

General Description

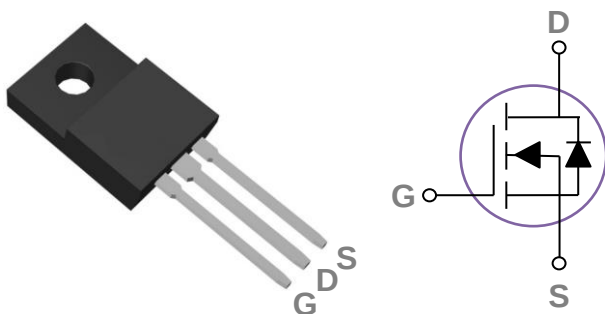
These N-Channel enhancement mode power field effect transistors are using super junction MOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

BVDSS	R _{DS(on)}	I _D
600V	190mΩ	20A

Features

- 600V,20A, R_{DS(ON)} =190mΩ @V_{GS} = 10V
- Improved dv/dt capability
- Fast switching
- Green Device Available

TO220F Pin Configuration



Applications

- PFC Power Supply Stages
- Motor Control
- DC-DC Converters
- Adapter

Absolute Maximum Ratings T_c=25°C unless otherwise noted

Symbol	Parameter	Rating	Units
V _{DS}	Drain-Source Voltage	600	V
V _{GS}	Gate-Source Voltage	±30	V
I _D	Drain Current – Continuous (T _c =25°C)	20	A
	Drain Current – Continuous (T _c =100°C)	12.5	A
I _{DM}	Drain Current – Pulsed ¹	80	A
EAS	Single Pulse Avalanche Energy	409	mJ
P _D	Power Dissipation (T _c =25°C)	33	W
	Power Dissipation – Derate above 25°C	0.26	W/°C
T _{STG}	Storage Temperature Range	-55 to 150	°C
T _J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R _{θJA}	Thermal Resistance Junction to ambient	---	62	°C/W
R _{θJC}	Thermal Resistance Junction to Case	---	3.8	°C/W

Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)
Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	600	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=600V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	---	---	1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 30V$, $V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V$, $I_D=10A$	---	165	190	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	3	---	5.5	V

Dynamic and switching Characteristics

Q_g	Total Gate Charge ^{2, 3}	$V_{DS}=480V$, $V_{GS}=10V$, $I_D=10A$	---	25	50	nC
Q_{gs}	Gate-Source Charge ^{2, 3}		---	7.5	15	
Q_{gd}	Gate-Drain Charge ^{2, 3}		---	8	16	
$T_{d(on)}$	Turn-On Delay Time ^{2, 3}	$V_{DS}=480V$, $V_{GS}=10V$, $R_G=25\Omega$ $I_D=10A$	---	35	70	ns
T_r	Rise Time ^{2, 3}		---	50	100	
$T_{d(off)}$	Turn-Off Delay Time ^{2, 3}		---	45	90	
T_f	Fall Time ^{2, 3}		---	35	70	
C_{iss}	Input Capacitance	$V_{DS}=100V$, $V_{GS}=0V$, $F=1\text{MHz}$	---	1400	2800	pF
C_{oss}	Output Capacitance		---	47	100	
C_{rss}	Reverse Transfer Capacitance		---	1	3	
R_g	Total Gate Charge ^{2, 3}	$V_{GS}=0V$, $V_{DS}=0V$, $F=1\text{MHz}$	---	4	---	Ω

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	20	A
I_{SM}	Pulsed Source Current		---	---	40	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V$, $I_S=10A$, $T_J=25^\circ\text{C}$	---	---	1.4	V
t_{rr}	Reverse Recovery Time	$V_R=400V$, $I_S=10A$	---	125	---	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=100A/\mu s$, $T_J=25^\circ\text{C}$	---	660	---	nC

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Essentially independent of operating temperature.

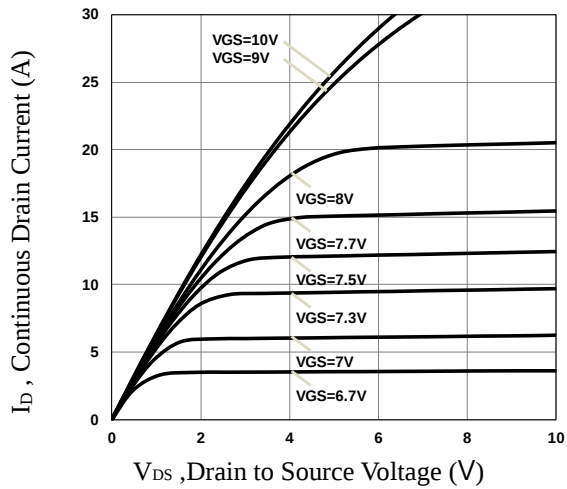


Fig.1 Typical Output Characteristics

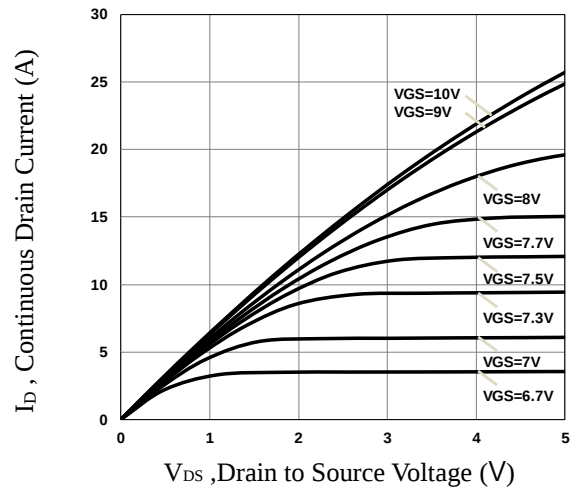


Fig.2 Typical Output Characteristics

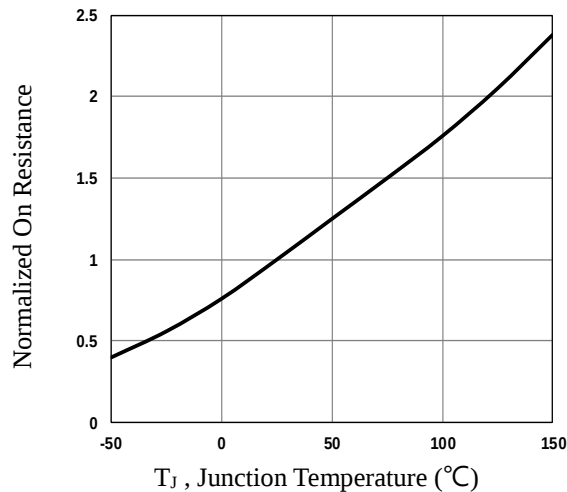


Fig.3 Normalized $R_{DS(on)}$ vs. T_J

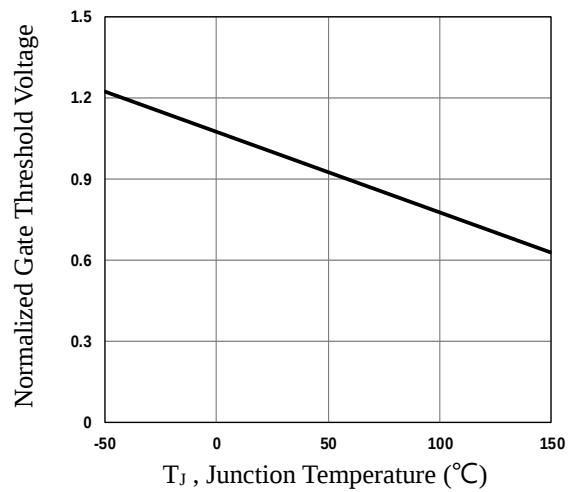


Fig.4 Normalized V_{th} vs. T_J

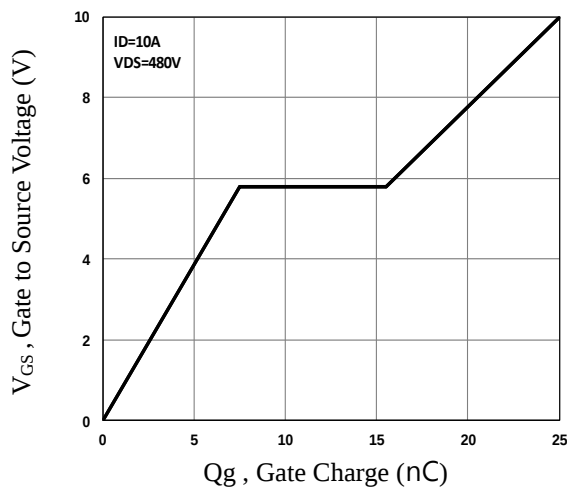


Fig.5 Gate Charge Characteristics

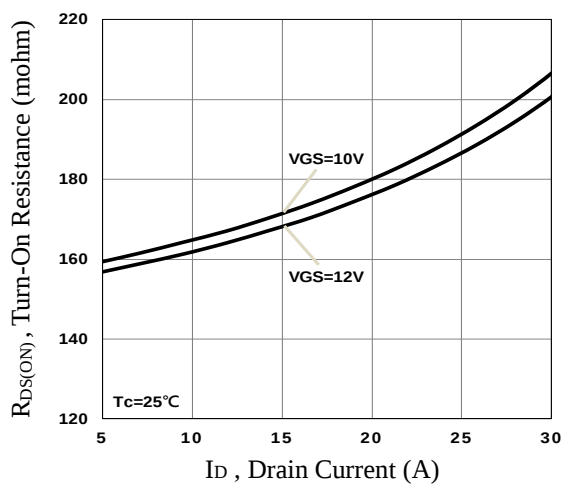


Fig.6 Turn-On Resistance vs. I_D

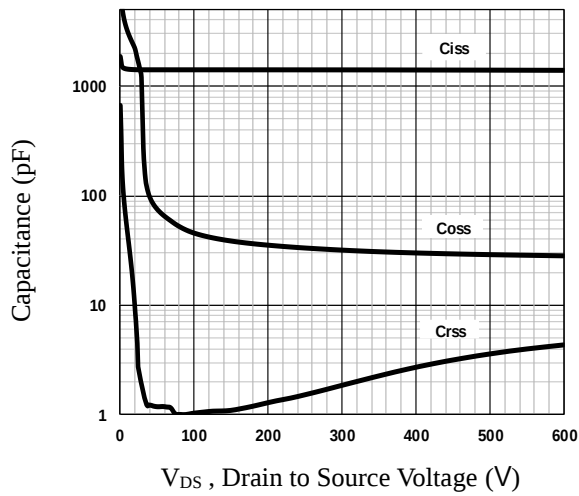


Fig.7 Capacitance Characteristics

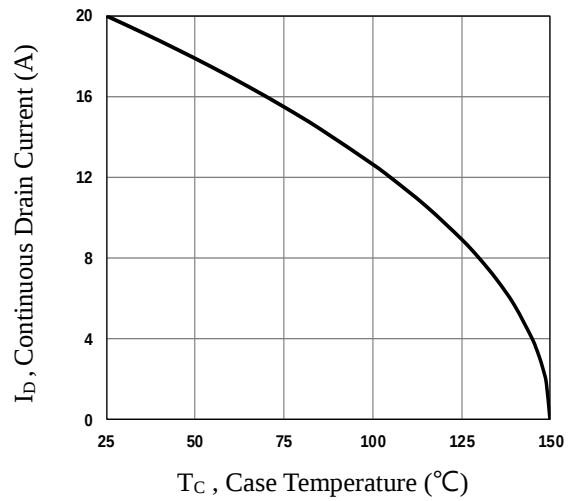


Fig.8 Continuous Drain Current vs. T_c

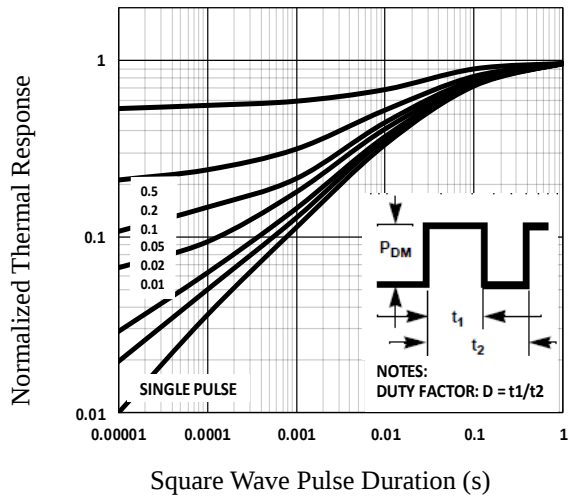


Fig.9 Normalized Transient Impedance

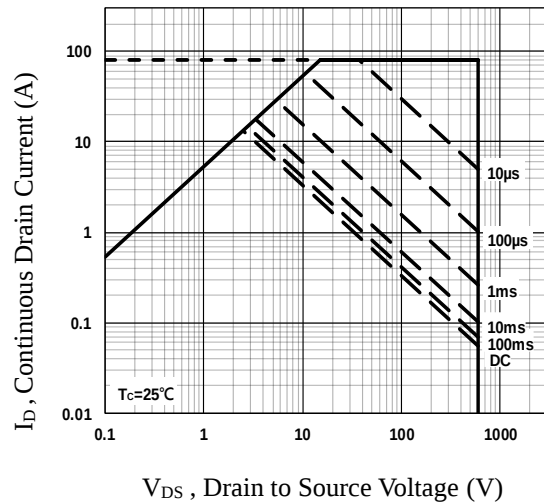


Fig.10 Maximum Safe Operation Area

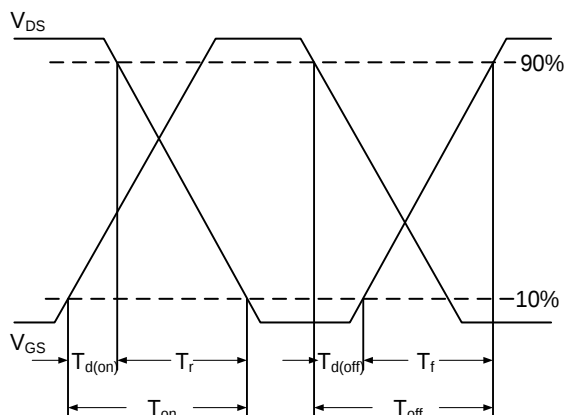


Fig.11 Switching Time Waveform

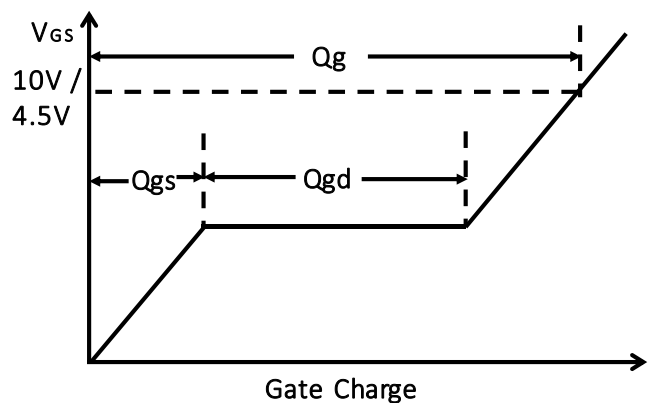
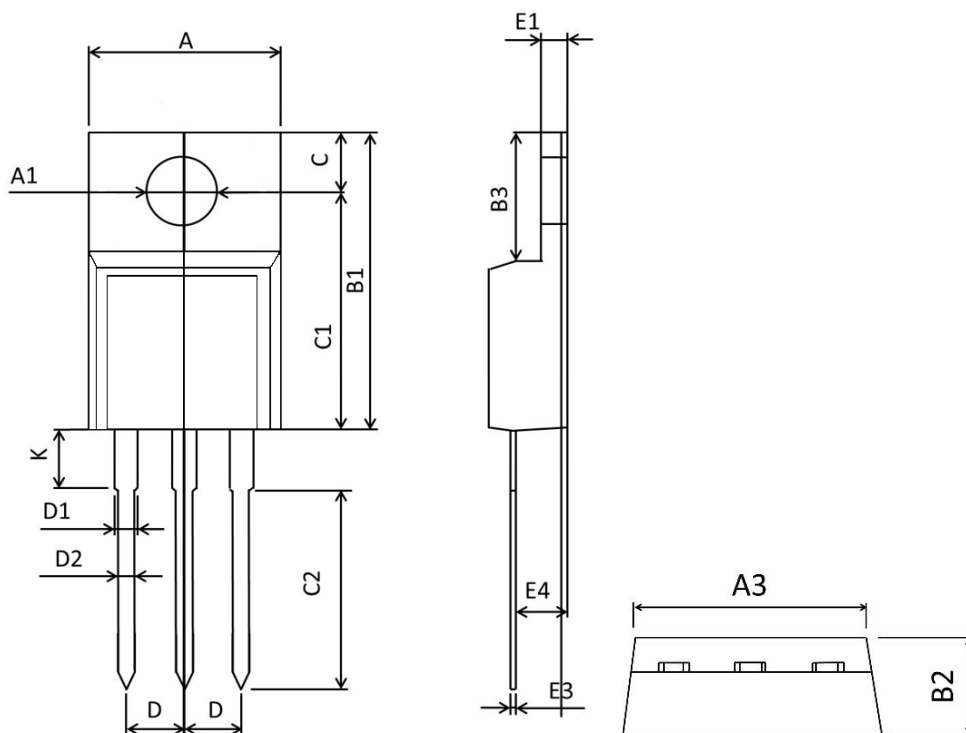


Fig.12 Gate Charge Waveform

TO220F PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	9.860	10.460	0.389	0.411
A1	3.100	3.500	0.122	0.138
B1	15.450	16.300	0.608	0.642
B2	4.400	5.000	0.173	0.197
B3	6.280	7.100	0.247	0.280
C	3.100	3.500	0.122	0.138
C1	12.270	12.870	0.483	0.507
C2	9.600	10.520	0.378	0.414
D	2.540BSC		0.1BSC	
D1	1.070	1.470	0.042	0.058
D2	0.600	1.000	0.024	0.039
K	2.800	3.500	0.110	0.138
E1	2.340	2.740	0.092	0.108
E3	0.350	0.650	0.014	0.026
E4	2.460	2.960	0.097	0.117