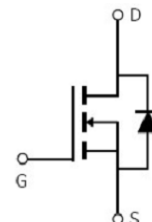


Main Product Characteristics:

V_{DSS}	40V
$R_{DS(on)}$	2.1 mohm
I_D	220A


TO220

**Marking and pin
Assignment**

Schematic diagram

Features and Benefits:

Advanced trench MOSFET process technology

- Special designed for Convertors and power controls
- Ultra low on-resistance
- 175°C operating temperature
- High Avalanche capability and 100% tested

Description:

It utilizes the latest trench processing techniques to achieve extremely low on resistance, fast switching speed and high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in Automotive applications and a wide variety of other applications



Absolute max Rating:

	Parameter	Max.	Units
ID @ TC = 25°C	Continuous Drain Current, VGS @ 10V (Silicon Limited)	220	A
ID @ TC = 100°C	Continuous Drain Current, VGS @ 10V	145	
ID @ TC = 25°C	Continuous Drain Current, VGS @ 10V (Package Limited)	85	
IDM	Pulsed Drain Current ^①	850	
PD @TC = 25°C	Power Dissipation	220	W
	Linear Derating Factor	1.5	W/°C
VGS	Gate-to-Source Voltage	± 24	V
EAS	Single Pulse Avalanche Energy ^②	1200	mJ
IAS	Avalanche Current @ L=0.3mH	90	A
TJ TSTG	Operating Junction and Storage Temperature Range	-55 to + 175	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

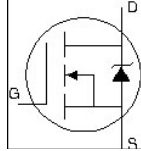
Thermal Resistance

Symbol	Characterizes	Value	Unit
$R_{\theta JC}$	Junction-to-case	0.62	°C/W
$R_{\theta JA}$	Junction-to-ambient ^④	60	°C/W
	Junction-to-Ambient (PCB mounted, steady-state) ^⑤	40	°C/W

Electrical Characterizes @T_A=25°C unless otherwise specified

	Parameter	Min.	Typ.	Max	Units	Conditions
BVDSS	Drain-to-Source breakdown voltage	40	—	—	V	VGS = 0V, ID = 250μA
RDS(on)	Static Drain-to-Source on-resistance	—	2.1	2.5	mΩ	VGS = 10V, ID = 30A③
VGS(th)	Gate threshold voltage	2	—	4	V	VDS = VGS, ID = 250μA
IDSS	Drain-to-Source leakage current	—	—	10	μA	VDS = 40V, VGS = 0V
		—	—	150		VDS = 40V, VGS = 0V, TJ = 125°C
IGSS	Gate-to-Source forward leakage	—	—	100	nA	VGS = 24V
	Gate-to-Source reverse leakage	—	—	-100		VGS = -24V
Qg	Total gate charge	—	220	—	nC	ID = 75A VDS = 32V VGS = 10V③
Qgs	Gate-to-Source charge	—	56	—		
Qgd	Gate-to-Drain("Miller") charge	—	56	—		
td(on)	Turn-on delay time	—	33	—	ns	VDD = 20V ID = 75A RG = 3.0 Ω VGS = 10V③
tr	Rise time	—	133	—		
td(off)	Turn-Off delay time	—	120	—		
tf	Fall time	—	80	—		
Ciss	Input capacitance	—	15300	—	pF	VGS = 0V VDS = 25V f = 1.0MHz
Coss	Output capacitance	—	1290	—		
Crss	Reverse transfer capacitance	—	306	—		

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max	Units	Conditions
IS	Continuous Source Current (Body Diode)	—	—	75	A	MOSFET symbol showing the integral reverse p-n junction diode. <div></div>
ISM	Pulsed Source Current (Body Diode) ①	—	—	750		TJ = 25°C, IS = 75A, VGS = 0V③
VSD	Diode Forward Voltage	—	0.85	1.3	V	TJ = 25°C, IF = 75A, VDD = 20V di/dt = 100A/μs③
trr	Reverse Recovery Time	—	37	45	ns	TJ = 25°C, IF = 65A, VDD = 20V di/dt = 100A/μs③
Qrr	Reverse Recovery Charge	—	36	55	nC	
ton	Forward Turn-on Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS:

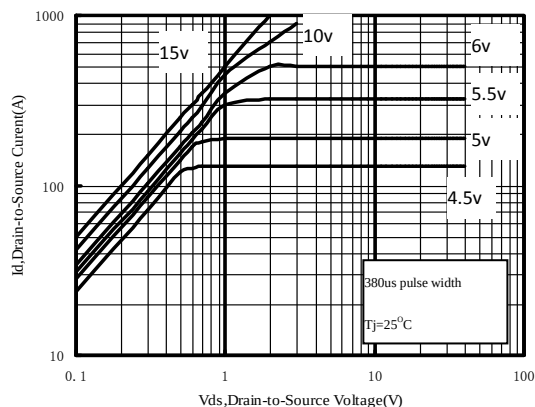


Fig 1. Typical Output Characteristics

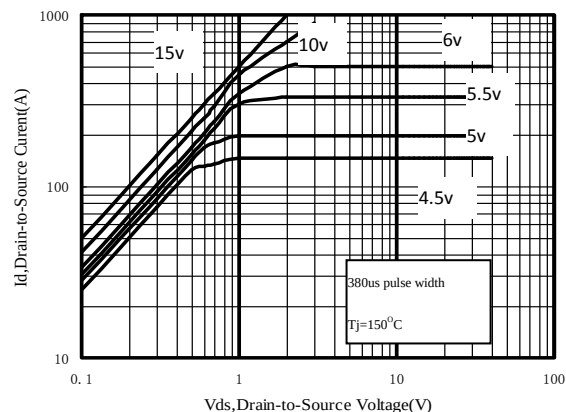


Fig 2. Typical Output Characteristics

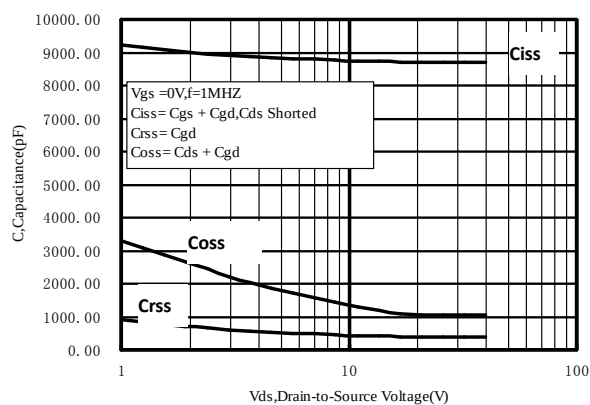


Fig 3. Typical Capacitance Vs. Drain-to-Source Voltage

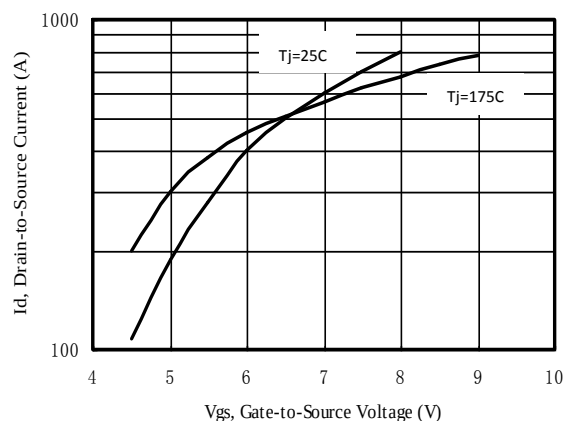


Fig 4. Typical Transfer Characteristics

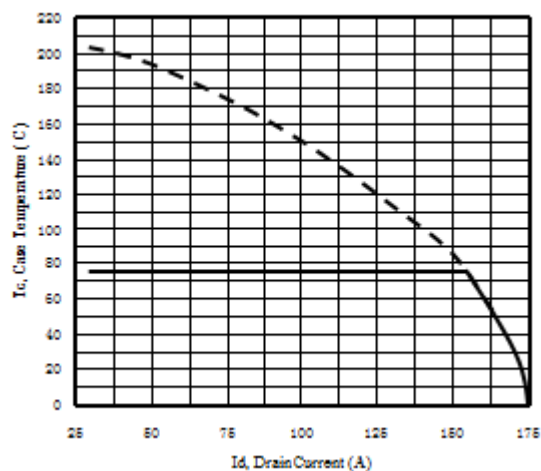


Fig 5. Maximum Drain Current Vs. Case Temperature

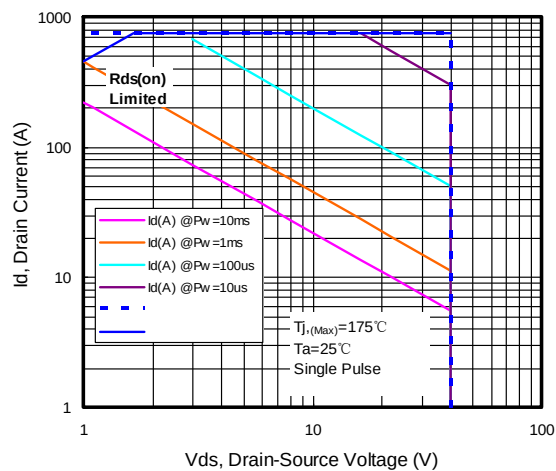
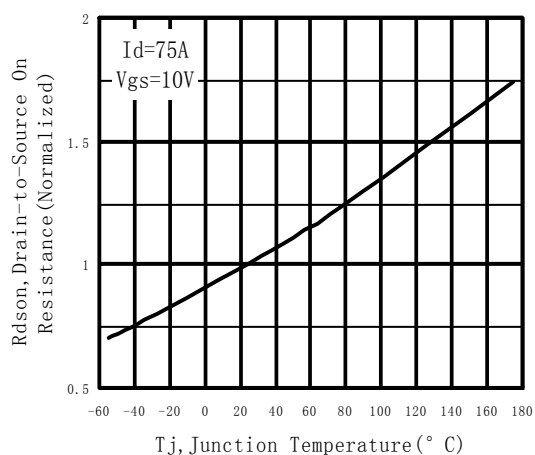
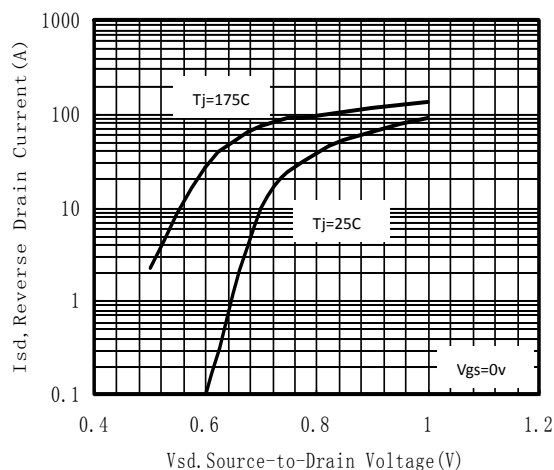
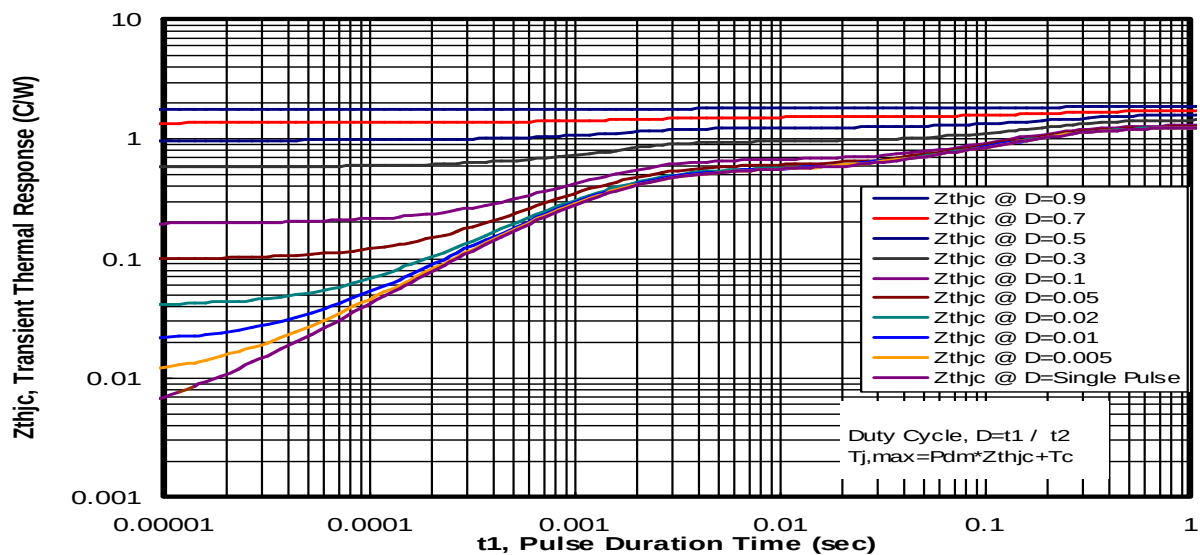
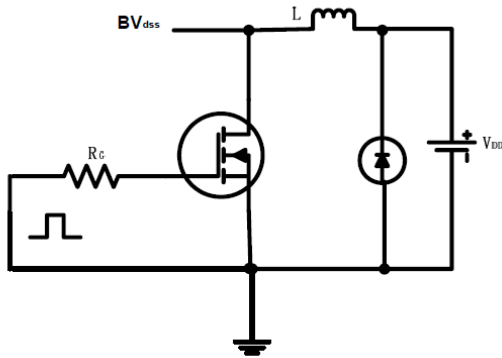
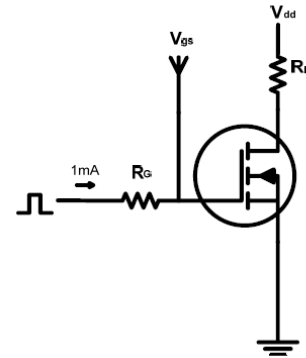
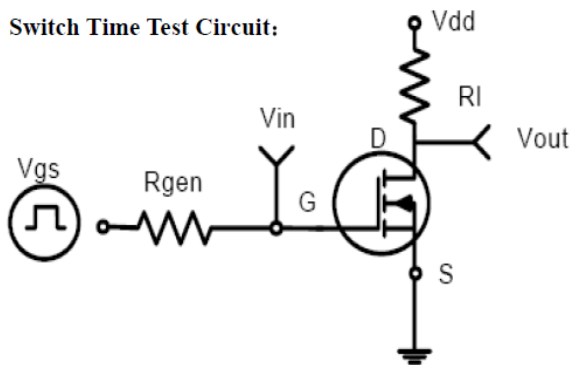
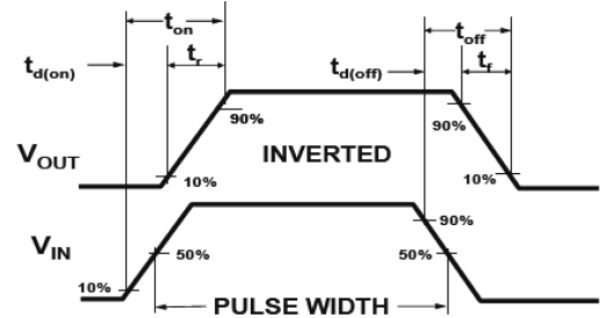


Fig 6. SOA, Safe Operation Area



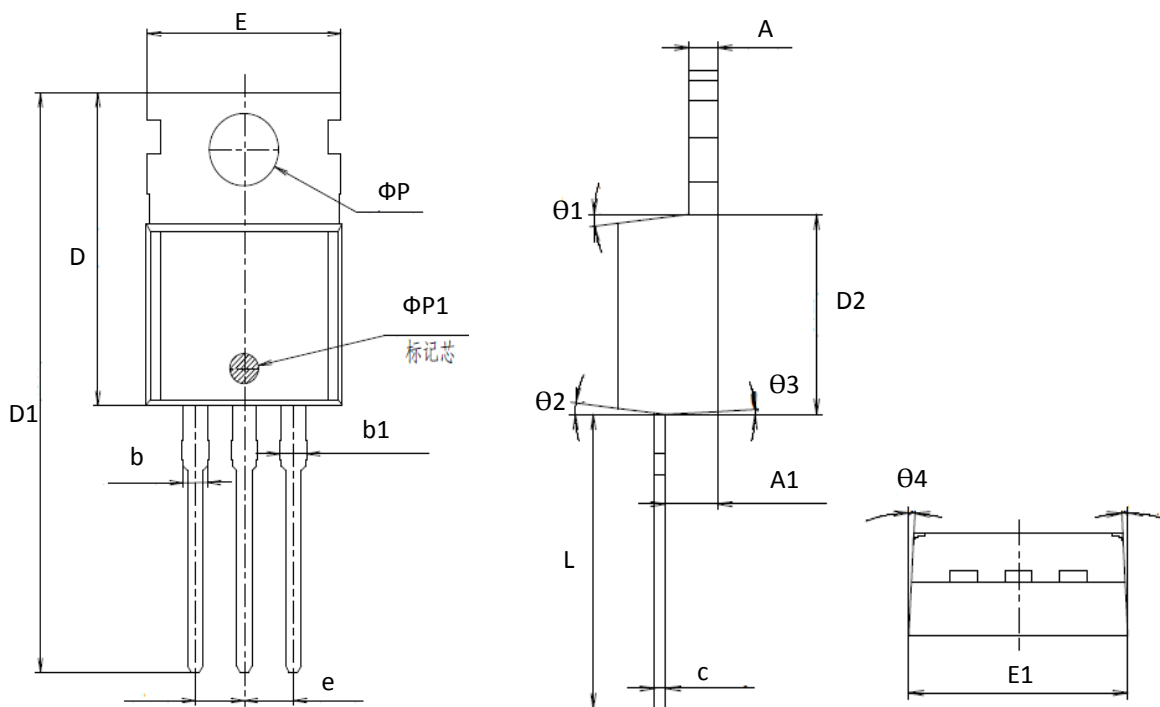
EAS test circuits:

Gate charge test circuit:

Switch Time Test Circuit:

Switch Waveforms:


Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by T_{Jmax} , starting $T_J = 25^\circ\text{C}$, $L = 0.3\text{mH}$, $R_G = 50\Omega$, $I_{AS} = 82\text{A}$, $V_{GS} = 10\text{V}$. Part not recommended for use above this value.
- ③ Pulse width $< 1.0\text{ms}$; duty cycle $< 2\%$.
- ④ This is only applied to TO-220 package.
- ⑤ for D2-PAK package, When mounted on 1" square PCB (FR-4 or G-10 Material).

Mechanical Data:

TO220 PACKAGE OUTLINE DIMENSION_GN



Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
A	-	1.300	-	-	0.051	-
A1	2.200	2.400	2.600	0.087	0.094	0.102
b	-	1.270	-	-	0.050	-
b1	1.270	1.370	1.470	0.050	0.054	0.058
c	-	0.500	-	-	0.020	-
D	-	15.600	-	-	0.614	-
D1	-	28.700	-	-	1.130	-
D2	-	9.150	-	-	0.360	-
E	9.900	10.000	10.100	0.390	0.394	0.398
E1	-	10.160	-	-	0.400	-
ΦP	-	3.600	-	-	0.142	-
ΦP1		1.500			0.059	
e		2.54BSC			0.1BSC	
L	12.900	13.100	13.300	0.508	0.516	0.524
Θ1	-	7°	-	-	7°	-
Θ2	-	7°	-	-	7°	-
Θ3	-	3°	-	5°	7°	9°
Θ4	-	3°	-	1°	3°	5°