

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

**Key digital®**

Key Digital® Systems :: 521 East 3rd Street :: Mount Vernon, NY 10553

Phone : 914.667.9700 Fax : 914.668.8666 Web : [www.keydigital.com](http://www.keydigital.com)

**HDBT™ Ultra HD/4K**  
**HDMI®**



## KD-X600ProK

HDBaseT/HDMI via Single CAT5e/6 (Tx + Rx Set) Extenders, support Ultra HD/4K, EDID Control, Hot Plug Control, Long Range Mode, Full Buffer System, HDMI Pass-through, Ethernet, IR Sensor, Up/Down IR & RS-232

### Operating Instructions



**Key digital®**

The Experts in Digital Video Technology and Solutions™

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# Ultra HD/4K



**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.**



**Please read all instructions to insure safe operation of the product.**

## About KD-X600ProK

**KD-X600ProK** HDBaseT/HDMI (Tx & Rx) Extenders extend 1080p/60, 1920x1200, 3D signals up to 600 ft. via single Key Digital® KD-CAT6STP1X Super CAT6A shielded cable, or up to 500 ft. using a single third-party CAT5e/6 cable. 4K/UHD 24/25/30/60 (4:2:0) signals are extended up to 300 ft. using Key Digital® KD-CAT6STP1X Super CAT6A Shielded cable, or up to 250 ft. using a single third-party CAT5e/6 cable. In addition to HDMI video and audio signals, KD-X600ProK carries Ethernet, IR and RS-232 for controlling remotely located equipment or the RS-232 port can be used to control the KD-X600ProK. Ethernet ports allow 10/100 LAN Network extension.

### Key Features

- **HDBaseT via Single CAT5e/6 UTP/STP Extension:** With fully automatic adjustment of feedback, equalization, and amplification depending on cabling length
- **Signal Extension:**
  - » **Standard Mode (HDBaseT Class A).** Supports resolutions up to 4K/UHD.
    - » Up to 300 ft. @ 4K/24/25/30/60 using KD-CAT6STP1X cabling
    - » Up to 250 ft. @ 4K/24/25/30/60 using third-party CAT5e/6 UTP/STP cabling
    - » Up to 400 ft. @ 1080p / 1920x1200 using KD-CAT6STP1X cabling
    - » Up to 300 ft. @ 1080p / 1920x1200 using third-party CAT5e/6 UTP/STP cabling
  - » **Long Range Mode** (4K resolutions not supported):
    - » Up to 600 ft. @ 1080p / 1920x1200 using KD-CAT6STP1X cabling
    - » Up to 500 ft. @ 1080p / 1920x1200 using third-party CAT5e/6 UTP/STP cabling
- **4K/Ultra HD:** Support for 4096x2160 or 3840x2160 24/25/30Hz at 4:4:4 or 60Hz at 4:2:0.
- **EDID Control:** Internal library features 14 default EDID configurations and native EDID data from Output/Display devices connected via 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 to source & display, and EDID Control handshake
- **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 connected to Tx and Rx units
- **RS-232:** Bi-Directional control to/from Tx and Rx unit on DB9 connector
- **RS-232 Control Mode:** Provides control of Tx unit as well as connectivity status
- **Ethernet:** Bi-Directional control and/or 10/100 LAN network via TCP/IP RJ45 port
- **3D:** Support for standard 3D stereoscopic signal formats
- **Deep Color Support:** 12bit Deep Color video / 8bit color for 4K/60.
- **Lossless compressed digital audio:** Support for Dolby® TrueHD, Dolby® Digital Plus and DTS-HD Master Audio™
- **CEC Support:** For inter-device control between main input and output HDMI channel
- **HDMI Pass-through:** Port on Tx unit connects additional devices up to 20 ft.
- **Daisy Chaining:** Connection of Tx and Rx units allows almost unlimited extension of HDMI, RS-232, IR and Ethernet signals
- **HDMI® and HDCP Licensing:** Fully licensed and compatible with all HDMI and HDCP technologies
- **I2C Communication:** EDID and HDCP authentication to Display and Source
- **Power Supplies:** Included with screw-in type connectors
- **Control System Support:** Compatible with Compass Control®, AMX®, Control4®, Crestron®, KNX®, RTI®, Savant, URC®, Honeywell®, HAJ®, Leviton® etc.

### Accessories

- (2) 5V 2A DC Power Supplies (Screw-in Type)
- (3) Locking HDMI Cable Clips
- (1) IR Emitter
- › (2) Mounting Brackets
- › (1) IR Sensor

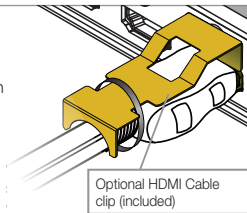
## Quick Setup Guide

- Step 1:** Find a safe and convenient location to mount or place your KD-X600ProK units
- Step 2:** Begin with the KD-X600ProK Tx/Rx units and all input/output devices turned off with power cables removed
- Step 3:** Connect your HDMI source to the input port of your KD-X600ProK Tx unit
- Step 4:** Connect your HDMI displays to the output port of your KD-X600ProK Rx unit
- Step 5:** Connect KD-X600ProK Tx unit to KD-X600ProK Rx with CAT5e/6 cable
- Step 6:** Connect additional IR/RS-232 control connections, IR sensors, and Ethernet
- Step 6:** Connect power to the KD-X600ProK Tx/Rx units
- Step 7:** Power on input/output devices

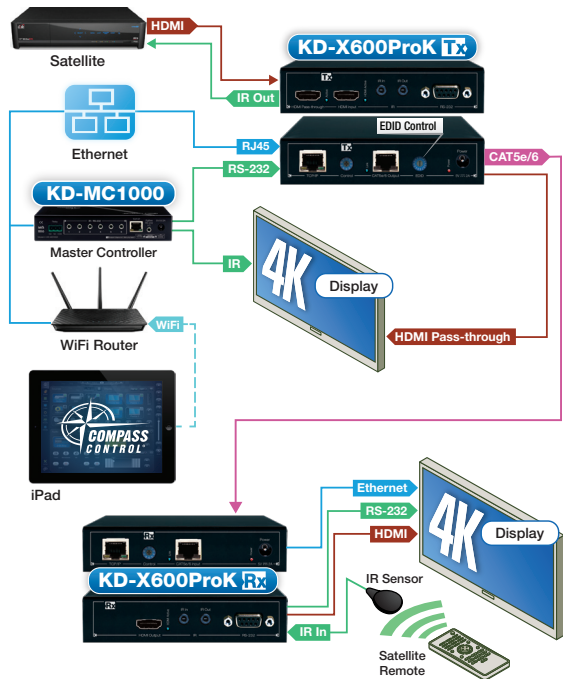
## Installation and Operation

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.

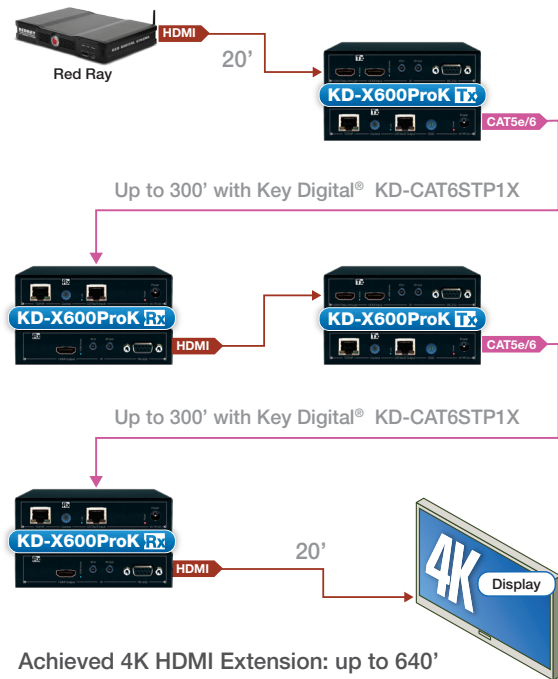
An optional HDMI cable clip (included) allows for a secure connection of HDMI cables to KD-X600ProK units and helps prevent intermittent or complete signal loss due to poor connectivity.



## Application Example



## Daisy-Chaining Example



## Connections

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

### Tx Unit:

- Using a short HDMI cable, connect your source device to the HDMI port labeled “HDMI Input”. To connect DVI or Display Port, use appropriate adapters.



- Connect the CAT6 STP cable that connects to the Rx Unit at the port labeled “CAT5e/6 Output”.



- Use the port labeled “HDMI Pass-Through” to connect (up to 20 ft.) your AVR, display or other device to the Tx unit.



- Make IR In and Out connections to receive (IR In port) or send (IR Out port) control signals. Refer to the “Extending Ethernet, IR & RS-232 Control” for more information.



- Connect a 10/100 Ethernet LAN cable to the TCP/IP port to carry network information for control, internet, or intranet.



- Connect a DB9 cable for bi-directional RS-232 control. Refer to the “Extending Ethernet, IR & RS-232 Control” for more information.



### Rx Unit:

- Using a short HDMI cable, connect your output / display device to the HDMI port labeled “HDMI Output”.



- Connect the CAT5e/6 cable at the port labeled “CAT5e/6 Input”.



→ If you are sending or receiving IR, connect it at this time



→ For Ethernet, connect the cable to TCP/IP RJ45 port.



→ If you are transmitting or receiving RS-232, connect to the RS-232 port



→ Connect power to the Tx and Rx using the included power supplies and then power up your source and display equipment.

## Extending Ethernet, IR and RS-232 Control

### Ethernet

- 10/100BaseT LAN data (10/100Mbps)
- Use TIA 568B or TIA 568A termination

### RS-232:

Three different modes of usage are available, determined by the position of the Control Rotary.

#### → RS-232 Pass-through Mode

- » Send and receive (bi-directional) RS-232 commands for controlling remote equipment.
- » Requires the use of a null-modem cable on one (either) side.

#### → Control Mode

- » Provides control of Tx unit as well as connectivity status
- » See RS-232 Commands section for more information

#### → Firmware Upgrade Mode

- » Two different types of firmware may be updated: MCU (KD-X600ProK units), and HDBaseT (extension over CAT5e/6)



Rotary Control Switch

RS-232 Mode	Pin 2	Pin 3	Pin 5	Control Rotary Position
Pass-through	Tx	Rx	Ground	0 – 7
Control	Tx	Rx	Ground	8, 9
F/W MCU	Tx	Rx	Ground	A, B
F/W HDBaseT	Tx	Rx	Ground	C, D, E, F

## IR

- Bi-directional IR control extension is supported.
- » "IR In" port on the Tx unit extends to the "IR Out" port of the Rx unit
  - » "IR In" port on the Rx unit extends to the "IR Out" port of the Tx unit
- **IR In:** IR In ports support two different modes, determined by the position of the Control Rotary.
- » Serial IR:
    - » A fixed 5V input signal with a 3.5mm mini jack
    - » IR signal on the tip. Mono or stereo 3.5mm mini jacks are supported, with the ring having no contact.
    - » Typically fed from a dedicated control system or an IR distribution block
  - » IR Sensor:
    - » IR Sensors can be connected directly into IR In port, without the need for an external IR distribution block
    - » IR signal on the Tip, with 5V powering of the IR sensor on the Ring.

IR In	Tip	Ring	Sleeve	Control Rotary Position
Serial IR	IR In	N/C	Ground	0-3, 8-B
IR Sensor	IR In	5V	Ground	4-7, C-F

- **IR Out:**
- » Pass-through from signal of corresponding IR In port
  - » Driving power: 5V with 32mA minimum current
  - » Typically connected with an IR emitter

IR Out	Tip	Ring	Sleeve	Control Rotary Position
Serial IR	IR Out	N/C	Ground	Any

- » The sleeve of the 3.5mm Male connector must have good physical contact with 3.5 mm Female input/output on the KD-X600ProK.




Some 3.5mm Male plugs feature a plastic sleeve that extends longer than an average sleeve. This may cause poor grounding contact. See the example on the left.

## Settings

### EDID Control

EDID authentication is provided from the KD-X600ProK Tx unit to the connected input / source device. The EDID file (AKA "handshake") is selected using the EDID Control rotary on the Tx 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.

0	Copy EDID from CAT5e/6 Output	A	4Kx2K@60, 2CH AUDIO
1	1080i, 2CH AUDIO	B	4Kx2K@60, DOLBY/DTS 5.1
2	1080i, DOLBY/DTS 5.1	C	4Kx2K@60, HD AUDIO
3	1080i, HD AUDIO	D	1280x720p@60 DVI (no audio)
4	1080p, 2CH AUDIO	E	1920x1080p@60 DVI (no audio)
5	1080p, DOLBY/DTS 5.1	F	Copy EDID from HDMI pass-through output
6	1080p, HD AUDIO		
7	4Kx2K@30, 2CH AUDIO		
8	4Kx2K@30, DOLBY/DTS 5.1		
9	4Kx2K@30, HD AUDIO		



Rotary EDID Switch:

**IMPORTANT!** Please apply light pressure to the EDID rotary when making your selection.

## Control Rotary



The Control rotary enables the integrator to choose the desired setting for IR In ports, RS-232 Mode, Hot Plug Detection Control, and Extension Mode.

In many settings, the Control rotary setting may not match on the Tx and Rx units. However, the desired Extension Modes must always match on the Tx and Rx units.

**IMPORTANT! Please apply light pressure to the Control rotary when making your selection**

### Control Rotary Position Assignments:

Position	IR In Mode	RS-232 Mode	Hot Plug Detection Control	Extension Mode
0	Serial IR	Pass-through	Bypass	Standard
1	Serial IR	Pass-through	Bypass	Long Range
2	Serial IR	Pass-through	Forced HPD ON	Standard
3	Serial IR	Pass-through	Forced HPD ON	Long Range
4	IR Sensor	Pass-through	Bypass	Standard
5	IR Sensor	Pass-through	Bypass	Long Range
6	IR Sensor	Pass-through	Forced HPD ON	Standard
7	IR Sensor	Pass-through	Forced HPD ON	Long Range
8	Serial IR	Control Mode	Bypass	Standard
9	Serial IR	Control Mode	Bypass	Long Range

Position	IR In Mode	RS-232 Mode	Hot Plug Detection Control	Extension Mode
A	Serial IR	F/W upgrade for MCU	Forced HPD ON	Standard
B	Serial IR	F/W upgrade for MCU	Forced HPD ON	Long Range
C	IR Sensor	F/W upgrade for HDBaseT	Bypass	Standard
D	IR Sensor	F/W upgrade for HDBaseT	Bypass	Long Range
E	IR Sensor	F/W upgrade for HDBaseT	Forced HPD ON	Standard
F	IR Sensor	F/W upgrade for HDBaseT	Forced HPD ON	Long Range

### Forced Hot Plug Detection (HPD)

Hot Plug Detection (HPD) may be forced on the Tx and/or Rx units in order to provide connected devices with necessary voltage to inform the device that a partner (source/display) is connected and active. If the Control rotary is set to any HPD Bypass setting, HPD signals from the output to the input device will pass as normal. In cases of many layers of connectivity, HPD may be lost leading to no signal at the display. In those cases, fix the Control rotary to any Forced HPD setting.

### Extension Modes

KD-X600ProK supports two different modes of signal extension selectable using the Control rotary.

- » **Standard Mode (HDBaseT Class A):** Supports resolutions up to 4K/UHD
- » **Long Range Mode:** 4K resolutions not supported

The desired Extension Mode must always match on the Tx and Rx units.

- » **Note: Distance performance is significantly increased when using Key Digital KD-CAT6STP1X Super CAT6/STP cabling.**



## Range and Resolution:

- **Standard Mode (HDBaseT Class A).** Supports resolutions up to 4K/UHD.
  - » Up to 300 ft. @ 4K/24/25/30/60 using KD-CAT6STP1X cabling
  - » Up to 250 ft. @ 4K/24/25/30/60 using third-party CAT5e/6 UTP/STP cabling
  - » Up to 400 ft. @ 1080p / 1920x1200 using KD-CAT6STP1X cabling
  - » Up to 300 ft. @ 1080p / 1920x1200 using third-party CAT5e/6 UTP/STP cabling
- **Long Range Mode** (4K resolutions not supported):
  - » Up to 600 ft. @ 1080p / 1920x1200 using KD-CAT6STP1X cabling
  - » Up to 500 ft. @ 1080p / 1920x1200 using third-party CAT5e/6 UTP/STP cabling



**NOTE: Use shielded metal RJ45 connectors with soldered ground wires when terminating shielded CAT5e/6. Key Digital part: KD-RJ45SC (compatible with KD-CAT6STP1X and other third-party CAT6/STP)**

## LED Indicator Lights

### Power:

- » **Color: Red**
- » Solid illumination during power on state, as provided by healthy connection with power supply.

### HDMI Active (HDMI Input/Output):

- » **Color: Blue**
- » Solid illumination during active link (voltage + data link) with connected HDMI input/output device
- » If Hot Plug Detection is forced to input or output device from Tx or Rx unit respectively, the HDMI Active light will illuminate solid regardless of HDMI signal from connected device.

### HDMI Active (HDMI Pass-through):

- » **Color: Blue**
- » Solid illumination during active link (voltage + data link) with connected HDMI input device

### CAT5e/6 Input/Output:

- » **Color: Blue**
- » Solid illumination during healthy linking to Rx unit and/or if HPD is forced at Rx unit.
- » Will regularly blink once per second if Extension mode is mismatched between Tx and Rx units.

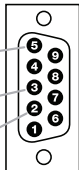
## RS-232 Commands

Connection protocol is as follows:

- Baud Rate = 57600 bits per second
- Data Bits = 8
- Stop Bits = 1
- Parity = None
- Flow Control = None
- Carriage Return: Required
- Line Feed: Required

### RS-232 cable pin out

- Pin 5 – Ground
- Pin 3 – Receive
- Pin 2 – Transmit



Commands are not case-sensitive. Spaces shown below may be excluded.  
Carriage return and line feed is required at the end of each string.

### Commands:

```
KD-X600ProK> H
-----
Key Digital Systems  HELP
-----
-- AZZ      : All Commands may have Prefix System Address zz=[01-99]
-- H        : Help
-- STA      : Global Status
-- SPCA xx   : Set system Address, xx = [00-99] (00=Single)
-----
-- Video I/O Setup Commands:
-- SPOC DBG ON/OFF : Set Output DGB ON/OFF
-- SPOC ON/OFF    : Set CAT5e/6 Output ON/OFF
-- SPOH ON/OFF    : Set HDMI Pass-through Output ON/OFF
-- SPOA ON/OFF    : Set All Output ON/OFF
-- SPC RSB z     : Set RS232 Baud Rate to z bps, z=[0-4]
--                [0:57600, 1:38400, 2:19200, 3:9600, 4:4800]
-----
```

### Status:

```
KD-X600ProK> STA
-----
Key Digital Systems  STATUS
-----
-- KD-X600ProK System Address : 00      F/w Version : 1.00
-- RS232 : Baud Rate=57600bps, Data=8bit, Parity=None, Stop=1bit
-- Extension Mode : Standard
-----
-- Video Input Status
-- EDID = 00, Pwr5V = ON , Link = ON , HDCP = ON , Video = HDMI
-----
-- CAT5e/6 video output Status
-- DISP = SAM 2014, HPD = ON , HDCP = ON , DDC = GOOD, OUT = ON , HDMI--
-----
-- HDMI Pass-Through Video Output Status
-- DISP = SAM 2014, HPD = ON , HDCP = ON , DDC = GOOD, OUT = ON , HDMI--
-----
```

## Specifications

### Technical:

- Inputs Tx (Each): 1 HDMI, 1 IR In, 1 RS-232, 1 TCP/IP
- Outputs Tx (Each): 1 CAT5e/6 UTP/STP, 1 HDMI pass-through, 1 IR Out
- Inputs Rx (Each): 1 CAT5e/6 UTP/STP, 1 IR In
- Outputs Rx (Each): 1 HDMI, 1 IR Out, 1 TCP/IP, 1 RS-232
- DDC Signal (Data): Input DDC Signal: 5 Volts p-p (TTL)
- HDMI Video/Audio Signal: Input Video Signal: 1.2 Volts p-p
- HDMI Connector: Type A, 19 Pin Female
- RJ45 Connector: Shielded Link Connector, HDBaseT
- Ethernet RJ45 Connector: Shielded TCP/IP 10/100 BaseT
- IR Connector: 3.5 mm monaural mini jack
- RS-232 Connector: D-Sub 9 Pin

### General

- Regulation: CE, FCC, RoHS, WEEE
- Enclosure: Black Metal
- Product (Each): 6" x 4.1" x 1.2", Weight: 0.8 lbs
- Shipping Carton: 15.4" x 8.7" x 3.6", Weight: 4 lbs
- Power: UL Certified Power Supply – 5V / 2A, 110-240 VAC, 50-60 Hz
- Power Consumption: Tx - 2.5 Watts, Rx - 5 Watts
- Accessories: (2) Mounting Brackets, (3) Locking HDMI Cable Clips, (1) IR Emitter, (1) IR Sensor

## 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®

### System Design Group (SDG)

For system design questions please contact us at:

→ Phone: 914-667-9700

→ E-mail: [sdg@keydigital.com](mailto:sdg@keydigital.com)

### Customer Support

For customer support questions please contact us at:

→ Phone: 914-667-9700

→ E-mail: [customersupport@keydigital.com](mailto: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](mailto: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: [ma@keydigital.com](mailto:ma@keydigital.com)

### Feedback

Please email any comments/questions about the manual to:

→ E-mail: [customersupport@keydigital.com](mailto:customersupport@keydigital.com)



## Warranty Information

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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 Lifetime Product Warranty Policy.

<http://www.keydigital.com/warranty.htm>