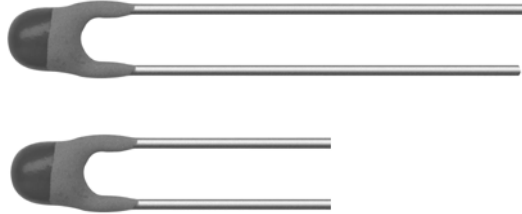


## PTC Thermistors, Mini Radial Leaded for Over-Temperature Protection



### FEATURES

- Well-defined protection temperature levels
- Fast reaction time (< 15 s in still air)
- Accurate resistance for ease of circuit design
- Excellent long term behavior (< 1 °C or 5 % after 1000 h at  $T_n + 15$  °C)
- Wide range of protection temperatures (70 °C to 150 °C)
- No need to reset supply after overtemperature switch
- Small size and rugged
- Coated leaded and naked devices available
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC



**RoHS**  
COMPLIANT

### QUICK REFERENCE DATA

| PARAMETER                               | VALUE                  | UNIT     |
|---|------------------------|----------|
| Maximum resistance at 25 °C             | 100                    | $\Omega$ |
| Minimum resistance at ( $T_n + 15$ ) °C | 4000                   | $\Omega$ |
| Maximum voltage                         | 30                     | V        |
| Temperature range                       | - 20 to ( $T_n + 15$ ) | °C       |
| Weight:                                 |                        |          |
| 91102 to 91114                          | $\approx 0.08$         | g        |
| 91152 to 91164                          | $\approx 0.11$         | g        |
| Climatic category                       | 25/125/56              |          |

### APPLICATIONS

Over-temperature protection and control in:

- Industrial electronics
- Power supplies
- Electronic data processing
- Motor protection

### DESCRIPTION

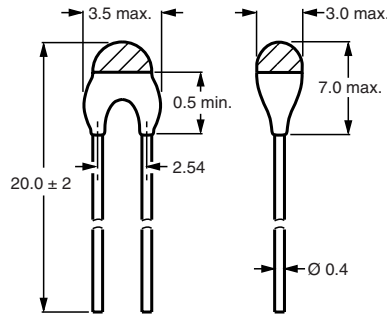
These directly heated thermistors have a positive temperature coefficient and are primarily intended for sensing.

### NOMINAL WORKING TEMPERATURES AND ORDERING INFORMATION

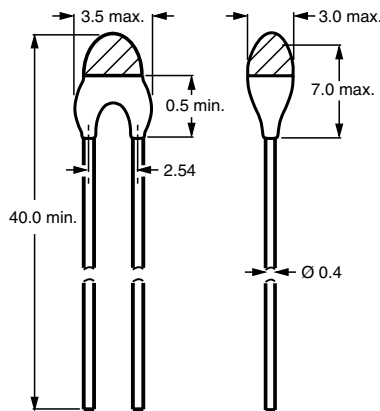
| NOMINAL WORKING TEMPERATURE |   |   |  | CATALOG NUMBER 2381 671 ..... |            |            |
|-----------------------------|---|---|--|-------------------------------|------------|------------|
| $T_n$<br>(°C)               | RESISTANCE from<br>- 20 °C to $T_n - 20$ °C<br>( $\Omega$ ) | RESISTANCE<br>at $T_n - 5$ °C<br>( $\Omega$ ) | RESISTANCE<br>at $T_n + 5$ °C<br>(k $\Omega$ ) | LEADED DEVICE                 |            | COLOR CODE |
|                             |   |   |  | NORMAL<br>LEADS               | LONG LEADS |            |
| 70                          | 30 to 250   | 50 to 570                                     | 0.570 to 50                                    | 91102                         | 91152      | Black      |
| 80                          | 30 to 250   | 50 to 550                                     | 1.33 to 50                                     | 91103                         | 91153      | Brown      |
| 90                          | 30 to 250   | 50 to 550                                     | 1.33 to 50                                     | 91104                         | 91154      | Red        |
| 100                         | 30 to 250   | 50 to 550                                     | 1.33 to 50                                     | 91105                         | 91155      | Orange     |
| 110                         | 30 to 250   | 50 to 550                                     | 1.33 to 50                                     | 91106                         | 91156      | Yellow     |
| 120                         | 30 to 250   | 50 to 550                                     | 1.33 to 50                                     | 91107                         | 91157      | Green      |
| 130                         | 30 to 250   | 50 to 550                                     | 1.33 to 50                                     | 91109                         | 91159      | Blue       |
| 140                         | 30 to 250   | 50 to 550                                     | 1.33 to 50                                     | 91112                         | 91162      | Violet     |
| 150                         | 30 to 250   | 50 to 550                                     | 1.33 to 50                                     | 91114                         | 91164      | Grey       |

| ELECTRICAL CHARACTERISTICS                     |   |
|--|---|
| PARAMETER                                      | VALUES  |
| Maximum resistance at 25 °C                    | 100 Ω   |
| Maximum resistance at (T <sub>n</sub> - 5) °C  | See Nominal Working Temperatures and Ordering Information table |
| Minimum resistance at (T <sub>n</sub> + 15) °C | 4000 Ω  |
| Minimum resistance at (T <sub>n</sub> + 5) °C  | See Nominal Working Temperatures and Ordering Information table |
| Maximum voltage                                | 30 V (AC or DC)   |

| CATALOG NUMBERS AND PACKAGING |                |                |                |     |
|-------------------------------|----------------|----------------|----------------|-----|
| 12NC                          | SAP            | 12NC           | SAP            | SPQ |
| 2381 671 91102                | PTCSL20T071DBE | 2381 671 91152 | PTCSL40T071DBE | 500 |
| 2381 671 91103                | PTCSL20T081DBE | 2381 671 91153 | PTCSL40T081DBE | 500 |
| 2381 671 91104                | PTCSL20T091DBE | 2381 671 91154 | PTCSL40T091DBE | 500 |
| 2381 671 91105                | PTCSL20T101DBE | 2381 671 91155 | PTCSL40T101DBE | 500 |
| 2381 671 91106                | PTCSL20T111DBE | 2381 671 91156 | PTCSL40T111DBE | 500 |
| 2381 671 91107                | PTCSL20T121DBE | 2381 671 91157 | PTCSL40T121DBE | 500 |
| 2381 671 91109                | PTCSL20T131DBE | 2381 671 91159 | PTCSL40T131DBE | 500 |
| 2381 671 91112                | PTCSL20T141DBE | 2381 671 91162 | PTCSL40T141DBE | 500 |
| 2381 671 91114                | PTCSL20T151DBE | 2381 671 91164 | PTCSL40T151DBE | 500 |

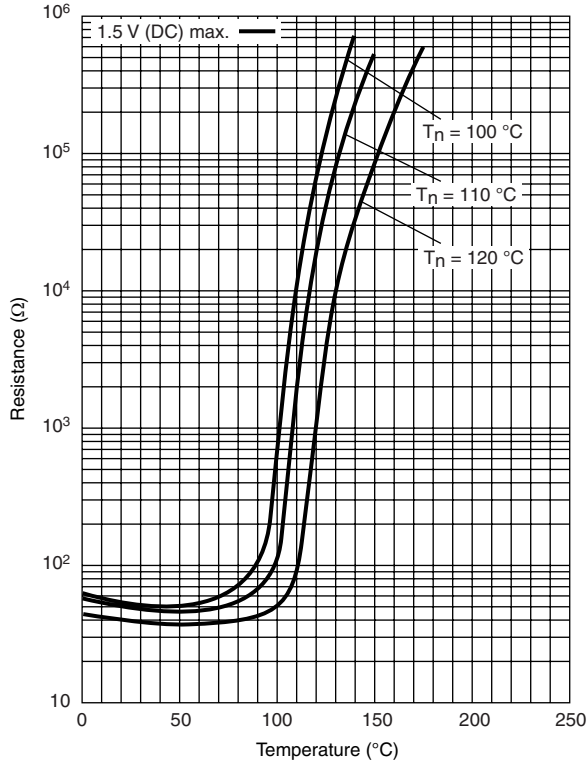
**COMPONENT OUTLINES DIMENSIONS** in millimeters


Component outline for 91102 to 91114

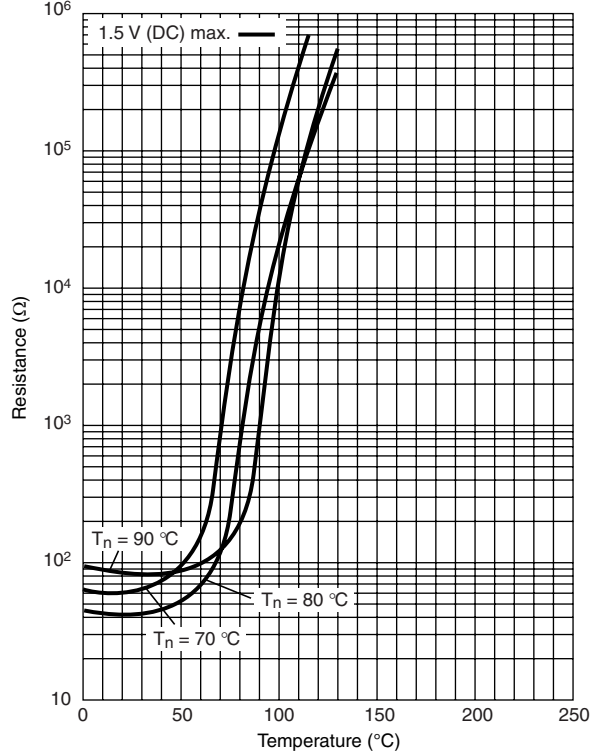


Component outline for 91152 to 91164

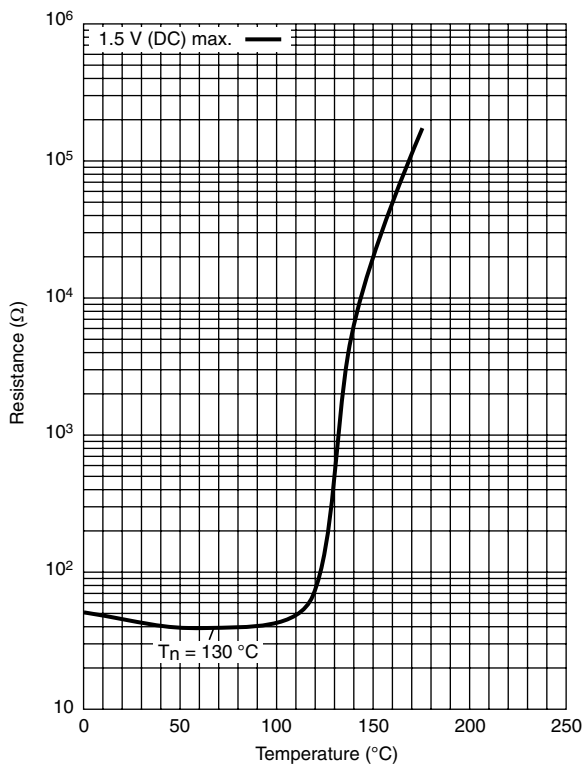
**TYPICAL RESISTANCE/TEMPERATURE CHARACTERISTIC FOR 2381 671 91105/91106 and 91107**



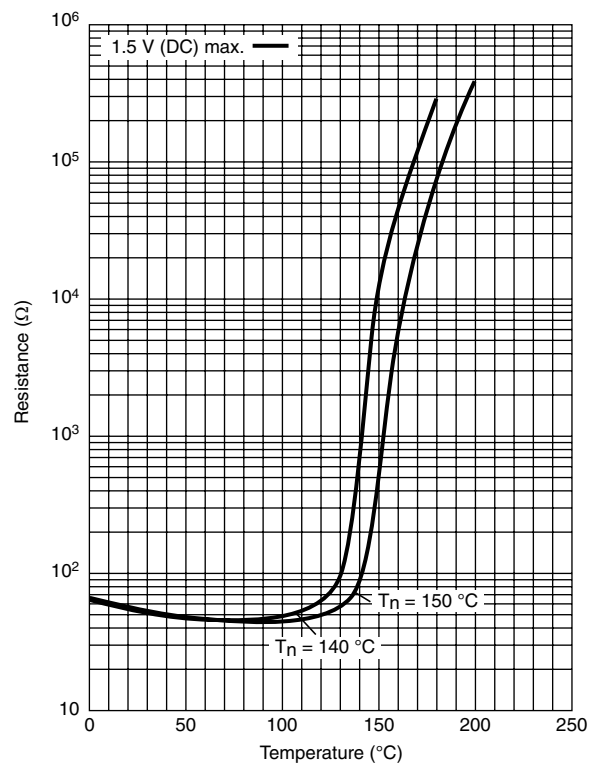
**TYPICAL RESISTANCE/TEMPERATURE CHARACTERISTIC FOR 2381 671 91102/91103 and 91104**



**TYPICAL RESISTANCE/TEMPERATURE CHARACTERISTIC FOR 2381 671 91109**



**TYPICAL RESISTANCE/TEMPERATURE CHARACTERISTIC FOR 2381 671 91112 and 91114**



**APPLICATION SPECIFIC DATA**

Negative Temperature Coefficient (NTC) thermistors are well known for temperature sensing. What is not well known, however, is that Positive Temperature Coefficient (PTC) thermistors can be used for thermal protection. Although their operating principles are similar, the applications are very different; whereas NTC thermistors sense and measure temperature over a defined range, PTC thermistors switch at one particular temperature.

Just like thermostats they protect such equipment and components as motors, transformers, power transistors and thyristors against overtemperature. A PTC thermistor is less expensive than a thermostat, and its switch temperature can be more accurately specified. It is also smaller and easier to design-in to electronic circuitry.

So how does it work? The PTC thermistor is mounted in thermal contact with the equipment to be protected, and connected into the bridge arm of a comparator circuit, such as shown in Fig. 1. At normal temperature, the PTC thermistor resistance ( $R_p$ ) is lower than  $R_s$  (see Fig. 2), so the comparator's output voltage  $V_O$  will be low. If an equipment overtemperature occurs, the PTC thermistor will quickly heat up to its trigger or nominal reference temperature  $T_n$ , whereupon its resistance will increase to a value much higher than  $R_s$ , causing  $V_O$  to switch to a high level sufficient to activate an alarm, relay or power shutdown circuit.

**APPLICATION EXAMPLES**

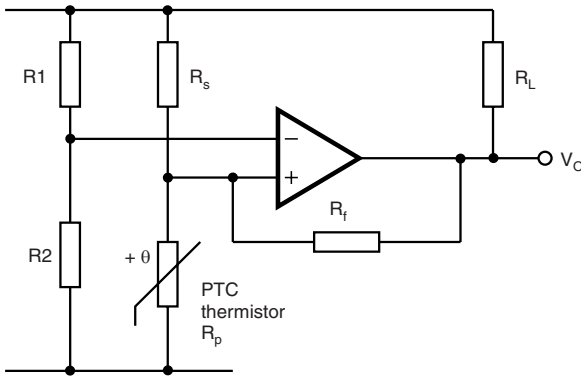


Fig. 1 Typical comparator circuit

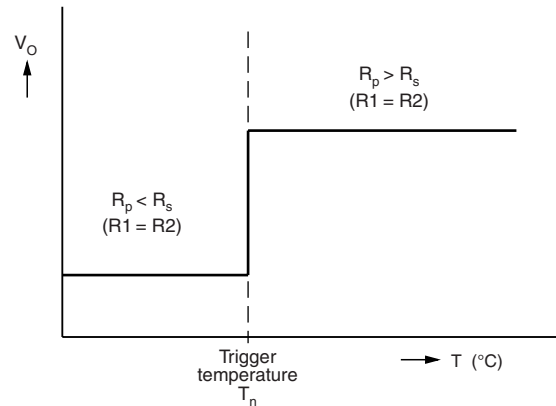
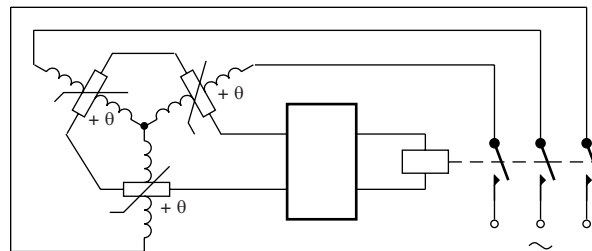


Fig. 2 Typical switch characteristic



As soon as one or more of the windings becomes too hot, the motor is switched off.

Fig. 3 Temperature protection of electric motors



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