Thank you for choosing our product.

To ensure the best performance of this product, please read this user guide fully and carefully before using it and keep this manual together with the product for future reference as needed.

IDK Corporation
Trademarks

- Blu-ray Disc and Blu-ray are trademarks of Blu-ray Disc Association.
- The terms HDMI and HDMI High-Definition Multimedia Interface, and the HDMI Logo are trademarks or registered trademarks of HDMI Licensing Administrator, Inc. 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 information contained in this User guide such as exact product appearance, diagrams, menu operations, and so on may differ depending on the product version.
- This User guide is subject to change without notice. You can download the latest version from IDK’s website at: http://www.idkav.com

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 product. Follow all instructions and heed all warnings/cautions.

<table>
<thead>
<tr>
<th>Enforcement Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="warning.png" alt="Warning" /></td>
<td></td>
</tr>
<tr>
<td><strong>Warning</strong></td>
<td>Indicates the presence of a hazard that may result in death or serious personal injury if the warning is ignored or the product is handled incorrectly.</td>
</tr>
<tr>
<td><img src="caution.png" alt="Caution" /></td>
<td></td>
</tr>
<tr>
<td><strong>Caution</strong></td>
<td>Indicates the presence of a hazard that may cause minor personal injury or property damage if the caution is ignored or the product is handled incorrectly.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="caution.png" alt="Caution" /></td>
<td>This symbol is intended to alert the user. (Warning and caution)</td>
<td><img src="electrical_hazard.png" alt="Electrical Hazard" /></td>
</tr>
<tr>
<td><img src="prohibited.png" alt="Prohibited" /></td>
<td>This symbol is intended to prohibit the user from specified actions.</td>
<td><img src="do_not_disassemble.png" alt="Do not disassemble" /></td>
</tr>
<tr>
<td><img src="instruction.png" alt="Instruction" /></td>
<td>This symbol is intended to instruct the user.</td>
<td><img src="unplug.png" alt="Unplug" /></td>
</tr>
</tbody>
</table>
### For lifting heavy products:

- **Instruction**
  - Lifting must be done by two or more personnel.
  
  To avoid injury: When lifting the product, bend your knees, keep your back straight and get close to it with two or more persons.

### For installing and connecting products:

- **Prohibited**
  - Do not place the product upon a surface that may give way or that may become unstable.
  
  Install the product in a secure and stable place to prevent it from falling and possibly causing injury.

- **Instruction**
  - Secure the product if installing in locations prone to vibration or movement.
  
  Otherwise, it may move unexpectedly or it may fall and lead to injury.

- **Instruction**
  - Installation work must be performed by professionals.
  
  The product is intended to be installed by skilled technicians. For installation, please contact a system integrator or IDK. Improper installation may lead to the risk of fire, electric shock, injury, or property damage.

- **Prohibited**
  - Do not place the product upon a surface that may give way or that may become unstable.

- **Instruction**
  - Insert the power plug into an outlet that is unobstructed.
  
  Unobstructed access to the plug enables unplugging the product in case of any extraordinary failure, abnormal situation or for easy disconnection during extended periods of non-use.

- **Instruction**
  - Insert the power plug into an appropriate outlet completely.
  
  If the plug is partially inserted, arching may cause the connection to overheat, increasing the risk of electrical shock or fire. Do not use a damaged plug or connect to a damaged outlet.

- **Prohibited**
  - Do not place the product upon a surface that may give way or that may become unstable.

- **Instruction**
  - Unplug the product from the AC power source during installation or service.
  
  When connecting peripheral devices to this product, unplug all involved devices from outlets. Ground potential differences may cause fire or other difficulties.

### For operating products:

- **Prohibited**
  - Keep out any foreign objects.
  
  To avoid fire or electric shock, do not permit foreign objects, such as metal and paper, to enter the product from vent holes or other apertures.

- **Prohibited**
  - For power cable/ plug:
    
    - Do not scratch, heat, or modify, including splicing or lengthening them.
    
    - Do not pull, place heavy objects on them, or pinch them.
    
    - Do not bend, twist, tie or clamp them together forcefully.

  Misuse of the power cable and plug may cause fire or electric shock. If power cables/plugs become damaged, contact your IDK representative.

- **Prohibited**
  - Do not repair, modify or disassemble.
  
  Since the product includes circuitry that uses potentially lethal, high voltage levels, disassembly by unauthorized personnel may lead to the risk of fire or electric shock. For internal inspection or repair, contact your IDK representative.

- **Prohibited**
  - Do not touch the product and connected cables during electrical storms.
  
  Contact may cause electric shock.

- **Instruction**
  - Clean the power plug regularly.
  
  If the plug is covered in dust, it may increase the risk of fire.
<table>
<thead>
<tr>
<th>If the following problem occurs:</th>
</tr>
</thead>
</table>
| • **Unplug immediately if the product smokes, makes unusual noise, or produces a burning odor.**  
  If you continue to use the product under these conditions, it may cause electric shock or fire.  
  **Unplug immediately if the product is damaged by falling or having been dropped.**  
  If you continue to use the product under these conditions, it may increase the risk of electrical shock or fire. For maintenance and repair, contact your IDK representative.  
  **Unplug immediately if water or other objects are directed inside.**  
  If you continue to use the product under these conditions, it may increase the risk of electrical shock or fire. For maintenance and repair, contact your IDK representative. |
## Caution

### For installing and connecting products:

<table>
<thead>
<tr>
<th>Prohibited</th>
<th>Do not place the product in a location where it will be subjected to high temperatures.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If the product is subjected to direct sunlight or high temperatures while under operation, it may affect the product’s performance and reliability and may increase the risk of fire.</td>
</tr>
<tr>
<td>No vent</td>
<td>Do not store or operate the product in dusty, oil smoke filled, or humid place.</td>
</tr>
<tr>
<td></td>
<td>If the product is placed near humidifiers or in a dusty area, it may increase the risk of fire or electric shock.</td>
</tr>
<tr>
<td>Prohibited</td>
<td>Do not block the vent holes.</td>
</tr>
<tr>
<td></td>
<td>If ventilation slots are blocked, it may cause the product to overheat, affecting performance and reliability and may increase the risk of fire.</td>
</tr>
<tr>
<td>Prohibited</td>
<td>Do not place or stack heavy items on the product.</td>
</tr>
<tr>
<td></td>
<td>Failure to observe this precaution may result in damage to the product and other property and may lead to the risk of personal injury.</td>
</tr>
<tr>
<td>Instruction</td>
<td>Do not exceed ratings of outlet and wiring devices.</td>
</tr>
<tr>
<td></td>
<td>Exceeding the rating of an outlet may increase the risk of fire and electric shock.</td>
</tr>
</tbody>
</table>

### Instruction

| Use and store the product within the specified temperature/humidity range. |
| If the product is used outside the specified range for temperature and humidity continuously, it may increase the risk of fire or electric shock. |
| Do not place the product at elevations of 1.24 mi. (2,000 m) or higher above sea level. |
| Failure to do so may shorten the life of the internal parts and result in malfunctions. |
| When mounting the product into the rack, provide sufficient cooling space. |
| Mount the product in a rack meeting EIA standards, and maintain spaces above and below for air circulation. For your safety as required, attach an L-shaped bracket in addition to the panel mount bracket kit to improve mechanical stability. |
| Never insert screws without the rubber feet into the threaded holes on the bottom of the product. |
| Never insert screws without the rubber feet into the threaded holes on the bottom of the product. Doing so may lead to damage when the screws contact electrical circuitry or components inside the product. |
| Reinstall the originally supplied rubber feet using only the originally supplied screws. |

### For operating products:

| Prohibited | Use only the supplied power cable and AC adapter. |
|            | Do not use the supplied power cable and AC adapter with other products. |
|            | If non-compliant adapter or power cables are used, it may increase the risk of fire or electrical shock. |

| Unplug | If the product won’t be used for an extended period of time, unplug it. |
|        | Failure to observe this precaution may increase the risk of fire. |
|        | Unplug the product before cleaning. |
|        | To prevent electric shock. |

| Instruction | If cooling fan stops, power off the product and contact us. |
|             | Failure to do so may rise internal temperature and increase the risk of malfunction, fire, or electric shock. |
|             | Clean the vent holes regularly. |
|             | If the vent holes of the cooling fan is covered in dust, internal temperature rises and it may increase the risk of malfunction, fire, or electric shock. |
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# 1 Included items

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
  - SFP optical transceiver  x 1
  - AC adapter with screw locking mechanism (4 ft. (1.2 m))  x 1
  - Cable clamp  x 1

- **Receiver (OPF-RH1000)**
  - OPF-RH1000 (main unit)  x 1
  - SFP optical transceiver  x 1
  - AC adapter with screw locking mechanism (4 ft. (1.2 m))  x 1
  - Cable clamp  x 1

**Tip:**
Dust caps are attached to SFP optical transceiver and the connector.
These caps will be used for shipping or repairing the OPF unit.
2 Precautions for shipping

The OPF-H1000 has an SFP optical transceiver that is vulnerable to damage caused by mishandling during shipment if it is improperly packaged.

If, for any reason, you need to ship the device, remove the transceiver from the device and plug the dust cap into the transceiver and the connector. Put the removed transceiver in an electrostatic bag with enough cushion and keep the bag and device together in a box.

To install a transceiver:
Make sure the bale clasp is closed.
Line up the transceiver with the port and slide it into the port until you hear a click.

Removing a transceiver:
Open the bale clasp and pull the transceiver out of the port.

[Fig. 2.1] Removing and installing SFP optical transceiver

Note:
When installing the SFP transceiver, push it firmly and ensure that it is completely seated and the bale clasp is locked. Do not open the bale clasp except for removing the transceiver.
3 Product Outline

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.
4 Features

■ Video
  • Up to 1080p/WUXGA (Reduced Blanking)
  • HDCP 1.4 (Pass-through)
  • Transmission distances
    Multimode fiber (OM3): 984 ft. (300 m)
    Multimode fiber (OM4): 0.62 mi. (1 km)
    Singlemode fiber (OS1): 2.92 mi. (4.7 km), (Up to 6.21 mi. (10 km, optional))

■ Audio
  • Analog audio transmission

■ Communication
  • Bidirectional RS-232C

■ Others
  • CEC (Pass-through)
  • AC adapter with locking mechanism

*DVI signal only

♦ 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 μm, while that of multimode fiber is approximately 50 μm or 62.5 μm.
  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.
## 5 Panels

### 5.1 Transmitter (OPF-TH1000)

![Diagram of Transmitter](image)

**[Fig. 5.1] Transmitter drawing**

<table>
<thead>
<tr>
<th>#</th>
<th>Part name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>HDMI input connector</td>
<td>Input connector for HDMI signals. Connect source devices such as Blu-ray players.</td>
</tr>
<tr>
<td>②</td>
<td>I/O connector for extension</td>
<td>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).</td>
</tr>
<tr>
<td>③</td>
<td>AC adapter connector</td>
<td>Connector for the supplied AC adapter.</td>
</tr>
<tr>
<td>④</td>
<td>Cable fixing hole</td>
<td>Hole for the attached cable clamp.</td>
</tr>
<tr>
<td>⑤</td>
<td>RS-232C port</td>
<td>Port for D-sub 9 pin.</td>
</tr>
<tr>
<td>⑥</td>
<td>Audio input connectors</td>
<td>Input connector for audio signals. Analog audio signals cannot be embedded to HDMI; they are sent independently.</td>
</tr>
<tr>
<td>⑦</td>
<td>Frame ground</td>
<td>Ground for indoor ground terminal.</td>
</tr>
<tr>
<td>⑧</td>
<td>LED lights</td>
<td>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.</td>
</tr>
<tr>
<td>⑨</td>
<td>DIP switches</td>
<td>Switches for changing each setting. DIP SW1 to 4: No feature is assigned on transmitter; please do not touch.</td>
</tr>
</tbody>
</table>
5.2 Receiver (OPF-RH1000)

[Fig. 5.2] Receiver drawing

[Table 5.2] Receiver features

<table>
<thead>
<tr>
<th>#</th>
<th>Part name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HDMI output connector</td>
<td>Output connector for HDMI signals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sink devices such as TVs can be connected.</td>
</tr>
<tr>
<td>2</td>
<td>I/O connector for extension</td>
<td>Digital optical signal I/O connector for extension</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Factory installed SFP module allows fiber optical cables to connect OPF-TH1000 (transmitter) and OPF-RH1000 (receiver).</td>
</tr>
<tr>
<td>3</td>
<td>AC adapter connector</td>
<td>Connector for the attached AC adapter</td>
</tr>
<tr>
<td>4</td>
<td>Cable fixing hole</td>
<td>Hole for the supplied cord clamp</td>
</tr>
<tr>
<td>5</td>
<td>RS-232C connector</td>
<td>Connector for D-sub 9 pin</td>
</tr>
<tr>
<td>6</td>
<td>Audio output connectors</td>
<td>Output connector for audio signals.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Those audio signals were not de-embedded.)</td>
</tr>
<tr>
<td>7</td>
<td>Frame ground</td>
<td>Ground for indoor ground terminal</td>
</tr>
<tr>
<td>8</td>
<td>LED lights</td>
<td>POWER: Lights when power is supplied from the AC adapter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIGNAL: Lights when video signal is valid.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TX: Lights when valid codes are sent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RX: Lights when the receiver fiber receives valid codes.</td>
</tr>
<tr>
<td>9</td>
<td>DIP Switches</td>
<td>DIPSW1:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sets the transmission reaction time of Hot Plug Detect (HDMI Pin 19).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “OFF”: Hot Plug Detect signals of the sink device is transmitted to the source device if they are 0.1 second or longer.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “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).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DIP SW2 to 4:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nothing is assigned. Please do not touch these switches.</td>
</tr>
</tbody>
</table>
6 Connection

6.1 Precautions

■ 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 stack or place the OPF-H1000 directly on top of another OPF-H1000
- Do not block vent holes. To provide adequate ventilation, maintain sufficient clearances around the OPF-H1000 (1.2 in. (30 mm) or more)
- When the OPF-H1000 needs to be mounted in an enclosed space or an EIA rack without using IDK’s rack mounting hardware (RM-SF, RM-SH), ensure that a sufficient ventilation/cooling system is provided to keep the ambient temperature at 104°F (40°C) or lower. If inadequately vented, the product’s service life, operation, and reliability may be affected.

■ Operating precautions

- Use HDMI signal I/O cables less than 16 ft. (5 m) whose pins are assigned appropriately. This transmission 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 24bit/pixel (8 bit/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 optical transceiver 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 optical transceiver 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
- 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 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 “Troubleshooting” if video image is not displayed appropriately on the monitor connected to the OPF-H1000.

6.2 Application example

[Fig. 6.1] Application diagram

1. Connect Type A (male) connector cables 16 ft (5 m) or shorter to the HDMI I/O connector.

2. Connect fiber optical cables that support the desired transmission distance to the SFP optical transceiver 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 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.
6.3 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)

![Diagram of cascade connection example]

*Note: HDCP pass through devices cannot be connected between OPF-RH1000-A and LCD monitor.*

**[Fig. 6.2] Application example**
6.4 Installing on wall or ceiling
You can install the OPF-H1000 on a wall or ceiling using the optional mounting plate (FP-100).

6.5 HDMI input/output cable
Use 16 ft. (5 m) or shorter HDMI cables with Type A (male) connector whose pins are configured correctly. Use the correct HDMI cable or HDMI-DVI conversion cable depending on the system configuration. Secure HDMI cables using cable clamps to prevent connectors from being accidently pulled out of ports.

Securing HDMI cable using cable clamp

Removing HDMI cable and cable clamp

[Fig. 6.3] Securing and removing cable clamp
6.6 Fiber optical cables for long distance transmission

- Use a duplex fiber or two simplex fiber cables with LC connectors at both ends.
- Make sure that the fiber optical cable to be connected between the transmitter and receiver meets the standard of the desired transmission distance.
- To polish connectors:
  For SFP optical transceiver for multimode : PC polishing is recommended.
  For SFP optical transceiver for singlemode : UPC polishing is recommended.
  **Note:** APC polishing is not supported.
- Transmission distance varies depending on attenuation of the fiber, connector and other contact portions.
- Make sure not to exceed the allowable tension and bend radius of fiber optic cable or the performance of the product and the life of the fiber optic cable may be affected.
- Plug the dust caps to both faces of the fiber optic cable when connecting the fiber optic cable and when not in use.
- Before inserting a fiber optic cable, make sure there is no damage or dirt on the end-face of the optical connector. Clean up it or OPF-H1000 may not operate correctly.

![Fig. 6.4] Dust caps

- 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)
6.7 SFP optical transceiver

The fiber type and transmission distance vary depending on the SFP optical transceiver.

<table>
<thead>
<tr>
<th>Table 6.1</th>
<th>Specification of standard SFP optical transceiver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Multimode fiber</td>
</tr>
<tr>
<td>Wave length</td>
<td>850 nm (Oxide VCSEL laser*)</td>
</tr>
<tr>
<td>Max. transmission distances</td>
<td>OM3: 984 ft. (300 m)</td>
</tr>
<tr>
<td></td>
<td>OS1: 2.92 mi. (4.7 km)</td>
</tr>
<tr>
<td>Receiver sensitivity (OMA) @10.3Gbps</td>
<td>-13 dBm or higher</td>
</tr>
<tr>
<td>Average Launch Power</td>
<td>-9 dBm to -2.5 dBm</td>
</tr>
<tr>
<td>Max. input power</td>
<td>0 dBm</td>
</tr>
<tr>
<td>Connector</td>
<td>LC (Duplex)</td>
</tr>
</tbody>
</table>

*The lasers in these models meet class1.

- Use only the supplied SFP optical transceiver to ensure the best system performance and reliability. The maximum receiving optic power used for the OPF-H1000 is 0 dBm.
- Ensure that the SFP optical transceiver is locked. If it is not locked correctly, the OPF may not work normally.

- Plug the attached dust cap into the SFP optical transceiver when not connecting a fiber optic cable.
- Pull the lever of the SFP optical transceiver in order to remove it. Lock the lever and push it into until it clicks to attach the module.

[Fig. 6.6] SFP transceiver Locked/Not locked

[Fig. 6.7] SFP optical transceiver
6.8 Audio Transmission

Analog audio signals can be transmitted over a long distance.

6.9 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 bales

![Diagram showing RS-232C cable connection example]

[Fig. 6.8] RS-232C cable connection example

Note:
Unnecessary data may be output to start-up RS-232C signal. A part of communication data may be damaged if control program is not designed appropriately.
7 Specifications

7.1 Pin assignments of HDMI Type A connector

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

*N.C.: No connection

7.2 RS-232C pin assignments

[Table 7.1] HDMI Type A pin assignments

![RS-232C Pin Assignments](image1)

[Fig. 7.1] RS-232C pin assignments
Connecting OPF-H1000 to PC
Use a cross cable to connect the OPF-H1000 to a PC.

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Signal</th>
<th>PC Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N.C. (Not Connected)*</td>
<td>N.C.</td>
</tr>
<tr>
<td>2</td>
<td>RD (Receive Data)</td>
<td>RD</td>
</tr>
<tr>
<td>3</td>
<td>TD (Transmit Data)</td>
<td>TD</td>
</tr>
<tr>
<td>4</td>
<td>N.C. (Not Connected)*</td>
<td>N.C.</td>
</tr>
<tr>
<td>5</td>
<td>GND (Ground)</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>N.C. (Not Connected)*</td>
<td>N.C.</td>
</tr>
<tr>
<td>7</td>
<td>RTS (Request to Send)</td>
<td>RTS</td>
</tr>
<tr>
<td>8</td>
<td>CTS (Clear to Send)</td>
<td>CTS</td>
</tr>
<tr>
<td>9</td>
<td>N.C. (Not Connected)*</td>
<td>N.C.</td>
</tr>
</tbody>
</table>

*Not used

[Fig. 7.2] RS-232C pin assignment (connecting to PC)

Connecting OPF-H1000 to IDK’s products
Use a cross cable to connect the OPF-H1000 to an IDK’s product.

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Signal</th>
<th>IDK’s products Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N.C. (Not Connected)*</td>
<td>N.C.</td>
</tr>
<tr>
<td>2</td>
<td>RD (Receive Data)</td>
<td>RD</td>
</tr>
<tr>
<td>3</td>
<td>TD (Transmit Data)</td>
<td>TD</td>
</tr>
<tr>
<td>4</td>
<td>N.C. (Not Connected)*</td>
<td>N.C.</td>
</tr>
<tr>
<td>5</td>
<td>GND (Ground)</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>N.C. (Not Connected)*</td>
<td>N.C.</td>
</tr>
<tr>
<td>7</td>
<td>RTS (Request to Send)</td>
<td>RTS</td>
</tr>
<tr>
<td>8</td>
<td>CTS (Clear to Send)</td>
<td>CTS</td>
</tr>
<tr>
<td>9</td>
<td>N.C. (Not Connected)*</td>
<td>N.C.</td>
</tr>
</tbody>
</table>

*Not used

[Fig. 7.3] RS-232C pin assignment (connecting to IDK’s product)

Connecting OPF-H1000 to another device requiring straight connection
Use a straight cable to connect the OPF-H1000 to other devices requesting straight connection.

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Signal</th>
<th>Other devices Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N.C. (Not Connected)*</td>
<td>N.C.</td>
</tr>
<tr>
<td>2</td>
<td>RD (Receive Data)</td>
<td>RD</td>
</tr>
<tr>
<td>3</td>
<td>TD (Transmit Data)</td>
<td>TD</td>
</tr>
<tr>
<td>4</td>
<td>N.C. (Not Connected)*</td>
<td>N.C.</td>
</tr>
<tr>
<td>5</td>
<td>GND (Ground)</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>N.C. (Not Connected)*</td>
<td>N.C.</td>
</tr>
<tr>
<td>7</td>
<td>RTS (Request to Send)</td>
<td>RTS</td>
</tr>
<tr>
<td>8</td>
<td>CTS (Clear to Send)</td>
<td>CTS</td>
</tr>
<tr>
<td>9</td>
<td>N.C. (Not Connected)*</td>
<td>N.C.</td>
</tr>
</tbody>
</table>

*Not used

[Fig. 7.4] RS-232C pin assignment (Connecting to device requiring straight connection)
### 7.3 Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>OPF-TH1000-A (Transmitter)</th>
<th>OPF-RH1000-A (Receiver)</th>
</tr>
</thead>
</table>
| Input | 1 input  
HDMI (*1)/DVI 1.0  
TMDS single link  
HDCP 1.4 (Pass-through)  
CEC (Pass-through)  
Connector: Female HDMI Type A (19-pin) (*2) | 1 input  
Digital optical signal for extension  
RS-232C |
| Output | 1 output  
Digital optical signal for extension  
RS-232C | 1 output  
HDMI (*1)/DVI 1.0  
TMDS single link  
HDCP 1.4 (Pass-through)  
CEC (Pass-through)  
Connector: Female HDMI Type A (19-pin) (*2) |
| Format |  | |
| Color depth | 24 bit (*4) | |
| Dot clock | 25 MHz to 165 MHz | |
| TMDS clock | 25 MHz to 165 MHz | |
| Plug & Play | Pass-through | |
| Digital audio input/output | Multi-channel LPCM up to 8 channels  
Sampling frequency: 32 kHz to 192 kHz, Sample size: 16 bit to 24 bit | |
| Analog audio input | 1 input  
Unbalanced Stereo LR  
Input impedance: 11 kΩ  
Reference level: -10 dBu, Max. input level: +3 dBu  
Connector: Stereo mini jack (3.5 mm) | - |
| Analog audio output | -  
1 output  
Unbalanced Stereo LR  
Input impedance: 11 kΩ  
Reference level: -10 dBu, Max. input level: +3 dBu  
Connector: Stereo mini jack (3.5 mm) | |
| Cable for extension | Duplex fiber cable  
SFP optical transceiver (2 LC connectors)  
Polishing (*5)  
SFP optical transceiver for Multimode: UPC polishing (Recommended), APC *APC is not supported  
Transmission distances (*6)  
Multimode fiber (OM3): Up to 984 ft. (300 m)  
Multimode fiber (OM4): Up to 0.62 mi. (1 km)  
Singlemode fiber (OS1): Up to 2.92 mi. (4.7 km)  
Singlemode fiber (OS1): Up to 6.21 mi. (10 km, optional) | - |
| Control | RS-232C  
1 port/male D-sub (9-pin), full duplex, up to 115.2 kbps | - |
| General | Input : 100 - 240 VAC ±10%, 50 Hz/60 Hz ±3 Hz  
Output : DC 5 V 3 A (A dedicated AC adapter is provided) | About 6 Watts  
About 6 Watts |
| Power consumption | Dimensions  
4.2 x 1.2 x 3.5" (106 W) x 30 (H) x 90 (D) mm)  
(Quarter rack wide, thin type) (Excluding connectors and the like) | |
| Dimensions | Weight  
0.9 lbs. (0.4kg)  
0.9 lbs. (0.4kg) | |
| Weight | Temperature  
Operating: -32°F to 104°F (0°C to +40°C)  
Storage: -4°F to +176°F (-20°C to +80°C) | |
| Temperature | Humidity  
Operating/Storage: 20 to 90% (Non Condensing) | |
| Humidity | *1 HEC and ARC are not supported.  
*2 Use 16.4 ft. (5 m) or shorter HDMI cables.  
*3 Deep Color is not supported.  
*4 Separate analog audio input cannot be embedded onto digital video.  
*5 Analog audio cannot be de-embedded (de-multiplexed) from digital audio.  
*6 It is possible to connect without using the recommended polishing method, but that may cause a change of transmission distance ability due to an increase in return loss.  
*7 The maximum transmission distance is measured under the following conditions: Fiber that is polished by a recommended method is used, there is no interconnection, and the allowable bending radius is not exceeded. |

#### SFP Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Multimode fiber</th>
<th>Singlemode fiber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wave length</td>
<td>850 nm (Oxide VCSEL laser*)</td>
<td>1310 nm (Fabry-Perot laser*)</td>
</tr>
</tbody>
</table>
| Max. transmission distances | OM3: 984 ft. (300 m)  
OM4: 0.62 mi. (1 km) | OS1: 2.92 mi. (4.7 km)  
OS1: 6.21 mi. (10 km, optional) |
| Receiver sensitivity (OMA) @10.3Gbps | -13 dBm or higher  
-18 dBm or higher | -8.4 dBm to -3 dBm |
| Max. input power | 0 dBm | 0 dBm |
| Connector | LC (Duplex) | |

#### Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber optic</td>
<td>Transmitter</td>
<td>OPF-TH1000-A-MM</td>
</tr>
<tr>
<td></td>
<td>Receiver</td>
<td>OPF-RH1000-A-MM</td>
</tr>
<tr>
<td>Singlemode fiber</td>
<td>Transmitter</td>
<td>OPF-TH1000-A-3M</td>
</tr>
<tr>
<td></td>
<td>Receiver</td>
<td>OPF-TH1000-A-MM</td>
</tr>
</tbody>
</table>
8 Troubleshooting

In case the OPF-H1000 does not work correctly, please check the following items first. Also refer to manuals for connected devices as well, since they may possibly be the cause of the problem.

- Are the OPF-H1000 and all devices plugged in and powered on normally?
- Are cables connected correctly?
- Are there no loose connections?
- Are correct cables for OPF-H1000 being used?
- Are signal specifications of connected devices matched to each other?
- Are settings of the sink device correct?
- Are there any nearby objects that may cause noise?

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

<table>
<thead>
<tr>
<th>No.</th>
<th>Checking items</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The problem occurs at all connectors?</td>
<td>Yes or No</td>
</tr>
<tr>
<td>2</td>
<td>Connect the devices using genuine cables without connecting the OPF-H1000.</td>
<td>Yes or No</td>
</tr>
<tr>
<td></td>
<td>The problem still cannot be solved? Please contact us for assistance.</td>
<td></td>
</tr>
</tbody>
</table>