

# NTC SMD Thermistors



## With Nickel Barrier Termination NB 12 - NB 20 - NB 21

Chip thermistors are high quality and low cost devices especially developed for surface mounting applications. They are widely used for temperature compensation but can also achieve temperature control of printed circuits.

A nickel barrier metallization provides outstanding qualities of solderability and enables this chip to meet the requirements of the most severe soldering processes.

| Types                                      | NB 21<br>IEC SIZE : 06-03 | NB 12<br>IEC SIZE : 08-05 | NB 20<br>IEC SIZE : 12-06 |
|--------------------------------------------|---------------------------|---------------------------|---------------------------|
| <b>DIMENSIONS:</b><br>millimeters (inches) |                           |                           |                           |
| Terminations                               | Nickel Barrier            |                           |                           |
| Marking                                    | On packaging only         |                           |                           |
| Climatic category                          | 40/125/56                 |                           |                           |
| Operating temperature                      | -55°C to +150°C           |                           |                           |
| Tolerance on R <sub>n</sub> (25°C)         | ±5%, ±10%, ±20%           |                           |                           |
| Maximum dissipation at 25°C                | 0.7 W                     | 0.12 W                    | 0.24 W                    |
| Thermal dissipation factor                 | 1 mW/°C                   | 2 mW/°C                   | 4 mW/°C                   |
| Thermal time constant                      | 4 s                       | 5 s                       | 7s                        |

Resistance - Temperature characteristics: pages 32 to 35.

## APPLICATIONS

- LCD compensation
- Battery packs
- Mobile phones
- CD players
- Heating systems
- Air-conditioning systems
- Temperature control of Switch Mode Power Supplies
- Compensation of pressure sensors
- Protection of power transistors in various electronic circuits

## HOW TO ORDER

**NB 20**

Type

**K 0**

Material Code  
K  
(See tables page 13)

**0103**

Resistance  
10,000 Ω

**M**

Tolerance  
M (±20%)

**BA**

Suffix: Packaging  
— : Bulk  
BA: Super 8 plastic tape  
BE: Super 8 plastic tape (1/2 reel)

# NTC SMD Thermistors



With Nickel Barrier Termination NB 12 – NB 20 – NB 21

## TABLE OF VALUES

| NB 12<br>IEC SIZE : 08-05                                                                                                                                                                                                                                                                                                        |                                                                                                                                          |                  |                                                          |                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------------------------------------------|----------------------------|
| Types                                                                                                                                                                                                                                                                                                                            | Rn at 25°C<br>( )                                                                                                                        | Material<br>Code | B (K)<br>( $\Delta B/B$ (1) $\pm 5\%$<br>(2) $\pm 3\%$ ) | $\alpha$ at 25°C<br>(%/°C) |
| NB 12 KC 0 180<br>NB 12 KC 0 220<br>NB 12 KC 0 270<br>NB 12 KC 0 330<br>NB 12 KC 0 390<br>NB 12 KC 0 470<br>NB 12 KC 0 560<br>NB 12 KC 0 680<br>NB 12 KC 0 820<br>NB 12 KC 0 101                                                                                                                                                 | 18<br>22<br>27<br>33<br>39<br>47<br>56<br>68<br>82<br>100                                                                                | KC               | 3470 (1)                                                 | - 3.9                      |
| NB 12 MC 0 121<br>NB 12 MC 0 151<br>NB 12 MC 0 181<br>NB 12 MC 0 221<br>NB 12 MC 0 271<br>NB 12 MC 0 331<br>NB 12 MC 0 391<br>NB 12 MC 0 471<br>NB 12 MC 0 561<br>NB 12 MC 0 681<br>NB 12 MC 0 821<br>NB 12 MC 0 102<br>NB 12 MC 0 122<br>NB 12 MC 0 152<br>NB 12 MC 0 182<br>NB 12 MC 0 222<br>NB 12 MC 0 272<br>NB 12 MC 0 332 | 120<br>150<br>180<br>220<br>270<br>330<br>390<br>470<br>560<br>680<br>820<br>1,000<br>1,200<br>1,500<br>1,800<br>2,200<br>2,700<br>3,300 | MC               | 3910 (1)                                                 | - 4.4                      |
| NB 12 J 5 0 392<br>NB 12 J 5 0 472                                                                                                                                                                                                                                                                                               | 3,900<br>4,700                                                                                                                           | J5               | 3480 (1)                                                 | - 3.9                      |
| NB 12 K 0 0562<br>NB 12 K 0 0682<br>NB 12 K 0 0822<br>NB 12 K 0 0103                                                                                                                                                                                                                                                             | 5,600<br>6,800<br>8,200<br>10,000                                                                                                        | K                | 3630 (1)                                                 | - 4.0                      |
| NB 12 L 0 0123<br>NB 12 L 0 0153                                                                                                                                                                                                                                                                                                 | 12,000<br>15,000                                                                                                                         | L                | 3790 (2)                                                 | - 4.2                      |
| NB 12 M 0 0183<br>NB 12 M 0 0223<br>NB 12 M 0 0273<br>NB 12 M 0 0333                                                                                                                                                                                                                                                             | 18,000<br>22,000<br>27,000<br>33,000                                                                                                     | M                | 3950 (2)                                                 | - 4.4                      |
| NB 12 N 0 0393<br>NB 12 N 0 0473<br>NB 12 N 0 0563                                                                                                                                                                                                                                                                               | 39,000<br>47,000<br>56,000                                                                                                               | N                | 4080 (2)                                                 | - 4.6                      |
| NB 12 N 5 0683<br>NB 12 N 5 0823                                                                                                                                                                                                                                                                                                 | 68,000<br>82,000                                                                                                                         | N5               | 4160 (2)                                                 | - 4.7                      |
| NB 12 P 0 0104<br>NB 12 P 0 0124<br>NB 12 P 0 0154<br>NB 12 P 0 0184                                                                                                                                                                                                                                                             | 100,000<br>120,000<br>150,000<br>180,000                                                                                                 | P                | 4220 (2)                                                 | - 4.7                      |

| NB 20<br>IEC SIZE : 12-06                                                                                |                                                                |                  |                                                          |                            |
|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|------------------|----------------------------------------------------------|----------------------------|
| Types                                                                                                    | Rn at 25°C<br>( )                                              | Material<br>Code | B (K)<br>( $\Delta B/B$ (1) $\pm 5\%$<br>(2) $\pm 3\%$ ) | $\alpha$ at 25°C<br>(%/°C) |
| NB 20 J 0 0472<br>NB 20 J 0 0562                                                                         | 4,700<br>5,600                                                 | J                | 3480 (1)                                                 | - 3.9                      |
| NB 20 J 5 0682<br>NB 20 J 5 0822                                                                         | 6,800<br>8,200                                                 | J5               | 3480 (2)                                                 | - 3.9                      |
| NB 20 K 0 0103<br>NB 20 K 0 0123                                                                         | 10,000<br>12,000                                               | K                | 3630 (1)                                                 | - 4.0                      |
| NB 20 L 0 0153<br>NB 20 L 0 0183                                                                         | 15,000<br>18,000                                               | L                | 3790 (2)                                                 | - 4.2                      |
| NB 20 M 0 0223<br>NB 20 M 0 0273<br>NB 20 M 0 0333<br>NB 20 M 0 0393                                     | 22,000<br>27,000<br>33,000<br>39,000                           | M                | 3950 (2)                                                 | - 4.4                      |
| NB 20 N 0 0473<br>NB 20 N 0 0563<br>NB 20 N 0 0683<br>NB 20 N 0 0823                                     | 47,000<br>56,000<br>68,000<br>82,000                           | N                | 4080 (2)                                                 | - 4.6                      |
| NB 20 N 5 0104                                                                                           | 100,000                                                        | N5               | 4160 (2)                                                 | - 4.7                      |
| NB 20 P 0 0124<br>NB 20 P 0 0154<br>NB 20 P 0 0184                                                       | 120,000<br>150,000<br>180,000                                  | P                | 4220 (2)                                                 | - 4.7                      |
| NB 20 Q 0 0224<br>NB 20 Q 0 0274<br>NB 20 Q 0 0334<br>NB 20 Q 0 0394<br>NB 20 Q 0 0474<br>NB 20 Q 0 0564 | 220,000<br>270,000<br>330,000<br>390,000<br>470,000<br>560,000 | Q                | 4300 (2)                                                 | - 4.7                      |
| NB 20 R 0 0684<br>NB 20 R 0 0824<br>NB 20 R 0 0105                                                       | 680,000<br>820,000<br>1,000,000                                | R                | 4400 (2)                                                 | - 4.8                      |

| NB 21<br>IEC SIZE : 06-03 |                   |                  |                                                          |                            |
|---------------------------|-------------------|------------------|----------------------------------------------------------|----------------------------|
| Types                     | Rn at 25°C<br>( ) | Material<br>Code | B (K)<br>( $\Delta B/B$ (1) $\pm 5\%$<br>(2) $\pm 3\%$ ) | $\alpha$ at 25°C<br>(%/°C) |
| NB 21 PC 0472             | 4,700             | PC               | 4200 (1)                                                 | - 4.7                      |
| NB 21 J 5 0103            | 10,000            | J5               | 3480 (1)                                                 | - 3.9                      |
| NB 21 K 0 0153            | 15,000            | K                | 3630 (2)                                                 | - 4.0                      |
| NB 21 L 0 0223            | 22,000            | L                | 3790 (2)                                                 | - 4.2                      |
| NB 21 M 0 0473            | 47,000            | M                | 3950 (2)                                                 | - 4.4                      |
| NB 21 N 5 0104            | 100,000           | N5               | 4160 (2)                                                 | - 4.7                      |
| NB 21 P 0 0154            | 150,000           | P                | 4220 (2)                                                 | - 4.7                      |

## Temperature Characteristics

| T<br>(°C) | Material code B (K) |        |          |             |        |          |             |        |          | T<br>(°C) |
|-----------|---------------------|--------|----------|-------------|--------|----------|-------------|--------|----------|-----------|
|           | F 2800              |        |          | G 3030      |        |          | H 3160      |        |          |           |
|           | R (T) / R25         | TF (%) | α (%/°C) | R (T) / R25 | TF (%) | α (%/°C) | R (T) / R25 | TF (%) | α (%/°C) |           |
| - 55      | 29.51               | 27.5   | 5.81     | 33.43       | 29.7   | 5.81     | 38.50       | 31.0   | 6.03     | - 55      |
| - 50      | 22.33               | 23.7   | 5.56     | 25.27       | 25.7   | 5.59     | 28.80       | 26.8   | 5.81     | - 50      |
| - 45      | 17.09               | 20.4   | 5.33     | 19.29       | 22.1   | 5.39     | 21.76       | 23.0   | 5.60     | - 45      |
| - 40      | 13.12               | 17.4   | 5.11     | 14.87       | 18.9   | 5.20     | 16.60       | 19.7   | 5.41     | - 40      |
| - 35      | 10.45               | 14.8   | 4.90     | 11.56       | 16.0   | 5.02     | 12.78       | 16.7   | 5.22     | - 35      |
| - 30      | 8.160               | 12.5   | 4.71     | 9.069       | 13.5   | 4.84     | 9.930       | 14.1   | 5.04     | - 30      |
| - 25      | 6.499               | 10.4   | 4.52     | 7.171       | 11.3   | 4.68     | 7.779       | 11.8   | 4.87     | - 25      |
| - 20      | 5.221               | 8.6    | 4.35     | 5.715       | 9.3    | 4.52     | 6.143       | 9.7    | 4.70     | - 20      |
| - 15      | 4.228               | 7.0    | 4.19     | 4.589       | 7.6    | 4.37     | 4.889       | 7.9    | 4.55     | - 15      |
| - 10      | 3.450               | 5.6    | 4.03     | 3.711       | 6.1    | 4.22     | 3.919       | 6.3    | 4.40     | - 10      |
| - 5       | 2.836               | 4.4    | 3.89     | 3.021       | 4.7    | 4.09     | 3.164       | 4.9    | 4.26     | - 5       |
| 0         | 2.348               | 3.3    | 3.75     | 2.476       | 3.6    | 3.96     | 2.572       | 3.7    | 4.12     | 0         |
| 5         | 1.956               | 2.4    | 3.62     | 2.042       | 2.6    | 3.83     | 2.104       | 2.7    | 3.99     | 5         |
| 10        | 1.640               | 1.6    | 3.49     | 1.694       | 1.8    | 3.71     | 1.732       | 1.8    | 3.87     | 10        |
| 15        | 1.383               | 1.0    | 3.38     | 1.413       | 1.1    | 3.60     | 1.434       | 1.1    | 3.75     | 15        |
| 20        | 1.173               | .4     | 3.26     | 1.186       | .5     | 3.49     | 1.194       | .5     | 3.63     | 20        |
| 25        | 1.0000              | 0.0    | 3.16     | 1.0000      | 0.0    | 3.38     | 1.0000      | 0.0    | 3.53     | 25        |
| 30        | .8570               | .4     | 3.06     | .8476       | .5     | 3.28     | .8417       | .5     | 3.42     | 30        |
| 35        | .7381               | .9     | 2.96     | .7220       | 1.0    | 3.18     | .7121       | 1.0    | 3.32     | 35        |
| 40        | .6386               | 1.4    | 2.87     | .6178       | 1.6    | 3.09     | .6053       | 1.6    | 3.22     | 40        |
| 45        | .5550               | 2.0    | 2.78     | .5310       | 2.2    | 3.00     | .5169       | 2.3    | 3.13     | 45        |
| 50        | .4844               | 2.7    | 2.69     | .4584       | 2.9    | 2.92     | .4434       | 3.0    | 3.04     | 50        |
| 55        | .4245               | 3.3    | 2.61     | .3973       | 3.6    | 2.83     | .3820       | 3.7    | 2.96     | 55        |
| 60        | .3734               | 4.0    | 2.54     | .3458       | 4.3    | 2.76     | .3305       | 4.5    | 2.87     | 60        |
| 65        | .3297               | 4.7    | 2.46     | .3021       | 5.1    | 2.68     | .2870       | 5.3    | 2.80     | 65        |
| 70        | .2922               | 5.5    | 2.39     | .2648       | 5.9    | 2.61     | .2502       | 6.2    | 2.72     | 70        |
| 75        | .2598               | 6.3    | 2.33     | .2330       | 6.8    | 2.54     | .2189       | 7.1    | 2.65     | 75        |
| 80        | .2318               | 7.1    | 2.26     | .2057       | 7.6    | 2.47     | .1923       | 8.0    | 2.58     | 80        |
| 85        | .2074               | 7.9    | 2.20     | .1822       | 8.5    | 2.40     | .1694       | 8.9    | 2.51     | 85        |
| 90        | .1861               | 8.7    | 2.14     | .1619       | 9.4    | 2.34     | .1498       | 9.8    | 2.44     | 90        |
| 95        | .1676               | 9.5    | 2.08     | .1443       | 10.3   | 2.38     | .1328       | 10.8   | 2.38     | 95        |
| 100       | .1513               | 10.4   | 2.03     | .1290       | 11.2   | 2.22     | .1181       | 11.7   | 2.32     | 100       |
| 105       | .1369               | 11.2   | 1.97     | .1156       | 12.2   | 2.17     | .1054       | 12.7   | 2.26     | 105       |
| 110       | .1242               | 12.1   | 1.92     | .1039       | 13.1   | 2.11     | .09430      | 13.7   | 2.21     | 110       |
| 115       | .1130               | 13.0   | 1.87     | .09365      | 14.0   | 2.06     | .08460      | 14.6   | 2.15     | 115       |
| 120       | .1030               | 13.9   | 1.83     | .08461      | 15.0   | 2.01     | .07610      | 15.6   | 2.10     | 120       |
| 125       | .09417              | 14.7   | 1.78     | .07663      | 15.9   | 1.96     | .06863      | 16.6   | 2.05     | 125       |
| 130       | .08625              | 15.6   | 1.74     | .06957      | 16.9   | 1.92     | .06204      | 17.6   | 2.00     | 130       |
| 135       | .07917              | 16.5   | 1.70     | .06330      | 17.9   | 1.87     | .05623      | 18.6   | 1.95     | 135       |
| 140       | .07282              | 17.4   | 1.66     | .05772      | 18.8   | 1.83     | .05107      | 19.6   | 1.91     | 140       |
| 145       | .06711              | 18.3   | 1.62     | .05275      | 19.8   | 1.78     | .04649      | 20.6   | 1.86     | 145       |
| 150       | .06197              | 19.2   | 1.58     | .04831      | 20.7   | 1.74     | .04242      | 21.6   | 1.82     | 150       |

| T<br>(°C) | Material code B (K) |        |          |             |        |          |             |        |          | T<br>(°C) |
|-----------|---------------------|--------|----------|-------------|--------|----------|-------------|--------|----------|-----------|
|           | I 3250              |        |          | J-J5 3480   |        |          | K 3630      |        |          |           |
|           | R (T) / R25         | TF (%) | α (%/°C) | R (T) / R25 | TF (%) | α (%/°C) | R (T) / R25 | TF (%) | α (%/°C) |           |
| - 55      | 42.35               | 21.9   | 5.98     | 51.74       | 34.1   | 6.43     | 56.26       | 35.6   | 6.46     | - 55      |
| - 50      | 31.48               | 20.0   | 5.78     | 37.97       | 29.5   | 6.21     | 41.21       | 30.8   | 6.26     | - 50      |
| - 45      | 23.63               | 18.1   | 5.59     | 28.15       | 25.3   | 6.01     | 30.47       | 26.4   | 6.06     | - 45      |
| - 40      | 17.91               | 16.3   | 5.41     | 21.07       | 21.7   | 5.81     | 22.73       | 22.6   | 5.88     | - 40      |
| - 35      | 13.70               | 14.6   | 5.23     | 15.91       | 18.4   | 5.62     | 17.11       | 19.2   | 5.70     | - 35      |
| - 30      | 10.58               | 13.1   | 5.06     | 12.13       | 15.5   | 5.44     | 12.98       | 16.2   | 5.53     | - 30      |
| - 25      | 8.232               | 11.6   | 4.90     | 9.320       | 12.9   | 5.26     | 9.930       | 13.5   | 5.36     | - 25      |
| - 20      | 6.460               | 10.1   | 4.74     | 7.221       | 10.7   | 5.10     | 7.654       | 11.2   | 5.21     | - 20      |
| - 15      | 5.110               | 8.8    | 4.59     | 5.640       | 8.7    | 4.94     | 5.945       | 9.1    | 5.05     | - 15      |
| - 10      | 4.072               | 7.5    | 4.45     | 4.438       | 7.0    | 4.78     | 4.650       | 7.3    | 4.91     | - 10      |
| - 5       | 3.268               | 6.3    | 4.31     | 3.517       | 5.4    | 4.64     | 3.663       | 5.7    | 4.76     | - 5       |
| 0         | 2.641               | 5.1    | 4.18     | 2.807       | 4.1    | 4.50     | 2.905       | 4.3    | 4.63     | 0         |
| 5         | 2.148               | 4.0    | 4.05     | 2.255       | 3.0    | 4.36     | 2.319       | 3.1    | 4.50     | 5         |
| 10        | 1.759               | 2.9    | 3.92     | 1.824       | 2.0    | 4.23     | 1.862       | 2.1    | 4.37     | 10        |
| 15        | 1.449               | 1.9    | 3.81     | 1.484       | 1.2    | 4.10     | 1.505       | 1.3    | 4.25     | 15        |
| 20        | 1.200               | 0.9    | 3.69     | 1.215       | .5     | 3.98     | 1.223       | .6     | 4.13     | 20        |
| 25        | 1.000               | 0.0    | 3.58     | 1.0000      | 0.0    | 3.87     | 1.0000      | 0.0    | 4.01     | 25        |
| 30        | 0.8377              | 0.9    | 3.48     | .8278       | .5     | 3.76     | .8219       | .6     | 3.90     | 30        |
| 35        | 0.7054              | 1.8    | 3.38     | .6889       | 1.1    | 3.65     | .6792       | 1.2    | 3.80     | 35        |
| 40        | 0.5969              | 2.6    | 3.28     | .5763       | 1.8    | 3.55     | .5641       | 1.9    | 3.69     | 40        |
| 45        | 0.5076              | 3.5    | 3.19     | .4845       | 2.5    | 3.45     | .4708       | 2.6    | 3.59     | 45        |
| 50        | 0.4336              | 4.3    | 3.10     | .4092       | 3.3    | 3.35     | .3949       | 3.4    | 3.50     | 50        |
| 55        | 0.3720              | 5.1    | 3.01     | .3473       | 4.1    | 3.26     | .3327       | 4.3    | 3.41     | 55        |
| 60        | 0.3206              | 5.9    | 2.93     | .2960       | 5.0    | 3.17     | .2816       | 5.2    | 3.32     | 60        |
| 65        | 0.2774              | 6.6    | 2.85     | .2534       | 5.9    | 3.09     | .2393       | 6.1    | 3.23     | 65        |
| 70        | 0.2410              | 7.4    | 2.77     | .2178       | 6.8    | 3.01     | .2043       | 7.1    | 3.14     | 70        |
| 75        | 0.2102              | 8.1    | 2.70     | .1879       | 7.8    | 2.93     | .1751       | 8.1    | 3.06     | 75        |
| 80        | 0.1839              | 8.8    | 2.63     | .1628       | 8.8    | 2.85     | .1507       | 9.1    | 2.99     | 80        |
| 85        | 0.1616              | 9.5    | 2.56     | .1415       | 9.8    | 2.78     | .1301       | 10.2   | 2.91     | 85        |
| 90        | 0.1424              | 10.2   | 2.49     | .1235       | 10.8   | 2.70     | .1128       | 11.3   | 2.84     | 90        |
| 95        | 0.1259              | 10.9   | 2.43     | .1081       | 11.8   | 2.64     | .09812      | 12.4   | 2.77     | 95        |
| 100       | 0.1117              | 11.5   | 2.36     | .09500      | 12.9   | 2.57     | .08565      | 13.5   | 2.70     | 100       |
| 105       | 0.09938             | 12.2   | 2.30     | .08373      | 14.0   | 2.50     | .07502      | 14.6   | 2.63     | 105       |
| 110       | 0.08869             | 12.8   | 2.25     | .07403      | 15.0   | 2.44     | .06592      | 15.7   | 2.57     | 110       |
| 115       | 0.07938             | 13.4   | 2.19     | .06565      | 16.1   | 2.38     | .05810      | 16.8   | 2.50     | 115       |
| 120       | 0.07124             | 14.0   | 2.14     | .05838      | 17.2   | 2.33     | .05137      | 18.0   | 2.44     | 120       |
| 125       | 0.06410             | 14.6   | 2.08     | .05207      | 18.3   | 2.27     | .04555      | 19.1   | 2.39     | 125       |
| 130       | 0.05783             | 15.2   | 2.03     | .04567      | 19.4   | 2.22     | .04050      | 20.3   | 2.33     | 130       |
| 135       | 0.05230             | 15.7   | 1.98     | .04175      | 20.5   | 2.16     | .03611      | 21.4   | 2.27     | 135       |
| 140       | 0.04741             | 16.3   | 1.94     | .03753      | 21.6   | 2.11     | .03229      | 22.5   | 2.22     | 140       |
| 145       | 0.04308             | 16.8   | 1.89     | .03382      | 22.7   | 2.06     | .02894      | 23.7   | 2.17     | 145       |
| 150       | 0.03924             | 17.4   | 1.85     | .03055      | 23.8   | 2.02     | .02600      | 24.9   | 2.12     | 150       |

## Temperature Characteristics

| T<br>(°C) | Material code B (K) |        |          |             |        |          |             |        |          | T<br>(°C) |
|-----------|---------------------|--------|----------|-------------|--------|----------|-------------|--------|----------|-----------|
|           | L 3790              |        |          | M 3950      |        |          | N 4080      |        |          |           |
|           | R (T) / R25         | TF (%) | α (°/°C) | R (T) / R25 | TF (%) | α (°/°C) | R (T) / R25 | TF (%) | α (°/°C) |           |
| - 55      | 82.52               | 22.3   | 7.38     | 99.56       | 23.2   | 7.71     | 110.1       | 24.0   | 7.81     | - 55      |
| - 50      | 58.01               | 19.3   | 7.11     | 68.95       | 20.1   | 7.42     | 75.90       | 20.7   | 7.53     | - 50      |
| - 45      | 41.30               | 16.6   | 6.84     | 48.38       | 17.3   | 7.15     | 52.98       | 17.8   | 7.26     | - 45      |
| - 40      | 29.75               | 14.2   | 6.60     | 34.37       | 14.8   | 6.89     | 37.43       | 15.2   | 7.01     | - 40      |
| - 35      | 21.67               | 12.0   | 6.36     | 24.71       | 12.5   | 6.64     | 26.75       | 12.9   | 6.77     | - 35      |
| - 30      | 15.96               | 10.1   | 6.13     | 17.96       | 10.6   | 6.41     | 19.33       | 10.9   | 6.54     | - 30      |
| - 25      | 11.88               | 8.5    | 5.92     | 13.20       | 8.8    | 6.18     | 14.12       | 9.1    | 6.32     | - 25      |
| - 20      | 8.930               | 7.0    | 5.72     | 9.803       | 7.3    | 5.97     | 10.41       | 7.5    | 6.10     | - 20      |
| - 15      | 6.776               | 5.7    | 5.32     | 7.351       | 5.9    | 5.77     | 7.758       | 6.1    | 5.90     | - 15      |
| - 10      | 5.188               | 4.5    | 5.34     | 5.585       | 4.7    | 5.57     | 5.834       | 4.9    | 5.71     | - 10      |
| - 5       | 4.007               | 3.6    | 5.16     | 4.251       | 3.7    | 5.39     | 4.426       | 3.8    | 5.53     | - 5       |
| 0         | 3.120               | 2.7    | 4.99     | 3.275       | 2.8    | 5.21     | 3.387       | 2.9    | 5.35     | 0         |
| 5         | 2.449               | 2.0    | 4.83     | 2.544       | 2.0    | 5.04     | 2.614       | 2.1    | 5.18     | 5         |
| 10        | 1.937               | 1.3    | 4.68     | 1.992       | 1.4    | 4.88     | 2.033       | 1.4    | 5.02     | 10        |
| 15        | 1.543               | .8     | 4.53     | 1.572       | .8     | 4.73     | 1.593       | .9     | 4.87     | 15        |
| 20        | 1.238               | .4     | 4.39     | 1.249       | .4     | 4.58     | 1.258       | .4     | 4.72     | 20        |
| 25        | 1.0000              | 0.0    | 4.25     | 1.0000      | 0.0    | 4.44     | 1.0000      | 0.0    | 4.57     | 25        |
| 30        | .8129               | .3     | 4.12     | .8057       | .4     | 4.30     | .8004       | .4     | 4.44     | 30        |
| 35        | .6648               | .7     | 4.00     | .6534       | .8     | 4.17     | .6448       | .8     | 4.31     | 35        |
| 40        | .5409               | 1.2    | 3.88     | .5331       | 1.2    | 4.05     | .5228       | 1.3    | 4.18     | 40        |
| 45        | .4525               | 1.6    | 3.77     | .4376       | 1.7    | 3.93     | .4264       | 1.8    | 4.06     | 45        |
| 50        | .3765               | 2.2    | 3.66     | .3612       | 2.2    | 3.81     | .3497       | 2.3    | 3.94     | 50        |
| 55        | .3148               | 2.7    | 3.55     | .2998       | 2.8    | 3.71     | .2885       | 2.9    | 3.83     | 55        |
| 60        | .2646               | 3.3    | 3.45     | .2501       | 3.4    | 3.60     | .2392       | 3.5    | 3.72     | 60        |
| 65        | .2235               | 3.8    | 3.36     | .2097       | 4.0    | 3.50     | .1994       | 4.1    | 3.62     | 65        |
| 70        | .1896               | 4.5    | 3.26     | .1767       | 4.6    | 3.40     | .1671       | 4.8    | 3.52     | 70        |
| 75        | .1616               | 5.1    | 3.17     | .1496       | 5.3    | 3.31     | .1406       | 5.5    | 3.42     | 75        |
| 80        | .1383               | 5.7    | 3.09     | .1272       | 6.0    | 3.22     | .1189       | 6.2    | 3.33     | 80        |
| 85        | .1189               | 6.4    | 3.00     | .1087       | 6.7    | 3.13     | .1010       | 6.9    | 3.24     | 85        |
| 90        | .1026               | 7.1    | 2.92     | .09321      | 7.4    | 3.05     | .08617      | 7.6    | 3.16     | 90        |
| 95        | .08889              | 7.7    | 2.85     | .08027      | 8.1    | 2.97     | .07381      | 8.3    | 3.07     | 95        |
| 100       | .07729              | 8.4    | 2.77     | .06939      | 8.8    | 2.89     | .06347      | 9.1    | 2.99     | 100       |
| 105       | .06745              | 9.1    | 2.70     | .06020      | 9.5    | 2.82     | .05480      | 9.8    | 2.92     | 105       |
| 110       | .05906              | 9.8    | 2.63     | .05243      | 10.2   | 2.75     | .04148      | 10.6   | 2.84     | 110       |
| 115       | .05189              | 10.5   | 2.57     | .04581      | 11.0   | 2.68     | .04129      | 11.3   | 2.77     | 115       |
| 120       | .04573              | 11.3   | 2.50     | .04017      | 11.7   | 2.61     | .03603      | 12.1   | 2.70     | 120       |
| 125       | .04043              | 12.0   | 2.44     | .03533      | 12.5   | 2.55     | .03155      | 12.9   | 2.64     | 125       |
| 130       | .03585              | 12.7   | 2.38     | .03117      | 13.2   | 2.48     | .02771      | 13.7   | 2.57     | 130       |
| 135       | .03188              | 13.4   | 2.33     | .02759      | 14.0   | 2.42     | .02442      | 14.4   | 2.51     | 135       |
| 140       | .02843              | 14.1   | 2.27     | .02449      | 14.7   | 2.37     | .02158      | 15.2   | 2.45     | 140       |
| 145       | .02543              | 14.8   | 2.22     | .02180      | 15.5   | 2.31     | .01913      | 16.0   | 2.39     | 145       |
| 150       | .02279              | 15.6   | 2.17     | .01945      | 16.2   | 2.26     | .01700      | 16.8   | 2.34     | 150       |

| T<br>(°C) | Material code B (K) |        |          |             |        |          |             |        |          | T<br>(°C) |
|-----------|---------------------|--------|----------|-------------|--------|----------|-------------|--------|----------|-----------|
|           | P 4220              |        |          | Q 4300      |        |          | R 4400      |        |          |           |
|           | R (T) / R25         | TF (%) | α (°/°C) | R (T) / R25 | TF (%) | α (°/°C) | R (T) / R25 | TF (%) | α (°/°C) |           |
| - 55      | 121.3               | 24.8   | 7.88     | 98.02       | 25.5   | 7.14     | 113.9       | 25.9   | 7.42     | - 55      |
| - 50      | 83.32               | 21.4   | 7.61     | 69.51       | 22.0   | 6.95     | 79.69       | 22.4   | 7.22     | - 50      |
| - 45      | 57.91               | 18.4   | 7.36     | 49.72       | 18.9   | 6.77     | 56.29       | 19.2   | 7.03     | - 45      |
| - 40      | 40.71               | 15.8   | 7.11     | 35.86       | 16.2   | 6.59     | 40.12       | 16.4   | 6.84     | - 40      |
| - 35      | 28.95               | 13.4   | 6.88     | 26.08       | 13.7   | 6.42     | 28.85       | 14.0   | 6.66     | - 35      |
| - 30      | 20.80               | 11.3   | 6.66     | 19.12       | 11.6   | 6.26     | 20.92       | 11.8   | 6.48     | - 30      |
| - 25      | 15.10               | 9.4    | 6.44     | 14.12       | 9.7    | 6.10     | 15.29       | 9.8    | 6.31     | - 25      |
| - 20      | 11.07               | 7.8    | 6.24     | 10.51       | 8.0    | 5.94     | 11.27       | 8.1    | 6.14     | - 20      |
| - 15      | 8.196               | 6.3    | 6.04     | 7.876       | 6.5    | 5.79     | 8.367       | 6.6    | 5.98     | - 15      |
| - 10      | 6.123               | 5.1    | 5.85     | 5.946       | 5.2    | 5.64     | 6.260       | 5.3    | 5.83     | - 10      |
| - 5       | 4.615               | 4.0    | 5.67     | 4.520       | 4.1    | 5.50     | 4.719       | 4.1    | 5.67     | - 5       |
| 0         | 3.507               | 3.0    | 5.49     | 3.460       | 3.1    | 5.36     | 3.583       | 3.1    | 5.53     | 0         |
| 5         | 2.688               | 2.2    | 5.33     | 2.666       | 2.2    | 5.23     | 2.739       | 2.3    | 5.38     | 5         |
| 10        | 2.078               | 1.5    | 5.16     | 2.067       | 1.5    | 5.09     | 2.108       | 1.5    | 5.24     | 10        |
| 15        | 1.616               | .9     | 5.01     | 1.613       | .9     | 4.96     | 1.634       | .9     | 5.11     | 15        |
| 20        | 1.267               | .4     | 4.86     | 1.266       | .4     | 4.84     | 1.274       | .4     | 4.97     | 20        |
| 25        | 1.0000              | 0.0    | 4.72     | 1.0000      | 0.0    | 4.72     | 1.0000      | 0.0    | 4.84     | 25        |
| 30        | .7949               | .4     | 4.58     | .7944       | .4     | 4.60     | .7897       | .4     | 4.72     | 30        |
| 35        | .6360               | .8     | 4.45     | .6347       | .8     | 4.48     | .6273       | .9     | 4.60     | 35        |
| 40        | .5120               | 1.3    | 4.32     | .5099       | 1.3    | 4.37     | .5012       | 1.4    | 4.48     | 40        |
| 45        | .4148               | 1.8    | 4.20     | .4119       | 1.9    | 4.26     | .4026       | 1.9    | 4.36     | 45        |
| 50        | .3380               | 2.4    | 4.06     | .3345       | 2.5    | 4.15     | .3255       | 2.5    | 4.25     | 50        |
| 55        | .2769               | 3.0    | 3.96     | .2730       | 3.1    | 4.05     | .2644       | 3.1    | 4.14     | 55        |
| 60        | .2282               | 3.6    | 3.86     | .2239       | 3.7    | 3.95     | .2159       | 3.8    | 4.04     | 60        |
| 65        | .1890               | 4.3    | 3.75     | .1846       | 4.4    | 3.85     | .1772       | 4.5    | 3.03     | 65        |
| 70        | .1573               | 5.0    | 3.65     | .1529       | 5.1    | 3.75     | .1462       | 5.2    | 3.83     | 70        |
| 75        | .1316               | 5.7    | 3.55     | .1272       | 5.8    | 3.66     | .1212       | 5.9    | 3.74     | 75        |
| 80        | .1106               | 6.4    | 3.45     | .1063       | 6.5    | 3.57     | .1009       | 6.7    | 3.64     | 80        |
| 85        | .09338              | 7.1    | 3.36     | .08928      | 7.3    | 3.48     | .08441      | 7.4    | 3.55     | 85        |
| 90        | .07919              | 7.9    | 3.28     | .07527      | 8.1    | 3.39     | .07093      | 8.2    | 3.46     | 90        |
| 95        | .06744              | 8.6    | 3.19     | .06373      | 8.8    | 3.31     | .05985      | 9.0    | 3.38     | 95        |
| 100       | .05767              | 9.4    | 3.11     | .05417      | 9.6    | 3.23     | .05072      | 9.8    | 3.29     | 100       |
| 105       | .04951              | 10.2   | 3.03     | .04623      | 10.4   | 3.15     | .04315      | 10.6   | 3.21     | 105       |
| 110       | .04267              | 10.9   | 2.95     | .03961      | 11.2   | 3.07     | .03686      | 11.4   | 3.13     | 110       |
| 115       | .03691              | 11.7   | 2.88     | .03405      | 12.0   | 3.00     | .03160      | 12.2   | 3.06     | 115       |
| 120       | .03204              | 12.5   | 2.81     | .02939      | 12.9   | 2.93     | .02720      | 13.1   | 2.98     | 120       |
| 125       | .02791              | 13.3   | 2.74     | .02545      | 13.7   | 2.86     | .02349      | 13.9   | 2.91     | 125       |
| 130       | .02440              | 14.1   | 2.67     | .02211      | 14.5   | 2.79     | .02036      | 14.7   | 2.84     | 130       |
| 135       | .02139              | 14.9   | 2.61     | .01928      | 15.3   | 2.72     | .01771      | 15.6   | 2.77     | 135       |
| 140       | .01882              | 15.7   | 2.55     | .01686      | 16.1   | 2.66     | .01545      | 16.4   | 2.71     | 140       |
| 145       | .01660              | 16.5   | 2.49     | .01479      | 17.0   | 2.60     | .01353      | 17.2   | 2.64     | 145       |
| 150       | .01469              | 17.3   | 2.43     | .01302      | 17.8   | 2.54     | .01188      | 18.1   | 2.58     | 150       |

## Temperature Characteristics

| T<br>(°C) | Material code B (K) |        |          |             |        |          |             |        |          | T<br>(°C) |
|-----------|---------------------|--------|----------|-------------|--------|----------|-------------|--------|----------|-----------|
|           | S 4520              |        |          | T 4630      |        |          | U 4840      |        |          |           |
|           | R (T) / R25         | TF (%) | α (%/°C) | R (T) / R25 | TF (%) | α (%/°C) | R (T) / R25 | TF (%) | α (%/°C) |           |
| - 55      | 126.1               | 26.6   | 7.55     | 137.0       | 27.2   | 7.64     | 173.7       | 28.5   | 8.04     | - 55      |
| - 50      | 87.73               | 23.0   | 7.35     | 94.92       | 23.5   | 7.45     | 118.2       | 24.6   | 7.83     | - 50      |
| - 45      | 61.59               | 19.8   | 7.16     | 66.34       | 20.2   | 7.26     | 81.16       | 21.2   | 7.63     | - 45      |
| - 40      | 43.62               | 16.9   | 6.97     | 46.77       | 17.3   | 7.09     | 56.25       | 18.1   | 7.44     | - 40      |
| - 35      | 31.17               | 14.3   | 6.79     | 33.25       | 14.7   | 6.90     | 39.33       | 15.4   | 7.25     | - 35      |
| - 30      | 22.45               | 12.1   | 6.62     | 23.83       | 12.4   | 6.72     | 27.74       | 12.9   | 7.07     | - 30      |
| - 25      | 16.31               | 10.1   | 6.45     | 17.22       | 10.3   | 6.56     | 19.73       | 10.8   | 6.89     | - 25      |
| - 20      | 11.94               | 8.3    | 6.28     | 12.54       | 8.5    | 6.39     | 14.15       | 8.9    | 6.71     | - 20      |
| - 15      | 8.808               | 6.8    | 6.12     | 9.205       | 6.9    | 6.23     | 10.23       | 7.3    | 6.54     | - 15      |
| - 10      | 6.548               | 5.4    | 5.96     | 6.806       | 5.6    | 6.08     | 7.456       | 5.8    | 6.38     | - 10      |
| - 5       | 4.904               | 4.2    | 5.81     | 5.069       | 4.3    | 5.92     | 5.475       | 4.5    | 6.22     | - 5       |
| 0         | 3.699               | 3.2    | 5.66     | 3.803       | 3.3    | 5.78     | 4.051       | 3.4    | 6.06     | 0         |
| 5         | 2.810               | 2.3    | 5.52     | 2.873       | 2.4    | 5.63     | 3.019       | 2.5    | 5.91     | 5         |
| 10        | 2.149               | 1.6    | 5.38     | 2.185       | 1.6    | 5.49     | 2.267       | 1.7    | 5.76     | 10        |
| 15        | 1.654               | 1.0    | 5.24     | 1.673       | 1.0    | 5.35     | 1.714       | 1.0    | 5.61     | 15        |
| 20        | 1.282               | .4     | 5.10     | 1.289       | .4     | 5.22     | 1.305       | .5     | 5.47     | 20        |
| 25        | 1.0000              | 0.0    | 4.97     | 1.0000      | 0.0    | 5.09     | 1.0000      | 0.0    | 5.33     | 25        |
| 30        | .7848               | .4     | 4.85     | .7805       | .4     | 4.96     | .7715       | .4     | 5.20     | 30        |
| 35        | .6196               | .9     | 4.72     | .6129       | .9     | 4.83     | .5991       | .9     | 5.06     | 35        |
| 40        | .4922               | 1.4    | 4.60     | .4842       | 1.4    | 4.71     | .4681       | 1.5    | 4.94     | 40        |
| 45        | .3932               | 2.0    | 4.48     | .3847       | 2.0    | 4.59     | .3681       | 2.1    | 4.81     | 45        |
| 50        | .3158               | 2.6    | 4.37     | .3074       | 2.6    | 4.48     | .2911       | 2.8    | 4.69     | 50        |
| 55        | .2551               | 3.2    | 4.26     | .2470       | 3.3    | 4.37     | .2316       | 3.4    | 4.57     | 55        |
| 60        | .2072               | 3.9    | 4.15     | .1996       | 4.0    | 4.26     | .1853       | 4.2    | 4.45     | 60        |
| 65        | .1691               | 4.6    | 4.05     | .1621       | 4.7    | 4.15     | .1491       | 4.9    | 4.34     | 65        |
| 70        | .1387               | 5.3    | 3.94     | .1323       | 5.4    | 4.04     | .1207       | 5.7    | 4.23     | 70        |
| 75        | .1144               | 6.1    | 3.84     | .1086       | 6.2    | 3.94     | .09813      | 6.5    | 4.12     | 75        |
| 80        | .09477              | 6.8    | 3.75     | .08953      | 7.0    | 3.84     | .08023      | 7.3    | 4.02     | 80        |
| 85        | .07888              | 7.6    | 3.65     | .07417      | 7.8    | 3.75     | .06592      | 8.2    | 3.91     | 85        |
| 90        | .06595              | 8.4    | 3.56     | .06173      | 8.6    | 3.65     | .05443      | 9.0    | 3.82     | 90        |
| 95        | .05539              | 9.2    | 3.47     | .05161      | 9.5    | 3.56     | .04515      | 9.9    | 3.72     | 95        |
| 100       | .04671              | 10.1   | 3.39     | .04334      | 10.3   | 3.47     | .03763      | 10.8   | 3.63     | 100       |
| 105       | .03956              | 10.9   | 3.30     | .03655      | 11.2   | 3.39     | .03151      | 11.7   | 3.54     | 105       |
| 110       | .03364              | 11.7   | 3.22     | .03095      | 12.0   | 3.31     | .02650      | 12.6   | 3.45     | 110       |
| 115       | .02872              | 12.6   | 3.14     | .02632      | 12.9   | 3.22     | .02237      | 13.5   | 3.38     | 115       |
| 120       | .02461              | 13.4   | 3.07     | .02247      | 13.7   | 3.15     | .01897      | 14.4   | 3.28     | 120       |
| 125       | .02117              | 14.3   | 2.99     | .01925      | 14.6   | 3.07     | .01615      | 15.3   | 3.20     | 125       |
| 130       | .01828              | 15.1   | 2.92     | .01656      | 15.5   | 2.99     | .01381      | 16.2   | 3.12     | 130       |
| 135       | .01584              | 16.0   | 2.85     | .01429      | 16.4   | 2.92     | .01185      | 17.1   | 3.04     | 135       |
| 140       | .01376              | 16.8   | 2.78     | .01238      | 17.3   | 2.85     | .01020      | 18.0   | 2.97     | 140       |
| 145       | .01201              | 17.7   | 2.72     | .01076      | 18.1   | 2.78     | .00882      | 19.0   | 2.90     | 145       |
| 150       | .01050              | 18.6   | 2.65     | .00938      | 19.0   | 2.72     | .00765      | 19.9   | 2.83     | 150       |

| T<br>(°C) | Material code B (K) |        |          |             |        |          |             |        |          | T<br>(°C) |
|-----------|---------------------|--------|----------|-------------|--------|----------|-------------|--------|----------|-----------|
|           | KC 3470             |        |          | MC 3910     |        |          | N5          |        |          |           |
|           | R (T) / R25         | TF (%) | α (%/°C) | R (T) / R25 | TF (%) | α (%/°C) | R (T) / R25 | TF (%) | α (%/°C) |           |
| -55       | 60.08               | 34.0   | 7.00     | 100.6       | 38.3   | 7.88     | 115.8       | 16.3   | 7.83     | -55       |
| -50       | 43.19               | 29.4   | 6.71     | 69.29       | 33.1   | 7.55     | 79.70       | 14.1   | 7.56     | -50       |
| -45       | 31.42               | 25.3   | 6.44     | 48.41       | 28.5   | 7.24     | 55.53       | 12.1   | 7.30     | -45       |
| -40       | 23.13               | 21.6   | 6.18     | 34.27       | 24.3   | 6.96     | 39.14       | 10.4   | 7.06     | -40       |
| -35       | 17.22               | 18.4   | 5.94     | 24.57       | 20.7   | 6.68     | 27.90       | 8.8    | 6.82     | -35       |
| -30       | 12.95               | 15.5   | 5.71     | 17.83       | 17.4   | 6.42     | 20.11       | 7.4    | 6.60     | -30       |
| -25       | 9.842               | 12.9   | 5.49     | 13.09       | 14.5   | 6.18     | 14.64       | 6.2    | 6.38     | -25       |
| -20       | 7.550               | 10.7   | 5.29     | 9.714       | 12.0   | 5.95     | 10.77       | 5.1    | 6.17     | -20       |
| -15       | 5.845               | 8.7    | 5.10     | 7.283       | 9.8    | 5.73     | 7.995       | 4.2    | 5.97     | -15       |
| -10       | 4.564               | 6.9    | 4.91     | 5.515       | 7.8    | 5.53     | 5.991       | 3.3    | 5.78     | -10       |
| -5        | 3.594               | 5.4    | 4.74     | 4.215       | 6.1    | 5.33     | 4.529       | 2.6    | 5.60     | -5        |
| 0         | 2.853               | 4.1    | 4.58     | 3.251       | 4.6    | 5.15     | 3.453       | 2.0    | 5.43     | 0         |
| 5         | 2.281               | 3.0    | 4.42     | 2.528       | 3.4    | 4.97     | 2.655       | 1.4    | 5.26     | 5         |
| 10        | 1.838               | 2.0    | 4.27     | 1.983       | 2.3    | 4.80     | 2.057       | 1.0    | 5.10     | 10        |
| 15        | 1.491               | 1.2    | 4.13     | 1.567       | 1.4    | 4.65     | 1.606       | .6     | 4.95     | 15        |
| 20        | 1.217               | 0.5    | 4.00     | 1.247       | 0.6    | 4.49     | 1.263       | .3     | 4.80     | 20        |
| 25        | 1.0000              | 0.0    | 3.90     | 1.0000      | 0.0    | 4.40     | 1.0000      | 0.0    | 4.65     | 25        |
| 30        | 0.8267              | 0.5    | 3.74     | 0.8072      | 0.6    | 4.21     | .7973       | .3     | 4.52     | 30        |
| 35        | 0.6873              | 1.1    | 3.63     | 0.6558      | 1.3    | 4.08     | .6398       | .5     | 4.39     | 35        |
| 40        | 0.5747              | 1.8    | 3.52     | 0.5361      | 2.0    | 3.96     | .5167       | .9     | 4.26     | 40        |
| 45        | 0.4830              | 2.5    | 3.41     | 0.4409      | 2.8    | 3.84     | .4198       | 1.2    | 4.14     | 45        |
| 50        | 0.4081              | 3.3    | 3.31     | 0.3647      | 3.7    | 3.72     | .3430       | 1.6    | 4.02     | 50        |
| 55        | 0.3465              | 4.1    | 3.21     | 0.3033      | 4.6    | 3.61     | .2819       | 2.0    | 3.91     | 55        |
| 60        | 0.2955              | 5.0    | 3.12     | 0.2535      | 5.6    | 3.51     | .2329       | 2.4    | 3.80     | 60        |
| 65        | 0.2532              | 5.9    | 3.03     | 0.2130      | 6.6    | 3.41     | .1934       | 2.8    | 3.69     | 65        |
| 70        | 0.2179              | 6.8    | 2.94     | 0.1798      | 7.7    | 3.31     | .1615       | 3.3    | 3.59     | 70        |
| 75        | 0.1883              | 7.8    | 2.86     | 0.1525      | 8.7    | 3.22     | .1354       | 3.7    | 3.50     | 75        |
| 80        | 0.1634              | 8.7    | 2.78     | 0.1299      | 9.9    | 3.13     | .1141       | 4.2    | 3.40     | 80        |
| 85        | 0.1423              | 9.7    | 2.71     | 0.1112      | 11.0   | 3.05     | .09660      | 4.7    | 3.31     | 85        |
| 90        | 0.12441             | 10.8   | 2.63     | 0.09551     | 12.1   | 2.97     | .08212      | 5.2    | 3.23     | 90        |
| 95        | 0.10915             | 11.8   | 2.56     | 0.08238     | 13.3   | 2.89     | .07011      | 5.7    | 3.14     | 95        |
| 100       | 0.09608             | 12.9   | 2.50     | 0.07132     | 14.5   | 2.81     | .06010      | 6.2    | 3.06     | 100       |
| 105       | 0.08486             | 13.9   | 2.43     | 0.06198     | 15.7   | 2.74     | .05172      | 6.7    | 2.98     | 105       |
| 110       | 0.07519             | 15.0   | 2.37     | 0.05405     | 16.9   | 2.67     | .04467      | 7.2    | 2.91     | 110       |
| 115       | 0.06683             | 16.1   | 2.31     | 0.04730     | 18.1   | 2.60     | .03873      | 7.7    | 2.83     | 115       |
| 120       | 0.05957             | 17.2   | 2.25     | 0.04153     | 19.3   | 2.54     | .03370      | 8.2    | 2.76     | 120       |
| 125       | 0.05325             | 18.3   | 2.20     | 0.03657     | 20.6   | 2.48     | .02942      | 8.8    | 2.70     | 125       |
| 130       | 0.04774             | 19.4   | 2.14     | 0.03231     | 21.8   | 2.42     | .02576      | 9.3    | 2.63     | 130       |
| 135       | 0.04290             | 20.5   | 2.09     | 0.02863     | 23.0   | 2.36     | .02264      | 9.8    | 2.57     | 135       |
| 140       | 0.03866             | 21.6   | 2.04     | 0.02544     | 24.3   | 2.30     | .01995      | 10.3   | 2.51     | 140       |
| 145       | 0.03492             | 22.7   | 1.99     | 0.02267     | 25.5   | 2.25     | .01764      | 10.9   | 2.45     | 145       |
| 150       | 0.03162             | 23.8   | 1.95     | 0.02025     | 26.8   | 2.20     | .01564      | 11.4   | 2.39     | 150       |

# Resistance



## Temperature Characteristics

| T<br>(°C) | Material code B (K) |        |          |             |        |          |             |        |          | T<br>(°C) |
|-----------|---------------------|--------|----------|-------------|--------|----------|-------------|--------|----------|-----------|
|           | KA 3625             |        |          | MA 3960     |        |          | NA 4100     |        |          |           |
|           | R (T) / R25         | TF (%) | α (%/°C) | R (T) / R25 | TF (%) | α (%/°C) | R (T) / R25 | TF (%) | α (%/°C) |           |
| - 55      | 61.21               | 7.1    | 6.77     | 104.2       | 3.9    | 7.89     | 109.5       | 8.0    | 7.83     | - 55      |
| - 50      | 44.24               | 6.1    | 6.53     | 71.63       | 3.4    | 7.57     | 75.42       | 6.9    | 7.54     | - 50      |
| - 45      | 32.33               | 5.3    | 6.30     | 49.94       | 2.9    | 7.28     | 52.63       | 6.0    | 7.27     | - 45      |
| - 40      | 23.88               | 4.5    | 6.08     | 35.28       | 2.5    | 7.00     | 37.18       | 5.1    | 7.01     | - 40      |
| - 35      | 17.81               | 3.8    | 5.88     | 25.25       | 2.1    | 6.73     | 26.58       | 4.3    | 6.76     | - 35      |
| - 30      | 13.41               | 3.2    | 5.68     | 18.28       | 1.8    | 6.48     | 19.22       | 3.7    | 6.52     | - 30      |
| - 25      | 10.19               | 2.7    | 5.49     | 13.39       | 1.5    | 6.25     | 14.04       | 3.1    | 6.30     | - 25      |
| - 20      | 7.814               | 2.2    | 5.31     | 9.917       | 1.2    | 6.02     | 10.37       | 2.5    | 6.09     | - 20      |
| - 15      | 6.040               | 1.8    | 5.14     | 7.419       | 1.0    | 5.81     | 7.730       | 2.1    | 5.89     | - 15      |
| - 10      | 4.707               | 1.5    | 4.98     | 5.605       | .8     | 5.61     | 5.817       | 1.6    | 5.70     | - 10      |
| - 5       | 3.696               | 1.1    | 4.83     | 4.275       | .6     | 5.42     | 4.416       | 1.3    | 5.51     | - 5       |
| 0         | 2.923               | .9     | 4.68     | 3.289       | .5     | 5.24     | 3.382       | 1.0    | 5.34     | 0         |
| 5         | 2.329               | .6     | 4.53     | 2.552       | .3     | 5.06     | 2.611       | .7     | 5.17     | 5         |
| 10        | 1.867               | .4     | 4.40     | 1.997       | .2     | 4.90     | 2.032       | .5     | 5.01     | 10        |
| 15        | 1.507               | .3     | 4.27     | 1.574       | .1     | 4.74     | 1.593       | .3     | 4.86     | 15        |
| 20        | 1.224               | .1     | 4.14     | 1.250       | .1     | 4.59     | 1.258       | .1     | 4.71     | 20        |
| 25        | 1.0000              | 0.0    | 4.02     | 1.0000      | 0.0    | 4.45     | 1.0000      | 0.0    | 4.57     | 25        |
| 30        | .8217               | .1     | 3.91     | .8053       | .1     | 4.31     | .8004       | .1     | 4.44     | 30        |
| 35        | .6788               | .2     | 3.80     | .6527       | .1     | 4.18     | .6446       | .3     | 4.31     | 35        |
| 40        | .5638               | .4     | 3.69     | .5323       | .2     | 4.06     | .5224       | .4     | 4.19     | 40        |
| 45        | .4707               | .5     | 3.59     | .4367       | .3     | 3.94     | .4258       | .6     | 4.07     | 45        |
| 50        | .3948               | .7     | 3.49     | .3604       | .4     | 3.82     | .3491       | .8     | 3.96     | 50        |
| 55        | .3328               | .9     | 3.40     | .2990       | .5     | 3.71     | .2877       | 1.0    | 3.85     | 55        |
| 60        | .2818               | 1.0    | 3.31     | .2493       | .6     | 3.61     | .2383       | 1.2    | 3.74     | 60        |
| 65        | .2396               | 1.2    | 3.22     | .2090       | .7     | 3.51     | .1984       | 1.4    | 3.64     | 65        |
| 70        | .2046               | 1.4    | 3.14     | .1760       | .8     | 3.41     | .1660       | 1.6    | 3.55     | 70        |
| 75        | .1754               | 1.6    | 3.06     | .1489       | .9     | 3.32     | .1396       | 1.8    | 3.45     | 75        |
| 80        | .1510               | 1.8    | 2.98     | .1266       | 1.0    | 3.23     | .1178       | 2.1    | 3.36     | 80        |
| 85        | .1305               | 2.0    | 2.90     | .1081       | 1.1    | 3.14     | .09991      | 2.3    | 3.28     | 85        |
| 90        | .1131               | 2.3    | 2.83     | .09262      | 1.2    | 3.06     | .08507      | 2.5    | 3.20     | 90        |
| 95        | .09846              | 2.5    | 2.76     | .07970      | 1.3    | 2.98     | .07273      | 2.8    | 3.12     | 95        |
| 100       | .08597              | 2.7    | 2.69     | .06885      | 1.5    | 2.91     | .06241      | 3.0    | 3.04     | 100       |
| 105       | .07531              | 2.9    | 2.63     | .05969      | 1.6    | 2.83     | .05376      | 3.3    | 2.96     | 105       |
| 110       | .06618              | 3.1    | 2.56     | .05194      | 1.7    | 2.76     | .04648      | 3.5    | 2.89     | 110       |
| 115       | .05834              | 3.4    | 2.50     | .04535      | 1.8    | 2.69     | .04032      | 3.8    | 2.82     | 115       |
| 120       | .05158              | 3.6    | 2.44     | .03973      | 2.0    | 2.63     | .03510      | 4.1    | 2.76     | 120       |
| 125       | .04573              | 3.8    | 2.39     | .03491      | 2.1    | 2.56     | .03065      | 4.3    | 2.69     | 125       |
| 130       | .04066              | 4.0    | 2.33     | .03077      | 2.2    | 2.50     | .02685      | 4.6    | 2.63     | 130       |
| 135       | .03625              | 4.3    | 2.28     | .02721      | 2.3    | 2.44     | .02359      | 4.8    | 2.57     | 135       |
| 140       | .03240              | 4.5    | 2.23     | .02412      | 2.5    | 2.39     | .02079      | 5.1    | 2.51     | 140       |
| 145       | .02903              | 4.7    | 2.18     | .02145      | 2.6    | 2.33     | .01838      | 5.4    | 2.45     | 145       |
| 150       | .02608              | 5.0    | 2.13     | .01912      | 2.7    | 2.28     | .01629      | 5.6    | 2.40     | 150       |

| T<br>(°C) | Material code B (K) |        |          |             |        |          |             |        |          | T<br>(°C) |
|-----------|---------------------|--------|----------|-------------|--------|----------|-------------|--------|----------|-----------|
|           | PA 4235             |        |          | QA 4250     |        |          | RA 4380     |        |          |           |
|           | R (T) / R25         | TF (%) | α (%/°C) | R (T) / R25 | TF (%) | α (%/°C) | R (T) / R25 | TF (%) | α (%/°C) |           |
| - 55      | 123.3               | 8.3    | 8.00     | 101.8       | 8.3    | 7.36     | 110.7       | 8.6    | 7.53     | - 55      |
| - 50      | 84.31               | 7.2    | 7.71     | 71.33       | 7.2    | 7.13     | 77.22       | 7.4    | 7.29     | - 50      |
| - 45      | 58.37               | 6.2    | 7.43     | 50.51       | 6.2    | 6.91     | 54.43       | 6.4    | 7.07     | - 45      |
| - 40      | 40.92               | 5.3    | 7.17     | 36.14       | 5.3    | 6.70     | 38.76       | 5.5    | 6.85     | - 40      |
| - 35      | 29.03               | 4.5    | 6.92     | 26.11       | 4.5    | 6.50     | 27.86       | 4.6    | 6.65     | - 35      |
| - 30      | 20.83               | 3.8    | 6.69     | 19.05       | 3.8    | 6.31     | 20.22       | 3.9    | 6.46     | - 30      |
| - 25      | 15.10               | 3.2    | 6.46     | 14.02       | 3.2    | 6.12     | 14.81       | 3.3    | 6.27     | - 25      |
| - 20      | 11.07               | 2.6    | 6.25     | 10.41       | 2.6    | 5.85     | 10.94       | 2.7    | 6.09     | - 20      |
| - 15      | 8.189               | 2.1    | 6.05     | 7.791       | 2.1    | 5.78     | 8.143       | 2.2    | 5.92     | - 15      |
| - 10      | 6.117               | 1.7    | 5.85     | 5.879       | 1.7    | 5.62     | 6.112       | 1.8    | 5.76     | - 10      |
| - 5       | 4.610               | 1.3    | 5.67     | 4.470       | 1.3    | 5.46     | 4.622       | 1.4    | 5.60     | - 5       |
| 0         | 3.504               | 1.0    | 5.49     | 3.424       | 1.0    | 5.31     | 3.522       | 1.0    | 5.45     | 0         |
| 5         | 2.686               | .7     | 5.32     | 2.642       | .7     | 5.17     | 2.702       | .8     | 5.31     | 5         |
| 10        | 2.075               | .5     | 5.16     | 2.052       | .5     | 5.03     | 2.087       | .5     | 5.17     | 10        |
| 15        | 1.615               | .3     | 5.01     | 1.605       | .3     | 4.90     | 1.623       | .3     | 5.03     | 15        |
| 20        | 1.266               | .1     | 4.86     | 1.263       | .1     | 4.77     | 1.270       | .1     | 4.91     | 20        |
| 25        | 1.0000              | 0.0    | 4.72     | 1.0000      | 0.0    | 4.65     | 1.0000      | 0.0    | 4.78     | 25        |
| 30        | .7949               | .1     | 4.58     | .7965       | .1     | 4.53     | .7920       | .1     | 4.66     | 30        |
| 35        | .6359               | .3     | 4.45     | .6380       | .3     | 4.42     | .6308       | .3     | 4.55     | 35        |
| 40        | .5119               | .4     | 4.32     | .5139       | .4     | 4.31     | .5052       | .5     | 4.43     | 40        |
| 45        | .4145               | .6     | 4.20     | .4162       | .6     | 4.20     | .4068       | .6     | 4.33     | 45        |
| 50        | .3376               | .8     | 4.09     | .3388       | .8     | 4.10     | .3292       | .8     | 4.22     | 50        |
| 55        | .2765               | 1.0    | 3.98     | .2771       | 1.0    | 4.00     | .2678       | 1.0    | 4.12     | 55        |
| 60        | .2276               | 1.2    | 3.87     | .2278       | 1.2    | 3.90     | .2189       | 1.3    | 4.02     | 60        |
| 65        | .1883               | 1.4    | 3.77     | .1881       | 1.4    | 3.81     | .1797       | 1.5    | 3.93     | 65        |
| 70        | .1566               | 1.7    | 3.67     | .1560       | 1.7    | 3.72     | .1483       | 1.7    | 3.84     | 70        |
| 75        | .1308               | 1.9    | 3.58     | .1300       | 1.9    | 3.63     | .1228       | 2.0    | 3.75     | 75        |
| 80        | .1098               | 2.1    | 3.48     | .1088       | 2.1    | 3.55     | .1022       | 2.2    | 3.67     | 80        |
| 85        | .09258              | 2.4    | 3.40     | .0914       | 2.4    | 3.47     | .08537      | 2.5    | 3.58     | 85        |
| 90        | .07838              | 2.6    | 3.31     | .07708      | 2.6    | 3.39     | .07160      | 2.7    | 3.50     | 90        |
| 95        | .06662              | 2.9    | 3.23     | .06527      | 2.9    | 3.31     | .06029      | 3.0    | 3.42     | 95        |
| 100       | .05686              | 3.1    | 3.15     | .05547      | 3.2    | 3.24     | .05095      | 3.2    | 3.35     | 100       |
| 105       | .04871              | 3.4    | 3.07     | .04731      | 3.4    | 3.17     | .04322      | 3.5    | 3.28     | 105       |
| 110       | .04189              | 3.7    | 3.00     | .04049      | 3.7    | 3.10     | .03679      | 3.8    | 3.21     | 110       |
| 115       | .03614              | 3.9    | 2.93     | .03478      | 3.9    | 3.03     | .03143      | 4.1    | 3.14     | 115       |
| 120       | .03130              | 4.2    | 2.86     | .02996      | 4.2    | 2.96     | .02693      | 4.3    | 3.07     | 120       |
| 125       | .02719              | 4.5    | 2.79     | .02590      | 4.5    | 2.90     | .02316      | 4.6    | 3.01     | 125       |
| 130       | .02370              | 4.7    | 2.73     | .02246      | 4.7    | 2.84     | .01997      | 4.9    | 2.94     | 130       |
| 135       | .02072              | 5.0    | 2.67     | .01953      | 5.0    | 2.78     | .01728      | 5.2    | 2.88     | 135       |
| 140       | .01817              | 5.3    | 2.61     | .01704      | 5.3    | 2.72     | .01499      | 5.4    | 2.82     | 140       |
| 145       | .01598              | 5.5    | 2.55     | .01490      | 5.5    | 2.67     | .01305      | 5.7    | 2.77     | 145       |
| 150       | .01410              | 5.8    | 2.49     | .01307      | 5.8    | 2.61     | .01138      | 6.0    | 2.71     | 150       |