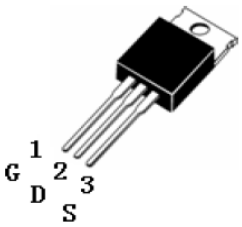
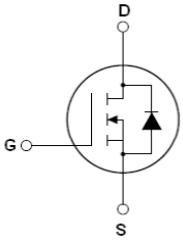
Main Product Characteristics:

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℃ 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
ID @ TC = 25°C	Continuous Drain Current, VGS @ 10V①	180	A
ID @ TC = 100°C	Continuous Drain Current, VGS @ 10V①	135	
IDM	Pulsed Drain Current②	500	
ISM	Pulsed Source Current (Body Diode)②	500	
PD @TC = 25°C	Power Dissipation③	346	W
PD @TC =100°C	Power Dissipation③	178	W
VDS	Drain-Source Voltage	80	V
VGS	Gate-to-Source Voltage	± 25	V
EAS	Single Pulse Avalanche Energy @ L=0.1mH②	450	mJ
IAR	Avalanche Current @ L=0.1mH②	95	A
TJ TSTG	Operating Junction and Storage Temperature Range	-55 to + 175	°C

Thermal Resistance

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

Electrical Characterizes @T_A=25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max	Units	Conditions
BVDSS	Drain-to-Source breakdown voltage	80	—	—	V	VGS = 0V, ID = 250μA
RDS(on)	Static Drain-to-Source on-resistance	—	4.5	5	mΩ	VGS = 10V, ID = 20A
VGS(th)	Gate threshold voltage	2	3	4	V	VDS = VGS, ID = 250μA
IDSS	Drain-to-Source leakage current	—	—	10	μA	VDS = 80V, VGS = 0V
		—	—	50		VDS =80V, VGS = 0V, TJ = 55°C
IGSS	Gate-to-Source forward leakage	—	—	100	nA	VGS =25V
	Gate-to-Source reverse leakage	-100	—	—		VGS = -25V
gFS	Forward Transconductance		37		S	VDS=5V, ID=20A
Qg	Total gate charge	—	96	120	nC	VGS=10V, VDS=40V, ID=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	VGS=10V, VDS=40V, RL=15Ω, RGEN=2.5Ω
tr	Rise time	—	12.2	—		
td(off)	Turn-Off delay time	—	88	—		
tf	Fall time	—	34	—		
Ciss	Input capacitance	—	6286	—	pF	VGS=0V, VDS=40V, f=1MHz
Coss	Output capacitance	—	670	—		
Crss	Reverse transfer capacitance	—	204	—		
R_g	Gate resistance	—	0.5	—	Ω	V_{GS}=0V, V_{DS}=0V, f=1MHz

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

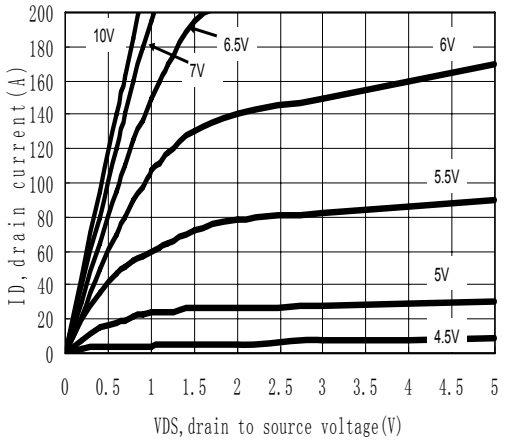


Figure 1: Typical Output Characteristics

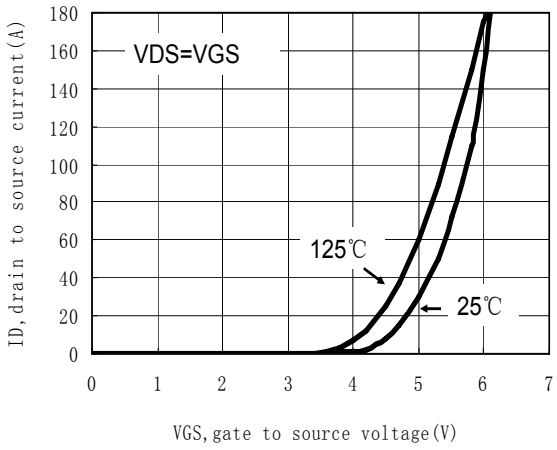


Figure 2: Typical Transfer Characteristics

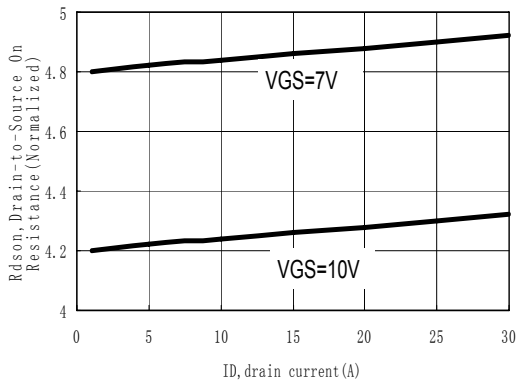


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

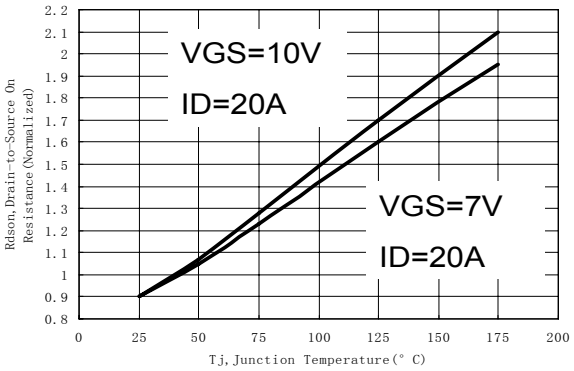


Figure 4: On-Resistance vs. Junction Temperature

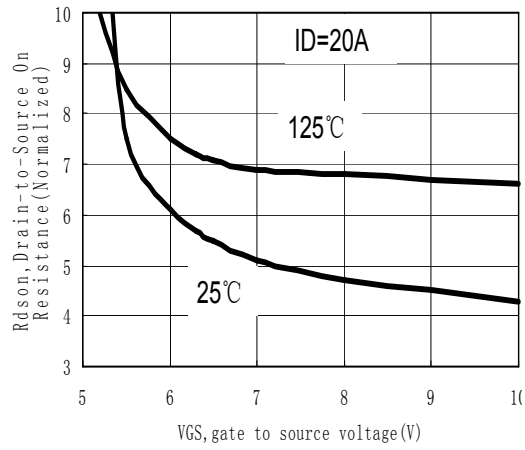


Figure 5: On-Resistance vs. Gate-Source Voltage

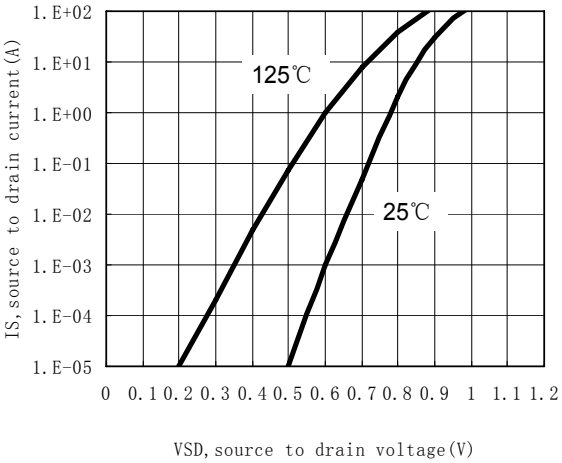


Figure 6: Body-Diode Characteristics

Typical electrical and thermal characteristics

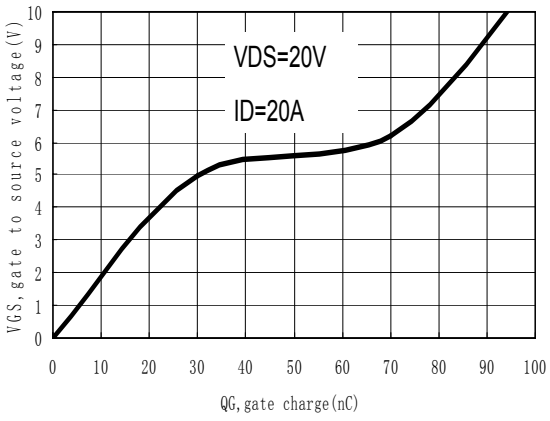
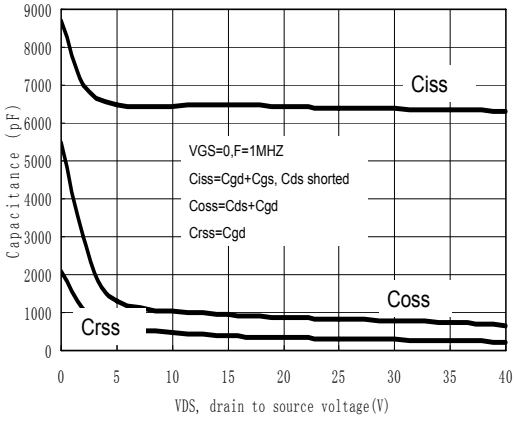


Figure 7: Gate-Charge Characteristics Figure



8: Capacitance Characteristics

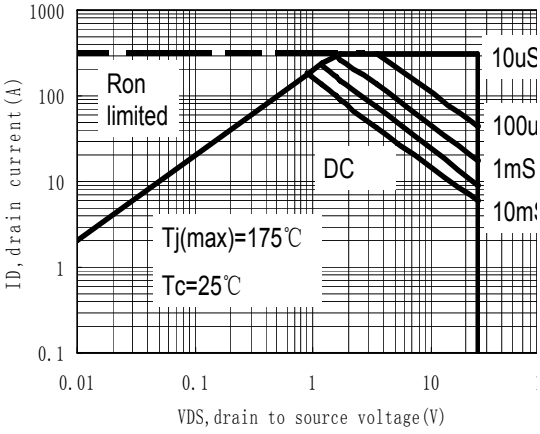


Figure 9: Maximum Forward Biased Safe Operating Area(⑤)

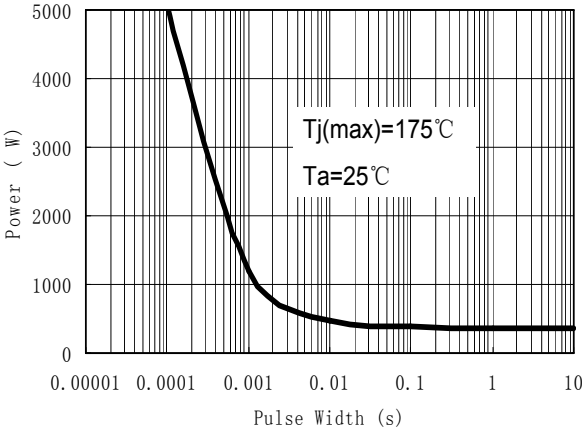


Figure 10: Single Pulse Power Rating Junction-to-Case (⑤)

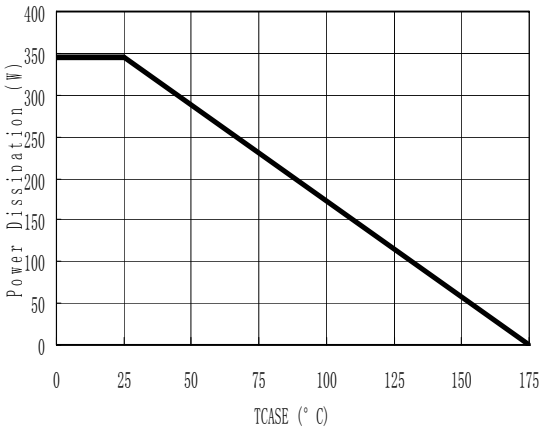


Figure 11: Power De-rating (③)

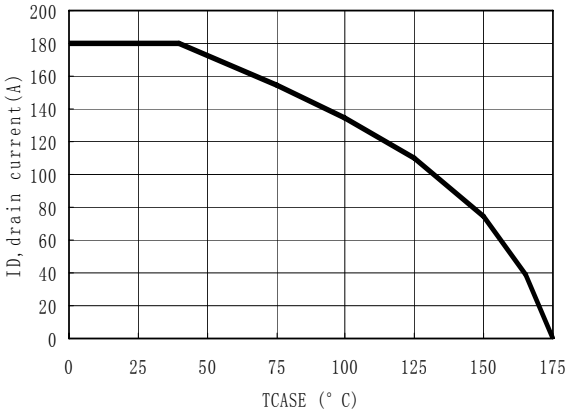


Figure 12: Current De-rating (③)

Typical electrical and thermal characteristics

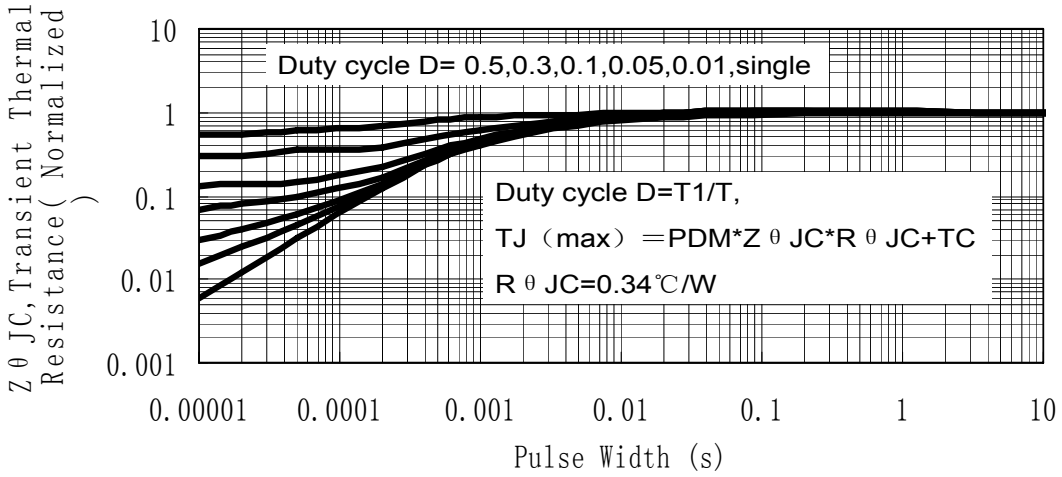


Figure 13: Normalized Maximum Transient Thermal Impedance (⑤)

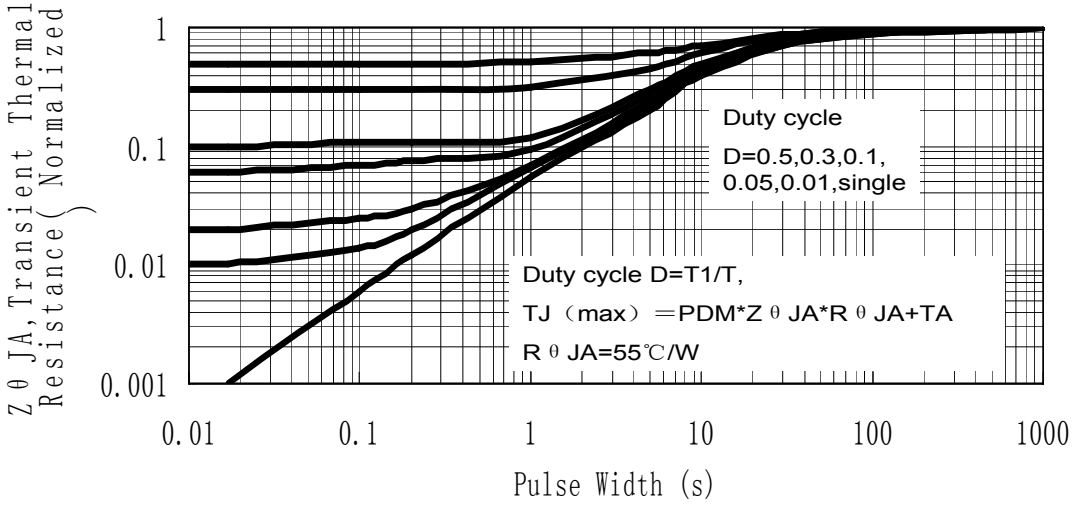
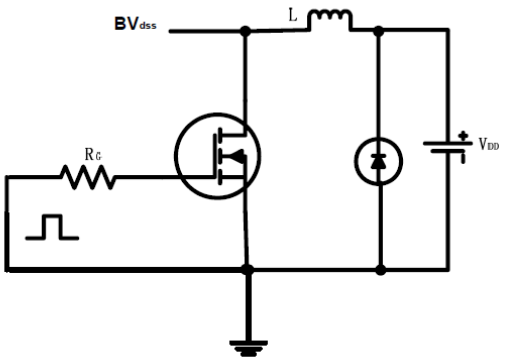
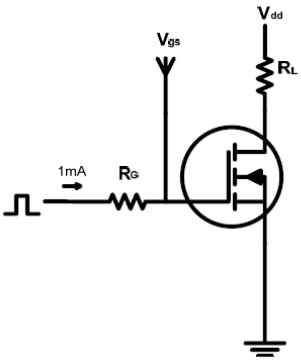


Figure 14: Normalized Maximum Transient Thermal Impedance (⑥)

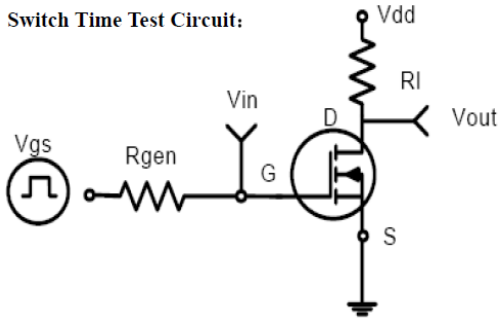
EAS test circuits:



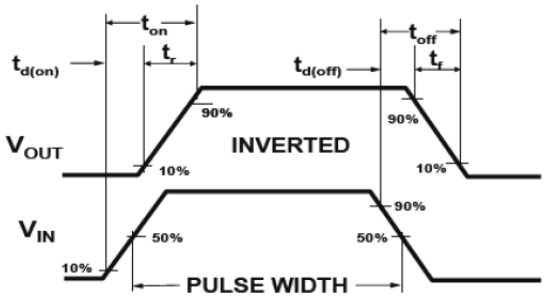
Gate charge test circuit:



Switch Time Test Circuit:



Switch Waveforms:



Notes:

①The maximum current rating is limited by bond-wires.

②Repetitive rating; pulse width limited by max. junction temperature.

③The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.

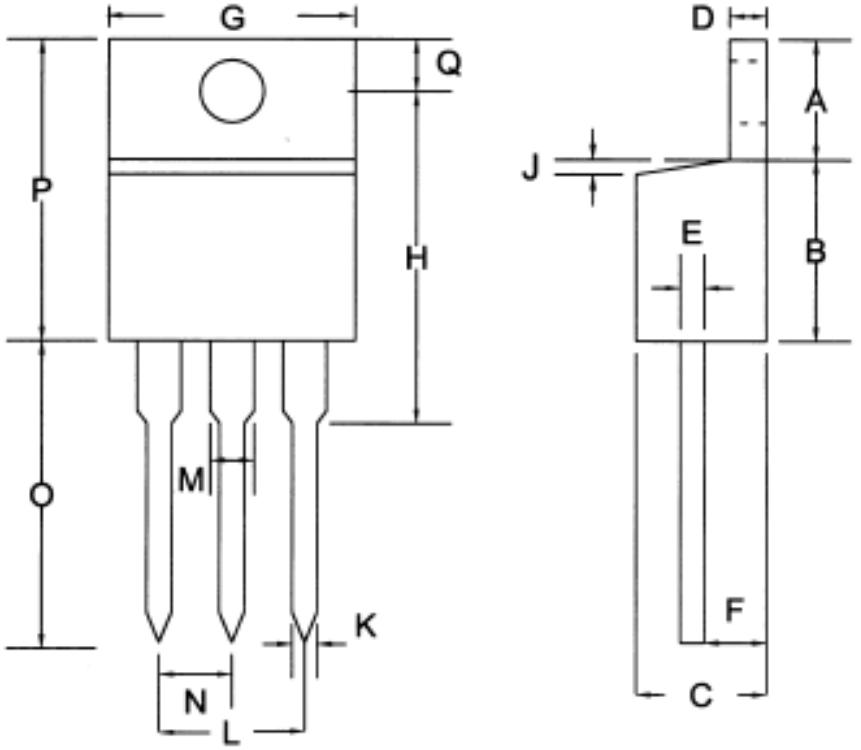
④The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C

⑤These curves are based on the junction-to-case thermal impedence which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of TJ(MAX)=175°C.

⑥ The maximum current rating is limited by bond-wires.

Mechanical Data：

TO220



Symbol	Dimensions In Millmeters			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