



RFM Integrated Device, Inc.

Part Number:  
SARCC433M93BXL4R05

## PRODUCT SPECIFICATION

Description:

SAW RES, 433.935 MHz,  
+/- 50 kHz, IL 2.5 dB, Op  
Temp -40 to 85C

SPECIFICATION FOR SAW RESONATOR  
 MODEL NAME : SARCC433M93BXL4R05



DATE	May 7, 2013	AEC-Q200 Qualified
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1. SCOPE

This Product specification is applied to SARCC433M93BXL4R05, the 400MHz range SAW Resonator used for oscillator.  
 Please contact us when using this product for any other applications than described in the above.  
 Country of origin: TAIWAN (TAI-SAW TECHNOLOGY Co., Ltd.)

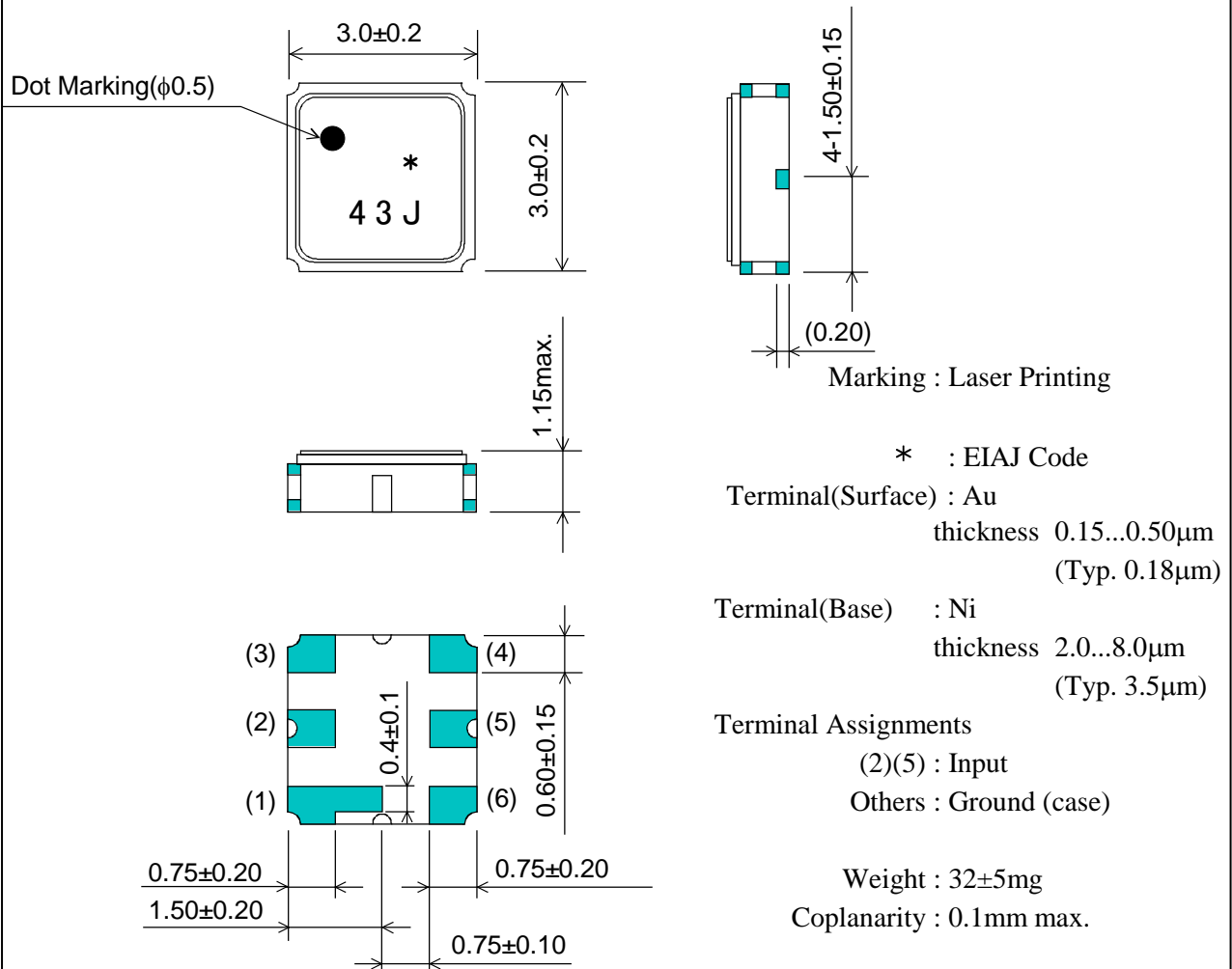
2. CUSTOMER NUMBER

Customer Part No.	2BC-00018RA	Customer's Drawing No.	
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3. RFMi PART NUMBER

SARCC433M93BXL4R05	: MAGAZINE PACKING (5000pcs)
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4. DIMENSIONS



Unit : mm

## 5. MAXIMUM RATINGS

5.1	Withstanding Voltage for a moment between each Terminal	Maximum Rating 10V D.C. (Insulation Resistance 100M $\Omega$ min. (25 $\pm$ 2 $^{\circ}$ C))
5.2	D. C. Voltage between each Terminal	Maximum Rating 3V D.C. (25 $\pm$ 2 $^{\circ}$ C)
5.3	A. C. Voltage between each Terminal	10V p-p
5.4	Amplitude Level each Terminal	0.2mW
5.5	Operating Temperature Range	-40 $^{\circ}$ C to +85 $^{\circ}$ C
5.6	Storage Temperature Range	-40 $^{\circ}$ C to +85 $^{\circ}$ C
5.7	Temperature Characteristics	$\pm$ 5ppm/ $^{\circ}$ Cmax. (Temp range : -10 $^{\circ}$ C to +60 $^{\circ}$ C) $\pm$ 10ppm/ $^{\circ}$ Cmax. (Temp range : -40 $^{\circ}$ C to -10 $^{\circ}$ C, +60 $^{\circ}$ C to +85 $^{\circ}$ C)

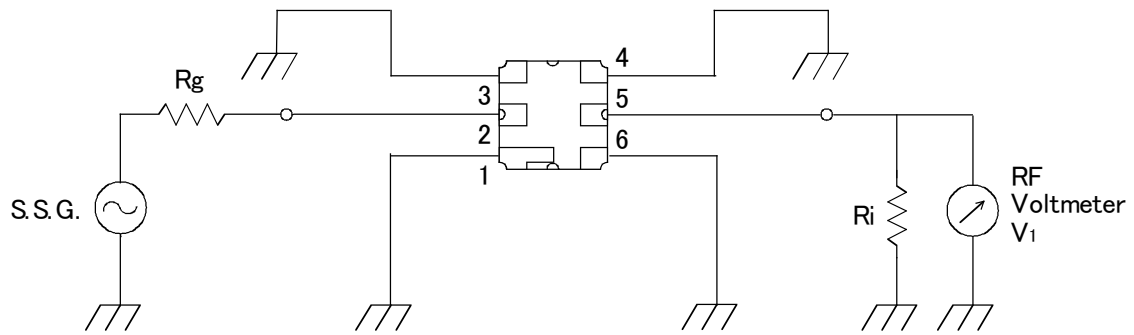
## 6. ELECTRICAL CHARACTERISTICS

	Item	Specifications
6-1	Resonant Frequency (at center frequency of 0.5dB bandwidth)	433.935 $\pm$ 0.050 MHz
6-2	Resonant Loss (at peak point)	2.5 dB max.
6-3	Parallel Capacitance at 1 MHz One terminal and Ground are parallel.	2.1 $\pm$ 0.5 pF
6-4	Antiresonant Loss	20 dB min.

※ Unless otherwise specified, all tests shall be carried out under the standard atmospheric conditions [ Temperature : 5 $\sim$ 35 $^{\circ}$ C, Humidity : 45 $\sim$ 85% ]

Test Circuit

(a) Measurement Circuit



2, 5 : Terminal  
Others : Ground

(b) 0dB Level



$R_g : 50 \Omega$  (internal resistance of S.S.G.)

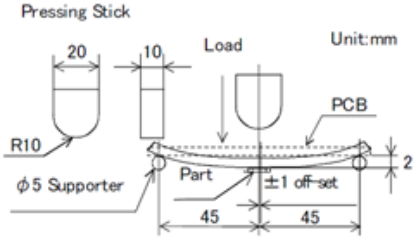
$R_i : 50 \Omega$  (Input impedance of network analyzer or spectrum analyzer)

$$\text{Insertion Loss} = 20 \log (V_2 / V_1) \text{ [dB]}$$

$V_1$  : Output voltage of Test Circuit (a)

$V_2$  : Output voltage of Test Circuit (b)

7. PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

	Test Item	Condition of Test	Requirements
7-1	PCB Bend Strength	<p>This component is soldered onto the center of 1.6mm thickness PCB which is laid on the two small supporters spaced 90mm as shown in below figure. PCB is deflected to 1mm below from horizontal level by the pressing stick. The force is supplied for 1 second, 5 times repeatedly.</p> 	<p>No visible damage and the measured values shall meet Table 1. No visible damage and the measured values shall meet Item 6.</p>
7-2	Vibration	<p>This component shall be measured after being applied vibration of amplitude of 1.5mm with 10 to 55 Hz of vibration frequency to each of 3 perpendicular directions for 2 hours.</p>	<p>The measured values shall meet Table 1.</p>
7-3	Random Drop	<p>Filter shall be measured after a dropping to each of 6 perpendicular directions from height of 150cm on concrete floor. Filter shall be with housing (around 100g).</p>	
7-4	Solderability	<p>Terminals are immersed in rosin flux (concentration 7~10%, solvent : methanol) for 5 seconds, then immersed in soldering bath at <math>230 \pm 5^{\circ}\text{C}</math> for <math>5 \pm 0.5</math> seconds.                      Refer to : Rosin : JIS-K-5902                      Methanol : JIS-K-1501                      Solder : JIS-Z-3282, H63A or H60A</p>	<p>75% min. of the immersed surface shall be covered with solder.</p>

7-5	Resistance to Soldering Heat	This component shall be preheated at $170 \pm 10^{\circ}\text{C}$ for 60 seconds, immersed whole electrode in soldering bath at $255 \pm 5^{\circ}\text{C}$ for $3 \pm 1$ seconds, then measured after being placed in natural condition for 2 hours.	The measured values shall meet Table 2.
7-6	Temperature Characteristics	This component shall be measured within $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$ temperature range.	The measured values shall meet Table 3.
		This component shall be measured within $-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$ temperature range.	The measured values shall meet Table 2.
7-7	Humidity	This component shall be measured after being placed in a chamber with 90 to 95% R.H.DC 3V bias at $40^{\circ}\text{C}$ for 500 hours and then being placed in natural condition for 2 hours.	
7-8	Life Test (High Temperature)	This component shall be measured after being placed in a chamber with $85^{\circ}\text{C}$ for 500 hours and then being placed in natural condition for 1 hours.	
7-9	Life Test (Low Temperature)	This component shall be measured after being placed in a chamber with $-40^{\circ}\text{C}$ for 500 hours and then being placed in natural condition for 1 hours.	
7-10	Thermal Shock	After temperature cycling of $-20^{\circ}\text{C}$ for 30 minutes to $+85^{\circ}\text{C}$ for 30 minutes was performed 50 times, this component shall be returned to room temperature and shall be measured after being placed in natural condition for 2 hours.	
7.11	Resistance to Reflow Soldering	This component shall be measured after being soldered by reflow 2 times with the following reflow profile (see page 8) and then being placed in natural condition for 24 hours.	

Item	Specifications
Resonant Frequency (at center frequency of 0.5dB bandwidth)	433.935MHz $\pm$ 0.070MHz
Resonant Loss (at peak point)	2.5 dB max.
Parallel Capacitance at 1 MHz One terminal is connected to ground	2.1 $\pm$ 0.5pF

Table 1.

Item	Specifications
Resonant Frequency (at center frequency of 0.5dB bandwidth)	433.935MHz $\pm$ 0.110MHz
Resonant Loss (at peak point)	3.0 dB max.
Parallel Capacitance at 1 MHz One terminal is connected to ground	2.1 $\pm$ 0.5pF

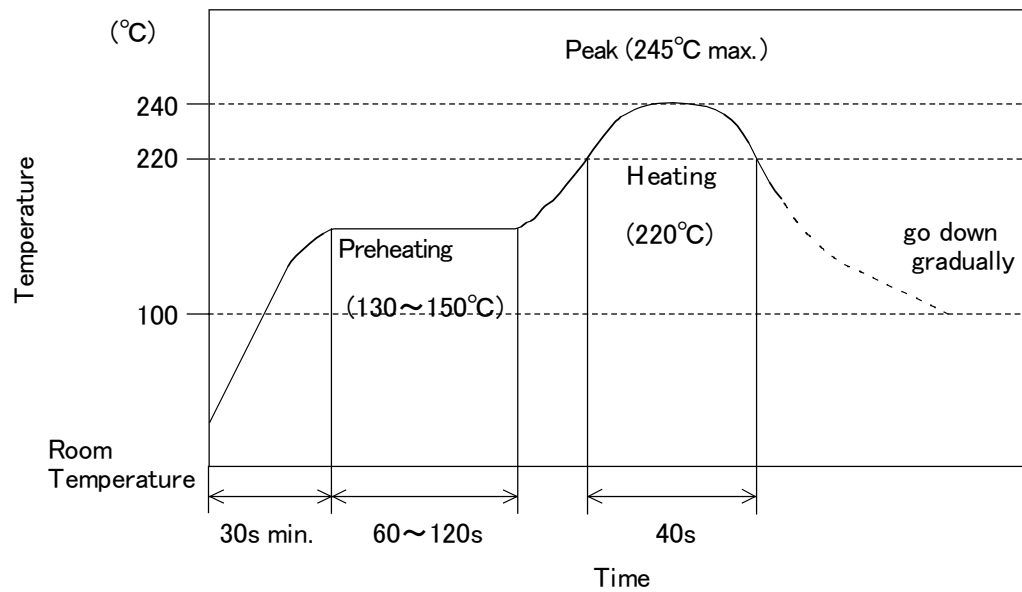
Table 2.

Item	Specifications
Resonant Frequency (at center frequency of 0.5dB bandwidth)	433.935MHz $\pm$ 0.185MHz
Resonant Loss (at peak point)	3.0 dB max.
Parallel Capacitance at 1 MHz One terminal is connected to ground	2.1 $\pm$ 0.5pF

Table 3.

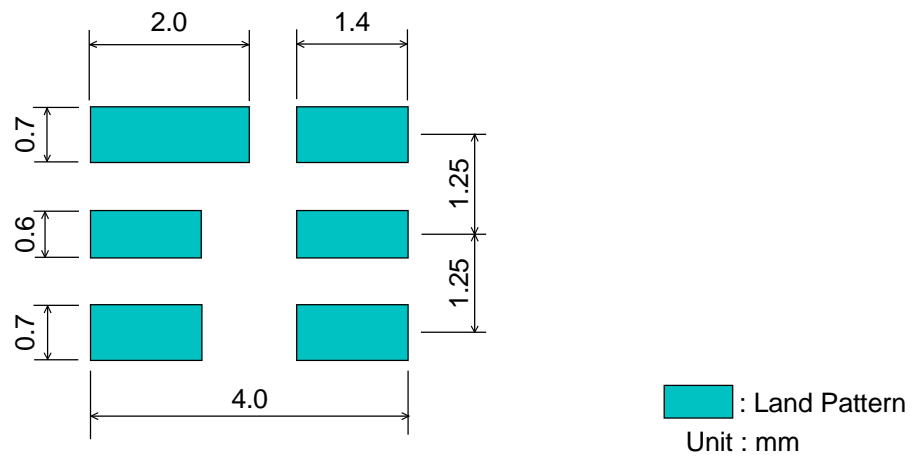
### Reflow Profile

1. Preheating shall be fixed at 130~150°C for 60~120 seconds.
2. Ascending time to preheating temperature 150°C shall be 30 seconds min.
3. Heating shall be fixed at 220°C for 40 seconds and at 240±5°C peak.



### Standard Land Pattern

1. Standard land pattern on reflow soldering is as follows.





## 8. TAPING METHOD OF PLASTIC PACKAGE

### 8-1 Packing

The components are packed to cause no damage. 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 as the tape is pulled toward user.)
- (2) Cover tape shall not be covered the feeding holes of cavity tape, and exceed cavity tape.
- (3) Empty tape area of 160~190 mm shall exist at the end of the tape and 80~120 mm at the tip of the tape. (as shown Figure 1.)
- (4) The tip of the cover tape shall be adhered to the side of reel with adhesive tape (50~120mm: 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 direction of filter shall be fixed. (as shown Fig 2.)
- (7) All the filters shall be packed continuously into the tape without vacant cavities except the leader cavity and tail end
- (8) A reel shall contain 5000 pcs of filter except odd.  
(But bulk packing may be applied for less than 5000 pcs shipment.)
- (9) Cover tape and cavity tape are made the anti-static processing.
- (10) Part number, customer's part number, quantity and inspection lot No. shall be given to the each reel.
- (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 <\*>.

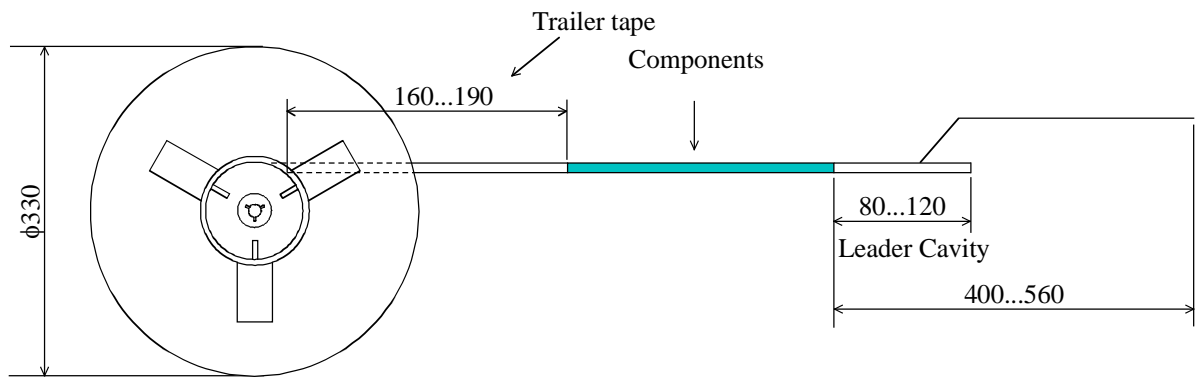
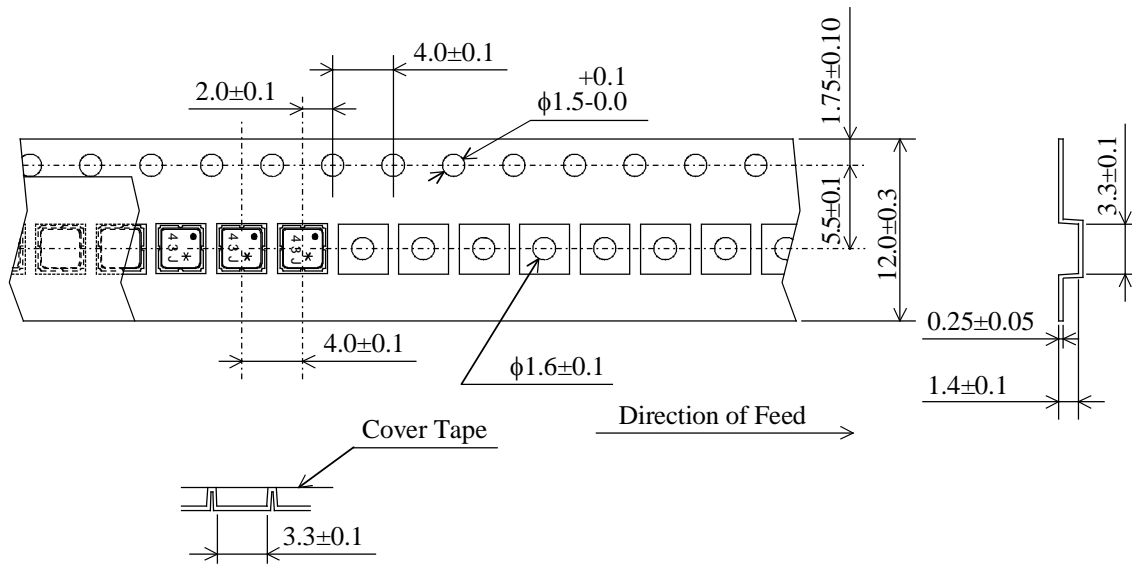


Figure.1

Unit: mm

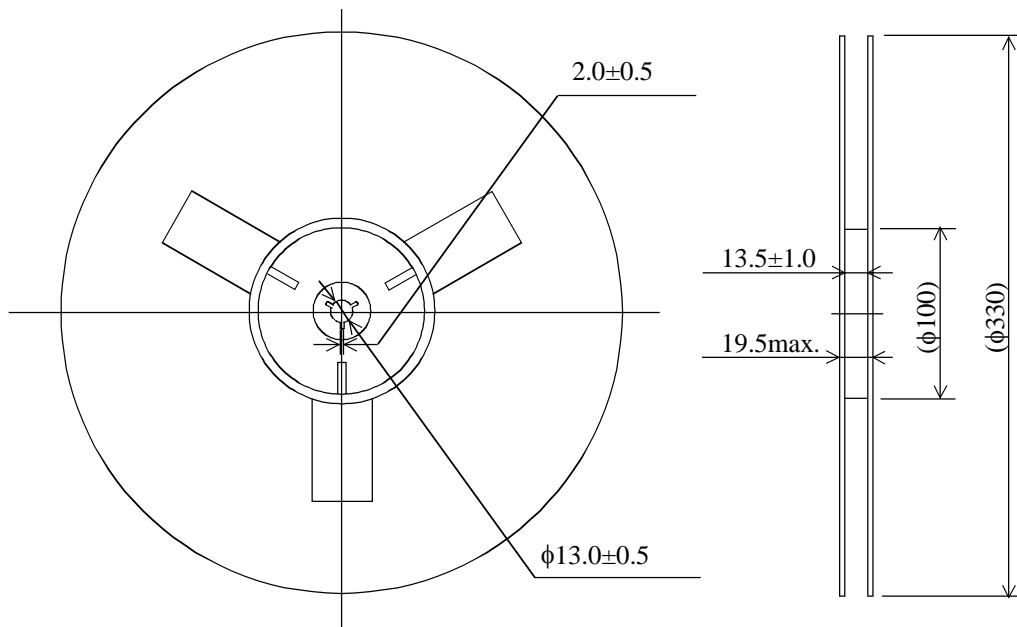
Dimensions of Carrier Tape



The marked part number is faced on the covertape side.

Figure.2

Dimensions of Reel



Unit : mm

Figure.3

## 9. NOTICE

### 9.1 Usage Conditions

I) Use this component within operating temperature range. It might not be satisfied with electrical specification without operating temperature range. When it is used less than  $-40^{\circ}\text{C}$  or more than  $+85^{\circ}\text{C}$ , it might be a cause of degradation or destruction of the component. Even if it endures during a short time, it causes degradation of qualification.

II) This product is designed for use of electrical equipment in the standard environment (temperature, humidity, atmospheric pressure and so on). As it causes degradation of characteristics and qualification, do not use 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 volatile or combustible gas
  - In dusty place
  - In the places where the water splashes and it tends to condense for high humid.
  - In direct sunlight
  - In the places under the strong influence of static electricity or electric field strength
- Contact the manufacturer before using the component in any of the above environments.

III) This component can not use in liquid (water, oil, chemical solution, organic solvents, etc.)

IV) Apply electrical power less than specified in the drawing. When it is used more than rating power greater than specified in the drawing, it might be a cause of degradation or destruction of the component. Even if it endures during a short time, it causes degradation of qualification.

V) As outer coating of this component is not for insulation, do not contact with other components.

## 9.2 Storage Conditions

I) Store in manufacturer's package or tightly reclosed box with the following conditions.  
Examine solderability before using this component, since more than 6 months storage might be a cause of degradation of solderability. Notice that long-term storage might be a cause of the discoloration.

II) To keep solderability of outer-electrode, do not store in the following environments.

- Ambient air containing corrosive gas (Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>x</sub>, NO<sub>x</sub>, etc.)
  - Ambient air containing volatile or combustible gas
  - In dusty place
  - In the places where the water splashes and it tends to condense for high humid.
  - In direct sunlight
  - In the places under the strong influence of static electricity or electric field strength
- Contact the manufacturer before using the component in any of the above environments.

III) Do not open minimum packing unit until usage.

## 9.3 Soldering Conditions

I) Solder on the following standard condition. Contact the manufacturer before soldering this component on the different standard condition. It might be a cause of destruction on some conditions.

### ① soldering with soldering iron

- preheating condition — 150°C ± 20°C, 60 seconds min.
- temperature at the tip of the soldering iron — 260°C ± 10°C, or 350°C ± 5°C
- time of soldering — 3 seconds max.
- diameter at the tip of the soldering iron — φ 3mm max.
- power of soldering iron — 30W max.

Avoid the contact with iron other than back or side terminals part in case of soldering with soldering iron, since it might be a cause of destruction.

②reflow soldering

- Solder on the specification of reflow soldering in this drawing.

II)As it might be a cause of destruction of chip by mechanical stress to supply too much solder, use standard land pattern in this drawing.

III)Use rosin flux. Do not use strong acidity flux [ more than 0.2wt% Halogen compound content.(converted to chlorine content.) ]

IV)Use H63A eutectic solder or H50A solder.

V)Solder with reflow soldering. Soldering with soldering iron shall be soldered on the standard condition in this specification. Since the lack of preheating gives this component rapid temperature change, it might be a cause of degradation and destruction. Contact the manufacturer before using this component in any of the standard condition in this drawing.

VI)Notice that the allowed time of soldering with soldering iron is the accumulated time, when soldering is repeated.

VII) Use this component after examine that the height of solder on outer electrode of the side of this component is 0.1 mm minimum smoothly.

#### 9.4 Cleaning Conditions

I )Cleaning agent isopropyl alcohol and ethyl alcohol can be used. Contact the manufacturer before using this component in any other cleaning agent. Do not use flon, trichloroethane and so on in point of protection for global environment.

II) Clean this component after examine the temperature of this component goes down to room temperature, since rapid temperature change for cleaning after reflow soldering might be a cause of degradation or destruction.

III )As ultrasonic vibration might be a cause of degradation or destruction, contact the manufacturer before using ultrasonic cleaning.

IV)Dry this component immediately after cleaning.

V) 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.

#### 9.5 Handling Conditions

- I) Notice that it might be a cause of destruction to apply excessive shock more than specified in the drawing while handling.
  
- II) Notice that it might be a cause of degradation of qualification to apply excessive shock and vibration while transportation.
  
- III) Notice to apply no shock and no pressure to this component while transportation of this component on PCB.
  
- IV) As it might be a cause of degradation or destruction to apply static electricity to this component, do not apply static electricity or excessive voltage while assembling and measuring.
  
- V) Do not transport this component with bare hand.

#### 9.6 Mounting Conditions

- I) Mount this component at the position so that stress by warp or bend of the PCB may not apply to it.
  
- II) It might be a cause of destruction to apply excessive shock on mounting this component on PCB when positioning claw, pick-up nozzle, etc of component placement machine are abraded. Keep regular maintenance which is instructed on each machine to prevent from these kinds of troubles.
  
- III) Mount all terminals, or terminal strength might be degraded.
  
- IV) Mount the component on PCB with not space between the component and PCB.

## 9.7 Application

I) Please contact us before using our products for the applications listed below which require especially for the prevention of defects which might directly cause damage to the third party's life, body or property.

- Aircraft equipment
- Aerospace equipment
- Undersea equipment
- Nuclear control equipment
- Medical equipment
- Transportation equipment(vehicles, trains, ships, etc.)
- Traffic signal equipment
- Disaster prevention / crime prevention equipment
- Data – processing equipment
- Application of similar complexity and / or reliability requirements to the applications listed in the above.

### NOTE

I) Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.

II) You are requested not to use our product deviating from such agreement.

III) We consider it not appropriate to include other terms and conditions for transaction warranty in

product specifications, drawings or other technical documents. Therefore, even if your original part of this approval sheet for product specification includes such terms and conditions as warranty clause, product liability clause, or intellectual property infringement liability clause, we are not able to accept such terms and conditions in this approval sheet for product specification unless they are based on the governmental regulation or what we have agreed otherwise in a separate contract. We would like to suggest that you propose to discuss them under negotiation of contract.

### Others

This product conforms to the provisions on the control of "Environmental Hazardous Substances" in "Green Procurement Standard".