

# DATA SHEET

## HDMI 2.0 and DisplayPort 1.2 to HDMI 2.0 optical converter, HDHF-4K

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## Description

A 4K video signal wall-plate converter, the HDHF-4K is designed compact enough to fit into an one (1) gang sized slot. Although the HDHF-4K is compact in size, it is brilliant enough to convert both DisplayPort 1.2 and HDMI 2.0 4K video signals to an Optical HDMI 2.0 video signal.

The HDHF-4K transmits the converted HDMI 2.0 optical signal up to 200m (656feet) over one (1) multi-mode fiber (OM3) without any data compression or latency. The optical HDMI 2.0 receiver, HDFX-500-Rx and HDFX-700-Rx, is used to recover optical HDMI 2.0 to electrical HDMI 2.0 signal.

HDHF-4K offers simple and easy installation on the wall or boom system, as it removes any additional copper cable between faceplate and stand-alone converters. With its selection-switch, users can easily choose between either DisplayPort 1.2 or HDMI 2.0 4K signals to get converted and transmitted

The shipping items are shown as follows;

- 1) One (1) HDHF-4K
- 2) User Manual

## Features

- Supports both DisplayPort 1.2 and HDMI 2.0 4K signals.
- Supports up to 4K (4096x2160) at 60Hz, (RGB & YcbCr : 4 : 4 : 4 )
- Transmits converted optical signal up to 200m (656ft) over LC terminated 1 core multi-mode fiber (OM3)
- Operated via DIP switch to select DisplayPort 1.2 or HDMI 2.0 for conversion and transmission.
- Equipped with three (3) LEDs for power detection and HDMI and DisplayPort signal Selection State.

## Applications

- Surgical room
- Radiology
- Control room

## Technical Specifications

	Parameter	Specifications	
Components	Laser Diodes in TX Module	Multi-mode VCSEL (Vertical Cavity Surface Emitting Laser)	
Electrical	Input Signals	Display Port	ANSI 8B/10 Level (complying with DP1.2)
		HDMI	ANSI 8B/10 Level (complying with HDMI 2.0)
	Output Signals		ANSI 8B/10 Level (complying with HDMI 2.0)
	Data Transfer Rate (Graphic Data)		Max. 6.0Gbps
	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 (WDH)	Size (WDH): 70 x 78 x 115mm	
Connect	Optical Connector		Simplex LC connector
	Electric Connector Type from Systems	Display Port	20pin DP Receptacle Connector
		HDMI	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>	+7.0	16.0	V
Operating Temperature	T <sub>OP</sub>	0	50	°C
Operating Humidity	RH <sub>OP</sub>	10	85 <sup>1)</sup>	%RH
Storage Temperature	T <sub>stg</sub>	-30	70	°C
Storage Humidity	RH <sub>stg</sub>	10	95 <sup>2)</sup>	%RH

Note

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

## Operating Conditions

### 1) HDMI Input

	Parameter	Symbol	Minimum	Typical	Maximum	Units
Power Supply	Supply Voltage	V <sub>CC</sub>	8.0	12.0	15.0	V
	Supply Current	I <sub>TCC</sub>	275	280	285	mA
	Power Dissipation	P <sub>TX</sub>	3.30	3.36	3.42	W
	Power Supply Rejection (Note1)	PSR		50		mV <sub>p-p</sub>
DATA ANSI 8b/10b	Data Input Load	R <sub>LD</sub>		50		Ω
	Transmitter Differential Input Voltage Swing (Peak-to-Peak)	V <sub>ID</sub>	0.4	-	1.6	V

### 2) Display Port Input

	Parameter	Symbol	Minimum	Typical	Maximum	Units
Power Supply	Supply Voltage	V <sub>CC</sub>	8.0	12.0	15.0	V
	Supply Current	I <sub>TCC</sub>	357	362	367	mA
	Power Dissipation	P <sub>TX</sub>	4.284	4.344	4.404	W
	Power Supply Rejection (Note1)	PSR		50		mV <sub>p-p</sub>
DATA ANSI 8b/10b	Data Input Load	R <sub>LD</sub>		50		Ω
	Transmitter Differential Input Voltage Swing (Peak-to-Peak)	V <sub>ID</sub>	0.4	-	1.6	V

### 3) Optical HDMI Output

	Parameter	Symbol	Minimum	Typical	Maximum	Units
Optical Output	Output Optical Power	P <sub>o</sub>			1	dBm
	Wavelength	λ	780		990	nm
	Spectral width in RMS	Δλ			3	nm
	Relative Intensity of Noise	RIN		-20		dB/Hz
	Extinction Ratio	Ext	4			dB
	Rising/Falling Time	T <sub>rise</sub> /T <sub>fall</sub>			100	ps
	Jitter in p-p value	T <sub>jitter</sub>			90	ps

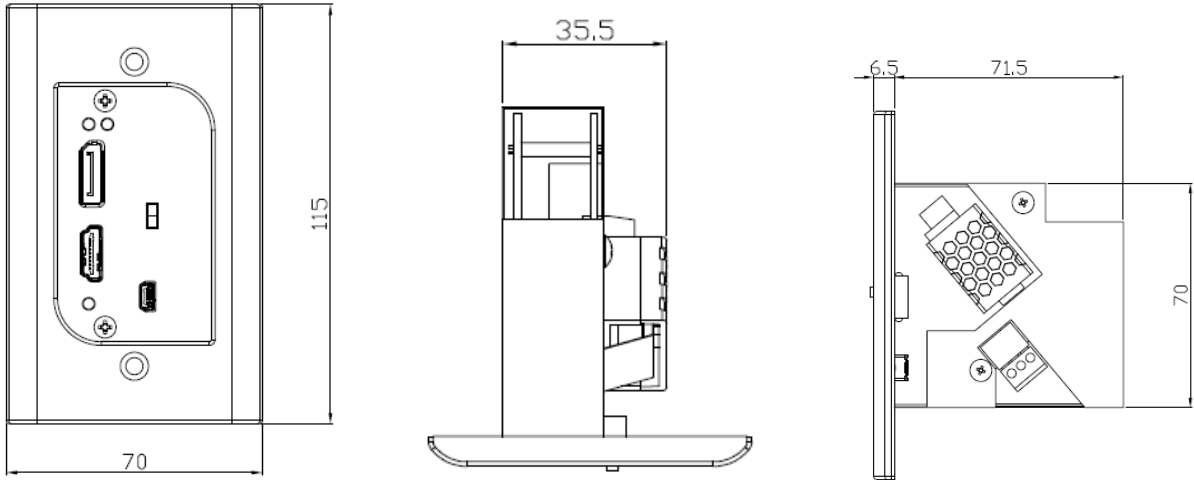
Note1. Tested with a 50mV<sub>p-p</sub> sinusoidal signal in the frequency range from 500 Hz to 500 MHz on the V<sub>CC</sub> supply with the recommended power supply filter in place. Typically less than a 0.25 dB change in sensitivity is experienced

Note2. Graphic Supply Voltage is regulated reference voltage for signal processing in modules.

## Recommended specifications of fiber-optic cable

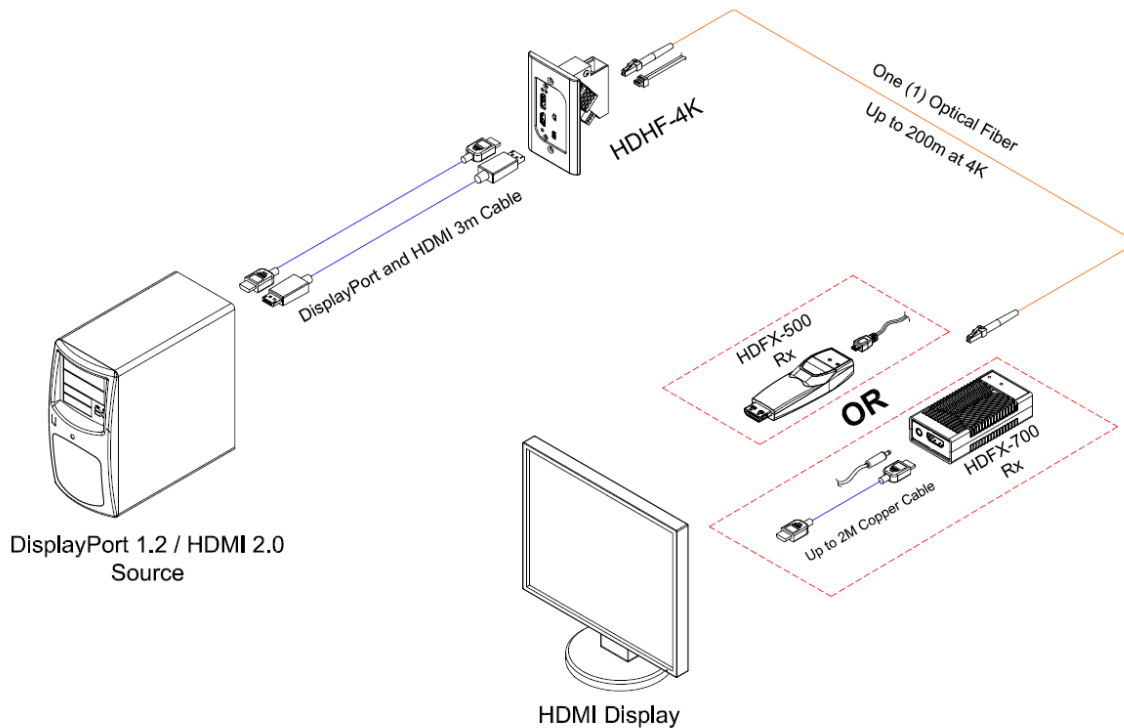
Parameters	Conditions	Specifications
Fiber Type		50μm Multi-mode Graded Index Glass Fiber
Modal Bandwidth	λ = 850nm	Min. 500 MHz km
Fiber Cable Attenuation	λ = 850nm	Max. 2.5dB/km
Extension Distance		10 – 1650ft (500 meters)
No. of Ferrules	Simplex LC	1 ferrule
Insertion Attenuation		Max. 0.5dB
Total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

### Drawing of Module



### Drawing of Cable Connection

The diagram shows the connection of HDHF-4K and 1-fiber HDMI and DisplayPort extender (Receiver; HDFX-500-RX and HDFX-700-Rx) by one (1) LC multi-mode fiber.



## Input Port Pin Description

### HDMI Input Port

Pin	Pin Assignment	Functional Description
1	TMDS 2+	TMDS Data Signal Channel 2 Positive
2	TMDS 2 Shield	TMDS Data Signal Channel 2 Shield
3	TMDS 2-	TMDS Data Signal Channel 2 Negative
4	TMDS 1+	TMDS Data Signal Channel 1 Positive
5	TMDS 1 Shield	TMDS Data Signal Channel 1 Shield
6	TMDS 1-	TMDS Data Signal Channel 1 Negative
7	TMDS 0+	TMDS Data Signal Channel 0 Positive
8	TMDS 0 Shield	TMDS Data Signal Channel 0 Shield
9	TMDS 0-	TMDS Data Signal Channel 0 Negative
10	TMDS Clock+	TMDS Clock Channel Positive
11	TMDS Clock Shield	TMDS Clock Channel Shield
12	TMDS Clock-	TMDS Clock Channel Negative
13	CEC	Consumer Electronics Control
14	Reserved	Not used
15	SCL	HDCP/DDC communication clock
16	SDA	HDCP/DDC communication data
17	DDC/CEC Ground	DDC/CEC shield
18	+5 Power	5 V Input for Transmitter for Host
19	Hot Plug Detect	Signal is driven by monitor to enable the system to identify the presence of a monitor

### DisplayPort Input Port

Pin	Symbol	Mating Row Contact Location	Functional Description
1	ML_Lane3(n)	Top	DisplayPort Data Lane3 Negative
2	GND	Bottom	Ground
3	ML_Lane3(p)	Top	DisplayPort Data Lane3 Positive
4	ML_Lane2(n)	Bottom	DisplayPort Data Lane2 Negative
5	GND	Top	Ground
6	ML_Lane2(p)	Bottom	DisplayPort Data Lane2 Positive
7	ML_Lane1(n)	Top	DisplayPort Data Lane1 Negative
8	GND	Bottom	Ground
9	ML_Lane1(p)	Top	DisplayPort Data Lane1 Positive
10	ML_Lane0(n)	Bottom	DisplayPort Data Lane0 Negative
11	GND	Top	Ground
12	ML_Lane0(p)	Bottom	DisplayPort Data Lane0 Positive
13	CONFIG1	Top	Cable Adaptor Detect
14	CONFIG2	Bottom	None
15	AUX CH(p)	Top	DisplayPort Aux Channel Positive
16	GND	Bottom	Ground
17	AUX CH(n)	Top	DisplayPort Aux Channel Negative
18	Hot Plug Detect	Bottom	HPD is used to detect a sink device by the source device
19	Return	Top	None
20	DP_PWR	Bottom	None



## Revision History

Version	date	History
0.9	2021-02	Preliminary version released
1.0	2021-11	Official version released