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With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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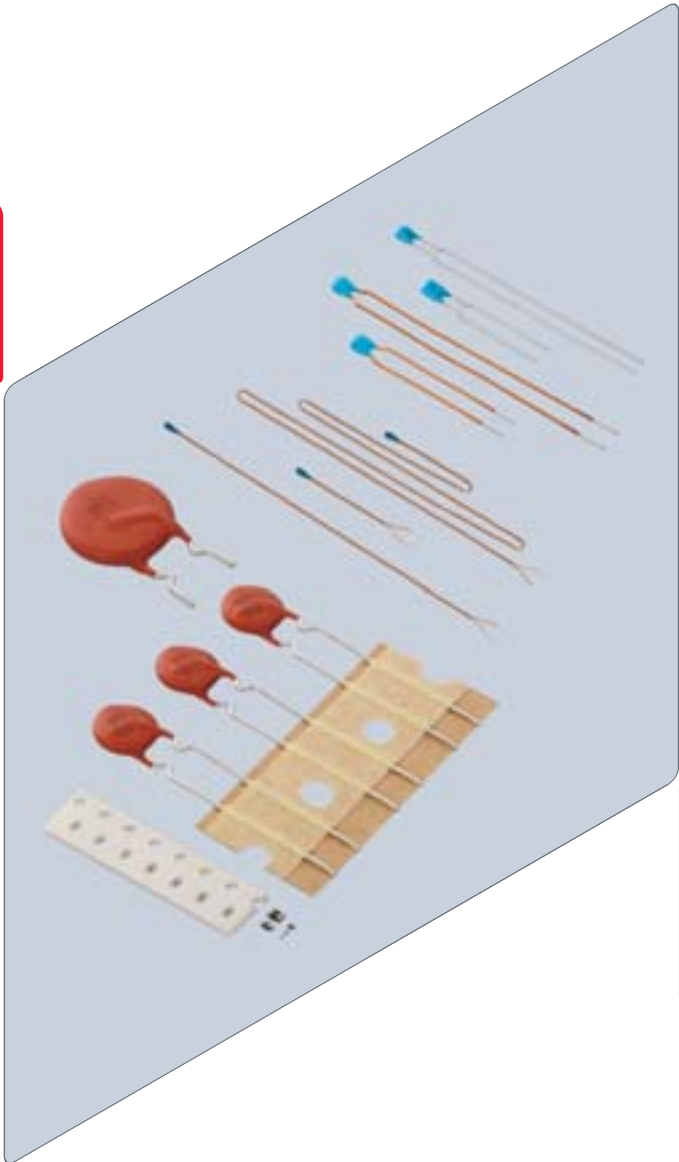
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NTC Thermistors





EU RoHS Compliant

- All the products in this catalog comply with EU RoHS.
- EU RoHS is "the European Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment."
- For more details, please refer to our website 'Murata's Approach for EU RoHS' (<http://www.murata.com/en-eu/support/compliance/rohs>).

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Please check the MURATA website (<http://www.murata.com/>) if you cannot find a part number in this catalog.

● Part Numbering

NTC Thermistors for Temp. Sensor and Compensation Chip Type

(Part Number)

NC	P	18	XH	103	J	03	RB
①	②	③	④	⑤	⑥	⑦	⑧

① Product ID

Product ID	
NC	NTC Thermistors Chip Type

② Series

Code	Series
P	Plated Termination Series
U	High Reliability Series

③ Dimensions (L x W)

Code	Dimensions (L x W)	EIA
03	0.60 x 0.30mm	0201
15	1.00 x 0.50mm	0402
18	1.60 x 0.80mm	0603
21	2.00 x 1.25mm	0805

④ Temperature Characteristics

Code	Temperature Characteristics
XC	Nominal B-Constant 3100–3149K
XF	Nominal B-Constant 3250–3299K
XH	Nominal B-Constant 3350–3399K
XM	Nominal B-Constant 3500–3549K
XQ	Nominal B-Constant 3650–3699K
XV	Nominal B-Constant 3900–3949K
XW	Nominal B-Constant 3950–3999K
WB	Nominal B-Constant 4050–4099K
WD	Nominal B-Constant 4150–4199K
WF	Nominal B-Constant 4250–4299K
WL	Nominal B-Constant 4450–4499K
WM	Nominal B-Constant 4500–4549K

⑤ Resistance

Expressed by three-digit alphanumerics. The unit is ohm (Ω). The first and second figures are significant digits, and the third figure expresses the number of zeros that follow the two figures.

Ex.

Code	Resistance
102	1k Ω
103	10k Ω
104	100k Ω

⑥ Resistance Tolerance

Code	Resistance Tolerance
D	$\pm 0.5\%$
F	$\pm 1\%$
E	$\pm 3\%$
J	$\pm 5\%$

⑦ Individual Specifications

Structures and other specifications are expressed by two figures.

Ex.

Code	Individual Specifications
03/05/10/12/60	Standard Type
<input type="checkbox"/> S	Automotive Type

⑧ Packaging

Code	Packaging
RA	Plastic Taping 4mm Pitch (4000 pcs.)
RB	Paper Taping 4mm Pitch (4000 pcs.)
RC	Paper Taping 2mm Pitch (10000 pcs.)
RL	Paper Taping 2mm Pitch (15000 pcs.)

NTC Thermistor for Temperature Sensor Thermo String Type

(Part Number)

NXF	T	15	XH	103	F	A	2	B	025
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

① Product ID

Product ID	
NXF	NTC Thermistors Sensor Thermo String Type

② Individual Specifications

Code	Individual Specifications
T	Commercial Type

③ Chip Dimensions

Code	Dimensions (L x T)	EIA
15	1.00 x 0.50mm	0402

④ Temperature Characteristics

Code	Temperature Characteristics
XH	Nominal B-Constant 3350-3399K
XV	Nominal B-Constant 3900-3949K
WB	Nominal B-Constant 4050-4099K
WF	Nominal B-Constant 4250-4299K

⑤ Resistance

Expressed by three figures. The unit is (Ω). The first and second figures are significant digits, and the third figure expresses the number of zeros that follow the two figures.

Ex.

Code	Resistance
103	10kΩ
473	47kΩ
104	100kΩ

⑥ Resistance Tolerance

Code	Resistance Tolerance
F	±1%

⑦ Lead Wire Type

Code	Lead Wire Type
A	∅0.3mm Copper Lead Wire with Polyurethane Coat

⑧ Shape of the Lead Wire Kink

Code	Shape of the Lead Wire Kink
1	Twisted Lead Wire Type
2	Standard Type

⑨ Packaging

Code	Packaging
B	Bulk

⑩ Dimensions (Full Length)

Code	Dimensions (Full Length)
025	25mm
030	30mm
040	40mm
050	50mm
060	60mm
070	70mm
080	80mm
090	90mm
100	100mm
110	110mm
120	120mm
130	130mm
140	140mm
150	150mm

NTC Thermistor for Temperature Sensor/Lead Type

(Part Number)

NXR	T	15	XH	103	F	A	1	B	040
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

① Product ID

Product ID	
NXR	NTC Thermistor Sensor/Lead Type

② Individual Specifications

Code	Individual Specifications
T	Commercial Type

③ Chip Dimensions

Code	Dimensions (L x T)
15	1.00 x 0.50mm

④ Temperature Characteristics

Code	Temperature Characteristics
XH	Nominal B-Constant 3350-3399K
XM	Nominal B-Constant 3500-3549K
XV	Nominal B-Constant 3900-3949K
WB	Nominal B-Constant 4050-4099K
WF	Nominal B-Constant 4250-4299K

⑤ Resistance

Expressed by three figures. The unit is (Ω). The first and second figures are significant digits, and the third figure expresses the number of zeros that follow the two figures.

Ex.

Code	Resistance
202	2.0kΩ
103	10kΩ
104	100kΩ

⑥ Resistance Tolerance

Code	Resistance Tolerance
F	±1%
E	±3%
J	±5%

⑦ Lead Wire Type

Code	Lead Wire Type
A	Lead Type: ø0.4mm Copper-clad Fe Wire, Tinned Lead Insulation Type: ø0.46mm Cu Wire with Coat

⑧ Shape of the Lead Wire

Code	Shape of the Lead Wire
1	Lead Spacing 2.5mm
3	Lead Spacing 5.0mm
5	Lead Spacing 2.5mm (Insulation Type)

⑨ Packaging

Code	Packaging
A	Ammo Pack Taping
B	Bulk

⑩ Dimensions (Full Length)

Code	Lead Type	Lead Insulation Type
010	10mm	-
020	20mm	-
025	-	25mm
030	30mm	30mm
035	-	35mm
040	40mm	-
016	16mm (Taping Type)	-

NTC Thermistors for Inrush Current Suppression Lead Type

(Part Number)

NT	PA7	160	L	BM	B0
①	②	③	④	⑤	⑥

① Product ID

Product ID	
NT	NTC Thermistors

② Series

Code	Series	Nominal Body Diameter
PA5	Inrush Current Suppression Lead Type	ø5mm
PA6		ø6mm
PA7		ø7mm
PA9		ø9mm
PAA		ø10mm
PAD		ø13mm
PAJ		ø18mm
PAN		ø22mm

③ Resistance

Expressed by three-digit alphanumerics. The unit is ohm (Ω). The first and second figures are significant digits, and the third figure expresses the number of zeros that follow the two figures. If there is a decimal point, it is expressed by the capital letter "R." In this case, all figures are significant digits.

Ex.

Code	Resistance
3R0	3 Ω
100	10 Ω

④ Resistance Tolerance

Code	Resistance Tolerance
L	±15%

⑤ Individual Specifications

The lead structure and other specifications are expressed by two-digit alphanumerics.

Code	Individual Specifications	Body Diameter
B1	Standard Type (Ammo Pack)	ø7mm, ø9mm
BM	Standard Type (Bulk)	ø7mm, ø9mm
D6	Standard Type (Ammo Pack)	ø10mm, ø13mm
DK	Standard (Bulk)	ø18mm, ø22mm
DN	Standard (Bulk)	ø10mm, ø13mm

⑥ Packaging

Code	Packaging
A0	Ammo Pack Taping
B0	Bulk

Basic Characteristics

Basic Characteristics

1. Zero-power Resistance of Thermistor: R

$$R = R_0 \exp B (1/T - 1/T_0) \dots\dots\dots (1)$$

R: Resistance in ambient temperature T (K)
 (K: absolute temperature)

R₀: Resistance in ambient temperature T₀ (K)

B: B-Constant of Thermistor

2. B-Constant

as (1) formula

$$B = \frac{\ln (R/R_0)}{1/T - 1/T_0} \dots\dots\dots (2)$$

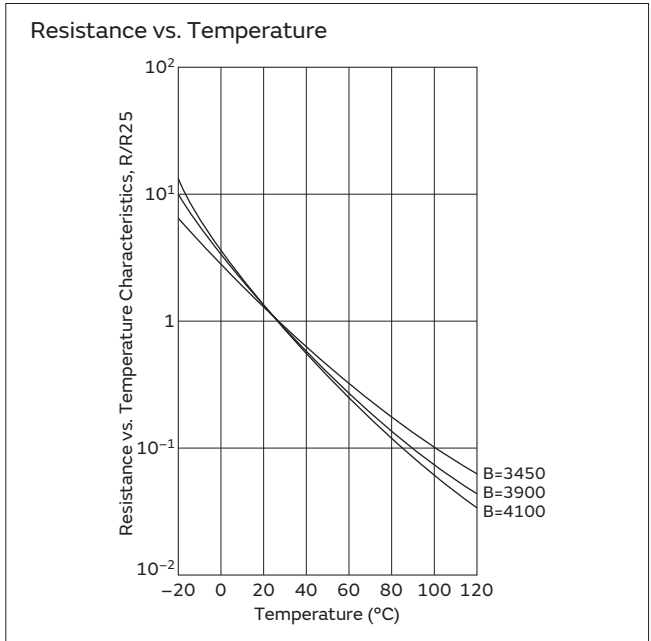
3. Thermal Dissipation Constant

When electric power P (mW) is spent in ambient temperature T₁ and thermistor temperature rises T₂, the formula is as follows

$$P = C (T_2 - T_1) \dots\dots\dots (3)$$

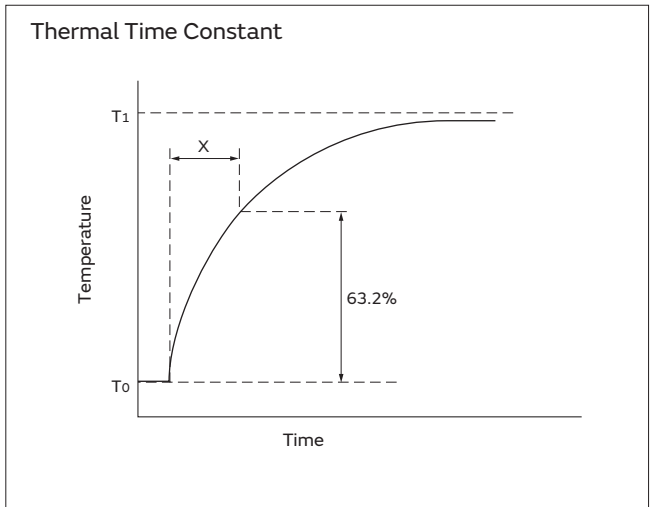
C: Thermal dissipation constant (mW/°C)

Thermal dissipation constant is varied with dimensions, measurement conditions, etc.



4. Thermal Time Constant

Period in which the thermistor's temperature will change 63.2% of its temperature difference from ambient temperature T₀ (°C) to T₁ (°C).



Performance

Item	Condition
Resistance	Measured by zero-power in specified ambient temperature.
B-Constant	Calculated between two specified ambient temperatures by the next formula. T and T ₀ is absolute temperature (K). $B = \frac{\ln (R/R_0)}{1/T - 1/T_0}$
Thermal Dissipation Constant	Shows necessary electric power that Thermistor's temperature rises 1°C by self-heating. It is calculated by the next formula (mW/°C). $C = \frac{P}{T - T_0}$
Rated Electric Power	Shows the required electric power that causes the thermistor's temperature to rise to a specified temperature by self-heating, at ambient temperature of 25 °C.
Permissible Operating Current	It is possible to keep the thermistor's temperature rising max. 1°C.

Please inquire about test conditions and ratings.

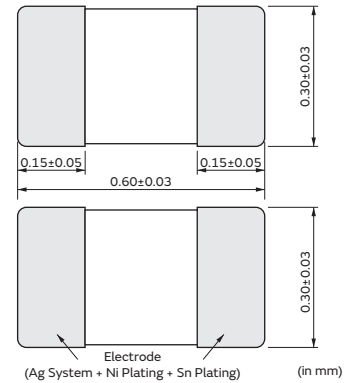
NTC Thermistors

Temperature Sensor and Compensation 0201 (0603) Size

Chip NTC Thermistors' Ni barrier termination provides excellent solderability and their unique construction offers high stability in the application's environment.

Features

1. Excellent solderability and high stability in the application's environment
2. Excellent long-term stability
3. High accuracy in resistance and B-Constant
4. Reflow soldering possible
5. NCP series are recognized by UL/cUL.
 (UL1434, File No.E137188)



Detailed are accessible from the following URL.
<http://www.murata.com/en-global/products/thermistor/ntc/ncp>

Applications

1. Temperature compensation for transistors, ICs, and crystal oscillators in mobile communications
2. Temperature sensor for rechargeable batteries

Part Number	Resistance (25°C) (ohm)	B-Constant (25-50°C) (K)	B-Constant (25-80°C) (Reference Value) (K)	B-Constant (25-85°C) (Reference Value) (K)	B-Constant (25-100°C) (Reference Value) (K)	Permissible Operating Current (25°C) (mA)	Rated Electric Power (25°C) (mW)	Typical Dissipation Constant (25°C) (mW/°C)
NCP03XM102□05RL	1.0k	3500 ±1%	3539	3545	3560	1.00	100	1
NCP03XM152□05RL	1.5k	3500 ±1%	3539	3545	3560	0.81	100	1
NCP03XM222□05RL	2.2k	3500 ±1%	3539	3545	3560	0.67	100	1
NCP03XM332□05RL	3.3k	3500 ±1%	3539	3545	3560	0.55	100	1
NCP03XM472□05RL	4.7k	3500 ±1%	3539	3545	3560	0.46	100	1
NCP03XH682□05RL	6.8k	3380 ±1%	3428	3434	3455	0.38	100	1
NCP03XH103F05RL	10k ±1%	3380 ±1%	3428	3434	3455	0.31	100	1
NCP03XH103□05RL	10k	3380 ±1%	3428	3434	3455	0.31	100	1
NCP03XV103□05RL	10k	3900 ±1%	3930	3934	3944	0.31	100	1
NCP03XH153□05RL	15k	3380 ±1%	3428	3434	3455	0.25	100	1
NCP03XH223□05RL	22k	3380 ±1%	3428	3434	3455	0.21	100	1
NCP03WF333□05RL	33k	4250 ±1%	4303	4311	4334	0.17	100	1
NCP03WB473□05RL	47k	4050 ±3%	4101	4108	4131	0.14	100	1
NCP03WL473□05RL	47k	4485 ±1%	4537	4543	4557	0.14	100	1
NCP03WF683□05RL	68k	4250 ±1%	4303	4311	4334	0.12	100	1
NCP03WL683□05RL	68k	4485 ±1%	4537	4543	4557	0.12	100	1
NCP03WF104F05RL	100k ±1%	4250 ±1%	4303	4311	4334	0.10	100	1
NCP03WF104□05RL	100k	4250 ±1%	4303	4311	4334	0.10	100	1
NCP03WL104□05RL	100k	4485 ±1%	4537	4543	4557	0.10	100	1
NCP03WL154□05RL	150k	4485 ±1%	4537	4543	4557	0.08	100	1
NCP03WL224□05RL	220k	4485 ±1%	4537	4543	4557	0.06	100	1

□ is filled with resistance tolerance codes (E: ±3%, J: ±5%).

Rated Electric Power shows the required electric power that the thermistor's temperature rise to 125°C by self-heating, at ambient temperature of 25 °C.
 Operating Temperature Range: -40°C to +125°C

NTC Thermistors

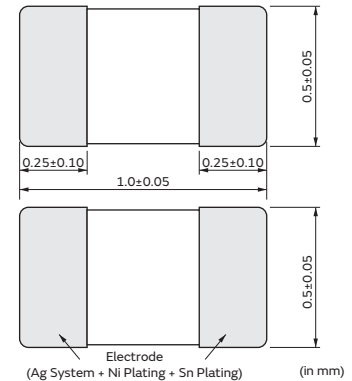
Temperature Sensor and Compensation 0402 (1005) Size/NCP Series

2

Chip NTC Thermistors' Ni barrier termination provides excellent solderability and their unique construction offers high stability in the application's environment.

Features

1. Excellent solderability and high stability in the application's environment
2. Excellent long-term stability
3. High accuracy in resistance and B-Constant
4. Reflow soldering possible
5. Same B-constant in the same resistance in the three sizes (0805 size/0603 size/0402 size)
Downsize is easy for design.
6. NCP series are recognized by UL/cUL.
(UL1434, File No.E137188)



Detailed are accessible from the following URL.
<http://www.murata.com/en-global/products/thermistor/ntc/ncp>

Applications

1. Temperature compensation for transistors, ICs, and crystal oscillators in mobile communications
2. Temperature sensor for rechargeable batteries
3. Temperature compensation of LCD
4. Temperature compensation in general use of electric circuits

Part Number	Resistance (25°C) (ohm)	B-Constant (25-50°C) (K)	B-Constant (25-80°C) (Reference Value) (K)	B-Constant (25-85°C) (Reference Value) (K)	B-Constant (25-100°C) (Reference Value) (K)	Permissible Operating Current (25°C) (mA)	Rated Electric Power (25°C) (mW)	Typical Dissipation Constant (25°C) (mW/°C)
NCP15XM221□03RC	220	3500 ±3%	3539	3545	3560	2.10	100	1
NCP15XM331□03RC	330	3500 ±3%	3539	3545	3560	1.70	100	1
NCP15XQ471□03RC	470	3650 ±2%	3688	3693	3706	1.40	100	1
NCP15XQ681□03RC	680	3650 ±3%	3688	3693	3706	1.20	100	1
NCP15XQ102□03RC	1.0k	3650 ±2%	3688	3693	3706	1.00	100	1
NCP15XW152□03RC	1.5k	3950 ±3%	3982	3987	3998	0.81	100	1
NCP15XW222□03RC	2.2k	3950 ±3%	3982	3987	3998	0.67	100	1
NCP15XW332□03RC	3.3k	3950 ±3%	3982	3987	3998	0.55	100	1
NCP15XM472□03RC	4.7k	3500 ±2%	3539	3545	3560	0.46	100	1
NCP15XW472□03RC	4.7k	3950 ±3%	3982	3987	3998	0.46	100	1
NCP15XW682□03RC	6.8k	3950 ±3%	3982	3987	3998	0.38	100	1
NCP15XV103□03RC	10k	3900 ±3%	3930	3934	3944	0.31	100	1
NCP15XW153□03RC	15k	3950 ±3%	3982	3987	3998	0.25	100	1
NCP15XW223□03RC	22k	3950 ±3%	3982	3987	3998	0.21	100	1
NCP15WL223□03RC	22k	4485 ±1%	4537	4543	4557	0.21	100	1
NCP15WB333□03RC	33k	4050 ±3%	4101	4108	4131	0.17	100	1
NCP15WL333□03RC	33k	4485 ±1%	4537	4543	4557	0.17	100	1
NCP15WL473□03RC	47k	4485 ±1%	4537	4543	4557	0.14	100	1
NCP15WD683□03RC	68k	4150 ±3%	4201	4209	4232	0.12	100	1
NCP15WL683□03RC	68k	4485 ±1%	4537	4543	4557	0.12	100	1
NCP15WL104□03RC	100k	4485 ±1%	4537	4543	4557	0.10	100	1
NCP15WL154□03RC	150k	4485 ±1%	4537	4543	4557	0.08	100	1
NCP15WM154□03RC	150k	4500 ±3%	4571	4582	4614	0.08	100	1
NCP15WM224□03RC	220k	4500 ±3%	4571	4582	4614	0.06	100	1
NCP15WM474□03RC	470k	4500 ±3%	4571	4582	4614	0.04	100	1

□ is filled with resistance tolerance codes (E: ±3%, J: ±5%).

Rated Electric Power shows the required electric power that the thermistor's temperature rise to 125°C by self-heating, at ambient temperature of 25 °C.

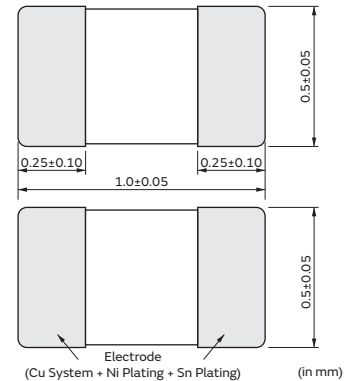
Operating Temperature Range: -40°C to +125°C

NTC Thermistors

Temperature Sensor and Compensation 0402 (1005) Size/NCU Series

0402/0603 sized Chip NTC Thermistors have Ni barrier termination, provide excellent solderability and offer high stability in environment due to unique inner construction.

This is new series, available market where request the high reliability for wide temperature sensing and compensation.



Features

1. Excellent solderability and high stability in the application's environment
2. Excellent long-term stability
3. High accuracy in resistance and B-Constant
4. Reflow soldering possible
5. Same B-constant in the same resistance in the three sizes (0805 size/0603 size/0402 size)
Downsize is easy for design.
6. NCU series are recognized by UL/cUL.
(UL1434, File No.E137188)

Detailed are accessible from the following URL.
<http://www.murata.com/en-global/products/thermistor/ntc/ncu>

Applications

1. Temperature compensation for transistors, ICs, and crystal oscillators in mobile communications
2. Temperature sensor for rechargeable batteries
3. Temperature compensation of LCD
4. Temperature compensation in general use of electric circuits

Part Number	Resistance (25°C) (ohm)	B-Constant (25-50°C) (K)	B-Constant (25-80°C) (Reference Value) (K)	B-Constant (25-85°C) (Reference Value) (K)	B-Constant (25-100°C) (Reference Value) (K)	Permissible Operating Current (25°C) (mA)	Rated Electric Power (25°C) (mW)	Typical Dissipation Constant (25°C) (mW/°C)
NCU15XH103D60RC	10k ±0.5%	3380 ±0.7%	3428	3434	3455	0.31	100	1
NCU15XH103F60RC	10k ±1%	3380 ±1%	3428	3434	3455	0.31	100	1
NCU15XH103□60RC	10k	3380 ±1%	3428	3434	3455	0.31	100	1
NCU15WB473D60RC	47k ±0.5%	4050 ±0.5%	4101	4108	4131	0.14	100	1
NCU15WB473F60RC	47k ±1%	4050 ±1%	4101	4108	4131	0.14	100	1
NCU15WB473□60RC	47k	4050 ±1%	4101	4108	4131	0.14	100	1
NCU15WF104D60RC	100k ±0.5%	4250 ±0.5%	4303	4311	4334	0.1	100	1
NCU15WF104F60RC	100k ±1%	4250 ±1%	4303	4311	4334	0.1	100	1
NCU15WF104□60RC	100k	4250 ±1%	4303	4311	4334	0.1	100	1

□ is filled with resistance tolerance codes (E: ±3%, J: ±5%).

Rated Electric Power is necessary electric power for Thermistor's temperature to rise 100°C by self heating at 25°C in still air.

Operating Temperature Range: -40°C to +125°C

If there is any additionally electrical characteristics, please contact from close sales office or website.

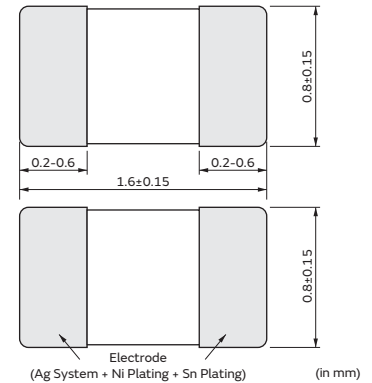
NTC Thermistors

Temperature Sensor and Compensation 0603 (1608) Size/NCP Series

Chip NTC Thermistors' Ni barrier termination provides excellent solderability and their unique construction offers high stability in the application's environment.

Features

1. Excellent solderability and high stability in the application's environment
2. Excellent long-term stability
3. High accuracy in resistance and B-constant
4. Flow/Reflow soldering possible
5. Same B-Constant in the same resistance in the three sizes (0805 size/0603 size/0402 size)
Downsize is easy for design.
6. NCP series are recognized by UL/cUL.
(UL1434, File No.E137188)



Detailed are accessible from the following URL.
<http://www.murata.com/en-global/products/thermistor/ntc/ncp>

Applications

1. Temperature compensation for transistors, ICs, and crystal oscillators in mobile communications
2. Temperature sensor for rechargeable batteries
3. Temperature compensation of LCD
4. Temperature compensation in general use of electric circuits

Part Number	Resistance (25°C) (ohm)	B-Constant (25-50°C) (K)	B-Constant (25-80°C) (Reference Value) (K)	B-Constant (25-85°C) (Reference Value) (K)	B-Constant (25-100°C) (Reference Value) (K)	Permissible Operating Current (25°C) (mA)	Rated Electric Power (25°C) (mW)	Typical Dissipation Constant (25°C) (mW/°C)
NCP18XM221□03RB	220	3500 ±3%	3539	3545	3560	2.10	100	1
NCP18XM331□03RB	330	3500 ±3%	3539	3545	3560	1.70	100	1
NCP18XQ471□03RB	470	3650 ±2%	3688	3693	3706	1.40	100	1
NCP18XQ681□03RB	680	3650 ±3%	3688	3693	3706	1.20	100	1
NCP18XQ102□03RB	1.0k	3650 ±2%	3688	3693	3706	1.00	100	1
NCP18XW152□03RB	1.5k	3950 ±3%	3982	3987	3998	0.81	100	1
NCP18XW222□03RB	2.2k	3950 ±3%	3982	3987	3998	0.67	100	1
NCP18XW332□03RB	3.3k	3950 ±3%	3982	3987	3998	0.55	100	1
NCP18XM472□03RB	4.7k	3500 ±2%	3539	3545	3560	0.46	100	1
NCP18XW472□03RB	4.7k	3950 ±3%	3982	3987	3998	0.46	100	1
NCP18XW682□03RB	6.8k	3950 ±3%	3982	3987	3998	0.38	100	1
NCP18XV103□03RB	10k	3900 ±3%	3930	3934	3944	0.31	100	1
NCP18XW153□03RB	15k	3950 ±3%	3982	3987	3998	0.25	100	1
NCP18XW223□03RB	22k	3950 ±3%	3982	3987	3998	0.21	100	1
NCP18WB333□03RB	33k	4050 ±3%	4101	4108	4131	0.17	100	1
NCP18WD683□03RB	68k	4150 ±3%	4201	4209	4232	0.12	100	1
NCP18WM154□03RB	150k	4500 ±3%	4571	4582	4614	0.08	100	1
NCP18WM224□03RB	220k	4500 ±3%	4571	4582	4614	0.06	100	1
NCP18WM474□03RB	470k	4500 ±3%	4571	4582	4614	0.04	100	1

□ is filled with resistance tolerance codes (E: ±3%, J: ±5%).

Rated Electric Power shows the required electric power that the thermistor's temperature rise to 125°C by self-heating, at ambient temperature of 25 °C.

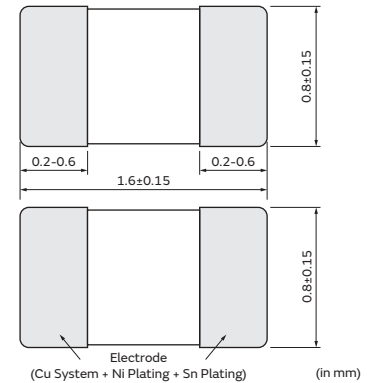
Operating Temperature Range: -40°C to +125°C

NTC Thermistors

Temperature Sensor and Compensation 0603 (1608) Size/NCU Series

0402/0603 sized Chip NTC Thermistors have Ni barrier termination, provide excellent solderability and offer high stability in environment due to unique inner construction.

This is new series, available market where request the high reliability for wide temperature sensing and compensation.



Features

1. Excellent solderability and high stability in the application's environment
2. Excellent long-term stability
3. High accuracy in resistance and B-constant
4. Flow/Reflow soldering possible
5. Same B-Constant in the same resistance in the three sizes (0805 size/0603 size/0402 size)
Downsize is easy for design.
6. NCU series are recognized by UL/cUL.
(UL1434, File No.E137188)

Detailed are accessible from the following URL.
<http://www.murata.com/en-global/products/thermistor/ntc/ncu>

Applications

1. Temperature compensation for transistors, ICs, and crystal oscillators in mobile communications
2. Temperature sensor for rechargeable batteries
3. Temperature compensation of LCD
4. Temperature compensation in general use of electric circuits

Part Number	Resistance (25°C) (ohm)	B-Constant (25-50°C) (K)	B-Constant (25-80°C) (Reference Value) (K)	B-Constant (25-85°C) (Reference Value) (K)	B-Constant (25-100°C) (Reference Value) (K)	Permissible Operating Current (25°C) (mA)	Rated Electric Power (25°C) (mW)	Typical Dissipation Constant (25°C) (mW/°C)
NCU18XH103D60RB	10k ±0.5%	3380 ±0.7%	3428	3434	3455	0.31	100	1
NCU18XH103F60RB	10k ±1%	3380 ±1%	3428	3434	3455	0.31	100	1
NCU18XH103□60RB	10k	3380 ±1%	3428	3434	3455	0.31	100	1
NCU18WB473D60RB	47k ±0.5%	4050 ±0.5%	4101	4108	4131	0.14	100	1
NCU18WB473F60RB	47k ±1%	4050 ±1%	4101	4108	4131	0.14	100	1
NCU18WB473□60RB	47k	4050 ±1%	4101	4108	4131	0.14	100	1
NCU18WF104D60RB	100k ±0.5%	4250 ±0.5%	4303	4311	4334	0.1	100	1
NCU18WF104F60RB	100k ±1%	4250 ±1%	4303	4311	4334	0.1	100	1
NCU18WF104□60RB	100k	4250 ±2%	4303	4311	4334	0.1	100	1

□ is filled with resistance tolerance codes (E: ±3%, J: ±5%).

Rated Electric Power is necessary electric power for Thermistor's temperature to rise 100°C by self heating at 25°C in still air.

Operating Temperature Range: -40°C to +125°C

If there is any additionally electrical characteristics, please contact from close sales office or website.

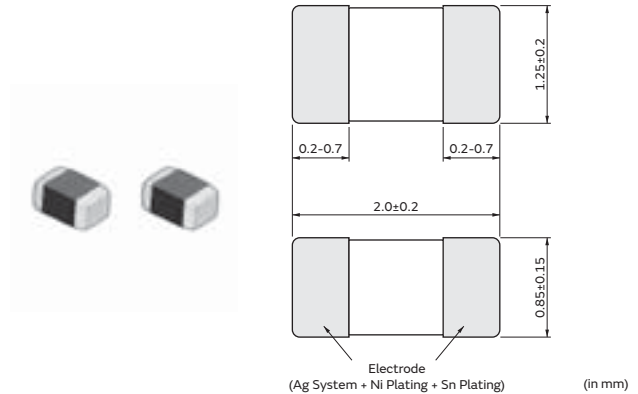
NTC Thermistors

Temperature Sensor and Compensation 0805 (2012) Size

Chip NTC Thermistors' Ni barrier termination provides excellent solderability and their unique construction offers high stability in the application's environment.

Features

1. Excellent solderability and high stability in the application's environment
2. Excellent long-term stability
3. High accuracy in resistance and B-constant
4. Flow/Reflow soldering possible
5. Same B-Constant in the same resistance in the three sizes (0805 size/0603 size/0402 size)
Downsize is easy for design.
6. NCP series are recognized by UL/cUL.
(UL1434, File No.E137188)



Detailed are accessible from the following URL.
<http://www.murata.com/en-global/products/thermistor/ntc/ncp>

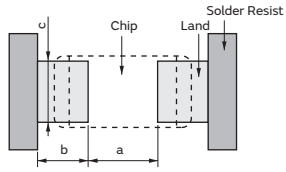
Applications

1. Temperature compensation for transistors, ICs, and crystal oscillators in mobile communications
2. Temperature sensor for rechargeable batteries
3. Temperature compensation of LCD
4. Temperature compensation in general use of electric circuits

Part Number	Resistance (25°C) (ohm)	B-Constant (25-50°C) (K)	B-Constant (25-80°C) (Reference Value) (K)	B-Constant (25-85°C) (Reference Value) (K)	B-Constant (25-100°C) (Reference Value) (K)	Permissible Operating Current (25°C) (mA)	Rated Electric Power (25°C) (mW)	Typical Dissipation Constant (25°C) (mW/°C)
NCP21XM221J03RA	220 ±5%	3500 ±3%	3539	3545	3560	3.00	200	2
NCP21XQ471J03RA	470 ±5%	3650 ±3%	3688	3693	3706	2.00	200	2
NCP21XQ102J03RA	1.0k ±5%	3650 ±3%	3688	3693	3706	1.40	200	2
NCP21XW222J03RA	2.2k ±5%	3950 ±3%	3982	3987	3998	0.90	200	2
NCP21XM472J03RA	4.7k ±5%	3500 ±3%	3539	3545	3560	0.65	200	2
NCP21XV103J03RA	10k ±5%	3900 ±3%	3930	3934	3944	0.44	200	2
NCP21XW153J03RA	15k ±5%	3950 ±3%	3982	3987	3998	0.36	200	2
NCP21XW223J03RA	22k ±5%	3950 ±3%	3982	3987	3998	0.30	200	2
NCP21WB333J03RA	33k ±5%	4050 ±3%	4101	4108	4131	0.24	200	2
NCP21WB473J03RA	47k ±5%	4050 ±3%	4101	4108	4131	0.20	200	2
NCP21WF104J03RA	100k ±5%	4250 ±3%	4303	4311	4334	0.14	200	2

Rated Electric Power shows the required electric power that the thermistor's temperature rise to 125°C by self-heating, at ambient temperature of 25 °C.
 Operating Temperature Range: -40°C to +125°C

Temperature Sensor and Compensation Chip Type Standard Land Pattern Dimensions



Part Number	Soldering Methods	Dimensions (mm)			
		Chip (LxW)	a	b	c
NCP03	Reflow Soldering	0.6x0.3	0.25	0.3	0.3
NCP15/NCU15	Reflow Soldering	1.0x0.5	0.4	0.4-0.5	0.5
NCP18	Flow Soldering	1.6x0.8	0.6-1.0	0.8-0.9	0.6-0.8
	Reflow Soldering		0.6-0.8	0.6-0.7	0.6-0.8
NCU18	Flow Soldering	1.6x0.8	0.6-1.2	0.8-0.9	0.6-0.8
	Reflow Soldering		0.6-1.2	0.6-0.7	0.6-0.8
NCP21	Flow Soldering	2.0x1.25	1.0-1.1	0.9-1.0	1.0-1.2
	Reflow Soldering		1.0-1.1	0.6-0.7	1.0-1.2

Temperature Sensor and Compensation Chip Type Temperature Characteristics (Center Value)

Part Number	NCP□□XM221	NCP□□XM331	NCP□□XQ471	NCP□□XQ681	NCP□□XM102	NCP□□XQ102	NCP□□XM152	NCP□□XW152
Resistance	220Ω	330Ω	470Ω	680Ω	1.0kΩ	1.0kΩ	1.5kΩ	1.5kΩ
B-Constant	3500K	3500K	3650K	3650K	3500K	3650K	3500K	3950K
Temp. (°C)	Resistance (Ω)	Resistance (Ω)	Resistance (Ω)	Resistance (Ω)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)
-40	4947.904	7421.856	11822.473	17104.854	21.266	25.154	31.899	51.791
-35	3703.755	5555.632	8767.745	12685.248	16.150	18.655	24.225	37.172
-30	2798.873	4198.309	6570.224	9505.855	12.347	13.979	18.520	27.005
-25	2135.887	3203.831	4971.784	7193.219	9.503	10.578	14.255	19.843
-20	1645.037	2467.555	3796.933	5493.436	7.365	8.079	11.047	14.728
-15	1278.034	1917.051	2923.400	4229.599	5.747	6.220	8.621	11.044
-10	1000.620	1500.930	2269.599	3283.675	4.516	4.829	6.773	8.362
-5	789.612	1184.418	1775.225	2568.411	3.572	3.777	5.358	6.389
0	627.752	941.628	1399.050	2024.158	2.844	2.977	4.266	4.922
5	502.474	753.711	1110.220	1606.275	2.280	2.362	3.419	3.825
10	405.010	607.514	887.257	1283.691	1.839	1.888	2.758	2.994
15	328.480	492.720	713.463	1032.245	1.492	1.518	2.238	2.361
20	268.044	402.066	577.375	835.351	1.218	1.229	1.827	1.876
25	220.000	330.000	470.000	680.000	1.000	1.000	1.500	1.500
30	181.576	272.365	384.800	556.733	0.825	0.819	1.238	1.207
35	150.668	226.002	316.757	458.287	0.685	0.674	1.027	0.978
40	125.681	188.521	262.177	379.320	0.571	0.558	0.857	0.797
45	105.336	158.004	218.069	315.504	0.479	0.464	0.718	0.653
50	88.717	133.076	182.297	263.749	0.403	0.388	0.605	0.538
55	75.059	112.588	153.150	221.579	0.341	0.326	0.512	0.446
60	63.777	95.666	129.249	186.998	0.290	0.275	0.435	0.371
65	54.415	81.622	109.551	158.499	0.247	0.233	0.371	0.317
70	46.631	69.946	93.281	134.960	0.212	0.199	0.318	0.261
75	40.115	60.172	79.750	115.383	0.182	0.170	0.274	0.221
80	34.637	51.955	68.446	99.029	0.157	0.146	0.236	0.187
85	30.013	45.019	58.996	85.356	0.136	0.126	0.205	0.160
90	26.110	39.165	51.036	73.839	0.119	0.109	0.178	0.137
95	22.790	34.186	44.332	64.140	0.104	0.094	0.155	0.117
100	19.957	29.935	38.640	55.905	0.091	0.082	0.136	0.101
105	17.541	26.312	33.790	48.888	0.080	0.072	0.120	0.088
110	15.453	23.180	29.664	42.918	0.070	0.063	0.105	0.076
115	13.663	20.494	26.123	37.795	0.062	0.056	0.093	0.067
120	12.114	18.171	23.091	33.409	0.055	0.049	0.083	0.058
125	10.778	16.168	20.472	29.618	0.049	0.044	0.074	0.051

Part Number	NCP□□XM222	NCP□□XW222	NCP□□XM332	NCP□□XW332	NCP□□XM472	NCP□□XW472	NCP□□XH682	NCP□□XW682
Resistance	2.2kΩ	2.2kΩ	3.3kΩ	3.3kΩ	4.7kΩ	4.7kΩ	6.8kΩ	6.8kΩ
B-Constant	3500K	3950K	3500K	3950K	3500K	3950K	3380K	3950K
Temp. (°C)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)
-40	46.786	75.961	70.179	113.941	105.705	162.279	133.043	234.787
-35	35.530	54.520	53.295	81.779	79.126	116.474	100.756	168.515
-30	27.162	39.607	40.743	59.411	59.794	84.615	77.076	122.422
-25	20.907	29.103	31.360	43.654	45.630	62.173	59.540	89.953
-20	16.203	21.601	24.304	32.401	35.144	46.147	46.401	66.766
-15	12.644	16.198	18.966	24.297	27.303	34.604	36.482	50.066
-10	9.934	12.264	14.901	18.396	21.377	26.200	28.904	37.906
-5	7.858	9.370	11.787	14.055	16.869	20.018	23.047	28.963
0	6.257	7.219	9.386	10.829	13.411	15.423	18.509	22.313
5	5.015	5.609	7.523	8.414	10.735	11.984	14.974	17.338
10	4.045	4.391	6.067	6.586	8.653	9.380	12.189	13.571
15	3.283	3.463	4.924	5.195	7.018	7.399	9.978	10.705
20	2.680	2.751	4.019	4.126	5.726	5.877	8.215	8.503
25	2.200	2.200	3.300	3.300	4.700	4.700	6.800	6.800
30	1.816	1.771	2.724	2.656	3.879	3.783	5.654	5.474
35	1.507	1.434	2.260	2.152	3.219	3.064	4.725	4.434
40	1.257	1.169	1.885	1.753	2.685	2.497	3.967	3.613
45	1.053	0.958	1.580	1.437	2.250	2.046	3.344	2.961
50	0.887	0.789	1.331	1.184	1.895	1.686	2.829	2.440
55	0.751	0.654	1.126	0.981	1.604	1.397	2.404	2.022
60	0.638	0.545	0.957	0.817	1.363	1.164	2.050	1.683
65	0.544	0.456	0.816	0.684	1.163	0.974	1.759	1.409
70	0.466	0.383	0.700	0.575	0.996	0.819	1.515	1.185
75	0.401	0.324	0.602	0.486	0.857	0.692	1.309	1.001
80	0.346	0.275	0.520	0.412	0.740	0.587	1.135	0.849
85	0.300	0.234	0.450	0.351	0.641	0.500	0.988	0.724
90	0.261	0.200	0.392	0.301	0.558	0.428	0.862	0.620
95	0.228	0.172	0.342	0.258	0.487	0.368	0.755	0.532
100	0.200	0.149	0.299	0.223	0.426	0.318	0.662	0.459
105	0.175	0.129	0.263	0.193	0.375	0.275	0.583	0.398
110	0.155	0.112	0.232	0.168	0.330	0.239	0.515	0.346
115	0.137	0.098	0.205	0.146	0.292	0.208	0.457	0.302
120	0.121	0.085	0.182	0.128	0.259	0.182	0.406	0.264
125	0.108	0.075	0.162	0.113	0.230	0.160	0.361	0.232

Continued on the following page. ↗

Temperature Sensor and Compensation Chip Type Temperature Characteristics (Center Value)

Continued from the preceding page. ↘

Part Number	NCP□□XV103	NCP□□XH153	NCP□□XW153	NCP□□XH223	NCP□□XW223	NCP□□WL223	NCP□□WB333	NCP□□WF333
Resistance	10kΩ	15kΩ	15kΩ	22kΩ	22kΩ	22kΩ	33kΩ	33kΩ
B-Constant	3900K	3380K	3950K	3380K	3950K	4485K	4050K	4250K
Temp. (°C)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)
-40	328.996	293.478	517.912	430.434	759.605	1073.436	1227.263	1451.049
-35	237.387	222.256	371.724	325.976	545.196	753.900	874.449	1019.238
-30	173.185	170.021	270.048	249.364	396.070	535.073	630.851	725.084
-25	127.773	131.338	198.426	192.629	291.025	383.590	460.457	522.021
-20	95.327	102.355	147.278	150.121	216.008	277.643	339.797	379.842
-15	71.746	80.474	110.439	118.029	161.977	202.813	253.363	279.371
-10	54.564	63.759	83.617	93.514	122.638	149.462	190.766	207.566
-5	41.813	50.838	63.888	74.563	93.702	111.082	144.964	155.639
0	32.330	40.828	49.221	59.881	72.191	83.233	111.087	117.814
5	25.194	33.032	38.245	48.446	56.093	62.858	85.842	89.925
10	19.785	26.888	29.936	39.436	43.907	47.831	66.861	69.204
15	15.651	22.010	23.613	32.282	34.633	36.664	52.470	53.675
20	12.468	18.121	18.756	26.577	27.509	28.304	41.471	41.937
25	10.000	15.000	15.000	22.000	22.000	22.000	33.000	33.000
30	8.072	12.472	12.074	18.292	17.709	17.214	26.430	26.143
35	6.556	10.422	9.780	15.285	14.344	13.557	21.298	20.845
40	5.356	8.751	7.969	12.834	11.688	10.744	17.266	16.723
45	4.401	7.375	6.531	10.817	9.578	8.566	14.076	13.498
50	3.635	6.241	5.382	9.154	7.894	6.871	11.538	10.954
55	3.019	5.302	4.459	7.777	6.540	5.544	9.506	8.940
60	2.521	4.521	3.713	6.631	5.446	4.498	7.870	7.334
65	2.115	3.879	3.108	5.690	4.559	3.669	6.549	6.046
70	1.781	3.341	2.613	4.901	3.832	3.009	5.475	5.011
75	1.509	2.887	2.208	4.234	3.239	2.479	4.595	4.170
80	1.284	2.503	1.873	3.671	2.748	2.052	3.874	3.487
85	1.097	2.178	1.597	3.195	2.342	1.707	3.282	2.928
90	0.941	1.902	1.367	2.790	2.004	1.426	2.789	2.469
95	0.810	1.664	1.174	2.441	1.722	1.196	2.379	2.091
100	0.701	1.461	1.013	2.142	1.486	1.008	2.038	1.777
105	0.608	1.287	0.878	1.888	1.287	0.852	1.751	1.516
110	0.530	1.137	0.763	1.668	1.119	0.724	1.509	1.298
115	0.463	1.007	0.665	1.477	0.975	0.617	1.306	1.116
120	0.406	0.895	0.582	1.312	0.854	0.528	1.134	0.962
125	0.358	0.797	0.511	1.169	0.750	0.454	0.987	0.832

Part Number	NCP□□WL333	NCP□□WL473	NCP□□WD683	NCP□□WF683	NCP□□WL683	NCP□□WL104	NCP□□WL154	NCP□□WM154
Resistance	33kΩ	47kΩ	68kΩ	68kΩ	68kΩ	100kΩ	150kΩ	150kΩ
B-Constant	4485K	4485K	4150K	4250K	4485K	4485K	4485K	4500K
Temp. (°C)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)
-40	1610.154	2293.249	2735.359	2990.041	3317.893	4879.254	7318.881	7899.466
-35	1130.850	1610.605	1937.391	2100.247	2330.237	3426.818	5140.228	5466.118
-30	802.609	1143.110	1389.345	1494.113	1653.862	2432.149	3648.224	3834.499
-25	575.385	819.487	1008.014	1075.679	1185.641	1743.590	2615.385	2720.523
-20	416.464	593.146	738.978	782.705	858.168	1262.012	1893.018	1951.216
-15	304.219	433.281	547.456	575.674	626.875	921.875	1382.813	1415.565
-10	224.193	319.305	409.600	427.712	461.974	679.373	1019.059	1036.984
-5	166.623	237.312	309.217	320.710	343.345	504.919	757.379	767.079
0	124.850	177.816	235.606	242.768	257.266	378.333	567.499	572.667
5	94.287	134.287	180.980	185.300	194.287	285.717	428.575	431.264
10	71.747	102.184	140.139	142.603	147.841	217.414	326.121	327.405
15	54.996	78.327	109.344	110.602	113.325	166.654	249.981	250.538
20	42.455	60.467	85.929	86.415	87.484	128.653	192.979	193.166
25	33.000	47.000	68.000	68.000	68.000	100.000	150.000	150.000
30	25.822	36.776	54.167	53.871	53.208	78.247	117.370	117.281
35	20.335	28.962	43.421	42.954	41.903	61.622	92.433	92.293
40	16.115	22.952	35.016	34.460	33.208	48.835	73.252	73.090
45	12.849	18.301	28.406	27.814	26.477	38.937	58.406	58.240
50	10.306	14.679	23.166	22.572	21.237	31.231	46.846	46.665
55	8.317	11.845	18.997	18.422	17.137	25.202	37.803	37.605
60	6.748	9.610	15.657	15.113	13.904	20.448	30.671	30.453
65	5.504	7.839	12.967	12.459	11.342	16.679	25.018	24.804
70	4.513	6.427	10.794	10.325	9.299	13.675	20.513	20.293
75	3.718	5.296	9.021	8.592	7.662	11.268	16.902	16.679
80	3.078	4.384	7.575	7.185	6.343	9.329	13.993	13.776
85	2.560	3.646	6.387	6.033	5.276	7.758	11.638	11.428
90	2.139	3.046	5.407	5.087	4.407	6.481	9.721	9.520
95	1.794	2.555	4.598	4.309	3.697	5.437	8.155	7.966
100	1.511	2.152	3.922	3.661	3.114	4.580	6.869	6.688
105	1.278	1.820	3.359	3.124	2.634	3.873	5.810	5.639
110	1.085	1.546	2.887	2.675	2.236	3.289	4.933	4.772
115	0.925	1.318	2.489	2.299	1.907	2.804	4.206	4.052
120	0.792	1.128	2.155	1.983	1.632	2.400	3.601	3.454
125	0.681	0.970	1.870	1.715	1.403	2.064	3.096	2.955

Continued on the following page. ↗

Temperature Sensor and Compensation Chip Type Temperature Characteristics (Center Value)

Continued from the preceding page. ↘

Part Number	NCP□□WL224	NCP□□WM224	NCP□□WM474
Resistance	220kΩ	220kΩ	470kΩ
B-Constant	4485K	4500K	4500K
Temp. (°C)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)
-40	10734.358	11585.884	24751.661
-35	7539.001	8016.973	17127.169
-30	5350.729	5623.931	12014.762
-25	3835.898	3990.100	8524.305
-20	2776.427	2861.784	6113.811
-15	2028.126	2076.162	4435.437
-10	1494.620	1520.909	3249.216
-5	1110.822	1125.049	2403.515
0	832.332	839.912	1794.358
5	628.577	632.521	1351.294
10	478.310	480.194	1025.870
15	366.639	367.455	785.018
20	283.036	283.310	605.252
25	220.000	220.000	470.000
30	172.143	172.012	367.480
35	135.569	135.364	289.186
40	107.436	107.198	229.014
45	85.662	85.419	182.485
50	68.708	68.441	146.215
55	55.444	55.153	117.828
60	44.984	44.665	95.420
65	36.694	36.379	77.718
70	30.085	29.763	63.584
75	24.789	24.462	52.260
80	20.523	20.205	43.166
85	17.068	16.761	35.808
90	14.258	13.962	29.828
95	11.961	11.684	24.961
100	10.075	9.809	20.955
105	8.521	8.270	17.668
110	7.236	6.998	14.951
115	6.169	5.942	12.695
120	5.281	5.067	10.824
125	4.540	4.334	9.259

Part Number	NCU□□XH103D	NCU□□XH103	NCU□□WB473D	NCU□□WB473	NCU□□WF104D	NCU□□WF104
Resistance	10kΩ±0.5%	10kΩ	47kΩ±0.5%	47kΩ	100kΩ±0.5%	100kΩ
B-Constant	3380K	3380K	4050K	4050K	4250K	4250K
Temp. (°C)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)	Resistance (kΩ)
-40	197.390	195.652	1690.586	1747.920	4221.283	4397.119
-35	149.390	148.171	1215.318	1245.428	2995.044	3088.599
-30	114.340	113.347	882.908	898.485	2146.996	2197.225
-25	88.381	87.559	647.911	655.802	1554.599	1581.881
-20	68.915	68.237	480.069	483.954	1136.690	1151.037
-15	54.166	53.650	359.009	360.850	839.019	846.579
-10	42.889	42.506	270.868	271.697	624.987	628.988
-5	34.196	33.892	206.113	206.463	469.678	471.632
0	27.445	27.219	158.126	158.214	355.975	357.012
5	22.165	22.021	122.267	122.259	272.011	272.500
10	18.010	17.926	95.256	95.227	209.489	209.710
15	14.720	14.674	74.754	74.730	162.559	162.651
20	12.099	12.081	59.075	59.065	127.057	127.080
25	10.000	10.000	47.000	47.000	100.000	100.000
30	8.309	8.315	37.636	37.643	79.222	79.222
35	6.939	6.948	30.326	30.334	63.167	63.167
40	5.824	5.834	24.583	24.591	50.677	50.677
45	4.911	4.917	20.043	20.048	40.904	40.904
50	4.160	4.161	16.433	16.433	33.195	33.195
55	3.539	3.535	13.545	13.539	27.091	27.091
60	3.024	3.014	11.223	11.209	22.224	22.224
65	2.593	2.586	9.345	9.328	18.323	18.323
70	2.233	2.228	7.818	7.798	15.184	15.184
75	1.929	1.925	6.571	6.544	12.635	12.635
80	1.673	1.669	5.548	5.518	10.566	10.566
85	1.455	1.452	4.704	4.674	8.873	8.873
90	1.270	1.268	4.004	3.972	7.481	7.481
95	1.112	1.110	3.422	3.388	6.337	6.337
100	0.976	0.974	2.936	2.902	5.384	5.384
105	0.860	0.858	2.528	2.494	4.594	4.594
110	0.759	0.758	2.184	2.150	3.934	3.934
115	0.673	0.672	1.893	1.860	3.380	3.380
120	0.598	0.596	1.646	1.615	2.916	2.916
125	0.532	0.531	1.436	1.406	2.522	2.522

Temperature Sensor and Compensation Chip Type ⚠Caution/Notice

⚠Caution (Storage and Operating Conditions)

This product is designed for application in an ordinary environment (normal room temperature, humidity and atmospheric pressure).

Do not use under the following conditions because all of these factors can deteriorate the product characteristics or cause failures and burn-out.

1. Corrosive gas or deoxidizing gas
(Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)

2. Volatile or flammable gas
3. Dusty conditions
4. Under vacuum, or under high or low pressure
5. Wet or humid locations
6. Places with salt water, oils, chemical liquids or organic solvents
7. Strong vibrations
8. Other places where similar hazardous conditions exist

⚠Caution (Others)

Be sure to provide an appropriate fail-safe function on your product to prevent secondary damage that may be caused by the abnormal function or the failure of our product.

Notice (Storage and Operating Conditions)

To keep the solderability of the product from degrading, the following storage conditions are recommended.

1. Storage condition:
Temperature -10 to +40°C
Humidity less than 75%RH (not dewing condition)
2. Storage term:
Use this product within 6 months after delivery by first-in and first-out stocking system.
3. Storage place:
Do not store this product in corrosive gas (Sulfuric acid gas, Chlorine gas, etc.) or in direct sunlight.

Notice (Rating)

Use this product within the specified temperature range.

Higher temperature may cause deterioration of the characteristics or the material quality of this product.

Notice (Handling)

The ceramic of this product is fragile, and care must be taken not to load an excessive press-force or to cause a shock at handling.

Such forces may cause cracking or chipping.

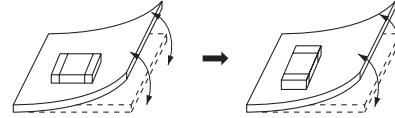
Temperature Sensor and Compensation Chip Type ⚠️Caution/Notice

Notice (Soldering and Mounting)

1. Mounting Position

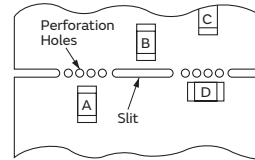
Choose a mounting position that minimizes the stress imposed on the chip during flexing or bending of the board.

Component Direction



Locate this product horizontal to the direction in which stress acts.

Mounting Close to Board Separation Line



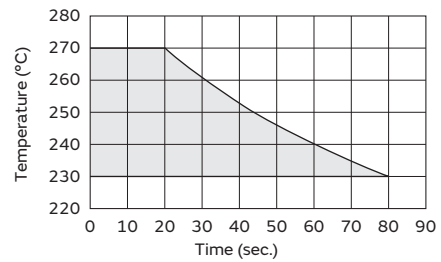
Keep this product on the PC Board away from the Separation Line.
 Worst ← A-C-B-D → Better

2. Allowable Soldering Temperature and Time

- Solder within the temperature and time combinations indicated by the slanted lines in the following graphs.
- Excessive soldering conditions may cause dissolution of metallization or deterioration of solder-wetting on the external electrode.
- In case of repeated soldering, the accumulated soldering time should be within the range shown in the figure below. (For example, Reflow peak temperature: 260°C, twice -> The total accumulated soldering time at 260°C is within 30 seconds.)

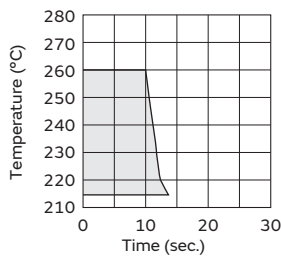
NCP03/15 Series, NCU15 Series

Allowable Reflow Soldering Temp. and Time

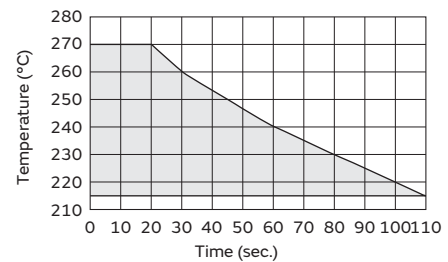


NCP18/21 Series, NCU18 Series

Allowable Flow Soldering Temp. and Time



Allowable Reflow Soldering Temp. and Time



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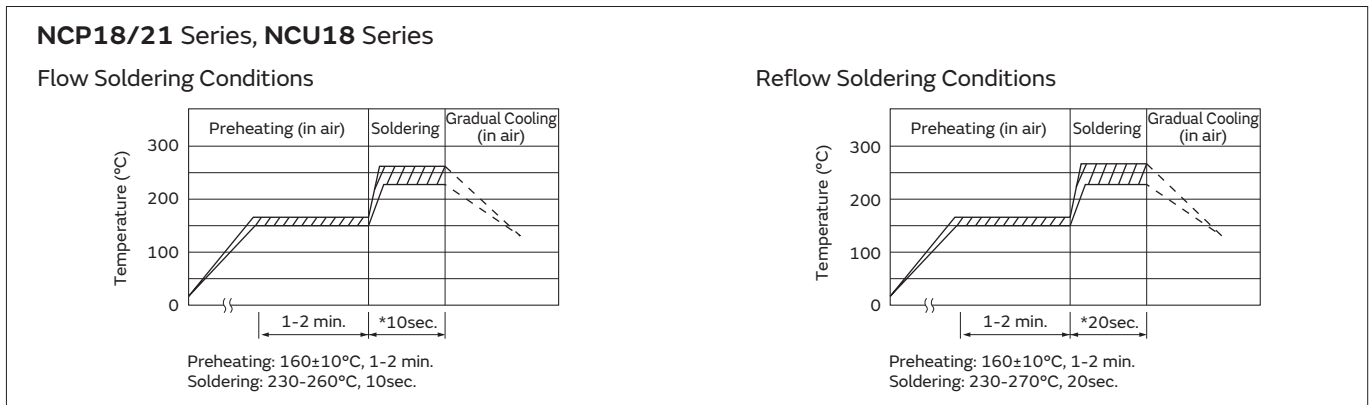
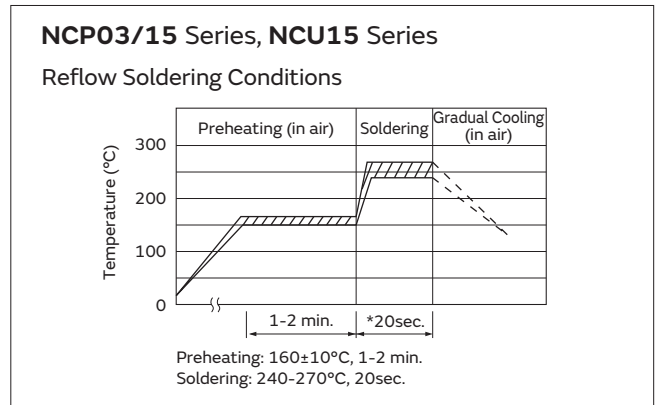
Temperature Sensor and Compensation Chip Type ⚠Caution/Notice

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3. Recommended Temperature Profile for Soldering

- (a) Insufficient preheating may cause a crack on the ceramic body. The difference between preheating temperature and maximum temperature in the profile shall be 100 °C.
 (b) Rapid cooling by dipping in solvent or by other means is not recommended.

* In case of repeated soldering, the accumulated soldering time should be within the range shown in the figure of section 2.



4. Solder and Flux

(1) Solder and Paste

(a) Reflow Soldering: NCP03/15/18/21 Series, NCU15/18 Series
 Use RA/RMA type or equivalent type of solder paste. For your reference, we use the solder paste below for any internal tests of this product.

- RMA9086 90-4-M20 (Sn:Pb=63wt%:37wt%)
 (Manufactured by Alpha Metals Japan Ltd.)
- M705-221BM5-42-11 (Sn:Ag:Cu=96.5wt%:3.0wt%:0.5wt%)
 (Manufactured by Senju Metal Industry Co., Ltd.)

(b) Flow Soldering: NCP18/21 Series, NCU18 Series

We use the solder paste below for any internal tests of this product.

- Sn:Pb=63wt%:37wt%
- Sn:Ag:Cu=96.5wt%:3.0wt%:0.5wt%

(2) Flux

Use rosin type flux in the soldering process.

If the flux listed below is used, some problems might be caused in the product characteristics and reliability.

Please do not use the following flux.

- Strong acidic flux (with halide content exceeding 0.1wt%).
- Water-soluble flux
 (*Water-soluble flux can be defined as non-rosin type flux including wash-type flux and non-wash-type flux.)

5. Cleaning Conditions

For removing the flux after soldering, observe the following points in order to avoid deterioration of the characteristics or any change of the external electrodes' quality.

- Please keep mounted parts and a substrate from an occurrence of resonance in ultrasonic cleaning.
- Please do not clean the products in the case of using a non-wash-type flux.

	NCP03/15, NCU15	NCP18/21, NCU18
Solvent	Isopropyl Alcohol	Isopropyl Alcohol
Dipping Cleaning	Less than 5 minutes at room temp. or less than 2 minutes at 40°C max.	Less than 5 minutes at room temp. or less than 2 minutes at 40°C max.
Ultrasonic Cleaning	Less than 5 minutes and 20W/ℓ Frequency of 28kHz to 40kHz	Less than 1 minute and 20W/ℓ Frequency of several 10kHz to 100kHz

6. Drying

After cleaning, promptly dry this product.

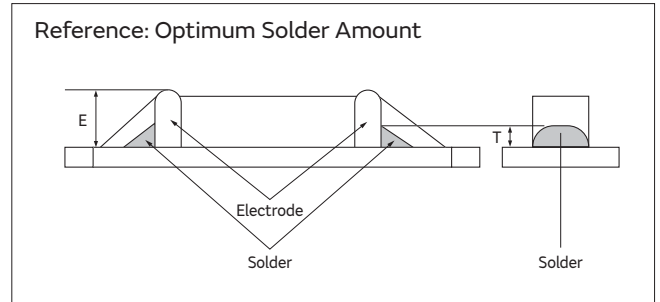
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Temperature Sensor and Compensation Chip Type ⚠️Caution/Notice

Continued from the preceding page. ↘

7. Printing Conditions of Solder Paste

- The amount of solder is critical. Standard height of fillet is shown in the table below.
- Too much solder may cause mechanical stress, resulting in cracking, mechanical and/or electronic damage.



Part Number	Solder Paste Thickness	T
NCP03	100μm	$1/3E \leq T \leq E$
NCP15, NCU15	150μm	$1/3E \leq T \leq E$
NCP18/NCP21, NCU18	200μm	$0.2\text{mm} \leq T \leq E$

8. Adhesive Application and Curing

- Thin or insufficient adhesive may result in loose component contact with land during flow soldering.
- Low viscosity adhesive causes chips to slip after mounting.

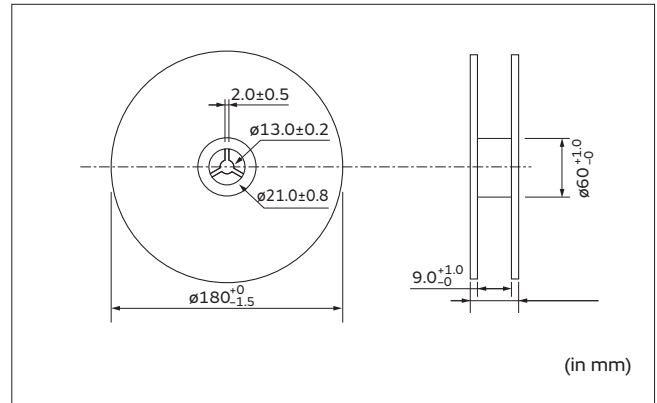
Temperature Sensor and Compensation Chip Type Package

Minimum Quantity Guide

Part Number	Quantity (pcs.)	
	Paper Tape	Embossed Tape
NCP03	15000	-
NCP15, NCU15	10000	
NCP18, NCU18	4000	
NCP21	-	4000

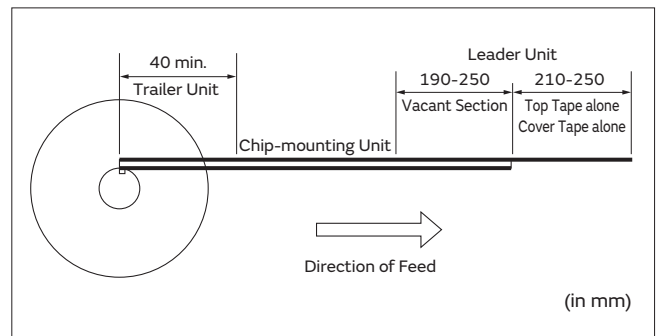
Tape Carrier Packaging

1. Dimensions of Reel



2. Taping Method

- (1) A tape in a reel contains Leader unit and Trailer unit where products are not packed. (Please refer to the figure at the right.)
- (2) The top and base tapes or plastic and cover tape are not stuck at the first five pitches minimum.
- (3) A label should be attached on the reel. (MURATA's part number, inspection number and quantity should be marked on the label.)
- (4) Taping reels are packed in a package.

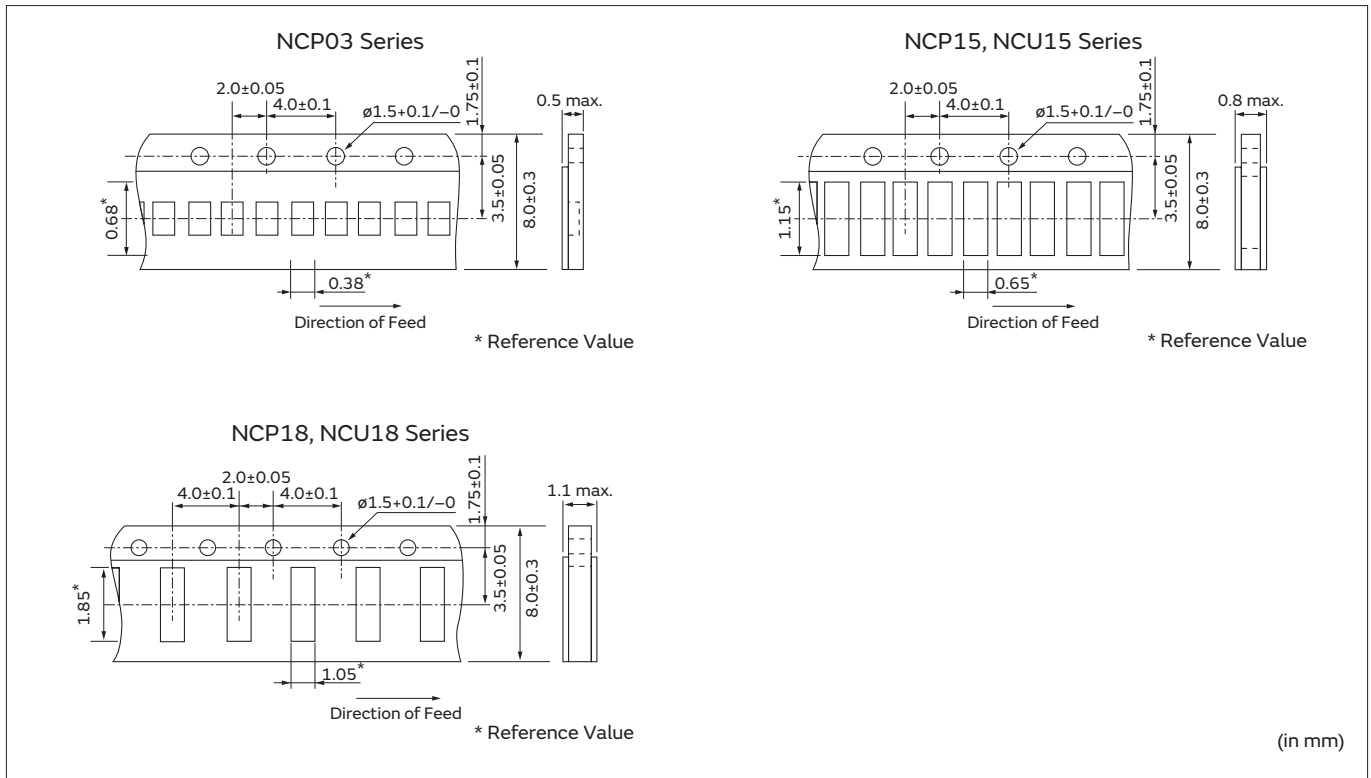


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Temperature Sensor and Compensation Chip Type Package

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3. Paper Tape (NCP03/15/18 Series, NCU15/18 Series)



(in mm)

(1) Other Conditions

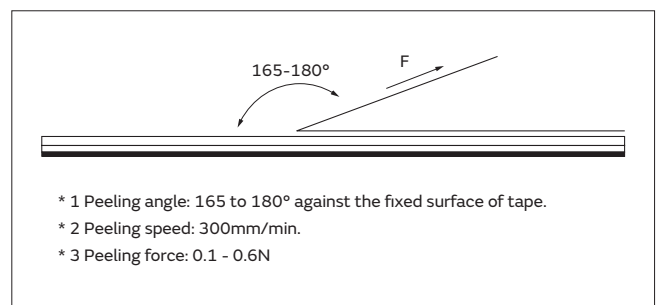
(a) Packaging

Products are packaged in the cavity of the base tape and sealed by a top tape and bottom tape.

(b) Tape

The top tape and bottom tape have no joints and products are packaged and sealed in the cavity of the base tape, continuously.

(2) Peeling Force of Top Tape



(3) Pull Strength

Pull strength of top tape is specified at 10N minimum.

Pull strength of bottom tape should be specified 5N minimum.

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Temperature Sensor and Compensation Chip Type Package

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4. Embossed Tape (NCP21 Series)

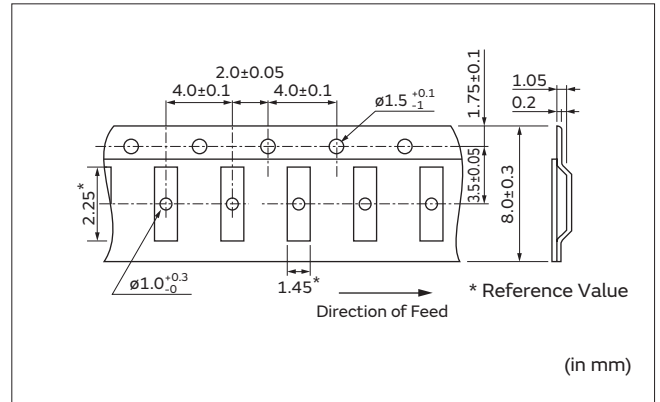
(1) Other Conditions

(a) Packaging

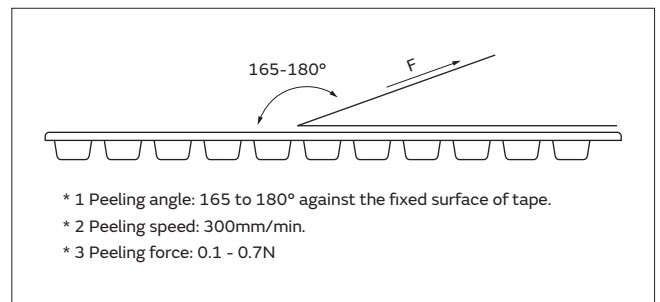
Products are packaged in the each cavity of Embossed tape and sealed by Cover tape.

(b) Tape

Cover tape has no joints.



(2) Peeling Force of Cover Tape



(3) Tape Strength

Pull strength of Embossed tape and Cover tape should be specified 10N minimum.