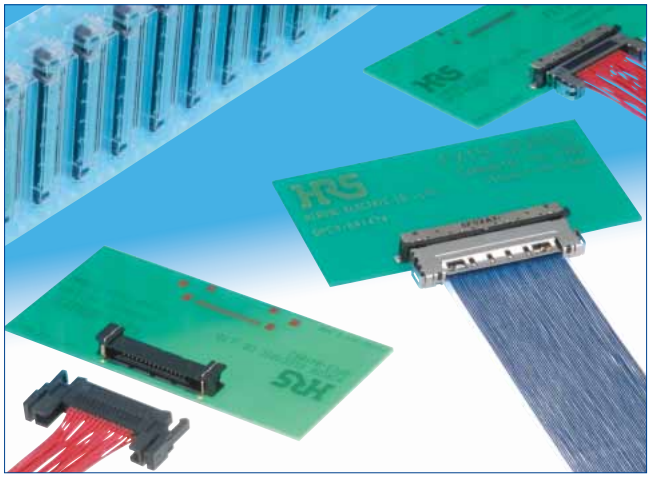
1mm Pitch Wire-to-Board Connectors supporting LVDS signal

FX15 Series



Features

1. Space-saving

Reduction in space is achieved by designing the contacts in 2-row staggered 1mm pitch on the mating side and on a single row 0.5mm pitch on the termination side (Fig.1).

2. Equal length transmission lines

Contact configuration provides equal length transmission lines, which prevents LVDS signal loss within the connector.

3. Variations

Availability of shielded and non-shielded types allows for design flexibility and cost reduction.

4. Self alignment and self-guiding

Built-in guide posts allow secure self-alignment within ±1.5mm (Fig.2).

5. Secure and complete mating / unmating

Side latch locking provides complete and secure mating, as well as easy unmating (Fig.3).

6. Enhanced shielding performance with FX15S

Enlarged metal shields prevent intrusion and emission of electromagnetic interference, which enhances the integrity of the LVDS signal (Fig.4).

7. RoHS compliant

All materials and substances used to produce this product comply with RoHS standards.

Space saving, Equal length transmission lines

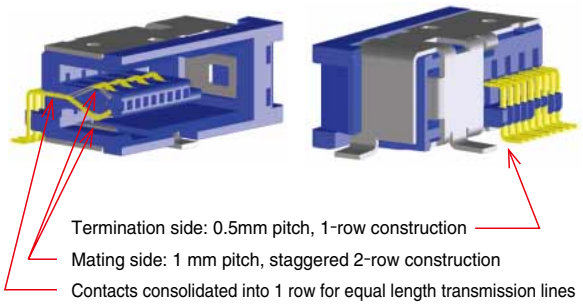


Fig.1

Self-alignment of ±1.5mm

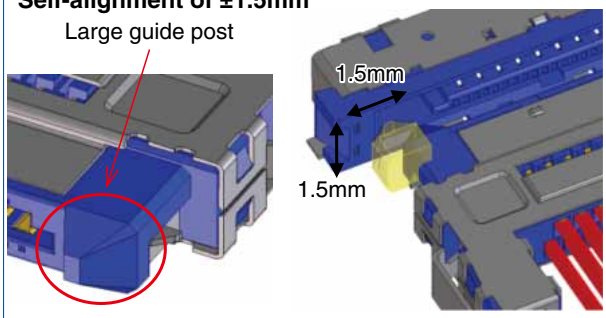
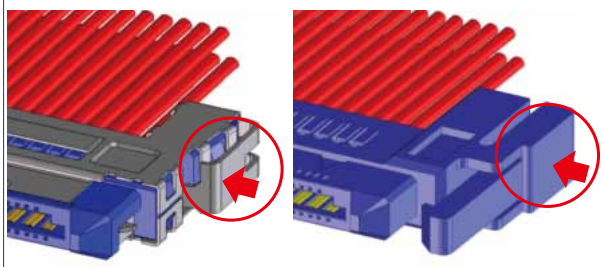


Fig.2

Side latch -locks



With metal shields (FX15 and FX15S Series)

Without metal shields (FX15M Series)

Fig.3

High Shielding Performance

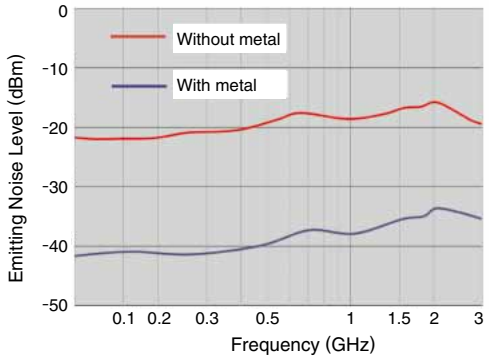


Fig.4

■Product Specifications

Ratings	Current rating Voltage rating	0.5A 100V AC	Operating temperature range Storage temperature range	-55℃ to +80℃ (Note 1) -10℃ to +60℃ (Note 2)

Item	Specification	Conditions
1. Contact resistance	60mΩ max. (Note 3)	1mA
2. Insulation resistance	500MΩ min.	100V DC
3. Withstanding voltage	No flashover or insulation breakdown.	300V AC/one minute
4. Insertion-Extraction force	2N min., 30N max.	With corresponding connector
5. Mating cycles	Contact resistance : 80mΩ max.(Note 3)	50 cycles
6. Vibration resistance	No electrical discontinuity of 1μs or more.	Frequency: 10 to 55 Hz, single amplitude of 0.75mm, 2 hours, 3 axis
7. Shock resistance	No electrical discontinuity of 1μs or more.	Acceleration of 490m/s², 11ms durations, sine half-wave waveform, 3 cycles, 3axis.
8. Humidity resistance	Contact resistance : 80mΩ max. No damage, cracks, or parts dislocation.(Note 3)	96 hours at 40℃, RH 90% to 95%
9. Temperature cycle	Contact resistance : 80mΩ max. (Note 3) Insulation resistance : 500MΩ min.	Temperature : -55℃ → +15℃ to +35℃ → +85℃ → +15℃ to +35℃ Time : 30 → 5 → 30 → 5 (Minutes) 5 cycles
10. Salt spray	Contact resistance : 80mΩ max. (Note 3) No corrosions	5% water solution for 48 hours.

Note 1 : Includes temperature rise caused by current flow.
Note 2 : The term “storage” refers to products stored for long period of time prior to mounting and use. Operating temperature and humidity range includes non-conducting condition of installed connectors in storage, shipment or during transportation.
Note 3 : Includes wire conductor resistance (12mm long).

■Materials / Finish

●Receptacle

Component	Material	Finish	Remarks
Insulator	Polyamide	Color : Black	UL94V-0
Contact	Phosphor bronze	Contact area : Gold plated Termination area : Tin plated	————
Metal shell (shielded version only)	FX15S : Nickel silver FX15SC : Stainless steel	FX15S : ———— FX15SC : Tin plated	————
Metal fittings (shielded version only)	Phosphor bronze	Selective gold flash plated	————

●Plug

Component	Material	Finish	Remarks
Insulator	Polyamide	Color : Black	UL94V-0
Contact	Phosphor bronze	Contact area : Gold plated Termination area : Tin plated	————
Metal shell (shielded version only)	Nickel silver	————	————
Metal latch locks (shielded version only)	Stainless steel	————	————
Metal shell, metal latch locks (on micro coax version only)	Stainless steel	Nickel plated	————

■Product Number Structure

●Receptacle

FX15 S - 31 S - 0.5 SH (**)
❶ ❷ ❸ ❹ ❺ ❻ ⓫

●Plug

FX15 S - 31 P - C
❶ ❷ ❸ ❹ ❼

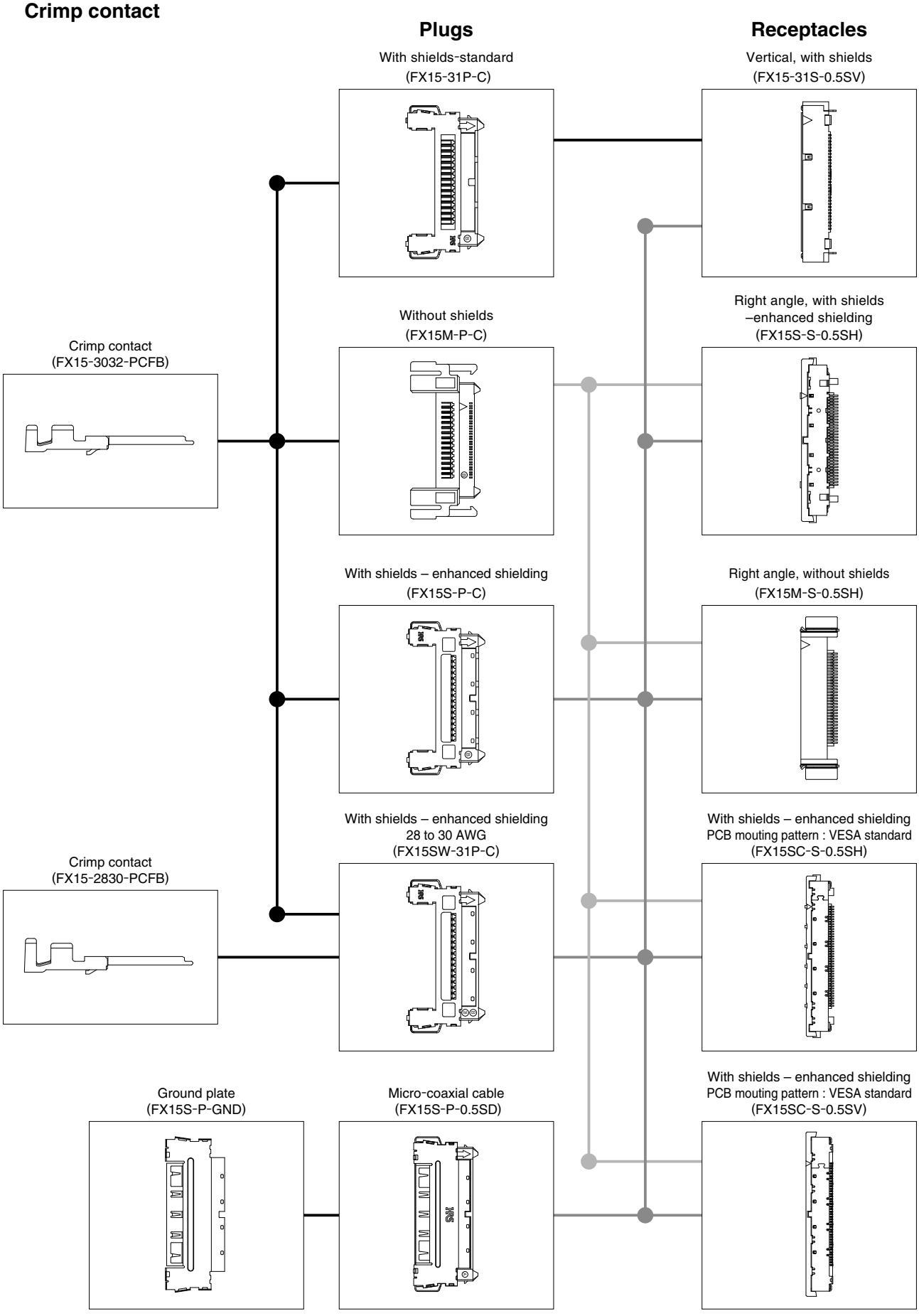
●Crimp contact

FX15 - 3032 PCF B
❶ ❽ ❾ ❿

❶Series Name		: FX15
❷Configuration	Blank 15S 15SC 15M	: With shields (or crimp contact) : With shields – enhanced shielding : With shields – enhanced shielding (PCB mounting pattern : VESA standard) : Without shields
❸Number of contacts		
❹Connector type	P S	: Male contact : Female contact
❺Contact pitch		: 0.5 mm
❻Housing configuration	SH SV	: Right angle : Straight
❼Termination	C 0.5SD GND	: Crimp : Micro-coaxial cable : Separate ground plate
❽Applicable conductor	2830 3032	: 28 to 30 AWG : 30 to 32 AWG
❾Packaging	PCF	: Male contact / reel
❿Plating (contact area)	B	: Gold plated
⓫Packaging	Blank (30)	: Embossed Packaging (1,000 pcs/reel) : Embossed Packaging (100 pcs/reel)

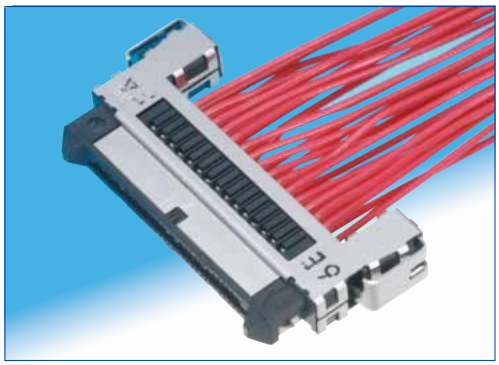
■FX15 Series – Functional Diagram

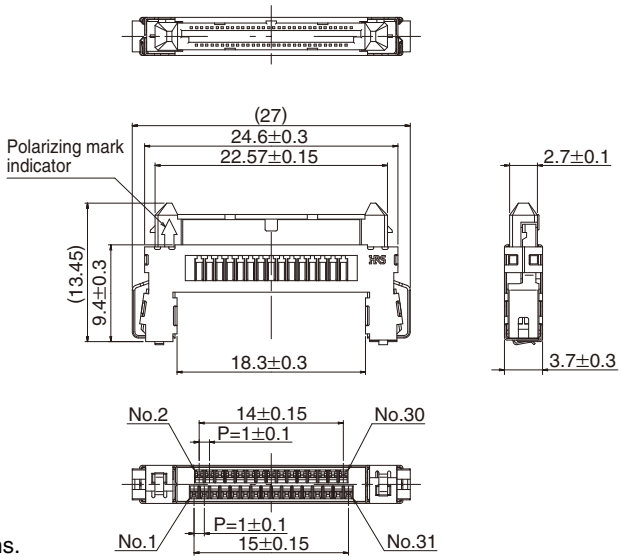
Crimp contact



■Plugs

●With shields (FX15-31P-C)

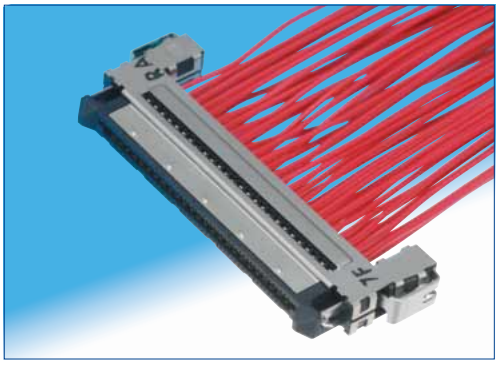


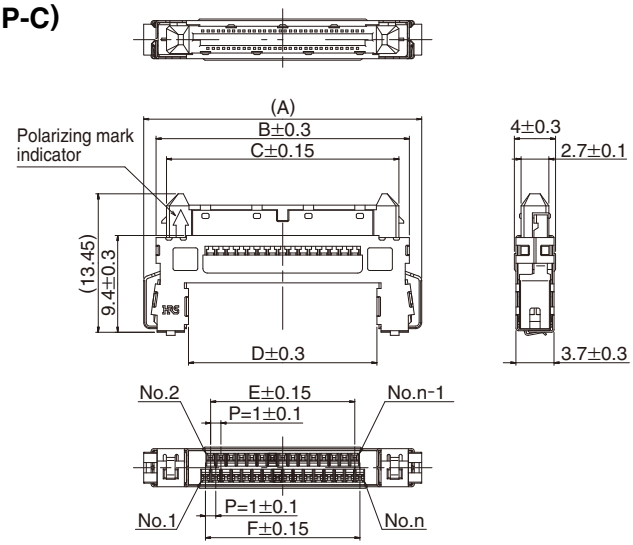


Part No.	HRS No.	No. of contacts	RoHS
FX15-31P-C	575-2101-2	31	Yes

Note 1 : Packaged in trays.
Note 2 : Dimensions in parenthesis ( ) are reference dimensions.

●With shields, enhanced shielding (FX15S-∗∗P-C)

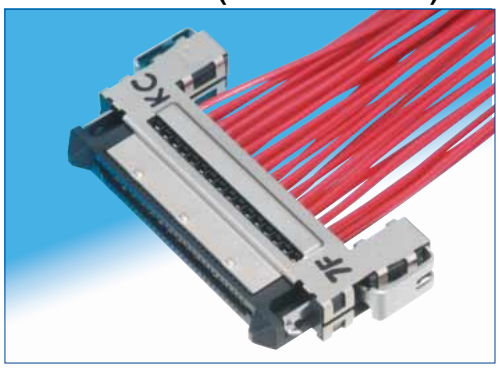


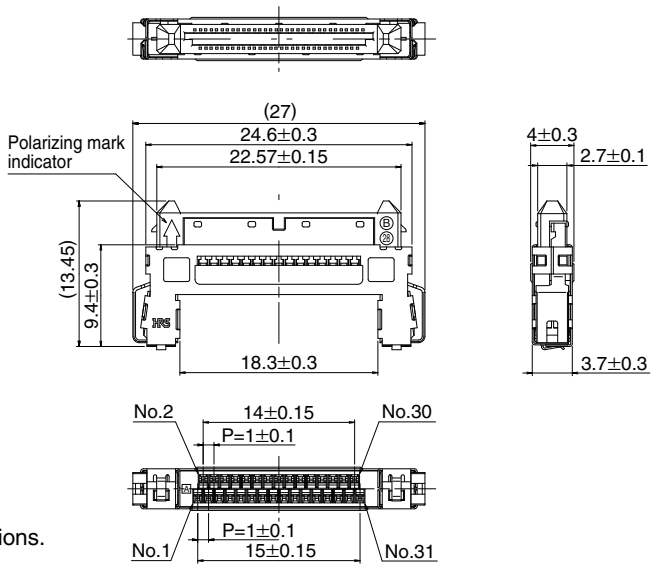


Part No.	HRS No.	No. of contacts	A	B	C	D	E	F	RoHS
FX15S-31P-C	575-2106-6	31	27	24.6	22.6	18.3	14	15	Yes
FX15S-41P-C	575-2107-9	41	32	29.6	27.6	23.3	19	20	
FX15S-51P-C	575-2103-8	51	37	34.6	32.6	28.3	24	25	

Note 1 : Packaged in trays.
Note 2 : Dimensions in parenthesis ( ) are reference dimensions.

●With shields – enhanced shielding 28 to 30 AWG (FX15SW-31P-C)

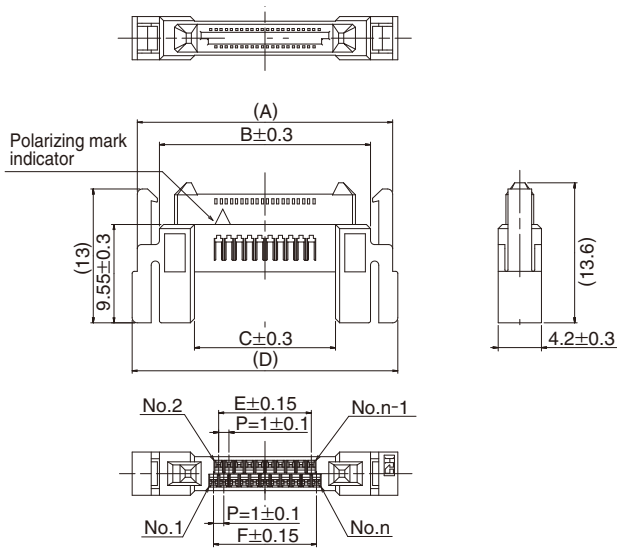




Part No.	HRS No.	No. of contacts	RoHS
FX15SW-31P-C	575-2113-1	31	Yes

Note 1 : Packaged in trays.
Note 2 : Dimensions in parenthesis ( ) are reference dimensions.

●Without shields (FX15M-∗∗P-C)



Part No.	HRS No.	No. of contacts	A	B	C	D	E	F	RoHS
FX15M-21P-C	575-2109-4	21	24.8	20.5	13.7	25.8	9	10	Yes
FX15M-31P-C	575-2108-1	31	29.8	25.5	18.7	30.8	14	15	

Note 1 : Sold in 100 piece packages. Please order in full package quantities.
Note 2 : Dimensions in parenthesis ( ) are reference dimensions.

◆Plug crimp contacts

Part No.	HRS No.	Packaging	Quantity	Finish	RoHS
FX15-2830PCFB	575-2002-0	Reel	20,000 pcs/reel	Gold plated	Yes
FX15-3032PCFB	575-2003-3				

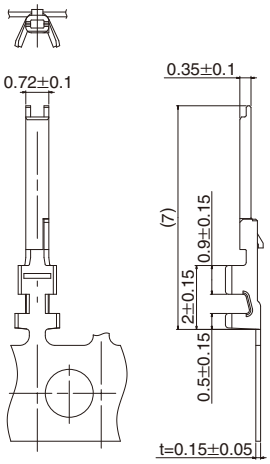
●Applicable cable (Tin plated, annealed copper wire)

FX15-2830PCFB

Applicable wire size (Stranded wire conductor)	Jacket diameter	UL No.
28 AWG (7/0.127mm)	ϕ0.56 to 0.72mm	1517
30 AWG (7/0.1mm)		1571

FX15-3032PCFB

Applicable wire size (Stranded wire conductor)	Jacket diameter	UL No.
30 AWG (7/0.1mm)	ϕ0.5 to 0.6mm	1516, 1571 (Note)
32 AWG (7/0.08mm)		1571



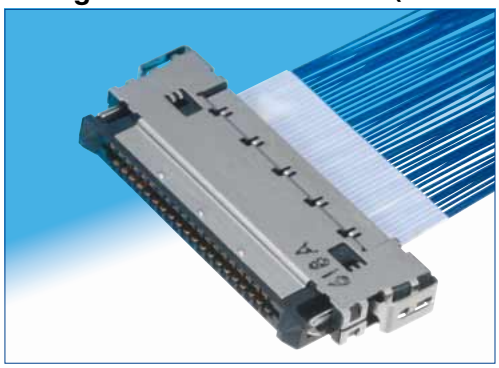
●Wire strip length: 1.1 to 1.8mm

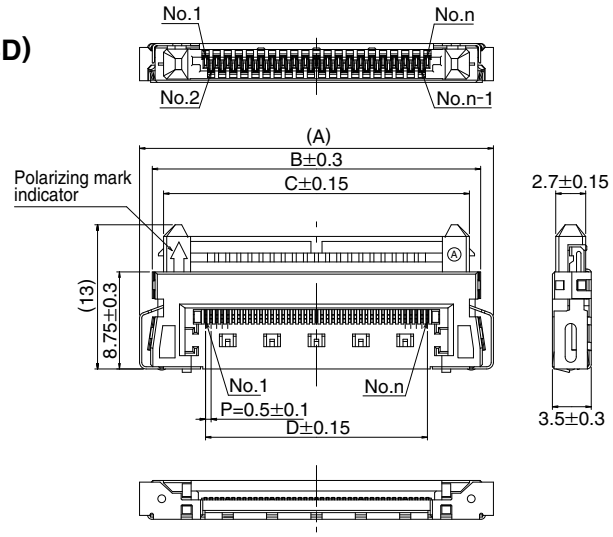
Note : When using wires other than those noted above, please contact Hirose for asistance.

●Tools

Item	Part No.	HRS No.	Applicable crimp contact
Applicator	AP105-FX15-2830	901-4036-0	FX15-2830PCFB
	AP105-FX15-3032	901-4033-1	FX15-3032PCFB
Press unit	CM-105C	901-0001-0	————

●Plug – Micro-coaxial cable (FX15S-**P-0.5SD)

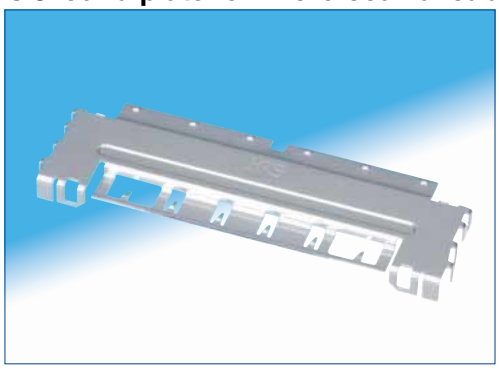


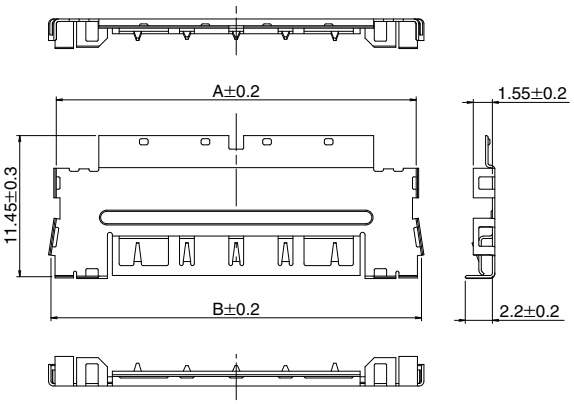


Part No.	HRS No.	No. of contacts	A	B	C	D	RoHS
FX15S-41P-0.5SD	575-2110-3	41	31.9	29.6	27.57	20	Yes
FX15S-51P-0.5SD	575-2118-5	51	36.9	34.6	32.57	25	

Note 1 : Packaged in trays.
Note 2 : Dimensions in parenthesis ( ) are reference dimensions.

●Ground plate for micro-coaxial cable type





Part No.	HRS No.	No. of contacts	A	B	RoHS
FX15S-41P-GND	575-2111-6	41	29.2	30.06	Yes
FX15S-51P-GND	575-2117-2	51	34.2	35.06	

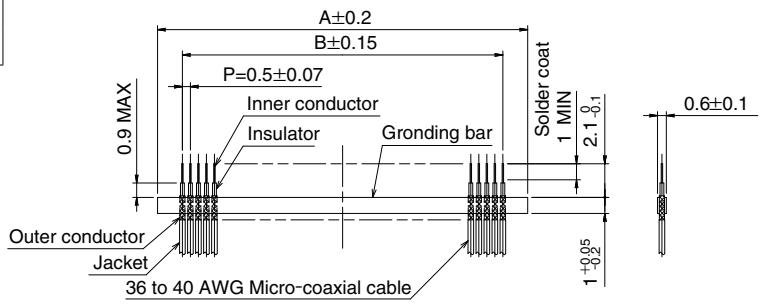
Note 1 : Packaged in trays.
Note 2 : Dimensions in parenthesis ( ) are reference dimensions.

●Applicable cable (Micro-coaxial cable)

Wire size (Standed wire inner conductor)	Jacket diameter
36 AWG (7/0.05mm)	0.3mm to 0.5mm
38 AWG (7/0.04mm)	
40 AWG (7/0.03mm)	

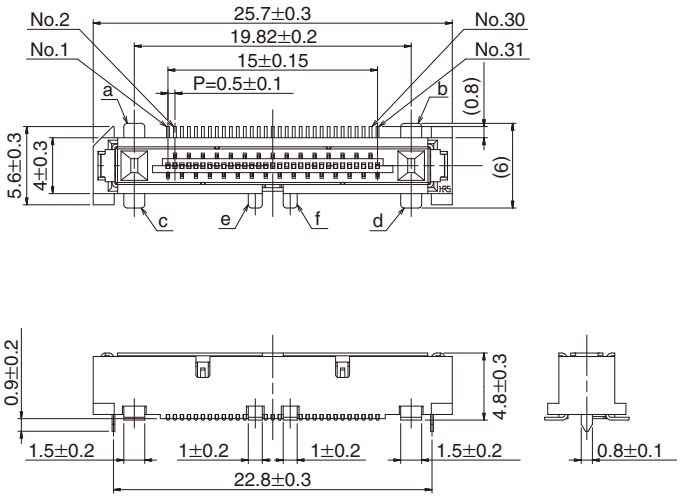
No. of contacts	A	B
41	23.1	20
51	28.1	25

●Cable preparation



■Receptacles

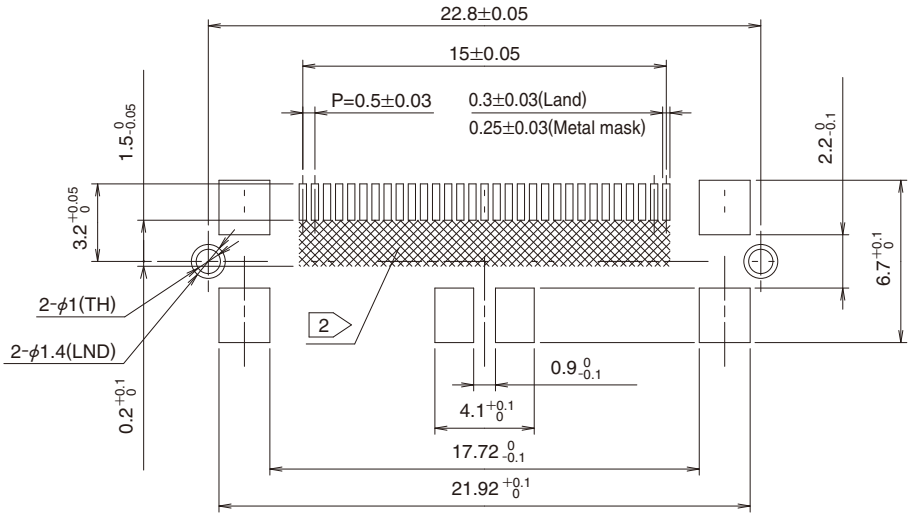
●Vertical, with shielding (FX15-31S-0.5SV)



Part No.	HRS No.	No. of contacts	RoHS
FX15-31S-0.5SV(**)	575-2201-7 **	31	Yes

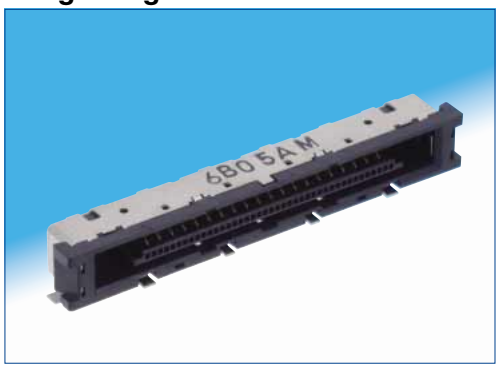
[Specification Number : **, (**)]
Blank : Embossed packaging (1,000 pcs/reel)
(30) : Embossed packaging (100 pcs/reel)

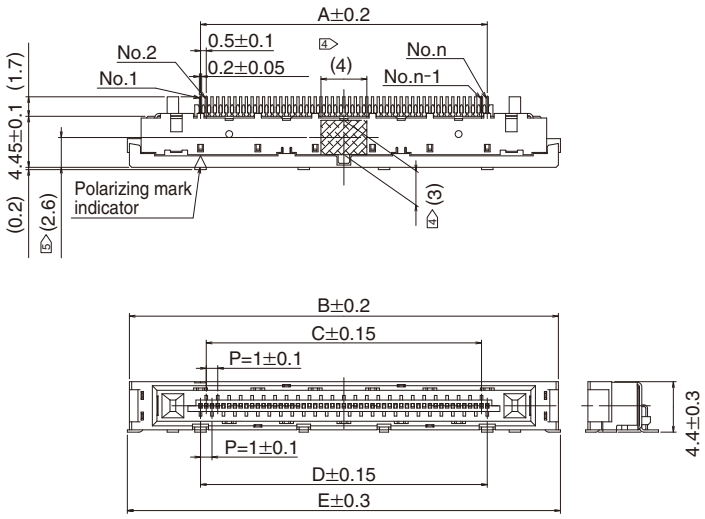
◆Recommended PCB mounting pattern and metal mask dimensions



Note 1 : The co-planarity of the terminal leads is as follows:
・All signals and shield leads “c” and “d”: 0.1mm max.
・Shield leads “a”, “b”, “e” and “f”: 0.15mm max.
2 : Area indicated by the crosshatched lines must be free of conductive traces or the conductive traces must be covered by resist film.
3 : Packaged on tape-and-reel.
4 : Dimensions in parenthesis ( ) are reference dimensions.

●Right angle with shields – enhanced shielding (FX15S-**S-0.5SH)

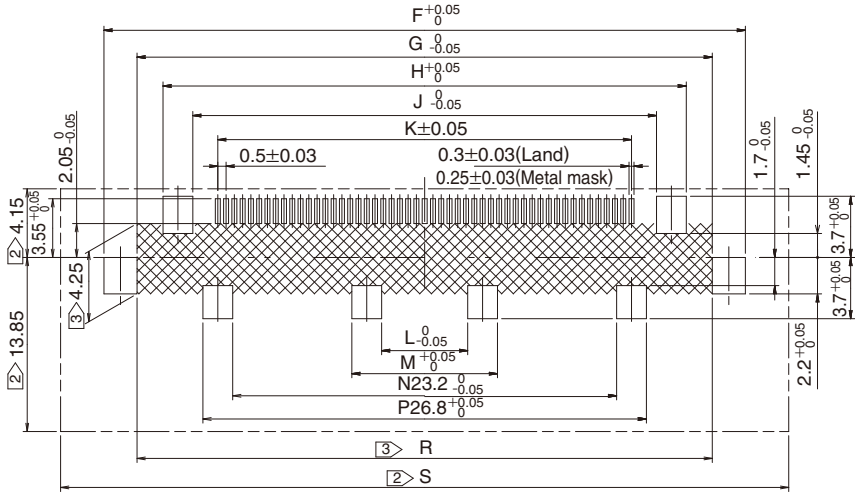




Part No.	HRS No.	No. of contacts	A	B	C	D	E	F	G	H
FX15S-31S-0.5SH(**)	575-2306-5 **	31	15	27.4	14	15	27.8	28.8	24.8	21.6
FX15S-41S-0.5SH(**)	575-2307-8 **	41	20	32.4	19	20	32.8	33.8	29.8	26.6
FX15S-51S-0.5SH(**)	575-2303-7 **	51	25	37.4	24	25	37.8	38.8	34.8	31.6

J	K	L	M	N	P	R	S	RoHS
18	15	——	——	13.2	16.8	24.8	40	Yes
23	20	5.2	8.8	18.2	21.8	29.8	45	
28	25			23.2	26.8	34.8	50	

◆Recommended PCB mounting pattern and metal mask dimensions



Note 1 : The coplanarity of the terminal leads is 0.1mm max. for all signal leads and 0.15mm max. for the shield leads.

2 : Do not place any components in the area indicated. Placement of components in this area may affect mating and latch lock operation.

3 : Area indicated by the cross-hatched lines must be free of conductive traces or the conductive traces must be covered by resist film.

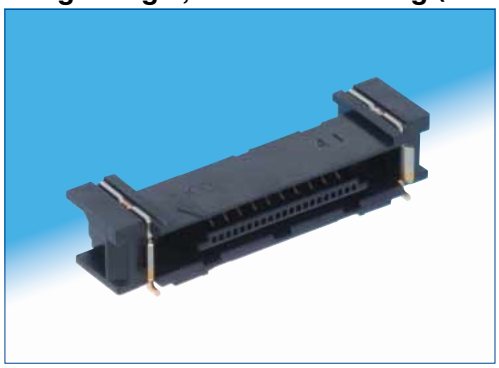
4 : The area marked ▨ indicates vacuum pick-and-place area for board placement with automatic equipment.

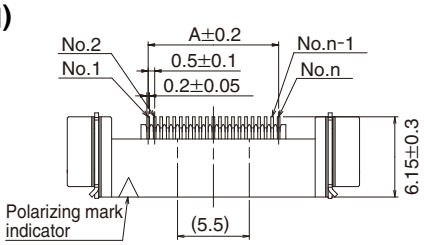
5 : Vacuum pick-up area

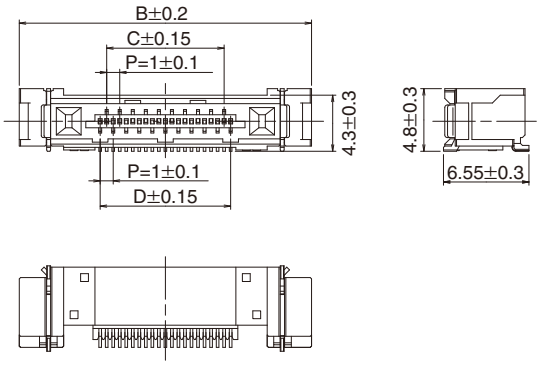
6 : Packaged on tape-and-reel.

7 : Dimensions in parenthesis ( ) are reference dimensions.

●Right angle, without shielding (FX15M-**S-0.5SH)



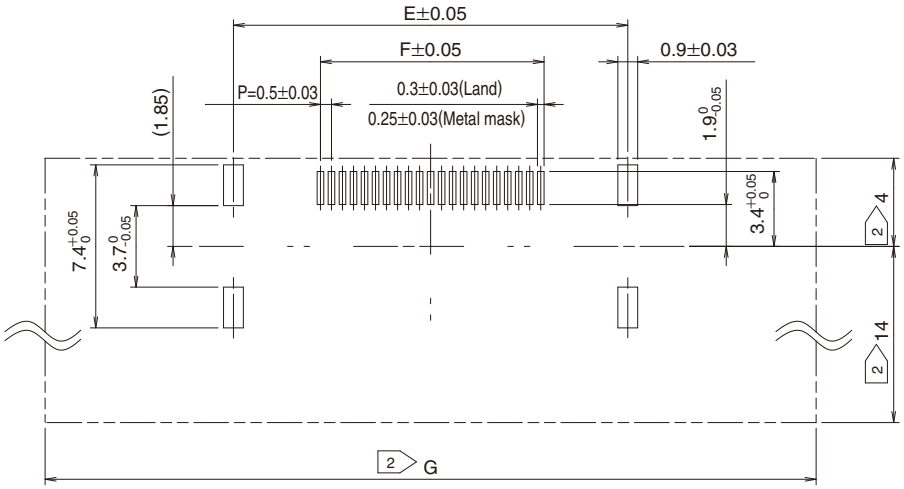




[Specification Number : **, (**)]
Blank : Embossed packaging (1,000 pcs/reel)
(30) : Embossed packaging (100 pcs/reel)

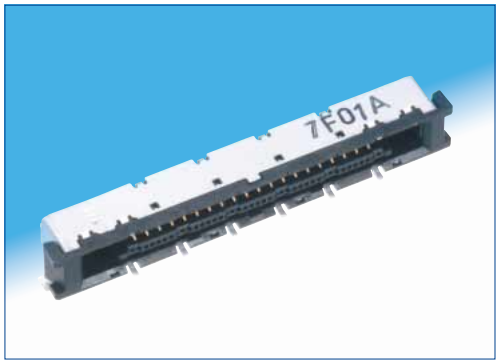
Part No.	HRS No.	No. of contacts	A	B	C	D	E	F	G	RoHS
FX15M-21S-0.5SH(**)	575-2309-3 **	21	10	22.4	9	10	17.9	10	35	Yes
FX15M-31S-0.5SH(**)	575-2308-0 **	31	15	27.4	14	15	22.9	15	40	

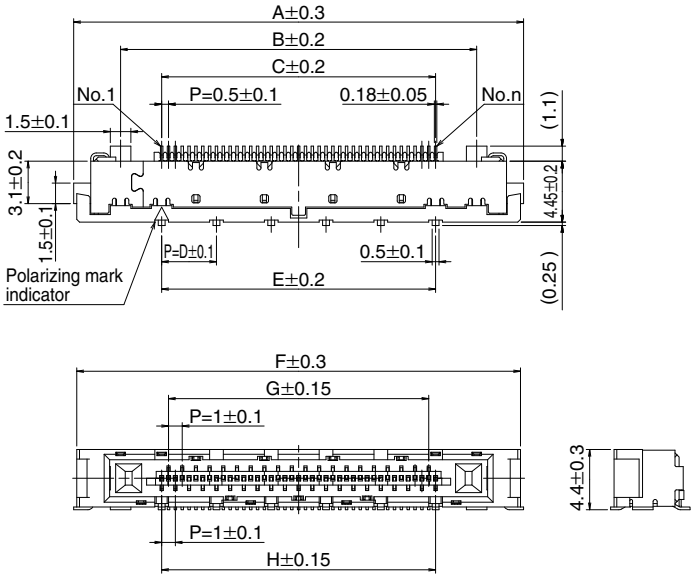
◆Recommended PCB mounting pattern and metal mask dimensions



Note 1 : The co-planarity of all terminal leads is 0.1mm max.
2 : Do not place any components in the area indicated. Placement of components in this area may affect mating and latch lock operation.
3 : Packaged on tape-and-reel.

●Right angle with shields – enhanced shielding (FX15SC-**S-0.5SH)
PCB mounting pattern : VESA standard

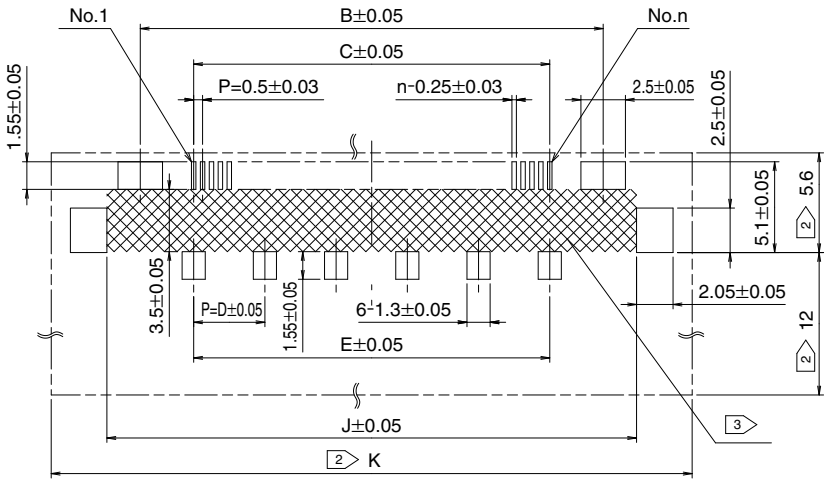




[Specification Number : **, (**)]
Blank : Embossed packaging (1,000 pcs/reel)
(30) : Embossed packaging (100 pcs/reel)

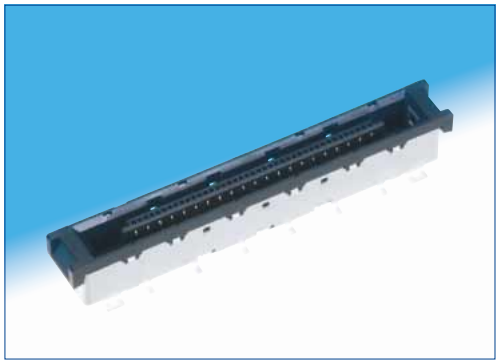
Part No.	HRS No.	No. of contacts	A	B	C	D	E	F	G	H	J	K	RoHS
FX15SC-41S-0.5SH(**)	575-2310-2 **	41	32.85	26	20	4	20	32.4	19	20	29.75	45	Yes
FX15SC-51S-0.5SH(**)	575-2311-5 **	51	37.85	31	25	5	25	37.4	24	25	34.75	50	

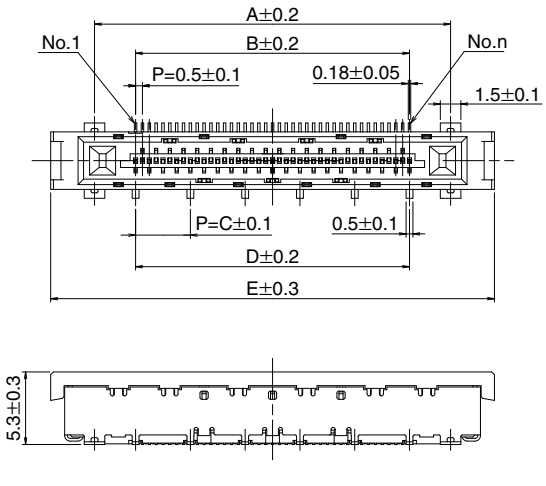
◆Recommended PCB mounting pattern and metal mask dimensions



Note 1 : The coplanarity of the terminal leads is 0.1mm max.
2 : Do not place any components in the area indicated. Placement of components in this area may affect mating and latch lock operation.
3 : Area indicated by the cross-hatched lines must be free of conductive traces or the conductive traces must be covered by resist film.
4 : Packaged on tape-and-reel.
5 : Dimensions in parenthesis ( ) are reference dimensions.

●Vertical with shields – enhanced shielding (FX15SC-**S-0.5SV)
PCB mounting pattern : VESA standard

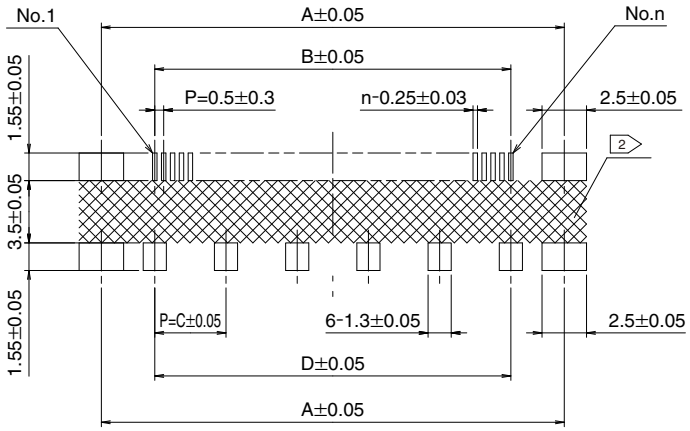




[Specification Number : **, (**)]
Blank : Embossed packaging (1,000 pcs/reel)
(30) : Embossed packaging (100 pcs/reel)

Part No.	HRS No.	No. of contacts	A	B	C	D	E	RoHS
FX15SC-41S-0.5SV(**)	575-2205-8 **	41	26	20	4	20	32.4	Yes
FX15SC-51S-0.5SV(**)	575-2204-5 **	51	31	25	5	25	37.4	

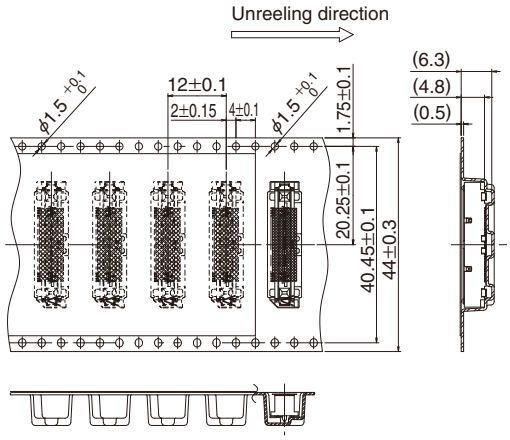
◆Recommended PCB layout and metal mask dimensions



Note 1 : The coplanarity of the terminal leads is 0.1mm max.
2 : Area indicated by the cross-hatched lines must be free of conductive traces or the conductive traces must be covered by resist film.
3 : Packaged on tape-and-reel.

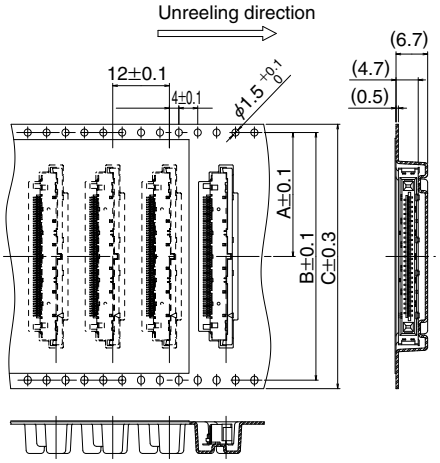
◆Packaging Specifications

●Vertical, with shields (FX15-31S-0.5SV)



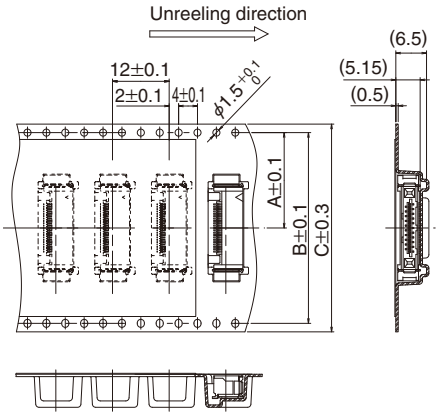
Part No.	HRS No.	No. of contacts	D
FX15-31S-0.5SV(**)	575-2201-7 **	31	44.5

●Right angle, with shields-enhanced shielding (FX15S-**S-0.5SH)

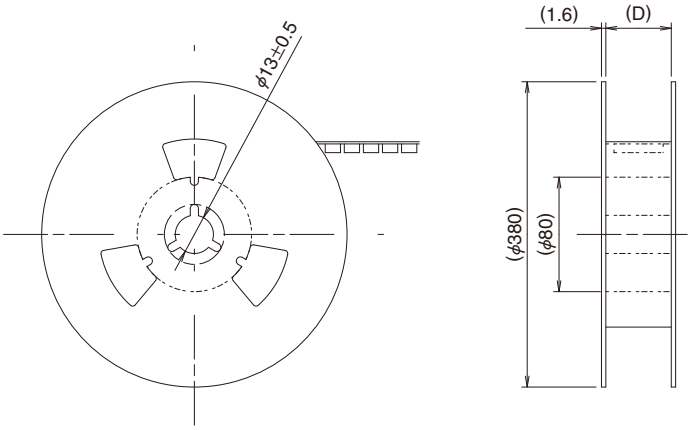


Part No.	HRS No.	No. of contacts	A	B	C	D
FX15S-31S-0.5SH(**)	575-2306-5 **	31	20.3	40.5	44	44.5
FX15S-41S-0.5SH(**)	575-2307-8 **	41	26.3	52.5	56	56.5
FX15S-51S-0.5SH(**)	575-2303-7 **	51				

●Right angle, without shields (FX15M-**S-0.5SH)

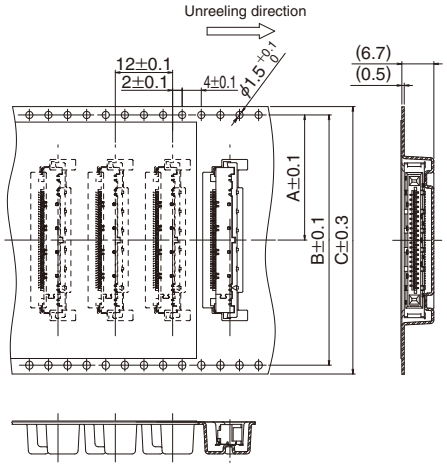


●Reel dimensions



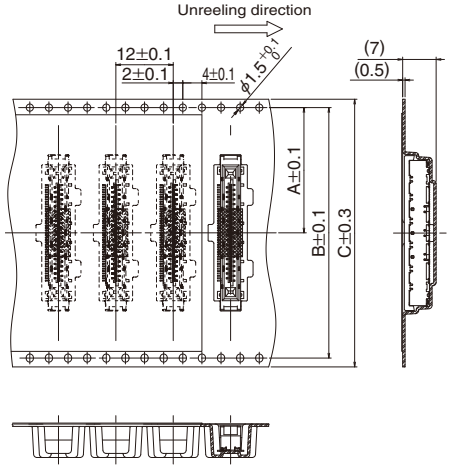
Part No.	HRS No.	No. of contacts	A	B	C	D
FX15M-21S-0.5SH(**)	575-2309-3 **	21	20.2	40.4	44	44.5
FX15M-31S-0.5SH(**)	575-2308-0 **	31				

●Right angle with shields – enhanced shielding (FX15SC-**S-0.5SH)



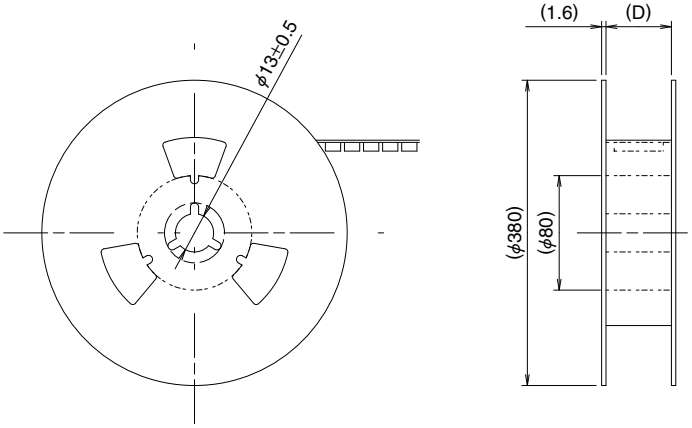
Part No.	HRS No.	No. of contacts	A	B	C	D	RoHS
FX15SC-41S-0.5SH(**)	575-2310-2 **	41	26.2	52.4	56	56.5	Yes
FX15SC-51S-0.5SH(**)	575-2311-5 **	51					

●Vertical with shields – enhanced shielding (FX15SC-**S-0.5SV)

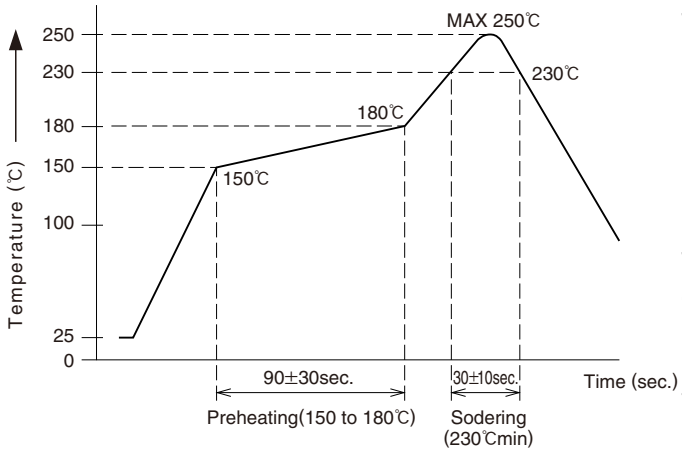


Part No.	HRS No.	No. of contacts	A	B	C	D	RoHS
FX15SC-41S-0.5SV(**)	575-2205-8 **	41	26.2	52.4	56	56.5	Yes
FX15SC-51S-0.5SV(**)	575-2204-5 **	51					

●Reel dimensions



◆Recommended temperature profile



HRS test conditions

Test board Glass epoxy 40mm×30mm×1mm thick
Solder method : Reflow
Solder composition : Paste
96.5%Sn/3%Ag/0.5%Cu
Metal mask : 0.12mm thick
Reflow cycles : 2 cycles

The temperature profile is 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.

Note : The temperature profile indicates the maximum temperature of the connector surfaces at the highest point from the PCB mounting surface.

◆Washing Conditions

Organic Solvent Washing

Solvent type	Room temperature washing	Heated washing
IPA (Isoporopyl alcohol)	Yes	Yes

Water Type Washing

When using water type cleaning agents (e.g., terpene, and alkali saponifiers), select the cleaning agent based on the documentation issued by the various manufacturers of cleaning agents which describes the effects on metals and resins. Be careful that parts are not left with moisture remaining on them.

Washing Precautions

Residual flux or cleaning agent on the contacts when washing with organic solvents or water type cleaners can give rise to the deterioration of electrical performance. In this regard it is important to check whether a thorough washing has been performed.

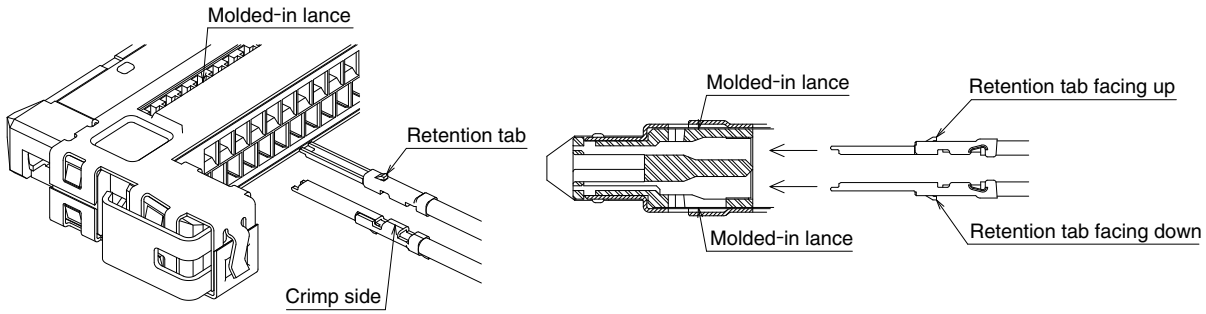
Precautions and recommendations

◆Wire termination

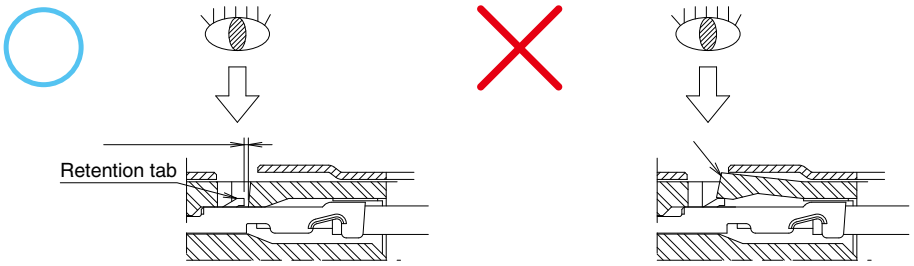
The following documents will be needed in order to perform the cable terminations.
①Basic cable termination and crimp requirements (general explanations).
②Contact crimp termination machine instruction manual (Explanation of the press)
③Applicator parts installation table (Applicator installation explanation)
④Crimp conditions table (Crimp height/Tensile strength standard values)
⑤Crimp quality fundamentals manual (Bell-mouth dimensions, bent up, bent down, rolling, etc.)
✻ Correct cable preparation and crimp termination is based on understanding and following the procedures in the above documents.

◆Insertion of the crimp contacts in the housing

Crimp contacts are inserted in the housing as illustrated below.
Exercising caution when inserting, align the retention tab of the contact with the corresponding molded-in lance in the housing's contact cavity and push the contacts in.
Make sure that the contact is fully inserted and the retention tab clears the molded-in lance.



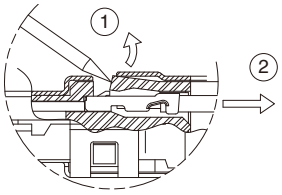
◆Verify that the retention tabs clear the molded-in lances as shown on the illustration below.



Light pull on the wire, with force NOT EXCEEDING 3N will also verify the correct contact insertion.

◆Removal of the contacts

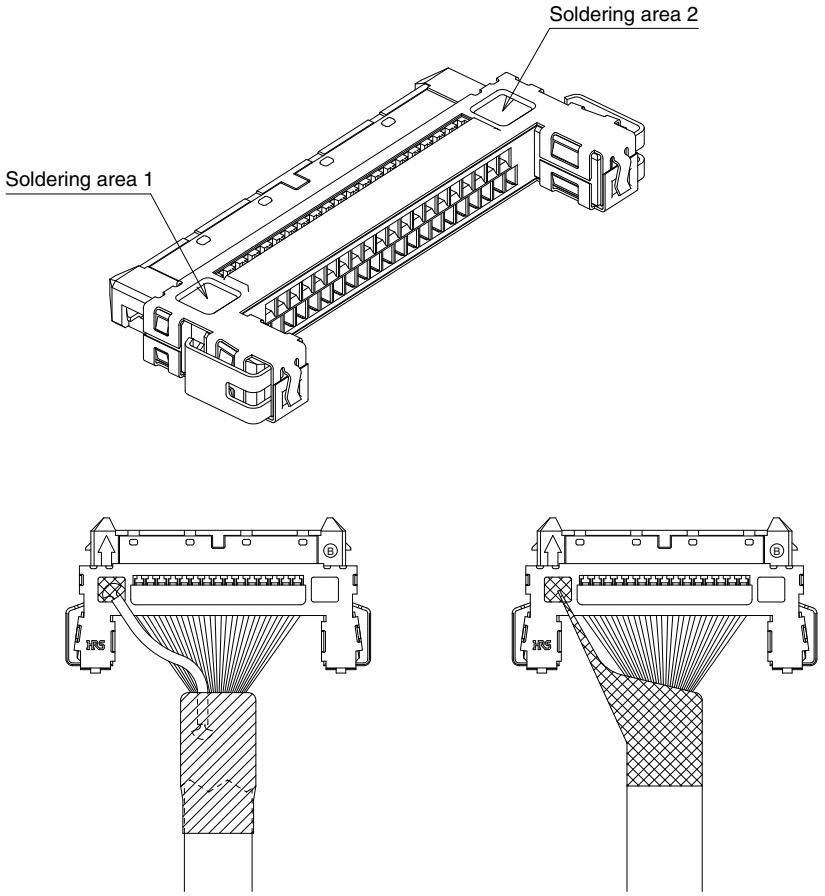
Using sharp-pointed tool of appropriate size gently lift the molded-in tab and pull-out the terminated contacts.
Excersize caution as NOT to damage the molded-in lance.
Should the damage occur, the entire housing will need to be replaced.



Precautions and recommendations

[Soldering precautions related to FX15S-**P-C connectors]

◆Grounding Methods of the ground wire or shields for the cable assemblies
①Solder the ground wire or the shields ONLY in the areas specifically designated for this purpose, as shown on the illustrations below.
②Observe the soldering iron tip temperature and soldering time specified.
③Do not apply excessive force to the connector by pressing it with the tip of a soldering iron.
④Do not splatter the flux from the solder core.



(Ground harness examples)

Precautions and recommendations

◆Plug – micro-coaxial cable

Cautions for soldering

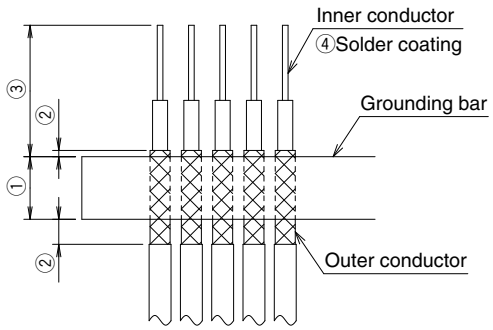
1. For the micro coaxial cable assembled to this connector, cable alignment process as shown in "Recommended cable" on the page 1 is required before assembly.

①Width of ground bar shall be 1.05mm Max. including misalignment of overlapping, flush by cutting, side drop or soldering. Using an inadequate cable will interfere the assembly to the connector. Forceful assembly and soldering could cause mis-soldering and damage the product.

②Minimize the length of outer conductor beyond the ground the bar.

③Length of cutting the extra cable should be 2.1mm Max. Any longer cable may cause contact with the connector during assembly and could damage the product. Recommended minimum length is 2.0mm, but this can be altered as long as good soldering ability is maintained.

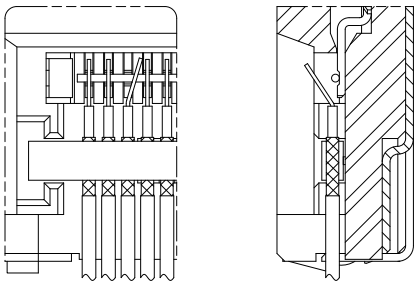
④Pre-solder and coat the inner conductor at the cable end.



2. Recommended solder for the assembly is flux cored solder with 0.2mm dia. (Lead-free: Sn-3Ag-0.5Cu), 21mm length.
If additional flux is used, make sure to prevent wicking onto the contact area.
Wicking onto the contact area will cause the contacts to fail.

3. Before soldering the cable and connector with a cable assembly machine, check the points to avoid below.

①Misalinment of cable end to the terminals in pitch direction
②Excessive floating of cable end



①Misalignment in pitch direction ②floating

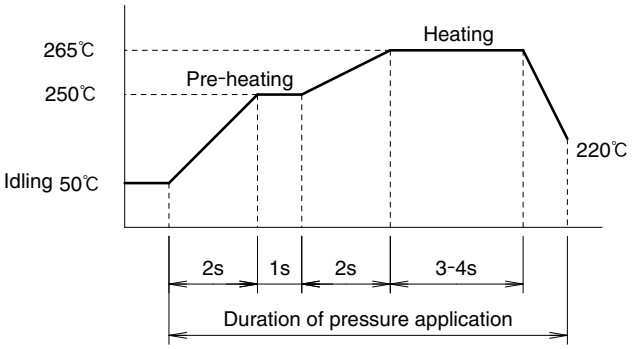
4. Follow the recommended temperature profile shown below for the soldering.

The optimum conditions for soldering can vary depending on cable type and length, and solder type. Be sure to check the recommended temperate profile and adjust the conditions accordingly.

Solder tip pressurization	13～17N

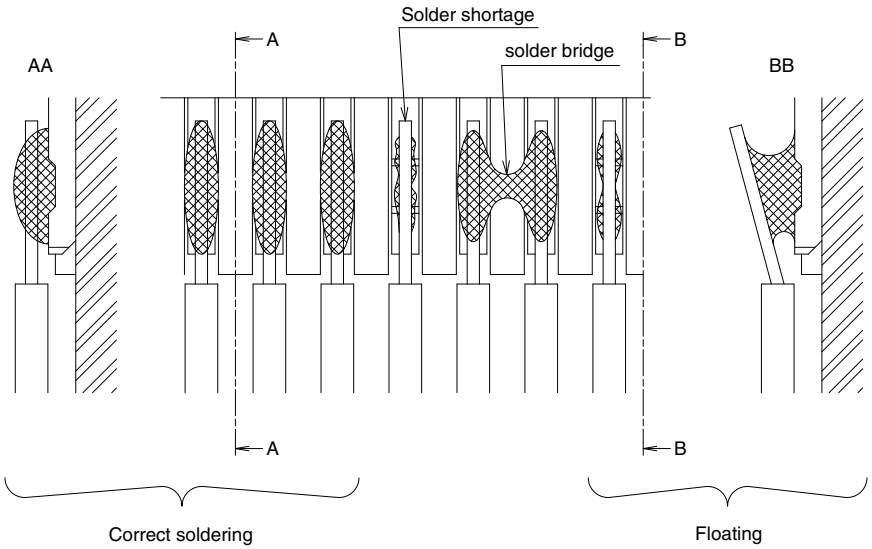
Heating

Temperature	265±5℃
Duration	3～4 sec



Precautions and recommendations

5. After soldering, check that no defect is found at soldered area.
   Examples of correct soldered and defective soldered state are shown below.



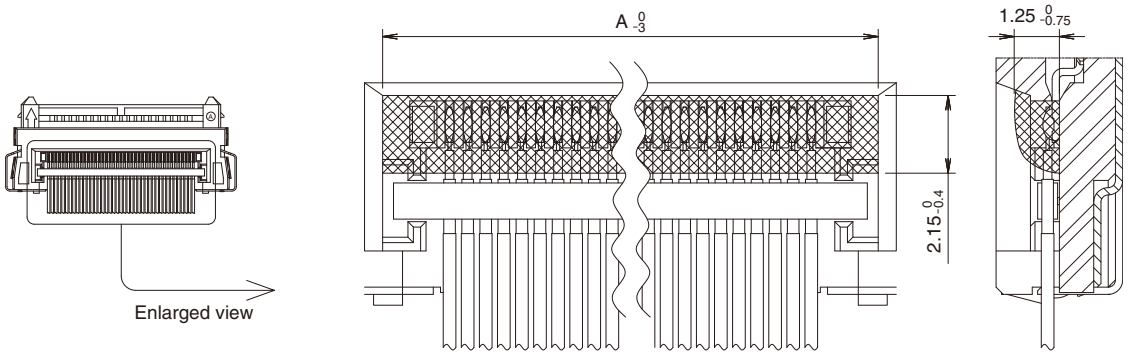
[Coutions for potting process]

1. Protect the soldered area by UV cured resin (referred as "potting" hereafter), in order to prevent cable breakage during cabling and other issues.

2. Apply 3033 manufactured by THREEBOND CO., LTD. or any equivalent product for potting.
   Follow the instruction of the potting manufacturer for UV curing exposure.

3. Refer to the following conditions the potting area.

Number of contacts	A
41	23.7
51	28.7



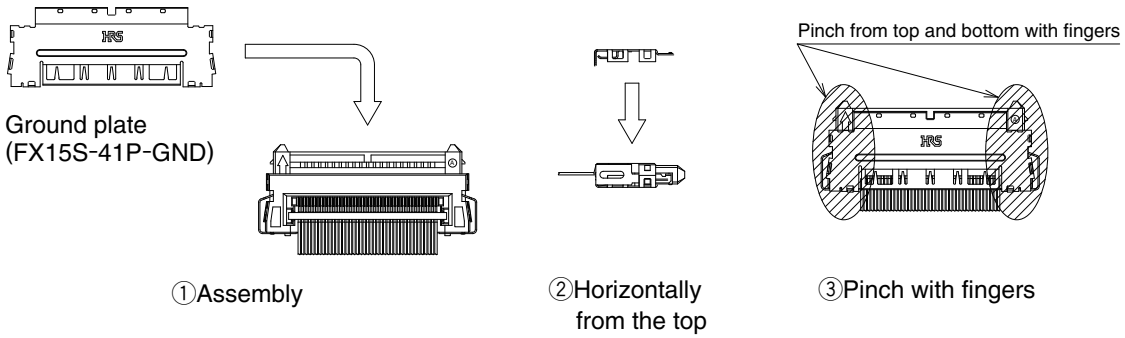
4. Use extreme care in handling the soldered and potted assembly. Too much stress applied to the cable could break it.

Precautions and recommendations

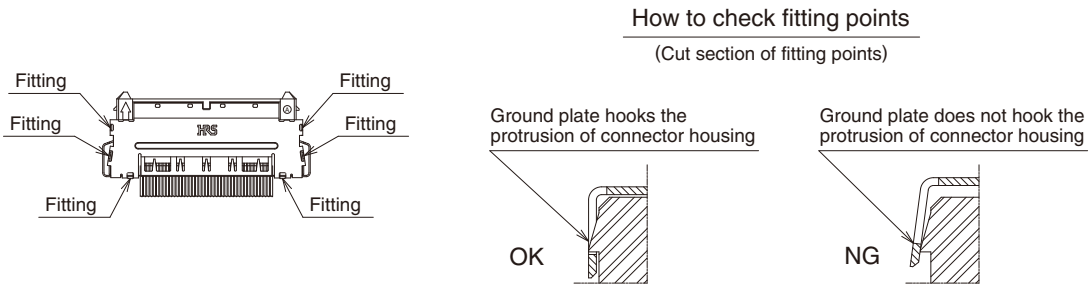
[Coutions for ground plate assembly]

1. Attach a ground plate separately provided as FX15S-41P-GND after the cable assembly process.

2. Place the ground plate onto the connector horizontally and pinch the two components from top and bottom with your fingers.

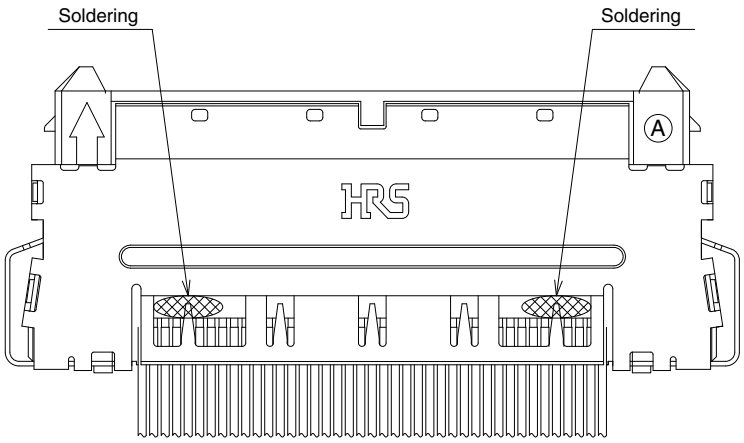


3. Check the six fitting points after assembly and make sure that they are all correctly fitted together.



[Soldering to ground plate]

1. Solder down the metal bar of the cable and ground plate after the assembly of the ground plate to enhance grounding capability and to protect against vertical cable puling forces.

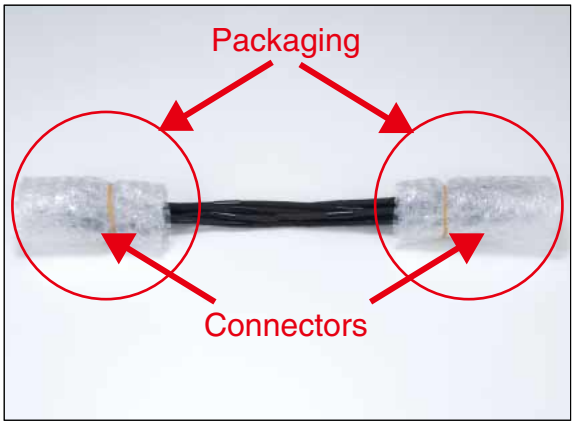


Precautions and recommendations

◆Packaging of the complete cable assemblies

Exercise caution as not to tangle, twist or deform the complete cable assemblies when packaging. Special care should be taken NOT to apply any excessive stress to the individual wires.

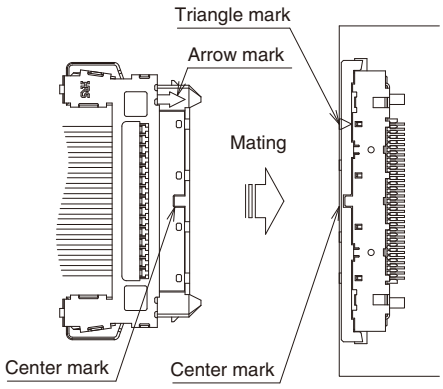
When removing the cable assemblies from the packaging do not pull on the wires. Make sure that the latch-locks are not interfering with packaging.

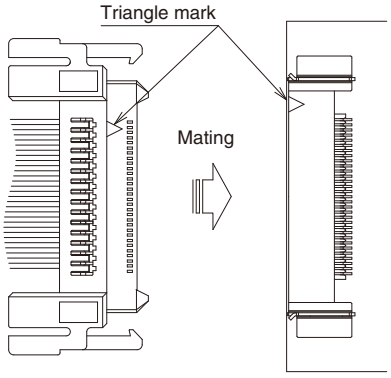


◆Mating of the connectors

These connectors have a built in polarizing feature and will NOT mate when reversed. Do NOT try and force tem together.

Align the connectors as shown on the illustration below and fully insert the plug into the receptacle. Confirm that both latch-locks are fully engaged.





Additionally, this connector is equipped with reverse-insertion preventing mechanism, but a forced mating with a minimum force of 25N could damage the connector.

Avoid any inappropriate mating, and perform the mating operation after checking the above-mentioned polarity indication.

◆Treatment after mating has been completed

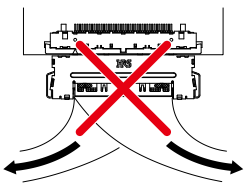
After mating, please take care to prevent any stress or load on the connector during the routing of cables.

If a load of a minimum of 5N is applied on the cable, the cable (crimp contact) could come off. Further, if the entire cable is pulled with a minimum force of 20N, the connector could be broken.

Please take extra care not to pull the cable and cause cable disconnection.

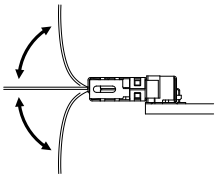
If you use a small gauge coaxial plug, a repeated rotation could also cause cable disconnection. Do not use the cable by rotating it repeatedly. The rotation times should be limited to a maximum of 10 even if rotation is required for routing.

If your use requires folding back of the cable over the base of the connector, make sure to maintain a large turn-back radius away from the connector base.

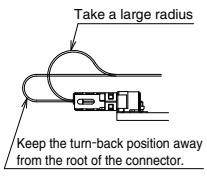


Pulling in the horizontal direction:
Not acceptable

Pulling in the vertical direction:
Not acceptable



Rotation in the vertical direction:
Up to a maximum of 10 times



When you use the cable by turning it back

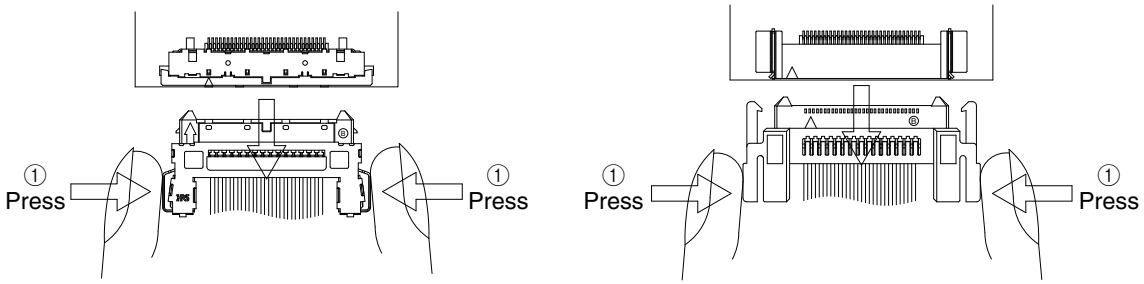
Precautions and recommendations

◆Handling of Connectors after Mating

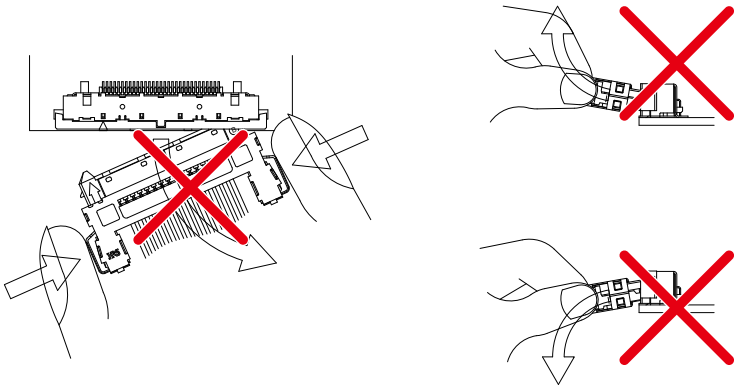
Do not to apply excessive force to the connectors when routing the cable after mating.
Pulling on the entire cable with a force of 20N or greater can damage the connector. Please take care not to pull the cable.

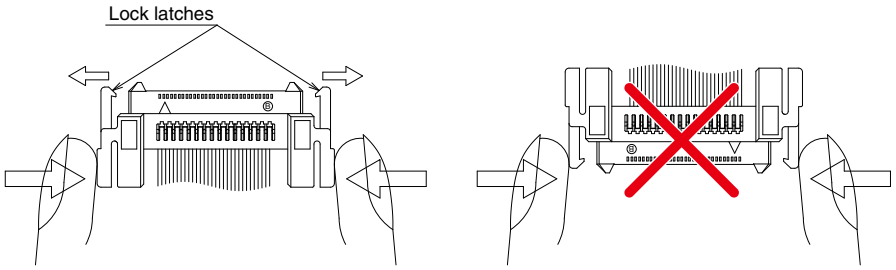
◆Un-mating of the connectors

Equally depress both sides of the latch-locks as shown on the illustration and pull the plug straight out. Do not pull on the cables!



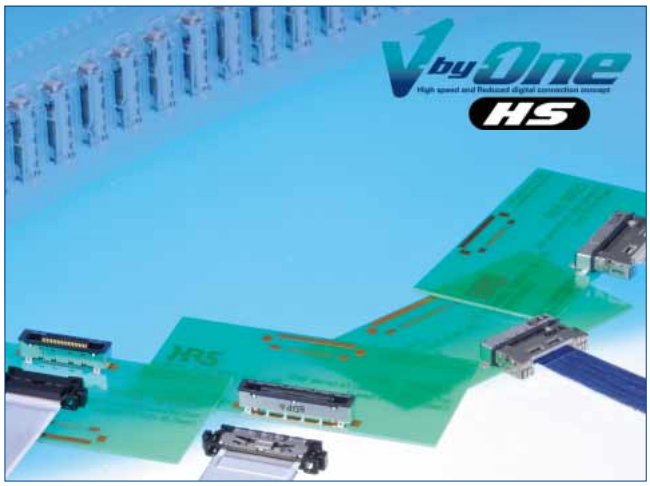
②Pull straight back.





0.5mm pitch, Next Generation High Speed Wire-to-Board Connectors

FX16 Series



"V-by-One® HS" is a trade mark of Thine Electronics, Inc.

Features

1.Supports next-generation high speed transmissions

FX16 Series supports next-generation high-speed signals including signal transmission of up to 6Gbps. The FX16 series delivers exceptional impedance-matching, even at sharp signal rise times of Tr=50ps (10 - 90%). (Fig.1)

2. V-by-One® HS compatible connector

The FX16 Series connector is recommended by Thine Electronics, Inc. for their V-By-One® HS next-generation panel interface, due to the connector's outstanding signal integrity performance at 3.75Gb/s - the top data rate of the interface. As shown in Fig.2 on the right, the eye pattern remains wide open at 3.75Gbps. (Please refer to the transmission property data shown on Page 4.)

3. A patented flip-lock harness simplifies FFC applications.

We have incorporated our proprietary patented flip-lock design that greatly simplifies FFC assembly by eliminating the need for costly cable soldering (Fig.3).

4. Vertical cable plug

The vertical plug mating style simplifies the assembly process. In addition, it offers a lower profile by limiting the mated height to only 8mm (Fig.4).

5. Multiple variations of plug style, cable type and number of positions available

The series features a common plug for shielded FFC and micro coaxial cable. Available plug variations include right-angle, vertical style for batch harness assembly and direct plugin styles. Multiple position sizes are available (please see page 5 for variations).

6. RoHS compliant

All materials and substances used to produce these parts fully comply with RoHS standards.

Supports next generation high-speed transmission

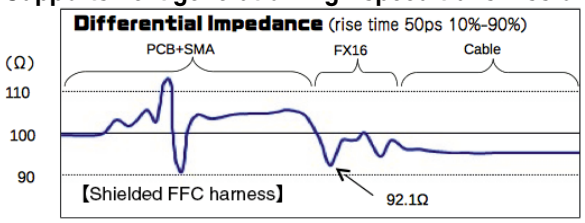


Fig.1

V-by-One® HS compatible connector

Fig.2

Simplified FFC harness assembly with a flip-lock system

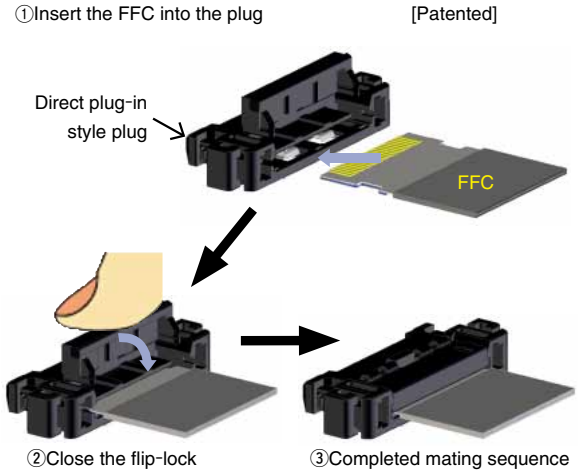


Fig.3

Vertical mating, horizontal wiring

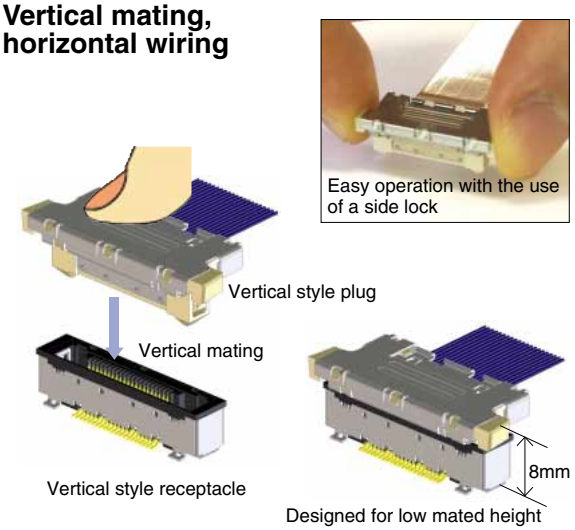


Fig.4

■Product Specifications

Ratings	Current Rating 0.5A	Voltage Rating AC60V
	Operating Temperature Range : -55 to 85℃ (Note 1) (Note 2)	Operating Humidity Range : relative humidity of no more than 85% (Note 2) (Note 4)
	Storage Temperature Range : -10 to 60℃ (Note 3)	Operating Humidity Range : relative humidity of no more than 70% (Note 3) (Note 4)

Items	Specifications	Conditions
1.Contact resistance	80mΩ max (Note 5)	Measured at 1mA
2.Insulation resistance	500MΩ minimum	Measured at DC 100V
3.Withstand voltage	No flashover or breakdown	AC 200V is applied for 1 minute
4.Overall push-pull force	Inserting force (0.5 × number of pos.) : no more than 1N Extracting force (0.05 × number of pos.) : no less than 1N	Measured by using applicable connectors
5.Durability	Contact resistance : variation from the initial state : no more than 20mΩ	50 mating cycles
6. Vibration	No electrical discontinuity of 1μ or greater	Frequency 10 - 55Hz, half amplitude 0.75mm, 2 hours for 3 axial directions
7.Shock	No electrical discontinuity of 1μ or greater	Accelerated velocity : 490m/s^2, for 11ms, half-sine in 3 directions, 3 times for each of the three directions (axes)
8. Humidity resistance	Contact resistance : variation from the initial state : 20mΩ max Insulation resistance : minimum of 500MΩ	96 hours at 40℃ temperature and the humidity range from 90 to 95%
9. Temperature cycles	Contact resistance : variation from the initial state : 20mΩ max Insulation resistance : 500MΩ min	Temperature : -55 → 5 to 35 → 85 → 5 to 35℃ 5 cycles of the testing time period of 30 → 5 → 30 → 5 minutes

Note 1 : Includes temperature rise caused by current flow.
Note 2 : The operating temperature range when the operating humidity is above 80% shall be -55 to 40℃.
Note 3 : The term “storage” refers to the long-term storage condition of unused products before PCB mounting.
Note 4 : No condensation allowed.
Note 5 : The conductor resistance of connected cables is not included.

■Materials / Finish

●Receptacle

Part	Materials	Finish	Remarks
Insulator	FX16 : LCP resin FX16M2 : Polyamide resin	Black color	UL94V-0
Contact	Copper alloy	Gold plating	————
Shell	Copper alloy	Pure tin-plating	————

●Plug

Part	Materials	Finish	Remarks
Insulator	FX16-SD/SDL : Polyamide resin FX16F-HC : PC resin FX16M2-HC : PBT resin	FX16-SD/SDL : Beige color FX16F-HC : Black color FX16M2-HC : Black color	UL94V-0
Contact (FX16-SD/SDL only)	Copper alloy	Contact interface area : gold plating Termination area : pure tin-plating	————
Shell	FX16-SD/SDL : Stainless steel FX16F-HC : Stainless steel FX16M2-HC : Copper alloy	FX16-SD/SDL : Nickel plating FX16F-HC : Nickel plating FX16M2-HC : Pure tin-plating	————

●Accessories

Part	Materials	Finish	Remarks
Cover shell	Stainless steel	————	————

■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.

●Receptacle

FX ❶ 16 ❷ M2 ❸ - 51 ❹ S ❺ - 0.5 ❻ SH ❼ (**) ❿

●Plug

FX ❶ 16 ❷ M2 ❸ - 51 ❹ P ❺ - HC ❽

●Accessories (Cover shell)

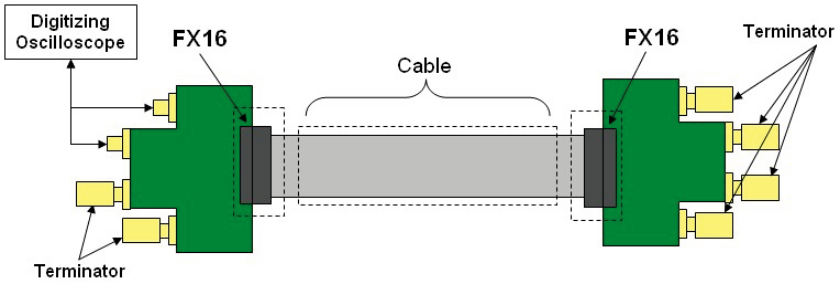
FX ❶ 16 ❷ - 31 ❹ P ❺ - GND ❾

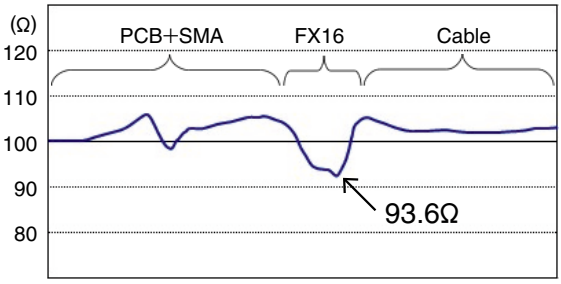
❶Series Name	: FX	
❷Series No.	: 16	
❸Shape designation	None/F/M2 : Hirose control identification code	
❹Number of positions		
❺Contact type	S P	: female contact : male contact
❻Contact pitch	0.5 None	: 0.5mm pitch : No contact
❼Product type (Receptacle)	SH SV	: right-angle type : vertical type
❽Product type(Plug)	SD SDL HC	: Right-angle batch cable assembly type (Micro coaxial cable) : Vertical batch cable assembly type (Micro coaxial cable) : FFC holder type
❾Product type (Accessories)	GND GNDL	: Right-angle type cover for micro coaxial cables : Vertical type cover for micro coaxial cables
❿Packaging	None (30)	: embossed tape package (1,000pcs/reel) : embossed tape package (100pcs/reel)

◆Transmission properties

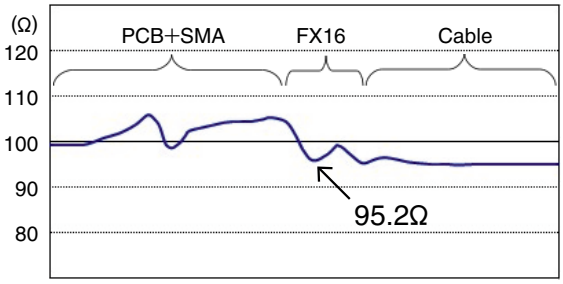
●Differential impedance [Rise time: Tr=100ps]

A differential impedance of 100Ω ±10% is maintained at signal rise time of 100ps. (※Notes), This specification is met by way of an impedance-matching design based on SI simulation.





[Micro coax cable harness product]

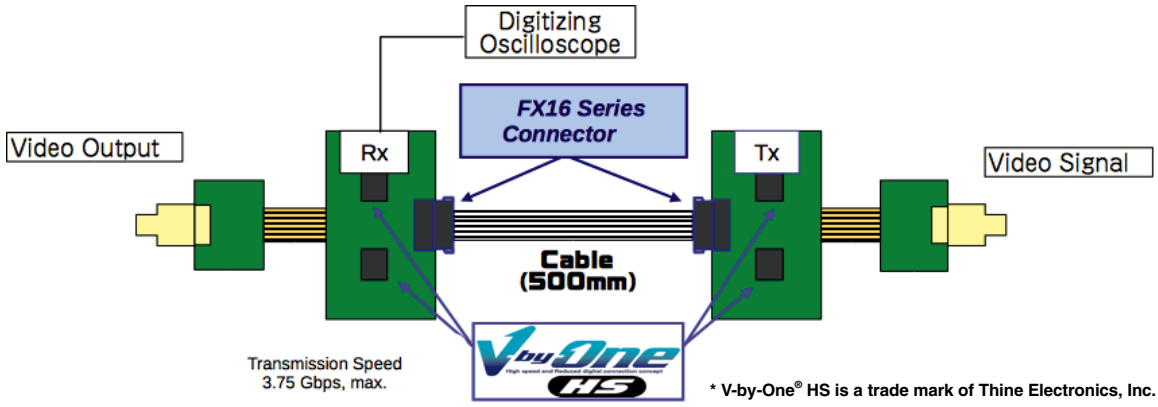


[Shielded FFC type harness product]

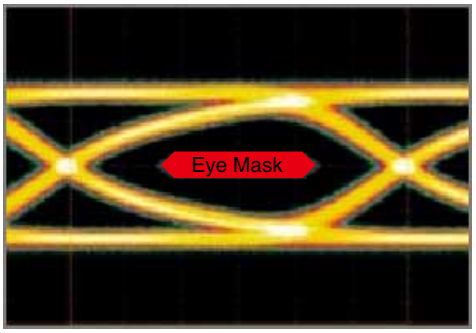
●Eye diagram

The FX16 Series connector shows outstanding performance at 3.75Gbps, the maximum speed of V-By-One® HS developed by Thine Electronics, Inc.

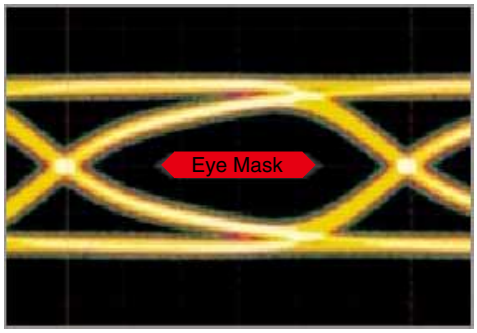
Testing with actual V-by-One® HS signals shows that the eye pattern is wide open at these signal speeds. (※Notes)



* V-by-One® HS is a trade mark of Thine Electronics, Inc.



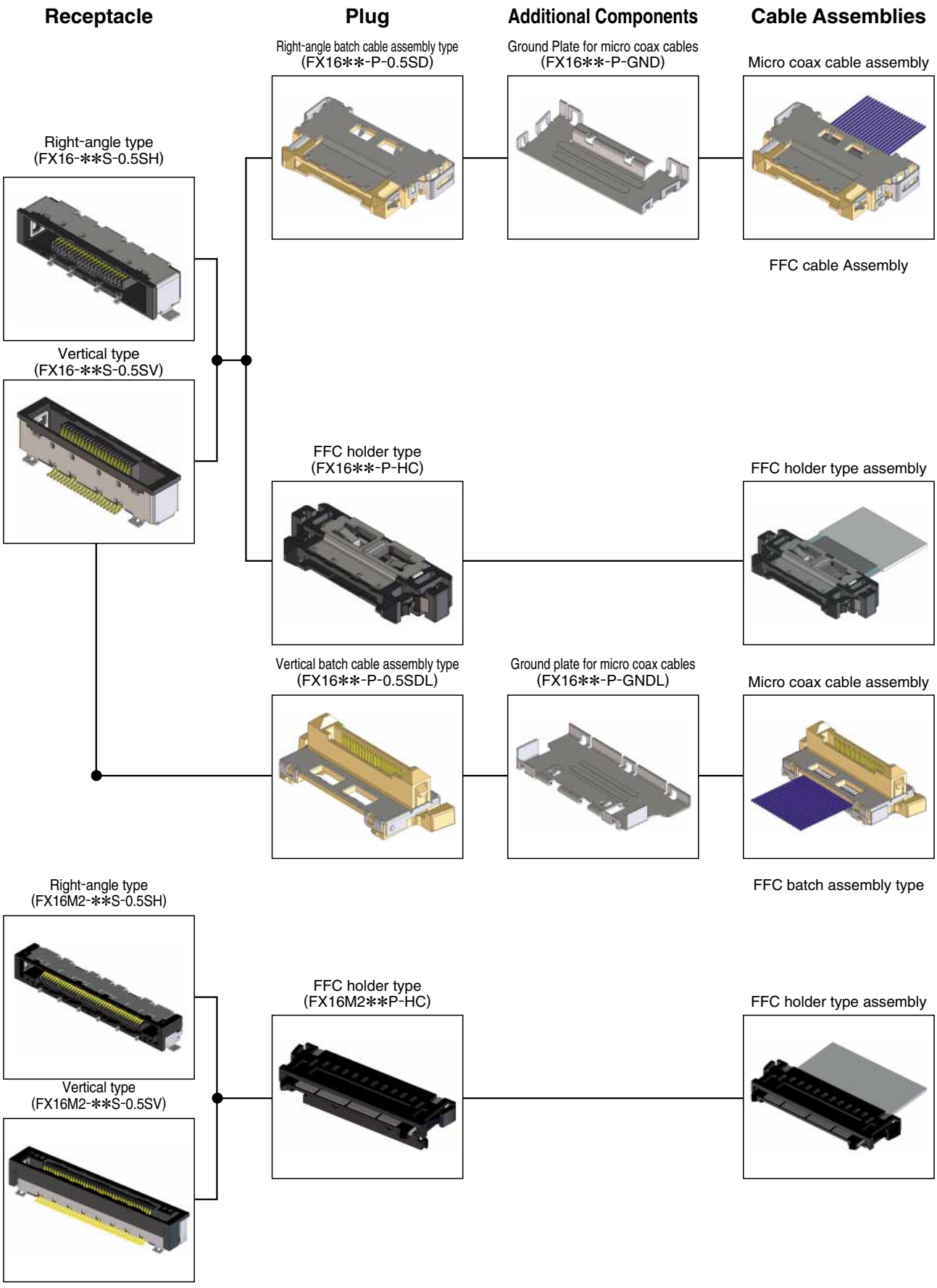
[Micro coax cable harness 500mm product]



[Shielded FFC type harness 500mm product]

※Note) Results may vary depending on the length and properties of the cables used.

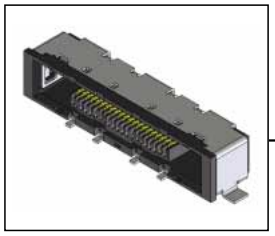
◆Diagram of FX16 Series variations and mating table



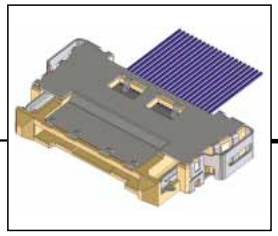
FX16 Series mating dimensions (Reference dimensions)

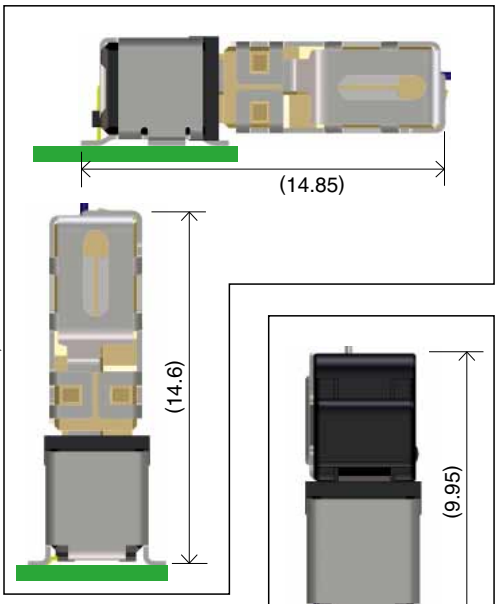
Receptacle	Plug	Mated condition

Right-angle, PCB mount type
(FX16-**S-0.5SH)

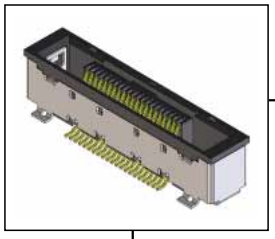


Right-angle type micro coaxial cable harness
(FX16**P-SD)

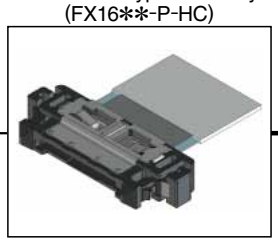


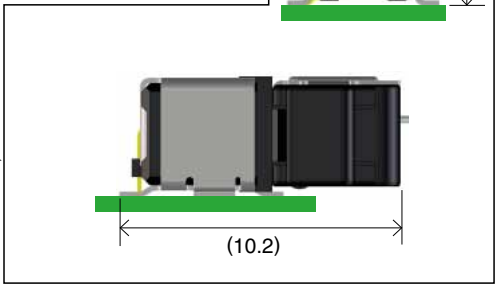


Vertical, PCB mount type
(FX16-**S-0.5SV)

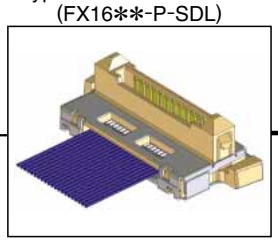


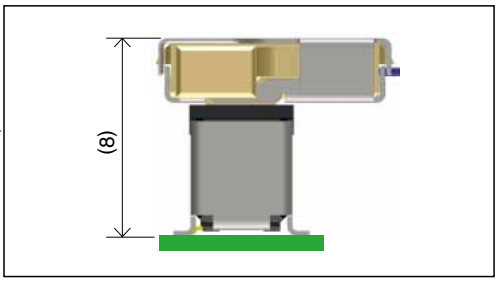
Holder FFC type assembly
(FX16**-P-HC)



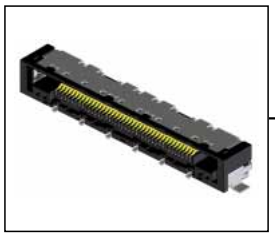


Vertical type micro coaxial cable harness
(FX16**-P-SDL)

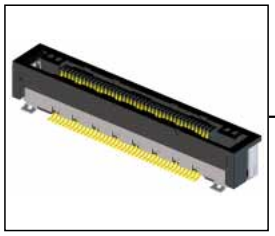




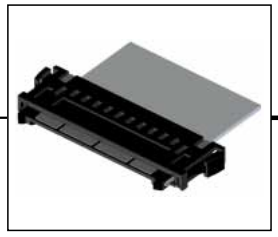
Right-angle, PCB mount type
(FX16M2-**S-0.5SH)

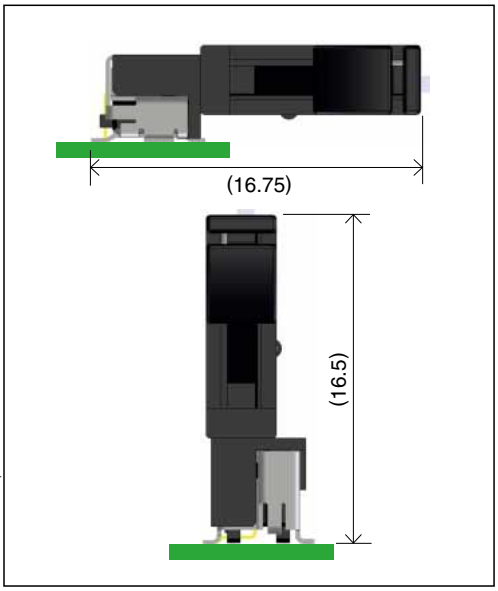


Vertical, PCB mount type
(FX16M2-**S-0.5SV)



Holder FFC type assembly
(FX16M2-**-P-HC)

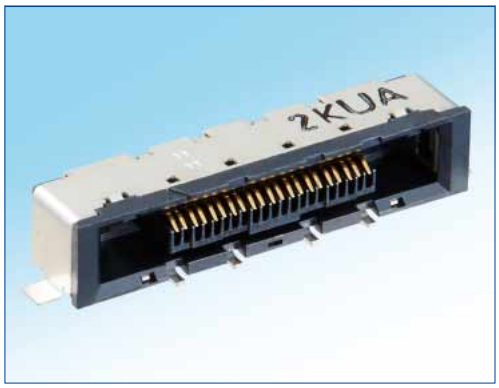


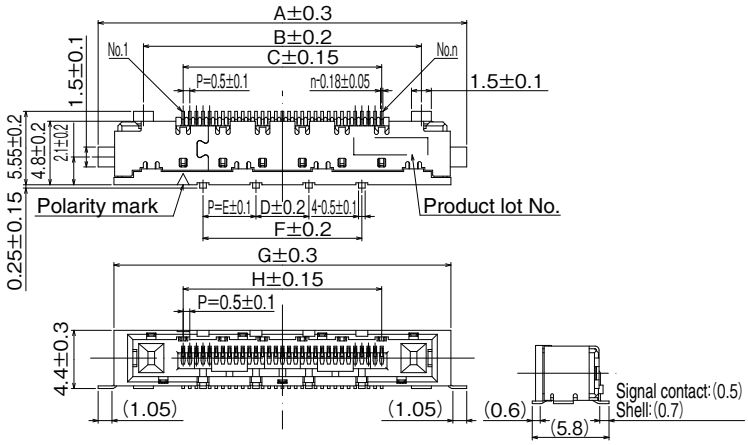


(Unit : mm)

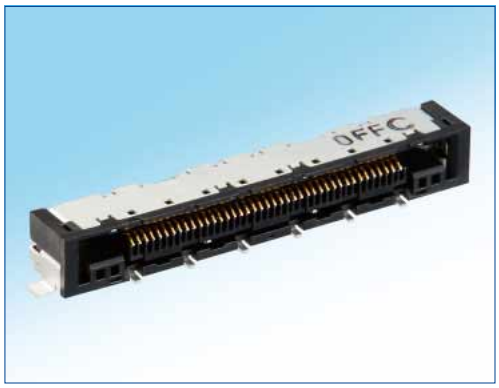
■Receptacle

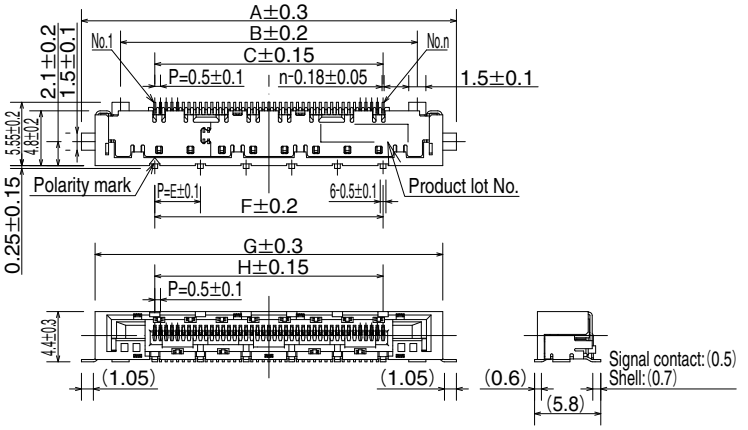
●Right-angle type (FX16-∗∗S-0.5SH)



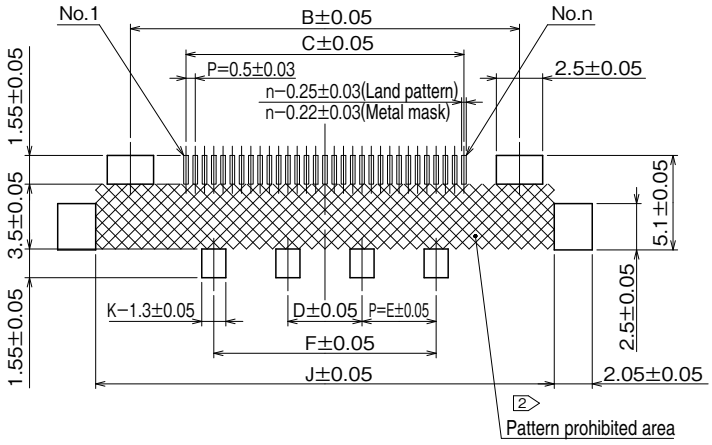


●Right-angle type (FX16M2-∗∗S-0.5SH)





◆Recommended PCB layout (Metal mask dimension)



Notes:

1 The co-planarity of the contact and shell of this product is 0.1mm max.

2 Insulation measures such as the pattern prohibited area or resist processing are required in the area identified by ▨ inside the land pattern.

3 ( ) is a reference dimension.

4 During the manufacturing process, products may incur some minor cosmetic damage (dents/scratches), but this will not affect their performance.

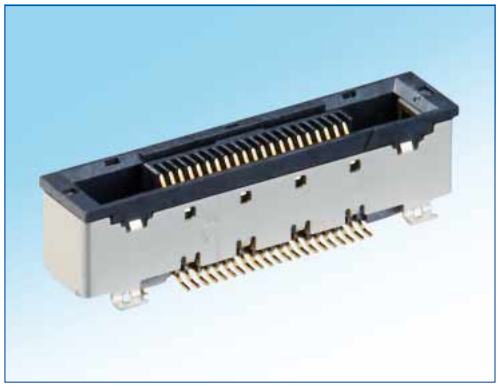
5 This product is delivered in an embossed reel packaging; the packaged quantity for one reel is 1,000 pieces for standard articles (00) and 100 pieces for the specification of (30).

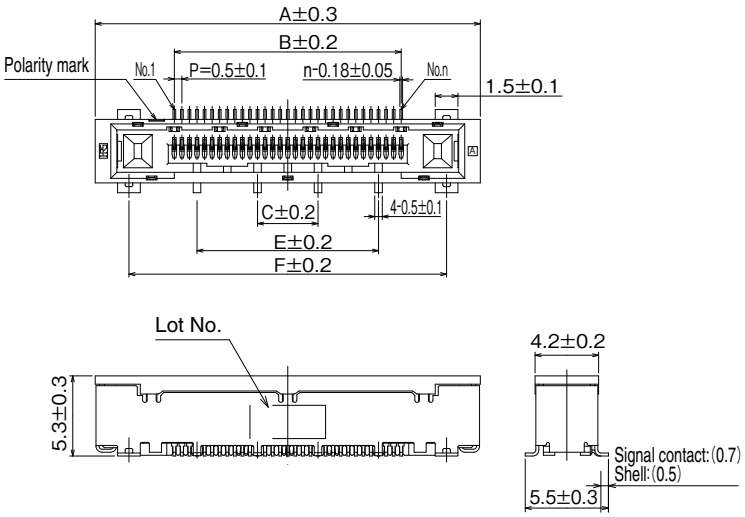
Unit : mm

Part No.	HRS No.	No. of Contacts (n)	A	B	C	D	E	F	G	H	J	K	RoHS
FX16-21S-0.5SH(∗∗)	575-3411-5 ∗∗	21	22.85	16	10	4	—	10	20.46	10	19.75	4	○
FX16-31S-0.5SH(∗∗)	575-3412-8 ∗∗	31	27.85	21	15	—	4	12	25.46	15	24.75		
FX16M2-41S-0.5SH(∗∗)	575-3003-9 ∗∗	41	32.85	26	20	—		20	30.46	20	29.75	6	
FX16M2-51S-0.5SH(∗∗)	575-3004-1 ∗∗	51	37.85	31	25	—	5	25	35.46	25	34.75		

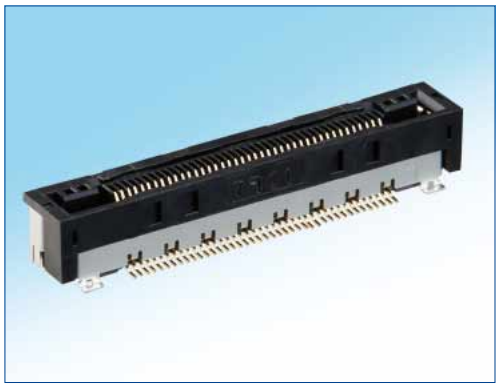
(00) : Embossed package (1,000pcs/reel), (30) : Embossed package (100pcs/reel)

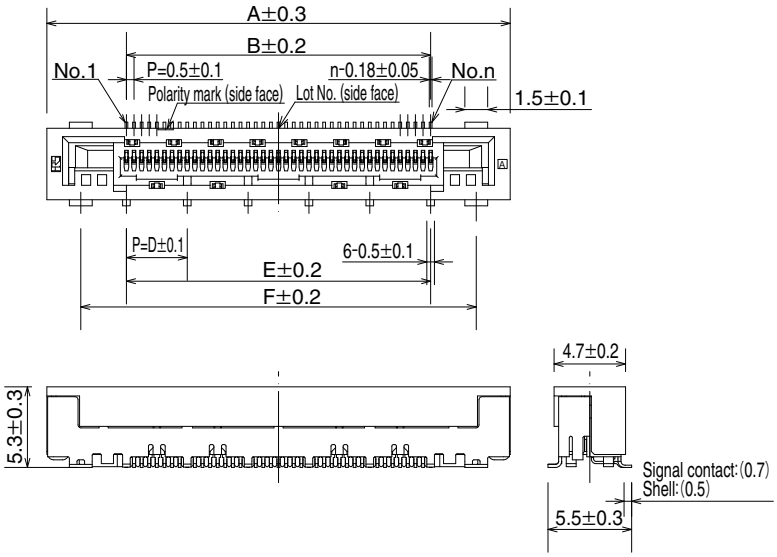
●Vertical type (FX16-**S-0.5SV)



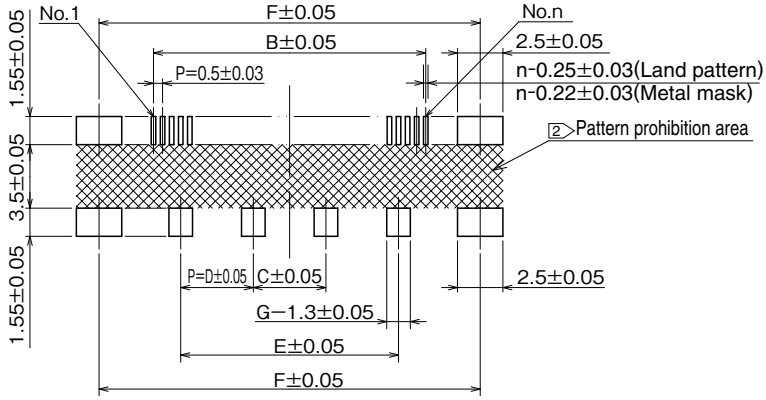


●Vertical type (FX16M2-**S-0.5SV)





◆Recommended PCB layout (Metal mask dimension)



Notes :

1 The co-planarity of the contact and shell should measure no more than 0.1 (mm).

2 Insulation measures such as the pattern prohibited area or resist processing are required in the area identified by ▨ inside the land pattern.

3 ( ) is a reference dimension.

4 During the manufacturing process, products may incur some minor cosmetic damage (dents/scratches), but this will not affect their performance.

5 This product is delivered in an embossed package; the packaged quantity in one reel is 1,000 pieces for standard articles (00) and 100 pieces for the specification of (30).

Unit : mm

Part No.	HRS No.	No. of Contacts (n)	A	B	C	D	E	F	G	RoHS
FX16-21S-0.5SV(**)	575-3401-1 **	21	20.46	10	4	-	10	16	4	○
FX16-31S-0.5SV(**)	575-3402-4 **	31	25.46	15	-	4	12	21		
FX16M2-41S-0.5SV(**)	575-3002-6 **	41	30.46	20	-		20	26	6	

(00) : Embossed package (1,000pcs/reel), (30) : Embossed package (100pcs/reel)

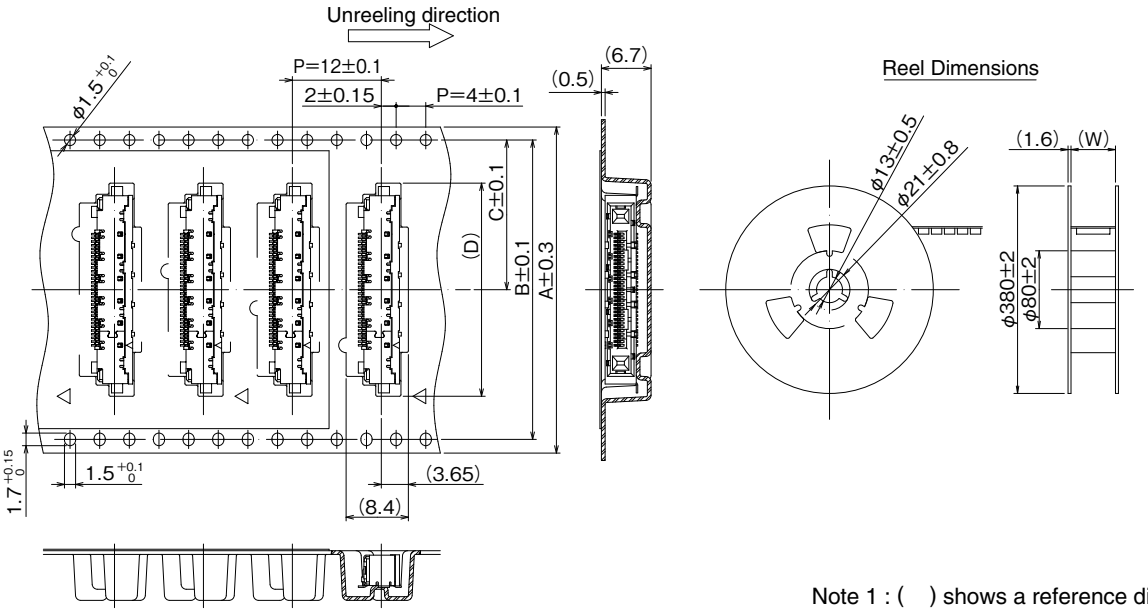
◆Emboss carrier dimensions (receptacles only)

●Horizontal type (FX16-**S-0.5SH / FX16M2-**S-0.5SH)

Unit : mm

Part No.	HRS No.	No. of Contacts (n)	A	B	C	D	W
FX16-21S-0.5SH(**)	575-3411-5 **	21	44	40.4	20.2	23.76	44.5
FX16-31S-0.5SH(**)	575-3412-8 **	31				28.76	
FX16M2-41S-0.5SH(**)	575-3003-9 **	41	56	52.4	26.2	33.76	56.5
FX16M2-51S-0.5SH(**)	575-3004-1 **	51				38.76	

(00) : Embossed package (1,000pcs/reel), (30) : Embossed package (100pcs/reel)



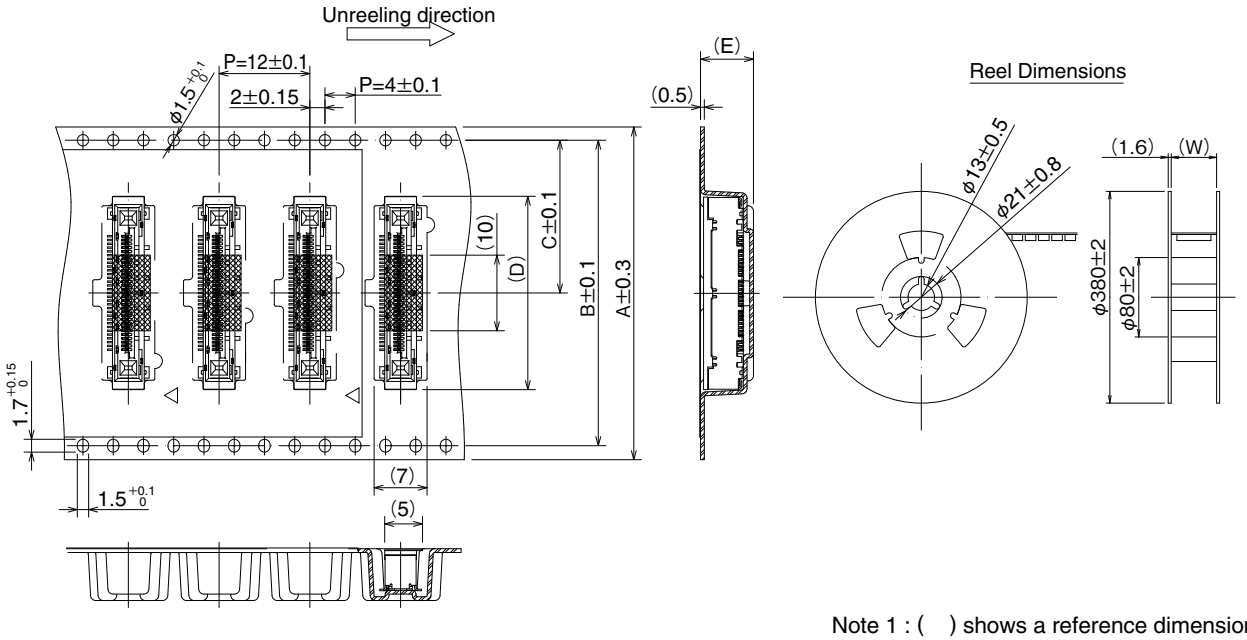
Note 1 : ( ) shows a reference dimension.

●Vertical type (FX16-**S-0.5SV / FX16M2-**S-0.5SV)

Unit : mm

Part No.	HRS No.	No. of Contacts (n)	A	B	C	D	E	W
FX16-21S-0.5SV(**)	575-3401-1 **	21	44	40.4	20.2	20.57	6.9	44.5
FX16-31S-0.5SV(**)	575-3402-4 **	31				25.57		
FX16M2-41S-0.5SV(**)	575-3002-6 **	41				30.57	7	

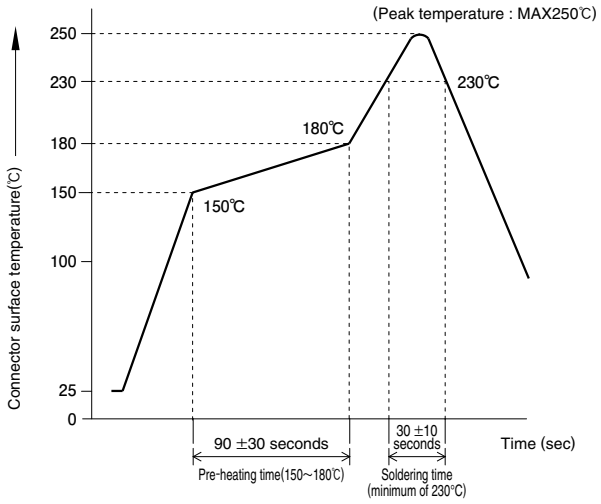
(00) : Embossed package (1,000pcs/reel), (30) : Embossed package (100pcs/reel)



Note 1 : ( ) shows a reference dimension.

Recommended Temperature Profile

This temperature profile is a reference based on the following conditions. Since your actual conditions may vary, please check your process before mounting the connectors.



(Applicable Conditions)

Test PCB Dimensions : 40×30×1(mm)
Reflow method Material : glass epoxy
Solder Composition : Sn-3 Ag-0.5 Cn (flux component : 10.5wt%)
Metal mask thickness : 0.12mm

Note 1 : This temperature profile is a recommended value.
Note 2 : The reflow process should not be conducted more than two times.
Note 3 : The values may show a slight variance due to solder paste type and thickness.

Cleaning Conditions

Cleaning with organic solvents

Solvent	Clean at normal temperature	Heated cleaning
IPA (Isopropyl alcohol)	○	○

Water cleaning

If wet cleaning is necessary, please select the proper cleaning agent (terpene, alkali saponification agent etc.) based on the reaction it will have on the metals and resins of the connector. This information is issued by the manufacturer of the cleaning agent. Additionally, please make sure not to apply an excessive amount of the cleaning agent.

Points to note during cleaning

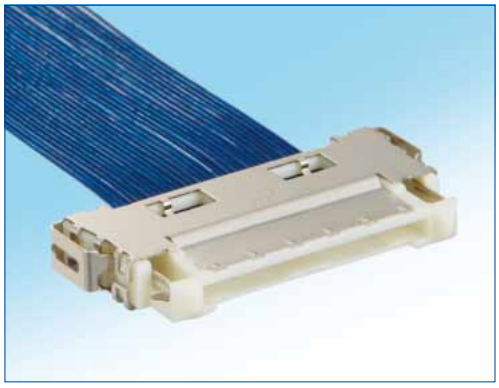
When using organic solvents or wet cleaning agents, please ensure proper rinsing is done to eliminate the possibility of deterioration in electrical performance caused by flux or cleaning agents remaining in the connector.

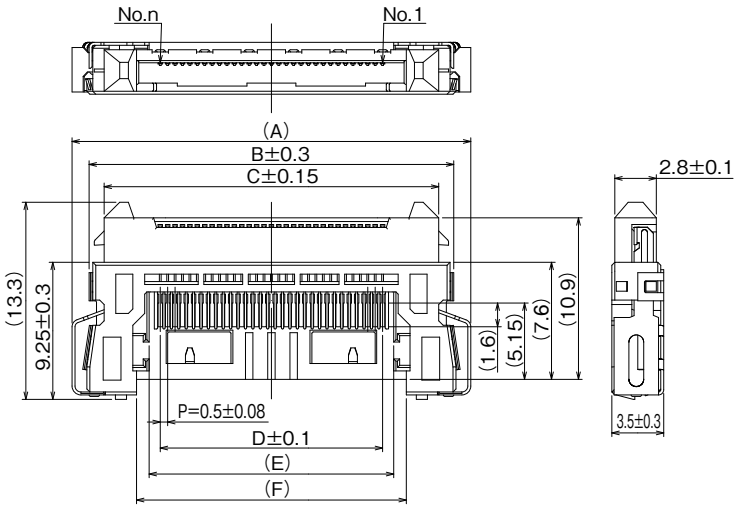
■Plug

●Right-angle batch cable assembly type

Unit : mm

Part No.	HRS No.	No. of Contacts (n)	A	B	C	D	RoHS
FX16-21P-0.5SD	575-3301-7	21	21.9	19.6	17.57	10	○
FX16-31P-0.5SD	575-3302-0	31	26.9	24.6	22.57	15	



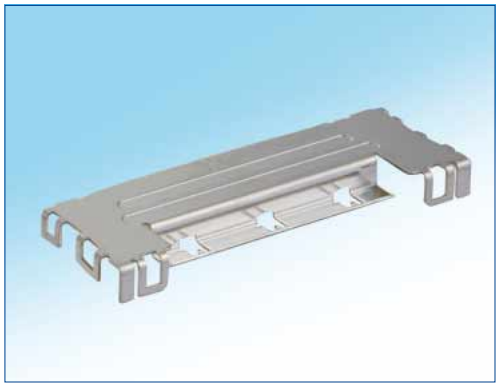


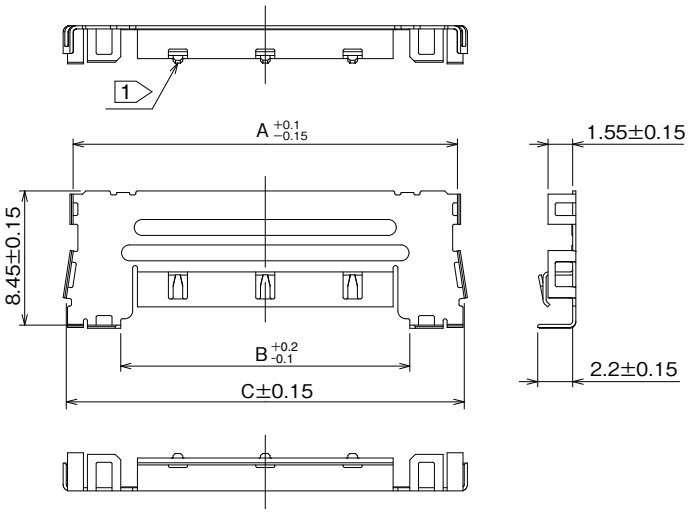
Notes :
1. ( ) shows a reference dimension.
2. During the manufacturing process, products may incur some minor cosmetic damage (dents/scratches) or black spots in the resin, but these small imperfections will not affect their performance.
3. This product is delivered in a tray package.

●Right-angle-type cover shell for micro axial cables

Unit : mm

Part No.	HRS No.	No. of Contacts (n)	A	B	C	RoHS
FX16-21P-GND	575-3311-0	21	19.2	13.2	20.06	○
FX16-31P-GND	575-3312-3	31	24.2	18.2	25.06	



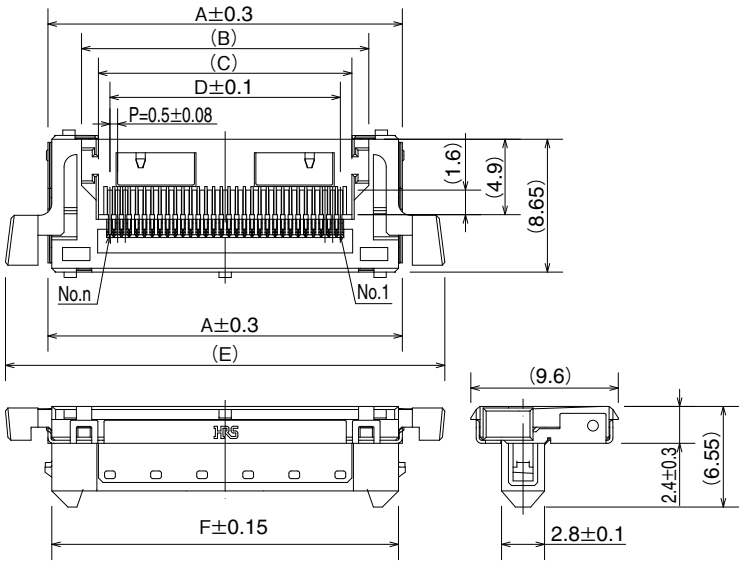


Notes :
1. During the manufacturing process, products may incur some minor cosmetic damage (dents/scratches), but this will not affect their performance.
2. This product is delivered packaged on a 2500pcs/reel.
3. This product is an accessory to the separately sold item "Right angle batch cable connection type plug (FX16-∗∗P-0.5SD)". Please be sure to use them together.

●Vertical batch cable connection type

Unit : mm

Part No.	HRS No.	No. of Contacts (n)	A	B	C	D	E	F	RoHS
FX16-21P-0.5SDL	575-3321-4	21	18.07	13.7	11.5	10	23.6	17.57	○
FX16-31P-0.5SDL	575-3322-7	31	23.07	18.7	16.5	15	28.6	22.57	

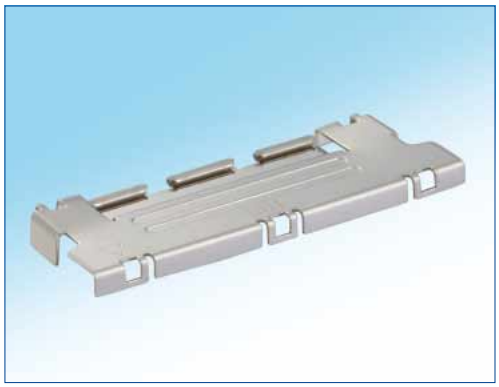


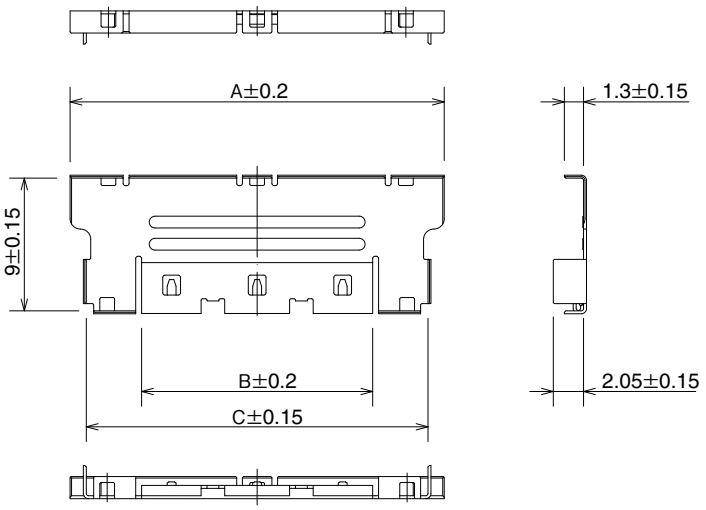
Notes :
1. ( ) shows a reference dimension.
2. During the manufacturing process, products may incur some minor cosmetic damage (dents/scratches) or black spots in the resin, but these small imperfections will not affect their performance.
3. This product is delivered in a tray package.

●Vertical type cover shell for micro coaxial cables

Unit : mm

Part No.	HRS No.	No. of Contacts (n)	A	B	C	RoHS
FX16-21P-GNDL	575-3331-8	21	20.37	11.47	18.17	○
FX16-31P-GNDL	575-3332-0	31	25.37	16.47	23.17	





Notes :
1. During the manufacturing process, products may incur some minor cosmetic damage (dents/scratches), but this will not affect their performance.
2. This product is delivered packaged on a 2000pcs/reel.
3. This product is a compliment to the separately sold item "vertical batch cable assembly type plug (FX16-**P-0.5SDL)". Please be sure to use them together.

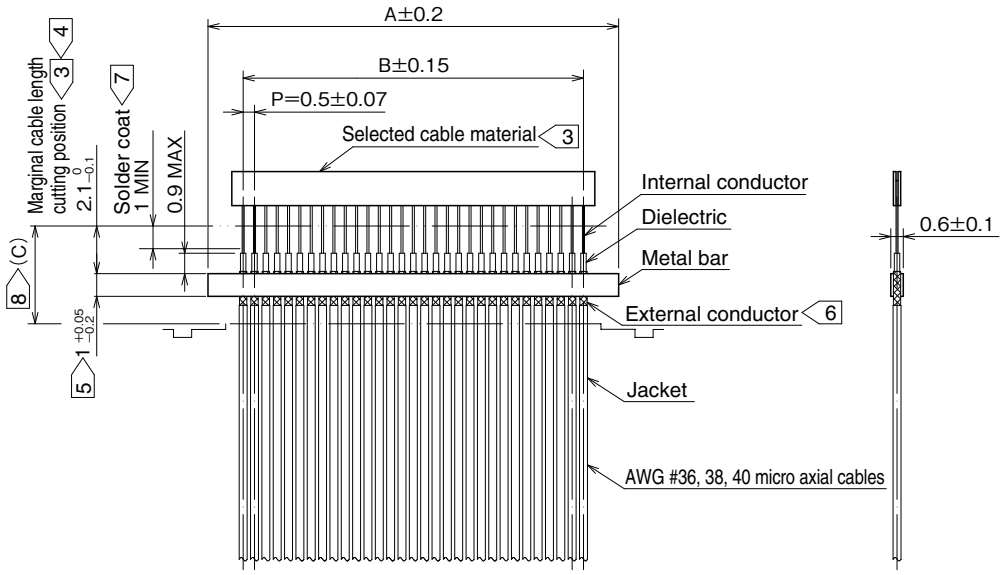
Applicable wires

●Micro coaxial cables

Applicable conductor size (core structure)	Insulation diameter
36 AWG# (7pcs/0.05mm)	ϕ0.3～ϕ0.5mm
38 AWG# (7pcs/0.04mm)	
40 AWG# (7pcs/0.03mm)	

No. of Contacts (n)	Applicable connectors	A	B	C
21	FX16-21P-0.5SD	13.1	10	4.55
	FX16-21P-0.5SDL			4.3
31	FX16-31P-0.5SD	18.1	15	4.55
	FX16-31P-0.5SDL			4.3

Recommended micro coaxial cable dimensions

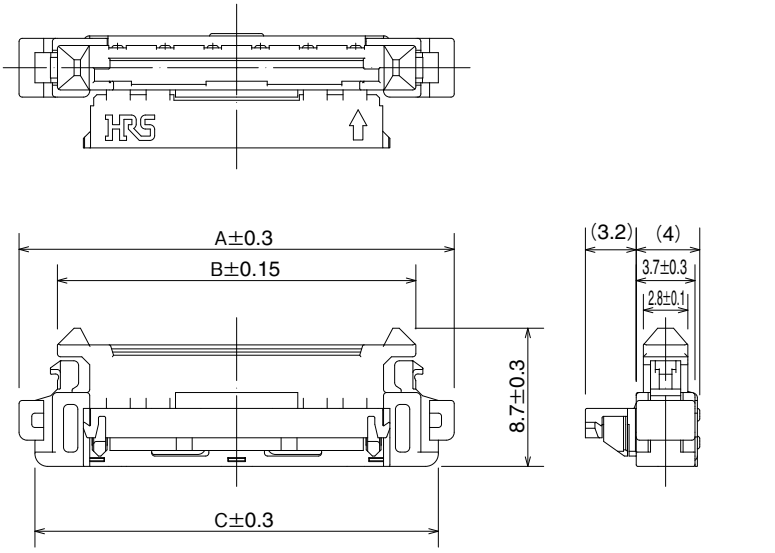


Notes :
1 ( ) shows a reference dimension.
2 Pulse heat batch soldering is recommended to affix the harness to the connector
3 To prevent any conductor deformation prior to harnessing, please use the cable material immediately after cutting
4 After confirming that the soldered state has no problems, departure from recommended values is permissible
5 Use of out-of-spec dimension cables may hinder the correct attachment to the connector. Additionally, use of excessive force during cable connection may cause faults such as unsoldered areas and disconnects.
6 The protrusion of the external conductor from the metal bar should be minimized.
7 Apply a solder coat (pre-tinning) on the internal conductor.
8 Shows the position at which the connector should be connected and the cable inserted into the connector when the cable has been stripped at the recommended length.
If cable is stripped at a different length, the amount of cable insertion will need to be changed as well.

●FFC holder type (FX16F-**P-HC)

Unit : mm

Part No.	HRS No.	No. of Contacts (n)	A	B	C	RoHS
FX16F-21P-HC	575-3265-5	21	22.4	17.57	20.4	○
FX16F-31P-HC	575-3266-8	31	27.4	22.57	25.4	

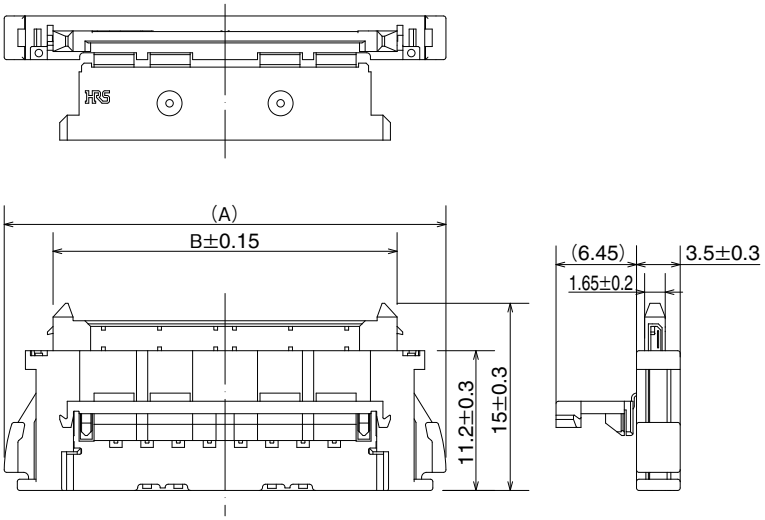


Notes :
1. ( ) shows a reference dimension.
2. During the manufacturing process, products may incur some minor cosmetic damage (dents/scratches). But this will not affect their performance. Additionally there may be mold sinks present.
3. This product is delivered in a tray package.

●FFC holder type (FX16M2-**P-HC)

Unit : mm

Part No.	HRS No.	No. of Contacts (n)	A	B	RoHS
FX16M2-41P-HC	575-3262-7	41	35.4	27.57	○
FX16M2-51P-HC	575-3263-0	51	40.4	32.57	



Notes :
1. ( ) shows a reference dimension.
2. During the manufacturing process, products may incur some minor cosmetic damage (dents/scratches), but this will not affect their performance. Additionally there may be mold sinks present.
3. This product is delivered in a tray package.

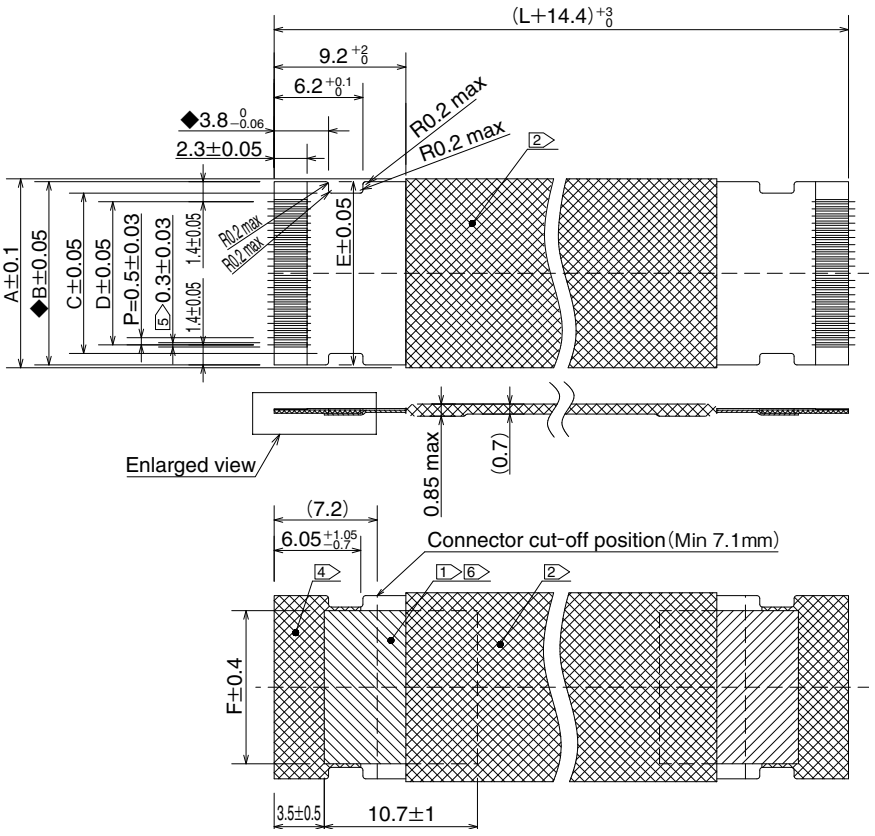
◆Applicable wires

●Completely shielded FFC for holder type

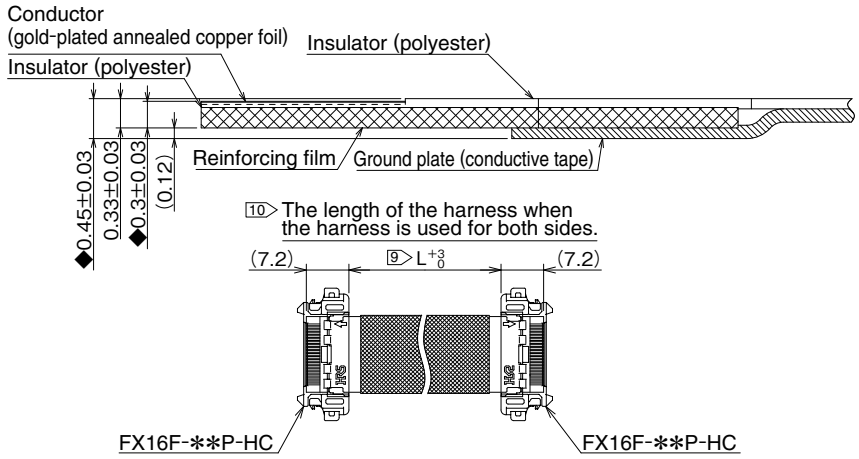
Unit : mm

No. of Contacts (n)	Applicable connectors	A	B	C	D	E	F
21	FX16F-21P-HC	13.2	12.8	11.2	10	12.8	10.7
31	FX16F-31P-HC	18.2	17.8	16.2	15	17.8	15.7

Recommended FFC dimensions



Enlarged view



Notes :

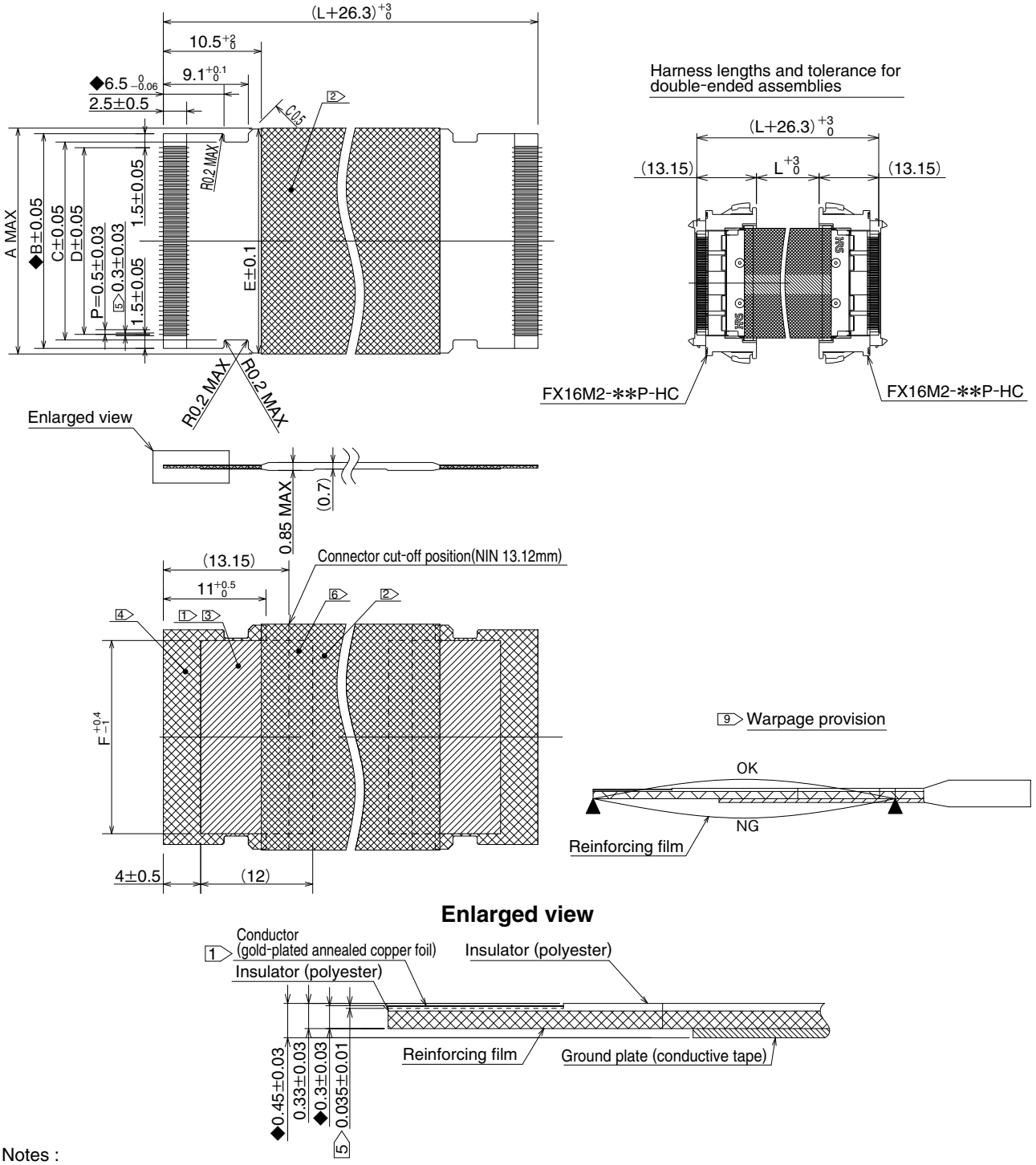
1 The plating on the ground plate (tape) must be at least 1.5μm of Sn plating, with the first 1 to 5μm of Ni plating + at least 0.2μ of Au plating on the pad surface as well as C-2000-equivalent sealing.
2 ▨ denotes the shielded area. (both sides are shielded).
3 ▨ denotes the area for the ground plate (conductive tape).
4 ▨ denotes the area for the reinforcing film.
5 The width of the conductor must be 0.3 ±0.03mm.
6 The ground plate (tape) and shield must overlap each other. This will allow a conductive path to be established through both ground plates and on both sides.
7 FFC must be made to satisfy the differential impedance value of 100Ω ±7%.
8 ( ) denotes the reference dimension and ◆ mark denotes important dimensions.
9 The L dimension is the length of the harness from one end face to the other end face of the connector cable port.

●Completely shielded FFC for holder type

Unit : mm

No. of Contacts (n)	Applicable connectors	A	B	C	D	E	F
41	FX16M2-41P-HC	24.4	23	21.2	20	23.5	20.7
51	FX16M2-51P-HC	29.4	28	26.2	25	28.5	25.7

Recommended FFC dimensions



Enlarged view

Notes :

1 The plating on the grounding plate (tape) must be at least 1.5μm of Sn plating, with the first 1 to 5μm of Ni plating + at least 0.2μ of Au plating on the pad surface as well as C-2000-equivalent sealing.

2 ▨ denotes the shielded area. (both sides are shielded).

3 ▨ denotes the area for the ground plate (conductive tape).

4 ▨ denotes the area for the reinforcing film.

5 The width of the conductor must be 0.3 ±0.03mm.

6 The ground plate (tape) and shield must overlap each other. This will allow a conductive path to be established through both ground plates and on both sides.

7 The manufacturing work should be directed to ensure that the FFC is made to satisfy a differential impedance value of 100Ω ±7%.

8 ( ) denotes the reference dimension and ◆ mark denotes important dimensions.

9 Warpage of the reinforcing film is permitted only in the direction of OK in reference to ▲▲ on both sides. However, please make sure that the film can still be inserted into the connector without any problems.

Precautions of use

◆Plug (Vertical/horizontal batch cable connection type)

[Precautions for soldering]

[1] Recommended soldering iron

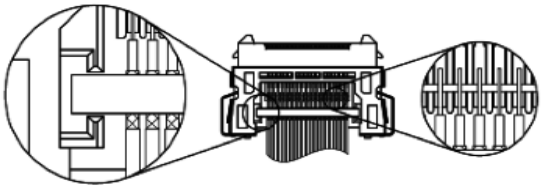
Wire solder with flux (lead-free type: Sn-3Au-0.5Cu)

When using micro coax cables……ϕ0.15 Length : number of pos. ×0.5mm

Be careful not use an excessive amount of flux, especially when using a wire solder that contains flux. Doing so may cause the flux to run up to the contact portion which can lead to contact failure.

[2] Prior to fixing the cables to the connector, make sure that the conductor is placed correctly in the center of the contact.

Fix the cable at the metal bar guide on the connector.



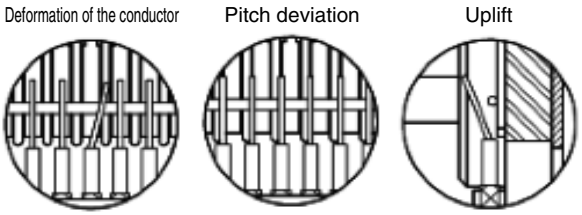
[3] Before you solder down the cables onto the connector, please check for the following issues :

·Deformation of the conductor

·Pitch deviations to the conductor relative to the contact

·Extreme uplift of the conductor tip end

This feature can lead to unsoldered spaces or solder bridges.



[4] Recommended pulse heat conditions

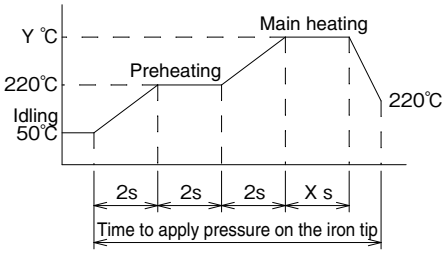
Conditions will vary depending on the length/type of cable used, type of solder, etc…

Please reference the recommended profile conditions when setting up your working conditions.

Pressure on the iron tip	13-17N

Main heating

Temperature (Y)	275±5℃
Hold time (X)	2 ±0.5 seconds



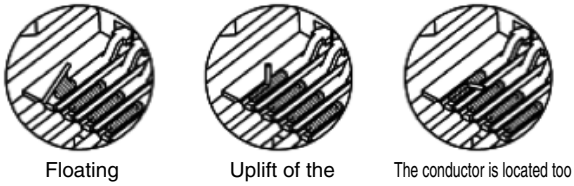
[5] Please check the soldered part after soldering to ensure no deformities were made. The illustrations below depict some examples of correct parts and some examples of incorrectly soldered parts.

Example of a correctly soldered part

The conductor is located at the center of the contact, and the whole area is uniformly soldered.

Examples of incorrectly soldered parts

Solder bridge | Insufficient amount of solder used | Scattered solder balls



Floating | Uplift of the conductor | The conductor is located too close to the extended contact.

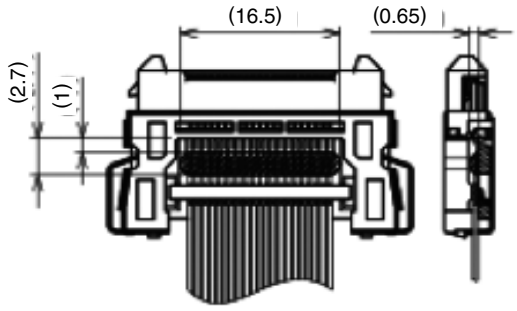
Precautions of use

[Precautions for resin sealing]

[1] To prevent insulation failure due to foreign materials, cable disconnection during the routing of the cable and other failures, we recommend that the soldered area be protected with an ultraviolet curable resin or another equivalent material. Recommended resin sealing material : Ultraviolet curable resin 3033 manufactured by ThreeBond Co., Ltd.

[2] Please refer to the resin manufacturer's directions for recommended usage conditions.

[3] Ensure that the complete soldering area of the conductor is covered with resin. Be careful not to let the applied resin flow into or stick to the connector contacts.

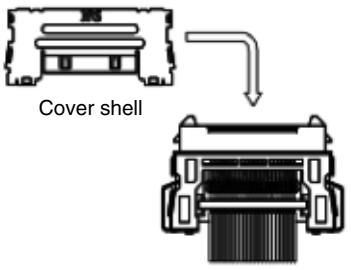


[4] Please pay close attention to the load (e.g. tension, stress.) placed on the soldered part after soldering. Poor handling could cause cable disconnection.

[How to mount the cover shell]

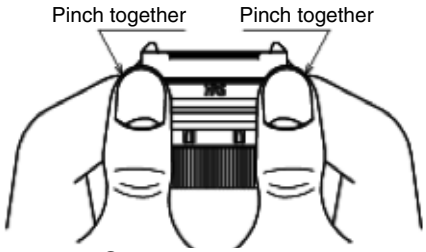
[1] After connecting the cables, mount the separately sold cover shell (for micro coax cables : FX16-31P-GND).

[2] Place the cover shell over the connector from above, set it on the connector while holding it with your fingers.



①Prepare the cover shell.

②Place it horizontally on the connector from above.

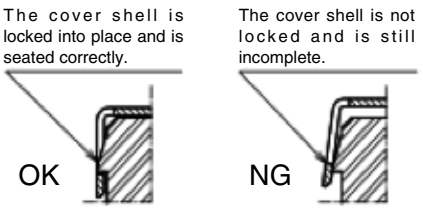


③Set it on the connector and pinch it down

[3] After applying it to the connector, check to see if all six "joining point" locations are correctly in place.

Illustration showing proper joining

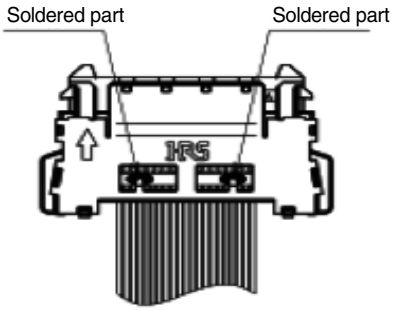
(cross-section of the joining point).



Precautions of use

[Ground soldering of the connector to the cable]

[1] Soldering the metal bar of the cable and the connector shell will enhance the shielding properties and provide additional cable strain relief.



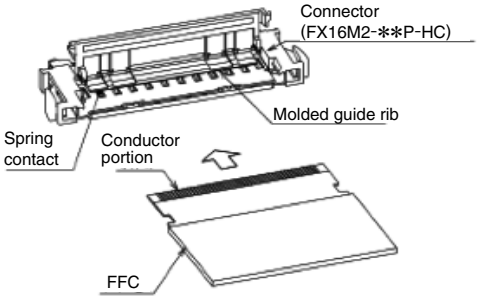
[2] Do not apply too much solder as this can lead to deformation/melting of the cable/connector due to the heat generated while soldering.

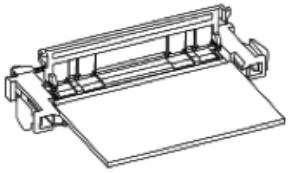
◆Plug (FFC holder type)

[Precautions during harness work]

[1] Inserting FFC

Insert the FFC straight along the guide rib of the mold, as shown in the following figure.
It cannot be inserted in different directions.
Please be careful not to deform FFC or damage the case or spring contact.

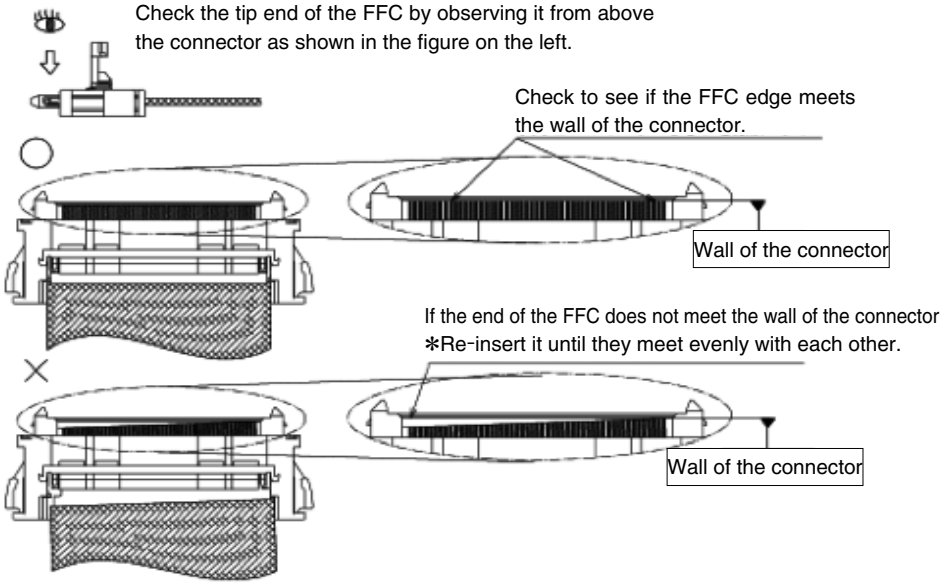




FFC has been completely inserted.

[2] Confirming the insertion of the FFC

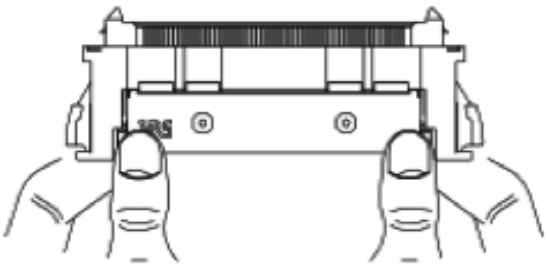
Check if the FFC has been inserted correctly by observing the tip end of the FFC from above the connector.
* If the FFC was inserted correctly, the tip of the FFC will meet up with the wall of the connector.

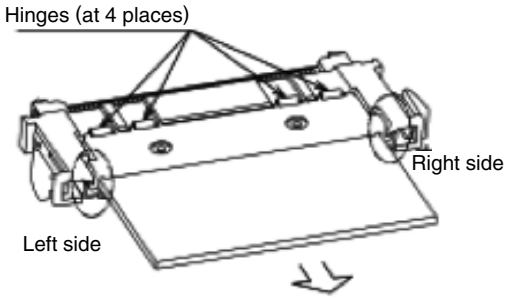


Precautions of use

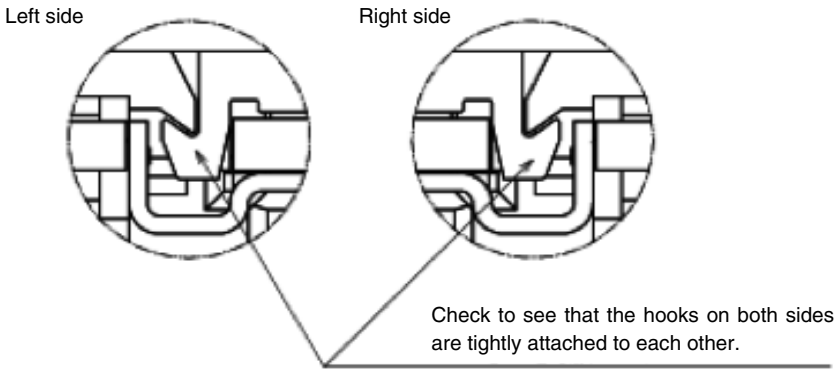
[3] Fixing the FFC

As shown in the figure below, hold the connector in both hands and push the lock straight with both thumbs.
At this time, verify the hooks are tightly attached to each other on both sides.
Additionally, after closing the lock, verify that the FFC cannot be easily pulled out, and that the hooks on both sides are tightly attached to each other by holding both ends of the assembly and pulling the FFC in the drawing direction with a force of 3 to 5 N



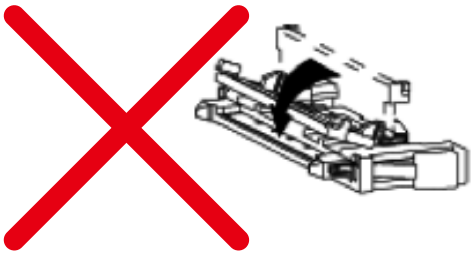


Check to see that the FFC cannot be pulled out with a force of 3 to 5 N.



[4] Other cautions

①From the time of opening the package until the assembly process, please do not handle the product in the manner which will cause the lock of the connector to be pushed down.
If the lock gets deflected it in the direction shown in the figure below, discard the connector.



②Once FFC has been removed from the connector, do not reuse the connector.
③At the time of packing the harness, be careful not to let the connector be damaged or deformed.

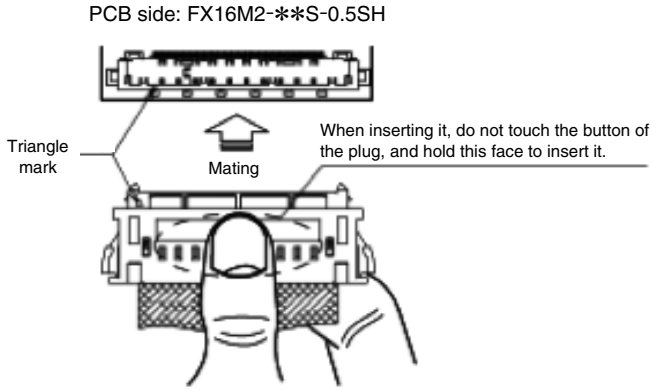
Precautions of use

◆General cautions

[Cautions for handling]

[1] Insertion into the connector on the side of PCB

The mating direction of this connector has been specified. Mating should be done with the mark facing the direction shown in the figure below.
Additionally, insertion should be done until the locks on both sides are set.

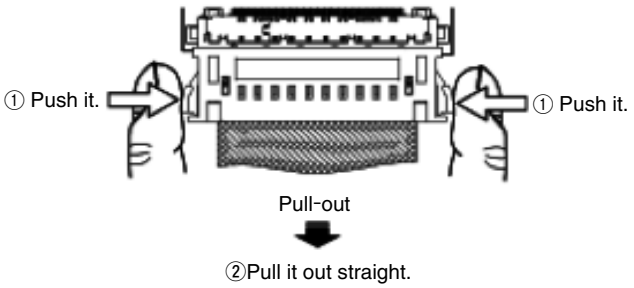


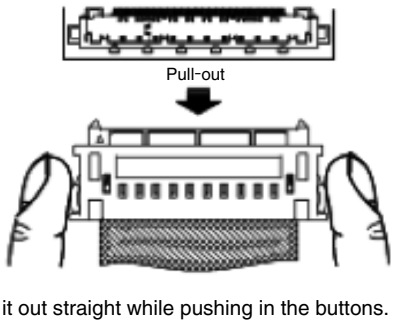
Although this connector is designed to prevent reverse insertion, the connector could be damaged if it were mated forcibly with a force exceeding 25 N. Avoid forced mating, and please verify the triangle mark position before mating.

Do not pull it out at an angle as shown in the figure below. This could damage the connector.

[2] Unmating the connector mounted on a PCB

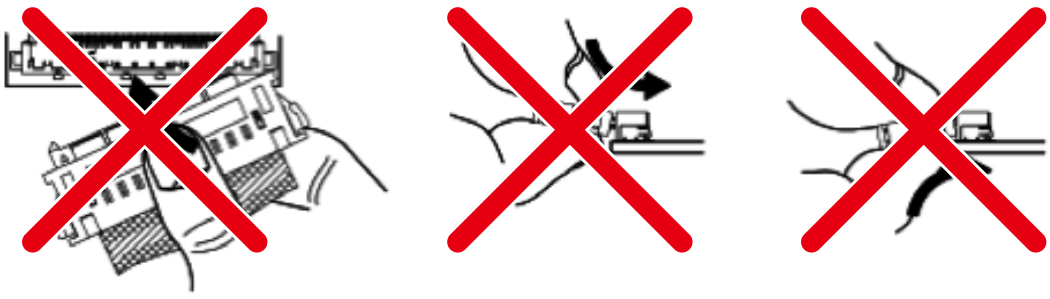
This connector is structured to lock on both ends when mated.
When unmating the connector, pull it out straight while pushing on both sides with your fingers to unlock it.
Please do not pull out FFC with a strong force.





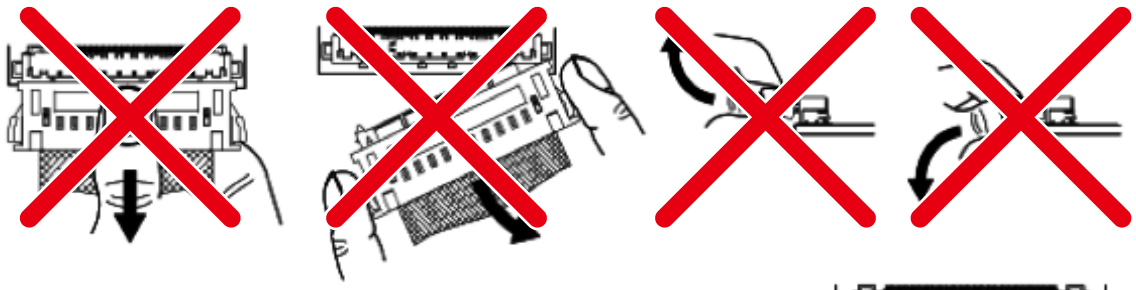
Do not pull it out at an angle as shown in the figure below. This could damage the connector.

〈Incorrect insertion method〉



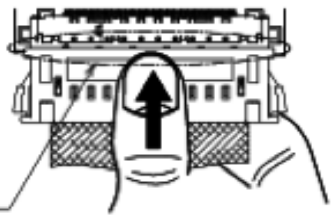
Precautions of use

〈**Incorrect pull-out method**〉



[3] In the case when the connector has been unmated forcibly.

If the connector has been unmated forcibly, push it back once to the completely mated condition, from this state, pull the plug by the "correct pull-out method".

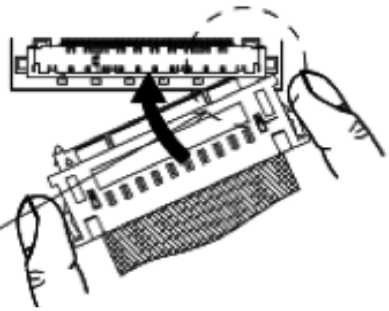


Be sure to push it once to the completely mated condition.

[4] In the case when you have pulled it out with one side locked

If the plug has been pulled out with one side locked, the locked part could be damaged if you pull it out forcibly.

In such a situation, do not try to unlock it forcibly, but mate the plug again as it is, and pull out the plug by the "correct pull-out method" again with both sides locked.



If the plug has been pulled out with one side locked, be sure to mate them again.

[5] Handling after mating

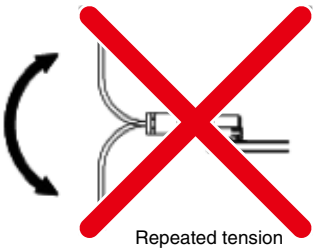
After mating, be careful not to apply load to the connector during cable routing.

The connector could be damaged if you pull the cable with a force of 20 N or more. Additionally, it could cause cable disconnection.

Please make sure that you do not pull the cable forcibly.

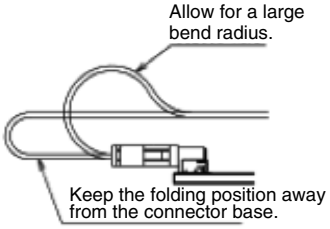
Repeated strain could also cause cable disconnection.

Avoid any use which involves repeated strain.



Repeated tension

When you use a cable that is folded back from the connector base, please maintain a large bend radius or keep the folding position away from the connector base in order minimize the load on the connector.



Using the cable in a folded state.