P3MNG021

60V N-Channel MOSFETs

BV_{DSS}	$R_{DS(ON)}$	I_D
60 V	21 mΩ	33 A

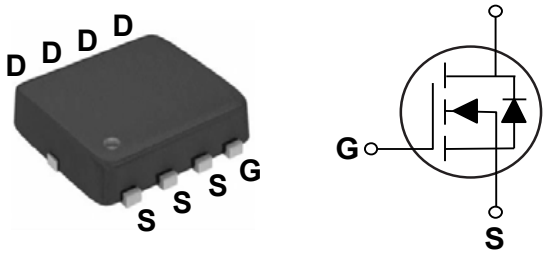
General Description

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.

Features

- $R_{DS(ON)} \leqq 21m\Omega @ V_{GS}=10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

PPAK3X3 Pin Configuration



Applications

- Motor Drive
- Power Tools
- LED Lighting

Absolute Maximum Ratings T_C=25°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°C)	33	A
	Drain Current - Continuous (T_C=100°C)	20	A
I_{DM}	Drain Current - Pulsed (NOTE 1)	132	A
EAS	Single Pulse Avalanche Energy (NOTE 2)	42	mJ
IAS	Single Pulse Avalanche Current (NOTE 2)	29	A
P_D	Power Dissipation (T_C=25°C)	44.6	W
	Power Dissipation - Derate above 25°C	0.36	W/°C
T_J	Operating Junction Temperature Range	-50 to 150	°C
T_{STG}	Storage Temperature Range	-50 to 150	°C
Marking Code		NG021 , DC6906	

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	---	2.8	°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=125°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	V_{GS}=10V , I_D=15A	---	17	21	mΩ
		V_{GS}=4.5V , I_D=8A	---	20	24	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=250uA	1.2	1.8	2.2	V
gfs	Forward Transconductance	V_{DS}=10V , I_D=10A	---	9	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge	V_{DS}=30V , V_{GS}=10V , I_D=15A (NOTE 3、4)	---	28	42	nC
Q_{gs}	Gate-Source Charge		---	3.5	7	
Q_{gd}	Gate-Drain Charge		---	6.5	10	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=30V , V_{GS}=10V , R_G=6Ω , I_D=1A (NOTE 3、4)	---	7.2	14	nS
T_r	Rise Time		---	38	72	
$T_{d(off)}$	Turn-Off Delay Time		---	34	65	
T_f	Fall Time		---	8.2	16	
C_{iss}	Input Capacitance	V_{DS}=20V , V_{GS}=0V , F=1MHz	---	1110	1665	pF
C_{oss}	Output Capacitance		---	110	165	
C_{rss}	Reverse Transfer Capacitance		---	60	90	
Rg	Gate resistance	V_{GS}=0V , V_{DS}=0V , F=1MHz	---	2.2	4.4	Ω

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	---	---	33	A
I_{SM}	Pulsed Source Current		---	---	66	A
V_{SD}	Diode Forward Voltage	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}=29A, 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.

Characteristics Curves

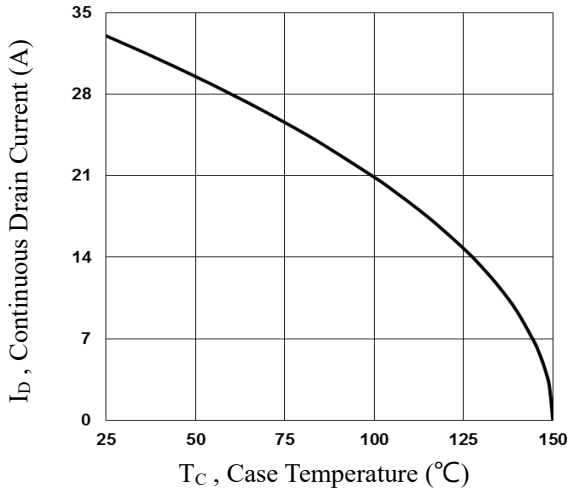


Fig.1 Continuous Drain Current vs. T_C

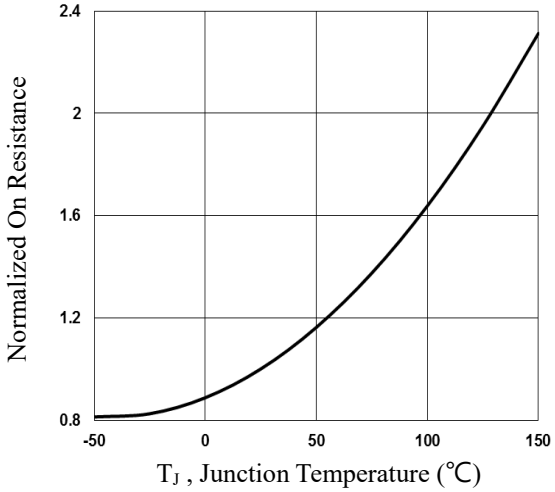


Fig.2 Normalized RDSON vs. T_J

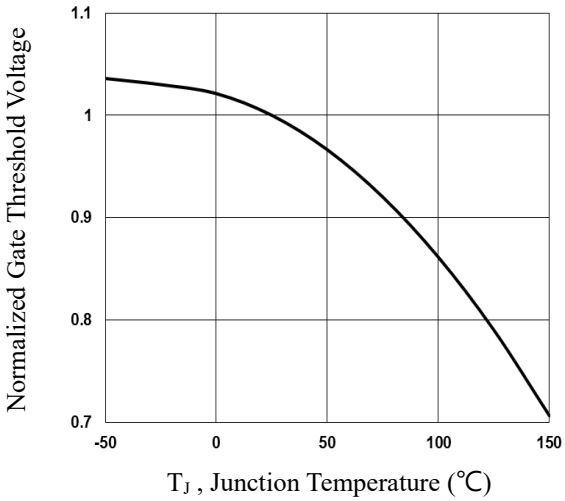


Fig.3 Normalized V_{th} vs. T_J

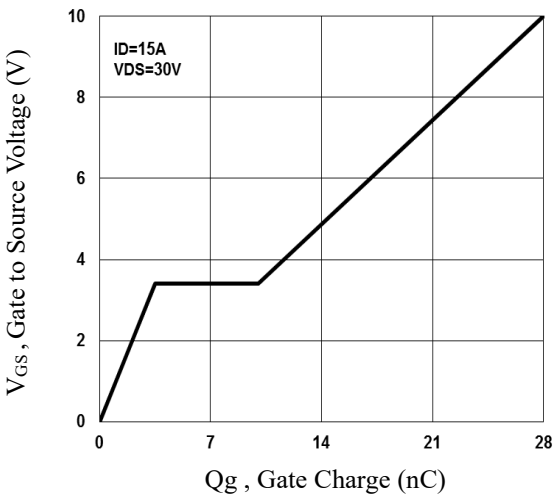


Fig.4 Gate Charge Waveform

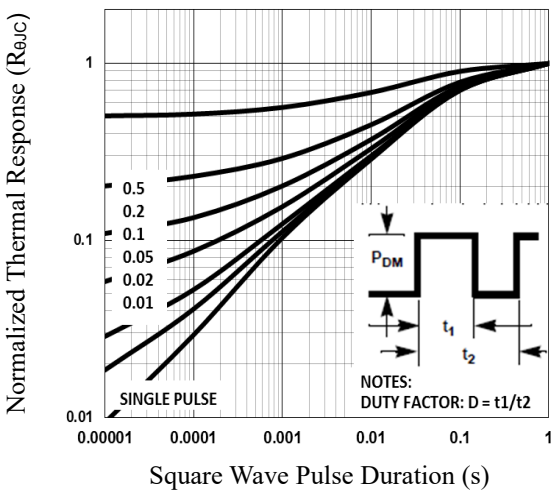


Fig.5 Normalized Transient Impedance

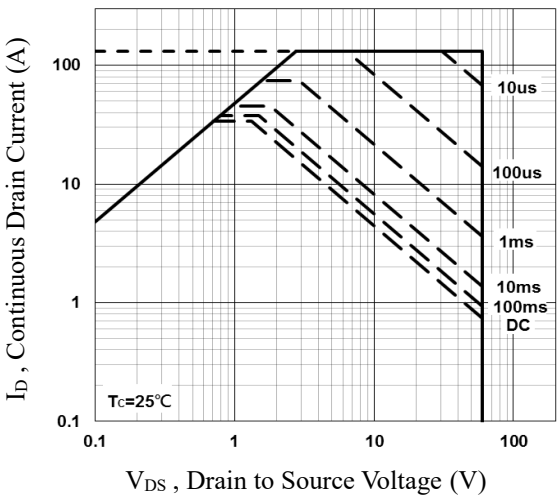


Fig.6 Maximum Safe Operation Area

Characteristics Curves

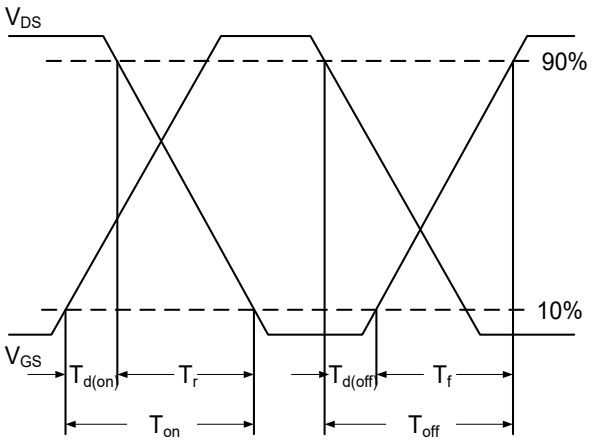
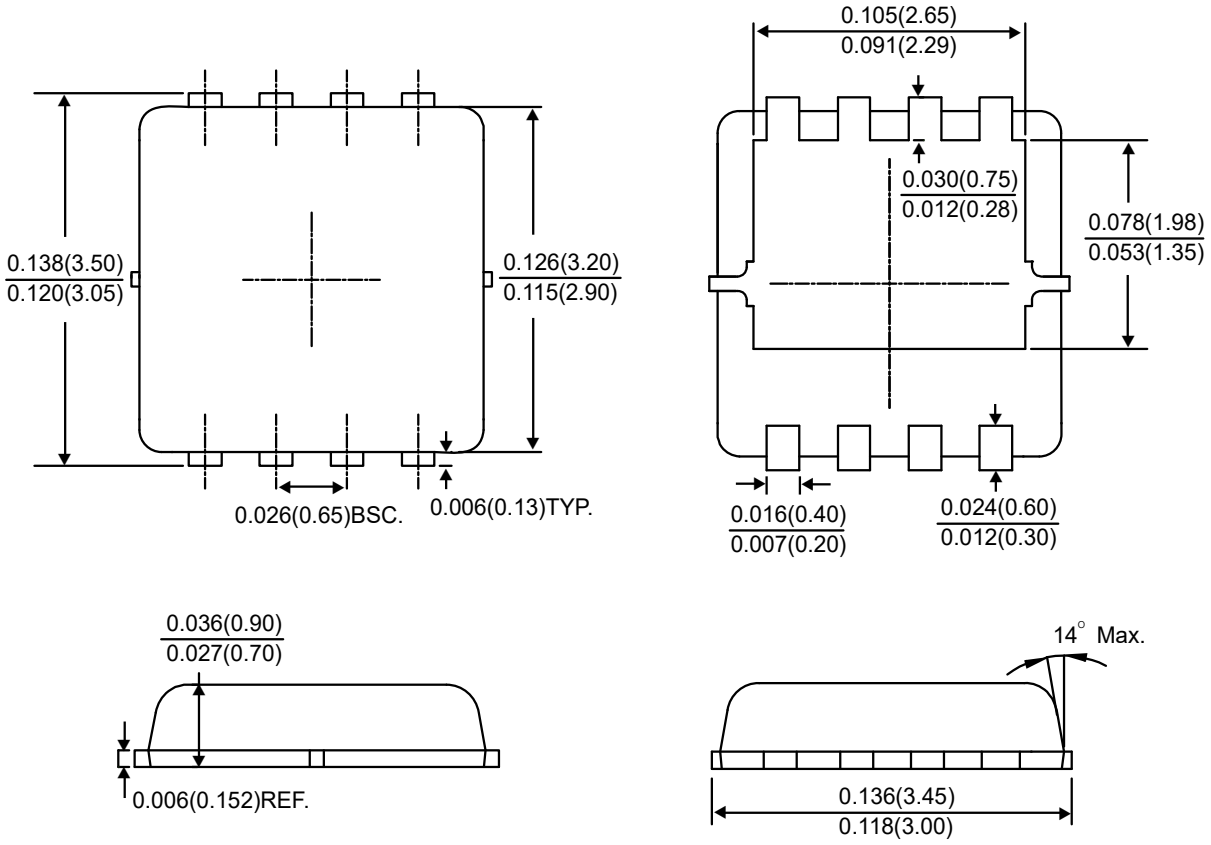


Fig.7 Switching Time Waveform

Package Outline Dimensions



PPAK3X3

Dimensions in inches and (millimeters)

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