

General Description

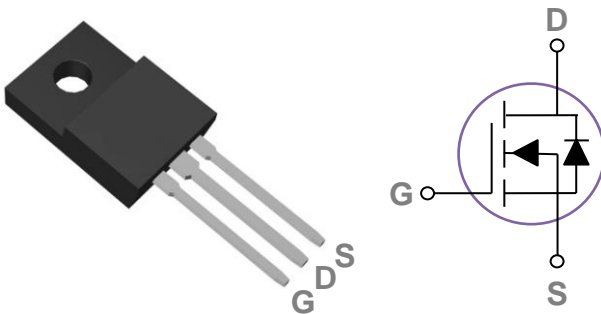
These N-Channel enhancement mode power field effect transistors are using Super Junction technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	RDSON	ID
700V	380mΩ	11A

Features

- 700V, 11A, $R_{DS(ON)} = 380m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

TO220F Pin Configuration



Applications

- High efficient switched mode power supplies
- LED Lighting
- Adapter/charger

Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Symbol	Parameter	Rating	Units
V _{DS}	Drain-Source Voltage	700	V
V _{GS}	Gate-Source Voltage	±30	V
I _D	Drain Current – Continuous (T _C =25°C)	11	A
	Drain Current – Continuous (T _C =100°C)	6.9	A
I _{DM}	Drain Current – Pulsed ¹	44	A
P _D	Power Dissipation (T _C =25°C)	32.5	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	---	62.5	°C/W
R _{θJC}	Thermal Resistance Junction to Case	---	3.85	°C/W

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	700	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=700V, V_{GS}=0V, T_J=25^\circ C$	---	---	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	$V_{GS}=10V, I_D=4A$	---	320	380	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	2	3	4	V

Dynamic and switching Characteristics²

Q_g	Total Gate Charge	$V_{DS}=350V, V_{GS}=10V, I_D=6A$	---	34	68	nC
Q_{gs}	Gate-Source Charge		---	3.9	8	
Q_{gd}	Gate-Drain Charge		---	14.8	30	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=350V, V_{GS}=10V, R_G=25\Omega, I_D=6A$	---	20	40	ns
T_r	Rise Time		---	40	80	
$T_{d(off)}$	Turn-Off Delay Time		---	100	200	
T_f	Fall Time		---	40	80	
C_{iss}	Input Capacitance	$V_{DS}=100V, V_{GS}=0V, F=1MHz$	---	1050	2100	pF
C_{oss}	Output Capacitance		---	52	110	
C_{rss}	Reverse Transfer Capacitance		---	5	10	
R_g	Gate resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	---	1.75	---	Ω

Guaranteed Avalanche Energy

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy	$V_{DD}=100V, L=79.9mH, I_{AS}=2.2A$	193	---	---	mJ

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V, \text{Force Current}$	---	---	11	A
I_{SM}	Pulsed Source Current		---	---	22	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_S=6A, T_J=25^\circ C$	---	---	1.4	V
t_{rr}	Reverse Recovery Time	$V_R=400V, I_S=5A,$	---	280	---	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=100A/\mu s, T_J=25^\circ C$	---	3	---	μC

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. Essentially independent of operating temperature.

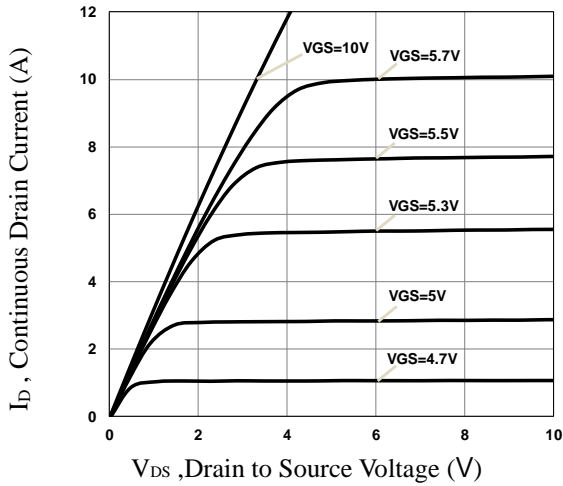


Fig.1 Typical Output Characteristics

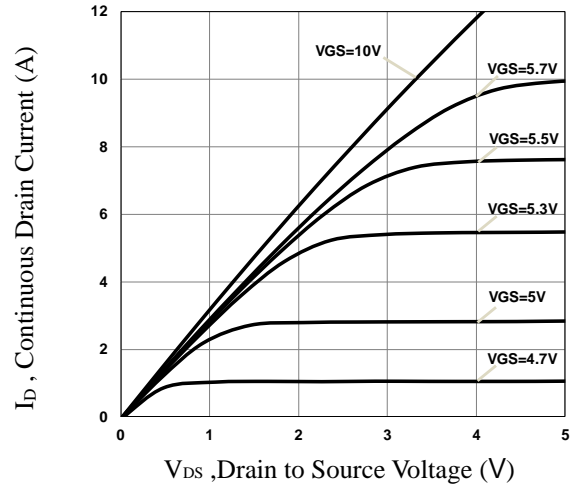


Fig.2 Typical Output Characteristics

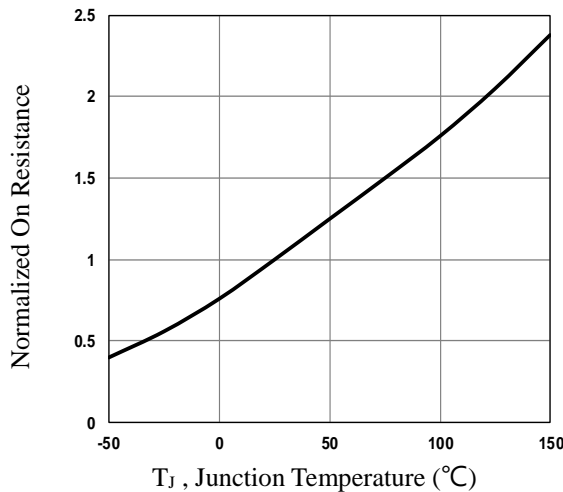


Fig.3 Normalized $R_{DS(on)}$ vs. T_J

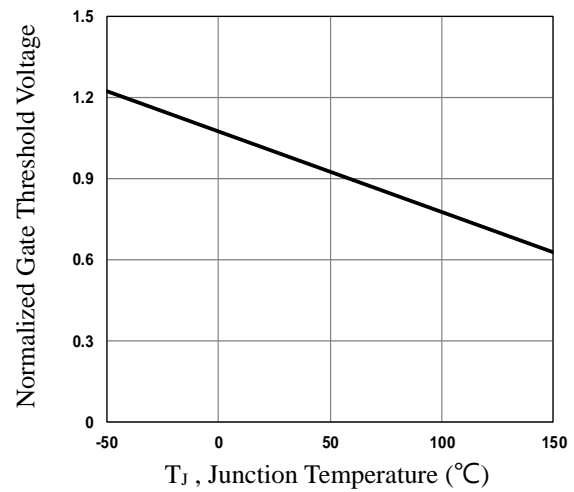


Fig.4 Normalized V_{th} vs. T_J

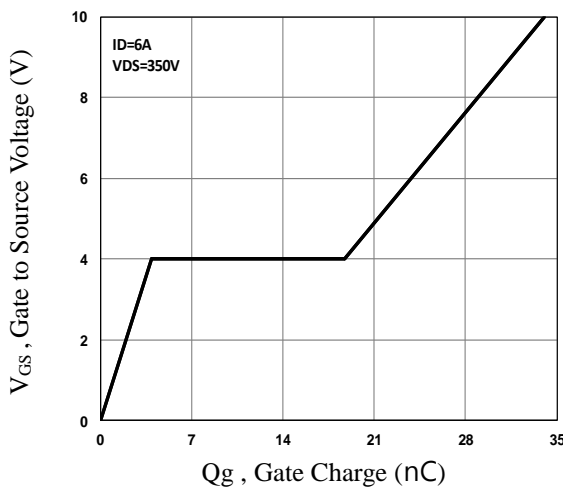


Fig.5 Gate Charge Characteristics

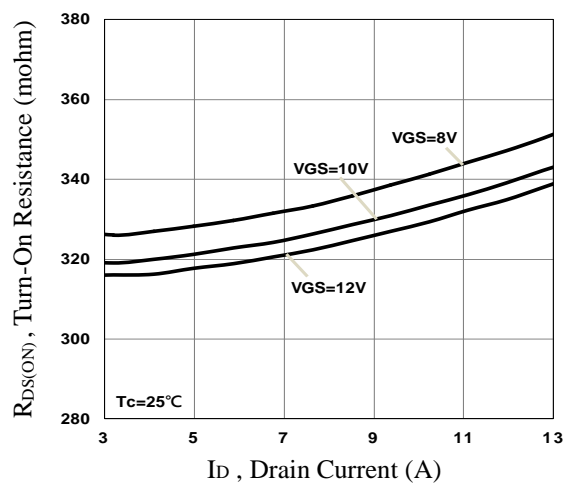


Fig.6 Turn-On Resistance vs. I_D

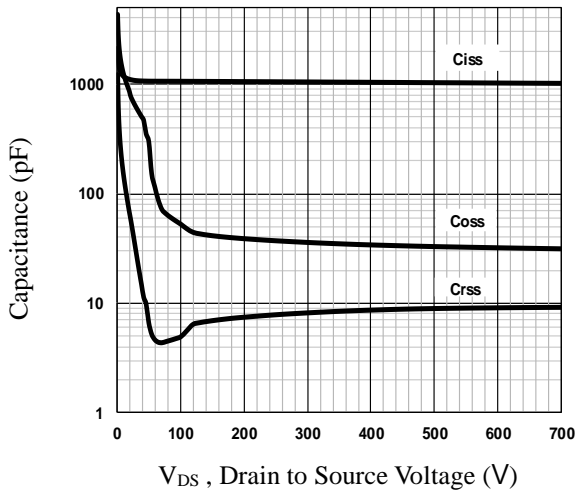


Fig.7 Capacitance Characteristics

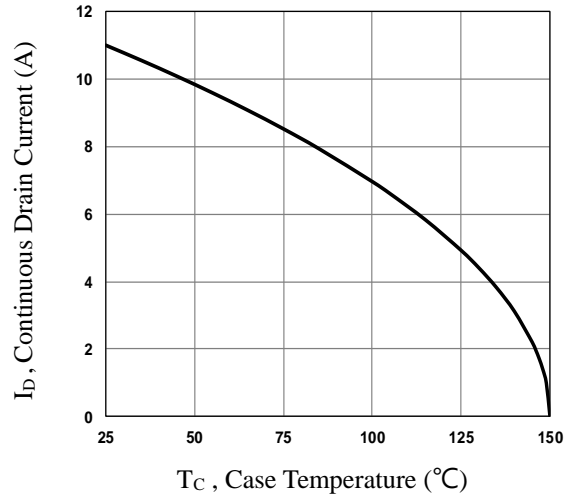


Fig.8 Continuous Drain Current vs. T_c

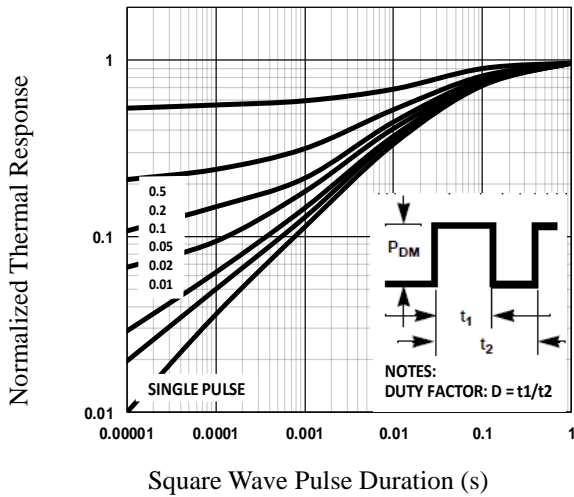


Fig.9 Normalized Transient Impedance

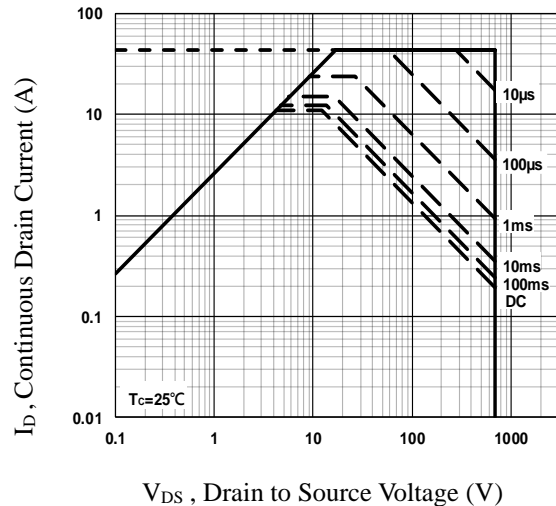


Fig.10 Maximum Safe Operation Area

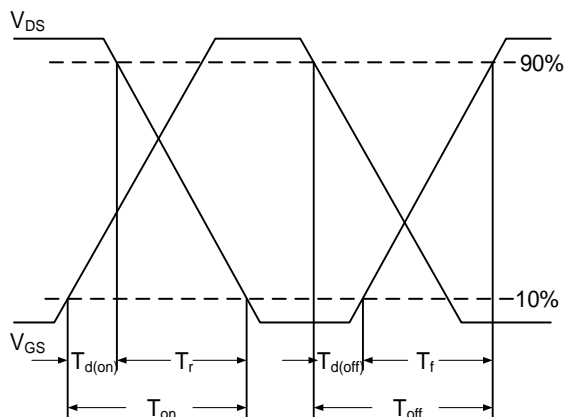


Fig.11 Switching Time Waveform

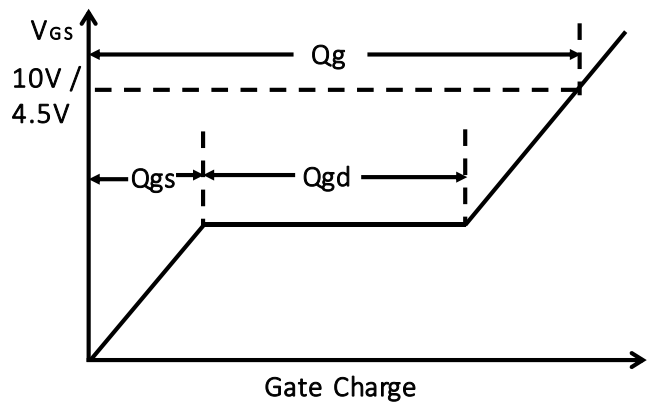
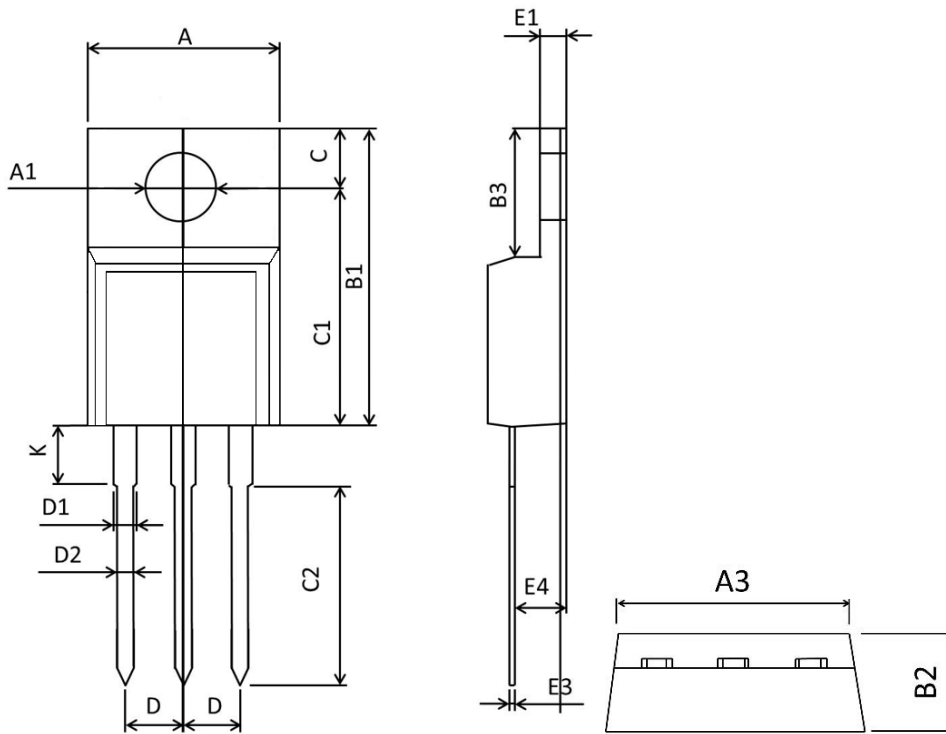


Fig.12 Gate Charge Waveform

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