

NTC Thermistors, Accuracy Line



FEATURES

- Accuracy over a wide temperature range
- High stability over a long life
- Excellent price/performance ratio

APPLICATIONS

- Temperature sensing and control

These thermistors have a negative temperature coefficient. The device consists of a chip with two tinned solid copper-plated leads. It is grey lacquered and colour coded, but not insulated.

PACKAGING

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

| QUICK REFERENCE DATA | |
|---|---|
| PARAMETER | VALUE |
| Resistance value at 25 °C | 3.3 Ω to 470 kΩ |
| Tolerance on R ₂₅ -value | ±2%; ±3%; ±5%; ±10% |
| Tolerance on B _{25/85} -value | ±0.5% to ±3% |
| Maximum dissipation | 500 mW |
| Dissipation factor δ (for information only) | 7 mW/K 8.5 mW/K (for 640..338 to 689) |
| Response time | 1.2 s |
| Thermal time constant τ (for information only) | 15 s |
| Operating temperature range: at zero dissipation; continuously at zero dissipation; for short periods at maximum dissipation (500 mW) | -40 to +125 °C ≤150 °C 0 to 55 °C |
| Climatic category | 40/125/56 |
| Mass | ≈0.3 g |

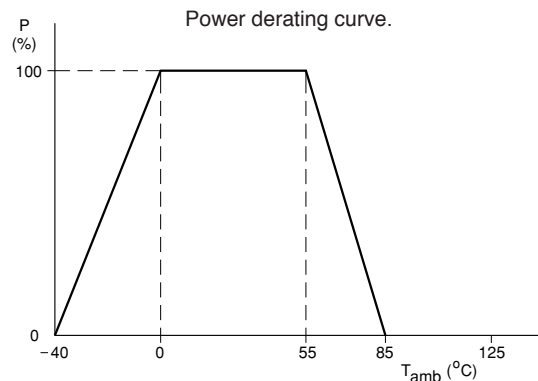
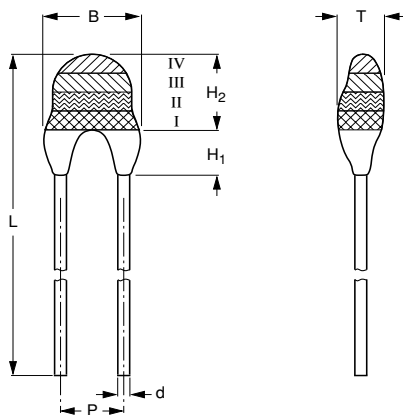
ELECTRICAL DATA AND ORDERING INFORMATION

| R ₂₅ (Ω) | B _{25/85} -VALUE | CATALOG NUMBER 2322 640 6.... | | | | COLOR CODE (see dimensions drawing and note 1) | | |
|------------------------|---------------------------|-------------------------------|---------------------|---------------------|----------------------|--|--------|-------|
| | | R ₂₅ ±2% | R ₂₅ ±3% | R ₂₅ ±5% | R ₂₅ ±10% | I | II | III |
| 3.3 | 2880 K ±3% | 4338 | 6338 | 3338 | 2338 | orange | orange | gold |
| 4.7 | 2880 K ±3% | 4478 | 6478 | 3478 | 2478 | yellow | violet | gold |
| 6.8 | 2880 K ±3% | 4688 | 6688 | 3688 | 2688 | blue | grey | gold |
| 10 | 2990 K ±3% | 4109 | 6109 | 3109 | 2109 | brown | black | black |
| 15 | 3041 K ±3% | 4159 | 6159 | 3159 | 2159 | brown | green | black |
| 22 | 3136 K ±3% | 4229 | 6229 | 3229 | 2229 | red | red | black |
| 33 | 3390 K ±3% | 4339 | 6339 | 3339 | 2339 | orange | orange | black |
| 47 | 3390 K ±3% | 4479 | 6479 | 3479 | 2479 | yellow | violet | black |
| 68 | 3390 K ±3% | 4689 | 6689 | 3689 | 2689 | blue | grey | black |
| 100 | 3560 K ±0.75% | 4101 | 6101 | 3101 | 2101 | brown | black | brown |
| 150 | 3560 K ±0.75% | 4151 | 6151 | 3151 | 2151 | brown | green | brown |
| 220 | 3560 K ±0.75% | 4221 | 6221 | 3221 | 2221 | red | red | brown |
| 330 | 3560 K ±0.75% | 4331 | 6331 | 3331 | 2331 | orange | orange | brown |
| 470 | 3560 K ±0.5% | 4471 | 6471 | 3471 | 2471 | yellow | violet | brown |
| 680 | 3560 K ±0.5% | 4681 | 6681 | 3681 | 2681 | blue | grey | brown |
| 1 000 | 3528 K ±0.5% | 4102 | 6102 | 3102 | 2102 | brown | black | red |
| 1 500 | 3528 K ±0.5% | 4152 | 6152 | 3152 | 2152 | brown | green | red |

| R ₂₅ (Ω) | B _{25/85} -VALUE | CATALOG NUMBER 2322 640 6.... | | | | COLOR CODE (see dimensions drawing and note 1) | | |
|------------------------|---------------------------|-------------------------------|---------------------|---------------------|----------------------|---|--------|--------|
| | | R ₂₅ ±2% | R ₂₅ ±3% | R ₂₅ ±5% | R ₂₅ ±10% | I | II | III |
| 2000 | 3528 K ±0.5% | 4202 | 6202 | 3202 | 2202 | red | black | red |
| 2200 | 3977 K ±0.75% | 4222 | 6222 | 3222 | 2222 | red | red | red |
| 2700 | 3977 K ±0.75% | 4272 | 6272 | 3272 | 2272 | red | violet | red |
| 3300 | 3977 K ±0.75% | 4332 | 6332 | 3332 | 2332 | orange | orange | red |
| 4700 | 3977 K ±0.75% | 4472 | 6472 | 3472 | 2472 | yellow | violet | red |
| 6800 | 3977 K ±0.75% | 4682 | 6682 | 3682 | 2682 | blue | grey | red |
| 10000 | 3977 K ±0.75% | 4103 | 6103 | 3103 | 2103 | brown | black | orange |
| 12000 | 3740 K ±2% | 4123 | 6123 | 3123 | 2123 | brown | red | orange |
| 15000 | 3740 K ±2% | 4153 | 6153 | 3153 | 2153 | brown | green | orange |
| 22000 | 3740 K ±2% | 4223 | 6223 | 3223 | 2223 | red | red | orange |
| 33000 | 4090 K ±1.5% | 4333 | 6333 | 3333 | 2333 | orange | orange | orange |
| 47000 | 4090 K ±1.5% | 4473 | 6473 | 3473 | 2473 | yellow | violet | orange |
| 68000 | 4190 K ±1.5% | 4683 | 6683 | 3683 | 2683 | blue | grey | orange |
| 100000 | 4190 K ±1.5% | 4104 | 6104 | 3104 | 2104 | brown | black | yellow |
| 150000 | 4370 K ±2.5% | 4154 | 6154 | 3154 | 2154 | brown | green | yellow |
| 220000 | 4370 K ±2.5% | 4224 | 6224 | 3224 | 2224 | red | red | yellow |
| 330000 | 4570 K ±1.5% | 4334 | 6334 | 3334 | 2334 | orange | orange | yellow |
| 470000 | 4570 K ±1.5% | 4474 | 6474 | 3474 | 2474 | yellow | violet | yellow |

Notes

- Dependent upon R₂₅-tolerance, the band IV is coloured as follows:
 - for R₂₅ ±2%, band IV is coloured red
 - for R₂₅ ±3%, band IV is coloured orange
 - for R₂₅ ±5%, band IV is coloured gold
 - for R₂₅ ±10%, band IV is coloured silver.

DERATING AND TEMPERATURE TOLERANCES

DIMENSIONS in millimeters


2322 640 6.338 to 6.474.

PHYSICAL DIMENSIONS FOR RELEVANT TYPE

| CODE NUMBER 2322 640 | B _{max} | d | H ₁ | | H ₂ max | L | P | T _{max} |
|----------------------------------|------------------|--------------|----------------|-------------|-----------------------|------------|------|------------------|
| | | | MIN. | MAX. | | | | |
| 6.338 to 6.221 | 5.0 | 0.6 ±0.06 | 1.0 | 4.0 | 6.0 | 24 ±1.5 | 2.54 | 4.0 |
| 6.331 to 6.474 | 3.3 ±0.5 | 0.6 ±0.06 | - | 2.0 ±1.0 | 6.0 | 24 ±1.5 | 2.54 | 3.0 |

MARKING

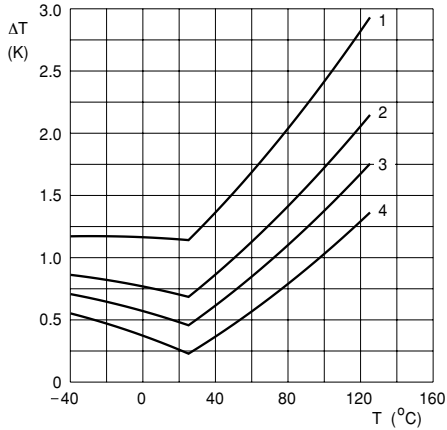
The thermistors are marked with coloured bands; see dimensions drawing and "Electrical data and ordering information".

MOUNTING

By soldering in any position.

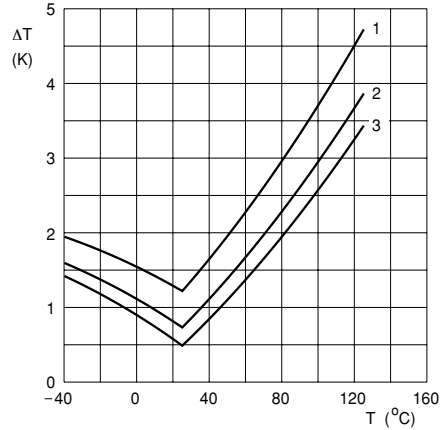


TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE.



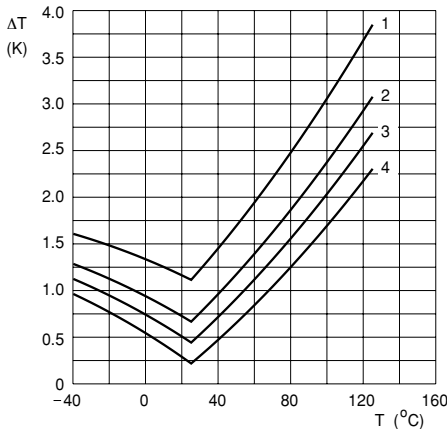
Curves valid for 2.2 to 10 kΩ.
 Curve 1: $\Delta R_{25}/R_{25} = 5\%$.
 Curve 2: $\Delta R_{25}/R_{25} = 3\%$.
 Curve 3: $\Delta R_{25}/R_{25} = 2\%$.
 Curve 4: $\Delta R_{25}/R_{25} = 1\%$
 (for 2322 640 5.... series only).

TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE.



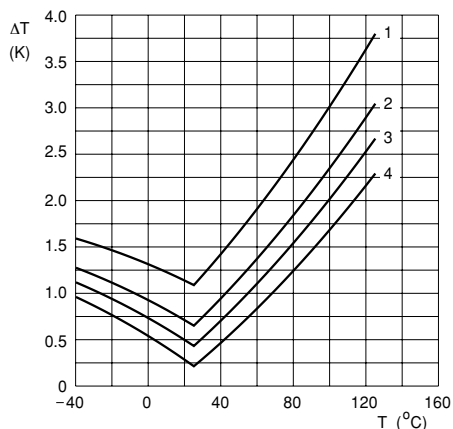
Curves valid for 12 to 22 kΩ.
 Curve 1: $\Delta R_{25}/R_{25} = 5\%$.
 Curve 2: $\Delta R_{25}/R_{25} = 3\%$.
 Curve 3: $\Delta R_{25}/R_{25} = 2\%$.

TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE.



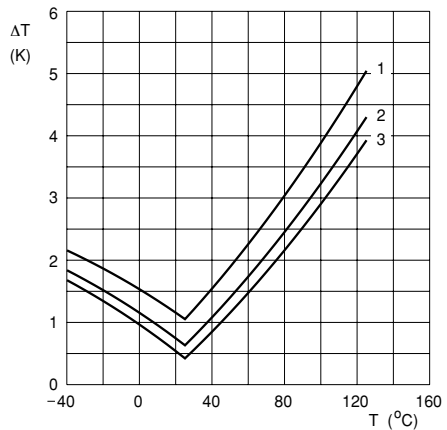
Curves valid for 33 to 47 kΩ.
 Curve 1: $\Delta R_{25}/R_{25} = 5\%$.
 Curve 2: $\Delta R_{25}/R_{25} = 3\%$.
 Curve 3: $\Delta R_{25}/R_{25} = 2\%$.
 Curve 4: $\Delta R_{25}/R_{25} = 1\%$
 (for 2322 640 5.... series only).

TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE.



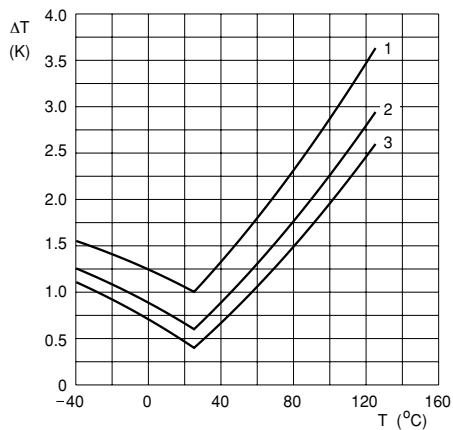
Curves valid for 68 to 100 kΩ.
 Curve 1: $\Delta R_{25}/R_{25} = 5\%$.
 Curve 2: $\Delta R_{25}/R_{25} = 3\%$.
 Curve 3: $\Delta R_{25}/R_{25} = 2\%$.
 Curve 4: $\Delta R_{25}/R_{25} = 1\%$
 (for 2322 640 5.... series only).

TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE.



Curves valid for 150 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 to 470 kΩ.
 Curve 1: $\Delta R_{25}/R_{25} = 5\%$.
 Curve 2: $\Delta R_{25}/R_{25} = 3\%$.
 Curve 3: $\Delta R_{25}/R_{25} = 2\%$.

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"):

$$R(T) = R_{ref} \times e^{(A+B/T+C/T^2+D/T^3)} \quad (1)$$

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

where:

A, B, C, D, A₁, B₁, C₁ and D₁ 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).

T is the temperature in K.

Formulae numbered (1) and (2) 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 'R₂₅-tolerance' and the 'resistance deviation due to B-tolerance'.

When:

X = R₂₅-tolerance

Y = resistance deviation due to B-tolerance

Z = complete resistance deviation,

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

When:

TC = temperature coefficient

ΔT = temperature deviation,

$$\text{then: } \Delta T = \frac{Z}{TC}$$

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

Example: at 0 °C, assume X = 5%, Y = 0.89% and TC = 5.08%/K (see Table), then:

$$Z = \left\{ \left[1 + \frac{5}{100} \right] \times \left[1 + \frac{0.89}{100} \right] - 1 \right\} \times 100\%$$

$$= \{ 1.05 \times 1.0089 - 1 \} \times 100\% = 5.9345\% (\approx 5.93\%)$$

$$\Delta T = \frac{Z}{TC} = \frac{5.93}{5.08} = 1.167 \text{ °C } (\approx 1.17 \text{ °C})$$

A NTC with a R₂₅-value of 10 kΩ has a value of 32.56 kΩ between -1.17 and +1.17 °C.

PARAMETERS FOR DETERMINING NOMINAL RESISTANCE VALUES

| B _{25/85} -VALUE (K) | A | B (K) | C (10 ⁵ K ²) | D (10 ⁶ K ³) | A ₁ (10 ⁻³) | B ₁ (10 ⁻⁴ K ⁻¹) | C ₁ (10 ⁻⁶ K ⁻²) | D ₁ (10 ⁻⁷ K ⁻³) |
|-------------------------------|----------|----------|-------------------------------------|-------------------------------------|------------------------------------|--|--|--|
| 2880 | -9.094 | 2251.74 | 229098 | -27.4482 | 3.354016 | 3.495020 | 2.095959 | 4.260615 |
| 2990 | -10.2296 | 2887.62 | 132336 | -25.0251 | 3.354016 | 3.415560 | 4.955455 | 4.364236 |
| 3041 | -11.1334 | 3658.73 | -102895 | 0.516652 | 3.354016 | 3.349290 | 3.683843 | 7.050455 |
| 3136 | -12.4493 | 4702.74 | -402687 | 31.96830 | 3.354016 | 3.243880 | 2.658012 | -2.70156 |
| 3390 | -12.6814 | 4391.97 | -232807 | 15.09643 | 3.354016 | 2.993410 | 2.135133 | -8.05672 |
| 3528 ⁽¹⁾ | -12.0596 | 3687.667 | -7617.13 | -5914730 | 3.354016 | 2.909670 | 1.632136 | 0.719220 |
| 3528 ⁽²⁾ | -21.0704 | 11903.95 | -2504699 | 247033800 | 3.354016 | 2.933908 | 3.494314 | -7.71269 |
| 3560 | -13.0723 | 4190.574 | -47158.4 | -11992560.91 | 3.354016 | 2.884193 | 4.118032 | 1.786790 |
| 3740 | -13.8973 | 4557.725 | -98275 | -7522357 | 3.354016 | 2.744032 | 3.666944 | 1.375492 |
| 3977 | -14.6337 | 4791.842 | -115334 | -3730535 | 3.354016 | 2.569355 | 2.626311 | 0.675278 |
| 4090 | -15.5322 | 5229.973 | -160451 | -5414091 | 3.354016 | 2.519107 | 3.510939 | 1.105179 |
| 4190 | -16.0349 | 5459.339 | -191141 | -3328322 | 3.354016 | 2.460382 | 3.405377 | 1.034240 |
| 4370 | -16.8717 | 5759.15 | -194267 | -6869149 | 3.354016 | 2.367720 | 3.585140 | 1.255349 |
| 4570 | -17.6439 | 6022.726 | -203157 | -7183526 | 3.354016 | 2.264097 | 3.278184 | 1.097628 |

Notes

1. Temperature < 25 °C.
2. Temperature ≥ 25 °C.



| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES | | | | | | |
|--|---------------------------------|---------------------------------|-------------|---|-------|-------|
| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (Ω) | | |
| | | | | 2322 640; see note 1 at end of tables | | |
| | | | | 6.338 | 6.478 | 6.688 |
| -40 | 13.6364 | 8.08 | -4.97 | 45.00 | 64.09 | 92.73 |
| -35 | 10.6806 | 7.30 | -4.80 | 35.25 | 50.20 | 72.63 |
| -30 | 8.4350 | 6.55 | -4.64 | 27.84 | 39.64 | 57.36 |
| -25 | 6.7148 | 5.84 | -4.48 | 22.16 | 31.56 | 45.66 |
| -20 | 5.3866 | 5.15 | -4.33 | 17.78 | 25.32 | 36.63 |
| -15 | 4.3532 | 4.49 | -4.19 | 14.37 | 20.46 | 29.60 |
| -10 | 3.5432 | 3.85 | -4.05 | 11.69 | 16.65 | 24.09 |
| -5 | 2.9035 | 3.24 | -3.92 | 9.58 | 13.65 | 19.74 |
| 0 | 2.3950 | 2.65 | -3.79 | 7.90 | 11.26 | 16.29 |
| 5 | 1.9880 | 2.08 | -3.66 | 6.56 | 9.34 | 13.52 |
| 10 | 1.6602 | 1.54 | -3.55 | 5.48 | 7.80 | 11.29 |
| 15 | 1.3944 | 1.01 | -3.43 | 4.60 | 6.55 | 9.48 |
| 20 | 1.1777 | 0.49 | -3.32 | 3.89 | 5.54 | 8.01 |
| 25 | 1.0000 | 0.00 | -3.22 | 3.30 | 4.70 | 6.80 |
| 30 | 0.8534 | 0.48 | -3.12 | 2.82 | 4.01 | 5.80 |
| 35 | 0.7319 | 0.94 | -3.02 | 2.42 | 3.44 | 4.98 |
| 40 | 0.6307 | 1.39 | -2.93 | 2.08 | 2.96 | 4.29 |
| 45 | 0.5459 | 1.82 | -2.84 | 1.80 | 2.57 | 3.71 |
| 50 | 0.4746 | 2.24 | -2.76 | 1.57 | 2.23 | 3.23 |
| 55 | 0.4143 | 2.65 | -2.68 | 1.37 | 1.95 | 2.82 |
| 60 | 0.3631 | 3.04 | -2.60 | 1.20 | 1.71 | 2.47 |
| 65 | 0.3194 | 3.43 | -2.52 | 1.05 | 1.50 | 2.17 |
| 70 | 0.2820 | 3.80 | -2.45 | 0.93 | 1.33 | 1.92 |
| 75 | 0.2499 | 4.16 | -2.38 | 0.82 | 1.17 | 1.70 |
| 80 | 0.2222 | 4.51 | -2.32 | 0.73 | 1.04 | 1.51 |
| 85 | 0.1982 | 4.85 | -2.25 | 0.65 | 0.93 | 1.35 |
| 90 | 0.1774 | 5.19 | -2.19 | 0.59 | 0.83 | 1.21 |
| 95 | 0.1592 | 5.51 | -2.13 | 0.53 | 0.75 | 1.08 |
| 100 | 0.1433 | 5.82 | -2.07 | 0.47 | 0.67 | 0.97 |
| 105 | 0.1294 | 6.13 | -2.02 | 0.43 | 0.61 | 0.88 |
| 110 | 0.1171 | 6.43 | -1.97 | 0.39 | 0.55 | 0.80 |
| 115 | 0.1063 | 6.72 | -1.92 | 0.35 | 0.50 | 0.72 |
| 120 | 0.0967 | 7.00 | -1.87 | 0.32 | 0.45 | 0.66 |
| 125 | 0.0882 | 7.28 | -1.82 | 0.29 | 0.41 | 0.60 |
| 130 | 0.0806 | 7.55 | -1.77 | 0.27 | 0.38 | 0.55 |
| 135 | 0.0739 | 7.81 | -1.73 | 0.24 | 0.35 | 0.50 |
| 140 | 0.0678 | 8.07 | -1.69 | 0.22 | 0.32 | 0.46 |
| 145 | 0.0624 | 8.32 | -1.65 | 0.21 | 0.29 | 0.42 |
| 150 | 0.0575 | 8.56 | -1.61 | 0.19 | 0.27 | 0.39 |

| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES | | | | | | |
|--|---------------------------------|---------------------------------|-------------|---|--|--|
| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (Ω) | | |
| | | | | 2322 640; see note 1 at end of tables | | |
| | | | | 6.109 | | |
| -40 | 13.675 | 8.39 | -4.86 | 136.75 | | |
| -35 | 10.763 | 7.58 | -4.72 | 107.63 | | |
| -30 | 8.5318 | 6.81 | -4.58 | 85.32 | | |
| -25 | 6.8097 | 6.06 | -4.44 | 68.10 | | |
| -20 | 5.4717 | 5.35 | -4.31 | 54.72 | | |
| -15 | 4.4253 | 4.66 | -4.18 | 44.25 | | |
| -10 | 3.6017 | 4.00 | -4.06 | 36.02 | | |
| -5 | 2.9494 | 3.37 | -3.94 | 29.49 | | |
| 0 | 2.4295 | 2.75 | -3.82 | 24.30 | | |



| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (Ω) |
|---------------------------|---------------------------------|---------------------------------|-------------|---|
| | | | | 2322 640; see note 1 at end of tables |
| | | | | 6.109 |
| 5 | 2.0128 | 2.16 | -3.71 | 20.13 |
| 10 | 1.6767 | 1.59 | -3.60 | 16.77 |
| 15 | 1.4042 | 1.04 | -3.50 | 14.04 |
| 20 | 1.1821 | 0.51 | -3.39 | 11.82 |
| 25 | 1.0000 | 0.00 | -3.30 | 10.00 |
| 30 | 0.8500 | 0.50 | -3.20 | 8.50 |
| 35 | 0.7259 | 0.98 | -3.11 | 7.26 |
| 40 | 0.6226 | 1.44 | -3.03 | 6.23 |
| 45 | 0.5363 | 1.89 | -2.94 | 5.36 |
| 50 | 0.4639 | 2.33 | -2.86 | 4.64 |
| 55 | 0.4029 | 2.75 | -2.78 | 4.03 |
| 60 | 0.3512 | 3.16 | -2.71 | 3.51 |
| 65 | 0.3073 | 3.56 | -2.64 | 3.07 |
| 70 | 0.2698 | 3.95 | -2.57 | 2.70 |
| 75 | 0.2377 | 4.32 | -2.50 | 2.38 |
| 80 | 0.2101 | 4.69 | -2.43 | 2.10 |
| 85 | 0.1864 | 5.04 | -2.37 | 1.86 |
| 90 | 0.1658 | 5.38 | -2.31 | 1.66 |
| 95 | 0.1479 | 5.72 | -2.25 | 1.48 |
| 100 | 0.1323 | 6.05 | -2.20 | 1.32 |
| 105 | 0.1187 | 6.36 | -2.14 | 1.19 |
| 110 | 0.1068 | 6.67 | -2.09 | 1.07 |
| 115 | 0.0964 | 6.98 | -2.04 | 0.96 |
| 120 | 0.0871 | 7.27 | -1.99 | 0.87 |
| 125 | 0.0790 | 7.56 | -1.94 | 0.79 |
| 130 | 0.0717 | 7.84 | -1.90 | 0.72 |
| 135 | 0.0653 | 8.11 | -1.85 | 0.65 |
| 140 | 0.0596 | 8.37 | -1.81 | 0.60 |
| 145 | 0.0545 | 8.63 | -1.77 | 0.55 |
| 150 | 0.0500 | 8.89 | -1.73 | 0.50 |

| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES | | | | |
|---|---------------------------------|---------------------------------|-------------|---|
| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (Ω) |
| | | | | 2322 640; see note 1 at end of tables |
| | | | | 6.159 |
| -40 | 17.042 | 8.53 | -5.54 | 255.63 |
| -35 | 12.993 | 7.71 | -5.31 | 194.90 |
| -30 | 10.017 | 6.92 | -5.10 | 150.26 |
| -25 | 7.8037 | 6.17 | -4.90 | 117.06 |
| -20 | 6.1382 | 5.44 | -4.71 | 92.07 |
| -15 | 4.8719 | 4.74 | -4.53 | 73.08 |
| -10 | 3.8996 | 4.07 | -4.37 | 58.49 |
| -5 | 3.1461 | 3.42 | -4.22 | 47.19 |
| 0 | 2.5571 | 2.80 | -4.07 | 38.36 |
| 5 | 2.0930 | 2.20 | -3.94 | 31.40 |
| 10 | 1.7245 | 1.62 | -3.81 | 25.87 |
| 15 | 1.4298 | 1.06 | -3.69 | 21.45 |
| 20 | 1.1924 | 0.52 | -3.57 | 17.89 |
| 25 | 1.0000 | 0.00 | -3.47 | 15.00 |
| 30 | 0.8431 | 0.50 | -3.36 | 12.65 |
| 35 | 0.7144 | 0.99 | -3.26 | 10.72 |
| 40 | 0.6083 | 1.47 | -3.17 | 9.12 |
| 45 | 0.5203 | 1.92 | -3.08 | 7.80 |



| T_{oper} (°C) | R_T/R_{25} | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R_{25} (Ω) |
|--------------------|--------------|---|-------------|---|
| | | | | 2322 640; see note 1 at end of tables |
| | | | | 6.159 |
| 50 | 0.4470 | 2.37 | -3.00 | 6.70 |
| 55 | 0.3856 | 2.80 | -2.92 | 5.78 |
| 60 | 0.3339 | 3.21 | -2.84 | 5.01 |
| 65 | 0.2903 | 3.62 | -2.76 | 4.35 |
| 70 | 0.2533 | 4.01 | -2.69 | 3.80 |
| 75 | 0.2218 | 4.39 | -2.62 | 3.33 |
| 80 | 0.1948 | 4.77 | -2.56 | 2.92 |
| 85 | 0.1717 | 5.13 | -2.50 | 2.58 |
| 90 | 0.1518 | 5.48 | -2.44 | 2.28 |
| 95 | 0.1346 | 5.82 | -2.38 | 2.02 |
| 100 | 0.1196 | 6.15 | -2.32 | 1.79 |
| 105 | 0.1067 | 6.47 | -2.27 | 1.60 |
| 110 | 0.0954 | 6.79 | -2.22 | 1.43 |
| 115 | 0.0855 | 7.09 | -2.17 | 1.28 |
| 120 | 0.0768 | 7.39 | -2.12 | 1.15 |
| 125 | 0.0691 | 7.69 | -2.07 | 1.04 |
| 130 | 0.0624 | 7.97 | -2.03 | 0.94 |
| 135 | 0.0565 | 8.25 | -1.98 | 0.85 |
| 140 | 0.0512 | 8.52 | -1.94 | 0.77 |
| 145 | 0.0465 | 8.78 | -1.90 | 0.70 |
| 150 | 0.0423 | 9.04 | -1.86 | 0.63 |

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES

| T_{oper} (°C) | R_T/R_{25} | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R_{25} (Ω) |
|--------------------|--------------|---|-------------|---|
| | | | | 2322 640; see note 1 at end of tables |
| | | | | 6.229 |
| -40 | 17.042 | 8.80 | -5.54 | 374.92 |
| -35 | 12.993 | 7.95 | -5.31 | 285.85 |
| -30 | 10.017 | 7.14 | -5.10 | 220.38 |
| -25 | 7.8037 | 6.36 | -4.90 | 171.68 |
| -20 | 6.1382 | 5.61 | -4.71 | 135.04 |
| -15 | 4.8719 | 4.89 | -4.53 | 107.18 |
| -10 | 3.8996 | 4.20 | -4.37 | 85.79 |
| -5 | 3.1461 | 3.53 | -4.22 | 69.21 |
| 0 | 2.5571 | 2.89 | -4.07 | 56.26 |
| 5 | 2.0930 | 2.27 | -3.94 | 46.05 |
| 10 | 1.7245 | 1.67 | -3.81 | 37.94 |
| 15 | 1.4298 | 1.10 | -3.69 | 31.45 |
| 20 | 1.1924 | 0.54 | -3.57 | 26.23 |
| 25 | 1.0000 | 0.00 | -3.47 | 22.00 |
| 30 | 0.8431 | 0.52 | -3.36 | 18.55 |
| 35 | 0.7144 | 1.02 | -3.26 | 15.72 |
| 40 | 0.6083 | 1.51 | -3.17 | 13.38 |
| 45 | 0.5203 | 1.98 | -3.08 | 11.45 |
| 50 | 0.4470 | 2.44 | -3.00 | 9.83 |
| 55 | 0.3856 | 2.88 | -2.92 | 8.48 |
| 60 | 0.3339 | 3.32 | -2.84 | 7.35 |
| 65 | 0.2903 | 3.73 | -2.76 | 6.39 |
| 70 | 0.2533 | 4.14 | -2.69 | 5.57 |
| 75 | 0.2218 | 4.53 | -2.62 | 4.88 |
| 80 | 0.1948 | 4.91 | -2.56 | 4.29 |
| 85 | 0.1717 | 5.29 | -2.50 | 3.78 |
| 90 | 0.1518 | 5.65 | -2.44 | 3.34 |



| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (Ω) | | |
|---------------------------|---------------------------------|---------------------------------|-------------|---|--|--|
| | | | | 2322 640; see note 1 at end of tables | | |
| | | | | 6.229 | | |
| 95 | 0.1346 | 6.00 | -2.38 | 2.96 | | |
| 100 | 0.1196 | 6.34 | -2.32 | 2.63 | | |
| 105 | 0.1067 | 6.68 | -2.27 | 2.35 | | |
| 110 | 0.0954 | 7.00 | -2.22 | 2.10 | | |
| 115 | 0.0855 | 7.32 | -2.17 | 1.88 | | |
| 120 | 0.0768 | 7.62 | -2.12 | 1.69 | | |
| 125 | 0.0691 | 7.93 | -2.07 | 1.52 | | |
| 130 | 0.0624 | 8.22 | -2.03 | 1.37 | | |
| 135 | 0.0565 | 8.50 | -1.98 | 1.24 | | |
| 140 | 0.0512 | 8.78 | -1.94 | 1.13 | | |
| 145 | 0.0165 | 9.06 | -1.90 | 1.02 | | |
| 150 | 0.0423 | 9.32 | -1.86 | 0.93 | | |

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES

| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (Ω) | | |
|---------------------------|---------------------------------|---------------------------------|-------------|---|---------|---------|
| | | | | 2322 640; see note 1 at end of tables | | |
| | | | | 6.339 | 6.479 | 6.689 |
| -40 | 21.4241 | 9.51 | -5.94 | 707.00 | 1006.93 | 1456.84 |
| -35 | 16.0147 | 8.59 | -5.70 | 528.48 | 752.69 | 1089.00 |
| -30 | 12.1074 | 7.72 | -5.49 | 399.54 | 569.05 | 823.30 |
| -25 | 9.2511 | 6.87 | -5.28 | 305.29 | 434.80 | 629.07 |
| -20 | 7.1395 | 6.06 | -5.09 | 235.60 | 335.56 | 485.49 |
| -15 | 5.5619 | 5.29 | -4.90 | 183.54 | 261.41 | 378.21 |
| -10 | 4.3715 | 4.54 | -4.73 | 144.26 | 205.46 | 297.26 |
| -5 | 3.4647 | 3.82 | -4.57 | 114.33 | 162.84 | 235.60 |
| 0 | 2.7678 | 3.12 | -4.42 | 91.34 | 130.09 | 188.21 |
| 5 | 2.2276 | 2.45 | -4.27 | 73.51 | 104.70 | 151.48 |
| 10 | 1.8057 | 1.81 | -4.13 | 59.59 | 84.87 | 122.79 |
| 15 | 1.4735 | 1.18 | -4.00 | 48.63 | 69.26 | 100.20 |
| 20 | 1.2102 | 0.58 | -3.88 | 39.94 | 56.88 | 82.29 |
| 25 | 1.0000 | 0.00 | -3.76 | 33.00 | 47.00 | 68.00 |
| 30 | 0.8311 | 0.56 | -3.64 | 27.43 | 39.06 | 56.51 |
| 35 | 0.6946 | 1.11 | -3.54 | 22.92 | 32.64 | 47.23 |
| 40 | 0.5835 | 1.63 | -3.43 | 19.26 | 27.42 | 39.68 |
| 45 | 0.4927 | 2.14 | -3.34 | 16.26 | 23.16 | 33.50 |
| 50 | 0.4180 | 2.64 | -3.24 | 13.79 | 19.65 | 28.42 |
| 55 | 0.3563 | 3.12 | -3.15 | 11.76 | 16.74 | 24.23 |
| 60 | 0.3050 | 3.58 | -3.07 | 10.06 | 14.33 | 20.74 |
| 65 | 0.2622 | 4.03 | -2.98 | 8.65 | 12.32 | 17.83 |
| 70 | .02263 | 4.47 | -2.90 | 7.47 | 10.64 | 15.39 |
| 75 | 0.1961 | 4.90 | -2.83 | 6.47 | 9.22 | 13.33 |
| 80 | 0.1705 | 5.31 | -2.76 | 5.63 | 8.02 | 11.60 |
| 85 | 0.1489 | 5.71 | -2.69 | 4.91 | 7.00 | 10.12 |
| 90 | 0.1304 | 6.11 | -2.62 | 4.30 | 6.13 | 8.86 |
| 95 | 0.1146 | 6.49 | -2.55 | 3.78 | 5.38 | 7.79 |
| 100 | 0.1010 | 6.86 | -2.49 | 3.33 | 4.75 | 6.87 |
| 105 | 0.0893 | 7.22 | -2.43 | 2.95 | 4.20 | 6.07 |
| 110 | 0.0792 | 7.57 | -2.37 | 2.61 | 3.72 | 5.38 |
| 115 | 0.0704 | 7.91 | -2.32 | 2.32 | 3.31 | 4.79 |
| 120 | 0.0628 | 8.24 | -2.26 | 2.07 | 2.95 | 4.27 |
| 125 | 0.0561 | 8.57 | -2.21 | 1.85 | 2.64 | 3.82 |
| 130 | 0.0503 | 8.88 | -2.16 | 1.66 | 2.37 | 3.42 |
| 135 | 0.0452 | 9.19 | -2.11 | 1.49 | 2.13 | 3.07 |



| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (Ω) | | |
|---------------------------|---------------------------------|---------------------------------|-------------|---|-------|-------|
| | | | | 2322 640; see note 1 at end of tables | | |
| | | | | 6.339 | 6.479 | 6.689 |
| 140 | 0.0407 | 9.49 | -2.07 | 1.34 | 1.91 | 2.77 |
| 145 | 0.0368 | 9.79 | -2.02 | 1.21 | 1.73 | 2.50 |
| 150 | 0.0333 | 10.08 | -1.98 | 1.10 | 1.56 | 2.26 |

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES

| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (Ω) | | | | | |
|---------------------------|---------------------------------|---------------------------------|-------------|---|--------|--------|-------|-------|-------|
| | | | | 2322 640; see note 1 at end of tables | | | | | |
| | | | | 6.101 | 6.151 | 6.221 | 6.331 | 6.471 | 6.681 |
| -40 | 21.9261 | 2.50 | -5.75 | 2192.6 | 2388.9 | 4823.7 | 7236 | 10503 | 14910 |
| -35 | 16.5224 | 2.26 | -5.57 | 1652.2 | 2478.4 | 3634.9 | 5452 | 7766 | 11235 |
| -30 | 12.5583 | 2.03 | -5.40 | 1255.8 | 1883.7 | 2762.8 | 4144 | 5902 | 8540 |
| -25 | 9.62492 | 1.80 | -5.24 | 962.5 | 1443.7 | 2117.5 | 3176 | 4524 | 6545 |
| -20 | 7.43618 | 1.59 | -5.08 | 743.6 | 1115.4 | 1636.0 | 2454 | 3495 | 5057 |
| -15 | 5.78976 | 1.39 | -4.93 | 579.0 | 868.5 | 1273.7 | 1911 | 2721 | 3937 |
| -10 | 4.54158 | 1.19 | -4.78 | 454.2 | 681.2 | 999.1 | 1499 | 1235 | 3088 |
| -5 | 3.58813 | 1.00 | -4.64 | 358.8 | 538.2 | 789.4 | 1184 | 1686 | 2440 |
| 0 | 2.85449 | 0.82 | -4.51 | 285.4 | 428.2 | 628.0 | 942.0 | 1342 | 1941 |
| 5 | 2.28599 | 0.64 | -4.38 | 228.6 | 342.9 | 502.9 | 754.4 | 1074 | 1554 |
| 10 | 1.84245 | 0.47 | -4.25 | 184.2 | 276.4 | 405.3 | 608.0 | 865.9 | 1253 |
| 15 | 1.49414 | 0.31 | -4.13 | 149.4 | 224.1 | 328.7 | 493.1 | 702.2 | 1016 |
| 20 | 1.21887 | 0.15 | -4.01 | 121.9 | 182.8 | 268.2 | 402.2 | 572.9 | 828.8 |
| 25 | 1.000 | 0.00 | -3.90 | 100.0 | 150.0 | 220.0 | 330.0 | 470.0 | 680.0 |
| 30 | 0.82494 | 0.15 | -3.80 | 82.5 | 123.7 | 181.5 | 272.2 | 387.7 | 561.0 |
| 35 | 0.68413 | 0.29 | -3.69 | 68.4 | 102.6 | 150.5 | 225.8 | 321.5 | 465.2 |
| 40 | 0.57025 | 0.43 | -3.59 | 57.0 | 85.5 | 125.5 | 188.2 | 268.0 | 387.8 |
| 45 | 0.47765 | 0.56 | -3.50 | 47.8 | 71.6 | 105.1 | 157.6 | 224.5 | 324.8 |
| 50 | 0.40198 | 0.69 | -3.40 | 40.2 | 60.3 | 88.4 | 132.7 | 188.9 | 273.3 |
| 55 | 0.33984 | 0.82 | -3.31 | 34.0 | 51.0 | 74.8 | 112.1 | 159.7 | 231.1 |
| 60 | 0.28856 | 0.94 | -3.23 | 28.9 | 43.3 | 63.5 | 95.23 | 135.6 | 196.2 |
| 65 | 0.24606 | 1.06 | -3.15 | 24.6 | 36.9 | 54.1 | 81.20 | 115.6 | 167.3 |
| 70 | 0.21067 | 1.17 | -3.07 | 21.1 | 31.6 | 46.3 | 69.52 | 99.00 | 143.3 |
| 75 | 0.18108 | 1.29 | -2.99 | 18.1 | 27.2 | 39.8 | 59.76 | 85.11 | 123.1 |
| 80 | 0.15623 | 1.39 | -2.91 | 15.6 | 23.4 | 34.4 | 51.56 | 73.43 | 106.2 |
| 85 | 0.13529 | 1.50 | -2.84 | 13.5 | 20.3 | 29.8 | 44.65 | 63.59 | 92.00 |
| 90 | 0.11757 | 1.60 | -2.77 | 11.8 | 17.6 | 25.9 | 38.80 | 55.26 | 79.95 |
| 95 | 0.10251 | 1.70 | -2.71 | 10.3 | 15.4 | 22.6 | 33.83 | 48.18 | 69.71 |
| 100 | 0.08968 | 1.80 | -2.64 | 8.97 | 13.5 | 19.7 | 29.59 | 42.15 | 60.98 |
| 105 | 0.07871 | 1.89 | -2.58 | 7.87 | 11.8 | 17.3 | 25.97 | 36.99 | 53.52 |
| 110 | 0.06928 | 1.99 | -2.52 | 6.93 | 10.4 | 15.2 | 22.86 | 32.56 | 47.11 |
| 115 | 0.06117 | 2.08 | -2.46 | 6.12 | 9.18 | 13.5 | 20.19 | 28.75 | 41.60 |
| 120 | 0.05416 | 2.16 | -2.41 | 5.42 | 8.12 | 11.9 | 17.87 | 25.46 | 36.83 |
| 125 | 0.04809 | 2.25 | -2.35 | 4.81 | 7.21 | 10.6 | 15.87 | 22.60 | 32.70 |
| 130 | 0.04282 | 2.33 | -2.30 | 4.28 | 6.42 | 9.42 | 14.13 | 20.12 | 29.11 |
| 135 | 0.03822 | 2.41 | -2.25 | 3.82 | 5.73 | 8.41 | 12.61 | 17.96 | 25.99 |
| 140 | 0.03420 | 2.49 | -2.20 | 3.42 | 5.13 | 7.52 | 11.29 | 16.07 | 23.25 |
| 145 | 0.03068 | 2.57 | -2.15 | 3.07 | 4.60 | 6.75 | 10.12 | 14.42 | 20.86 |
| 150 | 0.02758 | 2.65 | -2.10 | 2.76 | 4.14 | 6.07 | 9.10 | 12.96 | 18.76 |



| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES | | | | | | |
|--|---------------------------------|---------------------------------|-------------|---|-------|-------|
| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (Ω) | | |
| | | | | 2322 640; see note 1 at end of tables | | |
| | | | | 6.102 | 6.152 | 6.202 |
| -40 | 23.3402 | 1.65 | -6.06 | 23342 | 35013 | 46684 |
| -35 | 17.3347 | 1.49 | -5.84 | 17336 | 26004 | 34672 |
| -30 | 13.0166 | 1.34 | -5.62 | 13018 | 19526 | 26035 |
| -25 | 9.8764 | 1.19 | -5.42 | 9877 | 14816 | 19754 |
| -20 | 7.5682 | 1.05 | -5.23 | 7569 | 11353 | 15138 |
| -15 | 5.8541 | 0.92 | -5.05 | 5855 | 8782 | 11709 |
| -10 | 4.5688 | 0.79 | -4.87 | 4569 | 6854 | 9138 |
| -5 | 3.5961 | 0.66 | -4.71 | 3596 | 5395 | 7193 |
| 0 | 2.8533 | 0.54 | -4.55 | 2854 | 4280 | 5707 |
| 5 | 2.2815 | 0.43 | -4.40 | 2282 | 3422 | 4563 |
| 10 | 1.8376 | 0.31 | -4.26 | 1838 | 2457 | 3675 |
| 15 | 1.4904 | 0.21 | -4.12 | 1491 | 2236 | 2981 |
| 20 | 1.2169 | 0.10 | -3.99 | 1217 | 1826 | 2434 |
| 25 | 1.0000 | 0.00 | -3.87 | 1000 | 1500 | 2000 |
| 30 | 0.8266 | 0.10 | -3.75 | 826.7 | 1240 | 1653 |
| 35 | 0.6873 | 0.19 | -3.63 | 687.4 | 1031 | 1375 |
| 40 | 0.5746 | 0.28 | -3.53 | 574.6 | 861.9 | 1149 |
| 45 | 0.4827 | 0.37 | -3.42 | 482.7 | 724.1 | 965.0 |
| 50 | 0.4073 | 0.46 | -3.32 | 407.4 | 611.0 | 814.7 |
| 55 | 0.3452 | 0.54 | -3.23 | 345.2 | 517.8 | 690.5 |
| 60 | 0.2937 | 0.62 | -3.14 | 293.7 | 440.6 | 587.5 |
| 65 | 0.2508 | 0.70 | -3.05 | 250.8 | 376.2 | 501.7 |
| 70 | 0.2149 | 0.78 | -2.97 | 214.9 | 322.4 | 429.8 |
| 75 | 0.1847 | 0.85 | -2.89 | 184.8 | 277.1 | 369.5 |
| 80 | 0.1593 | 0.92 | -2.81 | 159.3 | 238.9 | 318.6 |
| 85 | 0.1377 | 0.99 | -2.73 | 137.7 | 206.6 | 275.5 |
| 90 | 0.11942 | 1.06 | -2.66 | 119.4 | 179.1 | 238.9 |
| 95 | 0.10380 | 1.13 | -2.59 | 103.8 | 155.7 | 207.6 |
| 100 | 0.09045 | 1.19 | -2.53 | 90.46 | 135.7 | 180.9 |
| 105 | 0.07900 | 1.25 | -2.46 | 79.00 | 118.5 | 158.0 |
| 110 | 0.06915 | 1.31 | -2.40 | 69.16 | 103.7 | 138.3 |
| 115 | 0.06066 | 1.37 | -2.34 | 60.66 | 90.99 | 121.3 |
| 120 | 0.05332 | 1.43 | -2.29 | 53.32 | 79.98 | 106.6 |
| 125 | 0.04696 | 1.49 | -2.23 | 46.96 | 70.44 | 93.9 |
| 130 | 0.04143 | 1.54 | -2.18 | 41.44 | 62.15 | 82.9 |
| 135 | 0.03662 | 1.60 | -2.13 | 36.63 | 54.94 | 73.3 |
| 140 | 0.03243 | 1.65 | -2.08 | 32.43 | 48.65 | 64.9 |
| 145 | 0.02877 | 1.70 | -2.03 | 28.77 | 43.16 | 57.5 |
| 150 | 0.02556 | 1.75 | -1.98 | 25.56 | 38.34 | 51.1 |

| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES | | | | | | | | | |
|--|---------------------------------|---------------------------------|-------------|---|-------|-------|-------|-------|-------|
| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (kΩ) | | | | | |
| | | | | 2322 640; see note 1 at end of tables | | | | | |
| | | | | 6.222 | 6.272 | 6.332 | 6.472 | 6.682 | 6.103 |
| -40 | 33.21 | 2.66 | 6.57 | 73.06 | 89.67 | 109.6 | 156.1 | 225.8 | 332.1 |
| -35 | 23.99 | 2.41 | 6.36 | 52.78 | 64.77 | 79.17 | 112.8 | 163.1 | 240.0 |
| -30 | 17.52 | 2.17 | 6.15 | 38.55 | 47.31 | 57.82 | 82.35 | 119.1 | 175.2 |
| -25 | 12.93 | 1.94 | 5.95 | 28.44 | 34.91 | 42.67 | 60.77 | 87.92 | 129.3 |
| -20 | 9.636 | 1.71 | 5.76 | 21.20 | 26.02 | 31.80 | 45.30 | 65.53 | 96.36 |
| -15 | 7.250 | 1.50 | 5.58 | 15.95 | 19.58 | 23.93 | 34.08 | 49.30 | 72.50 |
| -10 | 5.505 | 1.29 | 5.40 | 12.11 | 14.86 | 18.16 | 25.87 | 37.43 | 55.05 |



| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (kΩ) | | | | | |
|---------------------------|---------------------------------|---------------------------------|-------------|---|--------|--------|--------|--------|--------|
| | | | | 2322 640; see note 1 at end of tables | | | | | |
| | | | | 6.222 | 6.272 | 6.332 | 6.472 | 6.682 | 6.103 |
| -5 | 4.216 | 1.08 | 5.24 | 9.275 | 11.38 | 13.91 | 19.81 | 28.67 | 42.16 |
| 0 | 3.255 | 0.89 | 5.08 | 7.162 | 8.790 | 10.74 | 15.30 | 22.14 | 32.56 |
| 5 | 2.534 | 0.70 | 4.92 | 5.575 | 6.842 | 8.362 | 11.91 | 17.23 | 25.34 |
| 10 | 1.987 | 0.52 | 4.78 | 4.372 | 5.366 | 6.558 | 9.340 | 13.51 | 19.87 |
| 15 | 1.570 | 0.34 | 4.64 | 3.454 | 4.239 | 5.181 | 7.378 | 10.67 | 15.70 |
| 20 | 1.249 | 0.17 | 4.50 | 2.747 | 3.372 | 4.121 | 5.869 | 8.492 | 12.49 |
| 25 | 1.000 | 0.00 | 4.37 | 2.200 | 2.700 | 3.300 | 4.700 | 6.800 | 10.00 |
| 30 | 0.8059 | 0.16 | 4.25 | 1.773 | 2.176 | 2.660 | 3.788 | 5.480 | 8.059 |
| 35 | 0.6535 | 0.32 | 4.13 | 1.438 | 1.764 | 2.156 | 3.072 | 4.444 | 6.535 |
| 40 | 0.5330 | 0.47 | 4.02 | 1.173 | 1.439 | 1.759 | 2.505 | 3.624 | 5.330 |
| 45 | 0.4372 | 0.62 | 3.91 | 0.9618 | 1.180 | 1.443 | 2.055 | 2.972 | 4.372 |
| 50 | 0.3605 | 0.77 | 3.80 | 0.7932 | 0.973 | 1.190 | 1.694 | 2.451 | 3.606 |
| 55 | 0.2989 | 0.91 | 3.70 | 0.6575 | 0.807 | 0.9863 | 1.405 | 2.032 | 2.989 |
| 60 | 0.2490 | 1.05 | 3.60 | 0.5478 | 0.672 | 0.8217 | 1.170 | 1.693 | 2.490 |
| 65 | 0.2084 | 1.18 | 3.51 | 0.4586 | 0.562 | 0.6879 | 0.9797 | 1.417 | 2.084 |
| 70 | 0.1753 | 1.31 | 3.42 | 0.3857 | 0.473 | 0.5785 | 0.8239 | 1.192 | 1.753 |
| 75 | 0.1481 | 1.44 | 3.33 | 0.3258 | 0.399 | 0.4887 | 0.6960 | 1.007 | 1.481 |
| 80 | 0.1256 | 1.57 | 3.25 | 0.2764 | 0.339 | 0.4146 | 0.5905 | 0.8544 | 1.256 |
| 85 | 0.1070 | 1.69 | 3.16 | 0.2355 | 0.289 | 0.3532 | 0.5031 | 0.7278 | 1.070 |
| 90 | 0.09154 | 1.81 | 3.09 | 0.2014 | 0.247 | 0.3021 | 0.4303 | 0.6225 | 0.9154 |
| 95 | 0.07860 | 1.93 | 3.01 | 0.1729 | 0.212 | 0.2594 | 0.3694 | 0.5345 | 0.7860 |
| 100 | 0.06773 | 2.04 | 2.94 | 0.1490 | 0.182 | 0.2235 | 0.3183 | 0.4607 | 0.6773 |
| 105 | 0.05858 | 2.15 | 2.87 | 0.1289 | 0.158 | 0.1933 | 0.2753 | 0.3983 | 0.5858 |
| 110 | 0.05083 | 2.26 | 2.80 | 0.1118 | 0.137 | 0.1677 | 0.2389 | 0.3457 | 0.5083 |
| 115 | 0.04426 | 2.37 | 2.73 | 0.0974 | 0.1195 | 0.1461 | 0.2080 | 0.3010 | 0.4426 |
| 120 | 0.03866 | 2.47 | 2.67 | 0.0851 | 0.1044 | 0.1276 | 0.1817 | 0.2629 | 0.3866 |
| 125 | 0.03387 | 2.57 | 2.61 | 0.0745 | 0.0915 | 0.1118 | 0.1592 | 0.2303 | 0.3387 |
| 130 | 0.02977 | 2.67 | 2.55 | 0.0655 | 0.0804 | 0.0982 | 0.1399 | 0.2024 | 0.2977 |
| 135 | 0.02624 | 2.77 | 2.49 | 0.0577 | 0.0709 | 0.0866 | 0.1233 | 0.1784 | 0.2624 |
| 140 | 0.02319 | 2.86 | 2.43 | 0.0510 | 0.0626 | 0.0765 | 0.1090 | 0.1577 | 0.2319 |
| 145 | 0.02055 | 2.96 | 2.38 | 0.0452 | 0.0555 | 0.0678 | 0.0966 | 0.1398 | 0.2055 |
| 150 | 0.01826 | 3.05 | 2.33 | 0.0402 | 0.0493 | 0.0603 | 0.0858 | 0.1242 | 0.1826 |

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES

| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (kΩ) | | |
|---------------------------|---------------------------------|---------------------------------|-------------|---|-------|-------|
| | | | | 2322 640; see note 1 at end of tables | | |
| | | | | 6.123 | 6.153 | 6.223 |
| -40 | 25.78 | 6.81 | 6.09 | 309.4 | 386.8 | 567.2 |
| -35 | 19.13 | 6.16 | 5.89 | 229.5 | 286.9 | 420.8 |
| -30 | 14.32 | 5.53 | 5.70 | 171.8 | 214.8 | 315.0 |
| -25 | 10.82 | 4.93 | 5.52 | 129.8 | 162.3 | 238.0 |
| -20 | 8.245 | 4.35 | 5.35 | 98.93 | 123.7 | 181.4 |
| -15 | 6.335 | 3.80 | 5.19 | 76.02 | 95.03 | 139.4 |
| -10 | 4.907 | 3.26 | 5.03 | 58.88 | 73.60 | 107.9 |
| -5 | 3.830 | 2.74 | 4.88 | 45.95 | 57.44 | 84.25 |
| 0 | 3.011 | 2.24 | 4.73 | 36.13 | 45.16 | 66.24 |
| 5 | 2.384 | 1.76 | 4.60 | 28.60 | 35.76 | 52.45 |
| 10 | 1.900 | 1.30 | 4.46 | 22.80 | 28.50 | 41.81 |
| 15 | 1.525 | 0.85 | 4.34 | 18.30 | 22.87 | 33.55 |
| 20 | 1.231 | 0.42 | 4.21 | 14.77 | 18.47 | 27.09 |
| 25 | 1.000 | 0.00 | 4.10 | 12.00 | 15.00 | 22.00 |
| 30 | 0.8170 | 0.41 | 3.98 | 9.804 | 12.26 | 17.97 |



| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (kΩ) | | |
|---------------------------|---------------------------------|---------------------------------|-------------|---|--------|--------|
| | | | | 2322 640; see note 1 at end of tables | | |
| | | | | 6.123 | 6.153 | 6.223 |
| 35 | 0.6712 | 0.80 | 3.88 | 8.054 | 10.07 | 14.77 |
| 40 | 0.5543 | 1.19 | 3.77 | 6.652 | 8.315 | 12.20 |
| 45 | 0.4602 | 1.57 | 3.67 | 5.522 | 6.903 | 10.12 |
| 50 | 0.3839 | 1.94 | 3.57 | 4.607 | 5.759 | 8.447 |
| 55 | 0.3219 | 2.30 | 3.48 | 3.862 | 4.828 | 7.081 |
| 60 | 0.2710 | 2.65 | 3.39 | 3.252 | 4.067 | 5.963 |
| 65 | 0.2293 | 2.99 | 3.30 | 2.751 | 3.439 | 5.044 |
| 70 | 0.1947 | 3.33 | 3.22 | 2.337 | 2.921 | 4.284 |
| 75 | 0.1661 | 3.66 | 3.14 | 1.993 | 2.492 | 3.654 |
| 80 | 0.1422 | 3.98 | 3.06 | 1.707 | 2.134 | 3.129 |
| 85 | 0.1223 | 4.29 | 2.99 | 1.467 | 1.834 | 2.690 |
| 90 | 0.1055 | 4.60 | 2.92 | 1.266 | 1.583 | 2.321 |
| 95 | 0.09135 | 4.90 | 2.85 | 1.096 | 1.370 | 2.010 |
| 100 | 0.07937 | 5.19 | 2.78 | 0.9524 | 1.190 | 1.746 |
| 105 | 0.06919 | 5.48 | 2.71 | 0.8302 | 1.038 | 1.522 |
| 110 | 0.06050 | 5.76 | 2.65 | 0.7260 | 0.9075 | 1.331 |
| 115 | 0.05307 | 6.04 | 2.59 | 0.6369 | 0.7961 | 1.168 |
| 120 | 0.04670 | 6.31 | 2.53 | 0.5604 | 0.7005 | 1.027 |
| 125 | 0.04121 | 6.57 | 2.47 | 0.4945 | 0.6181 | 0.9065 |

| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES | | | | | | |
|--|---------------------------------|---------------------------------|-------------|---|-------|-------|
| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (kΩ) | | |
| | | | | 2322 640; see note 1 at end of tables | | |
| | | | | 6.333 | 6.473 | |
| -40 | 33.81 | 5.55 | 6.55 | 1116 | | 1589 |
| -35 | 24.50 | 5.02 | 6.34 | 808.6 | | 1151 |
| -30 | 17.93 | 4.52 | 6.15 | 591.7 | | 842.8 |
| -25 | 13.25 | 4.03 | 5.96 | 437.1 | | 622.6 |
| -20 | 9.875 | 3.56 | 5.78 | 325.9 | | 464.1 |
| -15 | 7.425 | 3.10 | 5.61 | 245.0 | | 349.0 |
| -10 | 5.630 | 2.67 | 5.45 | 185.8 | | 264.6 |
| -5 | 4.304 | 2.24 | 5.29 | 142.0 | | 202.3 |
| 0 | 3.315 | 1.84 | 5.14 | 109.4 | | 155.8 |
| 5 | 2.573 | 1.44 | 4.99 | 84.91 | | 120.9 |
| 10 | 2.011 | 1.07 | 4.85 | 66.37 | | 94.53 |
| 15 | 1.583 | 0.70 | 4.72 | 52.24 | | 74.40 |
| 20 | 1.254 | 0.34 | 4.59 | 41.39 | | 58.95 |
| 25 | 1.000 | 0.00 | 4.46 | 33.00 | | 47.00 |
| 30 | 0.8024 | 0.33 | 4.34 | 26.47 | | 37.71 |
| 35 | 0.6474 | 0.66 | 4.23 | 21.37 | | 30.43 |
| 40 | 0.5255 | 0.98 | 4.12 | 17.34 | | 24.70 |
| 45 | 0.4288 | 1.28 | 4.01 | 14.15 | | 20.15 |
| 50 | 0.3518 | 1.59 | 3.91 | 11.61 | | 16.53 |
| 55 | 0.2901 | 1.88 | 3.81 | 9.572 | | 13.63 |
| 60 | 0.2403 | 2.17 | 3.71 | 7.931 | | 11.30 |
| 65 | 0.2001 | 2.45 | 3.62 | 6.603 | | 9.404 |
| 70 | 0.1674 | 2.72 | 3.53 | 5.522 | | 7.865 |
| 75 | 0.1406 | 2.99 | 3.44 | 4.639 | | 6.607 |
| 80 | 0.1186 | 3.25 | 3.36 | 3.913 | | 5.573 |
| 85 | 0.1004 | 3.51 | 3.28 | 3.315 | | 4.721 |
| 90 | 0.08542 | 3.76 | 3.20 | 2.819 | | 4.015 |
| 95 | 0.07292 | 4.00 | 3.13 | 2.406 | | 3.427 |
| 100 | 0.06248 | 4.24 | 3.06 | 2.062 | | 2.936 |



| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (kΩ) | |
|---------------------------|---------------------------------|---------------------------------|-------------|---|--------|
| | | | | 2322 640; see note 1 at end of tables | |
| | | | | 6.333 | 6.473 |
| 105 | 0.05372 | 4.47 | 2.98 | 1.773 | 2.525 |
| 110 | 0.04635 | 4.70 | 2.92 | 1.530 | 2.179 |
| 115 | 0.04013 | 4.93 | 2.85 | 1.342 | 1.886 |
| 120 | 0.03485 | 5.15 | 2.79 | 1.150 | 1.638 |
| 125 | 0.03037 | 5.36 | 2.73 | 1.002 | 1.427 |
| 130 | 0.02654 | 5.57 | 2.67 | 0.8757 | 1.247 |
| 135 | 0.02326 | 5.78 | 2.61 | 0.7675 | 1.093 |
| 140 | 0.02044 | 5.98 | 2.55 | 0.6746 | 0.9608 |
| 145 | 0.01802 | 6.18 | 2.50 | 0.5945 | 0.8468 |
| 150 | 0.01592 | 6.37 | 2.44 | 0.5254 | 0.7483 |

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES

| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (kΩ) | |
|---------------------------|---------------------------------|---------------------------------|-------------|---|-------|
| | | | | 2322 640; see note 1 at end of tables | |
| | | | | 6.683 | 6.104 |
| -40 | 36.66 | 5.69 | 6.70 | 2493 | 3666 |
| -35 | 26.38 | 5.15 | 6.49 | 1794 | 2638 |
| -30 | 19.17 | 4.63 | 6.29 | 1303 | 1917 |
| -25 | 14.06 | 4.13 | 6.10 | 956.2 | 1406 |
| -20 | 10.41 | 3.65 | 5.92 | 708.0 | 1041 |
| -15 | 7.779 | 3.18 | 5.74 | 528.9 | 777.9 |
| -10 | 5.861 | 2.73 | 5.57 | 398.5 | 586.1 |
| -5 | 4.453 | 2.30 | 5.41 | 302.8 | 445.3 |
| 0 | 3.409 | 1.88 | 5.26 | 231.8 | 340.9 |
| 5 | 2.631 | 1.48 | 5.11 | 178.9 | 263.1 |
| 10 | 2.044 | 1.09 | 4.97 | 139.0 | 204.4 |
| 15 | 1.600 | 0.72 | 4.83 | 108.8 | 160.0 |
| 20 | 1.261 | 0.35 | 4.70 | 85.74 | 126.1 |
| 25 | 1.000 | 0.00 | 4.57 | 68.00 | 100.0 |
| 30 | 0.7981 | 0.34 | 4.45 | 54.27 | 79.81 |
| 35 | 0.6408 | 0.67 | 4.35 | 43.57 | 64.08 |
| 40 | 0.5175 | 1.00 | 4.22 | 35.19 | 51.74 |
| 45 | 0.4202 | 1.32 | 4.11 | 28.57 | 42.02 |
| 50 | 0.3431 | 1.63 | 4.00 | 23.33 | 34.31 |
| 55 | 0.2816 | 1.93 | 3.90 | 19.15 | 28.16 |
| 60 | 0.2322 | 2.22 | 3.80 | 15.79 | 23.22 |
| 65 | 0.1925 | 2.51 | 3.71 | 13.09 | 19.25 |
| 70 | 0.1602 | 2.79 | 3.62 | 10.90 | 16.03 |
| 75 | 0.1340 | 3.06 | 3.53 | 9.114 | 13.40 |
| 80 | 0.1126 | 3.33 | 3.45 | 7.655 | 11.26 |
| 85 | 0.09496 | 3.59 | 3.36 | 6.457 | 9.496 |
| 90 | 0.08042 | 3.85 | 3.28 | 5.469 | 8.042 |
| 95 | 0.06837 | 4.10 | 3.21 | 4.649 | 6.837 |
| 100 | 0.05835 | 4.35 | 3.13 | 3.968 | 5.835 |
| 105 | 0.04998 | 4.59 | 3.06 | 3.399 | 4.998 |
| 110 | 0.04296 | 4.82 | 2.99 | 2.921 | 4.296 |
| 115 | 0.03705 | 5.05 | 2.92 | 2.519 | 3.705 |
| 120 | 0.03206 | 5.28 | 2.86 | 2.180 | 3.206 |
| 125 | 0.02783 | 5.50 | 2.80 | 1.892 | 2.783 |



| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES | | | | | |
|---|--------------|---|-------------|---|-------|
| T_{oper} (°C) | R_T/R_{25} | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R_{25} (k Ω) | |
| | | | | 2322 640; see note 1 at end of tables | |
| | | | | 6.154 | 6.224 |
| -40 | 41.02 | 10.10 | 6.89 | 6153 | 9024 |
| -35 | 29.29 | 9.12 | 6.68 | 4394 | 6444 |
| -30 | 21.12 | 8.18 | 6.48 | 3168 | 4646 |
| -25 | 15.37 | 7.28 | 6.29 | 2305 | 3381 |
| -20 | 11.28 | 6.42 | 6.11 | 1693 | 2483 |
| -15 | 8.358 | 5.59 | 5.93 | 1254 | 1839 |
| -10 | 6.242 | 4.80 | 5.76 | 936.4 | 1373 |
| -5 | 4.700 | 4.03 | 5.60 | 705.0 | 1034 |
| 0 | 3.567 | 3.30 | 5.44 | 535.0 | 784.7 |
| 5 | 2.727 | 2.59 | 5.29 | 409.1 | 600.0 |
| 10 | 2.101 | 1.90 | 5.15 | 315.1 | 462.1 |
| 15 | 1.629 | 1.25 | 5.01 | 244.4 | 358.4 |
| 20 | 1.272 | 0.61 | 4.88 | 190.8 | 279.9 |
| 25 | 1.000 | 0.00 | 4.75 | 150.0 | 220.0 |
| 30 | 0.7910 | 0.59 | 4.62 | 118.6 | 174.0 |
| 35 | 0.6295 | 1.18 | 4.51 | 94.42 | 138.5 |
| 40 | 0.5039 | 1.74 | 4.39 | 75.58 | 110.9 |
| 45 | 0.4056 | 2.30 | 4.28 | 60.85 | 89.24 |
| 50 | 0.3283 | 2.84 | 4.17 | 49.25 | 72.24 |
| 55 | 0.2672 | 3.37 | 4.07 | 40.08 | 58.78 |
| 60 | 0.2185 | 3.89 | 3.97 | 32.78 | 48.08 |
| 65 | 0.1796 | 4.40 | 3.87 | 26.94 | 39.51 |
| 70 | 0.1483 | 4.90 | 3.78 | 22.25 | 32.63 |
| 75 | 0.1231 | 5.39 | 3.69 | 18.46 | 27.07 |
| 80 | 0.1025 | 5.86 | 3.60 | 15.38 | 22.56 |
| 85 | 0.08582 | 6.33 | 3.52 | 12.87 | 18.88 |
| 90 | 0.07213 | 6.79 | 3.44 | 10.82 | 15.87 |
| 95 | 0.06086 | 7.24 | 3.36 | 9.129 | 13.39 |
| 100 | 0.05155 | 7.68 | 3.28 | 7.732 | 11.34 |
| 105 | 0.04383 | 8.11 | 3.21 | 6.574 | 9.642 |
| 110 | 0.03740 | 8.53 | 3.14 | 5.610 | 8.228 |
| 115 | 0.03203 | 8.94 | 3.07 | 4.804 | 7.046 |
| 120 | 0.02752 | 9.35 | 3.00 | 4.128 | 6.054 |
| 125 | 0.02372 | 9.75 | 2.94 | 3.559 | 5.219 |

| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES | | | | | |
|---|--------------|---|-------------|---|-------|
| T_{oper} (°C) | R_T/R_{25} | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R_{25} (k Ω) | |
| | | | | 2322 640; see note 1 at end of tables | |
| | | | | 6.334 | 6.474 |
| -40 | 48.62 | 6.22 | 7.13 | 16044 | 22850 |
| -35 | 34.19 | 5.63 | 6.91 | 11282 | 16068 |
| -30 | 24.28 | 5.06 | 6.71 | 8013 | 11413 |
| -25 | 17.42 | 4.51 | 6.52 | 5747 | 8185 |
| -20 | 12.61 | 3.98 | 6.33 | 4161 | 5926 |
| -15 | 9.211 | 3.47 | 6.15 | 3040 | 4329 |
| -10 | 6.788 | 2.98 | 5.98 | 2240 | 3190 |
| -5 | 5.045 | 2.51 | 5.82 | 1665 | 2371 |
| 0 | 3.781 | 2.06 | 5.66 | 1248 | 1776 |
| 5 | 2.855 | 1.62 | 5.50 | 942.3 | 1342 |
| 10 | 2.173 | 1.19 | 5.36 | 717.1 | 1021 |
| 15 | 1.666 | 0.78 | 5.22 | 549.8 | 783.0 |
| 20 | 1.286 | 0.38 | 5.08 | 424.5 | 604.6 |



| T _{oper} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (kΩ) | |
|---------------------------|---------------------------------|---------------------------------|-------------|---|-------|
| | | | | 2322 640; see note 1 at end of tables | |
| | | | | 6.334 | 6.474 |
| 25 | 1.000 | 0.00 | 4.95 | 330.0 | 470.0 |
| 30 | 0.7825 | 0.37 | 4.82 | 258.2 | 367.8 |
| 35 | 0.6163 | 0.74 | 4.70 | 203.4 | 289.6 |
| 40 | 0.4883 | 1.09 | 4.59 | 161.1 | 229.5 |
| 45 | 0.3892 | 1.44 | 4.47 | 128.4 | 182.9 |
| 50 | 0.3120 | 1.77 | 4.36 | 103.0 | 146.7 |
| 55 | 0.2515 | 2.10 | 4.26 | 83.00 | 118.2 |
| 60 | 0.2038 | 2.43 | 4.15 | 67.26 | 95.80 |
| 65 | 0.1660 | 2.74 | 4.06 | 54.79 | 78.03 |
| 70 | 0.1359 | 3.05 | 3.96 | 44.86 | 63.88 |
| 75 | 0.1118 | 3.35 | 3.87 | 36.90 | 52.55 |
| 80 | 0.09240 | 3.64 | 3.78 | 30.49 | 43.43 |
| 85 | 0.07670 | 3.93 | 3.69 | 25.31 | 36.05 |
| 90 | 0.06395 | 4.21 | 3.61 | 21.10 | 30.06 |
| 95 | 0.05354 | 4.48 | 3.53 | 17.67 | 25.16 |
| 100 | 0.04501 | 4.75 | 3.45 | 14.85 | 21.15 |
| 105 | 0.03798 | 5.01 | 3.37 | 12.53 | 17.85 |
| 110 | 0.03218 | 5.27 | 3.30 | 10.70 | 15.12 |
| 115 | 0.02736 | 5.52 | 3.23 | 9.029 | 12.86 |
| 120 | 0.02335 | 5.77 | 3.16 | 7.704 | 10.97 |
| 125 | 0.01999 | 6.01 | 3.09 | 6.597 | 9.396 |

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R₂₅ AT 68 kΩ AND 100 kΩ

| T _{amb} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (kΩ) | |
|--------------------------|---------------------------------|---------------------------------|-------------|---|-------|
| | | | | 2322 640; see note 1 at end of tables | |
| | | | | 6.683 | 6.104 |
| -40 | 36.66 | 5.69 | 6.70 | 2493 | 3666 |
| -35 | 26.38 | 5.15 | 6.49 | 1794 | 2638 |
| -30 | 19.17 | 4.63 | 6.29 | 1303 | 1917 |
| -25 | 14.06 | 4.13 | 6.10 | 956.2 | 1406 |
| -20 | 10.41 | 3.65 | 5.92 | 708.0 | 1041 |
| -15 | 7.779 | 3.18 | 5.74 | 528.9 | 777.9 |
| -10 | 5.861 | 2.73 | 5.57 | 398.5 | 586.1 |
| -5 | 4.453 | 2.30 | 5.41 | 302.8 | 445.3 |
| 0 | 3.409 | 1.88 | 5.26 | 231.8 | 340.9 |
| 5 | 2.631 | 1.48 | 5.11 | 178.9 | 263.1 |
| 10 | 2.044 | 1.09 | 4.97 | 139.0 | 204.4 |
| 15 | 1.600 | 0.72 | 4.83 | 108.8 | 160.0 |
| 20 | 1.261 | 0.35 | 4.70 | 85.74 | 126.1 |
| 25 | 1.000 | 0.00 | 4.57 | 68.00 | 100.0 |
| 30 | 0.7981 | 0.34 | 4.45 | 54.27 | 79.81 |
| 35 | 0.6408 | 0.67 | 4.35 | 43.57 | 64.08 |
| 40 | 0.5175 | 1.00 | 4.22 | 35.19 | 51.74 |
| 45 | 0.4202 | 1.32 | 4.11 | 28.57 | 42.02 |
| 50 | 0.3431 | 1.63 | 4.00 | 23.33 | 34.31 |
| 55 | 0.2816 | 1.93 | 3.90 | 19.15 | 28.16 |
| 60 | 0.2322 | 2.22 | 3.80 | 15.79 | 23.22 |
| 65 | 0.1925 | 2.51 | 3.71 | 13.09 | 19.25 |
| 70 | 0.1602 | 2.79 | 3.62 | 10.90 | 16.03 |
| 75 | 0.1340 | 3.06 | 3.53 | 9.114 | 13.40 |
| 80 | 0.1126 | 3.33 | 3.45 | 7.655 | 11.26 |
| 85 | 0.09496 | 3.59 | 3.36 | 6.457 | 9.496 |



| T _{amb} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (kΩ) | |
|--------------------------|---------------------------------|---------------------------------|-------------|---|-------|
| | | | | 2322 640; see note 1 at end of tables | |
| | | | | 6.683 | 6.104 |
| 90 | 0.08042 | 3.85 | 3.28 | 5.469 | 8.042 |
| 95 | 0.06837 | 4.10 | 3.21 | 4.649 | 6.837 |
| 100 | 0.05835 | 4.35 | 3.13 | 3.968 | 5.835 |
| 105 | 0.04998 | 4.59 | 3.06 | 3.399 | 4.998 |
| 110 | 0.04296 | 4.82 | 2.99 | 2.921 | 4.296 |
| 115 | 0.03705 | 5.05 | 2.92 | 2.519 | 3.705 |
| 120 | 0.03206 | 5.28 | 2.86 | 2.180 | 3.206 |
| 125 | 0.02783 | 5.50 | 2.80 | 1.892 | 2.783 |

| RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R ₂₅ AT 470 kΩ | | | | | |
|---|---------------------------------|---------------------------------|-------------|---|--|
| T _{amb} (°C) | R _T /R ₂₅ | ΔR DUE TO B-TOLERANCE (%) | TC (%/K) | R ₂₅ (kΩ) | |
| | | | | 2322 640; see note 1 at end of tables | |
| | | | | 5.474 | |
| -40 | 48.62 | 6.22 | 7.13 | 22850 | |
| -35 | 34.19 | 5.63 | 6.91 | 16068 | |
| -30 | 24.28 | 5.06 | 6.71 | 11413 | |
| -25 | 17.42 | 4.51 | 6.52 | 8185 | |
| -20 | 12.61 | 3.98 | 6.33 | 5926 | |
| -15 | 9.211 | 3.47 | 6.15 | 4329 | |
| -10 | 6.788 | 2.98 | 5.98 | 3190 | |
| -5 | 5.045 | 2.51 | 5.82 | 2371 | |
| 0 | 3.781 | 2.06 | 5.66 | 1776 | |
| 5 | 2.855 | 1.62 | 5.50 | 1342 | |
| 10 | 2.173 | 1.19 | 5.36 | 1021 | |
| 15 | 1.666 | 0.78 | 5.22 | 783.0 | |
| 20 | 1.286 | 0.38 | 5.08 | 604.6 | |
| 25 | 1.000 | 0.00 | 4.95 | 470.0 | |
| 30 | 0.7825 | 0.37 | 4.82 | 367.8 | |
| 35 | 0.6163 | 0.74 | 4.70 | 289.6 | |
| 40 | 0.4883 | 1.09 | 4.59 | 229.5 | |
| 45 | 0.3892 | 1.44 | 4.47 | 182.9 | |
| 50 | 0.3120 | 1.77 | 4.36 | 146.7 | |
| 55 | 0.2515 | 2.10 | 4.26 | 118.2 | |
| 60 | 0.2038 | 2.43 | 4.15 | 95.80 | |
| 65 | 0.1660 | 2.74 | 4.06 | 78.03 | |
| 70 | 0.1359 | 3.05 | 3.96 | 63.88 | |
| 75 | 0.1118 | 3.35 | 3.87 | 52.55 | |
| 80 | 0.09240 | 3.64 | 3.78 | 43.43 | |
| 85 | 0.07670 | 3.93 | 3.69 | 36.05 | |
| 90 | 0.06395 | 4.21 | 3.61 | 30.06 | |
| 95 | 0.05354 | 4.48 | 3.53 | 25.16 | |
| 100 | 0.04501 | 4.75 | 3.45 | 21.15 | |
| 105 | 0.03798 | 5.01 | 3.37 | 17.85 | |
| 110 | 0.03218 | 5.27 | 3.30 | 15.12 | |
| 115 | 0.02736 | 5.52 | 3.23 | 12.86 | |
| 120 | 0.02335 | 5.77 | 3.16 | 10.97 | |
| 125 | 0.01999 | 6.01 | 3.09 | 9.396 | |

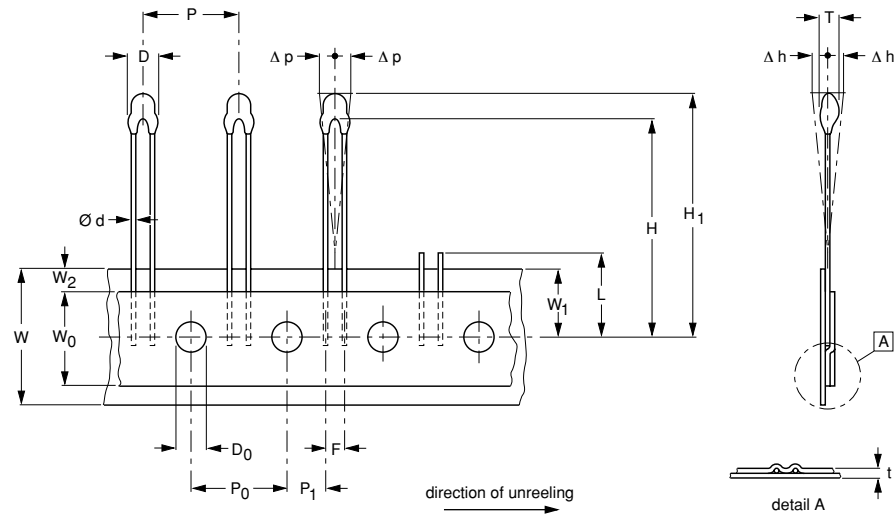
Note to Resistance Values At Intermediate Temperature Tables

1. Replace dot in last 5 digits of catalog number by a number according to the following details and depending on tolerance on required R₂₅-value: 4 for a tolerance of ±2%; 6 for a tolerance of ±3%; 3 for a tolerance of ±5%; 2 for a tolerance of ±10%.

PACKAGING

TAPE SPECIFICATIONS

Thermistors on tape.



1E pitch
2322 640 4....

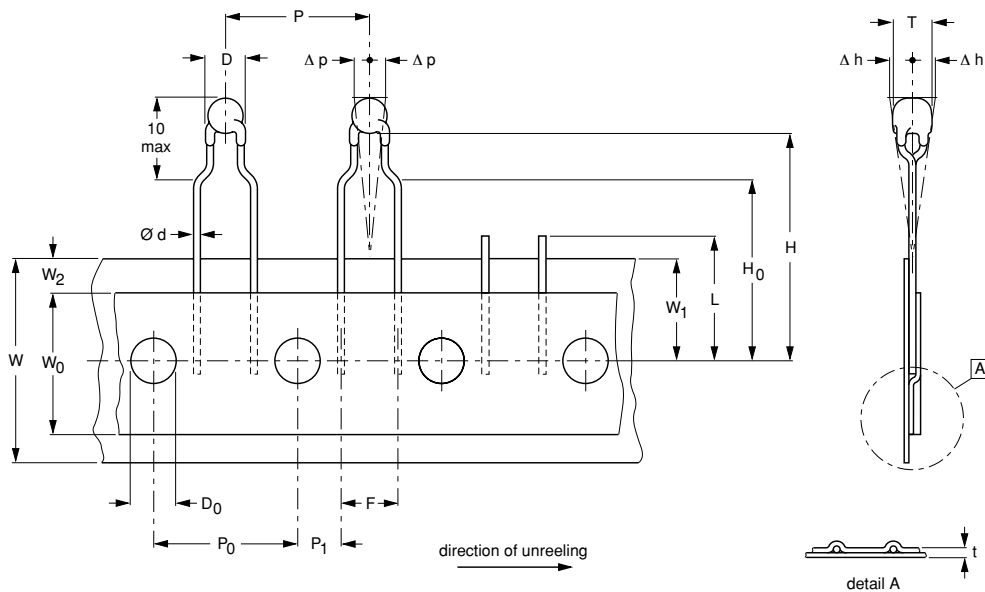
DIMENSIONS OF TAPE IN ACCORDANCE WITH "IEC 60286-2"

| SYMBOL | PARAMETER | DIMENSIONS (mm) | |
|----------------|--|-------------------|-----------|
| | | VALUE | TOLERANCE |
| D | body diameter ⁽²⁾ | 3.3 | +0.5 |
| T | maximum total thickness | ≤3 | - |
| d | lead diameter | 0.6 | ±0.06 |
| P | pitch between thermistors | 12.7 | ±1 |
| P ₀ | feed-hole pitch (cumulative pitch error ±0.2 mm/20 products) | 12.7 | ±0.3 |
| P ₁ | feed-hole centre to lead centre | 5.08 | ±0.7 |
| Δp | component alignment | 0 | ±1.3 |
| F | lead-to-lead distance | 2.54 | ±0.3 |
| Δh | component alignment | 0 | ±2 |
| W | tape width | 18.0 | +1/-0.5 |
| W ₀ | hold-down tape width | ≥12.5 | - |
| W ₁ | feed-hole position | 9.0 | ±0.5 |
| W ₂ | hold-down tape position | ≤3 | - |
| H | component to tape centre | 22 ⁽¹⁾ | ±1 |
| H ₁ | component height | ≤32 | - |
| L | length of snipped lead | ≤11 | - |
| D ₀ | feed-hole diameter | 4.0 | ±0.2 |
| t | total tape thickness with cardboard tape 0.5 ±0.1 mm | 0.65 | ±0.2 |
| | inspection level: S3 mechanical | - | 1% |

Note

1. Taped products with H= 45±1, are available on request.
2. D ≤5 max for 6404.338 to 221.

Thermistors on tape.


 2E pitch
 2322 640 3....

DIMENSIONS OF TAPE IN ACCORDANCE WITH "IEC 60286-2"

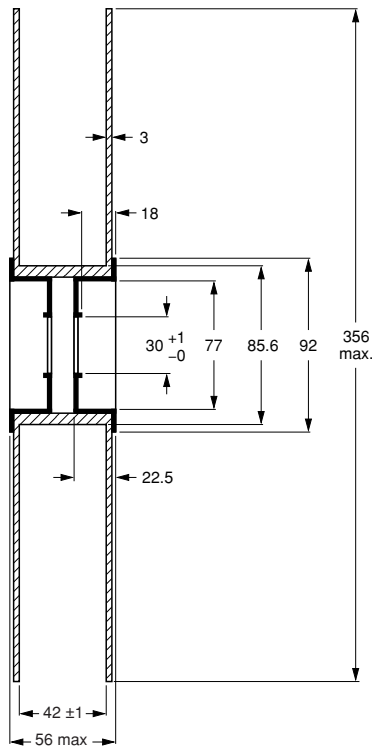
| SYMBOL | PARAMETER | DIMENSIONS (mm) | |
|----------------|--|-----------------|------------|
| | | VALUE | TOLERANCE |
| D | body diameter ⁽¹⁾ | 3.3 | +0.5 |
| T | maximum total thickness ⁽²⁾ | ≤3.2 | - |
| d | lead diameter | 0.6 | ±0.06 |
| P | pitch between thermistors | 12.7 | ±1 |
| P ₀ | feed-hole pitch (cumulative pitch error ±0.2 mm/20 products) | 12.7 | ±0.3 |
| P ₁ | feed-hole centre to lead centre | 3.85 | ±0.7 |
| Δp | component alignment | 0 | ±1.3 |
| F | lead-to-lead distance | 2.54 | ±0.3 |
| Δh | component alignment | 0 | ±2 |
| W | tape width | 18.0 | +1/-0.5 |
| W ₀ | hold-down tape width | ≥12.5 | - |
| W ₁ | feed-hole position | 9.0 | +0.75/-0.5 |
| W ₂ | hold-down tape position | ≤3 | - |
| H | component to tape centre | 20 | +2 |
| H ₀ | lead wire clinch height | 16 | ±0.5 |
| L | length of snapped lead | ≤11 | - |
| D ₀ | feed-hole diameter | 4.0 | ±0.3 |
| t | total tape thickness with cardboard tape 0.5 ±0.1 mm | 0.7 | ±0.2 |
| | inspection level: S3 mechanical | - | 1% |

Note

1. $D \leq 5$ max for 640 3. 338 to 640 4. 221.
2. $T \leq 4$ max for 640 3. 338 to 640 4. 221.

REEL SPECIFICATIONS

Dimensions of the reel.



CODE NUMBERS AND RELEVANT PACKAGING QUANTITIES

| PARAMETER | BULK | TAPE AND REEL ⁽¹⁾ 1e pitch | TAPE AND REEL ⁽¹⁾ 2e pitch |
|-----------|------|--|--|
| | | 2322 640 6.... | 2322 640 4.... |
| Quantity | 500 | 1 500 per reel, 2 reels per box | 1 500 per reel, 2 reels per box |

Note

- The maximum number of empty places per reel shall not exceed 0.1% of the total number of components per reel. With no consecutive positions empty.

CHARACTERISTICS OF TAPED PRODUCTS

- Minimum pull-out force of the component: 5 N.
- Minimum peel-off force of adhesive tape: 6N.
- Minimum tearing force tape: 15 N.
- Minimum pull-off force of tape-reel: 5 N.

STORAGE CONDITIONS

- Storage temperature range: -25 to +40 °C.
- Maximum relative humidity: 80%.

TESTS AND REQUIREMENTS

Essentially all tests are carried out in accordance with "IEC publication 60068-2; Environmental testing", except where indicated.

| STABILITY TESTS | | | | |
|-------------------------------|-------------------------------|---|--|--------------------------------|
| CECC 32 100 CLAUSE | IEC 60068-2 TEST METHOD | TEST | PROCEDURE | REQUIREMENTS |
| D3; 4.20.1 | | endurance | 25 °C; 1000 hours | $\Delta R/R < 1\%$ |
| | 1 | endurance | -40 °C; 1000 hours | $\Delta R/R < 1\%$ |
| | 539 | endurance | 500 mW; 55 °C; 1000 hours | $\Delta R/R < 3\%$ (note 1) |
| | 2 | dry heat | 125 °C; 1000 hours | $\Delta R/R < 3\%$ |
| D1; 4.19 | 3 | damp heat | 56 days at 40 °C; 90 to 95% RH | $\Delta R/R < 3\%$ |
| C2; 4.14 | 14 | rapid change of temperature | -40 °C to +125 °C; 50 cycles | $\Delta R/R < 2\%$ |
| Other applicable tests | | | | |
| | 21 | robustness of leads: tensile strength bending | loading force 10 N loading force 5 N | $\Delta R/R \leq 1\%$ |
| | 58 | soldering: solderability resistance to heat | 240 °C max.; duration 4 s max. 265 °C max.; duration 5 s max. | $\Delta R/R \leq 1\%$ (note 2) |
| | 27 | impact | free fall; 1 m | $\Delta R/R \leq 1\%$ |
| | 29 | shock | 490 m/s; half sinewave | $\Delta R/R \leq 1\%$ |
| | 45 | resistance to solvent | ambient temp for 5 min; | no traces of lacquer on |
| | 6 | vibration | 1.5 mm peak to peak: 10 to 58 Hz | no visible damage |
| | 2 | inflammability | 1980, needle flame test | non-flammable |

Notes

- For $R_{25} \geq 100 \text{ k}\Omega$ the drift requirement is $\Delta R/R < 5\%$.
- For R_{25} from 2.2 k Ω to 10 k Ω , requirement is $\pm 2\%$ max.