



# 30V N-Channel MOSFETs

## General Description

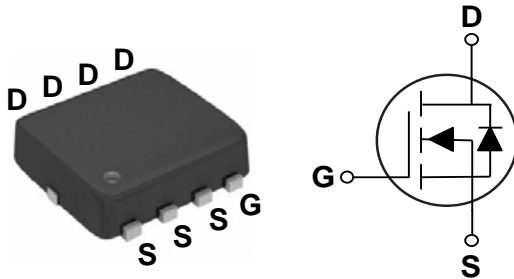
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
30 V	7.2 mΩ	54 A

## Features

- 30V, 54A,  $R_{DS(ON)} \leq 7.2m\Omega @ V_{GS}=10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

PPAK3X3 Pin Configuration



## Applications

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

## Absolute Maximum Ratings $T_C=25^\circ C$ 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 ( $T_C=25^\circ C$ )	54	A
	Drain Current - Continuous ( $T_C=100^\circ C$ )	34	A
$I_{DM}$	Drain Current - Pulsed (NOTE 1)	216	A
$E_{AS}$	Single Pulse Avalanche Energy (NOTE 2)	45	mJ
$I_{AS}$	Single Pulse Avalanche Current (NOTE 2)	30	A
$P_D$	Power Dissipation ( $T_C=25^\circ C$ )	34.7	W
	Power Dissipation - Derate above 25°C	0.28	W/°C
$T_J$	Operating Junction Temperature Range	-50 to 150	°C
$T_{STG}$	Storage Temperature Range	-50 to 150	°C
Marking Code		NC7P2	

## Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	---	62	°C/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	3.6	°C/W

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	$V_{GS}=0V, I_D=250\mu A$	30	---	---	V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=30V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	1	$\mu A$
		$V_{DS}=24V, V_{GS}=0V, T_J=125^{\circ}\text{C}$	---	---	10	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA

## On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{DS(ON)}$	Static Drain-Source On-Resistance (NOTE 3)	$V_{GS}=10V, I_D=16A$	---	5.7	7.2	m $\Omega$
		$V_{GS}=4.5V, I_D=8A$	---	8.4	11.5	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.6	2.5	V
gfs	Forward Transconductance	$V_{DS}=10V, I_D=3A$	---	15	---	S

## Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$Q_g$	Total Gate Charge	$V_{DS}=15V, V_{GS}=10V, I_D=20A$ (NOTE 3 & 4)	---	11.4	22	nC
$Q_{gs}$	Gate-Source Charge		---	2.1	4	
$Q_{gd}$	Gate-Drain Charge		---	2.5	5	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega,$ $I_D=15A$ (NOTE 3 & 4)	---	4.8	9	nS
$T_r$	Rise Time		---	12.5	24	
$T_{d(off)}$	Turn-Off Delay Time		---	27.6	52	
$T_f$	Fall Time		---	8.2	16	
$C_{iss}$	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, F=1\text{MHz}$	---	850	1700	pF
$C_{oss}$	Output Capacitance		---	133	260	
$C_{rss}$	Reverse Transfer Capacitance		---	78	160	
Rg	Gate resistance		$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	2.4	

## Guaranteed Avalanche Energy

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$E_{AS}$	Single Pulse Avalanche Energy	$V_{DD}=25V, L=0.1\text{mH}, I_{AS}=15A$	12	---	---	mJ

## Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V, \text{Force Current}$	---	---	54	A
$I_{SM}$	Pulsed Source Current (NOTE 3)		---	---	108	A
$V_{SD}$	Diode Forward Voltage (NOTE 3)	$V_{GS}=0V, I_S=1A, T_J=25^{\circ}\text{C}$	---	---	1	V
t <sub>rr</sub>	Reverse Recovery Time	$V_{GS}=0V, I_S=10A, di/dt=100A/\mu s,$ $T_J=25^{\circ}\text{C}$	---	126	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	165	---	nC

## NOTES :

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



Characteristics Curves

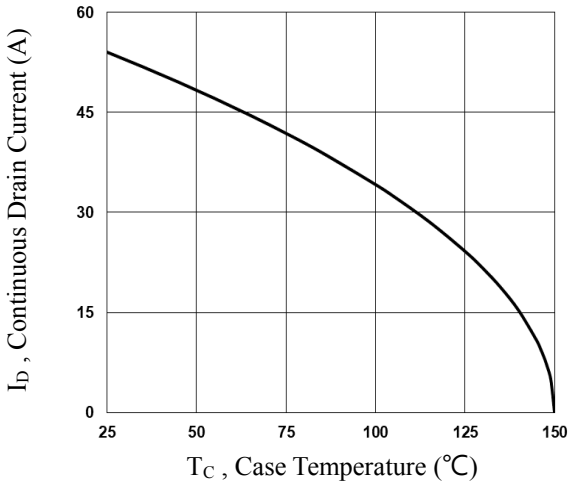


Fig.1 Continuous Drain Current vs.  $T_C$

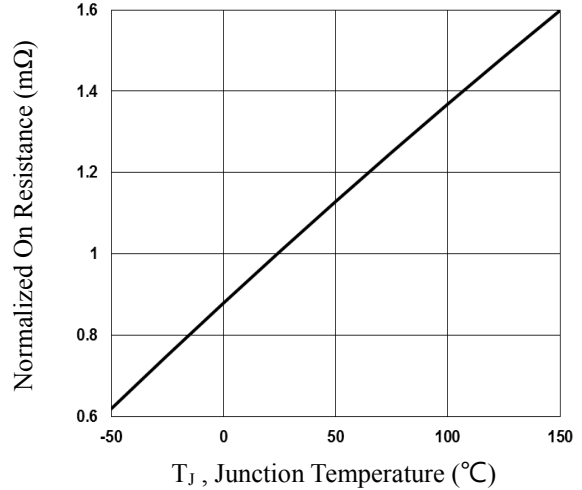


Fig.2 Normalized  $R_{DS(ON)}$  vs.  $T_J$

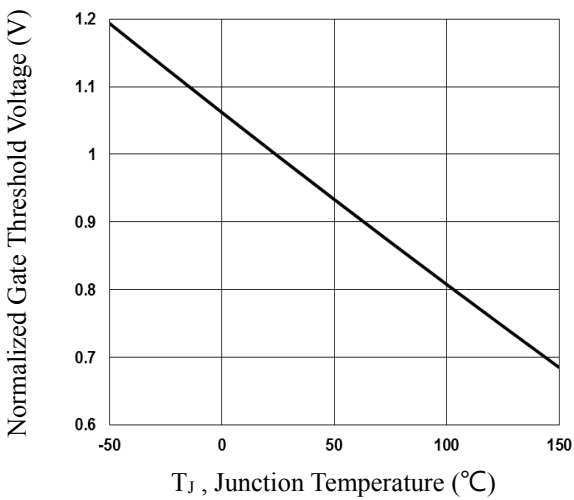


Fig.3 Normalized  $V_{th}$  vs.  $T_J$

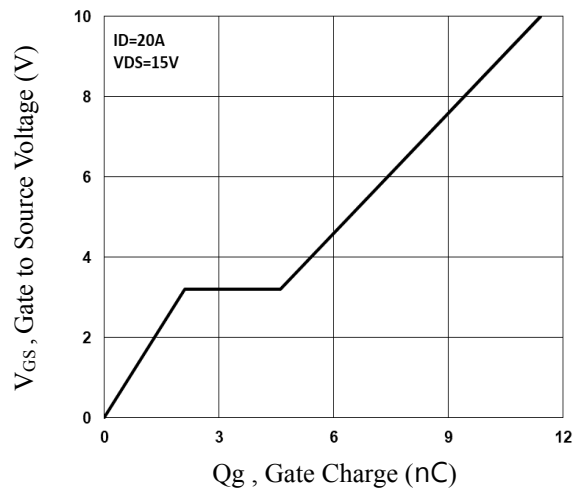


Fig.4 Gate Charge Waveform

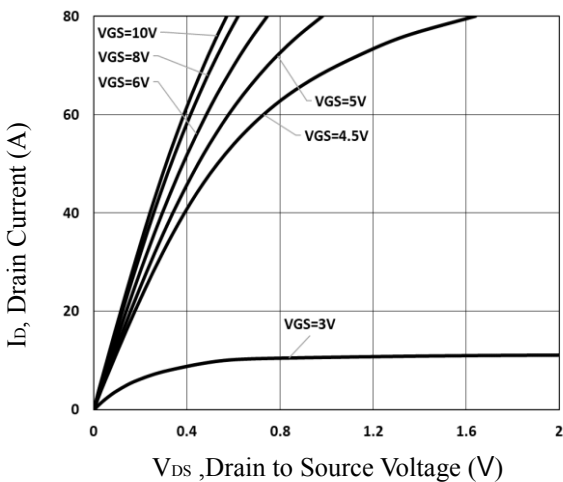


Fig.5 Typical Output Characteristics

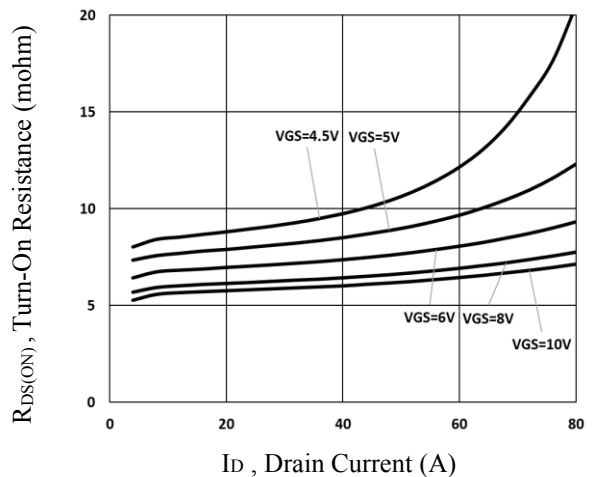


Fig.6 Turn-On Resistance vs.  $I_D$



Characteristics Curves

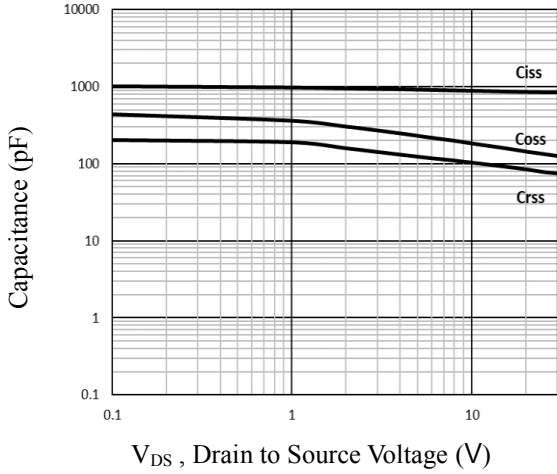


Fig.7 Capacitance Characteristics

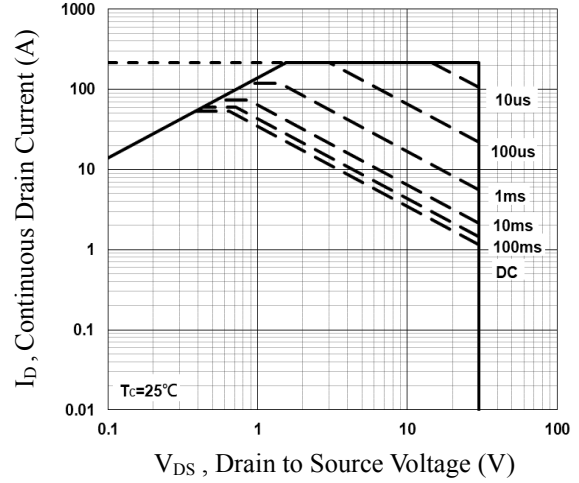


Fig.8 Maximum Safe Operation Area

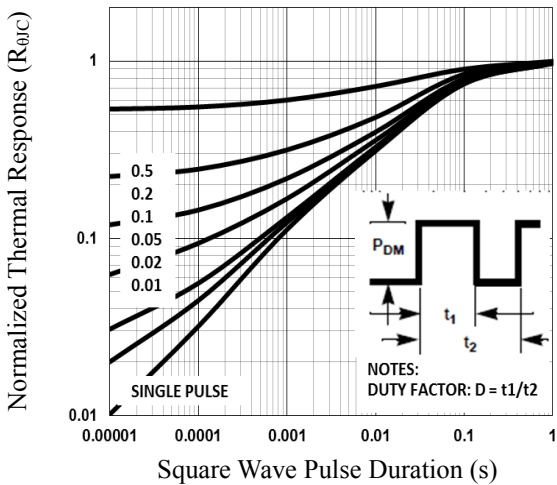


Fig.9 Normalized Transient Impedance

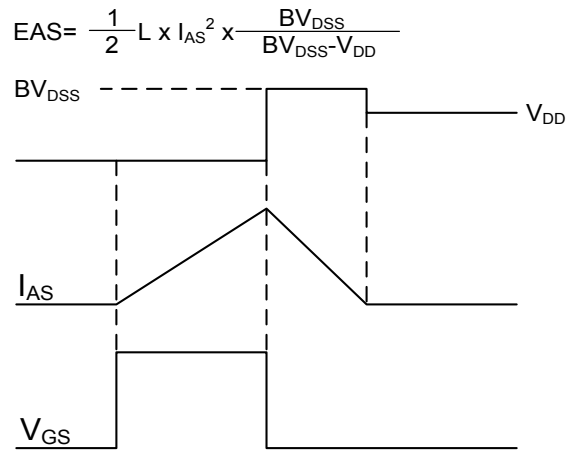


Fig.10 EAS Waveform

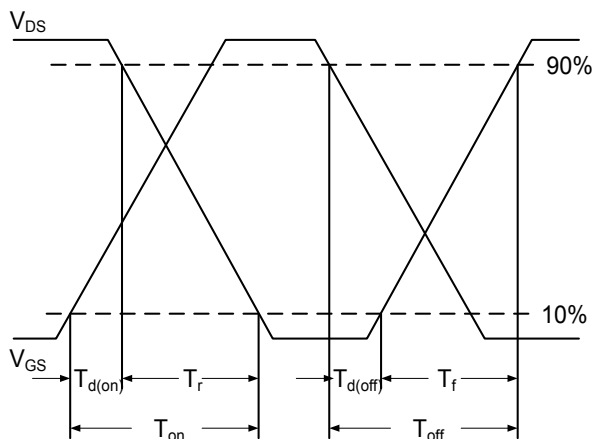


Fig.11 Switching Time Waveform

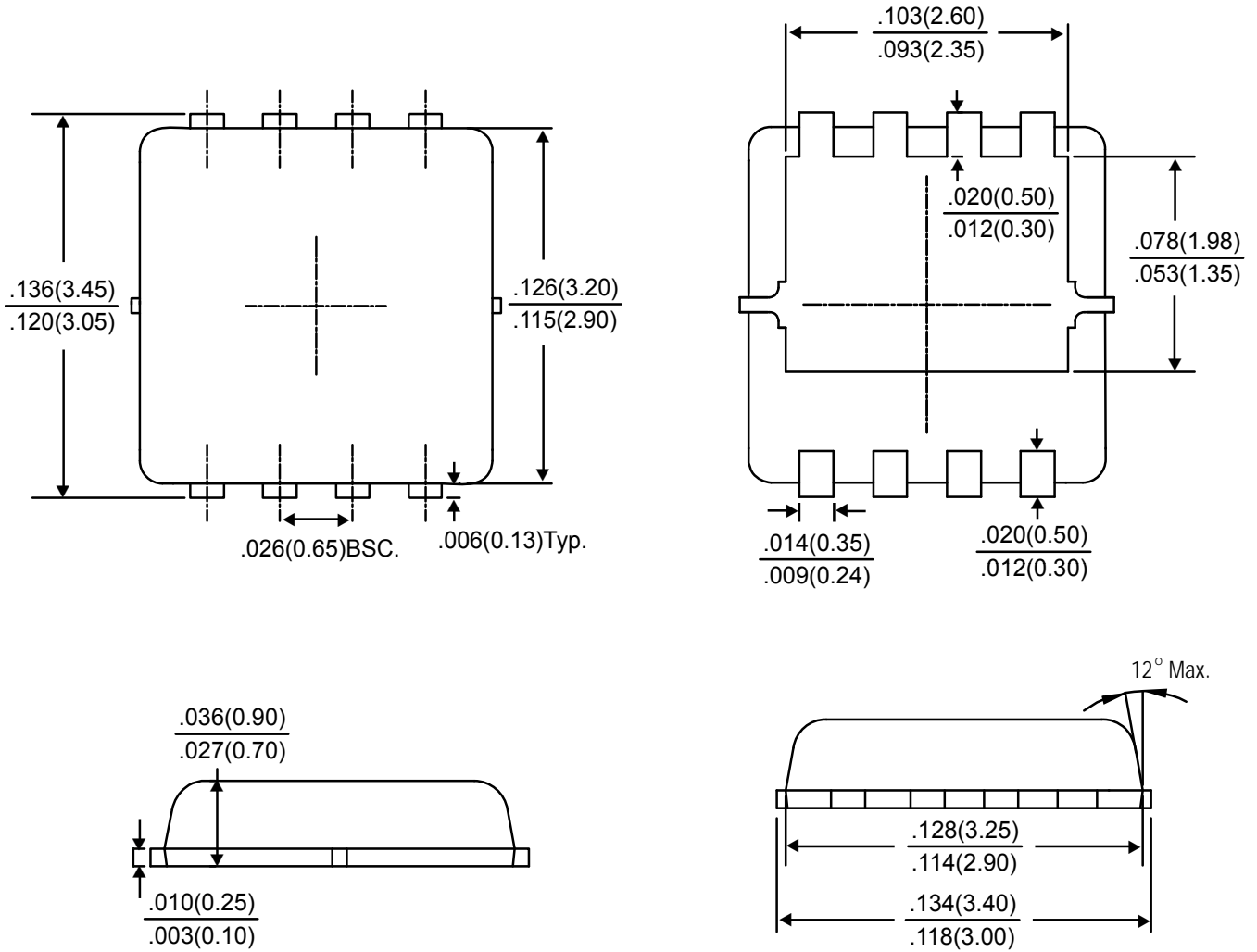


# P3MNC7P2



## 30V N-Channel MOSFETs

### Package Outline Dimensions



### PPAK3X3

Dimensions in inches and (millimeters)



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