

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



## QUICK REFERENCE DATA

| PARAMETER                                                                         | VALUE                        | UNIT      |
|-----------------------------------------------------------------------------------|------------------------------|-----------|
| Resistance value at 25 °C                                                         | 2.06K to 10K                 | $\Omega$  |
| Tolerance on $R_{25}$ -value                                                      | $\pm 1.92; \pm 2.19$         | %         |
| $B_{25/85}$ -value                                                                | 3511 to 3984                 | K         |
| Tolerance on $B_{25/85}$                                                          | $\pm 0.5$ to $\pm 1$         | %         |
| Accuracy of temperature measurement                                               | $\pm 0.5$ 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)                                        | $\approx 0.8$                | mW/K      |
| Response time (in stirred air) (in oil)                                           | $\approx 3$<br>$\approx 0.7$ | s         |
| Climatic category (LCT/UCT/days)                                                  | 40/125/56                    |           |
| Minimum dielectric withstanding voltage between leads termination and coated body | 100                          | $V_{RMS}$ |
| Weight                                                                            | $\approx 0.05$               | g         |

## 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

## 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

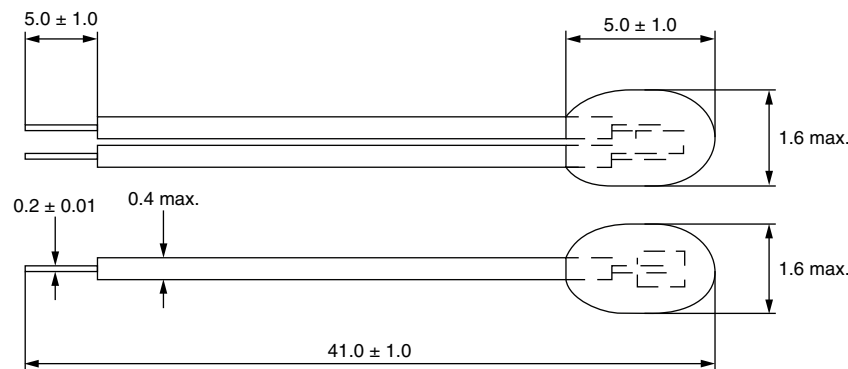
| SAP PART AND ORDERING NUMBER | $R_{25}^{(1)}$ ( $\Omega$ ) | $\alpha$ (25 °C) (%/K) | $R_{25}$ TOL. (%) | $B_{25/85}^{(1)}$ (K) | $B_{25/85}$ TOL. (%) | $\Delta T_{MAX.}^{(2)}$ 25 TO 85 (°C) |
|------------------------------|-----------------------------|------------------------|-------------------|-----------------------|----------------------|---------------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

### Notes

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

(2)  $\Delta T$  is the temperature measurement accuracy in the defined temperature range

## DIMENSIONS in millimeters



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

SAP PART AND ORDERING NUMBER: NTCLE305E4202SB

| 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>( $\Omega$ ) |
|---------------------|----------------------------|------------|---------------------|-------------------|----------------------------------|----------------------------|----------------------------|
| -40.0               | 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)

**RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH  $R_{25}$  AT 5 k $\Omega$** 

SAP PART AND ORDERING NUMBER: NTCLE305E4502SB

| 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                 | 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

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