PDS6904

60V N-Channel MOSFETs

| BVDSS	RDSON	ID
60V	12mΩ	10A

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.

Features

- *60V,10A, RDS(ON) =12mΩ @VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*

Applications

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

SOP8 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]	61	mJ
IAS	Single Pulse Avalanched Current[2]	35	A
P_D	Power Dissipation (T_C=25℃)	2.5	W
	Power Dissipation – Derate above 25℃	0.02	W/℃
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{θJA}$	Thermal Resistance Junction to ambient	---	50	℃/W

Electrical Characteristics (T$_J$=25 ℃, 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℃ , I$_D$=1mA	---	0.07	---	V/℃
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=60V , V$_{GS}$=0V , T$_J$=25℃	---	---	1	uA
		V$_{DS}$=48V , V$_{GS}$=0V , T$_J$=125℃	---	---	10	uA
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=±20V , V$_{DS}$=0V	---	---	±100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R$_{DS(ON)}$	Static Drain-Source On-Resistance[3]	V$_{GS}$=10V , I$_D$=10A	---	10	12	mΩ
		V$_{GS}$=4.5V , I$_D$=6A	---	12	15	mΩ
V$_{GS(th)}$	Gate Threshold Voltage	V$_{GS}$=V$_{DS}$, I$_D$ =250uA	1.2	1.6	2.5	V
△V$_{GS(th)}$	V$_{GS(th)}$ Temperature Coefficient		---	-4	---	mV/℃
gfs	Forward Transconductance	V$_{DS}$=10V , I$_D$=6A	---	11.7	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q$_g$	Total Gate Charge[3,4]	V$_{DS}$=30V , V$_{GS}$=10V , I$_D$=10A	---	39.2	59	nC
Q$_{gs}$	Gate-Source Charge[3,4]		---	5.9	9	
Q$_{gd}$	Gate-Drain Charge[3,4]		---	8.8	14	
T$_{d(on)}$	Turn-On Delay Time[3,4]	V$_{DD}$=15V , V$_{GS}$=10V , R$_G$=6Ω I$_D$=1A	---	9.6	18	ns
T$_r$	Rise Time[3,4]		---	28.2	54	
T$_{d(off)}$	Turn-Off Delay Time[3,4]		---	45.3	86	
T$_f$	Fall Time[3,4]		---	10.9	21	
C$_{iss}$	Input Capacitance	V$_{DS}$=25V , V$_{GS}$=0V , F=1MHz	---	2100	3050	pF
C$_{oss}$	Output Capacitance		---	165	240	
C$_{rss}$	Reverse Transfer Capacitance		---	80	120	
R$_g$	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, F=1MHz	---	1.6	3.2	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[3]		---	---	40	A
V$_{SD}$	Diode Forward Voltage[3]	V$_{GS}$=0V , I$_S$=1A , T$_J$=25℃	---	---	1	V
t$_{rr}$	Reverse Recovery Time	V$_{GS}$=0V,I$_S$=1A , di/dt=100A/μs	---	---	---	ns
Q$_{rr}$	Reverse Recovery Charge	T$_J$=25℃	---	---	---	nC

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V$_{DD}$=25V,V$_{GS}$=10V,L=0.1mH,I$_{AS}$=35A.,R$_G$=25Ω, Starting T$_J$=25℃.
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
4. Essentially independent of operating temperature.
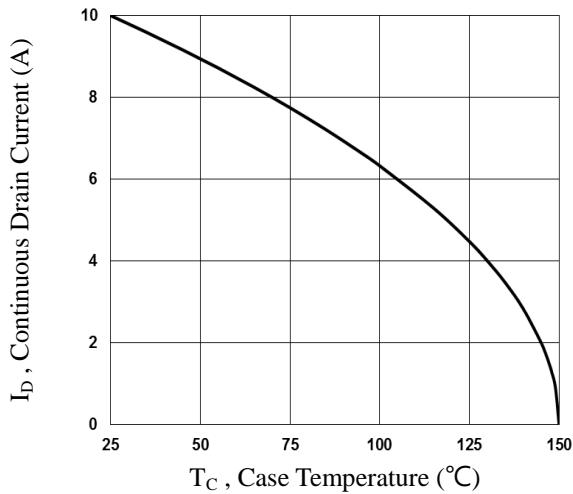
Fig.1 **Continuous Drain Current vs. T$_C$**
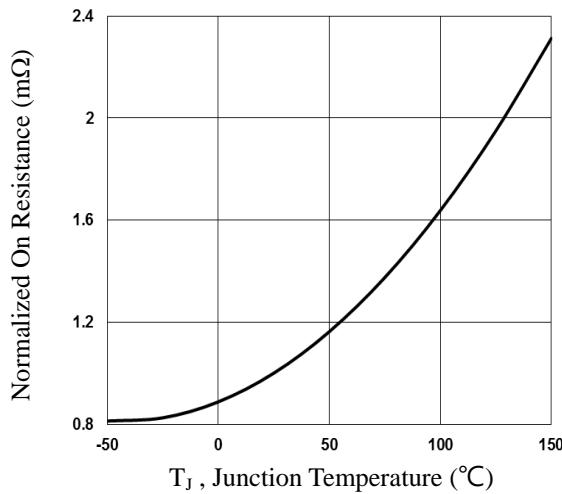

Fig.2 **Normalized RDSON vs. T$_J$**
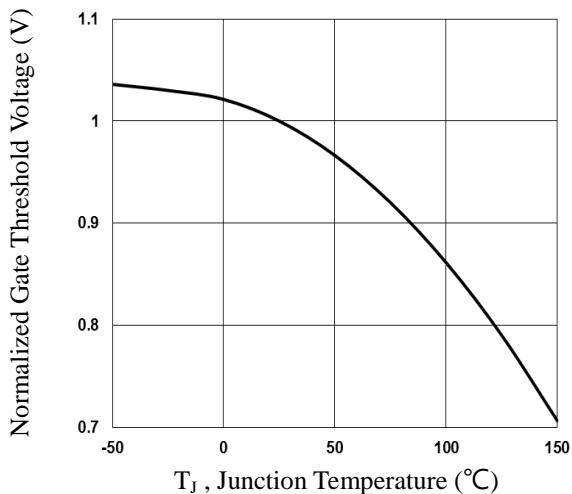
Fig.3 **Normalized V$_{th}$ vs. T$_J$**
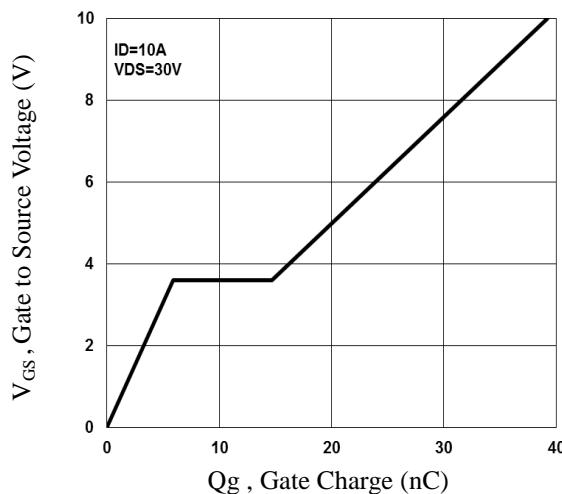

Fig.4 **Gate Charge Waveform**
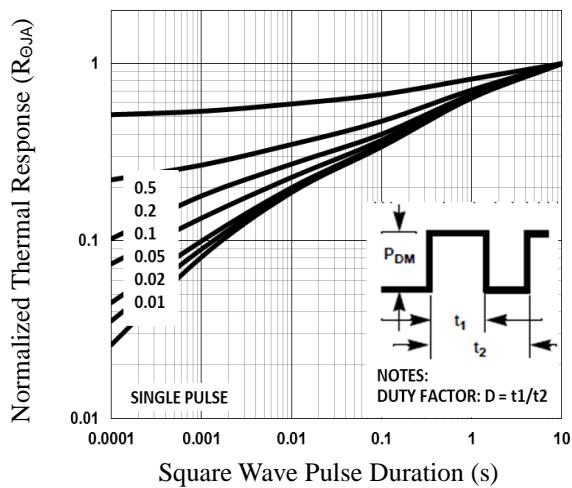
Fig.5 **Normalized Transient Response**
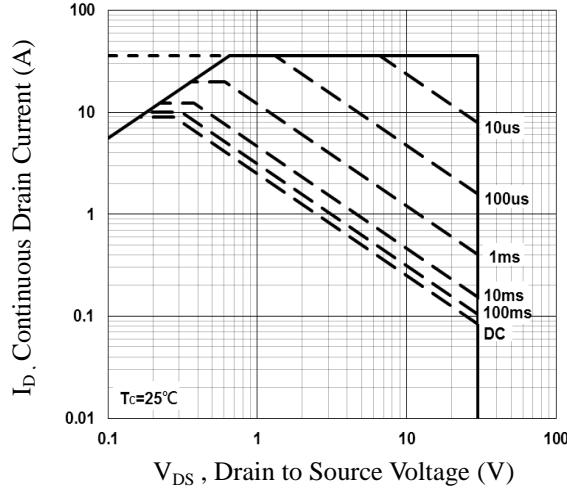
Fig.6 **Maximum Safe Operation Area**

$$EAS = \frac{1}{2}L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$
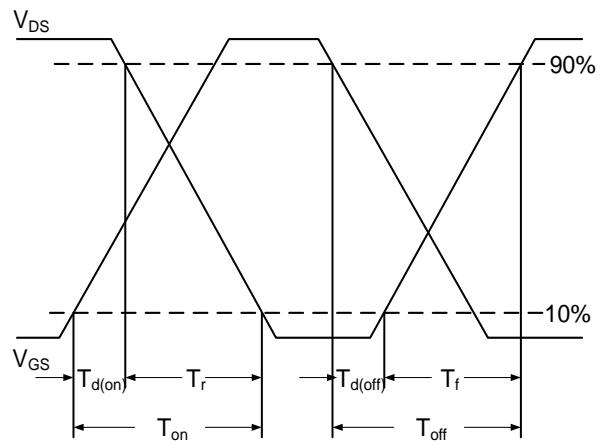
Fig.7   Switching Time Waveform
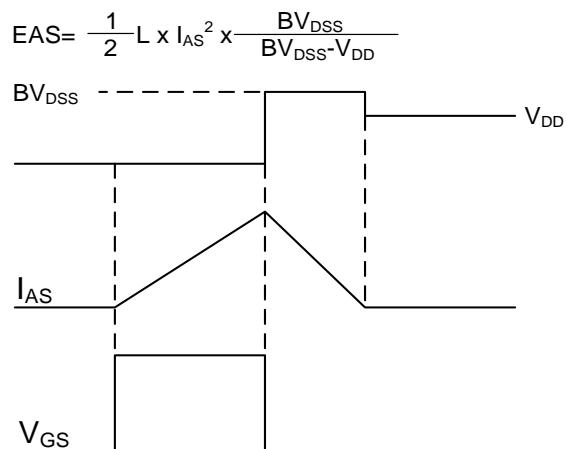
Fig.8   EAS Waveform

SOP8 PACKAGE INFORMATION
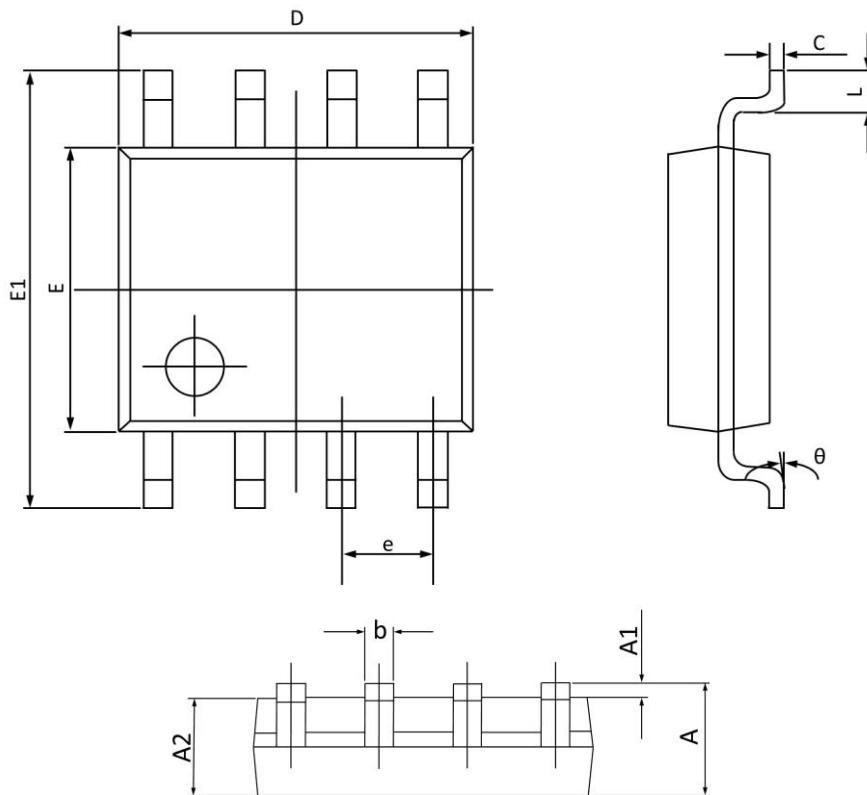
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.750	1.350	0.069	0.053
A1	0.250	0.100	0.010	0.004
A2	1.500	1.300	0.059	0.051
b	0.490	0.350	0.019	0.014
C	0.260	0.190	0.010	0.007
D	5.100	4.700	0.201	0.185
E	4.100	3.700	0.161	0.146
E1	6.200	5.800	0.244	0.228
e	1.27BSC		0.05BSC	
L	0.900	0.400	0.035	0.016
θ	8°	0°	8°	0°