



PGA-VHD

Video Generator, Tester, and Analyzer

- Generates VGA and HDMI Video patterns
- Supports HDMI 2.0(a), Deep Color, 4K @ 60Hz 4:4:4, and HDR
- Supports HDCP 1.4 and 2.2
- Can be Used as a portable HDMI Monitor/TV
- Rechargeable Battery Operation
- Customized Test Patterns

UMA1253 Rev n/c

**CUSTOMER SUPPORT
INFORMATION**

Order toll-free in the U.S. 800-959-6439
FREE technical support, Call **714-641-6607** or fax **714-641-6698**
Mail order: **Hall Research**, 1163 Warner Ave. Tustin, CA 92780
Web site: www.hallresearch.com E-mail: info@hallresearch.com

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FCC RADIO FREQUENCY INTERFERENCE STATEMENT

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been designed to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are intended to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at their own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



1.0 Introduction

1.1 General

The Hall Research PGA-VHD is a handheld versatile multi-interface tester for video and audio. As a video generator, it provides both VGA and HDMI outputs, and as an analyzer, it features an HDMI 2.0 input. The product boasts a bandwidth of 18 Gbps (supporting 4K/60 4:4:4) and supports HDCP 2.2. An indispensable tool for verification and troubleshooting of AV installations or for performing compatibility tests in the lab, the PGA-VHD offers many advanced features at a cost effective price.

The battery operated PGA-VHD has a large color 4K display with touch screen function for user operation and viewing status of outgoing and incoming video. The screen can also act as a 4K HDMI monitor supporting virtually all HDTV and PC resolutions. The instrument can also be used as an analyzer for video signal sources and displays. The PGA-VHD can perform “loop test” where quantitative information concerning performance of cables, extenders, repeaters, and video splitters can be obtained.

The instrument is packaged and shipped in a rugged carrying case to protect your instruments from hostile environments, shock, vibration, moisture and impact. Users will appreciate the built-in long lasting battery operation, multitudes of video patterns including user’s own custom pattern uploadable via USB, touch panel control, and access to advanced features such as HDCP analyzer and loop test in a single instrument. The PGA-VHD supports 8-channel LPCM audio with selectable sample rate. The analyzer can also be used in pass-through mode bypassing HDMI input to the connected display at the output.

NOTE

Fist time use:



*Prior to switching on the PGA-VHD for the first time, you must **plug the power supply to it**. This will disable the “shipping mode” and charge the device. We recommend leaving the product connected to the power supply for 2 to 3 hours prior to using it with battery alone for the first time.*

1.2 Features

- Provides both VGA and HDMI outputs and an HDMI input
- HDMI input can be used as a display, source analyzer, or pass-thru loop mode
- Supports HDMI 2.0(a) on output and input with 18 Gbps Bandwidth
- Supports 4K2K/60 4:4:4 8bit and 4K2K60 4:2:0 16bit video signals
- High Dynamic Range Video with HDR 10 support
- Supports HDCP 2.2 (and 1.4)
- Large selection of output video patterns including user defined and patterns with moving objects
- Large 4.3” touch screen for display and control
- Screen image can be mirrored (duplicated) to the HDMI output (perfect for training)
- USB port for mouse control, loading custom patterns, or firmware update
- Analog (stereo) audio output
- Ethernet control using Telnet commands
- Scrambler supported for videos over 340MHz output
- EDID read and save option
- Rugged and durable housing with convenient carrying case
- Battery operation time of up to 4 hours under full load

2.0 Package Contents

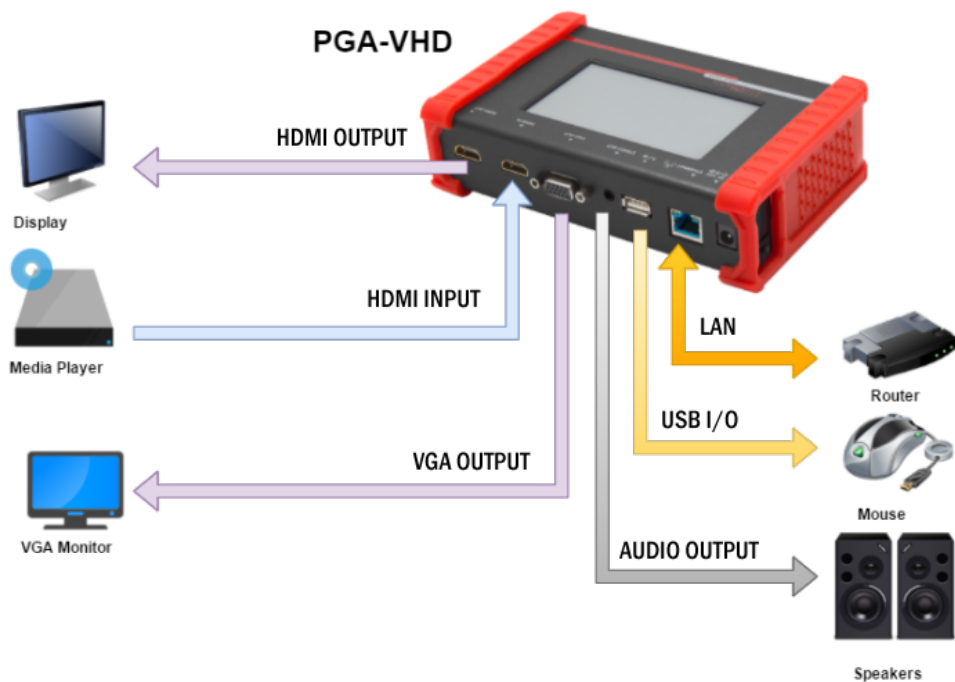
- (1) Carrying Case
- (1) Model PGA-VHD
- (1) 12V DC Power Supply
- (1) IEC Power Cord
- (1) 6' HDMI Cable
- (1) 6' VGA Cable
- (1) User's Manual



Sturdy carrying case

3.0 Configuration and Operation

3.1 Panel Description



Block Diagram

DC 12V: Connect the 12V 5A DC power supply supplied with the unit.

LAN: Connect the CAT5e/6 cable to this port to control the device using Ethernet TCP/IP protocol.

USB: Connect to a mouse for control or a flash drive for firmware update or loading custom patterns.

AUDIO OUT: Connect to speakers for analog audio output.

VGA OUT: Connect to a VGA display for simultaneous video output.

HDMI IN: Connect to this port to make the PGA-VHD act as a sink.

HDMI OUT: Connect to this port to make the PGA-VHD act as a source.

Touch Panel: Touch screen for user control.

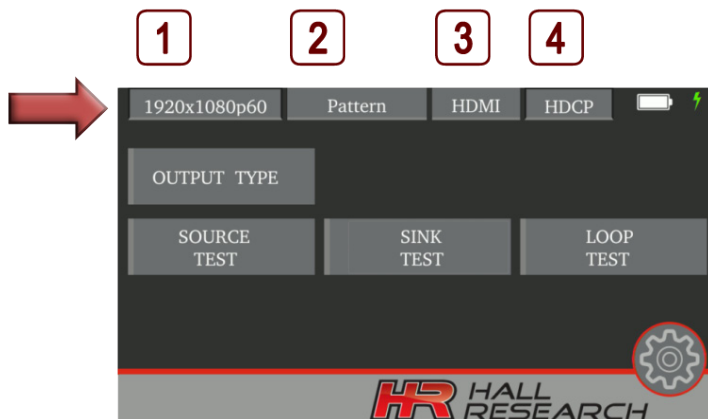
3.2 General Operation

There are **SIX** major options on the Home Screen on the PGA-VHD.

- Quick Select – Top Menu Bar
- Output Type
- Source Test
- Sink Test
- Loop Test
- Settings (gear icon on the bottom right)

3.2.1 Quick Select Bar

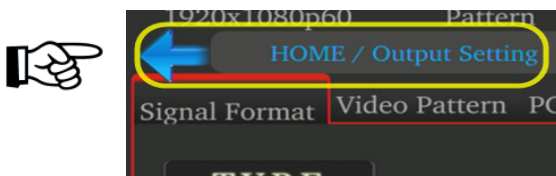
There is a quick select menu bar at the top of the HOME screen so users can easily navigate from one setting to another. PGA-VHD offers the users the convenience to change the output resolution, pattern and output HDCP encryption all from one screen.



Home Screen – Showing the Top Menu Bar

NOTE Navigating through Submenus:

The Quick Select items are clickable only when the main menu is shown. Once you have clicked into any submenu, the Quick Select top line items are not clickable. To navigate back to the main menu, use the blue back arrow button on the screen.



Quick Select – Top Menu Bar

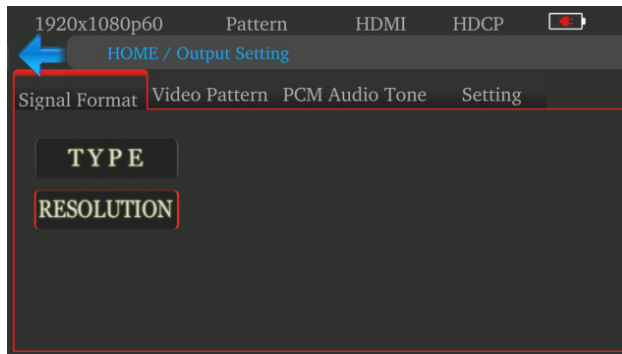
Menu Item	Description
1	Shows the current output resolution setting. Click on it to quickly jump to: Output Settings/Signal Format/Resolution to select a different resolution.

2	Shows the last pattern selected from the Default Patterns group (pattern names from Album including user uploaded patterns are not shown on the Quick Select bar). Clicking on this button will take you to: Output Settings/Video Pattern (Default patterns) screen where you can select a different pattern
3	Use this button to enable the HDMI / VGA only resolutions on the quick select line. Notice that both VGA and HDMI outputs are always active (VGA output is always RGBHV format regardless of HDMI color space settings). The Purpose of this quick select button is to help get you quicker to proper list of resolutions available from the quick select bar.
4	This button will take you to Sink Test/HDCP Selection page where you can select No HDCP, 1.4 or 2.2 HDCP.

OUTPUT TYPE

3.2.2 Output Type/Output Settings

This button is used to set the signal type for the HDMI output and to define other parameters pertaining to the outputs such as. color space, color depth, video resolution, video pattern, and audio formats.



Output Type

Output Type			
Menu	Sub-Menu	Options	Description
Signal Format	TYPE	HDMI	Select the digital video output type - Choose the color space (RGB, YCbCr 4:4:4, 4:2:2, or 4:2:0), color depth (8 bit thru 16 bit) and HDR mode. Depending on the resolution setting, not all color depths and color modes may be listed or available.
		DVI	The only color option for DVI output setting is RGB 8 bit.
	RESOLUTION	TV	Select among SDTV/HDTV resolutions. Here you will be making two selections: Resolutions and Frequency (refresh rate). Depending on the resolution selected you get different choices for the Frequency. For example when you select 576p for output resolution you only get 50Hz, but for 720p output resolution you get 6 choices from 25 Hz to 60 Hz
PC		Select the PC resolutions. Selection method is slightly different than that for TV explained above. Here, you don't select Resolution independent of Refresh rate, instead all available refresh rates are shown as part of the resolution. For example you have a choice for 1440x900 @ 60Hz, and	

PGA-VHD

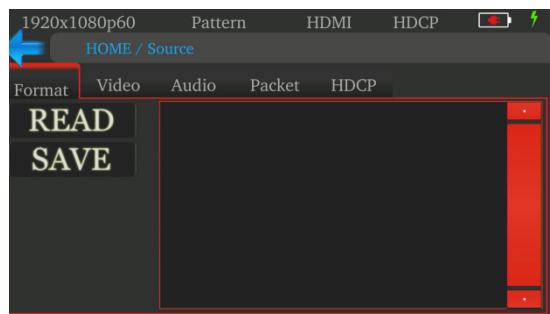
			1440x900 @ 75Hz
Video Pattern	DEFAULT	Pattern	Select the output pattern, enabling/disabling timer duration and number of moving squares and their speed
		Timer	
		Moving Squares	
	ALBUM		Select the user defined pattern *
PCM Audio Tone	MUTE ON/OFF		Enable/ Disable MUTE on output audio
	SINE WAVE	Content	Select the bits per sample (16~24 bits), sampling rate (32~192 KHz) and audio decibel levels
		Channel	Select the number of audio channels needed (from 2 to 7.1 channels).
Setting	Scrambling	AUTO	Auto enable Scrambling for video over 340 MHz bandwidth (Per HDMI 2.0 specifications, scrambling of the digital data is done prior to the TMDS encoding). Auto is default mode and is recommended.
		OFF	Turn off the scrambling for output video

* Selecting ALBUM under Video Pattern tab will activate the HDMI output mirroring function. Whatever is being shown on the touch-screen is also sent to the HDMI output. This mirroring mode stays in effect even after you leave this screen so the HDMI output will remain a duplicate of the screen on the device. This is a useful tool for training in a classroom setting on how to use the instrument. To disable the output-mirroring mode just select a pattern from the Default group.

SOURCE TEST

3.2.3 Source Test

In this mode you are using the PGA-VHD to test a video source such as STB, laptop, Blu-ray player, etc. You can also use this mode to turn the PGA-VHD into a 4K compatible TV. Source tests include format, video, audio, packet and HDCP analysis of the incoming video signal from the source.



Source Test – PGA-VHD as a Sink

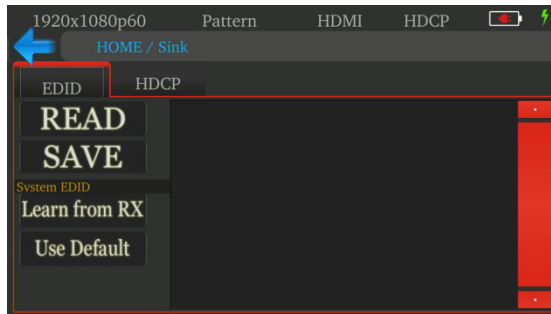
Source Test		
Menu	Sub-Menu	Description
Format	READ/ SAVE	Read and save the information from the VIDEO source such as timing parameters, HSYNC , VSYNC, pixel clock, etc.

Video	Full Screen	Provides a small screen displaying the video from the source in Full Screen
	Full Screen Info	Displays the video information along with the source
	Pass through	Enables video pass through to the display.
Audio	READ/ SAVE	Read and save the information from the AUDIO source such as modulation scheme, channel information, sampling rate, etc.
Packet	REFRESH	Read the hexadecimal AVI info frame
HDCP	HDCP 1.4/ HDCP 2.2 Type-0	Enable HDCP (1.4/ 2.2) on PGA-VHD display on HDMI IN port from the source

SINK TEST

3.2.4 Sink Test

This option is for getting more information from the connected sink device (such as TV, Projector, or Extender) – EDID and HDCP information regarding the connected sink are available here.



Sink Test – PGA-VHD acts as a Source

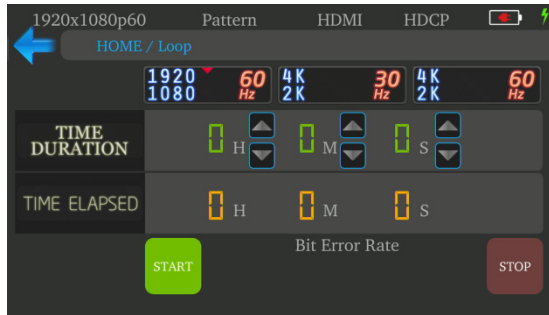
Sink Test		
Menu	Sub-Menu	Description
EDID	READ/ SAVE	Read and save the EDID of a HDTV or other devices using EDID analyzer
	Learn from RX	Learn EDID from the DUT that’s connected to the HDMI OUT to save it in the HDMI IN port
	Use Default	Use internal PGA-VHD EDID
HDCP	HDCP 1.4	Select HDCP 1.4 or 2.2 for video output on HDMI OUT port
	HDCP 2.2	

LOOP TEST

3.2.5 Loop Test

This section describes the cable or repeater loop test feature to evaluate the quality of the HDMI cables. It is important to note that in this mode the system generates video with random pixel values at its output and it expects to see the exact same pixel data values at the input. It tallies the number of errors. Therefore if the video

transport is using any encoding or compression techniques, the loop test will result in huge errors since pixels are modified (and delayed) by the encoder. You can use loop test for cables or extenders that do not modify pixel values in anyway, such as most HDBaseT products or Hall Research’s 4K Javelin optical HDMI cables.



Loop Test

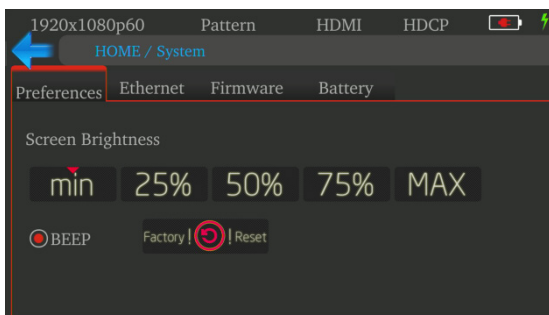
Loop Test		
Menu	Sub-Menu	Description
1920x1080@60 4Kx2K@30 4Kx2K@60	Time Duration / Time Elapsed	Evaluate the signal quality of HDMI cables and Device Under Test (DUT) in 3 different resolutions FHD(1080p), UHD @ 30 and UHD @ 60

It is recommended to run the test for at least 15 seconds for the results to be meaningful. You can use Loop Test to compare the quality of different cables or their ability to handle UHD 30Hz or 60 Hz



3.2.6 Settings

This section shows the system settings to change the screen brightness, network settings, firmware update and battery status.



System Settings

Settings		
Menu	Sub-Menu	Description
Preferences	Screen Brightness	Adjust the screen brightness at required levels
	Beep	Enable/ Disable system sound

	Factory Reset	Restore the device to factory default setting
Ethernet	DHCP	Set the network setting of PGA-VHD to either DHCP or Static IP addressing
	Static IP	
Firmware	System	Update the firmware files using USB flash drive
	ARM	
	FPGA	
	Pattern	Update and store customized patterns to the internal memory (up to 2 GB of storage)
Battery	Current Charge	Shows the battery status in percentage
	Time Remaining	Shows the remaining charge on the battery. You can also lock the battery (disconnect it from the circuit) in this screen. This is referred to as Ship Mode. The PGA-VHD is in this mode when purchased. In this mode the unit does not power up without the power supply connected.

4.0 Using the PGA-VHD as a Video Generator

The PGA-VHD simultaneously provides HDMI and VGA outputs, they are both active and show the same image. HDMI is the primary output (VGA output shows the same image and EDID functions apply to HDMI output only).

Connect the desired video output to the “Sink” using the provided cables. Sink can be an HDTV, Projector,

NOTE Both HDMI and VGA outputs are simultaneously active. You can select HDTV or VGA resolutions from HDMI/VGA Quick Select option from top menu bar..

Repeater, Splitter or a Video Switch.



PGA-VHD as Video Pattern Generator

Select *Output Type* from Main Menu. See [section 3.2.2](#) for more details.

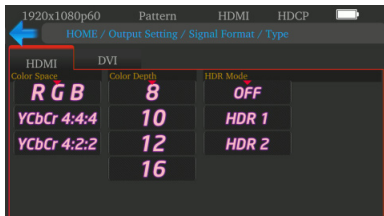


4.1 Signal Format

The following selections can be accessed under “Signal Format” option.

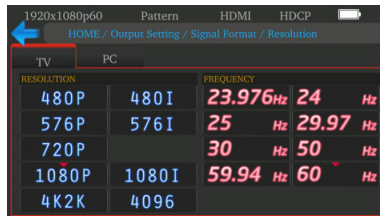
- **Type** – Switch between HDMI and DVI output format, select Color Space, Depth and HDR modes

- **Resolution** – Choose among HD and PC output resolutions



Select HDMI or DVI output format

Then select color parameters



Select resolution and refresh Rates

Both HDTV and PC (VGA or DVI) resolutions can be selected. Some TV resolutions (such as 480i, 1080i,) may not be available (grayed-out). This occurs when the Quick Select is set for VGA. If you want all resolutions available, go back to main menu and change Quick Select from VGA to HDMI

4.2 Video Pattern

PGA-VHD is able to output **default** and **user definable custom** video patterns (*Album*). Select “DEFAULT” to select among default patterns.

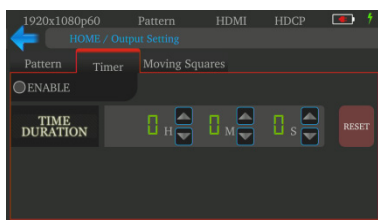
NOTE

*Default choice also allows display of a **timer** on the output screen as well as enabling **moving squares**.*

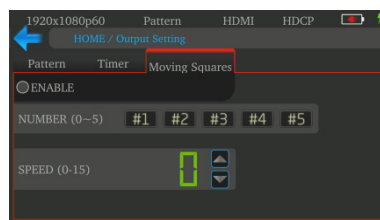


*In Album mode timer or moving squares are not displayed. This mode enables the output **mirroring feature** where the HDMI output is an exact duplicate of the instrument’s video screen, This is useful for demonstrations and training purposes. To disable mirroring, select any pattern from default choices.*

To go to the next image touch right edge of the screen, for previous image touch the left edge, and for going back to gallery touch the center of the screen.



Enabling Timer shows a running timer on the output screen. Hit RESET to reset displayed time to 0:0:0 (or any other start time you want to set)



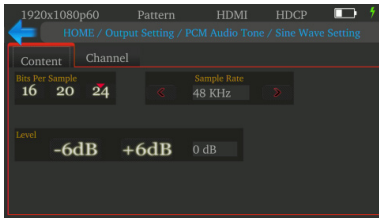
Enable Moving Squares and select up to 5 moving squares. Each square has a different pre-assigned color.

4.2.1 Steps to update user defined patterns using USB flash memory

- Create a folder by the name: **usr_pic** on the root directory of the USB flash drive with your desired images in JPG format. Images should ideally be 3840x2160 pixels. But the device accepts smaller images.
- From Main Menu, select the Settings Icon (gear symbol) → Firmware → Pattern
- Check the free space in the PGA-VHD disk storage displayed on this screen. The maximum total size for custom patterns is 2 GB.
- Touch the “Update” option to update the patterns and wait for completion. Then reboot the device.

4.3 Select Output Audio

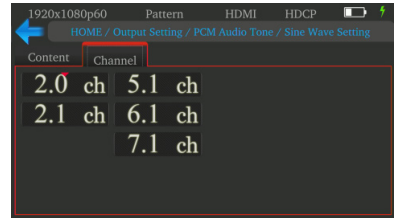
The audio settings can be changed in the “PCM Audio Tone” tab. The bit depth, sampling rate, decibel level and number of audio channels can be selected.



Content Settings



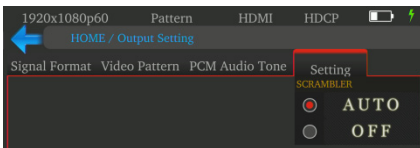
Output Audio Settings



Channel Settings

4.4 TMDS Scrambling Setting

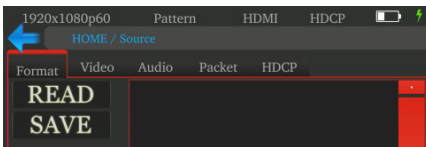
Auto enable Scrambling for video over 340 MHz bandwidth. Per HDMI 2.0 specifications, scrambling of the digital data is done prior to the TMDS encoding. Auto is default mode and is recommended.



TMDS Scrambler Setting

5.0 Source Test (PGA-VHD acts as Sink)

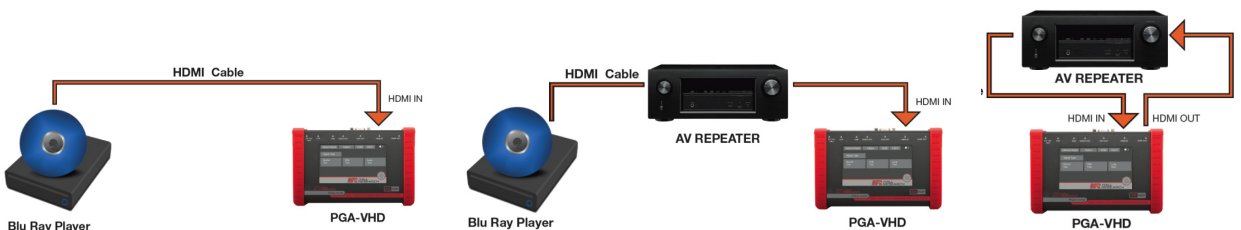
The PGA-VHD can be used to display the video from any HDMI or DVI source. It can also detect and display the video format, audio format, packet data, and HDCP status of the signal received from the source.



Source Test tabs

Note that the source signal can be from an original video source (laptop, DVD player, etc), or it could be the signal that is passed through a repeater, scaler, switcher, etc.

Also, for testing a switcher, scaler, or other device, you can use the PGA-VHD’s own output as the source.

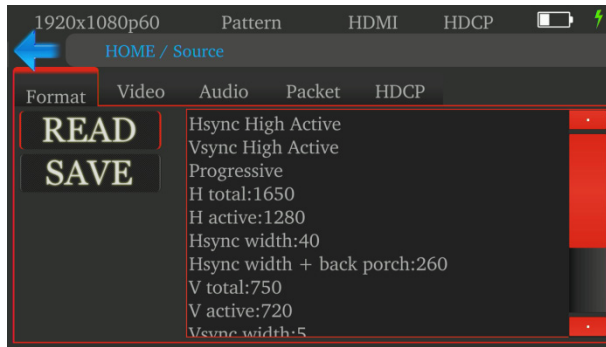


Source Test – Connection alternatives for Source Test

5.1 Format Analysis

In Format Tab, read and save the information from the VIDEO source such as timing parameters, HSYNC, VSYNC, pixel clock, etc.

The information shown can be saved in (.dat) and (.txt) format. Plug a USB flash to the analyzer and click on Save. Files are instantly created and saved on the USB flash device.

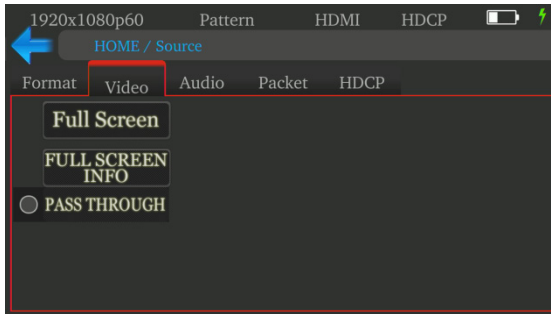


Source Test - Format Analysis

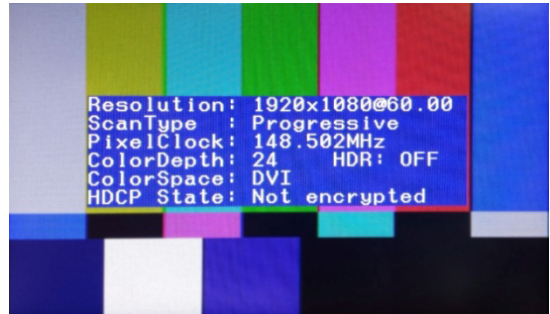
5.2 Video Analysis

In Video tab, a small screen displaying the video from the source is provided to monitor the incoming video from the source. In Full Screen, the video information along with the source information is displayed.

The **Pass through** option enables video pass through for the video coming into the PGA-VHD's HDMI IN to the display via HDMI OUT.



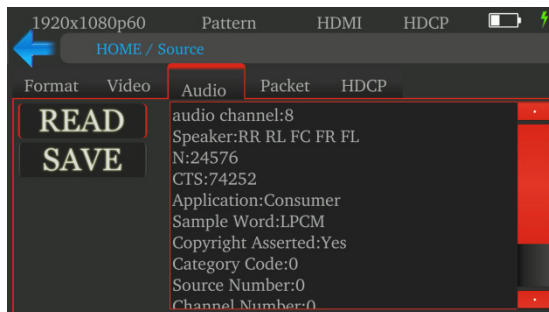
Source Test - Video Analysis



Full Screen w/ Info

5.3 Audio Analysis

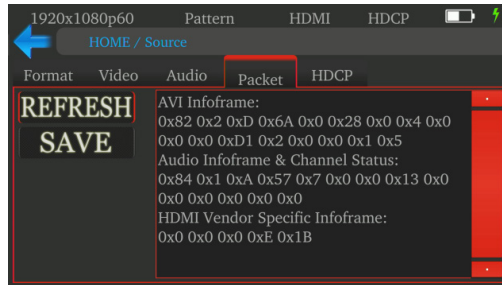
In Audio tab, read and save the information from the AUDIO source such as modulation scheme, channel information, sampling rate, etc. The information can be read and saved in (.dat) and (.txt) format in the USB flash drive



Source Test - Audio Analysis

5.4 Packet Information

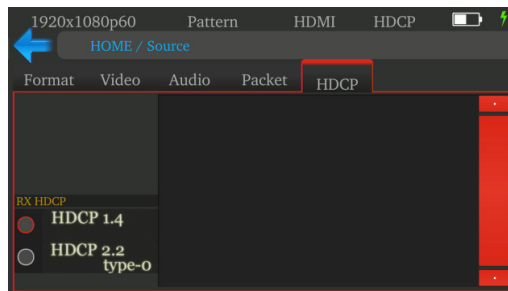
In this tab, the AVI info frame packet information of video source can be read and saved in (.dat) and (.txt) format in the USB flash drive



Source Test - Packet Information

5.5 HDCP Selection

Show the HDCP standard (none, 1.4 or 2.2) for the incoming video on HDMI IN port of the PGA-VHD.



Source Test - HDCP Selection

6.0 Sink Test (PGA-VHD as Source)

This option is used for testing the EDID and HDCP of the connected SINK

HDCP encryption can be enabled on the HDMI OUT to test HDCP authentication with the sink device.

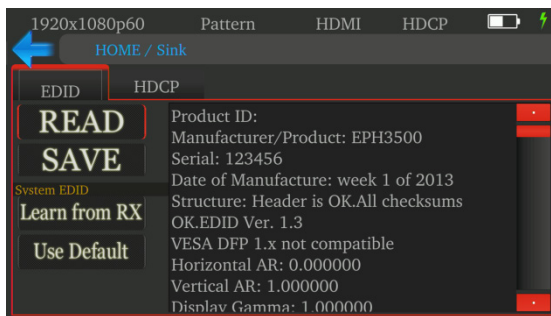
Use the following procedures to make the physical connections from the PGA-VHD from the source device under test.



Sink Test - PGA-VHD Acting as Video Generator

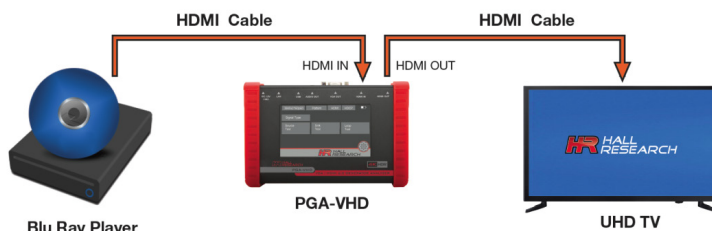
6.1 Sink EDID

The PGA-VHD can read the EDID data from the downstream device displayed (analyzed) and saved on a USB flash memory. It can also "Learn" the sink's EDID and use it for its own HDMI input



Sink Test - EDID Report

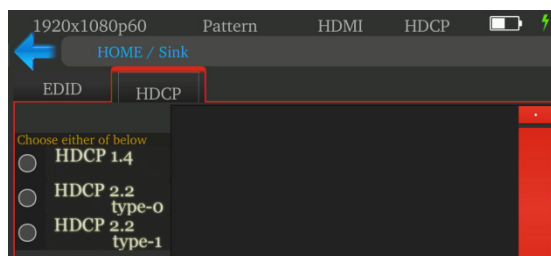
The “**Learn from RX**” option caused the PGA-VHD to use the EDID of the connected sink for its own HDMI input’s EDID. Select “**Use Default**” to revert and use the internal factory default PGA-VHD EDID.



Sink Test - Source learns EDID from UHD TV

6.2 HDCP Encryption applied to the output Video

In HDCP tab under SINK option, Test the HDCP of the downstream devices such as SINK or an AV receiver by enabling the HDCP 1.4 or HDCP 2.2 Type 0 or Type 1 encryption. This will enable the HDMI OUT of the PGA-VHD to output patterns with HDCP encryption in the above two SINK configurations.



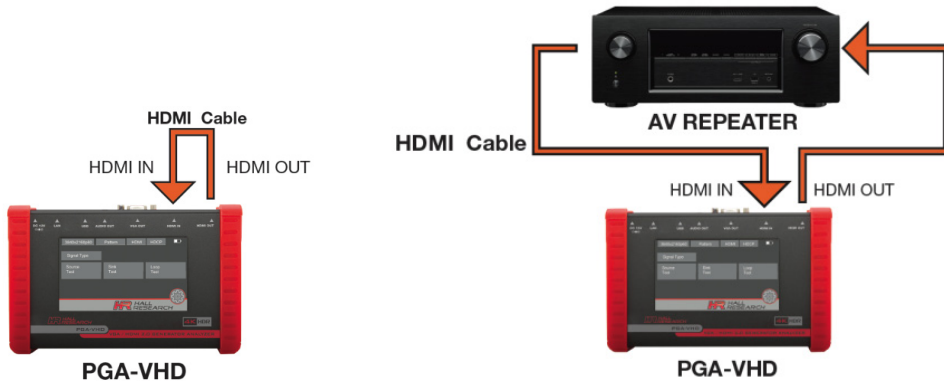
Sink Test – Output HDCP Selection

7.0 Cable or Repeater LoopTest

This option is used to evaluate the signal quality of HDMI cables or device under test (DUT) using one of 3 resolutions FHD(1080p), UHD @ 30, or UHD @ 60.

It is recommended to run the test for at least 15 seconds for the results to be meaningful. You can use Loop Test to compare the quality of different cables or their ability to handle UHD 30Hz or 60 Hz.

See [Section 3.2.5](#) for more details.



Loop Test - Connection Examples

Procedure for Loop Test:

- Select Loop Test from the HOME screen.
- Set the “Time Duration” for the test.
- Touch the “START” button to evaluate the signal transmission quality. Do not touch any buttons for at least 3 seconds after starting test.
- Let the PGA-VHD complete the test, or terminate Test by pressing “STOP”.

8.0 Settings

The Settings selection (gear icon) consists of system adjustments, firmware and network setup.

8.1 Preferences

Screen Brightness: Adjust the screen brightness in required levels in percentage.

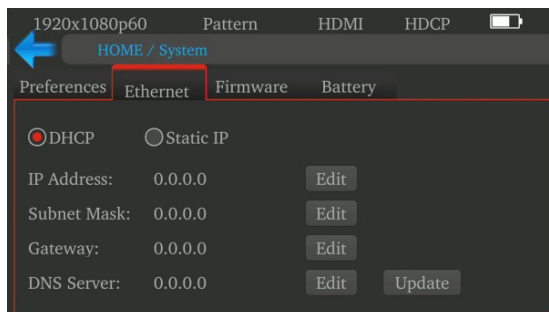
Beep: Enable/ Disable system sound.

Factory Reset: Select this option to restore the device to factory default setting.

8.2 Network Setting

The PGA-VHD has Ethernet (TCP/IP) control accessibility via Network settings under the “Settings” icon on the HOME screen.

Connect the Ethernet port of the PGA-VHD with the PC or an external control system. The user has the option to select either the DHCP or Static IP addressing.



Network Settings

As shipped from the factory (or after restoring factory defaults), the PGA-VHD IP address is set for DHCP and the IP address will be assigned by the router.

NOTE Network Setting

Before changing the network setting from DHCP to Static IP, select Static IP, touch “update” and then, reboot the device to enter the complete IP configuration..

Setting the IP address

(A) DHCP - Default

In order to use the DHCP feature, you must have a compatible DHCP ROUTER OR SWITCH that will assign the IP addresses to the end devices.

- Use DHCP radio button to automatically assign IP address to the pattern generator in the network. A DHCP router has to be connected to the network.
- Click “Update” and Reboot the device.

(B) Setting STATIC IP

If your network doesn't support DHCP server function: Then you have to change the IP addresses manually in the fields below.

- Static IP: Select Static IP radio button and enter the IP address manually.
- Subnet Mask: Enter the subnet mask as assigned by your network administrator.
- Gateway: Enter gateway IP address for the device and the PC.
- Click “Update” to confirm the settings.
- Reboot the device.

8.3 Firmware

The Firmware section can be found in “Settings” icon on the HOME screen. The firmware upgrade on PGA-VHD can be completed through the **USB** port by updating the System and ARM files.

We do not recommend the user to change any settings in this tab. If you have any questions regarding firmware update, contact Hall Research for more information

Procedure for Firmware Upgrade

Before updating the firmware on the PGA-VHD, make sure the files are in the root directory of the USB drive. *When both the ARM and System files are to be updated, update the ARM first and then the System file.*

- Make sure the arm.dat, system.dat, or FPGA.dat file is in the root directory.
- Connect the USB flash drive to the PGA-VHD.
- Select Settings → Firmware → "Arm", "System", or "FPGA" radio button
- Touch Update to initiate update. Wait for 10~15 seconds. Do not remove the USB while updating.
- There will be a message prompting the user to reboot the device upon completion of the update.

8.4 Battery

This section shows the battery status and time remaining for the PGA-VHD before it needs charging.

Depending on screen brightness, a fresh full battery lasts about 4 hours and it can be fully charged in 2 hours.

9.0 TELNET Ethernet Protocol: TCP/IP Port (6133)

PGA-VHD offers communication and control via Telnet. The user can obtain information from the unit such as output resolution, pattern, audio and video data from a remote location.

- Commands are in ASCII format.
- Each command has to be terminated by <CR> and responded with <CR>.
- Commands are case sensitive. Use uppercase characters.
- Unknown command respond with "Invalid Command".

Set Output Resolution

Command: S OUTPUT 0~55

Response: S OUTPUT 0~55

Res	0x	1x	2x	3x	4x	5x
0	720x480i60	1920x1080i60	1920x1080p23	1366x768p60	3840x2160p59	4096x2160p50
1	720x576i50	1920x1080i59	640x480p60	1400x1050p60	3840x2160p50	4096x2160p30
2	720x480p60	1920x1080i50	640x480p75	1600x1200p60	3840x2160p30	4096x2160p29
3	720x576p50	None	800x600p60	1440x900p60	3840x2160p29	4096x2160p25
4	1280x720p60	1920x1080p59	800x600p75	1440x900p75	3840x2160p25	4096x2160p24
5	1280x720p59	1920x1080p50	1024x768p60	1680x1050p60	3840x2160p24	4096x2160p23
6	1280x720p50	1920x1080p30	1024x768p75	1680x1050pRB	3840x2160p23	
7	1280x720p30	1920x1080p29	1280x1024p60	1920x1080pRB	1920x1080p60	
8	1280x720p29	1920x1080p25	1280x1024p75	1920x1200pRB	4096x2160p60	
9	1280x720p25	1920x1080p24	1360x768p60	3840x2160p60	4096x2160p59	

Example: Res = 21 for 640x480p60

Get Output Resolution

Command: R OUTPUT 0~55

Response: OUTPUT 0~55

Set Output Mode

Command: S MODE 0~4

Response: S MODE 0~4

NOTE YCbCr 4:2:0 is available only for 4K2K59.94/60

Index	0	1	2	3	4
Mode	DVI	RGB	YCbCr 4:4:4	YCbCr 4:2:2	YCbCr 4:2:0

Default Pattern

Command: S PATTERN 0~47

Response: S PATTERN 0~47

Default Pattern	Value	Default Pattern	Value	Default Pattern	Value
SMPTE Bar	0	TV Bar 100%	1	TV Bar 75%	2
Checkfield	3	EQ	4	PLL	5
Ramp Red H 1	6	Ramp Green H 1	7	Ramp Blue H 1	8
Ramp Red H 2	9	Ramp Green H 2	10	Ramp Blue H 2	11
Ramp Black to Red V	12	Ramp Green V 1	13	Ramp Blue V 1	14
Ramp Red V 2	15	Ramp Green V 2	16	Ramp Blue V 2	17
Stair Red 1	18	Stair Red 2	19	Stair Green 1	20
Stair Green 2	21	Stair Blue 1	22	Stair Blue 2	23
Stair White 1	24	Stair White 2	25	Red 100	26
Green 100	27	Blue 100	28	White 100	29
Gray 70	30	Gray 40	31	Black	32
Noise	33	Circle 1	34	Circle 2	35
Moire	36	V Stripe Red	37	V Stripe Green	38
V Stripe Blue	39	H Stripe Red	40	H Stripe Green	41
H Stripe Blue	42	Chess 1	43	Chess 2	44
Multi Burst	45	CZP	46	Overscan	47

User Defined Pattern

Command: S USERPATTERN 0~29

Response: S USERPATTERN 0~29

User Pattern	Value	User Pattern	Value	User Pattern	Value
Philips	0	Checker3x3	1	Checker6x6-1	2
Checker6x6-2	3	White75	4	White50	5
White25	6	Ramp W-1	7	Ramp W-2	8
Ramp W-3	9	Ramp W-4	10	Graybar32 R-1	11
Graybar32 G-1	12	Graybar32 B-1	13	Graybar32 W-1	14
Graybar32 R-2	15	Graybar32 G-1	16	Graybar32 B-2	17
Graybar32 W-2	18	Graybar32 R-1	19	Graybar64 G-1	20
Graybar 64 B-1	21	Graybar64 W-1	22	Graybar64 R-2	23
Graybar64 G-2	24	Graybar64 B-2	25	Graybar64 W-2	26
User can add...	27	User can add...	28	User can add...	29

Set Audio Mute

Command: S MUTE 0~1

Response: S MUTE 0~1

Mute	Off	On
Value	0	1

Get Audio Mute Status

Command: R MUTE

Response: MUTE 0~1

Set Audio Bit Depth

Command: S AUDIOBIT 0~2

Response: S AUDIOBIT 0~2

Audio Bit Depth	24bits	20bits	16bits
Value	0	1	2

Get Audio Bit Depth**Command:** R AUDIOBIT**Response:** AUDIOBIT 0~2**Set Audio Output Volume Level****Command:** S AUDIOLEVEL 0~7**Response:** S AUDIOLEVEL 0~7**Get Audio Output Volume Level****Command:** R AUDIOLEVEL**Response:** AUDIOLEVEL 0~7**Set Audio Sampling Rate****Command:** S AUDIOSAMPLE 0~4**Response:** S AUDIOSAMPLE 0~4

Rate	48KHz	96KHz	192KHz	32KHz	44.1KHz
Value	0	1	2	3	4

Get Audio Sampling Rate**Command:** R AUDIOSAMPLE**Response:** AUDIOSAMPLE 0~4**Set Audio Channel****Command:** S AUDIOCHANNEL 0~4**Response:** S AUDIOCHANNEL 0~4

Audio Channels	2	2.1	5.1	6.1	7.1
Value	0	1	2	3	4

Get Audio Channel Number**Command:** R AUDIOCHANNEL**Response:** AUDIOCHANNEL 0~4**Set Output HDCP ON/OFF****Command:** S HDCPTX 0~3**Response:** S HDCPTX 0~3

HDCP	OFF	HDCP1.4	HDCP2.2 Type 0	HDCP2.2 Type 1
Value	0	1	2	3

Get Output HDCP ON/OFF**Command:** R HDCPTX**Response:** HDCPTX 0~3**Set Input HDCP Version Support****Command:** S HDCPRX 0~3**Response:** S HDCPRX 0~3

HDCP	Not Supported	1.4	2.2	Both 1.4 & 2.2
Value	0	1	2	3

Get Input HDCP Version Support Level

Command: R HDCPRX

Response: HDCPRX 0~1

10.0 Recalling Factory Defaults

Factory defaults resets are parameters (including network settings) back to default. Select the FACTORY RESET option on “**Preferences**” tab under **Settings** icon on the HOME screen.

NOTE *Factory resetting the PGA-VHD will restore back the default Hall Research settings to the device. The user must confirm the action and take all necessary precautions to prevent loss of data.*

11.0 Firmware Upgrade

The firmware upgrade on PGA-VHD can be completed through the **USB** port as described in [Section 8.3](#). Contact Hall Research for more information.

12.0 Troubleshooting

There are no field serviceable parts or circuits in the device. If you think the device is malfunctioning, please try to use the following methods to obtain a picture first.

- Try Rebooting the device.
- If there is no picture on the display from HDMI OUT, you can select the FACTORY RESET option on the unit’s SETTINGS icon.

12.1 Contacting Hall Research

If you determine that your PGA-VHD is malfunctioning, do not attempt to repair the unit instead, contact Hall Research Technical Support at 714-641-6607. To return the unit to Hall Research you must first get a Return Authorization (RMA) number. Package the unit carefully, if returning. We recommend that you use the original container.

13.0 Specifications

Video Bandwidth	Single link 600 MHz (18 Gbps)
HDMI and HDCP	HDMI 2.0 (a) HDCP 1.4 and 2.2
Input Ports	1xHDMI, 1xUSB, 1xRJ45
Output Ports	1xHDMI, 1xVGA, 1x3.5 mm
Video Support	Up to 4K2K60 4:4:4 8 bit , 4K2K60 16 bit (HDR)
Audio	8 Channel LPCM up to 192K
USB	USB 2.0
Control	USB mouse/ Touch Panel/ Ethernet
ESD Protection	±15kV (gap discharge) and ±8kV (contact discharge)
Operating Temp	0 ~ 40 °C (32 ~ 104 °F) 20%~90%, non-condensing
Storage Temp	-20~60 °C (-4~140 °F)
Power Supply	12V 5A DC/ Battery
Power consumption	15 W max
Housing	Metal Enclosure
Dimensions	
Model	6.8"(175mm) W x 4.49"(114mm) D x 1.97"(50 mm) H
Carrying Case	15.35"(390mm) W x 12.4"(315mm) D x 4.33"(110mm) H
Shipping	24"(609.6mm) W x 16"(406.4mm) D x 6"(152.4mm) H
Weight	
Net	725.75g (1.6 lbs.)
Package	2721.5g (6 lbs.)
Shipping	3742.1g (8.25 lbs.)



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