

Product Summary

- $V_{DS} = 40V, I_D = 120A$
- $R_{DS(on)} < 3.4m\Omega$ @ $V_{GS} = 10V$
- $R_{DS(on)} < 4.2m\Omega$ @ $V_{GS} = 4.5V$

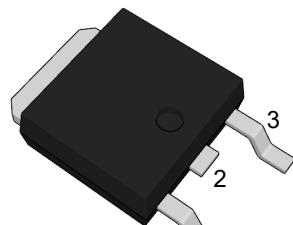
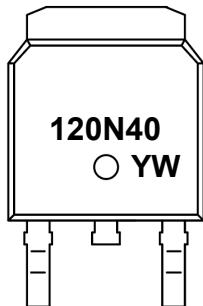
Features

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

Application

- DC-DC Converters
- Power Management Functions
- Backlighting

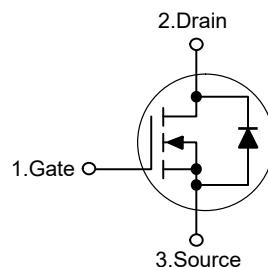
Marking Code



(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}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	120	A
Drain Current-Pulsed ^{Note1}	I_{DM}	360	A
Maximum Power Dissipation	P_D	22	W
Single Pulse Avalanche Energy ^{Note2}	E_{AS}	145	mJ
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Thermal Characteristics

Thermal Resistance, Junction-to-Case	R_{eJC}	1.7	°C/W
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Electrical Characteristics

(T_J=25°C unless otherwise specified)

Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	BV_{DSS}	40	-	-	V
Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =20A	R_{DS(ON)}	-	2.5	3.2	mΩ
	V _{GS} =4.5V, I _D =15A		-	3.8	5.3	
Gate-Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	V_{GS(th)}	1.2	1.7	2.2	V
Drain -Source Leakage Current	V _{DS} =40V, V _{GS} =0V, T _J =25°C	I_{DSS}	-	-	1	μA
	V _{DS} =40V, V _{GS} =0V, T _J =55°C		-	-	5	
Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	I_{GSS}	-	-	±100	nA
Forward Transconductance	V _{DS} =5V, I _D =20A	g_{FS}	-	75	-	S
Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	R_g	-	1.5	-	Ω
Total Gate Charge(4.5V)	V _{DS} =20V V _{GS} =4.5V I _D =20A	Q_g	-	22.7	-	nC
Gate-Source Charge		Q_{gs}	-	7.5	-	
Gate-Drain Charge		Q_{gd}	-	5.5	-	
Turn-on delay time	VDD=20V VGS=10V RG=3Ω ID=20A	t_{d(on)}	-	10	-	ns
Rise Time		T_r	-	5	-	
Turn-Off Delay Time		t_{d(OFF)}	-	33	-	
Fall Time		t_f	-	6.5	-	
Input Capacitance	V _{DS} =20V V _{GS} =0V f=1.0MHz	C_{iss}	-	2648	-	pF
Output Capacitance		C_{oss}	-	899	-	
Reverse Transfer Capacitance		C_{rss}	-	71	-	
Continuous Source Current ^{1,6}	V _G =V _D =0V, Force Current	I_s	-	-	30	A
Diode Forward Voltage ²	V _{GS} =0V, I _s =1A, T _J =25°C	V_{SD}	-	-	1	V

Note :

- 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 \leq 300us , duty cycle \leq 2%
- 3.The EAS data shows Max. rating . The test condition is V DD =25V,V GS =10V,L=0.1mH,I AS =54A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I D and I DM , in real applications , should be limited by total power dissipation.

Typical Characteristic Curves

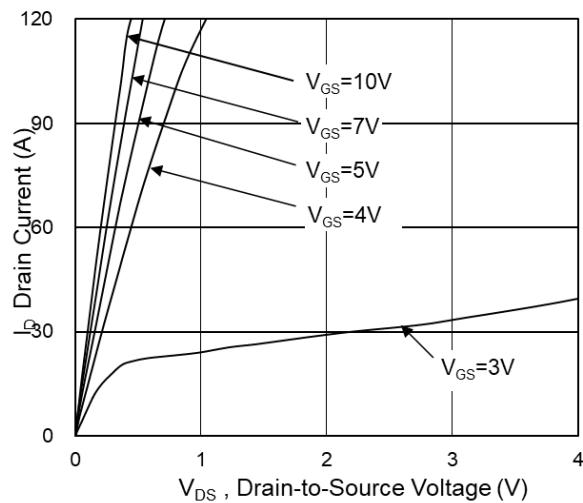


Fig.1 Typical Output Characteristics

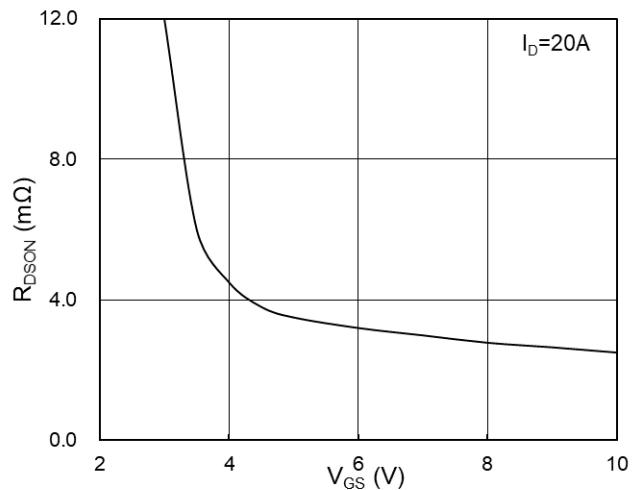


Fig.2 On-Resistance vs G-S Voltage

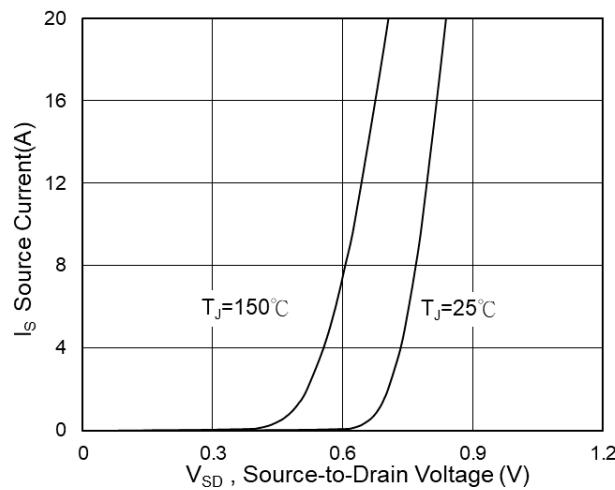


Fig.3 Source Drain Forward Characteristics

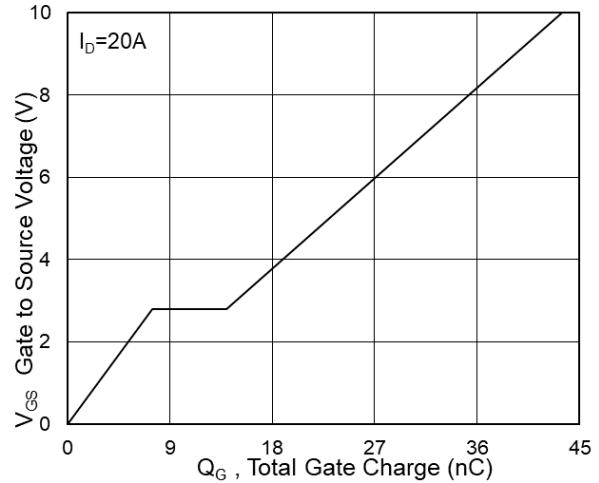
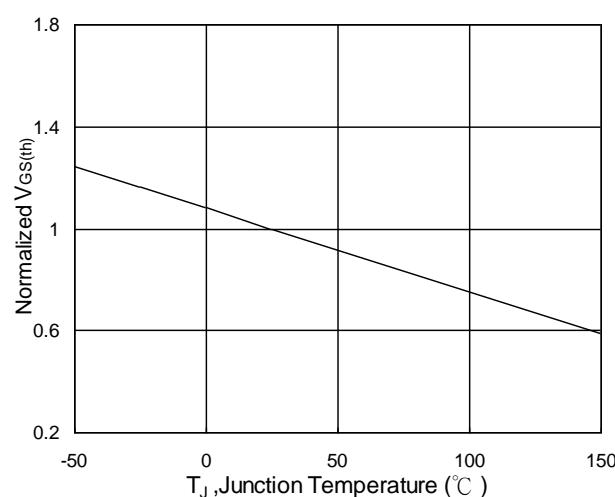
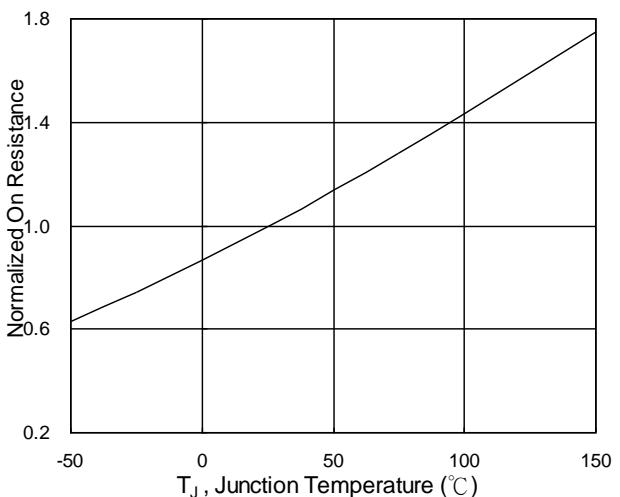


Fig.4 Gate-Charge Characteristics



Ratings and Characteristics Curves

Fig.6 Normalized $R_{DS(on)}$ vs T_J

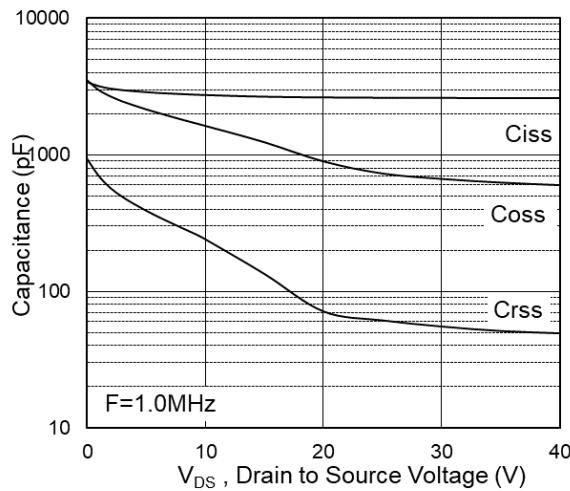


Fig.7 Capacitance

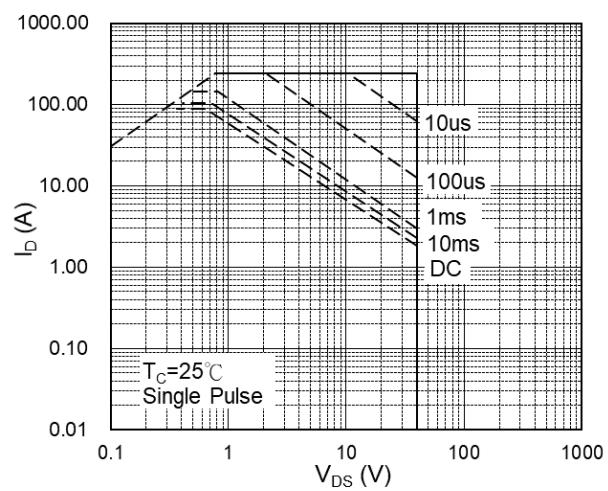


Fig.8 Safe Operating Area

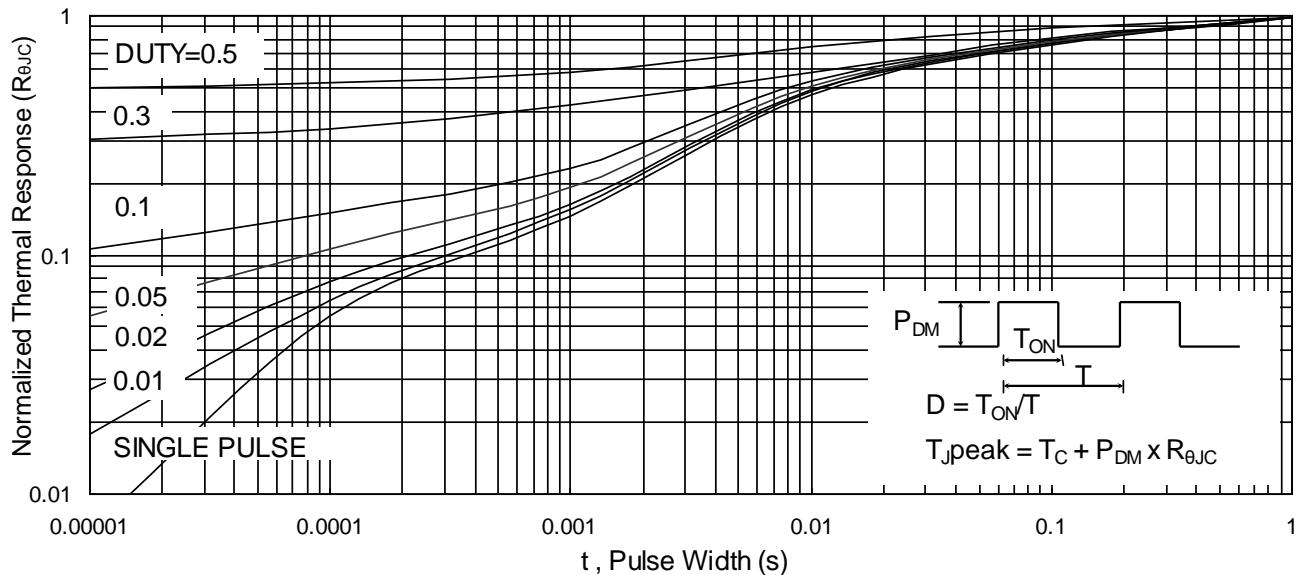


Fig.9 Normalized Maximum Transient Thermal Impedance

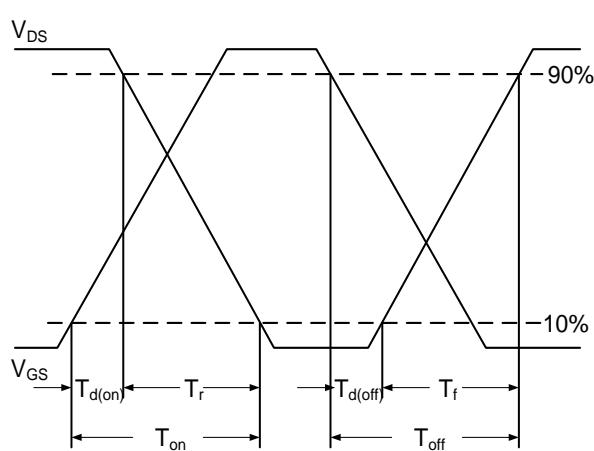


Fig.10 Switching Time Waveform

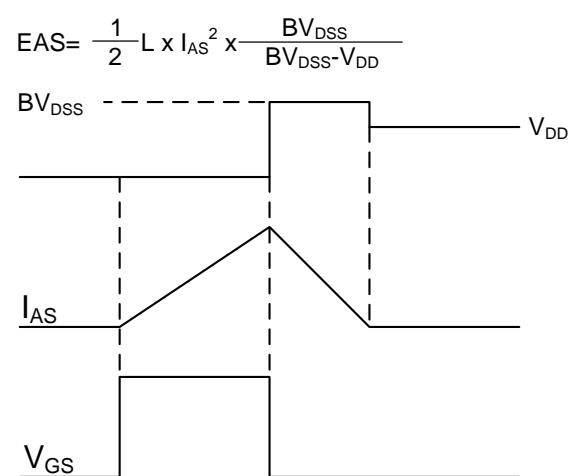
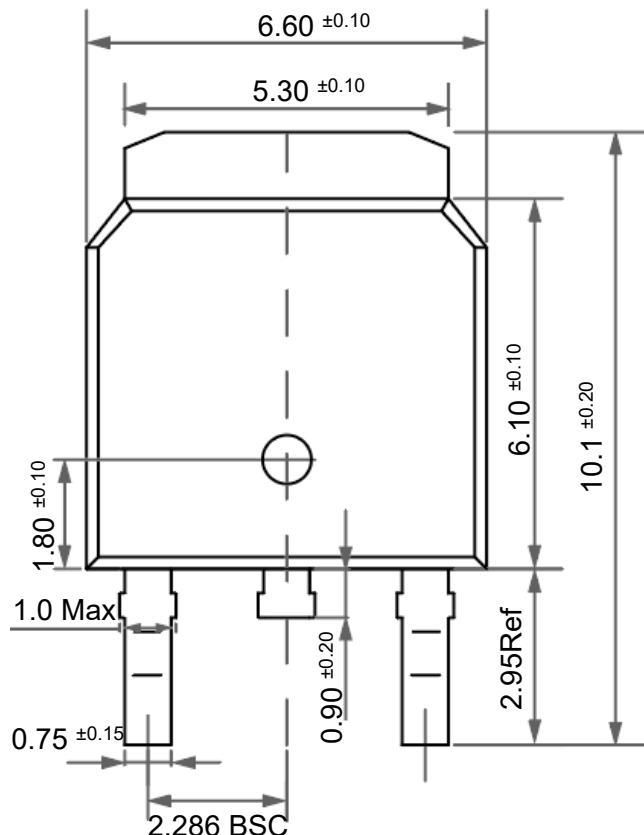
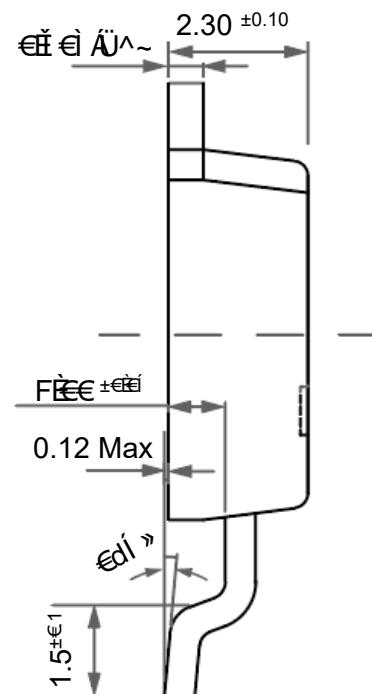
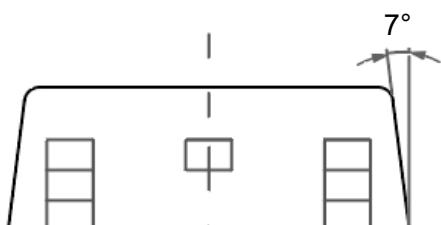


Fig.11 Unclamped Inductive Switching Wave

Package Outline

TO-252

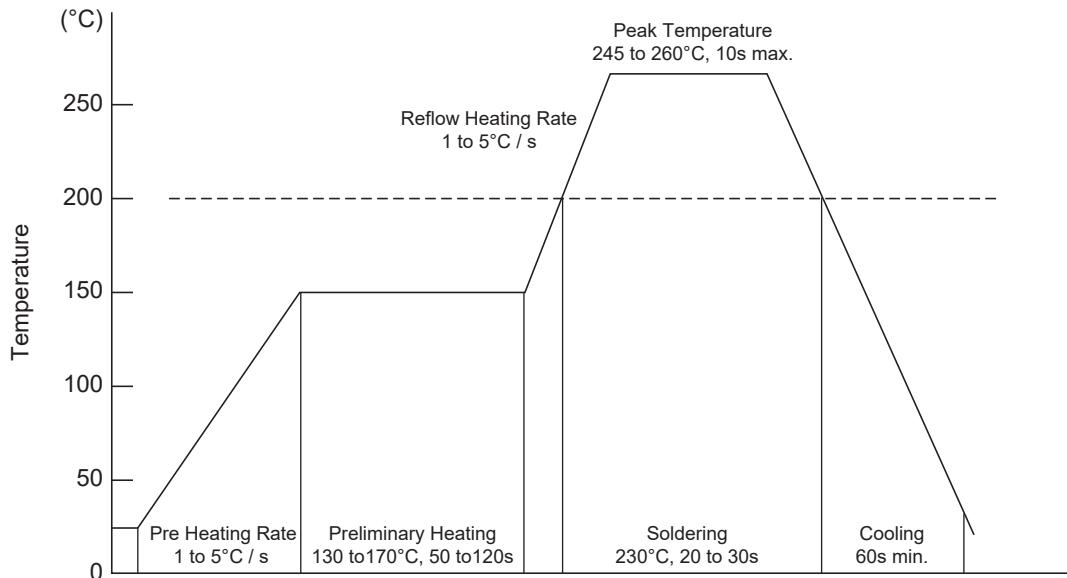
Dimensions in mm

**Front View****Side View****Bottom View****Ordering Information**

Device	Package	Shipping
TN120N40TE	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

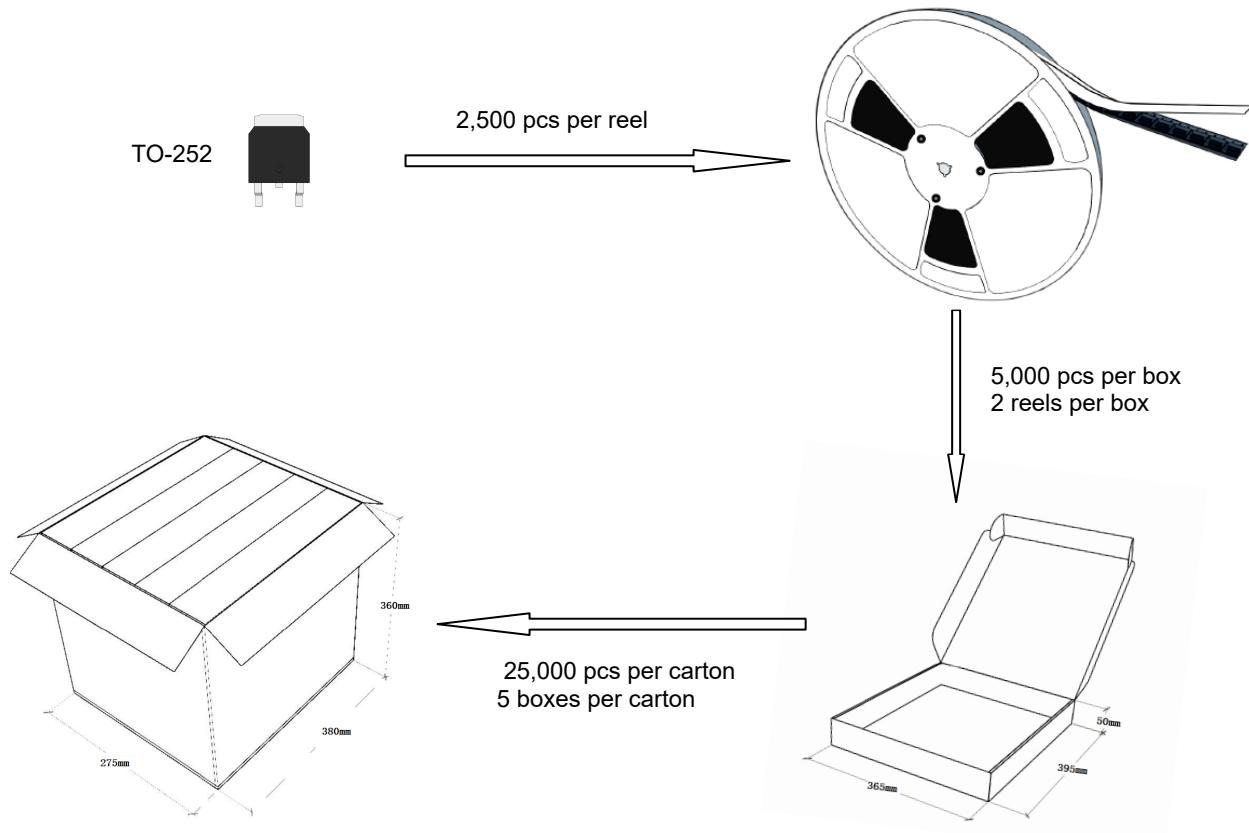
- Temperature: 300°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

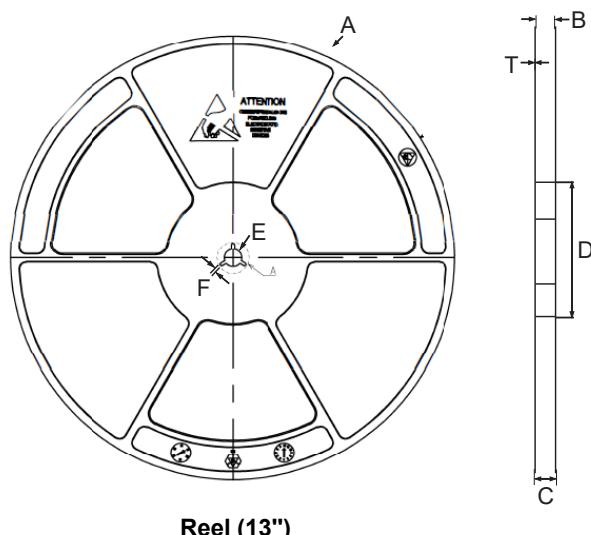
- **Temperature**
5 to 40°C
- **Humidity**
30 to 80% RH
- **Recommended period**
One year after manufacturing

Package Specifications

- The method of packaging

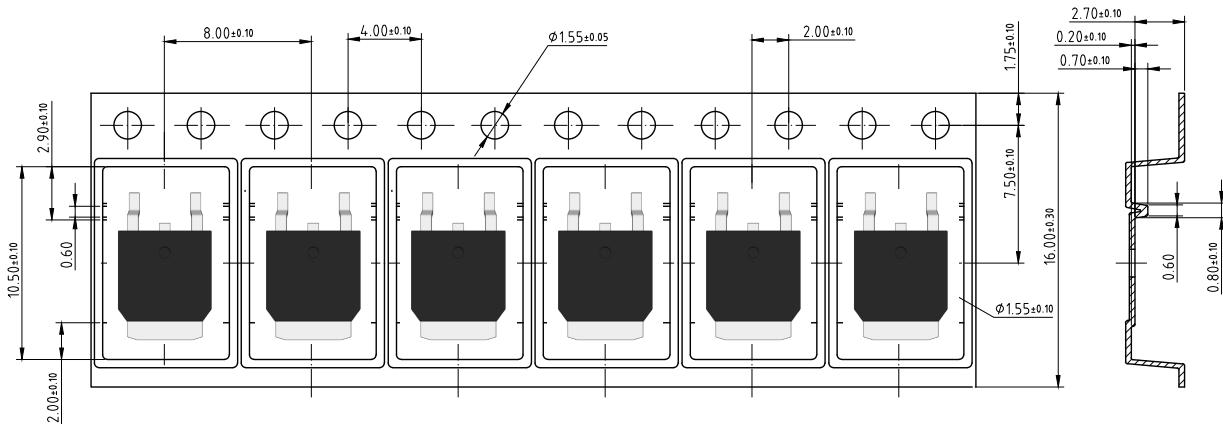


◆ reel data



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

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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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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