



# P3MNC4P0



## 30V N-Channel MOSFETs

### General Description

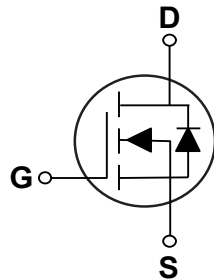
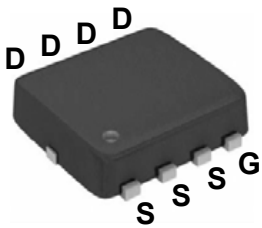
The P3MNC4P0 is the high cell density trench N-ch MOSFETs, which provide excellent  $R_{DS(ON)}$  and gate charge for most of the synchronous buck converter applications.

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
30 V	4 m $\Omega$	80 A

### Features

- $R_{DS(ON)} \leq 4m\Omega @ V_{GS}=10V$
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Green Device Available

PPAK3X3 Pin Configuration



### Applications

- MB / VGA / Vcore
- POL Applications
- SMPS 2<sup>nd</sup> SR

### Absolute Maximum Ratings $T_C=25^\circ\text{C}$ 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 ( $T_C=25^\circ\text{C}$ )	80	A
	Drain Current - Continuous ( $T_C=100^\circ\text{C}$ )	50	A
$I_{DM}$	Pulsed Drain Current (NOTE 1)	160	A
EAS	Single Pulse Avalanche Energy (NOTE 2)	144.7	mJ
IAS	Avalanche Current	53.8	A
$P_D$	Power Dissipation (NOTE 3)	43.4	W
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
Marking Code		NC4P0 , B3016	

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	---	75	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	2.88	$^\circ\text{C/W}$



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> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA

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	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A	---	---	6	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.0	---	2.5	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =30A	---	26.5	---	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> =4.5V, I <sub>D</sub> =15A	---	70	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	12	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	17	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =15V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =15A	---	11	---	nS
T <sub>r</sub>	Rise Time		---	120	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	25	---	
T <sub>f</sub>	Fall Time		---	60	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, F=1MHz	---	3500	---	pF
C <sub>oss</sub>	Output Capacitance		---	386	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	358	---	
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	---	1.4	---	Ω

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current (NOTE 4)	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	80	A
I <sub>SM</sub>	Pulsed Source Current (NOTE 1、4)		---	---	160	A
V <sub>SD</sub>	Diode Forward Voltage (NOTE 1)	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1.2	V

NOTES :

1. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
2. The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, I<sub>AS</sub>=53.8A, L=0.1mH.
3. The power dissipation is limited by 150°C junction temperature.
4. The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.



Characteristics Curves

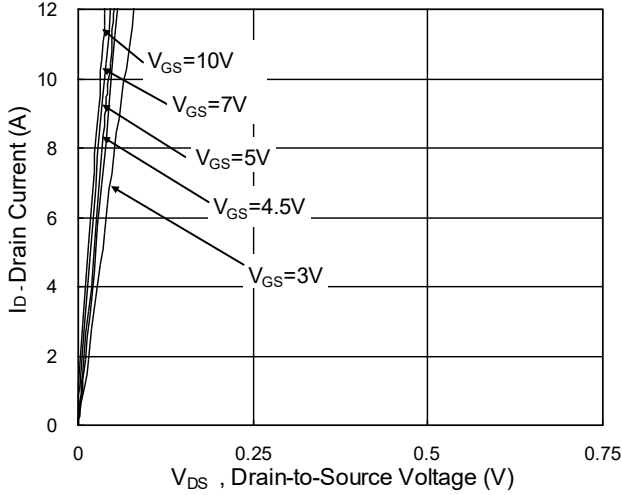


Fig.1 Typical Output Characteristics

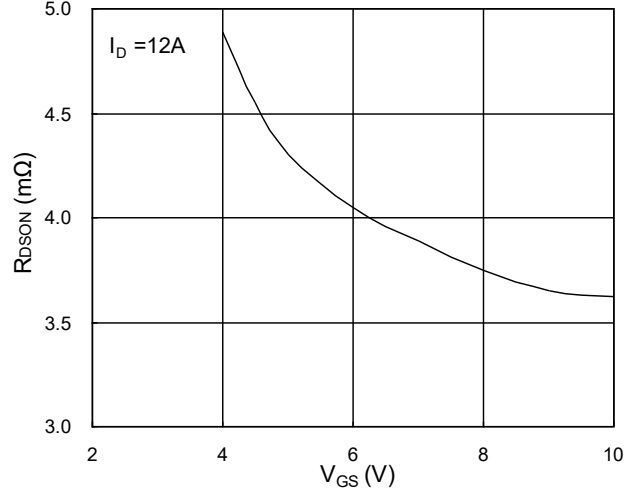


Fig.2 On-Resistance vs. G-S Voltage

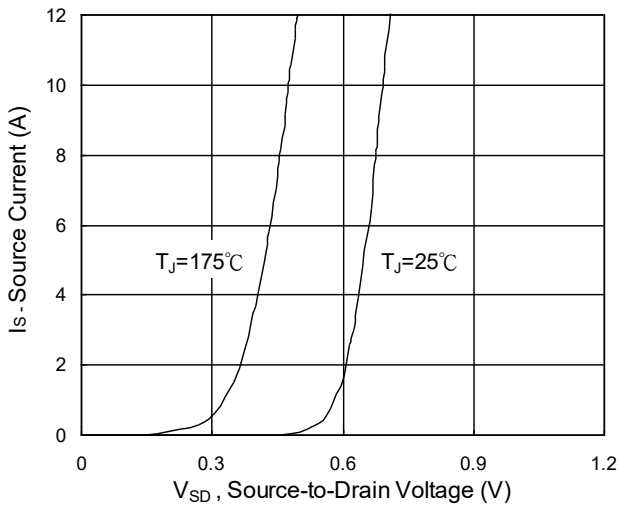


Fig.3 Forward Characteristics of Reverse

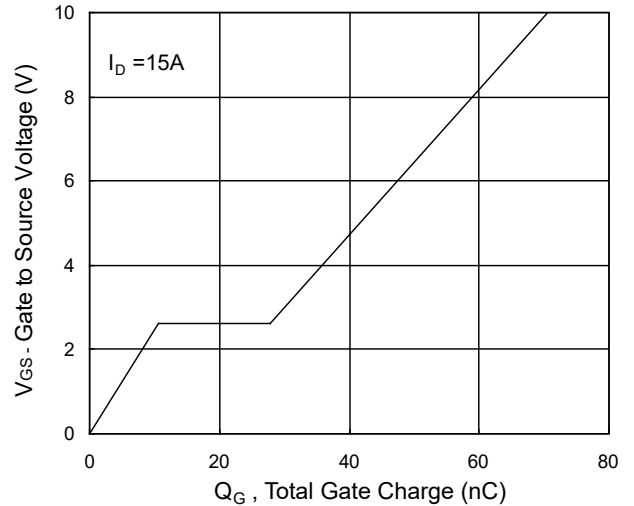


Fig.4 Gate-Charge Characteristics

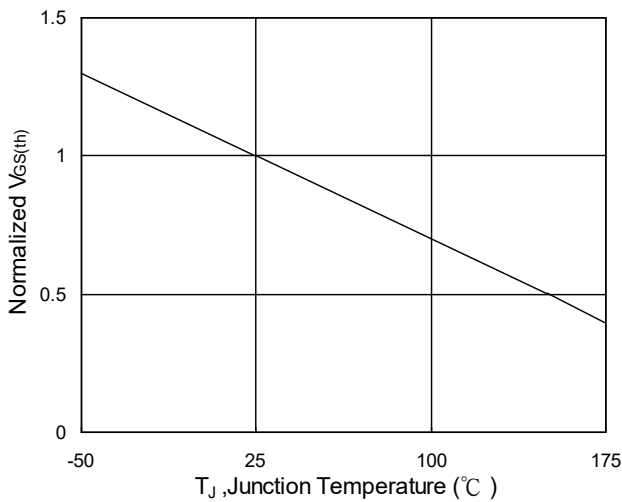


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

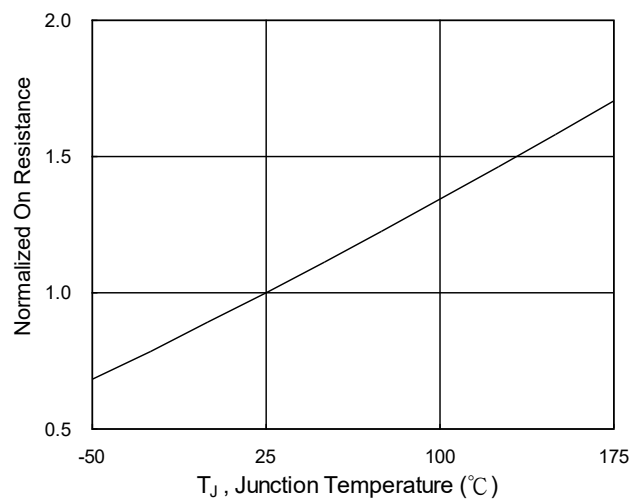


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$



Characteristics Curves

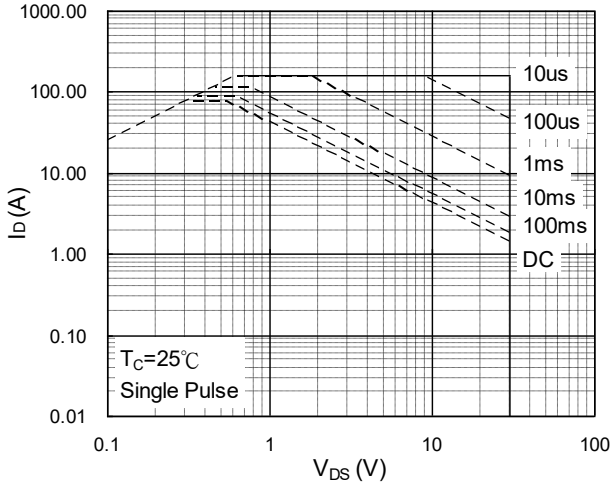


Fig.7 Safe Operating Area

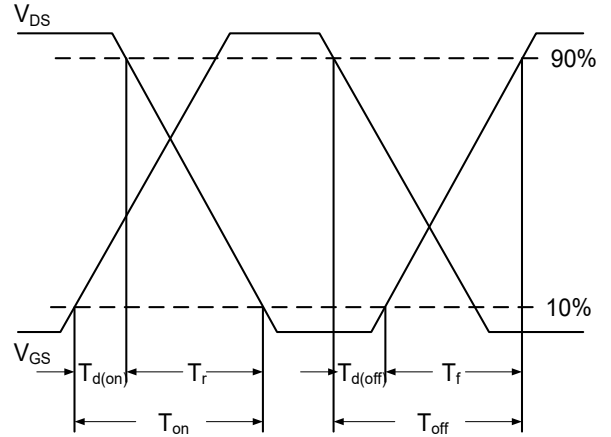
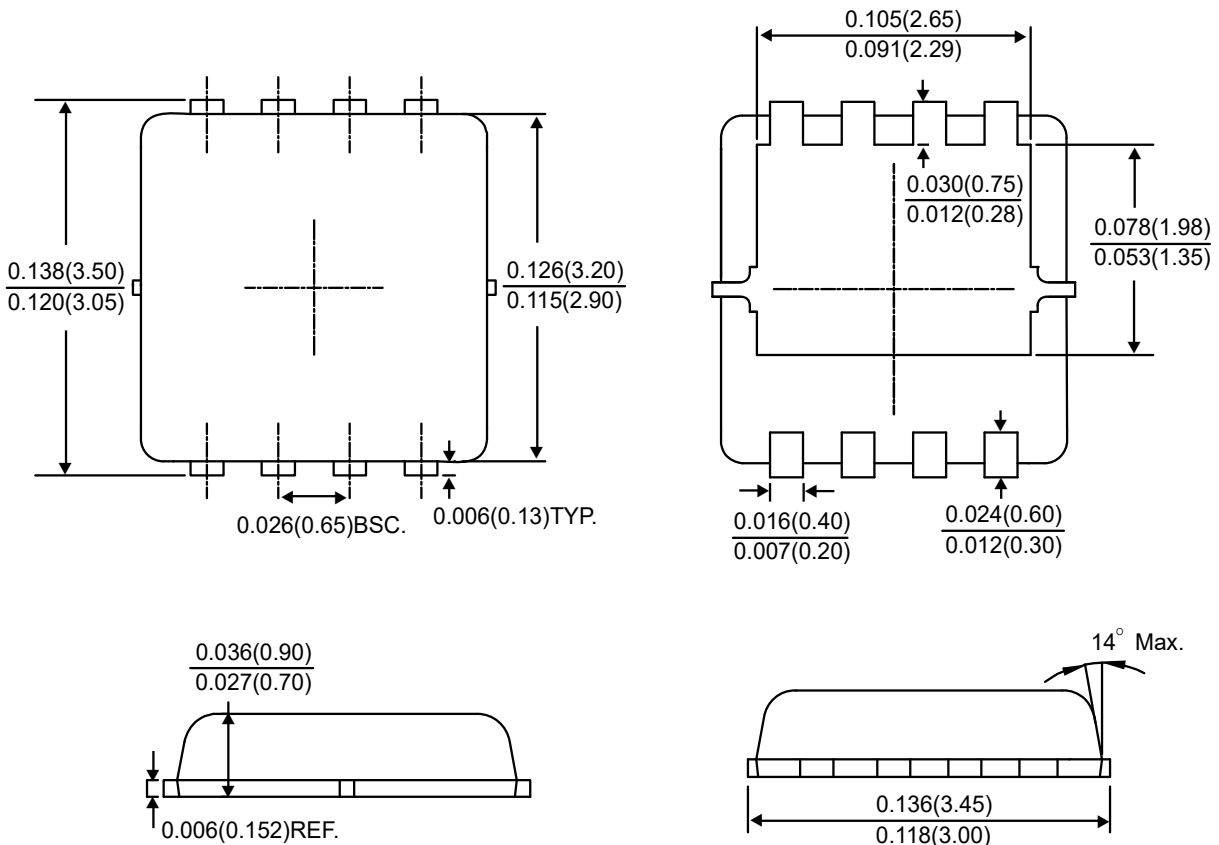


Fig.8 Switching Time Waveform

Package Outline Dimensions



PPAK3X3

Dimensions in inches and (millimeters)



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