



N3MNA4P3



12V Dual N-Channel MOSFETs

General Description

The N3MNA4P3 is the low $R_{DS(ON)}$ trenched N-CH MOSFETs with robust ESD protection.

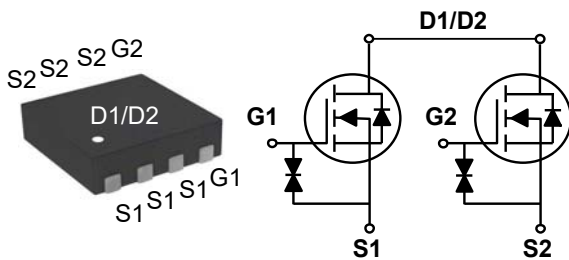
This product is suitable for Lithium-ion battery pack applications.

BV_{DSS}	$R_{DS(ON)}$	I_D
12 V	4.3 m Ω	56 A

Features

- $R_{DS(ON)} \leq 4.3m\Omega @ V_{GS}=4.5V$
- Super Low Gate Charge
- Green Device Available
- Excellent CdV/dt effect decline

DFN3x3 Dual Pin Configuration



Applications

- Handheld Instruments
- POL Applications
- Battery Protection Applications

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	12	V
V_{GS}	Gate-Source Voltage	± 8	V
I_D	Drain Current - Continuous ($T_C=25^\circ C$)	56	A
	Drain Current - Continuous ($T_C=100^\circ C$)	35.6	A
I_{DM}	Drain Current - Pulsed (NOTE 1)	100	A
P_D	Power Dissipation ($T_C=25^\circ C$)	31	W
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
Marking Code		NA4P3 , A1030	

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	---	35	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	4	$^\circ C/W$



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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	12	---	---	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =12V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =12V, V _{GS} =0V, T _J =55°C	---	---	5	uA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±8V, V _{DS} =0V	---	---	±10	uA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R _{DS(ON)}	Static Drain-Source On-Resistance (NOTE 1)	V _{GS} =4.5V, I _D =3A	---	3.3	4.3	mΩ
		V _{GS} =4.0V, I _D =3A	---	3.4	4.4	
		V _{GS} =3.1V, I _D =3A	---	3.6	4.7	
		V _{GS} =2.5V, I _D =3A	---	4.0	5.6	
		V _{GS} =1.8V, I _D =3A	---	5.4	7.6	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	0.4	0.6	1.0	V
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =3A	---	42	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q _g	Total Gate Charge (4.5V)	V _{DS} =10V, I _D =3A	---	38	---	nC
	Total Gate Charge (3.9V)		---	33	---	
Q _{gs}	Gate-Source Charge		---	4.5	---	
Q _{gd}	Gate-Drain Charge		---	12	---	
T _{d(on)}	Turn-On Delay Time		V _{DD} =10V, V _{GS} =4.5V, I _D =3A, R _G =6Ω	---	22	---
T _r	Rise Time	---		41	---	
T _{d(off)}	Turn-Off Delay Time	---		77	---	
T _f	Fall Time	---		21	---	
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, F=1MHz	---	3165	---	pF
C _{oss}	Output Capacitance		---	380	---	
C _{rss}	Reverse Transfer Capacitance		---	325	---	

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	---	---	30	A
I _{SM}	Pulsed Source Current (NOTE 1)		---	---	100	A
V _{SD}	Diode Forward Voltage (NOTE 1)	V _{GS} =0V, I _S =3A, T _J =25°C	---	---	1.2	V

NOTES :

1. The data tested by pulsed, pulse width ≤ 10us, duty cycle ≤ 1%.



Characteristics Curves

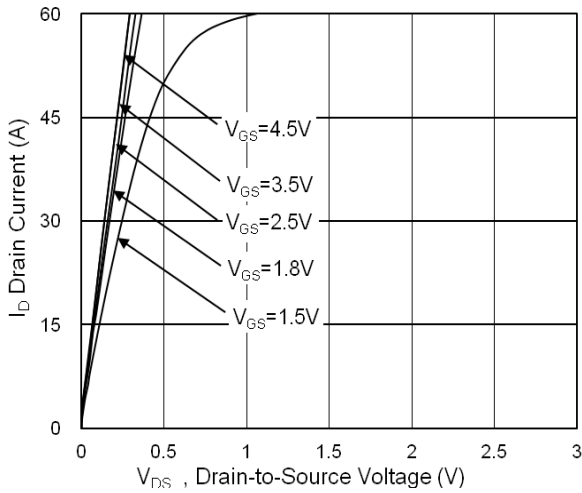


Fig.1 Typical Output Characteristics

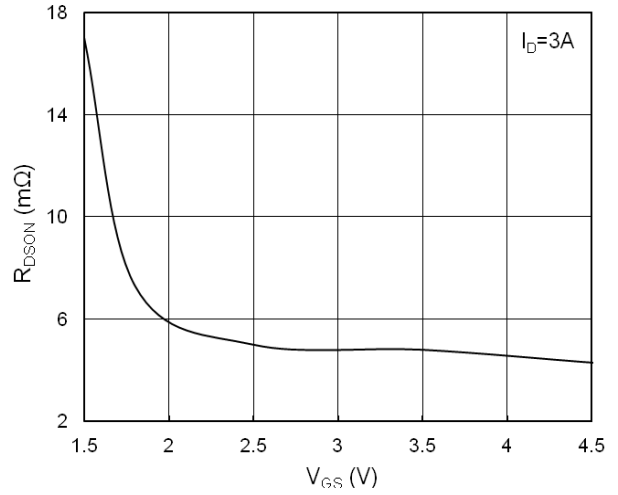


Fig.2 On-Resistance vs. Gate-Source Voltage

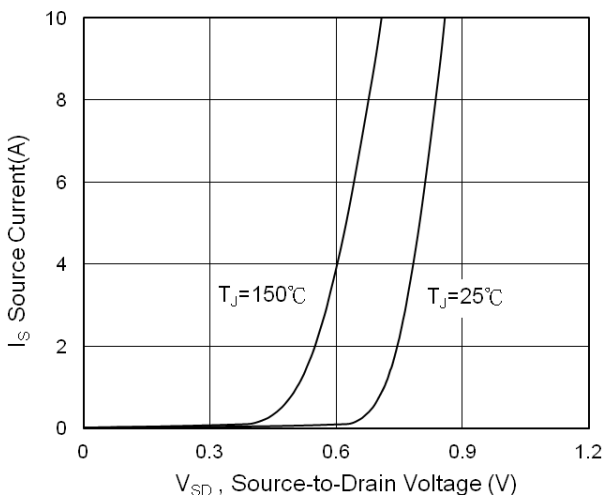


Fig.3 Source Drain Forward Characteristics

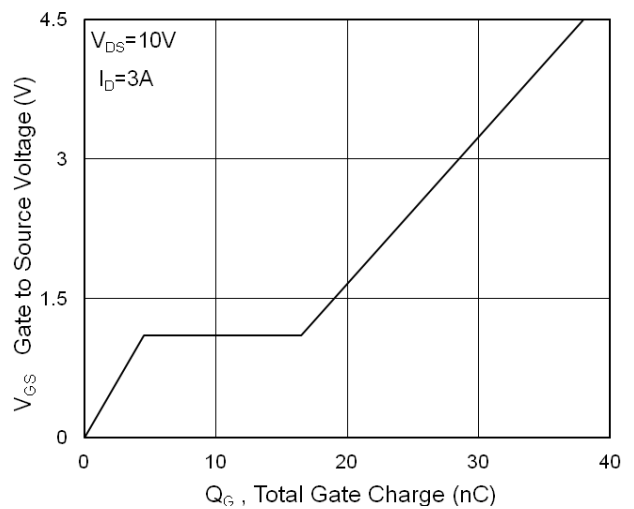


Fig.4 Gate-Charge Characteristics

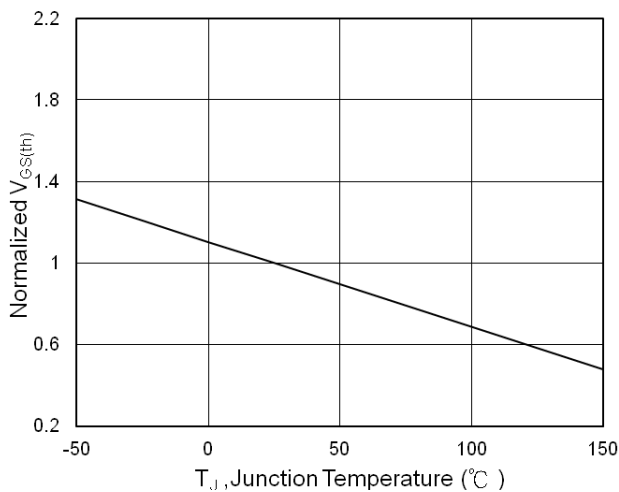


Fig.5 V_{GS(th)} vs. T_J

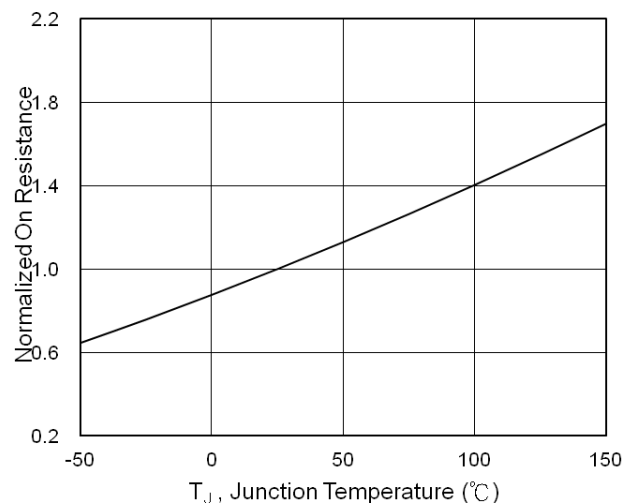


Fig.6 Normalized R_{DS(on)} vs. T_J



Characteristics Curves

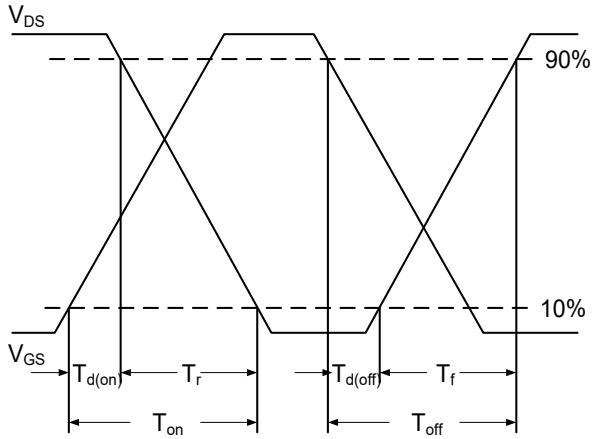


Fig.7 Switching Time Waveform

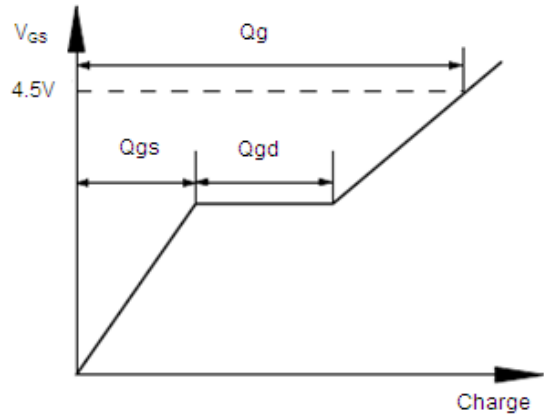
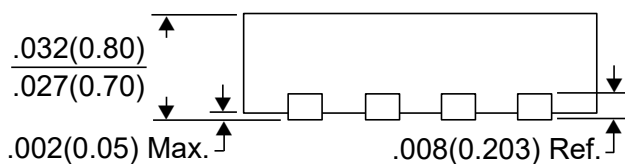
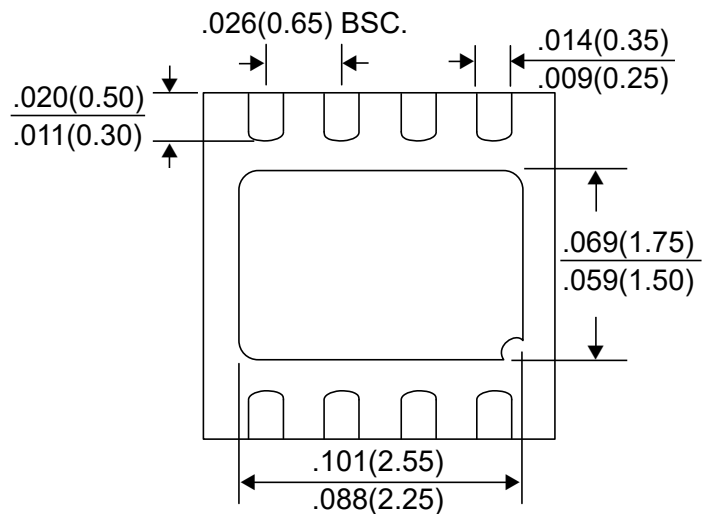
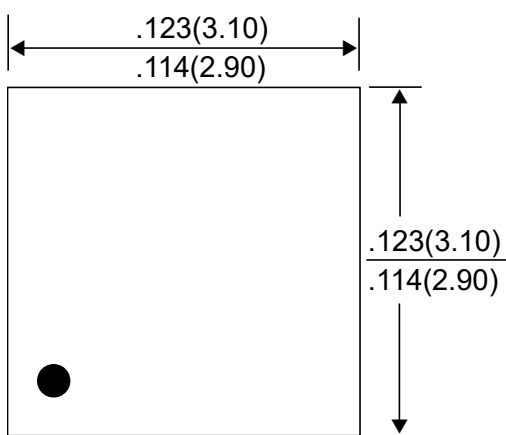


Fig.8 Gate Charge Waveform

Package Outline Dimensions



DFN3x3

Dimensions in inches and (millimeters)



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