



CPHD-V8L(Gray Case)

8K HDMI Signal Generator & Analyzer
(Portable Version)



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
Ver 1.00	2024/4/16	Initial Release





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1. INTRODUCTION

This portable 8K HDMI Signal Generator & Analyzer provides a convenient way to generate, test and verify all aspects of an HDMI signal path up to 8K@60Hz (4:2:0), including source and sink. In pattern mode, it can generate 40 selectable output resolutions, 20 test patterns and up to 8 channels of LPCM audio signals. The Analyzer mode supports video timing, audio timing, EDID and HDCP analysis. This unit complies with the HDMI 2.1 and HDCP 1.4/2.2/2.3 standards.

It is powered by a single rechargeable Lithium-ion battery (not included). Besides the Lithium-ion battery, the unit may also be powered (and the battery recharged) via the USB-C port. An external power bank can also be used to extend the portable service time.

The unit has an integrated OLED display which provides a way to quickly and clearly view the current signal state or the results of signal analysis. This portable handheld design is ideal for both the professional end user and installation engineer alike.

2. APPLICATIONS

- Installer/Integrator multi-function test tool
- HDMI source and sink testing
- UHD system/SCDC error identification
- Third-party equipment setup
- Source and sink EDID reading, writing and saving
- HDCP compliance verification
- Production testing
- R&D design and testing

3. PACKAGE CONTENTS

- 1× 8K HDMI Signal Generator & Analyzer (Portable Version)
- 1× USB Type-C to USB Type-A Cable
- 1× Operation Manual

4. SYSTEM REQUIREMENTS

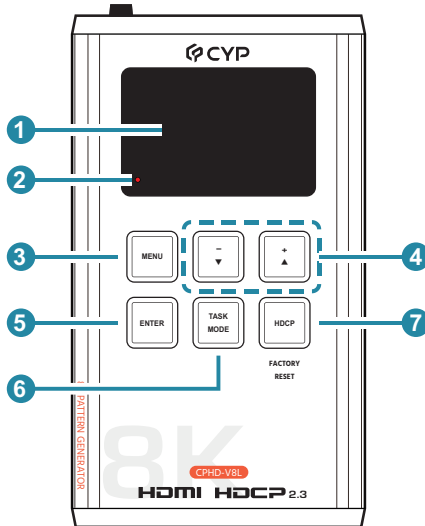
- HDMI receiving equipment such as an HDTV, monitor or audio amplifier and/or HDMI source equipment such as a media player, video game console or set-top box.
- For portable operation, a battery (not included) is required. The Panasonic NCR18650B (3.6V/3350mAh) Lithium-ion rechargeable battery, or similar, is recommended.

5. FEATURES

- Generator (Test Pattern Mode) supports 40 selectable output resolutions up to 8K and 20 selectable test patterns
- Supports 40Gbps 8K UHD* HDMI input and output
- Supports resolutions up to 7680×4320@60Hz (4:2:0, 8-bit)
- Analyzer mode supports 8K source video, audio, timing and packet analysis
- Comprehensive EDID management, analysis and emulation support with 12 built-in default EDIDs and 10 user-definable EDIDs
- Portable palm-sized design with easy to use front-panel controls
- OLED display with rapid updates of current status information
- HDCP and SCDC monitoring functions
- HDR bypass, analysis and generation function complies with the CEA standard HDR static metadata extensions CEA-861-G and CEA- 861.3
- Supports generation of up to 8 channels of LPCM audio with adjustable sinewave frequencies for each channel
- Powered by a single Lithium-ion battery (not included) or an external USB-C power supply/power bank
- DVI 1.0 compliant with the use of an HDMI-DVI adaptor
- HDCP 1.4 and 2.3 compliant

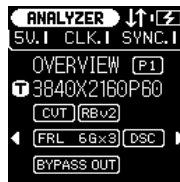
6. OPERATION CONTROLS AND FUNCTIONS

6.1 Front Panel



- 1 OLED:** This screen's layout changes depending on the unit's operational mode and selected function. The status lines at the top shows the unit's current operational mode (Analyzer, or Pattern), power status, and mode specific detection details. Information below are the status lines that consist of either the unit's menu or signal analysis data.

Analyzer Mode: The status line will display the 5V, clock detection, and sync detection state of the connected source. (1 = detected, 0 = not detected.)



Pattern Mode: The status line will display the RxSense and Hot-plug detection state of the connected display. (1 = detected, 0 = not detected.)



- 2 **BATTERY CHARGING LED:** The battery charging LED will illuminate red when a USB power source is connected and actively charging the battery.
- 3 **MENU Button:** Press to back out from menu items and return to the main OLED menu screen.
- 4 **+ /▲ & - /▼ Button:** Press to move up and down or adjust selections within menus.
- 5 **ENTER Button:** Press to confirm a selection or to go deeper into a menu item.

Note: In Pattern mode, press and hold this button for 2 seconds to turn audio on or off.

- 6 **TASK MODE Button:** Press to switch the unit between Analyzer Mode and Pattern Mode.

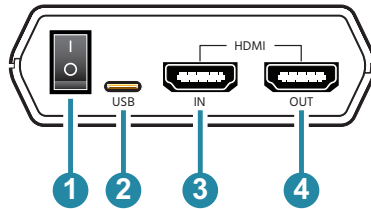
Note: In Analyzer mode, press and hold this button for 2 seconds to toggle the input's hot plug trigger. In Pattern mode, press and hold this button for 2 seconds to switch among presets.

- 7 **HDCP Button:** Press to switch between supported HDCP versions (1.4, 2.3) or to disable HDCP. In Analyzer mode, this changes the HDCP versions supported by the input port. In Pattern mode, this changes the HDCP required by the output port. The button's outline will light up according to the HDCP state and current version supported.

HDCP Button Outline	Status
Solid Red	HDCP 1.4
Solid Blue	HDCP 2.3
Off	HDCP Disabled
Flashing	Authentication Failure

Factory Reset: Pressing and holding the HDCP button during power on will reset the unit to its factory default settings.

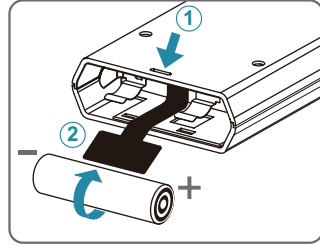
6.2 Rear Panel



- 1 POWER Switch:** Flip this switch to turn the unit ON or OFF.
- 2 USB Port:** Multi-function port for power/battery charging, firmware update or serial command control.
- 3 HDMI IN Port:** Connect to HDMI source equipment such as a media player, game console, or set-top box.
- 4 HDMI OUT Port:** Connect to an HDMI TV, monitor or amplifier for digital video and audio output.

6.3 Battery Compartment

While this unit may be powered directly via the USB port, it is more typically powered by a rechargeable Lithium-ion battery (not included) which is concealed within the bottom of the unit.



- (1) **Opening the Compartment:** Use a small flathead screwdriver to gently, but firmly, press down into the slot ① behind the base panel and the bottom cover will pop out.
- (2) **Removing the Battery:** If a battery is already installed, a Mylar tab ② will be visible beneath the battery. Pull on the Mylar tab to pop the battery out of its holding brackets.
- (3) **Inserting the Battery:** Turn the unit so that it is face down and align the battery so that the positive terminal of the battery (marked with a +) is aligned with the positive (+) marking on the right-hand side on the back of the battery compartment. Extend the Mylar tab out of the battery compartment, then place the battery on top of the extended tab and slide the battery into the unit until it snaps into the holding brackets as shown in the illustration.
- (4) **Closing the Compartment:** After the battery has been properly inserted, place the battery compartment cover back into the bottom of the unit by first fitting the 2 small tabs on the cover into the 2 slots in the case and then gently snapping the cover into place.
- (5) **Charging the Battery:** Connect a USB charger (5V/2.1A minimum) to the USB port to charge the unit's battery until it is full. The typical charging time, from empty to full, is approximately 3 hours while the unit's power is off. Average operation time from a fully charged battery is roughly 4 hours, but might be less depending on specific usage and battery quality.

Note: A battery is not included in the standard package, however the Panasonic NCR18650B (3.6V/3350mAh) Lithium-ion rechargeable battery is recommended.

6.4 Serial via USB Defaults








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




6.5 OLED Display

6.5.1 Power Saving Mode

The OLED display will automatically switch off after the set number of minutes. All other functions of the unit will continue normally while the display is turned off and the HDCP button will slowly flash blue to indicate it is in power saving mode. To turn the OLED display back on, press any key.

6.5.2 Special OLED Icons

USB PORT FUNCTION	
	RS-232 control mode.
	Firmware update mode.
POWER STATUS	
	External power only. No battery present.
	External power. Battery at max charge.
	External power. Battery charging.
	Battery power with ~100% charge.
	Battery power with ~80% charge.

	Battery power with ~60% charge.
	Battery power with under 10% charge. Icon flashes to indicate recharge needed.
	Battery power is critically low. Auto shutdown.

6.6 OLED Menu

All functions of this unit can be controlled by using the OLED Menu. Use the +/▲, -/▼, and ENTER buttons to navigate the OLED menu. Press the ENTER button to confirm a selection within the menu or to go deeper into a menu item. Press the MENU button to back out from any menu item. Switching between Analyzer Mode and Pattern Mode is accomplished by pressing the TASK MODE button.

The individual functions of the OLED Menus will be introduced in the following section. Items marked in **BOLD** are the factory default settings.

*Note: Settings marked with *PoR follow “Power-On Reset” rules and will always return to their factory default settings when the power is turned off.*

6.6.1 Analyzer Mode

MAIN MENU
VIDEO TIMING
AUDIO TIMING
PACKET
HDCP
EDID
SCDC
INPUT CONTROL
SETUP
INFORMATION

VIDEO TIMING	
2ND LEVEL	3RD LEVEL
TIMING	[Current Analytical Data]
STANDARD	
COLORSPACE	
COLOR DEPTH	
SCRAMBLING	
PIXEL REP.	
PROTOCOL	
FORMAT	
TMDS CLOCK [FRL RATE]	
PIXEL CLOCK	
DATA RATE	
DSC	
DSC	[Current Analytical Data]
H CACTIVE	
H CBLANK	
VRR	[Current Analytical Data]
H FREQUENCY	
V FREQUENCY	
H/V TOTAL	
H/V ACTIVE	
H BLANK	
BACK	[Current Analytical Data]
SYNC	
FRONT	
V BLANK	
BACK	[Current Analytical Data]
SYNC	
FRONT	

VIDEO TIMING	
2ND LEVEL	3RD LEVEL
V BLANK(FIELD2)	
BACK	[Current Analytical Data]
SYNC	
FRONT	
H/V SYNC POL.	[Current Analytical Data]
SCAN TYPE	
HV SYNC OFST.1	
HV SYNC OFST.2	

1) **Video Timing:** These pages display the real-time details of the video source currently connected to the HDMI input.

Note: Because 4K YUV 4:2:2 video does not report a bit depth and always uses 12-bits of space for color, even with 8-bit content, it will always be reported as 12-bit.

- **Timing:** Current resolution and refresh rate.
- **Standard:** Timing Matched Standard.
- **Color Space:** Color space (4:4:4/4:2:2/4:2:0).
- **Color Depth:** Bit depth (8/10/12-bit).
- **Scrambling:** TMDS Scrambling Status.
- **Pixel Rep:** Pixel Repetition Status.
- **Protocol:** Video Protocol.
- **Format:** Video Format.
- **TMDS Clock:** Current TMDS clock in kHz.
- **Pixel Clock:** Current pixel clock in kHz.
- **Data Rate:** Current data rate in Gbps.
- **DSC:** Display Stream Compression Status.
 - **H CACTIVE:** DSC H Chunk-Active.
 - **H CBLANK:** DSC H Chunk-Blank.
- **VRR:** Variable Refresh Rate Status.
- **H Frequency:** Horizontal sync frequency.
- **V Frequency:** Vertical sync frequency.

- **H/V Total:** Total horizontal and vertical pixels per frame.
- **H/V Active:** Active horizontal and vertical pixels per frame.
- **H Blank:** Horizontal blank.
- **V Blank:** Vertical blank.
- **V Blank(Field2):** Vertical blank of an interlaced source's second field.
- **H/V Sync Pol.:** Horizontal and vertical sync polarity.
- **Scan Type:** Progressive scan or interlaced video.
- **HV Sync Ofst1:** Vertical line offset of an interlaced source's odd field.
- **HV Sync Ofst2:** Vertical line offset of an interlaced source's even field.

AUDIO TIMING	
2ND LEVEL	3RD LEVEL
N	[Current Analytical Data]
CTS	
CALC.SAMP.RATE	
AUDIO	
PLL	
FIFO	
LAYOUT	
CHANNEL STATUS	
CAT.	[Current Analytical Data]
AUDIO TYPE	
CH. NUM.	
SRC. NUM.	
SAMP.RATE	
WORD LEN.	
AUD. INFOFRAME	
CODING TYPE	[Current Analytical Data]
CHANNEL COUNT	
SAMP. FREQ.	
SAMPLE SIZE	

- 1) **Audio Timing:** This page displays the real-time details of the audio signal currently detected on the HDMI input.
- **N:** A fixed value representing the audio rate.
 - **CTS:** Cycle Time Stamp.
 - **CALC.SAMP.RATE:** Calculated sampling rate from N, CTS, and TMDS clock.
 - **Audio:** Audio format (LPCM/Bitstream/HBR).
 - **PLL:** The audio signal's current PLL state.
 - **FIFO:** The audio signal's current FIFO status.
 - **Layout:** Indicates if the packet's audio is stereo (0) or multichannel (1).
 - **Channel Status:**
 - **CAT:** Category Code.
 - **Audio Type:** LPCM or non-LPCM.
 - **CH. Num.:** The channel position identification provided by the current audio source.
 - **SRC. NUM.:** The LPCM source number reported by the current audio source.
 - **Samp. Rate:** The current audio sampling rate in kHz.
 - **Word Len.:** Word length.
 - **Aud. Infoframe:**
 - **Coding Type:** Detailed information about audio format.
 - **Channel Count:** Number of channel sources.
 - **Samp. Freq:** Sampling frequency.
 - **Sample Size:** Channel sampling size.

PACKET (ACR)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
01H ACR	HEADER (HEX)	[Current Analytical Data]
	DATA (HEX)	
	CTS	
	N	

- 1) **01H ACR Packet:** This page displays the current details contained within the Audio Clock Regeneration packet.

PACKET (ASP)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
02H ASP	HEADER (HEX)	[Current Analytical Data]
	LAYOUT	
	SAMP. PRES.0	
	SAMP. PRES.1	
	SAMP. PRES.2	
	SAMP. PRES.3	
	SAMP. FLAT 0	
	SAMP. FLAT 1	
	SAMP. FLAT 2	
	SAMP. FLAT 3	
	B0	
	B1	
	B2	
B3		

1) **02H ASP Packet:** This page displays the current details contained within the Audio Sample Packet.

PACKET (GCP)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
03H GCP	HEADER (HEX)	[Current Analytical Data]
	DATA (HEX)	
	CLR.AVMUTE	
	SET AVMUTE	
	COLOR DEPTH	
	PACKING PHASE	
	DEFAULT PHASE	

1) **03H GCP Packet:** This page displays the current details contained within the General Control inf rame Packet.

PACKET (ACP)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
04H ACP	HEADER (HEX)	[Current Analytical Data]
	DATA (HEX)	

- 1) **04H ACP Packet:** This page displays the current details contained within the Audio Content Protection packet.

PACKET (ISRC1)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
05H ISRC1	HEADER (HEX)	[Current Analytical Data]
	DATA (HEX)	

- 1) **05H ISRC1 Packet:** This page displays the current details contained within the International Standard Recording Code packet.

PACKET (ISRC2)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
06H ISRC2	HEADER (HEX)	[Current Analytical Data]
	DATA (HEX)	

- 1) **06H ISRC2 Packet:** This page displays the current details contained within the International Standard Recording Code packet.

PACKET (O.B. ASP)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
07H O.B. ASP	HEADER (HEX)	[Current Analytical Data]

- 1) **07H O.B. ASP Packet:** This page displays the current details contained within the One Bit Audio Sample Packet.

PACKET (HBR AUD.)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
09H HBR AUD.	HEADER (HEX)	[Current Analytical Data]

- 1) **09H HBR AUD. Packet:** This page displays the current details contained within the High Bit Rate Audio packet.

PACKET (GAMUT M.)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
0AH GAMUT M.	HEADER (HEX)	[Current Analytical Data]
	DATA (HEX)	

- 1) **0AH GAMUT M. Packet:** This page displays the current details contained within the Gamut Metadata packet.

PACKET (3D ASP)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
0BH 3D ASP	HEADER (HEX)	[Current Analytical Data]

- 1) **0BH 3D ASP Packet:** This page displays the current details contained within the 3D Audio Sample Packet.

PACKET (O.B. 3DASP)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
0CH O.B. 3DASP	HEADER (HEX)	[Current Analytical Data]

- 1) **0CH O.B. 3DASP Packet:** This page displays the current details contained within the One Bit 3D Audio Sample Packet.

PACKET (AUDIO M.)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
0DH AUDIO M.	HEADER (HEX)	[Current Analytical Data]
	DATA (HEX)	

- 1) **0DH AUDIO M. Packet:** This page displays the current details contained within the Audio Metadata packet.

PACKET(MSASP)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
0EH MSASP	HEADER (HEX)	[Current Analytical Data]

- 1) **0EH MSASP Packet:** This page displays the current details contained within the Multi-Stream Audio Sample Packet.

PACKET (O.B. MSASP)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
0FH O.B. MSASP	HEADER (HEX)	[Current Analytical Data]

- 1) **0FH O.B. MSASP Packet:** This page displays the current details contained within the One Bit Multi-Stream Audio Sample Packet.

PACKET (14B VS)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
81H 14B VS	VERSION	[Current Analytical Data]
	LENGTH	
	CHECKSUM	
	DATA (HEX)	
	IEEE ID	
	HDMI VIDEO FMT	
	HDMI VIC	
	3D STRUCTURE	
	3D EXT. DATA	
METADATA		

- 1) **81H 14B VS Packet:** This page displays the current details contained within the HDMI1.4b Vendor Specific infoframe packet.

Note: This information is typically from HDMI 1.4b sources only.

PACKET (HF VS)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
81H HF VS	VERSION	[Current Analytical Data]
	LENGTH	
	CHECKSUM	
	DATA (HEX)	
	IEEE ID	
	HF-VSIF VER.	
	CCBPC	

PACKET (HF VS)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
	ALLM MODE	
	3D VALID	
	3D STRUCTURE	
	3D EXT. DATA	
	3D PRESENT	
	3D ADDL.INFO.	
	3D DISPARITY	
	RAW DISPARITY	
	3D METADATA	
	RAW METADATA	

1) **81H HF VS Packet:** This page displays the current details contained within the HDMI Forum Vendor Specific infoframe packet.

PACKET (VS 0)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
81H VS 0	VERSION	[Current Analytical Data]
	LENGTH	
	CHECKSUM	
	DATA (HEX)	
	IEEE ID	

1) **81H VS 0 Packet:** This page displays the current details contained within the Vendor Specific infoframe packe

PACKET (VS 1)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
81H VS 1	VERSION	[Current Analytical Data]
	LENGTH	
	CHECKSUM	
	DATA (HEX)	

PACKET (VS 1)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
	IEEE ID	

- 1) **81H VS 1 Packet:** This page displays the current details contained within the Vendor Specific infoframe packet.

PACKET (VS 2)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
81H VS 2	VERSION	[Current Analytical Data]
	LENGTH	
	CHECKSUM	
	DATA (HEX)	
	IEEE ID	

- 1) **81H VS 2 Packet:** This page displays the current details contained within the Vendor Specific infoframe packet.

PACKET (VS 3)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
81H VS 3	VERSION	[Current Analytical Data]
	LENGTH	
	CHECKSUM	
	DATA (HEX)	
	IEEE ID	

- 1) **81H VS 3 Packet:** This page displays the current details contained within the Vendor Specific infoframe packet.

PACKET (AVI)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
82H AVI	VERSION	[Current Analytical Data]
	LENGTH	
	CHECKSUM	
	DATA (HEX)	
	VIC	
	PIC. ASPECT	
	PIXEL REP.	
	COLORSPACE	
	COLORIMETRY	
	EXT.COLORIM.	
	ADDL.COLORIM.	
	RGB QNT.RANGE	
	YCC QNT.RANGE	
	AFD PRESENT	
	BAR INFO.	
	AFD	
	ETB	
	SBB	
	ELB	
	SRB	
SCAN INFO.		
N.UNI.SCALING		
IT CONTENT		
IT CONT. TYPE		

1) **82H AVI Packet:** This page displays the current details contained within the Auxiliary Video Information infoframe packet.

PACKET (SPD)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
83H SPD	VERSION	[Current Analytical Data]
	LENGTH	
	CHECKSUM	
	DATA (HEX)	
	VENDOR	
	PRODUCT DESC.	
	SOURCE INFO.	

1) **83H SPD Packet:** This page displays the current details contained within the Source Product Description infoframe packet.

PACKET (AUDIO)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
84H AUDIO	VERSION	[Current Analytical Data]
	LENGTH	
	CHECKSUM	
	DATA (HEX)	
	CODING TYPE	
	FMT. CODE EXT.	
	CHANNEL COUNT	
	SAMPLING FREQ.	
	SAMPLE SIZE	
	LEVEL SHIFT	
	DOWN MIX	
	LFE PB. LEVEL	
	SPEAKER PLCMT.	

1) **84H AUDIO Packet:** This page displays the current details contained within the Audio infoframe packe.

PACKET (MPEG)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
85H MPEG	VERSION	[Current Analytical Data]
	LENGTH	
	CHECKSUM	
	DATA (HEX)	

1) **85H MPEG Packet:** This page displays the current details contained within the MPEG source infoframe packet.

PACKET (DRM)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
87H DRM	VERSION	[Current Analytical Data]
	LENGTH	
	CHECKSUM	
	DATA (HEX)	
	EOTF	
	METADATA DESC.	
	DISP.PRIM.X0	
	DISP.PRIM.Y0	
	DISP.PRIM.X1	
	DISP.PRIM.Y1	
	DISP.PRIM.X2	
	DISP.PRIM.Y2	
	WHITE POINT X	
	WHITE POINT Y	
	MAX MSTR.LUMI.	
	MIN MSTR.LUMI.	
MAX CLL		
MAX FALL		

- 1) **87H DRM Packet:** This page displays the current details contained within the Dynamic Range and Mastering infoframe packet.

PACKET (HDREM)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
EXT HDREM	FIRST	[Current Analytical Data]
	LAST	
	SEQUENCE INDEX	
	DS_TYPE	
	SYNC	
	VFR	
	AFR	
	NEW	
	END	
	ORG. ID	
	DATA SET TAG	
DATA SET LEN.		

- 1) **EXT HDREM Packet:** This page displays the current details contained within the HDR Extended Metadata infoframe packet.

PACKET (VTEM)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
EXT VTEM	FIRST	[Current Analytical Data]
	LAST	
	SEQUENCE INDEX	
	DS_TYPE	
	SYNC	
	VFR	
	AFR	
	NEW	

PACKET (VTEM)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
	END	
	ORG. ID	
	DATA SET TAG	
	DATA SET LEN.	
	DATA (HEX)	
	PACKET CLASS	
	VRR EN [QMS-VRR EN]	
	FVA FACTOR [M CONST]	
	NEXT TFR	
	BASE VFRONT	
	BASE RFSH.RATE	

- 1) **EXT VTEM Packet:** This page displays the current details contained within the Video Timing Extended Metadata packet.

PACKET (CVTEM)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
EXT CVTEM	FIRST	
	LAST	
	SEQUENCE INDEX	
	DS_TYPE	
	SYNC	
	VFR	[Current Analytical Data]
	AFR	
	NEW	
	END	

PACKET (CVTEM)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
	ORG. ID	
	DATA SET TAG	
	DATA SET LEN.	
	DATA (HEX)	
	DSC VERSION	
	BIT PER COMP	
	LINEBUF DEPTH	
	PIC. HEIGHT	
	PIC. WIDTH	
	SLICE HEIGHT	
	SLICE WIDTH	
	NATIVE 420	
	NATIVE 422	
	HFRONT	
	HSYNC	
	HBACK	
	HACTIVE BYTES	

1) **EXT CVTEM Packet:** This page displays the current details contained within the Compressed Video Transport Extended Metadata packet.

HDCP		
2ND LEVEL	3RD LEVEL	4TH LEVEL
HDCP MONITOR		
[HDCP MONITOR] (HDCP 1.x)	Source HDCP	[Current Analytical Data]
	RX HDCP	
	Aksv	
	Bksv	

HDCP		
2ND LEVEL	3RD LEVEL	4TH LEVEL
	Ri	
	COUNT	
	DTM	
[HDCP MONITOR] (HDCP 2.3)	Source HDCP	[Current Analytical Data]
	RX HDCP	
	RECEIVER ID	
	TXCAPS	
	RXCAPS	
	m	
	riv	
	DTM	
VERSION	OFF	[Current Analytical Data]
	V1.4	
	V1.4+2.3	
REAUTH_REQ	RUN	[Current Analytical Data]

1) **HDCP Monitor (HDCP 1.x):** This page displays the real-time details of HDCP 1.4 communication between this unit and the source currently connected to the HDMI input. "Count" lists how many successful key authorizations have occurred.

Note: These details will only display when the source is encrypted with HDCP v1.4 or lower.

2) **HDCP Monitor (HDCP 2.3):** This page displays the real-time details of HDCP 2.3 communication between this unit and the device currently connected to the HDMI input.

Note: These details will only display when the source is encrypted with HDCP v2.3 or lower.

3) **Version:** Displays the current HDCP support version.

4) **REAUTH_REQ:** Forces the HDMI input to restart the HDCP authorization process.

Note: This function will only be effective when using HDCP2.3.

EDID (EDID ANALYZER)	
2ND LEVEL	3RD LEVEL
SINK	[Current Analytical Data]
RX PORT	
DEFAULT EDID	
[D1] DVI	[Default EDID Details]
[D2] VGA	
[D3] 8B LPCM PC	
[D4] 8B LPCM HD	
[D5] 12 BS 720p	
[D6] 12 BS HD 3D	
[D7] 12 BS 4K6G	
[D8] 12 HBR 4K30	
[D9] 12 HBR 4K420	
[D10] 12 HBR 4K6G	
[D11] 12 LPCM 8K60	
[D12] 12 HBR 8K60	
USER EDID	
[V1~10] User 01~10	[User EDID Details]

- 1) **EDID Analyzer:** This section provides a decoded view of the details of a selected EDID. All EDIDs related to the unit may be viewed, including the connected sink's EDID, the EDID currently being sent to the source, or any Default or stored User EDID.

EDID (EDID COPY SINK)	
2ND LEVEL	3RD LEVEL
[V1~10] User 01~10	[Save Sink EDID to Selected Entry]

- 1) **EDID Copy Sink:** Select any of the Copy EDID items to copy and store the EDID from the currently connected display into that slot. The EDID name will be automatically filled in with name data from the copied EDID.

EDID (EDID BURN SINK)	
2ND LEVEL	3RD LEVEL
[D1] DVI	[Overwrite Sink's EDID with the Selected EDID]
[D2] VGA	
[D3] 8B LPCM PC	
[D4] 8B LPCM HD	
[D5] 12 BS 720p	
[D6] 12 BS HD 3D	
[D7] 12 BS 4K6G	
[D8] 12 HBR 4K30	
[D9] 12 HBR 4K420	
[D10] 12 HBR 4K6G	
[D11] 12 LPCM 8K60	
[D12] 12 HBR 8K60	
[V1~10] User 01~10	

- 1) **EDID Burn Sink:** Select an EDID from the list to overwrite the EDID of the currently connected display with it.

Note 1: The connected display must support EDID update functionality.

Note 2: The user can only burn EDID block0 and block1.

EDID (RX EDID SELECT)	
2ND LEVEL	3RD LEVEL
SINK EDID	[Use Sink EDID]
[D1] DVI	[Use Selected EDID]
[D2] VGA	
[D3] 8B LPCM PC	
[D4] 8B LPCM HD	
[D5] 12 BS 720p	
[D6] 12 BS HD 3D	

EDID (RX EDID SELECT)	
2ND LEVEL	3RD LEVEL
[D7] 12 BS 4K6G	
[D8] 12 HBR 4K30	
[D9] 12 HBR 4K420	
[D10] 12 HBR 4K6G	
[D11] 12 LPCM 8K60	
[D12] 12 HBR 8K60	
[V1~10] User 01~10	

- 1) **RX EDID Select:** Select the EDID to provide to the connected HDMI source. The EDID from the currently connected sink, a built-in Default EDID, or a copied User EDID may be selected for use as the unit's EDID.

SCDC (SCDC MONITOR)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
SCDC EN.	[Current Analytical Data]	
SINK VER.		
SRC VER.		
TMDS	CLK RATIO	[Current Analytical Data]
	SCRAMB.EN.	
	SCRAMB.ST.	
UPDATE FLAGS	RSED_UPD.	
	FLT_UPD.	
	FRL_START	
	STATUS_UPD.	
	CED_UPD.	
SINK CONFIG	RR_ENABLE	
	FFE_LEVELS	
	FRL_RATE	

SCDC (SCDC MONITOR)		
2ND LEVEL	3RD LEVEL	4TH LEVEL
STATUS FLAGS	DSC_DECODE F.	
	FLT_READY	
	CH2_LOCKED	
	CH1_LOCKED	
	CH0_LOCKED	
	LANE3_LOCKED	
	CLK_DETECTED	
	LN0_LTP_REQ	
	LN1_LTP_REQ	
	LN2_LTP_REQ	
	LN3_LTP_REQ	

- 1) **SCDC Monitor:** This page displays the details of the SCDC (Status and Control Data Channel) of the source currently connected to the HDMI input.

SCDC (CED MONITOR)	
2ND LEVEL	3RD LEVEL
CED UPD COUNT	[Current Analytical Data]
CHECKSUM	
CH0	
CH1	
CH2	
LN3	
RSED UPD COUNT	
RSCC	
DATETIME	
RESET COUNTER	

- 1) **CED Monitor:** This page displays the details of the CED (Character Error Detection) of the source currently connected to the HDMI input. The CED (Character Error Detection) data for each of the 4 channels can be monitored in real time. While monitoring is live, a time counter will run and each channel will record any errors detected. Pressing “RESET COUNTER” will reset the error counters and clock while continuing to monitor.

INPUT CONTROL	
2ND LEVEL	3RD LEVEL
HPD TIME	50ms ~ 500ms (150ms)
HPD TOGGLE	
DDC EN. ^{*PoR}	NO
	YES
RXSENSE EN. ^{*PoR}	NO
	YES
HDCP VERSION	V1.4
	V1.4 + V2.3
	OFF

- 1) **HPD Time:** Set the length of time for the hot plug to last (in milliseconds).
- 2) **HPD Toggle:** Forces a hot plug event on the HDMI input.
- 3) **DDC En.:** Enable or Disable the HDMI input’s DDC bus.
Note: Will return to factory default settings if the power is turned off.
- 4) **RxSense En.:** Enable or Disable RxSense on the HDMI input.
Note: Will return to factory default settings if the power is turned off.
- 5) **HDCP Version:** Select the HDCP version(s) supported by the HDMI input.

SETUP	
2ND LEVEL	3RD LEVEL
FW UPDATE	NO
	YES
OLED SAV.	OFF~10M(1M)
OLED CONTRAST	0-8(4)
EDID RESET	NO
	YES
FACTORY RESET	NO
	YES

- 1) **Firmware Update:** Provides a way to update the unit’s firmware. To begin the firmware update process, select “Yes”.
Note: See Section 8.5 for more detailed firmware update instructions.
- 2) **OLED SAV.:** OLED Panel Saving Time Settings. Set the length of time before the screen is automatically turned off.
- 3) **OLED Contrast:** Set the OLED screen’s contrast level.
- 4) **EDID Reset:** Selecting “Yes” will reset all of the unit’s user EDID back to their factory defaults.
- 5) **Factory Reset:** Selecting “Yes” will reset all of the unit’s settings back to their factory defaults.

INFORMATION	
2ND LEVEL	3RD LEVEL
TIMING	[Current Analytical Data]
PROTOCOL	
FORMAT	
TMDS CLOCK	
DSC	
VRR	
COLORSPACE	
COLOR DEPTH	
HDR	
HDCP ABILITY	
HDCP STATUS	
AUDIO	
TYPE	[Current Analytical Data]
CH. NUM.	
SAMP.RATE	
WORD LEN.	
BAT. STATUS	[Current Unit Details]
FW VER.	

- 1) **Information:** Displays details about the unit’s current status, battery status, and the current firmware version.

6.6.2 Pattern Mode

MAIN MENU
VIDEO
AUDIO
HDR EMULATOR
HDCP
PRESET
EDID
SCDC
ARC
SETUP
INFORMATION

VIDEO	
2ND LEVEL	3RD LEVEL
PATTERN RESO.	720X480P60
	720X576P50
	1280X720P50
	1280X720P60
	1280X720P100
	1280X720P120
	1920X1080I50
	1920X1080I60
	1920X1080I100
	1920X1080I120
	1920X1080P24
	1920X1080P25
	1920X1080P30
	1920X1080P48
	1920X1080P50

VIDEO	
2ND LEVEL	3RD LEVEL
	1920X1080P60
	1920X1080P100
	1920X1080P120
	3840X2160P24
	3840X2160P25
	3840X2160P30
	3840X2160P48
	3840X2160P50
	3840X2160P60
	3840X2160P100
	3840X2160P120
	4096X2160P24
	4096X2160P25
	4096X2160P30
	4096X2160P48
	4096X2160P50
	4096X2160P60
	4096X2160P100
	4096X2160P120
	7680X4320P24
	7680X4320P25
	7680X4320P30
	7680X4320P48
	7680X4320P50
	7680X4320P60
PATTERN TYPE	[P1] BLACK
	[P2] BLUE
	[P3] CYAN

VIDEO		
2ND LEVEL	3RD LEVEL	
	[P4] GREEN	
	[P5] MAGENTA	
	[P6] RED	
	[P7] WHITE	
	[P8] YELLOW	
	[P9] COLORBAR	
	[P10] GRAYSCALE	
	[P11] V LINE ONOFF	
	[P12] CIRCLE	
	[P13] CROSSHATCH	
	[P14] CROSSHATCH I	
	[P15] DIAGONAL	
	[P16]H LINE ONOFF	
	[P17] MOTION	
	[P18] MULTIBUST	
	[P19] ARC TEST	
	[P20] LETTER H	
	COLORSPACE	RGB
		Y444
		Y422
Y420		
PROTOCOL	AUTO	
	TMDS	
	FRL	
FORMAT	DVI	
	HDMI	
FRL RATE	AUTO	
	FOLLOW EDID	

VIDEO	
2ND LEVEL	3RD LEVEL
	3G-3 LANES
	6G-3 LANES
	6G-4 LANES
	8G-4 LANES
	10G-4 LANES

- 1) **Pattern Reso.:** Select the output resolution and refresh rate.
- 2) **Pattern Type:** Select the test pattern to display.
- 3) **Color space:** Select the color space format for the video output.
Note: Available color space formats will vary depending on the standards supported by the selected output resolution.
- 4) **Protocol:** Output Protocol Settings.
- 5) **Format:** Select the video format for the output.
Note: DVI mode does not support audio output or the YUV color space.
- 6) **FRL Rate:** Output FRL Rate Settings

AUDIO	
2ND LEVEL	3RD LEVEL
VOLUME	0~80 (70)
MUTE ^{*PoR}	OFF
	ON
SAMP.	48 KHZ
	96 KHz
	192 KHz
WORD LEN.	16B
	20B
	24B
CHANNELS	2CH
	5.1CH
	7.1CH

AUDIO	
2ND LEVEL	3RD LEVEL
SD0L ~ SD3L FREQ.	200Hz ~ 1600Hz (1000Hz)
	MUTE
SD0R ~ SD3R FREQ.	200Hz ~ 1600Hz (1000Hz)
	MUTE

- 1) **Volume:** Set the global test tone output volume.
- 2) **Mute:** Enable/Disable audio output.
Note: Will return to factory default settings if the power is turned off.
- 3) **Samp.:** Set the global test tone sample rate.
Note: When 192 kHz is selected, only 2 channel output is supported.
- 4) **Word Len.:** Set the global test tone word length.
- 5) **Channels:** Set the number of LPCM audio channels to use when outputting test tones.
- 6) **SD0-L~SD03-L Freq:** Set the test tone frequency, in 200Hz steps, for each distinct “left” channel.
- 7) **SD0-R~SD03-R Freq:** Set the test tone frequency, in 200Hz steps, for each distinct “right” channel.
Note: In 5.1 and 7.1 arrangements, the “center” channel is typically the “SD1-R” channel and the “LFE” channel is typically the “SD1-L” channel.

HDR EMULATOR	
2ND LEVEL	3RD LEVEL
HDR ENABLE	OFF
	ON
COLORSPACE	RGB
	Y444
	4422
COLORIMETRY	Y420
	NO DATA(RGB)
	SMPTE 170M
	BT. 709

HDR EMULATOR	
2ND LEVEL	3RD LEVEL
	xvYCC601
	xvYCC709
	sYCC601
	opYCC601
	opRGB
	BT.2020 [1]
	BT.2020 [2]
	P3-D65
	P3-DCI Theater
	BT.2100
EOTF	SDR LUMI RANGE
	HDR LUMI RANGE
	PQ ST 2084
	HLG BT.2100
	RESERVED (4H)
	RESERVED (5H)
	RESERVED (6H)
RESERVED (7H)	
METADATA DESC.	METADATA TYPE1
	RESERVED (1H)
	RESERVED (2H)
	RESERVED (3H)
	RESERVED (4H)
	RESERVED (5H)
	RESERVED (6H)
	RESERVED (7H)
MAX CLL	0~65500 (0)
MAX FALL	0~65500 (0)

- 1) **HDR Enable:** Enable or disable the HDR output simulation mode.
Note: Enabling HDR will change the HDMI output's AVI packets to indicate an HDR signal to the connected display and activate the connected display's HDR mode, however all test patterns generated by this unit will continue to be 8-bit color within the SDR color range.
- 2) **Color Space:** Shows the currently active output color space.
- 3) **Colorimetry:** Set the AVI colorimetry mode to report when HDR is enabled.
- 4) **EOTF:** Set the EOTF (Electro-Optical Transfer Function) to report when HDR is enabled.
- 5) **Metadata Desc.:** Set the metadata description to report when HDR is enabled.
- 6) **Max CLL:** Set the maximum content light level to report when HDR is enabled.
- 7) **Max FALL:** Set the maximum frame average light level to report when HDR is enabled.

HDCP		
2ND LEVEL	3RD LEVEL	4TH LEVEL
HDCP MONITOR		
[HDCP MONITOR] (HDCP 1.x)	TX HDCP	[Current Analytical Data]
	SINK HDCP	
	Aksv	
	Bksv	
	RPT	
	[RPT] DEPTH	
	[RPT] DEVICE	
	Ri	
	Ri'	
	COUNT	
DTM		

HDCP		
2ND LEVEL	3RD LEVEL	4TH LEVEL
[HDCP MONITOR] (HDCP 2.3)	TX HDCP	[Current Analytical Data]
	SINK HDCP	
	RECEIVER ID	
	TXCAPS	
	RXCAPS	
	rn	
	riv	
	RPT	
	[RPT] STREAM TYPE	
	[RPT] DEPTH	
	[RPT] DEVICE	
	STORED_KM	
	DTM	
VERSION	OFF	
	V1.4	
	V1.4+2.3	
RPT.TYPE	TYPE 0	
	TYPE 1	
STORED_KM	OFF	
	ON	

- 1) HDCP (Active HDCP 1.4 Output):** This page displays the real-time details of HDCP 1.4 communication between this unit and the source currently connected to the HDMI output. “Count” lists how many successful key authorizations have occurred.
Note: These details will only display when the source is encrypted with HDCP v1.4 or lower.
- 2) HDCP (HDCP 2.3 Output):** This page displays the real-time details of HDCP 2.3 communication between this unit and the device currently connected to the HDMI output.

Note: These details will only display when the output is encrypted with HDCP v2.3 or lower.

- 3) **Version:** Select the HDCP version to encode the video signal with, or disable HDCP.

Note: HDCP v2.3 is not supported in DVI mode.

- 4) **RPT.TYPE:** Set the allowed HDCP downgrade capability for connected HDCP repeater devices. Setting it to “Type 0” allows upstream repeaters to downgrade from HDCP v2.3 to v1.4 if necessary, setting it to “Type 1” requires HDCP v2.3 compliance to be maintained all the way to the sink.

- 5) **STORED_KM:** Enable or disable the unit storing exchanged and decrypted km() keys from a connected sink for use when the sink is reconnected later.

Note: Enabling this feature can save time when frequently switching between different displays, but it should not be enabled if HDCP functionality is under test.

PRESET	
2ND LEVEL	3RD LEVEL
PRESET1	APPLY
	VIEW
	SAVE
PRESET2	APPLY
	VIEW
	SAVE
PRESET3	APPLY
	VIEW
	SAVE

1) **Preset 1~3:**

- **Apply:** Select a preset to activate the currently selected preset.
- **View:** Select a preset to view the settings of the currently selected preset.
- **Save:** Select a preset to store the unit's current configurations to the currently selected preset. Settings includes video, audio, HDR, and HDCP.

EDID (EDID ANALYZER)	
2ND LEVEL	3RD LEVEL
SINK	[Current Analytical Data]
RX PORT	
DEFAULT EDID	
[D1] DVI	[Default EDID Details]
[D2] VGA	
[D3] 8B LPCM PC	
[D4] 8B LPCM HD	
[D5] 12 BS 720p	
[D6] 12 BS HD 3D	
[D7] 12 BS 4K6G	
[D8] 12 HBR 4K30	
[D9] 12 HBR 4K420	
[D10] 12 HBR 4K6G	
[D11] 12 LPCM 8K60	
[D12] 12 HBR 8K60	
USER EDID	
[V1~10] User 01~10	[User EDID Details]

- 1) **EDID Analyzer:** This section provides a decoded view of the details of a selected EDID. All EDIDs related to the unit may be viewed, including the connected sink's EDID, the EDID currently being sent to the source, or any Default or stored User EDID.

EDID (EDID COPY SINK)	
2ND LEVEL	3RD LEVEL
[V1~10] User 01~10	[Save Sink EDID to Selected Entry]

- 1) **EDID Copy Sink:** Select any of the Copy EDID items to copy and store the EDID from the currently connected display into that slot. The EDID name will be automatically filled in with name data from the copied EDID.

EDID (EDID BURN SINK)	
2ND LEVEL	3RD LEVEL
[D1] DVI	[Overwrite Sink's EDID with the Selected EDID]
[D2] VGA	
[D3] 8B LPCM PC	
[D4] 8B LPCM HD	
[D5] 12 BS 720p	
[D6] 12 BS HD 3D	
[D7] 12 BS 4K6G	
[D8] 12 HBR 4K30	
[D9] 12 HBR 4K420	
[D10] 12 HBR 4K6G	
[D11] 12 LPCM 8K60	
[D12] 12 HBR 8K60	
[V1~10] User 01~10	

- 1) **EDID Burn Sink:** Select an EDID from the list to overwrite the EDID of the currently connected display with it.

Note 1: The connected display must support EDID update functionality.

Note 2: The user can only burn EDID block0 and block1.

EDID (RX EDID SELECT)	
2ND LEVEL	3RD LEVEL
SINK EDID	[Use Sink EDID]
[D1] DVI	[Use Selected EDID]
[D2] VGA	
[D3] 8B LPCM PC	
[D4] 8B LPCM HD	
[D5] 12 BS 720p	
[D6] 12 BS HD 3D	

EDID (RX EDID SELECT)	
2ND LEVEL	3RD LEVEL
[D7] 12 BS 4K6G	
[D8] 12 HBR 4K30	
[D9] 12 HBR 4K420	
[D10] 12 HBR 4K6G	
[D11] 12 LPCM 8K60	
[D12] 12 HBR 8K60	
[V1~10] User 01~10	

- 1) **RX EDID Select:** Select the EDID to provide to the connected HDMI source. The EDID from the currently connected sink, a built-in Default EDID, or a copied User EDID may be selected for use as the unit's EDID.

SCDC		
2ND LEVEL	3RD LEVEL	4TH LEVEL
SCDC MONITOR	SCDC EN.	[Current Analytical Data]
	SINK VER.	
	SRC VER.	
	[TMDS] CLK RATIO	
	[TMDS] SCRAMB.EN.	
	[TMDS] SCRAMB.ST.	
	RSED_UPD.	
	FLT_UPD.	
	FRL_START	
	SRC_TEST_UPD.	
	RR_TEST	
	CED_UPD.	
	STATUS_UPD.	
CA_PWR_ERR		

SCDC		
2ND LEVEL	3RD LEVEL	4TH LEVEL
	MONO_DIR_ERR	
	MONO_DIR_ON	
	DAISY_ERR	
	FTL_NO_RETRAIN	
	RR_ENABLE	
	FFE_LEVELS	
	FRL_RATE	
	DSC_DECODEFAIL	
	FLT_READY	
	LANE3_LOCKED	
	CH2_LOCKED	
	CH1_LOCKED	
	CH0_LOCKED	
	CLK_DETECTED	
	LN0_LTP_REQ	
	LN1_LTP_REQ	
	LN2_LTP_REQ	
	LN3_LTP_REQ	
	[TEST READ REQ.] REQUEST	
	[TEST READ REQ.] DELAY	
	OUI	
	DEVICE ID	
	HW REV.	
	SW REV.	
	SPECIFIC	

SCDC		
2ND LEVEL	3RD LEVEL	4TH LEVEL
CED MONITOR	CED UPD COUNT	[Current Analytical Data]
	CHECKSUM	
	CH0	
	CH1	
	CH2	
	LN3	
	RSED UPD COUNT	
	RSCC	
	DATETIME	
	RESET COUNTER	
Force Run SCDC	OFF	
	ON	

- 1) **SCDC Monitor:** This page displays the details of the SCDC (Status and Control Data Channel) of the display currently connected to the HDMI output. The CED (Character Error Detection) data for each of the 4 channels can be monitored in real time. While monitoring is live, a time counter will run and each channel will record any errors detected. Pressing “RESET COUNTER” will reset the error counters and clock while continuing to monitor.

ARC	
2ND LEVEL	3RD LEVEL
ARC MONITOR	
ARC TYPE	[ARC Information]
[CHANNEL STATUS]	
AUDIO TYPE	
[CHANNEL STATUS]	
CHANNEL NUM.	

ARC	
2ND LEVEL	3RD LEVEL
[CHANNEL STATUS] SOURCE NUM.	
[CHANNEL STATUS] SAMP.RATE	
[CHANNEL STATUS] WORD LEN.	
ENABLE PATTERN	NO
	YES
MANUAL CEC	SEND

- 1) **ARC Monitor:** This page display the details of the ARC (Audio Return Channel) of the display currently connected to the HDMI output.
- 2) **Enable Pattern:** Enable ARC test pattern settings.
- 3) **Manual CEC:** Manual CEC command send for ARC initiation command.

SETUP	
2ND LEVEL	3RD LEVEL
FW UPDATE	NO
	YES
OLED SAV.	OFF~10M(1M)
OLED CONTRAST	0-8(4)
EDID RESET	NO
	YES
FACTORY RESET	NO
	YES

- 1) **Firmware Update:** Provides a way to update the unit's firmware. To begin the firmware update process, select "Yes".
Note: See Section 8.5 for more detailed firmware update instructions.
- 2) **OLED SAV.:** OLED Panel Saving Time Settings. Set the length of time before the screen is automatically turned off.

- 3) **OLED Contrast:** Set the OLED screen’s contrast level.
- 4) **EDID Reset:** Selecting “Yes” will reset all of the unit’s user EDID back to their factory defaults.
- 5) **Factory Reset:** Selecting “Yes” will reset all of the unit’s settings back to their factory defaults.

INFORMATION	
2ND LEVEL	3RD LEVEL
RESOLUTION	[Current Analytical Data]
PATTERN	
PROTOCOL	
FORMAT	
COLORSPACE	
HDR EMU.	
HDCP STATUS	
HDCP ABILITY	
AUDIO	
SAMP.	[Current Analytical Data]
WORD LEN.	
CHANNELS	
ARC TYPE	
AUDIO TYPE	
BAT. STATUS	[Current Unit Details]
FW VER.	

- 1) **Information:** Displays details about the unit’s current status, battery status, and the current firmware version.

6.7 Test Timings & Patterns

6.7.1 Resolution Support (Analyzer Mode)

All resolutions will be passed without modification.

Note 1: If a source resolution or timing is not natively supported, the resolution will be highlighted.

Note 2: HDMI out content follows HDMI in, except SPD infoframe content and all packet position in data islands.

6.7.2 Resolution Support (Pattern Mode)

This unit supports a 40 output resolution timings in Pattern Mode.

Resolution	Hz	ID	Resolution	Hz	ID	
720x480p	60	0	3840X2160P	24	18	
720x576p	50	1		25	19	
1280x720p	50	2		30	20	
	60	3		48	21	
	100	4		50	22	
	120	5		60	23	
1920x1080i	50	6		100	24	
	60	7		120	25	
	100	8		4096X2160P	24	26
		120			9	25
1920x1080p	24	10	30		28	
	25	11	48		29	
	30	12	50		30	
	48	13	60		31	
	50	14	100		32	
	60	15	120		33	
	100	16	7680X4320P		24	34
	120	17			25	35

Resolution	Hz	ID	Resolution	Hz	ID
				30	36
				48	37
				50	38
				60	39

6.7.3 Test Patterns (Pattern Mode)

There are a total of 20 test patterns available for output when in Pattern Mode.

Test Pattern Name	ID	Test Pattern Name	ID
Black	P1	V Line On/Off	P11
Blue	P2	Circle	P12
Cyan	P3	Crosshatch	P13
Green	P4	Crosshatch Inverse	P14
Magenta	P5	Diagonal	P15
Red	P6	H Line On/Off	P16
White	P7	Motion	P17
Yellow	P8	Multiburst	P18
Color Bar	P9	ARC Test	P19
Grayscale	P10	Letter H	P20

P01 - Black	P02 - Blue	P03 - Cyan	P04 - Green
			
P05 - Magenta	P06 - Red	P07 - White	P08 - Yellow
			

These patterns are full screen purity tests offering eight different full field patterns: **Black, Blue, Cyan, Green, Magenta, Red, White, Yellow**. The color patterns should display an even distribution of brightness and consistent color tone across the screen. The 100% white pattern should display evenly across the screen and not cause the display's overall brightness to lower, or become unstable. The black pattern will give a good idea of the display's true minimum brightness level and is helpful for setting the viewing room lighting levels.

P09 - Color Bar



The **Color Bar** pattern is a series of repeating vertical colored bars (white, yellow, cyan, green, magenta, red, blue, black).

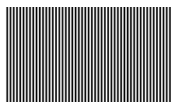
P10 - Grayscale



The **Grayscale** pattern provides a way to fine tune the contrast, brightness and grayscale tracking of your display with a full 265 step gradient progressing from 0% to 100% brightness. When testing a display, no color should be visible at any point across the gradient, and the transition from black to white should appear even and consistent.

Note: This pattern is not available when the resolution is below 1080i.

P11 - V Line On/Off



The **Line On/Off-V** pattern generates an alternating pattern of single-pixel vertical lines. This pattern can be used to analyze the horizontal pixel resolution of your display. If the output appears to have mosaic patterns, or appears to be a solid field (grey, white or black), then it is possible that your display does not fully support the resolution you are currently sending to it.

Note: When outputting above 8K@48Hz the pattern will consist of double, rather than single, pixel lines.

P12 - Circle



The **Circle** pattern provides 1 large white circle in the center and 2 smaller white circles in the upper left and lower right corners of the screen. All 3 circles have center crosses. This pattern can help confirm that the display is maintaining correct geometry across the entire screen.

Note: If the output resolution is set to 4096×2160, 128 pixels the pattern might be cropped by TV.

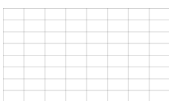
P13 - Crosshatch



The **Crosshatch** pattern is a full black field with a pattern of crossing vertical and horizontal white lines dividing the screen into 8 sections in each direction. This pattern is primarily used to check for color convergence and pincushion issues in projectors.

Note: If the output resolution is set to 4096×2160, 128 pixels the pattern might be cropped by TV.

P14 - Crosshatch Inverse



The **Crosshatch Inverse** pattern is a full white field with a pattern of crossing vertical and horizontal black lines dividing the screen into 8 sections in each direction. This pattern is primarily used to check for color convergence and pincushion issues in projectors.

Note: If the output resolution is set to 4096×2160, 128 pixels the pattern might be cropped by TV.

P15 - Diagonal



The **Diagonal** pattern is two crossing sets of 3 diagonal lines that travel through the exact center of the display. The outer border of the pattern also has a white outline. This pattern can be used to check for alignment and geometry issues, or to help align multi-display video walls.

P16 - H Line on/off



The **H Line on/off** pattern generates an alternating pattern of single-pixel horizontal lines. This pattern can be used to analyze the vertical pixel resolution of your display. If the output appears to have mosaic patterns, or appears to be a solid field (grey, white or black), then it is possible that your display does not fully support the resolution you are currently sending to it.

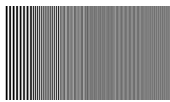
Note: When outputting above 4K@24Hz the pattern will consist of double, rather than single, pixel lines.

P17 - Motion



The **Motion** pattern is a standard (white, yellow, cyan, green, magenta, red, blue, black) 100% color bar pattern using vertical bars with a grey bar moving horizontally from right to left across it.

P18 - Multiburst

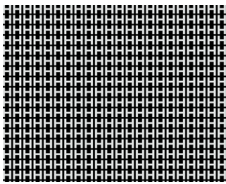
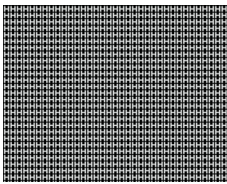
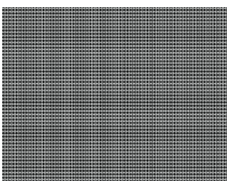


The **Multiburst** pattern provides a condensed multiburst pattern consisting of vertical white lines that decrease in thickness from left to right with an additional block of horizontal single pixel lines below it. This pattern allows the user to analyze the bandwidth and frequency response of the video path and connected display.

P19 - ARC Test



The **ARC Test** pattern is a pattern that you can check whether your ARC/eARC function is enabled and the analysis of your channel status bits.

P20 - Letter H		
Variation 1	Variation 2	Variation 3
		
Large H	Medium H	Small H
<p>The Letter H pattern is a screen filled with a series sizes of capital “H” characters moving vertically up the screen. This is a basic test to confirm motion detail. There are 3 variations: Large “H” characters, medium “H” characters and small “H” characters.</p> <p><i>Note: Hold the Menu button to switch between variations.</i></p>		

6.7.4 Audio Output Support (Pattern Mode)

Audio Source	Sampling Rate (kHz)	Channels	Word Length (Bits)	SD0~3 L/R Freq. (Hz)
Internal Sinewave	48	2.0, 5.1, 7.1	16, 20, 24	Mute 200 ~ 1600
	96			
	192	2.0		

6.8 Serial Commands

6.8.1 General Commands

COMMAND
Description and Parameters
<p>help↵</p> <p>Show all available commands.</p>
<p>help N1↵</p> <p>Show details about the specified command.</p> <p>N1 = {Command}</p>
<p>?↵</p> <p>Show all available commands.</p>
<p>? N1↵</p> <p>Show details about the specified command.</p> <p>N1 = {Command}</p>
<p>get fw ver↵</p> <p>Show the unit's current firmware version.</p>
<p>get command ver↵</p> <p>Show the unit's command version.</p>
<p>get model name↵</p> <p>Show the unit's model name.</p>
<p>get model type↵</p> <p>Show the unit's model type.</p>
<p>set factory default↵</p> <p>Reset the unit to its factory defaults.</p>
<p>get power↵</p> <p>Show the unit's current power state.</p>
<p>set system reboot↵</p> <p>Reboot the unit.</p>

COMMAND
Description and Parameters
get update filename ↵ Show the unit's update firmware filename.
set nickname N1 ↵ Set the name of the unit's nickname. Available values for N1 : N1 = {ASCII string} [Nickname]
get nickname ↵ Show the name of the unit's nickname.
set local echo N1 ↵ Enable or disable the local echo display of typed characters. Available values for N1 : ON [Enabled] OFF [Disabled]
get local echo ↵ Show the current local echo display setting.
set system usb fw update ↵ Trigger the unit's firmware update state and load the new firmware file via usb.

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

6.8.2 Analyzer Mode

COMMAND
Description and Parameters
get in 1 hactive ↵ Show the horizontal active pixel value of the input's current video source.

COMMAND	
Description and Parameters	
get in 1 vactive ↵	Show the vertical active pixel value of the input's current video source.
get in 1 refresh rate ↵	Show the refresh rate of the input's current video source.
get in 1 interlace ↵	Show the interlace state of the input's current video source. Possible response values: 0 [No interlace] 1 [interlaced]
get in 1 sync status ↵	Show the current sync state of the input. Possible response values: 0 [No sync detected] 1 [Sync active]
get in 1 timing ↵	Show the index number of the current resolution detected on the input. <i>Note: Value can only be read if the input is currently selected.</i>
get in 1 timing string ↵	Show the index number and description of the current resolution detected on the input. <i>Note: Value can only be read if the input is currently selected.</i>
get in 1 deep color ↵	Show the detected bit depth of the signal on the input.
get in 1 color space ↵	Show the color space format currently used by the input. Possible response values: 0 [Unknown] 1 [RGB] 2 [YUV444] 3 [YUV422] 4 [YUV420]

COMMAND**Description and Parameters****set in 1 edid N1**↵

Set the EDID to use on the input.

Available values for **N1**:

1	[DVI]
2	[VGA]
3	[8B LPCM PC]
4	[8B LPCM HD]
5	[12 BS 720p]
6	[12 BS HD 3D]
7	[12 BS 4K6G]
8	[12 HBR 4K30]
9	[12 HBR 4K420]
10	[12 HBR 4K6G]
11	[12 LPCM 8K60]
12	[12 HBR 8K60]
13	[User EDID 1]
14	[User EDID 2]
15	[User EDID 3]
16	[User EDID 4]
17	[User EDID 5]
18	[User EDID 6]
19	[User EDID 7]
20	[User EDID 8]
21	[User EDID 9]
22	[User EDID 10]
23	[Output's EDID]

get in 1 edid↵

Show the EDID currently being used on the input.

set edid N1 name N2↵

Set the name for the specified EDID. (Only User EDIDs may be re-named)

Available values for **N1**:

1	[User EDID 1]
2	[User EDID 2]
3	[User EDID 3]
4	[User EDID 4]
5	[User EDID 5]

COMMAND	
Description and Parameters	
6	[User EDID 6]
7	[User EDID 7]
8	[User EDID 8]
9	[User EDID 9]
10	[User EDID 10]
N2 = {ASCII string}	[User EDID name]
get edid N1 name ↵	
Show the name for the specified EDID.	
N1 = 1~10	[User EDID number]
set user N1 edid data N2 ↵	
Upload a new EDID (in hex format) for use as the specified User EDID.	
N1 = 1~10	[User EDID number]
N2 = {EDID data}	[Comma delimited hex pairs]
get user N1 edid data ↵	
Show the current contents of the specified User EDID as hex data.	
N1 = 1~10	[User EDID number]
get sink A edid data ↵	
Show the EDID from the display connected to the output as hex data.	
get in 1 edid data ↵	
Show the EDID currently used by the specified input as hex data.	
get internal N1 edid data ↵	
Show the specified Internal EDID as hex data.	
N1 = 1~12	[Internal EDID number]
get internal edid number ↵	
Show the total number of internal EDIDs in the unit.	
get user edid number ↵	
Show the total number of user EDIDs in the unit.	
get sink edid number ↵	
Show the total number of sink EDIDs in the unit.	

COMMAND							
Description and Parameters							
set factory user edid default↵	Reset the unit's user EDID settings to the factory defaults						
get in 1 hdcp status↵	<p>Show the current HDCP status of the input. Possible response values:</p> <table> <tr> <td>0</td> <td>[No HDCP support]</td> </tr> <tr> <td>1</td> <td>[HDCP 1.x supported]</td> </tr> <tr> <td>2</td> <td>[HDCP 2.x supported]</td> </tr> </table>	0	[No HDCP support]	1	[HDCP 1.x supported]	2	[HDCP 2.x supported]
0	[No HDCP support]						
1	[HDCP 1.x supported]						
2	[HDCP 2.x supported]						
get in 1 hdcp ability↵	<p>Show the HDCP compliance level of the source connected to the input. Possible response values:</p> <table> <tr> <td>0</td> <td>[No HDCP support]</td> </tr> <tr> <td>1</td> <td>[HDCP 1.x supported]</td> </tr> <tr> <td>2</td> <td>[HDCP 2.x supported]</td> </tr> </table>	0	[No HDCP support]	1	[HDCP 1.x supported]	2	[HDCP 2.x supported]
0	[No HDCP support]						
1	[HDCP 1.x supported]						
2	[HDCP 2.x supported]						
set pattern A mode N1↵	<p>Enable or disable the test pattern on the output. Available values for N1:</p> <table> <tr> <td>ON</td> <td>[Enabled]</td> </tr> <tr> <td>OFF</td> <td>[Disabled]</td> </tr> </table>	ON	[Enabled]	OFF	[Disabled]		
ON	[Enabled]						
OFF	[Disabled]						
get pattern A mode↵	Show the current state of the output's test pattern mode.						

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

COMMAND	
Description and Parameters	
set edid N1 name N2 ↵	
Set the name for the specified EDID. (Only User EDIDs may be re-named)	
Available values for N1 :	
1	[User EDID 1]
2	[User EDID 2]
3	[User EDID 3]
4	[User EDID 4]
5	[User EDID 5]
6	[User EDID 6]
7	[User EDID 7]
8	[User EDID 8]
9	[User EDID 9]
10	[User EDID 10]
N2 = {ASCII string}	[User EDID name]
get edid N1 name ↵	
Show the name for the specified EDID.	
N1 = 1~10	[User EDID number]
set user N1 edid data N2 ↵	
Upload a new EDID (in hex format) for use as the specified User EDID.	
N1 = 1~10	[User EDID number]
N2 = {EDID data}	[Comma delimited hex pairs]
get user N1 edid data ↵	
Show the current contents of the specified User EDID as hex data.	
N1 = 1~10	[User EDID number]
get sink A edid data ↵	
Show the EDID from the display connected to the output as hex data.	
get internal N1 edid data ↵	
Show the specified Internal EDID as hex data.	
N1 = 1~12	[Internal EDID number]

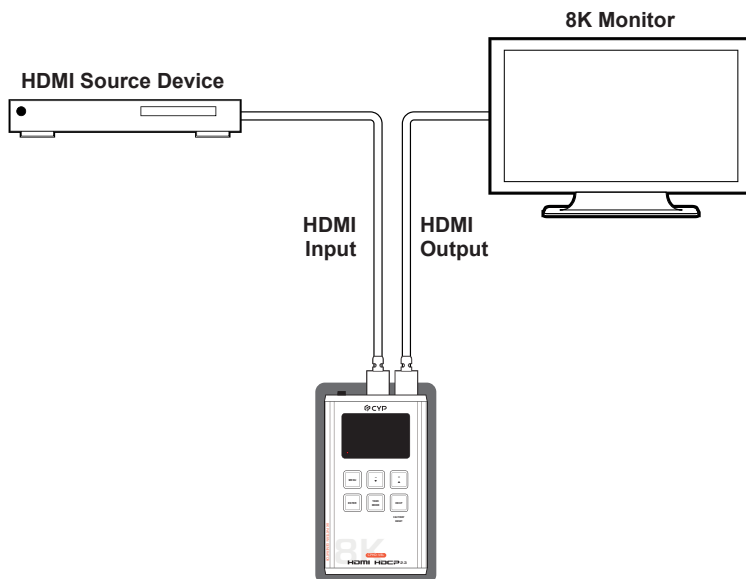
COMMAND													
Description and Parameters													
get internal edid number ↵	Show the total number of internal EDIDs in the unit.												
get user edid number ↵	Show the total number of user EDIDs in the unit.												
get sink edid number ↵	Show the total number of sink EDIDs in the unit.												
set factory user edid default ↵	Reset the unit's user EDID settings to the factory defaults												
get out A hdcp status ↵	<p>Show the current HDCP status of the DVI output.</p> <p>Possible response values:</p> <table> <tr> <td>0</td> <td>[No HDCP]</td> </tr> <tr> <td>1</td> <td>[HDCP 1.x active]</td> </tr> <tr> <td>2</td> <td>[HDCP 2.x active]</td> </tr> <tr> <td>3</td> <td>[HDCP 1.x failed]</td> </tr> <tr> <td>4</td> <td>[HDCP 2.x failed]</td> </tr> </table>	0	[No HDCP]	1	[HDCP 1.x active]	2	[HDCP 2.x active]	3	[HDCP 1.x failed]	4	[HDCP 2.x failed]		
0	[No HDCP]												
1	[HDCP 1.x active]												
2	[HDCP 2.x active]												
3	[HDCP 1.x failed]												
4	[HDCP 2.x failed]												
get out A hdcp ability ↵	<p>Show the HDCP compliance level of the display device connected to the DVI output.</p> <p>Possible response values:</p> <table> <tr> <td>0</td> <td>[No HDCP support]</td> </tr> <tr> <td>1</td> <td>[HDCP 1.x supported]</td> </tr> <tr> <td>2</td> <td>[HDCP 2.x supported]</td> </tr> </table>	0	[No HDCP support]	1	[HDCP 1.x supported]	2	[HDCP 2.x supported]						
0	[No HDCP support]												
1	[HDCP 1.x supported]												
2	[HDCP 2.x supported]												
set pattern A timing n1 ↵	<p>Set the test pattern's resolution for the output.</p> <p>Available values for N1:</p> <table> <tr> <td>0</td> <td>[720x480p59]</td> </tr> <tr> <td>1</td> <td>[720x576p50]</td> </tr> <tr> <td>2</td> <td>[1280x720p50]</td> </tr> <tr> <td>3</td> <td>[1280x720p60]</td> </tr> <tr> <td>4</td> <td>[1280x720p100]</td> </tr> <tr> <td>5</td> <td>[1280x720p120]</td> </tr> </table>	0	[720x480p59]	1	[720x576p50]	2	[1280x720p50]	3	[1280x720p60]	4	[1280x720p100]	5	[1280x720p120]
0	[720x480p59]												
1	[720x576p50]												
2	[1280x720p50]												
3	[1280x720p60]												
4	[1280x720p100]												
5	[1280x720p120]												

COMMAND	
Description and Parameters	
6	[1920x1080i50]
7	[1920x1080i60]
8	[1920x1080i100]
9	[1920x1080i120]
10	[1920x1080p24]
11	[1920x1080p25]
12	[1920x1080p30]
13	[1920x1080p48]
14	[1920x1080p50]
15	[1920x1080p60]
16	[1920x1080p100]
17	[1920x1080p120]
18	[3840x2160p24]
19	[3840x2160p25]
20	[3840x2160p30]
21	[3840x2160p48]
22	[3840x2160p50]
23	[3840x2160p60]
24	[3840x2160p100]
25	[3840x2160p120]
26	[4096x2160p24]
27	[4096x2160p25]
28	[4096x2160p30]
29	[4096x2160p48]
30	[4096x2160p50]
31	[4096x2160p60]
32	[4096x2160p100]
33	[4096x2160p120]
34	[7680x4320p24]
35	[7680x4320p25]
36	[7680x4320p30]
37	[7680x4320p48]
38	[7680x4320p50]
39	[7680x4320p60]
get pattern x1 timing ↵	
Show the test pattern's current resolution for the output.	
get pattern timing list ↵	
List all available test pattern output resolutions with their local index numbers.	

COMMAND	
Description and Parameters	
set pattern A mode N1 ↵	
Enable or disable the test pattern on the output.	
Available values for N1 :	
ON	[Enabled]
OFF	[Disabled]
get pattern A mode ↵	
Show the current state of the output's test pattern mode.	
set pattern A type N1 ↵	
Set the test pattern type to use on the output.	
Available values for N1 :	
1	[Black]
2	[Blue]
3	[Cyan]
4	[Green]
5	[Magenta]
6	[Red]
7	[White]
8	[Yellow]
9	[Color Bar]
10	[Grayscale]
11	[V Line On/Off]
12	[Circle]
13	[Crosshatch]
14	[Crosshatch Inverse]
15	[Diagonal]
16	[H Line On/Off]
17	[Motion]
18	[Multiburst]
19	[ARC test]
20	[Letter H]
get pattern A type ↵	
Show the current test pattern type used by the output.	
get pattern type list ↵	
List all available test pattern types.	

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	40Gbps
Input Port	1×HDMI (Type-A)
Output Port	1×HDMI (Type-A)
Service Port	1×USB 2.0 (Type-C)
Baud Rate	19200
Power Supply	5V/2.1A USB power or Lithium-ion battery (Not included)
ESD Protection (HBM)	±8kV (Air Discharge) ±4kV (Contact Discharge)
Dimensions (W×H×D)	80mm×124mm×26.5mm [Case Only] 80mm×126mm×26.5mm [All Inclusive]
Weight	260g
Chassis Material	Metal (Aluminum)
Chassis Color	Gray
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	4.7W

Note: A battery is not included in the standard package, however the Panasonic NCR18650B (3.6V/3350mAh) Lithium-ion rechargeable battery is recommended.

8.2 Video Specifications

Supported Resolutions (Hz)	Input	Output (Analyzer Bypass)	Output (Pattern)
	HDMI	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	✓	✓	×
1280×800p@60/60RB	✓	✓	×
1280×960p@60/85	✓	✓	×
1280×1024p@60/75/85	✓	✓	×
1360×768p@60	✓	✓	×
1366×768p@60/60RB	✓	✓	×
1400×1050p@60/60RB/75	✓	✓	×
1440×900p@60/60RB/75/85	✓	✓	×
1600×900p@60RB	✓	✓	×
1600×1200p@60	✓	✓	×
1680×1050p@60/60RB	✓	✓	×
1920×1080i@50/60	✓	✓	✓
1920×1080p@24/25/30	✓	✓	✓
1920×1080p@24/25/30/48/50/60/100/120	✓	✓	✓

Supported Resolutions (Hz)	Input	Output (Analyzer Bypass)	Output (Pattern)
	HDMI	HDMI	HDMI
1920×1200p@60RB	✓	✓	×
2560×1440p@60RB	✓	✓	×
2560×1600p@60RB	✓	✓	×
2048×1080p@50/60	✓	✓	×
3840×2160p@24/25/30/30RB	✓	✓	24/25/30
3840×2160p@50/60 (4:2:0)	✓	✓	✓
3840×2160p@24, HDR10	✓	✓	✓
3840×2160p@50/60 (4:2:0), HDR10	✓	✓	✓
3840×2160p@48/50/60/60 RB/100/120	✓	✓	48/50/60/100/120
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@48/50/60/100/120	✓	✓	✓
7680×4320p@24/25/30	✓	✓	✓
7680×4320p@48/50/60 (4:2:0)	✓	✓	✓
7680×4320p@48/50/60	×	×	×

8.3 Audio Specifications

8.3.1 Digital Audio

HDMI Input / Output (Bypass)	
LPCM	
Max Channels	8 Channels
Sampling Rate (kHz)	32, 44.1, 48, 88.2, 96, 176.4, 192
Bitstream	
Supported Formats	Standard & High-Definition
HDMI Output (Test Tone Generation)	
LPCM	
Max Channels	8 Channels
Sampling Rate (kHz)	48, 96, 192 <i>Note: 192kHz only supports 2 channels</i>
Bitstream	
Supported Formats	None

8.4 Cable Specifications

Cable Length	HD	FHD	4K UHD	4K UHD*	8K UHD
High Speed HDMI Cable					
HDMI Input	15m	10m	5m	5m	5m*
HDMI Output	15m	10m	5m	5m	5m*

Note: HDMI 2.1 signals require the use of Ultra High Speed HDMI cables.

Bandwidth Category Examples:

- **HD Video**
 - 720p@60Hz
 - HDMI transmission rates lower than 3Gbps
 - HD-SDI (SMPTE 292M, 1.485Gbps)
- **FHD Video**
 - 1080p@60Hz
 - HDMI transmission rates between 3Gbps and 5.3Gbps
 - 3G-SDI (SMPTE 424M, 2.970Gbps)
- **4K UHD Video**
 - 4K@24/25/30Hz (8-bit color) & 4K@50/60Hz (4:2:0, 8-bit color)
 - HDMI transmission rates between 5.3Gbps and 10.2Gbps
 - 6G-SDI (SMPTE ST 2081, 6Gbps)
- **4K UHD* Video**
 - 1080p@120Hz (10/12-bit HDR)
 - 4K@50/60Hz (4:4:4, 8-bit) & 4K@50/60Hz (4:2:0, 10/12-bit HDR)
 - HDMI transmission rates between 10.2Gbps and 18Gbps
 - 12G-SDI (SMPTE ST 2082, 12Gbps)
- **8K UHD Video**
 - 4K@120Hz (10/12-bit HDR)
 - 8K@24/25/30Hz (10/12-bit HDR) & 8K@50/60Hz (4:2:0, 8-bit color)
 - HDMI transmission rates between 18Gbps and 48Gbps
 - 24G-SDI (SMPTE ST 2083, 24Gbps)

8.5 Operational Notes

• Battery

- When the USB port is connect between the unit & a PC some power is also provided to the unit via USB, however a properly charged battery is still required to operate the unit.
- Many USB hubs do not provide proper 5V power to connected devices. When using a USB hub to connect the unit to a PC, it is strongly recommended to power the unit with a fully charged battery.

• Firmware Update

- From the main menu select “Setup”→“Firmware update”→“Yes”. The unit will then enter the Firmware Update mode.
- Connect a USB cable between the unit & a PC. After connection, the PC will detect the unit as a USB storage device named “USB UPDATE” and the OLED display will read “Paste FW File...”.
- Copy and paste a valid firmware *.BIN file into the USB UPDATE drive.
- After successfully copying the file, the unit will begin the update process. The OLED display will read “Programming...” followed by the HDCP button blinking rapidly. Please do not turn off the power during the programming phase.
- Once the update is complete the unit will automatically reboot.

• Factory Reset

- To return the unit to its factory default settings, please press and hold the “HDCP” key while powering the unit on.

9. ACRONYMS

ACRONYM	COMPLETE TERM
4K UHD	4K Ultra-High-Definition (10.2Gbps max)
4K UHD⁺	4K Ultra-High-Definition (18Gbps max)
8K UHD	8K Ultra-High-Definition (48Gbps max, without DSC)
8K UHD⁺	8K Ultra-High-Definition (48Gbps max, with DSC)
CEC	Consumer Electronics Control
DAC	Digital-to-Analog Converter
dB	Decibel
DSC	Display Stream Compression
DVI	Digital Visual Interface
eARC	Enhanced Audio Return Channel
EDID	Extended Display Identification Data
FRL	Fixed Rate Link
Gbps	Gigabits per second
HDCP	High-bandwidth Digital Content Protection
HDMI	High-Definition Multimedia Interface
HDR	High Dynamic Range
kHz	Kilohertz
LED	Light-Emitting Diode
LPCM	Linear Pulse-Code Modulation
MHz	Megahertz
SDI	Serial Digital Interface
SNR	Signal-to-Noise Ratio
THD+N	Total Harmonic Distortion plus Noise
TMDs	Transition-Minimized Differential Signaling
USB	Universal Serial Bus
Ω	Ohm



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