INSTRUCTION MANUAL

# ANI-4KANA

## 4K UHD+ HDMI Signal Generator & Analyzer


**A-NeuVideo.com**
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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.

THIS SAFETY INFORMATION IS OF A GENERAL NATURE AND MAY BE SUPERSEDED BY INSTRUCTIONS CONTAINED WITHIN THIS MANUAL.

## CONTENTS



## INTRODUCTION

The ANI-4KANA HDMI Signal Generator & Analyzer is an advanced and handy tool for generating, testing and verifying the signal path within your 18Gbps HDMI ecosystem. With (87) built-in resolutions, (56) test patterns and over a dozen types of A/V analysis functions, this unit provides an enormous range of testing options. HDMI data packet, EDID and HDCP analysis is supported along with EDID upload and emulation.

Additionally the Status and Control Data Channel (SCDC) can be monitored, allowing HDMI 18Gbps signal detection and analysis. Up to (8) channels of LPCM audio test tones can be generated with a wide range of frequencies. This unit also supports the ability to upload up to (2) user-generated graphic files which can be used as additional test patterns. The use of multi-function and multi-color backlit buttons allows for easy operation of the unit's wide variety of functions and a clear OLED display provides a way to quickly view the current signal status information. In addition to the front panel buttons, the unit can also be controlled via RS-232, Telnet, and IR providing a complete range of control options. 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.

We reserve the right to make improvements to this document and/or product at any time and without notice.

## COPYRIGHT NOTICE


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## TRADEMARK ACKNOWLEDGMENTS

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## FEATURES

- HDMI 2.0 (up to 4K@60Hz 4:4:4) and DVI 1.0 compliant
- HDCP 1.4 and 2.2 compliant
- Analysis of source and sink data paths up to 18Gbps HDMI signals
- Analysis of HDMI data packets
- Analysis and control of HDCP v1.4 and v2.2
- Analysis and emulation of EDID data, including SCDC
- Analysis of input audio signals
- HDR bypass and analysis support
- Generate HDMI timings up to 18Gbps (4096x2160@60Hz 4:4:4, 8-bit)
- Generate HDMI and VGA signal outputs
- VGA output supports 350p, 480p, 576p, 720p, 1080i, 1080p, 640x480, 800x600, 1024x768, 1280x1024, 1366x768, 1400x1050, 1440x900, 1600x900 (RB), 1600x1200, 1680x1050, 1920x1200 (RB), 2048x1080p
- HDMI output supports 350p, 480p, 576p, 720p, 1080i, 1080p, 640x480, 800x600, 1024x768, 1280x1024, 1366x768, 1400x1050, 1440x900, 1600x900 (RB), 1600x1200, 1680x1050, 1920x1200 (RB), 3G4K, 6G4K
- (2) custom user test pattern resolutions - 640x480 & 1920x1080
- External stereo audio input and output
- Generation of LPCM sinewave audio on up to 8 channels
- Front-panel, RS-232, Telnet, and IR Remote controls
- OLED display with rapid updates of current status information
- Detailed OSD for settings and informational displays
- Supports USB firmware and pattern update
- Small and portable unit

## 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
- Remote Control (ANI-174)
- DC to USB Type-A Power Cable
- Users Guide
- 5V/2.6A Power Adaptor

## SYSTEM REQUIREMENTS

- HDMI/VGA 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.
- Analog audio source equipment such as a PC or media player and/or analog audio receiving equipment such as headphones, an audio amplifier or powered speakers.
- RS-232 or Ethernet control device such as PC/Laptop. *(Optional)*
- USB enabled device for uploading user test patterns.

## SPECIFICATIONS

- **Video Bandwidth:** 600MHz/18Gbps
- **Input Ports:**
  - HDMI
  - 3.5mm Stereo
- **Output Ports:**
  - HDMI
  - VGA
  - 3.5mm Stereo
- **Control Ports:**
  - RS-232 (DB-9)
  - IP Control (RJ45)
- **Power Supply:** DC 5V/2.6A (US/EU standards, CE/FCC/UL certified) or 2.1A USB Power
- **DC to USB Power Source *(Optional)*:** 2.1A (Minimum)
- **ESD Protection:** Human Body Model:
  - ±8kV (air-gap discharge)
  - ±4kV (contact discharge)
- **Dimensions (WxHxD):** 4.9 x 1.2 x 6.4 in (125x30x162mm) / 4.7 x 1.2 x 6.1 in (120x30x155mm) (Case Only)
- **Weight:** 1.75 lb/796g
- **Chassis Material:** Metal
- **Color:** Black
- **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:** 8.4W

As product improvements are continuous, specifications are subject to change without notice.

## SUPPORTED COLOR FORMATS

| | RGB | | | YCbCr 4:4:4 | | | YCbCr 4:2:2 | | YCbCr 4:2:0 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Output Resolution (Hz)** | **8** | **10** | **12** | **8** | **10** | **12** | **8** | **12** | **8** | **10** | **12** |
| **640x350p@85~2048x1080p@60** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| **3840x2160p@23~30** | ✓ | * | * | ✓ | * | * | | | | | |
| **4096x2160p@23~30** | | | | | | | | | | | |
| **3840x2160p@50~60** | * | | | * | | | | | ✓ | * | * |
| **4096x2160p@50~60** | | | | | | | | | | | |

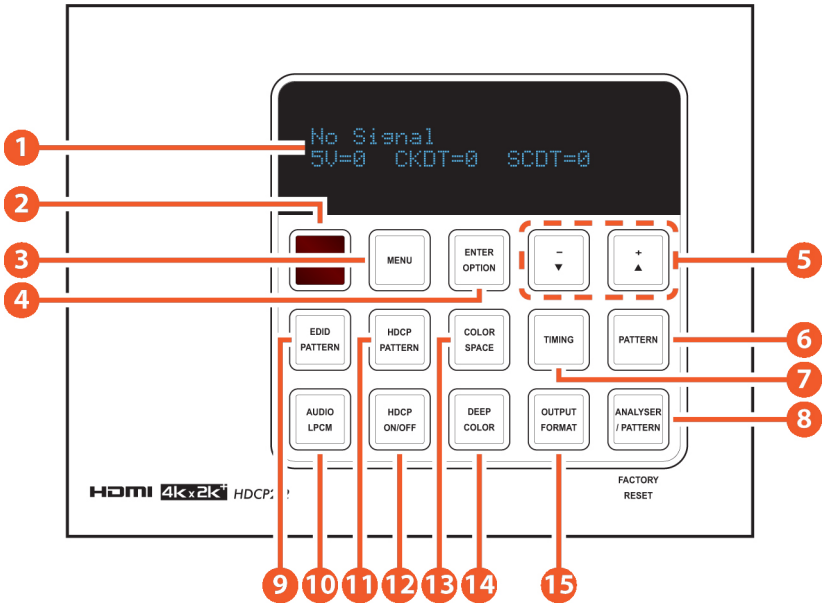
***NOTE:*** ✓ = Specified color depth is supported; * = Specified color depth is supported & TMDS scrambling is active.

## SUPPORTED AUDIO FORMATS

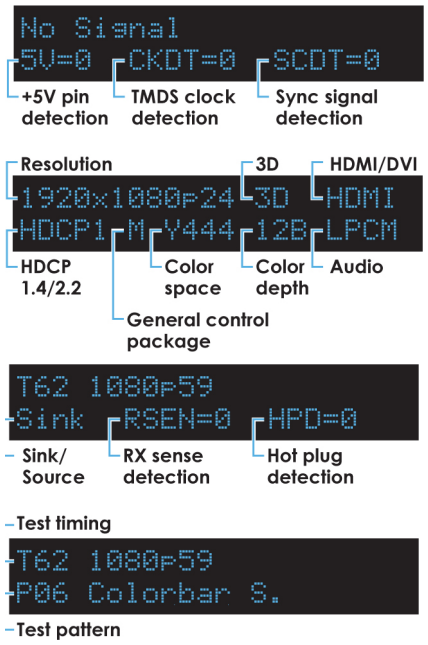
| Audio Source | Sampling Rate (kHz) | Channels | Word Length (Bits) | SD0~3 L/R Freq (Hz) |
|---|---|---|---|---|
| **HDMI Input** | Bypass | Bypass | Bypass | Bypass |
| **Analog Input** | 48 | 2.0 | 16, 20, 24 | Bypass |
| | 96 | 2.0 | | |
| | 192 | 2.0 | | |
| **Internal Sinewave** | 48 | 2.0, 5.1,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

- 48kHz supports a maximum of (2) channels at 2048x1080p@29/30Hz resolution.
- 96kHz supports a maximum of (2) channels at 480i, 576i, 480p, 576p, 640x480p@59Hz, 720x400p@70Hz, 1280x768p@60Hz (RB), 1366x768p@60Hz (RB), 2048x1080p@29/30/59/60Hz, 4096x2160p@29/30Hz resolutions.
- 192kHz is not supported at 1366x768p@60Hz (RB) or 2048x1080p@29/30Hz resolution.

## TOP PANEL




**1 OLED SCREEN:** Displays the current signal analysis information or test pattern mode selection details including input and/or output resolution timing. The screen layout changes depending on the unit's mode.




**ANALYZER MODE (Analyzer/Pattern button is RED):** In Analyzer mode, if there is no live video source detected on the input port, the OLED will display any voltage, TMDS or sync that might be present. Once a live video signal is detected, the unit will display that signal's current timing, format, HDCP version, AV Mute status, color space, color depth and audio format.

**PATTERN MODE (Analyzer/Pattern button is BLUE):** In Pattern mode, when the output isn't connected to a sink, the unit will display the current output timing, RxSense and Hot-plug detection status. Once an active sink has been connected, the lower portion of the display will change to indicate the current test pattern number and name.

**2 IR WINDOW:** Accepts IR signals from the included IR remote for control of this unit only.

**3 MENU:** Press to enter the OSD menu or to back out from menu items.

**4 ENTER/OPTION:** Press to confirm a selection or to go deeper into a menu item. When the selected function has optional selections, the associated button's LED will illuminate along with the ▼/▲ (-/+) buttons.

**5 +/- & ▲/▼:** Press to move up and down or adjust selections within menus. These buttons will illuminate when the selected function has values that can be adjusted up or down.

**6 PATTERN:** Within Pattern mode, press to enable selection of the test pattern used. The ▼/▲ buttons will illuminate and are used to select the new pattern. The new test pattern will automatically become active after selecting it and pausing for 2 seconds. Additional variations (if available) are selected by pressing the **PATTERN** button additional times. Within Analyzer mode, press to turn **ON/OFF** a **"title-safe/action-safe"** overlay.

## TOP PANEL

❼ **TIMING:** Press to enable selection of the output timing and resolution used. The ▼/▲ buttons will illuminate and are used to select the new timing. The currently selected timing will be shown on the OLED display. The new timing will automatically become active after selecting it and pausing for 2 seconds.

***NOTE:*** *In Analyzer mode, please select the* ***"Bypass"*** *timing if you do not wish for your source's output signal to be scaled by the unit before being sent to the display. The* ***TIMING*** *button's LED will blink Red when the timing is set to Bypass.*

❽ **ANALYZER/PATTERN:** Press to switch the unit between Analyzer Mode (LED=Red) and Pattern Mode (LED=Blue). When in Analyzer Mode, press and hold the button for 2 seconds to force an RX hot-plug. When in Pattern Mode, press and hold the button for 2 seconds to turn ON/OFF the AVMute bit within the output's GCP (General Control Packet).

**FACTORY RESET:** Press and hold this button while powering the unit on to perform a factory reset of the unit.

❾ **EDID PATTERN:** Press to enable selection of the EDID to use on the HDMI input port. The ▼/▲ buttons will illuminate and are used to select the new EDID. The currently selected EDID will be shown on the OLED display. The new EDID will automatically become active after selecting it and pausing for 5 seconds.

❿ **AUDIO LPCM:** Within Analyzer mode, press to select which digital audio source pair (0~3) is routed to the primary stereo channel (LPCM 2.0 and headphone output) for monitoring. The LED color indicates the selection (Off=SD0, Red=SD1, Blue=SD2, Purple=SD3). Within Pattern mode, press to switch between LPCM 2.0 (LED=Red), 5.1 (LED=Blue) and 7.1 (LED=Purple) channel test tone output formats. Press and hold this button for 2 seconds to allow adjustment of the output volume.

⓫ **HDCP PATTERN:** Press to enable/disable the OSD display of the detected HDCP version support and handshaking information between the sink and source. In Analyzer mode the unit is the RX, in Pattern mode the unit is the TX. In Pattern mode, if HDCP handshaking fails, an error message **"HDCP OUT FAIL"** will be displayed on the OSD.

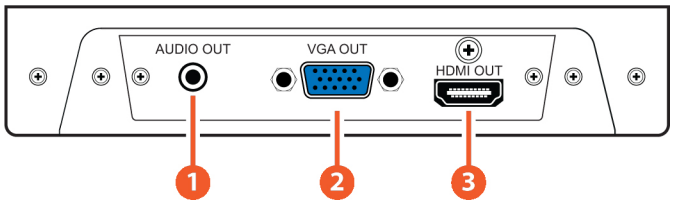
⓬ **HDCP ON/OFF:** Press to switch between supported HDCP versions or to disable HDCP. Within Analyzer mode, OFF (LED=Off), HDCP 1.4 (LED=Red), and HDCP 1.4+2.2 (LED=Blue) modes are available for the input port. Within Pattern mode, OFF, HDCP 1.4, and HDCP 2.2 modes are available for the output port.

⓭ **COLOR SPACE:** Press repeatedly to switch between the available color space formats. The button's LED is colored to indicate the current color space: Red=RGB, Blue=YCbCr 4:4:4, Purple=YCbCr 4:2:0, Off=YCbCr 4:2:2.

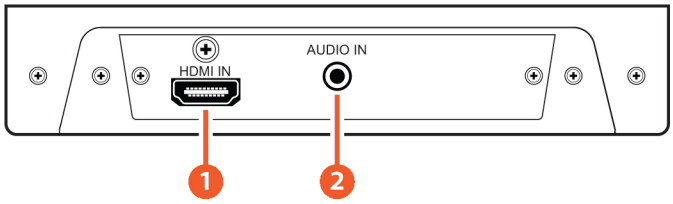
⓮ **DEEP COLOR:** Press repeatedly to switch between the available output color bit depth options. The button's LED is colored to indicate the current bit depth: OFF=8-bit, Red=10-bit, Blue=12-bit.

⓯ **OUTPUT FORMAT:** Press to switch between DVI (LED=Blue) and HDMI (LED=Red) output formats. Press and hold the button for 2 seconds to disable/enable video output completely. The button's LED will turn off when output is disabled.

## SIDE PANELS

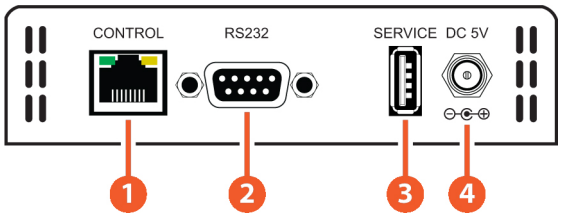



1. **AUDIO OUT:** Connects to powered speakers or an amplifier for stereo analog audio output with a 3.5mm phone jack cable.
2. **VGA OUT:** Connects to a VGA (RGBHV) monitor or display for analog video output.
3. **HDMI OUT:** Connects to HDMI TVs, monitors or amplifiers for digital video and audio output.




1. **HDMI IN:** Connects to HDMI source equipment such as a media player, game console or set-top box.
2. **AUDIO IN:** Connects to the stereo analog output of a device such as a CD player or PC.


1. **POWER:** Flip this switch to turn the unit ON or OFF after connecting an appropriate power source.

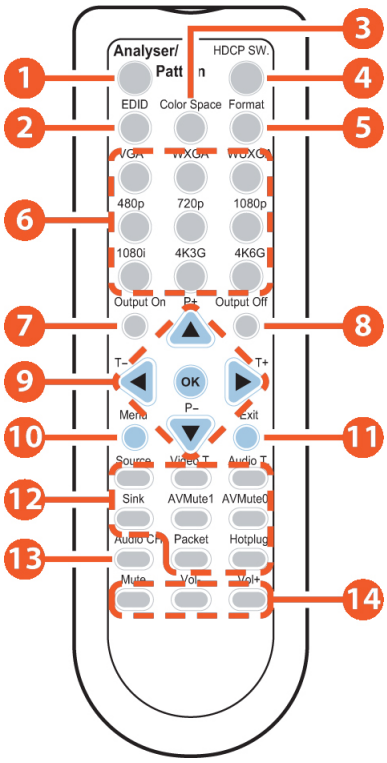



1. **CONTROL:** Connects directly, or through a network switch, to your PC/laptop to control the unit via Telnet.
2. **RS-232:** Connects directly to your PC/laptop to send RS-232 commands to control the unit.
3. **SERVICE:** TThis slot is used for firmware updates and uploading customer designed test pattern files.

   ***NOTE:*** *The patterns are restricted to 640x480 and 1920x1080. Both must be 24-bit RGB bitmap files*

4. **DC 5V:** Plug the 5V DC power supply into the unit and connect it to an AC wall outlet for power or use the DC to USB adapter cable to connect to a portable USB power bank (2.1A minimum) for power.

## REMOTE CONTROL




❶ **ANALYZER/PATTERN:** Press to switch between Analyzer Mode and Pattern Mode.

❷ **EDID:** Press repeatedly to switch between the available EDIDs for the HDMI input.

❸ **COLOR SPACE:** Press repeatedly to switch between the available color space formats (RGB, YCbCr 4:4:4, YCbCr 4:2:2 and YCbCr 4:2:0).

❹ **HDCP SW.:** Press to switch between supported HDCP versions or to disable HDCP.

❺ **FORMAT:** Press to switch between DVI and HDMI output formats.

❻ **VGA~4K6G:** Press to directly select the output resolution.

❼ **OUTPUT ON:** Press to enable video output.

❽ **OUTPUT OFF:** Press to disable video output.

❾ **T-/T+:** Press **(+/-)** to select a new output resolution timing. Within the OSD menu, press to adjust selections.

**P+/P-:** Press **(+/-)** to change the current test pattern. Within the OSD menu, press to move up and down.

**OK:** After selecting a pattern, press and hold for 2 seconds to switch to alternate variations of the pattern. Within the OSD menu, press to confirm selections.

❿ **MENU:** Press to enter the OSD menu.

⓫ **EXIT:** Press to exit the OSD or cancel the selection.

⓬ **SOURCE*:** Press to display source signal information on the OSD.

**VIDEO T*.:** Press to display video analysis details on the OSD.

**AUDIO T*.:** Press to display audio analysis details on the OSD.

**PACKET*:** Press to display the HDMI input's packet analysis info.

**HOTPLUG*:** Press to force an RX hot-plug event on the input port.

**SINK**:** Press to display HDMI output detection/information on the OSD.

**AV MUTE1**:** Press to turn on the AVMute bit within the output's GCP.

**AV MUTE0**:** Press to turn off the AVMute bit within the output's GCP.

***NOTE: * for use in Analyzer Mode only / ** for use in Pattern Mode only.***

⓭ **AUDIO CH:** Within Analyzer mode, press to select which digital audio source pair (0-3) is routed to the primary stereo channel for monitoring. Within Pattern mode, press to switch between LPCM 2.0, 5.1 and 7.1 channel test tone output formats.

⓮ **MUTE/VOL-/VOL+:** Press the **MUTE** button to mute both digital and analog audio outputs. Press the **Vol-/Vol+** buttons to increase/decrease the volume.

## RS-232 PROTOCOL

| SIGNAL GENERATOR | |
|---|---|
| PIN | ASSIGNMENT |
| 1 | NC |
| 2 | TxD |
| 3 | RxD |
| 4 | NC |
| 5 | GND |
| 6 | NC |
| 7 | NC |
| 8 | NC |
| 9 | NC |

| REMOTE CONTROL | |
|---|---|
| PIN | ASSIGNMENT |
| 1 | NC |
| 2 | RxD |
| 3 | TxD |
| 4 | NC |
| 5 | GND |
| 6 | NC |
| 7 | NC |
| 8 | NC |
| 9 | NC |

Baud Rate: 115200bps
Data Bits: 8
Parity: None
Flow Control: None
Stop Bit: 1

## RS-232 & TELNET 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.

### PARAMETERS

- The characters **"[" and "]"** are placed around descriptions of the variable parameters where additional explanation was needed. Please type the selected parameter without the contents inside the **"[" and "]"** characters when entering the command.

### 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 |
|---|---|
| **$?** | Show full command list. |
| **$HELP** | Show full command list. |
| **$AUDIO_CH N1** | Set the number of internally sourced audio output channels.<br>Available values for N1:<br>2 [2 Channels (2.0)]<br>6 [6 Channels (5.1)]<br>8 [8 Channels (7.1)] |
| **$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).<br>Available Values for N1:<br>SD0_L [SD0 Left Channel] SD0_R [SD0 Right Channel]<br>SD1_L [SD1 Left Channel] SD1_R [SD1 Right Channel]<br>SD2_L [SD2 Left Channel] SD2_R [SD2 Right Channel]<br>SD3_L [SD3 Left Channel] SD3_R [SD3 Right Channel]<br>N2 = MUTE, 200, 400, 600, 800, 1000, 1200, 1400, 1600 |

| COMMAND | DESCRIPTION |
|---|---|
| **$AUDIO_FREQ? N1** | Display the internal audio output frequency of the selected channel (in Hz).<br>Available Values for N1:<br>SD0_L [SD0 Left Channel] SD0_R[SD0 Right Channel]<br>SD1_L [SD1 Left Channel] SD1_R[SD1 Right Channel]<br>SD2_L [SD2 Left Channel] SD2_R[SD2 Right Channel]<br>SD3_L [SD3 Left Channel] SD3_R[SD3 Right Channel] |
| **$AUDIO_MUTE N1** | Turn the audio output mute on or off. N1 = ON, OFF |
| **$AUDIO_MUTE?** | Display the audio output mute state. |
| **$AUDIO_SOURCE N1** | Set the audio output source.<br>Available values for N1:<br>ANA [Analog Input]<br>HDMI [HDMI Input]<br>INT [Internal] |
| **$AUDIO_SOURCE?** | Display the audio output source. |
| **$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.<br>***NOTE:*** *The unit won't respond to any commands during the boot process.* |
| **$BOOT?** | Display the current boot state. |
| **$COLOR_SPACE N1** | Set the output color space.<br>Available values for N1:<br>RGB [RGB 4:4:4] Y444 [YCbCr 4:4:4]<br>Y422 [YCbCr 4:2:2] Y420 [YCbCr 4:2:0] |
| **$COLOR_SPACE?** | Display the current output color space. |
| **$DEEP_COLOR N1** | Set the output color bit depth. N1 = 8, 10, 12 |
| **$DEEP_COLOR?** | Display the current output color bit depth. |
| **$EDID_COPY_SINK N1** | Copy the current HDMI sink's EDID to the designated copy slot. N1 = C1~C10<br>***NOTE:*** *If the copy fails* ***"$err"*** *will be displayed.* |
| **$EDID_MANUF? N1** | Display the manufacturer name stored in the EDID of the selected location.<br>Available values for N1:<br>RX [HDMI Input (Rx) Port]<br>SINK_H [HDMI Sink]<br>SINK_V [VGA Sink]<br>***NOTES:***<br>• *If the EDID fails to be read,* ***"$err_ddc"*** *will be displayed.*<br>• *If the EDID has invalid content,* ***"$err_bad"*** *will be displayed.* |
| **$EDID_MODEL? N1** | Display the model/monitor name stored in the EDID of the selected location.<br>Available values for N1:<br>RX [HDMI Input (Rx) Port]<br>SINK_H [HDMI Sink]<br>SINK_V [VGA Sink]<br>***NOTES:***<br>• *If the EDID fails to be read,* ***"$err_ddc"*** *will be displayed.*<br>• *If the EDID has invalid content,* ***"$err_bad"*** *will be displayed.* |

| COMMAND | DESCRIPTION |
|---|---|
| **$EDID_NAME N1,N2** | Set the EDID name of the selected copy slot. N1 = C1~C10<br>N2 = {Name} [20 characters max] |
| **$EDID_NAME? N1** | Display the name of the selected EDID slot. N1 = D1~D10, C1~C10 |
| **$EDID_NATIVE? N1** | Display the native resolution value stored in the EDID of the selected location.<br>Available values for N1:<br>RX [HDMI Input (Rx) Port]<br>SINK_H [HDMI Sink]<br>SINK_V [VGA Sink]<br>***NOTES:***<br>• *First detailed timing from Block 0.*<br>• *If the EDID fails to be read, **"$err_ddc"** will be displayed.*<br>• *If the EDID has invalid content, **"$err_bad"** will be displayed.* |
| **$EDID_READ N1,N2** | Displays the selected data block stored in the EDID of the selected location.<br>Available values for N1:<br>D1~D10 [Default EDID 1~10]<br>C1~C10 [Copy EDID 1~10] SINK_H[HDMI Sink]<br>SINK_V [VGA Sink]<br><br>N2 = BLOCK0~BLOCK3<br>***NOTES:***<br>• *This command is not supported over Telnet connections.*<br>• *This data is output as a bit stream of 128 bytes following the <CR><LF> of the command acknowledgement.*<br>• *Each hex data unit is composed of 3 digits. The first 2 digits are the hex value. The 3rd digit is a space (0x20).*<br>• *Blocks 2 & 3 are only supported from the HDMI Sink.*<br>• *If the EDID fails to be read, **"$err_ddc"** will be displayed.*<br>• *If block 2 or block 3 doesn't exist, **"$err_block"** will be displayed.* |
| **$EDID_RX N1** | Select the EDID to use with the unit's HDMI input (Rx).<br>Available values for N1:<br>D1~D10 [Default EDID 1~10]<br>C1~C10 [Copy EDID 1~10]<br>SINK [Currently connected HDMI sink] |
| **$EDID_RX?** | Display the current EDID selection for the unit's HDMI input (Rx). |
| **$EDID_TYPE? N1** | Display the EDID type of the selected location.<br>Available values for N1:<br>RX [HDMI Input (Rx) Port]<br>SINK_H [HDMI Sink]<br>SINK_V [VGA Sink]<br>***NOTES:***<br>• *If the EDID fails to be read, **"$err_ddc"** will be displayed.*<br>• *If the EDID has invalid content, **"$err_bad"** will be displayed.* |
| **$EDID_WRITE N1,N2 N3** | Directly write an EDID block to the selected EDID location.<br>Available values for N1:<br>RX [HDMI Input (Rx) Port]<br>SINK_H [HDMI Sink]<br>SINK_V [VGA Sink]<br>N2 = BLOCK0~BLOCK1<br>N3 = <CR><LF>{128 byte hex data} |

| COMMAND | DESCRIPTION |
|---|---|
| **$EDID_WRITE N1,N2 N3 (CONT'D)** | ***NOTES:***<br>• *The data must be sent as a 128 byte hex data bit stream following the <CR><LF> in the N3 part of the command.*<br>• *Each hex data unit is composed of 3 digits. The first 2 digits are the hex value. The 3rd digit is a space (0x20).*<br>• *If the sum of the 128 byte data isn't 0,* ***"$err_ checksum"*** *will be displayed.* |
| **$FACTORY** | Execute a factory reset and reboot the unit.<br>***NOTE:*** *Stored Copy EDIDs and Ethernet settings will not be reset.* |
| **$FWVER?** | Display the current firmware version. |
| **$HDCP_IN_SW N1** | Enable or disable HDCP support for the unit's HDMI input. N1 = ON, OFF<br>***NOTE:*** *Affects Analyzer mode only.* |
| **$HDCP_IN_SW?** | Display the current HDCP support setting for the unit's HDMI input. |
| **$HDCP_IN_VER N1** | Set the HDCP version to use on the unit's HDMI input.<br>Available values for N1:<br>V1.4 [Supports HDCP v1.4 only]<br>V1.4+V2.2 [Supports HDCP v1.4 & v2.2]<br>***NOTE:*** *Affects Analyzer mode only.* |
| **$HDCP_IN_VER?** | Display the current HDCP version used on the unit's HDMI input. |
| **$HDCP_OUT_SW N1** | Enable or disable HDCP support on the unit's HDMI output. N1 = ON, OFF<br>***NOTE:*** Affects Pattern mode only. |
| **$HDCP_OUT_SW?** | Display the HDMI output's HDCP status. A status of **"Talk"** means HDCP is currently performing handshaking. |
| **$HDCP_OUT_VER N1** | Set the HDCP version to use on the unit's HDMI output.<br>Available values for N1:<br>V1.4 [Output encrypted with HDCP v1.4]<br>V2.2 [Output encrypted with HDCP v2.2]<br>***NOTE:*** Affects Pattern mode only. |
| **$HDCP_OUT_VER?** | Display the current HDCP version for the output port. |
| **$HDR_EOTF N1** | Set the HDR EOTF (Electro-Optical Transfer Function) mode.<br>Available values for N1:<br>SDR [Traditional Gamma, SDR Luminance Range]<br>HDR [Traditional Gamma, HDR Luminance Range]<br>2084 [SMPTE ST 2084]<br>RSVD [Reserved for future use] |
| **$HDR_EOTF?** | Display the current HDR EOTF mode. |
| **$HDR_MCLL N1** | Set the maximum HDR content light level.<br>N1 = 0~65500 [Incremented in 100 unit steps] |
| **$HDR_MCLL?** | Display the current maximum HDR content light level. |
| **$HDR_MFALL N1** | Set the maximum HDR frame-average light level.<br>N1 = 0~65500 [Incremented in 100 unit steps] |
| **$HDR_MFALL?** | Display HDR maximum light level of frame-average. |
| **$HDR_SET N1** | Select the current HDR setting. N1 = 1~3 |
| **$HDR_SET?** | Display the current HDR setting. |
| **$HDR_SW N1** | Enable or disable HDR support on the unit's HDMI output.<br>N1 = ON, OFF |
| **$HDR_SW?** | Display the current HDR support status for the unit's HDMI output. |

| COMMAND | DESCRIPTION |
|---|---|
| **$HDR_TX_COL N1** | Set the HDMI output (Tx) AVI Colorimetry mode.<br>Available values for N1:<br>1 [No Data]<br>2 [ITU601]<br>3 [ITU709]<br>4 [xvYCC601]<br>5 [xvYCC709]<br>6 [sYCC601]<br>7 [AdobeY601]<br>8 [Adobe RGB]<br>9 [BT.2020 (1) Y'CC'BCC'RC]<br>10 [BT.2020 (2) R'G'B' or Y'C'BC'R] |
| **$HDR_TX_COL?** | Display the current HDMI output (Tx) AVI Colorimetry mode. |
| **$MODEL?** | Display the unit's model number. |
| **$MOTION_TEXT N1** | Set the text used for the Motion-H and Motion-V patterns.<br>N1 = {Text} [20 characters max] |
| **$MOTION_TEXT?** | Display the current text used for the Motion-H and Motion-V patterns. |
| **$NET_GATE?** | Display the current Gateway address. |
| **$NET_IP?** | Display the current IP address. |
| **$NET_IP_MODE N1** | Set the IP mode. Available values for N1:<br>DHCP [Automatically get an IP address via DHCP]<br>STATIC [Use the currently defined static Ethernet values] |
| **$NET_IP_MODE?** | Display the current IP mode. |
| **$NET_LINK?** | Display the current Ethernet link status. |
| **$NET_MAC?** | Display the unit's MAC address. |
| **$NET_MASK?** | Display the current Netmask address. |
| **$NET_STATIC_GATE N1** | Set the static Gateway address. N1 = X.X.X.X [X = 0~255] |
| **$NET_STATIC_GATE?** | Display the static Gateway address. |
| **$NET_STATIC_IP N1** | Set the static IP address. N1 = X.X.X.X [X = 0~255] |
| **$NET_STATIC_IP?** | Display the static IP address. |
| **$NET_STATIC_MASK N1** | Set the static Netmask address. N1 = X.X.X.X [X = 0~255] |
| **$NET_STATIC_MASK?** | Display the static Netmask address. |
| **$PATTERN N1** | Select the test pattern to output. N1 = 1~56 |
| **$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). |
| **$RX_HOTPLUG N1** | Set hot plug value for the HDMI input (Rx).<br>Available values for N1:<br>OFF [Set hot plug low]<br>ON [Set hot plug high]<br>TOGGLE [Toggle hot plug low→high] |
| **$RX_HOTPLUG?** | Display the current hot plug state for the HDMI input (Rx). |

| COMMAND | DESCRIPTION |
|---|---|
| **$RX_HOTPLUG_T N1** | Set the hot plug time (in milliseconds) for the HDMI input (Rx).<br>N1 = 50~500 [Incremented in 50ms steps] |
| **$RX_HOTPLUG_T?** | Display the current hot plug time (in milliseconds) for the HDMI input (Rx). |
| **$RX_PC_TOL N1** | Set PC source clock detection tolerance for the HDMI input (Rx).<br>N1 = 1~10 [1/1000 ~ 10/1000] |
| **$RX_PC_TOL?** | Display the PC source clock detection tolerance for the HDMI input (Rx). |
| **$RX_SCDC N1** | Enable or disable the SCDC port function on the HDMI input (Rx). N1 = ON, OFF |
| **$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). |
| **$SINK_DETECT? N1** | Displays a variety of sink detection status and informational values.<br>Available values for N1:<br>HOTPLUG [Sink's hot plug status]<br>RSENSE [Sink's RxSense status]<br>HDCP [Sink's HDCP port status]<br>HDCP_AKSV [Source HDCP AKSV in 2-digit hex (HDCPv1.4)]<br>HDCP_BKSV [Rx HDCP BKSV in 2-digit hex (HDCPv1.4)]<br>HDCP_RXID [Rx Receiver ID in 2-digit hex (HDCPv2.2)]<br>SCDC [SCDC port status]<br>SCDC_SCR_ENABLE [Rx SCDC source scrambling setting]<br>SCDC_SCR_STATUS [SCDC sink scrambling status]<br>SCDC_SINK_VER [SCDC sink version]<br>SCDC_SOURCE_VER [SCDC source version] |
| **$SOURCE_DETECT? N1** | Displays a variety of source detection status and informational values.<br>Available values for N1:<br>5V [5V detection state]<br>CKDT [TMDS clock detection]<br>TMDS_FORMAT [Detected TMDS format (DVI or HDMI)]<br>SCDT [TMDS sync detection]<br>HDCP [Source HDCP status detection]<br>HDCP_AKSV [Source AKSV in 2-digit hex (HDCPv1.4)]<br>HDCP_BKSV [Rx BKSV in 2-digit hex (HDCPv1.4)]<br>HDCP_RXID [HDCP Receiver ID in 2-digit hex (HDCP v2.2)]<br>HA [Horizontal active pixels]<br>HBP [Horizontal back porch pixels]<br>HFP [Horizontal front porch pixels]<br>HSW [Horizontal sync width pixels]<br>HT [Total horizontal pixels]<br>HSP [Horizontal sync polarity]<br>HVS_OFFSET1 [Horizontal/vertical sync offset1 in dot]<br>HVS_OFFSET2 [Horizontal/vertical sync offset2 in dot]<br>PIXEL_CLOCK [Pixel clock in KHz]<br>SCAN [Video scan mode (P=Progressive, I=Interlaced)]<br>TIMING [Video timing (See "Source Video Timing List" below)]<br>TMDS_CLOCK [TMDS clock in KHz]<br>VA [Vertical active lines]<br>VBP [Vertical back porch lines]<br>VFP [Vertical front porch lines]<br>VSW [Vertical sync width lines]<br>VT [Total vertical lines] |

| COMMAND | DESCRIPTION |
|---|---|
| $SOURCE_DETECT? N1 (CONT'D) | VSP [Vertical sync polarity]<br>ACR [Audio-Clock-Recovery packet status]<br>ACR_CTS [Audio-Clock-Recovery CTS value]<br>ACR_N [Audio-Clock-Recovery N value]<br>ASP [Audio-Sample packet status]<br>ASP_CH [Audio-Sample packet channel number]<br>ASP_FIFO [Audio-Sample packet audio FIFO (error or normal)]<br>ASP_LAYOUT [Audio-Sample packet layout]<br>ASP_PLL [Audio-Sample packet PLL (locked or unlocked)]<br>CHS_CODE [Channel-status audio coding]<br>CHS_SR [Channel-status sampling rate in KHz]<br>CHS_SS [Channel-status sampling size]<br>CHS_TYPE [Channel-status application type (consumer or professional)]<br>HBR [High-Bit-Rate packet status]<br>AIF [Display packet-AIF data in 2-digit hex]<br>AVI [Display packet-AVI data]<br>DRMI [Display packet-DMI data]<br>GCP [Display packet-GCP data]<br>SPD [Display packet-SPD data]<br>VSI [Display packet-VSI data]<br>SCDC_SCR_ENABLE [Rx SCDC source enable scrambling state]<br>SCDC_SCR_STATUS [SCDC sink scrambling status]<br>SCDC_SINK_VER [SCDC sink version]<br>SCDC_SOURCE_VER [SCDC source version] |
| $TASK_MODE N1 | Set the unit's operation mode to Signal Analyzer or Pattern Generation.<br>N1 = ANALYSER, PATTERN |
| $TASK_MODE? | Display the unit's current operation mode. |
| $TIMING N1 | DispSelect the output resolution timing to use.<br>Available values for N1:<br>1~87 [All available standard output resolutions]<br>88 [Bypass (Analyzer mode only)] lay the PC source clock detection tolerance for the HDMI input (Rx). |
| $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 TMDS output format. N1 = HDMI, DVI |
| $TMDS_FORMAT? | Display the current TMDS output format. |
| $TMDS_SW N1 | Enable or disable TMDS output. N1 = ON, OFF [Off will disable all video output] |
| $TMDS_SW? | Display the current TMDS 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:<br>FOLLOW [Only outputs 5v if there is a live signal]<br>ON [Always outputs 5v] |
| $TX_5V? | Display the current output +5v pin setting. |
| $UPDATE_FW | Update firmware from USB & reboot the unit. |
| $UPDATE_IMG1080 | Update the 1920x1080 image from USB & reboot the unit. |
| $UPDATE_IMG480 | Update the 640x480 image from USB & reboot the unit. |

| RESOLUTION | HZ | ID |
|---|---|---|
| **640x350p** | 85 | 1 |
| **640x480p** | 59 | 2 |
| | 72 | 3 |
| | 75 | 4 |
| | 85 | 5 |
| **720x400p** | 70 | 6 |
| | 85 | 7 |
| **800x600p** | 56 | 8 |
| | 60 | 9 |
| | 72 | 10 |
| | 75 | 11 |
| | 85 | 12 |
| **848x480p** | 60 | 13 |
| **1024x768p** | 60 | 14 |
| | 70 | 15 |
| | 75 | 16 |
| | 85 | 17 |
| **1152x864p** | 70 | 18 |
| | 75 | 19 |
| | 85 | 20 |
| **1280x768p** | 60 (RB) | 21 |
| | 60 | 22 |
| | 75 | 23 |
| | 85 | 24 |
| **1280x800p** | 60 (RB) | 25 |
| | 60 | 26 |
| | 75 | 27 |
| | 85 | 28 |
| **1280x960p** | 60 | 29 |
| **1280x960p** | 85 | 30 |
| **1280x1024p** | 60 | 31 |
| | 75 | 32 |
| | 85 | 33 |
| **1360x768p** | 60 | 34 |

| RESOLUTION | HZ | ID |
|---|---|---|
| **1366x768p** | 60 (RB) | 35 |
| | 60 | 36 |
| **1400x1050p** | 60 (RB) | 37 |
| | 60 | 38 |
| **1440x900p** | 60 (RB) | 39 |
| | 60 | 40 |
| **1600x900p** | 60 (RB) | 41 |
| **1600x1200p** | 60 | 42 |
| **1680x1050p** | 60 (RB) | 43 |
| | 60 | 44 |
| **1920x1200p** | 60 (RB) | 45 |
| **480i** | 59 | 46 |
| | 60 | 47 |
| **480p** | 59 | 48 |
| | 60 | 49 |
| **576i** | 50 | 50 |
| **576p** | 50 | 51 |
| **720p** | 25 | 52 |
| | 29 | 53 |
| | 30 | 54 |
| | 50 | 55 |
| | 59 | 56 |
| | 60 | 57 |
| **1080i** | 50 | 58 |
| **1080i** | 59 | 59 |
| | 60 | 60 |
| **1080p** | 23 | 61 |
| | 24 | 62 |
| | 25 | 63 |
| | 29 | 64 |
| | 30 | 65 |
| | 50 | 66 |
| | 59 | 67 |
| | 60 | 68 |

| RESOLUTION | HZ | ID |
|---|---|---|
| **2048x1080p** | 23 | 69 |
| | 24 | 70 |
| | 25 | 71 |
| | 29 | 72 |
| | 30 | 73 |
| | 50 | 74 |
| | 59 | 75 |
| | 60 | 76 |
| **3840x2160p** | 23 | 77 |
| | 24 | 78 |
| | 25 | 79 |
| | 29 | 80 |
| | 30 | 81 |
| | 50 | 82 |
| | 59 | 83 |
| | 60 | 84 |
| **4096x2160p** | 23 | 85 |
| | 24 | 86 |
| | 25 | 87 |
| | 29 | 88 |
| 4096x2160p | 30 | 89 |
| | 50 | 90 |
| | 59 | 91 |
| | 60 | 92 |
| Not Supported | | 254 |

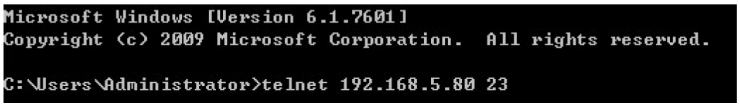
RB = Reduced Blanking.
***NOTE:*** No Signal = No source.

## TELNET CONTROL

Before attempting to use Telnet control, please ensure that both the unit and the PC/laptop are connected to the same active network.

| To Access Telnet | |
|---|---|
| In Windows XP | Click Start, type **"cmd"** in the search field, and press **ENTER**. |
| In Windows 7 | Click Start > Run, type **"cmd"** in the search field, and press **ENTER**. |
| In Mac OS X | Click **Go > Applications > Utilities > Terminal**. |

Once in the Command Line Interface (CLI), type **"telnet"** followed by the current IP address of the unit and **"23"**, then hit **ENTER**. See below for reference.




This will connect us to the unit we wish to control. Type **"help"** to list the available commands.

***NOTES:***

- The default IP address is 192.168.1.50. If the IP address is changed then the IP address required for Telnet access will also change accordingly.
- 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.

## ANALYZER MODE

| LEVEL 1 | LEVEL 2 | LEVEL 3 |
|---|---|---|
| **Source Monitor** | Analytic Data | |
| **Video Timing** | Analytic Data | |
| **Audio Timing** | Analytic Data | |
| **Packet** | Monitor | Analytic Data |
| | GCP | Analytic Data |
| | AVI | Analytic Data |
| | AIF | Analytic Data |
| | SPD | Analytic Data |
| | VSIF H14b | Analytic Data |
| | DRMI (HDR) | Analytic Data |
| **EDID Analyzer** | HDMI Sink | Analytic Data |
| | VGA Sink | Analytic Data |
| | RX EDID | Analytic Data |
| | Default & Copied EDID | [D1] ~ [D10] Default EDID Settings |
| | | [C1] ~ [C10] Copied EDID Settings |
| **EDID Emulator** | RX EDID Select | Copy HDMI Sink |
| | | [D1] DVI |
| | | [D2] VGA |
| | | [D3] 8B 2D 2CH LPCM PC |
| | | **[D4] 8B 2D 2CH LPCM HD** |
| | | [D5] 12B 2D 8CH Bits 720p |
| | | [D6] 12B 3D 8CH Bits HD |
| | | [D7] 12B 2D 8CH Bits 4K6G |
| | | [D8] 12B 2D 8CH HBR 4K3G |
| | | [D9] 12B 2D 8CH HBR 4K420 |
| | | [D10] 12B 2D 8CH HBR 4K6G |
| | | [C1] Copy 01 |
| | | [C2] Copy 02 |
| | | [C3] Copy 03 |
| | | [C4] Copy 04 |
| | | [C5] Copy 05 |
| | | [C6] Copy 06 |
| | | [C7] Copy 07 |
| | | [C8] Copy 08 |
| | | [C9] Copy 09 |

| MAIN MENU | SUB MENU | ADJUSTMENTS |
|---|---|---|
| **EDID Emulator** | RX EDID Select | [C10] Copy 10 |
| | Copy HDMI Sink EDID | Copy HDMI sink EDID to [C1] ~ [C10] |
| | Copy VGA Sink EDID | Copy VGA sink EDID to [C1] ~ [C10] |
| | Rename Copied Sink EDID | Rename EDID [C1] ~ [C10] |
| | Burn EDID to HDMI Sink | Burn EDID [D1] ~ [D10] & [C1] ~ [C10] to unlocked HDMI sink EDID |
| | Burn EDID to VGA Sink | Burn EDID [D1] ~ [D10] & [C1] ~ [C10] to unlocked VGA sink EDID |
| **HDCP Input Monitor** | Analytic Data | |
| **SCDC Input Monitor** | Analytic Data | |
| **RX Port Controls** | Hot Plug Preset | Low |
| | | High |
| | | **Toggle** |
| | Hot Plug Toggle Time | 50ms ~ 500ms **(100ms)** |
| | Hot Plug Run | |
| | RX Sense | **On (PoR)** |
| | | Off |
| | DDC | **On (PoR)** |
| | | Off |
| | V.Freq/1.001 Detection | **On** |
| | | Off |
| | PC Clock Tolerance | 1/1000 ~ 10/1000 (**6/1000**) |
| | HDCP Port ON/OFF | **On (PoR)** |
| | | Off |
| | HDCP Port Version | v1.4 |
| | | **v1.4+v2.2** |
| | HDCP REAUTH_REQ Toggle | |
| | HDCP Counter Reset | |
| | SCDC Port | **On (PoR)** |
| | | Off |
| | SCDC CED Ch Auto Clear | On<br>***NOTE:*** *Auto clear while source reads CED.* |
| | | **Off** |
| **Output Resolution** | See **"Test Timing List"** below **(T63 1080p60)** | |
| **OSD Settings** | H Position | 0% ~ 100% **(10%)** |
| | V Position | 0% ~ 100% **(10%)** |
| | Transparency | 0 ~ 7 **(4)** |

| MAIN MENU | SUB MENU | ADJUSTMENTS |
|---|---|---|
| **OSD Settings (CONT'D)** | A Mode Color (Analyzer mode only) | **Red** |
| | | Blue |
| | | Gray |
| | P Mode Color (Pattern mode only) | Red |
| | | **Blue** |
| | | Gray |
| | Font Type | **Narrow** |
| | | Wide |
| **Ethernet** | IP Mode | **DHCP** |
| | | Static |
| | IP Address (Static mode only) | X.X.X.X **(192.168.1.50)** |
| | Subnet Mask (Static mode only) | X.X.X.X **(255.255.255.0)** |
| | Gateway (Static mode only) | X.X.X.X **(192.168.1.254)** |
| **Setup** | Firmware Update | **No**/Yes |
| | Image 640x480 Update | **No**/Yes |
| | Image 1920x1080 Update | **No**/Yes |
| | [Letter H] Option 2 | Small |
| | | **Medium** |
| | 3D Source Image Bypass | **No**/Yes |
| | Information Refresh | 1 Sec |
| | | **2 Sec** |
| | | Manual |
| | IR Controller Address | 0 ~ 3 **(0)** |
| | Copied EDID Reset | **No**/Yes |
| | Ethernet Reset | **No**/Yes |
| | Factory Reset | **No**/Yes |
| **Information** | Analytic Data | **No**/Yes |

***NOTES:***

- Items in **Bold** are factory default settings.
- SCDC = Status and Control Data Channel. CED = Character Error Detection.
- PoR = Power on Reset.

### SOURCE HDR ABILITY

- Parse the HDR Static Metadata data block in the sink's EDID.
- Output 4K60 (4:2:0, 10/12-bit), or 4K30 (4:4:4, 10/12-bit).
- Output DRMI (Dynamic Range & Mastering InfoFrame).

### SINK HDR ABILITY

- Build in RX EDID that includes the HDR Static Metadata data block.
- Receive 4K60 (4:2:0, 10/12-bit), or 4K30 (4:4:4, 10/12-bit) signals.
- Receive DRMI and decode the HDR contents.

### UNIT HDR CAPABILITIES & LIMITATIONS

- Supports HDR bypass & analysis in Analyzer mode.
- HDR EDID must be copied from an connected sink to the RX EDID through the EDID Emulator menu in Analyzer mode.
- EDID Analyzer & DRMI Packet Monitor for HDR analysis in Analyzer mode.
- Output emulated HDR metadata to test sink HDR detection in Pattern mode.
- No support for test patterns with HDR content in Pattern mode.

### EDID ANALYZER LIMITATION

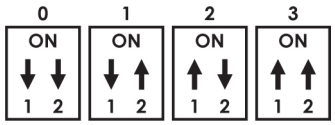
- The EDID Analyzer does not support 4-block analysis.

### EDID SETTINGS

- The unit has 10 built-in EDIDs and 10 custom EDID slots.
- Within the OSD menu's **"EDID Emulator"** section, the EDID from the currently connected sink, a built-in EDID, or a custom EDID may be selected for use as the unit's EDID.
- Programming a custom EDID through the RS-232 connection is supported.

### IR SETTINGS

- The IR remote uses one out of (4) available address channels for control of the test pattern generator, allowing up to (4) to be located in the same area while being controlled by different remotes.
- Select **"IR Controller Address"** within the **"Setup"** section of the OSD's main menu.
- Assign an address number (from 0 to 3) that matches the setting on the remote that is to be used with the unit. The default factory setting is 0.
- The IR remote's address can be set using the (2) Dip switches located on the back of the remote, inside the battery cover. The default factory setting is 0 (off, off).




### POWER ON RESET (POR)

- Settings marked with this are reset to the default when the unit is powered off and back on.

### IMAGE FILE FORMAT

- Uploadable image file format: 640x480/1920x1080 (RGB, 24-bit, bitmap).

## PATTERN MODE

| LEVEL 1 | LEVEL 2 | LEVEL 3 |
|---|---|---|
| **Sink Monitor** | Analytic Data | |
| **Pattern** | See **"Test Pattern List"** below **(P16 Colorbar S.)** | |
| **Audio Output** | Source | HDMI In |
| | | Analog In |
| | | **Int. Sinewave (PoR)** |
| | Volume | 0 ~ 80 **(70)** |
| | Analog Out CH | **SD0 L/R** |
| | | SD1 L/R |
| | | SD2 L/R |
| | | SD3 L/R |
| | Sampling Rate | **48kHz** |
| | | 96kHz |
| | | 192kHz |
| | Word Length | 16 Bits |
| | | 20 Bits |
| | | **24 Bits** |
| | Channels | 2CH |
| | | 5.1CH |
| | | **7.1CH** |
| | SD0-L Freq | Mute |
| | | 200Hz ~ 1600Hz **(1000Hz)** |
| | SD0-R Freq | Same as "SD0-L Freq." |
| | SD1-L Freq | Same as "SD0-L Freq." |
| | SD1-R Freq | Same as "SD0-L Freq." |
| | SD2-L Freq | Same as "SD0-L Freq." |
| | SD2-R Freq | Same as "SD0-L Freq." |
| | SD3-L Freq | Same as "SD0-L Freq." |
| | SD3-R Freq | Same as "SD0-L Freq." |
| **EDID Analyzer** | Analytic Data | |
| **EDID Emulator** | Analytic Data | |
| **HDCP Output Monitor** | Analytic Data | |
| **HDR Output Emulator** | HDR Out ON/OFF | On |
| | | **Off** |
| | Settings | **1** |

| LEVEL 1 | LEVEL 2 | LEVEL 3 |
|---|---|---|
| **HDR Output Emulator (CONT'D)** | Settings (CONT'D) | 2 |
| | | 3 |
| | Value Unit | Hex |
| | | **nit (cd/m*m)** |
| | Tx AVI Colorimetry | No Data |
| | | ITU601 |
| | | ITU709 |
| | | xvYCC601 |
| | | xvYCC709 |
| | | sYCC601 |
| | | AdobeY601 |
| | | Adobe RGB |
| | | BT.2020 (1) |
| | | **BT.2020 (2)** |
| | EOTF | **0: SDR Luminance Range** |
| | | 1: HDR Luminance Range |
| | | 2: SMPTE ST 2084 [2] |
| | | 3: Future EOTF |
| | Metadata Descriptor | Static Metadata Type 1 |
| | | Reserved |
| | Display primaries x0 | 0.0000 ~ 1.3100 **(0.0000)** |
| | Display primaries y0 | 0.0000 ~ 1.3100 **(0.0000)** |
| | Display primaries x1 | 0.0000 ~ 1.3100 **(0.0000)** |
| | Display primaries y1 | 0.0000 ~ 1.3100 **(0.0000)** |
| | Display primaries x2 | 0.0000 ~ 1.3100 **(0.0000)** |
| | Display primaries y2 | 0.0000 ~ 1.3100 **(0.0000)** |
| | White point x | 0.0000 ~ 1.3100 **(0.0000)** |
| | White point y | 0.0000 ~ 1.3100 **(0.0000)** |
| | Max disp mastering lumi | 0 ~ 65500 **(0)** |
| | Min disp mastering lumi | 0.0000 ~ 6.5500 **(0.0000)** |
| | Max Content Light Level | 0 ~ 65500 **(0)** |
| | Max Frame-average L-L | 0 ~ 65500 **(0)** |
| | Tx AVI Color Space | Analytic Data |
| | Sink EDID supports HDR | Analytic Data |
| **SCDC Output Monitor** | Analytic Data | |

| LEVEL 1 | LEVEL 2 | LEVEL 3 |
|---|---|---|
| **TX Port Controls** | +5V Out ON/OFF | **Follow TMDS** |
| | | Always On |
| | HDCP Output ON/OFF | On |
| | | **Off (PoR)** |
| | HDCP Output Version | **v1.4** |
| | | v2.2 |
| | HDCP AKE_Send_ Stored_ km() | On |
| | | **Off** |
| | HDCP Counter Reset | |
| | SCDC CED Counter Read | **On** |
| | | Off<br>***NOTE:*** *TX doesn't read sink CH0~3 Error- Counter.* |
| | SCDC CED Always Read | **On**<br>***NOTE:*** *TX ignores sink CED_Update flag.* |
| | | Off |
| | SCDC CED Ch Auto Clear | On<br>***NOTE:*** *While sink CED_ Update flag=1, TX auto clears its CH0~3 Error- Counter and reads a new counter from the sink.* |
| | | **Off** |
| **Output Resolution** | See **"Test Timing List"** below **(T63 1080p60)** | |
| **OSD Settings** | H Position | 0% ~ 100% **(10%)** |
| | V Position | 0% ~ 100% **(10%)** |
| | Transparency (Solid~Transparent) | 0 ~ 7 **(4)** |
| | A Mode Color (Analyzer mode only) | **Red** |
| | | Blue |
| | | Gray |
| | P Mode Color (Pattern mode only) | Red |
| | | **Blue** |
| | | Gray |
| **Ethernet** | IP Mode (Static mode only) | **DHCP** |
| | | Static |
| | IP Address | X.X.X.X **(192.168.1.50)** |
| | Subnet Mask (Static mode only) | X.X.X.X **(255.255.255.0)** |
| | Gateway (Static mode only) | X.X.X.X **(192.168.1.254)** |
| **Setup** | Firmware Update | **No**/Yes |
| | Image 640x480 Update | **No**/Yes |

| LEVEL 1 | LEVEL 2 | LEVEL 3 |
|---|---|---|
| **Setup (CONT'D)** | Image 1920x1080 | **No**/Yes |
| | [Letter H] Option 2 | Small |
| | | **Medium** |
| | 3D Source Image Bypass | **No**/Yes |
| | Information Refresh | 1 Sec |
| | | **2 Sec** |
| | | Manual |
| | IR Controller Address | 0 ~ 3 **(0)** |
| | Copied EDID Reset | **No**/Yes |
| | Ethernet Reset | **No**/Yes |
| | Factory Reset | **No**/Yes |
| **Information** | Analytic Data | |

***NOTES:***

- Items in **Bold** are factory default settings.
- SCDC = Status and Control Data Channel. CED = Character Error Detection.
- PoR = Power on Reset.

**HDR OUTPUT EMULATOR LIMITATION**

- This function simulates HDR info frame (DRMI) and AVI colorimetry (BT.2020, etc.) output. It does not generate HDR/colorimetry video content.

**POWER ON RESET (POR)**

- Settings marked with this are reset to the default when the unit is powered off.

## TEST TIMINGS

| Test Timing List | HZ | ID |
|---|---|---|
| **640x350p** | 85 | T01 |
| **640x480p** | 59 | T02 |
| | 72 | T03 |
| | 75 | T04 |
| | 85 | T05 |
| **720x400p** | 70 | T06 |
| | 85 | T07 |
| **800x600p** | 56 | T08 |
| | 60 | T09 |
| | 72 | T10 |
| | 75 | T11 |
| | 85 | T12 |
| **848x480p** | 60 | T13 |
| **1024x768p** | 60 | T14 |
| | 70 | T15 |
| | 75 | T16 |
| | 85 | T17 |
| **1152x864p** | 75 | T18 |
| **1280x768p** | 60 (RB) | T19 |
| | 60 | T20 |
| | 75 | T21 |
| | 85 | T22 |
| **1280x800p** | 60 (RB) | T23 |
| | 60 | T24 |
| | 75 | T25 |
| | 85 | T26 |
| **1280x960p** | 60 | T27 |
| | 85 | T28 |
| **1280x1024p** | 60 | T29 |
| **1280x1024p** | 75 | T30 |
| | 85 | T31 |
| **1360x768p** | 60 | T32 |
| **1366x768p** | 60 (RB) | T33 |
| | 60 | T34 |

| Test Timing List | HZ | ID |
|---|---|---|
| **1400x1050p** | 60 (RB) | T35 |
| | 60 | T36 |
| **1440x900p** | 60 (RB) | T37 |
| | 60 | T38 |
| **1600x900p** | 60 (RB) | T39 |
| **1600x1200p** | 60 | T40 |
| **1680x1050p** | 60 (RB) | T41 |
| | 60 | T42 |
| **1920x1200p** | 60 (RB) | T43 |
| **480i** | 59 | T44 |
| | 60 | T45 |
| **480p** | 59 | T46 |
| | 60 | T47 |
| **576i** | 50 | T48 |
| **576p** | 50 | T49 |
| **720p** | 50 | T50 |
| | 59 | T51 |
| | 60 | T52 |
| **1080i** | 50 | T53 |
| | 59 | T54 |
| | 60 | T55 |
| **1080p** | 23 | T56 |
| | 24 | T57 |
| | 25 | T58 |
| **1080p** | 29 | T59 |
| | 30 | T60 |
| | 50 | T61 |
| | 59 | T62 |
| | 60 | T63 |

| Test Timing List | HZ | ID |
|---|---|---|
| **2048x1080p** | 23 | T64 |
| | 24 | T65 |
| | 25 | T66 |
| | 29 | T67 |
| | 30 | T68 |
| | 50 | T69 |
| | 59 | T70 |
| | 60 | T71 |
| **3840x2160p** | 23 | T72 |
| | 24 | T73 |
| | 25 | T74 |
| | 29 | T75 |
| | 30 | T76 |
| | 50 | T77 |
| | 59 | T78 |
| | 60 | T79 |
| **4096x2160p** | 23 | T80 |
| | 24 | T81 |
| | 25 | T82 |
| | 29 | T83 |
| | 30 | T84 |
| | 50 | T85 |
| | 59 | T86 |
| | 60 | T87 |
| Bypass | | T88 |

RB = Reduced Blanking.

***NOTE:*** *T88 Bypass is only available in Analyzer mode.*

## INPUT/OUPUT PC RESOLUTIONS

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

**RB** = Reduced Blanking.

## INPUT/OUTPUT TV RESOLUTIONS

| TV RESOLUTION | VERTICAL FREQUENCY (HZ) | INPUT HDMI | HDMI | OUTPUT DVI | VGA |
|---|---|---|---|---|---|
| 480i | 59, 60 | ✓ | ✓ | ✓ | |
| 480p | 59, 60 | ✓ | ✓ | ✓ | ✓ |
| 576i | 50 | ✓ | ✓ | ✓ | |
| 576p | 50 | ✓ | ✓ | ✓ | ✓ |
| 720p | 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 | ✓ | ✓ | | |

### TOTAL RESOLUTIONS

- This unit supports a total of (87) output resolutions.

### VGA OUTPUT LIMITATIONS

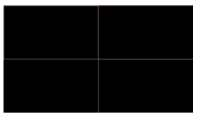
- Only supports RGBHV (YUV, RGBS, and RGsB are not supported).
- In Analyzer mode the VGA output is disabled.
- In Pattern mode the VGA output has limited resolution support.
- OSD Menu display is not supported.

## TEST PATTERNS

| TEST PATTERN NAME | VARIATIONS | ID |
|---|---|---|
| Border | | P01 |
| Checkerboard | 3 | P02 |
| Circle 1 | | P03 |
| Circle 4 | | P04 |
| Black | | P05 |
| Blue | | P06 |
| Cyan | | P07 |
| Green | | P08 |
| Magenta | | P09 |
| Red | | P10 |
| White | | P11 |
| Yellow | | P12 |
| Colorbar Delay | | P13 |
| Colorbar-H | | P14 |
| Colorbar Motion | 2 | P15 |
| Colorbar S. | | P16 |
| Colorbar Split | | P17 |
| Colorbar-V | 3 | P18 |
| Cross Hatch 8 | 2 | P19 |
| Cross Hatch 16 | 2 | P20 |
| Cross Hatch 32 | 2 | P21 |
| Diagonal 1 | | P22 |
| Diagonal 2 | | P23 |
| Dot | | P24 |
| General | 3 | P25 |
| Grayscale 8 | 3 | P26 |
| Grayscale 16 | 3 | P27 |
| Grayscale 32 | 3 | P28 |

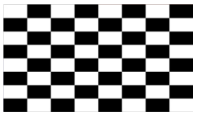
| TEST PATTERN NAME | VARIATIONS | ID |
|---|---|---|
| Grayscale 64 | 3 | P29 |
| Grayscale 256 | 4 | P30 |
| Grayscale 256RGB | | P31 |
| Grayscale Adjust | 256 | P32 |
| Grayscale H | | P33 |
| Grid | | P34 |
| Image | 2 | P35 |
| Letter H | 2 | P36 |
| Line ON/OFF-H | | P37 |
| Line ON/OFF-V | 2 | P38 |
| Line ON/OFF-V 4K | | P39 |
| Motion-H | 4 | P40 |
| Motion-V | 4 | P41 |
| Multiburst | 3 | P42 |
| Needles | | P43 |
| Overscan | | P44 |
| Pluge | 2 | P45 |
| Square H8 | 2 | P46 |
| Square H16 | 2 | P47 |
| Square H32 | 2 | P48 |
| Text | 4 | P49 |
| Window Blue | 4 | P50 |
| Window Cyan | 4 | P51 |
| Window Green | 4 | P52 |
| Window Magenta | 4 | P53 |
| Window Red | 4 | P54 |
| Window White | 4 | P55 |
| Window Yellow | 4 | P56 |

## 1. BORDER



The **Border** pattern presents (4) equal-sized squares dividing the screen into (4) quadrants, forming a central white cross, with red, green, blue and white inner squares. Ideal for testing screen boundary, alignment and pincushion issues. All lines should be straight, and edge transitions should be sharp.

## 2. CHECKERBOARD



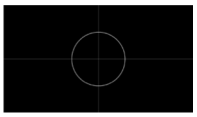
8x8

24x24

48x48

The **Checkerboard** pattern displays a repeating black and white checkerboard image. This is ideal for checking the alignment and corner convergence of TVs or monitors. Bandwidth can be checked by observing the vertical transitions. Transitions from black to white should be sharp. There are (3) variations: 8×8, 24×24 and 48×48.

## 3. CIRCLE 1



The **Circle 1** pattern provides a single white circle in the middle with a white cross and a white outer border line. This pattern is designed for quickly confirming that the geometry of the scene is correct and that the full source is being displayed, edge to edge.

## 4. CIRCLE 4

The **Circle 4** pattern provides (4) smaller white circles in each of the (4) corners of the screen. This pattern can help confirm that the display is maintaining correct geometry at the edges of the screen.

## 5. BLACK

## 6. BLUE

## 7. CYAN

## 8. GREEN

## 9. MAGENTA

## 10. RED

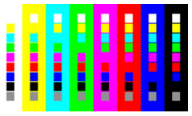
## 11. WHITE

## 12. YELLOW



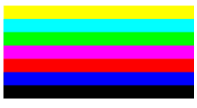
These patterns are full screen purity tests offering (8) different full field patterns: **Black, Blue, Cyan, Green, Magenta, Red, White, Yellow.** The color patterns should display an even distribution of brightness and consistent color tone across the screen. The 100% white pattern should display evenly 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.

## 13. COLORBAR DELAY



The **Colorbar Delay** pattern provides a sequence of standard 100% color bars with a full set of smaller color squares within each bar. This test is primarily to detect if any of the color components of the video signal are delayed/skewed relative to each other. Pay close attention to the left and right sides of the squares and look for a color shift. This is a common problem when using extreme-length analog extension products, or very long analog cables.

## 14. COLORBAR-H



The **Colorbar-H** pattern is a standard (white, yellow, cyan, green, magenta, red, blue, black) 100% color bar pattern using horizontal bars.

## 15. COLORBAR MOTION

**Slow/Fast Motion**

The **Colorbar Motion** pattern is a standard (white, yellow, cyan, green, magenta, red, blue, black) 100% color bar pattern using vertical bars with a grey bar moving horizontally across it. There are 2 variations: slow and fast motion of the grey bar.

## 16. COLORBAR S

The **Colorbar S** pattern is a standard SMPTE color bar pattern which is used for rapid verification of signal color accuracy and for display setup using the Blue-Only option on your display, if it has one.

## 17. COLORBAR SPLIT

The **Colorbar Split** pattern is a vertical color bar pattern with the color bars split in the middle by large black and white sections. All colors (white, yellow, cyan, green, magenta, red, blue) are at 100% brightness.

## 18. COLORBAR-V (3 VARIATIONS)

**100%**

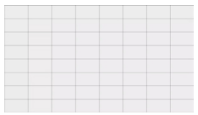
**75%**

**100% & 75%**

The **Colorbar-V** pattern comes in (3) variations. The first is a standard (white, yellow, cyan, green, magenta, red, blue, black) 100% color bar pattern using vertical bars. The 2nd variation has all bars at 75% brightness. The 3rd variation is split with the top half being at 100% and the lower half being at 75% brightness.

## 19. CROSS HATCH 8 (2 VARIATIONS)

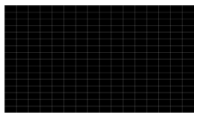
**100%**



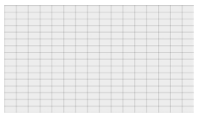
**75%**

The **Cross Hatch 8** pattern is a full field black & white pattern of crossing vertical and horizontal lines dividing the screen into (8) sections in each direction. This pattern is primarily used to check for color convergence and pincushion issues in projectors. There are (2) variations: Normal (white lines, black field) and Inverse (black lines, white field).

## 20. CROSS HATCH 16 (2 VARIATIONS)



**100%**

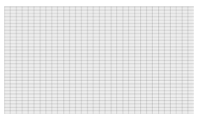


**75%**

The **Cross Hatch 16** pattern is a full field black & white pattern of crossing vertical and horizontal lines dividing the screen into (16) sections in each direction. This pattern is primarily used to check for color convergence and pincushion issues in projectors. There are (2) variations: Normal (white lines, black field) and Inverse (black lines, white field).

## 21. CROSS HATCH 32 (2 VARIATIONS)

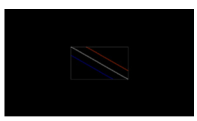
**100%**



**75%**

The **Cross Hatch 32** pattern is a full field black & white pattern of crossing vertical and horizontal lines dividing the screen into (32) sections in each direction. This pattern is primarily used to check for color convergence and pincushion issues in projectors. There are (2) variations: Normal (white lines, black field) and Inverse (black lines, white field).

## 22. DIAGONAL 1

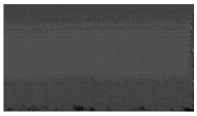


The **Diagonal 1** pattern is a set of (3) diagonal colored lines (red, white and blue) within a white square in the middle of the screen. This pattern is used to check for distortion and alignment issues in the center of the screen

## 23. DIAGONAL 2

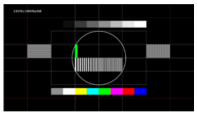
The **Diagonal 2** pattern is (2) diagonal lines that travel from the corners to the exact center of the display. This can be used to check for alignment and geometry issues, particularly with projectors. The outer border of the screen also has a white outline to verify that the full image is being displayed.

## 24. DOT



The **Dot** pattern is a full field black & white pattern with a repeating pattern of single-pixel (resolutions below 4K) or 4-pixel (at 4K) white dots surrounded by single pixels of black. This pattern is ideal for testing the signal path/display for bandwidth issues, interference, cross-talk or scaling issues.

## 25. GENERAL (3 VARIATIONS)



The **General** pattern is an all-purpose, multi-pattern test to visually check for multiple issues simultaneously. It includes color bars, 8-step greyscale, vertical and horizontal multi-burst, cross hatch, circle and motion patterns. There are (3) variations: No motion, slow motion and fast motion.

## 26. GRAYSCALE 8 (3 VARIATIONS)

**Vert. Bar**

**Vert. L/R Bar**

**Hori. Bar**

The **Grayscale 8** pattern provides a way to check and adjust the contrast, brightness and grayscale tracking of your display with (8) bars progressing from 0% to 100% brightness in even steps. When testing a display, no color should be visible in any of the bars, and all bars should be visible and distinct. There are (3) variations: (8) vertical bars, (2) sets of (8) vertical bars with the lower set reversed, and (8) horizontal bars.

## 27. GRAYSCALE 16 (3 VARIATIONS)

**Vert. Bar**

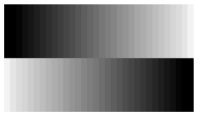
**Vert. L/R Bar**

**Hori. Bar**

The **Grayscale 16** pattern provides a way to check and adjust the contrast, brightness and grayscale tracking of your display with (16) bars progressing from 0% to 100% brightness in even steps. When testing a display, no color should be visible in any of the bars, and all bars should be visible and distinct. There are (3) variations: (16) vertical bars, (2) sets of (16) vertical bars with the lower set reversed, and (16) horizontal bars.

## 28. GRAYSCALE 32 (3 VARIATIONS)

**Vert. Bar**



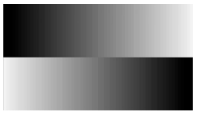
**Vert. L/R Bar**

**Hori. Bar**

The **Grayscale 32** pattern provides a way to check and adjust the contrast, brightness and grayscale tracking of your display with (32) bars progressing from 0% to 100% brightness in even steps. When testing a display, no color should be visible in any of the bars, and all bars should be visible and distinct. There are (3) variations: (32) vertical bars, (2) sets of (32) vertical bars with the lower set reversed, and (32) horizontal bars.

## 29. GRAYSCALE 64 (3 VARIATIONS)

Vert. Bar



Vert. L/R Bar

Hori. Bar

The **Grayscale 64** pattern provides a way to check and adjust the contrast, brightness and grayscale tracking of your display with (64) bars progressing from 0% to 100% brightness in even steps. When testing a display, no color should be visible in any of the bars, and all bars should be visible and distinct. There are (3) variations: (64) vertical bars, (2) sets of (64) vertical bars with the lower set reversed, and (64) horizontal bars.

## 30. GRAYSCALE 256 (4 VARIATIONS)

Gray

Red

Green

Blue

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. There are (3) variations: (256) vertical bars, (2) sets of (256) vertical bars with the lower set reversed and (265) horizontal bars.

## 31. GRAYSCALE 256RGB

The **Grayscale 256RGB** pattern provides a way to fine tune the contrast, brightness, grayscale and color tracking of your display with a four full (265) step gradients (gray, red, green, blue) progressing from 0% to 100% brightness. When testing a display, the transition from dark to light should appear even and consistent across all (4) sections.

## 32. GRAYSCALE ADJUST (256 VARIATIONS)

**Adjustable from 0 to 256**

The **Grayscale Adjust** pattern provides a full field of grey with user adjustable brightness levels for testing display gray purity and signal response. The brightness can be freely adjusted from (0 to 255) by pressing the **PATTERN** button followed by the -/+ buttons. The gray level number will appear in text on screen while it is in adjusting mode.

## 33. GRAYSCALE H

The **Grayscale H** pattern provides (4) distinct gray fields in an **"H"** arrangement for testing luminance transition stability. No color or interference should be visible at the transitions between sections.

## 34. GRID

The **Grid** pattern provides a selection of red, green, blue and white boxes with 2x2 grids within and above them to test for pixel on pixel and color offset issues.

## 35. IMAGE (2 VARIATIONS)

The **Image** pattern is a user customizable test pattern that holds (2) bitmap images. One image is for use with low output resolutions *(below 1920x1080)* and the other is for high output resolutions *(1920x1080 and above)*. The low resolution image is a 640x480 bitmap *(RGB, 24-bit)* and the high resolution image is a 1920x1080 bitmap *(RGB, 24-bit)*.

***NOTE:*** *To upload new images into the unit please the new replacement image on a USB thumb drive with the file named* ***"IMG_480.BMP"*** *or* ***"IMG_1080.BMP"*** *as appropriate. Plug the USB thumb drive into the USB port on the unit and navigate to the* ***"Setup"*** *menu. Next, activate the* ***"Image 640x480 Update"*** *or* ***"Image 1920x1080 Update"*** *menu item, as appropriate, to copy the new image to the unit.*

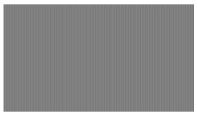
## 36. LETTER H (2 VARIATIONS)

The **Letter H** pattern is a screen filled with a series of large capital **"H"** characters moving vertically up the screen. This is a basic test to confirm motion detail. There are (2) variations: Large **"H"** characters and small **"H"** characters.

## 37. LINE ON/OFF-H

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

## 38. LINE ON/OFF-V (2 VARIATIONS)



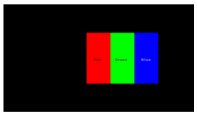
**White & Black Lines**

**Red & Green Lines**
*(Not supported in 4K)*

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 gray field, then it is possible that your display does not fully support the resolution you are currently sending to it. There are (2) variations: alternating white & black lines and alternating red and green lines.

***NOTE:*** *The red and green variation is not available if the selected output resolution is 4K. The following timings use dual-pixel lines: 3840x2160@50/60Hz & 4096x2160@25/30/50/60Hz.*

## 39. MOTION-H (4 VARIATIONS)



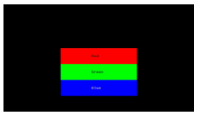
**Slow/Fast RGB Block**

**Slow/Fast String**

The **Motion-H** patterns are a collection of horizontal motion tests. These can be used to test your display's pixel ON/OFF response time. There are (4) variations: Slow red/green/blue block, fast red/green/block, slow moving sample text, fast moving sample text.

***NOTE:*** *The contents of the text can be modified using an RS-232 or Telnet command and can be up to 20 characters long.*

## 40. MOTION-V (4 VARIATIONS)



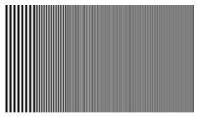
**Slow/Fast RGB Block**

**Slow/Fast String**

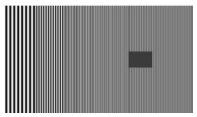
The **Motion-V** patterns are a collection of vertical motion tests. These can be used to test your display's pixel ON/OFF response time. There are (4) variations: Slow red/green/blue block, fast red/green/block, slow moving sample text, fast moving sample text.

***NOTE:*** *The contents of the text can be modified using an RS-232 or telnet command and can be up to 20 characters long.*

## 41. MULTIBURST (3 VARIATIONS)



**Stop Motion**



**Slow/Fast Motion**

The **Multiburst** pattern provides a standard multiburst pattern consisting of vertical white lines that decrease in thickness from left to right allowing the user to analyze the bandwidth and frequency response of the video path and connected display. There are (3) variations: Standard multiburst, multiburst with a slow moving gray block, and multiburst with a fast moving gray block.

## 42. NEEDLES

The **Needles** pattern is a standard needle pulse test. The top half of the screen is black and the bottom half is white with (2) thin inverse- brightness lines crossing from top to bottom. This pattern allows for analysis of the sharpness, blooming and screen distortion issues that a display might have.

## 43. OVERSCAN

The **Overscan** pattern provides a quick way to determine how much overscan, or clipping, is being caused by a display. It consists of (5) concentric rectangles moving in from the outer edge of the signal. They are positioned at 0%, 2.5%, 5%, 7.5% and 10% of the screen size.

## 44. PLUGE (2 VARIATIONS)

**Full/Limited RGB Range**

The **Pluge** pattern is used to perform the accurate and consistent brightness and contrast configuration of a display. Typically you will want to adjust the brightness control of the monitor so that the first bar is just barely indistinguishable from the background black while the second bar is still clearly visible. Next you should adjust the contrast so that all four segments of the greyscale box are clearly visible and distinguishable. There are (2) variations: Full RGB range (0-255) and Limited RGB range (16-235).

## 45. SQUARE H8 (2 VARIATIONS)

**Normal**



**Inverse**

The **Square H8** pattern is a full field black & white pattern of squares dividing the screen horizontally into (8) sections. This pattern is primarily used to check projector linearity. There are (2) variations: Normal (white lines, black field) and Inverse (black lines, white field).

## 46. SQUARE H16 (2 VARIATIONS)

**Normal**



**Inverse**

The **Square H16** pattern is a full field black & white pattern of squares dividing the screen horizontally into (16) sections. This pattern is primarily used to check projector linearity. There are (2) variations: Normal (white lines, black field) and Inverse (black lines, white field).

## 47. SQUARE H32 (2 VARIATIONS)

**Normal**



**Inverse**

The **Square H32** pattern is a full field black & white pattern of squares dividing the screen horizontally into (32) sections. This pattern is primarily used to check projector linearity. There are (2) variations: Normal (white lines, black field) and Inverse (black lines, white field).

## 48. TEXT (4 VARIATIONS)

**Normal & Small**

**Inverse & Small**

**Normal & Big**

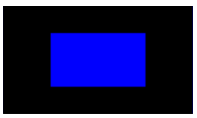
**Inverse & Big**

The **Text** pattern is used to check the clarity of text at various sizes and colors. This is primarily a test for projectors. There are (4) variations: Small multi-color text on a black background, small multi-color text on a white background, large multi-color text on a black background, and large multi-color text on a white background.

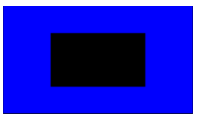
## 49. WINDOW BLUE (4 VARIATIONS)

**Normal 75%**

**Inverse 75%**



**Normal 50%**



**Inverse 50%**

## 50. WINDOW CYAN (4 VARIATIONS)

**Normal 75%**

**Inverse 75%**

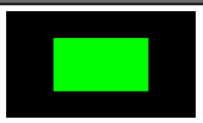
**Normal 50%**

**Inverse 50%**

## 51. WINDOW GREEN (4 VARIATIONS)

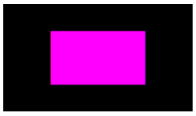
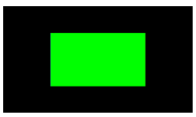
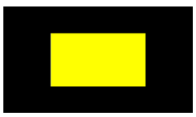
**Normal 75%**

**Inverse 75%**



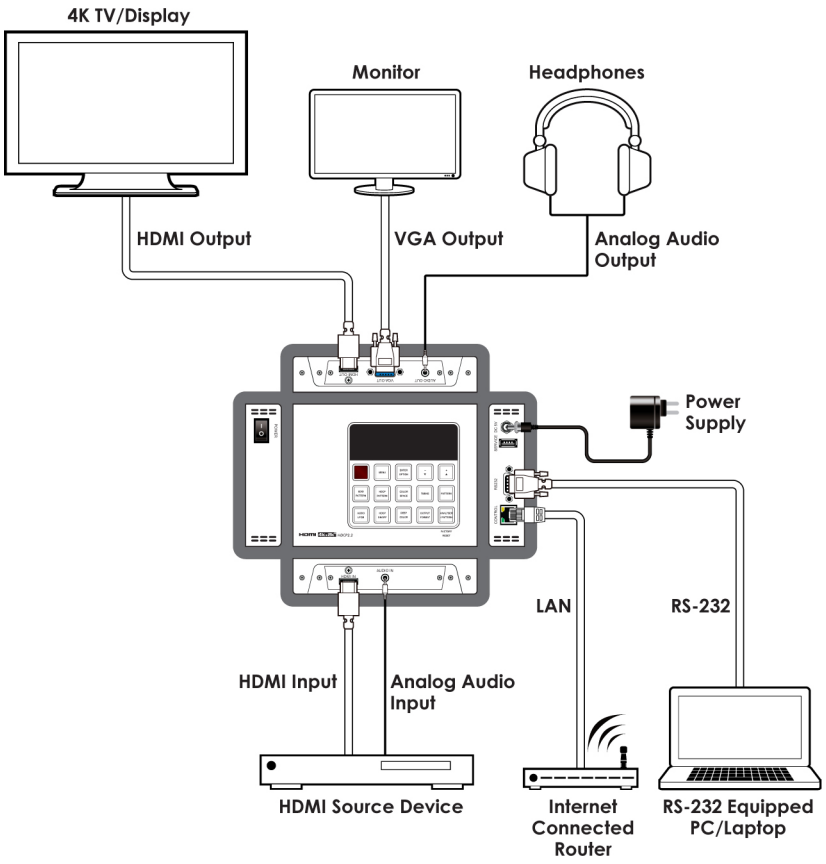
**Normal 50%**

**Inverse 50%**

| 52. WINDOW MAGENTA (4 VARIATIONS) | | | |
|---|---|---|---|
|  |  |  |  |
| Normal 75% | Inverse 75% | Normal 50% | Inverse 50% |
| **53. WINDOW RED (4 VARIATIONS)** | | | |
|  |  |  |  |
| Normal 75% | Inverse 75% | Normal 50% | Inverse 50% |
| **54. WINDOW WHITE (4 VARIATIONS)** | | | |
|  |  |  |  |
| Normal 75% | Inverse 75% | Normal 50% | Inverse 50% |
| **55. WINDOW YELLOW (4 VARIATIONS)** | | | |
|  |  |  |  |
| Normal 75% | Inverse 75% | Normal 50% | Inverse 50% |

These Window patterns are additional screen purity tests offering seven different patterns with different sized windows of each color on a black field: Blue, Cyan, Green, Magenta, Red, White, Yellow. The color patterns should display an even distribution of brightness and consistent color tone across the screen. Each pattern has (4) variations: Normal 75% Window, Inverse 75% Window, Normal 50% Window, and Inverse 50% Window.

## CONNECTION DIAGRAM




## ACRONYMS

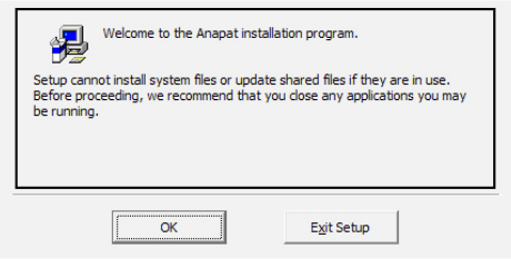
| ACRONYM | COMPLETE TERM |
|---|---|
| **CED** | Character Error Detection |
| **EDID** | Extended Display Identification Data |
| **HDCP** | High-bandwidth Digital Content Protection |
| **HDMI** | High-Definition Multimedia Interface |
| **IR** | Infrared |
| **OLED** | Organic Light Emitting Diodes |
| **OSD** | On-Screen Display |
| **PoR** | Power on Reset |
| **RB** | Reduced Blanking |
| **SCDC** | Status and Control Data Channel |

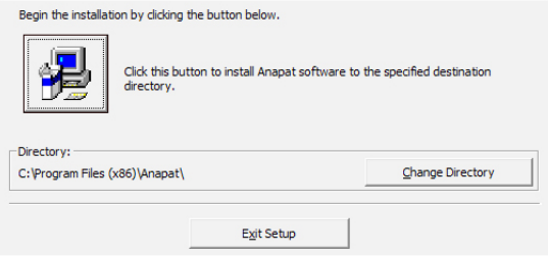
## INSTALLATION

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.




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

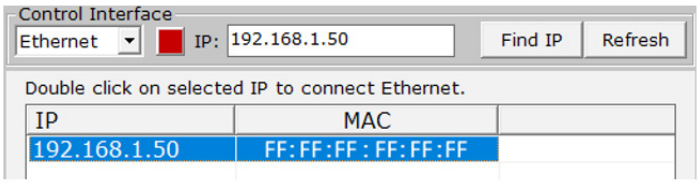
The Anapat software can connect to the Bench Version of the Signal Generator & Analyzer via RS-232 or Ethernet or to the Portable Version via RS-232 (Using the Micro-USB port). Please follow the steps below to connect using the method appropriate for the device you wish to control.

**CONNECT VIA ETHERNET** (Bench Version Only)

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

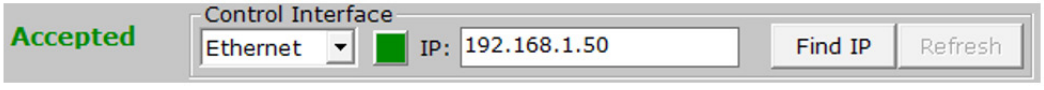
**Step 2:** Select **"Ethernet"** as the control interface.


**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.




**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 (** **)**.

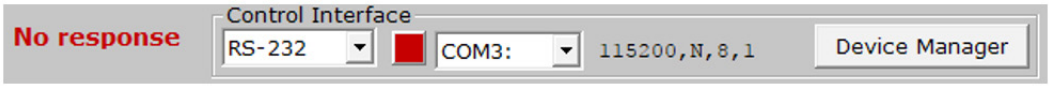


**CONNECT VIA RS-232** (Bench or Portable Version)

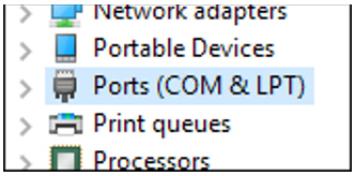
**Step 1:** Start the Anapat software by clicking on it in the **Start** Menu.

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

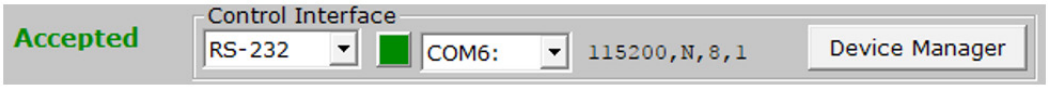
**Step 2:** Select **"RS-232"** as the control interface..




**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 **(Portable Version only)**.

## OPERATIONAL MODE

The Signal Generator & Analyzer units have (2) main operational modes, Analyzer Mode and Pattern Mode. The Portable Version has an additional 3rd mode, cable testing.

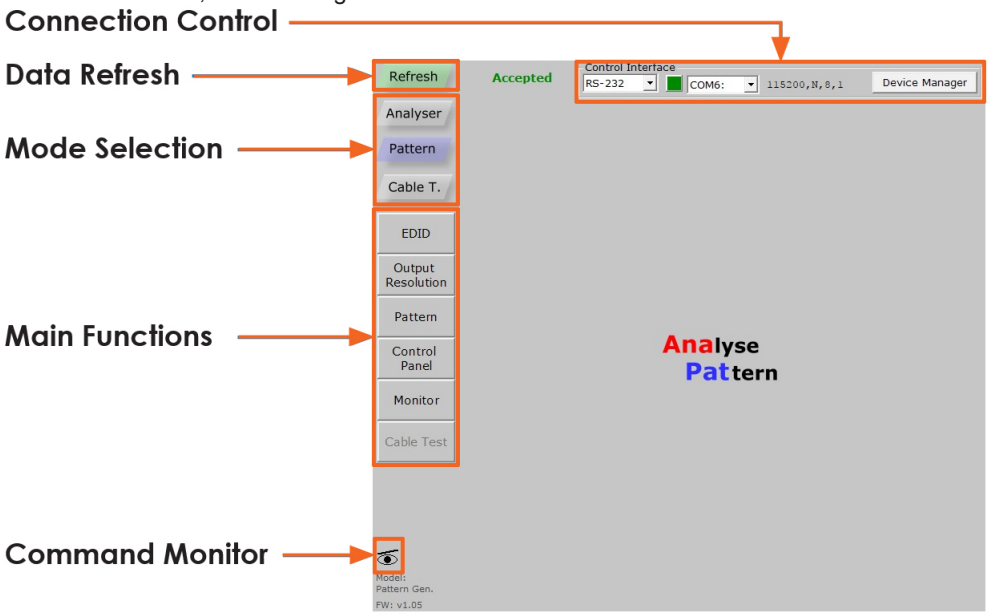



**Figure 1: Mode Selection, Portable Version**

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.

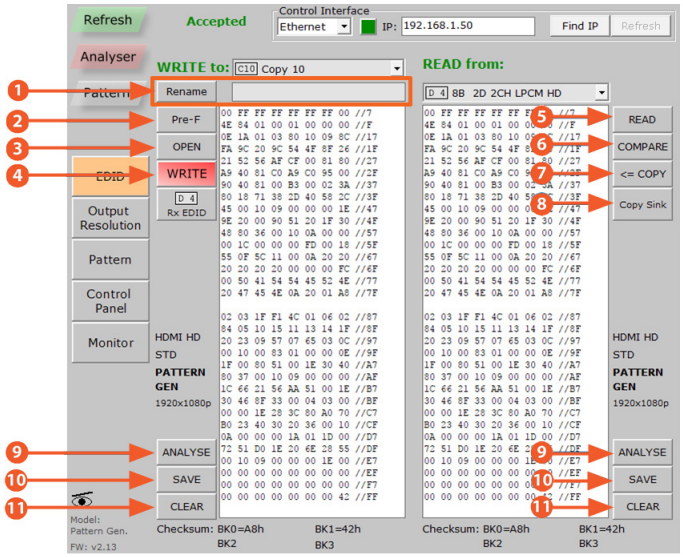



**Figure 3: EDID Management in Analyzer Mode, Bench Version**

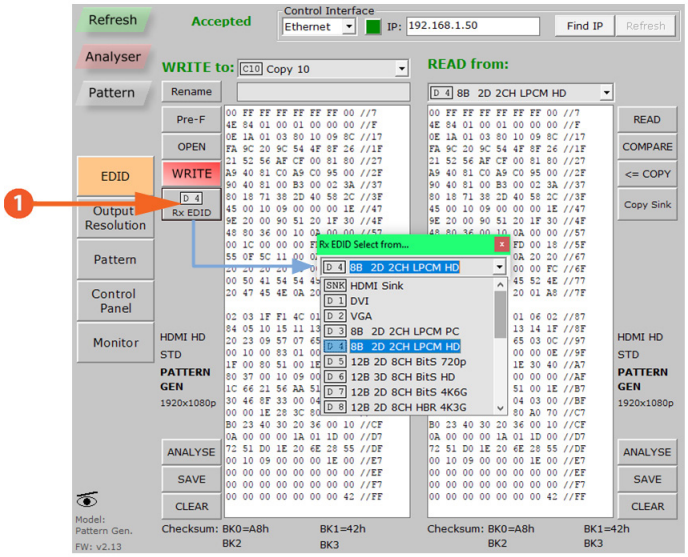



**Figure 4: Rx EDID Selection in Analyzer Mode, Bench Version**

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 Bench Version of the unit. The list of available resolutions for the Portable Version is more limited.*

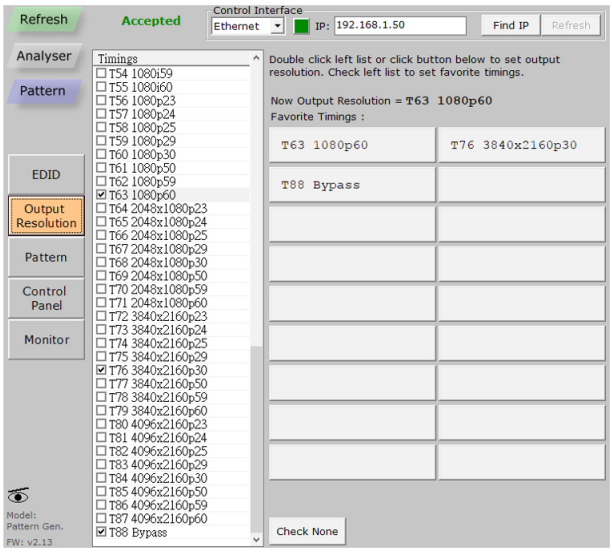



**Figure 5: Output Resolution in Pattern Mode, Bench Version**

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 Portable Version of the Signal Generator & Analyzer 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).

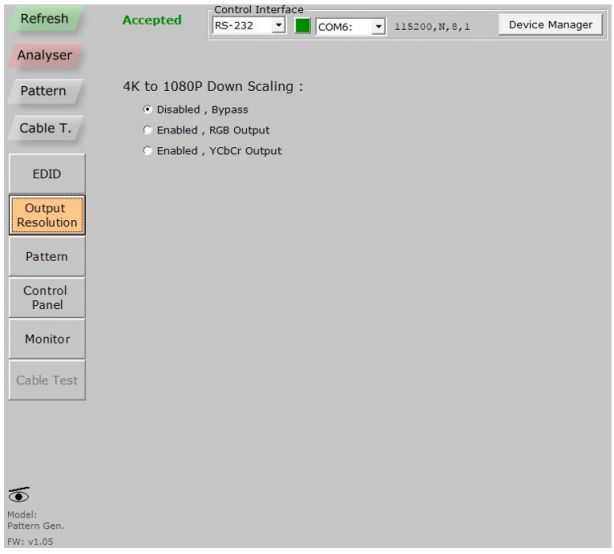



**Figure 6: Output Resolution in Analyzer Mode, Portable Version**

## 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 Bench Version of the unit. The list of available patterns for the Portable Version is more limited.*

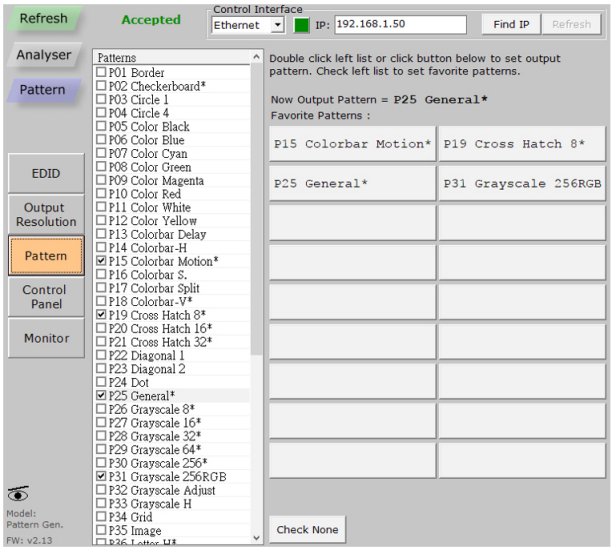



**Figure 7: Test Pattern in Pattern Mode, Bench Version**

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.

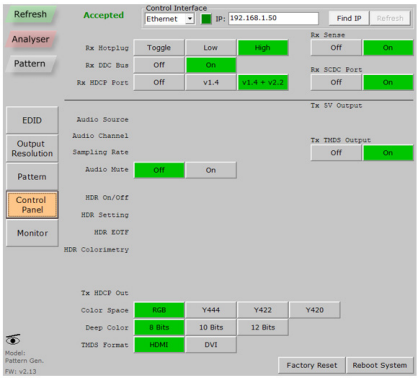



**Figure 8: Control Panel in Analyzer Mode, Bench Version**

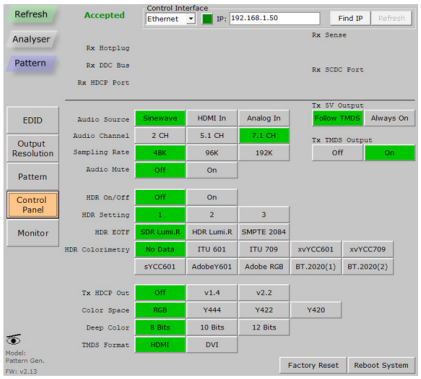



**Figure 9: Control Panel in Pattern Mode, Bench Version**

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.

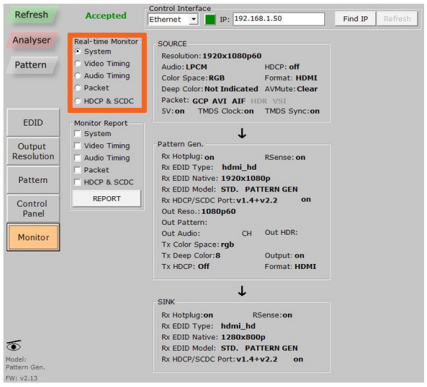



**Figure 10: Monitoring in Analyzer Mode, Bench Version**

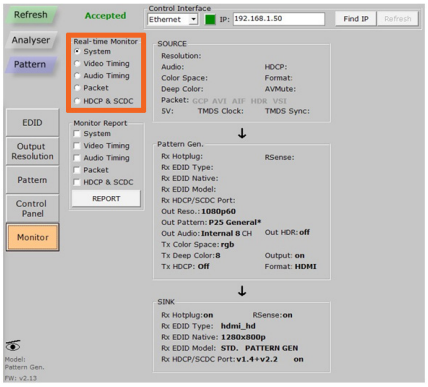



**Figure 11: Monitoring in Pattern Mode, Bench Version**

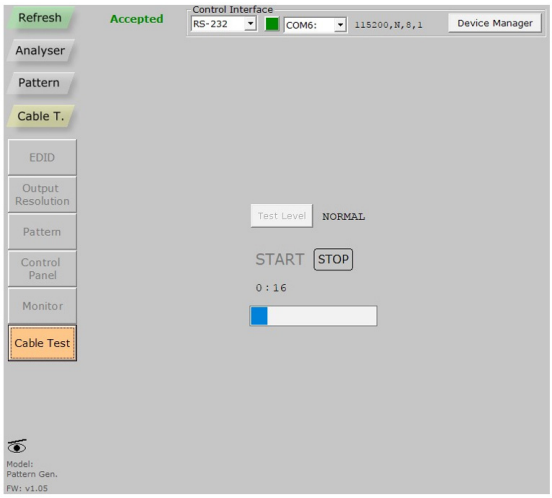
The available Real-time Monitor categories are:

1. **SYSTEM:** Basic source, sink and unit signal information.
2. **VIDEO TIMING (ANALYZER MODE ONLY):** Detailed information about the source's video timing.
3. **AUDIO TIMING (ANALYZER MODE ONLY):** Detailed information about the source's audio format.
4. **PACKET (ANALYZER MODE ONLY):** Detailed information about the source's GCP, AVI, AIF, SPD, VSI, and DRMI packets.
5. **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 (Portable Version Only)

The Portable Version 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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