

NTC Thermistors, Sleeved Long PVC Leads Sensors



FEATURES

- Accurate over wide temperature range
- High stability
- Excellent price / performance ratio
- High adhesive strength between PVC wire and the encapsulating lacquer
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT

LINKS TO ADDITIONAL RESOURCES



APPLICATIONS

Temperature measurement, sensing and control in remote locations and for various environmental conditions.

DESCRIPTION

These sensors exist of a small NTC chip reflow soldered between two AWG #24 UL-2468 style wires. They are lacquered and insulated and sleeved.

MARKING

UL mark on wire, no mark on body.

PACKAGING

The thermistors are packed in cardboard boxes; each box containing 500 pieces.

DESIGN-IN SUPPORT

Other wire length and wire type (UL-2651 style PVC 105 °C), other wire gage, are available on request. The products can be provided with a connector on request.

For complete curve computation, please visit: www.vishay.com/thermistors/ntc-curve-list/

MOUNTING

By soldering or clamping the wire ends, in any position. Body can be inserted or taped attached. Not intended for fluid immersed applications.

| QUICK REFERENCE DATA | | |
|--|-------------------------|----------|
| PARAMETER | VALUE | UNIT |
| Resistance value at 25 °C (R_{25}) | 2.2K to 100K | Ω |
| Tolerance on R_{25} -value ⁽²⁾ | ± 3 | % |
| $B_{25/85}$ -value | 3977 to 4190 | K |
| Tolerance on $B_{25/85}$ -value | ± 0.75 to ± 1.5 | % |
| Operating temperature range at zero dissipation | -40 to +85 | °C |
| Maximum power dissipation at 55 °C | 250 | mW |
| Min. dielectric withstanding voltage between terminals and sensor body | 1500 | V_{AC} |
| Dissipation factor | 8.0 | mW/K |
| Response time ⁽¹⁾ | ≈ 15 | s |
| Weight | ≈ 6 | g |

Notes

- (1) Response time in silicone oil MS 200/50. This is the time needed for the sensor to reach 63.2 % of the total temperature difference when subjected to a temperature change from 25 °C in air to 85 °C in oil
- (2) Tighter tolerances on R_{25} are available upon request

| ELECTRICAL DATA AND ORDERING INFORMATION | | | | | |
|--|------------------------------|--------------------|---------------------------------|--|-----------------|
| R_{25} (Ω) | R_{25} -TOL. (\pm %) | $B_{25/85}$ (K) | $B_{25/85}$ -TOL. (\pm %) | SAP MATERIAL AND ORDERING NUMBER | |
| | | | | RoHS COMPLIANT WITH EXEMPTION ⁽¹⁾ | RoHS COMPLIANT |
| 2200 | 3 | 3977 | 0.75 | NTCLS100E3222H | NTCLS100E3222HA |
| 4700 | 3 | 3977 | 0.75 | NTCLS100E3472H | NTCLS100E3472HA |
| 5000 | 3 | 3977 | 0.75 | NTCLS100E3502H | NTCLS100E3502HA |
| 10 000 | 3 | 3977 | 0.75 | NTCLS100E3103H | NTCLS100E3103HA |
| 47 000 | 3 | 4090 | 1.5 | NTCLS100E3473H | NTCLS100E3473HA |
| 100 000 | 3 | 4190 | 1.5 | NTCLS100E3104H | NTCLS100E3104HA |

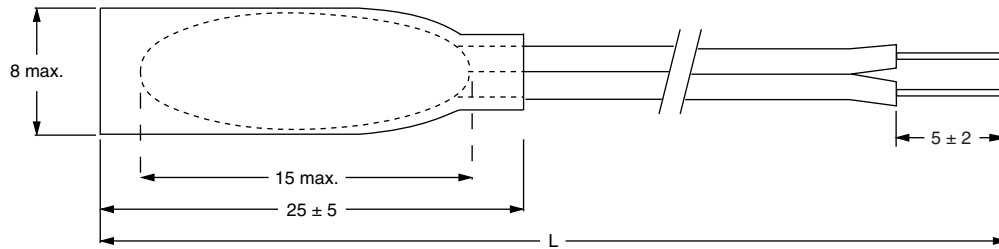
Notes

- Preferred versions for new designs
- (1) 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

Sleeved type NTCLS100E...

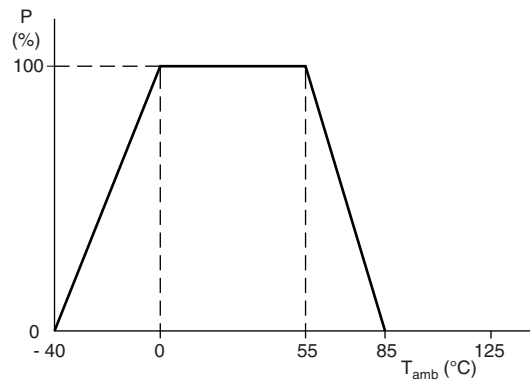


$L = 400 \text{ mm} + 15 / - 0$

Other wire lengths or connector attached available on request.

DERATING

Power derating curve.



Note

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



| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT 2.2 k Ω , 4.7 k Ω , 5.0 k Ω , | | | | | | | |
|--|-------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------|-------------------|------------------|
| T_{OPER} (°C) | PART NR. NTCLS100E3222H(A) | PART NR. NTCLS100E3472H(A) | PART NR. NTCLS100E3502H(A) | PART NR. NTCLS100E3103H(A) | R -TOL. (± %) | α (%/K) | T-TOL. (± °C) |
| | R_T (Ω) | R_T (Ω) | R_T (Ω) | R_T (Ω) | | | |
| -40 | 73 061 | 156 084 | 166 047 | 332 094 | 5.87 | -6.62 | 0.89 |
| -35 | 52 778 | 112 753 | 119 950 | 239 900 | 5.60 | -6.39 | 0.88 |
| -30 | 38 544 | 82 344 | 87 600 | 175 200 | 5.33 | -6.18 | 0.86 |
| -25 | 28 443 | 60 765 | 64 643 | 129 287 | 5.08 | -5.98 | 0.85 |
| -20 | 21 199 | 45 288 | 48 179 | 96 358 | 4.83 | -5.78 | 0.84 |
| -15 | 15 950 | 34 075 | 36 250 | 72 500 | 4.60 | -5.60 | 0.82 |
| -10 | 12 110 | 25 872 | 27 523 | 55 046 | 4.37 | -5.42 | 0.81 |
| -5 | 9275 | 19 814 | 21 078 | 42 157 | 4.15 | -5.25 | 0.79 |
| 0 | 7162 | 15 300 | 16 277 | 32 554 | 3.94 | -5.09 | 0.77 |
| 5 | 5574 | 11 909 | 12 669 | 25 339 | 3.74 | -4.93 | 0.76 |
| 10 | 4372 | 9340 | 9936 | 19 872 | 3.55 | -4.79 | 0.74 |
| 15 | 3454 | 7378 | 7849 | 15 698 | 3.36 | -4.64 | 0.72 |
| 20 | 2747 | 5869 | 6244 | 12 488 | 3.18 | -4.51 | 0.70 |
| 25 | 2200 | 4700 | 5000 | 10 000 | 3.00 | -4.38 | 0.69 |
| 30 | 1773 | 3788 | 4030 | 8059 | 3.17 | -4.25 | 0.75 |
| 35 | 1438 | 3071 | 3267 | 6535 | 3.33 | -4.13 | 0.81 |
| 40 | 1173 | 2505 | 2665 | 5330 | 3.49 | -4.02 | 0.87 |
| 45 | 961.8 | 2055 | 2186 | 4372 | 3.65 | -3.91 | 0.93 |
| 50 | 793.2 | 1694 | 1803 | 3605 | 3.80 | -3.80 | 1.00 |
| 55 | 657.5 | 1405 | 1494 | 2989 | 3.94 | -3.70 | 1.07 |
| 60 | 547.8 | 1170 | 1245 | 2490 | 4.08 | -3.60 | 1.13 |
| 65 | 458.6 | 979.7 | 1042 | 2084 | 4.22 | -3.51 | 1.20 |
| 70 | 385.7 | 823.9 | 876.5 | 1753 | 4.35 | -3.42 | 1.27 |
| 75 | 325.8 | 696.0 | 740.5 | 1481 | 4.48 | -3.33 | 1.35 |
| 80 | 276.4 | 590.5 | 628.2 | 1256 | 4.60 | -3.25 | 1.42 |
| 85 | 235.5 | 503.0 | 585.2 | 1070 | 4.73 | -3.17 | 1.49 |



| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT 47 kΩ | | | | |
|---|---|-------------------------------|--|--------------------------------|
| T_{OPER} (°C) | PART NR. NTCLS100E3473H(A) | R-TOL. (± %) | α (%/K) | T-TOL. (± °C) |
| | R_T (Ω) | | | |
| -40 | 1 589 068 | 8.91 | -6.54 | 1.36 |
| -35 | 1 151 627 | 8.34 | -6.34 | 1.32 |
| -30 | 842 790 | 7.79 | -6.15 | 1.27 |
| -25 | 622 597 | 7.27 | -5.96 | 1.22 |
| -20 | 464 110 | 6.77 | -5.79 | 1.17 |
| -15 | 348 989 | 6.28 | -5.62 | 1.12 |
| -10 | 264 628 | 5.82 | -5.45 | 1.07 |
| -5 | 202 280 | 5.37 | -5.30 | 1.01 |
| 0 | 155 823 | 4.94 | -5.14 | 0.96 |
| 5 | 120 932 | 4.52 | -5.00 | 0.91 |
| 10 | 94 528 | 4.12 | -4.86 | 0.85 |
| 15 | 74 399 | 3.74 | -4.72 | 0.79 |
| 20 | 58 945 | 3.36 | -4.59 | 0.73 |
| 25 | 47 000 | 3.00 | -4.47 | 0.67 |
| 30 | 37 706 | 3.35 | -4.35 | 0.77 |
| 35 | 30 429 | 3.69 | -4.23 | 0.87 |
| 40 | 24 696 | 4.02 | -4.12 | 0.97 |
| 45 | 20 154 | 4.33 | -4.01 | 1.08 |
| 50 | 16 534 | 4.64 | -3.91 | 1.19 |
| 55 | 13 633 | 4.94 | -3.81 | 1.30 |
| 60 | 11 296 | 5.23 | -3.71 | 1.41 |
| 65 | 9404 | 5.51 | -3.62 | 1.52 |
| 70 | 7865 | 5.78 | -3.53 | 1.64 |
| 75 | 6607 | 6.04 | -3.44 | 1.75 |
| 80 | 5573 | 6.30 | -3.36 | 1.87 |
| 85 | 4721 | 6.55 | -3.28 | 2.00 |



| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT 100 k Ω | | | | |
|--|--------------------------------|-----------------|-------------------|------------------|
| T _{OPER} (°C) | PART NR. NTCLS100E3104H(A) | R-TOL. (± %) | α (%/K) | T-TOL. (± °C) |
| | R _T (Ω) | | | |
| -40 | 3 666 299 | 9.05 | -6.69 | 1.35 |
| -35 | 2 637 588 | 8.47 | -6.49 | 1.31 |
| -30 | 1 916 576 | 7.91 | -6.29 | 1.26 |
| -25 | 1 406 111 | 7.37 | -6.10 | 1.21 |
| -20 | 1 041 184 | 6.86 | -5.92 | 1.16 |
| -15 | 777 846 | 6.36 | -5.75 | 1.11 |
| -10 | 586 097 | 5.89 | -5.58 | 1.06 |
| -5 | 445 257 | 5.43 | -5.42 | 1.00 |
| 0 | 340 942 | 4.99 | -5.26 | 0.95 |
| 5 | 263 054 | 4.56 | -5.11 | 0.89 |
| 10 | 204 446 | 4.15 | -4.97 | 0.84 |
| 15 | 160 014 | 3.75 | -4.83 | 0.78 |
| 20 | 126 087 | 3.37 | -4.70 | 0.72 |
| 25 | 100 000 | 3.00 | -4.57 | 0.66 |
| 30 | 79 808 | 3.36 | -4.45 | 0.75 |
| 35 | 64 077 | 3.70 | -4.33 | 0.86 |
| 40 | 51 745 | 4.04 | -4.22 | 0.96 |
| 45 | 42 021 | 4.36 | -4.11 | 1.06 |
| 50 | 34 308 | 4.68 | -4.00 | 1.17 |
| 55 | 28 156 | 4.98 | -3.90 | 1.28 |
| 60 | 23 222 | 5.28 | -3.80 | 1.39 |
| 65 | 19 246 | 5.57 | -3.71 | 1.50 |
| 70 | 16 025 | 5.85 | -3.62 | 1.62 |
| 75 | 13 402 | 6.12 | -3.53 | 1.73 |
| 80 | 11 258 | 6.38 | -3.45 | 1.85 |
| 85 | 9496 | 6.64 | -3.36 | 1.97 |

TESTS AND REQUIREMENTS

| STABILITY TESTS | | | |
|-----------------|-----------------------------|-----------------------------------|---------------------|
| IEC | TEST | PROCEDURE | DRIFT REQUIREMENT |
| 60068-2-2 | Endurance dry heat | 85 °C; 1000 h | $\Delta R/R < 5 \%$ |
| 60068-2-1 | Endurance cold | -40 °C; 1000 h | $\Delta R/R < 5 \%$ |
| 60539 | Endurance max. dissipation | 250 mW; 55 °C; 1000 h | $\Delta R/R < 5 \%$ |
| 60068-2-3 | Damp heat, steady state | 56 days at 40 °C; 90 % to 95 % RH | $\Delta R/R < 7 \%$ |
| 60068-20-14 | Rapid change of temperature | -40 °C to +85 °C; 50 cycles | $\Delta R/R < 5 \%$ |



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