

FH69 Series

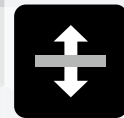
0.5mm Pitch, 2.3mm Height, Top and Bottom Independent 2-point Contact, 125°C Heat Resistance FPC/FFC Connector



™ Flip-Lock Pioneer Hirose



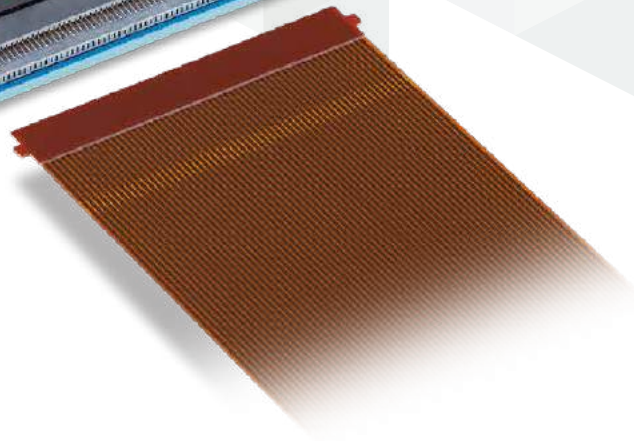
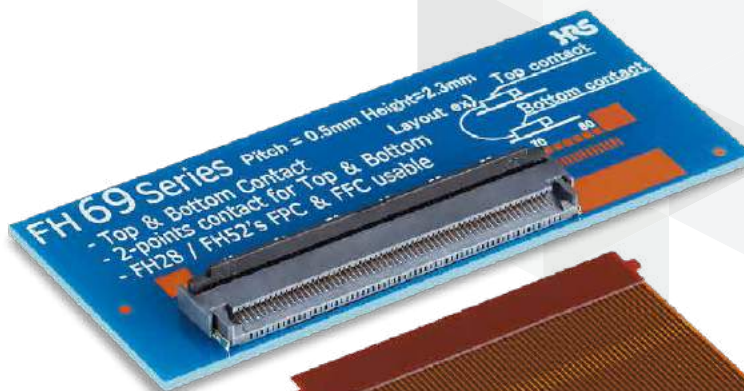
P = 0.5mm



Top/Bottom Contact



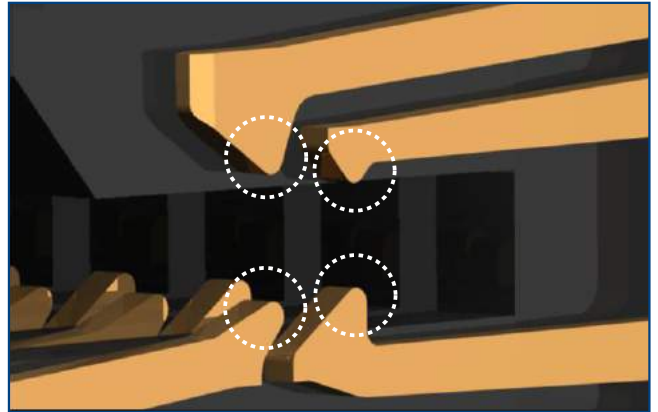
Automotive



Features

1. Industry's first top and bottom 2-point contact design prevents dust intrusion.

The top and bottom two-point contacts with springs prevent dust intrusion and enhance contact reliability.

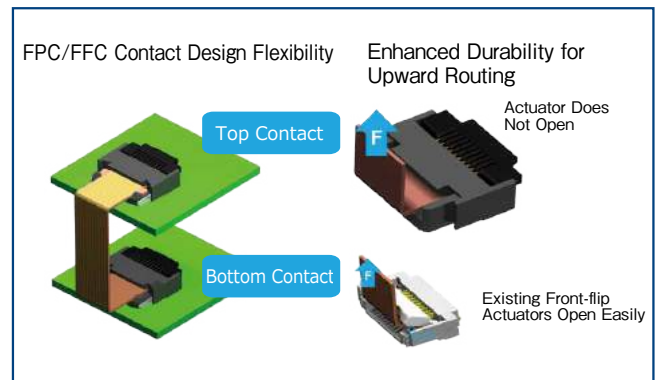


2-point contacts on the top and bottom prevent dust.

2. Greater Design Flexibility

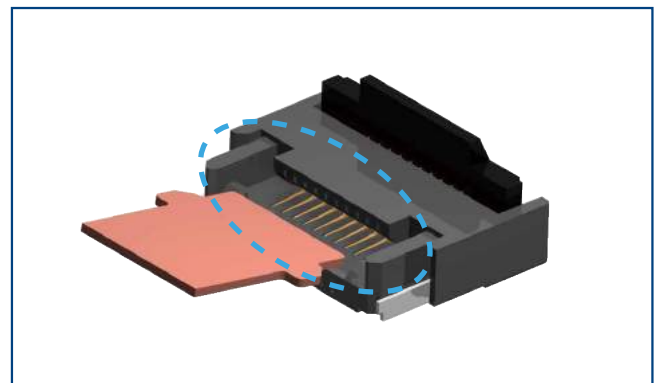
Can be used with both top and bottom contacts for enhanced product design.

Additionally, FH69's back flip design greatly increases the FPC/FFC retention force in the vertical direction.



3. Improved Workability

Even with the back-flip design, FH69 has a wide mating port like existing front-flip types for easy FPC/FFC insertion. Additionally, since the product is delivered with the actuator open, mating is completed in the two simple steps of 1. FPC/FFC insertion, and 2. Closing the actuator.



Wide Mating Port Even with Back-flip Design

4. FPC/FFC Mis-mating detection

Can detect mis-mating after FPC/FFC insertion by checking the location of the FPC/FFC tabs.

5. Reduced switching time

Compatible with the FPC/FFC and land pattern of 0.5mm pitch standard products FH28/FH28K/FH52K/FH52T/FH75 for easy replacement when top contact or vertical routing are required.

*Consult a Hirose representative about competitor products.

6. 125°C Heat Resistance

Ideal for applications requiring 125°C heat resistance

*When using FFC the heat resistance is up to 105°C. When the heat resistance of the FPC/FFC is less than 125 °C for FPC and 105°C for FFC, the heat resistance of the FPC/FFC is applicable.

7. Passes Strict Automotive Testing Requirements

FH69 passes rigorous tests for various automotive applications.

(Ex. : Temperature Cycle)

Temperature : -55 → +15 to +35 → +125
→ +15 to 35°C

Time : 30 → 2 to 3 → 30 → 2 to 3min.

1000 cycles repeated under the above conditions

8. Halogen-Free

No chlorine or bromine exceeding the standard value is used in the connector.

*As defined by IEC61249-2-21

Br-900ppm maximum, Cl-900ppm maximum,

Cl + Br combined-1,500ppm maximum

Product Specifications

| | | | |
|---------------|-----------|--|----------------------------------|
| Rated Current | 0.5A | Operating Temperature (Note 1)(Note 2) | -55 to +125°C |
| Rated Voltage | 50V AC/DC | Operating Humidity Range | RH 90% Max. (No Condensation) |
| | | Storage Temperature (Note 3) | -10 to +50°C |
| | | Storage Humidity Range (Note 3) | RH 90% Max. (No Condensation) |

| | |
|------------------------------------|-----------------------------|
| Recommended FPC/FFC Specifications | t=0.3 ± 0.05mm, Gold Plated |
|------------------------------------|-----------------------------|

| Item | Specifications | Conditions |
|----------------------------------|--|--|
| Insulation Resistance | 500M Ω Min. | Measured at 100V DC |
| Withstanding Voltage | No flashover or insulation breakdown | 150V AC for 1 min. |
| Contact Resistance | Initial : 50m Ω , After Testing: 70m Ω Max. Includes FPC/FFC conductor resistance. | Measured at 1mA (DC or 1000Hz) |
| Mating Durability | Contact Resistance : 70m Ω Max. No damage, cracks or part dislocation. | 10 times |
| Vibration Resistance | No electrical discontinuity of 1 μ s Min. Contact Resistance : 70m Ω Max. No damage, cracks or part dislocation. | Frequency : 10 to 55 Hz, single amplitude of 0.75mm, 10 cycles in each of the 3 axis |
| Shock Resistance | No electrical discontinuity of 1 μ s Min. Contact Resistance : 70m Ω Max. No damage, cracks or part dislocation. | Acceleration of 981m/s ² , 6 ms duration, sine halfwave, 3 cycles in each of the 3 axis |
| Steady-state Moisture Resistance | Contact Resistance : 70m Ω Max. Insulation Resistance : 50M Ω Min. No damage, cracks or part dislocation. | Left for 1000 hours at 60°C and humidity of 90 to 95% |
| Temperature Cycle | Contact Resistance : 70m Ω Max. Insulation Resistance : 50M Ω Min. No damage, cracks or part dislocation. | Temperature : -55 → +15 to +35 → +125 → +15 to +35°C Time : 30 → 2 to 3 → 30 → 2 to 3 minutes Above conditions repeated for 5 cycles |
| Solder Heat Resistance | No deformation in appearance or significant damage to contacts. | Reflow : At the recommended temperature profile Manual soldering : 400°C± 10°C for 5 seconds |

Note 1 : Includes the temperature rise due to current flow.

Note 2 : When using FFC the heat resistance is up to 105°C . When the heat resistance of the FPC/FFC is less than 125°C for FPC and 105°C for FFC, the heat resistance of the FPC/FFC is applicable.

Note 3 : Storage refers to long-term storage of products before board mounting. The operating temperature and humidity apply to the non-energized state after mounting.

Material and Finish

| Component | Material | Finish/Remarks | UL Standard |
|-----------------|--------------|-------------------------|-------------|
| Insulation Case | LCP | Gray | UL94V-0 |
| Actuator | PA 9T | Black | |
| Contact | Copper Alloy | Partially Gold Plated | — |
| Retention Tab | Brass | Pure Tin Reflow Plating | |

Part Number Structure

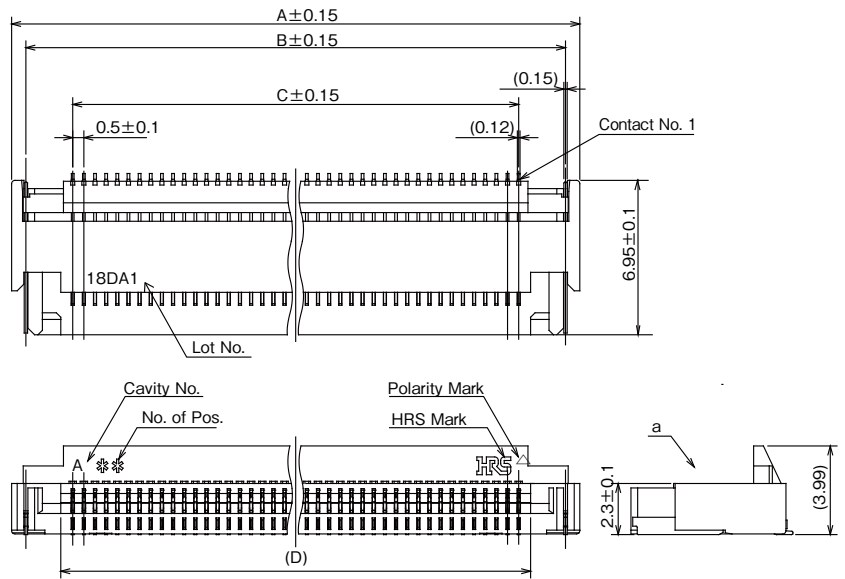
Refer to the chart below when determining the product specifications from the product number.
Please select from the product numbers listed in this catalog when placing orders.

FH69 - 60S - 0.5 SH (##)

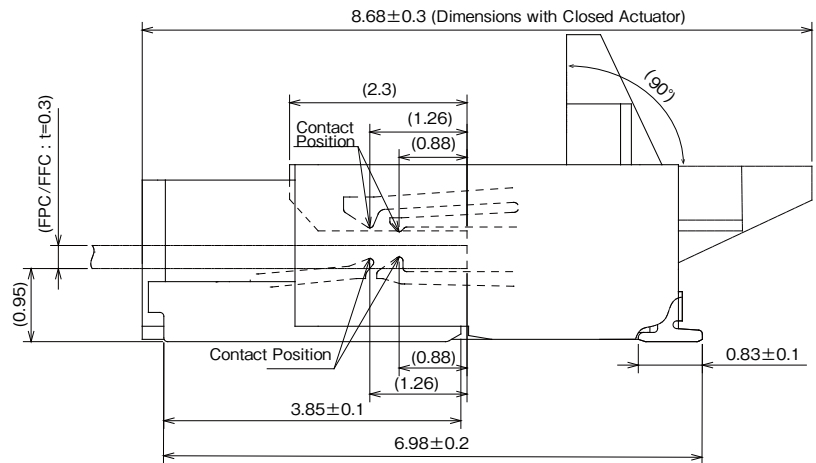
① ② ③ ④ ⑤

| | | | |
|-----------------|-------|--------------------|-----------------------------------|
| ① Series Name | FH69 | ④ Termination Type | SH : SMT Horizontal Mounting Type |
| ② No. of Pos. | 60 | ⑤ Specifications | (00) : Standard (1,000pcs) |
| ③ Contact Pitch | 0.5mm | | (99) : 500pcs |

Connector Dimensions



Detailed View a



Note 1 : The dimensions in parenthesis are for reference.

Note 2 : The coplanarity of the contact and retention tab lead should be 0.1mm Max.

Note 3 : Packaged in tape and reel. Check the packaging specifications for details.

Note 4 : Sink holes may be added for improvements.

Note 5 : This product is halogen-free.

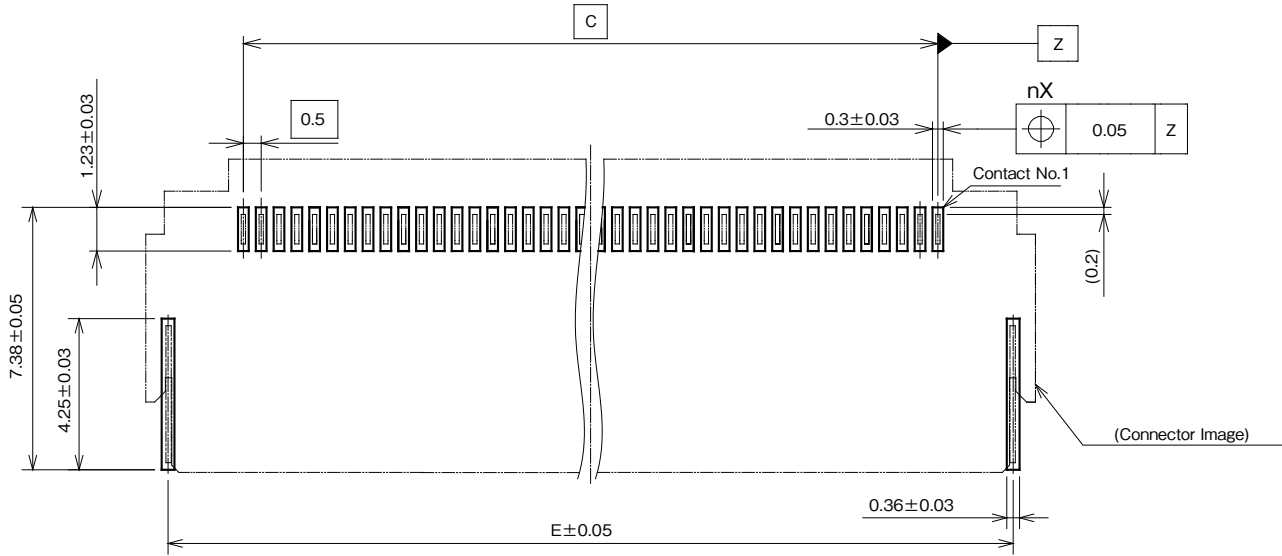
(Br : 900ppm maximum, Cl : 900ppm maximum, Cl + Br combined : 1,500ppm maximum)

Unit : mm

| Part No. | HRS No. | No. of Pos. | A | B | C | D | Purchase Unit (##) : (00) | Purchase Unit (##) : (99) |
|--------------------|-----------------------|-------------|-------|------|------|-------|------------------------------|------------------------------|
| FH69-10S-0.5SH(##) | Under Planning (Note) | 10 | 9.98 | 8.7 | 4.5 | 5.57 | 1,000pcs per reel | 500pcs per reel |
| FH69-20S-0.5SH(##) | Under Planning (Note) | 20 | 14.98 | 13.7 | 9.5 | 10.57 | | |
| FH69-30S-0.5SH(##) | Under Planning (Note) | 30 | 19.98 | 18.7 | 14.5 | 15.57 | | |
| FH69-40S-0.5SH(##) | Under Planning (Note) | 40 | 24.98 | 23.7 | 19.5 | 20.57 | | |
| FH69-50S-0.5SH(##) | Under Planning (Note) | 50 | 29.98 | 28.7 | 24.5 | 25.57 | | |
| FH69-60S-0.5SH(##) | CL0580-5007-0-## | 60 | 34.98 | 33.7 | 29.5 | 30.57 | | |

Note : Products without HRS No. are currently being planned for development. Please contact a Hirose representative regarding questions on pin count variation development.

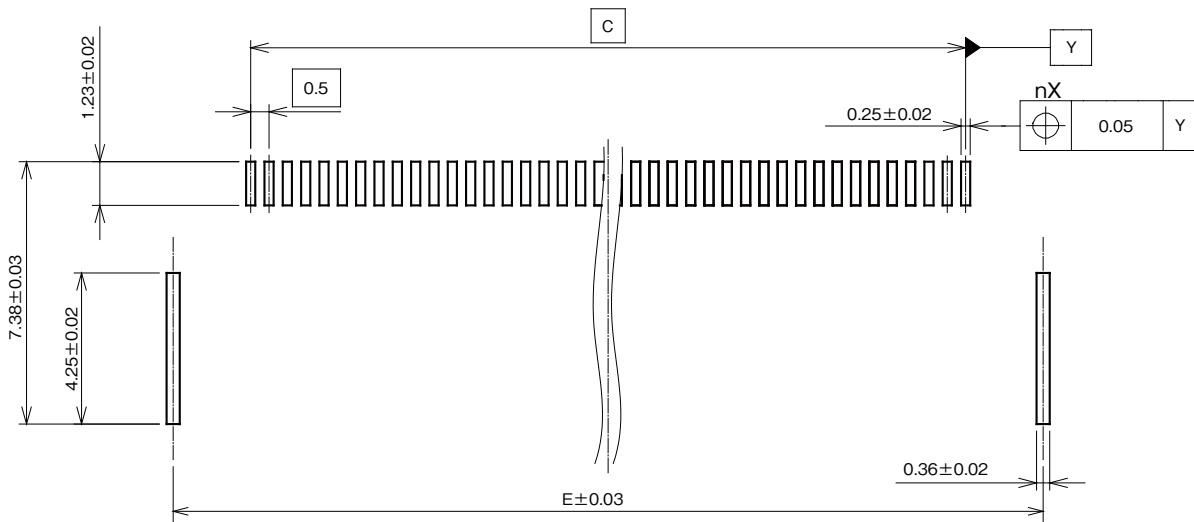
● Recommended PCB Layout



Note : 'n' indicated the number of positions.

*Can also be mounted using the recommended land pattern of FH28/FH28K/FH52K/FH52T/FH75 Series.

● Recommended Metal Mask Dimensions



(Recommended Metal Mask Thickness : $t=0.12$)

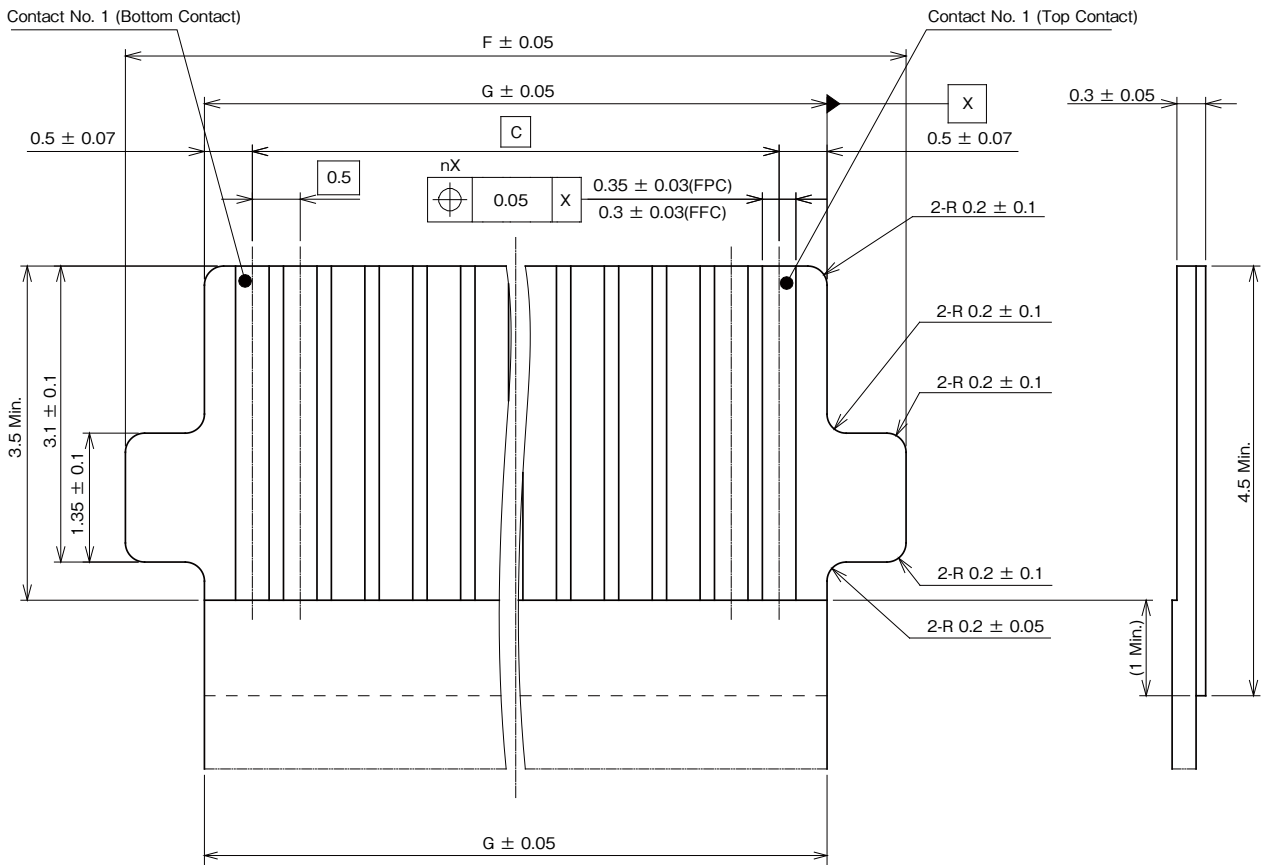
Note : 'n' indicated the number of positions.

Unit : mm

| Part No. | HRS No. | No. of Pos. | C | E |
|--------------------|-----------------------|-------------|------|-------|
| FH69-10S-0.5SH(##) | Under Planning (Note) | 10 | 4.5 | 8.73 |
| FH69-20S-0.5SH(##) | Under Planning (Note) | 20 | 9.5 | 13.73 |
| FH69-30S-0.5SH(##) | Under Planning (Note) | 30 | 14.5 | 18.73 |
| FH69-40S-0.5SH(##) | Under Planning (Note) | 40 | 19.5 | 23.73 |
| FH69-50S-0.5SH(##) | Under Planning (Note) | 50 | 24.5 | 28.73 |
| FH69-60S-0.5SH(##) | CL0580-5007-0-## | 60 | 29.5 | 33.73 |

Note : Products without HRS No. are currently being planned for development. Please contact a Hirose representative regarding questions on pin count variation development.

Recommended FPC/FFC Layout



Note : 'n' indicates the number of positions.

Unit : mm

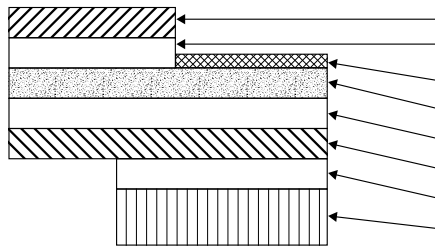
| Part No. | HRS No. | No. of Pos. | C | F | G |
|--------------------|-----------------------|-------------|------|-------|------|
| FH69-10S-0.5SH(##) | Under Planning (Note) | 10 | 4.5 | 7.15 | 5.5 |
| FH69-20S-0.5SH(##) | Under Planning (Note) | 20 | 9.5 | 12.15 | 10.5 |
| FH69-30S-0.5SH(##) | Under Planning (Note) | 30 | 14.5 | 17.15 | 15.5 |
| FH69-40S-0.5SH(##) | Under Planning (Note) | 40 | 19.5 | 22.15 | 20.5 |
| FH69-50S-0.5SH(##) | Under Planning (Note) | 50 | 24.5 | 27.15 | 25.5 |
| FH69-60S-0.5SH(##) | CL0580-5007-0-## | 60 | 29.5 | 32.15 | 30.5 |

Note : Products without HRS No. are currently being planned for development. Please contact a Hirose representative regarding questions on pin count variation development.

Recommended FPC/FFC Construction

FPC

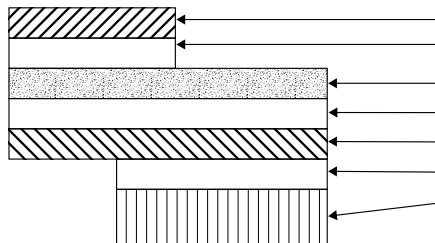
FPC : Flexible Printed Circuit



| Material Name | Material | Thickness (μm) |
|------------------------|---|----------------|
| Cover Film Layer | Polymide 1mil | (25) |
| Cover Adhesive | 1/2 oz | (18) |
| Surface Treatment | 0.2μm thick gold plated over 1 to 5μm thick nickel underplating | 3 |
| Copper Foil | Cu 1 oz | 35 |
| Base Adhesive | Thermosetting Adhesive | 25 |
| Base Film | Polymide 1 mil | 25 |
| Reinforcement Adhesive | Thermosetting Adhesive | 30 |
| Reinforcement Film | Polymide 7 mil | 175 |
| Total | | 293 |

FFC

FFC : Flexible Flat Cable



| Material Name | Material | Thickness (μm) |
|--------------------------------|-------------------------|----------------|
| Polyester Film | | (12) |
| Adhesive | Thermoplastic Polyester | (30) |
| Gold Plated Anneal Copper Foil | | 35 |
| Adhesive | Polyester | 30 |
| Polyester | | 12 |
| Adhesive | Polyester | 30 |
| Stiffener | Polyester | 188 |
| Total | | 295 |

*The allowable thickness tolerance is approx. 20μm.

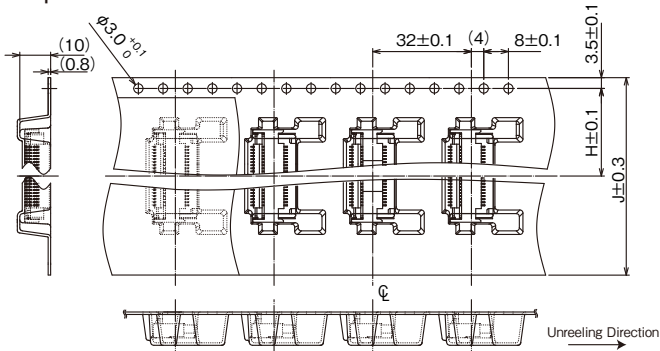
Note 1 : This is a reference specification for the FH69 Series FPC/FFC construction (t=0.3±0.05mm).
The thickness of the FPC/FFC mated portion should be 0.3±0.05mm in reference to the construction materials.

Note 2 : Contact an FPC/FFC maker for details on component construction.

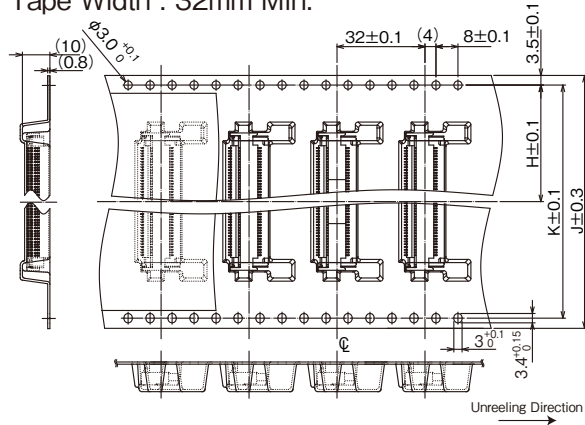
Packaging Specifications

● Embossed Carrier Tape Dimensions

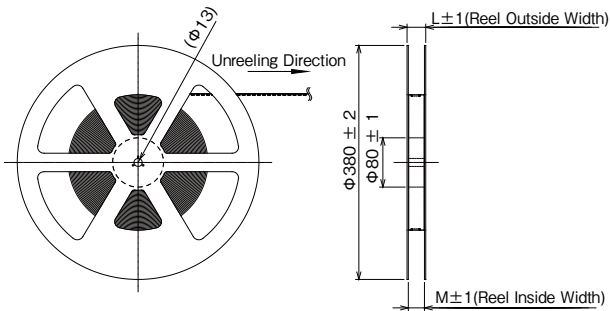
Tape Width : 24mm Max.



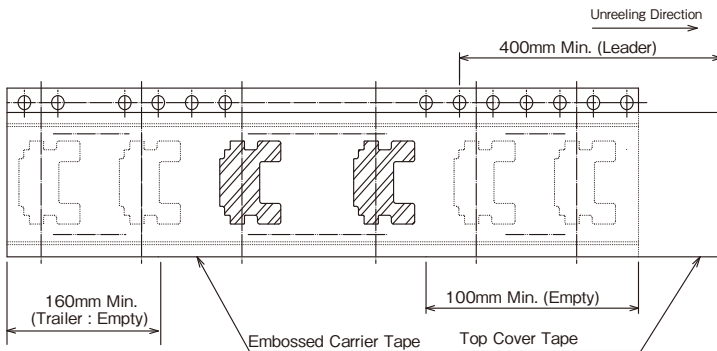
Tape Width : 32mm Min.



● Reel Dimensions



● Leader, Trailer Dimensions



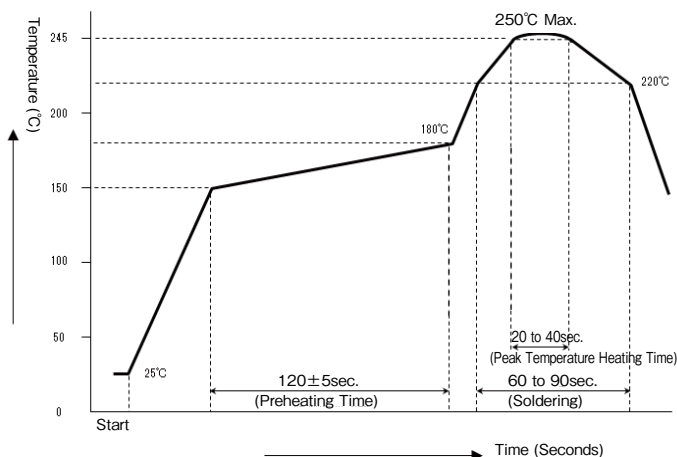
Note : This packaging meets JIS C 0806 and IEC 60286-3 (Packing of Components for Automatic Handling) standards.

Unit : mm

| Part No. | HRS No. | No. of Pos. | H | J | K | L | M |
|--------------------|-----------------------|-------------|------|------|------|------|------|
| FH69-10S-0.5SH(##) | Under Planning (Note) | 10 | 11.5 | 24.0 | - | 29.4 | 25.4 |
| FH69-20S-0.5SH(##) | Under Planning (Note) | 20 | 14.2 | 32.0 | 28.4 | 37.4 | 33.4 |
| FH69-30S-0.5SH(##) | Under Planning (Note) | 30 | 20.2 | 44.0 | 40.4 | 49.4 | 45.4 |
| FH69-40S-0.5SH(##) | Under Planning (Note) | 40 | 20.2 | 44.0 | 40.4 | 49.4 | 45.4 |
| FH69-50S-0.5SH(##) | Under Planning (Note) | 50 | 26.2 | 56.0 | 52.4 | 61.4 | 57.4 |
| FH69-60S-0.5SH(##) | CL0580-5007-0-## | 60 | 26.2 | 56.0 | 52.4 | 61.4 | 57.4 |

Note : Products without HRS No. are currently being planned for development. Please contact a Hirose representative regarding question on pin count variation development.

Temperature Profile



Applicable Conditions

Solder Method : Reflow, IR/Hot air

Environment : Room Air

Solder Composition

: Paste SN/3.0Ag/0.5Cu

(Senju Metal Industry, co. Ltd Part Number :

M705-221CM5-42-10.5)

Test Board : Board materials and size : Glass epoxy 80x100x1.6mm

As listed on "Recommended Land Dimensions"

Metal Mask : Recommended thickness and aperture dimensions

As listed on "Recommended Metal Mask Dimensions"

This temperature profile is for the above conditions.

The temperature profile may vary depending on the type of cream solder, the manufacturer, the board size and other conditions such as mounting materials. Please check the mounting status before use.

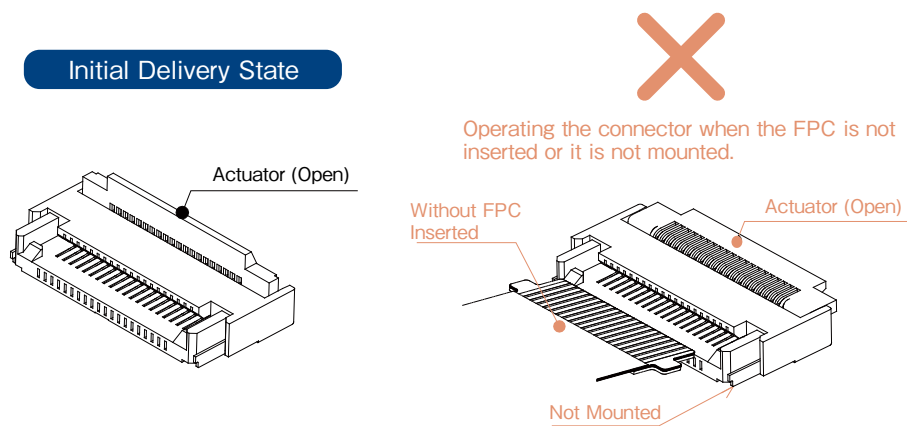
Connector Operation and Precautions

【Operating Method】

Please use this connector after confirming the following operation instructions in order to prevent connector or FPC damage and contact failure (incomplete mating, FPC pattern disconnection). This connector is compatible with both FPC and FFC but only FPC is listed for convenience.

1. Initial Delivery State

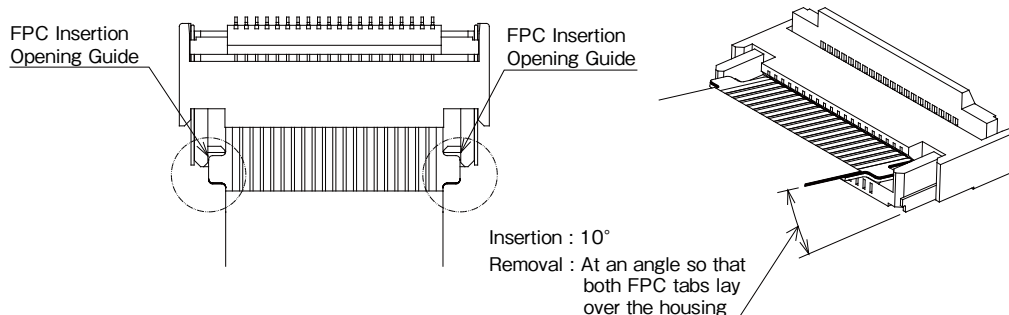
Since the product is delivered with the actuator open, there is no need to operate the actuator before FPC insertion.



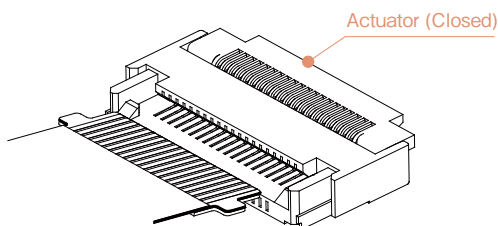
2. FPC Insertion and Extraction Method

- Insert the FPC fully at a 10° upward angle in respect to the board. Position both FPC tabs to the insertion opening guide and then insert completely.
- When removing the FPC, pull it out upward in a diagonal direction so that both tabs lay over the housing boss.

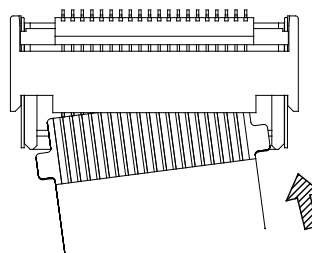
OK



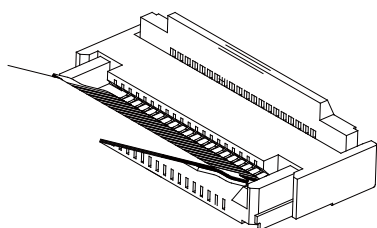
FPC Insertion or Removal while Actuator is Closed



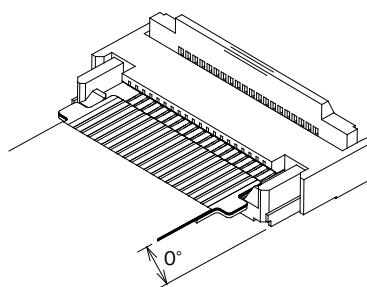
Twisting the FPC during FPC Insertion or Removal



Insertion or Removal of FPC at an Excessive Angle in Respect to the Board

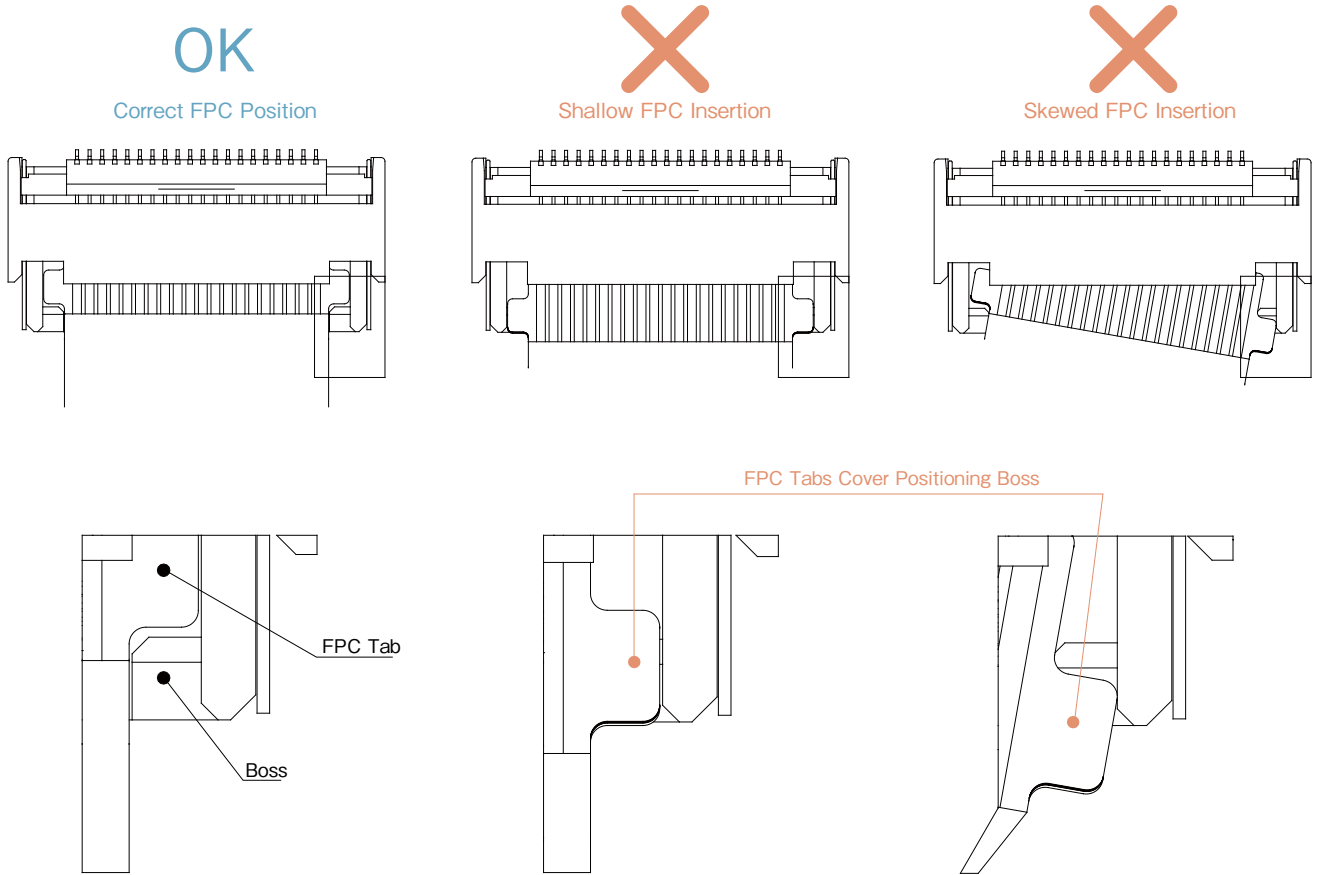


Insertion or Removal Horizontal to the Board



3. Confirm Actuator Locking After FPC Insertion

The FPC position is determined using the FPC positioning boss on the housing. After FPC insertion is completed and the actuator is locked, check whether both FPC tabs are in the below indicated positions.

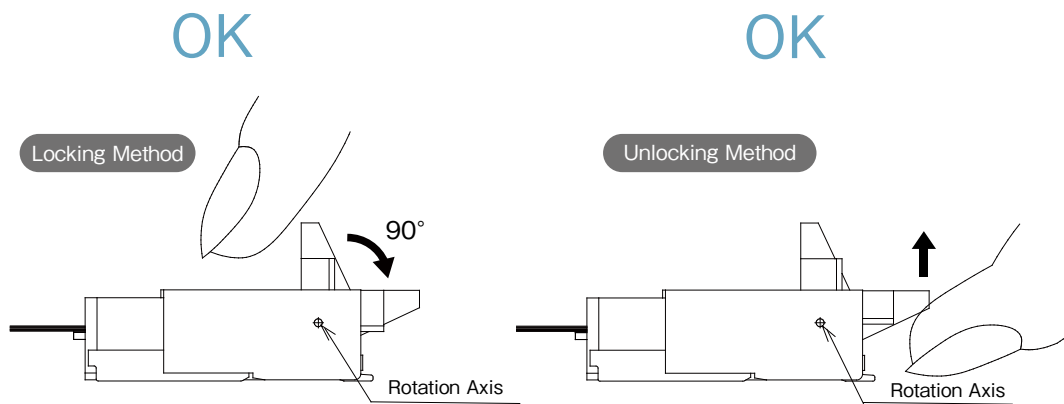


4. Actuator Locking and Release Method

The actuator rotates at its center.

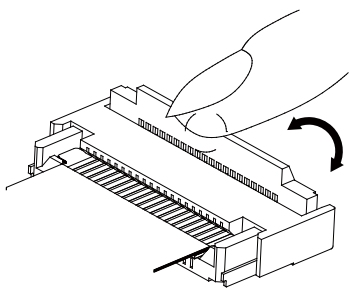
Locking : After inserting the FPC, operate the actuator and rotate it 90°.

Release : Slowly raise the actuator.



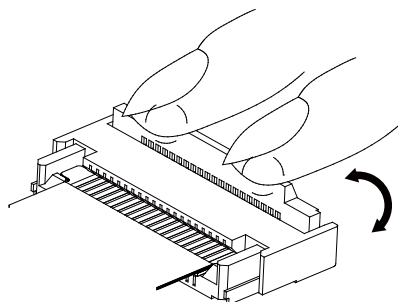
OK

Operate the Actuator Near its Center

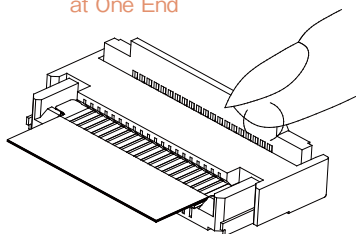


OK

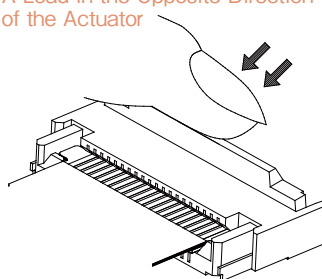
Operating at Both Ends of the Actuator at the Same Time



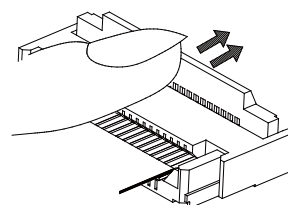
Operating the Actuator at One End



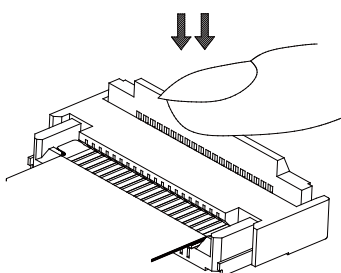
A Load in the Opposite Direction of the Actuator



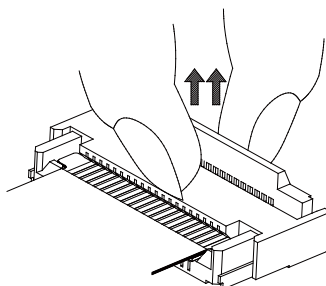
Pushing Horizontally to Lock



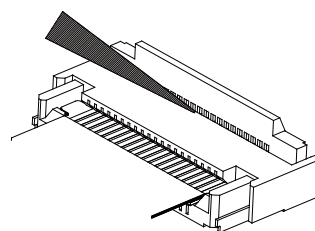
Pushing Down Vertically to Lock



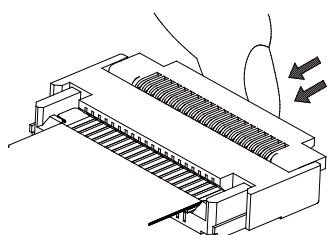
Lifting Up the Actuator



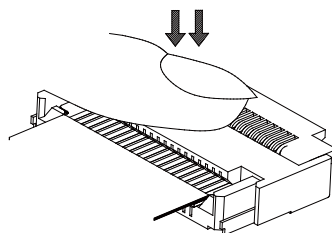
Operation Using Sharp Tools



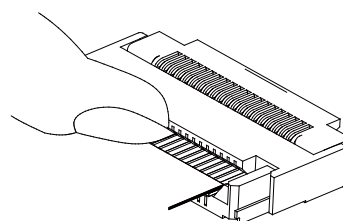
Pushing on the Actuator Towards the Connector Body



Applying Excessive Force to the Insulation Case



Operating From FPC Insertion Side



Precautions

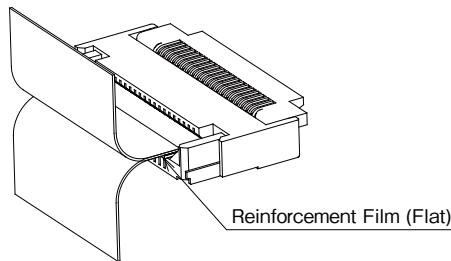
【PCB Layout Precautions】

Design the board layout so that no load is applied to the connector FPC.

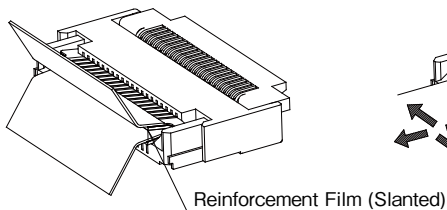
- Route the FPC so that it has leeway and is not pulled. Make sure that the reinforcing film is horizontal to the board surface.
- Do not place interfering components under the FPC.
- Check with the FPC manufacture regarding FPC flexibility.
- When designing the board/layout, ensure that there is enough space to operate and close the actuator.
- Consult with a Hirose representative about usage of FPC size and shape different from what is recommended.

OK

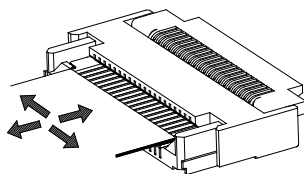
No Load on Reinforcement Film



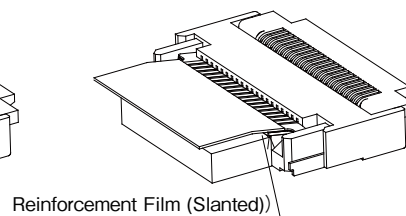
Load on Reinforcement Film



Load on FPC



Case and Components Interfering with FPC



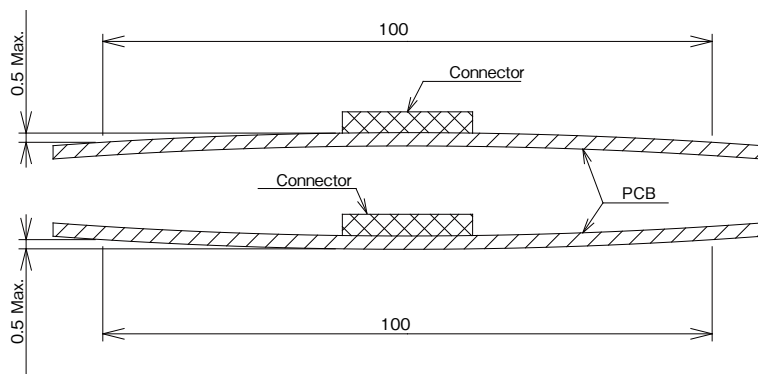
【Board Mounting Precautions】

- Please check the recommended mounting PCB land shape, metal mask opening and FPC. When using a pattern different from the recommendations, check the mounting condition before use.
- Check the mounting condition before use when there is silk printing below the connector.
- The reflow conditions must be within the specifications. Mounting conditions may be affected by the type of solder paste, manufacturer, PCB size and other mounted components. Please check the mounting conditions before use.
- Keep board warpage to a minimum. The coplanarity of this connector is 0.1mm Max. Soldering failure may occur due to excessive board warpage.
- When mounting the FPC, design a reinforcing plate for easy handling. Reinforcing plates made of glass epoxy with a thickness of 0.3mm Min. are recommended.
- Do not apply excessive force to the connector before mounting, such as by pulling the emboss out from the reel or suctioning the connector from the emboss. (0.5N Max.)

[Handling Precautions After PCB Mounting]

Board warpage may place a load to the connector and result in damage.

- Avoid placing a load to the board during the assembly processes such by as splitting a board into several pieces or screwing the board.
- The warpage of a 100mm wide board should be 0.5mm or less.



[Manual Soldering]

- Do not perform manual soldering with the FPC inserted into the connector.
- Do not heat the connector excessively or let the soldering iron touch any parts other than the contact leads.
- Do not use excessive solder (or flux).

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.