

# THERMISTOR

"Thermistor" is the generic name given to thermally sensitive resistors.

Negative temperature coefficient thermistor is generally called as thermistor. Thermistor is a semiconducting ceramic resistor produced by sintering the materials at high temperature, and made from metal oxide as its main component.

Depending on the manufacturing method and the structure, there are many shapes and characteristics of thermistors, which is utilized for various purpose such as temperature measurement, temperature compensation and etc.

The thermistor resistance values, other than those especially noted, are classified at a standard temperature of 25°C

B constant is value calculated from the resistance values at 25°C and 85°C.

## Resistance - Temperature Characteristics

The resistance of a temperature is solely a function of its absolute temperature. Since electrical power being dissipated within a temperature might heat above its ambient temperature and thereby reduce its resistance, it is necessary to test for resistance with temperature. The resistance so measured is called  $R_T$ , which means the resistance at essentially zero-power.

The mathematical expression which relates the resistance and the absolute temperature of a thermistor is as follows:

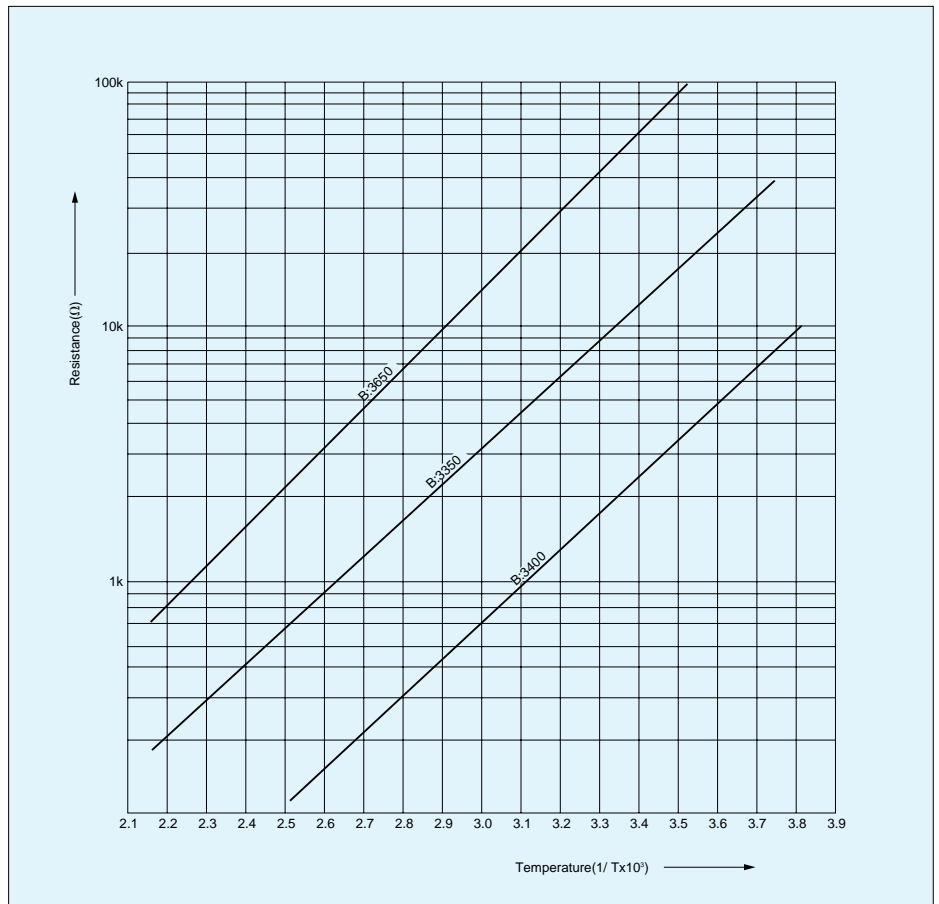
$$R_a = R_b \exp \left[ B \left( \frac{1}{T_1} - \frac{1}{T_2} \right) \right]$$

Where:  $R_a$  is the resistance at absolute temperature  $T_1$   
 $R_b$  is the resistance at absolute temperature  $T_2$   
 $B$  is a constant which depends on the material of the thermistor

Unless otherwise specified, all values of  $B$  are determined from measurements made at 25°C and 85°C.

The temperature coefficient of resistance  $\alpha$  is expressed in the following equation:

$$\alpha = -\frac{B}{T^2} \times 100 (\%/^{\circ}\text{C})$$



## Dissipation factor

Dissipation factor ( $\delta$ ) is power in milliwatts required to raise thermistor temperature 1°C. Measured with thermistor suspended by its leads in a specified environment.

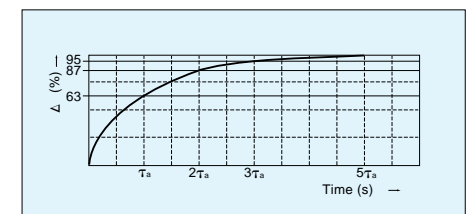
$$\delta = \frac{P}{\Delta t} (\text{mW}/^{\circ}\text{C})$$

$P$ : Power (mW)

$\Delta t$ : Raise temperature (°C)

## Thermal time constant

Thermal time constant ( $\tau_a$ ) is the time required by a thermistor to change 63% of the difference between its initial and final temperature. Measured with thermistor suspended by its leads in specified environment.



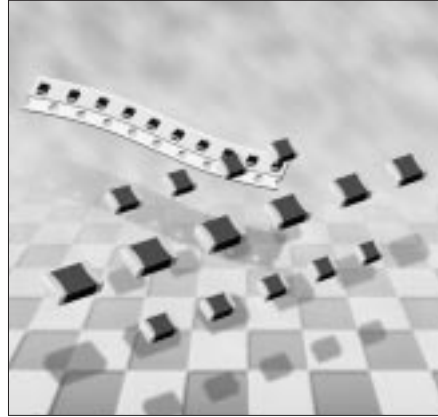
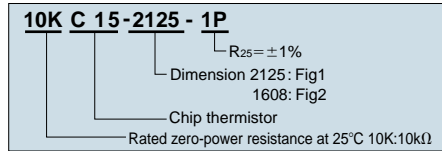
**New**

# CHIP THERMISTOR

Chip thermistors are specially processed, highly reliable thermistors with electrodes of silver and palladium alloy. They can be face bonded to act as thermal compensators for ICs and they are manufactured in sizes down to 1 square mm, they can also be used to detect temperature with relatively small time constants.

## EIAJ type

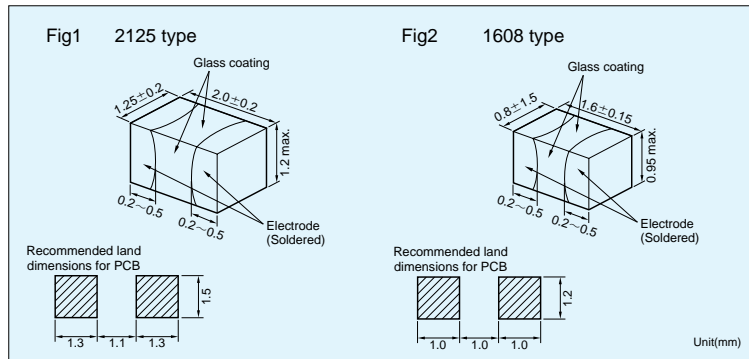
### Part number



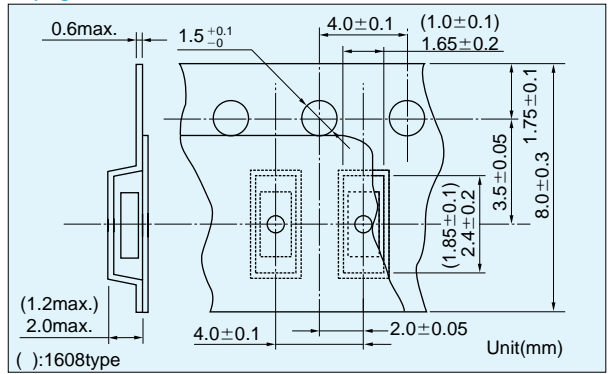
## Precautions

- Do not expose the thermistors to high soldering heat for too long. (260°C for not longer than 10s is recommended)

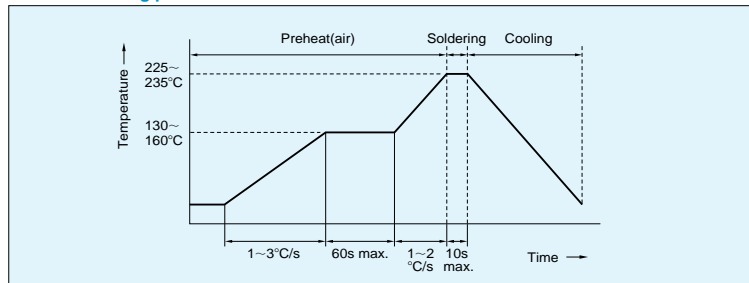
## Dimensions



## Taping



## Reflow soldering profile



## Specifications

Part No.	$R_{25}^{-1}$	B value*2	Dissipation factor (mW/°C)	Thermal time constant(s)*3	Rated power at 25°C(mW)	Operating temp. range(°C)
10KC15-2125-1P	10k $\Omega$ ±1%	3435K±1%	1.0	7.5	5.0	-40~125
10KC15-2125-2P	10k $\Omega$ ±2%	3435K±1%	1.0	7.5	5.0	-40~125
10KC15-2125-3P	10k $\Omega$ ±3%	3435K±1%	1.0	7.5	5.0	-40~125
10KC15-1608-1P	10k $\Omega$ ±1%	3435K±1%	0.9	5.0	4.5	-40~125
10KC15-1608-2P	10k $\Omega$ ±2%	3435K±1%	0.9	5.0	4.5	-40~125
10KC15-1608-3P	10k $\Omega$ ±3%	3435K±1%	0.9	5.0	4.5	-40~125

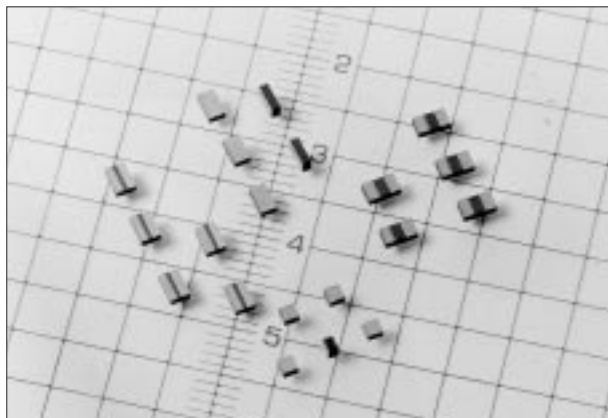
\*1  $R_{25}$  : Rated zero-power resistance value at 25°C.

\*2 B value : determined by rated zero-power resistance at 25°C and 85°C.

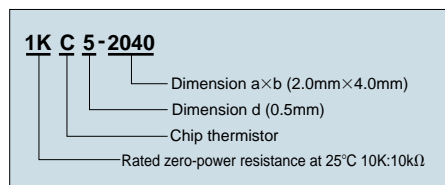
\*3 Time when thermistor temperature reaches 63.2% of the temperature difference. The value is measured in the air.

# CHIP THERMISTOR

Chip thermistors are specially processed, highly reliable thermistors with electrodes of silver and palladium alloy. They can be face bonded to act as thermal compensators for ICs and they are manufactured in sizes down to 1 square mm, they can also be used to detect temperature with relatively small time constants.



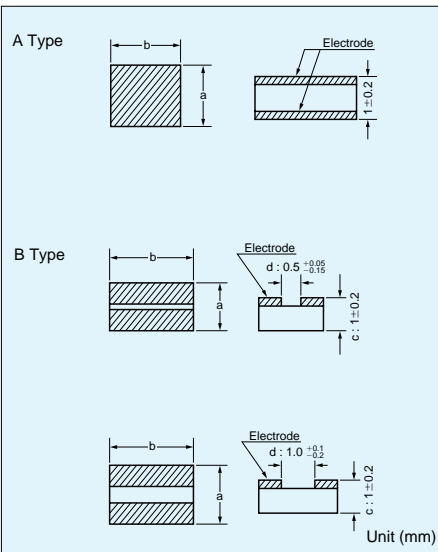
## Part number



## Precautions

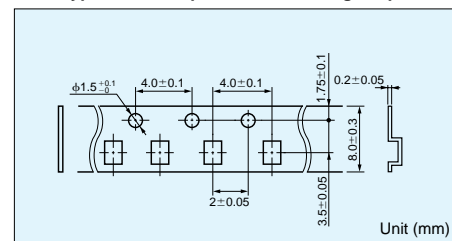
- The thermistors are not moisture proof, so store them in a dry place.
- Do not expose the thermistors to high soldering heat for too long. (220°C for not longer than 5 sec. is recommended)

## Dimensions



## Taping

Some types can be taped in the following shape :



Minimum quantity: 3000pcs/reel

## Specifications

A Type			B Type(d=0.5)			B Type(d=1.0)		
Part No	R <sub>25</sub> <sup>*1</sup>	B value <sup>*2</sup>	Part No	R <sub>25</sub> <sup>*1</sup>	B value <sup>*2</sup>	Part No	R <sub>25</sub> <sup>*1</sup>	B value <sup>*2</sup>
500C0-1717	0.5kΩ ± 10%	3250K ± 5%	500C5-2039	0.5kΩ ± 10%	3250K ± 5%	-	-	-
1KC0-1717	1.0kΩ ± 10%		1KC5-2040	1.0kΩ ± 10%		1KC10-3239	1.0kΩ ± 10%	3250K ± 5%
2KC0-1212	2.0kΩ ± 10%	3400K ± 5%	2KC5-2020	2.0kΩ ± 10%	2KC10-3220	2.0kΩ ± 10%		
5KC0-1111	5.0kΩ ± 10%		5KC5-2012	5.0kΩ ± 10%	5KC10-3224	5.0kΩ ± 10%	3500K ± 5%	
10KC0-1717	10.0kΩ ± 10%	3850K ± 5%	10KC5-2038	10.0kΩ ± 10%	10KC10-3212	10.0kΩ ± 10%		
20KC0-1212	20.0kΩ ± 10%		20KC5-2019	20.0kΩ ± 10%	20KC10-3238	20.0kΩ ± 10%	3850K ± 5%	

\*1 R<sub>25</sub>: Rated zero-power resistance value at 25°C.

\*2 B value: determined by rated zero-power resistance at 25°C and 85°C.  
Operating temp. range: -30~110°C

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## WARRANTY

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The manufacturer hereby warrants, that it will replace this product or any part thereof which shall prove to be defective in workmanship or material, subject to the following limitations:

- (1) This is only for the benefit of the original purchaser and to no other person, company or individual.
- (2) This warranty does not apply to defects caused by improper installation.
- (3) This warranty is limited to the replacement of the defective product, or part thereof, and does not include any labor costs for installation or removal of the product.
- (4) The manufacturer shall not be liable for indirect, consequential or special damages and is limited solely to replacement of the product.

If the product or any part thereof shall prove to be defective in workmanship or material, the original purchaser shall ship the product to the manufacturer in the original packing carton, together with a copy of the original sales receipt for the product, and, if in the opinion of the manufacturer, the product proves to be defective in workmanship or material, the sole obligation of the manufacturer shall be the replacement of the defective product or part thereof. Shipping charges to the manufacturer is the obligation of the original purchaser.

This limited warranty is in lieu of and replaces all of the warranties previously given by the manufacturer, both express and implied, including any warranties of merchantability or fitness for a particular purpose. There are no warranties which extend beyond the face hereof.

No lawsuit may be commenced against the manufacturer unless the original consumer purchaser has complied with all of the terms and conditions of this warranty and the manufacturer has refused to comply therewith.

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