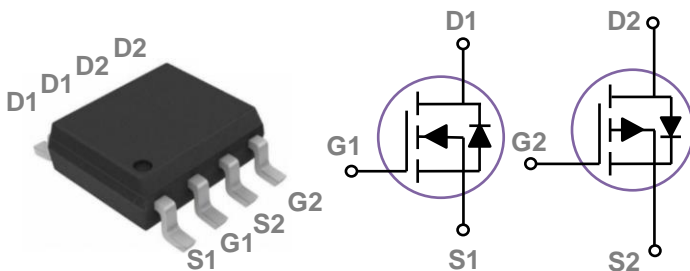# PDS6708

60V N+P Dual Channel MOSFETs

General Description

These N+P dual 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	RDSON	ID
60V	29mΩ	6A
-60V	70mΩ	-4.5A

Features

- *Fast switching*
- *Green Device Available*
- *Suit for 4.5V Gate Drive Applications*

SOP8 Pin Configuration

Applications

- *DC Fan*
- *Motor Drive Applications*
- *Networking*
- *Half / Full Bridge Topology*

Absolute Maximum Ratings Tc=25℃ unless otherwise noted

Symbol	Parameter	Rating		Units
V_{DS}	Drain-Source Voltage	60	-60	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D	Drain Current – Continuous (T_A=25℃)	6	-4.5	A
	Drain Current – Continuous (T_A=70℃)	4.8	-3.6	A
I_{DM}	Drain Current – Pulsed[1]	24	-18	A
P_D	Power Dissipation (T_A=25℃)	2		W
	Power Dissipation – Derate above 25℃	0.016		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	---	62.5	℃/W

N-CH Electrical Characteristics (T_J=25 ℃, unless otherwise)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	60	---	---	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	V_{GS}=10V , I_D=3A	---	24	29	mΩ
		V_{GS}=4.5V , I_D=2A	---	29	38	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.2	1.6	2.5	V
gfs	Forward Transconductance	V_{DS}=10V , I_D=2A	---	5	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge[2,3]	V_{DS}=30V , V_{GS}=10V , I_D=3A	---	11	17	nC
Q_{gs}	Gate-Source Charge[2,3]		---	1.5	3	
Q_{gd}	Gate-Drain Charge[2,3]		---	3	4.5	
$T_{d(on)}$	Turn-On Delay Time[2,3]	V_{DD}=30V , V_{GS}=10V , R_G=6Ω I_D=3A	---	6	10	ns
T_r	Rise Time[2,3]		---	7	15	
$T_{d(off)}$	Turn-Off Delay Time[2,3]		---	46	70	
T_f	Fall Time[2,3]		---	14	20	
C_{iss}	Input Capacitance	V_{DS}=30V , V_{GS}=0V , F=1MHz	---	800	1200	pF
C_{oss}	Output Capacitance		---	60	90	
C_{rss}	Reverse Transfer Capacitance		---	40	60	
Rg	Gate resistance	V_{GS}=0V, V_{DS}=0V, F=1MHz	---	2.8	---	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	---	---	6	A
I_{SM}	Pulsed Source Current		---	---	12	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1	V
T_{rr}	Reverse Recovery Time	V_R=50V, I_S=2A	---	30	---	ns
Q_{rr}	Reverse Recovery Charge	di/dt=100A/μs , T_J=25℃	---	15	---	nC

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
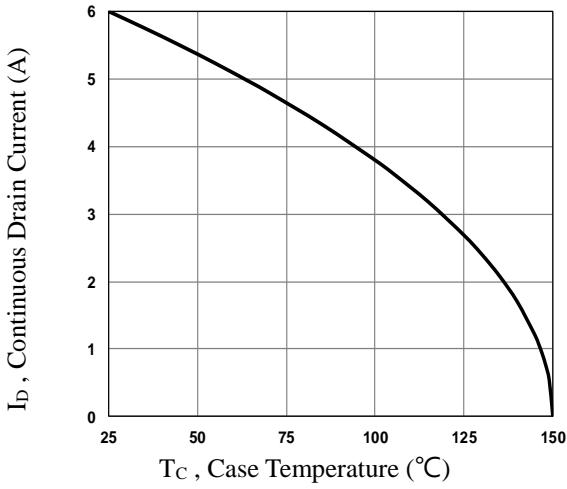3. Essentially independent of operating temperature.
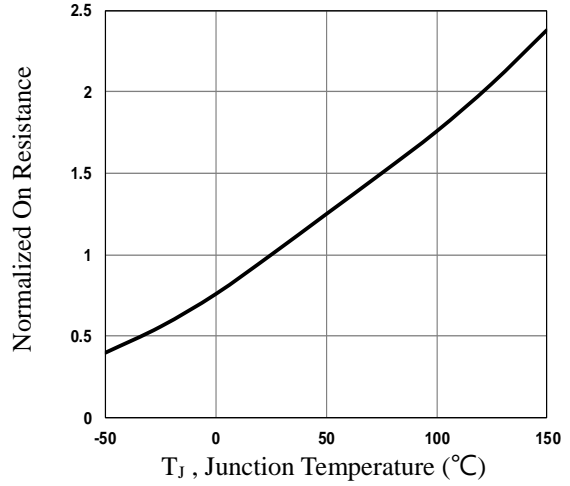
Fig.1   Continuous Drain Current vs. T$_C$
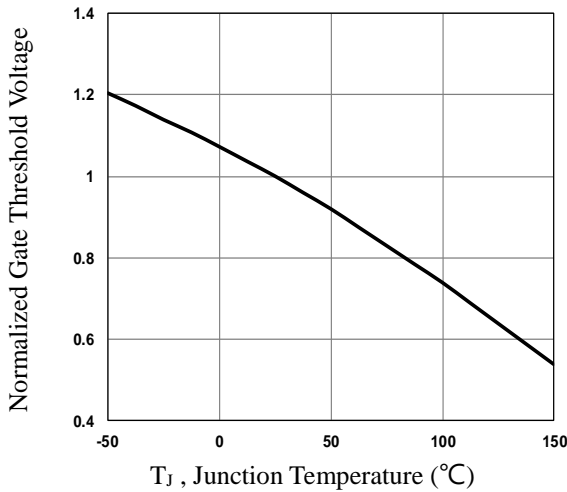

Fig.2   Normalized RDSON vs. T$_J$

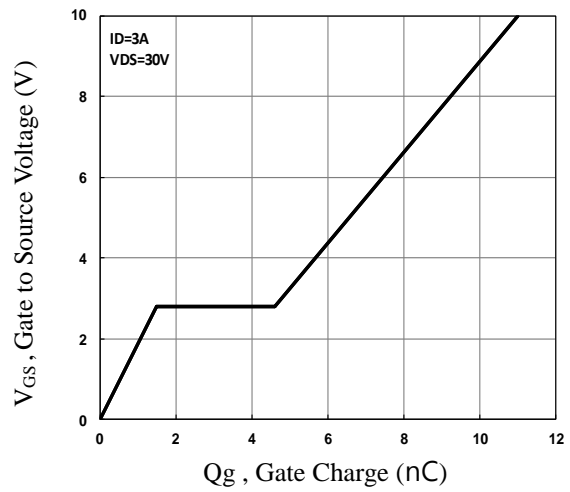Fig.3   Normalized V$_{th}$ vs. T$_J$

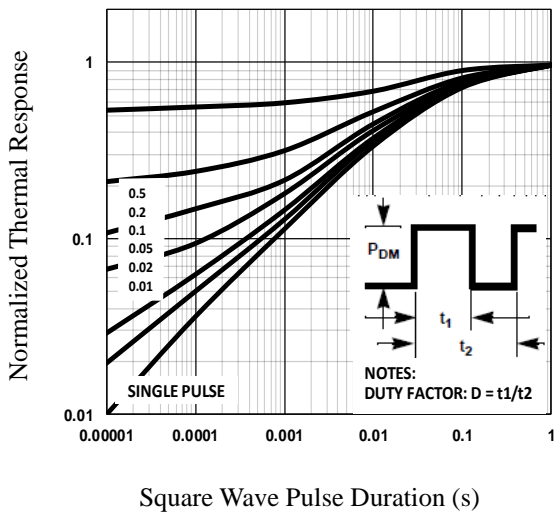Fig.4   Gate Charge Waveform

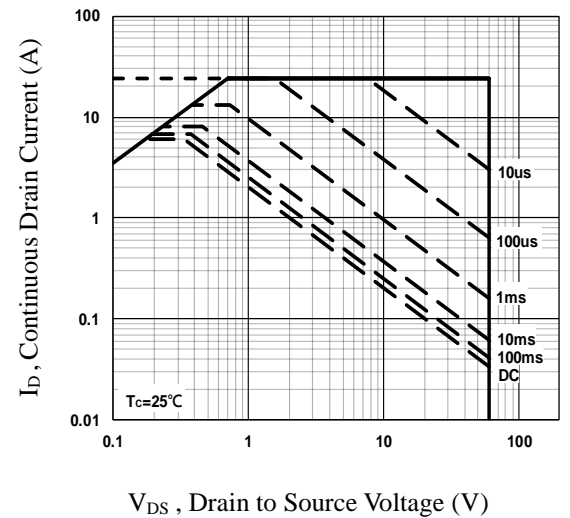Fig.5   Normalized Transient Impedance

Fig.6   Maximum Safe Operation Area

P-CH Electrical Characteristics (T_J=25 ℃, unless otherwise)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-60	---	---	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	V_{GS}=-10V , I_D=-3A	---	58	70	mΩ
		V_{GS}=-4.5V , I_D=-2A	---	72	94	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.2	-1.6	-2.5	V
gfs	Forward Transconductance	V_{DS}=-10V , I_D=-2A	---	5	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge[4],[5]	V_{DS}=-30V , V_{GS}=-10V , I_D=-2A	---	14	21	nC
Q_{gs}	Gate-Source Charge[4],[5]		---	1.4	3	
Q_{gd}	Gate-Drain Charge[4],[5]		---	3.3	5	
$T_{d(on)}$	Turn-On Delay Time[4],[5]	V_{DD}=-30V , V_{GS}=-10V , R_G=6Ω I_D=-2A	---	8	15	ns
T_r	Rise Time[4],[5]		---	25	40	
$T_{d(off)}$	Turn-Off Delay Time[4],[5]		---	50	75	
T_f	Fall Time[4],[5]		---	16	25	
C_{iss}	Input Capacitance	V_{DS}=-30V , V_{GS}=0V , F=1MHz	---	880	1320	pF
C_{oss}	Output Capacitance		---	60	90	
C_{rss}	Reverse Transfer Capacitance		---	45	70	
Rg	Gate resistance	V_{GS}=0V, V_{DS}=0V, F=1MHz	---	16	---	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	---	---	-4.5	A
I_{SM}	Pulsed Source Current		---	---	-9	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1	V
T_{rr}	Reverse Recovery Time	V_R=-50V , I_S=-2A	---	35	---	ns
Q_{rr}	Reverse Recovery Charge	di/dt=100A/μs , T_J=25℃	---	20	---	nC

Note :
4. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
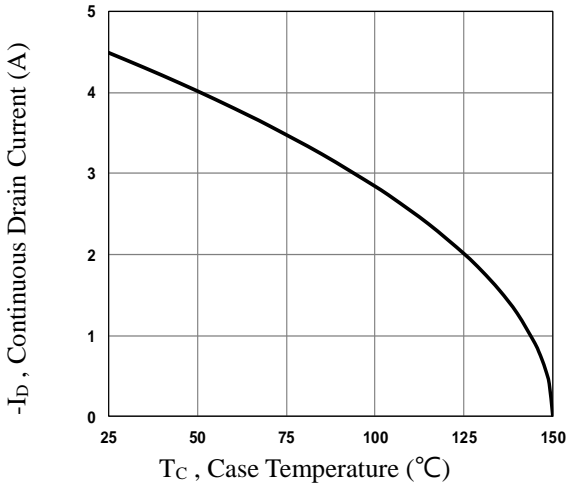5. Essentially independent of operating temperature.
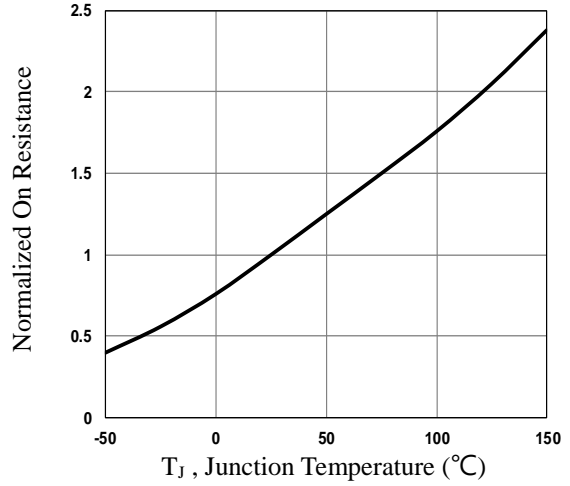
Fig.7 Continuous Drain Current vs. T$_C$
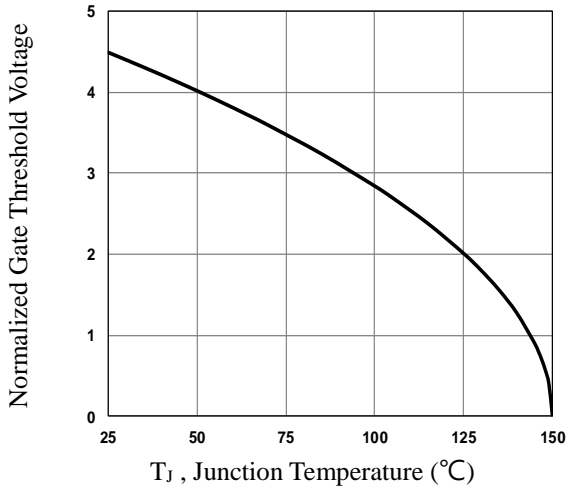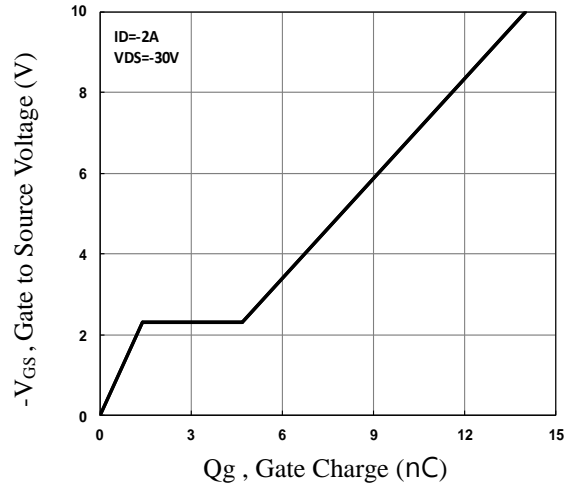

Fig.8 Normalized RDSON vs. T$_J$

Fig.9 Normalized V$_{th}$ vs. T$_J$

Fig.10 Gate Charge Waveform

Square Wave Pulse Duration (s)

Fig.11 Normalized Transient Impedance

-V$_{DS}$, Drain to Source Voltage (V)
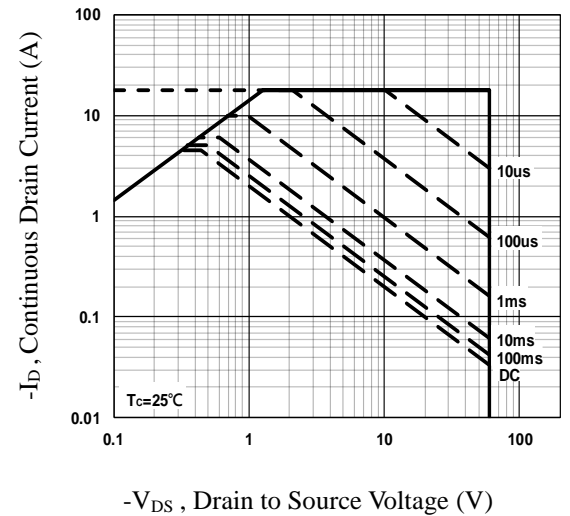
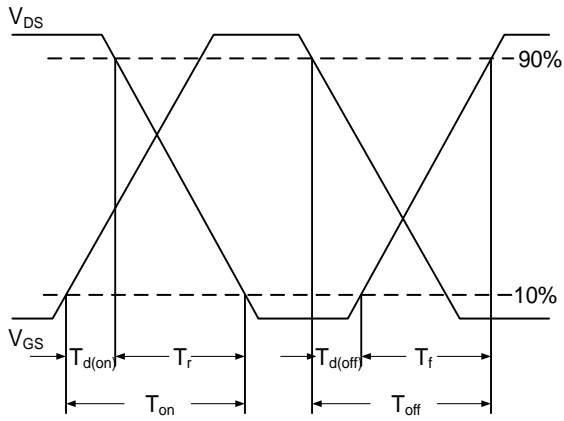**Fig.12 Maximum Safe Operation Area**
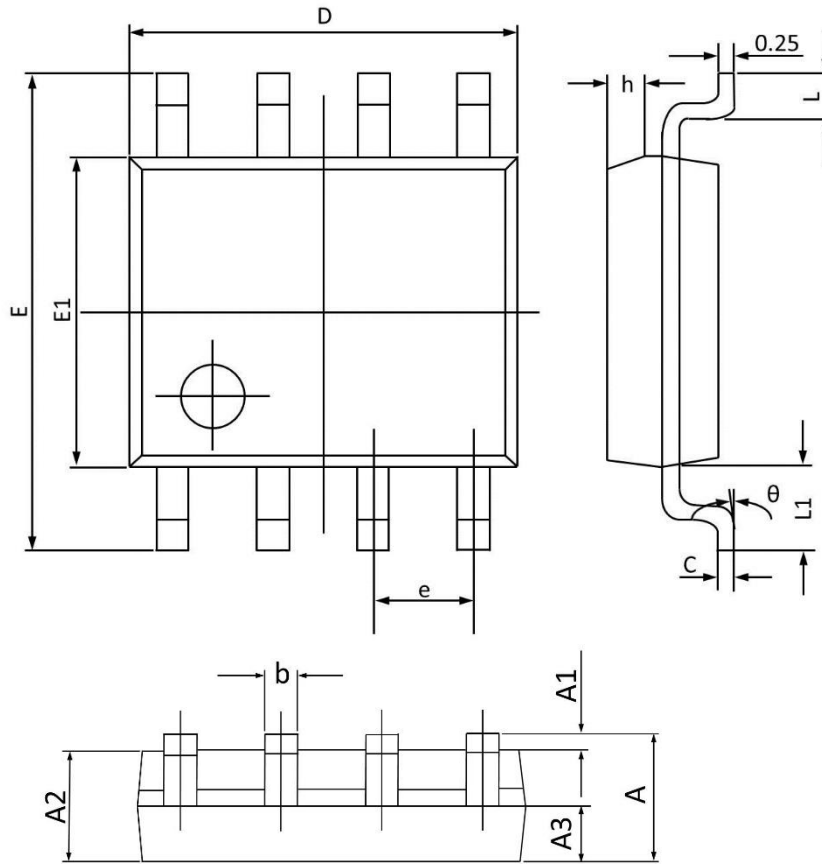
Fig.13   Switching Time Waveform

Fig.14   Gate Charge Waveform

SOP8 PACKAGE INFORMATION

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.800	0.053	0.069
A1	0.050	0.250	0.002	0.010
A2	1.250	1.650	0.049	0.065
A3	0.500	0.700	0.020	0.028
b	0.300	0.510	0.012	0.020
c	0.150	0.260	0.006	0.010
D	4.700	5.100	0.185	0.201
E	5.800	6.200	0.228	0.244
E1	3.700	4.100	0.146	0.161
e	1.270(BSC)		0.050(BSC)	
h	0.250	0.500	0.010	0.020
L	0.400	1.000	0.016	0.039
L1	1.050(BSC)		0.041(BSC)	
θ	0°	8°	0°	8°