



# TNMNG100



## 60V N-Channel MOSFETs

### General Description

The TNMNG100 is the high cell density trench N-ch MOSFETs, which provides excellent  $R_{DS(ON)}$  and efficiency for most of the small power switching and load switch applications.

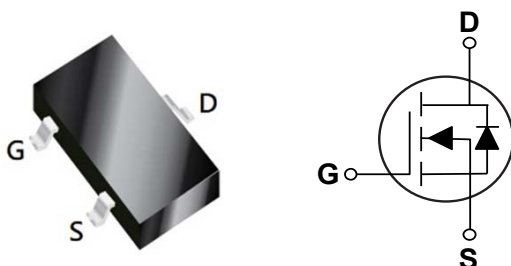
The TNMNG100 meets the RoHS and Green Product requirement with full function reliability approved.

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
60 V	100 m $\Omega$	2.3 A

### Features

- $R_{DS(ON)} \leq 100m\Omega @ V_{GS}=10V$
- Green Device Available
- Super Low Gate Charge
- Excellent  $Cdv/dt$  Effect Decline
- Advanced High Cell Density Trench Technology

SOT-23 Pin Configuration



### Applications

- Battery Protection
- Load Switch
- Uninterruptible Power Supply

### Absolute Maximum Ratings $T_c=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current - Continuous ( $T_A=25^\circ\text{C}$ )	2.3	A
$I_{DM}$	Drain Current - Pulsed	9.2	A
$P_D$	Total Power Dissipation (NOTE 2) ( $T_A=25^\circ\text{C}$ )	1	W
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
Marking Code		A4 , 6003	

### Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	125	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	80	$^\circ\text{C/W}$

**TNMNG100****60V N-Channel MOSFETs****Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ , unless otherwise noted)****Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V$ , $I_D=250\mu A$	60	---	---	V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=48V$ , $V_{GS}=0V$ , $T_J=25^{\circ}\text{C}$	---	---	1	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V$ , $V_{DS}=0V$	---	---	$\pm 100$	nA

**On Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V$ , $I_D=2A$	---	---	100	m $\Omega$
		$V_{GS}=4.5V$ , $I_D=1A$	---	---	110	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$ , $I_D=250\mu A$	1.2	---	2.5	V
gfs	Forward Transconductance	$V_{DS}=5V$ , $I_D=2A$	---	13	---	S

**Dynamic and switching Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$Q_g$	Total Gate Charge	$V_{DS}=48V$ , $V_{GS}=4.5V$ , $I_D=2A$	---	5	---	nC
$Q_{gs}$	Gate-Source Charge		---	1.68	---	
$Q_{gd}$	Gate-Drain Charge		---	1.9	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=30V$ , $V_{GS}=10V$ , $R_G=3.3\Omega$ , $I_D=2A$	---	1.6	---	ns
$T_r$	Rise Time		---	7.2	---	
$T_{d(off)}$	Turn-Off Delay Time		---	25	---	
$T_f$	Fall Time		---	14.4	---	
$C_{iss}$	Input Capacitance	$V_{DS}=15V$ , $V_{GS}=0V$ , $F=1\text{MHz}$	---	511	---	pF
$C_{oss}$	Output Capacitance		---	38	---	
$C_{rss}$	Reverse Transfer Capacitance		---	25	---	

**Drain-Source Diode Characteristics and Ratings**

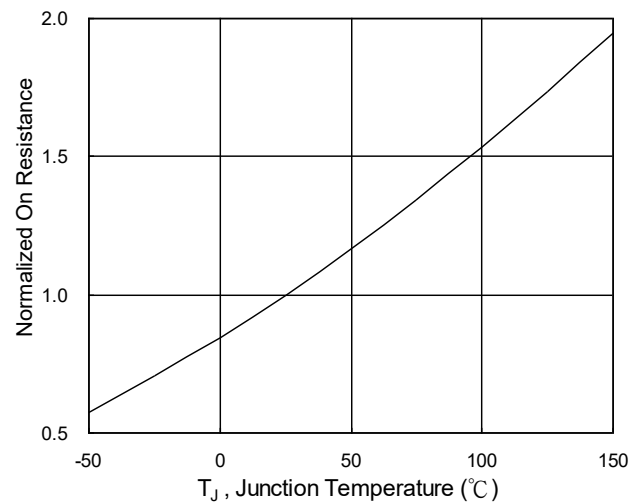
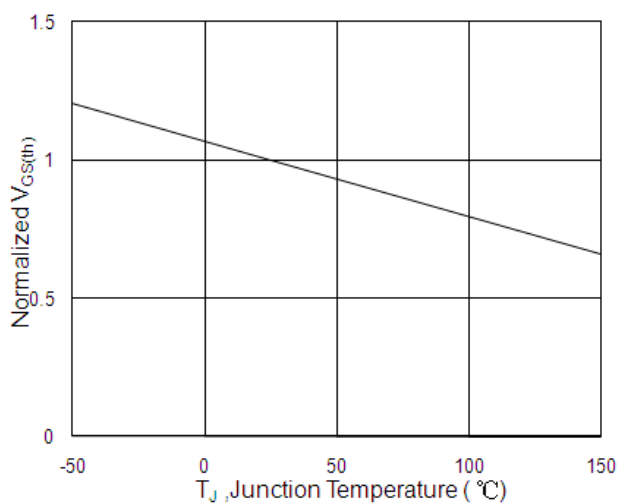
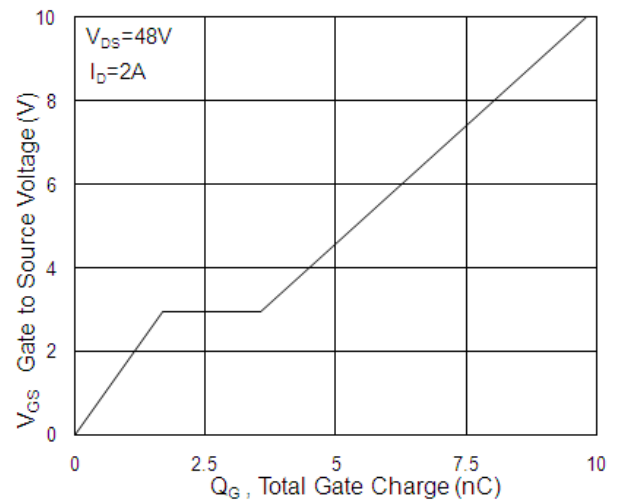
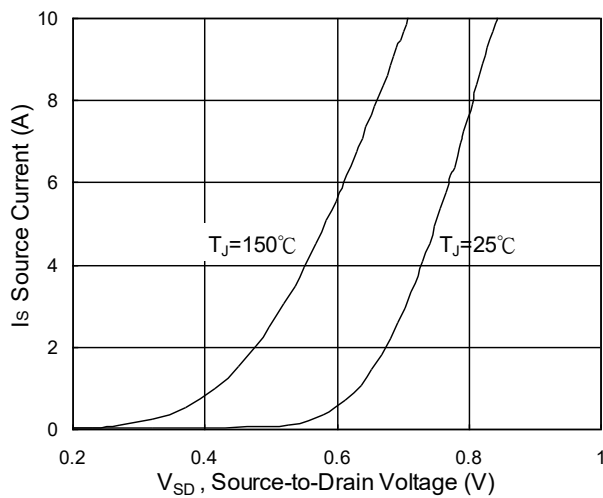
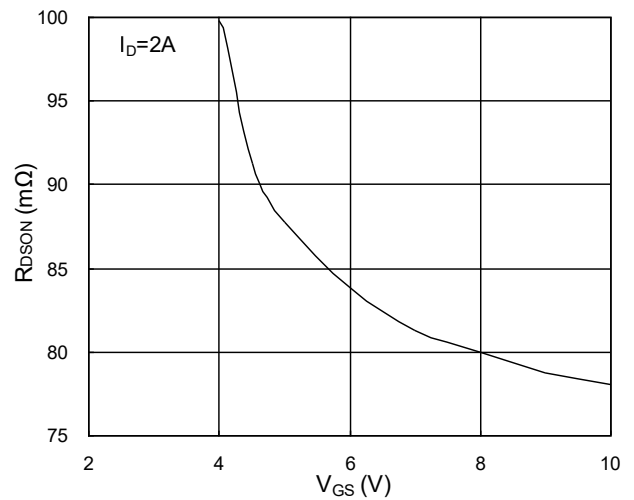
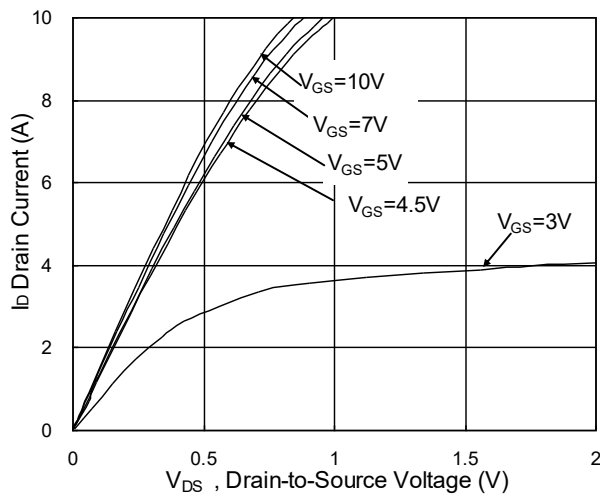
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V$ , Force Current	---	---	2.3	A
$I_{SM}$	Pulsed Source Current		---	---	9.2	A
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V$ , $I_S=1A$ , $T_J=25^{\circ}\text{C}$	---	---	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F=2A$ , $di/dt=100A/\mu s$ , $T_J=25^{\circ}\text{C}$	---	9.7	---	ns
$Q_{rr}$	Reverse Recovery Charge		---	5.8	---	nC

**NOTES :**

1. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
2. The power dissipation is limited by  $150^{\circ}\text{C}$  junction temperature.
3. The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications, should be limited by total power dissipation.



Characteristics Curves





Characteristics Curves

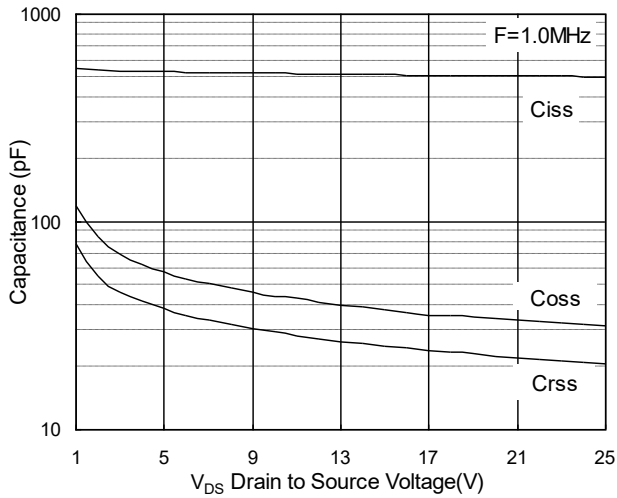


Fig.7 Capacitance

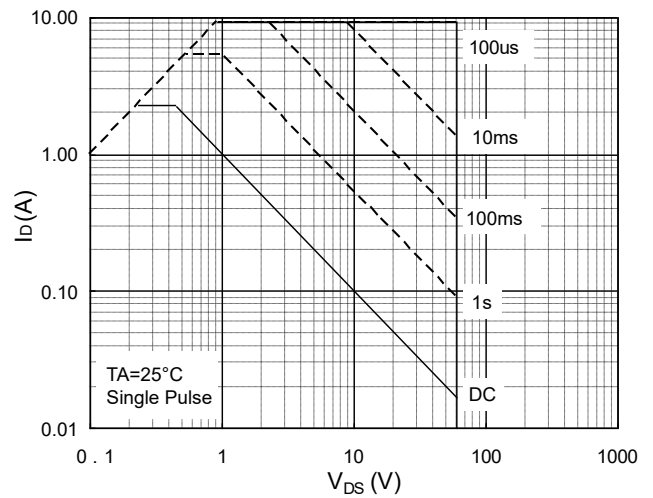


Fig.8 Safe Operating Area

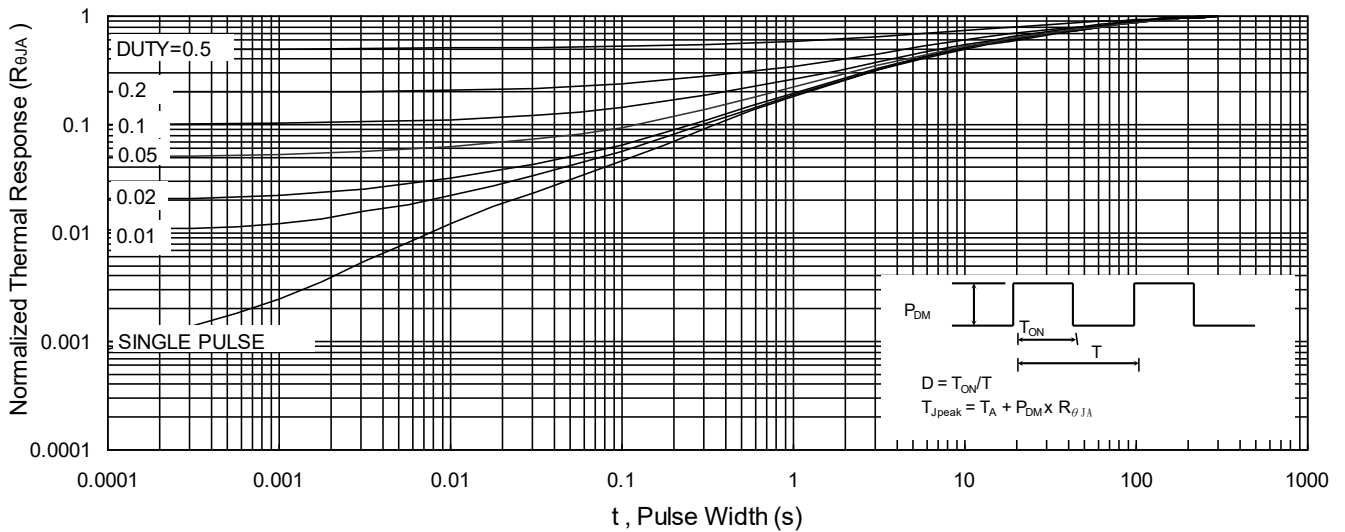


Fig.9 Normalized Maximum Transient Thermal Impedance

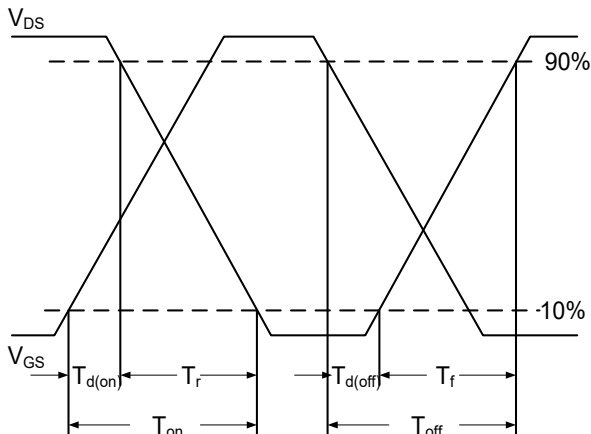


Fig.10 Switching Time Waveform

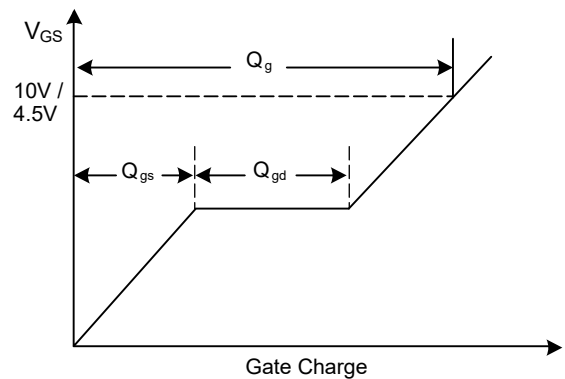


Fig.11 Gate Charge Waveform

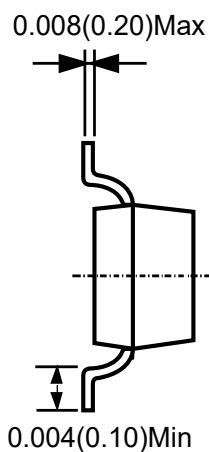
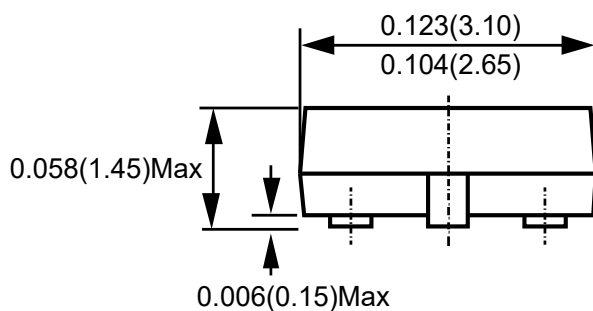
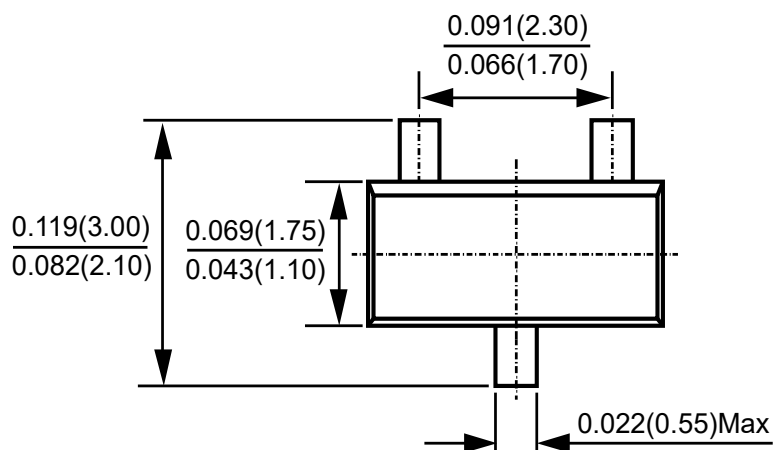


TNMNG100



## 60V N-Channel MOSFETs

### Package Outline Dimensions



### SOT-23

Dimensions in inches and (millimeters)



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