HDMI 2.0 4K HDR
Pattern Generator/Analyzer

User Manual

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Safety and Notice

Please read all of these instructions carefully before you use the device. Save this manual for future reference.

The HDMI 2.0 Pattern Generator / Analyzer has been tested for conformance to safety regulations and requirements, and has been certified for international use. However, like all electronic equipments, the should be used with care. Please read and follow the safety instructions to protect yourself from possible injury and to minimize the risk of damage to the unit.

- Follow all instructions and warnings marked on this unit.
- Do not attempt to service this unit yourself, except where explained in this manual.
- Provide proper ventilation and air circulation and do not use near water.
- Keep objects that might damage the device and assure that the placement of this unit is on a stable surface.
- Use only the power adapter and power cords and connection cables designed for this unit.
- Do not use liquid or aerosol cleaners to clean this unit. Always unplug the power to the device before cleaning.

Features

- 4K2K60 4:4:4 8bit, 4K2K60 4:2:0 16bit HDR pattern generator
- 4.3" touch panel
- Supports mouse control
- Supports user control device through Ethernet
- Firmware update through USB Flash Drive
- Supports user defined pattern up to 2GB
- Embedded LINUX KERNAL system with limitless extension
- Scrambler supported for videos over 340MHz output wise
- Loop test capability to provide statistical analysis for connection stability
- Supports HDMI loop through function
- HDCP test allow verify HDCP of HDMI source and transmit HDCP encrypted video
- Qualified physical layer performance to ensure the best compatibility
- Battery powered for portability, it can extend operation time with full load up to 4 hours
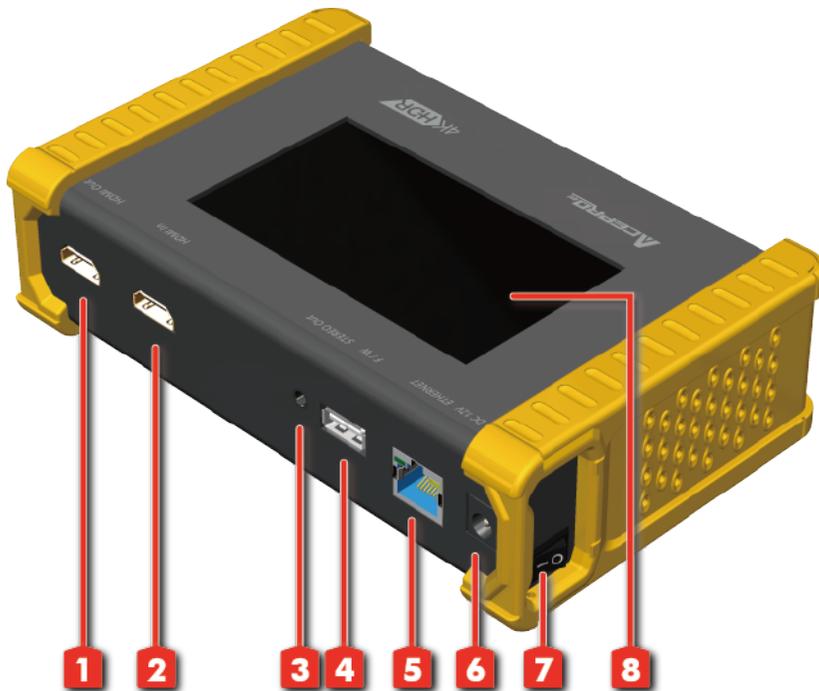- Rechargeable battery design with short charging time about 2 hours.

Package contents

- HDMI 2.0 4K HDR Pattern Generator/Analyzer
- Power adapter DC 12V / 5A
- User Manual

Notes:
Before using the Generator/Analyzer, please plugging the power adapter to switch off the shipping mode.

Layout

1. OUTPUT: HDMI output

2. INPUT: HDMI input

3. Stereo Out: Analog audio output

4. USB: Connect to USB device for control or firmware update

5. Ethernet: Ethernet control

6. +12V DC: 12V 5A DC power jack

7. Power Switch: Power ON/OFF switch

8. Touch Panel: Touch screen for control

Menu Operation

The major functions of the device are listed below

- HDMI Generator
- HDMI Receiver
- HDCP Test
- EDID Test
- Loop Test

Please refer the table below and the following section to know how to operate these functions.

Output Setting		Description
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	Scramble	for user to understand the signal encode a message situation

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

Generator

After making the physical connections between Generator and the display device. User can select different generator function to display on the sink device under test.

1. Selecting the Signal Format

Generator provides different signal resolution and signal types for user to select. User can touch the Signal Format Tab to select the signal type (HDMI / DVI) and signal resolution (HDTV / PC).The HDTV resolution is up to 4K2K 60Hz and PC resolution is up to 1920x1200 60Hz

2. Rendering Test Patterns on an HDTV

Generator provides multiple test patterns for user select to test HDTV. User can select the desired test pattern from the video pattern menu.

3. User Defined Pattern

Besides the embedded test patterns, Generator also provides user defined patterns function for user to use custom test image. More details please see the Upgrade Generator section.

4.   Testing Digital Audio on an HDTV or A/V Receiver
The PCM Audio Tone menu provides user for test audio on HDTV or other A/V receivers. In the PCM SINE WAVE menu, user can set up the bits per sample, sample rate, level and audio channel.

5.   Testing HDCP on an HDMI TV or HDMI device
Generator provides user to test HDCP on an HDMI equipped HDTV. For more details please see the HDCP test section.

Receiver

HDMI CABLE
Blu-ray Player

1.   Source Information from the HDMI source
In the Test/Source menu, user can touch the read/refresh button to get the video format, source audio and packet information from the HDMI source device.

2.   Testing the Video from the HDMI source
Receiver supports the incoming video from HDMI source/device to ensure user is receiving a valid video signal by displaying the information of incoming signal. The video information also will inform user whether the HDCP is encrypted or not. Return to Video menu by touching the touch panel (please stay at least 5 seconds).

HDCP Test

- **HDCP Receiver**

When device set as receiver, it can verify HDCP of video player or other DUT. It provides three options (HDCP 1.4 / HDCP 2.2 / no HDCP) for users to select and confirm the HDCP authentication of DUT.

- **HDCP Transmitter**

When device set as transmitter, it can transmit HDCP encrypted video. It also provides three modes (HDCP 1.4 / HDCP 2.2 / no HDCP) for you to select. If user wants to transmit HDCP encrypted video again, please select the Auto-Restart button.

Procedure for Testing HDCP:

1. Make the connection between the device HDMI output port and the display.

2. Select HDCP Test from the Sink Test Menu.

3. Touch Enable HDCP 1.4 or Enable HDCP 2.2 button.

EDID Analysis
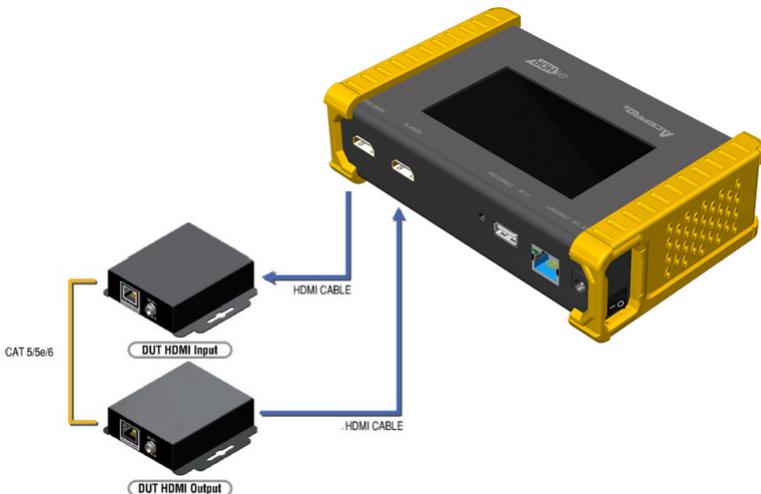
- **Procedure of EDID Analyze:**

1. Make sure the connections between the device HDMI output port and the device.

2. Select EDID Analyze from the Sink Test Menu.

3. Touch the Read button to get the EDID information of DUT.

- **Procedure of learning EDID from RX:**

1. Make sure the connections between the device HDMI output port and the device.

2. Select EDID Analyze from the Sink Test Menu.

3. Touch the Learn from RX button to learn the EDID. The EDID will be saved in the device input port.

Loop Test

Device offers the unique estimator for evaluating the quality of cables or DUT. Users can simply connect the cable or DUT to device 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 up robust A/V system.
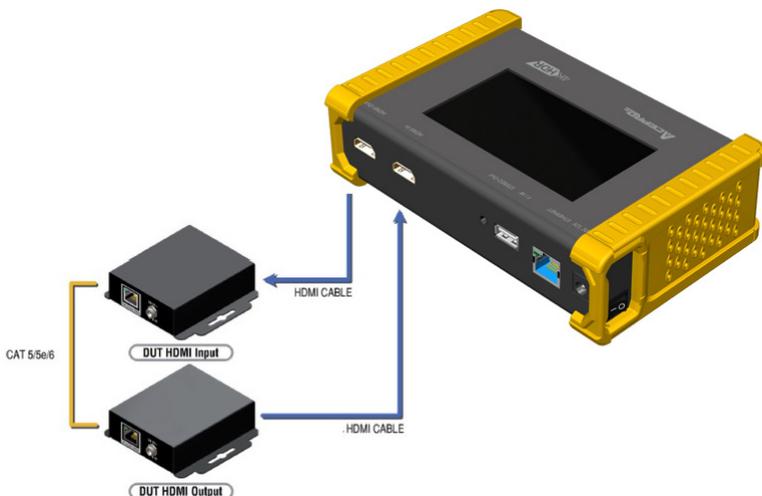
Procedure of Loop Test: *only support 1080p@60, 4K2K 30Hz and 4K2K 60Hz resolution

1. Make sure the connection between the PRO-HDMI2Gen and the DUT or cables.

2. Select Loop Test from the Loop Test Menu.

3. Set the test time and touch the START button. The device will capture the signal from its transmitter through the loop and evaluate the transmission quality.

4. The user interface of device will be locked until testing terminated. Unless user wants to break off the test.

5. Judgement criteria:

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

* Plugging HDMI Cable Will Influnce The Testing Result, So Please Settle Down The Connection Before Starting Running Test.

Ethernet Control (Tcp/Ip)

Device also provides user control through Ethernet. The Ethernet control includes many major functions, it can offer user develop software to do advance setting. (TCP Port: 6133)

Reply Format:
Received = ACK + Feedback Date
ACK: 0xaa 0xbb 0xcc
Feedback Date: Data0 Data1 Data2....

Command Set:

* Bold word part please refer to corresponding table

COMMAND	ACTION	RAMARK
0x4d 0x53 0x5 0x0 0x0 0x5 0x1 **Res**	Set output resolution	Hexadecimal
0x4d 0x53 0x5 0x0 0x0 0x5 0x2	Set output resolution	
0x4d 0x53 0x5 0x0 0x0 0x5 0x3 **Mode**	Set output mode	
0x4d 0x53 0x5 0x0 0x0 0x5 0x4	Set output mode	
0x4d 0x53 0x5 0x0 0x0 0x5 0x5 **Depth**	Set output color depth	
0x4d 0x53 0x5 0x0 0x0 0x5 0x6	Set 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	Set audio level	
0x4d 0x53 0x5 0x0 0x0 0x5 0xf **Rate**	Set audio sample rate	
0x4d 0x53 0x5 0x0 0x0 0x5 0x10	Set audio sample rate	
0x4d 0x53 0x5 0x0 0x0 0x5 0x11 **Number**	Get 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	Set TX HDCP on/off	
0x4d 0x53 0x5 0x0 0x0 0x5 0x15 **HDCP**	Set RX HDCP on/off	
0x4d 0x53 0x5 0x0 0x0 0x5 0x16	Set RX HDCP on/off	

Resolution:

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

Mode:

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

Depth:

Index	0x0	0x1	0x2	0x3
Depth	8bit	10bit	12bit	6bit

Default Pattern:

Index	Default Pattern	Index	Default Pattern
0x0	SMPTE BAR	0x18	Stair White 1
0x1	TV Bar 100%	0x19	Stair White 2
0x2	TV Bar 75%	0x1a	Red 100
0x3	Checkfield	0x1b	Green 100
0x4	EQ	0x1c	Blue 100
0x5	PLL	0x1d	White 100
0x6	Ramp Red H 1	0x1e	Gray 70
0x7	Ramp Green H 1	0x1f	Gray 40
0x8	Ramp Blue H 1	0x20	Black
0x9	Ramp Red H 2	0x21	Noise
0xa	Ramp Green H 2	0x22	Circle 1
0xb	Ramp Blue H 2	0x23	Circle 2
0xc	Ramp Black to Red V	0x24	Moire
0xd	Ramp Green V 1	0x25	V Stripe Red
0xe	Ramp Blue V 1	0x26	V Stripe Green
0xf	Ramp Red V 2	0x27	V Stripe Blue
0x10	Ramp Green V 2	0x28	H Stripe Red
0x11	Ramp Blue V 2	0x29	H Stripe Green
0x12	Stair Red 1	0x2a	H Stripe Blue
0x13	Stair Red 2	0x2b	Chess 1
0x14	Stair Green 1	0x2c	Chess 2
0x15	Stair Green 2	0x2d	Multi Burst
0x16	Stair Blue 1	0x2e	CZP
0x17	Stair Blue 2	0x2f	Overscan

User Pattern:

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

Mute:

Index	0x0	0x1
Mute	OFF	ON

Length:

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

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
Number	2 Ch	2.1 Ch	5.1 Ch	6.1 Ch	7.1 Ch

TX HDCP:

Index	0x0	0x1	0x2	0x3
TX HDCP	OFF	HDCP 1.4	HDCP 2.2 type 0	HDCP 2.2 type 1

RX HDCP:

Index	0x0	0x1	0x2	0x3
TX HDCP	OFF	HDCP 1.4	HDCP 2.2	HDCP 1.4 & HDCP 2.2

Upgrade Device

User can upgrade the firmware and pattern on the device through the USB interface. If user encounters a problem with the upgrade, please contact the supplier.

Procedure of Firmware Upgrade:
*Before updating the firmware, please ensure the file of new firmware files are in the root directory of USB Flash Drive. The file suffix is .dat.

System

1. Make sure the gui.dat and sysyem.dat files are in the root directory of USB.

2. Connect the USB Flash Drive on PRO-HDMI2Gen USB interface.

3. Select Firmware button from the System Menu and choose the GUI button.

4. Touch the Update button to do firmware update. The process of firmware update will take about 3~5 seconds. While updating, please do not remove the USB Flash Drive.

5. After completing the firmware update, please reboot the device

6. Select Firmware from the system Menu and choose the System button.

7. Touch the Update button to do firmware update. The process of firmware update will take about 3~5 seconds. While updating, please do not remove the USB Flash Drive.

8. After completing the firmware update, please reboot the device.

ARM

1. Make sure the arm.dat file is in the root directory of USB.

2. Connect the USB Flash Drive on device USB interface.

3. Select Firmware from the System Menu and choose the ARM button.

4. Touch the Update button to do firmware update. The process of firmware update will take about 5~10 seconds. While updating, please do not remove the USB Flash Drive.

FPGA

1. Make sure the fpga.dat file is in the root directory of USB.

2. Connect the USB Flash Drive on device USB interface.

3. Select Firmware from the System Menu and choose the FPGA button.

4. Touch the Update button to do firmware update. The process of firmware update will take about 5~10 seconds. While updating, please do not remove the USB Flash Drive

Pattern

1. Create a folder (folder name is usr_pic) on USB Flash Drive.

2. Ensure the file of pattern which user desire to update on the device is in the usr_pic directory of USB Flash Drive. The file suffix is .jpg.

3. Before updating the user defined pattern, please confirm the capacity of the PRO-HDMI2Gen.

4. Select Firmware from the System Menu and choose the Pattern button.

5. Touch the Update button to upgrade the user defined pattern. The process running time will depend on the file size, please wait patiently.

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