HALL RESEARCH

HDBT

HDMI Video Extender with Bidirectional IR, and RS232

Send HDMI, IR and full-duplex RS232
500 ft (150 m) on a single Cat6 cable

Model numbers covered in this User's Manual:

Individual Ends	
UHBX-S	HDMI+RS232+IR UTP Sender
UHBX-R	HDMI+RS232+IR UTP Receiver
Kits	
UHBX	HDMI+RS232+IR UTP Extender (includes Sender & Receiver)

CE   FC   RoHS Compliant

UMA1238 Rev 1.0

TRADEMARKS USED IN THIS MANUAL

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FCC RADIO FREQUENCY INTERFERENCE STATEMENT

This device complies with part 15 Class A of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

1.0 Introduction

This manual covers UHBX-S and UHBX-R (together sold as UHBX) HDMI extenders manufactured by Hall Research. They extend uncompressed HDMI, bidirectional IR and full-duplex RS232 up to 150 meters (500 feet) using a single Cat6 cable.

The extender supports all HDMI or single-link DVI video signals of virtually any resolution. PC resolutions are supported upto 1920x1200 and HDTV resolutions of UHD (4Kx2K) are supported.

Two user selectable distance modes are available: "Standard" and "Long Reach". These modes are explained further in section 4.4 of this manual.

The extenders comply with HDBaseT™ specifications and are compatible with all other certified HDBaseT gear. For example, the UHBX-S transmitter can be plugged into any projector or display with compatible input such as Panasonic's DIGITAL LINK, Epson's PowerLite Pro series and others.

Full-duplex RS-232 extension is provided that can operate at any baud rate to 115,200 bps. The extender can also extend IR from one end to the other. IR Detector and IR Emitter cables are sold separately. The IR extension preserves the modulation (carrier) frequency and provides compatibility to all standards. It supports modulation range from 30 KHz to 60 KHz

2.0 Features

- Extends HDMI or DVI video to 500 ft on just one Cat6
- Includes RS232 and IR extension in both directions
- Supports virtually all HDMI and DVI resolutions including 4Kx2K
- Sturdy metal enclosures with mounting provisions
- Complies fully with HDBaseT standard
- Fully isolates ground between TX and RX sides
- Compact, Rugged, Reliable, and Economical
- Made in USA

3.0 Setup

3.1 Package Contents

Each end is packaged separately and incudes a universal power supply (5v DC output), and a copy of this User's Manual.

3.2 Sender Connections

Figure 1 - UHBX-S Sender Connections

3.2.1 Sender Video Connection

Connect the HDMI input to the source. The HDMI input connector on the box has a locking nut above it. Hall Research offers compatible locking high-quality HDMI input cables.

Figure 2 -

Hall Research C-HDMI-L high bandwidth HDMI cable with flip-up locking tab

3.2.2 Sender Serial Data Connection

If required, plug DB9 RS232 cable from source to the connector on the box. Typically a straight-through male-to-female cable is used to connect to the sender. Pin out of the RS232 connector on the sender is shown below

DB9-F Pin	Term	Direction
2	TX	Output
3	RX	Input
5	GND	

3.2.3 IR Connections

The extender can extend Infra-red Remote Control signals in both directions. On each box two IR connectors are provided: "IR Detector" and "IR Emitter."

IR Detector Cable

As the names imply the IR detector jack requires connection to a compatible IR detector cable. This device uses "pass-thru" IR detector cable that maintains the IR modulation. Compatible cables are available from Hall Research (Model Number CIR-DET-P2).

Figure 3 –

IR Detector Cable *CIR-DET-P2*

(Detector eye has adhesive backing)

Pinout: Tip=Data, Ring=+5V DC, Sleeve=GND

IR Emitter (Blaster) Cables

Currently two IR emitter cables are available: CIR-EMT and CIR-EMT2.

CIR-EMT, shown below, is recommended for most applications

Figure 4 –

IR Emitter Cable *CIR-EMT*

(Emitter has adhesive backing)

Pinout: Tip=Anode, Ring=Cathode, Sleeve=Not Connected

An alternative Emitter cable is CIR-EMT2. This cable is better suited for situations where there is a need to isolate and confine the IR signal to just one device. A separately sold adhesive rubber cover can be used to confine the IR beam to just one target device. The CIR-EMT2 is placed in a cavity in the cover and stuck on the target device directly over its IR sensor. A typical application scenario is when several identical video sources are located in close proximity to each other and they need to be independently controlled.

The CIR-EMT2 has a mono-type plug. Pin out: Tip=Anode, Sleeve=Cathode

Figure 5 –
Alternate IR Emitter Cable *CIR-EMT2*

Figure 6 –
Emitter Cover: *CIR-EMT2-CVR*

Note: You can use P/N: CIR-KIT-EMT2 to order the emitter with cover.

3.2.4 UTP (Twisted Pair Catx) Connection

The extender is designed to be used with CAT6 UTP or STP cabling. However, CAT5e cables may be used but the maximum cable length will be reduced by approximately 20% depending on the quality of the cable.

Augmented CAT6 cables can also be used, and are recommended for extension distances exceeding 140 meters (or >450 feet).

T568A termination standard is recommended for the UTP cable, However T568B will also work (as long as both ends are terminated the same way).

In EMI noisy environments (such as close proximity to power transformers or AC wiring) shielded twisted pair (STP) cable is recommended. If STP is used it is important to ensure the RJ45 connector on both ends of the cable have the required metal shroud and that the cable shield/drain wire is electrically connected to the metal shroud.

3.3 Receiver Connections

Figure 7 - UHBX-R Receiver Connections

3.3.1 Receiver Video Output

Connect the HDMI output to the remote display's HDMI input using high quality HDMI cables. Note that the HDMI output connector on the Receiver has a locking nut so that compatible output cables can be positively anchored.

3.3.2 Receiver IR, UTP, and Power Connections

Please refer to the description given in section 3.2 since these connections work the same way on both the Sender and the Receiver.

3.3.3 Receiver Serial Connection

If required, plug DB9 RS232 cable from the Receiver to the device being controlled (such as a projector or switcher). Pinout of the Male RS232 connector on the sender is shown below

DB9-M Pin	Term	Direction
2	RX	Input
3	TX	Output
5	GND	

3.4 Setting the Distance Mode

Mode	UTP Length	Notes
STD	0 to 100 m (330ft)	Default setting
L.R.	0 to 150 m (500ft)	Long Reach setting Supports maximum of 1080p@60 Hz, 8-bit. 1080p deep-color and 4Kx2K are not supported

The extender has a mode setting that affects the maximum achievable extension distance. The Distance Mode switch is located on the Receiver (the Sender does not have a mode switch). The mode switch is a small slide switch located under the HDMI output connector on the Receiver.

Two modes are available: Standard (STD), and Long Reach (L.R.). If the length of UTP cable is less than 100 meters (330 ft), then STD mode should be used. For lengths above 330 ft Long Reach (L.R.) mode must be set.
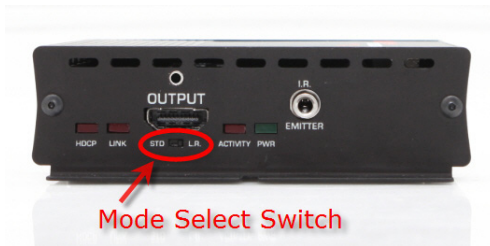

Figure 8 –

Mode Switch

When using "Long Reach" ensure that the source does not output 1080p with deep color nor 4K video since these formats are not supported in L.R. mode.

3.5 LED indicators

Figure 12 – LED Indicators

PWR	*Power.* Indicates unit is powered
ACTIVITY	*Firmware Running.* Blinking means device firmware is running properly
LINK	*UTP Link.* Solid on means Sender & Receiver are communicating.
HDCP	*Video Status.* Off = No Video, Blink = Video, Solid ON = Video + HDCP

4.0 Troubleshooting

If you are experiencing problems getting the extender to work properly, please use the following troubleshooting suggestions.

- Make sure that all of the connections on both the sender and the receiver are solid. Loose connections are the number one cause of issues.

- Try resetting the system by unplugging the power supply, waiting 5 seconds and plugging it back.

- Check the state of the LED's on the front of both the sender and the receiver. Refer to the table in section 4.5 to interpret the status being indicated.

- If the cable length is longer than 100 meters (330 ft) set the Mode Switch on the receiver to L.R. (Long Reach) position (see section 4.4).

- In L.R. mode the unit does not support deep-color, or 4Kx2K video.

- Make sure the display is compatible with the video source by connecting them directly.

- Make sure that the UTP or STP cable meets the requirements. Never use low-skew cable for digital video extension (low skew cables are suited for analog video extension, but do not work well for digital video). Read section 3.2.4 for UTP cable requirements.

- The extender requires that the source DDC signals of its HDMI output operate at100 KHz or less and support clock-stretching. The vast majority of sources meet these requirements. But if you determine that a particular source does not (by substituting a video pattern generator, or a different source), an HDMI transceiver may be needed. Hall Research offers the model HD-AUD that has a compatible output, can handle virtually any HDMI input, and has proven its ability to resolve source incompatibility issues.

If you still are not able to get the system working properly, contact Hall Research support (preferably via email or the form on support page of www.hallresearch .com) with a detailed description of the issue and the troubleshooting steps you have taken.

Do not open or try to repair the unit yourself as this will void your warranty. To return the extender for repair, you must contact HR Support at 714-641-6607 or via email or web. To ship the unit back for repair, make sure to obtain a Return Material Authorization (RMA) number.

5.0 Specifications

Video

Standards	DVI (single link) and HDMI (compliant with HDMI 1.4 video specifications including 12 bit color depth, 3D video and 4K support)
Signal type	TMDS
Connectors	Locking HDMI
Resolutions	DVI signal VGA (640x480) thru WUXGA (1920x1200)
	HDTV signal 480i through 1080p
	Digital Cinema 4K (4096x2160) – Not supported in Long Reach

Audio

Formats	All HDMI Embedded Audio including: LPCM 7.1CH, Dolby TrueHD and DTS-HD Master Audio (32-192kHz sample rate)

Other Signals

DDC	Pass-Thru DDC for reading EDID directly from remotely connected LCD and HDCP handshake
CEC	Pass-Thru DDC for Consumer Electronics Control compatible devices
RS232	Bidirectional (full-duplex) any baud rate up to 115,200
IR	Extended in both directions. Modulation from 30 KHz to 60 KHz

General

Power Supply	100 VAC to 240 VAC, 50-60 Hz, external; 5 VDC, 2 A, regulated Actual DC current Sender: 0.60A (approx), Receiver: 0.95A (approx)
Power	Sender: 3.0 watts (10 BTU)
	Receiver 4.8 watts (16 BTU)
Temp/humidity	Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, non-condensing Operating: +32 to +122 °F (0 to +50 °C) / 10% to 90%, non-condensing
Cooling	Convection
Mounting	End plates have L bracket with hole for surface mounting
Enclosure	Metal (Aluminum ends, Aluminum Extrusion)
Dimensions	1.18" H x 4.13" W x 4.57" D (30mm H x 105mm W x 116mm D) Depth excludes connectors
Product weight	Sender 8.7 oz (0.54 lb or 246 g)
	Receiver 9 oz (0.56 lb or 255 g)
	Kit (shipping) 40 oz (2.5 lb or 1.13 Kg) includes: sender, receiver, power supplies, power cords, manual, and packaging
Safety	CE
EMI/EMC	CE, FCC Class A
MTBF	90,000 hours (Calculated Estimate)

Specifications are subject to change without notice