

# 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<br>IEC SIZE : 0805                    | NC 20<br>IEC SIZE : 1206 |
|---|---|--------------------------|
| <b>DIMENSIONS: millimeters (inches)</b> |   |                          |
| Terminations                            | Silver – palladium – platinum metallization |                          |
| Marking                                 | On packaging only                           |                          |
| Climatic category                       | 40/125/56                                   |                          |
| Operating temperature                   | -55°C to +150°C                             |                          |
| Tolerance on R <sub>n</sub> (25°C)      | ±5%, ±10%, ±20%                             |                          |
| Maximum dissipation at 25°C             | 0.12 W                                      | 0.24 W                   |
| Thermal dissipation factor              | 2 mW/°C                                     | 4 mW/°C                  |
| Thermal time constant                   | 5 s   | 7 s                      |

Resistance - Temperature characteristics: pages 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

**NC 20**

Type

**K 0**

Material Code

K  
(See tables pages 11, 36-40)

**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<br>IEC SIZE : 0805 |                   |                  |  |                     |
|--------------------------|-------------------|------------------|--|---------------------|
| Types                    | Rn at 25°C<br>(Ω) | Material<br>Code | B (K)<br>( $\frac{\Delta B}{B}$<br>(1) ± 5%<br>(2) ± 3%) | α at 25°C<br>(%/°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<br>IEC SIZE : 1206 |                   |                  |  |                     |   |           |       |
|--------------------------|-------------------|------------------|--|---------------------|---|-----------|-------|
| Types                    | Rn at 25°C<br>(Ω) | Material<br>Code | B (K)<br>( $\frac{\Delta B}{B}$<br>(1) ± 5%<br>(2) ± 3%) | α at 25°C<br>(%/°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

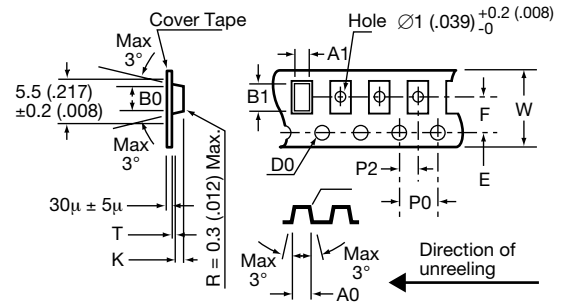


## NTC Chip Thermistors / NC/NB Series

### 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<br>-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<br>(size is adjustable)<br>(K = t1 +0.2) |
|                                | NC 20 (1206) | A0        | 1.95      | ±0.1  |
|                                |              | B0        | 3.55      | ±0.1  |
|                                |              | K         | 1.5 max.  | K ±0.1<br>(size is adjustable)<br>(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 <sub>0</sub> | 4                 | ±0.1       |
| Diameter of the sprocket holes | D <sub>0</sub> | 1.5<br>-0/+0.1    | ±0.1       |
| Distance                       | E <sub>1</sub> | 1.75              | ±0.1       |
| Distance (center to center)    | F              | 3.5               | ±0.05      |
| Distance (center to center)    | P <sub>2</sub> | 2                 | ±0.05      |
| Cover tape thickness           | T <sub>1</sub> | 0.10 max.         |            |
| Distance                       | E <sub>2</sub> | 6.25 min.         |            |
| Distance                       | G              | 0.75 min.         |            |
| Component pitch                | P <sub>1</sub> | 0805/0603<br>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  $2 \pm 1$  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           | $260 \pm 5$    | 15 max                 |
| NB  | Nickel Barrier   | 60/40           | $260 \pm 5$    | $30 \pm 1$             |

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  $270^\circ\text{C}$ . 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  $150^\circ\text{C}$

- 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:  $2.5^\circ\text{C/s}$
- 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<br>(.067) | 0.60<br>(.024) | 0.50<br>(.020) | 0.60<br>(.024) | 0.50<br>(.020) |
| 0603      | NB21 | 2.30<br>(.091) | 0.80<br>(.031) | 0.70<br>(.028) | 0.80<br>(.031) | 0.75<br>(.030) |
| 0805      | NB12 | 3.00<br>(.118) | 1.00<br>(.039) | 1.00<br>(.039) | 1.00<br>(.039) | 1.25<br>(.049) |
| 1206      | NB20 | 4.00<br>(.157) | 1.00<br>(.039) | 2.00<br>(.079) | 1.00<br>(.039) | 2.50<br>(.098) |

### WAVE SOLDERING

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

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А