P3MNG015

60V N-Channel MOSFETs

| BV$_{DSS}$	R$_{DS(ON)}$	I$_D$
60 V	15 mΩ	35 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$_{DS(ON)}$ ≦ 15mΩ@V$_{GS}$=10V
- Improved dv/dt capability
- Fast switching
- Green Device Available

PPAK3X3 Pin Configuration
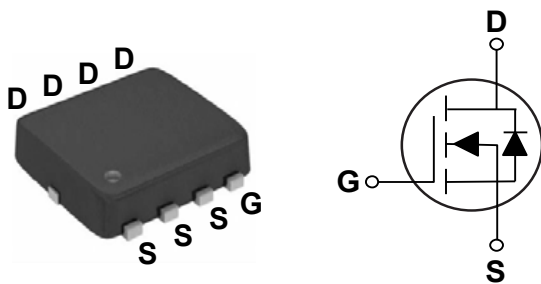
Applications

- Motor Drive
- Power Tools
- LED Lighting
- Quick Charger

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)	35	A
	Drain Current - Continuous (T$_C$=100°C)	22	A
I$_{DM}$	Drain Current - Pulsed (NOTE 1)	140	A
EAS	Single Pulse Avalanche Energy (NOTE 2)	45	mJ
IAS	Single Pulse Avalanche Current (NOTE 2)	30	A
P$_D$	Power Dissipation (T$_C$=25°C)	46	W
	Power Dissipation - Derate above 25°C	0.37	W/^{o}C
T$_J$	Operating Junction Temperature Range	-55 to 150	^{o}C
T$_{STG}$	Storage Temperature Range	-55 to 150	^{o}C
Marking Code		NG015 , DC6964	

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R$_{θJA}$	Thermal Resistance Junction to Ambient	---	62	^{o}C/W
R$_{θJC}$	Thermal Resistance Junction to Case	---	2.7	^{o}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}=60V , 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=10A	---	13	15	mΩ
		V_{GS}=4.5V , I_D=5A	---	16	19	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=250uA	1.2	1.7	2.5	V
gfs	Forward Transconductance	V_{DS}=10V , I_D=3A	---	10	---	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=10A (NOTE 3、4)	---	27	54	nC
Q_{gs}	Gate-Source Charge		---	4.2	9	
Q_{gd}	Gate-Drain Charge		---	6.2	12	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=15V , V_{GS}=10V , R_G=6Ω , I_D=1A (NOTE 3、4)	---	8.6	16	nS
T_r	Rise Time		---	24.2	48	
$T_{d(off)}$	Turn-Off Delay Time		---	32.3	64	
T_f	Fall Time		---	7.9	16	
C_{iss}	Input Capacitance	V_{DS}=25V , V_{GS}=0V , F=1MHz	---	1515	3000	pF
C_{oss}	Output Capacitance		---	120	200	
C_{rss}	Reverse Transfer Capacitance		---	76	120	
Rg	Gate resistance	V_{GS}=0V , V_{DS}=0V , F=1MHz	---	1.8	3.6	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	---	---	35	A
I_{SM}	Pulsed Source Current		---	---	70	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}=30A, R_G=25Ω, Starting T_J=25°C.

3. The data tested by pulsed , pulse width $\leq$ 300us , duty cycle $\leq$ 2%.

4. Essentially independent of operating temperature.
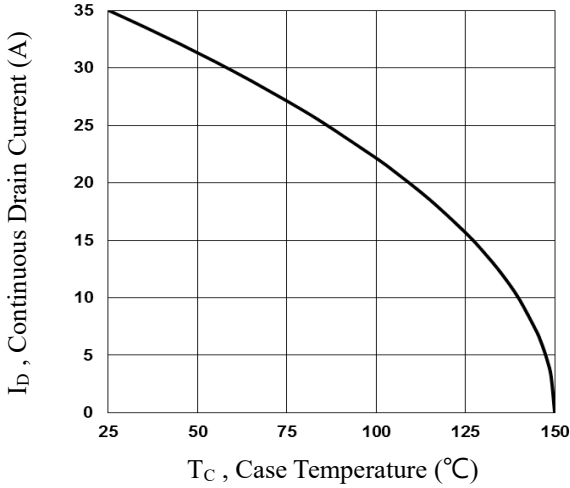
Characteristics Curves

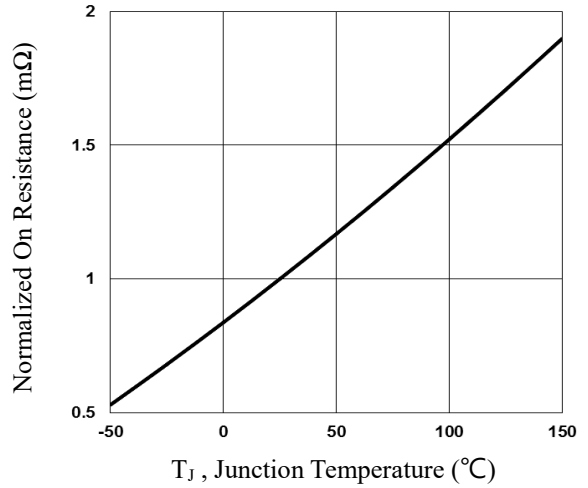**Fig.1   Continuous Drain Current vs. T$_C$**
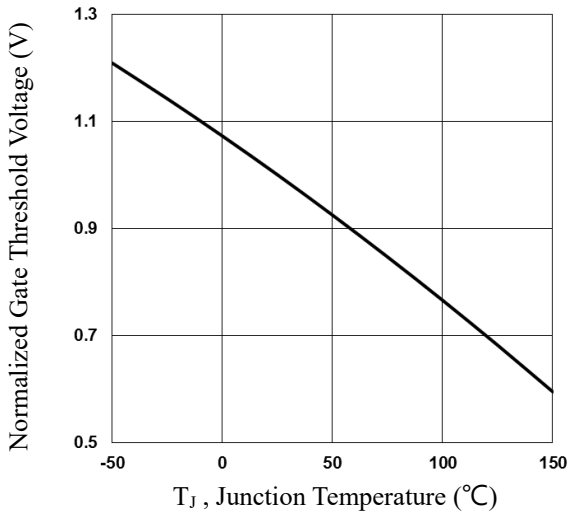

Fig.2   Normalized RDSON vs. T$_J$

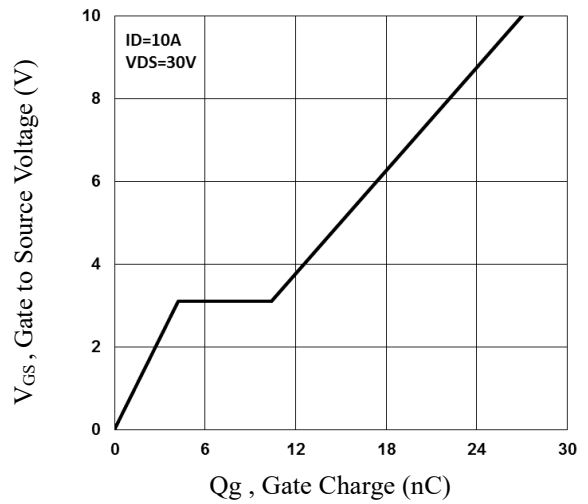**Fig.3   Normalized V$_{th}$ vs. T$_J$**
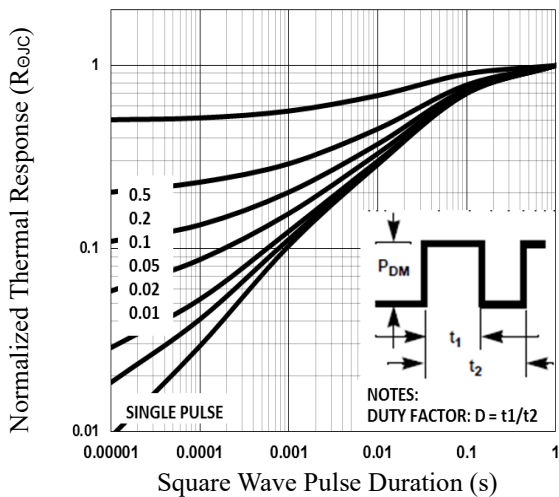

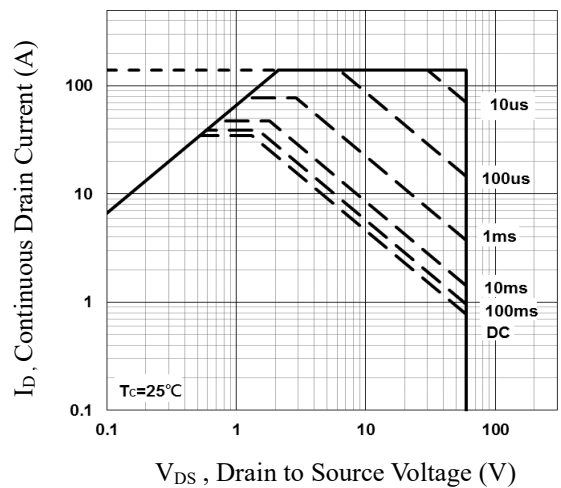**Fig.4   Gate Charge Waveform**

Fig.5   Normalized Transient Response

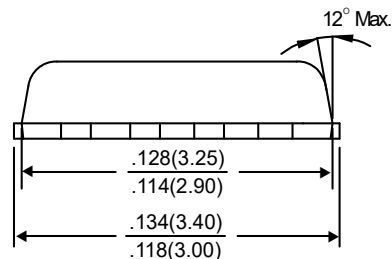**Fig.6   Maximum Safe Operation Area**

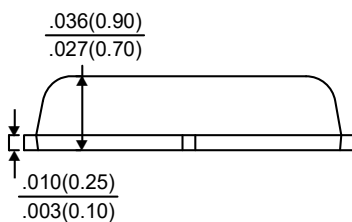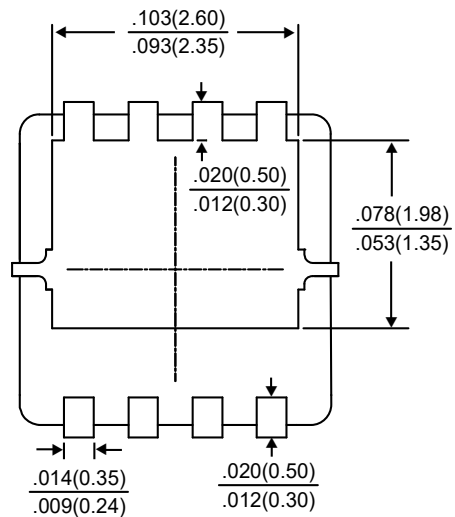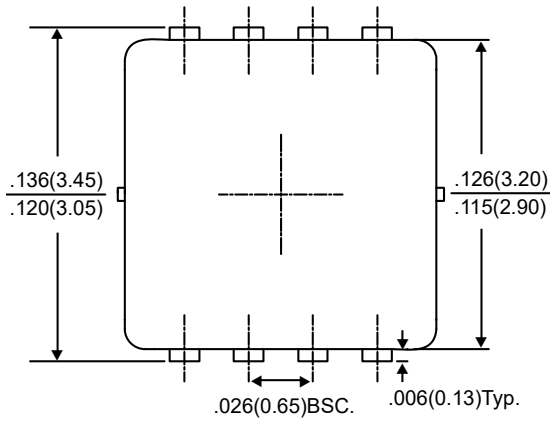## Characteristics Curves
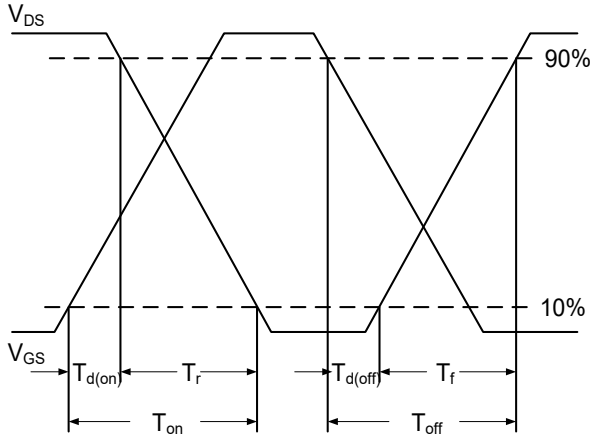
Fig.7   Switching Time Waveform

Package Outline Dimensions

PPAK3X3

Dimensions in inches and (millimeters)

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