N1MNB002

20V N-Channel MOSFETs

General Description

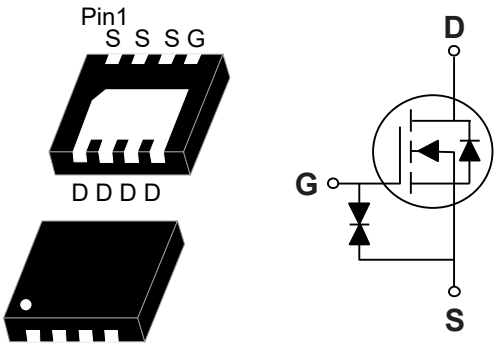
The N1MNB002 is the high cell density trenched N-ch MOSFETs, which provide excellent R_{DSON} and gate charge for most of the synchronous buck converter applications.

BV_{DSS}	$R_{DS(ON)}$	I_D
20 V	2 mΩ	50 A

Features

- $R_{DS(ON)} \leqq 2m\Omega @ V_{GS}=4.5V$
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Green Device Available

DFN3.3x3.3 Pin Configuration



Applications

- Load Switch
- Battery Protection
- Hand-Held Instruments

Absolute Maximum Ratings T_C=25°C unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	±12	V
I_D	Drain Current - Continuous (T_C=25°C)	50	A
	Drain Current - Continuous (T_C=100°C)	39	A
I_{DM}	Drain Current - Pulsed (NOTE 1)	200	A
EAS	Single Pulse Avalanche Energy (NOTE 2)	80	mJ
IAS	Avalanche Current	40	A
P_D	Power Dissipation (T_C=25°C) (NOTE 3)	83	W
T_J	Operating Junction Temperature Range	-55 to 150	°C
T_{STG}	Storage Temperature Range	-55 to 150	°C
Marking Code		NB002 , E2530	

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient (Steady State)	---	55	°C/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	1.5	°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	20	---	---	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=16V , V_{GS}=0V , T_J=25°C	---	---	1	uA
		V_{DS}=16V , V_{GS}=0V , T_J=125°C	---	---	5	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±10V , 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=20A	---	1.5	2	mΩ
		V_{GS}=2.5V , I_D=20A	---	2.0	2.7	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=250uA	0.4	---	1.0	V

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge (10V)	V_{DS}=15V , V_{GS}=10V , I_D=20A	---	77	---	nC
Q_{gs}	Gate-Source Charge		---	8.7	---	
Q_{gd}	Gate-Drain Charge		---	14	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=15V , V_{GS}=10V , R_G=3Ω , I_D=20A	---	10.2	---	nS
T_r	Rise Time		---	11.7	---	
$T_{d(off)}$	Turn-Off Delay Time		---	56.4	---	
T_f	Fall Time		---	16.2	---	
C_{iss}	Input Capacitance	V_{DS}=10V , V_{GS}=0V , F=1MHz	---	4307	---	pF
C_{oss}	Output Capacitance		---	501	---	
C_{rss}	Reverse Transfer Capacitance		---	321	---	

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	---	---	50	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=1A , T_J=25°C	---	---	1.2	V
t_{rr}	Reverse Recovery Time	I_F=20A , di/dt=100A/us , T_J=25°C	---	22	---	nS
Q_{rr}	Reverse Recovery Charge		---	72	---	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, L=0.1mH, I_{AS}=40A.
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

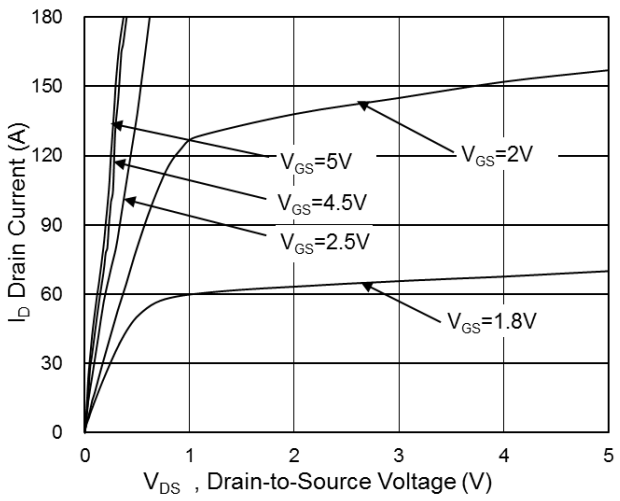


Fig.1 Typical Output Characteristics

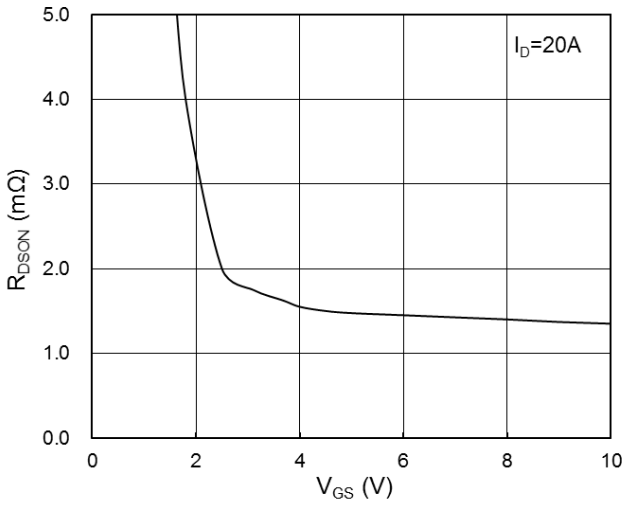


Fig.2 On-Resistance vs. Gate-Source Voltage

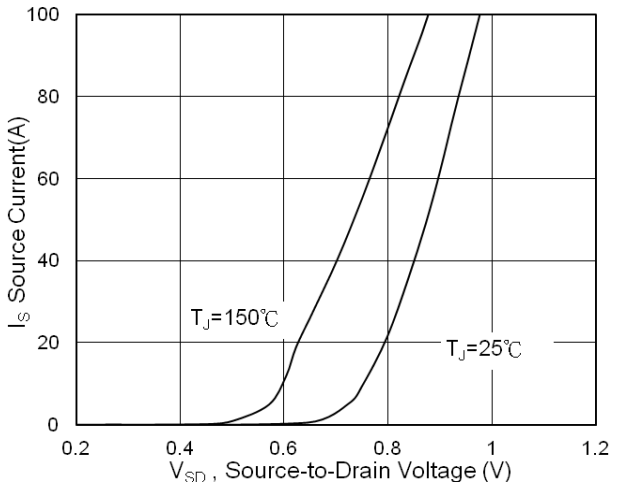


Fig.3 Forward Characteristics of Reverse

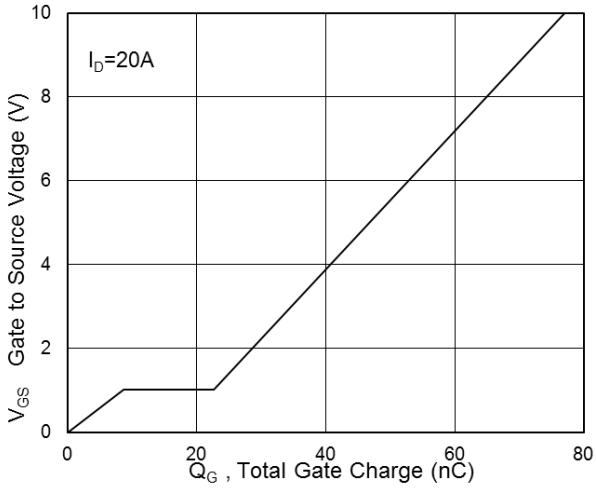


Fig.4 Gate-Charge Characteristics

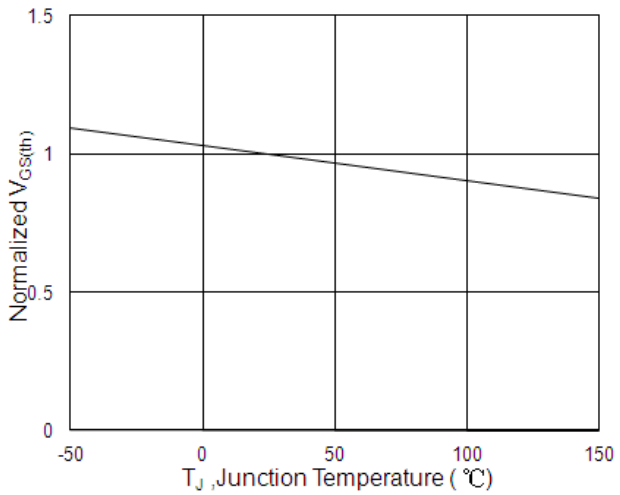


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

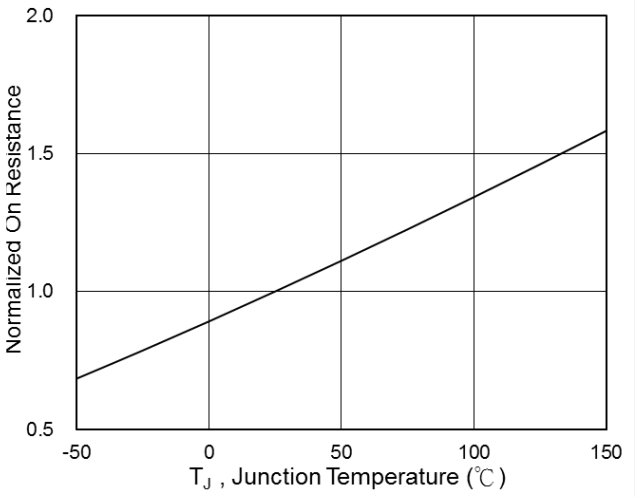


Fig.6 Normalized R_{DSON} vs. T_J

Characteristics Curves

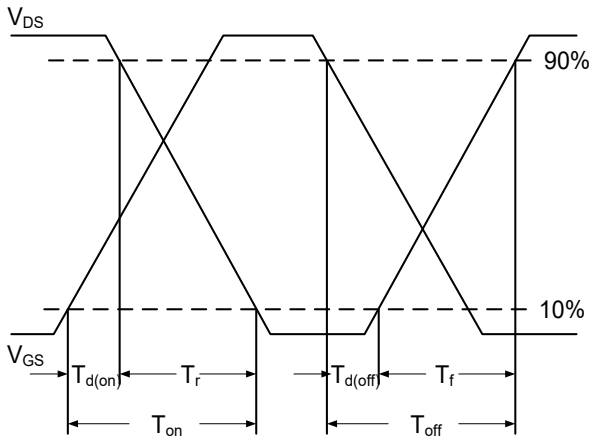
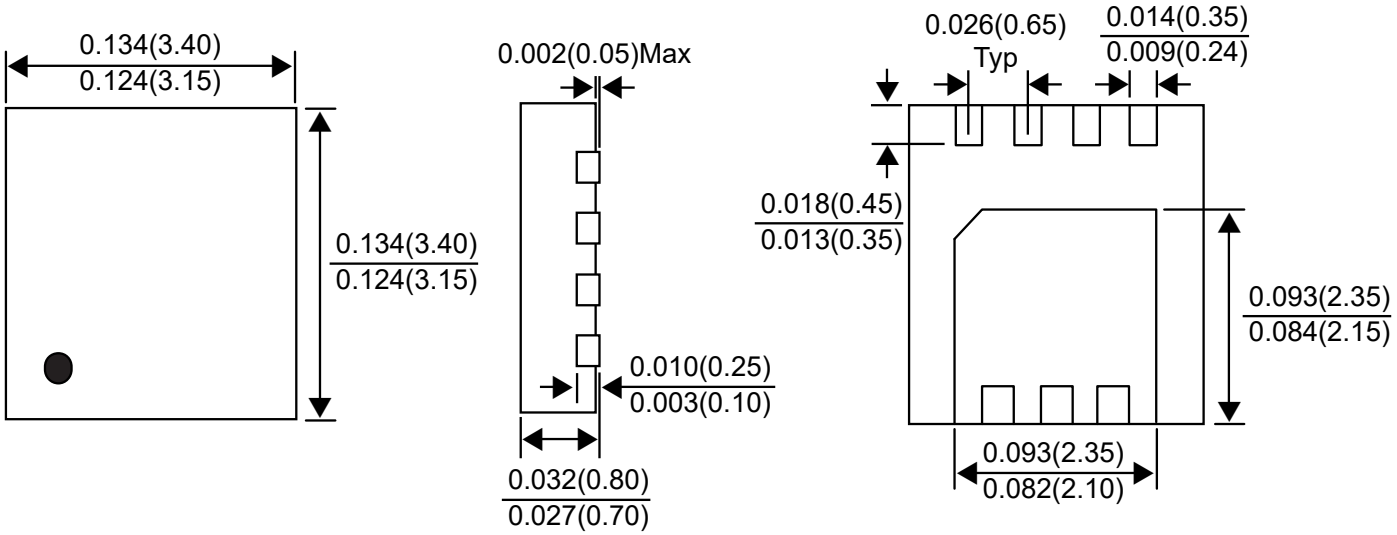


Fig. 7 Switching Time Waveform

Package Outline Dimensions



DFN3.3x3.3

Dimensions in inches and (millimeters)

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