

## NTC Thermistors, Radial Leaded, Accuracy Line


**RoHS**  
COMPLIANT

### 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 dissipation (continuously) | - 40 to + 125                         | °C   |
| Zero dissipation (for short periods) <sup>(2)</sup>                | $\leq 150$                            |      |
| Maximum power dissipation                                          | 0 to + 55                             |      |
| Maximum power dissipation                                          | 100                                   | mW   |
| Dissipation factor $\delta$                                        | 2.2                                   | mW/K |
| Response time <sup>(1)</sup>                                       | $\approx 1.7$                         | s    |
| Thermal time constant $\tau$                                       | 13                                    |      |
| Climatic category<br>(LCT/UCT/days)                                | 40/125/56                             |      |
| 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.
- <sup>(2)</sup> Valid for all types with the exception of the  $R_{25}$  values 12 kΩ, 22 kΩ and 470 kΩ.

### 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
- UL recognized, file E148885
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

### 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 band marked.

### PACKAGING

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

### DESIGN-IN SUPPORT

For complete Curve Computation, visit:  
[www.vishay.com/resistors-non-linear/curve-computation-list/](http://www.vishay.com/resistors-non-linear/curve-computation-list/)

### MARKING

The thermistors are marked with color bands on a grey epoxy base coating; see Dimensions and “Electrical Data and Ordering Information”.

### MOUNTING

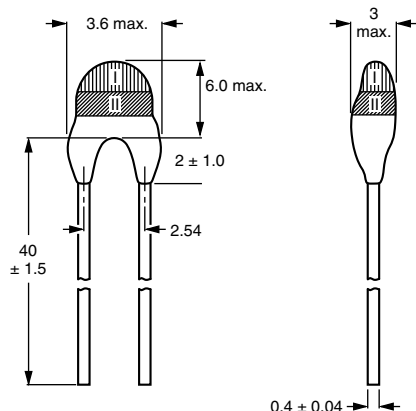
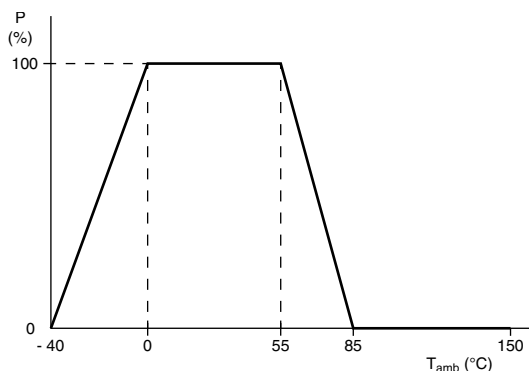
By soldering in any position.

### ELECTRICAL DATA AND ORDERING INFORMATION

| $R_{25}$<br>(kΩ) | $B_{25/85}$ - VALUE |       | SAP MATERIAL AND ORDERING NUMBER<br>NTCLE203E3..... <sup>(4)</sup> | OLD 12NC CODE<br>2381 640 5.... <sup>(3)</sup> | UL APPROVED | CODING (see dimensions) |        |
|------------------|---------------------|-------|--------------------------------------------------------------------|------------------------------------------------|-------------|-------------------------|--------|
|                  | (K)                 | (± %) |                                                                    |                                                | Y/N         | I                       | II     |
| 2                | 3528                | 0.5   | 202*B0                                                             | *202                                           | N           | Orange                  | Orange |
| 2.7              | 3977                | 0.75  | 272*B0                                                             | *272                                           | Y           | Red                     | Red    |
| 4.7              | 3977                | 0.75  | 472*B0                                                             | *472                                           | Y           | Green                   | Green  |
| 5                | 3977                | 0.75  | 502*B0                                                             | *502                                           | Y           | Black                   | White  |
| 10               | 3977                | 0.75  | 103*B0                                                             | *103                                           | Y           | Blue                    | Blue   |
| 12               | 3740                | 2     | 123*B0                                                             | *123                                           | Y           | Yellow                  | Yellow |
| 22               | 3740                | 2     | 223*B0                                                             | *223                                           | Y           | White                   | White  |
| 47               | 4090                | 1.5   | 473*B0                                                             | *473                                           | N           | Black                   | Black  |
| 68               | 4190                | 1.5   | 683*B0                                                             | *683                                           | N           | Grey                    | Grey   |
| 100              | 4190                | 1.5   | 104*B0                                                             | *104                                           | N           | Brown                   | Brown  |
| 470              | 4570                | 1.5   | 474*B0                                                             | *474                                           | N           | Violet                  | Violet |

#### Notes

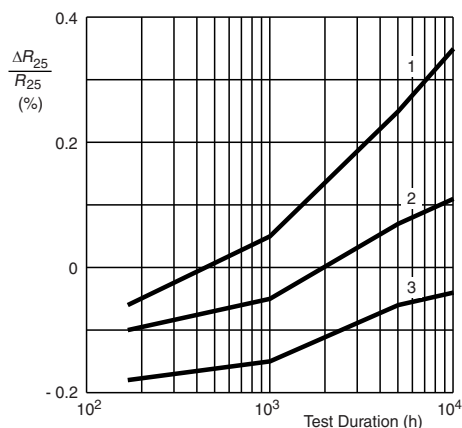
- <sup>(3)</sup> Replace \* in 12NC by 3 for  $\pm 5$  %, 6 for  $\pm 3$  %, 4 for  $\pm 2$  %, 5 for  $\pm 1$  %
- <sup>(4)</sup> Replace \* in SAP by J for  $\pm 5$  %, H for  $\pm 3$  %, G for  $\pm 2$  %, F for  $\pm 1$  %

**DIMENSIONS** in millimeters

**DERATING AND LONG TERM STABILITY**


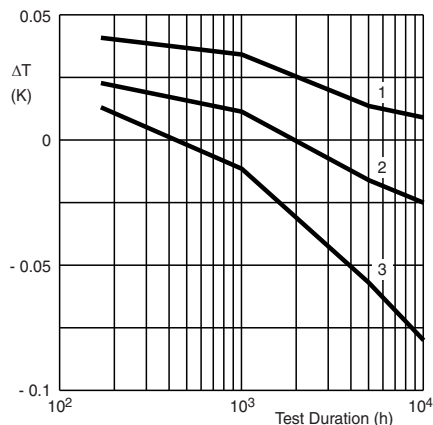
Power derating curve

**Note**

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

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


Curves valid for 2.2 kΩ to 10 kΩ. Curve 1: Maximum deviation. Curve 2: Average deviation. Curve 3: Minimum deviation

**LONG TERM STABILITY OF T AS A FUNCTION OF TEST DURATION AT MAXIMUM TEMPERATURE (150 °C)**


Curves valid for 2.2 kΩ to 10 kΩ. Curve 1: Minimum deviation. Curve 2: Average deviation.



For complete Curve Computation, visit: [www.vishay.com/resistors-non-linear/curve-computation-list/](http://www.vishay.com/resistors-non-linear/curve-computation-list/)

| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH $R_{25}$ AT 2 k $\Omega$ |                                 |              |                                       |
|------------------------------------------------------------------------------|---------------------------------|--------------|---------------------------------------|
| $T_{OPER}$<br>(°C)                                                           | PART NUMBER<br>NTCLE203E3202*B0 | TCR<br>(%/K) | $\Delta R/R$ DUE TO $B_{Tol.}$<br>(%) |
|                                                                              | $R_T$<br>( $\Omega$ )           |              |                                       |
| - 40                                                                         | 46 684                          | - 6.06       | 1.65                                  |
| - 35                                                                         | 34 672                          | - 5.84       | 1.49                                  |
| - 30                                                                         | 26 035                          | - 5.62       | 1.34                                  |
| - 25                                                                         | 19 754                          | - 5.42       | 1.19                                  |
| - 20                                                                         | 15 138                          | - 5.23       | 1.05                                  |
| - 15                                                                         | 11 709                          | - 5.05       | 0.92                                  |
| - 10                                                                         | 9138                            | - 4.87       | 0.79                                  |
| - 5                                                                          | 7193                            | - 4.71       | 0.66                                  |
| 0                                                                            | 5707                            | - 4.55       | 0.54                                  |
| 5                                                                            | 4563                            | - 4.40       | 0.43                                  |
| 10                                                                           | 3675                            | - 4.26       | 0.31                                  |
| 15                                                                           | 2981                            | - 4.12       | 0.21                                  |
| 20                                                                           | 2434                            | - 3.99       | 0.10                                  |
| 25                                                                           | 2000                            | - 3.87       | 0.00                                  |
| 30                                                                           | 1653                            | - 3.75       | 0.10                                  |
| 35                                                                           | 1375                            | - 3.63       | 0.19                                  |
| 40                                                                           | 1149                            | - 3.53       | 0.28                                  |
| 45                                                                           | 965.4                           | - 3.42       | 0.37                                  |
| 50                                                                           | 814.7                           | - 3.32       | 0.46                                  |
| 55                                                                           | 690.5                           | - 3.23       | 0.54                                  |
| 60                                                                           | 587.4                           | - 3.14       | 0.62                                  |
| 65                                                                           | 501.6                           | - 3.05       | 0.70                                  |
| 70                                                                           | 429.8                           | - 2.97       | 0.78                                  |
| 75                                                                           | 369.5                           | - 2.89       | 0.86                                  |
| 80                                                                           | 318.6                           | - 2.81       | 0.93                                  |
| 85                                                                           | 275.5                           | - 2.73       | 1.01                                  |
| 90                                                                           | 238.8                           | - 2.66       | 1.08                                  |
| 95                                                                           | 207.6                           | - 2.59       | 1.15                                  |
| 100                                                                          | 180.9                           | - 2.53       | 1.22                                  |
| 105                                                                          | 158.0                           | - 2.46       | 1.29                                  |
| 110                                                                          | 138.3                           | - 2.40       | 1.35                                  |
| 115                                                                          | 121.3                           | - 2.34       | 1.42                                  |
| 120                                                                          | 106.6                           | - 2.29       | 1.48                                  |
| 125                                                                          | 93.92                           | - 2.23       | 1.55                                  |
| 130                                                                          | 82.87                           | - 2.18       | 1.61                                  |
| 135                                                                          | 73.25                           | - 2.13       | 1.67                                  |
| 140                                                                          | 64.87                           | - 2.08       | 1.73                                  |
| 145                                                                          | 57.54                           | - 2.03       | 1.79                                  |
| 150                                                                          | 51.12                           | - 1.98       | 1.85                                  |



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| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH $R_{25}$ AT 2.7 k $\Omega$ , 4.7 k $\Omega$ , 5.0 k $\Omega$ , AND 10 k $\Omega$ |                                 |                                 |                                 |                                 |              |                                          |
|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|--------------|------------------------------------------|
| $T_{OPER}$<br>(°C)                                                                                                                   | PART NUMBER<br>NTCLE203E3272*B0 | PART NUMBER<br>NTCLE203E3472*B0 | PART NUMBER<br>NTCLE203E3502*B0 | PART NUMBER<br>NTCLE203E3103*B0 | TCR<br>(%/K) | $\Delta R/R$ DUE TO<br>$B_{Tol.}$<br>(%) |
|                                                                                                                                      | $R_T$<br>( $\Omega$ )           | $R_T$<br>( $\Omega$ )           | $R_T$<br>( $\Omega$ )           | $R_T$<br>( $\Omega$ )           |              |                                          |
| -40                                                                                                                                  | 89 665                          | 156 084                         | 166 047                         | 332 094                         | - 6.62       | 2.79                                     |
| -35                                                                                                                                  | 64 773                          | 112 753                         | 119 950                         | 239 900                         | - 6.39       | 2.52                                     |
| -30                                                                                                                                  | 47 304                          | 82 344                          | 87 600                          | 175 200                         | - 6.18       | 2.26                                     |
| -25                                                                                                                                  | 34 907                          | 60 765                          | 64 643                          | 129 287                         | - 5.98       | 2.02                                     |
| -20                                                                                                                                  | 26 017                          | 45 288                          | 48 179                          | 96 358                          | - 5.78       | 1.78                                     |
| -15                                                                                                                                  | 19 575                          | 34 075                          | 36 250                          | 72 500                          | - 5.60       | 1.55                                     |
| -10                                                                                                                                  | 14 862                          | 25 872                          | 27 523                          | 55 046                          | - 5.42       | 1.33                                     |
| -5                                                                                                                                   | 11 382                          | 19 814                          | 21 078                          | 42 157                          | - 5.25       | 1.12                                     |
| 0                                                                                                                                    | 8790                            | 15 300                          | 16 277                          | 32 554                          | - 5.09       | 0.92                                     |
| 5                                                                                                                                    | 6841                            | 11 909                          | 12 669                          | 25 339                          | - 4.93       | 0.72                                     |
| 10                                                                                                                                   | 5365                            | 9340                            | 9936                            | 19 872                          | - 4.79       | 0.53                                     |
| 15                                                                                                                                   | 4239                            | 7378                            | 7849                            | 15 698                          | - 4.64       | 0.35                                     |
| 20                                                                                                                                   | 3372                            | 5869                            | 6244                            | 12 488                          | - 4.51       | 0.17                                     |
| 25                                                                                                                                   | 2700                            | 4700                            | 5000                            | 10 000                          | - 4.38       | 0.00                                     |
| 30                                                                                                                                   | 2176                            | 3788                            | 4030                            | 8059                            | - 4.25       | 0.17                                     |
| 35                                                                                                                                   | 1764                            | 3071                            | 3267                            | 6535                            | - 4.13       | 0.32                                     |
| 40                                                                                                                                   | 1439                            | 2505                            | 2665                            | 5330                            | - 4.02       | 0.48                                     |
| 45                                                                                                                                   | 1180                            | 2055                            | 2186                            | 4372                            | - 3.91       | 0.63                                     |
| 50                                                                                                                                   | 973.4                           | 1694                            | 1803                            | 3605                            | - 3.80       | 0.77                                     |
| 55                                                                                                                                   | 806.9                           | 1405                            | 1494                            | 2989                            | - 3.70       | 0.91                                     |
| 60                                                                                                                                   | 672.3                           | 1170                            | 1245                            | 2490                            | - 3.60       | 1.05                                     |
| 65                                                                                                                                   | 562.8                           | 979.7                           | 1042                            | 2084                            | - 3.51       | 1.18                                     |
| 70                                                                                                                                   | 473.3                           | 823.9                           | 876.5                           | 1753                            | - 3.42       | 1.31                                     |
| 75                                                                                                                                   | 399.8                           | 696.0                           | 740.5                           | 1481                            | - 3.33       | 1.44                                     |
| 80                                                                                                                                   | 339.2                           | 590.5                           | 628.2                           | 1256                            | - 3.25       | 1.56                                     |
| 85                                                                                                                                   | 289.0                           | 503.0                           | 535.2                           | 1070                            | - 3.17       | 1.68                                     |
| 90                                                                                                                                   | 247.2                           | 430.2                           | 457.7                           | 915.4                           | - 3.09       | 1.79                                     |
| 95                                                                                                                                   | 212.2                           | 369.4                           | 393.0                           | 786.0                           | - 3.01       | 1.90                                     |
| 100                                                                                                                                  | 182.9                           | 318.3                           | 338.6                           | 677.3                           | - 2.94       | 2.01                                     |
| 105                                                                                                                                  | 158.2                           | 275.3                           | 292.9                           | 585.7                           | - 2.87       | 2.12                                     |
| 110                                                                                                                                  | 137.2                           | 238.9                           | 254.2                           | 508.3                           | - 2.80       | 2.22                                     |
| 115                                                                                                                                  | 119.5                           | 208.0                           | 221.3                           | 442.6                           | - 2.74       | 2.32                                     |
| 120                                                                                                                                  | 104.4                           | 181.7                           | 193.3                           | 386.6                           | - 2.67       | 2.42                                     |
| 125                                                                                                                                  | 91.46                           | 159.2                           | 169.4                           | 338.7                           | - 2.61       | 2.51                                     |
| 130                                                                                                                                  | 80.38                           | 139.9                           | 148.8                           | 297.7                           | - 2.55       | 2.61                                     |
| 135                                                                                                                                  | 70.84                           | 123.3                           | 131.2                           | 262.4                           | - 2.50       | 2.70                                     |
| 140                                                                                                                                  | 62.62                           | 109.0                           | 116.0                           | 231.9                           | - 2.44       | 2.78                                     |
| 145                                                                                                                                  | 55.49                           | 96.60                           | 102.8                           | 205.5                           | - 2.39       | 2.87                                     |
| 150                                                                                                                                  | 49.31                           | 85.84                           | 91.32                           | 182.6                           | - 2.34       | 2.96                                     |



For complete Curve Computation, visit: [www.vishay.com/resistors-non-linear/curve-computation-list/](http://www.vishay.com/resistors-non-linear/curve-computation-list/)

| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH $R_{25}$ AT 12 k $\Omega$ AND 22 k $\Omega$ |                                 |                                 |              |                                       |
|-------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------|--------------|---------------------------------------|
| $T_{OPER}$<br>(°C)                                                                              | PART NUMBER<br>NTCLE203E3123*B0 | PART NUMBER<br>NTCLE203E3223*B0 | TCR<br>(%/K) | $\Delta R/R$ DUE TO $B_{Tol.}$<br>(%) |
|                                                                                                 | $R_T$<br>(k $\Omega$ )          | $R_T$<br>(k $\Omega$ )          |              |                                       |
| - 40                                                                                            | 309.4                           | 567.2                           | - 6.07       | 7.00                                  |
| - 35                                                                                            | 229.5                           | 420.8                           | - 5.88       | 6.32                                  |
| - 30                                                                                            | 171.8                           | 315.0                           | - 5.70       | 5.68                                  |
| - 25                                                                                            | 129.8                           | 238.0                           | - 5.52       | 5.06                                  |
| - 20                                                                                            | 98.93                           | 181.4                           | - 5.35       | 4.46                                  |
| - 15                                                                                            | 76.02                           | 139.4                           | - 5.19       | 3.89                                  |
| - 10                                                                                            | 58.88                           | 107.9                           | - 5.03       | 3.34                                  |
| - 5                                                                                             | 45.95                           | 84.25                           | - 4.88       | 2.81                                  |
| 0                                                                                               | 36.13                           | 66.24                           | - 4.74       | 2.30                                  |
| 5                                                                                               | 28.61                           | 52.45                           | - 4.60       | 1.80                                  |
| 10                                                                                              | 22.80                           | 41.81                           | - 4.47       | 1.33                                  |
| 15                                                                                              | 18.30                           | 33.55                           | - 4.34       | 0.87                                  |
| 20                                                                                              | 14.77                           | 27.08                           | - 4.22       | 0.43                                  |
| 25                                                                                              | 12.00                           | 22.00                           | - 4.10       | 0.00                                  |
| 30                                                                                              | 9.804                           | 17.97                           | - 3.99       | 0.41                                  |
| 35                                                                                              | 8.054                           | 14.77                           | - 3.88       | 0.81                                  |
| 40                                                                                              | 6.652                           | 12.20                           | - 3.77       | 1.20                                  |
| 45                                                                                              | 5.522                           | 10.12                           | - 3.67       | 1.58                                  |
| 50                                                                                              | 4.607                           | 8.447                           | - 3.58       | 1.94                                  |
| 55                                                                                              | 3.862                           | 7.081                           | - 3.48       | 2.29                                  |
| 60                                                                                              | 3.252                           | 5.963                           | - 3.39       | 2.64                                  |
| 65                                                                                              | 2.751                           | 5.044                           | - 3.30       | 2.97                                  |
| 70                                                                                              | 2.337                           | 4.284                           | - 3.22       | 3.29                                  |
| 75                                                                                              | 1.993                           | 3.654                           | - 3.14       | 3.60                                  |
| 80                                                                                              | 1.707                           | 3.129                           | - 3.06       | 3.91                                  |
| 85                                                                                              | 1.467                           | 2.690                           | - 2.99       | 4.20                                  |
| 90                                                                                              | 1.266                           | 2.321                           | - 2.92       | 4.49                                  |
| 95                                                                                              | 1.096                           | 2.010                           | - 2.85       | 4.77                                  |
| 100                                                                                             | 0.9524                          | 1.746                           | - 2.78       | 5.04                                  |
| 105                                                                                             | 0.8302                          | 1.522                           | - 2.71       | 5.31                                  |
| 110                                                                                             | 0.7260                          | 1.331                           | - 2.65       | 5.56                                  |
| 115                                                                                             | 0.6369                          | 1.168                           | - 2.59       | 5.82                                  |
| 120                                                                                             | 0.5604                          | 1.027                           | - 2.53       | 6.06                                  |
| 125                                                                                             | 0.4945                          | 0.9065                          | - 2.47       | 6.30                                  |



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| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH $R_{25}$ AT 47 k $\Omega$ |                                 |              |                                       |
|-------------------------------------------------------------------------------|---------------------------------|--------------|---------------------------------------|
| $T_{OPER}$<br>(°C)                                                            | PART NUMBER<br>NTCLE203E3473*B0 | TCR<br>(%/K) | $\Delta R/R$ DUE TO $B_{Tol.}$<br>(%) |
|                                                                               | $R_T$<br>(k $\Omega$ )          |              |                                       |
| - 40                                                                          | 1589                            | - 6.54       | 5.74                                  |
| - 35                                                                          | 1152                            | - 6.34       | 5.19                                  |
| - 30                                                                          | 842.8                           | - 6.15       | 4.66                                  |
| - 25                                                                          | 622.6                           | - 5.96       | 4.15                                  |
| - 20                                                                          | 464.1                           | - 5.79       | 3.66                                  |
| - 15                                                                          | 349.0                           | - 5.62       | 3.19                                  |
| - 10                                                                          | 264.6                           | - 5.45       | 2.74                                  |
| - 5                                                                           | 202.3                           | - 5.30       | 2.30                                  |
| 0                                                                             | 155.8                           | - 5.14       | 1.88                                  |
| 5                                                                             | 120.9                           | - 5.00       | 1.48                                  |
| 10                                                                            | 94.53                           | - 4.86       | 1.09                                  |
| 15                                                                            | 74.40                           | - 4.72       | 0.71                                  |
| 20                                                                            | 58.95                           | - 4.59       | 0.35                                  |
| 25                                                                            | 47.00                           | - 4.47       | 0.00                                  |
| 30                                                                            | 37.71                           | - 4.35       | 0.34                                  |
| 35                                                                            | 30.43                           | - 4.23       | 0.67                                  |
| 40                                                                            | 24.70                           | - 4.12       | 0.99                                  |
| 45                                                                            | 20.15                           | - 4.01       | 1.29                                  |
| 50                                                                            | 16.53                           | - 3.91       | 1.59                                  |
| 55                                                                            | 13.63                           | - 3.81       | 1.88                                  |
| 60                                                                            | 11.30                           | - 3.71       | 2.16                                  |
| 65                                                                            | 9.404                           | - 3.62       | 2.43                                  |
| 70                                                                            | 7.865                           | - 3.53       | 2.70                                  |
| 75                                                                            | 6.607                           | - 3.44       | 2.95                                  |
| 80                                                                            | 5.573                           | - 3.36       | 3.20                                  |
| 85                                                                            | 4.721                           | - 3.28       | 3.45                                  |
| 90                                                                            | 4.015                           | - 3.20       | 3.68                                  |
| 95                                                                            | 3.427                           | - 3.13       | 3.91                                  |
| 100                                                                           | 2.936                           | - 3.05       | 4.13                                  |
| 105                                                                           | 2.525                           | - 2.98       | 4.35                                  |
| 110                                                                           | 2.179                           | - 2.92       | 4.56                                  |
| 115                                                                           | 1.886                           | - 2.85       | 4.77                                  |
| 120                                                                           | 1.638                           | - 2.79       | 4.97                                  |
| 125                                                                           | 1.427                           | - 2.73       | 5.17                                  |
| 130                                                                           | 1.247                           | - 2.67       | 5.36                                  |
| 135                                                                           | 1.093                           | - 2.61       | 5.54                                  |
| 140                                                                           | 0.9608                          | - 2.55       | 5.73                                  |
| 145                                                                           | 0.8468                          | - 2.50       | 5.90                                  |
| 150                                                                           | 0.7483                          | - 2.45       | 6.08                                  |



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| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH $R_{25}$ AT 68 k $\Omega$ AND 100 k $\Omega$ |                                 |                                 |              |                                       |
|--------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------|--------------|---------------------------------------|
| $T_{OPER}$<br>(°C)                                                                               | PART NUMBER<br>NTCLE203E3683*B0 | PART NUMBER<br>NTCLE203E3104*B0 | TCR<br>(%/K) | $\Delta R/R$ DUE TO $B_{Tol.}$<br>(%) |
|                                                                                                  | $R_T$<br>(k $\Omega$ )          | $R_T$<br>(k $\Omega$ )          |              |                                       |
| - 40                                                                                             | 2493                            | 3666                            | - 6.69       | 5.88                                  |
| - 35                                                                                             | 1794                            | 2638                            | - 6.49       | 5.31                                  |
| - 30                                                                                             | 1303                            | 1917                            | - 6.29       | 4.77                                  |
| - 25                                                                                             | 956.2                           | 1406                            | - 6.10       | 4.25                                  |
| - 20                                                                                             | 708.0                           | 1041                            | - 5.92       | 3.75                                  |
| - 15                                                                                             | 528.9                           | 777.8                           | - 5.75       | 3.27                                  |
| - 10                                                                                             | 398.5                           | 586.1                           | - 5.58       | 2.80                                  |
| - 5                                                                                              | 302.8                           | 445.3                           | - 5.42       | 2.36                                  |
| 0                                                                                                | 231.8                           | 340.9                           | - 5.26       | 1.93                                  |
| 5                                                                                                | 178.9                           | 263.1                           | - 5.11       | 1.52                                  |
| 10                                                                                               | 139.0                           | 204.4                           | - 4.97       | 1.12                                  |
| 15                                                                                               | 108.8                           | 160.0                           | - 4.83       | 0.73                                  |
| 20                                                                                               | 85.74                           | 126.1                           | - 4.70       | 0.36                                  |
| 25                                                                                               | 68.00                           | 100.0                           | - 4.57       | 0.00                                  |
| 30                                                                                               | 54.27                           | 79.81                           | - 4.45       | 0.35                                  |
| 35                                                                                               | 43.57                           | 64.08                           | - 4.33       | 0.68                                  |
| 40                                                                                               | 35.19                           | 51.75                           | - 4.22       | 1.01                                  |
| 45                                                                                               | 28.57                           | 42.02                           | - 4.11       | 1.33                                  |
| 50                                                                                               | 23.33                           | 34.31                           | - 4.00       | 1.63                                  |
| 55                                                                                               | 19.15                           | 28.16                           | - 3.90       | 1.93                                  |
| 60                                                                                               | 15.79                           | 23.22                           | - 3.80       | 2.21                                  |
| 65                                                                                               | 13.09                           | 19.25                           | - 3.71       | 2.49                                  |
| 70                                                                                               | 10.90                           | 16.02                           | - 3.62       | 2.76                                  |
| 75                                                                                               | 9.114                           | 13.40                           | - 3.53       | 3.03                                  |
| 80                                                                                               | 7.655                           | 11.26                           | - 3.45       | 3.28                                  |
| 85                                                                                               | 6.457                           | 9.496                           | - 3.36       | 3.53                                  |
| 90                                                                                               | 5.469                           | 8.042                           | - 3.28       | 3.77                                  |
| 95                                                                                               | 4.649                           | 6.837                           | - 3.21       | 4.01                                  |
| 100                                                                                              | 3.968                           | 5.835                           | - 3.13       | 4.24                                  |
| 105                                                                                              | 3.399                           | 4.998                           | - 3.06       | 4.46                                  |
| 110                                                                                              | 2.921                           | 4.296                           | - 2.99       | 4.68                                  |
| 115                                                                                              | 2.519                           | 3.705                           | - 2.93       | 4.89                                  |
| 120                                                                                              | 2.180                           | 3.206                           | - 2.86       | 5.09                                  |
| 125                                                                                              | 1.892                           | 2.783                           | - 2.80       | 5.29                                  |
| 130                                                                                              | 1.648                           | 2.423                           | - 2.74       | 5.49                                  |
| 135                                                                                              | 1.439                           | 2.116                           | - 2.68       | 5.68                                  |
| 140                                                                                              | 1.261                           | 1.854                           | - 2.62       | 5.87                                  |
| 145                                                                                              | 1.107                           | 1.628                           | - 2.57       | 6.05                                  |
| 150                                                                                              | 0.9752                          | 1.434                           | - 2.51       | 6.23                                  |



For complete Curve Computation, visit: [www.vishay.com/resistors-non-linear/curve-computation-list/](http://www.vishay.com/resistors-non-linear/curve-computation-list/)

| <b>RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH <math>R_{25}</math> AT 470 k<math>\Omega</math></b> |                                                    |                      |                                                                |
|------------------------------------------------------------------------------------------------------------|----------------------------------------------------|----------------------|----------------------------------------------------------------|
| <b>T<sub>OPER</sub><br/>(°C)</b>                                                                           | <b>PART NUMBER<br/>NTCLE203E3474*B0</b>            | <b>TCR<br/>(%/K)</b> | <b><math>\Delta R/R</math> DUE TO B<sub>Tol.</sub><br/>(%)</b> |
|                                                                                                            | <b><math>R_T</math><br/>(k<math>\Omega</math>)</b> |                      |                                                                |
| - 40                                                                                                       | 22 850                                             | - 7.14               | 6.41                                                           |
| - 35                                                                                                       | 16 068                                             | - 6.94               | 5.80                                                           |
| - 30                                                                                                       | 11 413                                             | - 6.74               | 5.20                                                           |
| - 25                                                                                                       | 8185                                               | - 6.55               | 4.64                                                           |
| - 20                                                                                                       | 5926                                               | - 6.37               | 4.09                                                           |
| - 15                                                                                                       | 4329                                               | - 6.19               | 3.57                                                           |
| - 10                                                                                                       | 3190                                               | - 6.02               | 3.06                                                           |
| - 5                                                                                                        | 2371                                               | - 5.85               | 2.57                                                           |
| 0                                                                                                          | 1777                                               | - 5.69               | 2.11                                                           |
| 5                                                                                                          | 1342                                               | - 5.54               | 1.65                                                           |
| 10                                                                                                         | 1021                                               | - 5.39               | 1.22                                                           |
| 15                                                                                                         | 783.0                                              | - 5.24               | 0.80                                                           |
| 20                                                                                                         | 604.6                                              | - 5.10               | 0.39                                                           |
| 25                                                                                                         | 470.0                                              | - 4.97               | 0.00                                                           |
| 30                                                                                                         | 367.8                                              | - 4.84               | 0.38                                                           |
| 35                                                                                                         | 289.6                                              | - 4.72               | 0.75                                                           |
| 40                                                                                                         | 229.5                                              | - 4.59               | 1.10                                                           |
| 45                                                                                                         | 182.9                                              | - 4.48               | 1.45                                                           |
| 50                                                                                                         | 146.7                                              | - 4.37               | 1.78                                                           |
| 55                                                                                                         | 118.2                                              | - 4.26               | 2.10                                                           |
| 60                                                                                                         | 95.80                                              | - 4.15               | 2.41                                                           |
| 65                                                                                                         | 78.04                                              | - 4.05               | 2.72                                                           |
| 70                                                                                                         | 63.88                                              | - 3.95               | 3.01                                                           |
| 75                                                                                                         | 52.55                                              | - 3.86               | 3.30                                                           |
| 80                                                                                                         | 43.43                                              | - 3.77               | 3.58                                                           |
| 85                                                                                                         | 36.05                                              | - 3.68               | 3.85                                                           |
| 90                                                                                                         | 30.06                                              | - 3.59               | 4.11                                                           |
| 95                                                                                                         | 25.16                                              | - 3.51               | 4.37                                                           |
| 100                                                                                                        | 21.15                                              | - 3.43               | 4.62                                                           |
| 105                                                                                                        | 17.85                                              | - 3.35               | 4.86                                                           |
| 110                                                                                                        | 15.12                                              | - 3.28               | 5.10                                                           |
| 115                                                                                                        | 12.86                                              | - 3.21               | 5.33                                                           |
| 120                                                                                                        | 10.97                                              | - 3.14               | 5.55                                                           |
| 125                                                                                                        | 9.396                                              | - 3.07               | 5.77                                                           |





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