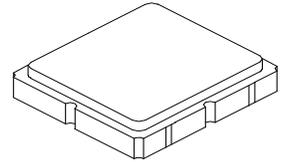


SAFDC433MPB0X32R12

**433.920 MHz
SAW Filter**



SM3030-6

1. SCOPE

This delivery specifications specifies SAFDC433MPB0X32R12, a 400MHz band surface acoustic wave filter used for communication equipment. Please contact us in advance if you use it for any other purpose.

- Country of Origin: TAIWAN
- AEC-Q200 Qualified

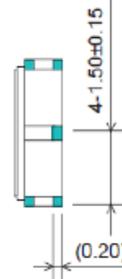
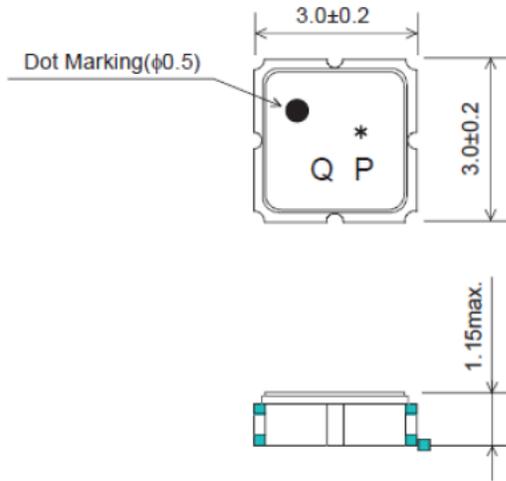
2. Customer Part Number if Applicable

Part No.		Specification No.	
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3. RFMi Part Number

SAFDC433MPB0X32R12	TAPING PACKING (2000pcs)
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4. Dimensions



Marking : Laser Printing

* EIAJ Code

Terminal(Surface) : Au
 thickness $0.3 \dots 1.0 \mu\text{m}$
 (Typ. $0.6 \mu\text{m}$)

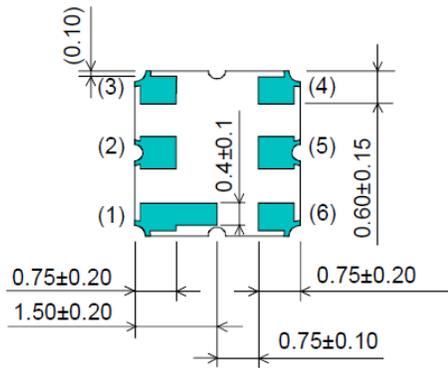
Terminal(Base) : Ni
 thickness $2.0 \dots 8.0 \mu\text{m}$
 (Typ. $3.5 \mu\text{m}$)

Terminal Number
 (2) : Input
 (5) : Output
 Others : Ground

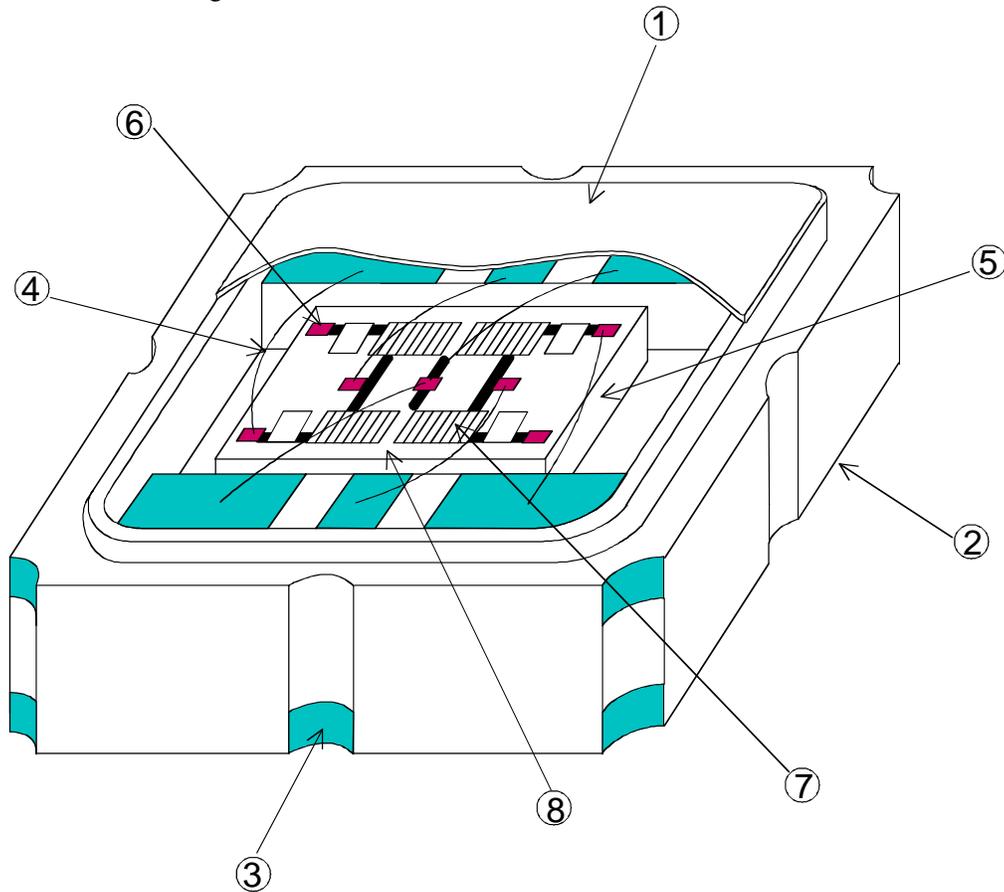
Weight : $32 \pm 5 \text{ mg}$

Coplanarity : 0.1 mm max.

Unit : mm



4.2 Internal Structure Diagram



	Product Name	Material Finish
①	Metal Lid	Kovar, Ni plating
②	Multilayer Ceramic	Alumina
③	Terminal	Au Plating
④	Bonding Wire	Al
⑤	Piezoelectric Substrate	Crystal
⑥	Wire Bonding Pad	Al/Cu
⑦	I D T (Interdigital transducer)	Al/Cu
⑧	Protective Film	S i O ₂

5. Maximum Rating

		Maximum Allowable Capacity 10V (Absolute resistance above 100MΩ, 25 ± 2 °C) Maximum Allowable Capacity 3V (25 ± 2 °C)
5.1	Instantaneous DC applied voltage Between terminals	
5.2	DC applied voltage Between terminals	
5.3	Allowable input level (input side)	1)30mW (+14.8dBm) for 1 minute 2)20mW (+13dBm) at 100 hours
5.4	Operating Temperature	-40~+125°C
5.5	Storage Temperature	-40~+125°C
5.6	Input / output impedance (nominal value) See p4	230 Ω //1.7pF (107.7-114.8jΩ)

6. Electrical Performance

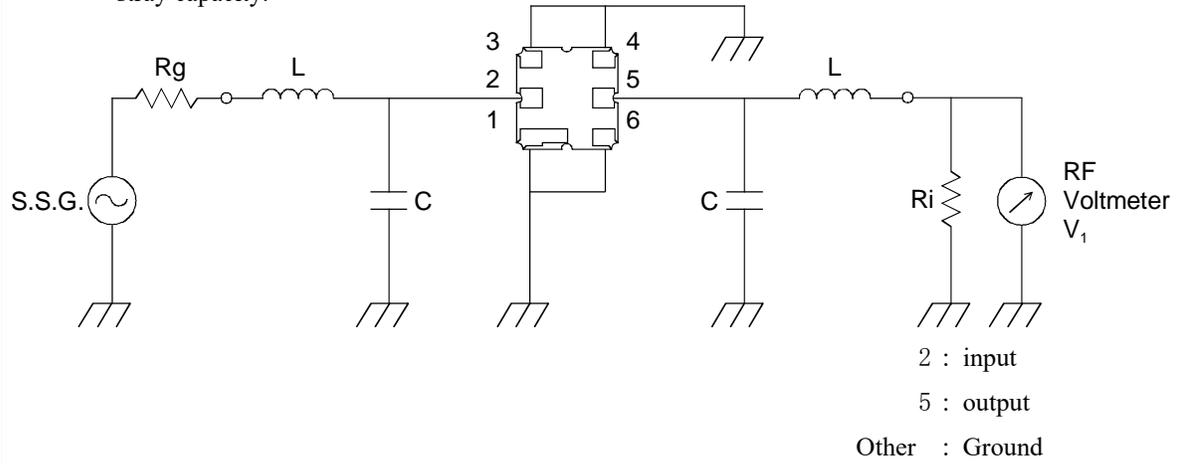
	Item	Specifications	Initial room temperature ability value
6.1	Nominal Center Frequency (fc)	433.920 MHz	
6.2	3dB Bandwidth (from minimum loss point)	fc ± 150kHz	690kHz
6.3	Guaranteed attenuation (from minimum loss point)		
	1) 10.00 ~ 414.00 MHz within	above 46 dB	51 dB
	2) 414.00 ~ 424.00 MHz within	above 38 dB	43 dB
	3) 424.00 ~ 430.62 MHz within	above 16 dB	20 dB
	4) 430.62 ~ 432.12 MHz within	above 29 dB	36 dB
	5) 432.12 ~ 432.92 MHz within	above 14 dB	18 dB
	6) 434.92 ~ 437.00 MHz within	above 18 dB	26 dB
	7) 437.00 ~ 455.50 MHz within	above 47 dB	53 dB
	8) 455.50 ~ 485.00 MHz within	above 20 dB	28 dB
	9) 485.00 ~ 1000.00 MHz within	above 45 dB	53 dB
	10) 1000.00 ~ 2500.00 MHz within	above 52 dB	58 dB
6.4	Insertion loss (at minimum loss point)	above 2.7dB	1.9 dB

The test is performed at a temperature of 25 ± 2 ° C and a relative humidity of 65 ± 5%.

Measurement Circuit

(a) Measurement Circuit

Calculate electrical characteristics assuming that inductor and capacitor have no loss and no stray capacity.



(b) 0 dB level



R_g : 50 Ω (Signal source resistance)

R_i : 50 Ω (Network analyzer or spectrum analyzer input resistance)

L : 33nH (Calculated value)

C : 1.5pF (Calculated value)

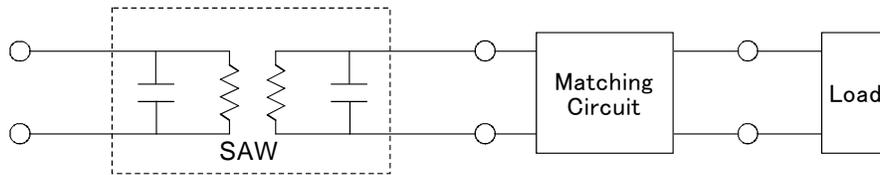
$$\text{Insertion Loss} = 20 \log (V_2 / V_1) \text{ [dB]}$$

V_1 : (a) Output level

V_2 : (b) Output level

Matching Method

Adjust the matching circuit so that the impedance of the SAW filter is the complex conjugate impedance of the load. (The matching configuration differs depending on the load impedance)



A : Load impedance = $R1 - j X1$

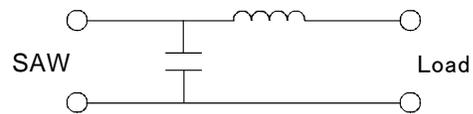
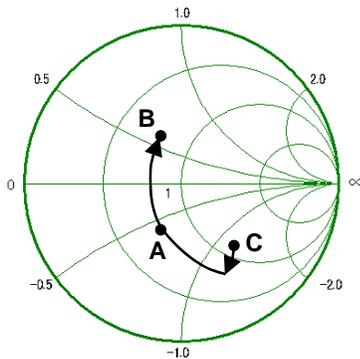
B : Complex conjugate impedance of load = $R1 + j X1$

C : SAW Impedance = $R2 - j X2$

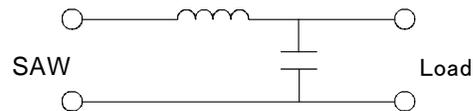
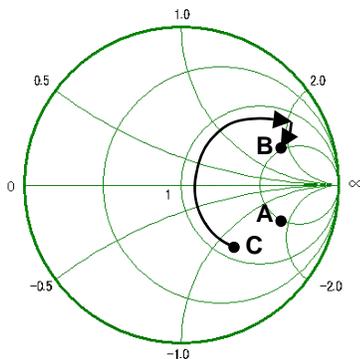
Recommended matching circuit configuration

To avoid deterioration of insertion loss, we recommend a series inductor configuration.

- (1) When the real part of the impedance $R1 < R2$ (when the real part of the SAW impedance is large)



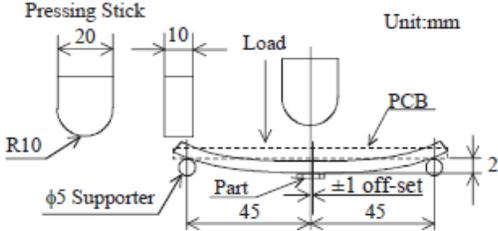
- (2) When the real part of the impedance $R1 > R2$ (when the real part of the load impedance is large)



Note) When adjusting the matching circuit, always consider the stray capacity of the board.

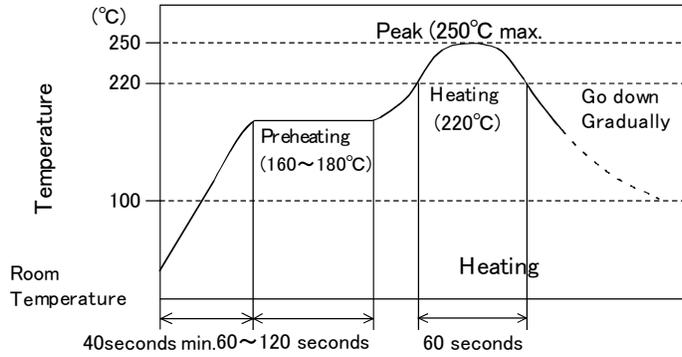
Be sure to evaluate the termination conditions when mounted on your product.

7. PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

	Test Item	Test Condition	Criteria
7.1	PCN bend Strength	<p>Solder to a 0.8 mm thick board and hold it as shown below. return.</p> 	No visible damage should be induced and the electrical performance should meet chapter 6.
7.2	Vibration	A sine vibration with a frequency of 10 to 55 Hz and a total amplitude of 1.5 mm is applied in the X, Y, and Z directions for 2 hours each.	The electrical performance should meet chapter 6
7.3	Shock Resistance	Apply a load of 100g from a height of 150cm and drop it on concrete three times for each of six sides.	
7.4	Solderability	Terminals are immersed in rosin flux (concentration 20~25%, solvent: ethanol 75~80%) for 5 seconds, then immersed in soldering bath at $230 \pm 5^\circ\text{C}$ (solder: JIS-Z-3282 H63, H60 or SN-3.0 Ag-0.5 Cu) for 5 ± 0.5 seconds.	
7.5	Resistance to Soldering Heat	This component is preheated at $170 \pm 10^\circ\text{C}$ for 90 seconds, immersed whole electrode in soldering bath at $255 \pm 5^\circ\text{C}$ for 3 ± 1 seconds, then measured after being placed in standard atmospheric conditions for 2 hours.	The electrical performance should meet chapter 6.
7.6	Temperature Characteristics	Measure in the range of $-40 \sim +125^\circ\text{C}$	
7.7	Humidity	Keep in a chamber at a temperature of 60°C and relative humidity of 90 to 95% for 1000 hours. Take out at room temperature and measure after 2 hours.	
7.8	Life Test High Temp	The electrical performance is measured after being place in a chamber with 125°C for 1000 hours and then being place in standard atmospheric conditions for 2 hours.	
7.9	Life Test Low Temp	The electrical performance is measured after being placed in a chamber with -40°C for 1000 hours and then being placed in standard atmospheric condition for 2 hours.	
7.10	Thermal Shock	After temperature cycling of -40°C for 30 minutes to $+125^\circ\text{C}$ for 30 minutes performed 1000 times, this component 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	Perform reflow twice according to the reflow profile on page 8, take out a normal temperature and pressure, and measure 24 hours later.	

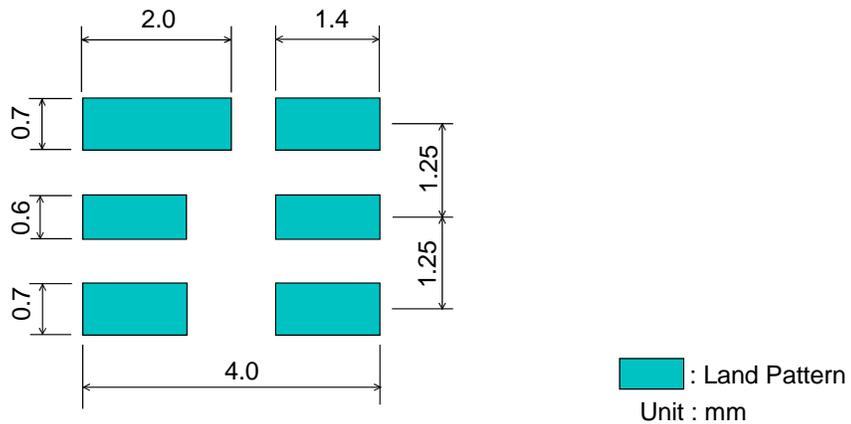
Profile A

- 1) Preheating temperature is set at 60 to 120 seconds at 160°C to 180°C
- 2) Ascending time to preheating temperature 170°C shall be 5°C
- 3) Heating shall be fixed at 220°C for 60 seconds and at 250°C peak.



Standard Land Pattern

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



8. TAPING METHOD OF PLASTIC PACKAGE

8.1 Packing

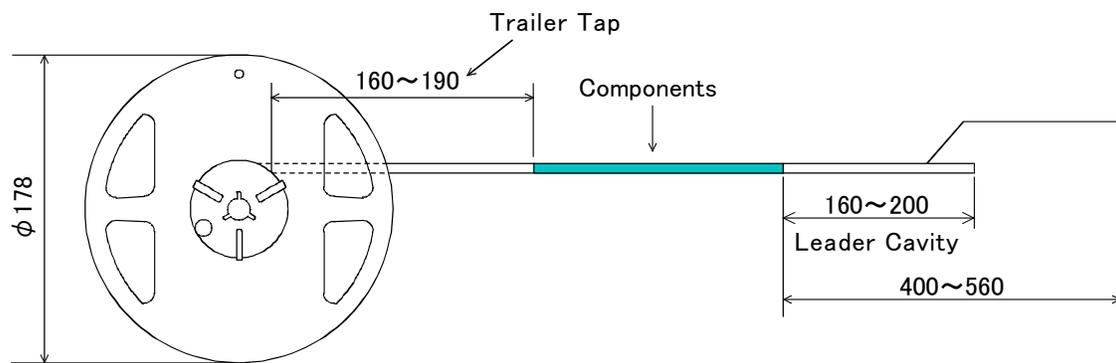
The components are packed to be prevented from being damaged. Part number, quantity and inspection number are indicated on each minimum packing unit.

8.2 Dimensions of Plastic Tape

See Figure 2

8.3 Taping Method

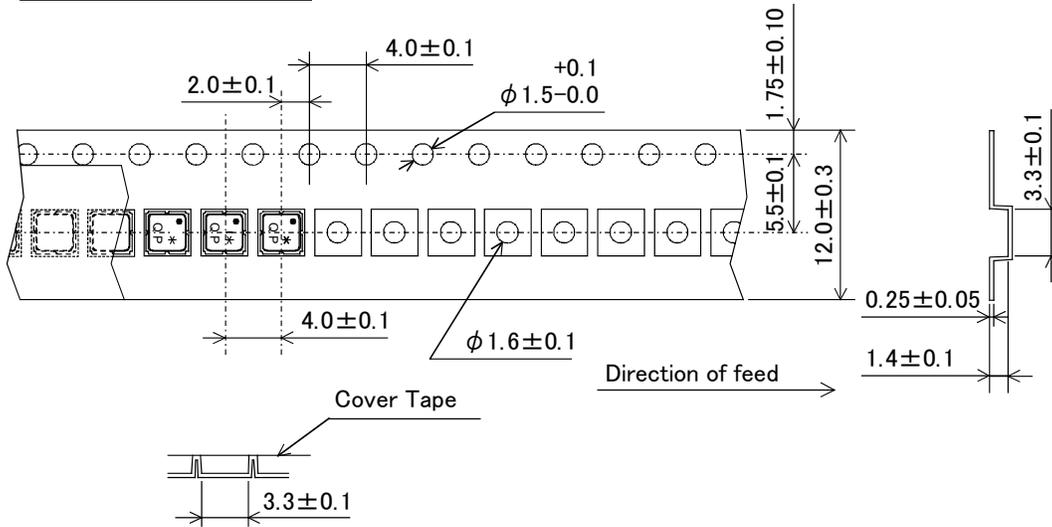
- 1) The tape shall be wound clockwise. (The feeding holes shall be to the right side as the tape is pulled toward user.)
- 2) Cover tape shall not cover the feeding holes of cavity tape or overlap the edge of cavity tape.
- 3) Trailer tape shall be 160~190 mm and leader cavity shall be 80~120 mm (refer to Figure. 1.)
- 4) The tip of the cover tape shall be adhered to the side of reel with adhesive tape (50~120mm: 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 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 trailer tape area.
- 8) A reel shall contain 2000 pcs of filters.
(Please place the order with 2000 pcs times integer number. In case of small quantity shipment, bulk packing may be applied.)
- 9) Cover tape and cavity tape are made of the anti-static material.
- 10) Part number, customer number, quantity and inspection lot number shall be marked on each reel. (The reel side containing the label will be 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 packing 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 directive corresponding to alphabets in <*>.



Unit : mm

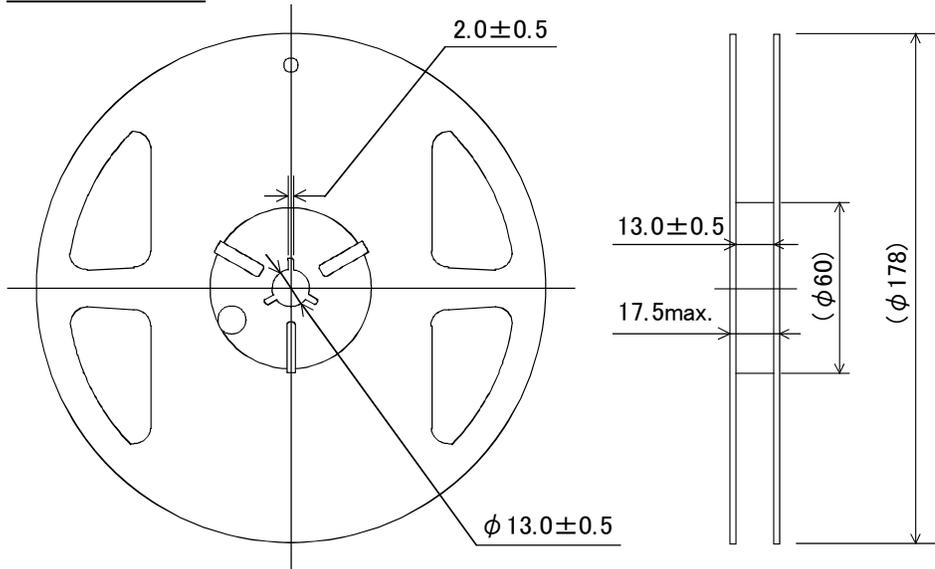
Figure 1

Dimensions of Carrier Tape



The marked part number faces on the cover tape side.

Dimension of Reel



Unit : mm

Figure2

9. NOTICE

9.1 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°C or over $+125^{\circ}\text{C}$ 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 (Cl_2 , H_2S , NH_3 , SO_x , 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 use 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.

9.2 Storage Conditions

1) Keep the component in the package or sealed container on the following conditions.

[Temperature: $-10\sim+40^{\circ}\text{C}$, 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 (Cl_2 , H_2S , NH_3 , SO_x , 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 field

Contact us before using the component in such conditions.

3) Do not open the package until usage.

9.3 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 — $150^{\circ}\text{C} \pm 20^{\circ}\text{C}$ 、60 seconds min.
- temperature at the tip of the soldering iron — $260^{\circ}\text{C} \pm 10^{\circ}\text{C}$ or $350^{\circ}\text{C} \pm 5^{\circ}\text{C}$
- Duration — 3seconds max.
- diameter at the tip of the soldering iron — ϕ 3mm max.
- power of soldering iron — 30Wmax.

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.
- 1) Use land pattern recommend in this specification, since excess solder might cause destruction of chip by mechanical stress to supply too much solder.
 - 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 no 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 solder than above.
 - 5) Solder with reflow soldering. Soldering with soldering iron shall be soldered on the condition specified in the 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 not specified in the specification.
 - 6) Notice that the duration of soldering with soldering iron must be considered to be accumulated time, when solder is repeated.
 - 7) Use this component after examining that the outer electrodes are smoothly covered with solder thicker than 0.1mm.

9.4 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.

9.5 Handling Conditions

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

9.6 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.

9.7 Application

- 1) 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 Alps Electric Co.,Ltd.,Green Procurement Standard.