

### General Description

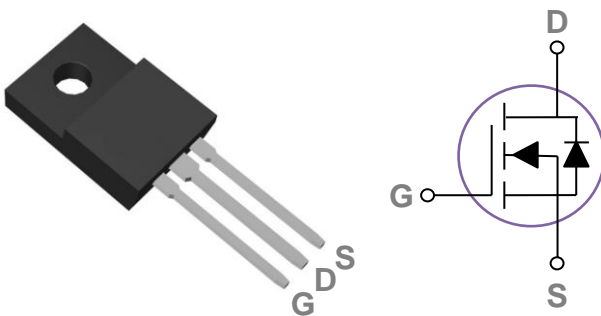
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	RDSON	ID
40V	3.8mΩ	85A

### Features

- 40V,85A,  $R_{DS(ON)} = 3.8m\Omega$  @  $V_{GS} = 10V$
- Improved  $dv/dt$  capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

### TO220F Pin Configuration



### Applications

- Networking
- Load Switch
- LED applications
- Quick Charger

### Absolute Maximum Ratings $T_c=25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current – Continuous ( $T_c=25^\circ C$ )	85	A
	Drain Current – Continuous ( $T_c=100^\circ C$ )	54	A
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	340	A
EAS	Single Pulse Avalanche Energy <sup>2</sup>	205	mJ
IAS	Single Pulse Avalanche Current <sup>2</sup>	64	A
$P_D$	Power Dissipation ( $T_c=25^\circ C$ )	61	W
	Power Dissipation – Derate above $25^\circ C$	0.49	W/ $^\circ C$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	2.06	$^\circ C/W$

**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	$V_{GS}=0V, I_D=250\mu A$	40	---	---	V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=40V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu A$
		$V_{DS}=32V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	10	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA

**On Characteristics**

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=30A$	---	3.2	3.8	m $\Omega$
		$V_{GS}=4.5V, I_D=20A$	---	4.2	5.5	m $\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.6	2.5	V
gfs	Forward Transconductance	$V_{DS}=10V, I_D=3A$	---	18	---	S

**Dynamic and switching Characteristics**

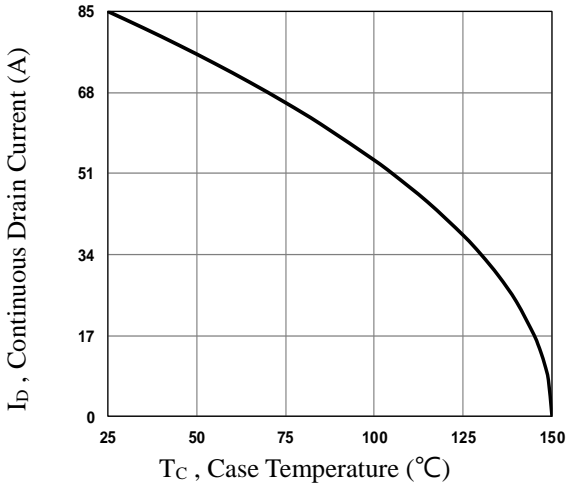
$Q_g$	Total Gate Charge <sup>3,4</sup>	$V_{DS}=20V, V_{GS}=10V, I_D=40A$	---	70	105	nC
$Q_{gs}$	Gate-Source Charge <sup>3,4</sup>		---	10	15	
$Q_{gd}$	Gate-Drain Charge <sup>3,4</sup>		---	16	24	
$T_{d(on)}$	Turn-On Delay Time <sup>3,4</sup>	$V_{DD}=20V, V_{GS}=10V, R_G=6\Omega, I_D=40A$	---	20	30	ns
$T_r$	Rise Time <sup>3,4</sup>		---	25	38	
$T_{d(off)}$	Turn-Off Delay Time <sup>3,4</sup>		---	65	100	
$T_f$	Fall Time <sup>3,4</sup>		---	25	38	
$C_{iss}$	Input Capacitance	$V_{DS}=20V, V_{GS}=0V, F=1\text{MHz}$	---	3880	5820	pF
$C_{oss}$	Output Capacitance		---	400	600	
$C_{rss}$	Reverse Transfer Capacitance		---	340	510	
$R_g$	Gate resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	1.7	---	$\Omega$

**Drain-Source Diode Characteristics and Maximum Ratings**

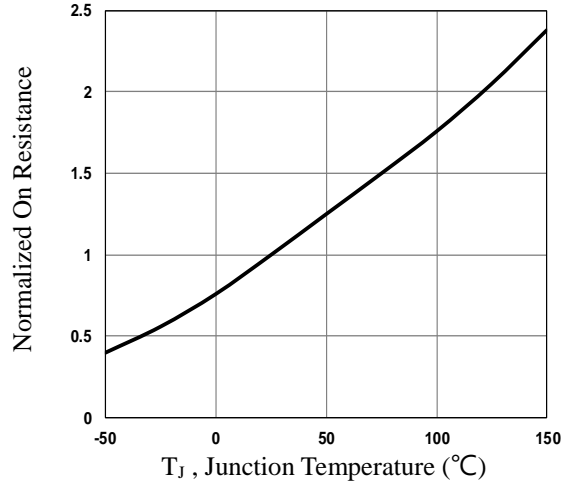
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V, \text{Force Current}$	---	---	85	A
$I_{SM}$	Pulsed Source Current <sup>3</sup>		---	---	170	A
$V_{SD}$	Diode Forward Voltage <sup>3</sup>	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1	V
$t_{rr}$	Reverse Recovery Time	$V_R=30V, I_S=10A$	---	50	---	ns
$Q_{rr}$	Reverse Recovery Charge	$di/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	40	---	nC

Note :

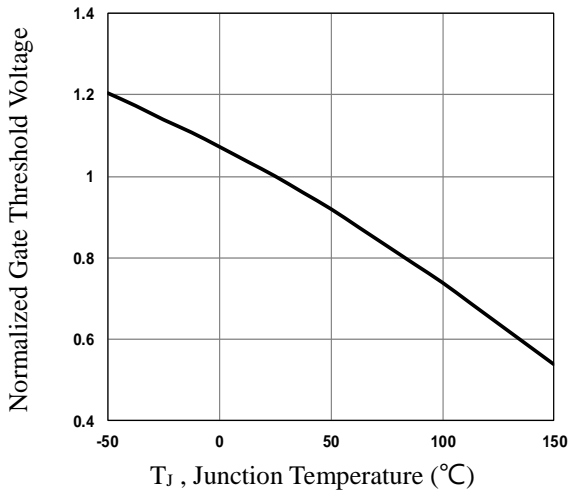
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=64A, R_G=25\Omega, \text{Starting } T_J=25^\circ\text{C}$ .
3. The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.



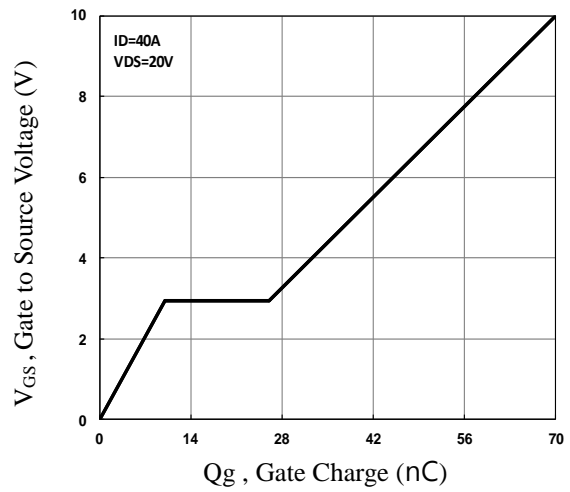
**Fig.1 Continuous Drain Current vs.  $T_c$**



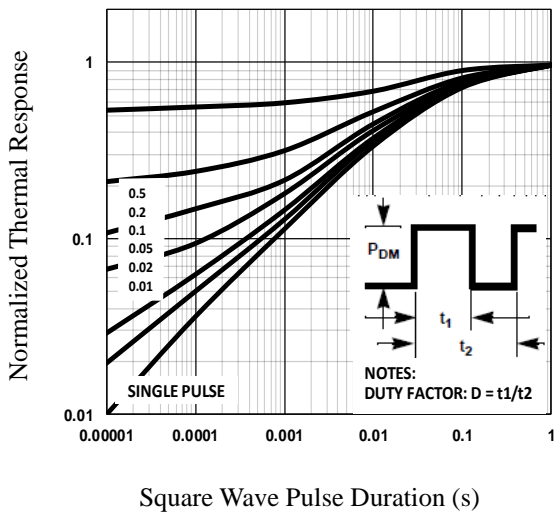
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$**



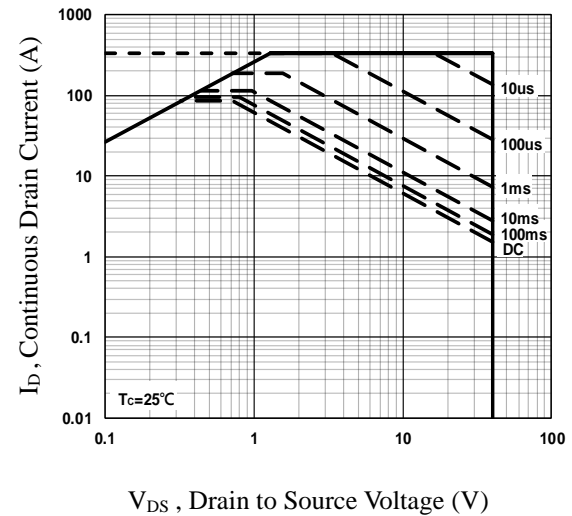
**Fig.3 Normalized  $V_{th}$  vs.  $T_j$**



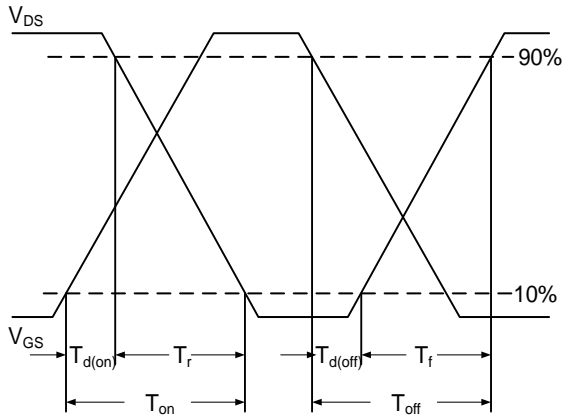
**Fig.4 Gate Charge Waveform**



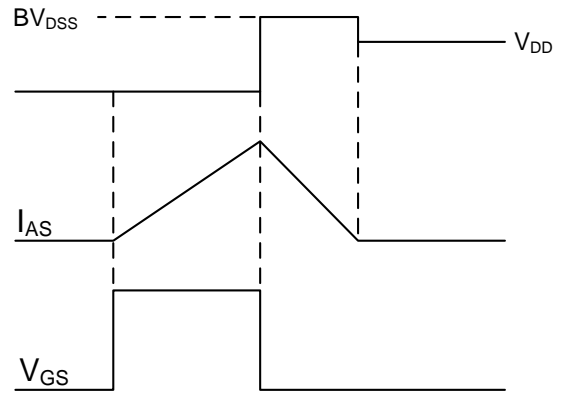
**Fig.5 Normalized Transient Impedance**



**Fig.6 Maximum Safe Operation Area**

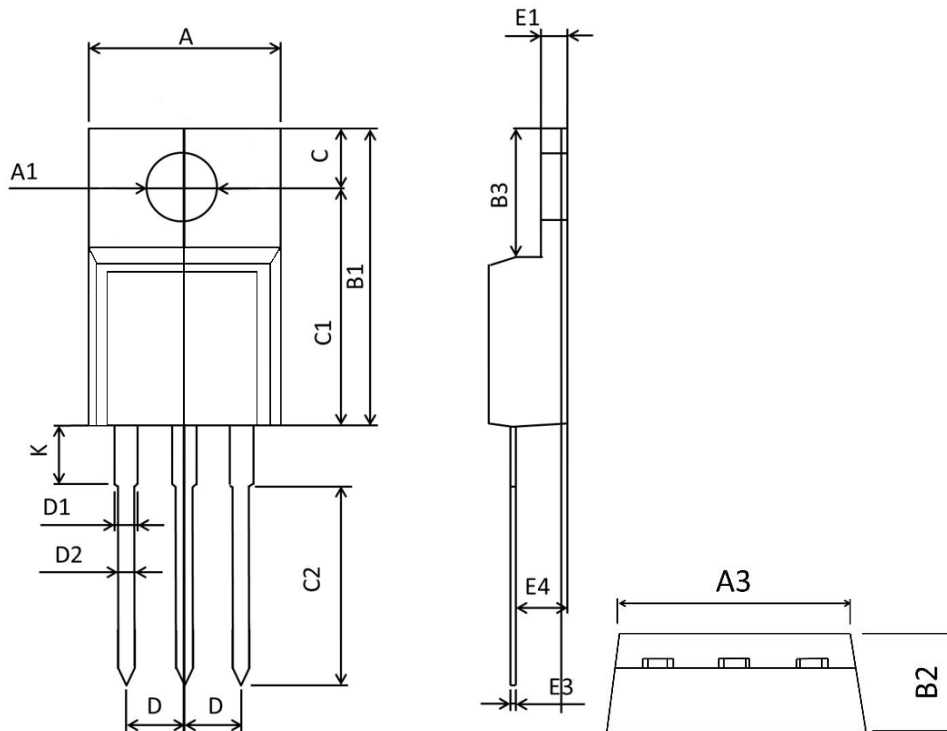


**Fig.7 Switching Time Waveform**



**Fig.8 EAS 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