PRODUCT CATALOG

HIROSE ELECTRIC CO.,LTD.

BF4-IR2 Series

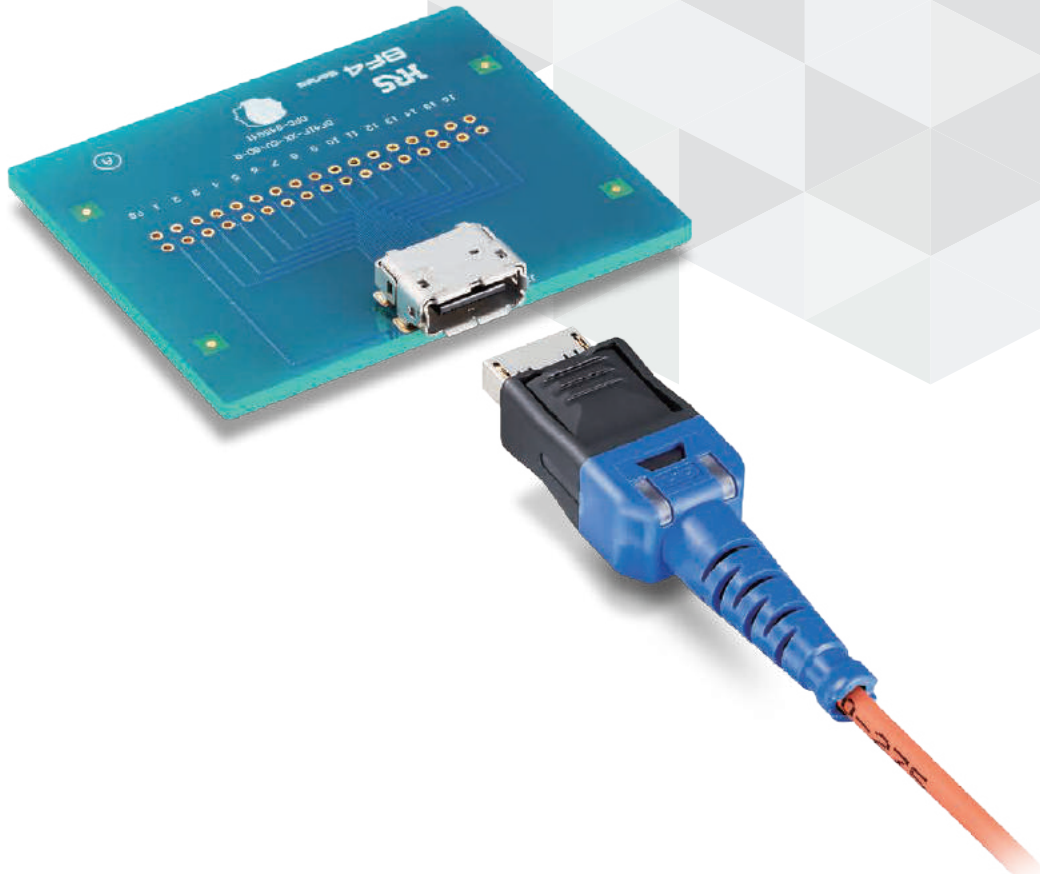
Active Optical I/F Connector

BF4-IR2 Series

AOC

Low Power

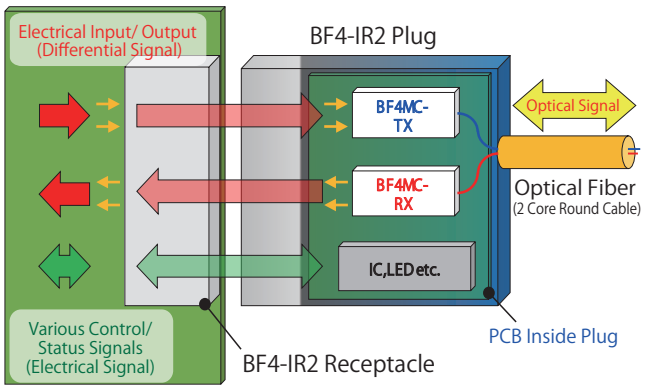
Noise Prevention

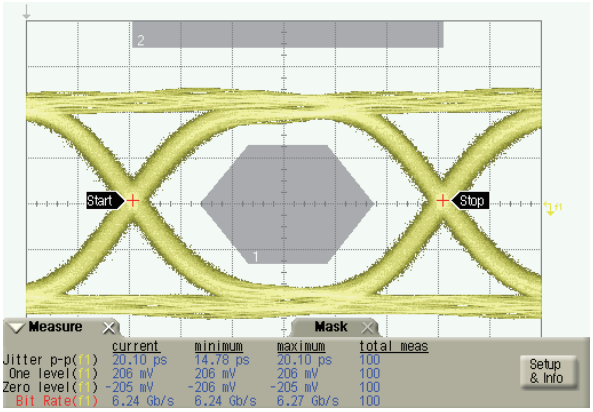


Outline

The bidirectional transmission active optical connector BF4-IR2 has been developed for internal and inter-device wiring. Incorporating two BF4MC Series connectors inside the plug enables bidirectional transmission, significant lower use of power consumption than conventional optical transmission modules, and an interface with flexibility superior to conventional optical fiber cables. Furthermore, BF4-IR2 is a dual core optical I/F connector that allows long distance transmission, electromagnetic noiselessness and isolation, all of which are merits of optical transmission.
*Refer to the BF4-IR2 Series Design Note (ETAD-K0794) and BF4MC Series Design Note (ETAD-K0671) for basic operation.

Block Diagram



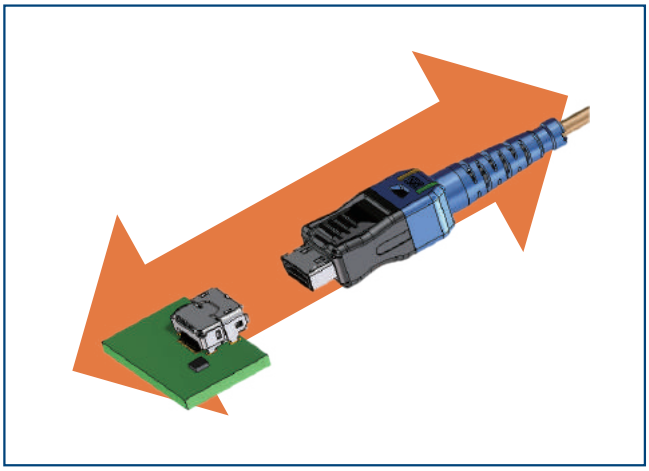


Eye Diagram (Typical) : Transmission Speed 6.25Gbps, Length 5m

Features

1. Mating Durability of 1,000 Cycles

Unlike conventional optical connectors, the BF4-IR2 Series is an active connector (electrical connection) and has a robust design for a mating durability of up to 1,000 cycles like other Hirose interface connectors.

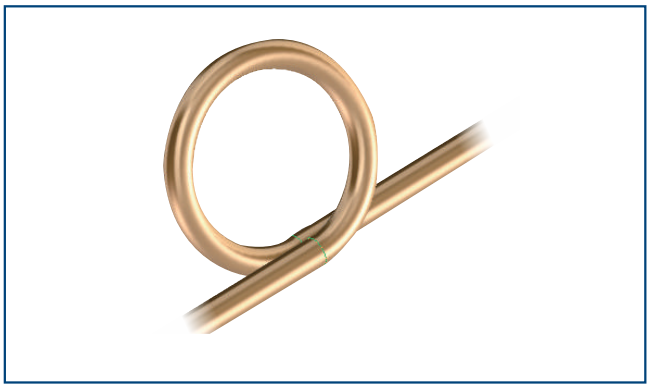


2. Built-in LED for Connection Confirmation

The built-in LED (Amber/Green) allows for operation check (control confirmation) from outside the connector.

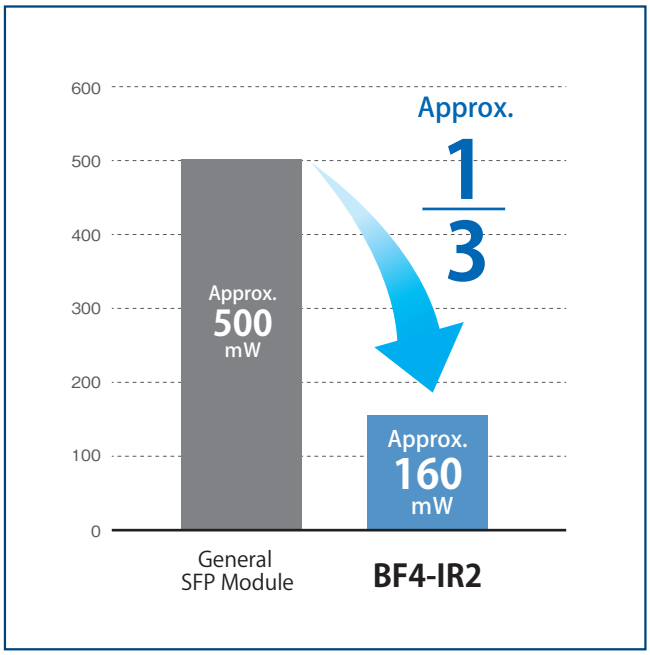
3. Bending Durable 2 Core Fiber

BF4-IR2 uses the same flexible fiber as BF4MC. The minimum recommended bending radius is R10.



4. Low Power Consumption

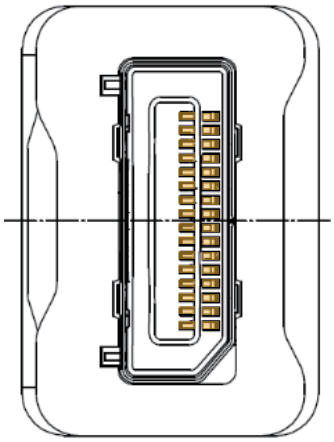
Two BF4MC inside the BF4-IR2 enable low power consumption.



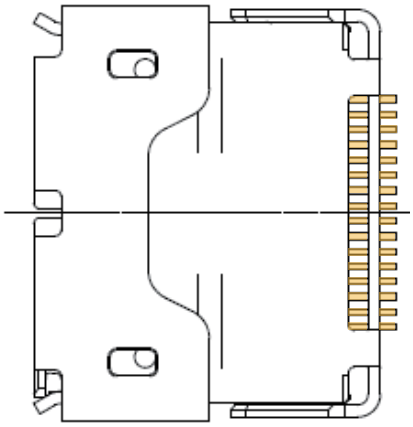
Electrical Characteristics

BF4-IR2 Plug Electrical Properties	Min.	Nominal	Max.	Unit	Remarks
Transmission Speed (8B10B)	0.05	-	6.25	Gbps	
VDD Voltage	3.0	3.3	3.6	V	
EO-ACT H Voltage	1.0	-	VDD Voltage	V	
EO-DATA Common Voltage		0		V	Internal AC Coupling
EO-DATA Differential Voltage	200	-	1400	mVp	
OE-SDn H Voltage	3.0	-	VDD Voltage	V	
ANDATA Voltage	40			mV	
OE-DATA Common Voltage		0		mV	Internal AC Coupling
OE-DATA Differential Voltage	160	-	330	mVp	

Pin Assignment and Explanation



1 : VDD
2 : VDD
3 : GRN-LEDn
4 : OE-SDn
5 : VANDATA
6 : GND
7 : OE-DATA-
8 : OE-DATA+
9 : GND
10 : EO-DATA-
11 : EO-DATA+
12 : GND
13 : EO-ACT
14 : EO-ACTn
15 : AMB-LEDn
16 : NC



1 : VDD
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9 : GND
10 : EO-DATA-
11 : EO-DATA+
12 : GND
13 : EO-ACT
14 : EO-ACTn
15 : AMB-LEDn
16 : NC

Pin No.	Pin Name	Type	Function
1	VDD	Power	BF4 Power Supply (3.3V DC)
2	VDD	Power	BF4 Power Supply (3.3V DC)
3	GRN-LEDn	Input	Green LED Emission Control 0V: On, 3.3V: Off
4	OE-SDn	Output	Signal Detection Pin 0V: Detection 3.3V: No Detection
5	ANDATA	Output	PD Current Monitor Pin [Output Voltage Value: monx2k Ω]
6	GND	GND	Ground
7	OE-DATA-	Output	SLVS Output
8	OE-DATA+	Output	
9	GND	GND	Ground
10	EO-DATA-	Input	SLVS Input
11	EO-DATA+	Input	
12	GND	GND	Ground
13	EO-ACT	Input	Transmitter Mode Switching 3.3V:Active 0V:Sleep
14	EO-ACTn	Output	ACT Detection Pin 0V:Detection 3.3V:No Detection
15	AMB-LEDn	Input	Amber LED Emission Control 0V: On, 3.3V: Off
16	N.C.	N.C.	Not Connected in Normal Operation

*The I/O notation (Type) in the table above is the direction as seen from the BF4-IR2 plug.

Materials

Component		Material
IR2 Plug	Housing	PBT (Black)
	Printed Circuit Board	FR-4
	BF4-TX-14DS-0.5V	Print Circuit Board Mounting (Note 1)
	BF4-RX-14DS-0.5V	Print Circuit Board Mounting (Note 1)
	Insulation Case	PA
	Lock Bracket	Stainless Alloy
	Contact	Copper Alloy
	Shell	Stainless Alloy
	Cable Clamper	Copper Alloy
	Caulking	Aluminum Alloy
	Heat Shrink Tube	Polyolefin
	Light Guide Plate	PC
	Boots	Polyester Elastomer (Blue)
Duplex LC Plug	Housing	PEI (Beige)
	Extender Cap	PEI (Beige), Aluminum Alloy
	LC Ferrule	Zirconia, Copper Alloy
	Spring	Stainless Alloy
	Side Clip	PP (Beige)
	Boots	Polyester Elastomer (Blue)
	Boots Holder	Copper Alloy
	Cable Clamper	Copper Alloy
	Clamp Ring	Copper Alloy
	Heat Shrink Tube	Polyolefin (Black)
	Cap	Polyester Elastomer (Black)
Optical Fiber Cord	BF4MC-6GTXP-1	(Note 1)
	BF4MC-6GRXP-1	(Note 1)
	Blindfold	Copper Alloy
	Securing Ring	Copper Alloy
	Optical Fiber Cord	Configuration Listed Below (Note 2)
	-Optical Fiber Cord	Quartz Fiber (GI50/80)
	-Primary Coating	UV-Curable Resin
	-Secondary Coating	Thermoplastic Resin
	-Tension Member	Aramid Fiber (Kevlar)
	-Outer Jacket	PVC (Orange)
IR2 Receptacle	Insulation Case	PA
	Contact	Copper Alloy
	Shell	Stainless Alloy

Note 1 : Refer to the BF4MC Design Notes (ETAD-K0671) for information on the BF4MC plug harness/receptacle.
Note 2 : Optical fiber cable jackets contain dibutyltin compounds (DBT) intentionally added as catalysts below the REACH regulation value (1000ppm tin equivalent)

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.

● Plug Harness

BF4-IR2 IR2 - 01 - # M
❶ ❷ ❸ ❹ ❺

❶	Series Name Type of Plug Attached to End of Harness 1	BF4-IR2 : BF4-IR2 Plug	❹	Cable Length Specification	# : Cable Length
❷	Type of Plug Attached to End of Harness 2	IR2 : BF4-IR2 Plug LCD : Duplex LC Plug	❺	Cable Length Measurement	M : Meter
❸	Optical Cable Used	01 : SWCC GI50/80 x 2pos., ϕ 2			

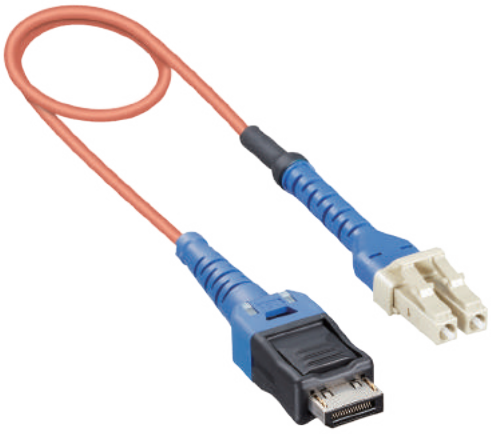
● Receptacle

BF4-IR2 - 16P - 0.5 SH (##)
❶ ❷ ❸ ❹ ❺

❶	Series Name	BF4-IR2	❹	Mating Method	SMT Mated Horizontally Type
❷	Number of Pins	16 Pins	❺	Product specifications (packing, etc.)	None : 150pcs per reel (01) : 10pcs per bag
❸	Contact Pitch	0.5mm Pitch			

Plug Variations

IR2-IR2

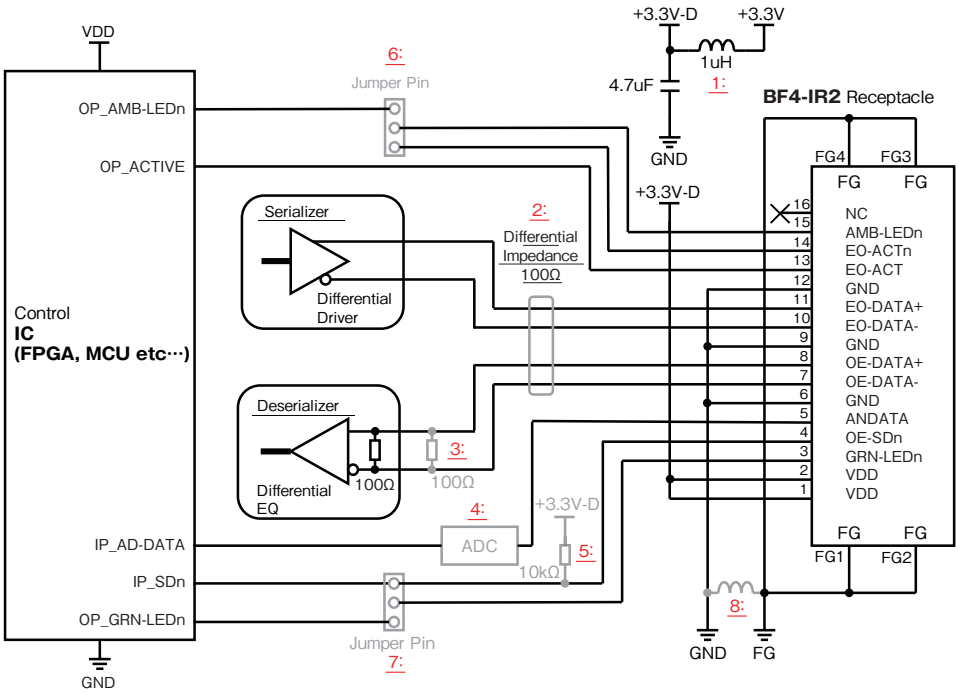


IR2-2 Core LC

Connection Example

● Design Points

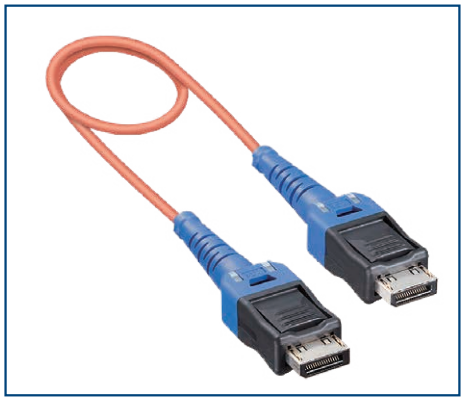
1: The +3.3V supplied to BF4-IR2 should be a low noise power supply made of linear regulators or LDO.
2: Route the Serdes (Serializer/Deserializer) to the BF4-IR2 receptacle with a differential impedance of 100Ω.
3: If the Deserializer (Differential EQ) does not have an internal terminator resistor, mount an external terminator resistor of 100Ω adjacent to the EQ input.
4: If an analog signal cannot be received by the Control IC, convert it to a digital signal with the AD converter (ADC) because the ANDATA signal is analog.
5: The OE-SDn signal is undefined when the BF4-IR2 receptacle is not inserted into the plug. Connect to the power supply with 10kΩ on the board. (10kΩ Pull-up)
6: Connect the BF4-IR2 internal plug LED (Amber) to the Control IC for lighting control. Short connection between EO-ACTn and AMB-LEDn is recommended when not controlling the LED.
7: Connect the BF4-IR2 internal plug LED (Green) to the Control IC for lighting control. Short connection between OE-SDn and GRN-LEDn is recommended when not controlling the LED.
8: It is recommended to use an inductor or ferrite bead for connection to GND as a measure to prevent noise from flowing in from FG.

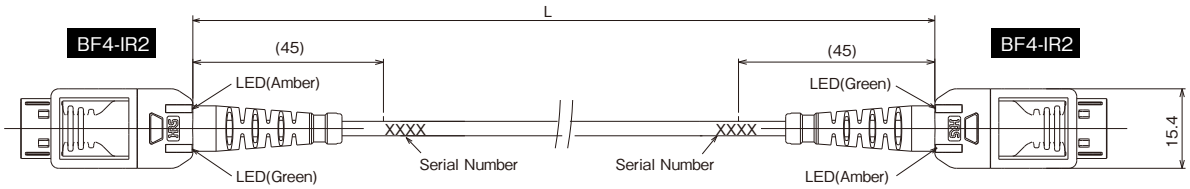


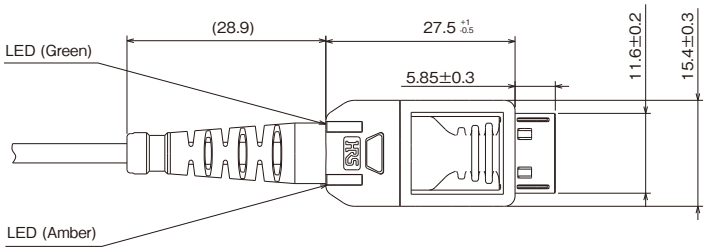
Receptacle Connection Example (Internal Board Connection)

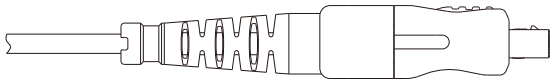
Plug Harness

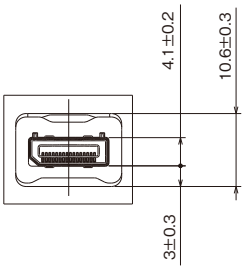
● Double-Ended IR2 (IR2-IR2) Plug







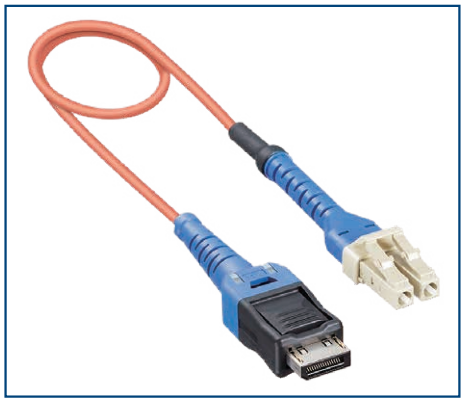


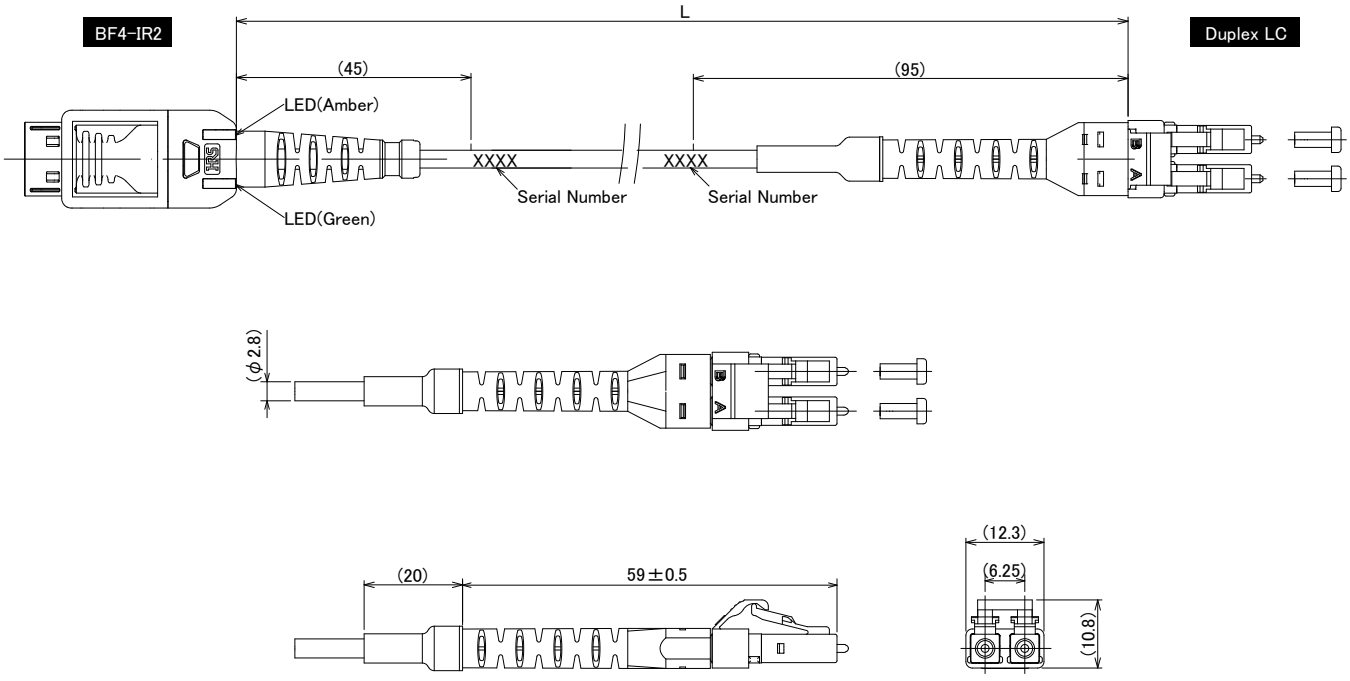


Representative Product Name for Double-Ended IR2 Plug Harness

Part No.	HRS No.	Cable Length
BF4-IR2IR2-01-1M	CL0831-1272-0-00	1m
BF4-IR2IR2-01-2M	CL0831-1274-0-00	2m
BF4-IR2IR2-01-3M	CL0831-1275-0-00	3m
BF4-IR2IR2-01-4M	CL0831-1276-0-00	4m
BF4-IR2IR2-01-5M	CL0831-1277-0-00	5m

● One-End Optical Connector LCD (IR2-Duplex LC) Plug

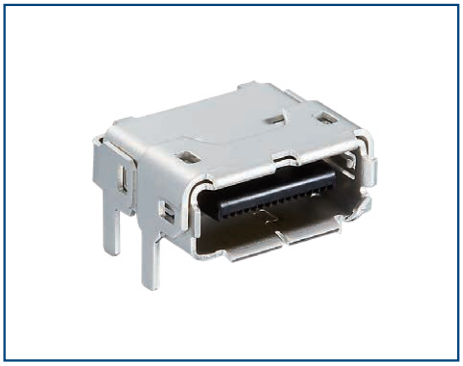


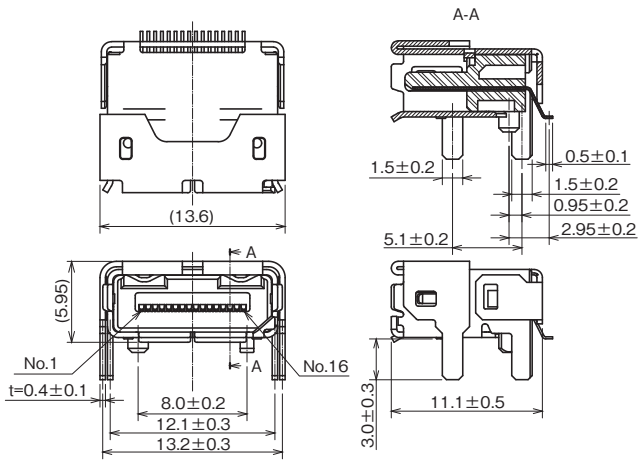


Representative Product Name for One-Ended LCD Plug Harness

Part No.	HRS No.	Cable Length
BF4-IR2LCD-01-1M	CL0831-1273-0-00	1m
BF4-IR2LCD-01-2M	CL0831-1282-0-00	2m
BF4-IR2LCD-01-3M	CL0831-1283-0-00	3m
BF4-IR2LCD-01-4M	CL0831-1284-0-00	4m
BF4-IR2LCD-01-5M	CL0831-1285-0-00	5m

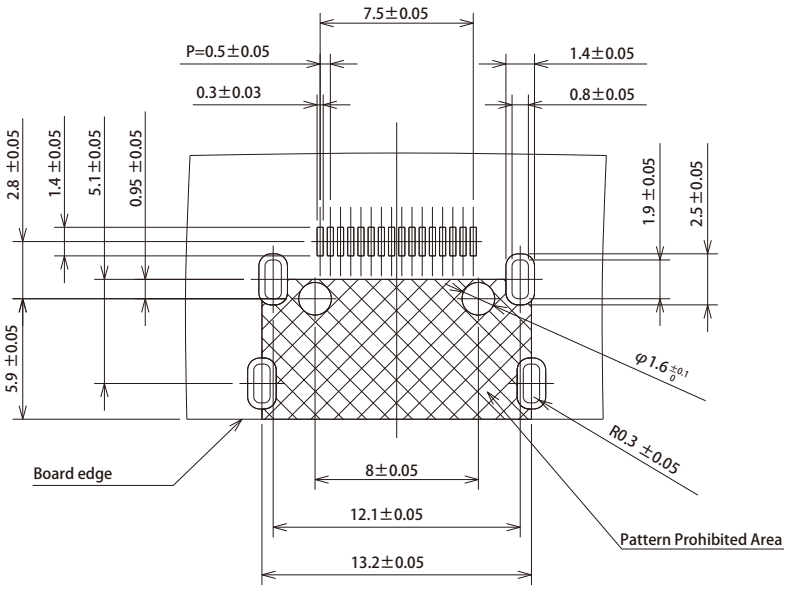
Receptacle





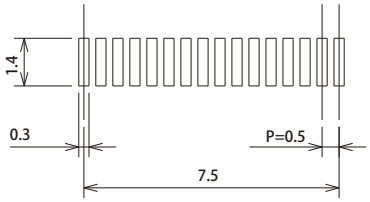
Part No.	HRS No.	Purchase Unit
BF4-IR2-16P-0.5SH	CL0831-1020-0-00	150pcs per reel
BF4-IR2-16P-0.5SH(01)	CL0831-1020-0-01	10pcs per bag

● Recommended Land Pattern



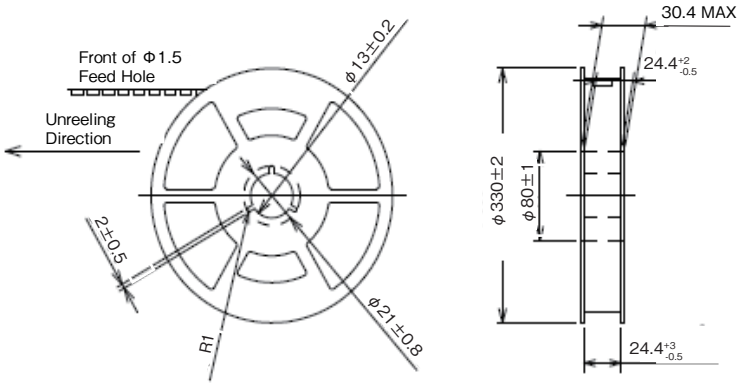
● Recommended Metal Mask Dimensions

(Recommended Metal Mask Dimensions：120 μm)

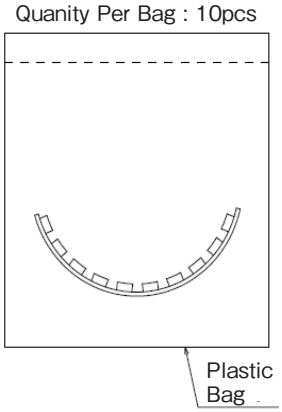


Receptacle Packaging (Reel, Pack and Embossed Carrier)

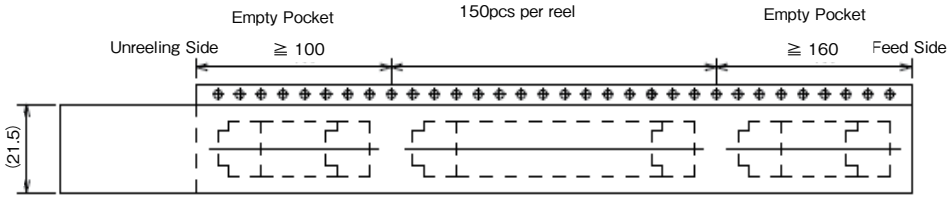
Reel and Dimensions



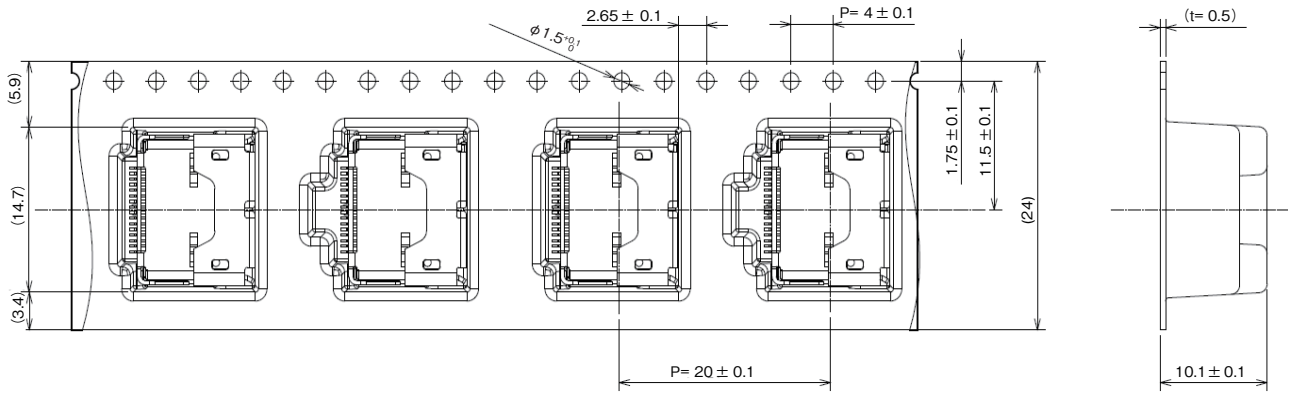
Pack



Taping Direction

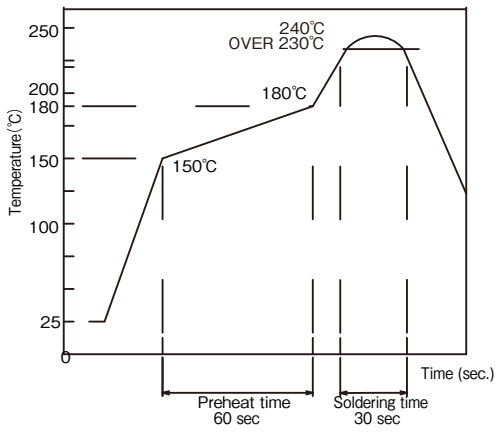


Emboss Carrier Tape Dimensions

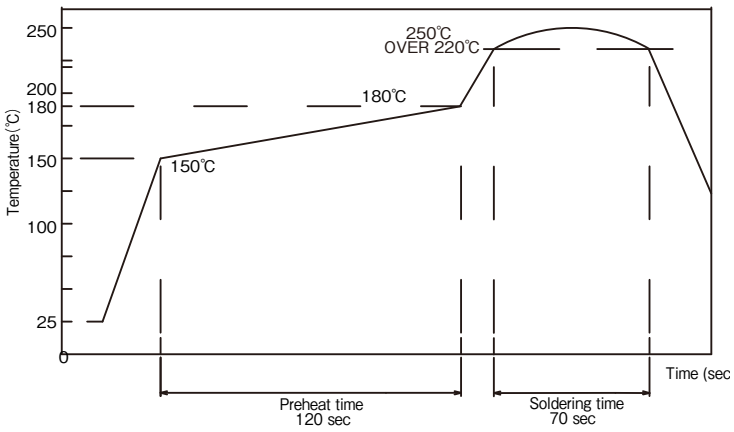


Recommended Reflow Temperature Profile (Lead-Free Solder)

Recommended Reflow Conditions
Temperature Profile
(Lead Free Solder)



Recommended Reflow Conditions
Temperature Profile
(Connector Top Surface)



Test Board

BF4-IR2 High Speed Transmission Board

A test board is available to evaluate the operating characteristics of the plug harness.
*Two pairs are required for evaluation. Contact a Hirose representative for details.

Connector Mating/Removal Method

●Connector Mating Method

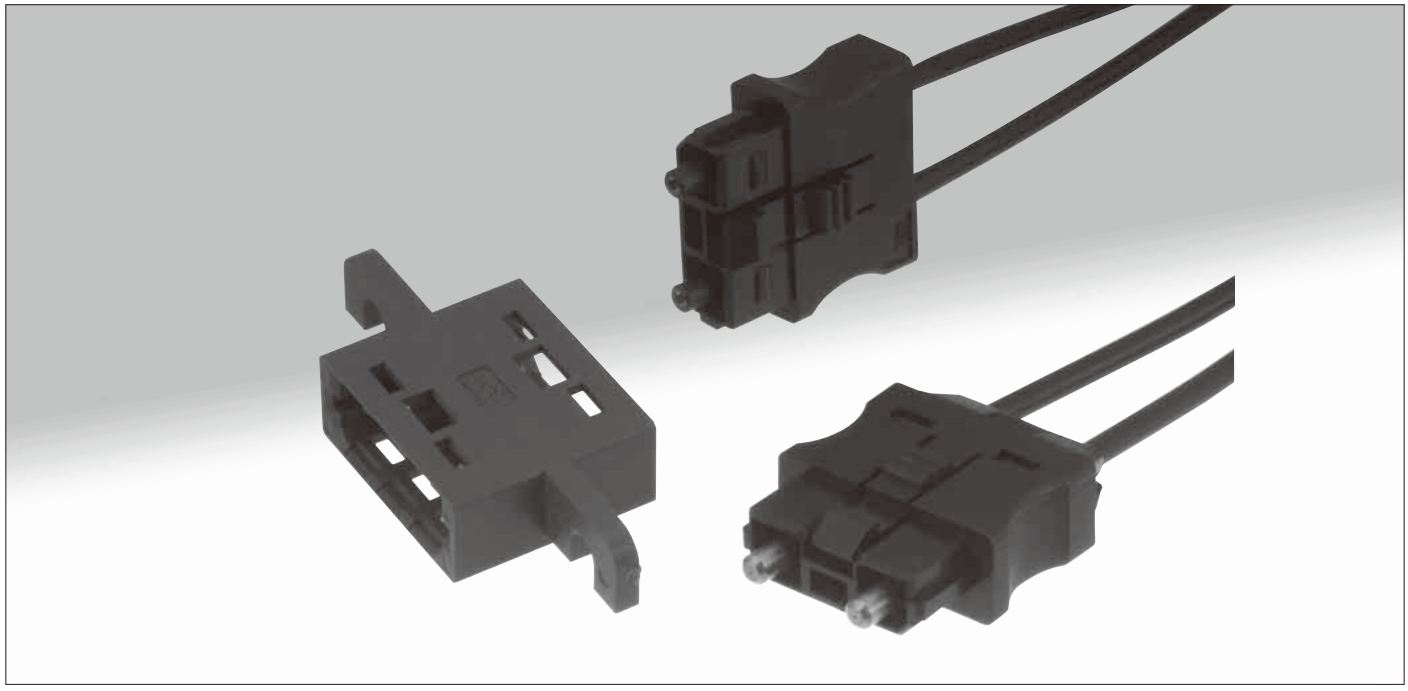
・Do not hold the optical fiber cable or cable securing section when mating. Hold the IR2 / LCD plug when mating.
Holding the optical fiber cable or cable securing section may cause an excessive load resulting in damage.
・Do not mate while the power is on.
IR2 Plug : Insert and remove the IR2 plug with the power turned off. Hot swap insertion or removal can cause damage.
LCD Plug : Insert and remove the LCD plug with the power turned off. (Refer to "Notes on the laser" below on Notes on Product Usage.)
・Do not touch the tip of the mating part of the LCD plug directly.
・Plug Mating Durability
IR2 Plug : The mating durability of the IR2 plug and IR2 receptacle is 1,000 times Max.
LCD Plug : The mating durability of the LCD plug and LC adapter is 100 times Max.

●Connector Removal Method

・Remove the plug by pushing on the IR2 / LCD plug lock (unlock).
Removal by holding the plug body without pushing on the lock or by holding the optical fiber cable or cable securing section can cause an excessive load resulting in damage.
・Do not remove the product while the power is on.
IR2 Plug : Insert and remove the IR2 plug with the power turned off. Hot swap insertion or removal can cause damage.
LCD Plug : Insert and remove the LCD plug with the power turned off. (Refer to "Notes on the laser" below on Notes on Product Usage.)

Duplex Optic Connectors for Plastic Fiber

H07 Series



■Features

1.Conformed to IEC 61754-16(JIS C 5976 F07 Type)

2.Two types of plugs, suited to different optical fiber.

①**Type AP ~for use with APF (All Plastic Fiber) or POF (Plastic Optical Fiber) ~**

These plugs have a monoblock design which includes the ferrules.
The connectors are suited to transfer systems that are tens of meters in length.

②**Type CP ~for Use with PCF (Plastic-Clad Silica Fiber) ~**

These connectors are of the floating ferrule type and are suited to transfer systems that are hundreds of meters in length.
The ferrules with this connectors are metal parts and are economical compared to ones that use ceramics.

■Applications

Between equipment such as audio/video, factory automation, and office equipment, and short data links such as transfer systems within equipment.

■Product Standards

Rating	Operating temperature range	-25°C to 85°C	Storage temperature range	-40°C to 85°C

Item		Test Method (JIS C 5961)	Standard
Mechanical Characteristics	Engagement Force	Measured with corresponding connector. Engagement speed : 50 mm/s	Engagement Force : 39.2 N max.
	Durability (cycles, mating/unmating)	500 times	No damage, cracks, or part looseness
	Vibration	Frequency : 10 Hz to 55 Hz, single amplitude of 0.75 mm, 24 cycles in each of the 3 axis.	
	Shock	Acceleration:981 m/s², duration time:6 ms, half sine shock pulse, 3 times in each of the 3 axis. (for a total 18 times)	
Environmental Characteristics	Humidity (Composite humidity cycle)	Humidity : 90 % to 96 % Temperature : -10°C to 65°C Time : 240 hours (10 cycle)	
	Temperature cycling	-40°C to 100°C, 100 cycles	
	Dry heat	240 hours at 85°C	
	Cold	240 hours at -40°C	
	Salt mist	48 hours in a 5% concentration of a salt mist	No corrosion

■Materials

Part name	Material
Plug housing	PBT
Adapter housing	PBT
Ferrule	Brass (Nickel plating)

Part name	Material
Spring	Stainless steel
Split sleeve	Phosphor bronze
Sleeve holder	Stainless steel

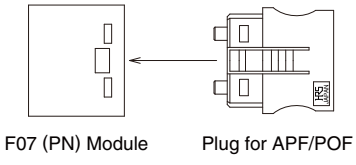
■Structure of the Product Number

H07 – CP – P1
❶ ❷ ❸

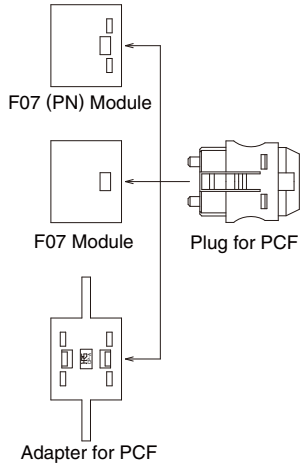
❶ Series Name
❷ CP:For Plastic clad silica fiber(PCF) AP:For All plastic fiber(APF)
❸ P1:Plug, A3: Adapter

■Function Diagram

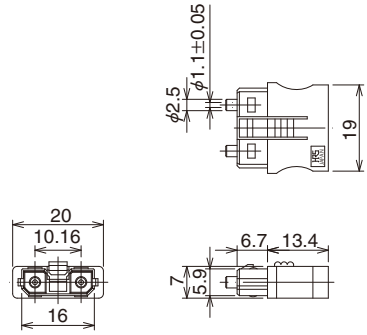
(1)Connectors for APF / POF



(2) Connectors for PCF

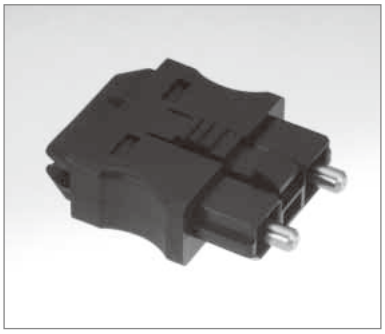


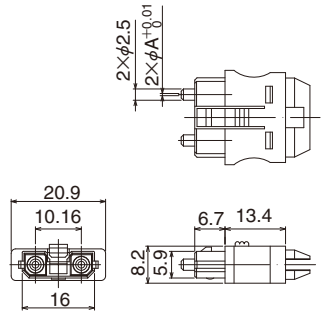
■Plugs for APF/POF



HRS No.	Product Number	Suitable Cable Diameter	Suitable Fiber Diameter (Clad Dia.)	Notes
CL822-0001-6-40	H07-AP-P1(40)	φ2.2mm	φ1mm	With ferrule

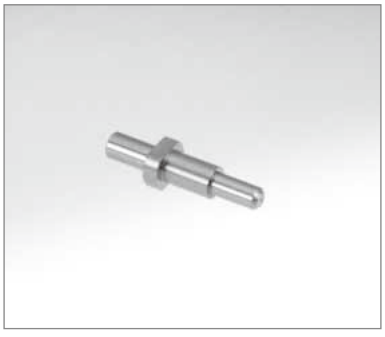
■Plugs for PCF

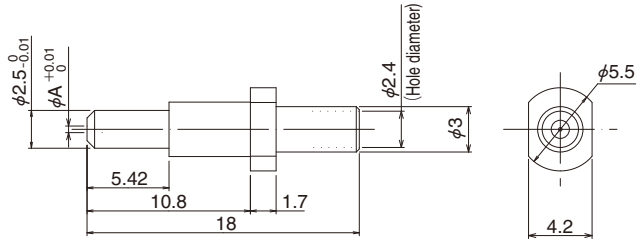




HRS No.	Product Number	Ferrule hole, φA Dimension	Suitable Cable Diameter	Suitable Fiber Diameter (Clad Dia.)	Notes
CL822-0014-8-60	H07-CP-P1(F0235)(60)	0.235	φ2.2mm	φ0.23	With ferrule
CL822-0015-0-60	H07-CP-P1(F0230)(60)	0.230	φ2.2mm	φ0.23	With ferrule
CL822-0019-0-60	H07-CP-P1(F0300)(60)	0.305	φ2.2mm	φ0.30	With ferrule

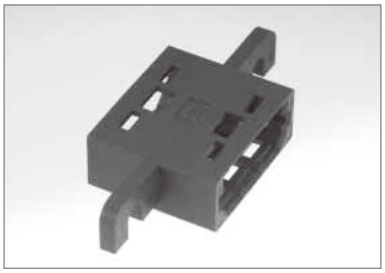
■Ferrules for PCF

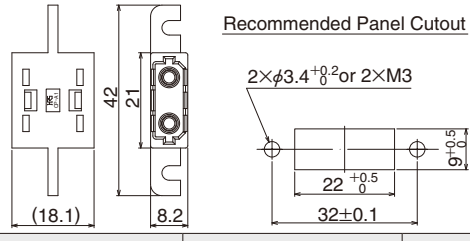




HRS No.	Product Number	Ferrule hole, φA Dimension	Suitable Cable Diameter	Suitable Fiber Diameter (Clad Dia.)	Notes
CL822-0004-4-40	H07-CP-F0235(40)	0.235	φ2.2mm	φ0.23	for PCF
CL822-0006-0-40	H07-CP-F0230(40)	0.230	φ2.2mm	φ0.23	
CL822-0018-9-40	H07-CP-F0300(40)	0.305	φ2.2mm	φ0.30	

■Adapters for PCF





HRS No.	Product Number	Suitable Plug	Notes
CL822-0028-2-00	H07-CP-A3	H07-CP-P1***	for PCF

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

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