

### General Description

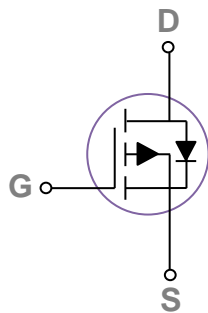
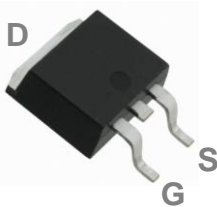
These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	R <sub>DS(ON)</sub>	ID
-60V	48mΩ	-16A

### Features

- -60V, -16A, R<sub>DS(ON)</sub> = 48mΩ@V<sub>GS</sub> = -10V
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

### TO252 Pin Configuration



### Applications

- Motor Drive
- Power Tools
- LED Lighting

### 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)	-16	A
	Drain Current – Continuous (T <sub>c</sub> =100°C)	-10	A
I <sub>DM</sub>	Drain Current – Pulsed <sup>1</sup>	-64	A
EAS	Single Pulse Avalanche Energy <sup>2</sup>	51	mJ
IAS	Single Pulse Avalanche Current <sup>2</sup>	-32	A
P <sub>D</sub>	Power Dissipation (T <sub>c</sub> =25°C)	25	W
	Power Dissipation – Derate above 25°C	0.2	W/°C
T <sub>STG</sub>	Storage Temperature Range	-50 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-50 to 150	°C

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction to ambient	---	62	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction to Case	---	5	°C/W

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**
**Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-60	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =-1mA	---	-0.05	---	V/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-60V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	-1	uA
		V <sub>DS</sub> =-48V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C	---	---	-10	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA

**On Characteristics**

R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-8A	---	39	48	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4A	---	53	65	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-1.2	-1.6	-2.2	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	5	---	mV/°C
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-10V, I <sub>D</sub> =-8A	---	10	---	S

**Dynamic and switching Characteristics**

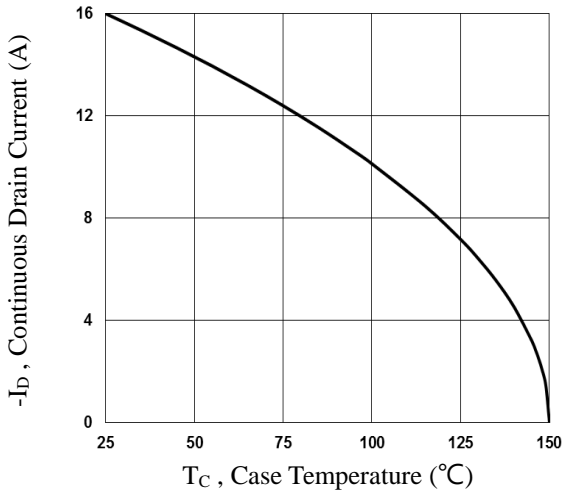
Q <sub>g</sub>	Total Gate Charge <sup>3, 4</sup>	V <sub>DS</sub> =-30V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-8A	---	22.4	31	nC
Q <sub>gs</sub>	Gate-Source Charge <sup>3, 4</sup>		---	4.1	6	
Q <sub>gd</sub>	Gate-Drain Charge <sup>3, 4</sup>		---	5.2	7	
T <sub>d(on)</sub>	Turn-On Delay Time <sup>3, 4</sup>	V <sub>DD</sub> =-30V, V <sub>GS</sub> =-10V, R <sub>G</sub> =6Ω I <sub>D</sub> =-1A	---	13	25	ns
T <sub>r</sub>	Rise Time <sup>3, 4</sup>		---	42.4	81	
T <sub>d(off)</sub>	Turn-Off Delay Time <sup>3, 4</sup>		---	64.6	123	
T <sub>f</sub>	Fall Time <sup>3, 4</sup>		---	16.4	31	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V, F=1MHz	---	1250	1810	pF
C <sub>oss</sub>	Output Capacitance		---	85	125	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	65	95	
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	---	15	30	Ω

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

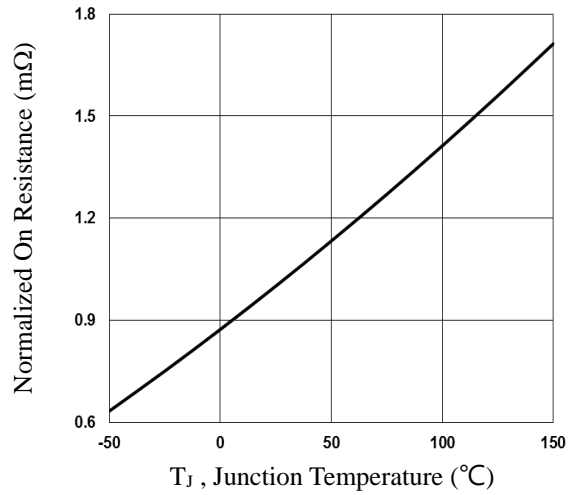
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-16	A
I <sub>SM</sub>	Pulsed Source Current		---	---	-64	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25°C	---	---	-1	V
t <sub>rr</sub>	Reverse Recovery Time <sup>3</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, di/dt=100A/μs	---	---	---	ns
Q <sub>rr</sub>	Reverse Recovery Charge <sup>3</sup>	T <sub>J</sub> =25°C	---	---	---	nC

Note :

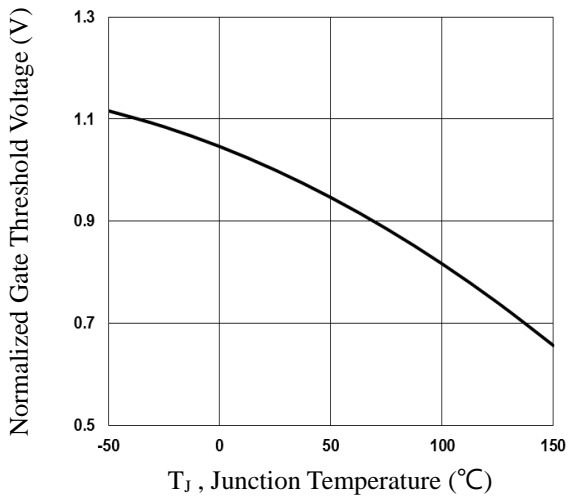
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub>=-25V, V<sub>GS</sub>=-10V, L=0.1mH, I<sub>AS</sub>=-32A., R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C
3. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
4. Essentially independent of operating temperature.



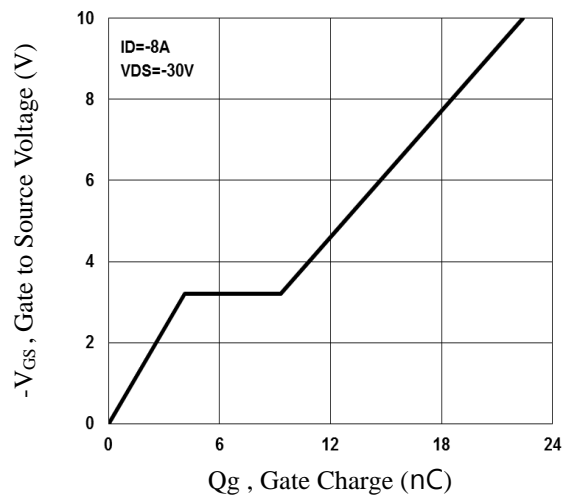
**Fig.1 Continuous Drain Current vs. T<sub>c</sub>**



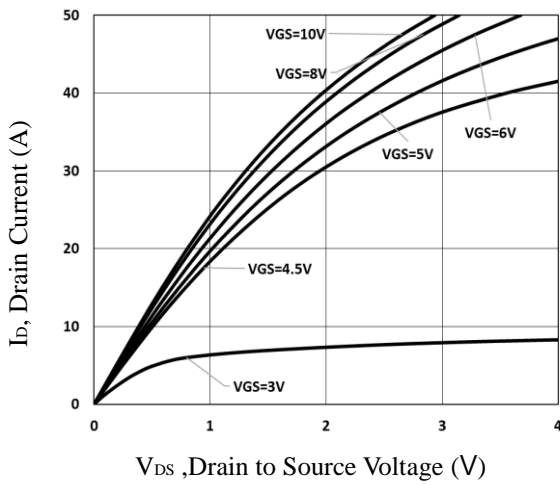
**Fig.2 Normalized R<sub>DS(on)</sub> vs. T<sub>j</sub>**



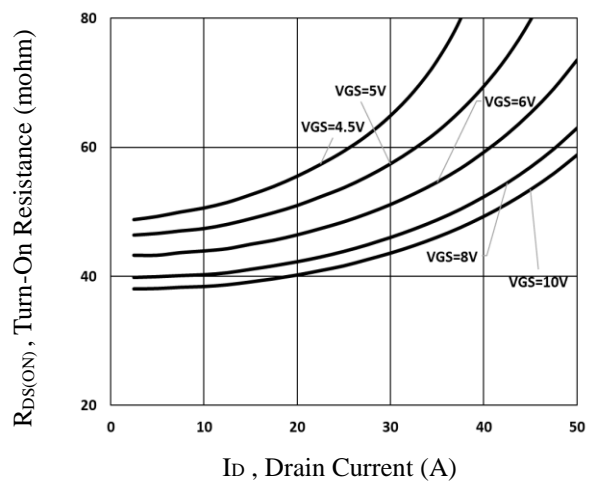
**Fig.3 Normalized V<sub>th</sub> vs. T<sub>j</sub>**



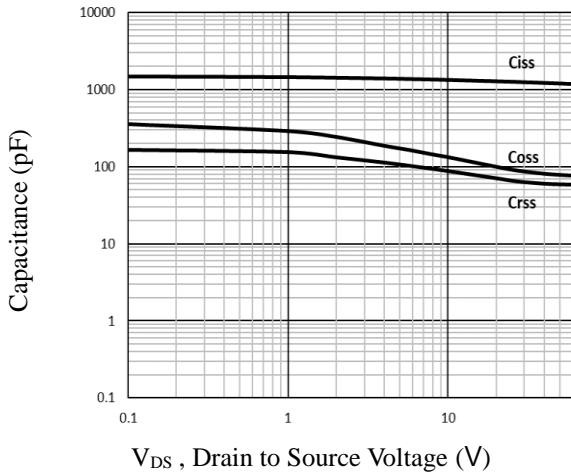
**Fig.4 Gate Charge Waveform**



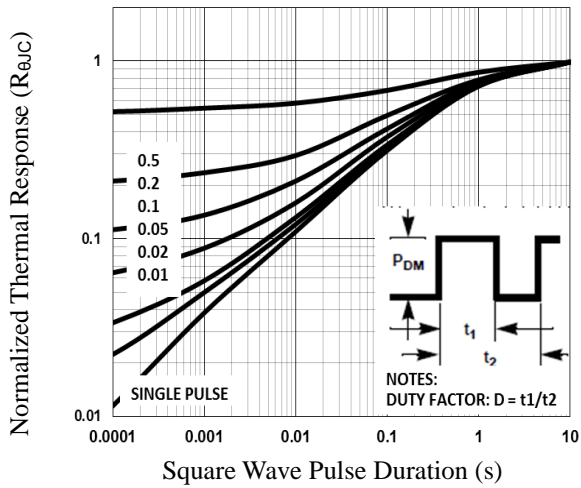
**Fig.5 Typical Output Characteristics**



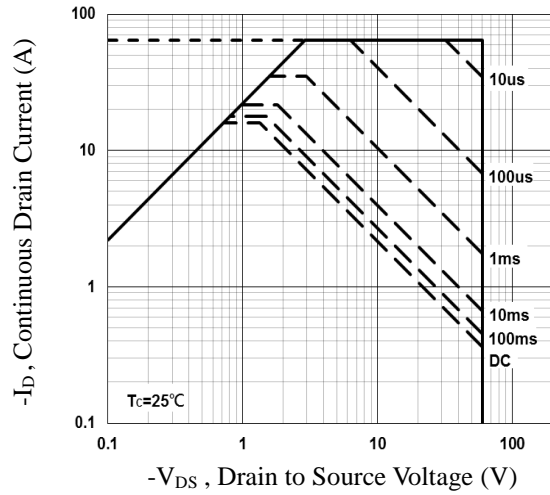
**Fig.6 Turn-On Resistance vs. I<sub>D</sub>**



**Fig.7 Capacitance Characteristics**



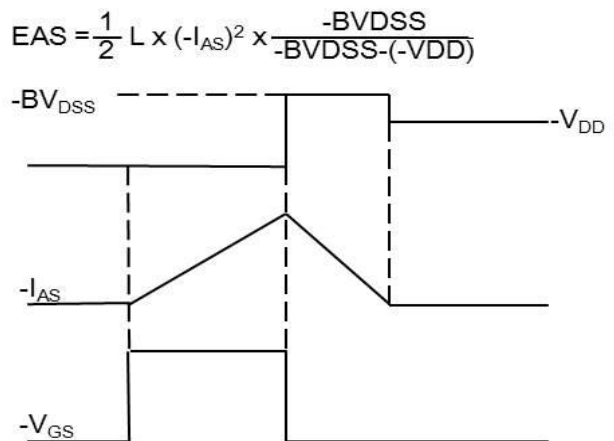
**Fig.8 Normalized Transient Impedance**



**Fig.9 Maximum Safe Operation Area**

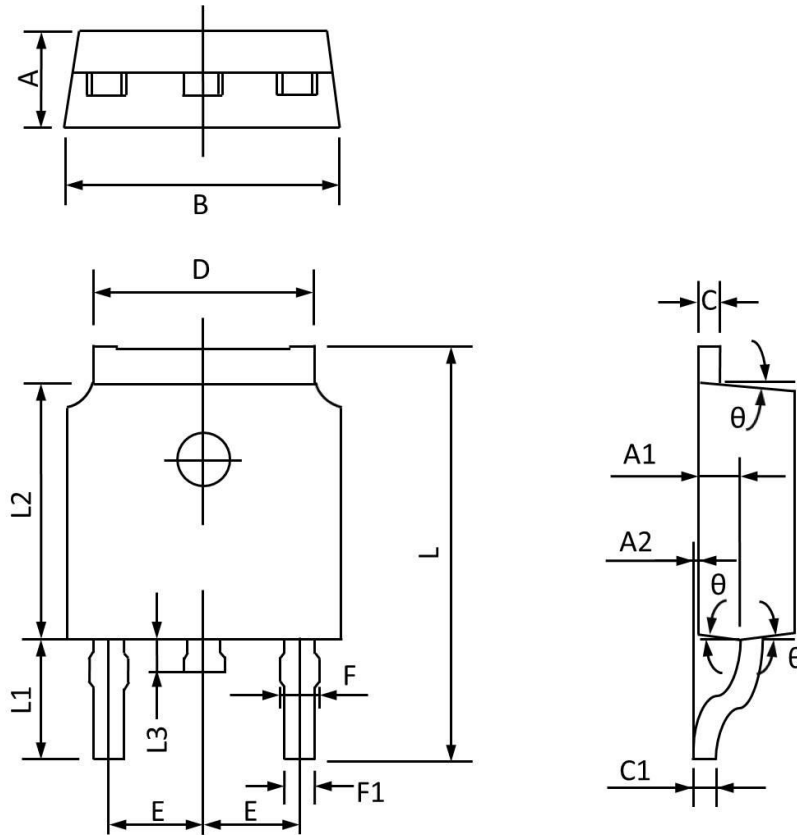


**Fig.10 Switching Time Waveform**



**Fig.11 EAS Waveform**

## TO252 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
<b>A</b>	<b>2.20</b>	<b>2.40</b>	<b>0.087</b>	<b>0.094</b>
<b>A1</b>	<b>0.91</b>	<b>1.11</b>	<b>0.036</b>	<b>0.044</b>
<b>A2</b>	<b>0.00</b>	<b>0.15</b>	<b>0.000</b>	<b>0.006</b>
<b>B</b>	<b>6.50</b>	<b>6.70</b>	<b>0.256</b>	<b>0.264</b>
<b>C</b>	<b>0.46</b>	<b>0.580</b>	<b>0.018</b>	<b>0.230</b>
<b>C1</b>	<b>0.46</b>	<b>0.580</b>	<b>0.018</b>	<b>0.030</b>
<b>D</b>	<b>5.10</b>	<b>5.46</b>	<b>0.201</b>	<b>0.215</b>
<b>E</b>	<b>2.186</b>	<b>2.386</b>	<b>0.086</b>	<b>0.094</b>
<b>F</b>	<b>0.74</b>	<b>0.94</b>	<b>0.029</b>	<b>0.037</b>
<b>F1</b>	<b>0.660</b>	<b>0.860</b>	<b>0.026</b>	<b>0.034</b>
<b>L</b>	<b>9.80</b>	<b>10.40</b>	<b>0.386</b>	<b>0.409</b>
<b>L1</b>	<b>2.9REF</b>		<b>0.114REF</b>	
<b>L2</b>	<b>6.00</b>	<b>6.20</b>	<b>0.236</b>	<b>0.244</b>
<b>L3</b>	<b>0.60</b>	<b>1.00</b>	<b>0.024</b>	<b>0.039</b>
$\theta$	<b>3°</b>	<b>9°</b>	<b>3°</b>	<b>9°</b>

## RECOMMEND FOOTPRINT INFORMATION

