PRODUCT CATALOG

HIROSE ELECTRIC CO.,LTD.

TF38 Series

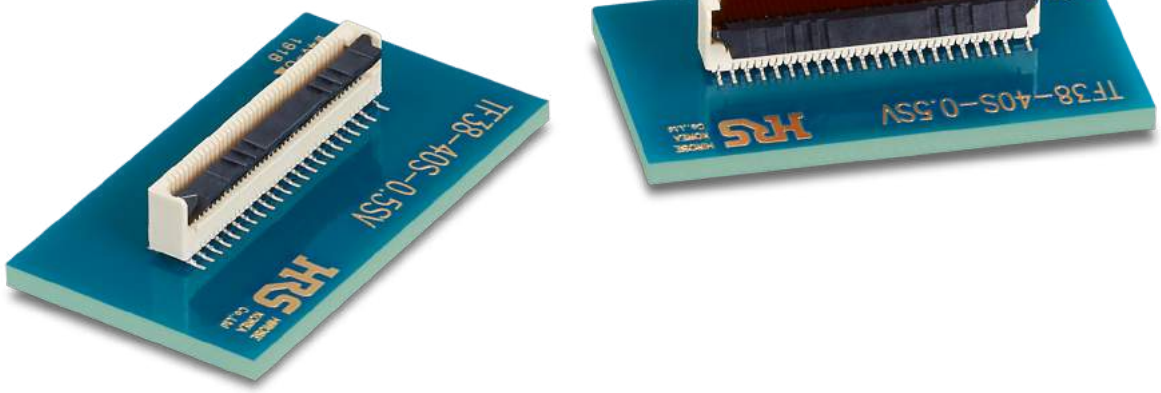
0.5mm Pitch, 5.2mm Height, Double-sided Lead, Vertical Connection Type FPC/FFC Connector

FH™ Flip-Lock Pioneer Hirose

P= 0.5 mm
P= 0.5mm

Vertical

Wide Variation



Product Page
https://www.hirose.com/en/product/series/TF38/

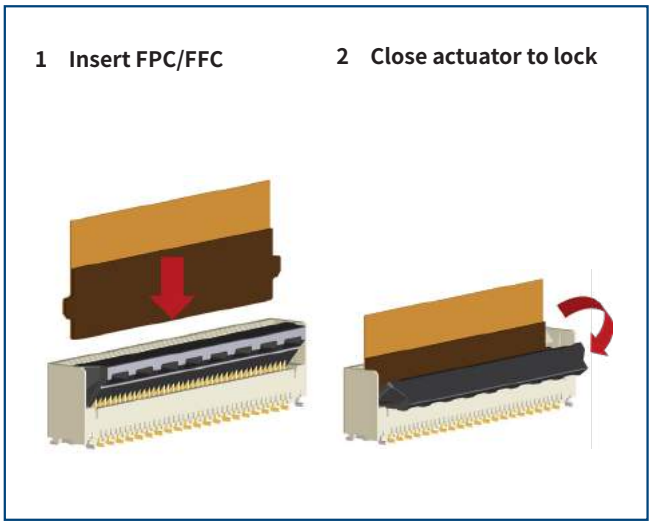
Sep. 2023

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Features

1. User-friendly design

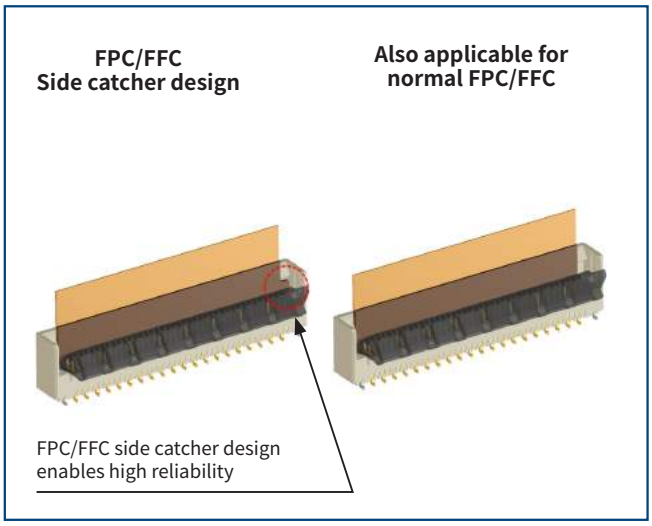
Long tapers on FPC/FFC insertion part enables easy FPC/FFC insertion.
Also, the large area at the actuator makes it easy to close the actuator.



Simple FPC/FFC insertion

2. FPC/FFC side catcher design

A high retention force enables high FPC/FFC reliability.



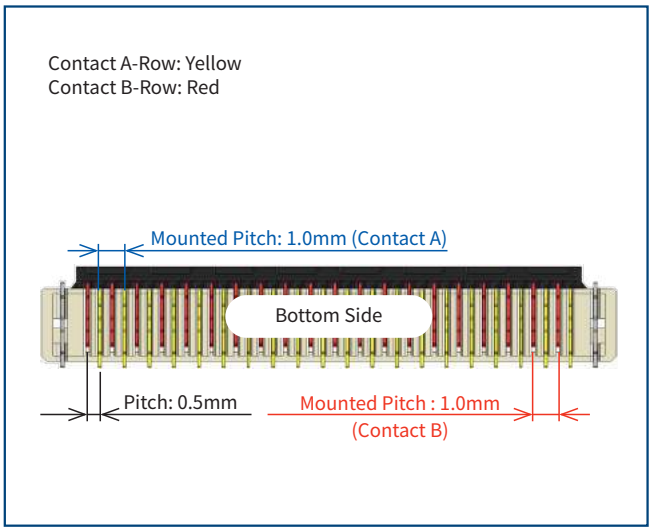
3. Prevents Actuator from Coming Off

Each terminal is attached to the actuator, which provides support to the actuator across its entire length. This prevents the actuator from separating from the housing.

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4. Enhanced Mounting Workability

TF38 Series has staggered contact leads on both sides of the connector. This enables easier mounting.



Double-sided lead Design

5. Halogen-Free

All materials and substances used to produce this product. Comply with Halogen-Free standards.

*As defined by IEC 61249-2-21
Br : 900ppm max., Cl : 900ppm max.,
Br+Cl : 1,500ppm max.

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Product Specifications

Rated Current (Note1)	0.5A	Operating Temperature (Note2)	-40 to +105° C
Rated Voltage	50V AC/DC	Operating Humidity Range	Relative humidity 90% Max. (No condensation)
		Storage Temperature (Note3)	-10 to +50°C
		Storage Humidity Range (Note3)	Relative humidity 90% Max. (No condensation)

Adaptive FPC/FFC Contact Specifications	Thickness : 0.3 ± 0.03mm Gold plated Contact Traces

Items	Specifications	Conditions
Contact Resistance	50mΩ Max. Including FPC/FFC conductor resistance	20mV AC Max., 1mA
Insulation Resistance	500MΩ Min.	100V DC
Withstanding Voltage	No insulation breakdown	150V AC for 1 min.
Mating Durability	Contact resistance: 50mΩ Max. No damage, cracks, or parts dislocation.	20 cycles
Vibration Resistance	No electrical discontinuity for more than 1μs. Contact resistance: 50mΩ Max. No damage, cracks, or parts dislocation	Frequency: 10 to 55Hz, Half Amplitude 0.75mm for 10 cycles in 3 axis directions
Shock Resistance	No electrical discontinuity for more than 1μs. Contact resistance: 50mΩ Max. No damage, cracks, or parts dislocation	Acceleration : 981m/s^2, 6ms duration, 3 cycles in each of the 3 axis.
Humidity Resistance	Contact resistance: 50mΩ Max. Insulation resistance: 50MΩ Min. No damage, cracks, or parts dislocation	96 hours at 40±2°C and humidity of 90% to 95%
Temperature Cycle	Contact resistance: 50mΩ Max. Insulation resistance: 50MΩ Min. No damage, cracks, or parts dislocation	Temperature：-40 → +15 to +35 → +105 → +15 to +35°C Time : 30 → 2 to 3 → 30 → 2 to 3 min. 5 cycles
Solder Heat Resistance	No deformation of components affecting performance No abnormality in electrical performance.	Reflow: At the recommended temperature profile

(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 cover non-conducting condition of installed connectors in storage, shipment or during transportation.

Materials / Finish

Item	Material	Finish and Color	Remarks
Insulator	LCP	Beige	UL94V-0
Actuator	LCP	Black	
Contact	Phosphor Bronze	Partially Gold Plated	-
Retention Tab	Phosphor Bronze	Tin Plated	

Product Number Structure

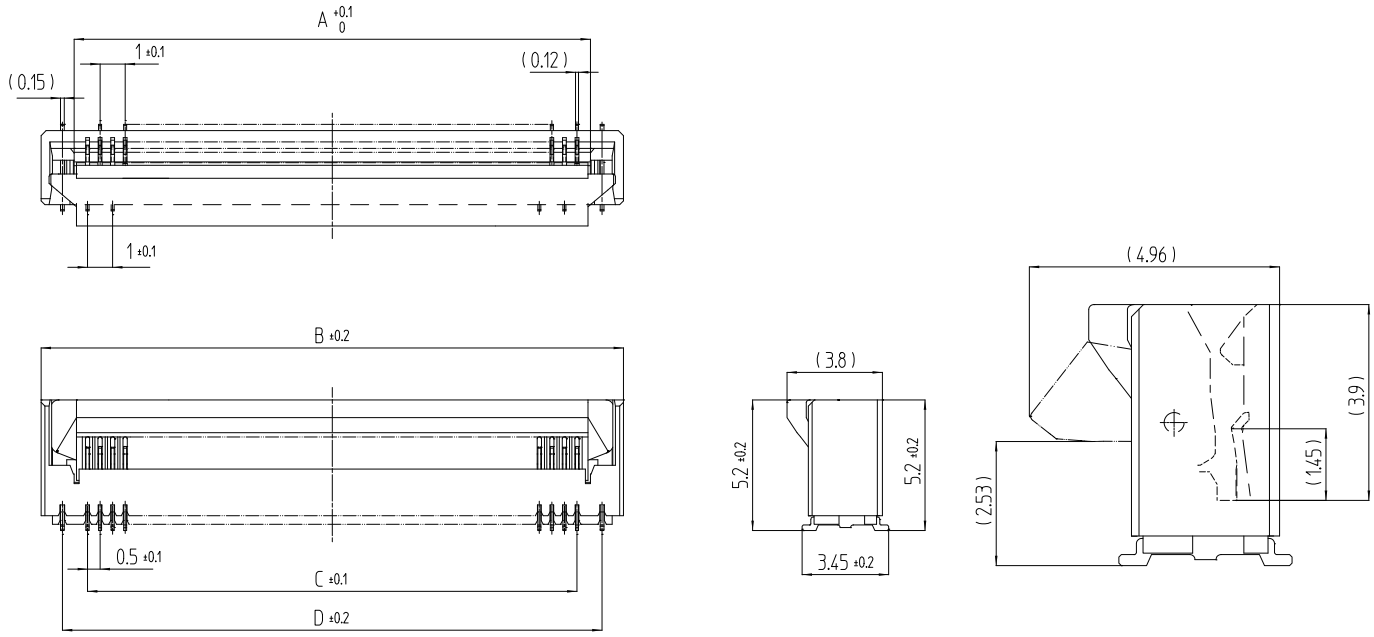
Refer to the chart below when determining the product specifications from the product number.
Please select from the product numbers listed in this catalog when placing orders.

TF38 - 16S - 0.5 SV (830)
❶ ❷ ❸ ❹ ❺

❶ Series Name	TF38	❺ Terminal Type	SV : SMT Vertical Mounting Type
❷ Number of Contacts	16, 18, 20, 22, 24, 26, 30, 32, 36, 38, 40, 45, 50, 60pos.	❻ Specifications	(830): Standard, Embossed Tape Packaging (1,000pcs per reel)
❸ Contact Pitch	0.5mm		

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Connector Dimensions



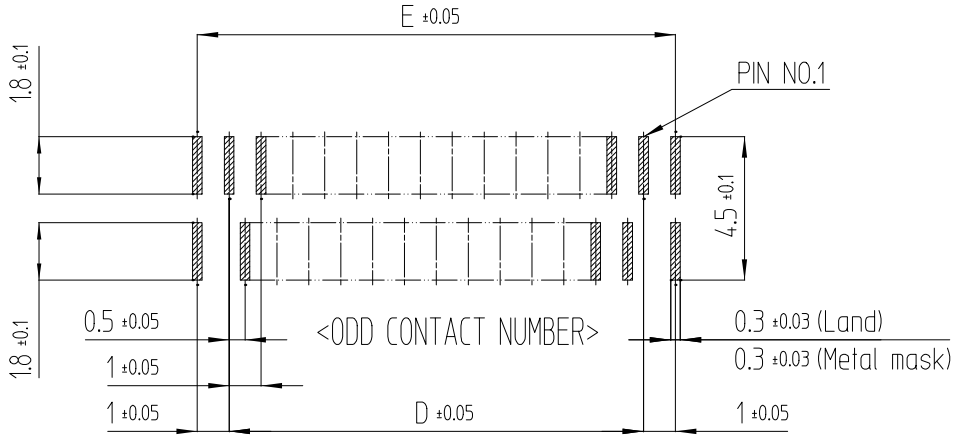
(Note 1) The co-planarity of each terminal lead is within 0.1mm.
(Note 2) This product is packaged and sold in tape and reel. Check the packaging specifications for details.
(Note 3) Sink mark reliefs may be added due to improvements.
(Note 4) Black spots may appear on the mold resin, but this does not affect product performance.
Additionally, the terminal plating may change color after reflow, however this does not represent a quality issue.

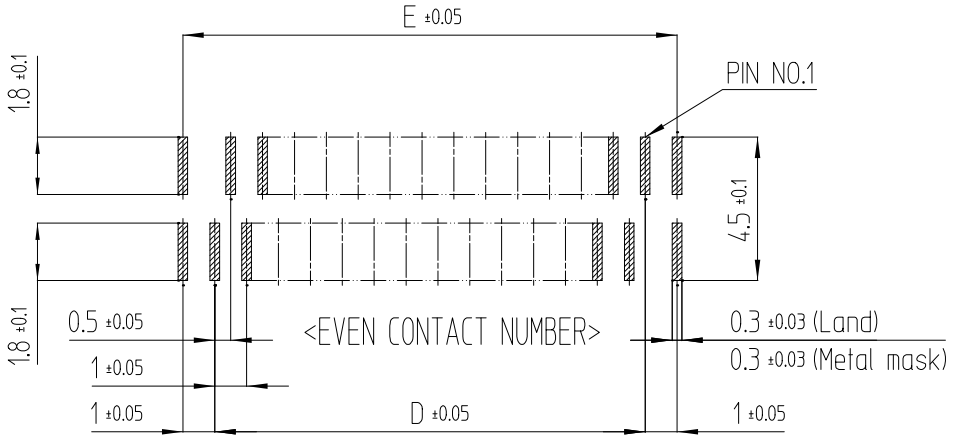
Unit : mm

Part No.	HRS No.	No. of Pos.	A	B	C	D	Purchase Unit
TF38-16S-0.5SV(830)	CL0480-0470-0-30	16	8.57	11.2	7.5	9.5	1,000pcs per reel
TF38-18S-0.5SV(830)	CL0480-0214-5-30	18	9.57	12.2	8.5	10.5	
TF38-20S-0.5SV(830)	CL0480-0215-8-30	20	10.57	13.2	9.5	11.5	
TF38-22S-0.5SV(830)	CL0480-0216-0-30	22	11.57	14.2	10.5	12.5	
TF38-24S-0.5SV(830)	CL0480-0372-0-30	24	12.57	15.2	11.5	13.5	
TF38-26S-0.5SV(830)	CL0480-0217-3-30	26	13.57	16.2	12.5	14.5	
TF38-30S-0.5SV(830)	CL0480-0242-0-30	30	15.57	18.2	14.5	16.5	
TF38-32S-0.5SV(830)	CL0480-0218-6-30	32	16.57	19.2	15.5	17.5	
TF38-36S-0.5SV(830)	CL0480-0207-0-30	36	18.57	21.2	17.5	19.5	
TF38-38S-0.5SV(830)	CL0480-0222-3-30	38	19.57	22.2	18.5	20.5	
TF38-40S-0.5SV(830)	CL0480-0225-1-30	40	20.57	23.2	19.5	21.5	
TF38-45S-0.5SV(830)	CL0480-0223-6-30	45	23.07	25.7	22.0	24.0	
TF38-50S-0.5SV(830)	CL0480-0219-9-30	50	25.57	28.2	24.5	26.5	
TF38-60S-0.5SV(830)	CL0480-0250-0-00	60	30.57	33.2	29.5	31.5	

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●Recommended Land / Metal Mask Dimensions
(Metal Mask Thickness：0.15mm)



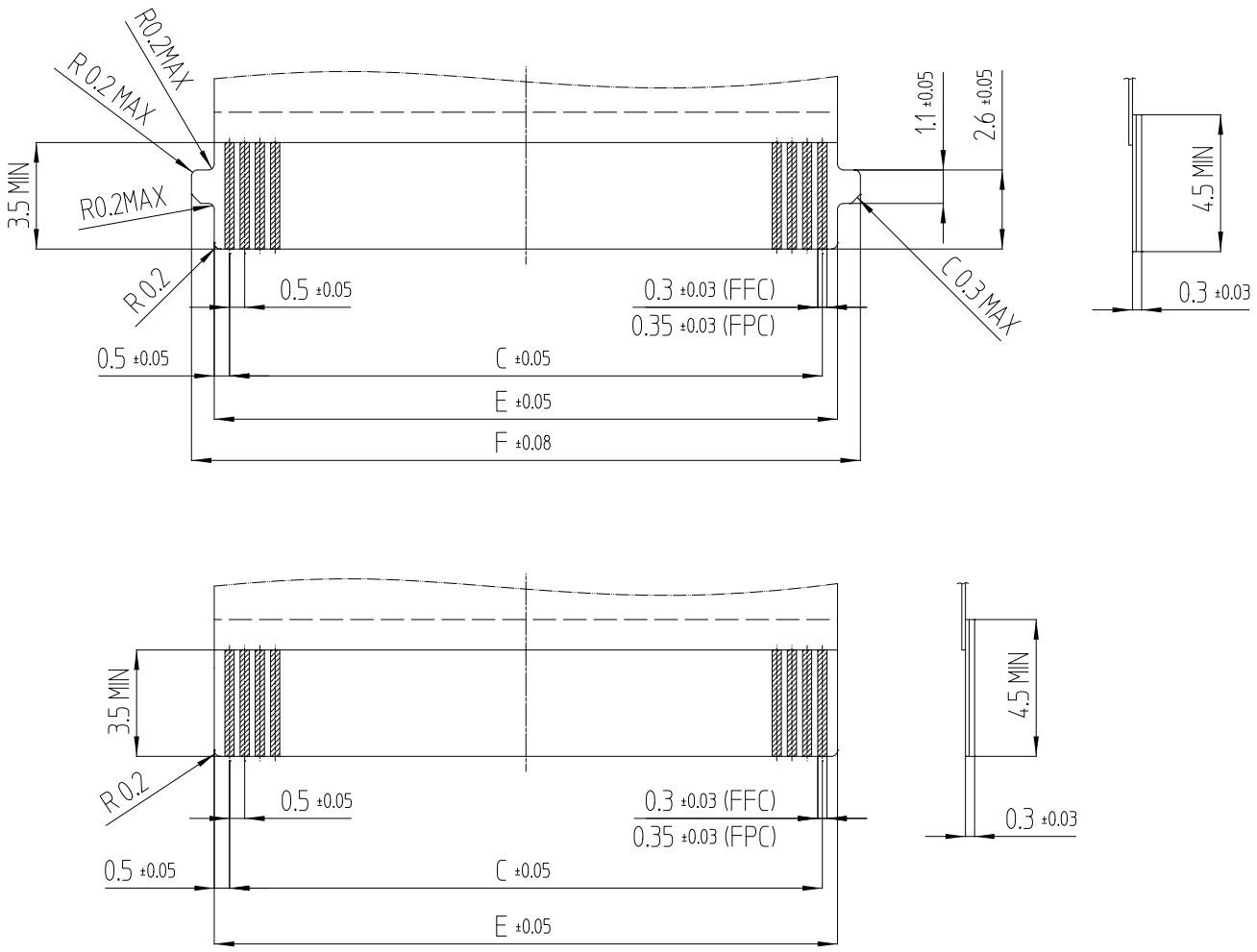


Unit : mm

Part No.	HRS No.	No. of Pos.	D	E
TF38-16S-0.5SV(830)	CL0480-0470-0-30	16	7.5	9.5
TF38-18S-0.5SV(830)	CL0480-0214-5-30	18	8.5	10.5
TF38-20S-0.5SV(830)	CL0480-0215-8-30	20	9.5	11.5
TF38-22S-0.5SV(830)	CL0480-0216-0-30	22	10.5	12.5
TF38-24S-0.5SV(830)	CL0480-0372-0-30	24	11.5	13.5
TF38-26S-0.5SV(830)	CL0480-0217-3-30	26	12.5	14.5
TF38-30S-0.5SV(830)	CL0480-0242-0-30	30	14.5	16.5
TF38-32S-0.5SV(830)	CL0480-0218-6-30	32	15.5	17.5
TF38-36S-0.5SV(830)	CL0480-0207-0-30	36	17.5	19.5
TF38-38S-0.5SV(830)	CL0480-0222-3-30	38	18.5	20.5
TF38-40S-0.5SV(830)	CL0480-0225-1-30	40	19.5	21.5
TF38-45S-0.5SV(830)	CL0480-0223-6-30	45	22.0	24.0
TF38-50S-0.5SV(830)	CL0480-0219-9-30	50	24.5	26.5
TF38-60S-0.5SV(830)	CL0480-0250-0-00	60	29.5	31.5

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● Recommended FPC/FFC Dimensions

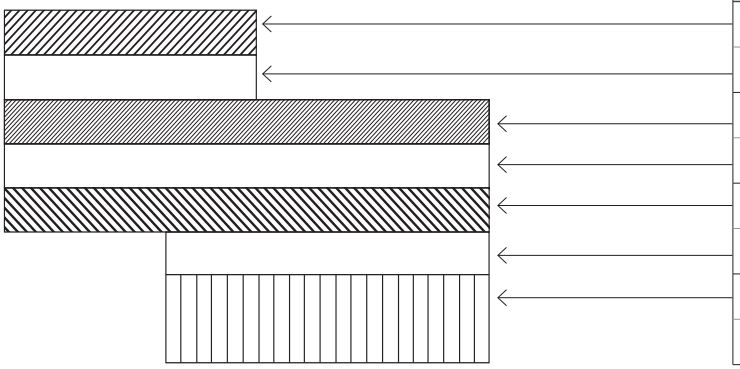


Unit : mm

Part No.	HRS No.	No. of Pos.	C	E	F
TF38-16S-0.5SV(830)	CL0480-0470-0-30	16	7.5	8.5	10.0
TF38-18S-0.5SV(830)	CL0480-0214-5-30	18	8.5	9.5	11.0
TF38-20S-0.5SV(830)	CL0480-0215-8-30	20	9.5	10.5	12.0
TF38-22S-0.5SV(830)	CL0480-0216-0-30	22	10.5	11.5	13.0
TF38-24S-0.5SV(830)	CL0480-0372-0-30	24	11.5	12.5	14.0
TF38-26S-0.5SV(830)	CL0480-0217-3-30	26	12.5	13.5	15.0
TF38-30S-0.5SV(830)	CL0480-0242-0-30	30	14.5	15.5	17.0
TF38-32S-0.5SV(830)	CL0480-0218-6-30	32	15.5	16.5	18.0
TF38-36S-0.5SV(830)	CL0480-0207-0-30	36	17.5	18.5	20.0
TF38-38S-0.5SV(830)	CL0480-0222-3-30	38	18.5	19.5	21.0
TF38-40S-0.5SV(830)	CL0480-0225-1-30	40	19.5	20.5	22.0
TF38-45S-0.5SV(830)	CL0480-0223-6-30	45	22.0	23.0	24.5
TF38-50S-0.5SV(830)	CL0480-0219-9-30	50	24.5	25.5	27.0
TF38-60S-0.5SV(830)	CL0480-0250-0-00	60	29.5	30.5	32.0

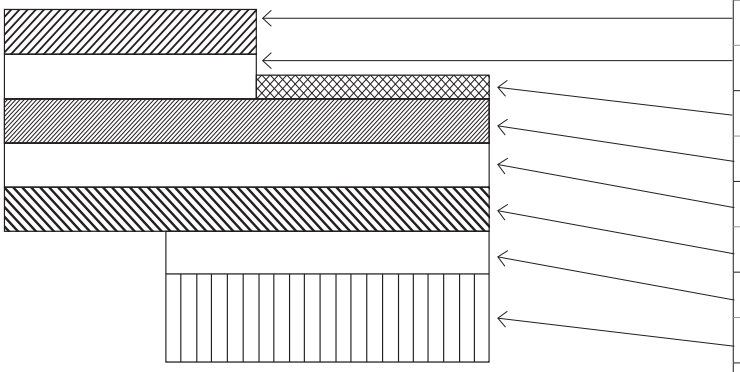
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●FFC Construction (Recommended Specifications)



Material Name	Material	Thickness(μm)
Polyester film		(12)
Adhesive	Polyester thermoplastic type	(30)
Annealed copper foil	Gold-plated nickel	35
Adhesive	Polyester type	30
Polyester		12
Adhesive	Polyester type	30
Stiffener	Polyester type	188
	Total	295

●FPC Construction (Recommended Specifications)



Material Name	Material	Thickness(μm)
Covering Layer Film	Polyimide 1mil	(25)
Cover Adhesive		(25)
Surface Treatment	Nickel 1 to 5 μm+ Gold plating	3
Copper Foil	CU 1/3oz	35
Base Adhesive	Thermoset adhesive	25
Base Film	Polyimide 1mil	25
Reinforcement Material Stiffener	Thermoset adhesive	30
Stiffener Film	Polyimide 7mil	175
	Total	293

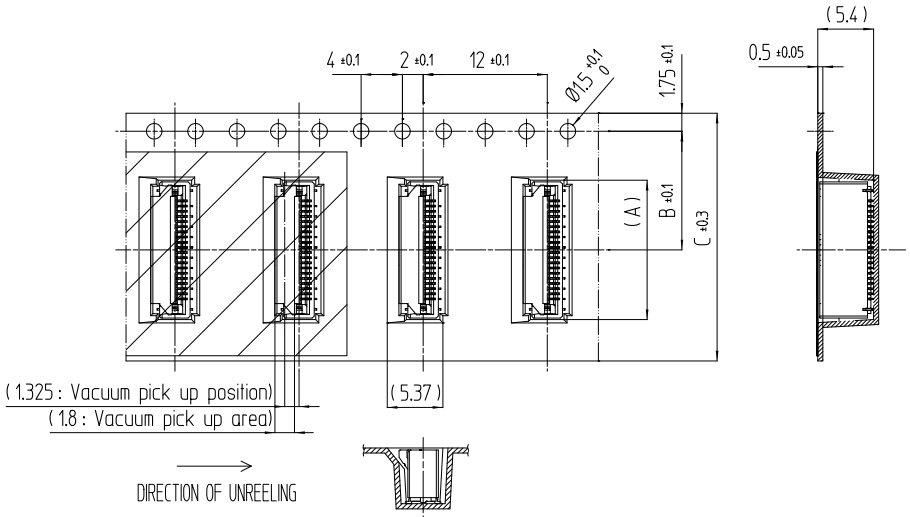
(Note 1) The material composition of FPC/FFC is for reference.
Please make the thickness of the FPC/FFC mating section 0.3 ± 0.03mm in reference to the above FPC/FFC construction.
(Note 2) For details about component configuration, please contact a FPC/FFC manufacturer.

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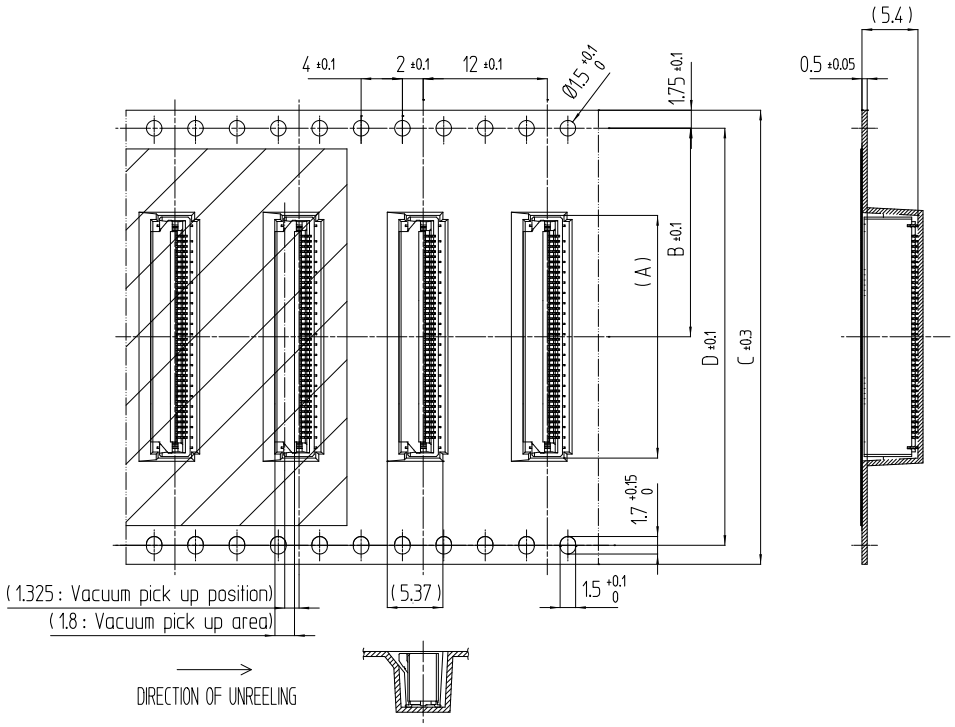
Packaging Specifications Diagram

● Embossed Tape Dimensions

Tape width 24mm Max.

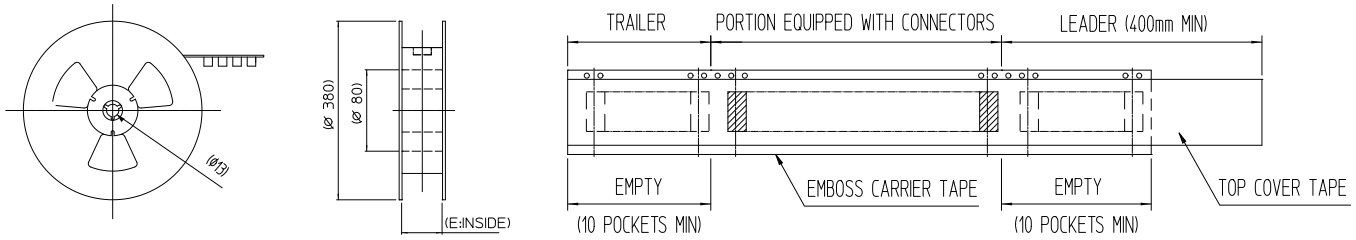


Tape width 32mm Min.



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● Reel Dimensions

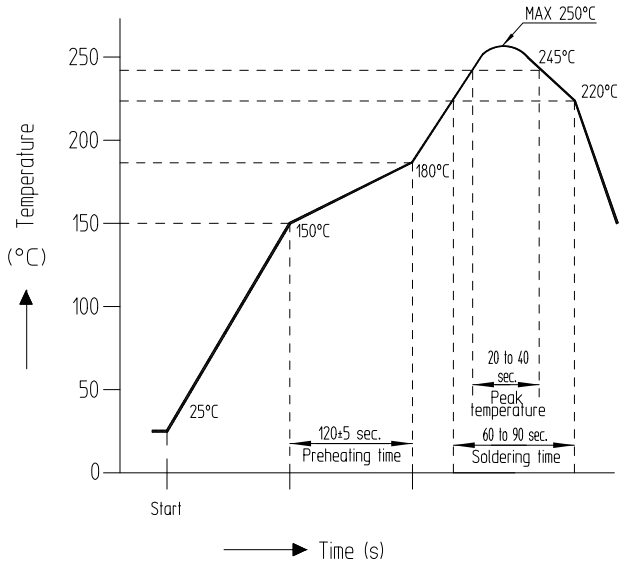


(Note 1) 1,000pcs / Reel (Outer diameter of Reel ø380mm)
(Note 2) Material
1) Emboss tape : PS (Antistatic treatment)
2) Cover tape : PET (Antistatic treatment)

Unit : mm

Part No.	HRS No.	No. of Pos.	A	B	C	D	E
TF38-16S-0.5SV(830)	CL0480-0470-0 30	16	11.5	11.5	24	-	24.5
TF38-18S-0.5SV(830)	CL0480-0214-5 30	18	12.5	11.5	24	-	24.5
TF38-20S-0.5SV(830)	CL0480-0215-8 30	20	13.5	11.5	24	-	24.5
TF38-22S-0.5SV(830)	CL0480-0216-0 30	22	14.5	11.5	24	-	24.5
TF38-24S-0.5SV(830)	CL0480-0372-0 30	24	15.5	11.5	24	-	24.5
TF38-26S-0.5SV(830)	CL0480-0217-3 30	26	16.5	14.2	32	28.4	32.5
TF38-30S-0.5SV(830)	CL0480-0242-0 30	30	18.5	14.2	32	28.4	32.5
TF38-32S-0.5SV(830)	CL0480-0218-6 30	32	19.5	20.2	44	40.4	44.5
TF38-36S-0.5SV(830)	CL0480-0207-0 30	36	21.5	20.2	44	40.4	44.5
TF38-38S-0.5SV(830)	CL0480-0222-3 30	38	22.5	20.2	44	40.4	44.5
TF38-40S-0.5SV(830)	CL0480-0225-1 30	40	23.5	20.2	44	40.4	44.5
TF38-45S-0.5SV(830)	CL0480-0223-6 30	45	26.5	20.2	44	40.4	44.5
TF38-50S-0.5SV(830)	CL0480-0219-9 30	50	28.5	20.2	44	40.4	44.5
TF38-60S-0.5SV(830)	CL0480-0250-0 00	60	33.5	26.2	56	52.4	56.5

Recommended Temperature Profile



HRS Test Conditions

Reflow Method : Reflow, IR/hot air
Reflow Environment : Room air
Solder Composition : Paste, 96.5%Sn/3%Ag/0.5%Cu
(M705-221CM5-32-10.5 from Senju Metal Industry Co.,Ltd.)

Test Board : Glass epoxy 50mm × 25mm × 1.0mm thick
Land Dimensions : Check the recommended land dimensions for details.
Metal Mask : Check the recommended metal mask dimensions for details.

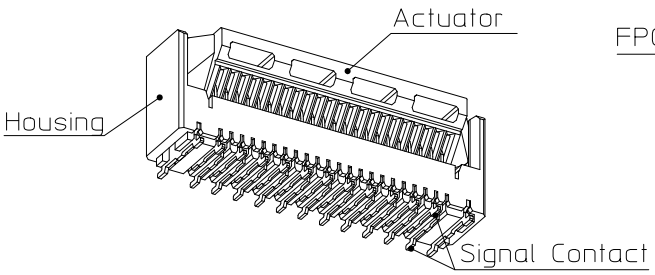
The temperature profile is based on the above conditions.
Please check the mounting conditions before use,
conditions such as solder paste types, manufacturer,
PCB size and any other soldering materials may alter the performance of such materials.

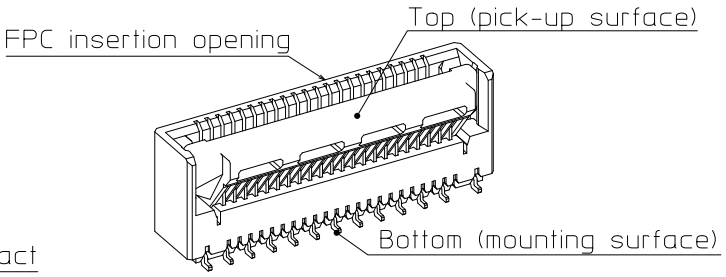
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Connector Operation and Precautions

● Operation Method

This connector requires delicate and careful handling.
To prevent connector/FPC breakage and contact failure (mating failure, FPC pattern breakage, etc.),
confirm the following before use and handle the connector properly.
This connector supports FPC/FFC, however, for convenience, only FPC is listed.



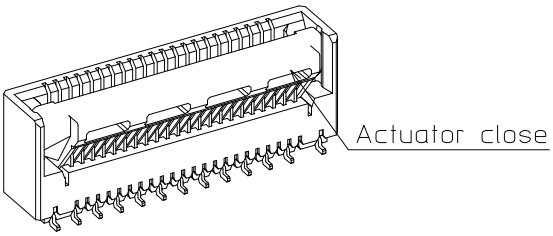


1. Initial condition

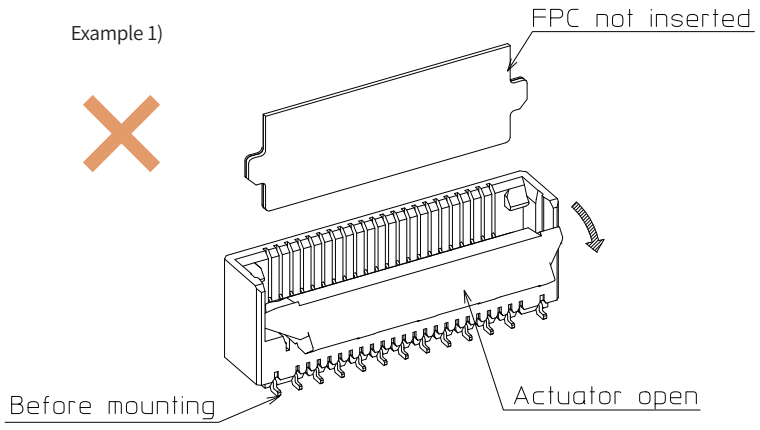
The product is supplied with the actuator closed.
Actuator does not need to be operated before inserting FPC.

[Caution]
- Do not open the actuator when the FPC is not inserted. (Example 1)
- Do not insert FPC or operate actuator before mounting. (Example 1)

- Delivered State -



Example 1)

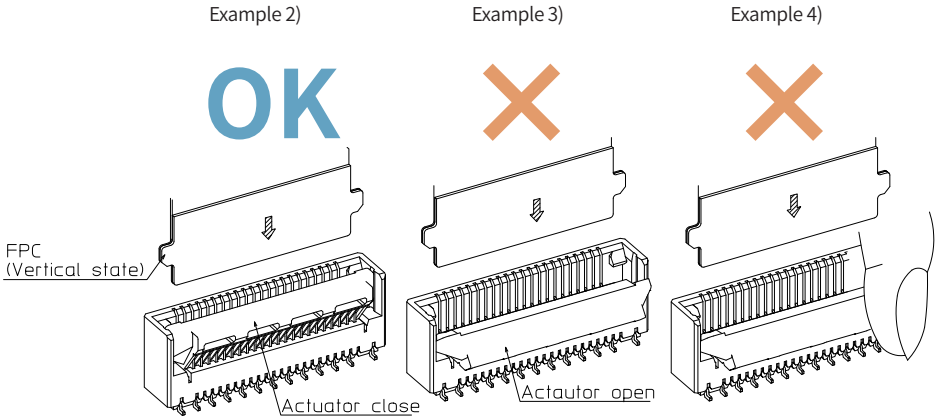


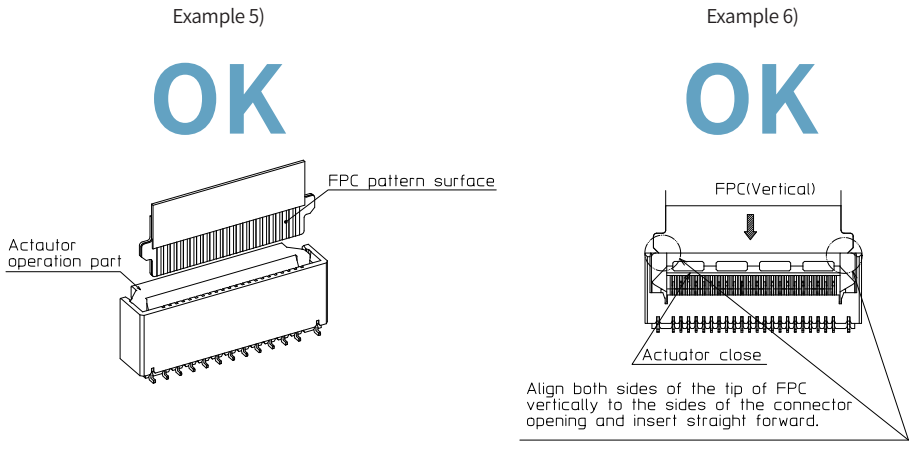
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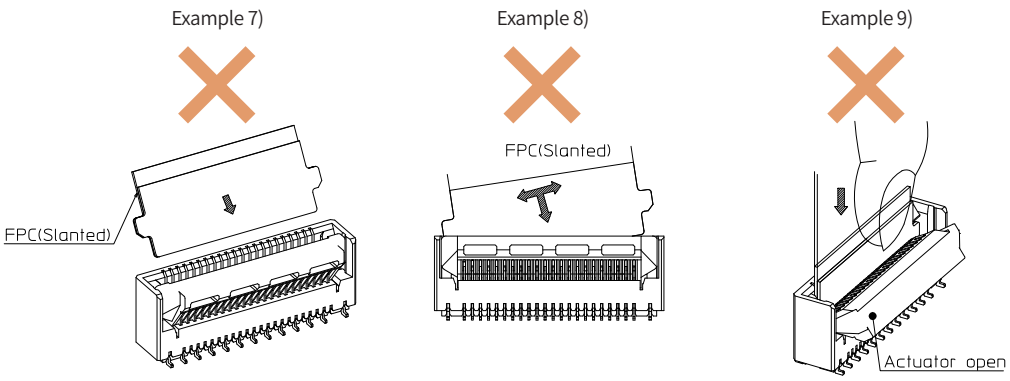
2. How to insert FPC

Insert the FPC into the connector opening vertically to the PCB surface (Example 2).
Insert it properly to the very end.

[Caution]
- Make sure the actuator is closed when insertion FPC.
  Do not insert the FPC when the actuator is open (Example 3).
  While actuator is open, it is structured so that FPC can't be inserted,
  if it is forced to insert FPC it will cause breakage.
- Do not insert the FPC when the actuator has pressured applied from above, with a finger for instance. (Example 4).
- Insert the FPC pattern surface on the opposite side of the actuator operation part. (Example 5).
- Align both sides of the tip of FPC vertically to the side of
  the connector opening and insert straight forward (Example 6).
- Do not twist the FPC up or down, right or left, or at an angle (Example 7, 8).
- Do not open the actuator with fingers when insert FPC (Example 9)





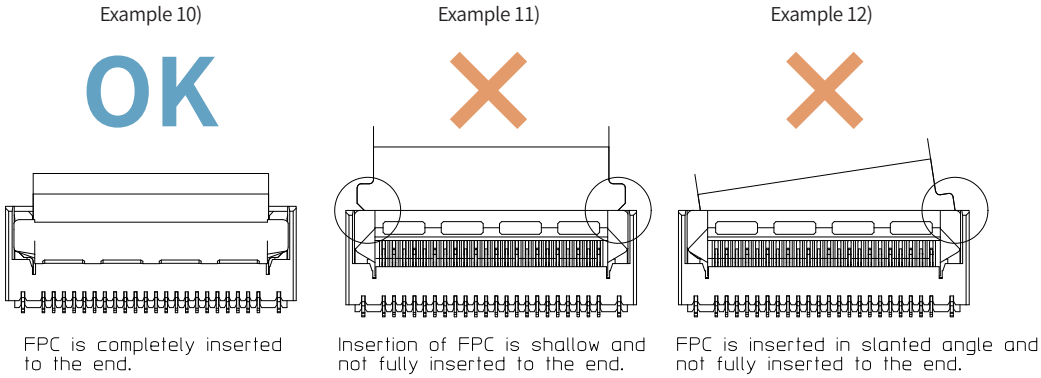


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3. FPC insertion check

Make sure that the FPC tabs are located in proper position after FPC insertion (Example 10).
(The FPC position is to be aligned with the protrusion of the housing.)

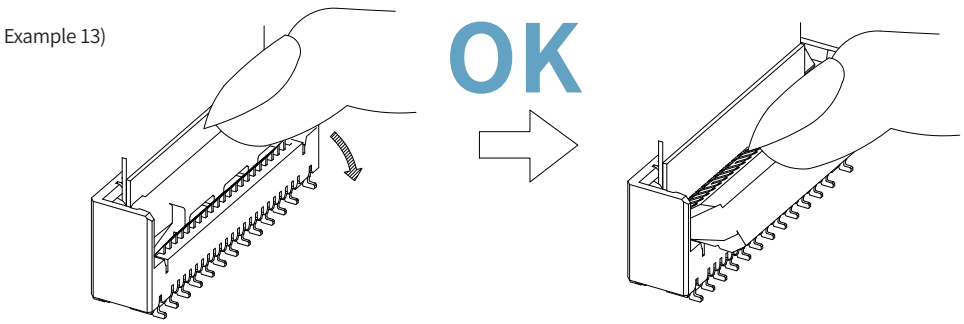
[Caution]
- Do not insert the FPC at an angle and/or stop it before insertion is completed (Example 11, 12)

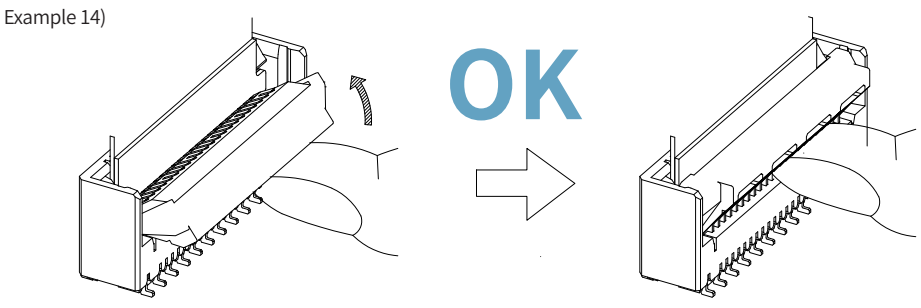


4. Use of the actuator(open/close)

Slowly flip down the actuator to the lock (Example 13).
Slowly flip up the actuator to release the lock (Example 14).

[Caution]
- To open/close the actuator, operate at the center of the actuator (Example 15).
- To open/close the actuator, do not operate the actuator at one end only (Example 16).
- The actuator is opened up to the movable limit, 90 degree.
  Do not open the actuator beyond the specified degree or apply excess force to the actuator (Example 17).
- Do not pick the actuator to lift and pull it (Example 18).
- Operate the actuator by hand without using sharp tool such as Tweezers (Example 19).
- Do not apply excess force to the actuator during the operation (Example 20).





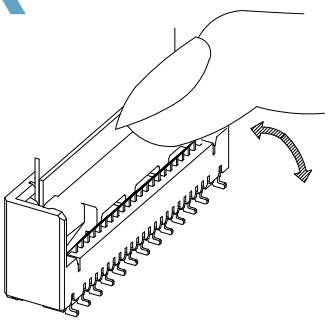
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Example 15)

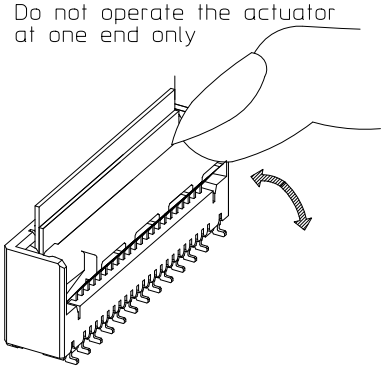
OK

Operate the actuator at the center

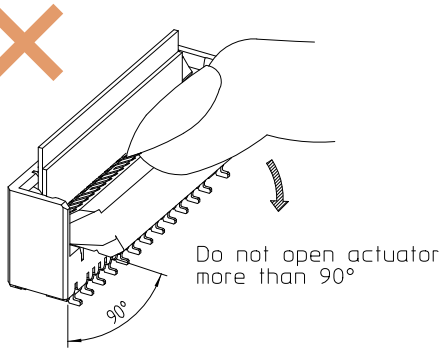


Example 16)

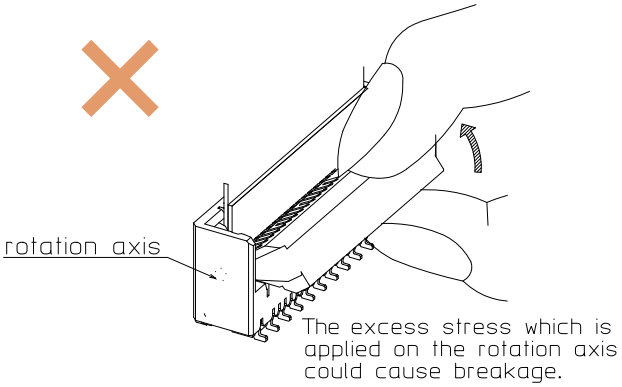
Do not operate the actuator at one end only



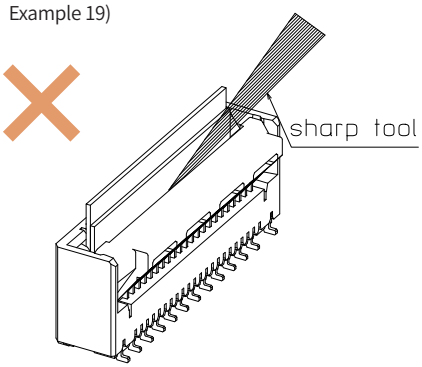
Example 17)



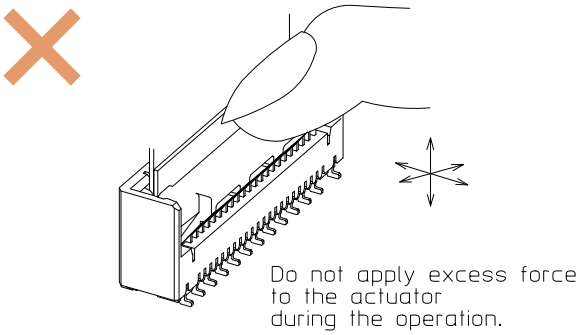
Example 18)



Example 19)



Example 20)

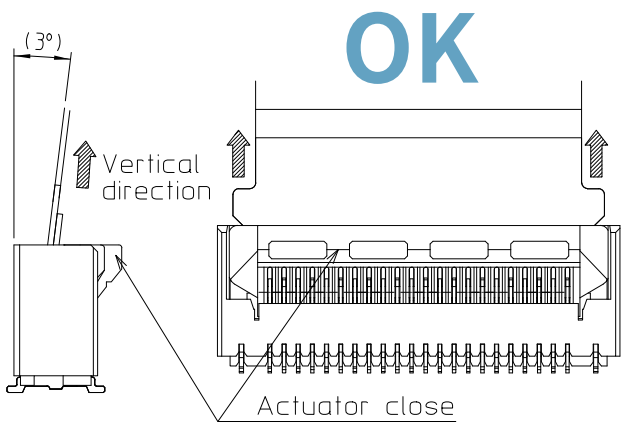


5. How to remove FPC

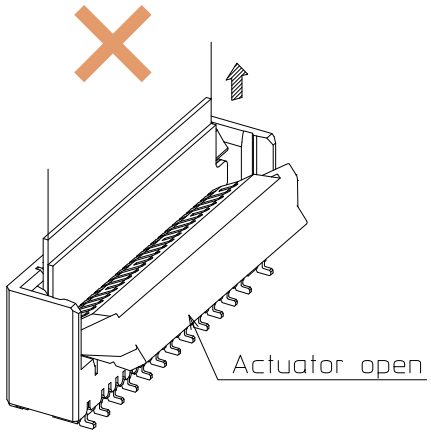
After flipping up the actuator to the fully opened position, vertically withdraw the FPC (Example 21).

[Caution]
- Do not attempt to pull the FPC without unlocking the housing (Example 22).
  After forcibly remove FPC, retention force of FPC may decrease.
- This connector has the temporary FPC holding structure with the housing.
  For FPC removal, do not pull out the FPC other than in the vertically direction of the PCB (Example 23).

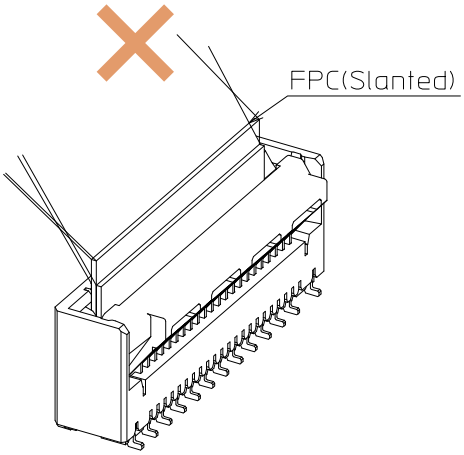
Example 21)

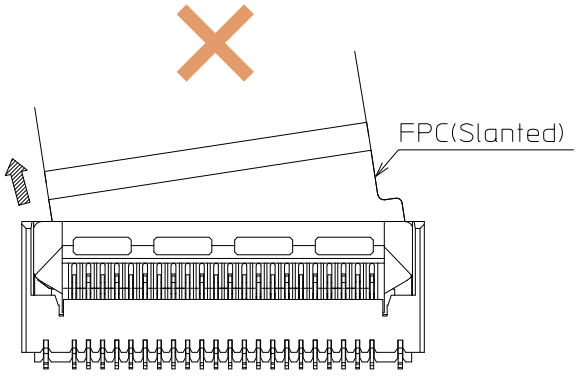


Example 22)



Example 23)





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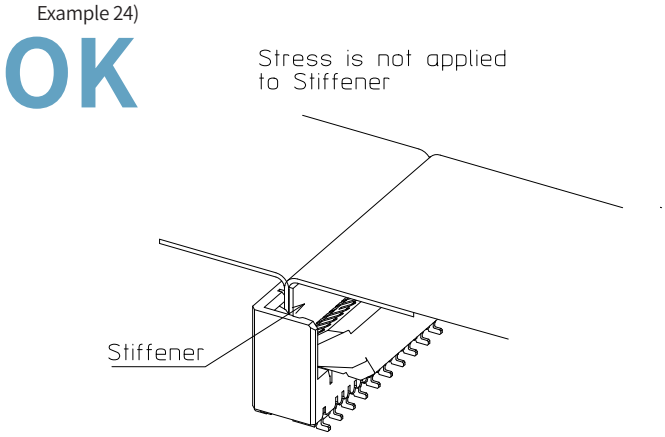
● Precautions for component layout

Depending on a FPC routing, a load is applied to the connector, and a contact failure may occur.
To prevent a failure, take the following notes into a consideration during mechanism design.

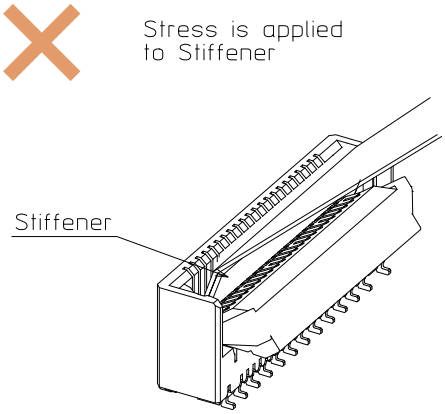
[Caution]
- When fixing FPC after FPC cabling, avoid pulling FPC, and route the wire FPC with slack.
  In this regard, the stiffener is vertical to the PCB (Example 24).
- Avoid applying forces to FPC in vertical or horizontal directions.
  Do not bend the FPC excessively near the connector during use, or it may cause contact failure of FPC breakage.
  Stabilizing the FPC is recommended (Example 25, 26)
- Do not mount other components or enclosure touching to the FPC underneath the FPC stiffener (Example 27).
- Make adjustments with the FPC manufacturer for FPC bending performance and wire breakage.
- Keep a sufficient FPC insertion space in the stage of the layout in order to avoid incorrect FPC insertion.
  Appropriate FPC length and component layout are recommended for assembly ease.
  Too short FPC length makes assembly difficult.
- Keep spaces for the locking lever movement and its operation for PCB design and component layout.

Example 24)

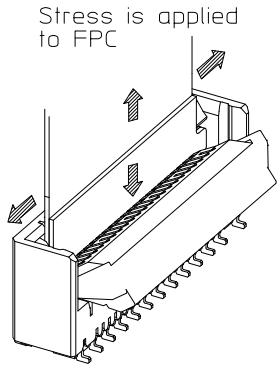
OK

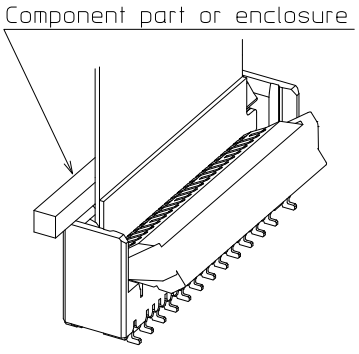


Example 25)



Example 26)





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● Instructions for mounting on the PCB

The Follow instructions shown below are for when mounting on the PCB.

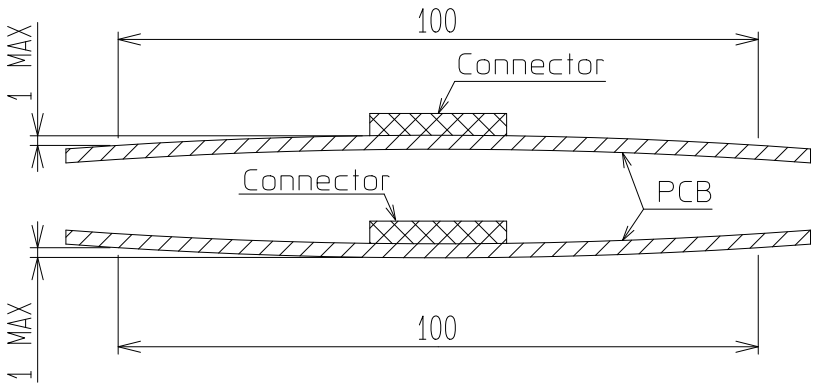
[Caution]
- Refer to the recommended PCB mounting pattern, metal mask opening size and FPC design.
- If the PCB mounting pattern is narrower than recommended or the metal mask opening is wider than recommended, solder(flux) wicking is more likely to occur.
- The level difference between the bottom surfaces of contact lead and the mold is designed to be minimal. When there is silk print etc. on the bottom surface of the connector, the lower surface of the connector may be pushed up, resulting in solder not applied or defective fillet formation. Please use after checking the mounted state.
- Apply reflow temperature profile within the specified conditions. The mounted status may vary due to external conditions such as the paste solder type, manufacturer, and board size. Please use it after checking the mounted state.
- Prevent warpage of PCB, as much as possible, since it can cause soldering failure. The lead co-planarity is 0.1mm or less.
- When mounting on the flexible board, please make sure to put a stiffener on the backsides of the flexible board. We recommend a glass epoxy material with the thickness of 0.3mm min.
- Do not apply excessive force of 1N or more when pulling out the emboss from the reel or suctioning the connector from the emboss. Otherwise, it may get damaged.

● Instructions for PCB handling after mounting the connector

Follow the instructions shown below when mounting on the PCB.

[Caution]
- Avoid the handling described below so that no force is exerted on the board during the assembly process. Otherwise, the connector may be damaged.
  • Splitting a large board into several pieces
  • Screwing the board
- A 100mm wide board has an acceptable warp range of 1.0mm or less. (Example 27) Excessive amounts of warping will place stress on the connector which may result in damage and malfunction.

Example 27)



● Instructions for manual soldering

Follow the instructions shown below when soldering the connector manually during repair work, etc.

[Caution]
- Do not perform manual soldering with the FPC inserted in the connector.
- Do not heat the connector excessively. Be very careful not to let the soldering iron contact any parts other than connector leads. Otherwise, the connector may be deformed or melt.
- Do not supply an excessive amount of solder (or flux). If excessive amount of solder (or flux) is supplied to the terminals, solder or flux may adhere to the contacts, and could cause contact failure. Additionally supplying excessive solder to the retention tabs may result in actuator rotation failure, causing connector damage

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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.

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https://www.hirose.com/

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