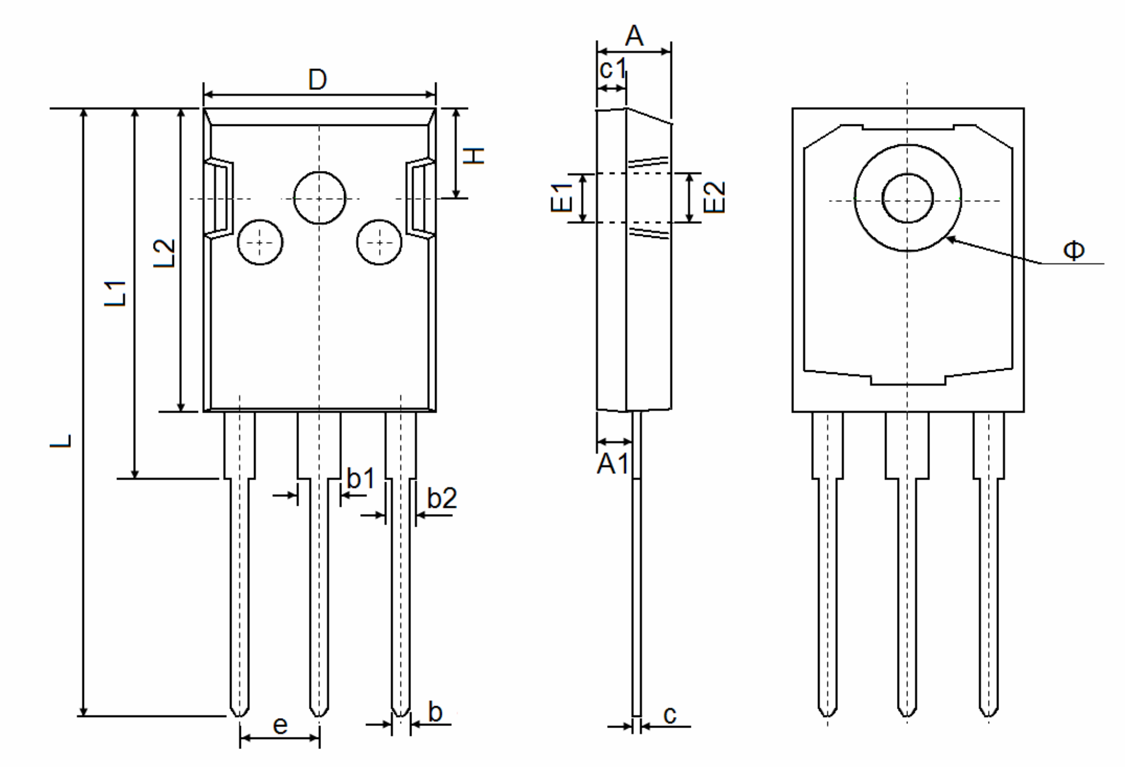


Figure 11 Normalized Maximum Transient Thermal Impedance

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	

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