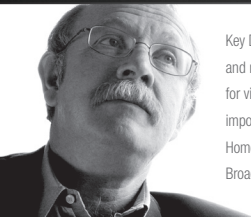


KD-X444L

4K/18G HDBT POH Extenders
(Includes KIT Tx/Rx 4K/70meters 1080P/100meters)

Operating Instructions



Key Digital®, led by digital video pioneer Mike Tsinberg, develops and manufactures high quality, cutting-edge technology solutions for virtually all applications where high-end video and control are important. Key Digital® is at the forefront of the video industry for Home Theater Retailers, Custom Installers, System Integrators, Broadcasters, Manufacturers, and Consumers.



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Note: Please visit www.keydigital.com for the latest product documentation and software downloads. Product features and specifications are subject to change without notice.

About KD-X444L

Key Digital® KD-X444L is an HDCP2.2 compliant long range HDBaseT kit (Tx + Rx) with support of 18Gbps 4K/UHD signal extension for the latest digital video standards.

KD-X444L extends UHD/4K signals up to 328 ft. (100m) using CAT6A STP / CAT7 cable or up to 230 ft. (70m) using CAT5e/6 cabling. 1080p signals may be extended up to 328 ft. (100m) in standard mode or 500 ft. (152m) in long range mode. In addition to HDMI video and audio signals, KD-X444L carries IR or RS-232 for controlling remotely located equipment.

Key Features

- **HDBaseT via Single CAT5e/6 UTP/STP Extension:** With fully automatic adjustment of feedback, equalization, and amplification depending on cabling length
- **4K Support:** 4096x2160 or 3840x2160 24/25/30/60hz at 4:4:4 (signals up to 18Gbps bandwidth)
- **Flexible Power over HDBaseT:** Only one power connection needed. Tx may power Rx, or Rx may power Tx.
- **Low Profile:** Super slim chassis design
- **Signal Extension:** For resolution and cable quality
 - » **4K/UHD:** Up to 230 ft. (70m) using CAT5e/6
Up to 328 ft. (100m) using CAT6A STP / CAT7
 - » **1080p:** Up to 328 ft. (100m) maximum
- **Long Range Mode:** Extends 1080p signals up to 500 ft. (152m) using CAT5e/6 (UHD/4K not supported)
- **10G Pass-thru:** Mode enables uncompressed 10.2Gbps signal extension
- **HDR10 (High Dynamic Range):** More life-like images through a greater range of luminance levels
- **HDCP 2.2:** Compliancy up to HDCP 2.2 and backward compliant

- **Deep Color Support:** Up to UHD/4K 30Hz 4:4:4/12 bits or 60Hz 4:4:4/8 bit
- **EDID Control:** Internal library with 15 EDID handshakes including 4K with HDR in addition to native EDID data from Output/Display device connected to Rx
- **Hot Plug Detection Control:** Enables integrator to choose if active signal voltage is forced to connected input and output devices
- **Full Buffer System™:** Manages TMDS re-clocking / signal re-generation, HDCP authentication with source & display, EDID Control handshake, and Hot Plug Detection control
- **IR Sensor:** Sensor powering via +5V on IR In ports collects line-of-sight IR from remote(s) without external IR connecting block
- **Up/Down IR:** Two channels of IR enable control to/from devices or control systems connected to Tx and Rx units
- **RS-232:** Bi-Directional control to/from Tx and Rx unit on Phoenix connector
- **Lossless compressed digital audio:** Support for Dolby® TrueHD, Dolby® Digital Plus, Dolby Atmos®, and DTS-HD Master Audio™
- **CEC Pass-thru:** For inter-device control between input and output HDMI channel

Accessories

- » 1x 48V/0.42A, 20W DC Power Supply (Screw-In Type)
- » 4x Mounting Brackets
- » 1x IR Emitter
- » 1x IR Sensor
- » 1x 3-pin Phoenix Connector
- » 1x 4-pin Phoenix Connector

Quick Setup Guide

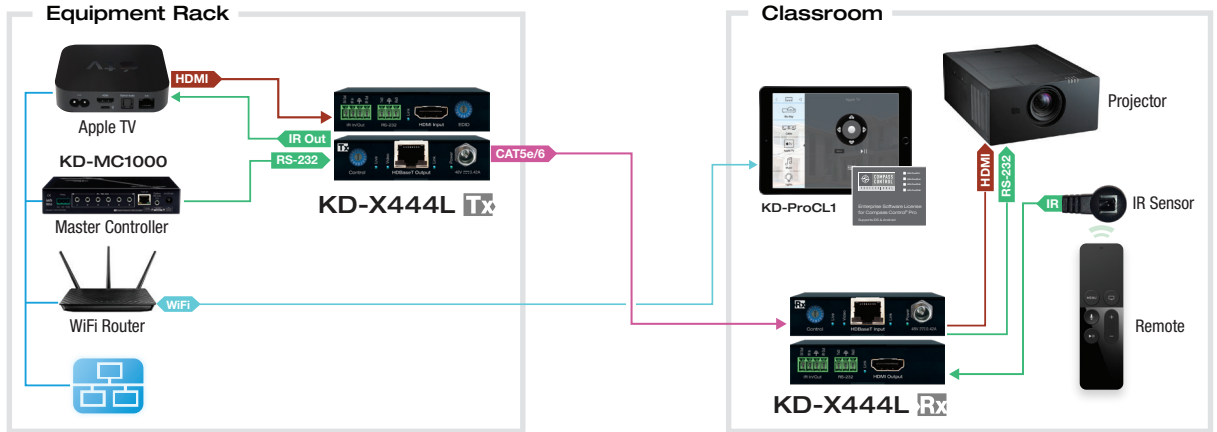
- Step 1:** Find a safe and convenient location to mount or place your KD-X444L units
- Step 2:** Begin with the Tx and Rx units and all input/output devices turned off with power cables removed
- Step 3:** Connect your HDMI source to the input port of the Tx unit
- Step 4:** Connect your HDMI display to the output port of the Rx unit
- Step 5:** Connect a CAT5e/6 UTP/STP cable between Tx and Rx unit
- Step 6:** Connect additional IR and/or RS-232 control connections and IR sensors. Refer to Settings and Adjustments section to ensure that the Control Rotary is set appropriately for desired control extension.
- Step 7:** **BEFORE** connecting power supply to power outlet, screw-in the power supply to the Tx or Rx unit
- Step 8:** **AFTER** all connections are made, plug-in power supplies to power outlets
- Step 9:** Power on input/output devices

Installation and Operation

Before permanently securing the unit for final installation, test for proper operation of the unit and cables in your system. It is recommended that you leave enough ventilation space to provide sufficient airflow and cooling.

You MUST use the Power Supply provided with your unit or you VOID the Key Digital® Warranty and risk damage to your unit and associated equipment.

Application Example



Connections and LEDs

→ Before making any connections, power off your source and display devices.



HDMI Input & HDMI Output:

HDMI Input: Using a short HDMI cable, connect your source device to the HDMI port labeled HDMI Input.

HDMI Output: Using a short HDMI cable, connect your display device to the HDMI port labeled HDMI Output.

For DVI-D/DVI-I sources or monitors, use appropriate adapters. For Display Port, use active converters.

→ Supports up to UHD/4K @ 50/60 fps [4:4:4], 18Gbps signals

› See Supported standard 4K Video Formats table

→ Supports HDR10

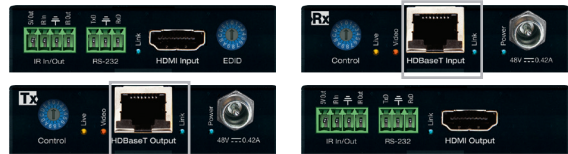
→ Compliant with HDCP 2.2 and previous

→ Supports lossless compressed audio formats including Dolby® TrueHD, Dolby® Digital Plus, Dolby Atmos®, and DTS-HD Master Audio™

→ Supports CEC pass thru

Supported standard 4K Video Formats:

	Resolution	Bandwidth
1	4K@24/25/30 [4:4:4] 8bit	< 10.2Gbps
2	4K@24/25/30 [4:2:2] 8/10/12bit	< 10.2Gbps
3	4K@50/60 [4:2:0] 8bit	< 10.2Gbps
4	4K@24/25/30 [4:4:4] 10/12bit	< 18Gbps
5	4K@50/60 [4:2:2] 8/10/12bit	< 18Gbps
6	4K@50/60 [4:2:0] 10/12bit	< 18Gbps
7	4K@50/60 [4:4:4] 8bit	< 18Gbps



HDBaseT Output & HDBaseT Input:

Connect Tx unit's HDBaseT Output port to Rx unit's HDBaseT Input port using CAT5e/6 UTP or STP

→ UHD/4K: Up to 328 ft. (100m) using CAT6A STP / CAT7. Up to 230 ft. (70m) using CAT5e/6

→ 1080p (Standard mode): Up to 328 ft. (100m) using CAT5e/6

→ 1080p (Long Range mode): Up to 500 ft. (152m) using CAT5e/6 (UHD/4K not supported)

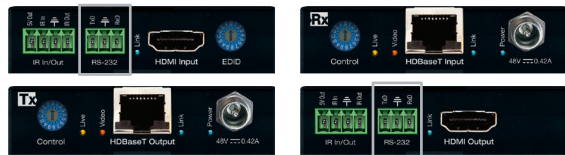


IR In/Out:

Connect to the IR In terminals from the included IR Sensor or a control system.
Connect the included IR Emitter or hard-wire to control peripheral components from the IR Out port.

Refer to the “[Extending IR & RS-232 Control](#)” for more information.

- Tx Unit IR In corresponds with Rx unit IR Out. Tx Unit IR Out corresponds with Rx unit IR In.
- Rx Unit IR In corresponds with Tx unit IR Out. Rx Unit IR Out corresponds with Tx unit IR In.
- Set the Control Rotary to adjust the IR In mode for IR Sensor (default at Rx unit) or hard-wired IR (default at Tx unit)
- Ground pin is shared if using both channels of IR



RS-232:

Connect a stripped wire to DB9 adapter cable for bi-directional RS-232 control. Refer to the “[Extending IR or RS-232 Control](#)” section for more information.

- Set the Control rotary RS-232 Pass-through mode to control remote equipment.
- Supports baud rate up to 115,200bps



Power:

Power connection required at either Tx or Rx unit.

- 48V/0.42A (20W) power supply
- **Not compatible with third-party Power Over HDBaseT devices**

LED Indicator Lights

Power:

- Color: **Blue**
- Solid illumination during power on state, as provided by healthy connection with power supply and healthy Power over HDBaseT extension.
- Steady blink if unit has a power short

Live:

- Color: **Yellow**
- Steady blink from healthy unit CPU state

HDBaseT Link:

- Color: **Blue**
- Solid illumination from healthy HDBaseT link between Tx and Rx units

Video:

- Color: **Orange**
- Illumination with active TMDS (video + audio) signal
- Off with no TMDS (video + audio) signal


HDMI Link:

- Color: **Blue**
- Tx Unit: Solid illumination from active signal from connected source
- Rx Unit: Solid illumination from active Hot Plug Detection voltage with connected display/output device

Settings and Adjustments

EDID Rotary:

- EDID authentication is provided from the Tx unit to the connected input/source device.
- The EDID file (AKA "handshake") is selected using the EDID rotary on the unit and provides a list of compatible video and audio formats as well as digital data, informing the source device what it should output.
- Most sources will comply with a new EDID file without a power-cycle, but each source may behave differently.
- Adjustments may be necessary to help achieve desired video and audio formatting and may speed up sync time.

Position	EDID Handshake Description	EDID Rotary
0	Copy EDID from HDMI Output	 <p>EDID</p> <p>Note: Default position is "A"</p>
1	1080i, 2CH AUDIO	
2	1080i, DOLBY/DTS 5.1	
3	1080i, HD AUDIO	
4	1080p, 2CH AUDIO	
5	1080p, DOLBY/DTS 5.1	
6	1080p, HD AUDIO	
7	4Kx2K@60, 10.2G, HDR, 2CH AUDIO	
8	4Kx2K@60, 10.2G, HDR, DOLBY/DTS 5.1	
9	4Kx2K@60, 10.2G, HDR, HD AUDIO	
A	4Kx2K@60, 18G, HDR, 2CH AUDIO	
B	4Kx2K@60, 18G, HDR, DOLBY/DTS 5.1	

C	4Kx2K@60, 18G, HDR, HD AUDIO	IMPORTANT: Please apply light pressure to the EDID rotary when making your selection.
D	1280x720p@60 DVI (no audio)	
E	1920x1080p@60 DVI (no audio)	
F	4Kx2K@30, 10.2G, HDR, 2CH AUDIO	

Control Rotary:

Choose the desired setting for hot plug detection control and long range mode. **Power cycle unit after changing settings.**

NOTE: The Tx and Rx unit each have a Control rotary. Some settings may require that the rotaries match on the Tx and Rx unit, others are only set on the Tx or Rx unit in order to work properly. Please read below information fully and refer to the Control Rotary settings table for more information.



Forced HPD On/Bypass

- In cases of many layers of connectivity or non-standard devices in-line, hot plug detection (HPD) may be lost or drop below standard levels, leading to the video source not detecting a display/sync device and not outputting a signal. A display device may also not detect a connected source in cases of failed hot plug detection.
- If set to On, Hot Plug Detection (HPD) voltage is forced at the HDMI connection of the Tx/Rx unit. The connected source/display device will be fed a constant voltage to inform the device that a partner is always connected and active.
- If set to Bypass, Hot Plug Detection (HPD) voltage is bypassed from connected output/display to the input/source.

Long Range Mode

KD-X444L features a long range option that extends 1080p signals up to 500 ft. (152m). If Long Range mode is enabled, UHD/4K signals are not supported

The desired setting for Long Range Mode is applied only on the Tx unit.

→ Long Range Mode OFF:

- » UHD/4K: Up to 328 ft. (100m) using CAT6A STP / CAT7. Up to 230 ft. (70m) using CAT5e/6
- » 1080p: Up to 328 ft. (100m) using CAT5e/6 in standard mode

→ Long Range Mode ON:

- » 1080p: Up to 500 ft. (152m) using CAT5e/6 (UHD/4K not supported)

IR In Mode:

Use the Control Rotary to select IR Sensor or Serial IR input mode. Refer to the Extending IR and RS-232 Control section for more information

→ IR Sensor Mode:

- » IR Sensors can be connected directly into the Tx or Rx unit's IR In port to collect line-of-sight signals from device remotes
- » No external IR distribution block or power supply is needed
- » 3-wire connection: IR Signal, Ground, and 5V for powering sensor

→ Serial IR Mode:

- » Typically fed from a control processor or IR connection block
- » 2-wire connection: IR Signal, and Ground

RS-232 Mode:

Set the desired RS-232 mode using the Control Rotary on the Tx and Rx unit. Refer to the Extending IR and RS-232 Control section for wiring information

RS-232 Pass-through Mode

- Send and receive (bi-directional) RS-232 communication for controlling peripheral equipment.
- Bi-directional RS-232 is achieved utilizing the 3-pin phoenix on the Tx and Rx unit
- Supports baud rate up to 115,200bps.
- RS-232 may be used at the same time as IR.

Firmware Upgrade Mode

- Firmware upgrades should only be initiated if instructed by Key Digital Technical Support
- Setting the Control Rotary to any firmware load option requires a power cycle at the respective unit
- Two types of firmware may be updated:
 - » Unit CPU
 - » HDBaseT Chip

Position	Forced HPD	IR In	RS-232	Long Range (Tx and Rx Units MUST MATCH)
0	OFF	Serial IR	Pass-Through	OFF
1	ON	Serial IR	Pass-Through	OFF
2	OFF	Serial IR	Pass-Through	ON
3	ON	Serial IR	Pass-Through	ON
4	OFF	IR Sensor	Pass-Through	OFF
5	ON	IR Sensor	Pass-Through	OFF

6	OFF	IR Sensor	Pass-Through	ON
7	ON	IR Sensor	Pass-Through	ON
8	OFF	Serial IR	Reserved	OFF
9	ON	Serial IR	Reserved	OFF
A	OFF	Serial IR	CPU Firmware	ON
B	ON	Serial IR	CPU Firmware	ON
C	OFF	IR Sensor	HDBaseT Firmware	OFF
D	ON	IR Sensor	HDBaseT Firmware	OFF
E	OFF	IR Sensor	HDBaseT Firmware	ON
F	ON	IR Sensor	HDBaseT Firmware	ON

IMPORTANT: Please apply light pressure to the Control rotary when making your selection.



Extending IR and RS-232 Control

IR

- Bi-directional IR control extension is supported and may be used simultaneously with RS-232.
- Set the Control Rotary to adjust the IR In mode for IR Sensor (default at Rx unit) or Serial IR (default at Tx unit)
- Tx Unit IR In corresponds with Rx unit IR Out. Tx Unit IR Out corresponds with Rx unit IR In.
- Rx Unit IR In corresponds with Tx unit IR Out. Rx Unit IR Out corresponds with Tx unit IR In.
- Ground pin is shared if using both channels of IR


IR In

- » The IR Sensor receives signals from a 90° angle at up to 30 ft. away.
- » Maximum supported IR burst frequency is 55kHz.
- » Only the included IR sensors are compatible with KD-X444L. Third-party IR Sensors may not be compatible.

IR Out



- » IR Out driving power: 5V with 32mA minimum current

IR Sensor / IN Pinout	Wire	Signal
	Red	5V Power
	White	IR Signal
	Black	Ground


IR Emitter / OUT Pinout	Wire	Signal
	Dashed/ Marked	IR Signal
	Solid/Black	Ground

RS-232


RS-232 cables are available through Key Digital and other wire suppliers, and can also be fabricated by skilled technicians.

Model	Wire	DB9 Pin	Signal
KD-3.5FDB96 3.5mm Stereo to Female DB9 (sold separately)	Red	2	TxD
	White	3	RxD
	Black	5	Ground
	Green	N/C	NA
	KD-3.5FDB96 with 3.5mm TRS Connector		
	KD-3.5FDB96 after stripping wire		

Model	Wire	DB9 Pin	Signal
KD-3.5MDB96 3.5mm Stereo to Male DB9 (sold separately)	Red	2	TxD
	Black	3	RxD
	Shield	5	Ground



KD-3.5MDB96 with 3.5mm TRS Connector



KD-3.5MDB96 after stripping wire

Use with third-party HDBaseT Tx or Rx

- KD unit must be powered by KD power supply.
- Signal must be 10.2Gbps only with Video Compress mode set to Auto

Specifications

Technical:

- Inputs Tx (Each): 1 HDMI, 1 IR, 1 RS-232
- Outputs Tx (Each): 1 HDBaseT, 1 IR, 1 RS-232
- Inputs Rx (Each): 1 HDBaseT, 1 IR, 1 RS-232
- Outputs Rx (Each): 1 HDMI, 1 IR, 1 RS-232
- Bandwidth: TMDS bandwidth 18Gbps
- Deep Color Support: Digital video formats in Deep Color Mode up to 12 bits per color
- DDC Communication: EDID and HDCP Bi-directional buffering from Display to Source
- HDMI Connector: Type A, 19 Pin Female
- RJ45 Connector: Shielded Link Connector, HDBaseT
- IR Connector: 4-pin Phoenix
- RS-232 Connector: 3-pin Phoenix
- Power: (1) 48V/0.42A, 20W DC Power Supply (Screw-In Type). 100-240VAC, 50-60Hz. Interchangeable transformer plug with screw-in connector. Model KD-PS4842ASC

General

- Regulation: CE, RoHS, WEEE, EAC
- Enclosure: Black Metal
- Product (Each): 4.1" x 2.8" x 0.875", Weight: 0.75 lbs
- Accessories: 4x Mounting Brackets, 1x IR Emitter, 1x IR Sensor, 1x 3-pin Phoenix Connector, 1x 4-pin Phoenix Connector



Important Product Warnings:

1. Connect all cables before providing power to the unit.
2. Test for proper operation before securing unit behind walls or in hard to access spaces.
3. If installing the unit into wall or mounting bracket into sheet-rock, provide proper screw support with bolts or sheet-rock anchors.



Safety Instructions:

Please be sure to follow these instructions for safe operation of your unit.

1. Read and follow all instructions.
2. Heed all warnings.
3. Do not use this device near water.
4. Clean only with dry cloth.
5. Install in accordance with the manufacturer's instructions.
6. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
7. Only use attachments/accessories specified by the manufacturer.
8. Refer all servicing to qualified service personnel. Servicing is required when the device has been damaged in any way including:
 - » Damage to the power supply or power plug
 - » Exposure to rain or moisture



Power Supply Use:

You **MUST** use the Power Supply **provided** with your unit or you **VOID** the Key Digital® Warranty and risk damage to your unit and associated equipment.

How to Contact Key Digital®

Customer Support

For customer support questions please contact us at:

→ Phone: 914-667-9700

→ E-mail: customersupport@keydigital.com

Technical Support

For technical questions about using Key Digital® products, please contact us at:

→ Phone: 914-667-9700

→ E-mail: tech@keydigital.com

Repairs and Warranty Service

Should your product require warranty service or repair, please obtain a Key Digital® Return Material Authorization (RMA) number by contacting us at:

→ Phone: 914-667-9700

→ E-mail: rma@keydigital.com

Feedback

Please email any comments/questions about the manual to:

→ E-mail: customersupport@keydigital.com

Warranty Information

All Key Digital® products are built to high manufacturing standards and should provide years of trouble-free operation. They are backed by a **Key Digital Limited 3 Year Product Warranty Policy**. <http://www.keydigital.com/warranty.htm>