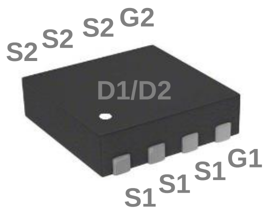
20V Dual N-Channel MOSFETs

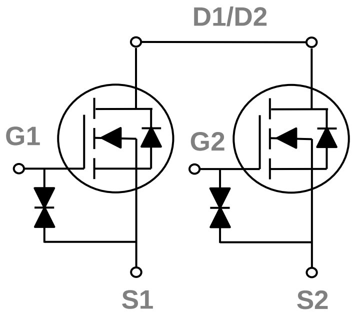
PDEB2594P

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.

DFN3x3 Dual Pin Configuration





BVDSS	RDSON	ID
20V	8mΩ	24A

Features

- *20V,24A, RDS(ON) =8mΩ @VGS = 4.5V*
- *Improved dv/dt capability*
- *Fast switching*
- *G-S ESD Protection Diode Embedded*
- *Green Device Available*

Applications

- *Handheld Instruments*
- *POL Applications*
- *Battery Protection Applications*

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	±12	V
I_D	Drain Current – Continuous (T_C=25℃)	24	A
	Drain Current – Continuous (T_C=100℃)	15	A
	Drain Current – Continuous (T_A=25℃)	12.5	A
	Drain Current – Continuous (T_A=70℃)	10	A
	Drain Current – Continuous (T_A=100℃)	7.9	A
I_{DM}	Drain Current – Pulsed[1]	96	A
P_D	Power Dissipation (T_C=25℃)	27	W
	Power Dissipation – Derate above 25℃	0.22	W/℃
	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
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	℃/W
$R_{\theta JC}$	Thermal Resistance Junction to case	---	4.55	℃/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=250µA	20	---	---	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=20V , V_{GS}=0V , T_J=25℃	---	---	1	µA
		V_{DS}=16V , V_{GS}=0V , T_J=85℃	---	---	10	µA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±12V , V_{DS}=0V	---	---	±20	µA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance[3]	V_{GS}=4.5V , I_D=2.4A	6.0	6.7	8	mΩ
		V_{GS}=4.0V , I_D=2.4A	6.0	7.1	8.5	mΩ
		V_{GS}=3.7V , I_D=2.4A	6.5	7.3	9	mΩ
		V_{GS}=3.1V , I_D=2.4A	7.0	8	10.5	mΩ
		V_{GS}=2.5V , I_D=2.4A	8.0	9.2	12	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250µA	0.5	0.65	1.5	V
gfs	Forward Transconductance	V_{DS}=5V , I_D=5A	---	15	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge[2,3]	V_{DS}=20V , V_{GS}=4.5V , I_D=5A	---	13.8	---	nC
Q_{gs}	Gate-Source Charge[2,3]		---	2.1	---	
Q_{gd}	Gate-Drain Charge[2,3]		---	4.5	---	
$T_{d(on)}$	Turn-On Delay Time[2,3]	V_{DD}=15V , V_{GS}=10V , R_G=6Ω I_D=5A	---	28	---	ns
T_r	Rise Time[2,3]		---	64	---	
$T_{d(off)}$	Turn-Off Delay Time[2,3]		---	60	---	
T_f	Fall Time[2,3]		---	55	---	
C_{iss}	Input Capacitance	V_{DS}=20V , V_{GS}=0V , F=1MHz	---	1514	---	pF
C_{oss}	Output Capacitance		---	178	---	
C_{rss}	Reverse Transfer Capacitance		---	145	---	

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	---	---	24	A
I_{SM}	Pulsed Source Current		---	---	48	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 ≦ 300µs , duty cycle ≦ 2%.
3. Essentially independent of operating temperature.

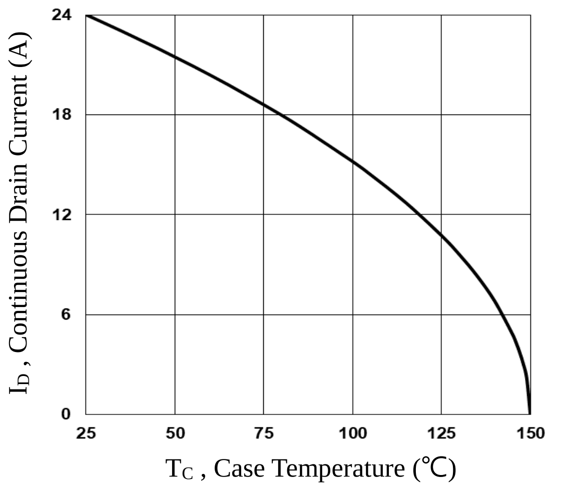


Fig.1 Continuous Drain Current vs. T_C

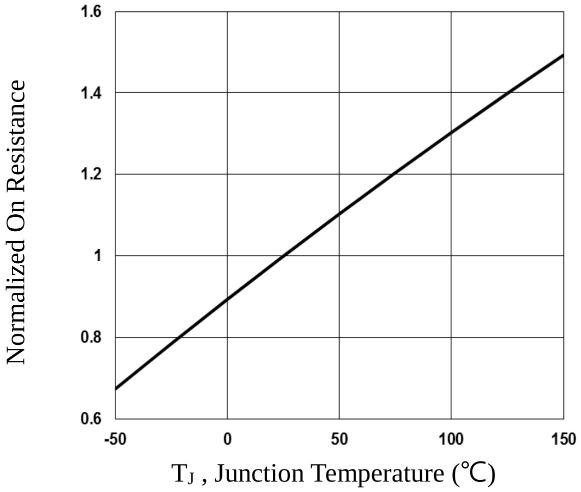


Fig.2 Normalized RDSON vs. T_J

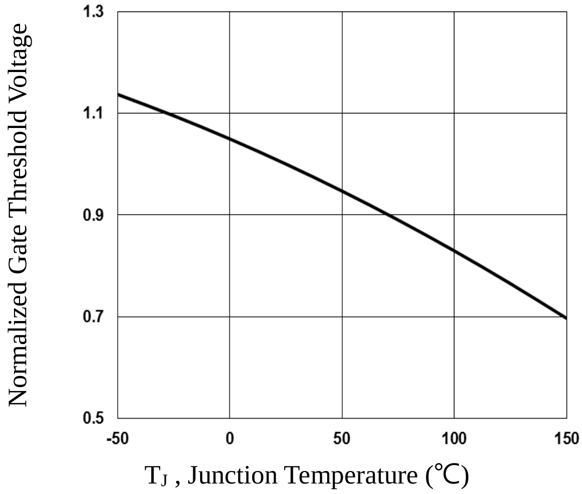


Fig.3 Normalized V_{th} vs. T_J

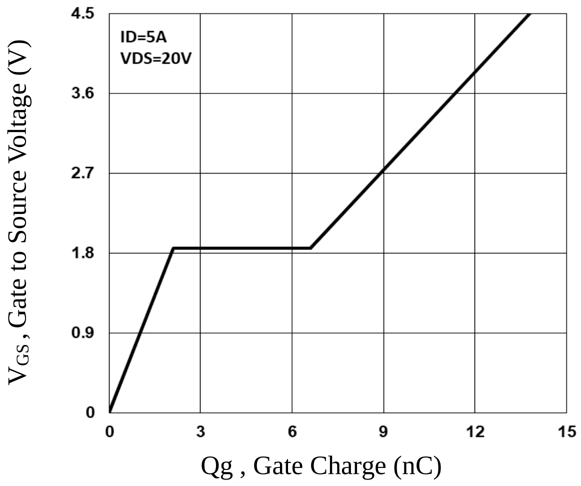


Fig.4 Gate Charge Waveform

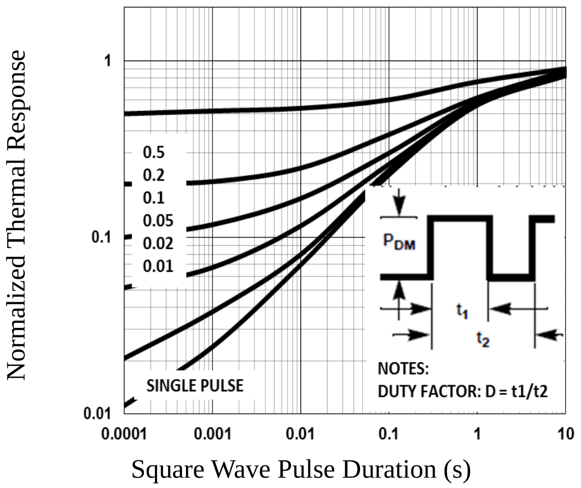


Fig.5 Normalized Transient Response

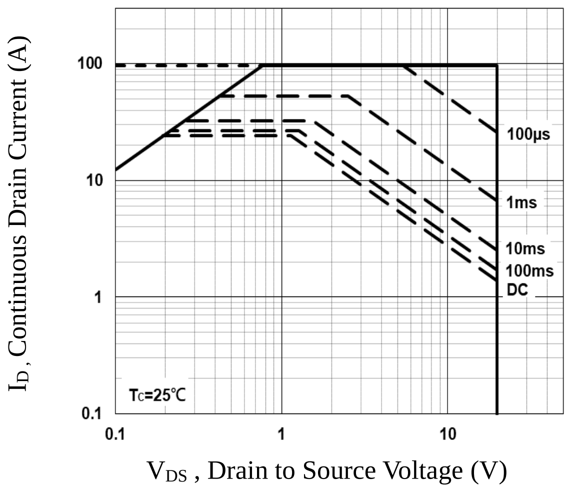


Fig.6 Maximum Safe Operation Area

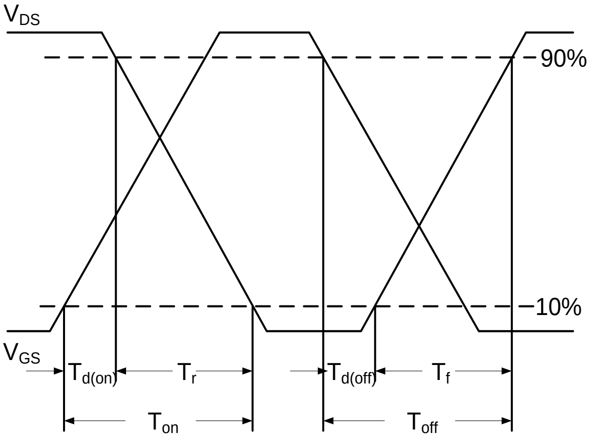


Fig.7 Switching Time Waveform

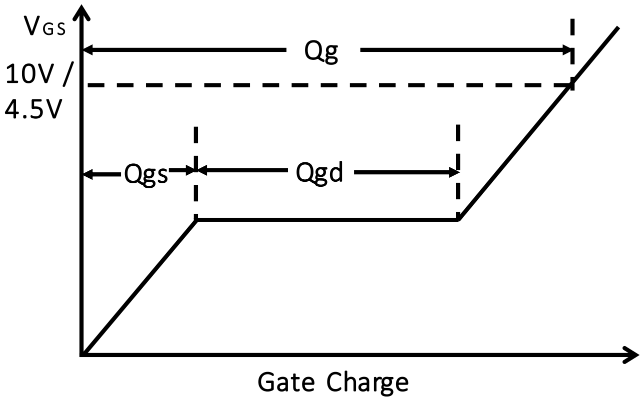
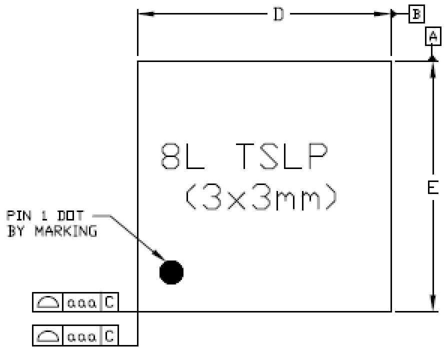
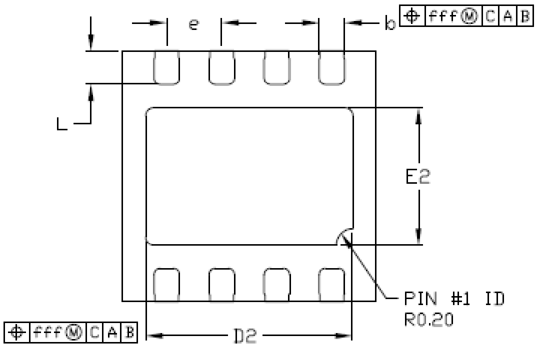


Fig.8 Gate Charge Waveform

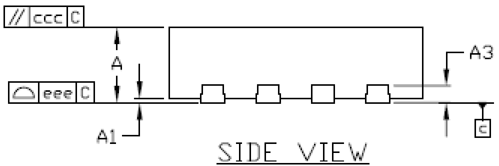
DFN3x3 Dual PACKAGE INFORMATION



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Notes

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER JEDEC MO-220.

Symbol	Dimensions In Millimeters		
	Min	Nom	Max
A	0.700	0.750	0.800
A1	-	-	0.050
A3	0.203Ref.		
D	2.950	3.000	3.050
E	2.950	3.000	3.050
D2	2.400	2.450	2.500
E2	1.600	1.650	1.700
b	0.250	0.300	0.350
e	0.650BSC		
L	0.350	0.400	0.450
aaa	0.010		
bbb	0.010		
ccc	0.010		
ddd	0.050		
eee	0.080		
fff	0.100		