

NTC Disc Thermistors

ND 03/06/09 – NE 03/06/09 – NV 06/09



APPLICATIONS

- ND or NE: Commercial, Industrial and Automotive Applications AEC-Q200 based Qual
NV: Professional Applications
- Alarm and temperature measurement application
- Temperature regulation application
- Level detection application
- Compensation application and more

TECHNOLOGY

- ND: epoxy-phenolic resin coating
NE: epoxy resin coating (recommended for severe mounting conditions)
NV: epoxy varnish coating
- Leads: Radial copper wire tinned
- Marking: on package only for ND03 & NE03
ND/NE 06/09: Nominal resistance and tolerance for $\pm 5\%$, $\pm 10\%$
NV06/09: Nominal resistance and tolerance
- Delivery Mode: Bulk, reeled or ammopacked

PERFORMANCE CHARACTERISTICS

| Types | General purpose | | | Professional | |
|-----------------------------|---|-------------------------------|-------------------------------|-------------------------|-------------------------|
| | ND03 or NE03 | ND06 or NE06 | ND09 or NE09 | NV06 | NV09 |
| Climatic category | | | | 55/125/56-434 | 55/125/56-434 |
| Operating Temperature | -55 to +150°C | -55 to +150°C | -55 to +150°C | -55 to +150°C | -55 to +150°C |
| Tolerance on Rn (25°C) | 330Ω to 1MΩ : $\pm \pm 3^*$, 5, 10, 20% 1500Ω to 150 kΩ : $\pm 3\%$ | $\pm 3^*$, 5, 10, $\pm 20\%$ | $\pm 3^*$, 5, 10, $\pm 20\%$ | $\pm 2, 3, 5, \pm 10\%$ | $\pm 2, 3, 5, \pm 10\%$ |
| Maximum dissipation at 25°C | 0.25 W | 0.71 W | 0.9 W | 0.69 W | 0.85 W |
| Thermal dissipation factor | 5 mW/°C | 7.1 mW/°C | 9 mW/°C | 6.9 mW/°C | 8.5 mW/°C |
| Thermal time constant | 10 s | 22 s | 30 s | 18 s | 30 s |
| Response time | < 3s | | | | |

STANDARDIZATION

NV range : approved by NFC 93271
Type: TN115 A for NV06
TN116 for NV09
List: GAM-T1
List: LNZ

* Optional tolerance, please contact factory

OPTIONS

Consult factory for availability of options:

- other nominal resistance values
- other tolerances
- alternative lead materials or lengths
- controlled dimensions

NTC Disc Thermistors

ND/NE 03



HOW TO ORDER

ND06

Type

ND03
NE03
ND06
NE06
NV06

ND09
NE09
NV09

P0

Material Code

P
(See tables
page 23-25)

0103

Resistance

10 kΩ
(See tables
page 22-24)

K

Tolerance

G (±2%) for NV
H (±3%)*
J (±5%)
K (±10%)
M (±20%)

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Packaging

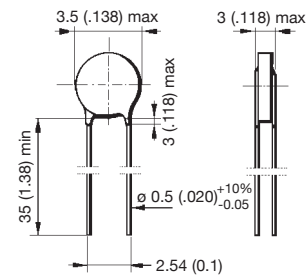
--: Bulk
Ammopack
(See table page 26)
Tape and reel
(See table page 26)

* Optional tolerance, please contact factory

TABLE OF VALUES

ND03/NE03 TYPE

ND03/NE03



| Part Number | Rn at 25°C (Ω) | Material Code | B (K) (B/B (1) ± 5% (2) ± 3%) | α at 25°C (%/°C) |
|--------------------------|--------------------|---------------|-------------------------------------|------------------|
| N_03J00681 N_03J00102 | 680 1,000 | J | 3480 (2) | - 3.9 |
| N_03K00152 N_03K00222 | 1,500 2,200 | K | 3630 (2) | - 4.0 |
| N_03L00272 N_03L00332 | 2,700 3,300 | L | 3790 (2) | - 4.2 |
| N_03M00472 N_03M00682 | 4,700 6,800 | M | 3950 (2) | - 4.4 |
| N_03N00103 N_03N00153 | 10,000 15,000 | N | 4080 (2) | - 4.6 |
| N_03P00223 N_03P00333 | 22,000 33,000 | P | 4220 (2) | - 4.7 |
| N_03Q00473 N_03Q00683 | 47,000 68,000 | Q | 4300 (2) | - 4.7 |
| N_03R00104 N_03R00154 | 100,000 150,000 | R | 4400 (2) | - 4.8 |
| N_03S00224 | 220,000 | S | 4520 (2) | - 5.0 |
| N_03T00334 N_03T00474 | 330,000 470,000 | T | 4630 (2) | - 5.1 |
| N_03U00105 | 1,000,000 | U | 4840 (2) | - 5.3 |

NTC Disc Thermistors

ND/NE/NV 06



TABLE OF VALUES

ND06/NE06/NV06



| Part Number | R _n at 25°C (Ω) | Material Code | B (K) (B/B) (1) ± 5% (2) ± 3% | α at 25°C (%/°C) |
|-------------|----------------------------|---------------|--|------------------|
| N_06J00151 | 150 | J | 3480 (2) | - 3.9 |
| N_06J00221 | 220 | | | |
| N_06K00331 | 330 | K | 3630 (2) | - 4.0 |
| N_06K00471 | 470 | | | |
| N_06L00681 | 680 | L | 3790 (2) | - 4.2 |
| N_06L00102 | 1,000 | | | |
| N_06M00152 | 1,500 | M | 3950 (2) | - 4.4 |
| N_06N00222 | 2,200 | | | |
| N_06N00332 | 3,300 | N | 4080 (2) | - 4.6 |
| N_06P00472 | 4,700 | | | |
| N_06P00682 | 6,800 | P | 4220 (2) | - 4.7 |
| N_06P00103 | 10,000 | | | |
| N_06Q00153 | 15,000 | Q | 4300 (2) | - 4.7 |
| N_06Q00223 | 22,000 | | | |
| N_06R00333 | 33,000 | R | 4400 (2) | - 4.8 |
| N_06S00473 | 47,000 | | | |
| N_06S00683 | 68,000 | S | 4520 (2) | - 5.0 |
| N_06T00104 | 100,000 | | | |
| N_06U00154 | 150,000 | U | 4840 (2) | - 5.3 |
| N_06U00224 | 220,000 | | | |
| N_06U00334 | 330,000 | | | |

For other resistance values, please consult us.

NTC Disc Thermistors

ND/NE/NV 09



TABLE OF VALUES

ND09/NE09/NV09

ND09/NE09



NV09



| Part Number | R _n at 25°C (Ω) | Material Code | B (K) (⁽¹⁾ ± 5% ⁽²⁾ ± 3%) | α at 25°C (%/°C) |
|-------------|----------------------------|---------------|--|------------------|
| N_09J00680 | 68 | J | 3480 (2) | - 3.9 |
| N_09J00101 | 100 | | | |
| N_09K00151 | 150 | K | 3630 (2) | - 4.0 |
| N_09K00221 | 220 | | | |
| N_09L00331 | 330 | L | 3790 (2) | - 4.2 |
| N_09M00471 | 470 | M | 3950 (2) | - 4.4 |
| N_09M00681 | 680 | | | |
| N_09N00102 | 1,000 | N | 4080 (2) | - 4.6 |
| N_09N00152 | 1,500 | | | |
| N_09P00222 | 2,200 | P | 4220 (2) | - 4.7 |
| N_09P00332 | 3,300 | | | |
| N_09Q00472 | 4,700 | Q | 4300 (2) | - 4.7 |
| N_09Q00682 | 6,800 | | | |
| N_09R00103 | 10,000 | R | 4400 (2) | - 4.8 |
| N_09R00153 | 15,000 | | | |
| N_09S00223 | 22,000 | S | 4520 (2) | - 5.0 |
| N_09T00333 | 33,000 | T | 4630 (2) | - 5.1 |
| N_09T00473 | 47,000 | | | |
| N_09U00683 | 68,000 | U | 4840 (2) | - 5.3 |
| N_09U00104 | 100,000 | | | |
| N_09U00154 | 150,000 | | | |

NTC Disc Thermistors

Packaging for Automatic Insertion



PACKAGING AND KINK SUFFIXES

Tables below indicate the suffixes to specify when ordering to get the required kink and packaging. For devices on tape, it is necessary to specify the height (H or Ho) which is the distance between the tape axis (sprocket holes axis) and the seating plane on the printed circuit board. The following types can be ordered on tape either in AMMOPACK (fan folder) or on REEL in accordance with IEC 286-2.

– **Straight leads:**

H represents the distance between the sprocket holes axis and the bottom plane of component body (base of resin or base of stand off).

– **Kinked leads and flat leads:**

Ho represents the distance between the sprocket holes axis and the base on the knee (kinked leads) or the bottom of the flat part (flat leads).

• **Reel & Ammopack**

millimeters (inches)

| Types | Suffix | H or Ho | Leads | Quantity/Size | Packaging |
|----------------|--------|-------------------------------|----------|---------------|-----------|
| ND/NE03 & NJ28 | CA | 16 ± 0.5 (0.630 ± 0.020) | Straight | 3000 | AMMOPACK |
| | CB | 16 ± 0.5 (0.630 ± 0.020) | Straight | 3000 | REEL |
| | CC | 19.5 ± 0.5 (0.768 ± 0.020) | Straight | 3000 | AMMOPACK |
| | CD | 19.5 ± 0.5 (0.768 ± 0.020) | Straight | 3000 | REEL |
| NP30 | CA | 16 ± 0.5 (0.630 ± 0.020) | Straight | 2000 | AMMOPACK |
| | CB | 16 ± 0.5 (0.630 ± 0.020) | Straight | 2000 | REEL |
| | CC | 19.5 ± 0.5 (0.768 ± 0.020) | Straight | 2000 | AMMOPACK |
| | CD | 19.5 ± 0.5 (0.768 ± 0.020) | Straight | 2000 | REEL |
| ND/NE/NV 06/09 | DA | 16 ± 0.5 (0.630 ± 0.020) | Straight | 1500 | AMMOPACK |
| | DB | 16 ± 0.5 (0.630 ± 0.020) | Straight | 1500 | REEL |
| | DC | 19.5 ± 0.5 (0.768 ± 0.020) | Straight | 1500 | AMMOPACK |
| | DD | 19.5 ± 0.5 (0.768 ± 0.020) | Straight | 1500 | REEL |
| | DL | 16 ± 0.5 (0.630 ± 0.020) | Kinked | 1500 | AMMOPACK |
| | DM | 16 ± 0.5 (0.630 ± 0.020) | Kinked | 1500 | REEL |
| | DN | 19.5 ± 0.5 (0.768 ± 0.020) | Kinked | 1500 | AMMOPACK |
| | DP | 19.5 ± 0.5 (0.768 ± 0.020) | Kinked | 1500 | REEL |

NTC

Type
ND03
NE03
NJ28
NP30



NTC

Types
ND/NE/NV
06/09



• **Bulk**

| Type | Quantity/box |
|------------------------------|--------------|
| ND/NE03 | 3000 |
| ND/NE06 | 1500 |
| ND/NE09 | 1500 |
| NV06 | 100 |
| NV09 | 100 |
| NI24 NJ28 NK20 NP30 | 1000 |

ND03 / NE03
NJ28 / NP30

ND/NE/NV
06/09



TAPING CHARACTERISTICS

Missing components

A maximum of 3 consecutive components may be missing from the bandolier, surrounded by at least 6 filled positions. The number of missing components may not exceed 0.5% of the total per packing module.

The beginning and the end of tape exhibit 8 or 9 blank positions.

DIMENSIONS: millimeters (inches)



| Value | Tolerance | Dimensions Characteristics |
|---------|--------------|--|
| 18 | +1 / -0.5 | W Leading tape width |
| 6 | ±0.3 | W ₀ Adhesive tape width |
| 9 | +0.75 / -0.5 | W ₁ Sprocket hole position |
| 3 max. | | W ₂ Distance between the top of the tape and the adhesive |
| 4 | ±0.2 | D ₀ Diameter of sprocket hole |
| 16/19.5 | ±0.5 | H ₀ Distance between the tape axis and the seating plane of the component |
| | | H ₁ Distance between the tape axis and the top of component body |

| Value | Tolerance | Dimensions Characteristics |
|-------------|--------------|--|
| 12.7 | ±0.2 | P ₀ Sprocket holes pitch |
| 254 | ±1 | - Distance between 21 consecutive holes 20 pitches |
| 0.7 | ±0.2 | t Total thickness of tape |
| 2.54 5.08 | +0.6 -0.1 | E Lead spacing |
| 5.08 3.85 | ± 0.7 | P ₁ Distance between the sprocket hole axis and the lead axis |
| 12.7 | ±1.0 | P Spacing of components |
| 0.5 0.6 | ±5% | d Lead diameter |
| 0 | ±1.3 | ³ P Verticality of components |
| 0 | ±2 | ³ h Alignment of components |

Tables of Resistance vs Temperature



| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | I 3250 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 42.35 | 21.9 | -5.98 |
| -50 | 31.48 | 20.0 | -5.78 |
| -45 | 23.63 | 18.1 | -5.59 |
| -40 | 17.91 | 16.3 | -5.41 |
| -35 | 13.70 | 14.6 | -5.23 |
| -30 | 10.58 | 13.1 | -5.06 |
| -25 | 8.232 | 11.6 | -4.90 |
| -20 | 6.460 | 10.1 | -4.74 |
| -15 | 5.110 | 8.8 | -4.59 |
| -10 | 4.072 | 7.5 | -4.45 |
| -5 | 3.268 | 6.3 | -4.31 |
| 0 | 2.641 | 5.1 | -4.18 |
| 5 | 2.148 | 4.0 | -4.05 |
| 10 | 1.759 | 2.9 | -3.92 |
| 15 | 1.449 | 1.9 | -3.81 |
| 20 | 1.200 | 0.9 | -3.69 |
| 25 | 1.000 | 0.0 | -3.58 |
| 30 | 0.8377 | 0.9 | -3.48 |
| 35 | 0.7054 | 1.8 | -3.38 |
| 40 | 0.5969 | 2.6 | -3.28 |
| 45 | 0.5076 | 3.5 | -3.19 |
| 50 | 0.4336 | 4.3 | -3.10 |
| 55 | 0.3720 | 5.1 | -3.01 |
| 60 | 0.3206 | 5.9 | -2.93 |
| 65 | 0.2774 | 6.6 | -2.85 |
| 70 | 0.2410 | 7.4 | -2.77 |
| 75 | 0.2102 | 8.1 | -2.70 |
| 80 | 0.1839 | 8.8 | -2.63 |
| 85 | 0.1616 | 9.5 | -2.56 |
| 90 | 0.1424 | 10.2 | -2.49 |
| 95 | 0.1259 | 10.9 | -2.43 |
| 100 | 0.1117 | 11.5 | -2.36 |
| 105 | 0.09938 | 12.2 | -2.30 |
| 110 | 0.08869 | 12.8 | -2.25 |
| 115 | 0.07938 | 13.4 | -2.19 |
| 120 | 0.07124 | 14.0 | -2.14 |
| 125 | 0.06410 | 14.6 | -2.08 |
| 130 | 0.05783 | 15.2 | -2.03 |
| 135 | 0.05230 | 15.7 | -1.98 |
| 140 | 0.04741 | 16.3 | -1.94 |
| 145 | 0.04308 | 16.8 | -1.89 |
| 150 | 0.03924 | 17.4 | -1.85 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | J-J5 3480 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 51.75 | 20.5 | -6.23 |
| -50 | 37.98 | 17.7 | -6.03 |
| -45 | 28.15 | 15.2 | -5.84 |
| -40 | 21.07 | 13.0 | -5.65 |
| -35 | 15.91 | 11.0 | -5.48 |
| -30 | 12.13 | 9.3 | -5.31 |
| -25 | 9.321 | 7.8 | -5.15 |
| -20 | 7.222 | 6.4 | -4.99 |
| -15 | 5.640 | 5.2 | -4.84 |
| -10 | 4.438 | 4.2 | -4.69 |
| -5 | 3.517 | 3.3 | -4.55 |
| 0 | 2.807 | 2.5 | -4.42 |
| 5 | 2.255 | 1.8 | -4.29 |
| 10 | 1.824 | 1.2 | -4.17 |
| 15 | 1.484 | 0.7 | -4.05 |
| 20 | 1.215 | 0.3 | -3.93 |
| 25 | 1.0000 | 0.0 | -3.82 |
| 30 | 0.8278 | 0.3 | -3.71 |
| 35 | 0.6889 | 0.7 | -3.61 |
| 40 | 0.5763 | 1.1 | -3.51 |
| 45 | 0.4845 | 1.5 | -3.41 |
| 50 | 0.4092 | 2.0 | -3.32 |
| 55 | 0.3472 | 2.5 | -3.23 |
| 60 | 0.2960 | 3.0 | -3.15 |
| 65 | 0.2533 | 3.5 | -3.06 |
| 70 | 0.2177 | 4.1 | -2.98 |
| 75 | 0.1879 | 4.7 | -2.90 |
| 80 | 0.1628 | 5.3 | -2.83 |
| 85 | 0.1415 | 5.9 | -2.76 |
| 90 | 0.12349 | 6.5 | -2.69 |
| 95 | 0.10813 | 7.1 | -2.62 |
| 100 | 0.09499 | 7.7 | -2.55 |
| 105 | 0.08372 | 8.4 | -2.49 |
| 110 | 0.07402 | 9.0 | -2.43 |
| 115 | 0.06564 | 9.7 | -2.37 |
| 120 | 0.05837 | 10.3 | -2.31 |
| 125 | 0.05206 | 11.0 | -2.26 |
| 130 | 0.04656 | 11.6 | -2.21 |
| 135 | 0.04175 | 12.3 | -2.15 |
| 140 | 0.03753 | 13.0 | -2.10 |
| 145 | 0.03382 | 13.6 | -2.06 |
| 150 | 0.03055 | 14.3 | -2.01 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | K 3630 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 56.27 | 21.4 | -6.25 |
| -50 | 41.22 | 18.5 | -6.06 |
| -45 | 30.48 | 15.9 | -5.89 |
| -40 | 22.74 | 13.6 | -5.71 |
| -35 | 17.11 | 11.5 | -5.55 |
| -30 | 12.98 | 9.7 | -5.39 |
| -25 | 9.931 | 8.1 | -5.24 |
| -20 | 7.655 | 6.7 | -5.09 |
| -15 | 5.945 | 5.4 | -4.95 |
| -10 | 4.651 | 4.4 | -4.81 |
| -5 | 3.663 | 3.4 | -4.67 |
| 0 | 2.905 | 2.6 | -4.54 |
| 5 | 2.319 | 1.9 | -4.42 |
| 10 | 1.862 | 1.3 | -4.30 |
| 15 | 1.505 | 0.8 | -4.18 |
| 20 | 1.223 | 0.3 | -4.07 |
| 25 | 1.0000 | 0.0 | -3.96 |
| 30 | 0.8219 | 0.3 | -3.85 |
| 35 | 0.6792 | 0.7 | -3.75 |
| 40 | 0.5641 | 1.1 | -3.65 |
| 45 | 0.4708 | 1.6 | -3.55 |
| 50 | 0.3949 | 2.1 | -3.46 |
| 55 | 0.3327 | 2.6 | -3.37 |
| 60 | 0.2816 | 3.1 | -3.28 |
| 65 | 0.2393 | 3.7 | -3.20 |
| 70 | 0.2043 | 4.3 | -3.12 |
| 75 | 0.1751 | 4.9 | -3.04 |
| 80 | 0.1506 | 5.5 | -2.96 |
| 85 | 0.1301 | 6.1 | -2.89 |
| 90 | 0.1128 | 6.8 | -2.82 |
| 95 | 0.09811 | 7.4 | -2.75 |
| 100 | 0.08564 | 8.1 | -2.68 |
| 105 | 0.07501 | 8.7 | -2.61 |
| 110 | 0.06591 | 9.4 | -2.55 |
| 115 | 0.05809 | 10.1 | -2.49 |
| 120 | 0.05136 | 10.8 | -2.43 |
| 125 | 0.04554 | 11.5 | -2.37 |
| 130 | 0.04049 | 12.2 | -2.32 |
| 135 | 0.03611 | 12.8 | -2.26 |
| 140 | 0.03228 | 13.5 | -2.21 |
| 145 | 0.02893 | 14.2 | -2.16 |
| 150 | 0.02600 | 14.9 | -2.11 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | KA 3625 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 61.22 | 7.1 | -6.55 |
| -50 | 44.25 | 6.1 | -6.33 |
| -45 | 32.34 | 5.3 | -6.12 |
| -40 | 23.88 | 4.5 | -5.92 |
| -35 | 17.81 | 3.8 | -5.73 |
| -30 | 13.41 | 3.2 | -5.54 |
| -25 | 10.19 | 2.7 | -5.37 |
| -20 | 7.815 | 2.2 | -5.20 |
| -15 | 6.041 | 1.8 | -5.04 |
| -10 | 4.707 | 1.5 | -4.89 |
| -5 | 3.696 | 1.1 | -4.74 |
| 0 | 2.923 | 0.9 | -4.60 |
| 5 | 2.329 | 0.6 | -4.46 |
| 10 | 1.867 | 0.4 | -4.33 |
| 15 | 1.507 | 0.3 | -4.21 |
| 20 | 1.224 | 0.1 | -4.09 |
| 25 | 1.0000 | 0.0 | -3.97 |
| 30 | 0.8217 | 0.1 | -3.86 |
| 35 | 0.6788 | 0.2 | -3.75 |
| 40 | 0.5638 | 0.4 | -3.65 |
| 45 | 0.4707 | 0.5 | -3.55 |
| 50 | 0.3948 | 0.7 | -3.46 |
| 55 | 0.3328 | 0.9 | -3.37 |
| 60 | 0.2817 | 1.0 | -3.28 |
| 65 | 0.2396 | 1.2 | -3.19 |
| 70 | 0.2046 | 1.4 | -3.11 |
| 75 | 0.1754 | 1.6 | -3.03 |
| 80 | 0.1510 | 1.8 | -2.96 |
| 85 | 0.1305 | 2.0 | -2.88 |
| 90 | 0.1131 | 2.3 | -2.81 |
| 95 | 0.09844 | 2.5 | -2.74 |
| 100 | 0.08596 | 2.7 | -2.68 |
| 105 | 0.07530 | 2.9 | -2.61 |
| 110 | 0.06618 | 3.1 | -2.55 |
| 115 | 0.05833 | 3.4 | -2.49 |
| 120 | 0.05157 | 3.6 | -2.43 |
| 125 | 0.04573 | 3.8 | -2.38 |
| 130 | 0.04065 | 4.0 | -2.32 |
| 135 | 0.03624 | 4.3 | -2.27 |
| 140 | 0.03239 | 4.5 | -2.22 |
| 145 | 0.02902 | 4.7 | -2.17 |
| 150 | 0.02607 | 5.0 | -2.12 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | KC 3470 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 60.08 | 34.0 | -7.00 |
| -50 | 43.19 | 29.4 | -6.71 |
| -45 | 31.42 | 25.3 | -6.44 |
| -40 | 23.13 | 21.6 | -6.18 |
| -35 | 17.22 | 18.4 | -5.94 |
| -30 | 12.95 | 15.5 | -5.71 |
| -25 | 9.842 | 12.9 | -5.49 |
| -20 | 7.550 | 10.7 | -5.29 |
| -15 | 5.845 | 8.7 | -5.10 |
| -10 | 4.564 | 6.9 | -4.91 |
| -5 | 3.594 | 5.4 | -4.74 |
| 0 | 2.853 | 4.1 | -4.58 |
| 5 | 2.281 | 3.0 | -4.42 |
| 10 | 1.838 | 2.0 | -4.27 |
| 15 | 1.491 | 1.2 | -4.13 |
| 20 | 1.217 | 0.5 | -4.00 |
| 25 | 1.0000 | 0.0 | -3.90 |
| 30 | 0.8267 | 0.5 | -3.74 |
| 35 | 0.6873 | 1.1 | -3.63 |
| 40 | 0.5747 | 1.8 | -3.52 |
| 45 | 0.4830 | 2.5 | -3.41 |
| 50 | 0.4081 | 3.3 | -3.31 |
| 55 | 0.3465 | 4.1 | -3.21 |
| 60 | 0.2955 | 5.0 | -3.12 |
| 65 | 0.2532 | 5.9 | -3.03 |
| 70 | 0.2179 | 6.8 | -2.94 |
| 75 | 0.1883 | 7.8 | -2.86 |
| 80 | 0.1634 | 8.7 | -2.78 |
| 85 | 0.1423 | 9.7 | -2.71 |
| 90 | 0.1244 | 10.8 | -2.63 |
| 95 | 0.10915 | 11.8 | -2.56 |
| 100 | 0.09608 | 12.9 | -2.50 |
| 105 | 0.08486 | 13.9 | -2.43 |
| 110 | 0.07519 | 15.0 | -2.37 |
| 115 | 0.06683 | 16.1 | -2.31 |
| 120 | 0.05957 | 17.2 | -2.25 |
| 125 | 0.05325 | 18.3 | -2.20 |
| 130 | 0.04774 | 19.4 | -2.14 |
| 135 | 0.04290 | 20.5 | -2.09 |
| 140 | 0.03866 | 21.6 | -2.04 |
| 145 | 0.03492 | 22.7 | -1.99 |
| 150 | 0.03162 | 23.8 | -1.95 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | KC 3470 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 82.54 | 22.3 | -7.12 |
| -50 | 58.03 | 19.3 | -6.87 |
| -45 | 41.31 | 16.6 | -6.63 |
| -40 | 29.75 | 14.2 | -6.40 |
| -35 | 21.68 | 12.0 | -6.18 |
| -30 | 15.97 | 10.1 | -5.98 |
| -25 | 11.88 | 8.5 | -5.78 |
| -20 | 8.931 | 7.0 | -5.59 |
| -15 | 6.777 | 5.7 | -5.40 |
| -10 | 5.188 | 4.5 | -5.23 |
| -5 | 4.007 | 3.6 | -5.06 |
| 0 | 3.120 | 2.7 | -4.90 |
| 5 | 2.449 | 2.0 | -4.75 |
| 10 | 1.937 | 1.3 | -4.60 |
| 15 | 1.543 | 0.8 | -4.46 |
| 20 | 1.238 | 0.4 | -4.33 |
| 25 | 1.0000 | 0.0 | -4.20 |
| 30 | 0.8128 | 0.3 | -4.07 |
| 35 | 0.6648 | 0.7 | -3.95 |
| 40 | 0.5469 | 1.2 | -3.84 |
| 45 | 0.4525 | 1.6 | -3.73 |
| 50 | 0.3764 | 2.2 | -3.62 |
| 55 | 0.3148 | 2.7 | -3.52 |
| 60 | 0.2646 | 3.3 | -3.42 |
| 65 | 0.2235 | 3.8 | -3.33 |
| 70 | 0.1896 | 4.5 | -3.24 |
| 75 | 0.1616 | 5.1 | -3.15 |
| 80 | 0.1383 | 5.7 | -3.07 |
| 85 | 0.1189 | 6.4 | -2.98 |
| 90 | 0.1026 | 7.1 | -2.91 |
| 95 | 0.08888 | 7.7 | -2.83 |
| 100 | 0.07728 | 8.4 | -2.76 |
| 105 | 0.06744 | 9.1 | -2.69 |
| 110 | 0.05905 | 9.8 | -2.62 |
| 115 | 0.05188 | 10.5 | -2.56 |
| 120 | 0.04572 | 11.3 | -2.49 |
| 125 | 0.04042 | 12.0 | -2.43 |
| 130 | 0.03585 | 12.7 | -2.37 |
| 135 | 0.03188 | 13.4 | -2.32 |
| 140 | 0.02843 | 14.1 | -2.26 |
| 145 | 0.02542 | 14.8 | -2.21 |
| 150 | 0.02279 | 15.6 | -2.16 |

Tables of Resistance vs Temperature



| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | L2 3805 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 62.45 | 22.4 | -6.41 |
| -50 | 45.40 | 19.3 | -6.22 |
| -45 | 33.33 | 16.6 | -6.03 |
| -40 | 24.70 | 14.2 | -5.85 |
| -35 | 18.47 | 12.1 | -5.68 |
| -30 | 13.92 | 10.2 | -5.52 |
| -25 | 10.58 | 8.5 | -5.36 |
| -20 | 8.110 | 7.0 | -5.21 |
| -15 | 6.260 | 5.7 | -5.07 |
| -10 | 4.867 | 4.6 | -4.93 |
| -5 | 3.810 | 3.6 | -4.80 |
| 0 | 3.003 | 2.7 | -4.67 |
| 5 | 2.382 | 2.0 | -4.55 |
| 10 | 1.901 | 1.3 | -4.43 |
| 15 | 1.526 | 0.8 | -4.31 |
| 20 | 1.232 | 0.4 | -4.20 |
| 25 | 1.0000 | 0.0 | -4.10 |
| 30 | 0.8161 | 0.3 | -4.00 |
| 35 | 0.6694 | 0.7 | -3.90 |
| 40 | 0.5518 | 1.2 | -3.80 |
| 45 | 0.4570 | 1.7 | -3.71 |
| 50 | 0.3802 | 2.2 | -3.62 |
| 55 | 0.3178 | 2.7 | -3.53 |
| 60 | 0.2667 | 3.3 | -3.45 |
| 65 | 0.2248 | 3.9 | -3.37 |
| 70 | 0.1902 | 4.5 | -3.29 |
| 75 | 0.1615 | 5.1 | -3.22 |
| 80 | 0.1377 | 5.8 | -3.14 |
| 85 | 0.1179 | 6.4 | -3.07 |
| 90 | 0.1012 | 7.1 | -3.00 |
| 95 | 0.08721 | 7.8 | -2.94 |
| 100 | 0.07539 | 8.5 | -2.87 |
| 105 | 0.06538 | 9.2 | -2.81 |
| 110 | 0.05688 | 9.9 | -2.75 |
| 115 | 0.04963 | 10.6 | -2.69 |
| 120 | 0.04343 | 11.3 | -2.63 |
| 125 | 0.03812 | 12.0 | -2.58 |
| 130 | 0.03354 | 12.7 | -2.53 |
| 135 | 0.02960 | 13.5 | -2.47 |
| 140 | 0.02618 | 14.2 | -2.42 |
| 145 | 0.02322 | 14.9 | -2.37 |
| 150 | 0.02064 | 15.6 | -2.33 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | M 3950 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 99.59 | 15.6 | -7.42 |
| -50 | 68.97 | 14.3 | -7.16 |
| -45 | 48.40 | 12.9 | -6.91 |
| -40 | 34.38 | 11.7 | -6.67 |
| -35 | 24.71 | 10.5 | -6.45 |
| -30 | 17.97 | 9.4 | -6.23 |
| -25 | 13.20 | 8.3 | -6.02 |
| -20 | 9.804 | 7.3 | -5.82 |
| -15 | 7.352 | 6.3 | -5.63 |
| -10 | 5.565 | 5.4 | -5.45 |
| -5 | 4.251 | 4.5 | -5.28 |
| 0 | 3.275 | 3.7 | -5.11 |
| 5 | 2.544 | 2.9 | -4.95 |
| 10 | 1.992 | 2.1 | -4.80 |
| 15 | 1.572 | 1.4 | -4.65 |
| 20 | 1.249 | 0.7 | -4.51 |
| 25 | 1.0000 | 0.0 | -4.38 |
| 30 | 0.8057 | 0.7 | -4.25 |
| 35 | 0.6534 | 1.3 | -4.12 |
| 40 | 0.5331 | 1.9 | -4.00 |
| 45 | 0.4376 | 2.5 | -3.89 |
| 50 | 0.3612 | 3.1 | -3.77 |
| 55 | 0.2998 | 3.7 | -3.67 |
| 60 | 0.2501 | 4.3 | -3.57 |
| 65 | 0.2097 | 4.8 | -3.47 |
| 70 | 0.1767 | 5.3 | -3.37 |
| 75 | 0.1496 | 5.9 | -3.28 |
| 80 | 0.1272 | 6.4 | -3.19 |
| 85 | 0.1087 | 6.9 | -3.11 |
| 90 | 0.09320 | 7.4 | -3.03 |
| 95 | 0.08025 | 7.8 | -2.95 |
| 100 | 0.06937 | 8.3 | -2.87 |
| 105 | 0.06019 | 8.8 | -2.80 |
| 110 | 0.05242 | 9.2 | -2.73 |
| 115 | 0.04580 | 9.6 | -2.66 |
| 120 | 0.04016 | 10.1 | -2.60 |
| 125 | 0.03532 | 10.5 | -2.53 |
| 130 | 0.03117 | 10.9 | -2.47 |
| 135 | 0.02758 | 11.3 | -2.41 |
| 140 | 0.02448 | 11.7 | -2.36 |
| 145 | 0.02179 | 12.1 | -2.30 |
| 150 | 0.01945 | 12.4 | -2.25 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | MA 3965 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 101.09 | 2.47 | -7.49 |
| -50 | 69.81 | 2.26 | -7.22 |
| -45 | 48.87 | 2.06 | -6.96 |
| -40 | 34.65 | 1.87 | -6.71 |
| -35 | 24.87 | 1.69 | -6.48 |
| -30 | 18.06 | 1.52 | -6.26 |
| -25 | 13.259 | 1.35 | -6.05 |
| -20 | 9.837 | 1.19 | -5.84 |
| -15 | 7.372 | 1.04 | -5.65 |
| -10 | 5.578 | 0.89 | -5.47 |
| -5 | 4.259 | 0.75 | -5.29 |
| 0 | 3.280 | 0.61 | -5.12 |
| 5 | 2.548 | 0.48 | -4.96 |
| 10 | 1.994 | 0.35 | -4.81 |
| 15 | 1.573 | 0.23 | -4.66 |
| 20 | 1.250 | 0.11 | -4.52 |
| 25 | 1.0000 | 0.00 | -4.38 |
| 30 | 0.8054 | 0.11 | -4.25 |
| 35 | 0.6528 | 0.22 | -4.13 |
| 40 | 0.5324 | 0.32 | -4.01 |
| 45 | 0.4368 | 0.42 | -3.90 |
| 50 | 0.3603 | 0.52 | -3.79 |
| 55 | 0.2989 | 0.61 | -3.68 |
| 60 | 0.2492 | 0.70 | -3.58 |
| 65 | 0.2088 | 0.79 | -3.48 |
| 70 | 0.1758 | 0.88 | -3.39 |
| 75 | 0.1487 | 0.96 | -3.30 |
| 80 | 0.1263 | 1.04 | -3.21 |
| 85 | 0.1078 | 1.12 | -3.13 |
| 90 | 0.0923 | 1.20 | -3.05 |
| 95 | 0.0794 | 1.27 | -2.97 |
| 100 | 0.06857 | 1.35 | -2.90 |
| 105 | 0.05942 | 1.42 | -2.83 |
| 110 | 0.05167 | 1.49 | -2.76 |
| 115 | 0.04509 | 1.55 | -2.69 |
| 120 | 0.03948 | 1.62 | -2.62 |
| 125 | 0.03467 | 1.68 | -2.56 |
| 130 | 0.03055 | 1.75 | -2.50 |
| 135 | 0.02699 | 1.81 | -2.44 |
| 140 | 0.02392 | 1.87 | -2.39 |
| 145 | 0.02125 | 1.93 | -2.33 |
| 150 | 0.01894 | 1.98 | -2.28 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | MC 3910 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 100.6 | 23.0 | -7.56 |
| -50 | 69.29 | 19.9 | -7.27 |
| -45 | 48.40 | 17.1 | -7.00 |
| -40 | 34.27 | 14.6 | -6.75 |
| -35 | 24.57 | 12.4 | -6.50 |
| -30 | 17.83 | 10.5 | -6.27 |
| -25 | 13.09 | 8.7 | -6.05 |
| -20 | 9.71 | 7.2 | -5.84 |
| -15 | 7.282 | 5.9 | -5.64 |
| -10 | 5.514 | 4.7 | -5.45 |
| -5 | 4.215 | 3.7 | -5.27 |
| 0 | 3.250 | 2.8 | -5.10 |
| 5 | 2.528 | 2.0 | -4.93 |
| 10 | 1.982 | 1.4 | -4.77 |
| 15 | 1.567 | 0.8 | -4.62 |
| 20 | 1.247 | 0.4 | -4.48 |
| 25 | 1.0000 | 0.0 | -4.34 |
| 30 | 0.8072 | 0.4 | -4.21 |
| 35 | 0.6559 | 0.8 | -4.08 |
| 40 | 0.5362 | 1.2 | -3.96 |
| 45 | 0.4410 | 1.7 | -3.85 |
| 50 | 0.3647 | 2.2 | -3.74 |
| 55 | 0.3033 | 2.8 | -3.63 |
| 60 | 0.2535 | 3.4 | -3.53 |
| 65 | 0.2130 | 4.0 | -3.43 |
| 70 | 0.1798 | 4.6 | -3.34 |
| 75 | 0.1525 | 5.2 | -3.25 |
| 80 | 0.1300 | 5.9 | -3.16 |
| 85 | 0.1112 | 6.6 | -3.08 |
| 90 | 0.09552 | 7.3 | -2.99 |
| 95 | 0.08239 | 8.0 | -2.92 |
| 100 | 0.07133 | 8.7 | -2.84 |
| 105 | 0.06199 | 9.4 | -2.77 |
| 110 | 0.05406 | 10.1 | -2.70 |
| 115 | 0.04731 | 10.9 | -2.63 |
| 120 | 0.04153 | 11.6 | -2.57 |
| 125 | 0.03658 | 12.3 | -2.51 |
| 130 | 0.03231 | 13.1 | -2.45 |
| 135 | 0.02863 | 13.8 | -2.39 |
| 140 | 0.02544 | 14.6 | -2.33 |
| 145 | 0.02267 | 15.3 | -2.28 |
| 150 | 0.02025 | 16.1 | -2.23 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | ME 3975 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 103.9 | 2.47 | -7.56 |
| -50 | 71.53 | 2.26 | -7.28 |
| -45 | 49.94 | 2.06 | -7.01 |
| -40 | 35.32 | 1.87 | -6.76 |
| -35 | 25.29 | 1.69 | -6.53 |
| -30 | 18.32 | 1.52 | -6.30 |
| -25 | 13.43 | 1.35 | -6.08 |
| -20 | 9.945 | 1.19 | -5.88 |
| -15 | 7.440 | 1.04 | -5.68 |
| -10 | 5.621 | 0.89 | -5.50 |
| -5 | 4.286 | 0.75 | -5.32 |
| 0 | 3.297 | 0.61 | -5.15 |
| 5 | 2.557 | 0.48 | -4.98 |
| 10 | 2.000 | 0.35 | -4.83 |
| 15 | 1.576 | 0.23 | -4.68 |
| 20 | 1.251 | 0.11 | -4.54 |
| 25 | 1.0000 | 0.00 | -4.40 |
| 30 | 0.8048 | 0.11 | -4.27 |
| 35 | 0.6519 | 0.22 | -4.14 |
| 40 | 0.5313 | 0.32 | -4.02 |
| 45 | 0.4356 | 0.42 | -3.91 |
| 50 | 0.3591 | 0.52 | -3.80 |
| 55 | 0.2977 | 0.61 | -3.69 |
| 60 | 0.2481 | 0.70 | -3.59 |
| 65 | 0.2078 | 0.79 | -3.49 |
| 70 | 0.1749 | 0.88 | -3.40 |
| 75 | 0.1479 | 0.96 | -3.31 |
| 80 | 0.1256 | 1.04 | -3.22 |
| 85 | 0.1071 | 1.12 | -3.14 |
| 90 | 0.09175 | 1.20 | -3.06 |
| 95 | 0.07890 | 1.27 | -2.98 |
| 100 | 0.06810 | 1.35 | -2.90 |
| 105 | 0.05900 | 1.42 | -2.83 |
| 110 | 0.05130 | 1.49 | -2.76 |
| 115 | 0.04476 | 1.55 | -2.69 |
| 120 | 0.03918 | 1.62 | -2.63 |
| 125 | 0.03441 | 1.68 | -2.57 |
| 130 | 0.03031 | 1.75 | -2.50 |
| 135 | 0.02678 | 1.81 | -2.45 |
| 140 | 0.02373 | 1.87 | -2.39 |
| 145 | 0.02108 | 1.93 | -2.34 |
| 150 | 0.01878 | 1.98 | -2.28 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | M4 4400 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 98.22 | 23.5 | -7.38 |
| -50 | 68.17 | 20.3 | -7.12 |
| -45 | 47.92 | 17.5 | -6.88 |
| -40 | 34.11 | 14.9 | -6.64 |
| -35 | 24.57 | 12.7 | -6.42 |
| -30 | 17.89 | 10.7 | -6.20 |
| -25 | 13.17 | 8.9 | -6.00 |
| -20 | 9.790 | 7.4 | -5.80 |
| -15 | 7.349 | 6.0 | -5.62 |
| -10 | 5.568 | 4.8 | -5.44 |
| -5 | 4.256 | 3.8 | -5.27 |
| 0 | 3.280 | 2.8 | -5.11 |
| 5 | 2.549 | 2.1 | -4.95 |
| 10 | 1.996 | 1.4 | -4.80 |
| 15 | 1.574 | 0.8 | -4.66 |
| 20 | 1.250 | 0.4 | -4.52 |
| 25 | 1.0000 | 0.0 | -4.39 |
| 30 | 0.8049 | 0.4 | -4.27 |
| 35 | 0.6519 | 0.8 | -4.15 |
| 40 | 0.5311 | 1.2 | -4.03 |
| 45 | 0.4352 | 1.7 | -3.92 |
| 50 | 0.3586 | 2.3 | -3.81 |
| 55 | 0.2970 | 2.8 | -3.71 |
| 60 | 0.2472 | 3.4 | -3.61 |
| 65 | 0.2068 | 4.1 | -3.52 |
| 70 | 0.1738 | 4.7 | -3.42 |
| 75 | 0.1468 | 5.4 | -3.34 |
| 80 | 0.1245 | 6.0 | -3.25 |
| 85 | 0.1060 | 6.7 | -3.17 |
| 90 | 0.09060 | 7.4 | -3.09 |
| 95 | 0.07776 | 8.2 | -3.01 |
| 100 | 0.06700 | 8.9 | -2.94 |
| 105 | 0.05793 | 9.6 | -2.87 |
| 110 | 0.05026 | 10.4 | -2.80 |
| 115 | 0.04376 | 11.1 | -2.74 |
| 120 | 0.03822 | 11.9 | -2.67 |
| 125 | 0.03349 | 12.6 | -2.61 |
| 130 | 0.02944 | 13.4 | -2.55 |
| 135 | 0.02595 | 14.1 | -2.49 |
| 140 | 0.02294 | 14.9 | -2.44 |
| 145 | 0.02033 | 15.6 | -2.38 |
| 150 | 0.01807 | 16.4 | -2.33 |

Tables of Resistance vs Temperature



| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | MN 4077 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 103.56 | 2.54 | -7.39 |
| -50 | 71.79 | 2.32 | -7.14 |
| -45 | 50.39 | 2.12 | -6.90 |
| -40 | 35.79 | 1.92 | -6.68 |
| -35 | 25.71 | 1.74 | -6.46 |
| -30 | 18.67 | 1.56 | -6.25 |
| -25 | 13.70 | 1.39 | -6.06 |
| -20 | 10.15 | 1.22 | -5.87 |
| -15 | 7.59 | 1.06 | -5.68 |
| -10 | 5.73 | 0.91 | -5.51 |
| -5 | 4.36 | 0.77 | -5.34 |
| 0 | 3.35 | 0.63 | -5.18 |
| 5 | 2.59 | 0.49 | -5.03 |
| 10 | 2.02 | 0.36 | -4.88 |
| 15 | 1.59 | 0.24 | -4.74 |
| 20 | 1.26 | 0.12 | -4.60 |
| 25 | 1.00 | 0.00 | -4.47 |
| 30 | 0.80 | 0.11 | -4.35 |
| 35 | 0.65 | 0.22 | -4.23 |
| 40 | 0.52 | 0.33 | -4.11 |
| 45 | 0.43 | 0.43 | -4.00 |
| 50 | 0.35 | 0.53 | -3.89 |
| 55 | 0.29 | 0.63 | -3.79 |
| 60 | 0.24 | 0.72 | -3.69 |
| 65 | 0.20 | 0.81 | -3.59 |
| 70 | 0.17 | 0.90 | -3.50 |
| 75 | 0.14 | 0.99 | -3.41 |
| 80 | 0.12 | 1.07 | -3.32 |
| 85 | 0.10 | 1.15 | -3.24 |
| 90 | 0.09 | 1.23 | -3.16 |
| 95 | 0.07 | 1.31 | -3.08 |
| 100 | 0.06 | 1.38 | -3.00 |
| 105 | 0.05 | 1.46 | -2.93 |
| 110 | 0.05 | 1.53 | -2.86 |
| 115 | 0.04 | 1.60 | -2.79 |
| 120 | 0.04 | 1.67 | -2.73 |
| 125 | 0.03 | 1.73 | -2.66 |
| 130 | 0.03 | 1.80 | -2.60 |
| 135 | 0.02 | 1.86 | -2.54 |
| 140 | 0.02 | 1.92 | -2.49 |
| 145 | 0.02 | 1.98 | -2.43 |
| 150 | 0.02 | 2.04 | -2.38 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | N 4080 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 110.1 | 24.0 | -7.50 |
| -50 | 75.89 | 20.7 | -7.25 |
| -45 | 52.97 | 17.8 | -7.01 |
| -40 | 37.42 | 15.2 | -6.78 |
| -35 | 26.75 | 12.9 | -6.56 |
| -30 | 19.33 | 10.9 | -6.35 |
| -25 | 14.11 | 9.1 | -6.14 |
| -20 | 10.41 | 7.5 | -5.95 |
| -15 | 7.758 | 6.1 | -5.76 |
| -10 | 5.834 | 4.9 | -5.58 |
| -5 | 4.426 | 3.8 | -5.41 |
| 0 | 3.387 | 2.9 | -5.24 |
| 5 | 2.614 | 2.1 | -5.08 |
| 10 | 2.033 | 1.4 | -4.93 |
| 15 | 1.593 | 0.9 | -4.78 |
| 20 | 1.258 | 0.4 | -4.64 |
| 25 | 1.0000 | 0.0 | -4.51 |
| 30 | 0.8004 | 0.4 | -4.37 |
| 35 | 0.6449 | 0.8 | -4.25 |
| 40 | 0.5228 | 1.3 | -4.13 |
| 45 | 0.4264 | 1.8 | -4.01 |
| 50 | 0.3497 | 2.3 | -3.90 |
| 55 | 0.2885 | 2.9 | -3.79 |
| 60 | 0.2392 | 3.5 | -3.68 |
| 65 | 0.1994 | 4.1 | -3.58 |
| 70 | 0.1671 | 4.8 | -3.49 |
| 75 | 0.1406 | 5.5 | -3.39 |
| 80 | 0.1189 | 6.2 | -3.30 |
| 85 | 0.1010 | 6.9 | -3.22 |
| 90 | 0.08616 | 7.6 | -3.13 |
| 95 | 0.07381 | 8.3 | -3.05 |
| 100 | 0.06347 | 9.1 | -2.97 |
| 105 | 0.05480 | 9.8 | -2.90 |
| 110 | 0.04748 | 10.6 | -2.83 |
| 115 | 0.04129 | 11.3 | -2.76 |
| 120 | 0.03603 | 12.1 | -2.69 |
| 125 | 0.03155 | 12.9 | -2.62 |
| 130 | 0.02771 | 13.7 | -2.56 |
| 135 | 0.02442 | 14.4 | -2.50 |
| 140 | 0.02158 | 15.2 | -2.44 |
| 145 | 0.01913 | 16.0 | -2.38 |
| 150 | 0.01700 | 16.8 | -2.33 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | NA 4100 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 109.5 | 8.0 | -7.53 |
| -50 | 75.44 | 6.9 | -7.27 |
| -45 | 52.64 | 6.0 | -7.02 |
| -40 | 37.19 | 5.1 | -6.78 |
| -35 | 26.59 | 4.3 | -6.56 |
| -30 | 19.22 | 3.7 | -6.34 |
| -25 | 14.05 | 3.1 | -6.14 |
| -20 | 10.37 | 2.5 | -5.94 |
| -15 | 7.730 | 2.1 | -5.75 |
| -10 | 5.817 | 1.6 | -5.57 |
| -5 | 4.417 | 1.3 | -5.40 |
| 0 | 3.382 | 1.0 | -5.23 |
| 5 | 2.611 | 0.7 | -5.08 |
| 10 | 2.032 | 0.5 | -4.92 |
| 15 | 1.593 | 0.3 | -4.78 |
| 20 | 1.258 | 0.1 | -4.64 |
| 25 | 1.0000 | 0.0 | -4.51 |
| 30 | 0.8003 | 0.1 | -4.38 |
| 35 | 0.6446 | 0.3 | -4.25 |
| 40 | 0.5224 | 0.4 | -4.14 |
| 45 | 0.4258 | 0.6 | -4.02 |
| 50 | 0.3490 | 0.8 | -3.91 |
| 55 | 0.2877 | 1.0 | -3.81 |
| 60 | 0.2383 | 1.2 | -3.71 |
| 65 | 0.1984 | 1.4 | -3.61 |
| 70 | 0.1660 | 1.6 | -3.51 |
| 75 | 0.1395 | 1.8 | -3.42 |
| 80 | 0.1178 | 2.1 | -3.34 |
| 85 | 0.09989 | 2.3 | -3.25 |
| 90 | 0.08506 | 2.5 | -3.17 |
| 95 | 0.07271 | 2.8 | -3.09 |
| 100 | 0.06240 | 3.0 | -3.02 |
| 105 | 0.05375 | 3.3 | -2.94 |
| 110 | 0.04647 | 3.5 | -2.87 |
| 115 | 0.04032 | 3.8 | -2.81 |
| 120 | 0.03509 | 4.1 | -2.74 |
| 125 | 0.03065 | 4.3 | -2.68 |
| 130 | 0.02685 | 4.6 | -2.61 |
| 135 | 0.02359 | 4.8 | -2.55 |
| 140 | 0.02079 | 5.1 | -2.50 |
| 145 | 0.01837 | 5.4 | -2.44 |
| 150 | 0.01628 | 5.6 | -2.39 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | NC 4080 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 105.4 | 24.0 | -7.45 |
| -50 | 72.89 | 20.7 | -7.20 |
| -45 | 51.04 | 17.8 | -6.95 |
| -40 | 36.18 | 15.2 | -6.72 |
| -35 | 25.94 | 12.9 | -6.50 |
| -30 | 18.81 | 10.9 | -6.29 |
| -25 | 13.78 | 9.1 | -6.08 |
| -20 | 10.20 | 7.5 | -5.89 |
| -15 | 7.621 | 6.1 | -5.71 |
| -10 | 5.748 | 4.9 | -5.53 |
| -5 | 4.373 | 3.8 | -5.36 |
| 0 | 3.355 | 2.9 | -5.20 |
| 5 | 2.595 | 2.1 | -5.04 |
| 10 | 2.023 | 1.4 | -4.89 |
| 15 | 1.588 | 0.9 | -4.75 |
| 20 | 1.256 | 0.4 | -4.61 |
| 25 | 1.0000 | 0.0 | -4.48 |
| 30 | 0.8014 | 0.4 | -4.35 |
| 35 | 0.6463 | 0.8 | -4.23 |
| 40 | 0.5243 | 1.3 | -4.11 |
| 45 | 0.4278 | 1.8 | -4.00 |
| 50 | 0.3510 | 2.3 | -3.89 |
| 55 | 0.2896 | 2.9 | -3.79 |
| 60 | 0.2401 | 3.5 | -3.69 |
| 65 | 0.2001 | 4.1 | -3.59 |
| 70 | 0.1675 | 4.8 | -3.50 |
| 75 | 0.1409 | 5.5 | -3.41 |
| 80 | 0.1190 | 6.2 | -3.32 |
| 85 | 0.1010 | 6.9 | -3.24 |
| 90 | 0.08605 | 7.6 | -3.16 |
| 95 | 0.07360 | 8.3 | -3.08 |
| 100 | 0.06319 | 9.1 | -3.01 |
| 105 | 0.05446 | 9.8 | -2.94 |
| 110 | 0.04710 | 10.6 | -2.87 |
| 115 | 0.04087 | 11.3 | -2.80 |
| 120 | 0.03559 | 12.1 | -2.73 |
| 125 | 0.03109 | 12.9 | -2.67 |
| 130 | 0.02724 | 13.7 | -2.61 |
| 135 | 0.02394 | 14.4 | -2.55 |
| 140 | 0.02111 | 15.2 | -2.49 |
| 145 | 0.01866 | 16.0 | -2.44 |
| 150 | 0.01654 | 16.8 | -2.38 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | NE 4100 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 97.27 | 24.1 | -7.2 |
| -50 | 67.99 | 20.8 | -7.0 |
| -45 | 48.08 | 17.9 | -6.8 |
| -40 | 34.39 | 15.3 | -6.5 |
| -35 | 24.85 | 13.0 | -6.3 |
| -30 | 18.15 | 11.0 | -6.1 |
| -25 | 13.38 | 9.2 | -6.0 |
| -20 | 9.960 | 7.6 | -5.8 |
| -15 | 7.479 | 6.2 | -5.6 |
| -10 | 5.664 | 4.9 | -5.4 |
| -5 | 4.325 | 3.8 | -5.3 |
| 0 | 3.328 | 2.9 | -5.1 |
| 5 | 2.581 | 2.1 | -5.0 |
| 10 | 2.016 | 1.4 | -4.9 |
| 15 | 1.585 | 0.9 | -4.7 |
| 20 | 1.255 | 0.4 | -4.6 |
| 25 | 1.0000 | 0.0 | -4.5 |
| 30 | 0.8017 | 0.4 | -4.3 |
| 35 | 0.6466 | 0.8 | -4.2 |
| 40 | 0.5245 | 1.3 | -4.1 |
| 45 | 0.4278 | 1.8 | -4.0 |
| 50 | 0.3508 | 2.3 | -3.9 |
| 55 | 0.2891 | 2.9 | -3.8 |
| 60 | 0.2394 | 3.5 | -3.7 |
| 65 | 0.1992 | 4.2 | -3.6 |
| 70 | 0.1666 | 4.8 | -3.5 |
| 75 | 0.1399 | 5.5 | -3.4 |
| 80 | 0.11794 | 6.2 | -3.4 |
| 85 | 0.09987 | 6.9 | -3.3 |
| 90 | 0.08491 | 7.6 | -3.2 |
| 95 | 0.07246 | 8.4 | -3.1 |
| 100 | 0.06207 | 9.1 | -3.1 |
| 105 | 0.05336 | 9.9 | -3.0 |
| 110 | 0.04604 | 10.6 | -2.9 |
| 115 | 0.03985 | 11.4 | -2.8 |
| 120 | 0.03461 | 12.2 | -2.8 |
| 125 | 0.03015 | 12.9 | -2.7 |
| 130 | 0.02635 | 13.7 | -2.7 |
| 135 | 0.02309 | 14.5 | -2.6 |
| 140 | 0.0203 | 15.3 | -2.5 |
| 145 | 0.01789 | 16.1 | -2.5 |
| 150 | 0.01581 | 16.8 | -2.4 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | N5 4160 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 115.8 | 16.3 | -7.52 |
| -50 | 79.72 | 14.1 | -7.28 |
| -45 | 55.54 | 12.1 | -7.04 |
| -40 | 39.15 | 10.4 | -6.82 |
| -35 | 27.91 | 8.8 | -6.61 |
| -30 | 20.11 | 7.4 | -6.40 |
| -25 | 14.64 | 6.2 | -6.20 |
| -20 | 10.77 | 5.1 | -6.01 |
| -15 | 7.996 | 4.2 | -5.83 |
| -10 | 5.991 | 3.3 | -5.65 |
| -5 | 4.529 | 2.6 | -5.48 |
| 0 | 3.454 | 2.0 | -5.31 |
| 5 | 2.655 | 1.4 | -5.16 |
| 10 | 2.057 | 1.0 | -5.00 |
| 15 | 1.606 | 0.6 | -4.86 |
| 20 | 1.263 | 0.3 | -4.72 |
| 25 | 1.0000 | 0.0 | -4.58 |
| 30 | 0.7973 | 0.3 | -4.45 |
| 35 | 0.6398 | 0.5 | -4.32 |
| 40 | 0.5167 | 0.9 | -4.20 |
| 45 | 0.4198 | 1.2 | -4.09 |
| 50 | 0.3430 | 1.6 | -3.97 |
| 55 | 0.2819 | 2.0 | -3.86 |
| 60 | 0.2329 | 2.4 | -3.76 |
| 65 | 0.1934 | 2.8 | -3.66 |
| 70 | 0.1614 | 3.3 | -3.56 |
| 75 | 0.1354 | 3.7 | -3.46 |
| 80 | 0.1141 | 4.2 | -3.37 |
| 85 | 0.09658 | 4.7 | -3.29 |
| 90 | 0.08211 | 5.2 | -3.20 |
| 95 | 0.07010 | 5.7 | -3.12 |
| 100 | 0.06009 | 6.2 | -3.04 |
| 105 | 0.05171 | 6.7 | -2.96 |
| 110 | 0.04467 | 7.2 | -2.89 |
| 115 | 0.03872 | 7.7 | -2.82 |
| 120 | 0.03369 | 8.2 | -2.75 |
| 125 | 0.02941 | 8.8 | -2.68 |
| 130 | 0.02576 | 9.3 | -2.62 |
| 135 | 0.02263 | 9.8 | -2.55 |
| 140 | 0.01995 | 10.3 | -2.49 |
| 145 | 0.01763 | 10.9 | -2.44 |
| 150 | 0.01563 | 11.4 | -2.38 |

Tables of Resistance vs Temperature



| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | P 4220 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 121.4 | 24.8 | -7.56 |
| -50 | 83.35 | 21.5 | -7.32 |
| -45 | 57.92 | 18.4 | -7.09 |
| -40 | 40.72 | 15.8 | -6.87 |
| -35 | 28.95 | 13.4 | -6.66 |
| -30 | 20.80 | 11.3 | -6.45 |
| -25 | 15.10 | 9.4 | -6.26 |
| -20 | 11.07 | 7.8 | -6.07 |
| -15 | 8.197 | 6.3 | -5.89 |
| -10 | 6.123 | 5.1 | -5.71 |
| -5 | 4.615 | 4.0 | -5.54 |
| 0 | 3.508 | 3.0 | -5.38 |
| 5 | 2.688 | 2.2 | -5.22 |
| 10 | 2.076 | 1.5 | -5.07 |
| 15 | 1.616 | 0.9 | -4.92 |
| 20 | 1.267 | 0.4 | -4.78 |
| 25 | 1.0000 | 0.0 | -4.64 |
| 30 | 0.7949 | 0.4 | -4.51 |
| 35 | 0.6359 | 0.8 | -4.38 |
| 40 | 0.5120 | 1.3 | -4.26 |
| 45 | 0.4148 | 1.8 | -4.14 |
| 50 | 0.3379 | 2.4 | -4.03 |
| 55 | 0.2769 | 3.0 | -3.92 |
| 60 | 0.2281 | 3.6 | -3.81 |
| 65 | 0.1890 | 4.3 | -3.71 |
| 70 | 0.1573 | 5.0 | -3.61 |
| 75 | 0.1316 | 5.7 | -3.52 |
| 80 | 0.1106 | 6.4 | -3.42 |
| 85 | 0.09337 | 7.1 | -3.34 |
| 90 | 0.07918 | 7.9 | -3.25 |
| 95 | 0.06743 | 8.6 | -3.17 |
| 100 | 0.05766 | 9.4 | -3.09 |
| 105 | 0.04950 | 10.2 | -3.01 |
| 110 | 0.04266 | 10.9 | -2.93 |
| 115 | 0.03691 | 11.7 | -2.86 |
| 120 | 0.03204 | 12.5 | -2.79 |
| 125 | 0.02791 | 13.3 | -2.72 |
| 130 | 0.02439 | 14.1 | -2.66 |
| 135 | 0.02139 | 14.9 | -2.59 |
| 140 | 0.01881 | 15.7 | -2.53 |
| 145 | 0.01660 | 16.5 | -2.47 |
| 150 | 0.01469 | 17.3 | -2.42 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | PA 4235 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 123.40 | 8.3 | -7.68 |
| -50 | 84.33 | 7.2 | -7.42 |
| -45 | 58.39 | 6.2 | -7.17 |
| -40 | 40.93 | 5.3 | -6.93 |
| -35 | 29.04 | 4.5 | -6.71 |
| -30 | 20.83 | 3.8 | -6.49 |
| -25 | 15.11 | 3.2 | -6.29 |
| -20 | 11.07 | 2.6 | -6.09 |
| -15 | 8.190 | 2.1 | -5.90 |
| -10 | 6.117 | 1.7 | -5.72 |
| -5 | 4.610 | 1.3 | -5.54 |
| 0 | 3.505 | 1.0 | -5.38 |
| 5 | 2.686 | 0.7 | -5.22 |
| 10 | 2.075 | 0.5 | -5.07 |
| 15 | 1.615 | 0.3 | -4.92 |
| 20 | 1.267 | 0.1 | -4.78 |
| 25 | 1.0000 | 0.0 | -4.64 |
| 30 | 0.7949 | 0.1 | -4.51 |
| 35 | 0.6359 | 0.3 | -4.39 |
| 40 | 0.5119 | 0.4 | -4.27 |
| 45 | 0.4145 | 0.6 | -4.15 |
| 50 | 0.3376 | 2.4 | -4.04 |
| 55 | 0.2764 | 1.0 | -3.93 |
| 60 | 0.2276 | 1.2 | -3.83 |
| 65 | 0.1883 | 1.4 | -3.73 |
| 70 | 0.1566 | 1.7 | -3.63 |
| 75 | 0.1308 | 1.9 | -3.54 |
| 80 | 0.1098 | 2.1 | -3.45 |
| 85 | 0.09257 | 2.4 | -3.37 |
| 90 | 0.07836 | 2.6 | -3.28 |
| 95 | 0.06661 | 2.9 | -3.20 |
| 100 | 0.05685 | 3.1 | -3.13 |
| 105 | 0.04870 | 3.4 | -3.05 |
| 110 | 0.04188 | 3.7 | -2.98 |
| 115 | 0.03614 | 3.9 | -2.91 |
| 120 | 0.03129 | 4.2 | -2.84 |
| 125 | 0.02719 | 4.5 | -2.78 |
| 130 | 0.02370 | 4.7 | -2.71 |
| 135 | 0.02072 | 5.0 | -2.65 |
| 140 | 0.01817 | 5.3 | -2.59 |
| 145 | 0.01598 | 5.5 | -2.54 |
| 150 | 0.01409 | 5.8 | -2.48 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | Q 4300 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 98.04 | 25.3 | -6.87 |
| -50 | 69.53 | 21.9 | -6.70 |
| -45 | 49.73 | 18.8 | -6.53 |
| -40 | 35.87 | 16.1 | -6.37 |
| -35 | 26.08 | 13.6 | -6.22 |
| -30 | 19.12 | 11.5 | -6.07 |
| -25 | 14.12 | 9.6 | -5.92 |
| -20 | 10.51 | 7.9 | -5.78 |
| -15 | 7.877 | 6.5 | -5.64 |
| -10 | 5.947 | 5.2 | -5.50 |
| -5 | 4.521 | 4.0 | -5.37 |
| 0 | 3.460 | 3.1 | -5.24 |
| 5 | 2.666 | 2.2 | -5.11 |
| 10 | 2.067 | 1.5 | -4.99 |
| 15 | 1.613 | 0.9 | -4.87 |
| 20 | 1.266 | 0.4 | -4.75 |
| 25 | 1.0000 | 0.0 | -4.63 |
| 30 | 0.7944 | 0.4 | -4.52 |
| 35 | 0.6347 | 0.8 | -4.41 |
| 40 | 0.5099 | 1.3 | -4.30 |
| 45 | 0.4119 | 1.9 | -4.20 |
| 50 | 0.3344 | 2.4 | -4.09 |
| 55 | 0.2730 | 3.1 | -3.99 |
| 60 | 0.2239 | 3.7 | -3.90 |
| 65 | 0.1846 | 4.4 | -3.80 |
| 70 | 0.1529 | 5.1 | -3.71 |
| 75 | 0.1272 | 5.8 | -3.62 |
| 80 | 0.1063 | 6.5 | -3.53 |
| 85 | 0.08927 | 7.2 | -3.44 |
| 90 | 0.07526 | 8.0 | -3.36 |
| 95 | 0.06372 | 8.8 | -3.28 |
| 100 | 0.05417 | 9.6 | -3.20 |
| 105 | 0.04622 | 10.4 | -3.13 |
| 110 | 0.03960 | 11.2 | -3.05 |
| 115 | 0.03405 | 12.0 | -2.98 |
| 120 | 0.02938 | 12.8 | -2.91 |
| 125 | 0.02545 | 13.6 | -2.84 |
| 130 | 0.02211 | 14.4 | -2.77 |
| 135 | 0.01928 | 15.2 | -2.71 |
| 140 | 0.01686 | 16.0 | -2.64 |
| 145 | 0.01479 | 16.8 | -2.58 |
| 150 | 0.01302 | 17.7 | -2.52 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | QA 4250 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 99.06 | 8.3 | -7.09 |
| -50 | 69.60 | 7.2 | -6.88 |
| -45 | 49.42 | 6.2 | -6.68 |
| -40 | 35.45 | 5.3 | -6.49 |
| -35 | 25.67 | 4.5 | -6.30 |
| -30 | 18.77 | 3.8 | -6.13 |
| -25 | 13.84 | 3.2 | -5.96 |
| -20 | 10.29 | 2.6 | -5.79 |
| -15 | 7.719 | 2.1 | -5.64 |
| -10 | 5.834 | 1.7 | -5.49 |
| -5 | 4.442 | 1.3 | -5.34 |
| 0 | 3.407 | 1.0 | -5.20 |
| 5 | 2.632 | 0.7 | -5.07 |
| 10 | 2.047 | 0.5 | -4.94 |
| 15 | 1.602 | 0.3 | -4.81 |
| 20 | 1.262 | 0.1 | -4.69 |
| 25 | 1.0000 | 0.0 | -4.57 |
| 30 | 0.7971 | 0.1 | -4.46 |
| 35 | 0.6389 | 0.3 | -4.35 |
| 40 | 0.5149 | 0.4 | -4.24 |
| 45 | 0.4172 | 0.6 | -4.14 |
| 50 | 0.3397 | 0.8 | -4.04 |
| 55 | 0.2780 | 1.0 | -3.95 |
| 60 | 0.2286 | 1.2 | -3.85 |
| 65 | 0.1888 | 1.4 | -3.76 |
| 70 | 0.1567 | 1.7 | -3.68 |
| 75 | 0.1306 | 1.9 | -3.59 |
| 80 | 0.1093 | 2.1 | -3.51 |
| 85 | 0.09179 | 2.4 | -3.43 |
| 90 | 0.07743 | 2.6 | -3.36 |
| 95 | 0.06556 | 2.9 | -3.28 |
| 100 | 0.05571 | 3.2 | -3.21 |
| 105 | 0.04752 | 3.4 | -3.14 |
| 110 | 0.04067 | 3.7 | -3.07 |
| 115 | 0.03492 | 3.9 | -3.01 |
| 120 | 0.03008 | 4.2 | -2.94 |
| 125 | 0.02600 | 4.5 | -2.88 |
| 130 | 0.02254 | 4.7 | -2.82 |
| 135 | 0.01960 | 5.0 | -2.76 |
| 140 | 0.01709 | 5.3 | -2.71 |
| 145 | 0.01495 | 5.5 | -2.65 |
| 150 | 0.01311 | 5.8 | -2.60 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | R 4400 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 113.90 | 25.9 | -7.13 |
| -50 | 79.71 | 22.4 | -6.95 |
| -45 | 56.30 | 19.2 | -6.77 |
| -40 | 40.13 | 16.4 | -6.60 |
| -35 | 28.85 | 14.0 | -6.44 |
| -30 | 20.92 | 11.8 | -6.28 |
| -25 | 15.29 | 9.8 | -6.12 |
| -20 | 11.27 | 8.1 | -5.97 |
| -15 | 8.368 | 6.6 | -5.82 |
| -10 | 6.261 | 5.3 | -5.68 |
| -5 | 4.719 | 4.1 | -5.53 |
| 0 | 3.583 | 3.1 | -5.40 |
| 5 | 2.739 | 2.3 | -5.26 |
| 10 | 2.108 | 1.5 | -5.13 |
| 15 | 1.634 | 0.9 | -5.00 |
| 20 | 1.274 | 0.4 | -4.88 |
| 25 | 1.0000 | 0.0 | -4.75 |
| 30 | 0.7897 | 0.4 | -4.64 |
| 35 | 0.6273 | 0.9 | -4.52 |
| 40 | 0.5012 | 1.4 | -4.41 |
| 45 | 0.4028 | 1.9 | -4.30 |
| 50 | 0.3255 | 2.5 | -4.19 |
| 55 | 0.2644 | 3.1 | -4.09 |
| 60 | 0.2159 | 3.8 | -3.98 |
| 65 | 0.1772 | 4.5 | -3.89 |
| 70 | 0.1462 | 5.2 | -3.79 |
| 75 | 0.1212 | 5.9 | -3.70 |
| 80 | 0.1009 | 6.7 | -3.60 |
| 85 | 0.08440 | 7.4 | -3.52 |
| 90 | 0.07092 | 8.2 | -3.43 |
| 95 | 0.05984 | 9.0 | -3.35 |
| 100 | 0.05071 | 9.8 | -3.26 |
| 105 | 0.04314 | 10.6 | -3.19 |
| 110 | 0.03685 | 11.4 | -3.11 |
| 115 | 0.03160 | 12.2 | -3.03 |
| 120 | 0.02719 | 13.1 | -2.96 |
| 125 | 0.02349 | 13.9 | -2.89 |
| 130 | 0.02036 | 14.7 | -2.82 |
| 135 | 0.01770 | 15.6 | -2.76 |
| 140 | 0.01545 | 16.4 | -2.69 |
| 145 | 0.01352 | 17.2 | -2.63 |
| 150 | 0.01187 | 18.1 | -2.57 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | RA 4380 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 110.80 | 8.6 | -7.24 |
| -50 | 77.24 | 7.4 | -7.03 |
| -45 | 54.44 | 6.4 | -6.83 |
| -40 | 38.76 | 5.5 | -6.63 |
| -35 | 27.87 | 4.6 | -6.45 |
| -30 | 20.22 | 3.9 | -6.27 |
| -25 | 14.81 | 3.3 | -6.10 |
| -20 | 10.94 | 2.7 | -5.93 |
| -15 | 8.144 | 2.2 | -5.78 |
| -10 | 6.112 | 1.8 | -5.62 |
| -5 | 4.623 | 1.4 | -5.48 |
| 0 | 3.522 | 1.0 | -5.34 |
| 5 | 2.702 | 0.8 | -5.20 |
| 10 | 2.087 | 0.5 | -5.07 |
| 15 | 1.623 | 0.3 | -4.94 |
| 20 | 1.270 | 0.1 | -4.82 |
| 25 | 1.0000 | 0.0 | -4.70 |
| 30 | 0.7920 | 0.1 | -4.59 |
| 35 | 0.6308 | 0.3 | -4.47 |
| 40 | 0.5052 | 0.5 | -4.37 |
| 45 | 0.4068 | 0.6 | -4.26 |
| 50 | 0.3292 | 0.8 | -4.16 |
| 55 | 0.2678 | 1.0 | -4.07 |
| 60 | 0.2189 | 1.3 | -3.97 |
| 65 | 0.1797 | 1.5 | -3.88 |
| 70 | 0.1482 | 1.7 | -3.79 |
| 75 | 0.1228 | 2.0 | -3.71 |
| 80 | 0.1022 | 2.2 | -3.63 |
| 85 | 0.08536 | 2.5 | -3.55 |
| 90 | 0.07159 | 2.7 | -3.47 |
| 95 | 0.06028 | 3.0 | -3.39 |
| 100 | 0.05095 | 3.2 | -3.32 |
| 105 | 0.04322 | 3.5 | -3.25 |
| 110 | 0.03679 | 3.8 | -3.18 |
| 115 | 0.03142 | 4.1 | -3.11 |
| 120 | 0.02693 | 4.3 | -3.05 |
| 125 | 0.02315 | 4.6 | -2.98 |
| 130 | 0.01997 | 4.9 | -2.92 |
| 135 | 0.01728 | 5.2 | -2.86 |
| 140 | 0.01499 | 5.4 | -2.80 |
| 145 | 0.01304 | 5.7 | -2.75 |
| 150 | 0.01138 | 6.0 | -2.69 |

Tables of Resistance vs Temperature



| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | RC 4340 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 105.70 | 25.5 | -7.15 |
| -50 | 74.01 | 22.1 | -6.95 |
| -45 | 52.37 | 19.0 | -6.75 |
| -40 | 37.43 | 16.2 | -6.56 |
| -35 | 27.01 | 13.8 | -6.38 |
| -30 | 19.66 | 11.6 | -6.20 |
| -25 | 14.44 | 9.7 | -6.04 |
| -20 | 10.70 | 8.0 | -5.87 |
| -15 | 7.990 | 6.5 | -5.72 |
| -10 | 6.013 | 5.2 | -5.57 |
| -5 | 4.559 | 4.1 | -5.42 |
| 0 | 3.482 | 3.1 | -5.29 |
| 5 | 2.678 | 2.2 | -5.15 |
| 10 | 2.074 | 1.5 | -5.02 |
| 15 | 1.616 | 0.9 | -4.90 |
| 20 | 1.267 | 0.4 | -4.77 |
| 25 | 1.0000 | 0.0 | -4.66 |
| 30 | 0.7936 | 0.4 | -4.54 |
| 35 | 0.6334 | 0.8 | -4.43 |
| 40 | 0.5083 | 1.3 | -4.33 |
| 45 | 0.4100 | 1.9 | -4.23 |
| 50 | 0.3325 | 2.5 | -4.13 |
| 55 | 0.2709 | 3.1 | -4.03 |
| 60 | 0.2218 | 3.7 | -3.94 |
| 65 | 0.1825 | 4.4 | -3.85 |
| 70 | 0.1508 | 5.1 | -3.76 |
| 75 | 0.1251 | 5.8 | -3.67 |
| 80 | 0.1043 | 6.6 | -3.59 |
| 85 | 0.08727 | 7.3 | -3.51 |
| 90 | 0.07332 | 8.1 | -3.43 |
| 95 | 0.06184 | 8.9 | -3.36 |
| 100 | 0.05235 | 9.7 | -3.29 |
| 105 | 0.04448 | 10.5 | -3.22 |
| 110 | 0.03793 | 11.3 | -3.15 |
| 115 | 0.03245 | 12.1 | -3.08 |
| 120 | 0.02785 | 12.9 | -3.01 |
| 125 | 0.02399 | 13.7 | -2.95 |
| 130 | 0.02072 | 14.5 | -2.89 |
| 135 | 0.01796 | 15.4 | -2.83 |
| 140 | 0.01561 | 16.2 | -2.77 |
| 145 | 0.01360 | 17.0 | -2.72 |
| 150 | 0.01189 | 17.8 | -2.66 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | T 4630 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 137.10 | 27.2 | -7.33 |
| -50 | 94.94 | 23.5 | -7.15 |
| -45 | 66.35 | 20.2 | -6.98 |
| -40 | 46.78 | 17.3 | -6.82 |
| -35 | 33.25 | 14.7 | -6.66 |
| -30 | 23.84 | 12.4 | -6.50 |
| -25 | 17.23 | 10.3 | -6.35 |
| -20 | 12.54 | 8.5 | -6.20 |
| -15 | 9.206 | 6.9 | -6.05 |
| -10 | 6.807 | 5.6 | -5.91 |
| -5 | 5.070 | 4.3 | -5.77 |
| 0 | 3.803 | 3.3 | -5.63 |
| 5 | 2.873 | 2.4 | -5.50 |
| 10 | 2.185 | 1.6 | -5.36 |
| 15 | 1.673 | 1.0 | -5.23 |
| 20 | 1.289 | 0.4 | -5.11 |
| 25 | 1.0000 | 0.0 | -4.99 |
| 30 | 0.7805 | 0.4 | -4.86 |
| 35 | 0.6129 | 0.9 | -4.75 |
| 40 | 0.4841 | 1.4 | -4.63 |
| 45 | 0.3847 | 2.0 | -4.52 |
| 50 | 0.3074 | 2.6 | -4.41 |
| 55 | 0.2470 | 3.3 | -4.30 |
| 60 | 0.1996 | 4.0 | -4.19 |
| 65 | 0.1621 | 4.7 | -4.09 |
| 70 | 0.1323 | 5.4 | -3.99 |
| 75 | 0.1086 | 6.2 | -3.89 |
| 80 | 0.08951 | 7.0 | -3.80 |
| 85 | 0.07416 | 7.8 | -3.71 |
| 90 | 0.06172 | 8.6 | -3.62 |
| 95 | 0.05160 | 9.5 | -3.53 |
| 100 | 0.04333 | 10.3 | -3.44 |
| 105 | 0.03655 | 11.2 | -3.36 |
| 110 | 0.03095 | 12.0 | -3.28 |
| 115 | 0.02632 | 12.9 | -3.20 |
| 120 | 0.02246 | 13.7 | -3.12 |
| 125 | 0.01925 | 14.6 | -3.05 |
| 130 | 0.01656 | 15.5 | -2.97 |
| 135 | 0.01429 | 16.4 | -2.90 |
| 140 | 0.01238 | 17.3 | -2.83 |
| 145 | 0.01076 | 18.1 | -2.77 |
| 150 | 0.009383 | 19.0 | -2.70 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | U 4840 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 173.70 | 28.5 | -7.69 |
| -50 | 118.20 | 24.6 | -7.50 |
| -45 | 81.18 | 21.2 | -7.32 |
| -40 | 56.26 | 18.1 | -7.15 |
| -35 | 39.34 | 15.4 | -6.98 |
| -30 | 27.75 | 12.9 | -6.82 |
| -25 | 19.74 | 10.8 | -6.66 |
| -20 | 14.15 | 8.9 | -6.50 |
| -15 | 10.23 | 7.3 | -6.34 |
| -10 | 7.457 | 5.8 | -6.19 |
| -5 | 5.476 | 4.5 | -6.04 |
| 0 | 4.051 | 3.4 | -5.90 |
| 5 | 3.020 | 2.5 | -5.76 |
| 10 | 2.267 | 1.7 | -5.62 |
| 15 | 1.714 | 1.0 | -5.48 |
| 20 | 1.305 | 0.5 | -5.35 |
| 25 | 1.0000 | 0.0 | -5.22 |
| 30 | 0.7715 | 0.4 | -5.09 |
| 35 | 0.5991 | 0.9 | -4.97 |
| 40 | 0.4681 | 1.5 | -4.84 |
| 45 | 0.3680 | 2.1 | -4.72 |
| 50 | 0.2911 | 2.8 | -4.61 |
| 55 | 0.2316 | 3.4 | -4.49 |
| 60 | 0.1853 | 4.2 | -4.38 |
| 65 | 0.1491 | 4.9 | -4.28 |
| 70 | 0.1206 | 5.7 | -4.17 |
| 75 | 0.09812 | 6.5 | -4.07 |
| 80 | 0.08022 | 7.3 | -3.97 |
| 85 | 0.06591 | 8.2 | -3.87 |
| 90 | 0.05442 | 9.0 | -3.77 |
| 95 | 0.04515 | 9.9 | -3.68 |
| 100 | 0.03763 | 10.8 | -3.59 |
| 105 | 0.03150 | 11.7 | -3.50 |
| 110 | 0.02649 | 12.6 | -3.42 |
| 115 | 0.02237 | 13.5 | -3.33 |
| 120 | 0.01897 | 14.4 | -3.25 |
| 125 | 0.01615 | 15.3 | -3.17 |
| 130 | 0.01380 | 16.2 | -3.10 |
| 135 | 0.01184 | 17.1 | -3.02 |
| 140 | 0.01020 | 18.0 | -2.95 |
| 145 | 0.008814 | 19.0 | -2.88 |
| 150 | 0.007643 | 19.9 | -2.81 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | S 4520 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 126.10 | 26.6 | -7.25 |
| -50 | 87.75 | 23.0 | -7.07 |
| -45 | 61.60 | 19.8 | -6.90 |
| -40 | 43.63 | 16.9 | -6.73 |
| -35 | 31.17 | 14.3 | -6.56 |
| -30 | 22.46 | 12.1 | -6.40 |
| -25 | 16.31 | 10.1 | -6.25 |
| -20 | 11.94 | 8.3 | -6.10 |
| -15 | 8.809 | 6.8 | -5.95 |
| -10 | 6.549 | 5.4 | -5.80 |
| -5 | 4.904 | 4.2 | -5.66 |
| 0 | 3.699 | 3.2 | -5.52 |
| 5 | 2.810 | 2.3 | -5.39 |
| 10 | 2.149 | 1.6 | -5.26 |
| 15 | 1.654 | 1.0 | -5.13 |
| 20 | 1.282 | 0.4 | -5.00 |
| 25 | 1.0000 | 0.0 | -4.88 |
| 30 | 0.7848 | 0.4 | -4.76 |
| 35 | 0.6196 | 0.9 | -4.64 |
| 40 | 0.4921 | 1.4 | -4.52 |
| 45 | 0.3931 | 2.0 | -4.41 |
| 50 | 0.3158 | 2.6 | -4.30 |
| 55 | 0.2551 | 3.2 | -4.20 |
| 60 | 0.2072 | 3.9 | -4.09 |
| 65 | 0.1691 | 4.6 | -3.99 |
| 70 | 0.1387 | 5.3 | -3.89 |
| 75 | 0.1144 | 6.1 | -3.80 |
| 80 | 0.0948 | 6.8 | -3.71 |
| 85 | 0.0789 | 7.6 | -3.61 |
| 90 | 0.06594 | 8.4 | -3.53 |
| 95 | 0.05538 | 9.2 | -3.44 |
| 100 | 0.04671 | 10.1 | -3.36 |
| 105 | 0.03956 | 10.9 | -3.28 |
| 110 | 0.03364 | 11.7 | -3.20 |
| 115 | 0.02872 | 12.6 | -3.12 |
| 120 | 0.02461 | 13.4 | -3.04 |
| 125 | 0.02117 | 14.3 | -2.97 |
| 130 | 0.01827 | 15.1 | -2.90 |
| 135 | 0.01583 | 16.0 | -2.83 |
| 140 | 0.01376 | 16.8 | -2.77 |
| 145 | 0.01200 | 17.7 | -2.70 |
| 150 | 0.01050 | 18.6 | -2.64 |

| T (°C) | Material B(K) | | |
|-----------|---------------|--------|----------|
| | SC 4500 | | |
| | R(T) / R25 | TF (%) | α (%/°C) |
| -55 | 129.80 | 26.5 | -7.51 |
| -50 | 89.31 | 22.9 | -7.29 |
| -45 | 62.15 | 19.7 | -7.07 |
| -40 | 43.72 | 16.8 | -6.87 |
| -35 | 31.07 | 14.3 | -6.68 |
| -30 | 22.29 | 12.0 | -6.49 |
| -25 | 16.15 | 10.0 | -6.31 |
| -20 | 11.80 | 8.3 | -6.14 |
| -15 | 8.703 | 6.8 | -5.97 |
| -10 | 6.470 | 5.4 | -5.81 |
| -5 | 4.849 | 4.2 | -5.66 |
| 0 | 3.662 | 3.2 | -5.51 |
| 5 | 2.786 | 2.3 | -5.36 |
| 10 | 2.135 | 1.6 | -5.23 |
| 15 | 1.647 | 0.9 | -5.09 |
| 20 | 1.279 | 0.4 | -4.96 |
| 25 | 1.0000 | 0.0 | -4.84 |
| 30 | 0.7865 | 0.4 | -4.72 |
| 35 | 0.6223 | 0.9 | -4.60 |
| 40 | 0.4953 | 1.4 | -4.49 |
| 45 | 0.3963 | 2.0 | -4.38 |
| 50 | 0.3189 | 2.6 | -4.28 |
| 55 | 0.2579 | 3.2 | -4.18 |
| 60 | 0.2096 | 3.9 | -4.08 |
| 65 | 0.1712 | 4.6 | -3.99 |
| 70 | 0.1405 | 5.3 | -3.89 |
| 75 | 0.1159 | 6.0 | -3.80 |
| 80 | 0.09595 | 6.8 | -3.72 |
| 85 | 0.07980 | 7.6 | -3.63 |
| 90 | 0.06664 | 8.4 | -3.55 |
| 95 | 0.05588 | 9.2 | -3.47 |
| 100 | 0.04704 | 10.0 | -3.40 |
| 105 | 0.03975 | 10.8 | -3.32 |
| 110 | 0.03371 | 11.7 | -3.25 |
| 115 | 0.02869 | 12.5 | -3.18 |
| 120 | 0.02450 | 13.4 | -3.12 |
| 125 | 0.02100 | 14.2 | -3.05 |
| 130 | 0.01805 | 15.1 | -2.99 |
| 135 | 0.01557 | 15.9 | -2.92 |
| 140 | 0.01347 | 16.8 | -2.86 |
| 145 | 0.01169 | 17.6 | -2.80 |
| 150 | 0.01017 | 18.5 | -2.75 |

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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