NCE N-Channel Enhancement Mode Power MOSFET

DESCRIPTION

The NCE75H21 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

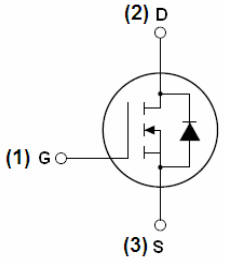
- V_{DSS} =75V,I_D =210A
  $R_{DS(ON)}$ < 4mΩ @ V_{GS}=10V
- Good stability and uniformity with high E_{AS}
- Special process technology for high ESD capability
- High density cell design for ultra low Rdson
- Fully characterized Avalanche voltage and current
- Excellent package for good heat dissipation

Application

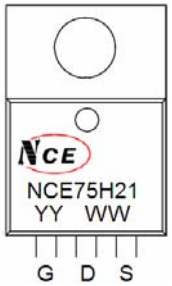
- Automotive applications
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply

100% UIS TESTED!

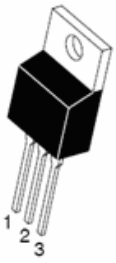
100% ΔVds TESTED!



Schematic diagram



Marking and pin Assignment



TO-220 top view

Package Marking And Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE75H21	NCE75H21	TO-220	-	-	-

Absolute Maximum Ratings (TA=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}	850	A
Maximum Power Dissipation	P_D	480	W
Derating factor		3.2	W/℃
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	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case (Note 1)	$R_{\theta JC}$	0.31	℃/W

Electrical Characteristics (TA=25℃unless otherwise noted)

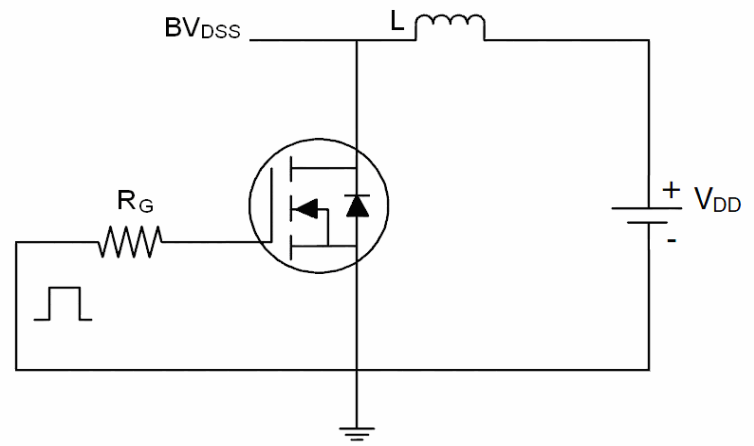
Parameter		Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V I_D=250μA	75	-	-	V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=75V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current		I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±200	nA
On Characteristics							
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_{lss}	V_{DS}=25V,V_{GS}=0V, F=1.0MHz	-	12100	-	PF
Output Capacitance		C_{oss}		-	2000	-	PF
Reverse Transfer Capacitance		C_{rss}		-	480	-	PF
Switching Characteristics							
Turn-on Delay Time		$t_{d(on)}$	V_{DD}=38V,I_D=40A V_{GS}=10V,R_{GEN}=1.2Ω (Note2)	-	20	-	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	V_{DS}=60V,I_D=40A, V_{GS}=10V(Note2)	-	410	620	nC
Gate-Source Charge		Q_{gs}		-	90	140	nC
Gate-Drain Charge		Q_{gd}		-	140	210	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)	-	120	210	nS
Reverse Recovery Charge		Qrr		-	860	1300	nC
Forward Turn-On Time		t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

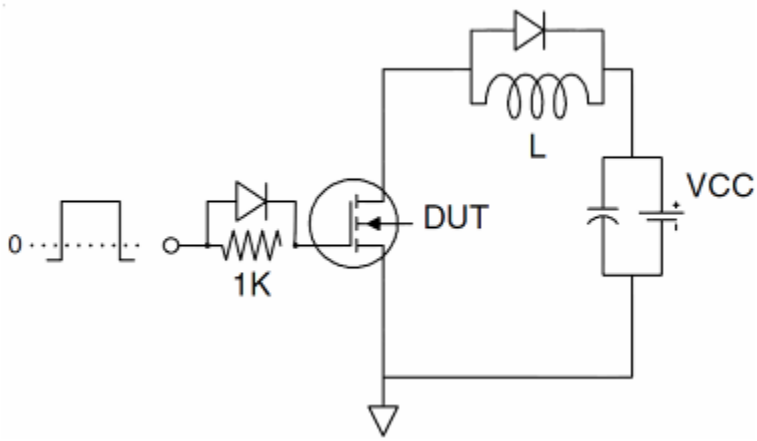
1. Surface Mounted on FR4 Board, t ≤ 10 sec.
2. Pulse Test: Pulse Width ≤ 400μs, Duty Cycle ≤ 2%.
3. EAS condition：Tj=25℃,V_{DD}=37.5V,V_G=10V,L=2mH,Rg=25Ω,I_{AS}=37A
4. I_{SD}≤125A, di/dt≤260A/μs, V_{DD}≤$V_{(BR)DSS}$，T_J ≤175°C

Test circuit

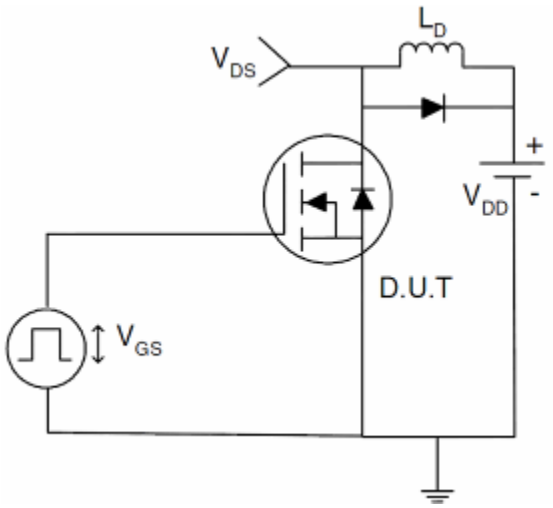
1）E_{AS} test Circuits



2）Gate charge test Circuit:



3）Switch Time Test Circuit：



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

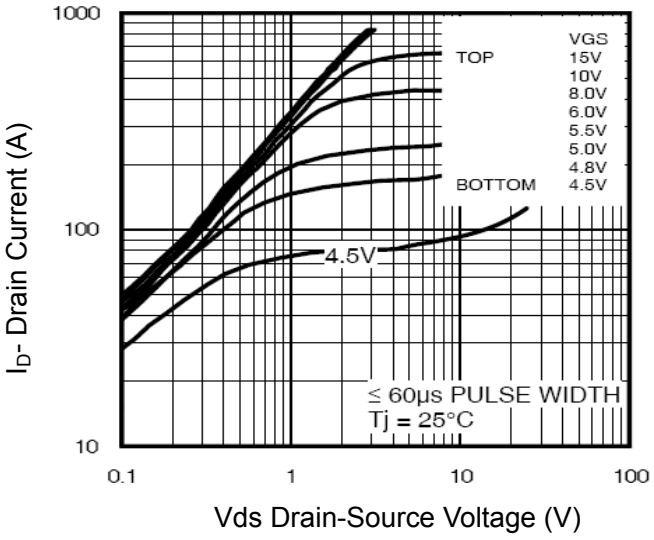


Figure 1 Output Characteristics

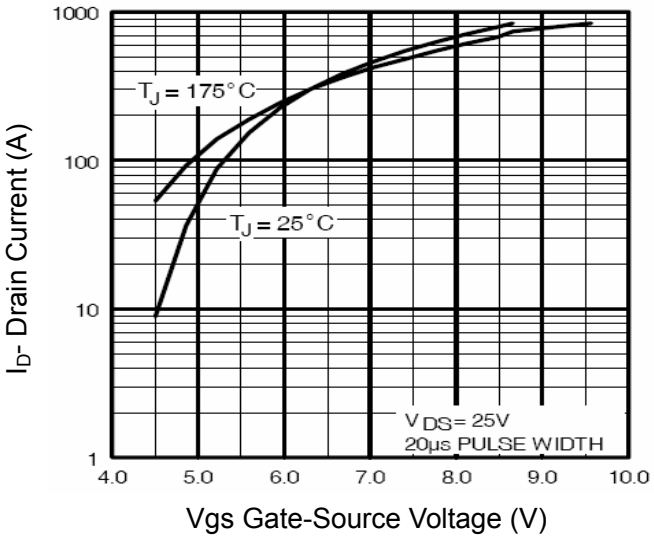


Figure 2 Transfer Characteristics

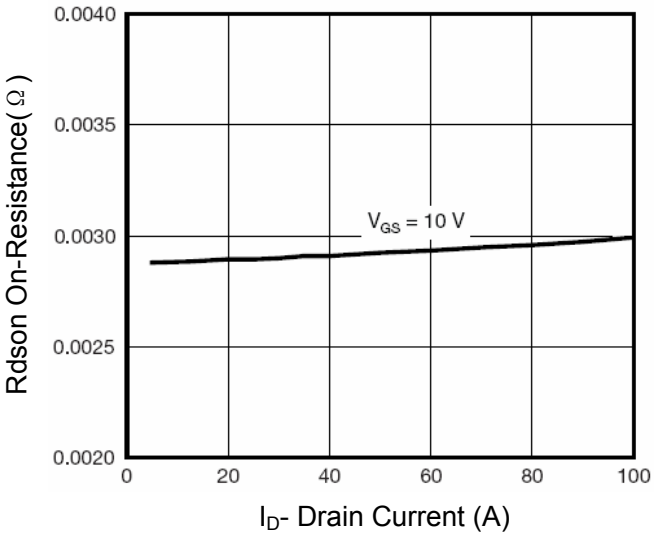


Figure 3 Rdson- Drain Current

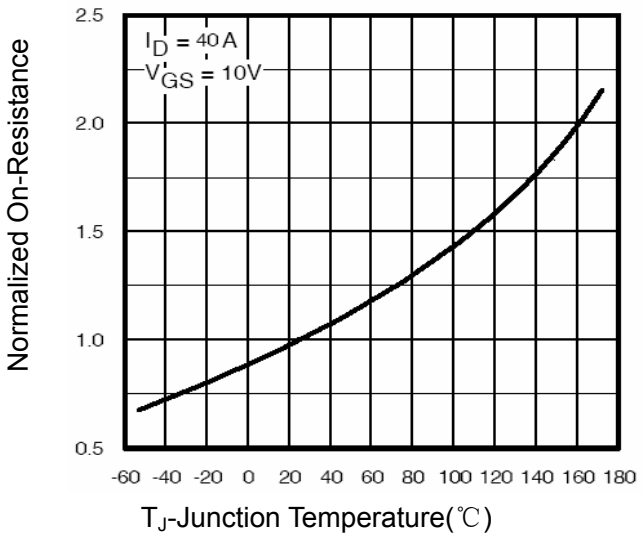


Figure 4 Rdson-JunctionTemperature

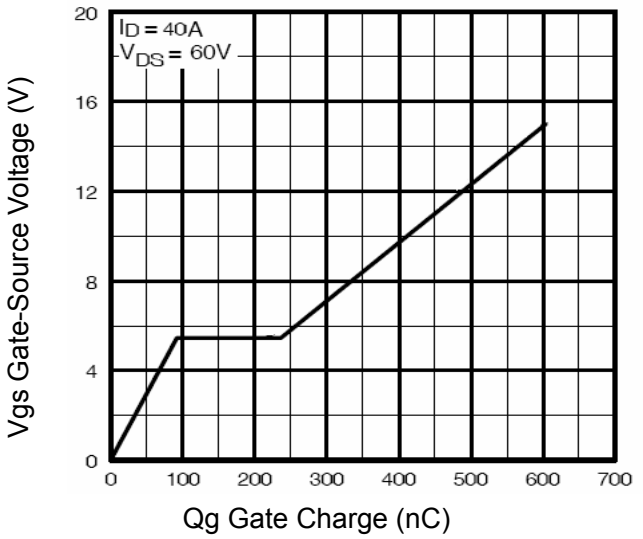


Figure 5 Gate Charge

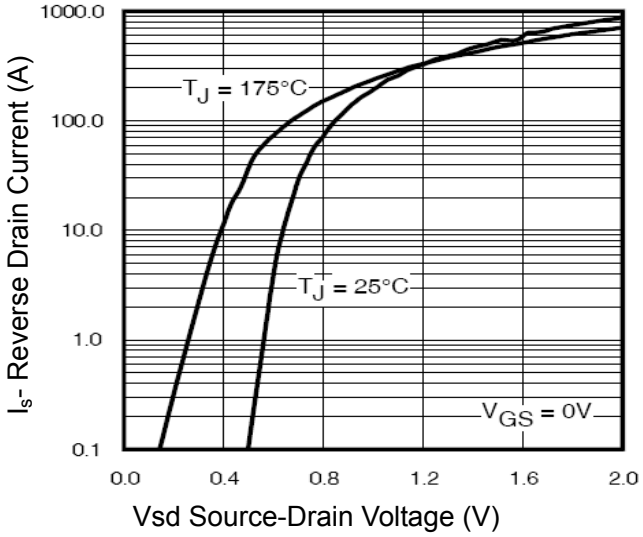


Figure 6 Source- Drain Diode Forward

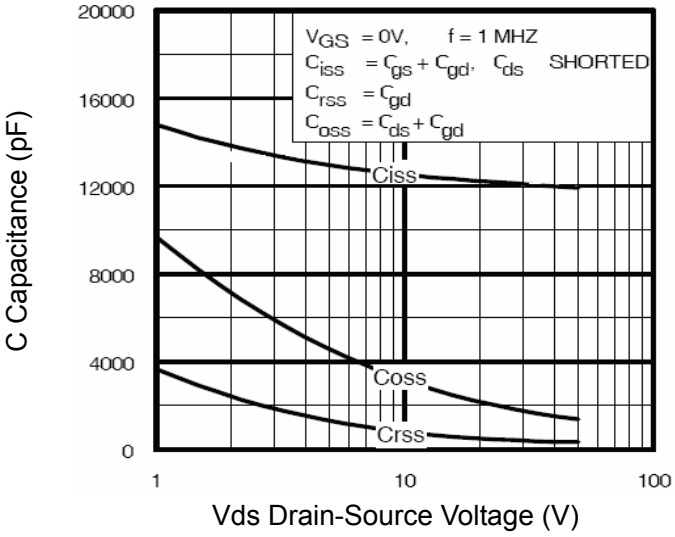


Figure 7 Capacitance vs Vds

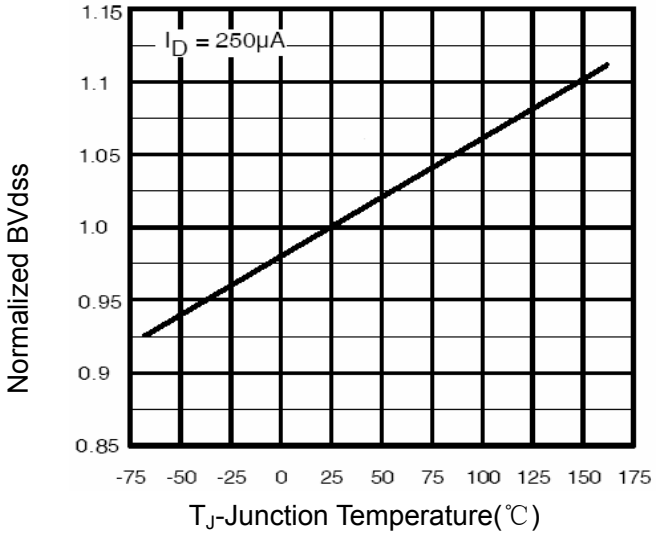


Figure 9 BV_{DSS} vs Junction Temperature

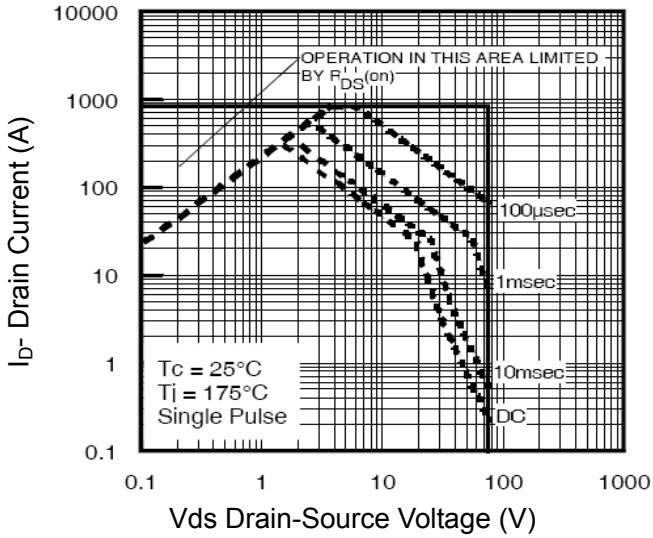


Figure 8 Safe Operation Area

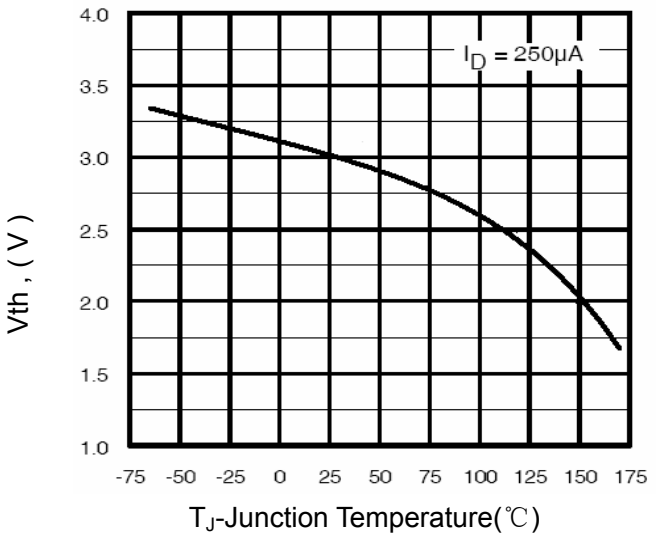


Figure 10 $V_{GS(th)}$ vs Junction Temperatur

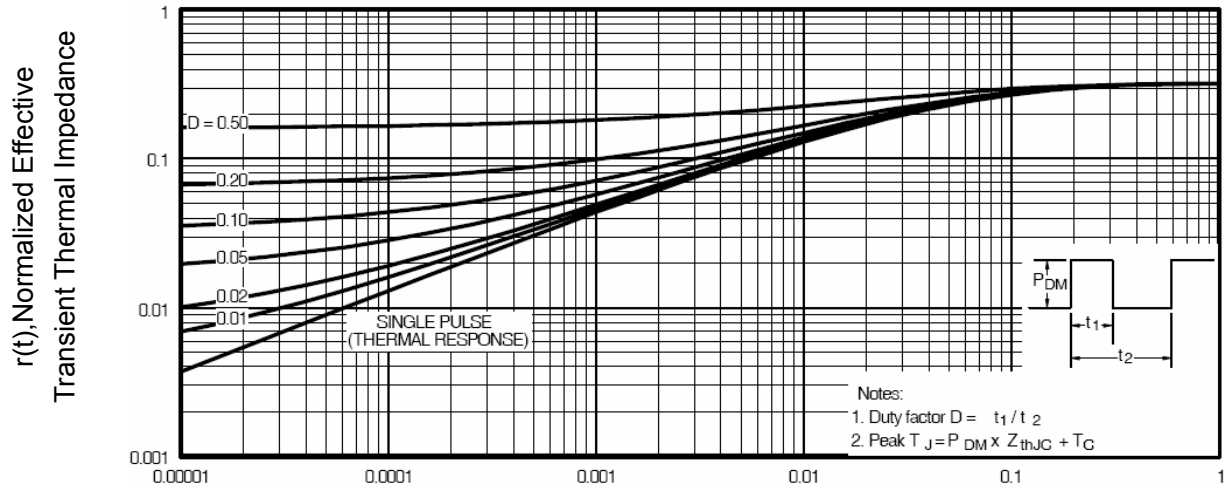
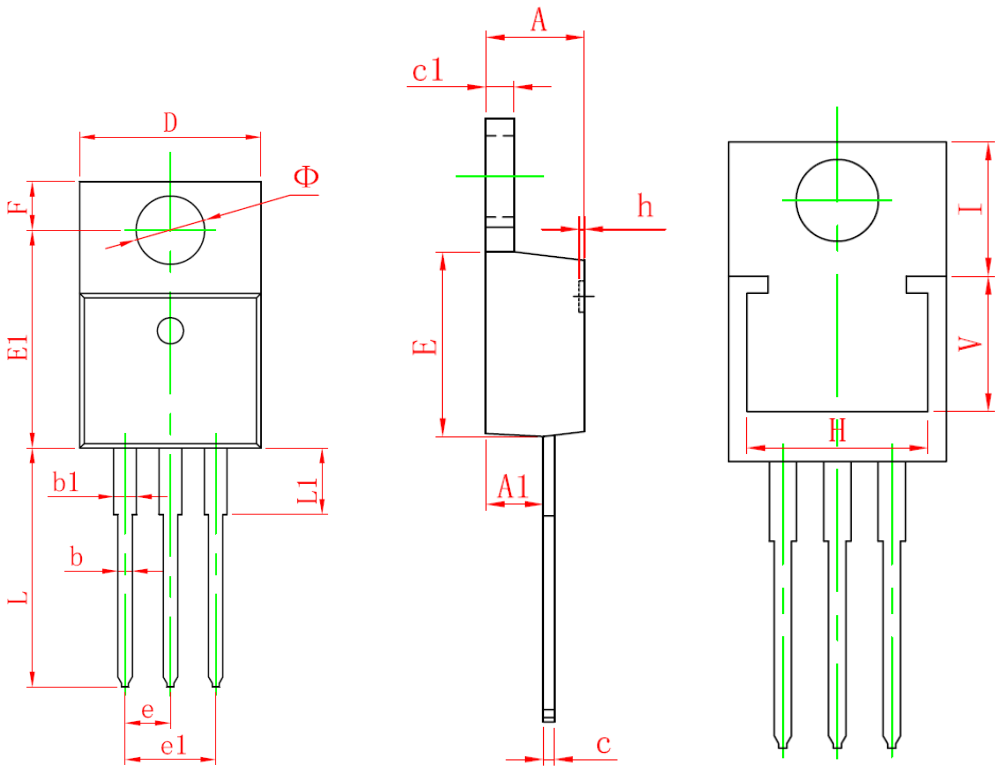


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220-3L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.470	4.670	0.176	0.184
A1	2.520	2.820	0.099	0.111
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	10.010	10.350	0.394	0.407
E	8.500	8.900	0.335	0.350
E1	12.060	12.460	0.475	0.491
e	2.540（TYP.）		0.100（TYP.）	
e1	4.980	5.180	0.196	0.204
F	2.590	2.890	0.102	0.114
H	8.440 REF.		0.332 REF.	
h	0.000	0.300	0.000	0.012
L	13.400	13.800	0.528	0.543
L1	3.560	3.960	0.140	0.156
V	6.360 REF.		0.250 REF.	
I	6.300 REF.		0.248 REF.	
Φ	3.735	3.935	0.147	0.155

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