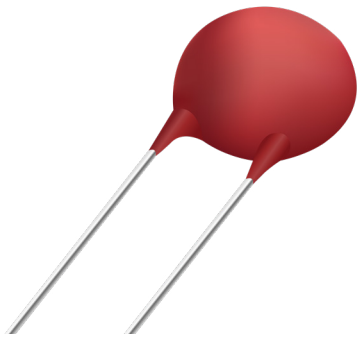


# NTC Disc Thermistors

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%<br>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%)

#### --

##### Packaging

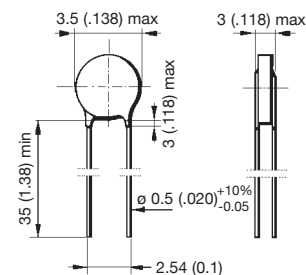
--: Bulk  
Ammopack  
(See table page 26)  
Tape and reel  
(See table page 26)

\* Optional tolerance, please contact factory

### TABLE OF VALUES

#### ND03/NE03 TYPE

#### ND03/NE03



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

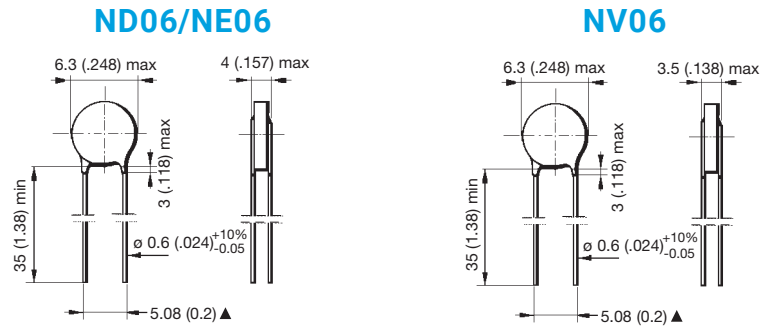
# NTC Disc Thermistors

ND/NE/NV 06



## TABLE OF VALUES

ND06/NE06/NV06



| Part Number | R <sub>n</sub> at 25°C (Ω) | Material Code | B (K)<br>(B/B)<br>(1) ± 5%<br>(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             | 4080 (2)                               | - 4.6            |
| N_06N00332  | 3,300                      |               |  |                  |
| N_06P00472  | 4,700                      | P             | 4220 (2)                               | - 4.7            |
| N_06P00682  | 6,800                      |               |  |                  |
| 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                     | S             | 4520 (2)                               | - 5.0            |
| N_06S00683  | 68,000                     |               |  |                  |
| N_06T00104  | 100,000                    | T             | 4630 (2)                               | - 5.1            |
| 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

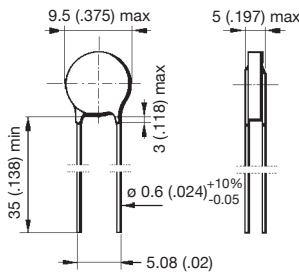
ND/NE/NV 09



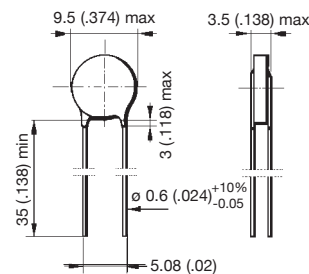
## TABLE OF VALUES

ND09/NE09/NV09

### ND09/NE09



### NV09



| Part Number | R <sub>n</sub> at 25°C (Ω) | Material Code | B (K)<br>( <sup>(1)</sup> ± 5%<br><sup>(2)</sup> ± 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).

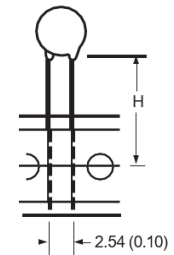
• **Reel & Ammopack**

millimeters (inches)

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

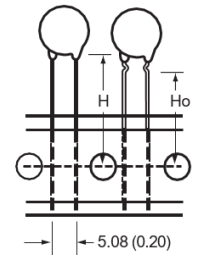
NTC

Type  
ND03  
NE03  
NJ28  
NP30



NTC

Types  
ND/NE/NV  
06/09

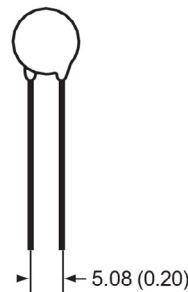
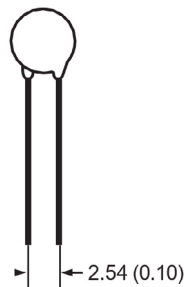


• **Bulk**

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

ND03 / NE03  
NJ28 / NP30

ND/NE/NV  
06/09



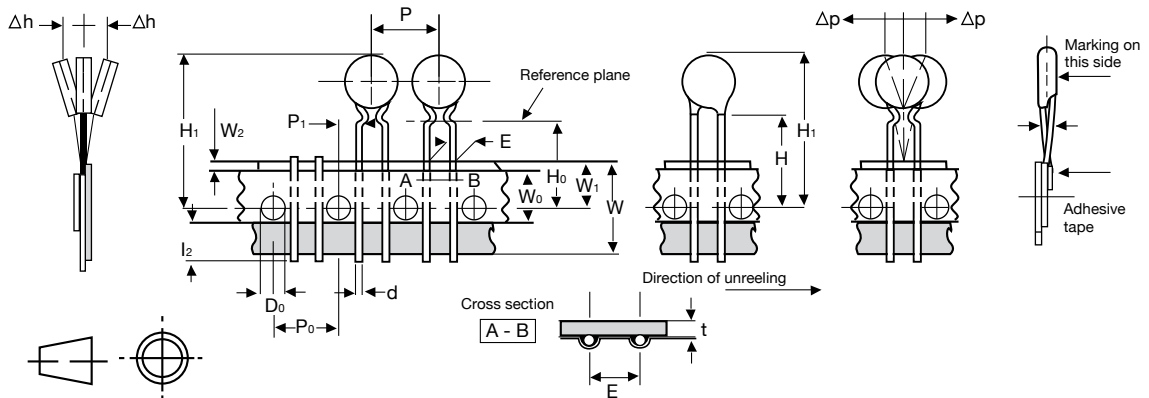
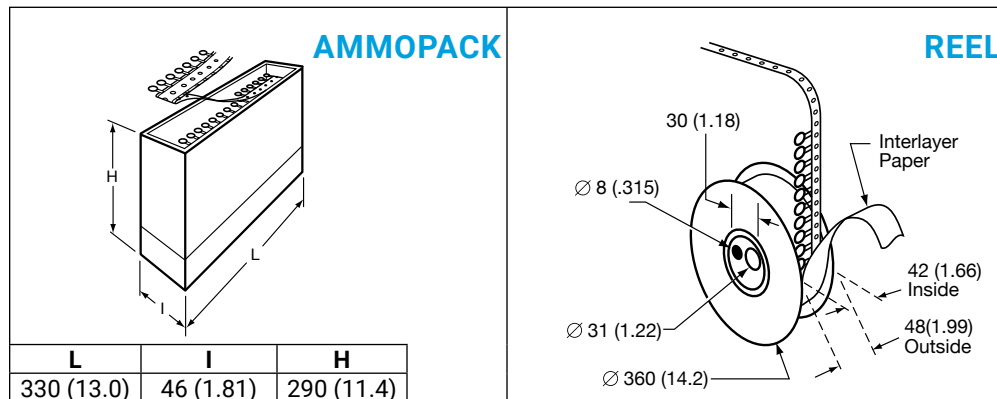
### TAPING CHARACTERISTICS

#### 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 <sub>0</sub>             | Adhesive tape width   |
| 9       | +0.75 / -0.5 | W <sub>1</sub>             | Sprocket hole position  |
| 3 max.  |              | W <sub>2</sub>             | Distance between the top of the tape and the adhesive                 |
| 4       | ±0.2         | D <sub>0</sub>             | Diameter of sprocket hole   |
| 16/19.5 | ±0.5         | H <sub>0</sub>             | Distance between the tape axis and the seating plane of the component |
|         |              | H <sub>1</sub>             | Distance between the tape axis and the top of component body          |

| Value       | Tolerance    | Dimensions Characteristics |   |
|-------------|--------------|----------------------------|---|
| 12.7        | ±0.2         | P <sub>0</sub>             | 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<br>-0.1 | E                          | Lead spacing  |
| 5.08   3.85 | ± 0.7        | P <sub>1</sub>             | 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         | <sup>3</sup> P             | Verticality of components                                 |
| 0           | ±2           | <sup>3</sup> h             | Alignment of components                                   |







# Tables of Resistance vs Temperature



| T<br>(°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<br>(°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<br>(°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<br>(°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<br>(°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<br>(°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<br>(°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<br>(°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<br>(°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<br>(°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<br>(°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<br>(°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<br>(°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<br>(°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<br>(°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<br>(°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<br>(°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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