# NTC Thermistors, Radial Leaded, Standard Precision



## FEATURES

- Accuracy over a wide temperature range
- High stability over a long life
- Excellent price/performance ratio
- cULus recognized, file E148885 (category XGPU2/XGPU8)
- Mounting: radial
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free Available

RoHS COMPLIANT

## APPLICATIONS

- Temperature measurement, compensation, sensing and control in consumer and industrial applications

## LINKS TO ADDITIONAL RESOURCES

3D Models | Design Tools | SPICE Models | Related Documents

## QUICK REFERENCE DATA

| PARAMETER | VALUE | UNIT |
|---|---|---|
| Resistance value at 25 °C | 3.3 to 470K | Ω |
| Tolerance on $R_{25}$-value | ± 2; ± 3; ± 5 | % |
| $B_{25/85}$-value | 2880 to 4570 | K |
| Tolerance on $B_{25/85}$-value | ± 0.5 to ± 3 | % |
| Operating temperature range:<br>At zero power dissipation; continuously<br>At zero power dissipation; for short periods | <br>-40 to +125<br>≤ 150 | °C |
| Response time (in oil) | ≈ 1.2 | s |
| Thermal time constant τ (for information only) | 15 | s |
| Dissipation factor δ (for information only) | 7<br>8.5 (for $R_{25}$-value ≤ 680 Ω) | mW/K |
| Maximum power dissipation at 55 °C | 500 | mW |
| Climatic category (LCT / UCT / days) | 40 / 125 / 56 | - |
| Weight | ≈ 0.3 | g |

## DESCRIPTION

These thermistors have a negative temperature coefficient. The part consists of a NTC chip, soldered between two tin plated copper wires. It has a gray base coating with a blue colored dot. The coating has no specified insulation properties.

## PACKAGING

The thermistors are packed in bulk or tape on reel; see part numbers and relevant packaging quantities.

## DESIGN-IN SUPPORT

For complete Curve Computation, visit:
www.vishay.com/thermistors/ntc-curve-list/

## MARKING

The thermistors are with a blue colored dot; see dimensions drawing and “Electrical Data and Ordering Information”.

## MOUNTING

**Important mounting and handling instructions: see www.vishay.com/doc?29222**

By soldering in any position.
Not intended for potted applications.

## ELECTRICAL DATA AND ORDERING INFORMATION

| $R_{25}$ (Ω) | $R_{25}$-TOL. (± %) | $B_{25/85}$ (K) | $B_{25/85}$-TOL. (± %) | UL RECOG. cULus | SAP MATERIAL AND ORDERING NUMBER (1) | |
|---|---|---|---|---|---|---|
| | | | | | NTCLE100E3....B0/T1/T2 RoHS-COMPLIANT WITH EXEMPTION (2) | NTCLE100E3....B0A/T1A/T2A RoHS-COMPLIANT |
| 3.3 | 5 | 2880 | 3 | | 338*B0 | 338*B0A |
| 4.7 | 5 | 2880 | 3 | | 478*B0 | 478*B0A |
| 6.8 | 5 | 2880 | 3 | | 688*B0 | 688*B0A |
| 10 | 5 | 2990 | 3 | | 109*B0 | 109*B0A |
| 15 | 5 | 3041 | 3 | | 159*B0 | 159*B0A |
| 22 | 5 | 3136 | 3 | | 229*B0 | 229*B0A |
| 33 | 5 | 3390 | 3 | ✓ | 339*B0 | 339*B0A |
| 47 | 5 | 3390 | 3 | ✓ | 479*B0 | 479*B0A |
| 68 | 5 | 3390 | 3 | ✓ | 689*B0 | 689*B0A |
| 100 | 5 | 3560 | 1.5 | ✓ | 101*B0 | 101*B0A |
| 150 | 5 | 3560 | 1.5 | ✓ | 151*B0 | 151*B0A |
| 220 | 5 | 3560 | 1.5 | ✓ | 221*B0 | 221*B0A |



For technical questions, contact: nlr@vishay.com

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## ELECTRICAL DATA AND ORDERING INFORMATION

| $R_{25}$ (Ω) | $R_{25}$-TOL. (± %) | $B_{25/85}$ (K) | $B_{25/85}$-TOL. (± %) | UL RECOG. c UL us | SAP MATERIAL AND ORDERING NUMBER (1) | |
|---|---|---|---|---|---|---|
| | | | | | NTCLE100E3....B0/T1/T2 RoHS-COMPLIANT WITH EXEMPTION (2) | NTCLE100E3....B0A/T1A/T2A RoHS-COMPLIANT |
| 330 | 5 | 3560 | 1.5 | ✓ | 331*B0 | 331*B0A |
| 470 | 5 | 3560 | 1.5 | ✓ | 471*B0 | 471*B0A |
| 680 | 5 | 3560 | 1.5 | ✓ | 681*B0 | 681*B0A |
| 1000 | 2, 3, 5 | 3528 | 0.5 | ✓ | 102*B0 | 102*B0A |
| 1500 | 2, 3, 5 | 3528 | 0.5 | ✓ | 152*B0 | 152*B0A |
| 2000 | 2, 3, 5 | 3528 | 0.5 | ✓ | 202*B0 | 202*B0A |
| 2200 | 2, 3, 5 | 3977 | 0.75 | ✓ | 222*B0 | 222*B0A |
| 2700 | 2, 3, 5 | 3977 | 0.75 | ✓ | 272*B0 | 272*B0A |
| 3300 | 2, 3, 5 | 3977 | 0.75 | ✓ | 332*B0 | 332*B0A |
| 4700 | 2, 3, 5 | 3977 | 0.75 | ✓ | 472*B0 | 472*B0A |
| 5000 | 2, 3, 5 | 3977 | 0.75 | ✓ | 502*B0 | 502*B0A |
| 6800 | 2, 3, 5 | 3977 | 0.75 | ✓ | 682*B0 | 682*B0A |
| 10 000 | 2, 3, 5 | 3977 | 0.75 | ✓ | 103*B0 | 103*B0A |
| 12 000 | 2, 3, 5 | 3740 | 2 | ✓ | 123*B0 | 123*B0A |
| 15 000 | 2, 3, 5 | 3740 | 2 | ✓ | 153*B0 | 153*B0A |
| 22 000 | 2, 3, 5 | 3740 | 2 | ✓ | 223*B0 | 223*B0A |
| 33 000 | 2, 3, 5 | 4090 | 1.5 | ✓ | 333*B0 | 333*B0A |
| 47 000 | 2, 3, 5 | 4090 | 1.5 | ✓ | 473*B0 | 473*B0A |
| 50 000 | 2, 3, 5 | 4190 | 1.5 | ✓ | 503*B0 | 503*B0A |
| 68 000 | 2, 3, 5 | 4190 | 1.5 | ✓ | 683*B0 | 683*B0A |
| 100 000 | 2, 3, 5 | 4190 | 1.5 | ✓ | 104*B0 | 104*B0A |
| 150 000 | 2, 3, 5 | 4370 | 2.5 | ✓ | 154*B0 | 154*B0A |
| 220 000 | 2, 3, 5 | 4370 | 2.5 | ✓ | 224*B0 | 224*B0A |
| 330 000 | 2, 3, 5 | 4570 | 1.5 | | 334*B0 | 334*B0A |
| 470 000 | 2, 3, 5 | 4570 | 1.5 | | 474*B0 | 474*B0A |

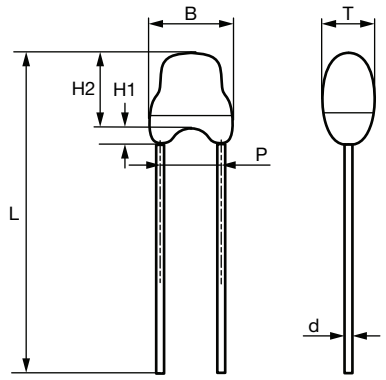
**Notes**

Preferred versions for new designs

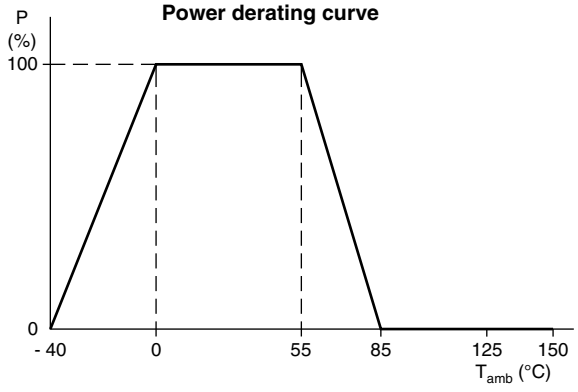
(1) Replace * in SAP by J for 5 %, H for 3 %, G for 2 %

(2) RoHS exemption 7(c)-I: electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezo-electronic devices, or in a glass or ceramic matrix compound

## DIMENSIONS in millimeters




## POWER DERATING




**Note**

- Zero power is considered as measuring power max. 1 % of max. power. Voltage on the NTC should always be below 50 $V_{DC}$

## PHYSICAL DIMENSIONS FOR RELEVANT TYPE (all dimensions in millimeters)

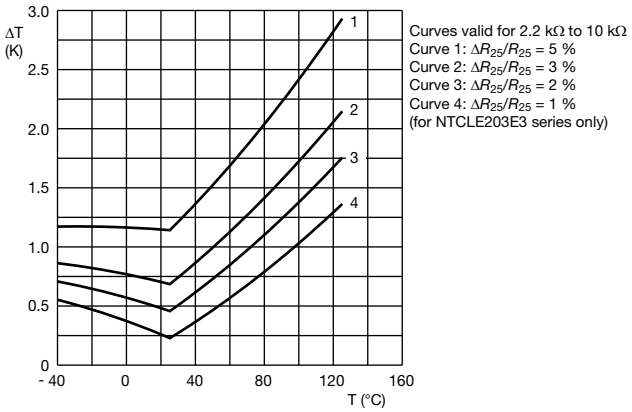
| $R_{25}$-VALUE | $B_{MAX.}$ | d | $H_1$ | | $H_{2\ MAX.}$ | L | P | $T_{MAX.}$ |
|---|---|---|---|---|---|---|---|---|
| | | | MIN. | MAX. | | | | |
| 3.3 Ω to 220 Ω | 5.0 | 0.6 ± 0.06 | 1.0 | 4.0 | 6.0 | 24 ± 1.5 | 2.54 | 4.0 |
| 330 Ω to 470 kΩ | 3.3 ± 0.5 | 0.6 ± 0.06 | 1.0 | 3.0 | 6.0 | 24 ± 1.5 | 2.54 | 3.0 |



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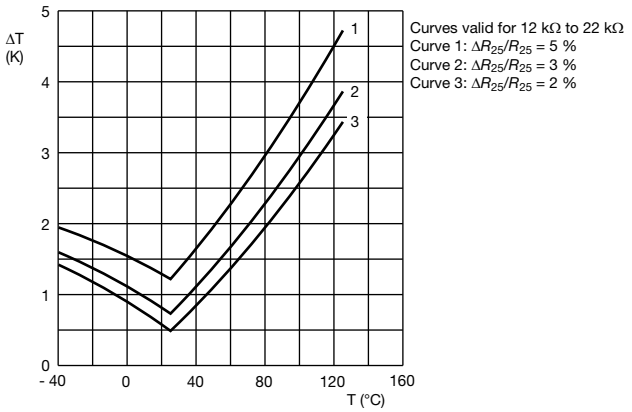
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## TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE



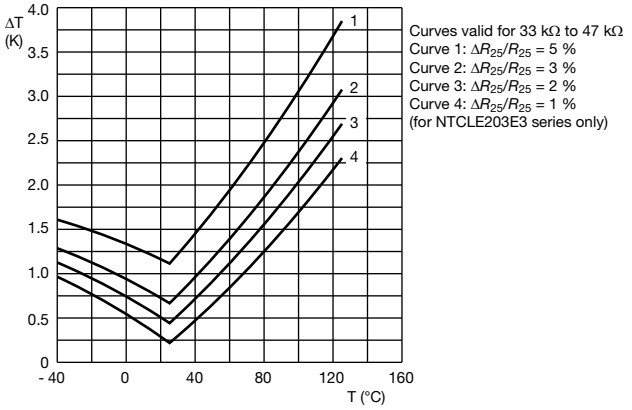

Curves valid for 2.2 kΩ to 10 kΩ
Curve 1: $\Delta R_{25}/R_{25}$ = 5 %
Curve 2: $\Delta R_{25}/R_{25}$ = 3 %
Curve 3: $\Delta R_{25}/R_{25}$ = 2 %
Curve 4: $\Delta R_{25}/R_{25}$ = 1 %
(for NTCLE203E3 series only)

## TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE



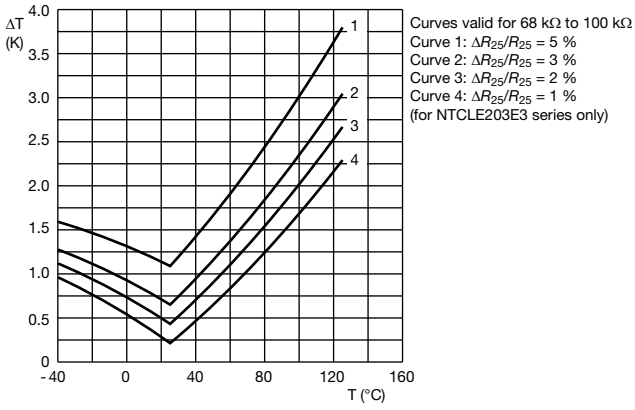

Curves valid for 12 kΩ to 22 kΩ
Curve 1: $\Delta R_{25}/R_{25}$ = 5 %
Curve 2: $\Delta R_{25}/R_{25}$ = 3 %
Curve 3: $\Delta R_{25}/R_{25}$ = 2 %

## TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE



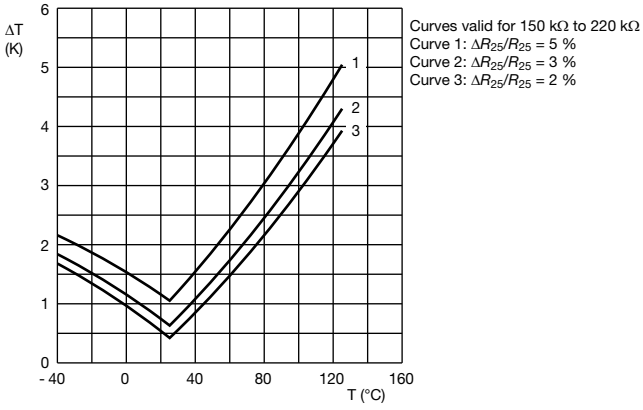

Curves valid for 33 kΩ to 47 kΩ
Curve 1: $\Delta R_{25}/R_{25}$ = 5 %
Curve 2: $\Delta R_{25}/R_{25}$ = 3 %
Curve 3: $\Delta R_{25}/R_{25}$ = 2 %
Curve 4: $\Delta R_{25}/R_{25}$ = 1 %
(for NTCLE203E3 series only)

## TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE



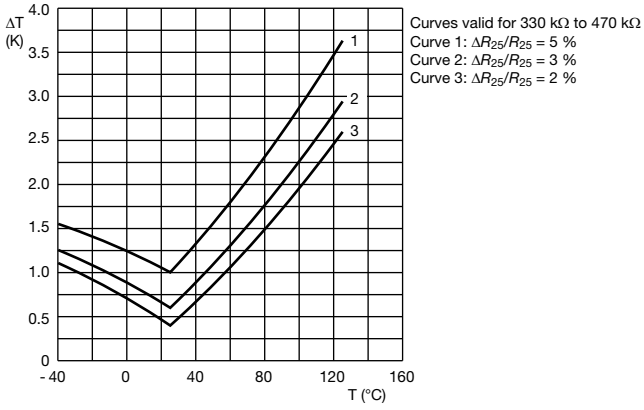

Curves valid for 68 kΩ to 100 kΩ
Curve 1: $\Delta R_{25}/R_{25}$ = 5 %
Curve 2: $\Delta R_{25}/R_{25}$ = 3 %
Curve 3: $\Delta R_{25}/R_{25}$ = 2 %
Curve 4: $\Delta R_{25}/R_{25}$ = 1 %
(for NTCLE203E3 series only)

## TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE




Curves valid for 150 kΩ to 220 kΩ
Curve 1: $\Delta R_{25}/R_{25}$ = 5 %
Curve 2: $\Delta R_{25}/R_{25}$ = 3 %
Curve 3: $\Delta R_{25}/R_{25}$ = 2 %

## TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE




Curves valid for 330 kΩ to 470 kΩ
Curve 1: $\Delta R_{25}/R_{25}$ = 5 %
Curve 2: $\Delta R_{25}/R_{25}$ = 3 %
Curve 3: $\Delta R_{25}/R_{25}$ = 2 %


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## $R_T$ VALUE AND TOLERANCE

These thermistors have a narrow tolerance on the B-value, the result of which provides a very small tolerance on the nominal resistance value over a wide temperature range. For this reason the usual graphs of $R = f(T)$ are replaced by Resistance Values at Intermediate Temperatures Tables, together with a formula to calculate the characteristics with a high precision.

## FORMULAE TO DETERMINE NOMINAL RESISTANCE VALUES

The resistance values at intermediate temperatures, or the operating temperature values, can be calculated using the following interpolation laws (extended *"Steinhart and Hart"*):

$$R_{(T)} = R_{ref} \times e^{(A + B/T + C/T^2 + D/T^3)}$$

$$T_{(R)} = \left(A_1 + B_1 \ln\frac{R}{R_{ref}} + C_1 \ln^2\frac{R}{R_{ref}} + D_1 \ln^3\frac{R}{R_{ref}}\right)^{-1}$$

where:

A, B, C, D, $A_1$, $B_1$, $C_1$ and $D_1$ are constant values depending on the material concerned; see table below.

$R_{ref.}$ is the resistance value at a reference temperature (in this event 25 °C, $R_{ref.} = R_{25}$).

T is the temperature in K. T (°C) = T (K) - 273.15

Formulae numbered  and  are interchangeable with an error of max. 0.005 °C in the range 25 °C to 125 °C and max. 0.015 °C in the range -40 °C to +25 °C.

## DETERMINATION OF THE RESISTANCE / TEMPERATURE DEVIATION FROM NOMINAL VALUE

The total resistance deviation is obtained by combining the "$R_{25}$-tolerance" and the "resistance deviation due to B-tolerance".

When:

X = $R_{25}$-tolerance
Y = resistance deviation due to B-tolerance
Z = complete resistance deviation,

then: $Z = \left[\left(1 + \frac{X}{100}\right) \times \left(1 + \frac{Y}{100}\right) - 1\right] \times 100\ \%$ or $Z \approx X + Y$

When:

TCR = temperature coefficient
$\Delta T$ = temperature deviation,

then: $\Delta T = \frac{Z}{TCR}$

The temperature tolerances are plotted in the graphs on the previous page.

**Example:** at 0 °C, assume X = 5 %, Y = 0.92 % and TCR = 5.09 %/K (see table ), then:

$$Z = \left\{\left[1 + \frac{5}{100}\right] \times \left[1 + \frac{0.92}{100}\right] - 1\right\} \times 100\ \%$$

$$= \{1.05 \times 1.0092 - 1\} \times 100\ \% = 5.966\ \%$$

$$\Delta T = \frac{Z}{TCR} = \frac{5.966}{5.09} \approx 1.17\ °C$$

A NTC with a $R_{25}$-value of 10 kΩ has a value of 32.55 kΩ between -1.17 °C and +1.17 °C.

**PARAMETER FOR DETERMINING NOMINAL RESISTANCE VALUES**

| NUMBER | $B_{25/85}$ (K) | NAME | TOL. B (%) | A | B (K) | C ($K^2$) | D ($K^3$) | $A_1$ | $B_1$ ($K^{-1}$) | $C_1$ ($K^{-2}$) | $D_1$ ($K^{-3}$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2880 | Mat O. with Bn = 2880K | 3 | - 9.094 | 2251.74 | 229098 | - 2.744820E+07 | 3.354016E-03 | 3.495020E-04 | 2.095959E-06 | 4.260615E-07 |
| 2 | 2990 | Mat P. with Bn = 3990K | 3 | - 10.2296 | 2887.62 | 132336 | - 2.502510E+07 | 3.354016E-03 | 3.415560E-04 | 4.955455E-06 | 4.364236E-07 |
| 3 | 3041 | Mat Q. with Bn = 3041K | 3 | - 11.1334 | 3658.73 | - 102895 | 5.166520E+05 | 3.354016E-03 | 3.349290E-04 | 3.683843E-06 | 7.050455E-07 |
| 4 | 3136 | Mat R. with Bn = 3136K | 3 | - 12.4493 | 4702.74 | - 402687 | 3.196830E+07 | 3.354016E-03 | 3.243880E-04 | 2.658012E-06 | - 2.701560E-07 |
| 5 | 3390 | Mat S. with Bn = 3390K | 3 | - 12.6814 | 4391.97 | - 232807 | 1.509643E+07 | 3.354016E-03 | 2.993410E-04 | 2.135133E-06 | - 5.672000E-09 |
| 6 | 3528 (1) | Mat I. with Bn = 3528K | 0.5 | - 12.0596 | 3687.667 | - 7617.13 | - 5.914730E+06 | 3.354016E-03 | 2.909670E-04 | 1.632136E-06 | 7.192200E-08 |
| | 3528 (2) | | | - 21.0704 | 11903.95 | - 2504699 | 2.470338E+08 | 3.354016E-03 | 2.933908E-04 | 3.494314E-06 | - 7.712690E-07 |
| 7 | 3560 | Mat H. with Bn = 3560K | 1.5 | - 13.0723 | 4190.574 | - 47158.4 | - 1.199256E+07 | 3.354016E-03 | 2.884193E-04 | 4.118032E-06 | 1.786790E-07 |
| 8 | 3740 | Mat B. with Bn = 3740K | 2 | - 13.8973 | 4557.725 | - 98275 | - 7.522357E+06 | 3.354016E-03 | 2.744032E-04 | 3.666944E-06 | 1.375492E-07 |
| 9 | 3977 | Mat A. with Bn =3977K | 0.75 | - 14.6337 | 4791.842 | - 115334 | - 3.730535E+06 | 3.354016E-03 | 2.569850E-04 | 2.620131E-06 | 6.383091E-08 |
| 10 | 4090 | Mat C. with Bn = 4090K | 1.5 | - 15.5322 | 5229.973 | - 160451 | - 5.414091E+06 | 3.354016E-03 | 2.519107E-04 | 3.510939E-06 | 1.105179E-07 |
| 11 | 4190 | Mat D. with Bn = 4190K | 1.5 | - 16.0349 | 5459.339 | - 191141 | - 3.328322E+06 | 3.354016E-03 | 2.460382E-04 | 3.405377E-06 | 1.034240E-07 |
| 12 | 4370 | Mat E. with Bn = 4370K | 2.5 | - 16.8717 | 5759.15 | - 194267 | - 6.869149E+06 | 3.354016E-03 | 2.367720E-04 | 3.585140E-06 | 1.255349E-07 |
| 13 | 4570 | Mat F. with Bn = 4570K | 1.5 | - 17.6439 | 6022.726 | - 203157 | - 7.183526E+06 | 3.354016E-03 | 2.264097E-04 | 3.278184E-06 | 1.097628E-07 |

**Notes**
(1) Temperature < 25 °C
(2) Temperature ≥ 25 °C


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For complete Curve Computation, visit: www.vishay.com/thermistors/ntc-curve-list/

| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH $R_{25}$ AT (3.3, 4.7, 6.8) Ω | | | | | |
|---|---|---|---|---|---|
| $T_{OPER}$ (°C) | PART NUMBER NTCLE100E3338*** | PART NUMBER NTCLE100E3478*** | PART NUMBER NTCLE100E3688*** | TCR (%/K) | $\Delta R/R$ DUE TO $B_{tol.}$ (%) |
| | $R_T$ (Ω) | $R_T$ (Ω) | $R_T$ (Ω) | | |
| -40 | 45.00 | 64.09 | 92.73 | -4.97 | 8.08 |
| -35 | 35.25 | 50.20 | 72.63 | -4.80 | 7.30 |
| -30 | 27.84 | 39.64 | 57.36 | -4.64 | 6.55 |
| -25 | 22.16 | 31.56 | 45.66 | -4.48 | 5.84 |
| -20 | 17.78 | 25.32 | 36.63 | -4.33 | 5.15 |
| -15 | 14.37 | 20.46 | 29.60 | -4.19 | 4.49 |
| -10 | 11.69 | 16.65 | 24.09 | -4.05 | 3.85 |
| -5 | 9.582 | 13.65 | 19.74 | -3.92 | 3.24 |
| 0 | 7.904 | 11.26 | 16.29 | -3.79 | 2.65 |
| 5 | 6.560 | 9.344 | 13.52 | -3.66 | 2.08 |
| 10 | 5.479 | 7.803 | 11.29 | -3.55 | 1.54 |
| 15 | 4.602 | 6.554 | 9.482 | -3.43 | 1.01 |
| 20 | 3.886 | 5.535 | 8.008 | -3.32 | 0.49 |
| 25 | 3.300 | 4.700 | 6.800 | -3.22 | 0.00 |
| 30 | 2.816 | 4.011 | 5.803 | -3.12 | 0.48 |
| 35 | 2.415 | 3.440 | 4.977 | -3.02 | 0.94 |
| 40 | 2.081 | 2.964 | 4.289 | -2.93 | 1.39 |
| 45 | 1.801 | 2.566 | 3.712 | -2.84 | 1.82 |
| 50 | 1.566 | 2.230 | 3.227 | -2.76 | 2.24 |
| 55 | 1.367 | 1.947 | 2.817 | -2.68 | 2.65 |
| 60 | 1.198 | 1.706 | 2.469 | -2.60 | 3.04 |
| 65 | 1.054 | 1.501 | 2.172 | -2.52 | 3.43 |
| 70 | 0.9308 | 1.326 | 1.918 | -2.45 | 3.80 |
| 75 | 0.8248 | 1.175 | 1.700 | -2.38 | 4.16 |
| 80 | 0.7334 | 1.044 | 1.511 | -2.32 | 4.51 |
| 85 | 0.6542 | 0.9318 | 1.348 | -2.25 | 4.85 |
| 90 | 0.5854 | 0.8338 | 1.206 | -2.19 | 5.19 |
| 95 | 0.5255 | 0.7484 | 1.083 | -2.13 | 5.51 |
| 100 | 0.4730 | 0.6737 | 0.9748 | -2.07 | 5.82 |
| 105 | 0.4270 | 0.6082 | 0.8799 | -2.02 | 6.13 |
| 110 | 0.3865 | 0.5505 | 0.7965 | -1.97 | 6.43 |
| 115 | 0.3508 | 0.4996 | 0.7228 | -1.92 | 6.72 |
| 120 | 0.3192 | 0.4545 | 0.6576 | -1.87 | 7.00 |
| 125 | 0.2911 | 0.4145 | 0.5998 | -1.82 | 7.28 |
| 130 | 0.2661 | 0.3789 | 0.5483 | -1.77 | 7.55 |
| 135 | 0.2438 | 0.3472 | 0.5023 | -1.73 | 7.81 |
| 140 | 0.2238 | 0.3188 | 0.4612 | -1.69 | 8.07 |
| 145 | 0.2059 | 0.2933 | 0.4244 | -1.65 | 8.32 |
| 150 | 0.1899 | 0.2704 | 0.3912 | -1.61 | 8.56 |



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| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH $R_{25}$ AT (10, 15, 22) Ω | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $T_{OPER}$ (°C) | PART NUMBER NTCLE100E3109*** | | | PART NUMBER NTCLE100E3159*** | | | PART NUMBER NTCLE100E3229*** | | |
| | $R_T$ (Ω) | TCR (%/K) | $\Delta R/R$ DUE TO $B_{tol.}$ (%) | $R_T$ (Ω) | TCR (%/K) | $\Delta R/R$ DUE TO $B_{tol.}$ (%) | $R_T$ (Ω) | TCR (%/K) | $\Delta R/R$ DUE TO $B_{tol.}$ (%) |
| -40 | 136.7 | -4.86 | 8.39 | 224.8 | -5.16 | 8.65 | 374.9 | -5.54 | 8.80 |
| -35 | 107.6 | -4.72 | 7.58 | 174.5 | -4.98 | 7.79 | 285.8 | -5.31 | 7.95 |
| -30 | 85.32 | -4.58 | 6.81 | 136.6 | -4.80 | 6.98 | 220.4 | -5.10 | 7.14 |
| -25 | 68.10 | -4.44 | 6.06 | 107.9 | -4.64 | 6.21 | 171.7 | -4.90 | 6.36 |
| -20 | 54.72 | -4.31 | 5.35 | 85.94 | -4.48 | 5.47 | 135.0 | -4.71 | 5.61 |
| -15 | 44.25 | -4.18 | 4.66 | 68.96 | -4.33 | 4.76 | 107.2 | -4.53 | 4.89 |
| -10 | 36.02 | -4.06 | 4.00 | 55.74 | -4.19 | 4.08 | 85.79 | -4.37 | 4.20 |
| -5 | 29.49 | -3.94 | 3.37 | 45.37 | -4.05 | 3.43 | 69.21 | -4.22 | 3.53 |
| 0 | 24.30 | -3.82 | 2.75 | 37.17 | -3.92 | 2.81 | 56.26 | -4.07 | 2.89 |
| 5 | 20.13 | -3.71 | 2.16 | 30.65 | -3.80 | 2.20 | 46.05 | -3.94 | 2.27 |
| 10 | 16.77 | -3.60 | 1.59 | 25.42 | -3.68 | 1.62 | 37.94 | -3.81 | 1.67 |
| 15 | 14.04 | -3.50 | 1.04 | 21.21 | -3.57 | 1.06 | 31.45 | -3.69 | 1.10 |
| 20 | 11.82 | -3.39 | 0.51 | 17.79 | -3.46 | 0.52 | 26.23 | -3.57 | 0.54 |
| 25 | 10.00 | -3.30 | 0.00 | 15.00 | -3.36 | 0.00 | 22.00 | -3.47 | 0.00 |
| 30 | 8.500 | -3.20 | 0.50 | 12.76 | -3.26 | 0.49 | 18.55 | -3.36 | 0.52 |
| 35 | 7.259 | -3.11 | 0.98 | 10.86 | -3.17 | 0.98 | 15.72 | -3.26 | 1.02 |
| 40 | 6.226 | -3.03 | 1.44 | 9.291 | -3.08 | 1.46 | 13.38 | -3.17 | 1.51 |
| 45 | 5.363 | -2.94 | 1.89 | 7.982 | -2.99 | 1.92 | 11.45 | -3.08 | 1.98 |
| 50 | 4.639 | -2.86 | 2.33 | 6.887 | -2.91 | 2.36 | 9.833 | -3.00 | 2.44 |
| 55 | 4.029 | -2.78 | 2.75 | 5.966 | -2.83 | 2.79 | 8.482 | -2.92 | 2.88 |
| 60 | 3.512 | -2.71 | 3.16 | 5.189 | -2.75 | 3.21 | 7.346 | -2.84 | 3.32 |
| 65 | 3.073 | -2.64 | 3.56 | 4.529 | -2.68 | 3.62 | 6.386 | -2.76 | 3.73 |
| 70 | 2.698 | -2.57 | 3.95 | 3.968 | -2.61 | 4.02 | 5.572 | -2.69 | 4.14 |
| 75 | 2.377 | -2.50 | 4.32 | 3.488 | -2.54 | 4.41 | 4.879 | -2.62 | 4.53 |
| 80 | 2.101 | -2.43 | 4.69 | 3.077 | -2.48 | 4.78 | 4.286 | -2.56 | 4.91 |
| 85 | 1.864 | -2.37 | 5.04 | 2.722 | -2.41 | 5.15 | 3.777 | -2.50 | 5.29 |
| 90 | 1.658 | -2.31 | 5.38 | 2.416 | -2.35 | 5.51 | 3.339 | -2.44 | 5.65 |
| 95 | 1.479 | -2.25 | 5.72 | 2.151 | -2.30 | 5.85 | 2.960 | -2.38 | 6.00 |
| 100 | 1.323 | -2.20 | 6.05 | 1.920 | -2.24 | 6.19 | 2.632 | -2.32 | 6.34 |
| 105 | 1.187 | -2.14 | 6.36 | 1.719 | -2.19 | 6.53 | 2.347 | -2.27 | 6.68 |
| 110 | 1.068 | -2.09 | 6.67 | 1.543 | -2.13 | 6.85 | 2.098 | -2.22 | 7.00 |
| 115 | 0.9635 | -2.04 | 6.98 | 1.389 | -2.08 | 7.17 | 1.880 | -2.17 | 7.32 |
| 120 | 0.8712 | -1.99 | 7.27 | 1.253 | -2.03 | 7.48 | 1.689 | -2.12 | 7.62 |
| 125 | 0.7897 | -1.94 | 7.56 | 1.133 | -1.99 | 7.78 | 1.521 | -2.07 | 7.93 |
| 130 | 0.7174 | -1.90 | 7.84 | 1.027 | -1.94 | 8.08 | 1.373 | -2.03 | 8.22 |
| 135 | 0.6533 | -1.85 | 8.11 | 0.9326 | -1.90 | 8.37 | 1.242 | -1.98 | 8.50 |
| 140 | 0.5961 | -1.81 | 8.37 | 0.8490 | -1.86 | 8.65 | 1.126 | -1.94 | 8.78 |
| 145 | 0.5451 | -1.77 | 8.63 | 0.7744 | -1.82 | 8.93 | 1.023 | -1.90 | 9.06 |
| 150 | 0.4995 | -1.73 | 8.89 | 0.7079 | -1.78 | 9.20 | 0.9309 | -1.86 | 9.32 |


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| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH $R_{25}$ AT (33, 47, 68) Ω | | | | | |
|---|---|---|---|---|---|
| $T_{OPER}$ (°C) | PART NUMBER NTCLE100E3339*** $R_T$ (Ω) | PART NUMBER NTCLE100E3479*** $R_T$ (Ω) | PART NUMBER NTCLE100E3689*** $R_T$ (Ω) | TCR (%/K) | $\Delta R/R$ DUE TO $B_{tol.}$ (%) |
| -40 | 707.0 | 1007 | 1457 | -5.94 | 9.30 |
| -35 | 528.5 | 752.7 | 1089 | -5.70 | 8.44 |
| -30 | 399.5 | 569.0 | 823.3 | -5.49 | 7.60 |
| -25 | 305.3 | 434.8 | 629.1 | -5.28 | 6.79 |
| -20 | 235.6 | 335.6 | 485.5 | -5.09 | 6.01 |
| -15 | 183.5 | 261.4 | 378.2 | -4.90 | 5.25 |
| -10 | 144.3 | 205.5 | 297.3 | -4.73 | 4.51 |
| -5 | 114.3 | 162.8 | 235.6 | -4.57 | 3.80 |
| 0 | 91.34 | 130.1 | 188.2 | -4.42 | 3.11 |
| 5 | 73.51 | 104.7 | 151.5 | -4.27 | 2.45 |
| 10 | 59.59 | 84.87 | 122.8 | -4.13 | 1.80 |
| 15 | 48.63 | 69.26 | 100.2 | -4.00 | 1.18 |
| 20 | 39.94 | 56.88 | 82.29 | -3.88 | 0.58 |
| 25 | 33.00 | 47.00 | 68.00 | -3.76 | 0.00 |
| 30 | 27.43 | 39.06 | 56.51 | -3.64 | 0.56 |
| 35 | 22.92 | 32.64 | 47.23 | -3.54 | 1.11 |
| 40 | 19.26 | 27.42 | 39.68 | -3.43 | 1.63 |
| 45 | 16.26 | 23.16 | 33.50 | -3.34 | 2.14 |
| 50 | 13.79 | 19.65 | 28.42 | -3.24 | 2.63 |
| 55 | 11.76 | 16.74 | 24.23 | -3.15 | 3.11 |
| 60 | 10.06 | 14.33 | 20.74 | -3.07 | 3.57 |
| 65 | 8.652 | 12.32 | 17.83 | -2.98 | 4.02 |
| 70 | 7.468 | 10.64 | 15.39 | -2.90 | 4.45 |
| 75 | 6.471 | 9.216 | 13.33 | -2.83 | 4.87 |
| 80 | 5.628 | 8.015 | 11.60 | -2.76 | 5.27 |
| 85 | 4.912 | 6.996 | 10.12 | -2.69 | 5.66 |
| 90 | 4.302 | 6.127 | 8.865 | -2.62 | 6.04 |
| 95 | 3.780 | 5.384 | 7.790 | -2.55 | 6.41 |
| 100 | 3.332 | 4.746 | 6.867 | -2.49 | 6.77 |
| 105 | 2.946 | 4.196 | 6.071 | -2.43 | 7.11 |
| 110 | 2.613 | 3.721 | 5.384 | -2.37 | 7.45 |
| 115 | 2.324 | 3.310 | 4.788 | -2.32 | 7.77 |
| 120 | 2.072 | 2.951 | 4.270 | -2.26 | 8.09 |
| 125 | 1.853 | 2.639 | 3.818 | -2.21 | 8.39 |
| 130 | 1.661 | 2.365 | 3.422 | -2.16 | 8.69 |
| 135 | 1.492 | 2.125 | 3.075 | -2.11 | 8.97 |
| 140 | 1.344 | 1.914 | 2.770 | -2.07 | 9.25 |
| 145 | 1.213 | 1.728 | 2.500 | -2.02 | 9.52 |
| 150 | 1.098 | 1.564 | 2.262 | -1.98 | 9.79 |



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| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH $R_{25}$ AT (100, 150, 220, 330, 470, 680) Ω | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $T_{OPER}$ (°C) | PART NUMBER NTCLE100E3101*** | PART NUMBER NTCLE100E3151*** | PART NUMBER NTCLE100E3221*** | PART NUMBER NTCLE100E3331*** | PART NUMBER NTCLE100E3471*** | PART NUMBER NTCLE100E3681*** | TCR (%/K) | $\Delta R/R$ DUE TO $B_{tol.}$ (%) |
| | $R_T$ (Ω) | $R_T$ (Ω) | $R_T$ (Ω) | $R_T$ (Ω) | $R_T$ (Ω) | $R_T$ (Ω) | | |
| -40 | 2193 | 3289 | 4824 | 7236 | 10 305 | 14 910 | -5.75 | 4.99 |
| -35 | 1652 | 2478 | 3635 | 5452 | 7766 | 11 235 | -5.57 | 4.51 |
| -30 | 1256 | 1884 | 2763 | 4144 | 5902 | 8540 | -5.40 | 4.05 |
| -25 | 962.5 | 1444 | 2117 | 3176 | 4524 | 6545 | -5.24 | 3.61 |
| -20 | 743.6 | 1115 | 1636 | 2454 | 3495 | 5057 | -5.08 | 3.19 |
| -15 | 579.0 | 868.5 | 1274 | 1911 | 2721 | 3937 | -4.93 | 2.78 |
| -10 | 454.2 | 681.2 | 999.1 | 1499 | 2135 | 3088 | -4.78 | 2.38 |
| -5 | 358.8 | 538.2 | 789.4 | 1184 | 1686 | 2440 | -4.64 | 2.01 |
| 0 | 285.4 | 428.2 | 628.0 | 942.0 | 1342 | 1941 | -4.51 | 1.64 |
| 5 | 228.6 | 342.9 | 502.9 | 754.4 | 1074 | 1554 | -4.38 | 1.29 |
| 10 | 184.2 | 276.4 | 405.3 | 608.0 | 866.0 | 1253 | -4.25 | 0.95 |
| 15 | 149.4 | 224.1 | 328.7 | 493.1 | 702.2 | 1016 | -4.13 | 0.62 |
| 20 | 121.9 | 182.8 | 268.2 | 402.2 | 572.9 | 828.8 | -4.01 | 0.31 |
| 25 | 100.0 | 150.0 | 220.0 | 330.0 | 470.0 | 680.0 | -3.90 | 0.00 |
| 30 | 82.49 | 123.7 | 181.5 | 272.2 | 387.7 | 561.0 | -3.80 | 0.30 |
| 35 | 68.41 | 102.6 | 150.5 | 225.8 | 321.5 | 465.2 | -3.69 | 0.58 |
| 40 | 57.02 | 85.54 | 125.5 | 188.2 | 268.0 | 387.8 | -3.59 | 0.86 |
| 45 | 47.77 | 71.65 | 105.1 | 157.6 | 224.5 | 324.8 | -3.50 | 1.13 |
| 50 | 40.20 | 60.30 | 88.44 | 132.7 | 188.9 | 273.3 | -3.40 | 1.39 |
| 55 | 33.98 | 50.98 | 74.76 | 112.1 | 159.7 | 231.1 | -3.31 | 1.64 |
| 60 | 28.86 | 43.28 | 63.48 | 95.23 | 135.6 | 196.2 | -3.23 | 1.88 |
| 65 | 24.61 | 36.91 | 54.13 | 81.20 | 115.6 | 167.3 | -3.15 | 2.12 |
| 70 | 21.07 | 31.60 | 46.35 | 69.52 | 99.01 | 143.3 | -3.07 | 2.35 |
| 75 | 18.11 | 27.16 | 39.84 | 59.76 | 85.11 | 123.1 | -2.99 | 2.57 |
| 80 | 15.62 | 23.43 | 34.37 | 51.56 | 73.43 | 106.2 | -2.91 | 2.79 |
| 85 | 13.53 | 20.29 | 29.76 | 44.65 | 63.59 | 92.00 | -2.84 | 3.00 |
| 90 | 11.76 | 17.63 | 25.86 | 38.80 | 55.26 | 79.95 | -2.77 | 3.21 |
| 95 | 10.25 | 15.38 | 22.55 | 33.83 | 48.18 | 69.71 | -2.71 | 3.41 |
| 100 | 8.968 | 13.45 | 19.73 | 29.59 | 42.15 | 60.98 | -2.64 | 3.60 |
| 105 | 7.871 | 11.81 | 17.32 | 25.97 | 36.99 | 53.52 | -2.58 | 3.79 |
| 110 | 6.928 | 10.39 | 15.24 | 22.86 | 32.56 | 47.11 | -2.52 | 3.97 |
| 115 | 6.117 | 9.176 | 13.46 | 20.19 | 28.75 | 41.60 | -2.46 | 4.15 |
| 120 | 5.416 | 8.125 | 11.92 | 17.87 | 25.46 | 36.83 | -2.41 | 4.33 |
| 125 | 4.809 | 7.214 | 10.58 | 15.87 | 22.60 | 32.70 | -2.35 | 4.50 |
| 130 | 4.282 | 6.422 | 9.419 | 14.13 | 20.12 | 29.11 | -2.30 | 4.66 |
| 135 | 3.822 | 5.732 | 8.408 | 12.61 | 17.96 | 25.99 | -2.25 | 4.83 |
| 140 | 3.420 | 5.130 | 7.523 | 11.29 | 16.07 | 23.25 | -2.20 | 4.99 |
| 145 | 3.068 | 4.601 | 6.749 | 10.12 | 14.42 | 20.86 | -2.15 | 5.14 |
| 150 | 2.758 | 4.137 | 6.068 | 9.102 | 12.96 | 18.76 | -2.10 | 5.29 |



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| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH $R_{25}$ AT (1, 1.5, 2) kΩ | | | | | |
|---|---|---|---|---|---|
| $T_{OPER}$ (°C) | PART NUMBER NTCLE100E3102*** | PART NUMBER NTCLE100E3152*** | PART NUMBER NTCLE100E3202*** | TCR (%/K) | $\Delta R/R$ DUE TO $B_{tol.}$ (%) |
| | $R_T$ (Ω) | $R_T$ (Ω) | $R_T$ (Ω) | | |
| -40 | 23 342 | 35 013 | 46 684 | -6.06 | 1.65 |
| -35 | 17 336 | 26 004 | 34 672 | -5.84 | 1.49 |
| -30 | 13 018 | 19 526 | 26 035 | -5.62 | 1.34 |
| -25 | 9877 | 14 816 | 19 754 | -5.42 | 1.19 |
| -20 | 7569 | 11 353 | 15 138 | -5.23 | 1.05 |
| -15 | 5855 | 8782 | 11 709 | -5.05 | 0.92 |
| -10 | 4569 | 6854 | 9138 | -4.87 | 0.79 |
| -5 | 3596 | 5395 | 7193 | -4.71 | 0.66 |
| 0 | 2854 | 4280 | 5707 | -4.55 | 0.54 |
| 5 | 2282 | 3422 | 4563 | -4.40 | 0.43 |
| 10 | 1838 | 2757 | 3675 | -4.26 | 0.31 |
| 15 | 1491 | 2236 | 2981 | -4.12 | 0.21 |
| 20 | 1217 | 1826 | 2434 | -3.99 | 0.10 |
| 25 | 1000 | 1500 | 2000 | -3.87 | 0.00 |
| 30 | 826.6 | 1240 | 1653 | -3.75 | 0.10 |
| 35 | 687.3 | 1031 | 1375 | -3.63 | 0.19 |
| 40 | 574.6 | 861.9 | 1149 | -3.53 | 0.28 |
| 45 | 482.7 | 724.0 | 965.4 | -3.42 | 0.37 |
| 50 | 407.4 | 611.0 | 814.7 | -3.32 | 0.46 |
| 55 | 345.2 | 517.8 | 690.5 | -3.23 | 0.54 |
| 60 | 293.7 | 440.6 | 587.4 | -3.14 | 0.62 |
| 65 | 250.8 | 376.2 | 501.6 | -3.05 | 0.70 |
| 70 | 214.9 | 322.4 | 429.8 | -2.97 | 0.78 |
| 75 | 184.7 | 277.1 | 369.5 | -2.89 | 0.86 |
| 80 | 159.3 | 238.9 | 318.6 | -2.81 | 0.93 |
| 85 | 137.7 | 206.6 | 275.5 | -2.73 | 1.01 |
| 90 | 119.4 | 179.1 | 238.8 | -2.66 | 1.08 |
| 95 | 103.8 | 155.7 | 207.6 | -2.59 | 1.15 |
| 100 | 90.45 | 135.7 | 180.9 | -2.53 | 1.22 |
| 105 | 79.00 | 118.5 | 158.0 | -2.46 | 1.29 |
| 110 | 69.15 | 103.7 | 138.3 | -2.40 | 1.35 |
| 115 | 60.66 | 90.99 | 121.3 | -2.34 | 1.42 |
| 120 | 53.32 | 79.98 | 106.6 | -2.29 | 1.48 |
| 125 | 46.96 | 70.44 | 93.92 | -2.23 | 1.55 |
| 130 | 41.43 | 62.15 | 82.87 | -2.18 | 1.61 |
| 135 | 36.63 | 54.94 | 73.25 | -2.13 | 1.67 |
| 140 | 32.43 | 48.65 | 64.87 | -2.08 | 1.73 |
| 145 | 28.77 | 43.16 | 57.54 | -2.03 | 1.79 |
| 150 | 25.56 | 38.34 | 51.12 | -1.98 | 1.85 |


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| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH $R_{25}$ AT (2.2, 2.7, 3.3, 4.7, 5.0, 6.8, 10) kΩ | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $T_{OPER}$ (°C) | PART NUMBER NTCLE100E3222*** | PART NUMBER NTCLE100E3272*** | PART NUMBER NTCLE100E3332*** | PART NUMBER NTCLE100E3472*** | PART NUMBER NTCLE100E3502*** | PART NUMBER NTCLE100E3682*** | PART NUMBER NTCLE100E3103*** | TCR (%/K) | $\Delta R/R$ DUE TO $B_{tol.}$ (%) |
| | $R_T$ (Ω) | $R_T$ (Ω) | $R_T$ (Ω) | $R_T$ (Ω) | $R_T$ (Ω) | $R_T$ (Ω) | $R_T$ (Ω) | | |
| -40 | 73 061 | 89 665 | 109 591 | 156 084 | 166 047 | 225 824 | 332 094 | -6.62 | 2.79 |
| -35 | 52 778 | 64 773 | 79 167 | 112 753 | 119 950 | 163 132 | 239 900 | -6.39 | 2.52 |
| -30 | 38 544 | 47 304 | 57 816 | 82 344 | 87 600 | 119 136 | 175 200 | -6.18 | 2.26 |
| -25 | 28 443 | 34 907 | 42 665 | 60 765 | 64 643 | 87 915 | 129 287 | -5.98 | 2.02 |
| -20 | 21 199 | 26 017 | 31 798 | 45 288 | 48 179 | 65 524 | 96 358 | -5.78 | 1.78 |
| -15 | 15 950 | 19 575 | 23 925 | 34 075 | 36 250 | 49 300 | 72 500 | -5.60 | 1.55 |
| -10 | 12 110 | 14 862 | 18 165 | 25 872 | 27 523 | 37 431 | 55 046 | -5.42 | 1.33 |
| -5 | 9275 | 11 382 | 13 912 | 19 814 | 21 078 | 28 667 | 42 157 | -5.25 | 1.12 |
| 0 | 7162 | 8790 | 10 743 | 15 300 | 16 277 | 22 137 | 32 554 | -5.09 | 0.92 |
| 5 | 5574 | 6841 | 8362 | 11 909 | 12 669 | 17 230 | 25 339 | -4.93 | 0.72 |
| 10 | 4372 | 5365 | 6558 | 9340 | 9936 | 13 513 | 19 872 | -4.79 | 0.53 |
| 15 | 3454 | 4239 | 5180 | 7378 | 7849 | 10 675 | 15 698 | -4.64 | 0.35 |
| 20 | 2747 | 3372 | 4121 | 5869 | 6244 | 8492 | 12 488 | -4.51 | 0.17 |
| 25 | 2200 | 2700 | 3300 | 4700 | 5000 | 6800 | 10 000 | -4.38 | 0.00 |
| 30 | 1773 | 2176 | 2659 | 3788 | 4030 | 5480 | 8059 | -4.25 | 0.17 |
| 35 | 1438 | 1764 | 2156 | 3071 | 3267 | 4444 | 6535 | -4.13 | 0.32 |
| 40 | 1173 | 1439 | 1759 | 2505 | 2665 | 3624 | 5330 | -4.02 | 0.48 |
| 45 | 961.8 | 1180 | 1443 | 2055 | 2186 | 2973 | 4372 | -3.91 | 0.63 |
| 50 | 793.2 | 973.4 | 1190 | 1694 | 1803 | 2452 | 3605 | -3.80 | 0.77 |
| 55 | 657.5 | 806.9 | 986.3 | 1405 | 1494 | 2032 | 2989 | -3.70 | 0.91 |
| 60 | 547.8 | 672.3 | 821.7 | 1170 | 1245 | 1693 | 2490 | -3.60 | 1.05 |
| 65 | 458.6 | 562.8 | 687.9 | 979.7 | 1042 | 1417 | 2084 | -3.51 | 1.18 |
| 70 | 385.7 | 473.3 | 578.5 | 823.9 | 876.5 | 1192 | 1753 | -3.42 | 1.31 |
| 75 | 325.8 | 399.8 | 488.7 | 696.0 | 740.5 | 1007 | 1481 | -3.33 | 1.44 |
| 80 | 276.4 | 339.2 | 414.6 | 590.5 | 628.2 | 854.3 | 1256 | -3.25 | 1.56 |
| 85 | 235.5 | 289.0 | 353.2 | 503.0 | 535.2 | 727.8 | 1070 | -3.17 | 1.68 |
| 90 | 201.4 | 247.2 | 302.1 | 430.2 | 457.7 | 622.5 | 915.4 | -3.09 | 1.79 |
| 95 | 172.9 | 212.2 | 259.4 | 369.4 | 393.0 | 534.5 | 786.0 | -3.01 | 1.90 |
| 100 | 149.0 | 182.9 | 223.5 | 318.3 | 338.6 | 460.6 | 677.3 | -2.94 | 2.01 |
| 105 | 128.9 | 158.2 | 193.3 | 275.3 | 292.9 | 398.3 | 585.7 | -2.87 | 2.12 |
| 110 | 111.8 | 137.2 | 167.7 | 238.9 | 254.2 | 345.7 | 508.3 | -2.80 | 2.22 |
| 115 | 97.37 | 119.5 | 146.1 | 208.0 | 221.3 | 301.0 | 442.6 | -2.74 | 2.32 |
| 120 | 85.05 | 104.4 | 127.6 | 181.7 | 193.3 | 262.9 | 386.6 | -2.67 | 2.42 |
| 125 | 74.52 | 91.46 | 111.8 | 159.2 | 169.4 | 230.3 | 338.7 | -2.61 | 2.51 |
| 130 | 65.49 | 80.38 | 98.24 | 139.9 | 148.8 | 202.4 | 297.7 | -2.55 | 2.61 |
| 135 | 57.72 | 70.84 | 86.59 | 123.3 | 131.2 | 178.4 | 262.4 | -2.50 | 2.70 |
| 140 | 51.02 | 62.62 | 76.53 | 109.0 | 116.0 | 157.7 | 231.9 | -2.44 | 2.78 |
| 145 | 45.22 | 55.49 | 67.83 | 96.60 | 102.8 | 139.8 | 205.5 | -2.39 | 2.87 |
| 150 | 40.18 | 49.31 | 60.27 | 85.84 | 91.32 | 124.2 | 182.6 | -2.34 | 2.96 |


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| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH $R_{25}$ AT (12, 15, 22) kΩ | | | | | |
|---|---|---|---|---|---|
| $T_{OPER}$ (°C) | PART NUMBER NTCLE100E3123*** | PART NUMBER NTCLE100E3153*** | PART NUMBER NTCLE100E3223*** | TCR (%/K) | $\Delta R/R$ DUE TO $B_{tol.}$ (%) |
| | $R_T$ (kΩ) | $R_T$ (kΩ) | $R_T$ (kΩ) | | |
| -40 | 309.4 | 386.7 | 567.2 | -6.07 | 7.00 |
| -35 | 229.5 | 286.9 | 420.8 | -5.88 | 6.32 |
| -30 | 171.8 | 214.8 | 315.0 | -5.70 | 5.68 |
| -25 | 129.8 | 162.3 | 238.0 | -5.52 | 5.06 |
| -20 | 98.93 | 123.7 | 181.4 | -5.35 | 4.46 |
| -15 | 76.02 | 95.02 | 139.4 | -5.19 | 3.89 |
| -10 | 58.88 | 73.60 | 107.9 | -5.03 | 3.34 |
| -5 | 45.95 | 57.44 | 84.25 | -4.88 | 2.81 |
| 0 | 36.13 | 45.16 | 66.24 | -4.74 | 2.30 |
| 5 | 28.61 | 35.76 | 52.45 | -4.60 | 1.80 |
| 10 | 22.80 | 28.51 | 41.81 | -4.47 | 1.33 |
| 15 | 18.30 | 22.87 | 33.55 | -4.34 | 0.87 |
| 20 | 14.77 | 18.47 | 27.08 | -4.22 | 0.43 |
| 25 | 12.00 | 15.00 | 22.00 | -4.10 | 0.00 |
| 30 | 9.804 | 12.25 | 17.97 | -3.99 | 0.41 |
| 35 | 8.054 | 10.07 | 14.77 | -3.88 | 0.81 |
| 40 | 6.652 | 8.315 | 12.20 | -3.77 | 1.20 |
| 45 | 5.522 | 6.903 | 10.12 | -3.67 | 1.58 |
| 50 | 4.607 | 5.759 | 8.447 | -3.58 | 1.94 |
| 55 | 3.862 | 4.828 | 7.081 | -3.48 | 2.29 |
| 60 | 3.252 | 4.066 | 5.963 | -3.39 | 2.64 |
| 65 | 2.751 | 3.439 | 5.044 | -3.30 | 2.97 |
| 70 | 2.337 | 2.921 | 4.284 | -3.22 | 3.29 |
| 75 | 1.993 | 2.492 | 3.654 | -3.14 | 3.60 |
| 80 | 1.707 | 2.134 | 3.129 | -3.06 | 3.91 |
| 85 | 1.467 | 1.834 | 2.690 | -2.99 | 4.20 |
| 90 | 1.266 | 1.582 | 2.321 | -2.92 | 4.49 |
| 95 | 1.096 | 1.370 | 2.010 | -2.85 | 4.77 |
| 100 | 0.9524 | 1.190 | 1.746 | -2.78 | 5.04 |
| 105 | 0.8302 | 1.038 | 1.522 | -2.71 | 5.31 |
| 110 | 0.7260 | 0.9075 | 1.331 | -2.65 | 5.56 |
| 115 | 0.6369 | 0.7961 | 1.168 | -2.59 | 5.82 |
| 120 | 0.5604 | 0.7005 | 1.027 | -2.53 | 6.06 |
| 125 | 0.4945 | 0.6181 | 0.9065 | -2.47 | 6.30 |
| 130 | 0.4375 | 0.5469 | 0.8022 | -2.42 | 6.53 |
| 135 | 0.3882 | 0.4853 | 0.7117 | -2.37 | 6.76 |
| 140 | 0.3454 | 0.4317 | 0.6332 | -2.31 | 6.98 |
| 145 | 0.3080 | 0.3850 | 0.5647 | -2.26 | 7.20 |
| 150 | 0.2754 | 0.3442 | 0.5049 | -2.22 | 7.41 |



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For complete Curve Computation, visit: www.vishay.com/thermistors/ntc-curve-list/

**RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH $R_{25}$ AT (33, 47, 50, 68, 100) kΩ**

| $T_{OPER}$ (°C) | PART NUMBER NTCLE100E3 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 333*** | 473*** | TCR (%/K) | $\Delta R/R$ DUE TO $B_{tol.}$ (%) | 503*** | 683*** | 104*** | TCR (%/K) | $\Delta R/R$ DUE TO $B_{tol.}$ (%) |
| | $R_T$ (kΩ) | $R_T$ (kΩ) | | | $R_T$ (kΩ) | $R_T$ (kΩ) | $R_T$ (kΩ) | | |
| -40 | 1116 | 1589 | -6.54 | 5.74 | 1833 | 2493 | 3666 | -6.69 | 5.88 |
| -35 | 808.6 | 1152 | -6.34 | 5.19 | 1319 | 1794 | 2638 | -6.49 | 5.31 |
| -30 | 591.7 | 842.8 | -6.15 | 4.66 | 958.3 | 1303 | 1917 | -6.29 | 4.77 |
| -25 | 437.1 | 622.6 | -5.96 | 4.15 | 703.1 | 956.2 | 1406 | -6.10 | 4.25 |
| -20 | 325.9 | 464.1 | -5.79 | 3.66 | 520.6 | 708.0 | 1041 | -5.92 | 3.75 |
| -15 | 245.0 | 349.0 | -5.62 | 3.19 | 388.9 | 528.9 | 777.8 | -5.75 | 3.27 |
| -10 | 185.8 | 264.6 | -5.45 | 2.74 | 293.0 | 398.5 | 586.1 | -5.58 | 2.80 |
| -5 | 142.0 | 202.3 | -5.30 | 2.30 | 222.6 | 302.8 | 445.3 | -5.42 | 2.36 |
| 0 | 109.4 | 155.8 | -5.14 | 1.88 | 170.5 | 231.8 | 340.9 | -5.26 | 1.93 |
| 5 | 84.91 | 120.9 | -5.00 | 1.48 | 131.5 | 178.9 | 263.1 | -5.11 | 1.52 |
| 10 | 66.37 | 94.53 | -4.86 | 1.09 | 102.2 | 139.0 | 204.4 | -4.97 | 1.12 |
| 15 | 52.24 | 74.40 | -4.72 | 0.71 | 80.01 | 108.8 | 160.0 | -4.83 | 0.73 |
| 20 | 41.39 | 58.95 | -4.59 | 0.35 | 63.04 | 85.74 | 126.1 | -4.70 | 0.36 |
| 25 | 33.00 | 47.00 | -4.47 | 0.00 | 50.00 | 68.00 | 100.0 | -4.57 | 0.00 |
| 30 | 26.47 | 37.71 | -4.35 | 0.34 | 39.90 | 54.27 | 79.81 | -4.45 | 0.35 |
| 35 | 21.37 | 30.43 | -4.23 | 0.67 | 32.04 | 43.57 | 64.08 | -4.33 | 0.68 |
| 40 | 17.34 | 24.70 | -4.12 | 0.99 | 25.87 | 35.19 | 51.75 | -4.22 | 1.01 |
| 45 | 14.15 | 20.15 | -4.01 | 1.29 | 21.01 | 28.57 | 42.02 | -4.11 | 1.33 |
| 50 | 11.61 | 16.53 | -3.91 | 1.59 | 17.15 | 23.33 | 34.31 | -4.00 | 1.63 |
| 55 | 9.572 | 13.63 | -3.81 | 1.88 | 14.08 | 19.15 | 28.16 | -3.90 | 1.93 |
| 60 | 7.931 | 11.30 | -3.71 | 2.16 | 11.61 | 15.79 | 23.22 | -3.80 | 2.21 |
| 65 | 6.603 | 9.404 | -3.62 | 2.43 | 9.623 | 13.09 | 19.25 | -3.71 | 2.49 |
| 70 | 5.522 | 7.865 | -3.53 | 2.70 | 8.012 | 10.90 | 16.02 | -3.62 | 2.76 |
| 75 | 4.639 | 6.607 | -3.44 | 2.95 | 6.701 | 9.114 | 13.40 | -3.53 | 3.03 |
| 80 | 3.913 | 5.573 | -3.36 | 3.20 | 5.629 | 7.655 | 11.26 | -3.45 | 3.28 |
| 85 | 3.315 | 4.721 | -3.28 | 3.45 | 4.748 | 6.457 | 9.496 | -3.36 | 3.53 |
| 90 | 2.819 | 4.015 | -3.20 | 3.68 | 4.021 | 5.469 | 8.042 | -3.28 | 3.77 |
| 95 | 2.406 | 3.427 | -3.13 | 3.91 | 3.419 | 4.649 | 6.837 | -3.21 | 4.01 |
| 100 | 2.062 | 2.936 | -3.05 | 4.13 | 2.918 | 3.968 | 5.835 | -3.13 | 4.24 |
| 105 | 1.773 | 2.525 | -2.98 | 4.35 | 2.499 | 3.399 | 4.998 | -3.06 | 4.46 |
| 110 | 1.530 | 2.179 | -2.92 | 4.56 | 2.148 | 2.921 | 4.296 | -2.99 | 4.68 |
| 115 | 1.324 | 1.886 | -2.85 | 4.77 | 1.853 | 2.519 | 3.705 | -2.93 | 4.89 |
| 120 | 1.150 | 1.638 | -2.79 | 4.97 | 1.603 | 2.180 | 3.206 | -2.86 | 5.09 |
| 125 | 1.002 | 1.427 | -2.73 | 5.17 | 1.392 | 1.892 | 2.783 | -2.80 | 5.29 |
| 130 | 0.8757 | 1.247 | -2.67 | 5.36 | 1.212 | 1.648 | 2.423 | -2.74 | 5.49 |
| 135 | 0.7675 | 1.093 | -2.61 | 5.54 | 1.058 | 1.439 | 2.116 | -2.68 | 5.68 |
| 140 | 0.6746 | 0.9608 | -2.55 | 5.73 | 0.9269 | 1.261 | 1.854 | -2.62 | 5.87 |
| 145 | 0.5946 | 0.8468 | -2.50 | 5.90 | 0.8141 | 1.107 | 1.628 | -2.57 | 6.05 |
| 150 | 0.5254 | 0.7483 | -2.45 | 6.08 | 0.7170 | 0.9752 | 1.434 | -2.51 | 6.23 |



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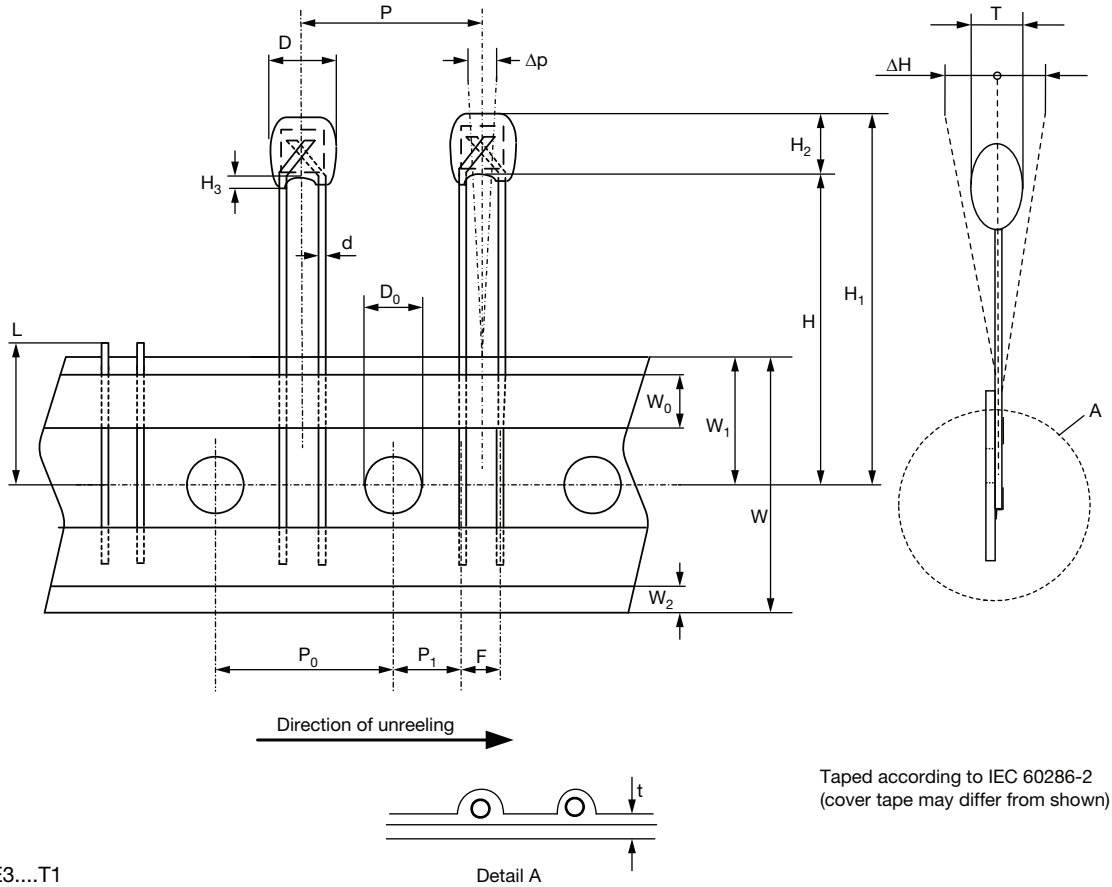
For complete Curve Computation, visit: www.vishay.com/thermistors/ntc-curve-list/

| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH $R_{25}$ AT (150, 220, 330, 470) kΩ | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $T_{OPER}$ (°C) | PART NUMBER NTCLE100E3 | | | | | | | |
| | 154*** | 224*** | TCR (%/K) | $\Delta R/R$ DUE TO $B_{tol.}$ (%) | 334*** | 474*** | TCR (%/K) | $\Delta R/R$ DUE TO $B_{tol.}$ (%) |
| | $R_T$ (kΩ) | $R_T$ (kΩ) | | | $R_T$ (kΩ) | $R_T$ (kΩ) | | |
| -40 | 6153 | 9024 | -6.83 | 10.22 | 16 044 | 22 850 | -7.14 | 6.41 |
| -35 | 4394 | 6444 | -6.64 | 9.24 | 11 282 | 16 068 | -6.94 | 5.80 |
| -30 | 3168 | 4646 | -6.45 | 8.29 | 8013 | 11 413 | -6.74 | 5.20 |
| -25 | 2305 | 3381 | -6.27 | 7.39 | 5747 | 8185 | -6.55 | 4.64 |
| -20 | 1693 | 2483 | -6.09 | 6.52 | 4161 | 5926 | -6.37 | 4.09 |
| -15 | 1254 | 1839 | -5.92 | 5.68 | 3040 | 4329 | -6.19 | 3.57 |
| -10 | 936.4 | 1373 | -5.75 | 4.88 | 2240 | 3190 | -6.02 | 3.06 |
| -5 | 705.0 | 1034 | -5.60 | 4.10 | 1665 | 2371 | -5.85 | 2.57 |
| 0 | 535.0 | 784.7 | -5.44 | 3.36 | 1248 | 1777 | -5.69 | 2.11 |
| 5 | 409.1 | 600.0 | -5.29 | 2.64 | 942.3 | 1342 | -5.54 | 1.65 |
| 10 | 315.1 | 462.1 | -5.15 | 1.94 | 717.1 | 1021 | -5.39 | 1.22 |
| 15 | 244.4 | 358.4 | -5.01 | 1.27 | 549.8 | 783.0 | -5.24 | 0.80 |
| 20 | 190.8 | 279.9 | -4.88 | 0.63 | 424.5 | 604.6 | -5.10 | 0.39 |
| 25 | 150.0 | 220.0 | -4.75 | 0.00 | 330.0 | 470.0 | -4.97 | 0.00 |
| 30 | 118.6 | 174.0 | -4.63 | 0.60 | 258.2 | 367.8 | -4.84 | 0.38 |
| 35 | 94.42 | 138.5 | -4.51 | 1.19 | 203.4 | 289.6 | -4.72 | 0.75 |
| 40 | 75.58 | 110.9 | -4.39 | 1.76 | 161.1 | 229.5 | -4.59 | 1.10 |
| 45 | 60.85 | 89.24 | -4.28 | 2.30 | 128.4 | 182.9 | -4.48 | 1.45 |
| 50 | 49.25 | 72.24 | -4.17 | 2.83 | 103.0 | 146.7 | -4.37 | 1.78 |
| 55 | 40.08 | 58.78 | -4.07 | 3.35 | 83.00 | 118.2 | -4.26 | 2.10 |
| 60 | 32.78 | 48.08 | -3.97 | 3.85 | 67.26 | 95.80 | -4.15 | 2.41 |
| 65 | 26.94 | 39.51 | -3.87 | 4.33 | 54.79 | 78.04 | -4.05 | 2.72 |
| 70 | 22.25 | 32.63 | -3.78 | 4.80 | 44.85 | 63.88 | -3.95 | 3.01 |
| 75 | 18.46 | 27.07 | -3.69 | 5.26 | 36.90 | 52.55 | -3.86 | 3.30 |
| 80 | 15.38 | 22.56 | -3.60 | 5.70 | 30.49 | 43.43 | -3.77 | 3.58 |
| 85 | 12.87 | 18.88 | -3.52 | 6.14 | 25.31 | 36.05 | -3.68 | 3.85 |
| 90 | 10.82 | 15.87 | -3.44 | 6.56 | 21.10 | 30.06 | -3.59 | 4.11 |
| 95 | 9.129 | 13.39 | -3.36 | 6.96 | 17.67 | 25.16 | -3.51 | 4.37 |
| 100 | 7.732 | 11.34 | -3.28 | 7.36 | 14.85 | 21.15 | -3.43 | 4.62 |
| 105 | 6.574 | 9.642 | -3.21 | 7.75 | 12.53 | 17.85 | -3.35 | 4.86 |
| 110 | 5.610 | 8.228 | -3.14 | 8.13 | 10.62 | 15.12 | -3.28 | 5.10 |
| 115 | 4.804 | 7.046 | -3.07 | 8.49 | 9.029 | 12.86 | -3.21 | 5.33 |
| 120 | 4.128 | 6.054 | -3.00 | 8.85 | 7.704 | 10.97 | -3.14 | 5.55 |
| 125 | 3.559 | 5.219 | -2.94 | 9.20 | 6.597 | 9.396 | -3.07 | 5.77 |
| 130 | 3.078 | 4.514 | -2.87 | 9.54 | 5.668 | 8.072 | -3.00 | 5.99 |
| 135 | 2.670 | 3.916 | -2.81 | 9.87 | 4.885 | 6.958 | -2.94 | 6.20 |
| 140 | 2.323 | 3.408 | -2.75 | 10.20 | 4.224 | 6.016 | -2.88 | 6.40 |
| 145 | 2.028 | 2.974 | -2.69 | 10.52 | 3.663 | 5.217 | -2.82 | 6.60 |
| 150 | 1.774 | 2.603 | -2.64 | 10.83 | 3.186 | 4.538 | -2.76 | 6.79 |


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## PACKAGING
## TAPE SPECIFICATIONS

**Thermistors on tape**




Taped according to IEC 60286-2
(cover tape may differ from shown)

**1E pitch**
NTCLE100E3....T1

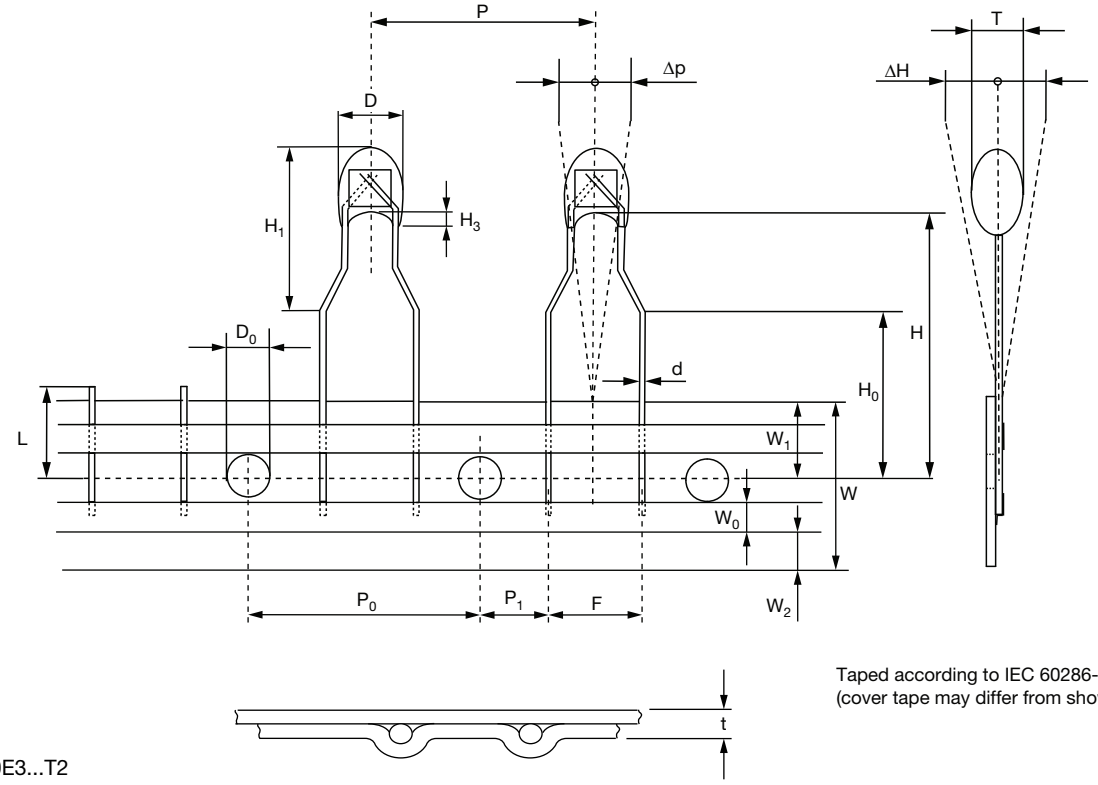
| **DIMENSIONS** in millimeters | | | | |
|---|---|---|---|---|
| **DETAILS** | **SYMBOL** | **DIMENSIONS NOMINAL** | **TOLERANCE** | **REMARKS** |
| Body diameter<br>Lead diameter<br>Feed hole diameter | D<br>d<br>$D_0$ | 3.3<br>0.6<br>4.0 | ± 0.5<br>± 0.06<br>± 0.2 | 5 max. for 3.3 Ω to 220 Ω |
| Lead to lead distance | F | 2.5 | +0.5<br>-0.2 | Guaranteed between component and tape |
| Distance component to tape center<br>Component height<br>Component alignment<br>Distance top/bottom of components<br>Length of lacquer under the comp. bottom | H<br>$H_1$<br>Δh<br>$H_2$<br>$H_3$ | 22.0<br>32.2<br>0<br>6<br>2 | ± 1.0<br>max.<br>± 2.0<br>max.<br>± 1 | <br><br><br><br>1 to 4 max. for 3.3 Ω to 220 Ω |
| Length of snipped lead | L | 11.0 | max. | |
| Pitch between thermistors<br>Feed hole pitch<br>Feed hole center to lead center<br>Component alignment | P<br>$P_0$<br>$P_1$<br>Δp | 12.7<br>12.7<br>5.08<br>0 | ± 1.0<br>± 0.3<br>± 0.7<br>± 1.3 | Cumulative pitch error<br>± 1 mm / 20 pitches<br>guaranteed between<br>component and tape |
| Total thickness<br>Total tape thickness | T<br>t | 3.0<br>0.9 | max.<br>max. | 4 max. for 3.3 Ω to 220 Ω with cardboard tape 0.5 ± 0.1 |
| Tape width<br><br>Hold down tape width<br>Hole position<br>Hold down tape position | W<br><br>$W_0$<br>$W_1$<br>$W_2$ | 18.0<br><br>5.0<br>9.0<br>1.5 | ± 1.0<br>- 0.5<br>± 0.3<br>± 0.5<br>± 1.0 | None of the hold down tapes may cover the holes |



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**Thermistors on tape**




Taped according to IEC 60286-2
(cover tape may differ from shown)

**2E pitch**
NTCLE100E3...T2

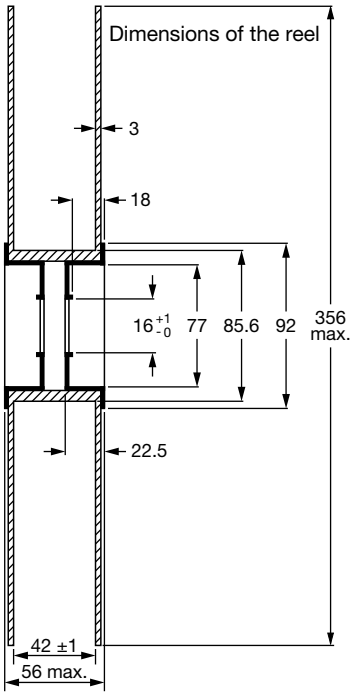
| **DIMENSIONS** in millimeters | | | | |
|---|---|---|---|---|
| **DETAILS** | **SYMBOL** | **DIMENSIONS NOMINAL** | **TOLERANCE** | **REMARKS** |
| Body diameter<br>Lead diameter<br>Feed hole diameter | D<br>d<br>$D_0$ | 3.3<br>0.6<br>4.0 | ± 0.5<br>± 0.06<br>± 0.2 | 5 max. for 3.3 Ω to 220 Ω |
| Lead to lead distance | F | 5.0 | +0.5<br>-0.2 | Guaranteed between component and tape |
| Distance component to tape center<br>Component height<br>Component alignment<br>Distance top/bottom of components<br>Length of lacquer under the comp. bottom | H<br>$H_0$<br>$H_1$<br>Δh<br>$H_3$ | 20.0<br>16.0<br>10.0<br>0.0<br>2.0 | ± 2.0<br>± 0.5<br>max.<br>± 2.0<br>± 1.0 | 12 max. for 100 Ω to 220 Ω |
| Length of snipped lead | L | 11.0 | max. | |
| Pitch between thermistors<br>Feed hole pitch<br>Feed hole center to lead center<br>Component alignment | P<br>$P_0$<br>$P_1$<br>Δp | 12.7<br>12.7<br>3.81<br>0.0 | ± 1.0<br>± 0.3<br>± 0.7<br>± 1.3 | Cumulative pitch error<br>± 1 mm / 20 pitches<br>guaranteed between<br>component and tape |
| Total thickness<br>Total tape thickness | T<br>t | 3.0<br>0.9 | max.<br>max. | 4 max. for 3.3 Ω to 220 Ω with<br>cardboard tape 0.5 ± 0.1 |
| Tape width<br><br>Hold down tape width<br>Hole position<br>Hold down tape position | W<br><br>$W_0$<br>$W_1$<br>$W_2$ | 18.0<br><br>5.0<br>9.0<br>1.5 | ± 1.0<br>- 0.5<br>± 0.3<br>± 0.5<br>± 1.0 | None of the hold down tapes may cover the holes |



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## REEL SPECIFICATIONS




| PART NUMBERS AND PACKAGING | | |
|---|---|---|
| **PACKING METHOD** | **PART NUMBERS** | **QUANTITY** |
| **Bulk** | **NTCLE100E3....B0(A)** | 500 |
| **Tape and reel 1E pitch** | **NTCLE100E3....T1(A)** | 1500 per reel, 2 reels per box |
| **Tape and reel 2E pitch** | **NTCLE100E3....T2(A)** | 1500 per reel, 2 reels per box |

## CHARACTERISTICS OF TAPED PRODUCTS

Minimum pull-out force of the component: 5 N

Minimum peel-off force of adhesive tape: 6 N

Minimum tearing force tape: 15 N

Minimum pull-off force of tape-reel: 5 N

## STORAGE CONDITIONS

Storage temperature range: -25 °C to +40 °C

Maximum relative humidity: 80 %, non-condensing



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