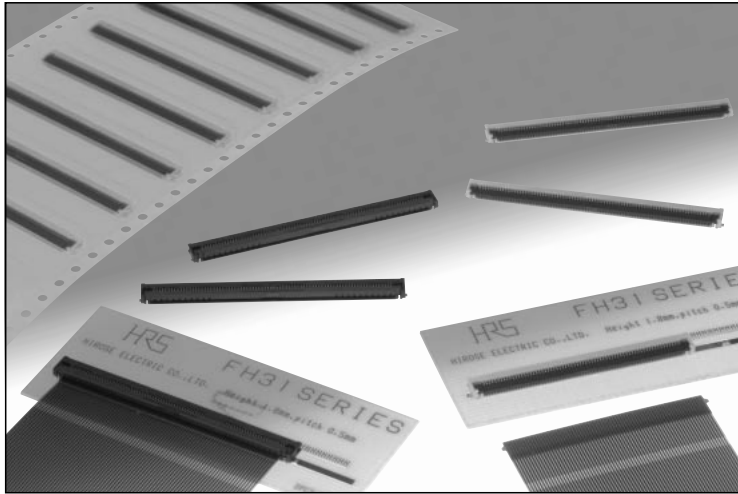
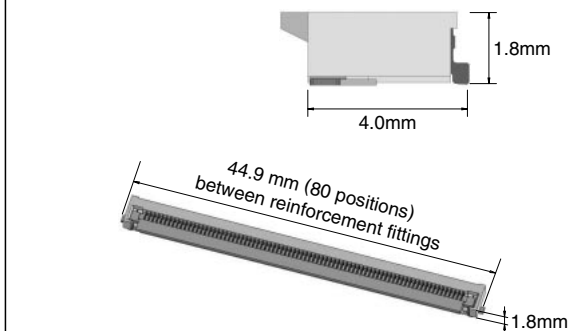


0.5 mm and 1 mm pitch, 1.8 mm / 2.4 mm above the board, Flip-Lock actuator, Flexible Printed Circuit and Flexible Flat Cable ZIF connectors

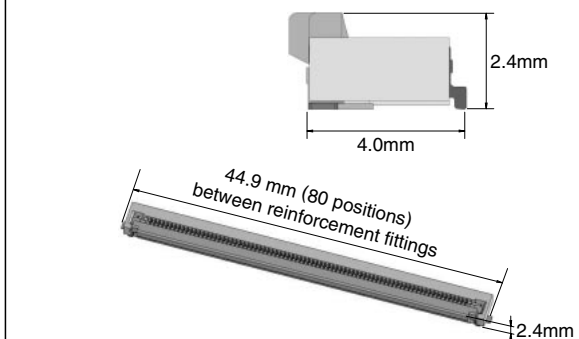
FH31H / FH31S Series



FH31H Series: 1.8 mm high



FH31S Series: 2.4mm high



■ Features

1. Decreased size

- Board mounting space 4.0 mm wide.
- * Reduced width: Approximately 38% (compared with existing FH28H Series)
- * Reduced PCB footprint: Approximately 40% (compared with existing FH28H Series)
- * Reduced height: Approximately 30% (compared with existing FH28H Series)

2. Rotating Flip-Lock actuator

Rotating actuator permits easy insertion and retention of the FPC/FFC, assuring reliable electrical and mechanical connection.

3. Choice of required heights

In applications where space is available and multiple re-insertions of the FPC/FFC are expected, the 2.4 mm high connectors with stronger actuator may be selected, adding to the ease of opening / closing of the connector.

4. Accepts standard FPC thickness

0.3mm thick standard Flexible Printed Circuit (FPC) can be used.

5. Board placement with automatic equipment

Flat upper surface and tape and reel packaging facilitate vacuum pick-up and placement.

Standard reel packaging contains 2500 connectors.

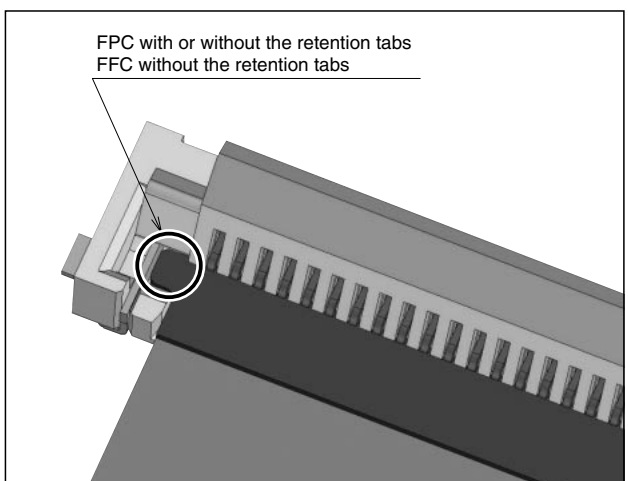
6. Halogen-free *

(FH31W series)

- *As defined by IEC61249-2-21
- Br-900ppm maximum, Cl-900ppm maximum,
- Cl + Br combined-1,500ppm maximum
- Br 900ppm or lower, Cl 900ppm or lower, Br + Cl 1,500ppm or lower

7. Conductive traces on the PCB can run under the connector

No exposed contacts on the bottom of the connector.



■ Specifications

Rating	Current rating	0.5 A (Note 3)	Operating temperature range	-40 to +85°C (Note 1)	Storage temperature range	-10 to +50°C (Note 2)
	Voltage rating	50 Vrms AC/DC	Operating humidity range	Relative humidity 90% or less (No condensation)	Storage humidity range	Relative humidity 90% or less (No condensation)

Recommended FPC/FFC	Thickness: 0.3 ± 0.05 mm, Gold plated
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Item	Specification	Conditions
1. Insulation resistance	500 MΩ min	100 V DC
2. Withstanding voltage	No flashover or insulation breakdown	150 Vrms AC / 1 minute
3. Contact resistance	100 mΩ max. * Including FPC and FFC conductor resistance	1 mA (DC or 1,000 Hz)
4. Durability	Contact resistance: 100 mΩ max. No damage, cracks, or parts dislocation	20 cycles
5. Vibration	No electrical discontinuity of 1 μs or longer Contact resistance: 100 mΩ max. 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 or longer Contact resistance: 100 mΩ max. No damage, cracks, or parts dislocation	Acceleration of 981m/s ² , 6 ms duration, sine half-wave, 3 cycles in each of the 3 axis
7. Humidity (Steady state)	Contact resistance: 100 mΩ max. Insulation resistance: 50 MΩ min. No damage, cracks, or parts dislocation	96 hours at 40°C and humidity of 90 to 95%
8. Temperature cycle	Contact resistance: 100 mΩ max. Insulation resistance: 50 MΩ min. No damage, cracks, or parts dislocation	Temperature: -40°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 a long period prior to mounting and use.

The operating temperature and humidity range covers the non-conducting condition of connectors after board mounting.

Note 3: When passing the current through all of the contacts, use 70% of the rated current.

■ Materials

Part	Material	Finish	Remarks
Insulator	LCP	FH31H: Color: Beige FH31S: Color: Black	UL94V-0
	FH31S, FH31H: Polyamide FH31HW: LCP	FH31H (64 pos.), FH31S: Color: Brown FH31H (68 and 80 pos.): Color: Black	
Contacts	Phosphor bronze	Gold plated	_____
Metal fittings		Pure tin plating	_____

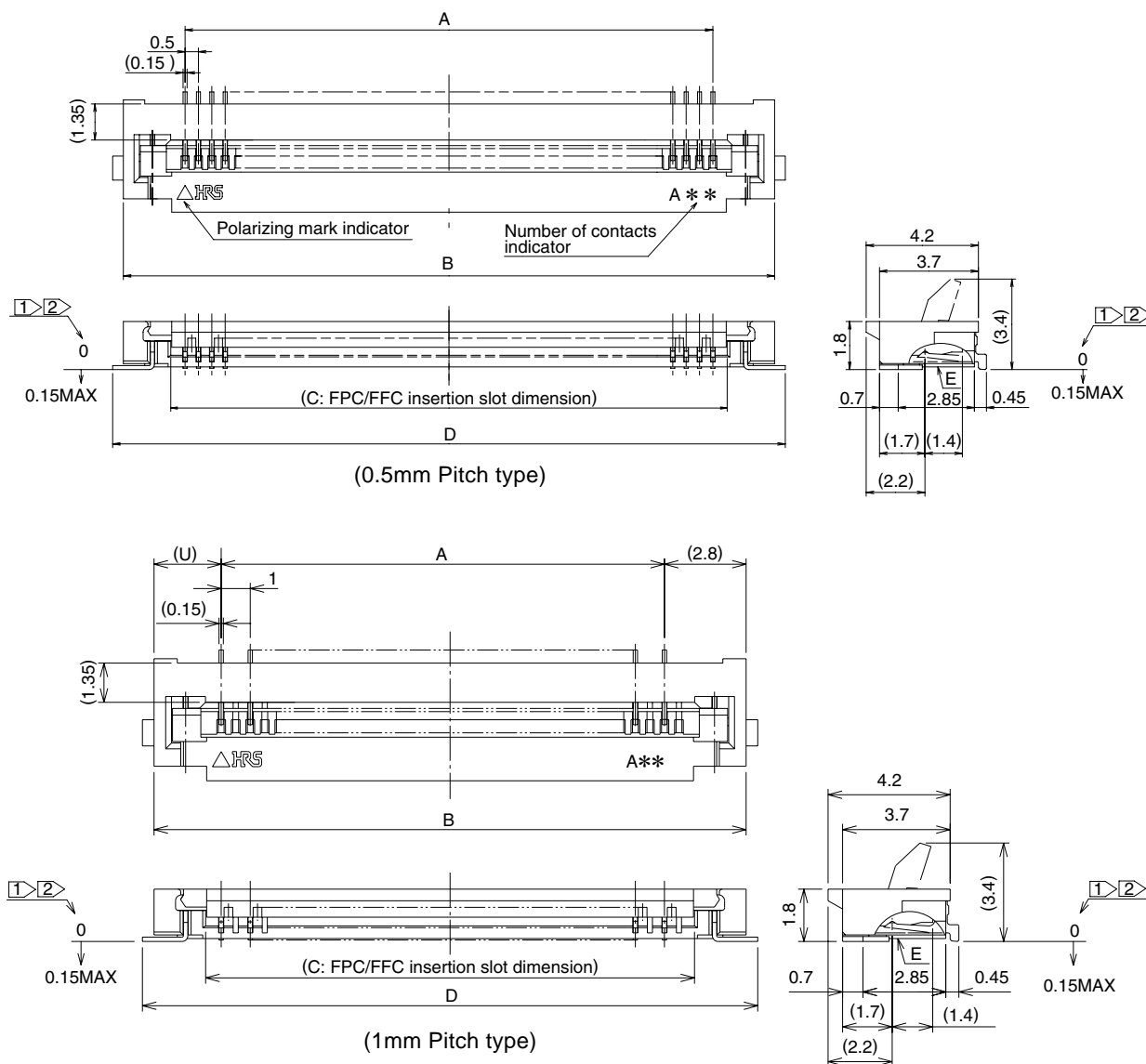
■ Ordering information

FH 31 H W - 56 (28) S B - 1 SH (05)

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① Series name: FH	⑤ Standard type: Number of contacts (16 to 80) Eccentric type: Number of contacts in 0.5mm housing	⑨ Contact pitch: 0.5mm, 1mm
② Series No.: 31		⑩ Contact type SH: SMT horizontal mounting
③ H: 1.8mm high S: 2.4mm high	⑥ Standard type: Blank Eccentric type: Number of contacts	⑪ Plating specifications: (05) (06): Gold plated (08): Partial gold plated
④ Blank: Standard W: halogen free (Flame retardance UL94HB).	⑦ Contact alignment: S: single	
	⑧ Eccentric direction: Blank: standard type B: Eccentric type	

■Dimensions – FH31H (1.8 mm high)



Note ①: The coplanarity of each terminal lead is within 0.1.

②: The contact terminal lead area indicates the dimension from the E surface, the bottom surface of the insulator body.

3 : Packaged on tape and reel only. Check packaging specification.

4 : Slight variations in color of the plastic compounds do not affect form, fit or function of the connector.

5 : After reflow, the terminal plating may change color, however this does not represent a quality issue.

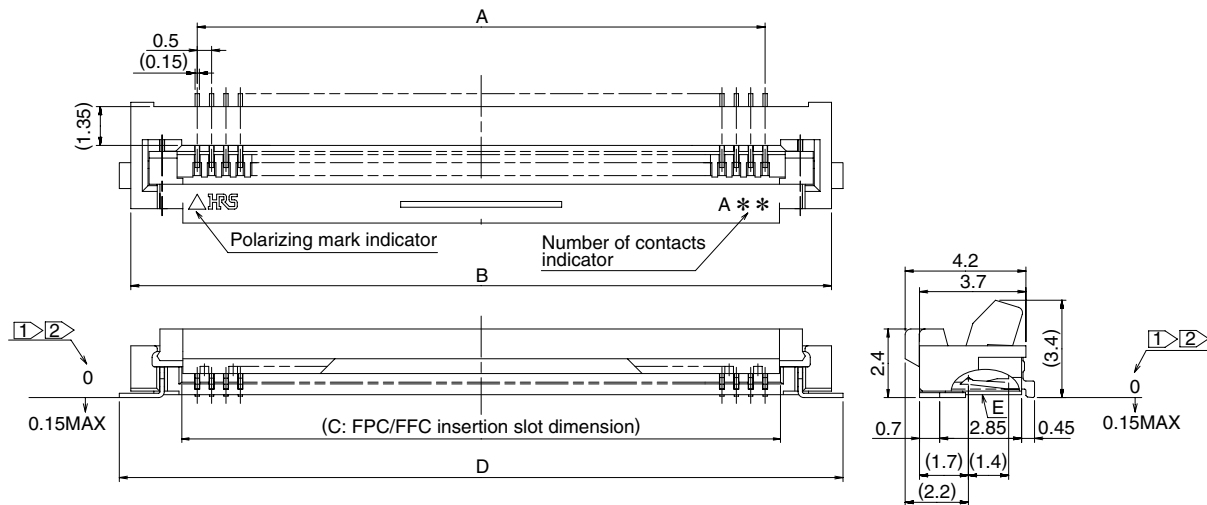
All dimensions: mm

Part Number	CL No.	Number of contacts	A	B	C	D	U
FH31H-56S-0.5SH(08)	580-0610-0-08	56	27.5	32.1	28.57	32.9	—
FH31H-64S-0.5SH(05)	580-0605-0-05	64	31.5	36.1	32.57	36.9	—
FH31H-68S-0.5SH(06)	580-0604-8-06	68	33.5	38.1	34.57	38.9	—
FH31H-80S-0.5SH(06)	580-0601-0-06	80	39.5	44.1	40.57	44.9	—
FH31H-64(32)S-1SH(05)	580-0612-6-05	32	31	36.1	32.57	36.9	2.3
FH31HW-16S-1SH	580-0611-3-00	16	15	20.6	17.07	21.4	2.8
FH31HW-64(32)SB-1SH	580-0612-6-00	32	31	36.1	32.57	36.9	2.3

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

Order by number of reels.

■Dimensions – FH31S (2.4 mm high)



Note ①: The coplanarity of each terminal lead is within 0.1.

②: The contact terminal lead area indicates the dimension from the E surface, the bottom surface of the insulator body.

3 : Packaged on tape and reel only. Check packaging specification.

4 : Slight variations in color of the plastic compounds do not affect form, fit or function of the connector.

5 : After reflow, the terminal plating may change color, however this does not represent a quality issue.

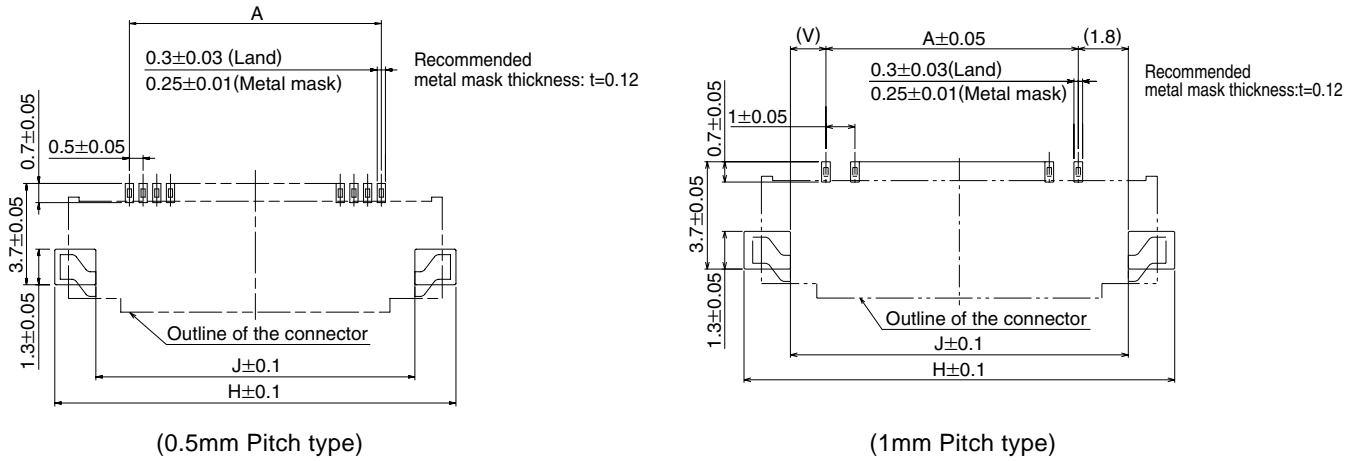
All dimensions: mm

Part Number	CL No.	Number of contacts	A	B	C	D
FH31S-64S-0.5SH(05)	580-0608-9-05	64	31.5	36.1	32.57	36.9
FH31S-80S-0.5SH(08)	580-0607-6-08	80	39.5	44.1	40.57	44.9

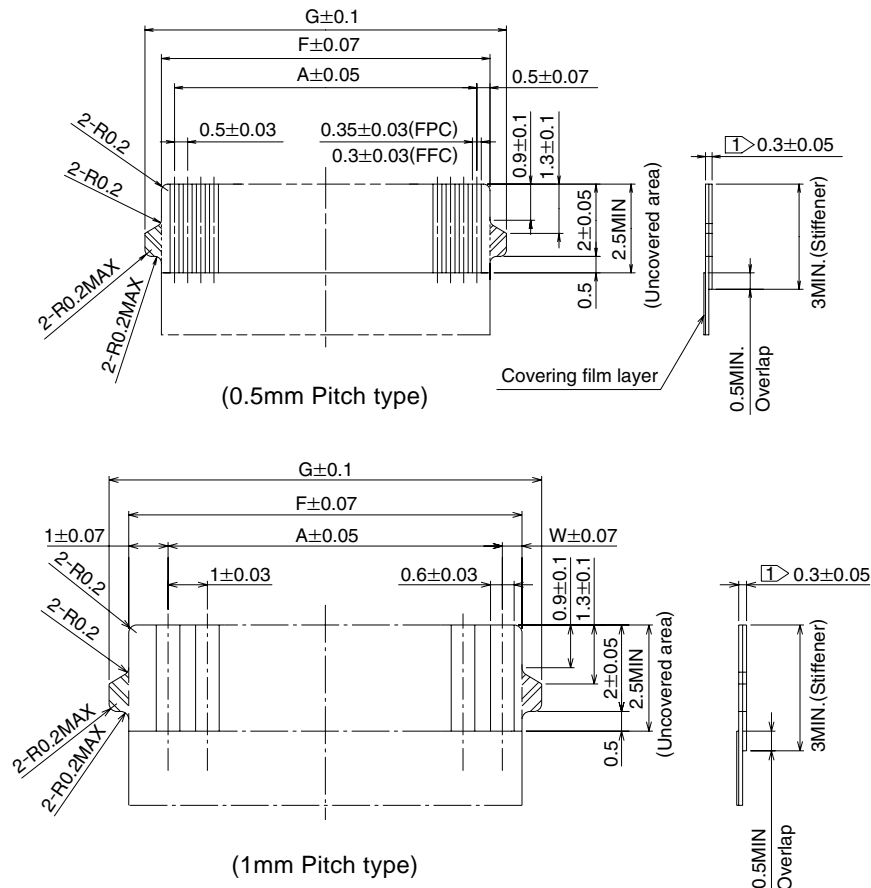
Tape and reel packaging (2,500 pieces/reel).

Order by number of reels.

Recommended PCB mounting pattern and metal mask dimensions



Recommended FPC/FFC Dimensions



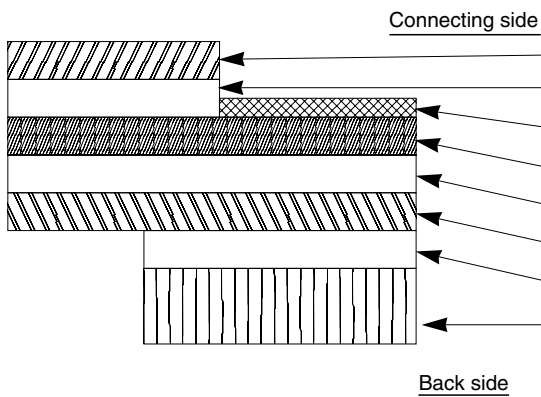
Note ①: Set the stiffener thickness to 0.188 (7.5mil) min.

All dimensions: mm

Number of contacts	Pitch type	F	G	H	J	V	W
16	1	17	18.1	21.8	18.6	1.8	1
32	1	32.5	33.6	37.3	34.1	1.3	0.5
56	0.5	28.5	29.6	33.3	30.1	—	—
64	0.5	32.5	33.6	37.3	34.1	—	—
68	0.5	34.5	35.6	39.3	36.1	—	—
80	0.5	41.6	41.6	45.3	42.1	—	—

■ Recommended FPC / FFC construction FH31S and FH31H

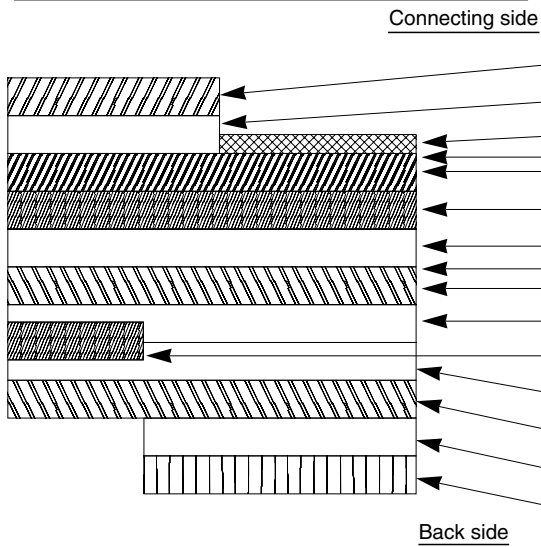
1. Using Single-sided FPC



FPC : Flexible Printed Circuit

Material Name	Material	Material Thickness (μm)
Covering film layer.	Polyimide 1 mil thick.	(25)
Cover adhesive		(25)
Surface treatment	0.2μm thick gold plated over 1 to 5μm thick nickel underplating	3
Copper foil	Cu 1oz	35
Base adhesive	Thermosetting adhesive	25
Base film	Polyimide 1 mil thick	25
Reinforcement material adhesive	Thermosetting adhesive	30
Stiffener	Polyimide 7 mil thick	175
Total		293

2. Using Double-sided FPC

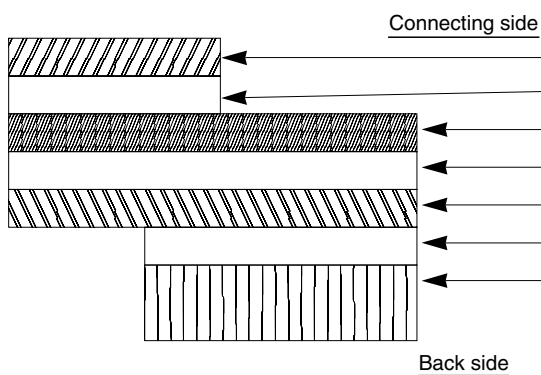


FPC : Flexible Printed Circuit

Material Name	Material	Material Thickness (μm)
Covering layer film	Polyimide 1 mil thick	(25)
Cover adhesive		(25)
Surface treatment	0.2μm thick gold plated over 1 to 5μm thick nickel underplating	3
Through-hole copper	Cu	15
Copper foil	Cu 1/2oz	18
Base adhesive	Thermosetting adhesive	18
Base film	Polyimide 1 mil thick	25
Base adhesive	Thermosetting adhesive	18
Copper foil	Cu 1/2oz	(18)
Cover adhesive	Thermosetting adhesive	25
Covering film layer	Polyimide 1 mil thick	25
Reinforcement material adhesive	Thermosetting adhesive	50
Stiffener	Polyimide 4 mil thick	100
Total		297

* To prevent release of the FPC due to its bending, use of the double sided FPC with copper foil on the back side is NOT RECOMMENDED.

3. Using FFC



FFC : Flexible Flat Cable

Material Name	Material	Material Thickness (μm)
Polyester film		(12)
Adhesive	Thermoplastic polyester	(30)
Gold plated annealed copper foil		35
Adhesive	Polyester	30
Polyester		12
Adhesive	Polyester	30
Stiffener	Polyester	188
Total		295

Note: Recommended FPC/FFC thickness specification: 0.3 ± 0.05 mm

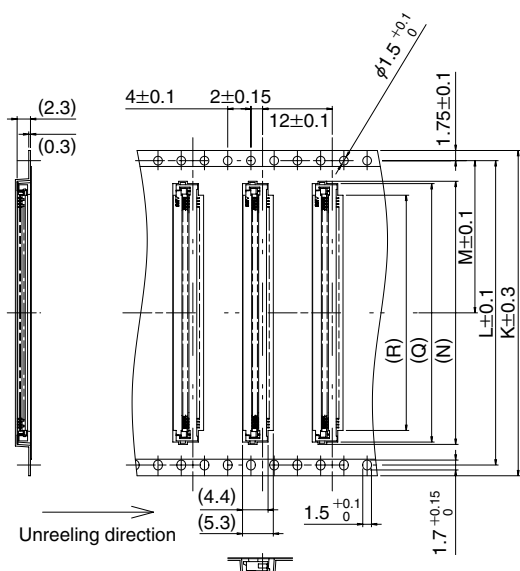
4. Precautions

1. This specification is a recommendation for the construction of the FH31H(S) Series FPC and FFC ($t=0.3 \text{ Å}$)0.05).
2. For details about the construction, please contact the FPC/FFC manufacturers.

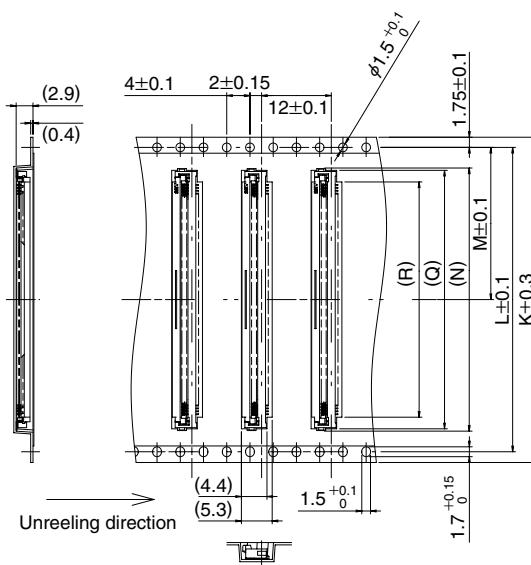
■ Packaging Specification

FH31H and FH31S

● Embossed Carrier Tape Dimensions

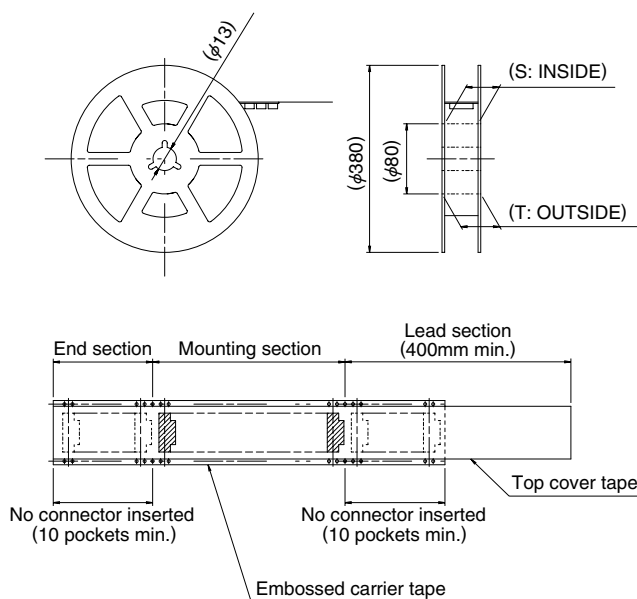


FH31H



FH31S

● Reel Dimensions



FH31H

All dimensions: mm

Part Number	CL No.	Number of contacts	K	L	M	N	Q	R	S	T
FH31H-56S-0.5SH(08)	580-0610-0-08	56	56	52.4	26.2	33.7	32.4	28.5	57.4	61.4
FH31H-64S-0.5SH(05)	580-0605-0-05	64	56	52.4	26.2	37.3	36.5	32.5	57.4	61.4
FH31H-68S-0.5SH(06)	580-0604-8-06	68	56	52.4	26.2	39.3	38.5	34.5	57.4	61.4
FH31H-80S-0.5SH(06)	580-0601-0-06	80	56	52.4	26.2	45.3	44.5	40.5	57.4	61.4
FH31H-64(32)S-1SH(05)	580-0612-6-05	32	56	52.4	26.2	37.7	36.4	32.5	57.4	61.4
FH31HW-16S-1SH	580-0611-3-00	16	44	40.4	20.2	22.2	20.9	17	45.4	49.4
FH31HW-64(32)S-1SH	580-0614-1-00	32	56	52.4	26.2	37.7	36.4	32.5	57.4	61.4

FH31S

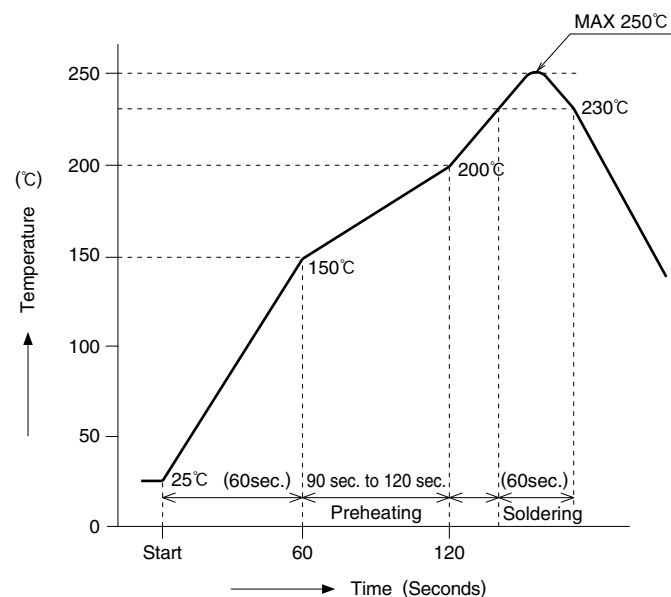
All dimensions: mm

Part Number	CL No.	Number of contacts	K	L	M	N	Q	R	S	T
FH31S-64S-0.5SH(05)	580-0608-9-05	64	56	52.4	26.2	37.3	36.5	32.5	57.4	61.4
FH31S-80S-0.5SH(08)	580-0607-6-08	80	56	52.4	26.2	45.3	44.5	40.5	57.4	61.4

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

■ Recommended 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:M705-221CM5-32-10.5)
Test board	:Glass epoxy 55mm×150mm×1.6mm thick :Land dimensions 0.3mm×0.7mm
Metal mask	:0.25×0.7×0.12mm 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.

■ FH31H and FH31S Series Handling Precautions

Operation and Precautions

Exercise care when handling connectors. Follow recommendations given below.

[Precautions in PCB Mounting]

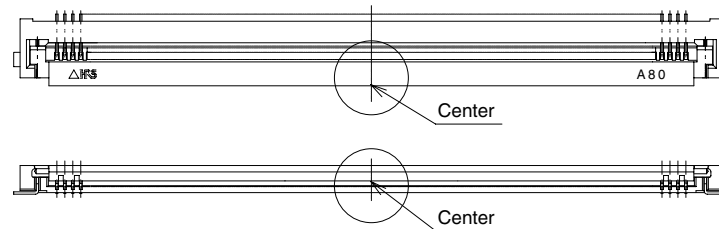
◆ PC board warpage

Minimize the warpage as much as possible. The connector are 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.

[When Inserting and Coupling FPC or FFC]

◆ Actuator Operation

- ① Lifting at the center, carefully rotate the actuator to a fully open position.



- ② The actuator rotates at the center of rotation (Fig. 1). Do not attempt to operate it in any other way.

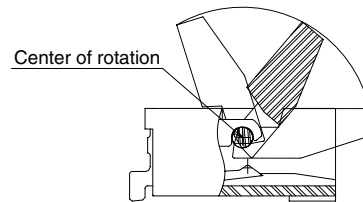


Fig.1

- ③ The actuator will not open more than 107°. Do not force it to open beyond this range. (Fig. 2)

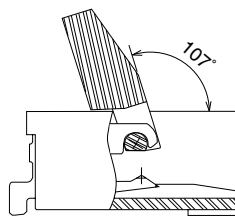


Fig.2

◆ Correct FPC / FFC orientation

Prior to insertion in the connector make sure that the contact pads (FPC / FFC) are facing down (Fig. 3).

Contact peels facing down

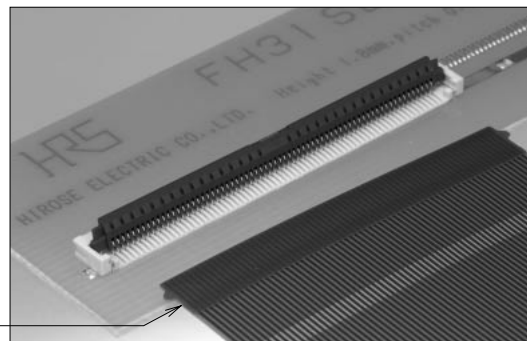


Fig.3

Operation and Precautions

◆Insertion of the FPC and FFC

① Insert the FPC or FFC, parallel with the mounting surface.

When using the FPC with the retention tabs make sure that both tabs fit into the corresponding clearances on both sides of the insulator body.

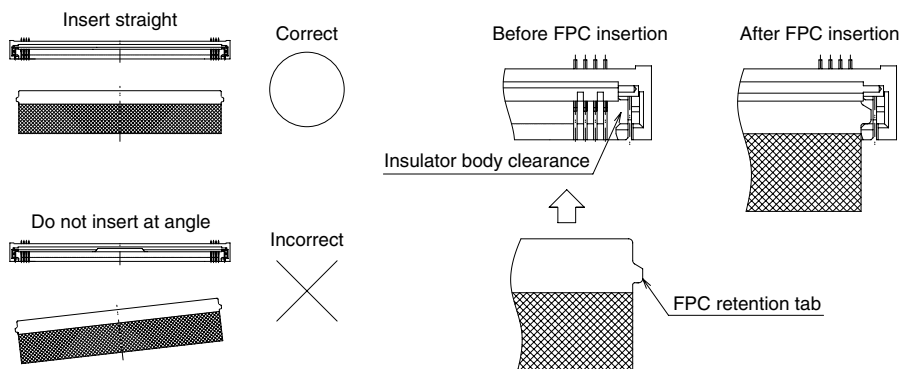


Fig.4

② Make sure that the FPC/FFC does not rub against the insertion slot or the contacts (Fig. 5).

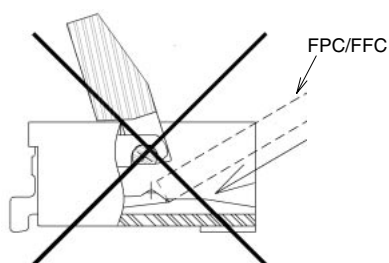


Fig.5

◆Actuator closing after the FFC/FPC is fully inserted.

Rotate down, pushing at each end, to a fully closed position (Fig. 6)

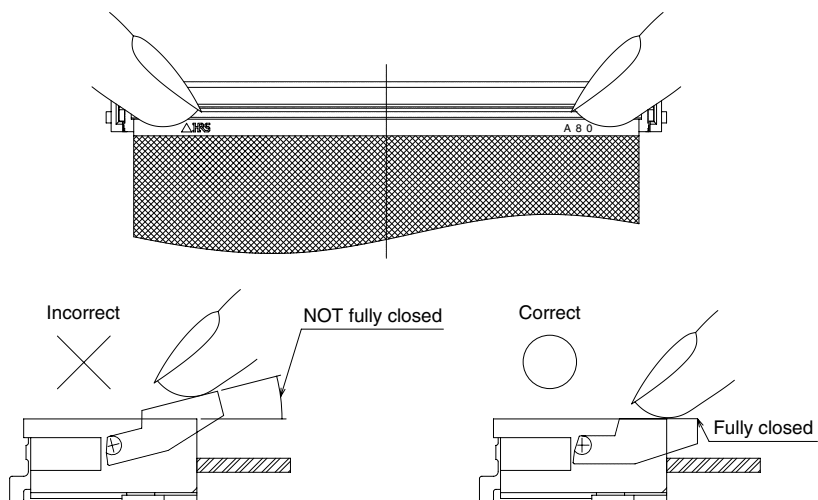


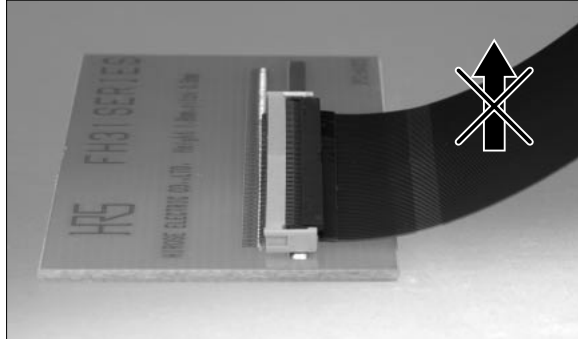
Fig.6

Precautions

◆ Forces to the FPC/FFC

- ① Do not apply upward pull-force to the FPC/FFC close to the connector.

If a need arise to route the FPC/FFC upward, assure that it is NOT transferring any forces to the closed actuator.



[Other Precautions]

◆ When hand soldering

- ① Do not perform hand soldering with the FPC/FFC inserted in the connector.
- ② Do not apply excessive heat or touch the soldering iron anywhere other than the connector leads.
- ③ 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.