

### General Description

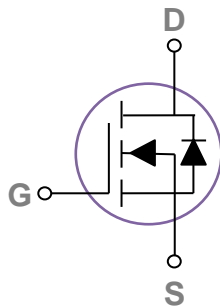
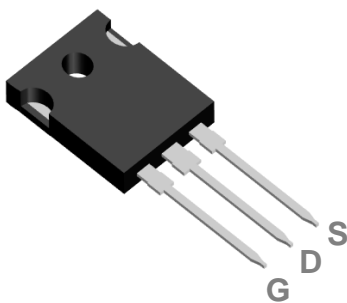
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	R <sub>DS(ON)</sub>	I <sub>D</sub>
60V	3.2mΩ	175A

### Features

- 60V, 175A, R<sub>DS(ON)</sub> = 3.2mΩ @ V<sub>GS</sub> = 10V
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

### TO247 Pin Configuration



### Applications

- Networking
- Load Switch
- LED applications
- Quick Charger

### 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/-12	V
I <sub>D</sub>	Drain Current – Continuous (T <sub>C</sub> =25°C)	175	A
	Drain Current – Continuous (T <sub>C</sub> =100°C)	110	A
I <sub>DM</sub>	Drain Current – Pulsed <sup>1</sup>	700	A
EAS	Single Pulse Avalanche Energy <sup>2</sup>	245	mJ
IAS	Single Pulse Avalanche Current <sup>2</sup>	70	A
P <sub>D</sub>	Power Dissipation (T <sub>C</sub> =25°C)	192	W
	Power Dissipation – Derate above 25°C	1.54	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>θJA</sub>	Thermal Resistance Junction to ambient	---	62	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction to Case	---	0.65	°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> =85°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> =20A	---	2.6	3.2	mΩ
		V <sub>GS</sub> =6V, I <sub>D</sub> =10A	---	3.4	4.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	---	4.8	7.0	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	2.5	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> =5A	---	15	---	S

**Dynamic and switching Characteristics**

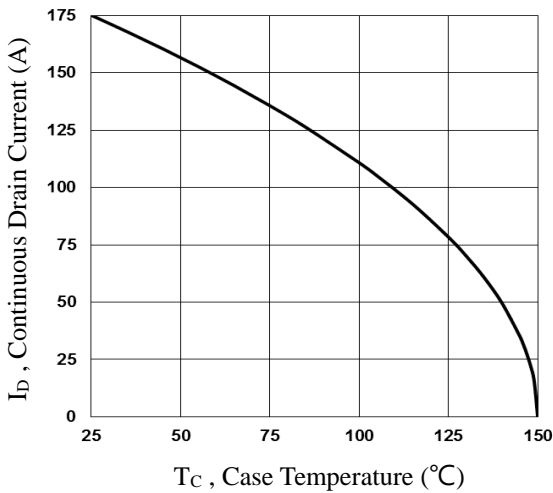
Q <sub>g</sub>	Total Gate Charge <sup>3, 4</sup>	V <sub>DS</sub> =48V, V <sub>GS</sub> =10V, I <sub>D</sub> =10A	---	59	120	nC
Q <sub>gs</sub>	Gate-Source Charge <sup>3, 4</sup>		---	10.4	20	
Q <sub>gd</sub>	Gate-Drain Charge <sup>3, 4</sup>		---	19.6	38	
T <sub>d(on)</sub>	Turn-On Delay Time <sup>3, 4</sup>	V <sub>DD</sub> =30V, V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω I <sub>D</sub> =1A	---	22	44	ns
T <sub>r</sub>	Rise Time <sup>3, 4</sup>		---	14	28	
T <sub>d(off)</sub>	Turn-Off Delay Time <sup>3, 4</sup>		---	40	80	
T <sub>f</sub>	Fall Time <sup>3, 4</sup>		---	20	40	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, F=1MHz	---	3620	7200	pF
C <sub>oss</sub>	Output Capacitance		---	2395	4800	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	177	350	
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	---	1.8	3.6	Ω

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

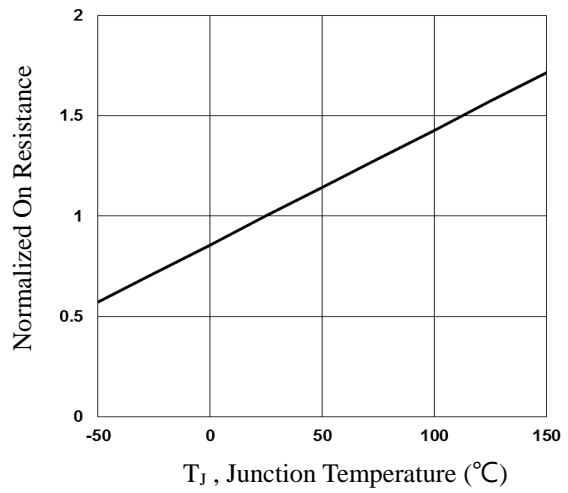
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	175	A
I <sub>SM</sub>	Pulsed Source Current		---	---	350	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1	V

Note :

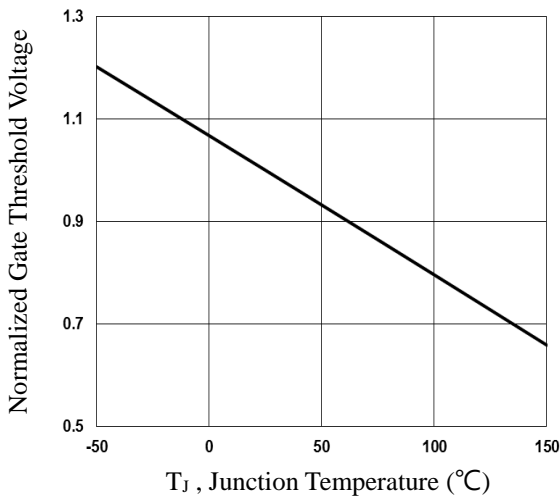
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=70A., R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C.
3. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
4. Essentially independent of operating temperature.



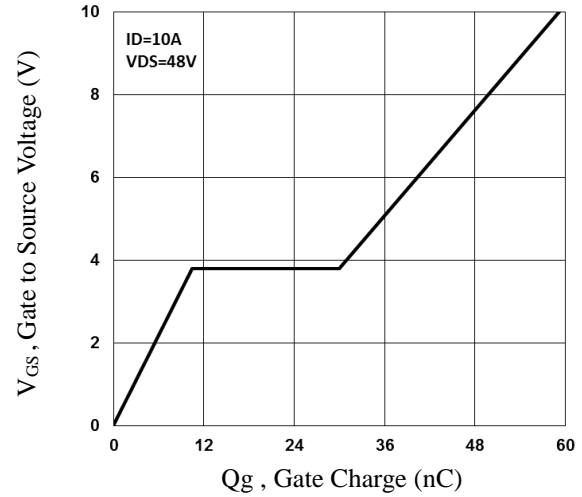
**Fig.1 Continuous Drain Current vs.  $T_c$**



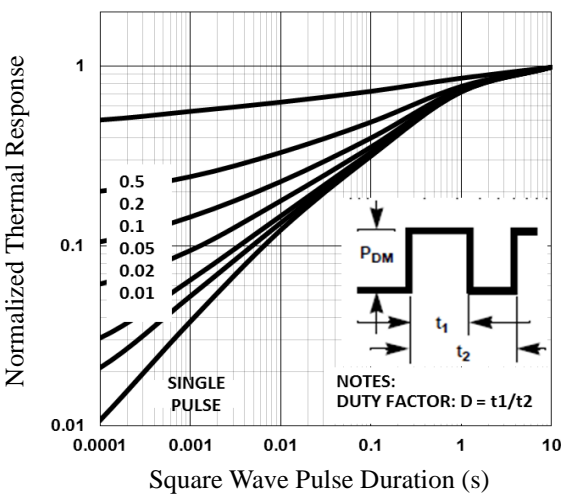
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$**



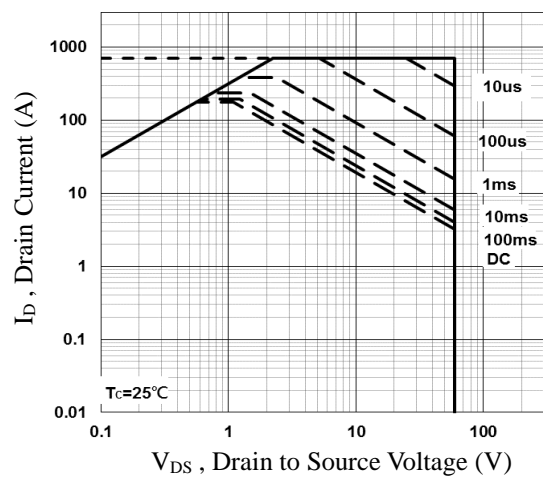
**Fig.3 Normalized  $V_{th}$  vs.  $T_j$**



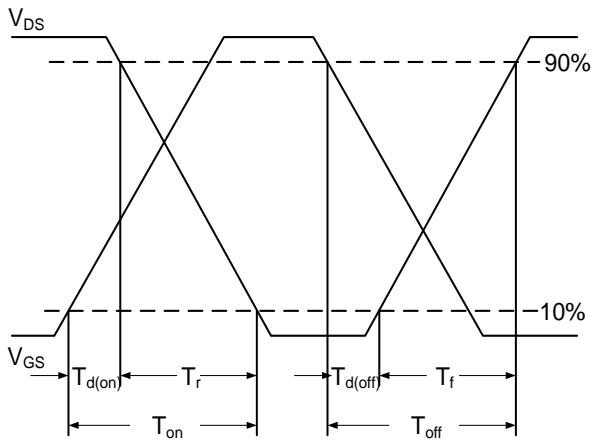
**Fig.4 Gate Charge Characteristics**



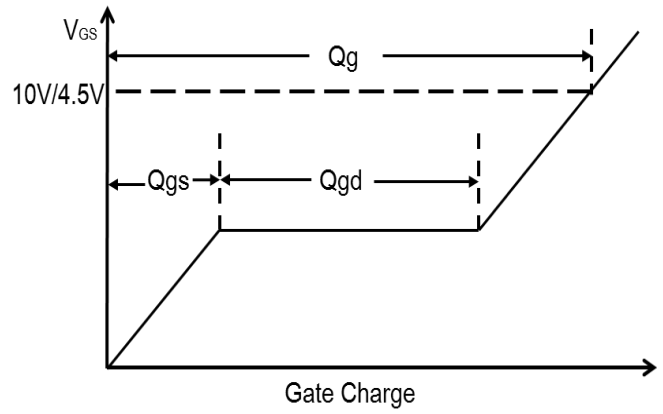
**Fig.5 Normalized Transient Impedance**



**Fig.6 Maximum Safe Operation Area**

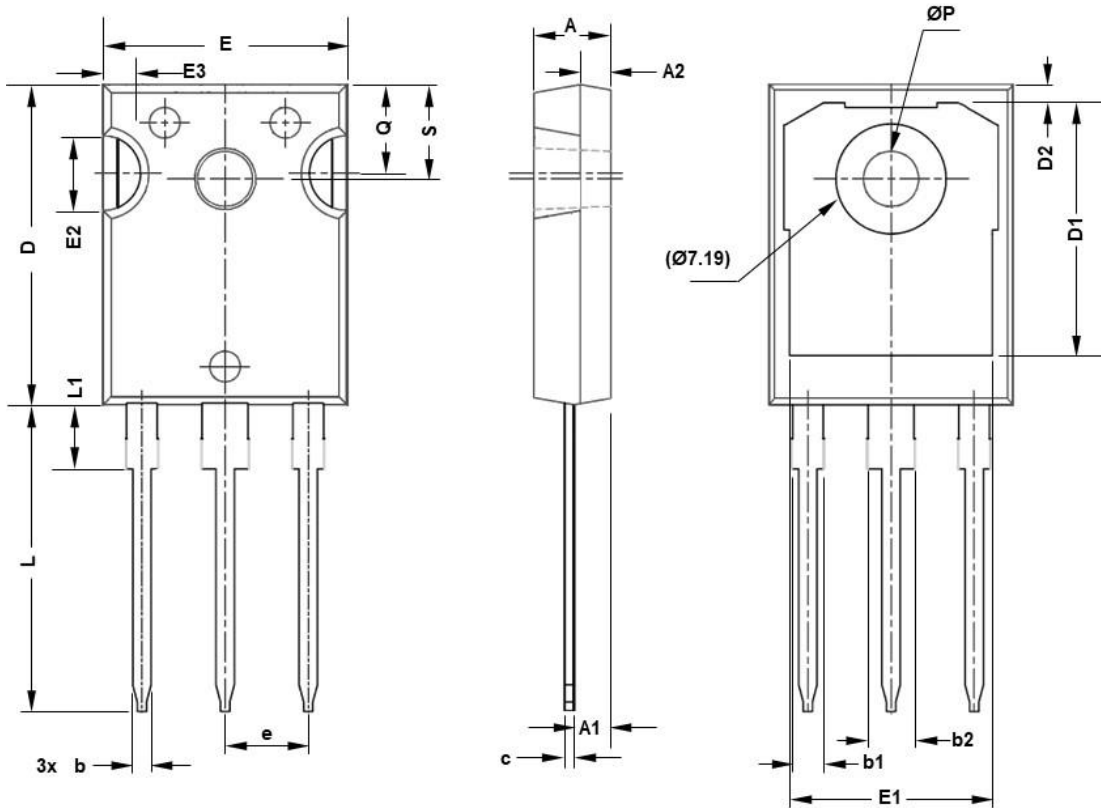


**Fig.7 Switching Time Waveform**



**Fig.8 Gate Charge Waveform**

## TO247 PACKAGE INFORMATION



SYMBOL	mm		SYMBOL	mm	
	MIN	MAX		MIN	MAX
A	4.83	5.21	E2	4.32	5.49
A1	2.29	2.55	E3	2.15	2.80
A2	1.50	2.49	e	5.44BSC	
b	1.12	1.33	L	19.81	20.32
b1	1.91	2.39	L1	4.10	4.40
b2	2.87	3.22	ΦP	3.56	3.65
C	0.55	0.69	Q	5.39	6.20
D	20.80	21.10	S	6.04	6.30
D1	16.25	17.65			
D2	0.51	1.35			
E	15.75	16.13			
E1	13.46	14.16			