0.4mm Pitch, 1.5mm Board-to-Board Connectors with Dual Shielding

FX12 Series

Dual Shields (when mated)
[Patented Design]

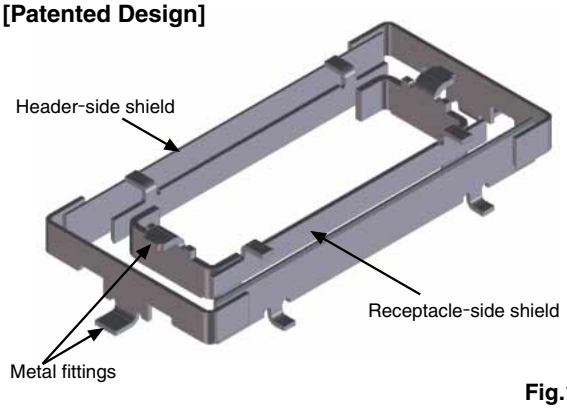

Fig.1

■Features

1. Dual shields

Built-in shield plates and metal fittings in the plugs and receptacles prevent electromagnetic emission and external interference on the entire 360° periphery of mated connectors. (Fig.1, 2)

2. Low-Profile

A board-to-board distance of 1.5mm combined with reduced mounting areas allow for use in space-limited applications. (Fig.3)

3. Self alignment

Built-in self-alignment feature in the plug and receptacle allows mating / un-mating in limited spaces. (Fig.4)

4. Consistent mated retention force

Indents in the shield plates and contact configuration assure consistent, mated retention forces regardless of the number of contacts. A positive, tactile "click" confirms the fully mated state.

5. Solder wicking prevention

Nickel plating barrier on the contacts prevents solder compound intrusion (wicking) into the contact engagement areas.

6. High contact reliability

The narrow female contacts have a curved shape that acts like a spring, producing a long wipe length during mating and results in high contact reliability.

7. Pick-and-Place automatic mounting friendly

The compact, double shielded structure still provides enough area for vacuum pick-up machines when used in automated mounting methods.
Receptacle: 0.8mm
Header: 0.8mm

8. RoHS Compliant

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

Effective Shielding

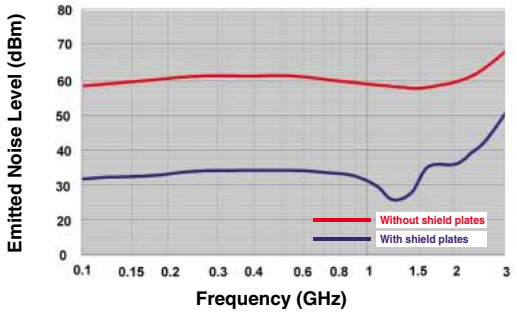

Fig.2

Low-Profile, Space-Saving with Reduced Connector Footprint
(Shown 24-Position – fully mated)

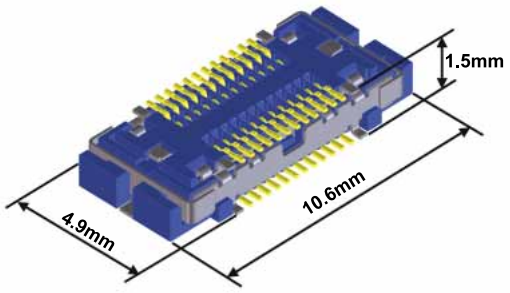

Fig.3

Self Alignment of 0.3 mm

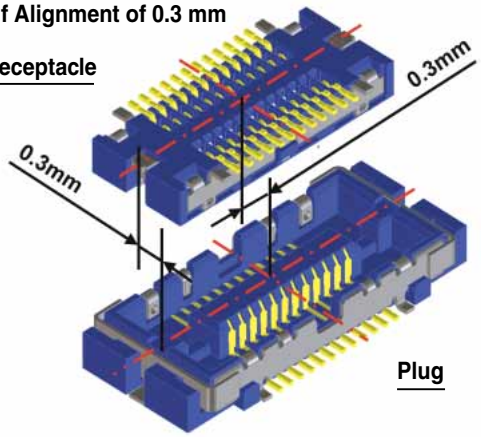

Fig.4

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■Product Specifications

Rating	Current rating 0.3A Voltage rating 30V AC	Operating temperature range -55℃ to +85℃ (Note 1)	Storage temperature range -10℃ to +60℃ (Note 2) Storage humidity range Relative humidity 95% max. (No condensation)

Item	Specification	Conditions
1.Insulation resistance	50MΩ min.	100V DC
2.Withstanding voltage	No flashover or insulation breakdown.	100V AC/one minute
3.Contact resistance	100mΩ max.	100mA
4.Vibration resistance	No electrical discontinuity of 1μs or more. No damage, cracks or parts dislocation.	Frequency: 10 to 55 Hz, single amplitude of 0.75mm, 3 axis, 10 cycles
5.Shock resistance	No electrical discontinuity of 1μs or more. No damage, cracks or parts dislocation.	Acceleration of 490m/s², 11ms duration, sine half-wave waveform, 3 cycles / each of 3 axis directions
6.Humidity resistance	Contact resistance: 120mΩ max. Insulation resistance: 25MΩ min. No damage, cracks or parts dislocation.	96 hours at 40℃, 90% to 95% R.H.
7.Temperature cycle	Contact resistance: 120mΩ max. Insulation resistance: 50MΩ min. No damage, cracks or parts dislocation.	Temperature: -55℃ → +15℃ to 35℃ → +85℃ → +15℃ to +35℃ Time: 30 → 2 to 3 → 30 → 2 to 3 (Minutes) 5 cycles
8.Mating Cycles	Contact resistance: 120mΩ max. No damage, cracks or parts dislocation.	30 cycles
9.Resistance to soldering heat	No deformation of components affecting performance.	Reflow: At the recommended temperature profile 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 long periods of time prior to mounting and use. Operating temperature range and humidity range includes non-conducting condition of installed connectors in storage, shipment or during transportation.

■Materials / Finish

Part	Material	Finish		Remarks
Insulator	Polyamide	Color: Black		UL94V-0
Contacts	Phosphor bronze	Header	Engagement Area: Gold Plated of 0.1μm	——
		Receptacle	Termination Area: Flash Plated	
Ground plates		Flash plated		——
Metal fittings		Tin plated		——

■Product Number Structure

FX12 B - 24 P - 0.4 SV (**)
❶ ❷ ❸ ❹ ❺ ❻ ❼

❶ Series name : FX12	❹ Connector type P : Header S : Receptacle
❷ Configuration B : Without guide post	
❸ Number of contacts : 24, 40, 60	❺ Contact pitch : 0.4 mm
	❻ Mounting style SV : SMT
	❼ Blank : Embossed tape packing (3,000 pcs/reel) (30) : Embossed tape packing (100 pcs/reel)

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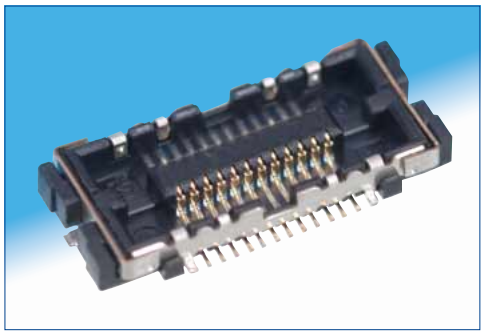
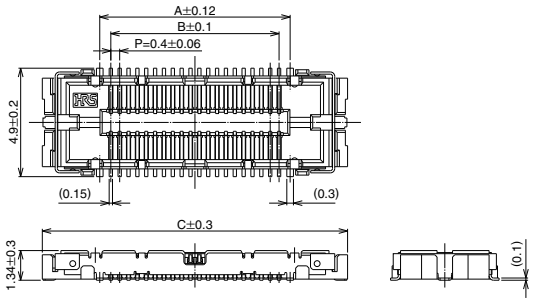
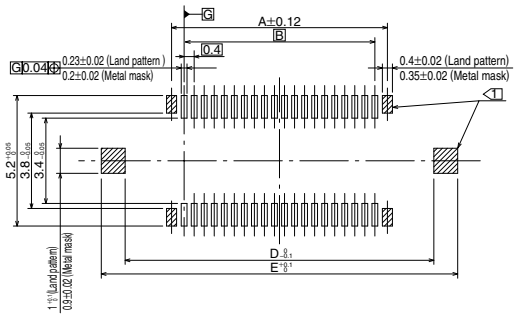
■Header





◆Recommended PCB Layout and Metal Mask Dimensions

Recommended metal mask thickness: 0.12 mm



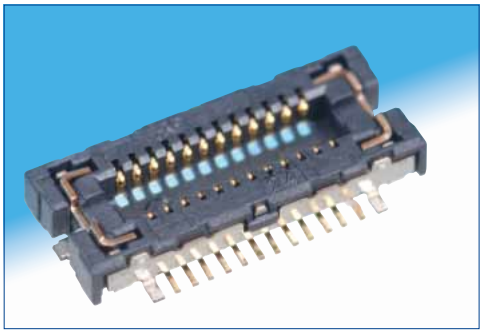
Notes:

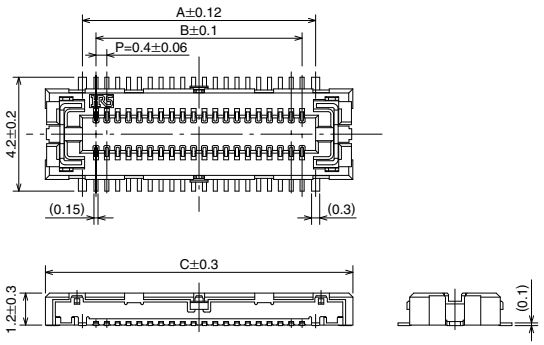
1. Positions marked ▨ indicate a ground circuit connections.
2. The co-planarity of SMT terminations is 0.1 maximum.
3. No polarity orientation for board mounting.
4. Dimensions in parentheses ( ) are reference dimensions.
5. All dimensions in mm.

Part No.	HRS No.	No. of Contacts	A	B	C	D	E	RoHS
FX12B-24P-0.4SV(**)	573-1005-0 **	24	5.4	4.4	10.6	9.1	11.0	Yes
FX12B-40P-0.4SV(**)	573-1001-0 **	40	8.6	7.6	13.8	12.3	14.2	
FX12B-60P-0.4SV(**)	573-1007-6 **	60	12.6	11.6	17.79	16.3	18.2	

Blank: Embossed tape packing (3,000 pcs/reel)
(30) : Embossed tape packing (100 pcs/reel)

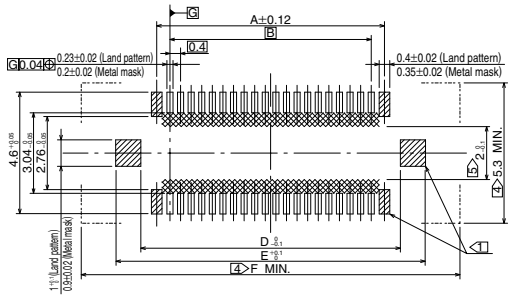
■Receptacle





◆Recommended PCB Layout and Metal Mask Dimensions

Recommended metal mask thickness: 0.12 mm



Notes:

1. Positions marked ▨ indicate a ground circuit connections.
2. The co-planarity of SMT terminations is 0.1 maximum.
3. No polarity orientation for board mounting.
4. Do NOT place any components within area indicated by the broken line ⬚.
5. Do NOT place conductive traces in areas indicated by ▩.
6. Dimensions in parentheses ( ) are reference dimensions.
7. All dimensions in mm.

Part No.	HRS No.	No. of Contacts	A	B	C	D	E	F	RoHS
FX12B-24S-0.4SV(**)	573-1006-3 **	24	5.4	4.4	8.14	6.6	8.5	11.1	Yes
FX12B-40S-0.4SV(**)	573-1002-2 **	40	8.6	7.6	11.34	9.8	11.7	14.3	
FX12B-60S-0.4SV(**)	573-1008-9 **	60	12.6	11.6	15.34	13.8	15.7	18.3	

Blank: Embossed tape packing (3,000 pcs/reel)
(30) : Embossed tape packing (100 pcs/reel)

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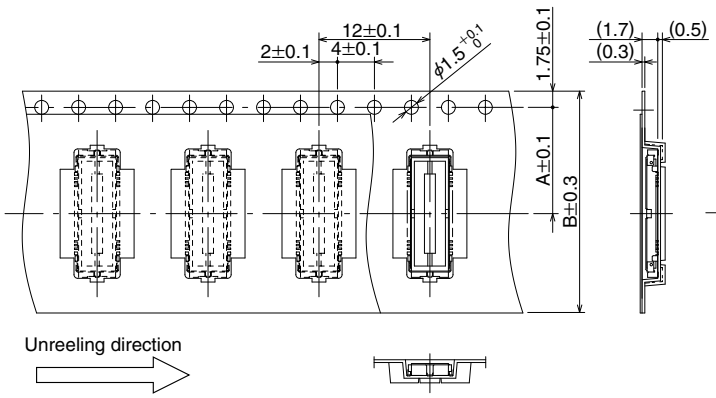
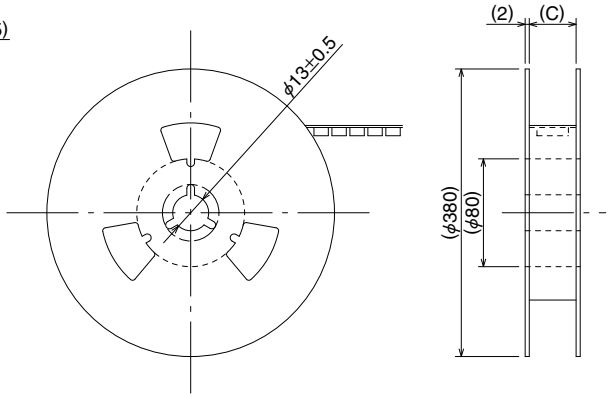
◆Embossed Carrier Tape and Reel Dimensions

●Header



●Reel dimensions

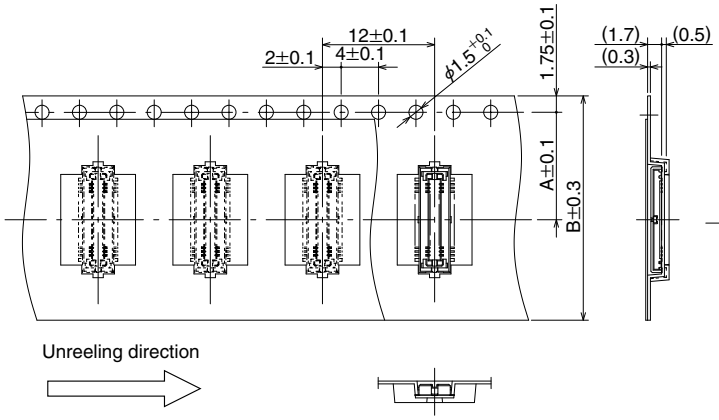


Part No.	A	B	C
FX12B-24P-0.4SV(**)	11.5	24.0	24.4
FX12B-40P-0.4SV(**)			
FX12B-60P-0.4SV(**)	14.2	32.0	32.4

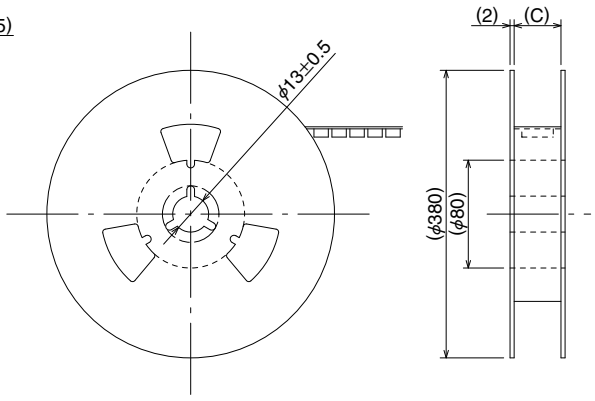
All dimensions in mm

◆Embossed Carrier Tape and Reel Dimensions

●Receptacle



●Reel dimensions



Part No.	A	B	C
FX12B-24S-0.4SV(**)	11.5	24.0	24.4
FX12B-40S-0.4SV(**)			
FX12B-60S-0.4SV(**)			

All dimensions in mm

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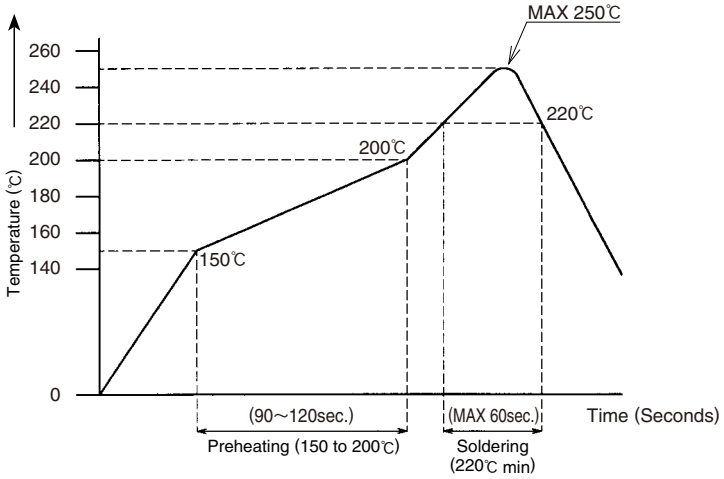
◆Recommended solder temperature profile.

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



< HRS test conditions >

Solder method	:Reflow
Environment	:Room air
Solder paste	:96.5%Sn/3.0%Ag/0.5%Cu
Test board	:Glass epoxy 40mm×30mm×1mm thick
Metal mask	:0.12mm thick
Reflow cycles	:2cycles

Note 1 : The temperature profiles shown are based on the above conditions.

Note 2 : In individual applications the actual temperature may very, depending on solder paste type, volume / thickness and board size/ thickness.

Note 3 : Cosult your solder paste and equipment manufacture for specific recommendations.

◆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.

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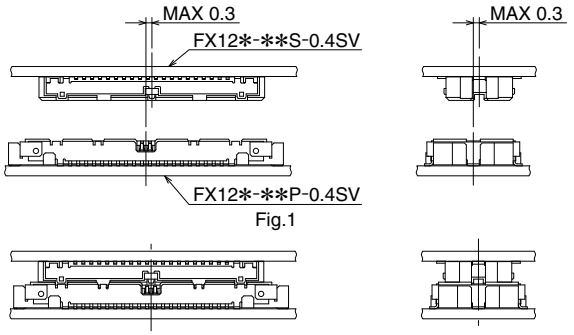
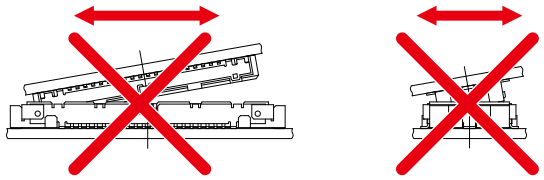
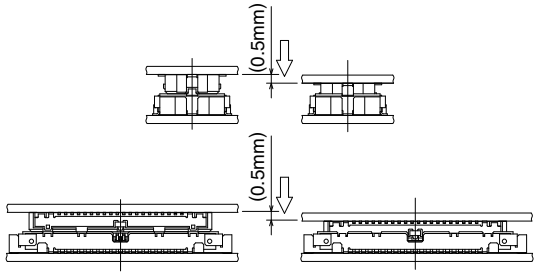
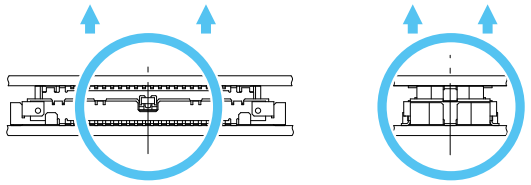
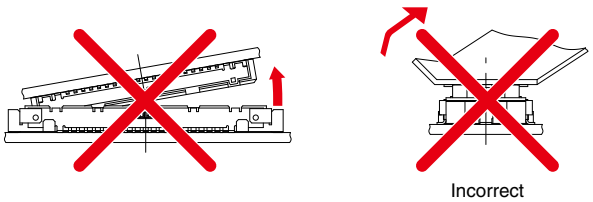
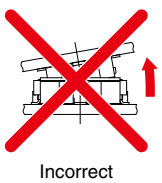
◆Handling Precautions when mating mounted connectors.

 Fig.1	Start the engagement of the connectors within the specified self-alignment range of 0.3 mm, while keeping the boards parallel to each other.
	Do NOT start mating of the mounted connectors at an angle. Correctly position the connectors over each other and assure that both boards are parallel to each other.
	When the connectors are correctly aligned (and both boards are parallel to each other) apply even force until full mating is confirmed by the “click” sensation.

Caution	When the connectors are mounted on the FPC, care should taken to prevent the mated connectors from bending or twisting on the FPC. The device case or cushioning material should be used to keep the connectors fully mated and supported.

◆Handling Precautions when un-mating

	Keep the boards (with mounted connectors) parallel to each other.
 **Fig. A** **Fig. B**	If parallel disconnection is impossible, start un-mating at one end, exercising extreme caution to apply force at the center of the connector itself, away from the solder joint rows (Ref. Fig A and Fig. B)
	Do NOT start disconnection at the sides as the connector can be damaged, voiding the warranty and making the re-engagement impossible.

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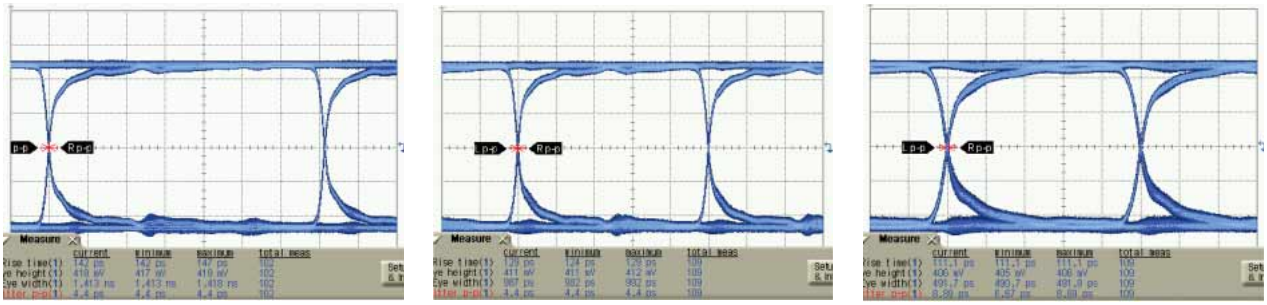
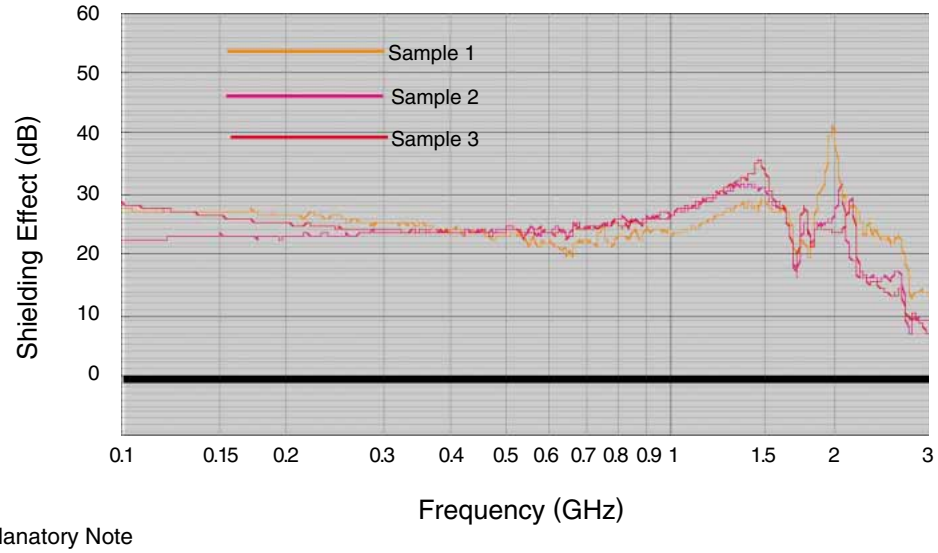
◆Technical Documentation

● Eye Pattern Output Waveform

【700MHz】 【1GHz】 【2GHz】

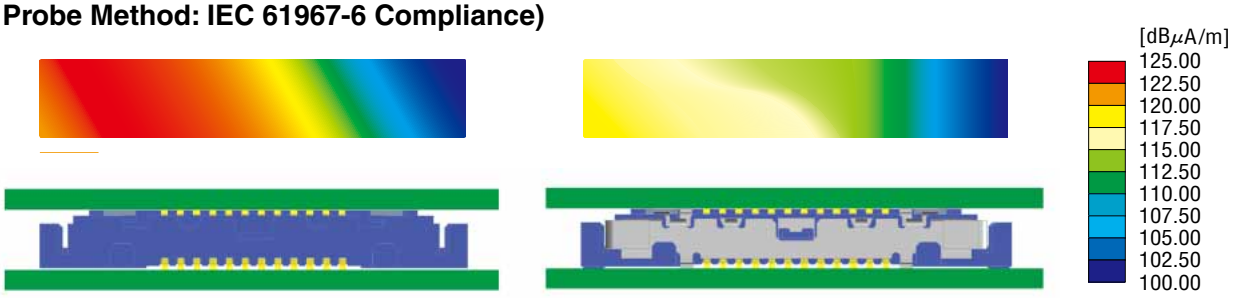


● Shielding Characteristics (1) (Measurement Results Using a 2-Chamber Shielded Room)



Explanatory Note
Measurement values of the unshielded connectors were set as the zero level of the vertical axis of the graph. The graph uses unshielded connectors as the reference and indicates the noise leakage suppression (shielding) effect of the shielded connectors as a relative comparison value.
In comparison to the unshielded connectors there was a noise suppression effect of 10 dB to 30 dB over the frequency range of 100 MHz to 3 GHz.

●Shielding Characteristics (2) (Board-to-Board Shielding Comparison Using a Magnetic Field Probe Method: IEC 61967-6 Compliance)



Without shielding **With shielding**

Explanatory Note
A signal of the 266 MHz operating frequency was transmitted through all contacts, over a frequency range of 10 MHz to 3 GHz. The magnetic field leaking to the surroundings from the gap between the boards was measured with a magnetic probe to provide the (mapping data) results.

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The characteristics and the specifications contained herein are for reference purpose. Please refer to the latest customer drawings prior to use.
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