

PureLink

HDG Pro

4K60/HDCP 2.2 Signal Generator & Analyzer USER MANUAL



PureLink™

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Chapter 1. Introduction

1.1 Safety Precautions

- All safety instructions should be read and understood before the unit is operated.
- The owner's manual and safety instructions should be retained for future reference.
- Unplug this unit from the wall outlet before cleaning. Do not use liquid or aerosol cleaners. Use a damp cloth only.
- Keep away from wet, magnetic, and flammable surfaces or substances.
- Always use the correct external power supply (indicated on the product label) when operating this unit.
- This unit may be equipped with a 3 wire grounding-type plug - a plug having a third (grounding) pin. This pin will only fit into a grounding-type power outlet. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet.
- Air vents should be kept clean and unobstructed at all times.
- Please refrain from using frayed power cords and damaged wall outlets.
- Do not place any heavy objects or equipment on top of the unit.
- To prevent electrical damage, TURN OFF the power to this unit before inserting or removing INPUT/OUTPUT slot cards.

If your product is malfunctioning or for assistance operating your product, please contact our technical support team.

PureLink™

Tel: 201.488.3232

Email: support@purelinkav.com

1.2 Declaration of Conformity

According to Council Directive 73/23/EEC (February 19, 1973) on the Harmonization of the Laws of Member States relating to Electrical Equipment; Council Directive 89/336/EEC (May 3, 1989) on Electromagnetic Compatibility; Council Directive 93/68/EEC (July 22, 1993)-Amending Directives 89/336/EEC (MC) and 73/23/EEC (Low Voltage Equipment Safety), and/or CPU Boards and Power Supplies used Council Directive 93/68/EEC with Matrix, Dtrovision LLC, 535 E Crescent Ave Ramsey, NJ 07446 201-488-3232, declares under sole responsibility, that the product identifies with 93/66/EEC of the Council Directive Low Voltage Equipment Safety. Each product marketed is identical to the representative unit tested and found to be compliant with the standards.

1.3 What's in the Box

- HDG Pro
- Power Adapter – 12V 5A
- Owner's manual

1.4 Product Introduction

The HDG Pro HDMI 2.0 Signal Generator / Analyzer is a versatile HDMI 2.0 toolbox with full 18Gb bandwidth and HDCP 2.2 support. With this handy and portable gadget, users will appreciate the built-in long hour operation chargeable battery, various video patterns, touch panel control with built-in 4.3" screen, HDCP analyzing capability, loop test a single device and many more.

HDG Pro is the most cost-effective HDMI 2.0 tool in the market.

1.5 Installation Guidelines

The following installation settings are recommended for optimal performance.

- The operational temperature should be 30° C or below
- The operational humidity should be 60% or below
- The operational environment should be dust-free and well ventilated
- Stabilized AC input power (AVR-based power supply) is highly advised

Chapter 2. Product Features

2.1 Features

- 4K2K @ 60 4:4:4 8 bit, 4K2K @ 60 4:2:0 16bit HDR pattern generator / signal analyzer.
- 4.3" Touch screen panel
- Supports user control device through Ethernet
- Firmware update through USB Flash drive
- Supports user-defined pattern up to 2Gb
- Scrambler supported for videos over 340MHz output wise
- Supports HDMI loop-through function
- HDCP test to verify HDCP source and transmit HDCP encrypted video
- Rechargeable battery design (2-hour charging time with up to 4-hour operation time)
- Video pass-through mode (analyze the signal and monitor the video at the same time)

Chapter 3. Operational guidelines

3.1 Main Menu User Guide

The major functions of the device include

- HDMI test pattern generator
- HDMI signal analyzer
- HDCP test
- EDID test
- Loop test

OUTPUT SETTING

Menu	Items	Remark
Signal Format	TYPE	select the HDMI/DVI signal type information (color space and color depth)
	RESOLUTION	setting the TV/PC resolution and frequency
VIDEO Pattern	DEFAULT	multiple patterns to test HDMI device, it also provides user to set the timer and moving squares
	ALBUM	
PCM Audio Tone	MUTE	mute / unmute the PCM audio
	TONE	for user setting the audio information to test audio on HDTV or other A/V receivers
Setting	SCRAMBLER	for user to understand the signal encode a message situation

TEST SETTING

Menu	Items	Remark
Source	Format	read format information from source
	Video	provide small screen for user to check the video information and also provide video pass through to the display
	Audio	read audio information
	Packet	read packet
	HDCP	enable HDCP function (1.4/2.0)
Sink	EDID	EDID analyzer or learn EDID from RX
	HDCP	HDCP test
Loop		evaluate the quality of cables or EUT

SYSTEM SETTING

Menu	Items	
Preference	Screen Brightness	adjust the screen brightness
	BEEP	ON/OFF system sound
Ethernet	DHCP	
	Static IP	
Firmware	upgrade the firmware	
Battery	battery status	

***Menu settings subject to change without notice**

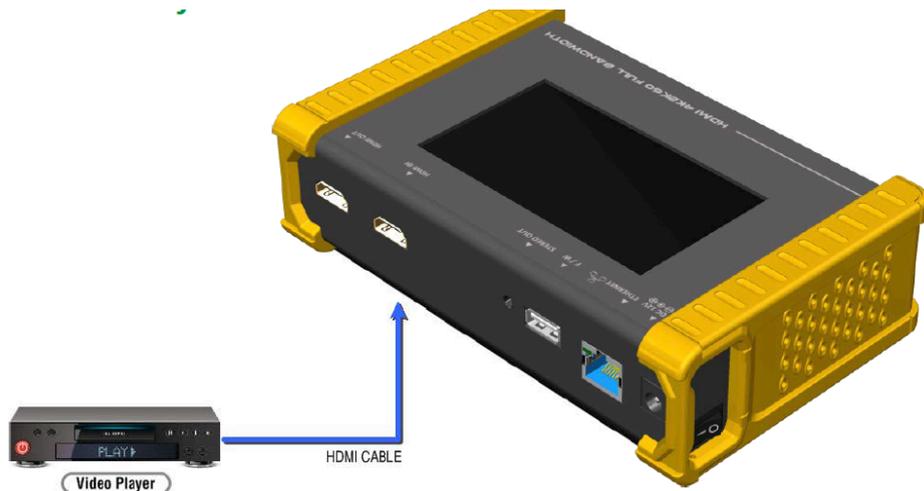
Pattern Generator Function



*Sample diagram for test pattern generator function

1. **Selecting Signal Format**
 HDG Pro provides different Signal resolution and signal types for users to select. Users can select the signal format tab to choose the signal type (HDMI/DVI) and signal resolution (HDTV / PC). The HDTV resolution supports up to 4K@60Hz and PC resolution up to 1920x1200 60Hz.
2. **Rendering Test Patterns on HDTV**
 HDG Pro provides multiple test patterns for users to test the display devices.
3. **User-defined pattern**
 HDG Pro provides user-defined patterns (custom image). Please refer to page 21 for more details.
4. **Digital audio test**
 The PCM audio tone menu provides users to test audio on display devices or A/V receivers. Users can set bits per sample, sample rate, level and audio channel (PCM sync wave menu).
5. **HDCP test on HDMI devices**
 HDG Pro provides users to test HDCP on HDMI equipped displays.

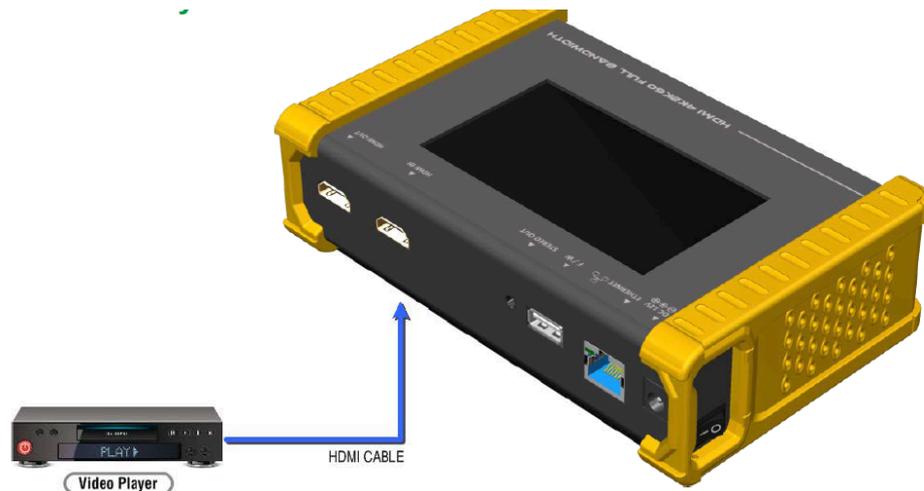
Signal Analyzer Function



*Sample diagram for signal analyzer function

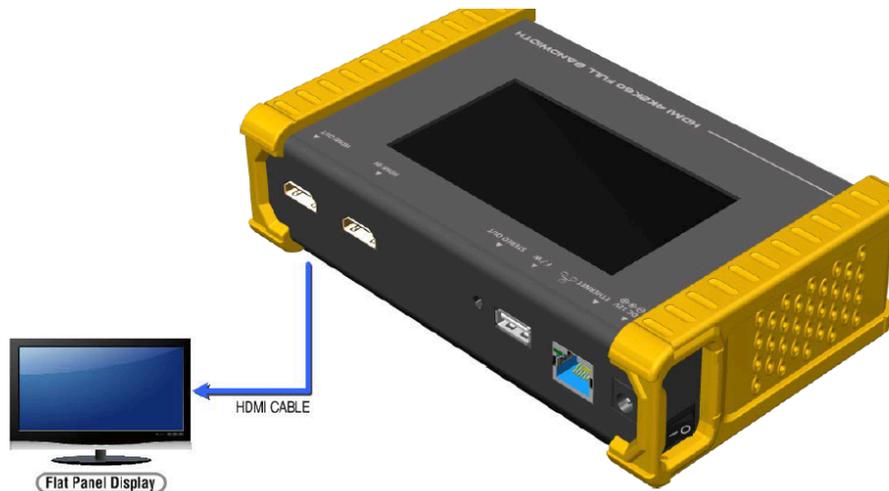
1. Source information from the HDMI source
Users can select Read/Refresh button (Test/source menu) to receive video format, source audio and packet information from the HDMI source device.
2. Testing video from HDMI source
HDG Pro displays the information of the incoming signal to ensure users are receiving a valid signal. The information also provides users with incoming HDCP information.
3. Video on the touchscreen
HDG pro provides the picture/video of incoming source on the front touch display to ensure users the incoming video is viable.

HDCP Test Function



*Sample diagram for HDCP test function as a receiver

HDG Pro can verify HDCP from the incoming source. Users can confirm HDCP 1.4 / HDCP 2.2. No HDCP authentication.



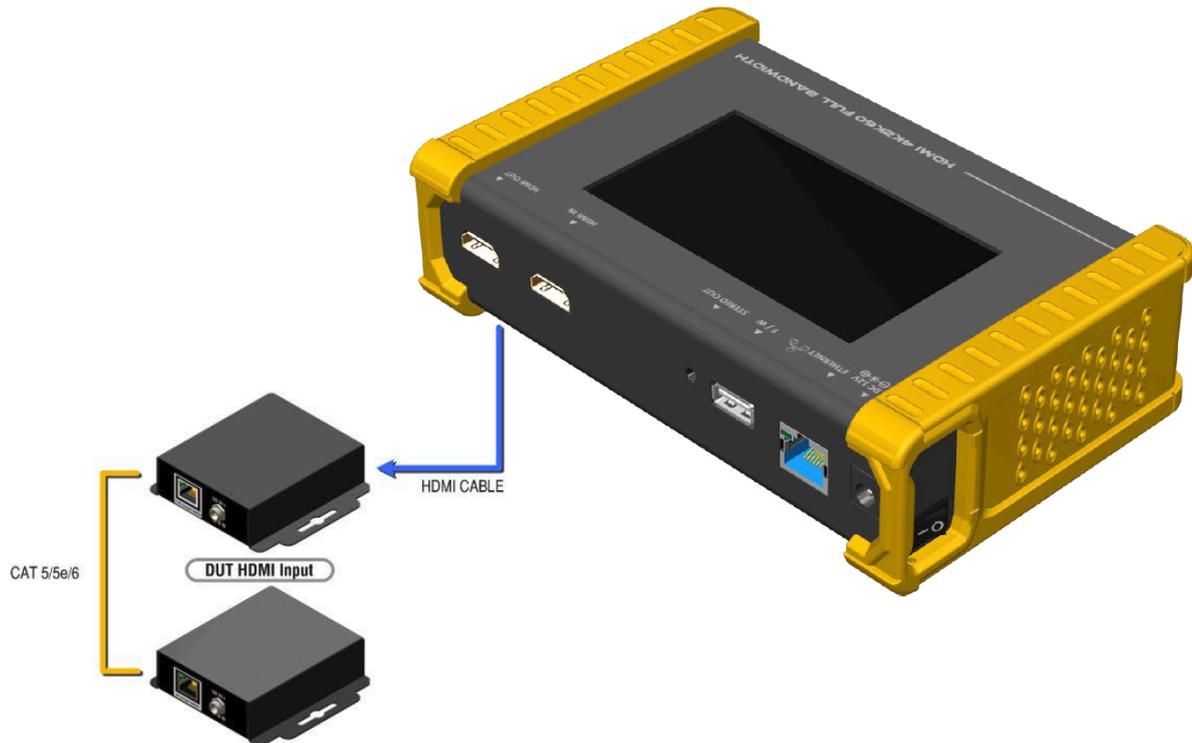
*Sample diagram for HDCP test function as a transmitter

HDG Pro can transmit HDCP encrypted video (HDCP 1.4 / HDCP 2.2 / No HDCP).

Procedure on testing HDCP

- Make the connection between HDG Pro output port to the display device
- Select the HDCP test from the Sync Test Menu
- Select Enable HDCP 1.4 or Enable HDCP 2.2 button

EDID Analysis Function



*Sample diagram for EDID analysis function

HDG Pro offers the most convenient way for users to analyze the EDID. Users can verify, view, and learn the EDID from the connected display to other devices.

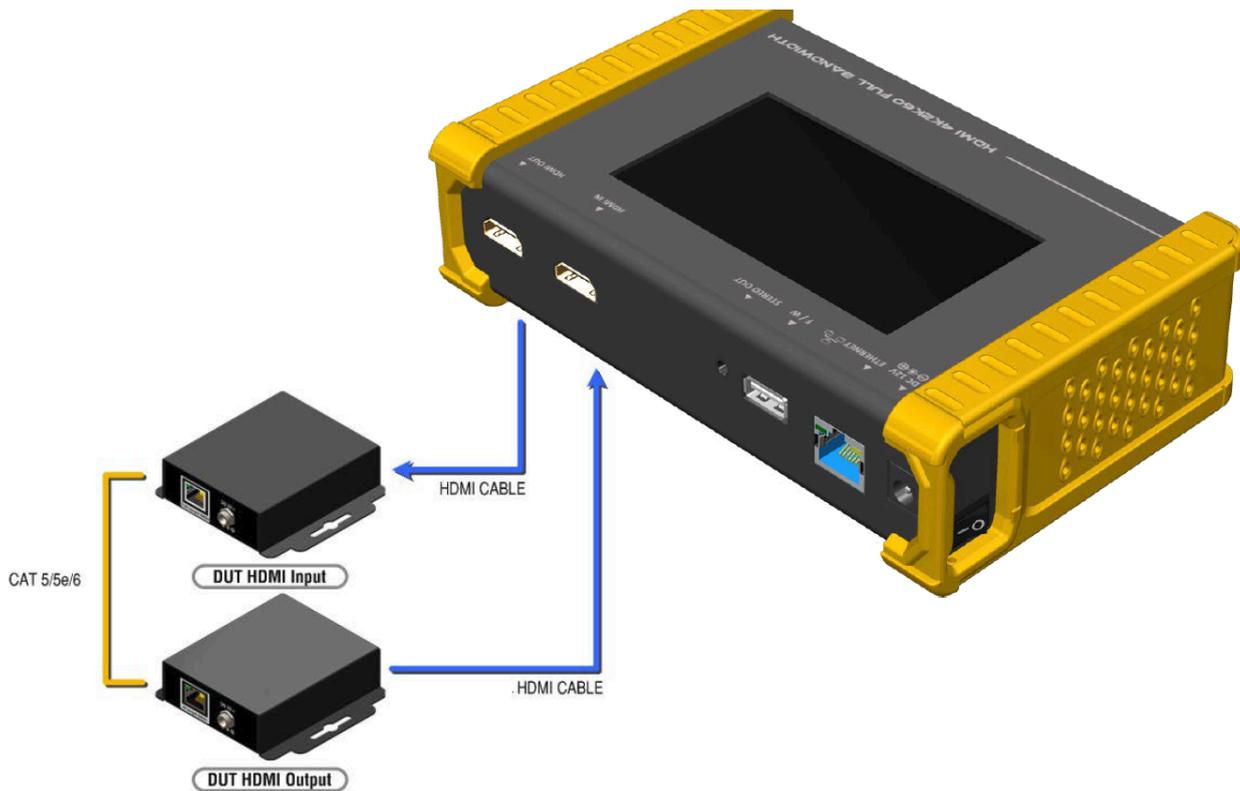
Procedure for EDID analyze

- Make the connection between the HDG Pro output port and the device using HDMI cable.
- Select EDID to analyze from the Sync Test Menu
- Select the Read button to get the EDID information from the connected device.

Procedure for learning EDID from the RX

- Make the connection between the HDG Pro output port and the device using HDMI cable.
- Select EDID to analyze from the Sync Test Menu
- Select Learn from the RX button to save the EDID into the HDG Pro input port.

Loop Test Function



*Sample diagram for Loop Test function

HDG Pro offers a unique estimator for evaluation of the quality of cables or DUT. Users can simply connect the cables or DUT to HDG Pro to form a loop, the monitor will examine the HDMI bitstream pixel by pixel. The measurement statistics will be displayed on-screen and offer useful information for building a robust A/V system,

Procedure for loop test.

- Make the connection between the HDG Pro and the Cables/DUT.
- Select the loop test from the loop test menu.
- Set the time (testing time) and press the start button. The HDG Pro will capture the signal from its transmitter through the loop and evaluate the transmission quality.

Test Result	Definition
Pass	The value of Bit Error Rate is less than 1
Fail	The Bit Error Rate is more than 1

*NOTE: Loop test only supports 1080p@60, 4K@30, and 4K@60 resolution.

*Moving cables or DUT may influence the result.

Ethernet control Function (TCP/IP)

The HDG Pro provides user control through Ethernet (TCP/IP). (TCP Port: 6133)

Reply Format:

Received = ACK + Feedback Date

ACK: 0xaa 0xbb 0xcc

Feedback date: Data0 Data1 Data2...

Command Set:

COMMAND	ACTION	RAMARK
0x4d 0x53 0x5 0x0 0x0 0x5 0x1 Res	Set output resolution	Hexadecimal
0x4d 0x53 0x5 0x0 0x0 0x5 0x2	Get output resolution	
0x4d 0x53 0x5 0x0 0x0 0x5 0x3 Mode	Set output mode	
0x4d 0x53 0x5 0x0 0x0 0x5 0x4	Get output mode	
0x4d 0x53 0x5 0x0 0x0 0x5 0x5 Depth	Set output color depth	
0x4d 0x53 0x5 0x0 0x0 0x5 0x6	Get output color depth	
0x4d 0x53 0x5 0x0 0x0 0x5 0x7 Pattern	Set default pattern	Hexadecimal
0x4d 0x53 0x5 0x0 0x0 0x5 0x8 Pattern	Set user pattern	Hexadecimal
0x4d 0x53 0x5 0x0 0x0 0x5 0x9 Mute	Set audio mute	
0x4d 0x53 0x5 0x0 0x0 0x5 0xa	Get audio mute status	
0x4d 0x53 0x5 0x0 0x0 0x5 0xb Length	Set audio length	
0x4d 0x53 0x5 0x0 0x0 0x5 0xc	Get audio length	
0x4d 0x53 0x5 0x0 0x0 0x5 0xd Level	Set audio level	
0x4d 0x53 0x5 0x0 0x0 0x5 0xe	Get audio level	
0x4d 0x53 0x5 0x0 0x0 0x5 0xf Rate	Set audio sample rate	
0x4d 0x53 0x5 0x0 0x0 0x5 0x10	Get audio sample rate	
0x4d 0x53 0x5 0x0 0x0 0x5 0x11 Number	Set audio channel number	
0x4d 0x53 0x5 0x0 0x0 0x5 0x12	Get audio channel number	
0x4d 0x53 0x5 0x0 0x0 0x5 0x13 HDCP	Set TX HDCP on/off	
0x4d 0x53 0x5 0x0 0x0 0x5 0x14	Get TX HDCP on/off	
0x4d 0x53 0x5 0x0 0x0 0x5 0x15 HDCP	Set RX HDCP on/off	
0x4d 0x53 0x5 0x0 0x0 0x5 0x16	Get RX HDCP on/off	

Resolution:

Index	Resolution	Index	Resolution	Index	Resolution
0x0	720x480i@60	0x13	1920x1080p@24	0x26	1920x1200pRB
0x1	720x576i@50	0x14	1920x1080p@23.976	0x27	3840x2160p@60
0x2	720x480p@60	0x15	640x480p@60	0x28	3840x2160p@59.94
0x3	720x576p@50	0x16	640x480p@75	0x29	3840x2160p@50
0x4	1280x720p@60	0x17	800x600p@60	0x2a	3840x2160p@30
0x5	1280x720p@59.94	0x18	800x600p@75	0x2b	3840x2160p@29.97
0x6	1280x720p@50	0x19	1024x768p@60	0x2c	3840x2160p@25
0x7	1280x720p@30	0x1a	1024x768p@75	0x2d	3840x2160p@24
0x8	1280x720p@29.97	0x1b	1280x1024p@60	0x2e	3840x2160p@23.976
0x9	1280x720p@25	0x1c	1280x1024p@75	0x2f	1920x1080p@60
0xa	1920x1080i@60	0x1d	1360x768p@60	0x30	4096x2160p@60
0xb	1920x1080i@59.94	0x1e	1366x768p@60	0x31	4096x2160p@59.94
0xc	1920x1080i@50	0x1f	1400x1050p@60	0x32	4096x2160p@50
0xd	N/a	0x20	1600x1200p@60	0x33	4096x2160p@30
0xe	1920x1080p@59.94	0x21	1440x900p@60	0x34	4096x2160p@29.97
0xf	1920x1080p@50	0x22	1440x900p@75	0x35	4096x2160p@25
0x10	1920x1080p@30	0x23	1680x1050p@60	0x36	4096x2160p@24
0x11	1920x1080p@29.97	0x24	1680x1050pRB	0x37	4096x2160p@23.976
0x12	1920x1080p@25	0x25	1920x1080pRB		

Mode:

Index	0x0	0x1	0x2	0x3	0x4
Mode	DVI	RGB	YCbCr444	YCbCr422	YCbCr420

Depth:

Index	0x0	0x1	0x2	0x3
Depth	8 Bit	10 Bit	12 Bit	16 Bit

Default Pattern:

Index	Default Pattern	Index	Default Pattern	Index	Default Pattern
0x0	SMPTE BAR	0x10	Ramp Green V 2	0x20	Black
0x1	TV Bar 100%	0x11	Ramp Blue V 2	0x21	Noise
0x2	TV Bar 75%	0x12	Stair Red 1	0x22	Circle 1
0x3	Checkfield	0x13	Stair Red 2	0x23	Circle 2
0x4	EQ	0x14	Stair Green 1	0x24	Moire
0x5	PLL	0x15	Stair Green 2	0x25	V Stripe Red
0x6	Ramp Red H 1	0x16	Stair Blue 1	0x26	V Stripe Green

Default Pattern (Continued):

Index	Default Pattern	Index	Default Pattern	Index	Default Pattern
0x7	Ramp Green H 1	0x17	Stair Blue 2	0x27	V Stripe Blue
0x8	Ramp Blue H 1	0x18	Stair White 1	0x28	H Stripe Red
0x9	Ramp Red H 2	0x19	Stair White 2	0x29	H Stripe Green
0xa	Ramp Green H 2	0x1a	Red 100	0x2a	H Stripe Blue
0xb	Ramp Blue H 2	0x1b	Green 100	0x2b	Chess 1
0xc	Ramp Black to Red V	0x1c	Blue 100	0x2c	Chess 2
0xd	Ramp Green V 1	0x1d	White 100	0x2d	Multi Burst
0xe	Ramp Blue V 1	0x1e	Gray 70	0x2e	CZP
0xf	Ramp Red V 2	0x1f	Gray 40	0x2f	Overscan

User Pattern:

Index	User Pattern	Index	User Pattern	Index	User Pattern
0x0	Philips	0xa	Ramp W-4	0x14	Graybar64 G-1
0x1	Checker 3x3	0xb	Graybar32 R-1	0x15	Graybar64 B-1
0x2	Checker 6x6-1	0xc	Graybar32 G-1	0x16	Graybar64 W-1
0x3	Checker 6x6-2	0xd	Graybar32 B-1	0x17	Graybar64 R-2
0x4	White 75	0xe	Graybar32 W-1	0x18	Graybar64 G-2
0x5	White 50	0xf	Graybar32 R-2	0x19	Graybar64 B-2
0x6	White 25	0x10	Graybar32 G-2	0x1a	Graybar64 W-2
0x7	Ramp W-1	0x11	Graybar32 B-2	0x1b	User Add..
0x8	Ramp W-2	0x12	Graybar32 W-2	0x1c	User Add..
0x9	Ramp W-3	0x13	Graybar64 R-1	0x1d

Mute:

Index	0x0	0x1
Mute	OFF	ON

Length:

Index	0x0	0x1	0x2
Length	24 bits	20 bits	16 bits

Level:

Index	0x0	0x1	0x2	0x3	0x4	0x5	0x6	0x7
Level	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7

Rate:

Index	0x0	0x1	0x2	0x3	0x4
Rate	48 KHz	96 KHz	192 KHz	32 KHz	44.1 KHz

Number:

Index	0x0	0x1	0x2	0x3	0x4
Rate	48 KHz	96 KHz	192 KHz	32 KHz	44.1 KHz

TX HDCP:

Index	0x0	0x1	0x2	0x3
TX HDCP	off	HDCP 1.4	HDCP 2.2 Type0	HDCP 2.2 Type 1

RX HDCP:

Index	0x0	0x1	0x2	0x3
RX HDCP	off	HDCP 1.4	HDCP 2.2	HDCP 1.4 & HDCP 2.2

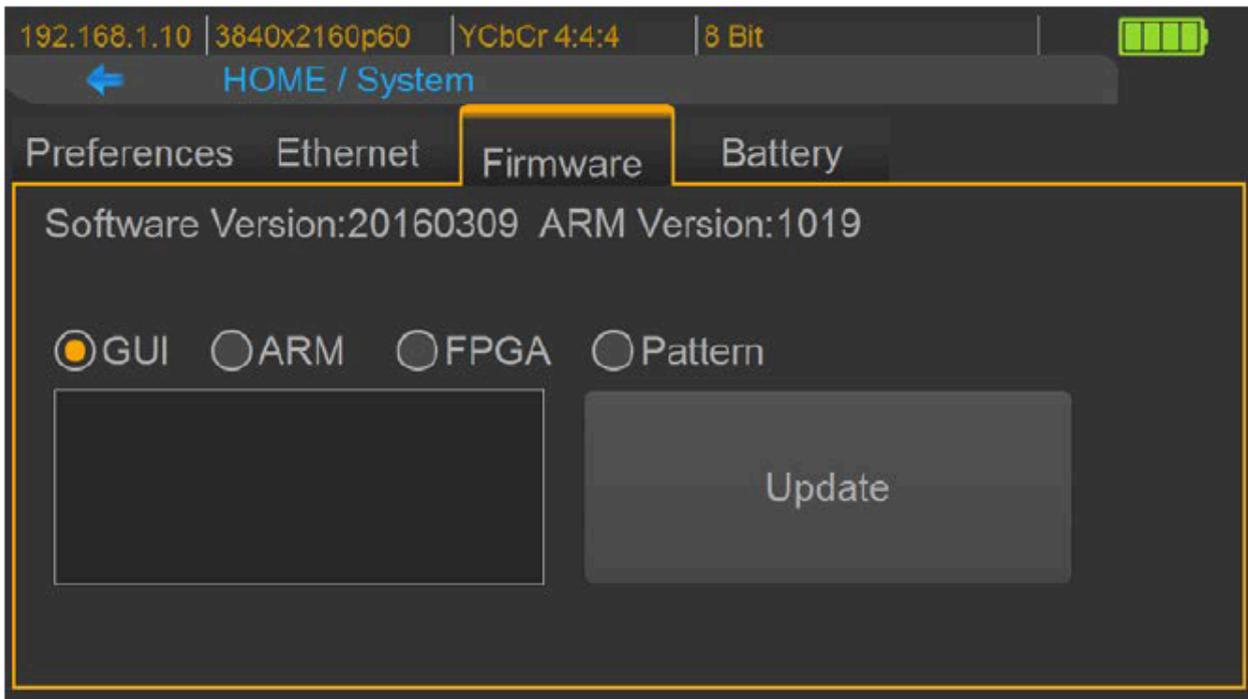
Firmware/Software Upgrade

Users can upgrade firmware and add patterns on the HDG Pro through the USB interface.

Procedure for firmware upload:

*Before uploading the firmware, please ensure the file of the firmware is in the root directory of USB flash drive. The file suffix is **.dat**.

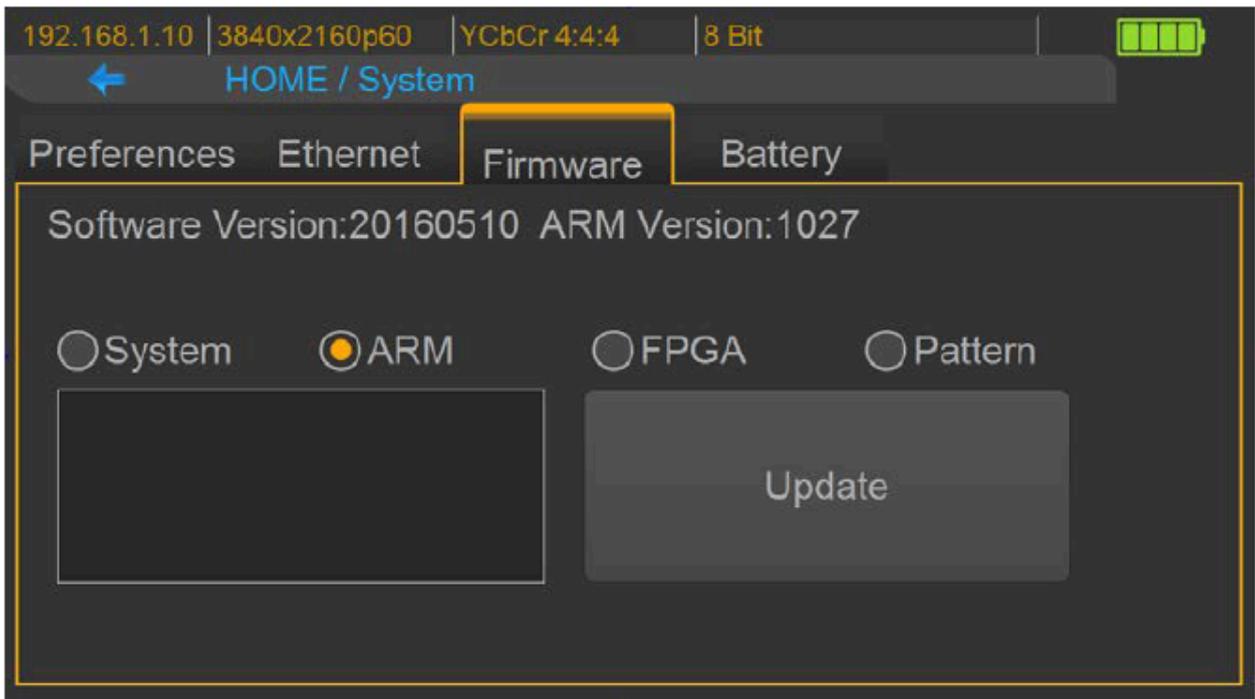
- **System**



1. Confirm the gui.dat and system.dat files are in the root directory of USB
2. Connect the USB flash drive to the HDG Pro USB port
3. Select the Firmware button on the system menu and choose the GUI button
4. Select the Update button. The upload may take about 3-5 seconds.
5. Reboot after the firmware upload is completed.
6. Confirm the new firmware was uploaded properly on the firmware page.

**Do not remove the USB drive during the upload.*

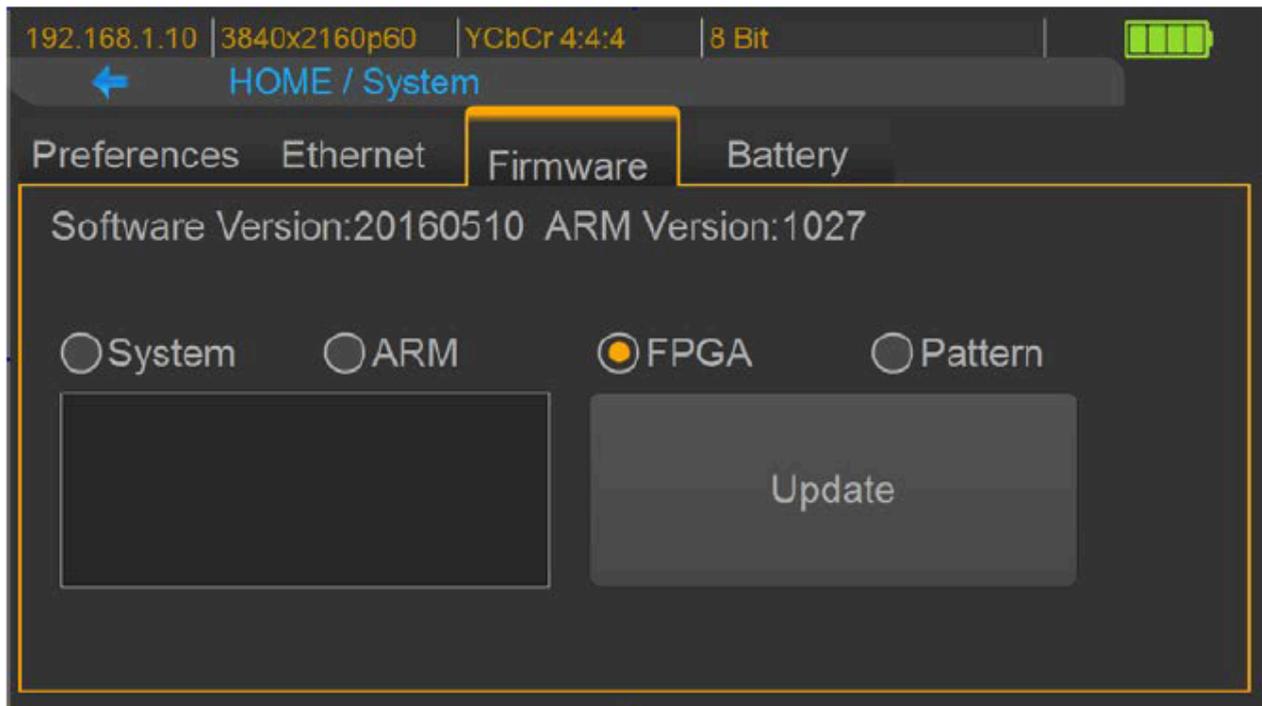
- ARM



- Confirm arm.dat file is in the root directory of the USB
- Connect the USB flash drive to the HDG pro USB port.
- Select the firmware from the system menu and choose the ARM button.
- Select the Update button. The upload may take about 5-10 seconds.
- Reboot after the firmware upload is completed.

*Do not remove the USB drive during the upload.

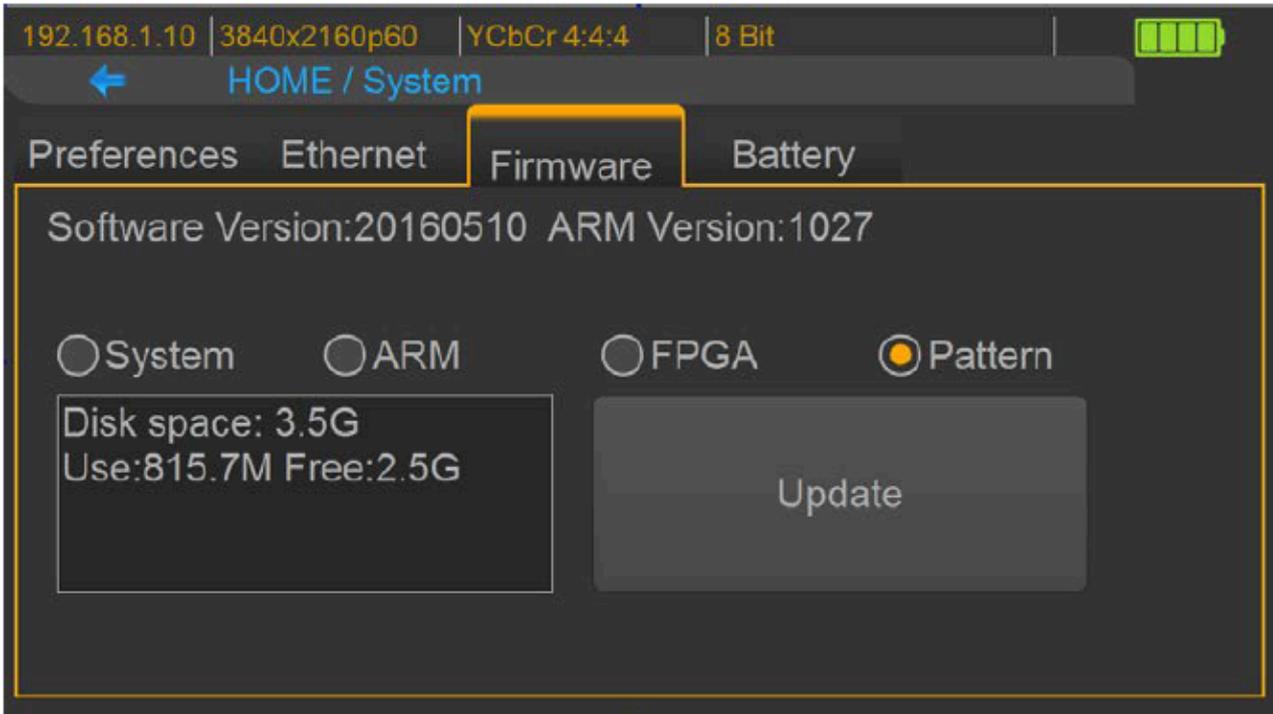
- FPGA



- Confirm fpga.dat file is in the root directory of the USB
- Connect the USB flash drive to the HDG pro USB port.
- Select the firmware from the system menu and choose the FPGA button.
- Select the Update button. The upload may take about 5-10 seconds.
- Reboot after the firmware upload is completed.

*Do not remove the USB drive during the upload.

- Pattern



- Create a folder (folder name is usr_poc) on USB flash drive
- Ensure the file of the pattern in which the user desires to upload on the HDG Pro is in the usr_poc directory on the USB flash drive. The file suffix is .jpg
- Select the Firmware from the system menu and choose the Pattern button.
- Press the update button to upgrade the user-defined pattern. The upload time will be dependent on the file size.

***Please check the capacity of HDG Pro before uploading**

Chapter 4. Additional Information

4.1 Manufacturer's Warranty (5-Year)

PureLink Five (5) Year Limited Warranty for PureStream™ Branded Products Only

Dtrovision, LLC. (hereinafter "PureLink") warrants its HDTools and PureStream™ branded products (hereinafter "Product") purchased directly from PureLink or Dealer shall be free from defects in workmanship and materials, under normal use and service, for a period of five (5) years on parts and five (5) years on labor. Any repaired or replaced equipment related to Product shall be covered only under the remaining portion of the warranty. This warranty has no relationship to and exists independently of any warranty offered by Dealer. This warranty is a limited warranty and gives you specific legal rights. You may also have other rights which vary from state to state.

TERMS & CONDITIONS

PureLink shall repair or replace the Product if it develops a material fault during the period of warranty, on condition that i) the Product has only been subject to normal use in a domestic or commercial environment in a manner consistent with its specification and functionality, ii) the Product has been cared for reasonably and only subjected to reasonable wear and tear, iii) the defect has not been caused by willful or negligent abuse or neglect, or any accident or improper installation procedure, iv) the serial number of the Product has not been altered or removed. This warranty only applies to the original purchaser, and shall be the exclusive remedy to the original purchaser. PureLink shall not be liable for any damages whatsoever caused by Product or the failure of Product to perform, including incidental or consequential damages. PureLink shall not be liable for any claim made by a third party or made by the purchaser for a third party. Except as expressly set forth in this warranty, PureLink makes no other warranties, expressed or implied, including any implied warranties of merchantability and fitness for a particular purpose. PureLink expressly disclaims all warranties not satisfied in this limited warranty. Any implied warranties that may be imposed by law are limited to the terms of this limited warranty. This warranty statement supersedes all previous warranties.

WARRANTY RETURNS/REPAIRS/EXCHANGES

No merchandise may be returned without prior authorization from PureLink, and a Return Materials Authorization (RMA) number. Failure to comply with these conditions will result in rejection of the returned merchandise. Any warranty service on Products must be arranged through Dealer. Authorized returns must be shipped freight prepaid and fully insured to PureLink, Fair Lawn, NJ USA, with the RMA number clearly marked on the outside of all shipping boxes and containers. PureLink reserves the right at its sole discretion to refuse any shipments arriving freight collect or without an RMA number. Any authorized returned merchandise must be accompanied by a note describing the reason for return, along with contact information including name, phone number, return mailing and shipping addresses, e-mail address, and RMA number. On any products returned and accepted with an RMA number, return freight charges following repair of items under warranty shall be paid by PureLink, shipping by the standard ground carrier of its choice.

ADVANCE WARRANTY REPLACEMENTS

PureLink's advance replacement service offers a Replacement Unit upon request - free of charge for eligible products purchased less than one (1) year of the warranty claim. Products purchased more than one (1) year prior to the warranty claim do not qualify for advance replacement services. Advance replacement requests must be validated by a member of PureLink's Technical Support Team. Replacement units may be new or refurbished and are subject to availability. PureLink is responsible for shipping the Replacement Unit to your designated location by standard ground service. All other shipping methods will be the responsibility of the Dealer. Original Unit Return – the Original Unit must be returned within thirty (30) calendar days of the return authorization date. Failure to return the Original Unit within this period will be subject to a minimum 15% re-stocking fee. Dealer is solely responsible for the shipping of the Original Unit to PureLink.

TO MAKE A WARRANTY CLAIM

To make a warranty claim, promptly notify PureLink within the warranty periods described above by calling PureLink's Technical Support Department at 1-201-488-3232. PureLink, in its sole discretion, will determine what action, if any, is required under this warranty. Most problems can be corrected over the phone through close cooperation between Customer and a PureLink technician. To better

enable PureLink to address a warranty claim, please have the Product's serial and model numbers. If PureLink, in its sole discretion, determines that an on-site visit or other remedial action is necessary, PureLink may send a representative to Customer's site.

CUSTOMER SERVICE

Technical support inquiries can be submitted electronically through the PureLink website at www.purelinkav.com. For immediate assistance please contact PureLink's Customer Care Team at +1 (201) 488-3232.