ANI-4KANA-L

4K UHD+ HDMI Signal Generator & Analyzer

(Portable Version)

UHD+ PATTERN GENERATOR & ANALYZER
HDMI HDCP 2.2

MENU

ENTER   TASK MODE   HDCP

FACTORY RESET

A-NeuVideo.com

Frisco, Texas 75036

A▸NEUVIDEO®

AUDIO / VIDEO MANUFACTURER

SAFETY INFORMATION

1. To ensure the best results from this product, please read this manual and all other documentation before operating your equipment. Retain all documentation for future reference.

2. Follow all instructions printed on unit chassis for proper operation.

3. To reduce the risk of fire, do not spill water or other liquids into or on the unit, or operate the unit while standing in liquid.

4. Make sure power outlets conform to the power requirements listed on the back of the unit. Keep unit protected from rain, water and excessive moisture.

5. Do not attempt to clean the unit with chemical solvents or aerosol cleaners, as this may damage the unit. Dust with a clean dry cloth.

6. Do not use the unit if the electrical power cord is frayed or broken. The power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords and plugs, convenience receptacles, and the point where they exit from the appliance.

7. Do not force switched or external connections in any way. They should all connect easily, without needing to be forced.

8. Always operate the unit with the AC ground wire connected to the electrical system ground. Precautions should be taken so that the means of grounding of a piece of equipment is not defeated.

9. AC voltage must be correct and the same as that printed on the rear of the unit. Damage caused by connection to improper AC voltage is not covered by any warranty.

10. Turn power off and disconnect unit from AC current before making connections.

11. Never hold a power switch in the "ON" position.

12. This unit should be installed in a cool dry place, away from sources of excessive heat, vibration, dust, moisture and cold. Do not use the unit near stoves, heat registers, radiators, or other heat producing devices.

13. Do not block fan intake or exhaust ports. Do not operate equipment on a surface or in an environment which may impede the normal flow of air around the unit, such as a bed, rug, carpet, or completely enclosed rack. If the unit is used in an extremely dusty or smoky environment, the unit should be periodically "blown free" of foreign dust and matter.

14. To reduce the risk of electric shock, do not remove the cover. There are no user serviceable parts inside. Refer all servicing to qualified service personnel. There are no user serviceable parts inside.

15. When moving the unit, disconnect input ports first, then remove the power cable; finally, disconnect the interconnecting cables to other devices.

16. Do not drive the inputs with a signal level greater than that required to drive equipment to full output.

17. The equipment power cord should be unplugged from the outlet when left unused for a long period of time.

18. Save the carton and packing material even if the equipment has arrived in good condition. Should you ever need to ship the unit, use only the original factory packing.

19. Service Information Equipment should be serviced by qualified service personnel when:

    A. The power supply cord or the plug has been damaged.
    B. Objects have fallen, or liquid has been spilled into the equipment.
    C. The equipment has been exposed to rain.
    D. The equipment does not appear to operate normally, or exhibits a marked change in performance.
    E. The equipment has been dropped, or the enclosure damaged.

▶ CONTENTS

INTRODUCTION

This portable HDMI Signal Generator & Analyzer provides a convenient way to test and verify all aspects of an HDMI signal path, including source and sink. This unit complies with the HDMI 2.0a and HDCP 1.4/2.2 standards. The unit's analyzer mode complies with the CEA standard HDR static metadata extensions CEA-861-F and CEA-861.3 for EDID analysis.

The unit is powered by a single rechargeable Lithium-Ion battery (not included). Beyond the Lithium-Ion battery, the unit may also be powered (and the battery recharged) via the micro USB port. An external power bank can also be used to extend the portable service time. 4K sources can be scaled down to 1080p output in analyzer mode to support a wider range of displays when analyzing high-bandwidth sources.

The unit has an integrated OLED display which provides a way to quickly and clearly view the current signal state or the results of signal analysis. This portable handheld design is ideal for both the professional end user and installation engineer alike. This unit comes with a 3 year warranty.

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

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.

DISCLAIMERS

The information in this manual has been carefully checked and is believed to be accurate. We assume no responsibility for any infringements of patents or other rights of third parties which may result from its use.

We assume no responsibility for any inaccuracies that may be contained in this document. We make no commitment to update or to keep current the information contained in this document.

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FEATURES

- HDMI input and output with 18Gbps (600MHz) 4K UHD support
- DVI 1.0 compliant with the use of an HDMI-DVI adaptor
- HDCP 1.4 and 2.2 compliant
- Supports HD resolutions up to 4096x2160@60Hz (4:4:4, 8-bit)
- Source bypass support in analyzer mode
- 4K sources can be scaled down to 1080p in analyzer mode to support a wider range of displays when analyzing a high-bandwidth source
- HDR bypass and analysis support
- Source video, audio and timing analysis
- Analysis and emulation of EDID data
- HDCP and SCDC monitoring functions
- HDMI packet analysis
- Analyzer mode complies with the CEA standard HDR static metadata extensions CEA-861-F and CEA-861.3
- (23) selectable output resolutions available in test pattern mode
- (11) selectable static test patterns in test pattern mode
- HDMI 2.0 cable test function including tests for 5V, CEC and hot- plug detection support
- Supports LPCM 2.0, 5.1, and 7.1 audio output with adjustable sinewave frequencies for each channel
- Comprehensive EDID management support with (10) built-in default EDIDs and (10) user EDIDs copied from sink devices
- Powered by a single Lithium-Ion battery (not included) or use of an external USB power bank can provide extended operation time
- OLED display with rapid updates of current status information
- Supports optional Windows control software

PACKAGE CONTENTS

Before attempting to use this unit, please check the packaging and make sure the following items are contained in the shipping carton:

- HDMI Signal Generator & Analyzer (Portable Version)
- USB Mirco-B to USB Type-A Cable
- Users Guide

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.
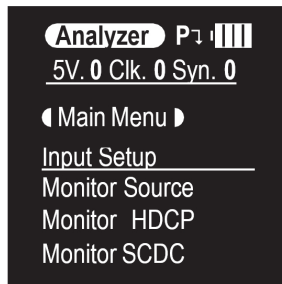
SPECIFICATIONS

- **Video Bandwidth:** 600MHz/18Gbps
- **Input Port:** HDMI
- **Output Port:** HDMI
- **Control Interface:** USB Micro-B
- **HDMI Cable Length:** 10M (1080p@60Hz, 12-bit) / 5M (4K@60Hz, 4:4:4, 8-bit)
- **Power Supply:** 5V/2.1A USB power or Lithium-Ion battery (not included)
- **ESD Protection:** Human Body Model:
    - ±12kV (Air Discharge)
    - ±8kV (Contact Discharge)
- **Dimensions (WxHxD):** 3.15 x 4.9 x 1 in (80x124x26.5mm) [Case Only] 3.15 x 5 x 1 in (80x126x26.5mm) [All Inclusive]
- **Weight:** 9.2 oz / 260g
- **Chassis Material:** Metal
- **Silkscreen Color:** Silver
- **Operating Temperature:** 0˚C - 40˚C/32˚F - 104˚F
- **Storage Temperature:** −20˚C - 60˚C/−4˚F - 140˚F
- **Relative Humidity:** 20 - 90% RH (Non-condensing)
- **Power Consumption:** 4.7W

As product improvements are continuous, specifications are subject to change without notice.
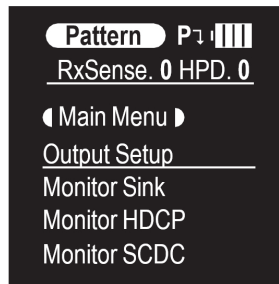
FRONT PANEL
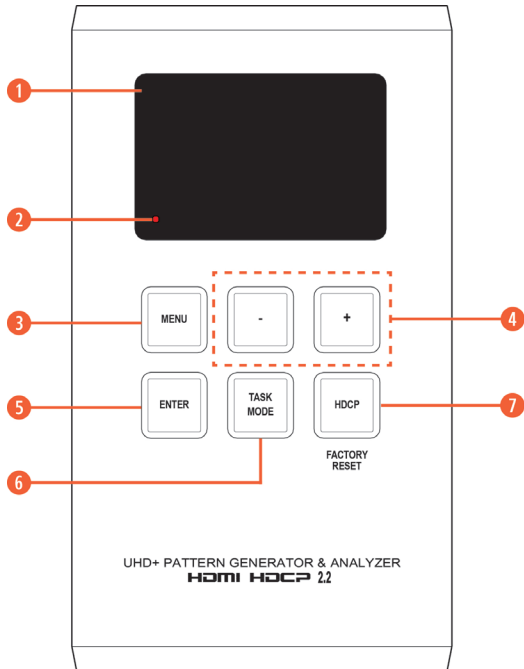
❶ **OLED:** This screen's layout changes depending on the unit's operational mode and selected function. The status lines at the top shows the unit's current operational mode (Analyzer, Pattern, or Cable Test), USB port mode (power or control), power status and mode-specific detection details. Information below the status lines consists of either the unit's menu or signal analysis data.

UHD+ PATTERN GENERATOR & ANALYZER
HDMI HDCP 2.2

Analyzer P ⌐ ▯||||
5V. **0** Clk. **0** Syn. **0**
◀ Main Menu ▶
Input Setup
Monitor Source
Monitor HDCP
Monitor SCDC

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

Pattern P ⌐ ▯||||
RxSense. **0** HPD. **0**
◀ Main Menu ▶
Output Setup
Monitor Sink
Monitor HDCP
Monitor SCDC

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

Cable T. P ⌐ ▯||||
IN ▶━━━━◀OUT
◀ Main Menu ▶
Run Test
Cable Setup
Setup
Information
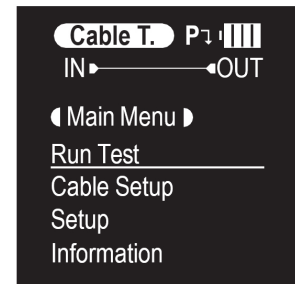
CABLE TEST MODE: The status line will display a cable connection graphic.

❷ **BATTERY CHARGING LED:** The battery charging LED will illuminate red when a USB power source is connected and actively charging the battery.

❸ **MENU:** Press to back out from menu items and return to the main OLED menu screen.

❹ **+/- & ▲/▼:** Press to move up and down or adjust selections within menus.

❺ **ENTER:** Press to confirm a selection or to go deeper into a menu item.
   NOTE: In Analyzer and Pattern modes, press and hold this button for 2 seconds to turn audio On or Off.

❻ **PATTERN:** Press to switch the unit between Analyzer Mode, Pattern Mode and Cable Test Mode.
   *NOTE: In Analyzer mode, press and hold this button for 2 seconds to toggle the input's hot plug trigger. In Pattern mode, press and hold this button for 2 seconds to enable or disable the output's AV Mute function.*

❼ **HDCP:** Press to switch between supported HDCP versions (1.4, 2.2) or to disable HDCP. In Analyzer mode, this changes the HDCP versions supported by the input port. In Pattern mode, this changes the HDCP required by the output port.
   NOTE: The button's outline will light up according to the HDCP state and current version supported. Red = HDCP 1.4, blue = HDCP 2.2, off = HDCP disabled, flashing = HDCP authentication failure.

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

TOP PANEL
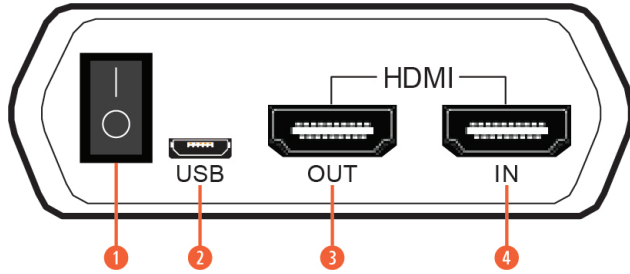
❶ POWER: Flip this switch to turn the unit ON or OFF.

❷ USB: Multi-function port for power/battery charging, firmware update or RS-232 command control.

   NOTE: *USB operation modes are changed within the OLED Setup menu.*

❸ HDMI OUT: Connect to an HDMI TV, monitor or amplifier for digital video and audio output.

❹ HDMI IN: Connect to HDMI source equipment such as a media player, game console or set-top box.

BATTERY COMPARTMENT
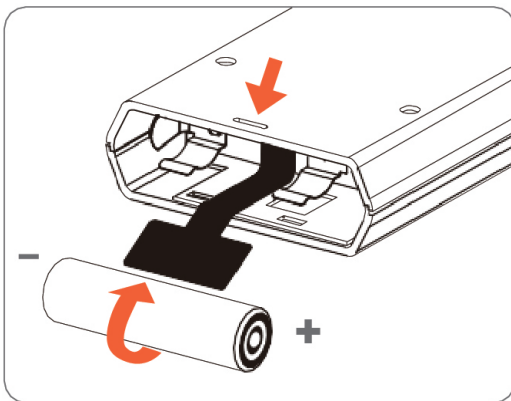
While this unit may be powered directly via the USB port, it is more typically powered by a rechargeable Lithium-ion battery (not included) which is concealed within the bottom of the unit. Battery type recommended NCR18650B.

A. OPENING THE COMPARTMENT: Use a small flathead screwdriver to gently, but firmly, ❶ press down into the slot panel and the bottom cover will pop out. behind the base

B. REMOVING THE BATTERY: If a battery is already installed, ❷ a Mylar tab will be visible beneath the battery. Pull on the Mylar tab to pop the battery out of its holding brackets.

C. 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.

D. 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.

E. 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.*

OLED DISPLAY

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 red to indicate it is in power saving mode. To turn the OLED display back on, press any key. This power saving feature is only available while the unit is not receiving power via USB.

USB PORT FUNCTION

	Battery charge mode.
	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 ~75% charge.
	Battery power with ~50% charge.
	Battery power with under 25% charge. Icon flashes to indicate recharge needed.
	Battery power is critically low. Auto shutdown.

ANALYZER MODE

LEVEL 1	LEVEL 2	LEVEL 3
Input Setup	Hotplug Time	50ms ~ 500ms (150ms)
	Hotplug Toggle	
	RxSense*PoR	**On**
		Off
	DDC Bus*PoR	**On**
		Off
	HDCP Port*PoR	v1.4
		v1.4+v2.2
		Off
	HDCP REAUTH-REQ	
	4K to 1080p	On YCbCr Out
		On RGB Out
		Off
	SCDC Port*PoR	**On**
		Off
	PC Tolerance	1 ~ 10 **(6)**
	Each step is ±1/1000.	
Monitor Source	Timing	[Analytic Data]
	HDCP	
	Format	
	Colorspace	
	Audio	
	Deep Color	
	AVI, AIF, HDR, VSI, AVMute, SPD, 3D	
Monitor HDCP (v1.4)	Source HDCP	[Analytic Data]
	Rx HDCP Port	
	Aksv	
	Bksv	
	Ri Source	
	Ri' Rx	
	Count	
	Day 0 00 : 00 : 00	

LEVEL 1	LEVEL 2	LEVEL 3
Monitor SCDC	Rx SCDC Port	[Analytic Data]
	Sink Version	
	Source Version	
	Scramble Enabled	
	Scramble Status	
	Clock Detect	
	Ch2/1/0 Locked	
	CED Ch0	
	CED Ch1	
	CED Ch2	
	ENTER Reset/Start	
	HF VSDB	
	SCDC Exist	
Monitor HDCP (v2.2)	Source HDCP	[Analytic Data]
	Rx HDCP Port	
	TxCaps	
	RxCaps	
	Receiver ID	
	rn	
	riv	
Monitor SCDC	Rx SCDC Port	[Analytic Data]
	Sink Version	
	Source Version	
	Scramble Enabled	
	Scramble Status	
	Clock Detect	
	Ch2/1/0 Locked	
	CED Ch0	
	CED Ch1	
	CED Ch2	
	ENTER Reset/Start	
	HF VSDB	
	SCDC Exist	

LEVEL 1	LEVEL 2	LEVEL 3
Video Timing	Timing	[Analytic Data]
	TMDS Clock	
	Pixel Clock	
	Data Rate	
	Bit Depth, 3D, Y4:2:0, Scramble	
	Total (H/V Total Pixel/Line)	
	Act (H/V Active Pixel/Line)	
	Polarity (H/V Sync. Polarity)	
	Scan	
	HFreq (H Sync. Frequency)	
	VFreq (V Sync. Frequency)	
	Offset1 (H/V Sync. Offset1)	
	Offset2 (H/V Sync. Offset2)	
Audio Timing	ACR, AIF, ASP, HBR	[Analytic Data]
	N	
	CTS	
	ASP PLL Lock	
	ASP audio FIFO	
	ASP Layout	
	ASP Ch No.	
	CHS App. Type	
	CHS Audio Coding	
	CHS Ch No.	
	CHS Source No.	
	CHS Sampling Rate	
	CHS Sampling Size	
Packet	GCP 0x03	[Analytic Data]
	AVI 0x82	
	AIF 0x84	
	SPD 0x83	
	VSIF H14b 0x81	
	DRMI (HDR) 0x87	

LEVEL 1	LEVEL 2	LEVEL 3
EDID Analyzer	Sink	[Analytic Data]
	Rx 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 4K3G	
	[D9] 12 HBR 4K420	
	[D10] 12 HBR 4K6G	
	[C1 ~ 10] Copy 01 ~ 10	[Copied EDID Details]
EDID Emulator	Copy Sink	
	[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 4K3G	
	[D9] 12 HBR 4K420	
	[D9] 12 HBR 4K420	
	[D10] 12 HBR 4K6G	
	[C1 ~ 10] Copy 01 ~ 10	[Copied EDID Details]
EDID Copy Sink	[C1 ~ 10] Copy 01 ~ 10	[Copied EDID Details]
EDID Burn Sink	[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 4K3G	
	[D9] 12 HBR 4K420	

LEVEL 1	LEVEL 2	LEVEL 3
EDID Burn Sink	[D10] 12 HBR 4K6G	[Default EDID Details]
	[C1 ~ 10] Copy 01 ~ 10	[Copied EDID Details]
Setup	USB Port	**Power**
		RS-232
	OLED Contrast	0 ~ 8 **(6)**
	Firmware Update	Yes/**No**
	Power Saving	2min ~ 10min
		Off
	EDID Reset	Yes/**No**
	Factory Restore	Yes/**No**
Information	[Unit Version Details]	

FACTORY DEFAULT: Items in **BOLD** are the factory default settings.

POWER-ON RESET: Items marked with ***PoR** will return to their factory default settings when the power is turned off.

PATTERN MODE

LEVEL 1	LEVEL 2	LEVEL 3
Output Setup	Timing	[T1] 720x480p59
		[T2] 720x576p50
		[T3] 1280x720p25
		[T4] 1280x720p30
		[T5] 1280x720p50
		[T6] 1280x720p60
		[T7] 1920x1080i50
		[T8] 1920x1080i60
		[T9] 1920x1080p24
		[T10] 1920x1080p25
		[T11] 1920x1080p30
		[T12] 1920x1080p50
		[T13] 1920x1080p60
		[T14] 3840x2160p24
		[T15] 3840x2160p25
		[T16] 3840x2160p30
		[T17] 3840x2160p50
		[T18] 3840x2160p60
		[T19] 4096x2160p24

LEVEL 1	LEVEL 2	LEVEL 3
Output Setup	Timing	[T20] 4096x2160p25
		[T21] 4096x2160p30
		[T22] 4096x2160p50
		[T23] 4096x2160p60
	Pattern	[P1] Black
		[P2] Blue
		[P3] Cyan
		[P4] Green
		[P5] Magenta
		[P6] Red
		[P7] White
		[P8] Yellow
		[P9] Color Bar
		[P10] Grayscale 256
		[P11] V Line OnOff
	Format	**HDMI**
		DVI
	Colorspace	**RGB**
		YUV444
	ColorRange	**Full**
		Limited
	Audio LPCM[*PoR]	2CH
		5.1CH
		7.1CH
	HDCP Out	v1.4
		v2.2
		Off
	HDCP V2.2 AKE_Stored_ km()	On
		Off
	AVMute[*PoR]	**On**
		Off
	Output[*PoR]	**On**
		Off
	+5V Out	**Follow**
		On

LEVEL 1	LEVEL 2	LEVEL 3
Monitor Sink	HDCP Port/Auth	[Analytic Data]
	EDID	
	SCDC Port	
Monitor HDCP (Output HDCP 1.4)	Tx HDCP	[Analytic Data]
	Sink HDCP Port	
	Aksv	
	Bksv	
	Ri Tx	
	Ri' Sink	
	Count	
	Day 0 00:00:00	
Monitor HDCP (Output HDCP 2.2)	Tx HDCP	[Analytic Data]
	Sink HDCP Port	
	TxCaps	
	RxCaps	
	Receiver ID	
	rn	
	riv	
	Stored km	
	Sink REAUTH	
	Count	
	Day 0 00:00:00	
Monitor SCDC	Sink SCDC Port	[Analytic Data]
	Sink Version	
	Source Version	
	Scramble Enable	
	Scramble Status	
	Clock Detect	
	Ch2/1/0 Locked	
	CED Ch0	
	CED Ch1	
	CED Ch2	
	+5V Out	
	ENTER Reset/Start	
	HF VSDB	
	SCDC Exist	

LEVEL 1	LEVEL 2	LEVEL 3
Audio Output	Volume	0 ~ 80 **(70)**
	Sample Rate	**48 kHz**
		96 kHz
		192 kHz
	Word Length	16 Bits
		20 Bits
		24 Bits
	Channels*PoR	2
		5.1
		7.1
	SD0-L ~ SD03-L Freq.	Mute
		200Hz ~ 1600Hz **(1000Hz)**
	SD0-R ~ SD3-R Freq.	Mute
		200Hz ~ 1600Hz **(1000Hz)**
EDID Analyzer	Same as Analyzer Mode	[Analytic Data]
EDID Emulator		
EDID Copy Sink		
EDID Burn Sink		
HDR Emulator	HDR Out	On
		Off
	AVI Colorimetry	BT.2020 (1)
		BT.2020 (2)
		No Data
		ITU601
		ITU709
		xvYCC601
	AVI Colorimetry	xvYCC709
		sYCC601
		Adobe Y601
		Adobe RGB
	EOTF	[0] SDR Lumi Range
		[1] HDR Lumi Range
		[2] SMPTE ST2084.2
		[3] Future EOTF
	Metadata Descr.	**S. Metadata Type 1**
		Reserved

LEVEL 1	LEVEL 2	LEVEL 3
HDR Emulator	Max. Content L-L	**0 ~ 65500 (0)**
	Max. FrameAve L-L	**0 ~ 65500 (0)**
	AVI Color Space	[Analytic Data]
	Sink EDID HDR	
Setup	USB Port	**Power**
		RS-232
	OLED Contrast	0 ~ 8 **(6)**
	Firmware Update	Yes/**No**
	Power Saving	2min ~ 10min
		Off
	EDID Reset	Yes/**No**
	Factory Restore	Yes/**No**
Information	[Unit Version Details]	

FACTORY DEFAULT: Items in **BOLD** are the factory default settings.

POWER-ON RESET: Items marked with ***PoR** will return to their factory default settings when the power is turned off.

CABLE TEST MODE

LEVEL 1	LEVEL 2	LEVEL 3
Run Test (Enter–Start/Stop)	[Testing Specifications]	[Analytic Data] (PASS or FAIL result)
	+5V	
	Hotplug	
	DDC Bus	
	CEC	
	4K6G A/V	
Cable Setup	Level	Normal
		Strict
	Length	2M
		3M
		4M
		5M
	Time	**2 minute**
		5 minute
		10 minute
		15 minute
		30 minute

LEVEL 1	LEVEL 2	LEVEL 3
Cable Setup	Time	1 hour
		Infinite
	AVI Color Space	[Analytic Data]
	Sink EDID HDR	
Setup	USB Port	**Power**
		RS-232
	OLED Contrast	0 ~ 8 **(6)**
	Firmware Update	Yes/**No**
	Power Saving	2min ~ 10min
		Off
	EDID Reset	Yes/**No**
	Factory Restore	Yes/**No**
Information	[Unit Version Details]	

FACTORY DEFAULT: Items in **BOLD** are the factory default settings.

RUN TEST: Once the testing begins, the test progress bar and the final PASS or FAIL result shows on the 2nd page. Please press the down button to view this information.

CABLE TESTING: The cable testing feature performs tests based on the HDMI 2.0 error rate tolerance specification for 18Gbps signals and is provided as an advisory tool only. It is recommended that each cable under test should be tested at least three times to help eliminate outlier results.

TEST TIMINGS

1. OUTPUT RESOLUTIONS (PATTERN MODE): This unit supports a total of (23) output resolution timings when in Pattern Mode.

Test Timing List	HZ	ID
720x480p	59	T01
720x576p	50	T02
1280x720p	25	T03
	30	T04
	50	T05
	60	T06
1920x1080i	50	T07
	60	T08
1920x1080p	24	T09
	25	T10
	30	T11
	50	T12
	60	**T13**
3840x2160p	24	T14
	25	T15
	30	T16
	50	T17
	60	T18
4096x2160p	24	T19
	25	T20
	30	T21
	50	T22
	60	T23

2. INPUT/OUTPUT RESOLUTIONS (ANALYZER MODE): This unit provides (3) options for how to handle the output of 4K video input sources when in Analyzer mode. These choices are selectable from the "Input Setup" menu using the "4K to 1080p" item.
- To pass the 4K source without modification set "4K to 1080p" to "Off".
- To scale the 4K source down to 1080p and output as YCbCr, set it to "On YCbCr Out".
- To scale the 4K source down to 1080p and output as RGB, set it to "On RGB Out".

All other (non-4K) resolutions will be passed without modification regardless of this setting.

When 4K sources are scaled down to 1080p they will maintain the same refresh rate. For example, if the source is 4K@24Hz, the scaled timing will be 1080p@24Hz.

Input/Output Resolution Support

INPUT/OUTPUT RESOLUTION SUPPORT: This unit supports a total of (23) output resolution timings when in Pattern Mode.

PC RESOLUTION	VERTICAL FREQUENCY (HZ)	INPUT HDMI	OUTPUT HDMI
640x350p	85	✓	✓
640x480p	59, 72, 75, 85	✓	✓
720x400p	70, 85	✓	✓
800x600p	56, 60, 72, 75, 85	✓	✓
848x480p	60	✓	✓
1024x768p	60, 70, 75, 85	✓	✓
1152x864p	70, 75, 85	✓	✓
1280x768p	60 (RB), 60, 75, 85	✓	✓
1280x800p	60 (RB), 60, 75, 85	✓	✓
1280x960p	60, 85	✓	✓

PC RESOLUTION	VERTICAL FREQUENCY (HZ)	INPUT HDMI	OUTPUT HDMI
1280x1024p	60, 75, 85	✓	✓
1360x768p	60	✓	✓
1366x768p	60 (RB), 60	✓	✓
1400x1050p	60 (RB), 60	✓	✓
1440x900p	60 (RB), 60	✓	✓
1600x900p	60 (RB)	✓	✓
1600x1200p	60	✓	✓
1680x1050p	60 (RB), 60	✓	✓
1920x1200p	60 (RB)	✓	✓

NOTE: *RB = Reduced Blanking.*

PC RESOLUTION	VERTICAL FREQUENCY (HZ)	INPUT HDMI	OUTPUT HDMI
480i	59, 60	✓	✓
480p	59, 60	✓	✓
576i	50	✓	✓
576p	50	✓	✓
720p	25, 29, 30	✓	✓
	50, 59, 60	✓	✓
1080i	50, 59, 60	✓	✓
1080p	23, 24, 25, 29, 30	✓	✓
	50, 59, 60	✓	✓
2048x1080p	23, 24, 25, 29, 30	✓	✓
	50, 59, 60	✓	✓
3840x2160p	23, 24, 25, 29, 30	✓	✓
	50, 59, 60	✓	✓
4096x2160p	23, 24, 25, 29, 30	✓	✓
	50, 59, 60	✓	✓

NOTE: *If a source resolution or timing is not natively supported, the resolution will be displayed on the unit as "Timing?"*

TEST PATTERNS

1. OUTPUT VIDEO SUPPORT (PATTERN MODE): There are a total of (11) test patterns available for output when in Pattern Mode.

TEST PATTERN NAME	VARIATIONS	ID
Black		P01
Blue		P02
Cyan		P03
Green		P04
Magenta		P05
Red		P06
White		P07
Yellow		P08
Color Bar		P09
Grayscale 256		P10
Line On/Off-V		P11

1. BLACK	2. BLUE	3. CYAN	4. GREEN
5. MAGENTA	**6. RED**	**7. WHITE**	**8. YELLOW**
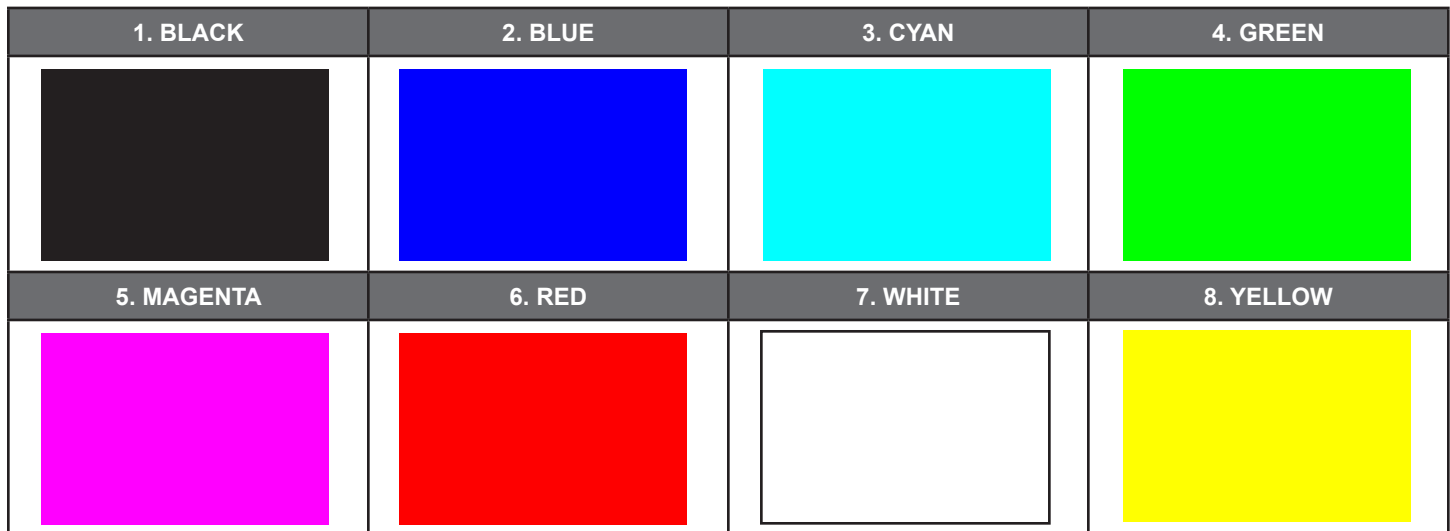
These patterns are full screen purity tests offering (8) different full field patterns: **Black, Blue, Cyan, Green, Magenta, Red, White, Yellow.** The color patterns should display an even distribution of brightness and consistent color tone across the screen. The 100% white pattern should display evenly across the screen and not cause the display's overall brightness to lower, or for the image to become instable. The black pattern will give a good idea of the display's true minimum brightness capability and is helpful for setting the viewing room lighting levels.
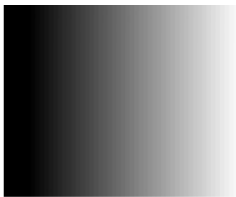
9. COLOR BAR
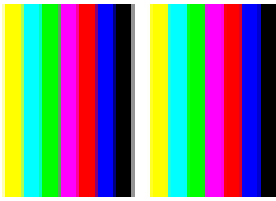
The **Color Bar** pattern is a series of repeating vertical colored bars (white, yellow, cyan, green, magenta, red, blue, black).

This pattern is not available when the output color range is set to "Limited".

10. GRAYSCALE 256

The **Grayscale 256** pattern provides a way to fine tune the contrast, brightness and grayscale tracking of your display with a full 265 step gradient progressing from 0% to 100% brightness. When testing a display, no color should be visible at any point across the gradient, and the transition from black to white should appear even and consistent.

This pattern is not available when the resolution is below 1080i, the color space is set to YUV 4:4:4, or the color range is set to "Limited".

11. LINE ON/OFF-V

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

When outputting 4K@50/60Hz the pattern will consist of double, rather than single, pixel lines.

This pattern is not available when the color space is set to YUV 4:4:4, or the color range is set to "Limited".

2. OUTPUT AUDIO SUPPORT (PATTERN MODE)

AUDIO SOURCE	SAMPLING RATE (KHZ)	CHANNELS	WORD LENGTH (BITS)	SD0~3 L/R Freq. (Hz)	ANALOG OUTPUT
Internal Sinewave	48	2.0, 5.1, 7.1	16, 20, 24	Mute, 200 ~ 1600	SD0~3 L/R
	96				
	192	2.0			SD0 L/R

RS-232 PROTOCOL

When the unit is set to RS-232 mode in the System menu and connected to a PC via a USB cable, the following COM port settings should be used for direct control.

Baud Rate: 115200bps

Data Bits: 8

Parity: None

Flow Control: None

Stop Bit: 1

RS-232 COMMANDS

Before using the commands, please read the following:

SYNTAX
- All commands **MUST** start with the **"$"** character or the command will not be recognized by the unit. Commands must end with a carriage return (0x0D). Use of a line feed (0x0A) is optional. Commands are not case-sensitive.

RESPONSES
- The unit will respond to most commands with a repeat of the original command followed by the specified parameters or requested information except where otherwise noted. If an invalid command is entered, the unit will respond with **"$err"**. All unit responses end with a carriage return (0x0D) + line feed (0x0A).

CAUTIONS
- Only one command may be processed at a time. Additional commands should not be sent until the response from the previous command has been received.

COMMAND	DESCRIPTION	VARIABLES
$?↵	Show full command list.	
$HELP ↵	Show full command list.	
$4K_TO_1080P N1 ↵	Set the 4K downscaling mode.	Available values for **N1**: OFF [No downscaling] ON_RGB [1080p, RGB color] ON_YUV [1080p, YUV color]
$4K_TO_1080P? ↵	Display the current 4K downscaling mode.	
$AUDIO_CH N1 ↵	Set the number of internally sourced audio output channels.	Available values for **N1**: 2 [2 Channels (2.0)] 6 [6 Channels (5.1)] 8 [8 Channels (7.1)]
$AUDIO_CH? ↵	Display the current number of audio output channels.	
$AUDIO_FREQ N1,N2 ↵	Set the internal audio output frequency of the selected channel (in Hz).	Available Values for **N1**: SD0_L [SD0 Left Channel] SD0_R [SD0 Right Channel] SD1_L [SD1 Left Channel] SD1_R [SD1 Right Channel] SD2_L [SD2 Left Channel] SD2_R [SD2 Right Channel] SD3_L [SD3 Left Channel] SD3_R [SD3 Right Channel] N2 = MUTE, 200, 400, 600, 800, 1000, 1200, 1400, 1600

COMMAND	DESCRIPTION	VARIABLES
$AUDIO_FREQ? N1 ↵	Display the internal audio output frequency of the selected channel (in Hz).	Available Values for **N1**: SD0_L [SD0 Left Channel] SD0_R [SD0 Right Channel] SD1_L [SD1 Left Channel] SD1_R [SD1 Right Channel] SD2_L [SD2 Left Channel] SD2_R [SD2 Right Channel] SD3_L [SD3 Left Channel] SD3_R [SD3 Right Channel]
$AUDIO_MUTE N1 ↵	Turn the audio output mute on or off.	**N1** = ON, OFF
$AUDIO_MUTE? ↵	Display the audio output mute state.	
$AUDIO_SR N1 ↵	Set the internal audio output sampling rate (in kHz).	**N1** = 48, 96, 192
$AUDIO_SR? ↵	Display internal audio output sampling rate.	
$AUDIO_VOL N1 ↵	Set the audio output volume.	**N1** = 0 ~ 80
$AUDIO_VOL? ↵	Display the current audio output volume.	
$BOOT GO ↵	Reboot the unit. *The unit won't respond to any commands during the boot process.*	
$BOOT? ↵	Display the current boot state.	
$CABLE_LEVEL N1 ↵	Set the cable test level.	**N1** = NORMAL, STRICT
$CABLE_LEVEL? ↵	Display the cable test level.	
$CABLE_RESULT? ↵	Display the cable test result.	
$CABLE_RUN N1 ↵	Start or stop the cable testing process.	**N1** = START, STOP
$CABLE_RUN? ↵	Display the cable test status.	
$CABLE_TIME N1 ↵	Set the testing time for the cable test.	Available values for **N1**: 1　　　[2 Minutes] 2　　　[5 Minutes] 3　　　[10 Minutes] 4　　　[15 Minutes] 5　　　[30 Minutes] 6　　　[1 Hour] 7　　　[Infinite]
$CABLE_TIME? ↵	Display the currently set testing time.	
$COLOR_SPACE N1 ↵	Set the output color space.	Available values for **N1**: RGB　　[RGB 4:4:4] Y444　[YCbCr 4:4:4]
$COLOR_SPACE? ↵	Display the current output color space.	
$EDID_COPY_SINK N1 ↵	Copy the current HDMI sink's EDID to the designated copy slot. *If the copy fails "$err" will be displayed.*	**N1** = C1 ~ C10
$EDID_MANUF? N1 ↵	Display the manufacturer name stored in the EDID of the selected location. *If the EDID fails to be read, "$err_ddc" will be displayed.* *If the EDID has invalid content, "$err_bad" will be displayed.*	Available values for **N1**: RX　　[HDMI Input (Rx) Port] SINK_H [HDMI Sink]

COMMAND	DESCRIPTION	VARIABLES
$EDID_MODEL? N1 ↵	Display the model/monitor name stored in the EDID of the selected location. *If the EDID fails to be read, "$err_ddc" will be displayed.* *If the EDID has invalid content, "$err_bad" will be displayed.*	Available values for **N1**: RX [HDMI Input (Rx) Port] SINK_H [HDMI Sink]
$EDID_NAME N1,N2 ↵	Set the EDID name of the selected copy slot.	**N1** = C1 ~ C10 **N2** = {Name} [20 characters max]
$EDID_NAME? N1 ↵	Display the name of the selected EDID slot.	**N1** = D1 ~ D10, C1 ~ C10
$EDID_NATIVE? N1 ↵	Display the native resolution value stored in the EDID of the selected location. *First detailed timing from Block 0.* *If the EDID fails to be read, "$err_ddc" will be displayed.* *If the EDID has invalid content, "$err_bad" will be displayed.*	Available values for **N1**: RX [HDMI Input (Rx) Port] SINK_H [HDMI Sink]
$EDID_READ N1,N2 ↵	Displays the selected data block stored in the EDID of the selected location. *This data is output as a bit stream of 128 bytes following the <CR><LF> of the command acknowledgement.* *Each hex data unit is composed of 3 digits. The first 2 digits are the hex value. The 3rd digit is a space (0x20).* *Blocks 2 & 3 are only supported from the HDMI sink.* *If the EDID fails to be read, "$err_ddc" will be displayed.* *If block 2 or block 3 doesn't exist, "$err_block" will be displayed.*	Available values for **N1**: D1 ~ D10 [Default EDID 1 ~ 10] C1 ~ C10 [Copy EDID 1 ~ 10] SINK_H [HDMI Sink] Available values for **N2**: BLOCK0 [EDID Block 0] BLOCK1 [EDID Block 1] BLOCK2 [EDID Block 2] BLOCK3 [EDID Block 3]
$EDID_RX N1 ↵	Select the EDID to use with the unit's HDMI input (Rx).	Available values for **N1**: D1 ~ D10 [Default EDID 1 ~ 10] C1 ~ C10 [Copy EDID 1 ~ 10] SINK [Current HDMI sink]
$EDID_RX? ↵	Display the current EDID selection for the unit's HDMI input (Rx).	
$EDID_TYPE? N1 ↵	Display the EDID type of the selected location. *If the EDID fails to be read, "$err_ddc" will be displayed.* *If the EDID has invalid content, "$err_bad" will be displayed.*	Available values for **N1**: RX [HDMI Input(Rx) Port] SINK_H [HDMI Sink]
$EDID_WRITE N1,N2 N3 ↵	Directly write an EDID block to the selected EDID location. *The data must be sent as a 128 byte hex data bit stream following the <CR><LF> in the N3 part of the command.* *Each hex data unit is composed of 3 digits. The first 2 digits are the hex value. The 3rd digit is a space (0x20).* *If the sum of the 128 byte data isn't 0, "$err_ checksum" will be displayed.*	Available values for **N1**: RX [HDMI Input(Rx) Port] SINK_H [HDMI Sink] Available values for **N2**: BLOCK0 [EDID Block 0] BLOCK1 [EDID Block 1] **N3** = <CR><LF>{128 byte hex data}
$FACTORY ↵	Execute a factory reset and reboot the unit. *Stored Copy EDIDs and Ethernet settings will not be reset.*	**N1** = NORMAL, STRICT
$FWVER? ↵	Display the current firmware version.	

| COMMAND	DESCRIPTION	VARIABLES
$HDCP_IN_SW N1 ↵	Enable or disable HDCP support for the unit's HDMI input. *Affects Analyzer mode only.*	**N1** = ON, OFF
$HDCP_IN_SW? ↵	Display the current HDCP support setting for the unit's HDMI input.	
$HDCP_IN_VER N1 ↵	Set the HDCP version to use on the unit's HDMI input. *Affects Analyzer mode only.*	Available values for **N1**: V1.4 [HDCP v1.4 only] V1.4+V2.2 [HDCP v1.4 & v2.2]
$HDCP_IN_VER? ↵	Display the current HDCP version used on the unit's HDMI input.	
$HDCP_OUT_SW N1 ↵	Enable or disable HDCP support on the unit's HDMI output. *Affects Pattern mode only.*	**N1** = ON, OFF
$HDCP_OUT_SW? ↵	Display the HDMI output's HDCP status. *A status of "Talk" means HDCP is currently performing handshaking.*	
$HDCP_OUT_VER N1 ↵	Set the HDCP version to use on the unit's HDMI output. *Affects Pattern mode only.*	Available values for **N1**: V1.4 [HDCP v1.4] V2.2 [HDCP v2.2]
$HDCP_OUT_VER? ↵	Display the current HDCP version for the output port.	

$HDR_EOTF N1 ↵	Set the HDR EOTF (Electro-Optical Transfer Function) mode.	Available values for **N1**:
		SDR [Traditional Gamma, SDR
		          Luminance Range]
		HDR [Traditional Gamma, HDR
		          Luminance Range]
		2084 [SMPTE ST 2084]
		RSVD [Reserved for future use]

$HDR_EOTF? ↵	Display the current HDR EOTF mode.	
$HDR_MCLL N1 ↵	Set the maximum HDR content light level.	**N1** = 0 ~ 65500 [100 unit increments]
$HDR_MCLL? ↵	Display the current maximum HDR content light level.	
$HDR_MFALL N1 ↵	Set the maximum HDR frame-average light level.	**N1** = 0 ~ 65500 [100 unit increments]
$HDR_MFALL? ↵	Display the current maximum HDR frame-average light level.	
$HDR_SW N1 ↵	Enable or disable HDR support on the unit's HDMI output.	**N1** = ON, OFF
$HDR_SW? ↵	Display the current HDR support status for the unit's HDMI output.	
$HDR_TX_COL N1 ↵	Set the HDMI output (Tx) AVI Colorimetry mode.	Available values for **N1**: 1 [No Data] 2 [ITU 601] 3 [ITU 709] 4 [xvYCC 601] 5 [xvYCC 709] 6 [sYCC 601] 7 [Adobe Y601] 8 [Adobe RGB] 9 [BT.2020 (1) Y'CC'BCC'RC] 10 [BT.2020 (2) R'G'B'/Y'C'BC'R]

COMMAND	DESCRIPTION	VARIABLES
$HDR_TX_COL? ↵	Display the current HDMI output (Tx) AVI Colorimetry mode.	
$MODEL? ↵	Display the unit's model number.	
$PATTERN N1 ↵	Select the test pattern to output.	Available values for **N1**: 1 [Black] 2 [Blue] 3 [Cyan] 4 [Green] 5 [Magenta] 6 [Red] 7 [White] 8 [Yellow] 9 [Color Bar] 10 [Grayscale 256] 11 [V Line On/Off]
$HDR_TX_COL?↵	Display the current HDMI output (Tx) AVI Colorimetry mode.	
$MODEL? ↵	Display the unit's model number.	
$PATTERN N1 ↵	Select the test pattern to output.	Available values for **N1**: 1 [Black] 2 [Blue] 3 [Cyan] 4 [Green] 5 [Magenta] 6 [Red] 7 [White] 8 [Yellow] 9 [Color Bar] 10 [Grayscale 256] 11 [V Line On/Off]
$PATTERN? ↵	Display the current test pattern selection.	
$RX_DDC N1 ↵	Enable or disable the DDC bus for the HDMI input (Rx).	**N1** = ON, OFF
$RX_DDC? ↵	Display the DDC bus state for the HDMI input (Rx).	
$RX_HOTPLUG N1 ↵	Set the hot plug value for the HDMI input (Rx).	Available values for **N1**: OFF [Set hot plug low] ON [Set hot plug high] TOGGLE [Toggle low→high]
$RX_HOTPLUG? ↵	Display the current hot plug state for the HDMI input (Rx).	
$RX_HOTPLUG_T N1 ↵	Set the hot plug time (in milliseconds) for the HDMI input (Rx).	**N1** = 50 ~ 500 [50ms increments]
$RX_HOTPLUG_T? ↵	Display the current hot plug time (in milliseconds) for the HDMI input (Rx).	
$RX_PC_TOL N1 ↵	Set PC source clock detection tolerance for the HDMI input (Rx)..	**N1** = 1 ~ 10 [1/1000 ~ 10/1000]
$RX_PC_TOL? ↵	Display the PC source clock detection tolerance for the HDMI input (Rx).	
$RX_SCDC N1 ↵	Enable or disable the SCDC port function on the HDMI input (Rx).	**N1** = ON, OFF

COMMAND	DESCRIPTION	VARIABLES
$RX_SCDC? ↵	Display the current SCDC port state for the HDMI input (Rx).	
$RX_SENSE N1 ↵	Enable or disable the RxSense function for the HDMI input (Rx).	**N1** = ON, OFF
$RX_SENSE? ↵	Display the current RxSense state for the HDMI input (Rx).	
$SINK_DETECT? N1 ↵	Displays a variety of sink detection status and informational values.	
	VARIABLES: Available values for **N1**: HOTPLUG [Sink's hot plug status] RSENSE [Sink's RxSense status] HDCP [Sink HDCP status detection] HDCP_AKSV [Sink AKSV in 2-digit hex (HDCP v1.4)] HDCP_BKSV [Rx BKSV in 2-digit hex (HDCP v1.4)] HDCP_RXID [HDCP Rx ID in 2-digit hex (HDCP v2.2)] SCDC_SCR_ENABLE [Rx SCDC source enable scrambling state] SCDC_SCR_STATUS [SCDC sink scrambling status] SCDC_SINK_VER [SCDC sink version] SCDC_SOURCE_VER [SCDC source version]	
$SOURCE_DETECT? N1 ↵	Displays a variety of source detection status and informational values.	
	VARIABLES: Available values for **N1**: 5V [5V detection state] HDCP [Source HDCP status detection] HDCP_AKSV [Source AKSV in 2-digit hex (HDCP v1.4)] HDCP_BKSV [Rx BKSV in 2-digit hex (HDCP v1.4)] HDCP_RXID [HDCP Receiver ID in 2-digit hex (HDCP v2.2)] SCDC_SCR_ENABLE [Rx SCDC source enable scrambling state] SCDC_SCR_STATUS [SCDC sink scrambling status] SCDC_SINK_VER [SCDC sink version] SCDC_SOURCE_VER [SCDC source version] CKDT [TMDS clock detection] DATA_RATE [Video data rate in Mbps] TMDS_FORMAT [Detected TMDS format (DVI/HDMI)] SCDT [TMDS sync detection] HA [Horizontal active pixels] HBP [Horizontal back porch pixels] HFP [Horizontal front porch pixels] HSW [Horizontal sync width pixels] HT [Total horizontal pixels] HSP [Horizontal sync polarity] HVS_OFFSET1 [Horizontal/vertical sync offset1 in dot] HVS_OFFSET2 [Horizontal/vertical sync offset2 in dot] PIXEL_CLOCK [Pixel clock in kHz] SCAN [Video scan mode (P = Progressive, I = Interlaced)] TIMING [Video timing (Ref. "Source Video Timing List")] TMDS_CLOCK [TMDS clock in kHz] VA [Vertical active lines] VBP [Vertical back porch lines] VFP [Vertical front porch lines] VSW [Vertical sync width lines] VT [Total vertical lines]	

COMMAND	DESCRIPTION	VARIABLES
	VSP [Vertical sync polarity] ACR [Audio-Clock-Recovery packet status] ACR_CTS [Audio-Clock-Recovery CTS value] ACR_N [Audio-Clock-Recovery N value] ASP [Audio-Sample packet status] ASP_CH [Audio-Sample packet channel number] ASP_FIFO [Audio-Sample packet audio FIFO (error/normal)] ASP_LAYOUT [Audio-Sample packet layout] ASP_PLL [Audio-Sample packet PLL (locked/unlocked)] CHS_CODE [Channel-status audio coding] CHS_SR [Channel-status sampling rate in kHz] CHS_SS [Channel-status sampling size] CHS_TYPE [Channel-status app type (consumer/professional)] HBR [High-Bit-Rate packet status] AIF [Display packet-AIF data in 2-digit hex] AVI [Display packet-AVI data] DRMI [Display packet-DMI data] GCP [Display packet-GCP data] SPD [Display packet-SPD data] VSI [Display packet-VSI data] SCDC_SCR_ENABLE [Rx SCDC source enable scrambling state] SCDC_SCR_STATUS [SCDC sink scrambling status] SCDC_SINK_VER [SCDC sink version] SCDC_SOURCE_VER [SCDC source version]	
$TASK_MODE N1 ↵	Set the unit's operation mode to Signal Analyzer or Pattern Generation.	Available values for **N1**: CABLE [Cable Test Mode] ANALYSER [Analyzer Mode] PATTERN [Pattern Mode]
$TASK_MODE? ↵	Display the unit's current operation mode.	
$TIMER_DAY? ↵	Display the unit's test timer day value.	
$TIMER_HOUR? ↵	Display the unit's test timer hour value.	
$TIMER_MINUTE? ↵	Display the unit's test timer minute value.	
$TIMER_SECOND? ↵	Display the unit's test timer second value.	
$TIMING N1 ↵	Select the output resolution timing to use.	Available values for **N1**: 1 [720x480p@59] 2 [720x576p@50] 3 [1280x720p@25] 4 [1280x720p@30] 5 [1280x720p@50] 6 [1280x720p@60] 7 [1920x1080i@50] 8 [1920x1080i@60] 9 [1920x1080p@24] 10 [1920x1080p@25] 11 [1920x1080p@30] 12 [1920x1080p@50] 13 [1920x1080p@60] 14 [3840x2160p@24] 15 [3840x2160p@25] 16 [3840x2160p@30] 17 [3840x2160p@50]

COMMAND	DESCRIPTION	VARIABLES
$TIMING N1 ↵	Select the output resolution timing to use.	18 [3840x2160p@60] 19 [4096x2160p@24] 20 [4096x2160p@25] 21 [4096x2160p@30] 22 [4096x2160p@50] 23 [4096x2160p@60]
$TIMING? ↵	Display the unit's current output resolution timing by timing number.	
$TIMINGX? ↵	Display the unit's current output resolution timing by timing name.	
$TMDS_FORMAT N1 ↵	Set the video output format.	**N1** = HDMI, DVI
$TMDS_FORMAT? ↵	Display the current video output format.	
$TMDS_SW N1 ↵	Enable or disable video output.	**N1** = ON, OFF [Off disables video output]
$TMDS_SW? ↵	Display the current video output status.	
$TX_5V N1 ↵	Set the unit's output +5V pin state to follow the TMDS output state or to always be on.	Available values for **N1**: FOLLOW [Only output 5V if there is a live signal] ON [Always output 5V]
$TX_5V? ↵	Display the current output +5V pin setting.	
$UPDATE_FW ↵	Update firmware from USB & reboot the unit.	

CONNECTION DIAGRAM
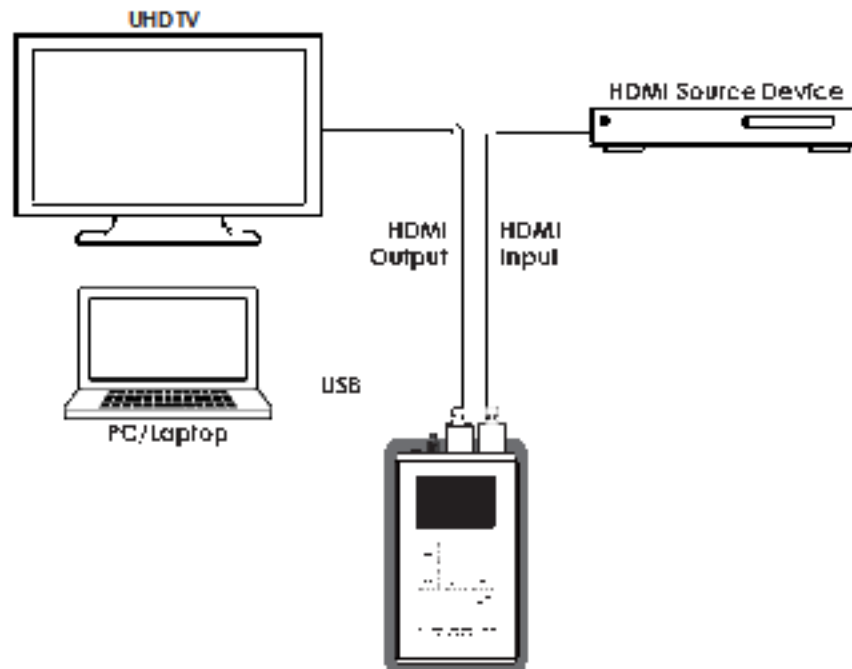
OPERATIONAL NOTES

BATTERY
- When the USB port is set to RS-232 mode some power is also provided to the unit via USB, however a properly charged battery is still required to fully 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.

PC CONTROL SOFTWARE
- This unit may also be controlled via a Windows PC software application. For more details, please refer to the separate Control Software for Signal Generator & Analyzer manual.

CABLE TESTING
- The cable testing feature performs tests based on the HDMI 2.0 error rate tolerance specification for 18Gbps signals and is provided as an advisory tool only. It is recommended that each cable under test should be tested at least three times to help eliminate outlier results.

ACRONYMS

ACRONYM	COMPLETE TERM
3D	Three-Dimensional
CEC	Consumer Electronics Control
CED	Character Error Detection
DDC	Display Data Channel
DVI	Digital Visual Interface
EDID	Extended Display Identification Data
EOTF	Electro-Optical Transfer Function
HD	High-Definition
HDCP	High-bandwidth Digital Content Protection
HDMI	High-Definition Multimedia Interface
HDR	High Dynamic Range
HDTV	High-Definition Television
Hz	Hertz
kHz	kilohertz
LED	Light-Emitting Diode
LPCM	Linear Pulse-Code Modulation
mAh	milliampere hour
min	minute
ms	millisecond
OLED	Organic Light-Emitting Diode
OSD	On-Screen Display
PC	Personal Computer
PoR	Power-On Reset
RB	Reduced Blanking
SCDC	Status and Control Data Channel
SDR	Standard Dynamic Range
SMPTE	Society of Motion Picture and Television Engineers
TMDS	Transition-Minimized Differential Signaling
UHD	Ultra-High-Definition
UHDTV	Ultra-High-Definition Television
USB	Universal Serial Bus
VGA	Video Graphics Array

INSTALLATION

Before beginning the installation of the software, please remember to uninstall any previously installed versions of the software, to avoid potential conflicts, by using the Windows **"Add or Remove Programs"** function.

Next, please obtain the **"Anapat"** software from your authorized dealer and save it in a directory where you can easily find it. Extract all files from the **Anapat.zip** file, find the **Setup.exe** file and execute it to launch the Installation Wizard.

Follow the installation prompts and select your preferred installation location to complete the installation.

Welcome to the Anapat installation program.

Setup cannot install system files or update shared files if they are in use. Before proceeding, we recommend that you close any applications you may be running.

OK   Exit Setup

Begin the installation by clicking the button below.

Click this button to install Anapat software to the specified destination directory.

Directory:
C:\Program Files (x86)\Anapat\   Change Directory

Exit Setup

After the installation has completed, a copy of the **Anapat** shortcut will be placed within your **Start** menu and it will have the same icon as seen here.

CONNECTION

The Anapat software can connect to the ANI-4KANA via RS-232 or Ethernet. The ANI-4KANAL via RS-232 (Using the Micro-USB port). Please follow the steps below to connect using the method appropriate for the device you wish to control.

CONNECT VIA ETHERNET (ANI-4KANA Only)

Step 1: Start the Anapat software by clicking on it in the **Start** Menu.

Step 2: Select **"Ethernet"** as the control interface.

Not Linked   Control Interface
Ethernet   IP: Find IP   Refresh

Step 3: *(If you already know the IP address of the unit, skip to Step 4.)* If you do not know the IP address of the unit you wish to connect to, click on the **"Find IP"** button. This will open up a window listing all available units on the local network.

Control Interface
Ethernet   IP: 192.168.1.50   Find IP   Refresh

Double click on selected IP to connect Ethernet.

IP	MAC
192.168.1.50	FF:FF:FF:FF:FF:FF
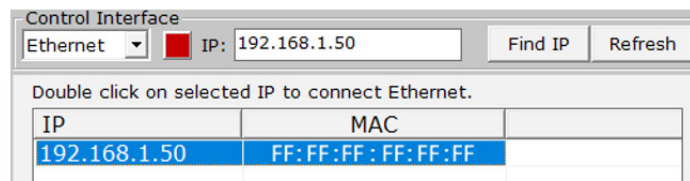
Step 4: Double click on the IP address of the unit you want to connect to or manually type it into the space provided.

Step 5: If the connection button is showing **Red ( )**, click it to initiate the connection. The **"Not Linked"** message should change to **"Accepted"** and the connection button will turn **Green ( )**.

Accepted   Control Interface
Ethernet   IP: 192.168.1.50   Find IP   Refresh
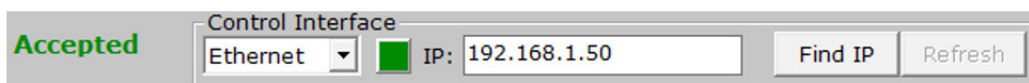
CONNECT VIA RS-232

Step 1: Start the Anapat software by clicking on it in the **Start** Menu.

NOTE: *If you are attempting to connect to the ANI-4KANAL, remember to change the USB connection to **"RS-232"** in the unit's "Setup" menu before connecting it to the PC's USB port.*

Step 2: Select **"RS-232"** as the control interface..
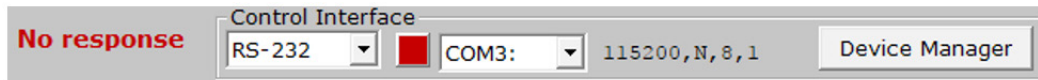
Step 3: *(If you already know the COM port of the unit, skip to Step 4.)* If you do not know the COM port of the unit you wish to connect to, click on the **"Device Manager"** button which will open up the Windows Device Manager. Browse through the devices listed under **"Ports (COM & LPT)"** to find the correct COM port.
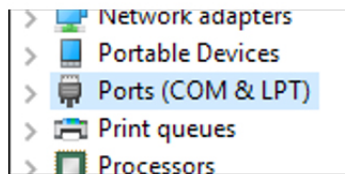
Step 4: Select the correct COM port of the unit from the dropdown in the Anapat software and the software should automatically connect to the unit. If it is successful the connection button will turn **Green (** ▮ **)** and the **"Not Linked"** message will change to read **"Accepted".**
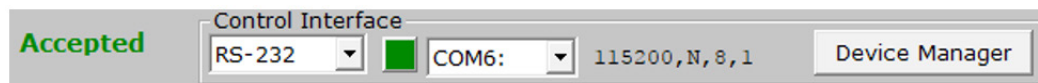
Step 5: If the connection button is still showing **Red (** ▮ **)**, double check that you have selected the correct COM port and that the cable is properly connected. Click the button to attempt to re-initiate the connection.

SOFTWARE OPERATION

All major functions of the Signal Generator & Analyzer units are accessible from the tabs and buttons provided in the main window of the Anapat software. These include operation mode selection, EDID management, output resolution selection, pattern selection, function control, sink/source monitoring, and cable testing **(ANI-4KANAL only)**.

OPERATIONAL MODE

The Signal Generator & Analyzer units have (2) main operational modes, Analyzer Mode and Pattern Mode. The ANI-4KANAL has an additional 3rd mode, cable testing.
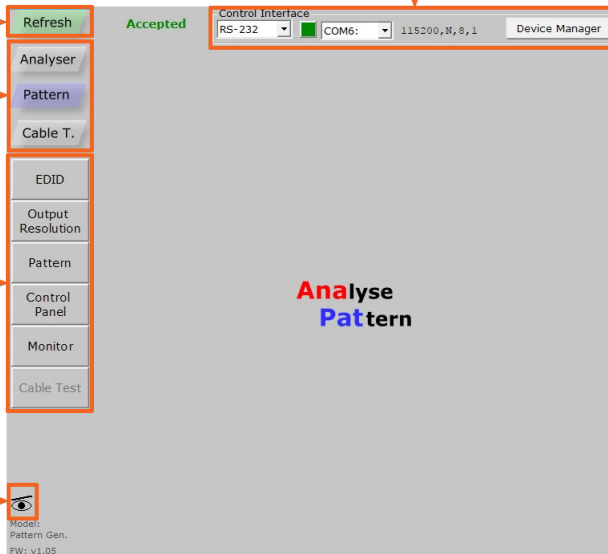
Figure 1: Mode Selection

Select the preferred mode of operation by clicking the appropriate button in the **Mode Selection** area of the software. The unit will take a few seconds to change modes and refresh its data. Once the process has completed the button will be highlighted and normal control can resume.

You may now select one of the **Main Function** buttons on the left side of the interface. This will populate the interface with all appropriate controls and data relating to the selected function.

If at any time you feel that the currently displayed data is not correct or up to date *(due to direct manual operation of the unit, for example)* you may click on the **REFRESH** button to force a re-download of the unit's data to the software.

Clicking on the **COMMAND MONITOR** button (👁) will open a second window that displays all command responses from the connected unit. Individual Telnet commands may also be entered here to test command syntax or to control the unit directly.
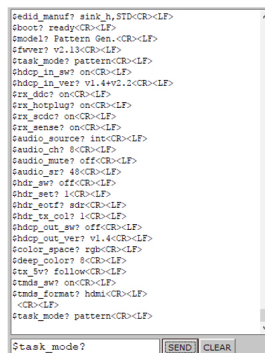
Figure 2: Command Window

EDID MANAGEMENT (Analyzer Mode & Pattern Mode)

This tab provides control over the unit's EDID Management including options to select, read, write, analyze and save any EDID available to the unit. These functions are primarily used when in Analyzer Mode, however they are available in both modes.
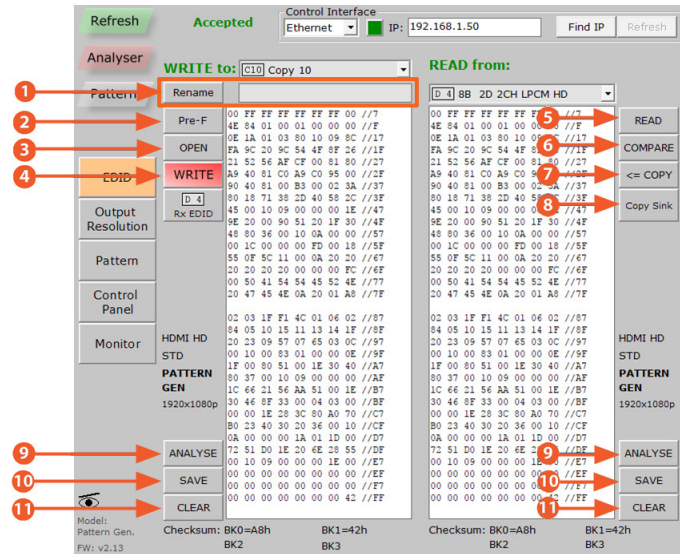

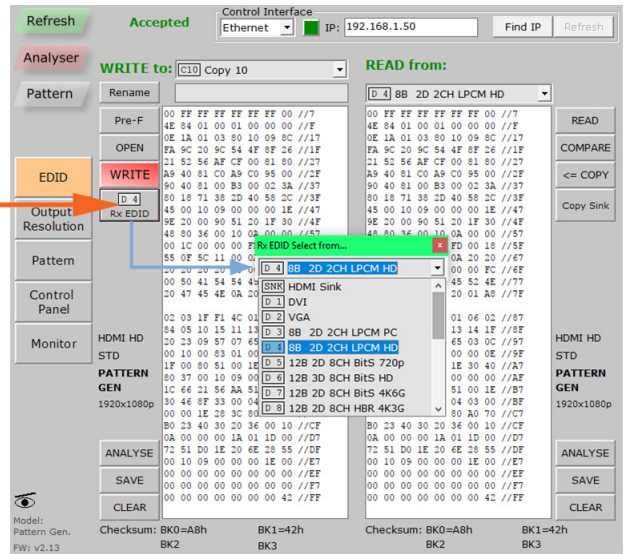**Figure 3: EDID Management in Analyzer Mode, ANI-4KANA**

Figure 4: Rx EDID Selection in Analyzer Mode, ANI-4KANA

❶ **RENAME:** Renames the currently selected **"Write to:"** EDID to the text typed into the entry box.

❷ **PRE-F:** Opens a quick-access list of recently opened EDID files.

❸ **OPEN:** Loads a previously saved EDID file **(*.bin format)** from the local PC/Laptop and places it into the left window.

❹ **WRITE:** Writes the EDID from the left window to the EDID destination selected in the "Write to:" dropdown menu.

❺ **READ:** Reads the EDID from the currently selected source/sink listed in the **"Read from:"** dropdown menu and places it into the right window.

❻ **COMPARE:** Compares the EDID in the left window with the EDID in the right window. Any data that is different between the EDIDs will be marked in red.

❼ **<= COPY:** Copies the EDID in the right window to the left window.

❽ **COPY SINK:** Allows directly copying the EDID from the current HDMI sink to any of the Copy EDID slots.

❾ **ANALYZE:** Generates a short analysis report for the EDID (from the left or right window, depending on the button pressed) in a new window. The report may be saved to the local PC/Laptop if desired.

❿ **SAVE:** Saves a copy of the EDID (from the left or right window, depending on the button pressed) to a file on the local PC/ Laptop.

⓫ **CLEAR:** Clears the copy of the EDID (from the left or right window, depending on the button pressed) from memory.

⓬ **RX EDID:** Allows selection of any EDID stored in the unit, or copied from a connected sink. The selected EDID will be set as the EDID to be sent to any device connected to the HDMI input (Rx) of the unit.

OUTPUT RESOLUTION (Analyzer Mode & Pattern Mode)

This tab provides control over the unit's Output Resolutions and allows setting **"Favorite Timings"** for quick selection. These functions are available for both Analyzer Mode and Pattern Mode.

NOTE: The "Bypass" output resolution only works in Analyzer mode. The image below is from the ANI-4KANA of the unit. The list of available resolutions for the ANI-4KANAL is more limited.
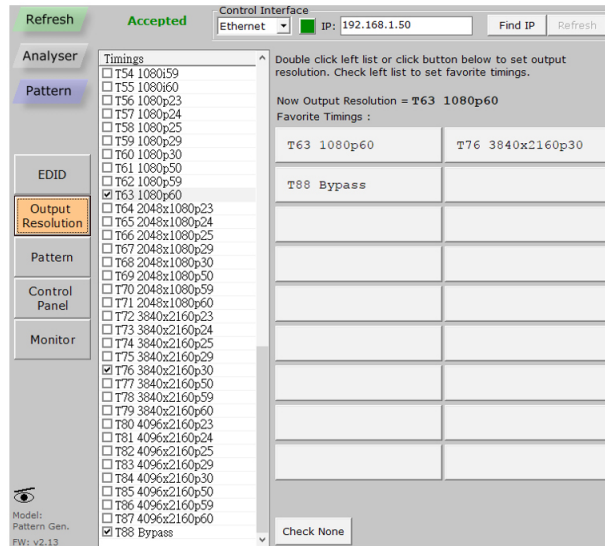

Figure 5: Output Resolution in Pattern Mode, ANI-4KANA

The output resolution that is currently in use is displayed near the top of the window. Selecting a new resolution for output can be done in one of two ways. Click on a resolution in the **"Favorite Timings"** list or find the resolution in the list on the left and double-click the resolution name.

To add a resolution to the **"Favorite Timings"** list, find it in the full list on the left and click its check box. To remove a resolution from the list, find it in the full list on the left and uncheck the checkbox. To remove all resolutions from the **"Favorite Timings"** list, click the **"Check None"** button.

NOTE: Favorites are not permanently saved and will be reset to the defaults when the software is closed.

When connected to the ANI-4KANAL in Analyzer Mode the available Output Resolution choices are limited to 3 options: A pure Bypass mode, a mode that down-converts 4K sources to 1080p and outputs as RGB (same frame rate as the source), and a mode that down-converts 4K sources to 1080p and outputs as YCbCr (same frame rate as the source).
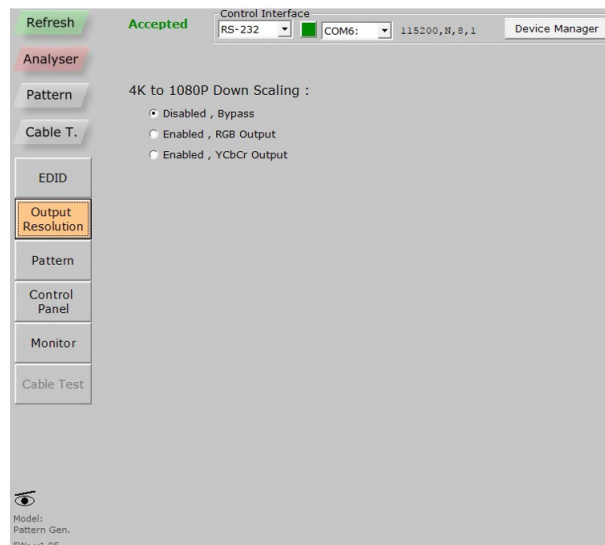

Figure 6: Output Resolution in Analyzer Mode, ANI-4KANAL

TEST PATTERN (Pattern Mode Only)

This tab provides control over the unit's test patterns and allows setting **"Favorite Patterns"** for quick selection. This function is only available in Pattern Mode.

NOTE: The image below is from the ANI-4KANA of the unit. The list of available patterns for the ANI-4KANAL is more limited.
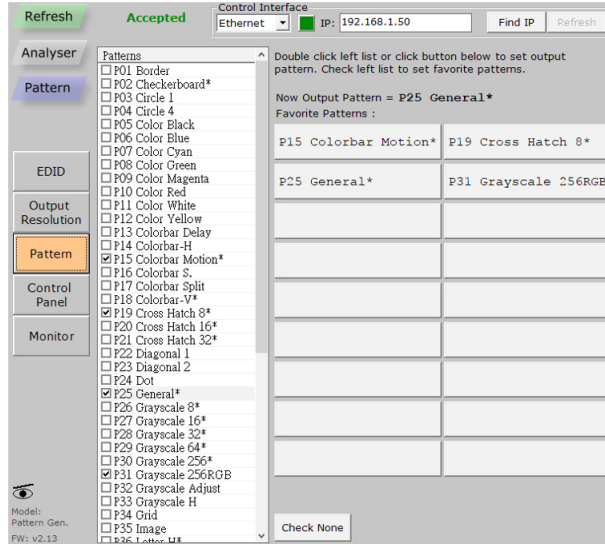

Figure 7: Test Pattern in Pattern Mode, ANI-4KANA

The pattern that is currently in use is displayed near the top of the window. Selecting a new pattern for output can be done in one of two ways. Click on a pattern in the **"Favorite Patterns"** list or find the pattern in the list on the left and double-click the resolution name. Patterns with multiple versions or modes are marked with an **(*)**. The additional versions of the pattern are activated by re-selecting the pattern multiple times.

To add a pattern to the **"Favorite Patterns"** list, find it in the full list on the left and click its check box. To remove a pattern from the list, find it in the full list on the left and uncheck the checkbox. To remove all patterns from the **"Favorite Patterns"** list, click the **"Check None"** button.

NOTE: Favorites are not permanently saved and will be reset to the defaults when the software is closed.

CONTROL PANEL (Analyzer Mode & Pattern Mode)

This tab provides control over the unit's additional features, functions and settings that are not covered by the other tabs. The available controls change depending on the unit's current operational mode (Analyzer or Pattern), and which functions are appropriate based on the unit's current output resolution and pattern selection.
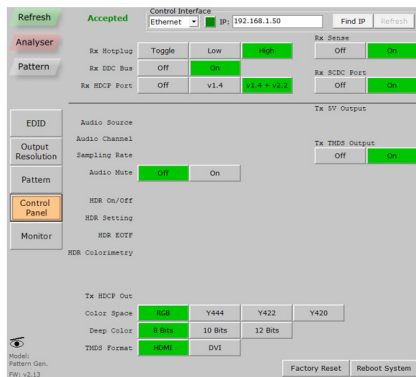

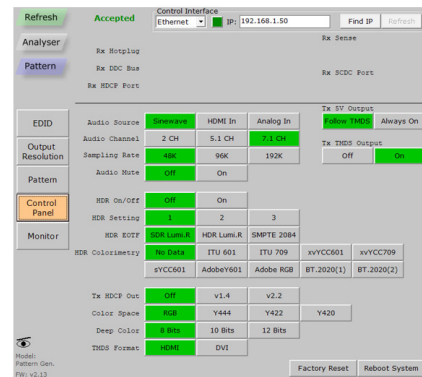**Figure 8: Control Panel in Analyzer Mode, ANI-4KANA**

Figure 9: Control Panel in Pattern Mode, ANI-4KANA

The primary controls contained here are for HDCP, Color Space/ Bit-depth/HDR, Audio, and Hot Plug/Voltage. Additionally, this tab provides controls for performing a Factory Reset or rebooting the unit.

REAL-TIME MONITORING (Analyzer Mode & Pattern Mode)

This tab provides access to a full suite of real-time monitoring and analysis functions covering a wide range of data from both the input and output.
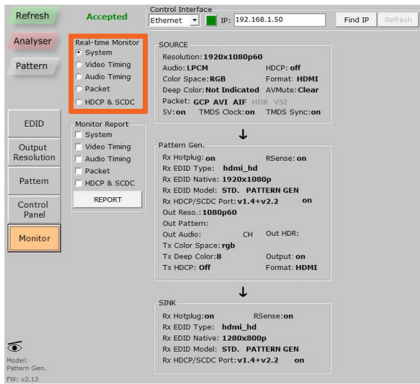

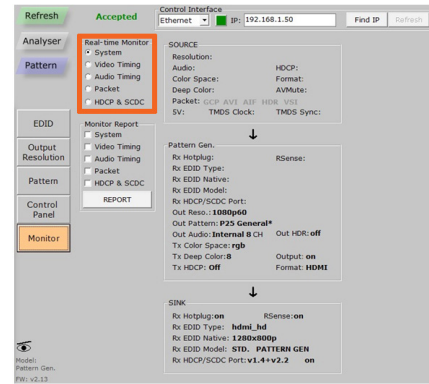**Figure 10: Monitoring in Analyzer Mode, ANI-4KANA**

Figure 11: Monitoring in Pattern Mode, ANI-4KANA

The available Real-time Monitor categories are:

❶ **SYSTEM:** Basic source, sink and unit signal information.

❷ **VIDEO TIMING (ANALYZER MODE ONLY):** Detailed information about the source's video timing.

❸ **AUDIO TIMING (ANALYZER MODE ONLY):** Detailed information about the source's audio format.

❹ **PACKET (ANALYZER MODE ONLY):** Detailed information about the source's GCP, AVI, AIF, SPD, VSI, and DRMI packets.

❺ **HDCP & SCDC (ANALYZER MODE):** Detailed information about the source's HDCP and SCDC interaction with the unit.

   HDCP & SCDC (PATTERN MODE): Detailed information about the sink's HDCP and SCDC interaction with the unit.

   Additionally, reports can be generated for each monitoring type, or any combination of multiple types. The report can be viewed directly in the window, or saved to the local PC/Laptop as a text file.

CABLE TESTING (ANI-4KANAL Only)

The ANI-4KANAL of the Signal Generator & Analyzer includes a cable testing function to help quantify the general feature support and error resistance capabilities of the cable being tested. The Cable Test tab contains the controls required to perform a cable test.
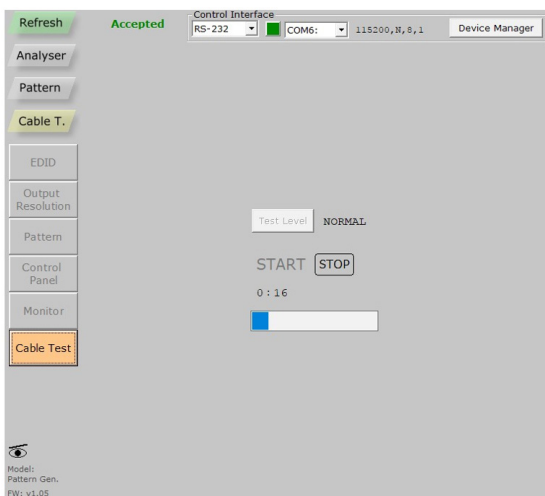
To perform a cable test:

Step 1: Connect the cable to be tested to both the HDMI input and HDMI output of the unit.

Step 2: Select the preferred Test Level (Normal or Strict).

Step 3: Click on the **"Start"** button and wait for the test process bar to complete. A test in **"Normal"** mode usually takes about two minutes to complete.

Step 4: The software will display the result of the testing (PASS or FAIL). More detailed information from the test is available on the unit itself.

NOTE: A FAIL result does not necessarily mean that the cable cannot pass an 18Gbps signal under ideal circumstances, however it is an indication of a high number of detected data errors that could result in unreliable or unstable performance with high-bitrate signals in less than optimal conditions.

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