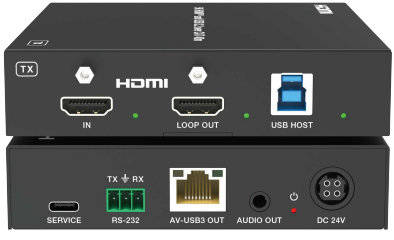
5K HDMI™ and USB 3.2 Extender

40m over CAT (Transmitter, HDMI™ IN)



User Manual

VER 1.2

Thank you for purchasing this product

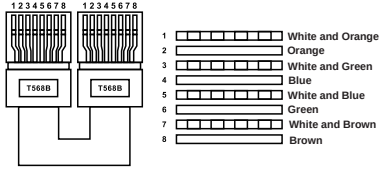
For optimum performance and safety, please read these instructions carefully before connecting, operating or adjusting this product. Please keep this manual for future reference.

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 in order to protect and extend the life of your equipment.

Caution

The network cable connection method required for this product is direct connection. Please do not cross connect.



Direct Interconnection Method

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1. Introduction

The extender kit can extend HDMI™ video and USB 3.2 data up to 40m/130ft via a single CAT6a cable. The transmitter box (TX) features one HDMI™ input, one HDMI™ loop out and one USB 3.2 upstream port. It supports audio de-embedding, RS-232 signal pass-through and bi-directional 24V PoC function. The extender offers the most convenient solution for BYOD extension via a single CAT cable, and it is a perfect solution for commercial A/V applications.

2. Features

- ☆ 5K HDMI™ and USB 3.2 Extender with HDMI™ input and loop out
- ☆ Extended distance is up to 40m/130ft for 4K signal, 35m/115ft for 5K signal via a single CAT6a cable
- ☆ HDCP 2.3 compliant, to create a secure connection between the source and display
- ☆ Supports USB 3.2 Gen 1 with data transfer rate up to 2.5 Gbps. It does not support 5 Gbps operation
- ☆ Features one HDMI™ input, one HDMI™ loop out and one USB 3.2 upstream port
- ☆ Supports audio de-embedding
- ☆ RS-232 pass-through
- ☆ HDR, HDR10+, Dolby Vision LLM and HLG pass-through
- ☆ Bi-directional 24V PoC (power over cable), when TX or RX gets power, the other end does not need an external power supply

3. Package Contents

① 1× 5K HDMI™ and USB 3.2 Extender (Transmitter)
② 1× 24V/2A Power Adapter
③ 1× 3-pin 3.5mm Phoenix Connector
④ 2× Mounting Ear
⑤ 4× Machine Screw
⑥ 2× Hexagonal Copper Stud
⑦ 1× User Manual

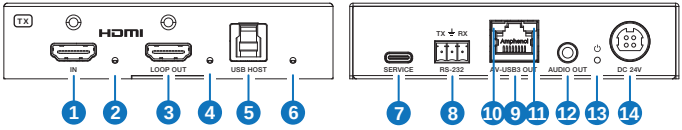
4. Specifications

Technical	
USB Protocol	USB 3.2 Gen 1
Transfer Rate	Up to 2.5 Gbps
HDCP Compliance	HDCP 2.3 and HDCP 1.x
HDMI™ Compliance	HDMI™ 2.0b
HDMI™ Video Bandwidth	18Gbps
HDMI™ Video Resolution (Input & Output)	640x480p60Hz, 800x600p60Hz, 1024x768p60Hz, 1280x1024p60Hz, 1360x768p60Hz, 1440x900p60Hz, 1440x1050p60Hz, 1600x1200p60Hz, 720x480i59.94Hz(480i59), 720x480p59.94Hz(480p59), 720x576i50Hz(576i50), 720x576p50Hz(576p50), 1280x720p50Hz(720p50), 1280x720p59.94Hz(720p59), 1280x720p60Hz(720p60), 1920x1080i50Hz(1080i50), 1920x1080i59.94Hz(1080i59), 1920x1080i60Hz(1080i60), 1920x1080p23.98Hz(1080p23), 1920x1080p24Hz(1080p24), 1920x1080p25Hz(1080p25), 1920x1080p29.97Hz(1080p29), 1920x1080p30Hz(1080p30), 1920x1080p50Hz(1080p50), 1920x1080p59.94Hz(1080p59), 1920x1080p60Hz(1080p60), 2560x1080p60Hz, 3440x1440p60Hz, 3840x2160p23.98Hz(2160p23), 3840x2160p24Hz(2160p24), 3840x2160p25Hz(2160p25), 3840x2160p29.97Hz(2160p29), 3840x2160p30Hz(2160p30), 3840x2160p50Hz(2160p50), 3840x2160p59.94Hz(2160p59), 3840x2160p60Hz(2160p60), 4096x2160p23.98Hz, 4096x2160p24Hz, 4096x2160p25Hz, 4096x2160p29.97Hz, 4096x2160p30Hz, 4096x2160p50Hz, 4096x2160p59.94Hz, 4096x2160p60Hz, 5120x1440p50Hz, 5120x1440p60Hz, 5120x2160p50Hz, 5120x2160p60Hz
HDR	HDR, HDR10, HDR10+, Dolby Vision, HLG
Color Depth	8/10/12-bit
Color Space	RGB, YCbCr_4:4:4, YCbCr_4:2:2, YCbCr_4:2:0
Audio Format	**HDMI™ IN, HDMI™ OUT:** LPCM, Dolby Digital/Plus/EX, Dolby True HD, Dolby Atmos, DTS, DTS-EX, DTS-96/24, DTS High Res, DTS-HD Master Audio **Analog Audio De-embedding:** LPCM 2CH (sample rate 32~192kHz)
Transmission Distance	Up to 40m/130ft for 4K and 35m/115ft for 5K via CAT6a (minimum required U/FTP 23AWG) cable; 1.5m/4.9ft via USB 3.2 Gen 1 5Gbps passive cable; 3m/9.8ft via HDMI™ passive cable

Audio Parameters	Output Level (Max)	2.2dBu(1Vrms)
	Frequency Response	20Hz to 20kHz (±0.5dB)
	Dynamic Range	>90dB@0dBu, 1kHz, A-weighted
	Audio S/N Ratio	>90dB@0dBu, 1kHz, A-weighted
	Audio THD+N	< 0.007%@OUT 2.2dBu, 1kHz
ESD Protection	IEC 61000-4-2: ±8kV (Air-gap discharge), ±4kV (Contact discharge)	
Connections		
Transmitter	Input: 1× IN [HDMI™ type A, 19-pin female] 1× USB-B [Upstream, 9-pin female] Output: 1× LOOP OUT [HDMI™ type A, 19-pin female] 1× AUDIO OUT [3.5mm audio jack] 1× AV-USB3 OUT [RJ45 connector, 24V PoC] Control: 1× RS-232 [3-pin 3.5mm phoenix connector] 1× SERVICE [USB-C, firmware update port]	
Mechanical		
Housing	Metal Enclosure	
Color	Black	
Dimensions	Transmitter: 118mm [W] × 111mm [D] × 25.5mm [H]	
Weight	Transmitter: 378g	
Power Supply	Input: AC 100~240V 50/60Hz; Output: DC 24V/2A (US/EU standards, CE/FCC/UL certified)	
Power Consumption	Transmitter: 4W (Max)	
Operating Temperature	0°C ~ 40°C / 32°F ~ 104°F	
Storage Temperature	-20°C ~ 60°C / -4°F ~ 140°F	
Operating Humidity	20%~80% relative humidity, non-condensing	
Storage Humidity	10%~90% relative humidity, non-condensing	

5. Operation Controls and Functions

Transmitter Panel



No.	Name	Function Description
1	HDMI IN	HDMI signal input port, connected to a source device such as a computer with HDMI cable.
2	HDMI IN LED	The green LED will light up, when the HDMI IN port is connected to an active source device.
3	LOOP OUT	HDMI loop out port, connected to a display device such as a monitor with HDMI cable.
4	LOOP OUT LED	The green LED will light up, when the LOOP OUT port is connected to a display device.
5	USB HOST	Upstream USB-B port, connected to the host port on a computer.
6	USB LED	USB signal indicator. ▪ **Light On:** USB 3.2 signal is detected. ▪ **Light Blinking:** USB 2.0 signal is detected. ▪ **Light Off:** There is no USB signal.
7	SERVICE	USB 2.0 port, used for firmware upgrade and API control.
8	RS-232	3-pin phoenix connector, connected to a control system for RS-232 signal pass-through.
9	AV-USB3 OUT	Connects to the AV-USB3 IN port on RX with CAT6a cable, used for AV and USB signal transmission and 24V PoC power supply.
10	LINK LED	▪ **Light On:** TX and RX are connected and linked. ▪ **Light Off:** TX and RX are not connected.

No.	Name	Function Description
11	VIDEO LED	▪ **Light On:** There is video signal transmission with HDCP encryption. ▪ **Light Blinking:** There is video signal transmission without HDCP encryption. ▪ **Light Off:** There is no video signal transmission.
12	AUDIO OUT	HDMI audio de-embedding output port, connected to an audio device.
13	Power LED	The red LED will light up, when the transmitter is powered on.
14	DC 24V	DC 24V/2A power input port.

6. API Commands

The product supports API commands control. Connect the SERVICE port on the product to a PC, then open a Serial Command tool on PC to send API commands to control the product. The API commands list is shown below.

ASCII Commands				
SERVICE (USB-C port with virtual RS-232) communication protocol (Connect to laptop) Baud rate: 115200 (fixed), Data bit: 8, Stop bit: 1, Parity bit: none				
Commands	**Function**	**Example**	**Feedback**	**Default**
?	Get the list of all commands	?		
help	Get the list of all commands	help		
get version	Get all firmware version	get version	TX BOOT: V1.1.1 TX FW: V1.0.1 RX FW: V1.0.1 SUB MCU1: V1.0.1 SUB MCU2: V1.0.17	
reboot	Reboot the device	reboot	Reboot… System Initializing... Initialization Finished! TX FW v1.0.0 RX FW v1.0.0	
reset	Reset to factory defaults	reset	Sure to RESET to default settings? Type "Yes" after next prompt to confirm…	

Commands	Function	Example	Feedback	Default
status	Get system status	status	Please refer to the note at the end of the list.	
set tx input x hdcp y	Set tx input x (x=0~1) HDCP y (y=0~2) x=0:All Inputs, x=1:Input 1, y=0:HDCP off, y=1:HDCP 1.4, y=2:HDCP 2.3	set tx input 0 hdcp 2 set tx input 1 hdcp 0	TX all input HDCP 2.3 TX input 1 HDCP off	HDCP 2.3
get tx input x hdcp	Get TX input x (x=0~1) HDCP status	get tx input 1 hdcp	TX input 1 HDCP 2.3	
get tx input x connected	Get TX input x (x=0~1) cable connected status x=0:All Inputs x=1:Input 1	get tx input 1 connected	TX input 1 connected TX input 1 disconnected	
get tx input x signal	Get TX input x (x=0~1) signal status	get tx input 1 signal	TX input 1 3840x2160p 60Hz YUV 4:4:4 8bit TX input 1 no signal	
set tx input x edid y	Set TX input x (x=0~1) EDID to y (y=01~25) x=0: All inputs x=1: Input 1 y=01: Auto EDID (default) y=02: Copy EDID from RX output y=03: Copy EDID from TX output y=04: 1080p60, 2CH PCM y=05: 1080p60, 5.1CH DTS/DOLBY y=06: 1080p60, 7.1CH DTS/DOLBY/HD y=07: 4K60, 2CH PCM y=08: 4K60, 5.1CH DTS/DOLBY y=09: 4K60, 7.1CH DTS/DOLBY/HD y=10: 5K60, 2CH PCM y=11: 5K60, 5.1CH DTS/DOLBY y=12: 5K60, 7.1CH DTS/DOLBY/HD y=13: 4K30, 2CH PCM y=14: 4K30, 5.1CH DTS/DOLBY y=15: 4K30, 7.1CH DTS/DOLBY/HD y=16: 720p60, 2CH PCM y=17: 1920x1200p60, 2CH PCM y=18: 1680x1050p60, 2CH PCM y=19: 1600x1200p60, 2CH PCM y=20: 1440x900p60, 2CH PCM y=21: 1360x768p60, 2CH PCM y=22: 1280x1024p60, 2CH PCM y=23: 1024x768p60, 2CH PCM y=24: User Defined 1 y=25: User Defined 2	set tx input 1 edid 1	TX input 1 EDID 01:auto EDID (default)	1

Commands	Function	Example	Feedback	Default
get tx input x edid	Get TX input x (x=0~1) EDID	get tx input 1 edid	TX input 1 EDID 01: Auto EDID (default)	
get tx input x edid data	Get TX input x (x=0~1) EDID data	get tx input 1 edid data	TX input 1 EDID <00 FF FF FF….>	
set user edid x <y>	Set user defined EDID x (x=0~2) to y x=0: User Defined 1 and User Defined 2 x=1: User Defined 1 x=2: User Defined 2 y=00 FF FF FF ….. (y is 256 bytes EDID data)	set user edid 1 <00 FF FF FF ….>	User Defined 1 EDID is loaded	
get user edid x	Get user defined EDID x (x=0~2) data x=0: User Defined 1 and User Defined 2 x=1: User Defined 1 x=2: User Defined 2	get user edid 1	<00 FF FF FF….>	
set tx loop hdcp y	Set TX loop HDCP mode to y (y=0~4) y=0: Signal management y=1: Follow sink (default) y=2: Follow source y=3: Force HDCP 1.4 y=4: Force HDCP 2.3	set tx loop hdcp 1	TX loop HDCP follow sink	1
get tx loop hdcp	Get TX loop HDCP mode	get tx loop hdcp	TX loop HDCP follow sink	
get tx loop connected	Get TX loop cable connected status	get tx loop connected	TX loop connected TX loop disconnected	
get tx usb connected	Get TX USB cable connected status	get tx usb connected	TX USB connected TX USB disconnected	
set hdbt update	Set SERVICE port to HDBT UART for FW update	set hdbt update	HDBT update…	

Note: The feedback of the command of “status” is as follow.

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Status Info 5K HDMI and USB 3.2 Extender over CAT

TX FW v1.0.0

TX	**Cable**	**Signal**	**HDCP**	**EDID**
Input	Connected	3840x2160p60Hz YUV 4:4:4 8bit	HDCP 2.3	01_Auto EDID (default)
Loop	Connected	3840x2160p60Hz YUV 4:4:4 8bit	HDCP 2.3	

TX_USB	**Cable**
TX_01	Connected

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7. Application Example