PDD6909

60V P-Channel MOSFETs

| BVDSS	RDSON	ID
-60V	105mΩ	-10A

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.

Features

- *-60V,-10A, RDS(ON) =105mΩ@VGS = -10V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*

Applications

- *Motor Drive*
- *Power Tools*
- *LED Lighting*

TO252 Pin Configuration

Absolute Maximum Ratings Tc=25℃ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-60	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Drain Current – Continuous (T_C=25℃)	-10	A
	Drain Current – Continuous (T_C=100℃)	-6.3	A
I_{DM}	Drain Current – Pulsed[1]	-40	A
EAS	Single Pulse Avalanche Energy[2]	25	mJ
IAS	Single Pulse Avalanche Current[2]	-18	A
P_D	Power Dissipation (T_C=25℃)	32	W
	Power Dissipation – Derate above 25℃	0.25	W/℃
T_{STG}	Storage Temperature Range	-50 to 150	℃
T_J	Operating Junction Temperature Range	-50 to 150	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{θJA}$	Thermal Resistance Junction to ambient	---	62	℃/W
$R_{θJC}$	Thermal Resistance Junction to Case	---	3.84	℃/W

Electrical Characteristics (T$_J$=25 °C, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV$_{DSS}$	Drain-Source Breakdown Voltage	V$_{GS}$=0V , I$_D$=-250uA	-60	---	---	V
△BV$_{DSS}$/△T$_J$	BV$_{DSS}$ Temperature Coefficient	Reference to 25°C , I$_D$=-1mA	---	-0.05	---	V/°C
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=-60V , V$_{GS}$=0V , T$_J$=25°C	---	---	-1	uA
		V$_{DS}$=-48V , V$_{GS}$=0V , T$_J$=125°C	---	---	-10	uA
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$_D$=-6A	---	87	105	mΩ
		V$_{GS}$=-4.5V , I$_D$=-3A	---	120	145	mΩ
V$_{GS(th)}$	Gate Threshold Voltage	V$_{GS}$=V$_{DS}$, I$_D$=-250uA	-1.0	-1.6	-2.5	V
△V$_{GS(th)}$	V$_{GS(th)}$ Temperature Coefficient		---	3	---	mV/°C
gfs	Forward Transconductance	V$_{DS}$=-10V , I$_D$=-6A	---	5.5	---	S

Dynamic and switching Characteristics

Q$_g$	Total Gate Charge[3,4]	V$_{DS}$=-30V , V$_{GS}$=-10V , I$_D$=-4A	---	10	15	nC
Q$_{gs}$	Gate-Source Charge[3,4]		---	1.6	3.2	
Q$_{gd}$	Gate-Drain Charge[3,4]		---	3	6	
T$_{d(on)}$	Turn-On Delay Time[3,4]	V$_{DD}$=-30V , V$_{GS}$=-10V , R$_G$=6Ω I$_D$=-1A	---	8	16	ns
T$_r$	Rise Time[3,4]		---	15.4	30	
T$_{d(off)}$	Turn-Off Delay Time[3,4]		---	42.8	80	
T$_f$	Fall Time[3,4]		---	8.4	16	
C$_{iss}$	Input Capacitance	V$_{DS}$=-30V , V$_{GS}$=0V , F=1MHz	---	785	1300	pF
C$_{oss}$	Output Capacitance		---	175	300	
C$_{rss}$	Reverse Transfer Capacitance		---	112	220	
R$_g$	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, F=1MHz	---	36	---	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	---	---	-10	A
I$_{SM}$	Pulsed Source Current		---	---	-20	A
V$_{SD}$	Diode Forward Voltage	V$_{GS}$=0V , I$_S$=-1A , T$_J$=25°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$_{AS}$=-18A.,R$_G$=25Ω, Starting T$_J$=25°C.
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
4. Essentially independent of operating temperature.
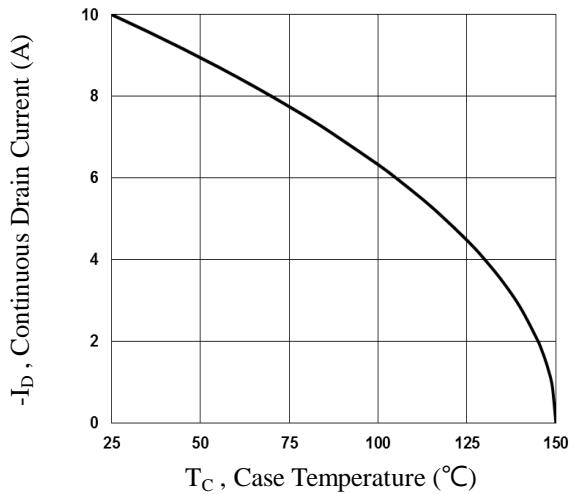
Fig.1   Continuous Drain Current vs. T_C
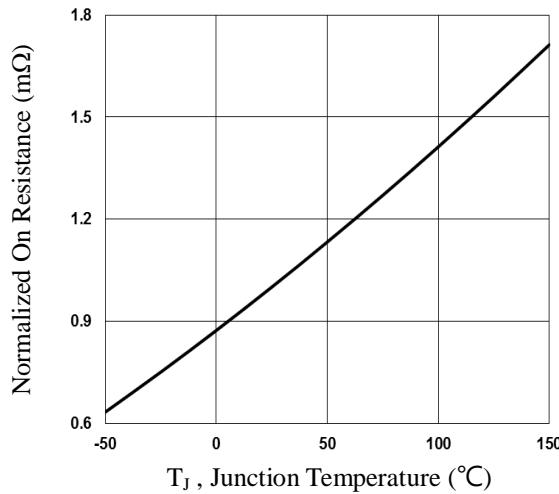
Fig.2   Normalized RDSON vs. T_J
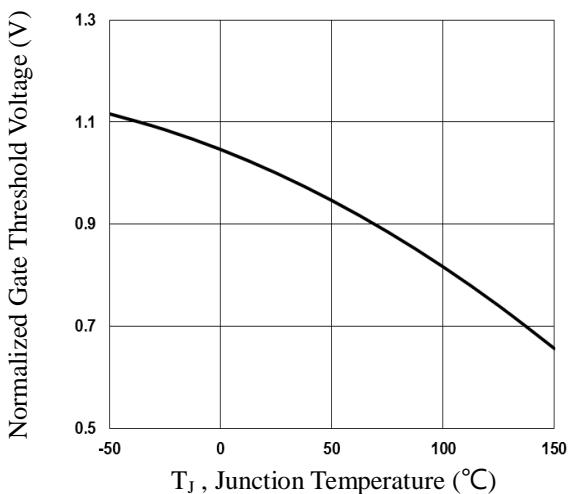

Fig.3   Normalized V_{th} vs. T_J
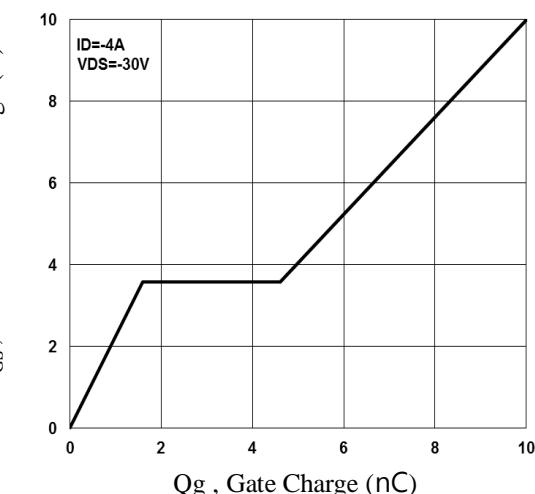
Fig.4   Gate Charge Waveform
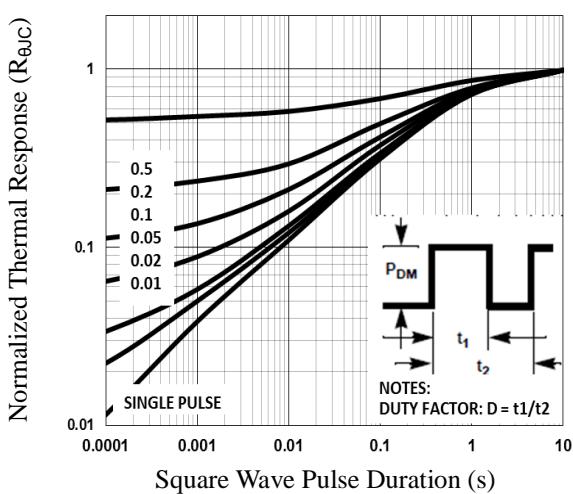
Fig.5   Normalized Transient Impedance
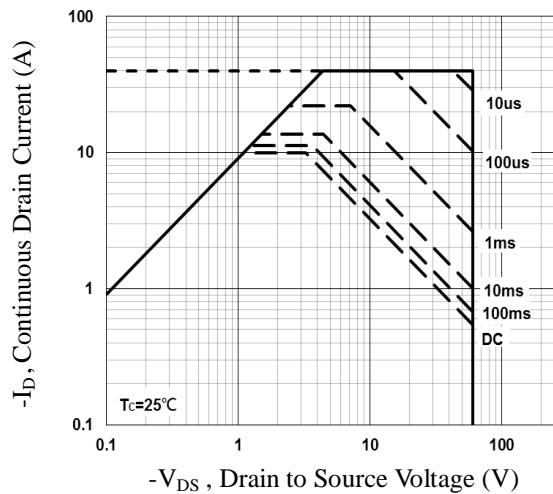
Fig.6   Maximum Safe Operation Area
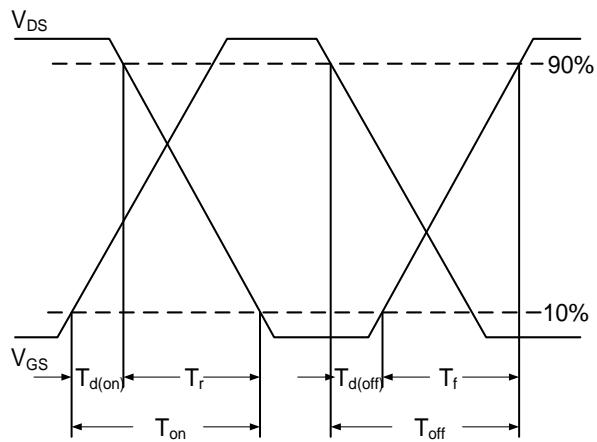
Fig.7   Switching Time Waveform

$$EAS = \frac{1}{2} L \times (-I_{AS})^2 \times \frac{-BVDSS}{-BVDSS-(-VDD)}$$
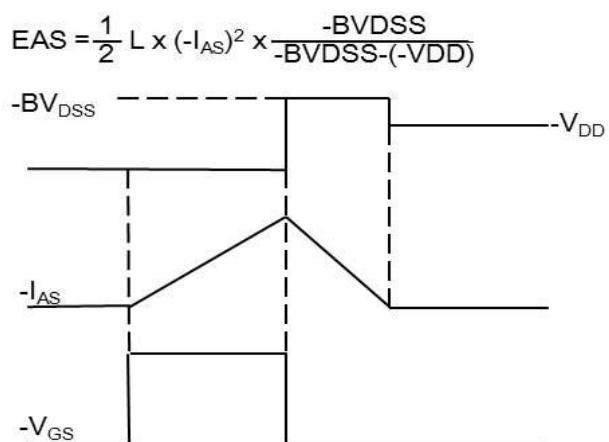
Fig.8   EAS Waveform

TO252 PACKAGE INFORMATION
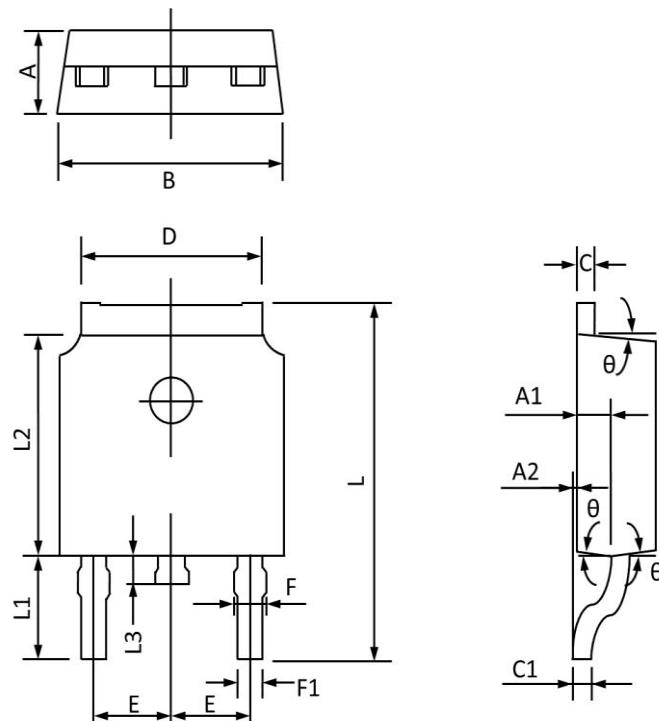
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	2.400	2.200	0.094	0.087
A1	1.110	0.910	0.044	0.036
A2	0.150	0.000	0.006	0.000
B	6.800	6.400	0.268	0.252
C	0.580	0.450	0.023	0.018
C1	0.580	0.460	0.023	0.018
D	5.500	5.100	0.217	0.201
E	2.386	2.186	0.094	0.086
F	0.940	0.600	0.037	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	5.400	0.244	0.213
L3	1.200	0.600	0.047	0.024
θ	9°	3°	9°	3°