To: **Digi-Key**

Issue No. : ERTJ06073105

Date of Issue : July 31.2006

Classification : ■ New □ Changed

PRODUCT SPECIFICATION FOR APPROVAL

Product Description : Multilayer Chip NTC Thermistors

Product Part Number : ERTJ0ER104J

[EIA:0402]

Customers Part Number :

Country of Origin : Japan

Applications : Consumer Type Electric Equipment

※If you approve this specification, please fill in and sign the below and return 1copy to us.

Approval No :

Approval Date :

Excecuted by :

(signature)

Title :

Dept. :

Prepared by : Engineering Section

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Capacitor Business Unit

Panasonic Electronic Devices Co.,Ltd.

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If there is a question, please ask the engineering section about it directly. **Panasonic**

CLASSIFICATION	SPECIFICATIONS	No. 151S-ERTJ-KE52E
SUBJECT	Multilayer Chip NTC Thermistors Individual Specification for Size 0402 (EIA)	PAGE 1 of 1 DATE Jul 31, 2006

1. Scope

This specification applies to Multilayer Chip NTC Thermistors , size 0402(EIA).

2. Style and Dimensions

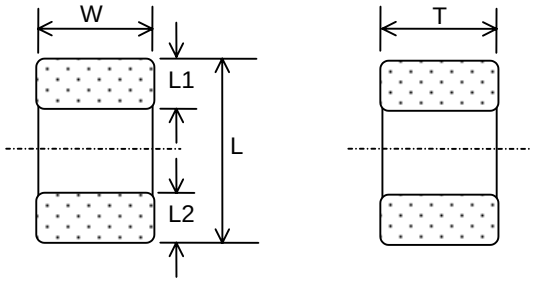


Table 1

Symbol	Dimensions(mm)
L	1.0 +/- 0.1
W	0.50 +/- 0.05
T	0.50 +/- 0.05
L1,L2	0.25 +/- 0.15

3. Operating Temperature Range / Storage Temperature Range

- 40 to 125 °C

4. Explanation of Part Numbers

E R T J 0 E R 1 0 4 J

- E R T J : Common Code
- 0 : Size Code

Code	Size
0	EIA:0402

- E R : B Value Class Code
- 1 0 4 : Nominal Resistance
- J : Resistance Tol Code

Code	Tolerance
J	+/- 5 %

- E : Packaging Style Code

Code	Packaging Style
E	ϕ180Reel, Paper Taping , 10000pcs./reel

5. Individual Specification

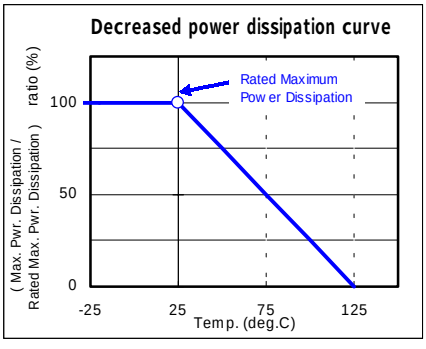
Table 2

Part Number	Rated Zero-power Resistance *1)	B Value ($B_{25/50}$)	Rated Maximum Power Dissipation *2)	Dissipation Factor *3) (Reference value)
ERTJ0ER104J	100 kΩ +/- 5 %	4250 K +/- 2 %	66 mW	Approx. 2 mW / °C

*1)Rated Zero-power Resistance : The value of the d.c. resistance of a thermistor, when measured at the rated ambient temperature, 25.0°C +/- 0.1°C, under conditions such that the change in resistance due to the internal generation of heat is negligible, i.e. 0.10mW Max.

*2)Rated Maximum Power Dissipation : The maximum value of the power dissipation which can be continuously applied to the thermistor at the rated ambient temperature, 25.0 °C.

† The maximum value of the power dissipation which can be continuously applied to the thermistor (referred to as “maximum power dissipation”) is equal to the rated maximum power dissipation when the ambient temperature is less than 25°C, and when more than 25°C, it is based on the decreased power dissipation curve.



*3)Dissipation Factor : The factor which indicates the power applied to the thermistor when the temperature of the thermistor element rises by 1°C due to its self-heat dissipation.

† The dissipation factor is a reference value when mounted on a glass epoxy board (1.6 mmT).

Note ;

Panasonic Electronic Devices Co., Ltd.	APPROVAL	CHECK	DESIGN
	Y. Sakaguti	T. Kawamura	T. Shinriki

CLASSIFICATION	SPECIFICATIONS	No. 151S-ERTJ-SG07E
SUBJECT	Multilayer Chip NTC Thermistors Common Specification for Standard Type	PAGE 1 of 5
		DATE May 12, 2006

1. Information

1- 1. Applicable laws and regulations

(1) Any ozone-depleting substances listed in the Montreal Protocol are not used in the manufacturing processes for parts and materials used in this product.
(2) PBB and PBDE are intentionally excluded from materials used in this product.
(3) All the materials used in this product are registered materials under the Law Concerning Examination and Regulation of Manufacture and Handling of Chemical Substances.
(4) This product complies with the RoHS, DIRECTIVE 2002/95/EC on the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment.
(5) This product is subject to export procedures under export related laws and regulations such as the Foreign Exchange and Foreign Trade Law.

1- 2. Limitation in Applications

This product was designed and manufactured for general-purpose electronic equipment such as household, office, information & communication equipment. When the following applications, which are required higher reliability and safety because the trouble or malfunction of this product may threaten the lives and/or properties, are examined, separate specifications suitable for the application should be exchanged.

- Aerospace / Aircraft equipment, Warning / Antitheft equipment, Medical equipment, Transport equipment (Motor vehicles, Trains, Ship and Vessel), Highly public information processing equipment, Others equivalent to the above.

1- 3. Production factory

(1) Panasonic Electronic Devices Hokkaido Co., Ltd.
(2) Panasonic Electronic Devices (Tianjin) Co., Ltd. (PEDTJ)

2. Scope

This specification applies to common specification for Multilayer Chip NTC Thermistors. If there is a difference between this common specification and any individual specifications, priority shall be given to the individual specifications.

2- 1. This product shall be used for general-purpose electronic equipment such as audio/visual, home, office, information & communication equipment.

Depending on the application, the time frame for failure modes such as performance deterioration or the time in which short/open circuits may occur may be accelerated.
For products which require high safety levels, please carefully consider how a single malfunction can affect your product.
Whenever any doubt about safety arises from this product, immediately inform us for technical consultation without fail, please.

2- 2. This specification shall form a part of documents related with the agreement made and entered by and between your company and Matsushita Electric Industrial Co., Ltd.

3. Part Number Code

ERTJ	1	V	A	101	J	__
(1)	(2)	(3)	(4)	(5)	(6)	(7)

3- 1. Common Code (1)

ERTJ : Multilayer Chip NTC Thermistors

Common Code			
Product Code		Type Code	
ERT	NTC Thermistors	J	Multilayer Chip Type (SMD)

3- 2. Size Code (2)

Z : size 0201 / EIA
0 : size 0402 / EIA
1 : size 0603 / EIA

Note ;.

Panasonic Electronic Devices Co., Ltd.	APPROVAL	CHECK	DESIGN
	Y. Sakaguti	T.Kawamura	S. Inagaki

3- 3. Packaging Style Code (3)
Shown in each Individual Specification

3- 4. B Value Class Code (4)

Code	Center of B Value
A	2701～2800K
G	3301～3400K
M	3801～3900K
P	4001～4100K
R	4201～4300K
S	4301～4400K
T	4401～4500K
V	4701～4800K

3- 5. Nominal Resistance (5)
The Nominal Resistance is expressed in ohm and identified by a three-digit number; the first two digits represent significant figures and the last digit specifies the number of zero to follow.

Symbol (Ex.)	Nominal Resistance (ohm)
102	1000
103	10000
104	100000

3- 6. Resistance Tolerance Code (6)
Shown in each Individual Specification

3- 7. Special Specification (7)
A specific code shall be given for identification as individual specification or design ranking if necessary.

4. Operating Temperature Range
Shown in each Individual Specification

5. Soldering method
Soldering method of the multilayer chip NTC thermistor shall be reflow soldering.

6. Performance
The performance of the multilayer chip NTC thermistor and its test conditions shall be specified in Table 2.

7. Test
Unless otherwise specified, all tests and measurements shall be made at a temperature of 15 to 35°C and at a relative humidity of 45 to 75%.
If results obtained are doubted, a further test should be carried out at a temperature of 25 +/- 2°C and a relative humidity of 60 to 70%.

8. Structure

Fig. 1

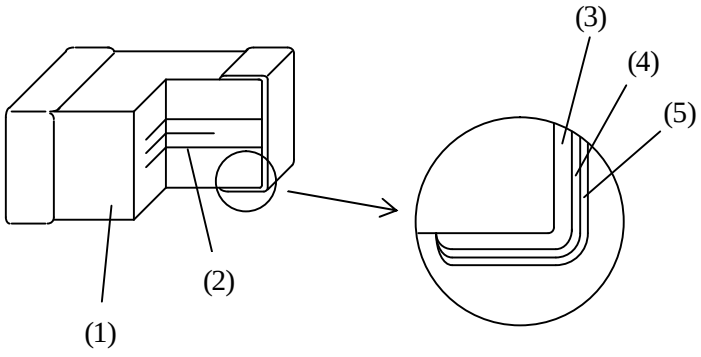
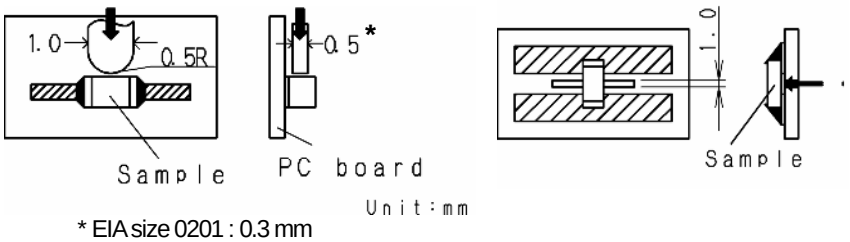
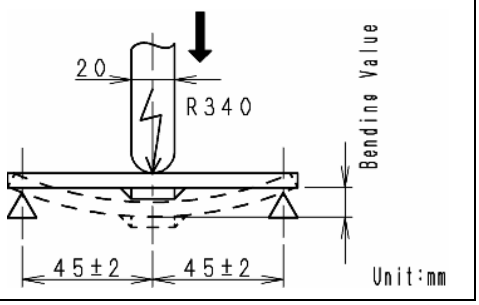


Table 1

No.	Name	
(1)	Semiconductive Ceramics	
(2)	Internal Electrode (Pd)	
(3)	Terminal Electrode	Substrate Electrode (Cu)
(4)		Intermediate Electrode (Ni)
(5)		External Electrode (Sn)

Note ;

Table 2

No.	Test	Performance	Test Method
1	Appearance	There shall be no defects which affect the life and use.	Check with a magnifying glass (3x)
2	Dimensions	Shown in each Individual Specification	Inspection with slide calipers and a micrometer or a projector
3	Rated Zero-power Resistance (R_{25})	Shown in each Individual Specification	The value of the d.c. resistance shall be measured at the rated ambient temperature of 25.0+/-0.1deg.C under the power less than 0.1mW which is negligible self heat generation.
4	B Value	Shown in each Individual Specification * Individual Specification shall specify $B_{25/50}$ or $B_{25/85}$.	The Zero-power resistances; R_1 and R_2, shall be measured respectively at T_1(deg.C) and T_2(deg.C). The B value is calculated by the following equation. $B_{T_1/T_2} = \frac{\ln(R_1) - \ln(R_2)}{1/(T_1+273.15) - 1/(T_2+273.15)}$ T_1: 25.0+/-0.1°C, T_2: 50.0+/-0.1°C (for $B_{25/50}$) T_1: 25.0+/-0.1°C, T_2: 85.0+/-0.1°C (for $B_{25/85}$)
5	Adhesion	The terminal electrode shall be free from peeling or signs of peeling.	Specimens shall be soldered on the testing board shown in Fig.2, and the following force is applied in the arrow direction for 10 seconds. ・Force EIA size 0201 : 2N others size : 5N EIA size 0201, 0402 / EIA size 0603  * EIA size 0201 : 0.3 mm Material of PCB : Alumina board (95% min.) or glass epoxy board. (Thickness/1.0mm min.)
6	Bending Strength	There shall be no cracks and other mechanical damage. Change of Zero-power Resistance (R_{25}) : Within +/-5%	After soldering a specimen on the substrate (shown in Fig.3), 1mm of bending shall be applied for 5 seconds. Bending speed : 1mm/s 

(to be continued)

Note ;

Table 2

<table>
<tr><th>No.</th><th>Test</th><th>Performance</th><th>Test Method</th></tr>
<tr><td>7</td><td>Resistance to soldering heat</td><td>There shall be no cracks and other mechanical damage.

Change of Zero-power Resistance (R_{25}) :
Within +/-3%

Change of B Value :
Within +/-2%</td><td>Solder temperature : 270 +/-5 deg.C
Dipping period : 3.0 +/-0.5 s
Specimens shall be dipped in solder so that both terminal electrodes are completely immersed.

Preconditioning : Heat treatment
<table><tr><th>Step</th><th>Temp. (deg.C)</th><th>Period (s)</th></tr><tr><td>1</td><td>80 to 100</td><td>120 to 180</td></tr><tr><td>2</td><td>150 to 200</td><td>120 to 180</td></tr></table>
Solder : H63A(JIS-Z-3282)
Flux: Concentration about 25% by weight of Rosin (JIS-K-5902) ethanol solution</td></tr>
<tr><td>8</td><td>Solderability</td><td>More than 75% of the soldered area of both terminal electrodes shall be covered with fresh solder.</td><td>Solder temperature : 230 +/-5 deg.C
Dipping period : 4 +/- 1 s
A specimen shall be dipped so that both terminal electrodes are completely immersed.
Solder : H63A(JIS-Z-3282)
Flux: Concentration about 25% by weight of Rosin (JIS-K-5902) ethanol solution
Dipping holder : Tweezers</td></tr>
<tr><td>9</td><td>Temperature Cycling</td><td>Change of Zero-power Resistance (R_{25}) :
Within +/-3%

Change of B Value :
Within +/-2%</td><td>Specimens shall be soldered on the testing jig shown in Fig. 2.
The specimens are conditioned to be each temperature from step 1 to 4 in this order for the period shown in the table below.
Regarding this conditioning as one cycle,
100 cycles shall be continuously performed.
<table><tr><th>Step</th><th>Temperature(°C)</th><th>Period(min)</th></tr><tr><td>1</td><td>-40 +/- 3</td><td>30 +/- 3</td></tr><tr><td>2</td><td>Room temperature</td><td>3 max.</td></tr><tr><td>3</td><td>125 +/- 5</td><td>30 +/- 3</td></tr><tr><td>4</td><td>Room temperature</td><td>3 max.</td></tr></table></td></tr>
<tr><td>10</td><td>Moisture Resistance</td><td>Change of Zero-power Resistance (R_{25}) :
Within +/-3%

Change of B Value :
Within +/-2%</td><td>Specimens shall be soldered on the testing board shown in Fig.2.
Test temperature : 85 +/-2 deg.C
Relative humidity : 85 +/-5 %
Test period : 1000 +48/-0 h</td></tr>
<tr><td>11</td><td>Damp Heat Load</td><td>Change of Zero-power Resistance (R_{25}) :
Within +/-3%

Change of B Value :
Within +/-2%</td><td>Specimens shall be soldered on the testing board shown in Fig.2.
Test temperature : 85 +/-2 deg.C
Relative humidity : 85 +/-5 %
Applied power : 10 mW (D.C.)
Test period : 1000 +48/-0 h</td></tr>
</table>

(to be continued)

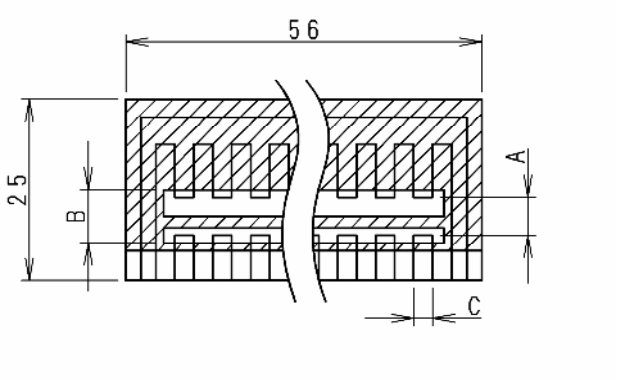
Note ;

Table 2

No.	Test	Performance	Test Method
12	Cold Resistance	Change of Zero-power Resistance (R_{25}) : Within +/-3% Change of B Value : Within +/-2%	Specimens are soldered on the testing board shown in Fig.2. Test temperature : -40 +/-3 deg.C Test period : 1000 +48/-0 h
13	Dry heat Resistance	Change of Zero-power Resistance (R_{25}) : Within +/-3% Change of B Value : Within +/-2%	Specimens are soldered on the testing board shown in Fig.2. Test temperature : 125 +/-3 deg.C Test period : 1000 +48/-0 h

When uncertainty occurs in the climatic tests (temperature cycle, moisture resistance, damp heat load, cold resistance and dry heat resistance), the same tests shall be performed for the capacitor itself.

Fig. 2 Testing jig



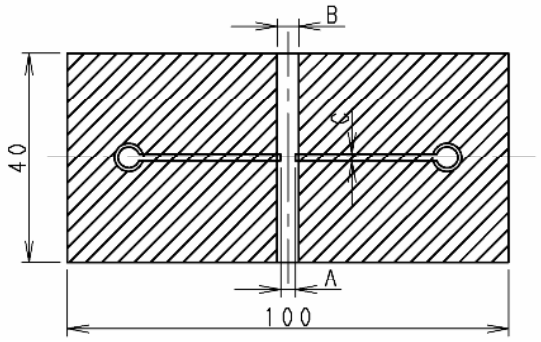
Material : Glass epoxy board
Thickness : 1.6mm
: Copper foil (0.035mm t)
: Solder resist

Table 3

Size (EIA)	A	B	C
0201	0.3	0.9	0.3
0402	0.5	1.5	0.6
0603	1.0	3.0	1.2

Unit : mm

Fig. 3 Testing jig



Material : Glass epoxy board
: Copper foil (0.035mm thick)
: Solder resist

Table 4

Size (EIA)	A	B	C	Board Thickness
0201	0.3	0.9	0.3	0.6
0402	0.5	1.5	0.6	0.6
0603	1.0	3.0	1.2	1.6

Unit : mm

Note ;

1. Precautions for Use

Multilayer Chip NTC Thermistors (hereafter referred to as “Thermistors”) may fail in a short circuit mode or in an open circuit mode, when subjected to severe conditions of electrical environmental and/or mechanical stress beyond the specified “Rating” and specified “Conditions” in the Specification, resulting in burnout, flaming or glowing in the worst case. The following “Precautions for Safety” and “Application Notes” shall be taken in your major consideration for use.

2. Operating Conditions and Circuit Design

2- 1.Circuit Design

2-1-1. Operating Temperature and Storage Temperature

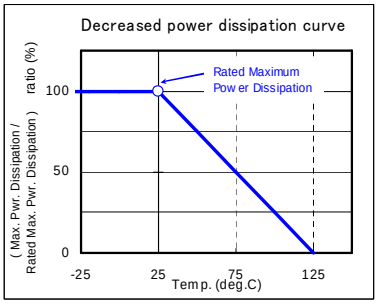
The specified “Operating Temperature Range” in the Specifications is the absolute maximum and minimum temperature rating. Every circuit mounting a Thermistor shall be operated within the specified “Operating Temperature Range”. The Thermistors mounted on PCB shall be stored without operating within the specified “Storage Temperature Range” in the Specifications.

2-1-2. Operating Power

Thermistors shall not be operated in excess of the “Maximum power dissipation”.
If the Thermistors are operated beyond the specified Maximum power dissipation, it may cause burnout and/or damage due to thermal run away.
For temperature detection applications, the accuracy may be greatly influenced by self-heat generation and the heat dissipation of the Thermistor, even if the Thermistor is operated under the specified Maximum Power Dissipation. Check safety and reliability in your circuit.

【Maximum power dissipation】

・ The Maximum power that can be continuously applied under static air at a certain ambient temperature. The Maximum power dissipation under ambient temperature 25°C or less is the same with the rated maximum power dissipation, and Maximum power dissipation beyond 25°C depends on the right Decreased power dissipation curve.



【Dissipation factor】

・ The constant amount power required to raise the temperature of the Thermistor 1°C through self heat generation under stable temperatures.

Dissipation factor (mW/°C) = Power consumption of Thermistor / Temperature rise of element

2-1-3. Environmental Restrictions

The Thermistors shall not be operated and/or stored under the following conditions.

(1) Environmental conditions
  (a) Under direct exposure to water or salt water
  (b) Under conditions where water can condense and/or dew can form
  (c) Under conditions containing corrosive gases such as hydrogen sulfide, sulfurous acid, chlorine and ammonia

(2) Mechanical conditions
  Under severe conditions of extreme vibrations or shocks.

2-1-4. Measurement of Resistance

The resistance of the Thermistors varies dependent on ambient temperatures and self-heating. Note the following points when measuring resistance values of the Thermistors during inspection or when considering them for circuits.

(1) Measurement temp : 25±0.1°C
  Measurement in liquid (silicon oil) is recommended for a stable measurement temperature.

(2) Power : 0.10 mW max.
  4 terminal measurement with a constant-current power supply is recommended.

Note :

2- 2.Design of Printed Circuit Board

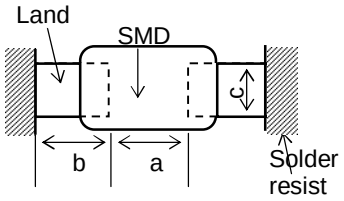
2-2-1. Selection of Printed Circuit Boards

When the Thermistors are mounted and soldered on an “Alumina Substrate”, the substrate influences the Thermistors’ reliability against “Temperature Cycles” and “Heat shock” due to the difference in the thermal expansion coefficient between them. Confirm that the actual board used does not deteriorate the characteristics of the Thermistors.

2-2-2. Design of Land Pattern

(1) Recommended land dimensions are shown below for proper amount of solder to prevent cracking at the time of excessive stress to the Thermistors due to increased amount of solder.

[Recommended land dimensions (Ex.)]

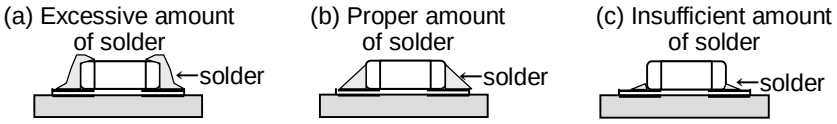


Unit: mm

Size Code (EIA)	Component Dimension L	W	T	a	b	C
Z (0201)	0.6	0.3	0.3	0.2 to 0.3	0.25 to 0.3	0.2 to 0.3
0 (0402)	1.0	0.5	0.5	0.4 to 0.5	0.4 to 0.5	0.4 to 0.5
1 (0603)	1.6	0.8	0.8	0.8 to 1.0	0.6 to 0.8	0.6 to 0.8

(2) The size of lands shall be designed to have equal spacing between the right and left sides. If the amount of solder on the right land is different from that on the left land, the component may be cracked by stress since the side with a larger amount of solder solidifies later during cooling.

Recommended Amount of Solder



2-2-3. Utilization of Solder Resist

The application of solder resist is effective in preventing solder bridges and controlling the amount of solder on PC boards.

(1) Solder resist shall be utilized to equalize the amounts of solder on both sides.

(2) Solder resist shall be used to divide the pattern for the following cases;

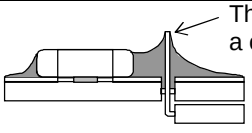
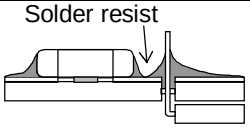
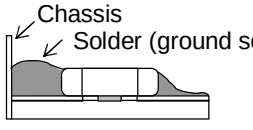
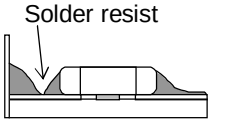
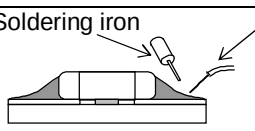
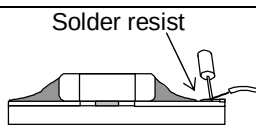
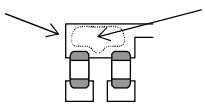
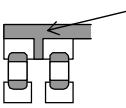
・Components are arranged closely.

・The Thermistor is mounted near a component with lead wires.

・The Thermistor is placed near a chassis.

See the table below.

NG Applications and Recommended Applications

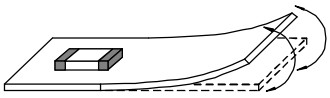
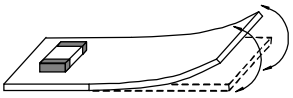
	NG applications	Improved applications by pattern division
Mixed mounting with a component with lead wires		
Arrangement near chassis		
Retro-fitting of component with lead wires		
Lateral arrangement		

Note ;

2-2-4. Component Layout

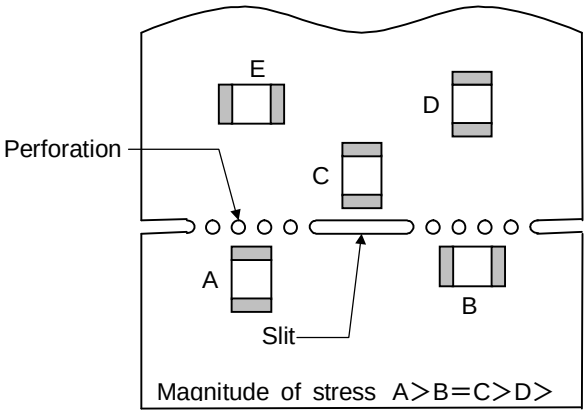
The Thermistors/components shall be placed on the PC board such that both electrodes are subjected to uniform stresses, or to position the component electrodes at right angles to the grid glove or bending line. This should be done to avoid cracking the Thermistors from bending the PC board after or during placing/mounting on the PC board.

(1) To minimize mechanical stress caused by warp or bending of a PC board, please follow the recommended Thermistor layout below.

	NG layout	Recommended layout
Warp of Circuit board		 Lay out the Thermistor sideways against the stressing direction

(2) The following layout is for your reference since mechanical stress near the dividing/breaking position of a PC board varies depending on the mounting position of the Thermistors.

(3) The magnitude of mechanical stress applied to the Thermistors when the circuit board is divided is in the order of push back < slit < V-groove < perforation.
Also take into account the layout of the Thermistors and the dividing/breaking method.



2-2-5. Mounting Density and Spaces

If components are arranged in too narrow a space, the components can be affected by solder bridges and solder balls. The space between components should be carefully determined.

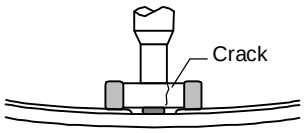
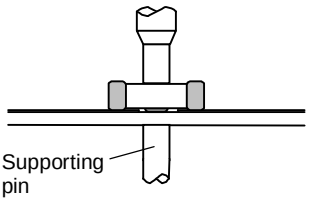
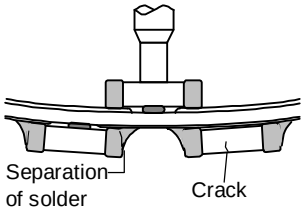
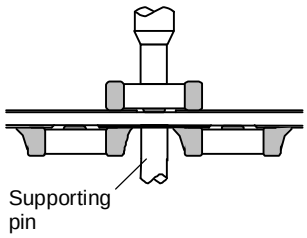
3. Precautions for Assembly

3- 1.Storage

(1) The Thermistors before mounting on PCB shall be stored between 5 - 40°C and 20 - 70% RH, not under severe conditions of high temperature and humidity.
(2) If stored in a place that is humid, dusty, or contains corrosive gasses (hydrogen sulfide, sulfurous acid, hydrogen chloride and ammonia, etc.), the solderability of terminal electrodes may deteriorate.
In addition, storage in a place subjected to heating and/or exposed to direct sunlight will cause deformed tapes and reels. This may also lead to components sticking to tapes. Both of which can result in mounting problems.
(3) Do not store components longer than 6 months. Check the solderability of products that have been stored for more than 6 months before use.

3- 2.Chip Mounting Consideration

(1) When mounting the Thermistors/components on a PC board, the Thermistor bodies shall be free from excessive impact loads such as mechanical impact or stress due to the positioning, pushing force and displacement of vacuum nozzles during mounting.
(2) Maintenance and inspection of the Chip Mounter must be performed regularly.
(3) If the bottom dead center of the vacuum nozzle is too low, the Thermistor will be cracked by excessive force during mounting.
The following precautions and recommendations are for your reference in use.
(a) Set and adjust the bottom dead center of the vacuum nozzles to the upper surface of the PC board after correcting the warp of the PC board.
(b) Set the pushing force of the vacuum nozzle during mounting to 1 to 3 N in static load.
(c) For double surface mounting, apply a supporting pin on the rear surface of the PC board to suppress the bending of the PC board in order to minimize the impact of the vacuum nozzles. Typical examples are shown in the following table.

	NG mounting	Recommended mounting
Single surface mounting		The supporting pin does not necessarily have to be positioned beneath the Thermistor. 
Double surface mounting		

(d) Adjust the vacuum nozzles so that their bottom dead center during mounting is not too low.

(4) The closing dimensions of the positioning chucks shall be controlled. Maintenance and replacement of positioning chucks shall be performed regularly to prevent chipping or cracking of the Thermistors caused by mechanical impact during positioning due to worn positioning chucks.
(5) Maximum stroke of the nozzle shall be adjusted so that the maximum bending of PC board does not exceed 0.5mm at 90mm span. The PC board shall be supported by an adequate number of supporting pins.

3- 3.Selection of Soldering Flux

Soldering flux may seriously affect the performance of the Thermistors. The following shall be confirmed before use.

(1) The soldering flux should have a halogen based content of 0.1 wt. % (converted to chlorine) or below.
Do not use soldering flux with strong acid.
(2) When applying water-soluble soldering flux, wash the Thermistors sufficiently because the soldering flux residue on the surface of PC boards may deteriorate the insulation resistance on the Thermistors' surface.

3- 4.Soldering

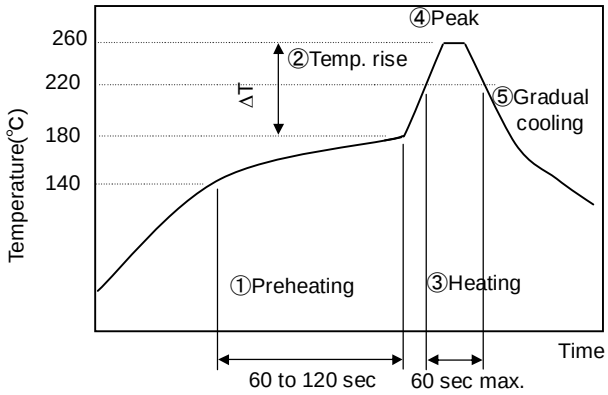
3-4-1. Reflow soldering

In reflow soldering, 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 the rapid heating and cooling which occurs during this process may cause electrical failure and mechanical damage to the devices.
It is essential that the soldering process be controlled by the following recommended conditions and precautions.

	Temperature	Period or Speed
①Preheating	140 to 180 °C	60 to 120s
②Temp. rise	Preheating temp to Peak temp.	2 to 5 °C/s
③Heating	220 °C min.	60 s max.
④Peak	260 °C max.	10 s max.
⑤Gradual cooling	Peak temp. to 140 °C	1 to 4 °C/s

Note ;

Recommended profile of Reflow soldering (Ex.)



〈Allowable temperature difference ΔT〉

Size	Temp. Tol.
0201 to 0603 (EIA)	ΔT≦ 150 °C

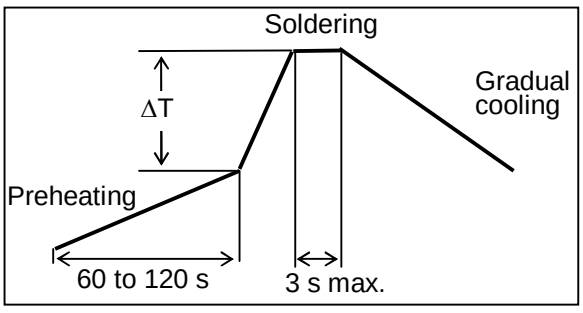
When the Thermistors are immersed into a cleaning solvent, make sure that the surface temperatures of the devices do not exceed 100°C.
Performing reflow soldering twice under the conditions shown in the figure above [Recommended profile of Reflow soldering (EX)] will not cause any problems. However, pay attention to the possible warp and bending of the PC board.

3-4-2. Hand soldering

When hand soldering Thermistors, a large temperature gradient between the preheated Thermistors and the tip of the soldering iron may cause electrical failure and mechanical damage such as cracking or breaking of the devices.
Soldering shall be carefully controlled and performed such that the temperature gradient is kept at a minimum with the following recommended conditions:

(1) Condition 1 (with preheating)
(a) Soldering:
ϕ1.0mm Thread eutectic solder with soldering flux* in the core.
*Rosin-based and non-activated flux is recommended.
(b) Preheating:
The Thermistors shall be preheated so that the “Temperature Gradient” between the devices and the tip of soldering iron is 150°C or below.
(c) Temperature of Iron tip: 300°C max.
(The required amount of solder shall be melted in advance on the soldering tip.)
(d) Gradual Cooling:
After soldering, the Thermistors shall be cooled gradually at room temperature.

Recommended profile of Hand soldering [Ex.]



〈Allowable temperature difference ΔT〉

Size	Temp. Tol.
0201 to 0603 (EIA)	ΔT≦ 150 °C

(2) Condition 2 (without preheating)

Hand soldering can be performed without preheating, by following the conditions below:

(a) Soldering iron tip shall never directly touch the ceramic dielectrics and terminal electrodes of the Thermistors.

(b) The lands are sufficiently preheated with a soldering iron tip before sliding the soldering iron tip to the terminal electrodes of the Thermistor for soldering.

Conditions of Hand soldering without preheating

	Condition
Temperature of Iron tip	270 °C Max.
Wattage	20 W Max.
Shape of Iron tip	ϕ3 mm Max.
Soldering time with a soldering iron	3 s Max.

3- 5.Post Soldering Cleaning

3-5-1. Cleaning solvent

Soldering flux residue may remain on the PC board if cleaned with an inappropriate solvent. This may deteriorate the electrical characteristics and reliability of the Thermistors.

3-5-2. Cleaning conditions

Inappropriate cleaning conditions such as insufficient cleaning or excessive cleaning may impair the electrical characteristics and reliability of the Thermistors.

(1) Insufficient cleaning can lead to:

(a) The halogen substance in the residue of the soldering flux may cause the metal of terminal electrodes to corrode.

(b) The halogen substance in the residue of the soldering flux on the surface of the Thermistors may change resistance values.

(c) Water-soluble soldering flux may have more remarkable tendencies of (a) and (b) above compared to those of rosin soldering flux.

(2) Excessive cleaning can lead to:

(a) Overuse of ultrasonic cleaning may deteriorate the strength of the terminal electrodes or cause cracking in the solder and/or ceramic bodies of the Thermistors due to vibration of the PC boards.

Please follow these conditions for Ultrasonic cleaning:

Ultrasonic wave output : 20 W/L max.
Ultrasonic wave frequency : 40 kHz max.
Ultrasonic wave cleaning time : 5 min. max.

3-5-3. Contamination of Cleaning solvent

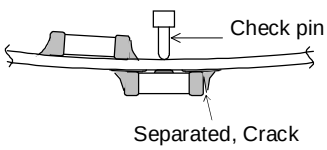
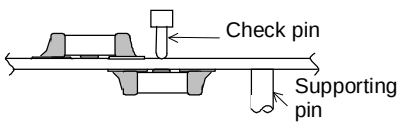
Cleaning with contaminated cleaning solvent may cause the same results as insufficient cleaning due to the high density of liberated halogen.

3- 6.Inspection Process

When mounted PC boards are inspected with measuring terminal pins, abnormal and excess mechanical stress shall not be applied to the PC board or mounted components, to prevent failure or damage to the devices.

(1) Mounted PC boards shall be supported by an adequate number of supporting pins with bend settings of 90 mm span 0.5mm max.

(2) Confirm that the measuring pins have the right tip shape, are equal in height and are set in the correct positions. The following figures are for your reference to avoid bending the PC board.

	NG setting	Recommended setting
Bending of PC board		

Note ;

3- 7.Protective Coating

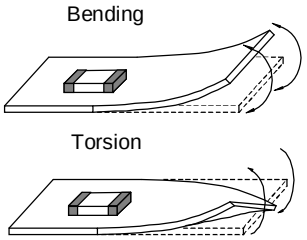
When the surface of a PC board on which the Thermistors have been mounted is coated with resin to protect against moisture and dust, it shall be confirmed that the protective coating does not influence the reliability of the Thermistors in the actual equipment.

(1) Do not use coating materials that are corrosive or chemically active.

(2) Do not use coating materials with large thermal expansivity to prevent damage to the Thermistors during the curing process.

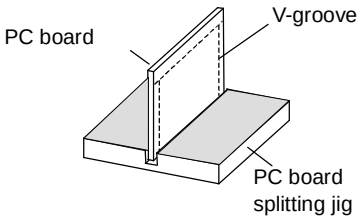
3- 8.Dividing/Breaking of PC Boards

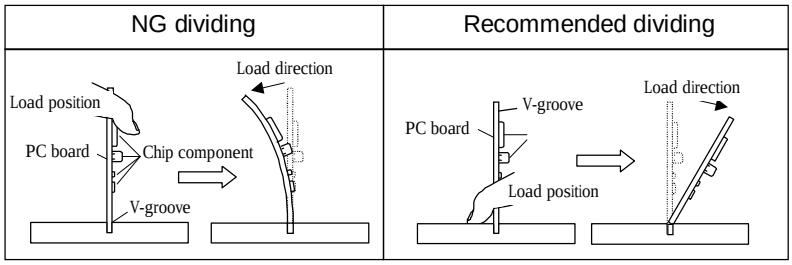
(1) Abnormal and excessive mechanical stress such as bending or torsion shown below can cause cracking in the Thermistors.



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

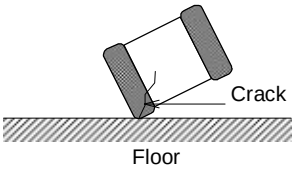
(3) Examples of PCB dividing/breaking jigs:
The outline of PC board breaking jig is shown below.
It is recommended when dividing or breaking PC boards that they are held near the jig where no bending will occur, this way there will be no compressive stress applied to the components or Thermistors on the PC board.
Do not hold the PC board at a position which is far away from the jig, tensile stress to the Thermistors may cause them to crack.



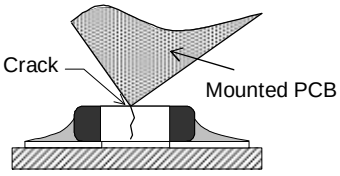


3- 9.Mechanical Impact

(1) The Thermistors shall be free from any excessive mechanical impact.
The Thermistor body is made of ceramics and may be damaged or cracked if dropped.
Never use a Thermistor which has been dropped; their quality may be impaired and failure rate increased.



(2) When handling PC boards with Thermistors mounted on them, do not allow the Thermistors to collide with another PC board.
When mounted PC boards are handled or stored in a stacked state, impact between the corner of a PC board and the Thermistor may cause damage or cracking and can deteriorate the withstand voltage and insulation resistance of the Thermistor.



4. Other

The various precautions described above are typical.
For special mounting conditions, please contact us.

Note ;

CLASSFICATION	SPECIFICATIONS	No. 151S-ERTJ-SV02E
SUBJECT	Multilayer Chip NTC Thermistors Taped and Reeled Packaging Specifications	PAGE 1 of 4 DATE May 12, 2006

1. Scope
This specification applies to taped and reeled packing for Multilayer chip NTC Thermistors.

2. Applicable Standards
EIAJ (Electric Industries Association of Japan) Standard EIAJ RC-1009B
JIS (Japanese Industrial Standard) Standard JIS C 0806

3. Packing Specification
3- 1.Structure and Dimensions
Paper taping packaging is carried out according the following diagram
1) Carrier tape : Shown in Fig. 4., Fig5.
2) Reel : Shown in Fig.6.
3) Packaging : We shall pack suitably in order prevent damage during transportation or storage.

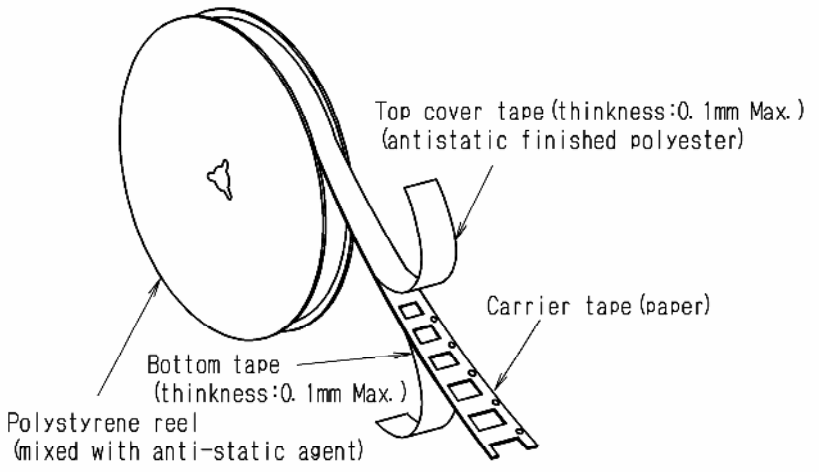
3- 2.Packing Quantity

Size(EIA)	Quantity (pcs./reel)
0201	15000
0402	10000
0603	4000

3- 3.Marking on the Reel
The following items are described in the side of a reel in English at least.
1) Part Number
2) Quantity
3) Lot Number
4) Place of origin

3- 4.Structure of Taping
1) The direction of winding of taping on the reel shall be in accordance with the following diagram.

Fig. 1 Paper Taping



Note :

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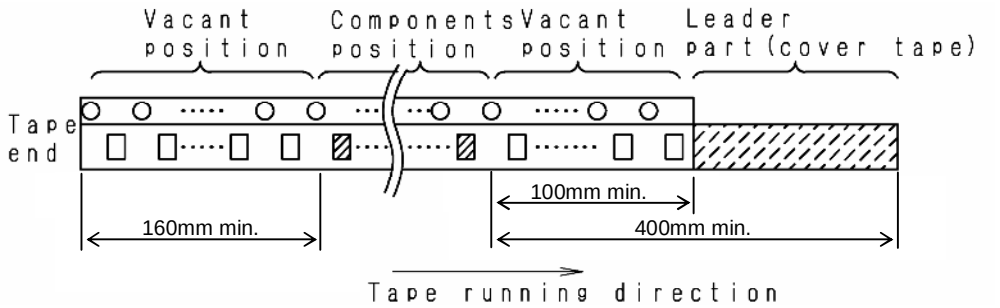
	Y.Sakaguti	T.Kawamura	S. Inagaki

2) The specification of the leader and empty portion shall be in accordance with the following diagram.

Fig. 2 Leader Part and Taped End



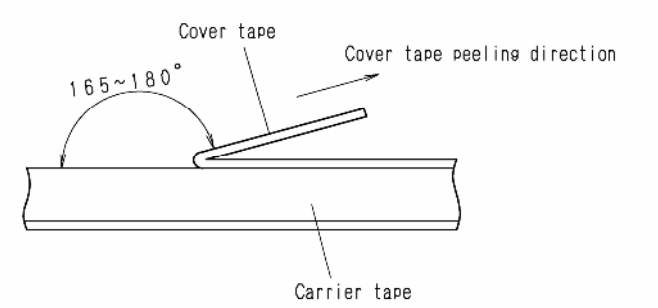
4. Efficiency

4- 1.Breakage strength of the tape : 10N or more.

4- 2.Peel strength of the cover tape (refer to the Fig. 3).

1) Peel angle : 165 to 180 degree from the tape adhesive face.
2) Peel velocity : 300mm per min.
3) Peel strength : 0.1 to 0.7N

Fig. 3 Peel strength of the cover tape.



4- 3.Barrs on tape

There shall be no barrs preventing suction when products are taken out.

4- 4.Missing of products

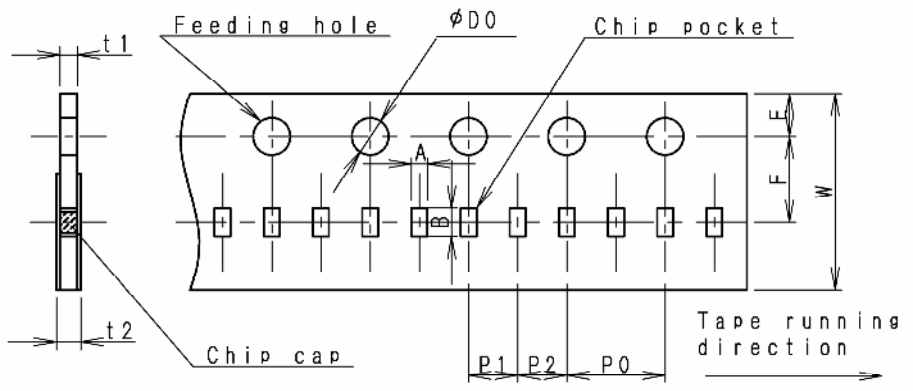
The missing of products shall be 0.1% or less per reel and there shall be no continuous missing of products.

4- 5.Adherence to the tape

Products shall not be stuck to the cover tape or bottom tape.

Note ;

Fig. 4 Carrier Tape Dimension (EIA 0201 and 0402)

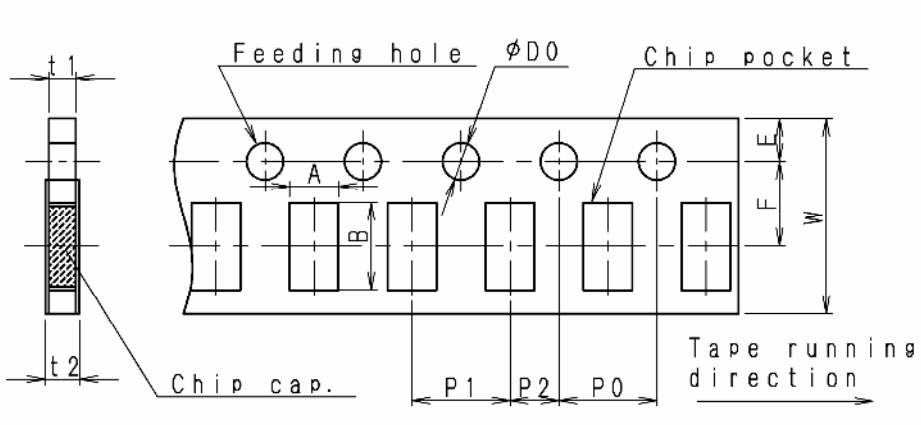


Code	Dimension	
W	8.0 +/- 0.2	
F	3.50 +/- 0.05	
E	1.75 +/- 0.10	
P_1	2.00 +/- 0.05	
P_2	2.00 +/- 0.05	
P_0	4.00 +/- 0.05	
D_0	φ1.5 +0.1/-0	
t_1	06 type	0.5 max.
	10 type	0.7 max.
t_2	06 type	0.8 max.
	10 type	1.0 max.

Unit : mm

Code \ Size	EIA 0201	EIA 0402
A	0.37 +/- 0.03	0.62 +/- 0.05
B	0.67 +/- 0.05	1.12 +/- 0.05

Fig. 5 Carrier Tape Dimension (EIA 0603)



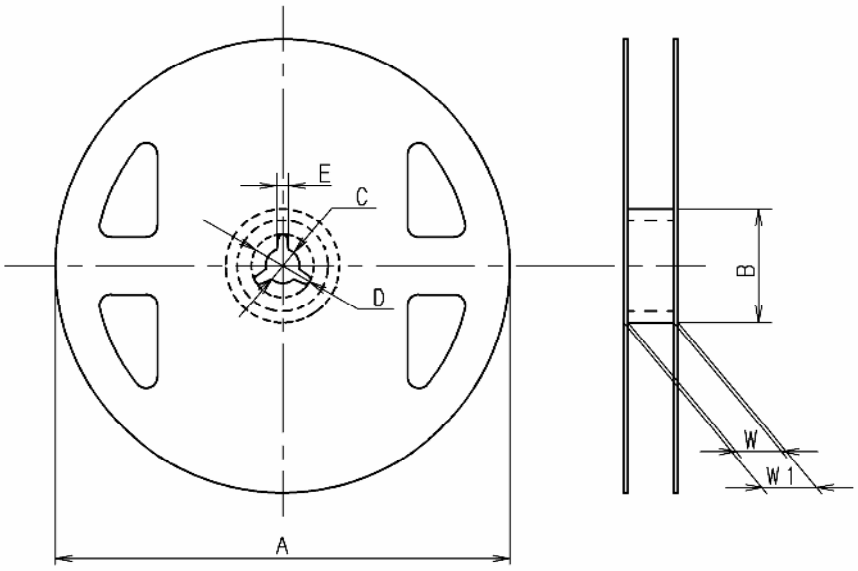
Code	Dimension
W	8.0 +/- 0.2
F	3.50 +/- 0.05
E	1.75 +/- 0.10
P_1	4.0 +/- 0.1
P_2	2.00 +/- 0.05
P_0	4.0 +/- 0.1
D_0	φ1.5 +0.1/-0
t_1	1.1 max.
t_2	1.4 max.

Unit : mm

Code \ Size	EIA 0603
A	1.0 +/- 0.1
B	1.8 +/- 0.1

Note ;

Fig. 6 Reel Dimension



Code	Dimension
A	ϕ180+0/-3.0
B	ϕ60 +/- 0.5
C	13.0 +/- 0.5
D	21.0 +/- 0.8
E	2.0 +/- 0.5
W	9.0 +/- 0.3
W_1	11.4 +/- 0.1

Unit : mm

Note ;