■ Characteristics

1. FPC Connector for High-Speed Transmission
   Capable of transmitting high-speed differential signals by arranging signal contacts (S) and ground contacts (G) in the sequence of GSSG.

2. Impedance Matched-Contact Design
   The signal contacts were designed with impedance control in mind to realize superior high-speed transmission feature.

3. Fully Enclosed Molded Structure (Over molding Structure)
   Board space under the connector can be utilized in patterning since the bottom of the connector is covered with resin and enhances PCB flexibility.

4. Flip-Lock System Provides Reliability and FPC Security
   The Flip-lock (one-touch rotational lock) ZIF structure allows for a reliable and simple to secure FPC connection operation. Utilizing a clear clicking feeling at the time of locking prevents an incomplete lock.

5. FPC Guiding System and ease of Insertion
   The FPC guiding system utilizes guide tabs that enable a temporary hold while FPC is inserted and accurately determines mating location all while ensuring a consistent connection.

6. Compatible with 0.3 mm Thick FPC
   This connector utilizes 0.3 mm thick FPC, which is the standard thickness of a 0.5 mm pitch connector (Appropriate stiffness with reinforcing board prevents FPC deformation, preventing troubles at times of insertion and mating).

7. Automatic Mounting Option Available
   Emboss packaging makes automatic mounting possible (5,000 connectors per reel).

8. Halogen-Free and RoHS Compliant
   Chlorine and bromine are not used in amounts that exceed the standard values in these connectors.
   * Defined according to IEC 61249-2-21
   Br: 900 ppm or below; Cl: 900 ppm or below; Br + Cl: 1,500 ppm or below
# Product Specifications

<table>
<thead>
<tr>
<th>Ratings</th>
<th>Current Rating</th>
<th>Operating Temperature Range</th>
<th>Storage Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 A (Note 1)</td>
<td>55° to +85°C (Note 2)</td>
<td>-10°C to +50°C (Note 3)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current Voltage</th>
<th>Operating Humidity Range</th>
<th>Relative humidity 90% or less (no condensation)</th>
<th>Storage Humidity Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC50 Vrms</td>
<td>Relative humidity 90% or less (no condensation)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Applicable FPC/FFC Terminal Specification

| t = 0.3 ± 0.03 gold plating |

### Items Specifications Conditions

1. **Insulation Resistance**: 500 MO or more, measured at DC 100V
2. **Withstanding Voltage**: No flashover or breakdown, AC150 Vrms applied for one minute
3. **Contact Resistance**: 100 mΩ or less, measured at 1mA
4. **Repeat Performance**: 100 mΩ or less, no breakage, cracking, or loosenings to parts, 20 times
5. **Vibration Resistance**: No electric outage of 1μ or greater, no breakage, cracking, or loosenings to parts, 10 cycles in each of three directions at frequency 10-55 Hz, half amplitude 0.75 mm
6. **Shock Resistance**: No electric outage of 1μ or greater, no breakage, cracking, or loosenings to parts, Acceleration of 981 m/S²; duration 6 ms, sine half-wave, 3 cycles in each of the 3 axes each in both directions
7. **Humidity Resistance in Steady State**: Contact Resistance: 100mΩ or less, insulation Resistance: 50 MΩ or more, no breakage, cracking, or loosenings to parts, 96 hours at temperature 40°C and humidity 90-95%
8. **Temperature Cycle**: Contact Resistance: 100mΩ or less, insulation Resistance: 50 MΩ or more, no breakage, cracking, or loosenings to parts, Temperature: -55°C → +15°C to +35°C → +85°C → +15° to +35°C, Time: 30 → 2 to 3 → 30 → 2 to 3 minutes, 5 cycles with the above conditions
9. **Solder Heat Resistance**: No marked instability in contacts, or appearance of deformation, 1) Reflow: Peak temperature MAX 250°C, 230°C or greater for 60 seconds, 2) Soldering iron: 350±10°C for 5 seconds

**Note 1**: Use at 70% of the current rating when all pins are energized with current rating.
**Note 2**: Temperature rise at the time of electrification is included.
**Note 3**: The term “storage” refers to the long-term storage condition of unused products before board mounting. The operating temperature and humidity ranges apply to non-energized state after board mounting.
**Note 4**: The above specifications are the representative one for this series. Please refer to “delivery specifications” for official individual agreement.

## Materials

<table>
<thead>
<tr>
<th>Parts</th>
<th>Material</th>
<th>Color/Treatment</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulator</td>
<td>LCP</td>
<td>Gray</td>
<td>UL94V-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>Contacts</td>
<td>Phosphor Bronze</td>
<td>Gold plating</td>
<td></td>
</tr>
<tr>
<td>Metal Parts</td>
<td>Brass</td>
<td>Pure tin reflow plating</td>
<td></td>
</tr>
</tbody>
</table>

## Product Number Structure

Refer to this page for product specifications and model types. The characteristics and specifications of the product described in this catalog are reference values. Please make sure to check the latest delivery specifications at the time of product use.

**FH 55 - 40S - 0.5 SH**

1. **Series Name**: FH
2. **Series No.**: 55
3. **Number of Contacts**: 10-61 contacts
4. **Contact Pitch**: 0.5 mm
5. **Contact Form**: SH (SMT vertical mount type)
### Connector Dimensions

** FH55 Series ● 0.5 mm Pitch, 1.5 mm Above-the-Board, High-Speed Transmission FPC Connector **

#### Connector Dimension Table

<table>
<thead>
<tr>
<th>Product No.</th>
<th>HRS No.</th>
<th>No. of connectors</th>
<th>No. of signal connectors</th>
<th>No. of ground connectors</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>FH55-10S-0.5SH</td>
<td>Under planning</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>8.4</td>
<td>4.5</td>
<td>5.57</td>
<td>7.59</td>
</tr>
<tr>
<td>FH55-19S-0.5SH</td>
<td>Under planning</td>
<td>19</td>
<td>12</td>
<td>7</td>
<td>12.9</td>
<td>9</td>
<td>10.07</td>
<td>12.09</td>
</tr>
<tr>
<td>FH55-31S-0.5SH</td>
<td>Under planning</td>
<td>31</td>
<td>20</td>
<td>11</td>
<td>18.9</td>
<td>15</td>
<td>16.07</td>
<td>18.09</td>
</tr>
<tr>
<td>FH55-40S-0.5SH</td>
<td>CL580-3700-8-00</td>
<td>40</td>
<td>26</td>
<td>14</td>
<td>23.4</td>
<td>19.5</td>
<td>20.57</td>
<td>22.59</td>
</tr>
<tr>
<td>FH55-49S-0.5SH</td>
<td>Under planning</td>
<td>49</td>
<td>32</td>
<td>17</td>
<td>27.9</td>
<td>24</td>
<td>25.07</td>
<td>27.09</td>
</tr>
<tr>
<td>FH55-61S-0.5SH</td>
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<td>61</td>
<td>40</td>
<td>21</td>
<td>33.9</td>
<td>30</td>
<td>31.07</td>
<td>33.09</td>
</tr>
</tbody>
</table>

The products above without a HRS No. are currently under planning. Please contact our sales representative for questions concerning the number of contacts.

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**Notes:**

1. The dimensions in parentheses ( ) are reference values.
2. The lead co-planarity of connector and reinforcing metal part is MAX 0.1 mm.
3. This product is emboss-packaged. See the package specification diagram for details.
4. Dimensions may be changed for sink mark prevention due to improvement, etc.
5. Black dots, etc. may occur in mold resin but do not create a quality problem.
6. This product is the halogen-free product. (Br content rate: 900 ppm or less; Cl content rate: 900 ppm or less; Br + Cl total content rate: 1,500 ppm or less)
7. See the table below for available pin arrangements.

S: SIGNAL CONTACT  G: GROUND CONTACT

* Pins are arranged in the sequence of GSSG to manage high-speed differential signals; however, all contacts can be used as signals for normal signals other than high-speed signals. Please contact our sales representative for any questions.
FH55 Series 0.5 mm Pitch, 1.5 mm Above-the-Board, High-Speed Transmission FPC Connector

### Recommended Land and Metal Mask Dimensions

- Recommended Metal Mask Thickness: $t=0.10$
- 0.3±0.03(Land Pattern)
- 0.25±0.03(Metal Mask)

### Recommended FPC Dimensions

### Recommended Land, Metal Mask, and FFC Dimensions

<table>
<thead>
<tr>
<th>Product No.</th>
<th>HRS No.</th>
<th>No. of connectors</th>
<th>No. of signal connectors</th>
<th>No. of ground connectors</th>
<th>E</th>
<th>F</th>
<th>G</th>
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<tr>
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<td>4</td>
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<tr>
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<td>11.15</td>
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<tr>
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<td>17</td>
<td>26.5</td>
<td>26.15</td>
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<tr>
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<td>Under planning</td>
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<td>40</td>
<td>21</td>
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<td>32.15</td>
<td>31</td>
</tr>
</tbody>
</table>

The products above without a HRS No. are currently under planning. Please contact our sales representative for questions concerning the number of contacts.
FH55 Series FPC Material Constitution (Recommended Specifications)

Notes 1: The FPC material constitution is a reference example. Please make the thickness of FPC mating area 0.3±0.03 mm by referring to this material constitution.

Notes 2: It is a reference example of the base film material. LCP refers to liquid crystal polymer, and PI for polyimide.

<table>
<thead>
<tr>
<th>Names of Materials</th>
<th>Material Thickness (µm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LCP 2-layer CCL</td>
</tr>
<tr>
<td>①Cover lay film</td>
<td>12.5</td>
</tr>
<tr>
<td>②Cover adhesive</td>
<td>28</td>
</tr>
<tr>
<td>③Surface treatment (nickel base + gold plating)</td>
<td>(6)</td>
</tr>
<tr>
<td>④Copper plating (through-hole copper)</td>
<td>15</td>
</tr>
<tr>
<td>⑤Pattern copper foil</td>
<td>9</td>
</tr>
<tr>
<td>⑥Base adhesive</td>
<td>-</td>
</tr>
<tr>
<td>⑦Base film</td>
<td>50</td>
</tr>
<tr>
<td>⑧Base adhesive</td>
<td>-</td>
</tr>
<tr>
<td>⑨Ground copper foil</td>
<td>9</td>
</tr>
<tr>
<td>⑩Copper plating (through-hole copper)</td>
<td>15</td>
</tr>
<tr>
<td>⑪Cover adhesive</td>
<td>28</td>
</tr>
<tr>
<td>⑫Cover lay film</td>
<td>12.5</td>
</tr>
<tr>
<td>⑬Reinforcement material adhesive (Thermosetting adhesive)</td>
<td>50</td>
</tr>
<tr>
<td>⑭Stiffener film</td>
<td>125</td>
</tr>
<tr>
<td>Total (Mating Area Thickness: Total of ③～⑧ and ⑪～⑭)</td>
<td>295.5</td>
</tr>
</tbody>
</table>
FH55 Series●0.5 mm Pitch, 1.5 mm Above-the-Board, High-Speed Transmission FPC Connector

Packaging Specifications

● Emboss Carrier Tape Dimensions

(Tape width of 24 mm or less)

(Tape width of 32 mm or more)

Reel Condition Dimensions

Packaging Specification Dimensions

<table>
<thead>
<tr>
<th>Product No.</th>
<th>HRS No.</th>
<th>No. of connectors</th>
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<th>H</th>
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<th>K</th>
<th>L</th>
<th>M</th>
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<td>29.4</td>
<td>25.4</td>
</tr>
<tr>
<td>FH55-19S-0.5SH</td>
<td>Under planning</td>
<td>19</td>
<td>12</td>
<td>7</td>
<td>13.1</td>
<td>11.5</td>
<td>-</td>
<td>24</td>
<td>29.4</td>
<td>25.4</td>
</tr>
<tr>
<td>FH55-31S-0.5SH</td>
<td>Under planning</td>
<td>31</td>
<td>20</td>
<td>11</td>
<td>19.1</td>
<td>20.2</td>
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<td>44</td>
<td>49.4</td>
<td>45.4</td>
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<td>CL580-3700-8-00</td>
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<td>23.6</td>
<td>20.2</td>
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<td>44</td>
<td>49.4</td>
<td>45.4</td>
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<tr>
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<td>Under planning</td>
<td>61</td>
<td>40</td>
<td>21</td>
<td>34.1</td>
<td>26.2</td>
<td>52.4</td>
<td>56</td>
<td>61.4</td>
<td>57.4</td>
</tr>
</tbody>
</table>

The products above without a HRS No. are currently under planning. Please contact our sales representative for questions concerning the number of contacts.
Applicable Conditions

Reflow System: Far-infrared, hot-air reflow
Reflow chamber atmosphere: Air
Solder: Paste type Sn/3.0Ag/0.5 Cu
(M705-221CM5-42-10.5; Senju Metal Industry Co., Ltd.)
Test Board: Board material and size
Glass epoxy 30 x 60 x 1.0 mm
Land dimensions
Contact area: 0.3 x 0.65
Metal part area: 0.7 x 1.5 mm
Metal Mask: Thickness 0.1 mm
Aperture Dimension
Contact area 0.25 x 0.65
Metal part area 0.7 x 1.5 mm

The temperature profile shown above is based on the above applicable conditions. Due to the changing conditions such as solder paste types, manufacturers, board size and other soldering materials, please check to ensure the proper soldering conditions before use.
Connector Operational Method and Precautions

Operational Method

1. FPC insertion method

❶ Operate the actuator as it rotates upward and open it. The actuator can be easily operated by flipping it up with a fingernail.

❷ Insert FPC with its conductor side facing down. There is an FPC position guiding tab. Insert FPC at an angle of approximately 12° against the PCB surface and vertical to the connector. Make sure to insert it completely.

❸ Operate the actuator in a rotational manner and press it down. When FPC is half inserted or insertion is significantly misaligned, remove the FPC according to the extraction method of 2-❶ and operate it again from 1-❶. Fix the connector at the time of locking.

2. FPC Extraction Method

❶ Operate the actuator upward in a rotational manner by flipping it up and extract FPC after releasing the lock. As there is the FPC position guiding tab, extract the FPC at an angle of approx. 12° against the PCB surface.
As this connector requires careful handling, please check the following points before use. Of note, values described in the precautions are different from the product specification values.

[Precautions at Time of Mounting on PCB]

- **PCB Warpage**
  Please minimize the PCB warpage amount as much as possible. Although the coplanarity of this connector is 0.1 mm or less, mounting failure may occur with an excessive amount of warpage.

- **Load to Connector**
  Do not place an excessive external load (1N or less) on the connector before mounting or when removing the emboss package from the reel or when absorbing connectors from the emboss package. Not following these precautions may result in connector breakage. **Do not insert FPC or operate connector before mounting.**

[Precautions when handling PCB after mounting]

- **Load to PCB**
  Please do not place load to the PCB in the assembly process when conducting the following, as it may result in connector breakage.
  - Separating the large PCB into individual PCBs
  - Attaching PCB with screws

- **Board Bending**
  For a board width of 100 mm, do not bend the board more than a MAX of 0.5 mm (See the diagram below). Bending the board more than 0.5 mm may impart that load to the connector and result in breakage.

[Precautions when Inserting or Mating the FPC]

Please pay attention to the following points at the time of FPC insertion and mating.

1. **Actuator Operation**
   When opening the actuator from its initial state (FPC non-insertion state), please pay attention not to place an excessive amount of force on the actuator. **Please see the diagram below to prevent deformity of the actuator through finger nail damage.**

2. As the actuator rotates centering around the shaft as shown in the diagram below, operate it in a rotational manner.
Precaution in Use

3 As the actuator structurally does not open more than 115°, please do not apply force to rotate it further toward back. It may result in disengagement or breakage of the actuator (1N or less).

4 Operate the actuator in its center area. When closing the actuator while FPC is inserted, operating it at its edge may result in breakage of the actuator.

5 Do not lift the actuator by clipping it or pick it up as shown in the diagrams on the right, as it may result in breakage [Do not perform operations other than the rotational movement described in 4].

- Contact Point Direction
The contact point on this connector is on the bottom; therefore insert the FPC with the conductor exposed surface facing down.

- FPC Insertion
1 There is a FPC position guiding tab. Make sure to completely insert FPC at an angle of approx. 12° against the PCB surface and vertically to the connector. If FPC is inserted at a slant angle, it may result in short circuit failure due to pitch misalignment or contact deformation with the FPC corner getting caught at contacts.
Precautions in Use

② Please do not insert FPC at a markedly slant angle from above. If it is inserted at a markedly slant angle from above in the FPC insertion process as shown in the diagram below, FPC may bend and break the pattern, or insufficient insertion of FPC may result in conduction failure.

![Contact Deformation](image1)  
(FPC Pattern Breakage)

※ In order to prevent slant insertion of FPC, make sure to secure sufficient space for FPC insertion at the time of layout designing. Insertion will become difficult if FPC is too short, therefore, please design appropriate part layout.  
※ Please confirm details of the flexion and wire breakage of FPC with your FPC manufacturer.

③ After FPC insertion, make sure that the FPC position guiding tab is not on top of the FPC position guide on both sides of the connector. Contact failure may occur if the actuator is locked while the FPC position guiding tab is still on top of the FPC position guide.

![FPC Position Guiding Tab](image2)  
(FPC Position Guide)  
(Normal insertion)  
(On top of guides on both sides)  
(On top of guide of one side)

◆ Lock State Confirmation
At the time of locking, make sure that the actuator is parallel to the PCB surface. However, when the actuator gets close to 0°, make sure you use the appropriate amount of force as the use of excessive force, may result in contact deformation (1N or less).

[Precautions when Routing FPC after FPC Insertion]

◆ About the load on the FPC
After the FPC has been inserted, ensure that no load will be applied to the FPC, as it may release the lock of the connector or result in wire breakage or breakage of the FPC. In particular, fix the FPC when load is continuously applied to it. Do not bend the FPC sharply near the FPC insertion slot at the time of routing the FPC.
Precautions in Use

[Precautions when Removing FPC]

- Operate the actuator at the center area when releasing it.
  If you operate the actuator at its edge when releasing the lock while the FPC is inserted, it may result in actuator breakage.
- Extracting the FPC while the actuator is unlocked.
  Since these connectors have FPC position guiding tabs, extract the FPC at an angle of 12° against the PCB. When the FPC is removed in a vertical direction (at approx. 0°), it may break the FPC position guide metal part.

[Other Precautions]

- Hand Soldering Precautions
  When hand soldering for repair, etc.:
  1. Do not perform reflow or hand soldering with the FPC inserted in the connector.
  2. Do not apply excessive heat and make sure that the soldering iron does not touch anywhere other than the connector lead. It may result in connector deformation or melting.
  3. Do not supply excessive solder (flux).
     If an excessive amount of solder (flux) is supplied to the contact, solder or flux may adhere to the contact points or the shaft of the actuator and can result in contact failure or rotational performance failure of the actuator.

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http://www.hirose-connectors.com

®
The characteristics and the specifications contained herein are for reference purpose. Please refer to the latest customer drawings prior to use. The contents of this catalog are current as of date of 09/2012. Contents are subject to change without notice for the purpose of improvements.