

User Manual

TPUH423L 4K HDBaseT™ Repeater



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Version: TPUH423L_2016V1.0



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Preface

Read this user manual carefully before using this product. Pictures shown in this manual is for reference only, different model and specifications are subject to real product.

This manual is only for operation instruction only, not for any maintenance usage. The functions described in this version are updated till September 2016. In the constant effort to improve our product, we reserve the right to make functions or parameters changes without notice or obligation. Please refer to the dealers for the latest details.

All product function is valid till 2016-9-22.

Trademarks

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FCC Statement

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. It has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation.

Operation of this equipment in a residential area is likely to cause interference, in which case the user at their own expense will be required to take whatever measures may be necessary to correct the interference.

Any changes or modifications not expressly approved by the manufacture would void the user's authority to operate the equipment.



SAFETY PRECAUTIONS

To insure the best from the product, please read all instructions carefully before using the device. Save this manual for further reference.

- Unpack the equipment carefully and save the original box and packing material for possible future shipment
- Follow basic safety precautions to reduce the risk of fire, electrical shock and injury to persons.
- Do not dismantle the housing or modify the module. It may result in electrical shock or burn.
- Using supplies or parts not meeting the products' specifications may cause damage, deterioration or malfunction.
- Refer all servicing to qualified service personnel.
- To prevent fire or shock hazard, do not expose the unit to rain, moisture or install this product near water.
- Do not put any heavy items on the extension cable in case of extrusion.
- Do not remove the housing of the device as opening or removing housing may expose you to dangerous voltage or other hazards.
- Install the device in a place with fine ventilation to avoid damage caused by overheat.
- Keep the module away from liquids.
- Spillage into the housing may result in fire, electrical shock, or equipment damage. If an object or liquid falls or spills on to the housing, unplug the module immediately.
- Do not twist or pull by force ends of the optical cable. It can cause malfunction.
- Do not use liquid or aerosol cleaners to clean this unit. Always unplug the power to the device before cleaning.
- Unplug the power cord when left unused for a long period of time.
- Information on disposal for scrapped devices: do not burn or mix with general household waste, please treat them as normal electrical wastes.

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1. Introduction

1.1 Introduction to TPUH423L

TPUH423L 4K HDBaseT™ Repeater is designed to extend the signal transmission distance of Matrix system(e.g. MUH44TP-N, MUH88TP-N) and our Extender sets (e.g. TPUH422) by repeating the HDBaseT signals up to 4K@70m & 1080p@100m over CAT5e/6/7 cable for each unit. User can connect up to 6 repeaters for each output by daisy-chain connection. For instance, MUH88TP-N which has 8 HDBT outputs, can connect with up to 48 repeaters in the system.

1.2 Features

- Features HDBT input, HDBT output, Audio output and two HDMI outputs.
- With two RS232 ports, supports point-to-point, one-to-many and one-to-all RS232 control.
- The input & output video resolution can up to 4Kx2K@60Hz 4:2:0.
- Supports all-known HDMI audio formats including Dolby TrueHD, Dolby Atmos, Dolby Digital Plus and DTS-HD Master Audio.
- HDBT ports with distance up to 328ft. (100m) at 1080p and 230ft. (70m) at 4Kx2K over CAT5e/6/7.
- HDCP2.2 compliant.
- Supports cascading, at least 6 units can be looped within the same operation system.
- ID PRESET switcher is designed for assigning the Unit ID.
- Supports input signal de-embedding.

1.3 Package Contents

- 1 x TPUH423L
- 2 x Mounting brackets & 4 x Screws
- 3 x 3-Pin phoenix connector
- 1 x Power adapters (12VDC, 2A)
- 4 x Plastic cushions
- 1 x User manual

Note: *Please confirm if the product and the accessories are all included, if not, please contact with the dealers.*

2. Product Appearance

2.1 Front Panel



Figure 2-1 Front Panel

No.	Name	Description
①	Power indicator	Illumine red when powered on.
②	HDMI 1	Illumine green when the HDMI 1 signal output normally.
③	HDMI 2	Illumine green when the HDMI 2 signal output normally.
④	ID PRESET	DIP switcher to assign the Unit ID (Range: 0~9/A~F).

2.2 Rear Panel

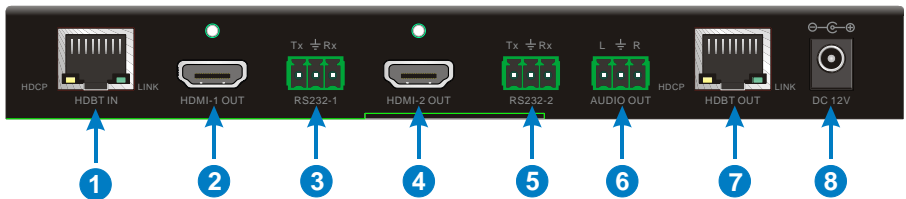


Figure 2-2 Rear Panel

No.	Name	Description
①	HDBT IN	<p>Connects the HDBT output port of Matrix Switcher or HDBaseT Transmitter.</p> <ul style="list-style-type: none"> ● HDCP indicator will turn yellow when the HDBaseT input signal is transmitted with HDCP. ● LINK indicator will turn green when the HDBaseT™ Repeater is connected with Matrix Switcher or Transceiver successfully over CAT5e/6/7.
②	HDMI-1 OUT	Connects with HDMI display.

③	RS232-1	3-Pin phoenix connector for bidirectional RS232 control, connects with control device (e.g. PC) or the third-party device (e.g. Projector) needed to be control.
④	HDMI-2 OUT	Connects with HDMI display.
⑤	RS232-2	3-Pin phoenix connector for bidirectional RS232 control, connects with control device (e.g. PC) or the third-party device (e.g. Projector) needed to be control.
⑥	AUDIO OUT	3-Pin phoenix connector for de-embedded analog audio output.
⑦	HDBT OUT	Connects the HDBT input port of HDBaseT Receiver or cascade another TPUH423L.
⑧	DC 12V	Connect with 12VDC, 2A power adaptor.

Note: Pictures shown on this manual are for reference only.

3. System Connection

3.1 Usage Precautions

- System should be installed in a clean environment and has a prop temperature and humidity.
- All of the power switches, plugs, sockets and power cords should be insulated and safety.
- All devices should be connected before power on.

3.2 System Diagram

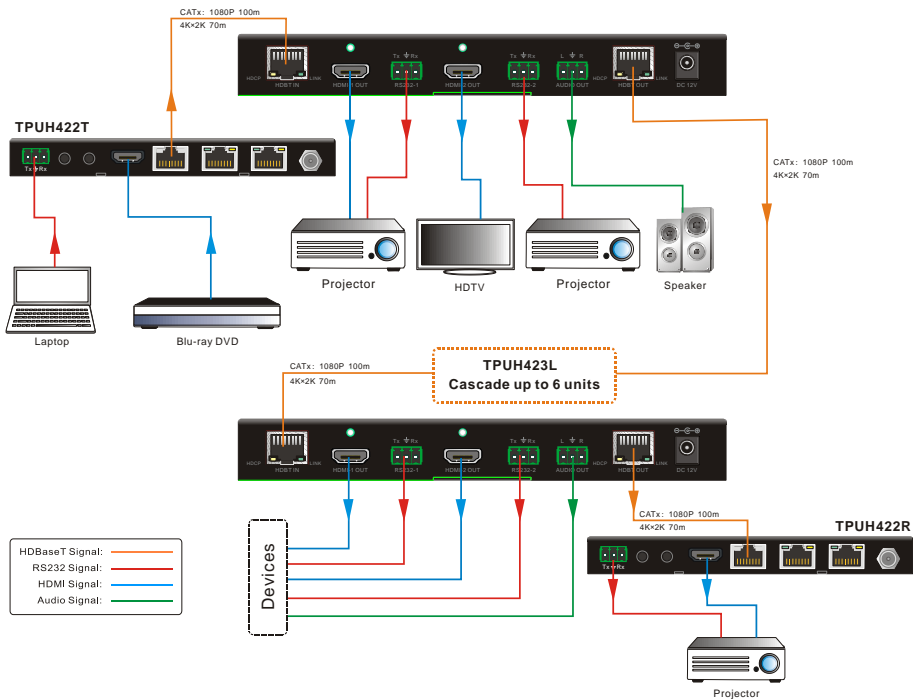


Figure 3-1 System Connection Diagram

3.3 Connection Procedure

- Step1.** Connect HDMI source (such as Blue-ray DVD/PC) to HDM input port of HDBaseT transmitter with HDMI cable.
- Step2.** Connect HDBT output port of HDBaseT Transmitter (such as TPUH422T) and HDBT input port of TPUH423L with CAT5e/6/7 cable.

- Step3.** Connect HDBT output port of TPUH423L and HDBT input port of HDBaseT Receiver (such as TPUH422T) or next TPUH423L with CAT5e/6/7 cable. With the daisy chain connection, user can connect with up to 6 repeaters for each source output.
- Step4.** Connect HDMI displayers (such as Projectors/HDTVs) to HDMI output ports of TPUH423Ls and TPUH422R HDBaseT Receiver with HDMI cables.
- Step5.** Connect audio player (such as speaker) to the audio output port of TPUH423L.
- Step6.** With RS232 control, connect the control PC to the RS232 port of TPUH422T HDBaseT Transmitter, and then connect the devices (such as projectors) which are needed to be controlled to RS232 ports of TPUH423Ls and TPUH422R HDBaseT Receiver based on the actual need.
- Step7.** Connect other devices you need to TPUH422T HDBaseT Transmitter, TPUH423Ls, and TPUH422R HDBaseT Receiver.
- Step8.** Make sure all devices are plugged into a working power source, and then to turn on for starting.



- System Diagram shown in this manual are for reference only, more specific schemes depend on real devices. For example, the TPUH422T HDBaseT Transmitter can be MUH88TP-N 4K HDBaseT Matrix Switcher.
- Connect HDBT ports via straight-thru CAT5e/6/7 cable with TIA/EIAT568B standard terminations at both ends.

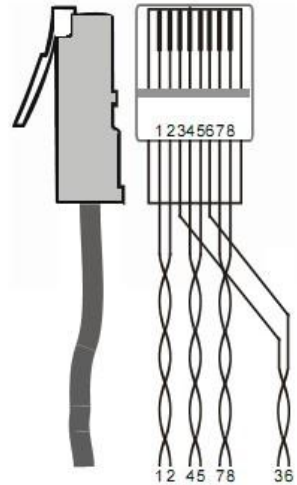
3.4 Application

TPUH423L has a good application in various occasions, such as computer realm, monitoring, big screen displaying, meeting room, education and bank & securities institution etc.

3.5 Twisted Pair Cable Connection

The twisted pair used in this extender must be a straight-through cable.

TIA/EIA T568A		TIA/EIA T568B	
Pin	Cable color	Pin	Cable color
1	green white	1	orange white
2	green	2	orange
3	orange white	3	green white
4	blue	4	blue
5	blue white	5	blue white
6	orange	6	green
7	brown white	7	brown white
8	brown	8	brown
1st Ground	4--5	1st Ground	4--5
2nd Ground	3--6	2nd Ground	1--2
3rd Group	1--2	3rd Group	3--6
4th Group	7--8	4th Group	7--8



Note: Cable connectors must be metal one, the shielded layer of cable must be connected to the connector's metal shell, to make a better transmission.

4. Operation

4.1 Unit ID setup

TPUH423Ls can be cascaded up to six in this system. Through the DIP switcher “**ID PRESET**” to set their ID for distinguishing. For example, the Unit ID of the first TPUH423L is set as 0, and then the second one is set as 1 and so on.

Note: The Unit ID of two or more TPUH423Ls can be set as same value for synchronous control.

4.2 RS232 Control

All devices (such as projectors) which are connected to RS232 ports of TPUH423Ls and HDBaseT Receiver can be controlled by sending RS232 commands via the control PC. There are three control modes: point-to-point, one-to-many and one-to-all RS232 control.

4.2.1 Installation/uninstallation of RS232 Control Software

- **Installation**

Copy the control software file to the control PC connected with HDBaseT Transmitter.

- **Uninstallation**

Delete all the control software files in corresponding file path.

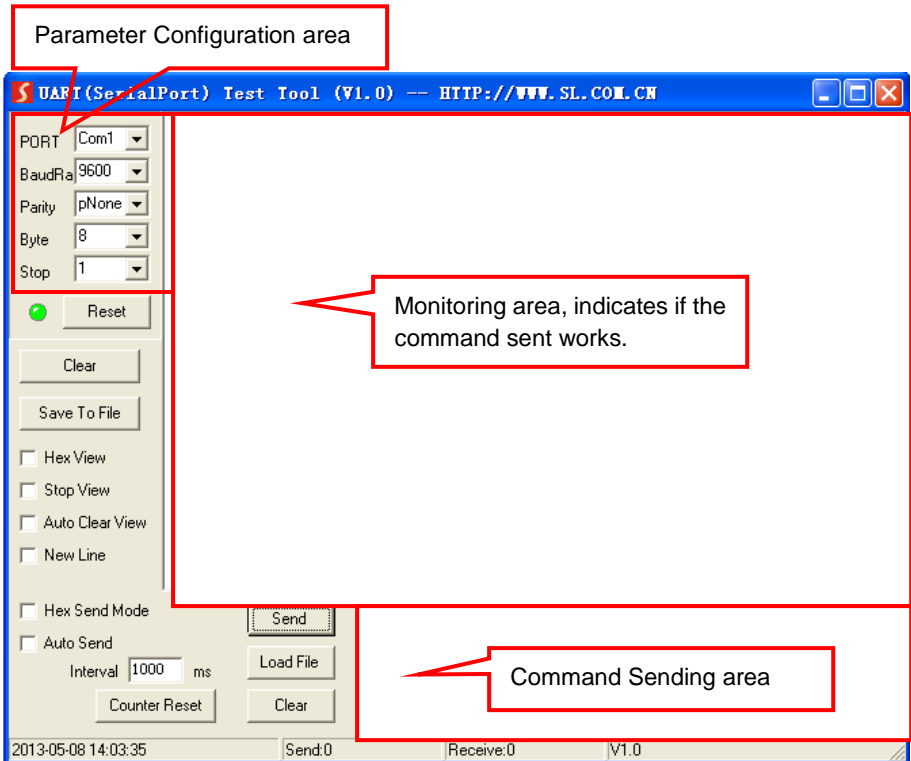
4.2.2 Basic Settings

Double-click the software icon to run RS232 Control Software.

Here we take the software **CommWatch.exe** as example. The icon is showed as below:



The interface of the control software is showed as below:

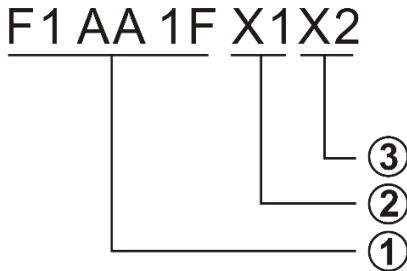


Please set the parameters of COM number, bound rate, data bit, stop bit and the parity bit correctly, and then tick the “Hex Send Mode”, you are able to send command in Command Sending Area.

- Baud rate: support 2400、4800、9600、19200、38400、57600、115200;
- Data bit: 8;
- Stop bit: 1;
- Parity bit: none.

4.2.3 RS232 Command Format

1. Firstly, send the below command in Command Sending Area:



- ① Fixed value.
- ② The Unit ID of the TPUH423L, X1=0~9/A~F
- ③ The RS232 port of TPUH423L, X2=1~3:
 - 1: “RS232-1” port
 - 2: “RS232-2” port
 - 3: Both “RS232-1” and “RS232-2” ports

Note: When the value of “X1X2” is FF, send the command “F1 AA 1F FF” to control all devices which are connected to RS232 ports of TPUH423Ls and HDBaseT Receiver at the same time.

RS232 Control Mode	Description
Point-to-Point	In this mode, control one of the devices which are connected to RS232 ports of TPUH423Ls. For example: F1 AA 1F 32 Send this command to control the device which is connected to the “RS232-2” port of the TPUH423L whose Unit ID is 3.
One-to-Many	In this mode, control several devices which are connected to RS232 ports of TPUH423Ls. For example: F1 AA 1F 01 E3 Send this command to control three devices: <ul style="list-style-type: none"> ● 01: The “01” represents the device which is connected to the “RS232-1” port of the TPUH423L whose Unit ID is 0. ● E3: The “E3” represents the two devices which are connected to both “RS232-1” and “RS232-2” ports of the TPUH423L whose Unit ID is E.
One-to-All	In this mode, control all devices which are connected to RS232 ports of TPUH423Ls and HDBaseT Receiver at the same time.

	For example: F1 AA 1F FF
--	------------------------------------

Note: When control the two devices which are connected to both “RS232-1” and “RS232-2” ports of the TPUH423L, it is normal that the feedback code may be garbled.

2. Secondly, send the specific control command data (Hexadecimal characters) in Command Sending Area.

The length of characters is unrestricted. For specific commands, please refer to the user manual of the devices which are needed to be control. For example, send “A5 A5 A5 5A 01 VV 02 0A 01 00 RR” to mute the devices.

4.3 EDID Management

An essential part of operation is the EDID table, which is transmitted to the source from the HDBaseT Transmitter input.

The TPUH423L features advanced built-in EDID management function, and it should follow the below rules:

1. When the “HDMI-1 OUT”, “HDMI-2 OUT” and “HDBT OUT” ports are connected with devices, the input source device will firstly read the EDID from the HDBT output device (such as HDTV) which is connected to the HDMI output port of HDBaseT Receiver. If disconnecting the HDBT output device, the EDID data don’t need to be read again. If changing the HDBT output device, the EDID data will be read again from the new device.
2. When the “HDMI-1 OUT”, “HDMI-2 OUT” ports are connected with devices, but the “HDBT OUT” port aren’t connected with any device, the input source device will firstly read the EDID from the HDMI-1 output device of the last repeater (such as HDTV). If disconnecting the HDMI-1 output device, the EDID data don’t need to be read again.

Note: The input source will re-read the EDID date according the above rules when the system is powered down and reset.

4.4 HDCP Management

The TPUH423L offers advanced HDCP management to allow greater compatibility with other devices. The output will always be encrypted or unencrypted, following the status of the source content. If the content is encrypted, the output of the HDBaseT receiver will be encrypted; if the content is unencrypted, the output of the HDBaseT receiver will

be unencrypted.

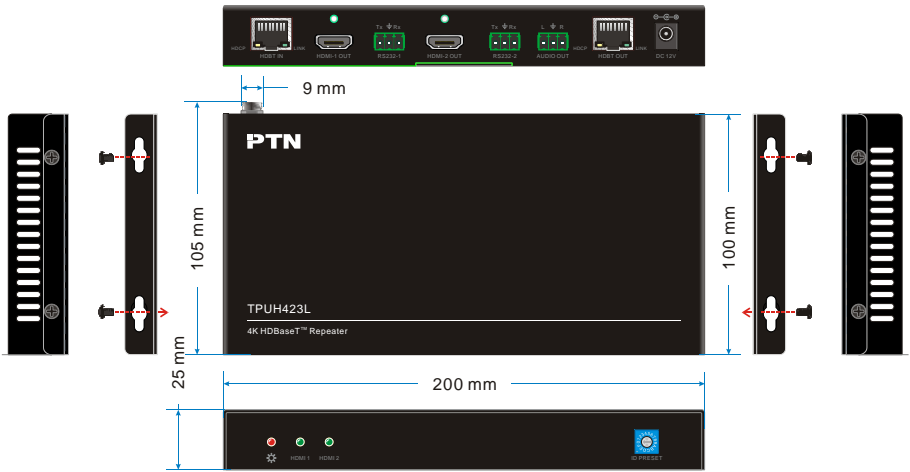
The TPUH423L HDCP2.2 compliant and backward compatible to the down-level version.

5. Specification

Input & Output	
Input Port	HDBT IN
Input Connector	One (1) RJ45 Receptacle
Input Video Signal	The max resolution is up to 4Kx2K/60Hz 4:2:0, compatible with HDCP2.2
Output Port	HDMI-1 OUT; HDMI-2-OUT; HDBT OUT; AUDIO OUT
Output Connector	Two (2) HDMI Type A Receptacle; One (1) RJ45 Receptacle; One (1) 3-Pin phoenix connector
Output Video Signal	The max resolution is up to 4Kx2K/60Hz 4:2:0, compatible with HDCP1.4
Embedded Audio Signal	Supports PCM/Dobly/DTS
Output Analog Audio Signal	Supports PCM
Analog Audio Frequency Response	20 Hz to 20 kHz, ± 3 dB
Transmission Mode	HDBaseT
Control Part	
RS232 Control Ports	RS232-1; RS232-2
RS232 Connector	Two (2) 3-Pin phoenix connector
Baud Rate	9600
General	
Power Supply	Input: 100VAC~240VAC, 50/60Hz Output: 12VDC, 2A
Maximum Power Consumption	14W
Work Temperature	-10 ~ +55°C
Humidity	10% ~ 90%
Dimension (W*H*D)	200mm x 25mm x 100mm
Net Weight	357g

Note: All nominal levels are at $\pm 10\%$.

6. Panel Drawing



7. Troubleshooting & Maintenance

Problems	Causes	Solutions
Output images in display show with ghost	Incorrect setting on the display	Check the display's setting
	A cable of bad quality	Try another high quality connection cable
No output image	No signal at the input / output end	Check with oscilloscope or multimeter if there is any signal at the input / output end.
	Fail or loose connection	Make sure the connection is good
Cannot control the device by control device (e.g. a PC) through RS232 port	Wrong RS232 communication parameters	Make sure the RS232 communication parameters are correct.
	The device has already been broken	Send it to authorized dealer for repairing.
Static becomes stronger when connecting the video connectors	Bad grounding	Check the grounding and make sure it is connected well.

If your problem persists after following the above troubleshooting steps, seek further help from authorized dealer or our technical support.

8. After-sales Service

If there appear some problems when running the device, please check and deal with the problems reference to this user manual. Any transport costs are borne by the users during the warranty.

1) Product Limited Warranty: It is warranted that the product will be free from defects in materials and workmanship for **three years**, which starts from the first day you buy this product (The purchase invoice shall prevail).

Proof of purchase in the form of a bill of sale or receipted invoice which is evidence that the unit is within the Warranty period must be presented to obtain warranty service.

2) What the warranty does not cover:

- Warranty expiration.
- Factory applied serial number has been altered or removed from the product.
- Damage, deterioration or malfunction caused by:
 - Normal wear and tear.
 - Use of supplies or parts not meeting our specifications.
 - No certificate or invoice as the proof of warranty.
 - The product model showed on the warranty card does not match with the model of the product for repairing or had been altered.
 - Damage caused by force majeure.
 - Servicing not authorized.
 - Any other causes which does not relate to a product defect.
- Delivery, installation or labor charges for installation or setup of the product.

3) Technical Support: Email to our after-sales department or make a call, please inform us the following information about your cases.

- Product version and name.
- Detailed failure situations.
- The formation of the cases.

Remarks: For any questions or problems, please try to get help from your local distributor, or email PTN at: support@PTN-electronics.com.



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