CH-2538TXM-TB

UHD+ HDMI/VGA over HDBaseT Table Box Scaler Transmitter (PD)

Operation Manual

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SAFETY PRECAUTIONS

Please read all instructions before attempting to unpack, install or operate this equipment and before connecting the power supply. Please keep the following in mind as you unpack and install this equipment:

- Always follow basic safety precautions to reduce the risk of fire, electrical shock and injury to persons.
- To prevent fire or shock hazard, do not expose the unit to rain, moisture or install this product near water.
- Never spill liquid of any kind on or into this product.
- Never push an object of any kind into this product through any openings or empty slots in the unit, as you may damage parts inside the unit.
- Do not attach the power supply cabling to building surfaces.
- Use only the supplied power supply unit (PSU). Do not use the PSU if it is damaged.
- Do not allow anything to rest on the power cabling or allow any weight to be placed upon it or any person walk on it.
- To protect the unit from overheating, do not block any vents or openings in the unit housing that provide ventilation and allow for sufficient space for air to circulate around the unit.
- Please completely disconnect the power when the unit is not in use to avoid wasting electricity.

VERSION HISTORY

REV.	DATE	SUMMARY OF CHANGE
RDV1	2019/12/17	Preliminary release

CONTENTS

1. INTRODUCTION

This UHD+ HDMI/VGA Table Box scaler is an HDMI/VGA switch with audio embedding and HDBaseT output. The table box is designed to be placed on a table, or mounted to any typical table edge using a clamp. This unit can send high definition uncompressed audio/video along with Ethernet over a single cable up to a distance of 100 meters at 1080p@60Hz.

The HDMI input supports resolutions up to 4K@60Hz (4:4:4, 8-bit) and the VGA input supports resolutions up to WUXGA (RB). With the use of the 3.5mm audio input, stereo audio may be embedded with VGA or DVI/HDMI sources as well. Despite HDBaseT's 10.2Gbps bandwidth limitation, even 4K UHD+ HDMI video sources, up to and including 4K@60Hz (4:4:4, 8-bit), can be supported thanks to the built in scaling engine. A specific output resolution can be manually set, or to provide maximum compatibility with a wide range of display types, sources can be automatically scaled to match the preferred resolution and timing of the connected display (as reported by the display's EDID).

Signal management features, such as automatic source switching based on input signal detection, enable convenient hands-free operation. Additional functionality such as basic EDID management, HDCP management, and basic signal event automation (which can automatically send customized RS-232 commands to an external device) is also available for configuration via serial commands.

The unit is powered via PoH (Power over HDBaseT) from a compatible HDBaseT receiver, which allows for greater flexibility in installations. Controllable via front panel buttons a s well as by RS-232 (with compatible receiver).

2. APPLICATIONS

- Household entertainment sharing and control
- Lecture room display and control
- Showroom display and control
- Meeting room presentation and control
- Classroom display and control

3. PACKAGE CONTENTS

- 1× UHD+ HDMI/VGA over HDBaseT Table Box Scaler Transmitter
- 1× Operation Manual

4. SYSTEM REQUIREMENTS

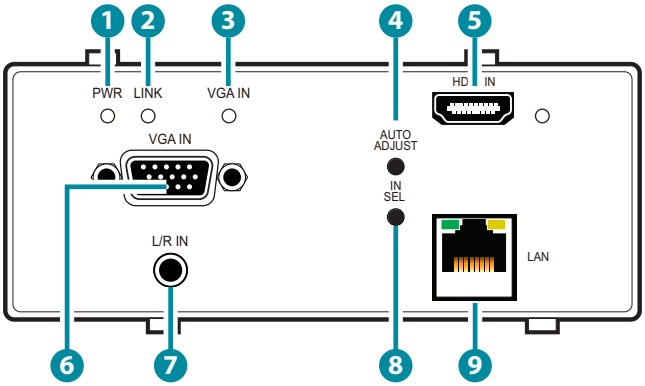
- HDMI source equipment such as a media player, video game console or set-top box.
- VGA source equipment such as a PC, laptop or set-top box.
- The use of Premium High Speed HDMI cables, and industry standard Cat.6, Cat.6A or Cat.7, is highly recommended.

5. FEATURES

- HDMI 2.0 and DVI 1.0 compliant
- HDCP 1.x and 2.2 compliant
- 1 HDMI input & 1 VGA input with 3.5mm mini-jack audio input
- HDMI input supports up to 4K UHD+ (18Gbps, 4K@60Hz 4:4:4, 8-bit) video
- VGA input supports up to 1080p60/WUXGA video
- Integrated scaler supports output resolutions from 640×480@60Hz up to 4096×2160@30Hz
- Automatic scaling of sources to match the native resolution of the HDMI display based on EDID
- HDBaseT output transmits video, audio and data over a single Cat.5e/6/7 cable and can reach distances up to 100m at 4K when using Cat.6A/7
- Supported HDBaseT feature set: HD Video & Audio, 100BaseT Ethernet, and PoH (PD)
- Supports 2 channel LPCM audio with volume control
- Supports CEC bypass
- Automatic input selection with hot plug detection enabling hands- free operation
- Basic signal event automation (via RS-232 with a compatible receiver)
- Unit is powered via PoH from a compatible HDBaseT receiver
- Convenient table box design
- Front panel LEDs indicate input selection, power and link status
- Controllable via front panel buttons and RS-232 (with compatible receiver only)

6. OPERATION CONTROLS AND FUNCTIONS

6.1 Front Panel

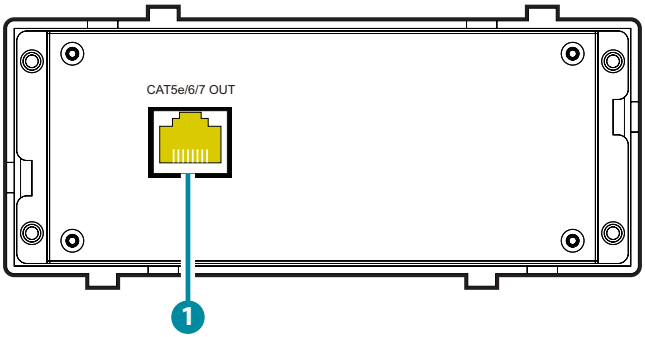


1. **PWR LED:** This LED will illuminate to indicate the unit is on and receiving power.
2. **LINK LED:** This LED will illuminate solidly when a live connection with a compatible receiver is active.
3. **VGA IN LED**: This LED will illuminate when the VGA input has been selected.
4. **AUTO ADJUST Button:** Press this button to activate the Auto Adjust function for VGA sources.

   Note: The Auto Adjust function requires a VGA source with a bright, edge-to-edge, image to accurately judge the dimensions of the signal.
5. **HDMI IN Port & LED:** Connect to HDMI source equipment such as a media player, game console, or set-top box. The LED will illuminate when the HDMI input has been selected.
6. **VGA IN Port:** Connect to VGA source equipment such as a PC or laptop.
7. **L/R IN Port:** Connect to the analog stereo output of the device connected to the VGA input port.

   Note: By default, this audio will be embedded with the VGA source.
8. **IN SEL Button:** Press this button to toggle between the two inputs.
9. **LAN Port:** Connect to an Ethernet supporting device or to your local network, as appropriate, to extend the network to both ends of the HDBaseT connection.

6.2 Rear Panel



1 **CAT5e/6/7 OUT Port:** Connect to a compatible HDBaseT receiver with a single Cat.5e/6/7 cable for transmission of all data signals. Power via PoH will also be supplied to this unit when connected to a compatible PSE receiver.

6.3 RS-232 Defaults

Serial Port Default Settings	
Baud Rate	19200
Data Bits	8
Parity Bits	None
Stop Bits	1
Flow Control	None

Note: Access to control the table box transmitter's settings is provided via the RS-232 port located on the connected receiver.

6.4 Serial Commands

COMMAND Description and Parameters
help↵ Show the full command list.
?↵ Show the full command list.
get fw ver↵ Show the unit's firmware version.
get model name↵ Show the unit's model name.
set out A route N1↵ Route the specified input to the HDBaseT output. Available values for **N1**: 1 [HDMI] 2 [VGA]
get out A route↵ Show the current input routed to the HDBaseT output.
set out auto mode N1↵ Set the auto switching behavior of the unit. Available values for **N1**: 1 [Off] 2 [Auto switch]
get out auto mode↵ Show the current auto switching mode of the unit.
get out auto mode list↵ List all available auto mode options.

COMMAND Description and Parameters
get in N1 timing↵ Show the current resolution detected on the specified input. Available values for **N1**: 1 [HDMI] 2 [VGA] *Note: Timing information can only be displayed for the currently selected input.*
get in type list↵ List the port type of all inputs on the unit.
set out A mask N1↵ Enable or disable the a/v mask setting on the specified output. Available values for **N1**: ON [Blank video] OFF [Enable video]
get out A mask↵ Display the current a/v mask setting for the specified output.
set out A timing N1↵ Set the output resolution to use for the HDBaseT output. Available values for **N1**: 0 [Native] 1 [640×480@60] 2 [800×600@60] 3 [1024×768@60] 4 [1280×720@60] 5 [1280×768@60] 6 [1280×800@60] 7 [1280×1024@60] 8 [1360×768@60] 9 [1440×900@60] 10 [1400×1050@60] 11 [1600×1200@60] 12 [1680×1050@60] 13 [1920×1080@60]

COMMAND	
Description and Parameters	
14	[1920×1200@60RB]
15	[2048×1080@50]
16	[2048×1080@60]
17	[2560×1440@60RB]
18	[2560×1600@60RB]
19	[720×480p@60]
20	[720×576p@60]
21	[1280×720p@50]
22	[1280×720p@60]
23	[1920×1080p@24]
24	[1920×1080p@25]
25	[1920×1080p@30]
26	[1920×1080p@50]
27	[1920×1080p@60]
28	[2560×1080p@50]
29	[2560×1080p@60]
30	[3840×2160p@24]
31	[3840×2160p@25]
32	[3840×2160p@30]
33	[4096×2160p@24]
34	[4096×2160p@25]
35	[4096×2160p@30]
get out A timing↵	
Show the current resolution used by the HDBaseT output.	
get out A sync status↵	
Show the current sync state of the HDBaseT output.	
get out timing list↵	
List all available output resolutions with their local index numbers.	
set out A contrast N1↵	
Set the contrast level of the HDBaseT output.	
N1 = 0~60	[Contrast]
get out A contrast↵	
Show the current contrast level.	

COMMAND Description and Parameters
set out A brightness N1↵ Set the brightness level of the HDBaseT output. **N1** = 0~60 [Brightness]
get out A brightness↵ Show the current brightness level.
set out A saturation N1↵ Set the saturation level of the HDBaseT output. **N1** = 0~60 [Saturation]
get out A saturation↵ Show the current saturation level.
set out A hue N1↵ Set the hue value of the HDBaseT output. **N1** = 0~60 [Hue]
get out A hue↵ Show the current hue value.
set out A sharpness N1↵ Set the sharpness level of the HDBaseT output. **N1** = 0~63 [Sharpness]
get out A sharpness↵ Show the current sharpness level.
set out A nr N1↵ Set the amount of noise reduction to apply to the HDBaseT output's source. Available values for **N1**: 0 [Off] 1 [Low] 2 [Middle] 3 [High] 4 [Auto]

COMMAND Description and Parameters
get out A nr↵ Show the current amount of noise reduction applied to the HDBaseT output's source.
set out A aspect ratio N1↵ Set the aspect ratio of the video shown on the HDBaseT output. Available values for **N1**: 0 [Overscan] 2 [Full] 3 [Best fit] 4 [Pan scan] 5 [Letterbox] 6 [Under 2] 7 [Under 1] 8 [Follow in]
get out A aspect ratio↵ Show the currently set aspect ratio.
get out aspect ratio list↵ List all available aspect ratio options.
set out A auto sync off N1↵ Enable or disable the Auto Sync Off function on the HDBaseT output and set the timeout length. Available values for **N1**: 0 [Disabled] 1 [30 seconds] 2 [60 seconds] 3 [3 minutes] 4 [5 minutes] 5 [10 minutes]
get out A auto sync off↵ Show the current Auto Sync Off settings for the HDBaseT output.
set out A r gain N1↵ Set the HDBaseT output's red gain level. **N1** = 0~1023 [Red gain]

COMMAND Description and Parameters
get out A r gain↵ Show the current red gain level.
set out A g gain N1↵ Set the HDBaseT output's green gain level. **N1** = 0~1023 [Green gain]
get out A g gain↵ Show the current green gain level.
set out A b gain N1↵ Set the HDBaseT output's blue gain level. **N1** = 0~1023 [Blue gain]
get out A b gain↵ Show the current blue gain level.
set out A r offset N1↵ Set the HDBaseT output's red gain level. **N1** = 0~1023 [Red offset]
get out A r offset↵ Show the current red gain level.
set out A g offset N1↵ Set the HDBaseT output's green gain level. **N1** = 0~1023 [Green offset]
get out A g offset↵ Show the current green gain level.
set out A b offset N1↵ Set the HDBaseT output's blue gain level. **N1** = 0~1023 [Blue offset]
get out A b offset↵ Show the current blue gain level.

COMMAND Description and Parameters
set in 2 phase N1↵ Set the PC phase value for the VGA input. **N1** = 0~255 [PC phase]
get in 2 phase↵ Show the current PC phase value for the VGA input.
set in 2 clock N1↵ Set the PC clock value for the VGA input. **N1** = 0~250 [PC clock]
get in 2 clock↵ Show the current PC clock value for the VGA input.
set in 2 hposition N1↵ Set the PC horizontal position for the VGA input. **N1** = 0~250 [PC H position]
get in 2 hposition↵ Show the current PC horizontal position for the VGA input.
set in 2 vposition N1↵ Set the PC vertical position for the VGA input. **N1** = 0~250 [PC V position]
get in 2 vposition↵ Show the current PC vertical position for the VGA input.
set pc mode N1↵ Set the PC resolution to detect, between 1280x960@60Hz and 1600x900@60Hz (RB), when the pixel clock is the same. Available values for **N1**: 0 [1280x960@60Hz] 1 [1600x900@60Hz (RB)]
get pc mode↵ Show the current PC mode resolution setting.

COMMAND Description and Parameters
set audio out A route N1↵ Set the audio routing behavior for the HDBaseT output. Available values for **N1**: 1 [Follow video] 2 [Analog audio]
get audio out A route↵ Show the currently selected audio routing behavior.
get audio in type list↵ List all available audio input sources.
set audio out A mute N1↵ Enable or disable muting the audio output. Available values for **N1**: ON [Mute enabled] OFF [Mute disabled]
get audio out A mute↵ Show the current mute state of the HDBaseT output.
set audio out A volume N1↵ Set the volume level of the HDBaseT output's audio. **N1** = 0~100 [Volume]
get audio out A volume↵ Show the current volume level of the HDBaseT output's audio.

COMMAND Description and Parameters
set out A osd timeout N1↵ Set the OSD's timeout value. Available values for **N1**: 0 [Off] 1 [5 seconds] 2 [10 seconds] 3 [15 seconds] 4 [20 seconds] 5 [25 seconds] 6 [30 seconds] 7 [35 seconds] 8 [40 seconds] 9 [45 seconds] 10 [50 seconds] 11 [55 seconds] 12 [60 seconds]
get out A osd timeout↵ Show the current OSD timeout value.
set out A osd info display N1↵ Enable, set the timeout value, or disable the info OSD. Available values for **N1**: 0 [Always off] 1 [Always on] 2 [5 seconds] 3 [10 seconds]
get out A osd info display↵ Show the current info OSD state for the specified output.
set out A osd vposition N1↵ Set the vertical position of the OSD. **N1** = 0~60 [V position]
get out A osd vposition↵ Show the current vertical position of the OSD.

COMMAND Description and Parameters
set out A osd hposition N1↵ Set the horizontal position of the OSD. **N1** = 0~60 [H position]
get out A osd hposition↵ Show the current horizontal position of the OSD.
set out A osd transparency N1↵ Set the transparency level of the OSD. **N1** = 0~50 [Transparency]
get out A osd transparency↵ Show the current transparency level of the OSD.
set in 1 hdcp mode N1↵ Set the HDCP behavior of the HDMI input. Available values for **N1**: 0 [Disable HDCP] 1 [Follow source] 2 [Follow display]
get in 1 hdcp mode↵ Show the current HDCP behavior used by the HDMI input.
get out A hdcp status↵ Show the current HDCP status of the HDBaseT output.
set uart 1 baudrate N1↵ Set the baud rate to accept from a connected receiver's RS-232 port. Available values for **N1**: 0 [4800 baud] 1 [9600 baud] 2 [19200 baud] 3 [38400 baud] 4 [57600 baud] 5 [115200 baud]

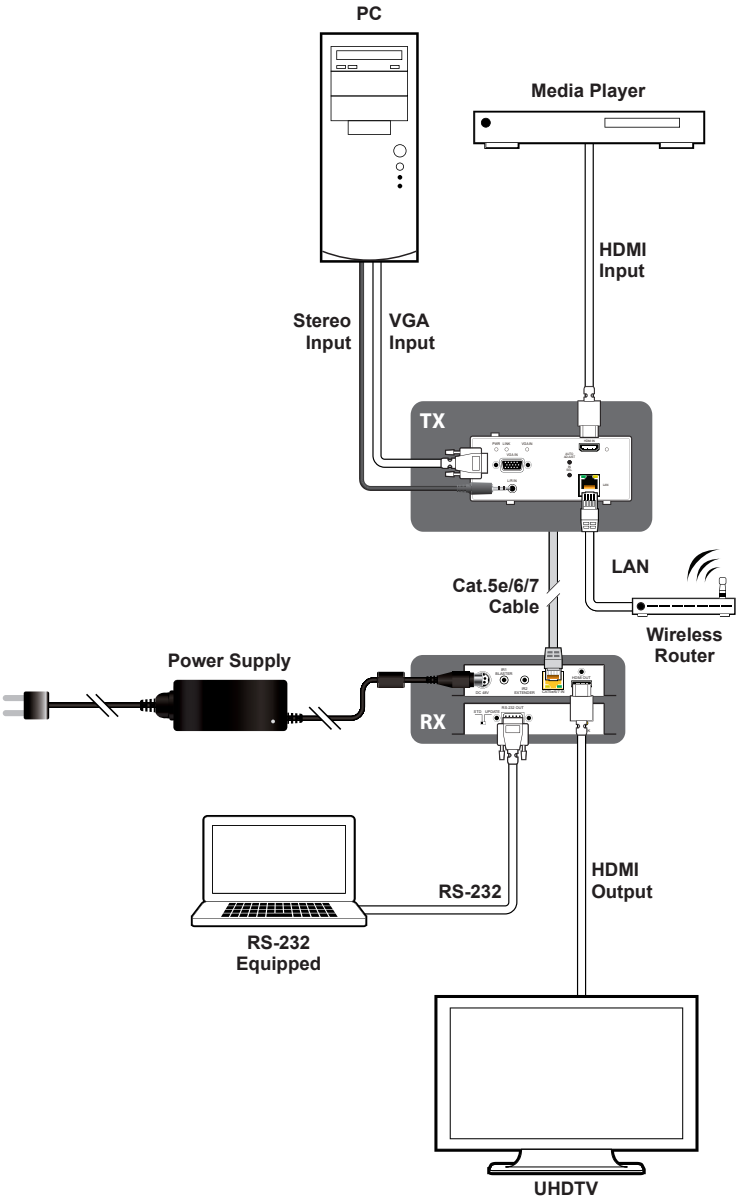
COMMAND Description and Parameters
get uart 1 baudrate↵ Show the current RS-232 baud rate setting.
set uart 1 stop bits N1↵ Set the number of RS-232 stop bits. Available values for **N1**: 0 [1 bit] 1 [2 bits]
get uart 1 stop bits↵ Show the current number of RS-232 stop bits.
set uart 1 data bits N1↵ Set the RS-232 data bits. Available values for **N1**: 0 [5 bits] 1 [6 bits] 2 [7 bits] 3 [8 bits]
get uart 1 data bits↵ Show the current number of RS-232 data bits.
set uart 1 parity N1↵ Set the RS-232 parity. Available values for **N1**: 0 [None] 1 [Odd] 2 [Even]
get uart 1 parity↵ Show the current RS-232 parity setting.

COMMAND Description and Parameters
set in 1 edid N1↵ Set the EDID to use on the HDMI input. Available values for **N1**: 1 [1080P, 2CH] 2 [4K (3G), 2CH] 3 [4K (6G), 2CH] 4 [Output's EDID]
get in 1 edid↵ Show the EDID currently being used on the HDMI input.
get in edid list↵ List all available EDID selections.
get trigger event list↵ List all available Automation Events.
set automation event N1 uart A command **N2**↵ Set the RS-232 command string to send when the specified Automation Event is activated. **N1** = 1~3 [Automation Event number] **N2** = {String} [64 characters max]
get automation event N1 uart A command↵ Show the RS-232 command string to be sent when the specified Automation Event is activated. **N1** = 1~3 [Automation Event number]
set automation event N1 uart A N2↵ Enable or disable the specified Automation Event's RS-232 response. **N1** = 1~3 [Automation Event number] Available values for **N2**: ON [Enable] OFF [Disable]

COMMAND Description and Parameters
get automation event N1 uart A↵ Show the current state of the specified Automation Event's RS-232 response. **N1** = 1~3 [Automation Event number]
set automation event N1 uart A delay N2 sce↵ Set the delay time that the specified Automation Event must continue to be true before sending the defined RS-232 command. **N1** = 1~3 [Automation Event number] **N2** = 0~240 [Delay in seconds]
get automation event N1 uart A delay↵ Show the delay time for the specified Automation Event's RS-232 response. **N1** = 1~3 [Automation Event number]
set automation event N1 uart A wait N2 sce↵ Set the length of time to wait after an Automation Event's RS-232 response has been activated before ANY other Automation Event can be detected. **N1** = 1~3 [Automation Event number] **N2** = 0~240 [Delay in seconds]
get automation event N1 uart A wait↵ Show the wait time for the specified Automation Event's RS-232 response. **N1** = 1~3 [Automation Event number]

Note: Commands will not be executed unless followed by a carriage return. Commands are not case-sensitive.

7. CONNECTION DIAGRAM



8. SPECIFICATIONS

8.1 Technical Specifications

HDMI Bandwidth	18Gbps
VGA Bandwidth	165MHz
HDBaseT Bandwidth	10.2Gbps
Input Ports	1×HDMI (Type-A) 1×VGA (HD-15) 1×Stereo Audio (3.5mm)
Output Port	1×HDBaseT (RJ-45)
Pass-through Port	1×LAN (RJ-45)
Service Port	1×USB 2.0 (Type A)
Baud Rate	19200
Power Supply	PoH (from Rx)
ESD Protection (HBM)	±8kV (Air Discharge) ±4kV (Contact Discharge)
Dimensions (W×H×D)	201mmx82mmx60mm [Case Only] 201mmx82mmx65mm [All Inclusive]
Weight	467g
Chassis Material	Metal (Aluminum)& Plastic
Chassis Color	Black/Silver
Operating Temperature	0˚C – 40˚C/32˚F – 104˚F
Storage Temperature	-20˚C – 60˚C/-4˚F – 140˚F
Relative Humidity	20 – 90% RH (Non-condensing)
Power Consumption	16.17 W

8.2 Video Specifications

Supported Resolutions (Hz)	Input		Output
	HDMI	VGA	HDBaseT
720×400p@70/85	✓	✓	✓
640×480p@60/72/75/85	✓	✓	✓
720×480i@60	✓	×	✓
720×480p@60	✓	✓	✓
720×576i@50	✓	×	✓
720×576p@50	✓	✓	✓
800×600p@56/60/72/75/85	✓	✓	✓
848×480p@60	✓	✓	✓
1024×768p@60/70/75/85	✓	✓	✓
1152×864p@75	✓	✓	✓
1280×720p@50/60	✓	✓	✓
1280×768p@60/75/85	✓	✓	✓
1280×800p@60/75/85	✓	✓	✓
1280×960p@60/85	✓	✓	✓
1280×1024p@60/75/85	✓	✓	✓
1360×768p@60	✓	✓	✓
1366×768p@60	✓	✓	✓
1400×1050p@60	✓	✓	✓
1440×900p@60/75	✓	✓	✓
1600×900p@60RB	✓	✓	✓
1600×1200p@60	✓	✓	✓
1680×1050p@60	✓	✓	✓
1920×1080i@50/60	✓	×	✓
1920×1080p@24/25/30	✓	✓	✓
1920×1080p@50/60	✓	✓	✓
1920×1200p@60RB	✓	✓	✓

Supported Resolutions (Hz)	Input		Output
	HDMI	VGA	HDBaseT
2560×1440p@60RB	✓	×	✓
2560×1600p@60RB	✓	×	✓
2048×1080p@24/25/30	✓	×	✓
2048×1080p@50/60	✓	×	✓
3840×2160p@24/25/30	✓	×	✓
3840×2160p@50/60 (4:2:0)	✓	×	×
3840×2160p@24, HDR10	×	×	×
3840×2160p@50/60 (4:2:0), HDR10	×	×	×
3840×2160p@50/60	✓	×	×
4096×2160p@24/25/30	✓	×	✓
4096×2160p@50/60 (4:2:0)	✓	×	×
4096×2160p@24, HDR10	×	×	×
4096×2160p@50/60 (4:2:0), HDR10	×	×	×
4096×2160p@50/60	×	×	×

8.3 Audio Specifications

8.3.1 Digital Audio

HDMI Input	
LPCM	
Max Channels	2 Channels
Sampling Rate (kHz)	32, 44.1, 48, 88.2, 96, 176.4, 192
Bitstream	
Supported Formats	None

HDBaseT Output	
LPCM	
Max Channels	2 Channels
Sampling Rate (kHz)	48
Bitstream	
Supported Formats	None

8.3.2 Analog Audio

Analog Input	
Max Audio Level	2Vrms
Impedance	10kΩ
Type	Unbalanced

8.4 Cable Specifications

Cable Length	1080p		4K30	4K60
	8-bit	12-bit	(4:4:4) 8-bit	(4:4:4) 8-bit
High Speed HDMI Cable				
HDMI Input	15m	10m	5m	3m
VGA Cable				
VGA Input	2m		×	
Ethernet Cable				
Cat.5e/6	100m		90m	×
Cat.6A/7	100m		100m	×

Bandwidth Category Examples:

- **1080p (FHD Video)**
  - Up to 1080p@60Hz, 12-bit color
  - Data rates lower than 5.3Gbps or below 225MHz TMDS clock
- **4K30 (UHD Video)**
  - 4K@24/25/30Hz & 4K@50/60Hz (4:2:0), 8-bit color
  - Data rates higher than 5.3Gbps or above 225MHz TMDS clock but below 10.2Gbps
- **4K60 (UHD+ Video)**
  - 4K@50/60Hz (4:4:4, 8-bit)
  - 4K@50/60Hz (4:2:0, 10-bit HDR)
  - Data rates higher than 10.2Gbps

8.5 HDBaseT Features

HDBaseT Feature Set	Transmitter
Video & Audio Extension	Supported
LAN Extension	Supported
Send power to Receiver	Unsupported
Accept power from Receiver	Supported (PoH)
IR Extension	Unsupported
RS-232 Extension	Unsupported
USB 2.0 Extension	Unsupported

9. ACRONYMS

ACRONYM	COMPLETE TERM
ADC	Analog-to-Digital Converter
ASCII	American Standard Code for Information Interchange
AVR	Audio/Video Receiver or Recorder
Cat.5e	Enhanced Category 5 cable
Cat.6	Category 6 cable
Cat.6A	Augmented Category 6 cable
Cat.7	Category 7 cable
CEC	Consumer Electronics Control
CLI	Command-Line Interface
DHCP	Dynamic Host Configuration Protocol
DVI	Digital Visual Interface
EDID	Extended Display Identification Data
Gbps	Gigabits per second
HD	High-Definition
HDBT	HDBaseT
HDCP	High-bandwidth Digital Content Protection
HDMI	High-Definition Multimedia Interface
HDR	High Dynamic Range
HDTV	High-Definition Television
IP	Internet Protocol
IR	Infrared
kHz	Kilohertz
LAN	Local Area Network
LED	Light-Emitting Diode
LPCM	Linear Pulse-Code Modulation
MHz	Megahertz
OSD	On-Screen Display
PD	Powered Device

ACRONYM	COMPLETE TERM
PoH	Power over HDBaseT
PSE	Power Sourcing Equipment
TCP	Transmission Control Protocol
4K UHD	4K Ultra-High-Definition (10.2Gbps max)
4K UHD+	4K Ultra-High-Definition (18Gbps max)
UHDTV	Ultra-High-Definition Television
USB	Universal Serial Bus
VGA	Video Graphics Array
WUXGA (RB)	Widescreen Ultra Extended Graphics Array (Reduced Blanking)
XGA	Extended Graphics Array
Ω	Ohm

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