

## NTC Thermistors, Radial Leaded, Accuracy Line


**RoHS**  
COMPLIANT

### FEATURES

- Accurate over a wide temperature range (tolerance on B-value down to 0.5 %)
- Good stability over a long life
- Excellent price/performance ratio
- Low heat conductivity through 0.4 mm Ni-leads
- cULus recognized, file E148885 (UL category XGPU2/XGPU8)
- Mounting: radial
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

### APPLICATIONS

- Temperature measurement, sensing and control in industrial, consumer, and telecom applications. For on-board sensing or accurate remote sensing

### DESCRIPTION

These thermistors are made of NTC ceramic material. The device consists of a chip with two tinned nickel leads. The parts are coated and color marked.

### PACKAGING

The thermistors are packed in cardboard boxes; the smallest packing quantity is 500 units.

### DESIGN-IN SUPPORT

For complete curve computation, please visit: [www.vishay.com/en/thermistors/ntc-rt-calculator/](http://www.vishay.com/en/thermistors/ntc-rt-calculator/).

### MARKING

The thermistors are marked with colored dots on a gray epoxy base coating; see Dimensions and “Electrical Data and Ordering Information”.

### CAUTIONS AND WARNINGS ON MOUNTING AND HANDLING

Please read the special instructions: see [www.vishay.com/doc?29222](http://www.vishay.com/doc?29222).

By soldering in any position. Not intended for potting.

### LINKS TO ADDITIONAL RESOURCES



| QUICK REFERENCE DATA                                                                                                                     |                               |      |
|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------|
| PARAMETER                                                                                                                                | VALUE                         | UNIT |
| Resistance value at 25 °C                                                                                                                | 2K to 470K                    | Ω    |
| Tolerance on $R_{25}$ -value                                                                                                             | $\pm 1; \pm 2; \pm 3; \pm 5$  | %    |
| $B_{25/85}$ -value                                                                                                                       | 3528 to 4570                  | K    |
| Tolerance on $B_{25/85}$ -value                                                                                                          | $\pm 0.5$ to $\pm 2.0$        | %    |
| Operating temperature range at:<br>Zero power dissipation (continuously)<br>Zero power dissipation<br>(for short periods) <sup>(2)</sup> | -40 to +125<br><br>$\leq 150$ | °C   |
| Maximum power dissipation at 55 °C                                                                                                       | 100                           | mW   |
| Dissipation factor $\delta$ in still air (for info)                                                                                      | 2.2                           | mW/K |
| Response time <sup>(1)</sup>                                                                                                             | $\approx 1.7$                 | s    |
| Thermal time constant $\tau$ <sup>(1)</sup>                                                                                              | 13                            | s    |
| Mass                                                                                                                                     | $\approx 0.11$                | g    |

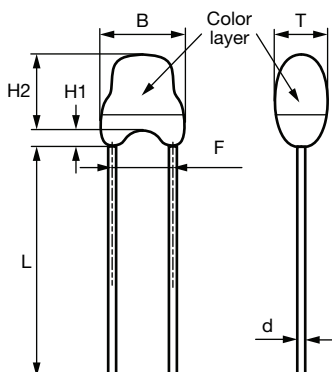
#### Notes

- <sup>(1)</sup> Response time in silicone oil MS200/50. This is the time needed for the sensor to reach 63.2 % of the total temperature difference when subjected to a temperature change from 25 °C in air to 85 °C in oil. Thermal time constant by cooling from electrically pre-heated body
- <sup>(2)</sup> Valid for all types with the exception of the  $R_{25}$  values 12 kΩ, 22 kΩ and 470 kΩ

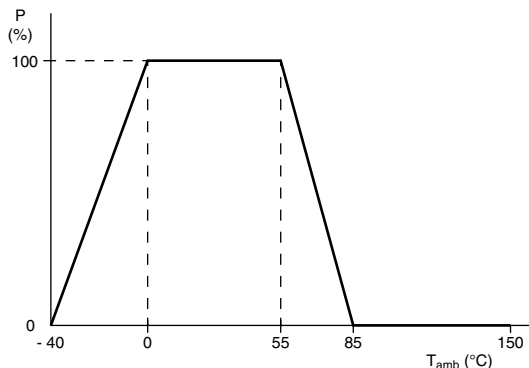
| ELECTRICAL DATA AND ORDERING INFORMATION |                         |                    |                            |                  |                                                                                                  |                                                 |                   |
|------------------------------------------|-------------------------|--------------------|----------------------------|------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------|
| $R_{25}$<br>(Ω)                          | $R_{25}$ -TOL.<br>(± %) | $B_{25/85}$<br>(K) | $B_{25/85}$ -TOL.<br>(± %) | COLOR<br>MARKING | UL RECOG.<br> | SAP MATERIAL AND ORDERING NUMBER <sup>(1)</sup> |                   |
|                                          |                         |                    |                            |                  |                                                                                                  | RoHS-COMPLIANT<br>WITH EXEMPTION <sup>(2)</sup> | RoHS-COMPLIANT    |
| 2000                                     | 1, 2, 3, 5              | 3528               | 0.5                        | Orange           | ✓                                                                                                | NTCLE203E3202*B0                                | NTCLE203E3202*B0A |
| 2700                                     | 1, 2, 3, 5              | 3977               | 0.75                       | Red              | ✓                                                                                                | NTCLE203E3272*B0                                | NTCLE203E3272*B0A |
| 4700                                     | 1, 2, 3, 5              | 3977               | 0.75                       | Green            | ✓                                                                                                | NTCLE203E3472*B0                                | NTCLE203E3472*B0A |
| 5000                                     | 1, 2, 3, 5              | 3977               | 0.75                       | Pink             | ✓                                                                                                | NTCLE203E3502*B0                                | NTCLE203E3502*B0A |
| 10 000                                   | 1, 2, 3, 5              | 3977               | 0.75                       | Blue             | ✓                                                                                                | NTCLE203E3103*B0                                | NTCLE203E3103*B0A |
| 12 000                                   | 1, 2, 3, 5              | 3740               | 2                          | Yellow           | ✓                                                                                                | NTCLE203E3123*B0                                | NTCLE203E3123*B0A |
| 22 000                                   | 1, 2, 3, 5              | 3740               | 2                          | White            | ✓                                                                                                | NTCLE203E3223*B0                                | NTCLE203E3223*B0A |
| 47 000                                   | 1, 2, 3, 5              | 4090               | 1.5                        | Black            | ✓                                                                                                | NTCLE203E3473*B0                                | NTCLE203E3473*B0A |
| 68 000                                   | 1, 2, 3, 5              | 4190               | 1.5                        | Grey             | ✓                                                                                                | NTCLE203E3683*B0                                | NTCLE203E3683*B0A |
| 100 000                                  | 1, 2, 3, 5              | 4190               | 1.5                        | Brown            | ✓                                                                                                | NTCLE203E3104*B0                                | NTCLE203E3104*B0A |
| 470 000                                  | 2, 3, 5                 | 4570               | 1.5                        | Violet           | ✓                                                                                                | NTCLE203E3474*B0                                | NTCLE203E3474*B0A |

#### Notes

- Preferred versions for new designs
- <sup>(1)</sup> Replace \* in SAP by J for  $\pm 5$  %, H for  $\pm 3$  %, G for  $\pm 2$  %, F for  $\pm 1$  %
  - <sup>(2)</sup> RoHS exemption 7(c)-I: electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezo-electronic devices, or in a glass or ceramic matrix compound

**DIMENSIONS** in millimeters


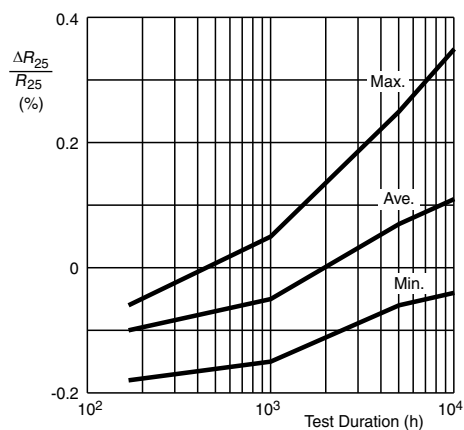
| B max. | T max. | H <sub>1</sub> | H <sub>2</sub> max. | L        | d          | F    |
|--------|--------|----------------|---------------------|----------|------------|------|
| 3.6    | 3.0    | 2.0 ± 1.0      | 6.0                 | 40 ± 1.5 | 0.4 ± 0.04 | 2.54 |

**DERATING**


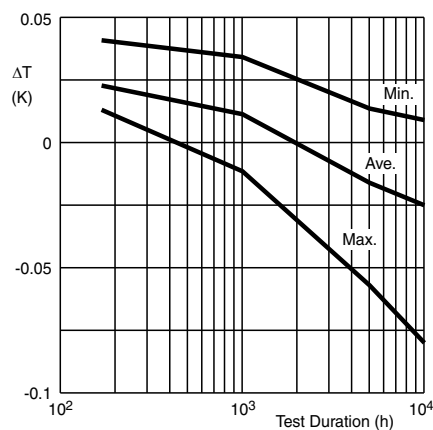
Power derating curve

**Note**

- Zero power is considered as measuring power max. 1 % of max. power

**LONG TERM STABILITY AS A FUNCTION OF TEST DURATION AT MAXIMUM TEMPERATURE (150 °C)**
**TYPICAL  $R_{25}$  STABILITY**


Typical curves valid for 2.2 kΩ to 10 kΩ

**TYPICAL ROOM TEMPERATURE STABILITY**


Typical curves valid for 2.2 kΩ to 10 kΩ



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