



MURATA MANUFACTURING CO., LTD.

CUSTOMER : \_\_\_\_\_

DATE : \_\_\_\_\_

# PRODUCT SPECIFICATION (Product Name: SAW Filter)

Part Number: SAFEB1G57KE0F00R15

**REFERENCE ONLY**

MURATA MFG. CO., LTD.

Issue Date	Specification No.
July 26, 2013	JESA86-8112B

**1. SCOPE**

This product specification is applied to SAFEB1G57KE0F00R15,  
the 1500MHz range SAW filter for communication equipment.

Please contact us when using this product for any other applications than described in above.

Country of origin: JAPAN (Kanazawa Murata Manufacturing Co., Ltd.)

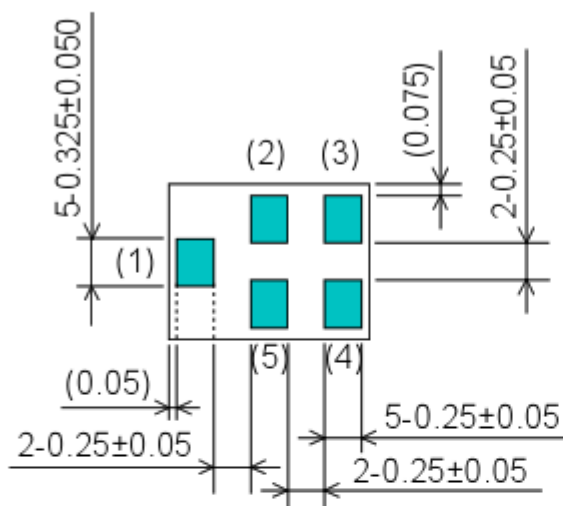
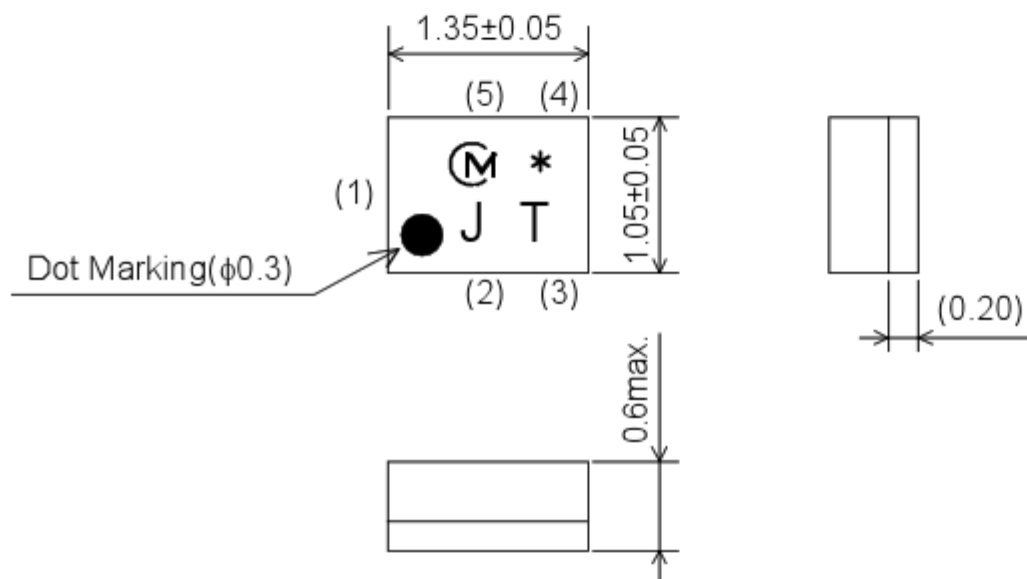
**2. CUSTOMER PART NUMBER**

Part No.	Specification No.
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**3. MURATA PART NUMBER**

SAFEB1G57KE0F00R15	: TAPING PACKING (5000pcs)
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**4. DIMENSIONS**



Marking : Laser Printing

(M) : Manufacturer symbol

\* : EIAJ Code

Terminal (Surface) : Au

thickness 0.5...1.0μm

(Typ. 0.6μm)

Terminal (Base) : Ni

thickness 2.0...6.0μm

(Typ. 4.0μm)

Terminal Number

(1) : Unbalance Port

(4) : Unbalance Port

Others : Ground

Weight : 3.2±1.0mg

Coplanarity : 0.1mm max.

Unit : mm

## 5. RATINGS

5.1	Withstanding Voltage for short term between the terminals	10V (Minimum Resistance; 10MΩ at 25±2°C)
5.2	D. C. Voltage between the terminals	3V at 25±2°C
5.3	Input Signal Level	20mW (+13dBm), 2000 hours
5.4	Operating Temperature Range	-30...+85°C
5.5	Storage Temperature Range	-40...+85°C
5.6	Unbalance Port Matching Impedance (nominal)	50Ω

## 6. ELECTRICAL CHARACTERISTICS

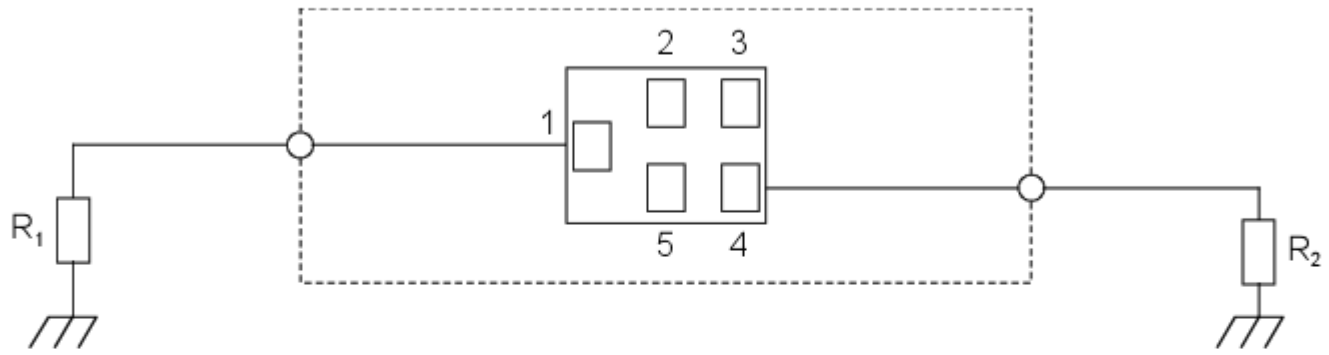
## 6.1 Over -30...+85°C

	Item	Specifications	Typical value at 25±2°C (Reference value)
6.1.1	Nominal Center Frequency (fc)	1575.5MHz	—
6.1.2	Insertion Loss (1573.92...1576.92MHz)	1.3 dB max.	0.95 dB
6.1.3	Absolute Attenuation		
	1) 0.1 ... 250MHz	40 dB min.	48 dB
	2) 250 ... 810MHz	41 dB min.	42 dB
	3) 810 ... 960MHz	40 dB min.	42 dB
	4) 960 ... 1429MHz	40 dB min.	42 dB
	5) 1429 ... 1453MHz	40 dB min.	53 dB
	6) 1453 ... 1525.42MHz	37 dB min.	43 dB
	7) 1525 ... 1560MHz	1.1 dB min.	1.6 dB
	8) 1625 ... 1710MHz	40 dB min.	46 dB
	9) 1710 ... 1749.9MHz	43 dB min	46 dB
	10) 1749.9 ... 1785MHz	44 dB min	46 dB
	11) 1785 ... 1920MHz	43 dB min	47 dB
	12) 1920 ... 1990MHz	43 dB min.	50 dB
	13) 1990 ... 2170MHz	45 dB min	50 dB
	14) 2170 ... 2700MHz	40 dB min	44 dB
	15) 2700 ... 6000MHz	30 dB min.	33 dB
6.1.4	Ripple Deviation (1573.92...1576.92MHz)	0.6 dB max.	0.03 dB
6.1.5	VSWR (1573.92...1576.92MHz)	1.7 max.	1.2

## 6.2 At 25±2°C

	Item	Specifications	Typical value at 25±2°C (Reference value)
6.2.1	Nominal Center Frequency (fc)	1575.5MHz	—
6.2.2	Insertion Loss (1573.92...1576.92MHz)	1.2dB max.	0.95dB
6.2.3	<b>Absolute Attenuation</b>		
	1) 0.1 ... 250MHz	40dB min.	48dB
	2) 250 ... 810MHz	41dB min.	42dB
	3) 810 ... 960MHz	40dB min.	42dB
	4) 960 ... 1429MHz	40dB min.	42dB
	5) 1429 ... 1453MHz	40dB min.	53dB
	6) 1453 ... 1525.42MHz	37dB min.	43dB
	7) 1525 ... 1560MHz	1.1dB min.	1.6dB
	8) 1625 ... 1710MHz	40dB min.	46dB
	9) 1710 ... 1749.9MHz	43dB min.	46dB
	10) 1749.9 ... 1785MHz	44dB min.	46dB
	11) 1785 ... 1920MHz	43dB min.	47dB
	12) 1920 ... 1990MHz	43dB min.	50dB
	13) 1990 ... 2170MHz	45dB min.	50dB
	14) 2170 ... 2700MHz	40dB min.	44dB
	15) 2700 ... 6000MHz	30dB min.	33dB
6.2.4	Ripple Deviation (1573.92...1576.92MHz)	0.5dB max.	0.03dB
6.2.5	VSWR (1573.92...1576.62MHz)	1.5max.	1.2

Measurement Circuit

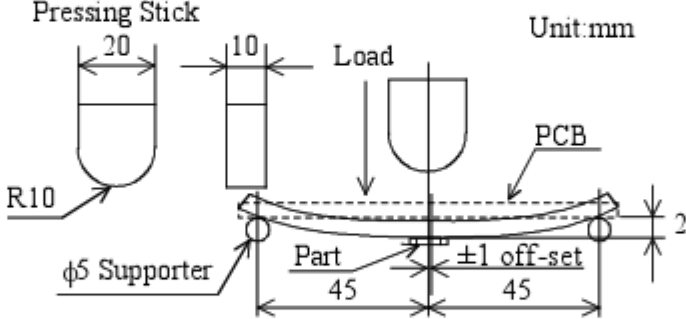


(1): Unbalance Port  
(4): Unbalance Port  
Others: Ground

R<sub>1</sub>: 50Ω

R<sub>2</sub>: 50Ω

**7. PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS**

	Test Item	Test Condition	Criteria
7.1	PCB Bend Strength	<p>Filter is soldered onto the center of 0.8mm thickness PCB which is laid on the two small supportors spaced 90mm as shown in below figure. PCB is deflected to 2mm below from horizontal level by the pressing stick. The force is supplied for 1 second, 5 times repeatedly.</p> 	No visible damage should be induced and the electrical performance should meet Table 1.
7.2	Vibration	The electrical performance is measured after being applied vibration of amplitude of 1.5mm with 10 to 55Hz of vibration frequency to each of 3 perpendicular directions for 2 hours.	The electrical performance should meet Table 1.
7.3	Drop Test	The electrical performance is measured after a dropping with housing (around 150g) from a height of 150cm onto the concrete plate 3 times in each of 6 perpendicular directions.	
7.4	Solderability	<p>In accordance to the following conditions solder wettability is satisfied.</p> <p>Solder Paste: Sn-3.0Ag-0.5Cu                      Pre-heat: 150~180 deg.C, 60~120sec                      Peak temperature: 235 deg.C max.                      Over 225 deg.C: 15s~25s</p>	95% minimum of the immersed surface should be covered with solder.
7.5	Resistance to Soldering Heat	Filter is preheated at 170±10°C for 90 seconds, immersed whole electrode in soldering bath at 255±5°C for 3±1 seconds, then measured after being placed in standard atmospheric conditions for 2 hours.	The electrical performance should meet Table 1.
7.6	Temperature Characteristics	The electrical performance is measured over -30...+85°C temperature range.	The electrical performance should meet chapter 6.1.
		The electrical performance is measured at 25±2°C temperature range.	The electrical performance should meet chapter 6.2.
7.7	Humidity	The electrical performance is measured after being placed in a chamber with 90...95% R.H. at 60°C for 500 hours and then being placed in standard atmospheric conditions for 2 hours.	The electrical performance should meet Table 1.
7.8	Life Test (High Temperature)	The electrical performance is measured after being placed in a chamber with 85°C for 500 hours and then being placed in standard atmospheric conditions for 2 hours.	
7.9	Life Test (Low Temperature)	The electrical performance is measured after being placed in a chamber with -40°C for 500 hours and then being placed in standard atmospheric conditions for 2 hours.	
7.10	Thermal Shock	After temperature cycling of -40°C for 30 minutes to +85°C for 30 minutes performed 150 times, filter shall be returned to room temperature. And the electrical performance is measured after being placed in standard atmospheric conditions for 2 hours.	

7.11	Resistance to Reflow Soldering	The electrical performance is measured after being soldered by reflow 2 times with the following reflow profile A or B (see page 7) and then being placed in standard atmospheric conditions for 24 hours.	
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Table 1 Electrical Characteristics

&lt;Refer to Measurement Circuit in chapter 6&gt;

Item	Specifications	Typical value at 25±2°C (Reference value)
Nominal Center Frequency (fc)	1575.5MHz	—
Insertion Loss (1573.92...1576.92MHz)	1.3dB max.	0.95dB
<b>Absolute Attenuation</b>		
1) 0.1 ... 250MHz	40dB min.	48dB
2) 250 ... 810MHz	41dB min.	42dB
3) 810 ... 960MHz	40dB min.	42dB
4) 960 ... 1429MHz	40dB min.	42dB
5) 1429 ... 1453MHz	40dB min.	53dB
6) 1453 ... 1525.42MHz	37dB min.	43dB
7) 1525 ... 1560MHz	1.1dB min.	1.6dB
8) 1625 ... 1710MHz	40dB min.	46dB
9) 1710 ... 1749.9MHz	43dB min.	46dB
10) 1749.9 ... 1785MHz	44dB min.	46dB
11) 1785 ... 1920MHz	43dB min.	47dB
12) 1920 ... 1990MHz	43dB min.	50dB
13) 1990 ... 2170MHz	45dB min.	50dB
14) 2170 ... 2700MHz	40dB min.	44dB
15) 2700 ... 6000MHz	30dB min.	33dB
Ripple Deviation (1573.92...1576.92MHz)	0.6dB max.	0.03dB
VSWR (1573.92...1576.92MHz)	1.7 max.	1.2

\* All the tests shall be carried out on the following conditions.

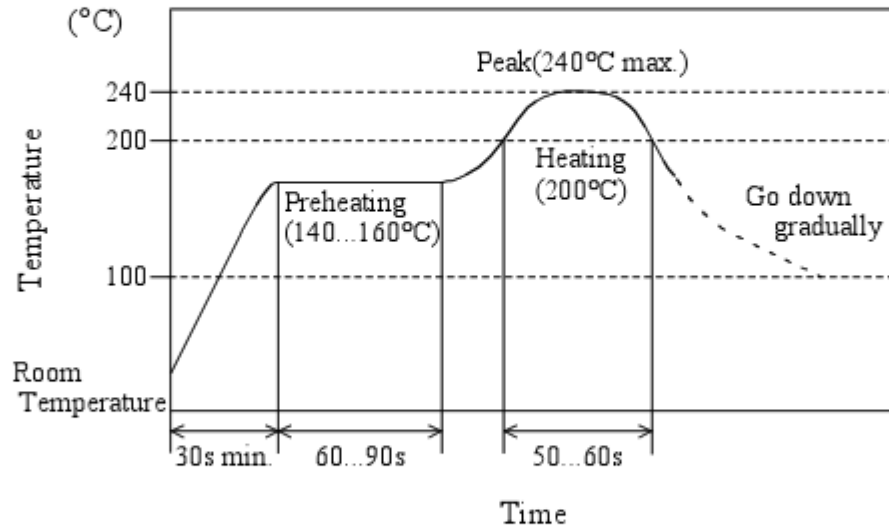
[Temperature: 25±2°C, Humidity: 65±5% R.H.]



**Reflow Profile**

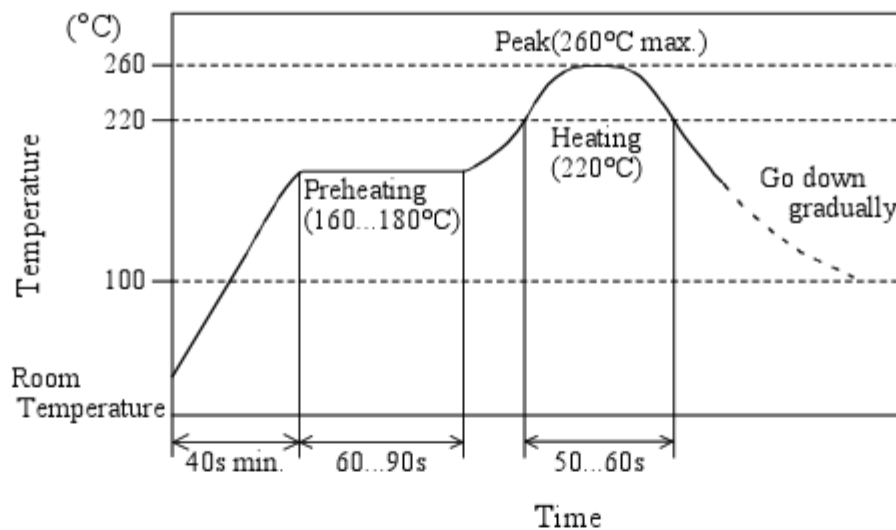
• Profile A

- 1) Preheating shall be fixed at 140...160°C for 60...90 seconds.
- 2) Ascending time to preheating temperature 150°C shall be 30 seconds minimum.
- 3) Heating shall be fixed at 200°C for 50...60 seconds and at 230±10°C peak.



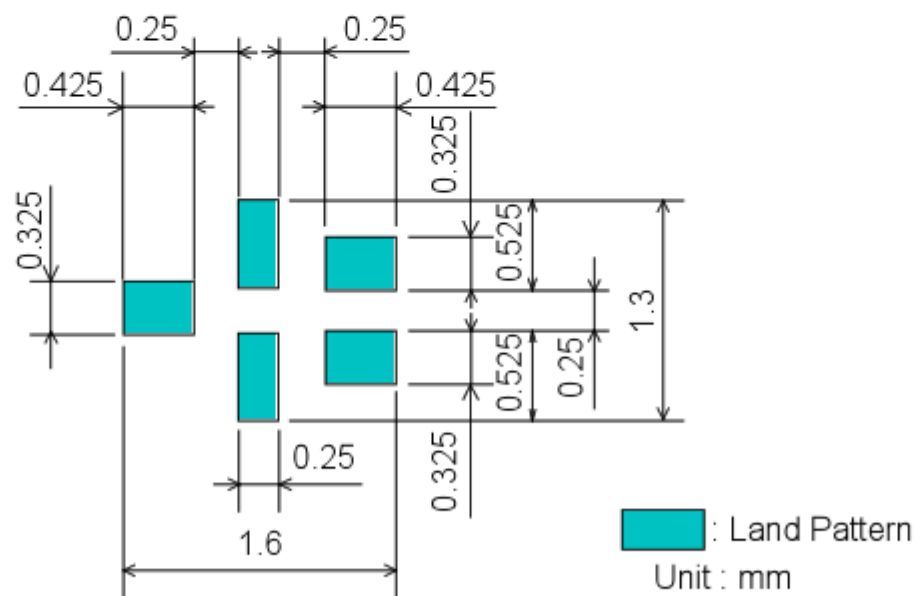
• Profile B

- 1) Preheating shall be fixed at 160...180°C for 60...90 seconds.
- 2) Ascending time to preheating temperature 170°C shall be 40 seconds minimum.
- 3) Heating shall be fixed at 220°C for 50...60 seconds and at 255±5°C peak.



**Recommended Land Pattern**

- 1) Recommended land pattern is as follows.



## 8. TAPING METHOD OF PLASTIC TAPE PACKAGE

8.1 The components are packed to be prevented from being damaged. Part number, quantity and inspection number are indicated on each minimum packing unit.

8.2 Dimensions of Plastic Tape See Figure. 2.

### 8.3 Taping Method

- 1) The tape shall be wound clockwise. (The feeding holes shall be to the right side when the tape is pulled toward user.)
- 2) Cover tape shall not cover the feeding holes of cavity tape or overlap the edge of cavity tape.
- 3) Trailer tape shall be 160...190 mm and leader cavity shall be 80...120 mm (refer to Figure. 1.)
- 4) The tip of the cover tape shall be adhered to the side of reel with adhesive tape (50...120 mm: Reference value).
- 5) The cover tape peel strength force shall be 0.2...0.6N (Reference value) which measured at 170 degrees with respect to the carrier tape.
- 6) The orientation is ruled as Figure. 2 shows.
- 7) All the filters shall be packed continuously into the tape without vacant cavities except the leader cavity and trailer tape area.
- 8) A reel shall contain 5000 pcs of filters.  
(Please place the order with 5000 pcs times integer number. In case of small quantity shipment, bulk packing may be applied.)
- 9) Cover tape and cavity tape are made of anti-static material.
- 10) Part number, customer part number, quantity and inspection lot number shall be marked on each reel. (The reel side containing the label will visible when the reel is oriented in a direction that dispenses the tape from the top of the reel and in a clockwise direction.)
- 11) The product which has ROHS-Y<\*> mark on the packaging label is compliance with RoHS directives. The alphabet in blank <\*> will be changed A to B, B to C, and so on with every revision of the RoHS directives. Please refer to the document, "The Marking for the directives on the restriction of the hazardous substances' use," to check the directives corresponding to alphabets in <\*>.

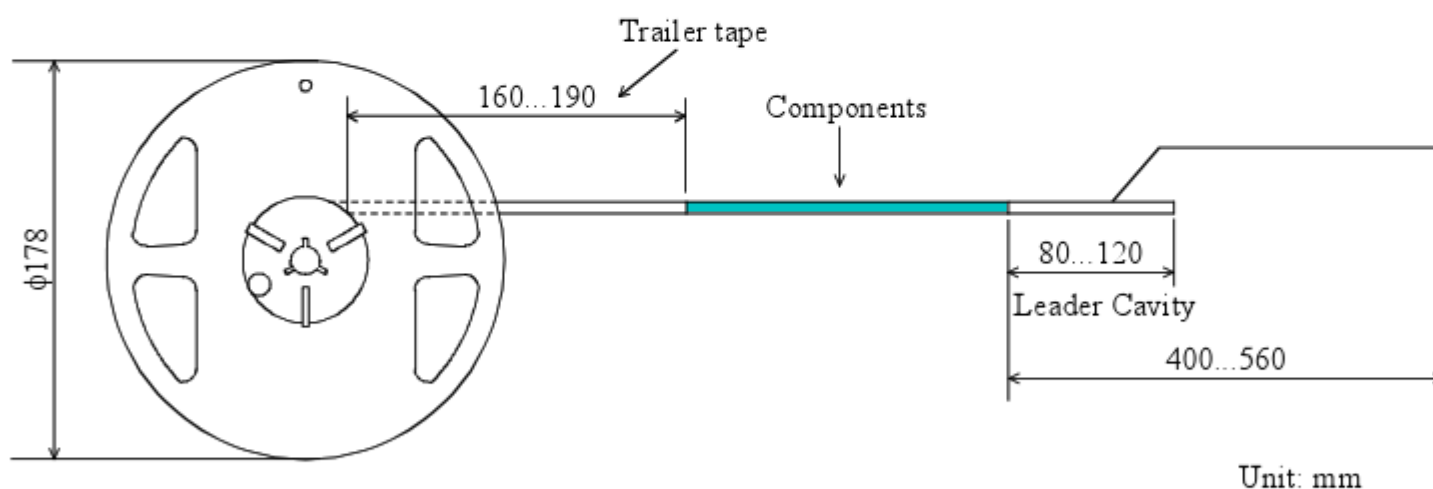
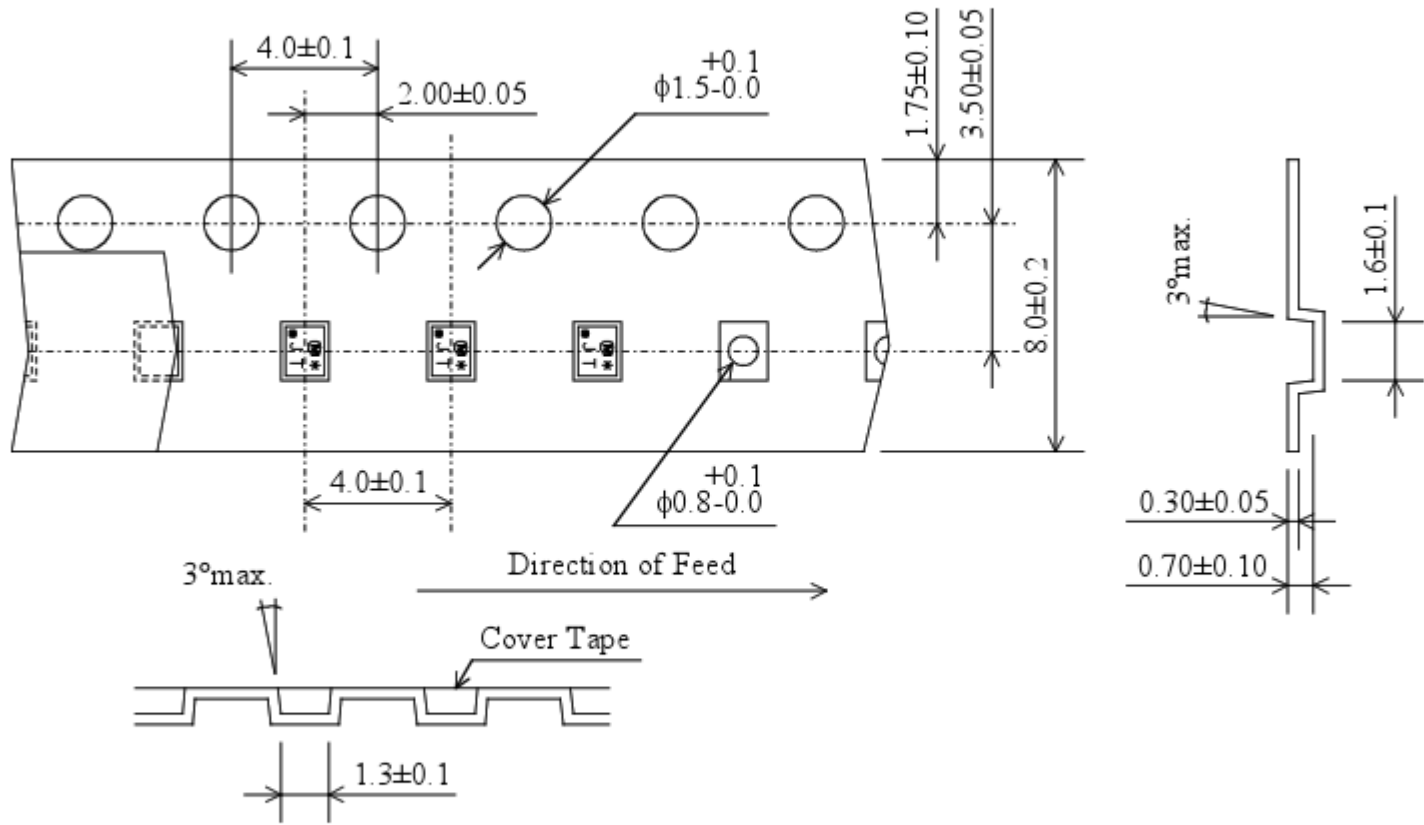


Figure. 1

**Dimensions of Carrier Tape**

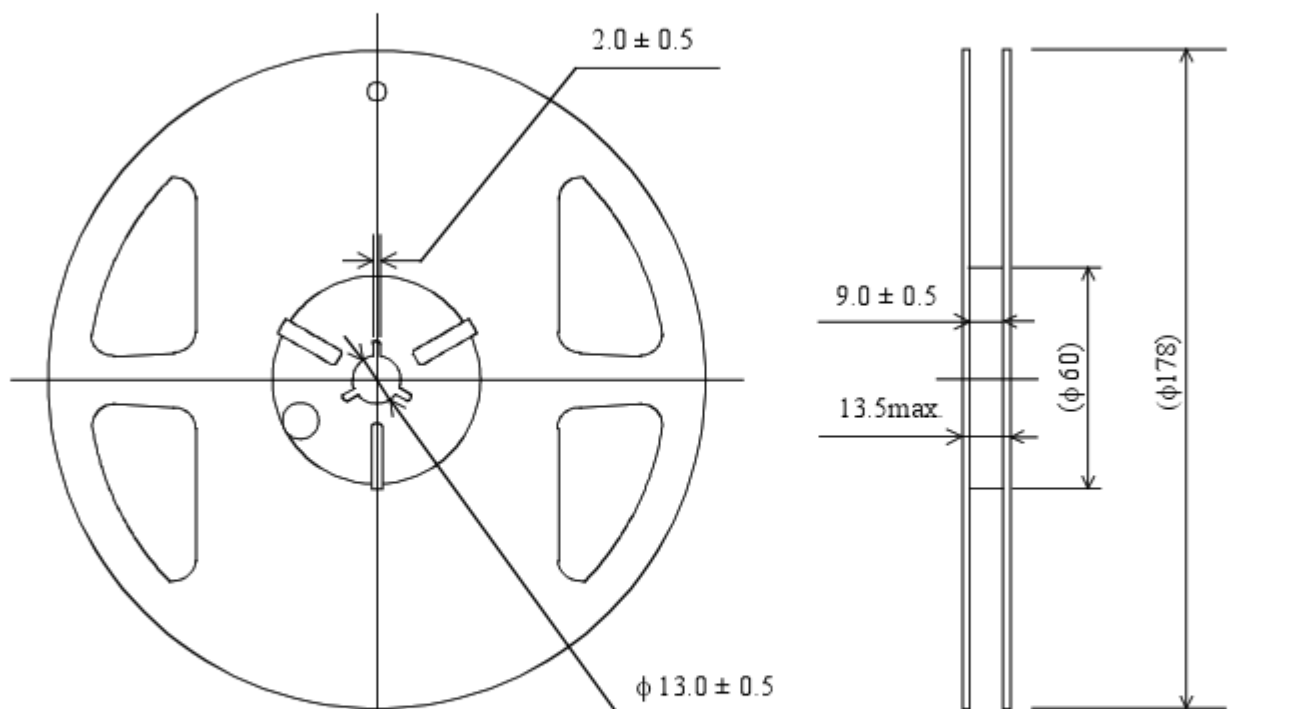


Unit: mm

- The marked part number faces the cover tape side.
- All the components are oriented as  $\text{M}$  mark to be closer to the tape feeding holes than EIAJ code.

Figure. 2

**Dimensions of Reel**



Unit: mm

Figure. 3

**9.  CAUTION****9.1 Storage Conditions**

- 1) This product should be used within 6 months after delivered. Store in manufacturer's package keeping the seal of aluminum coated baggage or tightly reclosed box with the following conditions.  
[Temperature: -10...+40°C, Humidity: 30...85% R.H.]
- 2) Keep the seal of aluminum coated baggage immediately before usage.
- 3) After breaking the seal of aluminum coated baggage, this product should be used within 4 weeks on the following conditions.  
[Temperature: 5...30°C, Humidity: 60% R.H.]
- 4) This product should be baked on the following conditions, in the case that those are stored longer than 6 months after delivered or longer than 4 weeks after breaking the seal of aluminum coated baggage. Their performances should be checked on your PCB before usage.
  1. Stored longer than 6 months after delivered.
    - This product should be baked after breaking the seal of aluminum coated baggage. Baking must be performed under the following conditions.
      - a. Transfer the components to heat resistant tray from plastic reel and bake them.  
Temperature: 80...85°C, 2...4 hours, 1 time
      - b. Keep the components in plastic reel and bake them.  
Temperature: 55...60°C, 20...24 hours, 1 timeAfter baking, place the components at room temperature for 2 hours.
    - Confirm solderability before using the components, because it might be a cause of solderability degradation.
  2. Stored longer than 4 weeks after breaking the seal of aluminum coated baggage.
    - This product should be baked on one of the conditions listed in 1.  
Solder on the condition of reflow soldering specified in the specification.

## 10. NOTICE

### 10.1 Usage Conditions

- 1) Use this component within operating temperature range. It might not meet the specification of electrical performance out of operating temperature range. Usage on the condition of under  $-40^{\circ}\text{C}$  or over  $+85^{\circ}\text{C}$  might cause degradation or destruction of the component. Even a short time usage on such conditions might cause degradation of reliability.
- 2) This product is designed for use of electrical equipment in the standard environment (temperature, humidity, atmospheric pressure etc.) Do not use in the following environments, since it causes degradation of characteristics and reliability.
  - Ambient air containing corrosive gas ( $\text{Cl}_2$ ,  $\text{H}_2\text{S}$ ,  $\text{NH}_3$ ,  $\text{SO}_x$ ,  $\text{NO}_x$ , etc.)
  - Ambient air containing combustible gas and substance with high volatility
  - In dusty place
  - In the places where the water splashes or precipitates
  - Under direct sunlight
  - In the places under the strong influence of static electricity or electric fieldContact us before using the component in such conditions.
- 3) This component can not be used in liquid (water, oil, chemical solution, organic solvents, etc.)
- 4) Apply electrical power lower than specified in the specification. When the component is used with higher rating power than specified in the specification, it might cause degradation or destruction of the component. Even if a short time, it might cause degradation of reliability under such a condition.
- 5) Do not let the component contact with other components, since its coating is not insulated.
- 6) Rapid temperature change of this component makes electric charge. Include discharge circuit between port and ground, since it might cause degradation or destruction of this component and other components around this component.

### 10.2 Storage Conditions

- 1) Keep the component in the package or sealed container on the following conditions.  
[Temperature:  $-10\dots+40^{\circ}\text{C}$ , Humidity: 30...85% R.H.]  
Examine solderability before using this component, after longer than 6 months storage since it might cause degradation of solderability. Notice that long-term storage might cause discoloration.
- 2) To keep solderability of outer-electrode, do not store in the following environments.
  - Ambient air containing corrosive gas ( $\text{Cl}_2$ ,  $\text{H}_2\text{S}$ ,  $\text{NH}_3$ ,  $\text{SO}_x$ ,  $\text{NO}_x$ , etc.)
  - Ambient air containing combustible gas and substance with high volatility
  - In dusty place
  - In the places where the water splashes or precipitates
  - Under direct sunlight
  - In the places under the strong influence of static electricity or electric fieldContact us before using the component in such conditions.
- 3) Do not open the package until usage.

### 10.3 Soldering Conditions

1) Solder on the following condition. Contact us before soldering this component on conditions other than following since it might cause destruction.

a. Soldering with soldering iron

- Preheating condition : 150±20°C, 60 seconds min.
- Temperature at the tip of the soldering iron : 260±10°C
- Duration : 3 seconds max.
- Diameter at the tip of the soldering iron : φ3mm max.
- Power of soldering iron : 30W max.

Avoid the contact with iron other than back or side terminals part.

b. Reflow soldering

- Solder on the reflow soldering condition specified in this specification

2) Use land pattern recommended in this specification, since excess solder might cause destruction of chip by mechanical stress to supply too much solder.

3) Use rosin flux. Do not use strong acid flux [ex. Flux with more than 0.2wt% Halogen compound content (converted to chlorine content.)]

4) Use JIS-Z-3282 H63A, H60A, H50A solder or Lead free solder (Sn-3.0Ag-0.5Cu). Contact us before using other solders than above.

5) Solder with reflow soldering. Soldering with soldering iron shall be soldered on the condition specified in this specification. Since the lack of preheating gives this component rapid temperature change, it might cause degradation and destruction. Contact us before using the component on other conditions than specified in this specification.

6) Notice that the duration of soldering with soldering iron must be considered to be accumulated time, when soldering is repeated.

#### 10.4 Cleaning Conditions

- 1) Isopropyl alcohol and ethyl alcohol can be used for cleaning. Contact us before using other cleaning solvents than above. Do not use flon, trichloroethane etc in the point of view to protect for global environment.
- 2) Clean this component after ensuring that the temperature of the component is room temperature, since rapid temperature change by cleaning after reflow soldering might cause degradation or destruction.
- 3) Do not use ultrasonic cleaning, since ultrasonic vibration might cause degradation or destruction.
- 4) Dry this component immediately after cleaning.
- 5) In the case that cleaning process is included in the manufacturing process, examine the influence to the performance of the component with mounting on PCB before use.

#### 10.5 Handling Conditions

- 1) Notice that it might cause destruction to apply larger shock than specified in the specification while handling.
- 2) Notice that it might cause reliability degradation to apply excessive shock or vibration during transportation.
- 3) Do not apply any shock or pressure to this component during transportation when the component is on PCB.
- 4) Do not apply static electricity or excessive voltage while assembling and measuring, since it might cause degradation or destruction to apply static electricity to this component.
- 5) Do not handle this component with bare hand.

#### 10.6 Mounting Conditions

- 1) Mount this component not to apply a stress caused by warp or bend of PCB.
- 2) Abraded positioning claw, pick-up nozzle, etc of component placement machine might apply excessive shock on the component on PCB and cause destruction. Keep the maintenance which is instructed on each machine regularly to prevent the component from these kinds of troubles.
- 3) Mount all terminals, or terminal strength might be degraded.
- 4) Mount the component on PCB with no space between component and PCB.

**△ PLEASE READ THIS NOTICE BEFORE USING OUR PRODUCTS.**

Please make sure that your product has been evaluated and confirmed from the aspect of the fitness for the specifications of our product when our product is mounted to your product.

All the items and parameters in this product specification/datasheet/catalog have been prescribed on the premise that our product is used for the purpose, under the condition and in the environment specified in this specification. You are requested not to use our product deviating from the condition and the environment specified in this specification.

Please note that the only warranty that we provide regarding the products is its conformance to the specifications provided herein. Accordingly, we shall not be responsible for any defects in products or equipment incorporating such products, which are caused under the conditions other than those specified in this specification.

WE HEREBY DISCLAIM ALL OTHER WARRANTIES REGARDING THE PRODUCTS, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, THAT THEY ARE DEFECT-FREE, OR AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS.

The product shall not be used in any application listed below which requires especially high reliability for the prevention of such defect as may directly cause damage to the third party's life, body or property. You acknowledge and agree that, if you use our products in such applications, we will not be responsible for any failure to meet such requirements.

Furthermore, YOU AGREE TO INDEMNIFY AND DEFEND US AND OUR AFFILIATES AGAINST ALL CLAIMS, DAMAGES, COSTS, AND EXPENSES THAT MAY BE INCURRED, INCLUDING WITHOUT LIMITATION, ATTORNEY FEES AND COSTS, DUE TO THE USE OF OUR PRODUCTS IN SUCH APPLICATIONS.

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- Aerospace equipment
- Undersea equipment
- Power plant control equipment
- Medical equipment
- Transportation equipment (vehicles, trains, ships, elevator, etc.)
- Traffic signal equipment
- Disaster prevention / crime prevention equipment
- Burning / explosion control equipment
- Application of similar complexity and/ or reliability requirements to the applications listed in the above

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Please do not use our products, our technical information and other data provided by us for the purpose of developing of mass-destruction weapons and the purpose of military use.

Moreover, you must comply with "foreign exchange and foreign trade law", the "U.S. export administration regulations", etc.

Please note that we may discontinue the manufacture of our products, due to reasons such as end of supply of materials and/or components from our suppliers.

Customer acknowledges that Murata will, if requested by you, conduct a failure analysis for defect or alleged defect of Products only at the level required for consumer grade Products, and thus such analysis may not always be available or be in accordance with your request (for example, in cases where the defect was caused by components in Products supplied to Murata from a third party).

By signing on specification sheet or approval sheet, you acknowledge that you are the legal representative for your company and that you understand and accept the validity of the contents herein.

When you are not able to return the signed version of specification sheet or approval sheet within 90 days from receiving date of specification sheet or approval sheet, it shall be deemed to be your consent on the content of specification sheet or approval sheet.

The product shall not be used in any other application/model than that of claimed to Murata.

Customer acknowledges that engineering samples may deviate from specifications and may contain defects due to their development status.

We reject any liability or product warranty for engineering samples.

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- improper use of engineering samples.

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