

NTC SMD Thermistors



With Nickel Barrier Termination NB 12 - NB 20

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 12 IEC SIZE : 0805 | NB 20 IEC SIZE : 1206 |
|--|--------------------------|--------------------------|
| DIMENSIONS: millimeters (inches) | | |
| Terminations | Nickel Barrier | |
| Marking | On packaging only | |
| Climatic category | 40/125/56 | |
| Operating temperature | -55°C to +150°C | |
| Tolerance on R _n (25°C) | ±5%, ±10%, ±20% | |
| Maximum dissipation at 25°C | 0.12 W | 0.24 W |
| Thermal dissipation factor | 2 mW/°C | 4 mW/°C |
| Thermal time constant | 5 s | 7s |

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 20

Type

K 0

Material Code

K
(See tables page 13)

0103

Resistance
10,000 Ω

M

Tolerance
M (±20%)
J (±5%)
K (±10%)

BA

Suffix: Packaging

— : Bulk
BA: Plastic tape
(180mm diam. reel)
BE: Plastic tape (1/2 reel)
BC: Plastic tape
(330mm diam. reel)
BB: Cardboard tape
(180mm diam. reel)
BF: Cardboard tape (1/2 reel)
BD: Cardboard tape
(330mm diam. reel)

NTC SMD Thermistors



With Nickel Barrier Termination NB 12 – NB 20

TABLE OF VALUES

| NB 12 IEC SIZE : 0805 | | | | |
|--|--|------------------|---|---------------------|
| Types | Rn at 25°C (Ω) | Material Code | B (K) ($\Delta B/B$ ⁽¹⁾ ± 5% ⁽²⁾ ± 3%) | α at 25°C (%/°C) |
| NB 12 KC 0 180 NB 12 KC 0 220 NB 12 KC 0 270 NB 12 KC 0 330 NB 12 KC 0 390 NB 12 KC 0 470 NB 12 KC 0 560 NB 12 KC 0 680 NB 12 KC 0 820 NB 12 KC 0 101 | 18 22 27 33 39 47 56 68 82 100 | KC | 3470 ± 5% | – 3.9 |
| NB 12 MC 0 121 NB 12 MC 0 151 NB 12 MC 0 181 NB 12 MC 0 221 NB 12 MC 0 271 NB 12 MC 0 331 NB 12 MC 0 391 NB 12 MC 0 471 NB 12 MC 0 561 NB 12 MC 0 681 NB 12 MC 0 821 NB 12 MC 0 102 NB 12 MC 0 122 NB 12 MC 0 152 NB 12 MC 0 182 NB 12 MC 0 222 NB 12 MC 0 272 NB 12 MC 0 332 | 120 150 180 220 270 330 390 470 560 680 820 1,000 1,200 1,500 1,800 2,200 2,700 3,300 | MC | 3910 ± 3% | – 4.4 |
| NB 12 J 0 0332 NB 12 J 0 0392 NB 12 J 0 0472 NB 12 J 0 0562 | 3,300 3,900 4,700 5,600 | J | 3480 ± 3% | – 3.9 |
| NB 12 K 0 0682 NB 12 K 0 0822 NB 12 K 0 0103 | 6,800 8,200 10,000 | K | 3630 ± 3% | – 4.0 |
| NB 12 L 0 0123 NB 12 L 0 0153 | 12,000 15,000 | L | 3790 ± 3% | – 4.2 |
| NB 12 M 0 0183 NB 12 M 0 0223 NB 12 M 0 0273 NB 12 M 0 0333 | 18,000 22,000 27,000 33,000 | M | 3950 ± 3% | – 4.4 |
| NB 12 N 0 0393 NB 12 N 0 0473 NB 12 N 0 0563 | 39,000 47,000 56,000 | N | 4080 ± 3% | – 4.6 |
| NB 12 L 2 0683 | 68,000 | L2 | 3805 ± 3% | – 4.1 |
| NB 12 N 5 0683 NB 12 N 5 0823 | 68,000 82,000 | N5 | 4160 ± 3% | – 4.7 |
| NB 12 P 0 0104 | 100,000 | P | 4220 ± 3% | – 4.7 |
| NB 12 SC 0104 | 100,000 | SC | 4500 ± 3% | – 4.8 |
| NB 12 P 0 0124 NB 12 P 0 0154 NB 12 P 0 0184 | 120,000 150,000 180,000 | P | 4220 ± 3% | – 4.7 |
| NB 12 Q 0 0224 NB 12 Q 0 0274 | 220,000 270,000 | Q | 4300 ± 3% | – 4.7 |
| NB 12 R 0 0105 | 1,000,000 | R | 4400 ± 3% | – 4.8 |

| NB 20 IEC SIZE : 1206 | | | | |
|--|---|------------------|---|---------------------|
| Types | Rn at 25°C (Ω) | Material Code | B (K) ($\Delta B/B$ ⁽¹⁾ ± 5% ⁽²⁾ ± 3%) | α at 25°C (%/°C) |
| NB 20 MC 0 221 NB 20 MC 0 102 | 220 1,000 | MC | 3910 ± 3% 3910 ± 3% | – 4.4 – 4.4 |
| NB 20 J 0 0472 NB 20 J 0 0562 NB 20 J 0 0682 | 4,700 5,600 6,800 | J | 3480 ± 3% | – 3.9 |
| NB 20 J 5 0822 | 8,200 | J5 | 3480 ± 3% | – 3.9 |
| NB 20 K 0 0103 NB 20 K 0 0123 | 10,000 12,000 | K | 3630 ± 3% | – 4.0 |
| NB 20 L 0 0153 NB 20 L 0 0183 NB 20 L 0 0223 | 15,000 18,000 22,000 | L | 3790 ± 3% | – 4.2 |
| NB 20 M 0 0273 NB 20 M 0 0333 NB 20 M 0 0393 NB 20 M 0 0473 | 27,000 33,000 39,000 47,000 | M | 3950 ± 3% | – 4.4 |
| NB 20 N 0 0563 NB 20 N 0 0683 NB 20 N 0 0823 | 56,000 68,000 82,000 | N | 4080 ± 3% | – 4.6 |
| NB 20 N 5 0104 | 100,000 | N5 | 4160 ± 3% | – 4.7 |
| NB 20 P 0 0124 NB 20 P 0 0154 NB 20 P 0 0184 NB 20 P 0 0224 | 120,000 150,000 180,000 220,000 | P | 4220 ± 3% | – 4.7 |
| NB 20 Q 0 0274 NB 20 Q 0 0334 NB 20 Q 0 0394 NB 20 Q 0 0474 NB 20 Q 0 0564 | 270,000 330,000 390,000 470,000 560,000 | Q | 4300 ± 3% | – 4.7 |
| NB 20 R 0 0684 NB 20 R 0 0824 NB 20 R 0 0105 | 680,000 820,000 1,000,000 | R | 4400 ± 3% | – 4.8 |

Packaging for Automatic Insertion

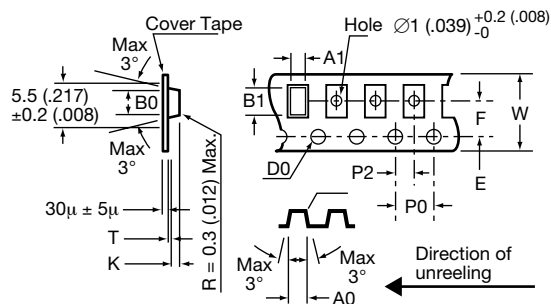


NTC Chip Thermistors / NC/NB Series

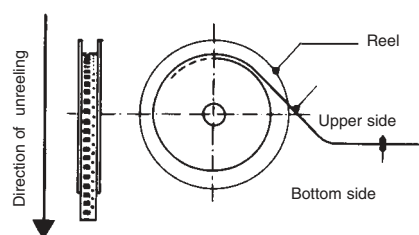
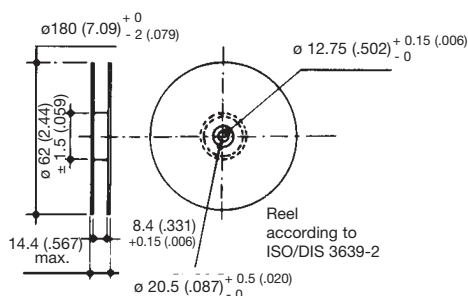
AUTOMATIC INSERTION

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) NC 20 (1206) | A0 | 1.5 | ±0.1 |
| | B0 | 2.4 | ±0.1 |
| | K | 1.4 max. | K ±0.1 (size is adjustable) (K = t1 +0.2) |
| | 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

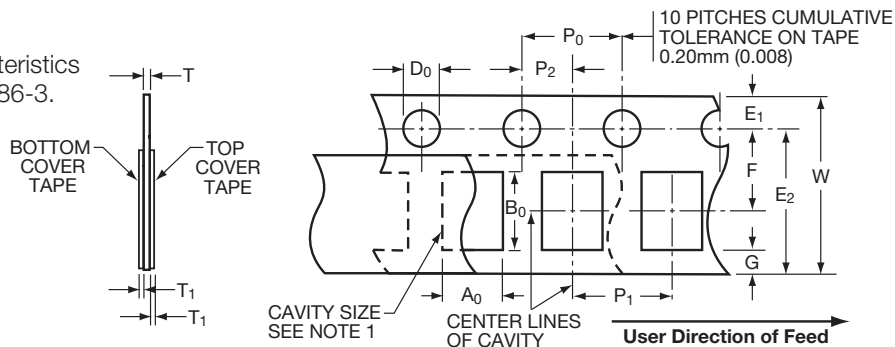


NTC Chip Thermistors / NC/NB Series

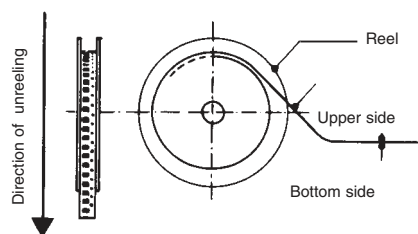
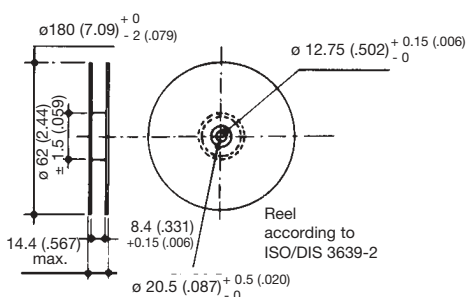
AUTOMATIC INSERTION

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 | 4 | ±0.1 |
| | | 2 | ±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.

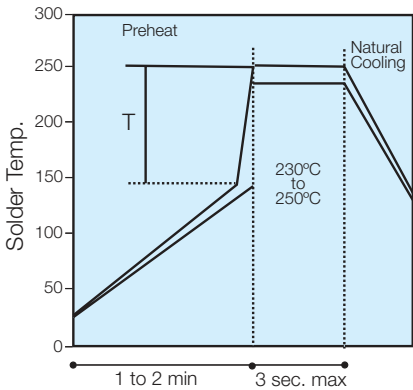
Terminations will resist leaching for at least the immersion times and conditions recommendations shown below.

| 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.

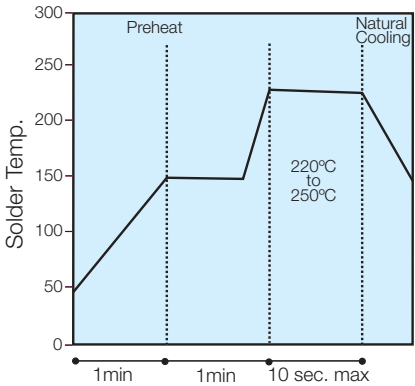
Wave



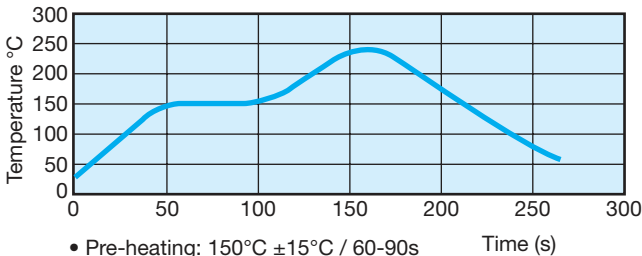
(Preheat chips before soldering)
T/maximum 150°C

- 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



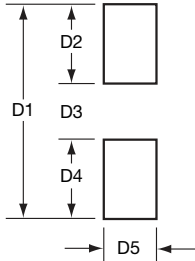
(Minimize soldering time)



- 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) |