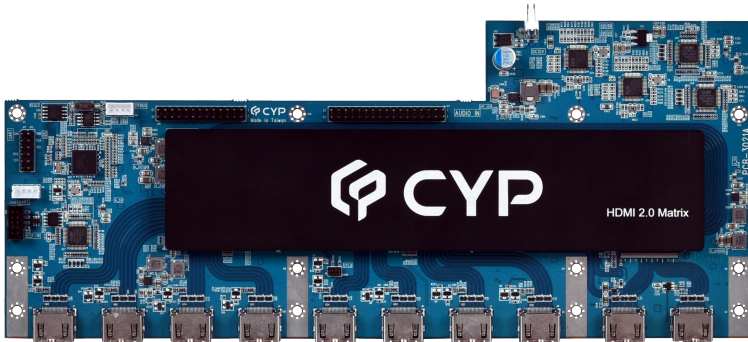




CPLUS-V8H2H

UHD+ 8x2 HDMI Matrix Module with eARC



Operation Manual

HDMI[®]
HIGH-DEFINITION MULTIMEDIA INTERFACE

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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	2020/01/02	Preliminary release



CONTENTS

1. Introduction	1
2. Applications	1
3. Package Contents	1
4. System Requirements	2
5. Features	2
6. Operation Controls and Functions	3
6.1 I/O Ports & Connectors.....	3
6.2 Block Diagram	4
6.3 Connector Pinouts	5
6.4 API.....	7
6.4.1 Software Parameters.....	7
6.4.2 System API.....	8
6.4.3 Routing API	11
6.4.4 EDID API	14
6.4.5 Audio Insertion API	16
6.4.6 Audio Extraction API.....	17
6.4.7 ARC API	19
7. Connection Diagram	20
8. Specifications	21
8.1 Technical Specifications	21
8.2 Video Specifications	22
8.3 Audio Specifications	24
8.3.1 Digital Audio	24
8.4 Cable Specifications	25
9. Acronyms	26



1. INTRODUCTION

This UHD* 8×2 HDMI Matrix Module with eARC has been developed to comply with the advanced HDMI 2.1 and HDCP 2.2 standards with support for eARC. Eight HDMI inputs may be routed to two HDMI outputs providing flexible configurations in order to fit different scenarios. The HDMI inputs and outputs support HDMI signals up to 18Gbps including HDR and 12-bit color capability. Beyond the 18Gbps multi-channel video routing this module also features audio breakaway functionality (audio insertion and extraction) which can be a valuable addition to any AV product, such as amplifiers, speakers, sound bars, home theater systems, etc. The audio signal extraction and insertion is handled via standard I²S. Many audio formats are supported, including LPCM up to 8 channels as well as standard bitstream formats. This module also handles EDID management.

This module offers AV designers and manufacturers the ability to improve their existing products by adding advanced features in a cost and time effective manner. Using this module, existing or under-design products can be easily upgraded to support HDMI interfaces or a single HDMI interface can be expanded to multiple interfaces. This module's dimensions and connections are optimized for easy integration.

This module also features an API source code to assist in development for controlling the host microprocessor. All functions, including video routing, audio breakaway, EDID management pass-through and HDCP handing will be managed by this embedded module.

2. APPLICATIONS

- Embedded module for inclusion inside of AV Receivers, Event Amplifiers, and Sound Bars.

3. PACKAGE CONTENTS

- 1× UHD* 8×2 HDMI Matrix Module with eARC
- 1× Demo Board (Optional)
- 1× Operation Manual

4. SYSTEM REQUIREMENTS

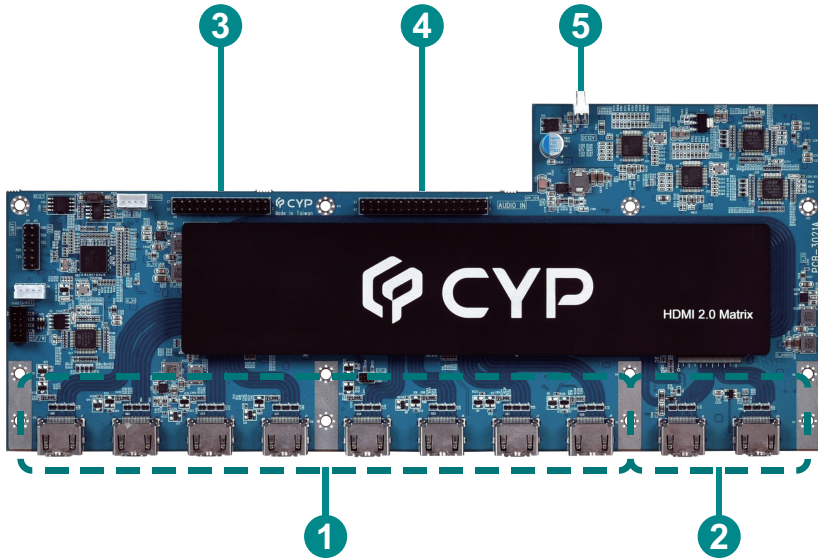
- HDMI source equipment such as a media players, video game consoles, or set-top boxes.
- HDMI receiving equipment such as HDTVs, monitors or audio amplifiers.
- The use of Premium High Speed HDMI cables is highly recommended.
- Must be integrated with a main audio board supporting audio insertion and extraction for full functionality.

5. FEATURES

- Existing audio products can be upgraded to support advanced HDMI and HDCP protocols in an easy way.
- Fully self-contained support for the HDMI and HDCP standards allowing you to focus on the development of audio processing hardware.
- Compact embedded module design for OEM/ODM integration within customized devices with HDMI interfaces, especially ideal for audio devices such as sound bars and amplifiers.
- HDMI 2.1 and DVI 1.0 compliant.
- HDCP 1.x and 2.2 compliant.
- HDMI inputs and outputs support up to 4K@60Hz (8-bit, 4:4:4) video.
- Supports Deep Color input and output up to 12-bit.
- Supports 10-bit and 12-bit HDR.
- Supports EDID management and pass-through.
- Supports audio insertion via I²S (up to 2 LPCM channels) or S/PDIF.
- Supports audio extraction via I²S (up to 8 LPCM channels) or S/PDIF.
- HDMI bypass supports all standard audio formats, including up to 8 channel LPCM, bitstream, and HD bitstream.

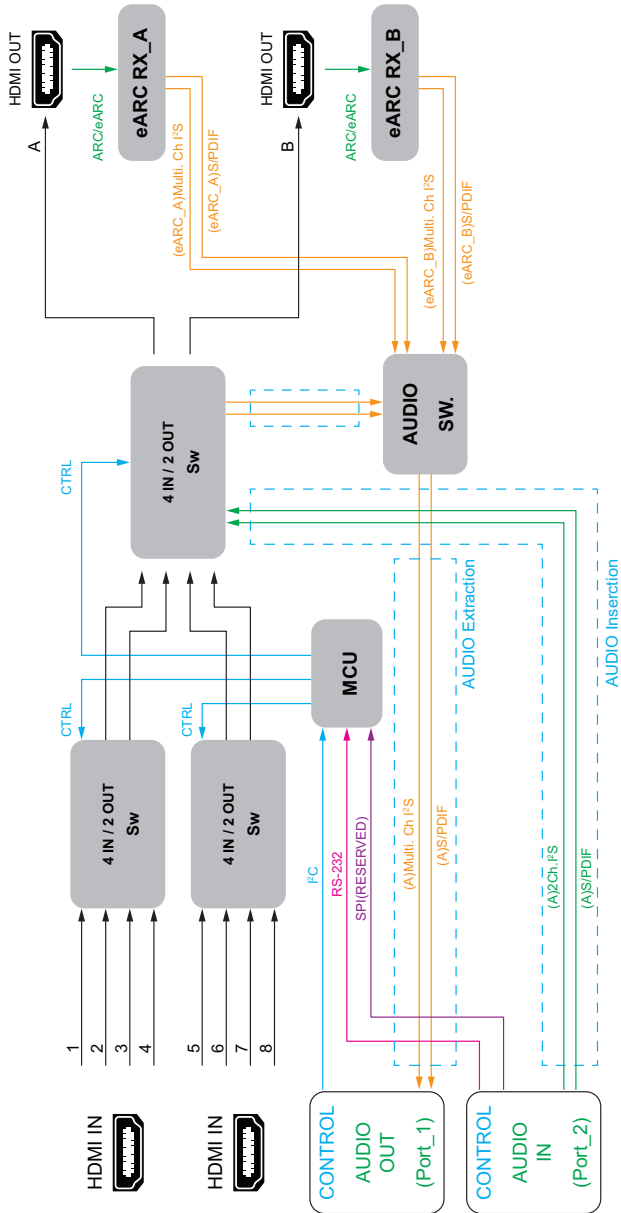
6. OPERATION CONTROLS AND FUNCTIONS

6.1 I/O Ports & Connectors

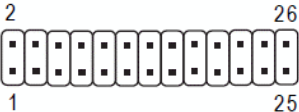


- 1 HDMI IN Ports:** Connect to HDMI source equipment such as media players, game consoles or set-top boxes.
- 2 HDMI OUT Ports:** Connect to HDMI TVs, monitors, or amplifiers for digital video and audio output.
- 3 AUDIO OUT 26-pin Header (J15):** Connect directly to your main board to receive extracted audio signals via the I²S and S/PDIF pins. Control over the module is also provided via the I²C pin.
- 4 AUDIO IN 34-pin Header (J17):** Connect directly to your main board to send audio signals for embedding via the I²S and S/PDIF pins.
- 5 POWER 2-pin Header (J20):** Connect a 12V DC power source to the dual pin header to power the module.

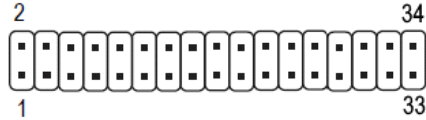
6.2 Block Diagram



6.3 Connector Pinouts

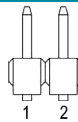
AUDIO OUT 26-PIN HEADER (J15)		
		
Pin	Designation	Usage Description
4	SW_I2S_MCK_A	I ² S Output 1
6	SW_I2S_SCK_A	
8	SW_I2S_WS_A	
10	SW_I2S_SD0_A	
11	SW_I2S_SD1_A	
12	SW_I2S_SD2_A	
13	SW_I2S_SD3_A	
15	SW_SPDIF_A	S/PDIF Output 1
17	I2C_SDA1	Host Control Slave
18	I2C_SCL1	
21	nHDMI_RESET	Module Board Reset
22	nHOST_HDMI_OUTA_INT	
25	nHOST_HDMI_OUTA_MUTE	

AUDIO IN 34-PIN HEADER (J17)



Pin	Designation	Usage Description
6	I2S_IN_BCLK_A	I ² S Input 1
8	I2S_IN_LRCK_A	
10	I2S_IN_SD0_A	
16	SPDIF_IN_A	S/PDIF Input 1
18	nHDMI_IN_MUTE	
19	HDMI_READY	Module Board Ready
26	U1RXD	UART Debug Message
27	U1TXD	
28	nHDMI_WAKE_UP	
30	SSP1_MISO	
31	SSP1_MOSI	
32	SSP1_SSEL1	
33	SSP1_SCK	

POWER 2-PIN HEADER (J20)



Pin	Designation	Usage Description
1	12V	+12V DC Power
2	GND	Ground

6.4 API

The CPLUS-V8H2H module's API source code assists in development for controlling the host microprocessor. All functions, including video routing, audio breakaway, EDID management & pass-through, and HDCP handing are managed by this embedded module.

Note: This manual provides only a part of the API to serve as an example. To receive the full version, please contact your official sales representative.

6.4.1 Software Parameters

- BYTE is an unsigned char.
- OCSI is the specified output's currently selected input. (For example: OCSI_1 is output 1's current selected input)

Some API functions will use the most recent OCSI setting to do signal processing.

Note: CPLUS_V8H2H_API.h defines all parameters used by the API functions. Please don't modify it.

USAGE EXAMPLES

```
sCPLUS_V8H2H_Set_HDMI_Route (eHDMI_Output1, eHDMI_Input2);
```

[In this case OCSI_1 is HDMI input 2]

```
sCPLUS_V8H2H_Set_HDMI_Route (eHDMI_Output2, eHDMI_Input7);
```

[In this case OCSI_2 is HDMI input 7]

6.4.2 System API

BYTE sCPLUS_V8H2H_Get_OCSI_Sync_Status(BYTE bOCSI)			
INPUT			
Parameters		Value	Description
BYTE	bOCSI	eCPLUS_V8H2H_OCSI_1	Select OCSI 1
		eCPLUS_V8H2H_OCSI_2	Select OCSI 2
RETURN			
Format	Value		Description
BYTE	eSignal_NotReady		OCSI has no signal or the signal is not ready
	eSignal_Ready		OCSI has a signal and is ready

BYTE sCPLUS_V8H2H_Get_Output_Sink_Status(BYTE bOutput)			
INPUT			
Parameters		Value	Description
BYTE	bOutput	eCPLUS_V8H2H_HDMI_Output1	Select Output 1
		eCPLUS_V8H2H_HDMI_Output2	Select Output 2
RETURN			
Format	Value		Description
BYTE	eSink_NotReady		Sink has no connection or is not ready
	eSink_Ready		Sink has a connection and is ready

BYTE sCPLUS_V8H2H_Get_OCSI_Resolution(BYTE bOCSI, BYTE* ptResolution)			
INPUT			
Parameters		Value	Description
BYTE	bOCSI	eCPLUS_V8H2H_OCSI_1	Select OCSI 1
		eCPLUS_V8H2H_OCSI_2	Select OCSI 2
BYTE	ptResolution		Return resolution string
RETURN			
Format	Value		Description
BYTE	0~16		String length (0=OCSI signal is not ready)
Example:			
If OCSI_1's input is 1080P then:			
bLenght = sCPLUS_V8H2H_Get_OCSI_Resolution(eCPLUS_V8H2H_OCSI_1, ptResolution);			
Will return:			
bLenght = 12, ptResolution = "1920x1080@60"			
If OCSI_1's input has no signal or the signal is not ready then it will return:			
bLength = 0, ptResolution = null			

BYTE sCPLUS_V8H2H_Get_Input_HDCP_Version(BYTE bInput)

INPUT			
Parameters	Value	Description	
BYTE	bInput	eCPLUS_V8H2H_HDMI_Input1	Select Input 1
		eCPLUS_V8H2H_HDMI_Input2	Select Input 2
		eCPLUS_V8H2H_HDMI_Input3	Select Input 3
		eCPLUS_V8H2H_HDMI_Input4	Select Input 4
		eCPLUS_V8H2H_HDMI_Input5	Select Input 5
		eCPLUS_V8H2H_HDMI_Input6	Select Input 6
		eCPLUS_V8H2H_HDMI_Input7	Select Input 7
		eCPLUS_V8H2H_HDMI_Input8	Select Input 8
RETURN			
Format	Value	Description	
BYTE	eCPLUS_V8H2H_HDCP_Unknown	Input has no connection or is not ready	
	eCPLUS_V8H2H_HDCP_Off	Input source has no HDCP	
	eCPLUS_V8H2H_HDCP_14	Input source uses HDCP 1.4	
	eCPLUS_V8H2H_HDCP_22	Input source uses HDCP 2.2	

BYTE sCPLUS_V8H2H_Get_OCSI_Color_Space_Status(BYTE bOCSI)

INPUT			
Parameters	Value	Description	
BYTE	bOCSI	eCPLUS_V8H2H_OCSI_1	Select OCSI 1
		eCPLUS_V8H2H_OCSI_2	Select OCSI 2
RETURN			
Format	Value	Description	
BYTE	eCPLUS_V8H2H_Signal_NotReady	OCSI has no signal or the signal is not ready	
	eCPLUS_V8H2H_Color_RGB	OCSI Color Space is RGB	
	eCPLUS_V8H2H_Color_YCbCr444	OCSI Color Space is YCbCr(4:4:4)	
	eCPLUS_V8H2H_Color_YCbCr422	OCSI Color Space is YCbCr(4:2:2)	
	eCPLUS_V8H2H_Color_YCbCr420	OCSI Color Space is YCbCr(4:2:0)	

BYTE sCPLUS_V8H2H_Get_OCSI_Color_Space_Status(BYTE bOCSI)			
INPUT			
Parameters		Value	Description
BYTE	bOCSI	eCPLUS_V8H2H_OCSI_1	Select OCSI 1
		eCPLUS_V8H2H_OCSI_2	Select OCSI 2
RETURN			
Format	Value		Description
BYTE	eCPLUS_V8H2H_Signal_NotReady		OCSI has no signal or the signal is not ready
	eCPLUS_V8H2H_Depth_8bpc		OCSI Color Depth is 8bpc
	eCPLUS_V8H2H_Depth_10bpc		OCSI Color Depth is 10bpc
	eCPLUS_V8H2H_Depth_12bpc		OCSI Color Depth is 12bpc
	eCPLUS_V8H2H_Depth_16bpc		OCSI Color Depth is 16bpc

6.4.3 Routing API

BYTE sCPLUS_V8H2H_Set_HDMI_Route(BYTE bOutput, BYTE bInput)			
INPUT			
Parameters		Value	Description
BYTE	bOutput	eCPLUS_V8H2H_HDMI_Output1	Select Output 1
		eCPLUS_V8H2H_HDMI_Output2	Select Output 2
BYTE	bInput	eCPLUS_V8H2H_HDMI_Input_None	Select No Input
		eCPLUS_V8H2H_HDMI_Input1	Select Input 1
		eCPLUS_V8H2H_HDMI_Input2	Select Input 2
		eCPLUS_V8H2H_HDMI_Input3	Select Input 3
		eCPLUS_V8H2H_HDMI_Input4	Select Input 4
		eCPLUS_V8H2H_HDMI_Input5	Select Input 5
		eCPLUS_V8H2H_HDMI_Input6	Select Input 6
		eCPLUS_V8H2H_HDMI_Input7	Select Input 7
Default Values: eCPLUS_V8H2H_HDMI_Output1: eCPLUS_V8H2H_HDMI_Input_None eCPLUS_V8H2H_HDMI_Output2: eCPLUS_V8H2H_HDMI_Input_None <i>Note: When an HDMI output's setting is eCPLUS_V8H2H_HDMI_Input_None, then no signal will pass to that output.</i>			

BYTE sCPLUS_V8H2H_Set_HDMI_Route(BYTE bOutput, BYTE blInput)

RETURN

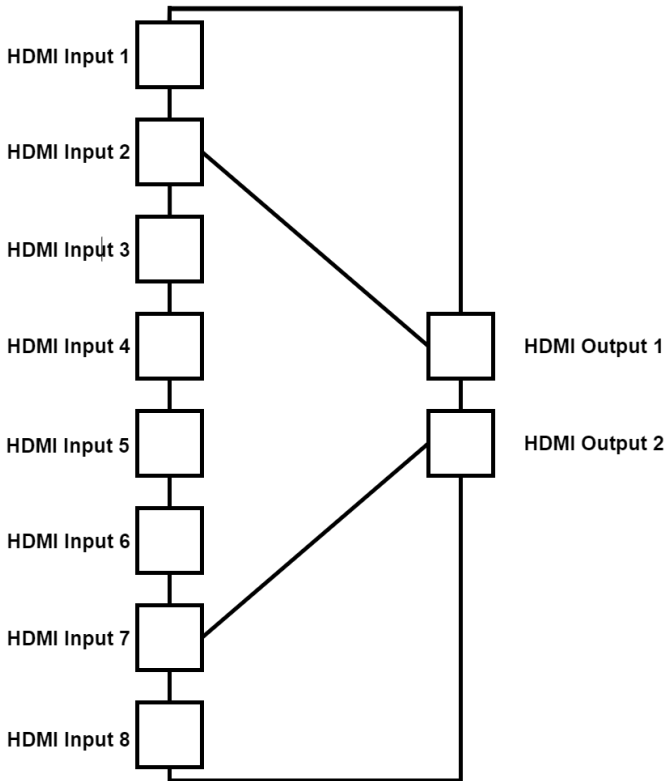
Format	Value	Description
BYTE	eCPLUS_V8H2H_Parameter_Error	Setup failure
	eCPLUS_V8H2H_Command_Error	Setup failure
	eCPLUS_V8H2H_Success	Setup successfully

Example:

sCPLUS_V8H2H_Set_HDMI_Route(eCPLUS_V8H2H_HDMI_Output1, eCPLUS_V8H2H_HDMI_Input2);

sCPLUS_V8H2H_Set_HDMI_Route(eCPLUS_V8H2H_HDMI_Output2, eCPLUS_V8H2H_HDMI_Input7);

This will result in the following route assignments:



BYTE sCPLUS_V8H2H_Get_HDMI_Route(BYTE bOutput)			
INPUT			
Parameters		Value	Description
BYTE	bOutput	eCPLUS_V8H2H_HDMI_Output1	Select Output 1
		eCPLUS_V8H2H_HDMI_Output2	Select Output 2
RETURN			
Format	Value		Description
BYTE	eCPLUS_V8H2H_HDMI_Input_None		No route is selected
	eCPLUS_V8H2H_HDMI_Input1		Input 1 is currently routed
	eCPLUS_V8H2H_HDMI_Input2		Input 2 is currently routed
	eCPLUS_V8H2H_HDMI_Input3		Input 3 is currently routed
	eCPLUS_V8H2H_HDMI_Input4		Input 4 is currently routed
	eCPLUS_V8H2H_HDMI_Input5		Input 5 is currently routed
	eCPLUS_V8H2H_HDMI_Input6		Input 6 is currently routed
	eCPLUS_V8H2H_HDMI_Input7		Input 7 is currently routed
	eCPLUS_V8H2H_HDMI_Input8		Input 8 is currently routed

6.4.4 EDID API

BYTE sCPLUS_V8H2H_Set_Input_EDID(BYTE blInput, BYTE* ptEDID)			
INPUT			
Parameters	Value	Description	
BYTE	blInput	eCPLUS_V8H2H_HDMI_Input1	Select Input 1
		eCPLUS_V8H2H_HDMI_Input2	Select Input 2
		eCPLUS_V8H2H_HDMI_Input3	Select Input 3
		eCPLUS_V8H2H_HDMI_Input4	Select Input 4
		eCPLUS_V8H2H_HDMI_Input5	Select Input 5
		eCPLUS_V8H2H_HDMI_Input6	Select Input 6
		eCPLUS_V8H2H_HDMI_Input7	Select Input 7
		eCPLUS_V8H2H_HDMI_Input8	Select Input 8
		eCPLUS_V8H2H_HDMI_Output2	Select Output 2
BYTE	ptEDID	Fill in EDID (data length fixed at 256 bytes)	Set EDID data
RETURN			
Format	Value	Description	
BYTE	eCPLUS_V8H2H_Parameter_Error	Setup failure	
	eCPLUS_V8H2H_Command_Error	Setup failure	
	eCPLUS_V8H2H_Success	Setup successfully	

BYTE sCPLUS_V8H2H_Get_Input_EDID(BYTE bInput, BYTE* ptEDID)			
INPUT			
Parameters		Value	Description
BYTE	bInput	eCPLUS_V8H2H_HDMI_Input1	Select Input 1
		eCPLUS_V8H2H_HDMI_Input2	Select Input 2
		eCPLUS_V8H2H_HDMI_Input3	Select Input 3
		eCPLUS_V8H2H_HDMI_Input4	Select Input 4
		eCPLUS_V8H2H_HDMI_Input5	Select Input 5
		eCPLUS_V8H2H_HDMI_Input6	Select Input 6
		eCPLUS_V8H2H_HDMI_Input7	Select Input 7
		eCPLUS_V8H2H_HDMI_Input8	Select Input 8
BYTE*	ptEDID		Return input's EDID (Data length fixed at 256 bytes)
RETURN			
Format	Value		Description
BYTE	eCPLUS_V8H2H_Parameter_Error		Setup failure
	eCPLUS_V8H2H_Success		Setup successfully

BYTE sCPLUS_V8H2H_Get_Output_EDID(BYTE bOutput, BYTE* ptEDID)			
INPUT			
Parameters		Value	Description
BYTE	bOutput	eCPLUS_V8H2H_HDMI_Output1	Select Output 1
		eCPLUS_V8H2H_HDMI_Output2	Select Output 2
BYTE*	ptEDID		Return output's EDID (Data length fixed at 256 bytes)
RETURN			
Format	Value		Description
BYTE	eCPLUS_V8H2H_Sink_NotReady		Sink not connected/ready
	eCPLUS_V8H2H_Success		EDID download complete

6.4.5 Audio Insertion API

BYTE sCPLUS_V8H2H_Set_HDMI_Audio_Mode(BYTE bOutput, BYTE bAudioMode)			
INPUT			
Parameters		Value	Description
BYTE	bOutput	eCPLUS_V8H2H_HDMI_Output1	Select Output 1
		eCPLUS_V8H2H_HDMI_Output2	Select Output 2
BYTE	bAudioMode	eCPLUS_V8H2H_Follow_OCSI	Follow OCSI
		eCPLUS_V8H2H_SPDIF_Input1	SPDIF Input 1 Audio
		eCPLUS_V8H2H_I2S_Input1	I ² S Input 1 Audio
Default Values: eCPLUS_V8H2H_HDMI_Output1: eCPLUS_V8H2H_Follow_OCSI eCPLUS_V8H2H_HDMI_Output2: eCPLUS_V8H2H_Follow_OCSI			
RETURN			
Format	Value		Description
BYTE	eCPLUS_V8H2H_Parameter_Error		Setup failure
	eCPLUS_V8H2H_Command_Error		Setup failure
	eCPLUS_V8H2H_Success		Setup successfully

BYTE sCPLUS_V8H2H_Get_HDMI_Audio_Mode(BYTE bOutput)			
INPUT			
Parameters		Value	Description
BYTE	bOutput	eCPLUS_V8H2H_HDMI_Output1	Select Output 1
		eCPLUS_V8H2H_HDMI_Output2	Select Output 2
RETURN			
Format	Value		Description
BYTE	eCPLUS_V8H2H_Follow_OCSI		Follow OCSI
	eCPLUS_V8H2H_SPDIF_Input1		SPDIF Input 1 Audio
	eCPLUS_V8H2H_I2S_Input1		I ² S Input 1 Audio

6.4.6 Audio Extraction API

BYTE sCPLUS_V8H2H_Set_I2S_Output(BYTE bAudioSource)			
INPUT			
Parameters		Value	Description
BYTE	bAudioSource	eCPLUS_V8H2H_OCSI_1	I ² S is from OCSI 1
		eCPLUS_V8H2H_OCSI_2	I ² S is from OCSI 2
		eCPLUS_V8H2H_ARC_1	I ² S is from ARC 1
		eCPLUS_V8H2H_ARC_2	I ² S is from ARC 2
		eCPLUS_V8H2H_eARC_1	I ² S is from eARC 1
		eCPLUS_V8H2H_eARC_2	I ² S is from eARC 2
Default Value: eCPLUS_V8H2H_OCSI_1			
RETURN			
Format	Value		Description
BYTE	eCPLUS_V8H2H_Parameter_Error		Setup failure
	eCPLUS_V8H2H_Command_Error		Setup failure
	eCPLUS_V8H2H_Success		Setup successfully

BYTE sCPLUS_V8H2H_Get_I2S_Output(void)		
RETURN		
Format	Value	Description
BYTE	eCPLUS_V8H2H_OCSI_1	I ² S is from OCSI 1
	eCPLUS_V8H2H_OCSI_2	I ² S is from OCSI 2
	eCPLUS_V8H2H_ARC_1	I ² S is from ARC 1
	eCPLUS_V8H2H_ARC_2	I ² S is from ARC 2
	eCPLUS_V8H2H_eARC_1	I ² S is from eARC 1
	eCPLUS_V8H2H_eARC_2	I ² S is from eARC 2

BYTE sCPLUS_V8H2H_Set_SPDIF_Output(BYTE bAudioSource)
INPUT

Parameters		Value	Description
BYTE	bAudioSource	eCPLUS_V8H2H_OCSI_1	I ² S is from OCSI 1
		eCPLUS_V8H2H_OCSI_2	I ² S is from OCSI 2
		eCPLUS_V8H2H_ARC_1	I ² S is from ARC 1
		eCPLUS_V8H2H_ARC_2	I ² S is from ARC 2

Default Value:

eCPLUS_V8H2H_OCSI_1

RETURN

Format	Value	Description
BYTE	eCPLUS_V8H2H_Parameter_Error	Setup failure
	eCPLUS_V8H2H_Command_Error	Setup failure
	eCPLUS_V8H2H_Success	Setup successfully

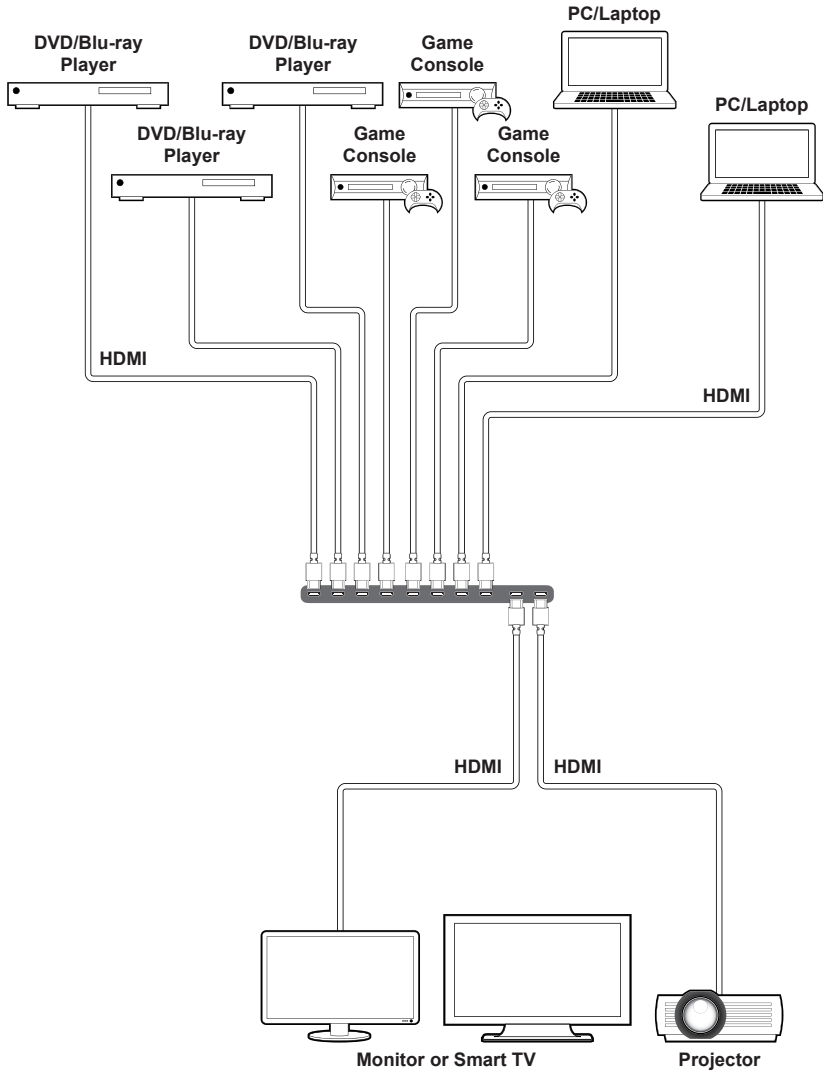
BYTE sCPLUS_V8H2H_Get_SPDIF_Output(void)
RETURN

Format	Value	Description
BYTE	eCPLUS_V8H2H_OCSI_1	I ² S is from OCSI 1
	eCPLUS_V8H2H_OCSI_2	I ² S is from OCSI 2
	eCPLUS_V8H2H_ARC_1	I ² S is from ARC 1
	eCPLUS_V8H2H_ARC_2	I ² S is from ARC 2

6.4.7 ARC API

BYTE sCPLUS_V8H2H_Get_ARC_Status(BYTE bSinkARC)			
INPUT			
Parameters		Value	Description
BYTE	bSinkARC	eCPLUS_V8H2H_SinkARC_1	Select SinkARC 1
		eCPLUS_V8H2H_SinkARC_2	Select SinkARC 2
RETURN			
Format	Value		Description
BYTE	eCPLUS_V8H2H_Sink_NotReady		Sink has no connection or is not ready
	eCPLUS_V8H2H_Sink_ARC_NoExist		Sink has no ARC support
	eCPLUS_V8H2H_Sink_ARC_Exist		Sink supports ARC
	eCPLUS_V8H2H_Sink_eARC_Exist		Sink supports eARC

7. CONNECTION DIAGRAM



8. SPECIFICATIONS

8.1 Technical Specifications

HDMI Bandwidth	18Gbps
Input Ports	8×HDMI (Type-A) 1×Multichannel Audio (34-pin Header)
Output Ports	2×HDMI (Type-A) 1×Multichannel Audio (26-pin Header)
Control Port	1×I ² C (26-pin Header)
Power Supply	12V/1.4A DC (2-pin Header)
Dimensions (W×H×D)	279mm×30mm×119mm [All Inclusive]
Weight	168g
Operating Temperature	0°C – 60°C/32°F – 140°F
Storage Temperature	-20°C – 60°C/-4°F – 140°F
Relative Humidity	20 – 90% RH (Non-condensing)
Power Consumption	17W

8.2 Video Specifications

Supported Resolutions (Hz)	Input	Output
	HDMI	HDMI
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	✓	✓

Supported Resolutions (Hz)	Input	Output
	HDMI	HDMI
1920×1080p@50/60	✓	✓
1920×1200p@60RB	✓	✓
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 / Output	
LPCM	
Max Channels	8 Channels
Sampling Rate (kHz)	32, 44.1, 48, 88.2, 96, 176.4, 192
Bitstream	
Supported Formats	Standard & High-Definition

S/PDIF Input / Output	
LPCM	
Max Channels	2 Channels
Sampling Rate (kHz)	32, 44.1, 48
Bitstream	
Supported Formats	Standard

I ² S Input / Output	
LPCM	
Max Channels	8 Channels
Sampling Rate (kHz)	32, 44.1, 48, 88.2, 96, 176.4, 192
Bitstream	
Supported Formats	Standard & High-Definition

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	10m		5m	3m
HDMI Output	10m		5m	3m

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 (4K 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 (4K 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

9. ACRONYMS

ACRONYM	COMPLETE TERM
ARC	Audio Return Channel
AV	Audio/Video
AVR	Audio/Video Receiver or Recorder
CEC	Consumer Electronics Control
DVI	Digital Visual Interface
eARC	Enhanced Audio Return Channel
EDID	Extended Display Identification Data
Gbps	Gigabits per second
HD	High-Definition
HDCP	High-bandwidth Digital Content Protection
HDMI	High-Definition Multimedia Interface
HDR	High Dynamic Range
HDTV	High-Definition Television
I²C	Inter-Integrated Circuit
I²S	Inter-IC Sound
kHz	Kilohertz
LPCM	Linear Pulse-Code Modulation
MHz	Megahertz
S/PDIF	Sony/Philips Digital Interface Format
4K UHD	4K Ultra-High-Definition (10.2Gbps max)
4K UHD*	4K Ultra-High-Definition (18Gbps max)
UHDTV	Ultra-High-Definition Television
WUXGA (RB)	Widescreen Ultra Extended Graphics Array (Reduced Blanking)
XGA	Extended Graphics Array



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