

## BM50 Series

# 0.35mm Pitch, 0.6mm Stacking Height, 15A Rated Current, Power/Signal Hybrid FPC-to-Board Connector



This product  
was selected as a  
**CES**  
Innovation  
Awards  
Honoree



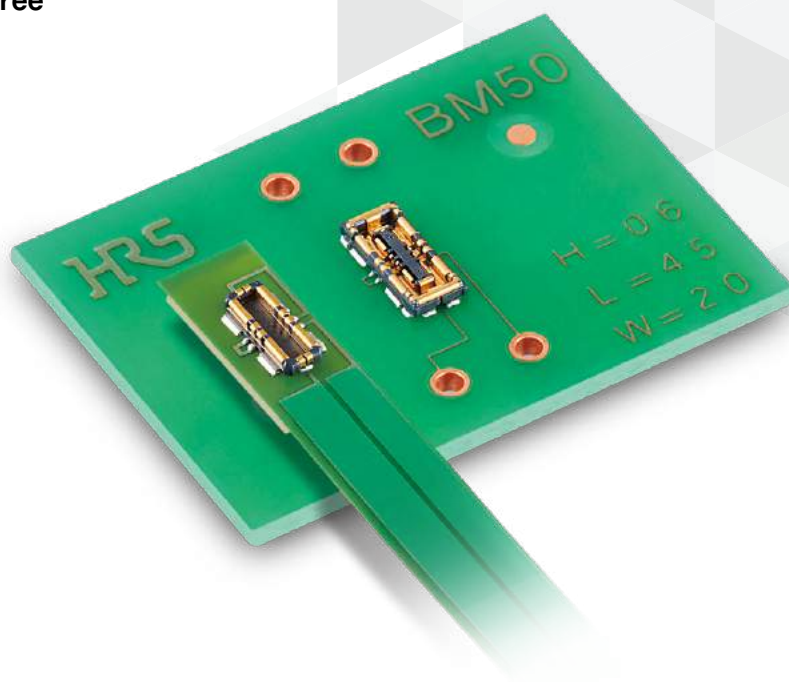
High-Current



Compact



Full Armored

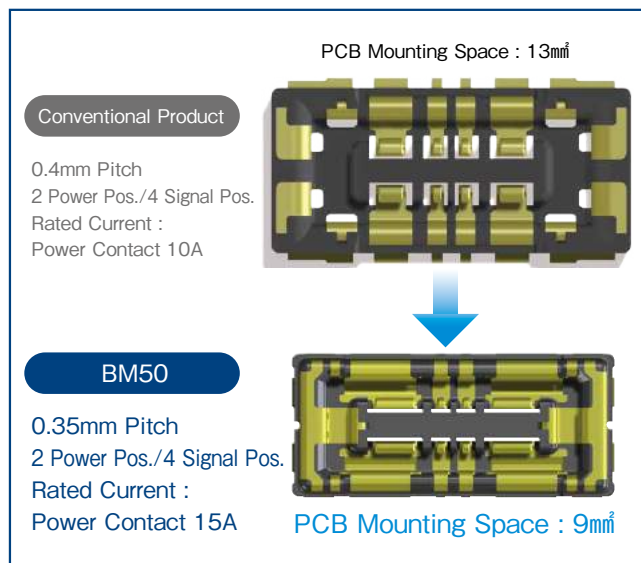


NEW

## Features

### 1. Space-saving Design with 15A Rated Current

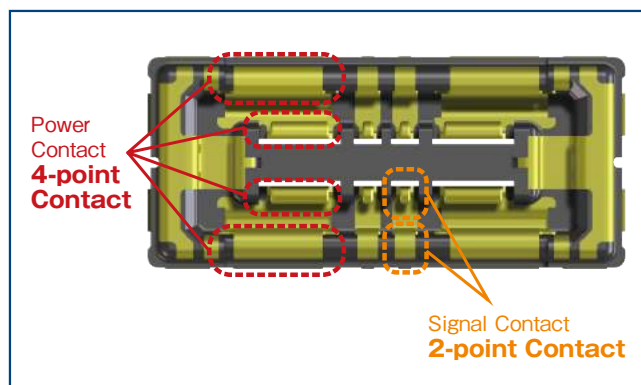
The power contact supports 15A per position and the signal contact supports 0.3A per position for high power supply capability. Additionally, the BM50U has a space-saving design that minimizes connector size.



Increase the Rated Current from 10A to 15A  
 While Achieving Space Reduction  
 (30% Decrease in PCB Mounting Space)

### 2. High Contact Reliability

Multi-point contact design with 4-point power contact and 2-point signal contact for stable connection.



### 3. Compact with High Extraction Force

The original lock design ensures high extraction force and prevents unmating due to impact.

### 4. Halogen-free

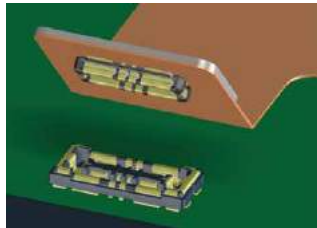
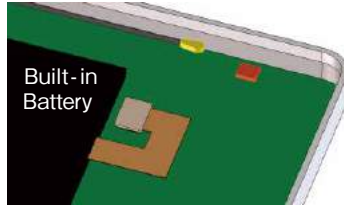
No chlorine or bromine exceeding the standard values are used in this connector.

In accordance with IEC 61249-2-21  
 Br : 900ppm max., Cl : 900ppm max.,  
 Br+Cl : 1500ppm max.

## Applications

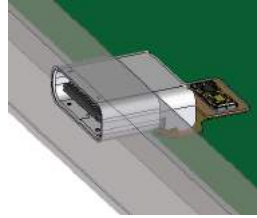
Devices that require low-profile, compact design such as smartphones, wearable terminals and tablet PCs.

### Battery Connection

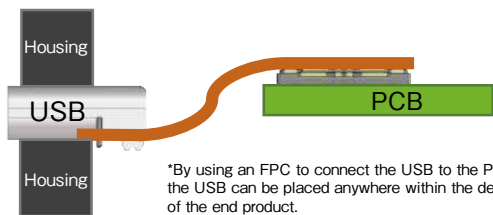


- Space-saving
- High Current Capacity

### USB Connection



- Compatible with USB Power Delivery
- Easy to Replace USB Connector
- No Need for Main Board Height Alignment\*



\*By using an FPC to connect the USB to the PCB, the USB can be placed anywhere within the design of the end product.

## Product Specifications

|               |                                              |                                         |              |
|---------------|----------------------------------------------|-----------------------------------------|--------------|
| Rated Current | Signal Contact : 0.3A<br>Power Contact : 15A | Operating Temperature (Note 1)          | -55 to +85°C |
|               |                                              | Operating Humidity Range (Note 2)       | 90% RH Max.  |
| Rated Voltage | 60V AC/DC                                    | Storage Temperature (Note 3)            | -10 to +60°C |
|               |                                              | Storage Humidity Range (Note 2)(Note 3) | 90% RH Max.  |

| Item                   | Specifications                                                                                       | Conditions                                                                                                       |
|------------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Contact Resistance     | Signal Contact 30mΩ, Power Contact 5mΩ                                                               | Measured at 20mV AC, 1kHz, and 1mA                                                                               |
| Insulation Resistance  | 1000 MΩ Min.                                                                                         | Measured at 100V DC                                                                                              |
| Withstanding Voltage   | No flashover or dielectric breakdown                                                                 | 150V AC for 1 min.                                                                                               |
| Mating Durability      | Contact Resistance : Signal Contact 30mΩ<br>Power Contact 5mΩ                                        | 10 cycles                                                                                                        |
| Vibration Resistance   | No electrical discontinuity of 1 μs or more.                                                         | Frequency : 10 to 55Hz, half amplitude of 0.75mm,<br>10 cycles in each of 3 axis directions for 5 minutes/cycle  |
| Humidity Resistance    | Contact Resistance : Signal Contact 30mΩ<br>Power Contact 5mΩ<br>Insulation Resistance : 1000MΩ Min. | Left for 96 hours at a temperature of 40 ± 2°C and a humidity range from 90 to 95%                               |
| Temperature Cycle      | Contact Resistance : Signal Contact 30mΩ<br>Power Contact 5mΩ<br>Insulation Resistance : 1000MΩ Min. | -55°C for 30 minutes → 85 for 30 minutes,<br>5 cycles<br>(Tank transfer time: within 2 to 3 min.)                |
| Solder Heat Resistance | No dissolution or resin melting that will affect performance.                                        | Reflow : At recommended temperature profile<br>Hand solder : Solder iron temperature of 350°C for 3 seconds max. |

Note 1 : Includes temperature rise caused by current flow.

Note 2 : Use without condensation.

Note 3 : Storage refers to long-term storage of unused items before they are mounted on the PCB.

Operating temperature and humidity range apply when the product is not powered after PCB mounting and when temporarily stored during transportation.

Material/Finish

| Part                 | Component      | Material     | Finish      | UL Standard |
|----------------------|----------------|--------------|-------------|-------------|
| Header<br>Receptacle | Insulator      | LCP          | Black       | UL94V-0     |
|                      | Signal Contact | Copper Alloy | Gold Plated | -           |
|                      | Power Contact  | Copper Alloy | Gold Plated | -           |

Product Number Structure

Refer to the chart below when determining the product specifications from the product number.  
Please select from the product numbers listed in this catalog when placing orders.

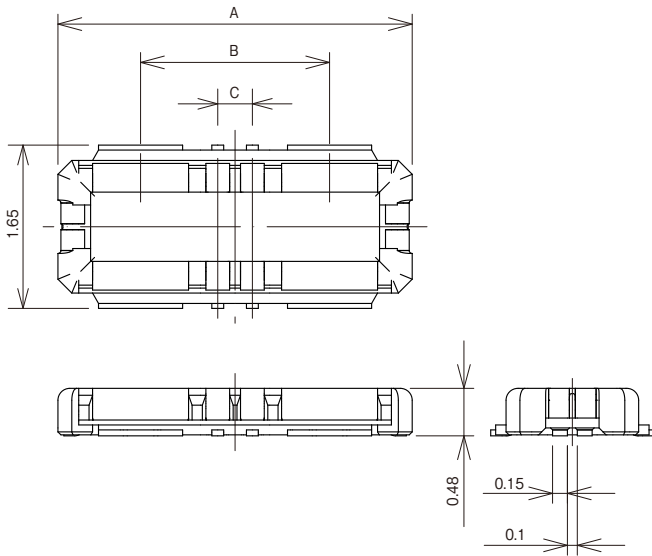
●Header/Receptacle

**BM 50U - 4 DP / 2 - 0.35 V (51)**

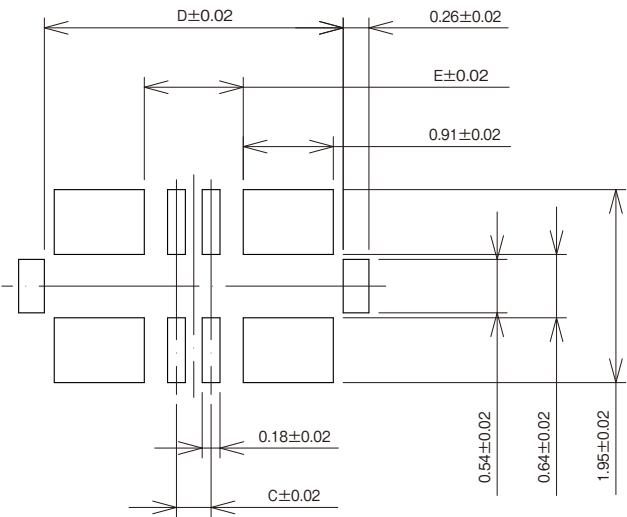
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8

|                          |                                |                                        |                                                                                                                                                                       |
|--------------------------|--------------------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 Series Name            | BM                             | 5 No. of Power Contacts                | 2pos.                                                                                                                                                                 |
| 2 Series No.             | 50U                            | 6 Contact Pitch                        | 0.35mm                                                                                                                                                                |
| 3 No. of Signal Contacts | 4pos.                          | 7 Terminal Design                      | V : Straight SMT                                                                                                                                                      |
| 4 Connector Type         | DP : Header<br>DS : Receptacle | 8 Plating Specifications and Packaging | (51) : Gold Plating Thickness 0.05 μ m<br>Embossed Packaging (20,000pcs per reel)<br>(53) : Gold Plating Thickness 0.05 μ m<br>Embossed Packaging (1,000pcs per reel) |

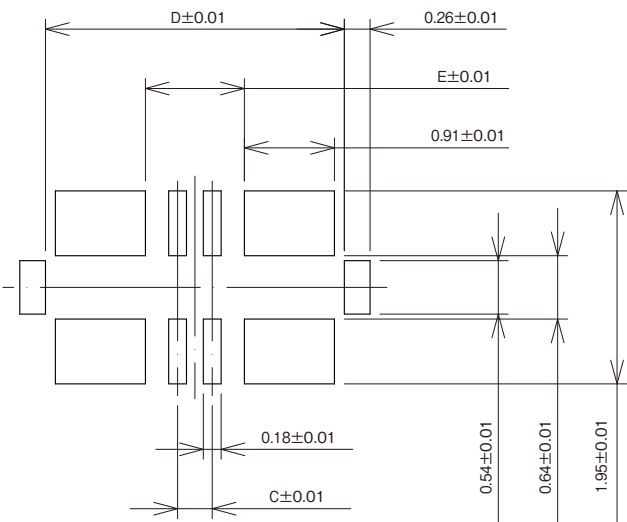
Header



●Recommended PCB Layout



●Recommended Metal Mask Dimensions  
(Mask Thickness : 0.08mm)

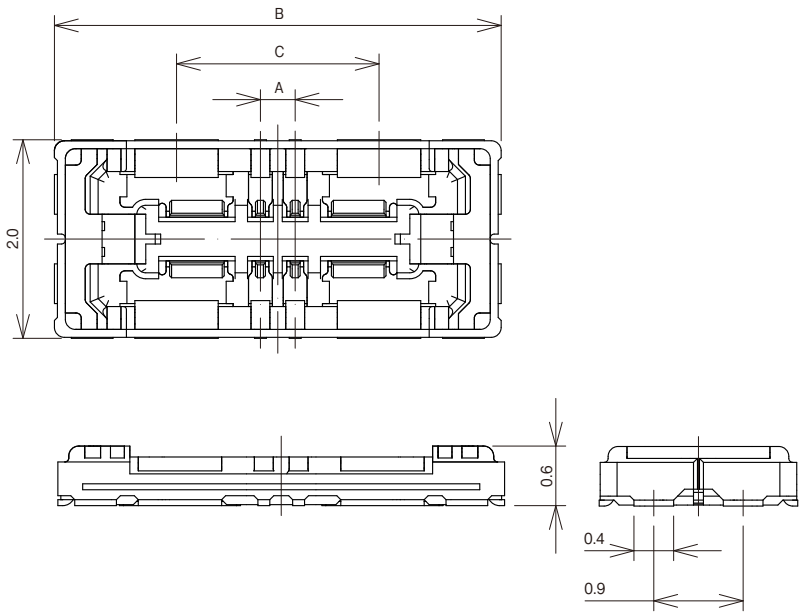


Unit : mm

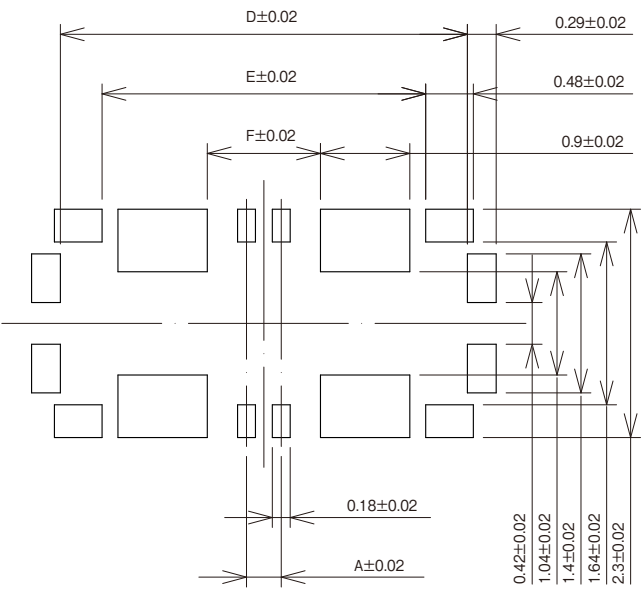
| Part No.              | HRS No.          | No. of Pos.       |                  | A    | B    | C    | D    | E    | Purchase Unit<br>(#):(51) | Purchase Unit<br>(#):(53) |
|-----------------------|------------------|-------------------|------------------|------|------|------|------|------|---------------------------|---------------------------|
|                       |                  | Signal<br>Contact | Power<br>Contact |      |      |      |      |      |                           |                           |
| BM50U-4DP/2-0.35V(##) | CL0480-0670-0-## | 4                 | 2                | 3.58 | 1.91 | 0.35 | 3.02 | 1.00 | 20,000pcs<br>per reel     | 1,000pcs<br>per reel      |

Note : This connector has no polarity.

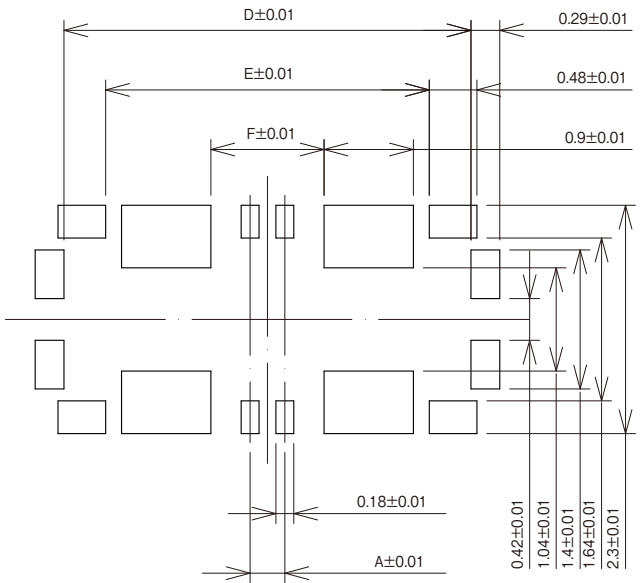
Receptacle



Recommended PCB Layout



Recommended Metal Mask Dimensions  
(Mask Thickness : 0.08mm)



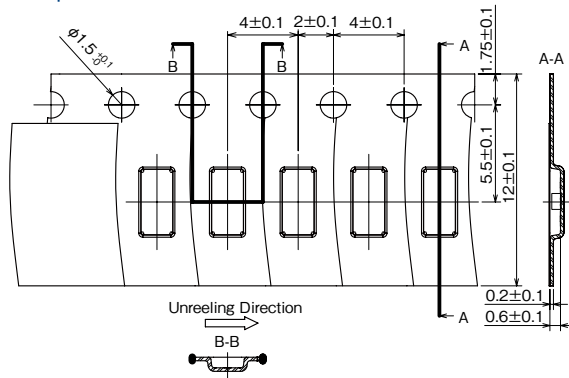
| Part No.              | HRS No.          | No. of Pos.       |                  | A    | B    | C    | D    | E    | F    | Purchase Unit<br>(##):(51) | Purchase Unit<br>(##):(53) |
|-----------------------|------------------|-------------------|------------------|------|------|------|------|------|------|----------------------------|----------------------------|
|                       |                  | Signal<br>Contact | Power<br>Contact |      |      |      |      |      |      |                            |                            |
| BM50U-4DS/2-0.35V(##) | CL0480-0671-0-## | 4                 | 2                | 0.35 | 4.50 | 2.04 | 4.10 | 3.26 | 1.14 | 20,000pcs<br>per reel      | 1,000pcs<br>per reel       |

Note : This connector has no polarity.

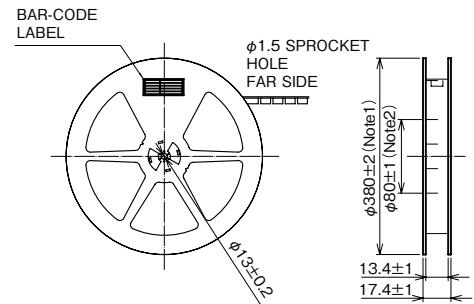
IEC 60286-3, JIS C 0806 Compliant

## Header

## ● Embossed Tape Dimensions



## ● Reel Dimensions

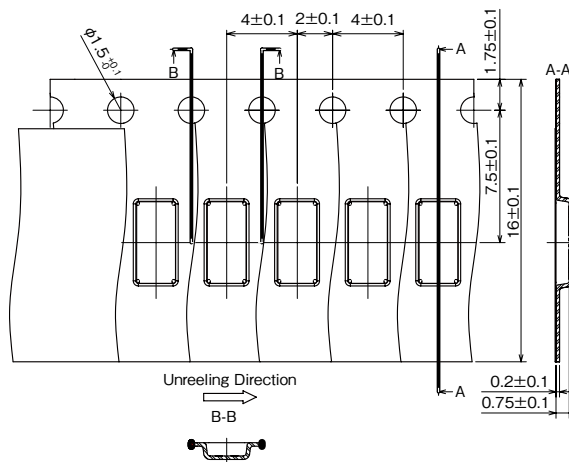


Note1:The (53) specification is  $\phi 180 \pm 2$ .

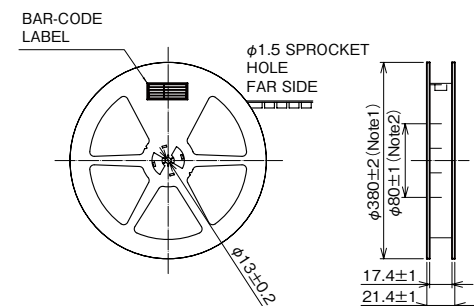
Note2:The (53) specification is  $\phi 60 \pm 1$ .

## Receptacle

## ● Embossed Tape Dimensions



## ● Reel Dimensions



Note1:The (53) specification is  $\phi 180 \pm 2$ .

Note2:The (53) specification is  $\phi 60 \pm 1$ .

## Usage Precautions

|                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Recommended Temperature Profile                                          | <p><b>Temperature (°C)</b></p> <p><b>Heating Time (sec.)</b></p> <p>Room Temperature</p> <p>150°C</p> <p>180°C</p> <p>220°C</p> <p>250°C</p> <p>90-120 sec.</p> <p>60 sec. max.</p> <p><b>【Conditions】</b></p> <ol style="list-style-type: none"> <li>1. Peak Temperature : 250°C</li> <li>2. Heating : 220°C min. for 60 sec. max.</li> <li>3. Preheating : 150 to 180°C, 90 to 120 sec.</li> <li>4. Number of Reflow Cycles : 2 cycles max.</li> </ol> <p>Note : Temperature refers to the surface temperature of the board near the connector lead.<br/>Reflow mounting in a nitrogen environment is recommended.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Recommended Manual Soldering Conditions                                  | <p>Soldering iron temperature : <math>340 \pm 10^{\circ}\text{C}</math> ;</p> <p>Soldering time : within 3 seconds</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Recommended Metal Mask Thickness and Open Area to PCB Pattern Area Ratio | <p>Thickness : 0.08mm</p> <p>Aperture Ratio : Receptacle Side : 100%, Header Side : 100%</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Board Warpage                                                            | <p>Max. of 0.02mm at the center in reference to both ends of the connector</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Cleaning                                                                 | <p>Cleaning is not recommended.</p> <p>If you clean this product, please evaluate its performance before using it.</p> <p>(Cleaning may impair the mating/unmating properties and lower resistance to environmental factors.)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Precautions                                                              | <ul style="list-style-type: none"> <li>• Be careful when mating/unmating the connector when it is not mounted on the PCB as it may cause damage/deformation to contacts.</li> <li>• Avoid supporting the PCB only with the connectors. Support it by other means such as bolts, screws, posts, etc.</li> <li>• Excessive prying during unmating/mating may result in damage.</li> <li>• In the case of hand soldering, please do not apply any flux which could cause flux wicking.</li> <li>• This product may have slight color differences due to production lot variability, but this does not affect the performance.</li> <li>• Please refer to the following page for handling precautions when inserting and removing.</li> <li>• Because the product can disengage if dropped (or other impact), or by FPC routing, it is advised to secure the mated connectors to the board with housings and cushioning materials.</li> <li>• Do not use the connector in non-recommended conditions (i.e., rated current, rated voltage, PCB design and operating environment, etc.). Such usage could lead to material outgassing, ignition, or short-circuit, etc. Refer to the specifications and guidelines for board pattern dimensions, board cautions, and connector treatment.</li> </ul> <p>Please contact Hirose if connector usage in conditions other than those described in the specifications and the guidelines is being considered.</p> |

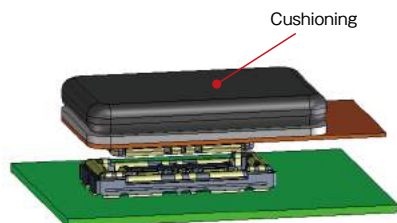
## Connector Handling Precautions

### 【Mating Disengagement Prevention】

Please use cushioning.

This connector may come off due to impact such as dropping.

Cushioning should be large enough to cover the entire connector.



### 【Mating Method】

1. Locate the guide port and align.

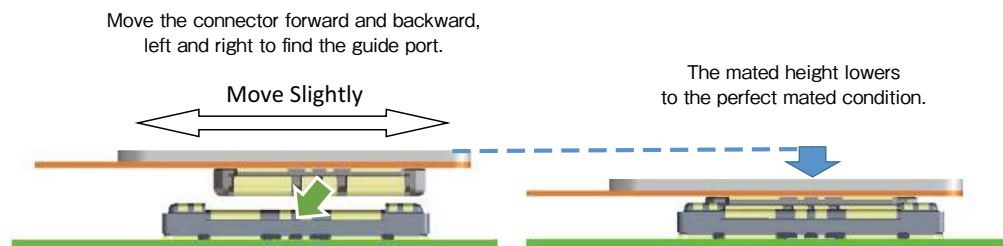
This product has a guide rib on the header to ensure proper engagement.

Align the connector so that it is in this position.

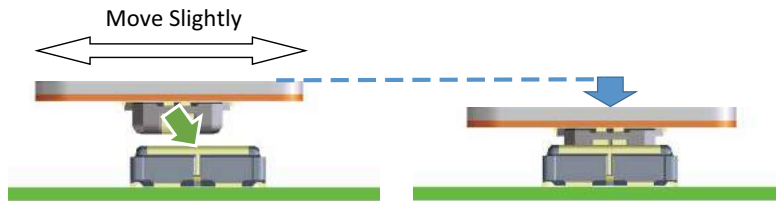


2. Once aligned, the connector engages.

You can feel the mated height of the connector lower.



3. In the engaged state, the connectors are parallel to each other, and the connectors cannot move forward, backward, left, or right. Complete mating from this state.



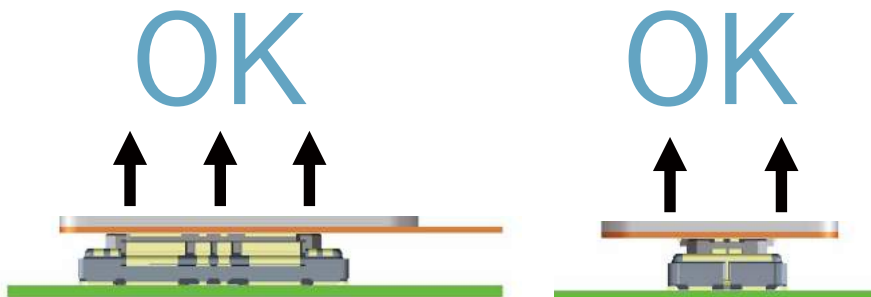
4. Check that mating is completed.

If one side is floating, or if it is mated at a diagonal, remove and re-mate.

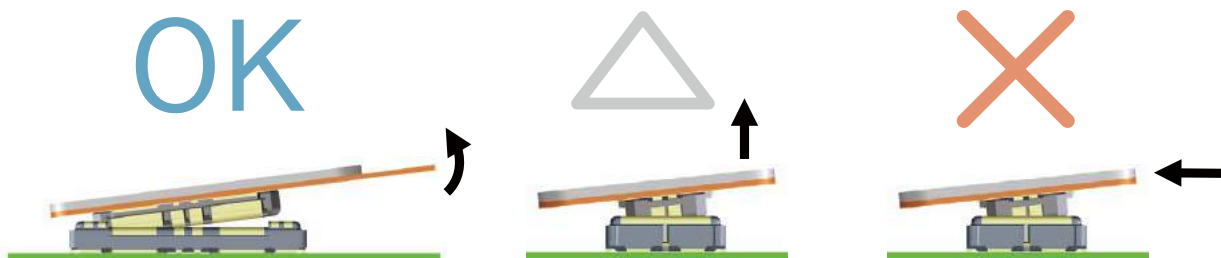


#### 【Handling Precautions for Connector Removal】

1. When removing the connector, it is preferable to pull it out in the upward direction from the connector mounting surface.  
However, when removing the FPC from the circuit board it becomes more difficult to remove it vertically with higher pin counts and thin FPCs.



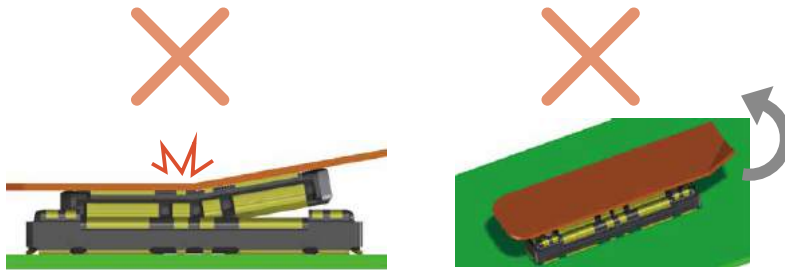
2. If difficult to remove, extract the connector diagonally in the direction of the pitch.  
Note that removal from the widthwise side will apply a large load to the contacts.  
When removing from the width direction, pull the end of the FPC in the upward direction.  
(When a force is applied in the horizontal direction, a large load is applied to the contact.)



3.If the FPC does not have sufficient rigidity, solder stripping or connector breakage may occur.

Please use it after checking the repetitive operation with a flexible board in advance, such as during a trial manufacture run.

Refrain from holding the corner of the flexible board and removing it diagonally as it will result in a large load to the contacts.



## While Taking into Consideration

Specifications mentioned in this catalog are reference values.

When considering to order or use this product, please confirm the Drawing and Product Specifications sheets.

Use an appropriate cable when using the connector in combination with cables.

If considering usage of a non-specified cable, please contact your sales representative.

If assembly process is done by jigs & tools which are not identified by Hirose, assurance will not be given.

If considering usage for below mentioned applications, please contact your sales representative.

In cases where the application will demand a high level of reliability, such as automotive, medical instruments, public infrastructure, aerospace/ defense etc. Hirose must review before assurance of reliability can be given.