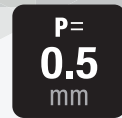


# FH40 Series

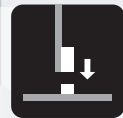
## 0.5mm Pitch, Height 5.8mm, Vertical Connection, FPC/FFC Connector



™ Flip-Lock Pioneer Hirose



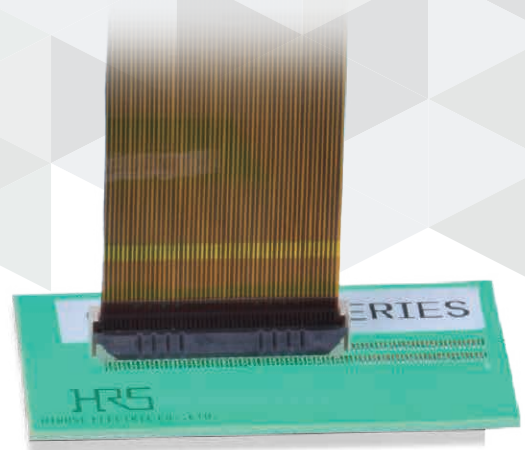
P = 0.5mm



Vertical



Robust



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## Features

### 1. Reduction in Connection Man-Hours (30% reduction compared to our conventional items)

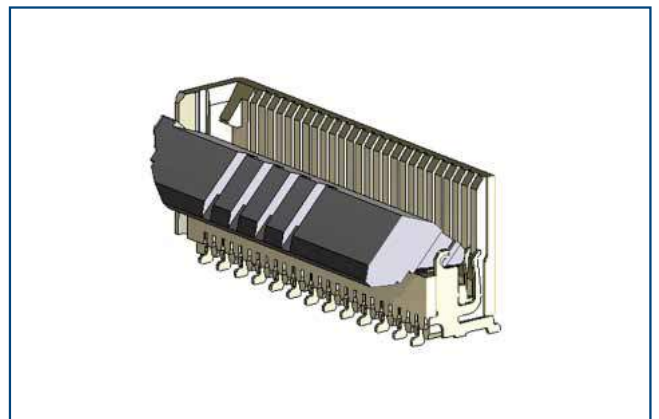
Our unique actuator shape enables the completion of both FPC/FFC insertion to joint in a sequence of motion.

### 2. Prevention of Half and Diagonal Joints

The side catcher for FPC/FFC positioning ensures accurate FPC/FFC insertion.

### 3. Robust Design and No Falling off Actuator

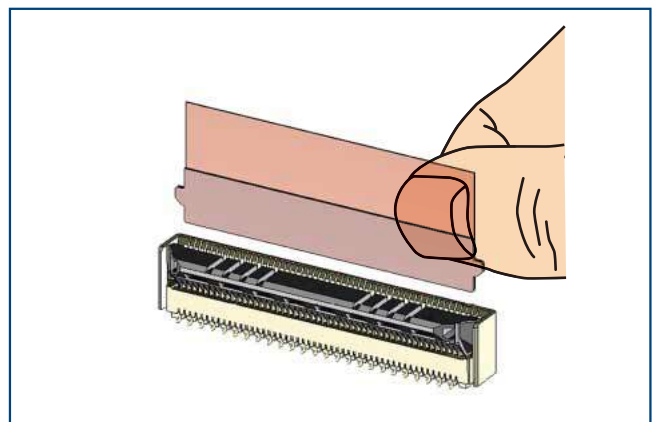
The unique terminal shape prevents the actuator from falling off even under rough operation.



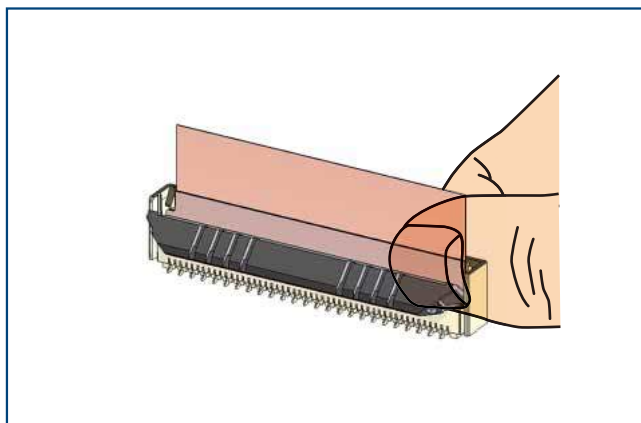
Robust Locking Design

### 4. Excellent Workability with Flip-Lock Design

The flip-lock (rotating one-touch) allows FPC/FFC connection work with ease and light force. The clickability at the time of locking has also been improved so that connection work can be done without anxiety.



Inserting FPC/FFC



Locked

## 5. FPC/FFC Thickness 0.3mm Compatible

It is compatible with a thickness of 0.3mm, which makes item easy to insert.

## 6. Pick-up Surface for Automatic Mounting

Pick & place mounting is possible with embossed packaging. (1,000pcs per reel)

## 7. Halogen-free

The connector does not contain chlorine or bromine above the standard value.

\* As defined by IEC61249-2-21

Br : 900ppm maximum, Cl : 900ppm maximum,  
Cl+Br combined : 1,500ppm maximum.

## 8. FPC/FFC is interchangeable with FH28.

FPC/FFC can be used in common with coplanar connection type FH28.

## Product Specifications

Rated Current (Note 1)	0.5A	Operating Temperature (Note 2)	-40 to +105°C
Rated Voltage	50Vrms AC	Operating Humidity Range	RH 90% Max. (No Condensation)
		Storage Temperature (Note 3)	-10 to +50°C
		Storage Humidity Range	RH 90% Max. (No Condensation)

Adaptive FPC/FFC Contact Specifications	t=0.30 ± 0.05 Gold Plating
---	----------------------------

Item	Standards	Condition
Insulation Resistance	500M Ω Min.	Measured at 100V DC
Withstanding Voltage	No flashover or insulation breakdown	150Vrms AC applied for 1 min.
Contact Resistance	50m Ω Max. *Include FPC/FFC conductor resistance	Measured at 1mA (DC or 1,000 Hz)
Mating Durability	Contact Resistance: 50m Ω Max. No damage, cracks or part dislocation.	20 times
Vibration Resistance	No electrical discontinuity of 1 μ s or more Contact Resistance: 50m Ω Max. No damage, cracks or part dislocation.	Frequency 10 to 55Hz, half amplitude 0.75mm, 10 cycles each in 3 axes
Shock Resistance	No electrical discontinuity of 1 μ s or more Contact Resistance: 50m Ω Max. No damage, cracks or part dislocation.	Acceleration: 981 m/s <sup>2</sup> duration: 6ms, Half-sine wave 3 axes 3 times each in both directions
Humidity Resistance (Steady-State)	Contact Resistance: 50m Ω Max. Insulation Resistance: 50M Ω Min. No damage, cracks or part dislocation.	Leave for 96 hours in +40°C and 90 to 95% humidity.
Temperature Cycle	Contact Resistance: 50m Ω Max. Insulation Resistance: 50M Ω Min. No damage, cracks or part dislocation.	Temperature: -40 to +15 to +35 to +105 to +15 to +35°C Time: 30 → 2 to 3 → 30 → 2 to 3 min. 5 cycles under the above conditions
Solder Heat Resistance	Variation in appearance and no significant rattle in contact etc.	Reflow: In recommended Temperature Profile Hand solder: 350 ± 5°C , 5 sec.

Note 1 : When energizing rated current for all pins, use 70% of rated current.

Note 2 : Includes temperature rise caused by current flow.

Note 3 : Storage refers to the long-term storage condition for unused products before the board mounting.

Operating temperature and humidity range apply when the product is not powered after PCB mounting and when temporarily stored during transportation.

## Materials / Finish

Component	Material	Color/Finish	Remarks
Insulator	LCP	Beige	UL94V-0
		Black	
Contact	Phosphorous Bronze	Gold Plating	-

## Product Number Structure

Refer to the chart below when determining the product specifications from the product number.  
Please select from the product numbers listed in this catalog when placing orders.

### **FH40 - 50S - 0.5 SV (##)**

①

②

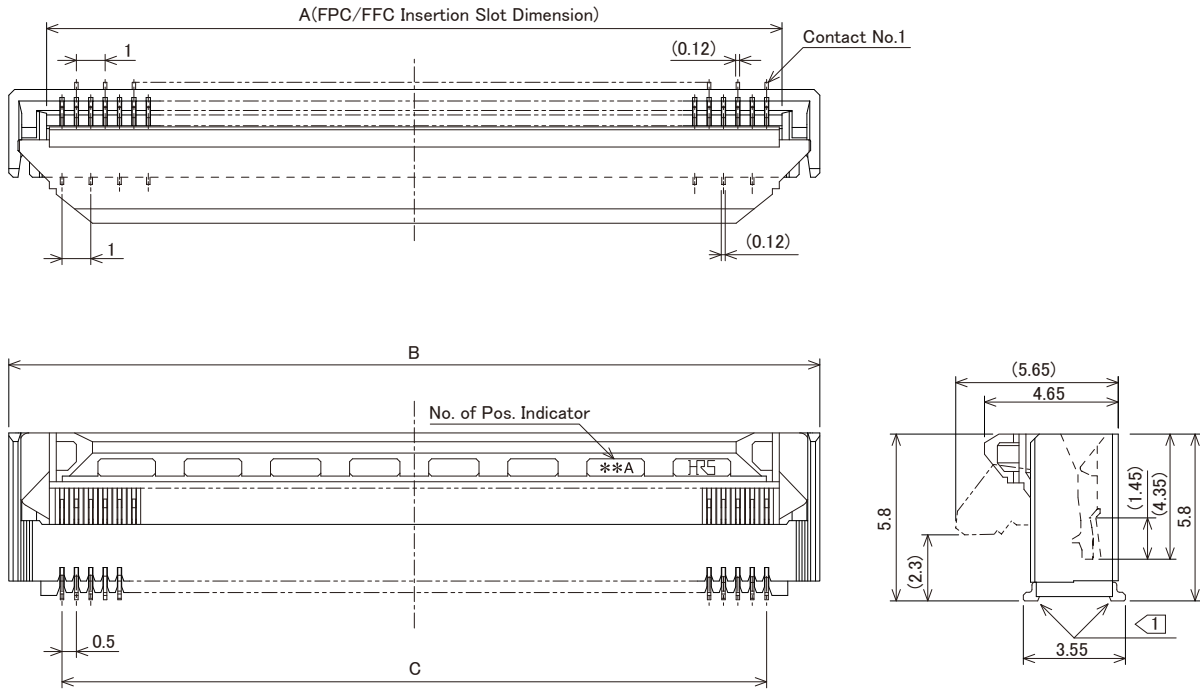
③

④

⑤

① Series Name	FH40	④ Contact Type	SV : SMT Vertical Mounting Type
② No. of Pos.	10 to 80	⑤ Specifications	None : Partial Gold Plating (1,000pcs per reel) (99) : Partial Gold Plating (500pcs per reel) (For trial production)
③ Contact Pitch	0.5mm		

## Connector Dimensions

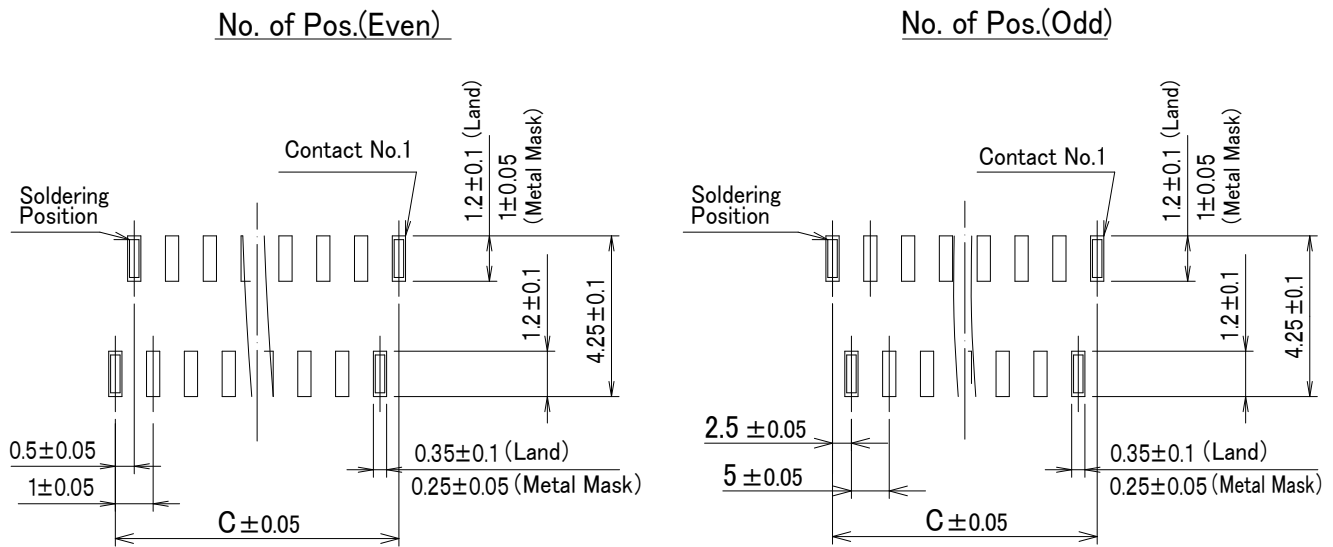


- Note 1 : The coplanarity of each terminal lead within specified dimension is 0.1mm Max.  
 Note 2 : Packaged in tape and reel. Check the packaging specifications for details.  
 Note 3 : Sink holes may be added for improvements.  
 Also, black spots may appear on the mold resin, but this does not affect the quality of the product.  
 Note 4 : After reflow, contact plating may change color, however this does not represent a quality issue.

Unit : mm

Part No.	HRS No.	No. of Pos.	A	B	C	Purchase Unit (#) : (00)	Purchase Unit (#) : (99)
FH40-10S-0.5SV(##)	CL0580-2104-6-##	10	5.57	8.2	4.5	1,000pcs per reel	500pcs per reel
FH40-20S-0.5SV(##)	CL0580-2105-9-##	20	10.57	13.2	9.5		
FH40-24S-0.5SV(##)	CL0580-2106-1-##	24	12.57	15.2	11.5		
FH40-30S-0.5SV(##)	CL0580-2108-7-##	30	15.57	18.2	14.5		
FH40-40S-0.5SV(##)	CL0580-2107-4-##	40	20.57	23.2	19.5		
FH40-45S-0.5SV(##)	CL0580-2101-8-##	45	23.07	25.7	22		
FH40-50S-0.5SV(##)	CL0580-2100-5-##	50	25.57	28.2	24.5		
FH40-60S-0.5SV(##)	CL0580-2109-0-##	60	30.57	33.2	29.5		
FH40-64S-0.5SV(##)	CL0580-2102-0-##	64	32.57	35.2	31.5		
FH40-80S-0.5SV(##)	CL0580-2103-3-##	80	40.57	43.2	39.5		

## Recommended PCB Mounting Pattern, Metal Mask Dimensions



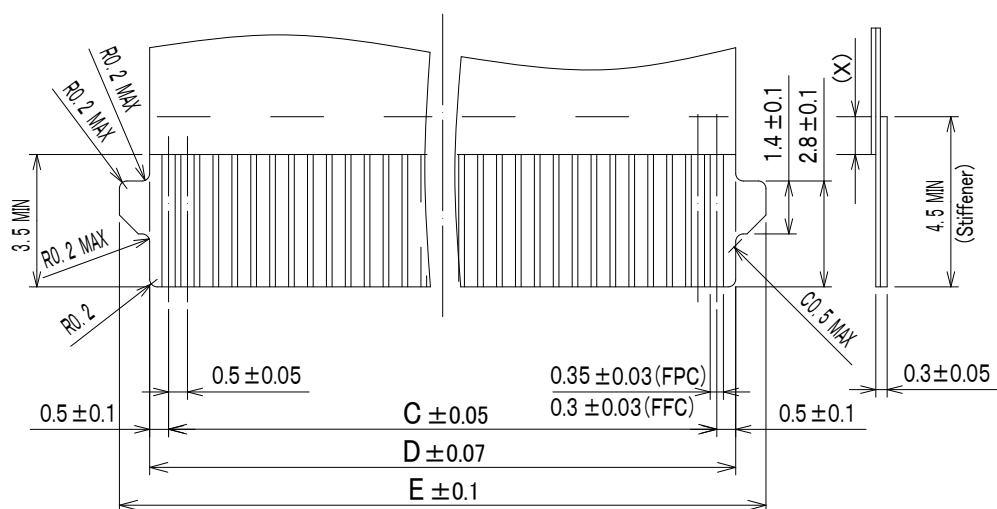
Recommended Metal Mask Thickness :  $t=0.15$

Unit : mm

Part No.	HRS No.	No. of Pos.	C	D	E
FH40-10S-0.5SV(##)	CL0580-2104-6-##	10	4.5	5.5	7.1
FH40-20S-0.5SV(##)	CL0580-2105-9-##	20	9.5	10.5	12.1
FH40-24S-0.5SV(##)	CL0580-2106-1-##	24	11.5	12.5	14.1
FH40-30S-0.5SV(##)	CL0580-2108-7-##	30	14.5	15.5	17.1
FH40-40S-0.5SV(##)	CL0580-2107-4-##	40	19.5	20.5	22.1
FH40-45S-0.5SV(##)	CL0580-2101-8-##	45	22	23.0	24.6
FH40-50S-0.5SV(##)	CL0580-2100-5-##	50	24.5	25.5	27.1
FH40-60S-0.5SV(##)	CL0580-2109-0-##	60	29.5	30.5	32.1
FH40-64S-0.5SV(##)	CL0580-2102-0-##	64	31.5	32.5	34.1
FH40-80S-0.5SV(##)	CL0580-2103-3-##	80	39.5	40.5	42.1

## Recommended FPC/FFC Dimensions

It is not recommended to mate FPC/FFC without tabs to this connector.



Note 1 : Stiffener dimension should be 3.5mm Min., and X dimension should be 0.5mm for improved flexibility of FPC/FFC.

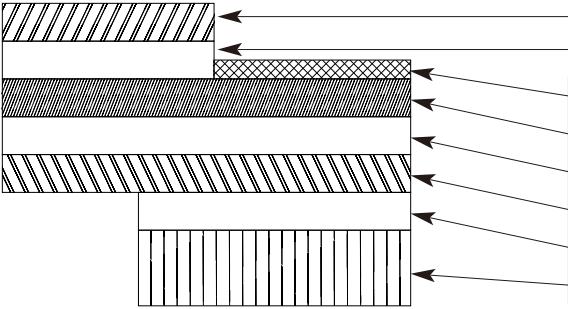
Unit : mm

Part No.	HRS No.	No. of Pos.	C	D	E
FH40-10S-0.5SV(##)	CL0580-2104-6-##	10	4.5	5.5	7.1
FH40-20S-0.5SV(##)	CL0580-2105-9-##	20	9.5	10.5	12.1
FH40-24S-0.5SV(##)	CL0580-2106-1-##	24	11.5	12.5	14.1
FH40-30S-0.5SV(##)	CL0580-2108-7-##	30	14.5	15.5	17.1
FH40-40S-0.5SV(##)	CL0580-2107-4-##	40	19.5	20.5	22.1
FH40-45S-0.5SV(##)	CL0580-2101-8-##	45	22	23.0	24.6
FH40-50S-0.5SV(##)	CL0580-2100-5-##	50	24.5	25.5	27.1
FH40-60S-0.5SV(##)	CL0580-2109-0-##	60	29.5	30.5	32.1
FH40-64S-0.5SV(##)	CL0580-2102-0-##	64	31.5	32.5	34.1
FH40-80S-0.5SV(##)	CL0580-2103-3-##	80	39.5	40.5	42.1



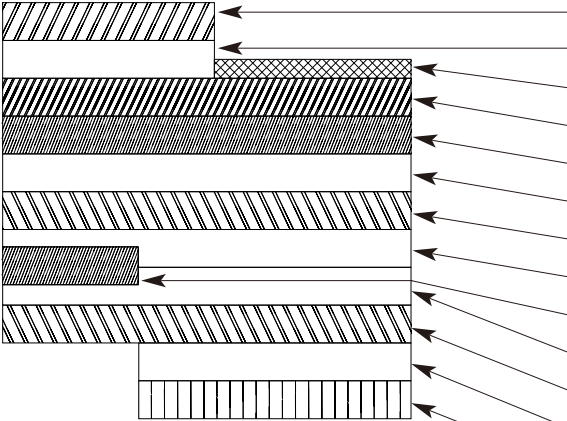
## FPC/FFC Construction (Recommended Specifications)

### Single-Sided FPC



Material Name	Material	Thickness ( $\mu\text{m}$ )
Covering Film Layer	Polyimide 1mil	(25)
Cover Adhesive		(25)
Surface Treatment	0.2 $\mu\text{m}$ thick gold plated over 1 to 5 $\mu\text{m}$ nickel underplatin	3
Copper Foil	Cu 1oz	35
Base Adhesive	Thermosetting Adhesive	25
Base Film	Polyimide 1mil	25
Reinforcement Material Adhesive	Thermosetting Adhesive	40
Stiffener	Polyimide 7mil	175
Total		303

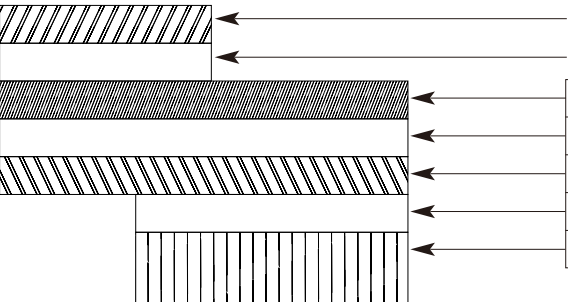
### Double-Sided FPC



Material Name	Material	Thickness ( $\mu\text{m}$ )
Covering Film Layer	Polyimide 1mil	(25)
Cover Adhesive		(25)
Surface Treatment	0.2 $\mu\text{m}$ thick gold plated over 1 to 5 $\mu\text{m}$ nickel underplatin	3
Through-Hole Copper	Cu	15
Copper Foil	Cu 1/2oz	18
Base Adhesive	Thermosetting Adhesive	18
Base Film	Polyimide 1mil	25
Base Adhesive	Thermosetting Adhesive	18
Copper Foil	Cu 1/2oz	(18)
Cover Adhesive	Thermosetting Adhesive	25
Covering Film Layer	Polyimide 1mil	25
Reinforcement Material Adhesive	Thermosetting Adhesive	50
Stiffener	Polyimide 4mil	100
Total		297

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

### FFC



Material Name	Material	Thickness ( $\mu\text{m}$ )
Polyester Film		12
Adhesive	Thermoplastic Polyester	30
Soft Copper Foil (Nickel underplating, Gold plating)		35
Adhesive	Polyester	30
Polyester		12
Adhesive	Polyester	30
Stiffener	Polyester	188
Total		295

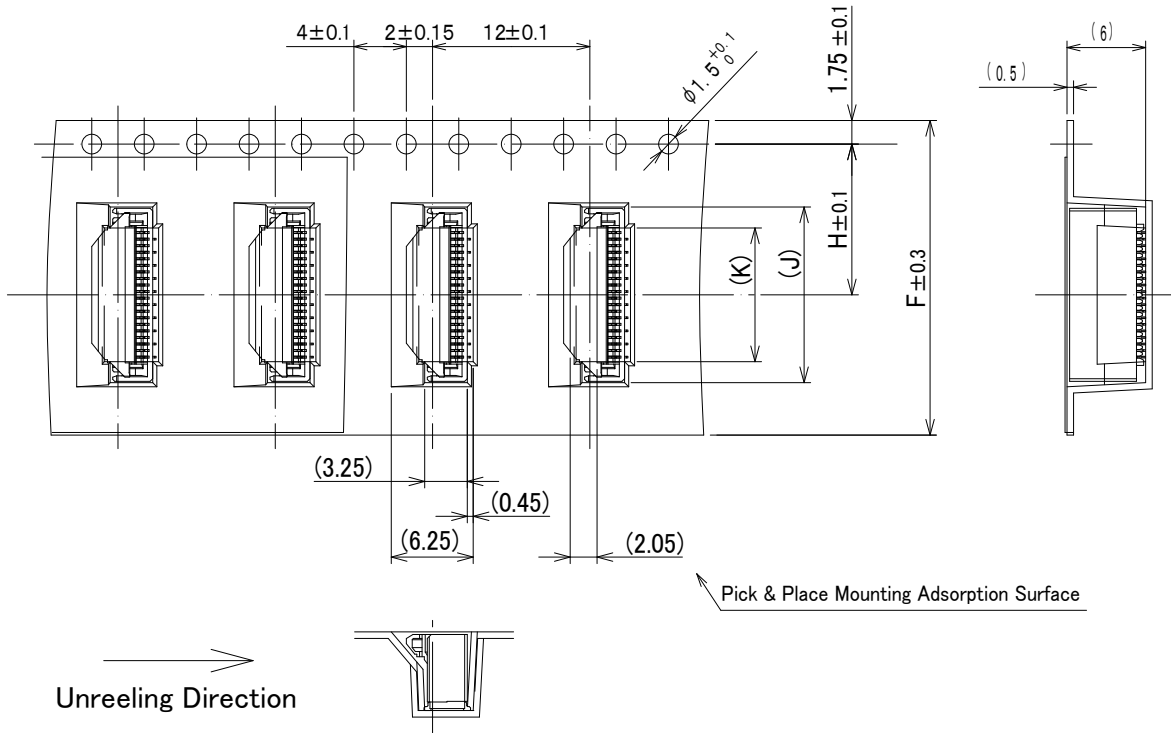
\* Actual tolerance of the thickness is approximately  $\pm 20\mu\text{m}$ .

Note 1 : This specification is a recommendation for the material configuration of the FPC/FFC ( $t=0.3 \pm 0.05\text{mm}$ ) for the FH40 series connectors.

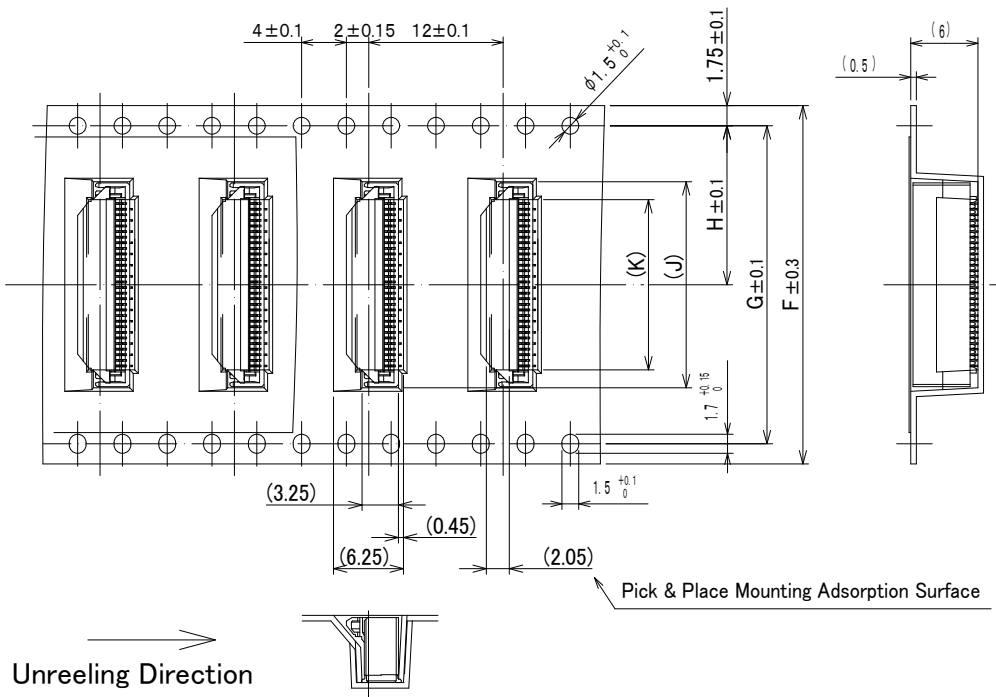
Note 2 : Please contact the FPC/FFC manufacturer for the material configurations of their FPC/FFC.

## Packaging Specifications

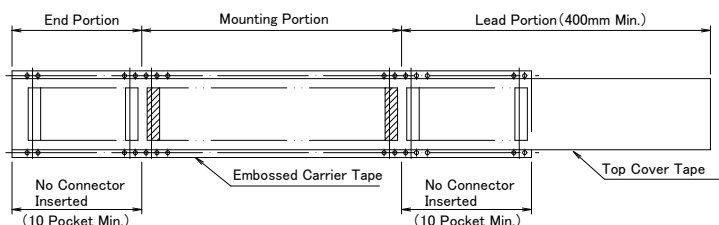
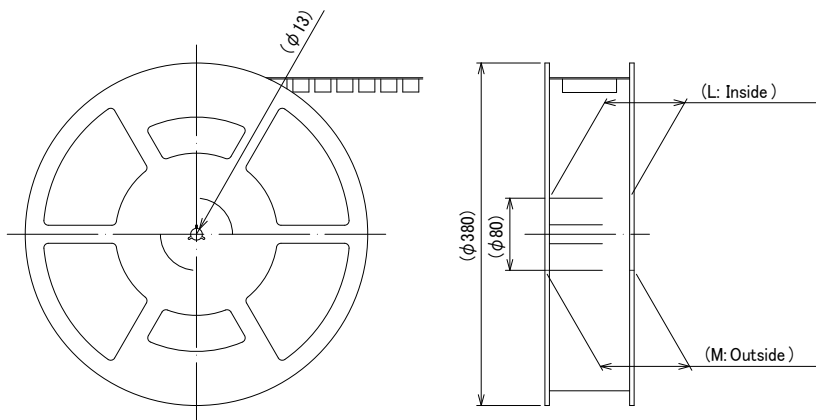
### Embossed Carrier Tape Dimensions (Tape Width 24mm Max.)



### Embossed Carrier Tape Dimensions (Tape Width 32mm Min.)



## Reel Dimensions



Unit : mm

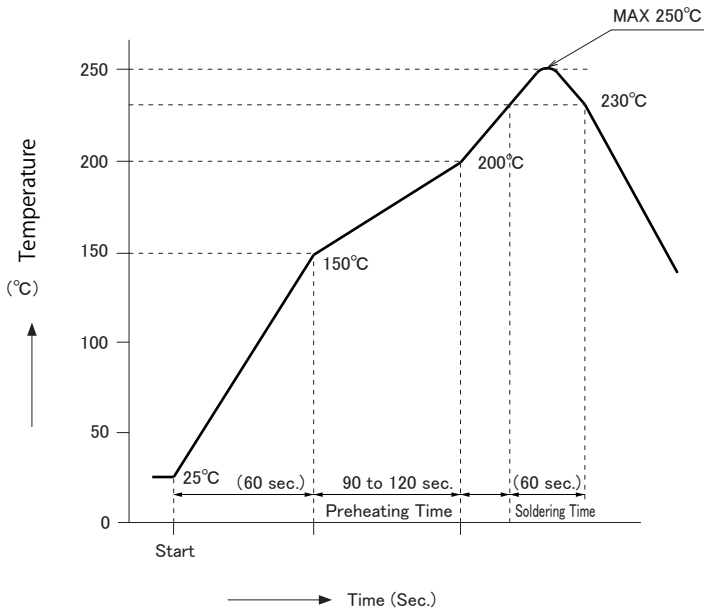
Part No.	HRS No.	No. of Pos.	F	G	H	J	K	L
FH40-10S-0.5SV(##)	CL0580-2104-6-##	10	16	-	7.5	8.4	17.4	21.4
FH40-20S-0.5SV(##)	CL0580-2105-9-##	20	24	-	11.5	13.4	25.4	29.4
FH40-24S-0.5SV(##)	CL0580-2106-1-##	24	24	-	11.5	15.4	25.4	29.4
FH40-30S-0.5SV(##)	CL0580-2108-7-##	30	32	28.4	14.2	18.4	33.4	37.4
FH40-40S-0.5SV(##)	CL0580-2107-4-##	40	44	40.4	20.2	23.4	45.4	49.4
FH40-45S-0.5SV(##)	CL0580-2101-8-##	45	44	40.4	20.2	25.9	45.4	49.4
FH40-50S-0.5SV(##)	CL0580-2100-5-##	50	44	40.4	20.2	28.4	45.4	49.4
FH40-60S-0.5SV(##)	CL0580-2109-0-##	60	56	52.4	26.2	33.4	57.4	61.4
FH40-64S-0.5SV(##)	CL0580-2102-0-##	64	56	52.4	26.2	35.4	57.4	61.4
FH40-80S-0.5SV(##)	CL0580-2103-3-##	80	56	52.4	26.2	43.4	57.4	61.4

[Specification No.]

Blank : Standard (1,000pcs per reel)

(99) : For trial production (500pcs per reel)

## Temperature Profile



### Applicable Conditions

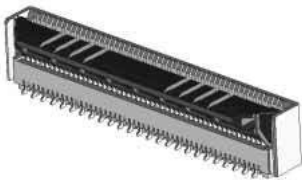
Solder Method	: Reflow, IR/Hot Air
Environment	: Room Air
Solder	: Paste Type Sn/3.0Ag/0.5Cu (SENJU METAL INDUSTRY CO., LTD. Part Number : M705-GRN360-K2-V)
Test Board	: Material and Size Glass Epoxy 30 × 66 × 0.8mm PCB Mounting Pattern 0.35 × 1.2mm
Metal Mask	: Thickness 0.15mm Opening Dimensions 0.25 × 1mm

This temperature profile is for the above conditions. The temperature profile may vary depending on the type of cream solder, the manufacturer, the board size and other conditions such as mounting materials. Please check the mounting status before use.

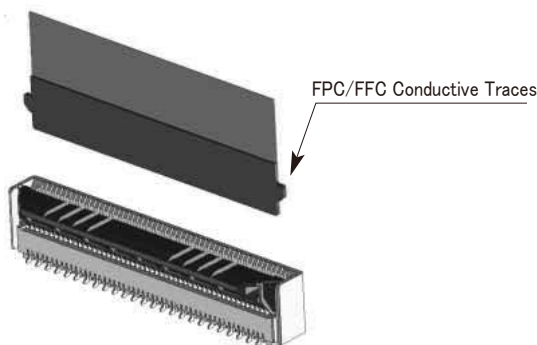
## Connector Operation and Precautions

### 1. FPC/FFC Insertion Procedure

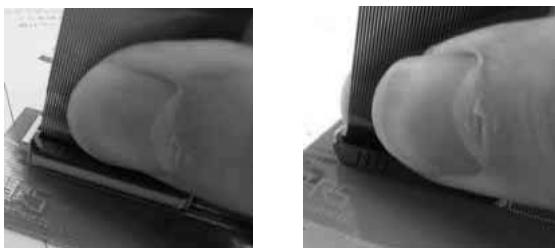
- (1) Verify that the actuator is positioned upright. If the actuator has rotated to the side, carefully rotate it upright.



- (2) Insert the FPC/FFC vertically in the connector slot assuring that the conductive traces of the FPC/FFC are facing away from the actuator.



(3) Press down the actuator in the direction shown.



## 2. FPC/FFC Removal

(1) Rotate the actuator upward and withdraw the FPC/FFC.

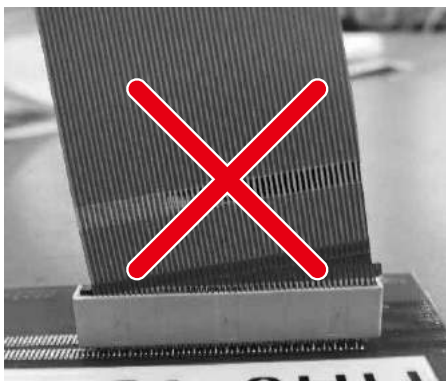


## Precautions

(1) Avoid forcing the actuator up or down without the FPC/FFC inserted.



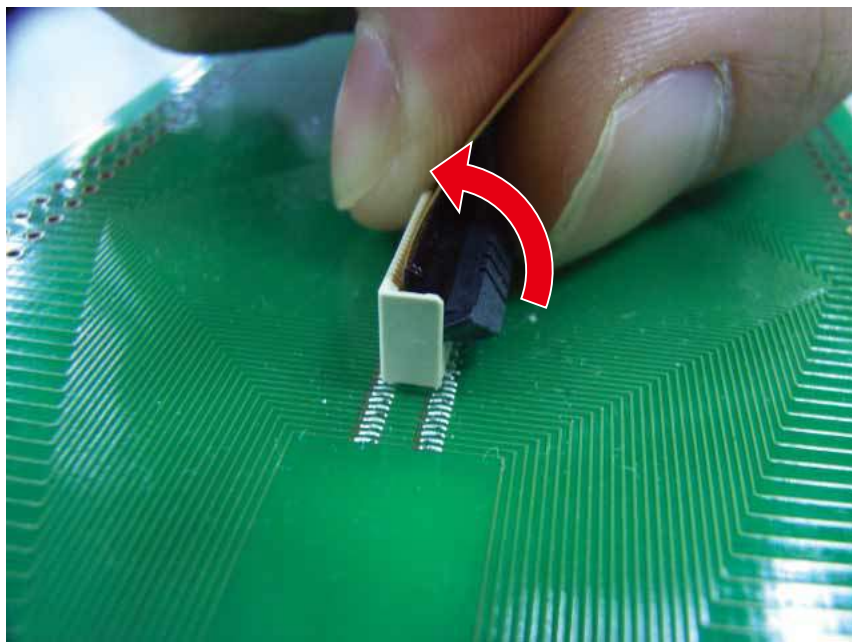
(2) Application of excessive force to the inserted FPC/FFC may cause damage to connector and may affect the reliability of electrical connection.



Do not insert the FPC/FFC diagonally.

Doing so will result in the corners of the FPC/FFC catching on the contacts and will cause deformation of the contacts.

(3) Disengage the actuator to release the lock and extract the FPC/FFC (refer to the picture below). By utilizing your thumb and index finger, you can easily manipulate the actuator to disengage the lock.



During the design phase of the PCB layout, make sure to incorporate enough space for the actuator on this connector to insert or remove the FPC/FFC.

## While Taking into Consideration

Specifications mentioned in this catalog are reference values.

When considering to order or use this product, please review the Drawing and Product Specifications sheets.

Use an appropriate cable when using the connector in combination with cables.

If considering usage of a non-specified cable, please contact your sales representative.

If assembly process is done by jigs & tools which are not identified by Hirose, the warranty of the product may be affected.

If considering usage for below mentioned applications, please contact your sales representative.

In cases where the application will demand a high level of reliability, such as automotive, medical instruments, public infrastructure, aerospace/defense etc. Hirose must review before assurance of reliability can be given.