



CH-1604TXD & CH-1604RXD

4K UHD+ HDMI over HDBaseT Transmitter & Receiver
with HDR/USB



Operation Manual

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SAFETY PRECAUTIONS

Please read all instructions before attempting to unpack, install or operate this equipment and before connecting the power supply.

Please keep the following in mind as you unpack and install this equipment:

- Always follow basic safety precautions to reduce the risk of fire, electrical shock and injury to persons.
- To prevent fire or shock hazard, do not expose the unit to rain, moisture or install this product near water.
- Never spill liquid of any kind on or into this product.
- Never push an object of any kind into this product through any openings or empty slots in the unit, as you may damage parts inside the unit.
- Do not attach the power supply cabling to building surfaces.
- Use only the supplied power supply unit (PSU). Do not use the PSU if it is damaged.
- Do not allow anything to rest on the power cabling or allow any weight to be placed upon it or any person walk on it.
- To protect the unit from overheating, do not block any vents or openings in the unit housing that provide ventilation and allow for sufficient space for air to circulate around the unit.
- Please completely disconnect the power when the unit is not in use to avoid wasting electricity.

REVISION HISTORY

REVISION	DATE	SUMMARY OF CHANGE
VS0	25/06/18	Initial technical review
VS1	08/08/18	Updated Section 6.1, 6.3 (USB ports)



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1. INTRODUCTION

This HDBaseT 2.0 Transmitter and Receiver set provides for the extension of 4K video with HDR and high bitrate audio over a single Cat.6a/7 cable at distances of up to 100 meters (328 feet). This extender set complies with the advanced HDCP 2.2 and HDMI 2.0 standards, as well as supporting the legacy HDCP 1.x and HDMI 1.x standards. Through the use of the highly efficient, and visually lossless, DSC compression scheme, high bandwidth signals, previously unsupported by HDBaseT, such as 4K@60Hz (4:4:4, 8-bit) or 4K@24Hz (4:4:4, 12-bit, HDR) can be extended without visual compromise or additional latency! These extenders can also pass RS-232, IR, Ethernet, and multiple audio streams across the same cable that carries the video signal.

This system also allows for the extension of USB signals between any standard USB host (such as a PC or laptop) on one side to up to 2 USB ports on the other side. This both extends the USB port while simultaneously providing USB hub functionality making this an ideal KVM solution when the PC is housed in a distant control room, or secure server room. The 48V PoH (Power over HDBaseT) design can power the Receiver (PD) from the Transmitter (PSE), eliminating the need for a separate power supply for the Receiver.

2. APPLICATIONS

- Household entertainment sharing and control
- Lecture room display and control
- Showroom display and control
- Meeting room presentation and control
- Classroom display and control

3. PACKAGE CONTENTS

Transmitter

- 1×HDMI over HDBaseT Transmitter with HDR/USB
- 1×24V/2.7A DC Power Adapter
- 1×Power Cord
- 1×3.5mm to IR Blaster Cable
- 1×Shockproof Feet (Set of 4)
- 1×Operation Manual

Receiver

- 1×HDMI over HDBaseT Receiver with HDR/USB
- 1×3.5mm to IR Extender Cable
- 1×Shockproof Feet (Set of 4)
- 1×Operation Manual

4. SYSTEM REQUIREMENTS

- HDMI source equipment such as a media player, video game console or set-top box.
- HDMI receiving equipment such as an HDTV, monitor or audio amplifier.
- The use of "Premium High Speed HDMI" cables, and industry standard Cat.6, Cat.6a or Cat.7, is highly recommended.

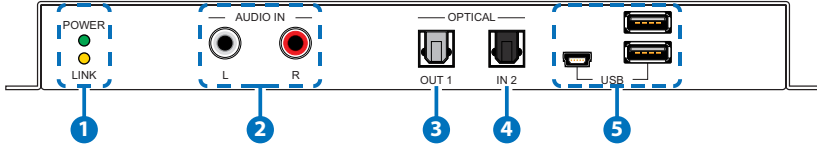


5. FEATURES

- HDMI input and output with 18Gbps (600MHz) 4K UHD with HDR support
- DVI 1.0 compliant with the use of an HDMI-DVI adapter
- HDCP 1.4 and 2.2 compliant
- Supports the HDBaseT 2.0 specification
- Supports HD resolutions up to 3840×2160@60Hz (YUV 4:4:4, 8-bit)
- Supports 4K HDR at 24Hz (YUV 4:4:4) and 60Hz (YUV 4:2:0) with up to 12-bit color
- Supports 16-bit Deep Color up to 1080p@60Hz
- Simultaneous transmission of video, audio and data over a single Cat.6/7 cable up to 100 meters (328 feet)
- HDBaseT feature support: HD Video and Audio, 100BaseT Ethernet, USB 2.0, 48V PoH and Control (Bi-directional IR/RS-232 pass-through)
- RS-232 baud rates from 110bps to 115200bps are supported
- Supports pass-through of audio formats including LPCM 2.0/5.1/7.1, Bitstream, and HD Bitstream via HDMI
- Supports bi-directional pass-through of digital optical audio formats including LPCM 2.0 at audio sampling rates up to 48kHz, and Bitstream via Optical (S/PDIF) connections
- Supports pass-through of analog stereo audio from the Transmitter to the Receiver via stereo RCA connections
- 2 USB Type A ports and 1 USB Mini B (on Transmitter and Receiver) for extension of USB devices including mice, keyboards, webcams or digital storage
- Supports standard 48V PoH from Transmitter (PSE) to Receiver (PD) (compatible Receivers only)

6. OPERATION CONTROLS AND FUNCTIONS

6.1 Transmitter's Front Panel



- 1 POWER & LINK LEDs:** The Power LED will illuminate to indicate the unit is on and receiving power. The Link LED will illuminate solidly when a live connection with a compatible Receiver is active.
- 2 AUDIO IN:** Connect to the stereo analog output of a device such as a CD player or PC to extend it to the Receiver's AUDIO OUT L/R ports.
- 3 OPTICAL OUT 1:** Connect to powered speakers or an amplifier for digital audio output using an appropriate optical cable. Audio is sourced from the Optical Audio Input port on a connected compatible Receiver.
- 4 OPTICAL IN 2:** Connect to the optical audio output of a device such as a media player or game console using an appropriate optical cable. Audio is sent to the Optical Audio Output on a connected compatible Receiver.
- 5 MINI-B USB:** Connect to a PC or Laptop to extend the USB data connection to the Type-A USB ports on a connected compatible Receiver.

TYPE-A USB: Connect to USB peripheral devices such as keyboard, mouse, printer, flash drive, etc. for connection to the USB host device connected to the Mini-B USB port on a connected compatible Receiver.

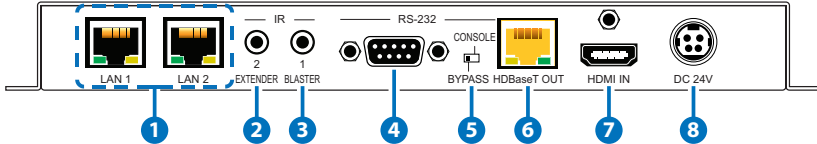
Note 1: The direction of USB extension (Transmitter to Receiver, or Receiver to Transmitter) is automatically determined by which Mini-B port is connected to a host device (such as a PC or laptop).

Note 2: If the host connection is moved from one side to the other, the video output will briefly blink out while support for the new USB direction initializes.



Note 3: Only one host connection is supported at a time. USB functionality will be disabled if host devices are connected to both sides simultaneously.

6.2 Transmitter's Rear Panel



- 1 LAN 1~2:** Connect directly, or through a network switch, to your PC/laptop to control the unit via Telnet/WebGUI and to extend the network across the HDBaseT connection.

Note: Connect only one Ethernet port from the HDBaseT Transmitter/Receiver pair to the local network. Connecting multiple ports to the same local network may result in a feedback loop and cause the network to fail.

- 2 IR EXTENDER 2:** Connect to the provided IR Extender to extend the IR control range of remotely located devices. Ensure that the remote being used is within direct line-of-sight of the IR Extender.
- 3 IR BLASTER 1:** Connect to the provided IR Blaster to transmit IR signals to devices within direct line-of-sight of the IR Blaster.
- 4 RS-232:** Connect to a PC, laptop or serial controllable device for the extension of RS-232 signals between both ends of the HDBaseT connection in "Bypass" mode, or for control this unit when in "Console" mode.

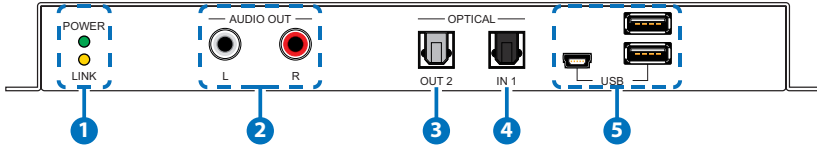
- 5 CONSOLE/BYPASS:** This switch controls the operational mode of the RS-232 port. When set to "Bypass", RS-232 signals will be passed to the connected Receiver. When set to "Console" the RS-232 port will send commands directly to the Transmitter.

Note: RS-232 bypass requires both the Transmitter and Receiver to be set to "Bypass" mode. "Console" mode is currently reserved for factory use only.

- 6 HDBaseT OUT:** Connect to a compatible HDBaseT Receiver with a single Cat.5e/6/7 cable for transmission of all data signals. 48V PoH will also be supplied when connected to a compatible PD Receiver.

- 7 HDMI IN:** Connect to HDMI source equipment such as a media player, game console or set-top box.
- 8 DC 24V:** Plug the 24V DC power adapter into this port and connect it to an AC wall outlet for power.

6.3 Receiver's Front Panel



- 1 POWER & LINK LEDs:** The Power LED will illuminate to indicate the unit is on and receiving power. The Link LED will illuminate solidly when a live connection with a compatible Transmitter is active.
- 2 AUDIO OUT:** Connect to powered speakers or an amplifier for stereo analog audio output.
- 3 OPTICAL OUT 2:** Connect to powered speakers or an amplifier for digital audio output using an appropriate optical cable. Audio is sourced from the Optical Audio Input port on a connected compatible Transmitter.
- 4 OPTICAL IN 1:** Connect to the optical audio output of a device such as a media player or game console using an appropriate optical cable. Audio is sent to the Optical Audio Output on a connected compatible Transmitter.
- 5 MINI-B USB:** Connect to a PC or Laptop to extend the USB data connection to the Type-A USB ports on a connected compatible Transmitter.

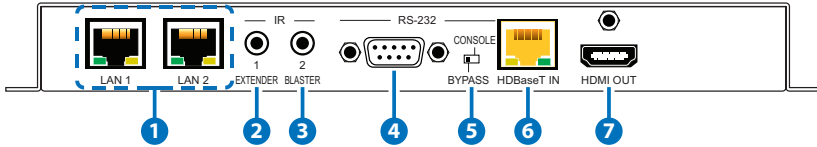
TYPE-A USB: Connect to USB peripheral devices such as keyboard, mouse, printer, flash drive, etc. for connection to the USB host device connected to the Mini-B USB port on a connected compatible Transmitter.

Note 1: The direction of USB extension (Transmitter to Receiver, or Receiver to Transmitter) is automatically determined by which Mini-B port is connected to a host device (such as a PC or laptop).

Note 2: If the host connection is moved from one side to the other, the video output will briefly blink out while support for the new USB direction initializes.

Note 3: Only one host connection is supported at a time. USB functionality will be disabled if host devices are connected to both sides simultaneously.

6.4 Receiver's Rear Panel



- 1 LAN 1~2:** Connect to an Ethernet supporting device or to your local network, as appropriate, to extend the network to both ends of the HDBaseT connection.

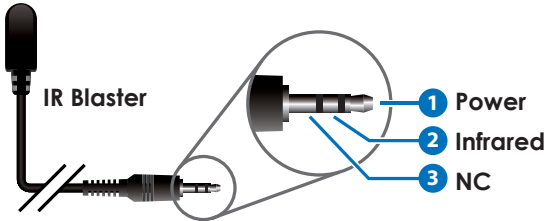
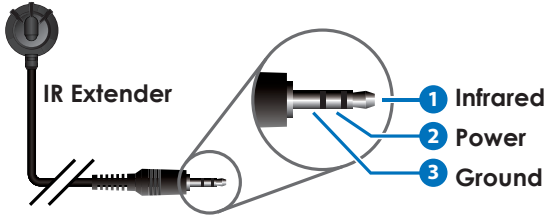
Note: Connect only one Ethernet port from the HDBaseT Transmitter/Receiver pair to the local network. Connecting multiple ports to the same local network may result in a feedback loop and cause the network to fail.

- 2 IR EXTENDER 1:** Connect to an IR Extender to extend the IR control range of devices connected to the other end of the HDBaseT connection. Ensure that the remote being used is within direct line-of-sight of the IR Extender.
- 3 IR BLASTER 2:** Connect to the provided IR Blaster to transmit IR signals from the other end of the HDBaseT connection to devices within direct line-of-sight of the IR Blaster.
- 4 RS-232:** Connect to a PC, laptop or serial controllable device for the extension of RS-232 signals between both ends of the HDBaseT connection in "Bypass" mode, or for control this unit when in "Console" mode.
- 5 CONSOLE/BYPASS:** This switch controls the operational mode of the RS-232 port. When set to "Bypass", RS-232 signals will be passed to the connected Receiver. When set to "Console" the RS-232 port will send commands directly to the Receiver.

Note: RS-232 bypass requires both the Transmitter and Receiver to be set to "Bypass" mode. "Console" mode is currently reserved for factory use only.

- 6 HDBaseT IN:** Connect to a compatible HDBaseT Transmitter with a single Cat.5e/6/7 cable for transmission of all data signals. 48V PoH will also be supplied when connected to a compatible PD Transmitter.
- 7 HDMI OUT:** Connect to an HDMI TV, monitor or amplifier for digital video and audio output.

6.5 IR Cable Pinouts

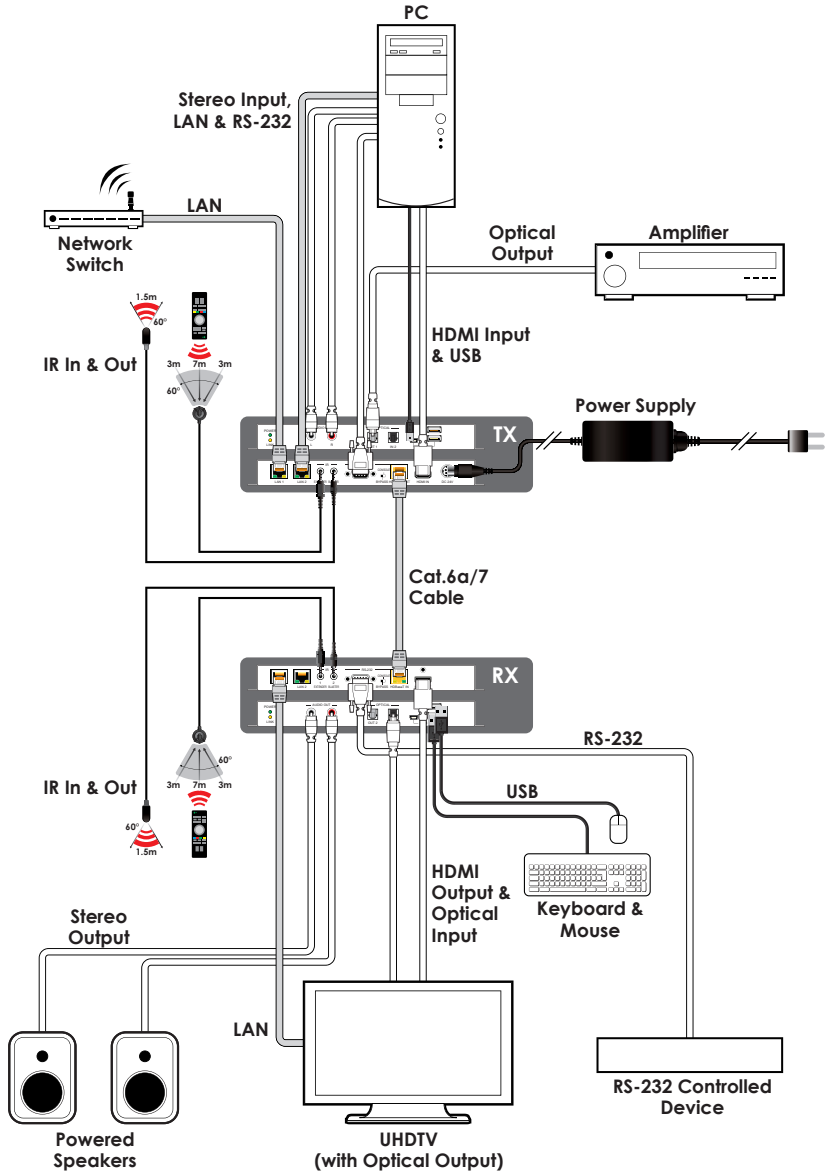


6.6 RS-232 Protocol

Unit		Controlling PC	
Pin	Definition	Pin	Definition
1		1	
2	TxD	2	RxD
3	RxD	3	TxD
4		4	
5	GND	5	GND
6		6	
7		7	
8		8	
9		9	

Serial Port Settings	
Baud Rate	115200
Data Bits	8
Parity Bit	None
Stop Bits	1
Flow Control	None

7. CONNECTION DIAGRAM





8. SPECIFICATIONS

8.1 Transmitter's Technical Specifications

HDMI Bandwidth	600MHz/18Gbps
HDBaseT Bandwidth	340MHz/10.2Gbps
Input Ports	1×HDMI 1×S/PDIF (TOSLINK) 1×Stereo (2×RCA)
Output Ports	1×HDBaseT (RJ-45) 1×S/PDIF (TOSLINK)
Pass-through Ports	1×IR Extender (3.5mm) 1×IR Blaster (3.5mm) 2×LAN (RJ-45) 1×USB (Mini-B) 2×USB (Type-A)
Pass-through/Control Port	1×RS-232 (DE-9)
IR Frequency	30–50kHz (30–60kHz under ideal conditions)
Baud Rate	Up to 115200bps
Power Supply	24V/2.7A DC (US/EU standards, CE/FCC/UL certified)
ESD Protection	Human Body Model: ±8kV (Air Discharge) ±4kV (Contact Discharge)
Dimensions	231.5mm×25mm×108mm (W×H×D) [Case Only] 231.5mm×25mm×120mm (W×H×D) [All Inclusive]
Weight	700g
Chassis Material	Metal
Silkscreen Color	Black

Operating Temperature	0 °C–40 °C/32 °F–104 °F
Storage Temperature	-20 °C–60 °C/-4 °F–140 °F
Relative Humidity	20–90% RH (Non-condensing)
Power Consumption	19W

8.2 Receiver's Technical Specifications

HDMI Bandwidth	600MHz/18Gbps
HDBaseT Bandwidth	340MHz/10.2Gbps
Input Ports	1×HDBaseT (RJ-45) 1×S/PDIF (TOSLINK)
Output Ports	1×HDMI 1×S/PDIF (TOSLINK) 1×Stereo (2×RCA)
Pass-through Ports	1×IR Extender (3.5mm) 1×IR Blaster (3.5mm) 1×RS-232 (DE-9) 2×LAN (RJ-45) 1×USB (Mini-B) 2×USB (Type-A)
IR Frequency	30–50kHz (30–60kHz under ideal conditions)
Baud Rate	Up to 115200bps
Power Supply	48V PoH
ESD Protection	Human Body Model: ±8kV (Air Discharge) ±4kV (Contact Discharge)
Dimensions	231.5mm×25mm×108mm (W×H×D) [Case Only] 231.5mm×25mm×120mm (W×H×D) [All Inclusive]



Weight	700g
Chassis Material	Metal
Silkscreen Color	Black
Operating Temperature	0 °C–40 °C/32 °F–104 °F
Storage Temperature	-20 °C–60 °C/-4 °F–140 °F
Relative Humidity	20–90% RH (Non-condensing)
Power Consumption	20W

8.3 Video Specifications

Supported PC Resolution (Hz)		Input	Output
640×480	60, 72, 75, 85	✓	✓
720×400	70, 85	✓	✓
800×600	56, 60, 72, 75	✓	✓
1024×768	60, 70, 75, 85	✓	✓
1152×864	75	✓	✓
1280×768	60, 75, 85	✓	✓
1280×800	60RB, 60, 75, 85	✓	✓
1280×960	60, 85	✓	✓
1280×1024	60, 75, 85	✓	✓
1360×768	60RB, 60	✓	✓
1366×768	60	✓	✓
1400×1050	60RB, 60, 75	✓	✓
1440×900	60RB, 60, 75, 85	✓	✓
1600×900	60RB	✓	✓
1680×1050	60RB, 60	✓	✓
1600×1200	60	✓	✓
1680×1050	60RB	✓	✓
1920×1200	60RB	✓	✓

Supported TV Resolution (Hz)		Input	Output
720×480i	59.94, 60	✓	✓
720×480p	59.94, 60	✓	✓
720×576i	50	✓	✓
720×576p	50	✓	✓
1280×720p	50, 59.94, 60	✓	✓
1920×1080i	50, 59.94, 60	✓	✓
1920×1080p	23.98, 24, 25, 29.97, 30, 50, 59.94, 60	✓	✓
3840×2160p	24, 25, 29.97, 30, 50, 59.94, 60	✓	✓
4096×2160p	24, 25, 29.97, 30	✓	✓

8.4 Audio Specifications

Analog Input	
Max Audio Level	2Vrms
Impedance	90kΩ
Type	Unbalanced

Analog Output	
Max Audio Level	2Vrms
THD+N	< -80dB@0dBFS 1kHz (A-wt)
SNR	> 70dB@0dBFS
Frequency Response	< ±3dB@20Hz~20kHz
Crosstalk	< -60dB@10kHz
Impedance	499Ω
Type	Unbalanced

Digital (S/PDIF) Input	
Sampling Rate (kHz)	44.1, 48, 88.2, 96, 176.4, 192

Digital (S/PDIF) Output	
Sampling Rate (kHz)	44.1, 48, 88.2, 96, 176.4, 192

8.5 Cable Specifications

HDMI Cable Length	1080p		4K
	8-bit	12-bit	8-bit
Input	15m	15m	5m
Output	15m	15m	5m

Cat. Cable Length	1080p	4K
Cat.5e	100m	90m
Cat.6	100m	90m
Cat.6a	100m	100m
Cat.7	100m	100m

- **Full HD Video (1080p)**
 - Up to 1080p@60Hz, 12-bit color
 - Data rates lower than 5.3Gbps or below 225MHz TMDS clock
- **Ultra HD Video (4K)**
 - 4K@24/25/30Hz & 4K@50/60Hz (YUV 4:2:0), 8-bit color
 - 4K@50/60Hz (4:4:4, 8-bit) with DSC active
 - Data rates higher than 5.3Gbps or above 225MHz TMDS clock

9. ACRONYMS

ACRONYM	COMPLETE TERM
Cat.5e	Category 5 (enhanced) cable
Cat.6	Category 6 cable
Cat.7	Category 7 cable
CLI	Command-Line Interface
DVI	Digital Visual Interface
GUI	Graphical User Interface
HD	High-Definition
HDCP	High-bandwidth Digital Content Protection
HDMI	High-Definition Multimedia Interface
HDR	High Dynamic Range
HDTV	High-Definition Television
IP	Internet Protocol
IR	Infrared
LAN	Local Area Network
LPCM	Linear Pulse-Code Modulation
PC	Personal Computer
PD	Powered Device
PoH	Power over HDBaseT
PSE	Power Sourcing Equipment
S/PDIF	Sony/Philips Digital Interface Format
SNR	Signal-to-Noise Ratio
THD+N	Total Harmonic Distortion plus Noise
UHD	Ultra-High-Definition
UHDTV	Ultra-High-Definition Television
USB	Universal Serial Bus



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