



40V N+P Dual Channel MOSFETs

General Description

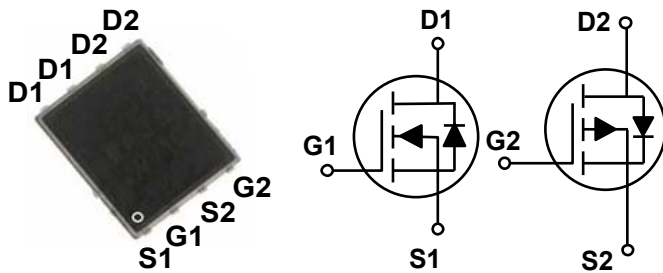
These N+P dual Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.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

BV _{DSS}	R _{DS(ON)}	I _D
40 V	11.5 mΩ	42 A
-40 V	30 mΩ	-27 A

Features

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

PPAK5x6 Dual Pin Configuration



Applications

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

Absolute Maximum Ratings T_c=25°C 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°C)	42	-27	A
	Drain Current - Continuous (T _c =100°C)	26.5	-17	A
I _{DM}	Drain Current - Pulsed (NOTE 1)	168	-108	A
EAS	Single Pulse Avalanche Energy (NOTE 2 · 6)	45	51	mJ
IAS	Single Pulse Avalanche Current (NOTE 2)	30	32	A
P _D	Power Dissipation (T _c =25°C)	34.7		W
	Power Dissipation - Derate above 25°C	0.28		W/°C
T _J	Operating Junction Temperature Range	-55 to 150		°C
T _{STG}	Storage Temperature Range	-55 to 150		°C

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R _{θJA}	Thermal Resistance Junction to Ambient	---	62	°C/W
R _{θJC}	Thermal Resistance Junction to Case	---	3.6	°C/W



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N Channel Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu\text{A}$	40	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=40V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=32V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=15A$	---	---	11.5	m Ω
		$V_{GS}=4.5V, I_D=12A$	---	---	16	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu\text{A}$	1.2	1.6	2.5	V
gfs	Forward Transconductance	$V_{DS}=10V, I_D=3A$	---	6	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge	$V_{DS}=20V, V_{GS}=10V, I_D=10A$ (NOTE 3 · 4)	---	16.9	---	nC
Q_{gs}	Gate-Source Charge		---	2	---	
Q_{gd}	Gate-Drain Charge		---	4.4	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=20V, V_{GS}=10V, R_G=6\Omega,$ $I_D=1A$ (NOTE 3 · 4)	---	8	---	nS
T_r	Rise Time		---	3.2	---	
$T_{d(off)}$	Turn-Off Delay Time		---	26.4	---	
T_f	Fall Time		---	3.8	---	
C_{iss}	Input Capacitance	$V_{DS}=20V, V_{GS}=0V, F=1\text{MHz}$	---	1109	---	pF
C_{oss}	Output Capacitance		---	114	---	
C_{riss}	Reverse Transfer Capacitance		---	89	---	
Rg	Gate resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	2.8	---	Ω

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V, \text{Force Current}$	---	---	42	A
I_{SM}	Pulsed Source Current		---	---	84	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1	V

NOTES :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=30A, R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$.
3. The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.



Characteristics Curves

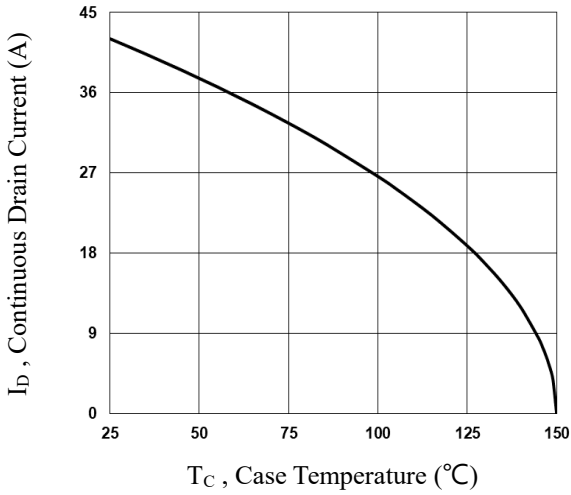


Fig.1 Continuous Drain Current vs. T_C

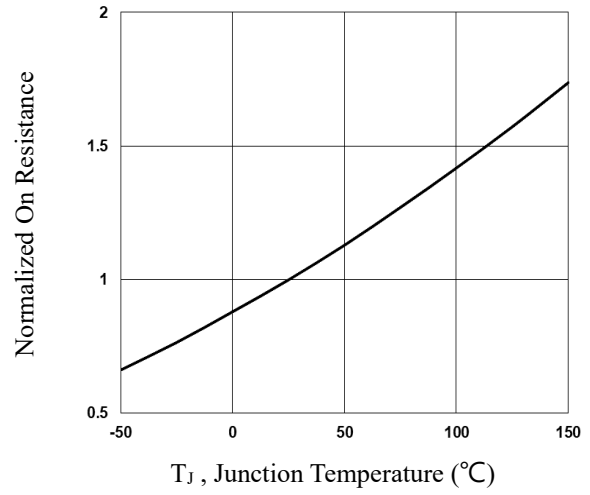


Fig.2 Normalized $R_{DS(on)}$ vs. T_J

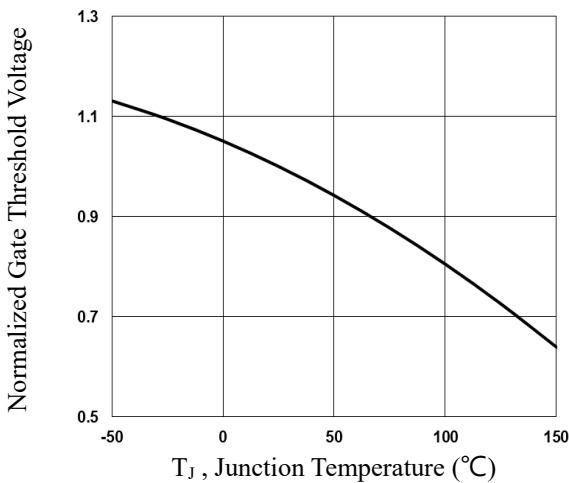


Fig.3 Normalized V_{th} vs. T_J

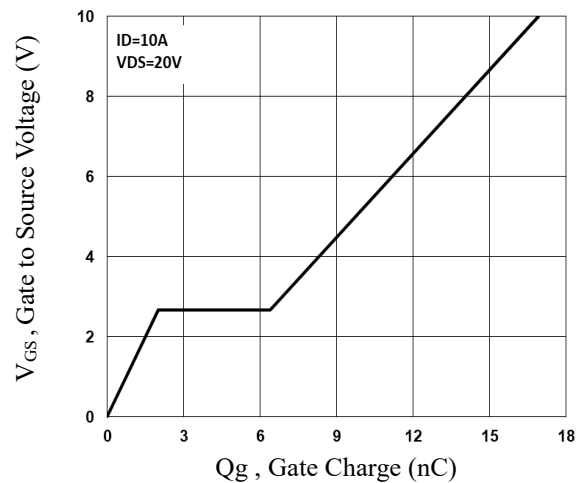


Fig.4 Gate Charge Waveform

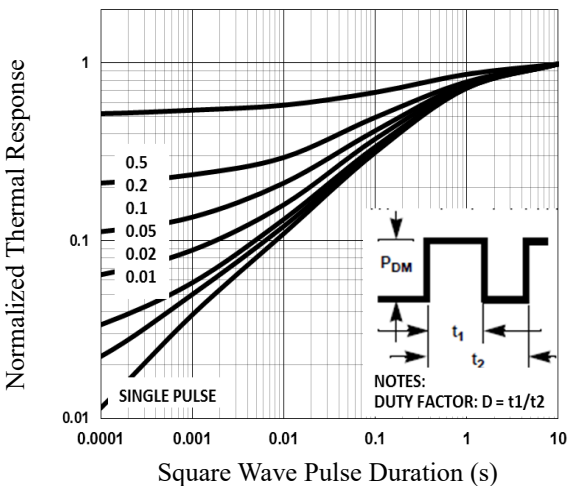


Fig.5 Normalized Transient Response

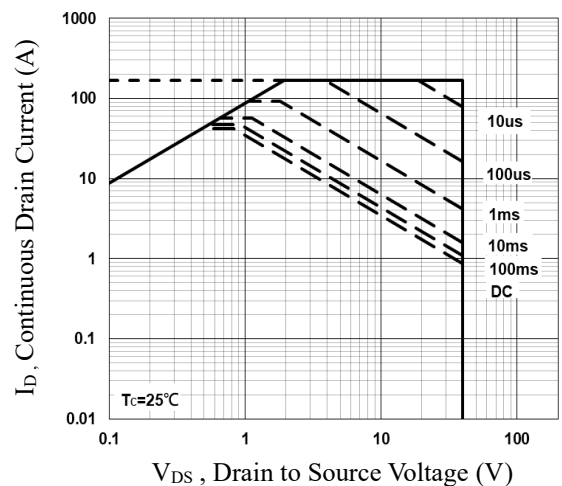


Fig.6 Maximum Safe Operation Area



40V N+P Dual Channel MOSFETs

P Channel 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	-40	---	---	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} = -40V , V _{GS} = 0V , T _J =25°C	---	---	-1	uA
		V _{DS} = -32V , V _{GS} = 0V , T _J =125°C	---	---	-10	
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 = -10A	---	---	30	mΩ
		V _{GS} = -4.5V , I _D = -8A	---	---	45	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D = -250uA	-1.2	-1.5	-2.5	V
g _{fs}	Forward Transconductance	V _{DS} = -10V , I _D = -3A	---	6	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q _g	Total Gate Charge	V _{DS} = -20V , V _{GS} = -10V , I _D = -10A (NOTE 7 & 8)	---	23.2	---	nC
Q _{gs}	Gate-Source Charge		---	2.9	---	
Q _{gd}	Gate-Drain Charge		---	4.3	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} = -20V , V _{GS} = -10V , R _G = 6Ω , I _D = -1A (NOTE 7 & 8)	---	12.8	---	nS
T _r	Rise Time		---	8.7	---	
T _{d(off)}	Turn-Off Delay Time		---	65	---	
T _f	Fall Time		---	12.6	---	
C _{iss}	Input Capacitance	V _{DS} = -20V , V _{GS} = 0V , F= 1MHz	---	1320	---	pF
C _{oss}	Output Capacitance		---	116	---	
C _{riss}	Reverse Transfer Capacitance		---	89	---	

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current	V _G =V _D =0V , Force Current	---	---	-27	A
I _{SM}	Pulsed Source Current		---	---	-54	A
V _{SD}	Diode Forward Voltage	V _{GS} =0V , I _S = -1A , T _J =25°C	---	---	-1	V

NOTES :

5. Repetitive Rating : Pulsed width limited by maximum junction temperature.
6. V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-32A, R_G=25Ω, Starting T_J=25°C.
7. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
8. Essentially independent of operating temperature.



Characteristics Curves

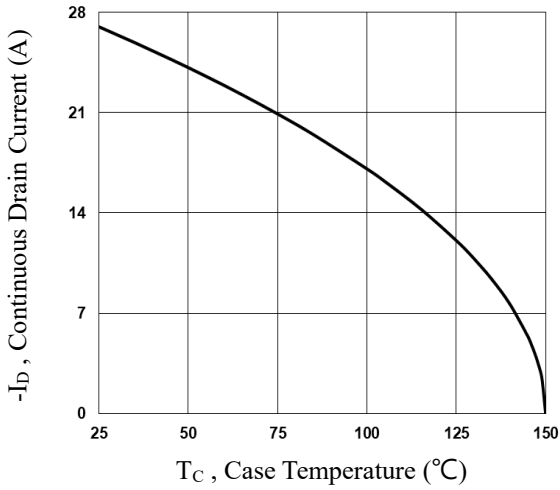


Fig.7 Continuous Drain Current vs. T_c

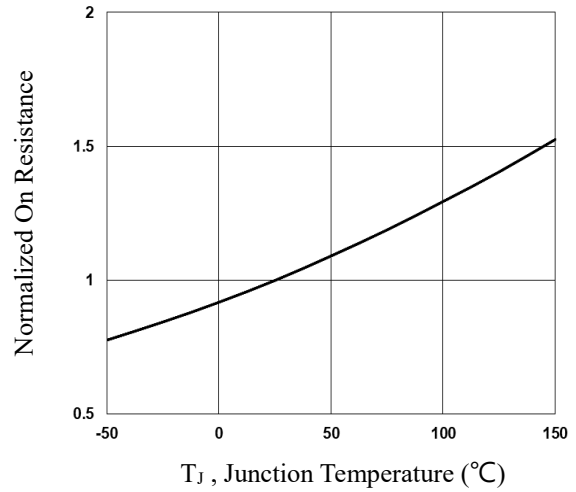


Fig.8 Normalized $R_{DS(on)}$ vs. T_j

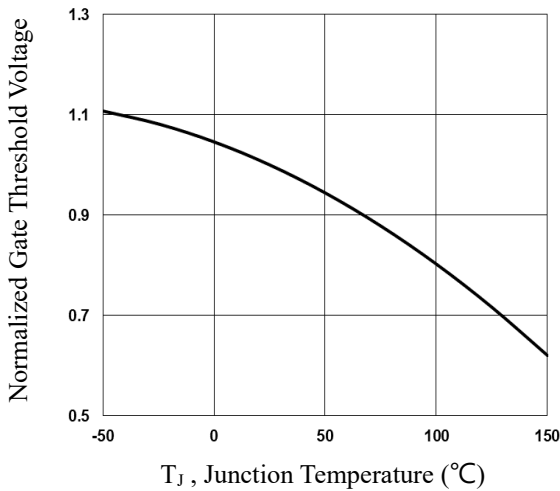


Fig.9 Normalized V_{th} vs. T_j

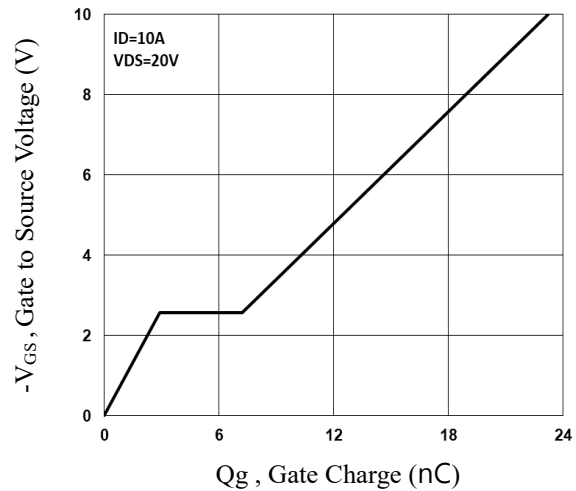


Fig.10 Gate Charge Waveform

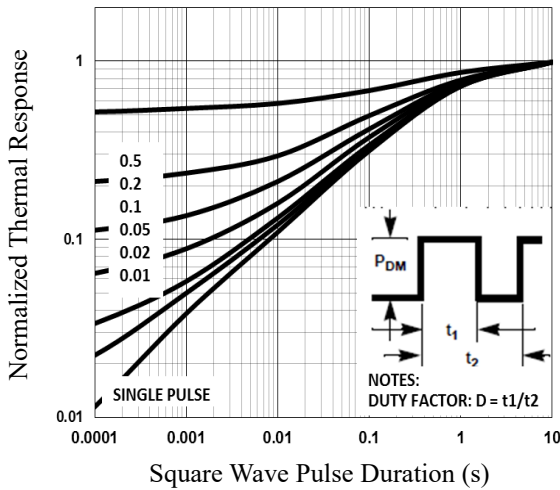


Fig.11 Normalized Transient Impedance

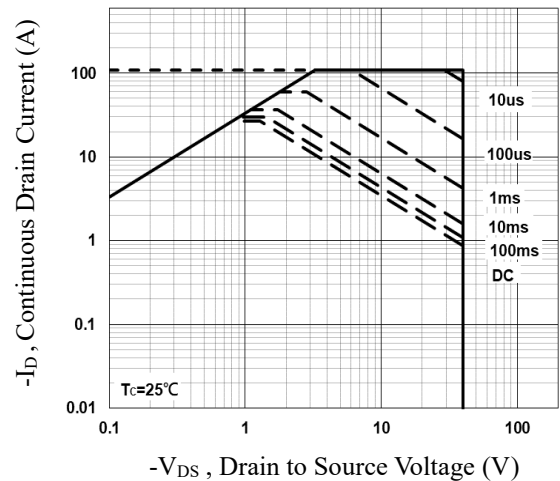


Fig.12 Maximum Safe Operation Area

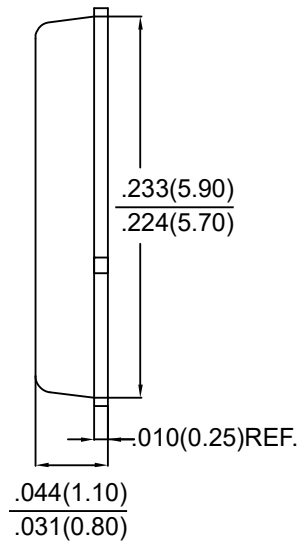
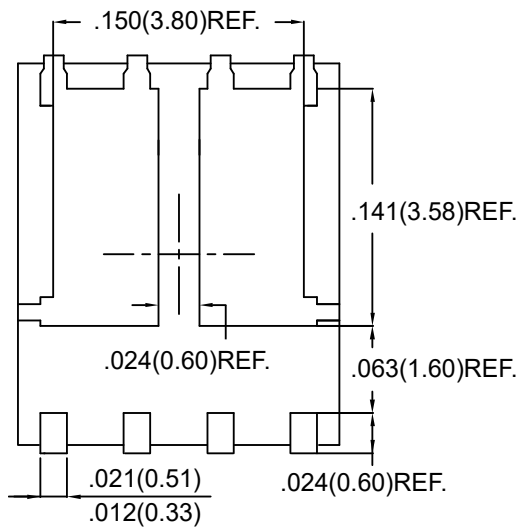
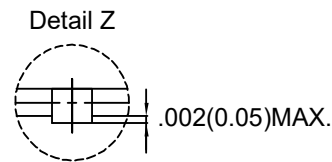
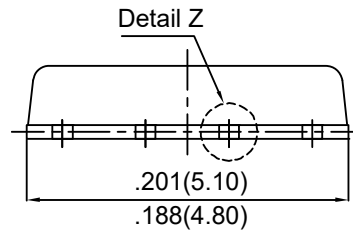
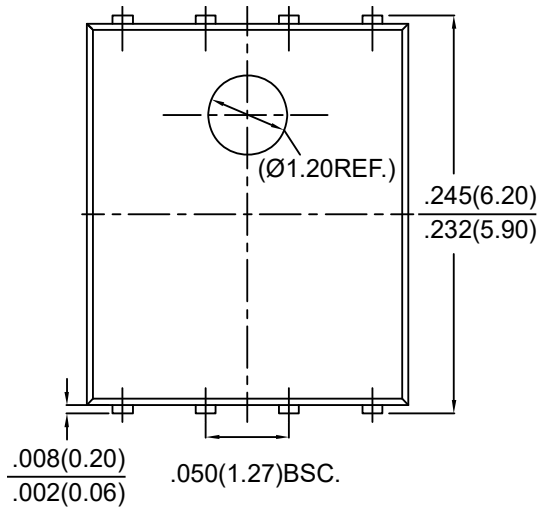


P5MBD012



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Package Outline Dimensions



PPAK5x6 Dual

Dimensions in inches and (millimeters)



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