

## TGD N-Channel Enhancement Mode Power MOSFET

### Description

The TGD0275 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

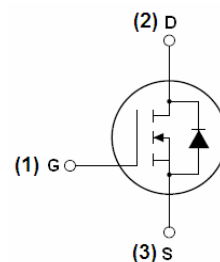
- $V_{DSS} = 200V, I_D = 75A$   
 $R_{DS(ON)} < 20m\Omega @ V_{GS} = 10V$
- Good stability and uniformity with high  $E_{AS}$
- Special process technology for high ESD capability
- High density cell design for ultra low  $R_{DS(on)}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

### Application

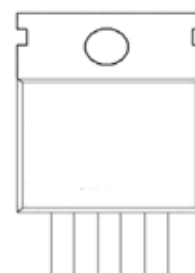
- Automotive applications
- Hard switched and high frequency circuits
- Uninterruptible power supply

**100% UIS TESTED!**

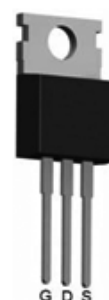
**100%  $\Delta V_{ds}$  TESTED!**



Schematic diagram



pin assignment



TO-220-3L top view

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
0275	0275	TO-220-3L	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DSS}$	200	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	75	A
Drain Current-Continuous( $T_C = 100^\circ C$ )	$I_D (100^\circ C)$	53	A
Pulsed Drain Current	$I_{DM}$	300	A
Maximum Power Dissipation	$P_D$	360	W
Derating factor		2.4	W/ $^\circ C$
Single pulse avalanche energy (Note 3)	$E_{AS}$	1512	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 1)</sup>	$R_{\theta JC}$	0.42	$^{\circ}\text{C/W}$
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**Electrical Characteristics ( $T_C=25^{\circ}\text{C}$  unless otherwise noted)**

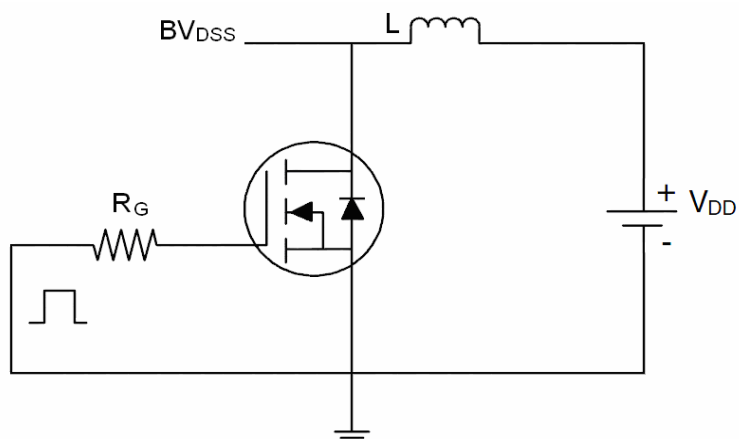
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	200	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =200V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±200	nA
On Characteristics						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.5	3.5	4.5	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =40A	-	17.8	20	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =50V, I <sub>D</sub> =40A		79	-	S
Dynamic Characteristics						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, F=1.0MHz	-	6990	-	PF
Output Capacitance	C <sub>OSS</sub>		-	950	-	PF
Reverse Transfer Capacitance	C <sub>RSS</sub>		-	700	-	PF
Switching Characteristics						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =100V, I <sub>D</sub> =40A, V <sub>GS</sub> =10V, R <sub>G</sub> =2.7Ω	-	17	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	18	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	56	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	22	-	nS
Total Gate Charge	Q <sub>g</sub>	ID=40A, VDD=100V, VGS=10V	-	140	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	40	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	45	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =75A	-	-	1.2	V
Reverse Recovery Time	t <sub>rr</sub>	TJ = 25°C, IF = 40A	-	136	-	nS
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 100A/μs <sup>(Note2)</sup>	-	458	-	nC

**Notes:**

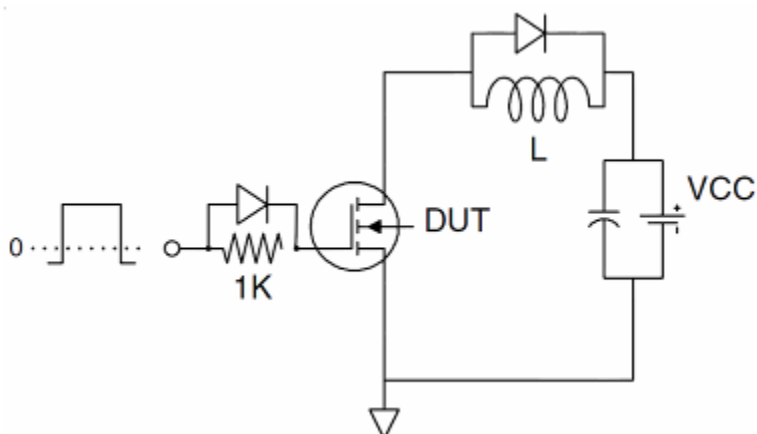
1. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
2. Pulse Test: Pulse Width  $\leq 400\mu s$ , Duty Cycle  $\leq 2\%$ .
3. EAS condition:  $T_J=25^{\circ}\text{C}, V_{DD}=50V, V_G=10V, L=1\text{mH}, R_G=25\Omega, I_{AS}=55A$
4.  $I_{SD} \leq 125A, di/dt \leq 260A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 175^{\circ}\text{C}$

## Test Circuit

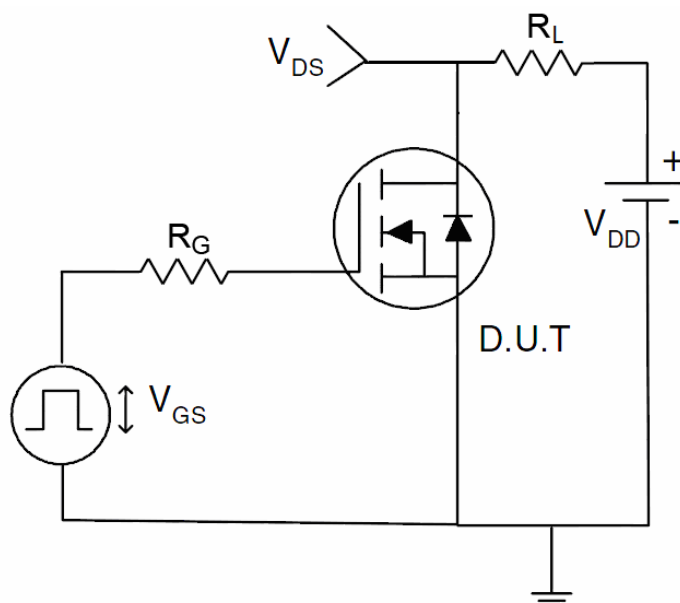
### 1) $E_{AS}$ test Circuit



### 2) Gate charge test Circuit



### 3) Switch Time Test Circuit



## Typical Electrical and Thermal Characteristics

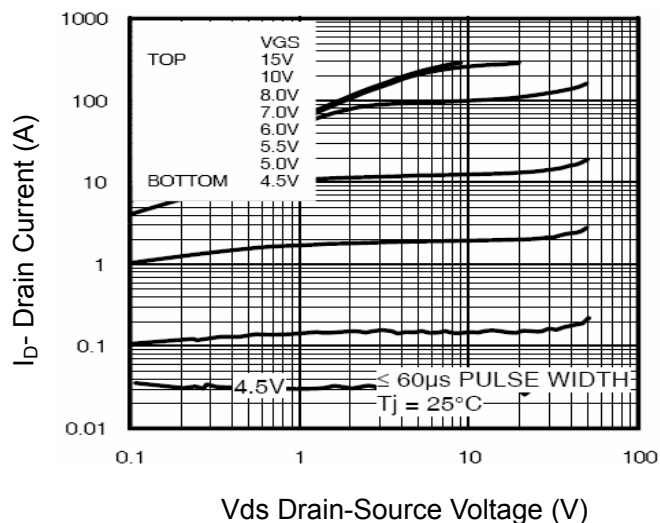


Figure 1 Output Characteristics

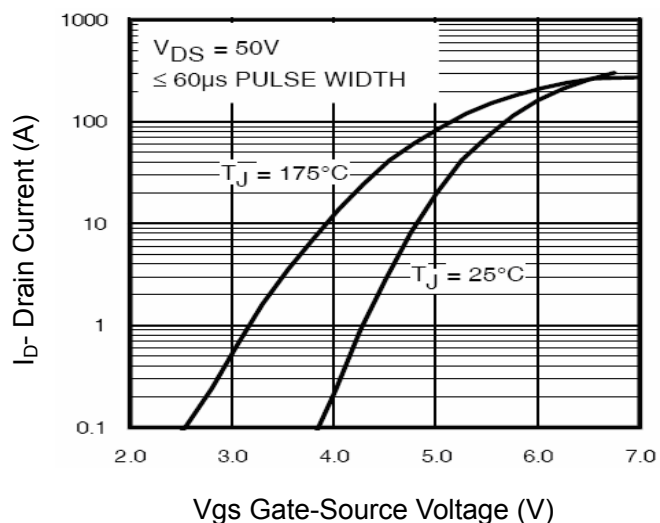


Figure 2 Transfer Characteristics

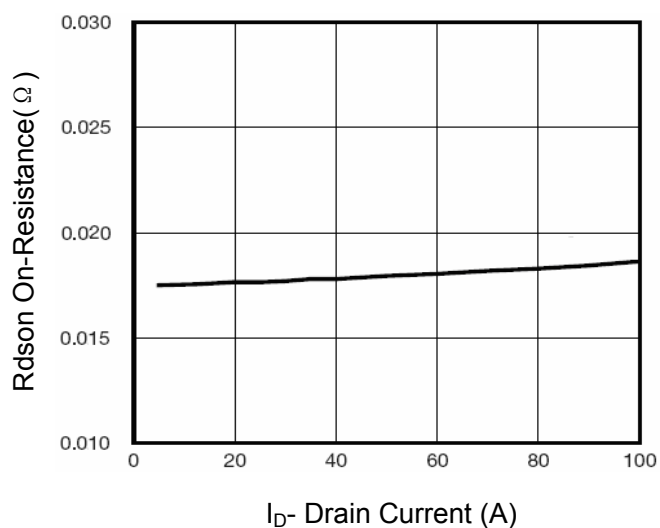


Figure 3  $R_{DS(on)}$ - Drain Current

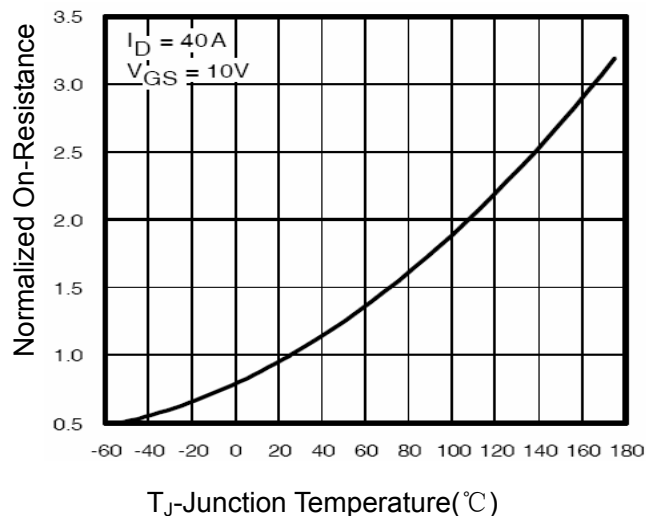


Figure 4  $R_{DS(on)}$ -Junction Temperature

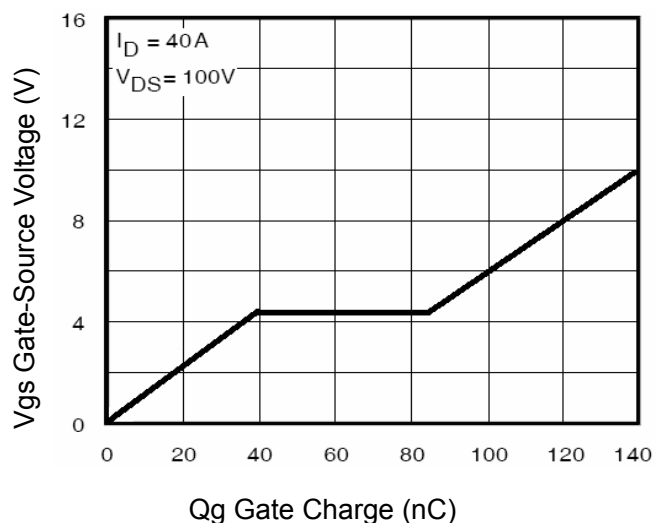


Figure 5 Gate Charge

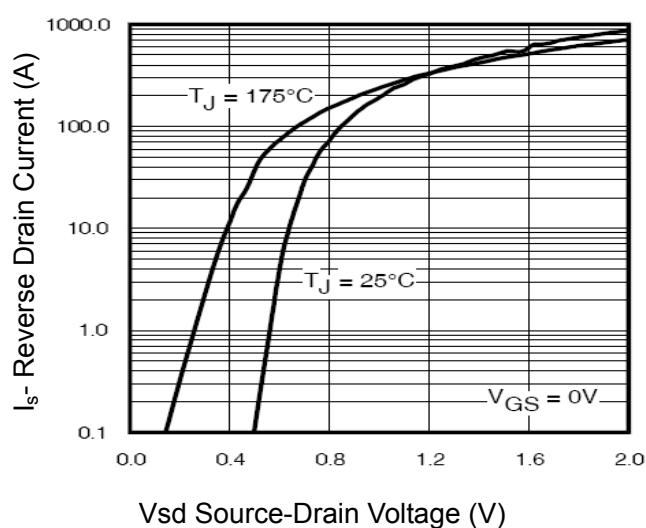


Figure 6 Source- Drain Diode Forward

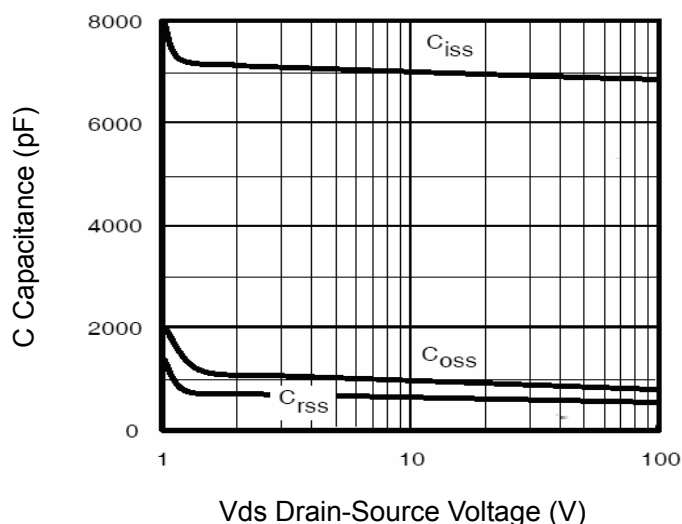


Figure 7 Capacitance vs Vds

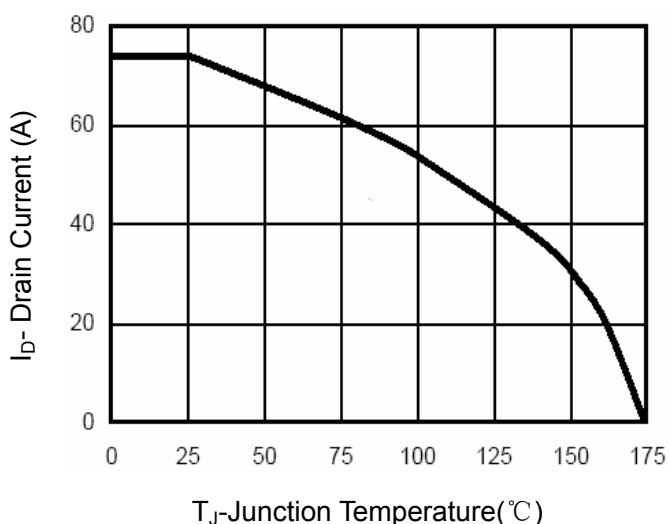


Figure 9 ID Current Derating vs Junction Temperature

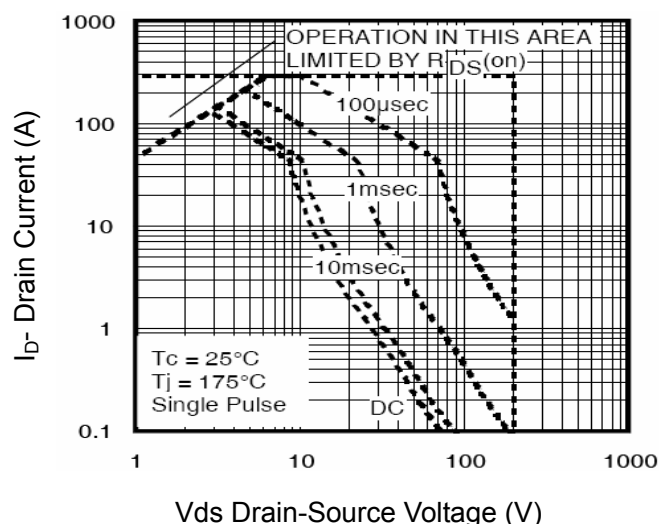


Figure 8 Safe Operation Area

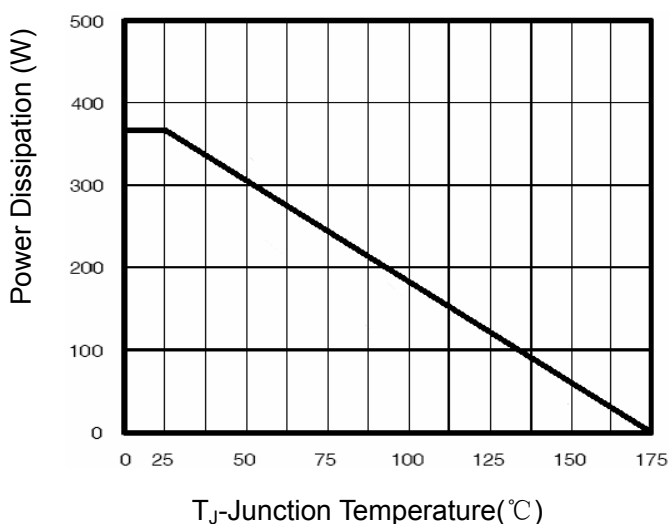


Figure 10 Power De-rating

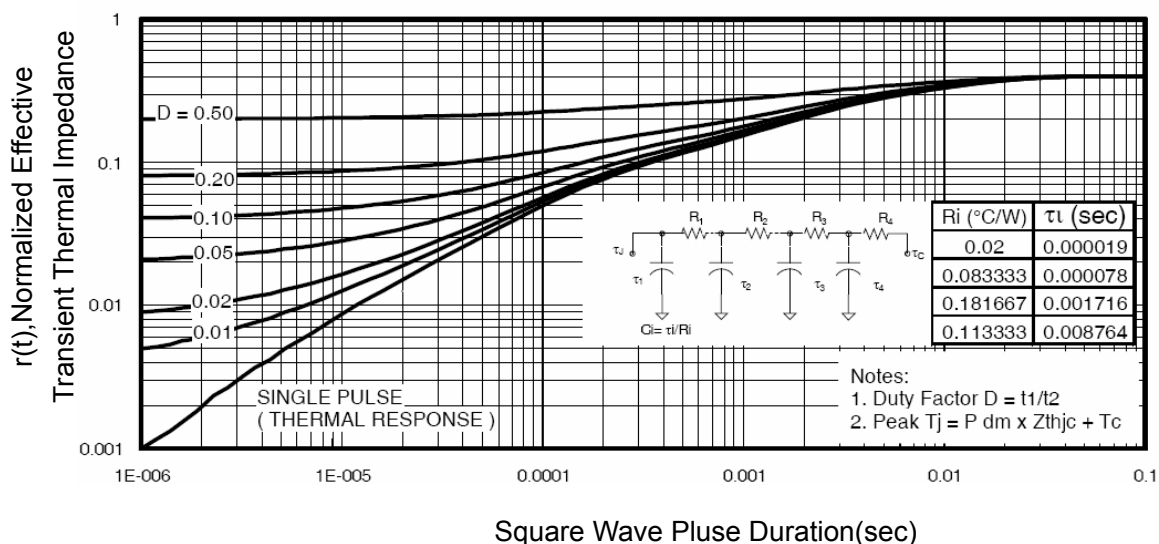
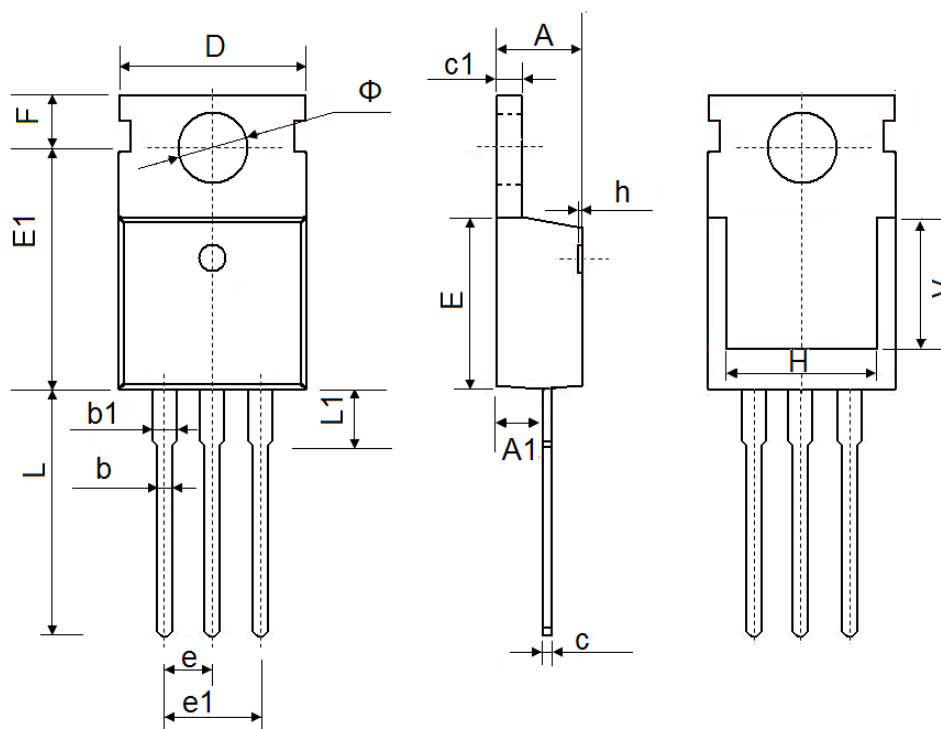


Figure 11 Normalized Maximum Transient Thermal Impedance  
<http://www.goodark.asia>

## 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.	
Φ	3.400	3.800	0.134	0.150