

TNG04P60SG

P-Channel Enhancement Mode Power MOSFET

Product Summary

- $V_{DS} = -60V, I_D = -4A$
- $R_{DS(on)} < 95m\Omega @ V_{GS} = -10V$
- $R_{DS(on)} < 130m\Omega @ V_{GS} = -4.5V$

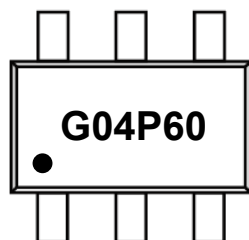
Features

- Advanced Split Gate Trench Technology
- 100% Avalanche Tested
- RoHS and Reach Compliant
- Halogen and Antimony Free
- Moisture Sensitivity Level 3

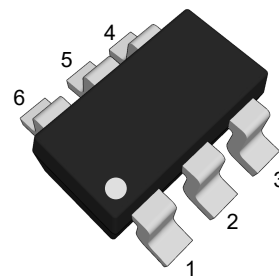
Application

- Load Switch
- PWM Applications
- Power Management

Marking Code



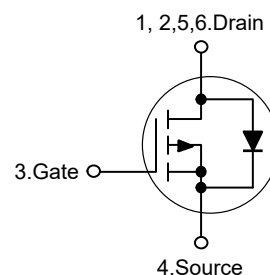
SOT-23-6



(Top View)

Pin	Description
1,2,5,6	Drain
3	Gate
4	Source

Schematic Diagram



Absolute Maximum Ratings

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$-V_{DS}$	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	$-I_D$	4	A
Drain Current-Pulsed ^{Note1}	$-I_{DM}$	16	A
Maximum Power Dissipation	P_D	1.2	W
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Thermal Characteristics

Thermal Resistance, Junction-to-Ambient ^{Note2}	$R_{\theta JA}$	104	°C/W
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Electrical Characteristics

(T_J=25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-60	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -60V, V _{GS} = 0V	--	--	-1	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±20V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-2.0	-2.8	-4.0	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = -10V, I _D = -6A	--	83	100	mΩ
Forward Transconductance	g _{FS}	V _{DS} = -5V, I _b = -6A	--	7	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = -30V, f = 1.0MHz	--	1000	--	pF
Output Capacitance	C _{oss}		--	40	--	
Reverse Transfer Capacitance	C _{rss}		--	37	--	
Total Gate Charge	Q _g	V _{DD} = -30V, I _D = -6A, V _{GS} = -10V	--	16	--	nC
Gate-Source Charge	Q _{gs}		--	3.4	--	
Gate-Drain Charge	Q _{gd}		--	3.5	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = -30V, I _D = -6A, R _G = 6Ω	--	12	--	ns
Turn-on Rise Time	t _r		--	10	--	
Turn-off Delay Time	t _{d(off)}		--	19	--	
Turn-off Fall Time	t _f		--	6	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	-4	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = -6A, V _{GS} = 0V	--	--	-1.2	V
Reverse Recovery Charge	Q _{rr}	I _F = -6A, V _{GS} = 0V di/dt=-100A/us	--	40	--	nC
Reverse Recovery Time	T _{rr}		--	25	--	ns

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : T_J=25°C ,VDD=-50V,VGS=-10V,L=0.5mH,R_G=25Ω
The table shows the minimum avalanche energy, which is 42mJ when the device is tested until failure
3. Identical low side and high side switch with identical R_G

Test Circuit

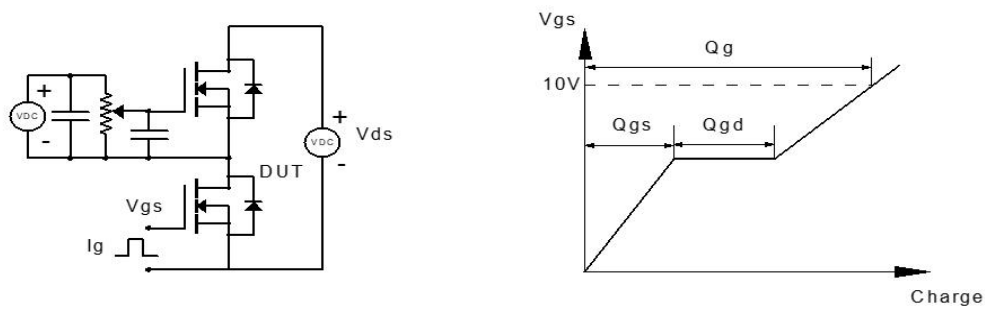


Figure 1: Gate Charge Test Circuit & Waveform

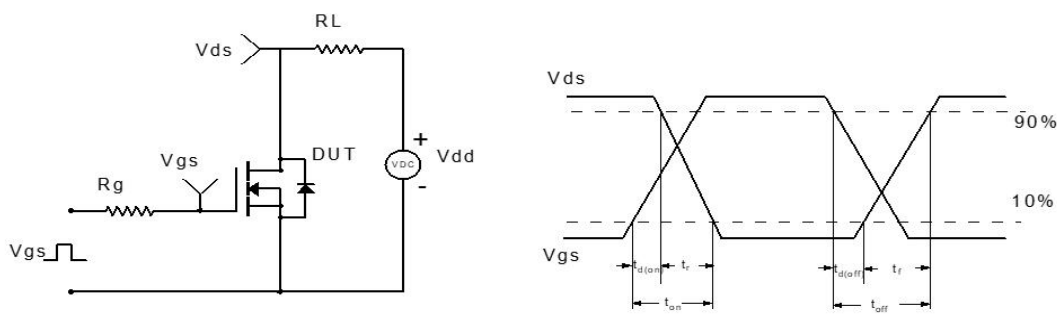


Figure 2: Resistive Switching Test Circuit & Waveform

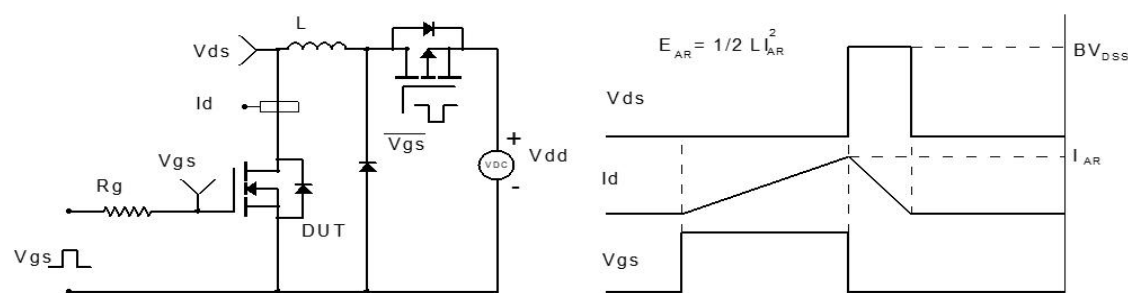


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

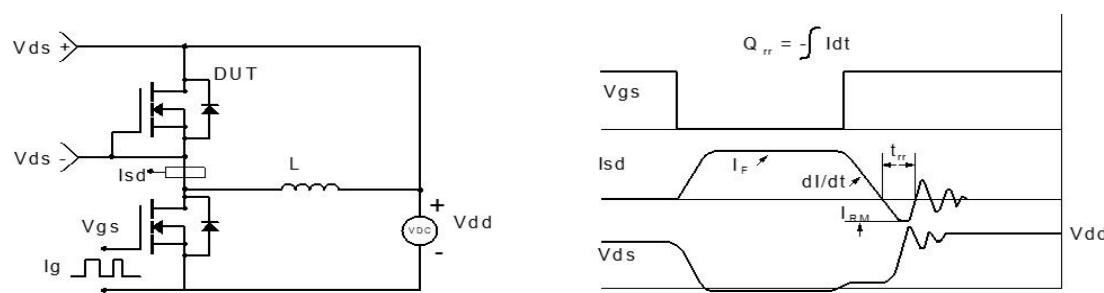


Figure 4: Diode Recovery Test Circuit & Waveform

Typical Operating Characteristics

Figure 1. Output Characteristics

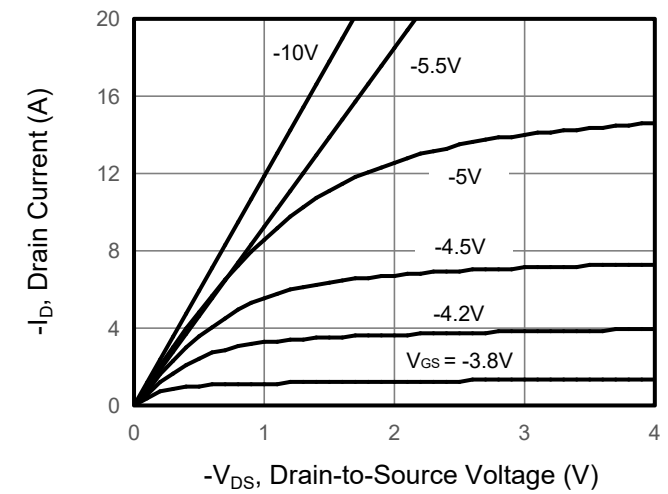


Figure 2. Transfer Characteristics

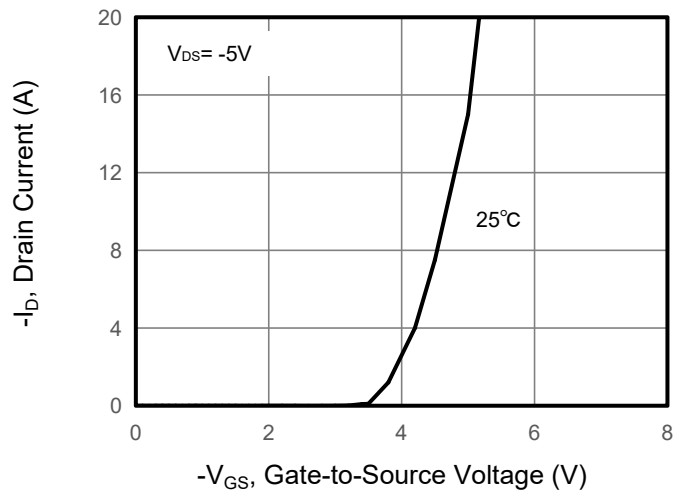


Figure 3. Drain Source On Resistance

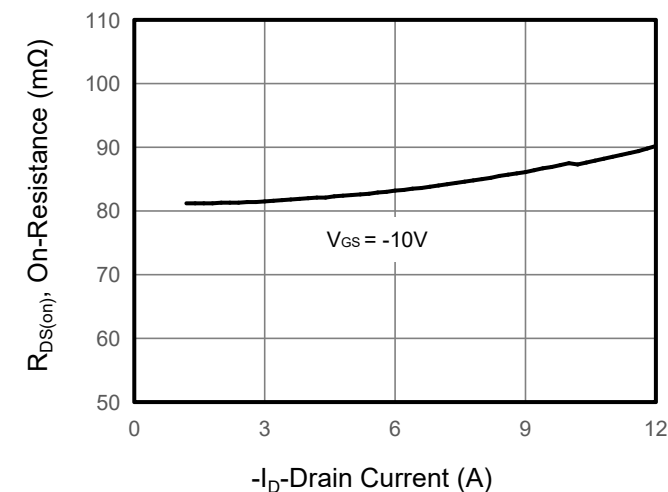


Figure 4. Gate Charge

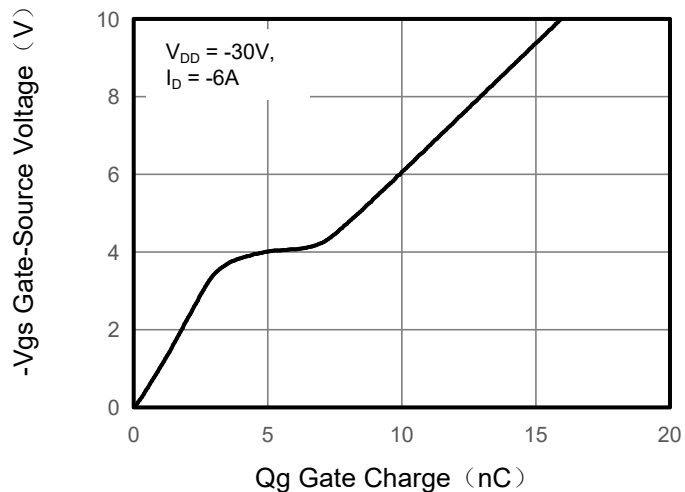


Figure 5. Capacitance

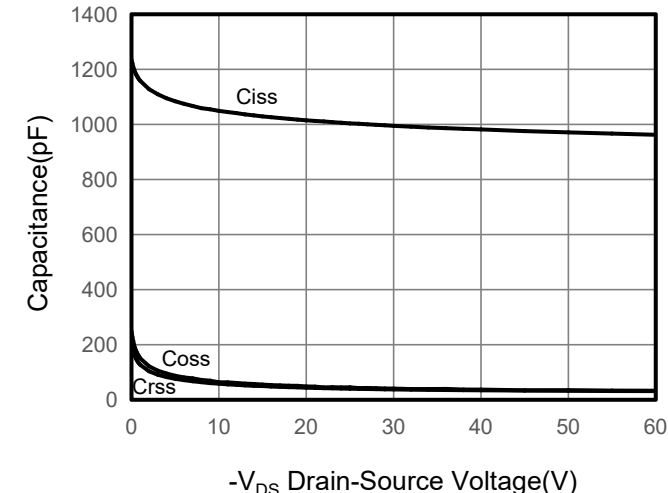
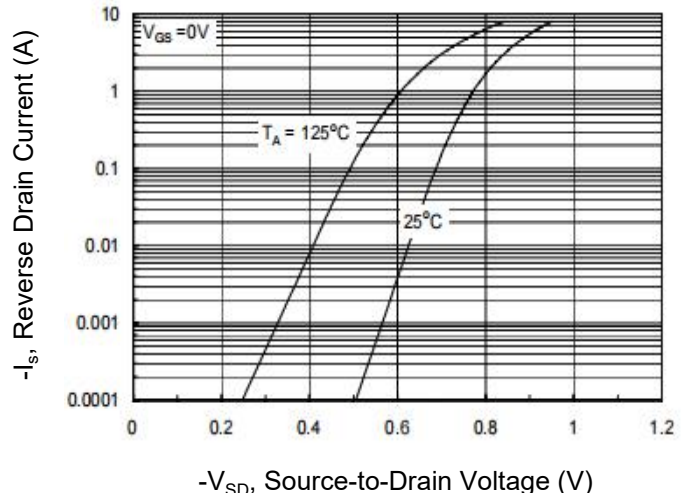
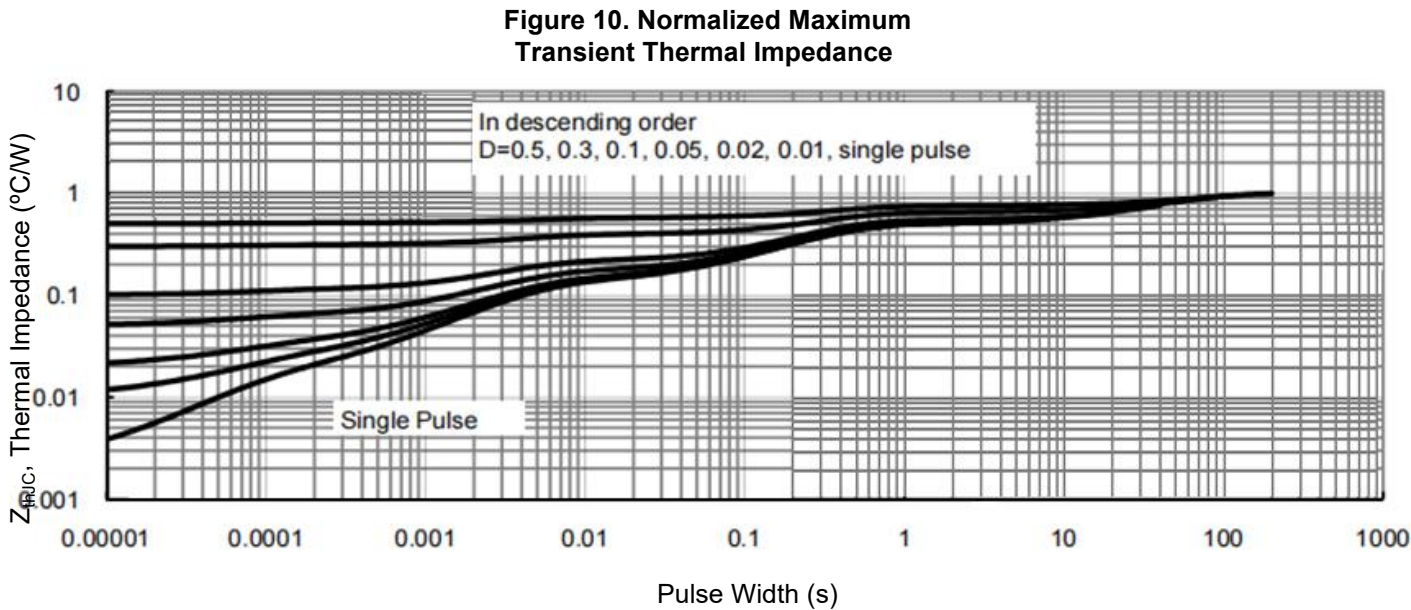
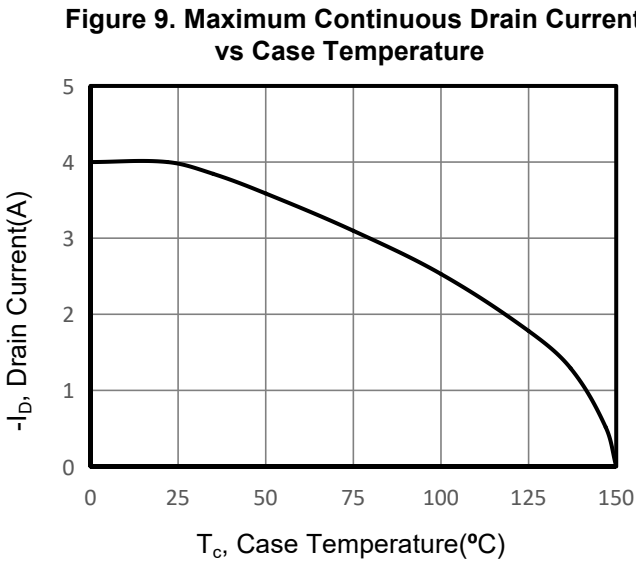
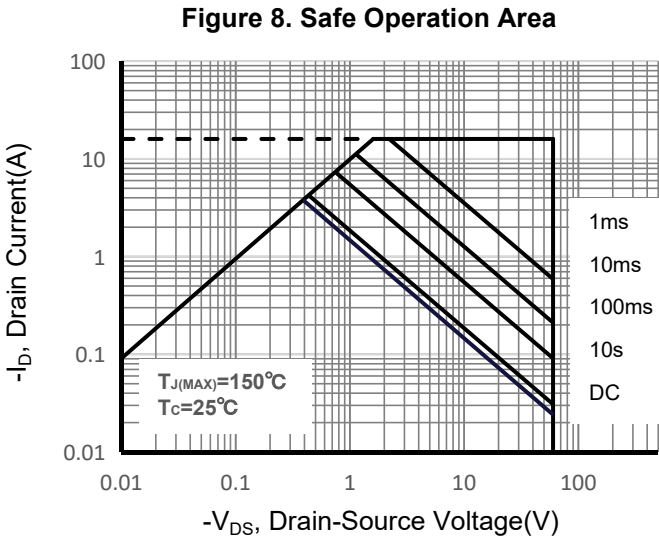
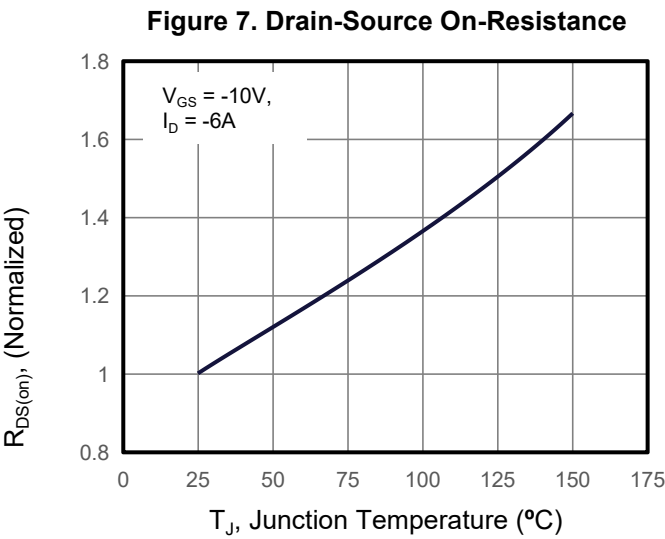


Figure 6. Source-Drain Diode Forward



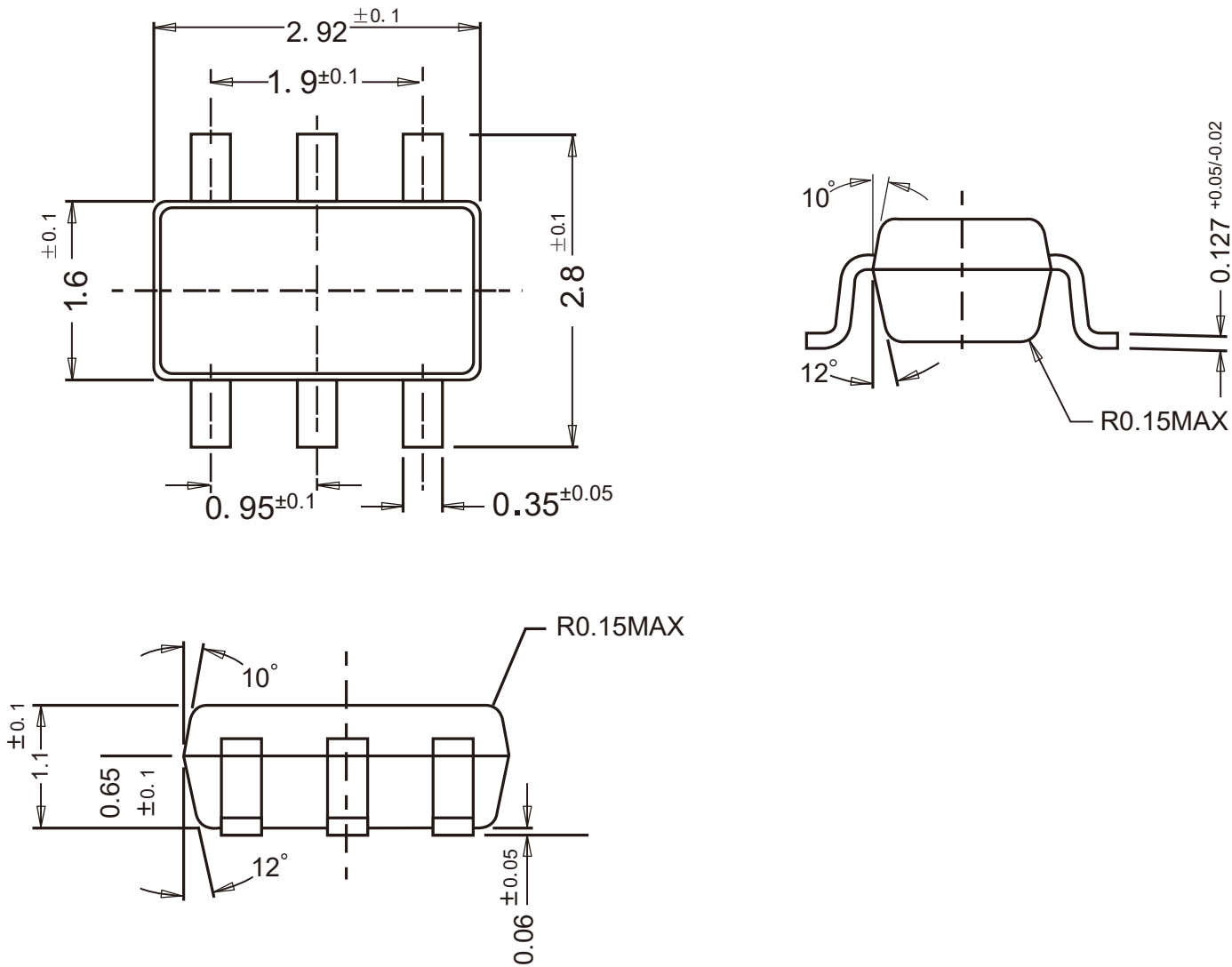
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Package Outline

SOT-23-6

Dimensions in mm

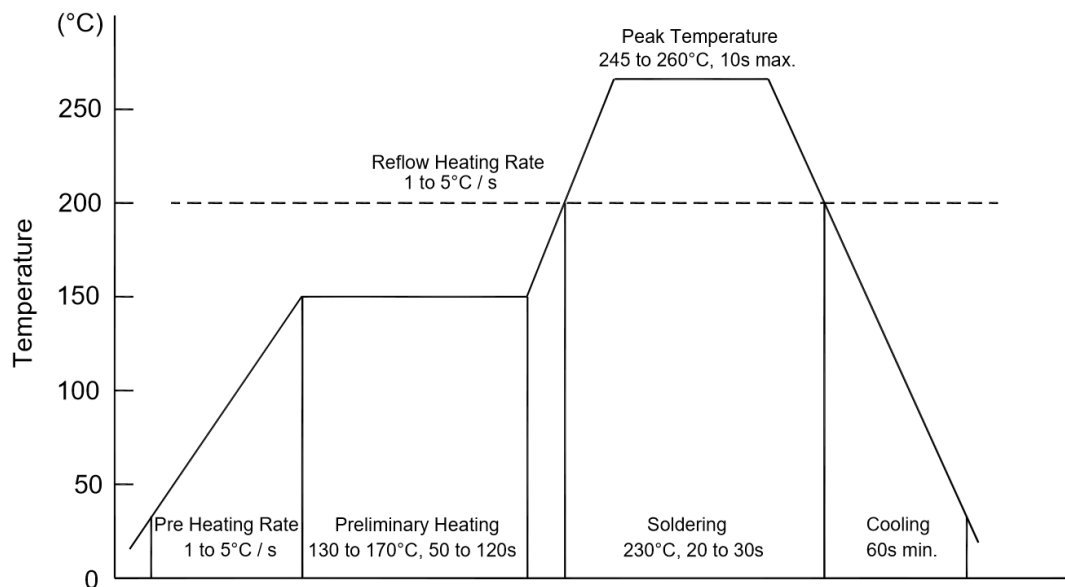


Ordering Information

Device	Package	Shipping
TNG04P60SG	SOT-23-6	3,000PCS/Reel&7inches

Conditions of Soldering and Storage

◆ Recommended condition of reflow soldering



Recommended peak temperature is over 245°C. If peak temperature is below 245°C, you may adjust the following parameters:

- Time length of peak temperature (longer)
- Time length of soldering (longer)
- Thickness of solder paste (thicker)

◆ Conditions of hand soldering

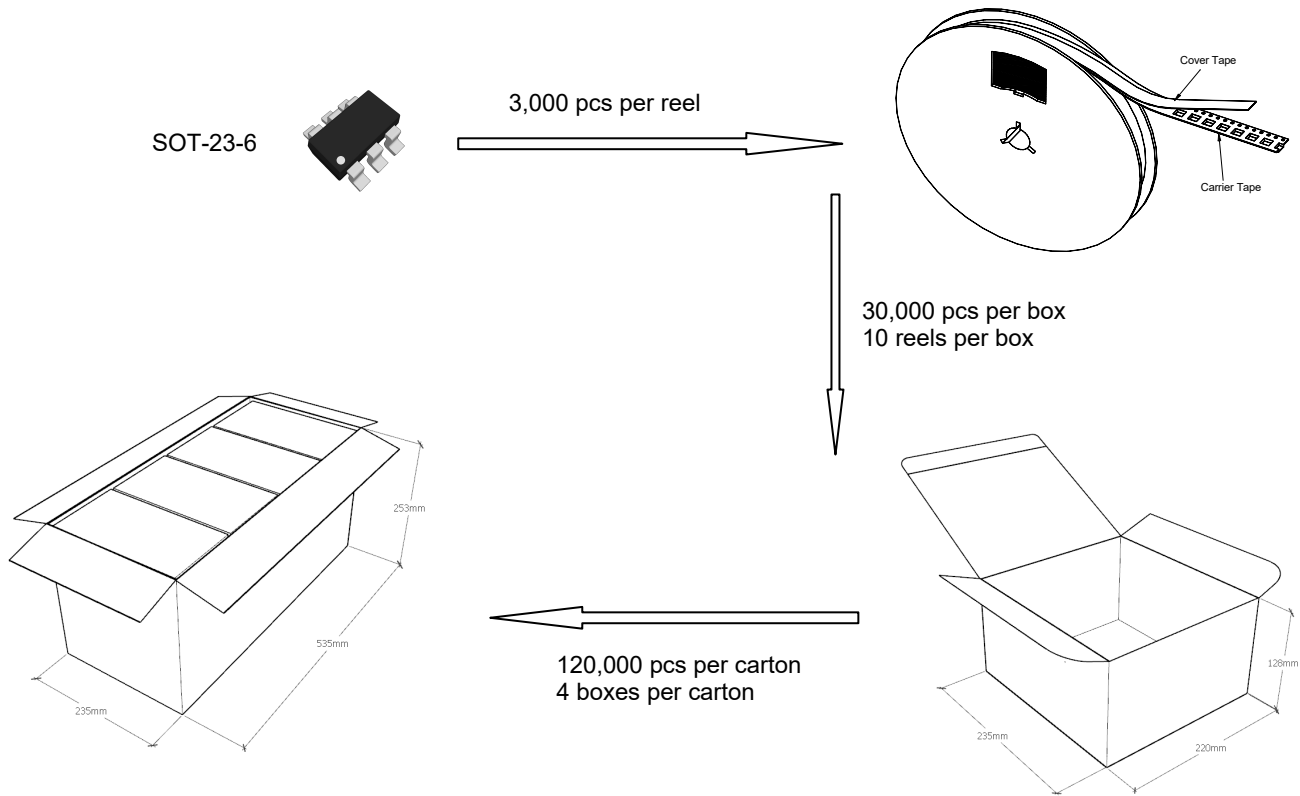
- Temperature: 300°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

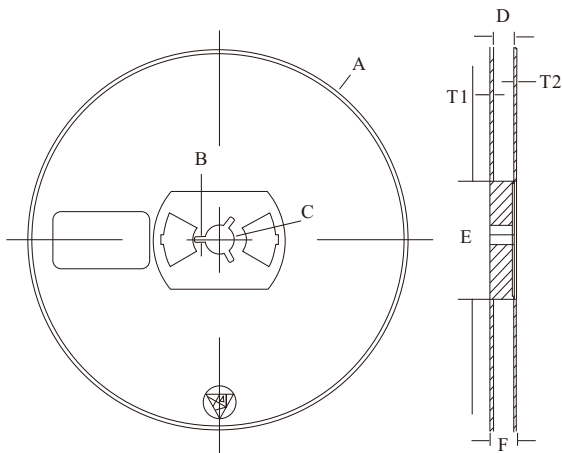
- **Temperature**
5 to 40°C
- **Humidity**
30 to 80% RH
- **Recommended period**
One year after manufacturing

Package Specifications

- The method of packaging

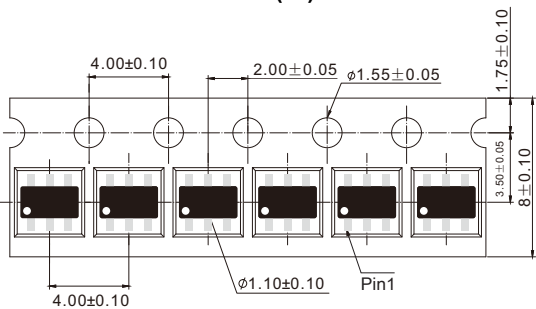


◆ Embossed tape and reel data



Symbol	Value (unit: mm)
A	Ø 177.8±1
B	2.7±0.2
C	Ø 13.5±0.2
E	Ø 54.5±0.2
F	12.3±0.3
D	9.6+2/-0.3
T1	1.0±0.2
T2	1.2±0.2

Reel (7")



Tape (8mm)

Contact Information

TANI website: <http://www.tanisemi.com> Email: tani@tanisemi.com

For additional information, please contact your local Sales Representative.



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Product Specification Statement

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The product parameters described in the product specification are numerical values, characteristics, and functions obtained through actual testing or theoretical calculations of the product in an independent or ideal state. Due to the complexity of product applications and variations in test conditions and equipment, there may be slight fluctuations in parameter test values. TANI shall not guarantee that the actual performance of the product when installed in the customer's system or equipment will be entirely consistent with the product specification, especially concerning dynamic parameters. It is recommended that users consult with professionals for product selection and system design. Users should also thoroughly validate and assess whether the actual parameters and performance when installed in their respective systems or equipment meet their requirements or expectations. Additionally, users should exercise caution in verifying product compatibility issues, and TANI assumes no responsibility for the application of the product. TANI strives to provide accurate and up-to-date information to the best of our ability. However, due to technical, human, or other reasons, TANI cannot guarantee that the information provided in the product specification is entirely accurate and error-free. TANI shall not be held responsible for any losses or damages resulting from the use or reliance on any information in these product specifications.

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