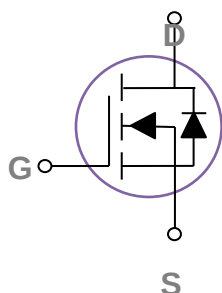


General Description

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.

TO247 Pin Configuration



BVDSS	RDS(ON)	ID
60V	3.2mΩ	175A

Features

- 60V,175A, $R_{DS(ON)} = 3.2m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

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	60	V
V_{GS}	Gate-Source Voltage	+20/-12	V
I_D	Drain Current – Continuous ($T_c=25^\circ\text{C}$)	175	A
	Drain Current – Continuous ($T_c=100^\circ\text{C}$)	110	A
I_{DM}	Drain Current – Pulsed ¹	700	A
EAS	Single Pulse Avalanche Energy ²	245	mJ
IAS	Single Pulse Avalanche Current ²	70	A
P_D	Power Dissipation ($T_c=25^\circ\text{C}$)	192	W
	Power Dissipation – Derate above 25°C	1.54	W/ $^\circ\text{C}$
T_{STG}	Storage Temperature Range	-50 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-50 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	---	0.65	$^\circ\text{C/W}$

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	$V_{GS}=0V$, $I_D=250\mu A$	60	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1mA$	---	0.05	---	$V/^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=60V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=48V$, $V_{GS}=0V$, $T_J=85^\circ\text{C}$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=20V$, $V_{DS}=0V$	---	---	100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V$, $I_D=20A$	---	2.6	3.2	$m\Omega$
		$V_{GS}=6V$, $I_D=10A$	---	3.4	4.5	$m\Omega$
		$V_{GS}=4.5V$, $I_D=10A$	'---	4.8	7.0	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	1.2	1.6	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5	---	$mV/^\circ\text{C}$
gfs	Forward Transconductance	$V_{DS}=10V$, $I_D=5A$	---	15	---	S

Dynamic and switching Characteristics

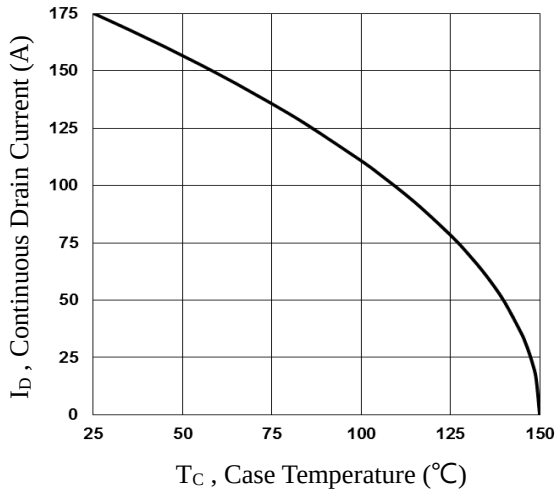
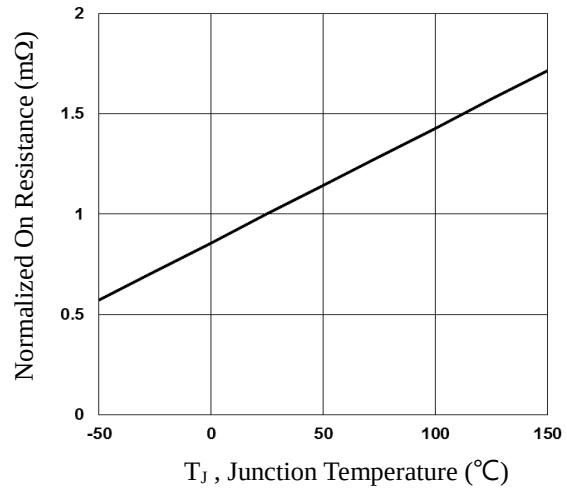
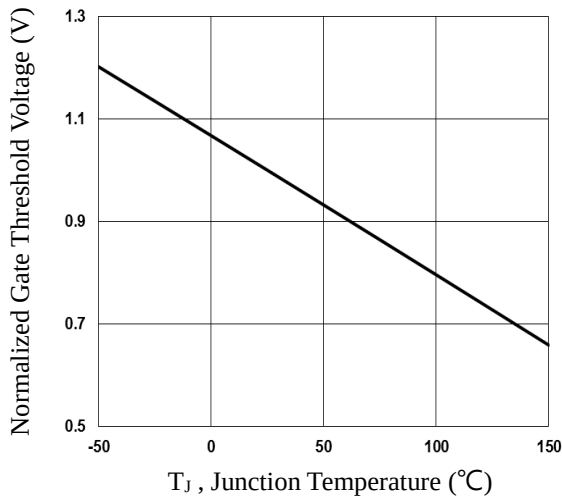
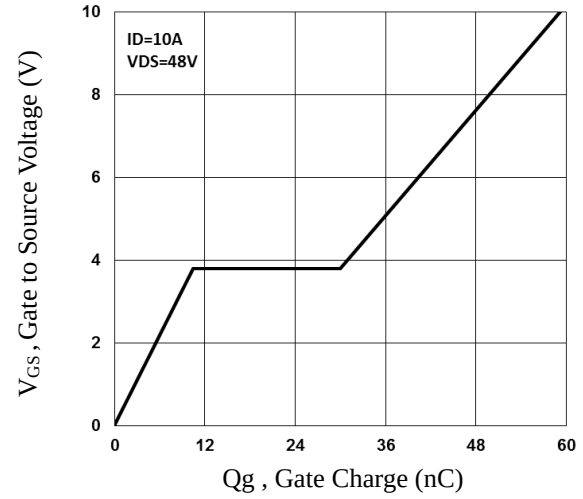
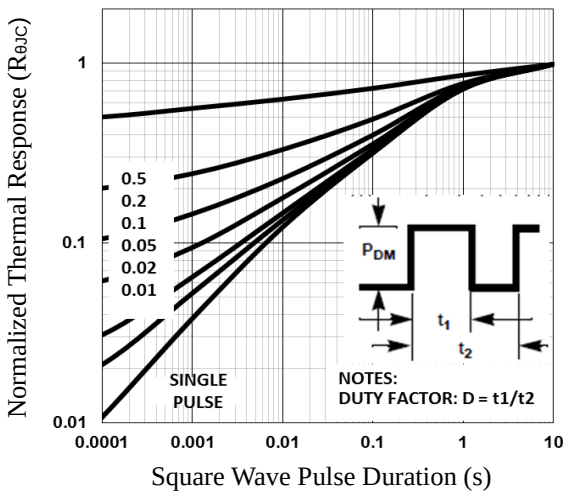
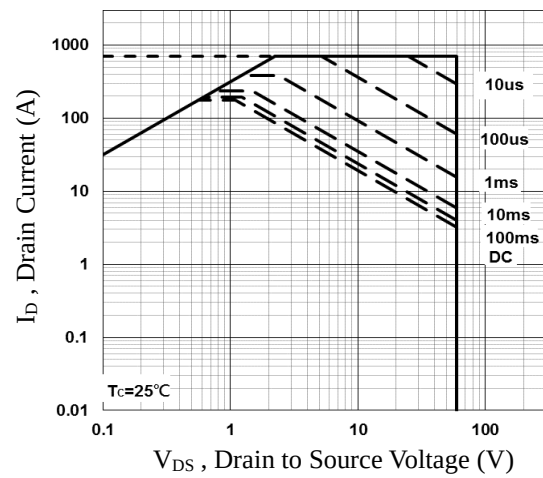
Q_g	Total Gate Charge ^{3, 4}	$V_{DS}=48V$, $V_{GS}=10V$, $I_D=10A$	---	59	120	nC
Q_{gs}	Gate-Source Charge ^{3, 4}		---	10.4	20	
Q_{gd}	Gate-Drain Charge ^{3, 4}		---	19.6	38	
$T_{d(on)}$	Turn-On Delay Time ^{3, 4}	$V_{DD}=30V$, $V_{GS}=10V$, $R_G=6\Omega$ $I_D=1A$	---	22	44	ns
T_r	Rise Time ^{3, 4}		---	14	28	
$T_{d(off)}$	Turn-Off Delay Time ^{3, 4}		---	40	80	
T_f	Fall Time ^{3, 4}		---	20	40	
C_{iss}	Input Capacitance	$V_{DS}=25V$, $V_{GS}=0V$, $F=1MHz$	---	3620	7200	pF
C_{oss}	Output Capacitance		---	2395	4800	
C_{rss}	Reverse Transfer Capacitance		---	177	350	
R_g	Gate resistance	$V_{GS}=0V$, $V_{DS}=0V$, $F=1MHz$	---	1.8	3.6	Ω

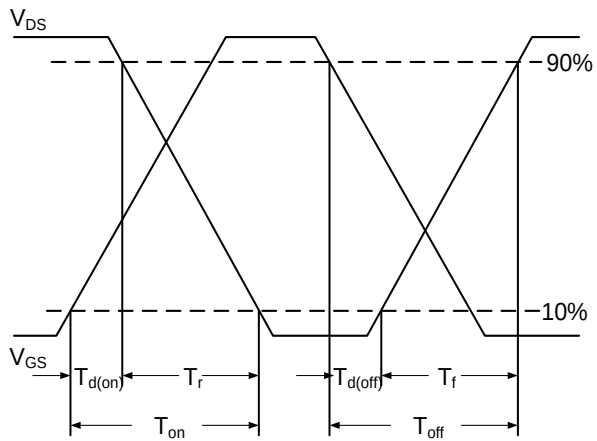
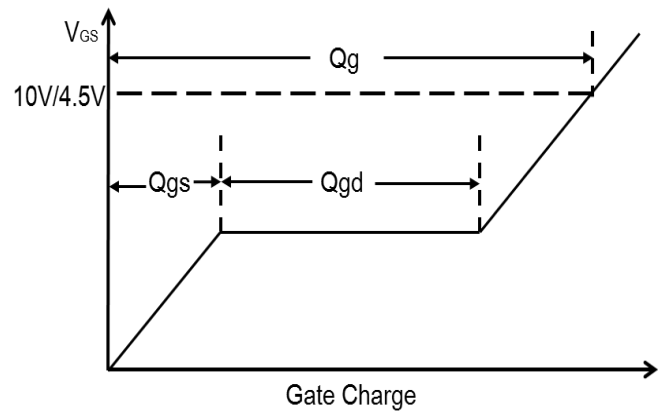
Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	175	A
I_{SM}	Pulsed Source Current		---	---	350	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V$, $I_S=1A$, $T_J=25^\circ\text{C}$	---	---	1	V

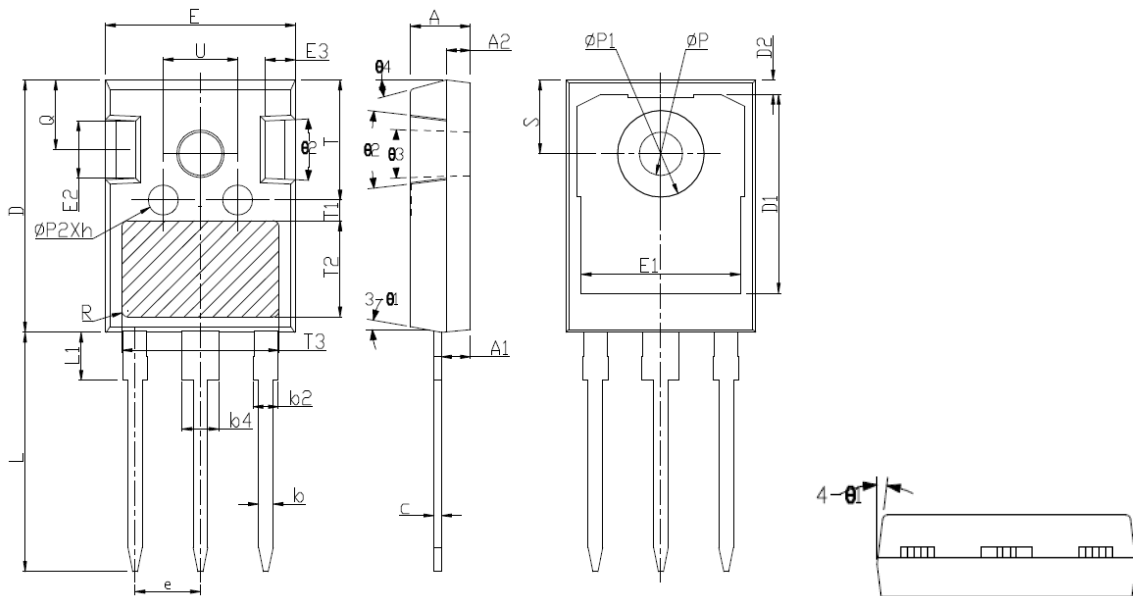
Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V$, $V_{GS}=10V$, $L=0.1mH$, $I_{AS}=70A$, $R_G=25\Omega$, 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 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	NOM	MAX		MIN	NOM	MAX
A	4.75	5.00	5.25	L	19.52	19.92	20.32
A1	2.16	2.41	2.66	L1	---	---	4.30
A2	1.85	2.00	2.15	ØP	3.35	3.60	3.85
b	1.11	1.20	1.35	ØP1	---	---	7.30
b2	1.90	2.01	2.25	ØP2	2.25	2.50	2.75
b4	2.90	3.10	3.25	Q	5.50	5.80	6.10
c	0.51	0.61	0.75	S	6.15BSC		
D	20.60	21.00	21.40	R	0.50REF		
D1	16.15	16.55	16.95	T	9.70	---	10.30
D2	1.00	1.20	1.40	T1	1.65REF		
E	15.50	15.80	16.10	T2	8.00REF		
E1	13.00	13.30	13.60	T3	12.80REF		
E2	4.70	5.00	5.30	U	5.9	---	6.5
E3	2.25	2.50	2.75	Ø1	4°	7°	10°
e	5.44BSC			Ø2	2°	5°	8°
h	0.00	0.10	0.25	Ø3	1°	---	2°
				Ø4	10°	15°	20°