

# DATA SHEET

## One (1) Fiber Detachable HDMI 2.0 Extender With Copper Extension, HDFX-700-TR

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## Description

HDMI 2.0 one(1) fiber optic detachable extender, HDFX-700, extends HDMI 2.0 signal up to 200m (656feet) and transmits 4K UHD (4096x2160) at 60Hz over one(1) LC multi-mode fiber. Cutting-edge technology of Opticis reduces limits in installation by providing an option for longer copper extension.

HDFX-700-TR transmit uncompressed and transparent data signal even when used with up to 3 m copper cable as an intermediary. This enables installation of the product in the limited spaced area in such our small module type extender cannot be used. 2m copper cable is provided in the shipping group.

Furthermore, to meet all the needs of the customers, HDFX-700-TR offers two selectable options which are: support of ARC up to 200m, and full interoperability with HDFX-500 as a pair. Depending on the circumstances, customer can choose to use direct connection type module on one side, and copper extension type module on the other side.

HDFX-700-TR gives slim, light, and easy installation with perfect electrical isolation, but without electrical hazard and interference. It is operated external DC power adapter which is supplied in the shipping group.

The shipping items are shown as follows;

- 1) One (1) Transmitter (Tx) and One (1) Receiver (Rx)
- 2) Two (2) 2m Male to Male HDMI copper cable
- 3) Two (2) 5V 1A power adapter
- 4) User Manual

※ If the purchase was made with mixed pair of HDFX-700 and HDFX-500, the shipping group may vary.

※ In shipping group, two 2m copper cables are included. Contact the regional sales representative or [tosales@opticis.com](mailto:tosales@opticis.com) for using 3m copper cable.

## Features

- Compliance with HDMI standard: supports HDMI 2.0
- Extension limit: 200m (656feet) for 4K (4096x2160) at 60 Hz refresh rate over one (1) LC OM3 fiber (50/125um).
- Graphic Transmission Bandwidth: Supports total data rate 18Gbps (6Gbps per lane).
- Supports HDR at 10bit or 12bit speed respectively within 18Gbps
- Extra Copper Extension available up to 3m on each side (TX/RX)
- Selectable options for ARC support (200m) or full interoperable with HDFX-500-TR as a pair
- Firmware upgradable via micro USB port
- Support CEC, EDID, and HDCP 2.2 / 1.4

## Applications

- Medical imaging
- Military
- Digital Signage
- Control room
- Simulator
- Rental Staging

## Technical Specifications

	Parameter	Specifications
Components	Laser Diodes in TX Module	Multi-mode VCSEL (Vertical Cavity Surface Emitting Laser)
	Photo Diodes in Rx Module	PIN-PD
Electrical	Input and Output Signals	ANSI 8B/10 Level (complying with HDMI 2.0)
	Data Transfer Rate (Graphic Data)	Max. 6Gbps
	Total Jitter at the end of Rx output	Max. 0.6UI
	Skew inter-channels	Max. 2ns
Optical	Link Power Budget	Min. 1dB
Mechanical	Module dimension (LWH)	39 x 76 x 20mm
Connect	Optical Connector	Simplex LC connector
	Electric Connector Type from Systems and to Displays	pin HDMI Receptacle Connector
	Recommended Fiber	OM3(50/125 um) Multi-mode Glass Fiber

## Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these of any other conditions in excess of those given in the operational sections of the datasheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Min	Max	Unit
Supply Adapter Voltage	V <sub>CC</sub>	-0.3	+6.0	V
Operating Temperature	T <sub>OP</sub>	0	50	° C
Operating Relative Humidity	RH <sub>OP</sub>	10	85 <sup>1)</sup>	%RH
Storage Temperature	T <sub>stg</sub>	-20	70	° C
Storage Relative Humidity	RH <sub>stg</sub>	10	95 <sup>2)</sup>	%RH

Note

1), 2) Under the conditions of No drops of dew

## Operating Conditions

### Transmitter module: HDFX-700-T

	Parameter	Symbol	Minimum	Typical	Maximum	Units
Power Supply	Supply Voltage	V <sub>CC</sub>	4.5	5.0	5.5	V
	Supply Current	I <sub>TCC</sub>	360	365	370	mA
	Power Dissipation	P <sub>TX</sub>	1.8	1.825	1.85	W
	Power Supply Rejection (Note1)	PSR		50		mV <sub>p-p</sub>
DATA ANSI 8b/10b	Data Output Load	R <sub>LD</sub>		50		Ω
	Transmitter Differential Input Voltage Swing (Peak-to-Peak)	V <sub>ID</sub>	0.4	-	1.6	V
Optical Link (Note3)	Output Optical Power	P <sub>o</sub>			3	dBm
	Wavelength	λ	780		990	nm
	Spectral width in RMS	Δλ			3	nm
	Relative Intensity of Noise (Note2)	RIN		-20		dB/Hz
	Extinction Ratio	Ext	4			dB
	Rising/Falling Time	T <sub>rise</sub> /T <sub>fall</sub>			77	ps
	Jitter in p-p value (Note3)	T <sub>jitter</sub>			70	ps

Note1. Tested with a 50mV<sub>p-p</sub> sinusoidal signal in the frequency range from 500 Hz to 500 MHz on the V<sub>CC</sub> supply with the recommended power supply filter in place. Typically less than a 0.25 dB change in sensitivity is experienced.

Note2. Measure in 1GHz of frequency bandwidth

Note3. Use PPG (Pulse Pattern Generator) source with jitter 50ps

### Receiver module: HDFX-700-R

	Parameter	Symbol	Minimum	Typical	Maximum	Units
Power Supply	Supply Voltage	V <sub>CC</sub>	4.5	5.0	5.5	V
	Supply Current	I <sub>RCC</sub>	360	365	370	mA
	Power Dissipation	P <sub>RX</sub>	1.8	1.825	1.85	W
	Power Supply Rejection (Note4)	PSR		50		mV <sub>p-p</sub>
DATA ANSI 8b/10b	Data Input Load	R <sub>LD</sub>		50		Ω
	Receiver Data Output Voltage Swing (Peak-to-Peak)	V <sub>ODp-p</sub>	600	800	1200	mV <sub>p-p</sub>
Optical Link	Receiving Optical Power	P <sub>o</sub>			1	dBm
	Receiving Wavelength	λ	780		990	nm
	Link Power Budget	P <sub>bgt</sub>	1			dB
	Total Jitter (note 5)	TR <sub>jitter</sub>			0.6	UI

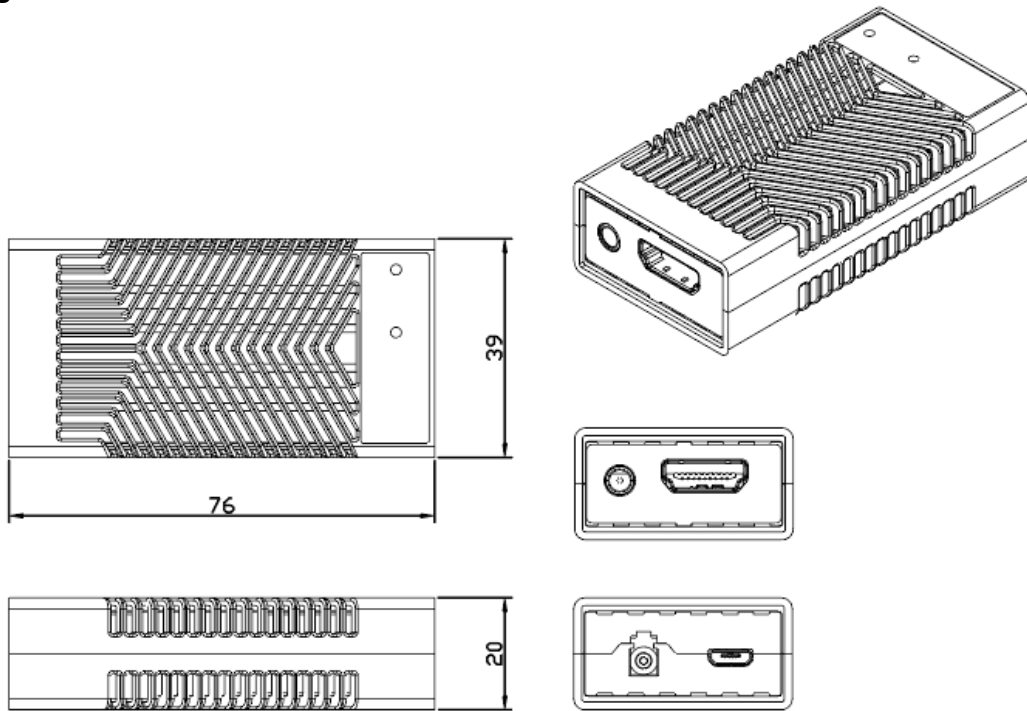
Note4. Tested with a 50mV<sub>p-p</sub> sinusoidal signal in the frequency range from 500 Hz to 500 MHz on the V<sub>CC</sub> supply with the recommended power supply filter in place. Typically less than a 0.25 dB change in sensitivity is experienced.

Note5. It is measured as total jitters including Tx and Rx modules under maximum extension, 200 meters with 5.4Gbps.

## Recommended specifications of fiber-optic cable

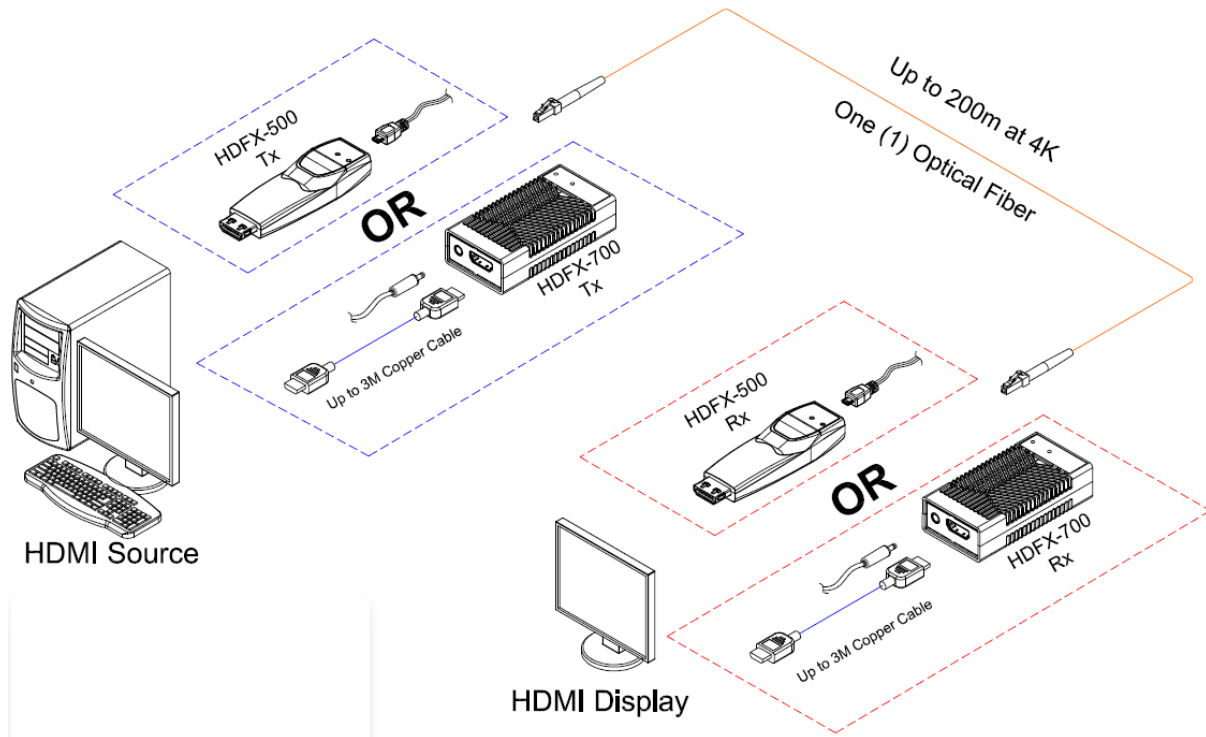
Parameters	Conditions	Specifications
Fiber Type		50μm Multi-mode Graded Index Glass Fiber
Modal Bandwidth	λ = 850nm	Min. 500 MHz km
Fiber Cable Attenuation	λ = 850nm	Max. 2.5dB/km
Extension Distance		10 – 1650ft (500 meters)
No. of Ferrules	Simplex LC	1 ferrule
Skew		Max. 0.4ns
Insertion Attenuation		Max. 0.5dB
Total Optical Attenuation	In 656 ft (200 meter) extension	Max. 1.5dB

**Drawing of Module**



Note: The transmitter, HDFX-700-Tx and the receiver, HDFX-700-Rx have the same mechanical dimensions

**Drawing of Cable Connection**



## HDMI Pin Description

### TX Module

No	Pin Assignment	Functional Description
1	TMDS2+	TMDS Data Signal Channel 2 Positive
2	TMDS2 Shield	TMDS Data Signal Channel 2 Shield
3	TMDS2-	TMDS Data Signal Channel 2 Negative
4	TMDS1+	TMDS Data Signal Channel 1 Positive
5	TMDS1 Shield	TMDS Data Signal Channel 1 Shield
6	TMDS1-	TMDS Data Signal Channel 1 Negative
7	TMDS0+	TMDS Data Signal Channel 0 Positive
8	TMDS0 Shield	TMDS Data Signal Channel 0 Shield
9	TMDS0-	TMDS Data Signal Channel 0 Negative
10	TMDS Clock+	TMDS Clock Channel Positive
11	TMDS Clock Shield	TMDS Clock Channel Shield
12	TMDS1Clock-	TMDS Clock Channel Negative
13	CEC	Consumer Electronics Control
14	Utility	Optional, Audio Return Channel (ARC)
15	SCL	HDPC/DDC communication clock
16	SDA	HDPC/DDC communication data
17	DDC/CEC Ground	DDC/CEC shield
18	+5V Power	5 V Input for Transmitter for Host
		5 V Output for Monitor from Receiver
19	Hot Plug Detect	Signal is driven by monitor to enable the system to identify the presence of a monitor

## RX Module

No	Pin Assignment	Functional Description
1	TMDS2+	TMDS Data Signal Channel 2 Positive
2	TMDS2 Shield	TMDS Data Signal Channel 2 Shield
3	TMDS2-	TMDS Data Signal Channel 2 Negative
4	TMDS1+	TMDS Data Signal Channel 1 Positive
5	TMDS1 Shield	TMDS Data Signal Channel 1 Shield
6	TMDS1-	TMDS Data Signal Channel 1 Negative
7	TMDS0+	TMDS Data Signal Channel 0 Positive
8	TMDS0 Shield	TMDS Data Signal Channel 0 Shield
9	TMDS0-	TMDS Data Signal Channel 0 Negative
10	TMDS Clock+	TMDS Clock Channel Positive
11	TMDS Clock Shield	TMDS Clock Channel Shield
12	TMDS1Clock-	TMDS Clock Channel Negative
13	CEC	Consumer Electronics Control
14	Utility	Optional, Audio Return Channel (ARC)
15	SCL	HDPCP/DDC communication clock
16	SDA	HDPCP/DDC communication data
17	DDC/CEC Ground	DDC/CEC shield
18	+5V Power	5 V Input for Transmitter for Host
		5 V Output for Monitor from Receiver
19	Hot Plug Detect	Signal is driven by monitor to enable the system to identify the presence of a monitor



## Revision History

Version	date	History
0.9	2021-02	Preliminary version released
1.0	2021-08	Official version released
1.1	2021-09	Pin No.14 modified
1.2	2022-03	Extra Copper Extension length changed 2m to 3m