

### Product Summary

- $V_{DS} = -20V, I_D = -50A$
- $R_{DS(on)} < 7.6m\Omega @ V_{GS} = -4.5V$
- $R_{DS(on)} < 10m\Omega @ V_{GS} = -2.5V$

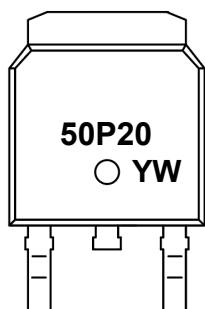
### Features

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

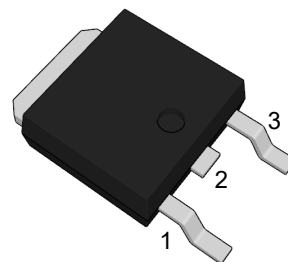
### Application

- Electronic Cigarette
- Load Switch

### Marking Code



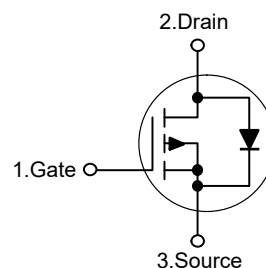
### TO-252



(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                  | $-V_{DS}$ | 20          | V    |
| Gate-Source Voltage                   | $V_{GS}$  | $\pm 12$    | V    |
| Drain Current-Continuous              | $-I_D$    | 50          | A    |
| Drain Current-Pulsed <sup>Note1</sup> | $-I_{DM}$ | 180         | A    |
| Maximum Power Dissipation             | $P_D$     | 2.4         | W    |
| Junction Temperature                  | $T_J$     | 150         | °C   |
| Storage Temperature Range             | $T_{STG}$ | -55 to +150 | °C   |

### Thermal Characteristics

|                                                          |                 |    |      |
|----------------------------------------------------------|-----------------|----|------|
| Thermal Resistance, Junction-to-Ambient <sup>Note2</sup> | $R_{\theta JA}$ | 52 | °C/W |
|----------------------------------------------------------|-----------------|----|------|

## Electrical Characteristics

(T<sub>J</sub>=25°C unless otherwise specified)

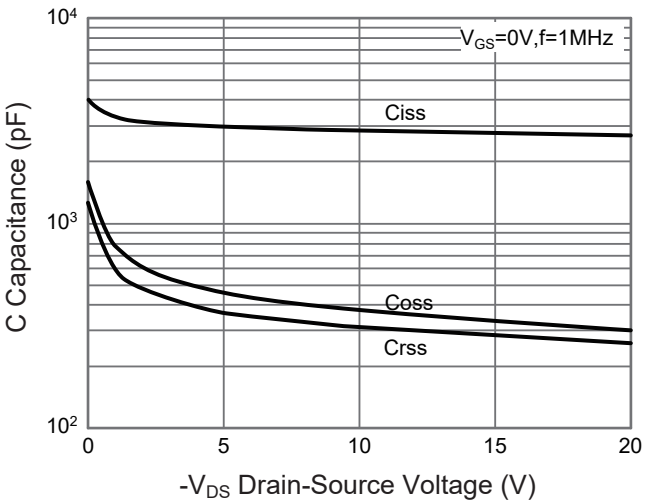
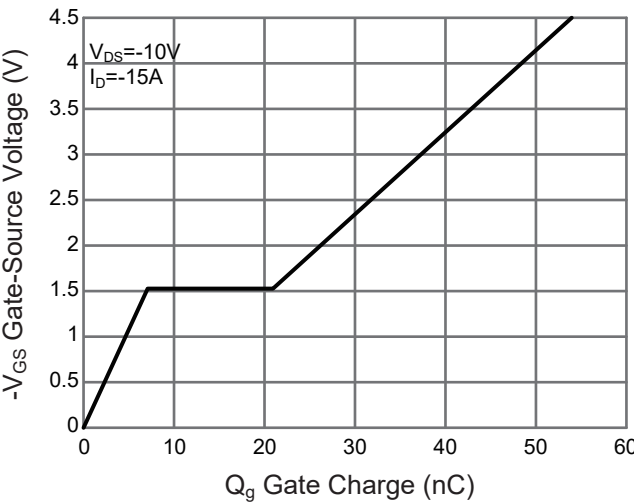
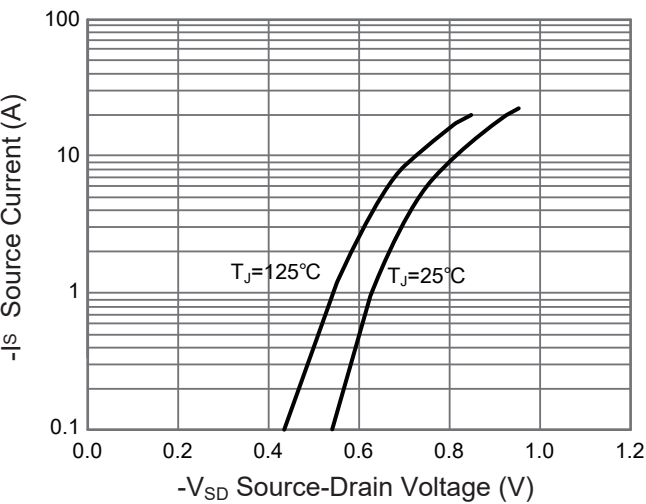
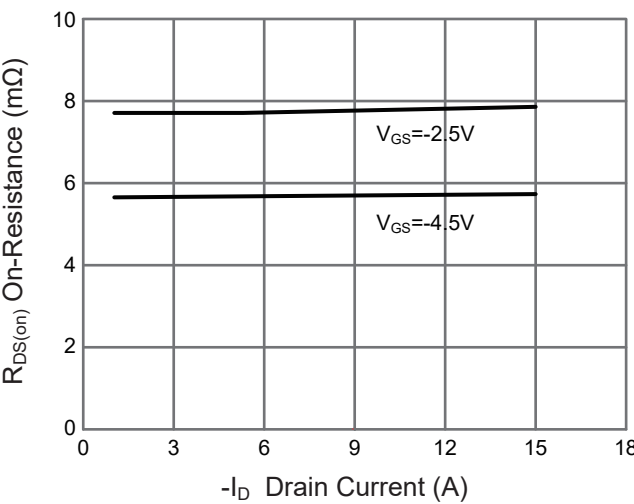
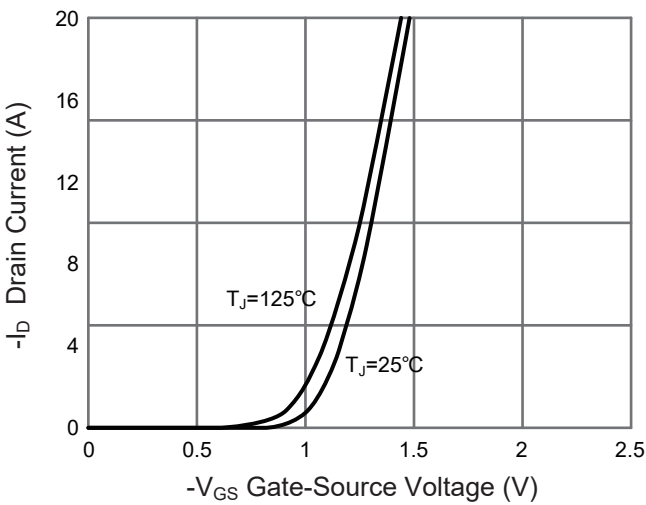
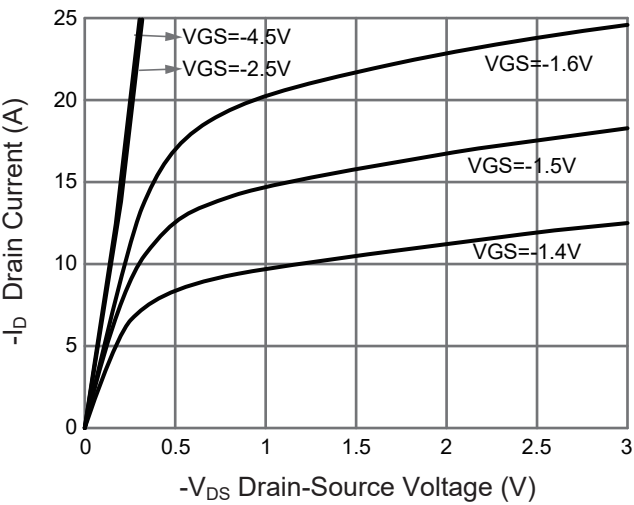
| Parameter                                   | Symbol                | Test Condition                                                                              | Min. | Typ. | Max. | Unit |
|---------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------|------|------|------|------|
| Static Characteristics                      |                       |                                                                                             |      |      |      |      |
| Drain-Source Breakdown Voltage              | -V <sub>(BR)DSS</sub> | V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA                                                 | 20   | --   | --   | V    |
| Zero Gate Voltage Drain Current             | -I <sub>DSS</sub>     | V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V                                                  | --   | --   | 1    | μA   |
| Gate-Body Leakage Current                   | I <sub>GSS</sub>      | V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V                                                  | --   | --   | ±100 | nA   |
| Gate Threshold Voltage <sup>Note3</sup>     | -V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                   | 0.4  | --   | 1    | V    |
| Drain-Source On-Resistance <sup>Note3</sup> | R <sub>DS(on)</sub>   | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-15A                                                | --   | --   | 7.6  | mΩ   |
|                                             |                       | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-10A                                                | --   | --   | 10   | mΩ   |
| Dynamic Characteristics                     |                       |                                                                                             |      |      |      |      |
| Input Capacitance                           | C <sub>iss</sub>      | V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V, f=1MHz                                          | --   | 2839 | --   | pF   |
| Output Capacitance                          | C <sub>oss</sub>      |                                                                                             | --   | 372  | --   | pF   |
| Reverse Transfer Capacitance                | C <sub>rss</sub>      |                                                                                             | --   | 311  | --   | pF   |
| Total Gate Charge                           | Q <sub>g</sub>        | V <sub>DS</sub> =-10V, I <sub>D</sub> =-15A,<br>V <sub>GS</sub> =-4.5V                      | --   | 54   | --   | nC   |
| Gate-Source Charge                          | Q <sub>gs</sub>       |                                                                                             | --   | 7    | --   | nC   |
| Gate-Drain Charge                           | Q <sub>gd</sub>       |                                                                                             | --   | 14   | --   | nC   |
| Switching Characteristics                   |                       |                                                                                             |      |      |      |      |
| Turn-on Delay Time                          | t <sub>d(on)</sub>    | V <sub>DD</sub> =-10V, I <sub>D</sub> =-13A,<br>V <sub>GS</sub> =-10V, R <sub>GEN</sub> =3Ω | --   | 13   | --   | nS   |
| Turn-on Rise Time                           | t <sub>r</sub>        |                                                                                             | --   | 105  | --   | nS   |
| Turn-off Delay Time                         | t <sub>d(off)</sub>   |                                                                                             | --   | 145  | --   | nS   |
| Turn-off Fall Time                          | t <sub>f</sub>        |                                                                                             | --   | 150  | --   | nS   |
| Source-Drain Diode Characteristics          |                       |                                                                                             |      |      |      |      |
| Diode Forward Voltage                       | -V <sub>SD</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =-10A                                                   | --   | --   | 1.2  | V    |
| Diode Forward Current                       | -I <sub>S</sub>       |                                                                                             | --   | --   | 50   | A    |

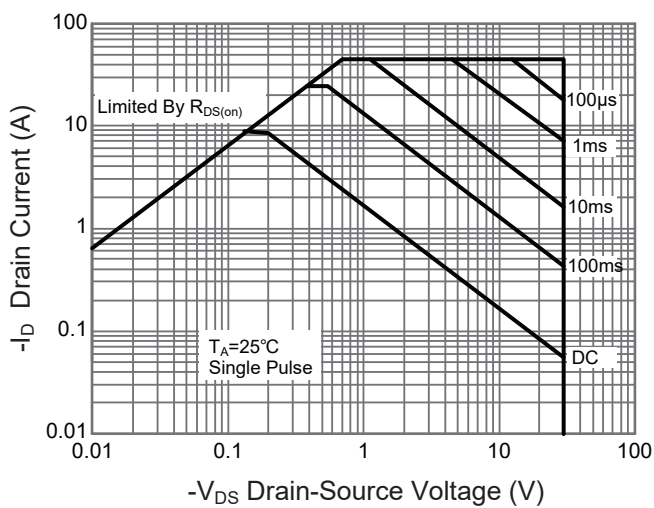
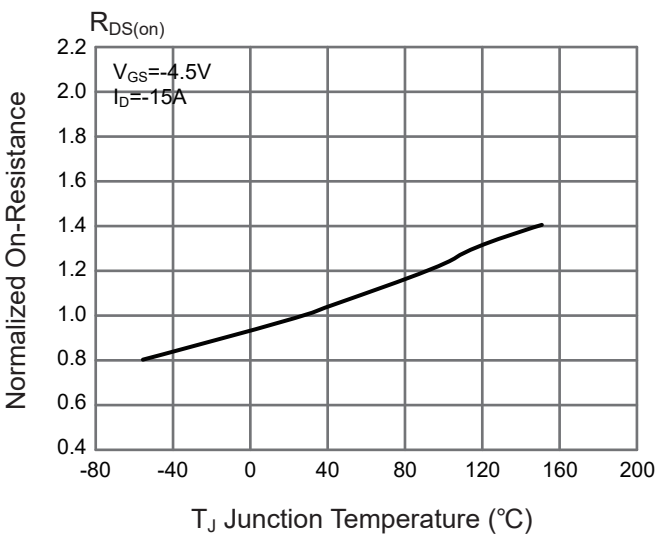
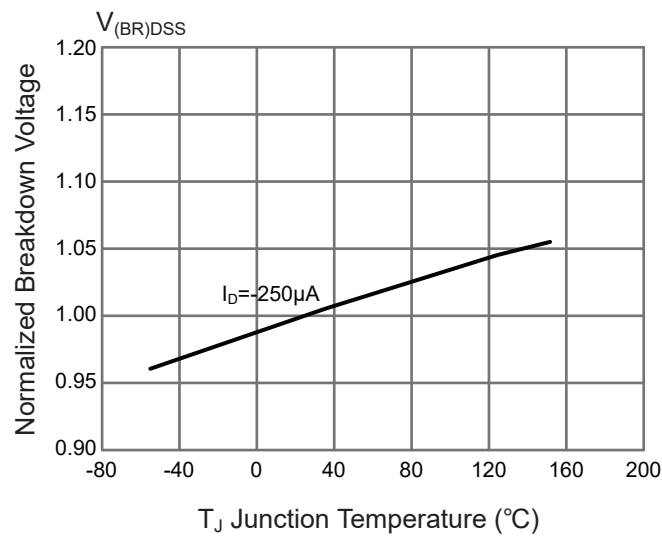
Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. Surface Mounted on FR4 Board, t ≤ 10 sec

3. Pulse Test: Pulse width ≤ 300μs, duty cycle ≤ 0.5%

Typical Characteristic Curves

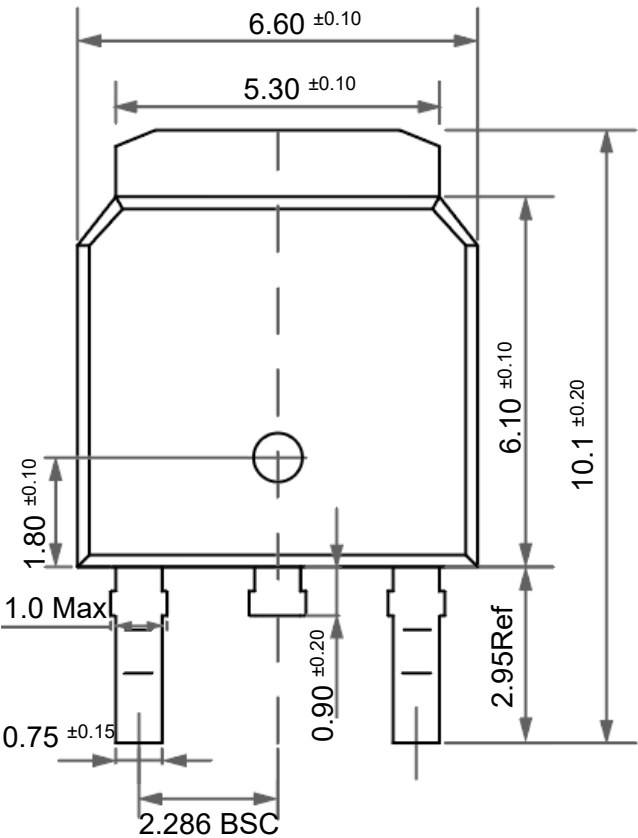




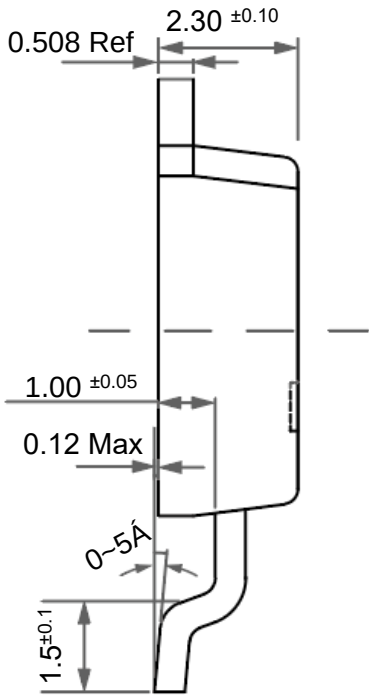
Package Outline

TO-252

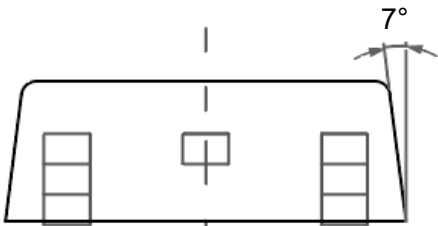
Dimensions in mm



Front View



Side View



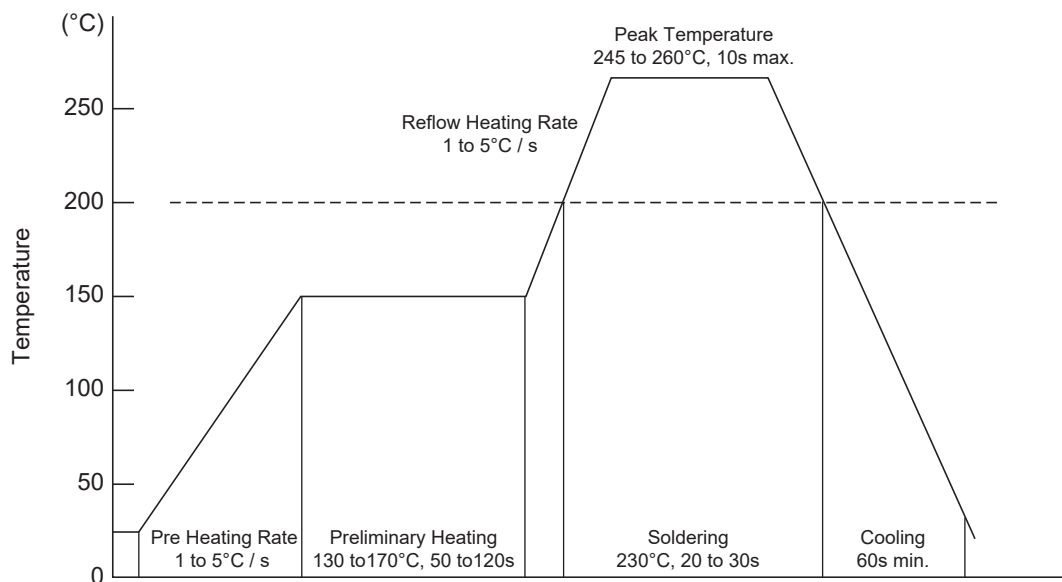
Bottom View

Ordering Information

| Device    | Package | Shipping               |
|-----------|---------|------------------------|
| TN50P20TE | 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

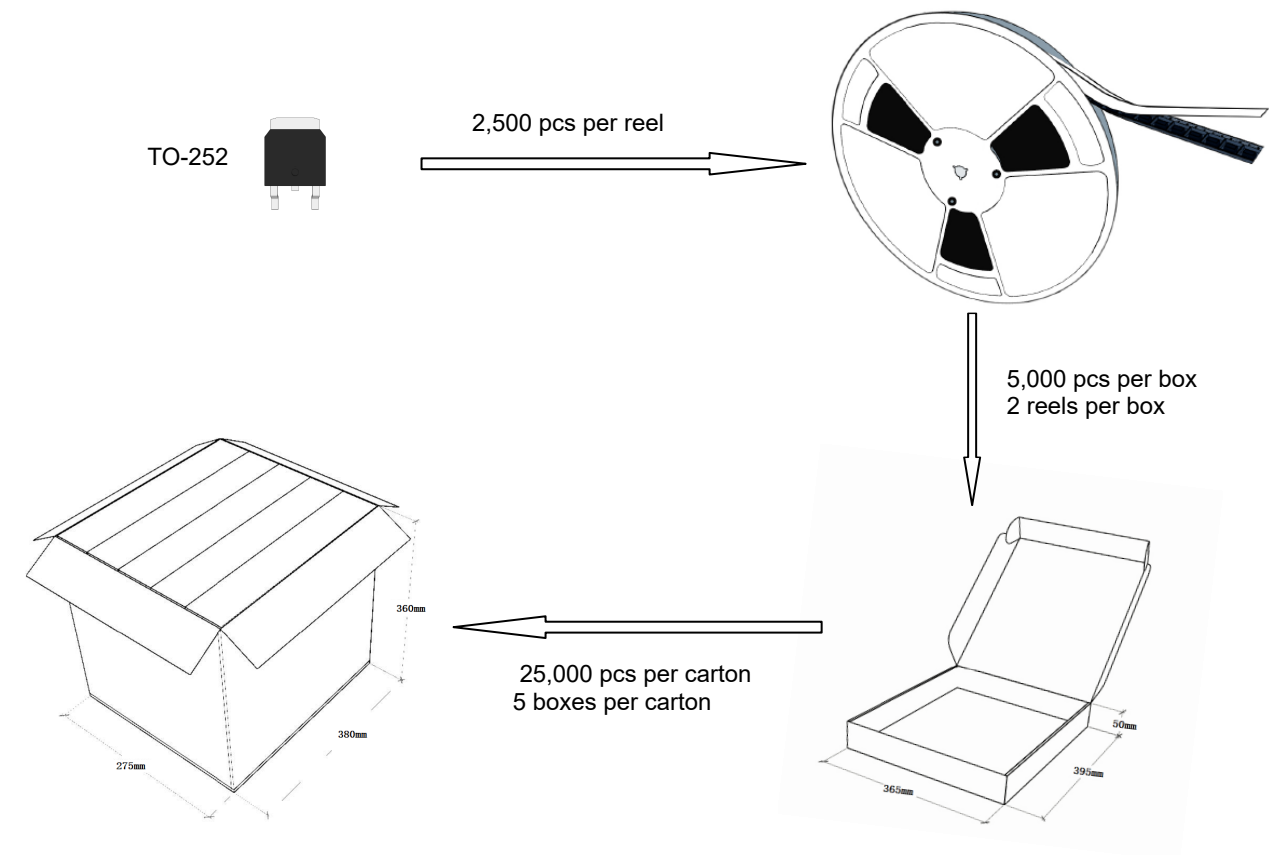
- Temperature: 300°C
- Time: 3s max.
- Times: one time

### ◆ Storage conditions

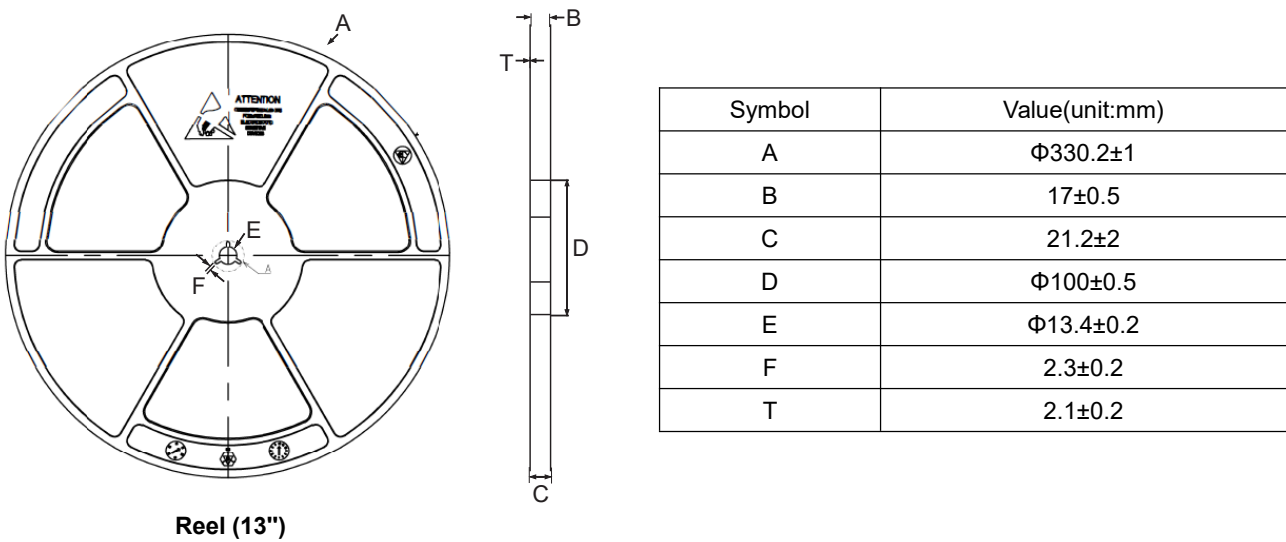
- **Temperature**  
5 to 40°C
- **Humidity**  
30 to 80% RH
- **Recommended period**  
One year after manufacturing

Package Specifications

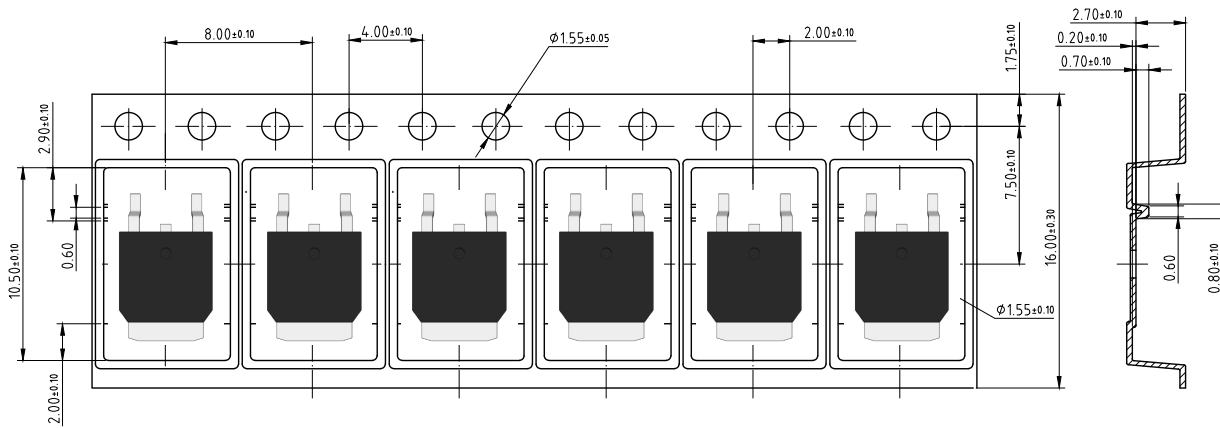
- The method of packaging



reel data



◆ 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.

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