Chip NTC Thermistor for temperature sensor and temperature compensation 0201 size

1. Part Numbering.

(ex.) NC P 03 XH 103 F 05 RL

Product ID	Series	Dimensions Characteristics	Temperature	Resistance Specifications	Resistance Tolerance	Individual	Packaging

2.Ratings

2.1 F 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)
NCP03XH103F05RL	10k±1%	3380±1%	0.100	5.00	Approx. 1.0	-40 ~ +125	1-⑦
NCP03WB473F05RL	47k±1%	4050±1%	0.046				3-②
NCP03WF104F05RL	100k±1%	4250±1%	0.032				4-③

*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 2.4, 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 E 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)
NCP03XM102E05RL	1.0k±3%	3500±1%	0.316	5.00	Approx. 1.0	-40 ~ +125	1-①
NCP03XM152E05RL	1.5k±3%	3500±1%	0.258				1-②
NCP03XM222E05RL	2.2k±3%	3500±1%	0.213				1-③
NCP03XM332E05RL	3.3k±3%	3500±1%	0.174				1-④
NCP03XM472E05RL	4.7k±3%	3500±1%	0.146				1-⑤
NCP03XH682E05RL	6.8K±3%	3380±1%	0.121				1-⑥
NCP03XH103E05RL	10k±3%	3380±1%	0.100				1-⑦
NCP03XV103E05RL	10k±3%	3900±1%	0.100				2-①
NCP03XH153E05RL	15k±3%	3380±1%	0.082				3-①
NCP03XH223E05RL	22k±3%	3380±1%	0.067				4-①
NCP03WF333E05RL	33k±3%	4250±1%	0.055				2-②
NCP03WB473E05RL	47k±3%	4050±1%	0.046				3-②
NCP03WL473E05RL	47k±3%	4485±1%	0.046				4-②
NCP03WF683E05RL	68k±3%	4250±1%	0.038				2-③
NCP03WL683E05RL	68k±3%	4485±1%	0.038				3-③
NCP03WF104E05RL	100k±3%	4250±1%	0.032				4-③
NCP03WL104E05RL	100k±3%	4485±1%	0.032				2-④
NCP03WL154E05RL	150k±3%	4485±1%	0.026				3-④
NCP03WL224E05RL	220k±3%	4485±1%	0.021				4-④

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Please use NTC Thermistor by lower voltage than the maximum operating voltage curve.

Please consult with us on off-specification usage.

2.3 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)
NCP03XM102J05RL	1.0k±5%	3500±1%	0.316	5.00	Approx. 1.0	-40 ~ +125	1-①
NCP03XM152J05RL	1.5k±5%	3500±1%	0.258				1-②
NCP03XM222J05RL	2.2k±5%	3500±1%	0.213				1-③
NCP03XM332J05RL	3.3k±5%	3500±1%	0.174				1-④
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NCP03XH153J05RL	15k±5%	3380±1%	0.082				3-①
NCP03XH223J05RL	22k±5%	3380±1%	0.067				4-①
NCP03WF333J05RL	33k±5%	4250±1%	0.055				2-②
NCP03WB473J05RL	47k±5%	4050±1%	0.046				3-②
NCP03WL473J05RL	47k±5%	4485±1%	0.046				4-②
NCP03WF683J05RL	68k±5%	4250±1%	0.038				2-③
NCP03WL683J05RL	68k±5%	4485±1%	0.038				3-③
NCP03WF104J05RL	100k±5%	4250±1%	0.032				4-③
NCP03WL104J05RL	100k±5%	4485±1%	0.032				2-④
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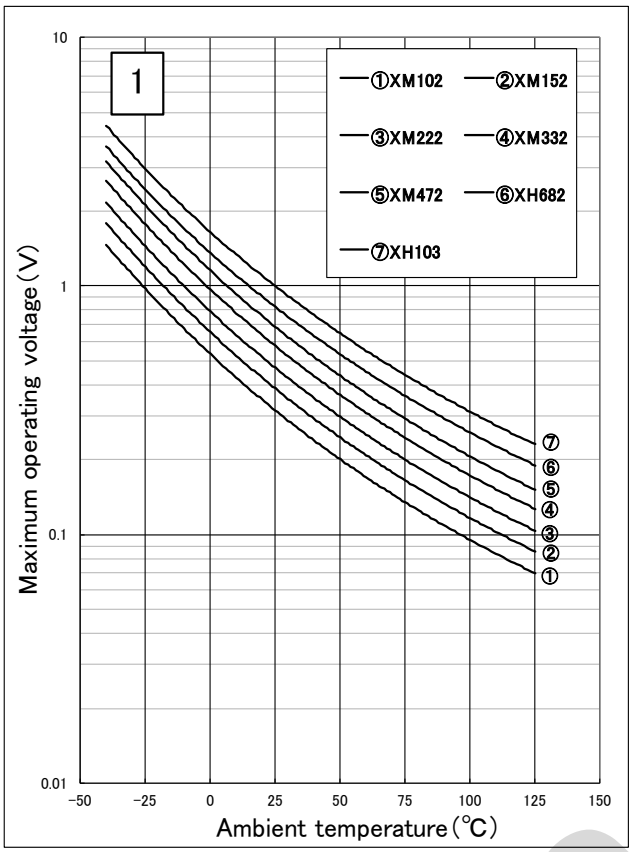
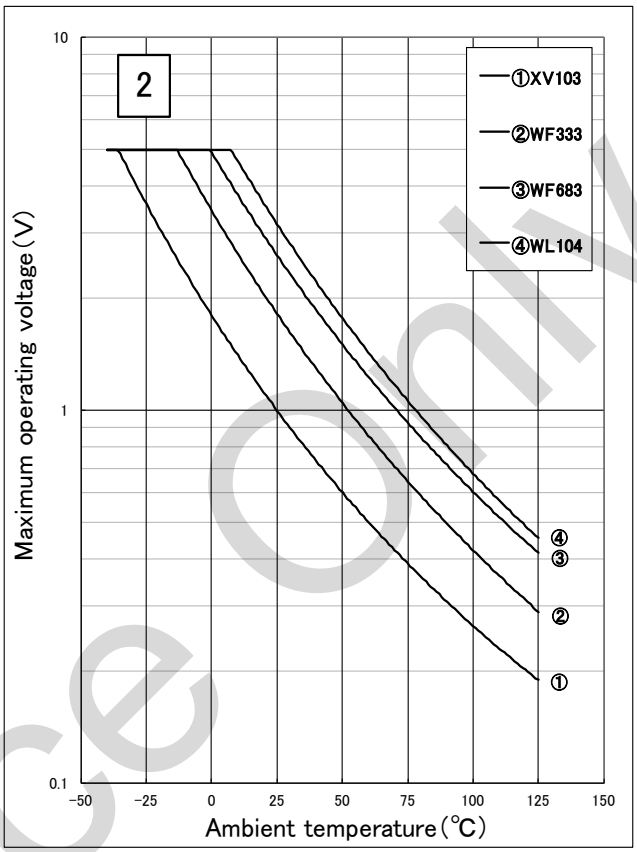
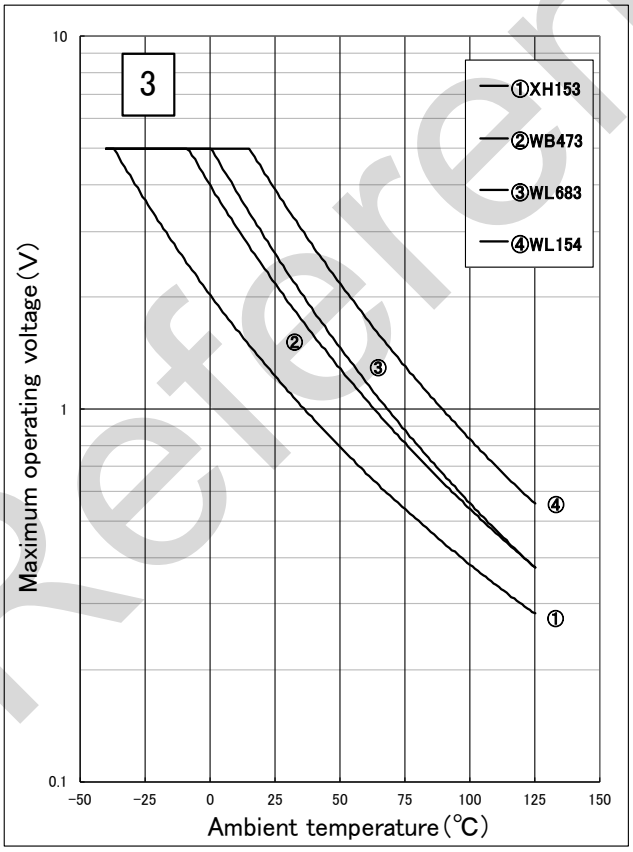
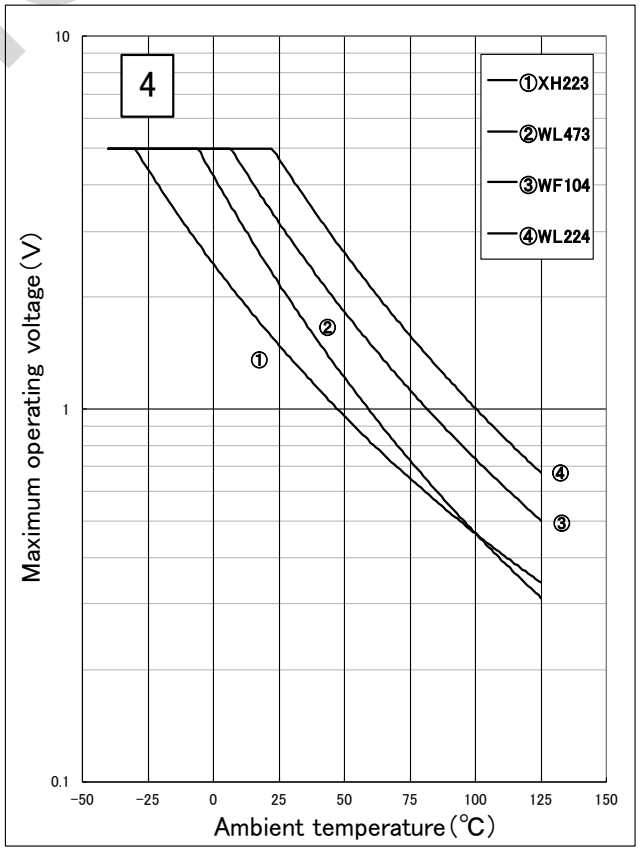
Please consult with us on off-specification usage.

2.4 Graph of Maximum Operating Voltage Reduction Characteristics

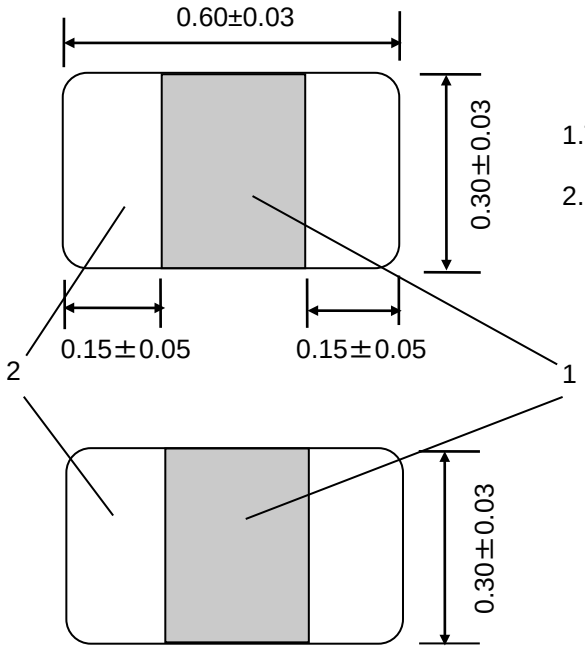








3.Dimensions



1.Thermistor

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

(Unit : mm)

4. Quantity (Standard Quantity)

Products quantity in a reel
15,000 pcs./1 reel

⚠ CAUTION

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

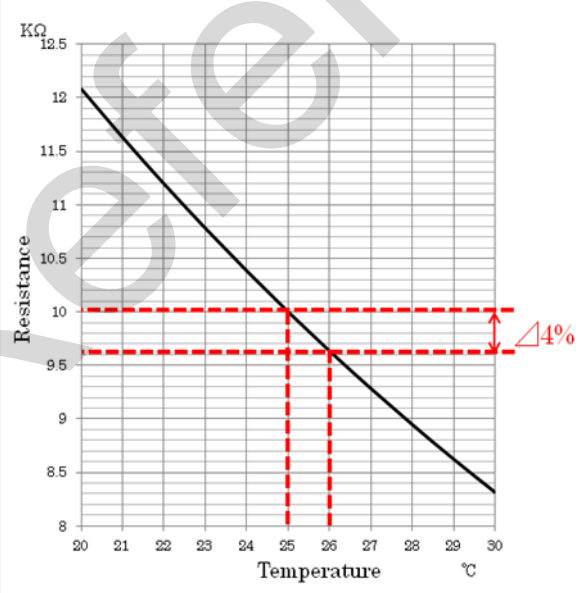
(1) High humidity environment, or in close proximity to splashing water.
A water droplet between the outer electrodes needs to be avoided completely.
(Ex. Resistance abnormality, Short (includes Sn/Ag ion migration))
(2) corrosive or deoxidizing gas (Cl_2, H_2S, NH_3, SO_X, NO_X, etc.)
(Ex. Resistance 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%

for users

⚠ CAUTION

1. Applying the power exceeding the specified 'Rated Electric Power' may causes deterioration of the characteristics or destruction of this product. Do not apply the power exceeding the 'Rated Electric Power'.
2. Do not use chip NTC Thermistor under the following environments because all these factors can deteriorate the characteristics of product or can cause failures and burning-out.
   (1) volatile or flammable gas
   (Ex. Resistance abnormality, Emit smoke, Ignition)
   (2) dusty environment
   (Ex. Short)
   (3) under vacuum, reducing pressure or high-pressure
   (Ex. Resistance abnormality)
   (4) place with salt water, oils, chemical liquids or organic solvents
   (Ex. Resistance abnormality, Short)
   (5) high vibration environment
   (Ex. Open)
   (6) other place, That is similar to the above-mentioned environments
3. Please contact us before using this product for the under-mentioned applications requiring, especially high reliability, in order to prevent defects which might directly cause damage to other party's life, body or property. (Listed below.)
   (1) Aircraft equipment
   (2) Aerospace equipment
   (3) Undersea equipment
   (4) Power plant control equipment
   (5) Medical equipment
   (6) Transportation equipment (automobiles, trains, ships, etc.)
   (7) Traffic signal equipment
   (8) Disaster prevention / Crime prevention equipment
   (9) Data-processing equipment
   (10) Applications of similar complexity or with reliability requirements comparable to the applications listed in the above
4. Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

NOTICE

1. Use this product within the specified temperature range. Higher temperature may cause deterioration of the characteristics or the material quality of this product.

2. Following conditions should be kept in order to avoid deterioration of solderability of outer electrodes and the characteristics of this products.
   (1) Storage Condition: Temperature: -10°C to +40°C
   Humidity: less than 75 %RH, without dewing.
   (2) Storage Term: Use this product within 6 months after delivery.
   If 6 months or more elapsed, please check the solderability before use.
   (3) Storage Place: Do not store this product in corrosive gas (SO_X, Cl, etc.), in direct sunlight

3. Solder and Flux
   (1) Solder Paste
   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 5 min. 20W/L Frequency of 28 KHz to 40 KHz.

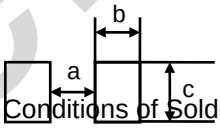
   • Please keep mounted parts and a substrate from an occurance of resonance in ultrasonic cleaning.
   • Please do not clean the products if using a non-washed type flux.

   (2) Drying : Please fully perform cleaning and fully remove 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.

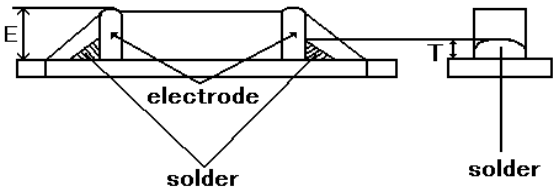
   (2) Recommended Land Pattern
   Too large of a land pattern will allow too much solder paste at the mounting points.
   This may cause destruction of this product, Due to mechanical stress, especially in the case of board bending.



	a	b	c
Reflow Soldering	0.25	0.30	0.30

(Unit : mm)

   (3) Printing Conditions of Solder Paste
   i. Recommendable thickness of solder paste printing shall be 100 µm.
   ii. After soldering, the solder fillet shall be a height from 1/3E to the thickness of this product. (See the figures below.)



1/3E≦T≦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.

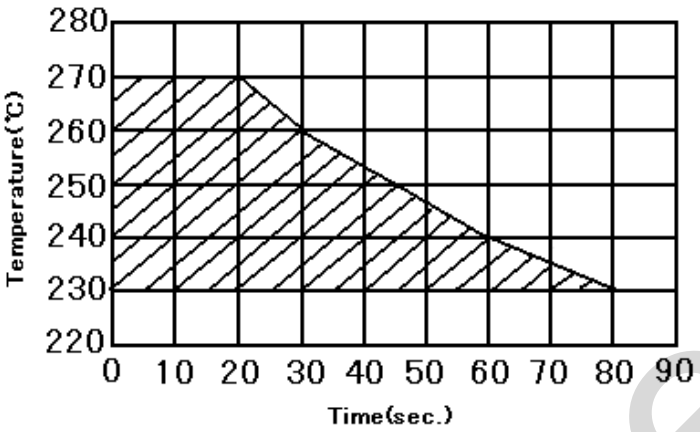
(4) Allowable Soldering Temperature and Time

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 Reflow Soldering Temp. and Time>



(5) 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.

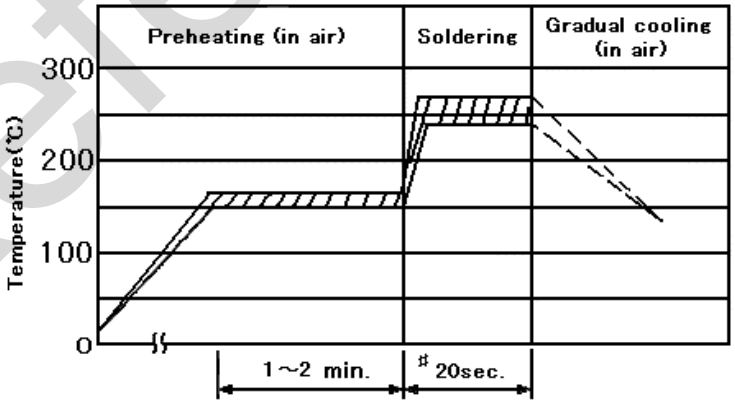
ii. Insufficient soldering temperature may cause deterioration of solder-wetting on the outer electrode. The soldering temperature of reflow soldering shall be from 240°C to 270°C.

iii. Rapid cooling by dipping in solvent or by other means is not recommended.

If you can not use the above-mentioned conditions, please evaluate if this product is correctly mounted under your mounting and soldering conditions.

Recommended Soldering Condition

<Reflow Soldering Condition>



Preheating: 160 +/- 10 °C
1min. ~ 2 min.
Soldering: 240 °C~270°C
20sec.

#: In case of repeated soldering, the total accumulated soldering time should be within the range shown above figure (4).

(6) 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.

(7) 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	20W 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.

(8) Notes about solder mounting

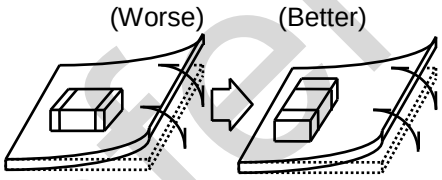
NCP03 type is a very small chip component, Size 0.6mmx 0.3mm. It is very sensitive to mechanical and thermal stress. Excess solder fillet height can multiply these stresses and cause chip cracking. When designing substrates, take land patterns and dimensions into consideration to eliminate the possibility of excess solder fillet height.

There is a possibility of chip cracking caused by PCB bending and expansion/contraction with heat such as reflow soldering, because stress on a chip changes depending on PCB material and structure. When the thermal expansion coefficient greatly differs between the board used for mounting and the chip, it will cause cracking of the chip due to the thermal expansion and contraction. When the chip is mounted on a fluorine resin printed circuit board or on a single-layered glass epoxy board, it may also cause cracking of the chip for the same reason. Please consider abnormalities in the mounting process in your evaluation.

7. Location on Printed Circuit Board(PC Board)

<Component Direction>

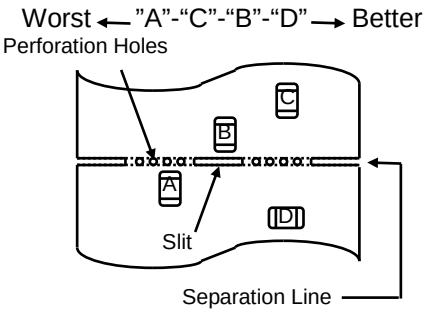
Locate this product horizontal to the direction in which stress acts.



<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.



⚠ 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 aknowledge 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.