

General Description

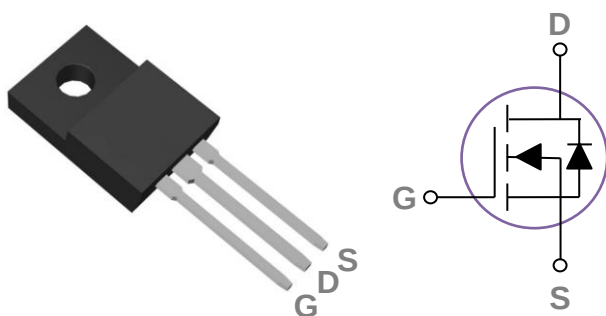
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	RDS(ON)	ID
115V	8.8mΩ	55A

Features

- 115V, 55A, $R_{DS(ON)} = 8.8m\Omega$ @ $V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

TO220F Pin Configuration



Applications

- Networking
- Load Switch
- LED applications
- Quick Charger

Absolute Maximum Ratings $T_c=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	115	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous ($T_c=25^\circ\text{C}$)	55	A
	Drain Current – Continuous ($T_c=100^\circ\text{C}$)	35	A
I_{DM}	Drain Current – Pulsed ¹	220	A
EAS	Single Pulse Avalanche Energy ²	80	mJ
IAS	Single Pulse Avalanche Current ²	40	A
P_D	Power Dissipation ($T_c=25^\circ\text{C}$)	67	W
	Power Dissipation – Derate above 25°C	0.54	W/ $^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	1.86	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	115	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=100V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=100V, V_{GS}=0V, T_J=85^\circ\text{C}$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance ³	$V_{GS}=10V, I_D=15A$	---	7.3	8.8	m Ω
		$V_{GS}=4.5V, I_D=10A$	---	9	12	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.6	2.5	V

Dynamic and switching Characteristics

Q_g	Total Gate Charge ^{3, 4}	$V_{DS}=60V, V_{GS}=10V, I_D=30A$	---	39	60	nC
			---	21	30	
Q_{gs}	Gate-Source Charge ^{3, 4}	$V_{DS}=60V, V_{GS}=4.5V, I_D=30A$	---	5.2	10	
Q_{gd}	Gate-Drain Charge ^{3, 4}		---	9.7	15	
$T_{d(on)}$	Turn-On Delay Time ^{3, 4}	$V_{DS}=60V, V_{GS}=10V, R_G=6\Omega$ $I_D=30A$	---	12	18	ns
T_r	Rise Time ^{3, 4}		---	8	12	
$T_{d(off)}$	Turn-Off Delay Time ^{3, 4}		---	14	20	
T_f	Fall Time ^{3, 4}		---	16	25	
C_{iss}	Input Capacitance	$V_{DS}=60V, V_{GS}=0V, F=1\text{MHz}$	---	2355	3550	pF
C_{oss}	Output Capacitance		---	260	400	
C_{rss}	Reverse Transfer Capacitance		---	4	6	
R_g	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	1.5	---	Ω

Guaranteed Avalanche Energy

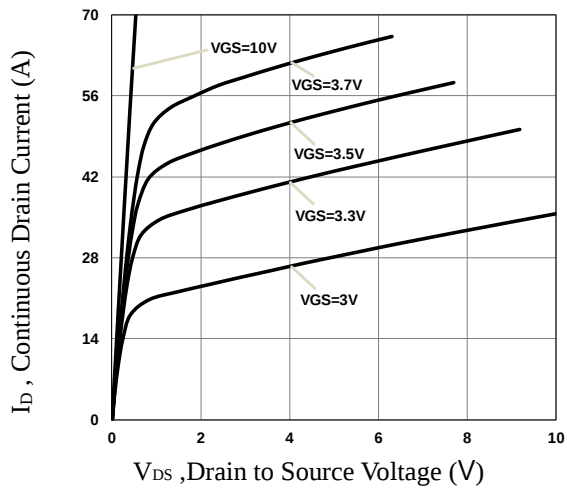
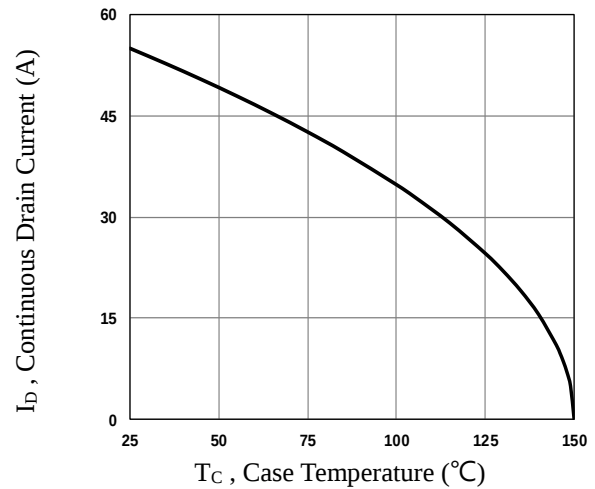
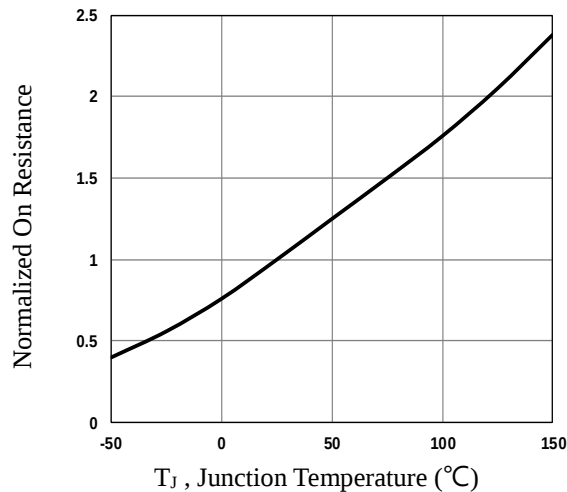
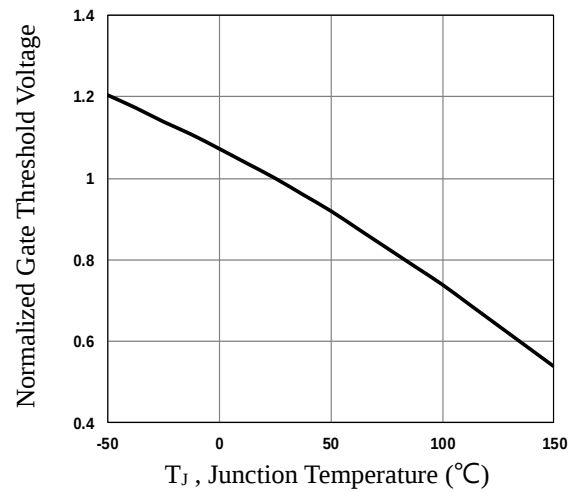
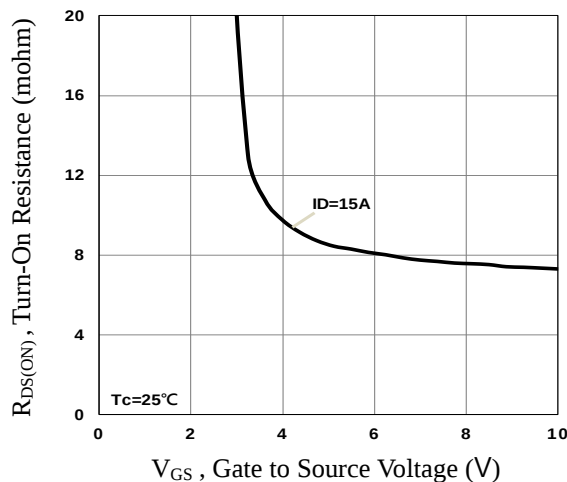
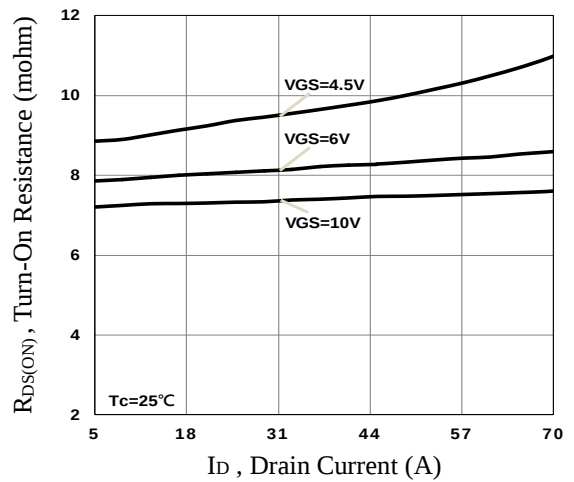
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy	$V_{DD}=50V, L=0.1\text{mH}, I_{AS}=36A$	64.8	---	---	mJ

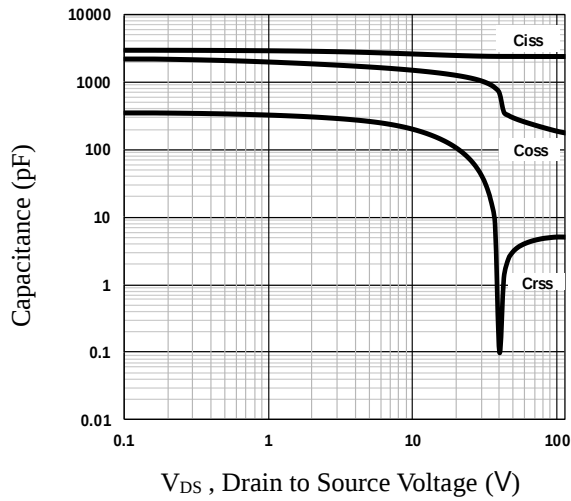
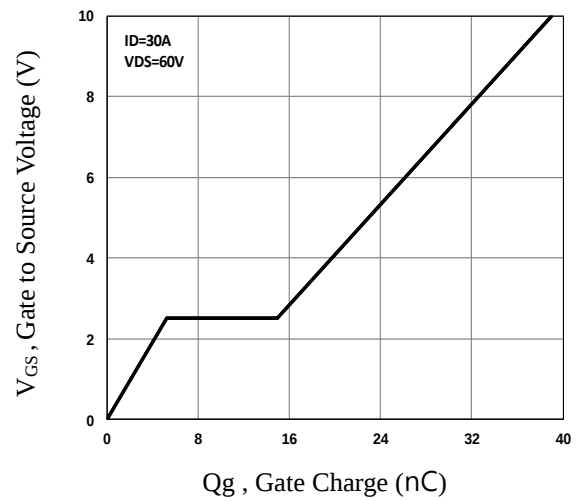
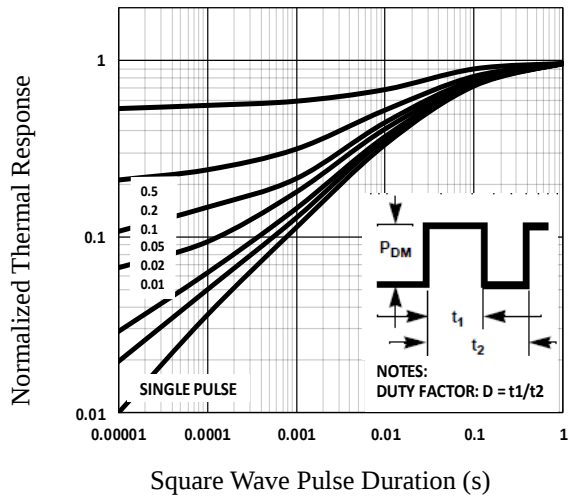
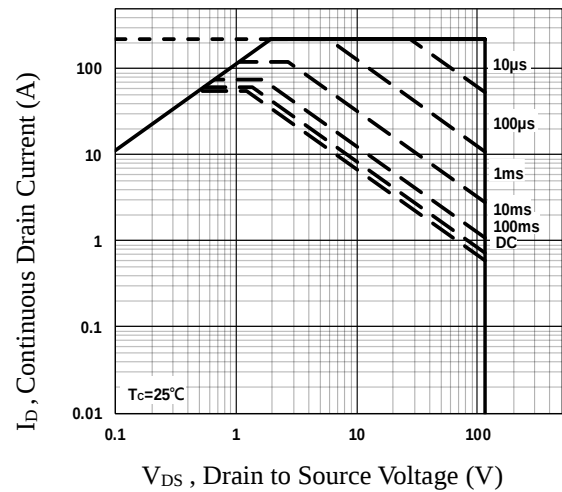
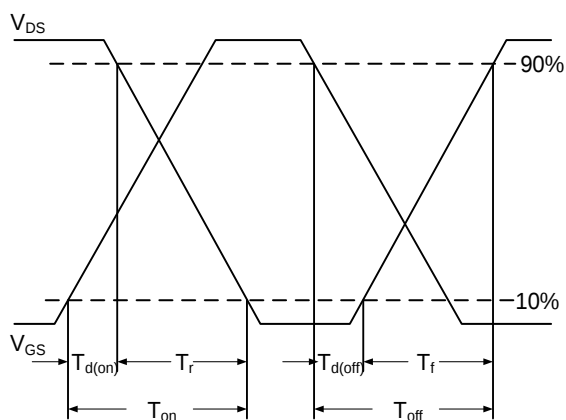
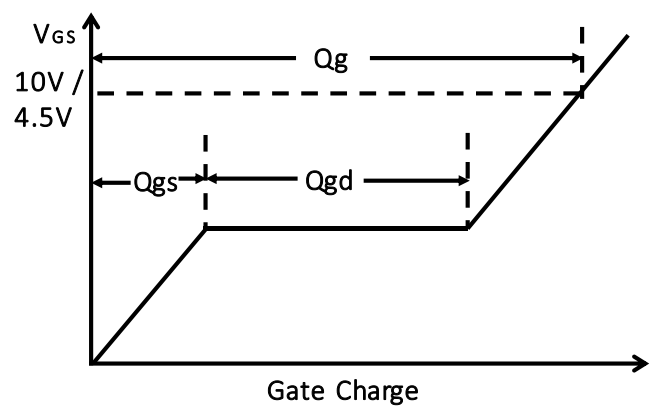
Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	55	A
I_{SM}	Pulsed Source Current		---	---	110	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1	V
t_{rr}	Reverse Recovery Time ³	$V_R=100V, I_S=10A$ $di/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	80	---	ns
Q_{rr}	Reverse Recovery Charge ³		---	170	---	nC

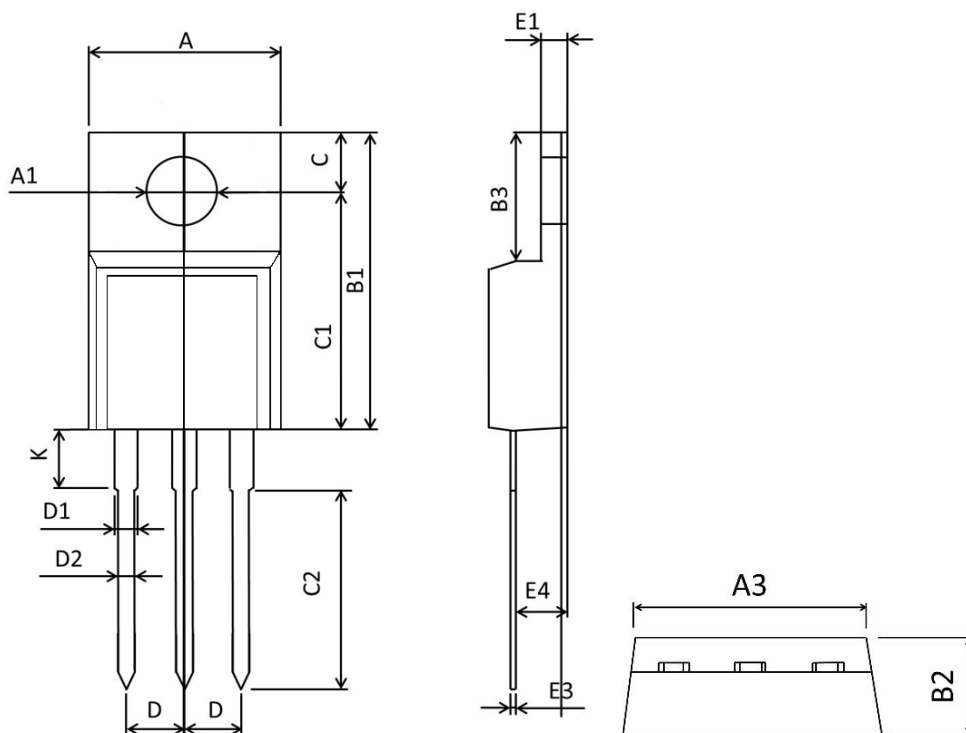
Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=50V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=40A, R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$.
3. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.


Fig.1 Typical Output Characteristics

Fig.2 Continuous Drain Current vs. T_C

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

Fig.4 Normalized V_{th} vs. T_J

Fig.5 Turn-On Resistance vs. V_{GS}

Fig.6 Turn-On Resistance vs. I_D


Fig.7 Capacitance Characteristics

Fig.8 Gate Charge Characteristics

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