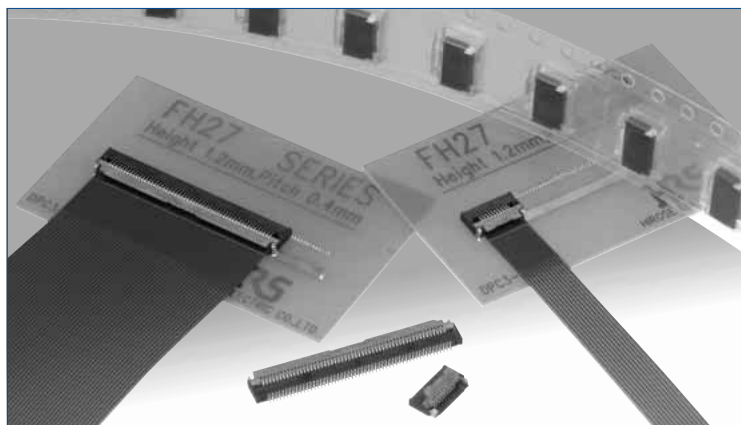


# 0.4 mm Contact Pitch, 1.2 mm above the board, Flexible Printed Circuit ZIF Connectors

## FH 27 Series



### Overview

Continuous miniaturization of personal mobile devices created a need for a low profile, high density interconnection system. In the same time, the demand for higher currents and higher reliability Flexible Printed Circuits has also increased. Hirose meets all these challenges with introduction of this connector.

### Features

#### 1. Low profile, small PCB mounting area, weight reduction

Protruding only 1.2 mm above the board the connector occupies 50% less area than comparable type having contacts spaced on 0.5 mm centers. Creative design, coupled with high manufacturing capabilities resulted in extremely low weight of the connector.

#### 2. Higher current carrying capacity

Contact spacing of 0.4 mm allows production of wider and simpler pattern of conductive traces on FPC.

#### 3. FPC temporary hold and verification of correct insertion

The connector has built-in FPC hold protrusions allowing the tactile feel of the correct FPC insertion and holding it in position before closing of the actuator.

#### 4. Uses standard 0.2 mm thick FPC

#### 5. One-finger operation of the actuator

Proven (in several other Hirose's connectors!) Flip-Lock rotating actuator assures reliable mechanical and electrical connection with FPC, confirming it with a definite tactile feel.

#### 6. Board placement with automatic equipment

Flat top surface and packaging on the tape-and-reel allows the use of vacuum nozzles. Standard reel contains 2,500 connectors.

#### 7. Environmental considerations

The center cores of the embossed tape reels are made of Styrofoam.

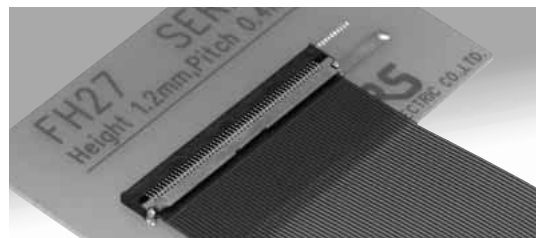
#### 8. Variety of contact positions

Available with 10, 40, 50, 54, 57 and 60 pos.

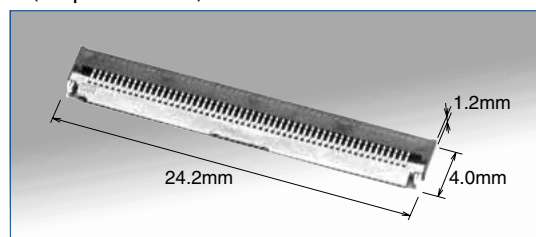
### Applications

Mobile phones, PDA's, digital cameras, digital video cameras, LCD connections, plasma displays (PDP), camera modules and other compact devices requiring Flexible Printed Circuit connections using high reliability ultra-small profile connectors

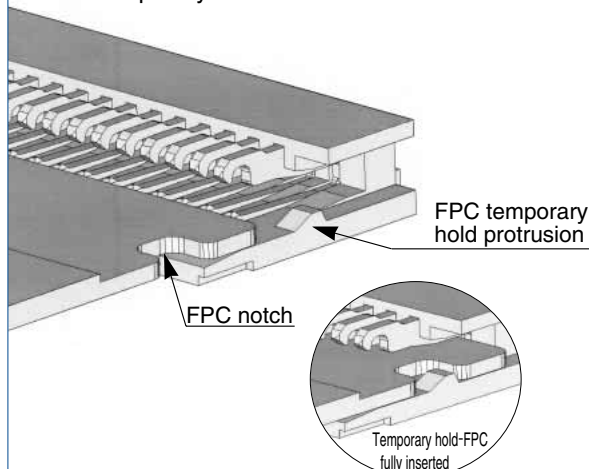
#### ●FPC thickness: $0.2 \pm 0.03$ mm



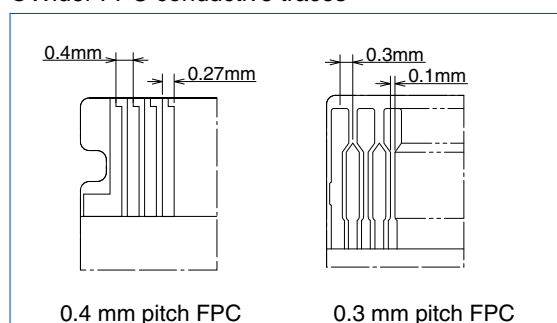
#### ●1.2 mm Height, actuator fully closed. (54 pos. shown)



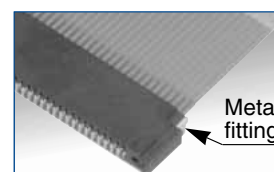
#### ●FPC temporary retention



#### ●Wider FPC conductive traces



Metal fittings on each side do not protrude out allowing side-by-side mounting of the connectors or closer component placement.



## Product Specifications

|        |                                                         |                                                                                                                                    |                                                                                                              |
|--------|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Rating | Rated current 0.4 A DC(Note 1)<br>Rated voltage 40 V AC | Operating temperature range<br>-55°C to +85°C (Note 2)<br>Operating humidity range<br>Relative humidity 90% max. (No condensation) | Storage temperature range<br>-10°C to +50°C (Note 3)<br>Storage humidity range<br>Relative humidity 90% max. |
|--------|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|

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

| Item                                     | Specification                                                                                                                | Conditions                                                                                                            |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| 1. Insulation resistance                 | 500 M Ω min.                                                                                                                 | 100 V DC                                                                                                              |
| 2. Withstanding voltage                  | No flashover or insulation breakdown.                                                                                        | 120 V AC /one minute                                                                                                  |
| 3. Contact resistance                    | 100 m Ω max.<br>* Including FPC conductor resistance                                                                         | 1 mA                                                                                                                  |
| 4. Durability<br>(insertion/ withdrawal) | Contact resistance: 100 m Ω 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 Ω max.<br>No damage, cracks, or parts dislocation. | Frequency: 10 to 55 Hz, single amplitude of 0.75 mm, 10 cycles in each of the 3 directions.                           |
| 6. Shock                                 | No electrical discontinuity of 1 μs. min.<br>Contact resistance: 100 m Ω max.<br>No damage, cracks, or parts dislocation.    | Acceleration of 981 m/s <sup>2</sup> , 6ms duration, sine half-wave waveform, 3 cycles / each of 3 axis               |
| 7. Humidity<br>(Steady state)            | Contact resistance: 100 m Ω max.<br>Insulation resistance: 50 M Ω min.<br>No damage, cracks, or parts dislocation.           | 96 hours at 40°C and humidity of 90% to 95%.RH                                                                        |
| 8. Temperature cycle                     | Contact resistance: 100 m Ω max.<br>Insulation resistance: 50 M Ω min.<br>No damage, cracks, or parts dislocation.           | Temperature: -55°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 soldering heat          | No deformation of components affecting performance.                                                                          | Reflow: At the recommended temperature profile<br>Manual soldering: 350°C±10°C for 5 seconds                          |

Note 1: When passing the current through all of the contacts, use 70% of the current rating.

Note 2: Includes temperature rise caused by current flow.

Note 3: 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.

## Materials

| Part           | Material        | Finish               | Remarks |
|----------------|-----------------|----------------------|---------|
| Insulator      | LCP             | Color: Black         | UL94V-0 |
| Actuator       | LCP             | Color: Brown         |         |
| Contacts       | Phosphor bronze | Gold plated (Note 3) | _____   |
| Metal fittings | Phosphor bronze | Tin plated           | _____   |

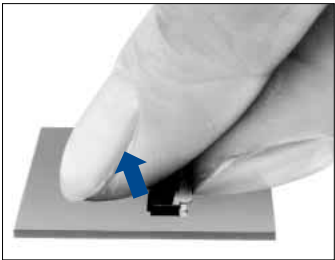
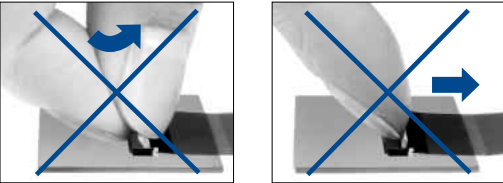
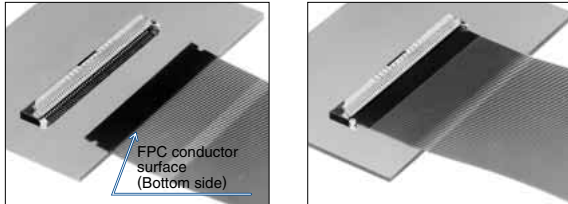
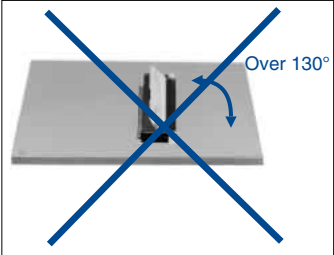
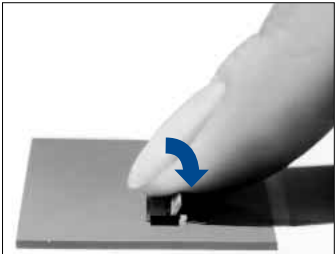
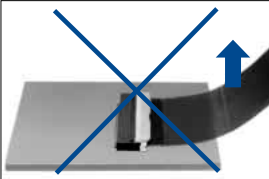
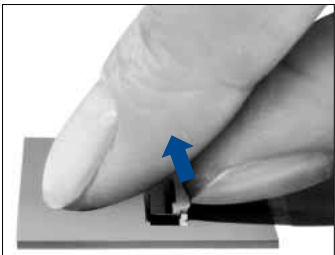
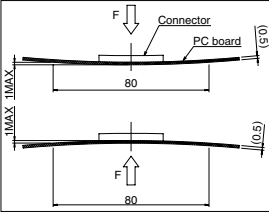
## Ordering information

**FH27 - 54S - 0.4 SH (05)**

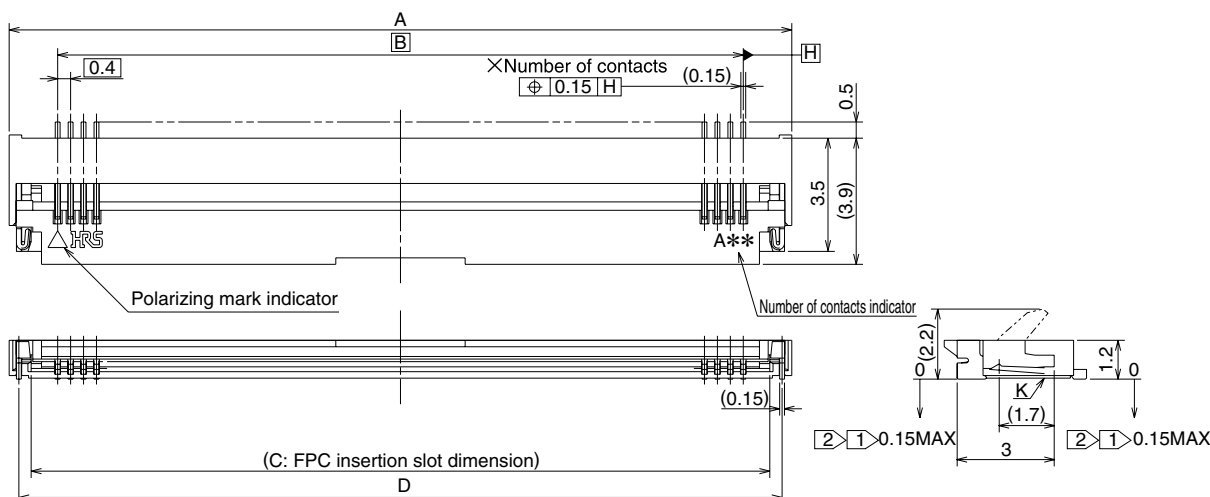
①      ②      ③      ④      ⑤

|                                                                 |                                                                                                                              |
|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| ① Series name: FH27                                             | ④ Terminal type<br>SH: SMT horizontal mounting type                                                                          |
| ② No. of contacts<br>Number of contacts: 10, 40, 50, 54, 57, 60 | ⑤ Plating code<br>(05): Gold plated(40,50,60contacts)(RoHS compliant)<br>(15): Gold plated(10,54,57contacts)(RoHS compliant) |
| ③ Contact pitch: 0.4 mm                                         |                                                                                                                              |

## ◆ Operation and Precautions

| Operation                                                                                                                                                                                                                | Precautions                                                                                                                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>1.FPC insertion procedure. Connector installed on the board.</b></p> <p>① Lift up the actuator. Use thumb or index finger.</p>    | <p>① Do not apply excessive force or use any type of tool to operate the actuator.</p>                                                                                                                            |
| <p>② Fully insert the FPC in the connector parallel to mounting surface, with the exposed conductive traces facing down.</p>           | <p>② The connector will assure reliable performance when the actuator is open to 130° maximum. Do not exceed this angle, as this may cause permanent damage to the connector.</p>                               |
| <p>③ Rotate down the actuator until firmly closed. It is critical that the inserted FPC is not moved and remains fully inserted.</p>  | <p>③ Exercise caution when applying upward force to the connected FPC.</p>                                                                                                                                     |
| <p><b>2.FPC removal</b></p> <p>① Lift up the actuator.<br/>Carefully withdraw the FPC.</p>                                            | <p>④ The connectors are straight within 0.1 mm max.<br/>Make sure that the PC board connector mounting area flatness can accept the connector terminals without causing any failure of the solder joints.</p>  |

## Connector Dimension



- Notes
- ① Lead co-planarity including reinforced metal fittings shall be 0.1 MAX.
  - ② The contact terminal lead position indicates the dimension from the K surface, the bottom surface of the insulator body.
  - 3 Packaging for this product is embossed carrier tape packaging. Refer to packaging specification.
  - 4 Note that preventive hole for sink mark could be added for improvement.  
The quality remains good, even with the dark spots, which could occasionally occur on molded plastic.

Unit: mm

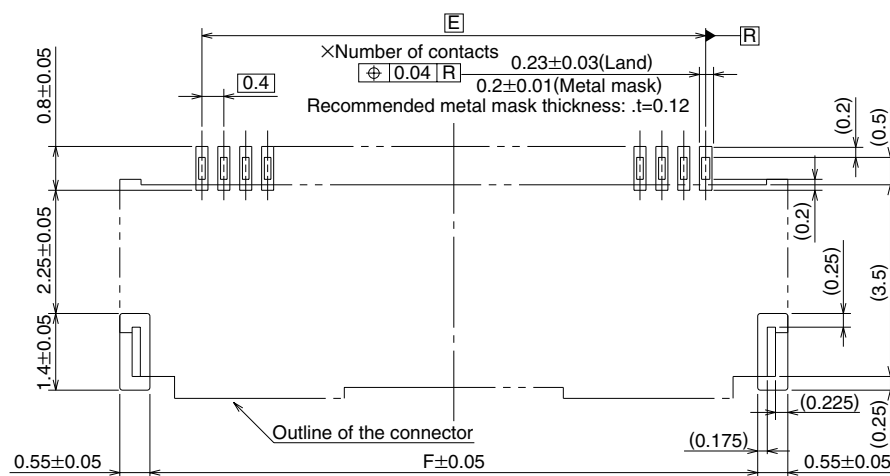
| Part Number        | CL No.          | Number of Contacts | A    | B    | C     | D    | RoHS         |
|--------------------|-----------------|--------------------|------|------|-------|------|--------------|
| FH27-10S-0.4SH(15) | CL580-0004-0-15 | 10                 | 6.6  | 3.6  | 5.24  | 6.0  | YES<br>Note1 |
| FH27-40S-0.4SH(05) | CL580-0005-3-05 | 40                 | 18.6 | 15.6 | 17.24 | 18.0 |              |
| FH27-50S-0.4SH(05) | CL580-0010-3-05 | 50                 | 22.6 | 19.6 | 21.24 | 22.0 |              |
| FH27-54S-0.4SH(15) | CL580-0001-2-15 | 54                 | 24.2 | 21.2 | 22.84 | 23.6 |              |
| FH27-57S-0.4SH(15) | CL580-0003-8-15 | 57                 | 25.4 | 22.4 | 24.04 | 24.8 |              |
| FH27-60S-0.4SH(05) | CL580-0006-6-05 | 60                 | 26.6 | 23.6 | 25.24 | 26.0 |              |

Note 1 : Refer to "Ordering information".

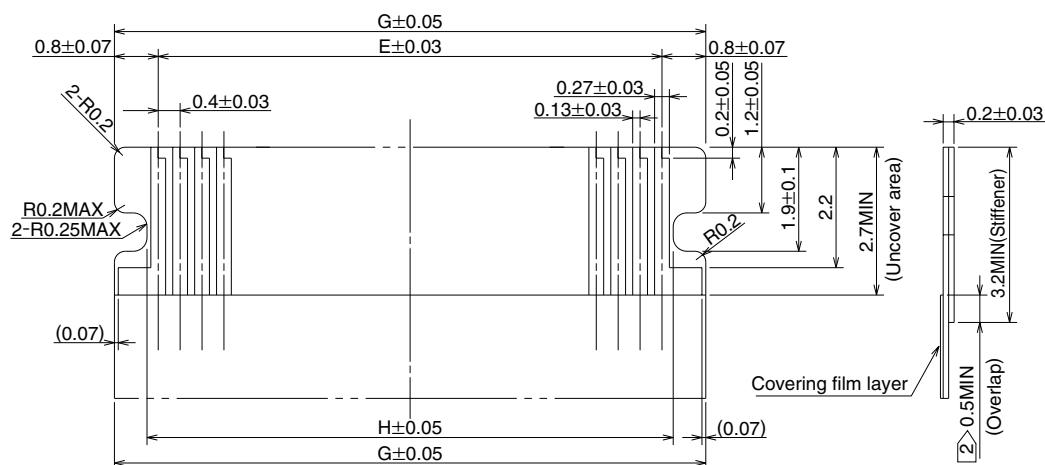
Note 2 : Tape and reel packaging (2,500 pieces/reel).

Order by number of reels.

## ◆ Recommended PCB mounting pattern and metal mask dimensions



## ◆ Recommended FPC Dimensions



1 Polyimide and thermally hardening adhesive is recommended as the materials for the stiffener.

2 Overlap between covering film layer and stiffener is 0.5mm min.

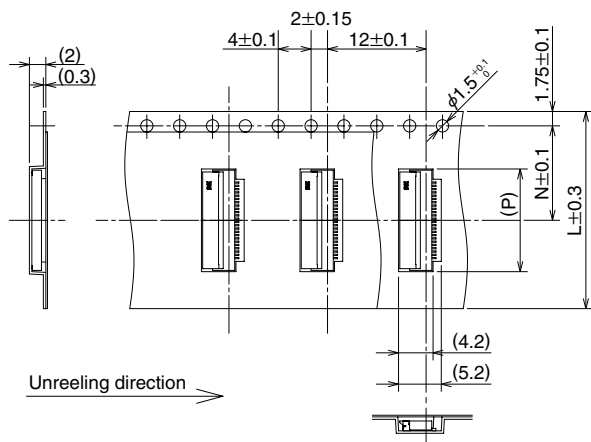
Unit: mm

| Part Number        | CL No.          | Number of Contacts | E    | F    | G    | H     |
|--------------------|-----------------|--------------------|------|------|------|-------|
| FH27-10S-0.4SH(15) | CL580-0004-0-15 | 10                 | 3.6  | 5.5  | 5.2  | 4.01  |
| FH27-40S-0.4SH(05) | CL580-0005-3-05 | 40                 | 15.6 | 17.5 | 17.2 | 16.01 |
| FH27-50S-0.4SH(05) | CL580-0010-3-05 | 50                 | 19.6 | 21.5 | 21.2 | 20.01 |
| FH27-54S-0.4SH(15) | CL580-0001-2-15 | 54                 | 21.2 | 23.1 | 22.8 | 21.61 |
| FH27-57S-0.4SH(15) | CL580-0003-8-15 | 57                 | 22.4 | 24.3 | 24.0 | 22.81 |
| FH27-60S-0.4SH(05) | CL580-0006-6-05 | 60                 | 23.6 | 25.5 | 25.2 | 24.01 |

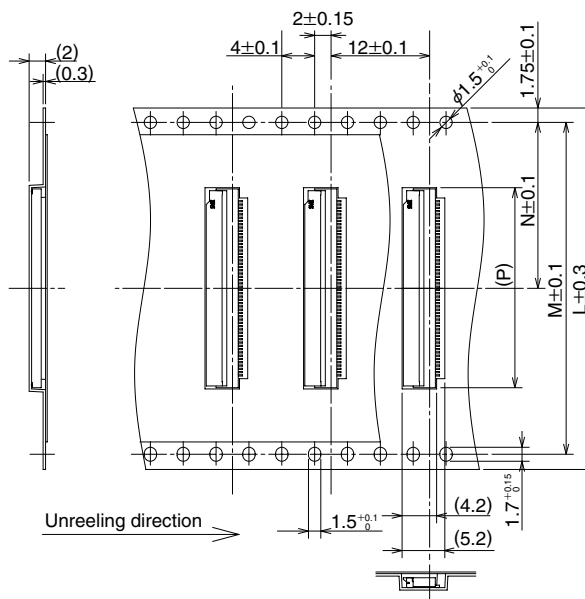
## ◆ Packaging Specification

### ● Embossed Carrier Tape Dimensions

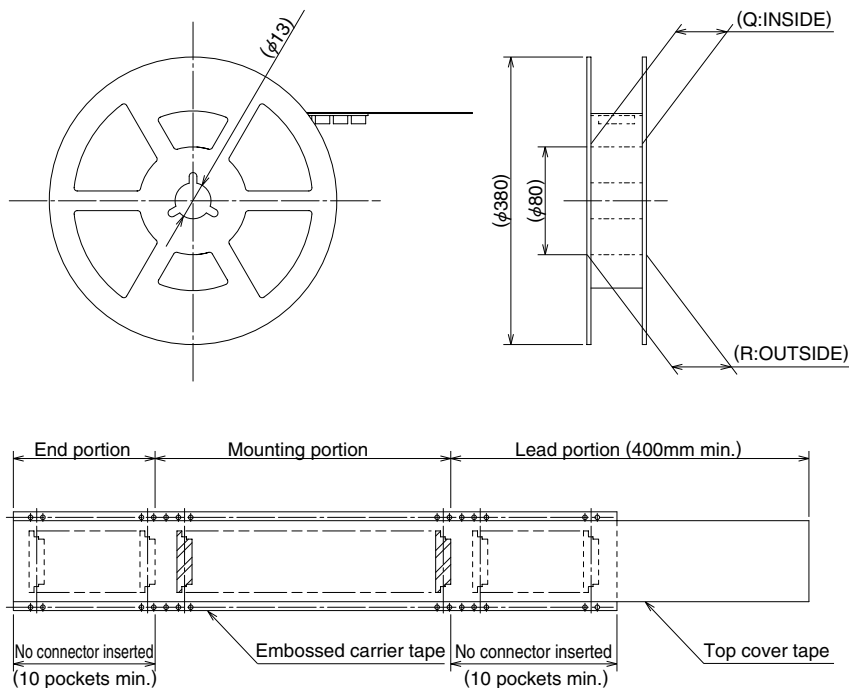
● Tape width up to 24mm .



● Tape width 32mm and over.



### ● Reel Dimensions



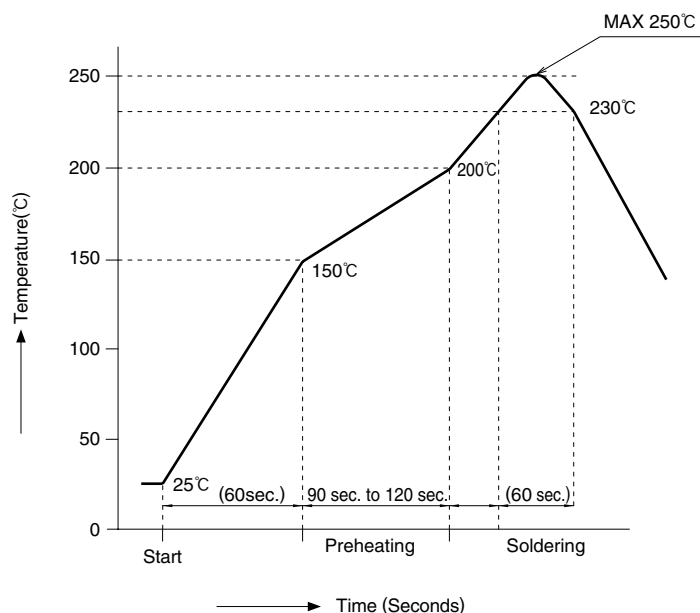
Unit: mm

| Part Number        | CL No.          | Number of Contacts | L    | M    | N    | P    | Q    | R    |
|--------------------|-----------------|--------------------|------|------|------|------|------|------|
| FH27-10S-0.4SH(15) | CL580-0004-0-15 | 10                 | 16.0 | —    | 7.5  | 6.9  | 17.4 | 21.4 |
| FH27-40S-0.4SH(05) | CL580-0005-3-05 | 40                 | 32.0 | 28.4 | 14.2 | 18.9 | 33.4 | 37.4 |
| FH27-50S-0.4SH(05) | CL580-0010-3-05 | 50                 | 44.0 | 40.4 | 20.2 | 22.9 | 45.4 | 49.4 |
| FH27-54S-0.4SH(15) | CL580-0001-2-15 | 54                 | 44.0 | 40.4 | 20.2 | 24.5 | 45.4 | 49.4 |
| FH27-57S-0.4SH(15) | CL580-0003-8-15 | 57                 | 44.0 | 40.4 | 20.2 | 25.7 | 45.4 | 49.4 |
| FH27-60S-0.4SH(05) | CL580-0006-6-05 | 60                 | 44.0 | 40.4 | 20.2 | 26.9 | 45.4 | 49.4 |

2,500 pieces per reel.

## ◆ Recommended Temperature Profile

### ● 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:0.23mm×0.8mm

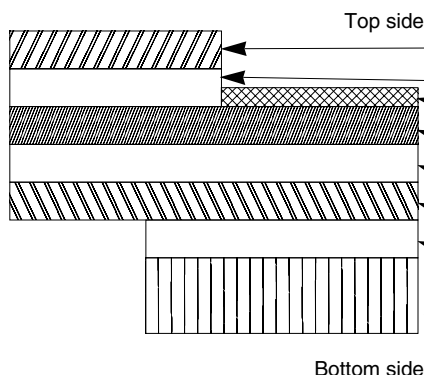
Metal mask :0.2×0.8×0.12mm thick

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.

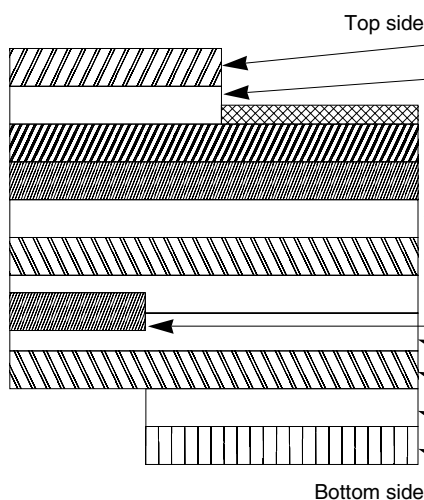
## ◆FPC Construction (Recommended Specifications)

### 1. Using Single-sided FPC



| Material Name                   | Material                                                    | Thickness (μm) |
|---------------------------------|-------------------------------------------------------------|----------------|
| Covering layer film             | Polyimide 1 mil thick.                                      | 25             |
| Cover adhesive                  |                                                             | 25             |
| Surface treatment               | 1 to 5 micron nickel underplated<br>0.2 micron gold palated | 3              |
| Copper foil                     | Cu 1oz                                                      | 35             |
| Base adhesive                   |                                                             | 25             |
| Base film                       | Polyimide 1 mil thick                                       | 25             |
| Reinforcement material adhesive | Thermosetting adhesive                                      | 30             |
| Stiffener                       | Polyimide 3 mil thick                                       | 75             |
| Total                           |                                                             | 193            |

### 2. Using Double-sided FPC



| Material Name                   | Material                                                    | Thickness (μm) |
|---------------------------------|-------------------------------------------------------------|----------------|
| Covering layer film             | Polyimide 1 mil thick                                       | 25             |
| Cover adhesive                  |                                                             | 25             |
| Surface treatment               | 1 to 5 micron nickel underplated<br>0.2 micron gold palated | 3              |
| Through-hole copper             | Cu                                                          | 15             |
| Copper foil                     | Cu 1/2oz                                                    | 18             |
| Base adhesive                   |                                                             | 18             |
| Base film                       | Polyimide 1 mil thick                                       | 25             |
| Base adhesive                   |                                                             | 18             |
| Copper foil                     | Cu 1/2oz                                                    | 18             |
| Cover adhesive                  |                                                             | 25             |
| Covering layer film             | Polyimide 1 mil thick                                       | 25             |
| Reinforcement material adhesive | Thermosetting adhesive                                      | 25             |
| Stiffener                       | Polyimide 1 mil thick                                       | 25             |
| Total                           |                                                             | 197            |

To prevent release of the lock due to FPC bending, use of the FPC with copper foil on bottom side is not recommended.