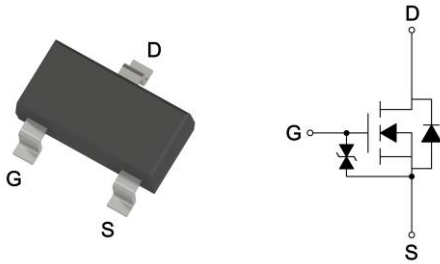


## Product Summary

|   |     |            |
|---|-----|------------|
| $BV_{DSS}$                                  | 100 | V          |
| $R_{DS(ON)}$ typ. @ $V_{GS}=10V, I_D=1A$    | 230 | m $\Omega$ |
| $R_{DS(ON)}$ typ. @ $V_{GS}=4.5V, I_D=0.5A$ | 350 |            |
| $I_D$ @ $V_{GS}=10V, T_A=25^\circ C$        | 1.1 | A          |

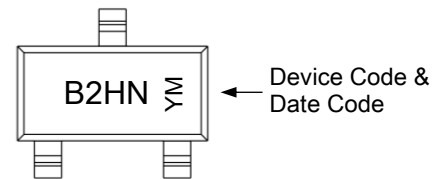
## SOT-23



## Features

- Low Gate Charge
- Fast Switching Characteristic
- Pb-free lead plating and halogen-free
- ESD protected gate

## Marking



YMXX: Date Code Marking

Y: Year Code, the last digit of Christian year

M: Month Code

|        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| 1: Jan | 2: Feb | 3: Mar | 4: Apr | 5: May | 6: Jun |
| 7: Jul | 8: Aug | 9: Sep | A: Oct | B: Nov | C: Dec |

## Ordering Information

| Device                | Package | Shipping              |
|-----------------------|---------|-----------------------|
| MTB250N10KRSN3-0-T1-G | SOT-23  | 3000pcs / Tape & Reel |

0: Product rank, zero for no rank products.

T1: Packing spec, T1 : 3000pcs / tape & reel, 7" reel

G: Environment friendly grade: S for RoHS compliant products, G for RoHS compliant and green compound products.

## Absolute Maximum Ratings ( $T_A=25^\circ C$ )

| Parameter  | Symbol          | Value            | Unit         |   |
|--|-----------------|------------------|--------------|---|
| Drain-Source Voltage                                     | $V_{DS}$        | 100              | V            |   |
| Gate-Source Voltage                                      | $V_{GS}$        | $\pm 20$         |              |   |
| Continuous Drain Current @ $V_{GS}=10V, T_A=25^\circ C$  | $I_D$           | 1.1              | A            |   |
| Continuous Drain Current @ $V_{GS}=10V, T_A=70^\circ C$  |                 | 0.9              |              |   |
| Pulsed Drain Current                                     | $I_{DM}$        | 4.4              |              |   |
| Continuous Body Diode Forward Current @ $T_A=25^\circ C$ | $I_S$           | 0.6              |              |   |
| Pulsed Body Diode Forward Current @ $T_A=25^\circ C$     | $I_{SM}$        | 2.4              |              |   |
| Total Power Dissipation                                  | $P_D$           | $T_A=25^\circ C$ | 0.8          | W |
|  |                 | $T_A=70^\circ C$ | 0.5          |   |
| Operating Junction and Storage Temperature Range         | $T_J, T_{stg}$  | -55~+150         | $^\circ C$   |   |
| Steady State Thermal Resistance, Junction-to-Ambient     | $R_{\theta JA}$ | 166              | $^\circ C/W$ |   |



**Electrical Characteristics (T<sub>A</sub>=25°C, unless otherwise specified)**

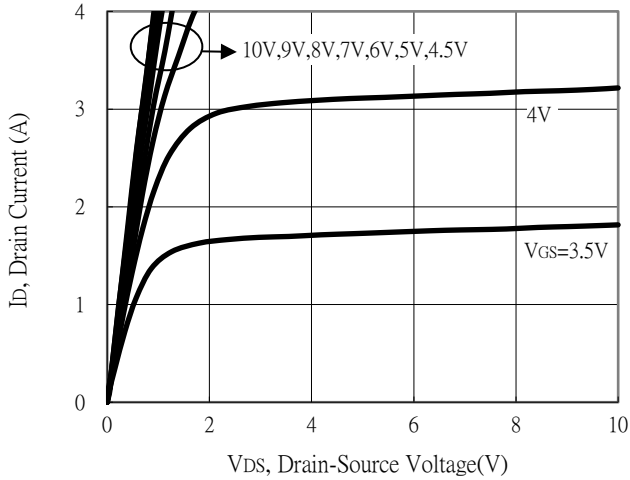
| Symbol                    | Min. | Typ. | Max. | Unit | Test Conditions   |
|---------------------------|------|------|------|------|---|
| <b>Static</b>             |      |      |      |      |   |
| BV <sub>DSS</sub>         | 100  | -    | -    | V    | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA  |
| V <sub>GS(th)</sub>       | 1    | -    | 2.5  |      | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                            |
| G <sub>FS</sub>           | -    | 1.5  | -    | S    | V <sub>DS</sub> =10V, I <sub>D</sub> =1A  |
| I <sub>GSS</sub>          | -    | -    | ±10  | μA   | V <sub>GS</sub> =±16V, V <sub>DS</sub> =0V  |
| I <sub>DSS</sub>          | -    | -    | 1    |      | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V   |
| R <sub>DS(ON)</sub>       | -    | 230  | 300  | mΩ   | V <sub>GS</sub> =10V, I <sub>D</sub> =1A  |
|                           | -    | 350  | 500  |      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =0.5A   |
| <b>Dynamic</b>            |      |      |      |      |   |
| C <sub>ISS</sub>          | -    | 105  | -    | pF   | V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz                                   |
| C <sub>OSS</sub>          | -    | 19   | -    |      |   |
| C <sub>ISS</sub>          | -    | 14   | -    |      |   |
| R <sub>g</sub>            | -    | 7    | -    | Ω    | f=1MHz  |
| Q <sub>g</sub> *d,e       | -    | 1.4  | -    | nC   | V <sub>DS</sub> =50V, I <sub>D</sub> =1A, V <sub>GS</sub> =4.5V                     |
| Q <sub>g</sub> *d,e       | -    | 3    | -    |      |   |
| Q <sub>gs</sub> *d,e      | -    | 0.6  | -    |      |   |
| Q <sub>gd</sub> *d,e      | -    | 0.4  | -    |      |   |
| t <sub>d(ON)</sub> *d,e   | -    | 3.2  | -    | ns   | V <sub>DS</sub> =50V, I <sub>D</sub> =1A, V <sub>GS</sub> =10V, R <sub>GS</sub> =1Ω |
| t <sub>r</sub> *d,e       | -    | 17   | -    |      |   |
| t <sub>d(OFF)</sub> *d,e  | -    | 9    | -    |      |   |
| t <sub>f</sub> *d,e       | -    | 15   | -    |      |   |
| <b>Source-Drain Diode</b> |      |      |      |      |   |
| V <sub>SD</sub> *d        | -    | 0.87 | 1.2  | V    | I <sub>S</sub> =1A, V <sub>GS</sub> =0V   |
| t <sub>rr</sub>           | -    | 21   | -    | ns   | I <sub>F</sub> =1A, di/dt=100A/μs   |
| Q <sub>rr</sub>           | -    | 7    | -    | nC   |   |

**Note:**

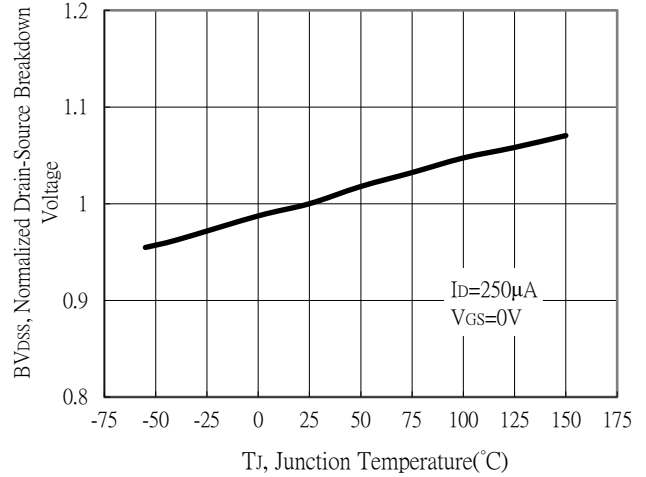
- \*a. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper Dissipation.
- \*b. The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz copper, in a still air environment with T<sub>A</sub>=25°C. The power dissipation P<sub>D</sub> is based on R<sub>θJA</sub> and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
- \*c. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C. Ratings are based on low frequency and low duty cycles to keep initial T<sub>J</sub>=25°C.
- \*d. Pulse Test : Pulse Width≤300μs, Duty Cycle≤2%.
- \*e. Independent of operating temperature.

## Typical Characteristics

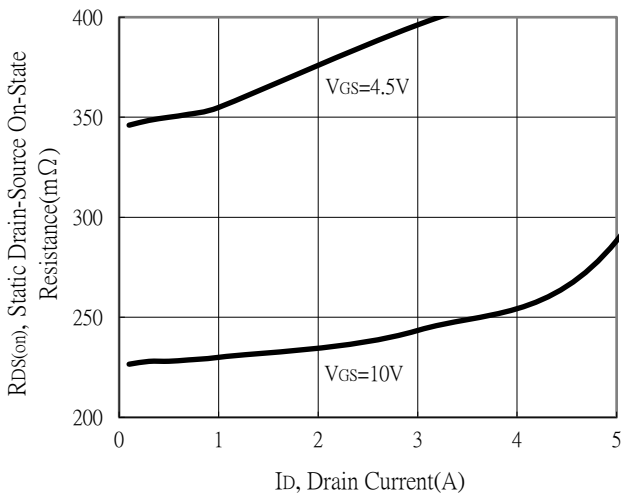
Typical Output Characteristics



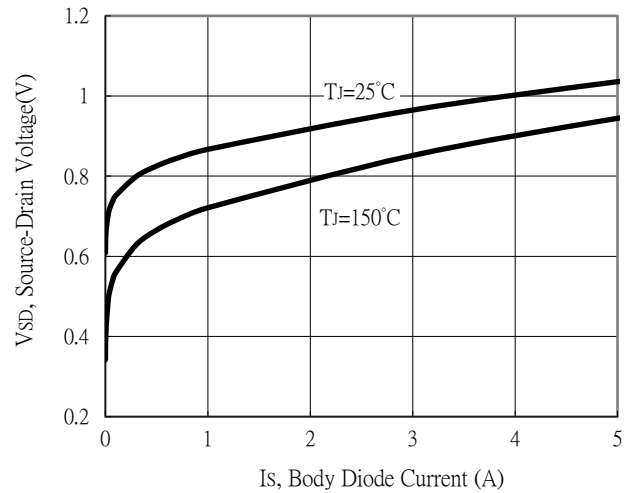
Breakdown Voltage vs Ambient Temperature



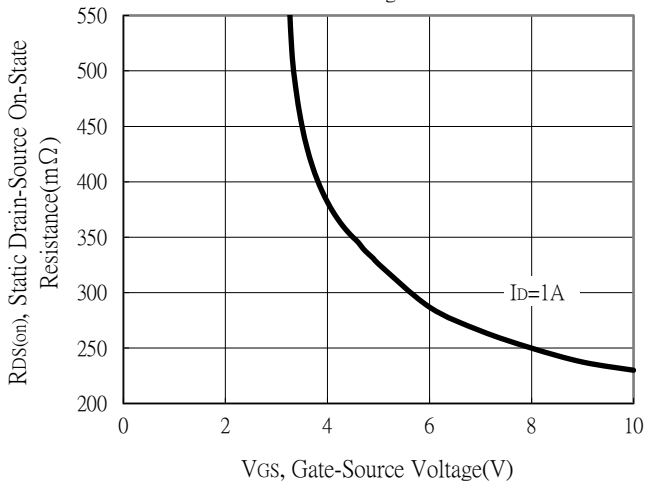
Static Drain-Source On-State resistance vs Drain Current



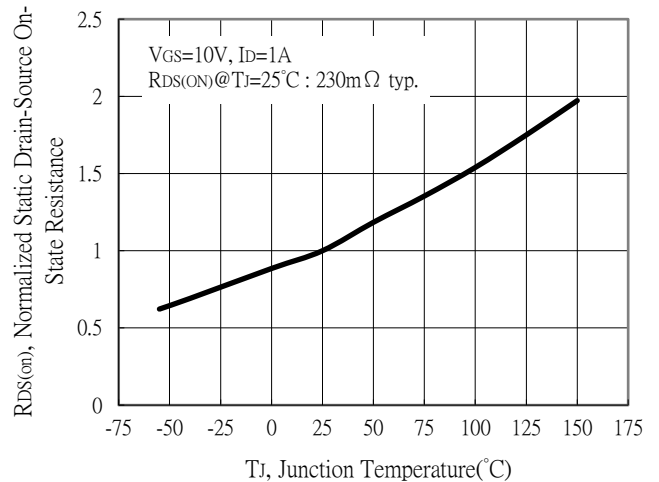
Body Diode Current vs Source-Drain Voltage



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

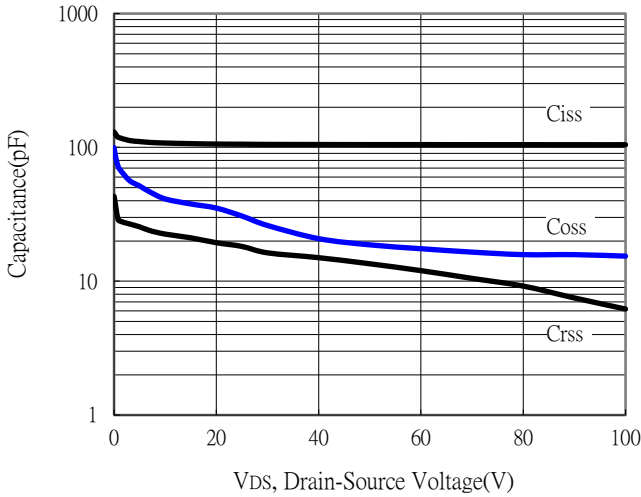


Drain-Source On-State Resistance vs Junction Temperature

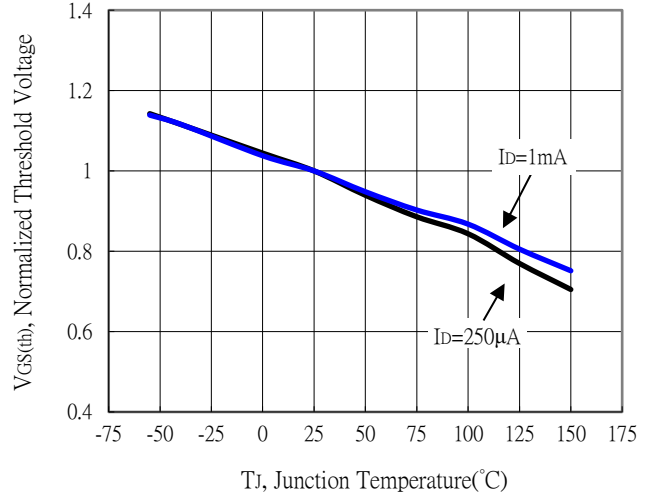


## Typical Characteristics

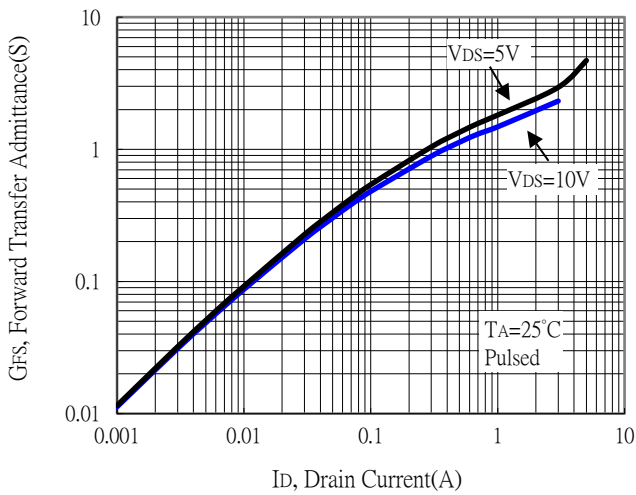
Capacitance vs Drain-to-Source Voltage



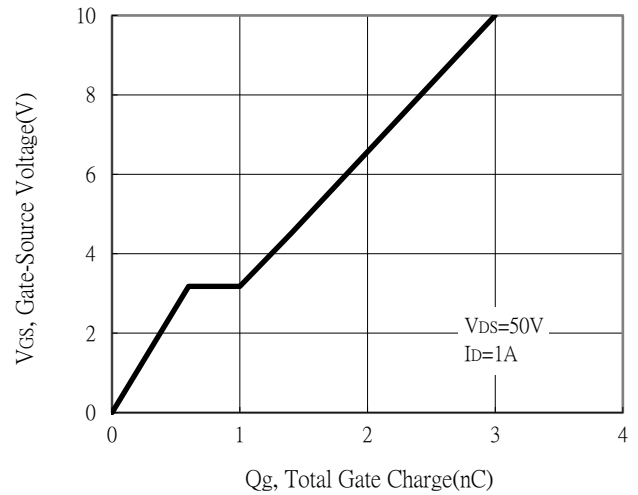
Threshold Voltage vs Junction Temperature



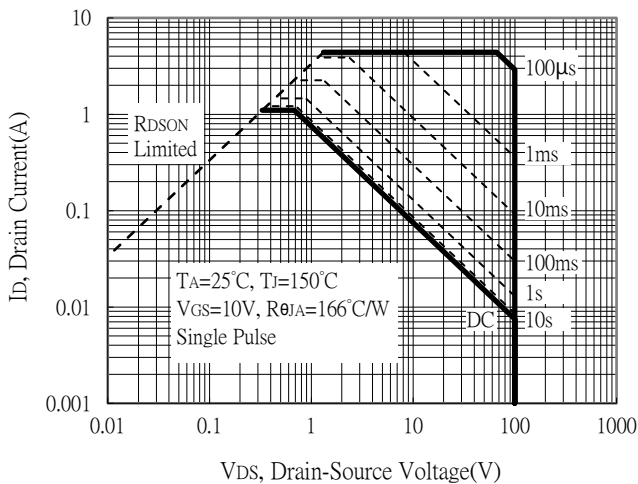
Forward Transfer Admittance vs Drain Current



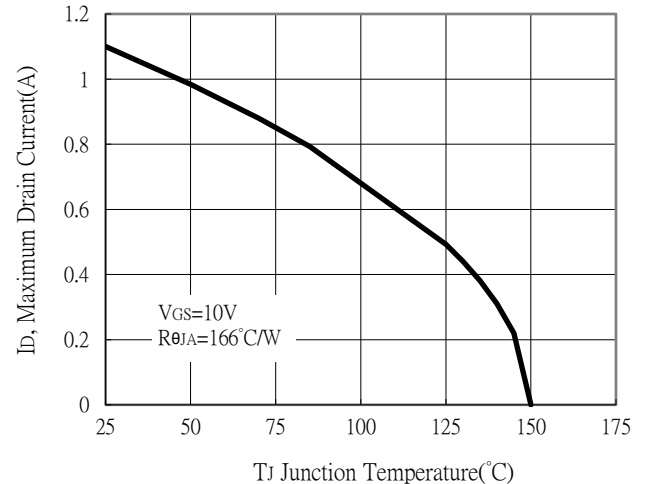
Gate Charge Characteristics



Maximum Safe Operating Area

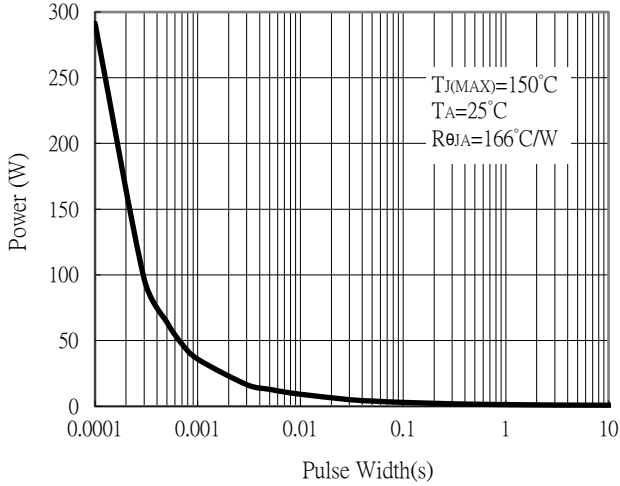


Maximum Drain Current vs Junction Temperature

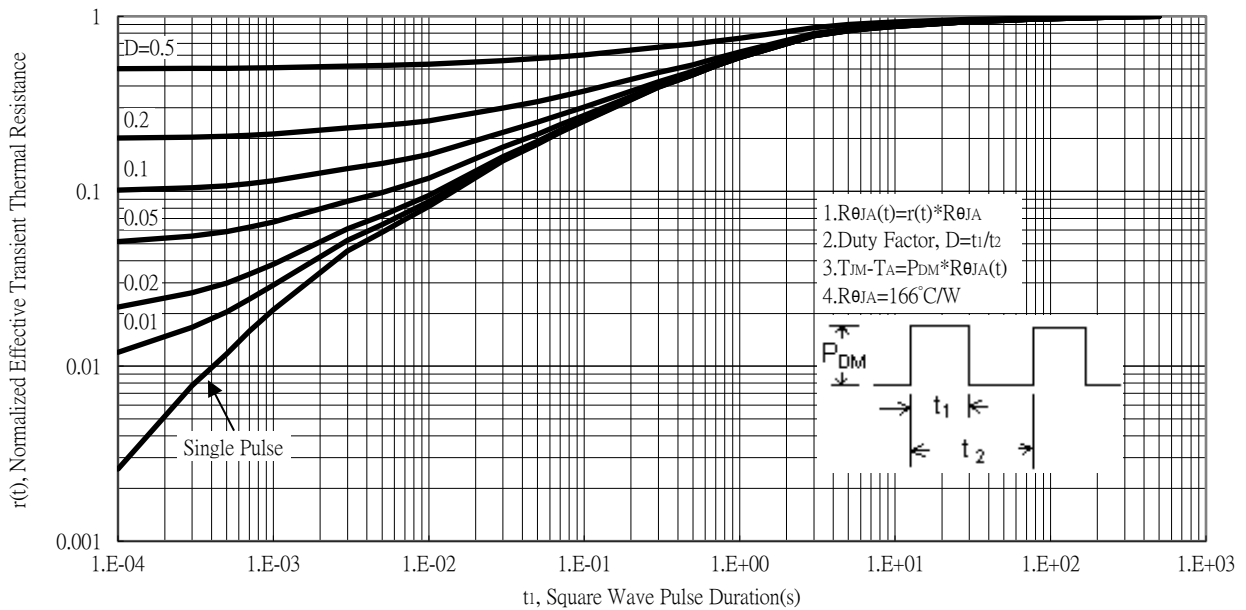


## Typical Characteristics

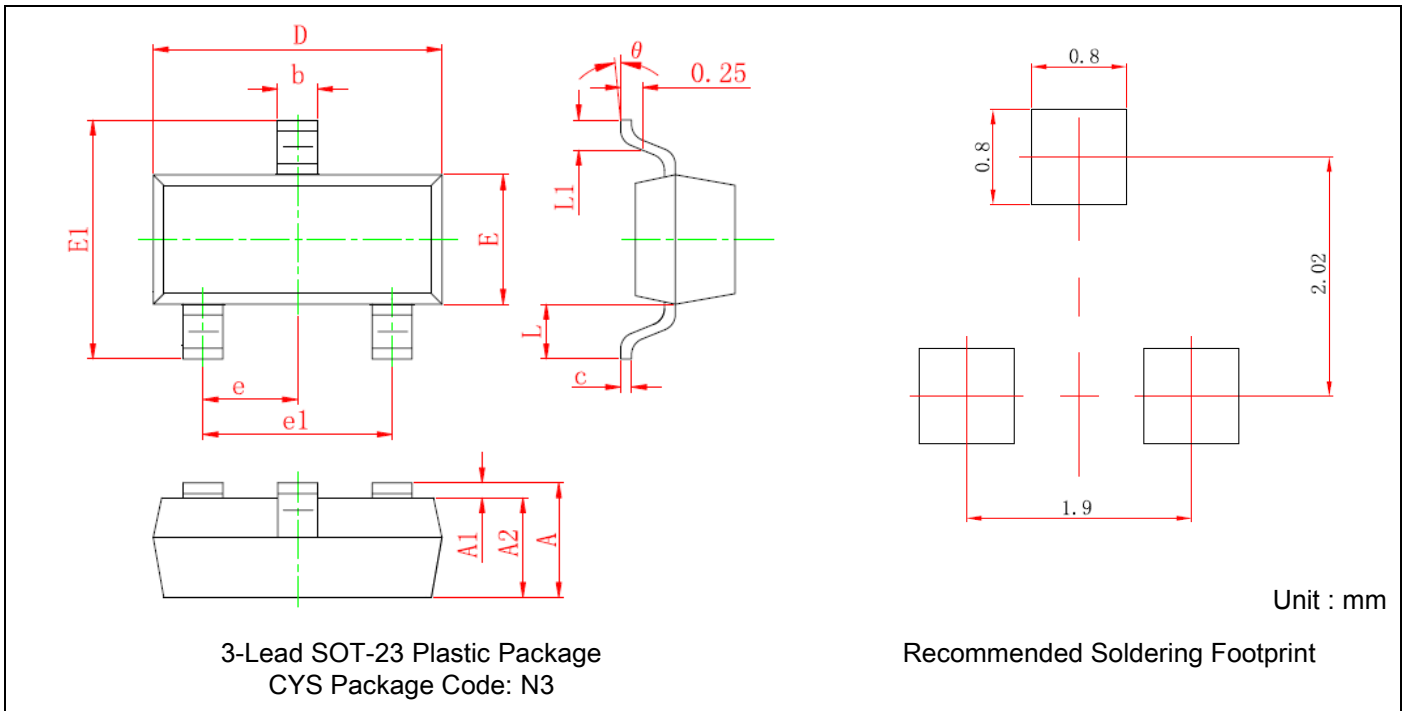
Single Pulse Power Rating, Junction to Ambient



Transient Thermal Response Curves



## SOT-23 Dimension



| DIM | Inches |       | Millimeters |       | DIM | Inches |       | Millimeters |       |
|-----|--------|-------|-------------|-------|-----|--------|-------|-------------|-------|
|     | Min.   | Max.  | Min.        | Max.  |     | Min.   | Max.  | Min.        | Max.  |
| A   | 0.035  | 0.045 | 0.900       | 1.150 | E1  | 0.089  | 0.100 | 2.250       | 2.550 |
| A1  | 0.000  | 0.004 | 0.000       | 0.100 | e   | 0.037  | TYP.  | 0.095       | TYP.  |
| A2  | 0.035  | 0.041 | 0.900       | 1.050 | e1  | 0.071  | 0.079 | 1.800       | 2.000 |
| b   | 0.012  | 0.020 | 0.300       | 0.500 | L   | 0.022  | REF.  | 0.550       | REF.  |
| c   | 0.003  | 0.006 | 0.080       | 0.150 | L1  | 0.012  | 0.020 | 0.300       | 0.500 |
| D   | 0.110  | 0.118 | 2.800       | 3.000 | θ   | 0°     | 8°    | 0°          | 8°    |
| E   | 0.047  | 0.055 | 1.200       | 1.400 |     |        |       |             |       |

**Note:**

- Controlling dimension: millimeters.
- Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
- If there is any question with packing specification or packing method, please contact your local CYStek sales office.

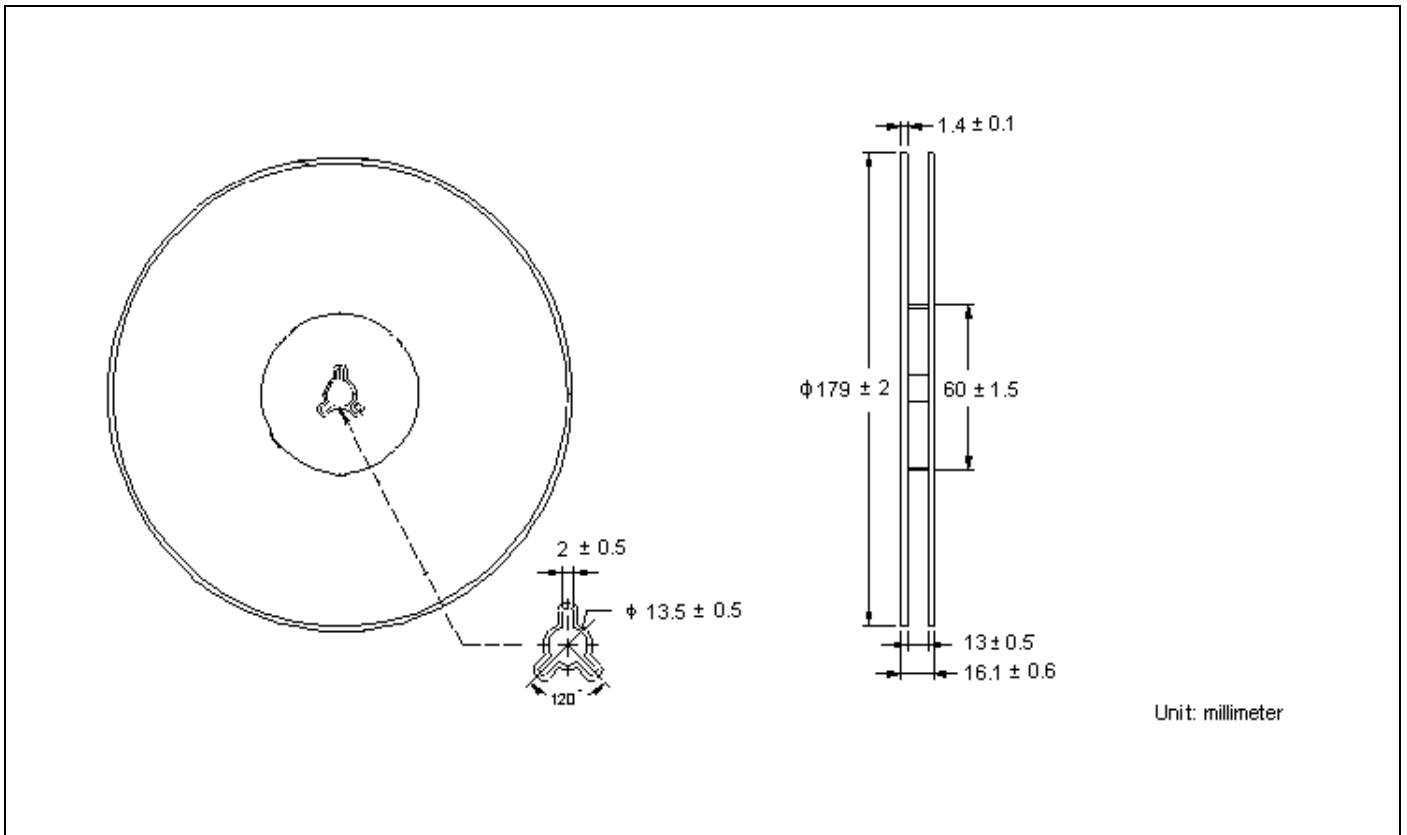
**Material:**

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

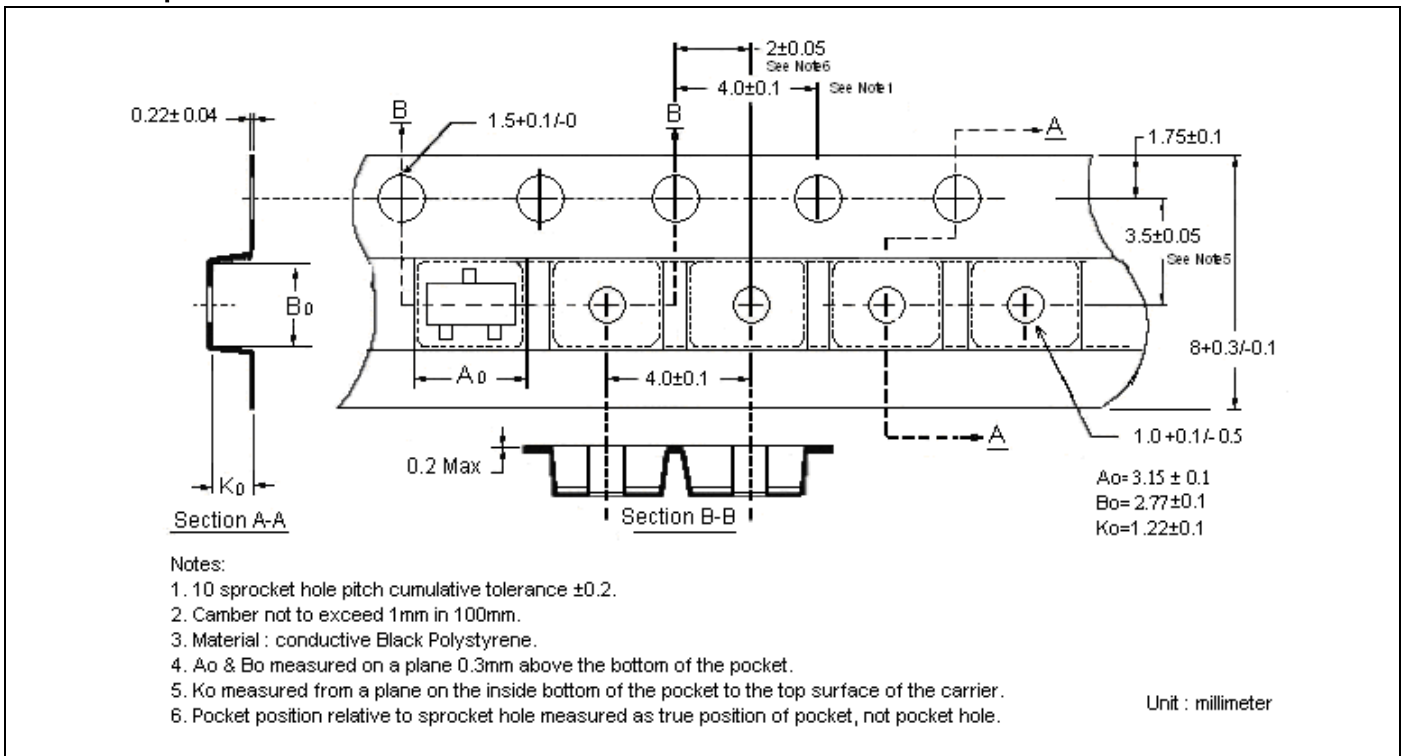
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## Reel Dimension



## 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 (T <sub>S</sub> max to T <sub>P</sub> )  | 3°C/second max.                  | 3°C/second max.                  |
| Preheat<br>-Temperature Min (T <sub>S</sub> min)<br>-Temperature Max (T <sub>S</sub> max)<br>-Time (t <sub>s</sub> min to t <sub>s</sub> max) | 100°C<br>150°C<br>60-120 seconds | 150°C<br>200°C<br>60-180 seconds |
| Time maintained above:<br>-Temperature (T <sub>L</sub> )<br>-Time (t <sub>L</sub> )   | 183°C<br>60-150 seconds          | 217°C<br>60-150 seconds          |
| Peak Temperature (T <sub>P</sub> )  | 240 +0/-5 °C                     | 260 +0/-5 °C                     |
| Time within 5°C of actual peak temperature (t <sub>p</sub> )  | 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.