

## Important notice for usage to Pin type Piezoelectric Sounders

Please take a look for technical guideline  
and failure mode information before  
using products.



# Important notice for usage to Pin type Piezoelectric Sounders



Item	Guideline
Pre-Mounting	<p><b>When inserting this product manually into the printed circuit board, be careful that the pins properly enter the holes in the board.</b></p> <p>If the fixing part of a pin is broken, it is conceivable that an open circuit may occur. Because of this sound may fail to be emitted due to the pins being pushed into the product.</p>
	<p><b>Secure the rear cover pins to the board. Failure to do this may result in a chattering type noise.</b></p> <p>Failure to do this may result in a chattering type noise.</p>
	<p><b>To prevent flux vapor from entering the product, arrange the holes in the board so that they do not align with the open holes in the product.</b></p> <p>An insulating layer is formed at the terminal contact part, which may prevent the generation of noise.</p>
Soldering	<p><b>It is possible for the product to become damaged from heat when being soldered. For this reason, please use a one-sided board.</b></p> <p>If you use a two-sided through-hole board instead of a one-sided board, the rear cover or the fixing points of the pins are likely to become deformed, resulting in poor contact or an open circuit, which in turn may result in reduced sound volume or no sound at all.</p>
	<p><b>Please review our stipulated soldering conditions.</b></p> <p>If the peripheral support condition of the vibration plate changes, the sound pressure level may decrease.</p>
After Mounting	<p><b>If the product is tilted when soldered, melt the solder again and correct the tilt. (Do not press down on the product from the top.)</b></p> <p>If the pins touch two locations on the piezoelectric vibration plate, a short may occur, preventing any sound from being emitted.</p>
	<p><b>Avoid having the piezoelectric sounder in any area where foreign objects will be blown away using compressed air.</b></p> <p>This may cause deformation of the piezoelectric sounder or cracking of the piezoelectric ceramic, resulting in unstable sound.</p>
	<p><b>If the casing and the rear cover are separated after the product has been mounted, do not attempt to re-assemble the product. Replace it with a new one.</b></p> <p>Deformation and mis-positioning of the pins or the vibration plate may result in unstable sound or prevent the generation of any sound at all.</p>
Other	<p><b>Do not insert foreign objects into the sound emission hole.</b></p> <p>This may cause deformation of the piezoelectric sounder or cracking of the piezoelectric ceramic, resulting in unstable sound.</p>
	<p><b>Do not use this product in an atmosphere containing chlorine gas, sulfidizing gas, acid, or another corrosive substances.</b></p> <p>This may cause the characteristics of the product to deteriorate, and also reduce the sound volume level or prevent the emission of any sound at all.</p>

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Other	<p><b>Do not insert foreign objects into the sound emission hole.</b></p> <p>This may cause deformation of the piezoelectric sounder or cracking of the piezoelectric ceramic, resulting in unstable sound.</p>
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Applicable Series : PKM Series (Pin type)

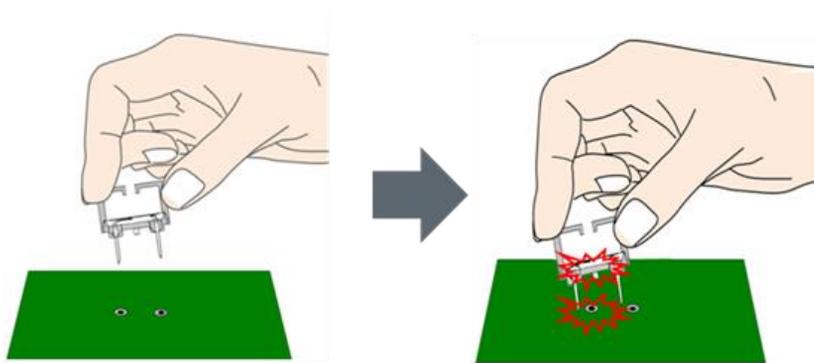
**When inserting this product manually into the printed circuit board, be careful that the pins properly enter the holes in the board.**

If the fixing part of a pin is broken, it is conceivable that an open circuit may occur. Because of this sound may fail to be emitted due to the pins being pushed into the product.

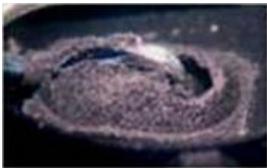
**<How the failure occurs>**

When attempting to insert the pins into the printed circuit board, if the pins do not enter the holes but instead strike the printed circuit board, a force will act to push the pins in the direction toward the inside of the product. If an excessively large force is applied in the direction toward the inside of the product, the fixing point of each pin will break, and the pins will be pushed into the product.

When the pins are pushed through the component, the two electrodes will touch the piezoelectric vibration plate, and a short circuit will occur, resulting in a malfunction.



**<Case>**

PKM17EPP-2002-B0	PKM13EPYH4000-A0
	

Condition of the pins that have been pushed into the product



Applicable Series : PKM Series (Pin type)

**Secure the rear cover pins to the board. Failure to do this may result in a chattering type noise.**  
Failure to do this may result in a chattering type noise.

**<How the failure occurs>**

A vibration occurs when noise is generated causing the cover pins\* to collide with the board repeatedly, which may result in the generation of a chattering type noise.

A noise may also be generated as a result of the board striking other parts as well due the force of the collision being propagated throughout the board.

\*Cover pins (plastic pins): Used to stabilize the product after it is mounted on the board.

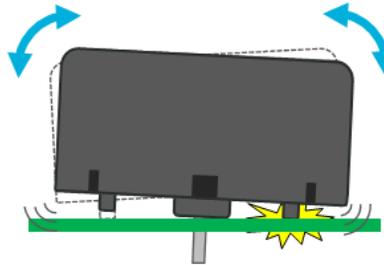
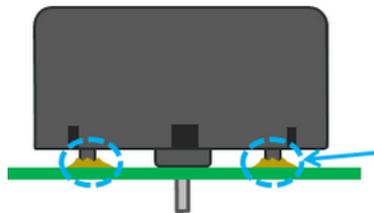


Fig. 1 Rear cover pin strikes the board

**<For reference>**

Please secure the pins to the board in order to suppress chattering noises by using adhesive.



In addition, securely fix the parts other than the sounder to the board.

Applicable Series : PKM13EPYH Series, PKM17EPP-20 Series (Pin type)

**To prevent flux vapor from entering the product, arrange the holes in the board so that they do not align with the open holes in the product.**

An insulating layer is formed at the terminal contact part, which may prevent the generation of noise.

**<How the failure occurs>**

When flux is applied, it adheres to the areas surrounding the holes in the board.

The applied flux is vaporized by heat emitted during the flow soldering process. If this vaporized flux penetrates into the product, the metal terminals will halogenize, and an insulating layer (oxide layer) will be generated at the point of contact between the metal terminals and the vibration plate.

As a result, a continuity fault (open circuit) may occur, preventing sound from being emitted.

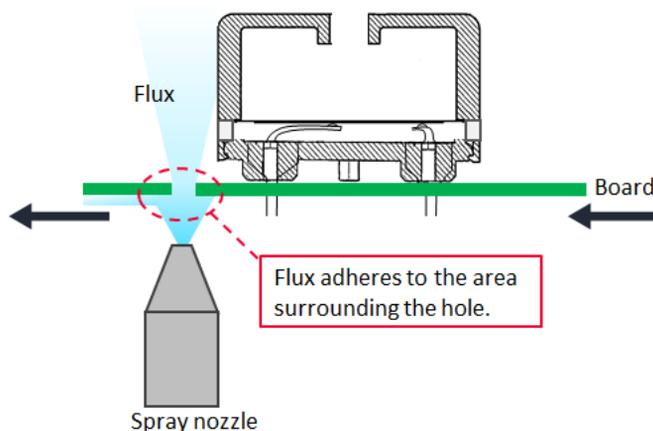


Fig. 1 When flux is applied

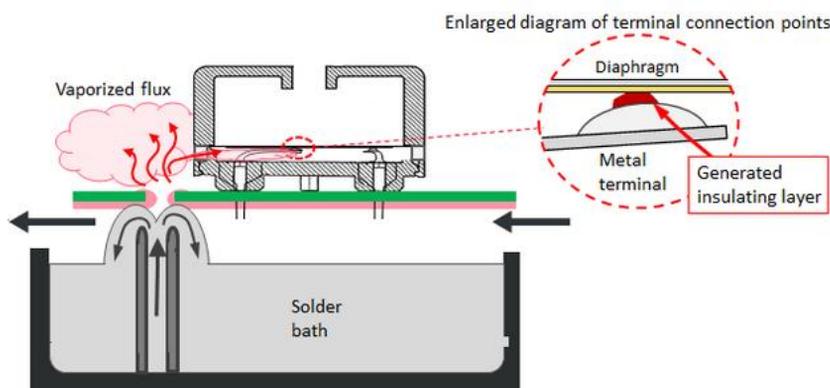


Fig. 2 During flow soldering

**<For reference> Positions of open holes**

PKM13 series	PKM17EPP-20 series

Applicable Series : PKM13EPYH Series (Pin type)

**It is possible for the product to become damaged from heat when being soldered. For this reason, please use a one-sided board.**

If you use a two-sided through-hole board instead of a one-sided board, the rear cover or the fixing points of the pins are likely to become deformed, resulting in poor contact or an open circuit, which in turn may result in reduced sound volume or no sound at all.

### <How the failure occurs>

In the case of the PKM13EPYH series, the pins are formed to specified dimensions and are fixed to the rear cover.

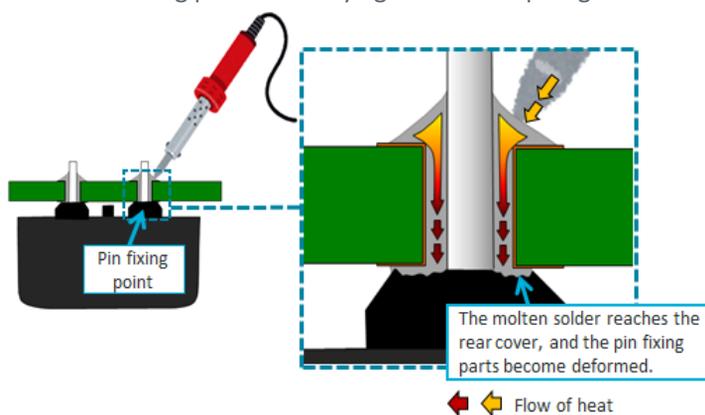
The springiness of the pins is utilized by pressing the end of each pin against the piezoelectric diaphragm to ensure reliable electrical contact.

The fixing point of each pin is made of plastic.

In the case where the product is mounted on a two-sided through-hole board, and then soldered in place, the molten solder will flow through the through-hole and reach the rear cover.

Due to the heat of the molten solder, the possibility of deformation of the rear cover and the pins' fixing points will increase.

If the fixing points of the pins becomes loose, as a result of deformation, the pins will move and lose their springiness preventing them from being pressed firmly against the diaphragm.



### <Case>

	Normal	Abnormal
Pin fixing part		 Melting due to the soldering heat
X-ray photograph	 Pin Pin fixing point	 Pin Pin fixing point As a result of the soldering heat, the fixing points lose their springiness.

Applicable Series : PKM Series (Pin type)

**Please review our stipulated soldering conditions (\*).**

If the peripheral support condition of the vibration plate changes, the sound pressure level may decrease.

<How the failure occurs>

The protruding part of the rear cover is designed to fit into the depression of the casing, in order to maintain the peripheral support condition.

The product is designed so that the resonance frequency determined by the peripheral support condition enables the optimum sound pressure level to be obtained.

If the product is exposed to a higher temperature or for a longer time than our stipulated soldering condition values (\*),

it is conceivable that the casing and the rear cover may change in size, resulting in a change in the peripheral support condition of the diaphragm.

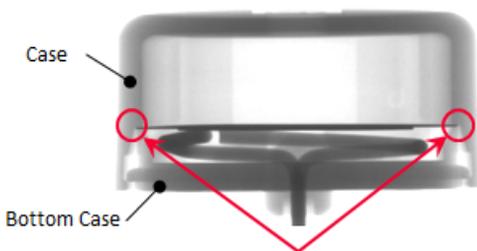
If this occurs, the resonance frequency will shift to a lower frequency, causing the frequency corresponding to the sound pressure peak to fall.

In some cases, it may fall below the sound pressure level indicated in the delivery specifications for the defined frequency (2kHz, 4kHz, etc.).

\* Soldering conditions

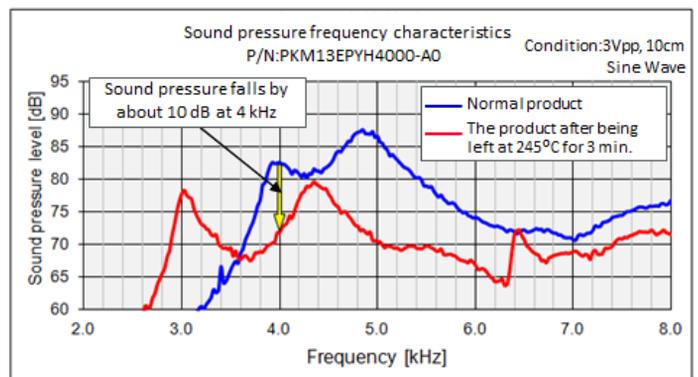
Flow soldering	<ul style="list-style-type: none"> <li>• Molten solder temperature: <math>+260^{\circ}\text{C}\pm 5^{\circ}\text{C}</math></li> <li>• Time: <math>10\pm 1</math> seconds</li> <li>• Pins minus 1.5 mm protruding from the pin exit on the rear cover.</li> </ul>
Soldering iron	<ul style="list-style-type: none"> <li>• Tip temperature: <math>350\pm 5^{\circ}\text{C}</math></li> <li>• Soldering time: <math>3.0\pm 0.5</math> seconds</li> <li>• Pins minus 1.5 mm protruding from the pin exit on the rear cover.</li> </ul>

<Construction>



The sound pressure frequency characteristics change according to the peripheral support condition of the sound pressure piezoelectric diaphragm.

<Sound pressure frequency characteristics>



Applicable Series : PKM Series (Pin type)

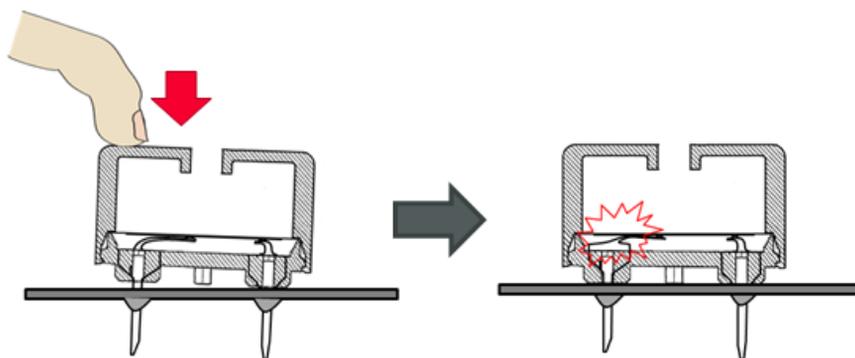
**If the product is tilted when soldered, melt the solder again and correct the tilt. (Do not press down on the product from the top.)**

If the pins touch two locations on the piezoelectric vibration plate, a short may occur, preventing any sound from being emitted.

<How the failure occurs>

After the product has been soldered and is pressed downward from the top, an incredibly large force will be applied to the inside of the product causing the fixing point of each pin to break. This results in the pins being pushed into the product.

When the pins are pushed through the holes in the board, if they touch the two electrodes on the piezoelectric diaphragm, a short circuit will occur, resulting in a malfunction or failure.



<Case>

PKM17EPP-2002-B0	PKM13EPYH4000-A0

Condition of the pins that have been pushed into the product

<For reference>

In order to prevent a defect due to the pins being pushed in, be careful not to apply a force exceeding the value shown below, for each product.

Note that if the temperature of the product body is high, there is a possibility of a defect occurring even under a force that is weaker than the following value.

Maximum applied push-in force (In the case where the temperature is 25°C)

Part Number	Maximum pressure applied to the pins
PKM13EPYH40*	28.0N
PKM17EPP-20*	4.4N
PKM22EPPH*	5.8N

Applicable Series : PKM Series (Pin type)

**Avoid having the piezoelectric sounder in any area where foreign objects will be blown away using compressed air.**

This may cause deformation of the piezoelectric sounder or cracking of the piezoelectric ceramic, resulting in unstable sound.

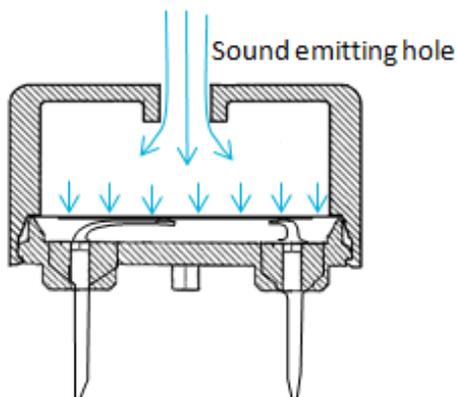
<How the failure occurs>

The piezoelectric sounder produces sound waves from the oscillation of the piezoelectric diaphragm, via the sound emission holes in the acoustic housing, so it is not sealed from the environment.

Due to this construction, when compressed air is blown onto the piezoelectric sounder, the air pressure is applied from the sound emission hole to the piezoelectric diaphragm, which may cause the following failures to occur.

<p>The piezoelectric diaphragm becomes deformed.</p>	<p>In the acoustic housing, where the pin contact method is used to withdraw the electrode, deformation may produce poor contact. At the same time, as a result of the change in the electrical characteristics of the piezoelectric diaphragm, the sound generating condition may change, preventing normal operation.</p>
<p>The piezoelectric ceramic becomes damaged.</p>	<p>The damage will cause silver migration and a decrease in the drive area of the piezoelectric diaphragm, which may cause failures to occur.</p>
<p>The casing and the rear cover are pulled off.</p>	<p>There is no acoustic housing thus no the sound pressure level will be zero.</p>

<Cause>



<Case>

Deformed diaphragm



Applicable Series : PKM Series (Pin type)

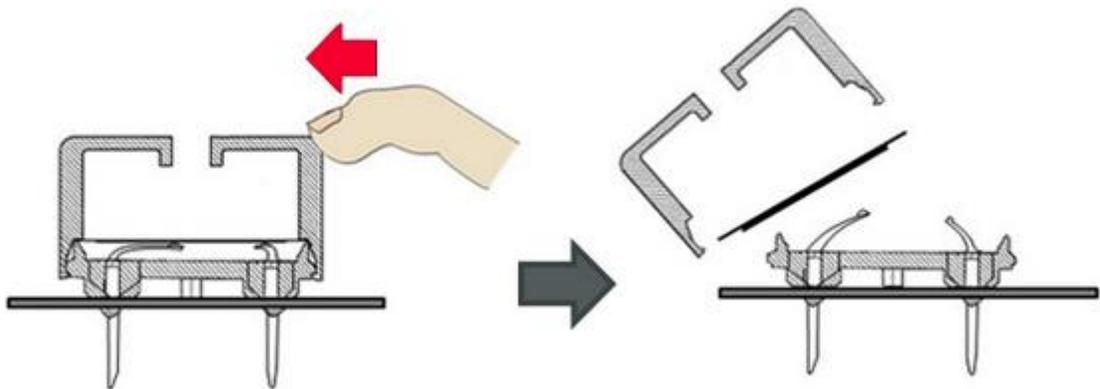
**If the casing and the rear cover are separated after the product has been mounted, do not attempt to re-assemble the product. Replace it with a new one.**

Deformation and mis-positioning of the pins or the vibration plate may result in unstable sound or prevent the generation of any sound at all.

<How the failure occurs>After mounting the piezoelectric sounder on the printed circuit board or the set, if you apply a large force exceeding the fitting force or the adhesive force to the side of the product, the casing or the vibration plate will separate from the rear cover.

If you re-assembled the casing and the piezoelectric diaphragms, the exterior may in some cases appear to have returned to the condition prior to the separation of these parts.

However, it is likely that the electrical characteristics may fail to have been restored on account of deformation, mis-positioning of the pins or mis-positioning of the piezoelectric diaphragms during re-assembly.



Applicable Series : PKM Series (Pin type)

**Do not insert foreign objects into the sound emission hole.**

This may cause deformation of the piezoelectric sounder or cracking of the piezoelectric ceramic, resulting in unstable sound.

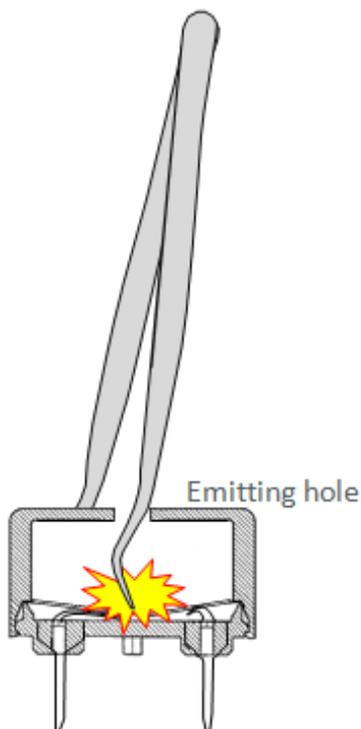
<How the failure occurs>

The piezoelectric sounder produces sound waves from the oscillation of the piezoelectric diaphragm, via the sound emission holes in the acoustic housing, so it is not sealed from the environment.

If a foreign object is inserted into the sound emission hole, and it touches the piezoelectric diaphragm, this is likely to cause the following failures.

The piezoelectric diaphragm becomes deformed.	In the acoustic housing, where the pin contact method is used to withdraw the electrode, deformation may produce poor contact. At the same time, as a result of the change in the electrical characteristics of the piezoelectric diaphragm, the sound generating condition may change, preventing normal operation.
The piezoelectric ceramic becomes damaged.	The damage will cause silver migration and a decrease in the drive area of the piezoelectric diaphragm, which may cause failures to occur.
The casing and the rear cover are pulled off.	There is no acoustic housing thus no the sound pressure level will be zero.

<Cause>



<Case>

Deformed diaphragm



Applicable Series : PKM Series (Pin type)

**Do not use this product in an atmosphere containing chlorine gas, sulfurizing gas, acid, or another corrosive substances.**

This may cause the characteristics of the product to deteriorate, and also reduce the sound volume level or prevent the emission of any sound at all.

<How the failure occurs>

The silver electrode of the piezoelectric diaphragm will sulfurize, resulting in the formation of silver sulfide. Because silver sulfide does not conduct electricity, an open circuit condition is likely to occur.

Sulfidation :  $H_2S + Ag \rightarrow Ag_2S + H_2$

<Case>

Normal



Abnormal



The electrode has turned black due to sulfidation.

\* In order to indicate cases of sulfidation, Murata has example photographs for different part numbers.

<For reference>

Among our products, Murata also produces a silver electrode type which has been subjected to a simple coating process. Please contact us for details.