

### General Description

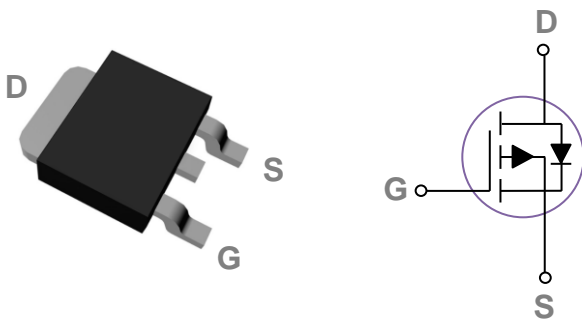
These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	R <sub>DS(ON)</sub>	I <sub>D</sub>
-60V	28mΩ	-35A

### Features

- -60V, -35A, R<sub>DS(ON)</sub> = 28mΩ @ V<sub>GS</sub> = -10V
- Fast switching
- Green Device Available
- Suit for -4.5V Gate Drive Applications

### TO252 Pin Configuration



### Applications

- POL Applications
- Load Switch
- LED Application

### Absolute Maximum Ratings T<sub>c</sub>=25°C unless otherwise noted

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	-60	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub>	Drain Current – Continuous (T <sub>c</sub> =25°C)	-35	A
	Drain Current – Continuous (T <sub>c</sub> =100°C)	-22.1	A
I <sub>DM</sub>	Drain Current – Pulsed <sup>1</sup>	-140	A
EAS	Single Pulse Avalanche Energy <sup>2</sup>	105	mJ
IAS	Single Pulse Avalanche Current <sup>2</sup>	-46	A
P <sub>D</sub>	Power Dissipation (T <sub>c</sub> =25°C)	72.6	W
	Power Dissipation – Derate above 25°C	0.58	W/°C
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJC</sub>	Thermal Resistance Junction to Case	---	1.72	°C/W
R <sub>θJA</sub>	Thermal Resistance Junction to Ambient	---	62	°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	$V_{GS}=0V, I_D=-250\mu A$	-60	---	---	V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=-60V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	$\mu A$
		$V_{DS}=-48V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	-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	$V_{GS}=-10V, I_D=-8A$	---	22	28	$m\Omega$
		$V_{GS}=-4.5V, I_D=-6A$	---	26	35	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.0	-1.6	-2.5	V
gfs	Forward Transconductance	$V_{DS}=-10V, I_D=-3A$	---	18	---	S

**Dynamic and switching Characteristics**

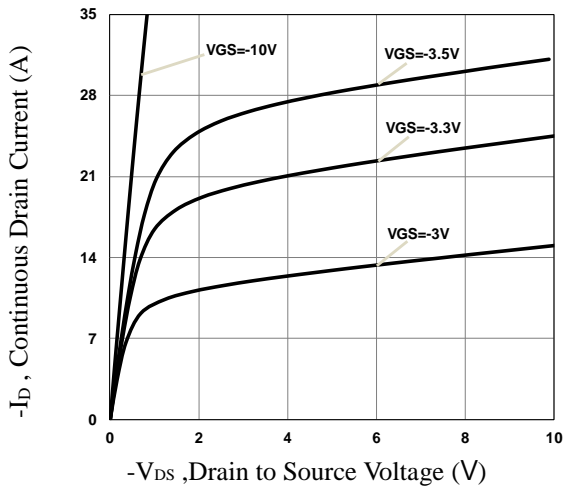
$Q_g$	Total Gate Charge <sup>3, 4</sup>	$V_{DS}=-30V, V_{GS}=-10V, I_D=-5A$	---	43.8	88	nC
			---	20	40	
$Q_{gs}$	Gate-Source Charge <sup>3, 4</sup>	$V_{DS}=-30V, V_{GS}=-4.5V, I_D=-5A$	---	4.6	9	
$Q_{gd}$	Gate-Drain Charge <sup>3, 4</sup>		---	8.3	17	
$T_{d(on)}$	Turn-On Delay Time <sup>3, 4</sup>	$V_{DD}=-30V, V_{GS}=-10V, R_G=6\Omega$ $I_D=-1A$	---	25	50	ns
$T_r$	Rise Time <sup>3, 4</sup>		---	13.8	28	
$T_{d(off)}$	Turn-Off Delay Time <sup>3, 4</sup>		---	148	290	
$T_f$	Fall Time <sup>3, 4</sup>		---	51	100	
$C_{iss}$	Input Capacitance	$V_{DS}=-25V, V_{GS}=0V, F=1\text{MHz}$	---	2595	3900	pF
$C_{oss}$	Output Capacitance		---	162	240	
$C_{rss}$	Reverse Transfer Capacitance		---	115	170	

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

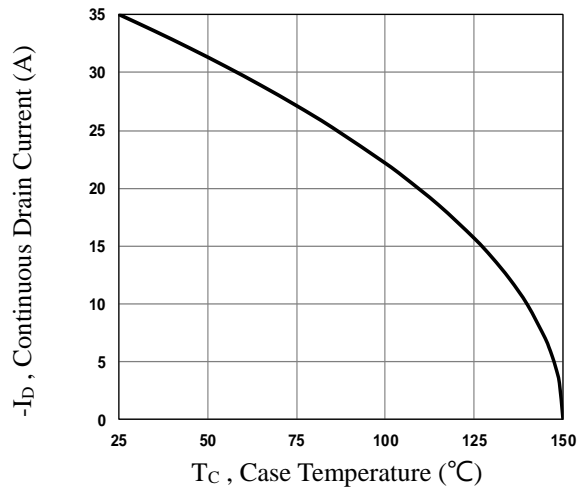
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V$ , Force Current	---	---	-35	A
$I_{SM}$	Pulsed Source Current		---	---	-70	A
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1	V

Note :

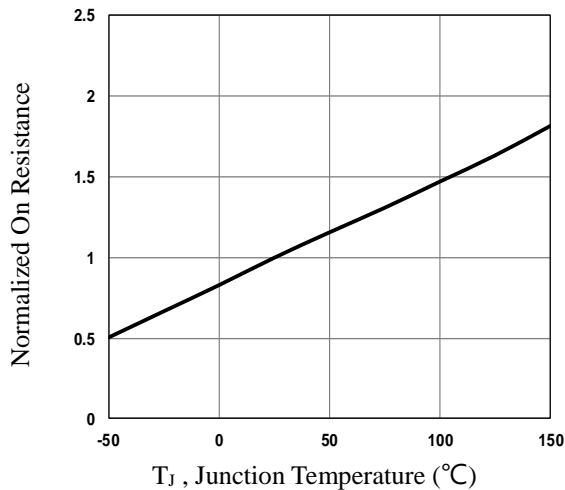
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=-25V, V_{GS}=-10V, L=0.1\text{mH}, I_{AS}=-46A$ ., Starting  $T_J=25^\circ\text{C}$
3. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.



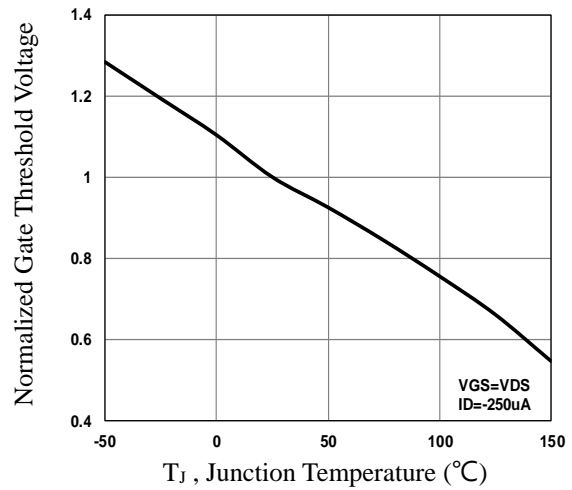
**Fig.1 Typical Output Characteristics**



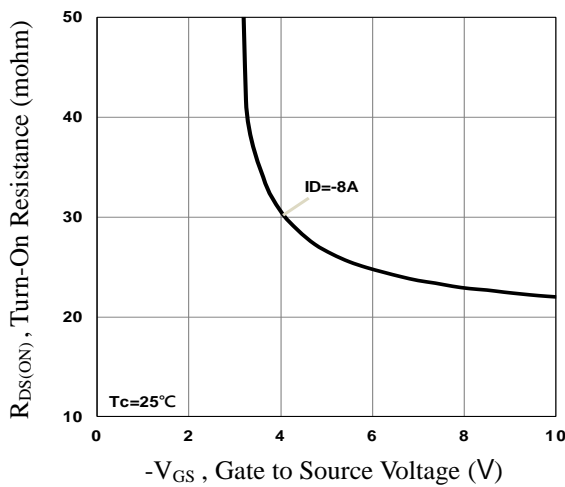
**Fig.2 Continuous Drain Current vs. T<sub>c</sub>**



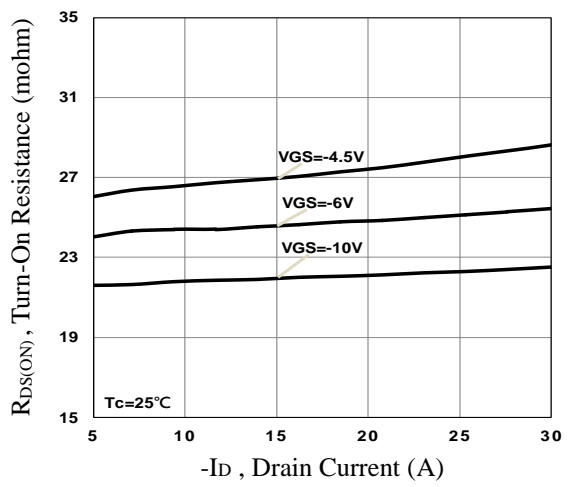
**Fig.3 Normalized R<sub>DS(on)</sub> vs. T<sub>j</sub>**



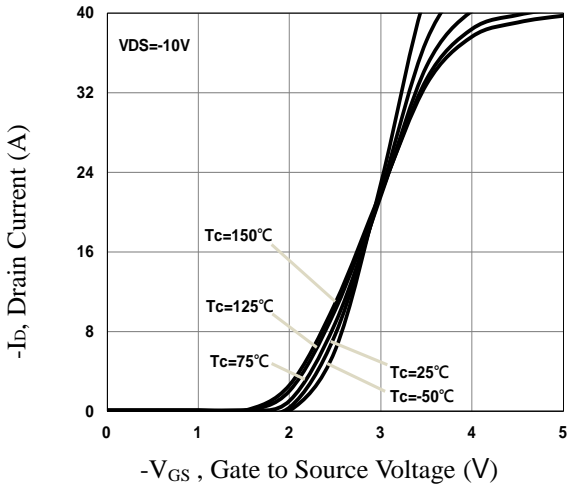
**Fig.4 Normalized V<sub>th</sub> vs. T<sub>j</sub>**



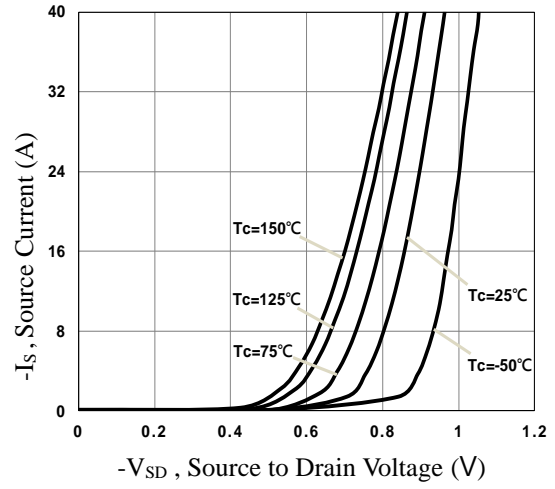
**Fig.5 Turn-On Resistance vs. V<sub>GS</sub>**



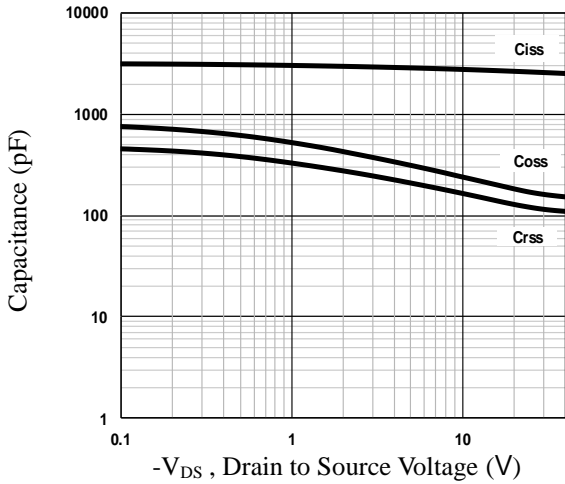
**Fig.6 Turn-On Resistance vs. I<sub>D</sub>**



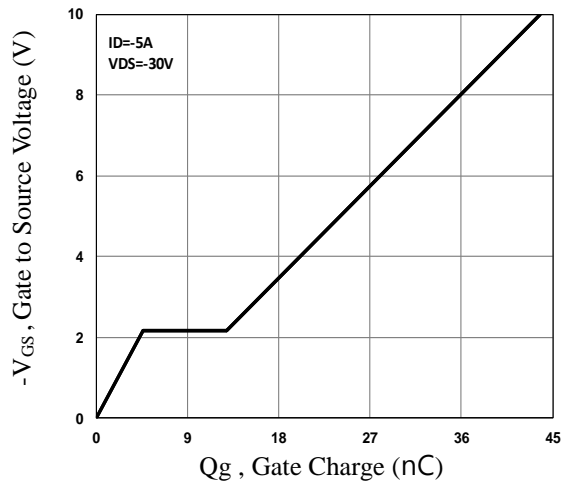
**Fig.7 Transfer Characteristics**



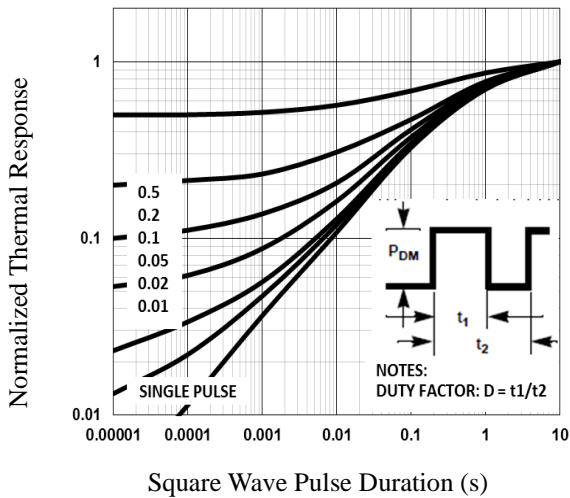
**Fig.8 Source Current vs.  $V_{SD}$**



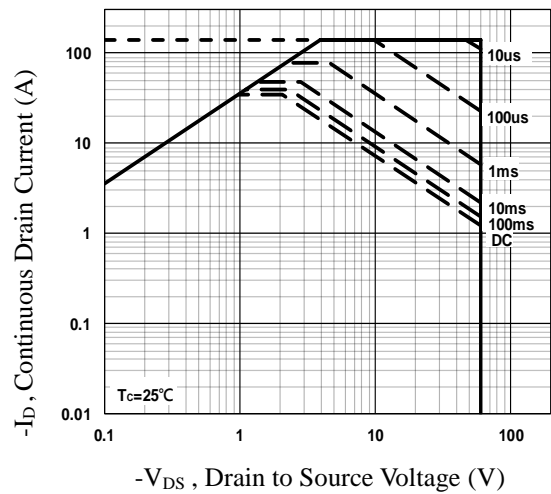
**Fig.9 Capacitance Characteristics**



**Fig.10 Gate Charge Characteristics**

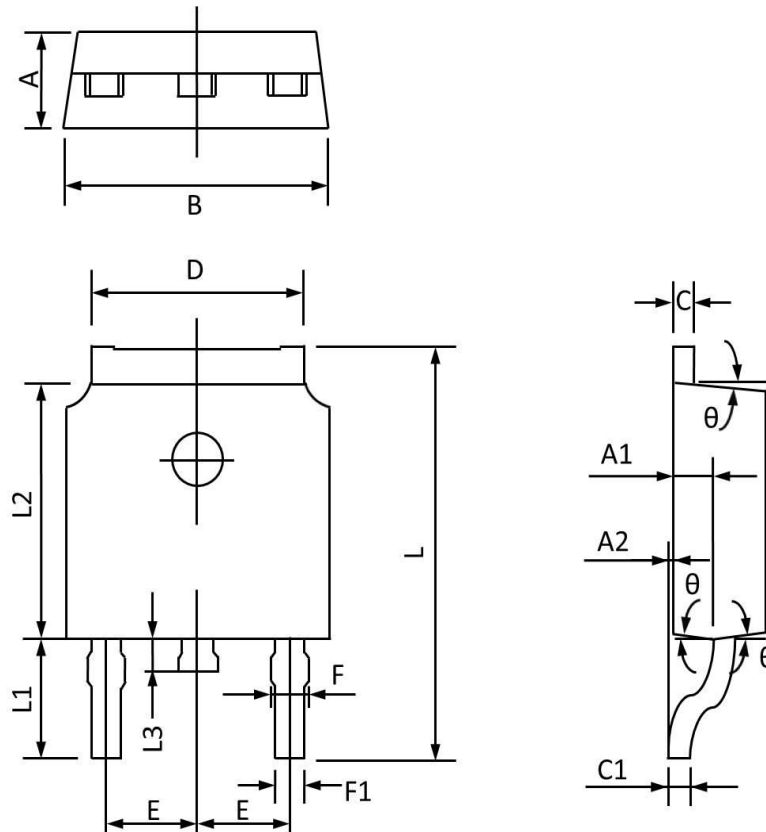


**Fig.11 Normalized Transient Impedance**



**Fig.12 Maximum Safe Operation Area**

## TO252 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	2.450	2.150	0.096	0.085
A1	1.200	0.910	0.047	0.036
A2	0.150	0.000	0.006	0.000
B	6.800	6.300	0.268	0.248
C	0.580	0.350	0.023	0.014
C1	0.550	0.380	0.022	0.015
D	5.500	5.100	0.217	0.201
E	2.390	2.000	0.094	0.079
F	0.940	0.600	0.037	0.024
F1	0.860	0.500	0.034	0.020
L	10.400	9.400	0.409	0.370
L1	3.000	2.400	0.118	0.094
L2	6.200	5.300	0.244	0.209
L3	1.200	0.600	0.047	0.024
$\theta$	9°	3°	9°	3°