# TN08N20SC

N-Channel Enhancement Mode Power MOSFET

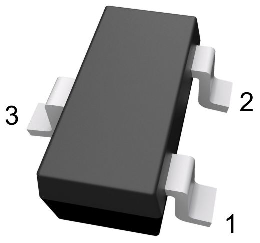
## Features

- $V_{DS}$=20V, $R_{DS}$@4.5V=14mΩ, $I_D$=8A
- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent Cdv/dt effect decline
- Green Device Available

## Application

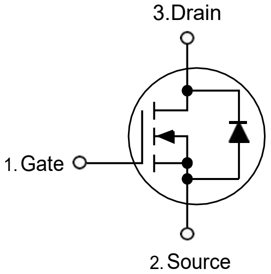
- Power switching application
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply

### SOT-23-3



1. Gate 2.Source 3.Drain

### Schematic Diagram



## Absolute Maximum Ratings

Ratings at 25℃ ambient temperature unless otherwise specified.

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 20 | V |
| $V_{GS}$ | Gate-Source Voltage | ±12 | V |
| $I_D$@$T_c$=25℃ | Continuous Drain Current, $V_{GS}$ @ 4.5V | 8.8 | A |
| $I_D$@$T_c$=70℃ | Continuous Drain Current, $V_{GS}$ @ 4.5V | 6.2 | A |
| $I_{DP}$ | Pulsed Drain Current | 40 | A |
| $P_D$@$T_A$=25℃ | Total Power Dissipation | 1.5 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

## Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| Rthj-a | Maximum Thermal Resistance, Junction-ambient | --- | 25 | ℃/W |
| Rthj-c | Maximum Thermal Resistance, Junction-case | --- | 8 | ℃/W |

## Electrical Characteristics

(Ta=25℃ unless otherwise specified)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250uA | 20 | --- | --- | V |
| $\triangle BV_{DSS}/\triangle T_J$ | BVDSS Temperature Coefficient | Reference to 25℃ , $I_D$=1mA | --- | 0.018 | --- | V/℃ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=4.5V , $I_D$=6A | --- | 8 | 13 | mΩ |
| | | $V_{GS}$=2.5V , $I_D$=5A | --- | 10 | 19 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | 0.5 | --- | 1.3 | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=16V , $V_{GS}$=0V. | --- | --- | 10 | uA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±12V , $V_{DS}$=0V | --- | --- | ±100 | nA |
| $Q_g$ | Total Gate Charge | $V_{DS}$=15V , $V_{GS}$=4.5V , $I_D$=6A | --- | 16 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 3 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 4.5 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DS}$=10V , $V_{GS}$=4.5V , $R_G$=3.3Ω $I_D$=1A | --- | 10 | --- | ns |
| $T_r$ | Rise Time | | --- | 13 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 28 | --- | |
| $T_f$ | Fall Time | | --- | 7 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=15V , $V_{GS}$=0V , f=1MHz | --- | 1400 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 170 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 135 | --- | |

## Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V , $I_S$=1A | --- | --- | 1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | IF=1A , $V_{GS}$=0V,<br>dI/dt=100A/μs | --- | 8.5 | --- | nS |
| $Q_{rr}$ | Reverse Recovery Charge | | --- | 2.5 | --- | nC |

Notes:

1.Pulse width limited by Max. junction temperature.

2.Pulse test

3.Surface mounted on 1 in$^2$ copper pad of FR4 board, t ≤10sec ; 60 ℃/W at steady state.

4.Starting $T_j$=25ºC , $V_{DD}$=20V , L=0.1mH , $R_G$=25Ω, $V_{GS}$=10V

## Typical Characteristics

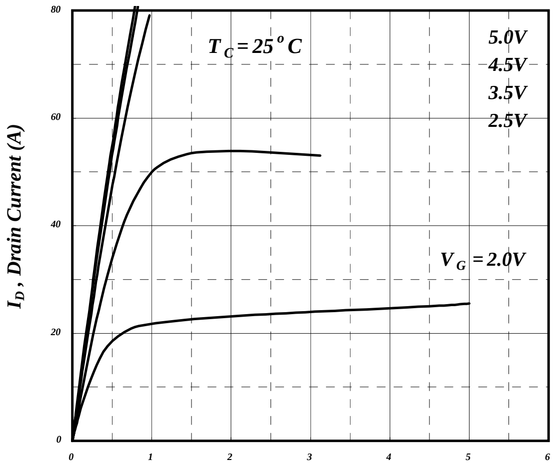


Fig 1. Typical Output Characteristics

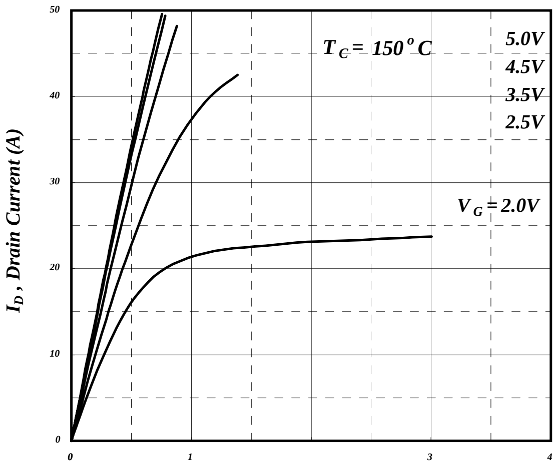


Fig 2. Typical Output Characteristics

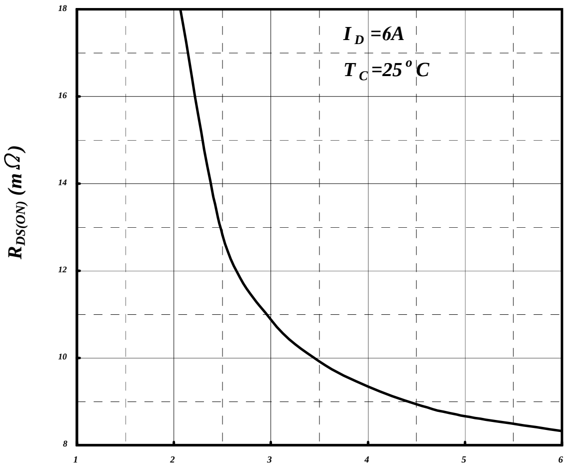


Fig 3. On-Resistance v.s. Gate Voltage

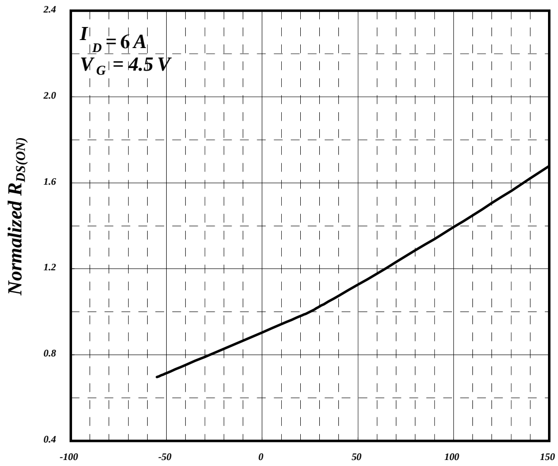


Fig 4. Normalized On-Resistance v.s. Junction Temperature

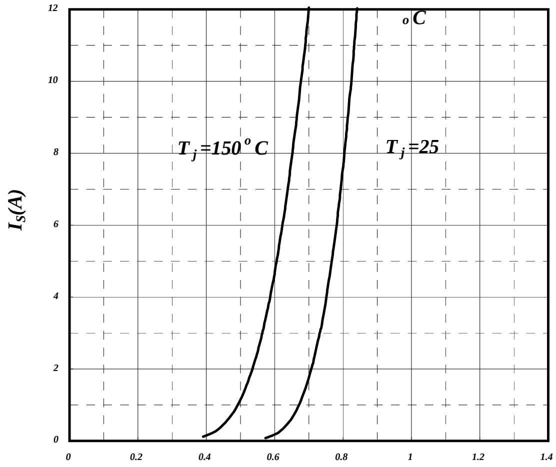


Fig 5. Forward Characteristic of Reverse Diode

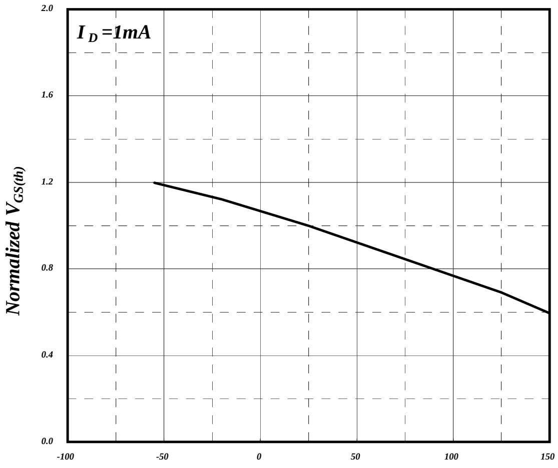


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

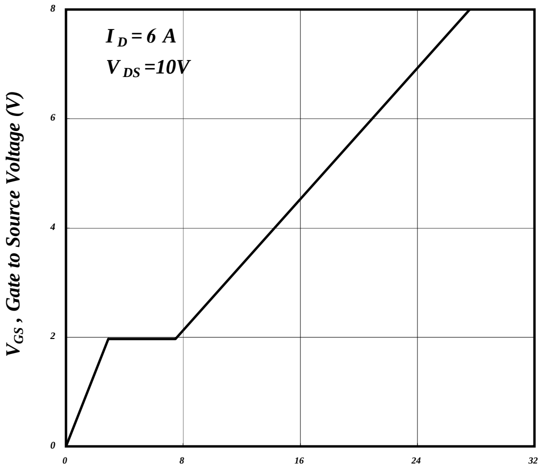


Fig 7. Gate Charge Characteristics

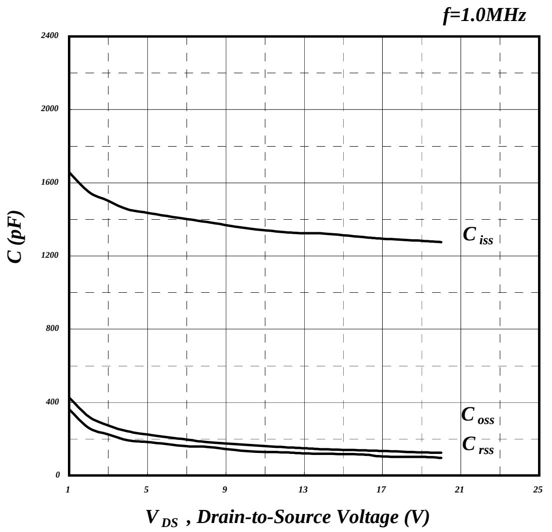


Fig 8. Typical Capacitance Characteristics

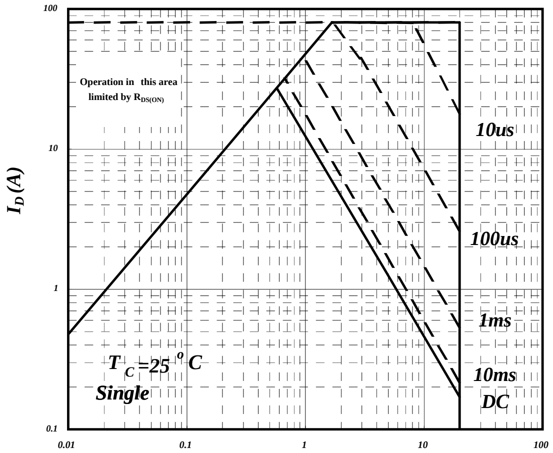


Fig 9. Maximum Safe Operating Area

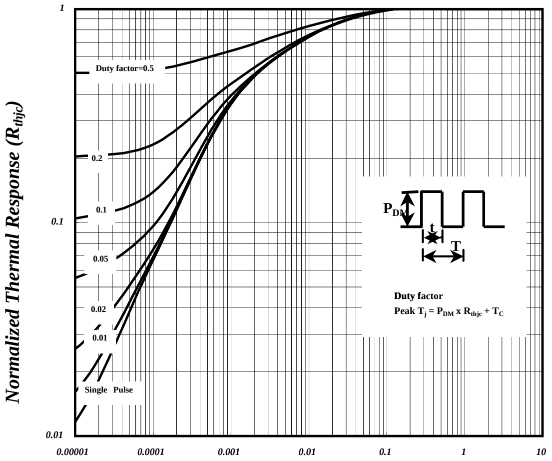


Fig 10. Effective Transient Thermal Impedance

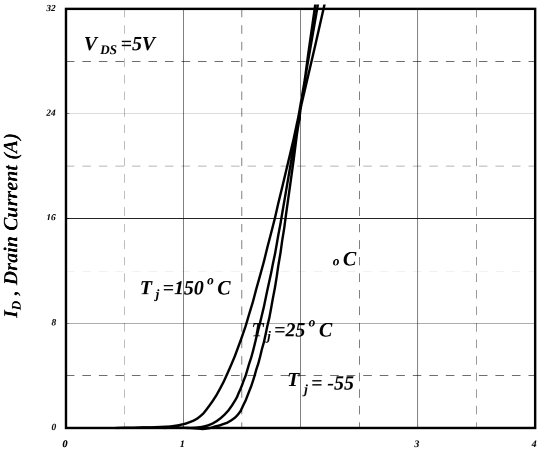


Fig 11. Transfer Characteristics

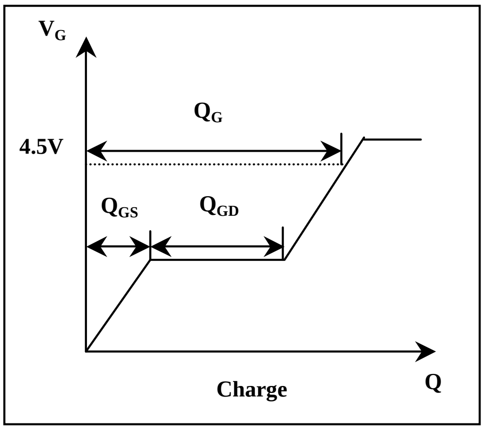


Fig 12. Gate Charge Waveform

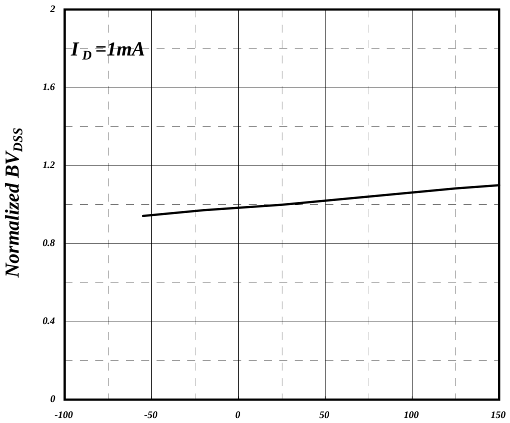


Fig 13. Normalized $BV_{DSS}$ v.s. Junction Temperature

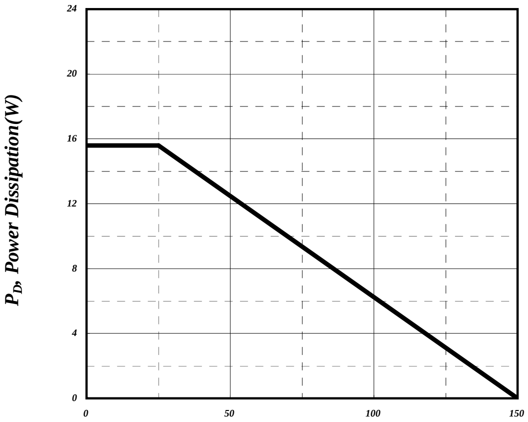


Fig 14. Total Power Dissipation

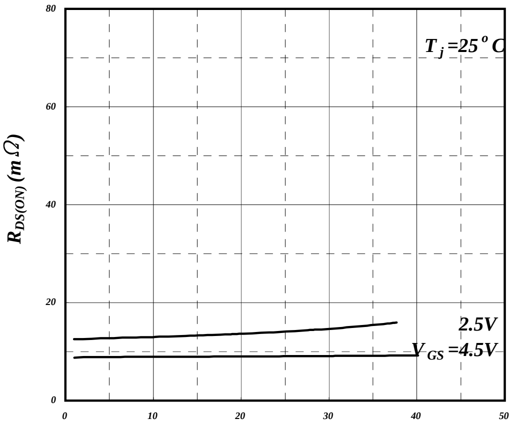
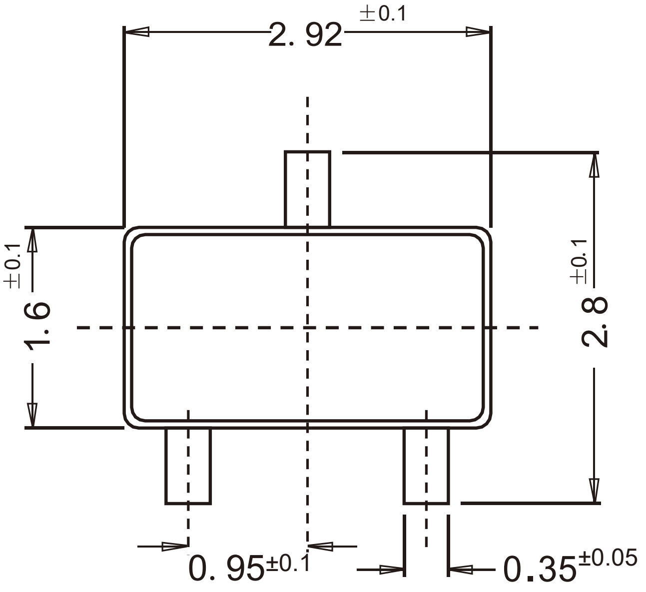


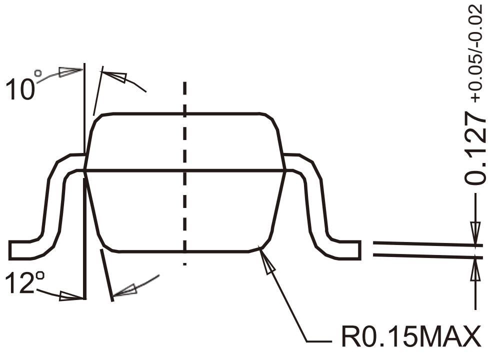
Fig 15. Typ. Drain-Source on State Resistance

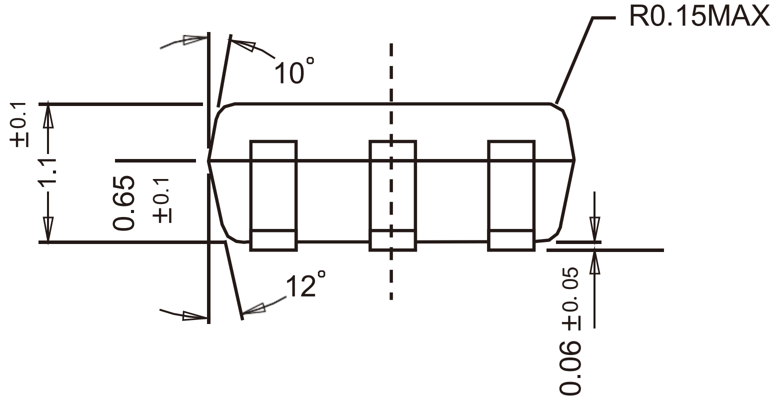
## Package Outline

SOT-23-3

Dimensions in mm





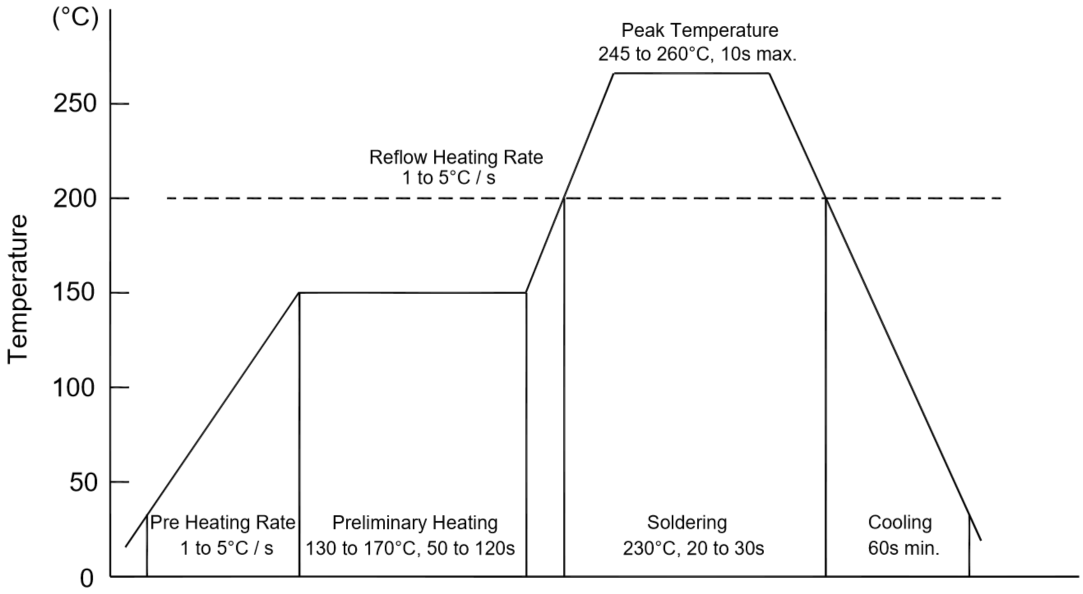


## Ordering Information

| Device | Package | Shipping |
|---|---|---|
| TN08N20SC | SOT-23-3 | 3,000PCS/Reel&7inches |

## Conditions of Soldering and Storage

### ◆ Recommended condition of reflow soldering



Recommended peak temperature is over 245 $^{O}$C. If peak temperature is below 245 $^{O}$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

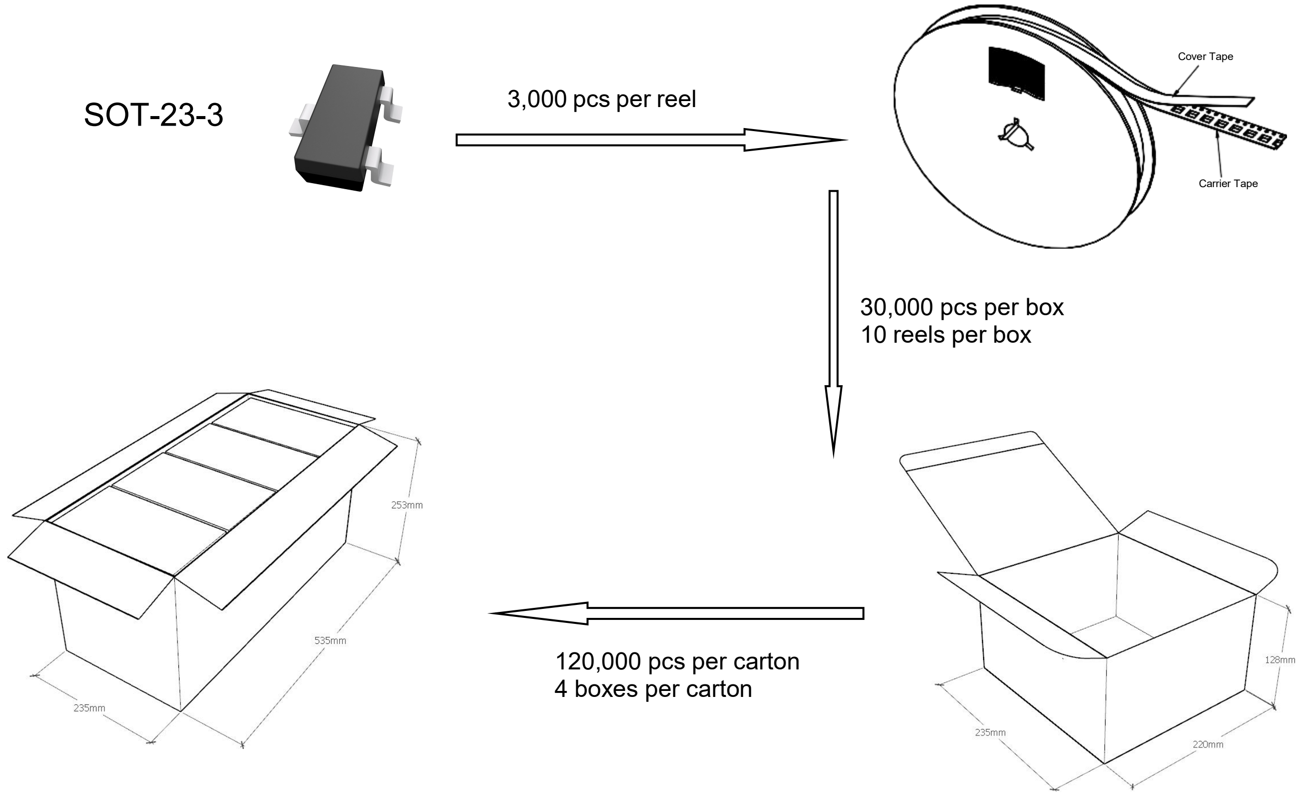
- Temperature: 370 $^{O}$C
- Time: 3s max.
- Times: one time

### ◆ Storage conditions

- **Temperature**
  5 to 40 $^{O}$C
- **Humidity**
  30 to 80% RH
- **Recommended period**
  One year after manufacturing

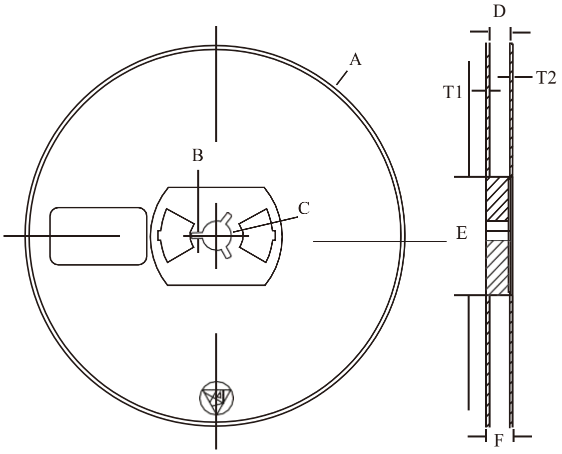
## Package Specifications

- The method of packaging



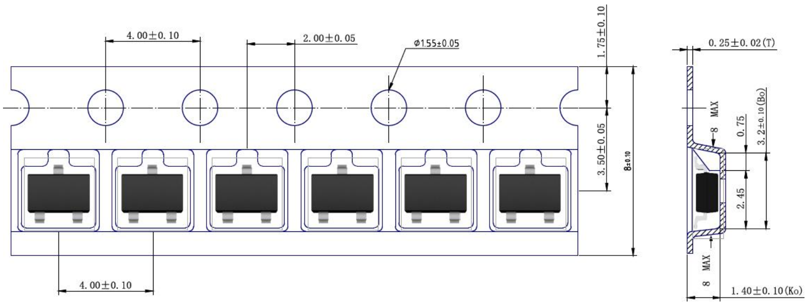
◆

### Embossed tape and reel data



Reel (7")

| Symbol | Value (unit: mm) |
|---|---|
| A | Ø 177.8±1 |
| B | 2.7±0.2 |
| C | Ø 13.5±0.2 |
| E | Ø 54.5±0.2 |
| F | 12.3±0.3 |
| D | 9.6+2/-0.3 |
| T1 | 1.0±0.2 |
| T2 | 1.2±0.2 |



## 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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