40V N+P Dual Channel MOSFETs

PDS4701

General Description

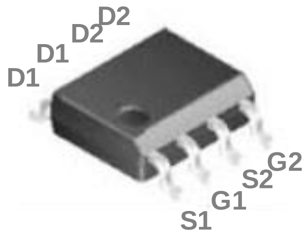
These N+P dual Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.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

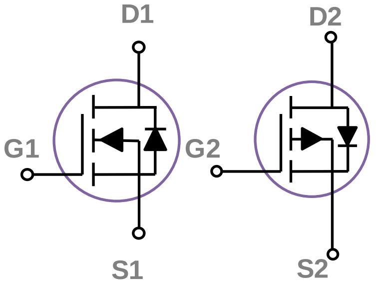
BVDSS	RDSON	ID
40V	32mΩ	6.7A
-40V	40mΩ	-7.2A

Features

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

SOP-8L Pin Configuration





Applications

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

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Parameter	Rating		Units
V_{DS}	Drain-Source Voltage	40	-40	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D	Drain Current – Continuous (T_C=25℃)	6.7	7.2	A
	Drain Current – Continuous (T_C=100℃)	4.3	4.5	A
I_{DM}	Drain Current – Pulsed[1]	26.8	28.8	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
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	50	℃/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	---	62	℃/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	40	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.04	---	V/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=40V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=32V , V_{GS}=0V , T_J=125℃	---	---	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=5A	---	24	32	mΩ
		V_{GS}=4.5V , I_D=3A	---	32	45	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.0	1.8	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-3	---	mV/℃
gfs	Forward Transconductance	V_{DS}=10V , I_D=3A	---	3.6	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge[2,3]	V_{DS}=20V , V_{GS}=4.5V , I_D=3A	---	2.8	5.6	nC
Q_{gs}	Gate-Source Charge[2,3]		---	0.5	1	
Q_{gd}	Gate-Drain Charge[2,3]		---	1.5	3	
$T_{d(on)}$	Turn-On Delay Time[2,3]	V_{DD}=20V , V_{GS}=4.5V , R_G=25Ω I_D=1A	---	3.2	6	ns
T_r	Rise Time[2,3]		---	8.6	16	
$T_{d(off)}$	Turn-Off Delay Time[2,3]		---	18	36	
T_f	Fall Time[2,3]		---	6	12	
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , F=1MHz	---	420	800	pF
C_{oss}	Output Capacitance		---	65	120	
C_{rss}	Reverse Transfer Capacitance		---	40	80	

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	---	---	6.7	A
I_{SM}	Pulsed Source Current		---	---	13.4	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1	V

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.

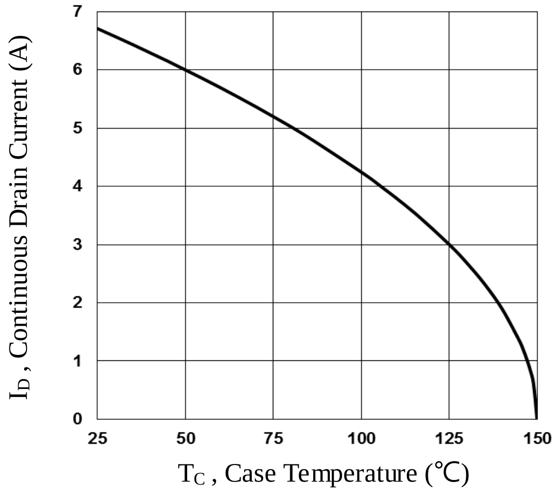


Fig.1 Continuous Drain Current vs. T_C

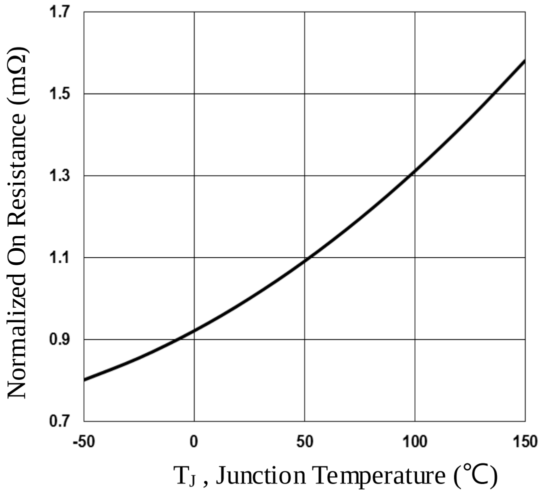


Fig.2 Normalized RDSON vs. T_J

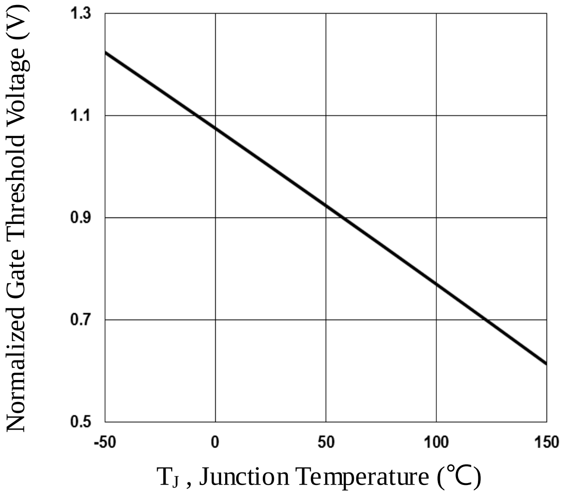


Fig.3 Normalized V_{th} vs. T_J

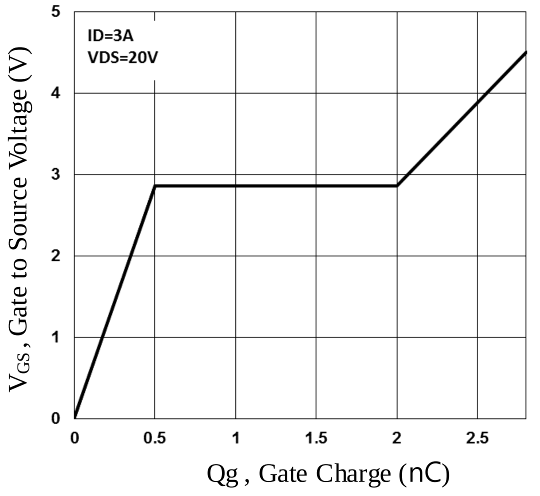


Fig.4 Gate Charge Waveform

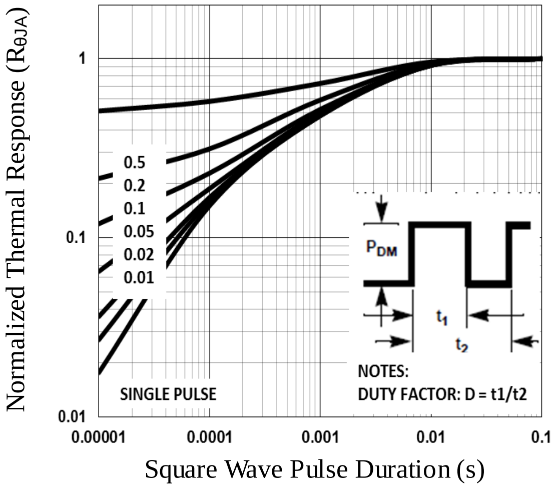


Fig.5 Normalized Transient Impedance

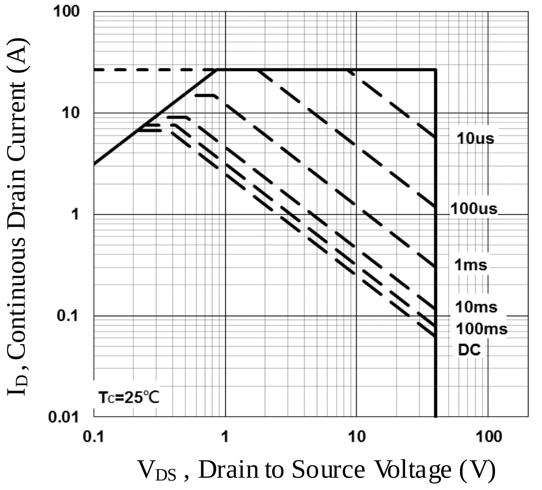


Fig.6 Maximum Safe Operation Area

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

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-40	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=-1mA	---	-0.04	---	V/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-40V , V_{GS}=0V , T_J=25℃	---	---	-1	uA
		V_{DS}=-32V , V_{GS}=0V , T_J=125℃	---	---	-10	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±10V , 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=-4A	---	32	40	mΩ
		V_{GS}=-4.5V , I_D=-2A	---	45	60	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.0	-1.6	-2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	3	---	mV/℃
gfs	Forward Transconductance	V_{DS}=-10V , I_D=-3A	---	5	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge[2,3]	V_{DS}=-20V , V_{GS}=-4.5V , I_D=-2A	---	8	16	nC
Q_{gs}	Gate-Source Charge[2,3]		---	2.1	4.2	
Q_{gd}	Gate-Drain Charge[2,3]		---	3.6	7.2	
$T_{d(on)}$	Turn-On Delay Time[2,3]	V_{DD}=-20V , V_{GS}=-4.5V , R_G=25Ω I_D=-1A	---	20	40	ns
T_r	Rise Time[2,3]		---	12	24	
$T_{d(off)}$	Turn-Off Delay Time[2,3]		---	46	80	
T_f	Fall Time[2,3]		---	6	12	
C_{iss}	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , F=1MHz	---	1050	1600	pF
C_{oss}	Output Capacitance		---	110	160	
C_{rss}	Reverse Transfer Capacitance		---	80	120	

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	---	---	-7.2	A
I_{SM}	Pulsed Source Current		---	---	-14.4	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1	V

Note :

4. Repetitive Rating : Pulsed width limited by maximum junction temperature.
5. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
6. Essentially independent of operating temperature.

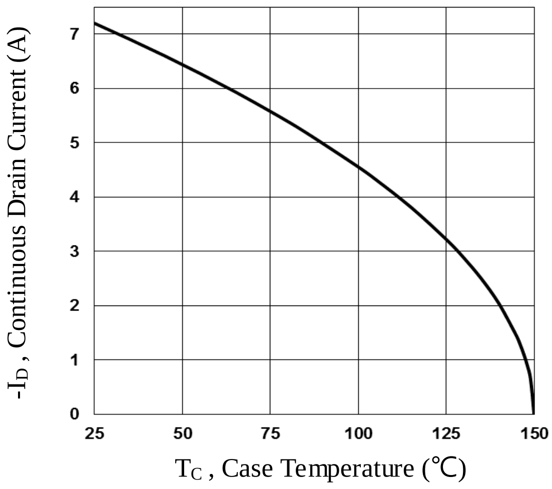


Fig.7 Continuous Drain Current vs. T_C

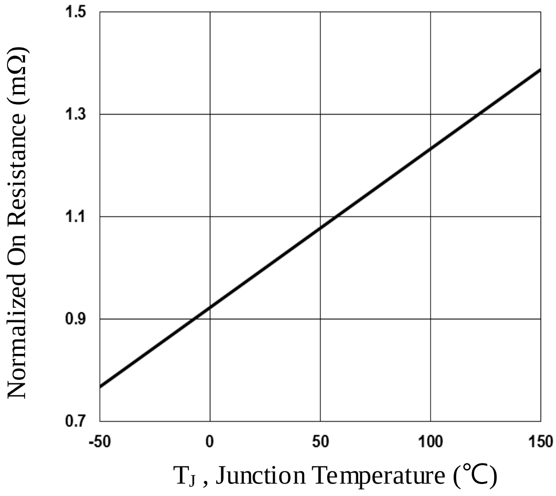


Fig.8 Normalized RDSON vs. T_J

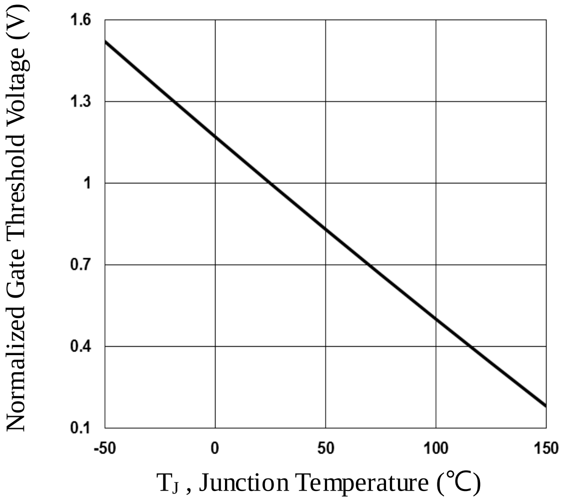


Fig.9 Normalized V_{th} vs. T_J

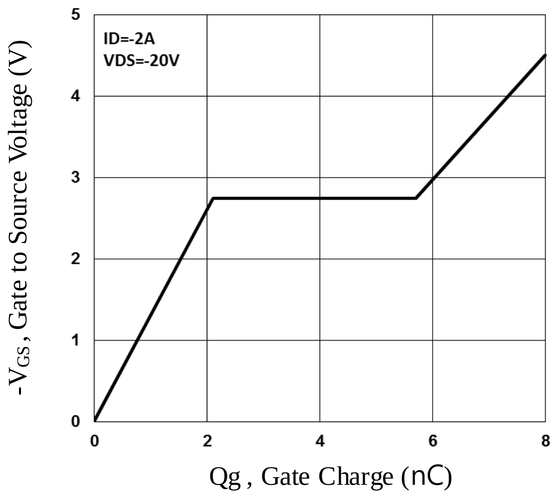


Fig.10 Gate Charge Waveform

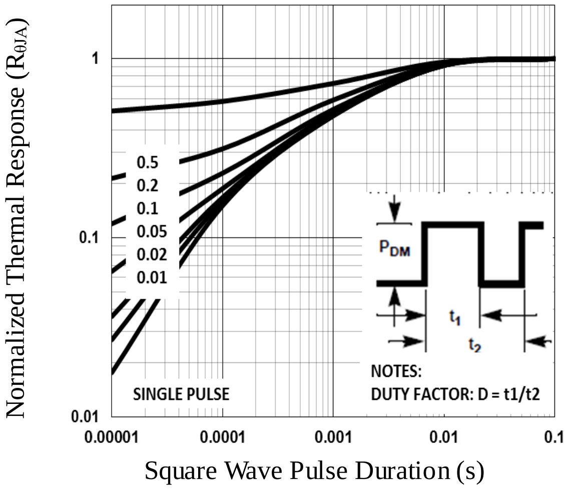


Fig.11 Normalized Transient Impedance

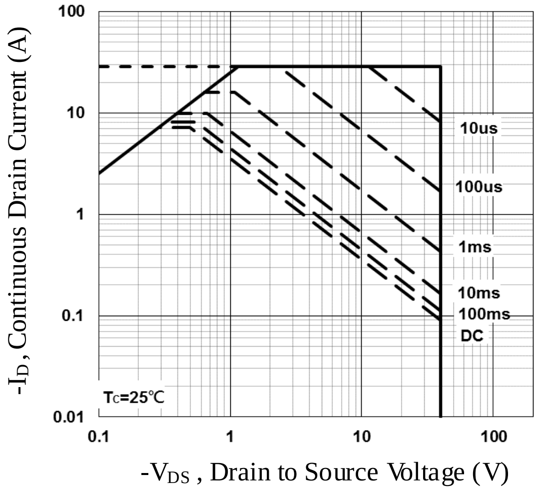
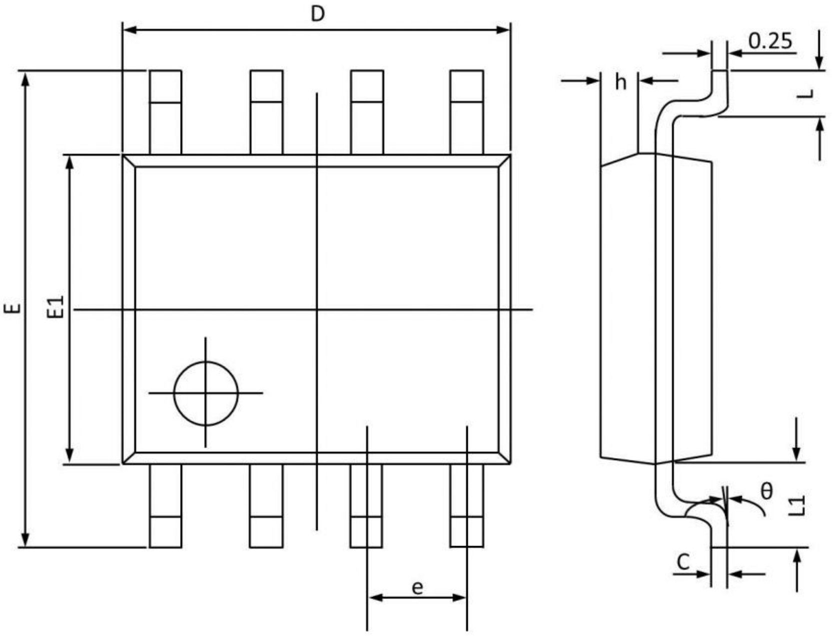
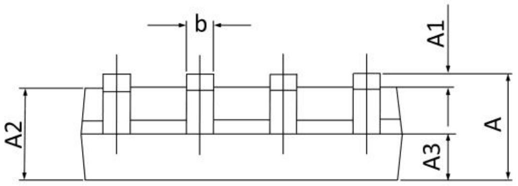


Fig.12 Maximum Safe Operation Area

SOP8 PACKAGE INFORMATION





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.068
A1	0.100	0.250	0.004	0.009
A2	1.300	1.500	0.052	0.059
A3	0.600	0.700	0.024	0.027
b	0.390	0.480	0.016	0.018
c	0.210	0.260	0.009	0.010
D	4.700	5.100	0.186	0.200
E	5.800	6.200	0.229	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	0.019
L	0.500	0.800	0.019	0.031
L1	1.050(BSC)		0.041(BSC)	
θ	0°	8°	0°	8°