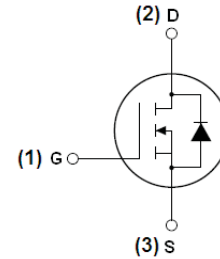


## N-Channel Enhancement Mode Power MOSFET

### Description

The RM80N80T2 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications.



Schematic diagram



Marking and pin assignment



TO-220-3L top view

### General Features

- $V_{DS} = 80V, I_D = 80A$   
 $R_{DS(ON)} < 8.5m\Omega @ V_{GS} = 10V$  (Typ: 7.0m $\Omega$ )
- High density cell design for ultra low  $R_{DS(ON)}$
- Fully characterized avalanche voltage and current
- Special designed for converters and power controls
- 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
- Halogen-free

**100% UIS TESTED!**

**100%  $\Delta V_{DS}$  TESTED!**

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
80N80	RM80N80T2	TO-220-3L	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	80	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	80	A
Drain Current-Continuous( $T_C = 100^\circ C$ )	$I_D(100^\circ C)$	60	A
Pulsed Drain Current	$I_{DM}$	320	A
Maximum Power Dissipation	$P_D$	170	W
Peak diode recovery voltage	dv/dt	15	V/ns
Derating factor		1.13	W/ $^\circ C$
Single pulse avalanche energy <sup>(Note 5)</sup>	$E_{AS}$	620	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 175	$^\circ C$

## Thermal Characteristic

Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta JC}$	0.88	°C/W
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## Electrical Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted)

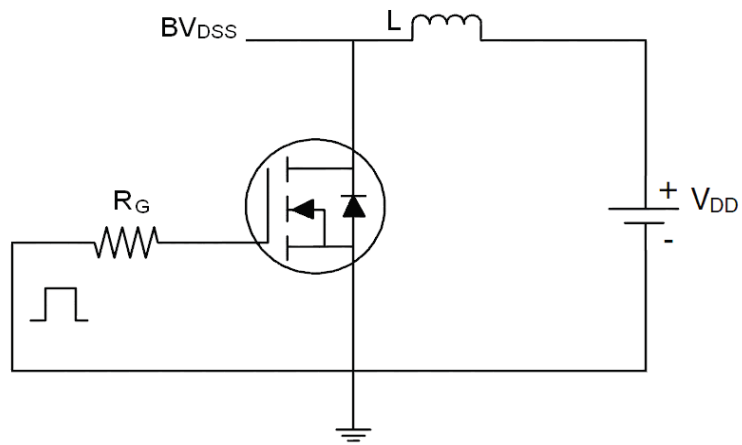
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	85	89	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=85V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> <sup>(Note 3)</sup>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	2.85	4	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=40A$	-	7.0	8.5	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=25V, I_D=40A$	110	-	-	S
<b>Dynamic Characteristics</b> <sup>(Note 4)</sup>						
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V,$ $F=1.0\text{MHz}$	-	4100	-	PF
Output Capacitance	$C_{oss}$		-	343	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	258	-	PF
<b>Switching Characteristics</b> <sup>(Note 4)</sup>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, I_D=2A, R_L=15\Omega,$ $R_G=2.5\Omega, V_{GS}=10V$	-	18	-	nS
Turn-on Rise Time	$t_r$		-	12	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	56	-	nS
Turn-Off Fall Time	$t_f$		-	15	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=42.5V, I_D=50A,$ $V_{GS}=10V$	-	90	-	nC
Gate-Source Charge	$Q_{gs}$		-	23	-	nC
Gate-Drain Charge	$Q_{gd}$		-	30	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note 3)</sup>	$V_{SD}$	$V_{GS}=0V, I_S=40A$	-	-	1.2	V
Diode Forward Current <sup>(Note 2)</sup>	$I_S$		-	-	80	A
Reverse Recovery Time	$t_{rr}$	$T_j=25^\circ\text{C}, I_F=75A$ $di/dt=100A/\mu s$ <sup>(Note 3)</sup>	-	-	36	nS
Reverse Recovery Charge	$Q_{rr}$		-	-	56	nC
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

### Notes:

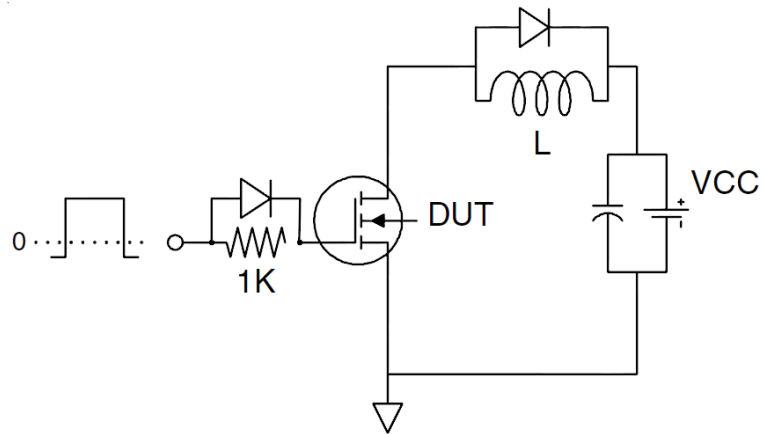
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5. EAS condition:  $T_j=25^\circ\text{C}, V_{DD}=40V, V_G=10V, L=0.5\text{mH}, R_g=25\Omega$

# Test Circuit

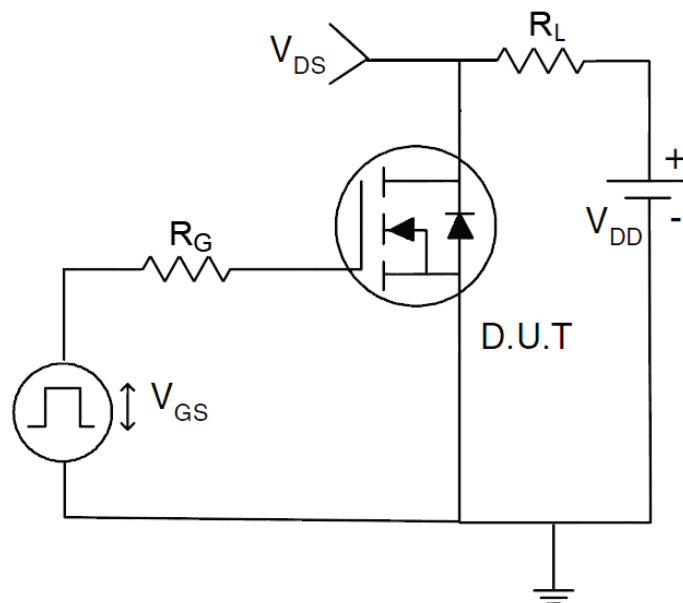
## 1) E<sub>AS</sub> Test Circuits



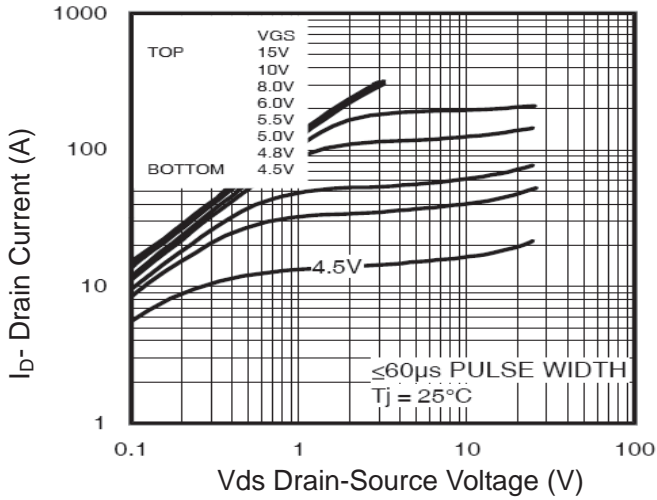
## 2) Gate Charge Test Circuit



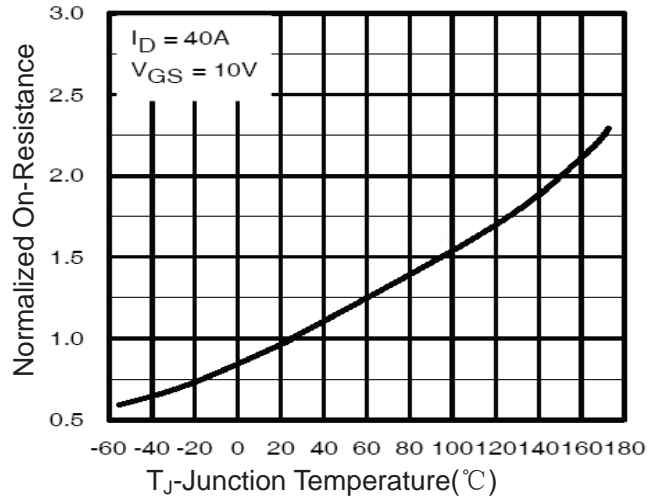
## 3) Switch Time Test Circuit



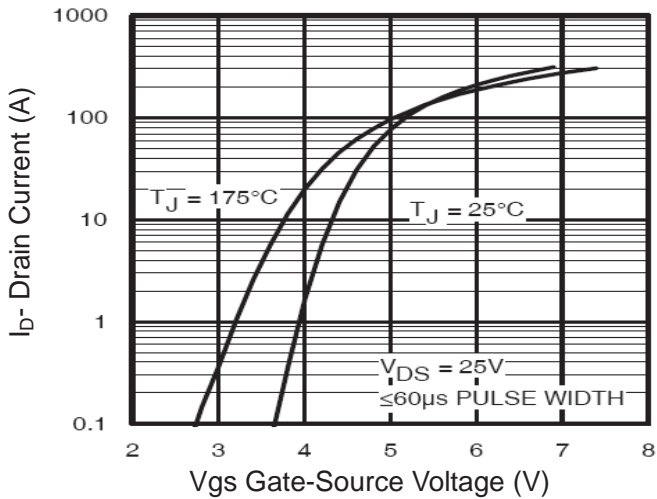
## RATING AND CHARACTERISTICS CURVES (RM80N80T2)



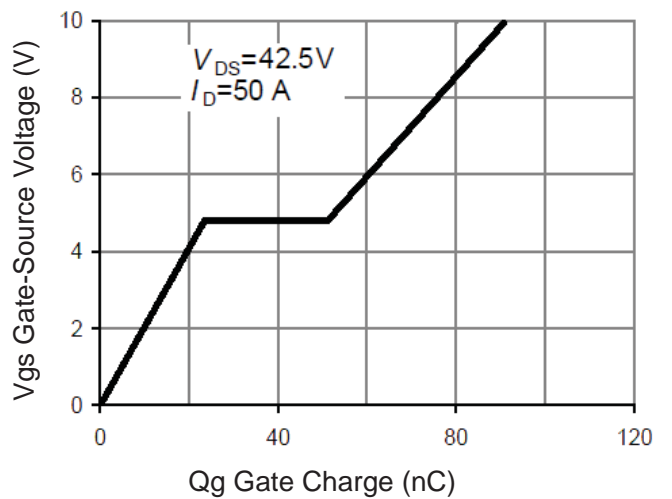
**Figure 1 Output Characteristics**



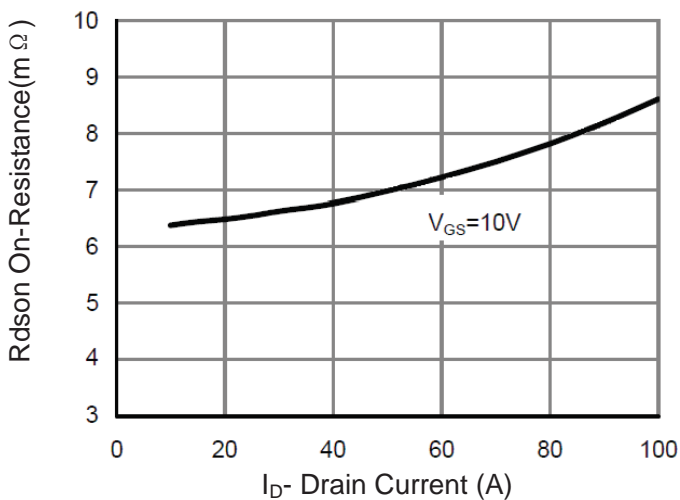
**Figure 4 Rdson-Junction Temperature**



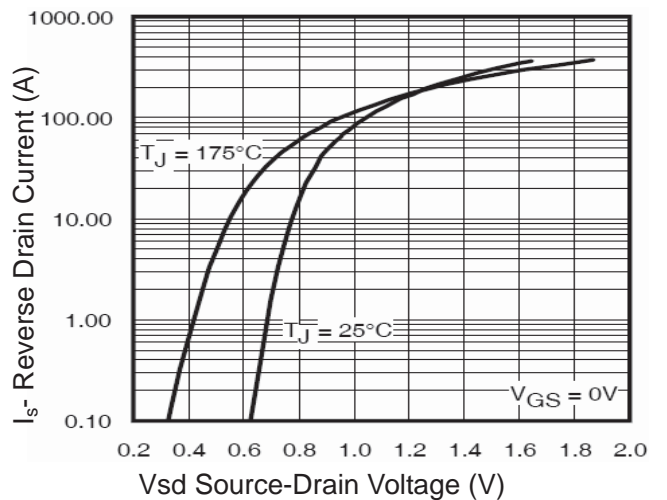
**Figure 2 Transfer Characteristics**



**Figure 5 Gate Charge**

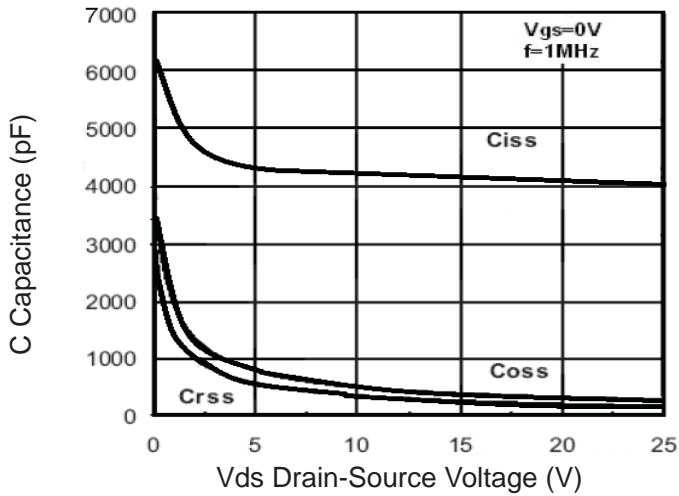


**Figure 3 Rdson- Drain Current**

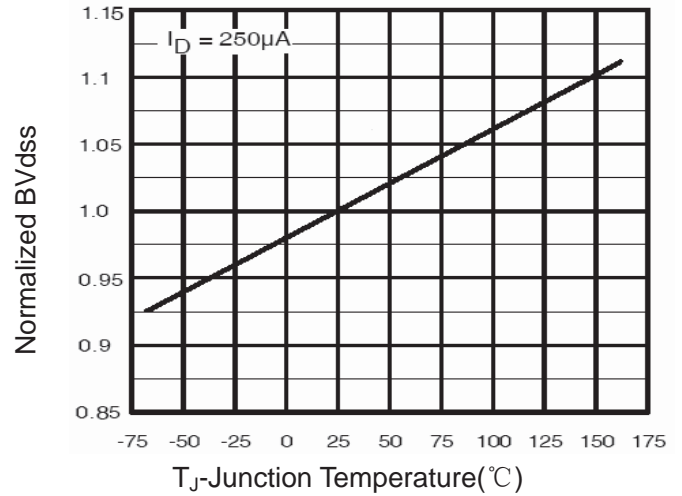


**Figure 6 Source- Drain Diode Forward**

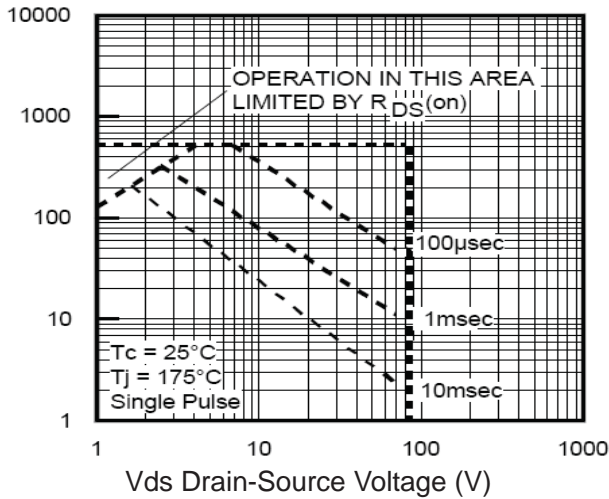
## RATING AND CHARACTERISTICS CURVES (RM80N80T2)



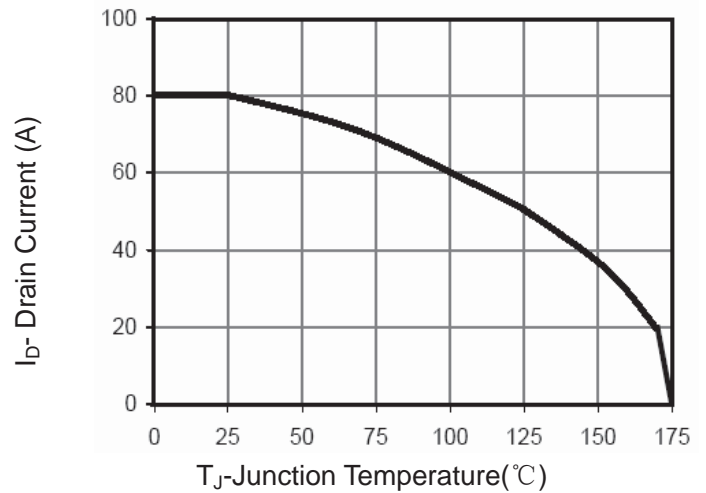
**Figure 7 Capacitance vs  $V_{ds}$**



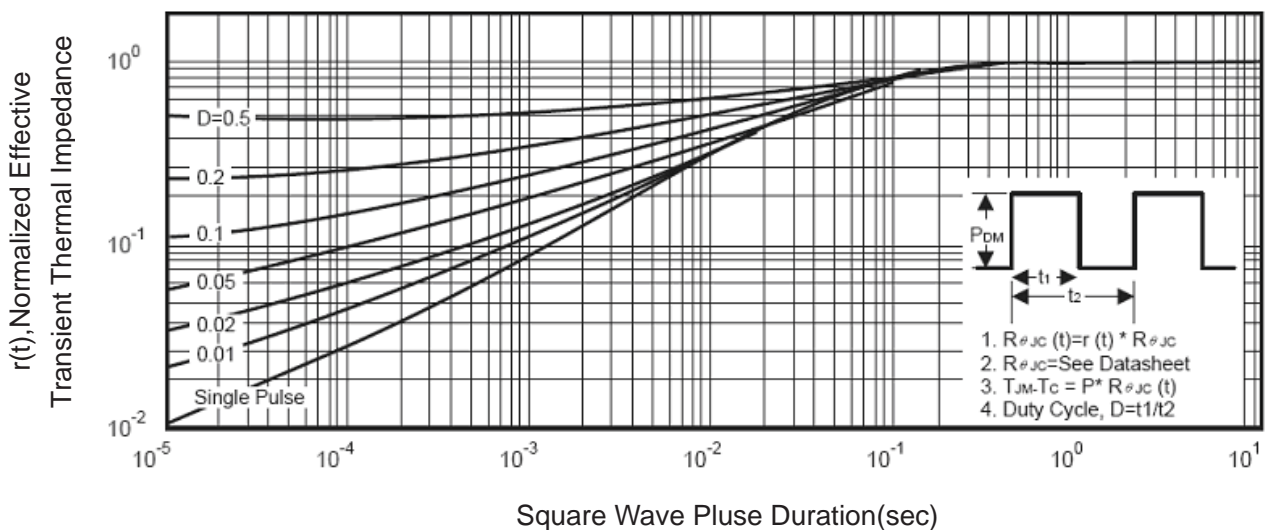
**Figure 9  $BV_{DSS}$  vs Junction Temperature**



**Figure 8 Safe Operation Area**

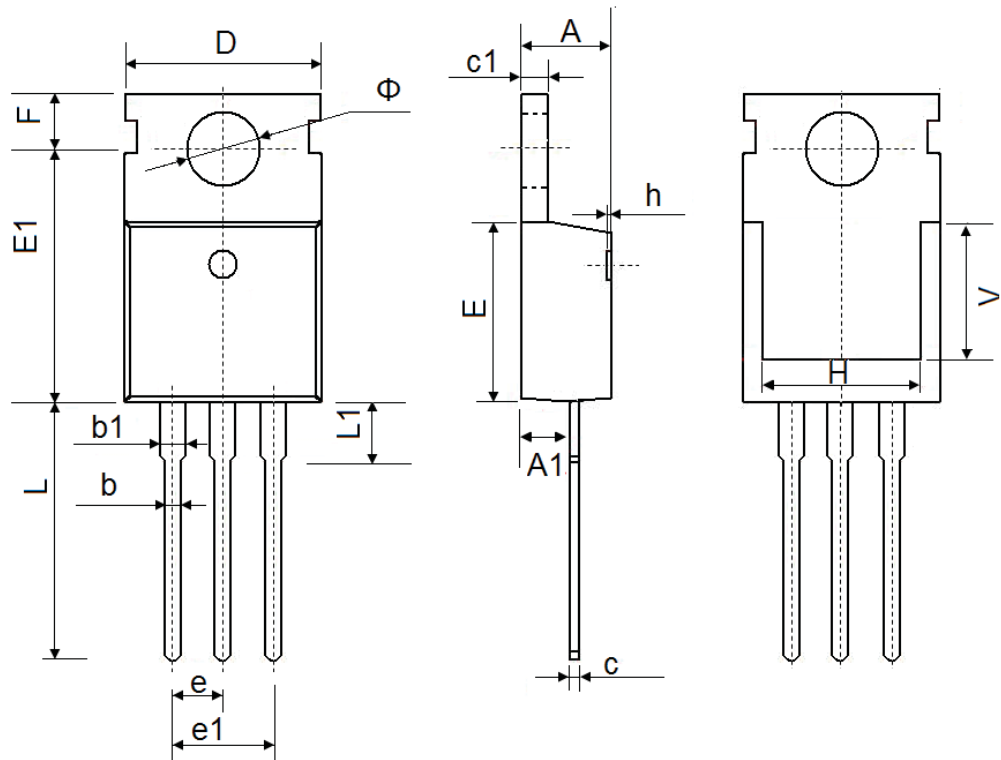


**Figure 10  $I_D$  Current De-rating**



**Figure 11 Normalized Maximum Transient Thermal Impedance**

## TO-220-3L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	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	7.500 REF.		0.295 REF.	
$\Phi$	3.400	3.800	0.134	0.150

Package	Tube (pcs/tube)	Tube (pcs/inner box)	Tube (pcs/cartoon)	Tape&Reel (pcs/reel)	Tape&Reel (pcs/inner box)	Tape&Reel (pcs/cartoon)
DFN	100	10,000	100,000	2,500	5,000	40,000
SOP-8	100	10,000	100,000	4,000	4,000	20,000
TSSOP-8	100	32,000	128,000	3,000	6,000	48,000
SOT-23-3L	—	—	—	3,000	30,000	120,000
SOT-23-6L	—	—	—	3,000	30,000	120,000
SOT-23(6R)	—	—	—	3,000	30,000	120,000
SOT-363	—	—	—	3,000	30,000	120,000
SOT-523	—	—	—	3,000	30,000	120,000
SOT223	—	—	—	2,500	2,500	20,000
TO-220	50	1,000	5,000	—	—	—
TO-220F	50	1,000	10,000	—	—	—
TO-247	30	300	1,200	—	—	—
TO-251	80	4,000	40,000	—	—	—
TO-251S(4R)	80	4,000	40,000	—	—	—
TO-252-2L(4R)	80	4,000	40,000	2,500	2,500	25,000
TO-263-2L	50	1,000	10,000	800	800	8,000
TO-3P	30	300	3,000	—	—	—
TO-92	—	—	—	1,000(袋装)	10,000	100,000

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