

NTC SMD Thermistors

NC 12 – NC 20



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

palladium - platinum metallization provides a high degree of resistance to dewetting of the terminations during soldering (typically 260°C / 30 s).

| Types | NC 12 IEC SIZE : 0805 | NC 20 IEC SIZE : 1206 |
|---|---|--------------------------|
| DIMENSIONS: millimeters (inches) | | |
| Terminations | Silver – palladium – platinum metallization | |
| 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 | 0.12 W | 0.24 W |
| Thermal dissipation factor | 2 mW/°C | 4 mW/°C |
| Thermal time constant | 5 s | 7 s |

Resistance - Temperature characteristics: pages 29 to 33.

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

NC 20

Type

K 0

Material Code
K
(See tables pages 11, 29-33)

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

NC 12 – NC 20



TABLE OF VALUES

| NC 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) |
| NC 12 KC 0 180 | 18 | KC | 3470 ± 5% | - 3.9 |
| NC 12 KC 0 220 | 22 | | | |
| NC 12 KC 0 270 | 27 | | | |
| NC 12 KC 0 330 | 33 | | | |
| NC 12 KC 0 390 | 39 | | | |
| NC 12 KC 0 470 | 47 | | | |
| NC 12 KC 0 560 | 56 | | | |
| NC 12 KC 0 680 | 68 | | | |
| NC 12 KC 0 820 | 82 | | | |
| NC 12 KC 0 101 | 100 | | | |
| NC 12 MC 0 121 | 120 | MC | 3910 ± 3% | - 4.4 |
| NC 12 MC 0 151 | 150 | | | |
| NC 12 MC 0 181 | 180 | | | |
| NC 12 MC 0 221 | 220 | | | |
| NC 12 MC 0 271 | 270 | | | |
| NC 12 MC 0 331 | 330 | | | |
| NC 12 MC 0 391 | 390 | | | |
| NC 12 MC 0 471 | 470 | | | |
| NC 12 MC 0 561 | 560 | | | |
| NC 12 MC 0 681 | 680 | | | |
| NC 12 MC 0 821 | 820 | | | |
| NC 12 MC 0 102 | 1,000 | | | |
| NC 12 MC 0 122 | 1,200 | | | |
| NC 12 MC 0 152 | 1,500 | | | |
| NC 12 MC 0 182 | 1,800 | | | |
| NC 12 MC 0 222 | 2,200 | | | |
| NC 12 MC 0 272 | 2,700 | | | |
| NC 12 MC 0 332 | 3,300 | | | |
| NC 12 J 0 0332 | 3,300 | J | 3480 ± 3% | - 3.9 |
| NC 12 J 0 0392 | 3,900 | | | |
| NC 12 J 0 0472 | 4,700 | | | |
| NC 12 J 0 0562 | 5,600 | | | |
| NC 12 K 0 0682 | 6,800 | K | 3630 ± 3% | - 4.0 |
| NC 12 K 0 0822 | 8,200 | | | |
| NC 12 K 0 0103 | 10,000 | | | |
| NC 12 K 0 0123 | 12,000 | | | |
| NC 12 L 0 0153 | 15,000 | L | 3790 ± 3% | - 4.2 |
| NC 12 L 0 0183 | 18,000 | | | |
| NC 12 M 0 0223 | 22,000 | M | 3950 ± 3% | - 4.4 |
| NC 12 M 0 0273 | 27,000 | | | |
| NC 12 M 0 0333 | 33,000 | | | |
| NC 12 M 0 0393 | 39,000 | | | |
| NC 12 N 0 0473 | 47,000 | N | 4080 ± 3% | - 4.6 |
| NC 12 N 0 0563 | 56,000 | | | |
| NC 12 L 2 0683 | 68,000 | L2 | 3805 ± 3% | - 4.1 |
| NC 12 N 0 0823 | 82,000 | N | 4080 ± 3% | - 4.6 |
| NC 12 P 0 0104 | 100,000 | P | 4220 ± 3% | - 4.7 |
| NC 12 P 0 0124 | 120,000 | | | |
| NC 12 P 0 0154 | 150,000 | | | |
| NC 12 P 0 0184 | 180,000 | | | |
| NC 12 Q 0 0224 | 220,000 | Q | 4300 ± 3% | -4.7 |

| NC 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) | | | |
| NC 20 KC 0 100 | 10 | KC | 3470 ± 5% | - 3.9 | | | |
| NC 20 KC 0 120 | 12 | | | | | | |
| NC 20 KC 0 150 | 15 | | | | | | |
| NC 20 KC 0 180 | 18 | | | | | | |
| NC 20 KC 0 220 | 22 | | | | | | |
| NC 20 KC 0 270 | 27 | | | | | | |
| NC 20 KC 0 330 | 33 | | | | | | |
| NC 20 KC 0 390 | 39 | | | | | | |
| NC 20 KC 0 470 | 47 | | | | | | |
| NC 20 KC 0 560 | 56 | | | | | | |
| NC 20 KC 0 680 | 68 | | | | | | |
| NC 20 KC 0 820 | 82 | | | | | | |
| NC 20 KC 0 101 | 100 | | | | | | |
| NC 20 MC 0 121 | 120 | MC | 3910 ± 3% | - 4.4 | | | |
| NC 20 MC 0 151 | 150 | | | | | | |
| NC 20 MC 0 181 | 180 | | | | | | |
| NC 20 MC 0 221 | 220 | | | | | | |
| NC 20 MC 0 271 | 270 | | | | | | |
| NC 20 MC 0 331 | 330 | | | | | | |
| NC 20 MC 0 391 | 390 | | | | | | |
| NC 20 MC 0 471 | 470 | | | | | | |
| NC 20 MC 0 561 | 560 | | | | | | |
| NC 20 MC 0 681 | 680 | | | | | | |
| NC 20 MC 0 821 | 820 | | | | | | |
| NC 20 MC 0 102 | 1,000 | | | | | | |
| NC 20 MC 0 122 | 1,200 | | | | | | |
| NC 20 MC 0 152 | 1,500 | | | | | | |
| NC 20 I 0 0182 | 1,800 | | | | I | 3250 ± 5% | - 3.7 |
| NC 20 I 0 0222 | 2,200 | | | | | | |
| NC 20 I 0 0272 | 2,700 | | | | | | |
| NC 20 I 0 0332 | 3,300 | | | | | | |
| NC 20 J 0 0392 | 3,900 | J | 3480 ± 3% | - 3.9 | | | |
| NC 20 J 0 0472 | 4,700 | | | | | | |
| NC 20 J 0 0562 | 5,600 | | | | | | |
| NC 20 J 0 0682 | 6,800 | | | | | | |
| NC 20 K 0 0822 | 8,200 | K | 3630 ± 3% | - 4.0 | | | |
| NC 20 K 0 0103 | 10,000 | | | | | | |
| NC 20 K 0 0123 | 12,000 | | | | | | |
| NC 20 K 0 0153 | 15,000 | | | | | | |
| NC 20 L 0 0183 | 18,000 | L | 3790 ± 3% | - 4.2 | | | |
| NC 20 L 0 0223 | 22,000 | | | | | | |
| NC 20 M 0 0273 | 27,000 | M | 3950 ± 3% | - 4.4 | | | |
| NC 20 M 0 0333 | 33,000 | | | | | | |
| NC 20 M 0 0393 | 39,000 | | | | | | |
| NC 20 M 0 0473 | 47,000 | | | | | | |
| NC 20 N 0 0563 | 56,000 | N | 4080 ± 3% | - 4.6 | | | |
| NC 20 N 0 0683 | 68,000 | | | | | | |
| NC 20 N 0 0823 | 82,000 | | | | | | |
| NC 20 N 0 0104 | 100,000 | | | | | | |
| NC 20 P 0 0124 | 120,000 | P | 4220 ± 3% | - 4.7 | | | |
| NC 20 P 0 0154 | 150,000 | | | | | | |
| NC 20 P 0 0184 | 180,000 | | | | | | |
| NC 20 P 0 0224 | 220,000 | | | | | | |
| NC 20 Q 0 0274 | 270,000 | Q | 4300 ± 3% | - 4.7 | | | |
| NC 20 Q 0 0334 | 330,000 | | | | | | |
| NC 20 Q 0 0394 | 390,000 | | | | | | |
| NC 20 Q 0 0474 | 470,000 | | | | | | |
| NC 20 R 0 0564 | 560,000 | R | 4400 ± 3% | - 4.8 | | | |
| NC 20 R 0 0684 | 680,000 | | | | | | |
| NC 20 R 0 0824 | 820,000 | | | | | | |
| NC 20 R 0 0105 | 1,000,000 | | | | | | |

Packaging for Automatic Insertion

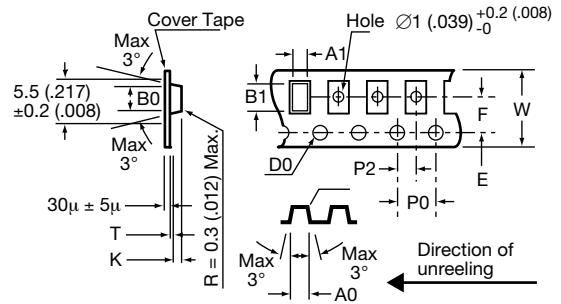
NTC Chip Thermistors / NC/NB Series



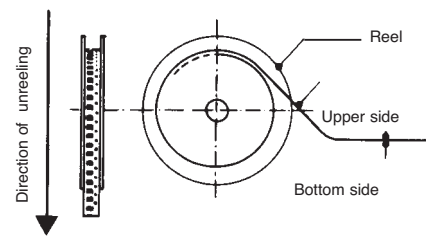
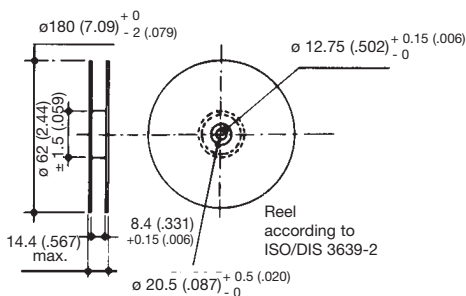
AUTOMATIC INSERTION

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) | 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

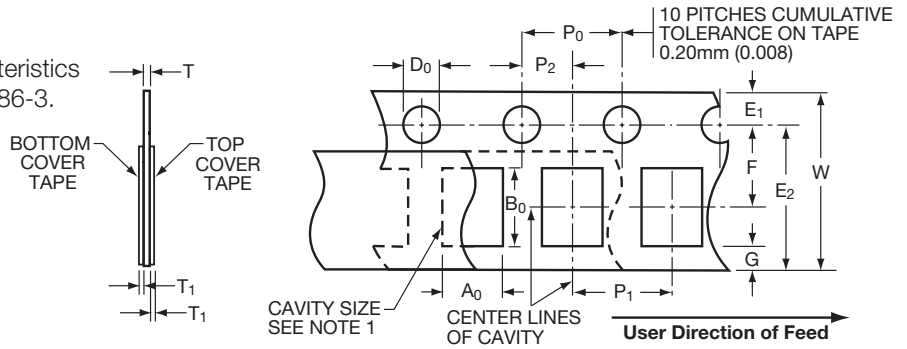
NTC Chip Thermistors / NC/NB Series



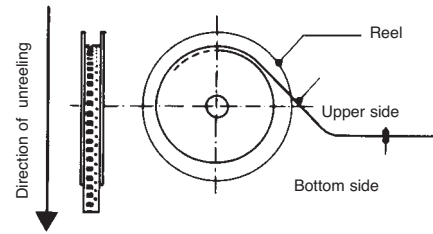
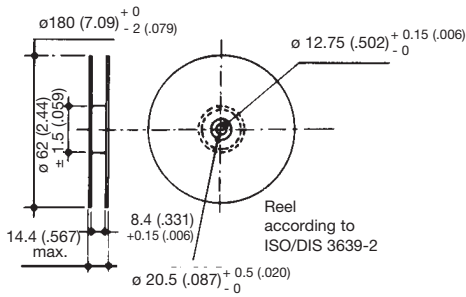
AUTOMATIC INSERTION

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 | -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 | ±0.1 |
| | | 0402 | ±0.1 |



QUANTITY PER REEL

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



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.

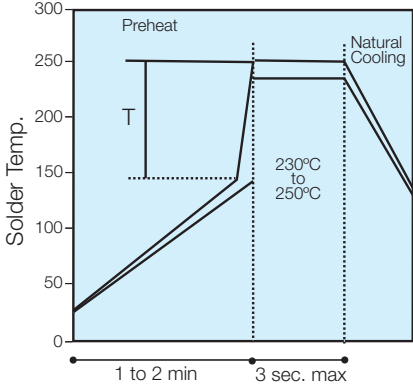
Terminations will resist leaching for at least the immersion times and conditions recommendations shown below.

| 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.

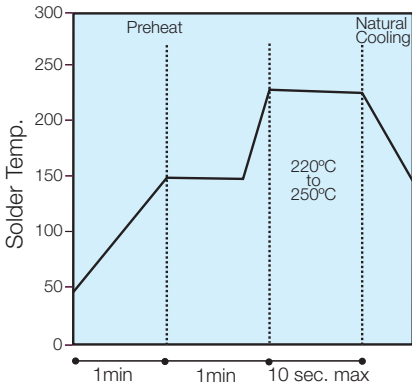
Wave



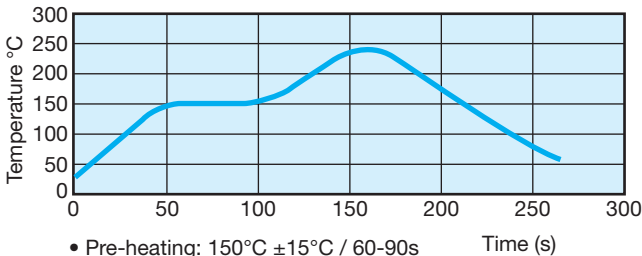
(Preheat chips before soldering)
T/maximum 150°C

- 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



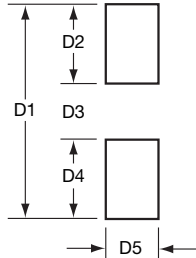
(Minimize soldering time)



- 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) |