



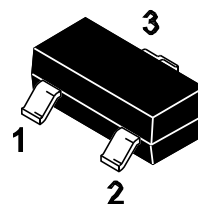
# PJM2309APSA

## P-Channel Enhancement Mode Power MOSFET

### Features

- Halogen and Antimony Free
- $V_{DS} = -55V, I_D = -2A$   
 $R_{DS(on)} < 200m\Omega @ V_{GS} = -10V$

### SOT-23



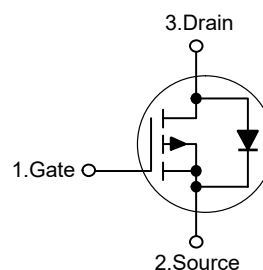
1. Gate 2. Source 3. Drain

Marking Code: S9A

### Applications

- PWM applications
- Load switch
- Power management

### Schematic Diagram



### Absolute Maximum Ratings

Ratings at 25°C ambient temperature unless otherwise specified.

| Parameter                             | Symbol    | Value       | Unit |
|---------------------------------------|-----------|-------------|------|
| Drain-Source Voltage                  | $-V_{DS}$ | 55          | V    |
| Gate-Source Voltage                   | $V_{GS}$  | $\pm 20$    | V    |
| Drain Current-Continuous              | $-I_D$    | 2           | A    |
| Drain Current-Pulsed <sup>Note1</sup> | $-I_{DM}$ | 8           | A    |
| Maximum Power Dissipation             | $P_D$     | 0.9         | 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> | $R_{\theta JA}$ | 139 | °C/W |
|----------------------------------------------------------|-----------------|-----|------|



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### Electrical Characteristics

(Ta=25°C unless otherwise specified)

| Parameter                                   | Symbol         | Test Condition                                             | Min. | Typ.  | Max.      | Unit       |
|---------------------------------------------|----------------|------------------------------------------------------------|------|-------|-----------|------------|
| Static Characteristics                      |                |                                                            |      |       |           |            |
| Drain-Source Breakdown Voltage              | $-V_{(BR)DSS}$ | $V_{GS}=0V, I_D=-250\mu A$                                 | 55   | --    | --        | V          |
| Zero Gate Voltage Drain Current             | $-I_{DSS}$     | $V_{DS}=-55V, V_{GS}=0V$                                   | --   | --    | 1         | $\mu A$    |
| Gate-Body Leakage Current                   | $I_{GSS}$      | $V_{GS}=\pm 20V, V_{DS}=0V$                                | --   | --    | $\pm 100$ | nA         |
| Gate Threshold Voltage <sup>Note3</sup>     | $-V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=-250\mu A$                             | 1.5  | 1.75  | 3         | V          |
| Drain-Source On-Resistance <sup>Note3</sup> | $R_{DS(on)}$   | $V_{GS}=-10V, I_D=-2A$                                     | --   | 150   | 200       | m $\Omega$ |
|                                             |                | $V_{GS}=-4.5V, I_D=-1A$                                    | --   | 190   | 300       | m $\Omega$ |
| Forward Transconductance <sup>Note3</sup>   | $g_{FS}$       | $V_{DS}=-5V, I_D=-1A$                                      | --   | 4     | --        | S          |
| Dynamic Characteristics                     |                |                                                            |      |       |           |            |
| Input Capacitance                           | $C_{iss}$      | $V_{DS}=-30V, V_{GS}=0V, f=1MHz$                           | --   | 444.2 | --        | pF         |
| Output Capacitance                          | $C_{oss}$      |                                                            | --   | 19.6  | --        | pF         |
| Reverse Transfer Capacitance                | $C_{rss}$      |                                                            | --   | 17.9  | --        | pF         |
| Switching Characteristics                   |                |                                                            |      |       |           |            |
| Turn-on Delay Time                          | $t_{d(on)}$    | $V_{DD}=-30V, I_D=-1.5A$<br>$V_{GS}=-10V, R_{GEN}=3\Omega$ | --   | 40    | --        | nS         |
| Turn-on Rise Time                           | $t_r$          |                                                            | --   | 35    | --        | nS         |
| Turn-off Delay Time                         | $t_{d(off)}$   |                                                            | --   | 15    | --        | nS         |
| Turn-off Fall Time                          | $t_f$          |                                                            | --   | 10    | --        | nS         |
| Total Gate Charge                           | $Q_g$          | $V_{DS}=-30V, I_D=-1.5A,$<br>$V_{GS}=-10V$                 | --   | 11.3  | --        | nC         |
| Gate-Source Charge                          | $Q_{gs}$       |                                                            | --   | 2.7   | --        | nC         |
| Gate-Drain Charge                           | $Q_{gd}$       |                                                            | --   | 1.6   | --        | nC         |
| Source-Drain Diode Characteristics          |                |                                                            |      |       |           |            |
| Diode Forward Voltage <sup>Note3</sup>      | $-V_{SD}$      | $V_{GS}=0V, I_S=-2A$                                       | --   | --    | 1.2       | V          |
| Diode Forward Current <sup>Note2</sup>      | $-I_S$         |                                                            | --   | --    | 2         | A          |

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

2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.

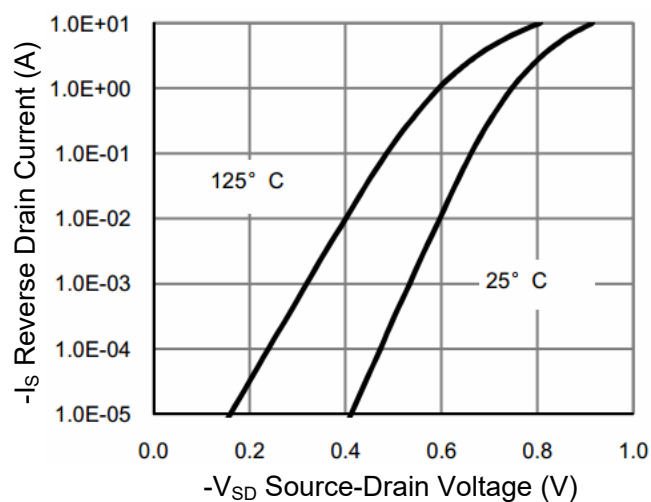
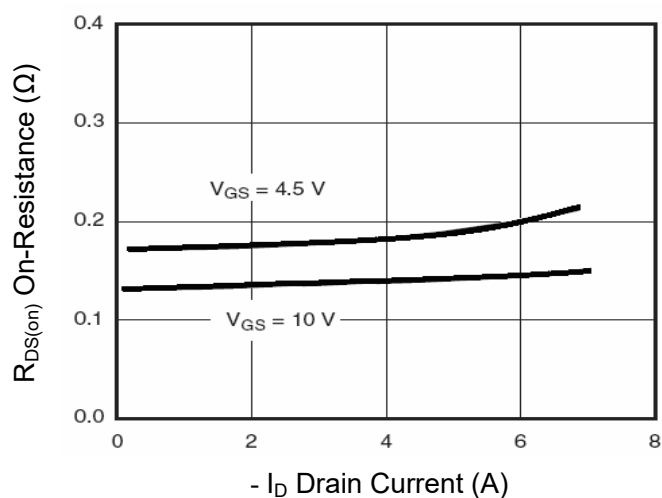
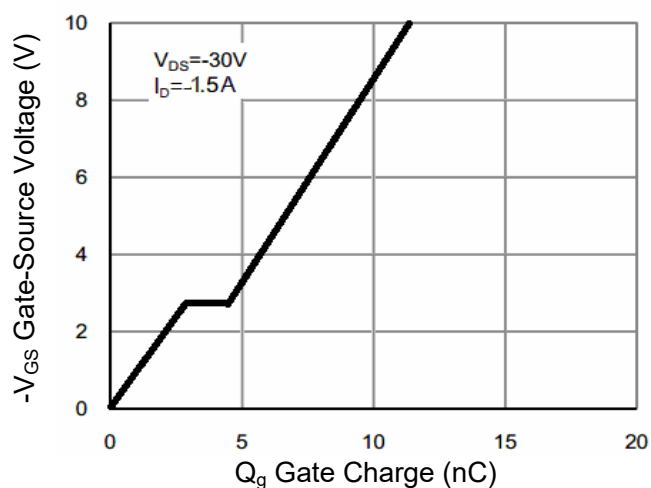
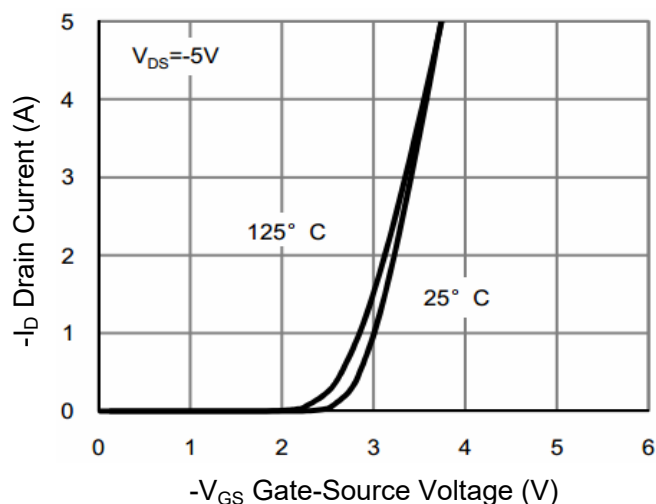
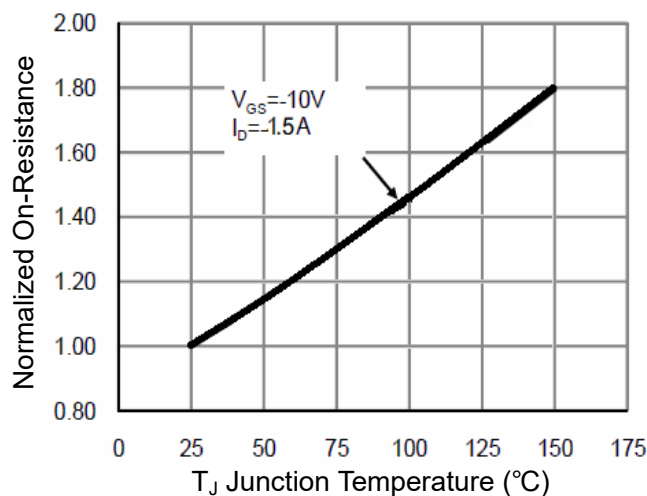
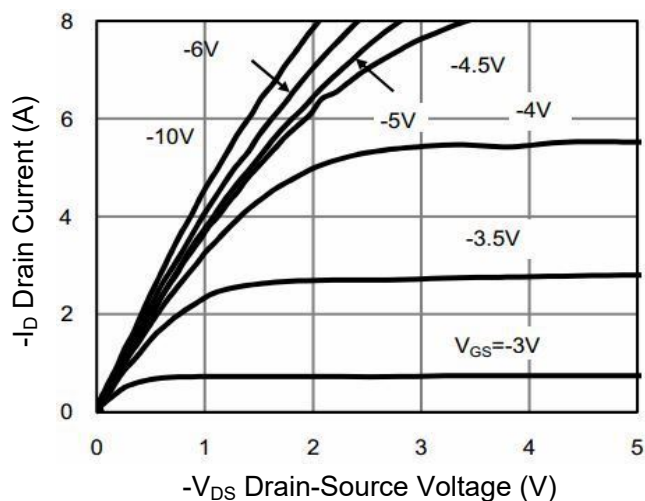
3. Pulse Test: Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .



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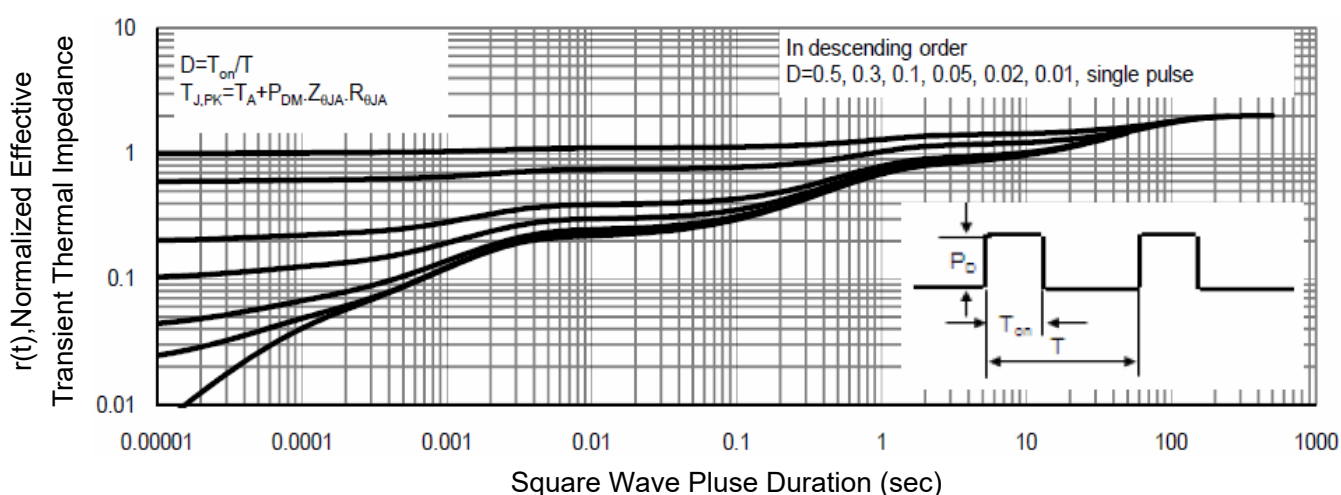
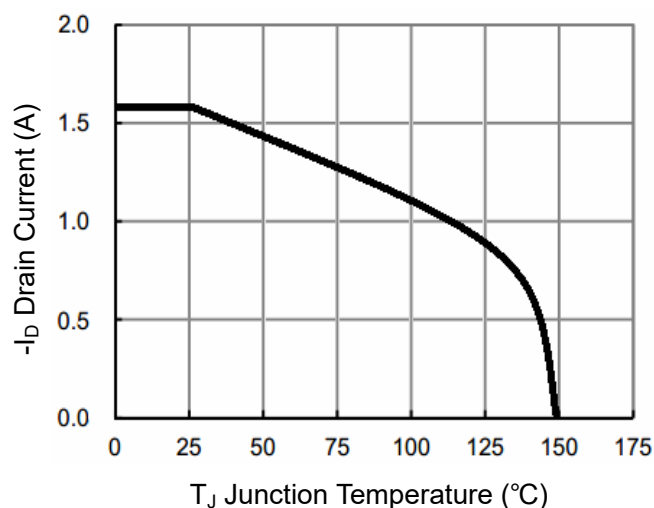
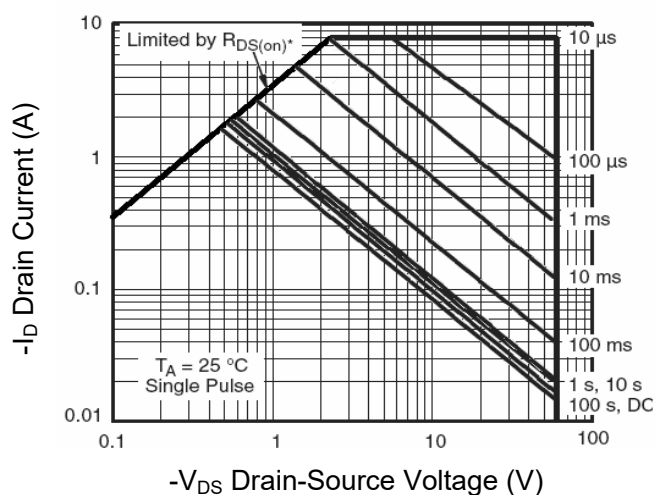
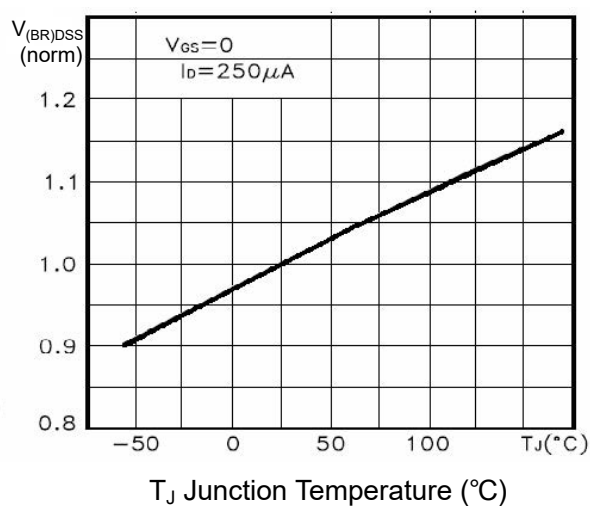
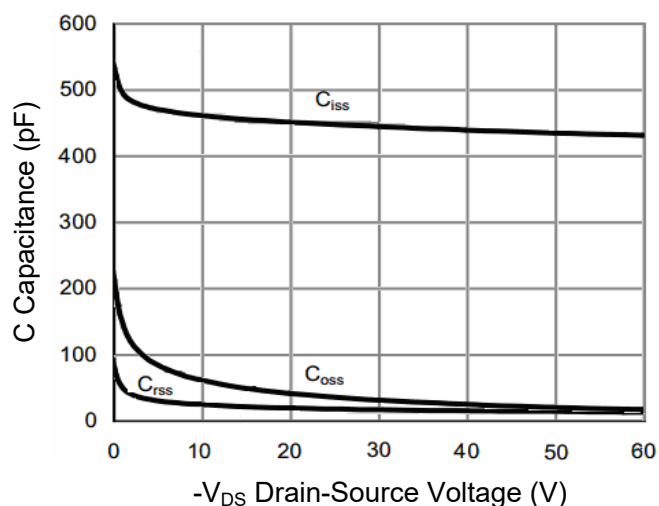
### Typical Characteristic Curves





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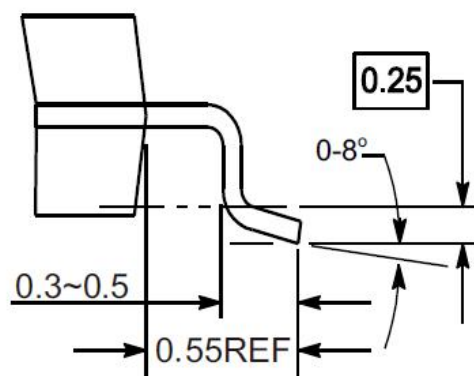
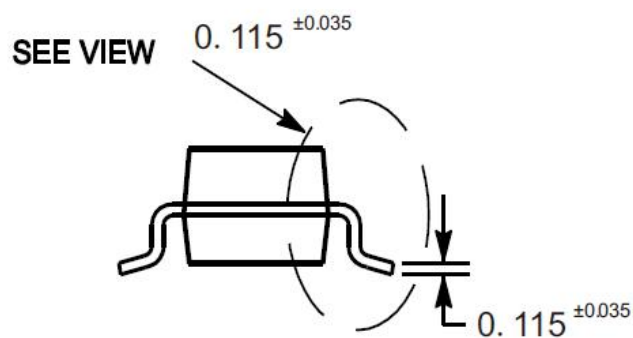
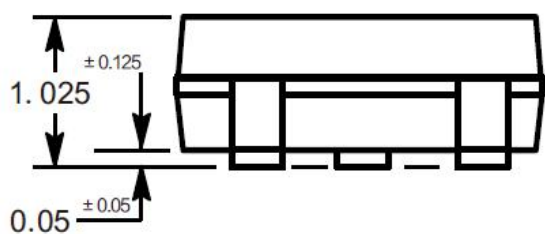
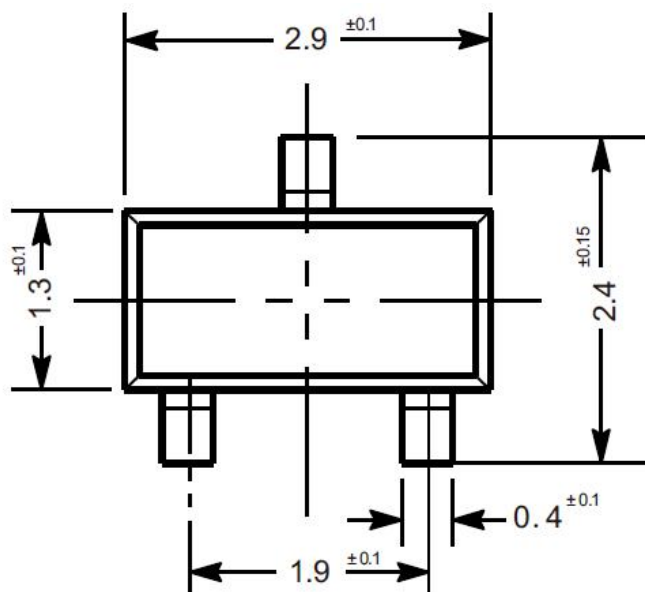
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### Package Outline

SOT-23

Dimensions in mm



VIEW C

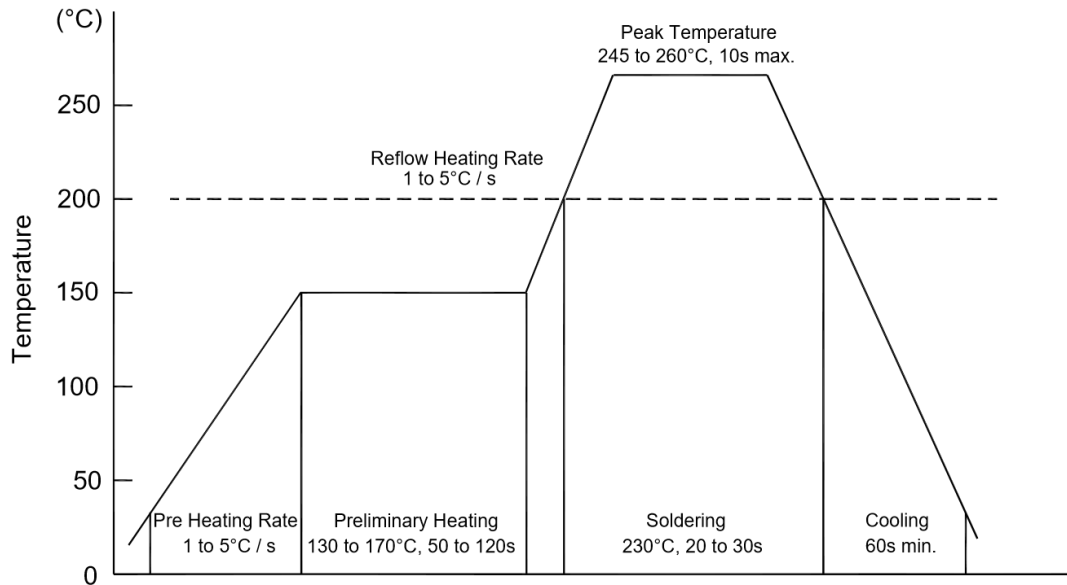
### Ordering Information

| Device      | Package | Shipping              |
|-------------|---------|-----------------------|
| PJM2309APSA | SOT-23  | 3,000PCS/Reel&7inches |



### 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

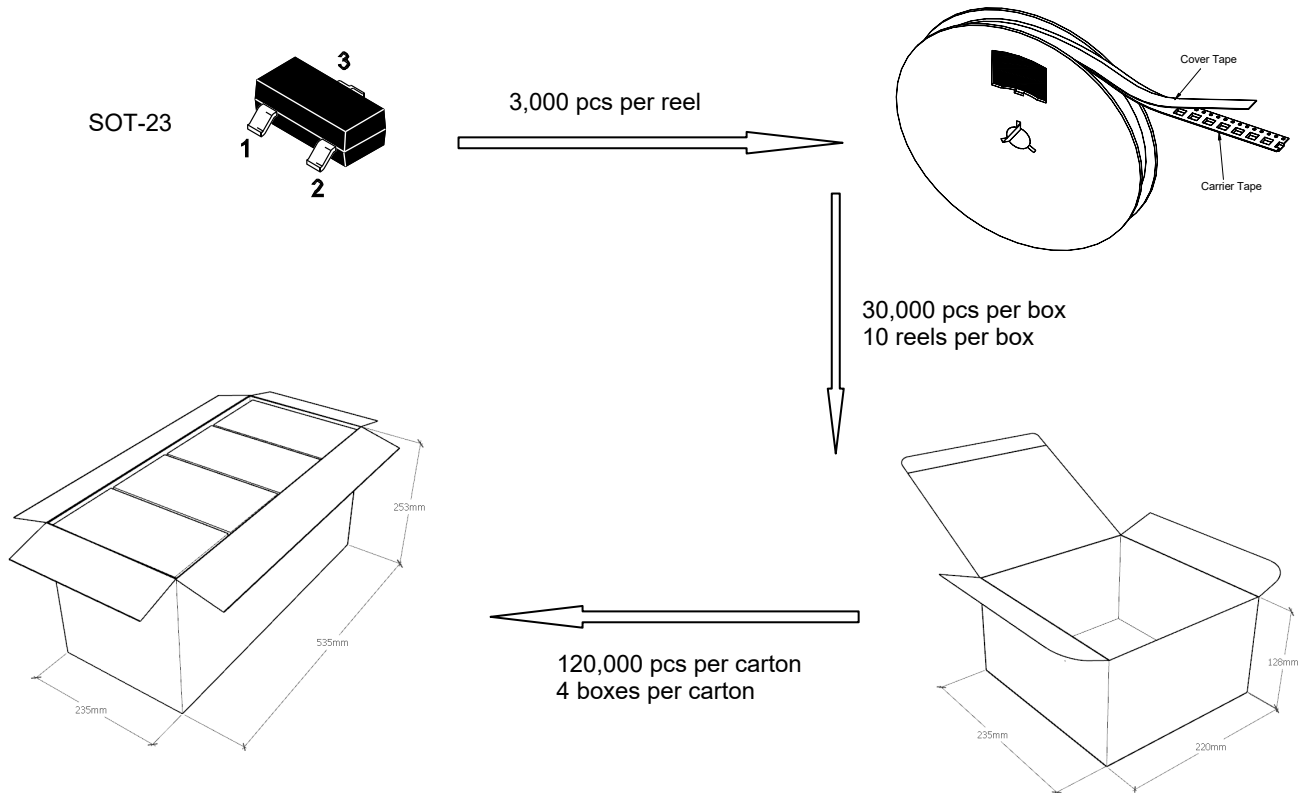
- Temperature: 370 °C
- Time: 3s max.
- Times: one time

#### ◆ Storage conditions

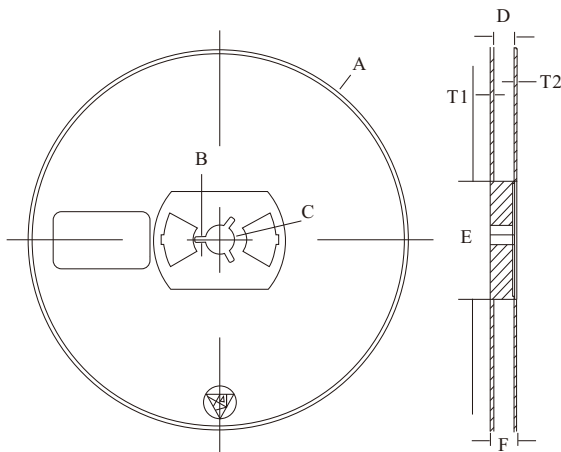
- **Temperature**  
5 to 40 °C
- **Humidity**  
30 to 80% RH
- **Recommended period**  
One year after manufacturing

### Package Specifications

- The method of packaging



### ◆ Embossed tape and reel data



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

Reel (7")

