

**N-CHANNEL MOSFET**

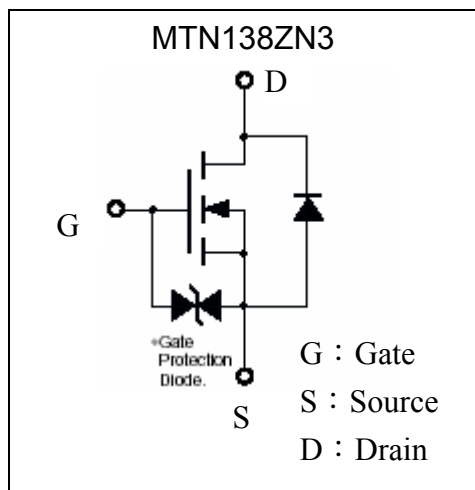
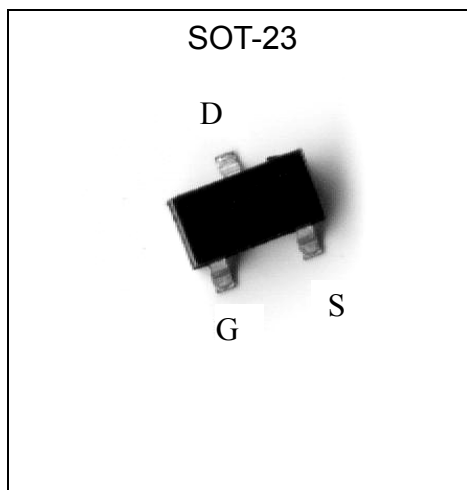
# MTN138ZN3

**Description**

The MTN138ZN3 is a N-channel enhancement-mode MOSFET.

**Features**

- Low on-resistance
- High ESD
- High speed switching
- Low-voltage drive(4V)
- Easily designed drive circuits
- Easy to use in parallel
- Pb-free package

**Symbol****Outline**

**Absolute Maximum Ratings** (Ta=25°C)

| Parameter               |            | Symbol           | Limits   | Unit |
|-------------------------|------------|------------------|----------|------|
| Drain-Source Voltage    |            | V <sub>DSS</sub> | 60       | V    |
| Gate-Source Voltage     |            | V <sub>GSS</sub> | ±20      | V    |
| Drain Current           | Continuous | I <sub>D</sub>   | 200      | mA   |
|                         | Pulsed     | I <sub>DP</sub>  | 800 *1   | mA   |
| Drain Reverse Current   | Continuous | I <sub>DR</sub>  | 200      | mA   |
|                         | Pulsed     | I <sub>DRP</sub> | 800 *1   | mA   |
| Total Power Dissipation |            | P <sub>D</sub>   | 200 *2   | mW   |
| ESD susceptibility      |            |                  | 1550 *3  | V    |
| Channel Temperature     |            | T <sub>CH</sub>  | +150     | °C   |
| Storage Temperature     |            | T <sub>stg</sub> | -55~+150 | °C   |

Note : \*1. Pulse Width ≤ 300μs, Duty cycle ≤ 2%

\*2. When the device is mounted on a glass epoxy board with area measuring 1×0.75×0.62 inch

\*3. Human body model, 1.5kΩ in series with 100pF

**Electrical Characteristics** (Ta=25°C)

| Symbol                | Min. | Typ. | Max. | Unit | Test Conditions                                          |
|-----------------------|------|------|------|------|----------------------------------------------------------|
| BV <sub>DSS</sub> *   | 60   | -    | -    | V    | V <sub>GS</sub> =0, I <sub>D</sub> =10μA                 |
| V <sub>GS(th)</sub>   | 1    | 1.2  | 2    | V    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA |
| I <sub>GSS</sub>      | -    | -    | ±10  | μA   | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0                |
| I <sub>DSS</sub>      | -    | -    | 1    | μA   | V <sub>DS</sub> =60V, V <sub>GS</sub> =0                 |
| R <sub>DS(ON)</sub> * | -    | 3.2  | 5    | Ω    | I <sub>D</sub> =1mA, V <sub>GS</sub> =2.5V               |
|                       | -    | 3.2  | 5    |      | I <sub>D</sub> =10mA, V <sub>GS</sub> =2.5V              |
|                       | -    | 2    | 4    |      | I <sub>D</sub> =10mA, V <sub>GS</sub> =4V                |
|                       | -    | 2    | 4    |      | I <sub>D</sub> =200mA, V <sub>GS</sub> =4V               |
|                       | -    | 1.5  | 3    |      | I <sub>D</sub> =200mA, V <sub>GS</sub> =10V              |
| G <sub>FS</sub>       | 100  | 240  | -    | mS   | V <sub>DS</sub> =10V, I <sub>D</sub> =100mA              |
| C <sub>iss</sub>      | -    | 30.6 | -    | pF   | V <sub>DS</sub> =10V, V <sub>GS</sub> =0, f=1MHz         |
| C <sub>oss</sub>      | -    | 5.5  | -    |      |                                                          |
| C <sub>rss</sub>      | -    | 4    | -    |      |                                                          |

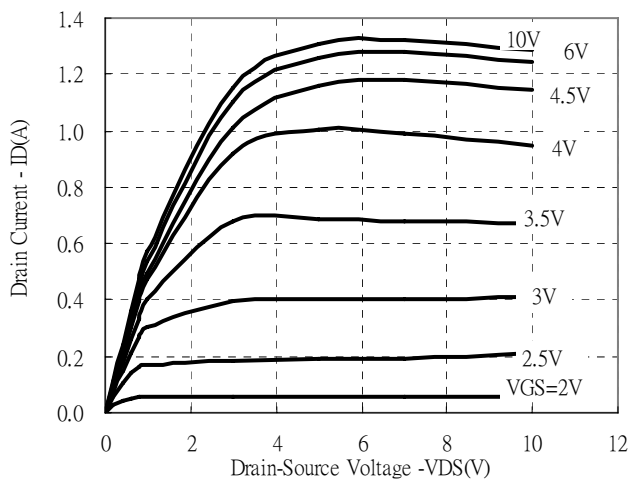
\*Pulse Test : Pulse Width ≤ 380μs, Duty Cycle ≤ 2%

**Ordering Information**

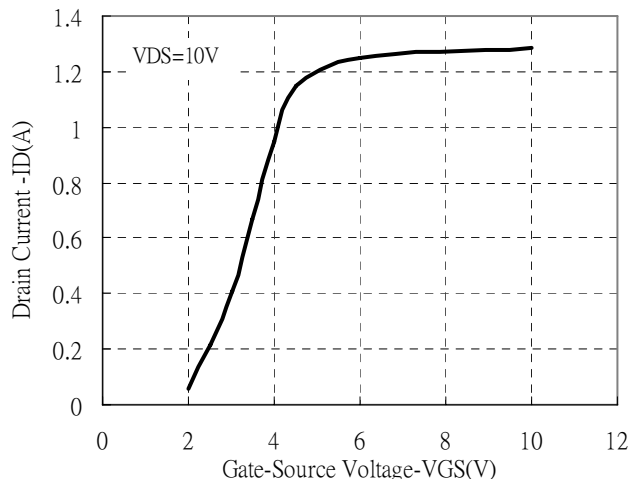
| Device    | Package             | Shipping               | Marking |
|-----------|---------------------|------------------------|---------|
| MTN138ZN3 | SOT-23<br>(Pb-free) | 3000 pcs / Tape & Reel | 702     |

## Characteristic Curves

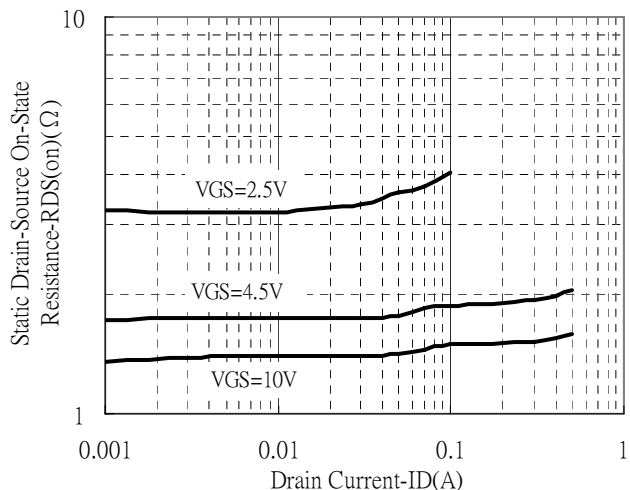
Typical Output Characteristics



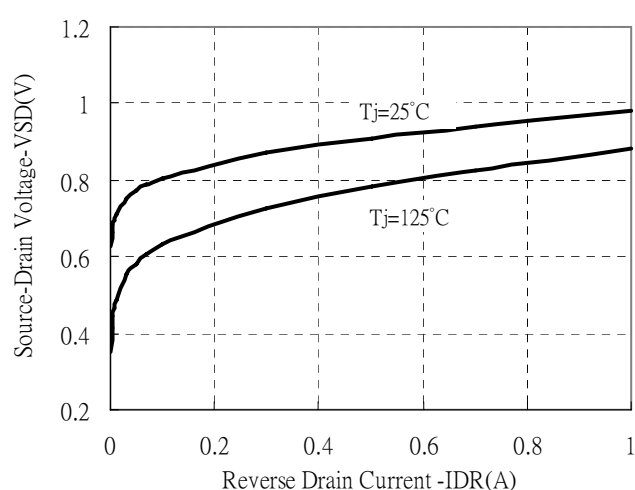
Typical Transfer Characteristics



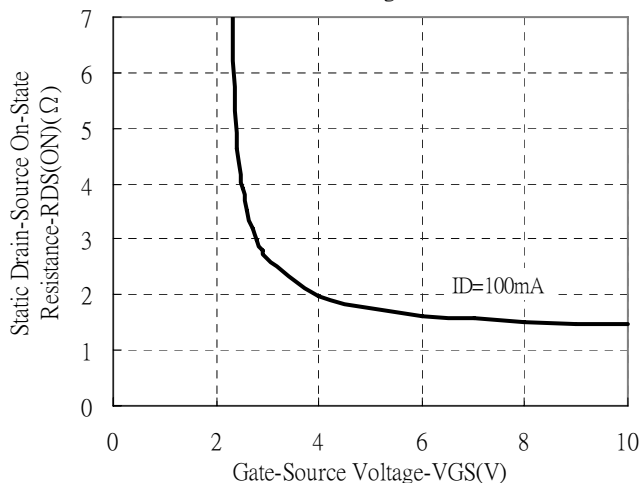
Static Drain-Source On-State resistance vs Drain Current



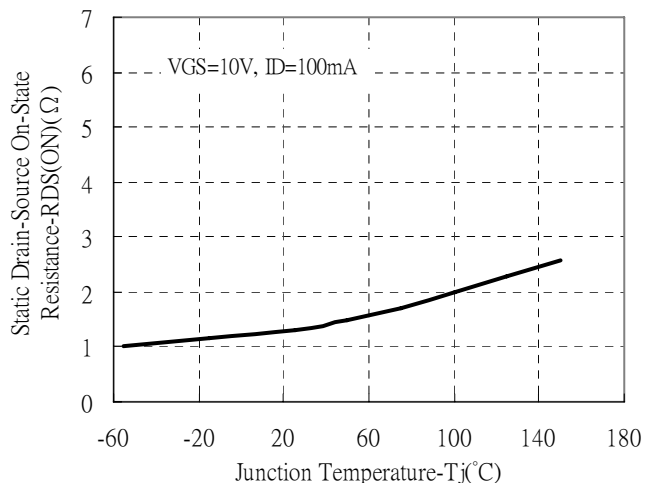
Reverse Drain Current vs Source-Drain Voltage



Static Drain-Source On-State Resistance vs Gate-Source Voltage

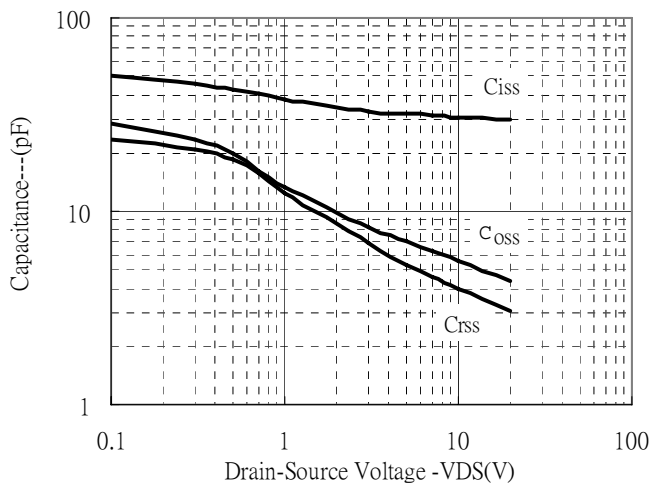


Drain-Source On-State Resistance vs Junction Temperature

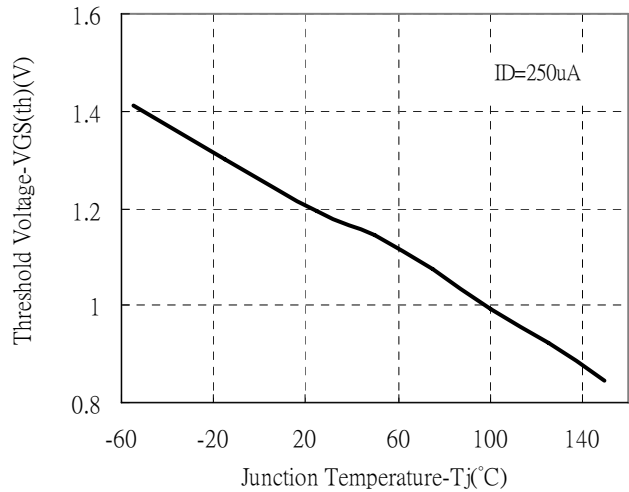


## Characteristic Curves(Cont.)

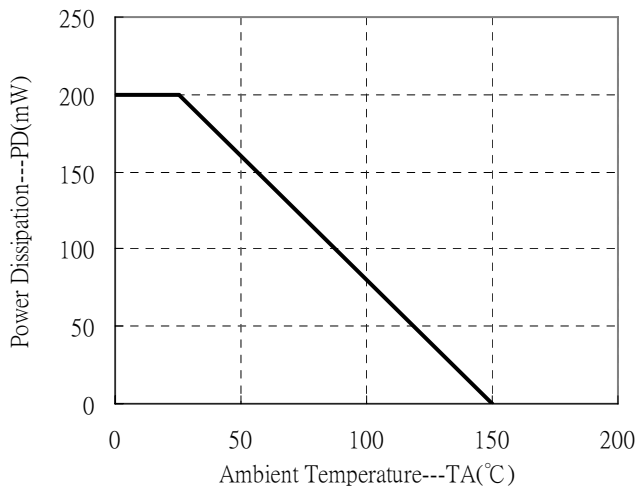
Capacitance vs Drain-to-Source Voltage



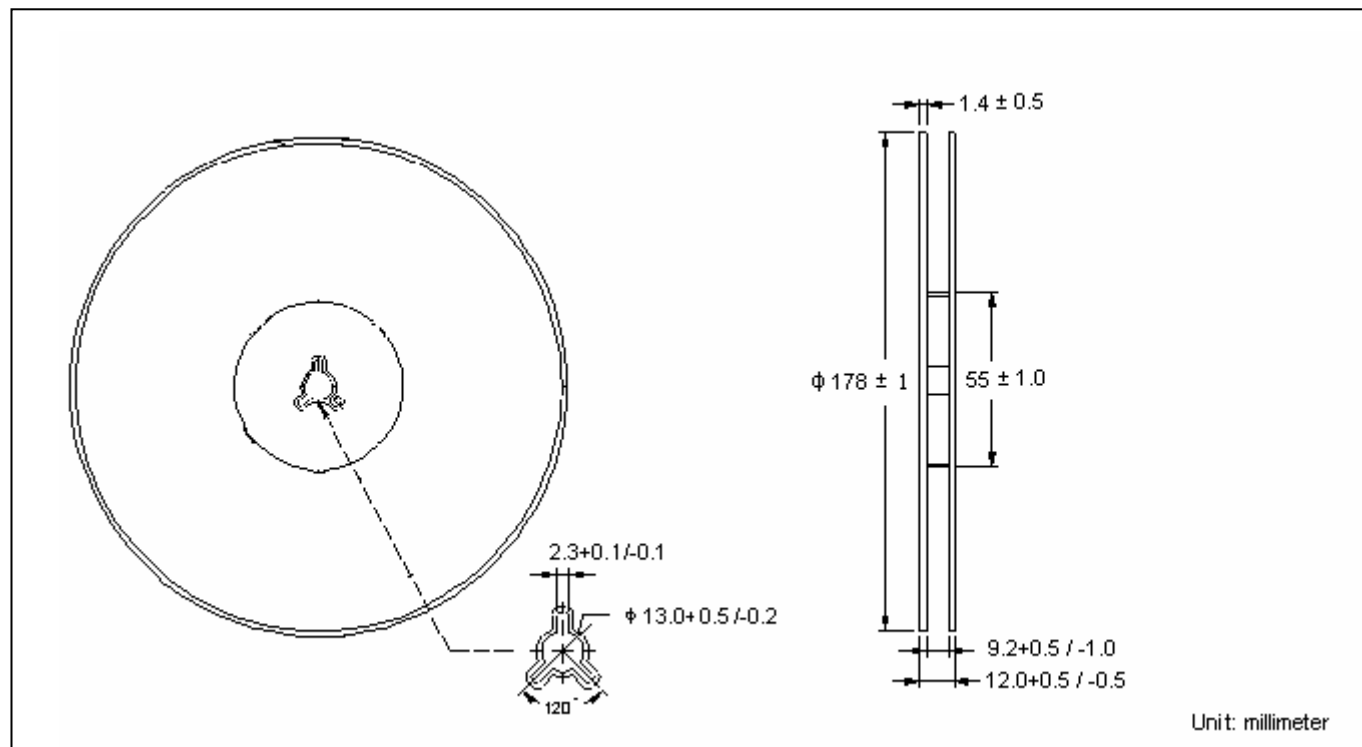
Threshold Voltage vs Junction Temperature



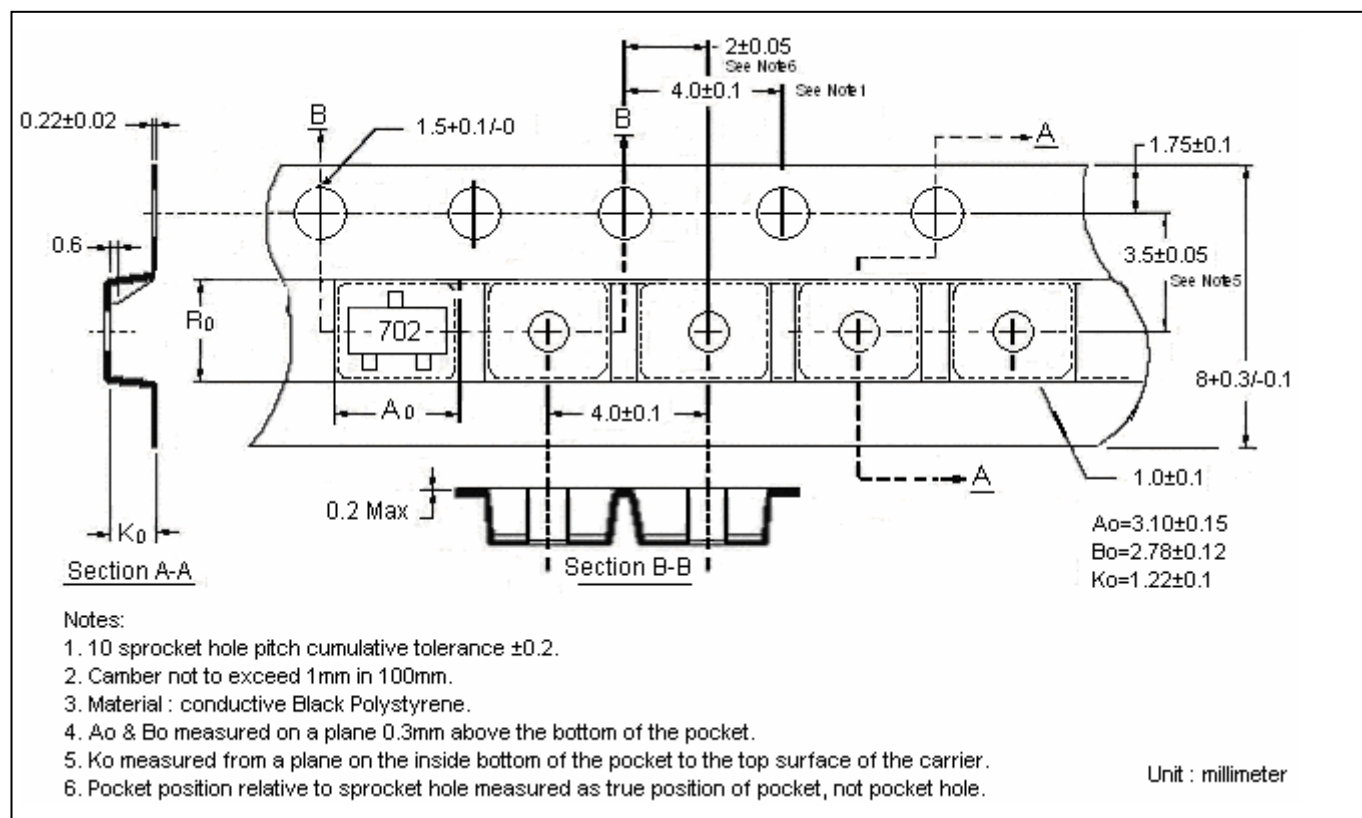
Power Derating Curve



## Reel Dimension



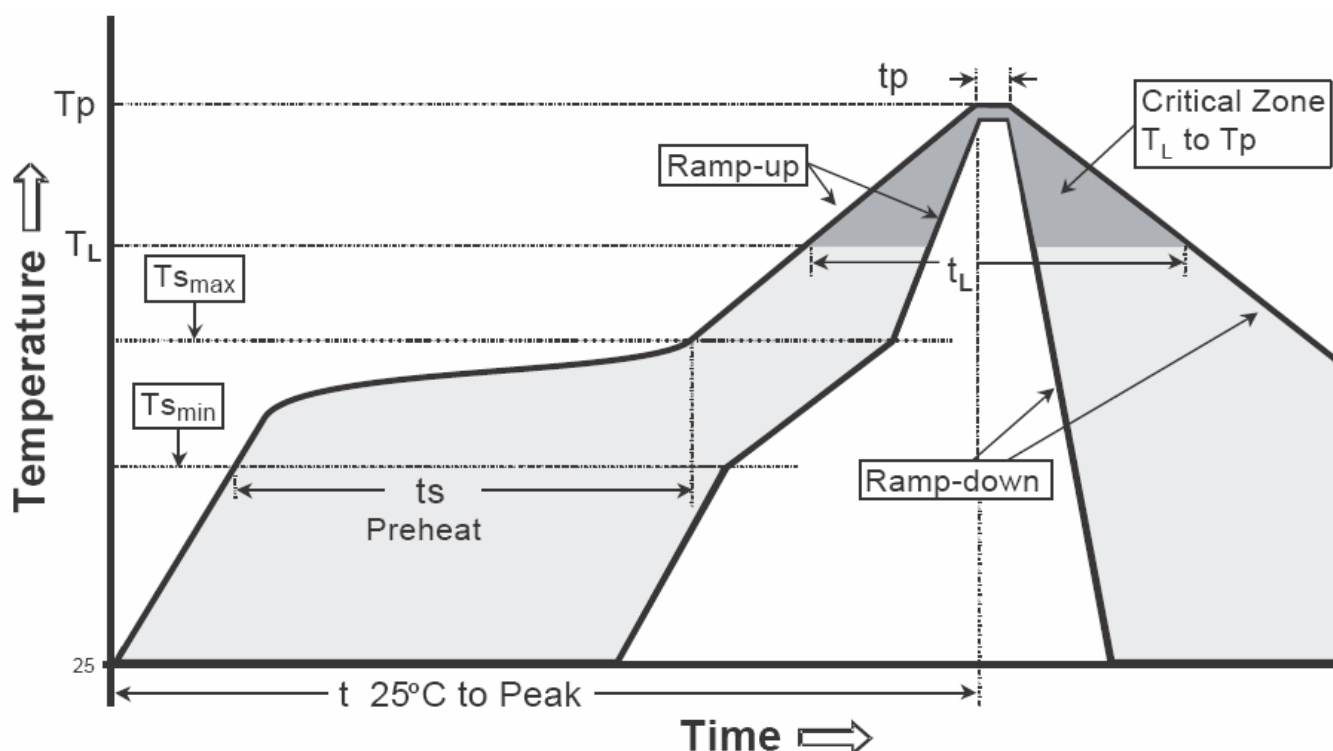
## Carrier Tape Dimension



### Recommended wave soldering condition

| Product         | Peak Temperature | Soldering Time  |
|-----------------|------------------|-----------------|
| Pb-free devices | 260 +0/-5 °C     | 5 +1/-1 seconds |

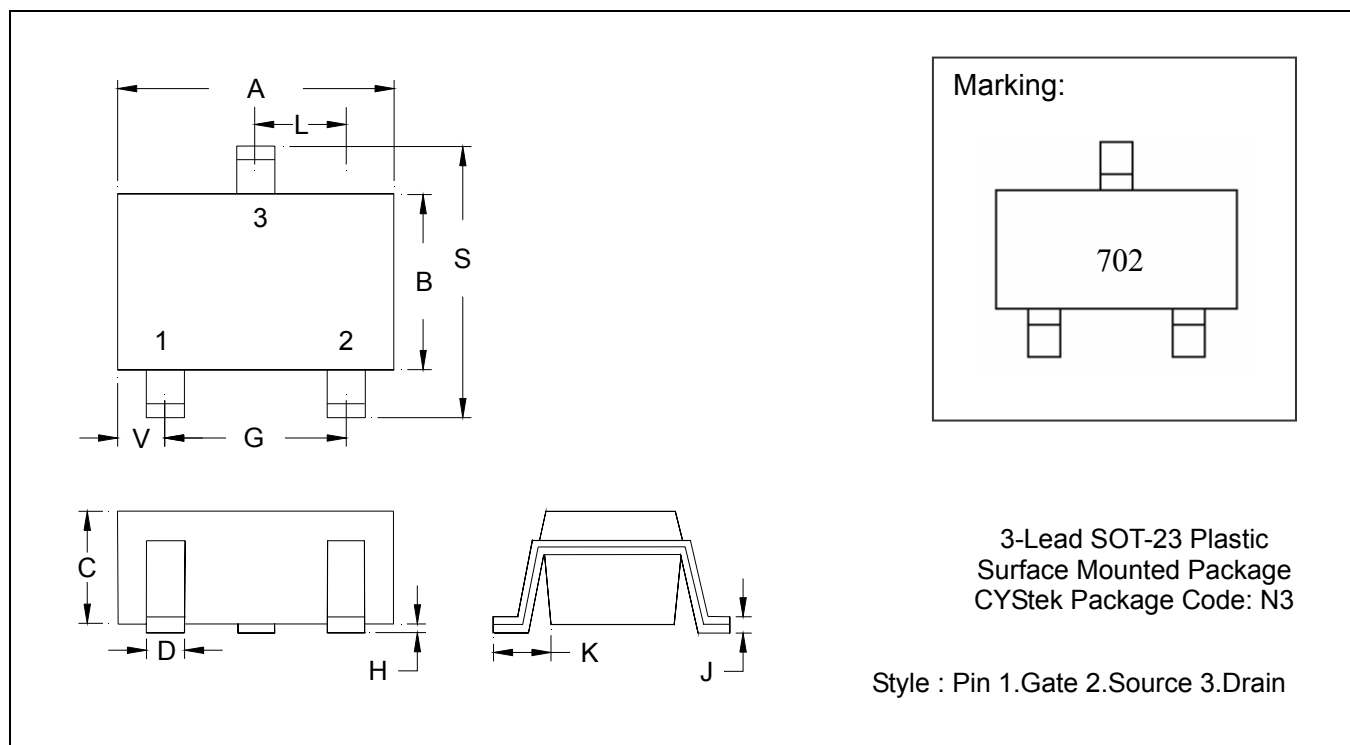
### Recommended temperature profile for IR reflow



| Profile feature                                | Sn-Pb eutectic Assembly | Pb-free Assembly |
|------------------------------------------------|-------------------------|------------------|
| Average ramp-up rate (Tsmax to Tp)             | 3°C/second max.         | 3°C/second max.  |
| Preheat                                        |                         |                  |
| -Temperature Min(Ts min)                       | 100°C                   | 150°C            |
| -Temperature Max(Ts max)                       | 150°C                   | 200°C            |
| -Time(ts min to ts max)                        | 60-120 seconds          | 60-180 seconds   |
| Time maintained above:                         |                         |                  |
| -Temperature (TL)                              | 183°C                   | 217°C            |
| - Time (tL)                                    | 60-150 seconds          | 60-150 seconds   |
| Peak Temperature(Tp)                           | 240 +0/-5 °C            | 260 +0/-5 °C     |
| Time within 5°C of actual peak temperature(tp) | 10-30 seconds           | 20-40 seconds    |
| Ramp down rate                                 | 6°C/second max.         | 6°C/second max.  |
| Time 25 °C to peak temperature                 | 6 minutes max.          | 8 minutes max.   |

Note : All temperatures refer to topside of the package, measured on the package body surface.

## SOT-23 Dimension



\*:Typical

| DIM | Inches |        | Millimeters |      | DIM | Inches |        | Millimeters |       |
|-----|--------|--------|-------------|------|-----|--------|--------|-------------|-------|
|     | Min.   | Max.   | Min.        | Max. |     | Min.   | Max.   | Min.        | Max.  |
| A   | 0.1102 | 0.1204 | 2.80        | 3.04 | J   | 0.0034 | 0.0070 | 0.085       | 0.177 |
| B   | 0.0472 | 0.0630 | 1.20        | 1.60 | K   | 0.0128 | 0.0266 | 0.32        | 0.67  |
| C   | 0.0335 | 0.0512 | 0.89        | 1.30 | L   | 0.0335 | 0.0453 | 0.85        | 1.15  |
| D   | 0.0118 | 0.0197 | 0.30        | 0.50 | S   | 0.0830 | 0.1083 | 2.10        | 2.75  |
| G   | 0.0669 | 0.0910 | 1.70        | 2.30 | V   | 0.0098 | 0.0256 | 0.25        | 0.65  |
| H   | 0.0005 | 0.0040 | 0.013       | 0.10 |     |        |        |             |       |

Notes : 1.Controlling dimension : millimeters.

2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.

3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

Material :

- Lead : Pure tin plated.
- Mold Compound : Epoxy resin family, flammability solid burning class:UL94V-0.

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