

## SMD PTC Thermistors For Overload Protection


**RoHS**  
COMPLIANT

### FEATURES

- Ideal for pick-and-place circuit assembly
- Low mounting height
- Suitable for reflow soldering
- Small ceramic diameter for faster response
- Low heat transfer to substrate
- Flat terminations for stable positioning and good solderability
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC

### APPLICATIONS

Over-temperature/over-load protection:

- Telecom
  - Central office switching (C.O.)
  - Subscriber terminal equipment (T.E.)
  - Set top box
  - Modems
  - Cable TV communications
- General industry and automotive
  - Low power supplies overload protection
  - Data bus protection

### DESCRIPTION

The component consists of a high-performance PTC ceramic disc mounted in a lead-frame for direct soldering onto a printed-circuit board (PCB) or substrate.

The ceramic is soldered to the leadframe by a local reflow process, during which the solder layer is melted to the metallized ceramic surface using a low residue flux.

### MARKING

- All SMD PTCs are marked with the last 3-digits of the type number (XXX) and a date code (YYWW)

| QUICK REFERENCE DATA                           |   |  |
|--|---|--|
| DESCRIPTION                                    | VALUE                                       |  |
|  | STANDARD TYPES (1) (2)                      | TELECOM TYPES (1) (2)                        |
| Nominal R25                                    | 2 Ω to 500 Ω                                | 10 Ω to 70 Ω                                 |
| Resistance tolerance                           | ± 10 %; ± 15 %; ± 20 %                      |  |
| Maximum overload current (voltage dependent)   | 2 A to 10 A                                 |  |
| Non-trip current                               | 50 mA to 500 mA at 25 °C                    | 50 mA to 100 mA at 70 °C                     |
| Maximum voltage                                | 16 V <sub>RMS</sub> to 400 V <sub>RMS</sub> | 220 V <sub>RMS</sub> to 600 V <sub>RMS</sub> |
| Response time at 25 °C and 20 W overload power | < 1 s                                       |  |
| Matching                                       | -   | Down to 0.5 Ω                                |
| Maximum continuous power at 25 °C              | 2 W   |  |

#### Notes

- (1) Customized products are available on request  
 (2) Coated and/or reinforced types are available on request

### ELECTRICAL DATA AND ORDERING INFORMATION

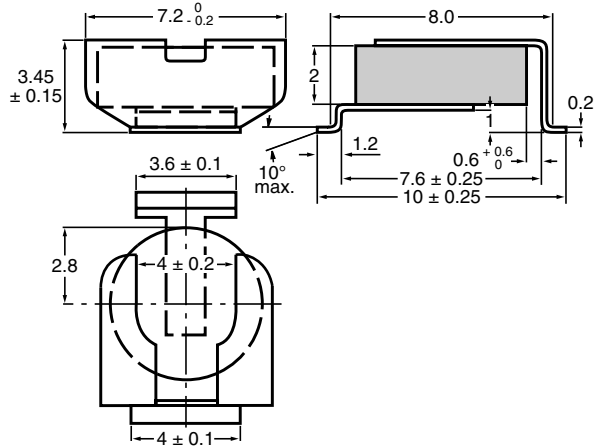
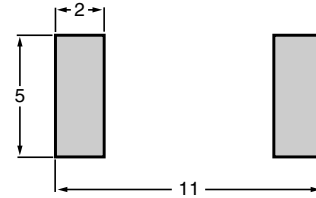
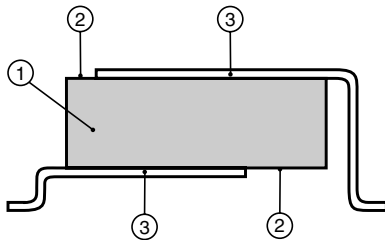
| RESISTANCE                      |            | MATCHING<br>Ω | V<br>MAX.<br>(V) | I <sub>nt</sub> at |               | I <sub>t</sub> at | MAX.<br>TRIP-TIME<br>at 1 A (s) | I <sub>max.</sub> at<br>V <sub>max.</sub> (A) | CATALOG NUMBER                |                               |  |
|---------------------------------|------------|---------------|------------------|--------------------|---------------|-------------------|---------------------------------|---|-------------------------------|-------------------------------|--|
| R <sub>25</sub><br>(Ω)          | TOL<br>(%) |               |                  | 25 °C<br>(mA)      | 70 °C<br>(mA) | 25 °C<br>(mA)     |                                 |   | 12NC                          | SAP CODING                    |  |
| <b>Telecommunication Types</b>  |            |               |                  |                    |               |                   |                                 |   |                               |                               |  |
| 10                              | 20         | no            | 245              | 165                | 100           | 270               | 3.0                             | 2.0   | 2381 661 97012 <sup>(3)</sup> | PTCTZ3NR100GTE <sup>(3)</sup> |  |
| 10                              | 20         | 0.5           | 245              | 165                | 100           | 270               | 3.0                             | 2.0   | 2381 661 97016 <sup>(3)</sup> | PTCTZ3MR100GTE <sup>(3)</sup> |  |
| 40                              | 25         | no            | 265              | 80                 | 50            | 130               | 0.8                             | 2.0   | 2381 661 97002                | PTCTZ3NR400HTE                |  |
| 25                              | 20         | 1             | 265              | 120                | 70            | 220               | 1.3                             | 2.0   | 2381 661 97005 <sup>(3)</sup> | PTCTZ3MR250HTE <sup>(3)</sup> |  |
| 15 to 20                        | -          | no            | 300              | 150                | 100           | 250               | 1.5                             | 1.5   | 2381 661 97004 <sup>(3)</sup> | PTCTZ3NR150KTE <sup>(3)</sup> |  |
| 15 to 20                        | -          | 0.5           | 300              | 150                | 100           | 250               | 1.5                             | 2.0   | 2381 661 97003 <sup>(3)</sup> | PTCTZ3MR150KTE <sup>(3)</sup> |  |
| 20                              | 20         | 0.5           | 300              | 120                | 70            | 250               | 1.4                             | 1.5   | 2381 661 97018 <sup>(3)</sup> | PTCTZ3MR200KTE <sup>(3)</sup> |  |
| 35                              | + 15/- 20  | 1             | 425              | 110                | 70            | 175               | 1.0                             | 0.7   | 2381 661 97009 <sup>(3)</sup> | PTCTZ3MR350MTE <sup>(3)</sup> |  |
| 50                              | 20         | 1             | 425              | 90                 | 60            | 150               | 0.8                             | 0.7   | 2381 661 97019                | PTCTZ3MR500MTE                |  |
| <b>General Industrial Types</b> |            |               |                  |                    |               |                   |                                 |   |                               |                               |  |
| 3.3                             | 25         | -             | 24               | 400                | -             | 650               | 6.0                             | 8.0   | 2381 661 97013 <sup>(3)</sup> | PTCTZ3NR339CTE <sup>(3)</sup> |  |
| 9.4                             | 25         | -             | 60               | 150                | 100           | 300               | 1.8                             | 3.0   | 2381 661 97011 <sup>(3)</sup> | PTCTZ3NR949ETE <sup>(3)</sup> |  |

#### Note

(3) These types pass ITU-K20-21-45 edition 2003 telecommunication protection recommendation

**PTC OUTLINES**

PTC SMD ceramic size: 6.5 mm

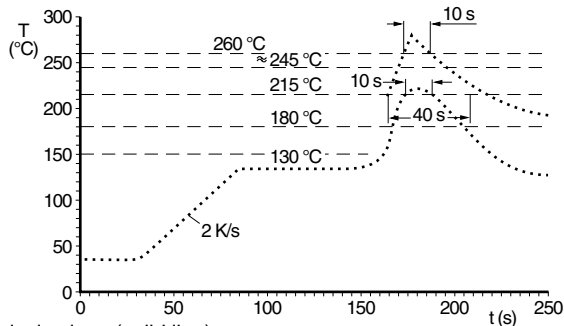

**DIMENSIONS OF SOLDER LANDS** in millimeters

**DIMENSIONS** in millimeters


| MATERIAL INFORMATION |               |   |
|----------------------|---------------|---|
| REF.                 | DESCRIPTION   | MATERIAL AND REMARKS  |
| 1                    | Ceramic       | BaTiO <sub>3</sub> doped  |
| 2                    | Metallization | NiCr Ag layer<br>(vacuum deposition)                                |
| 3                    | Leadframe     | Ni plated phosphor bronze material<br>covered by PbSn8 solder layer |

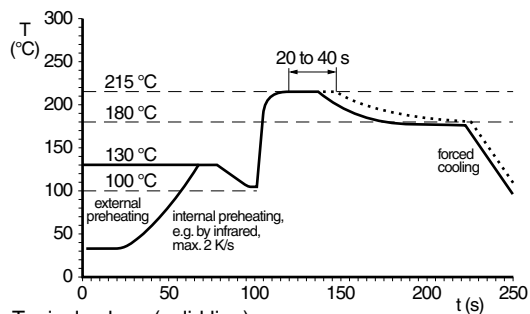
**SOLDERING CONDITIONS**

This SMD thermistor is only suitable for reflow soldering, in accordance with JEDEC J-STD-020D. Soldering processes which can be used are reflow (infrared and convection heating) and vapour phase. The maximum temperature of 260 °C during 10 s should not be exceeded and no liquid flux should be allowed to reach the ceramic body.

Typical examples of a soldering processes that will provide reliable joints without damage, are shown below.

**Reflow soldering**


Typical values (solid line)  
Process limits (dotted lines)

**Vapour phase soldering**


Typical values (solid line)  
Process limits (dotted lines)

**HANDLING PRECAUTIONS**

The special leadframe construction and the applied processes do not allow high handling forces on the component. Because of the nature of PTC ceramic material the component should not be touched with bare hands, as the residue of perspiration can influence component behaviour at high temperatures.

Handling forces vertically applied to the centre of the component should be limited to 5 N in the non-soldered condition and to 10 N in the soldered. These forces should not be exceeded during the handling, transportation and packaging of the soldered product.

For those applications where higher handling forces can be present, a reinforced version is available on request.



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