

## TGD N-Channel Enhancement Mode Power MOSFET

### Description

The TGD1530C 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 applications.

### General Features

- $V_{DS} = 150V, I_D = 30A$   
 $R_{DS(ON)} < 72m\Omega @ V_{GS}=10V$  (Typ:62m $\Omega$ )

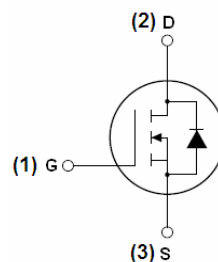
- High density cell design for ultra low  $R_{dson}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high  $E_{AS}$
- Excellent package for good heat dissipation

### Application

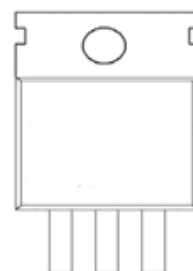
- Boost converters
- LED backlighting
- Uninterruptible power supply

**100% UIS TESTED!**

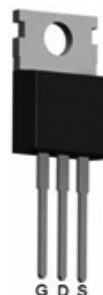
**100%  $\Delta V_{ds}$  TESTED!**



Schematic diagram



pin assignment



TO-220-3L top view

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
1530C	1530C	TO-220-3L	-	-	-

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

Symbol	Parameter	Limit	Unit
$V_{DS}$	Drain-Source Voltage	150	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current-Continuous	30	A
$I_D (100^\circ\text{C})$	Drain Current-Continuous( $T_C=100^\circ\text{C}$ )	21	A
$I_{DM}$	Pulsed Drain Current	65	A
$P_D$	Maximum Power Dissipation	105	W
	Derating factor	0.7	W/ $^\circ\text{C}$
$E_{AS}$	Single pulse avalanche energy <sup>(Note 5)</sup>	306	mJ
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55 To 175	$^\circ\text{C}$

**Thermal Characteristic**

$R_{\theta JC}$	Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup>	1.43	°C/W
-----------------	--	------	------

**Electrical Characteristics ( $T_C=25^{\circ}\text{C}$  unless otherwise noted)**

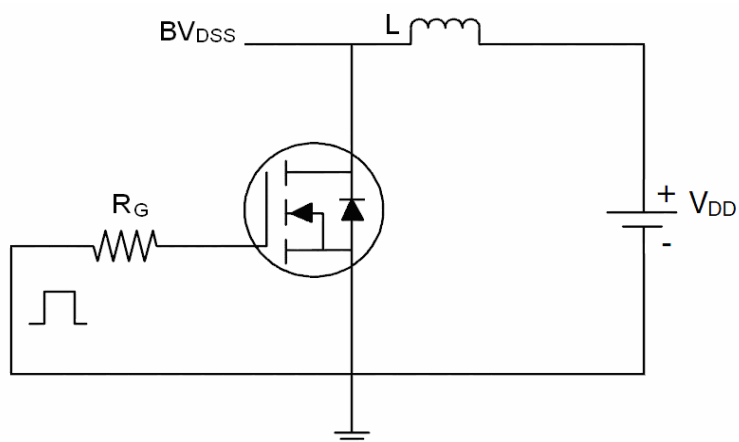
Symbol	Parameter	Condition	Min	Typ	Max	Unit
Off Characteristics						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	150	165	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =150V, V <sub>GS</sub> =0V	-	-	1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
On Characteristics <sup>(Note 3)</sup>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.5	3.5	4.5	V
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =15A	-	62	72	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =10A	-	20	-	S
Dynamic Characteristics <sup>(Note4)</sup>						
C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, F=1.0MHz	-	1650	-	PF
C <sub>OSS</sub>	Output Capacitance		-	200	-	PF
C <sub>RSS</sub>	Reverse Transfer Capacitance		-	70	-	PF
Switching Characteristics <sup>(Note 4)</sup>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =75V, R <sub>L</sub> =5Ω V <sub>GS</sub> =10V, R <sub>GEN</sub> =3Ω	-	10.5	-	nS
t <sub>r</sub>	Turn-on Rise Time		-	5.5	-	nS
t <sub>d(off)</sub>	Turn-Off Delay Time		-	14.5	-	nS
t <sub>f</sub>	Turn-Off Fall Time		-	3	-	nS
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =75V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V	-	30	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	7.5	-	nC
Q <sub>gd</sub>	Gate-Drain Charge		-	9.5	-	nC
Drain-Source Diode Characteristics						
V <sub>SD</sub>	Diode Forward Voltage <sup>(Note 3)</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =30A	-	-	1.2	V
I <sub>S</sub>	Diode Forward Current <sup>(Note 2)</sup>	-	-	-	30	A
t <sub>rr</sub>	Reverse Recovery Time	T <sub>J</sub> = 25°C, I <sub>F</sub> = 10A di/dt = 100A/μs <sup>(Note3)</sup>	-	23	-	nS
Q <sub>rr</sub>	Reverse Recovery Charge		-	35	-	nC
t <sub>on</sub>	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

**Notes:**

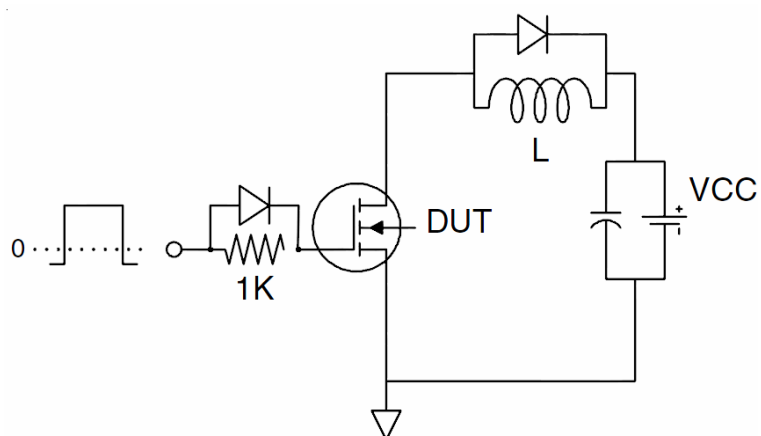
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5. EAS condition:  $T_J=25^{\circ}\text{C}, V_{DD}=50V, V_G=10V, L=0.5mH, R_g=25\Omega$

## Test Circuit

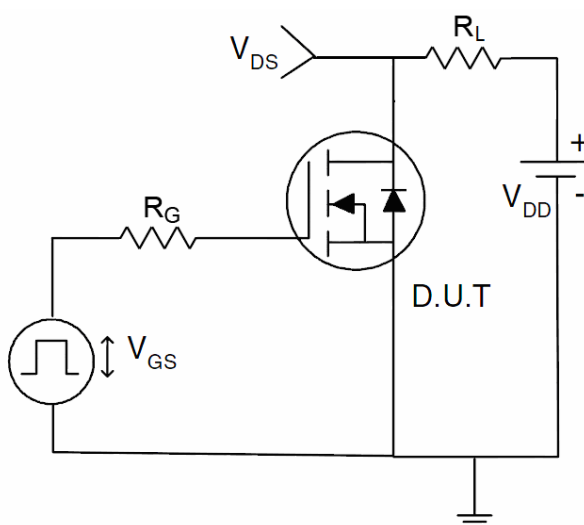
### 1) $E_{AS}$ Test Circuit



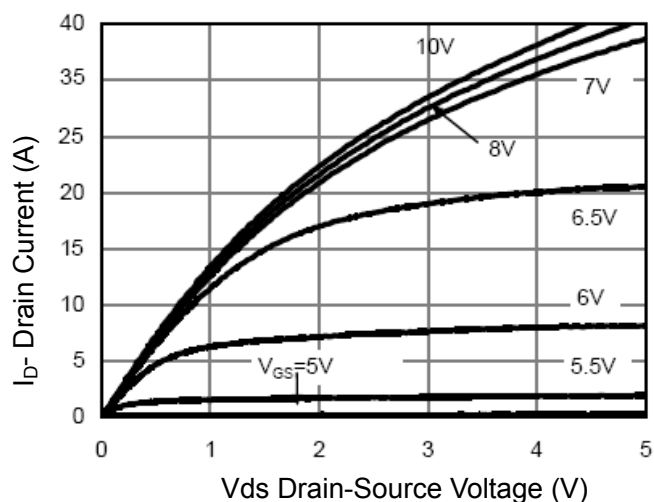
### 2) Gate Charge Test Circuit



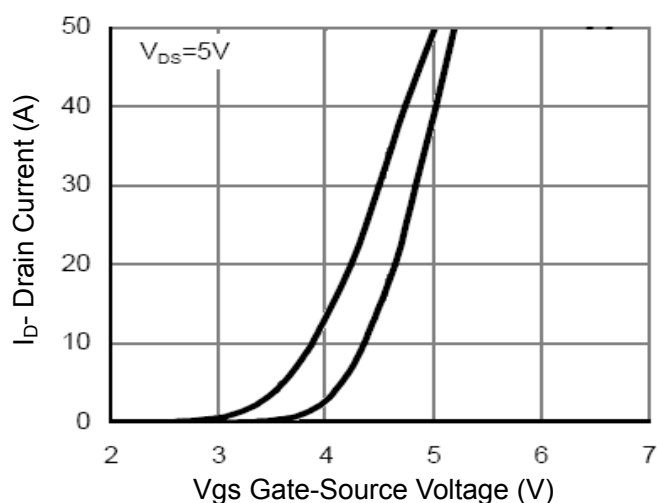
### 3) Switch Time Test Circuit



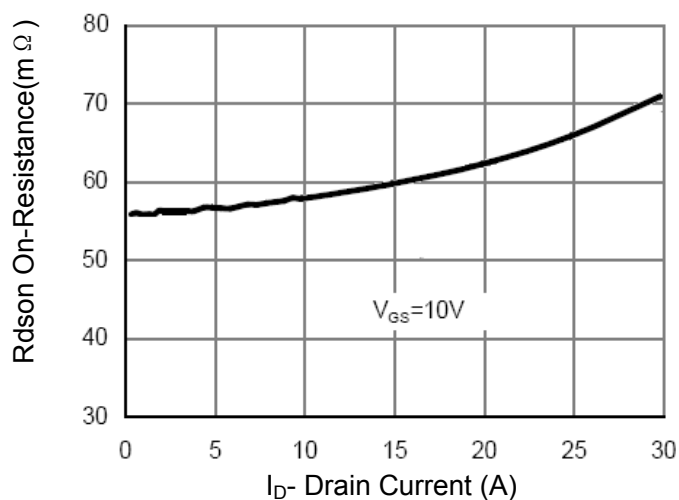
# Typical Electrical and Thermal Characteristics (Curves)



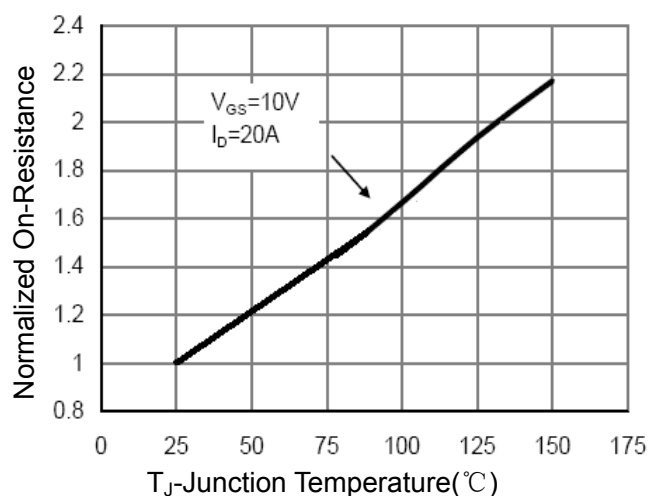
**Figure 1 Output Characteristics**



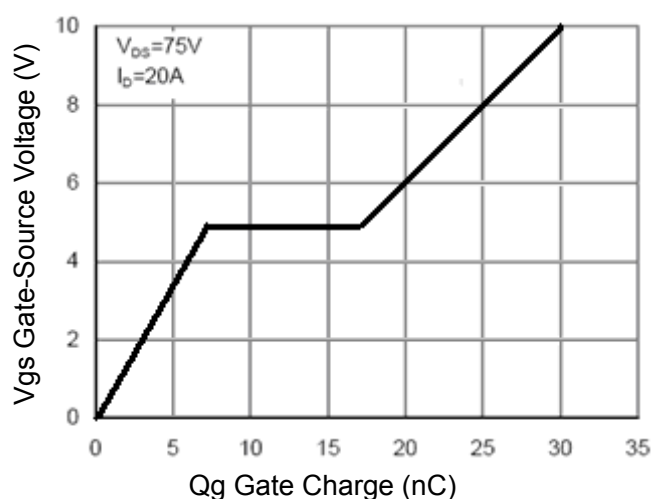
**Figure 2 Transfer Characteristics**



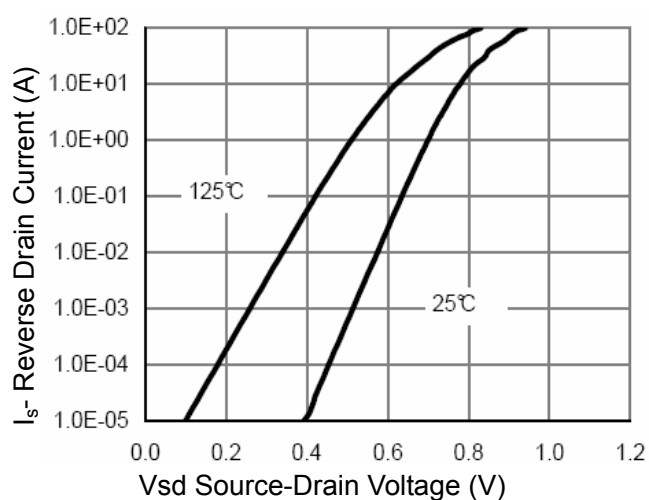
**Figure 3 Rdson- Drain Current**



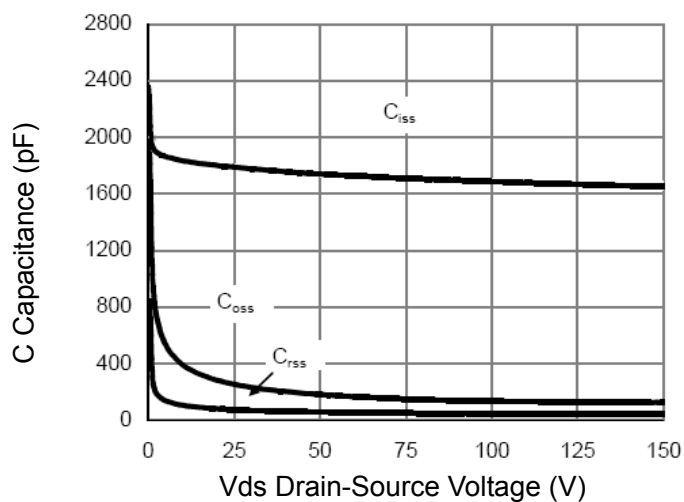
**Figure 4 Rdson-Junction Temperature**



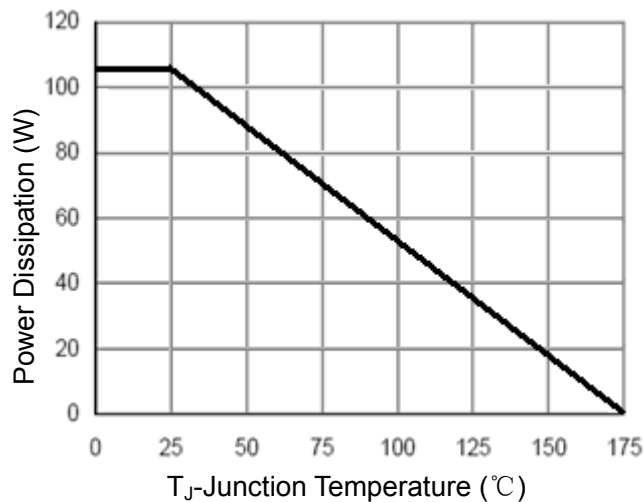
**Figure 5 Gate Charge**



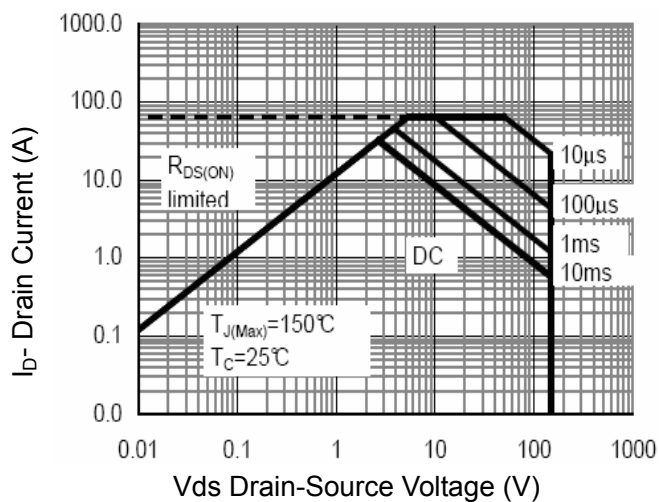
**Figure 6 Source- Drain Diode Forward**



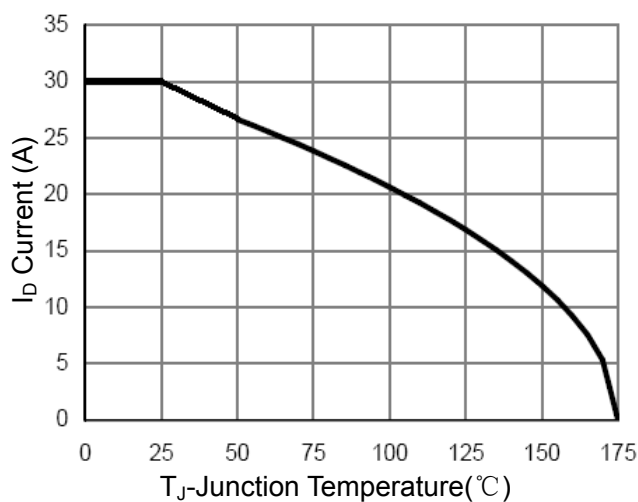
**Figure 7 Capacitance vs Vds**



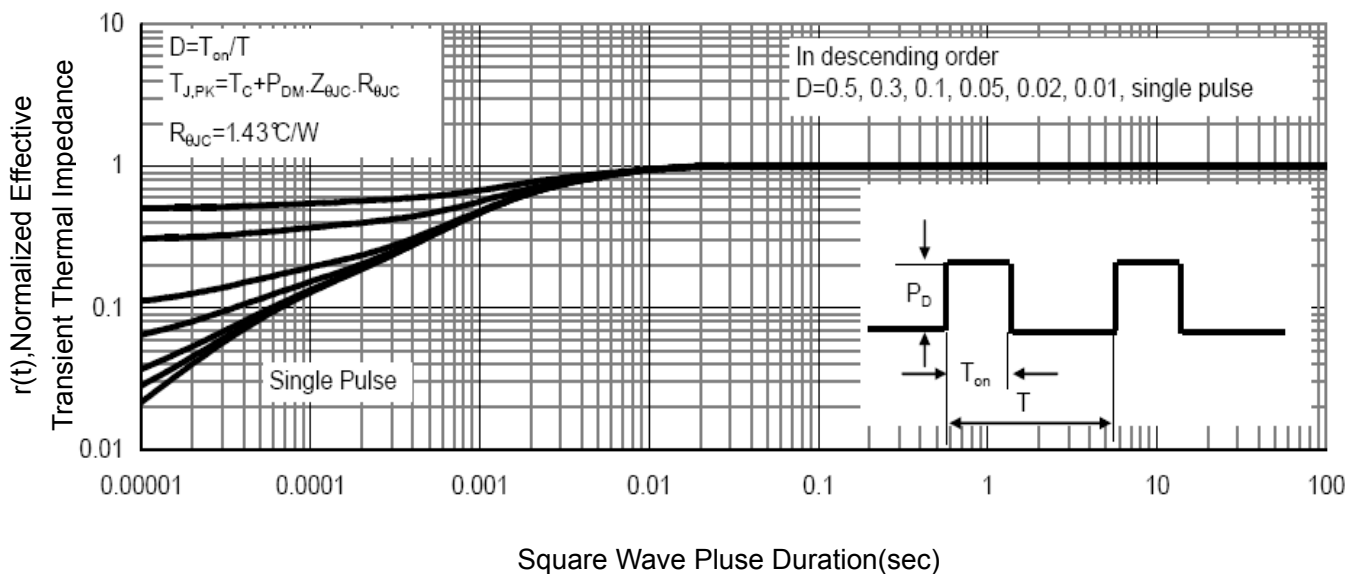
**Figure 9 Power De-rating**



**Figure 8 Safe Operation Area**

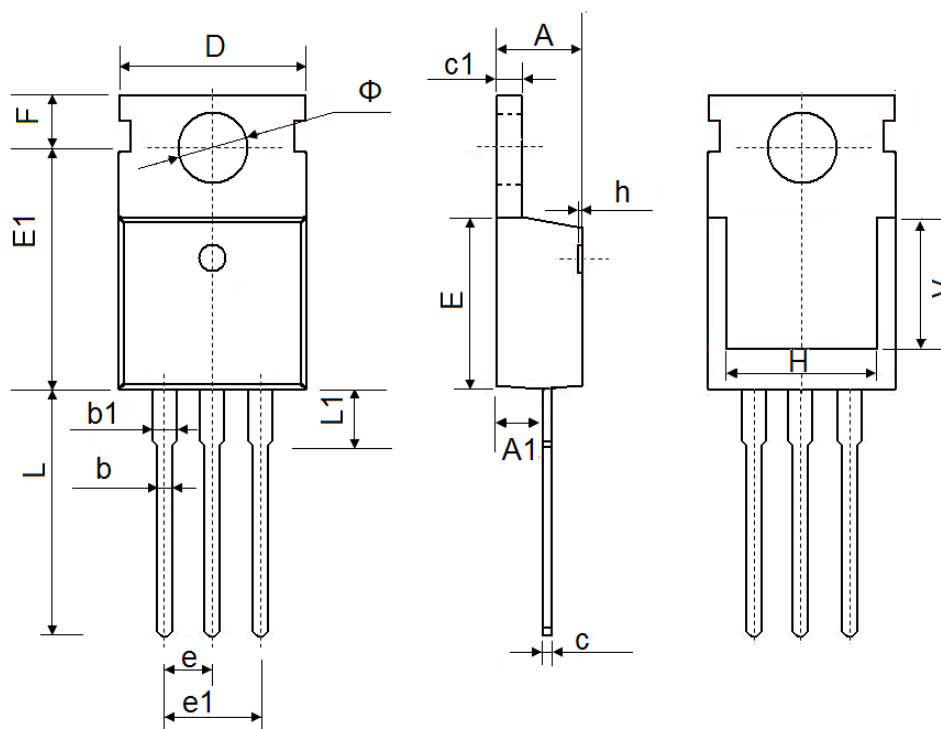


**Figure 10 ID Current- Junction Temperature**



**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.	
Φ	3.400	3.800	0.134	0.150