

# THOR Fiber



## F-M4SDI-TxRx

### 4 Channel HD-SDI Optical Tx-Rx Kit with RS485

User Manual

2017

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# Chapter 1. Introduction

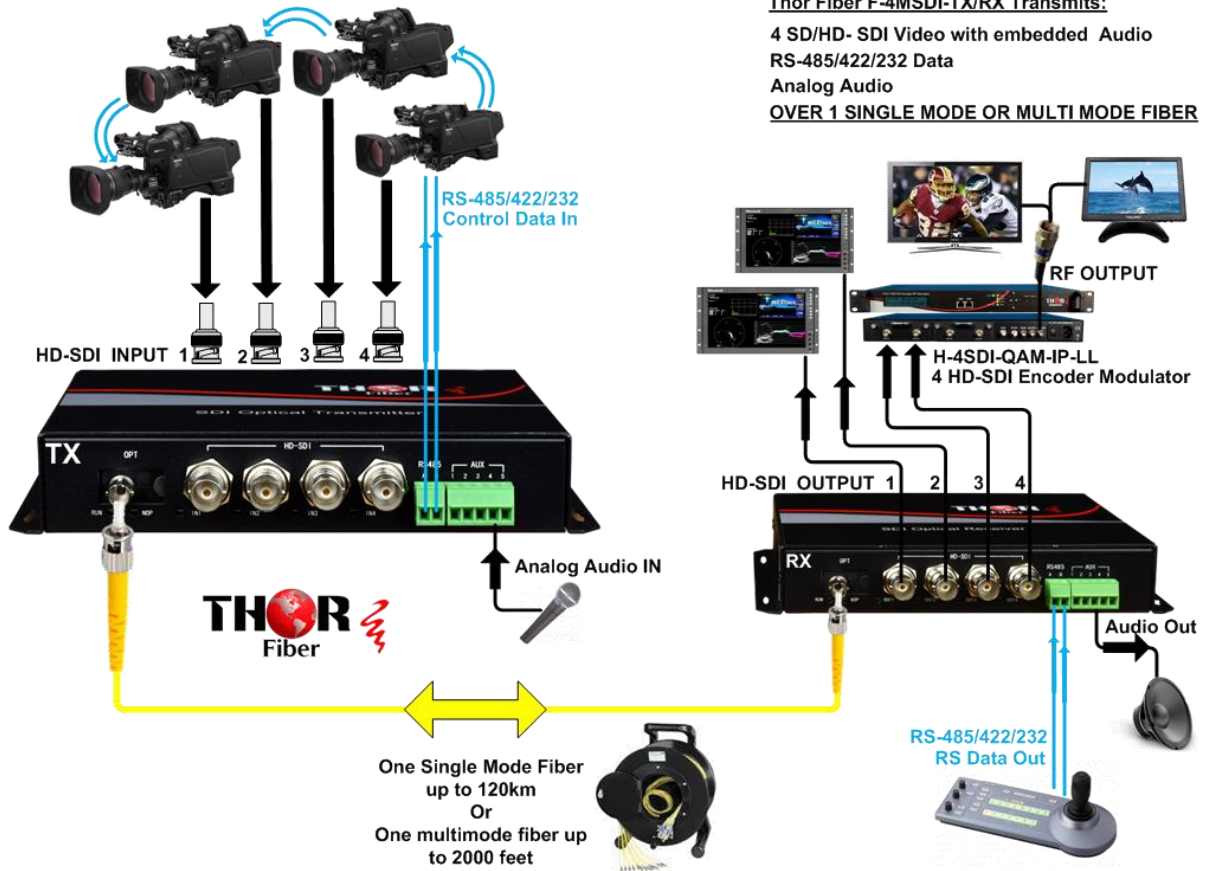
## 1.1 Overview

The Thor Fiber F-M4SDI-TxRx kit is a compact power house that will allow any user to transport four channels of 1.485Gbps HD-SDI Serial Data Interface over a single strand of fiber. Furthermore this Thor Fiber Kit of Transmitter and Receiver will send RS485 in reverse for easy control over the kit. This sturdy unit creates an easy drop environment for users that require multiple [HD-SDI sources on one Fiber](#) across any application and even allows additional AUX Cards which can allow a plethora of other options such as RS232 and RS422, and even capable of carrying external analog audio instead of the SDI embedded audio. Thor Fiber has an excellent reputation for high quality and low cost products to help complete your project on time, in a loss free high quality kit that will ensure you stay under budget. Commonly used in security applications, live performance environments, video surveillance, SDI distribution and control in any environment.

## 1.2 Features

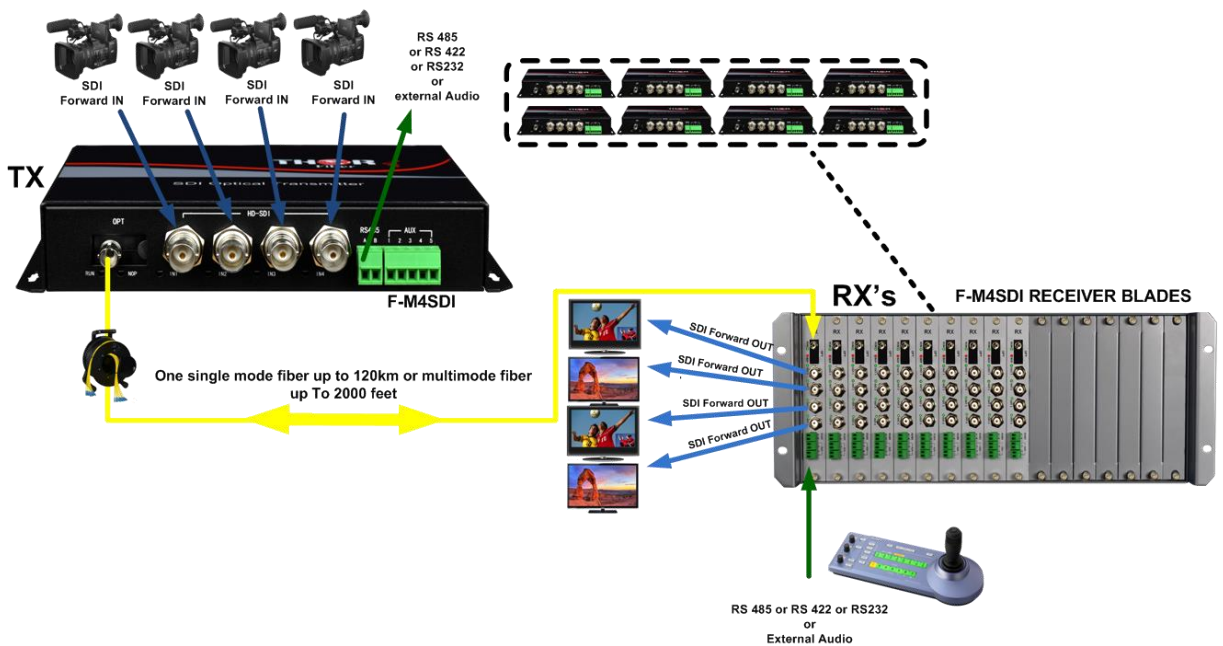
- SMPTE-292M HD-SDI standard, supports 1.485Gb/s
- Transmitter: Four SD/HD-SDI input (BNC)
- Receiver: Four SD/HD-SDI output (BNC)
- One auxiliary channel, which can be 1-channel bi-directional audio, or two-channel unidirectional audio, or 2-channel contact closure input/output, or 1-channel bi-directional RS422/RS232 channel
- One directional RS485 channel, half duplex, up to 115.2Kb/s baud rate
- Supports 1080P@29.97, 23.98, 1080I@59.94, 720P@59.94, 29.97, 23.98 format
- Integrated cable equalizer
- Embedded ESD and surge protection circuit to prevent damage from static and thunder
- NOP (No optical signal) alarm indications, output status indicator and input lock indicator
- APC circuit for stable optical power
- 1080P@30,29.97,25,24,23.98, 1080I@60,59.94,50, 720P@60,59.94,50,30,29.97,25,24, 23.98, and 625i, 525i

### 1.3 Application Drawing



### 4 Ch Mini HD-SDI Fiber Optic Extender

Extend four HD-SDI or SD-SDI digital video signals long distances over single-mode fiber optic cable



## Chapter 2. F-M4SDI Kit Panels



Figure 2-1 F-M4SDI-TxRx Front Panel

Table 2-1-1 Interface on F-M4SDI-TxRx Front Panel

Name	Description	
OPT	Optical interface, bi-directional, ST/PC Connector	
SDI	IN	HD-SDI input 1-4
	OUT	HD-SDI output 1-4
RS485	RS485 serial management interface, adopts PHOENIX connector	
	A	RS485 differential signal A
	B	RS485 differential signal B
AUX	One auxiliary channel, which can be 2-channel bi-directional audio, or 2-channel unidirectional audio, or 4-channel unidirectional audio, or 2-channel contact closure input/output, or 1-channel bi-directional RS422 , or 2-channel bi-directional RS232 channel. <b>Note: if the auxiliary channel is used as the audio channel, the embedded audio channel in the HD-SDI signal will be unavailable.</b>	

Table 2-1-2 Indicators on F-M4SDI-TxRx

Name	Description
NOP	Optical signal loss alarm indicator, red. ON: Optical signal loss is detected at the port. OFF: the optical port receive normal signal.
RUN	Running indicator, green. Normal blink: works normally

	OFF: Abnormal.
IN	The HD-SDI input lock indicator, green. ON: video input normally. OFF: video input abnormally.
OUT	The HD-SDI output status indicator, green. ON: output normally. OFF: output abnormally.
ACT	RS485 link indicator, green. Blink: There are data transmitting and receiving; OFF: No data transmit or receive;

Table 2-1-3 AUX interface

AUX interface	No.	Name	Description
2-channel bi-directional audio (AUX206)	1	AOUT1	Audio channel -1 output
	2	AOUT2	Audio channel -2 output
	3	G	Ground
	4	AIN1	Audio channel -1 input
	5	AIN2	Audio channel -2 input
2-channel unidirectional audio input (AUX208)	1	AIN1	Audio channel -1 input
	2	AIN2	Audio channel -2 input
	3	G	Ground
	4	--	--
	5	--	--
2-channel unidirectional audio Output (AUX207)	1	AOUT1	Audio channel -1 output
	2	AOUT2	Audio channel -2 output
	3	G	Ground
	4	--	--
	5	--	--
4-channel unidirectional audio Input (AUX211)	1	AIN1	Audio channel -1 input
	2	AIN2	Audio channel -2 input
	3	G	Ground
	4	AIN3	Audio channel -3 input
	5	AIN4	Audio channel -4 input
4-channel unidirectional audio Output (AUX212)	1	AOUT1	Audio channel -1 output
	2	AOUT2	Audio channel -2 output
	3	G	Ground
	4	AOUT3	Audio channel -3 output
	5	AOUT4	Audio channel -4 output
2-channel contact closure output (AUX200)	1	NC0	The first channel contact closure output No alarm: the contact is normally-closed (NC) Alarm: the contact is open

	2	COM0	Command contact of the first channel contact closure
	3	NC1	The second channel contact closure output No alarm: the contact is normally-closed (NC) Alarm: the contact is open
	4	COM1	Command contact of the first channel contact closure
	5	--	--
2-channel contact closure input (AUX201)	1	K0	The first channel contact closure input
	2	COM0	Command contact of the first channel contact closure
	3	K1	The second channel contact closure input
	4	COM1	Command contact of the second channel contact closure
	5	--	--
1-channel bi-directional RS422 (AUX204)	1	TXA	RS422 differential signal A output
	2	TXB	RS422 differential signal B output
	3	RXA	RS422 differential signal A input
	4	RXB	RS422 differential signal B input
	5	G	Ground
2-channel bi-directional RS232 (AUX205)	1	TX1	RS232 signal output 1
	2	RX1	RS232 signal input 1
	3	G	Ground
	4	TX2	RS232 signal output 2
	5	RX2	RS232 signal input 2

Note1: The AUX interface of F-M4SDI-T and F-M4SDI-R are used in pairs, if F-M4SDI-T uses 2-channel unidirectional audio output interface, F-M4SDI-R should use 2-channel unidirectional audio input interface.

## 2.1 Rear Panel



Figure 2-2-1 F-M4SDI-TxRx

Table 2-2-1 F-M4SDI-TxRx Rear Panel

Name	Description
DC12V	DC 12V power input interface Adopts AC220V/DC12V power adapter, provides 12V power supply
⊕	Protective Ground (PGND) screw, connect with the chassis.



## Chapter 3. Technical Specifications

Table 3-1 Technical Specifications

HD-SDI Interface	
Connector	BNC
Bit rate	1.485Gb/s and 270Mb/s auto adaptive
Impedance	75Ω
Return loss	>15dB
Output level	800mVp-p ± 10%
Rise and fall time (HD-SDI)	≤270ps
Rise and fall time (SD-SDI)	≤1.50ns
SD-SDI Alignment jitter (1KHz)	≤0.2UI
SD-SDI Timing jitter (10Hz)	<0.2UI
HD-SDI Alignment jitter (100KHz)	≤0.2UI
HD-SDI Timing jitter (10Hz)	<1.0UI
Standard	SMPTE-292M HD-SDI and SMPTE-259M SD-SDI
Audio Interface (Optional)	
Connector	PHOENIX connector
Impedance	Input high-impedance, output 600Ω
Quantization grade	24 bits
Sample frequency	48KHz
Audio input/output voltage	2VP-P
Bandwidth	20Hz~20KHz
Total Harmonic Distortion	0.1%
RS485 Interface	
Connector	PHOENIX connector
Baud rate	0~115.2Kb/s
Bit error ratio	<10 <sup>-9</sup>
Duplex	Half-duplex
CONSOLE Interface	
Connector	RJ45
Baud rate	38400
bits	8
Stop bit	1
parity check	None
EMU/EMU-EX Interface	
Connector	RJ45
Bit rate	10Mb/s or 100Mb/s auto adaptive

Power and Consumption for compact equipment	
Power supply	DC 12V
DC input voltage range	8V~14V
Power consumption	3W±10%
Power and Consumption for rack mount chassis	
Power supply	AC 220V /DC-48V
DC input voltage range	-36~-72V DC
AC input voltage range	176~264V
Power consumption for each card	3W±10%
Environment Requirements	
Working temperature	-30~60℃
Relative Humidity	≤95%, no condensation
Storage temperature	-40~85℃
Equipment Dimension	
Dimension of Rack mounting chassis (with rack ear)	330mm x 178mm x 482mm
Desktop equipment dimension	180mm x 123mm x 30mm

Note: The optical module is optional for users, the default is 20Km, other long distance needs to be declared when ordering.

## Chapter 4 Serial Management Interface

Table A-1 Pin description of CONSOLE interface

Pin	Definition	Remarks
PIN1	-	Null
PIN2	-	Null
PIN3	-	Null
PIN4	-	Null
PIN5	-	Null
PIN6	GND	Ground
PIN7	RSNM-IN	Serial network management channel input
PIN8	RSNM-OUT	Serial network management channel output

The CONSOLE cable adopts RJ45 connector at one end to connect the front panel of equipment, and DB9 connector at the other end to connect PC, the diagram is as Fig. A-1-1, Fig.A-1-2 shows:



Figure A-1-1 RJ45 connector

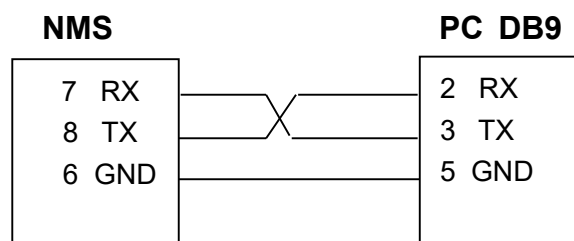


Figure A-1-2 Connection

## Chapter 5 Rack Mount Chassis

Rack mount chassis is 19 inches wide, 4U height, has 16 1-channel HD-SDI optical receive cards F-4MSDI-RK and 1 management card. In addition the rack mount chassis has 3 fans and 2 power modules, because it supports redundant power protection.

Table 3-1 Card list of rack mounting chassis

Name	Module	Description	Slot	Remote
4-channel HD-SDI optical receiver card	F-M4SDI-Rk	Four HD-SDI output interfaces, one RS485 interface and one auxiliary channel.	1-16	F-M4SDI-T
Management card	--	One Ethernet management interface(EMU), one cascade management interface (EMU-EX), and one serial management interface (CONSOLE). It supports CLI command line and SNMP_V1&V2 protocol, which is used to manage Ethernet port VLAN, temperature control of FAN, and various alarm and performance control.	17	-
-48V DC power card	PWR100DC	-48V DC power input, +12V power output. The power consumption is 100W, supports power management control.	Specific power card slot	-
220V AC power card	PWR100AC	~220VAC power input, +12V power output. The power consumption is 100W, supports power management control.		-

Note: The HD-SDI optical receive card supports hot-pluggable, which won't affect other working cards.

### 3.1 F-4MSDI-RK panel

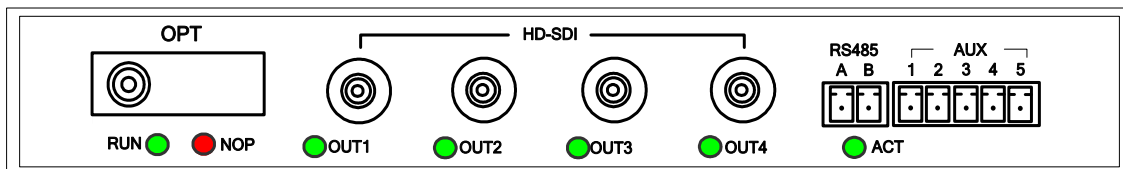


Figure 3-1-1 F-4MSDI-RK panel

### 3.2 NMS card Panel

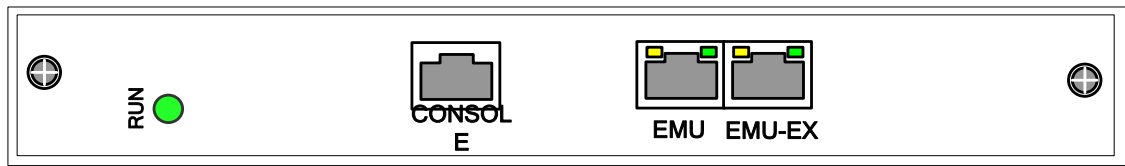


Figure 3-2-1 NMS card Panel – SLOT 17 in the Rack Mount Chassis for Management


Table 3-2-1 NMS Card Panel Description

Name	Description	
RUN	Running indicator, green. Normal blink: Device works normally (blink cycle is 0.3s). Quickly blink: Device is initializing (blink cycle is 0.1s). Slowly blink: Data is transferring from ARM to FLASH (blink cycle is 1.2s). Other status: Abnormal.	
CONSOLE	RS232 serial management interface (RJ-45), for CLI management. Refer to appendix 6 for the cable definition	
EMU	Ethernet management interface, adopts RJ45 connector, supports auto MDI/MDX function.	
	LINK/ACT	EMU link indicator, green. ON: Normal link but no data transmitted or received. Blink: Normal link and there are data transmitting and receiving. OFF: No link or the interface is not used.
	SPD	EMU work speed indicator, yellow ON: work in 100M; OFF: work in 10M.
EMU-EX	Ethernet cascade management interface, adopts RJ45 connector, supports auto MDI/MDX function.	
	LINK/ACT	EMU-EX link indicator, green. ON: Normal link but no data transmitted or received. Blink: Normal link and there are data transmitting and receiving. OFF: No link or the interface is not used.
	SPD	EMU-EX work speed indicator, yellow ON: work in 100M; OFF: work in 10M.

### 3.3 Rack Mount Chassis



Figure 3-2-1 Rack Mount Chassis (picture with F-M1SDI-2ET-RK Cards)

Name	Description
-48VIN	-48VDC power interface, the voltage range: -36~-72V。
PGND	Protective ground (PGND) screw, connect with the chassis.
GND	-48V power ground
220VIN	~220V AC power interface, the voltage range:176~264V
Power switch	“ON”: Power On; “OFF”: Power Off.
	Protective ground (PGND) screw, connect with the chassis.

## Chapter 4. NTSC/PAL Configuration

The transmitter can automatically detect the HD-SDI/SD-SDI standard of the input video, the receiver supports a PAL/NTSC dial switch to configure the standard of the output video. When the input video is 1080P@30,25,24, 1080I@60,50, 720P@60,50,30,25,24, the receiver should be configured as PAL; when the input video is 1080P@29.97, 23.98, [1080I@59.94](#), 720P@59.94, 29.97, 23.98, the receiver should be configured as NTSC; when the input video is 625i, 525i i.e. SD-SDI, both the PAL and NTSC are OK on the receiver.



Figure 5-1 The dial switch for PAL/NTSC standard and embedded audio

When the input video is 625i, 525i i.e. SD-SDI, the audio embedded in the SD-SDI can be transmitted to the receiver transparently. When the input video is HD-SDI, if there is AUX audio interface, the audio signal is transmitted between the AUX audio interface and the audio embedded in the HD-SDI is muted; if there is not AUX audio interface, the audio embedded in the HD-SDI can be transmitted. Only in the last case above, the HD MUTE dial switch is valid: NORMAL means the audio embedded in the output video is normal, and HD MUTE means the output video is muted.