## 1. Scope

This specification applies to 1.25×2.00 mm , 0.25W fixed metal film low resistance value chip resistors rectangular type.

## 2. Type Designation

RL 1220 □ − ※※※※ − □

(1) (2) (3) (4) (5)

(1) Product Type

RL : Fixed metal film low resistance value chip resistors rectangular type

(2) Size

1220 : 1.25×2.00 mm

(3) Temperature coefficient of resistance

S: 0～+200ppm/℃

T: 0～+350ppm/℃

(4) Rated resistance

E-12 series Three digits of number Example R10=0.1Ω

Four digits of number R022=0.022Ω

(5) Tolerance on rated resistance

F : ±1.0%

G : ±2.0%

J : ±5.0%

## 3. Physical Dimensions

See Fig.1.

## 4. Ratings

4.1 Rated resistance, Tolerance on rated resistance and Temperature coefficient of resistance

| | | | | |
|---|---|---|---|---|
| (1) | Rated resistance E-12 series | 0.010Ω～0.018Ω | 0.022Ω～0.082Ω | 0.1Ω～10Ω |
| (2) | Tolerance on rated resistance | ±5.0% (Code:J) | ±2.0% (Code:G)<br>±5.0% (Code:J) | ±1.0% (Code:F)<br>±2.0% (Code:G) |
| (3) | Temperature coefficient of resistance | 0～+350 ppm/℃ (Code:T) | | 0～+200 ppm/℃ (Code:S) |

| REV | CHANG.NO NOTE. | DATE | DRAWN | APPD |
|---|---|---|---|---|
| 0 | First edition. | / / | | |

APPD M.Egashi 24/Aug/2001
CHKD H.Tanaka 24/Aug/2001
DRAW Y.Chou 24/Aug/2001

SSM

SUSUMU CO.,LTD

TITLE: RL1220□-※※※※-□ SPECIFICATION

SPEC.NO: RL00−4053−E0

様式:GS83-1071(REV0)

Fig.1 Dimensions

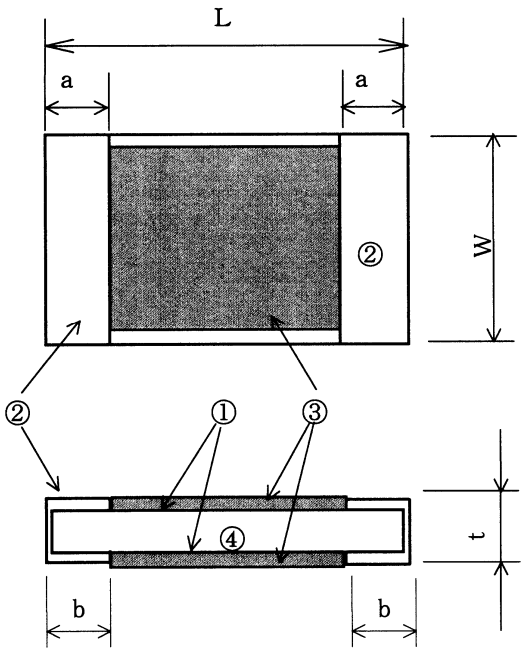



Fig.1.1 Double sides structure

(<0.082Ω)

(Unit) mm

| Code letter | Dimension | |
|---|---|---|
| | Double sides structure | Single side structure |
| L | 2.00 ± 0.2 | 2.00 ± 0.2 |
| W | 1.25 ± 0.2 | 1.25 ± 0.2 |
| t | 0.4+0.15 −0.1 | 0.4 ±0.1 |
| a | 0.4 ± 0.2 | 0.4 ± 0.2 |
| b | 0.4 ± 0.2 | 0.4 ± 0.2 |

NOTE :

① Resistive element Nickel alloy film
② Electrode plating Sn-Pb=9:1 or Sn100%(Lead-Free)
③ Protective coat Epoxy Resin coating
④ Substrate Alumina ceramic

mass : Double sides structure 5mg (REF.)

Single sides structure 4mg (REF.)

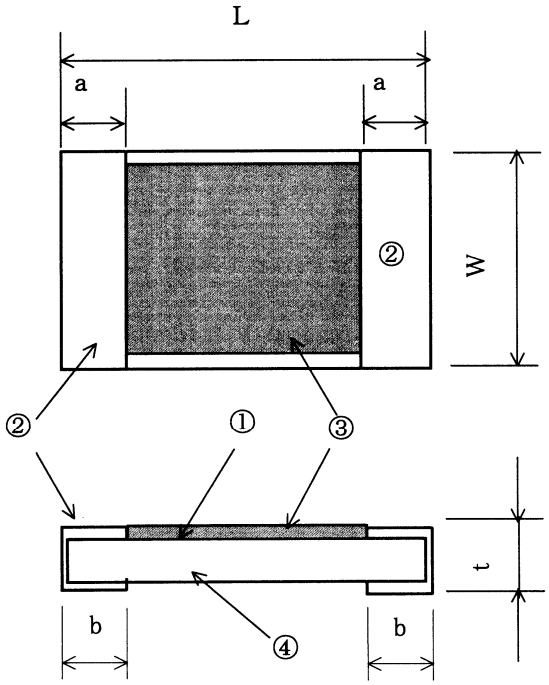



Fig.1.2 Single side structure

(≧0.082Ω)

4.2 Rated dissipation at 70℃

0.25W [ JIS Code 2E ]

Rated dissipation is based on continuous full load operation at rated ambient temperature of 70℃.For the resistor operated at ambient temperature in excess of 70℃, the maximum load shall be derated in accordance with the following curve.

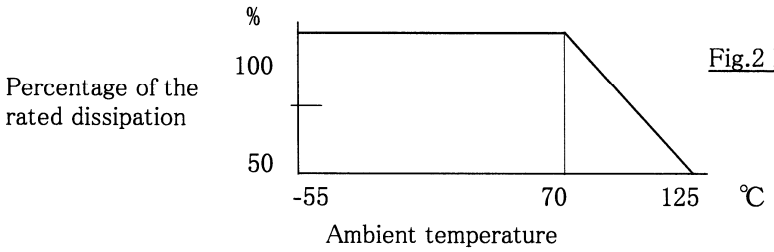



Fig.2 Derating curve

4.3 Rated voltage

The d.c. or a.c. r.m.s voltage shall be calculated from the following expression.

$E=\sqrt{R\times P}$ Where E : Rated voltage (V)
R : Rated resistance (Ω)
P : Rated dissipation (W)

4.4 Operating temperature range −55 to +125 ℃

4.5 Storage temperature range −55 to +125 ℃

**5. Marking**

A rated resistance shall be marked on the protective coat with three digit of number.
See para.2. (3)

(Example) 0.22Ω → R22

But, there is no marking in the rated resistance under 0.1Ω.

## 6. Performance

The test method shall be as specified in IEC 60115-1.
Standard atmospheric conditions
Unless otherwise specified, the standard range of atmospheric conditions for making measurements tests is as follows;

| | |
|---|---|
| Temperature | 5 to 35℃ |
| Relative humidity | 45 to 85%RH |
| Air pressure | 86 to 106kPa |

If there is any doubt about results, measurements shall be made within the following limits;

| | |
|---|---|
| Temperature | 20±2℃ |
| Relative humidity | 60 to 70%RH |
| Air pressure | 86 to 106kPa |

Table. 1 Performance

| No | Item | Conditions | Specifications |
|---|---|---|---|
| 1 | Resistance and tolerance | Refer to IEC 60115-1, Sub-clause 4.5. | Not exceed the specified tolerance on rated resistance in para.4.1. (2). |
| 2 | Temperature characteristic of resistance | Resistance shall be measured under standard atmospheric conditions.<br>When the temperature reaches and is maintained at 100℃ higher than the temperature of standard atmospheric conditions, resistance shall be measured again. The measurement shall be made after a period of 30 min, after each specified temperature is reached.<br>Refer to IEC 60115-1, Sub-clause 4.13. | Not exceed the specified temperature coefficient of resistance in para.4.1. (3). |
| 3 | Overload | A d.c. or a.c. r.m.s. voltage of 2.5 times the rated voltage shall be applied for 5 sec, and a check shall be made to see if arcing or other damage happened. Then the specimen shall be maintained without electrical load for 30 min after which the resistance shall be measured. However the applied voltage shall not exceed the maximum overload voltage.<br>Refer to IEC 60115-1, Sub-clause 4.13. | Change in resistance : ±(0.5%)<br>Without damage by flash over (spark, arcing), burning or breakdown etc. |

Table. 1 Performance (Continued)

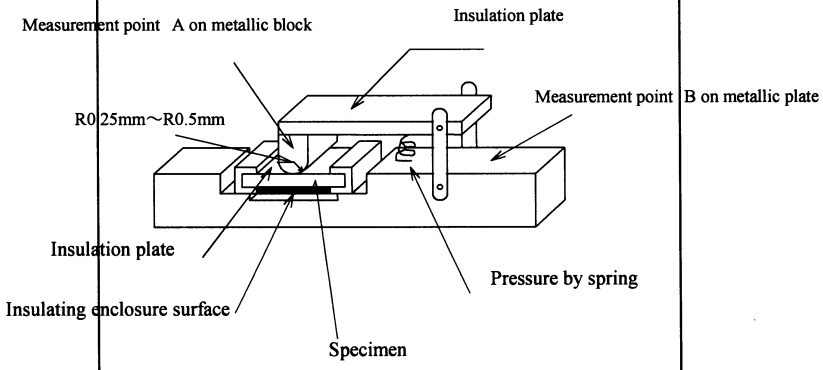
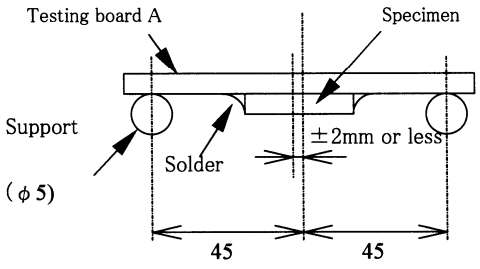
| No | Item | Conditions | Specifications |
|---|---|---|---|
| 4 | Insulation resistance | Place the specimen on the groove of metal plate so that the edge of metal block positions almost center of both electrodes, with the surface of insulation enclosure located downward or upward and pressurize the block by a force of 1.0±0.2 N. The test voltage shall be 100±15V d.c., and maintain this voltage for about 1 min. The insulation resistance shall then be measured while applying the voltage.   Refer to IEC 60115-1,Sub-clause 4.6. | (1)Between electrodes and insulating enclosure. 100MΩ or more<br>(2)Between electrodes and base material.<br>1000MΩ or more |
| 5 | Voltage proof | The specimen shall be tested as shown in paragraph 6.1.4.<br>The test voltage shall be a voltage of 100V (a.c. r.m.s.) between both electrode.<br>The voltage is gradually increased at a rate of about 100 V/s. from almost 0 V to the specified voltage and maintained as it is for 60s. ±5s., then gradually decreased to almost 0 V.<br>Refer to IEC 60115-1, Sub-clause 4.7. | Change in resistance : ±(0.5%)<br>Without damage by flash over (spark, arcing), burning or breakdown etc. |
| 6 | Substrate bending test (Bond strength of the face plating ) | Apply pressure in the direction of the arrow at a rate of about 1mm/s. until bent width reaches 3 mm and hold for 30 s.   | Change in resistance : ±(0.5%)<br>Without mechanical damage such as breaks. |

Table. 1 Performance (Continued)

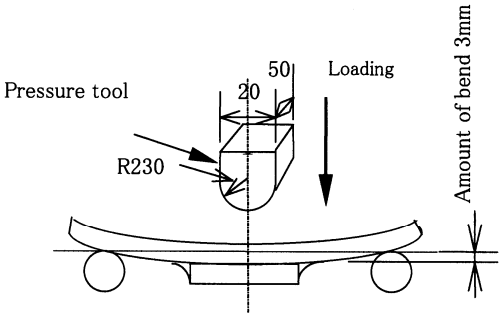
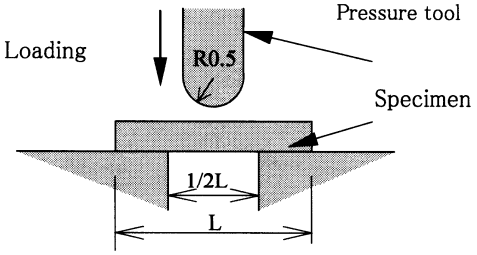
| No | Item | Conditions | Specifications |
|---|---|---|---|
| 6 | Substrate bending test (Bond strength of the face plating )<br><br>(Continued) |  <br>Refer to IEC 60115-1, Sub-clause 4.33. | |
| 7 | Body strength | A load of 10 N {1.02kgf} using a R0.5 pressure rod shall be applied to the center in the direction of arrow and held for 10±1sec.<br>  | Change in Resistance : ±(0.5%)<br>Without mechanical damage such as breaks. |
| 8 | Resistance to soldering heat | (1) Solder bath method<br>Pre-heat : 100 to 110℃ 30 sec.<br>Temperature : 270±5℃ 10±1 sec.<br><br>(2) Reflow soldering method<br>Peak temperature : 260±5℃ 10 sec. or less<br>Temperature : 220±5℃ 60 sec. max.<br>2 cycles or less<br>The temperature shall be board surface temperature.<br><br>(3) Soldering iron method<br>Bit Temperature : 350±5℃<br>Time 時間 : 3+1／0sec<br><br>The specimen shall be stored at standard atmospheric conditions for 1 hr after which the measurements shall be made.<br><br>Refer to IEC 60115-1, Sub-clause 4.18. | Change in Resistance : ±(0.5%)<br>Without mechanical damage.<br>Electrical characteristics shall be satisfied. |

Table. 1 Performance (Continued)

<table>
<tr><th>No</th><th>Item</th><th>Conditions</th><th>Specifications</th></tr>
<tr><td>9</td><td>Solderability</td><td>Solder temperature : 235±5℃<br>Duration of immersion : 2±0.5sec<br>Sn−Pb solder<br>Refer to IEC 60115-1, Sub-clause 4.17.<br><br>Solder temperature : 245±5℃<br>Duration of immersion : 2±0. 5sec<br>S n-3Ag-0.5Cu solder<br>Refer to IEC 60115-1, Sub-clause 4.17.</td><td>A new uniform coating of solder shall cover a minimum of 95% of the surface being immersed.</td></tr>
<tr><td>10</td><td>Solvent Resistance</td><td>Immersion cleaning<br>At normal temperature, 5min Isopropyl alcohol<br><br>Refer to IEC 60115-1, Sub-clause 4.29.</td><td>Without distinct damage in appearance.</td></tr>
<tr><td>11</td><td>Rapid change of temperature</td><td>The specimen shall be subjected to 5continuous cycles, each as shown in the figure below.<br><table><tr><th></th><th>Temperature</th><th>Time</th></tr><tr><td>1</td><td>−55±3℃</td><td>30min</td></tr><tr><td>2</td><td>R.T</td><td>2～3 min</td></tr><tr><td>3</td><td>+125±2℃</td><td>30min</td></tr><tr><td>4</td><td>R.T</td><td>2～3min</td></tr></table>Use for Testing board B.<br><br>R.T. =Room Temperature<br>Refer to IEC 60115-1, Sub-clause 4.19.</td><td>Change in resistance : ±(0.5%)<br>Without mechanical damage and distinct damage in appearance.</td></tr>
<tr><td>12</td><td>Endurance (Damp heat with load)</td><td>The specimen shall be placed in the test chamber at a temperature 60 ± 2 ℃ and a relative humidity 90 to 95 %, and then subjected to a voltage cycle consisting of rated d.c. voltage application of 1 hr 30 min and rest of 30 min repeatedly for 1000 +48/0 hrs.<br>However the applied voltage shall not exceed the limited element voltage.</td><td>Change in resistance : ±(1.0%)<br>Without mechanical damage and distinct damage in appearance.</td></tr>
<tr><td>13</td><td>Endurance (Rated load)</td><td>The specimen shall be placed in the test chamber at 70±2℃, and then subjected to a voltage cycle consisting of rated d.c. voltage application of 1 hr 30 min and rest of 30 min repeatedly for 1000 +48/0 hrs.<br>However the applied voltage shall not exceed the limited element voltage.<br>For other procedures, refer to IEC 60115-1, Sub-clause 4.25.<br><br>Refer to IEC 60115-1, Sub-clause 4.25.</td><td>Change in resistance : ±(1.0%)<br>Without mechanical damage and distinct damage in appearance.</td></tr>
</table>

Mounting method

(1) Mounting method according to solder bath method

Epoxy based adhesive agent shall be applied in the middle of two lands of the test board.

The specimen shall be mounted in such a way that the electrodes of specimens will be evenly placed in the land area and then adhesive agent shall be cured.

After applying the Resin Flux with 25 weight % Methyl Alcohol, the board shall be soldered by dipping into a molten solder bath with 260±5℃ for 3 to 5 sec.

(2) Mounting method according to reflow soldering method

Solder paste with approximate 200 μm thickness shall be applied to the land of test board.

The specimen shall be mounted in such way that the electrodes of specimen will be evenly placed in the land area and then shall be soldered under the circumstance that the surface temperature of the board shall be raised 245±5℃(peak temperature) for 5 to 10 sec in an upper-heater oven.

Test board

Material : Glass fabric base epoxy resin. (Refer to JIS C 6484)

Board Thickness : 1.6mm

Copper foil, thickness : 0.035 mm

Fig.3 Test Board A ( For substrate bending test )

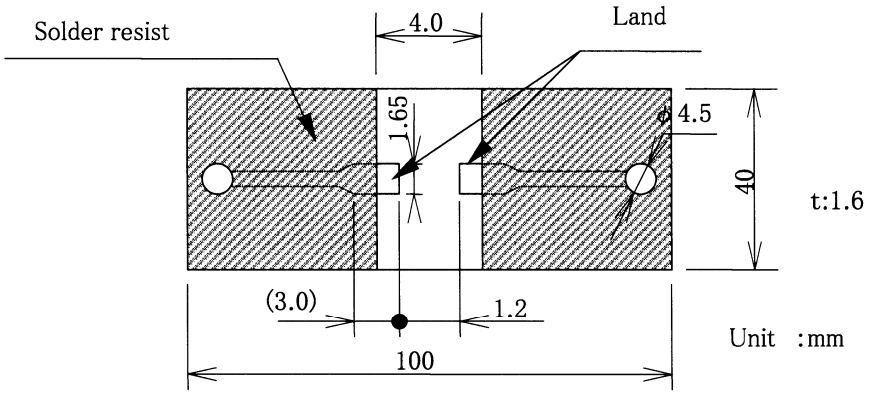
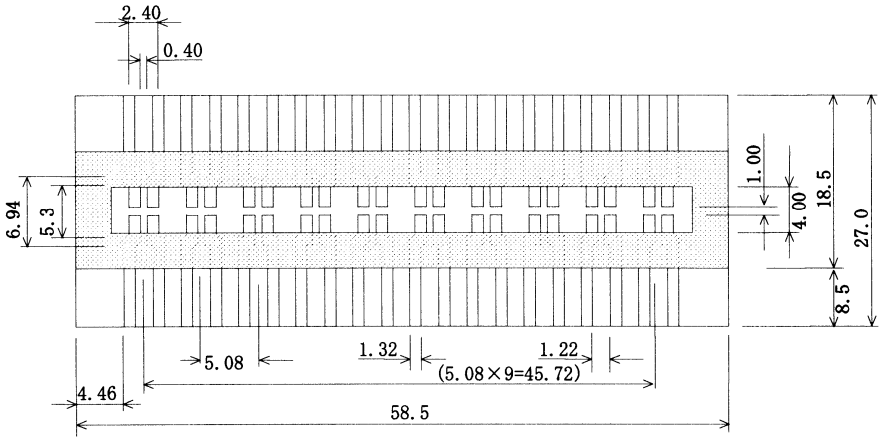


Fig.4 Test Board B (For another test )




Unit :mm

## 7. Packaging

The products shall be in Taping.

### 7.1 Dimensions

#### 7.1.1 Tape packaging dimensions

See Fig.5

#### 7.1.2 Reel dimensions

See Fig.6

### 7.2 Materials

Tape :Paper
Reel :Plastic

### 7.3 Specification of taping

Refer to IEC 60286-3.

### 7.4 Pieces per reel

5,000 piece / reel

## 7.5 Marking

The label indicated following items shall be marked on single side of the reel.

① Type designation

② Quantity

③ Manufacturing date code

(Month and year are marked. Refer to JIS C 5201-1 Annex 1 Table5.)

④ Manufacturer's name

⑤ The country of origin

⑥ Shipping number

⑦ Identification showing lead-free products.

【Label Example】

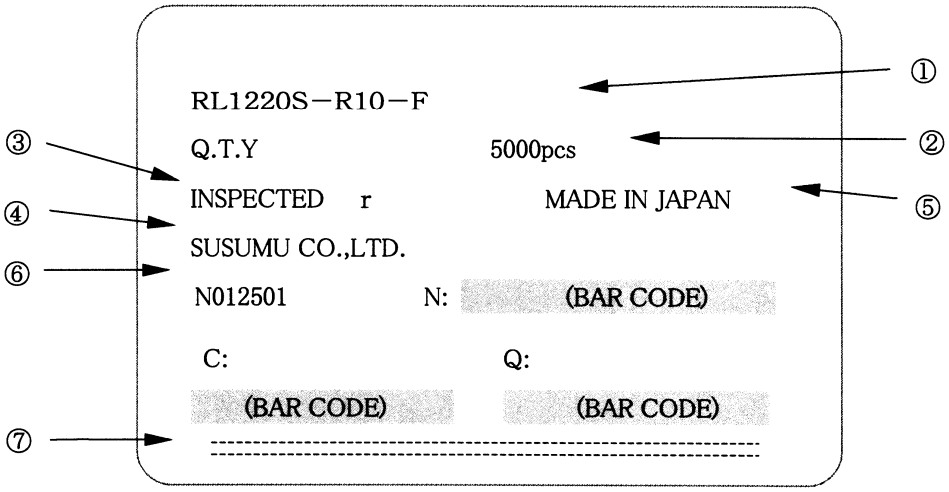
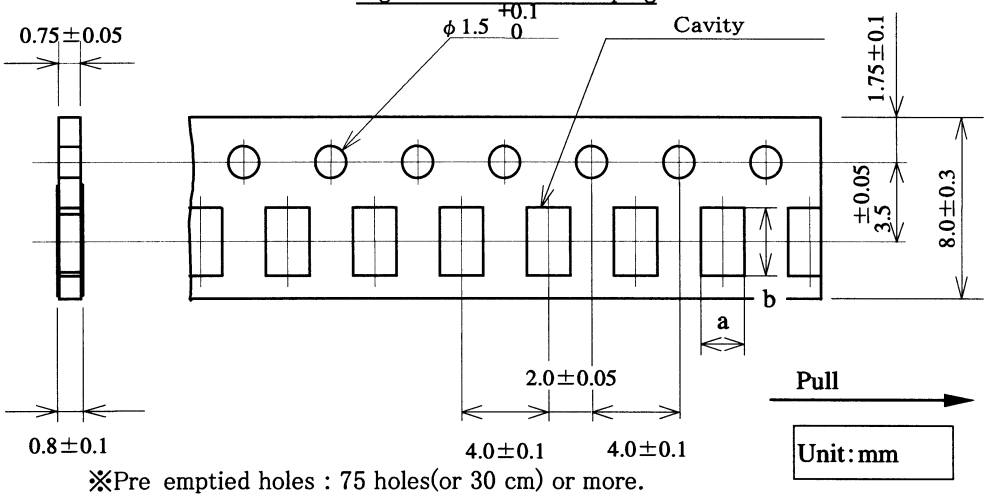


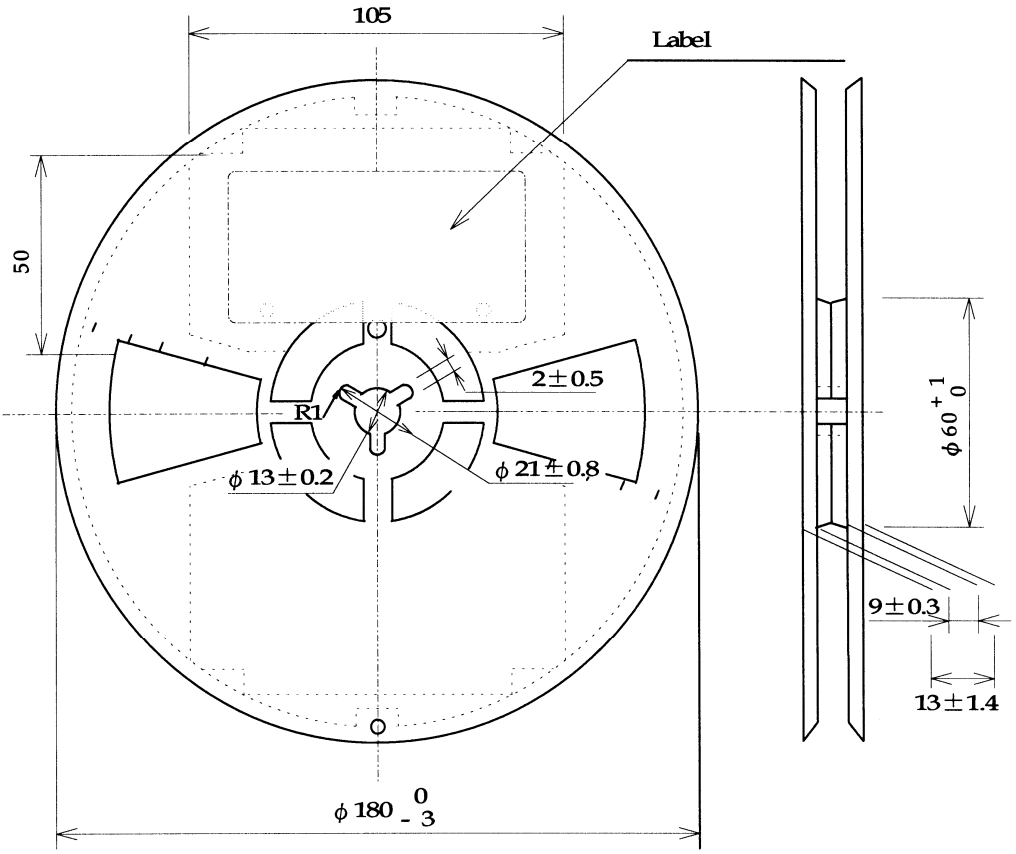
Fig.5 Dimensions of taping




※Pre emptied holes : 75 holes(or 30 cm) or more.

| Code letter | a | b |
|---|---|---|
| Dimension | 1. 65±0. 2 | 2. 4±0. 2 |

Fig.6 Dimensions of reel




Plastic Reel Thickness : 0.5mm.
Plastic Reel : Correspond with EIAJ RRV08B

Unit : mm

| TITLE: | | | | |
|---|---|---|---|---|
| RL1220□-※※※※-□<br>SPECIFICATION | SUSUMU CO.,LTD<br>SSM | SPEC.NO:<br>RL00−4053−E0 | Rev. No.<br>0 |

様式:GS83-1071(REV0)

## 8. Precautions in use

### 8.1 Storage

(1)The product shall be stored in a room where temperature and humidity must be controlled.
( temperature 5 to 35 ℃, humidity 45 to 85 % RH )
However, humidity keeps it low, as it is possible.

(2)The product shall be stored as direct sunshine doesn't hit on it.

(3)The product shall be stored with no moisture, dust, a material that will make solderability inferior, and a harmful gas (hydrogen chloride, sulfurous acid gas, and hydrogen sulfide).

(4)The product shall be stored as tape packaging condition.

### 8.2 Term for use

(1) The term for use is within one year from the shipping day of the product.

(2) If the product has been left unused for more than one year after delivered, check solderability before use.

### 8.3 Chip mounting

(1)When chip are mounted on the PC board, the protective coat of the product must not be scratched. If it will be scratched, it will make characteristic inferior.

(2)In case that product will be soldered by soldering iron, heating shall be done on the land, and soldering iron must not hit on the product itself.

(3)In case that resin coating or resin seal will be made for a PC board after chip mounting, do washing and drying it enough before coating or sealing. If ion bear or moisture will be sealed in resin coating, it will make characteristic inferior.

(4)For resinous use, it is necessary to set up enough the curing conditions. As it gets improper for the condition, changes of a resistance value are large and are a case.

(5)According to shape, material, and pressure of clamping in chip mounting machine, there is the case that crack will be appeared on the product.
Control a shock energy for clamping the product under $7\times10^{-4}$ J.
With a shock energy around clamping that says here, it is suited to a potential energy, in case that iron block of 25g is dropped naturally to the product placed on iron plate for the height of 2.8mm.

(6)The glue to fix the product on the PC board around chip mounting, it is needed high insulation resistance and great performance or moisture. And it is needed that these characteristics are not inferior in using temperature range and a hot spot temperature to be acting.

### 8.4 Using and Handling

(1)It is necessary to investigate the performance and reliability enough when using under harsh environment.

(2)It is necessary to protect the edge and protective coat of the product from mechanical stress.

(3)Handle with care when PC board is divided or fixed on support body, because bending of PC board after chip mounting will make mechanical stress for the product.

(4)The product shall be used within rated range shown in specification.
Especially, if voltage more than specified value will be loaded to the product, there is a case it will make damage for machine because of temperature rise depending on generation of heat, and increase resistance value or breaks.

(5)In case that product is loaded a rated voltage, it is necessary to confirm temperature of the product and to reduce a load power according to load reduction curve, because a temperature rise of the product depends on influence of heat from mounting density and neighboring element.

(6)If there is a possibility that a large voltage (pulse voltage, shock voltage) charge to the product, It is necessary that operating condition shall be set up before use, because performance of the product is affected by a large shock voltage.

(7) The items listed in the specifications assure the product quality as the product alone.
Evaluation and confirmation of the product quality after mounting, in accordance with the operation condition, is required for actual use.