265 V PTC Thermistors for Overload Protection

FEATURES
- Wide range of trip and non-trip currents: From 11 mA up to 800 mA
- Small ratio between trip and non-trip currents ($I_t/I_{nt} = 1.5$ at 25 °C)
- High maximum inrush current (up to 5.5 A)
- Leaded parts withstand mechanical stresses and vibration
- UL file E148885 according to XGPU standard UL1434

APPLICATIONS
Overload (current, voltage, temperature) protection in:
- Industrial electronics
- Consumer electronics
- Electronic data processing

DESCRIPTION
These directly heated ceramic-based thermistors have a positive temperature coefficient and are primarily intended for overload protection. They consist of a ceramic pellet soldered between two tinned CCS wires and coated with a UL 94 V-0 high temperature hard silicone lacquer.

MOUNTING
PTC thermistors can be mounted by wave, reflow, or hand-soldering. Current levels have been determined according IEC 60738 conditions. Different ways of mounting or connecting the thermistors can influence their thermal and electrical behavior. Standard operation is in still air, any potting or encapsulation of PTC thermistors is not recommended and will change its operating characteristics.

Typical Soldering
- 235 °C; duration: 5 s (Lead (Pb)-bearing)
- 245 °C, duration: 5 s (Lead (Pb)-free)

Resistance to Soldering Heat
260 °C, duration: 10 s max.

MARKING
Only the gray lacquered thermistors with a diameter of 8.5 mm to 20.5 mm are marked with BC, $R_{25}$ value (example 1R9) on one side and $I_{nt}, V_{max}$ on the other side.
### ELECTRICAL DATA AND ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Int MAX. at 25 °C (mA) (1)</th>
<th>It MIN. at 25 °C (mA) (1)</th>
<th>Rs MAX. ± 20 % (Ω)</th>
<th>Iol MAX. at Vmax and 25 °C (mA) (2)</th>
<th>Ires MAX. at Vmax and 25 °C (mA) (1)</th>
<th>DISSIP. FACTOR (mW/K) (1)</th>
<th>Ø D MAX. (mm)</th>
<th>ORDERING PART NUMBERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>23</td>
<td>29</td>
<td>39</td>
<td>63</td>
<td>76</td>
<td>95</td>
<td>110</td>
</tr>
<tr>
<td>17</td>
<td>23</td>
<td>120</td>
<td>250</td>
<td>85</td>
<td>115</td>
<td>143</td>
<td>165</td>
</tr>
<tr>
<td>3000</td>
<td>1900</td>
<td>1200</td>
<td>500</td>
<td>110</td>
<td>115</td>
<td>143</td>
<td>165</td>
</tr>
</tbody>
</table>

**Notes**

1. The indicated current levels are guaranteed according IEC 60738 mounting conditions. For different mounting conditions the indicated current levels can change and should be evaluated in the application.

2. Iol max. is the maximum overload current that may flow through the PTC when it passes from the low ohmic to the high ohmic state. UL approval: Iol_max. x 0.85

3. Not UL approved

### CURRENT DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE

![Graph showing current deviation as a function of ambient temperature]
VOLTAGE DERATING AS A FUNCTION OF AMBIENT TEMPERATURE

MAXIMUM OVERLOAD CURRENT $I_{ol\ max}$ DERATING AS A FUNCTION OF VOLTAGE

$I_{ol\ max}$, as stated in the electrical data and ordering information tables, is the maximum overload current that may flow through the PTC when passing from the low ohmic to high ohmic state at rated voltage.

When other voltages are present after tripping, the $I_{ol\ max}$ value can be derived from the above $I_{max}$ as a function of voltage graph. Voltages below $V_{rated}$ will allow higher overload currents to pass the PTC.

TYPICAL TRIP-TIME AS A FUNCTION OF TRIP CURRENT RATIO

Trip-Time or Switching Time ($t_s$)

To check the trip-time for a specific PTC, refer to the Electrical Data and Ordering Information tables for the value $I_{th}$. Divide the overload or trip current by this $I_{th}$ and you realize the factor $I/I_{th}$. This rule is valid for any ambient temperature between 0 °C and 70 °C. Adapt the correct non-trip current with the appropriate curve in the Current Deviation as a Function of the Ambient Temperature graph. The relationship between the $I/I_{th}$ factor and the switching time is a function of the PTC diameter; see the above graphs.

Example

What will be the trip-time at $I_{th} = 0.8$ A and $T_{amb} = 50$ °C of a thermistor type PTCCL09H171HBE; 22 Ω; Ø Dmax. = 8.5 mm:

$I_{th}$ from the table: 170 mA at 25 °C
$I_{th}$: $170 \times 0.87 = 148$ mA (at 50 °C)

Overload current = 0.8 A; factor $I/I_{th}$: $0.8/0.148 = 5.40$. In the Typical trip-time as a function of trip current ratio graph, at the 8.5 mm line and $I/I_{th} = 5.40$, the typical trip-time is 3.0 s.
PTC THERMISTORS IN BULK

![Diagram of PTC thermistor in bulk](image1)

**Fig. 1**

**DIMENSIONS OF BULK TYPE PTCs (in mm)**

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>DIMENSIONS</th>
<th>TOLERANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Body diameter</td>
<td>See table</td>
<td>max.</td>
</tr>
<tr>
<td>d</td>
<td>Lead diameter</td>
<td>0.6 ± 0.05</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>Pitch of components</td>
<td>5.5 max.</td>
<td></td>
</tr>
<tr>
<td>H2</td>
<td>Component bottom to seating plane</td>
<td>4.0 ± 1.0</td>
<td></td>
</tr>
<tr>
<td>H3</td>
<td>Component top to seating plane</td>
<td>D + 5 max.</td>
<td></td>
</tr>
<tr>
<td>L1</td>
<td>Seating plane difference (left-right lead)</td>
<td>0 ± 0.2</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Leadwire clinch height</td>
<td>16.0</td>
<td>± 0.5</td>
</tr>
<tr>
<td>P0</td>
<td>Leadwire pitch</td>
<td>12.7</td>
<td>± 0.3</td>
</tr>
</tbody>
</table>

**PTC THERMISTORS ON TAPE AND REEL**

![Diagram of PTC thermistor on tape and reel](image2)

**Fig. 2**

**TAPE AND REEL ACCORDING TO IEC 60286-2 (in mm)**

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>DIMENSIONS</th>
<th>TOLERANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Pitch of components</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P0</td>
<td>Feedhole pitch</td>
<td>12.7</td>
<td>± 0.3</td>
</tr>
<tr>
<td>F</td>
<td>Leadcenter to leadcenter distance (between component and tape)</td>
<td>5.0</td>
<td>± 0.5 / - 0.2</td>
</tr>
<tr>
<td>H0</td>
<td>Lead wire clinch height</td>
<td>16.0</td>
<td>± 0.5</td>
</tr>
<tr>
<td>H2</td>
<td>Component bottom to seating plane</td>
<td>4.0</td>
<td>± 1.0</td>
</tr>
<tr>
<td>H3</td>
<td>Component top to seating plane</td>
<td>D + 5</td>
<td>max.</td>
</tr>
<tr>
<td>H4</td>
<td>Seating plane difference (left-right lead)</td>
<td>0</td>
<td>± 0.2</td>
</tr>
<tr>
<td>T</td>
<td>Total thickness</td>
<td>5.5</td>
<td>max.</td>
</tr>
</tbody>
</table>
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