0.3 mm Pitch, 0.65 mm above the board, Top Contact, Back-Flip actuator Flexible Printed Circuit ZIF Connectors

FH42 Series

Features

1. Low-profile and space-saving 0.3mm pitch, top contact point, connector
   A top contact point type connector, low-profile and space-saving design, with 0.65mm height and 3.55mm depth (implementation depth: 3.08mm).

2. FPC retention secured, despite the low profile
   Improved FPC horizontal retention by reinforcing the clasp temporary retention mechanism.

3. Delivered with the actuator open
   FPC can be immediately inserted without the need for the opening of the actuator.

4. Favorable FPC insertion, despite the low profile
   - The unique clasp form means an audible click when the FPC goes over the clasp, while also preventing incorrect (diagonal) insertion of FPC.
   - Despite the temporary retention mechanism of the reinforcing clasp, horizontal insertion of FPC is possible.

5. Accepts standard FPC thickness
   0.12mm thick standard Flexible Printed Circuit (FPC) can be used. This is the only ultra-low profile ZIF connector using standard FPC.

6. Conductive traces on the PCB can run under the connector
   No exposed contacts on the bottom of the connector.

7. Board placement with automatic equipment
   Flat upper surface and tape and reel packaging facilitate vacuum pick-up and placement. Standard reel packaging contains 5,000 connectors.

8. Halogen-free *
   *As defined by IEC61249-2-21
   Br-900ppm maximum, Cl-900ppm maximum, Cl + Br combined-1,500ppm maximum

Figure 1: Height 0.65mm

Simple FPC insertion

Figure 2: Lock

Figure 3: The product information in this catalog is for reference only. Please request the Engineering Drawing for the most current and accurate design information.
**Specifications**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Insulation resistance</td>
<td>50 MΩ min.</td>
<td>100 V DC</td>
</tr>
<tr>
<td>2. Withstanding voltage</td>
<td>No flashover or insulation breakdown</td>
<td>90 Vrms AC / one minute</td>
</tr>
<tr>
<td>3. Contact resistance</td>
<td>200 mΩ max.</td>
<td>1 mA, AC max (AC: 1kHz)</td>
</tr>
<tr>
<td>4. Durability</td>
<td>Contact resistance: 200 mΩ max. No damage, cracks, or parts dislocation</td>
<td>10 cycles</td>
</tr>
<tr>
<td>5. Vibration</td>
<td>No electrical discontinuity of 1μs or longer Contact resistance: 200 mΩ max. No damage, cracks, or parts dislocation</td>
<td>Frequency: 10 to 55 Hz, single amplitude of 0.75mm, 10 cycles in each of the 3 axis</td>
</tr>
<tr>
<td>6. Shock</td>
<td>No electrical discontinuity of 1μs or longer Contact resistance: 200 mΩ max. No damage, cracks, or parts dislocation</td>
<td>Acceleration of 981m/s², 6 ms duration, sine halfwave, 3 cycles in each of the 3 axis</td>
</tr>
<tr>
<td>7. Humidity (Steady state)</td>
<td>Contact resistance: 200 mΩ max. Insulation resistance: 50 MΩ min. No damage, cracks, or parts dislocation</td>
<td>96 hours at 40°C and humidity of 90 to 95%</td>
</tr>
<tr>
<td>8. Temperature cycle</td>
<td>Contact resistance: 200 mΩ max. Insulation resistance: 50 MΩ min. No damage, cracks, or parts dislocation</td>
<td>Temperature: -55°C → +15°C → +35°C → +85°C → +15°C to +35°C Time: 30 → 2 to 3 → 30 → 2 to 3 minutes 5 cycles</td>
</tr>
<tr>
<td>9. Resistance to soldering heat</td>
<td>No deformation of components affecting performance</td>
<td>Reflow: At the recommended temperature profile Manual soldering: 350°C ±10°C for 5 seconds</td>
</tr>
</tbody>
</table>

**Recommended FPC Thickness** 0.12 +/- 0.02 mm, Gold plated contact pads

**Materials**

<table>
<thead>
<tr>
<th>Part</th>
<th>Material</th>
<th>Finish</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulator</td>
<td>LCP</td>
<td>Color: Beige</td>
<td>UL94V-0</td>
</tr>
<tr>
<td></td>
<td>PA</td>
<td>Color: Black</td>
<td>UL94HB</td>
</tr>
<tr>
<td>Contacts</td>
<td>Phosphor bronze</td>
<td>Gold plated</td>
<td>——</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pure tin reflow plated</td>
<td>——</td>
</tr>
</tbody>
</table>

**Ordering information**

```
FH 42 - 31S - 0.3 SHW (10)
1 2 3 4 5 6
```

1. Series name: FH
2. Series No.: 41
3. Contact type SHW: SMT horizontal staggered mounting
4. Number of positions: 19, 31, 41
5. Contact pitch: 0.3 mm
6. Plating specifications (10)...Gold plating with nickel barrier
## Connector Dimensions

### [FH42 Series]

![Connector Dimensions Diagram]

### Table

<table>
<thead>
<tr>
<th>Part Number</th>
<th>CL No.</th>
<th>Number of contacts</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>FH42-19S-0.3SHW(10)</td>
<td>0580-2305-8-10</td>
<td>19</td>
<td>7.8</td>
<td>4.8</td>
<td>5.4</td>
<td>6.55</td>
<td>7.28</td>
</tr>
<tr>
<td>FH42-31S-0.3SHW(10)</td>
<td>0580-2301-7-10</td>
<td>31</td>
<td>11.4</td>
<td>8.4</td>
<td>9</td>
<td>10.15</td>
<td>10.88</td>
</tr>
<tr>
<td>FH42-41S-0.3SHW(10)</td>
<td>0580-2304-5-10</td>
<td>41</td>
<td>14.4</td>
<td>11.4</td>
<td>12</td>
<td>13.15</td>
<td>13.88</td>
</tr>
</tbody>
</table>

Note 1. Tape and reel packaging (5,000 pieces/reel). Order by number of reels.
FH42 Series® 0.3 mm Pitch, 0.65 mm above the board, Top Contact, Back-Flip actuator Flexible Printed Circuit ZIF Connectors

**Recommended PCB mounting pattern and metal mask dimensions**

![Recommended PCB mounting pattern and metal mask dimensions diagram]

**Recommended FPC Dimensions**

![Recommended FPC Dimensions diagram]

*Stiffener dimension should be 2.4mm min., and M dimension should be 0.5mm for improved flexibility of FPC.*

<table>
<thead>
<tr>
<th>Part Number</th>
<th>CL No.</th>
<th>Number of contacts</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>F (mm)</th>
<th>G (mm)</th>
<th>H (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FH42-19S-0.3SHW(10)</td>
<td>0580-2305-8-10</td>
<td>19</td>
<td>4.8</td>
<td>5.4</td>
<td>7.25</td>
<td>6.22</td>
<td>8.2</td>
</tr>
<tr>
<td>FH42-31S-0.3SHW(10)</td>
<td>0580-2301-7-10</td>
<td>31</td>
<td>8.4</td>
<td>9</td>
<td>10.85</td>
<td>9.82</td>
<td>11.8</td>
</tr>
<tr>
<td>FH42-41S-0.3SHW(10)</td>
<td>0580-2304-5-10</td>
<td>41</td>
<td>11.4</td>
<td>12</td>
<td>13.85</td>
<td>12.82</td>
<td>14.8</td>
</tr>
</tbody>
</table>

Unit: mm

The product information in this catalog is for reference only. Please request the Engineering Drawing for the most current and accurate design information.
Recommended FPC construction

1. Using Single-sided FPC

FPC : Flexible Printed Circuit

<table>
<thead>
<tr>
<th>Material Name</th>
<th>Material</th>
<th>Material Thickness (μm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covering film layer</td>
<td>Polyimide 1 mil thick.</td>
<td>(25)</td>
</tr>
<tr>
<td>Cover adhesive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface treatment</td>
<td>0.2μm thick gold plated over 1</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>to 5μm nickel underplating</td>
<td></td>
</tr>
<tr>
<td>Copper foil</td>
<td>Cu 1/2 oz</td>
<td>18</td>
</tr>
<tr>
<td>Base adhesive</td>
<td>Thermosetting adhesive</td>
<td>Non-adhesive type</td>
</tr>
<tr>
<td>Base film</td>
<td>Polyimide 1 mil thick</td>
<td>25</td>
</tr>
<tr>
<td>Reinforcement material adhesive</td>
<td>Thermosetting adhesive</td>
<td>35</td>
</tr>
<tr>
<td>Stiffener</td>
<td>Polyimide 2 mil thick</td>
<td>40</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>131.2</td>
</tr>
</tbody>
</table>

1. This specification is a recommendation for the construction of the FH42 Series FPC and FFC (t=0.12 ±0.02).
2. For details about the construction, please contact the FPC/FFC manufacturers.
FH42 Series @0.3 mm Pitch, 0.65 mm above the board, Top Contact, Back-Flip actuator Flexible Printed Circuit ZIF Connectors

Packaging Specification

● Embossed Carrier Tape Dimensions
(Tape width to 24mm max.)

● Embossed Carrier Tape Dimensions
(Tape width 32mm min.)

● Reel Dimensions

<table>
<thead>
<tr>
<th>Part Number</th>
<th>CL No.</th>
<th>Number of contacts</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>FH42-19S-0.3SHW(10)</td>
<td>0580-2305-8-10</td>
<td>19</td>
<td>24</td>
<td>—</td>
<td>11.5</td>
<td>9.3</td>
<td>25.4</td>
<td>29.4</td>
</tr>
<tr>
<td>FH42-31S-0.3SHW(10)</td>
<td>0580-2301-7-10</td>
<td>31</td>
<td>24</td>
<td>—</td>
<td>11.5</td>
<td>12.9</td>
<td>25.4</td>
<td>29.4</td>
</tr>
<tr>
<td>FH42-41S-0.3SHW(10)</td>
<td>0580-2304-5-10</td>
<td>41</td>
<td>24</td>
<td>—</td>
<td>11.5</td>
<td>15.9</td>
<td>25.4</td>
<td>29.4</td>
</tr>
</tbody>
</table>

Tape and reel packaging (5,000 pieces/reel).

Unit: mm

The product information in this catalog is for reference only. Please request the Engineering Drawing for the most current and accurate design information.
Temperature Profile
● Using Lead-free Solder Paste

HRS test condition
- Solder method: Reflow, IR/hot air
- Environment: Room air
- Solder composition: Paste, 96.5%Sn/3.0%Ag/0.5%Cu
  (Senju Metal Industry, Co., Ltd.'s Part Number: M705-GRN360-K2-V)
- Test board: Glass epoxy 25mm×50mm×0.8mm thick
- Land dimensions: 0.28mm×0.6mm, 0.28mm×0.9mm
- Metal mask: 0.26×0.48, 0.26×0.73×0.1mm thick

The temperature profiles shown are based on the above conditions.
In individual applications the actual temperature may vary, depending on solder paste type, volume / thickness and board size / thickness. Consult your solder paste and equipment manufacturer for specific recommendations.
## Connector Operation and Precautions

Exercise care when handling connectors. Follow recommendations given below.

### 1. As delivered
- Delivered with the actuator open. There is no need to operate the actuator prior to the insertion of the FPC.

### 2. FPC insertion (Top contact)
1. Make sure that the conductive pads are facing up.
2. Align the FPC perpendicular with the connector and insert it firmly all the way.
   *For the bottom contact, reverse.*

### 3. FPC correct insertion verification (Top contact)
A visual comparison of the edge of the housing opening and the FPC pattern boundary will prevent diagonal insertion and partial insertion errors.

---

The actuator is open when delivered in the embossed tape packaging.
FPC conductive pads are facing up.
Correct insertion
Diagonal insertion
Partial insertion
### Operation

#### 4. Locking

1. After FPC/FFC insertion, rotate the actuator down to a full stop, pushing it at the center.

   - **Excessive force after the actuator is already closed**
   - **Do NOT close at the ends.**

#### 5. FPC removal (Lock release)

Carefully rotate the actuator up to 90°, lifting it at the center.

   - **Do not attempt to open more than 90°**
   - **Do not open (lift) at one end.**

*The actuator opens by rotating it in the direction OPPOSITE to the direction of the insertion of the FPC. DO NOT attempt to open it from the same side as the insertion of the FPC.*
### Precautions when mounting connectors on the PCB

- **Handling before mounting on PCB**
  Insertion of the FPC or operation of the actuator prior to mounting on the PCB is NOT RECOMMENDED.

- **PC board warpage**
  Minimize the warpage as much as possible. The connector is straight within 0.1 mm max. Make sure that the mounting area flatness can accept the connector terminals without causing any failure of the solder joints.

- **Forces on the board**
  - When braking the large PC board into individual boards exercise care NOT to damage the installed connectors.
  - When attaching the boards or other components with the screws make sure that any stresses will NOT cause board deflections affecting the mounting areas of the connector

#### Other precautions

- **When hand soldering:**
  - Do not perform hand soldering with the FPC inserted in the connector.
  - Do not apply excessive heat or touch the soldering iron anywhere other than the connector leads.
  - Do not use excessive amount of solder or flux compounds.
  
  Operation of the actuator or contacts may be affected by excessive amounts of solder or flux compounds.