

## NTC Thermistors, 2-Point Micro Chip Sensor Insulated Leads



### FEATURES

- Flexible insulated leads for special mounting or assembly
- Miniature sized very fast reacting
- Accurate over a wide temperature range
- High stability over a long life
- Exceptional withstanding in thermal shocks
- AEC-Q200 qualified
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC
- Fulfils the ELV 2000/53/EC

 AUTOMOTIVE  
GRADE

**RoHS**  
COMPLIANT

| QUICK REFERENCE DATA  |                         |           |
|---|-------------------------|-----------|
| PARAMETER   | VALUE                   | UNIT      |
| Resistance value at 25 °C   | 2.06K to 10K            | Ω         |
| Tolerance on $R_{25}$ -value  | ± 1.92; ± 2.19          | %         |
| $B_{25/85}$ -value  | 3511 to 3984            | K         |
| Tolerance on $B_{25/85}$  | ± 0.5 to ± 1            | %         |
| Accuracy of temperature measurement   | ± 0.5 between 25 and 85 | °C        |
| Operating temperature range   | - 40 to + 125           | °C        |
| Maximum power dissipation at 55 °C  | 50                      | mW        |
| Dissipation factor $\delta$ (in still air)  | ≈ 0.8                   | mW/K      |
| Response time (in stirred air) (in oil)   | ≈ 3<br>≈ 0.7            | s         |
| Climatic category (LCT/UCT/days)  | 40/125/56               |           |
| Minimum dielectric withstanding voltage between leads termination and coated body | 100                     | $V_{RMS}$ |
| Weight  | ≈ 0.05                  | g         |

### APPLICATIONS

- Temperature measurement, sensing and control in automotive and industrial applications

### DESCRIPTION

These negative temperature coefficient thermistors consist of a micro NTC chip with two insulated solid silver plated nickel wires and coated with a ochre-colored epoxy lacquer.

### PACKAGING

The thermistors are packed in cardboard boxes; the smallest packing quantity is 1000 pieces.

### MARKING

The components are not marked.

### DESIGN-IN SUPPORT

$R(T)$  tables spreadsheet available on request at [nlr@vishay.com](mailto:nlr@vishay.com).

### MOUNTING

By soldering or welding in any position. The parts can be potted in suitable resins.

| ELECTRICAL DATA AND ORDERING INFORMATION |                             |                        |                   |                                |                      |  |
|--|-----------------------------|------------------------|-------------------|--------------------------------|----------------------|--|
| SAP PART AND ORDERING NUMBER             | $R_{25}$ <sup>(1)</sup> (Ω) | $\alpha$ (25 °C) (%/K) | $R_{25}$ TOL. (%) | $B_{25/85}$ <sup>(1)</sup> (K) | $B_{25/85}$ TOL. (%) | $\Delta T_{MAX.}$ <sup>(2)</sup> 25 TO 85 (°C) |
| NTCLE305E4202SB                          | 2060                        | - 3.85                 | 1.92              | 3511                           | 1.0                  | ± 0.5  |
| NTCLE305E4502SB                          | 5000                        | - 4.39                 | 2.19              | 3984                           | 0.5                  | ± 0.5  |
| NTCLE305E4103SB                          | 10 000                      | - 4.39                 | 2.19              | 3984                           | 0.5                  | ± 0.5  |

#### Notes

<sup>(1)</sup> Other  $R_{25}$  and B-values available on request

<sup>(2)</sup>  $\Delta T$  is the temperature measurement accuracy in the defined temperature range

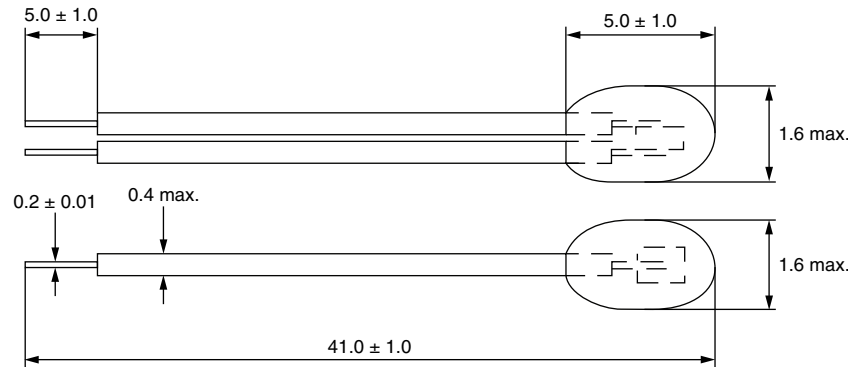
# NTCLE305E4...SB



Vishay BCcomponents

NTC Thermistors, 2-Point Micro Chip  
Sensor Insulated Leads

## DIMENSIONS in millimeters



### RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH $R_{25}$ AT 2060 $\Omega$

SAP PART AND ORDERING NUMBER: NTCLE305E4202SB

| TEMPERATURE (°C) | RESISTANCE ( $\Omega$ ) | $R/R_{25}$ | $\Delta R/R$ (%) | $\alpha$ (%/K) | $\Delta T_{MAX.}$ ( $\pm$ °C) | $R_{MIN.}$ ( $\Omega$ ) | $R_{MAX.}$ ( $\Omega$ ) |
|------------------|-------------------------|------------|------------------|----------------|-------------------------------|-------------------------|-------------------------|
| -40.0            | 47 326                  | 22.974     | 5.27             | -6.03          | 0.87                          | 44 832                  | 49 820                  |
| -35.0            | 35 203                  | 17.089     | 4.95             | -5.81          | 0.85                          | 33 461                  | 36 945                  |
| -30.0            | 26 473                  | 12.851     | 4.64             | -5.60          | 0.83                          | 25 245                  | 27 700                  |
| -25.0            | 20 115                  | 9.7643     | 4.34             | -5.39          | 0.81                          | 19 241                  | 20 988                  |
| -20.0            | 15 435                  | 7.4925     | 4.06             | -5.20          | 0.78                          | 14 808                  | 16 061                  |
| -15.0            | 11 954                  | 5.8031     | 3.78             | -5.02          | 0.75                          | 11 502                  | 12 407                  |
| -10.0            | 9341.4                  | 4.5347     | 3.52             | -4.85          | 0.73                          | 9012.6                  | 9670.2                  |
| -5.0             | 7361.4                  | 3.5735     | 3.27             | -4.68          | 0.70                          | 7120.9                  | 7601.8                  |
| 0.0              | 5847.7                  | 2.8387     | 3.02             | -4.53          | 0.67                          | 5671.0                  | 6024.5                  |
| 5.0              | 4680.9                  | 2.2723     | 2.79             | -4.38          | 0.64                          | 4550.5                  | 4811.4                  |
| 10.0             | 3774.3                  | 1.8322     | 2.56             | -4.24          | 0.60                          | 3677.7                  | 3870.9                  |
| 15.0             | 3064.4                  | 1.4876     | 2.34             | -4.10          | 0.57                          | 2992.7                  | 3136.2                  |
| 20.0             | 2504.6                  | 1.2158     | 2.13             | -3.97          | 0.54                          | 2451.3                  | 2557.9                  |
| 25.0             | 2060.0                  | 1.0000     | 1.92             | -3.85          | 0.50                          | 2020.4                  | 2099.6                  |
| 30.0             | 1704.5                  | 0.82744    | 1.86             | -3.73          | 0.50                          | 1672.7                  | 1736.3                  |
| 35.0             | 1418.6                  | 0.68864    | 1.81             | -3.62          | 0.50                          | 1392.9                  | 1444.3                  |
| 40.0             | 1186.9                  | 0.57618    | 1.76             | -3.52          | 0.50                          | 1166.1                  | 1207.8                  |
| 45.0             | 997.97                  | 0.48445    | 1.71             | -3.42          | 0.50                          | 980.90                  | 1015.0                  |
| 50.0             | 842.90                  | 0.40917    | 1.67             | -3.33          | 0.50                          | 828.85                  | 856.95                  |
| 55.0             | 714.92                  | 0.34705    | 1.63             | -3.25          | 0.50                          | 703.29                  | 726.55                  |
| 60.0             | 608.74                  | 0.29550    | 1.59             | -3.18          | 0.50                          | 599.06                  | 618.41                  |
| 65.0             | 520.21                  | 0.25253    | 1.55             | -3.11          | 0.50                          | 512.13                  | 528.30                  |
| 70.0             | 446.08                  | 0.21654    | 1.52             | -3.04          | 0.50                          | 439.29                  | 452.86                  |
| 75.0             | 383.73                  | 0.18628    | 1.49             | -2.98          | 0.50                          | 378.01                  | 389.45                  |
| 80.0             | 331.09                  | 0.16072    | 1.46             | -2.92          | 0.50                          | 326.25                  | 335.93                  |
| 85.0             | 286.48                  | 0.13907    | 1.43             | -2.87          | 0.50                          | 282.37                  | 290.59                  |
| 90.0             | 248.55                  | 0.12065    | 1.57             | -2.81          | 0.56                          | 244.64                  | 252.45                  |
| 95.0             | 216.18                  | 0.10494    | 1.70             | -2.77          | 0.62                          | 212.50                  | 219.87                  |
| 100.0            | 188.49                  | 0.091501   | 1.83             | -2.72          | 0.67                          | 185.04                  | 191.95                  |
| 105.0            | 164.73                  | 0.079964   | 1.96             | -2.67          | 0.73                          | 161.50                  | 167.95                  |
| 110.0            | 144.27                  | 0.070036   | 2.08             | -2.63          | 0.79                          | 141.27                  | 147.28                  |
| 115.0            | 126.63                  | 0.061470   | 2.20             | -2.59          | 0.85                          | 123.84                  | 129.42                  |
| 120.0            | 111.36                  | 0.054061   | 2.32             | -2.55          | 0.91                          | 108.78                  | 113.95                  |
| 125.0            | 98.133                  | 0.047637   | 2.43             | -2.51          | 0.97                          | 95.746                  | 100.52                  |

#### Note

- $R(T)$  table spreadsheet available on request at [nlr@vishay.com](mailto:nlr@vishay.com)



| <b>RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH <math>R_{25}</math> AT 5 k<math>\Omega</math></b> |   |                              |  |                                      |   |  |  |
|--|---|------------------------------|--|--------------------------------------|---|--|--|
| <b>SAP PART AND ORDERING NUMBER: NTCLE305E4502SB</b>   |   |                              |  |                                      |   |  |  |
| <b>TEMPERATURE<br/>(°C)</b>  | <b>RESISTANCE<br/>(<math>\Omega</math>)</b> | <b><math>R/R_{25}</math></b> | <b><math>\Delta R/R</math><br/>(%)</b> | <b><math>\alpha</math><br/>(%/K)</b> | <b><math>\Delta T_{MAX.}</math><br/>(<math>\pm</math> °C)</b> | <b><math>R_{MIN.}</math><br/>(<math>\Omega</math>)</b> | <b><math>R_{MAX.}</math><br/>(<math>\Omega</math>)</b> |
| -40  | 167 137                                     | 33.427                       | 4.10                                   | - 6.63                               | 0.62  | 160 290  | 173 984  |
| -35  | 120 661                                     | 24.132                       | 3.91                                   | - 6.41                               | 0.61  | 115 939  | 125 383  |
| -30  | 88 066                                      | 17.613                       | 3.74                                   | - 6.19                               | 0.60  | 84 775   | 91 358   |
| -25  | 64 950                                      | 12.990                       | 3.57                                   | - 5.99                               | 0.60  | 62 632   | 67 268   |
| -20  | 48 381                                      | 9.6761                       | 3.41                                   | - 5.79                               | 0.59  | 46 732   | 50 029   |
| -15  | 36 382                                      | 7.2765                       | 3.25                                   | - 5.61                               | 0.58  | 35 199   | 37 565   |
| -10  | 27 609                                      | 5.5218                       | 3.10                                   | - 5.43                               | 0.57  | 26 753   | 28 465   |
| -5   | 21 134                                      | 4.2268                       | 2.96                                   | - 5.26                               | 0.56  | 20 509   | 21 759   |
| 0  | 16 312                                      | 3.2624                       | 2.82                                   | - 5.10                               | 0.55  | 15 852   | 16 772   |
| 5  | 12 691                                      | 2.5381                       | 2.68                                   | - 4.94                               | 0.54  | 12 350   | 13 031   |
| 10   | 9948.4                                      | 1.9897                       | 2.55                                   | - 4.80                               | 0.53  | 9694.3   | 10 203   |
| 15   | 7855.6                                      | 1.5711                       | 2.43                                   | - 4.65                               | 0.52  | 7664.7   | 8046.5   |
| 20   | 6246.4                                      | 1.2493                       | 2.31                                   | - 4.52                               | 0.51  | 6102.1   | 6390.6   |
| 25   | 5000.0                                      | 1.0000                       | 2.19                                   | - 4.39                               | 0.50  | 4890.3   | 5109.7   |
| 30   | 4028.0                                      | 0.80560                      | 2.13                                   | - 4.26                               | 0.50  | 3942.2   | 4113.8   |
| 35   | 3264.9                                      | 0.65297                      | 2.07                                   | - 4.14                               | 0.50  | 3197.3   | 3332.5   |
| 40   | 2661.9                                      | 0.53239                      | 2.01                                   | - 4.03                               | 0.50  | 2608.4   | 2715.5   |
| 45   | 2182.6                                      | 0.43653                      | 1.96                                   | - 3.92                               | 0.50  | 2139.9   | 2225.4   |
| 50   | 1799.4                                      | 0.35987                      | 1.90                                   | - 3.81                               | 0.50  | 1765.1   | 1833.6   |
| 55   | 1491.1                                      | 0.29823                      | 1.85                                   | - 3.71                               | 0.50  | 1463.5   | 1518.8   |
| 60   | 1241.9                                      | 0.24838                      | 1.80                                   | - 3.61                               | 0.50  | 1219.5   | 1264.3   |
| 65   | 1039.3                                      | 0.20787                      | 1.76                                   | - 3.51                               | 0.50  | 1021.1   | 1057.6   |
| 70   | 873.83                                      | 0.17477                      | 1.71                                   | - 3.42                               | 0.50  | 858.87   | 888.79   |
| 75   | 737.96                                      | 0.14759                      | 1.67                                   | - 3.34                               | 0.50  | 725.65   | 750.27   |
| 80   | 625.90                                      | 0.12518                      | 1.63                                   | - 3.25                               | 0.50  | 615.72   | 636.08   |
| 85   | 533.05                                      | 0.10661                      | 1.59                                   | - 3.17                               | 0.50  | 524.60   | 541.51   |
| 90   | 455.79                                      | 0.091159                     | 1.66                                   | - 3.09                               | 0.54  | 448.21   | 463.37   |
| 95   | 391.23                                      | 0.078246                     | 1.74                                   | - 3.02                               | 0.58  | 384.43   | 398.03   |
| 100  | 337.06                                      | 0.067411                     | 1.81                                   | - 2.94                               | 0.62  | 330.95   | 343.16   |
| 105  | 291.42                                      | 0.058284                     | 1.88                                   | - 2.87                               | 0.66  | 285.93   | 296.91   |
| 110  | 252.84                                      | 0.050568                     | 1.95                                   | - 2.81                               | 0.70  | 247.90   | 257.78   |
| 115  | 220.09                                      | 0.044019                     | 2.02                                   | - 2.74                               | 0.74  | 215.64   | 224.54   |
| 120  | 192.21                                      | 0.038441                     | 2.09                                   | - 2.68                               | 0.78  | 188.19   | 196.22   |
| 125  | 168.37                                      | 0.033675                     | 2.15                                   | - 2.62                               | 0.82  | 164.75   | 172.00   |

**Note**

- $R(T)$  table spreadsheet available on request at [nlr@vishay.com](mailto:nlr@vishay.com)

| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH $R_{25}$ AT 10 k $\Omega$ |                            |            |                     |                   |                                  |                            |                            |
|---|----------------------------|------------|---------------------|-------------------|----------------------------------|----------------------------|----------------------------|
| SAP PART AND ORDERING NUMBER: NTCLE305E4103SB                                 |                            |            |                     |                   |                                  |                            |                            |
| TEMPERATURE<br>(°C)   | RESISTANCE<br>( $\Omega$ ) | $R/R_{25}$ | $\Delta R/R$<br>(%) | $\alpha$<br>(%/K) | $\Delta T_{MAX.}$<br>( $\pm$ °C) | $R_{MIN.}$<br>( $\Omega$ ) | $R_{MAX.}$<br>( $\Omega$ ) |
| -40   | 334 274                    | 33.427     | 4.10                | - 6.63            | 0.62                             | 320 580                    | 347 969                    |
| -35   | 241 323                    | 24.132     | 3.91                | - 6.41            | 0.61                             | 231 879                    | 250 767                    |
| -30   | 176 133                    | 17.613     | 3.74                | - 6.19            | 0.60                             | 169 549                    | 182 716                    |
| -25   | 129 900                    | 12.990     | 3.57                | - 5.99            | 0.60                             | 125 264                    | 134 536                    |
| -20   | 96 761                     | 9.6761     | 3.41                | - 5.79            | 0.59                             | 93 465                     | 100 058                    |
| -15   | 72 765                     | 7.2765     | 3.25                | - 5.61            | 0.58                             | 70 399                     | 75 130                     |
| -10   | 55 218                     | 5.5218     | 3.10                | - 5.43            | 0.57                             | 53 506                     | 56 931                     |
| -5  | 42 268                     | 4.2268     | 2.96                | - 5.26            | 0.56                             | 41 018                     | 43 518                     |
| 0   | 32 624                     | 3.2624     | 2.82                | - 5.10            | 0.55                             | 31 705                     | 33 544                     |
| 5   | 25 381                     | 2.5381     | 2.68                | - 4.94            | 0.54                             | 24 700                     | 26 063                     |
| 10  | 19 897                     | 1.9897     | 2.55                | - 4.80            | 0.53                             | 19 389                     | 20 405                     |
| 15  | 15 711                     | 1.5711     | 2.43                | - 4.65            | 0.52                             | 15 329                     | 16 093                     |
| 20  | 12 493                     | 1.2493     | 2.31                | - 4.52            | 0.51                             | 12 204                     | 12 781                     |
| 25  | 10 000                     | 1.0000     | 2.19                | - 4.39            | 0.50                             | 9780.7                     | 10 219                     |
| 30  | 8056.0                     | 0.80560    | 2.13                | - 4.26            | 0.50                             | 7884.3                     | 8227.6                     |
| 35  | 6529.7                     | 0.65297    | 2.07                | - 4.14            | 0.50                             | 6394.5                     | 6664.9                     |
| 40  | 5323.9                     | 0.53239    | 2.01                | - 4.03            | 0.50                             | 5216.7                     | 5431.1                     |
| 45  | 4365.3                     | 0.43653    | 1.96                | - 3.92            | 0.50                             | 4279.8                     | 4450.7                     |
| 50  | 3598.7                     | 0.35987    | 1.90                | - 3.81            | 0.50                             | 3530.2                     | 3667.3                     |
| 55  | 2982.3                     | 0.29823    | 1.85                | - 3.71            | 0.50                             | 2927.0                     | 3037.6                     |
| 60  | 2483.8                     | 0.24838    | 1.80                | - 3.61            | 0.50                             | 2439.0                     | 2528.6                     |
| 65  | 2078.7                     | 0.20787    | 1.76                | - 3.51            | 0.50                             | 2042.1                     | 2115.2                     |
| 70  | 1747.7                     | 0.17477    | 1.71                | - 3.42            | 0.50                             | 1717.7                     | 1777.6                     |
| 75  | 1475.9                     | 0.14759    | 1.67                | - 3.34            | 0.50                             | 1451.3                     | 1500.5                     |
| 80  | 1251.8                     | 0.12518    | 1.63                | - 3.25            | 0.50                             | 1231.4                     | 1272.2                     |
| 85  | 1066.1                     | 0.10661    | 1.59                | - 3.17            | 0.50                             | 1049.2                     | 1083.0                     |
| 90  | 911.59                     | 0.091159   | 1.66                | - 3.09            | 0.54                             | 896.42                     | 926.75                     |
| 95  | 782.46                     | 0.078246   | 1.74                | - 3.02            | 0.58                             | 768.85                     | 796.06                     |
| 100   | 674.11                     | 0.067411   | 1.81                | - 2.94            | 0.62                             | 661.89                     | 686.33                     |
| 105   | 582.84                     | 0.058284   | 1.88                | - 2.87            | 0.66                             | 571.86                     | 593.83                     |
| 110   | 505.68                     | 0.050568   | 1.95                | - 2.81            | 0.70                             | 495.79                     | 515.56                     |
| 115   | 440.19                     | 0.044019   | 2.02                | - 2.74            | 0.74                             | 431.28                     | 449.09                     |
| 120   | 384.41                     | 0.038441   | 2.09                | - 2.68            | 0.78                             | 376.38                     | 392.44                     |
| 125   | 336.75                     | 0.033675   | 2.15                | - 2.62            | 0.82                             | 329.50                     | 344.00                     |

**Note**

- $R(T)$  table spreadsheet available on request at [nlr@vishay.com](mailto:nlr@vishay.com)



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**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**