TNMNC033

30V N-Channel MOSFETs

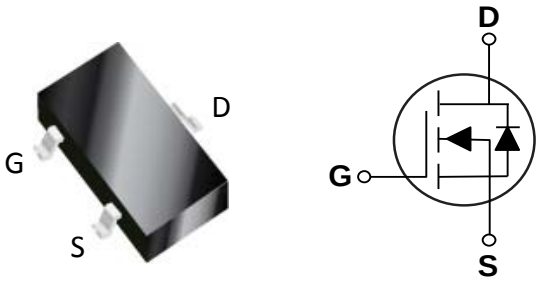
General Description

The TNMNC033 is the high cell density trenched N-ch MOSFETs, which provides excellent R_{DSON} and efficiency for most of the small power switching and load switch applications.

The TNMNC033 meets the RoHS and Green Product requirement with full function reliability approved.

BV_{DSS}	$R_{DS(ON)}$	I_D
30 V	33 mΩ	4.6 A

SOT-23 Pin Configuration



Features

- 30V, 4.6A, $R_{DS(ON)}$=33mΩ @V_{GS}=10V
- Green Device Available
- Super Low Gate Charge
- Excellent Cdv/dt effect decline
- Advanced high cell density Trench technology

Absolute Maximum Ratings T_C=25°C unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Drain Current - Continuous, V_{GS} @ 10V (NOTE 1) (T_A=25°C)	4.6	A
	Drain Current - Continuous, V_{GS} @ 10V (NOTE 1) (T_A=70°C)	3.7	A
I_{DM}	Drain Current - Pulsed (NOTE 2)	18.4	A
P_D	Total Power Dissipation (NOTE 3) (T_A=25°C)	1	W
T_J	Operating Junction Temperature Range	-50 to 150	°C
T_{STG}	Storage Temperature Range	-50 to 150	°C
Marking Code		AC	

Thermal Characteristics

Symbol	Parameter	Typ.	Max	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient (NOTE 1)	---	125	°C/W
$R_{\theta JC}$	Thermal Resistance Junction to Case (NOTE 1)	---	80	°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	30	---	---	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=24V , V_{GS}=0V , T_J=25°C	---	---	1	uA
		V_{DS}=24V , V_{GS}=0V , T_J=55°C	---	---	5	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 (NOTE 2)	V_{GS}=10V , I_D=4A	---	27	33	mΩ
		V_{GS}=4.5V , I_D=3A	---	36	50	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=250uA	1.0	1.5	2.5	V
gfs	Forward Transconductance	V_{DS}=5V , I_D=4A	---	7	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge	V_{DS}=15V , V_{GS}=4.5V , I_D=4A	---	5.0	6.9	nC
Q_{gs}	Gate-Source Charge		---	1.1	2.2	
Q_{gd}	Gate-Drain Charge		---	2.6	2.8	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=15V , V_{GS}=10V , R_G=3.3Ω , I_D=4A	---	2	4	ns
T_r	Rise Time		---	34.4	62	
$T_{d(off)}$	Turn-Off Delay Time		---	13.2	26	
T_f	Fall Time		---	4.8	9.6	
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , F=1MHz	---	420	582	pF
C_{oss}	Output Capacitance		---	60	87	
C_{rss}	Reverse Transfer Capacitance		---	53	71	

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current (NOTE 1、4)	V_G=V_D=0V , Force Current	---	---	4.6	A
I_{SM}	Pulsed Source Current (NOTE 2、4)		---	---	18.4	A
V_{SD}	Diode Forward Voltage (NOTE 2)	V_{GS}=0V , I_S=1A , T_J=25°C	---	---	1.2	V
t_{rr}	Reverse Recovery Time	I_F=4A , dI/dt=100A/us , T_J=25°C	---	8.7	---	ns
Q_{rr}	Reverse Recovery Charge		---	2.3	---	nC

NOTES：

1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2oz copper.
2. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
3. The power dissipation is limited by 150℃ 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

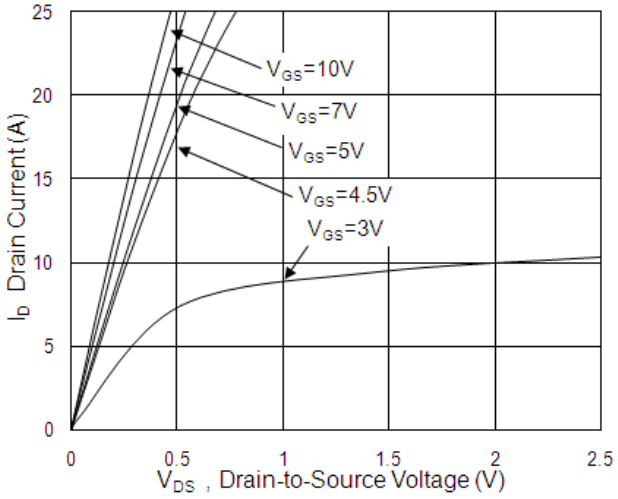


Fig.1 Typical Output Characteristics

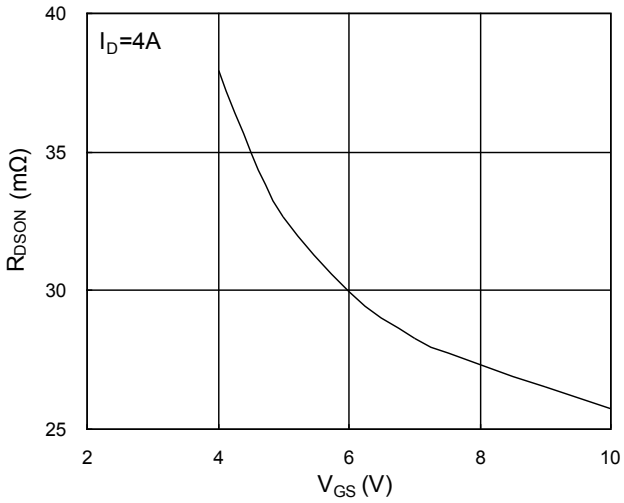


Fig.2 On-Resistance vs. Gate-Source

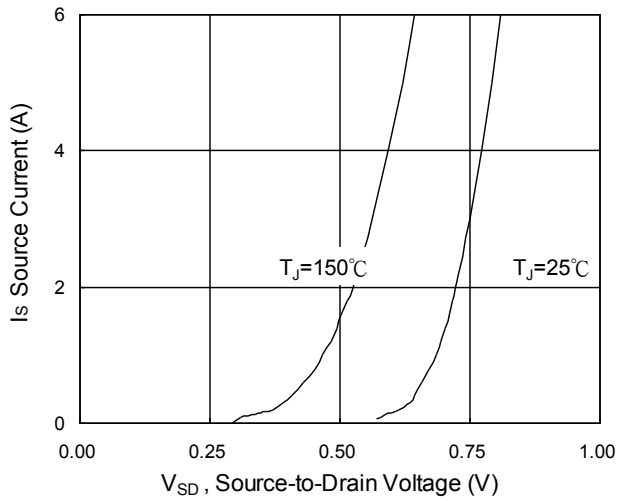


Fig.3 Forward Characteristics Of Reverse

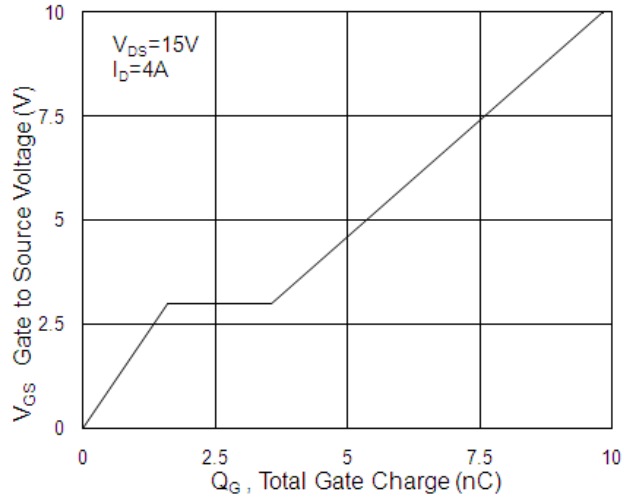


Fig.4 Gate-Charge Characteristics

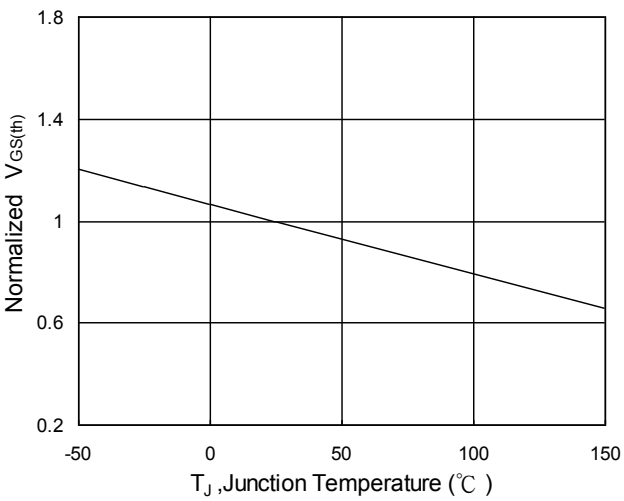


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

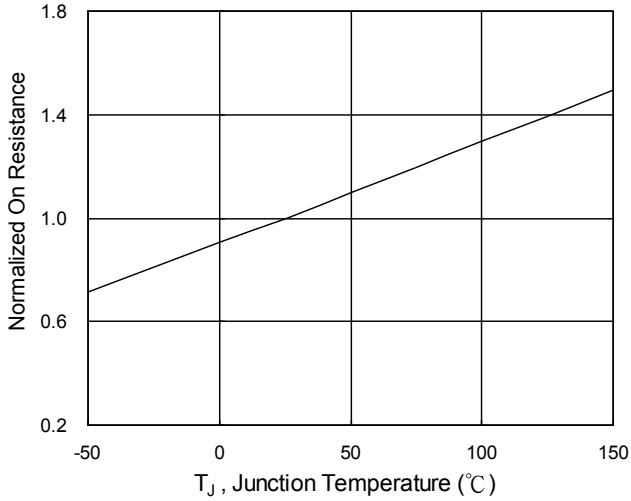


Fig.6 Normalized R_{DSON} vs. T_J

Characteristics Curves

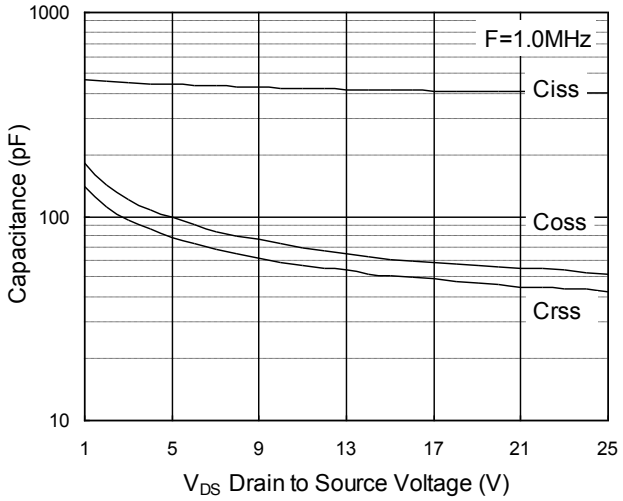


Fig.7 Capacitance

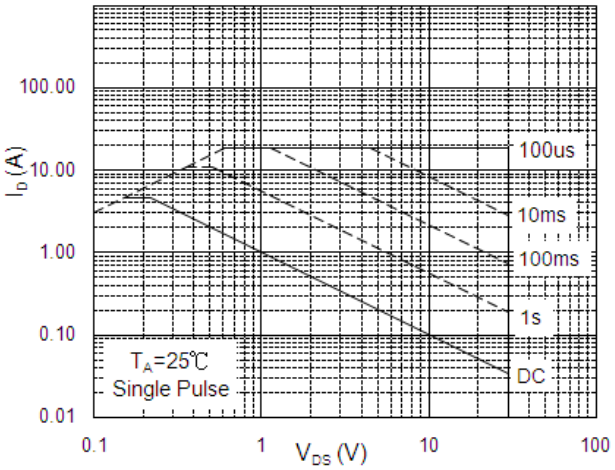


Fig.8 Safe Operating Area

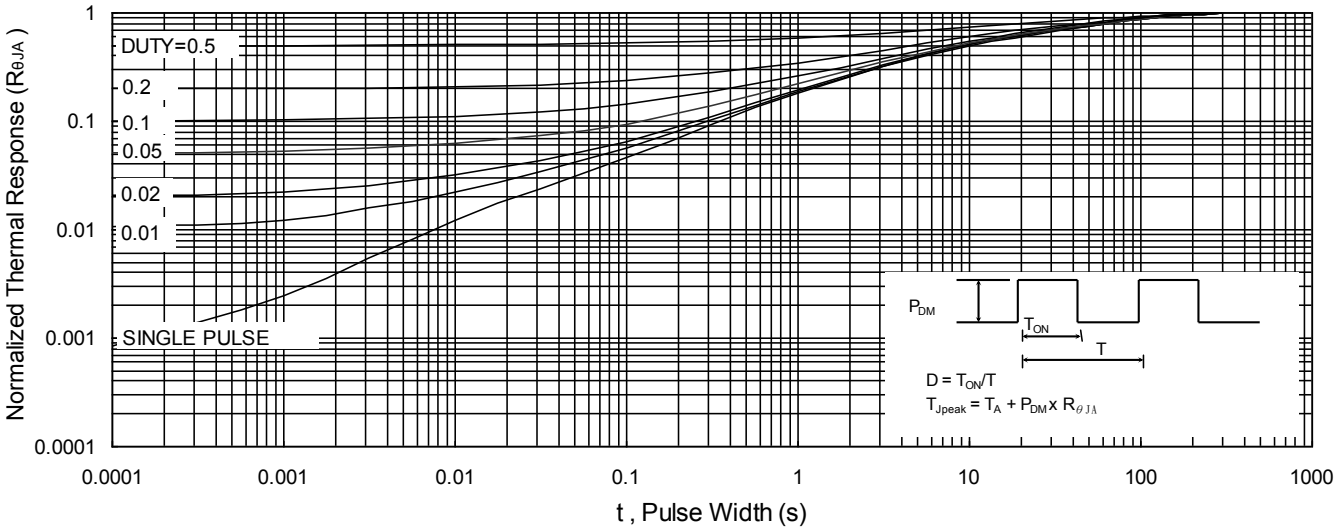


Fig.9 Normalized Maximum Transient Thermal Impedance

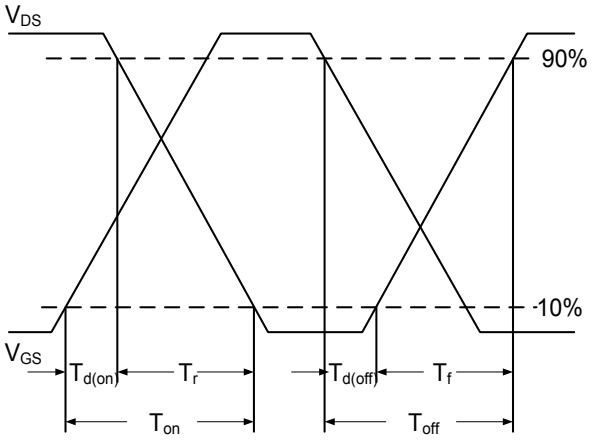


Fig.10 Switching Time Waveform

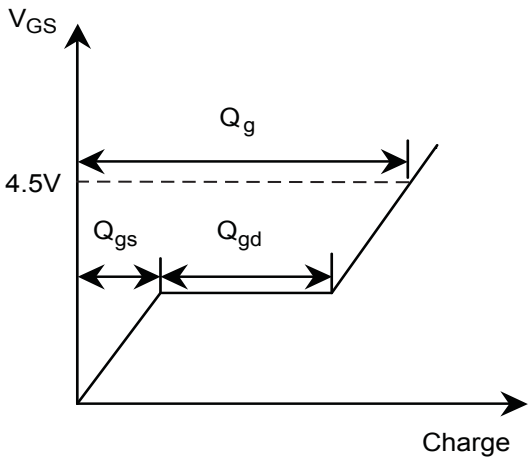
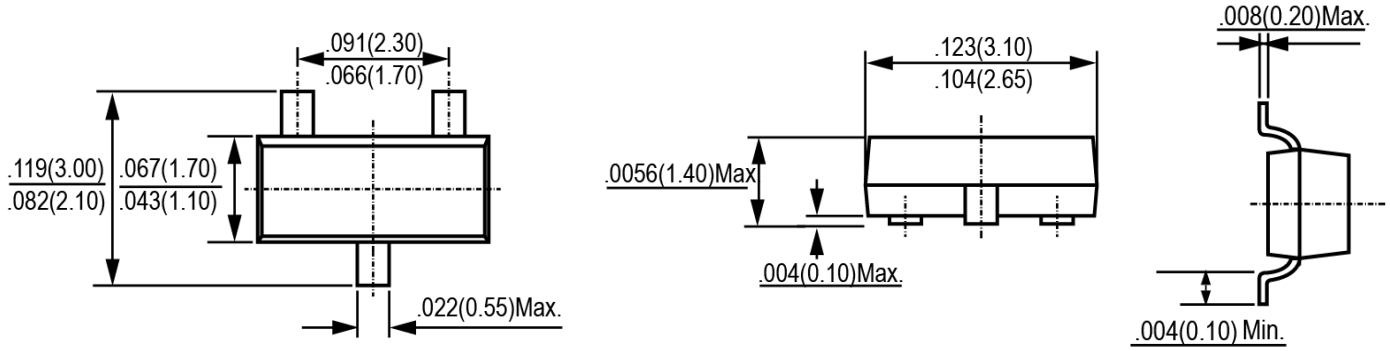


Fig.11 Gate Charge Waveform

Package Outline Dimensions



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Dimensions in inches and (millimeters)

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