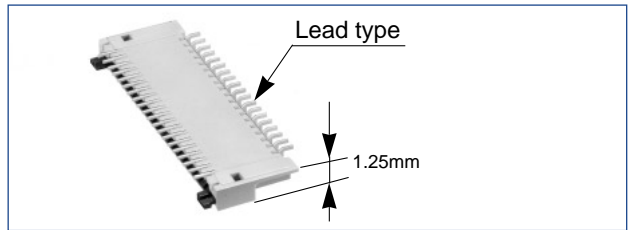
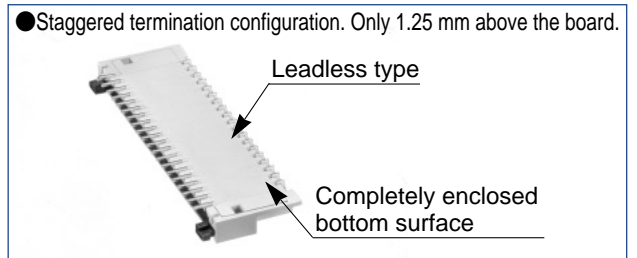
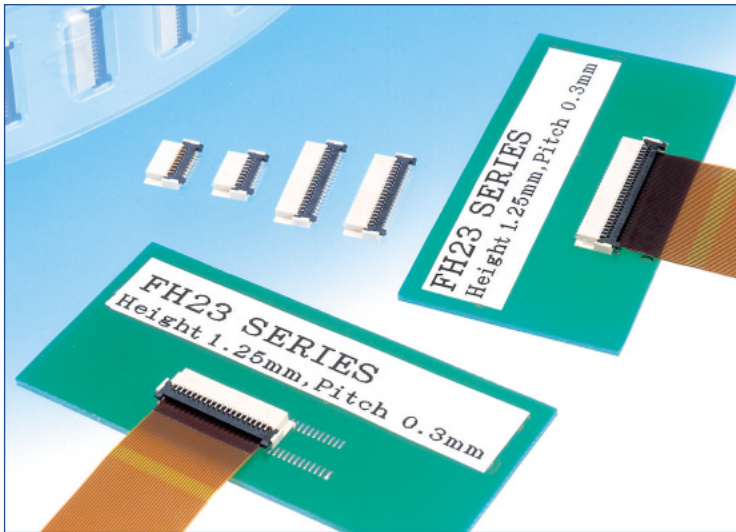


0.3mm Contact Pitch, 1.25mm above the board, Flexible Printed Circuit Connectors

FH 23 Series



Features

- 1. FPC low insertion force and high holding force**
Hirose Electric's unique low insertion force (LIF) design (patents pending) improves the Flexible Printed Circuit (FPC) holding force after insertion.

FPC insertion force: Reduced approximately 36% (as compared with FH18 Series connectors).

FPC holding force: Improvement of approximately 22% (as compared with FH18 Series connectors).

- 2. Temporary hold of FPC**

There is no need to hold the FPC after insertion in the connector. The connector will hold it in correct position, allowing closing of the actuator.

- 3. Easy board mounting**

The surface mounted termination of the contacts is staggered on 0.6 mm centers, positioned on front and back of the connector. Bottom of the connector is completely insulated, allowing conductive traces on PCB to run under the connector.

- 4. Proven Flip-lock Actuator assures easy and reliable operation**

Rotating actuator permits easy insertion and reliable connection with the FPC. Tactile sensation confirms complete mechanical locking of the actuator and the electrical connection.

- 5. Variations to suit different mounting areas**

Available with lead and leadless type of terminations (for opposing FPC insertion side).

- 6. Designed for placement with automatic equipment**

Flat top surface allows pick-up with vacuum nozzles.

Packaged in embossed tape, on reel. One reel contains 2,500 pieces.

- 7. Accepts 0.2mm thick FPC**

- 8. Variety of contact positions**

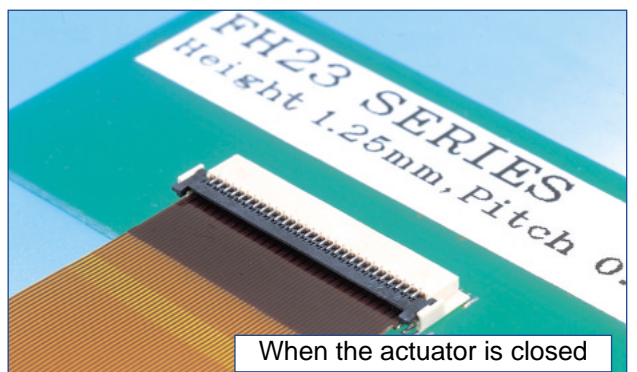
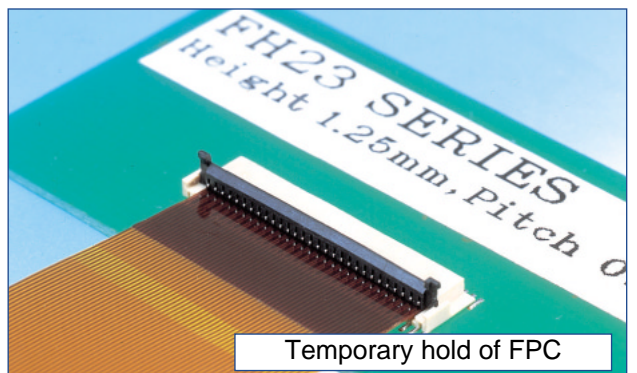
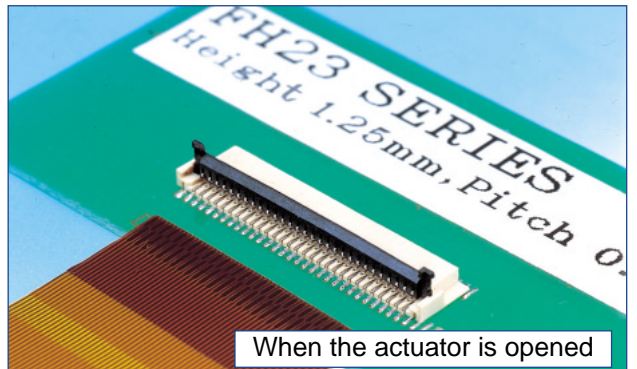
Available with 15,17,21,23,25,27,31,33,39,45,51,61 and 71 pos.

- 8. Environmental considerations**

Plating is lead-free in order to protect environment.

Applications

Mobile phones, PDA's, digital cameras, digital video cameras and other compact devices requiring interconnections of the main circuit with the LCD, plasma display (PDP), camera module, or other devices.



Product Specifications

| | | | | |
|---------|----------------|----------|--------------------------------------------------------------------------|--------------------------------------------------------|
| Ratings | Current rating | 0.3 A DC | Operating temperature range -55 °C to +85 °C (Note 1) | Storage temperature range -10 °C to +50 °C (Note 2) |
| | Voltage rating | 30 V AC | Operating humidity range Relative humidity 90% max. (No condensation) | Storage humidity range Relative humidity 90% max. |

| | |
|-----------------|---------------------------------------------------|
| Recommended FPC | Thickness: = 0.2±0.03mm Tin-lead plating (Note 3) |
|-----------------|---------------------------------------------------|

| Item | Specification | Conditions |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| 1. Insulation resistance | 50 M ohms min. | 100 V DC |
| 2. Withstanding voltage | No flashover or insulation breakdown | 90 V AC/one minute |
| 3. Contact resistance | 100 m ohms max. *Including FPC/FFC conductor resistance | 1 mA AC |
| 4. Durability (insertion/ withdrawal) | Contact resistance: 100 m ohms max. No damage, cracks, or parts dislocation. | 10 cycles |
| 5. Vibration | No electrical discontinuity of 1 μs or more. Contact resistance: 100 m ohms max. No damage, cracks, or parts dislocation. | Frequency: 10 to 55 Hz, single amplitude of 0.75 mm, 10 cycles, 3 axis. |
| 6. Shock | No electrical discontinuity of 1 μs. min. Contact resistance: 100 m ohms max. No damage, cracks, or parts dislocation. | Acceleration of 981 m/s ² , 6ms duration, sine half-wave waveform, 3 cycles, 3 axis. |
| 7. Humidity (Steady state) | Contact resistance: 100 m ohms max. Insulation resistance: 50 M ohms min. No damage, cracks, or parts dislocation. | 96 hours at temperature of 40 °C and humidity of 90% to 95% |
| 8. Temperature cycle | Contact resistance: 100 m ohms max. Insulation resistance: 50 M ohms min. No damage, cracks, or parts looseness. | Temperature: -55 °C → +15 °C to +35 °C → +85 °C → +15 °C to +35 °C Time: 30 → 2 to 3 → 30 → 2 to 3 (Minutes) 5 cycles |
| 9. Resistance to soldering heat | No deformation of components affecting performance. | Reflow: At the recommended temperature profile Manual soldering: 350 °C ± 5 °C for 5 seconds |

Note 1: Includes temperature rise caused by current flow.

Note 2: The term "storage" refers to products stored for long period of time prior to mounting and use. Operating Temperature Range and Humidity range covers non- conducting condition of installed connectors in storage, shipment or during transportation.

Note 3: When FPC is gold plated, the connector contacts should be also gold plated: Select the (05) specification.

Materials

| Part | Material | Finish | Remarks |
|-----------|-----------------|---------------------------|---------|
| Insulator | LCP | Color:Beige | UL94V-0 |
| | LCP | Color:Black | |
| Contacts | Phosphor bronze | Tin-lead plating (Note 3) | _____ |

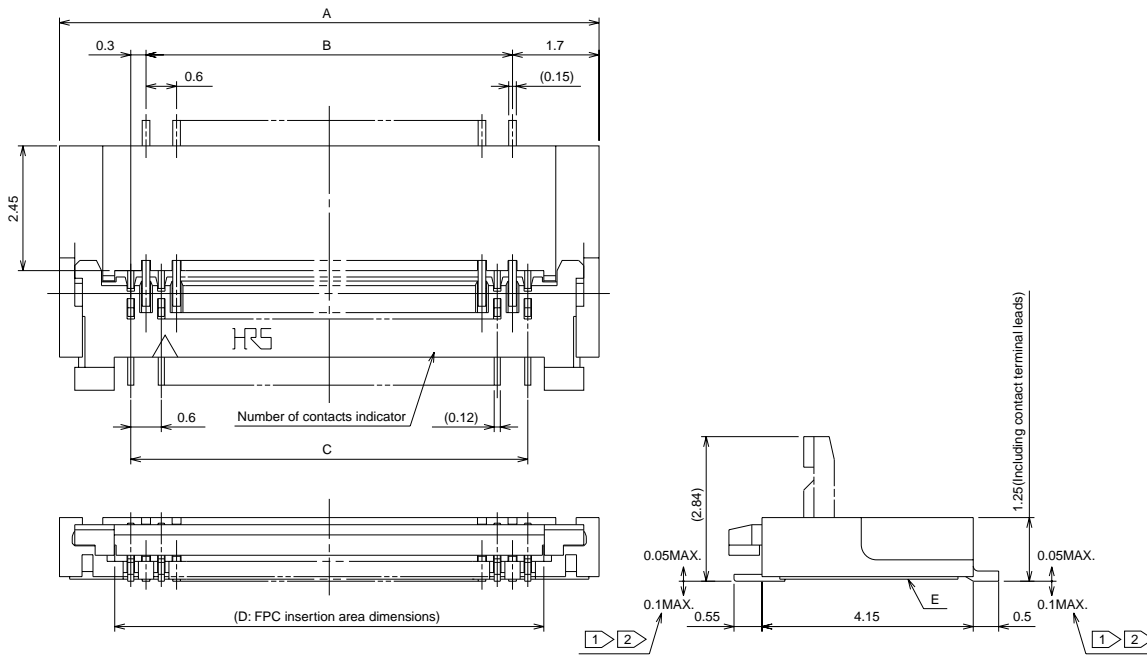
Ordering information

FH23 - 39S - 0.3 SHW (05)

① ② ③ ④ ⑤

| | |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| ① Series name : FH23 | ④ Terminal type SHW: SMT horizontal mounting type, lead type termination. SHAW: SMT horizontal mounting type, lead-less type termination. |
| ② No. of contacts. Number of contacts : 15,17,21,23,25,27,31,33,39,45,51,61,71 | ⑤ Plating specifications : (05) : Gold plating (51) : Tin-lead plating |
| ③ Contact pitch: 0.3 mm | |

◆ Connector Dimensions (Lead Type termination)



- Notes
- ① The coplanarity of each terminal lead is within 0.1.
 - ② The contact terminal lead position indicates the dimension from the E surface, the bottom surface of the insulator body.
 - ③ Any discoloration of the plastic compound will NOT AFFECT form, fit or function of the connector.

Lead Type

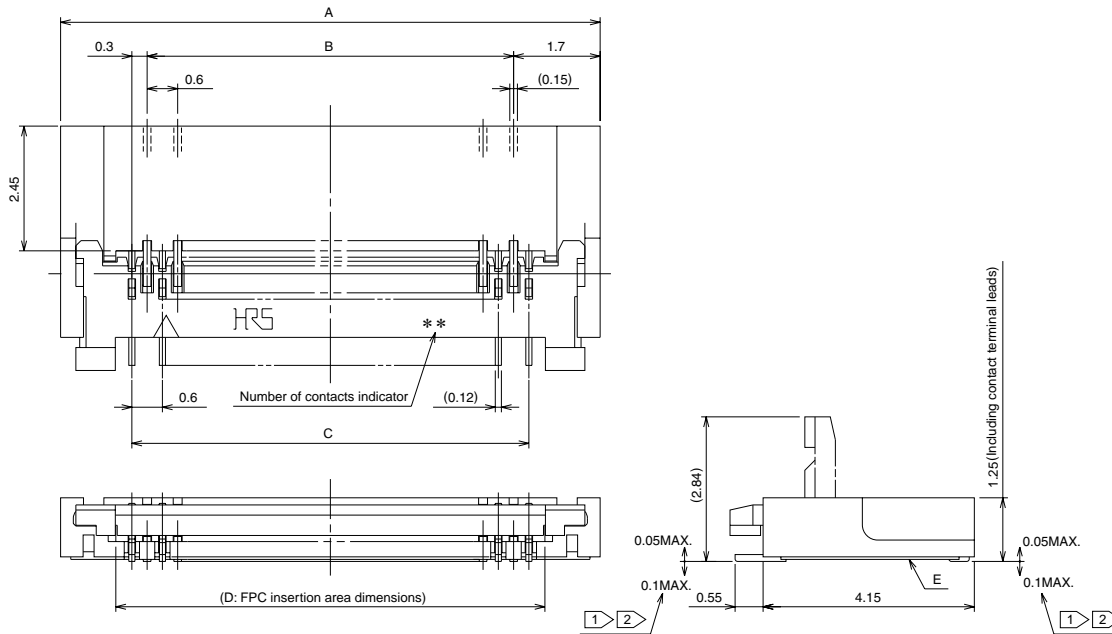
Unit: mm

| Part Number | CL No. | Number of Contacts | A | B | C | D |
|---------------------|---------------|--------------------|------|------|------|-------|
| FH23-15S-0.3SHW(51) | 586-1317-0-51 | 15 | 7 | 3.6 | 4.2 | 4.83 |
| FH23-17S-0.3SHW(51) | 586-1300-7-51 | 17 | 7.6 | 4.2 | 4.8 | 5.43 |
| FH23-21S-0.3SHW(51) | 586-1314-1-51 | 21 | 8.8 | 5.4 | 6 | 6.63 |
| FH23-23S-0.3SHW(51) | 586-1324-5-51 | 23 | 9.4 | 6 | 6.6 | 7.23 |
| FH23-25S-0.3SHW(51) | 586-1322-0-51 | 25 | 10 | 6.6 | 7.2 | 7.83 |
| FH23-27S-0.3SHW(51) | 586-1308-9-51 | 27 | 10.6 | 7.2 | 7.8 | 8.43 |
| FH23-31S-0.3SHW(51) | 586-1302-2-51 | 31 | 11.8 | 8.4 | 9 | 9.63 |
| FH23-33S-0.3SHW(51) | 586-1304-8-51 | 33 | 12.4 | 9 | 9.6 | 10.23 |
| FH23-39S-0.3SHW(51) | 586-1306-3-51 | 39 | 14.2 | 10.8 | 11.4 | 12.03 |
| FH23-45S-0.3SHW(51) | 586-1318-2-51 | 45 | 16 | 12.6 | 13.2 | 13.83 |
| FH23-51S-0.3SHW(51) | 586-1312-6-51 | 51 | 17.8 | 14.4 | 15 | 15.63 |
| FH23-61S-0.3SHW(51) | 586-1310-0-51 | 61 | 20.8 | 17.4 | 18 | 18.63 |
| FH23-71S-0.3SHW(51) | 586-1320-4-51 | 71 | 23.8 | 20.4 | 21 | 21.63 |

Note: Embossed tape reel packaging(2,500 pieces/reel)

Order by number of reels.

■ Connector Dimensions Diagram (Leadless Type termination)



- Notes
- ① The coplanarity of each terminal lead is within 0.1.
 - ② The contact terminal lead position indicates the dimension from the E surface, the bottom surface of the insulator body.
 - 3 Any discoloration of the plastic compound will NOT AFFECT form, fit or function of the connector.

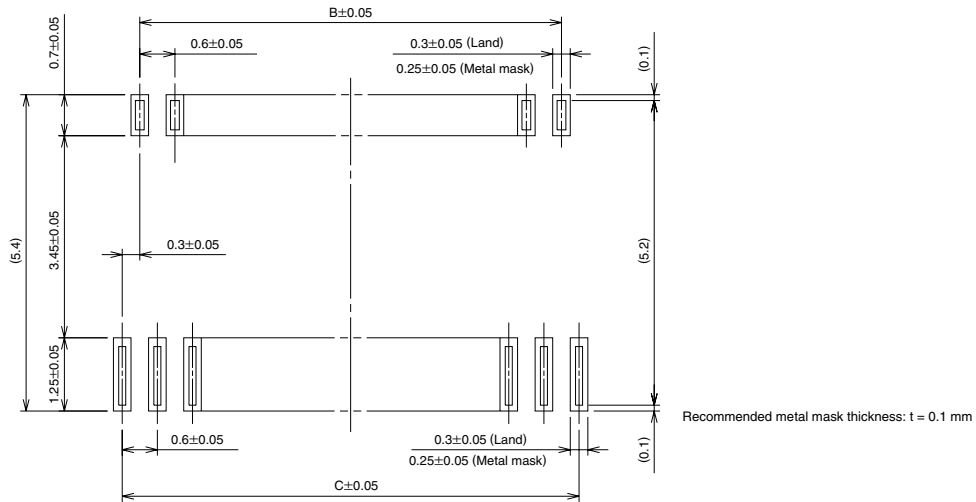
Leadless Type

Unit: mm

| Part Number | CL No. | Number of Contacts | A | B | C | D |
|----------------------|---------------|--------------------|------|------|------|-------|
| FH23-15S-0.3SHAW(51) | 586-1316-7-51 | 15 | 7 | 3.6 | 4.2 | 4.83 |
| FH23-17S-0.3SHAW(51) | 586-1301-0-51 | 17 | 7.6 | 4.2 | 4.8 | 5.43 |
| FH23-21S-0.3SHAW(51) | 586-1315-4-51 | 21 | 8.8 | 5.4 | 6 | 6.63 |
| FH23-23S-0.3SHAW(51) | 586-1325-8-51 | 23 | 9.4 | 6 | 6.6 | 7.23 |
| FH23-25S-0.3SHAW(51) | 586-1323-2-51 | 25 | 10 | 6.6 | 7.2 | 7.83 |
| FH23-27S-0.3SHAW(51) | 586-1309-1-51 | 27 | 10.6 | 7.2 | 7.8 | 8.43 |
| FH23-31S-0.3SHAW(51) | 586-1303-5-51 | 31 | 11.8 | 8.4 | 9 | 9.63 |
| FH23-33S-0.3SHAW(51) | 586-1305-0-51 | 33 | 12.4 | 9 | 9.6 | 10.23 |
| FH23-39S-0.3SHAW(51) | 586-1307-6-51 | 39 | 14.2 | 10.8 | 11.4 | 12.03 |
| FH23-45S-0.3SHAW(51) | 586-1319-5-51 | 45 | 16 | 12.6 | 13.2 | 13.83 |
| FH23-51S-0.3SHAW(51) | 586-1313-9-51 | 51 | 17.8 | 14.4 | 15 | 15.63 |
| FH23-61S-0.3SHAW(51) | 586-1311-3-51 | 61 | 20.8 | 17.4 | 18 | 18.63 |
| FH23-71S-0.3SHAW(51) | 586-1321-7-51 | 71 | 23.8 | 20.4 | 21 | 21.63 |

Note: Embossed tape reel packaging(2,500 pieces/reel)
Order by number of reels.

◆ Recommended PCB Land and Metal Mask Dimensions (Lead Type)



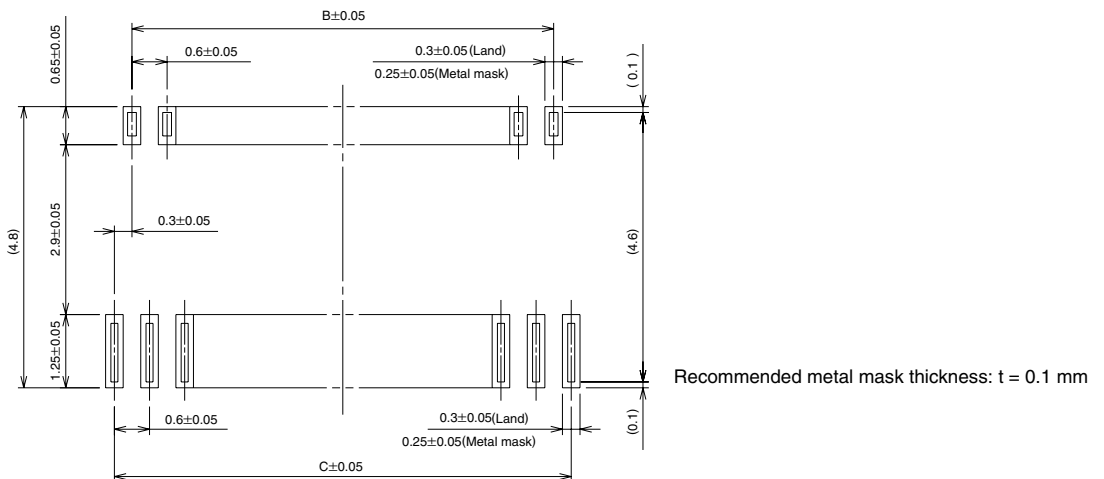
Lead Type

Unit: mm

| Part Number | CL No. | Number of Contacts | B | C | G |
|---------------------|---------------|--------------------|-----|-----|-----|
| FH23-15S-0.3SHW(51) | 586-1317-0-51 | 15 | 3.6 | 4.2 | 4.8 |
| FH23-17S-0.3SHW(51) | 586-1300-7-51 | 17 | 4.2 | 4.8 | 5.4 |
| FH23-21S-0.3SHW(51) | 586-1314-1-51 | 21 | 5.4 | 6 | 6.6 |
| FH23-23S-0.3SHW(51) | 586-1324-5-51 | 23 | 6 | 6.6 | 7.2 |
| FH23-25S-0.3SHW(51) | 586-1322-0-51 | 25 | 6.6 | 7.2 | 7.8 |
| FH23-27S-0.3SHW(51) | 586-1308-9-51 | 27 | 7.2 | 7.8 | 8.4 |
| FH23-31S-0.3SHW(51) | 586-1302-2-51 | 31 | 8.4 | 9 | 9.6 |

| Part Number | CL No. | Number of Contacts | B | C | G |
|---------------------|---------------|--------------------|------|------|------|
| FH23-33S-0.3SHW(51) | 586-1304-8-51 | 33 | 9 | 9.6 | 10.2 |
| FH23-39S-0.3SHW(51) | 586-1306-3-51 | 39 | 10.8 | 11.4 | 12 |
| FH23-45S-0.3SHW(51) | 586-1318-2-51 | 45 | 12.6 | 13.2 | 13.8 |
| FH23-51S-0.3SHW(51) | 586-1312-6-51 | 51 | 14.4 | 15 | 15.6 |
| FH23-61S-0.3SHW(51) | 586-1310-0-51 | 61 | 17.4 | 18 | 18.6 |
| FH23-71S-0.3SHW(51) | 586-1320-4-51 | 71 | 20.4 | 21 | 21.6 |

◆ Recommended Land and Metal Mask Dimensions (Leadless Type)



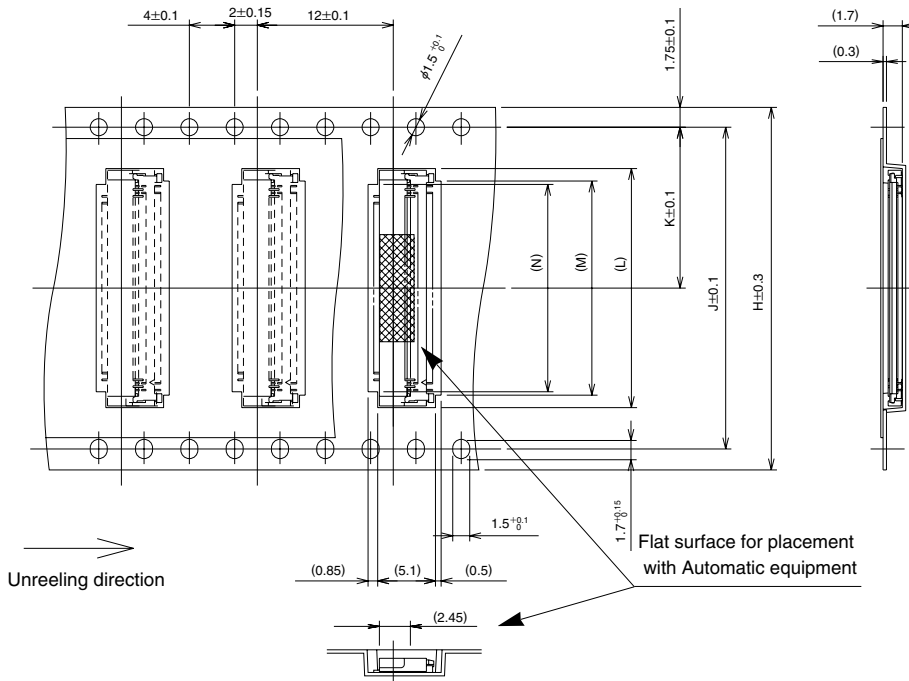
Leadless Type

Unit: mm

| Part Number | CL No. | Number of Contacts | B | C | G |
|----------------------|---------------|--------------------|-----|-----|-----|
| FH23-15S-0.3SHAW(51) | 586-1316-7-51 | 15 | 3.6 | 4.2 | 4.8 |
| FH23-17S-0.3SHAW(51) | 586-1301-0-51 | 17 | 4.2 | 4.8 | 5.4 |
| FH23-21S-0.3SHAW(51) | 586-1315-4-51 | 21 | 5.4 | 6 | 6.6 |
| FH23-23S-0.3SHAW(51) | 586-1325-8-51 | 23 | 6 | 6.6 | 7.2 |
| FH23-25S-0.3SHAW(51) | 586-1323-2-51 | 25 | 6.6 | 7.2 | 7.8 |
| FH23-27S-0.3SHAW(51) | 586-1309-1-51 | 27 | 7.2 | 7.8 | 8.4 |
| FH23-31S-0.3SHAW(51) | 586-1303-5-51 | 31 | 8.4 | 9 | 9.6 |

| Part Number | CL No. | Number of Contacts | B | C | G |
|----------------------|---------------|--------------------|------|------|------|
| FH23-33S-0.3SHAW(51) | 586-1305-0-51 | 33 | 9 | 9.6 | 10.2 |
| FH23-39S-0.3SHAW(51) | 586-1307-6-51 | 39 | 10.8 | 11.4 | 12 |
| FH23-45S-0.3SHAW(51) | 586-1319-5-51 | 45 | 12.6 | 13.2 | 13.8 |
| FH23-51S-0.3SHAW(51) | 586-1313-9-51 | 51 | 14.4 | 15 | 15.6 |
| FH23-61S-0.3SHAW(51) | 586-1311-3-51 | 61 | 17.4 | 18 | 18.6 |
| FH23-71S-0.3SHAW(51) | 586-1321-7-51 | 71 | 20.4 | 21 | 21.6 |

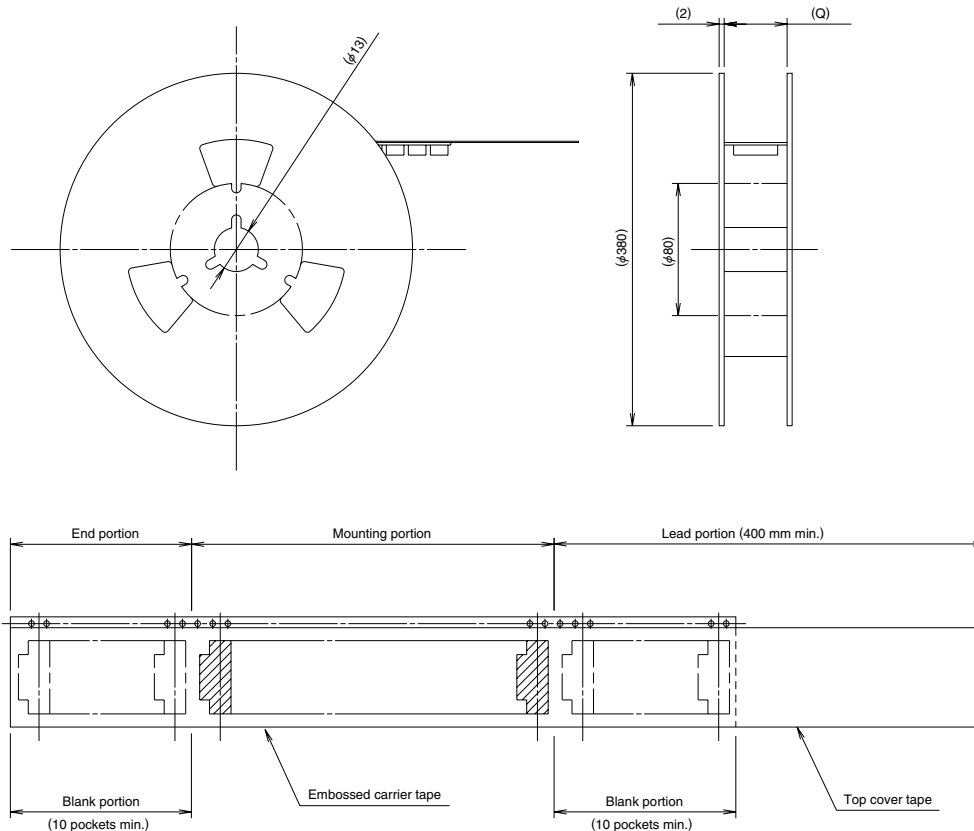
● Embossed Carrier Tape Dimensions (Tape width of 32 mm min.)



Unit: mm

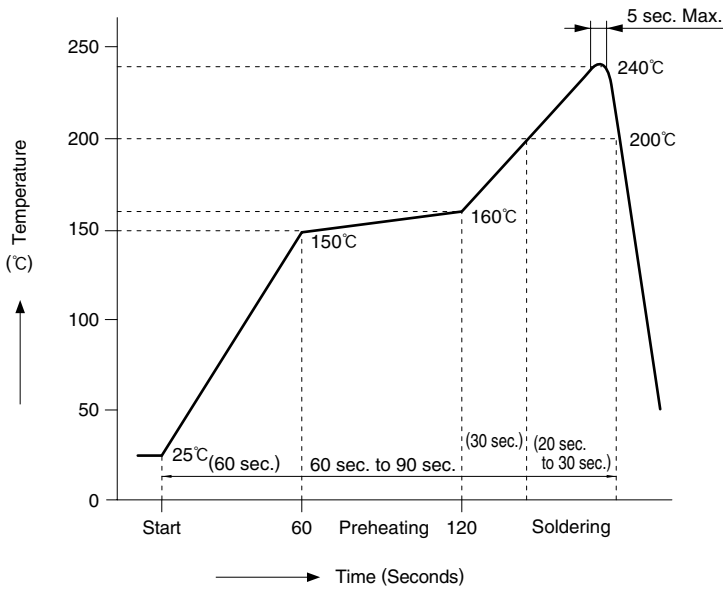
| Part Number | CL No. | Number of Contacts | H | J | K | L | M | N | Q |
|----------------------|---------------|--------------------|----|------|------|------|------|------|------|
| FH23-61S-0.3SHW(51) | 586-1310-0-51 | 61 | 32 | 28.4 | 14.2 | 21.1 | 18.9 | 18.3 | 32.5 |
| FH23-61S-0.3SHAW(51) | 586-1311-3-51 | | | | | | | | |
| FH23-71S-0.3SHW(51) | 586-1320-4-51 | 71 | 44 | 40.4 | 20.2 | 24.1 | 21.9 | 21.3 | 44.5 |
| FH23-71S-0.3SHAW(51) | 586-1321-7-51 | | | | | | | | |

● Reel Dimensions



◆ Recommended Temperature Profile

● Using Typical Solder Paste

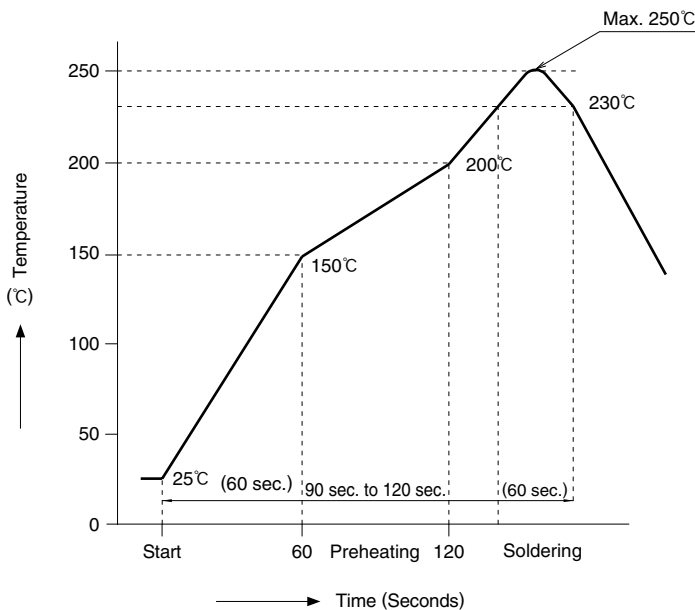


HRS test conditions

| | |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Solder method | :Reflow, IR/hot air (Nihon Den-netsu Co., Ltd.'s Part Number: SENSBY NR- II) |
| Environment | :Room air |
| Solder composition | :Paste, 63%Sn/37%Pb (Senju Metal Industry, Co., Ltd.'s Part Number: OZ63-201C-50-9) |
| Test board | :Glass epoxy 45mm×100mm×1.6mm thick |
| Land dimensions | :Lead type 0.3mm×1.25mm, 0.3mm×0.7mm Leadless type 0.3mm×1.25mm, 0.3mm×0.65mm |
| Metal mask | :Lead type 0.25mm×1.25mm×0.1mm thick 0.25mm×0.7mm×0.1mm thick Leadless type 0.25mm×1.25mm×0.1mm thick 0.25mm×0.65mm×0.1mm thick |

This temperature profile is 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.

● Using Lead-free Solder paste



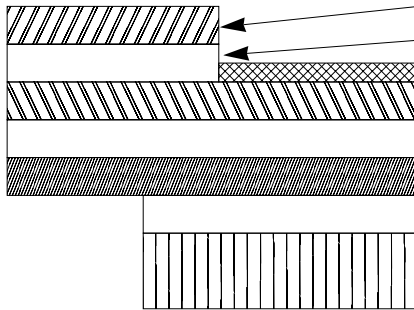
HRS test condition

| | |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Solder method | :Reflow, IR/hot air (Nihon Den-netsu Co., Ltd.'s Part Number: SENSBY NR- II) |
| Environment | :Room air |
| Solder composition | :Paste, 96.5%Sn/3.0%Ag/0.5%Cu (Senju Metal Industry, Co., Ltd.'s Part Number: M705-221CM5-42-10.5) |
| Test board | :Glass epoxy 45mm×100mm×1.6mm thick |
| Land dimensions | : Lead type 0.3mm×1.25mm, 0.3mm×0.7mm Leadless type 0.3mm×1.25mm, 0.3mm×0.65mm |
| Metal mask | : Lead type 0.25mm×1.25mm×0.1mm thick 0.25mm×0.7mm×0.1mm thick Leadless type 0.25mm×1.25mm×0.1mm thick 0.25mm×0.65mm×0.1mm thick |

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.

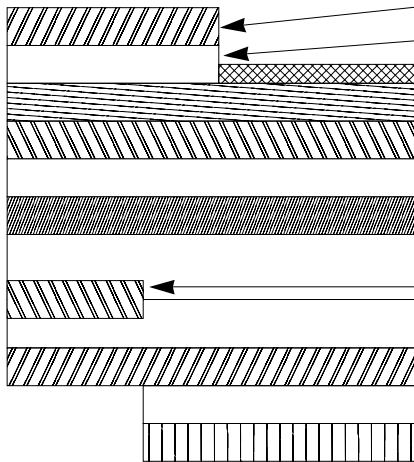
◆FH23 Series FPC Construction (Recommended Specifications)

1. Using Single-sided FPC



| Material Name | Material | Thickness (μm) |
|---------------------------------|------------------------|----------------|
| Covering film layer. | Polyamide 1 mil thick. | 25 |
| Cover adhesive | | 25 |
| Surface treatment | Tin-lead plating | 5 |
| Copper foil | Cu 1oz | 35 |
| Base adhesive | | 25 |
| Base film | Polyamide 1 mil thick | 25 |
| Reinforcement material adhesive | Heat-hardened adhesive | 30 |
| Stiffener | Polyamide 3 mil thick | 75 |
| Total | | 195 |

2. Using Double-sided FPC



| Material Name | Material | Thickness (μm) |
|---------------------------------|------------------------|----------------|
| Covering layer film | Polyamide 1 mil thick | 25 |
| Cover adhesive | | 25 |
| Surface treatment | Tin-lead plating | 5 |
| Through-hole copper | Cu | 15 |
| Copper foil | Cu 1/2oz | 18 |
| Base adhesive | | 18 |
| Base film | Polyamide 1 mil thick | 25 |
| Base adhesive | | 18 |
| Copper foil | Cu 1/2oz | 18 |
| Cover adhesive | | 25 |
| Covering layer film | Polyamide 1 mil thick | 25 |
| Reinforcement material adhesive | Heat-hardened adhesive | 25 |
| Stiffener | Polyamide 1 mil thick | 25 |
| Total | | 199 |

3. Precautions

Note : Recommended specification for FPC 0.2±0.03 mm thick.

FPC/FFC Manufactures' Contact List

Sumitomo Bakelite Co., Ltd. Flexible Printed Circuit Board Division
5-8, Higashi-shinagawa 2-chome, Shinagawa-ku, Tokyo, Japan

TEL:+81 3 5462 4191
FAX:+81 3 5462 4882

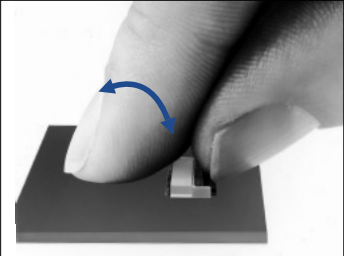
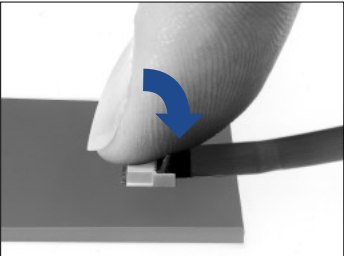
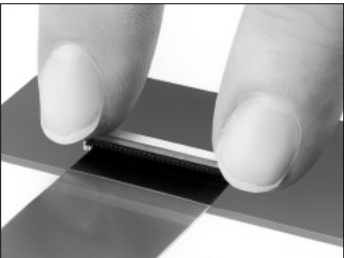
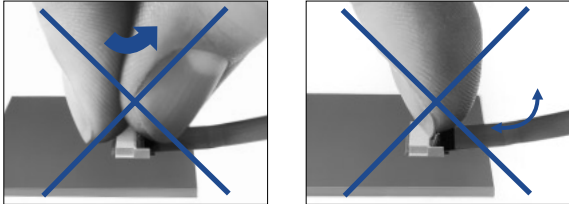
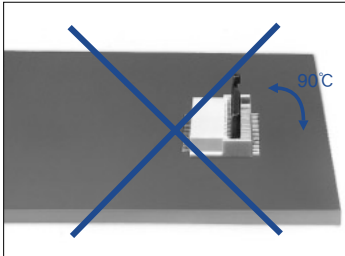
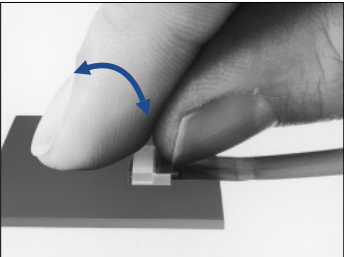
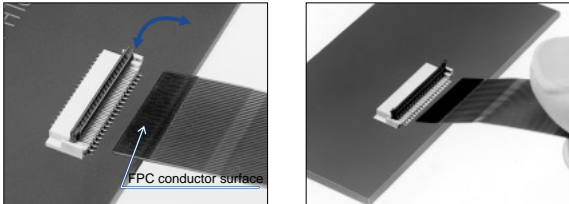
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1-5-1, Kiba, Koto-ku, Tokyo, Japan

TEL:+81 3 5606 1165
FAX:+81 3 5606 1530

NOK Corporation Sales Division Overseas Business Department
1-12-15, Shiba-Daimon, Minato-ku, Tokyo, Japan

TEL:+81 3 3432 6976/8415
FAX:+81 3 3432 3919

◆ Connector Operating Instructions, precautions and recommendations

| Operation | Precautions |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1.FPC Termination procedure. Connector installed on the board.</p> <p>1) Lift up the actuator. Use thumb or index finger.</p>  <p>2) Rotate down the actuator until firmly closed. NOTE: The FPC must be fully inserted in the connector. If not fully inserted, the actuator will not close properly. Should this be the case, lift up the actuator (per Step 2 below) and repeat the process (starting with Step 1 above)</p>  <p>3) For connectors with multiple contacts, such as 39 and 61 pos. rotate down the actuator pushing at both ends.</p>  | <p>1) Do not apply excessive force or use any type of tool to operate the actuator.</p>  <p>2) The connector will assure reliable performance when the actuator is open to 90° maximum (see fig.1) Do not exceed this angle, as this may cause permanent damage to the connector.</p>  <p>3) Assure that the FPC is fully inserted parallel to mounting surface, with the exposed conductive traces facing down.</p> |
| <p>2.FPC Removal</p> <p>1) Lift up the actuator. 2) Carefully remove the FPC.</p>  |  |