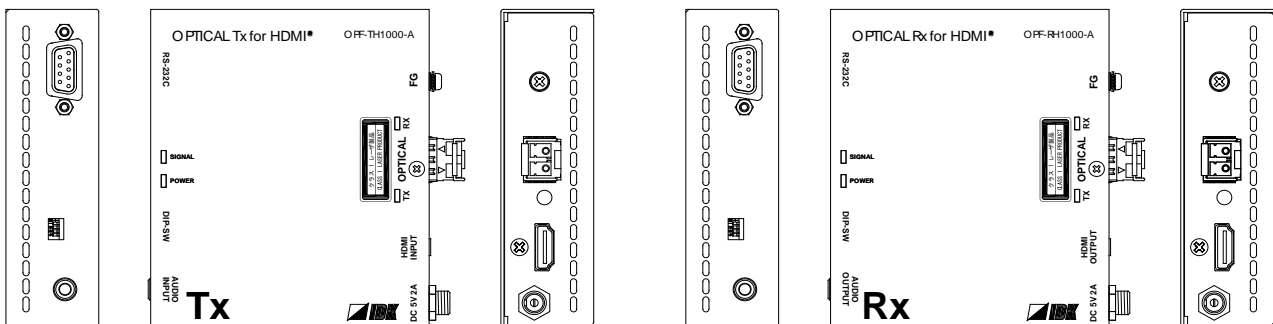




# HDMI Fiber Optic Extender

## OPF-TH1000-A/OPF-RH1000-A

User's Guide Ver. 1.0.0



- Thank you for choosing this IDK product.
- To ensure the best performance of the OPF-H1000, please read this User's Guide fully and carefully before using it and keep this manual beside the OPF-H1000.

IDK Corporation

## Trademarks

- The terms HDMI and HDMI High-Definition Multimedia Interface, and the HDMI Logo are trademarks or registered trademarks of HDMI Licensing, LLC in the United States and other countries.
- All other company and product names mentioned in this manual are either registered trademarks or trademarks of their respective owners. In this manual, the “®” or “™” marks may not be specified.

## Before reading this manual

- All rights reserved.
- Some of the contents in this User's Guide such as appearance diagrams, menu operations, communication commands, and so on may differ depending on the version of the extender.
- This User's Guide is subject to change without notice. You can download the latest version from IDK's website at: <http://www.idk.co.jp/en/index.html>



The lasers in this product meet Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 laser safety standards which specifies design safety.

### FCC STATEMENT

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

**Note:** This equipment was tested with shielded cables on the peripheral devices. Shielded cables must be used with the equipment to ensure compliance with FCC emissions limits.

### CE MARKING

This equipment complies with the essential requirements of the relevant European health, safety and environmental protection legislation.

### WEEE MARKING











Waste Electrical and Electronic Equipment (WEEE), Directive 2002/96/EC  
(This directive is only valid in the EU.)

This equipment complies with the WEEE Directive (2002/96/EC) marking requirement. The left marking indicates that you must not discard this electrical/electronic equipment in domestic household waste.

## Safety instructions







Read and understand all safety and operating instructions before using this device. Follow all instructions and cautions as detailed in this document.

Enforcement Symbol	Description
 <b>Warning</b>	Indicates the presence of a hazard that may result in death or serious personal injury if the warning is ignored or the equipment is handled incorrectly.
 <b>Caution</b>	Indicates the presence of a hazard that may cause minor personal injury or property damage if the caution is ignored or the equipment is handled incorrectly.

Symbol	Description	Example
 Caution	This symbol is indicated to alert the user. (Warning and caution)	 Electrical Hazard
 Prohibition	This symbol is intended to prohibit the user from actions.	 Do not disassemble
 Instruction	This symbol is intended to instruct the user.	 Unplug







# Warning

 <p><b>Prohibition</b></p>	<p><b>Do not place the product in any unstable place.</b> Install the product to a horizontal and stable place. Otherwise, it may fall/turn over and lead to injury.</p>
	<p><b>Do not place the product in any environment with vibration.</b> Otherwise, it may move/fall and lead to injury.</p>
	<p><b>Keep out any foreign objects.</b> In order to avoid fire or electric shock, do not allow foreign objects, such as metal and paper, to enter the product from the vent holes.</p>
	<p><b>For power cable/ plug:</b></p> <ul style="list-style-type: none"> <li>• Do not scratch, heat, or modify, including extending them.</li> <li>• Do not pull, put heavy stuff on them, or pinch them.</li> <li>• Do not bend, twist, or tie them together forcefully.</li> </ul> <p>If they are used in those states continuously, it may cause fire or electric shock. If power cables/plugs become damaged, contact IDK.</p>
 <p><b>Do not disassemble</b></p>	<p><b>Do not repair, modify or disassemble.</b> Since the product includes high-voltage parts, those actions may cause fire or electric shock. For internal inspections or repairs, contact IDK.</p>
 <p><b>Do not touch</b></p>	<p><b>In the event of lighting or thunder, do not touch the main unit or cables such as power cable and LAN cable.</b> Contact may cause electric shock</p>
 <p><b>Instruction</b></p>	<p><b>For installation:</b> The product is intended to be installed by skilled technicians. For installation, please contact a system integrator or IDK. Otherwise, it may cause fire, electric shock, injury, or property damage.</p>
	<p><b>Set the power plug in a convenient place to unplug easily.</b> You can easily unplug in case of any extraordinary failure or abnormal situation, and it also helps for unplugging when you do not use it for a long period.</p>
	<p><b>Plug the power plug into appropriate outlet completely.</b> If the plug is plugged incompletely, it may overheat which causes electrical shock or fire. Do not use damaged plug or loosened outlet.</p>
	<p><b>Clean the power plug regularly.</b> If the plug is covered in dust, it may cause fire due to reduced insulating power.</p>
 <p><b>Unplug</b></p>	<p><b>Unplug immediately if the product smokes, makes unusual noise, or smells.</b> If you continue to use the product under those situations, it may cause electric shock or fire. After confirming that the product stops smoking, contact IDK.</p>
	<p><b>Unplug immediately if you drop the product or if the cabinet is damaged.</b> If you continue to use the product under those situations, it may cause electrical shock or fire. For maintenance and repair, contact IDK.</p>
	<p><b>Unplug immediately if water or other objects are directed inside.</b> If you continue to use it under those situations, it may cause electrical shock or fire. For maintenance and repair, contact IDK.</p>
<b>For connection</b>	
 <p><b>Instruction</b></p>	<p>Differences in ground potential among the product and peripheral devices may cause electric shock or damage of the devices. When using cables to connect devices, including connection of long-distance transmission, unplug the power cables of all related devices. After connecting signal/control cables of each device, plug in the power cables of each device.</p>




## Caution


 <b>Prohibition</b>	<p><b>Do not place the product in any place where it will be subjected to high temperatures.</b> If the product is subjected to direct sunlight or high temperatures, it may cause fire.</p>
	<p><b>Do not place the product in humid, oil smoke, or dusty place.</b> If the product is placed near humidifiers or dusty area, it may cause fire or electric shock.</p>
	<p><b>Do not block the vent holes.</b> If ventilation slots are blocked, it may cause fire or failure due to internal heat.</p>
	<p><b>Do not put heavy items on the product.</b> It may fall/turn over and lead to injury.</p>
	<p><b>Do not exceed ratings of outlet and wiring devices.</b> If several plugs are put in an outlet, it may cause fire and electric shock.</p>
	<p><b>Use only the provided AC adapter and power cable.</b> If non-compliant adapter or power cables is used, it may cause fire or electrical shock. Use the provided AC power connection cable. If you want to use your product in other countries that use different AC power cables, contact IDK.</p>
 <b>No wet hands</b>	<p><b>Do not plug or unplug with wet hands.</b> It may cause electrical shock.</p>
 <b>Instruction</b>	<p><b>Use and store the product within the specified temperature/humidity range.</b> If the product is used outside the range continuously, it may cause fire or electric shock.</p>
	<p><b>Turn off devices when they are connected to another device.</b> It may cause fire or electric shock.</p>
 <b>Unplug</b>	<p><b>Unplug the power plug if you do not use the product for a long period.</b> In case of defect, it may cause fire.</p>
	<p><b>Unplug the power plug before cleaning.</b> It may cause electric shock.</p>

### For installation


#### For rack mount devices:

 <b>Instruction</b>	<p>Mount the product to the rack meeting EIA standards, and maintain spaces above and below for air cooling. For your safety, attach an L-shape bracket in addition to the mount bracket kit for the front panel in order to balance the weight.</p>
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#### For devices with rubber feet:

 <b>Instruction</b>	<p>Never insert only the screws into the holes after removing the rubber feet. It may lead to damage when the screws contact electrical circuit or parts inside of the product. To put the rubber feet back on, use only provided rubber feet and screws.</p>
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#### Altitude:

 <b>Instruction</b>	<p>Do not place the product at elevations of 2,000 meters (6562 feet) or higher above sea level. Failure to do so may shorten the life of the internal parts and result in malfunctions.</p>
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# 1. Included items

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Make sure all items below are included in the package.

If any items are missing or damaged, please contact IDK.

“OPF-H1000” mentioned in this manual refers to OPF-TH1000 and OPF-RH1000 set.

- Transmitter (OPF-TH1000)
  - OPF-TH1000 (main unit) x 1
  - AC adapter with screw type lock (1.2 m/3.94 feet) x 1
  - Cable clamp x 1
  
- Receiver (OPF-RH1000)
  - OPF-RH1000 (main unit) x 1
  - AC adapter with screw type lock (1.2 m/3.94 feet) x 1
  - Cable clamp x 1

This User's Guide is common to both the transmitter and receiver.

You can download the latest version from IDK's website at: <http://www.idk.co.jp/en/index.html>



## 2. Product Outline

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**Caution:** The OPF-H1000 outputs continuous invisible light, which may be harmful to your eyes. Please follow the following cautions.

- Do not look into the rear panel fiber optic cable connectors or into the fiber optic cables themselves.
- Plug the attached dust caps into the optical transceivers when the fiber cable is unplugged.

The OPF-H1000 is a transmitter and receiver set that enables HDMI signals to be transmitted long distance over fiber optical cables. Input signals are transmitted without quality deterioration since they are not compressed or processed.

The OPF-H1000 also supports RS-232C serial bidirectional communication and analog audio.

### 3. Features

- Video
  - Maximum resolution: WUXGA (RB)\*/1080p
  - Transmission distance of each SFP module
    - Multimode fiber (OM3): 300 m/984.25 feet
    - Multimode fiber (OM4): 1 km/3280.84 feet
    - Singlemode fiber (OS1): 4.7 km/15419.95 feet

\* WUXGA is available only for RB (Reduced Blanking) on DVI signals.
- Audio
  - Analog audio transmission
- Control
  - RS-232C Bidirectional communication using RS-232C is supported.
- Others
  - HDCP (Pass through)
  - CEC (Pass through)
  - The DC plug and jack of the AC adapter have a locking mechanism.

◆ Singlemode and multimode:

Fiber optical cables can be classified into two modes based on transmission method of signals. The core diameter of the singlemode fiber is approximately 9  $\mu\text{m}$ , while that of multimode fiber is approximately 50  $\mu\text{m}$  or 62.5  $\mu\text{m}$ .

Singlemode fiber is suited for long distance transmission. Multimode fiber is not suited for those transmissions, but it is inexpensive.

◆ OM3, OM4, and OS1:

Fiber optical cables are defined in terms of attenuation and mode excitation bandwidth as follows:

- Multimode: OM1 to 4
- Singlemode: OS1

The transmission distance varies depending on the standard of the fiber to be used. Please contact us for your standard and transmission distance.

◆ SFP (Small Form factor Pluggable) module:

SFP module is an optical transceiver, which is also called optical module and is for connections of network communication devices. This interface is for connecting devices (such as switches and routers) and optical cables.

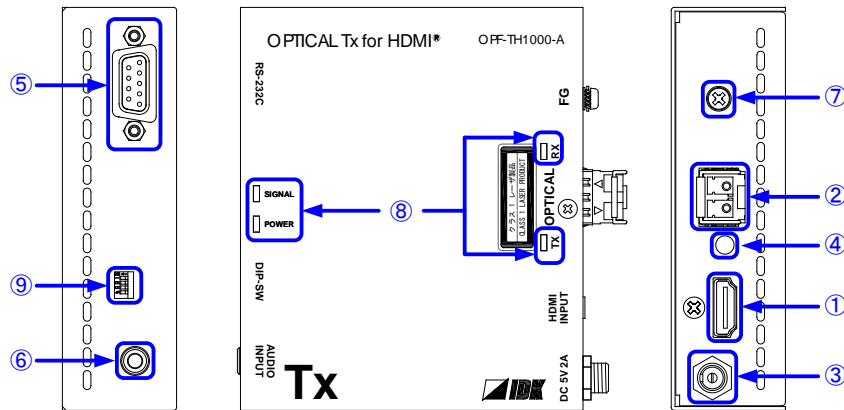
◆ CEC (Consumer Electronics Control):

Device control protocol defined in HDMI

This protocol controls multiple devices connected via HDMI cables using a remote control.

## 4. Part names and descriptions

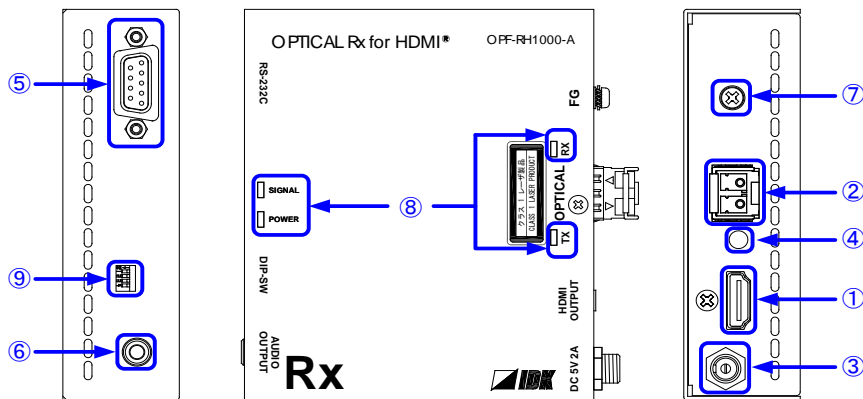
### 4.1 Transmitter (OPF-TH1000)



**Panel drawing (OPF-TH1000)**

#	Part name	Description
①	HDMI input connector	Input connector for HDMI signals Connect source devices such as Blu-ray players.
②	I/O connector for extension	Digital optical signal I/O connector for extension Factory installed SFP module allows fiber optical cables to connect OPF-TH1000 (transmitter) and OPF-RH1000 (receiver).
③	AC adapter connector	Connector for the supplied AC adapter.
④	Cable fixing hole	Hole for the attached cable clamp
⑤	RS-232C port	Port for D-sub 9 pin
⑥	Audio input connectors	Input connector for audio signals Analog audio signals cannot be embedded to HDMI; they are sent independently.
⑦	Frame ground	Ground for indoor ground terminal
⑧	LED lights	POWER: Lights when power is supplied from the AC adapter. SIGNAL: Lights when video signal is valid. TX: Lights when valid codes are sent. RX: Lights when the receiver fiber receives valid codes.
⑨	DIP switches	Switches for changing each setting DIP SW1 to 4: No feature is assigned on transmitter; please do not touch.

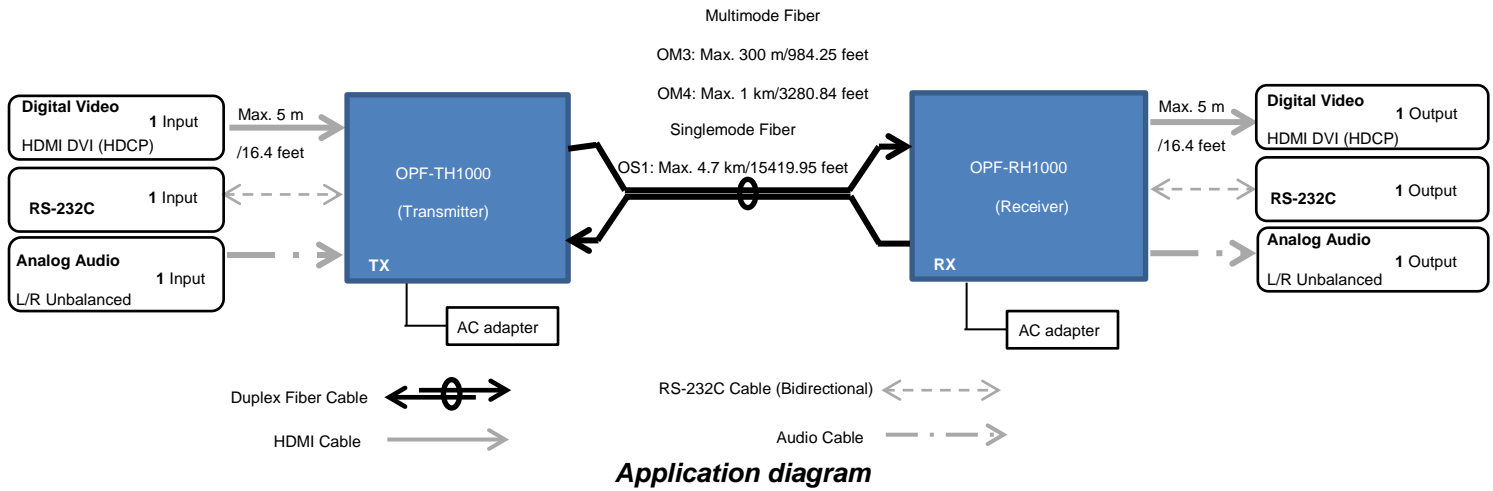
## 4.2 Receiver



Panel drawing (OPF-RH1000)

#	Part name	Description
①	HDMI output connector	Output connector for HDMI signals Sink devices such as TVs can be connected.
②	I/O connector for extension	Digital optical signal I/O connector for extension Factory installed SFP module allows fiber optical cables to connect OPF-TH1000 (transmitter) and OPF-RH1000 (receiver).
③	AC adapter connector	Connector for the attached AC adapter
④	Cable fixing hole	Hole for the supplied cord clamp
⑤	RS-232C connector	Connector for D-sub 9 pin
⑥	Audio output connectors	Output connector for audio signals. (Those audio signals were not de-embedded.)
⑦	Frame ground	Ground for indoor ground terminal
⑧	LED lights	POWER: Lights when power is supplied from the AC adapter. SIGNAL: Lights when video signal is valid. TX: Lights when valid codes are sent RX: Lights when the receiver fiber receives valid codes.
⑨	DIP Switches	DIPSW1: Sets the transmission reaction time of Hot Plug Detect (HDMI Pin 19). <ul style="list-style-type: none"> <li>“OFF”: Hot Plug Detect signals of the sink device is transmitted to the source device if they are 0.1 second or longer.</li> <li>“ON”: Hot Plug Detect signals of the sink device is transmitted to the source device if they are 1 second or longer (not transmitted if 0.9 seconds or less).</li> </ul> DIP SW2 to 4: Nothing is assigned. Please do not touch these switches.

## 5 Connection



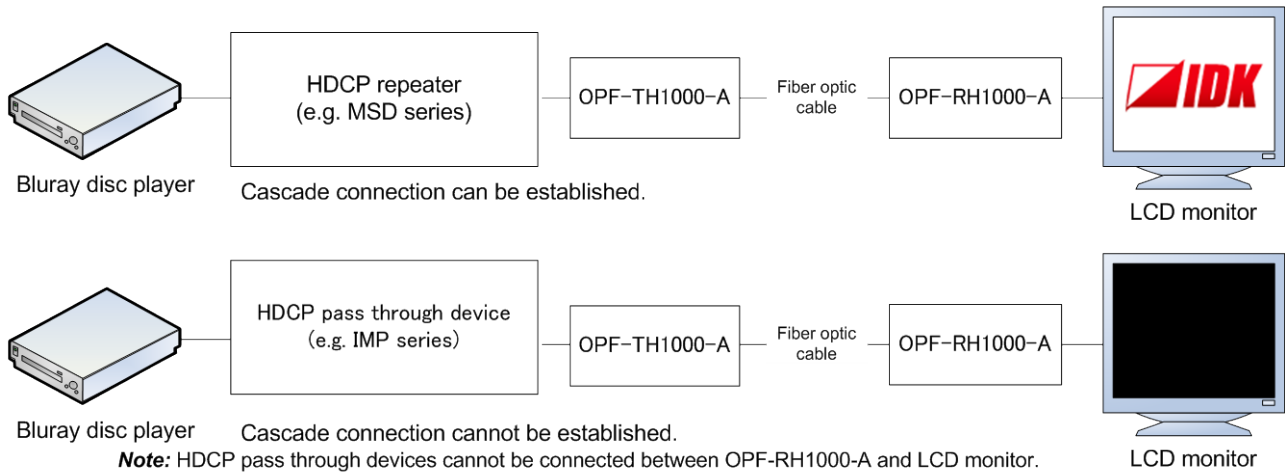
- 1 Connect Type A (male) connector cables (5 m/16.40 feet or shorter) to the HDMI I/O connector.
- 2 Connect fiber optical cables that support the desired extension distance to the SFP module connector for long distance transmission.
- 3 Connect a cross cable or straight cable to the RS-232C connector according to the requirements of the destination device.
- 4 Connect a 3.5-mm/0.14-inch mini stereo jack to the audio I/O connector.
- 5 Connect the DC plug of the supplied AC adapter to the DC jack. Make sure to lock the DC jack and plug using the screw-type locking mechanism.

**Note:** After all connections are established, plug the AC adapter to supply power.

## 5.1 Cascade connection

Distribution amplifiers and multi switchers that are HDCP compliant repeaters can be connected. However, cascade connection is not available in the following cases:

- repeater that only supports HDCP pass through (such as some switchers, boosters and so on) is included
- another set of OPF-TH/RH1000 (IDK's fiber optic cable extender supporting HDCP signals)



### *Application example*

## 5.2 HDMI input/output cable

Use 5 m/16.40 feet or shorter HDMI cables with Type A (male) connector whose pins are configured correctly.

## 5.3 Fiber optical cables for long distance transmission

Use correct fiber optical cables to maximize the performance of the OPF-H1000.

- Use a duplex fiber or two simplex fiber cables with LC connectors at both ends.
- To polish connectors:
  - For SFP module for multimode: PC polishing is recommended.
  - For SFP module for singlemode: UPC polishing is recommended.
- **Note:** APC polishing is not supported.
- Make sure that the fiber optical cable to be connected between the transmitter and receiver meets the standard of the desired extension distance.
- Extension distance varies depending on attenuation of the fiber, connector and other contact portions.
- Before inserting or removing the fiber, make sure to first turn the OPF-H1000 off and not to touch the ends of the fiber. Clean up the fiber before inserting it again.

- ◆ Simplex fiber and duplex fiber  
Simplex fiber has an optical fiber and a connector at both ends while duplex fiber has two fibers and two connectors. The duplex fiber cable is recommended for OPF-H1000, but signals can be transmitted using two simplex fiber cables.
- ◆ LC connector  
One of connectors for fiber optical cables. (Example: SC connector, FC connector, ST connector, MU connector)

## 5.4 SFP (Small Form-factor Pluggable) module

The fiber type and extension distance to be used vary depending on the SFP module.

[Table 0.1] Specifications of standard SFP modules

	Multimode fiber	Singlemode fiber
Connector	LC (Duplex)	
Wave length	850 nm (Oxide VCSEL laser <sup>*</sup> )	1310 nm (Fabry-Perot laser <sup>*</sup> )
Maximum extension distance	OM3: 300 m/984.25 feet OM4: 1 km/3280.84 feet	OS1 : 4.7 km/15419.94 feet
Output level	-9 dBm to -2.5 dBm	-8.4 dBm to -3 dBm
Input level	-13 dBm or higher	-18 dBm or higher

\*Some SFP modules for singlemode can extend the transmission distance up to 30 km with OS1. Please contact us if needed.

### Notes:

- Use only the supplied SFP module to ensure the best system performance and reliability.
- Plug the dust cap to the fiber optical cable if not connecting the cable.
- Pull the lever of the SFP module to remove it. Lock the lever and push it into until it clicks to attach the module.

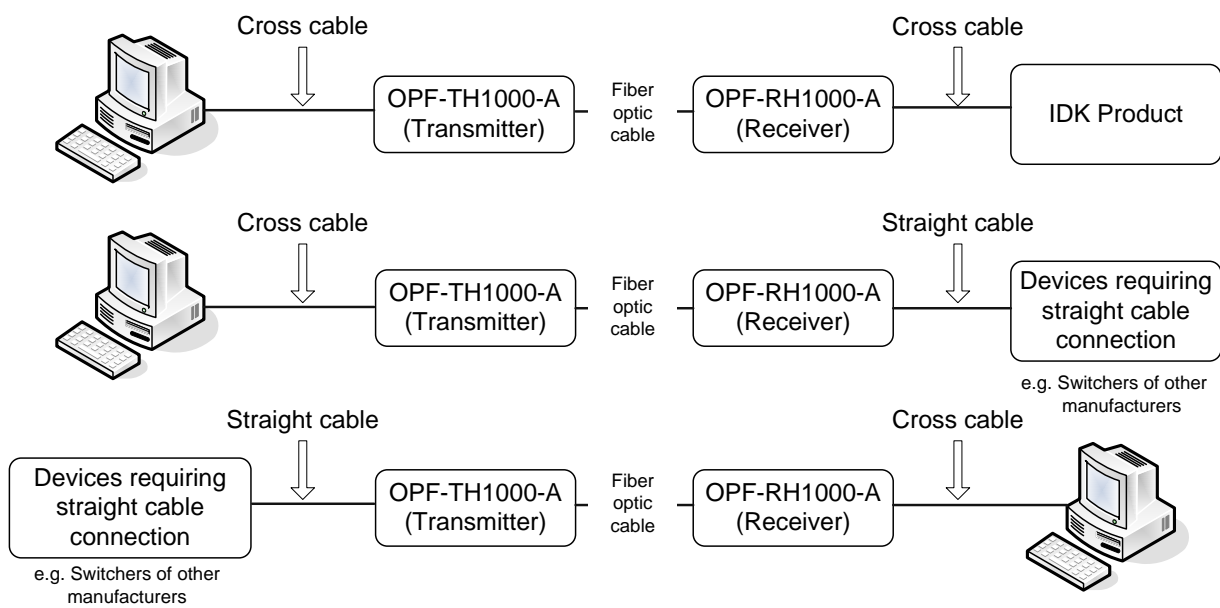
## 5.5 Audio Transmission

Analog audio signals can be transmitted over a long distance.

## 5.6 RS-232C Transmission

RS-232C signals (115.2 Kbps at a maximum) can be transmitted in duplex over a long distance. OPF-TH1000 and OPF-RH1000 communicate using the original protocol. Select communication cables for the Transmitter and Receiver individually according to the specifications of each connected device.

- Connection with other IDK products: Cross cables.
- Connection with a computer: Cross cables



**RS-232C cable connection example**



## 5.7 Precautions

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### ■ Installation

#### <Electrostatic discharge failure of connector>

- In order to connect cables to the OPF-H1000 or to devices connected to the OPF-H1000, remove static electricity by touching grounded metal such as racks before handling single cables. Otherwise it may cause a malfunction.

#### <Others>

- Do not place the transmitter on top of the receiver and vice versa.
- Do not block vent holes. Keep enough space (3 cm/1.18 inches or more) around the product.
- Do not install the OPF-H1000 in closed space.

If you have to install the product to an EIA rack mount in closed space, add a ventilation to keep the ambient temperature of 40 degrees C/104 degrees F or less. (Exception: Installing to IDK's Quarter rack, RM-42HQ) If inadequately vented, the life of parts may be shortened and operations may be affected.

### ■ Operating precautions

- Use HDMI signal I/O cables less than 5 m/16.4 feet whose pins are assigned appropriately. This extension distance cannot be longer even if connecting to a device that has a compensation circuit for digital cables.
- If connecting the OPF-H1000 to a device that is in an extremely bad condition, video image may be interrupted.
- The OPF-H1000 will transmit signals using DVI mode only if the resolution of the input signal resolution is set to WUXGA. However, some source devices can still use HDMI mode for WUXGA resolution if supported.
- Since the OPF-H1000 transmits input signals without compressing or processing, signals are transmitted in 24bits/pixel (8 bits/component) even to sink devices that support Deep Color formats.
- Clean the connector ends of the fiber optic with a cleaner before inserting.
- Plug the dust cap to the SFP module when you do not connect the fiber optical cable. For connectors of the fiber optical cable, use the cap.
- Do not plug or unplug the SFP module or fiber optical cable when the product is turned on.
- Before turning on/off the OPF-H1000, turn off or mute the connected devices first to avoid a noise sound.
- Make sure not to exceed the allowable bend radius of fiber optical cable that are determined based on each fiber specifications. Otherwise, transmission loss may occur.
- The maximum transmission distance is the value acquired from the following conditions:
  - the recommended fiber is used,
  - no connection through the path way, and
  - the allowable bend radius is not exceeded.
- Do not use the SFP module of the OPF-H1000 for other devices or connect fiber optical cable that are connected to other devices to the SFP module of the OPF-H1000. It may cause malfunctions of the SFP module. The maximum receiving optic power used for the OPF-H1000 is 0 dBm.
- The OPF-H1000 can be connected to the optical I/O slot board of the FDX series but not to other OPF series.

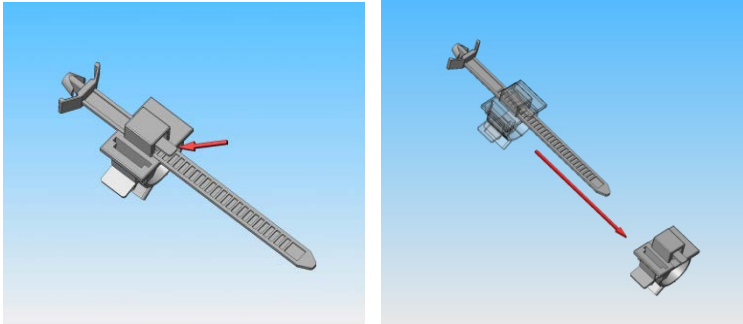
**Notes:**

- Supply power to the AC adapter only after all connections are completed.
- See “7. Troubleshooting” if video image is not displayed appropriately on the monitor connected to the OPF-H1000.

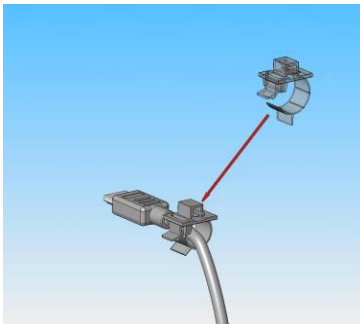
## 5.8 Reference: Attaching cable clamp

HDMI cables and connectors do not normally have a lock mechanism. Use the supplied cable clamp to apply the HDMI cable to the OPF-H1000.

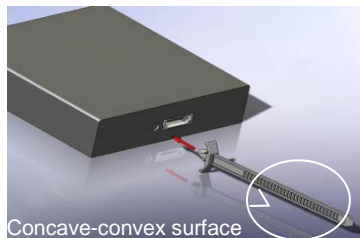
- 1 Pull up the part pointed by the short arrow and separate the bar and ring parts.



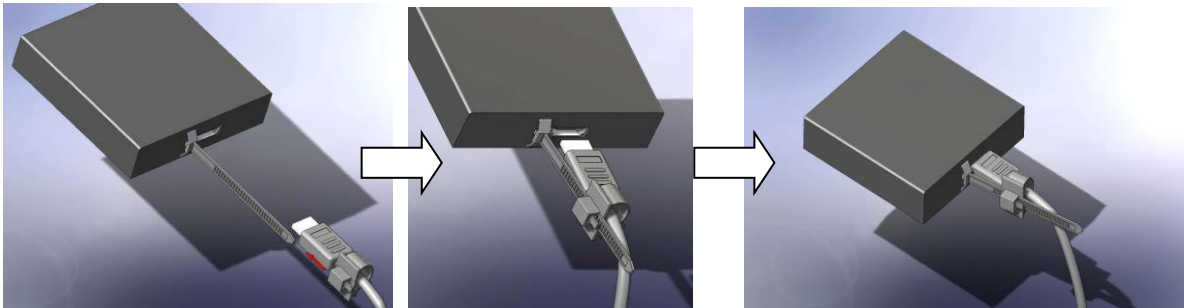
- 2 Pass the HDMI cable through the ring.



- 3 Insert the bar to the OPF-H1000 as shown below.



- 4 Attach the HDMI cable to the bar using the ring and insert the HDMI cable to the OPF-H1000.



To remove the HDMI cable, perform step 1 again to separate the ring and cable.

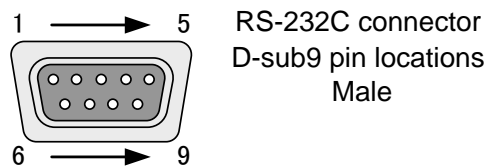
## 6 Specifications

### 6.1 Pin assignments of HDMI Type A connector

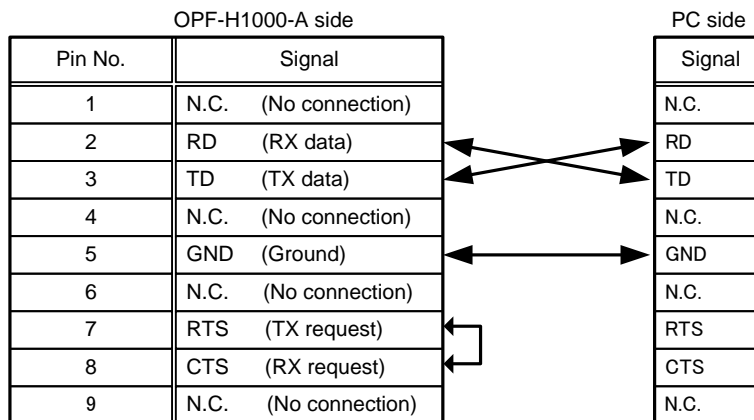
1	TMDS Data2+	2	TMDS Data2 Shield	3	TMDS Data2-
4	TMDS Data1+	5	TMDS Data1 Shield	6	TMDS Data1-
7	TMDS Data0+	8	TMDS Data0 Shield	9	TMDS Data0-
10	TMDS Clock+	11	TMDS Clock Shield	12	TMDS Clock-
13	CEC	14	Reserved (N.C.*)	15	SCL
16	SDA	17	DDC/CEC Ground	18	+5 V Power
19	Hot Plug Detect				

\*N.C.: No connection

### 6.2 RS-232C pin assignments

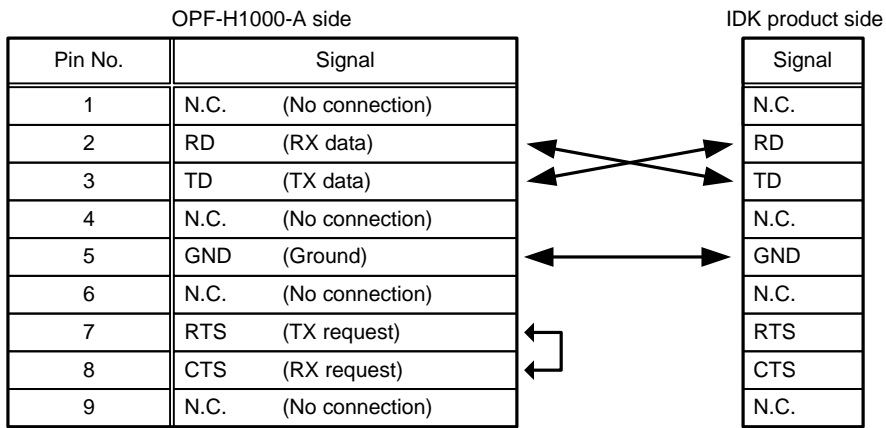


**RS-232C connector Pin assignments**



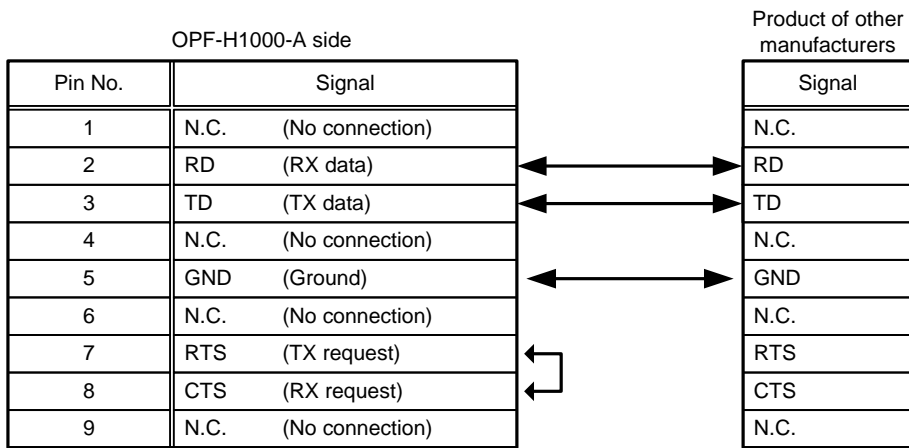
**Pin assignments when connected to a PC**

**Note:** Make sure to use a cross cable.



**Pin assignments when connected to an IDK product**

**Note:** Make sure to use a cross cable.



**Pin assignments when connected to a device requiring straight connection**

**Note:** Make sure to use a straight cable.

## 6.3 Specifications

### ■ Specifications

		OPF-TH1000 (Transmitter)	OPF-RH1000 (Receiver)
Input signals		1 channel HDMI signal* <sup>1</sup> HDMI Type A (19 pin) connector (female)* <sup>2</sup> HDCP, CEC (Pass through) TMDS Single Link	1 channel Optical signal for extension
Output signals		1 channel Digital optical signal for extension	1 channel HDMI signal* <sup>1</sup> HDMI Type A (19 pin) connector (female)* <sup>2</sup> HDCP, CEC (Pass through) TMDS Single Link
Formats	SDTV/HDTV	480i/480p/576i/576p/720p/1080i/1080p	
	VESA(PC)	VGA/SVGA/XGA/WXGA (1280x768)/WXGA (1280x800) /Quad-VGA/SXGA/WXGA(1360x768)/WXGA(1366x768)/ SXGA+/WXGA+/WXGA++/UXGA/WSXGA+/WUXGA* <sup>3</sup>	
Color depth		24 bit* <sup>4</sup>	
Clocks		Dot/TMDS : 25 MHz to 165 MHz	
Plug&play		DDC2B (EDID automatically acquired from the monitor)	
Audio format		Multi linear PCM up to 8 channels	
Analog audio input* <sup>5</sup>		3.5 mm Stereo mini jack L/R Unbalanced signal Input impedance: 11 kΩ Reference level: -10 dBu Max. input level: +3 dBu	-
Analog audio output* <sup>6</sup>		-	3.5 mm Stereo mini jack L/R Unbalanced signal Output impedance: 60 Ω Reference level: -10 dBu Max. output level: +3 dBu
Extension cable	Suitable cable	Duplex fiber cable, SFP module (LC connector x 2)	
	Polishing method* <sup>7</sup>	SFP modules for multimode: PC (recommended) SFP modules for singlemode: UPC (recommended), SPC *APC not supported	
	Max. extension distance* <sup>8</sup>	Multimode fiber (OM3: 300 m/984.25 feet, OM4: 1 km/ 3280.84 feet), singlemode fiber (OS1: 4.7 km/15419.94 feet)	
Control communication	RS-232C	1 channel D-sub 9 pin connector Male, duplex, up to 115.2 kbps	
Others	AC adapter	Input: AC 100 V - 240 V±10% 50 Hz/60 Hz±3 Hz Output: DC 5 V 2 A (AC adapter is supplied)	
	Consumed power	About 6 W	
	Dimensions	106(W)x30(H)x90(D) mm/4.17"(W)x1.18"(H)x3.54"(D)	

		(This is the quarter rack size; projection portion is not included.)
	Weight	0.4 kg/0.88 lbs
	Temperature	For use: 0°C to + 40°C/104°F; for storage: -20°C/ 4°F to +80°C/176°F
	Humidity	For use and storage: 20% to 90% (Non condensing)
	Shipping group	AC adapter with spring type lock (1.2 m/3.94 feet), cable clamp
	Option	Tie plate (FP-70)

#### ■ Specifications of Standard SFP

	Multimode fiber	Singlemode fiber
Connector	LC (Duplex)	
Wave length	850 nm (Oxide VCSEL laser <sup>*9</sup> )	1310 nm (Fabry-Perot laser <sup>*9</sup> )
Max. extension distance	OM3: 300 m/984.25 feet, OM4: 1 km/3280.84 feet	OS1: 4.7 km/15419.94 feet
Output level	-9 dBm to -2.5 dBm	-8.4 dBm to -3 dBm
Input level	-13 dBm or higher	-18 dBm or higher

#### ■ Model names

Multimode fiber	Transmitter	OPF-TH1000-A-MM	SFP module for multimode is mounted.
	Receiver	OPF-RH1000-A-MM	
Singlemode fiber	Transmitter	OPF-TH1000-A-SM	SFP module for singlemode is mounted.
	Receiver	OPF-RH1000-A-SM	

\*<sup>1</sup> HEC and ARC are not supported.

\*<sup>2</sup> Use an HDMI cable that is 5 m/16.4 feet or shorter.

\*<sup>3</sup> WUXGA is only for RB (Reduced Blanking) plus DVI signals.

\*<sup>4</sup> Deep Color is not supported.

\*<sup>5</sup> Analog audio input cannot be embedded in digital video.

\*<sup>6</sup> Analog audio output cannot be embedded from digital audio.

\*<sup>7</sup> Polishing methods other than recommended methods can also be used, but they increase return loss and it changes extension distance.

\*<sup>8</sup> Maximum extension distances are measured under the following conditions:

- recommended polishing method is used,
- no additional connections through the path way, and
- allowable bending radius is not exceeded.

\*<sup>9</sup> The laser meets Class 1 of JIS C 6802, which specifies design safety.

#### Notes:

- The supplied AC adapter is only for the OPF-H1000. Do not use it for other products.
- Specifications are subject to change without notice.
- All nominal levels are at  $\pm 5\%$ .

## 7. Troubleshooting

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In case this device does not work correctly, please check the following items first. Refer to manuals of connected devices as well, since they may possibly be the cause of the problem.

- Are this device and the connected devices turned on normally?
- Are cables connected correctly?
- Are there no loose connections?
- Are cables that are appropriate to this device being used?
- Are signal specifications of connected devices matched to each other?
- Are settings of the sink device correct?
- Are there any close objects that may cause noise?

If additional assistance is required, please perform the following tests and then contact us.

1. Reboot the OPF. The problem still cannot be solved?
2. Connect the devices using genuine cables without connecting the OPF-H1000.  
The problem still cannot be solved? Please contact us for assistance.



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