Multilayer Chip NTC Thermistors

Type: **ERTJ**

The miniaturized Multilayer Chip NTC Thermistors (ERTJ) are specially designed for surface mounting capacitors.

■ Features

- High reliable multilayer / monolithic structure
- Superior heat resistance to reflow soldering and excellent solderability
- Wide ranges of operating temperature (–40 to 125 °C)

■ Recommended Applications

- Cellular Phones
  - Temperature compensation for Crystal Oscillator
  - Temperature compensation for Semiconductor
- Personal Computers
  - Temperature detection for CPU and memory device
  - Temperature compensation for Ink-viscosity (Inkjet Printer)
- Battery Packs
  - Temperature detection for battery cell
- Liquid Crystal Display(LCDs)
  - Temperature compensation for contrast
  - Temperature compensation for Back light

■ Explanation of Part Numbers

1	2	3	4	5	6	7	8	9	10	11	12
E	R	T									

Product Code	
ERT	NTC Thermistors

Shape Size Type (EIA)	
JZ	"0201" Type
J0	"0402" Type
J1	"0603" Type

Packaging Styles	
Code	Styles
E	"0201"Type "0402"Type Paper Taping (Pitch: 2 mm)
V	"0603"Type Paper Taping (Pitch: 4 mm)

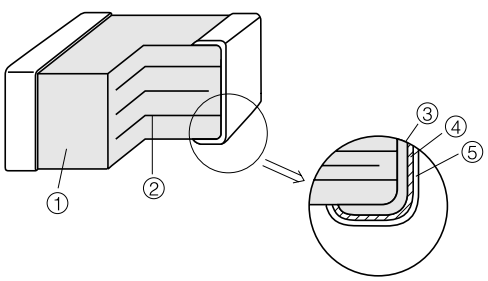
Center of "B" Value (K)	
A	2701 – 2800K
B	2801 – 2900K
C	2901 – 3000K In every step of 100 (K) as following. (Note: Expect letters of "I" and "O")
W	4701 – 4800K
X	4801 – 4900K
Y	4901 – 5000K
Z	Others

Resistance R_{25} (Ω)
The first two digits are significant figures of resistance and the third one denotes number of zeros following them.

Resistance Tolerance		
F	±1%	Narrow Tolerance Type
G	±2%	
H	±3%	Standard Type
J	±5%	

Special Specification

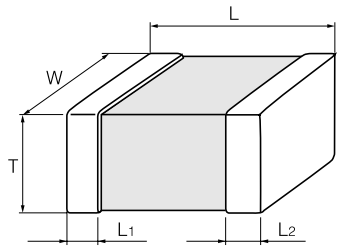
■ Construction



No	Name
①	Ceramic Semiconductor
②	Inner electrode
③	Substrate electrode
④	Intermediate electrode
⑤	External electrode

Rev.02/04

■ Dimensions in mm (not to scale)



Size Code (EIA)	L	W	T	L_1, L_2
JZ(0201)	0.60±0.03	0.30±0.03	0.30±0.03	0.15±0.05
J0(0402)	1.00±0.10	0.50±0.05	0.50±0.05	0.25±0.15
J1(0603)	1.60±0.15	0.80±0.10	0.80±0.10	0.30±0.20

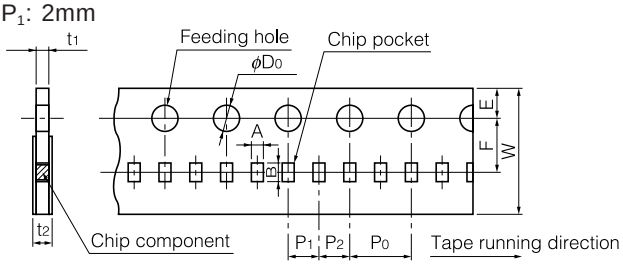
■ Packaging Specifications

● Standard Packing Quantity

Size Code \ Thickness \ Style		Paper taping
JZ (0201)	0.3 mm	Pitch 2 mm: 15000 pcs./reel
J0 (0402)	0.5 mm	Pitch 2 mm: 10000 pcs./reel
J1 (0603)	0.8 mm	Pitch 4 mm: 4000 pcs./reel

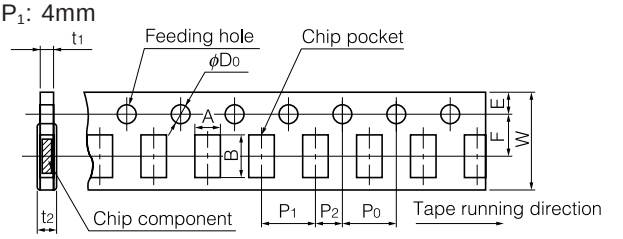
● Paper Taping

P_1: 2mm



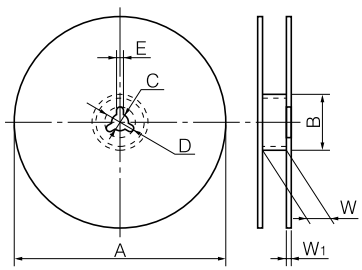
Size Code \ Symbol		A	B	W	F	E	P_1	P_2	P_0	ϕD_0	t_1	t_2
Dim. (mm)	JZ (0201)	0.37 ±0.03	0.67 ±0.03	8.0 ±0.2	3.50 ±0.05	1.75 ±0.10	2.00 ±0.05	2.00 ±0.05	4.0 ±0.1	1.5 +0.1 0	0.5 max.	0.8 max.
	J0 (0402)	0.65 ±0.05	1.15 ±0.05								0.7 max.	1.0 max.

P_1: 4mm



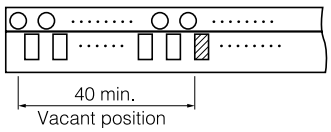
Size Code \ Symbol		A	B	W	F	E	P_1	P_2	P_0	ϕD_0	t_1	t_2
Dim. (mm)	J1 (0603)	1.10 ±0.10	1.90 ±0.10	8.0 ±0.2	3.50 ±0.05	1.75 ±0.10	4.0 ±0.1	2.00 ±0.05	4.0 ±0.1	1.5 +0.1 0	1.1 max.	1.4 max.

● Reel for Taping

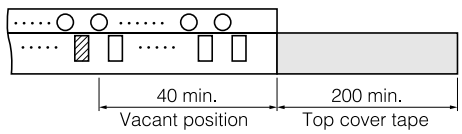


Symbol	A	B	C	D	E	W	W_1
Dim. (mm)	ϕ180 $^{0}_{-3}$	ϕ60.0±0.5	13.0±0.5	21.0±0.8	2.0±0.5	9.0±0.3	1.3±0.2

● Leader Part and Taped End



Leader part



Unit : mm

■ Ratings and Characteristics

Size code (EIA)	0603 Type	0402 Type	0201 Type
Operating Temperature Range	–40 to 125 °C		
Resistance to Soldering Heat	270 °C–3s, 260 °C–10s		
Heat Dissipation Constant ✻	approximately 3mW / °C	approximately 2mW / °C	approximately 1mW / °C
Rated Maximum Power Dissipation	100 mW	66 mW	33 mW

✻ Mounted on a glass epoxy board (1.6t)

● Resistance ratios to R25 at each temperature
(for obtaining resistance at each temperature by using R25 shown in part number)

T(°C)	ERTJ□□A (2750 K) typical	ERTJ□□A (2800 K) typical	ERTJ□□T (4500 K) typical	ERTJ□□R (4250 K) typical	ERTJ□□P (4050 K) typical	ERTJ□□V (4700 K) typical	ERTJ□□G *(3435 K) typical	ERTJ□□S *(4390 K) typical
–40	12.965	13.583	62.936	42.791	36.401	59.797	20.238	45.549
–35	10.177	10.615	42.679	30.246	26.052	41.298	15.292	32.019
–30	8.060	8.372	29.347	21.628	18.865	28.758	11.669	22.774
–25	6.438	6.660	20.445	15.635	13.813	20.267	8.988	16.379
–20	5.184	5.341	14.421	11.420	10.219	14.428	6.984	11.904
–15	4.205	4.317	10.291	8.424	7.636	10.368	5.472	8.738
–10	3.436	3.514	7.425	6.271	5.759	7.519	4.322	6.475
–5	2.826	2.880	5.414	4.710	4.382	5.500	3.439	4.841
0	2.340	2.376	3.987	3.567	3.362	4.056	2.755	3.650
5	1.949	1.973	2.964	2.723	2.600	3.015	2.221	2.773
10	1.634	1.649	2.226	2.096	2.026	2.260	1.803	2.124
15	1.379	1.387	1.689	1.626	1.591	1.709	1.473	1.640
20	1.171	1.174	1.294	1.271	1.257	1.302	1.210	1.276
25	1	1	1	1	1	1	1	1
30	0.8585	0.8562	0.7795	0.7923	0.8006	0.7733	0.8309	0.7889
35	0.7409	0.7369	0.6127	0.6318	0.6450	0.6022	0.6941	0.6265
40	0.6425	0.6373	0.4852	0.5069	0.5229	0.4720	0.5826	0.5006
45	0.5598	0.5539	0.3872	0.4090	0.4264	0.3723	0.4914	0.4024
50	0.4899	0.4836	0.3111	0.3319	0.3496	0.2954	0.4164	0.3253
55	0.4286	0.4220	0.2517	0.2710	0.2882	0.2358	0.3543	0.2645
60	0.3774	0.3708	0.2049	0.2224	0.2388	0.1894	0.3027	0.2162
65	0.3345	0.3279	0.1679	0.1834	0.1989	0.1530	0.2596	0.1776
70	0.2982	0.2918	0.1385	0.1520	0.1664	0.1242	0.2233	0.1467
75	0.2674	0.2611	0.1148	0.1266	0.1398	0.1014	0.1928	0.1217
80	0.2411	0.2350	0.09570	0.1059	0.1180	0.08322	0.1670	0.1014
85	0.2185	0.2125	0.08021	0.08894	0.1000	0.06862	0.1451	0.08486
90	0.1980	0.1923	0.06766	0.07507	0.08511	0.05684	0.1260	0.07137
95	0.1801	0.1746	0.05735	0.06361	0.07271	0.04731	0.1097	0.06027
100	0.1645	0.1592	0.04884	0.05412	0.06235	0.03956	0.09570	0.05111
105	0.1507	0.1456	0.04177	0.04622	0.05366	0.03322	0.08370	0.04350
110	0.1386	0.1337	0.03588	0.03962	0.04634	0.02801	0.07338	0.03717
115	0.1279	0.1232	0.03094	0.03408	0.04015	0.02371	0.06448	0.03187
120	0.1183	0.1138	0.02679	0.02941	0.03490	0.02015	0.05678	0.02743
125	0.1098	0.1055	0.02328	0.02547	0.03043	0.01719	0.05011	0.02368

✻ :B25/85

■ Ratings and Chatacteristics

● Narrow Tolerance Type (Resistance Tolerance: ±2 %, ±1 %)

Size Code	Part No.	Zero-Power Resistance (at 25 °C)	B Value	
			B25/50	B25/85
J0 (0402)	ERTJ0EG103□A	10 kΩ	(3375 K)	3435 K±1%
	ERTJ0EV104□	100 kΩ	4700 K±1%	(4750 K)
J1 (0603)	ERTJ1VG103□A	10 kΩ	(3375 K)	3435 K±1%
	ERTJ1VS104□A	100 kΩ	(4330 K)	4390 K±1%

● Standard Products (Resistance Tolerance: ±5 %, ±3 %)

Size Code	Part No.	Zero-Power Resistance (at 25 °C)	B Value	
			B25/50	B25/85
JZ (0201)	ERTJZET202□	2 kΩ	4500 K±2 %	(4450 K)
	ERTJZET302□	3 kΩ		
J0 (0402)	ERTJ0EA220□	22 Ω	2750 K±3 %	(2700 K)
	ERTJ0EA330□	33 Ω		
	ERTJ0EA400□	40 Ω		
	ERTJ0EA470□	47 Ω		
	ERTJ0EA680□	68 Ω	2800 K±3 %	(2750 K)
	ERTJ0EA101□	100 Ω		
	ERTJ0EA151□	150 Ω		
	ERTJ0ET102□	1 kΩ	4500 K±2 %	(4450 K)
	ERTJ0ET152□	1.5 kΩ		
	ERTJ0ET202□	2.0 kΩ		
	ERTJ0ET222□	2.2 kΩ		
	ERTJ0ET302□	3.0 kΩ		
	ERTJ0ET332□	3.3 kΩ		
	ERTJ0ET472□	4.7 kΩ		
	ERTJ0ER332□	3.3 kΩ	4250 K±2 %	(4300 K)
	ERTJ0ER472□	4.7 kΩ		
	ERTJ0ER682□	6.8 kΩ		
	ERTJ0ER103□	10 kΩ		
	ERTJ0ER153□	15 kΩ		
	ERTJ0ER223□	22 kΩ		
	ERTJ0ER333□	33 kΩ		
	ERTJ0EP473□	47 kΩ	4050 K±2 %	(4100 K)
	ERTJ0EV473□	47 kΩ	4700 K±2 %	(4750 K)
	ERTJ0EV683□	68 kΩ		
	ERTJ0EV104□	100 kΩ		
	ERTJ0EV154□	150 kΩ		
	ERTJ0EV224□	220 kΩ		
	ERTJ0EV334□	330 kΩ		
	ERTJ0EV474□	470 kΩ		
J1 (0603)	ERTJ1VA220□	22 Ω	2750 K±3 %	(2700 K)
	ERTJ1VA330□	33 Ω		
	ERTJ1VA400□	40 Ω	2800 K±3 %	(2750 K)
	ERTJ1VA470□	47 Ω		
	ERTJ1VA680□	68 Ω		
	ERTJ1VA101□	100 Ω		
	ERTJ1VT102□	1 kΩ	4500 K±2 %	(4450 K)
	ERTJ1VT152□	1.5 kΩ		
	ERTJ1VT202□	2.0 kΩ		
	ERTJ1VT222□	2.2 kΩ		
	ERTJ1VT302□	3.0 kΩ		
	ERTJ1VT332□	3.3 kΩ		
	ERTJ1VT472□	4.7 kΩ		
	ERTJ1VR332□	3.3 kΩ	4250 K±2 %	(4300 K)
	ERTJ1VR472□	4.7 kΩ		
	ERTJ1VR682□	6.8 kΩ		
	ERTJ1VR103□	10 kΩ		
	ERTJ1VR153□	15 kΩ		
	ERTJ1VR223□	22 kΩ		
	ERTJ1VR333□	33 kΩ		
	ERTJ1VR473□	47 kΩ		
	ERTJ1VR683□	68 kΩ		
	ERTJ1VP473□	47 kΩ	4050 K±2 %	(4100 K)
	ERTJ1VV473□	47 kΩ	4700 K±2 %	(4750 K)
	ERTJ1VV683□	68 kΩ		
	ERTJ1VV104□	100 kΩ		
	ERTJ1VV154□	150 kΩ		

✻ □ : Resistance Tolerance Code

$$B25/50=\frac{\ell n\,(R_{25}/R_{50})}{1/298.15-1/323.15} \qquad B25/85=\frac{\ell n\,(R_{25}/R_{85})}{1/298.15-1/358.15}$$

R_{25}=Resistance at 25.0±0.1 °C
R_{50}=Resistance at 50.0±0.1 °C
R_{85}=Resistance at 85.0±0.1 °C

Multilayer Chip NTC Thermistors

Handling Precautions

⚠Safety Precautions

The Multilayer Chip NTC Thermistors (hereafter referred to as "Thermistors") are intended for general consumer-type electronic (audiovisual, household, office, information & communication)equipment. It is important to understand the features and specifications before making a selection.
Misuse may result performance deterioration resulting in short or open circuits.
For product designs which requires a high level of safety, make a careful analysis about how a failure mode could affect the end products;
For the following applications, please consult us for a more detailed information or if you have any questions about the intstructions below for safety or handling, or for any applications where erroneous operation with this porduct may cause directly, or indirectly, hazardous situations which could result in death or injury.

① Aircraft Equipment, Aerospace Equipment (satellite, rocket, etc.)
② Submarine Equipment (submarine repeating equipment, etc.)
③ The Department of Defense
④ Transportation Equipment (motor vehicles, airplanes, trains, ships, traffic signal controls)
⑤ Power Generation Control Equipment (atomic power, hydroelectric power, thermal power plant control system)
⑥ Medical Equipment (life-support equipment, pacemakers, dialysis controllers)
⑦ Information Processing Equipment (a large scale computer system)
⑧ Electric Heating Appliances, Burning Apparatus
⑨ Rotary Motion Equipment
⑩ Security Systems

■ ⚠Operating Conditions and Circuit Design

1. Circuit Design

1.1 Operating Temperature Range

The specified "Operating Temperature Range" In the Specification is absolute maximum and minimum temperature rating. So in any case, each of the Thermistors shall be operated within the specified "Operating Temperature Range".

1.2 Operating Power

Thermistors, shall not be operated in excess of the specified "Maximum Permissible Electrical power".
Thermistors shall not be operated beyond thespecified Maximum Permissible Electrical Power, otherwise, burnout and damages could occur. (if operated in ambienttemperatures above 25 °C, power rating shall be derated in accordance with the derating curve.)
In case of applications of the Thermistor to temperature detection, the accuracy of the detection may be greatly affected by the self-heat generation and heat dissipation of the Thermistor, even if the Thermistor is operated under the specified Maximum Permissible Electrical power before use.
The safety and reliability shall be checked in your circuit.

2. Design of Printed Circuit Board

2.1 Selection of Printed Circuit Boards

When the Thermistors are mounted and soldered on an "Aluminum Substrate", the substrate has influences on the Thermistors ability to withstand "Temperature Cycles" and "Heat shock" because of difference in thermal expansion coefficients between them. It should be carefully confirmed that the actual board used does not deteriorate the characteristics of the Thermistors.

2.2 Design of Land Pattern

(1) Recommended Dimensions of Lands:
As shown in Table 1.

Notes: ∗ Too a large land area requires an excess amount of solder.
∗∗ The Dimensions shall be symmetrical

Fig.1 Recommended Land Dimensions

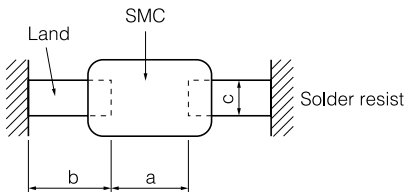
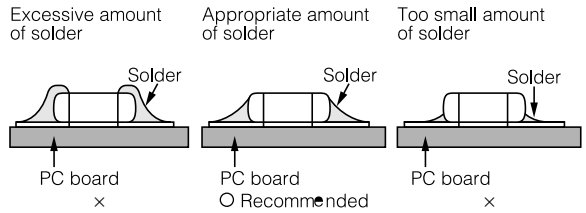


Table 1 Recommended Land Dimensions in mm

Size Code (EIA)	Component Dimensions			a	b	c
	L	W	T			
JZ (0201)	0.6	0.3	0.3	0.2–0.3	0.25–0.30	0.2–0.3
J0 (0402)	1.0	0.5	0.5	0.4–0.5	0.4–0.5	0.5–0.6
J1 (0603)	1.6	0.8	0.8	0.8–1.0	0.6–0.8	0.6–0.8

(2) Recommended Amount of Solder:
As shown in Fig.2
Excess amounts of solder may cause large mechanical stresses to the Thermistors/components.

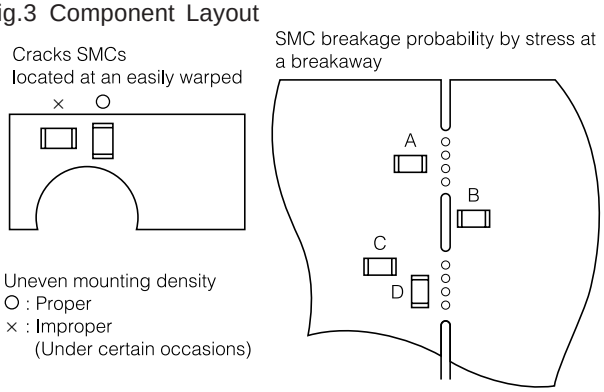
Fig.2 Recommended Amount of Solder



2.3 Component Layout

When placing/mounting the Thermistors/components near an area which is apt to bend or near a grid groove on the PC board, it is advisable to have both electrodes subjected to uniform stresses, or toposition the components electrodes at right angles to the grid groove or bending line.

Fig.3 Component Layout



Probability at which the chip Thermistors is broken by the stress on PC board break: A>C>B≒D

2.4 Mounting Density and Spaces

Placements in too narrow spaces between components may cause “Solder Bridges”, during soldering. The minimum space between components shall be 0.5 mm in view of the positioning tolerances of the mounting machines and the dimensional tolerances of the components and PC boards.

2.5 Applications of Solder Resist

Applications of Solder resist are effective in preventing solder bridges and controlling amounts of solder on PC boards. (As shown in Table 2)

Table 2 Application Examples of Solder Resist

	Recommended Application Examples	Examples of Solder Bridges
Narrow Spacing between Chip Components	Solder Resist	Solder Bridge
Radial Components are directly connected to Chip Components	Solder Resist	Solder Bridge
Common lands (chassis,etc.)are close to Chip Components.	Solder Resist	Solder Bridge

■Precautions for Assembly

1 Storage

(1) The Thermistors shall not be stored under severe conditions of high temperature and/or humiditiy .Store them indoors under at 5-40 °C and 20-70% RH.
(2) The solderability of the external electrodes maybe degraded if the Thermistors are stored where they are exposed to high humidities, dust or harmful gases such as hydrogen sulfide, sulfuric acid, hydrogen chlorine or ammonia. Avoid exposing the Thermistor to heat or direct sunlight. Otherwise the packing materials may be deformed or the Thermistors may stick together that would cause problems during mounting.
(3) The Thermistors should be used within 6 months. Check solderability before use.

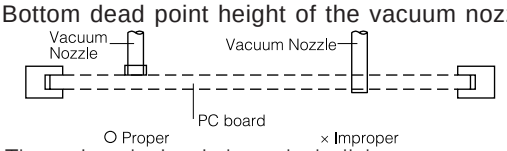
2 Adhesives for Mounting

(1) The viscosity of an adhesive for mountings shall be such that the adhesive does not flow off of the land during it’s curing.
(2) If the adhesive is too low in its viscosity, mounted components may be out of alignment after or during soldering.
(3) The adhesives shall not be corrosive or chemically active to the mounted components and the PC boards.
(4) The amount of adhesive shall be such that the adhesive does not flow off of the land or cause the component.
(5) Adhesives for mountings can be cured by ultraviolet or infrared radiation. In order to prevent the terminal electrodes of the Thermistors from oxidizing. The curing shall be done at conditions of 160 °C max., for 2 minutes max.

3 Chip Mounting Consideration

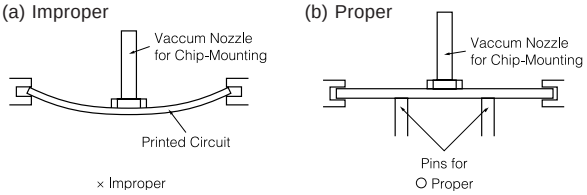
In mounting the Thermistors/components on a printed circuit board, any bending and expanding force against them shall be kept minimum to prevent being damage or cracking. The following precautions and recommendations shall be observed carefully in the process;
(1) Maximum stroke of the vacuum nozzle shall be adjusted so that the pushing force to the printed circuit board should be limited to a static load of 1 to 3 N. (See Fig.4)
(2) Maximum stroke of the nozzle shall be adjusted so that the maximum bending of printed circuit board does not exceed 0.5 mm. (See Fig.4)

Fig.4 Bottom dead point height of the vacuum nozzle



(3) The printed circuit board shall be supported by means of adequate supporting pins as shown in Fig.5-(b).

Fig.5 Backup pins



4 Soldering Flux and Solder

(1) Soldering Flux:
The content of halogen in the soldering flux should be 0.2 wt% or less.
Rosin-based and non-activated soldering flux is recommended.

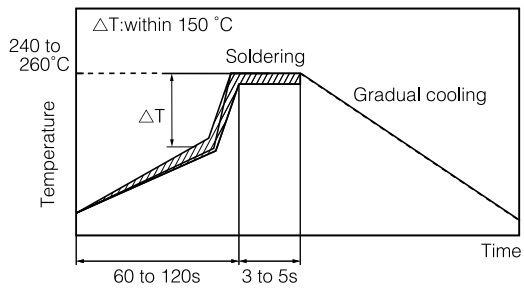
(2) Water soluble type Soldering Flux:
In case of water soluble type soldering flux being applied, the flux residue on the surface of PC boards may have influences on the reliability of the components and be the cause of deterioration and possible failures.

5 Soldering

5-1 Flow Soldering

In flow soldering process, abnormal and large thermal and mechanical stresses, caused by a "Temperature Gradient" between the mounted Thermistors and melted solder in a soldering bath can result in failure and/or damage to the Thermistors. Therefore it is essential that the soldering process shall be controlled by the following recommended conditions and precautions. (See Fig.6)

Fig.6 Recommended Soldering Temperature-Time Profile (Flow soldering)



(1) Application of Flux:
Soldering flux shall be applied to the mounted Thermistors thinly and uniformly using the forming method.

(2) Preheating:
The mounted Thermistors/Components shall be preheated sufficiently so that the "Temperature Gradient" between the Thermistors/components and the melted solder shall be 150 °C or below.

(3) Immersion to Soldering Bath:
The Thermistors should be immersed into a soldering bath of 240 to 260 °C for 3 to 5 seconds.

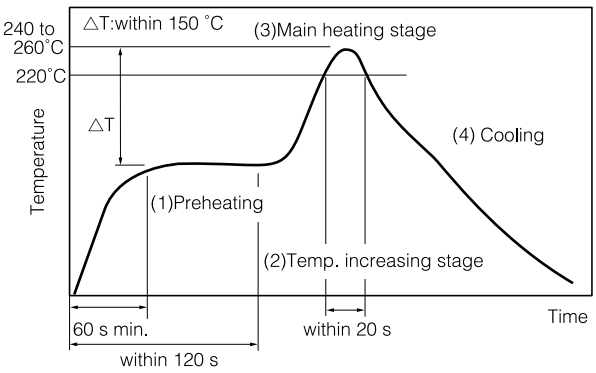
(4) Cooling:
The Thermistors shall be cooled gradually to room ambient temperature after soldering.

(5) Flux Cleaning:
When the Thermistors are immersed into cleaning solvent, it shall be confirmed that the surface temperature of devices do not exceed 100 °C.

5-2 Reflow Soldering

In reflow soldering process, the mounted Thermistors / components are generally heated and soldered by a thermal conduction system such as an "Infrared radiation and hot blast soldering system" or a "Vapor Phase Soldering System (VPS)", Large temperature gradients such as a rapid heating and cooling in the process may cause electrical failures and mechanical damage to the device. It is essential that the soldering process adhere to the following recommended conditions and precautions. (See Fig.7)

Fig.7 Recommended Soldering Temperature-Time Profile (Reflow Soldering)



(1) Preheating: 140 to 160 °C
(2) Temperature increasing stage: 2 to 5 °C / s
(3) Main heating stage: 220 °C min. within 20s
(4) Cooling:
After the soldering, the mounted Thermistors / components shall be gradually cooled to room ambient temperature to prevent mechanical damages such as cracking of the device.
(5) Flux Cleaning:
When the mounted Thermistors / components are immersed into cleaning solvent, it shall be comfirmed that the surface temperature of devices do not exceed 100 °C.

Notes: If the mounted Thermistors / components are partially heated in the soldering process, the device may be separated from the printed circuit board by the surface tension of partially melted solder, and stand up like a "Tombstone"

5-3 Hand Soldering

In hand soldering of the Thermistors, a large temperature gradient between the Thermistors and the tip of soldering iron may cause electrical failures and mechanical damages such as cracking or breaking of the device. The soldering should be carefully controlled and carried out so that the temperature gradient is kept at a minimum with the following recommended conditions for hand soldering.

[Condition 1 (With preheating)]

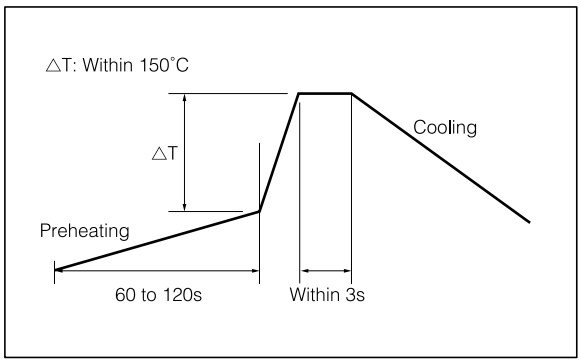
(1) Solder:
ϕ1 mm Thick eutectic solder with soldering flux* in the core.
* Rosin-based, and non-activated flux is recommended.

(2) Preheating:
The Thermistors shall be preheated so that "Temperature Gradient" between the devices and the tip of soldering iron is 150 °C or below.

(3) Soldering Iron:
Temperature of soldering iron tip: 300 °C max.
(The required amount of solder shall be melted in advance on the soldering tip.)

(4) Cooling:
After soldering. The Thermistors shall be cooled gradually at room ambient temperature.

Fig.8 Recommended Soldering Temperature-Time Profile (Hand Soldering)



[Condition 2 (Without preheating)]

Hand soldering is acceptable for modification without preheating if the range below.

(1) Solder iron tip shall not directly touch the ceramic dielectric.

(2) Solder iron tip shall be fully preheated before soldering while soldering the external electrode of Thermistors.

Conditions of Hand soldering without preheating

	Conditions
Temperature	270 ˚C max.
Wattage	20 W max.
Shape of iron tip	ϕ 3 mm max.
Time while touch	Within 3s

6 Post Soldering Cleaning

(1) Residues of corrosive soldering fluxes on the PC board after cleaning may affect the electrical characteristics and reliability (such as humidity resistance) of Thermistors which have been mounted on the board. Please confirm that the characteristics and the reliability of the devices are not affected by the cleaning agents used.

(2) Solubility of alternative cleaning flux solvents such as alcohol is inferior to that of freon cleaning solvent.
In case of alternative cleaning solvents use, fresh cleaning solvent shall always be used, and sufficient rinsing and drying shall be carried out.

(3) When ultrasonic cleaning is applied to the mounted Thermistors on PC boards, the following conditions are recommended to prevent failure or damages of the device due to the high vibration energy and resonance generated by the ultrasonic waves :
Frequency : 29 kHz max.
Radiated Power : 20 W/liter max.
Period : 5 minuets max.

7 Process Inspection

When the mounted printed circuits are inspected with measuring terminal pins, abnomal and excess mechanical stresses shall not be applied to the PC board and mounted components in order to prevent failures or damage to the devices.

(1) The mounted PC boards shall be supported by some adequate supporting pins to prevent excessive bending.

(2) Verify that the measuring pinshave the right tip in shape, and equal in height and are set in the right positions.

8 Protective Coating

When the surface of the printed board on which the Thermistors have been mounted is coated with resin to protect against moisture and dust; Please confirm that the protective coat does not have affect on the reliability of the Thermistors in the actual equipment.

(1) Coating materials, that are corrosive and chemically active, shall not be applied to the Thermistors and other components.

(2) Coating materials with large expansivity shall not be applied to the Thermistors in order to prevent failure or damage(such as crackings) during the curing process.

9 Dividing/Breaking of PC Boards

(1) Abnormal and/or excessive mechanical stress, such as bending or expanding force on the components mounted on the printed circuit board, shall be kept to a minimum in the dividing/breaking process.

(2) Dividing/Breaking of the PC boards shall be done carefully and at moderate speeds by using a jig or apparatus to prevent the Thermistors on the boards from mechanical damage or separation.