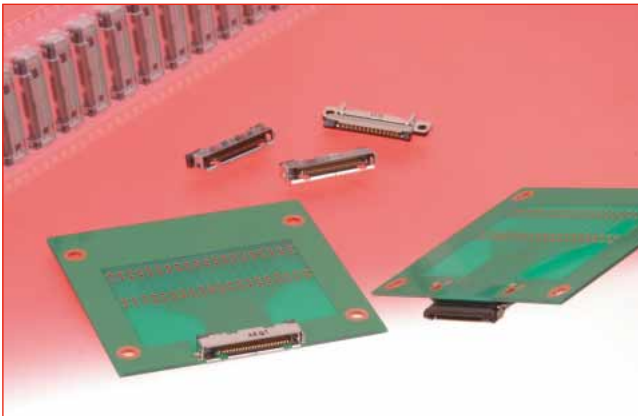


Low-Angle Mating / Unmating Interface Connectors

EX60B Series



■ Features

1. Angle Mating / Unmating

The cradle mount plug incorporates a unique rotating mating/unmating guide allowing the portable device to be placed or removed at an angle, up to 20° max. In addition, the angle mating force is approximately 3N(29 pos.), with extremely low unmating forces.

2. High durability

Bellow configuration of the contacts guarantees 10,000 angle mating/unmating cycles, without any degradation of electrical and mechanical performance.

3. High-Speed Data Transfer

A full eye pattern is maintained at a speed of 2.5 G bps, making it applicable for high-speed differential signals of the USB 2.0 and PCI-EXPRESS.

4. Secure attachment

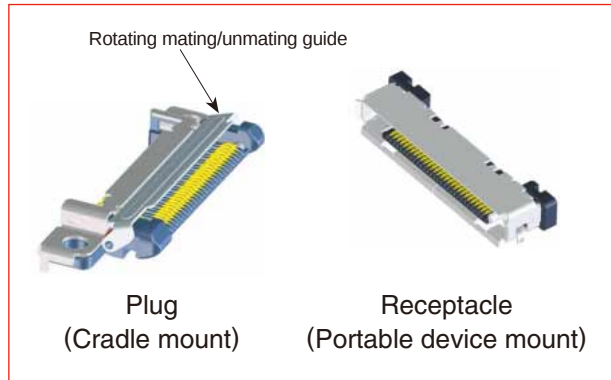
Standard or extended flange versions of the receptacle can be mounted directly to the portable device's case. The cradle mount plug is attached using screws.

5. Low profile - Space-Saving

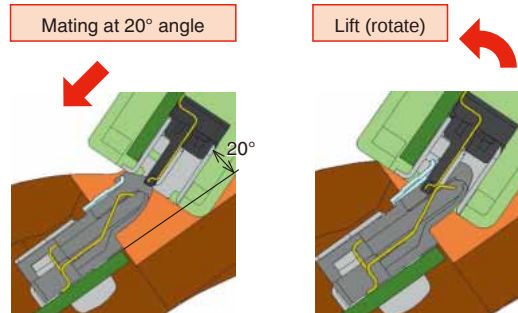
Small size (4 mm high × 6.8 mm deep) of the Receptacle allows efficient use of space in a portable device.

■ Applications

PDA and POS terminals, electronic books, tablet PCs, mobile TVs, media players, digital cameras and other devices requiring high durability angle mating/unmating connectors.

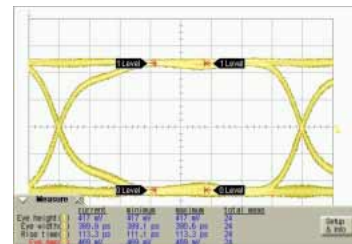


Angle mating/unmating

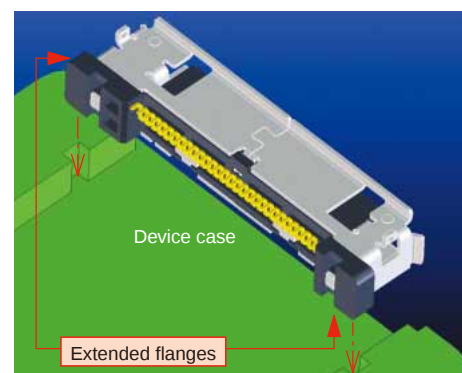


High speed data transfer

2.5 Gbps Eye Pattern Output Waveform



Extended flange mounting



Алматы (7273)495-231
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Владикавказ (8672)28-90-48
Владимир (4922)49-43-18
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89

Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Коломна (4966)23-41-49
Кострома (4942)77-07-48
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
Курган (3522)50-90-47
Липецк (4742)52-20-81

Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Ноябрьск (3496)41-32-12
Новосибирск (383)227-86-73
Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
Петрозаводск (8142)55-98-37
Псков (8112)59-10-37
Пермь (342)205-81-47

Ростов-на-Дону (863)308-18-15
Рязань (4912)46-61-64
Самара (846)206-03-16
Санкт-Петербург (812)309-46-40
Саратов (845)249-38-78
Севастополь (8692)22-31-93
Саранск (8342)22-96-24
Симферополь (3652)67-13-56
Смоленск (4812)29-41-54
Сочи (862)225-72-31
Ставрополь (8652)20-65-13
Сургут (3462)77-98-35
Сыктывкар (8212)25-95-17
Тамбов (4752)50-40-97
Тверь (4822)63-31-35

Тольятти (8482)63-91-07
Томск (3822)98-41-53
Тула (4872)33-79-87
Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
Улан-Удэ (3012)59-97-51
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Чебоксары (8352)28-53-07
Челябинск (351)202-03-61
Череповец (8202)49-02-64
Чита (3022)38-34-83
Якутск (4112)23-90-97
Ярославль (4852)69-52-93

Россия +7(495)268-04-70

Казахстан +7(7172)727-132

Киргизия +996(312)96-26-47

■Specifications

Rating	Current rating 0.5A	Operating temperature range -55℃ to +85℃
	Voltage rating 125V AC	

Characteristic	Specification	Conditions
1.Insulation resistance	1000MΩ min.	250V DC
2.Dielectric withstanding voltage	No flashover or insulation breakdown.	250V AC/ one minute
3.Contact resistance	60mΩ max.	100mA DC
4.Vibration	No electrical discontinuity of 1μ sec. max. Contact resistance: 100mΩ max.	Frequency: 10 to 55 Hz, single amplitude of 0.75mm, for 2 hours in 6 axis.
5.Shock	No electrical discontinuity of 1μ sec. max. Contact resistance: 100mΩ max.	Acceleration of 490 m/s², 11 ms duration, sine half-wave waveform, 3 cycles in each of the 6 axis.
6. Mating/un-mating forces	Mating: 10N max. (Horizontal), 5N max. (At 20° angle) Un-mating: 10N max. (Horizontal), 2N max. (At 20° angle)	With corresponding connector.
7.Durability (mating/un-mating)	Contact resistance: 100mΩ max.	5000 cycles (Straight mating) 10000 cycles (At 20° angle)
8.Temperature cycle	Contact resistance: 100mΩ max. Insulation resistance: 1000M Ω min.	Temperature : -55℃ → +15℃ to +35℃ → +85℃ → +15℃ to +35℃ Time (Minutes) : 30 → 2 to 3 → 30 → 2 to 3 5 cycles
9.Humidity	Contact resistance: 100mΩ max. Insulation resistance: 5MΩ min.(Dry state)	96 hours at temperature of 60℃ and humidity of 90% to 95%.
10.Salt spray	No corrosions	5% salt water solution for 48 hours

Note: Includes temperature rise caused by the current flow.

■Materials/ Finish

●Receptacles (Portable device mount)

Component	Material	Finish	Remarks
Insulator	LCP	Color: Black	UL94V-0
Contacts	Copper alloy	Contact area: Gold plated	—
Metal shield	Stainless steel	Tin plated	—

●Plugs (Cradle mount)

Component	Material	Finish	Remarks
Insulator	Polyamide	Color: Black	UL94V-0
Contacts	Copper alloy	Contact area: Gold plated	—
Metal shield	Stainless steel	Tin-plated	—
Guide	Stainless steel	—	—
Spring	Stainless steel	—	—

■Ordering information

●Receptacles (Portable device mount)

EX 60 B - 29 P - FL
① ② ① ③ ④ ⑤

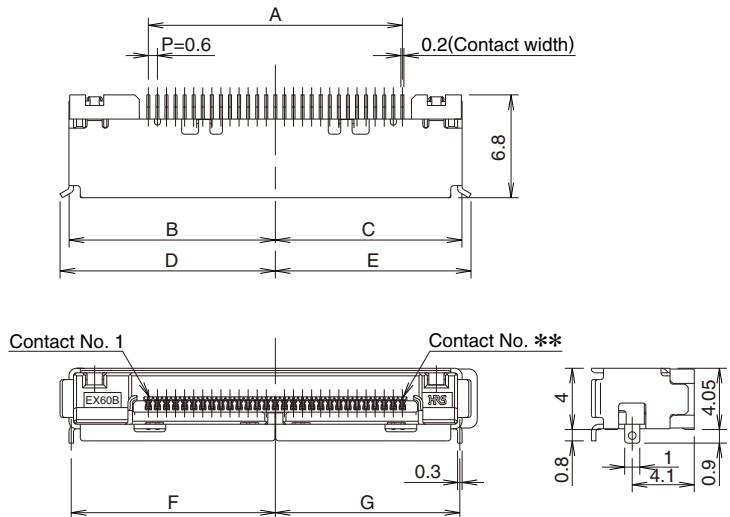
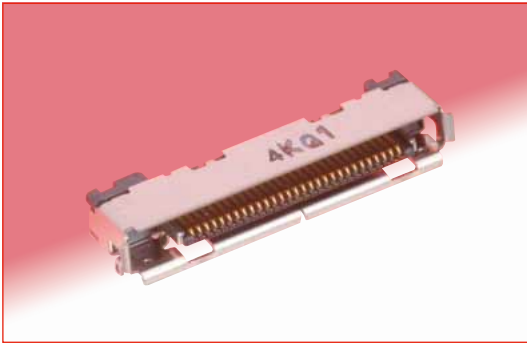
●Plugs (Cradle mount)

EX 60 B - 29 S
① ② ① ③ ④

① Series name	: EXB
② Termination type	: 60 : Right angle SMT
③ Number of contacts	: 15, 29
④ Contact type	P : Male contact (Receptacle = device mount) S : Female contact (Plug = cradle mount)
⑤ Option	FL : Extended flanges

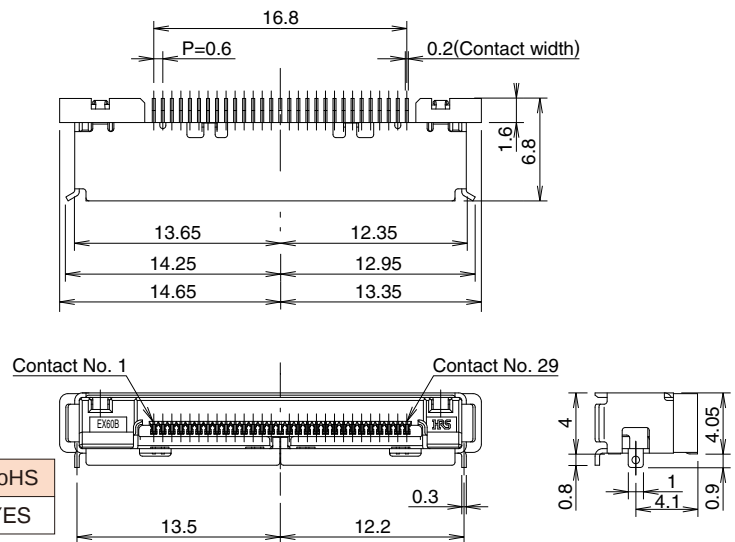
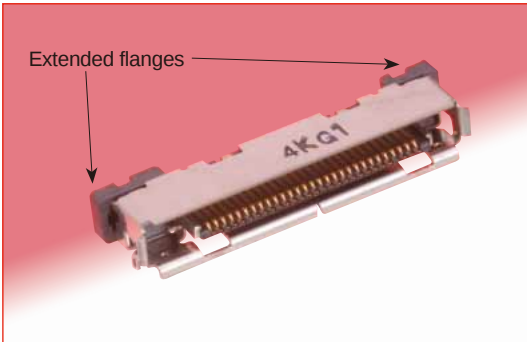
■Receptacles

●15 pos., 29 pos. (Standard)



Part number	CL No.	HRS No.	A	B	C	D	E	F	G	RoHS
EX60B-29P	29	CL232-0611-5	16.8	13.65	12.35	14.25	12.95	13.5	12.2	YES
EX60B-15P	15	CL232-0621-9	8.4	9.45	8.15	10.05	8.75	9.3	8.0	

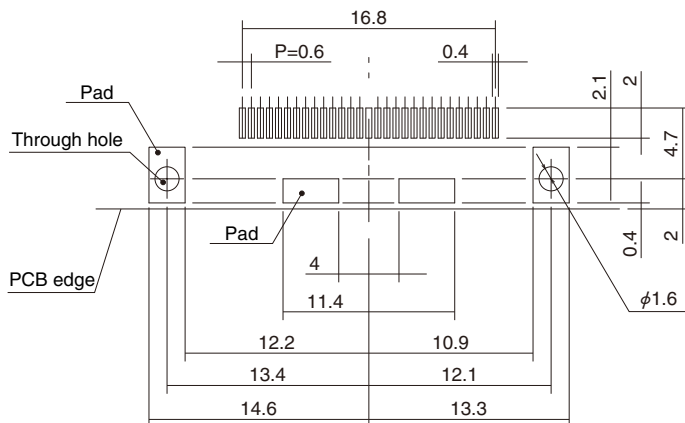
●29 pos. (Extended flanges)



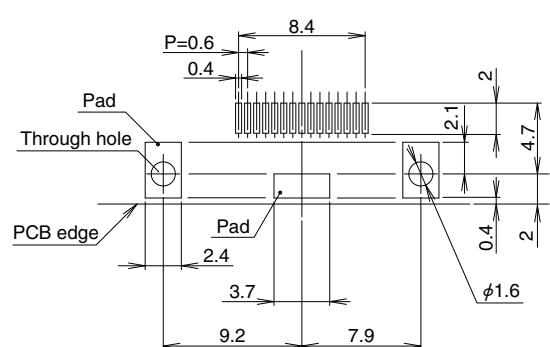
Part number	CL No.	RoHS
EX60B-29P-FL	232-0612-8	YES

◆Recommended PCB mounting pattern

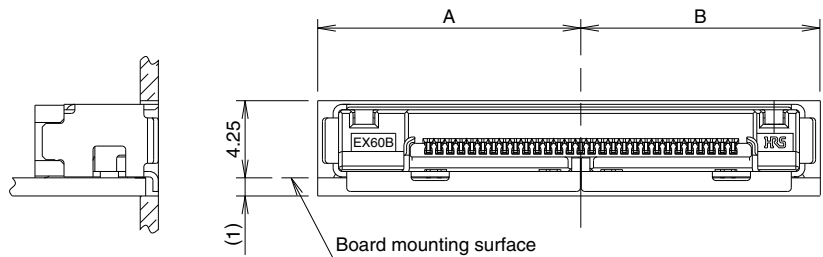
●EX60B-29P and EX60B-29P-FL



●EX60B-15P

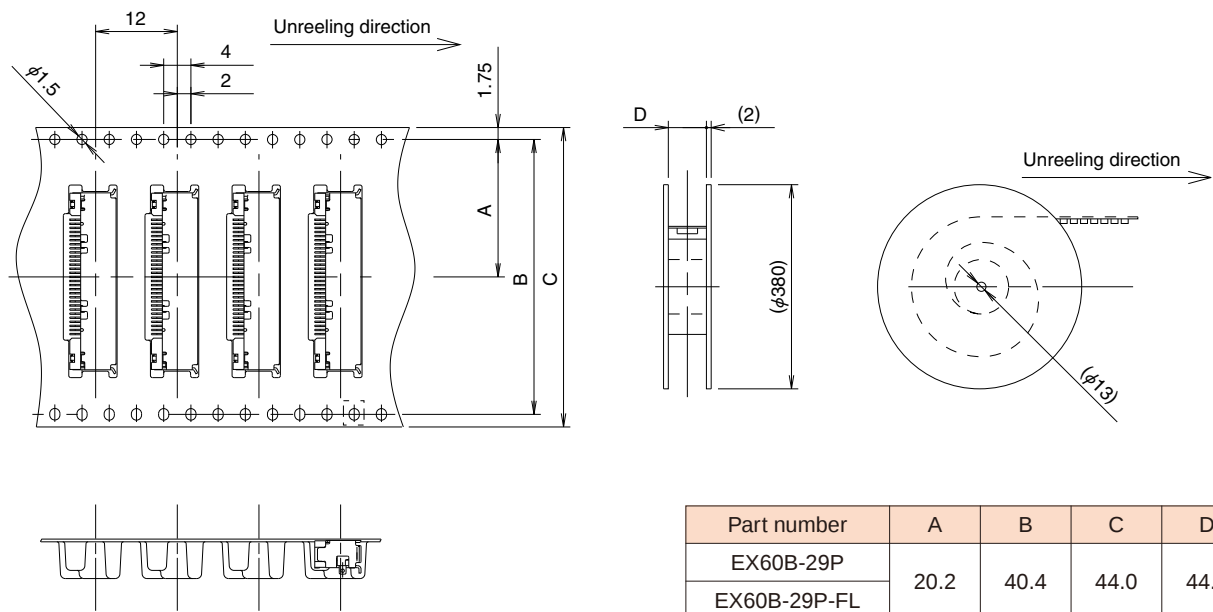


Portable device case cutout



Part number	A	B
EX60B-29P	14.5	13.2
EX60B-29P-FL		
EX60B-15P	10.3	9

Packaging specifications

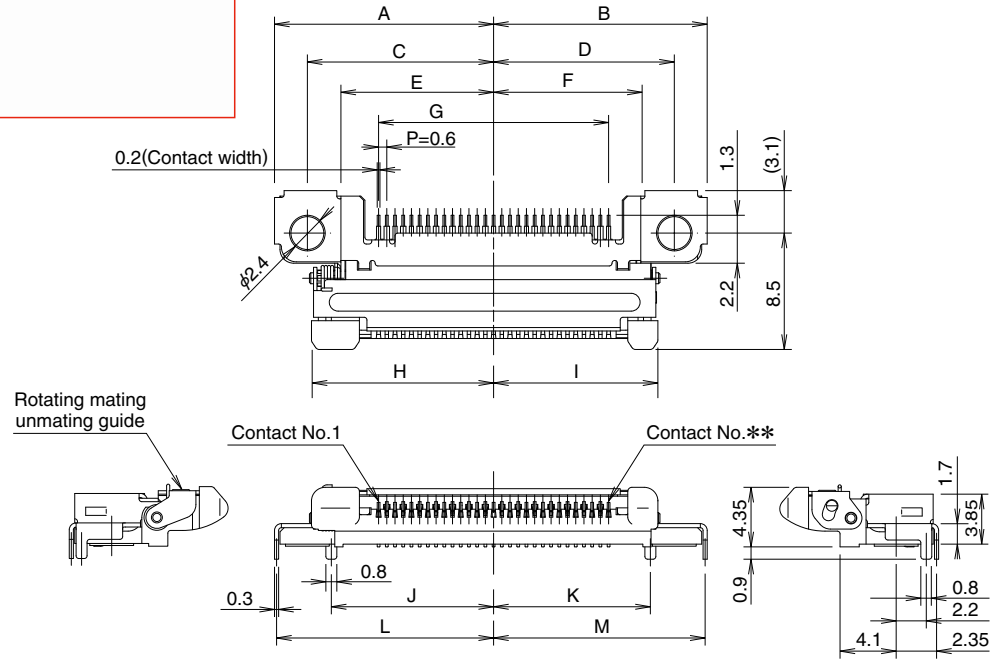
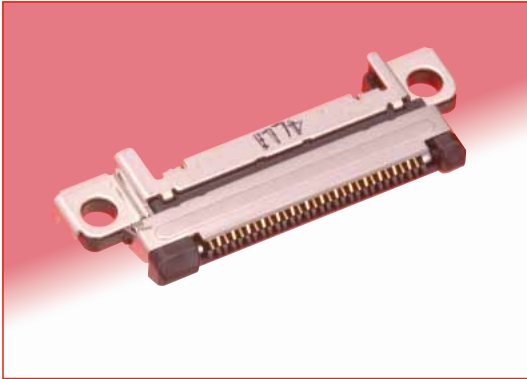


Part number	A	B	C	D
EX60B-29P	20.2	40.4	44.0	44.4
EX60B-29P-FL				
EX60B-15P	14.2	28.4	32.0	32.4

Note: 1,200 pieces per reel.

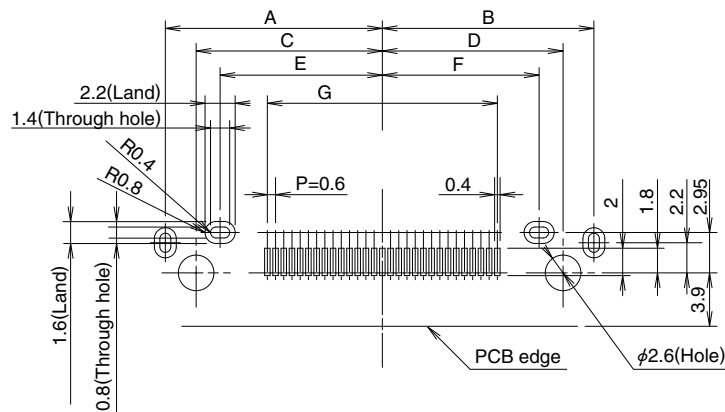
■Plug (Cradle mount)

●15 pos., 29 pos.



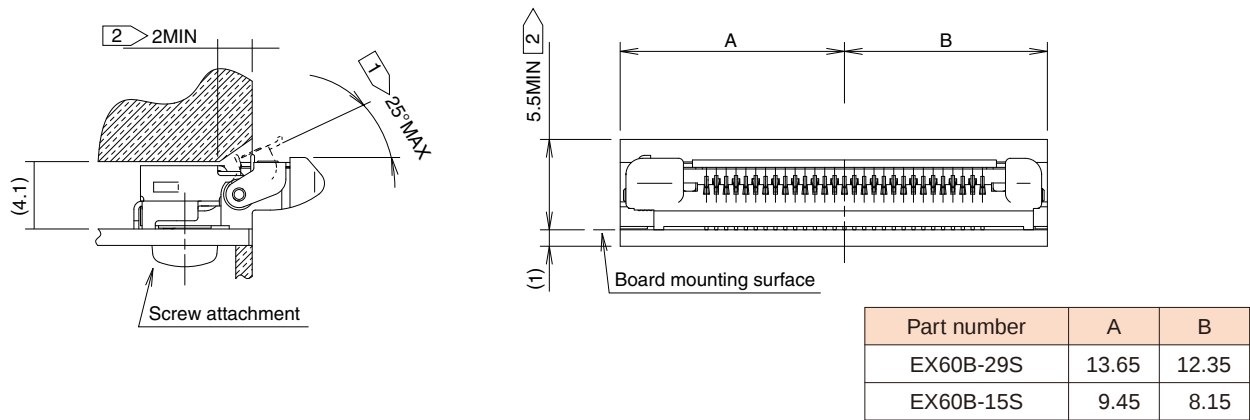
Part number	Number of contacts	HRS No.	A	B	C	D	E	F	G	H	I	J	K	L	M	RoHS
EX60B-29S	29	CL232-0613-0	(16.0)	(15.6)	13.6	13.2	11.15	10.75	16.8	13.3	12.0	11.85	11.45	15.85	15.45	YES
EX60B-15S	15	CL232-0622-1	(11.8)	(11.4)	9.4	9.0	6.95	6.55	8.4	9.1	7.8	7.65	7.25	11.65	11.25	

■Recommended PCB mounting pattern



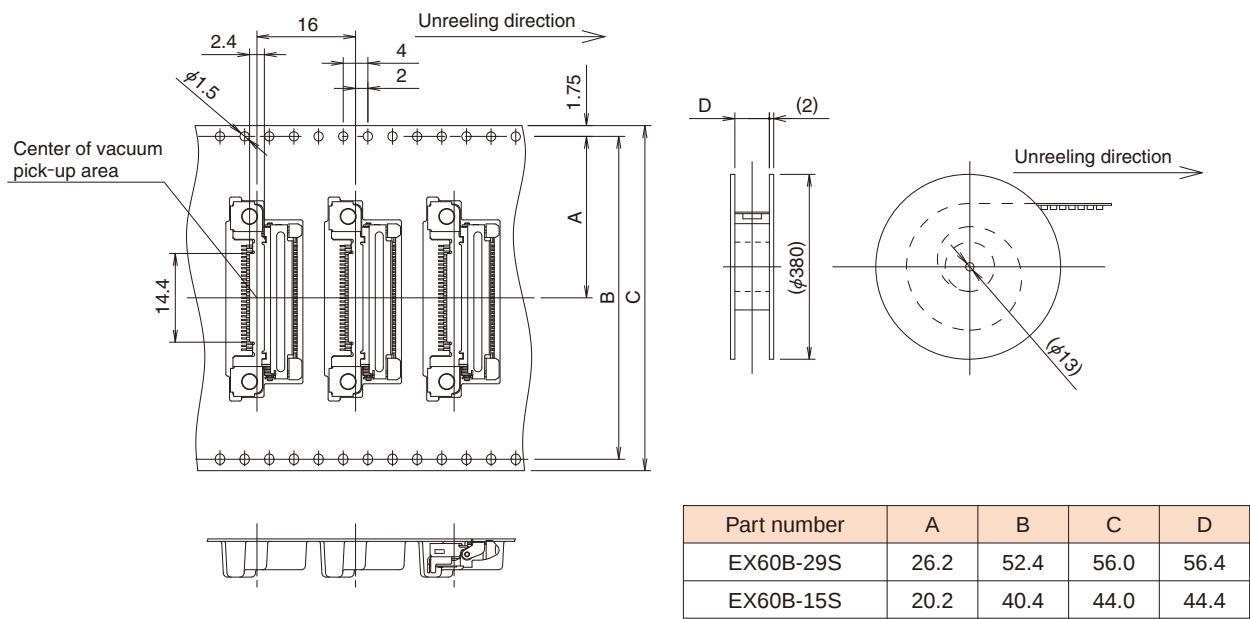
Part number	A	B	C	D	E	F	G
EX60B-29S	15.85	15.45	13.6	13.2	11.85	11.45	16.8
EX60B-15S	11.65	11.25	9.4	9.0	7.65	7.25	8.4

■Cradle case mounting recommendations - Plug



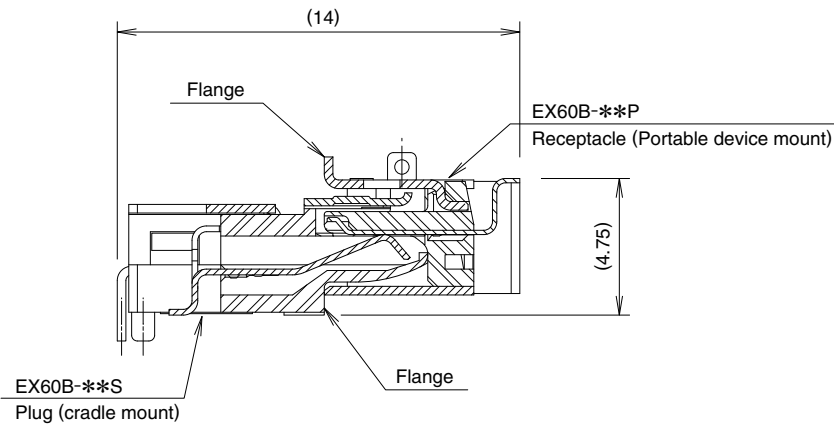
- Notes 1 The maximum opening angle of the rotating mating/unmating guide is 25°. Do not exceed this angle.
- Notes 2 Device's case must have the recommended cutout dimensions.
Assure that there is no interference with the free movement and operation of the mating/unmating guide.
- Notes 3 Use screw (not supplied) to attach the receptacle to the case.

■Packaging Specifications (Plug, EX60B-29S)

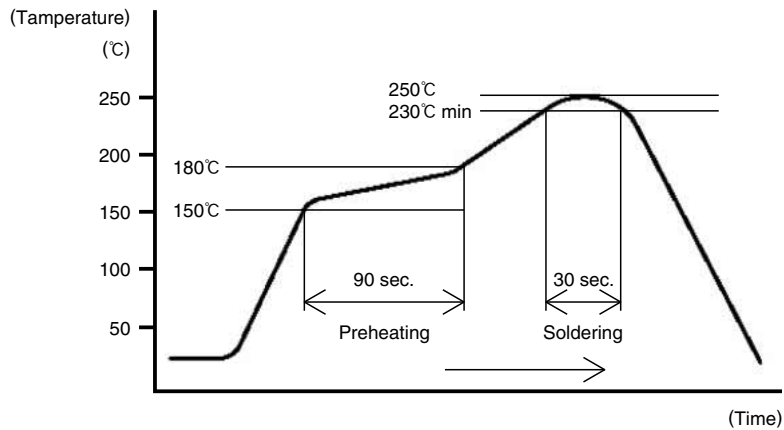


Note: 800 pieces per reel.

■Mating cross-section



■Recommended Temperature Profile



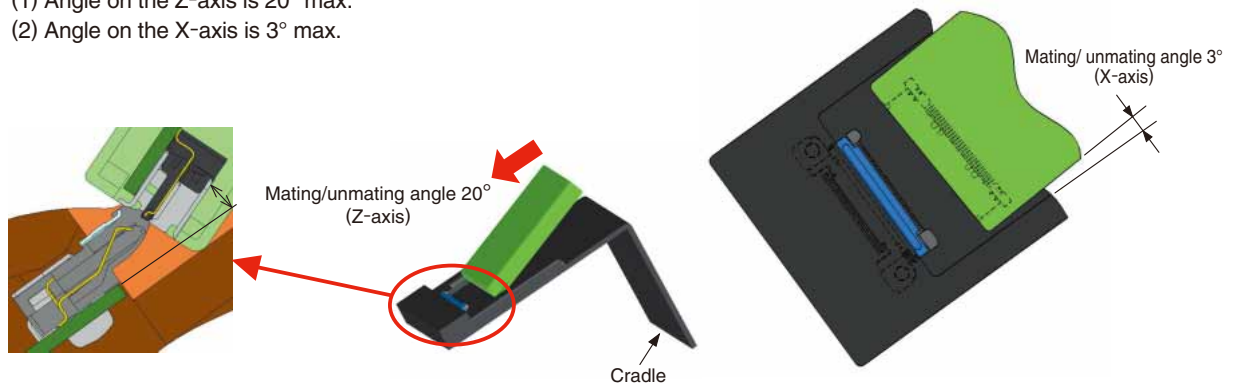
Note 1: Up to 2 cycles of Reflow soldering are possible under the same conditions, provided that there is a return to normal temperature between the first and second cycle.

Note 2: The temperature profile indicates the board surface temperature at the point of contacts with the connector terminals.

■Portable device case and cradle design requirements

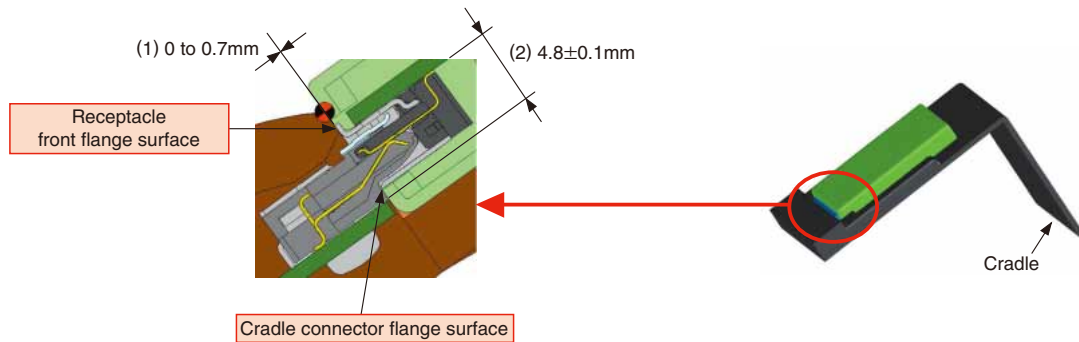
1. Mating/unmating angles (see illustrations below)

- (1) Angle on the Z-axis is 20° max.
- (2) Angle on the X-axis is 3° max.



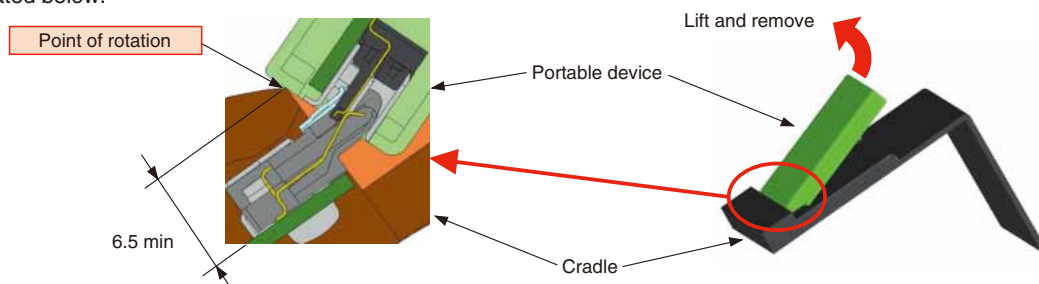
2. Dimensional requirements

- (1) Distance between the flanges of the receptacle and plug: 0 to 0.7 mm.
- (2) Distance between the PCB mounting surface of the plug (cradle) and the PCB surface of the receptacle (portable device): 4.8 ± 0.1 mm.



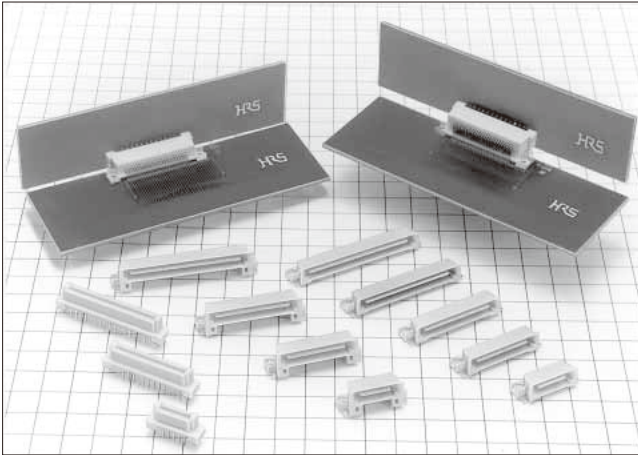
3. Portable device removal

The point of the rotation of the portable device during it's removal from the cradle should be at the distance of 6.5 mm min. as illustrated below.



1mm Pitch Connectors for Vertical Connection

FX5 Series



Connecting Height: Low profile

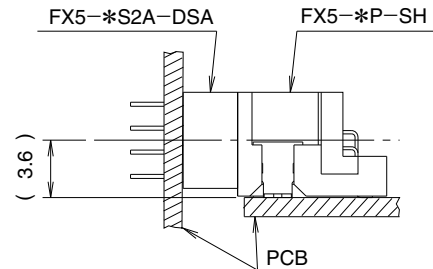


Fig.1

■Features

1. Header Side : 2 Types Available

Two header types are available, low and high profiles. Combined with various contact positions, the FX5 is versatile to work in many application. (See Fig.1 and 2)

2. Two-step, Sequential Mating

The mating sequence features a 2-step, "first mate-last break" condition that helps to protect the circuit.

3. Mating Guide

A guide rib is provided along with a self-alignment range of ± 1 mm to allow for easy mating operations.

4. SMT Coplanarity

The coplanarity of SMT soldered area has a high accuracy of 0.1mm.

5. Miniaturization

The FX5 uses about 30% less mounting area on the board compared with a 1.27mm pitch connector.

Connecting Height: High profile

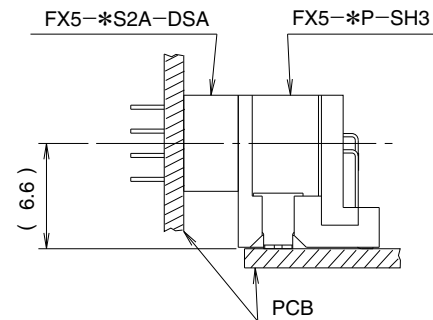


Fig.2

■Product Specifications

Ratings	Current rating 0.5A	Operating Temperature Range -55℃ to +85℃ (Note 1)	Storage Temperature Range -10℃ to +60℃ (Note 2)
	Voltage rating 100V AC	Operating Humidity Range 40% to 80%	Storage Humidity Range 40% to 70%

Items	Specifications	Conditions	
1. Insulation Resistance	100M ohms min.	250V DC	
2. Withstanding voltage	No flashover or insulation breakdown.	300V AC/1 minute	
3. Contact Resistance	50m ohms max.	100mA	
4. Vibration Resistance	No electrical discontinuity of 1μs or more	Frequency: 10 to 55 Hz, single amplitude of 0.75 mm, 2 hours in each of the 3 directions.	
5. Moisture Resistance	Contact resistance: 60m ohms max. Insulation resistance: 100M ohms min.	96 hours at temperature of 40℃ and humidity of 90% to 95%	
6. Temperature Cycle	Contact resistance: 60m ohms max. Insulation resistance: 100M ohms min.	(-55℃: 30 minutes, 15 to 35℃: 2 to 3 minutes 85℃: 30 minutes, 15 to 35℃: 2 to 3minutes) 5 cycles	
7. Mating Cycles	Contact resistance: 60m ohms max.	500 cycles	
8. Resistance to Soldering heat	No deformation of components affecting performance.	SMT	Reflow: At the recommended temperature profile Manual soldering: 360℃ for 5 seconds
		DIP	Solder Bath: 260℃ for 10 seconds Manual soldering: 360℃ for 5 seconds

Note 1: Includes temperature rise caused by current flow.
Note 2: The term "storage" refers to products stored for a long time prior to use. Operating temperature and humidity range includes a non-conducting state of installed connectors in storage, shipment, or during transportation.

■Material

Part	Material	Finish	Remarks
Insulator	Polyamide	Beige	UL94V-0
Header Contact	Brass	Contact area : Gold plated	————
Receptacle Contact	Phosphor bronze	Lead area : Tin plated	————

Note : The black dots on the insulator will not affect performance

■Product Number Structure

●Header

FX5 - * P - SH 3
① ② ③ ④ ⑤

① Series Name : FX5	⑤ Connector Height Blank : 6.5mm 3 : 9.5mm
② Number of Contacts : 20, 40, 52, 56, 68, 80	
③ Connector Type P: Header	
④ Contact type SH : Right angle SMT type	

Note: The 56 contact header is for SH 3 type only.

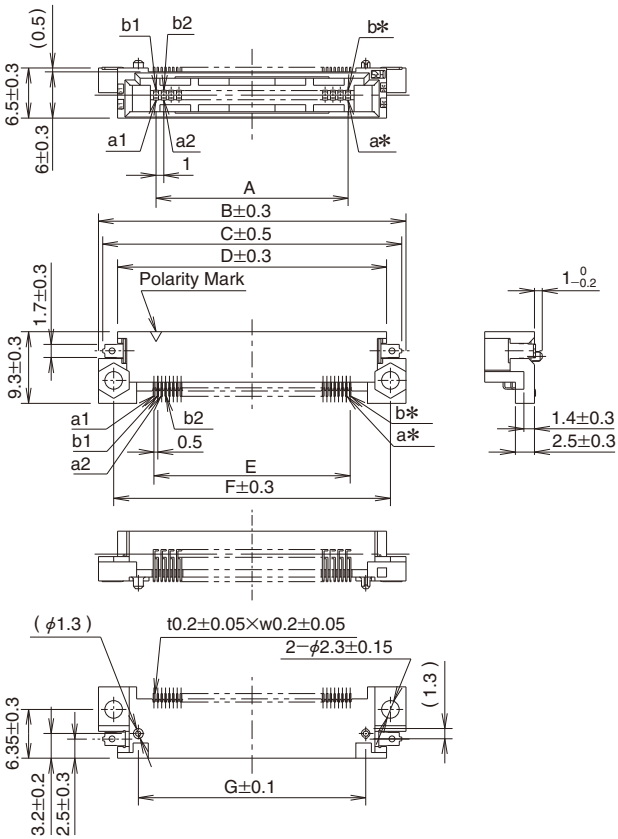
●Receptacle

FX5 - * S 2 A - DSA L
① ② ③ ④ ⑤ ⑥ ⑦

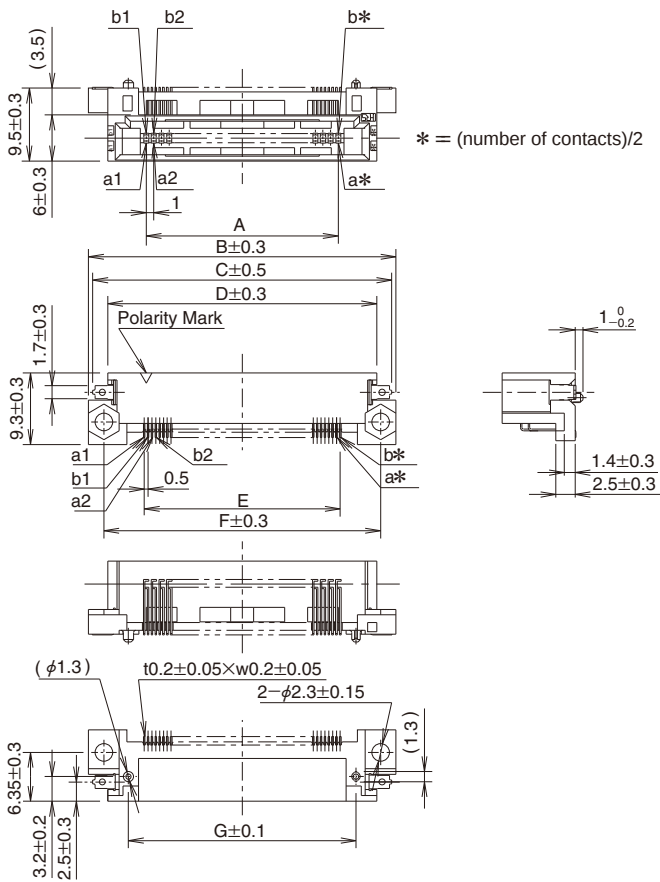
① Series Name : FX5	⑥ Contact type DSA : Straight through hole type
② Number of Contacts : 20, 40, 52, 56, 68, 80	
③ Connector Type S: Receptacle	⑦ Board prefixed pin Blank : Without board prefixed pin L : With board Prefixed pin
④ Contact Sequence 2 : 2 Stages Sequence	
⑤ Serial No. : A	

■Header

●Low profile



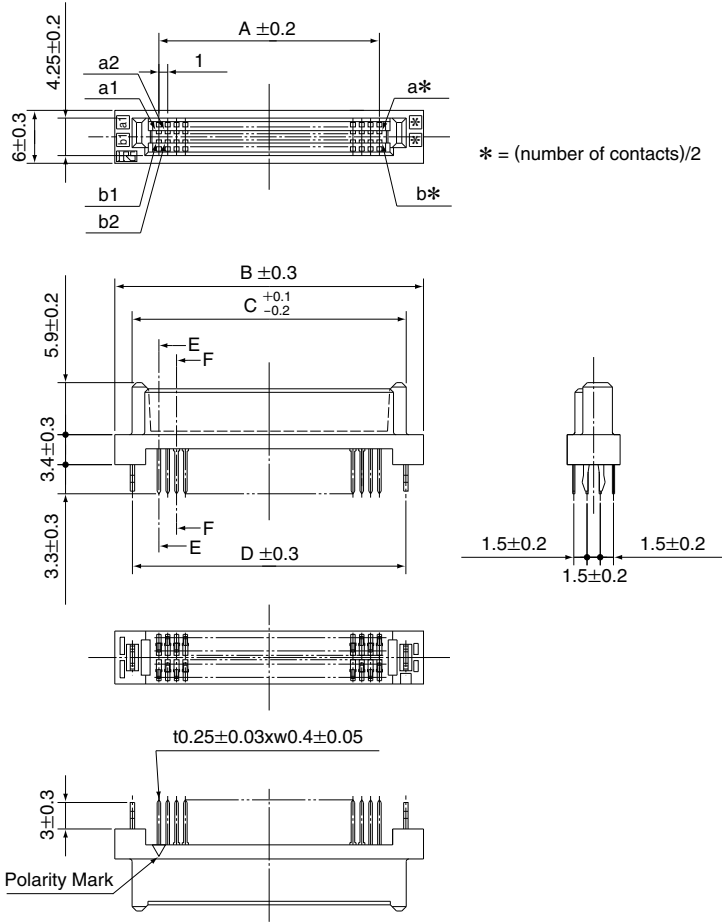
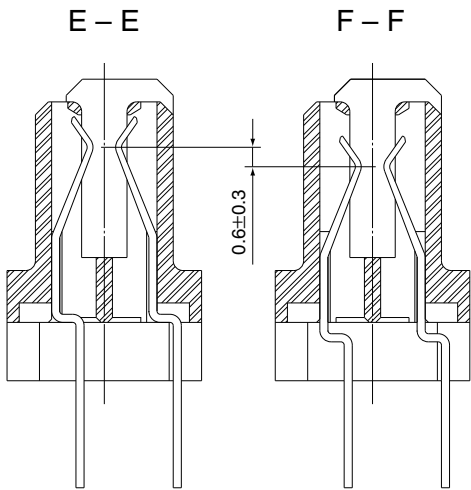
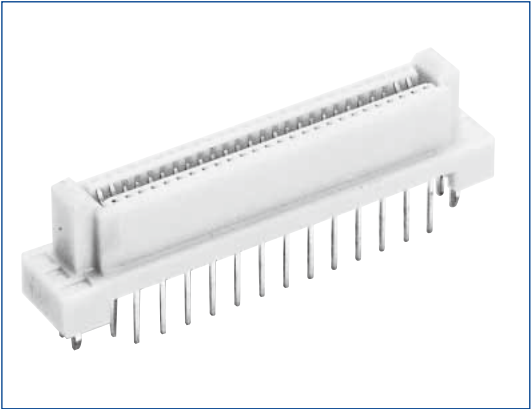
●High profile



Unit: mm

Part No.	HRS No.	No. of contacts	A	B	C	D	E	F	G	RoHS
FX5-20P-SH(71)	575-0001-7 71	20	9	24	22.9	19	9.5	20	13.6	Yes
FX5-20P-SH3(71)	575-0041-1 71									
FX5-40P-SH(71)	575-0005-8 71	40	19	34	32.9	29	19.5	30	23.6	
FX5-40P-SH3(71)	575-0045-2 71									
FX5-52P-SH(71)	575-0006-0 71	52	25	40	38.9	35	25.5	36	29.6	
FX5-52P-SH3(71)	575-0046-5 71									
FX5-56P-SH3(71)	575-1001-2 71	56	27	42	40.9	37	27.5	38	31.6	
FX5-68P-SH(71)	575-0008-6 71	68	33	48	46.9	43	33.5	44	37.6	
FX5-68P-SH3(71)	575-0048-0 71									
FX5-80P-SH(71)	575-0009-9 71	80	39	54	52.9	49	39.5	50	43.6	
FX5-80P-SH3(71)	575-0049-3 71									

Receptacle



Unit: mm									
Part No.	HRS No.	No. of contacts	A	B	C	D	Order of Contact Sequence(Contact No.)		RoHS
							1	2	
FX5-20S2A-DSA(71)	575-0101-1 71	20	9	19	15.08	—	a1,a2,a9,a10	a3 to a8	Yes
FX5-20S2A-DSAL(71)	575-0121-9 71					15	b1,b2,b9,b10	b3 to b8	
FX5-40S2A-DSA(71)	575-0105-2 71	40	19	29	25.08	—	a1,a2,a19,a20	a3 to a18	
FX5-40S2A-DSAL(71)	575-0125-0 71					25	b1,b2,b19,b20	b3 to b18	
FX5-52S2A-DSA(71)	575-0106-5 71	52	25	35	31.08	—	a1,a2,a25,a26	a3 to a24	
FX5-52S2A-DSAL(71)	575-0126-2 71					31	b1,b2,b25,b26	b3 to b24	
FX5-56S2A-DSA(71)	575-0107-8 71	56	27	37	33.08	—	a1,a2,a27,a28	a3 to a26	
FX5-56S2A-DSAL(71)	575-0127-5 71					33	b1,b2,b27,b28	b3 to b26	
FX5-68S2A-DSA(71)	575-0108-0 71	68	33	43	39.08	—	a1,a2,a33,a34	a3 to a32	
FX5-68S2A-DSAL(71)	575-0128-8 71					39	b1,b2,b33,b34	b3 to b32	
FX5-80S2A-DSA(71)	575-0109-3 71	80	39	49	45.08	—	a1,a2,a39,a40	a3 to a38	
FX5-80S2A-DSAL(71)	575-0129-0 71					45	b1,b2,b39,b40	b3 to b38	

◆Cleaning Conditions

1. Organic Solvent Cleaning

Solvent	Cold Cleaning	
IPA (Isopropyl alcohol)	Yes	Yes

*Methylene chloride is not suitable for this product.

2. Liquid Cleaning

2. When cleaning with liquid detergents (e.g. terpene, alkali saponifiers), consult the manufacturer's specifications and make make sure that the cleaner is suitable for use with the metal and resin components of this connector. Also, do not leave the connector outside where it moisture could infiltrate the product.

3. Cautions for Cleaning

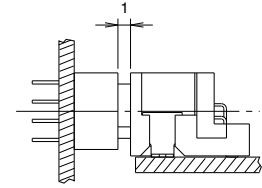
3. If any organic solvent or other liquid cleaner or flux remains in the connector, it can cause eletrical performance degradation. Please make sure that the connector is completely free of any cleaner or flux before use.

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Connector Precautions

1. Tolerance Clearance on Mating Side

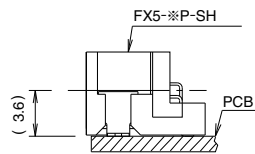
The effective clearance of this product is 1.6mm. Please make sure that your design accounts for 1mm mating clearance between the header and receptacle.



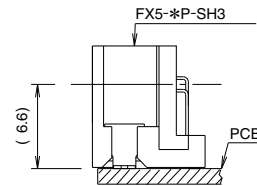
2. Header Connector Height

Because the SMT height specification for the header does not account for the thickness of the solder paste, please remember to account for the extra height in the total stacking height.

Mating Height: Low profile

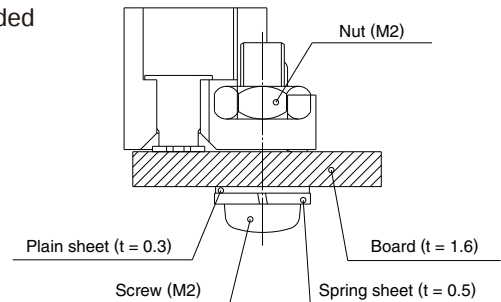


Mating Height: High profile



3. Screw Fastening Torque (SMT Type)

When the screw is fastened, please use the M2 screw. The recommended fastening torque is 0.15(N.m) max.

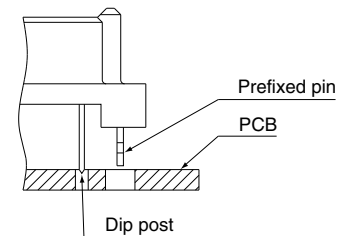


4. Prefixed Process to Board (Through hole Type)

If the prefixed process is required for board mounting, please use the prefixed pin type. (Applicable Thickness $t = 1.6 \pm 0.1$)

Note:

When the connector is mounted on the board, the dip post is guided into the through-hole first. To prevent dip post damage, make sure that the connector is parallel to the board during this process.



5. Plug and Play

Please consult your Hirose representative if you will be mating/unmating the connector while the circuit is energized.

6. Others

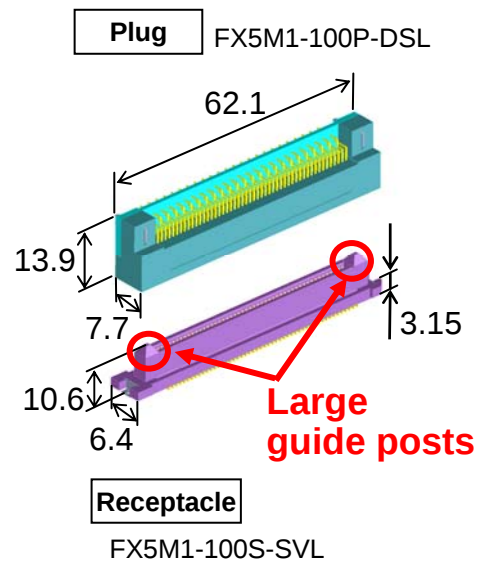
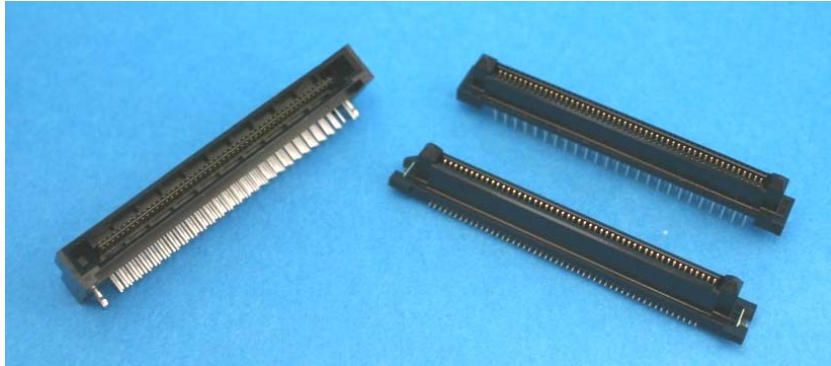
- Excessive force during mating/unmating will damage the connector.
- Avoid using the mated connectors as a means of holding the PCB together.
The PCBs need to be secured together with screws, spacers or other means which do not rely on the connectors as the primary support mechanism.
- The resin color of the product may vary slightly with different production lots.
This does not effect the performance.



FX5M1 Series

1.0 mm pitch, high-pin-count
Board to Board connector

MKT-E-05010F



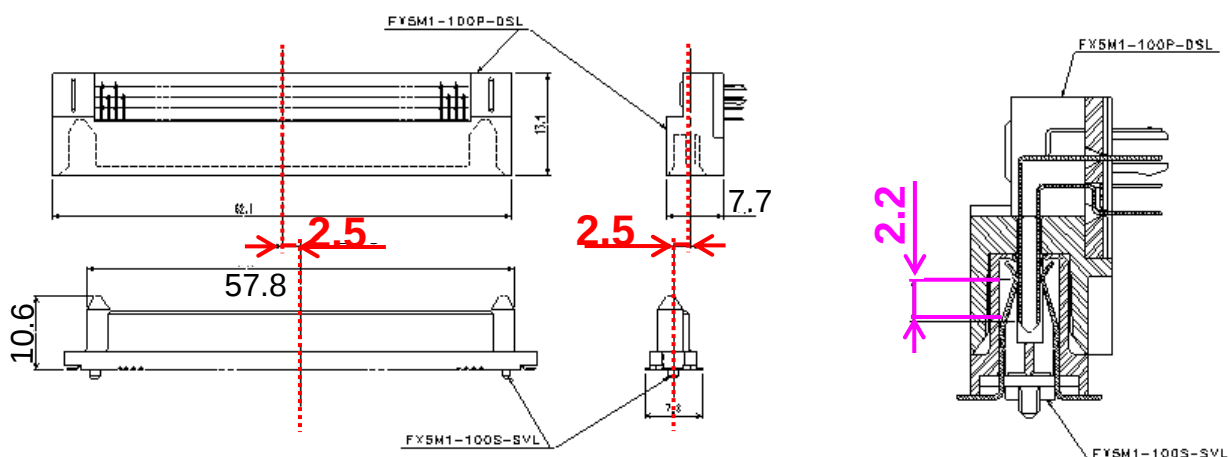
◆ Features

1. High-pin-count : 100 pos., 120 pos.
2. Large guide post design for connector alignment for mating
Wide alignment range: 2.5 mm
3. Long effective mating length: 2.2 mm
4. Clear click feeling for mating
5. RoHS-compliant types are also available.

◆ Large guide post design for connector alignment

Alignment range: 2.5 mm

Effective mating length: 2.2 mm



◆ Applications:

Office equipment, FA control unit, and others



Shield



Multiple Position



Wide Variation



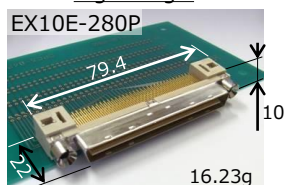
Features

- 1 Optimum for portable ultrasound scanning interface
- 2 High pin count, yet small size and light weight
- 3 Enhanced grounding design
- 4 4-step displaced contact point for lower insertion force with high pin count
- 5 Floating locator improves mounting efficiency

Wide Variations

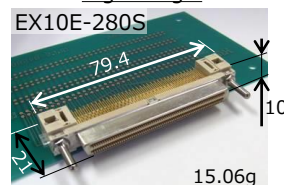
[Plug on Probe Side]

Right Angle

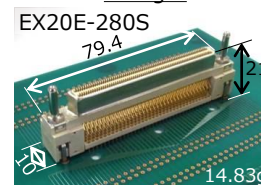


[Receptacle on Device Side]

Right Angle



Straight



[Guides] Attachable with screwdriver

Guide Socket

Flathead / Cross Slot Screwdriver

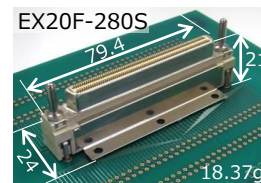
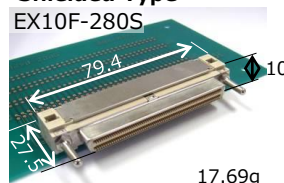


Guide Pin

Nut Screwdriver



Shielded Type



M3 screws are not included.
*Dimensions are in millimeters

Specifications

Rated Current	0.5A
Rated Voltage	250V AC
Contact Resistance	125mΩ Max. (100mA)
Insulation Resistance	250MΩ Min. (100V DC)
Withstanding Voltage	400V AC for 1 min.
Operating Temperature	-25 to 85°C
Mating Durability	10,000 times

- RoHS compliant, Halogen-free product*

*This product satisfies halogen free requirements defined as 900 ppm maximum chlorine, 900 maximum bromine, and 1500 ppm maximum total of chlorine and bromine.

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