



# P3MNC4P5A



## 30V N-Channel MOSFETs

### General Description

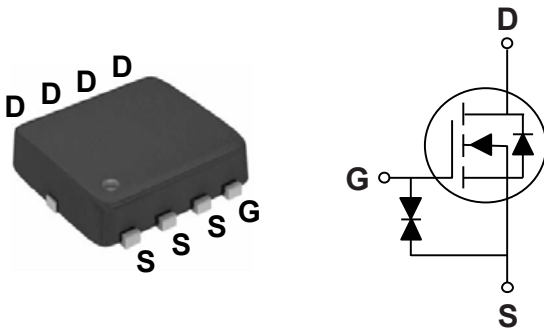
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
30 V	4.5 m $\Omega$	60 A

### Features

- $R_{DS(ON)} \leq 4.5m\Omega @ V_{GS}=10V$
- Improved dv/dt Capability
- Fast Switching
- Green Device Available
- ESD Protection Diode Embedded

PPAK3X3 Pin Configuration



### Applications

- Networking
- Load Switch
- LED Applications

### Absolute Maximum Ratings $T_C=25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current - Continuous ( $T_C=25^\circ C$ )	60	A
$I_{DM}$	Drain Current - Pulsed (NOTE 1)	240	A
EAS	Single Pulse Avalanche Energy (NOTE 2)	60	mJ
IAS	Single Pulse Avalanche Current (NOTE 2)	34.5	A
$P_D$	Power Dissipation ( $T_C=25^\circ C$ )	30.5	W
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
Marking Code		NC4P5A	

### Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction to Case	4.1	$^\circ C/W$



Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	30	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =27V, V <sub>GS</sub> =0V	---	---	1	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±20	uA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	---	---	4.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A	---	---	7.5	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.2	---	2.5	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>DS</sub> =3A	---	6	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =15V, V <sub>GS</sub> =10V, I <sub>D</sub> =30A	---	11	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	1.9	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	2.6	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =15V, V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω, I <sub>D</sub> =30A	---	2	---	nS
T <sub>r</sub>	Rise Time		---	3	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	5	---	
T <sub>f</sub>	Fall Time		---	5	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, F=1MHz	---	840	---	pF
C <sub>oss</sub>	Output Capacitance		---	620	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	10	---	
R <sub>g</sub>	Gate Resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	---	1.3	---	Ω

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	60	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =1A	---	---	1	V

NOTES :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=34.5A, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C.
3. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
4. Essentially independent of operating temperature.



Characteristics Curves

FIG. 1- $I_D$  vs  $T_C$

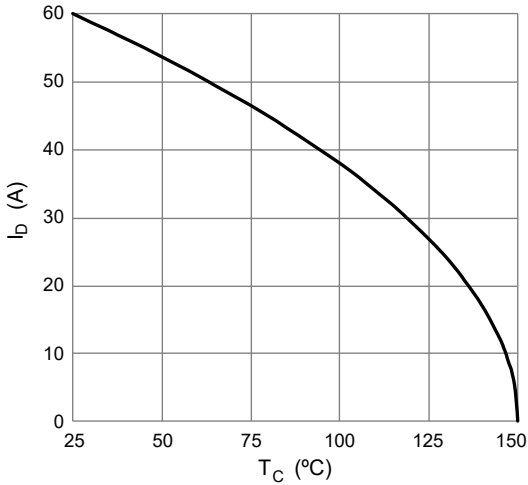


FIG. 2-Normalized  $R_{DS(ON)}$  vs  $T_J$

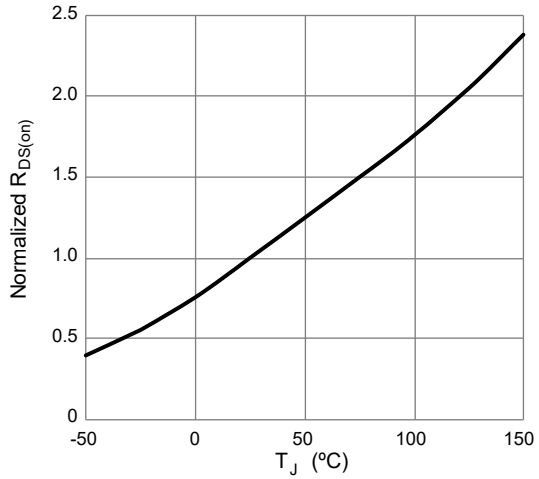


FIG. 3-Normalized  $V_{th}$  vs  $T_J$

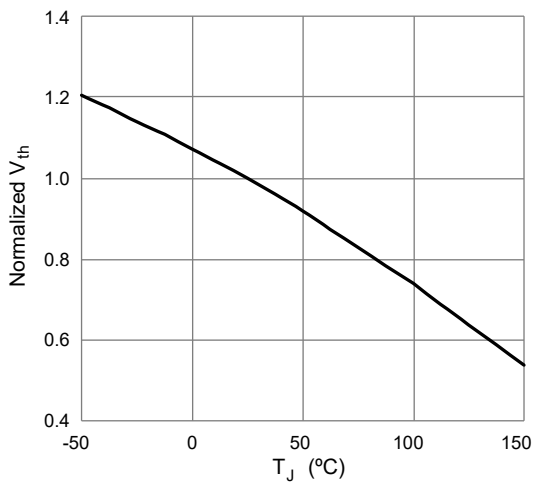


FIG. 4-Gate Charge Characteristics

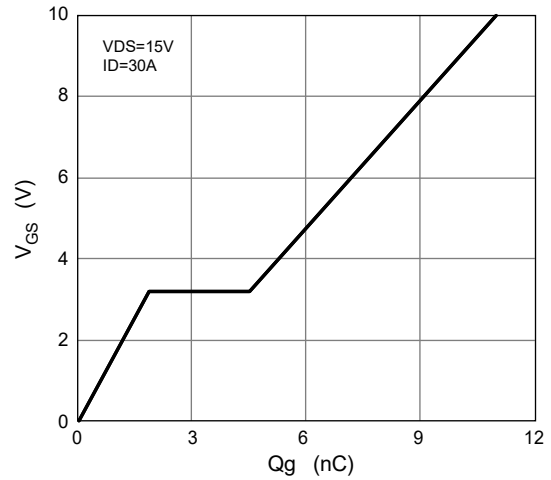


FIG. 5-Normalized Transient Impedance

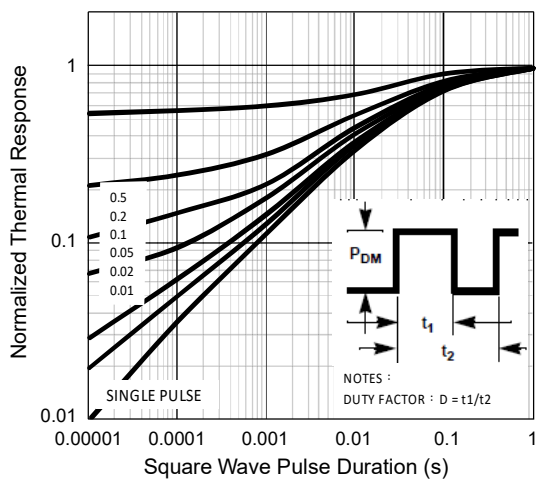
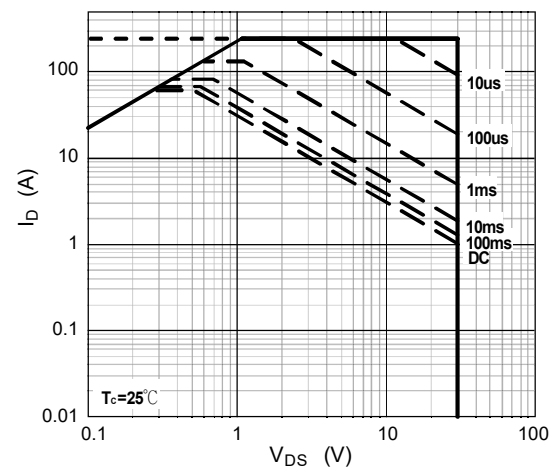


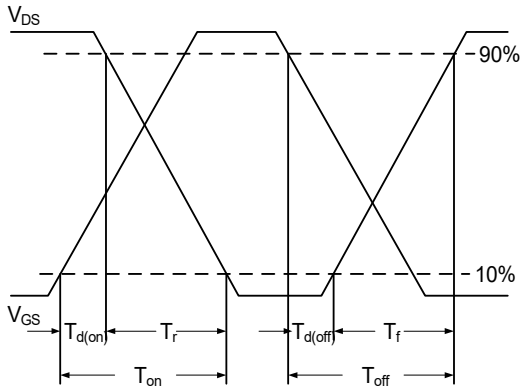
FIG. 6-Maximum Safe Operating Area



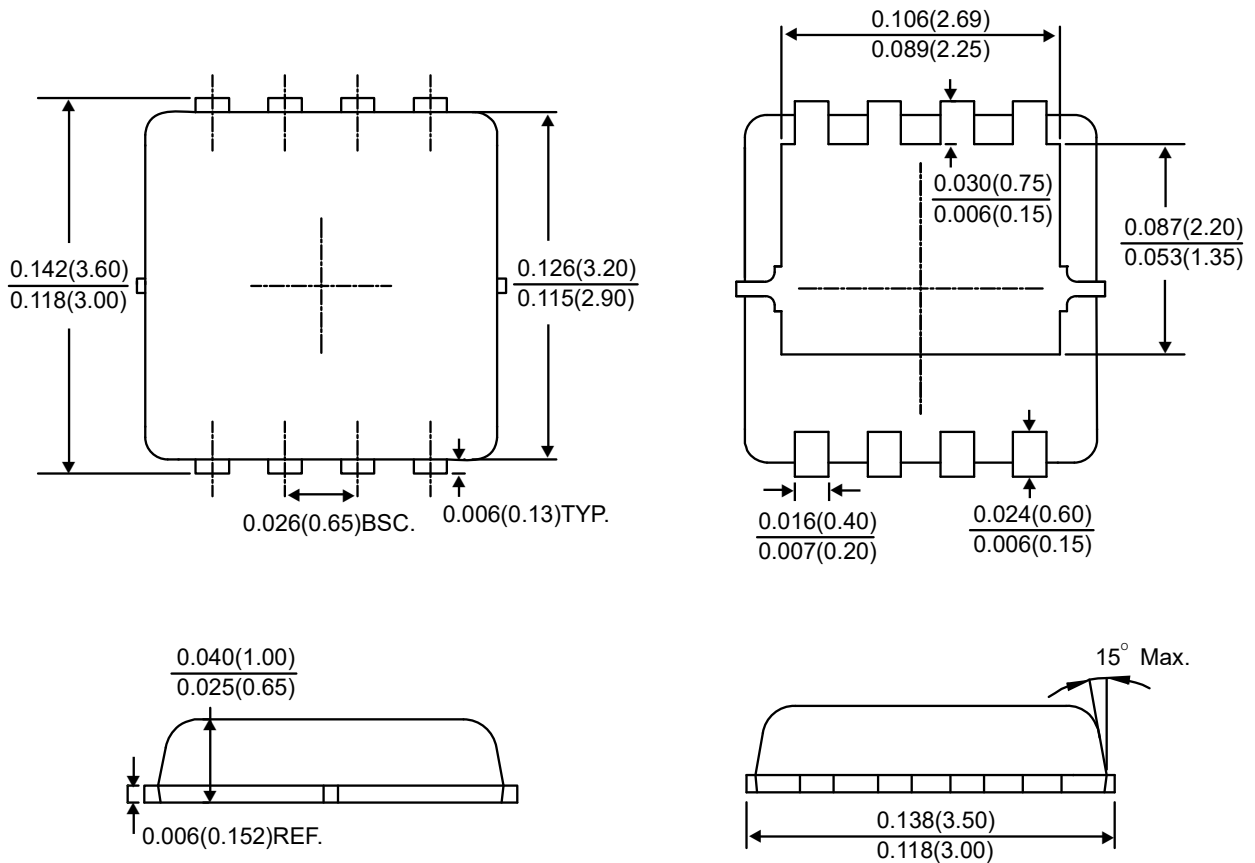


**Characteristics Curves**

FIG. 7-Switching Time Waveform



**Package Outline Dimensions**



**PPAK3X3**

Dimensions in inches and (millimeters)



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