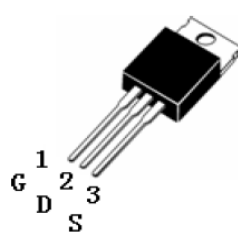
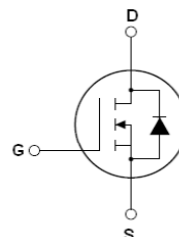


Main Product Characteristics:

V_{DSS}	80V
$R_{DS(on)}$	4.5mohm
I_D	180A



TO-220AB



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

Description:

It utilizes the latest FRRMOS (fast reverse recovery MOS) trench processing techniques to achieve extremely low on resistance, fast switching speed and short reverse recovery time. These features combine to make this design an extremely efficient and reliable device for use in PWM, load switching and a wide variety of other applications

Absolute max Rating:

Symbol	Parameter	Max.	Units
I_D @ TC = 25°C	Continuous Drain Current, VGS @ 10V①	180	A
I_D @ TC = 100°C	Continuous Drain Current, VGS @ 10V①	135	
I_{DM}	Pulsed Drain Current②	500	
I_{SM}	Pulsed Source Current (Body Diode)②	500	
P_D @TC = 25°C	Power Dissipation③	346	W
P_D @TC =100°C	Power Dissipation③	178	W
V_{DS}	Drain-Source Voltage	80	V
V_{GS}	Gate-to-Source Voltage	± 25	V
E_{AS}	Single Pulse Avalanche Energy @ L=0.1mH②	450	mJ
I_{AR}	Avalanche Current @ L=0.1mH②	95	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C

Thermal Resistance

Symbol	Characterizes	Value	Unit
$R_{\theta JC}$	Junction-to-case③	0.34	°C/W
$R_{\theta JA}$	Junction-to-ambient (t ≤ 10s) ④	12	°C/W
	Junction-to-Ambient (PCB mounted, steady-state) ④	55	°C/W

Electrical Characterizes @ $T_A=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max	Units	Conditions
BVDSS	Drain-to-Source breakdown voltage	80	—	—	V	$V_{GS} = 0V$, $I_D = 250\mu A$
RDS(on)	Static Drain-to-Source on-resistance	—	4.5	5	m Ω	$V_{GS} = 10V$, $I_D = 20A$
VGS(th)	Gate threshold voltage	2	3	4	V	$V_{DS} = V_{GS}$, $I_D = 250\mu A$
IDSS	Drain-to-Source leakage current	—	—	10	μA	$V_{DS} = 80V$, $V_{GS} = 0V$
		—	—	50		$V_{DS} = 80V$, $V_{GS} = 0V$, $T_J = 55^{\circ}\text{C}$
IGSS	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 25V$
	Gate-to-Source reverse leakage	-100	—	—		$V_{GS} = -25V$
gFS	Forward Transconductance		37		S	$V_{DS}=5V$, $I_D=20A$
Qg	Total gate charge	—	96	120	nC	$V_{GS}=10V$, $V_{DS}=40V$, $I_D=20A$
Qgs	Gate-to-Source charge	—	29	36		
Qgd	Gate-to-Drain("Miller") charge	—	27	36		
Qg(th)	Gate charge at shreshold	—	18	24		
Vplateau	gate plateau voltage	—	5.28	6.2	V	
td(on)	Turn-on delay time	—	24.8	—	ns	$V_{GS}=10V$, $V_{DS}=40V$, $R_L=15\Omega$, $R_{GEN}=2.5\Omega$
tr	Rise time	—	12.2	—		
td(off)	Turn-Off delay time	—	88	—		
tf	Fall time	—	34	—		
Ciss	Input capacitance	—	6286	—	pF	$V_{GS}=0V$, $V_{DS}=40V$, $f=1\text{MHz}$
Coss	Output capacitance	—	670	—		
Crss	Reverse transfer capacitance	—	204	—		
R _g	Gate resistance	—	0.5	—	Ω	$V_{GS}=0V$, $V_{DS}=0V$, $f=1\text{MHz}$

Source-Drain Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max	Units	Conditions
IS	Maximum Body-Diode Continuous Curren		180		A	
VSD	Diode Forward Voltage	—	0.63	1	V	IS=1A, VGS=0V
trr	Reverse Recovery Time	—	41	—	ns	IF=20A, dI/dt=100A/μs
Qrr	Reverse Recovery Charge	—	65	—	nC	
ton	Forward Turn-on Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Typical electrical and thermal characteristics

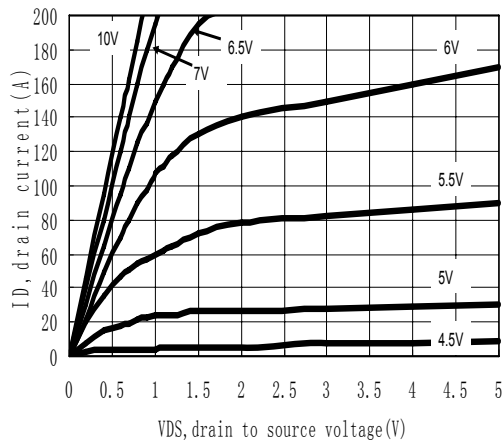


Figure 1: Typical Output Characteristics

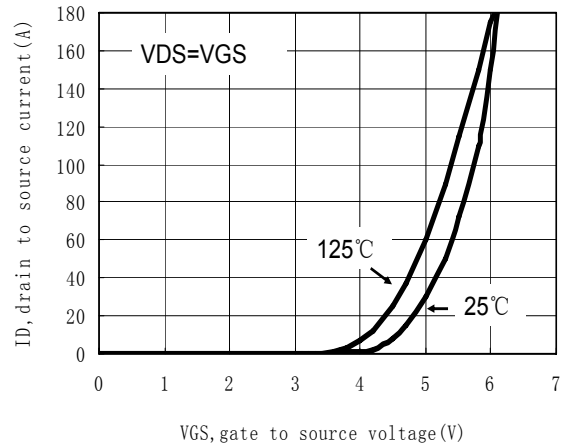


Figure 2: Typical Transfer Characteristics

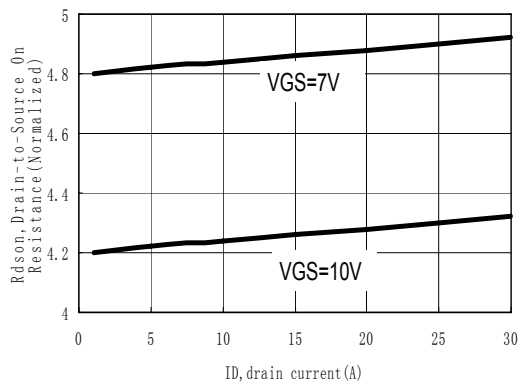


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

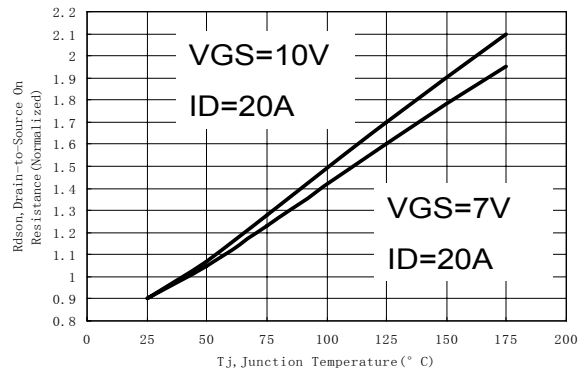


Figure 4: On-Resistance vs. Junction Temperature

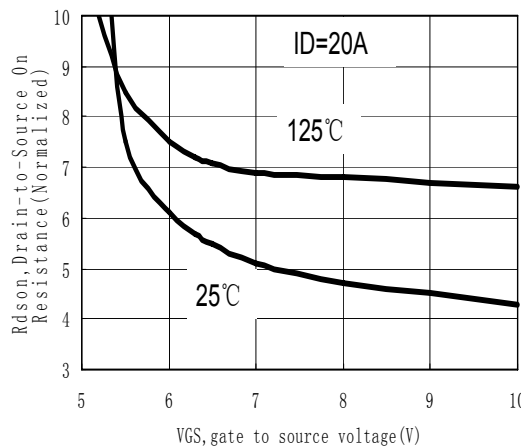


Figure 5: On-Resistance vs. Gate-Source Voltage

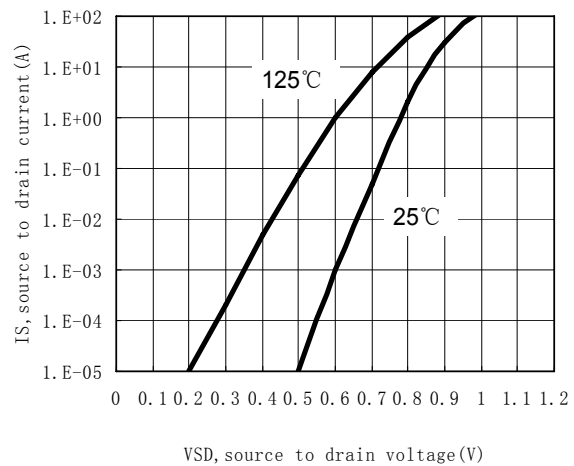


Figure 6: Body-Diode Characteristics

Typical electrical and thermal characteristics

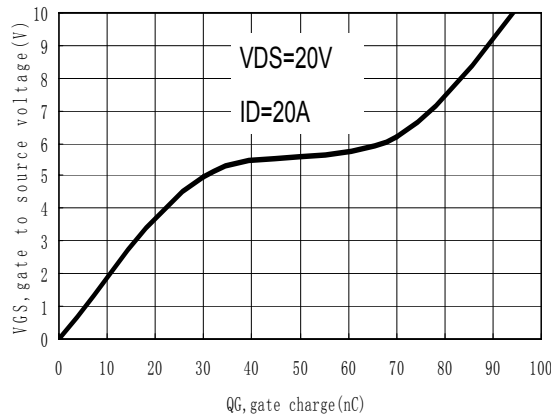
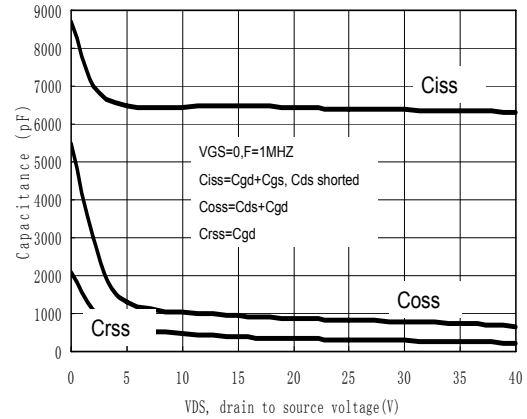


Figure 7: Gate-Charge Characteristics Figure



8: Capacitance Characteristics

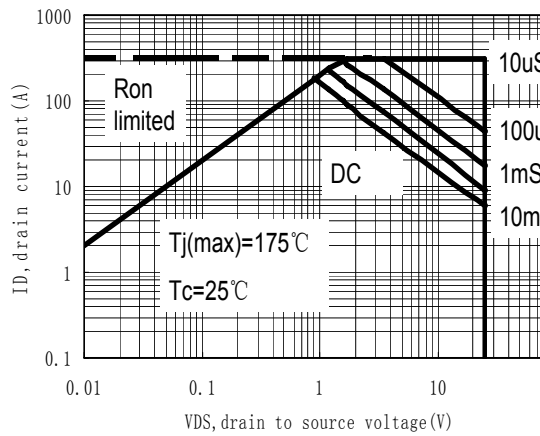


Figure 9: Maximum Forward Biased Safe Operating Area(⑤)

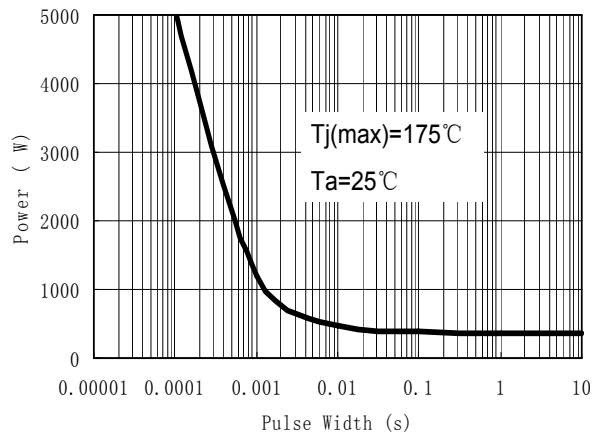


Figure 10: Single Pulse Power Rating Junction-to-Case (⑤)

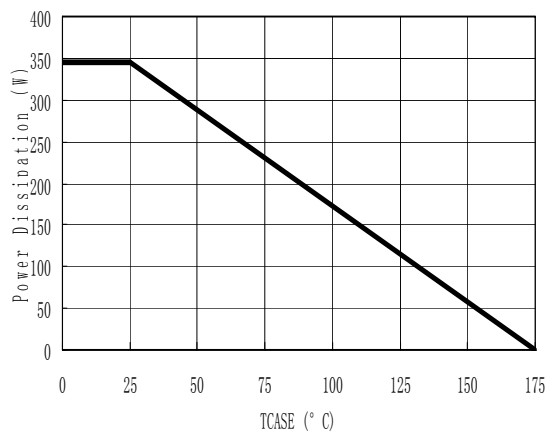


Figure 11: Power De-rating (③)

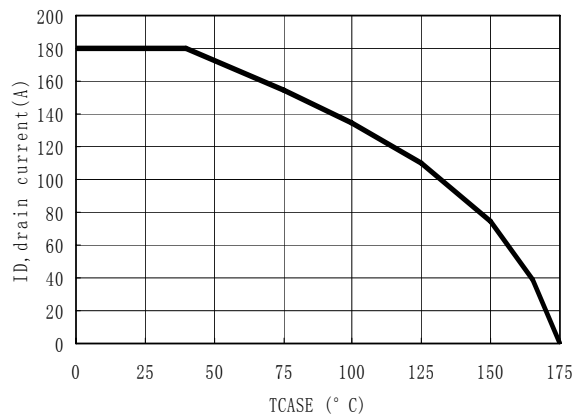


Figure 12: Current De-rating (③)

Typical electrical and thermal characteristics

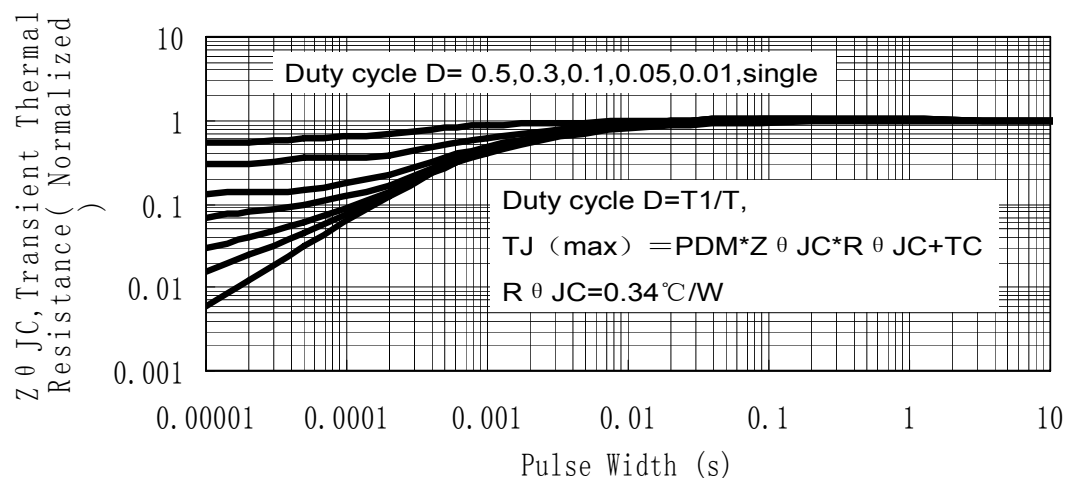


Figure 13: Normalized Maximum Transient Thermal Impedance (5)

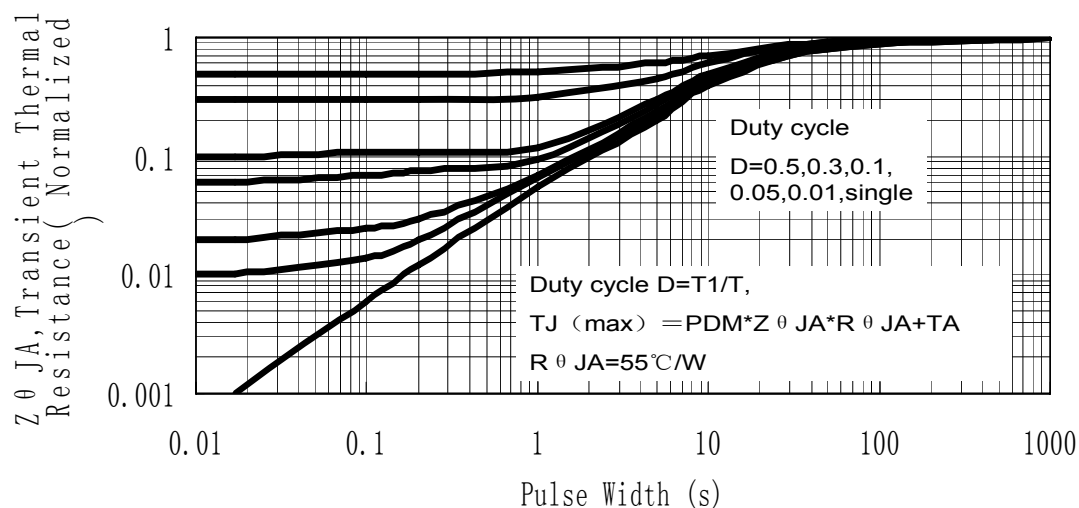
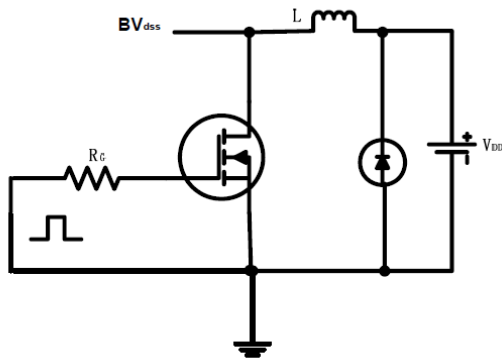
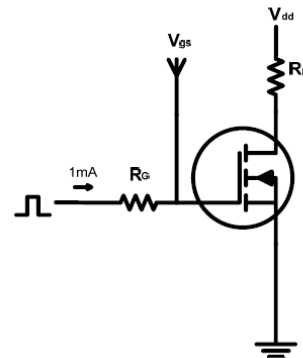
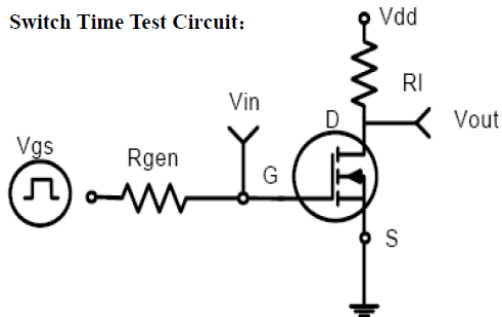
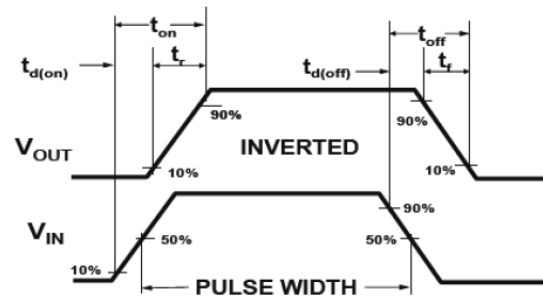


Figure 14: Normalized Maximum Transient Thermal Impedance (6)

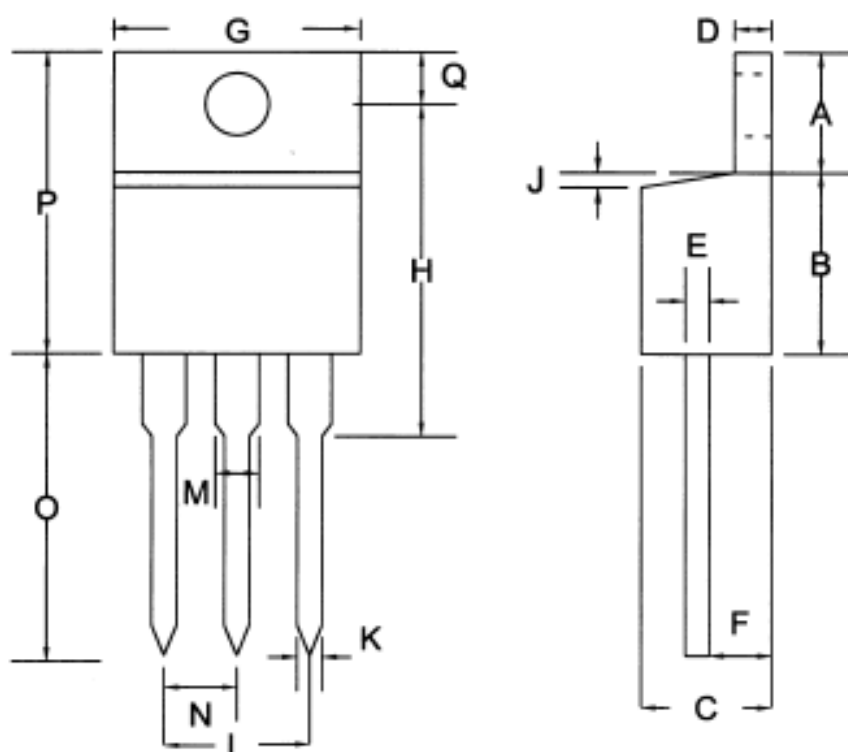
EAS test circuits:

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 P_D 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 $T_A = 25^\circ\text{C}$
- 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 $T_J(\text{MAX}) = 175^\circ\text{C}$.
- ⑥ The maximum current rating is limited by bond-wires.

Mechanical Data:

TO220



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	5.58	6.54	7.49	0.220	0.257	0.295
B	8.38	8.64	8.90	0.330	0.340	0.350
C	4.07	4.45	4.82	0.160	0.175	0.190
D	1.15	1.27	1.39	0.045	0.050	0.055
E	0.35	0.45	0.60	0.014	0.018	0.024
F	2.04	2.42	2.79	0.080	0.095	0.110
G	9.66	9.97	10.28	0.380	0.393	0.405
H	—	16.25	—	—	0.640	—
I	3.68	3.83	3.98	0.145	0.151	0.157
J	—	—	1.27	—	—	0.050
K	0.75	0.85	0.95	0.030	0.033	0.037
L	4.83	5.08	5.33	0.190	0.200	0.210
M	1.15	1.33	1.52	0.045	0.052	0.060
N	2.42	2.54	2.66	0.095	0.100	0.105
O	12.70	13.48	14.27	0.500	0.531	0.562
P	14.48	15.17	15.87	0.570	0.597	0.625
Q	2.54	2.79	3.04	0.100	0.110	0.120