

**Chip NTC Thermistor** for temperature sensor and temperature compensation 0805 size

1.Part Numbering.

(ex.) NC P 21 XV 103 J 03 RA  
 Product ID Series Dimensions Temperature Resistance Resistance Individual Packaging  
 Specifications Tolerance

2.Ratings

2.1 J SERIES

P/N	Resistance (ohm) at 25°C (*1)	B-constant (K) 25/50°C (*2)	Maximum operating current (mA) (*1,*3)	Maximum voltage (V) (*4)	Thermal Dissipation Constant (mW/°C) (*1)	Operating Temperature Range (°C)	Graph of maximum operating voltage (*5)
NCP21XM221J03RA	220 ± 5%	3500 ± 3%	0.953	5.00	Approx. 2.0	-40 ~ +125	①
NCP21XQ471J03RA	470 ± 5%	3650 ± 3%	0.652				②
NCP21XQ102J03RA	1.0 k ± 5%	3650 ± 3%	0.447				③
NCP21XW222J03RA	2.2 k ± 5%	3950 ± 3%	0.302				④
NCP21XM472J03RA	4.7 k ± 5%	3500 ± 3%	0.206				⑤
NCP21XV103J03RA	10 k ± 5%	3900 ± 3%	0.141				⑥
NCP21XW153J03RA	15 k ± 5%	3950 ± 3%	0.115				⑦
NCP21XW223J03RA	22 k ± 5%	3950 ± 3%	0.095				⑧
NCP21WB333J03RA	33 k ± 5%	4050 ± 3%	0.078				⑨
NCP21WB473J03RA	47 k ± 5%	4050 ± 3%	0.065				⑩
NCP21WF104J03RA	100 k ± 5%	4250 ± 3%	0.045				⑪

- \*1 : NTC thermistor is measured at 25°C in still air, as a single unit without mounting.
- \*2 : B-constant is a constant representing the resistance temperature characteristic of NTC thermistor.
- \*3 : NTC Thermistor raises 0.1°C more by maximum operating current.
- \*4 : Voltage range shown on Fig 2.3, can keep NTC Temperature less than 0.1°C rise.
- \*5 : Voltage at which self-heating becomes 0.1°C when applied to an unmounted NTC thermistor  
Please use NTC Thermistor by lower voltage than the maximum operating voltage curve.

Please consult with us on off-specification usage.

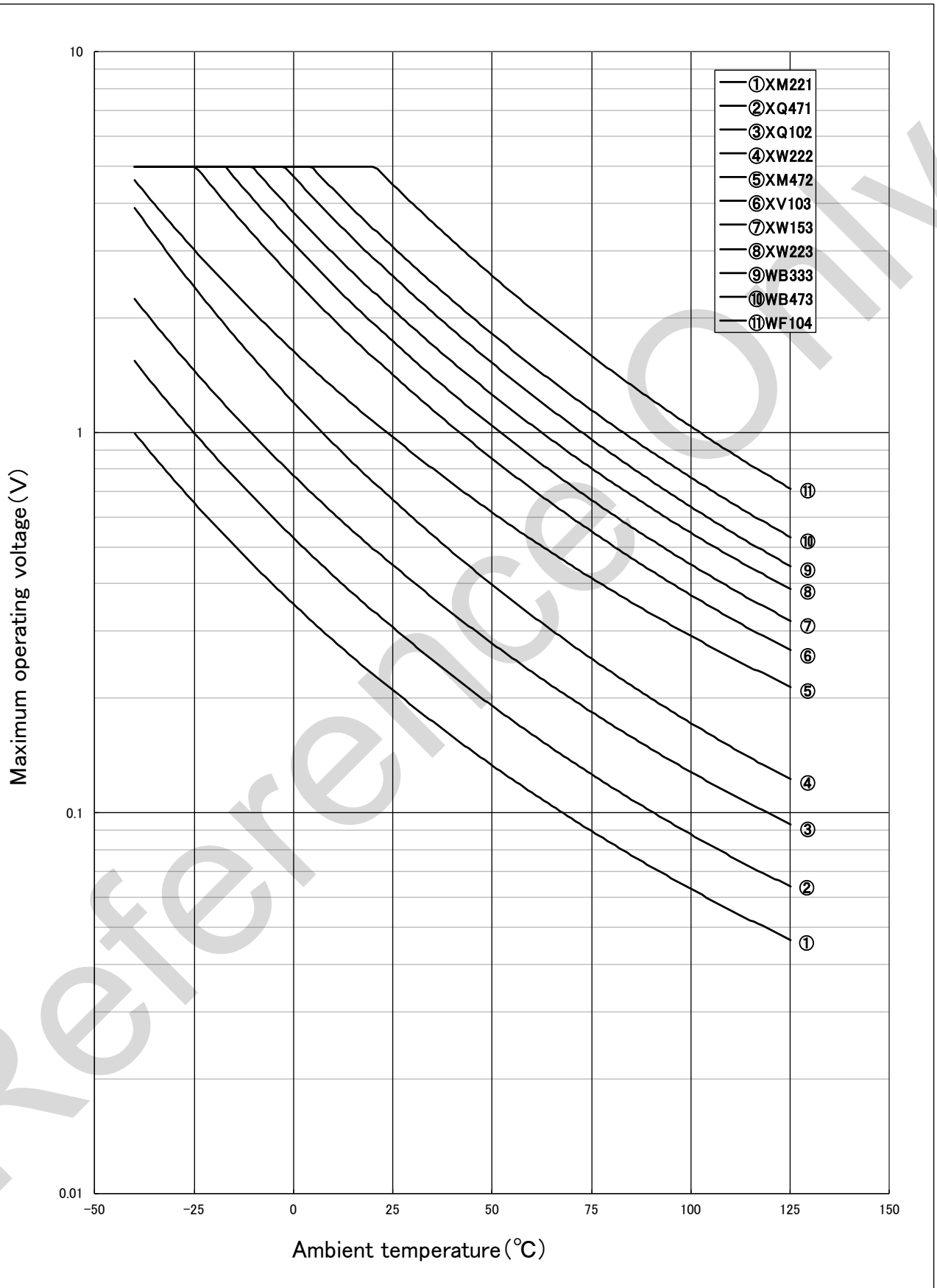
2.2 K SERIES

P/N	Resistance (ohm) at 25°C (*1)	B-constant (K) 25/50°C (*2)	Maximum operating current (mA) (*1, *3)	Maximum voltage (V) (*4)	Thermal Dissipation Constant (mW/°C) (*1)	Operating Temperature Range (°C)	Graph of maximum operating voltage (*5)
NCP21XM221K03RA	220 ± 10%	3500 ± 3%	0.953	5.00	Approx. 2.0	-40 ~ +125	①
NCP21XQ471K03RA	470 ± 10%	3650 ± 3%	0.652				②
NCP21XQ102K03RA	1.0 k ± 10%	3650 ± 3%	0.447				③
NCP21XW222K03RA	2.2 k ± 10%	3950 ± 3%	0.302				④
NCP21XM472K03RA	4.7 k ± 10%	3500 ± 3%	0.206				⑤
NCP21XV103K03RA	10 k ± 10%	3900 ± 3%	0.141				⑥
NCP21XW153K03RA	15 k ± 10%	3950 ± 3%	0.115				⑦
NCP21XW223K03RA	22 k ± 10%	3950 ± 3%	0.095				⑧
NCP21WB333K03RA	33 k ± 10%	4050 ± 3%	0.078				⑨
NCP21WB473K03RA	47 k ± 10%	4050 ± 3%	0.065				⑩
NCP21WF104K03RA	100 k ± 10%	4250 ± 3%	0.045				⑪

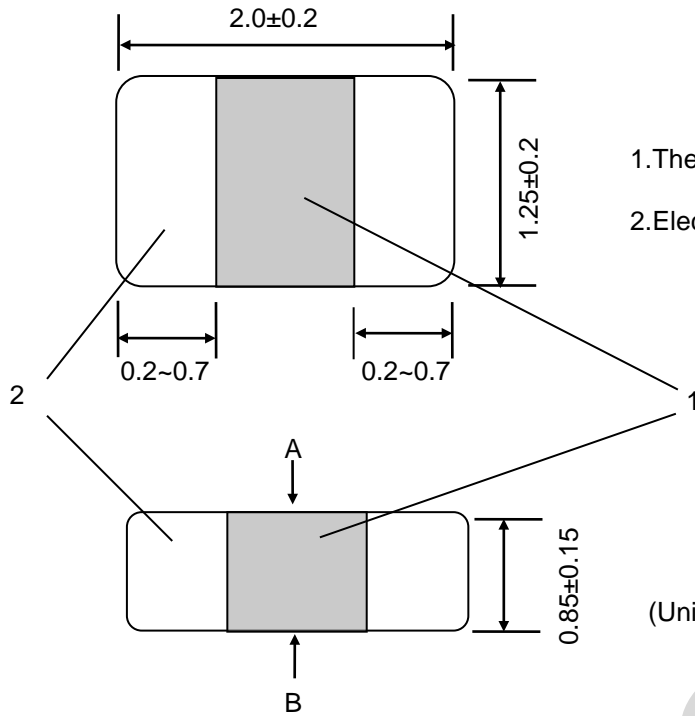
- \*1 : NTC thermistor is measured at 25°C in still air, as a single unit without mounting.
- \*2 : B-constant is a constant representing the resistance temperature characteristic of NTC thermistor.
- \*3 : NTC Thermistor raises 0.1°C more by maximum operating current.
- \*4 : Voltage range shown on Fig 2.3, can keep NTC Temperature less than 0.1°C rise.
- \*5 : Voltage at which self-heating becomes 0.1°C when applied to an unmounted NTC thermistor  
Please use NTC Thermistor by lower voltage than the maximum operating voltage curve.

Please consult with us on off-specification usage.

2.3 Graph of Maximum Operating Voltage Reduction Characteristics



3. Dimensions



1. Thermistor

2. Electrode (Ag System + Ni Plating + Sn Plating)

Surface A or B should face PCB  
(Printed Circuit Board)

(Unit : mm)

4. Quantity (Standard Quantity)

Products quantity in a reel
4,000 pcs./1 reel

**⚠ CAUTION**

Do not use chip NTC Thermistor under the following environments ; These all these factors can deteriorate the characteristics of product or can cause failures and burning-out.

- (1) High humidity environment, or in close proximity to splashing water.  
A water droplet between the outer electrodes needs to be avoided completely.  
(Ex. Resistance abnormality, Short (includes Sn/Ag ion migration))
- (2) corrosive or deoxidizing gas (Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>x</sub>, NO<sub>x</sub>, etc.)  
(Ex. Resistance abnormality, Short (includes Sn/Ag ion migration))

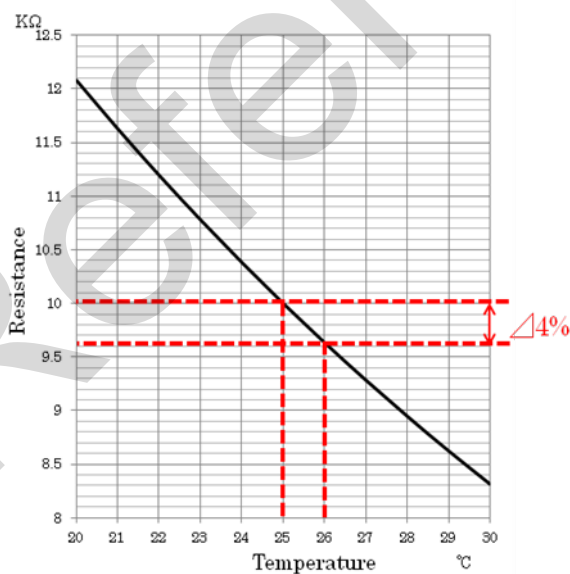
Outside temperature influences the resistance value of this product, therefore is important to control the fluctuation of the environment temperature when measuring the resistance value of this product.

- POINT1: Please measure the resistance value without touching a device and a substrate by hand or finger directly.
- POINT2: Please install a thermometer at your measuring area in order to recognize the environmental temperature.

Murata's website explains it by using video in following URL:

<http://www.murata.com/en-us/support/faqs/products/thermistor/ntc/pct/0001>

(For Example) Resistance value changes  
Murata P/N : NCP15XH103F03RC  
(Resistance @25°C :10kΩ+/-1%, B-constant : 3380K+/-1%)  
Resistance value change approx.4% per 1°C difference  
around 25°C



Temp. (°C)	Resist. (k ohm)	Changes %
20	12.081	20.8%
21	11.628	16.3%
22	11.195	12.0%
23	10.780	7.8%
24	10.382	3.8%
25	10.000	0.0%
26	9.634	-3.7%
27	9.284	-7.2%
28	8.947	-10.5%
29	8.624	-13.8%
30	8.315	-16.9%



3. Solder and Flux

(1) Solder Paste

- i. Flow Soldering : We are using the following solder paste for any internal tests of this product.
  - Sn:Pb=63wt%:37wt%
  - Sn:Ag:Cu=96.5wt%:3.0wt%:0.5wt%
- ii. Reflow Soldering : Use RA/RMA type or equivalent type of solder paste.  
For your reference, we are using 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 Metals Industry Co., Ltd)

(2) Flux : Use rosin type flux in soldering process.

Problems with product characteristics or reliability may occur if the below flux is used. Please do not use below 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.)

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

(1) Cleaning Conditions

Solvent	Dipping Cleaning	Ultrasonic Cleaning
Isopropyl Alcohol	Less than 5 min. at room temp. or Less than 2 min. at 40°C max.	Less than 1 min. 20W/L Frequency of several 10 KHz to several 100 KHz.

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

(2) Drying : Please fully perform cleaning and keep flux and cleaning solvents from product. After cleaning, promptly dry this product.

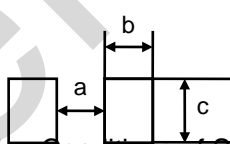
5. Do not give this product a strong press-force nor a mechanical shock. Such mechanical forces may cause cracking or chipping of this ceramic product.

6. In your mounting process, observe the following points in order to avoid deterioration of the characteristics or destruction of this product. The mounting quality of this product may also be affected by the mounting conditions, shown the points below.

(1) Please mount this product by soldering. When mounted by other methods, such as conductive adhesives, please contact us in advance.

(2) Recommended Land Pattern

Too large of a land pattern will allow too much solder paste at the mounting points. This may cause destruction of his product Due to mechanical stress, especially in the case of board bending.

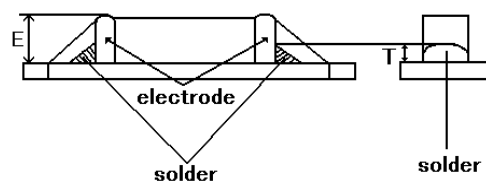


	a	b	c
Flow Soldering	1.0 - 1.1	0.9 - 1.0	1.0 - 1.2
Reflow Soldering	1.0 - 1.1	0.6 - 0.7	1.0 - 1.2

(Unit : mm)

(3) Printing Conditions of Solder Paste

- i. Recommendable thickness of solder paste printing shall be 200 μm.
- ii. After soldering, the solder fillet shall be a height from 0.2 mm to the thickness of this product. (See the figures below.)



$$0.2\text{mm} \leq T \leq E$$

- iii. Too much solder will put too much mechanical stress on this product, such stress may cause cracking or mechanical damage. Also, it can deteriorate the electrical performance of this product.

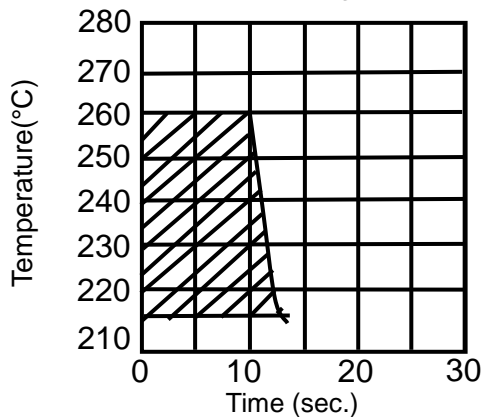
(4) Adhesive Application and Curing

- i. If insufficient adhesive is applied, or if the adhesive is not sufficiently hardened, this product may have a loose contact with the land, during flow soldering.
- ii. Too low viscosity of adhesive causes this product to slip on broad, after mounting.

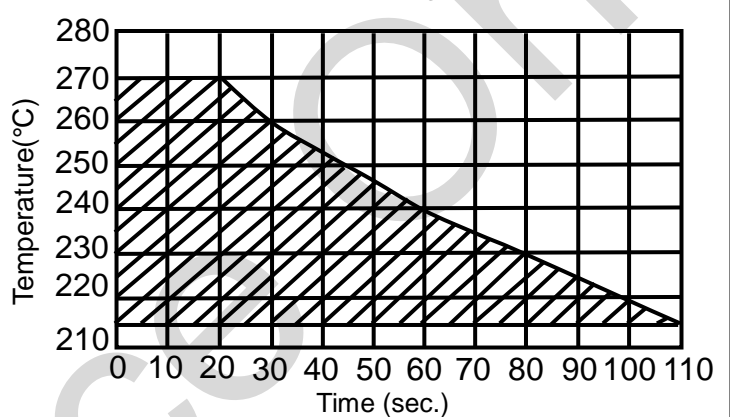
(5) Allowable Soldering Temperature and Time

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

<Allowable Flow Soldering Temp. and Time>



<Allowable Reflow Soldering Temp. and Time>

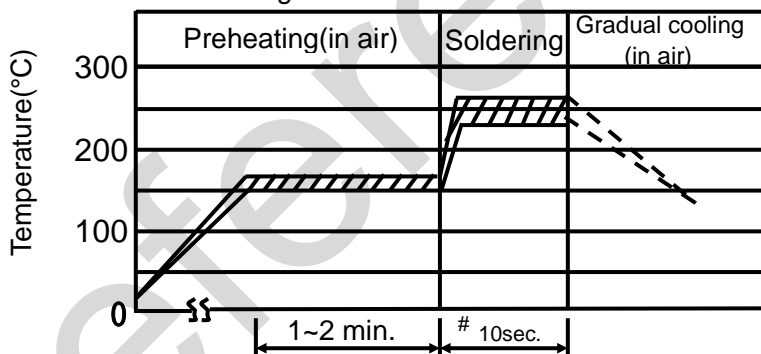


(6) Recommended Temperature Profile for Soldering

- i. Insufficient preheating may cause a crack on ceramic body. The difference between preheating temperature and soldering temperature shall be less than 100°C.
- ii. Rapid cooling by dipping in solvent or by other means is not recommended.

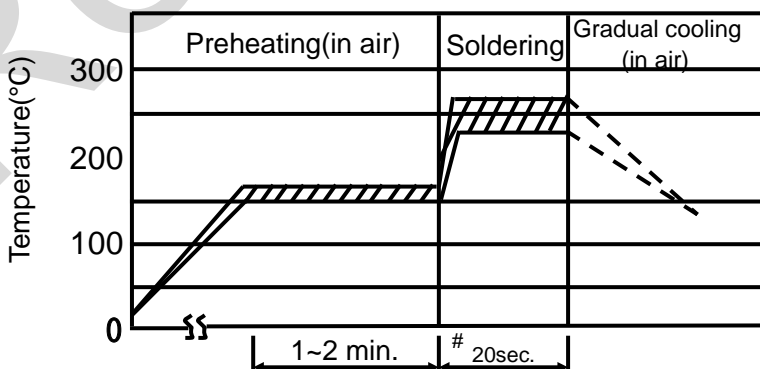
Recommended Soldering Condition

<Flow Soldering Condition>



Preheating: 160 +/- 10 °C  
1min. to 2 min.  
Soldering: 230~260°C  
10sec.

<Reflow Soldering Condition>



Preheating: 160 +/- 10 °C  
1min. to 2 min.  
Soldering: 230~270°C  
20sec.

#: In case of repeated soldering, the total accumulated soldering time should be within the range shown above figure (5).



(7) There is a Risk of unexpected failures (tombstone, insufficient solder-wetting, etc.) in your mounting process, caused by the mounting conditions. Please evaluate if this product is correctly mounted under your mounting conditions.

(8) Reworking Conditions with Soldering Iron

The following conditions must be strictly followed using a soldering iron.

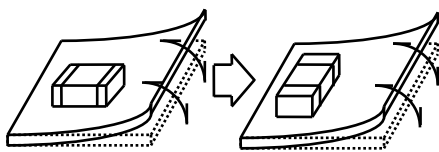
Item	Conditions
Preheating	at 150°C for 1 to 2 minute
Temperature of Iron-tip	280 °C max.
Soldering Iron Wattage	30W max.
Diameter of Iron-tip	3mm dia. max.
Soldering Time	10sec. max.
Caution	Do not allow the iron-tip to directly touch the ceramic body.

7. Location on Printed Circuit Board(PC Board)

<Component Direction>

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

(Worse) (Better)

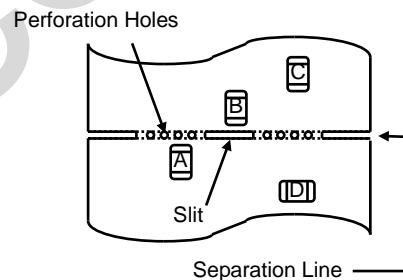


<Mounting Close to Board Separation Line>

Put this product on the PC Board near the Slit, not near the Perforation Holes.

Keep this product on the PC Board away from the Separation Line.

Worst ← "A"- "C"- "B"- "D" → Better



**NOTE**

1. Please make sure that your product has been evaluated for your specifications with our product being mounted to your product.
2. Do not use our product deviating from this product specification.
3. Please return one duplicate of this product specification to us with your signature to acknowledge your receipt. If the duplicate is not returned by appointed day, the product specification will be deemed to have been received by you.
4. We consider it not appropriate to include any terms and conditions with regard to the business transaction in the product specifications, drawings or other technical documents. Therefore, if your technical documents as above include such terms and conditions such as warranty clause, product liability clause, intellectual property infringement liability clause, or export control clause, they will be deemed to be invalid.