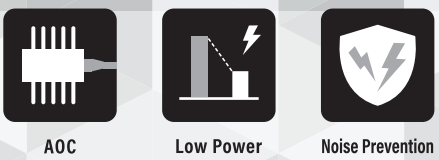
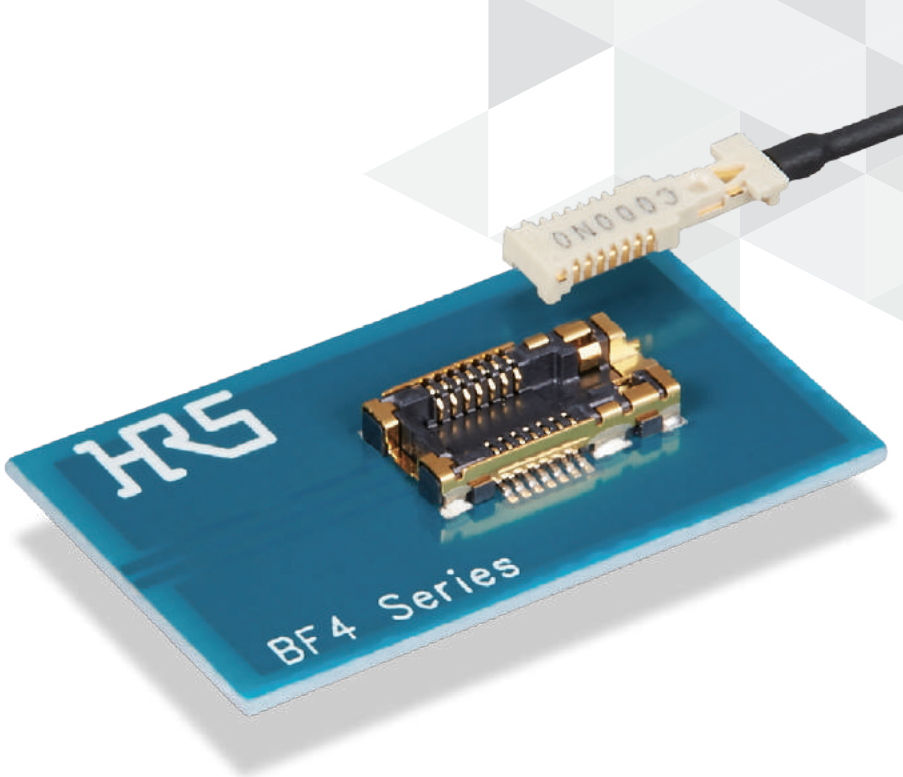
PRODUCT CATALOG

HIROSE ELECTRIC CO.,LTD.

BF4M Series

Active Optical Connector





Oct.1.2023 Copyright 2023 HIROSE ELECTRIC CO., LTD. All Rights Reserved.

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

https://hirose.nt-rt.ru/ || hes@nt-rt.ru

Overview

Hirose developed the micro "BF4MC connector" that enables optical transmission of data between boards that are incorporated in devices.
It converts an electrical signal that is received from a board by using the semiconductor component built in the connector and then transfers the data via optical fiber.
The BF4MC connector has a revolutionary design that enables easy use of the benefits of optical transmission, including electromagnetic noise-free, insulated, long-distance, high speed transmission. Mounting inside devices achieves dramatic space saving and lower power consumption when compared to existing optical products.
It can be used in a wide range of applications, including medical appliances, measurement equipment, FA systems, etc.
Please consult with a Hirose representative when considering for applications that require high reliability such as automotive.

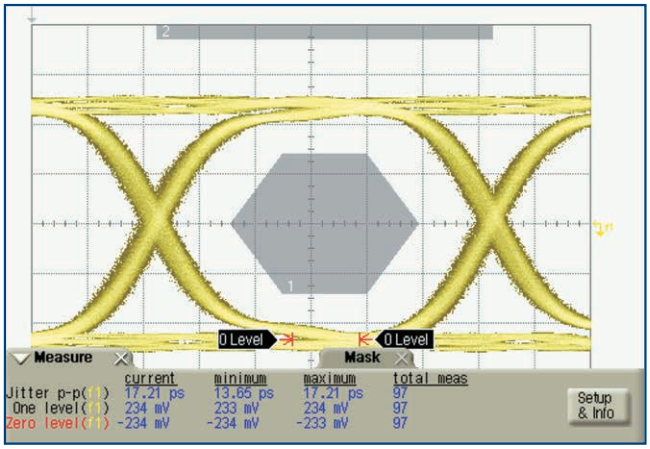
Features

1. Optical Transmissions Achieved by Simplified Electrical Connections

An easy transmission is accomplished with electronic connectors and eliminates the need for cleaning the mating faces of traditional fiber optic connectors.

2. High Speed Signal Transmissions with No EMI Noise.

Optical signal transmissions rated up to 6.25 Gbps are possible.
Since there is no EMI noise on the signal lines, system design time will be saved.



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

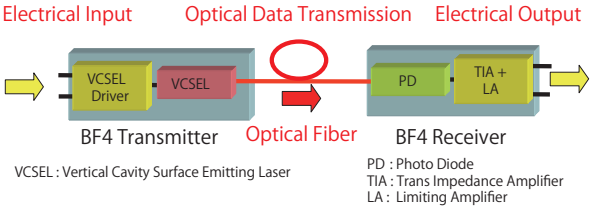
3. Highly Flexible Optical Fiber

A highly flexible optical fiber is useful for narrow space wiring within devices.

Oct.1.2023 Copyright 2023 HIROSE ELECTRIC CO., LTD. All Rights Reserved.

4. Long Distance, High Speed and High Quality Signal Transmissions

The BM4M design is capable of high speed and high quality signal transmissions even over long transmission distances.



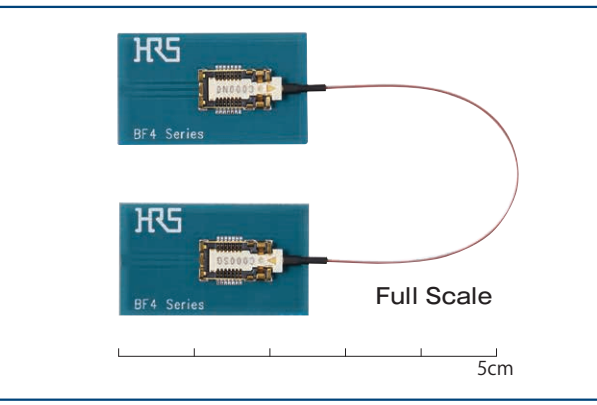
Block Diagram

5. Low Power Consumption

Power consumption is significantly reduced compared to a conventional optical transceiver.

6. Space-Saving and Low Profile Design with 1.5mm Height

Using the BF4M enables optical transmission with the same small form factor as electronic connectors.



7. Hirose offers a wide array of optical in-line and device to device connection types.

Oct.1.2023 Copyright 2023 HIROSE ELECTRIC CO., LTD. All Rights Reserved.

Electrical Characteristics

● Electrical Characteristics of BF4MC-TX (Transmitter Side)

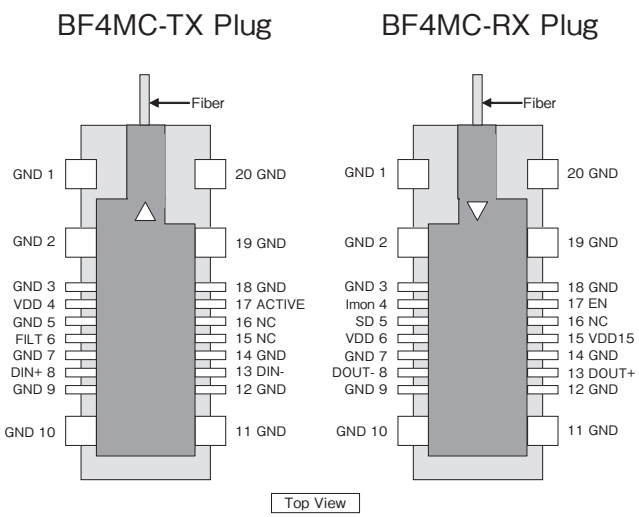
	Min.	Nominal	Max.	Unit
Transmission Speed (8B/10B)	0.05	-	6.25	Gbps
VDD Voltage	2.25	2.5/3.3	3.6	V
ACTIVATE = H Voltage	1.0	-	VDD Voltage	V
DIN Common Voltage	150	-	340	mVp
DIN Differential Voltage	200	-	1400	mVp

● Electrical Characteristics of BF4MC-RX (Receiver Side)

	Min.	Nominal	Max.	Unit	Remarks
Transmission Speed (8B/10B)	0.05	-	6.25	Gbps	-
VDD Voltage	2.25	2.5/3.3	3.6	V	-
VDD 15 Voltage	1.45	1.5	1.55	V	When driving with dual power sources
DOUT Common Voltage	160	-	330	mVp	-
DOUT Differential Voltage	160	-	330	mVp	-
SD = H Voltage	1.0	1.5	1.6	V	-

Oct.1.2023 Copyright 2023 HIROSE ELECTRIC CO., LTD. All Rights Reserved.

<Pin Assignment>



<Pin Functions>

Descriptions of BF4MC-TX Pins

Symbol	Name	Type	Details
VDD	Vsupply	Power	Power Supply DC+2.5 or +3.3V
GND	Ground	Ground	-
ACTIVE	Activate	Input	H Voltage : Active Mode L Voltage : Sleep Mode
FILT	Filter	-	Decouping Capacitor Connection Contact
DIN+	Data input +	Input	Differential Data Input
DIN-	Data input -	Input	Differential Data Input
NC	Not Connect	-	Not Connected in Normal Operation

Descriptions of BF4MC-RX Pins

Symbol	Name	Type	Details
VDD	Vsupply	Power	Power for PD(*)
VDD15	Vdd1.5V	Power	Power for Core(*)
GND	Ground	Ground	-
SD	Signal Detect	Output	H Voltage : Detected L Voltage : Undetected
DOUT+	Data Output +	Output	Differential Data Output
DOUT-	Data Output -	Output	Differential Data Output
EN	Regulator Enable	Input	[Dual Supply Mode] Not Connected [Single Supply Mode] EN Pin Must be Connect to VDD
Imon	Mirrored Photodiode Current Monitor	Output	Not Connected (Inspection Pin)
NC	Not Connect	-	Not Connected in Normal Operation

Note : For details, see the BF4MC Design Note ETAD-K0671.

Oct.1.2023 Copyright 2023 HIROSE ELECTRIC CO., LTD. All Rights Reserved.

Product Materials

● Plug Harnesses

Component		Details
Transmitter Plug (TX)	Housing	LCP (BF4MC : White)
	Contact	Phosphor Bronze (Gold Plating)
	Plate	Phosphor Bronze (Nickel Plating)
	VCSEL	GaAs
	VCSEL Driver	Si (CMOS)
	Bonding Wire	Gold
	Sealing Resin	Epoxy Resin
	Heat Shrink Tubing	Polyolefin (Black)
	ESD Cap	TPC (Black)
Receiver Plug (RX)	Housing	LCP (BF4MC : White)
	Contact	Phosphor Bronze (Gold Plating)
	Plate	Phosphor Bronze (Nickel Plating)
	PD	GaAs
	TIA/LA	Si (CMOS)
	Bonding Wire	Gold
	Sealing Resin	Epoxy Resin
	Heat Shrink Tubing	Polyolefin (Black)
	ESD Cap	TPC (Black)
Optical Fiber	Fiber	Silica Glass (GI50/80)
	Coating	UV Curable Resin/Thermo Plastic Resin(ϕ 0.5)
SC Connector	Housing	PBT (Blue)
	Boot	TPC (Blue)
	Spring	Stainless Steel
	Ferrule	ZrO2
	Ferrule Flange	Stainless Steel
	Cap	TPC (Black)
LC Connector	Housing	PEI (Beige)
	Boot	Elastomer (White)
	Spring	Stainless Steel
	Ferrule	ZrO2
	Ferrule Flange	Brass
	Cap	TPC (Black)

● Receptacles

Component		Materials
Transmitter Receptacle (TX) and Receiver Receptacle (RX)	Housing	LCP (Black)
	Contact	Phosphor Bronze (Gold Plating)
	Shell	Phosphor Bronze (Gold Plating)

Oct.1.2023 Copyright 2023 HIROSE ELECTRIC CO., LTD. All Rights Reserved.

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

BF4M C-6G TX RX - B1 - 75MM
❶ ❷ ❸ ❹ ❺ ❻

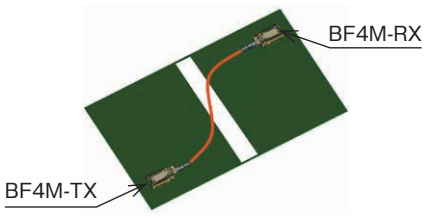
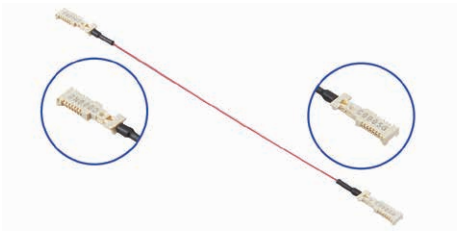
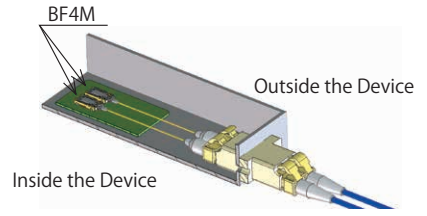
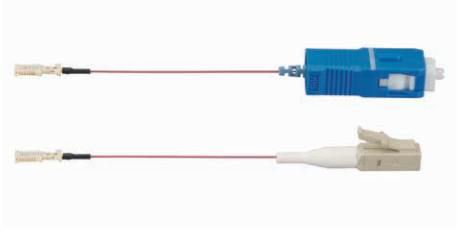
❶ Series	BF4M	❺ Type of Fiber Cable	B1 : Diameter ϕ 0.5, Red B2 : Diameter ϕ 0.5, Blue
❷ Bit Rate	C-6G : 0.05 to 6.25 Gbps		
❸ ❹ Type of plug that attaches to both ends of the harness	TX : BF4 Transmitter Plug SC : SC Connector RX : BF4 Receiver Plug LC : LC Connector	❻ Fiber Cable Length	*Cable length 1m Max. ⇒ The end of the product name·##MM (Millimeter) *Cable length 1m Min. ⇒ The end of the product name·##M (Meter)

■ Receptacle

BF4 - TX - 14 DS - 0.5 V (##)
❶ ❷ ❸ ❹ ❺ ❻ ❼

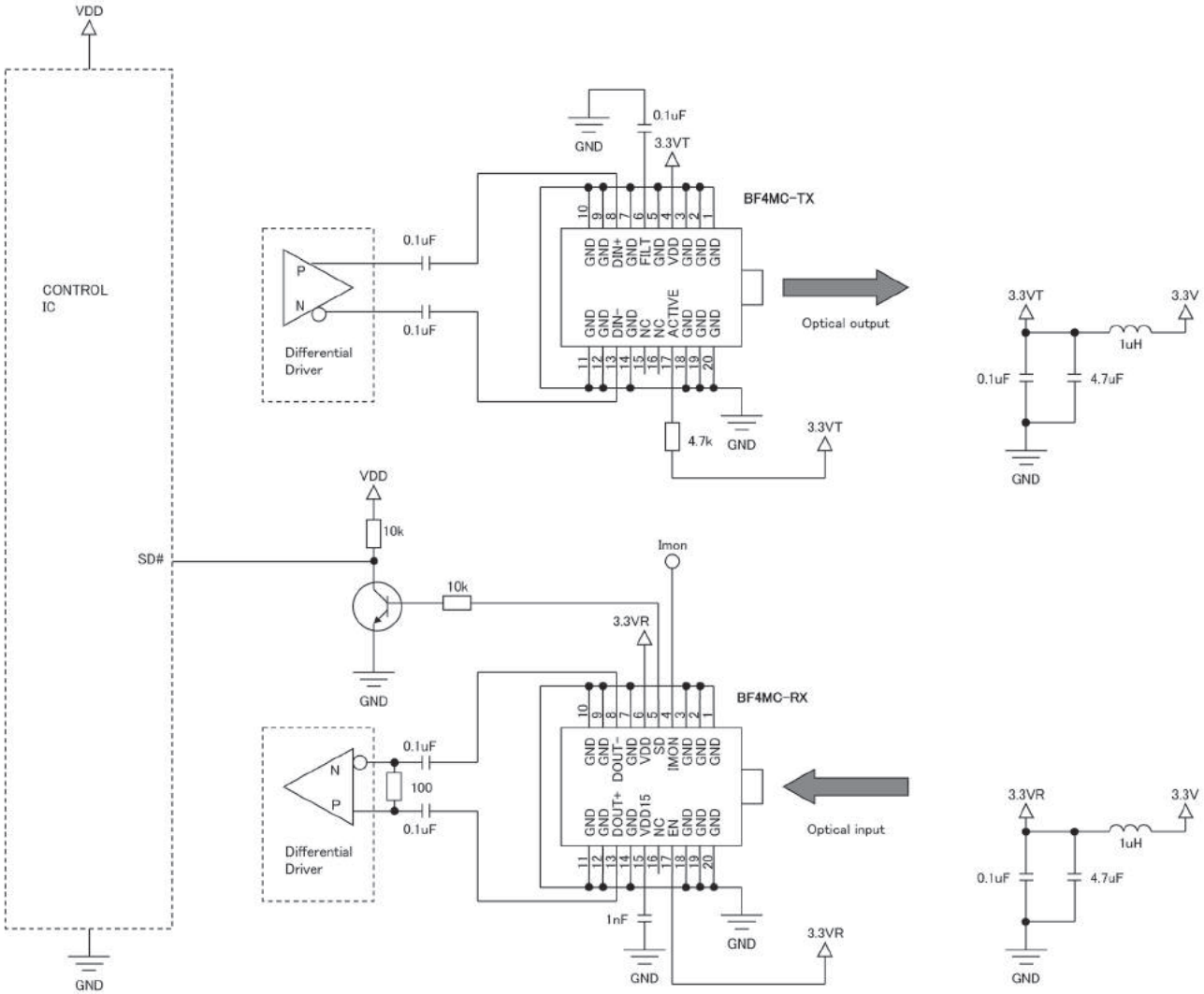
❶ Series	BF4	❻ Mating Method	V : Vertical Mated to the Mounting Surface
❷ Transmitter/ Receiver	TX : Transmitter RX : Receiver	❼ Packing Specifications	None : 500pcs per reel (01) : 1000pcs per reel (02) : 2000pcs per reel (10) : 10pcs per bag (11) : 100pcs per reel
❸ No. of Pos.	14		
❹ Socket Shape	Socket (S) of Double line assignment pins (D)		
❺ Pitch	0.5mm		

BF4 Variations

Type	Usage Image	Product Image
Both Ends BF4M (Connection for board-to-board)		
One End BF4M, the Other Conventional Optical Connector (SC,LC) In-line Optical Connector (In-line Connection Between Inside and Outside the Device)		

Oct.1.2023 Copyright 2023 HIROSE ELECTRIC CO., LTD. All Rights Reserved.

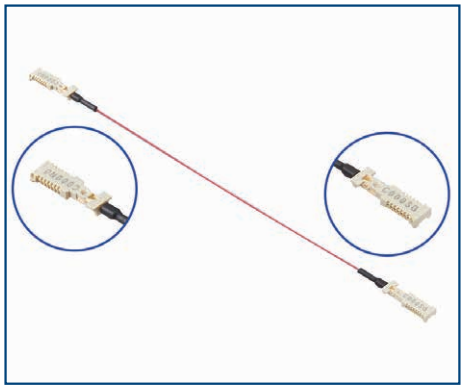
Connection Example of +3.3V (Single Power Supply Mode)

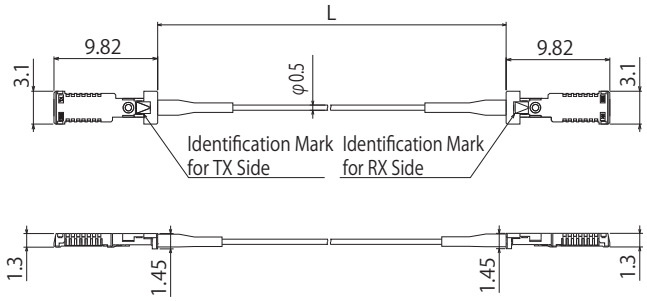


Oct.1.2023 Copyright 2023 HIROSE ELECTRIC CO., LTD. All Rights Reserved.

Plug Harness

● BF4MC Harness





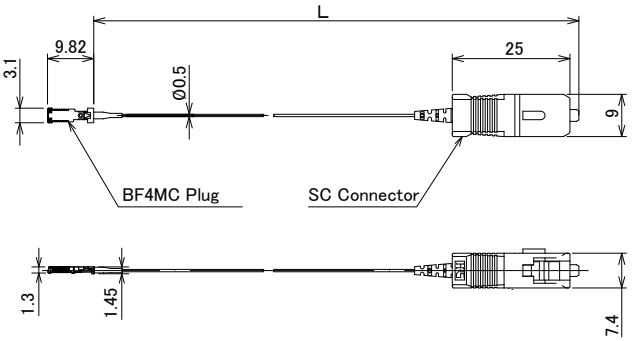
● BF4MC Harness (Representative Product)

Part No.	HRS No.	Fiber	Cable length L	Purchase Unit
BF4MC-6GTXRX-B1-45MM	CL0831-1102-0-04		45mm	
BF4MC-6GTXRX-B1-50MM	CL0831-1102-0-05		50mm	
BF4MC-6GTXRX-B1-55MM	CL0831-1102-0-06		55mm	
BF4MC-6GTXRX-B1-60MM	CL0831-1102-0-07		60mm	
BF4MC-6GTXRX-B1-65MM	CL0831-1102-0-08		65mm	
BF4MC-6GTXRX-B1-70MM	CL0831-1102-0-09		70mm	15pcs per tray
BF4MC-6GTXRX-B1-75MM	CL0831-1102-0-00		75mm	
BF4MC-6GTXRX-B1-80MM	CL0831-1102-0-11		80mm	
BF4MC-6GTXRX-B1-85MM	CL0831-1102-0-12	ϕ 0.5 Red	85mm	
BF4MC-6GTXRX-B1-90MM	CL0831-1102-0-13		90mm	
BF4MC-6GTXRX-B1-95MM	CL0831-1102-0-14		95mm	
BF4MC-6GTXRX-B1-100MM	CL0831-1102-0-15		100mm	
BF4MC-6GTXRX-B1-1M	CL0831-1109-9-00		1m	
BF4MC-6GTXRX-B1-2M	CL0831-1109-9-01		2m	
BF4MC-6GTXRX-B1-3M	CL0831-1109-9-02		3m	1pcs per bag
BF4MC-6GTXRX-B1-4M	CL0831-1109-9-03		4m	
BF4MC-6GTXRX-B1-5M	CL0831-1109-9-04		5m	

Note 1 : The shortest harness length is 45mm, and harnesses up to 100mm in length are available in 5mm increments. (45mm, 50mm, 55mm...100mm)
Note 2 : Harness lengths other than those listed above are also available upon request. Please inform a Hirose representative of your desired harness length.
Note 3 : Blue fiber color is also available. Contact a Hirose sales representative for details.

Oct.1.2023 Copyright 2023 HIROSE ELECTRIC CO., LTD. All Rights Reserved.

● BF4MC - SC Connector Harness

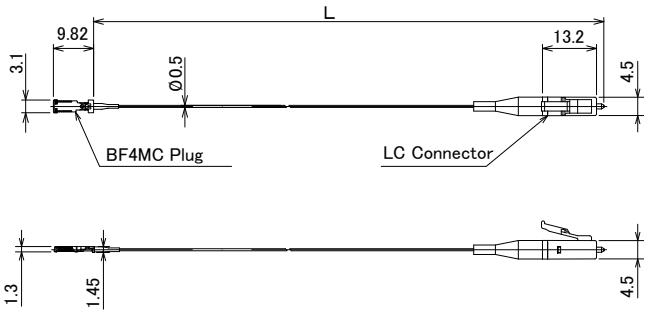


● BF4MC - SC Connector Harness (Representative Product)

Part No.	HRS No.	Fiber	Length	TX or RX
BF4MC-6GTXSC-B1-100MM	CL0831-1111-0-00	ϕ 0.5 Red	100mm	TX
BF4MC-6GRXSC-B1-100MM	CL0831-1112-0-00		100mm	RX
BF4MC-6GTXSC-B1-500MM	CL0831-1111-0-05		500mm	TX
BF4MC-6GRXSC-B1-500MM	CL0831-1112-0-05		500mm	RX

Note 1 : The shortest harness length is 100mm.
Note 2 : Please use the BF4MC transmitter and receiver connectors together.
Note 3 : Harness lengths other than those listed above are also available upon request. Please inform a Hirose representative of your desired harness length.
Note 4 : Blue fiber color is also available.

● BF4MC - LC Connector Harness



● BF4MC - LC Connector Harness (Representative Product)

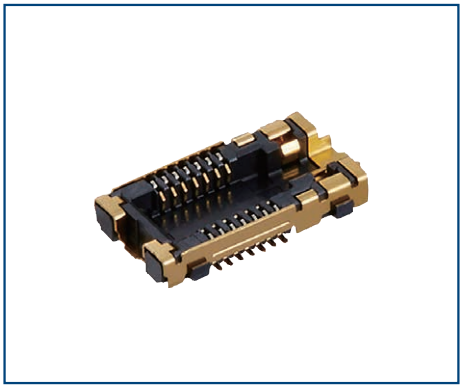
Part No.	HRS No.	Fiber	Length	TX or RX
BF4MC-6GTXLC-B1-100MM	CL0831-1114-0-00	ϕ 0.5 Red	100mm	TX
BF4MC-6GRXLC-B1-100MM	CL0831-1135-0-00		100mm	RX
BF4MC-6GTXLC-B1-500MM	CL0831-1114-0-05		500mm	TX
BF4MC-6GRXLC-B1-500MM	CL0831-1135-0-05		500mm	RX

Note 1 : The shortest harness length is 100mm.
Note 2 : Please use the BF4MC transmitter and receiver connectors together.
Note 3 : Harness lengths other than those listed above are also available upon request. Please inform a Hirose representative of your desired harness length.
Note 4 : Blue fiber color is also available.

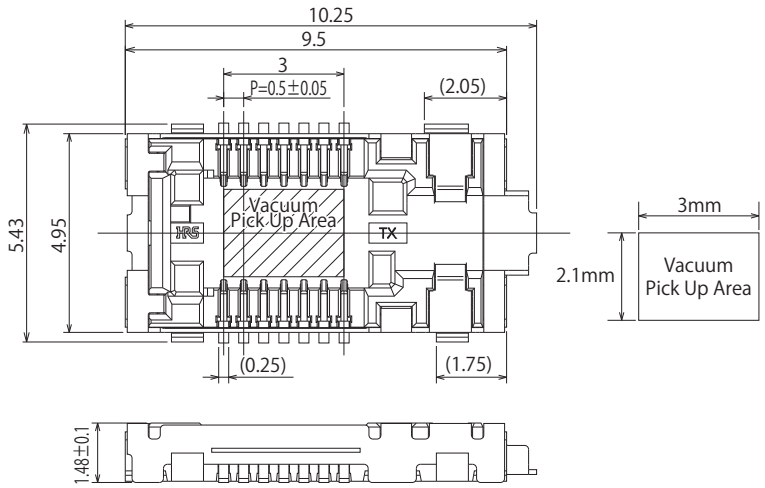
Oct.1.2023 Copyright 2023 HIROSE ELECTRIC CO., LTD. All Rights Reserved.

Receptacle

● Receptacle : Transmitter (TX)



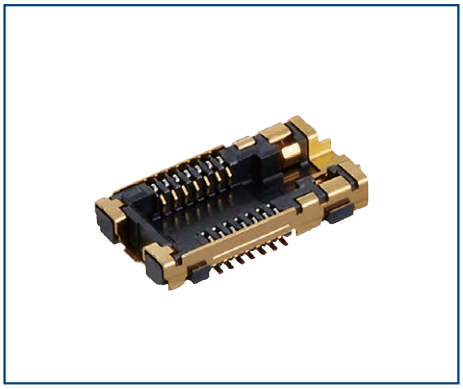
Note : Designed so that the receiver (RX) plug does not mate.



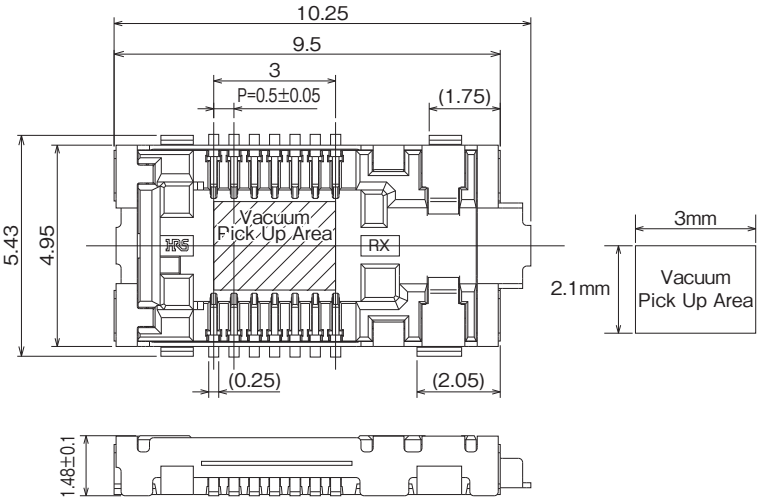
Part No.	HRS No.	Purchase Unit
BF4-TX-14DS-0.5V	CL0831-0008-6-00	500pcs per reel
BF4-TX-14DS-0.5V(01)	CL0831-0008-6-01	1000pcs per reel
BF4-TX-14DS-0.5V(02)	CL0831-0008-6-02	2000pcs per reel
BF4-TX-14DS-0.5V(10)	CL0831-0008-6-10	10pcs per bag
BF4-TX-14DS-0.5V(11)	CL0831-0008-6-11	100pcs per reel

Oct.1.2023 Copyright 2023 HIROSE ELECTRIC CO., LTD. All Rights Reserved.

● Receptacle : Receiver (RX)



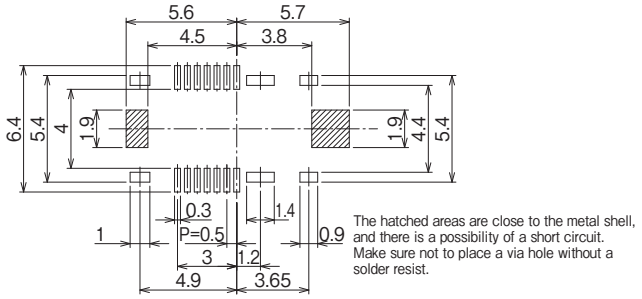
Note : Designed so that the transmitter (TX) plug does not mate.



Part No.	HRS No.	Purchase Unit
BF4-RX-14DS-0.5V	CL0831-0009-9-00	500pcs per reel
BF4-RX-14DS-0.5V(01)	CL0831-0009-9-01	1000pcs per reel
BF4-RX-14DS-0.5V(02)	CL0831-0009-9-02	2000pcs per reel
BF4-RX-14DS-0.5V(10)	CL0831-0009-9-10	10pcs per bag
BF4-RX-14DS-0.5V(11)	CL0831-0009-9-11	100pcs per reel

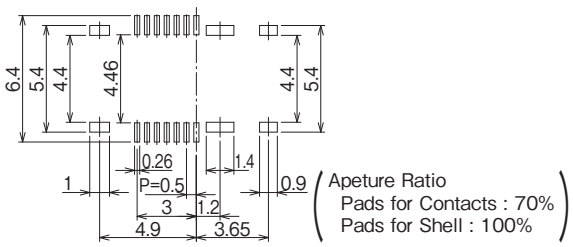
● Pattern Layout

Recommended PCB Land Pattern Dimensions



The hatched areas are close to the metal shell, and there is a possibility of a short circuit. Make sure not to place a via hole without a solder resist.

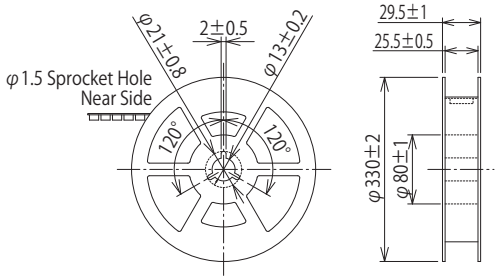
Recommended Stencil Dimensions
(Stencil Thickness 120μm)



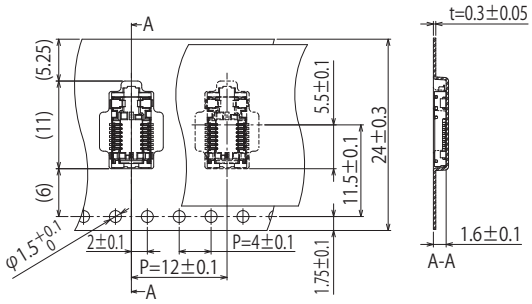
Apeture Ratio
Pads for Contacts : 70%
Pads for Shell : 100%

● Packaging Specifications

Reel Dimensions

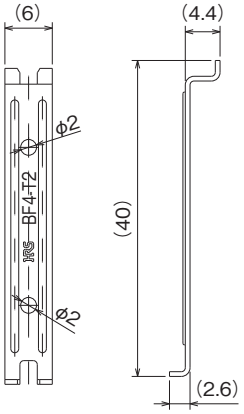


Emboss Carrier Tape Dimensions



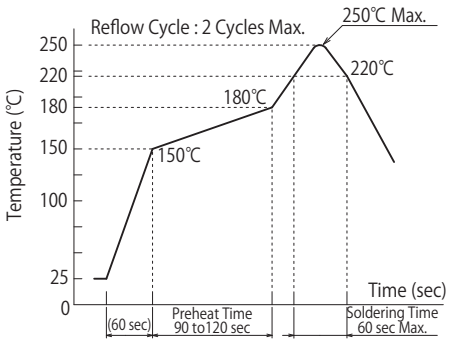
Oct.1.2023 Copyright 2023 HIROSE ELECTRIC CO., LTD. All Rights Reserved.

Extraction Tool



Part No.	HRS No.	Purchase Unit
BF4-T2	CL0831-0006-0-00	1pcs per bag

Recommended Reflow Temperature Profile (Lead-Free Solder)



Test Board

PCBs for testing and evaluation are available.
Please contact us for more information.

BF4M High Speed
Transmission Board : TX2

BF4M High Speed
Transmission Board : RX2

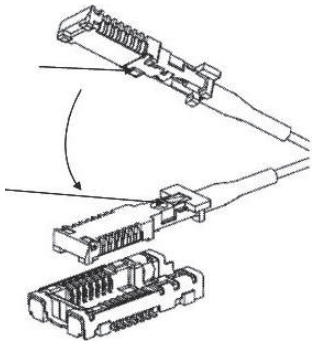
Oct.1.2023 Copyright 2023 HIROSE ELECTRIC CO., LTD. All Rights Reserved.

Connector Mating Method

Do not mate the connector while power is being supplied.
Make sure to insert or remove the plug after the power supply is turned off. Hot plugging/unplugging may cause damage.

Metal plate (silver) shall be on bottom surface during mating process.

Metal exposed area (gold, triangle mark) shall be on top surface during mating process.



Cautions for Connector Unmating

Do not pull the fiber when removing the connector.
When removing the connector, make sure to hook the plug with an extraction tool so that the stress is not applied to the cable. Pulling the cable to remove it may cause a breakage in the cable. Please unmate by hooking onto the plug that protudes slightly from the optical fiber for easy unmating.

Do not remove the plug while power is being supplied.
Make sure to remove the plug after the power supply is stopped. Hot plugging / unplugging may cause damage.

Precautions for Optical Connectors

Refer to the optical fiber catalog for cautions on handling cables with optical connectors.

Oct.1.2023 Copyright 2023 HIROSE ELECTRIC CO., LTD. All Rights Reserved.

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

https://hirose.nt-rt.ru/ || hes@nt-rt.ru