P5MNC1P6

30V N-Channel MOSFETs

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.

BV_{DSS}	$R_{DS(ON)}$	I_D
30 V	1.6 mΩ	130 A

Features

- $R_{DS(ON)} \leqq 1.6mΩ@V_{GS}=10V$
- Fast switching
- Improved dv/dt capability
- Green Device Available

PPAK5X6 Pin Configuration
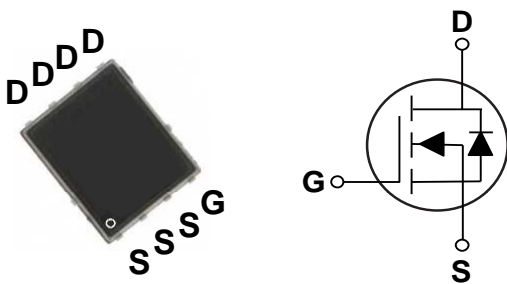
Applications

- MB / VGA / Server Vcore
- POL Applications
- SMPS 2nd SR
- BMS System

Absolute Maximum Ratings $T_C=25^oC$ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Drain Current - Continuous ($T_C=25^oC$)	130	A
	Drain Current - Continuous ($T_C=100^oC$)	82	A
I_{DM}	Drain Current - Pulsed (NOTE 1)	520	A
EAS	Single Pulse Avalanche Energy (NOTE 2)	245	mJ
IAS	Single Pulse Avalanche Current (NOTE 2)	70	A
P_D	Power Dissipation ($T_C=25^oC$)	166	W
	Power Dissipation - Derate above 25°C	1.33	W/^{o}C
T_J	Operating Junction Temperature Range	-50 to 175	^{o}C
T_{STG}	Storage Temperature Range	-50 to 175	^{o}C
Marking Code		NC1P6	

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{θJA}$	Thermal Resistance Junction to Ambient	---	62	^{o}C/W
$R_{θJC}$	Thermal Resistance Junction to Case	---	0.9	^{o}C/W

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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	30	---	---	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=27V , V_{GS}=0V , T_J=25°C	---	---	1	uA
		V_{DS}=24V , V_{GS}=0V , T_J=85°C	---	---	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 (NOTE 3)	V_{GS}=10V , I_D=30A	---	1.2	1.6	mΩ
		V_{GS}=4.5V , I_D=15A	---	1.8	2.4	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=250uA	1.0	1.6	2.5	V
gfs	Forward Transconductance	V_{DS}=10V , I_D=15A	---	30	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge	V_{DS}=15V , V_{GS}=4.5V , I_D=10A (NOTE 3 、 4)	---	65	120	nC
Q_{gs}	Gate-Source Charge		---	16	30	
Q_{gd}	Gate-Drain Charge		---	21	40	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=15V , V_{GS}=10V , R_G=3.3Ω , I_D=1A (NOTE 3 、 4)	---	28	56	nS
T_r	Rise Time		---	45	90	
$T_{d(off)}$	Turn-Off Delay Time		---	105	200	
T_f	Fall Time		---	40	80	
C_{iss}	Input Capacitance	V_{DS}=25V , V_{GS}=0V , F=1MHz	---	7720	11000	pF
C_{oss}	Output Capacitance		---	945	1400	
C_{rss}	Reverse Transfer Capacitance		---	435	650	
R_g	Gate resistance	V_{GS}=0V , V_{DS}=0V , f=1MHz	---	1.2	2.4	Ω

Guaranteed Avalanche Energy

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy	V_{DD}=25V , L=0.1mH , IAS=30A	45	---	---	mJ

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	---	---	130	A
I_{SM}	Pulsed Source Current (NOTE 3)		---	---	260	A
V_{SD}	Diode Forward Voltage (NOTE 3)	V_{GS}=0V , I_S=1A , T_J=25°C	---	---	1	V

NOTES：

1. Repetitive Rating：Pulsed width limited by maximum junction temperature.

2. V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=70A, R_G=25Ω, Starting T_J=25°C.

3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.

4. Essentially independent of operating temperature.

30V N-Channel MOSFETs
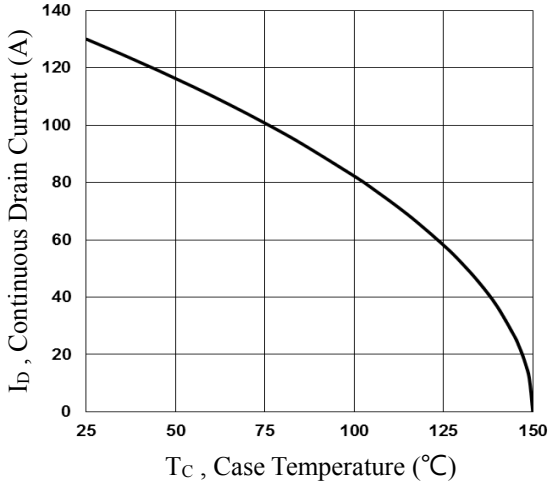
Characteristics Curves

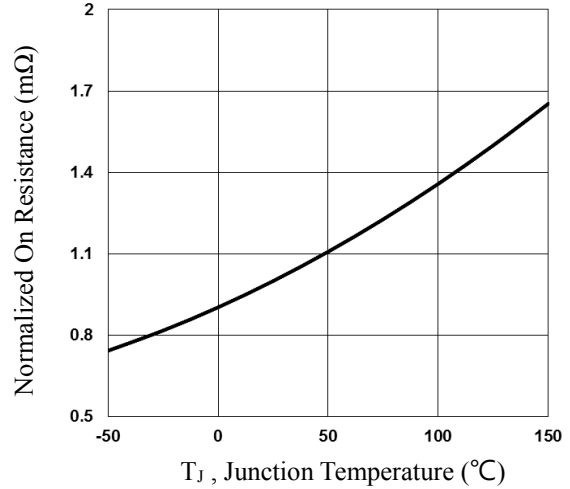**Fig.1   Continuous Drain Current vs. T$_C$**

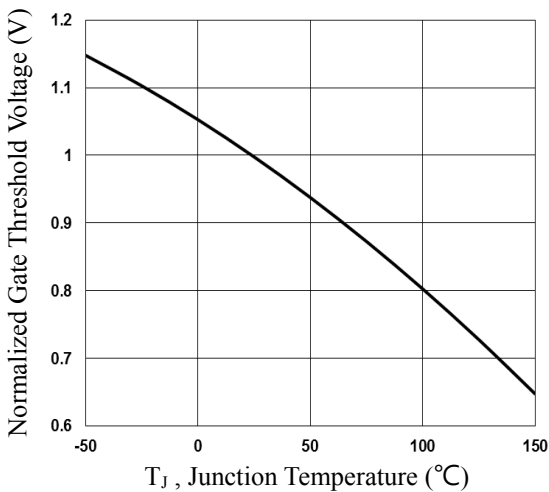
Fig.2   Normalized RDSON vs. T$_J$

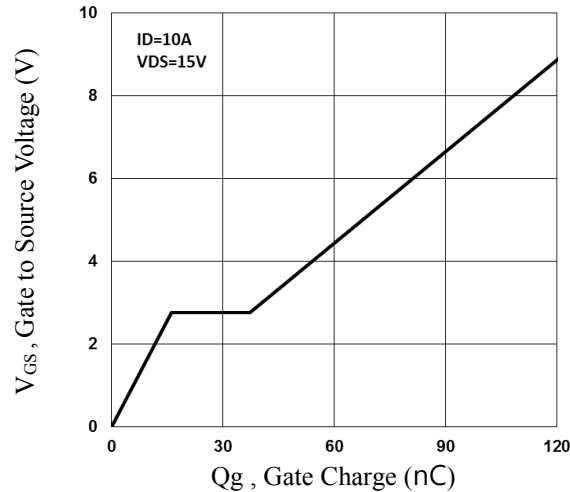**Fig.3   Normalized V$_{th}$ vs. T$_J$**

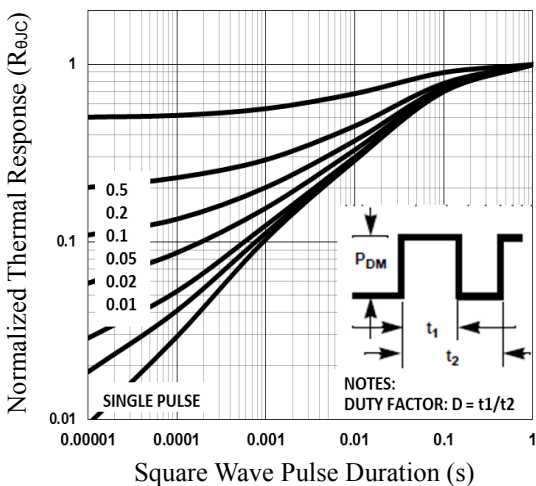**Fig.4   Gate Charge Waveform**

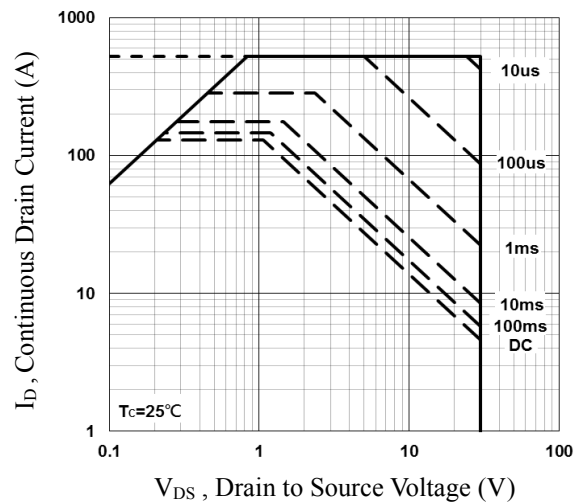**Fig.5   Normalized Transient Impedance**

Fig.6   Maximum Safe Operation Area

Characteristics Curves
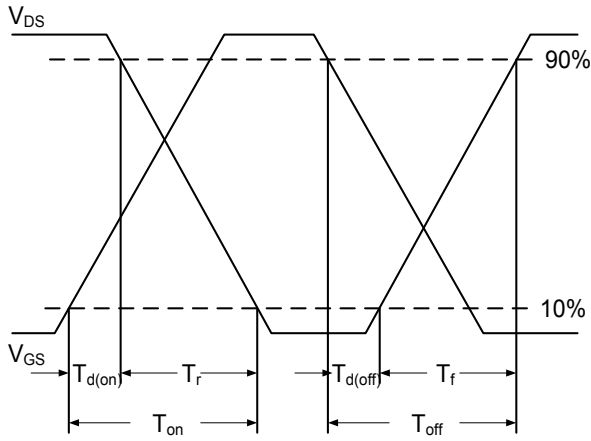
Fig.7   Switching Time Waveform

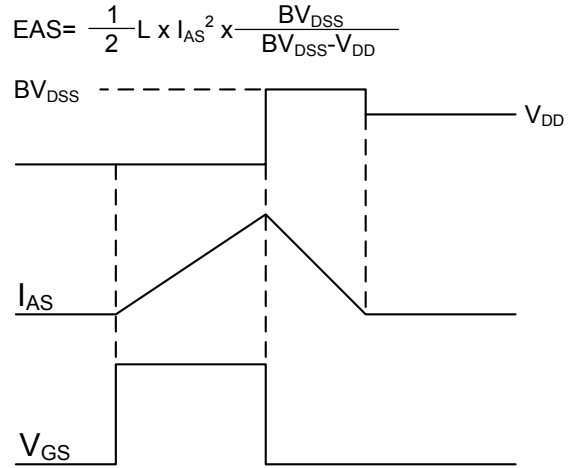$$EAS= \frac{1}{2}L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

Fig.8   EAS Waveform

Package Outline Dimensions
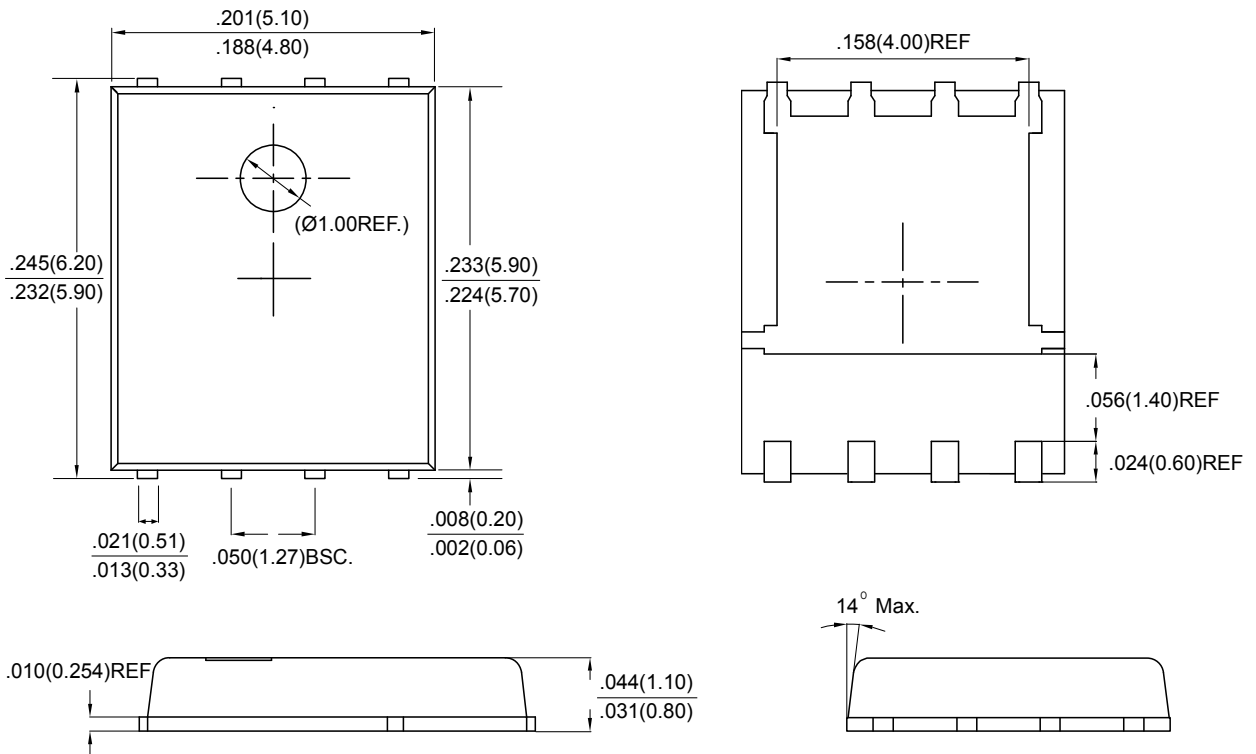
PPAK5X6

Dimensions in inches and (millimeters)

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