



Description

It utilizes the latest trench processing techniques to achieve the cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and wide variety of other applications

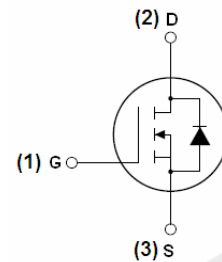
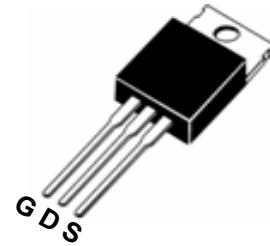
Features and Benefits

- Advanced trench MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 175°C operating temperature

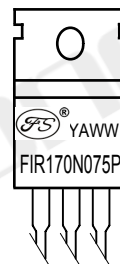
Main Product Characteristics

V _{DSS}	75V
R _{DS(on)}	3.3mohm(typ.)
I _D	170A

PIN Connection TO-220AB



Marking Diagram



- Y = Year
- A = Assembly Location
- WW = Work Week
- FIR170N075P = Specific Device Code

Package Marking And Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
FIR170N075P	FIR170N075PG	TO-220	-	-	-

Absolute max Rating:

Symbol	Parameter	Max.	Units
I _D @ TC = 25°C	Continuous Drain Current, V _{GS} @ 10V ^①	170	A
I _D @ TC = 100°C	Continuous Drain Current, V _{GS} @ 10V ^①	110	
I _{DM}	Pulsed Drain Current ^②	670	
P _D @TC = 25°C	Power Dissipation ^③	272	W
	Linear Derating Factor	2.0	W/°C
V _{DS}	Drain-Source Voltage	75	V
V _{GS}	Gate-to-Source Voltage	± 20	V
E _{AS}	Single Pulse Avalanche Energy @ L=0.3mH ^②	960	mJ
I _{AR}	Avalanche Current @ L=0.3mH ^②	80	A
T _J T _{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C



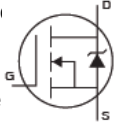
Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
R _{θJC}	Junction-to-case ^③	—	0.55	°C/W
R _{θJA}	Junction-to-ambient (t ≤ 10s) ^④	—	62	°C/W
	Junction-to-Ambient (PCB mounted, steady-state) ^④	—	40	°C/W

Electrical Characterizes @T_A=25°C unless otherwise specified

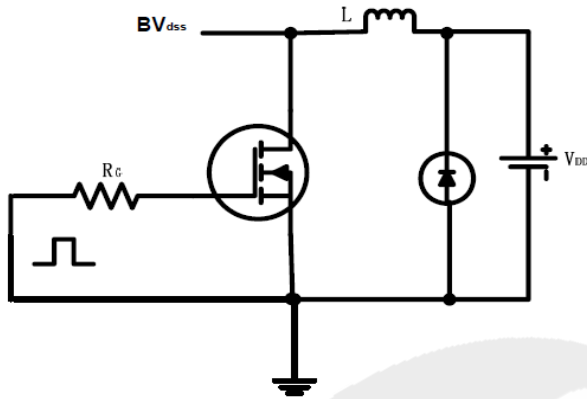
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source breakdown voltage	75	—	—	V	V _{GS} = 0V, I _D = 250μA
R _{DS(on)}	Static Drain-to-Source on-resistance	—	3.3	5	mΩ	V _{GS} =10V, I _D = 30A T _J = 125°C
		—	6.25	—		
V _{GS(th)}	Gate threshold voltage	2	—	4	V	V _{DS} = V _{GS} , I _D = 250μA T _J = 125°C
		—	2.0	—		
I _{DSS}	Drain-to-Source leakage current	—	—	1	μA	V _{DS} = 75V, V _{GS} = 0V T _J = 125°C
		—	—	50		
I _{GSS}	Gate-to-Source forward leakage	—	—	100	nA	V _{GS} = 20V
		-100	—	—		V _{GS} = -20V
Q _g	Total gate charge	—	221	—	nC	I _D = 30A, V _{DS} =30V, V _{GS} = 10V
Q _{gs}	Gate-to-Source charge	—	42	—		
Q _{gd}	Gate-to-Drain("Miller") charge	—	70	—		
t _{d(on)}	Turn-on delay time	—	25	—	ns	V _{GS} =10V, V _{DS} =30V, R _L =15Ω, R _{GEN} =2.55Ω
t _r	Rise time	—	24	—		
t _{d(off)}	Turn-Off delay time	—	125	—		
t _f	Fall time	—	53	—		
C _{iss}	Input capacitance	—	9139	—	pF	V _{GS} = 0V V _{DS} = 25V f = 600KHz
C _{oss}	Output capacitance	—	757	—		
C _{rss}	Reverse transfer capacitance	—	669	—		

Source-Drain Ratings and Characteristics

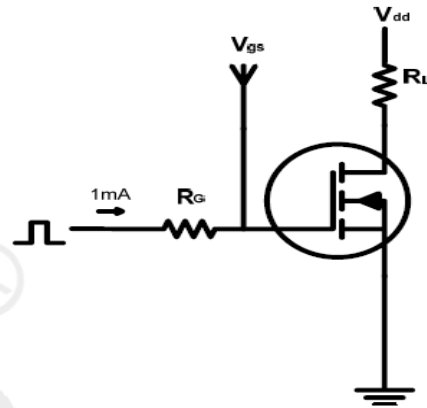
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	170	A	MOSFET symb. showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode)	—	—	670	A	
V _{SD}	Diode Forward Voltage	—	0.84	1.3	V	I _S =30A, V _{GS} =0V
t _{rr}	Reverse Recovery Time	—	47	—	ns	T _J = 25°C, I _F =75A, di/dt =
Q _{rr}	Reverse Recovery Charge	—	97	—	nC	100A/μs

Test circuits and Waveforms

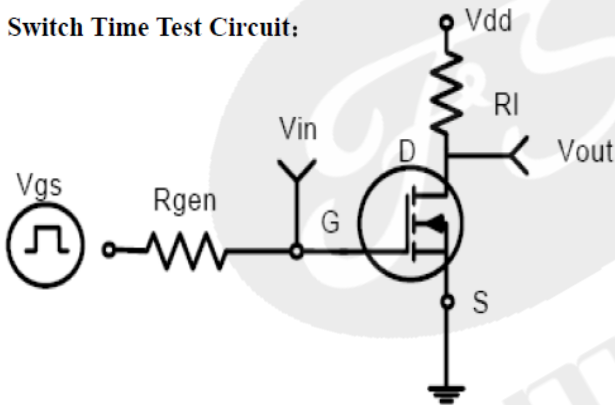
EAS test circuits:



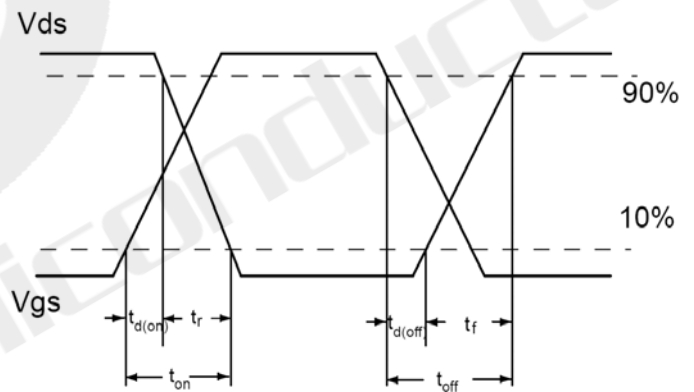
Gate charge test circuit:



Switch Time Test Circuit:



Switch Waveforms:



Notes:

- ① The maximum current rating is limited by bond-wires.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^{\circ}C$
- ⑤ 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 $T_{J(MAX)} = 175^{\circ}C$.
- ⑥ The maximum current rating is limited by bond-wires.

Typical electrical and thermal characteristics

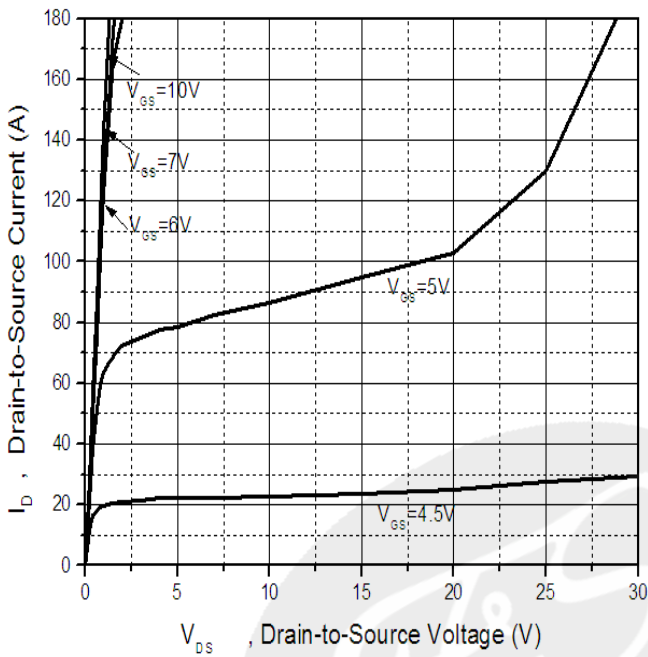


Figure 1: Typical Output Characteristics

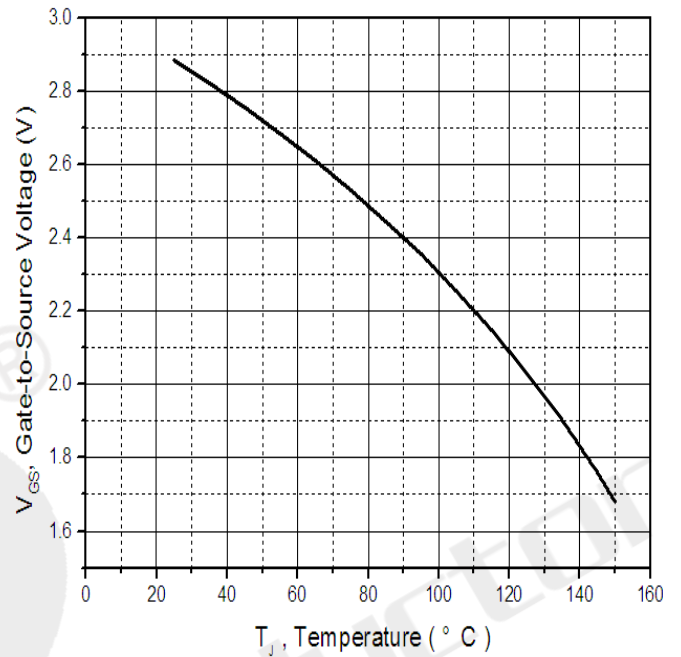


Figure 2. Gate to source cut-off voltage

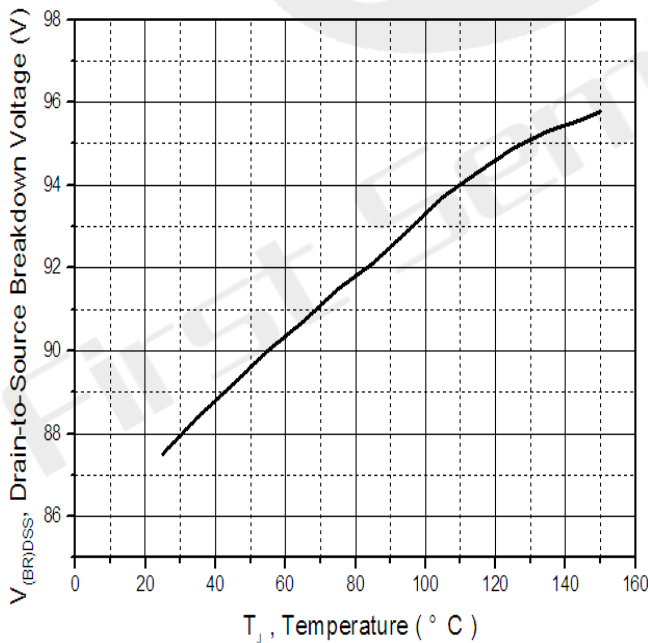


Figure 3. Drain-to-Source Breakdown Voltage vs. Temperature

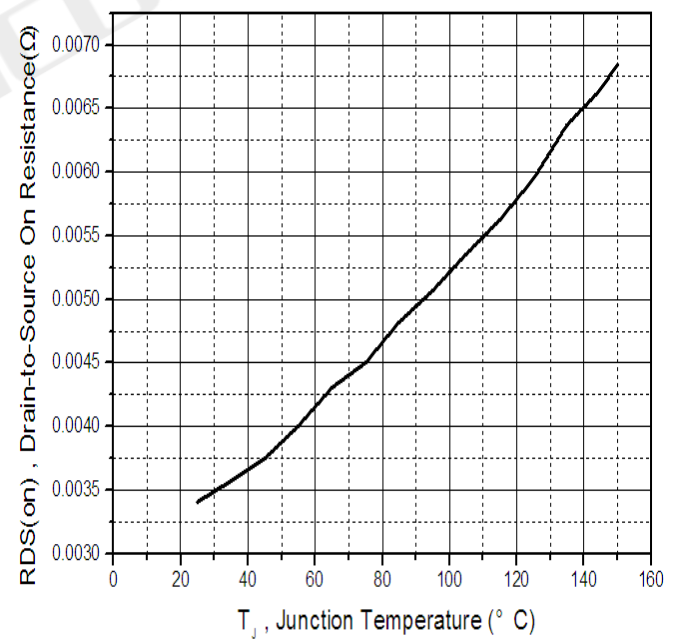


Figure 4: Normalized On-Resistance Vs. Case Temperature

Typical electrical and thermal characteristics

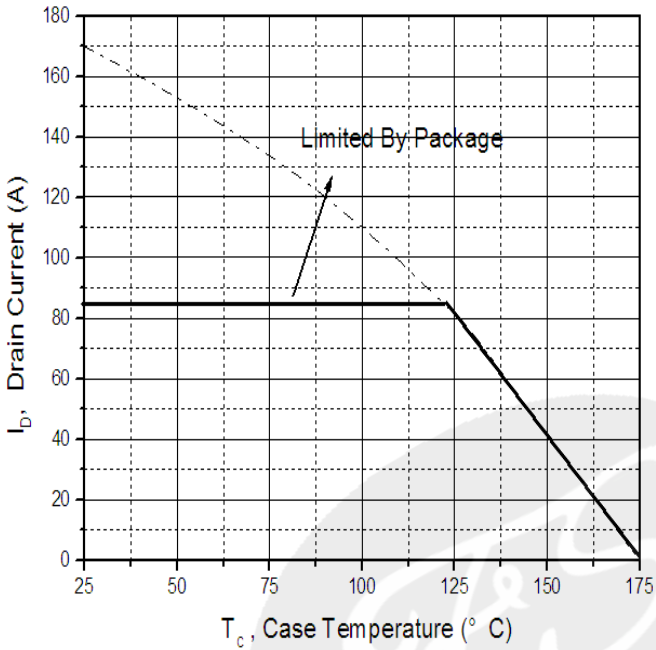


Figure 5. Maximum Drain Current Vs. Case Temperature

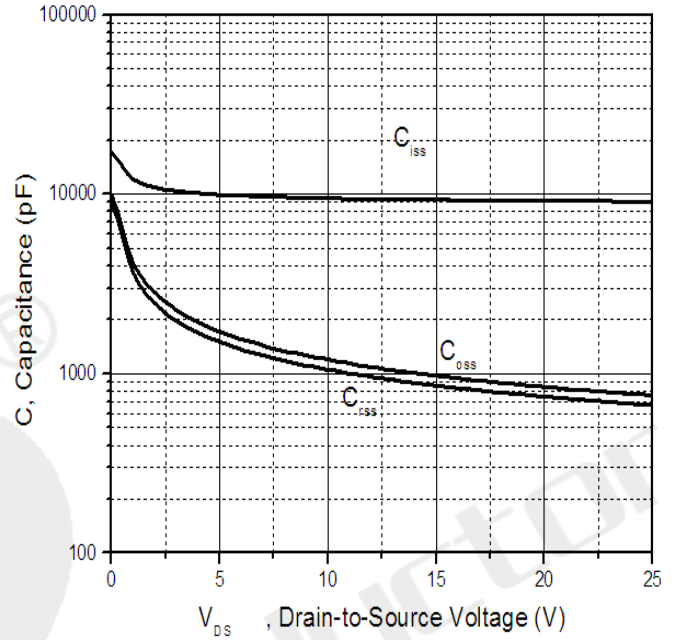


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

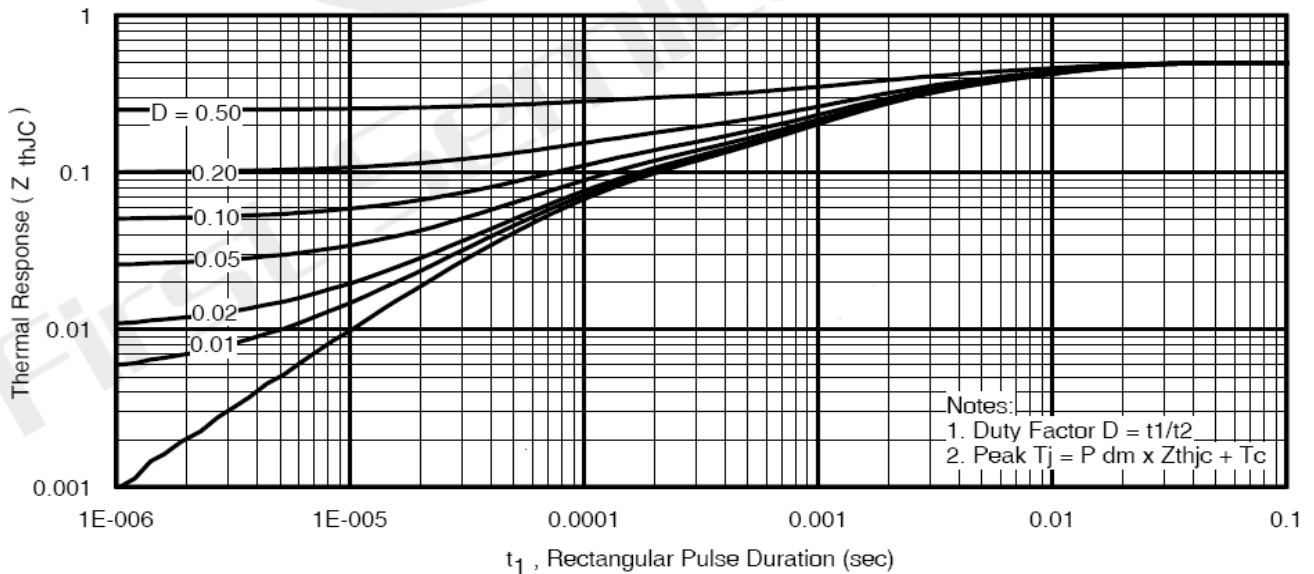
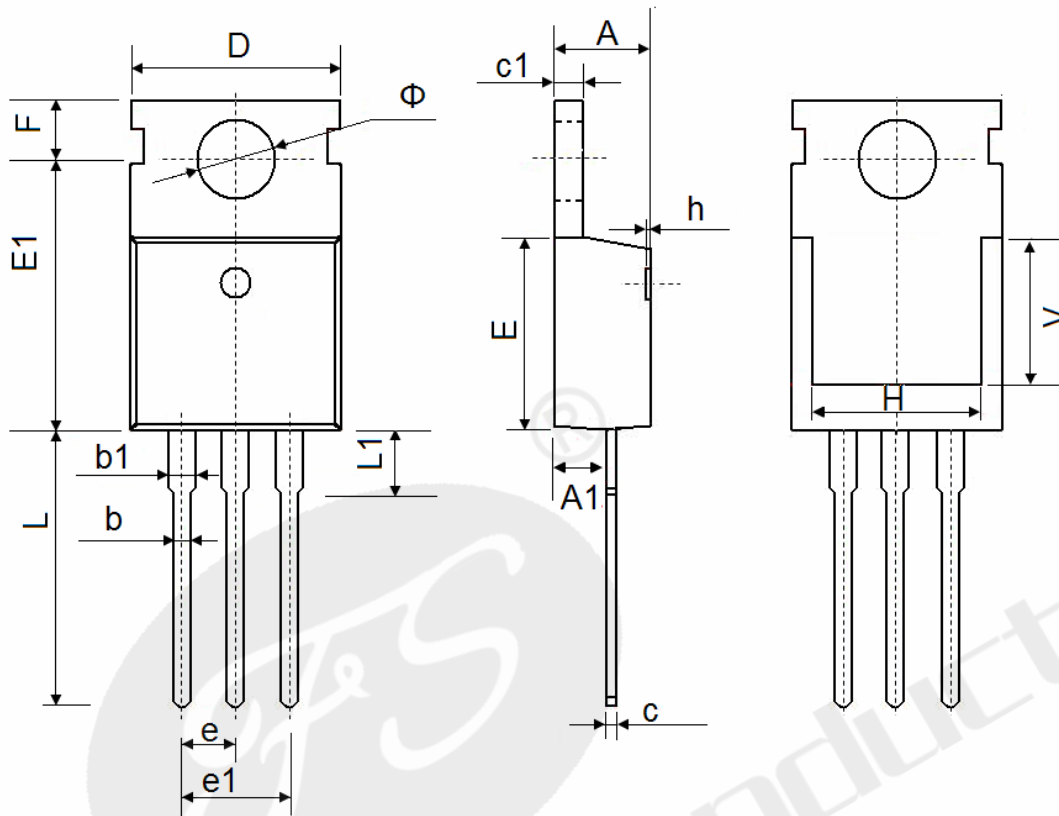


Figure 7. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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	