

# NRL

## Epoxy sealed radial lead NTC thermistor



### Product features

- Faster thermal response
- Epoxy sealed radial lead NTC thermistor with UL3656 XLPE insulation lead wire
- Non-linear change in resistance vs temperature

### Applications

- Industrial process control
- Commercial appliances
- Battery, supercapacitor and energy storage systems
- Uninterruptible power supplies
- Consumer appliances
- Medical devices
- Heating, ventilation and air conditioning, refrigeration (HVACR)
- Food service equipment
- IoT

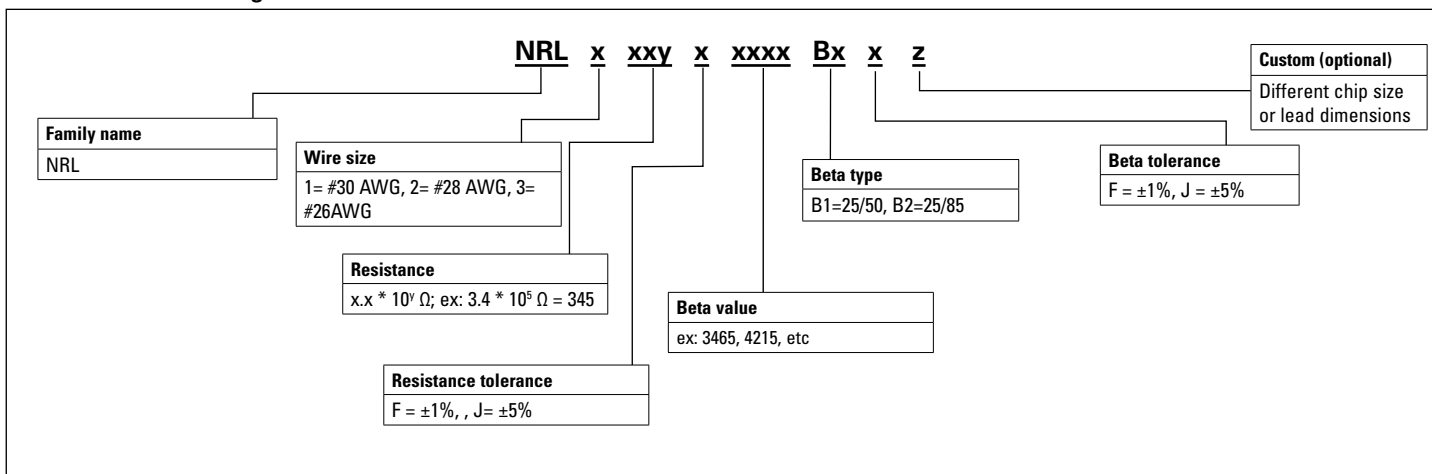
### Environmental compliance and general specifications



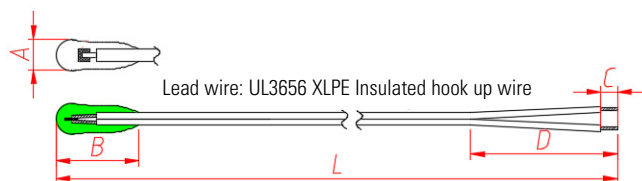
### Packaging information

- Bulk: 400 parts per poly bag

**Table 1. Part numbering**



## Mechanical parameters- mm/inches



| Dimension | Millimeters |         | Inches  |         |
|-----------|-------------|---------|---------|---------|
|           | Minimum     | Maximum | Minimum | Maximum |
| A         | 2.0         | 4.0     | 0.0787  | 0.157   |
| B         | 5.0         | 8.0     | 0.197   | 0.315   |
| C         | 2.0         | 4.0     | 0.0787  | 0.1575  |
| D         | 9.0         | 15      | 0.354   | 0.591   |
| L         | 27          | 33      | 1.063   | 1.299   |

## Electrical specifications

| Part number     | Rated temperature | Resistance (kΩ) | Beta value (K) | Beta type |
|-----------------|-------------------|-----------------|----------------|-----------|
| NRL#233?3935B1* | +25°C             | 2.252           | 3935           | B25/50    |
| NRL#303?3950B1* | +25°C             | 3               | 3950           | B25/50    |
| NRL#503?3300B2* | +25°C             | 5               | 3300           | B25/85    |
| NRL#503?3470B1* | +25°C             | 5               | 3470           | B25/50    |
| NRL#503?3950B1* | +25°C             | 5               | 3950           | B25/50    |
| NRL#104?3380B1* | +25°C             | 10              | 3380           | B25/50    |
| NRL#104?3435B2* | +25°C             | 10              | 3435           | B25/85    |
| NRL#104?3500B2* | +25°C             | 10              | 3500           | B25/85    |
| NRL#104?3950B1* | +25°C             | 10              | 3950           | B25/50    |
| NRL#104?4100B1* | +25°C             | 10              | 4100           | B25/50    |
| NRL#154?4150B1* | +25°C             | 15              | 4150           | B25/50    |
| NRL#234?4200B1* | +25°C             | 23              | 4200           | B25/50    |
| NRL#504?3950B1* | +25°C             | 50              | 3950           | B25/50    |
| NRL#105?3950B1* | +25°C             | 100             | 3950           | B25/50    |
| NRL#105?4150B1* | +25°C             | 100             | 4150           | B25/50    |
| NRL#105?4200B1* | +25°C             | 100             | 4200           | B25/50    |
| NRL#105?4450B1* | +25°C             | 100             | 4450           | B25/50    |
| NRL#353?3435B2* | +50°C             | 3.4513          | 3435           | B25/85    |
| NRL#324?4550B2* | +50°C             | 31.765          | 4550           | B25/85    |
| NRL#203?4250B2* | +86°C             | 2.028           | 4250           | B25/85    |

#= Enter wire size designation (1= #30 AWG, 2= #28 AWG, 3= #26AWG)

?= Enter resistance tolerance codes (F = ±1%, J = ±5%)

\*= Enter Beta tolerance codes (F = ±1%, J = ±5%)

Dissipation coefficient: ~1.8 mW/ °C

Thermal time constant: ≤15 s

Withstand voltage: 500 Vac/1 mA/60 s

Insulation resistance: 50 Vdc/50 MΩ/60 s

Operation temperature: -40 °C to +125 °C

# Temperature characteristics

| Part number      | NRL#23373935B1* | NRL#30373950B1* | NRL#50373300B2* | NRL#50373470B1* | NRL#50373950B1* |
|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Resistance       | 2.252K(25 °C)   | 3K(25 °C)       | 5K(25 °C)       | 5K(25 °C)       | 5K(25 °C)       |
| Beta Value       | B25/50=3935     | B25/50=3950     | B25/85=3300     | B25/50=3470     | B25/50=3950     |
| Temperature (°C) | Resistance (kΩ) | Resistance (kΩ) | Resistance (kΩ) | Resistance (kΩ) | Resistance (kΩ) |
| -40              | 68.45           | 91.18           | 93.37           | 110.53          | 154.07          |
| -39              | 64.4            | 85.79           | 88.32           | 104.22          | 144.64          |
| -38              | 60.62           | 80.75           | 83.58           | 98.32           | 135.85          |
| -37              | 57.07           | 76.03           | 79.13           | 92.78           | 127.65          |
| -36              | 53.75           | 71.61           | 74.95           | 87.6            | 119.98          |
| -35              | 50.64           | 67.47           | 71.01           | 82.74           | 112.83          |
| -34              | 47.73           | 63.58           | 67.31           | 78.19           | 106.14          |
| -33              | 45              | 59.94           | 63.83           | 73.91           | 99.88           |
| -32              | 42.43           | 56.53           | 60.55           | 69.9            | 94.03           |
| -31              | 40.03           | 53.32           | 57.46           | 66.13           | 88.56           |
| -30              | 37.77           | 50.31           | 54.55           | 62.59           | 83.44           |
| -29              | 35.6            | 47.43           | 51.8            | 59.27           | 78.68           |
| -28              | 33.58           | 44.73           | 49.21           | 56.15           | 74.22           |
| -27              | 31.67           | 42.2            | 46.76           | 53.21           | 70.03           |
| -26              | 29.89           | 39.82           | 44.45           | 50.44           | 66.11           |
| -25              | 28.22           | 37.59           | 42.27           | 47.84           | 62.42           |
| -24              | 26.64           | 35.49           | 40.22           | 45.38           | 58.96           |
| -23              | 25.17           | 33.53           | 38.27           | 43.07           | 55.71           |
| -22              | 23.78           | 31.68           | 36.43           | 40.89           | 52.65           |
| -21              | 22.48           | 29.95           | 34.7            | 38.84           | 49.78           |
| -20              | 21.25           | 28.32           | 33.05           | 36.9            | 47.08           |
| -19              | 20.1            | 26.77           | 31.49           | 35.07           | 44.56           |
| -18              | 19.01           | 25.33           | 30.01           | 33.35           | 42.18           |
| -17              | 17.99           | 23.96           | 28.61           | 31.72           | 39.94           |
| -16              | 17.03           | 22.68           | 27.29           | 30.18           | 37.83           |
| -15              | 16.12           | 21.48           | 26.03           | 28.72           | 35.85           |
| -14              | 15.27           | 20.34           | 24.85           | 27.34           | 33.97           |
| -13              | 14.46           | 19.27           | 23.72           | 26.04           | 32.2            |
| -12              | 13.71           | 18.26           | 22.65           | 24.81           | 30.54           |
| -11              | 12.99           | 17.31           | 21.64           | 23.64           | 28.96           |
| -10              | 12.32           | 16.41           | 20.68           | 22.54           | 27.47           |
| -9               | 11.69           | 15.57           | 19.76           | 21.49           | 26.05           |
| -8               | 11.09           | 14.77           | 18.9            | 20.51           | 24.72           |
| -7               | 10.52           | 14.02           | 18.08           | 19.57           | 23.45           |
| -6               | 9.99            | 13.3            | 17.3            | 18.68           | 22.26           |
| -5               | 9.48            | 12.63           | 16.55           | 17.84           | 21.13           |
| -4               | 9.01            | 12              | 15.85           | 17.04           | 20.07           |
| -3               | 8.56            | 11.4            | 15.17           | 16.28           | 19.06           |
| -2               | 8.13            | 10.83           | 14.54           | 15.55           | 18.12           |
| -1               | 7.73            | 10.3            | 13.93           | 14.87           | 17.22           |
| 0                | 7.35            | 9.79            | 13.35           | 14.22           | 16.37           |
| 1                | 6.98            | 9.3             | 12.79           | 13.59           | 15.55           |
| 2                | 6.64            | 8.85            | 12.27           | 13              | 14.78           |
| 3                | 6.31            | 8.41            | 11.76           | 12.43           | 14.06           |
| 4                | 6.01            | 8               | 11.29           | 11.9            | 13.37           |
| 5                | 5.72            | 7.62            | 10.83           | 11.39           | 12.72           |
| 6                | 5.44            | 7.25            | 10.39           | 10.9            | 12.11           |
| 7                | 5.18            | 6.9             | 9.98            | 10.44           | 11.53           |
| 8                | 4.9351          | 6.57            | 9.58            | 10              | 10.98           |
| 9                | 4.7019          | 6.26            | 9.21            | 9.58            | 10.46           |
| 10               | 4.4812          | 5.97            | 8.84            | 9.18            | 9.96            |
| 11               | 4.2719          | 5.69            | 8.5             | 8.8             | 9.5             |
| 12               | 4.0737          | 5.43            | 8.17            | 8.44            | 9.06            |
| 13               | 3.8858          | 5.18            | 7.86            | 8.09            | 8.64            |
| 14               | 3.7076          | 4.9391          | 7.56            | 7.77            | 8.24            |
| 15               | 3.5386          | 4.7139          | 7.27            | 7.45            | 7.86            |
| 16               | 3.3781          | 4.5001          | 7               | 7.15            | 7.51            |
| 17               | 3.2259          | 4.2974          | 6.73            | 6.87            | 7.17            |
| 18               | 3.0814          | 4.1049          | 6.48            | 6.59            | 6.84            |
| 19               | 2.944           | 3.9218          | 6.24            | 6.33            | 6.54            |
| 20               | 2.8137          | 3.7483          | 6.01            | 6.09            | 6.25            |

**Temperature characteristics, cont.**

|    |        |        |        |        |        |
|----|--------|--------|--------|--------|--------|
| 21 | 2.6897 | 3.5831 | 5.79   | 5.85   | 5.97   |
| 22 | 2.5719 | 3.4262 | 5.58   | 5.62   | 5.71   |
| 23 | 2.4599 | 3.277  | 5.38   | 5.41   | 5.46   |
| 24 | 2.3534 | 3.1351 | 5.19   | 5.2    | 5.23   |
| 25 | 2.252  | 3      | 5      | 5      | 5      |
| 26 | 2.1555 | 2.8714 | 4.8222 | 4.8104 | 4.7856 |
| 27 | 2.0627 | 2.7478 | 4.6503 | 4.627  | 4.5794 |
| 28 | 1.9743 | 2.6301 | 4.4857 | 4.4518 | 4.3835 |
| 29 | 1.8903 | 2.5182 | 4.3279 | 4.2844 | 4.1971 |
| 30 | 1.8105 | 2.4119 | 4.1766 | 4.1243 | 4.0198 |
| 31 | 1.7345 | 2.3106 | 4.0316 | 3.9712 | 3.8511 |
| 32 | 1.6621 | 2.2142 | 3.8925 | 3.8247 | 3.6906 |
| 33 | 1.5932 | 2.1224 | 3.7591 | 3.6845 | 3.5377 |
| 34 | 1.5276 | 2.035  | 3.6311 | 3.5504 | 3.3921 |
| 35 | 1.4651 | 1.9517 | 3.5082 | 3.4219 | 3.2534 |
| 36 | 1.4056 | 1.8725 | 3.3903 | 3.2989 | 3.1212 |
| 37 | 1.3488 | 1.7968 | 3.277  | 3.1811 | 2.9951 |
| 38 | 1.2946 | 1.7246 | 3.1682 | 3.0682 | 2.875  |
| 39 | 1.243  | 1.6559 | 3.0637 | 2.9599 | 2.7604 |
| 40 | 1.1937 | 1.5902 | 2.9633 | 2.8562 | 2.651  |
| 41 | 1.1467 | 1.5276 | 2.8668 | 2.7567 | 2.5467 |
| 42 | 1.1018 | 1.4678 | 2.774  | 2.6613 | 2.447  |
| 43 | 1.059  | 1.4107 | 2.6848 | 2.5699 | 2.3519 |
| 44 | 1.018  | 1.3561 | 2.599  | 2.482  | 2.261  |
| 45 | 0.979  | 1.3042 | 2.5164 | 2.3977 | 2.1742 |
| 46 | 0.9415 | 1.2542 | 2.437  | 2.3168 | 2.0912 |
| 47 | 0.9059 | 1.2068 | 2.3606 | 2.2391 | 2.0119 |
| 48 | 0.8717 | 1.1612 | 2.287  | 2.1644 | 1.9361 |
| 49 | 0.839  | 1.1177 | 2.2161 | 2.0927 | 1.8635 |
| 50 | 0.8078 | 1.0761 | 2.1478 | 2.0238 | 1.7942 |
| 51 | 0.7778 | 1.0361 | 2.0814 | 1.9561 | 1.7271 |
| 52 | 0.7491 | 0.9979 | 2.0174 | 1.891  | 1.6629 |
| 53 | 0.7216 | 0.9613 | 1.9557 | 1.8282 | 1.6013 |
| 54 | 0.6953 | 0.9262 | 1.8961 | 1.7679 | 1.5424 |
| 55 | 0.6701 | 0.8927 | 1.8387 | 1.7098 | 1.4859 |
| 56 | 0.646  | 0.8606 | 1.7833 | 1.6538 | 1.4318 |
| 57 | 0.6228 | 0.8297 | 1.7299 | 1.5999 | 1.3799 |
| 58 | 0.6007 | 0.8002 | 1.6783 | 1.548  | 1.3301 |
| 59 | 0.5794 | 0.7718 | 1.6286 | 1.498  | 1.2824 |
| 60 | 0.559  | 0.7447 | 1.5805 | 1.4498 | 1.2366 |
| 61 | 0.5394 | 0.7186 | 1.5341 | 1.4034 | 1.1928 |
| 62 | 0.5206 | 0.6935 | 1.4893 | 1.3586 | 1.1506 |
| 63 | 0.5026 | 0.6695 | 1.446  | 1.3154 | 1.1101 |
| 64 | 0.4854 | 0.6466 | 1.4042 | 1.2738 | 1.0713 |
| 65 | 0.4687 | 0.6244 | 1.3638 | 1.2337 | 1.0341 |
| 66 | 0.4528 | 0.6032 | 1.3248 | 1.195  | 0.9983 |
| 67 | 0.4375 | 0.5828 | 1.2871 | 1.1576 | 0.9639 |
| 68 | 0.4227 | 0.5631 | 1.2506 | 1.1216 | 0.9308 |
| 69 | 0.4086 | 0.5443 | 1.2153 | 1.0868 | 0.8991 |
| 70 | 0.395  | 0.5262 | 1.1812 | 1.0533 | 0.8685 |
| 71 | 0.3819 | 0.5087 | 1.1483 | 1.0209 | 0.8392 |
| 72 | 0.3693 | 0.492  | 1.1164 | 0.9896 | 0.811  |
| 73 | 0.3573 | 0.476  | 1.0855 | 0.9594 | 0.7838 |
| 74 | 0.3456 | 0.4604 | 1.0556 | 0.9303 | 0.7578 |
| 75 | 0.3345 | 0.4456 | 1.0267 | 0.9022 | 0.7326 |
| 76 | 0.3237 | 0.4312 | 0.9987 | 0.875  | 0.7085 |
| 77 | 0.3133 | 0.4174 | 0.9717 | 0.8487 | 0.6852 |
| 78 | 0.3033 | 0.404  | 0.9455 | 0.8233 | 0.6629 |
| 79 | 0.2937 | 0.3913 | 0.9201 | 0.7988 | 0.6413 |
| 80 | 0.2845 | 0.379  | 0.8955 | 0.7751 | 0.6206 |

Temperature characteristics, cont.

|     |        |        |        |        |        |
|-----|--------|--------|--------|--------|--------|
| 81  | 0.2756 | 0.3671 | 0.8716 | 0.7521 | 0.6006 |
| 82  | 0.2669 | 0.3556 | 0.8486 | 0.7301 | 0.5814 |
| 83  | 0.2587 | 0.3446 | 0.8262 | 0.7087 | 0.5628 |
| 84  | 0.2507 | 0.334  | 0.8045 | 0.6879 | 0.5449 |
| 85  | 0.243  | 0.3237 | 0.7835 | 0.6679 | 0.5277 |
| 86  | 0.2357 | 0.314  | 0.7632 | 0.6483 | 0.5115 |
| 87  | 0.2285 | 0.3044 | 0.7436 | 0.6294 | 0.4959 |
| 88  | 0.2216 | 0.2952 | 0.7245 | 0.6111 | 0.4809 |
| 89  | 0.215  | 0.2864 | 0.706  | 0.5934 | 0.4664 |
| 90  | 0.2087 | 0.278  | 0.6881 | 0.5764 | 0.4523 |
| 91  | 0.2025 | 0.2698 | 0.6707 | 0.5598 | 0.4388 |
| 92  | 0.1965 | 0.2618 | 0.6538 | 0.5437 | 0.4258 |
| 93  | 0.1907 | 0.254  | 0.6374 | 0.5282 | 0.4132 |
| 94  | 0.1852 | 0.2467 | 0.6216 | 0.5131 | 0.4011 |
| 95  | 0.1798 | 0.2395 | 0.6061 | 0.4986 | 0.3893 |
| 96  | 0.1746 | 0.2326 | 0.5912 | 0.4844 | 0.378  |
| 97  | 0.1696 | 0.2259 | 0.5767 | 0.4708 | 0.3671 |
| 98  | 0.1648 | 0.2195 | 0.5626 | 0.4575 | 0.3566 |
| 99  | 0.1602 | 0.2134 | 0.5489 | 0.4447 | 0.3463 |
| 100 | 0.1556 | 0.2073 | 0.5357 | 0.4323 | 0.3365 |
| 101 | 0.1513 | 0.2016 | 0.5228 | 0.4202 | 0.3268 |
| 102 | 0.147  | 0.1958 | 0.5102 | 0.4087 | 0.3175 |
| 103 | 0.1429 | 0.1904 | 0.4981 | 0.3974 | 0.3084 |
| 104 | 0.1389 | 0.185  | 0.4862 | 0.3864 | 0.2997 |
| 105 | 0.1352 | 0.1801 | 0.4747 | 0.3758 | 0.2913 |
| 106 | 0.1315 | 0.1752 | 0.4636 | 0.3655 | 0.2831 |
| 107 | 0.1279 | 0.1704 | 0.4526 | 0.3557 | 0.2752 |
| 108 | 0.1244 | 0.1657 | 0.442  | 0.3463 | 0.2676 |
| 109 | 0.121  | 0.1612 | 0.4316 | 0.3371 | 0.2602 |
| 110 | 0.1177 | 0.1568 | 0.4215 | 0.3282 | 0.2531 |
| 111 | 0.1145 | 0.1525 | 0.4118 | 0.3196 | 0.2462 |
| 112 | 0.1115 | 0.1485 | 0.4022 | 0.3112 | 0.2394 |
| 113 | 0.1085 | 0.1445 | 0.393  | 0.3031 | 0.2329 |
| 114 | 0.1056 | 0.1407 | 0.384  | 0.2952 | 0.2267 |
| 115 | 0.1028 | 0.1369 | 0.3752 | 0.2875 | 0.2206 |
| 116 | 0.1001 | 0.1333 | 0.3667 | 0.28   | 0.2147 |
| 117 | 0.0975 | 0.1299 | 0.3584 | 0.2728 | 0.209  |
| 118 | 0.0949 | 0.1264 | 0.3503 | 0.2657 | 0.2035 |
| 119 | 0.0924 | 0.1231 | 0.3424 | 0.2589 | 0.1981 |
| 120 | 0.09   | 0.1199 | 0.3347 | 0.2522 | 0.1929 |
| 121 | 0.0877 | 0.1168 | 0.3273 | 0.2459 | 0.1879 |
| 122 | 0.0856 | 0.114  | 0.32   | 0.2396 | 0.183  |
| 123 | 0.0834 | 0.1111 | 0.313  | 0.2336 | 0.1783 |
| 124 | 0.0813 | 0.1083 | 0.3061 | 0.2276 | 0.1736 |
| 125 | 0.0792 | 0.1055 | 0.2994 | 0.2219 | 0.1692 |

## Temperature characteristics

| Part number         | NRL#10473380B1*<br>NRL#10473435B2* | NRL#10473500B2*    | NRL#10473950B1*    | NRL#10474100B1*    | NRL#15474150B1*    |
|---------------------|------------------------------------|--------------------|--------------------|--------------------|--------------------|
| Resistance          | 10K(25 °C)                         | 10K(25 °C)         | 10K(25 °C)         | 10K(25 °C)         | 15K(25 °C)         |
| Beta Value          | B25/50=3380<br>B25/85=3435         | B25/85=3500        | B25/50=3950        | B25/50=4100        | B25/50=4150        |
| Temperature<br>(°C) | Resistance<br>(kΩ)                 | Resistance<br>(kΩ) | Resistance<br>(kΩ) | Resistance<br>(kΩ) | Resistance<br>(kΩ) |
| -40                 | 200.79                             | 216.45             | 307.57             | 335.5              | 612.12             |
| -39                 | 189.87                             | 204.19             | 288.79             | 315.56             | 572.57             |
| -38                 | 179.61                             | 192.7              | 271.27             | 296.9              | 535.77             |
| -37                 | 169.98                             | 181.94             | 254.91             | 279.42             | 501.54             |
| -36                 | 160.92                             | 171.86             | 239.63             | 263.04             | 469.66             |
| -35                 | 152.4                              | 162.4              | 225.36             | 247.69             | 439.98             |
| -34                 | 144.38                             | 153.53             | 212.02             | 233.3              | 412.32             |
| -33                 | 136.84                             | 145.2              | 199.55             | 219.8              | 386.55             |
| -32                 | 129.74                             | 137.38             | 187.88             | 207.14             | 362.51             |
| -31                 | 123.05                             | 130.03             | 176.96             | 195.26             | 340.09             |
| -30                 | 116.74                             | 123.12             | 166.73             | 184.11             | 319.16             |
| -29                 | 110.76                             | 116.61             | 157.18             | 173.85             | 299.47             |
| -28                 | 105.13                             | 110.49             | 148.23             | 164.19             | 281.09             |
| -27                 | 99.81                              | 104.73             | 139.84             | 155.1              | 263.94             |
| -26                 | 94.8                               | 99.31              | 131.96             | 146.54             | 247.92             |
| -25                 | 90.07                              | 94.2               | 124.58             | 138.48             | 232.95             |
| -24                 | 85.61                              | 89.39              | 117.64             | 130.89             | 218.97             |
| -23                 | 81.39                              | 84.86              | 111.13             | 123.74             | 205.89             |
| -22                 | 77.41                              | 80.58              | 105.02             | 117                | 193.66             |
| -21                 | 73.64                              | 76.55              | 99.27              | 110.64             | 182.22             |
| -20                 | 70.09                              | 72.75              | 93.87              | 104.65             | 171.51             |
| -19                 | 66.73                              | 69.17              | 88.84              | 98.93              | 161.56             |
| -18                 | 63.56                              | 65.79              | 84.11              | 93.55              | 152.23             |
| -17                 | 60.56                              | 62.6               | 79.66              | 88.47              | 143.49             |
| -16                 | 57.71                              | 59.58              | 75.46              | 83.69              | 135.28             |
| -15                 | 55.02                              | 56.73              | 71.5               | 79.18              | 127.58             |
| -14                 | 52.46                              | 54.03              | 67.77              | 74.93              | 120.35             |
| -13                 | 50.04                              | 51.47              | 64.25              | 70.92              | 113.57             |
| -12                 | 47.75                              | 49.05              | 60.92              | 67.14              | 107.19             |
| -11                 | 45.57                              | 46.76              | 57.79              | 63.58              | 101.21             |
| -10                 | 43.5                               | 44.59              | 54.83              | 60.21              | 95.58              |
| -9                  | 41.54                              | 42.52              | 52.11              | 57.05              | 90.36              |
| -8                  | 39.68                              | 40.55              | 49.54              | 54.06              | 85.44              |
| -7                  | 37.91                              | 38.69              | 47.1               | 51.23              | 80.81              |
| -6                  | 36.22                              | 36.93              | 44.78              | 48.57              | 76.45              |
| -5                  | 34.63                              | 35.26              | 42.59              | 46.05              | 72.33              |
| -4                  | 33.11                              | 33.67              | 40.51              | 43.66              | 68.45              |
| -3                  | 31.66                              | 32.17              | 38.53              | 41.41              | 64.8               |
| -2                  | 30.29                              | 30.74              | 36.66              | 39.28              | 61.35              |
| -1                  | 28.99                              | 29.38              | 34.88              | 37.27              | 58.09              |
| 0                   | 27.74                              | 28.1               | 33.2               | 35.36              | 55.02              |
| 1                   | 26.55                              | 26.87              | 31.51              | 33.47              | 51.97              |
| 2                   | 25.41                              | 25.71              | 29.93              | 31.69              | 49.12              |
| 3                   | 24.33                              | 24.61              | 28.43              | 30.01              | 46.44              |
| 4                   | 23.3                               | 23.55              | 27.02              | 28.44              | 43.93              |
| 5                   | 22.32                              | 22.56              | 25.69              | 26.96              | 41.57              |
| 6                   | 21.39                              | 21.6               | 24.43              | 25.57              | 39.36              |
| 7                   | 20.51                              | 20.7               | 23.24              | 24.25              | 37.27              |
| 8                   | 19.66                              | 19.84              | 22.12              | 23.02              | 35.32              |
| 9                   | 18.86                              | 19.01              | 21.05              | 21.85              | 33.48              |
| 10                  | 18.09                              | 18.23              | 20.05              | 20.76              | 31.75              |
| 11                  | 17.36                              | 17.49              | 19.1               | 19.72              | 30.12              |
| 12                  | 16.66                              | 16.78              | 18.2               | 18.74              | 28.58              |
| 13                  | 16                                 | 16.1               | 17.35              | 17.82              | 27.14              |
| 14                  | 15.36                              | 15.45              | 16.54              | 16.95              | 25.78              |
| 15                  | 14.76                              | 14.83              | 15.78              | 16.13              | 24.49              |
| 16                  | 14.18                              | 14.25              | 15.05              | 15.35              | 23.28              |
| 17                  | 13.62                              | 13.68              | 14.37              | 14.62              | 22.14              |
| 18                  | 13.1                               | 13.15              | 13.72              | 13.93              | 21.06              |
| 19                  | 12.59                              | 12.63              | 13.1               | 13.27              | 20.04              |

Temperature characteristics, cont.

|    |        |        |        |        |        |
|----|--------|--------|--------|--------|--------|
| 20 | 12.11  | 12.14  | 12.51  | 12.65  | 19.08  |
| 21 | 11.65  | 11.68  | 11.96  | 12.06  | 18.17  |
| 22 | 11.21  | 11.23  | 11.43  | 11.5   | 17.31  |
| 23 | 10.79  | 10.8   | 10.93  | 10.97  | 16.5   |
| 24 | 10.39  | 10.39  | 10.45  | 10.47  | 15.73  |
| 25 | 10     | 10     | 10     | 10     | 15     |
| 26 | 9.63   | 9.63   | 9.57   | 9.55   | 14.31  |
| 27 | 9.27   | 9.26   | 9.16   | 9.13   | 13.66  |
| 28 | 8.93   | 8.92   | 8.77   | 8.72   | 13.05  |
| 29 | 8.61   | 8.59   | 8.4    | 8.34   | 12.47  |
| 30 | 8.29   | 8.27   | 8.04   | 7.97   | 11.91  |
| 31 | 7.99   | 7.97   | 7.71   | 7.63   | 11.39  |
| 32 | 7.71   | 7.68   | 7.39   | 7.3    | 10.89  |
| 33 | 7.43   | 7.4    | 7.08   | 6.99   | 10.41  |
| 34 | 7.17   | 7.13   | 6.79   | 6.69   | 9.96   |
| 35 | 6.92   | 6.88   | 6.51   | 6.41   | 9.53   |
| 36 | 6.68   | 6.63   | 6.25   | 6.14   | 9.13   |
| 37 | 6.45   | 6.4    | 6      | 5.88   | 8.74   |
| 38 | 6.22   | 6.18   | 5.76   | 5.64   | 8.37   |
| 39 | 6.01   | 5.96   | 5.53   | 5.4    | 8.02   |
| 40 | 5.81   | 5.75   | 5.31   | 5.18   | 7.68   |
| 41 | 5.61   | 5.56   | 5.1    | 4.9717 | 7.37   |
| 42 | 5.42   | 5.37   | 4.9028 | 4.7704 | 7.06   |
| 43 | 5.24   | 5.18   | 4.7127 | 4.5786 | 6.77   |
| 44 | 5.07   | 5.01   | 4.5311 | 4.3956 | 6.5    |
| 45 | 4.898  | 4.8411 | 4.3576 | 4.2209 | 6.24   |
| 46 | 4.7374 | 4.6798 | 4.1917 | 4.0542 | 5.99   |
| 47 | 4.583  | 4.5248 | 4.0331 | 3.8953 | 5.75   |
| 48 | 4.4345 | 4.3759 | 3.8815 | 3.7433 | 5.52   |
| 49 | 4.2917 | 4.2327 | 3.7365 | 3.5981 | 5.3    |
| 50 | 4.1544 | 4.0951 | 3.5978 | 3.4595 | 5.09   |
| 51 | 4.0207 | 3.961  | 3.4636 | 3.3254 | 4.8934 |
| 52 | 3.8919 | 3.8319 | 3.3353 | 3.1973 | 4.7025 |
| 53 | 3.7679 | 3.7076 | 3.2122 | 3.0746 | 4.5202 |
| 54 | 3.6484 | 3.588  | 3.0944 | 2.9573 | 4.346  |
| 55 | 3.5333 | 3.4728 | 2.9814 | 2.845  | 4.1792 |
| 56 | 3.4223 | 3.3618 | 2.8732 | 2.7375 | 4.0199 |
| 57 | 3.3154 | 3.2549 | 2.7695 | 2.6346 | 3.8674 |
| 58 | 3.2124 | 3.152  | 2.6699 | 2.5361 | 3.7215 |
| 59 | 3.1131 | 3.0527 | 2.5745 | 2.4417 | 3.5819 |
| 60 | 3.0173 | 2.957  | 2.4829 | 2.3513 | 3.4482 |
| 61 | 2.925  | 2.8649 | 2.3951 | 2.2647 | 3.3203 |
| 62 | 2.8359 | 2.776  | 2.3108 | 2.1816 | 3.1976 |
| 63 | 2.7499 | 2.6902 | 2.2298 | 2.1021 | 3.0802 |
| 64 | 2.6669 | 2.6076 | 2.1521 | 2.0258 | 2.9678 |
| 65 | 2.5869 | 2.5278 | 2.0775 | 1.9526 | 2.86   |
| 66 | 2.5096 | 2.4509 | 2.0059 | 1.8824 | 2.7566 |
| 67 | 2.4349 | 2.3766 | 1.937  | 1.8151 | 2.6575 |
| 68 | 2.3628 | 2.3049 | 1.8709 | 1.7504 | 2.5625 |
| 69 | 2.2933 | 2.2357 | 1.8073 | 1.6884 | 2.4713 |
| 70 | 2.2261 | 2.169  | 1.7463 | 1.6289 | 2.3839 |
| 71 | 2.1611 | 2.1044 | 1.6875 | 1.5717 | 2.3    |
| 72 | 2.0984 | 2.0422 | 1.631  | 1.5168 | 2.2194 |
| 73 | 2.0378 | 1.982  | 1.5767 | 1.4641 | 2.1421 |
| 74 | 1.9792 | 1.9239 | 1.5243 | 1.4134 | 2.0679 |
| 75 | 1.9225 | 1.8677 | 1.474  | 1.3648 | 1.9966 |
| 76 | 1.8677 | 1.8134 | 1.4256 | 1.3181 | 1.9281 |
| 77 | 1.8148 | 1.761  | 1.3792 | 1.273  | 1.8623 |
| 78 | 1.7636 | 1.7102 | 1.3343 | 1.2299 | 1.7991 |
| 79 | 1.714  | 1.6612 | 1.2911 | 1.1882 | 1.7382 |
| 80 | 1.6661 | 1.6138 | 1.2495 | 1.1483 | 1.6798 |

**Temperature characteristics, cont.**

|     |        |        |        |        |        |
|-----|--------|--------|--------|--------|--------|
| 81  | 1.6197 | 1.568  | 1.2095 | 1.1098 | 1.6237 |
| 82  | 1.5748 | 1.5236 | 1.1709 | 1.0728 | 1.5696 |
| 83  | 1.5314 | 1.4807 | 1.1337 | 1.0373 | 1.5177 |
| 84  | 1.4892 | 1.4392 | 1.0979 | 1.003  | 1.4677 |
| 85  | 1.4485 | 1.399  | 1.0634 | 0.97   | 1.4196 |
| 86  | 1.4094 | 1.361  | 1.0301 | 0.9388 | 1.3728 |
| 87  | 1.3716 | 1.3243 | 0.9982 | 0.9088 | 1.3278 |
| 88  | 1.335  | 1.2887 | 0.9673 | 0.8798 | 1.2844 |
| 89  | 1.2995 | 1.2542 | 0.9375 | 0.852  | 1.2426 |
| 90  | 1.2651 | 1.2208 | 0.9088 | 0.8251 | 1.2023 |
| 91  | 1.2318 | 1.1886 | 0.8811 | 0.7993 | 1.1636 |
| 92  | 1.1995 | 1.1572 | 0.8544 | 0.7744 | 1.1263 |
| 93  | 1.1683 | 1.1269 | 0.8286 | 0.7503 | 1.0903 |
| 94  | 1.1379 | 1.0975 | 0.8037 | 0.7272 | 1.0557 |
| 95  | 1.1085 | 1.0691 | 0.7796 | 0.7049 | 1.0223 |
| 96  | 1.08   | 1.0415 | 0.7564 | 0.6832 | 0.9901 |
| 97  | 1.0523 | 1.0147 | 0.734  | 0.6625 | 0.959  |
| 98  | 1.0255 | 0.9887 | 0.7123 | 0.6425 | 0.9291 |
| 99  | 0.9995 | 0.9636 | 0.6914 | 0.6231 | 0.9002 |
| 100 | 0.9743 | 0.9392 | 0.6712 | 0.6044 | 0.8724 |
| 101 | 0.9498 | 0.9156 | 0.6517 | 0.5864 | 0.8455 |
| 102 | 0.926  | 0.8926 | 0.6328 | 0.569  | 0.8195 |
| 103 | 0.9029 | 0.8704 | 0.6145 | 0.5521 | 0.7945 |
| 104 | 0.8805 | 0.8487 | 0.5968 | 0.5359 | 0.7703 |
| 105 | 0.8588 | 0.8278 | 0.5798 | 0.5202 | 0.7469 |
| 106 | 0.8377 | 0.8074 | 0.5633 | 0.5051 | 0.7244 |
| 107 | 0.8173 | 0.7871 | 0.5474 | 0.4903 | 0.7033 |
| 108 | 0.7974 | 0.7675 | 0.5321 | 0.476  | 0.6829 |
| 109 | 0.7782 | 0.7483 | 0.5172 | 0.4621 | 0.6632 |
| 110 | 0.7594 | 0.7297 | 0.5029 | 0.4488 | 0.6441 |
| 111 | 0.7412 | 0.7116 | 0.489  | 0.4359 | 0.6257 |
| 112 | 0.7236 | 0.6941 | 0.4754 | 0.4234 | 0.6079 |
| 113 | 0.7064 | 0.6771 | 0.4625 | 0.4113 | 0.5907 |
| 114 | 0.6897 | 0.6605 | 0.4498 | 0.3997 | 0.5741 |
| 115 | 0.6735 | 0.6444 | 0.4376 | 0.3884 | 0.558  |
| 116 | 0.6577 | 0.6289 | 0.4257 | 0.3774 | 0.5425 |
| 117 | 0.6424 | 0.6137 | 0.4143 | 0.3669 | 0.5274 |
| 118 | 0.6274 | 0.5989 | 0.4033 | 0.3566 | 0.5129 |
| 119 | 0.6129 | 0.5846 | 0.3924 | 0.3468 | 0.4988 |
| 120 | 0.5988 | 0.5706 | 0.382  | 0.3371 | 0.4851 |
| 121 | 0.5851 | 0.557  | 0.3719 | 0.3278 | 0.4719 |
| 122 | 0.5717 | 0.5438 | 0.3621 | 0.3189 | 0.4592 |
| 123 | 0.5587 | 0.531  | 0.3526 | 0.3102 | 0.4468 |
| 124 | 0.5461 | 0.5185 | 0.3434 | 0.3017 | 0.4348 |
| 125 | 0.5338 | 0.5064 | 0.3345 | 0.2935 | 0.4232 |

Temperature characteristics

| Part number         | NRL#23474200B1*    | NRL#50473950B1*    | NRL#10573950B1*    | NRL#10574150B1*    | NRL#10574200B1*    |
|---------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Resistance          | 23K(25 °C)         | 50K(25 °C)         | 100K(25 °C)        | 100K(25 °C)        | 100K(25 °C)        |
| Beta Value          | B25/50=4200        | B25/50=3950        | B25/50=3950        | B25/50=4150        | B25/50=4200        |
| Temperature<br>(°C) | Resistance<br>(kΩ) | Resistance<br>(kΩ) | Resistance<br>(kΩ) | Resistance<br>(kΩ) | Resistance<br>(kΩ) |
| -40                 | 937.76             | 1619.43            | 3324.3             | 3780.99            | 3776.61            |
| -39                 | 875.81             | 1519.85            | 3119.09            | 3542.47            | 3533.28            |
| -38                 | 818.32             | 1426.96            | 2927.68            | 3320.21            | 3307.03            |
| -37                 | 764.95             | 1340.27            | 2749.07            | 3113.03            | 3096.56            |
| -36                 | 715.36             | 1259.33            | 2582.34            | 2919.82            | 2900.7             |
| -35                 | 669.28             | 1183.73            | 2426.63            | 2739.57            | 2718.33            |
| -34                 | 626.43             | 1113.09            | 2281.15            | 2571.35            | 2548.46            |
| -33                 | 586.57             | 1047.04            | 2145.17            | 2414.29            | 2390.16            |
| -32                 | 549.48             | 985.28             | 2018.03            | 2267.59            | 2242.58            |
| -31                 | 514.94             | 927.49             | 1899.1             | 2130.53            | 2104.93            |
| -30                 | 482.77             | 873.41             | 1787.8             | 2002.41            | 1976.49            |
| -29                 | 453                | 822.51             | 1683.67            | 1875.43            | 1854.6             |
| -28                 | 425.22             | 774.87             | 1586.15            | 1757.36            | 1740.96            |
| -27                 | 399.29             | 730.24             | 1494.78            | 1647.54            | 1634.97            |
| -26                 | 375.09             | 688.43             | 1409.15            | 1545.33            | 1536.07            |
| -25                 | 352.47             | 649.23             | 1328.85            | 1450.16            | 1443.74            |
| -24                 | 331.34             | 612.48             | 1253.54            | 1361.49            | 1357.5             |
| -23                 | 311.58             | 578.01             | 1182.88            | 1278.84            | 1276.93            |
| -22                 | 293.11             | 545.66             | 1116.55            | 1201.76            | 1201.61            |
| -21                 | 275.82             | 515.29             | 1054.28            | 1129.85            | 1131.17            |
| -20                 | 259.64             | 486.77             | 995.79             | 1062.71            | 1065.28            |
| -19                 | 243.96             | 460.36             | 941.19             | 1004.03            | 1003.72            |
| -18                 | 229.32             | 435.5              | 889.83             | 948.8              | 946.08             |
| -17                 | 215.66             | 412.09             | 841.51             | 896.82             | 892.07             |
| -16                 | 202.9              | 390.05             | 796.04             | 847.87             | 841.44             |
| -15                 | 190.98             | 369.29             | 753.23             | 801.77             | 793.98             |
| -14                 | 179.83             | 349.72             | 712.91             | 758.33             | 749.45             |
| -13                 | 169.41             | 331.28             | 674.93             | 717.41             | 707.67             |
| -12                 | 159.66             | 313.89             | 639.14             | 678.84             | 668.44             |
| -11                 | 150.53             | 297.49             | 605.41             | 642.47             | 631.61             |
| -10                 | 141.98             | 282.02             | 573.6              | 608.19             | 597                |
| -9                  | 134.05             | 267.67             | 544.15             | 576.38             | 564.19             |
| -8                  | 126.6              | 254.1              | 516.31             | 546.31             | 533.37             |
| -7                  | 119.61             | 241.26             | 489.98             | 517.89             | 504.42             |
| -6                  | 113.05             | 229.11             | 465.07             | 491.01             | 477.21             |
| -5                  | 106.89             | 217.61             | 441.52             | 465.59             | 451.62             |
| -4                  | 101.09             | 206.73             | 419.23             | 441.55             | 427.56             |
| -3                  | 95.65              | 196.42             | 398.13             | 418.8              | 404.91             |
| -2                  | 90.52              | 186.66             | 378.16             | 397.28             | 383.6              |
| -1                  | 85.7               | 177.41             | 359.26             | 376.91             | 363.52             |
| 0                   | 81.17              | 168.66             | 341.36             | 357.63             | 344.62             |
| 1                   | 76.88              | 159.95             | 323.53             | 338.37             | 326.89             |
| 2                   | 72.85              | 151.75             | 306.76             | 320.28             | 310.17             |
| 3                   | 69.05              | 144.03             | 290.98             | 303.27             | 294.39             |
| 4                   | 65.47              | 136.75             | 276.12             | 287.27             | 279.5              |
| 5                   | 62.09              | 129.9              | 262.12             | 272.23             | 265.43             |
| 6                   | 58.91              | 123.43             | 248.93             | 258.07             | 252.15             |
| 7                   | 55.92              | 117.33             | 236.5              | 244.73             | 239.6              |
| 8                   | 53.09              | 111.57             | 224.77             | 232.18             | 227.73             |
| 9                   | 50.42              | 106.13             | 213.7              | 220.34             | 216.52             |
| 10                  | 47.9               | 100.99             | 203.26             | 209.19             | 205.91             |
| 11                  | 45.52              | 96.14              | 193.39             | 198.67             | 195.88             |
| 12                  | 43.27              | 91.55              | 184.08             | 188.75             | 186.38             |
| 13                  | 41.14              | 87.22              | 175.27             | 179.39             | 177.4              |
| 14                  | 39.13              | 83.11              | 166.95             | 170.55             | 168.89             |
| 15                  | 37.23              | 79.23              | 159.08             | 162.2              | 160.83             |
| 16                  | 35.44              | 75.55              | 151.63             | 154.31             | 153.19             |
| 17                  | 33.74              | 72.07              | 144.58             | 146.86             | 145.96             |
| 18                  | 32.13              | 68.77              | 137.91             | 139.81             | 139.1              |
| 19                  | 30.6               | 65.65              | 131.59             | 133.15             | 132.6              |
| 20                  | 29.16              | 62.69              | 125.6              | 126.84             | 126.43             |

**Temperature characteristics, cont.**

|    |        |       |        |        |        |
|----|--------|-------|--------|--------|--------|
| 21 | 27.79  | 59.88 | 119.93 | 120.88 | 120.58 |
| 22 | 26.5   | 57.21 | 114.54 | 115.23 | 115.03 |
| 23 | 25.27  | 54.68 | 109.44 | 109.87 | 109.76 |
| 24 | 24.11  | 52.28 | 104.6  | 104.8  | 104.75 |
| 25 | 23     | 50    | 100    | 100    | 100    |
| 26 | 21.95  | 47.83 | 95.64  | 95.44  | 95.48  |
| 27 | 20.94  | 45.78 | 91.51  | 91.12  | 91.11  |
| 28 | 19.99  | 43.83 | 87.59  | 87.02  | 86.96  |
| 29 | 19.09  | 41.97 | 83.86  | 83.12  | 83.03  |
| 30 | 18.23  | 40.2  | 80.31  | 79.43  | 79.3   |
| 31 | 17.41  | 38.52 | 76.93  | 75.92  | 75.76  |
| 32 | 16.64  | 36.92 | 73.72  | 72.59  | 72.4   |
| 33 | 15.91  | 35.4  | 70.66  | 69.42  | 69.22  |
| 34 | 15.21  | 33.94 | 67.74  | 66.41  | 66.19  |
| 35 | 14.55  | 32.56 | 64.97  | 63.56  | 63.31  |
| 36 | 13.92  | 31.24 | 62.32  | 60.84  | 60.57  |
| 37 | 13.32  | 29.98 | 59.8   | 58.25  | 57.97  |
| 38 | 12.75  | 28.78 | 57.39  | 55.79  | 55.5   |
| 39 | 12.21  | 27.64 | 55.1   | 53.45  | 53.15  |
| 40 | 11.69  | 26.55 | 52.91  | 51.22  | 50.91  |
| 41 | 11.2   | 25.5  | 50.82  | 49.1   | 48.78  |
| 42 | 10.74  | 24.51 | 48.83  | 47.07  | 46.75  |
| 43 | 10.29  | 23.56 | 46.93  | 45.15  | 44.82  |
| 44 | 9.87   | 22.65 | 45.11  | 43.31  | 42.98  |
| 45 | 9.47   | 21.78 | 43.37  | 41.56  | 41.22  |
| 46 | 9.08   | 20.95 | 41.71  | 39.89  | 39.55  |
| 47 | 8.72   | 20.16 | 40.13  | 38.29  | 37.96  |
| 48 | 8.37   | 19.4  | 38.61  | 36.77  | 36.44  |
| 49 | 8.03   | 18.68 | 37.16  | 35.32  | 34.98  |
| 50 | 7.71   | 17.98 | 35.77  | 33.94  | 33.6   |
| 51 | 7.41   | 17.31 | 34.43  | 32.58  | 32.25  |
| 52 | 7.12   | 16.67 | 33.14  | 31.29  | 30.96  |
| 53 | 6.84   | 16.05 | 31.91  | 30.05  | 29.72  |
| 54 | 6.57   | 15.46 | 30.73  | 28.87  | 28.54  |
| 55 | 6.31   | 14.89 | 29.6   | 27.74  | 27.41  |
| 56 | 6.07   | 14.35 | 28.52  | 26.65  | 26.33  |
| 57 | 5.84   | 13.83 | 27.48  | 25.62  | 25.3   |
| 58 | 5.61   | 13.33 | 26.49  | 24.62  | 24.31  |
| 59 | 5.4    | 12.85 | 25.53  | 23.67  | 23.36  |
| 60 | 5.2    | 12.39 | 24.62  | 22.77  | 22.46  |
| 61 | 5      | 11.95 | 23.74  | 21.89  | 21.59  |
| 62 | 4.815  | 11.53 | 22.9   | 21.06  | 20.76  |
| 63 | 4.636  | 11.12 | 22.09  | 20.26  | 19.96  |
| 64 | 4.4645 | 10.73 | 21.31  | 19.5   | 19.2   |
| 65 | 4.3003 | 10.36 | 20.57  | 18.76  | 18.47  |
| 66 | 4.1429 | 10    | 19.85  | 18.06  | 17.77  |
| 67 | 3.9921 | 9.65  | 19.17  | 17.38  | 17.1   |
| 68 | 3.8475 | 9.32  | 18.5   | 16.74  | 16.46  |
| 69 | 3.7089 | 9     | 17.87  | 16.12  | 15.85  |
| 70 | 3.5759 | 8.69  | 17.26  | 15.52  | 15.26  |
| 71 | 3.4484 | 8.4   | 16.68  | 14.95  | 14.69  |
| 72 | 3.3261 | 8.11  | 16.11  | 14.4   | 14.15  |
| 73 | 3.2087 | 7.84  | 15.57  | 13.88  | 13.63  |
| 74 | 3.096  | 7.58  | 15.05  | 13.37  | 13.13  |
| 75 | 2.9879 | 7.33  | 14.55  | 12.89  | 12.65  |
| 76 | 2.884  | 7.08  | 14.07  | 12.43  | 12.19  |
| 77 | 2.7843 | 6.85  | 13.6   | 11.98  | 11.75  |
| 78 | 2.6885 | 6.63  | 13.15  | 11.55  | 11.32  |
| 79 | 2.5964 | 6.41  | 12.73  | 11.14  | 10.92  |
| 80 | 2.508  | 6.2   | 12.31  | 10.74  | 10.52  |
| 81 | 2.423  | 6     | 11.91  | 10.36  | 10.15  |
| 82 | 2.3413 | 5.81  | 11.53  | 10     | 9.79   |

Temperature characteristics, cont.

|     |        |        |        |        |        |
|-----|--------|--------|--------|--------|--------|
| 83  | 2.2627 | 5.62   | 11.16  | 9.65   | 9.44   |
| 84  | 2.1871 | 5.44   | 10.8   | 9.31   | 9.11   |
| 85  | 2.1144 | 5.27   | 10.46  | 8.98   | 8.79   |
| 86  | 2.0443 | 5.1    | 10.12  | 8.68   | 8.48   |
| 87  | 1.9767 | 4.9326 | 9.79   | 8.38   | 8.19   |
| 88  | 1.9118 | 4.7741 | 9.48   | 8.09   | 7.91   |
| 89  | 1.8492 | 4.6212 | 9.17   | 7.82   | 7.64   |
| 90  | 1.789  | 4.4738 | 8.88   | 7.55   | 7.38   |
| 91  | 1.731  | 4.3316 | 8.6    | 7.3    | 7.13   |
| 92  | 1.6752 | 4.1945 | 8.33   | 7.05   | 6.89   |
| 93  | 1.6214 | 4.0622 | 8.06   | 6.82   | 6.66   |
| 94  | 1.5696 | 3.9345 | 7.81   | 6.59   | 6.44   |
| 95  | 1.5196 | 3.8113 | 7.57   | 6.37   | 6.23   |
| 96  | 1.4718 | 3.6923 | 7.33   | 6.16   | 6.02   |
| 97  | 1.4258 | 3.5775 | 7.1    | 5.95   | 5.82   |
| 98  | 1.3814 | 3.4666 | 6.88   | 5.76   | 5.63   |
| 99  | 1.3386 | 3.3596 | 6.67   | 5.57   | 5.45   |
| 100 | 1.2973 | 3.2562 | 6.46   | 5.39   | 5.27   |
| 101 | 1.2574 | 3.1563 | 6.27   | 5.21   | 5.1    |
| 102 | 1.219  | 3.0599 | 6.07   | 5.04   | 4.9323 |
| 103 | 1.1819 | 2.9667 | 5.89   | 4.8816 | 4.7734 |
| 104 | 1.1462 | 2.8767 | 5.71   | 4.7246 | 4.6202 |
| 105 | 1.1116 | 2.7897 | 5.54   | 4.5733 | 4.4724 |
| 106 | 1.0783 | 2.7056 | 5.37   | 4.4273 | 4.33   |
| 107 | 1.0464 | 2.6265 | 5.21   | 4.2894 | 4.1928 |
| 108 | 1.0155 | 2.55   | 5.06   | 4.1563 | 4.0604 |
| 109 | 0.9857 | 2.4761 | 4.9068 | 4.0278 | 3.9327 |
| 110 | 0.957  | 2.4045 | 4.7622 | 3.9038 | 3.8094 |
| 111 | 0.9292 | 2.3353 | 4.6224 | 3.7841 | 3.6906 |
| 112 | 0.9023 | 2.2684 | 4.4872 | 3.6686 | 3.5757 |
| 113 | 0.8764 | 2.2037 | 4.3564 | 3.5571 | 3.4649 |
| 114 | 0.8513 | 2.141  | 4.2298 | 3.4493 | 3.358  |
| 115 | 0.827  | 2.0804 | 4.1074 | 3.3452 | 3.2547 |
| 116 | 0.8036 | 2.0217 | 3.989  | 3.2447 | 3.155  |
| 117 | 0.7809 | 1.9649 | 3.8742 | 3.1475 | 3.0587 |
| 118 | 0.7589 | 1.9099 | 3.7633 | 3.0536 | 2.9656 |
| 119 | 0.7377 | 1.8566 | 3.6559 | 2.963  | 2.8758 |
| 120 | 0.7172 | 1.805  | 3.5519 | 2.8753 | 2.789  |
| 121 | 0.6973 | 1.7551 | 3.4513 | 2.7906 | 2.705  |
| 122 | 0.6781 | 1.7066 | 3.3538 | 2.7086 | 2.624  |
| 123 | 0.6595 | 1.6598 | 3.2593 | 2.6295 | 2.5456 |
| 124 | 0.6415 | 1.6144 | 3.1679 | 2.5528 | 2.4699 |
| 125 | 0.624  | 1.5704 | 3.0793 | 2.4787 | 2.3966 |

**Temperature characteristics**

| Part number         | NRL#10574450B1*    | NRL#35373435B2*    | NRL#32474550B2*    | NRL#20374250B2*    |
|---------------------|--------------------|--------------------|--------------------|--------------------|
| Resistance          | 100K(25 °C)        | 3.4513K(50 °C)     | 31.765K(50 °C)     | 2.028K(86 °C)      |
| Beta Value          | B25/50=4450        | B25/85=3435        | B25/85=4550        | B25/85=4250        |
| Temperature<br>(°C) | Resistance<br>(kΩ) | Resistance<br>(kΩ) | Resistance<br>(kΩ) | Resistance<br>(kΩ) |
| -40                 | 4673.96            | 166.81             | 4754.69            | 930.3              |
| -39                 | 4360.69            | 157.74             | 4436.01            | 868.85             |
| -38                 | 4070.07            | 149.22             | 4140.37            | 811.82             |
| -37                 | 3800.33            | 141.21             | 3865.97            | 758.86             |
| -36                 | 3549.88            | 133.69             | 3611.19            | 709.67             |
| -35                 | 3317.22            | 126.61             | 3374.52            | 663.96             |
| -34                 | 3101.01            | 119.95             | 3154.57            | 621.45             |
| -33                 | 2899.99            | 113.68             | 2950.08            | 581.91             |
| -32                 | 2713.02            | 107.78             | 2759.88            | 545.11             |
| -31                 | 2539.05            | 102.22             | 2582.9             | 510.85             |
| -30                 | 2377.1             | 96.98              | 2418.16            | 478.93             |
| -29                 | 2225.88            | 92.02              | 2264.33            | 449.4              |
| -28                 | 2085.04            | 87.34              | 2121.06            | 421.84             |
| -27                 | 1953.82            | 82.92              | 1987.57            | 396.12             |
| -26                 | 1831.52            | 78.76              | 1863.15            | 372.1              |
| -25                 | 1717.47            | 74.83              | 1747.13            | 349.67             |
| -24                 | 1611.09            | 71.12              | 1638.91            | 328.7              |
| -23                 | 1511.81            | 67.62              | 1537.92            | 309.1              |
| -22                 | 1419.14            | 64.31              | 1443.65            | 290.78             |
| -21                 | 1332.59            | 61.18              | 1355.61            | 273.63             |
| -20                 | 1251.74            | 58.23              | 1273.36            | 257.58             |
| -19                 | 1175.7             | 55.44              | 1196               | 242.02             |
| -18                 | 1104.66            | 52.8               | 1123.74            | 227.5              |
| -17                 | 1038.27            | 50.31              | 1056.2             | 213.94             |
| -16                 | 976.19             | 47.95              | 993.05             | 201.28             |
| -15                 | 918.14             | 45.71              | 934                | 189.46             |
| -14                 | 863.82             | 43.58              | 878.74             | 178.4              |
| -13                 | 812.98             | 41.57              | 827.02             | 168.06             |
| -12                 | 765.38             | 39.67              | 778.6              | 158.39             |
| -11                 | 720.8              | 37.86              | 733.25             | 149.33             |
| -10                 | 679.03             | 36.14              | 690.76             | 140.85             |
| -9                  | 639.9              | 34.51              | 650.95             | 132.98             |
| -8                  | 603.21             | 32.96              | 613.63             | 125.6              |
| -7                  | 568.8              | 31.49              | 578.63             | 118.66             |
| -6                  | 536.51             | 30.09              | 545.78             | 112.15             |
| -5                  | 506.21             | 28.77              | 514.95             | 106.04             |
| -4                  | 477.75             | 27.5               | 486                | 100.29             |
| -3                  | 451.03             | 26.31              | 458.82             | 94.88              |
| -2                  | 425.92             | 25.16              | 433.27             | 89.8               |
| -1                  | 402.32             | 24.08              | 409.27             | 85.02              |
| 0                   | 380.14             | 23.05              | 386.7              | 80.52              |
| 1                   | 358.97             | 22.05              | 365.17             | 76.27              |
| 2                   | 339.1              | 21.11              | 344.95             | 72.27              |
| 3                   | 320.44             | 20.21              | 325.97             | 68.5               |
| 4                   | 302.91             | 19.36              | 308.14             | 64.95              |
| 5                   | 286.44             | 18.55              | 291.38             | 61.6               |
| 6                   | 270.95             | 17.77              | 275.63             | 58.45              |
| 7                   | 256.39             | 17.04              | 260.82             | 55.47              |
| 8                   | 242.69             | 16.33              | 246.88             | 52.66              |
| 9                   | 229.79             | 15.67              | 233.76             | 50.02              |
| 10                  | 217.65             | 15.03              | 221.41             | 47.52              |
| 11                  | 206.22             | 14.42              | 209.78             | 45.15              |
| 12                  | 195.45             | 13.84              | 198.83             | 42.92              |
| 13                  | 185.3              | 13.29              | 188.5              | 40.82              |
| 14                  | 175.73             | 12.76              | 178.77             | 38.82              |
| 15                  | 166.71             | 12.26              | 169.59             | 36.94              |
| 16                  | 158.19             | 11.78              | 160.93             | 35.16              |
| 17                  | 150.16             | 11.32              | 152.75             | 33.47              |
| 18                  | 142.58             | 10.88              | 145.04             | 31.87              |
| 19                  | 135.42             | 10.46              | 137.76             | 30.36              |
| 20                  | 128.65             | 10.06              | 130.87             | 28.93              |

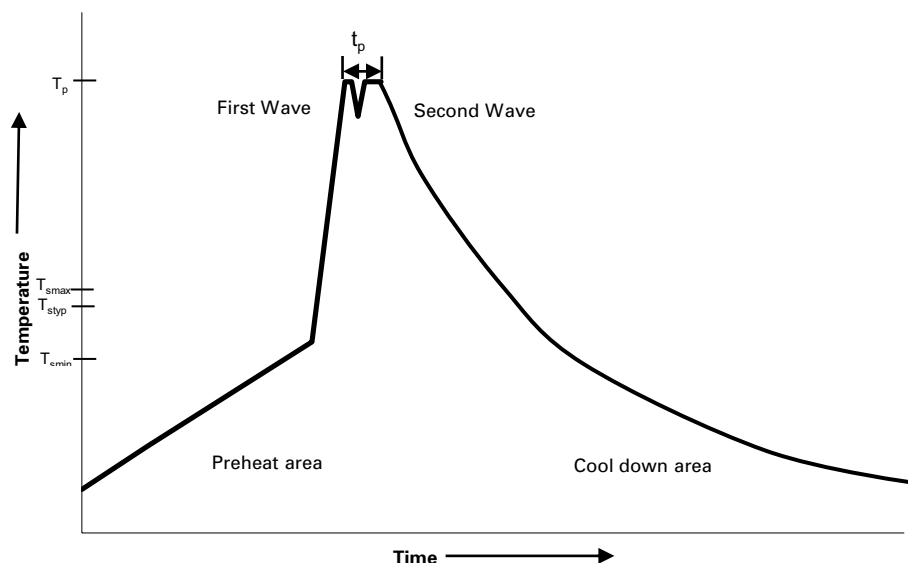
Temperature characteristics, cont.

|    |        |        |        |       |
|----|--------|--------|--------|-------|
| 21 | 122.26 | 9.68   | 124.37 | 27.57 |
| 22 | 116.22 | 9.31   | 118.23 | 26.29 |
| 23 | 110.51 | 8.96   | 112.42 | 25.07 |
| 24 | 105.11 | 8.63   | 106.92 | 23.91 |
| 25 | 100    | 8.31   | 101.73 | 22.82 |
| 26 | 95.14  | 8      | 96.785 | 21.78 |
| 27 | 90.55  | 7.7    | 92.11  | 20.78 |
| 28 | 86.2   | 7.42   | 87.686 | 19.83 |
| 29 | 82.08  | 7.15   | 83.499 | 18.93 |
| 30 | 78.19  | 6.89   | 79.534 | 18.08 |
| 31 | 74.49  | 6.64   | 75.778 | 17.28 |
| 32 | 71     | 6.4    | 72.22  | 16.51 |
| 33 | 67.68  | 6.18   | 68.848 | 15.78 |
| 34 | 64.54  | 5.96   | 65.651 | 15.09 |
| 35 | 61.56  | 5.75   | 62.619 | 14.43 |
| 36 | 58.73  | 5.55   | 59.743 | 13.81 |
| 37 | 56.05  | 5.35   | 57.014 | 13.21 |
| 38 | 53.5   | 5.17   | 54.424 | 12.65 |
| 39 | 51.08  | 4.9927 | 51.965 | 12.11 |
| 40 | 48.79  | 4.8227 | 49.63  | 11.6  |
| 41 | 46.61  | 4.6595 | 47.412 | 11.12 |
| 42 | 44.54  | 4.5029 | 45.304 | 10.65 |
| 43 | 42.57  | 4.3524 | 43.301 | 10.21 |
| 44 | 40.69  | 4.2079 | 41.396 | 9.792 |
| 45 | 38.91  | 4.069  | 39.585 | 9.391 |
| 46 | 37.22  | 3.9356 | 37.862 | 9.01  |
| 47 | 35.61  | 3.8073 | 36.223 | 8.646 |
| 48 | 34.08  | 3.684  | 34.664 | 8.299 |
| 49 | 32.62  | 3.5654 | 33.179 | 7.968 |
| 50 | 31.23  | 3.4513 | 31.765 | 7.652 |
| 51 | 29.9   | 3.3402 | 30.419 | 7.349 |
| 52 | 28.64  | 3.2332 | 29.136 | 7.059 |
| 53 | 27.44  | 3.1302 | 27.914 | 6.782 |
| 54 | 26.29  | 3.0309 | 26.749 | 6.517 |
| 55 | 25.2   | 2.9353 | 25.638 | 6.264 |
| 56 | 24.16  | 2.8431 | 24.579 | 6.022 |
| 57 | 23.17  | 2.7543 | 23.568 | 5.791 |
| 58 | 22.22  | 2.6688 | 22.605 | 5.57  |
| 59 | 21.32  | 2.5862 | 21.685 | 5.358 |
| 60 | 20.45  | 2.5067 | 20.807 | 5.156 |
| 61 | 19.63  | 2.4299 | 19.968 | 4.962 |
| 62 | 18.84  | 2.3559 | 19.168 | 4.777 |
| 63 | 18.09  | 2.2845 | 18.403 | 4.599 |
| 64 | 17.37  | 2.2155 | 17.673 | 4.429 |
| 65 | 16.69  | 2.149  | 16.975 | 4.266 |
| 66 | 16.03  | 2.0848 | 16.308 | 4.11  |
| 67 | 15.4   | 2.0228 | 15.67  | 3.96  |
| 68 | 14.8   | 1.963  | 15.06  | 3.817 |
| 69 | 14.23  | 1.9052 | 14.477 | 3.679 |
| 70 | 13.68  | 1.8493 | 13.919 | 3.548 |
| 71 | 13.16  | 1.7954 | 13.385 | 3.421 |
| 72 | 12.66  | 1.7433 | 12.874 | 3.3   |
| 73 | 12.17  | 1.6929 | 12.385 | 3.183 |
| 74 | 11.71  | 1.6442 | 11.917 | 3.071 |
| 75 | 11.27  | 1.5971 | 11.468 | 2.964 |
| 76 | 10.85  | 1.5516 | 11.039 | 2.861 |
| 77 | 10.45  | 1.5076 | 10.627 | 2.762 |
| 78 | 10.06  | 1.4651 | 10.233 | 2.667 |
| 79 | 9.69   | 1.4239 | 9.855  | 2.576 |
| 80 | 9.33   | 1.3841 | 9.493  | 2.488 |
| 81 | 8.99   | 1.3455 | 9.145  | 2.404 |

**Temperature characteristics, cont.**

|     |        |        |        |        |
|-----|--------|--------|--------|--------|
| 82  | 8.66   | 1.3083 | 8.812  | 2.323  |
| 83  | 8.35   | 1.2722 | 8.493  | 2.245  |
| 84  | 8.05   | 1.2372 | 8.186  | 2.17   |
| 85  | 7.76   | 1.2034 | 7.892  | 2.098  |
| 86  | 7.48   | 1.1709 | 7.612  | 2.028  |
| 87  | 7.22   | 1.1395 | 7.343  | 1.961  |
| 88  | 6.96   | 1.1091 | 7.084  | 1.897  |
| 89  | 6.72   | 1.0796 | 6.836  | 1.835  |
| 90  | 6.49   | 1.051  | 6.597  | 1.775  |
| 91  | 6.26   | 1.0234 | 6.368  | 1.717  |
| 92  | 6.04   | 0.9965 | 6.148  | 1.662  |
| 93  | 5.84   | 0.9705 | 5.936  | 1.609  |
| 94  | 5.64   | 0.9453 | 5.733  | 1.557  |
| 95  | 5.44   | 0.9209 | 5.538  | 1.508  |
| 96  | 5.26   | 0.8972 | 5.35   | 1.46   |
| 97  | 5.08   | 0.8743 | 5.169  | 1.414  |
| 98  | 4.9103 | 0.852  | 4.9952 | 1.37   |
| 99  | 4.746  | 0.8304 | 4.828  | 1.328  |
| 100 | 4.5879 | 0.8094 | 4.6671 | 1.287  |
| 101 | 4.4325 | 0.789  | 4.5091 | 1.247  |
| 102 | 4.283  | 0.7693 | 4.3571 | 1.209  |
| 103 | 4.1392 | 0.7501 | 4.2107 | 1.173  |
| 104 | 4.0007 | 0.7315 | 4.0699 | 1.137  |
| 105 | 3.8673 | 0.7135 | 3.9341 | 1.103  |
| 106 | 3.7389 | 0.6959 | 3.8036 | 1.07   |
| 107 | 3.6153 | 0.6789 | 3.6778 | 1.038  |
| 108 | 3.4963 | 0.6625 | 3.5567 | 1.0074 |
| 109 | 3.3815 | 0.6464 | 3.44   | 0.9779 |
| 110 | 3.271  | 0.6309 | 3.3275 | 0.9494 |
| 111 | 3.1645 | 0.6158 | 3.2192 | 0.9218 |
| 112 | 3.0619 | 0.6011 | 3.1148 | 0.8952 |
| 113 | 2.963  | 0.5868 | 3.0141 | 0.8694 |
| 114 | 2.8676 | 0.573  | 2.9171 | 0.8445 |
| 115 | 2.7756 | 0.5595 | 2.8236 | 0.8204 |
| 116 | 2.687  | 0.5464 | 2.7334 | 0.7972 |
| 117 | 2.6015 | 0.5336 | 2.6464 | 0.7747 |
| 118 | 2.519  | 0.5212 | 2.5625 | 0.7529 |
| 119 | 2.4394 | 0.5092 | 2.4816 | 0.7319 |
| 120 | 2.3627 | 0.4975 | 2.4035 | 0.7115 |
| 121 | 2.2886 | 0.4861 | 2.3281 | 0.6918 |
| 122 | 2.2171 | 0.475  | 2.2554 | 0.6727 |
| 123 | 2.148  | 0.4642 | 2.1852 | 0.6542 |
| 124 | 2.0814 | 0.4537 | 2.1174 | 0.6364 |
| 125 | 2.0172 | 0.4435 | 2.052  | 0.6191 |

## Wave solder profile



## Reference EN 61760-1:2006

| Profile feature                               | Standard SnPb solder                      | Lead (Pb) free solder                     |
|-----------------------------------------------|-------------------------------------------|-------------------------------------------|
| Preheat                                       |                                           |                                           |
| • Temperature min. ( $T_{smin}$ )             | 100 °C                                    | 100 °C                                    |
| • Temperature typ. ( $T_{styp}$ )             | 120 °C                                    | 120 °C                                    |
| • Temperature max. ( $T_{smax}$ )             | 130 °C                                    | 130 °C                                    |
| • Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ ) | 70 seconds                                | 70 seconds                                |
| $\Delta$ preheat to max Temperature           | 150 °C max.                               | 150 °C max.                               |
| Peak temperature ( $T_p$ )*                   | 235 °C – 260 °C                           | 250 °C – 260 °C                           |
| Time at peak temperature ( $t_p$ )            | 10 seconds max<br>5 seconds max each wave | 10 seconds max<br>5 seconds max each wave |
| Ramp-down rate                                | ~ 2 K/s min<br>~3.5 K/s typ<br>~5 K/s max | ~ 2 K/s min<br>~3.5 K/s typ<br>~5 K/s max |
| Time 25 °C to 25 °C                           | 4 minutes                                 | 4 minutes                                 |

## Manual solder

+280 °C  $\pm$ 20 °C (less than 2 seconds by soldering iron at  $\geq$ 9 mm distance from the thermistor head), generally manual/hand soldering is not recommended

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