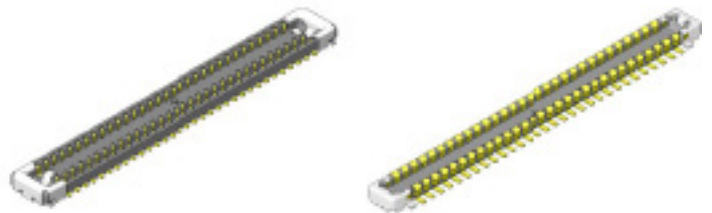


High Current Connectors

**R35(h=0.6)**

# Operation manual

---



## Contents

01. Introduction.....	2
02. Precautions for product design.....	3
03. Precautions for mounting and reflow soldering.....	15
04. Precautions for mating and unmating.....	25

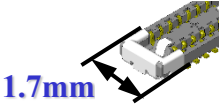
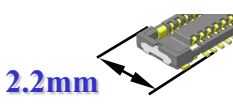
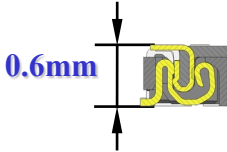
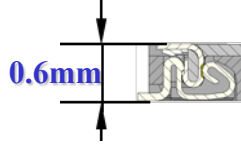
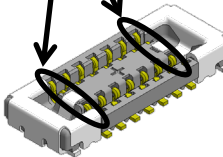
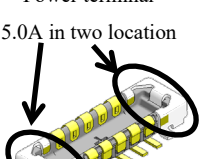
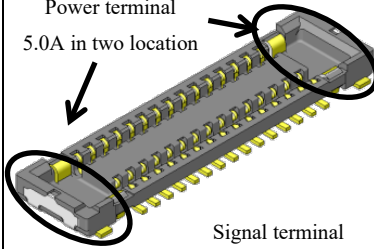

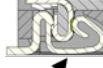
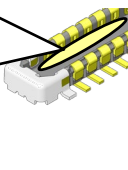
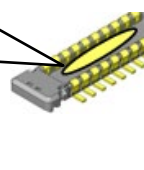
Points which particularly need to be confirmed before designing products are **bold** and underlined.

Please refer to "**the latest product specifications**" when designing your product.  
·Requests to customers:  
<https://industrial.panasonic.com/ac/e/salespolicies/>

# 01. Introduction

Our R series R35 consists of robust connectors with a **terminal pitch of 0.35 mm**, a **stacking height of 0.6mm**, and a **width of 1.7 mm**. This connector is designed for board-to-FPC connections that require a less failure due to fracture than our A35UH series.

For this purpose, the size and thickness of the molded part is different at each series. Select the types best suited to the conditions of use. Read this document before designing a product and starting production.

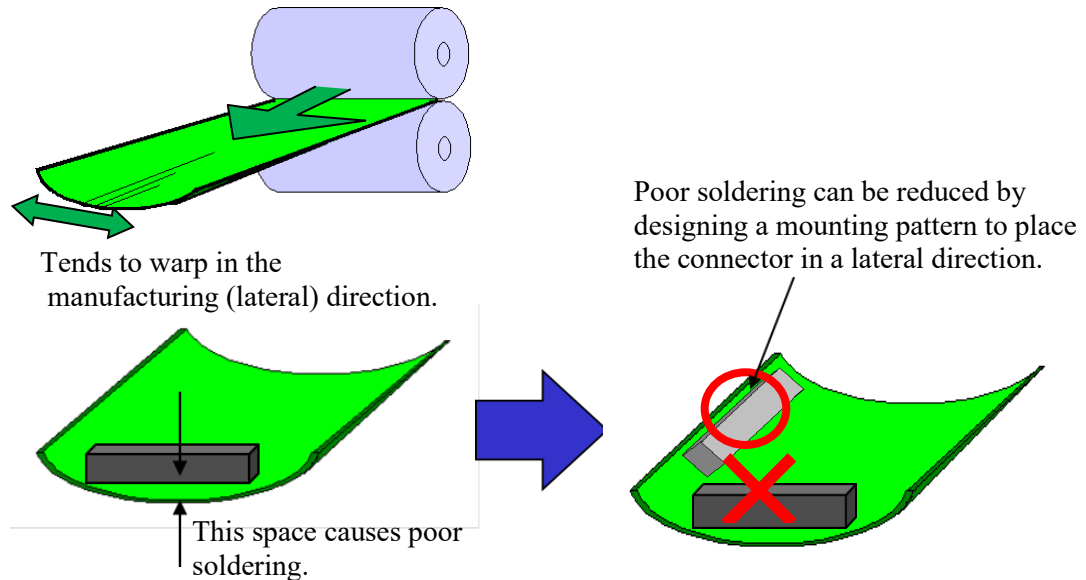
	R35 (h=0.6)		A35UH with power terminal	
Space-saving	<b>Excellent</b> Width: 1.7mm		<b>Good</b> Width: 2.2mm	
Low profile	<b>Excellent</b> Mated height 0.6mm		<b>Excellent</b> Mated height 0.6mm	
High current	<b>Excellent</b> With power terminal (Max 10A at total)	Power terminal 5.0A in two location  Power terminal 5.0A in two location  Signal terminal 0.3A/Pin	<b>Excellent</b> With power terminal (Max 10A at total)	Power terminal 5.0A in two location  Signal terminal 0.3A/Pin
Wiring underneath	<b>Good</b> Exposed metal part on the rear face	 Exposed metal part	<b>Good</b> Exposed metal part on the rear face	 Exposed metal part
Contact reliability	<b>Excellent</b>	<b>TOUGH CONTACT</b>	<b>Excellent</b>	<b>TOUGH CONTACT</b>
Drop resistance	<b>Very good</b>	<b>Bellows-type contact</b> With a thin plastic part	<b>Very good</b>	<b>Bellows-type contact</b> With a thin plastic part
Mountability	<b>Very good</b> Header needs special nozzle	Header pickup space: 0.62mm-wide bottom 	<b>Very good</b> Header needs special nozzle	Header pickup space: 0.8mm-wide bottom 
Clicking feedback	<b>Excellent</b>		<b>Excellent</b>	

## 02. Precautions for product design

### 02-1. Considerations in mechanical design

#### 1) Position of the connector on a board

Rigid boards tend to warp in a direction perpendicular to the rolling direction during the production process. Poor soldering may occur depending on the warping direction. Make sure to place the connector in a direction which reduces warpage.

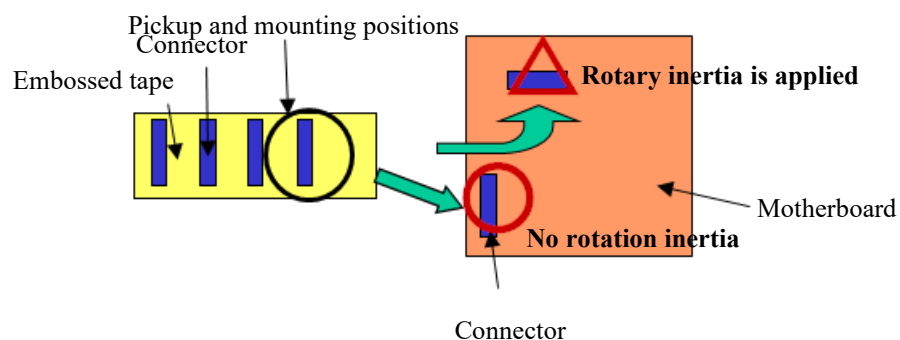


#### 2) Position of the connector in the mounting process

Design multi-pin connector layouts that do not require a swinging movement during pickup and mounting.

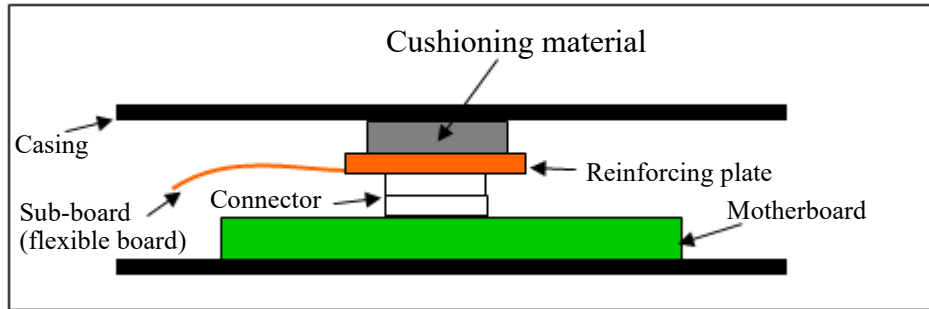
In many cases, deviation of the connector mounting position is caused by the inertia of the swinging movement of the mounter. A layout that does not require swinging is thus required.

##### ● Example of a connector layout requiring a swinging movement in the mounting process



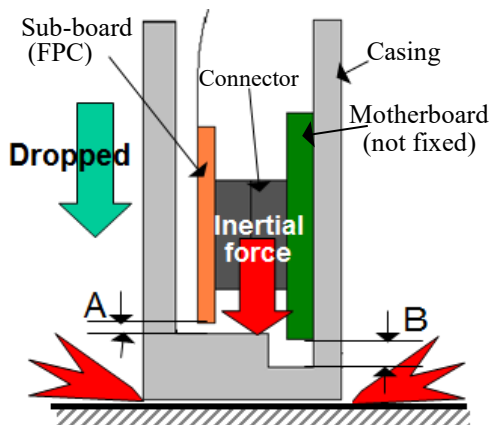
### 3) Prevention of problems during use

(1) The connectors have a simple locking structure, but make sure to consider preventive measures against the detachment of mated connectors during practical use.



- Make sure to eliminate any gaps between the casing and board.
- We recommend that the holding force is set greater than the insertion force of the connector.
- Select an appropriate cushioning material with a suitable shape and dimensions, and hold down the **connector at the center**. (If the holding position is off the center, it may cause detachment of mated connectors.)

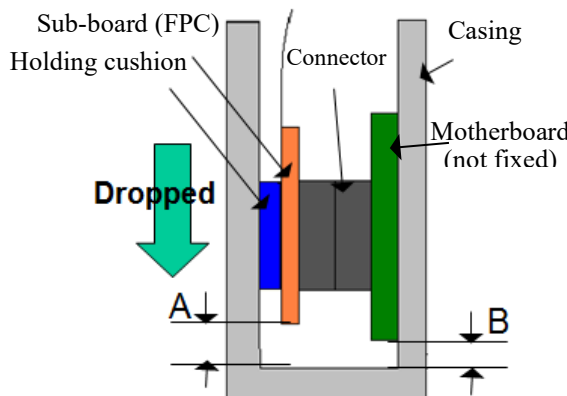
(2) If the board is insufficiently fixed as in the following drawing, the inertial load applied to the connector may damage it. Pay attention to the following points.



When an impact such as dropping as shown in the drawing is applied:

- (1) If both boards are not sufficiently fixed, the connector will be damaged due to the impact applied to the connector.
- (2) In particular, if there is no gap between the casing and sub-board ( $A < B$ ), the sub-board side will hit the casing wall first. This impact may damage the connector.

#### <Preventive measures>



#### <Preventive measures>

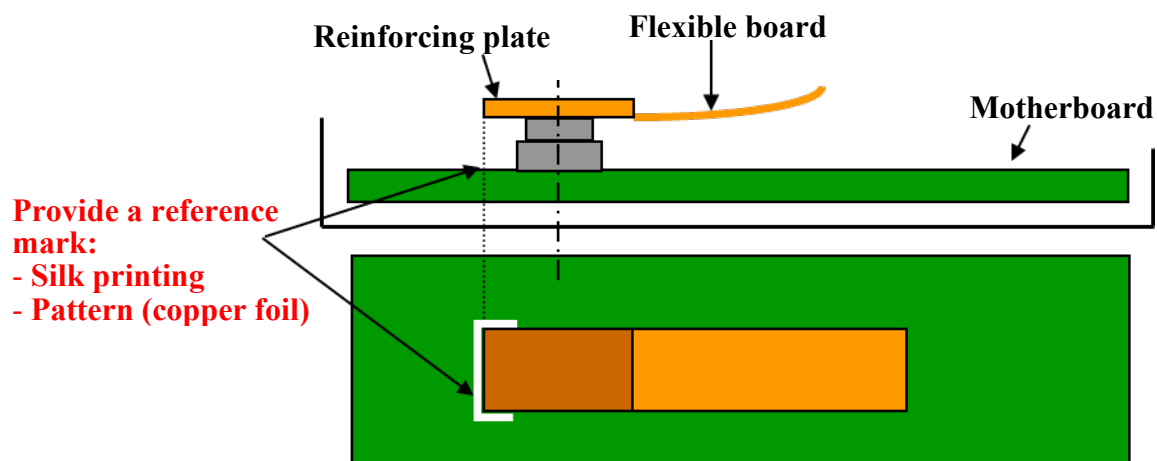
Securely fix both the motherboard and sub-board.

- (1) Fixing motherboard  
(Prevents inertial movement by drop impact by fixing the side with a greater mass.)
- (2) Hold down the sub-board to prevent it from moving using a rubber cushioning material, etc.
- (3) It is safer if board gaps are set to  $A \geq B$  so as to prevent shearing damage on deviation of the board by impact.

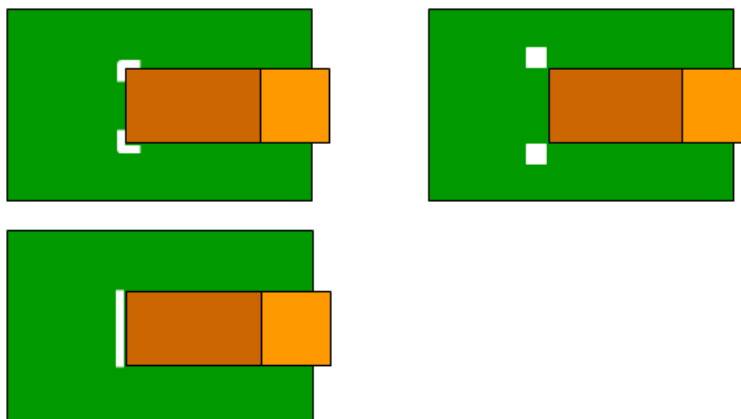
×	$A < B$
○	$A \geq B$

(3) **To facilitate the mating of connectors, we recommend that you pay attention to the following points when designing the motherboard.**

- **Provide a reference mark.**
- Design a layout that allows easy-checking of the connector mating condition.



#### Examples of reference mark



## 02-2. Precautions for board design

### 1) Circuit design

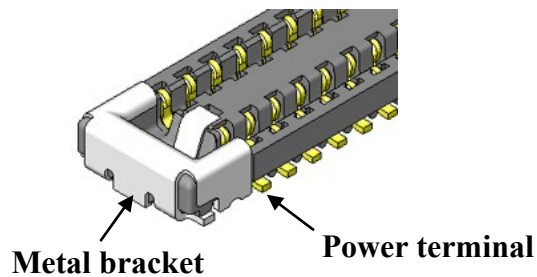
- (1) When designing the terminal foot pattern, check the latest specifications and examine the recommended foot pattern and dimensions of the metal mask opening.

The current recommendations are indicated on pages 13 and 14.

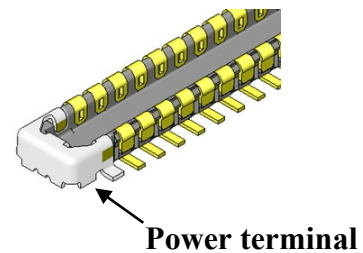
- (2) This connector is provided with power terminal for high current.

When designing, in order to prevent an excessive temperature rise, make sure to design a foot pattern for the power terminal.

#### Socket



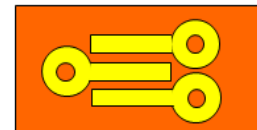
#### Header



- (3) Pay attention to the following points when providing a through hole by extending the foot pattern.

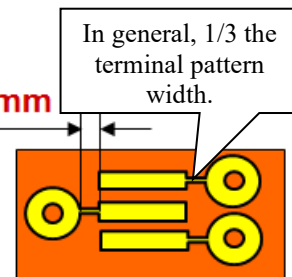
If a through-hole is created simply by extending the foot pattern by the same width, solder is absorbed into the through-hole during the reflow process, which may cause defective or poor soldering of the terminals.

NG



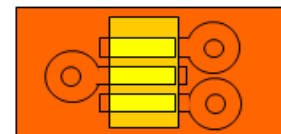
>0.5 mm

Good



- ① Thin and extend the tip of the foot pattern before creating a through-hole.

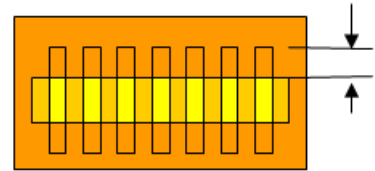
Good



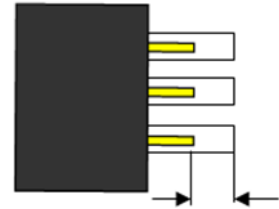
- ② Prevent solder from reaching the land by using a coverlay or resist.

(4) Pay attention to the following point as a pattern peeling preventive measure when removing the connector.

- Make the foot pattern length longer than the coverlay opening.  
In general, at least 0.3 mm.



(5) Foot pattern dimensions indicated in the drawings are intended to achieve the minimum area on the premise that the reflow-soldering process is used. **For manual soldering or for ensuring solder reworkability, make a longer pattern at the terminal tip.**

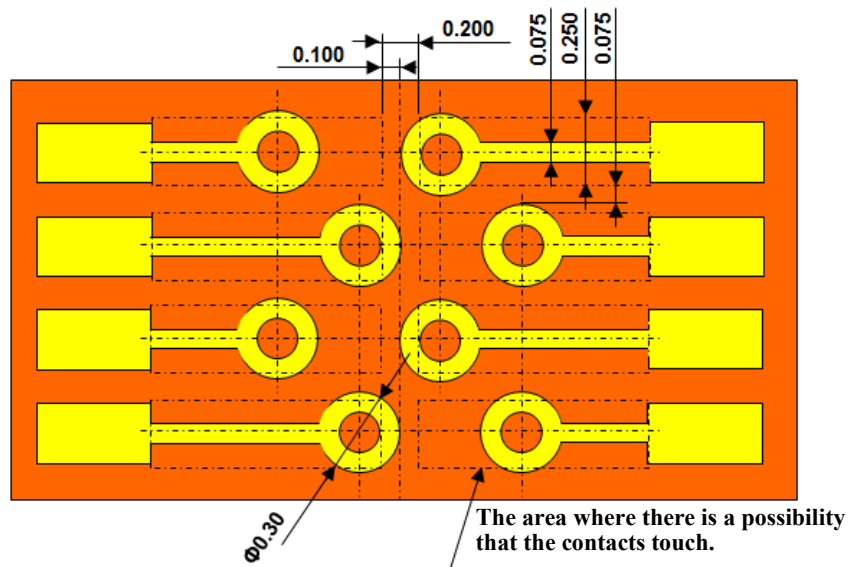


- Secure space for applying the soldering iron tip.

Terminal looseness and unwanted solder creep are preventable by applying the soldering iron tip here.

(6) When it is needed to provide pattern wiring and through-hole underneath the socket, it is possible to use it by designing the pattern as shown below in case insulation underneath the socket is not assured.

Example of through hole

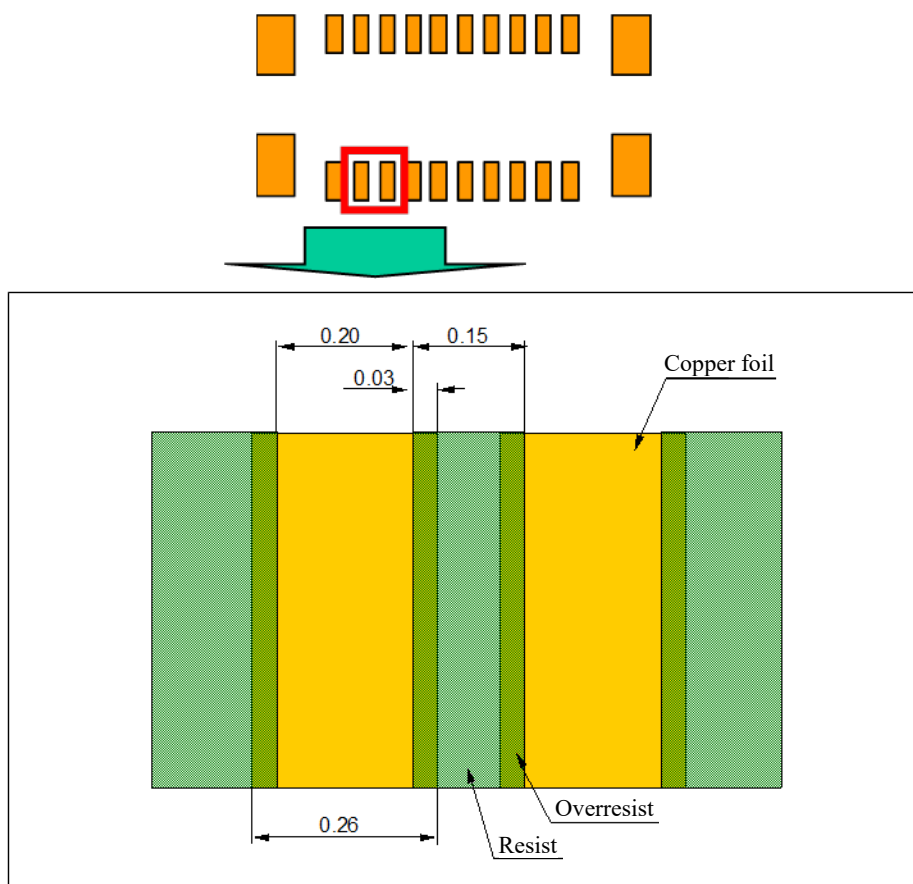




**(7) Resist between pins**

When it is needed to provide resist between the pins, there is a way to adopt the overresist method as below.

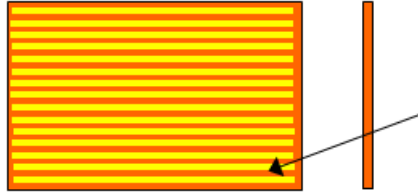
(If the resist is out of alignment, the pattern width 0.20mm would not change.)



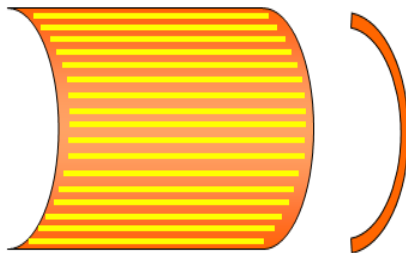
## 2) FPC board design

### (1) Positions of connectors on the FPC

The FPC board is made by laminating a polyimide layer, copper foil, and adhesive layers. Since each material has slightly different heat-shrinkable properties, warpage may occur typically due the reflow heat in the following cases. This may cause poor soldering. Make sure to arrange the board in a direction that minimizes warpage.



In case of a one-sided FPC board, warpage is more likely to occur if a pattern is laid in a line, or if the copper foil is applied over the entire FPC board for noise-prevention purposes.



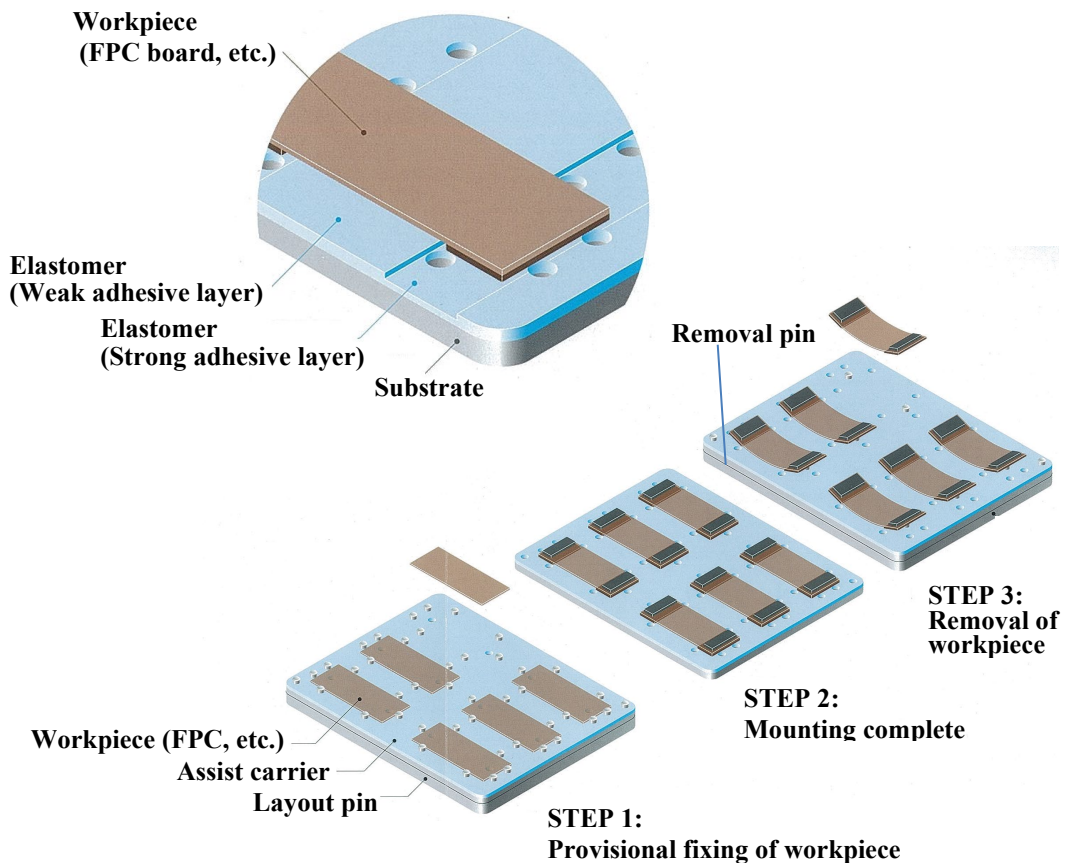
Since the FPC is soft, it is difficult to keep it flat.

To keep the FPC board flat during mounting, we recommend the use of a “Sticky transfer jig” for the wiring board mounting process.

•Typical transfer jigs for the board mounting process

- Magic resin (Daisho Denshi)
- Keiju board (Mitsubishi Resin)
- Assist carrier (ShinEtsu Polymer)

### ■ Example of the Assist carrier (ShinEtsu Polymer)



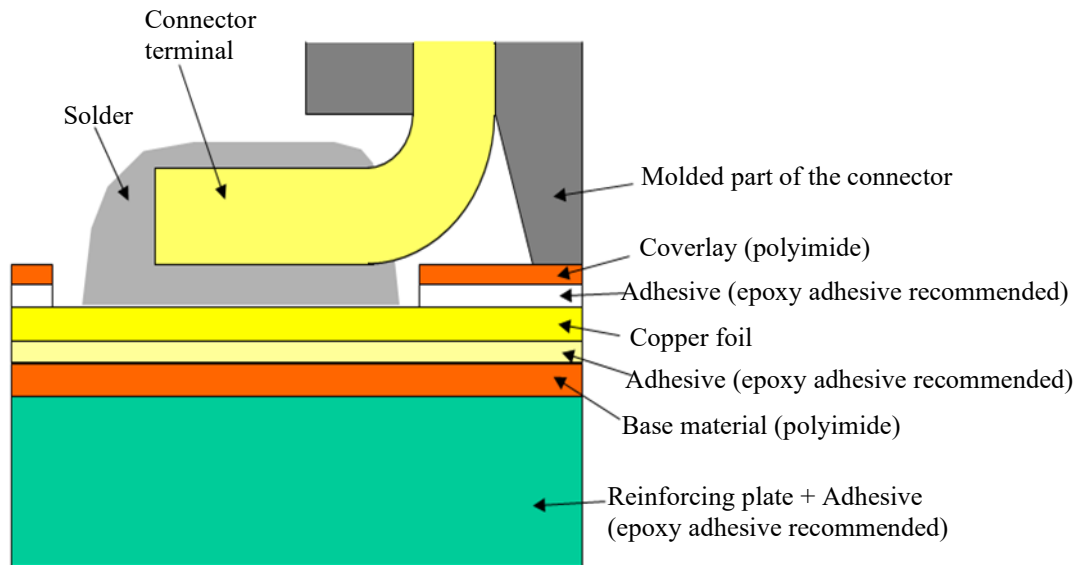
**(2) FPC board specifications**

**Control the thicknesses of the coverlay and adhesive to prevent poor soldering.**

**This connector has no stand-off.**

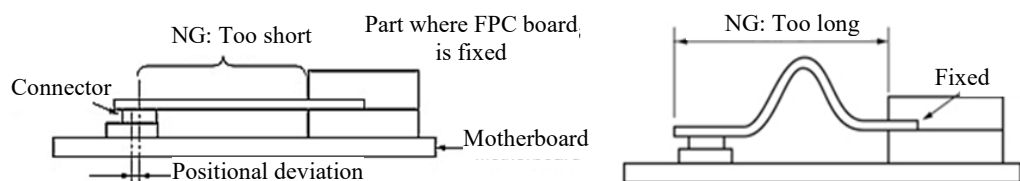
**Therefore, minimize the thickness of the coverlay, etc. so as to prevent the occurrence of poor soldering.**

If poor soldering occurs frequently, check the actual thickness of each insulation layer. Generally, the coverlay thickness is set to about 30  $\mu\text{m}$ , including the adhesive. If the thickness exceeds 30  $\mu\text{m}$ , design the board so as to remove the coverlay under the connector.



(3) This connector is often used for connecting the motherboard and FPC board. In this case, if the FPC board is too short, a load that causes deviation will be applied to the connector.

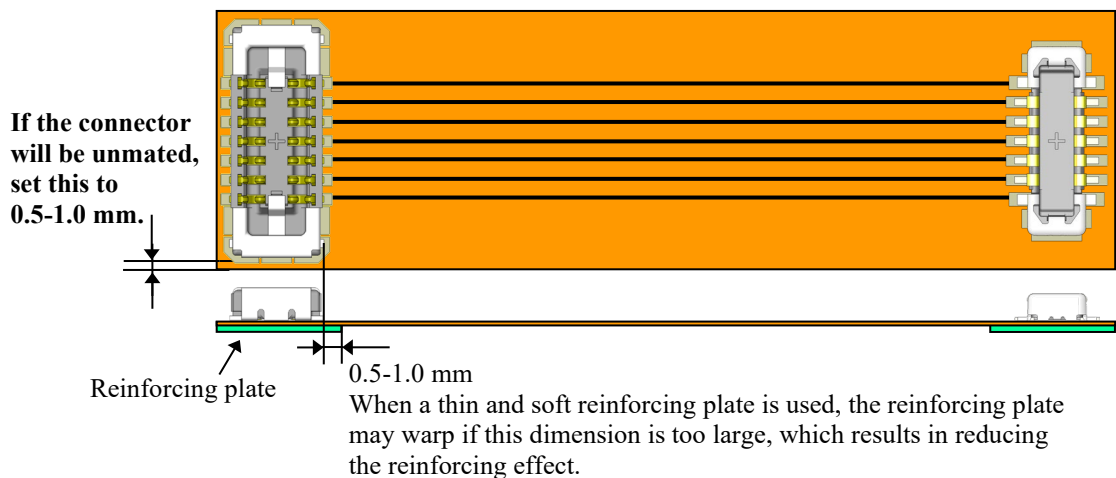
Make sure to create a design that provides some allowance in the FPC board.



### 3) Reinforcing plate design

We recommend the use of a reinforcing plate with appropriate thickness and rigidity to prevent solder peeling and pattern peeling when unmating the connector, and to guard against board warpage during the reflow process.

- (1) We recommend the use of a glass-reinforced epoxy resin sheet, since it is rigid.
- (2) When a polyimide resin plate is used to avoid the generation of fabric particles:
  - Select a thick sheet whenever possible.  
(In general, 0.2 mm or thicker sheet is used.)
  - **High-rigidity epoxy adhesive is recommended for attaching the reinforcing plate to a flexible board.**
  - As a measure to ensure rigidity, attach two thin reinforcing plates using epoxy adhesive. This achieves greater rigidity than a single reinforcing plate of the same thickness.
- (3) Warpage of the reinforcing plate during the reflow process or poor soldering may occur depending on the direction the reinforcing plate on material was cut. Accordingly, make sure to indicate the direction of the material.  
(**Rolled sheets generate warpage depending on material direction, so therefore, make sure to warpage reduction into consideration.**)
- (4) For using an ultra-thin reinforcing plate for slimming a product, one way is to use metals such as stainless steel for the reinforcing plate.
- (5) To avoid generating stress on the soldering portion of the connector when removing the connector or bending an FPC board, design **a reinforcing plate about 0.5 to 1.0 mm longer from the foot pattern tip.**

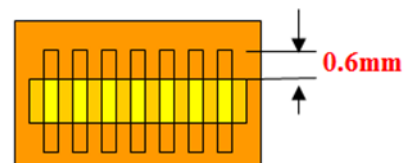


### (6) Foot pattern design

**The following measure is effective for improving the strengthening effect when the reinforcing plate is thin.**

- **Make the foot pattern length longer than the coverlay opening.**

**In general, it is designed to be about 0.3 mm. However, when the reinforcing plate is thin, it is recommended to secure at least **twice the normal length.****



**4) Metal Mask Design**

Since this connector is designed with an ultra low-profile, pay attention to the following precautions for reflow soldering.

(1) In addition to the amount of applied solder, the reflow-soldering environment and temperature profile affect the finish quality after reflow soldering. Make sure to adjust the amount of solder applied after checking the finish quality in a test run.

(2) Compared with natural air reflow soldering, N2 reflow soldering can reduce oxidization of the melted solder surface. This significantly improves the solder wettability. Therefore, make sure to apply an appropriate amount of solder.

(3) Please ensure that the solder volume is within  $\pm 20\%$  of the recommended solder volume.

If there is too much solder, the soldered parts may interfere with each other during assembly, resulting in incomplete fitting.

If there is too little solder, it may lead to a decrease in soldering strength. Therefore, we kindly request that you use the appropriate amount of solder.

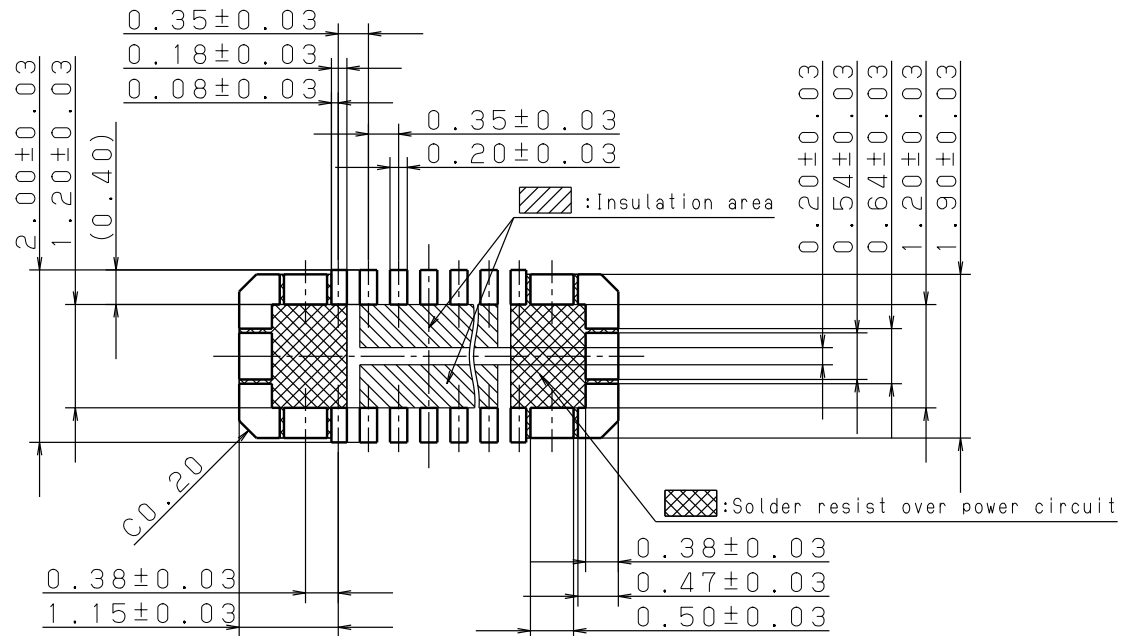
(4) It is recommended that solder with a grain diameter of 40  $\mu\text{m}$  or smaller is used so as to print a constant amount of solder.

(5) Please check the latest specifications for metal mask patterns.  
Please refer to the following pages for the current dimensions.

**Specifications for PC-board and metal mask opening area**

When designing please verify with the product specification sheets

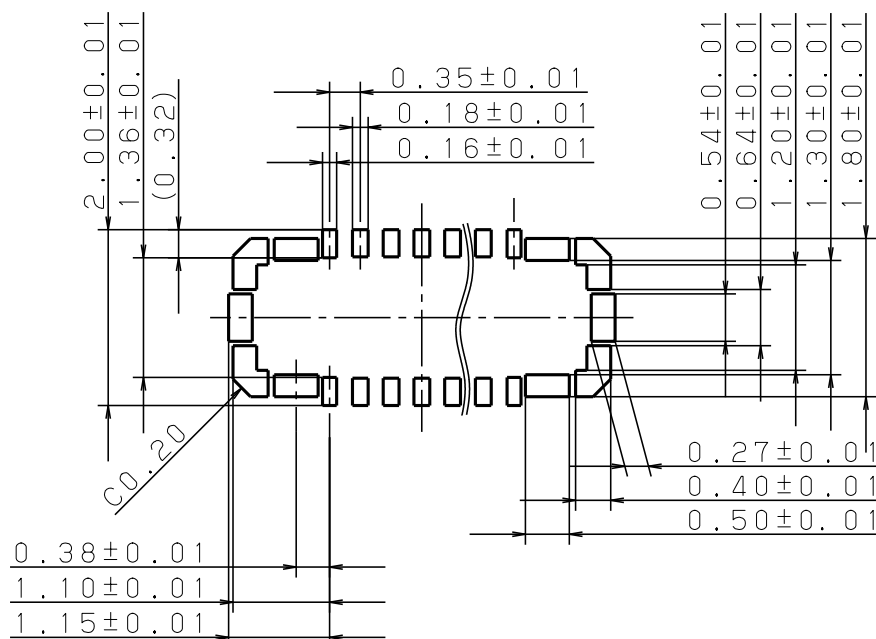
Applicable product: R35 narrow-pitch connector socket (Mated height: 0.6mm)

**PC-board pattern (Mount-pad layout)****Recommended metal mask pattern**

When the metal mask thickness is 100  $\mu\text{m}$

(Terminal section opening area: 70%)

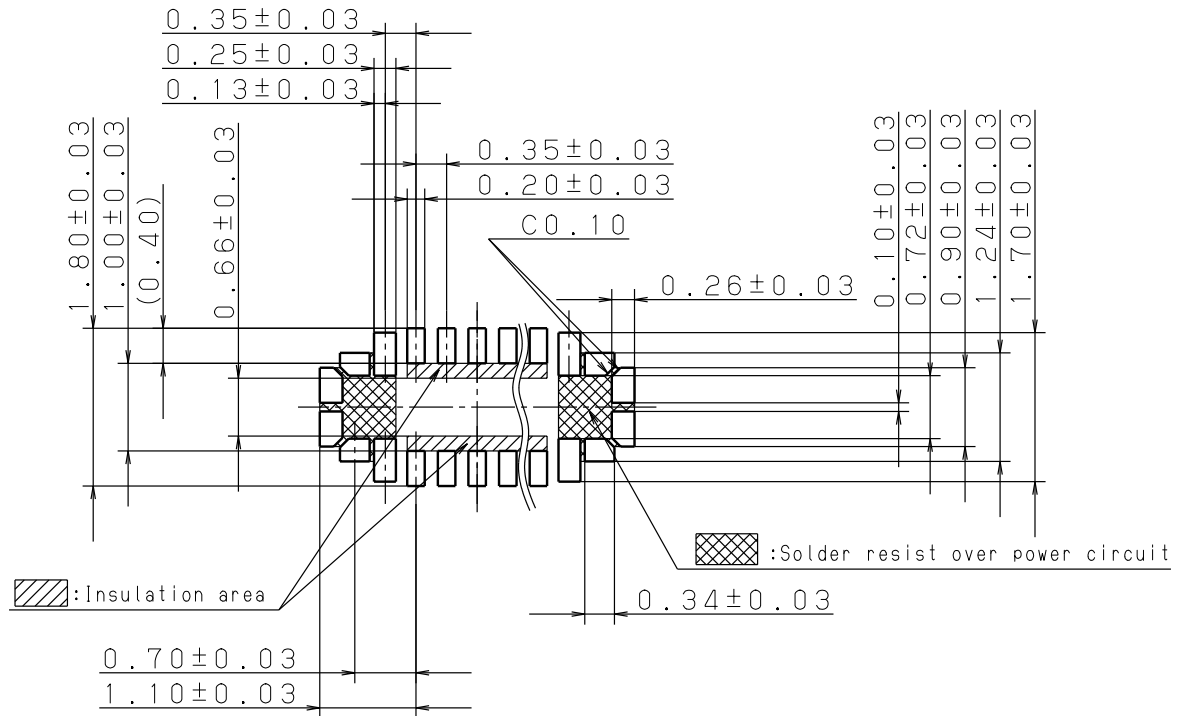
(Metal section opening area: 70%)



## Specifications for PC-board and metal mask opening area

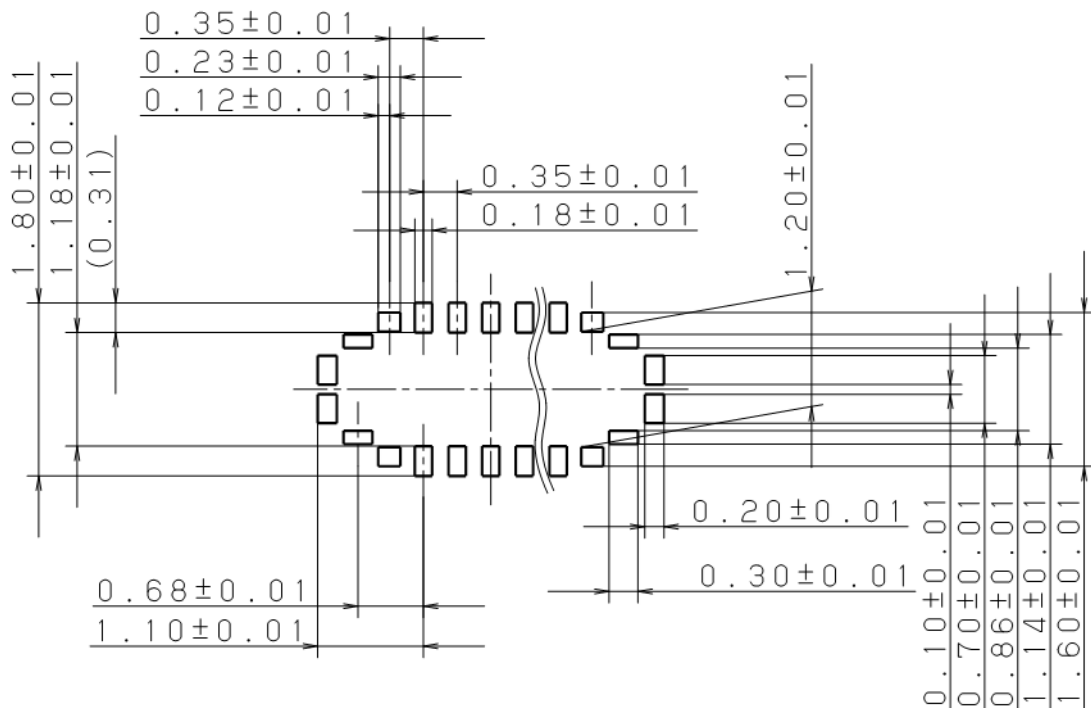
Applicable product: R35 narrow-pitch connector header (Mated height: 0.6mm)

### PC-board pattern (Mount-pad layout)



### Recommended metal mask pattern

When the metal mask thickness is 100  $\mu\text{m}$   
 (Terminal section opening area: 70%)  
 (Metal section opening area: 49%)



## 03. Precautions for mounting and reflow soldering

### 03-1. Mounting

- When mounting, a multifunctional mounter is recommended  
If using a high-speed mounter, control the suction force by using a multifunctional head
- In case of dry condition, please note the occurrence of static electricity.  
The product may be adhered to the embossed carrier tape or the cover tape in dry condition.  
Recommended humidity is from 40%RH to 60%RH and please remove static electricity by ionizer in manufacturing process.

### 03-2. Points to consider when selecting a pickup nozzle

Select a pickup nozzle with a suction area that demonstrates a theoretical lifting force at least **10 times** greater than the connector weight. .

Theoretical lifting force (g)

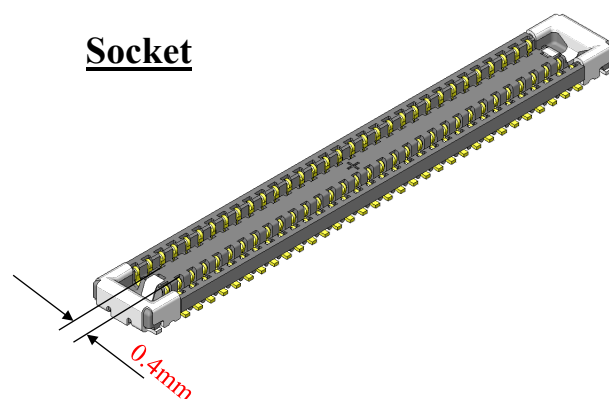
$$= \text{Vacuum pressure (mmHG)} / 760 \times 10.33 \times \text{Nozzle area (mm}^2\text{)}$$

Example of machine vacuum pressure setting: 480–520 mmHg

#### 1) Picking up the socket

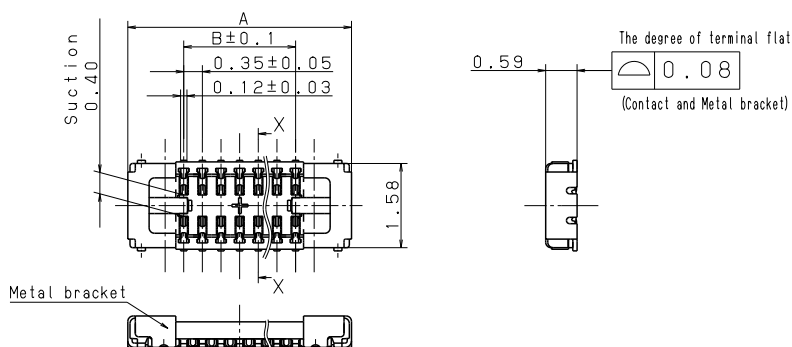
(1) The suction area on the socket is 0.4 mm in the shorter direction.

#### Socket



(2) Dimension of the socket

Mated height: 0.6mm



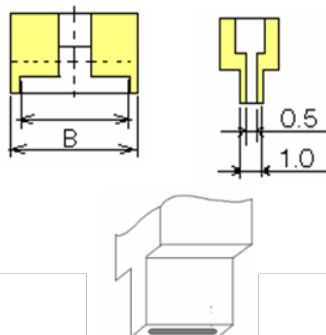
Dimension No. of contacts	A	B
10	4.20	2.10
16	5.25	3.15
20	5.95	3.85
24	6.65	4.55
26	7.00	4.90
30	7.70	5.60
40	9.45	7.35
50	11.20	9.10
60	12.95	10.85

(Unit; mm)

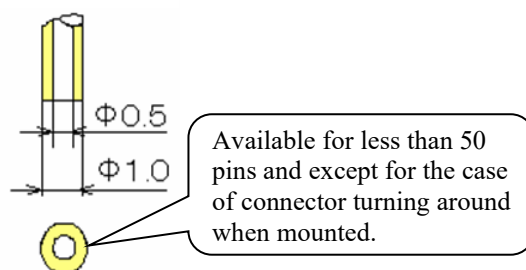


# ●Examples of suction nozzle shape

① Elongated hole



② Circular hole



# ●Connector weight (socket)

Mated height: 0.6mm

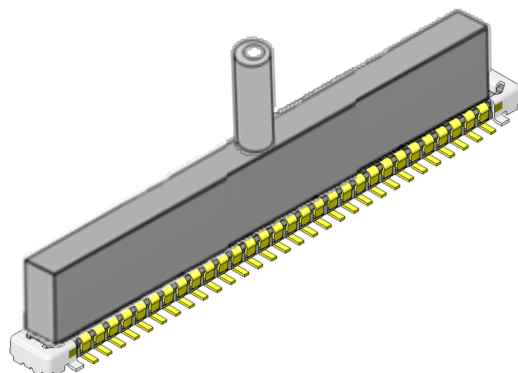
(Unit; g)

Number of pins	10	20	30	40	50	60
Weight	0.008	0.011	0.013	0.016	0.018	0.021

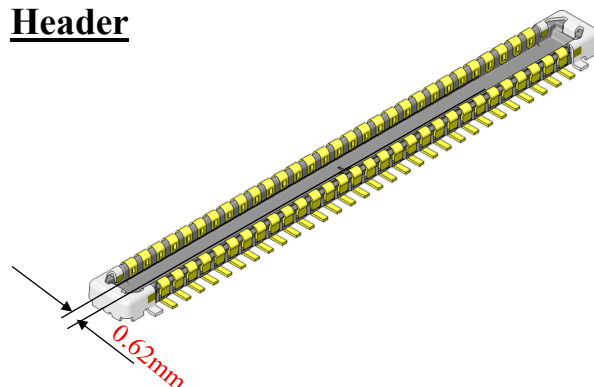
## 2) Picking up the header

(1) The suction area on the header is 0.62 mm in the shorter direction.

If it is difficult to reliably insert the nozzle to the connector bottom face of 0.62 mm widthwise, the header can be picked up by converting the entire top face of the connector as shown below.

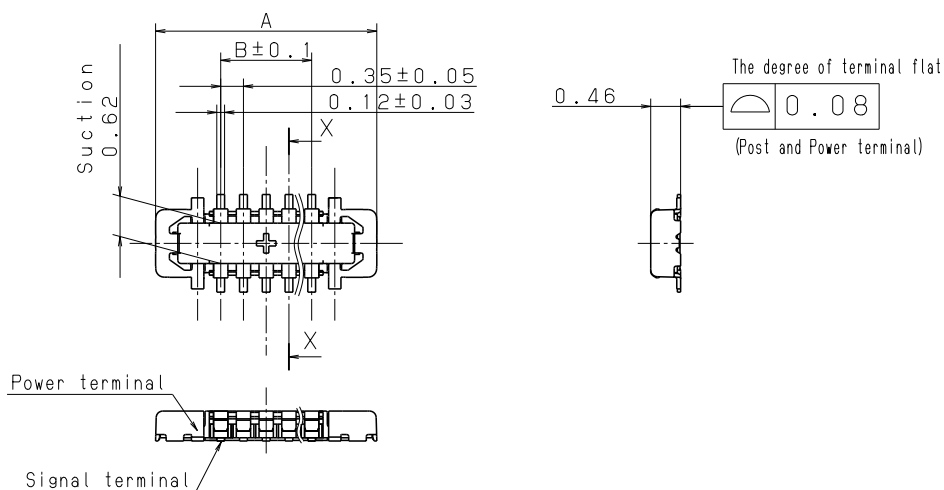


**Header**



(2) Dimension of the header

Mated height: 0.6 mm

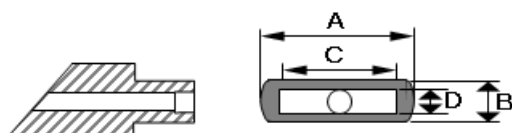


(Unit; mm)

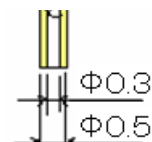
Dimension No. of contacts	A	B
10	3.40	1.40
16	4.45	2.45
20	5.15	3.15
24	5.85	3.85
26	6.20	4.20
30	6.90	4.90
40	8.65	6.65
50	10.40	8.40
60	12.15	10.15

## ●Examples of suction nozzle shape

### ① Elongated hole



### ② Circular hole



(Unit; mm)

Pins	A	B	C	D
10	3.10	1.5	2.10	0.5
16	4.10	1.5	3.10	0.5
20	4.80	1.5	3.80	0.5
24	5.50	1.5	4.50	0.5
26	5.90	1.5	4.90	0.5
30	6.60	1.5	5.60	0.5
40	8.30	1.5	7.30	0.5
50	10.10	1.5	9.10	0.5
60	11.80	1.5	10.80	0.5

Available for less than 50 pins and except for the case of connector turning around when mounted.

\*It is available to suck the connector's whole top surface.

## ●Connector weight (header)

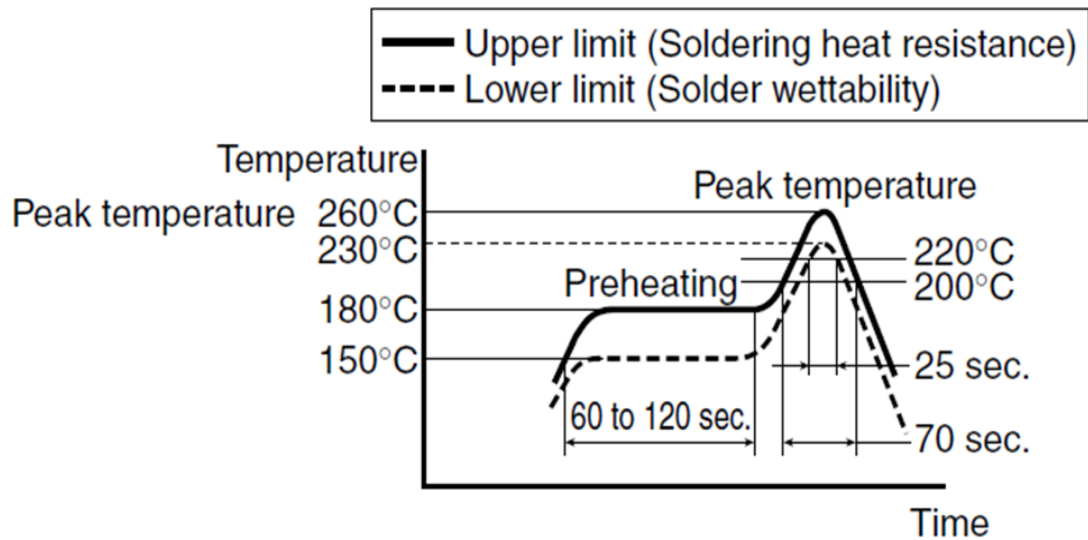
Mated height: 0.6mm

(Unit; g)

Number of pins	10	20	30	40	50	60
Weight	0.003	0.005	0.006	0.007	0.009	0.010

### 03-3. Precautions for reflow soldering

- (1) Measure the temperature profile at the mounted connector position, and make sure that it conforms to the recommended profile.



- (2) When the molded part of connector melts or becomes deformed during the reflow process, the heating temperature may be too high, or the connector may be affected by a nearby electronic component with high heat capacity.
- (3) When the soldering finish is abnormal, check the next points.  
 If solder creeps to or near the contact section, then excessive solder may have been applied or the wicking phenomenon may have occurred. Check the amount of solder applied, the position, and the temperature profile at the mounted connector position.  
In particular, be careful not to apply excessive solder when the N2 reflow furnace is used.
- (4) Extending the screen pattern outward and providing a solder application position on the outer side can help secure a large front fillet.
- (5) In the reflow process of FPC boards, pay attention to the following points to reduce temperature variations among connector terminals.
- Ensure that the FPC board and the base attach firmly to each other when the base on which the FPC board is placed is made of metal (e.g., Al).
  - When a metal reinforcing plate is used, further firmly attach the base and reinforcing plate (e.g., by using heat-resistant double-sided tape).
- (6) Do not use resin-containing solder. Otherwise, the contacts might be firmly fixed.

## 03-4. Precautions for manual soldering and solder rework

The size of this connector has been reduced in order to achieve a narrow pitch and save space. Therefore, take great care when carrying out manual soldering or rework.

- (1) When carrying out manual soldering or rework, make sure that the soldering iron tip does not contact the molded part. In addition, do not overheat the iron, otherwise the resin will melt.
- (2) During solder rework, solder is supplied at and the soldering iron is applied to the tip of each pattern. Make sure that solder and the soldering iron do not contact the terminal.
- (3) **When carrying out manual soldering or rework, avoid using flux if possible in order to prevent it from rising to the contact section. (For details, see the next page.)**
- (4) **When using flux, apply as little as possible to the tip of the foot pattern.** Since this connector has an ultra-low profile, an excessive amount of flux may cause an unwanted rise of flux and may result in requiring flux cleaning.
- (5) After manual soldering or solder reworking, inspect and check the solder finish and other abnormalities, such as the adhesion of dispersed flux on the contact, using a magnifying glass.
- (6) Please avoid using solder with resin as it may cause the contacts to become stuck.

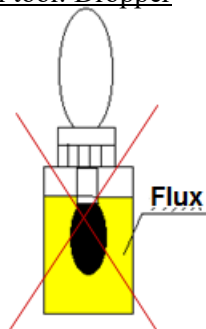
## 03-5. Detailed precautions for solder rework

### (1) Flux-applying tool

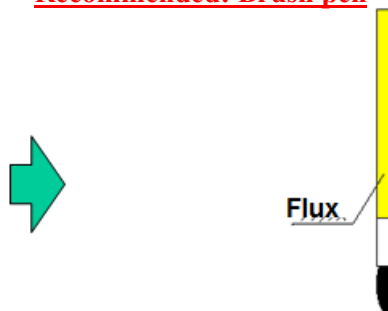
To prevent solder creeping to a contact section, we recommend the use of a **brush pen** that can apply an appropriate amount of flux.  
(e.g., BON-102F, Japan Bonkote)



Conventional tool: Dropper



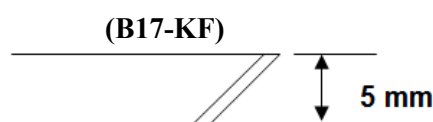
Recommended: Brush pen



### (2) Selection of soldering iron

For narrow-pitch connectors with a 0.35-mm pitch, we recommend:

- An iron tip with a **retractable-knife shape**  
Ex. Japan Bonkote



- With a temperature sensor on the iron tip
- Temperature-controllable iron tip

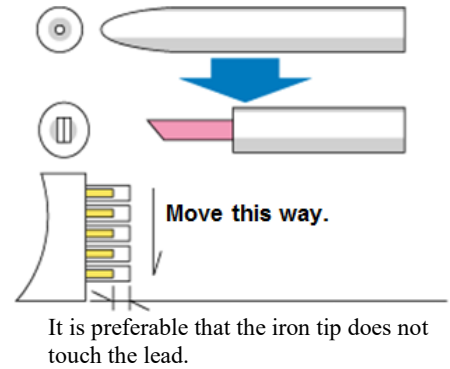
**It is also necessary to check that there are no differences between the indicated temperature and the actual temperature of the iron tip.**

The following temperatures are recommended for iron tips: 340–360°C

## 03-6. Detailed precautions for manual soldering

### (1) General precautions

- When applying flux, apply it thinly on each foot pattern using a brush pen as shown on the previous page.  
(Place the connector at a predetermined position after applying flux.)
- The use of a soldering iron with a retractable-knife shape tip as shown in the previous page is also recommended.
- While heating with the soldering iron, it is recommended to slide the iron tip on the foot pattern along the terminals without touching them.
- Apply the soldering iron to the foot pattern to heat it. Complete soldering in 1 or 2 seconds.



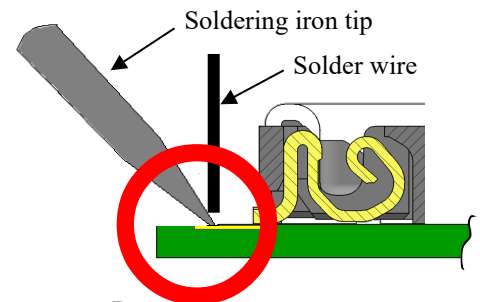
#### Connector's resistance to soldering heat

- 300 °C: 5 sec max.
- 350 °C: 3 sec max.

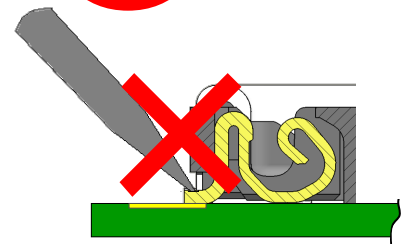
- Thin wire solder with **a diameter of 0.3 - 0.4 mm** is recommended.
- Final soldering is recommended after provisionally soldering the terminals at both ends.
- Note that when the soldering iron touches the terminal, wicking or contact failure may occur.

### (2) Detailed precautions on how to apply the iron tip

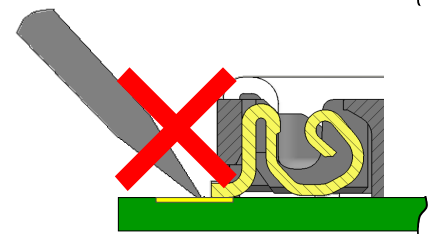
Place the iron tip on the end of the foot pattern, and apply heat to melt the solder.



Do not touch and push the terminal with the iron tip, since the contact may become deformed.



If the iron tip touches and pushes the terminal end, the contact may also become deformed. This must also be avoided.



## 03-7. Flux cleaning method of PC board

There is no need to clean this product.

If cleaning, pay attention to the following points to prevent the negative effect to the product

- (1) In order to keep the solvent purity and to enhance cleaning, prepare equipments such as boil, ultrasonic cleaning with cold solvent and vapor washing.
- (2) Keep the cleaning solvent clean and prevent the connector contacts from contamination.
- (3) Some cleaning solvents are strong and they may dissolve the molded part and characters, so pure water passed liquid solvent is recommended
- (4) When cleaning by alcohol solvent, pay attention that the face of molded part may become white.

Please contact us, when using other solvents.



## 03-8. Solder evaluation of 0.35mm pitch connector

With the present technique, it is possible to mount the 0.35mm pitch connectors. However, pay attention to the solder printing and the following points when mounting.

### (1) Cleaning frequency of the mask

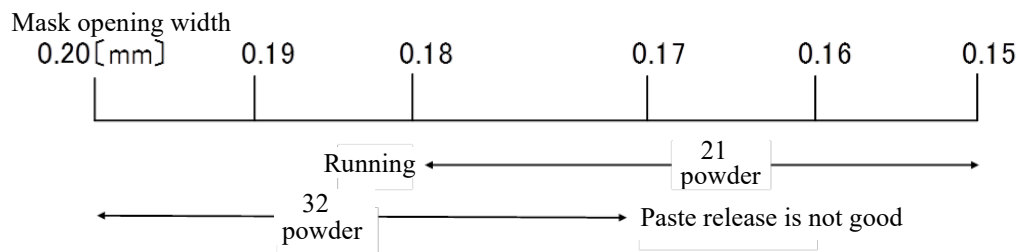
Considering solder particle diameter and running, we recommend the setup as below.

Solder	Cleaning frequency
21 powder	Approx. third- consecutive- cleanings
32 powder	Max. tenth-consecutive cleanings

### (2) Mask opening width

Considering solder particle diameter and pattern width, we recommend the setup as below.

#### 《Suitable mask opening width for pattern width 0.20mm》



### (3) Peeling force

Predict a decrease in solder area causing the low peeling force.  
Need reliability evaluation for each product. Please consult us.

## 04. Precautions for mating and unmating

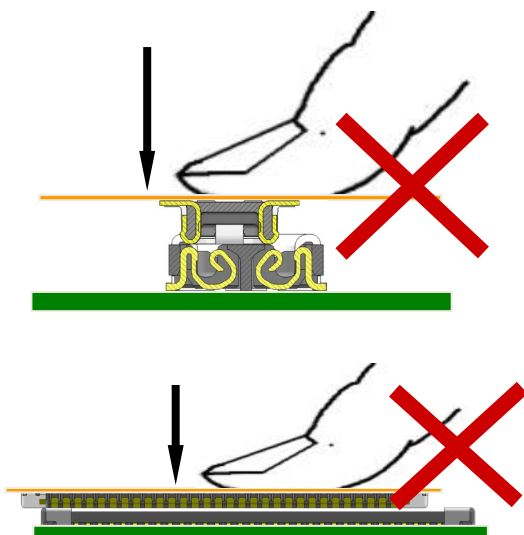
### 04-1. Precautions for mating

Although this connector features a robust structure, follow the rules for mating below to avoid damage to the molded part and buckling or deformation of the contact.

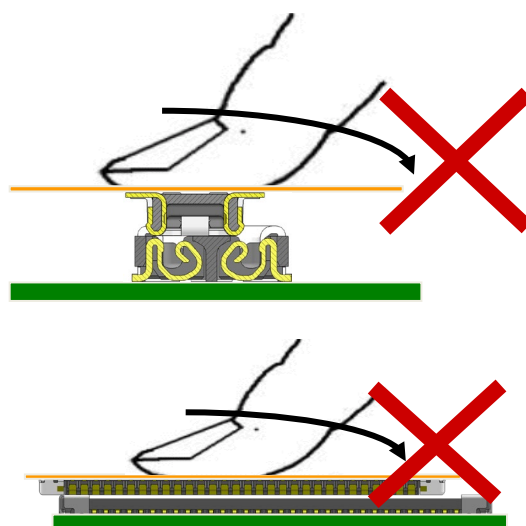
- (1) Roughly position the connector on the FPC board to a mating position of the connector on the motherboard. [If the reference mark described on Page 5 is provided, tentative positioning becomes easy.](#)
- (2) Slightly move the connector on the FPC board in the X and Y directions to check that the mating position is correct.
- (3) Lightly press the [connector at the center](#) until mating between the simple locking sections and mating between the contacts and posts of both connectors are completed.  
A snapping sound will indicate that the simple locking sections are completely mated.
- (4) After completing the mating process, check that the clearance between the FPC board and the motherboard is visibly even in both the X and Y directions.  
If the space is not even, mating may not be completed. Unmate the connectors once, check that there is no damage, and press them in again.
- (5) In cases when the reinforcing plate is thin, following method makes mating easy.
  - 1, Put a thick board on the connector after checking that the mating position is correct.
  - 2, Press them with both hands.
- (6) Do not remove or insert the electrified connector.  
(in the state of carrying current or applying voltage)

The following ways of mating in the drawings may cause deformation of the contacts, crushing of the molded part, generation of resin particles that cause a contact failure when entering the contact section, a return failure of the socket contact due to **crushed molded part, etc.** Make sure to avoid mating in the following ways.

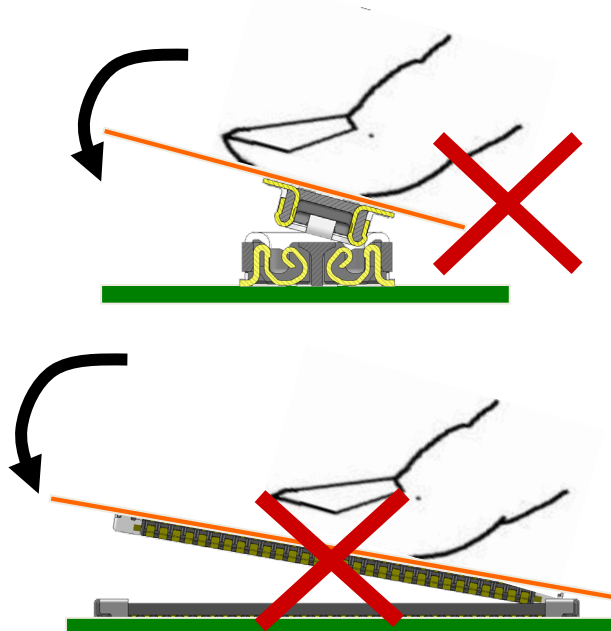
Press-fitting while the mating inlets of the socket and header are not matched.



Strongly pressed and twisted

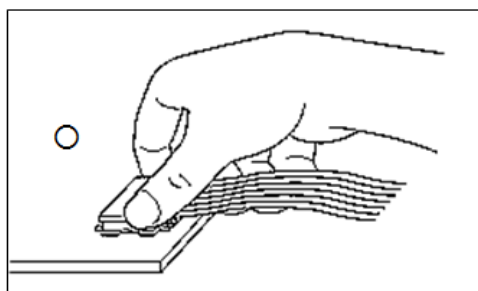


tilted mating

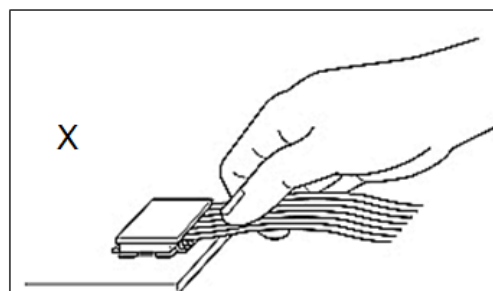


## 04-2. Precautions for connector unmating

(1) **Hold the reinforcing plate at unmating the connector.**

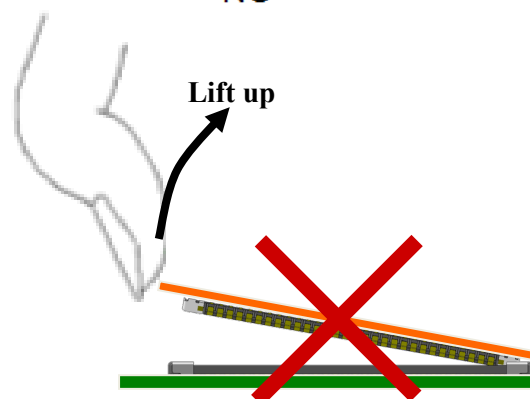
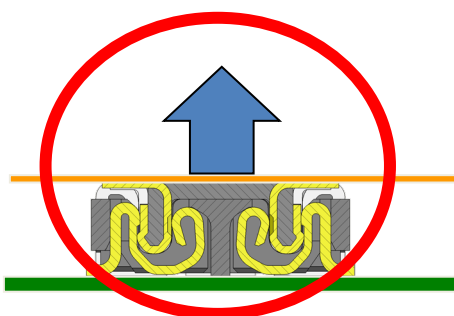


OK



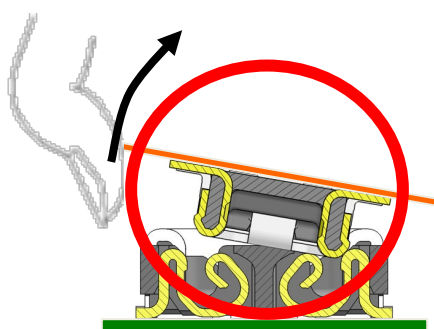
NG

(2) **Lift straight up to unmate.**



(3) If the method of unmating described above is not feasible due to a lack of space around the connector, please lift around one of the shorter sides of the connector to unmate it.

(Please avoid completely lifting from the other longer side to unmate, which risks damaging the connector.)



---

## Panasonic Industry Co., Ltd.

Electromechanical Control Business Division

■1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan  
[industrial.panasonic.com/ac/e/](http://industrial.panasonic.com/ac/e/)