



60V N-Channel MOSFETs

General Description

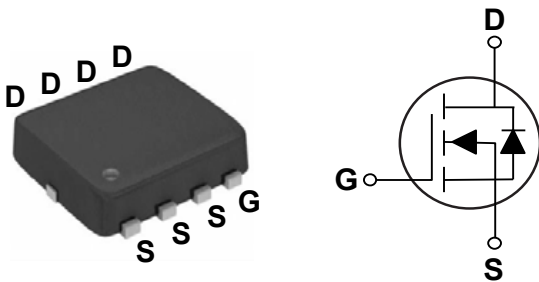
The P3MNG020 is the high cell density trench N-ch MOSFETs, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

BV_{DSS}	$R_{DS(ON)}$	I_D
60 V	20 m Ω	33 A

Features

- $R_{DS(ON)} \leq 20m\Omega @ V_{GS}=10V$
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Green Device Available

PPAK3X3 Pin Configuration



Applications

- Motor Drive
- Power Tools
- LED Lighting

Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current - Continuous ($T_C=25^\circ\text{C}$)	33	A
	Drain Current - Continuous ($T_C=100^\circ\text{C}$)	21	A
I_{DM}	Pulsed Drain Current (NOTE 1)	80	A
EAS	Single Pulse Avalanche Energy (NOTE 2)	39.2	mJ
IAS	Avalanche Current	28	A
P_D	Power Dissipation (NOTE 3)	42	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		NG020 , B6006	

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	---	3	$^\circ\text{C/W}$



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	60	---	---	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =48V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =48V, V _{GS} =0V, T _J =55°C	---	---	5	
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 =8A	---	---	20	mΩ
		V _{GS} =4.5V, I _D =6A	---	---	24	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.2	---	2.5	V
gfs	Forward Transconductance	V _{DS} =5V, I _D =8A	---	45	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q _g	Total Gate Charge	V _{DS} =30V, V _{GS} =4.5V, I _D =8A	---	19.3	---	nC
Q _{gs}	Gate-Source Charge		---	7.1	---	
Q _{gd}	Gate-Drain Charge		---	7.6	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =30V, V _{GS} =10V, R _G =3.3Ω, I _D =8A	---	7.2	---	nS
T _r	Rise Time		---	50	---	
T _{d(off)}	Turn-Off Delay Time		---	36.4	---	
T _f	Fall Time		---	7.6	---	
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, F=1MHz	---	2423	---	pF
C _{oss}	Output Capacitance		---	145	---	
C _{rss}	Reverse Transfer Capacitance		---	97	---	
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	---	1.7	---	Ω

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current (NOTE 4)	V _G =V _D =0V, Force Current	---	---	35	A
I _{SM}	Pulsed Source Current (NOTE 1、4)		---	---	80	A
V _{SD}	Diode Forward Voltage (NOTE 1)	V _{GS} =0V, I _S =1A, T _J =25°C	---	---	1	V
t _{rr}	Reverse Recovery Time	I _F =8A, dI/dt=100A/us, T _J =25°C	---	16.3	---	nS
Q _{rr}	Reverse Recovery Charge		---	11	---	nC

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_{DD}=25V, V_{GS}=10V, I_{AS}=28A, L=0.1mH.
3. The power dissipation is limited by 150°C junction temperature.
4. The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.



Characteristics Curves

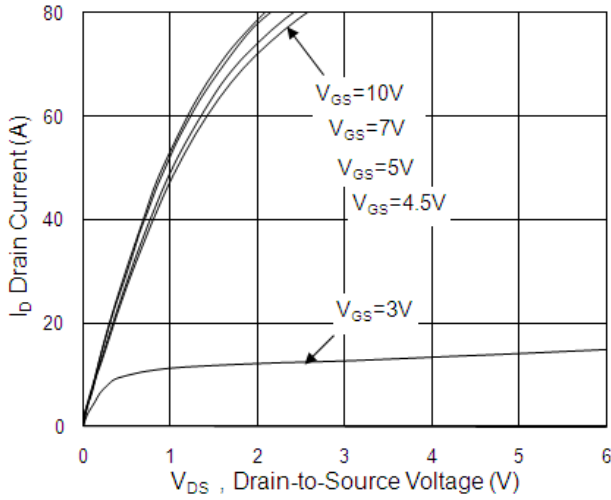


Fig.1 Typical Output Characteristics

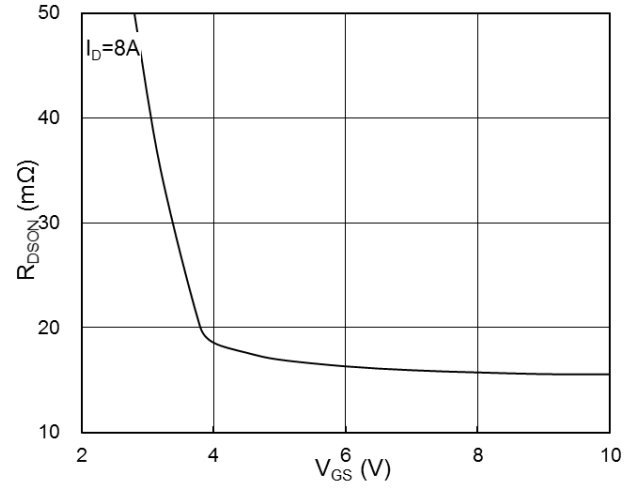


Fig.2 On-Resistance vs. Gate-Source Voltage

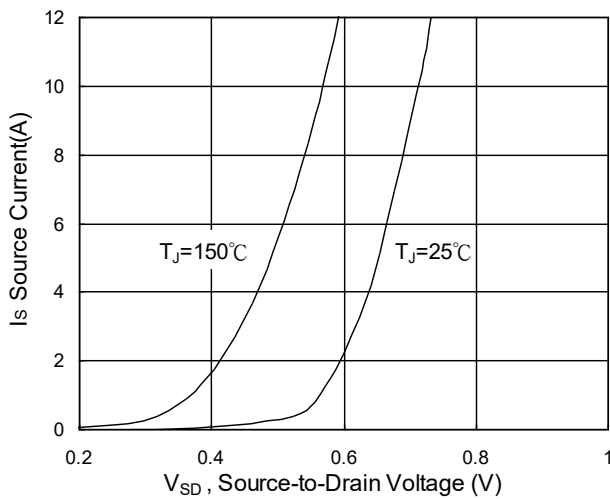


Fig.3 Forward Characteristics of Reverse

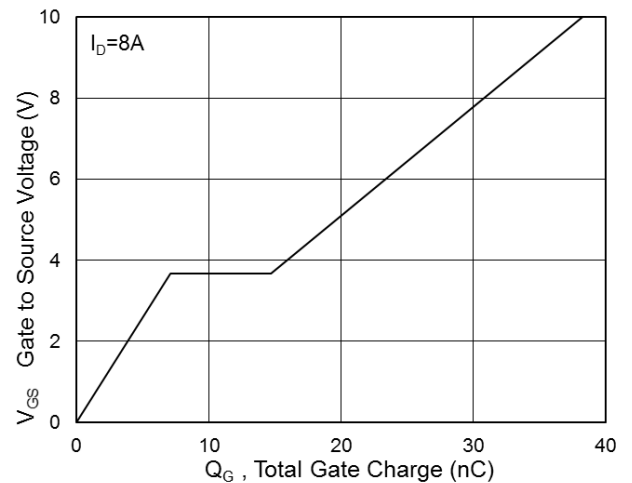


Fig.4 Gate-Charge Characteristics

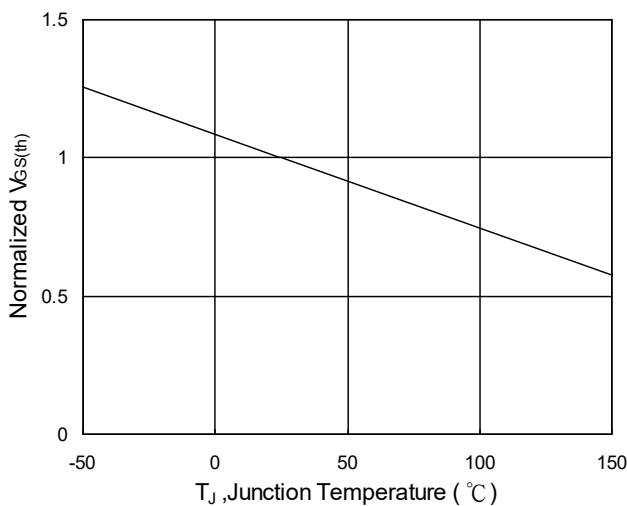


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

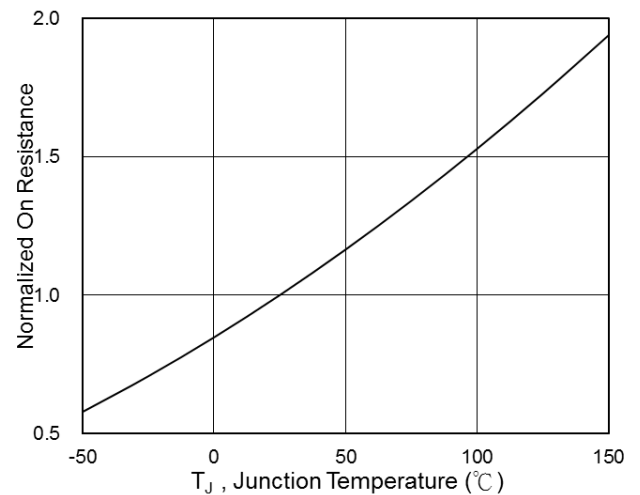


Fig.6 Normalized $R_{DS(on)}$ vs. T_J



Characteristics Curves

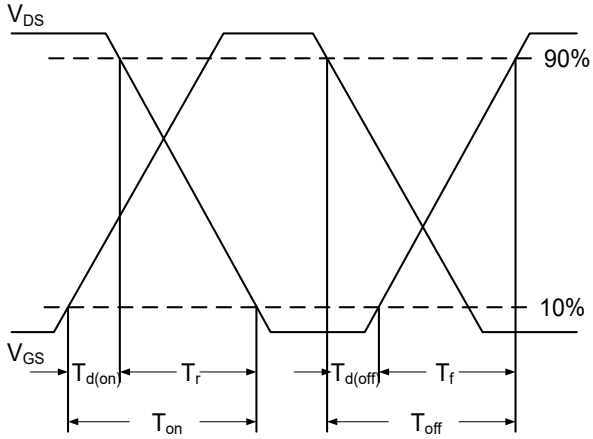
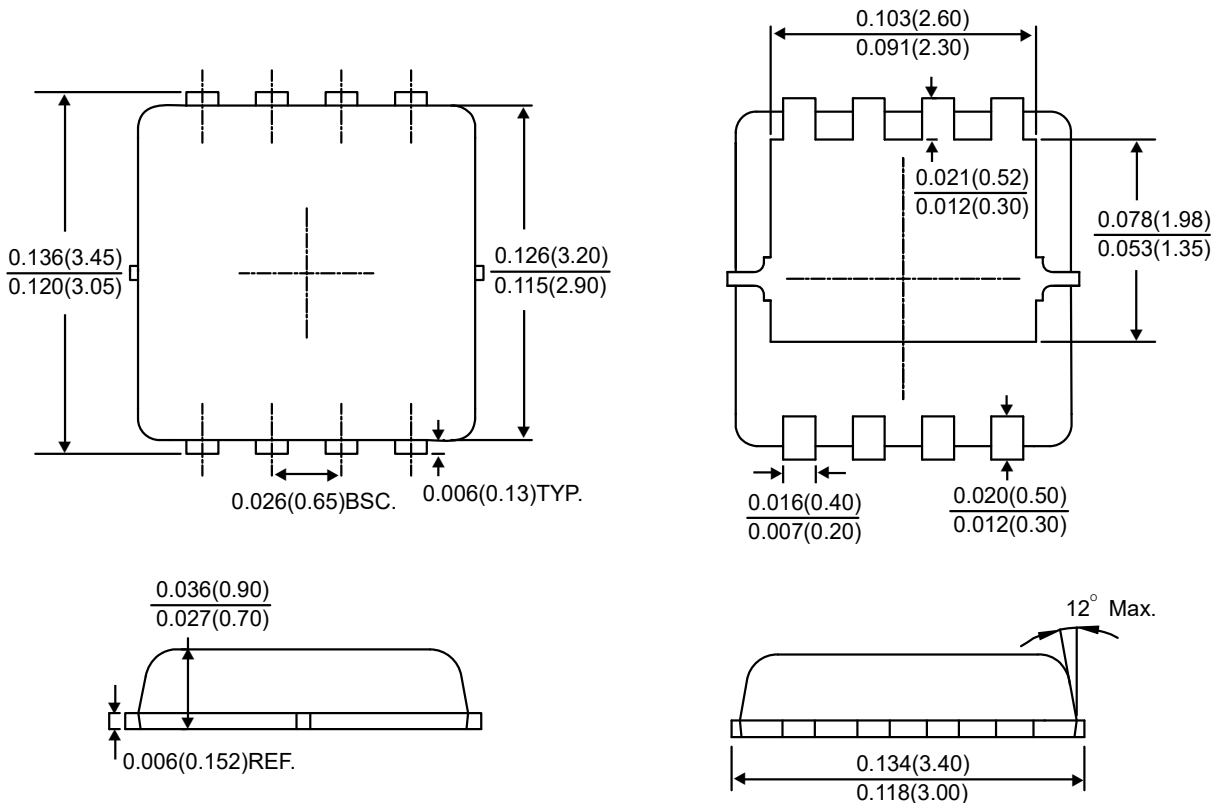


Fig.7 Switching Time Waveform

Package Outline Dimensions



PPAK3X3

Dimensions in inches and (millimeters)



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