

NTC SMD Thermistors



With Nickel Barrier Termination NB 21 - NB 23

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 IEC SIZE : 0603 | NB 23 IEC SIZE : 0402 |
|--|--------------------------|--------------------------|
| DIMENSIONS: millimeters (inches) | | |
| Terminations | Nickel Barrier | |
| Marking | On packaging only | |
| Climatic category | 40/125/56 | |
| Operating temperature | -55°C to +150°C | |
| Tolerance on Rn (25°C) | ±5%, ±10%, ±20% | |
| Maximum dissipation at 25°C | 0.07 W | 0.06 W |
| Thermal dissipation factor | 1 mW/°C | 0.8 mW/°C |
| Thermal time constant | 4 s | 3 s |

Resistance - Temperature characteristics: pages 36 to 40.

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 21

Type

K 0

Material Code
K
(See tables page 15)

0103

Resistance
10,000 Ω

M

Tolerance
M (±20%)
J (±5%)
K (±10%)

BB

Suffix: Packaging
--: Bulk
BB: Cardboard tape
(180mm diam. reel)
BF: Cardboard tape (1/2 reel)
BD: Cardboard tape
(330mm diam. reel)

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With Nickel Barrier Termination NB 21 - NB 23

TABLE OF VALUES

| NB 21 IEC SIZE : 0603 | | | | |
|--|--------------------|------------------|---|----------------------------|
| Types | Rn at 25°C (Ω) | Material Code | B (K) ($\frac{\Delta B}{B}$ (1) \pm 5% (2) \pm 3%) | α at 25°C (%/°C) |
| NB 21 KC 0 470 NB 21 KC 0 101 NB 21 KC 0 471 | 47 100 470 | KC | 3470 \pm 5% | - 3.9 |
| NB 21 MC 0 102 | 1,000 | MC | 3910 \pm 3% | - 4.4 |
| NB 21 J 0 0472 | 4,700 | J | 3480 \pm 3% | - 3.9 |
| NB 21 J 5 0682 NB 21 J 5 0103 | 6,800 10,000 | J5 | 3480 \pm 3% 3480 \pm 3% | - 3.9 - 3.9 |
| NB 21 K 0 0103 NB 21 K 0 0153 | 10,000 15,000 | K | 3630 \pm 3% | - 4.0 |
| NB 21 L 0 0223 | 22,000 | L | 3790 \pm 3% | - 4.2 |
| NB 21 M 0 0333 NB 21 M 0 0473 | 33,000 47,000 | M | 3950 \pm 3% | - 4.4 |
| NB 21 L 2 0683 | 68,000 | L2 | 3805 \pm 3% | - 4.1 |
| NB 21 N 0 0683 | 68,000 | N | 4080 \pm 3% | - 4.6 |
| NB 21 N 5 0104 | 100,000 | N5 | 4160 \pm 3% | - 4.7 |
| NB 21 P 0 0154 | 150,000 | P | 4220 \pm 3% | - 4.7 |
| NB 21 Q 0 0334 NB 21 Q 0 0474 | 330,000 470,000 | Q | 4300 \pm 3% | - 4.7 |

| NB 23 IEC SIZE : 0402 | | | | |
|--|-----------------------------|------------------|---|----------------------------|
| Types | Rn at 25°C (Ω) | Material Code | B (K) ($\frac{\Delta B}{B}$ (1) \pm 5% (2) \pm 3%) | α at 25°C (%/°C) |
| NB 23 NC 0 103 | 10,000 | NC | 4080 \pm 3% | - 4.6 |
| NB 23 RC 0 103 | 10,000 | RC | 4340 \pm 3% | - 4.7 |
| NB 23 NC 0 153 NB 23 NC 0 223 | 15,000 22,000 | NC | 4080 \pm 3% | - 4.6 |
| NB 23 RC 0 223 NB 23 RC 0 333 | 22,000 33,000 | RC | 4340 \pm 3% | - 4.7 |
| NB 23 NE 0 473 | 47,000 | NE | 4100 \pm 3% | - 4.6 |
| NB 23 RC 0 473 NB 23 RC 0 683 NB 23 RC 0 104 | 47,000 68,000 100,000 | RC | 4340 \pm 3% | - 4.7 |

AUTOMATIC INSERTION

Super 8 Plastic Tape Packaging:

The mechanical and dimensional reel characteristics are in accordance with the IEC publication 286-3.



| Designation | Symbol | Value | Tolerance | |
|--------------------------------|--------------|-----------|-----------|---|
| Tape width | W | 8 | ±0.2 | |
| Tape thickness | T | 0.4 max. | | |
| Pitch of the sprocket holes | P0 | 4 | ±0.1 | |
| Diameter of the sprocket holes | D0 | 1.5 -0 | ±0.1 | |
| Distance | E | 1.75 | ±0.1 | |
| Distance (center to center) | F | 3.5 | ±0.05 | |
| Distance (center to center) | P2 | 2 | ±0.1 | |
| Sizes of the cavities | NC 12 (0805) | A0 | 1.5 | ±0.1 |
| | | B0 | 2.4 | ±0.1 |
| | | K | 1.4 max. | K ±0.1 (size is adjustable) (K = t1 +0.2) |
| NC 20 (1206) | | A0 | 1.95 | ±0.1 |
| | | B0 | 3.55 | ±0.1 |
| | | K | 1.5 max. | K ±0.1 (size is adjustable) (K = t1 +0.2) |



QUANTITY PER REEL

| Type | Suffix | Qty Per Reel |
|---------------|--------|--------------|
| NC - NB 12 | BA | 4000 |
| | BE | 2000 |
| NC 20 - NB 20 | BA | 3000 |
| | BE | 1500 |

Packaging for Automatic Insertion



NTC Chip Thermistors / NC/NB Series

AUTOMATIC INSERTION

8mm Paper Tape Packaging:

The mechanical and dimensional reel characteristics are in accordance with the IEC publication 286-3.



| Designation | Symbol | Value | Tolerance |
|--------------------------------|----------------|-------------------|------------|
| Tape width | W | 8 | -.0.1/+0.3 |
| Tape thickness | T | 1.1 max. | |
| Pitch of the sprocket holes | P ₀ | 4 | ±0.1 |
| Diameter of the sprocket holes | D ₀ | 1.5 -0/+0.1 | ±0.1 |
| Distance | E ₁ | 1.75 | ±0.1 |
| Distance (center to center) | F | 3.5 | ±0.05 |
| Distance (center to center) | P ₂ | 2 | ±0.05 |
| Cover tape thickness | T ₁ | 0.10 max. | |
| Distance | E ₂ | 6.25 min. | |
| Distance | G | 0.75 min. | |
| Component pitch | P ₁ | 0805/0603 0402 | ±0.1 |
| | | | ±0.1 |



QUANTITY PER REEL

| Type | Suffix | Qty Per Reel |
|------------|--------|--------------|
| NB - NC 12 | BB | 4000 |
| NB 21 | BF | 2000 |
| NB 23 | BB | 10000 |
| | BF | 5000 |



Surface Mounting Guide



Chip Thermistor – Application Notes

STORAGE

Good solderability is maintained for at least twelve months, provided the components are stored in their “as received” packaging at less than 40°C and 70% RH.

SOLDERABILITY / LEACHING

Terminations to be well soldered after immersion in a 60/40 tin/lead solder bath at $235 \pm 5^\circ\text{C}$ for 2 ± 1 seconds.

Terminations will resist leaching for at least the immersion times and conditions recommendations shown below.

| P/N | Termination Type | Solder Tin/Lead | Solder Temp °C | Immersion Time Seconds |
|-----|------------------|-----------------|----------------|------------------------|
| NC | AgPdPt | 60/40 | 260 ± 5 | 15 max |
| NB | Nickel Barrier | 60/40 | 260 ± 5 | 30 ± 1 |

NB products are compatible with a wide range of soldering conditions consistent with good manufacturing practice for surface mount components. This includes Pb free reflow processes with peak temperatures up to 270°C . Recommended profiles for reflow and wave soldering are shown below for reference.

NC products are recommended for lead soldering application or gluing techniques.

Wave



(Preheat chips before soldering)
T/maximum 150°C

- The visual standards used for evaluation of solder joints will need to be modified as lead free joints are not as bright as with tin-lead pastes and the fillet may not be as large.
- Resin color may darken slightly due to the increase in temperature required for the new pastes.
- Lead-free solder pastes do not allow the same self alignment as lead containing systems. Standard mounting pads are acceptable, but machine set up may need to be modified.

Reflow



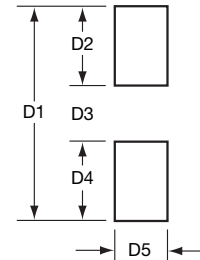
(Minimize soldering time)



- Pre-heating: $150^\circ\text{C} \pm 15^\circ\text{C}$ / 60-90s
- Max. Peak Gradient: 2.5°C/s
- Peak Temperature: $245^\circ\text{C} \pm 5^\circ\text{C}$
- Time at $>230^\circ\text{C}$: 40s Max.

RECOMMENDED SOLDERING PAD LAYOUT

Dimensions in mm (inches)



REFLOW SOLDERING

| Case Size | P/N | D1 | D2 | D3 | D4 | D5 |
|-----------|------|----------------|----------------|----------------|----------------|----------------|
| 0402 | NB23 | 1.70 (.067) | 0.60 (.024) | 0.50 (.020) | 0.60 (.024) | 0.50 (.020) |
| 0603 | NB21 | 2.30 (.091) | 0.80 (.031) | 0.70 (.028) | 0.80 (.031) | 0.75 (.030) |
| 0805 | NB12 | 3.00 (.118) | 1.00 (.039) | 1.00 (.039) | 1.00 (.039) | 1.25 (.049) |
| 1206 | NB20 | 4.00 (.157) | 1.00 (.039) | 2.00 (.079) | 1.00 (.039) | 2.50 (.098) |

WAVE SOLDERING

| Case Size | P/N | D1 | D2 | D3 | D4 | D5 |
|-----------|------|----------------|----------------|----------------|----------------|----------------|
| 0603 | NB21 | 3.10 (.122) | 1.20 (.047) | 0.70 (.028) | 1.20 (.047) | 0.75 (.030) |
| 0805 | NB12 | 4.00 (.157) | 1.50 (.059) | 1.00 (.039) | 1.50 (.059) | 1.25 (.049) |
| 1206 | NB20 | 5.00 (.197) | 1.50 (.059) | 2.00 (.079) | 1.50 (.059) | 1.60 (.063) |