

N-Channel Enhancement Mode Power MOSFET

Description

The HM4110T 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 other applications.

General Features

- $V_{DSS} = 100V, I_D = 210A$
 $R_{DS(ON)} < 4.0m\Omega @ V_{GS}=10V$ (Typ: 3.1 m Ω)

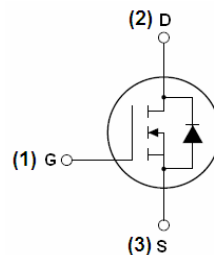
- Good stability and uniformity with high E_{AS}
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

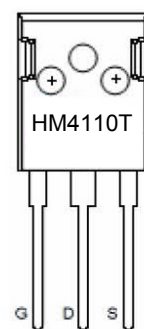
- DC motor drive
- High efficiency synchronous rectification in SMPS
- Uninterruptible power supply
- High speed power switching
- Hard switched and high frequency circuits

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
HM4110T	HM4110T	TO-247	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DSS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	210	A
Drain Current-Continuous($T_C=100^\circ C$)	$I_D(100^\circ C)$	140	A
Pulsed Drain Current	I_{DM}	850	A
Maximum Power Dissipation	P_D	385	W
Derating factor		2.57	W/ $^\circ C$
Single pulse avalanche energy (Note 3)	E_{AS}	2300	mJ
Peak Diode Recovery dv/dt (Note 4)	dv/dt	13	V/ns

Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	°C
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Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 1)	$R_{\theta JC}$	0.39	°C/W
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Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

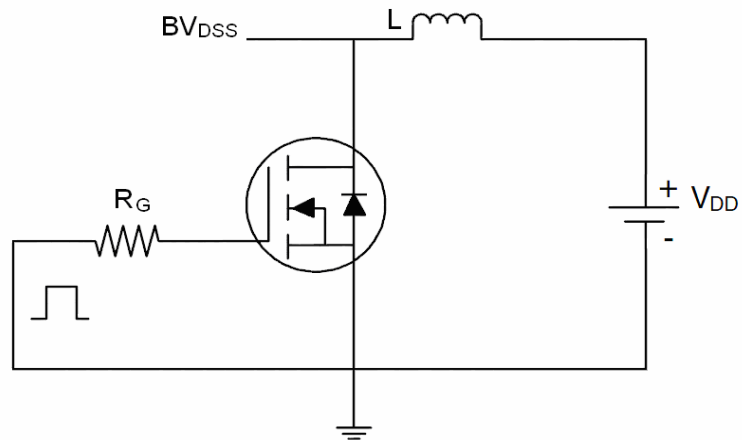
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	100	110	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =100V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±200	nA
On 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	-	3.1	4.0	mΩ
Forward Transconductance	g _{FS}	V _{DS} =25V, I _D =40A	300	-	-	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, F=1.0MHz	-	16500	-	PF
Output Capacitance	C _{oss}		-	1061	-	PF
Reverse Transfer Capacitance	C _{rss}		-	811	-	PF
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =30V, I _D =2A V _{GS} =10V, R _{GEN} =2.5Ω (Note2)	-	68	-	nS
Turn-on Rise Time	t _r		-	45	-	nS
Turn-Off Delay Time	t _{d(off)}		-	215	-	nS
Turn-Off Fall Time	t _f		-	56	-	nS
Total Gate Charge	Q _g	V _{DS} =30V, I _D =30A, V _{GS} =10V ^(Note2)	-	377	-	nC
Gate-Source Charge	Q _{gs}		-	79	-	nC
Gate-Drain Charge	Q _{gd}		-	118	-	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 = 75A di/dt = 100A/μs ^(Note2)	-	69	-	nS
Reverse Recovery Charge	Q _{rr}		-	108	-	nC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

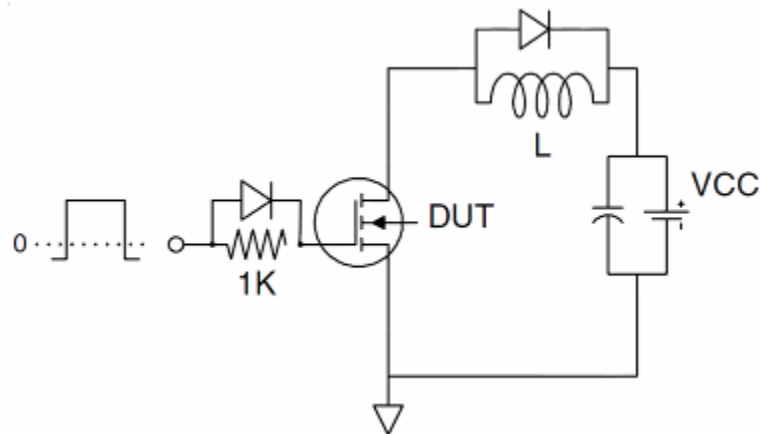
1. Surface Mounted on FR4 Board, $t \leq 10$ sec.
2. Pulse Test: Pulse Width $\leq 400\mu s$, Duty Cycle $\leq 2\%$.
3. EAS condition: $T_J=25^{\circ}\text{C}, V_{DD}=37.5V, V_G=10V, L=2mH, R_g=25\Omega, I_{AS}=37A$
4. $I_{SD} \leq 125A, di/dt \leq 260A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 175^{\circ}\text{C}$

Test circuit

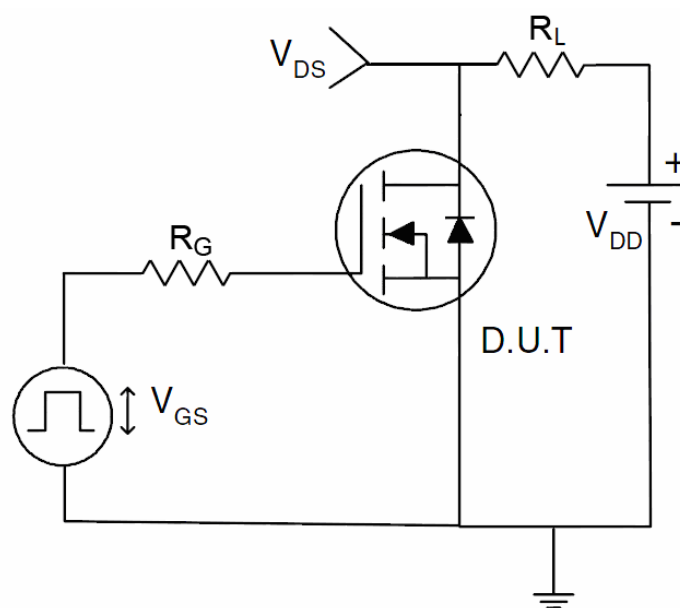
1) E_{AS} test Circuits



2) Gate charge test Circuit:



3) Switch Time Test Circuit:



Typical Electrical and Thermal Characteristics

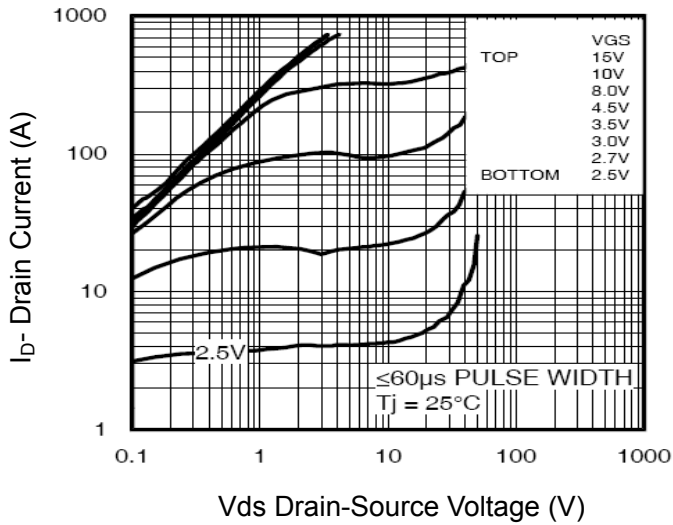


Figure 1 Output Characteristics

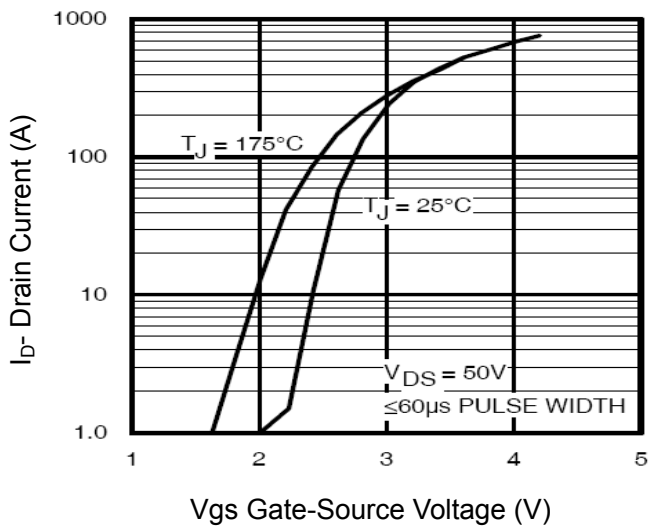


Figure 2 Transfer Characteristics

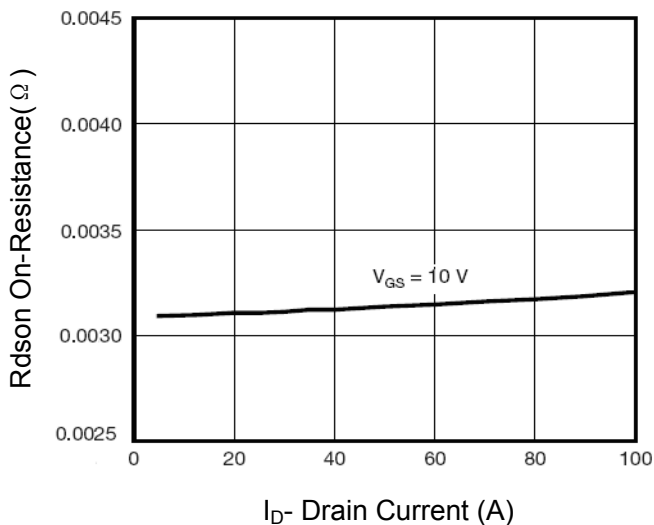


Figure 3 $R_{DS(on)}$ - Drain Current

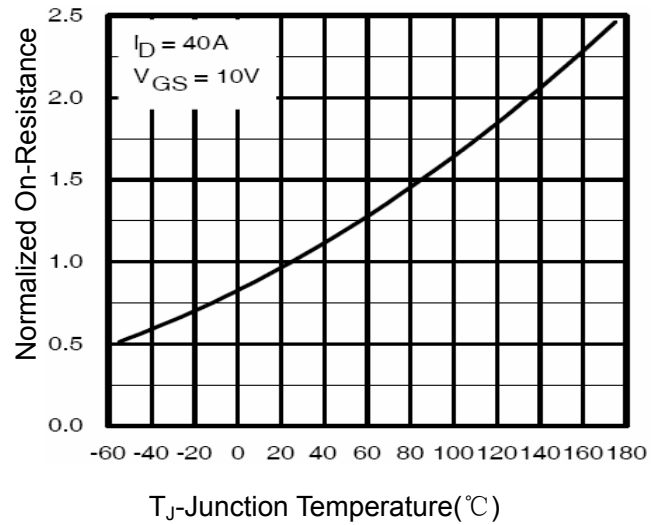


Figure 4 $R_{DS(on)}$ -Junction Temperature

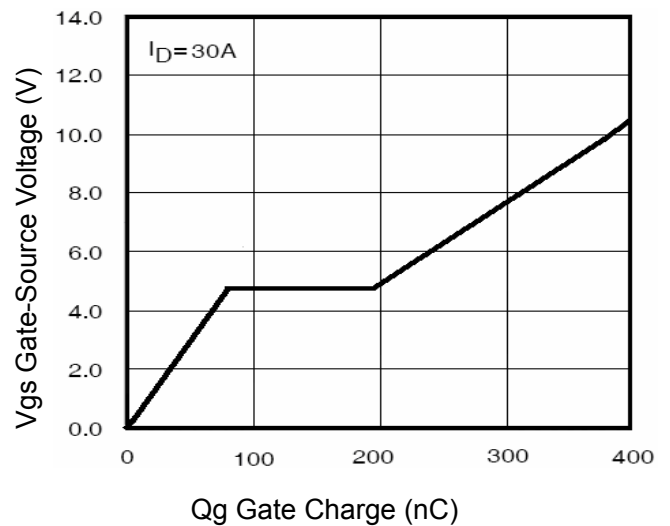


Figure 5 Gate Charge

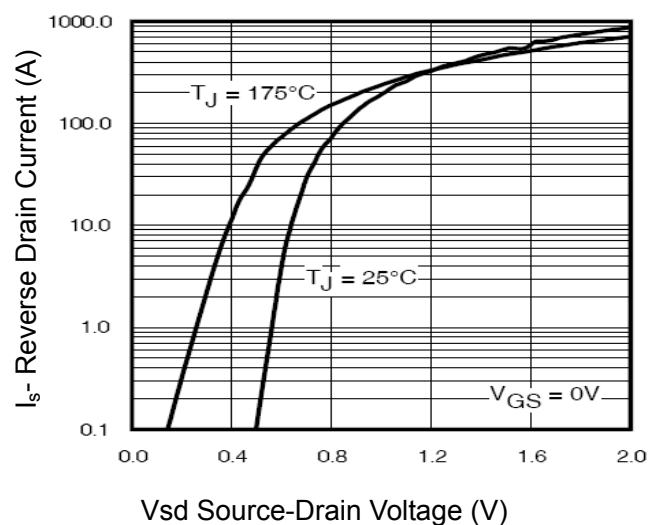
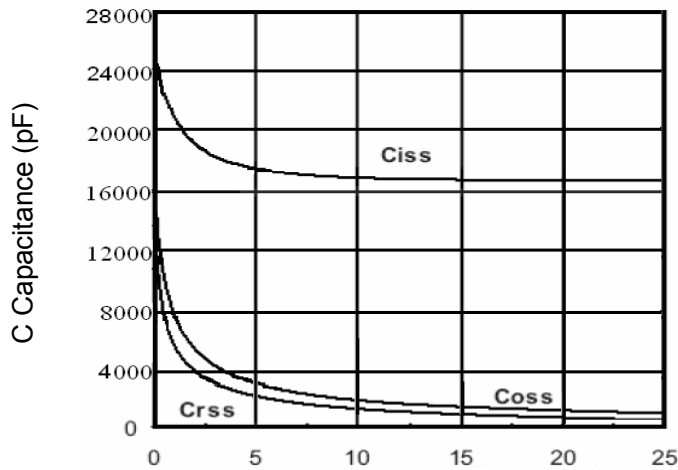
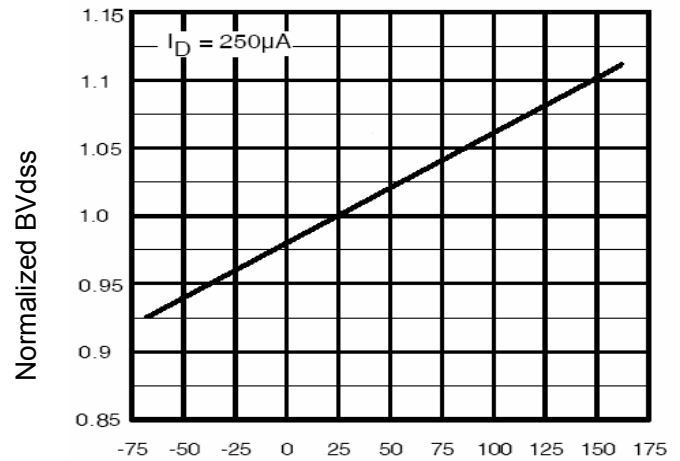


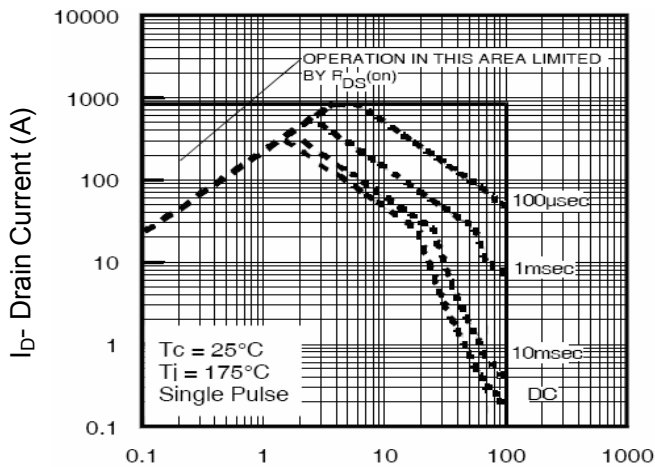
Figure 6 Source- Drain Diode Forward



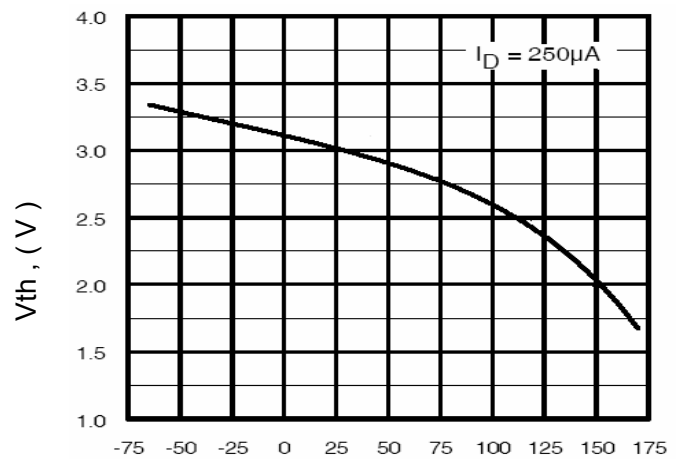
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



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

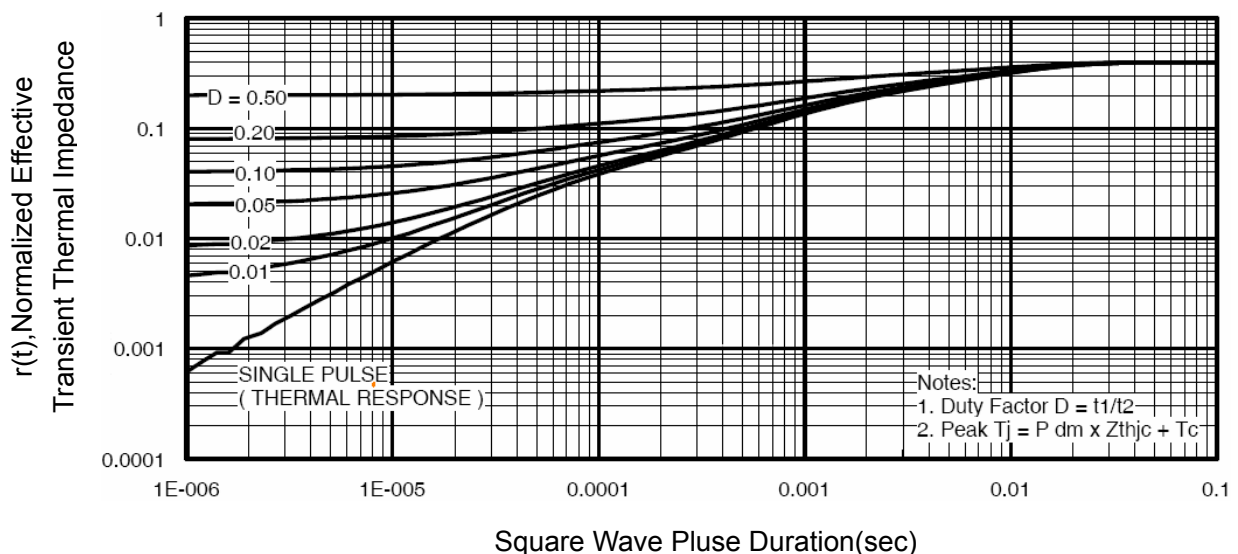
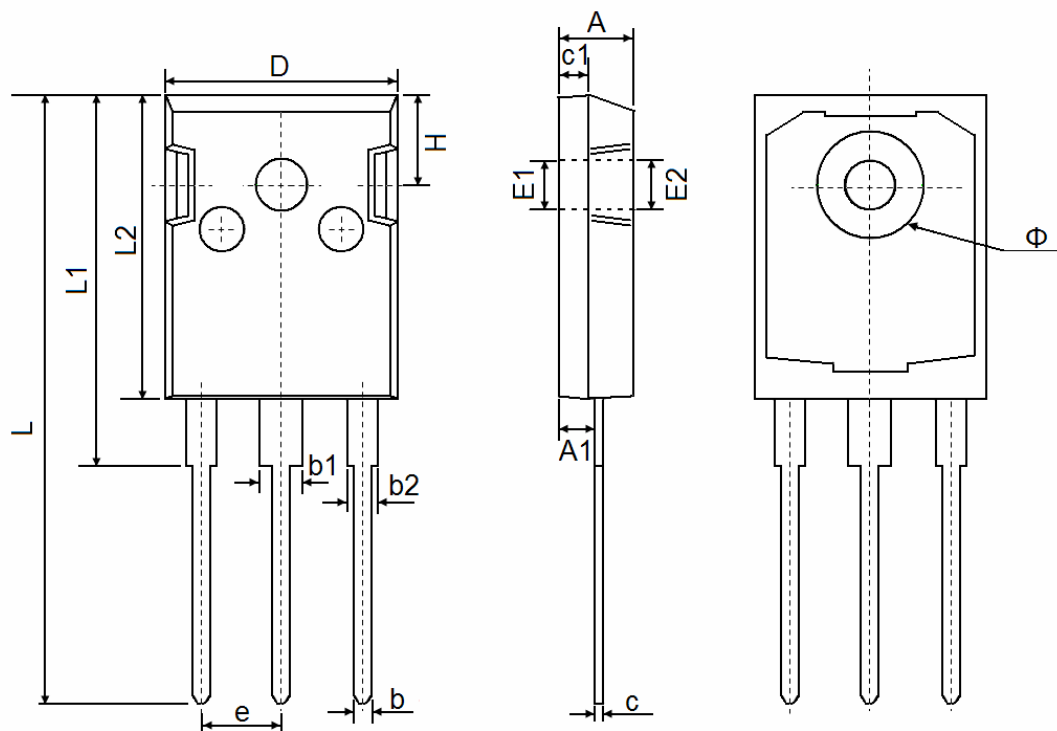


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-247 Package Information



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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