

## 1. General Description

FX-I340 let your HDMI compliant display devices extend up to 60 meters (131.2 ft) away from host, based on HDMI standard without signal degradation up to 4K UltraHD (4096x2160@60Hz) and 3D FullHD (1920x1080@60Hz) resolution.

- High speed and long distance transmission by optical system
- Compatible with digital video and audio of HDMI-V2.0 standard
- The use of standard HDMI source-sink connector
- MMF optical fiber + copper hybrid cable structure
- High Bandwidth Cable Assembly (up to 6Gbps data rate per channel)
- E-EDID and Hot Plug channels are transmitted by copper line
- Supports HDCP by DDC channel
- CEC compliant, no HEAC!
- SCDC (Scrambling) function is support
- Power operation LED installed
- External power supply is used as the default

## 2. General Specification

Parameter	Symbol	
	Transmitter	Receiver
Optical Converter	4 ch 850 nm Multi-mode VCSEL	4 ch GaAs PIN photo Diode
Input and Output Signal	TMDS Signal HDMI 2.0 standard	
Video Bandwidth	18 Gbps	
Module Size	114x25x21mm (WxHxD)	73 x 25 x 21mm
Using electrical connector	HDMI A Type Plug(Male)	HDMI A Type Plug(Male)
Applied Fiber	50/125 $\mu$ m Multi-mode glass-fiber	

## 3. Absolute Maximum Ratings

Parameter	Rating
Storage temperature	-20°C ~ +70°C
Operating temperature	0°C ~ +50°C
Power Supply (DC)	-0.3 ~ +3.3V
Relative Humidity	10~ 80%
Lead solder temperature	260°C, 10 seconds

**Notice:** Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions above those indicated in the operations section for extended periods of time may affect reliability.

## 4. Electrical Specification

### 4.1 Electrical Specification

#### 4.1.1 Transmitter (Source) Module

	Parameter	Symbol	Min.	Typ	Max.	Units	Condition
POWER	Supply Voltage (DC)	$V_{CC}$	+4.5	+5	+5.5	V	
	Supply Current	$I_{CC}$		338		mA	3840x2160@60Hz
	Power Dissipation	$P_o$		1.69		W	
TMDS	Reference voltage for graphic signal	$V_{ref}$	+3.1	+3.3	+3.5	V	
	Single-ended high level input voltage	$V_H$	$V_{ref} - 0.01$		$V_{ref} + 0.01$	V	
	Single-ended low level input voltage	$V_L$	$V_{ref} - 0.6$		$V_{ref} - 0.4$	V	
	Single-ended input swing voltage	$V_{swing}$	0.4		0.6	V	
	Single-ended standby input voltage		$V_{ref} - 0.01$		$V_{ref} + 0.01$	V	
	Data Output Load	RLD		50		Ohms	

Transmitter module of model FX-I340 includes 4 channel VCSEL (Vertical Surface Emitting Laser Diode) with 850nm invisible laser radiation.

#### 4.1.2 Receiver (Sink) Module

	Parameter	Symbol	Min.	Typ	Max.	Units	Condition
POWER	Supply Voltage	$V_{CC}$	+4.5	+ 5	+ 5.5	V	
	Supply Current	$I_{CC}$		352		mA	3840x2160@60Hz
	Power Dissipation	$P_o$		1.76		W	
TMDS	Reference voltage for graphic signal	$V_{ref}$	+ 3.1	+3.3	+3.5	V	
	Single-ended output swing voltage	$V_{oswing}$	0.4		0.6	V	AC couple
	Data Input Load	RLD		50		Ohms	

## 4.2 Optical Specification

### 4.2.1 Transmitter Characteristics

Parameters	Symbol	Specified			Unit	Test Conditions
		Min.	Typ.	Max.		
Peak Fiber Coupled Optical Output Power	P(OC)		0.500		μW	If = 6 mA, 50/125 μm fiber NA=0.20
Threshold Current	I <sub>th</sub>		1.0	2.0	mA	CW
I <sub>th</sub> Temperature Variation	ΔI <sub>th</sub>		1.0		mA	T <sub>a</sub> =-10 to 85 °C
Slope Efficiency	H	0.04		0.16	W/A	If = 6 mA
η Temperature Variation	Δη / ΔT		-4000		PPM/ °C	T <sub>a</sub> =-10 to 85°C at 6 mA
Coupling efficiency	EFCE		75		%	If = 6 mA
Peak Wavelength	λ <sub>P</sub>	840	850	860	nm	If = 6 mA
λ <sub>P</sub> Temperature Coefficient	Δλ / ΔT		0.06		nm/ °C	T <sub>a</sub> =-10 to 85°C at 6mA
Spectral Bandwidth (RMS)	Δλ		0.4		nm	If = 6 mA
Forward Voltage	V <sub>f</sub>		2.2	2.5	V	If = 6 mA
Breakdown Voltage	V <sub>b</sub>		-10		V	I <sub>r</sub> = 10μA
Small Signal Bandwidth	GHz	8				If = 6 mA
Rise and Fall Times	t <sub>R</sub>		40		ps	Prebias Above Threshold, 20%-80%
	t <sub>F</sub>		50			
Relative Intensity Noise	RIN			-130	dB/Hz	10GHz BW, If = 6mA
Series Resistance	R <sub>S</sub>		80		Ohm	If = 6 mA
R <sub>S</sub> Temperature Coefficient	dR <sub>S</sub> /dT		-2000		PPM/ °C	
Monitor Current	I <sub>PD</sub>	0.2		0.7	mA	POC=0.5mW
Dark current	I <sub>D</sub>			10	nA	P <sub>o</sub> =0mW, V <sub>r</sub> =3V
PD Reverse Voltage	BVR <sub>PD</sub>	40			V	P <sub>o</sub> =0mW, I <sub>r</sub> =100mA
PD Capacitance	C			50	pF	V <sub>r</sub> =0V, Freq=1MHz
				20		V <sub>r</sub> =3V, Freq=1MHz

### 4.2.2 Receiver Characteristics

Parameters	Symbol	Specified			Unit	Test Conditions
		Min.	Typ.	Max.		
Supply Voltage	VCC	3.0	3.3	3.6	V	
Supply Current	ICC	21	28	41	mA	
Sensitivity	S	-12	-14		dBm	BER=1E10-12 PRBS=231-1 at 10.3125Gbps
Optical Overload	OL		0		dBm	
Differential Saturated Output Swing	Vout-,diff	240	280	350	mVp-p	
3dB Bandwidth	fh,-3dB	7	10		GHz	Pave=-12dBm, λ =850nm, referenced to 100MHz
Low Frequency Cutoff	LF		30	100	KHz	
Wavelength responsivity	λ	830	850	860	nm	
Rise/Fall Time	tR/tF			50	ps	Pave=-12dBm, λ =850nm
Output Resistance	Ro	30	50	60	Ω	
Monitor Current Slope vs IIN	I MON-P		0.5			
Monitor Current Offset	I OFFSET		10		μA	no photo current
Monitor Current linearity	I RANGE	1		1100	μA	

### 4.3 Connector Pin Assignment Transmitter (Source, Male)

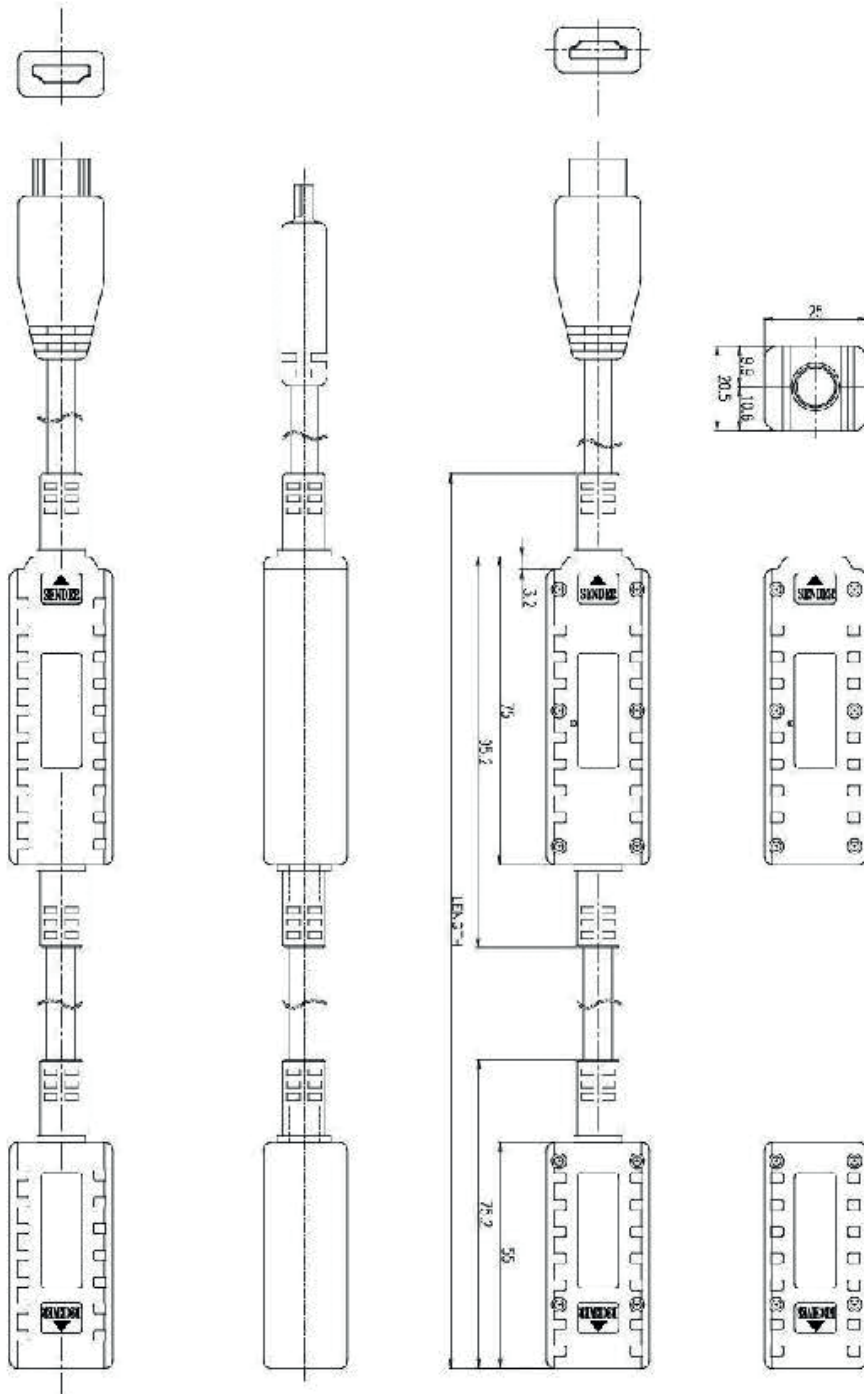
Pin	Signal Assignment	Pin	Signal Assignment
1	T.M.D.S. Data 2+	2	T.M.D.S. Data 2 Shield
3	T.M.D.S. Data 2-	4	T.M.D.S. Data 1+
5	T.M.D.S. Data 1 Shield	6	T.M.D.S. Data 1-
7	T.M.D.S. Data 0+	8	T.M.D.S. Data 0 Shield
9	T.M.D.S. Data 0-	10	T.M.D.S. Clock+
11	T.M.D.S. Clock Shield	12	T.M.D.S. Clock-
13	CEC	14	Reserved (N. C on device)
15	SCL	16	SDA
17	DDC/CEC Ground	18	+5V Power (Input)
19	Hot Plug Detect		

### Receiver (Sink, Female)

Pin	Signal Assignment	Pin	Signal Assignment
1	T.M.D.S. Data 2+	2	T.M.D.S. Data 2 Shield
3	T.M.D.S. Data 2-	4	T.M.D.S. Data 1+
5	T.M.D.S. Data 1 Shield	6	T.M.D.S. Data 1-
7	T.M.D.S. Data 0+	8	T.M.D.S. Data 0 Shield
9	T.M.D.S. Data 0-	10	T.M.D.S. Clock+
11	T.M.D.S. Clock Shield	12	T.M.D.S. Clock-
13	CEC	14	Reserved (N. C on device)
15	SCL	16	SDA
17	DDC/CEC Ground	18	+5V Power (Output)
19	Hot Plug Detect		

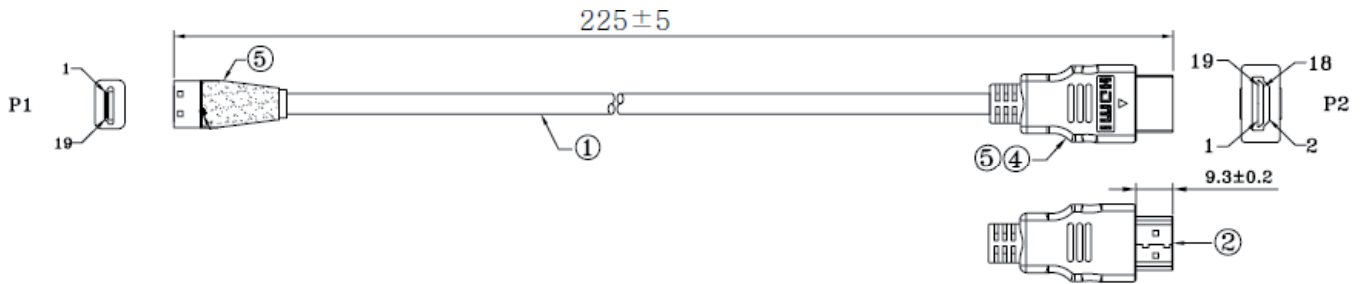
## 5. Mechanical Specification

### 5.1 Dimension



\*It may change without notice

### 5.2.1 Copper Cable Information



WIRE ARRANGEMENT		
P1	COLOR	P2
1	DRAIN WIRE	2
2	WHITE	1
3	RED	3
4	DRAIN WIRE	5
5	WHITE	4
6	GREEN	6
7	DRAIN WIRE	8
8	WHITE	7
9	BLUE	9
10	DRAIN WIRE	11
11	WHITE	10
12	BROWN	12
13	PINK	17
14	PURPLE	13
15	YELLOW	15
16	ORANGE	16
17	WHITE	14
18	RED	18
19	GRAY	19
CASE	DRAIN WIRE	CASE

#### ELECTRICAL TEST:

1. 100% OPEN & SHORT TEST
2. CONDUCTOR RESISTANCE: 3 Ohm (MAX)
3. INSULATION RESISTANCE: 5M Ohm (MIN)
4. HI-POT TEST: AC & DC: 300V

### 5.2.2 Optical Cable Information

The construction of 4 optical fibers and 6 copper wires cable shall be in accordance with figure 1 and table 1.

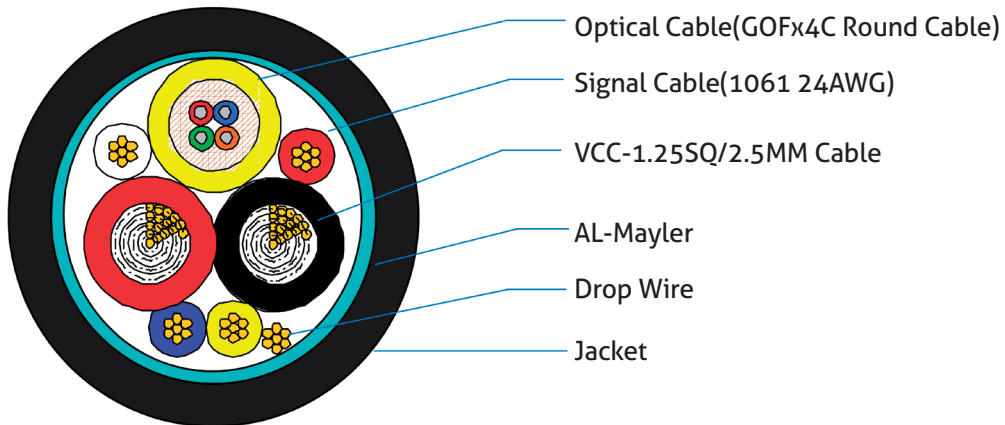


Figure 1. Cable structure of HDMB2

Table 1. Specification of electrical wire for FX-I340 cable

The Dimensions of FX-I340 Cable		
Items	Unit	Specification
DVI Cable Make-up	-	Layer Stranding
Drain Wires (Size/Stranded)	mm(AWG)	-0.203/7 (24)
AL-Mylar Screen Shield	-	A helically
Cable Outer Diameter	mm	7.40±0.20
Jacket Color	-	FR-PVC(Orange, Blue, Black)



### 5.2.2 Optical Cable Information

The construction of 4 optical fibers and 4 copper wires cable shall be in accordance with Figure 2 and Table 2 and 3.

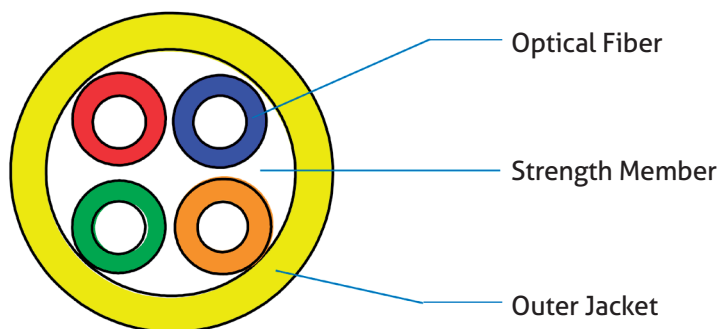


Figure 2. Cable structure of GOFx4C Round Cable

Table 2. Fiber Cable Construction

Items		Description
Optical Fiber	Number	4
	Structure	Figure 1
Strength Member		Aramid Yarn
"Outer Jacket"	Material	FR-PVC(Yellow)
	Approx.Thickness	1.6mm
Nominal Outside Diameter		Ø 4.0±0.4mm
Approximate Net Weight		10kg/km
Cable Identification		OPTICAL CABLE

Table 3. Fiber Cable Characteristics

Item	spec.	unit	Condition
Storage Temperature	-40 ~ 70	°C	Spooled
Operational Test	-20 ~ 70	°C	-
Max. Tensile Load	245	N	By careless handling(short term)
Min. Radius Bend	75	mm	By careless handling(short term)
	125		After installing(long term)
Crush Resistance	490	N/50mm	By careless handling(short term)



## 6. RoHS

### Certificate of Conformance RoHS

On January 27, 2003, the European Parliament and the Administrative Council adopted Directive 2002/95/EC (RoHS) that concerns the "Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment".

The parts currently delivered by PureLink GmbH are already free of lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (Cr 6), polybrominated biphenyl (PBB) and poly brominated diphenyl (PBDE).

This Certification of Conformance is to certify that the products listed below comply with RoHS Directive mentioned above:

- FX-I340

If you have any further questions regarding the RoHS compliance of parts delivered by PureLink GmbH, please do not hesitate to contact us.

