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This manual describes important and required points of handling about FLH Connector (Embossed-Taping Product).

Be sure to read this manual thoroughly before using FLH connector.

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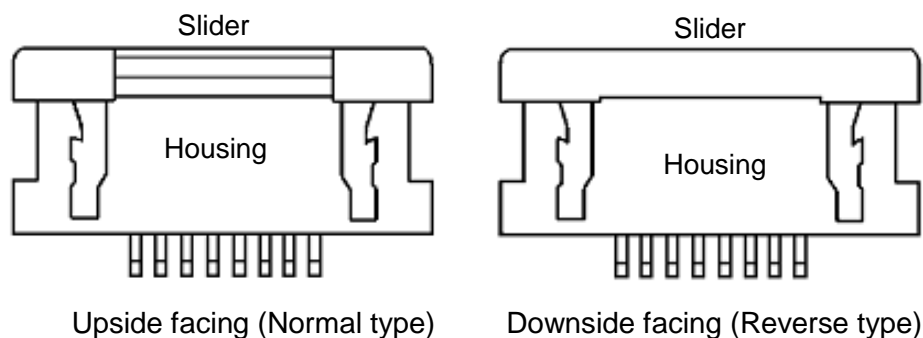
**1. Model Number and Part Name****(1) Part name**

Fig.1: Part name (Connector)

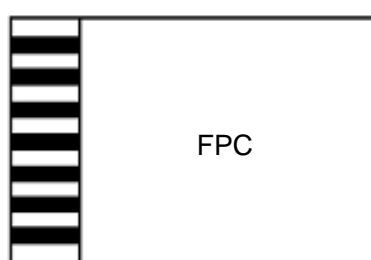


Fig.2: Part name (FPC)

**(2) Model number**

Product name		Model No.
Normal type (Upside facing)	Embossed-taping type	**FLH-SM1-( ) <sub>2</sub> -TB ( ) <sub>3</sub> **FLH-SM2-( ) <sub>2</sub> -TB( ) <sub>3</sub>
	Loose piece type	**FLH-SM1-( ) <sub>2</sub> ( ) <sub>3</sub> **FLH-SM2-( ) <sub>2</sub> ( ) <sub>3</sub>
Reverse type (Downside facing)	Embossed-taping type	**FLH-RSM1-( ) <sub>1</sub> -( ) <sub>2</sub> -TB ( ) <sub>3</sub> **FLH-RSM2-( ) <sub>1</sub> -( ) <sub>2</sub> -TB( ) <sub>3</sub>
	Loose piece type	**FLH-RSM1-( ) <sub>1</sub> -( ) <sub>2</sub> ( ) <sub>3</sub> **FLH-RSM2-( ) <sub>1</sub> -( ) <sub>2</sub> ( ) <sub>3</sub>

Note<sub>1</sub>: The number of circuits is indicated in \*\*.Note<sub>2</sub>: “( )<sub>1</sub>” stands for FPC temporary retention mechanism.

Blank: Normal product

S: With FPC temporary retention mechanism

“( )<sub>2</sub>” stands for contact plating specification.

Blank: Tin-plated product

G: Gold-plating

GB: Selective gold-plating

GAN: Nickel-underplated, Striped gold-plated

“( )<sub>3</sub>” stands for green product.

(LF)(SN): Lead-free product

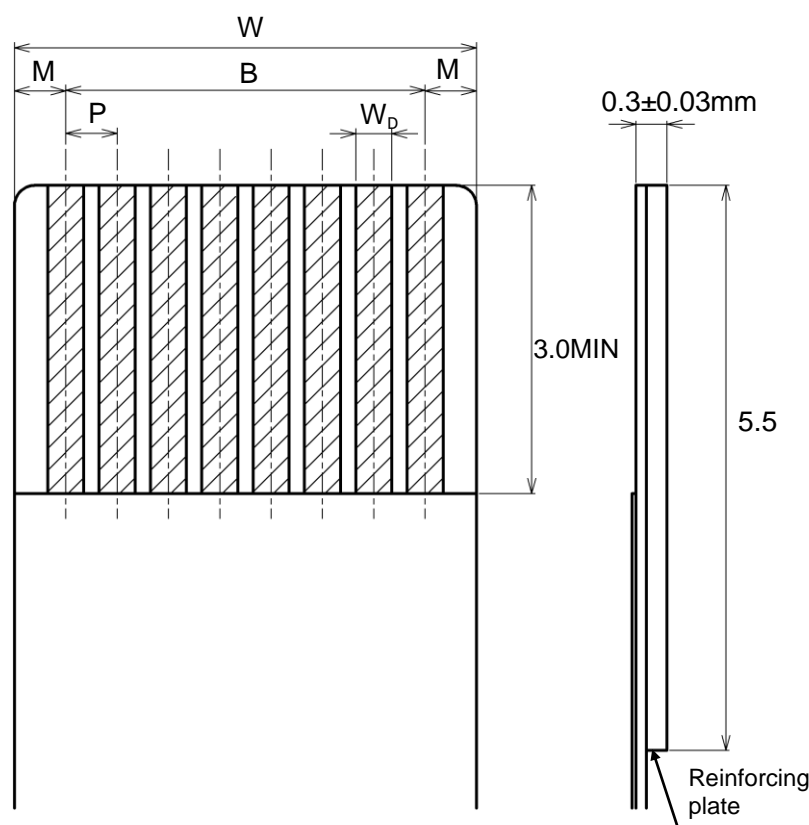
(HF): Lead-free and halogen-free type product

Note<sub>3</sub>: Slider width dimension of 40 circuits product is 1 mm and of 50 circuits is 2 mm longer than that of others.Note<sub>4</sub>: FLH connector is supplied on embossed tape (3,000 pcs./reel).

## 2. Applicable Lead (FPC)

- (1) Dimensions of FPC greatly affect to the contacting reliability with connector.  
Conform the dimensions of FPC with those of applicable ones described in drawing.
- (2) Especially, narrow pitch connector has a high possibility to come off from contact point due to warpage, deformation, slant insertion, insufficient insertion and so on of FPC.  
In order to reduce these risks, manage that the important dimensions such as conductor width, length, pitch, FPC total width, position misalignment between conductor and FPC width etc. shall be satisfied with the given tolerances, considering the variations of those dimensions.
- (3) Confirm the applicability of the connector with the FPC used, before use. FPC, which applicability is not confirmed, might not be able to guarantee the performance.
- (4) As FPC with silver carbon pasted lead part is used, contact resistance may become high, and such FPC may not satisfy this product specification.  
Pay attention to a case when contact resistance rises further with silver sulfurized by hydrogen sulfide gas.

Item	Rating	
Applicable lead (FPC)	Conductor:	Copper foil tin-plated or Gold-plated
	Each dimension:	As shown below



	FPC
M	$0.5 \pm 0.1$
P	$0.5 \pm 0.03$
B	$0.5 (N-1) \pm 0.03$
W	$0.5 (N+1) \pm 0.05$
$W_D$	$0.35 \pm 0.04$

N = No. of circuits

### FPC construction

1. Base: Polyimide ( $25\ \mu\text{m}$ )
2. Copper foil:  $35\ \mu\text{m}$
3. Cover lay: Polyimide ( $25\ \mu\text{m}$ )
4. Reinforcing board: Polyimide ( $188\ \mu\text{m}$ )
5. Bonded part: Thermosetting adhesive ( $45\ \mu\text{m}$ )
6. Plating: Solder-plated or Ni-underplated Au-plated

Fig.3: Applicable lead (FPC)

### 3. PC Board Pattern Layout

The following PC board layout is recommended.

Besides, contact is exposed at grounding surface on PC board because of low profile type.

Do not design circuit pattern at dead space part hatching area shown below to avoid the defect as short-circuits, etc.

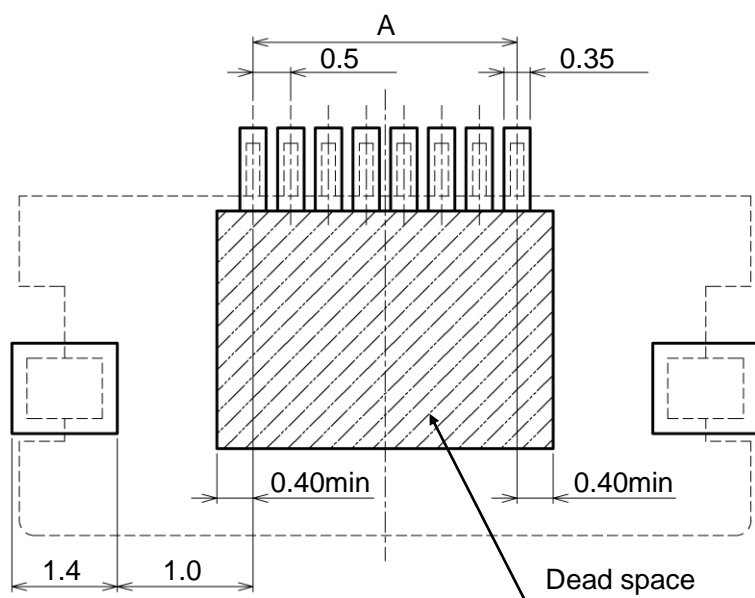


Fig.4: PC board pattern layout (connector)

No. of circuits	A
4	1.5
6	2.5
7	3.0
8	3.5
10	4.5
11	5.0
12	5.5
13	6.0
15	7.0
16	7.5
17	8.0
18	8.5
19	9.0
20	9.5
21	10.0
22	10.5
24	11.5
26	12.5
28	13.5
30	14.5
32	15.5
34	16.5
40	19.5
50	24.5

## 4. Handling Precautions

### 4.1 FPC inserting operation

#### (1) Releasing slider of connector

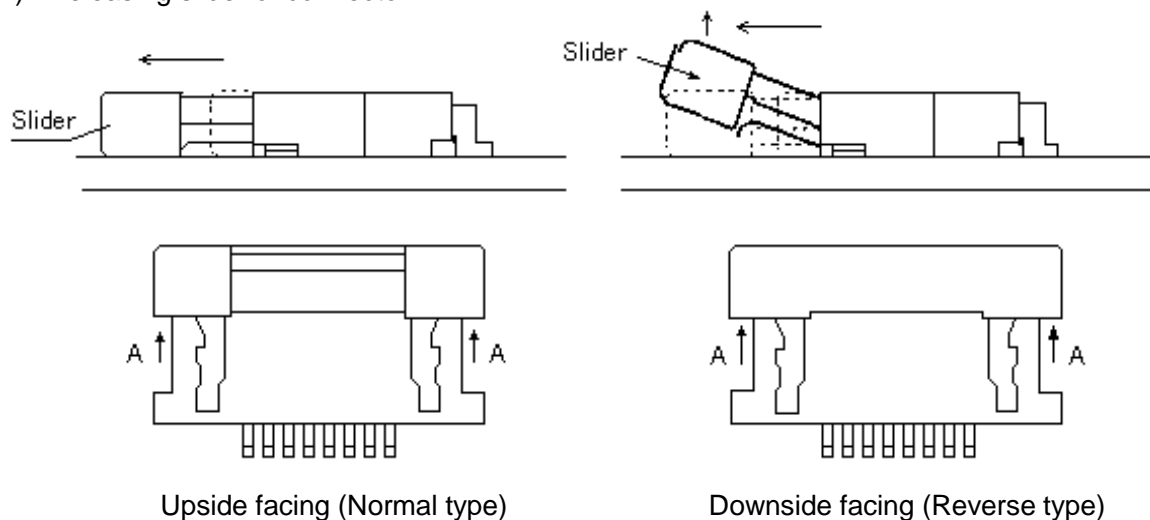


Fig.5: Releasing slider of connector

- ① Hook "A" part to direction as shown above, and release slider straight with even force at both sides.
- ② When slider is released, do not apply excessive force and do not release and pull only one side of slider, since such handling may lead to breakage.

#### (2) Inserting FPC into connector

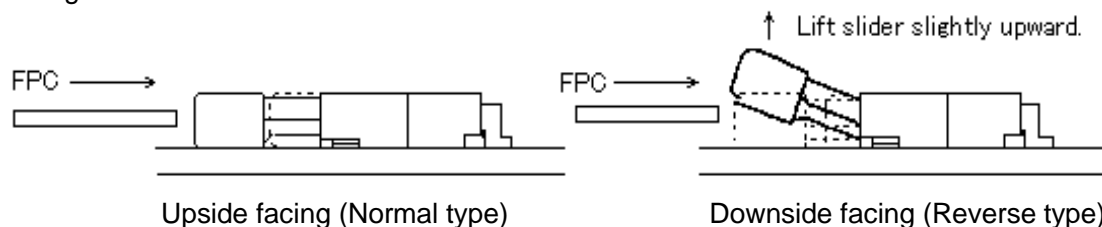


Fig.6: Inserting FPC

[Upside facing (Normal type)]

- ① Insert FPC into connector up to the backmost straight on the mating axis.

[Downside facing (Reverse type)]

- ① Insert FPC into connector up to the backmost straight on the mating axis.

When FPC is inserted into connector in case of "Downside facing (Reverse type)," it is easy to insert FPC into connector by lifting slider slightly.

**Note:** When FPC is inserted into connector, FPC may knock slider of connector and it may not be inserted up to the backmost. In such a case when slider is inserted together at FPC insertion, release slider again and reinsert FPC into connector.

## (3) Fitting slider

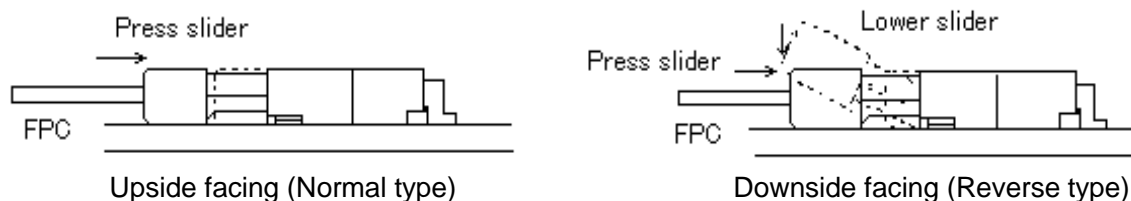


Fig.7: Fitting slider

## [Upside facing (Normal type)]

- ① After checking that FPC is inserted up to the backmost of connector, press in both sides of slider straight with even force.
- ② Do not press in only one side in the same case as in item 4.1 (1) that slider is released, and press in both sides of slider at one time, since one-side pressing may lead to breakage.

## [Downside facing (Reverse type)]

- ① After checking that FPC is inserted up to the backmost of connector, lower slider which is lifted at FPC insertion.
- ② Press in both sides of slider straight with even force.
- ③ Do not press in only one side in the case as in item 4.1 (1) that slider is released and press in both sides of slider at one time, since one-side pressing may lead to breakage.

## 4.2 Releasing FPC

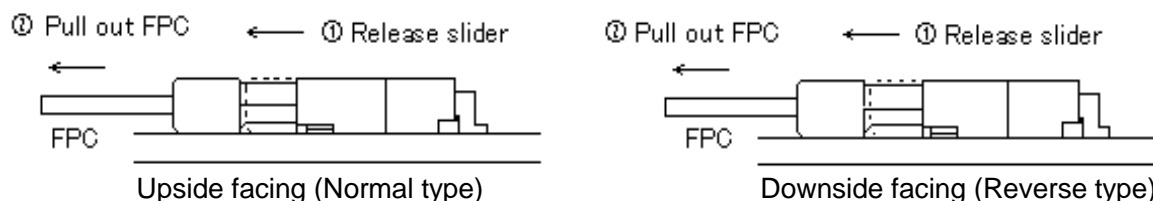


Fig.8: Releasing FPC

- ① Hook "A" part of slider as in item 4.1 (1), and release slider so as not to apply excessive force. Pull out slider gradually one side by one side, and slider can be released easily.
- ② When slider is pulled, do not apply excessive force, not pull in a stroke and not pull out only one side of slider, since such handling may lead to breakage.
- ③ After slider is released, pull out FPC straight on the mating axis. Do not pry to pull out or do not pull out upward direction, since such handling may cause damage of FPC and breakage of connector.

### 4.3 Handling of FPC after mounting on PC board

When inserted FPC is handled, provide sufficient FPC length so that force is not loaded to connector, since such loading may cause breakage of connector and electrical discontinuity.

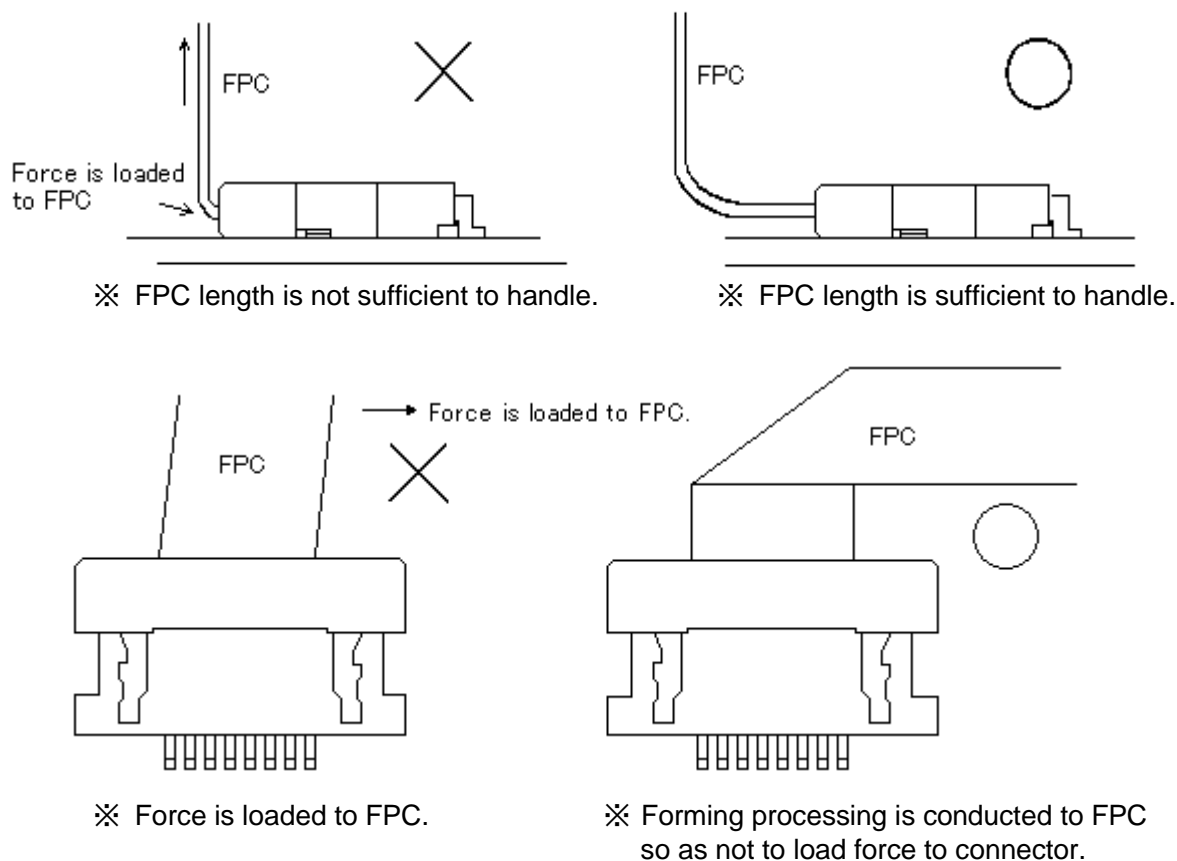


Fig.9: Handling of FPC after mounting on PC board

### 4.4 Precautions for soldering operation

#### (1) Soldering iron method

Solder a connector mounted on PC board using a soldering iron with temperature of 350°C at the tip of soldering iron quickly within 3 seconds, and check appearance visually.

When soldering, strictly conduct the following points.

**Note:** Do not press soldering iron tip on connector contact lead part nor apply abnormal force such as lateral load, etc. If done, dismount and exchange connector, and conduct soldering again. Do not reuse dismantled connector.

#### (2) Reflow soldering method

Soldering should be conducted at the temperature below the temperature profile shown in Product Specification as item of "Resistance to soldering heat".

Though recommended reflow temperature condition varies depending on solder paste to be used, follow such condition.

**Note:** When bridge trouble appears in the process of reflow soldering method and repair is conducted by hand, strictly conduct item 4.4 (1) "Soldering iron method."

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#### 4.5 Blister of cover housing

Considering handling of the mated connector, tenacious nylon material is used for cover housing while blister may generate on outer surface of the wafer in the process of reflow soldering as per conditions of water absorption and reflow temperature. Such “blister” is not caused by deterioration of resin, not deteriorate connector performance.

#### 4.6 Other precautions

- ① FLH connector is a low profile type with a height of only 1.2 mm and each part consisting of connector is quite delicate.  
Regarding operation of slider of connector and mating FPC, carefully read the said notes and pay full attention to handling.
- ② After mating FPC, do not pull out FPC in a condition when slider is fitted, and do not apply force to FPC, since such handling may cause damage of FPC, breakage of connector and electrical discontinuity.

#### 5. Use of Jig

Do not apply the excessive load to 25-circuit or more FLH connector with inserted FPC when releasing slider, because slider may be broken. When excessive load is applied to such connector during releasing slider by manual, we recommend using jig. Contact JST for the slider release jig.

#### 6. Storage

Keep FLH connector (embossed-taping product) in the following ambience.

Storage temperature	5°C to 35°C
Relative humidity	60% max.