

MURATA MANUFACTURING CO., LTD.

Specification of Posistor®

May. 7, 2015
(JWA01BC - E0304B)

Murata type: PRF18BA473QB5RB
(Reflow soldering type)

1. Scope

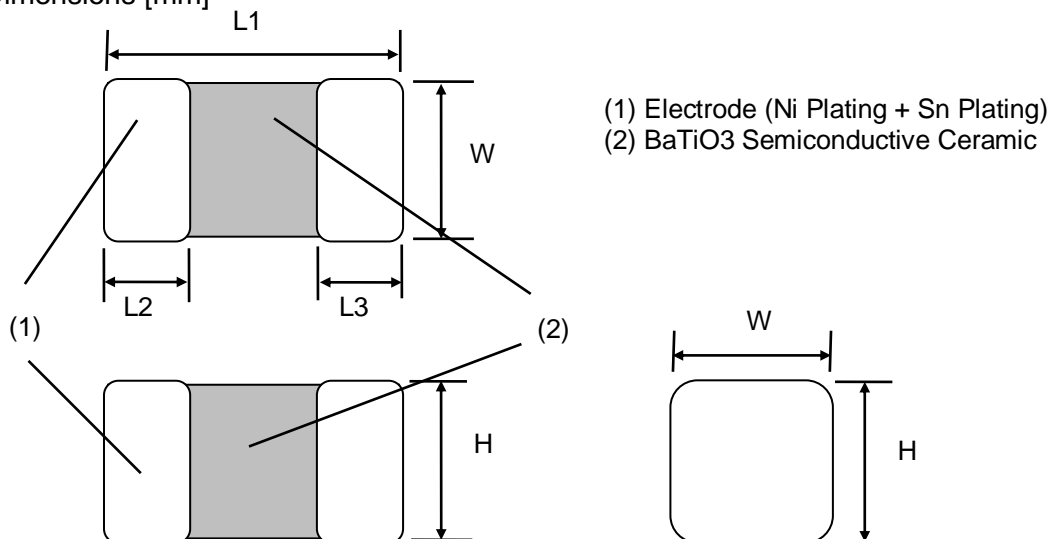
This product specification is applied to SMD type Posistor® for over heat sensing.
These specifications are based on condition when it's mounted on PCB by soldering.
Please contact us when it will be used for an application other than above.
This product is only for reflow soldering.

2. Ratings

Part Number	Resistance (at 25°C)	Sensing Temp. (at 4.7Mohm)	Max. Voltage	Operating Temp.
PRF18BA473QB5RB	47k ohm ±50%	130±5°C	32 VDC.	-20~+140°C

Packaging Tape: Taping (Standard quantity is 4000pcs. Per reel)

3. Dimensions [mm]



L1	W	H	L2 and L3
1.60±0.15	0.80±0.10	0.80±0.10	0.10 ~ 0.60

4. Marking

No Marking

5. Electrical characteristics

	Item	Specification	Test Condition
5.1	Resistance value	The resistance value shall be within the specified tolerance.	After applying max. operating voltage for 3 mins. and leaving for 2 hrs. in 25°C, measured by applying voltage less than 3VDC.
5.2	Temperature Characteristics	The resistance change with temperature typical curve shown in Graph-1.	Resistance value is measured by applying voltage less than 3 VDC.

6. Mechanical characteristics

	Item	Specification	Test Condition
6.1	Adhesive Strength	There is no detachment sign of electrode.	Reference standard: IEC 60068-2-21 (2006) Soldered Posistor® to PCB (#) Test board: Grass-Epoxy test board (FR-4) with our standard land size Pushing force: 5N Keep time: 10+/-1sec
6.2	Vibration	<ul style="list-style-type: none"> Resistance (R25) change: Less than +/-30% (##) Appearance: No defects or abnormalities 	Reference standard: IEC 60068-2-6 (1995) Soldered Posistor® to PCB (#) Frequency range: 10 to 55Hz Amplitude: 1.5mm Sweep rate: 1octave/min. Direction: X-Y-Z (3 direction) 2 hours in each axis
6.3	Solderability (Other)	Min. 95% electrode is covered with new solder. Resistance change is less than ±30% (##)	Reference standard: IEC 60068-2-58 (2004) <ul style="list-style-type: none"> Solder : Sn-3.0Ag-0.5Cu Solder temp. : 245±5°C Soaking time : 3±0.3secs. Soaking position : Until a whole electrode is soaked.
6.4	Resistance to soldering heat (Reflow)	There is No abnormal appearance after the test. Resistance change is less than ±30% (##)	Reference standard: IEC 60068-2-58 (2004) [Reflow method] <ul style="list-style-type: none"> Solder : Sn-3.0Ag-0.5Cu Preheating : 150~180°C, 120±5secs Peak temp. : 260±5°C Soldering time: ≥220°C, 60 to 90secs Reflow cycle: 1time Test board: Grass-Epoxy test board(FR-4) with our standard size

7. Environmental characteristics

	Item	Specification	Test Condition									
7.1	Thermal Shock	There is No abnormal appearance after the test. Resistance change is less than ±30% (##)	Reference standard: IEC 60068-2-14 (2009) [Test Na] • Soldered Posistor® to PCB (#) • Transport time: <10 sec. • Test condition: See below table <table><tr><th>Step</th><th>Condition</th><th>Time</th></tr><tr><td>1</td><td>-20+/-2°C</td><td>30min.</td></tr><tr><td>2</td><td>+125+/-2°C</td><td>30min.</td></tr></table>	Step	Condition	Time	1	-20+/-2°C	30min.	2	+125+/-2°C	30min.
Step	Condition		Time									
1	-20+/-2°C		30min.									
2	+125+/-2°C		30min.									
7.2	Damp Heat	• Test cycle: 5cycles										
7.3	High temperature load	Reference standard: IEC 60068-2-67 (1995) • Soldered Posistor® to PCB (#) • +40+/-2°C, 90~95%RH • 500+24/-0 hrs										
		• Soldered Posistor® to PCB (#) • +85+/-2°C • Load max. voltage • 1000+48/-0 hrs										

Above mentioned soldering is done following condition at our side.

- Glass-Epoxy PC board
- Standard land dimension
- Standard solder paste
- Standard solder profile

Above conditions are mentioned in Notice.

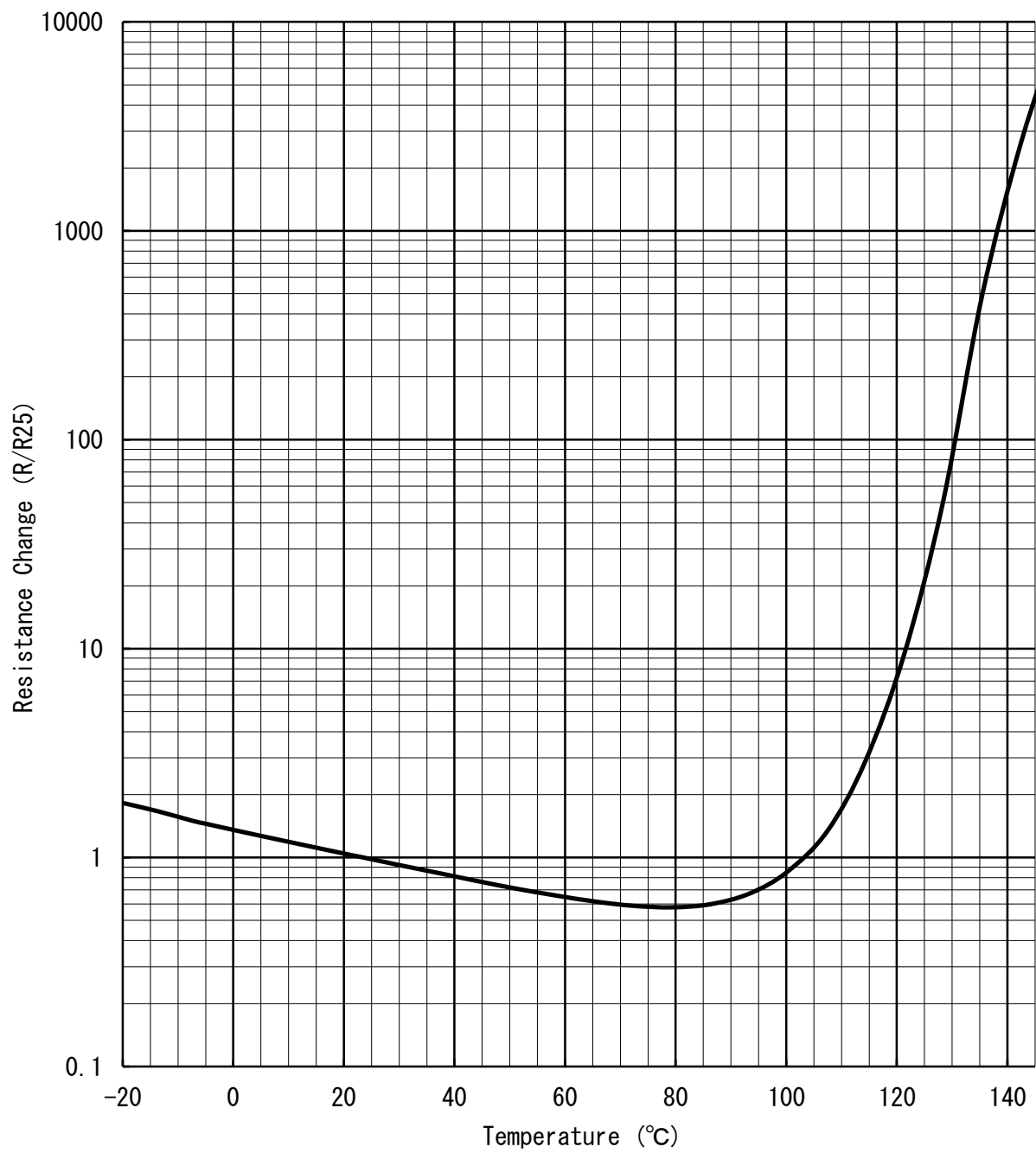
The resistance measurement after the test.

It is measured by applying voltage less than 3 VDC.

(by a direct current less than 10 mA.) after left at 25 \pm 2 °C for 2 hrs.

Resistance-Temperature Characteristics
Typical Curve

Graph-1

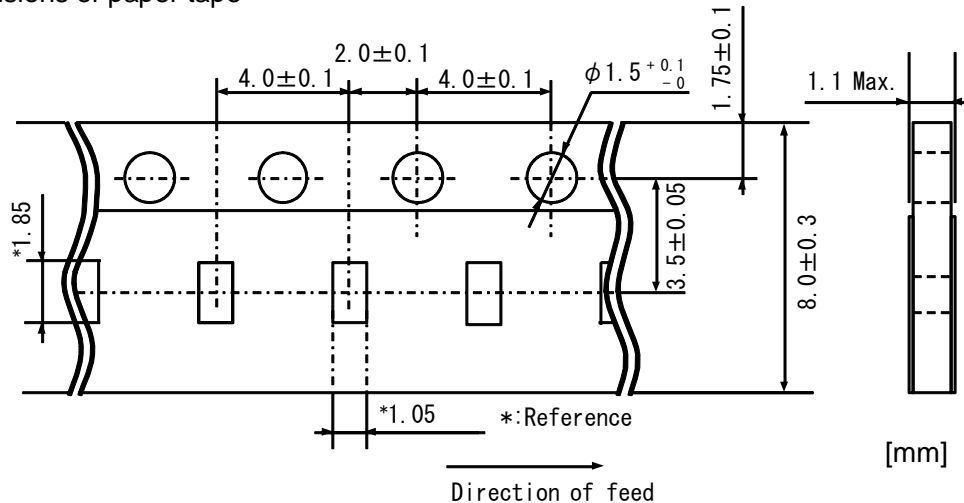


MURATA MANUFACTURING CO.,LTD.

Tape and packaging Specification of Posistor®

1. Taping Specification

1.1 Dimensions of paper tape



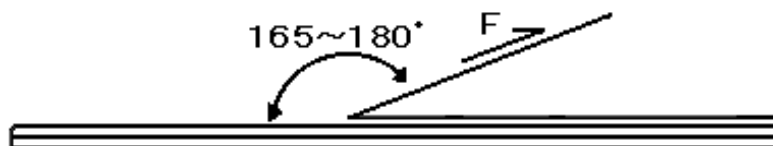
- (1) Products shall be packaged in the cavity of the base tape and sealed by top tape and bottom tape.
- (2) Top tape and bottom tape have no joints and products shall be packaged and sealed in the cavity of the base tape, continuously.

1.2 Tape strength

- (1) Pull strength of top tape and bottom tape shall be specified as follows:

Top tape	Bottom tape
5N minimum	5N minimum

- (2) Peeling force of top tape



*1 peeling angle : 165 to 180 degree against the fixed surface of tape.

*2 peeling speed : 300mm/min.

*3 Peeling force : 0.1 ~ 0.6 N

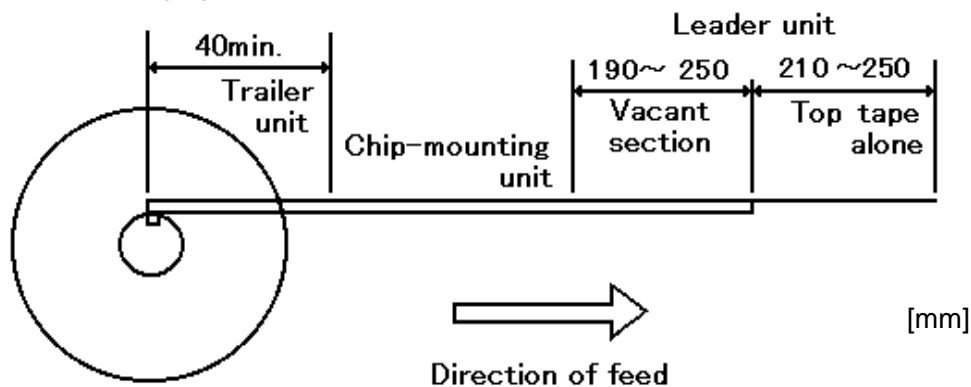
1.3 Reeling

(1) Quantity (Standard Quantity)

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

(2) A tape in a reel contains Leader unit and Trailer unit where products are not packed.

(See the following figure.)



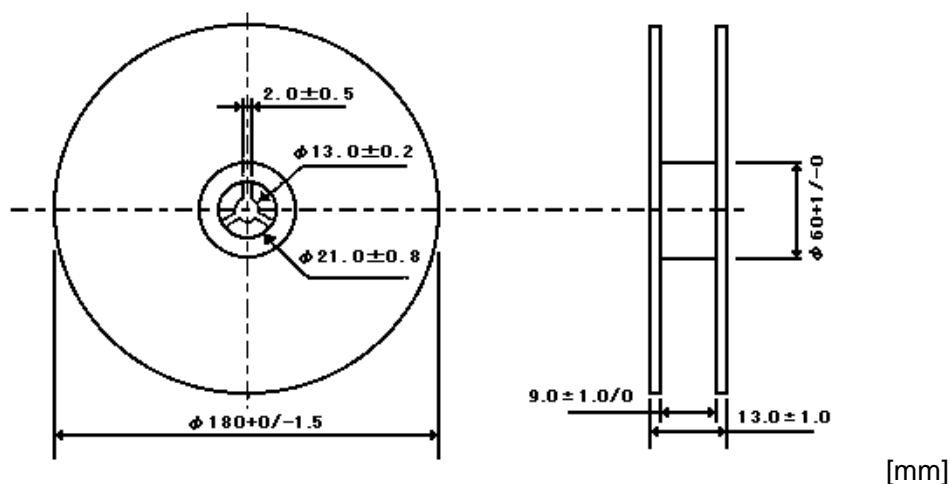
* The reeling specification above shall not be applied for the order less than 4,000pcs.

(3) Five or more pitches of attachment of a top tape and a base tape at the tip of "Vacant section" are not performed.

(4) A label shall be attached on the reel.

(MURATA's part number, inspection number and quantity shall be marked on the label.)

(5) Dimensions of reel



2. Packaging

The reeling shall be packed in a package.

The label shall be attached on the package.

(Customer's name, order number, customer's part number, MURATA's part number and quantity shall be marked on a label.)

Notice for use



1. This product is designed for application, which is used under ordinary environment. (room temperature, normal humidity, normal pressure) Do not expose this to the following environments, because all these factors can deteriorate the characteristic of this and can cause failure or burn out.
 - (1) Corrosive gas or deoxidizing gases (Cl₂, H₂S, NH₃, SOx, NOx etc.)
 - (2) Volatile, flammable gas
 - (3) Dusty place
 - (4) Place in a vacuum, reducing or putting pressure
 - (5) Place in splashed water, or high humidity and dewing place
 - (6) Salt water, oil, chemical liquid and solvent
 - (7) Vibratile place
 - (8) Other place equivalent to the above
2. Limitation of Applications
Please contact us before using our products 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
3. 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. Do not apply abnormal voltage exceeding the specified maximum value.
Because they may deteriorate or destroy PTC element.
2. Use this product within the specified temperature. A higher temperature may deteriorate the characteristic or material.
3. The body of this product is not insulated. Please keep an adequate distance to surrounding components and wiring.
4. Storage conditions
To keep solderability from declining, following storage condition is recommended.
 - (1) Condition Temperature : -10 to +40°C
 Humidity : Less than 75%RH (not dewing condition)
 - (2) Term: Please use this POSISTOR within 6 months after shipment by first-in and first-out stocking system.
 - (3) Handling after seal open: After unpacking of the minimum package, reseal it promptly or store it inside a sealed container with a drying agent.
 - (4) Place: Do not store this product in corrosive gas (SOx, Cl etc) or under sunlight.

5. Solder and Flux

(1) Solder Paste

Reflow Soldering : Use Sn:Pb=60:40wt% , Sn:Pb=63:37wt% , Sn:Ag:Cu=96.5:3.0:0.5wt% or equivalent type of solder paste.

Do not use strong acidic flux (with halide content exceeding 0.2wt%).

For your reference, we are using

'63Sn/37Pb RMA9086 90-3-M18', manufactured by Alpha Metals Japan Ltd.,

'96.5Sn/3.0Ag/0.5Cu M705GRN360-K2-V', manufactured by Senju Metal Industry Co.,LTD.

for any Internal tests of this product.

(2) Flux

Use rosin type flux in soldering process.

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

Please do not use below flux.

- Strong acidic flux (with halide content exceeding 0.2wt%).
- Water-soluble flux(*Water-soluble flux can be defined as non rosin type flux including wash-type flux and non-wash-type flux.)

6. 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.

(1) Cleaning Conditions

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

A sufficient cleaning shall be applied to remove flux completely.

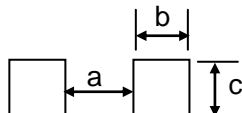
(2) Drying: After cleaning, dry promptly this product.

7. 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.

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

(1) Standard Land Size

Too big land size gives too much solder paste on the land. It may cause destruction of this product, because of the mechanical stress especially in the case of board bending.



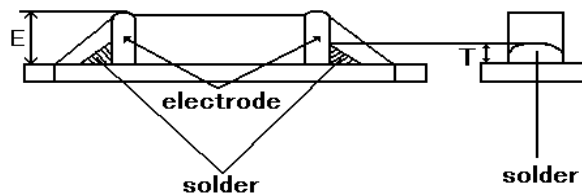
a	b	c
0.6~0.8	0.6~0.7	0.6~0.8

[mm]

(2) Printing Conditions of Solder Paste

- i. Standard thickness of solder paste printing shall be from 0.15 to 0.20 mm.
- ii. After soldering, the solder fillet shall be a height from 0.2 mm to the thickness of this product.

(See the figures below.)



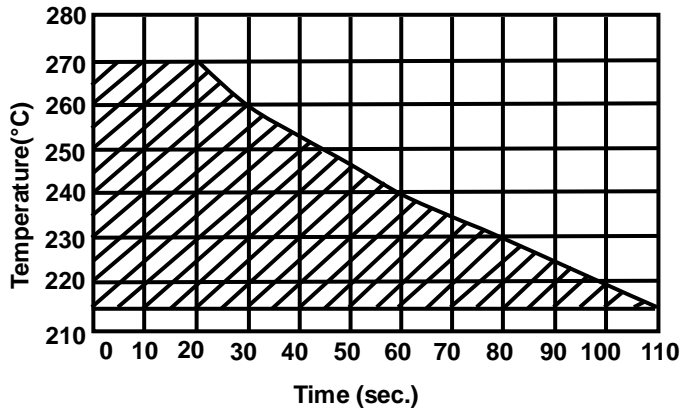
$$0.2\text{mm} \leq T \leq E$$

- iii. Too much solder gives too strong mechanical stress to this product, such stress may cause cracking or any mechanical damage. And also, it can destroy the electrical performance of this product.

(3) Allowable Soldering Temperature and Time

- Solder within the temperature and time combinations, indicated by the slanted lines in the following graphs.
- The excessive soldering conditions may cause dissolution of metallization or deterioration of solder-wetting on the external electrode.
- 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.)

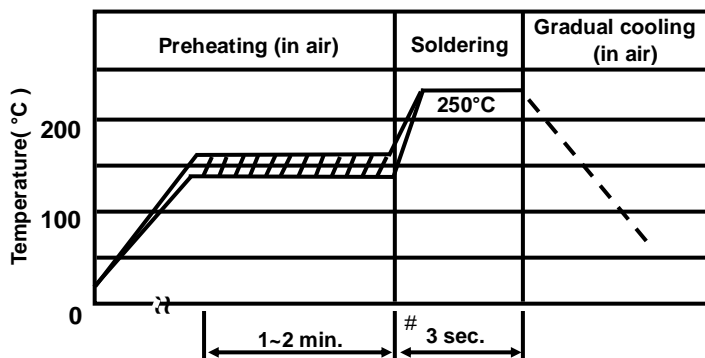
<Allowable Reflow Soldering Temp. and Time>



(4) Standard Temperature Profile for Soldering

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

<Reflow Soldering Condition>



Preheating: 150 +/- 10 °C
1min. to 2 min.
Soldering : 250 °C
3sec.

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

- There is a fear 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.

(6) Conditions with Soldering Iron

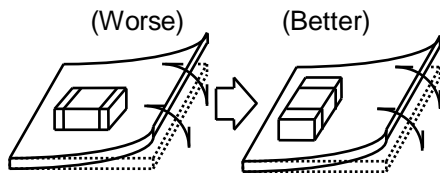
When hand soldering by iron is applied, be sure to keep following conditions.

Item	Conditions
Preheating	at 150°C for 1 to 2 minute
Temperature of Iron-tip	350°C max.
Soldering Iron Wattage	30W max.
Diameter of Iron-tip	3mm dia. max.
Soldering Time	5sec. max.
Solder	H60A (Sn:Pb=60:40wt%) type , H63A (Sn:Pb=63:37wt%) type, Sn:Ag:Cu=96.5:3.0:0.5wt%, or equivalent type.
Flux	Do not use strong acidic flux (with halide content exceeding 0.2wt%).
Caution	Do not allow the iron-tip to directly touch the ceramic body. Preheat the ceramic body and mounting board.

8. Do not give this product a strong press-force nor a mechanical shock. Because such mechanical forces may cause cracking or chipping of this ceramic product.
9. Rapid cooling or heating during soldering is not recommended.
Such treatment may destroy the element.
10. Resin coating
Please select the resin of which hardness shrinkage is much less, on selecting a resin materials.
11. Location on Printed Circuit Board(PC Board)

<Component Direction>

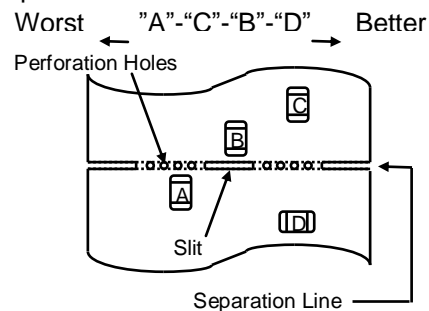
Locate this product horizontal to the direction in which stress acts.



<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.



1. Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
2. You are requested not to use our product deviating from the agreed specifications.
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 the date, this product specification will be deemed to have been received by you.
4. We consider it not appropriate to include any terms and condition with regard to the business transaction in the product specification, 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.