

NCE N-Channel Super Trench Power MOSFET

Description

The series of devices uses **Super Trench** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

General Features

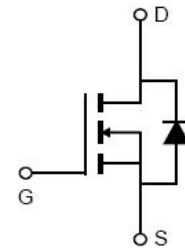
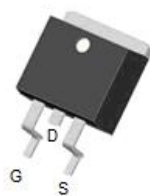
- $V_{DS} = 200V, I_D = 70A$
 $R_{DS(ON)} = 16.5m\Omega$, typical @ $V_{GS} = 10V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating

100% UIS TESTED!
100% ΔVds TESTED!

TO-220-3L



TO-263-2L



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCEP0260	NCEP0260	TO-220-3L	-	-	-
NCEP0260D	NCEP0260D	TO-263-2L	Ø330mm	24mm	800 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	200	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	70	A
Drain Current-Continuous($T_c = 100^\circ C$)	$I_D(100^\circ C)$	49	A
Pulsed Drain Current	I_{DM}	280	A
Maximum Power Dissipation	P_D	285	W
Derating factor		1.9	W/°C
Single pulse avalanche energy ^(Note 1)	E_{AS}	135	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.53	°C/W
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Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise noted)

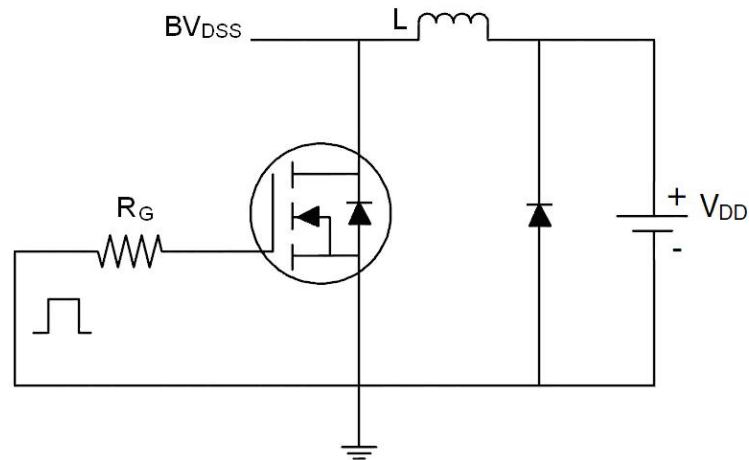
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	200	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=200V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	3.0	4.0	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=30A$	-	16.5	23	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=30A$	-	50	-	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=100V, V_{GS}=0V,$ $F=1.0MHz$	-	3300	-	PF
Output Capacitance	C_{oss}		-	255	-	PF
Reverse Transfer Capacitance	C_{rss}		-	20	-	PF
Switching Characteristics (Note 2)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=100V, I_D=30A$ $V_{GS}=10V, R_G=4.7\Omega$	-	25	-	nS
Turn-on Rise Time	t_r		-	21	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	56	-	nS
Turn-Off Fall Time	t_f		-	15	-	nS
Total Gate Charge	Q_g	$V_{DS}=100V, I_D=30A,$ $V_{GS}=10V$	-	50	-	nC
Gate-Source Charge	Q_{gs}		-	15.2	-	nC
Gate-Drain Charge	Q_{gd}		-	14.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=30A$	-	-	1.2	V
Diode Forward Current	I_S		-	-	65	A
Reverse Recovery Time	t_{rr}	$T_J = 25^\circ\text{C}, I_F = 30A$	-	140	-	nS
Reverse Recovery Charge	Q_{rr}	$di/dt = 100A/\mu s$	-	460	-	nC

Notes:

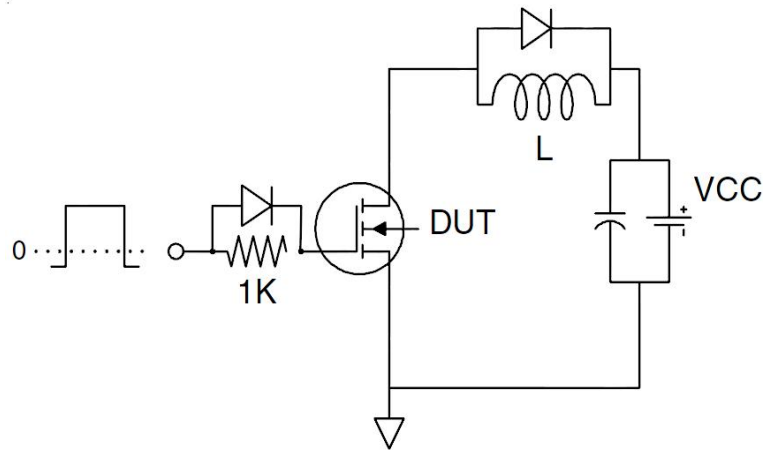
1. EAS condition : $T_J=25^\circ\text{C}, V_{DD}=50V, V_G=10V, L=0.5mH, R_g=25\Omega$
2. Guaranteed by design, not subject to production
3. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_J(MAX)=175^\circ\text{C}$. The SOA curve provides a single pulse rating.

Test Circuit

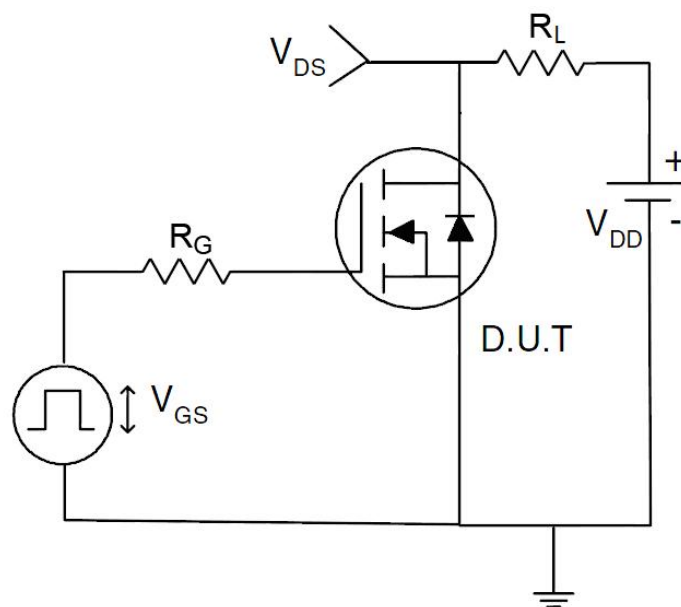
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics

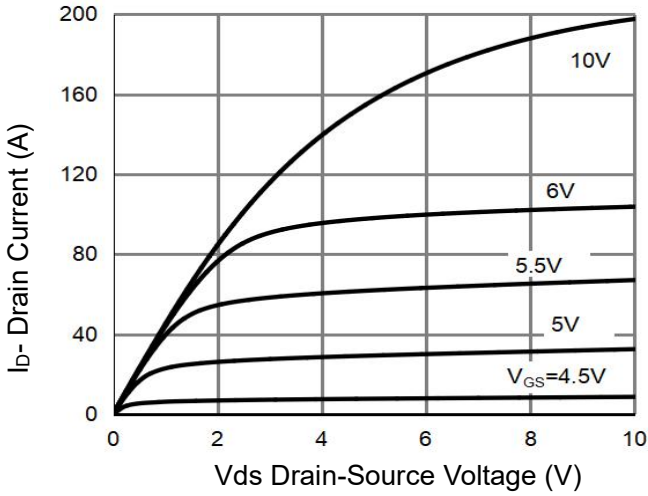


Figure 1 Output Characteristics

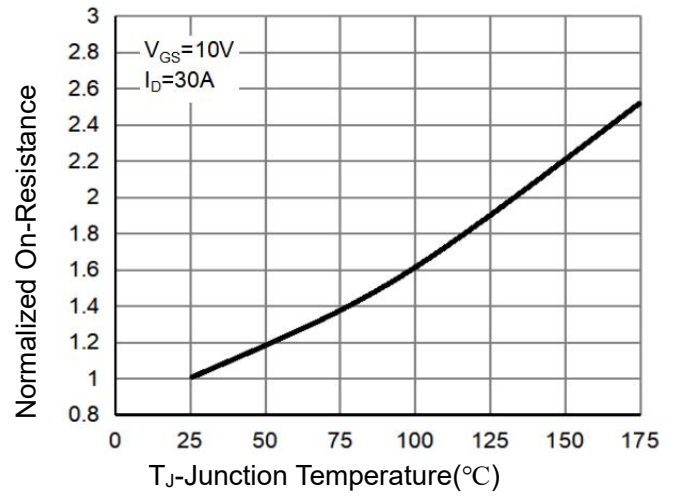


Figure 4 R_{dson} -Junction Temperature

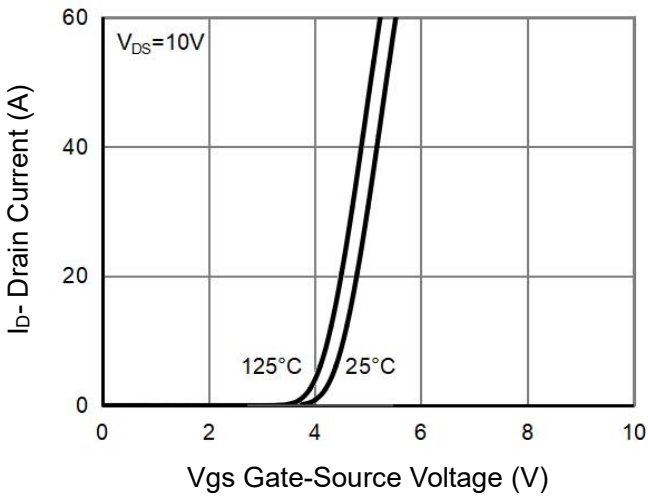


Figure 2 Transfer Characteristics

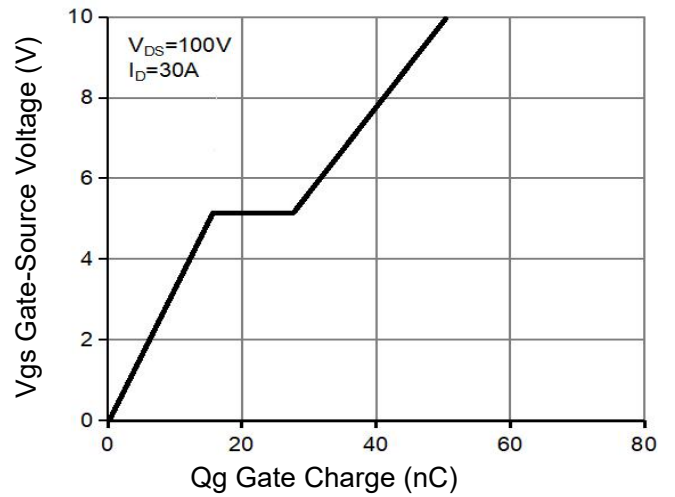


Figure 5 Gate Charge

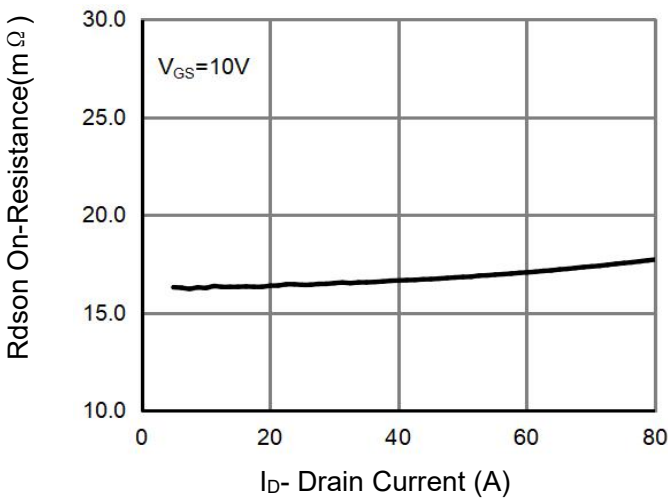


Figure 3 R_{dson} - Drain Current

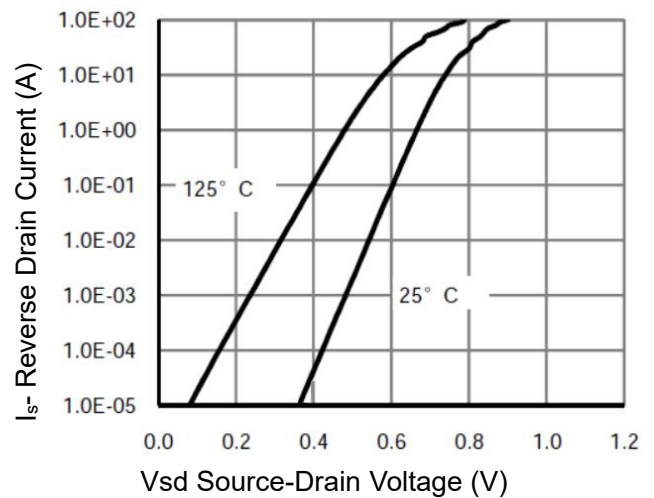


Figure 6 Source- Drain Diode Forward

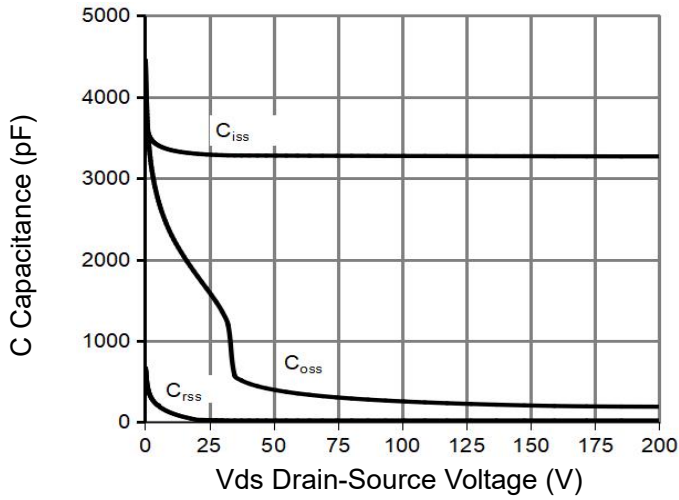


Figure 7 Capacitance vs Vds

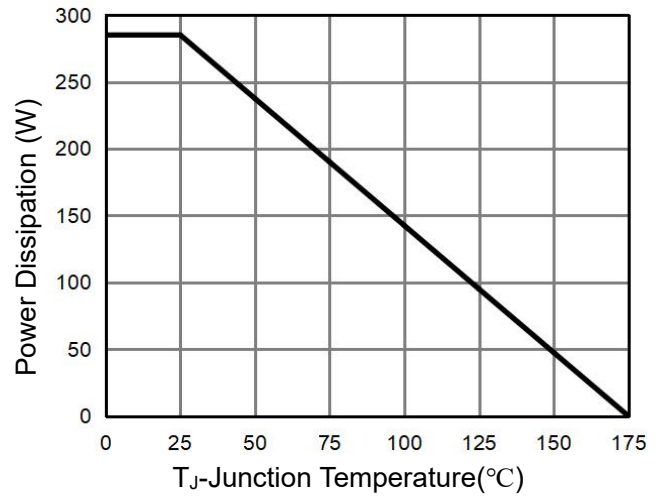


Figure 9 Power De-rating

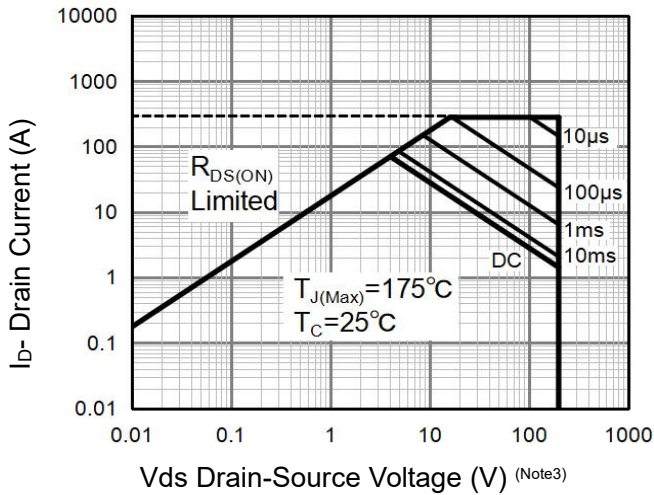


Figure 8 Safe Operation Area

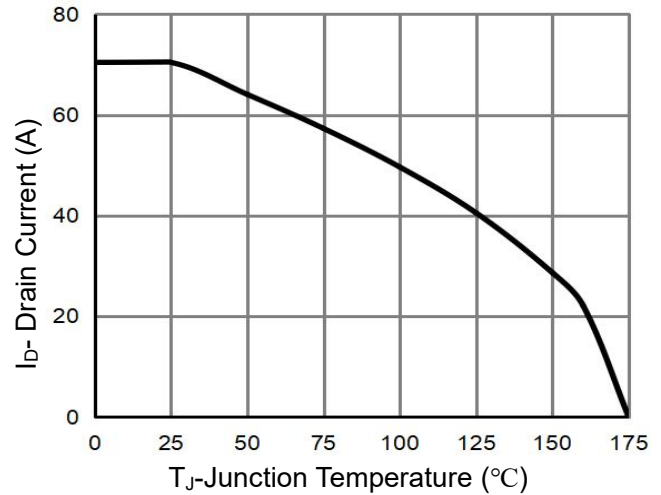


Figure 10 Current De-rating

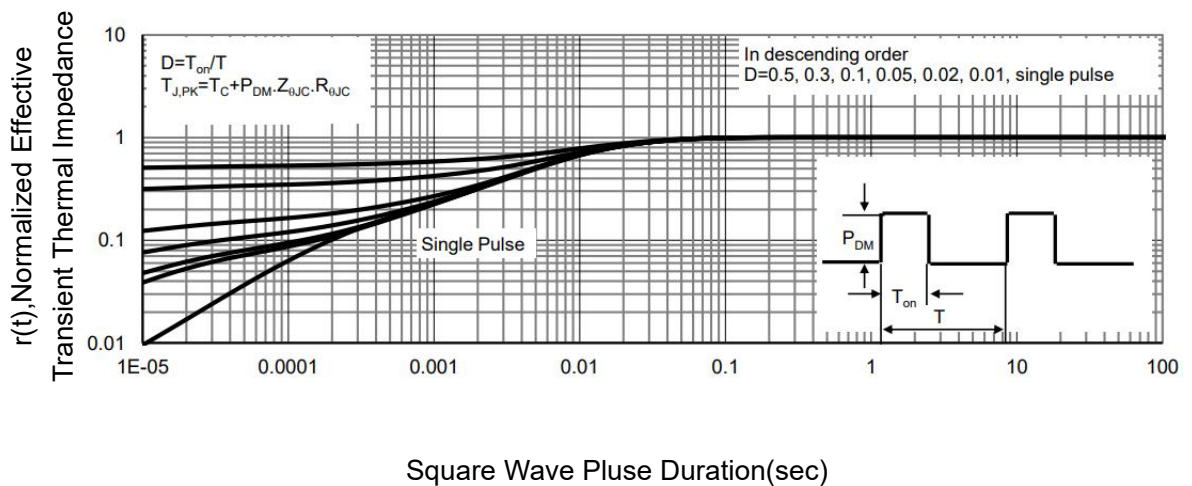
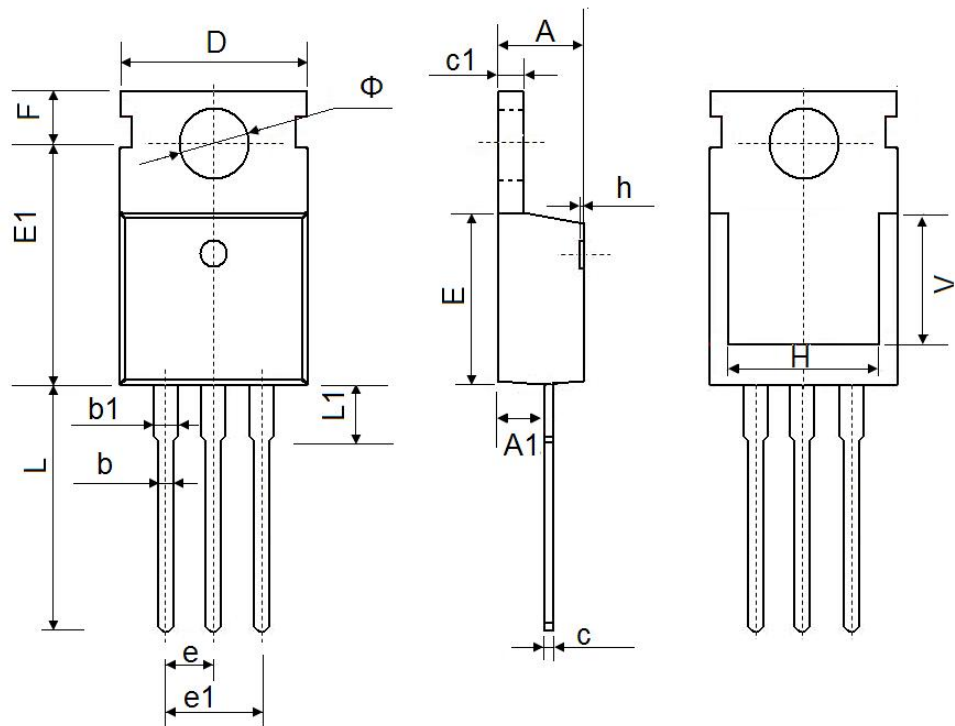


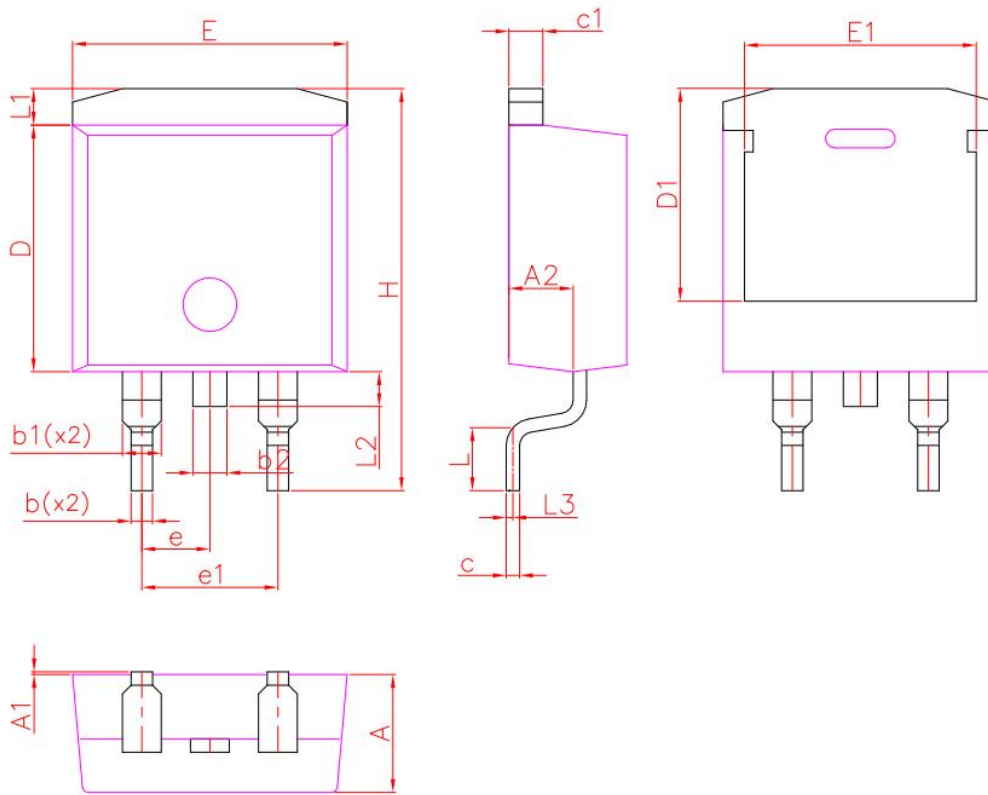
Figure 12 Normalized Maximum Transient Thermal Impedance

TO-220-3L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
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	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150

TO-263-2L Package Information



TO263			
DIM.	MIN.	NOM.	MAX.
A	4.20	4.40	4.60
A1	0.00	0.10	0.25
A2	2.20	2.40	2.60
b	0.70	0.80	0.90
b1	1.20	1.45	1.75
b2	1.17	1.27	1.37
c	0.40	0.50	0.60
c1	1.15	1.27	1.40
D	9.10	9.20	9.30
D1	7.63	7.93	8.23
E	10.05	10.25	10.45
E1	8.35	8.65	8.95
e	2.54BSC		
e1	5.08BSC		
H	14.61	15.00	15.88
L	1.78	2.35	2.79
L1	1.36REF		
L2	1.3REF		
L3	0.25REF		
All dimensions in millimeters			

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