



# XA-8P

**Battery Powered  
8K HDMI Pattern Generator  
& Analyser**

**OPERATION MANUAL**



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## SAFETY PRECAUTIONS

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

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

## VERSION HISTORY

| REV.     | DATE       | SUMMARY OF CHANGE                                                                                                                        |
|----------|------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Ver 1.00 | 2024/04/16 | Initial Release                                                                                                                          |
| Ver 1.01 | 2024/06/18 | Revised note of V Line on/off & H Line on/off<br>Added note to resolution table for 4096x2160p @100/120<br>Added Output control function |

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## 1. INTRODUCTION

Testing the integrity of an HDMI systems is essential for any professional AV Installer. As commercial and residential systems are upgraded the demands on HDMI cables to deliver the best possible image are becoming greater and can often be overlooked, particularly when delivering HDR content.

The XA-8P is the most advanced battery powered partner for an AV installer, providing a convenient way to test and verify all aspects of an HDMI Signal Path, including the source and the sink. As well as being HDMI 2.1 and HDCP 1.4 / 2.2 / 2.3 compliant, the unit has a number of testing features including System Analysis, Pattern Generator & EDID Management.

The front panel controls are very simple to navigate and the HDMI I/O is easily accessed on the top of the device. The XA-8P is battery operated giving the AV Installer ultimate flexibility in challenging installation scenarios. The battery can be recharged via its USB connector or mains powered through the same port.

## 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 & Analyser (Portable Version)
- /// 1× USB Type-C to USB Type-A Cable
- /// 1× Operation Manual

## 4. SYSTEM REQUIREMENTS

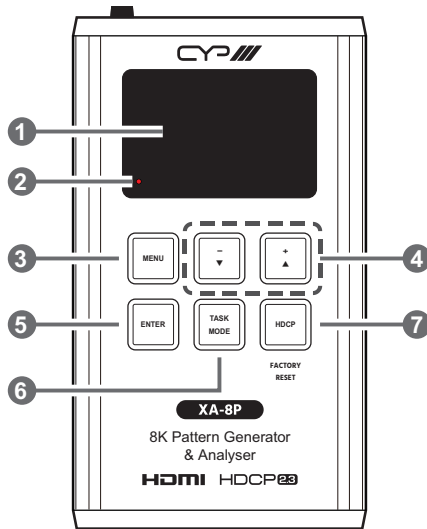
- /// HDMI receiving equipment such as an HDTV, monitor or audio amplifier and/or HDMI source equipment such as a media player, video game console or set-top box.
- /// For portable operation, a battery (not included) is required. The Panasonic NCR18650B (3.6V/3350mAh) Lithium-ion rechargeable battery,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

**Analyser 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 Analyser Mode and Pattern Mode.

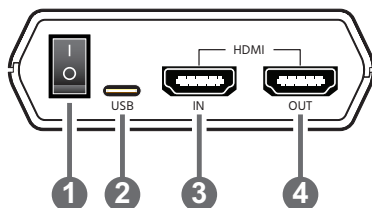
*Note: In Analyser mode, press and hold this button for 2 seconds to toggle the input's hot plug trigger. In Pattern mode, press and hold this button for 2 seconds to switch among presets.*

- 7 **HDCP Button:** Press to switch between supported HDCP versions (1.4, 2.3) or to disable HDCP. In Analyser 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.

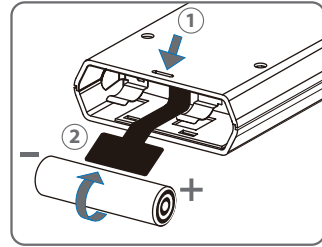
## 6.2 Rear Panel



- ❶ **POWER Switch:** Flip this switch to turn the unit ON or OFF.
- ❷ **USB Port:** Multi-function port for power/battery charging, firmware update or serial command control.
- ❸ **HDMI IN Port:** Connect to HDMI source equipment such as a media player, game console, or set-top box.
- ❹ **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.<br>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 Analyser 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 Analyser Mode

| MAIN MENU           |
|---------------------|
| <b>VIDEO TIMING</b> |
| <b>AUDIO TIMING</b> |
| <b>PACKET</b>       |
| <b>HDCP</b>         |
| <b>EDID</b>         |
| <b>SCDC</b>         |

|               |
|---------------|
| MAIN MENU     |
| INPUT CONTROL |
| SETUP         |
| INFORMATION   |

| VIDEO TIMING             |                           |
|--------------------------|---------------------------|
| 2ND LEVEL                | 3RD LEVEL                 |
| TIMING                   | [Current Analytical Data] |
| STANDARD                 |                           |
| COLORSPACE               |                           |
| COLOR DEPTH              |                           |
| SCRAMBLING               |                           |
| PIXEL REP.               |                           |
| PROTOCOL                 |                           |
| FORMAT                   |                           |
| TMD5 CLOCK<br>[FRL RATE] |                           |
| PIXEL CLOCK              |                           |
| DATA RATE                |                           |
| DSC                      |                           |
| DSC                      | [Current Analytical Data] |
| H CACTIVE                |                           |
| H CBLANK                 |                           |

| VIDEO TIMING    |                           |
|-----------------|---------------------------|
| 2ND LEVEL       | 3RD LEVEL                 |
| 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           |                           |
| 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 colour, 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:** Colour 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 infoframe 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         |                           |
|                | 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) |                           |
|               | 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.     |                           |

| PACKET (AVI) |               |           |
|--------------|---------------|-----------|
| 2ND LEVEL    | 3RD LEVEL     | 4TH LEVEL |
|              | 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<br>[QMS-VRR EN]  |           |
|               | FVA FACTOR<br>[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          | [Current Analytical Data] |
|                | LAST           |                           |
|                | SEQUENCE INDEX |                           |
|                | DS_TYPE        |                           |
|                | SYNC           |                           |
|                | VFR            |                           |
|                | AFR            |                           |
|                | NEW            |                           |
|                | END            |                           |
|                | 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         |                           |



| PACKET (CVTEM) |               |           |
|----------------|---------------|-----------|
| 2ND LEVEL      | 3RD LEVEL     | 4TH LEVEL |
|                | 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]<br>(HDCP 1.x) | Source HDCP | [Current Analytical<br>Data] |
|                              | RX HDCP     |                              |
|                              | Aksv        |                              |
|                              | Bksv        |                              |
|                              | Ri'         |                              |
|                              | COUNT       |                              |
|                              | DTM         |                              |
| [HDCP MONITOR]<br>(HDCP 2.3) | Source HDCP | [Current Analytical<br>Data] |
|                              | RX HDCP     |                              |
|                              | RECEIVER ID |                              |
|                              | TXCAPS      |                              |
|                              | RXCAPS      |                              |
|                              | rn          |                              |
|                              | riv         |                              |
|                              | DTM         |                              |

| HDCP       |           |                           |
|------------|-----------|---------------------------|
| 2ND LEVEL  | 3RD LEVEL | 4TH LEVEL                 |
| 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 ANALYSER) |                           |
|----------------------|---------------------------|
| 2ND LEVEL            | 3RD LEVEL                 |
| SINK                 | [Current Analytical Data] |
| RX PORT              |                           |
| DEFAULT EDID         |                           |

| EDID (EDID ANALYSER) |                        |
|----------------------|------------------------|
| 2ND LEVEL            | 3RD LEVEL              |
| [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 Analyser:** 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       |                     |

| EDID (RX EDID SELECT) |           |
|-----------------------|-----------|
| 2ND LEVEL             | 3RD LEVEL |
| [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) **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                 |           |
|                     | SCRAMB.EN.                |           |
|                     | SCRAMB.ST.                |           |

| SCDC (SCDC MONITOR) |               |                           |
|---------------------|---------------|---------------------------|
| 2ND LEVEL           | 3RD LEVEL     | 4TH LEVEL                 |
| UPDATE FLAGS        | RSED_UPD.     | [Current Analytical Data] |
|                     | FLT_UPD.      |                           |
|                     | FRL_START     |                           |
|                     | STATUS_UPD.   |                           |
|                     | CED_UPD.      |                           |
| SINK CONFIG         | RR_ENABLE     |                           |
|                     | FFE_LEVELS    |                           |
|                     | FRL_RATE      |                           |
| 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 ( <b>150ms</b> ) |
| HPD TOGGLE                  |                               |
| DDC EN. <sup>*PoR</sup>     | NO                            |
|                             | <b>YES</b>                    |
| RXSENSE EN. <sup>*PoR</sup> | NO                            |
|                             | <b>YES</b>                    |

| INPUT CONTROL |             |
|---------------|-------------|
| 2ND LEVEL     | 3RD LEVEL   |
| 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     | <b>NO</b>            |
|               | YES                  |
| OLED SAV.     | OFF~10M( <b>1M</b> ) |
| OLED CONTRAST | 0-8( <b>4</b> )      |
| EDID RESET    | <b>NO</b>            |
|               | YES                  |
| FACTORY RESET | <b>NO</b>            |
|               | 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            |
| OUTPUT CONTROL |
| SETUP          |
| INFORMATION    |

| VIDEO         |              |
|---------------|--------------|
| 2ND LEVEL     | 3RD LEVEL    |
| PATTERN RESO. | 720X480P60   |
|               | 720X576P50   |
|               | 1280X720P50  |
|               | 1280X720P60  |
|               | 1280X720P100 |
|               | 1280X720P120 |
|               | 1920X1080I50 |

| VIDEO     |                     |
|-----------|---------------------|
| 2ND LEVEL | 3RD LEVEL           |
|           | 1920X1080I60        |
|           | 1920X1080I100       |
|           | 1920X1080I120       |
|           | 1920X1080P24        |
|           | 1920X1080P25        |
|           | 1920X1080P30        |
|           | 1920X1080P48        |
|           | 1920X1080P50        |
|           | <b>1920X1080P60</b> |
|           | 1920X1080P100       |
|           | 1920X1080P120       |
|           | 3840X2160P24        |
|           | 3840X2160P25        |
|           | 3840X2160P30        |
|           | 3840X2160P48        |
|           | 3840X2160P50        |
|           | 3840X2160P60        |

| VIDEO        |               |
|--------------|---------------|
| 2ND LEVEL    | 3RD LEVEL     |
|              | 3840X2160P100 |
|              | 3840X2160P120 |
|              | 4096X2160P24  |
|              | 4096X2160P25  |
|              | 4096X2160P30  |
|              | 4096X2160P48  |
|              | 4096X2160P50  |
|              | 4096X2160P60  |
|              | 4096X2160P100 |
|              | 4096X2160P120 |
|              | 7680X4320P24  |
|              | 7680X4320P25  |
|              | 7680X4320P30  |
|              | 7680X4320P48  |
|              | 7680X4320P50  |
|              | 7680X4320P60  |
| PATTERN TYPE | [P1] BLACK    |
|              | [P2] BLUE     |
|              | [P3] CYAN     |
|              | [P4] GREEN    |
|              | [P5] MAGENTA  |
|              | [P6] RED      |
|              | [P7] WHITE    |
|              | [P8] YELLOW   |

| VIDEO      |                      |
|------------|----------------------|
| 2ND LEVEL  | 3RD LEVEL            |
|            | <b>[P9] COLORBAR</b> |
|            | [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 | <b>RGB</b>           |
|            | Y444                 |
|            | Y422                 |
|            | Y420                 |
| PROTOCOL   | <b>AUTO</b>          |
|            | TMDS                 |
|            | FRL                  |
| FORMAT     | DVI                  |
|            | <b>HDMI</b>          |
| FRL RATE   | <b>AUTO</b>          |
|            | FOLLOW EDID          |
|            | 3G-3 LANES           |

| VIDEO     |             |
|-----------|-------------|
| 2ND LEVEL | 3RD LEVEL   |
|           | 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) **Colour space:** Select the colour space format for the video output.

*Note: Available colour 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 ( <b>70</b> ) |
| MUTE <sup>*PoR</sup> | <b>OFF</b>         |
|                      | ON                 |
| SAMP.                | <b>48 KHZ</b>      |
|                      | 96 KHz             |
|                      | 192 KHz            |
| WORD LEN.            | 16B                |
|                      | 20B                |
|                      | <b>24B</b>         |

| AUDIO             |                                  |
|-------------------|----------------------------------|
| 2ND LEVEL         | 3RD LEVEL                        |
| CHANNELS          | 2CH                              |
|                   | 5.1CH                            |
|                   | <b>7.1CH</b>                     |
| SD0L ~ SD3L FREQ. | 200Hz ~ 1600Hz ( <b>1000Hz</b> ) |
|                   | MUTE                             |
| SD0R ~ SD3R FREQ. | 200Hz ~ 1600Hz ( <b>1000Hz</b> ) |
|                   | 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   | <b>OFF</b> |
|              | ON         |



| HDR EMULATOR |                     |
|--------------|---------------------|
| 2ND LEVEL    | 3RD LEVEL           |
| COLORSPACE   | RGB                 |
|              | Y444                |
|              | 4422                |
|              | Y420                |
| COLORIMETRY  | <b>NO DATA(RGB)</b> |
|              | SMPTE 170M          |
|              | BT. 709             |
|              | xvYCC601            |
|              | xvYCC709            |
|              | sYCC601             |
|              | opYCC601            |
|              | opRGB               |
|              | BT.2020 [1]         |
|              | BT.2020 [2]         |
|              | P3-D65              |
|              | P3-DCI Theater      |
|              | BT.2100             |

| HDR EMULATOR   |                       |
|----------------|-----------------------|
| 2ND LEVEL      | 3RD LEVEL             |
| EOTF           | <b>SDR LUMI RANGE</b> |
|                | HDR LUMI RANGE        |
|                | PQ ST 2084            |
|                | HLG BT.2100           |
|                | RESERVED (4H)         |
|                | RESERVED (5H)         |
|                | RESERVED (6H)         |
|                | RESERVED (7H)         |
| METADATA DESC. | <b>METADATA TYPE1</b> |
|                | RESERVED (1H)         |
|                | RESERVED (2H)         |
|                | RESERVED (3H)         |
|                | RESERVED (4H)         |
|                | RESERVED (5H)         |
|                | RESERVED (6H)         |
|                | RESERVED (7H)         |
| MAX CLL        | 0~65500 <b>(0)</b>    |
| MAX FALL       | 0~65500 <b>(0)</b>    |

- 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 colour within the SDR colour range.*

- 2) **Color Space:** Shows the currently active output colour space.
- 3) **Colorimetry:** Set the AVI colourimetry 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]<br>(HDCP 1.x) | TX HDCP      | [Current Analytical<br>Data] |
|                              | SINK HDCP    |                              |
|                              | Aksv         |                              |
|                              | Bksv         |                              |
|                              | RPT          |                              |
|                              | [RPT] DEPTH  |                              |
|                              | [RPT] DEVICE |                              |
|                              | Ri           |                              |
|                              | Ri'          |                              |
|                              | COUNT        |                              |
|                              | DTM          |                              |

| HDCP                         |                   |                              |
|------------------------------|-------------------|------------------------------|
| 2ND LEVEL                    | 3RD LEVEL         | 4TH LEVEL                    |
| [HDCP MONITOR]<br>(HDCP 2.3) | TX HDCP           | [Current Analytical<br>Data] |
|                              | SINK HDCP         |                              |
|                              | RECEIVER ID       |                              |
|                              | TXCAPS            |                              |
|                              | RXCAPS            |                              |
|                              | rn                |                              |
|                              | riv               |                              |
|                              | RPT               |                              |
|                              | [RPT] STREAM TYPE |                              |
|                              | [RPT] DEPTH       |                              |
|                              | [RPT] DEVICE      |                              |
|                              | STORED_KM         |                              |
|                              | DTM               |                              |
| VERSION                      | <b>OFF</b>        |                              |
|                              | V1.4              |                              |
|                              | V1.4+2.3          |                              |
| RPT.TYPE                     | <b>TYPE 0</b>     |                              |
|                              | TYPE 1            |                              |
| STORED_KM                    | <b>OFF</b>        |                              |
|                              | 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 ANALYSER) |                           |
|----------------------|---------------------------|
| 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 Analyser:** 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      |                     |
| [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 EN.          |           |
|           | SINK VER.         |           |
|           | SRC VER.          |           |
|           | [TMDS] CLK RATIO  |           |
|           | [TMDS] SCRAMB.EN. |           |



| SCDC         |                   |                           |
|--------------|-------------------|---------------------------|
| 2ND LEVEL    | 3RD LEVEL         | 4TH LEVEL                 |
| SCDC MONITOR | [TMDS] SCRAMB.ST. | [Current Analytical Data] |
|              | RSED_UPD.         |                           |
|              | FLT_UPD.          |                           |
|              | FRL_START         |                           |
|              | SRC_TEST_UPD.     |                           |
|              | RR_TEST           |                           |
|              | CED_UPD.          |                           |
|              | STATUS_UPD.       |                           |
|              | CA_PWR_ERR        |                           |
|              | 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       |                           |

| SCDC           |                             |                              |
|----------------|-----------------------------|------------------------------|
| 2ND LEVEL      | 3RD LEVEL                   | 4TH LEVEL                    |
|                | LN1_LTP_REQ                 |                              |
|                | LN2_LTP_REQ                 |                              |
|                | LN3_LTP_REQ                 |                              |
|                | [TEST READ REQ.]<br>REQUEST |                              |
|                | [TEST READ REQ.]<br>DELAY   |                              |
|                | OUI                         |                              |
|                | DEVICE ID                   |                              |
|                | HW REV.                     |                              |
|                | SW REV.                     |                              |
|                | SPECIFIC                    |                              |
| CED MONITOR    | CED UPD COUNT               | [Current Analytical<br>Data] |
|                | CHECKSUM                    |                              |
|                | CH0                         |                              |
|                | CH1                         |                              |
|                | CH2                         |                              |
|                | LN3                         |                              |
|                | RSED UPD COUNT              |                              |
|                | RSCC                        |                              |
|                | DATETIME                    |                              |
|                | RESET COUNTER               |                              |
| Force Run SCDC | <b>OFF</b>                  |                              |
|                | 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.     |                   |
| [CHANNEL STATUS] |                   |
| SOURCE NUM.      |                   |
| [CHANNEL STATUS] |                   |
| SAMP.RATE        | [ARC Information] |
| [CHANNEL STATUS] |                   |
| WORD LEN.        | [ARC Information] |
| ENABLE PATTERN   |                   |
|                  | NO                |
|                  | YES               |
| MANUAL CEC       | <b>SEND</b>       |

- 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.

| OUTPUT CONTROL |             |
|----------------|-------------|
| 2ND LEVEL      | 3RD LEVEL   |
| GCP AVMUTE     | <b>OFF</b>  |
|                | ON          |
| OUTPUT         | <b>OFF</b>  |
|                | ON          |
| 5V OUTPUT      | <b>AUTO</b> |
|                | ALWAYS ON   |

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

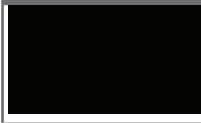
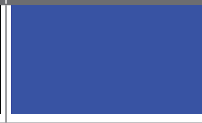
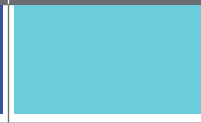
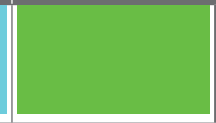
| Resolution | Hz  | ID        | Resolution | Hz  | ID        |
|------------|-----|-----------|------------|-----|-----------|
| 720x480p   | 60  | <b>0</b>  | 3840X2160P | 24  | <b>18</b> |
| 720x576p   | 50  | <b>1</b>  |            | 25  | <b>19</b> |
| 1280x720p  | 50  | <b>2</b>  |            | 30  | <b>20</b> |
|            | 60  | <b>3</b>  |            | 48  | <b>21</b> |
|            | 100 | <b>4</b>  |            | 50  | <b>22</b> |
|            | 120 | <b>5</b>  |            | 60  | <b>23</b> |
| 1920x1080i | 50  | <b>6</b>  |            | 100 | <b>24</b> |
|            | 60  | <b>7</b>  |            | 120 | <b>25</b> |
|            | 100 | <b>8</b>  | 4096X2160P | 24  | <b>26</b> |
|            | 120 | <b>9</b>  |            | 25  | <b>27</b> |
| 1920x1080p | 24  | <b>10</b> |            | 30  | <b>28</b> |
|            | 25  | <b>11</b> |            | 48  | <b>29</b> |
|            | 30  | <b>12</b> |            | 50  | <b>30</b> |
|            | 48  | <b>13</b> |            | 60  | <b>31</b> |
|            | 50  | <b>14</b> |            | 100 | <b>32</b> |
|            | 60  | <b>15</b> |            | 120 | <b>33</b> |

| Resolution | Hz  | ID        | Resolution | Hz        | ID        |
|------------|-----|-----------|------------|-----------|-----------|
|            | 100 | <b>16</b> | 7680X4320P | 24        | <b>34</b> |
|            | 120 | <b>17</b> |            | 25        | <b>35</b> |
|            |     | 30        |            | <b>36</b> |           |
|            |     | 48        |            | <b>37</b> |           |
|            |     | 50        |            | <b>38</b> |           |
|            |     | 60        |            | <b>39</b> |           |

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

| P01 - Black                                                                         | P02 - Blue                                                                          | P03 - Cyan                                                                          | P04 - Green                                                                         |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |  |



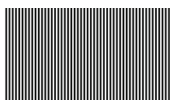
| P05 - Magenta                                                                     | P06 - Red                                                                         | P07 - White                                                                       | P08 - Yellow                                                                      |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|  |  |  |  |

These patterns are full screen purity tests offering eight different full field patterns: **Black, Blue, Cyan, Green, Magenta, Red, White, Yellow**. The colour patterns should display an even distribution of brightness and consistent colour 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 - Colour Bar                                                                  |                                                                                                                                        |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
|  | The <b>Colour Bar</b> pattern is a series of repeating vertical coloured bars (white, yellow, cyan, green, magenta, red, blue, black). |

| P10 - Grayscale                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>The <b>Grayscale</b> 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 colour should be visible at any point across the gradient, and the transition from black to white should appear even and consistent.</p> <p><i>Note: This pattern is not available when the resolution is below 1080i.</i></p> |

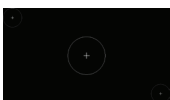
### P11 - V Line On/Off



The **Line On/Off-V** pattern generates an alternating pattern of single-pixel vertical lines. This pattern can be used to analyse 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 4K@100Hz 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 4096x2160, 128 pixels the pattern might be cropped by TV.*

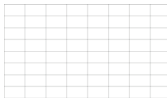
### P13 - Crosshatch



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 colour convergence and pincushion issues in projectors.

*Note: If the output resolution is set to 4096x2160, 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 colour convergence and pincushion issues in projectors.

*Note: If the output resolution is set to 4096x2160, 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 analyse 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.

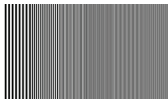
*Note: When outputting above 4K@100Hz the pattern will consist of double, rather than single, pixel lines.*

### P17 - Motion



The **Motion** pattern is a standard (white, yellow, cyan, green, magenta, red, blue, black) 100% colour 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 analyse 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     |

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.

*Note: Hold the Menu button to switch between variations.*

#### 6.7.4 Audio Output Support (Pattern Mode)

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

## 6.8 Serial Commands

### 6.8.1 General Commands

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

| COMMAND                           |                                                                                                                                     |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Description and Parameters        |                                                                                                                                     |
| <b>get power</b> ↵                | Show the unit's current power state.                                                                                                |
| <b>set system reboot</b> ↵        | Reboot the unit.                                                                                                                    |
| <b>get update filename</b> ↵      | Show the unit's update firmware filename.                                                                                           |
| <b>set nickname N1</b> ↵          | Set the name of the unit's nickname.<br>Available values for <b>N1</b> :<br><b>N1</b> = {ASCII string} [Nickname]                   |
| <b>get nickname</b> ↵             | Show the name of the unit's nickname.                                                                                               |
| <b>set local echo N1</b> ↵        | Enable or disable the local echo display of typed characters.<br>Available values for <b>N1</b> :<br>ON [Enabled]<br>OFF [Disabled] |
| <b>get local echo</b> ↵           | Show the current local echo display setting.                                                                                        |
| <b>set system usb fw update</b> ↵ | 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 Analyser Mode

| COMMAND                                                                                    |                    |
|--------------------------------------------------------------------------------------------|--------------------|
| Description and Parameters                                                                 |                    |
| <b>get in 1 hactive</b> ↵                                                                  |                    |
| Show the horizontal active pixel value of the input's current video source.                |                    |
| <b>get in 1 vactive</b> ↵                                                                  |                    |
| Show the vertical active pixel value of the input's current video source.                  |                    |
| <b>get in 1 refresh rate</b> ↵                                                             |                    |
| Show the refresh rate of the input's current video source.                                 |                    |
| <b>get in 1 interlace</b> ↵                                                                |                    |
| Show the interlace state of the input's current video source.<br>Possible response values: |                    |
| 0                                                                                          | [No interlace]     |
| 1                                                                                          | [interlaced]       |
| <b>get in 1 sync status</b> ↵                                                              |                    |
| Show the current sync state of the input.<br>Possible response values:                     |                    |
| 0                                                                                          | [No sync detected] |
| 1                                                                                          | [Sync active]      |
| <b>get in 1 timing</b> ↵                                                                   |                    |
| 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>                    |                    |



## COMMAND

## Description and Parameters

**get in 1 timing string**↵

Show the index number and description of the current resolution detected on the input.

*Note: Value can only be read if the input is currently selected.*

**get in 1 deep color**↵

Show the detected bit depth of the signal on the input.

**get in 1 color space**↵

Show the colour space format currently used by the input.

Possible response values:

|   |           |
|---|-----------|
| 0 | [Unknown] |
| 1 | [RGB]     |
| 2 | [YUV444]  |
| 3 | [YUV422]  |
| 4 | [YUV420]  |

**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]  |

| COMMAND                                                               |                    |
|-----------------------------------------------------------------------|--------------------|
| Description and Parameters                                            |                    |
| 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]    |
| <b>get in 1 edid</b> ↵                                                |                    |
| Show the EDID currently being used on the input.                      |                    |
| <b>set edid N1 name N2</b> ↵                                          |                    |
| Set the name for the specified EDID. (Only User EDIDs may be renamed) |                    |
| Available values for <b>N1</b> :                                      |                    |
| 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]     |
| <b>N2</b> = {ASCII string}                                            | [User EDID name]   |
| <b>get edid N1 name</b> ↵                                             |                    |
| Show the name for the specified EDID.                                 |                    |
| <b>N1</b> = 1~10                                                      | [User EDID number] |

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

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

### 6.8.3 Pattern Mode

| COMMAND                                                    |                 |
|------------------------------------------------------------|-----------------|
| Description and Parameters                                 |                 |
| <b>set out A color space N1 ↵</b>                          |                 |
| Set the colour space format to use on the output.          |                 |
| Available values for <b>N1</b> :                           |                 |
| 1                                                          | [RGB]           |
| 2                                                          | [YUV444]        |
| 3                                                          | [YUV422]        |
| 4                                                          | [YUV420]        |
| <b>get out A color space ↵</b>                             |                 |
| Show the colour space format currently used by the output. |                 |
| <b>set audio out A mute N1 ↵</b>                           |                 |
| Enable or disable muting on the audio output.              |                 |
| Available values for <b>N1</b> :                           |                 |
| ON                                                         | [Mute]          |
| OFF                                                        | [Audio enabled] |
| <b>get audio out A mute ↵</b>                              |                 |
| Show the current mute state of the audio output.           |                 |
| <b>set audio out A volume N1 ↵</b>                         |                 |
| Set the volume level of the audio output.                  |                 |
| <b>N1</b> = 0~80                                           | [Volume level]  |
| <b>get audio out A volume ↵</b>                            |                 |
| Show the current volume level of the audio output.         |                 |
| <b>set audio out A volume up ↵</b>                         |                 |
| Increase the volume level of the audio output by 1 unit.   |                 |

| COMMAND                                                               |                             |
|-----------------------------------------------------------------------|-----------------------------|
| Description and Parameters                                            |                             |
| <b>set audio out A volume down</b> ↵                                  |                             |
| Decrease the volume level of the audio output by 1 unit.              |                             |
| <b>set edid N1 name N2</b> ↵                                          |                             |
| Set the name for the specified EDID. (Only User EDIDs may be renamed) |                             |
| Available values for <b>N1</b> :                                      |                             |
| 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]              |
| <b>N2</b> = {ASCII string}                                            | [User EDID name]            |
| <b>get edid N1 name</b> ↵                                             |                             |
| Show the name for the specified EDID.                                 |                             |
| <b>N1</b> = 1~10                                                      | [User EDID number]          |
| <b>set user N1 edid data N2</b> ↵                                     |                             |
| Upload a new EDID (in hex format) for use as the specified User EDID. |                             |
| <b>N1</b> = 1~10                                                      | [User EDID number]          |
| <b>N2</b> = {EDID data}                                               | [Comma delimited hex pairs] |

| COMMAND                                                             |                        |
|---------------------------------------------------------------------|------------------------|
| Description and Parameters                                          |                        |
| <b>get user N1 edid data</b> ↵                                      |                        |
| Show the current contents of the specified User EDID as hex data.   |                        |
| <b>N1</b> = 1~10                                                    | [User EDID number]     |
| <b>get sink A edid data</b> ↵                                       |                        |
| Show the EDID from the display connected to the output as hex data. |                        |
| <b>get internal N1 edid data</b> ↵                                  |                        |
| Show the specified Internal EDID as hex data.                       |                        |
| <b>N1</b> = 1~12                                                    | [Internal EDID number] |
| <b>get internal edid number</b> ↵                                   |                        |
| Show the total number of internal EDIDs in the unit.                |                        |
| <b>get user edid number</b> ↵                                       |                        |
| Show the total number of user EDIDs in the unit.                    |                        |
| <b>get sink edid number</b> ↵                                       |                        |
| Show the total number of sink EDIDs in the unit.                    |                        |
| <b>set factory user edid default</b> ↵                              |                        |
| Reset the unit's user EDID settings to the factory defaults         |                        |
| <b>get out A hdcp status</b> ↵                                      |                        |
| Show the current HDCP status of the DVI output.                     |                        |
| Possible response values:                                           |                        |
| 0                                                                   | [No HDCP]              |
| 1                                                                   | [HDCP 1.x active]      |
| 2                                                                   | [HDCP 2.x active]      |
| 3                                                                   | [HDCP 1.x failed]      |
| 4                                                                   | [HDCP 2.x failed]      |

## COMMAND

### Description and Parameters

#### get out A hdcv ability↵

Show the HDCP compliance level of the display device connected to the DVI output.

Possible response values:

|   |                      |
|---|----------------------|
| 0 | [No HDCP support]    |
| 1 | [HDCP 1.x supported] |
| 2 | [HDCP 2.x supported] |

#### set pattern A timing n1↵

Set the test pattern's resolution for the output.

Available values for N1:

|    |                 |
|----|-----------------|
| 0  | [720x480p59]    |
| 1  | [720x576p50]    |
| 2  | [1280x720p50]   |
| 3  | [1280x720p60]   |
| 4  | [1280x720p100]  |
| 5  | [1280x720p120]  |
| 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]  |
| 22 | [3840x2160p50]  |
| 23 | [3840x2160p60]  |



| COMMAND                                                                            |                 |
|------------------------------------------------------------------------------------|-----------------|
| Description and Parameters                                                         |                 |
| 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]  |
| <b>get pattern x1 timing</b> ↵                                                     |                 |
| Show the test pattern's current resolution for the output.                         |                 |
| <b>get pattern timing list</b> ↵                                                   |                 |
| List all available test pattern output resolutions with their local index numbers. |                 |
| <b>set pattern A mode N1</b> ↵                                                     |                 |
| Enable or disable the test pattern on the output.                                  |                 |
| Available values for <b>N1</b> :                                                   |                 |
| ON                                                                                 | [Enabled]       |
| OFF                                                                                | [Disabled]      |
| <b>get pattern A mode</b> ↵                                                        |                 |
| Show the current state of the output's test pattern mode.                          |                 |

## COMMAND

## Description and Parameters

**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  | [Colour 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**↵

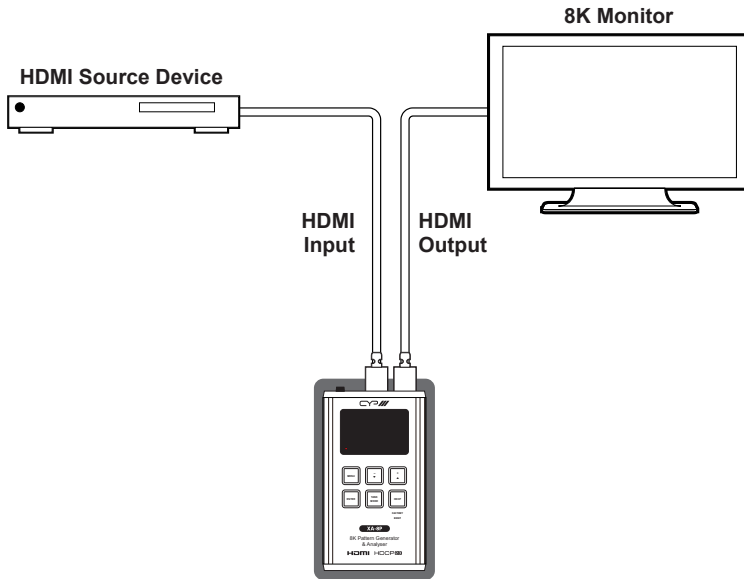
Show the current test pattern type used by the output.

**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

|                              |                                                                    |
|------------------------------|--------------------------------------------------------------------|
| <b>HDMI Bandwidth</b>        | 40Gbps                                                             |
| <b>Input Port</b>            | 1×HDMI (Type-A)                                                    |
| <b>Output Port</b>           | 1×HDMI (Type-A)                                                    |
| <b>Service Port</b>          | 1×USB 2.0 (Type-C)                                                 |
| <b>Baud Rate</b>             | 19200                                                              |
| <b>Power Supply</b>          | 5V/2.1A USB power<br>or<br>Lithium-ion battery (Not included)      |
| <b>ESD Protection (HBM)</b>  | ±8kV (Air Discharge)<br>±4kV (Contact Discharge)                   |
| <b>Dimensions (W×H×D)</b>    | 80mm×124mm×26.5mm [Case Only]<br>80mm×126mm×26.5mm [All Inclusive] |
| <b>Weight</b>                | 260g                                                               |
| <b>Chassis Material</b>      | Metal (Aluminum)                                                   |
| <b>Chassis Colour</b>        | Gray                                                               |
| <b>Operating Temperature</b> | 0°C – 40°C/32°F – 104°F                                            |
| <b>Storage Temperature</b>   | -20°C – 60°C/-4°F – 140°F                                          |
| <b>Relative Humidity</b>     | 20 – 90% RH (Non-condensing)                                       |
| <b>Power Consumption</b>     | 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<br>(Analyser<br>Bypass) | Output<br>(Pattern) |
|--------------------------------|-------|--------------------------------|---------------------|
|                                | HDMI  | HDMI                           | HDMI                |
| <b>720×400p@70/85</b>          | ✓     | ✓                              | ×                   |
| <b>640×480p@60/72/75/85</b>    | ✓     | ✓                              | ×                   |
| <b>720×480i@60</b>             | ✓     | ✓                              | ×                   |
| <b>720×480p@60</b>             | ✓     | ✓                              | ✓                   |
| <b>720×576i@50</b>             | ✓     | ✓                              | ×                   |
| <b>720×576p@50</b>             | ✓     | ✓                              | ✓                   |
| <b>800×600p@56/60/72/75/85</b> | ✓     | ✓                              | ×                   |
| <b>848×480p@60</b>             | ✓     | ✓                              | ×                   |
| <b>1024×768p@60/70/75/85</b>   | ✓     | ✓                              | ×                   |
| <b>1152×864p@75</b>            | ✓     | ✓                              | ×                   |
| <b>1280×720p@50/60</b>         | ✓     | ✓                              | ✓                   |
| <b>1280×768p@60/75</b>         | ✓     | ✓                              | ×                   |
| <b>1280×800p@60/60RB</b>       | ✓     | ✓                              | ×                   |
| <b>1280×960p@60/85</b>         | ✓     | ✓                              | ×                   |
| <b>1280×1024p@60/75/85</b>     | ✓     | ✓                              | ×                   |
| <b>1360×768p@60</b>            | ✓     | ✓                              | ×                   |
| <b>1366×768p@60/60RB</b>       | ✓     | ✓                              | ×                   |
| <b>1400×1050p@60/60RB/75</b>   | ✓     | ✓                              | ×                   |
| <b>1440×900p@60/60RB/75/85</b> | ✓     | ✓                              | ×                   |
| <b>1600×900p@60RB</b>          | ✓     | ✓                              | ×                   |
| <b>1600×1200p@60</b>           | ✓     | ✓                              | ×                   |
| <b>1680×1050p@60/60RB</b>      | ✓     | ✓                              | ×                   |

| Supported Resolutions (Hz)                  | Input | Output (Analyser Bypass) | Output (Pattern) |
|---------------------------------------------|-------|--------------------------|------------------|
|                                             | HDMI  | HDMI                     | HDMI             |
| <b>1920×1080i@50/60</b>                     | ✓     | ✓                        | ✓                |
| <b>1920×1080p@24/25/30</b>                  | ✓     | ✓                        | ✓                |
| <b>1920×1080p@24/25/30/48/50/60/100/120</b> | ✓     | ✓                        | ✓                |
| <b>1920×1200p@60RB</b>                      | ✓     | ✓                        | ×                |
| <b>2560×1440p@60RB</b>                      | ✓     | ✓                        | ×                |
| <b>2560×1600p@60RB</b>                      | ✓     | ✓                        | ×                |
| <b>2048×1080p@50/60</b>                     | ✓     | ✓                        | ×                |
| <b>3840×2160p@24/25/30/30RB</b>             | ✓     | ✓                        | 24/25/30         |
| <b>3840×2160p@50/60 (4:2:0)</b>             | ✓     | ✓                        | ✓                |
| <b>3840×2160p@24, HDR10</b>                 | ✓     | ✓                        | ✓                |
| <b>3840×2160p@50/60 (4:2:0), HDR10</b>      | ✓     | ✓                        | ✓                |
| <b>3840×2160p@48/50/60/60 RB/100/120</b>    | ✓     | ✓                        | 48/50/60/100/120 |
| <b>4096×2160p@24/25/30</b>                  | ✓     | ✓                        | ✓                |
| <b>4096×2160p@50/60 (4:2:0)</b>             | ✓     | ✓                        | ✓                |
| <b>4096×2160p@24, HDR10</b>                 | ✓     | ✓                        | ✓                |
| <b>4096×2160p@50/60 (4:2:0), HDR10</b>      | ✓     | ✓                        | ✓                |
| <b>4096×2160p@48/50/60/100/120</b>          | ✓     | ✓                        | ✓<br>(100/120)*  |
| <b>7680×4320p@24/25/30</b>                  | ✓     | ✓                        | ✓                |
| <b>7680×4320p@48/50/60 (4:2:0)</b>          | ✓     | ✓                        | ✓                |

|                            | Input | Output<br>(Analyser<br>Bypass) | Output<br>(Pattern) |
|----------------------------|-------|--------------------------------|---------------------|
| Supported Resolutions (Hz) | HDMI  | HDMI                           | HDMI                |
| <b>7680×4320p@48/50/60</b> | x     | x                              | x                   |

*\*Note: When the colour space is not Y420, the colour will not be 100% accurate(Ex. RGB red value 255 will become 254)*

## 8.3 Audio Specifications

### 8.3.1 Digital Audio

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

## 8.4 Cable Specifications

| Cable Length          | HD  | FHD | 4K UHD | 4K UHD <sup>+</sup> | 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 colour) & 4K@50/60Hz (4:2:0, 8-bit colour)
  - HDMI transmission rates between 5.3Gbps and 10.2Gbps
  - 6G-SDI (SMPTE ST 2081, 6Gbps)
- **4K UHD<sup>+</sup> 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 colour)
  - 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                                      |
|----------------|----------------------------------------------------|
| <b>4K UHD</b>  | 4K Ultra-High-Definition (10.2Gbps max)            |
| <b>4K UHD+</b> | 4K Ultra-High-Definition (18Gbps max)              |
| <b>8K UHD</b>  | 8K Ultra-High-Definition (48Gbps max, without DSC) |
| <b>8K UHD+</b> | 8K Ultra-High-Definition (48Gbps max, with DSC)    |
| <b>CEC</b>     | Consumer Electronics Control                       |
| <b>DAC</b>     | Digital-to-Analog Converter                        |
| <b>dB</b>      | Decibel                                            |
| <b>DSC</b>     | Display Stream Compression                         |
| <b>DVI</b>     | Digital Visual Interface                           |
| <b>eARC</b>    | Enhanced Audio Return Channel                      |
| <b>EDID</b>    | Extended Display Identification Data               |
| <b>FRL</b>     | Fixed Rate Link                                    |
| <b>Gbps</b>    | Gigabits per second                                |
| <b>HDCP</b>    | High-bandwidth Digital Content Protection          |
| <b>HDMI</b>    | High-Definition Multimedia Interface               |
| <b>HDR</b>     | High Dynamic Range                                 |
| <b>kHz</b>     | Kilohertz                                          |
| <b>LED</b>     | Light-Emitting Diode                               |
| <b>LPCM</b>    | Linear Pulse-Code Modulation                       |
| <b>MHz</b>     | Megahertz                                          |
| <b>SDI</b>     | Serial Digital Interface                           |
| <b>SNR</b>     | Signal-to-Noise Ratio                              |
| <b>THD+N</b>   | Total Harmonic Distortion plus Noise               |
| <b>TMDS</b>    | Transition-Minimized Differential Signaling        |
| <b>USB</b>     | Universal Serial Bus                               |
| <b>Ω</b>       | Ohm                                                |





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