TN120N40TE

N-Channel Enhancement Mode Power MOSFET

Product Summary

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

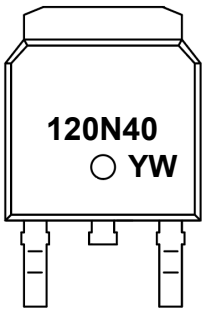
Features

- 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



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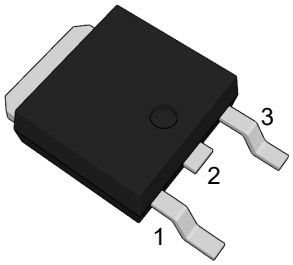
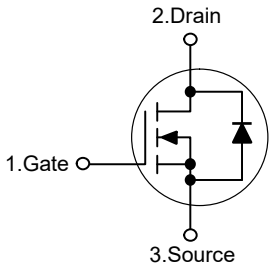


(Top View)

Pin	Description
1	Gate
2	Drain
3	Source

Schematic Diagram



Absolute Maximum Ratings

Ratings at 25℃ 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	$R_{\theta JC}$	1.7	°C/W

Electrical Characteristics

(T_J=25℃ 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℃	I_{DSS}	-	-	1	μA
	V_{DS}=40V , V_{GS}=0V , T_J=55℃		-	-	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℃	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 ≦ 300us , duty cycle ≦ 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℃ 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

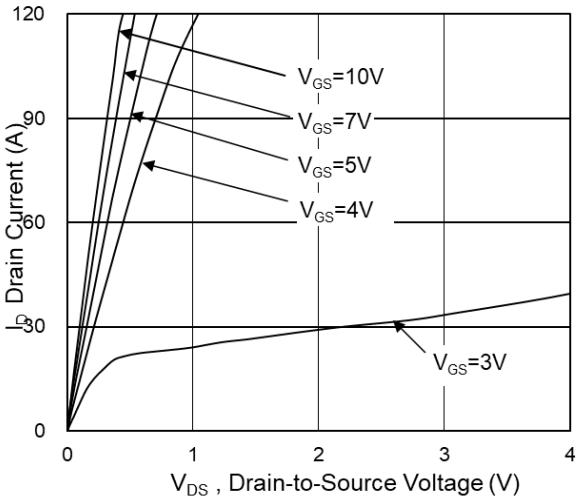


Fig.1 Typical Output Characteristics

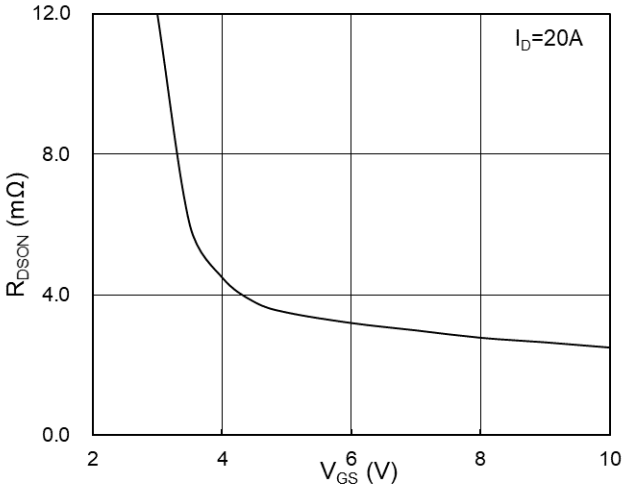


Fig.2 On-Resistance vs G-S Voltage

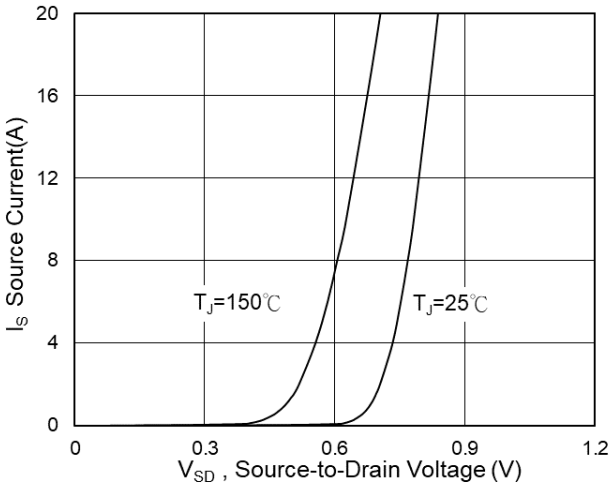


Fig.3 Source Drain Forward Characteristics

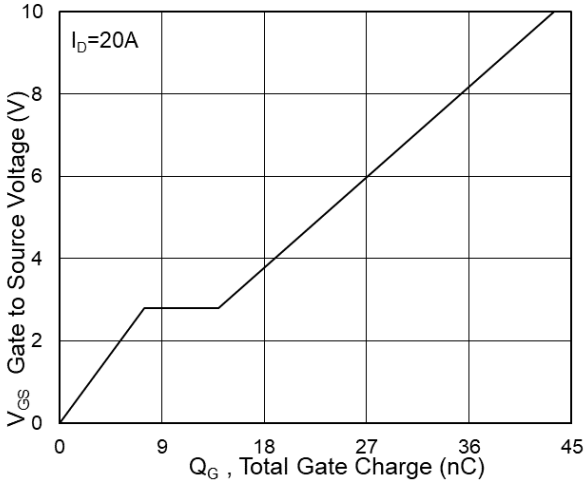


Fig.4 Gate-Charge Characteristics

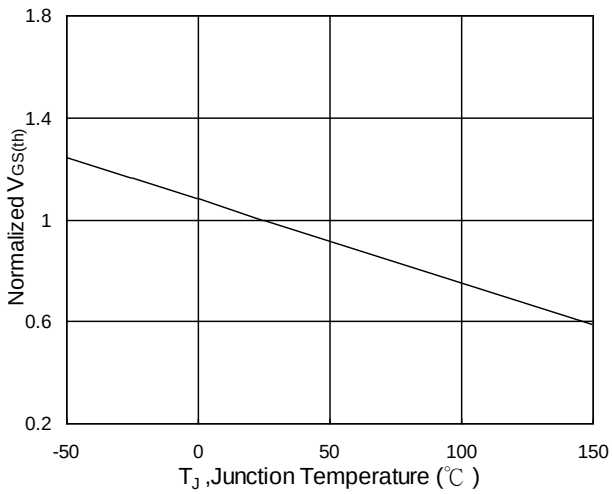


Fig.5 Normalized $V_{GS(th)}$ vs T_J

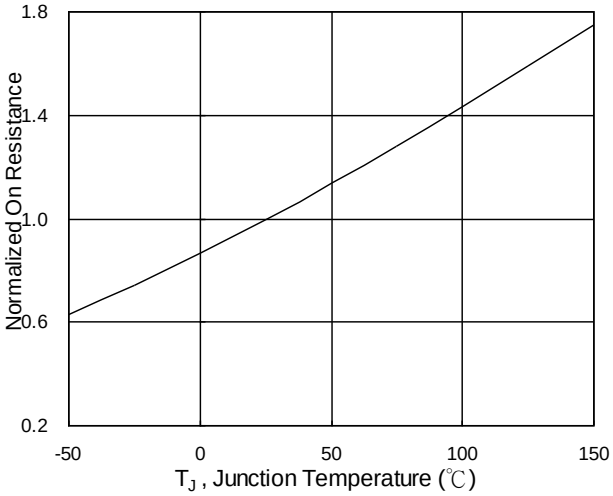


Fig.6 Normalized R_{DSON} vs T_J

Ratings and Characteristic Curves

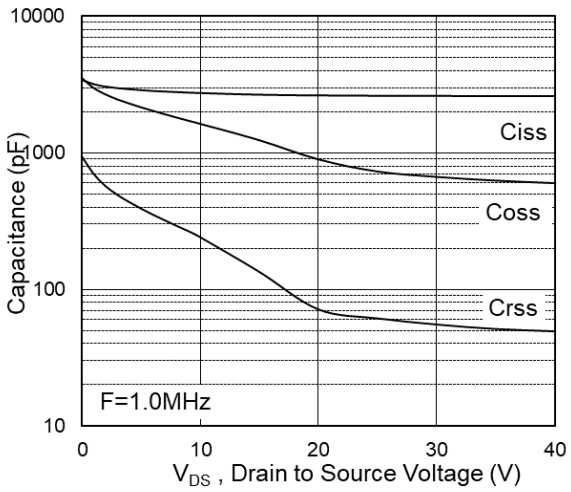


Fig.7 Capacitance

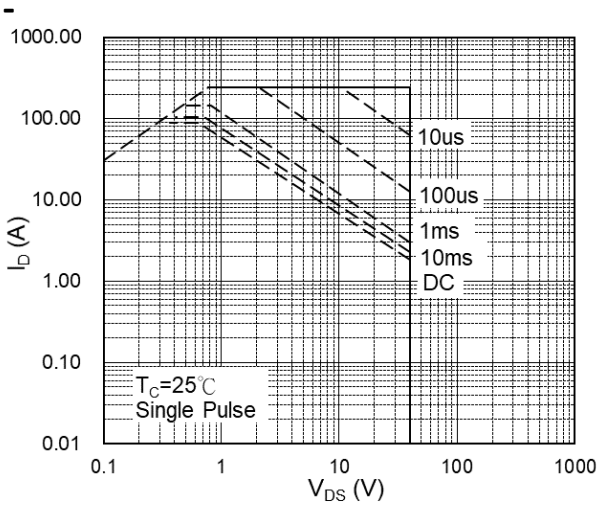


Fig.8 Safe Operating Area

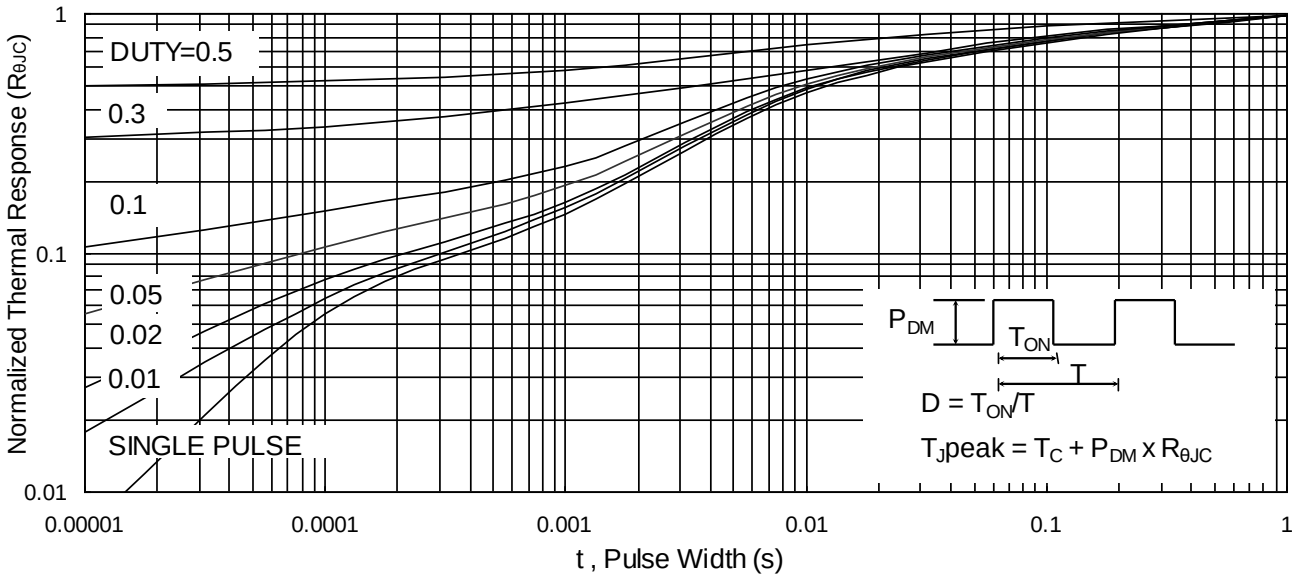


Fig.9 Normalized Maximum Transient Thermal Impedance

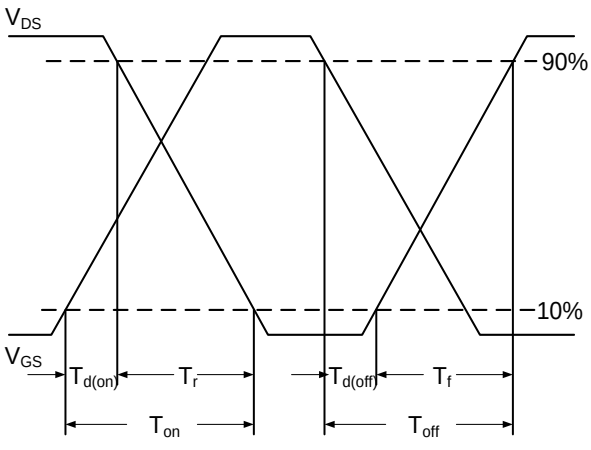


Fig.10 Switching Time Waveform

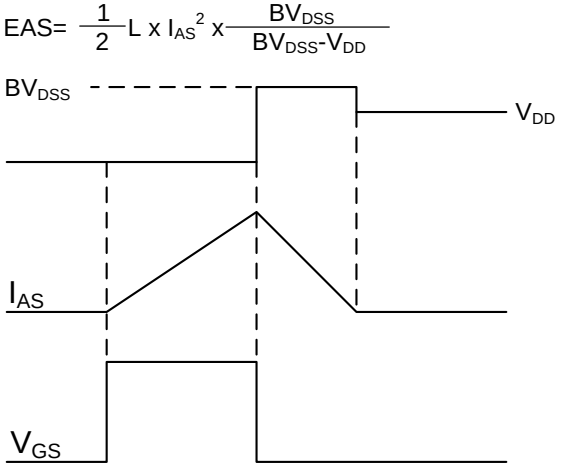
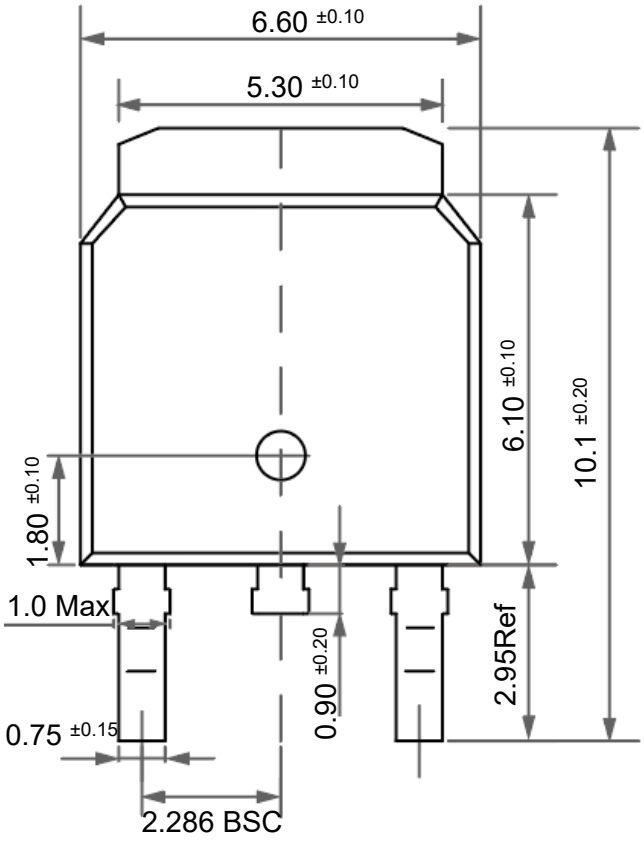


Fig.11 Unclamped Inductive Switching Wave

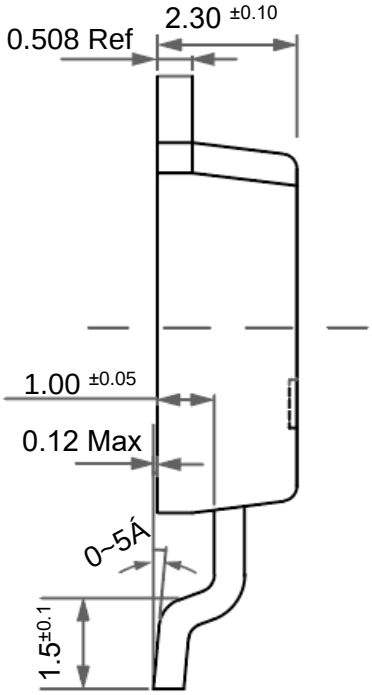
Package Outline

TO-252

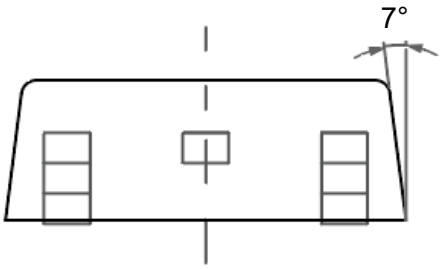
Dimensions in mm



Front View



Side View



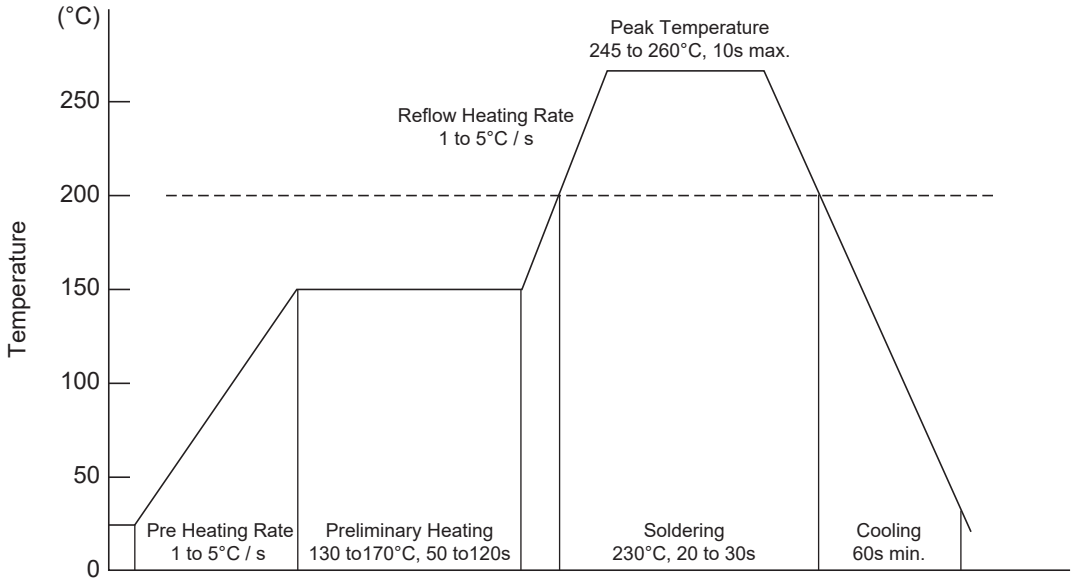
Bottom View

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

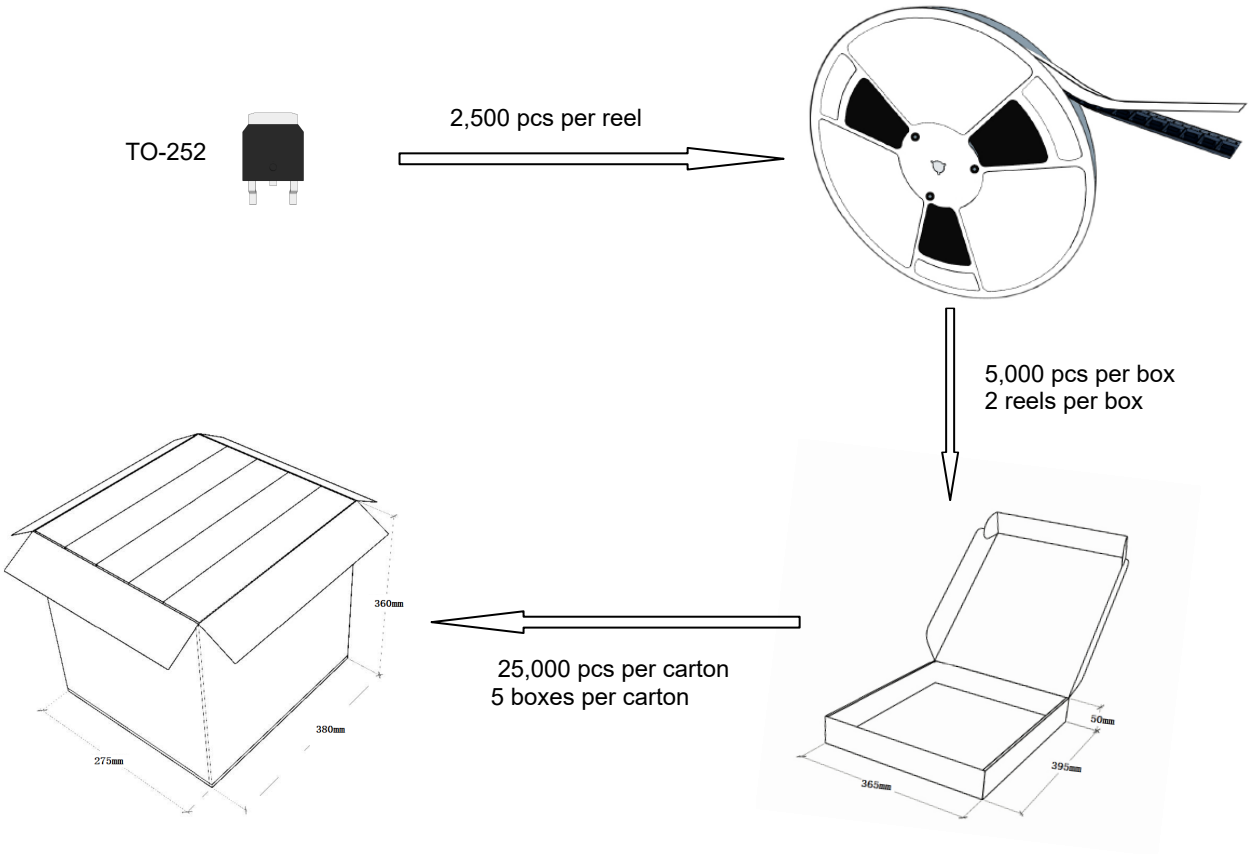
- Temperature: 300°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

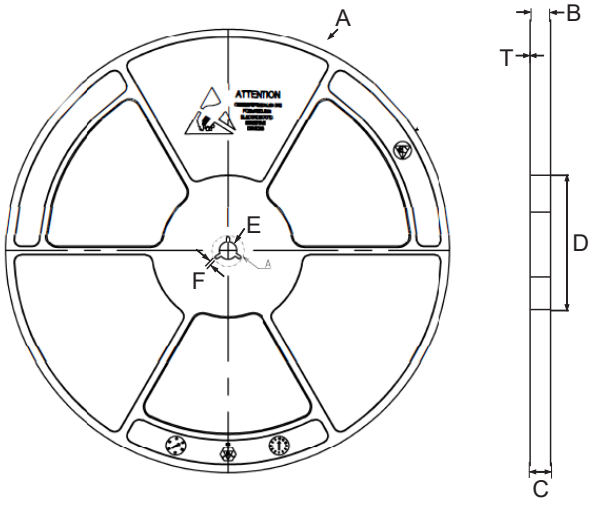
- **Temperature**
  5 to 40°C
- **Humidity**
  30 to 80% RH
- **Recommended period**
  One year after manufacturing

Package Specifications

- The method of packaging



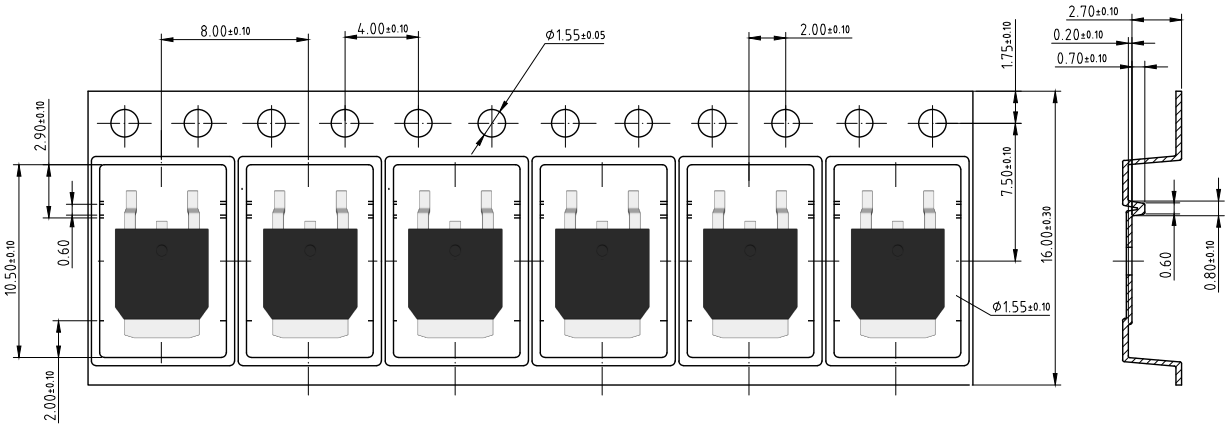
◆ **reel data**



Reel (13")

Symbol	Value(unit:mm)
A	Φ330.2±1
B	17±0.5
C	21.2±2
D	Φ100±0.5
E	Φ13.4±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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