

NTC THERMISTORS: STANDARD DISCS – D103 MATERIAL

DATA:

Resistance range @ 25°C.....800 Ω to 12K Ω†
 Temperature coefficient of resistance (α) @ 25°C.....-4.49%/°C
 Operating temperature range-50°C to +150°C

| Temp. Range (°C) | Resistance Ratio (Nom.) | Beta (°K) |
|------------------|-------------------------|-----------|
| 0/50 | 9.6 | 3991 |
| 37.8/104.4 | 10.3 | 4111 |
| 25/125 | 31.6 | 4101 |

†This resistance range is based on the diameter/thickness combinations shown in the table below. Other R₂₅ @ 25°C values are available in this material system.

CALCULATIONS:

To calculate $\frac{R_T}{R_{25}}$ at temperatures other than those listed in the table, use the following equation:

$$\frac{R_T}{R_{25}} = e^{(\ln A - C \ln T + \frac{D}{T})}$$

T = temperature in °K and equation constants are as follows:

| Temperature Range (°C) | Ln A | C | D |
|------------------------|----------|---------|---------|
| -50 to 0 | 27.80891 | 6.18843 | 2218.28 |
| 0 to 50 | 9.92949 | 3.48346 | 2957.01 |
| 50 to 100 | -2.29382 | 1.67619 | 3532.43 |
| 100 to 150 | -8.78257 | 0.73845 | 3881.51 |

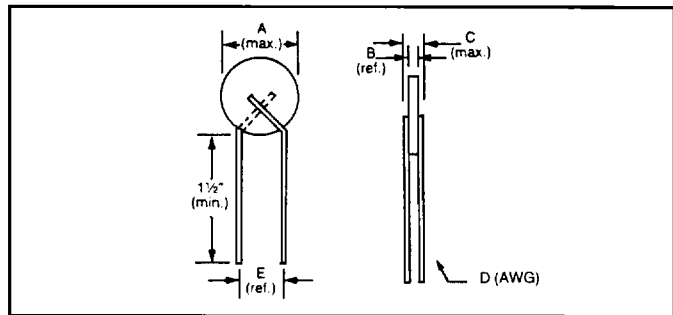
To calculate the actual thermistor temperature as a function of the thermistor resistance, use the following equation:

$$T = \frac{1}{a + b \left(\ln \frac{R_T}{R_{25}}\right) + c \left(\ln \frac{R_T}{R_{25}}\right)^2 + d \left(\ln \frac{R_T}{R_{25}}\right)^3}$$

T = temperature in °K and equation constants are as follows:

| $\frac{R_T}{R_{25}}$ Range | a | b | c | d |
|----------------------------|--------------|--------------|--------------|---------------|
| 3.363 to 72.50 | 3.356463E-03 | 2.462530E-04 | 4.065524E-06 | -5.880759E-08 |
| .3507 to 3.363 | 3.354016E-03 | 2.502706E-04 | 2.425564E-06 | -7.350715E-08 |
| .0637 to .3507 | 3.352963E-03 | 2.477688E-04 | 9.903545E-07 | -8.048379E-08 |
| .0169 to .0637 | 3.346921E-03 | 2.435247E-04 | 3.419306E-07 | -4.637018E-08 |

DIMENSIONS:



| Temperature (°F) | Temperature (°C) | $\frac{R_T}{R_{25}}$ | Temperature Coef. Of Resistance (α) (%/°C) |
|------------------|------------------|----------------------|--------------------------------------------|
| -58 | -50 | 72.50 | -7.23 |
| -49 | -45 | 50.84 | -6.97 |
| -40 | -40 | 36.09 | -6.74 |
| -31 | -35 | 25.92 | -6.51 |
| -22 | -30 | 18.82 | -6.30 |
| -13 | -25 | 13.80 | -6.10 |
| -4 | -20 | 10.23 | -5.91 |
| 5 | -15 | 7.646 | -5.73 |
| 14 | -10 | 5.767 | -5.56 |
| 23 | -5 | 4.387 | -5.39 |
| 32 | 0 | 3.363 | -5.24 |
| 41 | 5 | 2.599 | -5.07 |
| 50 | 10 | 2.024 | -4.92 |
| 59 | 15 | 1.589 | -4.77 |
| 68 | 20 | 1.256 | -4.63 |
| 77 | 25 | 1.000 | -4.49 |
| 86 | 30 | 0.8013 | -4.37 |
| 95 | 35 | 0.6461 | -4.24 |
| 104 | 40 | 0.5241 | -4.13 |
| 113 | 45 | 0.4276 | -4.02 |
| 122 | 50 | 0.3507 | -3.90 |
| 131 | 55 | 0.2894 | -3.79 |
| 140 | 60 | 0.2400 | -3.69 |
| 149 | 65 | 0.2001 | -3.58 |
| 158 | 70 | 0.1677 | -3.49 |
| 167 | 75 | 0.1412 | -3.40 |
| 176 | 80 | 0.1194 | -3.31 |
| 185 | 85 | 0.1014 | -3.22 |
| 194 | 90 | 0.08652 | -3.14 |
| 203 | 95 | 0.07409 | -3.06 |
| 212 | 100 | 0.06370 | -2.99 |
| 221 | 105 | 0.05497 | -2.91 |
| 230 | 110 | 0.04760 | -2.84 |
| 239 | 115 | 0.04139 | -2.78 |
| 248 | 120 | 0.03610 | -2.71 |
| 257 | 125 | 0.03160 | -2.65 |
| 266 | 130 | 0.02774 | -2.59 |
| 275 | 135 | 0.02443 | -2.53 |
| 284 | 140 | 0.02158 | -2.47 |
| 293 | 145 | 0.01912 | -2.42 |
| 302 | 150 | 0.01698 | -2.37 |

| Type Number | R° @ 25°C Ω | Tolerance* ± % | A | | B | | C | | D (AWG) | E | | δ (mW/°C) | τ (Sec.) |
|--------------------|-------------|----------------|-------|------|-------|------|-------|------|---------|-------|------|-----------|----------|
| | | | (in.) | (mm) | (in.) | (mm) | (in.) | (mm) | | (in.) | (mm) | | |
| RL1007-6890-103-D1 | 12K | 10 | 0.110 | 2.79 | 0.070 | 1.78 | 0.150 | 3.81 | 26 | 0.100 | 2.54 | 2.8 | 10 |
| RL1005-5744-103-D1 | 10K | | | | 0.050 | 1.27 | 0.130 | 3.30 | | | | 2.5 | 10 |
| RL1004-4019-103-D1 | 7K | | | | 0.040 | 1.02 | 0.120 | 3.05 | | | | 2.5 | 9 |
| RL1003-2871-103-D1 | 5K | | | | 0.030 | 0.76 | 0.110 | 2.79 | | | | 2.5 | 9 |
| RL2008-2010-103-D1 | 3.5K | 10 | 0.220 | 5.59 | 0.080 | 2.03 | 0.170 | 4.32 | 24 | 0.156 | 3.96 | 6.5 | 30 |
| RL2006-1600-103-D1 | 2786 | | | | 0.060 | 1.52 | 0.150 | 3.81 | | | | 6.5 | 20 |
| RL2005-1148-103-D1 | 2K | | | | 0.050 | 1.27 | 0.140 | 3.56 | | | | 6.5 | 20 |
| RL3007-861-103-D1 | 1.5K | 10 | 0.320 | 8.13 | 0.070 | 1.78 | 0.160 | 4.06 | 24 | 0.250 | 6.35 | 7.5 | 40 |
| RL3005-574-103-D1 | 1K | | | | 0.050 | 1.27 | 0.140 | 3.56 | | | | 7.0 | 35 |
| RL3004-459-103-D1 | 800 | | | | 0.040 | 1.02 | 0.130 | 3.30 | | | | 7.0 | 35 |

*Consult Keystone Thermometrics Engineering Department for information on other tolerances or tolerances at temperatures other than 25°C.

KEYSTONE THERMOMETRICS