

# 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
<b>DIMENSIONS:</b> millimeters (inches)		
Terminations	Nickel Barrier	
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	0.07 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)

# NTC SMD Thermistors



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

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

# Packaging for Automatic Insertion

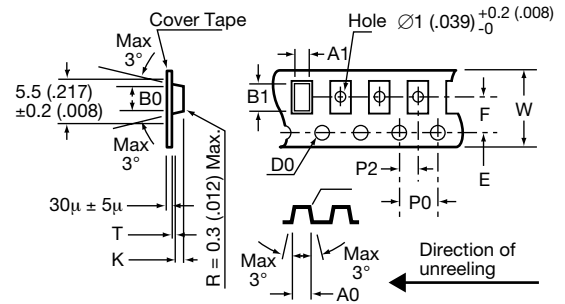


## NTC Chip Thermistors / NC/NB Series

### 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

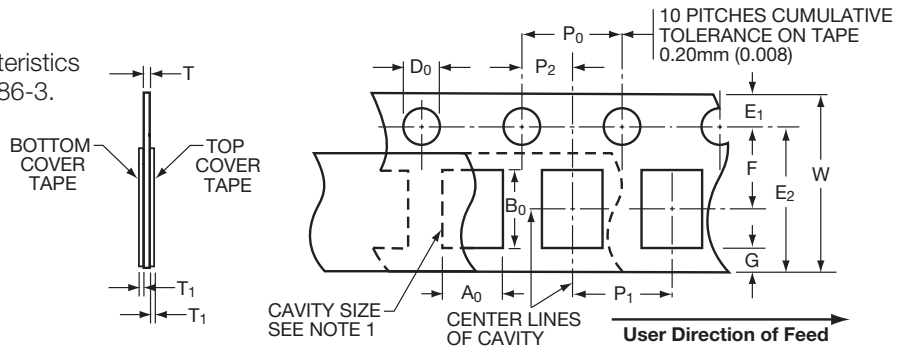


## NTC Chip Thermistors / NC/NB Series

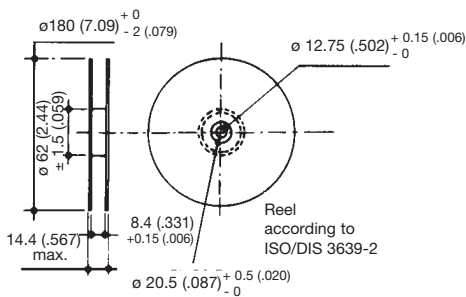
### AUTOMATIC INSERTION

#### 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	$\pm 0.1$
Diameter of the sprocket holes	$D_0$	1.5	$\pm 0.1$
Distance	$E_1$	1.75	$\pm 0.1$
Distance (center to center)	F	3.5	$\pm 0.05$
Distance (center to center)	$P_2$	2	$\pm 0.05$
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	$\pm 0.1$
		0402	$\pm 0.1$



### 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.

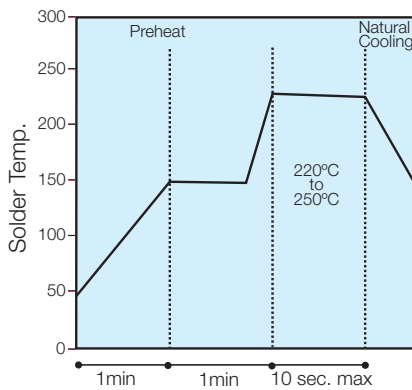
### Wave



(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



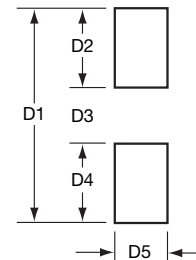
(Minimize soldering time)



- 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 (.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)