

User Manual



SP141TH2-4K

1x4 HDBaseT Splitter Kit



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1. Product Introduction

Thanks for choosing this 1x4 HDBaseT Splitter Kit! This device accepts a single HDMI input and splits it into one HDMI and four HDBaseT outputs. The splitter is designed with an IR loop out and loop in which are intended to cascade to additional units. It supports video resolutions up to 4K@60Hz 4:4:4 8bit and all HDMI audio formats. It can extend 1080p signals on each output to distance up to 229 feet (70 meters) and 4K signals to distance up to 131 feet (40 meters) over a single CATx Ethernet cable. It supports the Power over HDBaseT (PoC) feature, which allows the receivers to be powered from the splitter over the Ethernet cables. It supports bidirectional IR pass-through and IR, RS232 cascade control.

1.1 Features

- Support HDMI 2.0, video resolutions up to 4K@60Hz 4:4:4.
- Distribute one UHD/4K HDMI signal to four HDBaseT outputs and one loop HDMI output.
- Supports cascade connection, distribute video signal to multiple video displays.
- Maximum transmission distance is up to 40m for 4K, and 70m for 1080p.
- Supports video resolution down-scaling, 4K input can be automatically downgraded to 1080 output.
- Supports audio de-embedding.
- Each HDBaseT output supports IR pass-through.
- Support RS232 and IR cascade control.
- Support 24V PoC, the HDBaseT receiver can be powered by HDBaseT splitter.

1.2 Package List

HDBaseT Splitter	<ul style="list-style-type: none">• 1x SP141TH2-4K 1x4 HDBaseT Splitter• 2x Mounting Ears with 4 Screws• 4x Plastic Cushions• 1x RS232 Cable (3-pin to 3-pin, used for RS232 cascade)• 1x RS232 Cable (3-pin to DB9)• 1x 5-pin terminal block• 1x IR Cable (3.5mm to 3.5mm, used for IR cascade)• 4x IR Receivers• 1x IR Emitter• 1x Power Adaptor (24V DC 5A)
HDBaseT Receivers	<ul style="list-style-type: none">• 4x TPUH610S1R HDBaseT Receivers• 8x Mounting Ears with 16 Screws• 16x Plastic Cushions• 4 x 3-pin terminal blocks
	<ul style="list-style-type: none">• 1x User Manual

Note: Please contact your distributor immediately if any damage or defect in the components is found.

2. Technical Specification

2.1 HDBaseT Splitter

Video Input	
Input	(1) HDMI
Input Connector	(1) Female type A HDMI
HDMI Input Resolution	Up to 4K@60Hz 4:4:4 8bit
Video Output	
Output	(1) HDMI, (4) HDBT
Output Connector	(1) Female type A HDMI; (4) RJ45
HDMI Output Resolution	Up to 4K@60Hz 4:4:4
HDBT Output Resolution	Up to 4K@60Hz 4:4:4 (Signal has been compressed.)
SPDIF Audio Output	
Audio Output	(1) SPDIF
Audio Output Connector	(1) Toslink
Audio Format	LPCM 2ch, Dolby Digital 2ch, 5.1ch, 7.1ch, Dolby TureHD 7.1ch, DTS 2ch, 5.1ch
Output Level	$\pm 0.05\text{dBFS}$
Frequency Response	20Hz ~20kHz, $\pm 1\text{dB}$
THD+N	< 0.05%, 20Hz ~20kHz bandwidth, 1kHz sine at 0dBFS level (or max level)
SNR	> 90dB, 20Hz ~20kHz bandwidth
Crosstalk Isolation	> 70dB, 10kHz sine at 0dBFS level (or max level before clipping)
Noise	-90dB
Stereo Balanced L/R Audio Output	
Audio Output	(1) Stereo balanced L/R audio
Audio Output Connector	(1) 5-pin terminal block
Audio Format	PCM
Frequency Response	20Hz ~20kHz, $\pm 1\text{dB}$
Max output level	2.0Vrms $\pm 0.5\text{dB}$.
THD+N	< 0.05%, 20Hz ~20kHz bandwidth, 1kHz sine at 0dBFS level (or max level)
SNR	> 80dB, 20Hz ~20kHz bandwidth
Crosstalk Isolation	> 70 dB, 10kHz sine at 0dBFS level (or max level before clipping)
L-R Level Deviation	< 0.3 dB, 1kHz sine at 0dBFS level (or max level before clipping)
Output Load Capability	1kohm and higher (supports 10x paralleled 10kohm loads)
Noise	- 80dB

Control	
Control port	(1) EDID, (1) FIRMWARE, (1) ID PRESET, (1) IR ALL IN/LOOP IN, (1) IR OUT, (4) IR IN, (1) IR LOOP OUT, (1) RS232 IN, (1) RS232 OUT,
Control Connector	(1) 4-pin DIP switch, (1) Micro-USB, (1) DIP switch, (7) 3.5mm mini jacks, (2) 3-pin terminal blocks
General	
HDMI Standard	2.0
HDCP Version	2.2
Transmission Mode	HDBaseT
Transmission Distance	1080p ≤ 229 feet (70 meters), 4K ≤ 131 feet (40 meters)
Operation Temperature	-10 ~ +55°C
Storage Temperature	-25~ +70°C
Relative Humidity	10% ~ 90%
AC Adapter Input Power	100V~240V AC, 50/60Hz
Input Power	24V DC 5A
Power Consumption	47W (Max)
Dimension (W*H*D)	250mm x 44mm x 148mm
Net Weight	1.16kg

Note: SPDIF audio output does not support DTS-HD Master Audio and Dolby TrueHD format.

2.2 HDBaseT Receiver

Video	
Input	(1) HDBT
Input Connector	(1) RJ45
Input Resolution	Up to 4K@60Hz 4:2:0
Output	(1) HDMI
Output Connector	(1) Type-A female HDMI
Output Resolution	Up to 4K@60Hz 4:4:4 8bit HDR10
Audio	
Output	(1) Audio Breakout
Output Connector	(1) Toslink connector
Audio Format	Supports PCM, Dolby Digital, Dolby True-HD, DTS and DTS-HD
Frequency Response	20Hz - 20KHz, ±3dB
Max Output Level	2.0Vrms ± 0.5dB. 2V = 16dB headroom above -10dBV (316mV)

	nominal consumer line level signal
THD+N	< 0.05% (-80dB), 20Hz – 20KHz bandwidth, 1KHz sine at 0dBFS level (or max level)
SNR	> 85dB, 20Hz-20 kHz bandwidth
Crosstalk Isolation	> 70dB, 10KHz sine at 0dBFS level (or max level before clipping)
L-R Level Deviation	< 0.3dB, 1KHz sine at 0dBFS level (or max level before clipping)
Frequency Response Deviation	< ± 0.5 dB 20Hz - 20KHz
Output Load Capability	1K Ω and higher (Supports 10x paralleled 10K Ω loads)
Stereo Channel Separation	>70dB@1KHz
Control	
Control Part	(1) FW, (1) IR In, (1) IR Out, (1) RS232
Control Connector	(1) Micro-USB port, (2) 3.5mm jacks, (1) 3-pin terminal block
General	
Bandwidth	18Gbps
HDMI Standard	2.0
HDCP Version	2.2, 1.4 compliant
Bidirectional PoC	Supported
HDMI 2.0 Cable Length	4K@60Hz 4:4:4 ≤ 5 m, 4K@60Hz 4:2:0 ≤ 10 m, 1080p ≤ 15 m
Transmission Standard	HDBaseT
Transmission Distance	1080p@60Hz ≤ 230 feet (70 meters), 4K@60Hz ≤ 131 feet (40 meters)
Operation Temperature	-5~ +55 $^{\circ}$ C
Storage Temperature	-25 ~ +70 $^{\circ}$ C
Relative Humidity	10%-90%
Power Supply	Input:100V~240V AC; Output:24V DC 1.25A
Power Consumption	12W (Max)
Dimension (W*H*D)	140mm x 19.5mm x 84mm
Net Weight	290g

Note: Please adopt quality CAT Ethernet cable compliant with CAT6e or higher standard for reliable transmission.

2.3 Video Resolution Down-scaling

The product supports video resolution down-scaling, the 4K input can be automatically degraded to 1080p output for compatibility with 1080p display, shown in the below chart.

HDMI Output:

#	Input			Output	
	Resolution	Refresh	Color Space	Downscale	1080p Specs
1	3840x2160	60	4:4:4	Support	1080p@60Hz 4:4:4
2	3840x2160	30	4:4:4	Support	1080p@30Hz 4:4:4
3	3840x2160	24	4:4:4	Support	1080p@24Hz 4:4:4
4	3840x2160	60	4:2:0	Support	1080p@60Hz 4:4:4
5	3840x2160	60	4:2:2	Support	1080p@60Hz 4:4:4
6	3840x2160	30	4:2:2	Support	1080p@30Hz 4:4:4
7	3840x2160	24	4:2:2	Support	1080p@24Hz 4:4:4
8	3840x2160	60	RGB	Support	1080p@60Hz RGB
9	3840x2160	30	RGB	Support	1080p@30Hz RGB
10	3840x2160	24	RGB	Support	1080p@24Hz RGB

HDBT Output:

#	Input			Output	
	Resolution	Refresh	Color Space	Downscale	1080p Specs
1	3840x2160	60	4:4:4	Support	1080p@60Hz 4:4:4
2	3840x2160	30	4:4:4	Support	1080p@30Hz 4:4:4
3	3840x2160	24	4:4:4	Support	1080p@24Hz 4:4:4
4	3840x2160	60	4:2:0	Support	1080p@60Hz 4:4:4
5	3840x2160	60	4:2:2	Support	1080p@60Hz 4:4:4
6	3840x2160	30	4:2:2	Not Support	N/A
7	3840x2160	24	4:2:2	Not Support	N/A
8	3840x2160	60	RGB	Support	1080p@60Hz 4:4:4
9	3840x2160	30	RGB	Support	1080p@30Hz RGB
10	3840x2160	24	RGB	Support	1080p@24Hz RGB

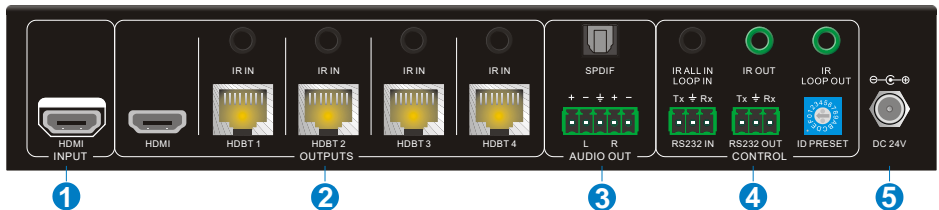
3. Panel Description

3.1 Splitter Front Panel



1. POWER LED: Illuminates red when power is applied.
2. INPUT LED: Illuminates green when there is HDMI source input.
3. OUTPUT LEDs: The HDMI LED illuminates green when there is HDMI output. The HDBT 1~3 LEDs illuminate green when there is a valid HDBaseT link between the splitter and the receiver.
4. 4-pin DIP switch for EDID setting and HDCP mode selection.
5. FIRMWARE: Micro-USB port for firmware upgrade.

3.2 Splitter Rear Panel



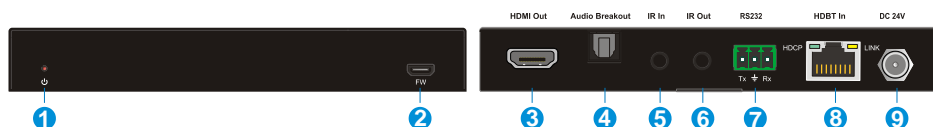
1. HDMI INPUT: Connects to HDMI source device.
2. OUTPUTS:
 - HDMI: Connects to local HDMI display device.
 - HDBT 1~4: Connect to four HDBaseT receivers.
 - IR IN: Connect to four IR receivers to control far-end third-party devices by IR.
3. AUDIO OUT:
 - Toslink audio output for audio de-embedding from HDMI output.
 - Balanced L/R audio output for audio de-embedding from HDMI output.

4. CONTROL:

- IR ALL IN/LOOP IN: Connects to IR receiver to control far-end display device, or it can be connected to IR LOOP OUT of previous splitter.
- IR OUT: Connects to IR emitter to control the local source device by IR.
- IR LOOP OUT: Connects to IR ALL IN port of next splitter.
- RS232 IN: Connects to control device (e.g. PC) to control the splitter or far-end third-party devices by RS232, or it can be connected to the RS232 OUT port of previous splitter.
- RS232 OUT: Connects to the RS232 IN port of next splitter.
- ID PRESET: Assigns a unique ID to each splitter when cascading multiple splitters. There are sixteen ID (0~9, A~F) can be set by using a small, flathead screwdriver. The new ID will take effect after device reboot.

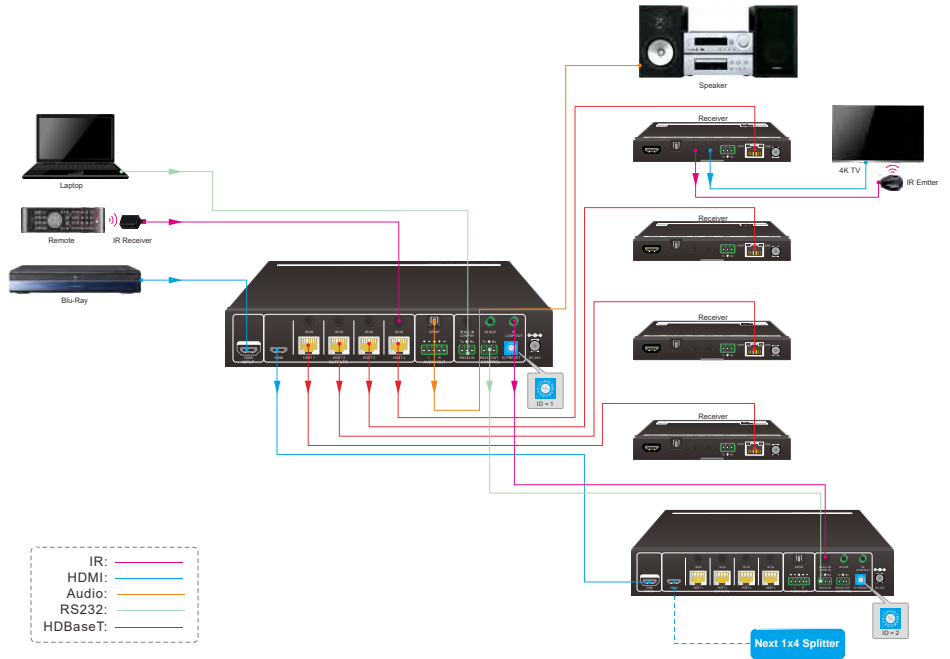
5. DC 24V: DC connector for the power adapter connection.

3.3 HDBaseT Receiver Panel



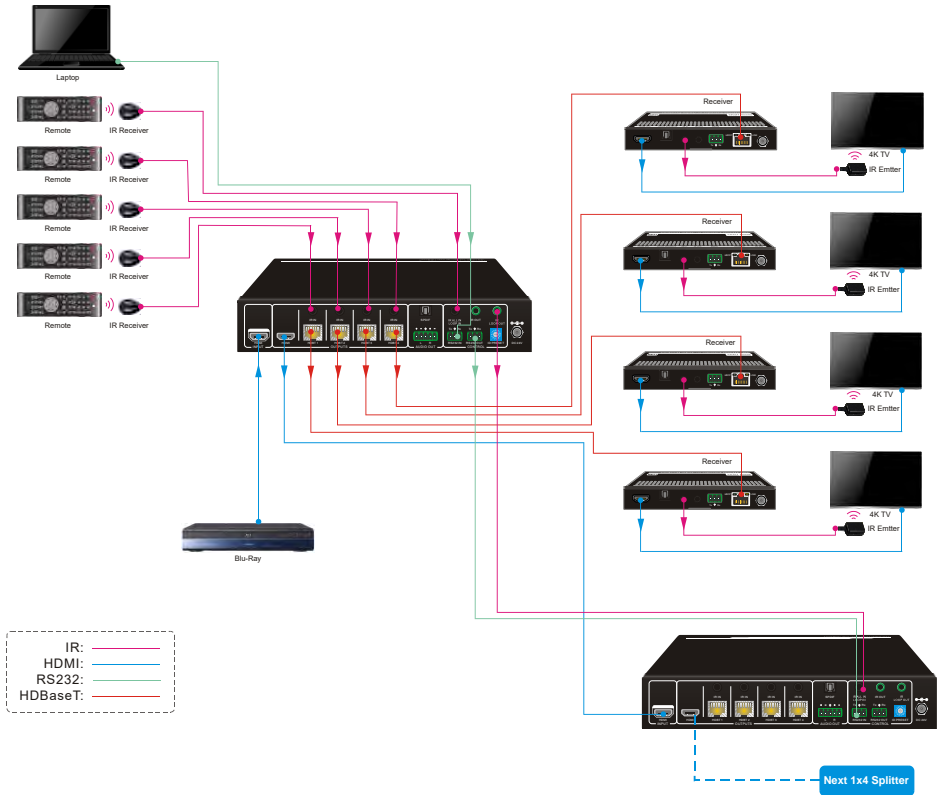
1. Power LED: Illuminates red when power is applied.
2. FW: Micro-USB port for firmware upgrade.
3. HDMI Out: Connects to HDMI display (e.g.TV).
4. Audio Breakout: Connects to speaker or amplifier for HDMI source audio de-embedding.
5. IR In: Connects to the IR receiver to control source device at splitter end.
6. IR Out: Connects to the IR emitter to control the display device at receiver end.
7. RS232: Connects to the RS232 control device (e.g. PC) or a third-party device to be controlled.
8. HDBT In: Connects to the HDBT output port of transmitter by CATx Ethernet cable. The LINK LED illuminates orange when there is a valid HDBaseT link between the transmitter and the receiver. The HDCP LED illuminates green when the video contains HDCP content.
9. DC 24V: DC connector for the power adapter connection.

4. System Connection



Cascade Connection:

The splitter supports cascade connection to distribute video signal to multiple video displays. Use the following connection diagram as a guide for cascading multiple units. Note that each unit must have a unique ID if using RS232 control.

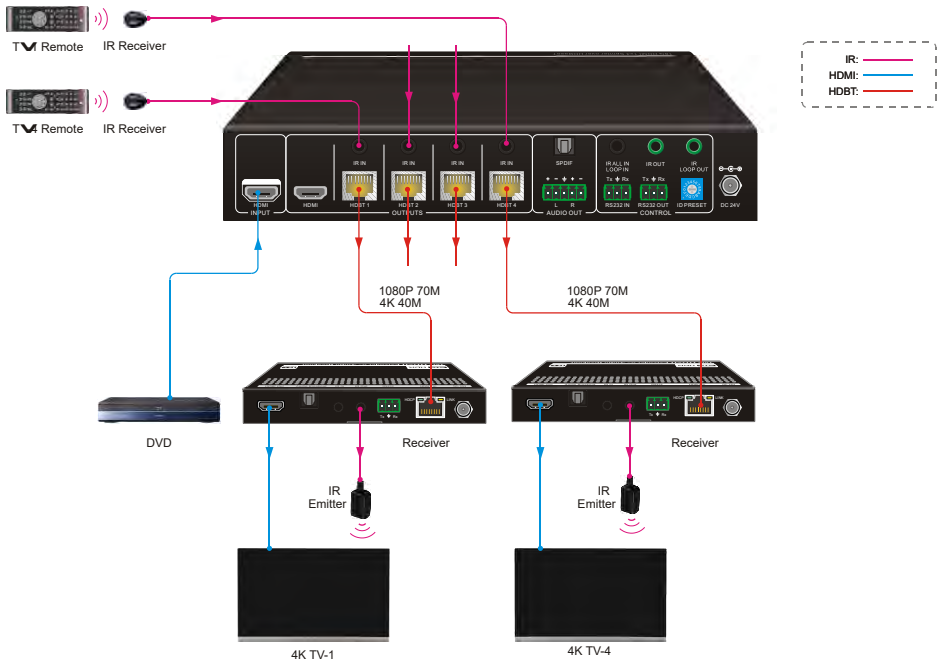


5. IR Control

The IR receivers and emitters can be connected to the system to allow for IR control of remote devices. The bidirectional IR feature provides the two-way control either for the source or display device(s). Use the following sample connection diagrams to connect for IR remote control.

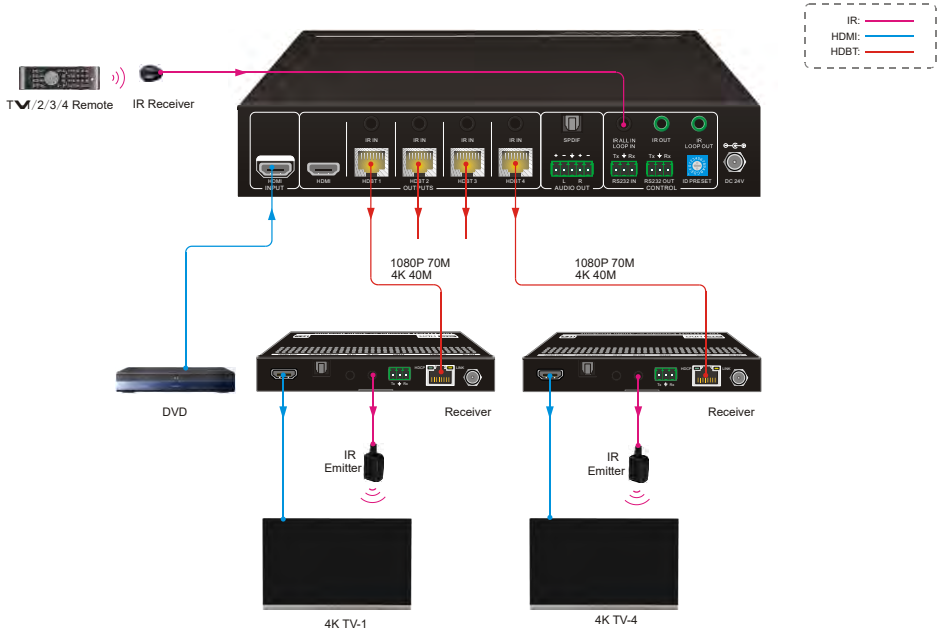
5.1 Controlling the Display Device by IR IN

The four **IR IN** ports of the splitter can receive IR signals from remotes to send to control displays. Connect four IR receiver to **IR IN** ports of the splitter, and then connect four IR emitters to **IR OUT** ports on HDBaseT receivers.



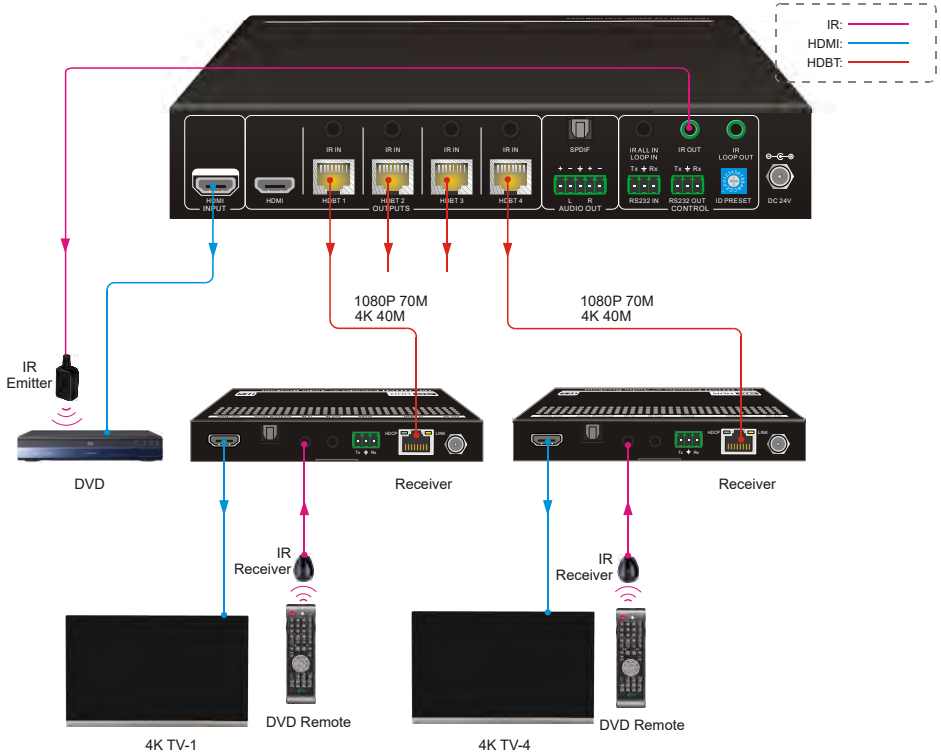
5.2 Controlling the Display Device by IR ALL IN

The **IR ALL IN** port of the splitter can receive all IR signals from remotes to send to control displays. Connect an IR receiver to **IR ALL IN** port of the splitter, and then connect four IR emitters to **IR OUT** port on HDBaseT receivers.



5.3 Controlling the Source Device

The **IR OUT** port of the splitter can send all IR signals to control source device. Connect four IR receivers to **IR IN** ports on HDBaseT receivers, and then connect an IR emitter to **IR OUT** port of the splitter.



6. RS232 Control

The splitter and compatible receivers features RS232 ports to transmit RS232 signals from computer to control far-end third-party devices by using 3-pin to DB9 cable and a RS232 control software, such as **docklight**. After installing the RS232 control software, please set the parameters of COM number, bound rate, data bit, stop bit and the parity bit correctly. Compatible receivers must be able to communicate at 2400, 4800, 9600, 19200, 38400, 57600, or 115200 baud. The splitter requires the following communication protocol parameters:

Baud rate: 9600 (default)

Data bit: 8

Stop bit: 1

Parity bit: none

RS232 Commands

The end mark of below commands is "<CR><LF>".

Command	Function	Command Example and Feedback
#param1_GET_FIRMWARE_VERSION	Get the firmware version. param1=0~15. The splitter ID 0~9, A~F. param1=ALL. All splitters.	#5_GET_FIRMWARE_VERSION
		@5_V1.0.0
#param1_FACTORY_RESET	Restore to factory Default setting. param1=0~15. The splitter ID 0~9, A~F. param1=ALL. All splitters.	#5_FACTORY_RESET
		@5_FACTORY_RESET
#param1_SET_RS232_BAUD param2	Set the baud rate of splitter. param1=0~15. The splitter ID 0~9, A~F. param1=ALL. All splitters.param1=ALL. param2=0~4. Baud rate. 0=9600 1=19200 2=38400 3=57600 4=115200	#5_SET_RS232_BAUD 0
		@5_RS232_BAUD 9600
#param1_GET_RS232_BAUD	Get the baud rate of splitter. param1=0~15. The splitter ID 0~9, A~F. param1=ALL. All splitters.	#5_GET_RS232_BAUD
		@5_RS232_BAUD 9600
#param1_GET_STATE	Get system status.	#5_GET_STATE

Command	Function	Command Example and Feedback
	param1=0~15. The splitter ID 0~9, A~F. param1=ALL. All splitters.	@ID:5 @5_V1.x.x @5_RS232_BAUD xxx @5_HDBT_PoC_x_ON/OFF F @5_SPDIF_ON/OFF @5_I2S_ON/OFF @5_EDID:xxx @5_HDCP:xxx
#param1_GET_DIP	Get EDID DIP switch status. param1=0~15. The splitter ID 0~9, A~F. param1=ALL. All splitters.	#5_GET_DIP
		@5_EDID:xxx @5_HDCP:xxx
#param1_SET_HDBT_PoC param2 param3	Turn on/off PoC of HDBT output. param1=0~15. The splitter ID 0~9, A~F. param1=ALL. All splitters. param2=1~4. HDBT output 1~4. param2=0. All HDBT outputs. Param3=ON/OFF. PoC ON/OFF.	#5_SET_HDBT_PoC 1 ON
		@5_HDBT_PoC_1_ON
#param1_GET_HDBT_PoC	Get PoC on-off status.	#5_GET_HDBT_PoC
		@5_HDBT_PoC_1_ON
#param1_SET_SPDIF param2	Turn on/off SPDIF audio output. param1=0~15. The splitter ID 0~9, A~F. param1=ALL. All splitters. param2=ON/OFF.	#5_SET_SPDIF ON
		@5_SPDIF_ON
#param1_GET_SPDIF	Get the on-off status of SPDIF audio output. param1=0~15. The splitter ID 0~9, A~F. param1=ALL. All splitters.	#5_GET_SPDIF
		@5_SPDIF_ON
#param1_SET_I2S param2	Turn on/off balanced audio (L/R) output. param1=0~15. The splitter ID 0~9, A~F. param1=ALL. All splitters. param2=ON/OFF.	#5_SET_I2S ON
		@5_I2S_ON
#param1_GET_I2S	Get the on-off status of balanced audio (L/R) output. param1=0~15. The splitter ID 0~9, A~F. param1=ALL. All splitters.	#5_GET_I2S
		@5_I2S_ON

The following commands do not require end mark.

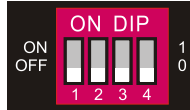
Command	Function	Command Example and Feedback
#param1_SEND_A_param2_param3:param4	Send ASCII command to control the far-end third-party device which is connected to the RS232 port of HDBaseT receiver. param1=0~15. The splitter ID 0~9, A~F. param1=ALL. All splitters. param2=1~4. HDBT output 1~4. param2=0. All HDBT outputs. param3=0~4. Baud rate. 0=9600 1=19200, 2=38400 3=57600 4=115200 param4=ASCII command.	#5_SET_A_1_0:ABC1234567 ...
#param1_SET_H_param2_param3:param4	Send HEX command to control the far-end third-party device which is connected to the RS232 port of HDBaseT receiver. param1=0~15. The splitter ID 0~9, A~F. param1=ALL. All splitters. param2=1~4. HDBT output 1~4. param2=0. All HDBT outputs. param3=0~4. Baud rate. 0=9600 1=19200, 2=38400 3=57600 4=115200 param4=HEX command.	#5_SET_H_1_0:11 22 33 44 55 ...

7. DIP Switch Operation

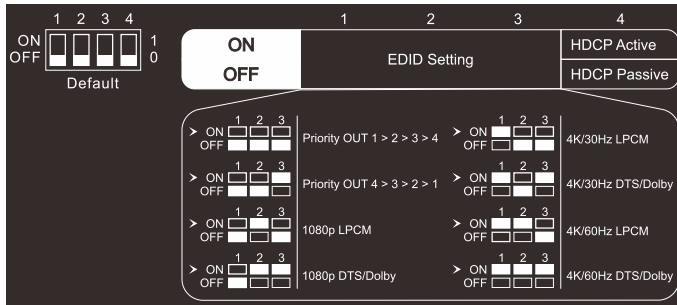
7.1 EDID Management

The DIP switch on the front panel can be used to set the EDID to a fixed value to ensure the compatibility in video resolution.

The switch represents “0” when in the lower (**OFF**) position, and it represents “1” while putting the switch in the upper (**ON**) position.



Switch 1~3 are used for EDID setting. The DIP switch status and its corresponding setting are shown at the back of the product.



Switch Status	EDID
000	Obtains the EDID from the first detected display device which is connected to HDBaseT receiver starting at HDBT output 1>2>3>4 (Default).
001	Obtains the EDID from the first detected display device which is connected to HDBaseT receiver starting at HDBT output 4>3>2>1.
010	1080p LPCM
011	1080p DTS/Dolby
100	3840x2160@30Hz HDR LPCM
101	3840x2160@30Hz HDR DTS/Dolby
110	3840x2160@60Hz HDR LPCM
111	3840x2160@60Hz HDR DTS/Dolby

7.2 HDCP Mode

Put switch 4 on “**ON**” position to select HDCP Active mode, or to “**OFF**” for HDCP Passive mode.

Switch Status	Mode	HDCP
OFF (0)	Passive (Default)	Automatically follows the HDCP version of source device.
ON (1)	Active	<ul style="list-style-type: none"> ● If the input video has HDCP content, the HDCP version of HDMI output is HDCP 1.4 for broader video solution. ● If the input video has no HDCP content, the HDMI output has no HDCP either.

8. Firmware Upgrade

Please follow the below steps to upgrade firmware by the Micro-USB port:

- 1) Prepare the latest upgrade file (.bin) and rename it as “FW_MERG.bin” on PC.
- 2) Power off the splitter and connect the Micro-USB (FIRMWARE) port of splitter to the PC with USB cable.
- 3) Power on the splitter, and then the PC will automatically detect a U-disk named of “BOOTDISK”.
- 4) Double-click to open the U-disk, a file named of “READY.TXT” will be showed.
- 5) Directly copy the latest upgrade file (.bin) to the “BOOTDISK” U-disk.
- 6) Reopen the U-disk to check whether there is a filename “SUCCESS.TXT”, if yes, the firmware was updated successfully, otherwise, the firmware updating is fail, the name of upgrade file (.bin) should be confirmed again, and then follow the above steps to update again.
- 7) Remove the USB cable and reboot the splitter after firmware upgrade.