DATA SHEET

Four (4) fibers Detachable HDMI Extender, HDFX-150-TR

Contents

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Description

New optical HDMI extender, HDFX-150-TR consists of transmitter module and receiver module, each of which has Four (4) LC fibers connection and is designed compact enough to be fitted into various installation environments.

It enables to transmit WUXGA (1920x1200) or 1080p at 60Hz signal up to 300m (985feet), avoiding any tricks like scaling or data compression for lessening a burden of data transmission and supports 3D contents transmission.

The pure fiber connection by four (4) LC fibers connector between transmitter and receiver, gives clean, secure and easy installation with perfect electrical isolation, but without electrical hazard and interference.

The HDFX-150-TR can be operated by USB power without external DC power adapter by plugging the supplied USB to DC plug cables to each module.

In shipping group, two (2) short HMDI cables are also included so as to be mated to various types of HDMI connectors.

The shipping items are shown as follows;

1) One (1) Transmitter (Tx) and One (1) Receiver (Rx)
2) Two (2) DC +5V 1A power adapter
3) Two (2) HDMI cables (0.5m)
4) Two (2) USB to DC plug cables
4) User's Manual

※ Other options – contact with sales office

Features

- Extends WUXGA (1920x1200) at 60Hz (1.65Gbps/ch) or 1080p at 60Hz (36bit, 2.25Gbps/ch)
- Transmits HDMI data up to 300m (985feet) over four (4) LC multi-mode fibers
- Supports HDMI1.3, 36-bit color depth
- Supports 3D contents transmission
- Has HDMI receptacle and provides intermediate cable for flexible installation
- Supports Auto-power switching (Tx)
- Operated by USB power or DC power supplier
- Complies with CEC, EDID & HDCP
- Includes one (1) +5V, 1A DC power adapter / two (2) USB to DC plug cables for the transmitter and receiver
- Size (WDH): 67 x 46 x 14mm
- Certifications: CE / FCC, Class 1 LASER Eye Safety

Applications

- Digital HD-TV of types of LCD, PDP, projection and projectors for Home or Commercial Entertainments
- Digital HD-TVs for industrial applications such as medical appliances, aero traffic control, factory, conference room, auditorium and bank
- Digital FPDs and projectors in conference room and auditorium
- Kiosk with digital FPDs showing full motion graphic displays from remote systems
- HD-TVs for information display in public sites
- LED signboards in streets or in stadiums

Technical Specifications

	Parameter	Specifications
Components	Laser Diodes in Tx Module	Multi-mode VCSEL (Vertical Cavity Surface Emitting Laser)
	Photo Diodes in Rx Module	GaAs PIN-PD/InGaAs PIN-PD
Electrical	Input and Output signals	TMDS level
	Data Transfer Rate	Max. 2.25Gbps
	Total Jitter at the end of Rx output	Max. 300 ps
	Skew inter-channels	Max. 10ns
Optical	Link Power Budget	Min. 9.4 dB
Mechanical	Module dimension (WDH)	46 x 67 x 14mm
Connect	Optical Connector	2 Duplex LC connectors
	Electrical connector type from modules and to HDTVs	HDMI receptacle
	Recommended fiber	50um Multi-mode Glass fiber
External Power	Input	100~240V, 50~60Hz
	Output	5V, 1A

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_{CC}	-	5.5	V
Operating Temperature	T_{OP}	0	50	C
Operating Relative Humidity	RH_{OP}	10	85[1)]	%RH
Storage Temperature	Tstg	-30	70	C
Storage Relative Humidity	RHstg	10	95[2)]	%RH

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

Operating Conditions

- **Transmitter module: HDFX-150-T**

	Parameter	Symbol	Min	Typ.	Max	Units
Power Supply	Supply Voltage	V_{CC}	4.5	5.0	5.5	V
	Supply current	I_{TCC}	310	340	380	mA
	Power Dissipation	P_{TX}	1.4	1.7	2.1	W
	Power Supply Rejection (Note1)	PSR	-	50	-	mV_{p-p}
TMDS	Data Output Load	R_{LD}		50		Ω
	Graphic Supply Voltage (Note2)	GV_{CC}	+ 3.1	+ 3.3	+ 3.5	V
	Single-Ended High Level Input Voltage	GV_{IH}	GV_{CC} - 0.01	GV_{CC}	GV_{CC} + 0.01	V
	Single-Ended Low Level Input Voltage	GV_{IL}	GV_{CC} - 0.6	-	GV_{CC} - 0.4	V
	Single-Ended Input Swing Voltage	GV_{ISWING}	0.4	-	0.6	V
Optical Link (Note3)	Transmitter					
	Output Optical Power	P_o		-3		dBm
	850 VCSEL Wavelength	λ	840	850	860	nm
	980 VCSEL Wavelength	λ	970	980	990	
	Extinction Ratio	Ext	4			dB
	Rising/Falling Time	T_{rise}/T_{fall}			260	ps
	Jitter in p-p value (Note4)	T_{jitter}			260	ps
	Receiver					
	Sensitivity	S	-15	-17		dBm
	Receiving Wavelength	λ	840	850	860	nm

Note1. Tested with a $50mV_{p-p}$ sinusoidal signal in the frequency range from 500 Hz to 500 MHz on the V_{CC} 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
Note3. Measure signals at the end of 2 meter 50/125um MMGOF
Note4. Use PPG (Pulse pattern Generator) source with jitter 50ps

- **Receiver module: HDFX-150-R**

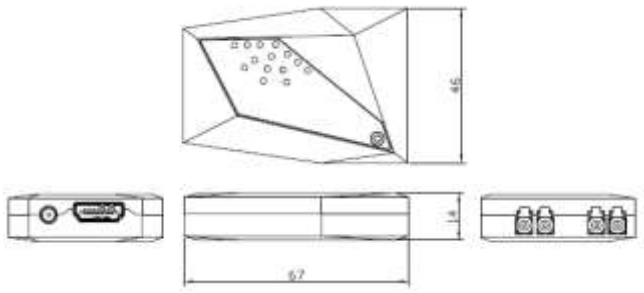
	Parameter	Symbol	Min	Typ.	Max	Units
Power Supply	Supply Voltage	V_{CC}	4.5	5.0	5.5	V
	Supply current	I_{TCC}	340	370	400	mA
	Power Dissipation	P_{TX}	1.53	1.85	2.2	W
	Power Supply Rejection (Note5)	PSR	-	50	-	mV_{p-p}
TMDS	Data Input Load	R_{LD}		50		Ω
	Graphic Supply Voltage	GV_{CC}	+ 3.1	+ 3.3	+ 3.5	V
	Single-Ended Input Swing Voltage	GV_{ISWING}	0.2	-	0.4	V
Optical Link	Transmitter					
	Side Output Optical Power	P_o		-3.0		dBm
	Wavelength	λ	840	850	860	nm
	Receiver					
	GaAs PD Receiving Wavelength	λ	840	850	860	nm
	InGaAs PD Receiving Wavelength	λ	970	980	990	nm
	Sensitivity	S	-15	-17		dBm
	Link Power Budget	P_{bgt}	9.45			dB
	Total Jitter (note 6)	TR_{jitter}			260	ps

Note5. Tested with a $50mV_{p-p}$ sinusoidal signal in the frequency range from 500 Hz to 500 MHz on the V_{CC} supply with the recommended power supply filter in place. Typically less than a 0.25 dB change in sensitivity is experienced.
Note6. It is measured as total jitters including Tx and Rx modules under maximum extension, 300 meters with 2.25Gbps.

Recommended specifications of fiber-optic cable

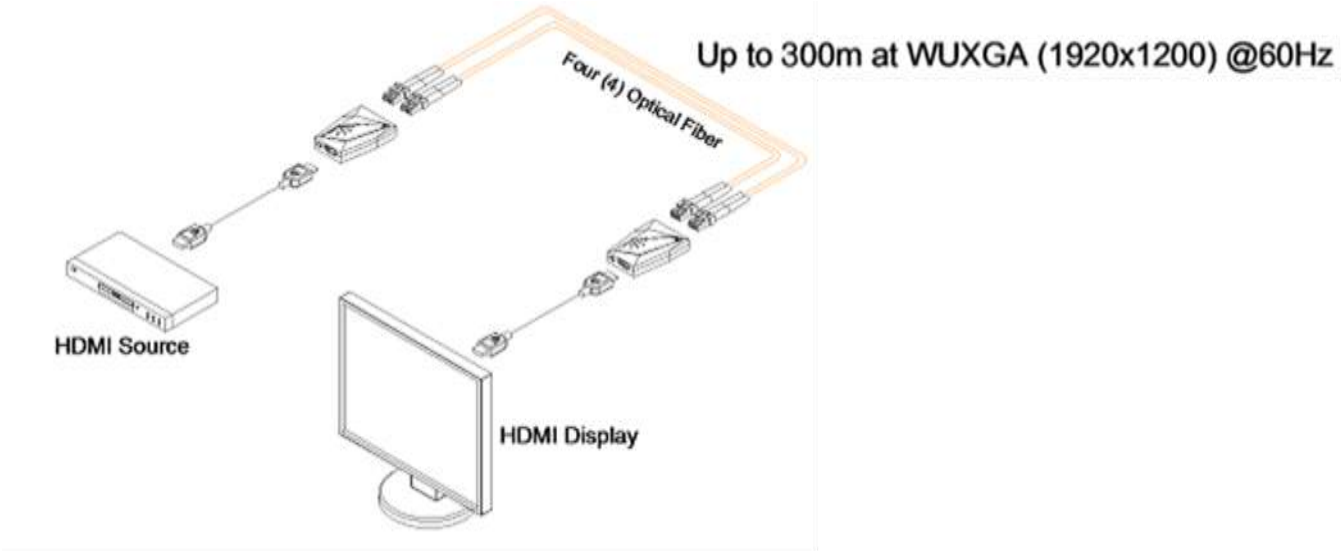
Parameters	Conditions	Specifications
Fiber Type		50μm Multi-mode Graded Index Glass Fiber
Modal Bandwidth	λ = 850nm	Min. 500 MHz km
Fiber Cable Attenuation	λ = 850nm	Max. 2.5dB/km
Extension Distance		10 – 990ft (300 meters)
No. of Ferrules	2 Duplex LC	4 ferrule
Skew		Max. 0.4ns
Insertion Attenuation		Max. 0.5dB
Total Optical Attenuation	In 330 ft (100 meter) extension	Max. 1.5dB

Drawing of Module



Note: The transmitter, HDFX-150-T and the receiver, HDFX-150-R have the same mechanical dimensions

Drawing of Cable Connection



HDMI Pin Description

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	Reserved	Not used
15	SCL	HDCP/DDC communication clock
16	SDA	HDCP/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

Reliability Test

We have two kinds of test criteria for a continuous improvement of characteristics of Optical HDMI interface module by our failure mode analysis program

1) Temperature & Humidity test
2) EMC test - FCC

◆ **Temp. & Humidity Test**

Items	Test	Conditions	Duration	Sample Size
Operation Test	Operating at each Temperature (1)	-10 ~ 60 °C (step: 10 °C)	30 min. (each Temperature)	N = 5
Storage Test	Low Temperature	Ts(2) = -30 °C	96HR	N = 5
	Low Temperature	Ts = 70 °C RH(3): 85%	96HR	N = 5

Note 1) Evaluate display quality of Full HD TV connected to Graphic signal Generator (Quantum Data: GE-802B) at each temperature.
Note 2) Ts: Storage Temperature
Note 3) RH: Relative Humidity

