SIMPLIFIED
MFG

EX3-8K

HDMI 2.1 (40Gbps) 90m Extender with eARC,

1Gb LAN, IR, RS232, & USB 2.0

User Manual

VER 1.1

Thank you for purchasing this device

The Simplified MFG EX3-8K was designed to provide years of reliable service. At Simplified MFG we want your experience with this device to be the best possible and are committed to helping achieve that experience. Please read and keep this manual for future reference.

Surge protection device recommended

This product contains sensitive electrical components that may be damaged by electrical spikes, surges, electric shock, lighting strikes, etc. Use of surge protection systems is highly recommended to protect and extend the life of your equipment. Set top boxes (cable and satellite) can pass surges through the HDMI connection, a Simplified MFG HDSURGE is suggested.

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**Please use 568b protocol when terminating the category cable.

1. Introduction

The EX3-8K 40Gbps HDMI Extender can extend 8K and 4K@120Hz. HDR/DolbyVision™ Audio/Video, RS-232, bi-directional IR with selectable voltage, Audio Return, a 1Gb LAN connection, and USB 2.0 communication up to 295ft / 100 meters between transmitter and receiver via a single CAT6a cable and supports resolutions up to 8K2K@60Hz and all 4K formats including 120Hz.

The EX3-8K is a multi-use solution from conference room applications where you are using USB functions for a keyboard, mouse, or conference camera. Or situations where you need 8K or 4K@120Hz and do not have a fiber infrastructure.

2. Features

- Supports the HDMI 2.1 format up to 40Gbps
- Supports 8K30Hz YUV4:4:4 10-bit
  Supports all 4K formats including 120Hz.
- Supports all HD audio formats to the display
- Supports all HD audio formats from display (eARC)
- 1Gbps LAN passthrough
- USB2.0 (either end can be host or client)
- Distance rated at 90m (295ft) on CAT6A/7
- Control features include CEC passthrough, bi-directional 5V or 12V IR and RS-232
- Has separate analog audio send and receive capability as well
- EDID Management
- Advanced clocking features to prevent handshake issues
- Single power supply can be used at either the RX or the TX

3. Package Contents

Qty	Item
1	40Gbps HDMI over HDBaseT Extender (Transmitter)
1	40Gbps HDMI over HDBaseT Extender (Receiver)
1	IR Blaster cable (1.5 meters)
1	20~60KHz IR Receiver cable (1.5 meters)
4	Mounting Ears
2	3-pin Phoenix connector
1	24V/1A Locking Power adapter
1	User Manual
8	Machine screws- KM3*4mm

4. Specifications

Technical	
HDCP Compliance	HDCP 2.3
Video Bandwidth	40Gbps
Video Resolution	All formats up to 40Gbps including • 8K@30Hz. YUV4:4:4 10bit • 4K@120Hz. YUV 4:4:4 10 bit
USB Bandwidth	Up to 350Mbps
HDR	HDR, HDR10, HDR10+, HLG, & DolbyVision™
Color Space	RGB / YCbCr 4:4:4, YCbCr 4:2:2, YCbCr 4:2:0
Color Depth	8/10/12-bit
HDMI Audio Formats	LPCM 2.0/2.1/5.1/6.1/7.1, Dolby Digital, Dolby TrueHD, Dolby Digital Plus (DD+), Atmos, DTS-ES, DTS HD Master, DTS HD-HRA, DTS-X
L/R Audio Formats	PCM 2.0
Transmission Distance	Cat 6 – 60m 197ft. Max. Cat6A/7 – 90m 295ft. Max.
ESD Protection	Human body model — ±8kV (Air-gap discharge) & ±4kV (Contact discharge)

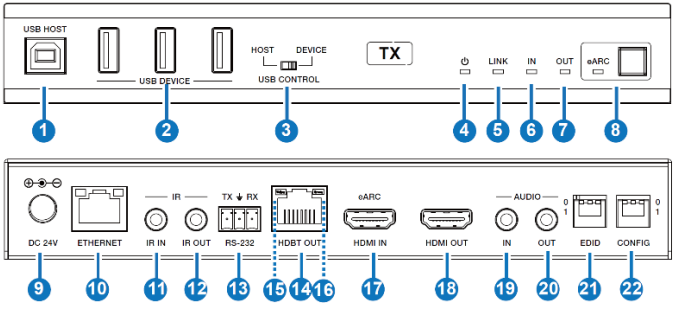
Connection		
Transmitter	Inputs:	1x HDMI Type A [19-pin female] 1x Audio In [3.5mm mini-jack]
	Outputs:	1x HDMI Type A [19-pin female] 1x HDBaseT OUT [RJ-45] 1x IR OUT [3.5mm Stereo mini-jack] 1x AUDIO OUT [3.5mm mini-jack]
	Control:	1x IR IN [3.5mm mini-jack] 1x IR OUT [3.5mm mini-jack] 1x RS-232 [3-pin Phoenix jack] 1x USB Host [USB Type B] 3x USB Device [USB Type A] 1x Ethernet [RJ-45]
Receiver	Input:	1x HDMI IN [Type A 19-pin female] 1x HDBaseT In [RJ-45] 1x Audio IN [3.5mm mini-jack]
	Output:	1x HDMI OUT [19-pin Female] 1x AUDIO OUT [3.5mm mini-jack]
	Control:	1x IR IN [3.5mm mini-jack] 1x IR OUT [3.5mm mini-jack] 1x RS-232 [3-pin Phoenix jack] 1x USB Host [USB Type B] 3x USB Device [USB Type A] 1x ETHERNET [RJ-45]

Mechanical	
Housing	Metal Enclosure
Color	Black
Dimensions	Transmitter / Receiver: 200mm (7.87") [W] x 100mm (4.0") [D] x 30mm (1.18") [H]
Weight	Transmitter: 571g (1lb, 4.1oz.), Receiver: 571g (1lb,4.1oz.)
Power Supply	Input: AC 100 - 240V 50/60Hz Output: DC 24V/2.7A (Locking connector)
Power Consumption	20.4 W - TX 9.36W Loaded / 2.46 in standby RX 9.84W Loaded / 3.36 in standby
Operating Temperature	32 - 104°F / 0 - 40°C
Storage Temp.	-4 - 140°F / -20 - 60°C

Relative Humidity	20 - 90% RH (no condensation)
Max Distance	**Infrastructure**
296ft /90M	Cat6A/7
197ft /60M	Cat6

5. Operation Controls and Functions

5.1 Transmitter Panel

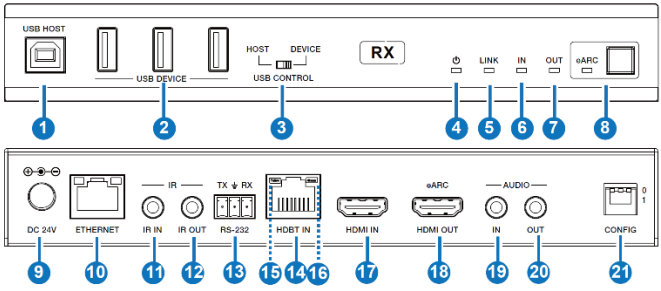


No.	Name	Function Description
1	USB HOST	USB Type B For connection to PC
2	USB DEVICE	Three USB ports extended from host input port
3	Host/Device Switch	Use to set the USB function of the device Host/Extended from host port of RX
4	Power LED	Illuminated means TX is connected to power
5	Link LED	Illuminated - TX is powered on Flashing – Connection between RX and TX is poor Not Illuminated -TX and RX are not connected
6	IN LED	Illuminated – HDMI signal is present at HDMI input Not Illuminated – HDMI signal is not present at HDMI input
7	OUT LED	Illuminated – Indicates there is HDMI signal out Not Illuminated – No HDMI output or system is off
8	eARC Switch/Indicator	Switches on eARC/ARC Mode Push to enable eARC/ARC LED on – eARC/ARC is enabled and working correctly LED flashing – eARC/ARC enabled, but not operating correctly LED off – eARC/ARC disengaged

9	DC 24V	DC 24V/2.7V input The EX3-8K supports POC meaning only one of the devices needs to be powered. By powering one side and connecting the two together the side without power is powered via category cable
10	ETHERNET PORT	The Ethernet port has an adaptive broadband rate. For an example if a 100Mbps rate device is connected, it will adapt to 100Mbps, if that is changed to 1Gbps, it will adapt to 1Gbps as well. - Green LED Illuminated = 1Gbps - Amber LED Illuminated = 100Mbps
11	IR IN	IR input port for IR from Control system or remote
12	IR OUT	IR output port for control of source device. This IR output signal is from IR IN port of receiver
13	RS-232 Port	The RS-232 port is multifunction, and these functions are controlled via DIP switch settings. 1. RS-232 Pass-through 2. Control and Firmware update 3. HDBaseT Firmware update 4. Debug
14	HDBaseT Out	HDBaseT out port for connection to RX via Cat6A/7
15	Data Flow Indicator (amber)	▪ Illuminated – HDMI signal with HDCP ▪ Flashing – HDMI signal without HDCP ▪ Not Illuminated – No HDMI signal
16	Link Signal Indicator (Green)	▪ Illuminated – TX and RX have a good connection ▪ Flashing – TX and RX have poor communication ▪ Not Illuminated – TX and RX are not connected
17	eARC HDMI IN	This is the HDMI input from source or eARC/ARC enabled switch/amplifier. eARC/ARC is returned to the input device from the display/RX
18	HDMI Out Port	This port has to be enabled with a command and is a 1080p @24Hz. video return that uses the eARC/ARC path. When used, eARC and ARC must be disabled.
19	Audio In Port	Analog audio in port that is output at RX Audio out port
20	Audio Out Port	Analog Audio that comes from the RX Audio In port
21	EDID DIP Switch	[DIP]=000 (Default) – Copies the EDID of the display connected to the RX. If no display is connected to RX, the

21 (cont)	EDID DIP Switch (cont)	display connected to the HDMI out on the TX is copied. [DIP]=001 – 1080p@60Hz. / 2 ch. PCM audio [DIP]=010 – 4K2K@60Hz. YUV4:4:4 / 2 ch. PCM audio [DIP]=011 - 4K2K@60Hz. YUV4:4:4 / 5.1 PCM/DTS/Dolby [DIP]=100 - 4K2K@60Hz. YUV4:4:4 / 7.1 PCM/DTS/Dolby [DIP]=101 – 8K@30Hz. + 4K@120Hz. YUV4:4:4 / 2 ch. PCM audio [DIP]=110 - 8K@30Hz. + 4K@120Hz. YUV4:4:4 / 5.1 PCM/DTS/Dolby [DIP]=111 - 8K@30Hz. + 4K@120Hz. YUV4:4:4 / 7.1 PCM/DTS/Dolby
22	Configuration DIP Switch	This DIP switch is to be treated as two DIP switches. Number 1 controls the IR Voltage and numbers 2 and 3 control how the RS-232 functions DIP = Number 1 at "0" position (Default), IR is 12V DIP = Number 1 at "1" position, IR is 5V DIP = Numbers 2 and 3 at "00", RS-232 is pass-through DIP = Numbers 2 and 3 at "01", RS-232 is configured to upgrade the EX3-8K's firmware DIP = Numbers 2 and 3 at "10", RS-232 is configured for upgrading the HDBaseT firmware DIP = Numbers 2 and 3 at "11", RS-232 is in debug mode

5.2 Receiver Panel



No.	Name	Function Description
1	USB HOST	USB Type B For connection to PC
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5	LINK LED	Illuminated - TX is powered on Flashing – Connection between RX and TX is poor Not Illuminated -TX and RX are not connected
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7	OUT LED	Illuminated – Indicates there is HDMI signal out Not Illuminated – No HDMI output or system is off
8	eARC Switch/Indicator	Switches on eARC/ARC Mode Push to enable eARC/ARC LED on – eARC/ARC is enabled and working correctly LED flashing – eARC/ARC enabled, but not operating correctly LED off – eARC/ARC disengaged
9	DC 24V IN	DC 24V input for 24V 1A power adapter. *Note that the extender supports PoC function, it means that either transmitter or receiver is connected to 24V/1A power supply, the other doesn't need power supply*
		The Ethernet port has an adaptive broadband rate. For an example if a 100Mbps rate device is connected, it will adapt to

10	ETHERNET Port	100Mbps, if that is changed to 1Gbps, it will adapt to 1Gbps as well. - Green LED Illuminated = 1Gbps - Amber LED Illuminated = 100Mbps
11	IR IN	IR input port for IR from Control system or remote
12	IR OUT	IR output port for control of source device. This IR output signal is from IR IN port of TX
13	RS-232 Port	The RS-232 port is multifunction, and these functions are controlled via DIP switch settings. 1. RS-232 Pass-through 2. Control and Firmware update 3. HDBaseT Firmware update 4. Debug
14	HDBaseT IN	HDBaseT IN port for connection to TX via Cat6A/7
15	Data Flow Indicator (amber)	▪ Illuminated – HDMI signal with HDCP ▪ Flashing – HDMI signal without HDCP ▪ Not Illuminated – No HDMI signal
16	Link Signal Indicator (Green)	▪ Illuminated – TX and RX have a good connection ▪ Flashing – TX and RX have poor communication ▪ Not Illuminated – TX and RX are not connected
17	HDMI IN Port	This is a 1080p 24Hz. send back to the HDMI OUT port on TX. This return path to the TX is defaulted to closed and must be enabled with a command via Hercules or similar program. The eARC/ARC path is then inoperable and eARC/ARC should be disabled.
18	eARC/HDMI Out	Connects to display and provides HDMI signal from TX while simultaneously returning eARC/ARC back to TX HDMI IN port
19	Audio IN Port	Analog audio in port that is output at TX Audio out port
20	Audio OUT Port	Analog Audio that comes from the TX Audio In port
	Configuration DIP	This DIP switch is to be treated as two DIP switches. Number 1 controls the IR Voltage and numbers 2 and 3 control how the RS-232 functions DIP = Number 1 at "0" position (Default), IR is 12V DIP = Number 1 at "1" position, IR is 5V

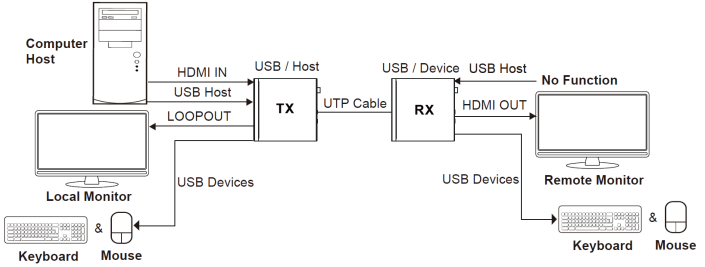
21	Switch	DIP = Numbers 2 and 3 at "00", RS-232 is pass-through DIP = Numbers 2 and 3 at "01", RS-232 is configured to upgrade the EX3-8K's firmware DIP = Numbers 2 and 3 at "10", RS-232 is configured for upgrading the HDBaseT firmware DIP = Numbers 2 and 3 at "11", RS-232 is in debug mode

5.3 USB Mode Applications

The USB functions can be adjusted so that either the TX or the RX can become the host or the client. Simply use the Host/Device to choose the function and power cycle the RX and TX for it to take effect.

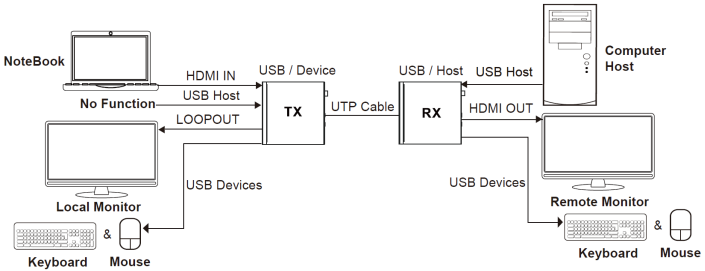
Example 1: TX Host, RX Client

Set the Host/Client switch on TX to "Host", set the Host/Client switch on RX to "Client" and power cycle the RX and TX.



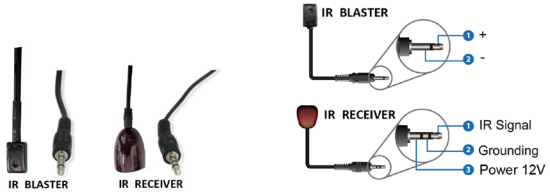
Example 2: TX Client, RX Host

Set the Host/Client switch on TX to "Client", set the Host/Client switch on RX to "Host" and power cycle the RX and TX.



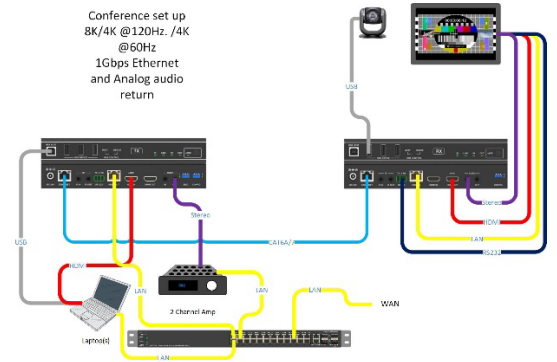
5.4 IR Pin Definition

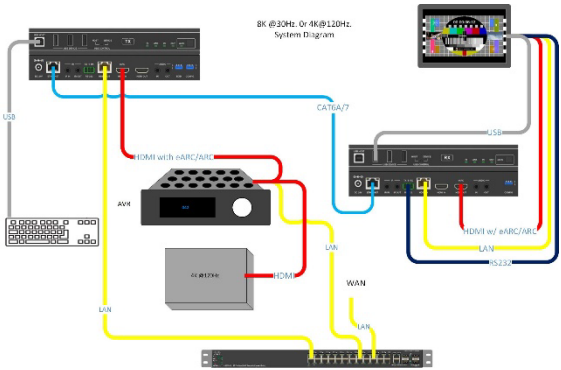
IR Receiver and Blaster pin's definition is as below:

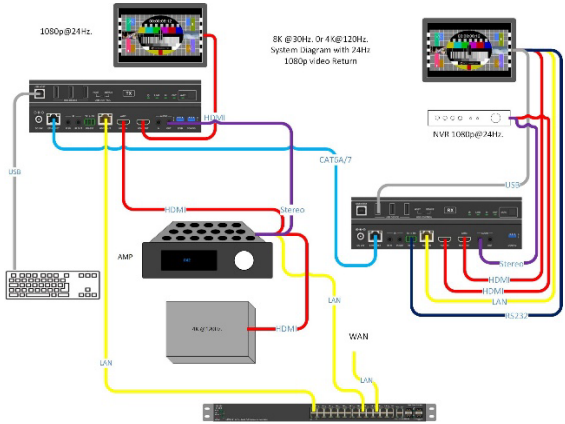


Note: When the angle between the IR receiver and the remote control is ± 45 °, the transmission distance is 0-5 meters; when the angle between the IR receiver and the remote control is ± 90 °, the transmission distance is 0-8 meters.

6. Application Examples







A 1080p @ 24Hz. Video return path can be opened by sacrificing the eARC/ARC feature. This is done by disabling the eARC/ARC with the button on the TX and RX and then sending a command to tell the TX to switch to this mode. This is done using Hercules (the link is on the M88SL webpage at www.simplifiedmfg.com/m88sl) and it is freeware. You will need to set the RS-232 DIP switch on the TX to "01" and then send the correct command to set the HDMI loop out to output the return video. Using the serial portion of Hercules, use these settings;

Baud rate: 115200**, Data bits:** 8, **Stop bits:** 1, **Check bit:** 0

Send the command "s loop-out in 2!", to put it back to loop-out from source send the Command "s loop-out in 1!". If you want to poll the device to see which mode it is in, you would use the command "r loop-out in!"

Other commands are: "r fw version!" – display's devices current firmware

"s reboot!" – reboots the device

" s reset!" – sets the device to factory defaults

7. Warranty

Should you feel that this product does not function adequately due to defects in materials or workmanship, we (referred to as "the warrantor") will, for the length of the period indicated below (starting from the original date of the purchase) either a) repair the product with new or refurbished parts. Or b) Replace the product with new or refurbished product. All Simplified MFG products are covered by a 3-year warranty. During this period there will be no charge for unit repair, replacement of unit components or replacement of the product if deemed necessary. The decision to repair or replace is made by the warrantor. The purchaser must mail in the product during the warranty period. This limited warranty only covers the product purchased as new and is extended to the original purchaser only. It is non-transferrable to subsequent owners, even during the warranty period. A purchase receipt or other proof of purchase date is required for the limited warranty service.

8. Contact

Sales and Tech Support
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E. info@simplifiedmfg.com