

PTC Thermistors, Mini Radial Leaded for Over-Temperature Protection



Non preferred type
(replaced by PTCSL03)

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)
- Small size and rugged
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

APPLICATIONS

Over-temperature protection and control in:

- Industrial electronics
- Power supplies
- Motor protection

DESCRIPTION

These PTC sensing thermistors consist of a medium resistivity doped BaTiO₃ ceramic chip lead (Pb)-free soldered with nickel wires and coated with a high temperature silicone lacquer and color coding band.

PACKAGING

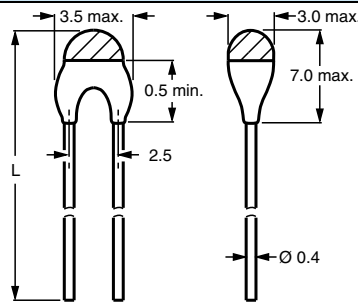
PTC thermistors are available in 500 pieces bulk packed.

| QUICK REFERENCE DATA | | |
|--|-------------|----------|
| PARAMETER | VALUE | UNIT |
| Resistance at 25 °C (R_{25}) | 20 to 100 | Ω |
| Nominal working temperature (T_n) | 70 to 150 | °C |
| Tolerance on T_n | ± 5 | °C |
| Maximum voltage (AC or DC) | 30 | V |
| Operating temperature range ⁽¹⁾ | -20 to 165 | °C |
| Dissipation factor | 5 | mW/K |
| Storage temperature | -25 to +155 | °C |

Note

⁽¹⁾ Max operating temperature range is $T_n + 15$ °C, indicated value is for $T_n = 150$ °C.

COMPONENT OUTLINES DIMENSIONS in millimeters



PTCSL20T..., L = 20 ± 2
PTCSL40T..., L = 40 min.

NOMINAL WORKING TEMPERATURES AND ORDERING INFORMATION

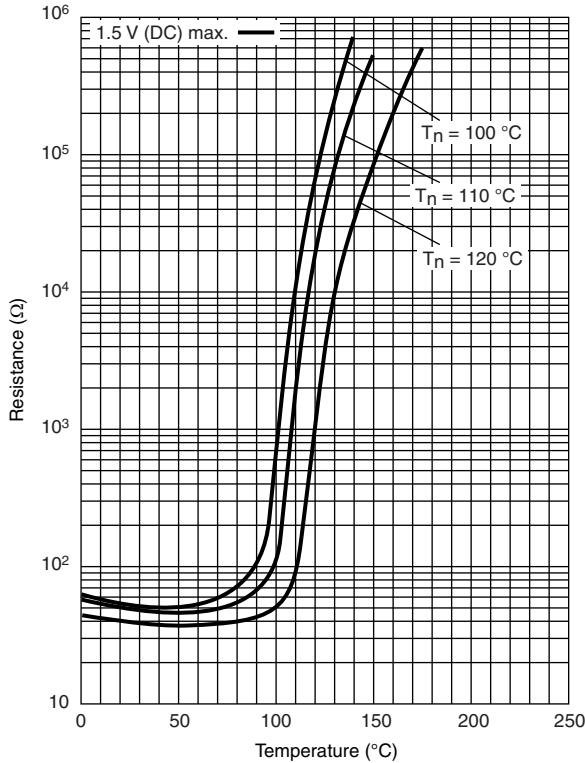
| NOMINAL WORKING TEMP. T_n (°C) | RESISTANCE from -20 °C to $T_n - 20$ °C (Ω) | RESISTANCE at $T_n - 5$ °C (Ω) | RESISTANCE at $T_n + 5$ °C (k Ω) | MIN. RESISTANCE at $T_n + 15$ °C (k Ω) | COLOR CODE | ORDERING PART NUMBERS ⁽²⁾ |
|----------------------------------|--|---|--|--|------------|--------------------------------------|
| 70 | 20 to 250 | 50 to 570 | 0.570 to 50 | 4 | Black | PTCSL20T071DBE |
| 80 | 20 to 250 | 50 to 550 | 1.33 to 50 | 4 | Brown | PTCSL20T081DBE |
| 90 | 20 to 250 | 50 to 550 | 1.33 to 50 | 4 | Red | PTCSL20T091DBE |
| 100 | 20 to 250 | 50 to 550 | 1.33 to 50 | 4 | Orange | PTCSL20T101DBE |
| 110 | 20 to 250 | 50 to 550 | 1.33 to 50 | 4 | Yellow | PTCSL20T111DBE |
| 120 | 20 to 250 | 50 to 550 | 1.33 to 50 | 4 | Green | PTCSL20T121DBE |
| 130 | 20 to 250 | 50 to 550 | 1.33 to 50 | 4 | Blue | PTCSL20T131DBE |
| 140 | 20 to 250 | 50 to 550 | 1.33 to 50 | 4 | Violet | PTCSL20T141DBE |
| 150 | 20 to 250 | 50 to 550 | 1.33 to 50 | 4 | Grey | PTCSL20T151DBE |

Note

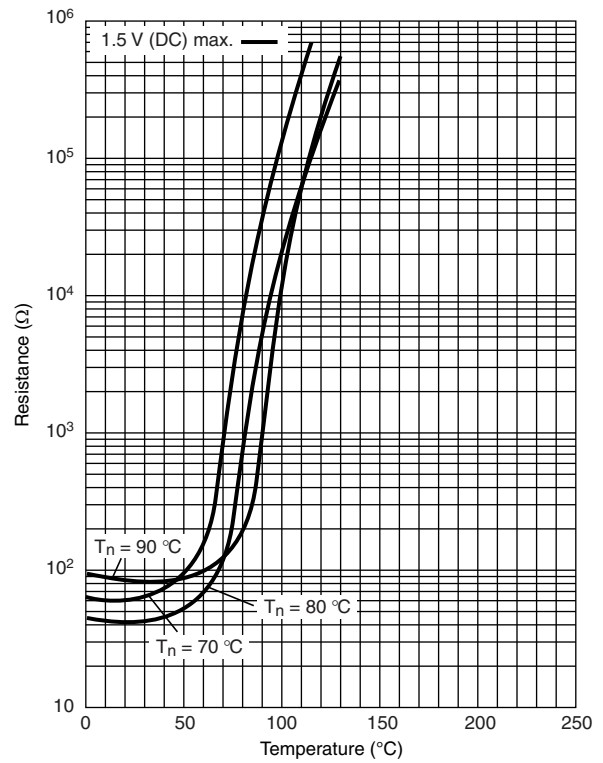
⁽²⁾ Parts with total length of 40 mm available as PTCSL40T...DBE catalog numbers.



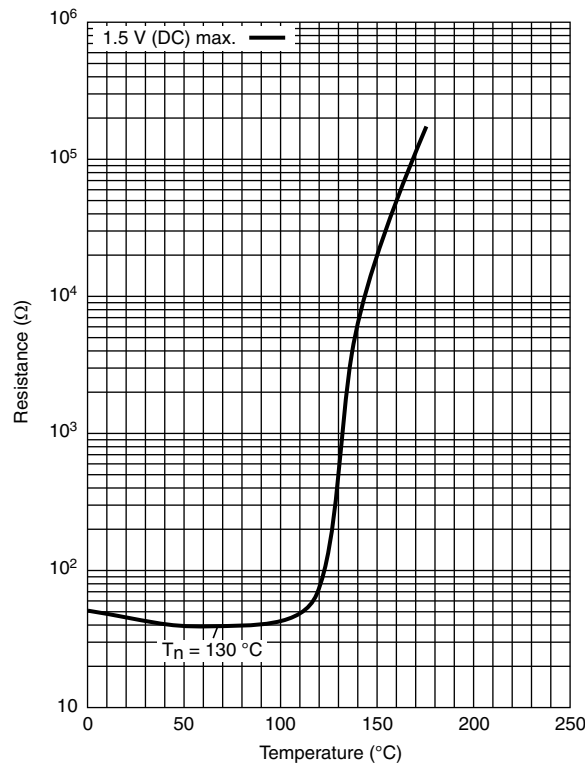
TYPICAL RESISTANCE/TEMPERATURE CHARACTERISTIC for T_n 100 °C to 120 °C



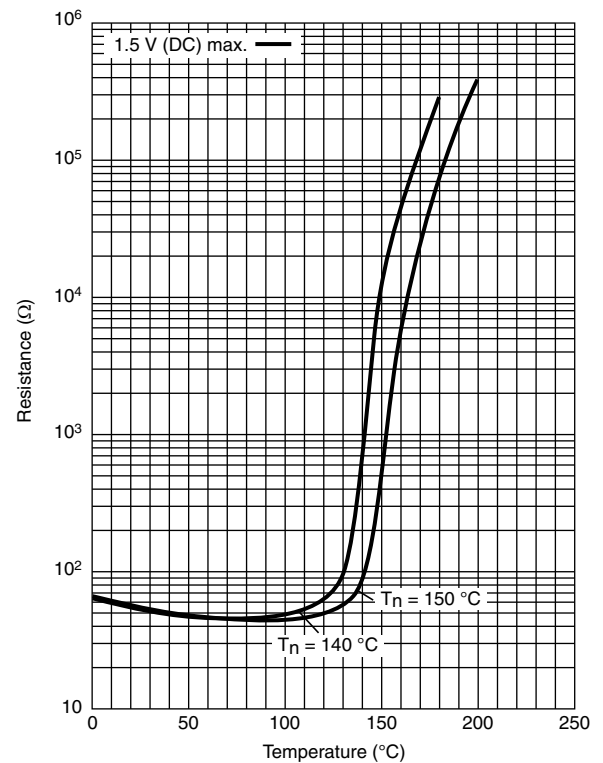
TYPICAL RESISTANCE/TEMPERATURE CHARACTERISTIC for T_n 70 °C to 90 °C



TYPICAL RESISTANCE/TEMPERATURE CHARACTERISTIC for T_n 130 °C



TYPICAL RESISTANCE/TEMPERATURE CHARACTERISTIC for T_n 140 °C and 150 °C



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 over temperature. 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 over temperature 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.

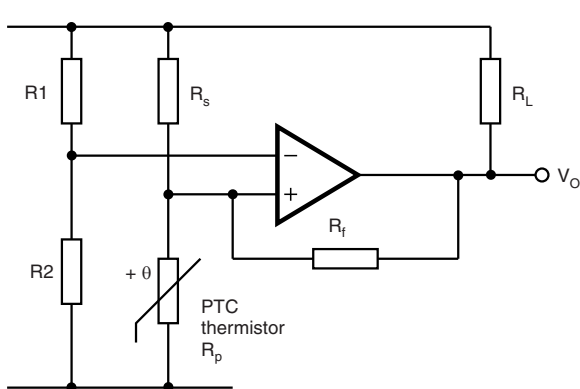
APPLICATION EXAMPLES


Fig. 1 - Typical Comparator Circuit

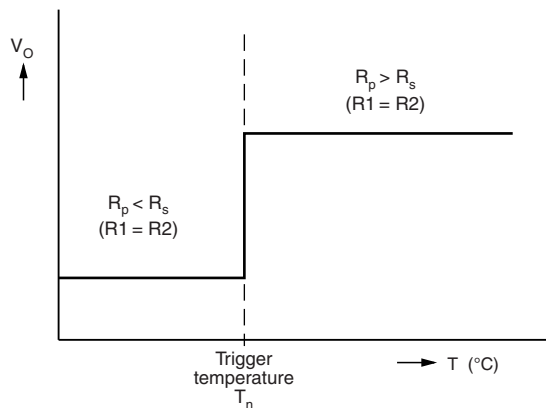
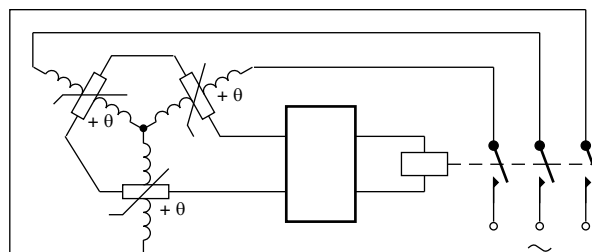


Fig. 2 - Typical Switch Characteristic



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

Fig. 3 - Temperature Protection of 3-phase electric motor



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