

# BF4MC series


△3 0.05 to 6.25 Gbps, Super small Connector  
Incorporating E/O and O/E converters

## Specifications

Revision History

Rev.	Change
△0	First version for preproduction sample
△1	Modified pin description
△2	Correction of errors
△3	Correction of errors

Notes) In this document, "BF4MC-TX" means Tx (transmitter) plug,  
and "BF4MC-RX" is RX (receiver) plug

	COUNT	DESCRIPTION OF REVISIONS	DESIGNED	CHECKED	DATE
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名称 TITLE			 <b>HIROSE ELECTRIC CO., LTD.</b> APPROVED MT.SHIBUTANI 14.05.30 CHECKED OM.MIYAMOTO 14.05.30 DESIGNED TS.YAMAZAKI 14.05.30 WRITTEN TS.YAMAZAKI 14.05.30		
BF4MC series Specification					
技術指定書 TECHICAL SPECIFICATION					
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## Table of contents

1. General description.....	3
2. Features.....	3
3. Function description.....	3
3-1. Block diagram.....	3
3-2. Pin assignment.....	3
4. Characteristics.....	4
4-1. Absolute maximum ratings.....	4
4-2. Electrical characteristics.....	4
4-3. Pin assignment.....	5
4-4 Operating conditions of BF4MC-RX.....	6
4-4-1. Dual supply mode.....	6
4-4-2. Single supply mode.....	6
5. Application notes.....	7
5-1. Termination.....	7
5-2. DC balance.....	7
5-3. Connection with LVDS signal.....	7
5-4. Peripheral circuit.....	8
5-5. Definition of differential and common voltage.....	10

### 1. General description

This document defines the ratings and characteristics of Hirose BF4MC series, super small optical active connector.

### 2. Features

- ③ - 6.25 Gbps high-speed transmission capability by using optical fiber
- Simplex, One-way data transmission
- VCSEL and VCSEL driver are incorporated in a connector (Tx)
- Photodiode and TIA/LA are incorporated in a connector (Rx)
- Low power consumption : 80 mW MAX. (Dual supply mode, Operating at room temperature)  
120 mW MAX. (Single supply mode, Operating at room temperature)
- SLVS-200 interface (LVDS tolerant)
- Power supply : [Tx (transmitter)] 2.5 V or 3.3 V  
[Rx (receiver)] 2.5 V and 1.5 V (Dual supply mode)  
3.3 V (Single supply mode)

### 3. Function description

#### 3-1. Block diagram

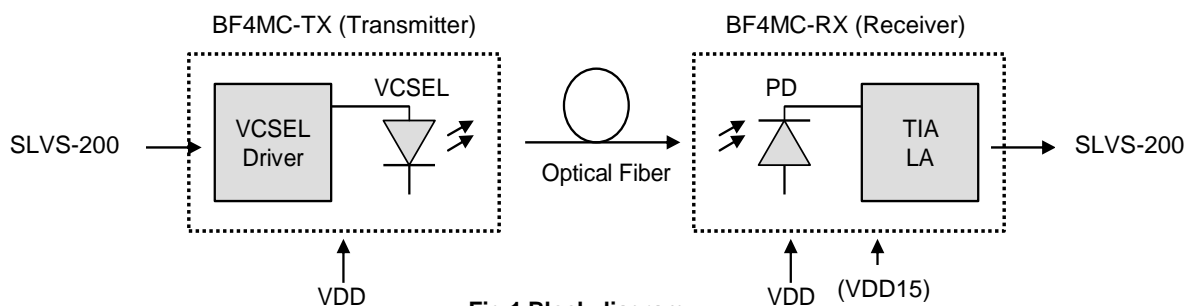


Fig.1 Block diagram

#### 3-2. Pin assignment

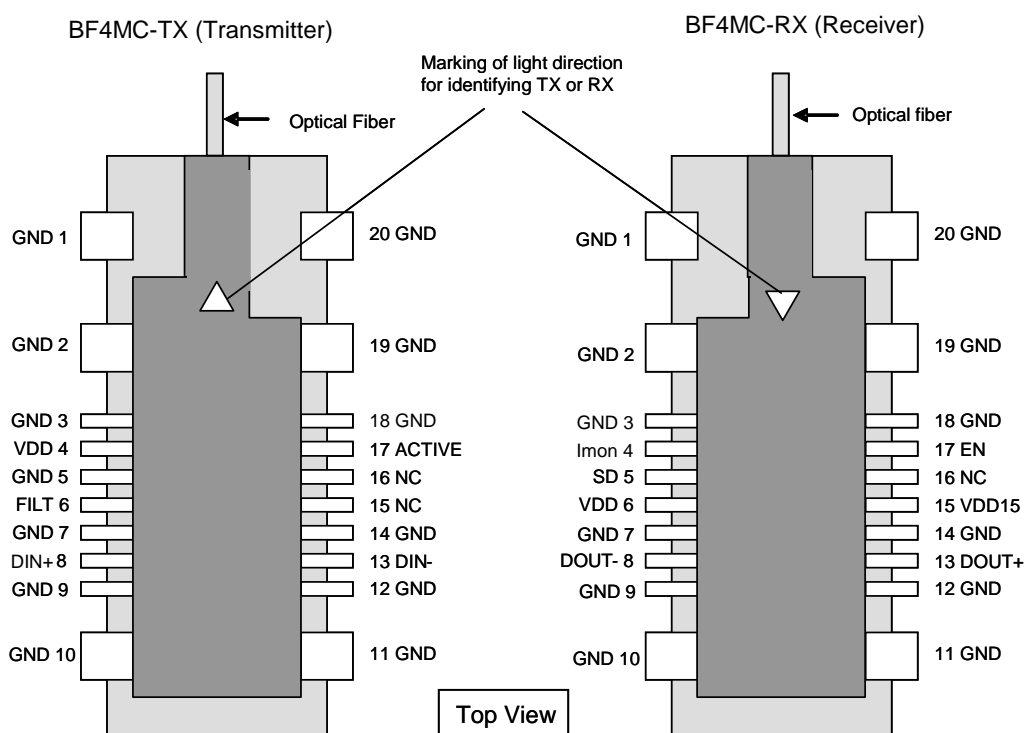


Fig2 Pin assignment

## 4. Characteristics

### 4-1. Absolute maximum ratings

**Table 1. BF4MC-TX maximum rating**

	MIN.	MAX.	UNIT
VDD Voltage	- 0.5	4.5	V
DIN Voltage	- 0.5	1.8	V
FILT Voltage	- 0.5	2.8	V
ACTIVE Voltage	- 0.5	3.6	V

**Table 2. BF4MC-RX maximum rating**

	MIN.	MAX.	UNIT
VDD Voltage	-0.4	4.0	V
VDD15 Voltage	-0.4	1.6	V

### 4-2. Electrical characteristics

**Table 3. BF4MC-TX electrical characteristics**

	MIN	TYP	MAX	UNIT	NOTE
Transmission Speed(8B10B)	0.05		$\triangle$ 6.25	Gbps	
VDD Voltage	2.25	2.5/3.3	3.6	V	
ACTIVE=H voltage	1.0		VDD	V	
DIN common mode voltage	150		340	mV	
DIN differential voltage	200		1400	mV	

**Table4. BF4MC-RX electrical characteristics**

	MIN	TYP	MAX	UNIT	NOTE
Transmission Speed(8B10B)	0.05		$\triangle$ 6.25	Gbps	
VDD voltage	3.2	3.3	3.4	V	Single Supply Mode
VDD voltage	2.25	2.5	3.6	V	Dual Supply mode
VDD15 voltage	1.45	1.50	1.60	V	
DOUT common mode voltage	160		330	mV	
DOUT differential voltage	160		330	mV	
SD = H voltage	1.0	1.50	1.60	V	
I <sub>mon</sub>	20			uA	For Internal test

### 4-3. Pin functions

**Table 5. BF4MC-TX Pin function**

SYMBOL	NAME	TYPE	DETAILS
VDD	Vsupply	Power	Power Supply DC2.5V or DC3.3V
GND	Ground	Ground	-
ACTIVE	Activate	Input	1:Active mode 0:Sleep mode
FILT	Filter	-	Decoupling capacitor connection contact, Connected via 0.01 uF capacitor
DIN+	Data input+	Input	SLVS Input
DIN-	Data input-	Input	SLVS Input
NC	No connect	-	Not connected

**Table 6. BF4MC-RX Pin function**

SYMBOL	NAME	TYPE	DETAILS
VDD	Vsupply	Power	Power <u>Dual supply mode</u> DC2.5V <u>Single supply mode</u> DC3.3V
VDD15	Vdd 1.5V	Power	Power for core <u>Dual supply mode</u> DC 1.5V <u>Single supply mode</u> Not connect or Connect decoupling capacitor
GND	Ground	Ground	-
SD	Signal Detect	Output	1:Detected 0:Not detected
Dout+	Data OUTPUT+	Output	SLVS Output
Dout-	Data OUTPUT-	Output	SLVS Output
EN	Regulator Enable	Input	For change supply mode <u>Dual supply mode</u> Not connected <u>Single supply mode</u> Connect VDD
Imon	Mirrored photodiode Current monitor	Output	For internal test. Not connected
NC	No connect	-	Not connected

## 4-4. Operating condition of BF4MC-RX

### 4-4-1. Dual supply mode

BF4MC shall be connected referring to Table 7 when operating at dual voltage supply.

**Table 7. BF4MC-RX Pin description for dual supply mode**

SYMBOL	DETAILS
EN	Not connected (Open)
VDD	DC2.5V
VDD15	DC1.5V

### 4-4-2. Single supply mode

BF4MC shall be connected referring to Table 8 when operating at single voltage supply.

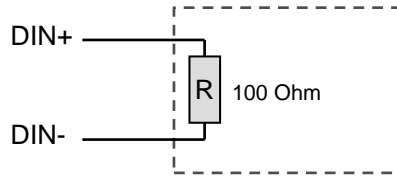
**Table 8. BF4MC-RX Pin description for single supply mode**

SYMBOL	DETAILS
EN	Connect VDD
VDD	DC3.3V
VDD15	Not connected or connect decoupling capacitor

## 5. Application notes

### 5-1. Termination

100 Ohm termination is built in the differential input DIN of a transmitter connector, BF4MC-TX.



**Fig.3 Built-in termination**

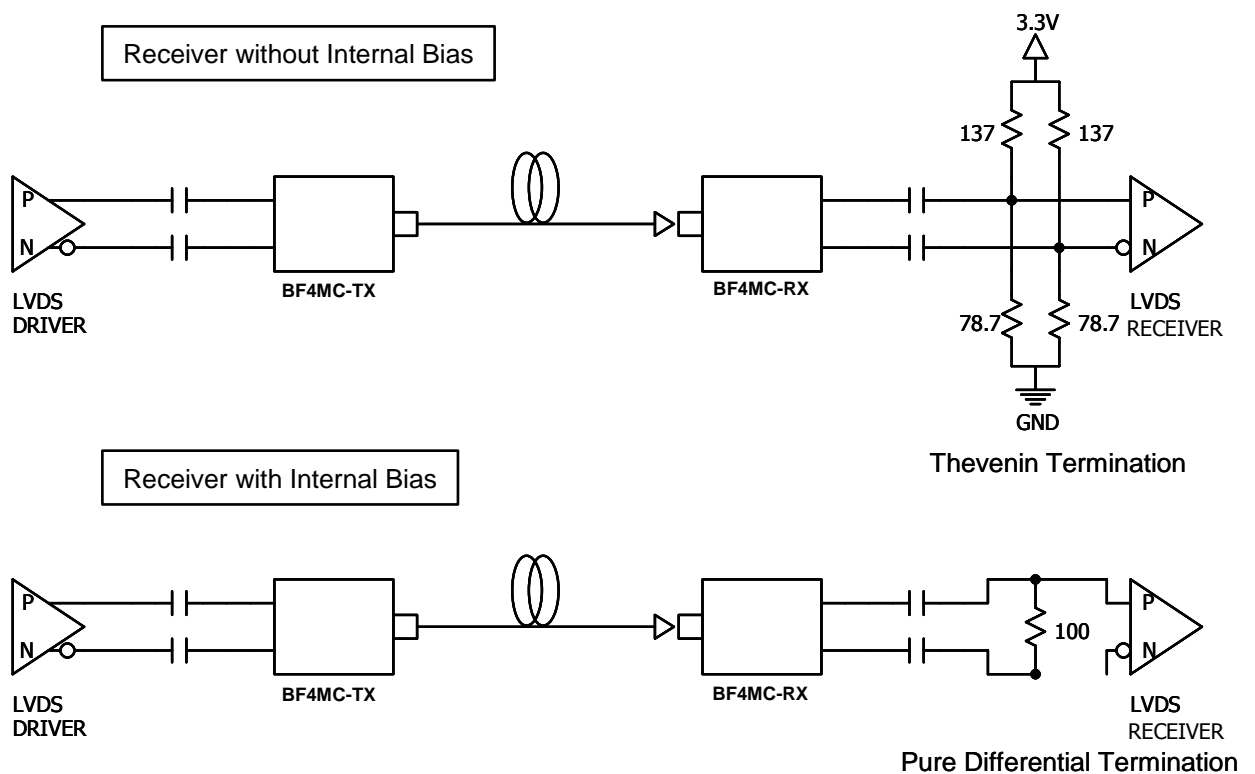
### 5-2. DC balance

BF4MC connector shows excellent performance by signal input with well-considered DC balance. Therefore the coding at 8B/10B is recommended.

### 5-3. Connection with LVDS signal

BF4MC I/O conforms to SLVS-200.

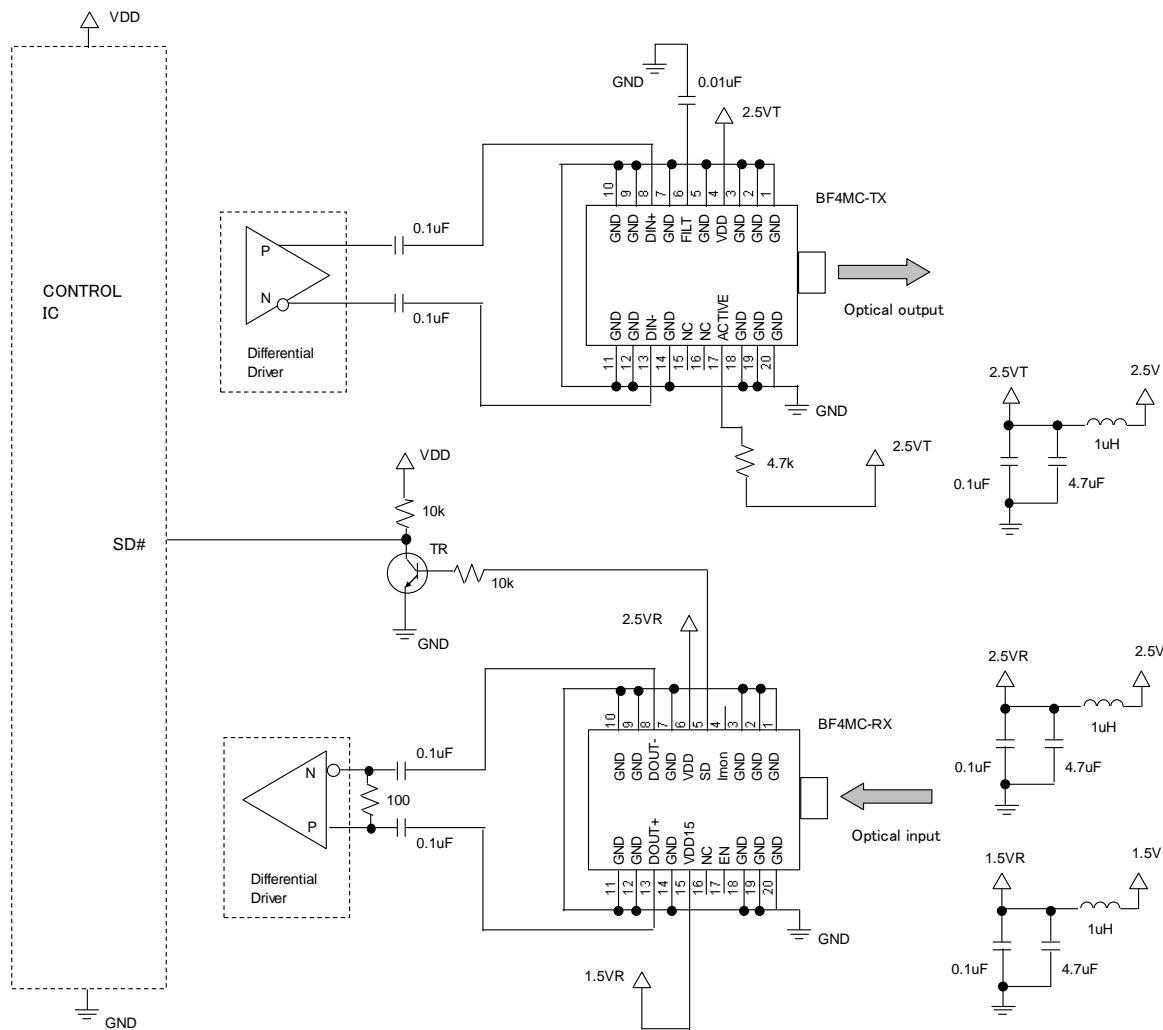
Also, BF4MC is compatible to LVDS I/O signal by AC coupling and termination like Fig.4



**Fig.4 Example of connection with LVDS signal**

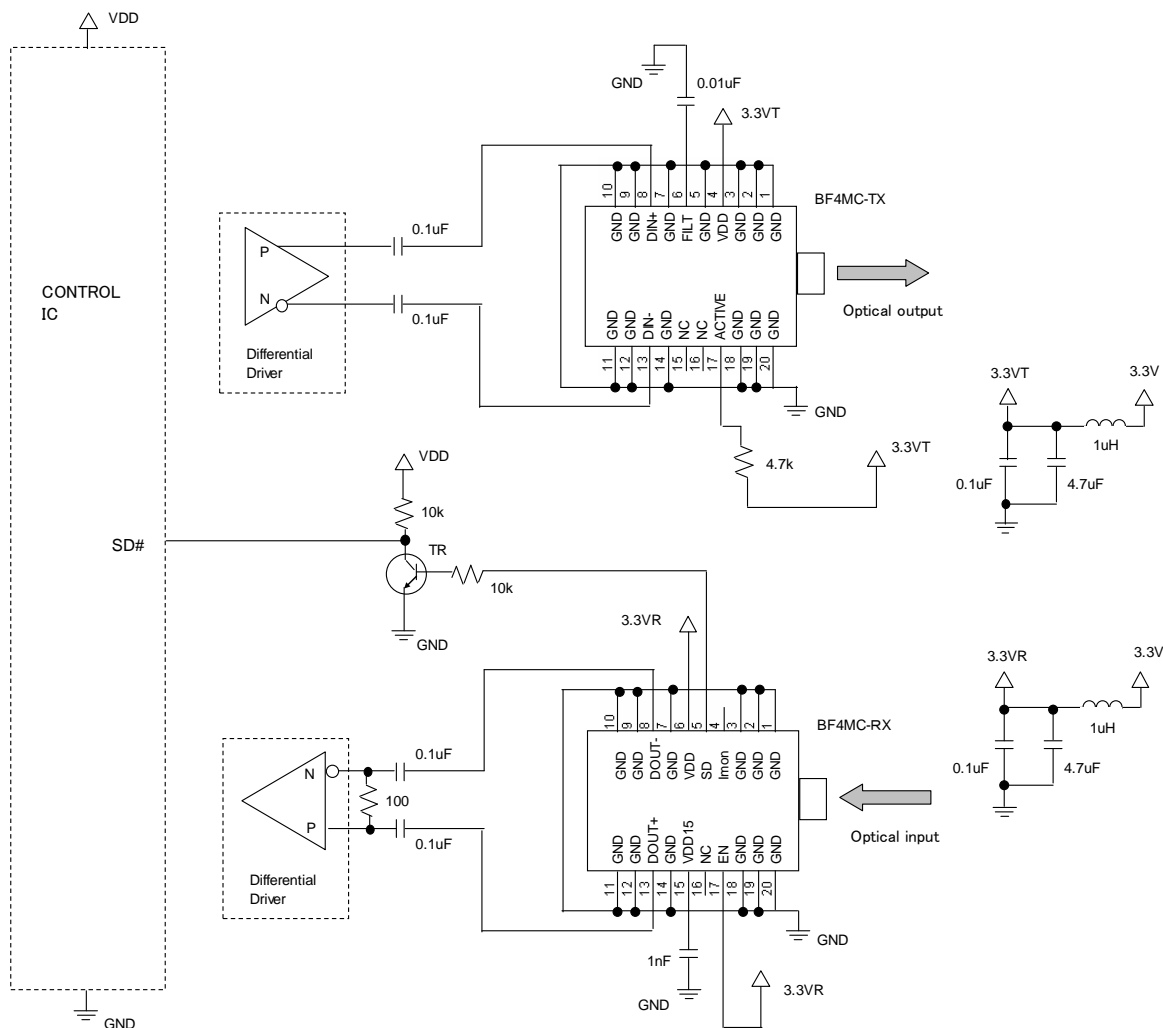
### 5-4. Peripheral circuits

To minimize noise leakage from digital circuit, power supply should be isolated by connecting inductor, chip beads, etc. for both BF4MC-TX and BF4MC-RX.  
 “SD” output level shall be converted when BF4MC-RX is connected to 3.3 V LVC MOS, because “SD” output level is 1.5 V. Example of “SD” level conversion using transistor is shown in Fig.5-1 and 5-2. But please take care that logic are inverted in this case.



**Fig.5-1 Peripheral circuits ~Dual supply mode~**

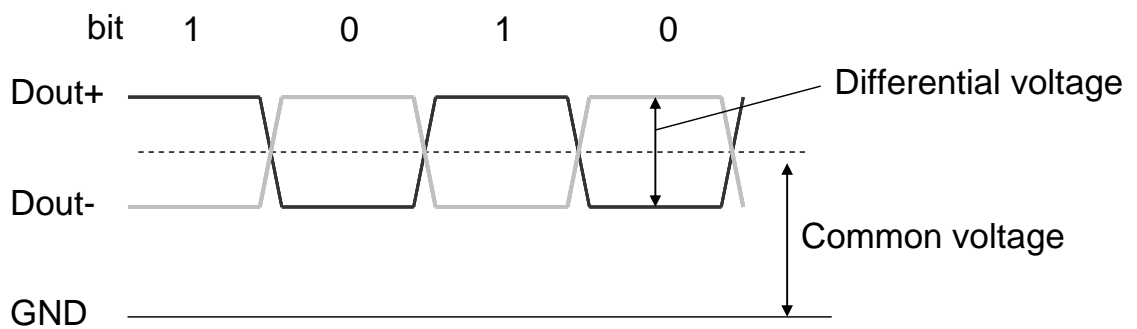




**Fig.5-2 Peripheral circuits ~Single supply mode~**

### 5-5. Definition of differential and common voltage

The differential and common voltage in this specifications sheet is defined as Fig.6.



**Fig.6 Differential and Common voltage**