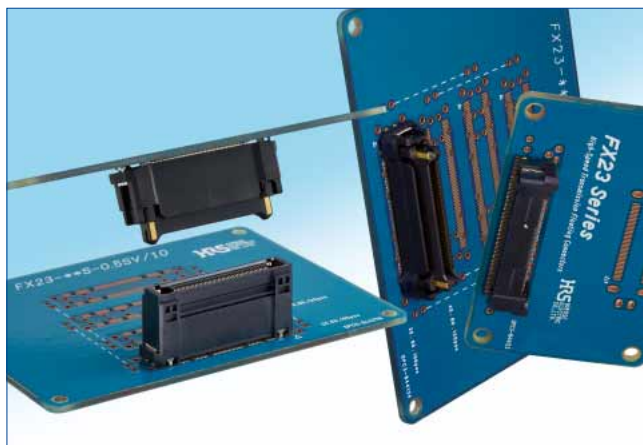
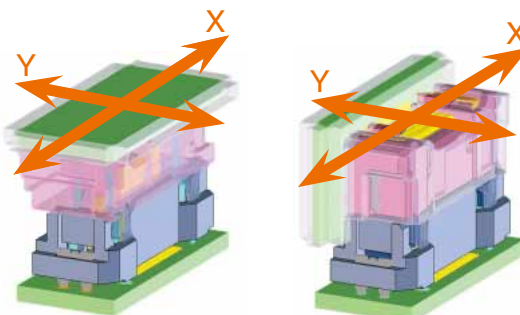


High-speed transmission 0.5mm pitch Board-to-Board connection floating connectors

FX23 Series



Floating ability : XY-axis $\pm 0.6\text{mm}$



Stacking connection

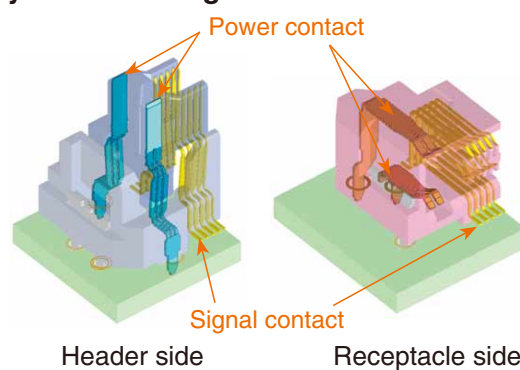
Vertical connection

Fig.1

■ Features

1. 0.5mm pitch
2. Stacking (Height : 15 - 30mm)/vertical
3. Contacts available : 20/40/60/80/100/120 for signal + 4 for power source
4. Floating movable amount : X direction : $\pm 0.6\text{mm}$; Y direction: $\pm 0.6\text{mm}$
A floating movement above the connector pitch is possible. (Fig.1)
5. High-speed transmission (8+ Gbps)
6. Hybrid power design (3A/pin $\times$ 4 lines)
The guide posts on both sides of the connector are equipped with 4 lines of power contacts in addition to the signal contact. (Fig.2)
7. Current capacity : Signal contact 0.5A/pin, power contact 3A/pin
8. Available for automatic mounting (absorption tape is attached as standard equipment)
9. Excellent mating performance due to the large guide post.

Hybrid Power/Signal contacts



Header side

Receptacle side

Fig.2

■ Signal integrity

● ICR (Insertion-loss-to-Crosstalk-Ratio)

The ICR containing cross-talk from 5 adjacent differential pairs provides adequate margin in comparison with the criteria based on the specification of IEEE802.3ap. (Fig.3)

● Differential impedance

Differential impedance is $100 \pm 10\Omega$ at the rise time of 87.5ps (20 to 80%). (Fig.4)

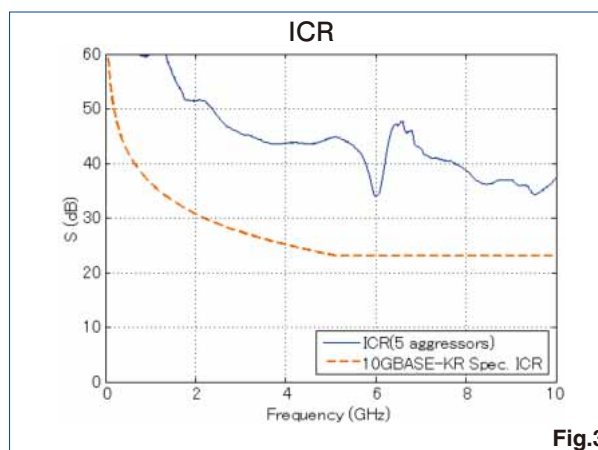


Fig.3

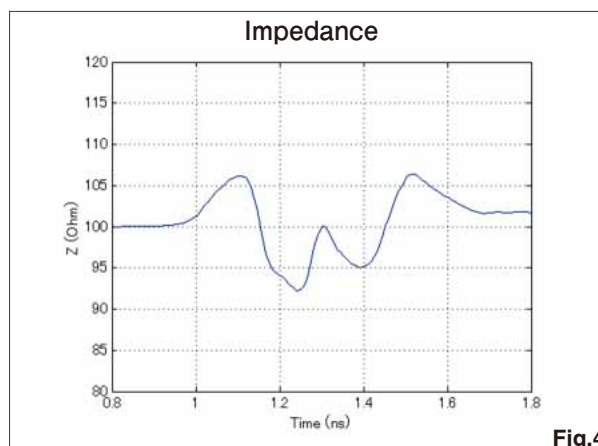


Fig.4

Product Specifications

Ratings	Rated current : Signal part 0.5A Power part 3.0A	Operating temperature range : -55 to 85°C (Note 1)
		Storage temperature range : -10 to 60°C (Note 2)
	Rated voltage : Signal part AC 50V Power part AC 200V	Operating/storage humidity range : 90% or less relative humidity (No dew condensation is allowed)

Items	Specifications	Conditions
1. Contact resistance	Signal part 70mΩ or less Power part 20mΩ or less	Measured at 100mA
2. Insulation resistance	Signal part 100MΩ or more Power part 1,000MΩ or more	Signal part Measured at DC Signal Measured at DC 100V Power Measured at DC 250V
3. Withstanding Voltage	No flashover or breakdown.	Signal contacts Energized at AC 150V for 1 minute Power contacts Energized at AC 600V for 1 minute
4. Mating durability	Contact resistance of the signal part 80mΩ or less Power part 30mΩ or less.	100 times insertion/withdrawal
5. Vibration proof	No electric outage of 1μ or greater.	Frequency 10 - 55Hz, half amplitude 0.75mm, 10 cycles in each of the 3-axis directions each for 5 minutes per cycle
6. Shock resistance	No electric outage of 1μ or greater.	Acceleration of 490m/s ² ; duration 11ms, sine half-wave, 3 cycles in each of the 3 axes each in both directions.
7. Moisture resistance	Contact resistance of the signal part 80mΩ or less Power part 30mΩ or less Insulation resistance at the signal part 100MΩ or more Power part 1,000MΩ or more.	Left to stand for 96 hours at the temperature of 40°C and the humidity of 90 to 95%
8. Temperature cycle	Contact resistance of the signal part 80mΩ or less Power part 30mΩ or less Insulation resistance at the signal part 100MΩ or more Power part 1,000MΩ or more.	Temperature -55 → 85°C 5 cycles for a series of time periods : 30 minutes → 30 minutes

Note 1 : Includes temperature rise caused by current flow.

Note 2 : The term "storage" refers to the long-term storage condition of unused products before mounting on PCB.

Materials / Finish

Part	Materials		Finish	UL standard
Insulator	Header	Polyamide resin	Black color	UL94V-0
	Receptacle	LCP resin		
Contact	Header	Copper alloy	Contacted part : gold plating Signal contact-mounting part : gold plating Power contact-mounting part : pure tin plating	—
	Receptacle			
Reinforcement metal fitting	Brass		Pure tin plated	—

Product Number Structure

Refer to the chart below when determining the product specifications from the product number.

Please select from the product numbers listed in this catalog when placing orders.

●Straight header

FX23 - 60 P - 0.5 SV 15

① ② ③ ④ ⑤ ⑥

●Straight receptacle

FX23 - 60 S - 0.5 SV 10

① ② ③ ④ ⑤ ⑥

●Right angle receptacle

FX23 - 60 S - 0.5 SH

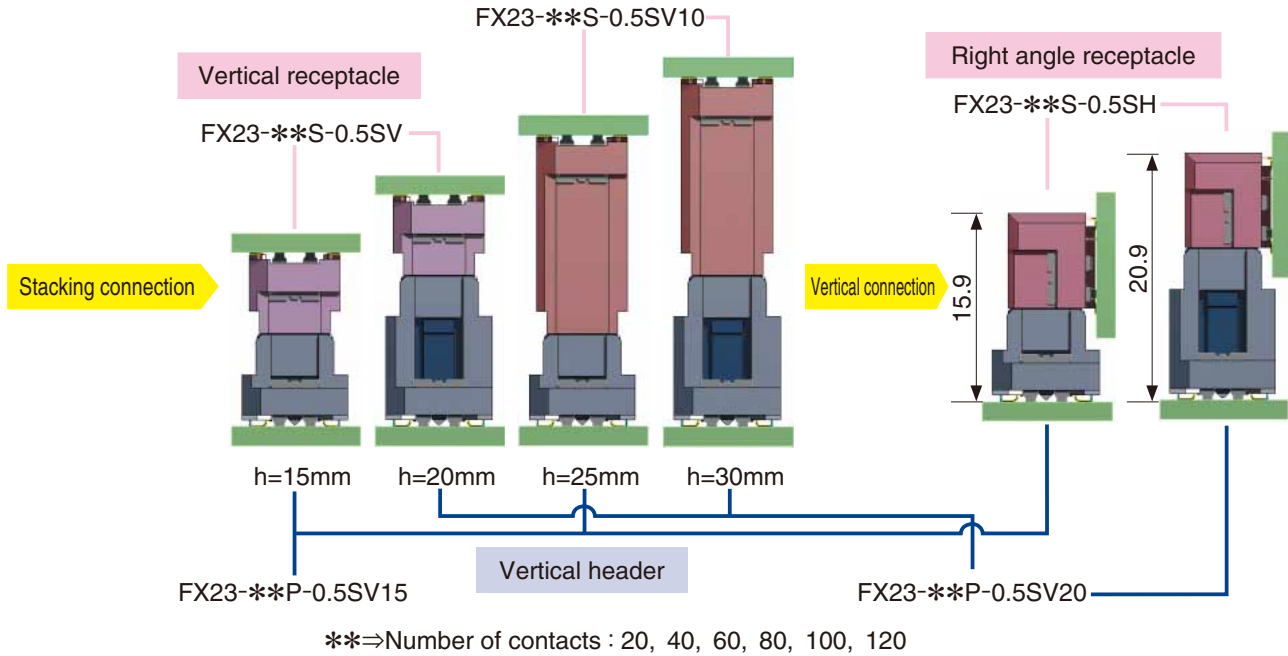
① ② ③ ④ ⑤

① Series name	: FX23
② Number of contacts	
③ Connector type	P : Header type S : Receptacle type
④ Contact pitch	: 0.5mm
⑤ Product type	SV : Vertical SH : Right angle type
⑥ Product height type	Mating height [mm] = Numerical value on the header side + Numerical value on the receptacle side

◆ List of connection variations

Receptacle	Header	FX23-**-P-0.5SV15	FX23-**-P-0.5SV20
FX23-**-S-0.5SV	Height 15mm	Height 15mm	Height 20mm
FX23-**-S-0.5SV10	Height 25mm	Height 25mm	Height 30mm
FX23-**-S-0.5SH	Vertical connection	Vertical connection	Vertical connection

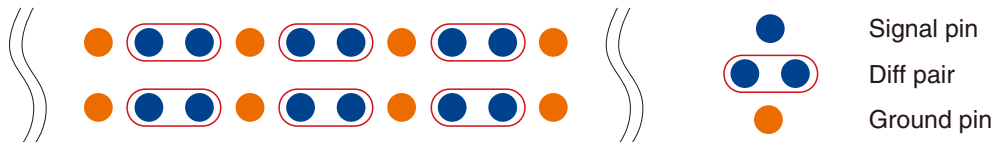
◆ Diagram of connection variations



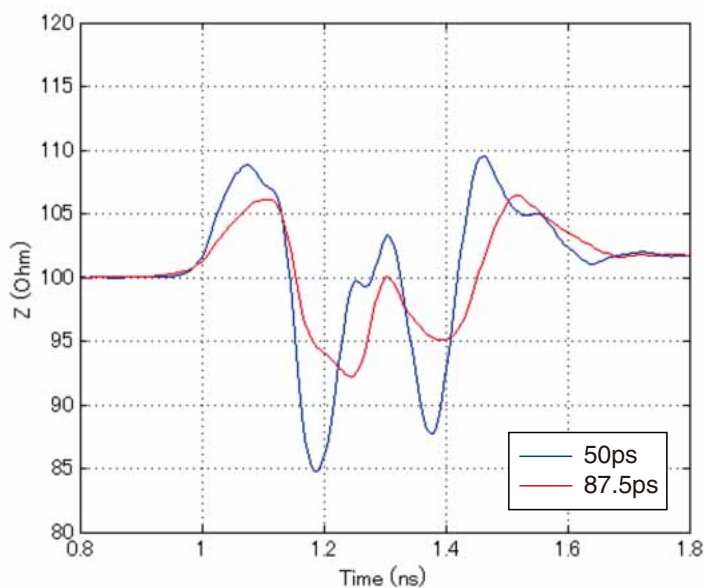
◆ High-speed transmission property (h=15mm)

● Pin assignment

The following pin arrangement is recommended to match the 100Ω differential impedance and to contain cross-talk.

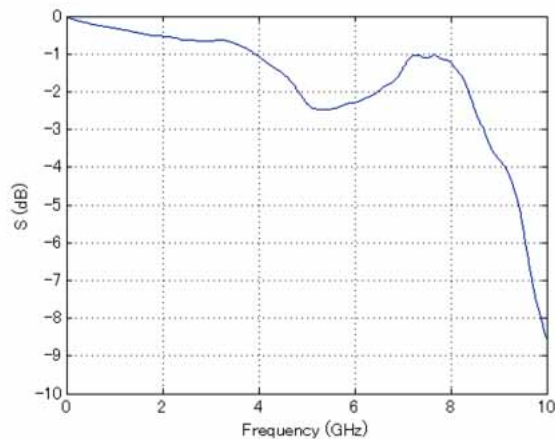


● Differential impedance 50ps, 87.5ps rise time (20 to 80%)



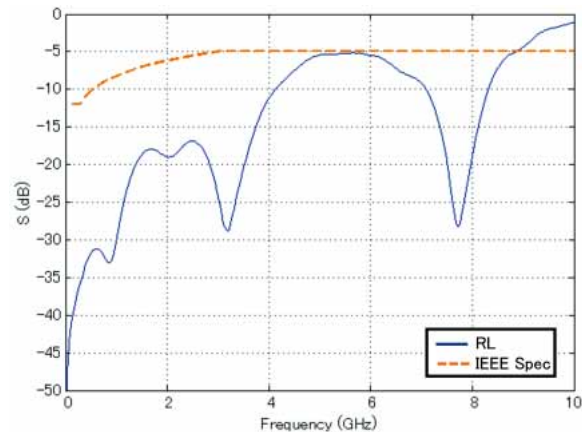
Meets the criterion of $100 \pm 10\Omega$ at the rise time of 87.5ps (20 to 80%).

● Insertion loss



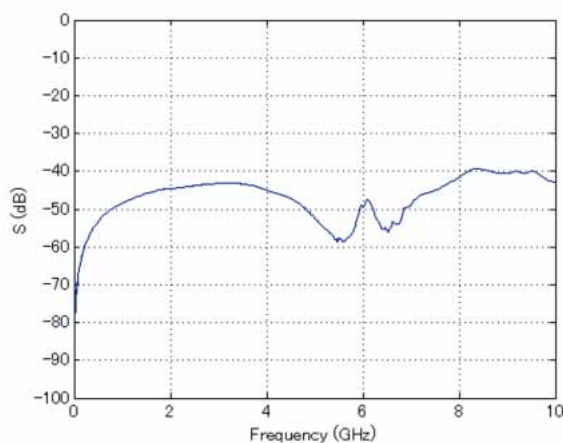
Passes insertion loss up to 5GHz.

● Return loss



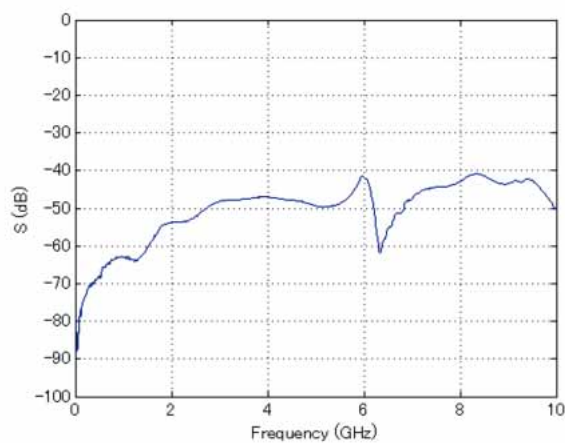
Meets the of IEEE802.3ap specification up to 5GHz.

● Near end cross-talk (NEXT)

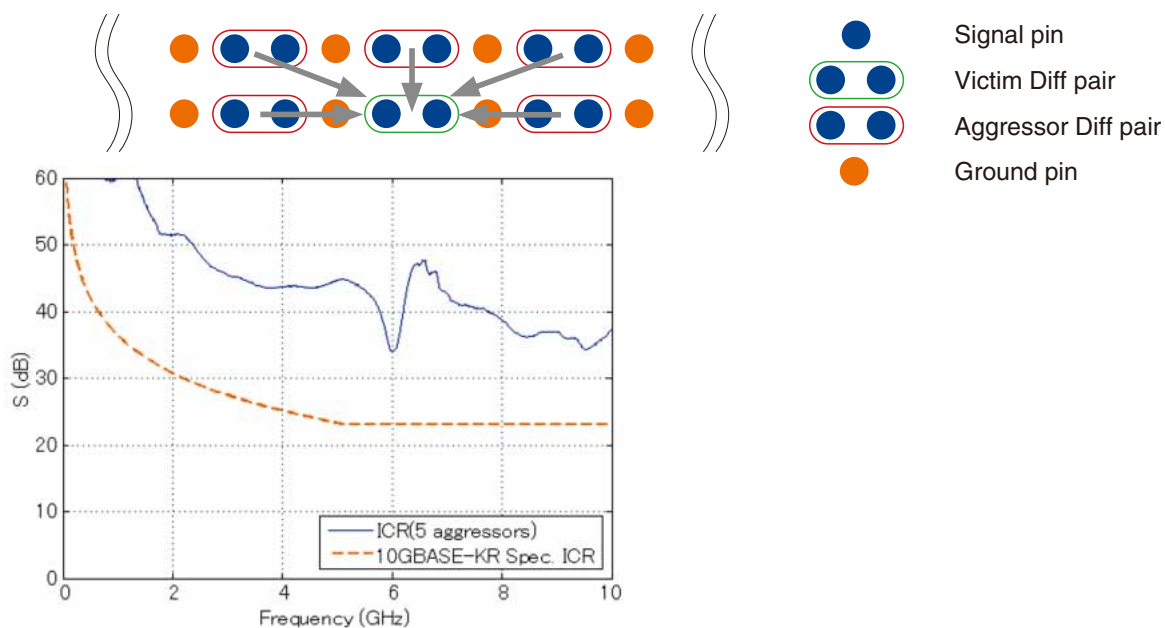


Low cross-talk up to 10GHz.

● Far end cross-talk (FEXT)



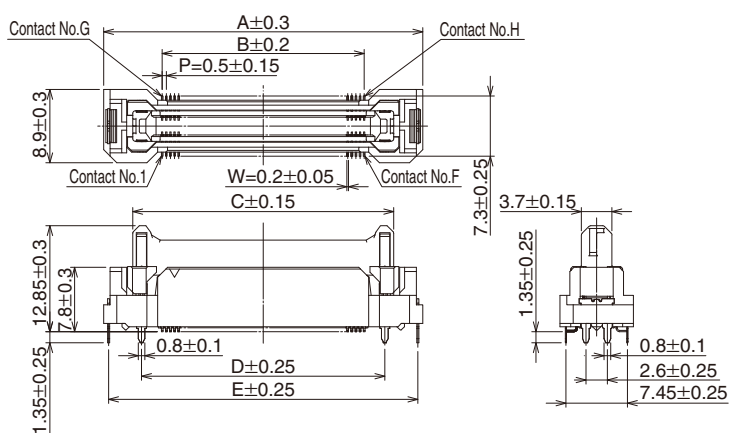
● Insertion loss/cross-talk ratio (ICR) for FEXT



Insertion loss/cross-talk ratio (ICR) for FEXT using 5 sets of Aggressors has an adequate margin according to the specification of IEEE802.3ap.

●Vertical header

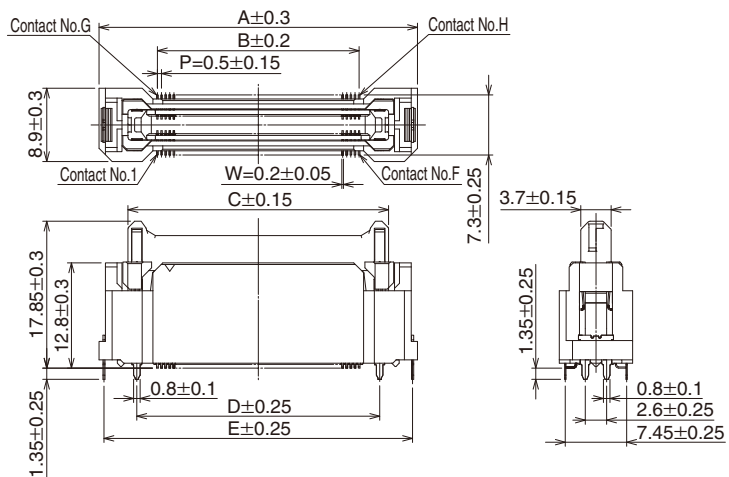
[FX23-**-P-0.5SV15]



Unit : mm

Part No.	HRS No.	No. of contacts	A	B	C	D	E	F	G	H
FX23-20P-0.5SV15	573-3001-0 00	20	18.7	4.5	11.65	9.5	17.5	10	11	20
FX23-40P-0.5SV15	573-3002-3 00	40	23.7	9.5	16.65	14.5	22.5	20	21	40
FX23-60P-0.5SV15	573-3003-6 00	60	28.7	14.5	21.65	19.5	27.5	30	31	60
FX23-80P-0.5SV15	573-3004-9 00	80	33.7	19.5	26.65	24.5	32.5	40	41	80
FX23-100P-0.5SV15	573-3005-1 00	100	38.7	24.5	31.65	29.5	37.5	50	51	100
FX23-120P-0.5SV15	573-3006-4 00	120	43.7	29.5	36.65	34.5	42.5	60	61	120

[FX23-**-P-0.5SV20]

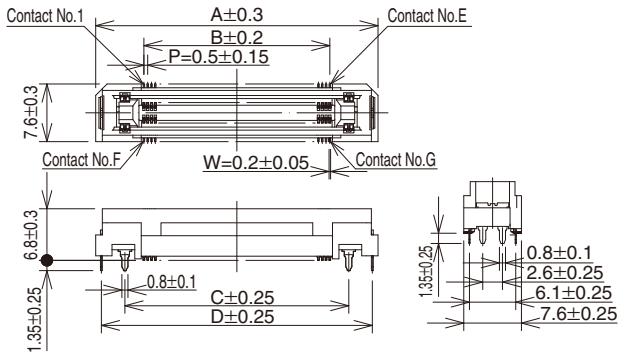


Unit : mm

Part No.	HRS No.	No. of contacts	A	B	C	D	E	F	G	H
FX23-20P-0.5SV20	573-3101-5 00	20	18.7	4.5	11.65	9.5	17.5	10	11	20
FX23-40P-0.5SV20	573-3102-8 00	40	23.7	9.5	16.65	14.5	22.5	20	21	40
FX23-60P-0.5SV20	573-3103-0 00	60	28.7	14.5	21.65	19.5	27.5	30	31	60
FX23-80P-0.5SV20	573-3104-3 00	80	33.7	19.5	26.65	24.5	32.5	40	41	80
FX23-100P-0.5SV20	573-3105-6 00	100	38.7	24.5	31.65	29.5	37.5	50	51	100
FX23-120P-0.5SV20	573-3106-9 00	120	43.7	29.5	36.65	34.5	42.5	60	61	120

●Vertical receptacle

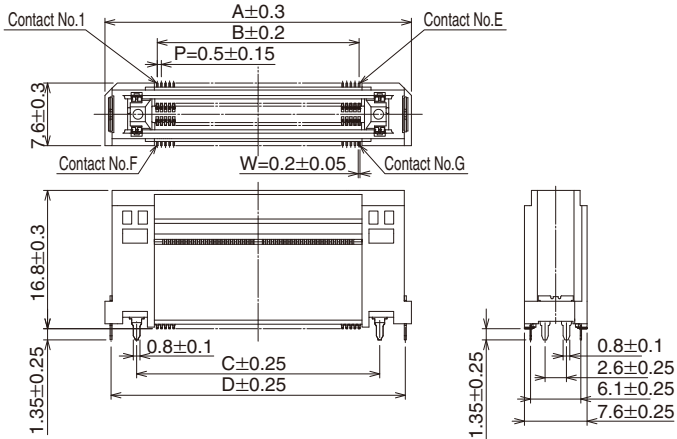
[FX23-**-S-0.5SV]



Unit : mm

Part No.	HRS No.	No. of contacts	A	B	C	D	E	F	G
FX23-20S-0.5SV	573-3201-0 00	20	17.2	4.5	9.5	15.7	10	11	20
FX23-40S-0.5SV	573-3202-2 00	40	22.2	9.5	14.5	20.7	20	21	40
FX23-60S-0.5SV	573-3203-5 00	60	27.2	14.5	19.5	25.7	30	31	60
FX23-80S-0.5SV	573-3204-8 00	80	32.2	19.5	24.5	30.7	40	41	80
FX23-100S-0.5SV	573-3205-0 00	100	37.2	24.5	29.5	35.7	50	51	100
FX23-120S-0.5SV	573-3206-3 00	120	42.2	29.5	34.5	40.7	60	61	120

[FX23-**-S-0.5SV10]

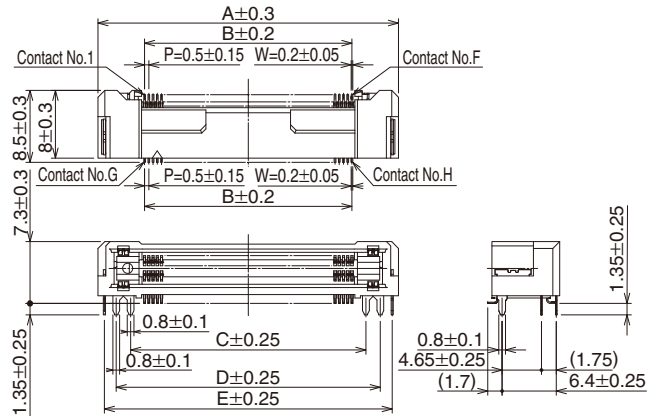


Unit : mm

Part No.	HRS No.	No. of contacts	A	B	C	D	E	F	G
FX23-20S-0.5SV10	573-3301-4 00	20	17.2	4.5	9.5	15.7	10	11	20
FX23-40S-0.5SV10	573-3302-7 00	40	22.2	9.5	14.5	20.7	20	21	40
FX23-60S-0.5SV10	573-3303-0 00	60	27.2	14.5	19.5	25.7	30	31	60
FX23-80S-0.5SV10	573-3304-2 00	80	32.2	19.5	24.5	30.7	40	41	80
FX23-100S-0.5SV10	573-3305-5 00	100	37.2	24.5	29.5	35.7	50	51	100
FX23-120S-0.5SV10	573-3306-8 00	120	42.2	29.5	34.5	40.7	60	61	120

●Right angle receptacle

[FX23-**S-0.5SH]



Unit : mm

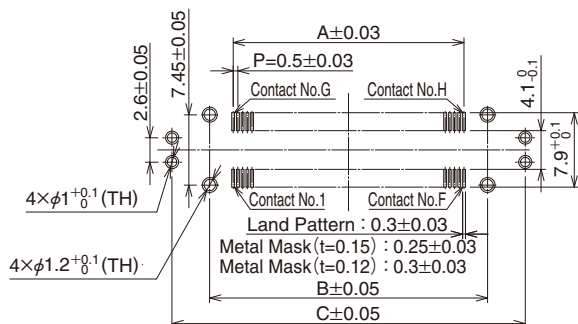
Part No.	HRS No.	No. of contacts	A	B	C	D	E	F	G	H
FX23-20S-0.5SH	573-3401-9 00	20	15.5	4.5	7.8	11.2	14	10	11	20
FX23-40S-0.5SH	573-3402-1 00	40	20.5	9.5	12.8	16.2	19	20	21	40
FX23-60S-0.5SH	573-3403-4 00	60	25.5	14.5	17.8	21.2	24	30	31	60
FX23-80S-0.5SH	573-3404-7 00	80	30.5	19.5	22.8	26.2	29	40	41	80
FX23-100S-0.5SH	573-3405-0 00	100	35.5	24.5	27.8	31.2	34	50	51	100
FX23-120S-0.5SH	573-3406-2 00	120	40.5	29.5	32.8	36.2	39	60	61	120

◆ Recommended PCB Layout

(PCB thickness : $t=1.6\text{mm}$ /metal mask thickness: $t=0.15\text{mm}$, $t=0.12\text{mm}$)

● Vertical header (P-SV15/P-SV20 type)

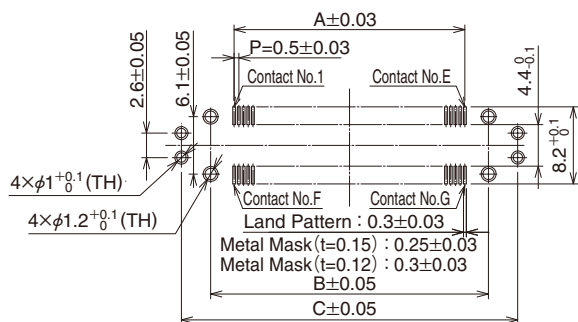
Unit : mm



Part No.	A	B	C
FX23-20P-0.5SV15 FX23-20P-0.5SV20	4.5	9.5	17.5
FX23-40P-0.5SV15 FX23-40P-0.5SV20	9.5	14.5	22.5
FX23-60P-0.5SV15 FX23-60P-0.5SV20	14.5	19.5	27.5
FX23-80P-0.5SV15 FX23-80P-0.5SV20	19.5	24.5	32.5
FX23-100P-0.5SV15 FX23-100P-0.5SV20	24.5	29.5	37.5
FX23-120P-0.5SV15 FX23-120P-0.5SV20	29.5	34.5	42.5

● Vertical receptacle (S-SV/S-SV10 type)

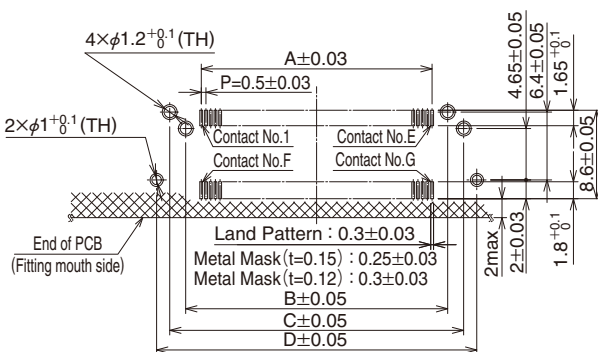
Unit : mm



Part No.	A	B	C
FX23-20S-0.5SV FX23-20S-0.5SV10	4.5	9.5	15.7
FX23-40S-0.5SV FX23-40S-0.5SV10	9.5	14.5	20.7
FX23-60S-0.5SV FX23-60S-0.5SV10	14.5	19.5	25.7
FX23-80S-0.5SV FX23-80S-0.5SV10	19.5	24.5	30.7
FX23-100S-0.5SV FX23-100S-0.5SV10	24.5	29.5	35.7
FX23-120S-0.5SV FX23-120S-0.5SV10	29.5	34.5	40.7

● Right angle receptacle (S-SH type)

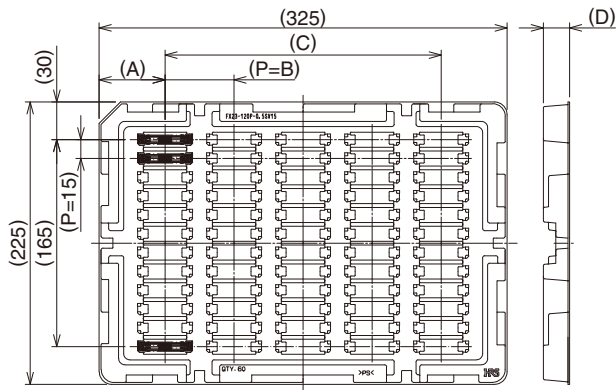
Unit : mm



Part No.	A	B	C	D
FX23-20S-0.5SH	4.5	7.8	11.2	14
FX23-40S-0.5SH	9.5	12.8	16.2	19
FX23-60S-0.5SH	14.5	17.8	21.2	24
FX23-80S-0.5SH	19.5	22.8	26.2	29
FX23-100S-0.5SH	24.5	27.8	31.2	34
FX23-120S-0.5SH	29.5	32.8	36.2	39

◆ Tray packaged diagram

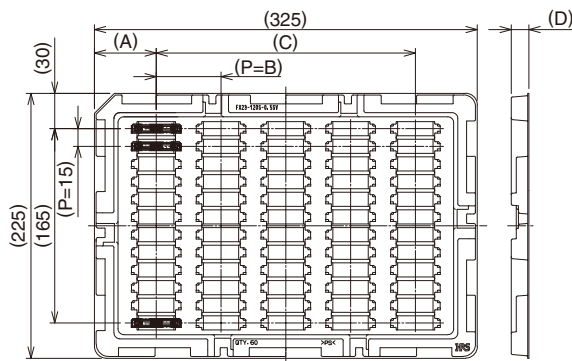
● Vertical header



Unit : mm

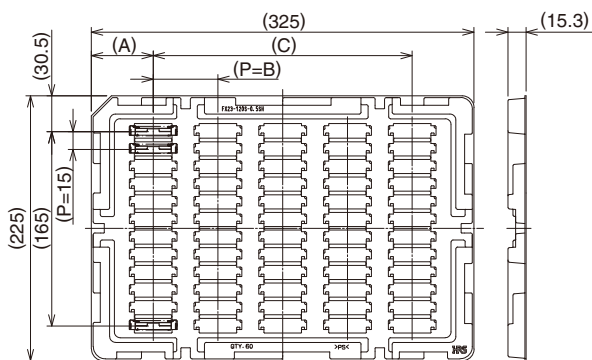
Part No.	Packaging	A	B	C	D
FX23-20P-0.5SV15 FX23-20P-0.5SV20	84 pcs.	50	37.5	225	20.9
FX23-40P-0.5SV15 FX23-40P-0.5SV20					25.9
FX23-60P-0.5SV15 FX23-60P-0.5SV20					20.9
FX23-80P-0.5SV15 FX23-80P-0.5SV20					25.9
FX23-100P-0.5SV15 FX23-100P-0.5SV20	72 pcs.	47.5	45	230	20.9
FX23-120P-0.5SV15 FX23-120P-0.5SV20			55		25.9

● Vertical receptacle



Unit : mm

Part No.	Packaging	A	B	C	D
FX23-20S-0.5SV FX23-20S-0.5SV10	84 pcs.	50	37.5	225	15
FX23-40S-0.5SV FX23-40S-0.5SV10					25.2
FX23-60S-0.5SV FX23-60S-0.5SV10					15
FX23-80S-0.5SV FX23-80S-0.5SV10					25.2
FX23-100S-0.5SV FX23-100S-0.5SV10	72 pcs.	47.5	46	230	15
FX23-120S-0.5SV FX23-120S-0.5SV10					25.2

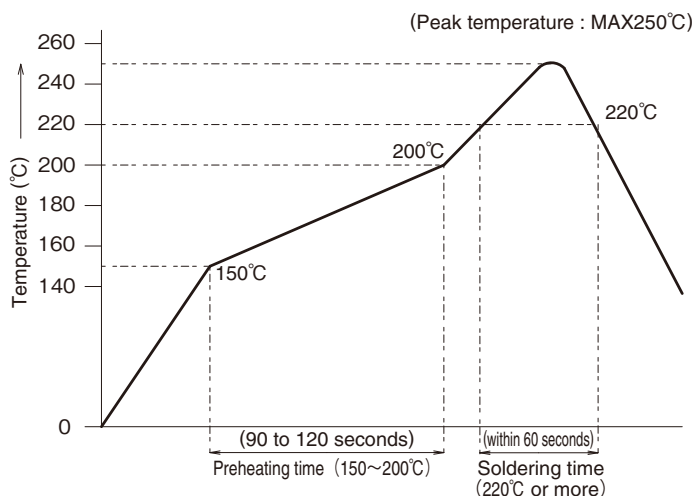


Unit : mm

Part No.	Packaging	A	B	C
FX23-20S-0.5SH FX23-40S-0.5SH FX23-60S-0.5SH	84 pcs.	50	37.5	225
FX23-80S-0.5SH				
FX23-100S-0.5SH FX23-120S-0.5SH				
FX23-100S-0.5SH FX23-120S-0.5SH	72 pcs.	47.5	46	230
FX23-120S-0.5SH	60 pcs.	52.5	55	220

◆ Recommended temperature profile

Temperature profile is referenced under the following conditions : Be sure to mount parts after checking the status, which may differ depending on each condition.



<Applicable conditions>

Test PCB Dimension : 110×60×1.6mm

Material : Glass epoxy

Solder composition : Sn-3Ag-0.5Cu

Flux content : 11wt%

Metal mask thickness : 0.12mm, 0.15mm

Number of reflow times : 2 times max.

*The temperature profile is a reference under the condition of the above settings : Temperature profile may change depending on the conditions such as solder paste types, manufacturers, PCB size, and other soldering materials, please fully check the mounting conditions before use.

◆ Cleaning conditions

● Cleaning with organic solvent

Solvent	Cleaning at normal temperature	Heating cleaning
IPA (Isopropyl alcohol)	○	○

● Cleaning with water

When water-type cleaning agents (terpene, alkaline saponification agents) are used, select cleaning agents based on the 'table of influence' on metals and resins issued by the cleaning agent manufacturer. Caution : Do not leave with any water content left.

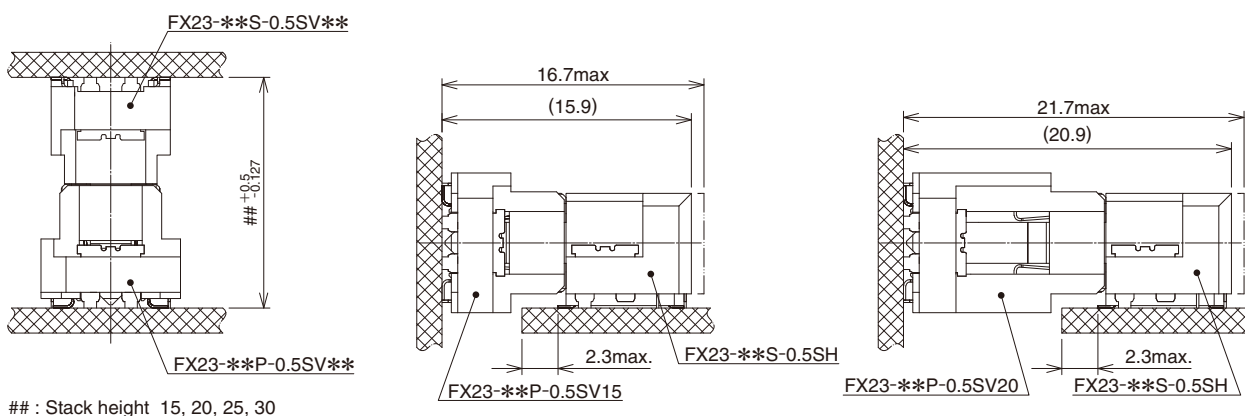
● Precautions in cleaning

When cleaning the parts with organic solvents and water-type agents, if flux or cleaning agents remain in the connector, it could cause the deterioration of electric performance. Please be sure to check if adequate cleaning has been carried out.

◆ Precautions in use

● About the specified dimension between PCBs

The dimension between PCBs shall be within the following range :

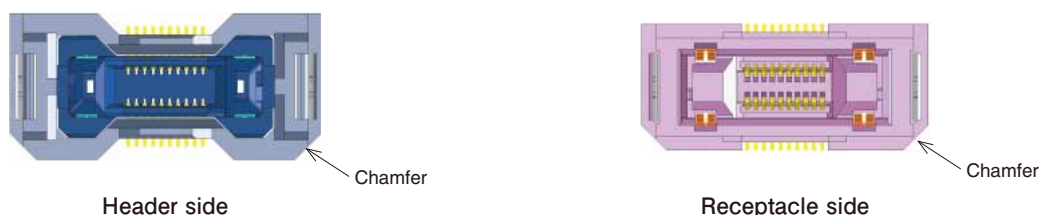


● Fixation among PCBs

Please take measures to fix the PCB other than using connectors.

● Cautions in mating operations

- This connector is designed to prevent reverse insertion. The connector could be damaged if excessive force is exerted when mating. Avoid excessive force when mating. Mate only after confirming the following connector properties (chamfer of the external face) :



- The allowable misalignment is $\pm 1.2\text{mm}$ in both the X and Y directions. After mating is started, proceed with the operation along a straight line without forcing the connector.

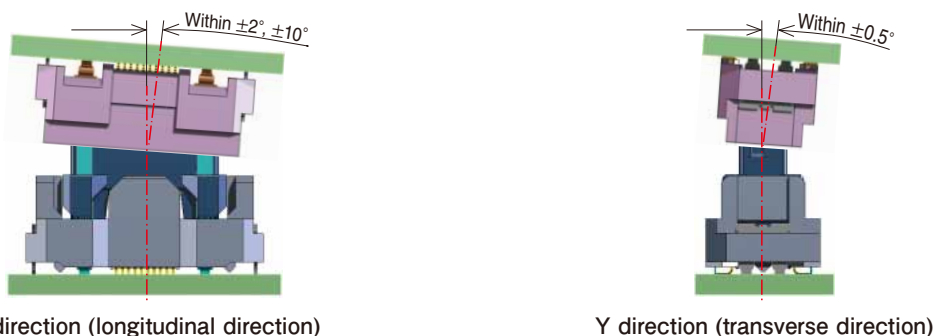


- When mating / un-mating, it is strongly recommended to insert or remove in a straight line. If not possible, the operation shall be carried out within the following angle. Moreover, during the mating operation, be sure to proceed without forcibly applying a load to the connector. Allow the connector to be placed straight when the mating operation is completed.

X direction (longitudinal direction) $\Rightarrow$ for 20, 40, 60-pos. : within 2° ; for 80, 100, 120-pos. : within 10°

Y direction (transverse direction) $\Rightarrow$ within 0.5°

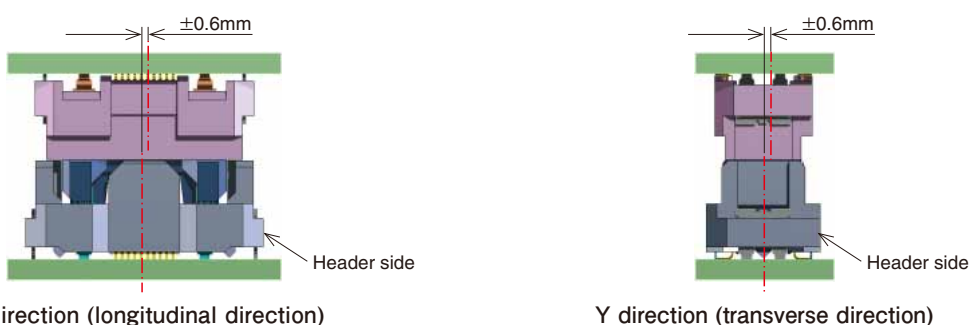
(However, this is not a recommended operation. Damage to the connector could occur.)



● Permissible position deviation in the mated state (floating movable amount)

This connector is designed to float when mated, the permissible PCB position deviation in the mated state is $\pm 0.6\text{mm}$ in both the X and Y directions.

However, it is not applicable to absorbing when the position deviation amount is continually changing due to vibration etc. Be sure to secure PCBs after mating. Additionally, the number of repetitive floating operations shall be according to the number of connector insertion/withdrawal cycles.



USA:

HIROSE ELECTRIC (U.S.A.), INC. HEADQUARTERS CHICAGO OFFICE
2300 Warrenville Road, Suite 150,
Downers Grove, IL 60515
Phone : +1-630-282-6700
<http://www.hirose.com/us/>

USA:

HIROSE ELECTRIC (U.S.A.), INC. SAN JOSE OFFICE
2841 Junction Ave, Suite 200
San Jose, CA. 95134
Phone : +1-408-253-9640
Fax : +1-408-253-9641
<http://www.hirose.com/us/>

USA:

HIROSE ELECTRIC (U.S.A.), INC. DETROIT OFFICE (AUTOMOTIVE)
17197 N. Laurel Park Drive, Suite 253,
Livonia, MI 48152
Phone : +1-734-542-9963
Fax : +1-734-542-9964
<http://www.hirose.com/us/>

THE NETHERLANDS:

HIROSE ELECTRIC EUROPE B.V.
Hogehillweg #8 1101 CC Amsterdam Z-O
Phone : +31-20-6557460
Fax : +31-20-6557469
<http://www.hirose.com/eu/>

GERMANY:

HIROSE ELECTRIC EUROPE B.V. GERMAN BRANCH
Schoenbergstr. 20, 73760 ostfildern
Phone : +49-711-456002-1
Fax : +49-711-456002-299
<http://www.hirose.com/eu/>

GERMANY:

HIROSE ELECTRIC EUROPE B.V. NUREMBERG OFFICE
Neumeyerstrasse 22-26, 90411 Nurnberg
Phone : +49-911 32 68 89 63
Fax : +49-911 32 68 89 69
<http://www.hirose.com/eu/>

GERMANY:

HIROSE ELECTRIC EUROPE B.V. HANOVER OFFICE
Bayernstr. 3, Haus C 30855 Langenhagen, Germany
Phone : +49-511 97 82 61 30
Fax : +49-511 97 82 61 35
<http://www.hirose.com/eu/>

FRANCE:

HIROSE ELECTRIC EUROPE B.V. PARIS OFFICE
Regus La Garenne Colombes, Place de La Belgique,
71 Boulevard National La Garenne Colombes, 92250, France
Phone : +33 (0) 1 7082 3170
Fax : +33 (1) 7082 3101
<http://www.hirose.com/eu/>

UNITED KINGDOM:

HIROSE ELECTRIC EUROPE BV (UK BRANCH)
4 Newton Court, Kelvin Drive, Knowlhill,
Milton Keynes, MK5 8NH
Phone : +44-1908 202050
Fax : +44-1908 202058
<http://www.hirose.com/eu/>

CHINA:

HIROSE ELECTRIC (SHANGHAI) CO., LTD.
1601, Henderson Metropolitan, NO.300, East Nanjing
Road, Huangpu District, Shanghai, China 200001
Phone : +86-21-6391-3355
Fax : +86-21-6391-3335
<http://www.hirose.com/cn/>

CHINA:

HIROSE ELECTRIC (SHANGHAI) CO., LTD. BEIJING BRANCH
A1001, Ocean International Center, Building 56# East 4th
Ring Middle Road, ChaoYang District, Beijing, 100025
Phone : +86-10-5165-9332
Fax : +86-10-5908-1381
<http://www.hirose.com/cn/>

CHINA:

HIROSE ELECTRIC TECHNOLOGIES (SHENZHEN) CO., LTD.
Room 09-13, 19/F, Office Tower Shun Hing Square, Di Wang Commercial Centre,
5002 Shen Nan Dong Road, Shenzhen City, Guangdong Province, 518008
Phone : +86-755-8207-0851
Fax : +86-755-8207-0873
<http://www.hirose.com/cn/>

HONG KONG:

HIROSE ELECTRIC HONGKONG TRADING CO., LTD.
Room 1001, West Wing, Tsim Sha Tsui Centre, 66
Mody Road, Tsim Sha Tsui East, Kowloon, Hong Kong
Phone : +852-2803-5338
Fax : +852-2591-6560
<http://www.hirose.com/hk/>

TAIWAN:

HIROSE ELECTRIC TAIWAN CO., LTD.
103 8F, No.87, Zhengzhou Rd., Taipei
Phone : +886-2-2555-7377
Fax : +886-2-2555-7350
<http://www.hirose.com/tw/>

KOREA:

HIROSE KOREA CO., LTD.
250, Huimanggongwon-ro, Siheung-si,
Gyeonggi-do, Korea, 15083
Phone : +82-31-496-7000 or 7124
Fax : +82-31-496-7100
<http://www.hirose.co.kr/>

SINGAPORE:

HIROSE ELECTRIC SINGAPORE PTE. LTD.
10 Anson Road #26-16, International Plaza
079903, Singapore
Phone : +65-6324-6113
Fax : +65-6324-6123
<http://www.hirose.com/sg/>

INDIA:

HIROSE ELECTRIC SINGAPORE PTE. LTD. DELHI LIAISON OFFICE
Office NO.552, Regus-Green Boulevard, Level5, Tower C,
Sec62, Plot B-9A, Block B, Noida, 201301, Uttar Pradesh, India
Phone : +91-12-660-8018
Fax : +91-120-4804949
<http://www.hirose.com/sg/>

INDIA:

HIROSE ELECTRIC SINGAPORE PTE. LTD. BANGALORE LIAISON OFFICE
Unit No-403, 4th Floor, No-84, Barton Centre, Mahatma
Gandhi (MG) Road, Bangalore 560 001, Karnataka, India
Phone : +91-80-4120 1907
Fax : +91-80-4120 9908
<http://www.hirose.com/sg/>

MALAYSIA:

PENANG REPRESENTATIVE OFFICE
1-21-01, Suntech @ Penang Cybercity (1164), Lintang
Mayang Pasir 3,11950, Bayan Baru, Penang, Malaysia.
Phone : +604-619-2564
Fax : +604-619-2574
<http://www.hirose.com/sg/>

THAILAND:

BANGKOK OFFICE (REPRESENTATIVE OFFICE)
Unit 4703, 47th FL., 1 Empire Tower, South Sathorn
Road, Yannawa, Sathorn, Bangkok 10120 Thailand
Phone : +66-2-686-1255
Fax : +66-2-686-3433
<http://www.hirose.com/sg/>



HIROSE ELECTRIC CO.,LTD.

2-6-3, Nakagawa Chuoh, Tsuzuki-Ku, Yokohama-Shi 224-8540, JAPAN
TEL: +81-45-620-3526 Fax: +81-45-591-3726
<http://www.hirose.com>
<http://www.hirose-connectors.com>