



Description

The FIR75N075PG is a new generation of middle voltage and high current N-Channel enhancement mode trench power MOSFET. This new technology increases the cell density and reduces the on-resistance; its typical Rdson can reduce to 7.0mohm.

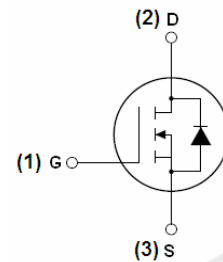
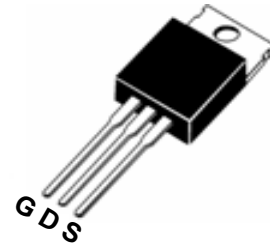
Features

- Advanced trench process technology
- Special designed for Convertors and power controls
- High density cell design for ultra low Rdson
- Fully characterized Avalanche voltage and current
- Avalanche Energy 100% test

Application

- Power switching application
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply

PIN Connection TO-220AB



Marking Diagram



- Y = Year
- A = Assembly Location
- WW = Work Week
- FIR75N075P = Specific Device Code

Package Marking And Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
FIR75N075P	FIR75N075PG	TO-220	-	-	-

Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D@T_c=25\text{ }^\circ\text{C}$	Continuous drain current, VGS@10V	78	A
$I_D@T_c=100\text{ }^\circ\text{C}$	Continuous drain current, VGS@10V	55	
$I_{DM}$	Pulsed drain current ①	300	
$P_D@T_c=25\text{ }^\circ\text{C}$	Power dissipation	160	W
	Linear derating factor	1.05	W/ C
$V_{GS}$	Gate-to-Source voltage	±20	V
dv/dt	Peak diode recovery voltage	310	v/ns
$E_{AS}$	Single pulse avalanche energy ②	550	mJ
$E_{AR}$	Repetitive avalanche energy	TBD	
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +175	°C

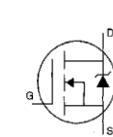
**Thermal Resistance**

	Parameter	Min.	Typ.	Max.	Units
R <sub>θJC</sub>	Junction-to-case	—	0.94	—	C/W
R <sub>θJA</sub>	Junction-to-ambient	—	—	62	

**Electrical Characteristics @T<sub>J</sub>=25 °C (unless otherwise specified)**

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV <sub>DSS</sub>	Drain-to-Source breakdown voltage	75	84	—	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
R <sub>DS(on)</sub>	Static Drain-to-Source on-resistance	—	7	8.5	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =40A
V <sub>GS(th)</sub>	Gate threshold voltage	2.0	2.9	4.0	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA
g <sub>fs</sub>	Forward transconductance	—	58	—	S	V <sub>DS</sub> =5V, I <sub>D</sub> =30A
I <sub>DSS</sub>	Drain-to-Source leakage current	—	—	1	μA	V <sub>DS</sub> =75V, V <sub>GS</sub> =0V
		—	—	10		V <sub>DS</sub> =75V, V <sub>GS</sub> =0V, T <sub>J</sub> =150C
I <sub>GSS</sub>	Gate-to-Source forward leakage	—	—	100	nA	V <sub>GS</sub> =20V
	Gate-to-Source reverse leakage	—	—	-100		V <sub>GS</sub> =-20V
Q <sub>g</sub>	Total gate charge	—	94	—	nC	I <sub>D</sub> =30A
Q <sub>gs</sub>	Gate-to-Source charge	—	16	—		V <sub>DD</sub> =30V
Q <sub>gd</sub>	Gate-to-Drain("Miller") charge	—	24	—		V <sub>GS</sub> =10V
t <sub>d(on)</sub>	Turn-on delay time	—	15	—	nS	V <sub>DD</sub> =30V
t <sub>r</sub>	Rise time	—	11	—		I <sub>D</sub> =2A, R <sub>L</sub> =15Ω
t <sub>d(off)</sub>	Turn-Off delay time	—	52	—		R <sub>G</sub> =2.5Ω
t <sub>f</sub>	Fall time	—	13	—		V <sub>GS</sub> =10V
C <sub>iss</sub>	Input capacitance	—	3400	—	pF	V <sub>GS</sub> =0V
C <sub>oss</sub>	Output capacitance	—	290	—		V <sub>DS</sub> =25V
C <sub>rss</sub>	Reverse transfer capacitance	—	221	—		f=1.0MHZ

**Source-Drain Ratings and Characteristics**

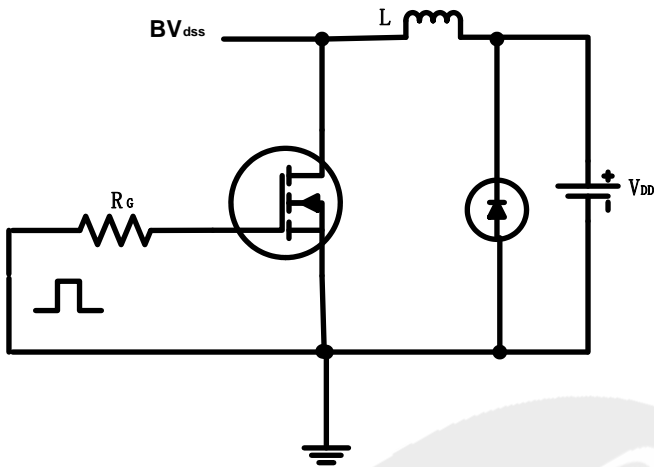
	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I <sub>S</sub>	Continuous Source Current. (Body Diode)	—	—	78	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	312		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.2	V	T <sub>J</sub> =25°C, I <sub>S</sub> =40A, V <sub>GS</sub> =0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	—	33	nS	T <sub>J</sub> =25°C, I <sub>F</sub> =75A di/dt=100A/μs ③
Q <sub>rr</sub>	Reverse Recovery Charge	—	—	54	nC	
t <sub>on</sub>	Forward Turn-on Time	Intrinsic turn-on time is negligible (turn-on is dominated by L <sub>s</sub> + L <sub>D</sub> )				

Notes:

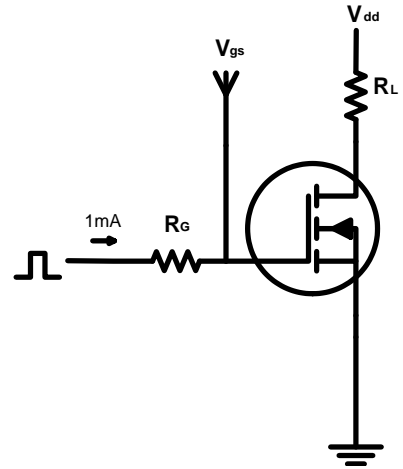
- ① Repetitive rating; pulse width limited by max junction temperature.
- ② Test condition: L =0.3mH, I<sub>D</sub> = 57A, V<sub>DD</sub> = 47V
- ③ Pulse width≤300μS; duty cycle≤1.5% R<sub>G</sub> = 25Ω Starting T<sub>J</sub> = 25°C

### Test circuit

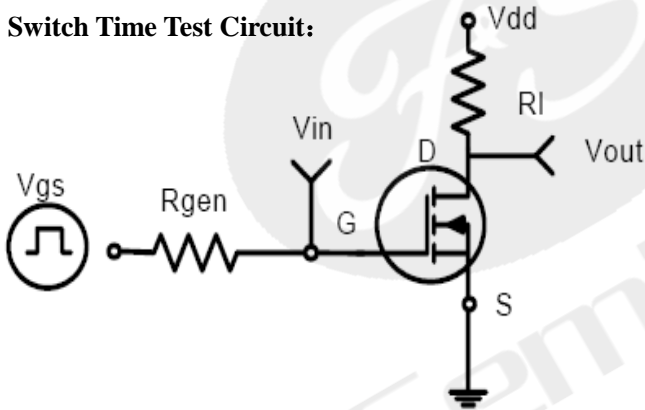
EAS test circuits:



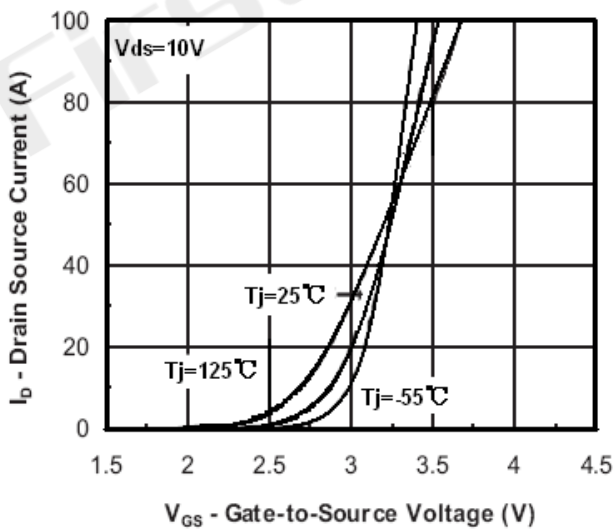
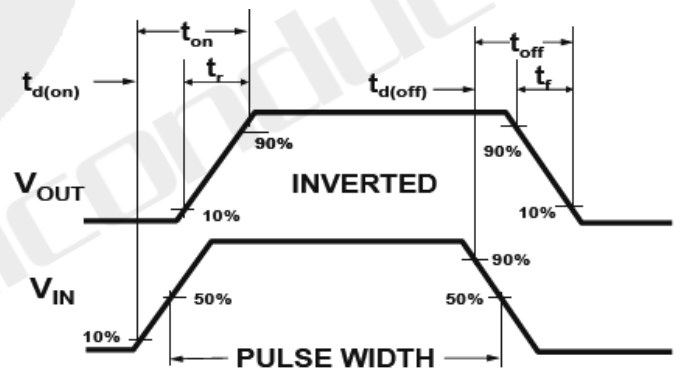
Gate charge test circuit:



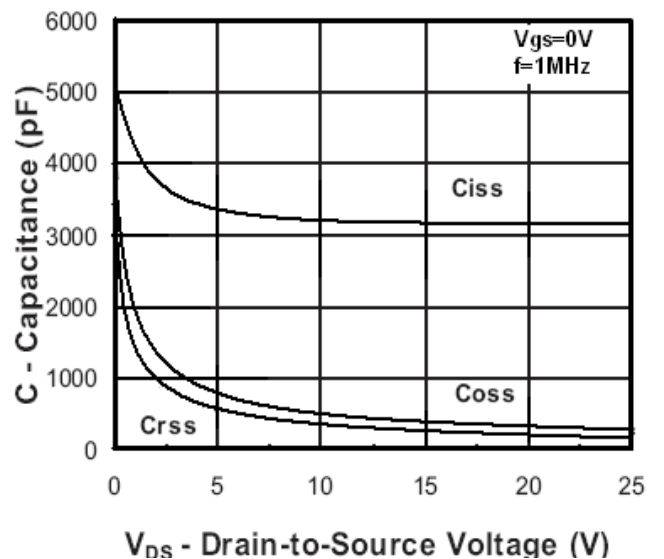
Switch Time Test Circuit:



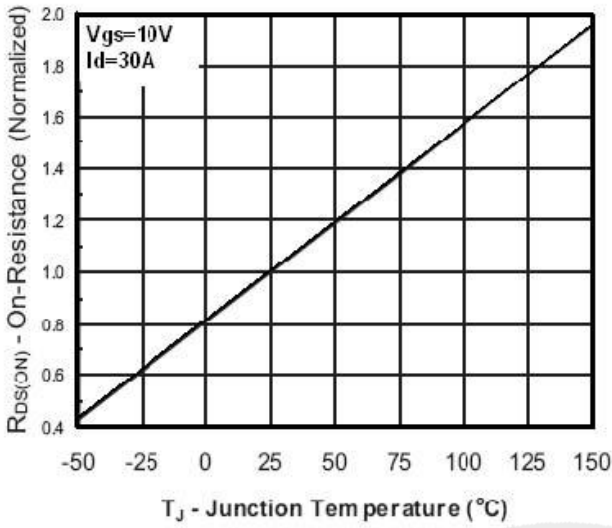
Switch Waveforms:



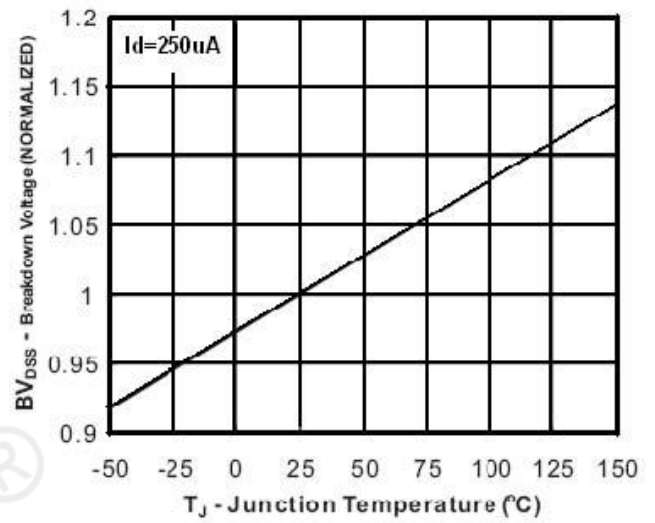
Transfer Characteristic



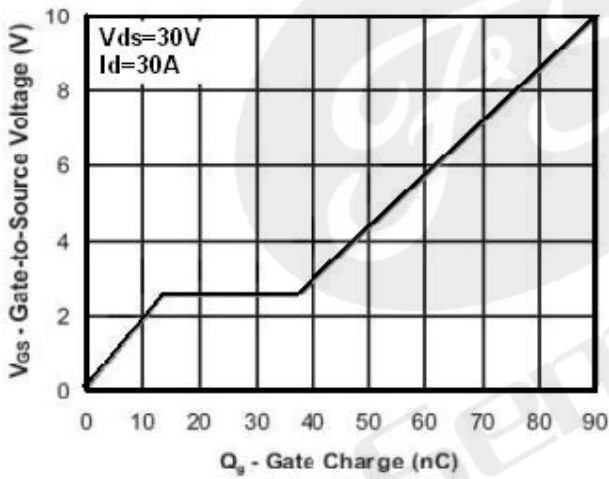
Capacitance



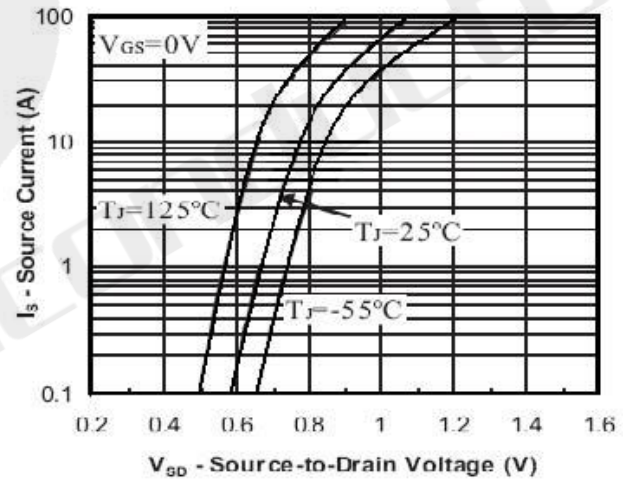
On Resistance vs. Junction Temperature



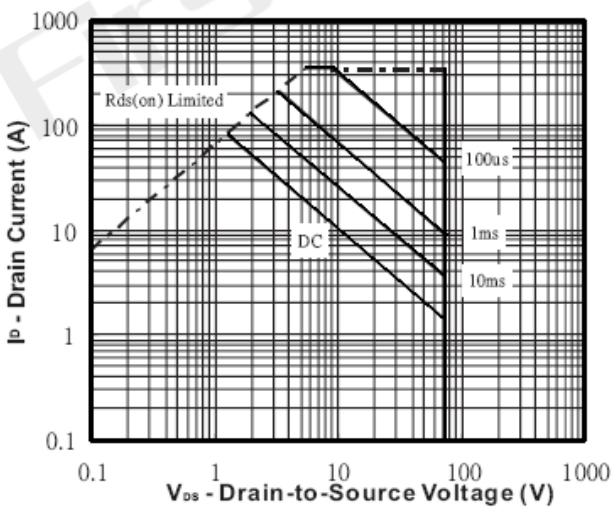
Breakdown Voltage vs. Junction Temperature



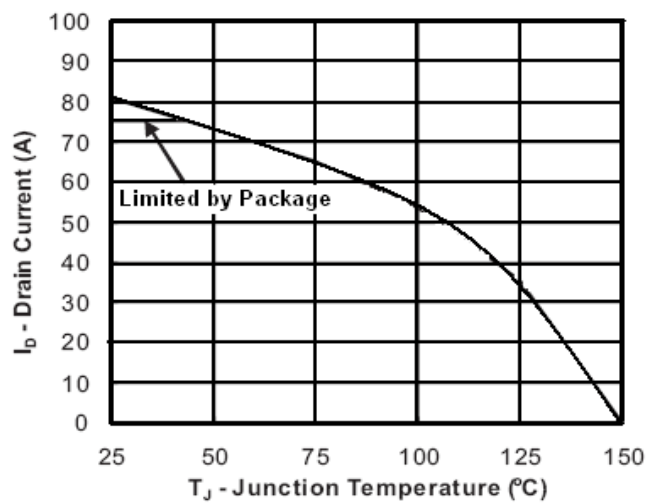
Gate Charge



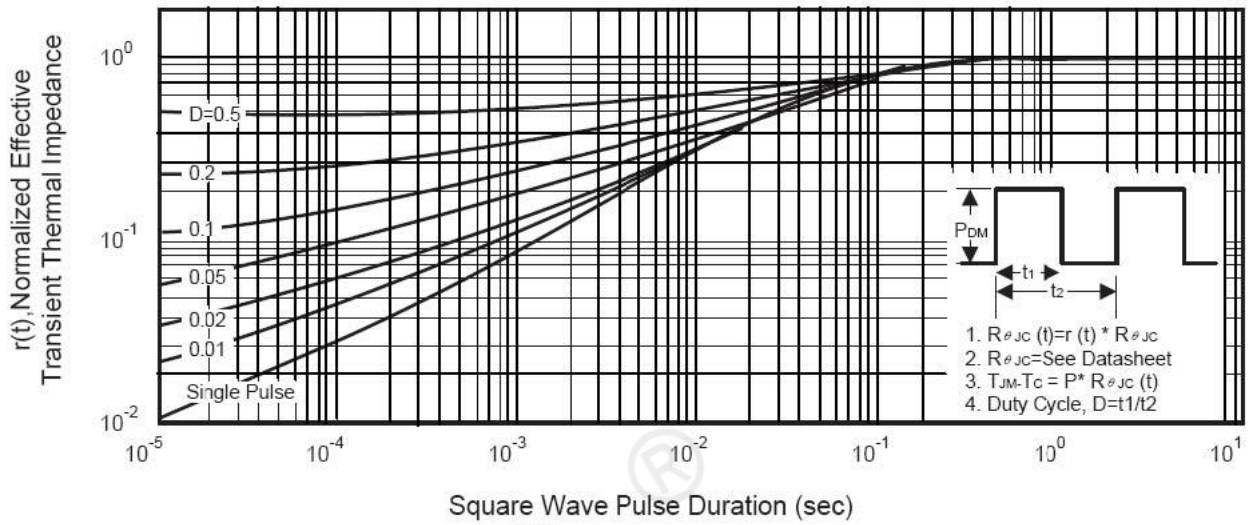
Source-Drain Diode Forward Voltage



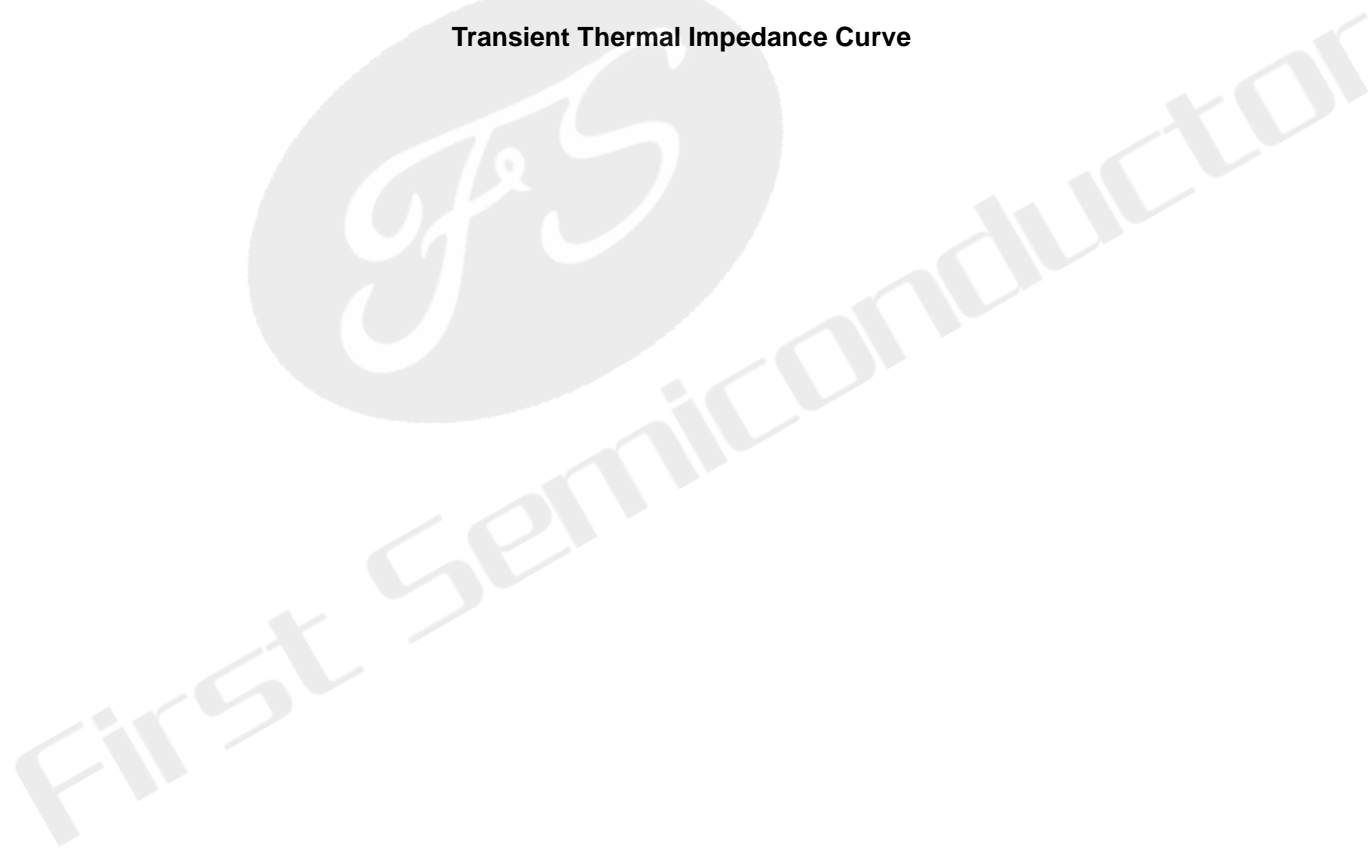
Safe Operation Area



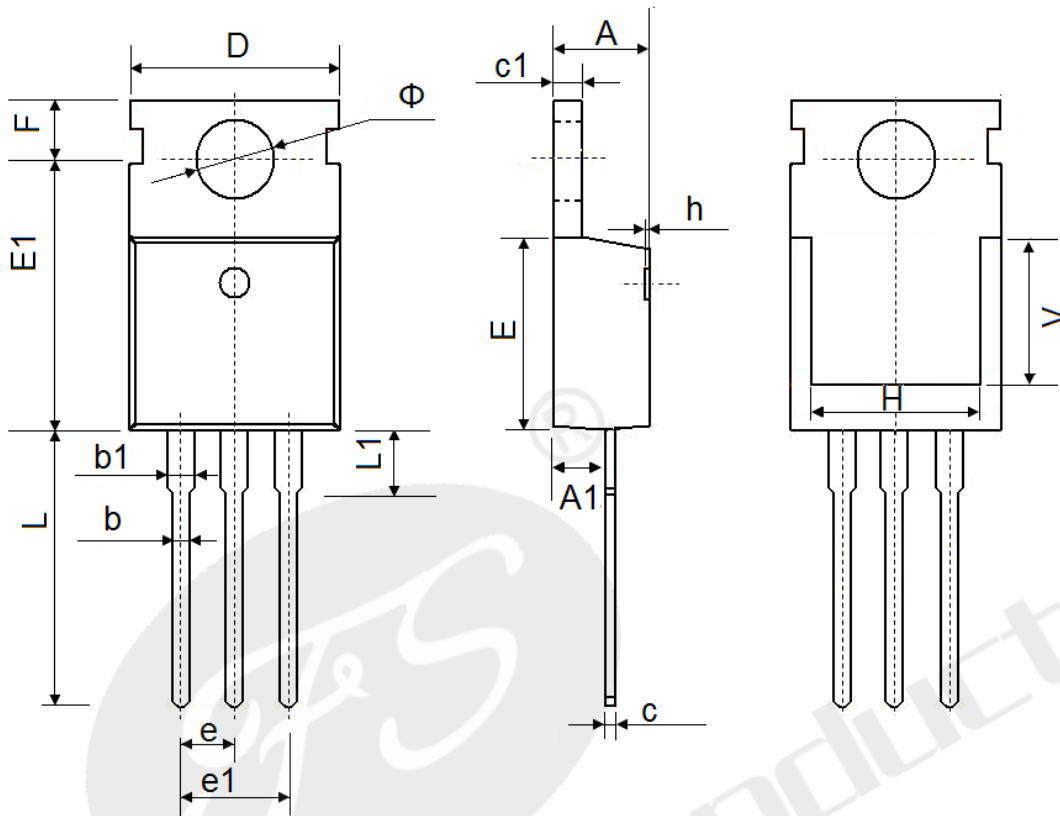
Max Drain Current vs. Junction Temperature



Transient Thermal Impedance Curve



TO-220AB 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



Declaration

- FIRST reserves the right to change the specifications, the same specifications of products due to different packaging line mold, the size of the appearance will be slightly different, shipped in kind, without notice! Customers should obtain the latest version information before ordering, and verify whether the relevant information is complete and up-to-date.
- Any semiconductor product under certain conditions has the possibility of failure or failure, The buyer has the responsibility to comply with safety standards and take safety measures when using FIRST products for system design and manufacturing, To avoid To avoid potential failure risks, which may cause personal injury or property damage!
- Product promotion endless, our company will wholeheartedly provide customers with better products!

**ATTACHMENT**

Revision History

Date	REV	Description	Page
2018.01.01	1.0	Initial release	