

Product Summary

- $V_{DS} = -60V, I_D = 12A$
- $R_{DS(on)} < 110m\Omega @ V_{GS} = -10V$
- $R_{DS(on)} < 136m\Omega @ V_{GS} = -4.5V$

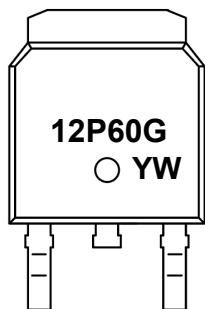
Features

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

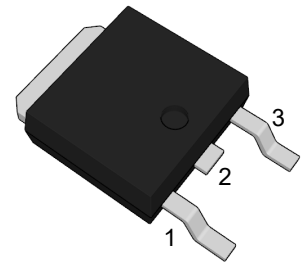
Application

- Load Switch
- PWM Application
- Power Management

Marking Code



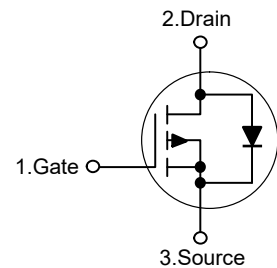
TO-252



(Top View)

Pin	Description
1	Gate
2	Drain
3	Source

Schematic Diagram



Absolute Maximum Ratings

Ratings at 25°C case 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	$-I_D$	12	A
Drain Current-Pulsed ^{Note1}	$-I_{DM}$	48	A
Maximum Power Dissipation	P_D	27	W
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Thermal Characteristics

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	4.63	°C/W
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Electrical Characteristics

(T_J=25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$-V_{(BR)DSS}$	$V_{GS}=0V, I_D=-250\mu A$	60	--	--	V
Zero Gate Voltage Drain Current	$-I_{DSS}$	$V_{DS}=-60V, V_{GS}=0V$	--	--	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	± 100	nA
Gate Threshold Voltage ^{Note2}	$-V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	1	--	2.5	V
Drain-Source On-Resistance ^{Note2}	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-6A$	--	--	110	m Ω
		$V_{GS}=-4.5V, I_D=-4A$	--	--	136	m Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=-30V, V_{GS}=0V, f=1MHz$	--	324	--	pF
Output Capacitance	C_{oss}		--	66	--	pF
Reverse Transfer Capacitance	C_{rss}		--	4	--	pF
Total Gate Charge	Q_g	$V_{DS}=-30V, I_D=-2A,$ $V_{GS}=-10V$	--	5	--	nC
Gate-Source Charge	Q_{gs}		--	1	--	nC
Gate-Drain Charge	Q_{gd}		--	0.72	--	nC
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-30V, I_D=-2A,$ $V_{GS}=-10V, R_{GEN}=5\Omega$	--	6.8	--	nS
Turn-on Rise Time	t_r		--	8	--	nS
Turn-off Delay Time	$t_{d(off)}$		--	16	--	nS
Turn-off Fall Time	t_f		--	4	--	nS
Source-Drain Diode Characteristics						
Diode Forward Voltage ^{Note2}	$-V_{SD}$	$V_{GS}=0V, I_S=-10A$	--	--	1.2	V
Diode Forward Current	$-I_S$		--	--	12	A

Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

Typical Characteristic Curves

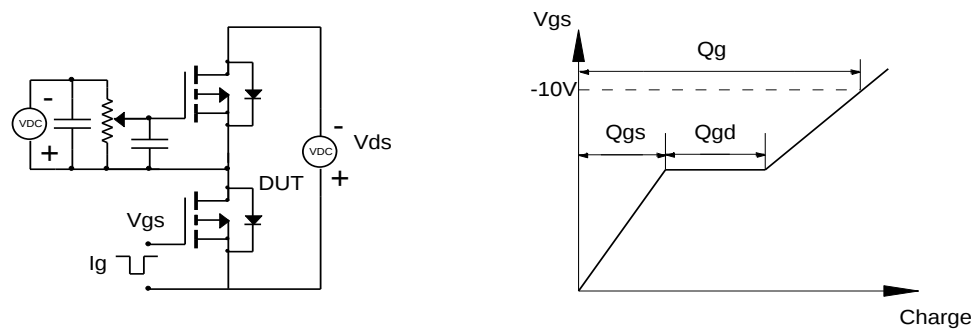


Figure 1: Gate Charge Test Circuit & Waveform

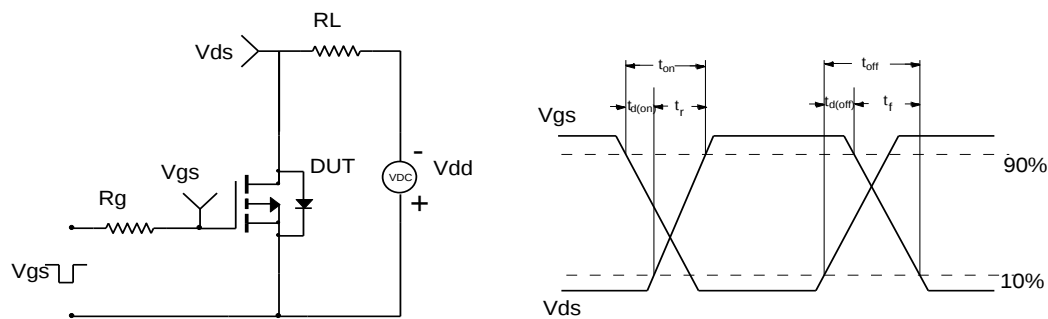


Figure 2: Resistive Switching Test Circuit & Waveform

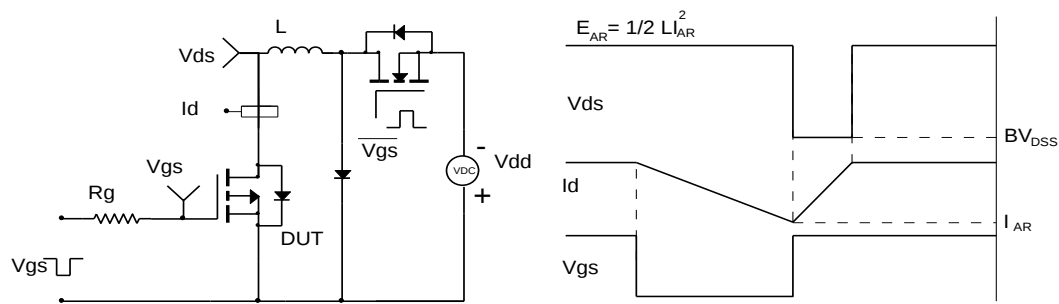


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

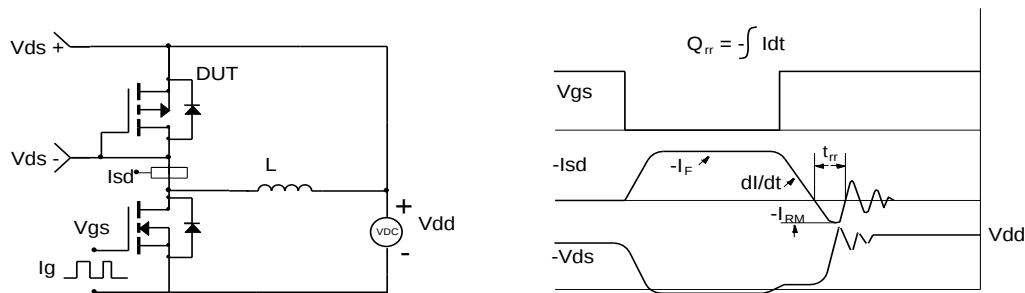
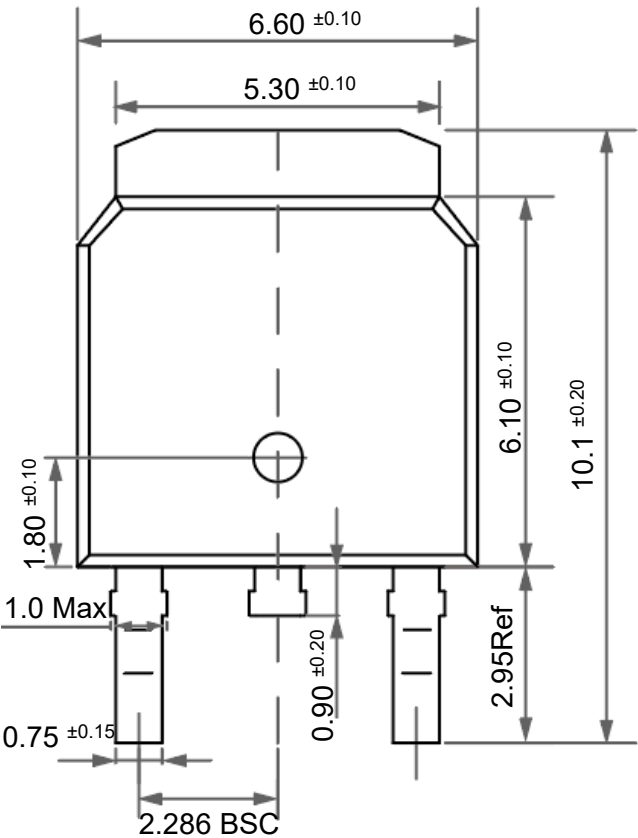


Figure 4: Diode Recovery Test Circuit & Waveform

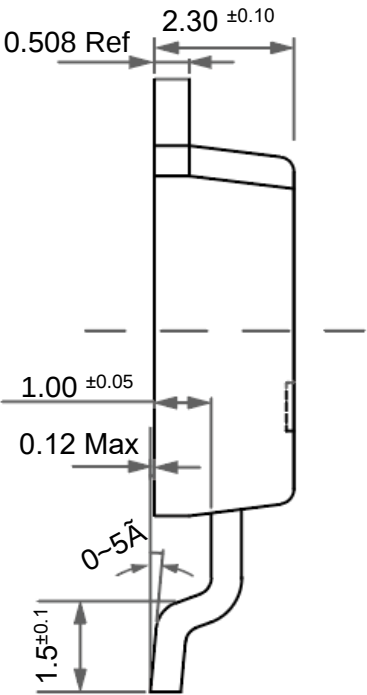
Package Outline

TO-252

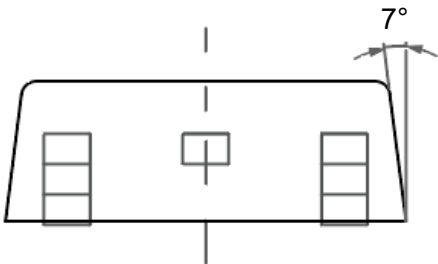
Dimensions in mm



Front View



Side View



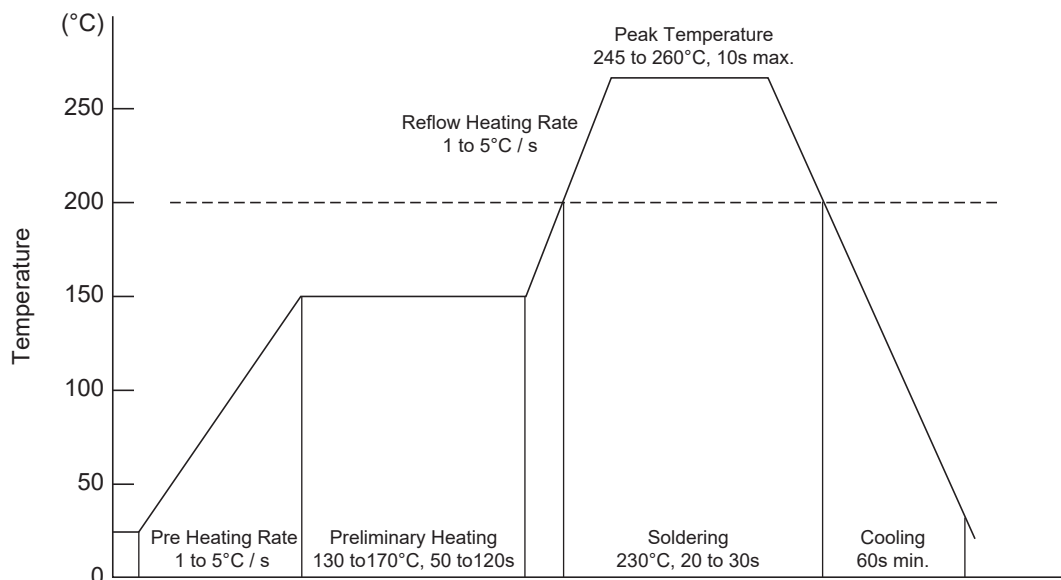
Bottom View

Ordering Information

Device	Package	Shipping
TNG12P60TE	TO-252	2,500PCS/Reel&13inches

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

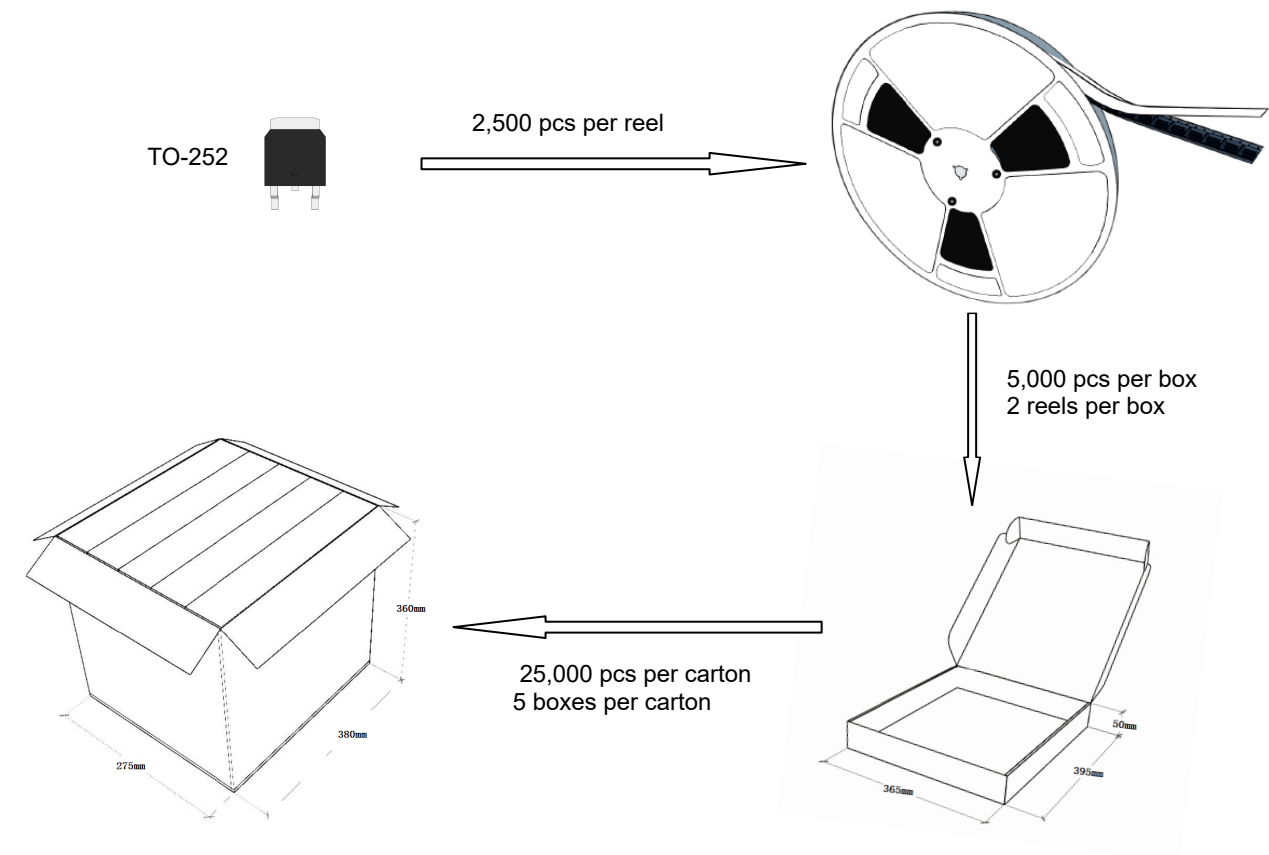
- Temperature: 300°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

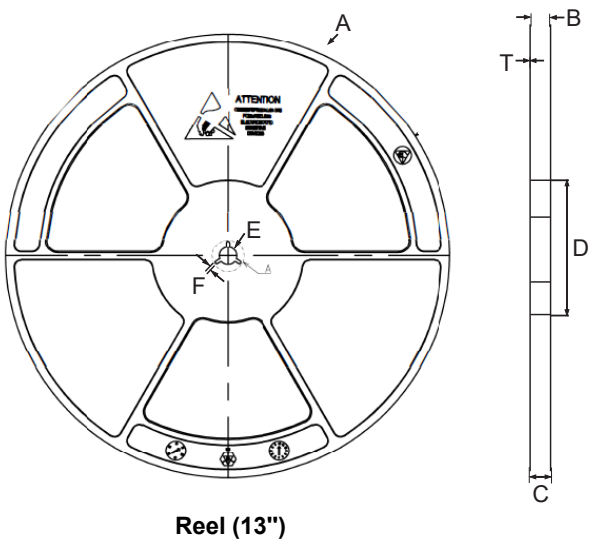
- **Temperature**
5 to 40°C
- **Humidity**
30 to 80% RH
- **Recommended period**
One year after manufacturing

Package Specifications

- The method of packaging

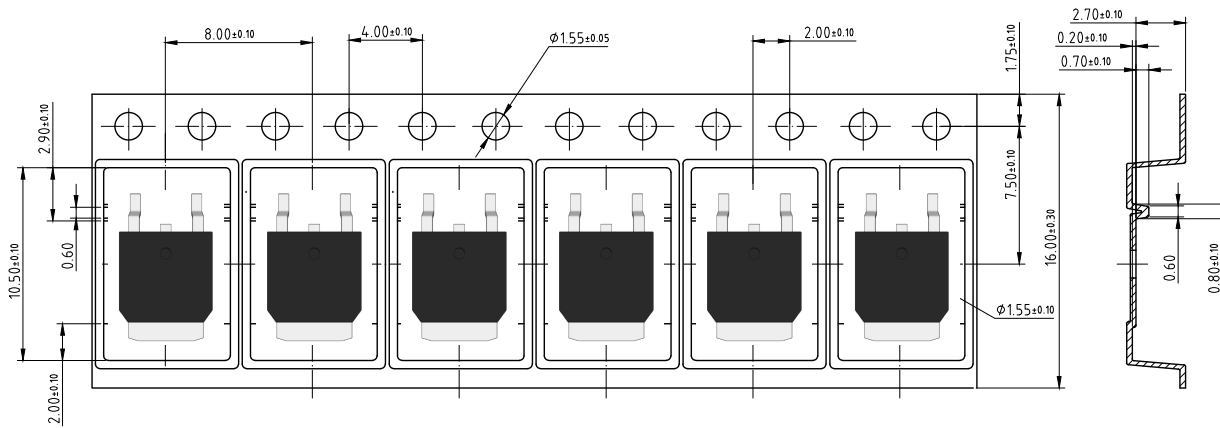


reel data



Symbol	Value(unit:mm)
A	$\Phi 330.2\pm 1$
B	17 ± 0.5
C	21.2 ± 2
D	$\Phi 100\pm 0.5$
E	$\Phi 13.4\pm 0.2$
F	2.3 ± 0.2
T	2.1 ± 0.2

◆ Embossed tape data



Contact Information

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For additional information, please contact your local Sales Representative.

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Product Specification Statement

The product specification aims to provide users with a reference regarding various product parameters, performance, and usage. It presents certain aspects of the product's performance in graphical form and is intended solely for users to select product and make product comparisons, enabling users to better understand and evaluate the characteristics and advantages of the product. It does not constitute any commitment, warranty, or guarantee.

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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Users are advised to pay attention to the parameter limit values specified in the product specification and maintain a certain margin in design or application to ensure that the product does not exceed the parameter limit values defined in the product specification. This precaution should be taken to avoid exceeding one or more of the limit values, which may result in permanent irreversible damage to the product, ultimately affecting the quality and reliability of the system or equipment.

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