

# TN70H04BNTE

## N-Channel Enhancement Mode Power MOSFET

### TO-252

### Product Summary

- $V_{DS} = 700V, I_D = 4A$
- $R_{DS(on)} < 3.2\Omega @ V_{GS} = 10V$

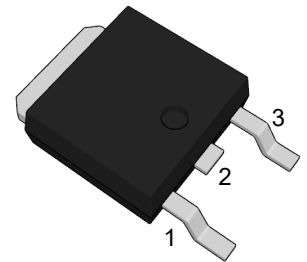
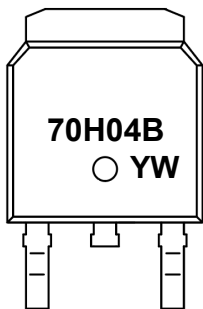
### Features

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

### Application

- High Efficiency Switch Mode Power Supplies
- Electronic Lamp Ballasts Based on Half Bridge
- LED Power Supplies

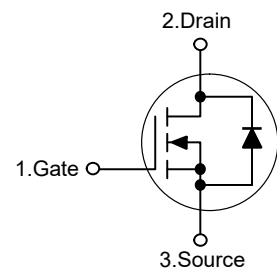
### Marking Code



(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                           | $V_{DS}$  | 700         | V    |
| Gate-Source Voltage                            | $V_{GS}$  | $\pm 30$    | V    |
| Drain Current-Continuous                       | $I_D$     | 4           | A    |
| Drain Current-Pulsed <sup>Note1</sup>          | $I_{DM}$  | 16          | A    |
| Maximum Power Dissipation                      | $P_D$     | 75          | W    |
| Single Pulse Avalanche Energy <sup>Note2</sup> | $E_{AS}$  | 4.05        | mJ   |
| Junction Temperature                           | $T_J$     | 150         | °C   |
| Storage Temperature Range                      | $T_{STG}$ | -55 to +150 | °C   |

### Thermal Characteristics

|                                      |                 |      |      |
|--------------------------------------|-----------------|------|------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 1.67 | °C/W |
|--------------------------------------|-----------------|------|------|

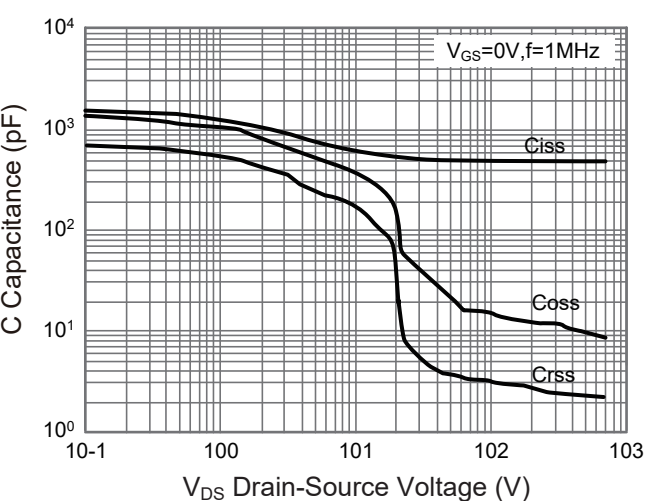
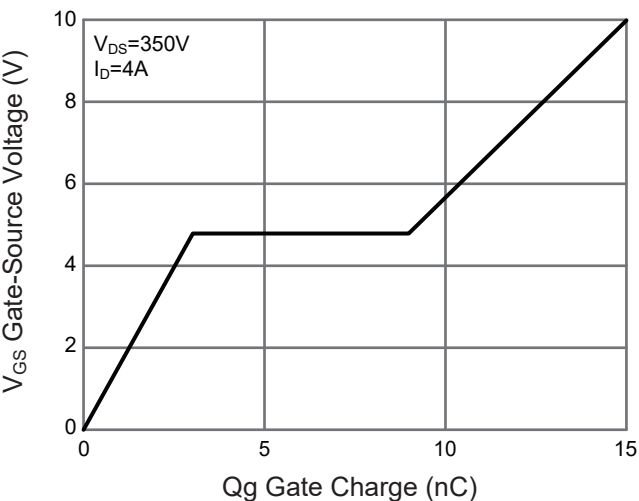
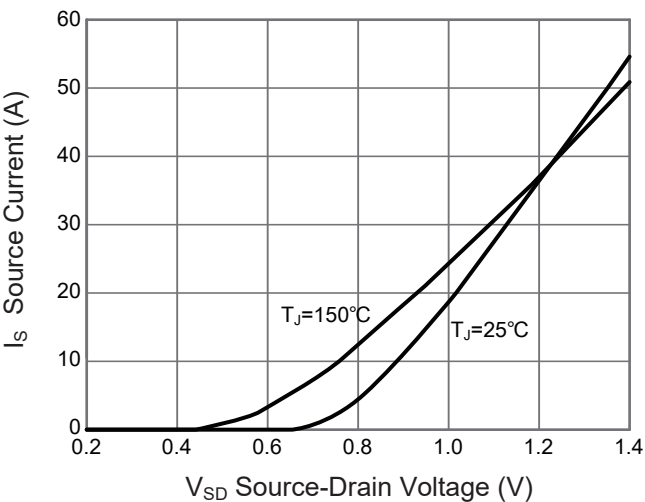
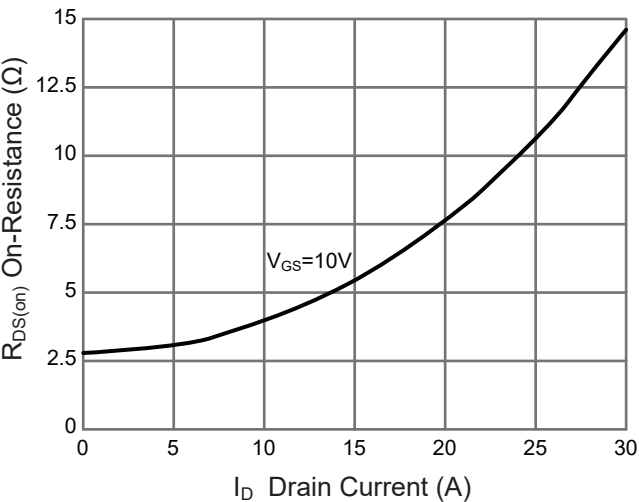
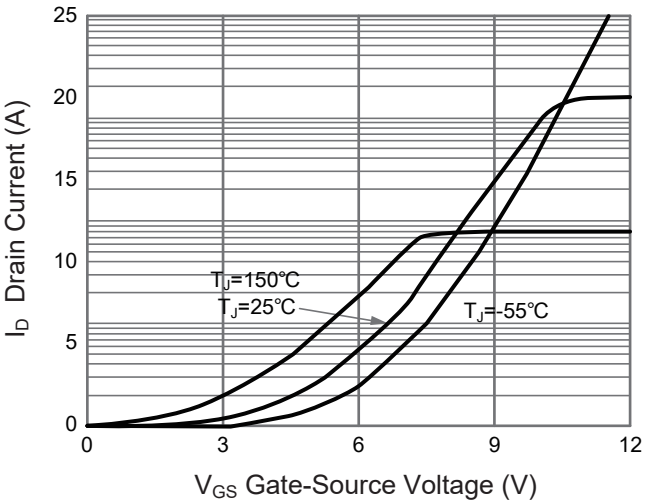
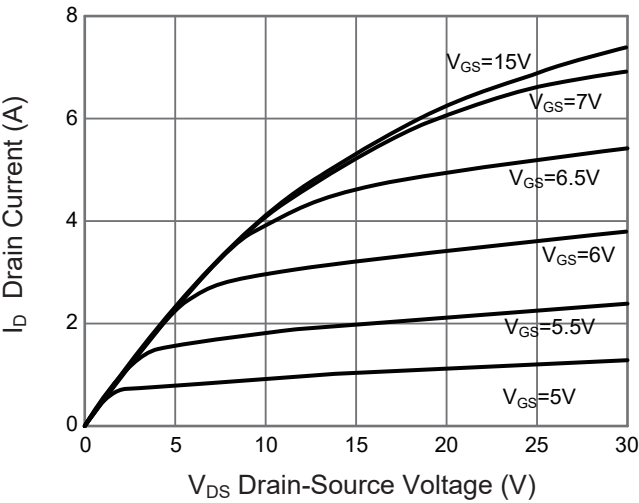
## Electrical Characteristics

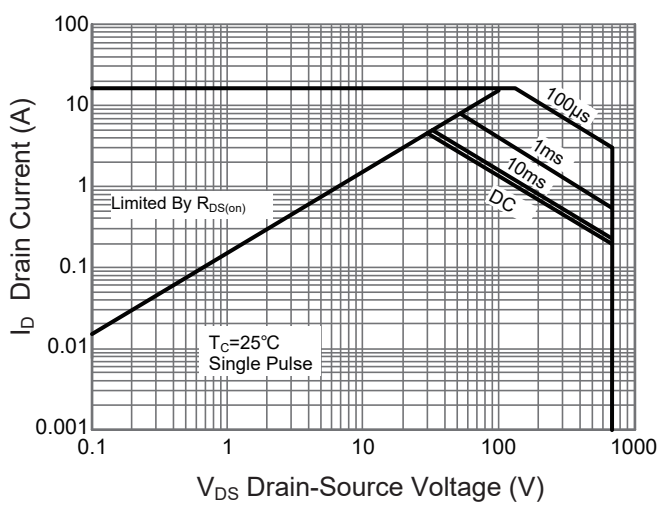
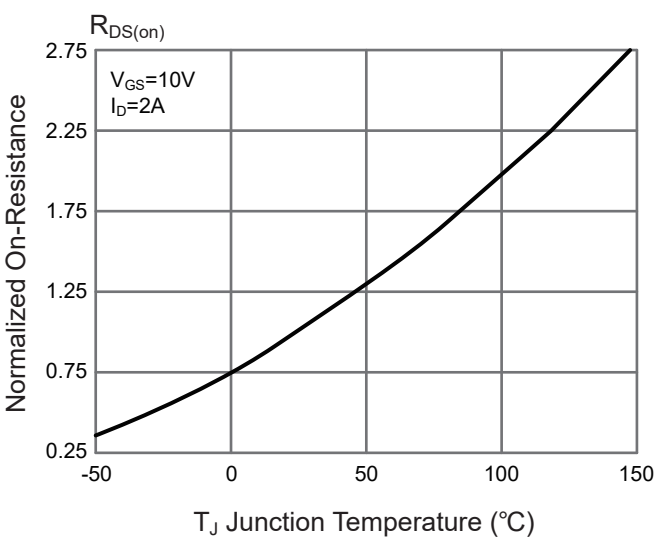
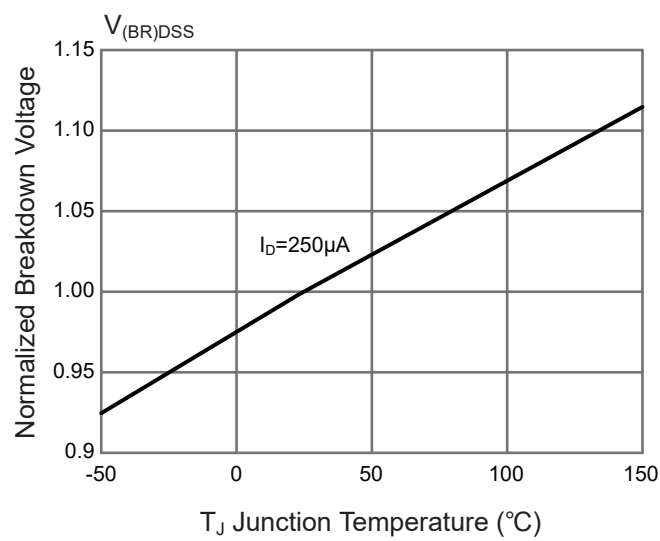
(T<sub>J</sub>=25°C unless otherwise specified)

| 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                                                 | 700  | --   | --   | V    |
| Zero Gate Voltage Drain Current             | I <sub>DSS</sub>     | V <sub>DS</sub> =700V,V <sub>GS</sub> =0V                                                 | --   | --   | 1    | μA   |
| Gate-Body Leakage Current                   | I <sub>GSS</sub>     | V <sub>GS</sub> =±30V,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                                   | 2    | 3    | 4    | V    |
| Drain-Source On-Resistance <sup>Note3</sup> | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V,I <sub>D</sub> =2A                                                   | --   | 2.8  | 3.2  | Ω    |
| Forward Transconductance <sup>Note3</sup>   | g <sub>FS</sub>      | V <sub>DS</sub> =30V,I <sub>D</sub> =2A                                                   | --   | 3.5  | --   | S    |
| Dynamic Characteristics                     |                      |                                                                                           |      |      |      |      |
| Input Capacitance                           | C <sub>iss</sub>     | V <sub>DS</sub> =25V,V <sub>GS</sub> =0V,f=1MHz                                           | --   | 535  | --   | pF   |
| Output Capacitance                          | C <sub>oss</sub>     |                                                                                           | --   | 53   | --   | pF   |
| Reverse Transfer Capacitance                | C <sub>rss</sub>     |                                                                                           | --   | 7.6  | --   | pF   |
| Gate Resistance                             | R <sub>G</sub>       | V <sub>DS</sub> =0V,V <sub>GS</sub> =0V,f=1MHz                                            | --   | 3.8  | --   | Ω    |
| Total Gate Charge                           | Q <sub>g</sub>       | V <sub>DS</sub> =350V, I <sub>D</sub> =4A,<br>V <sub>GS</sub> =10V                        | --   | 15   | --   | nC   |
| Gate-Source Charge                          | Q <sub>gs</sub>      |                                                                                           | --   | 3    | --   | nC   |
| Gate-Drain Charge                           | Q <sub>gd</sub>      |                                                                                           | --   | 6    | --   | nC   |
| Switching Characteristics                   |                      |                                                                                           |      |      |      |      |
| Turn-on Delay Time                          | t <sub>d(on)</sub>   | V <sub>DD</sub> =350V, I <sub>D</sub> =4A,<br>V <sub>GS</sub> =10V, R <sub>GEN</sub> =25Ω | --   | 12   | --   | nS   |
| Turn-on Rise Time                           | t <sub>r</sub>       |                                                                                           | --   | 17   | --   | nS   |
| Turn-off Delay Time                         | t <sub>d(off)</sub>  |                                                                                           | --   | 45   | --   | nS   |
| Turn-off Fall Time                          | t <sub>f</sub>       |                                                                                           | --   | 23   | --   | nS   |
| Source-Drain Diode Characteristics          |                      |                                                                                           |      |      |      |      |
| Diode Forward Voltage                       | V <sub>SD</sub>      | V <sub>GS</sub> =0V,I <sub>S</sub> =4A                                                    | --   | --   | 1.2  | V    |
| Diode Forward Current                       | I <sub>S</sub>       |                                                                                           | --   | --   | 4    | A    |

- Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature  
2. EAS Condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=100V, V<sub>G</sub>=10V, R<sub>G</sub>=25Ω, L=10mH, I<sub>AS</sub>=0.9A  
3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

Typical Characteristic Curves

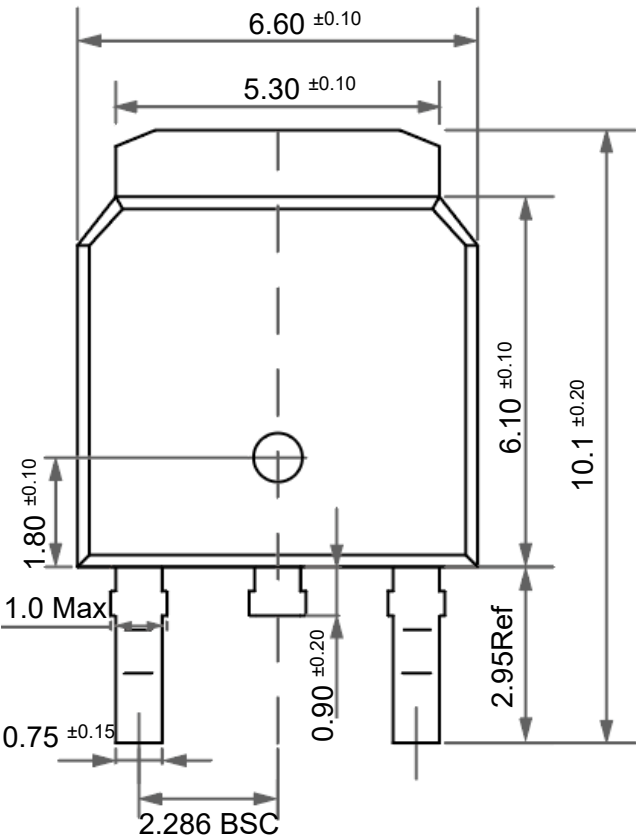




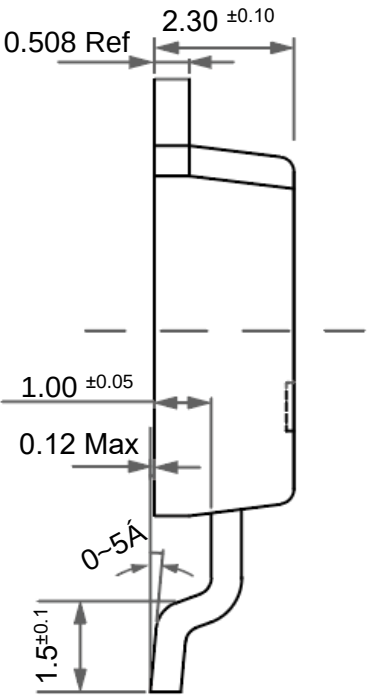
Package Outline

TO-252

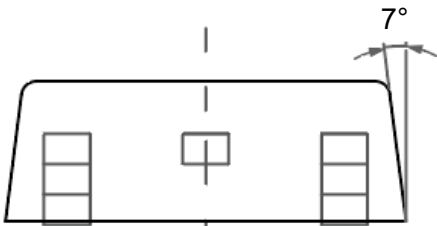
Dimensions in mm



Front View



Side View



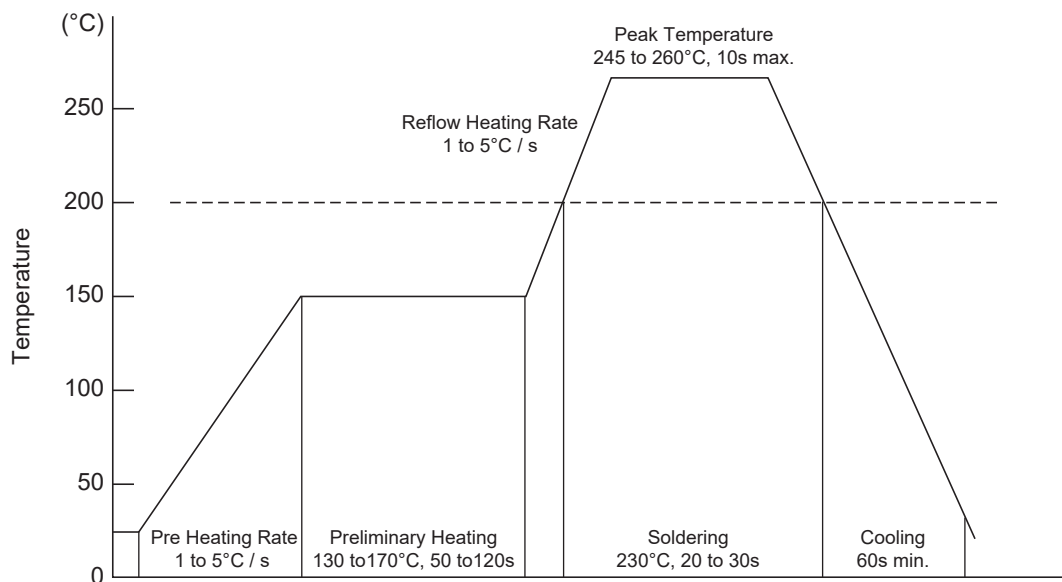
Bottom View

Ordering Information

| Device      | Package | Shipping               |
|-------------|---------|------------------------|
| TN70H04BNTE | 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

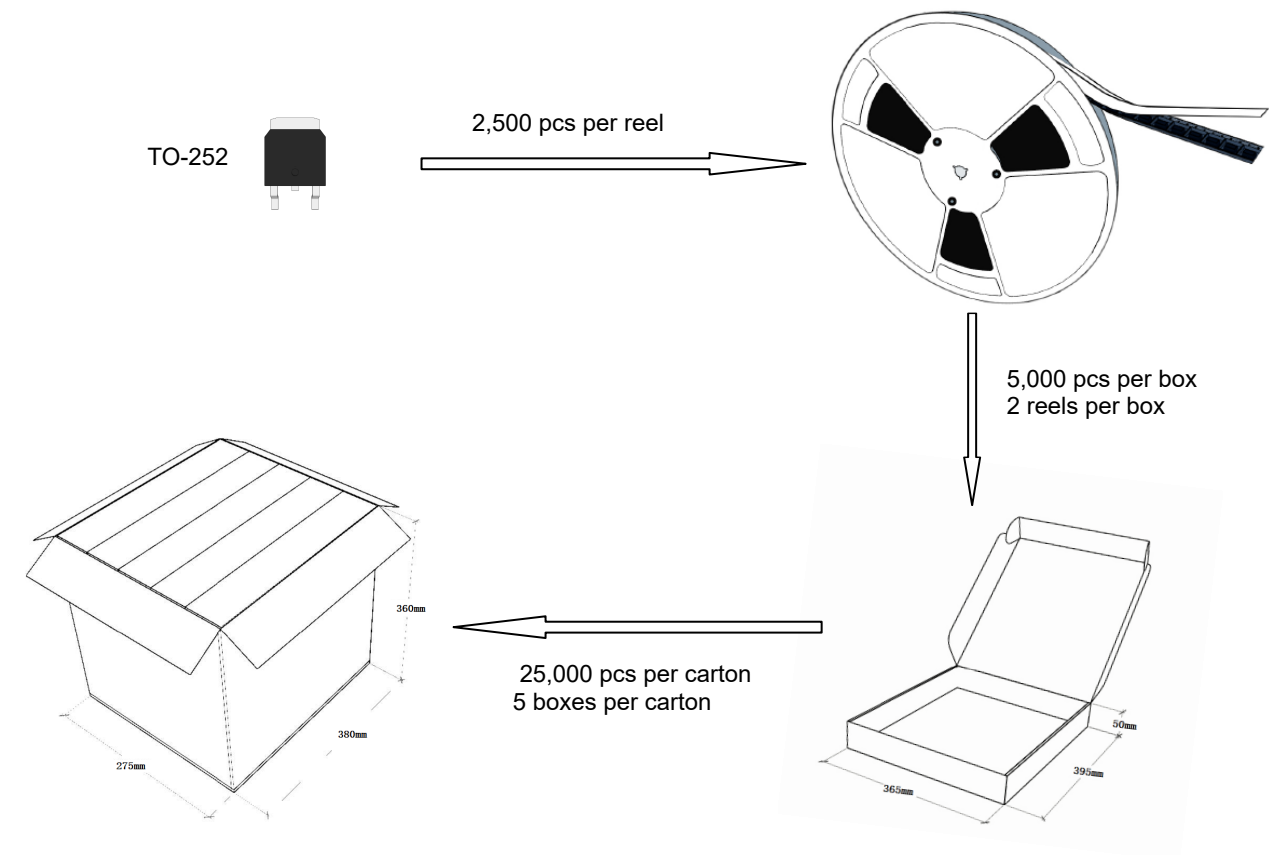
- Temperature: 300°C
- Time: 3s max.
- Times: one time

### ◆ Storage conditions

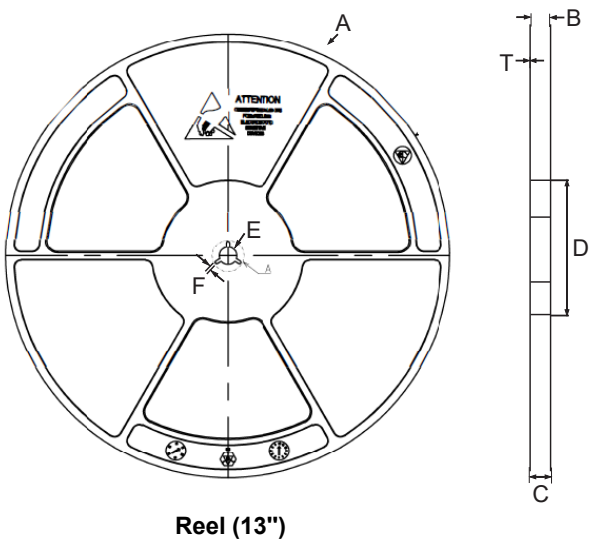
- **Temperature**  
5 to 40°C
- **Humidity**  
30 to 80% RH
- **Recommended period**  
One year after manufacturing

Package Specifications

- The method of packaging

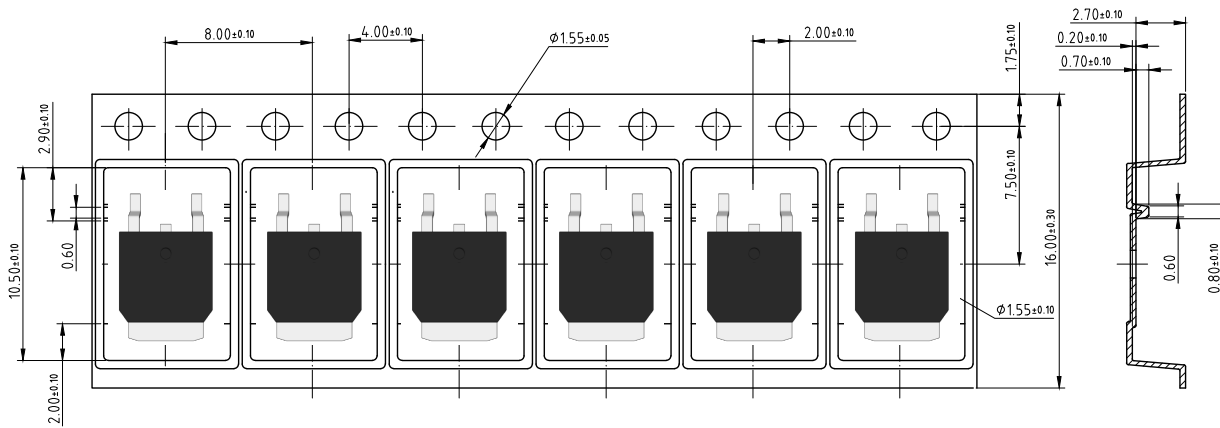


reel data



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

## ◆ Embossed tape data



## Contact Information

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For additional information, please contact your local Sales Representative.

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