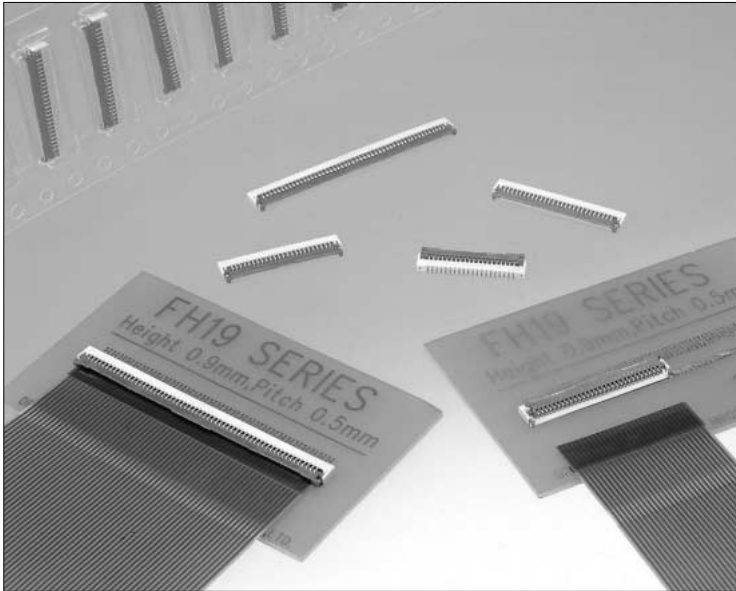
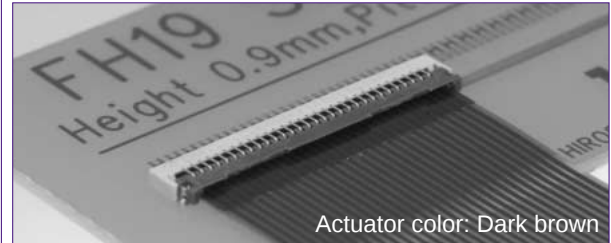


# World's smallest & lightest 0.5mm pitch, 0.9mm above the board, Flexible Printed Circuit & Flexible Flat Cable Connectors

## FH19 & FH19S Series



FH19 Series – FPC, FFC thickness:  $0.2 \pm 0.03\text{mm}$



FH19S Series – FPC, FFC thickness:  $0.3 \pm 0.03\text{mm}$



### ■ Features

#### World's smallest & lightest

#### 1. Low-profile 0.5mm pitch FPC, FFC Connectors

Miniaturization of portable equipment and personal mobile devices has created increased demand for a low profile, high density, and high reliability connectors.

\*The design of this connector has been made thinner and smaller, with a height of 0.9mm and width of 3mm.

[As of August 2002, this is the smallest connector of this type available on the market !]

\*PCB footprint: Reduced approximately 48% (as compared with Hirose Electric's 0.5mm pitch FH12 Series connectors)

\*Connector weight: Reduced approximately 78% (as compared with Hirose Electric's 0.5mm pitch FH12 Series connectors)

#### 2. Conductive traces on the PCB can be designed to run under the connector

All bottom surface of the connector is solid, without any exposure of the contact.

#### 3. Proven Flip-Lock Actuator System assures easy and reliable operation

Rotating actuator permits easy insertion and reliable connection with the FPC & FFC.

Tactile sensation confirms complete mechanical locking of the actuator and the electrical connection.

#### 4. Accepts 0.2mm & 0.3mm thick FPC, FFC

Accepts 0.2mm & 0.3mm thick FPC, FFC, easy inserted in the connector.

The connector will also terminate successfully with 0.2mm thick Flat Flexible Cable (FFC).

#### 5. Designed for placement with automatic equipment

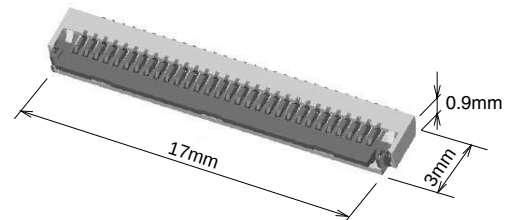
Packaged in embossed tape, on reel.

One reel contains 5,000 pieces.

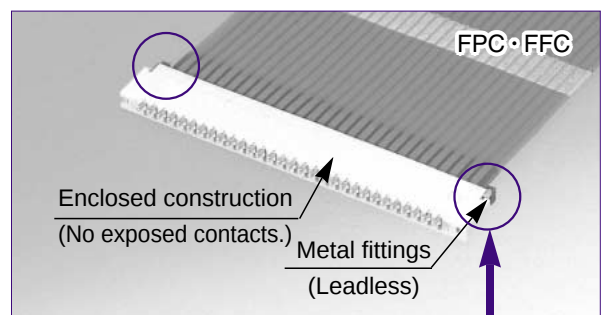
#### 6. Environmental considerations

Plating is lead-free. In addition, the center cores of the embossed tape reels are made of paper, unlike typical cores made of styrofoam.

#### ● 0.9mm Height incorporates the Flip-Lock System (30pos. Type)



#### ● Enclosed construction



#### ● Metal Fittings (Leadless Type)

Absence of protrusions from the connector helps in design of miniaturized devices.



### ■ Applications

Notebook PC's, PDA's, digital cameras and other compact devices requiring interconnections of the main circuit board with the LCD, plasma display (PDP), HDD or other devices.

## ■Product Specifications

|                         |                         |                                                                          |                                                      |
|-------------------------|-------------------------|--------------------------------------------------------------------------|------------------------------------------------------|
| Rating                  | Current rating 0.5 A DC | Operating temperature range<br>-55°C to +80°C (Note 1)                   | Storage temperature range<br>-10°C to +50°C (Note 2) |
|                         | Voltage rating 50 V AC  | Operating humidity range<br>Relative humidity 90% max. (No condensation) | Storage humidity range<br>Relative humidity 90% max. |
| Recommended<br>FPC, FFC | FH19 Series             | Thickness: = 0.2 ± 0.03mm tinned copper or pure tin plating (Note 3)     |                                                      |
|                         | FH19S Series            | Thickness: = 0.3 ± 0.03mm tinned copper or pure tin plating (Note 3)     |                                                      |

| Item                                     | Specification                                                                                                                   | Conditions                                                                                                           |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| 1. Insulation resistance                 | 500 M ohms min.                                                                                                                 | 100 V DC                                                                                                             |
| 2. Withstanding voltage                  | No flashover or insulation breakdown                                                                                            | 150 V AC/1 minute                                                                                                    |
| 3. Contact resistance                    | 100 m ohms max.<br>*Including FPC/FFC conductor resistance                                                                      | 1 mA                                                                                                                 |
| 4. Durability<br>(insertion/ withdrawal) | Contact resistance: 100 m ohms max.<br>No damage, cracks, or parts dislocation.                                                 | 20 cycles                                                                                                            |
| 5. Vibration                             | No electrical discontinuity of 1 μs or more.<br>Contact resistance: 100 m ohms max.<br>No damage, cracks, or parts dislocation. | Frequency: 10 to 55 Hz, single amplitude of 0.75mm, 2 hours in each of the 3 directions                              |
| 6. Shock                                 | No electrical discontinuity of 1 μs. min.<br>Contact resistance: 100 m ohms max.<br>No damage, cracks, or parts dislocation.    | Acceleration of 981 m/s <sup>2</sup> , 6 ms duration, sine half-wave waveform, 3 cycles in each of the 3 axis.       |
| 7. Humidity<br>(Steady state)            | Contact resistance: 100 m ohms max.<br>Insulation resistance: 100 M ohms min.<br>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.<br>Insulation resistance: 100 M ohms min.<br>No damage, cracks, or parts dislocation.       | Temperature: -40°C → +15°C to +35°C → +85°C → +15°C to +35°C<br>Time: 30 → 2 to 3 → 30 → 2 to 3(Minutes)<br>5 cycles |
| 9. Resistance to<br>soldering heat       | No deformation of components affecting performance.                                                                             | Reflow: At the recommended temperature profile<br>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

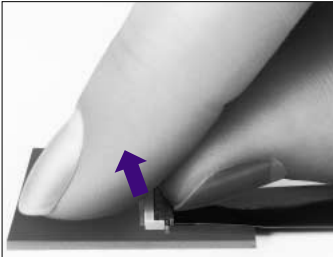
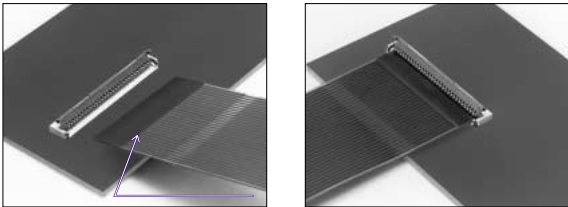
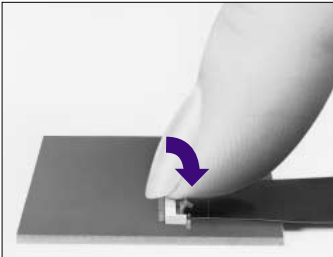
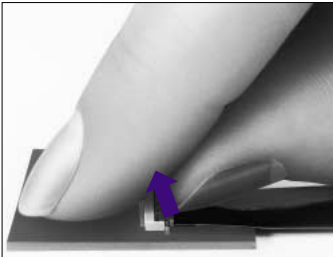
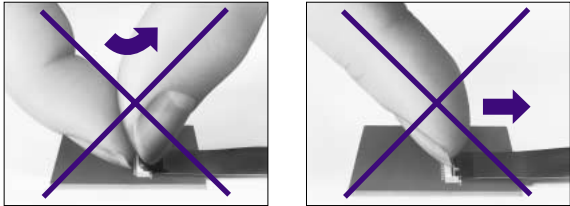
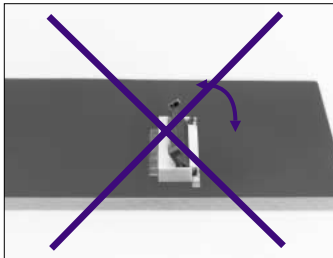
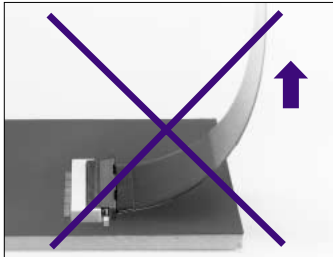
| Part           | Material        | Finish                                                         | Remarks |
|----------------|-----------------|----------------------------------------------------------------|---------|
| Insulator      | LCP             | Color: Beige                                                   | UL94V-0 |
|                | PPS             | Color: Dark brown (FH19 Series)<br>Color: Black (FH19S Series) |         |
| Contacts       | Phosphor bronze | Pure tin plating (Note 3)                                      | —       |
| Metal fittings | Phosphor bronze | Pure tin reflow plating                                        | —       |

## ■Ordering information

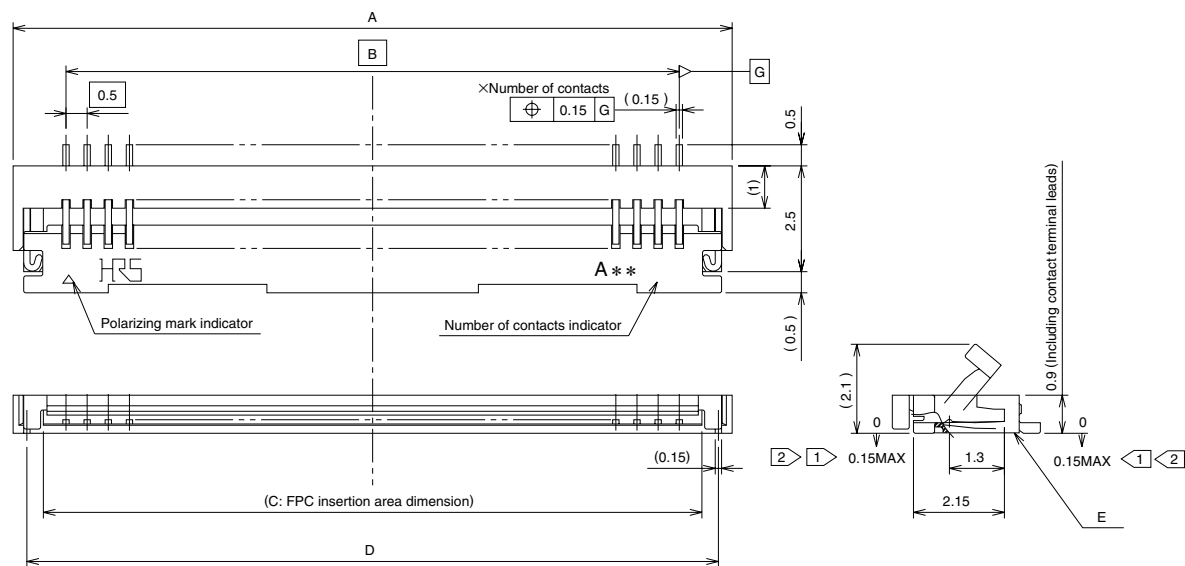
**FH19    S   -   30S   -   0.5   SH   (05)**

|                     |                                                        |                                                     |                                               |
|---------------------|--------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------|
| ① Series name :     | FH19                                                   | ④ Contact pitch :                                   | 0.5mm                                         |
| ② Blank :<br>S :    | FPC,FFC thickness : 0.2mm<br>FPC,FFC thickness : 0.3mm | ⑤ Terminal type<br>SH: SMT horizontal mounting type |                                               |
| ③ No. of contacts : | 4,9,13,17,20,27,30,(40,50)                             | ⑥ Plating specifications :                          | Blank: Pure tin plating<br>(05): Gold plating |

## ◆ Connector Operation Method and Precautions

| Operation Method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Precautions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>1. FPC termination procedure. Connector installed on the board</b></p> <p>① Lift up the actuator.<br/>Use thumb or index finger.</p>  <p>② Insert with the FPC parallel to the mounting surface, with the exposed conductive traces facing down.</p>  <p>③ Rotate down the actuator until firmly closed.<br/>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><b>2. FPC Extraction Method</b></p> <p>① Lift up the actuator. Carefully remove the FPC.</p>  | <p>① The actuator is designed to withstand normal opening/closing operation. However, care should be taken not to use excessive force or grasping it with any type of tool.</p>  <p>② The actuator of the FH19 Series connector is designed to open no more than 130°. Do not apply force to make the actuator open more than 130°!<br/>This may break or disconnect the actuator!</p>  <p>③ Do not apply pull forces on the FPC, especially in the upward direction.<br/>If needed, secure the FPC to avoid transfer of pull forces to the terminated connector.</p>  |

# ■ Connector Dimension [FH19 Series]



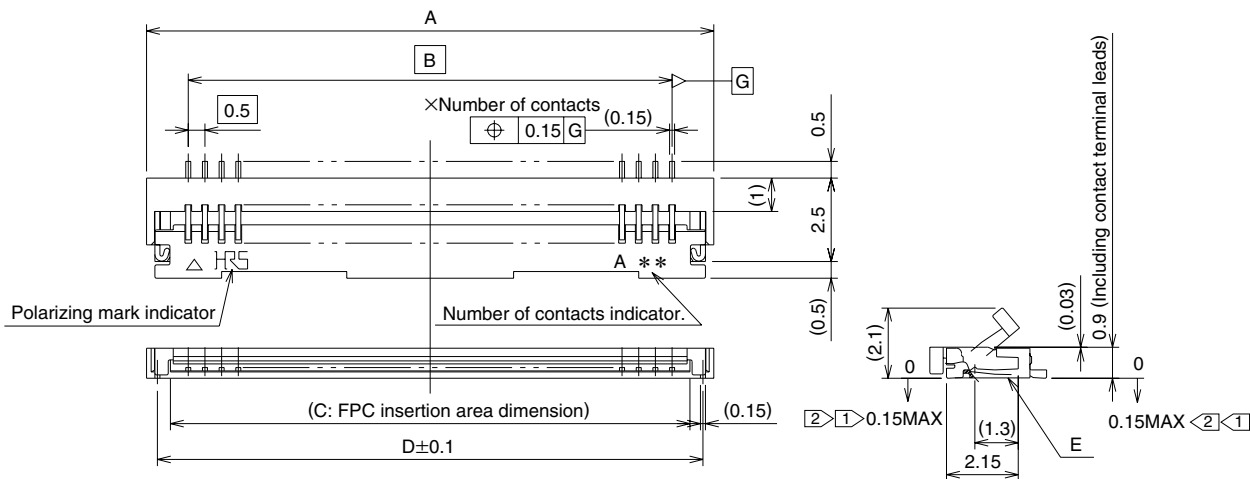
- Notes
- ① The coplanarity of each terminal lead and metal fitting is within 0.1
  - ② The contact terminal lead position indicates the dimension from the E surface, the bottom surface of the insulator body.
  - ③ The connector is supplied in embossed tape packaging. For details see the Packaging Specifications Diagram on Page 6.
  - ④ Any discoloration of the plastic compound will NOT AFFECT form, fit or function of the connector.

Unit: mm

| Part Number    | CL No.                         | Number of Contacts | A    | B    | C     | D     |
|----------------|--------------------------------|--------------------|------|------|-------|-------|
| FH19-4S-0.5SH  | 586-1009-8                     | 4                  | 4.0  | 1.5  | 2.57  | 3.35  |
| FH19-9S-0.5SH  | 586-1006-0                     | 9                  | 6.5  | 4.0  | 5.07  | 5.85  |
| FH19-13S-0.5SH | 586-1001-6                     | 13                 | 8.5  | 6.0  | 7.07  | 7.85  |
| FH19-17S-0.5SH | 586-1007-2                     | 17                 | 10.5 | 8.0  | 9.07  | 9.85  |
| FH19-20S-0.5SH | 586-1002-9                     | 20                 | 12.0 | 9.5  | 10.57 | 11.35 |
| FH19-24S-0.5SH | 586-1011-0                     | 24                 | 14.0 | 11.5 | 12.57 | 13.35 |
| FH19-27S-0.5SH | 586-1000-3                     | 27                 | 15.5 | 13.0 | 14.07 | 14.85 |
| FH19-30S-0.5SH | 586-1003-1                     | 30                 | 17.0 | 14.5 | 15.57 | 16.35 |
| FH19-40S-0.5SH | Reserved for product expansion | 40                 | 22.0 | 19.5 | 20.57 | 21.35 |
| FH19-50S-0.5SH | Reserved for product expansion | 50                 | 27.0 | 24.5 | 25.57 | 26.35 |

Note: Embossed tape reel packaging (5,000 pieces/reel) .  
 Order by number of reels.

[FH19S Series]



Notes 1 The coplanarity of each terminal lead and metal fitting 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 The connector is supplied in embossed tape packaging. For details see the Packaging Specifications Diagram on Page 6.

4 Any discoloration of the plastic compound will NOT AFFECT form, fit or function of the connector.

Unit: mm

| Part Number     | CL No.                         | Number of Contacts | A    | B    | C     | D     |
|-----------------|--------------------------------|--------------------|------|------|-------|-------|
| FH19S-12S-0.5SH | 586-1105-1                     | 12                 | 8.0  | 5.5  | 6.57  | 7.35  |
| FH19S-17S-0.5SH | 586-1100-8                     | 17                 | 10.5 | 8.0  | 9.07  | 9.85  |
| FH19S-18S-0.5SH | Reserved for product expansion | 18                 | 11.0 | 8.5  | 9.57  | 10.35 |
| FH19S-20S-0.5SH | 586-1101-0                     | 20                 | 12.0 | 9.5  | 10.57 | 11.35 |
| FH19S-22S-0.5SH | Reserved for product expansion | 22                 | 13.0 | 10.5 | 11.57 | 12.35 |
| FH19S-24S-0.5SH | 586-1102-3                     | 24                 | 14.0 | 11.5 | 12.57 | 13.35 |
| FH19S-26S-0.5SH | 586-1104-9                     | 26                 | 15.0 | 12.5 | 13.57 | 14.35 |
| FH19S-27S-0.5SH | 586-1103-6                     | 27                 | 15.5 | 13.0 | 14.07 | 14.85 |
| FH19S-50S-0.5SH | Reserved for product expansion | 50                 | 27.0 | 24.5 | 25.57 | 26.35 |

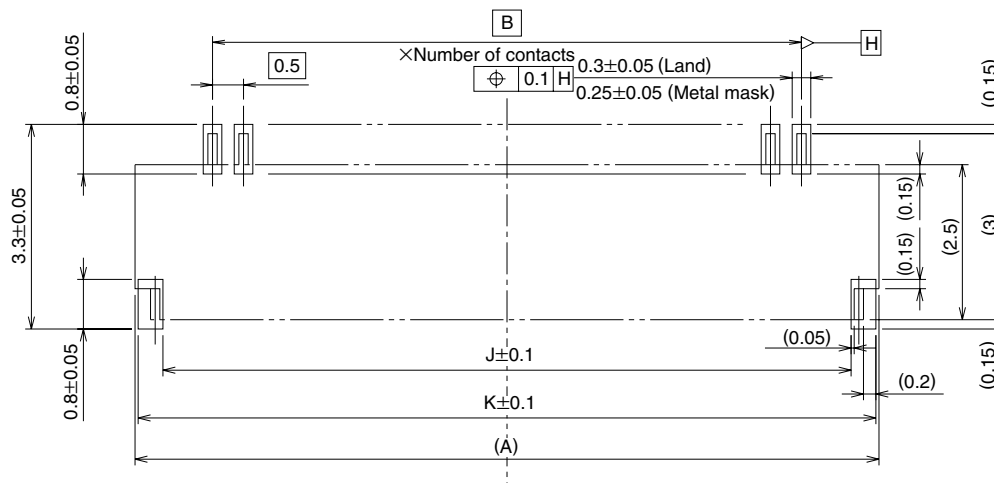
Note: Embossed tape reel packaging (5,000 pieces/reel) .

Order by number of reels.

## ◆ Recommended PCB Land and Metal Mask Dimensions

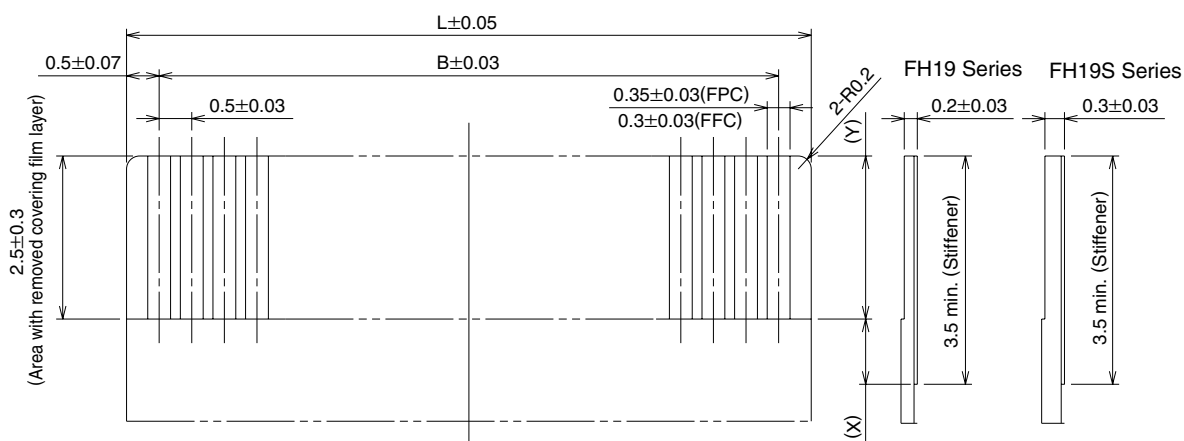
[Common to FH19 & FH19S Series]

Recommended metal mask thickness: 0.10 mm.



## ◆ Recommended FPC, FFC Dimensions

[Common to FH19 & FH19S Series]



Note1: Polyamide and a thermally hardened adhesive is recommended as the materials for the stiffener.

Note2: Y dimension should be 1.5mm min., and X dimension should be 0.5mm for improved flexibility of FPC.

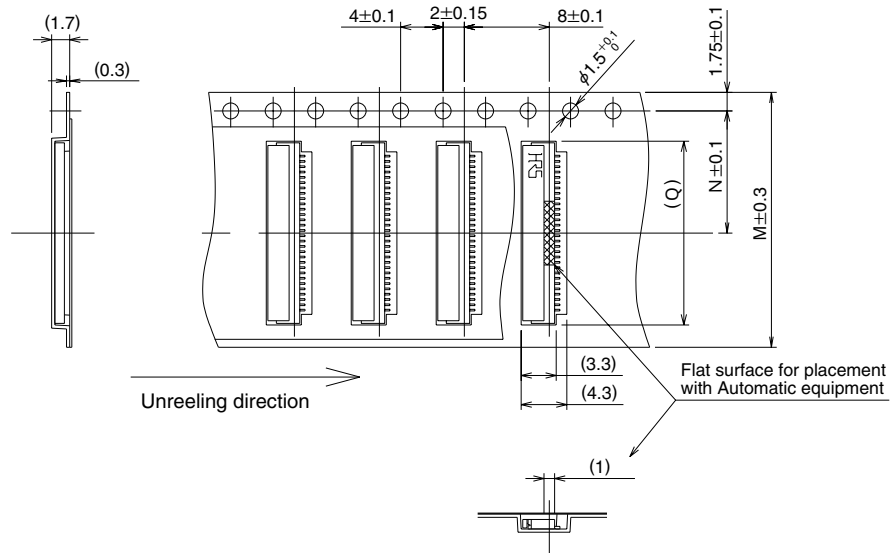
Unit: mm

| Number of Contacts | A    | B    | J    | K    | L    |
|--------------------|------|------|------|------|------|
| 4                  | 4.0  | 1.5  | 3.1  | 3.9  | 2.5  |
| 9                  | 6.5  | 4.0  | 5.6  | 6.4  | 5.0  |
| 12                 | 8.0  | 5.5  | 7.1  | 7.9  | 6.5  |
| 13                 | 8.5  | 6.0  | 7.6  | 8.4  | 7.0  |
| 17                 | 10.5 | 8.0  | 9.6  | 10.4 | 9.0  |
| 18                 | 11.0 | 8.5  | 10.4 | 10.9 | 9.5  |
| 20                 | 12.0 | 9.5  | 11.1 | 11.9 | 10.5 |
| 22                 | 13.0 | 10.5 | 12.1 | 12.9 | 11.5 |
| 24                 | 14.0 | 11.5 | 13.1 | 13.9 | 12.5 |
| 26                 | 15.0 | 12.5 | 14.1 | 14.9 | 13.5 |
| 27                 | 15.5 | 13.0 | 14.6 | 15.4 | 14.0 |
| 30                 | 17.0 | 14.5 | 16.1 | 16.9 | 15.5 |
| 40                 | 22.0 | 19.5 | 21.1 | 21.9 | 20.5 |
| 50                 | 27.0 | 24.5 | 26.1 | 26.9 | 25.5 |

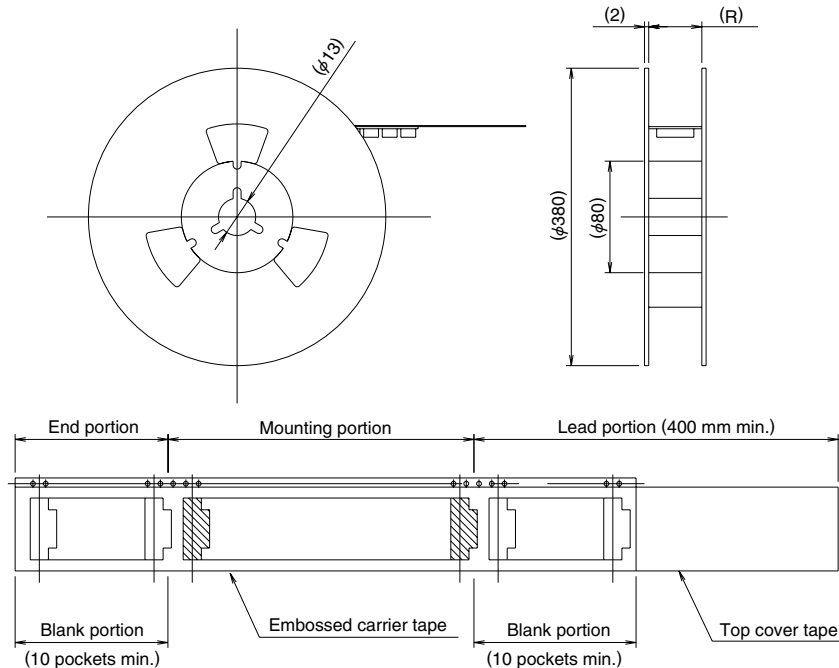
## ◆ Packaging Specifications

[Common to FH19 & FH19S Series]

### ● Embossed Carrier Tape Dimensions



### ● Reel Dimensions



Unit: mm

| Number of Contacts | M  | N    | Q    | R    |
|--------------------|----|------|------|------|
| 4                  | 16 | 7.5  | 4.3  | 16.5 |
| 9                  | 16 | 7.5  | 6.8  | 16.5 |
| 12                 | 16 | 7.5  | 8.3  | 16.5 |
| 13                 | 16 | 7.5  | 8.8  | 16.5 |
| 17                 | 24 | 11.5 | 10.8 | 24.5 |
| 18                 | 24 | 11.5 | 11.3 | 24.5 |
| 20                 | 24 | 11.5 | 12.3 | 24.5 |
| 22                 | 24 | 11.5 | 13.3 | 24.5 |
| 24                 | 24 | 11.5 | 14.3 | 24.5 |
| 26                 | 24 | 11.5 | 15.3 | 24.5 |
| 27                 | 24 | 11.5 | 15.8 | 24.5 |
| 30                 | 24 | 11.5 | 17.3 | 24.5 |
| 40                 | 44 | 20.2 | 22.3 | 44.5 |
| 50                 | 44 | 20.2 | 27.3 | 44.5 |

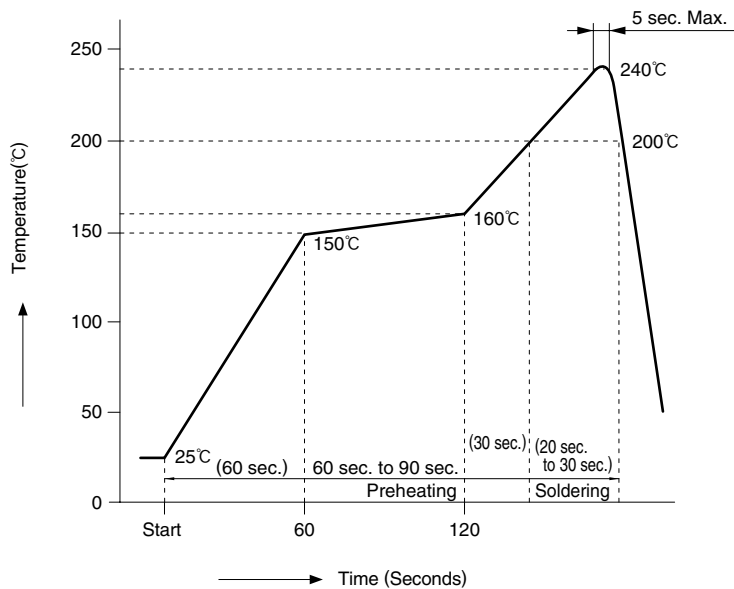
Notes: 5,000 pieces per reel.

Embossed tape 32 mm or wider will have perforated feed holes on two sides.

## ◆ Recommended Temperature Profile

[Common to FH19 & FH19S Series]

### ● Using Conventional Solder Paste



#### Applicable conditions

Reflow method : IR reflow

Solder : Paste type 63 Sn/37 Pb  
(Flux content 11/wt%)

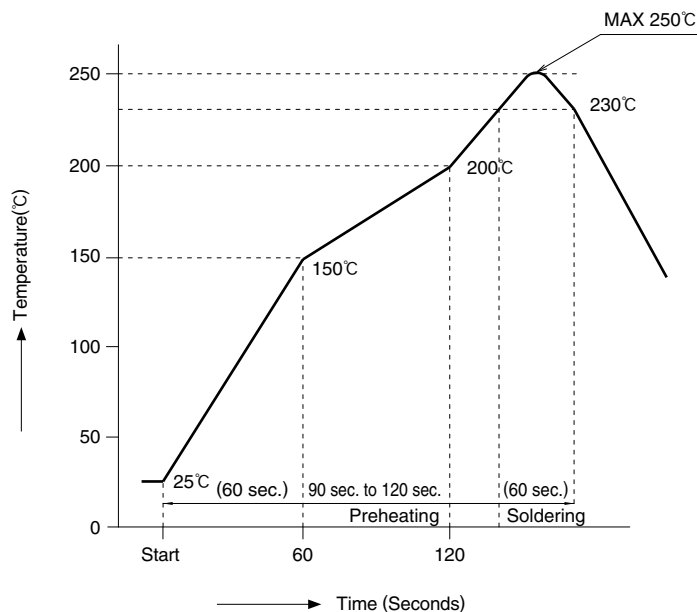
Test board : Glass epoxy 45 mm x 100 mm x 1.6 mm

Metal mask thickness : 0.1 mm

#### Recommended temperature profile.

The temperature may be slightly changed according to the solder paste type and amount.

### ● Using Lead-free Solder paste



#### Applicable Conditions

Reflow method : IR reflow

Solder : Paste type Sn/3.0Ag/0.5Cu  
(Flux content 11 wt%)

Test board : Glass epoxy 45 x 100 x 1.6 mm

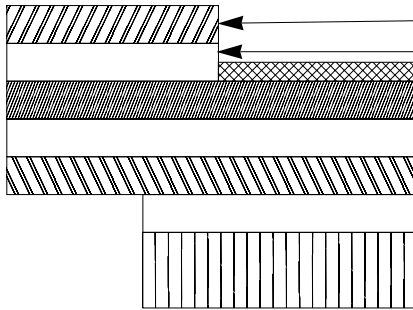
Metal mask thickness : 0.1 mm

#### Recommended temperature profile.

The temperature may be slightly changed according to the solder paste type and amount.

# ◆FH19 & FH19S Series FPC/FFC Construction (Recommended Specifications)

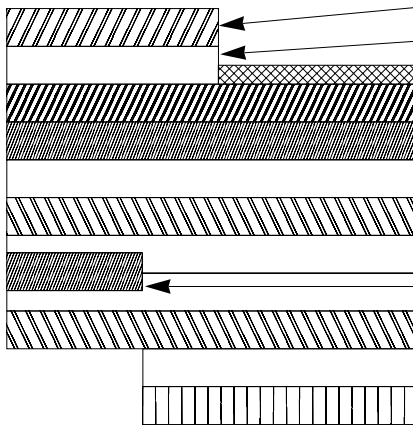
## 1. Using Single-sided FPC



### FPC : Flexible Printed Circuit

| Material Name                   | Material                                  | Thickness (μm) |       |
|---------------------------------|-------------------------------------------|----------------|-------|
|                                 |                                           | FH19           | FH19S |
| Covering film layer.            | Polyamide 1 mil thick                     | 25             | 25    |
| Cover adhesive                  |                                           | 25             | 25    |
| Surface treatment               | Tinned copper plating or pure tin plating | 5              | 5     |
| Copper foil                     | Cu 1oz                                    | 35             | 35    |
| Base adhesive                   |                                           | 25             | 25    |
| Base film                       | Polyamide 1 mil thick                     | 25             | 25    |
| Reinforcement material adhesive | Heat-hardened adhesive                    | 30             | 30    |
| Stiffener                       | Polyamide 3 mil thick                     | 75             | 175   |
| Total                           |                                           | 195            | 295   |

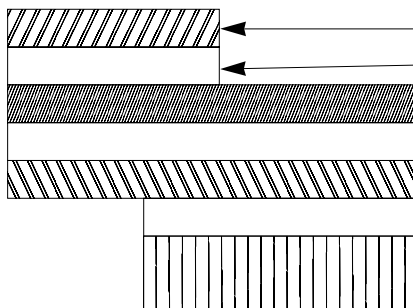
## 2. Dual-sided FPC



### FPC : Flexible Printed Circuit

| Material Name                   | Material                                  | Thickness (μm) |       |
|---------------------------------|-------------------------------------------|----------------|-------|
|                                 |                                           | FH19           | FH19S |
| Covering layer film             | Polyamide 1 mil thick                     | 25             |       |
| Cover adhesive                  |                                           | 25             |       |
| Surface treatment               | Tinned copper plating or pure tin plating | 5              | 5     |
| Through-hole copper             | Cu                                        | 15             | 15    |
| Copper foil                     | Cu 1/2oz                                  | 18             | 18    |
| Base adhesive                   |                                           | 18             | 18    |
| Base film                       | Polyamide 1 mil thick                     | 25             | 25    |
| Base adhesive                   |                                           | 18             | 18    |
| Copper foil                     | Cu 1/2oz                                  | 18             | 18    |
| Cover adhesive                  |                                           | 25             | 25    |
| Covering layer film             | Polyamide 1 mil thick                     | 25             | 25    |
| Reinforcement material adhesive | Heat-hardened adhesive                    | 25             | 50    |
| Stiffener                       | Polyamide 1 mil thick                     | 25             | 100   |
| Total                           |                                           | 199            | 299   |

## 3. Using FFC (Flexible Flat Cable)



### FFC : Flexible Flat Cable

| Material Name                | Material                     | Thickness (μm) |       |
|------------------------------|------------------------------|----------------|-------|
|                              |                              | FH19           | FH19S |
| Polyester film               |                              | 12             | 12    |
| Adhesive                     | Polyester thermoplastic type | 30             | 30    |
| Tin plated, soft copper film |                              | 35             | 35    |
| Adhesive                     | Polyester                    | 30             | 30    |
| Polyester                    |                              | 12             | 12    |
| Adhesive                     | Polyester                    | 30             | 30    |
| Stiffener                    | Polyester                    | 100            | 188   |
| Total                        |                              | 207            | 295   |

\* Practical tolerance of thickness dimension is  $\pm 20\mu\text{m}$  (i.e., 187 to  $227\mu\text{m}$ ).

Note 1: The 0.2mm thick FFC is the 0.3mm thick FFC with different stiffener.

Note 2: This specification is a recommendation for the FH19, FH19S Series connectors using FPC/FFC 0.2/0.3  $\pm 0.03\text{mm}$  thick.