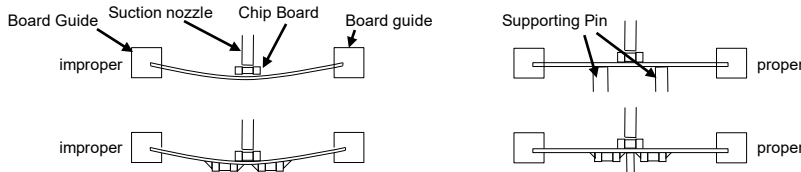


## Handling Precautions

### ■ Mounting

#### 1. Chip mounting

(1) If the bottom dead point of the suction nozzle is too low, the force on the chip may be great enough to cause breaking or cracking while mounting. Adjust the distance of the bottom dead point of the nozzle from the top surface of the chip, after resetting the substrate straight, to prevent overload on the chip.

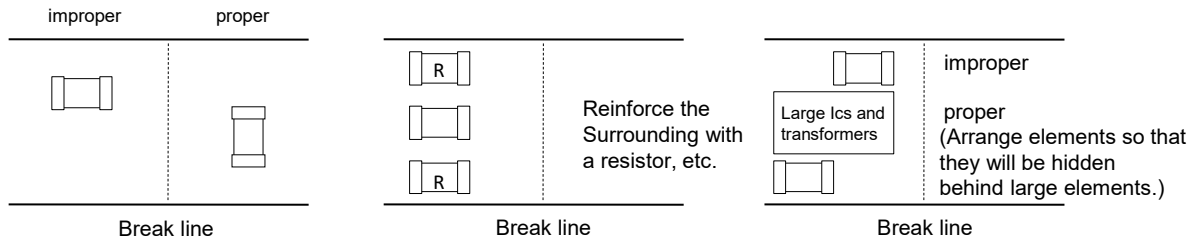


(2) To prevent cracking or breaking, set the static load force between 100~300gf when mounting.

(3) A worn clamp fixture of the mounter can cause an uneven distribution of the clamping force, leading to cracking or breaking of the varistor. Check the dimensions of the clamping fixture in the closed position, perform routine maintenance on the suction nozzle and clamping fixture, and inspect or change worn parts on a periodic basis.

#### 2. Board breaking

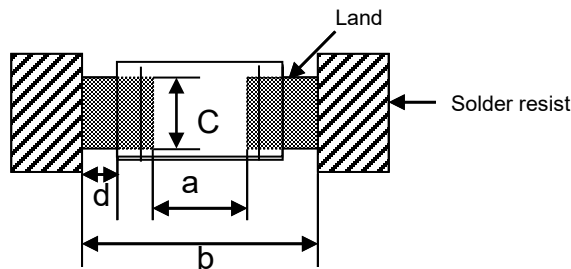
When large multi-circuit boards are broken into individual boards after soldering, flexure stress may be placed on the parts causing them to cracking or breaking. For designing patterns please refer to below.



### ■ Soldering

#### 1. Basic Design

Recommended land pattern



Unit : mm

	Type	10	20	30	40	70	80
	Chip length (L) × Width (W)	1.6 × 0.8	2.0 × 1.25	3.2 × 1.6	3.2 × 2.5	4.5 × 3.2	5.7 × 5.0
Land Dimension	a	0.6~0.8	1.0~1.2	1.8~2.5	1.8~2.5	2.5~3.5	2.7~4.7
	b	2.6~4.2	3.0~4.6	4.2~5.8	4.2~5.8	5.5~6.1	6.7~8.3
	c	0.6~0.8	0.9~1.2	1.2~1.6	1.8~2.5	2.3~3.2	3.5~5.0
	d	0.4~0.8	0.4~0.8	0.4~0.8	0.5~1.0	0.6~1.1	0.7~1.2

## Handling Precautions

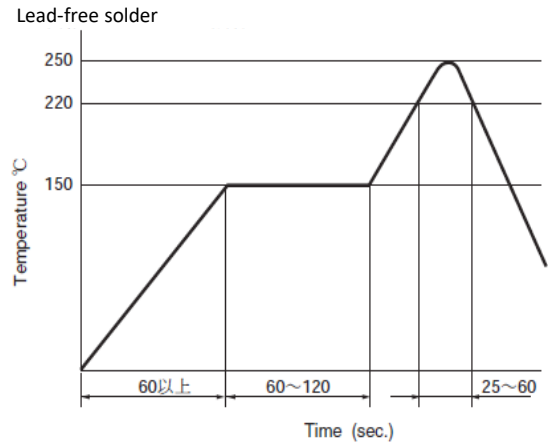
### 2. General cautions for soldering

(1) Excessively high soldering temperatures or long soldering times can cause leaching of the terminations, and consequently decrease adherence strength or maximum peak current.

(2) For soldering, please refer to the soldering curves right. Not applicable to flow soldering. Use them for reflow soldering. Reflow soldering should be done only twice.

(3) soldering recommended : Pb free soldering(Sn-3.0Ag-0.5Cu) or equivalent goods.

Reflow soldering recommended conditions



### ■ Guide to application

**The performance of varistors may deteriorate, the inside elements may be damaged, and they cause the varistors to smoke or catch fire, if the following precautions are not observed.**

1. Do not use varistors in places whose temperature exceeds their rated operating temperature due to direct sunlight or heating objects.
2. Do not use varistors in a humid place directly exposed to the weather or steam.
3. Do not use varistors in places filled with dust, salt K mist or corrosive gas.
4. Do not apply high voltage exceeding the rated maximum allowable circuit voltage to varistors. In the case of automotive jumping starters, use the varistors within short-term allowable voltage limits prescribed in the catalog. If voltage wave form is not complete DC, a maximum value of peak voltages shall not exceed the rated maximum allowable circuit voltage.
5. Do not apply peak currents exceeding the rated maximum energy.
6. Using varistors in circuits whose frequency exceeds 1kHz may damage their elements by heat generation due to dielectric loss.

**Varistors may fly off and injure someone if the following precautions are not observed.**

1. Do not use varistors in circuits to which surge currents exceeding the specified limits are applied.
2. Do not exceed the rated maximum allowable circuit voltage.

**The following preventive measures should be made for avoiding unexpected accident.**

1. When using a varistor in between circuits, insert an electric leakage breaker (ground-fault circuit interrupter) or current fuse and thermal fuse in series with the varistor. Also, in case of excessive voltage due to ground short circuit accident, use the varistor with the rated voltage higher than the excessive voltage.
2. When using a varistor in between circuits and ground, connect an earth leakage breaker (ground-fault circuit interrupter) or both of a current fuse and thermal fuse in series with the varistor. Also, in case of excessive voltage due to ground short circuit accident, use the varistor with the rated voltage higher than the excessive voltage.

## Handling Precautions

### ■ Precautions for the safety use

1. The products are designed and manufactured for the use in ordinary electronic products. There is a possibility to cause performance deterioration depends on the way of using. In case of the product breaking down in short mode, varistor itself become hot then the circuit board might have been damaged by a fire. If any of these products are used in special applications requiring high reliability, where product defects or its misconduct might pose a safety risk or cause a social problem, please consult sales offices well in advance.
  - ① aerospace instrument
  - ② submarine repeater (bottom of the sea relay, work equipment in the sea inside etc.)
  - ③ atomic power control system
  - ④ vehicle instrument including its accessories
  - ⑤ fuel control equipment
  - ⑥ other transportation equipments (vehicles, airplanes, trains, vessels and traffic rights etc.)
  - ⑦ safety equipment
  - ⑧ medical equipment (life-support equipment etc.)
  - ⑨ power generation control equipment
  - ⑩ disaster prevention and security equipment
  - ⑪ for military and the Defense Agency applications
  - ⑫ information processing equipment (communications infrastructure etc.)
  - ⑬ other equipments required the same quality and reliability as above equipments
2. In case of circuit design using the products, the safety for end users should be confirmed if the products have any problem. And products, security must be kept taking into consideration of the sufficient fail safe design (secure the protection circuit) in order not to be unsafe as a system when the products are in defects by single trouble.

### ■ Storage / Keeping

1. Deterioration of solderability can be caused by oxidization/sulfurization because of high temperature, high humidity or chlorine/sulfur gas. Parts should be used within 6 months if possible and stored -10° C~+40° C and 70%RH in an atmosphere free of sulfur, chlorine or toxic gasses
2. Varistors made of ceramics, please not to give a mechanical shock.
3. About the long-term storage (a case more than six months), please use soldering characteristics after confirmation.

### ■ Notice

1. The names of products and their specifications listed in this catalog may be changed for improvement or the production of some products may be discontinued without any advance notice. Before using the products, please ask for delivery specifications and confirm its contents.
2. The specific characteristic and quality of a product as a single item are guaranteed in this catalog. When using the products, please make sure that you check and evaluate them as they are contained in a package.
3. Our warranty does not apply to troubles that may arise as a result of using products ignoring their characteristics, ratings and the application scope described in this catalog.
4. Although we have taken all possible measures to ensure the quality and reliability of our products, there is a possibility that accidents causing injury or death, fire or social damage may occur if products are not used as instructed. If you have any questions regarding how to use the products, please consult with our customer service personnel.
5. If problem arises regarding a third party's industrial proprietary rights as a result of using this products, our company will have no liability for the problem except for those related to our products' structure and production method.