MU-SIX-A-8K

HDMI 2.1 40Gbps Test Pattern Analyzer
PRELIMINARY

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Introduction

In today's world of mixed systems and multiple flavors of SD, HD, UHD and now 8K! The 8K SIX-A Analyzer helps you solve manufacturing and installation issues. Use the 8K SIX-A for testing basic and complex switching solutions for maximum capability and performance. This includes complete high bandwidth HDMI cable testing, HDBaseT and HDIP link testing up to 40 Gbps. With the ability to monitor a pesky system with intermittent issues the 8K SIX-A will capture the data required to fix the system.

Consultants will love the 8K SIX-A as a tool for system commissioning and validation and, when paired the 8K SIX-G, the 8K SIX-A Analyzer becomes the most powerful (and affordable) HDMI system troubleshooting system on the planet!

NOTE: This document contains many technical terms and acronyms. If you are unsure of what these mean we have a full GLOSSARY of Audio Video terms with definitions available at www.murideo.com

Features

- Analyze any HDMI/DVI signals up to 40Gbps (7680x4320P60)
- est HDMI/DVI Cables up to 40Gbps, full TMDS testing
- View up to 40 Gbps Video Content & Format Info - Anywhere
- Analyze & Report HDMI Distribution System over Time (minutes, hours, days) down to the Pixel Read & Analyze HDR Signals & Metadata
- Report & Analyze InfoFrames
- Analyze & Report HDMI Distribution System over Time (minutes, hours, days) - Down to the pixel
- Advanced EDID Analysis & Tools
- Hot Plug Detect Setting
- HDCP Analyzer - 2.X, 1.X, Disable
- Audio Confidence Tests (2-Channel & Multichannel)Audio VU Meter
- Pixel Color Checker
- Portable, Battery Operated
- CEC Test - CEC Pass/Fail test. Connect to an HDMI INPUT/OUTPUT to validate CEC functionality
- Sync & Latency Test. When using SIX-G-8K/SIX-A-8K Pair
- Printable Reports using the free PC software

What's in the box

- MU-SIX-A-8K-8K Generator
- 12V 2A DC/AC Power Supply / Charger (110-240 VAC) with set of International plugs (US, UK, AU, EU).
- Rechargeable Battery Pack (Internal)
- Hard Case
- x1 Micro USB to USB A cable
- x1 3.5mm to DB9 (F) serial cable adapter

VIDEO:	
HDMI VERSION	HDMI 2.1 (FRL5 40GBPS)
HDCP VERSION	HDCP 2.3 AND 1.4
HDCP ON/OFF	YES
MAXIMUM CLOCK RATE	600 MCSC (594 MHZ)
MAXIMUM THROUGHPUT PER CHANNEL	10.0 GBITS/SEC (40 GBP/SEC TOTAL)
RESOLUTION TIMINGS	ALL VESA; VIDEO STANDARD WITH 60, 59.94, 30, 29.97, 24, 23.98, FPS; VIDEO STANDARD WITH 50, 25 FPS; SMPTE 4K TIMINGS (4096X2160); UHD 4K TIMINGS (3840X2160)
VIDEO ENCODING	RGB, YCBCR
VIDEO SAMPLING MODELS	RGB 4:4:4, YUV 4:4:4, YUV 4:2:2, YUV 4:2:0 HDMI 2.0
COLOR BIT DEPTH	8, 10, 12, 16, AND AUTO EDID READ
AUDIO:	
AUDIO TYPE	LPCM
AUDIO SAMPLING RATE	32K, 44.1K, 48K, 88K, 96K, 176K
AUDIO SAMPLING BIT SIZE	16, 20, 24, AUTO
AUDIO CHANNELS	2
AUDIO VOLUME	YES
PORTS:	
HDMI	TYPE A
AUDIO (L/R INPUT)	3.5MM STEREO (3-CONDUCTOR)
SYNC (SYNC & LATENCY TEST)	3.5MM STEREO (3-CONDUCTOR)
RS232	3.5MM STEREO (3-CONDUCTOR)
FIRMWARE/CONTROL/	MICRO USB
ENVIRONMENTAL:	
OPERATING TEMPRATURE	23 TO 125°F (-5 TO 51°C)
STORAGE TEMPERATURE	-4 TO 140°F (-20 TO 60°C)
HUMIDITY RANGE	5-90% RH (NO CONDENSATION)
POWER:	
POWER	7.4V 2600MAH INTERNAL BATTERY OR WALL ADAPTER
POWER CONSUMPTION (TOTAL)	12 WATTS MAX
POWER SUPPLY	INPUT: AC 100-240V ~ 50/60HZ OUTPUT: DC 12V 2A
DIMENSIONS:	
DIMENSIONS (UNIT ONLY DEPTH/WIDTH/HEIGHT)	MM: 28.8 X 108.44 X 139 INCH: 1.13 X 4.27 X 5.47
WEIGHT (UNIT)	0.8 LBS/0.36 KG

*SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE. MASS & DIMENSIONS ARE APPROXIMATE

FRONT PANEL OVERVIEW

3" color LCD Display with Polycarbonate protective covering

HPD (Hot Plug Detect) LED: Solid light indicates that hot plug detect is successful

HDCP (High Bandwidth Content Protection) LED: On indicates HDCP is being recieved

Shortcut button to commonly used video resolution timings

Shortcut button to HDCP settings

Power button to turn the device off and on

Menu navigation buttons

Selection button

Back button to back up one menu with each push

Connection Overview:

Signal Info:

This menu provides the following information on the source/system under test.

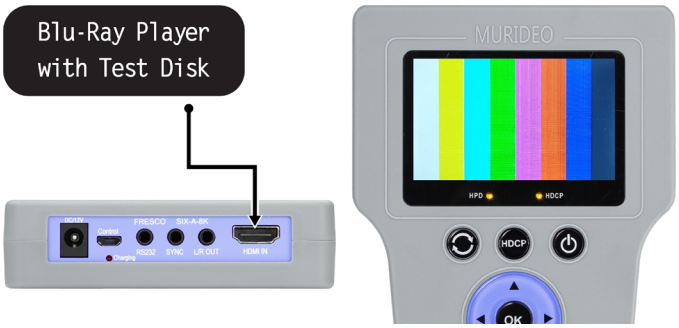
- **Timing –** Horizontal & Vertical Pixel Count, Progressive or Interlaced Video info, and Refresh Rate
  Example - 3840x2160P@60Hz
- **Color Space –** Provides Color Space and Chroma Subsampling information.
  Example - YUV422 means that the color-space is YUV. 422 means that the chroma subsampling is 4:2:2.
- **HDCP –** Displays HDCP type.
  Example - 1.x, or 2.x, or No HDCP.
- **Color Depth –** The SIX-A-8K will display the bit depth of the signal from 8 to 16 bits. Bit Depth, aka Color Depth, describes the amount of information stored in each pixel. As you increase bit depth, you also increase the number of colors that can be represented. In the case of an 8-bit RGB image, each pixel has 8-bits of data per color (RGB). 8 bits of data x3 channels (RGB) gives us a total of 24 bits. This means each pixel has a total of 256 possibilities. In the case of a 10-bit RGB image, each pixel has 10 bits of data per color (RGB). 10 bits of data x3 channels (RGB) gives us a total of 30 bits. This means each pixel has a total of 1024 possibilities. Sometimes manufacturer documentation refers to 8-bit as 24 bit and 10-bit as 30 bit, etc. – they are both correct and mean the same thing.
- **TMDS Bandwidth –** Displays the total bandwidth of the source/system under test.
  Example - A 720P signal requires about 2.2 GBPS of bandwidth, 1080P about 4.5 GBPS, and a 4K signal would require between about 9 to 18 GBPS depending on refresh rate, chroma subsampling, and color depth/bit depth.
- **HDR Metadata –** This indicates whether HDR is present in the signal or not. If HDR metadata is present in the signal HDR METADATA will say HDR10/Standard DV/Low-Latency (Dolby Vision Low-Latency). If HDR metadata is not present in the signal HDR METADATA will say None.
- **Audio Sampling Frequency –** Displays the audio sampling frequency of the incoming signal(ex. 48K, 88K, 176K, etc.). Sample rate is the number of samples of audio carried per second, measured in Hz or kHz (one kHz being 1000 Hz). For example, 44,100 samples per second can be expressed as either 44,100 Hz, or 44.1 kHz.
- **Audio Sampling Size –** Displays the audio sample size (ex 16-bit, 24-bit, etc.). Higher bit depth means higher-resolution audio and a better representation of the original analog sound wave.
- **Audio Channel Allocations –** Displays which audio channels that are active in the HDMI stream.
  Example - C, FR, FL (Center, Front Right, Front Left).
- **Audio Coding Type –** Displays the type of the incoming audio stream.
  Example - LPCM (Linear Pulse Code Modulation).
  Example - If the audio sampling size says "Refer to Stream Header" you must refer back to the source and confirm exactly which type of audio signal is being output.
- **ACR N/CTS -** (Audio Clock Regeneration) The source device sends N (Dividing ratio of video clock to TMDS clock) and CTS (Cycle Time Stamp) values to the sink device for regenerating the audio clock. See expected values to the right for a 48K, 96K and 192K sampling frequencies. Credit AES.

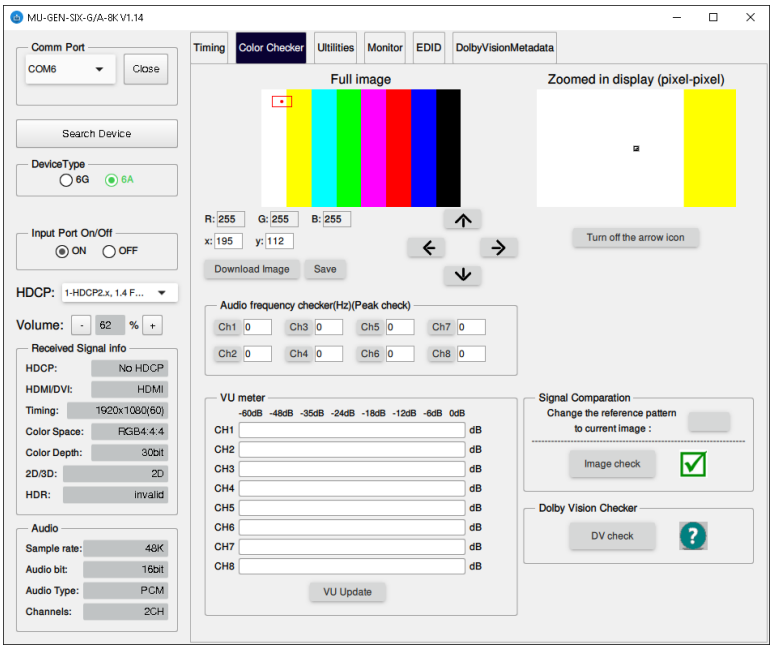
TMDS Clock (MHz)	48 kHZ		96 kHZ		192 kHZ	
	N	CTS	N	CTS	N	CTS
25.2 / 1.001	6864	28125	13728	28125	27456	28125
25.2	6144	25200	12288	25200	24576	25200
27	6144	27000	12288	27000	24576	27000
27 - 1.001	6144	27027	12288	27027	24576	27027
54	6144	54000	12288	54000	24576	54000
54-1.001	6144	54054	12288	54054	24576	54054
74.25 / 1.001	11646	140625	23296	140625	46592	140625
74.25	6144	74250	12288	74250	24576	74250
148.5 / 1.001	5824	140625	11648	140625	23296	140625
148.5	6144	148500	12288	148500	24576	148500
297 / 1.001	5824	281250	11648	281250	23296	281250
297	5120	247500	10240	247500	20480	247500
Other	6144	measured	12288	measured	24576	measured

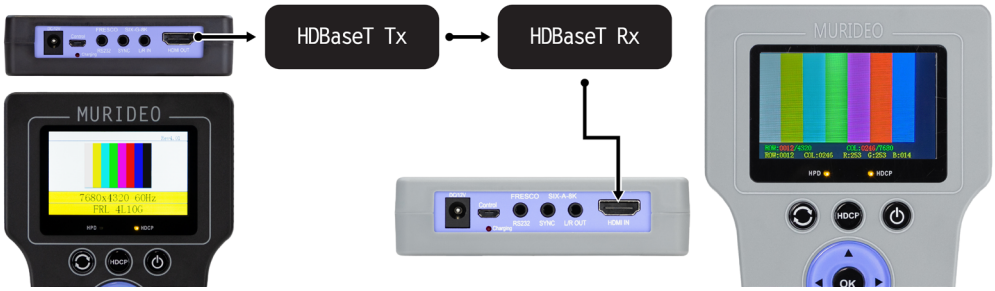
Pixel Color Checker:

Used to check the accuracy of an input video signal from any other device.
Example 1- You are wondering about the color accuracy of a Blu-ray player. Follow these steps to test:

1. Using an HDMI cable connect the Blu-ray player's HDMI output to the SIX-A-8K.
2. Insert a reference test disc into the Blu-ray player.
3. Choose a test pattern that has a known RGB triplet value.
4. On the SIX-A-8K navigate to the PIXEL COLOR CHECKER menu.
5. Press the OK button.
6. Use the UP/DOWN/LEFT/RIGHT arrow buttons to choose a pixel. Use UP and DOWN to choose a specific row, then use the LEFT and RIGHT buttons to choose a column.
7. Once you have a pixel chosen press the OK button on the SIX-A-8K to select.
8. You will now see (in yellow font at the bottom of the screen) the row and column of the pixel that you selected. Next to that you will see the RGB triplet value of that pixel.







Example 2 - The Pixel Color Test could also be used to test the color accuracy of a repeater device.

NOTE: Although you can use this tool using the front panel controls we HIGHLY recommend you use the free PC Control Software available for download from www.murideo.com

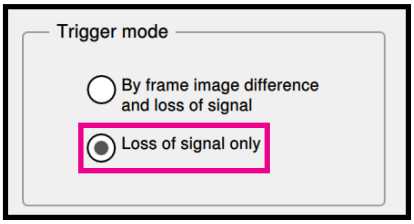
Signal Monitor:

This is an abbreviated test for signal loss and frame to frame difference in an HDMI signal. This can be used to diagnose intermittent issues in a system caused by a defective sink, source, or repeater. This can also be used to identify the cause of any interruption of the signal.

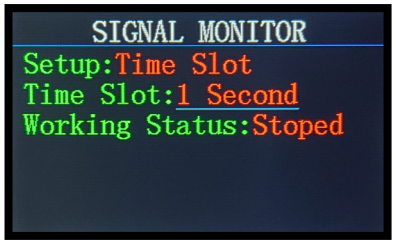
Example - The picture on the display randomly flashes around the same time every day.

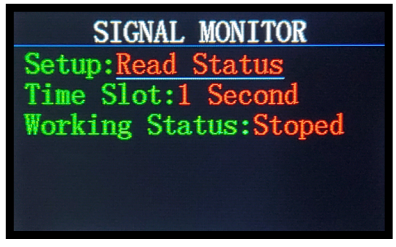
NOTE: This test requires a still or stationary image generated from the source. The test will fail 100% of the time if the source is a moving image. The test is checking each pixel at the source and comparing it to the same pixel at the end of the signal chain (the SIX-A-8K).

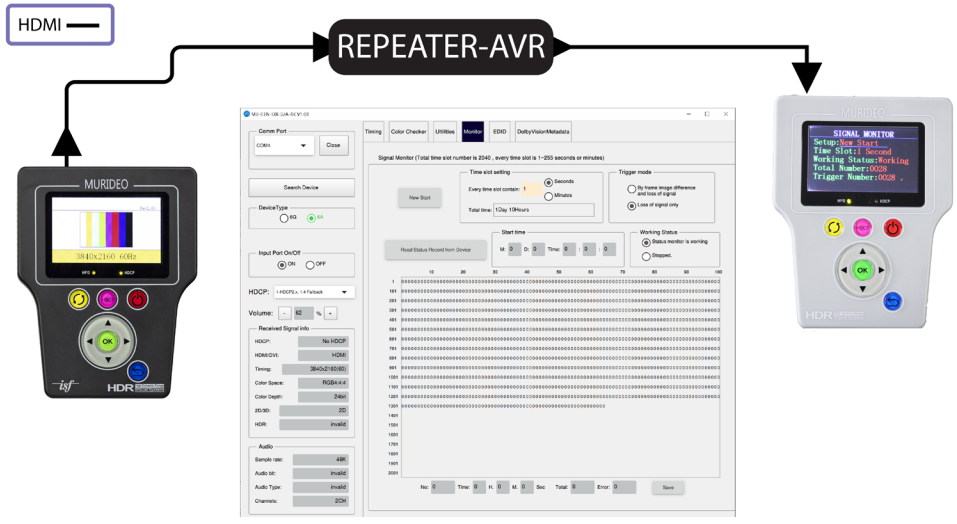
NOTE: The PC Software has the option to select "Loss of signal only" for testing. This option will only look for a drop or loss in the signal. It is not comparing pixel to pixel so will work with a moving image.



1. Using an HDMI cable connect the SIX-A-8K to the display and copy the EDID (see page XX for instructions on how to copy the EDID).
2. Install the SIX-A-8K in place of the display.
3. On the SIX-A-8K navigate to the SIGNAL MONITOR menu
4. The first line on the SIGNAL MONITOR Menu is SETUP. There are 3 options -
   New Start, Time Slot, and Read Status. Use the UP/DOWN arrow buttons to choose Time Slot and press the OK button

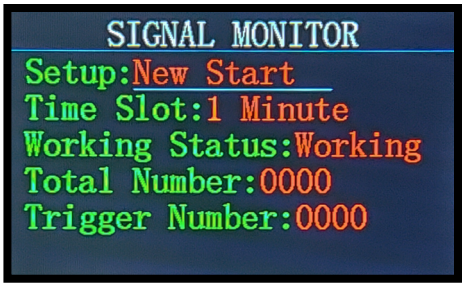


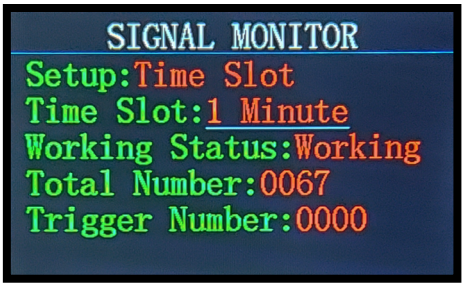




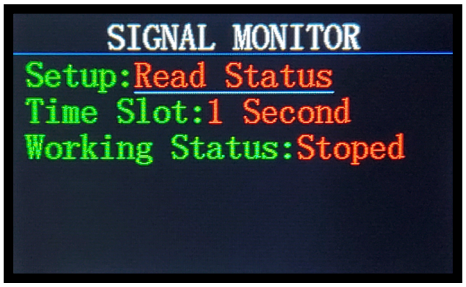
Signal Monitor Continued:

5. Use the UP/DOWN arrow buttons to choose either 1 Second or 1 Minute the selection you make here determines how often the test triggers. Once your selection is made press the OK button.
   Example - Setting this to 1 second means the SIX-A-8K will look for frame image difference and loss of signal every 1 second. Setting it to 1 minute means the SIX-A-8K will look for frame image difference and loss of signal every 1 minute.
6. Use the UP/DOWN arrow buttons to change the Setup to "New Start" and press the OK button to start the test. The Working Status will now say "Working". You will now see two new lines labeled "Total Number" and "Trigger Number".
7. "Total Number" is the number of times the SIX-A-8K has checked for "Frame image difference and loss of signal" compared to the original image.
   Example - If set to 1 second you will see the "Total Number" increase every 1 second.
8. "Trigger Number" is the total number of failures the SIX-A-8K has detected.
   Example - The Total Number reads 0100 and the Trigger Number reads 0002. This means there were 2 failures over 100 total tests. This could mean at least 1 (or any amount) of pixels were different (comparing the source to the SIX-A-8K). This could also mean there was a complete loss of signal at some point during the test.

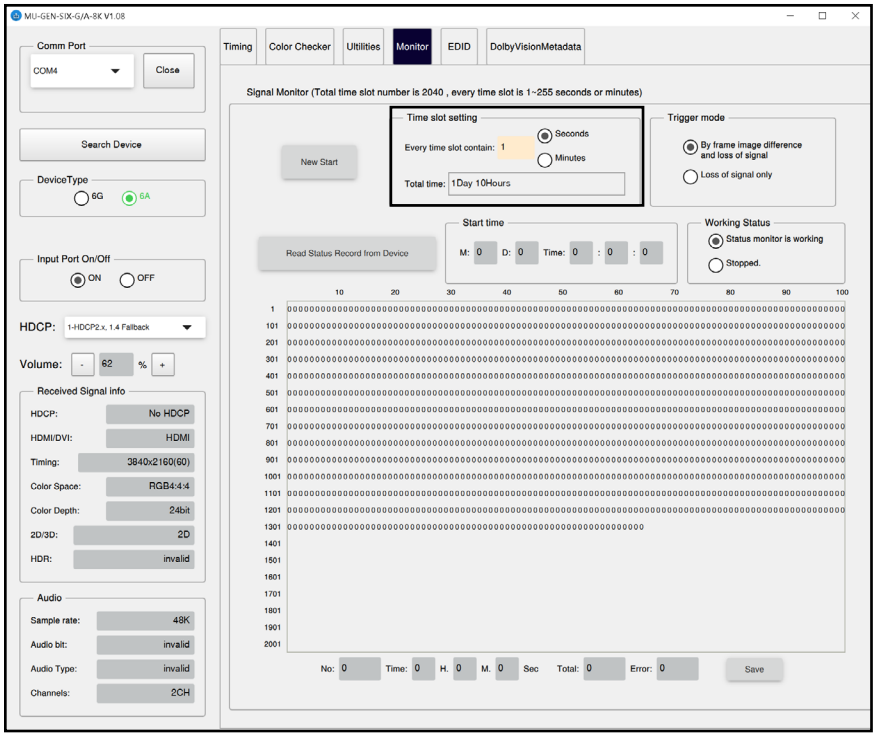




NOTE: One option on the "Setup" line says "Read Status". This is meant to be used in conjunction with the SIX-A-8K PC Software to read the total number of failures as the test is running.



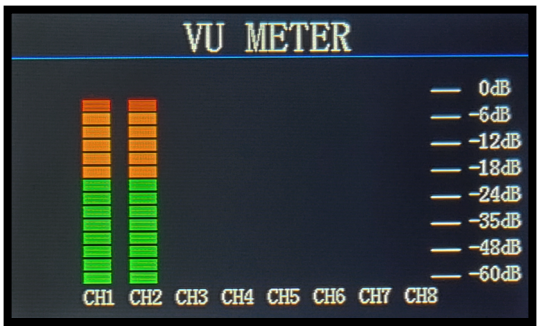
NOTE: Although you can run this test from the front panel controls of the SIX-A-8K, we HIGHLY recommend using the PC Software. If using the PC Software you have more freedom and can see more detailed information on what is happening during the test. For example you can run the test for nearly 1 year if necessary (you are not limited to 1 second or 1 minute).

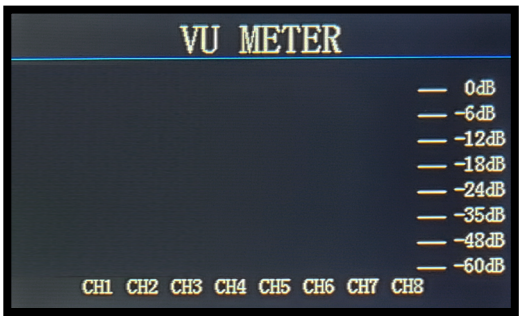


Example - The system you are working on is in a commercial facility that also has an HVAC system. After running the Signal Monitor test you discover that the signal is dropping every time the air conditioner turns on. By using the results of the Signal Monitor test you can now compare when the dropouts occur to the time(s) the air conditioner turns on. If the timing of the dropout is consistent with the timing of the air conditioner, the culprit of the picture dropout is most likely caused by the HVAC system. Now you can come up with a solution to remedy the problem.

VU Meter:

In this menu you can verify that there is an audio signal in the HDMI stream. The SIX-A-8K will display the number of active audio channels and each channel's respective amplitude in decibels (dB). You will see color bars for each channel indicating theres is an audio signal present for those channels. If the VU Meter menu has no colored bars that means there is no audio present in the HDMI stream (see images below).



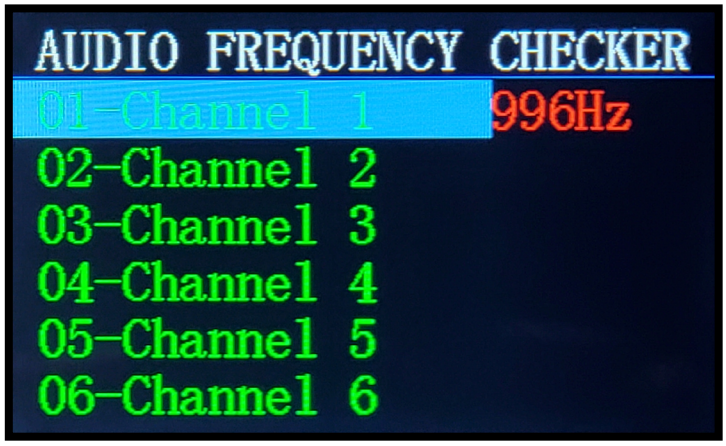


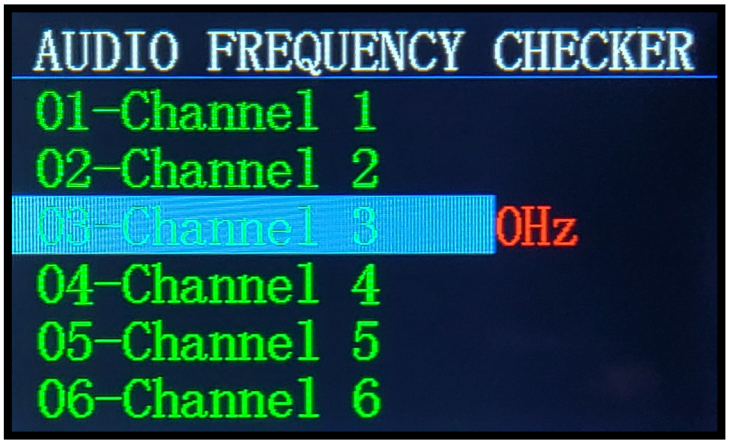
Audio Frequency Checker:

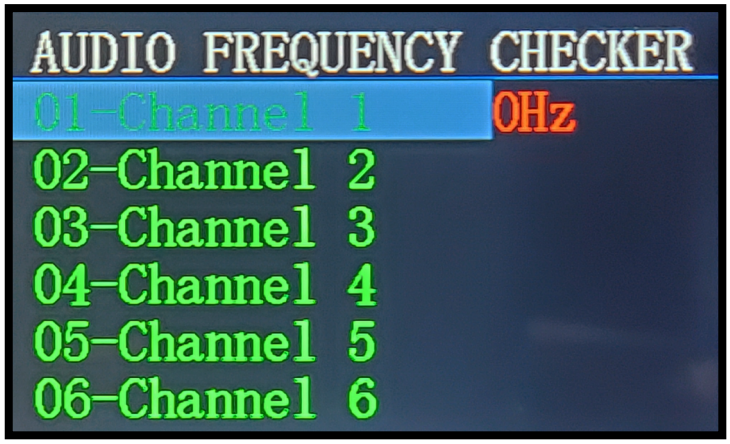
Use this menu to verify the frequency of the incoming audio signal per channel (up to 8 channels). This is commonly used as an audio confidence test.

Example - You are generating an audio test tone of 1KHz in a 2 channel (FL/FR) configuration from the source. You would like to verify that the audio signal is unaltered throughout the signal chain.

1. Replace the device at the end of the signal chain with the SIX-A-8K.
2. Generate the 1KHz 2 channel test tone from the source.
3. On the SIX-A-8K navigate to the AUDIO FREQUENCY CHECKER menu.
4. You will now see channels 1-8 on the SIX-A-8K.
5. Use the UP/DOWN arrow buttons to select a channel (1-8).
6. Press the OK button on the channel you would like to verify.
7. You will now see the frequency of the audio signal (in red font) on the same line as the selected channel.
8. As long as the measured frequency is the same as the generated frequency the test is successful.
   NOTE: The measure frequency may not be exactly the same as the generated frequency. For example the generated signal is 1KHz while the measurement on the SIX-A-8K is 996Hz. There is a slight tolerance so this would still be considered a successful test.







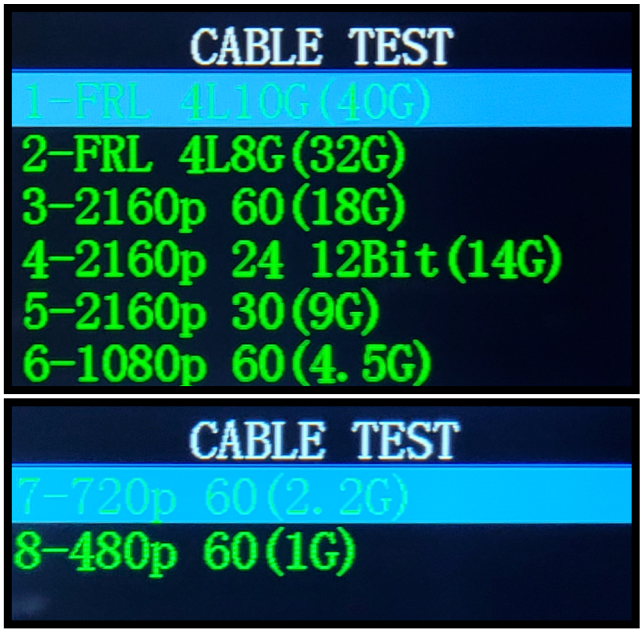
Cable Test:

The cable test is used to verify the capabilities and functionality of a passive, copper based HDMI cable. You can test cables anywhere from 480P@60Hz (1Gbps) all the way up to FRL10G (40Gbps). After a successful cable test you can confidently install the cable into the system you are working on.

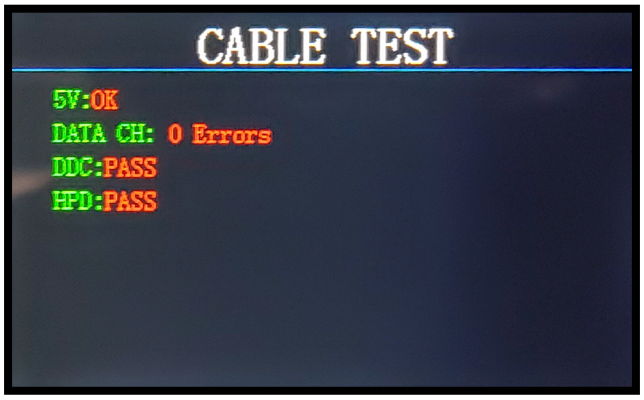
NOTE: This test is designed to work while using the SIX-G-8K as the source.

To run the test:

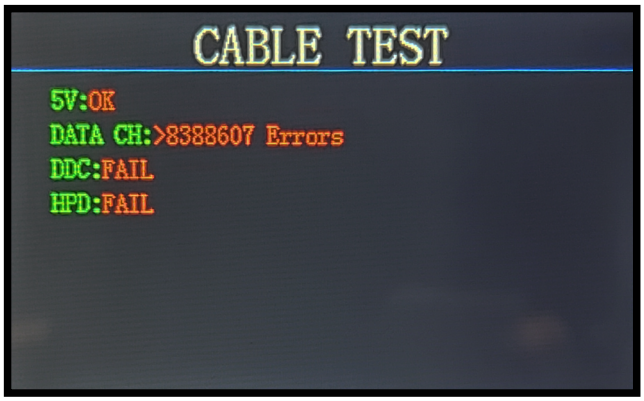
1. Connect the HDMI cable in question between the SIX-G-8K and the SIX-A-8K
2. Navigate to the CABLE TEST menu on the SIX-A-8K.
3. Using the UP/DOWN arrow buttons, choose the format that you would like to test the cable for. Example FRL 4L10G (40G)
4. Press the OK button.
5. Wait for test results (approximately 15 seconds).



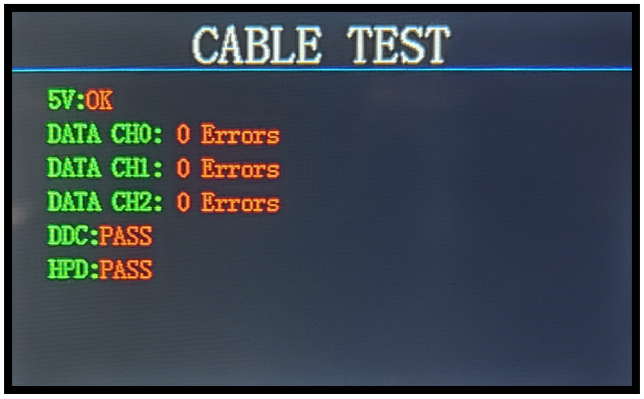
FRL Pass



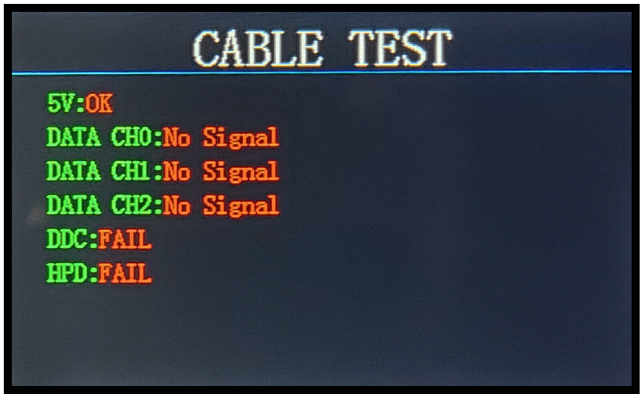
FRL Fail



TMDS Pass



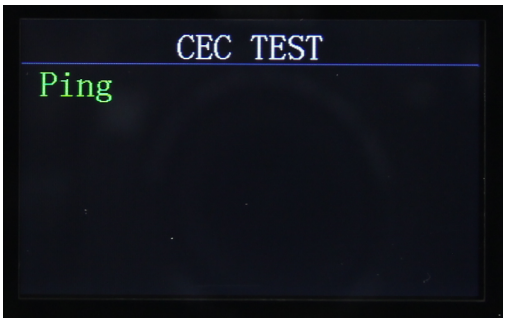
TMDS Fail

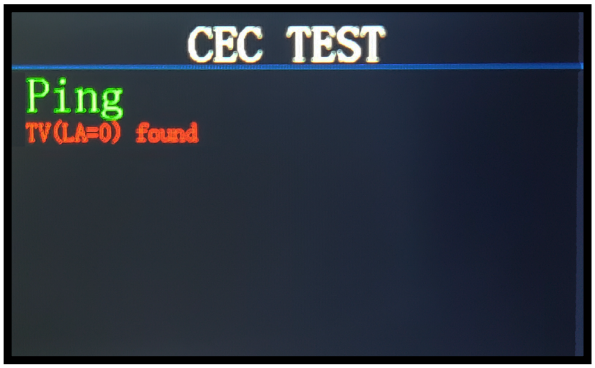


CEC Test:

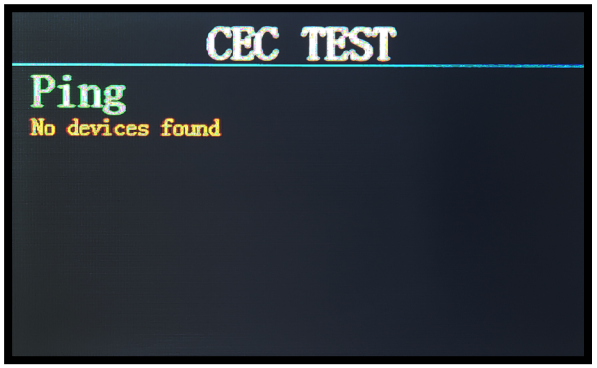
The CEC (Consumer Electronics Control) test is a simple pass/fail test to confirm CEC is functioning on the device that is connected to the SIX-A-8K. This can be either a source, repeater, or sink (display). To run the CEC test connect an HDMI Cable from the SIX-A-8K to the device you are testing. Navigate to the CEC TEST menu and press the OK button. The test results will be either:

1. PASS
2. FAIL





1. PASS



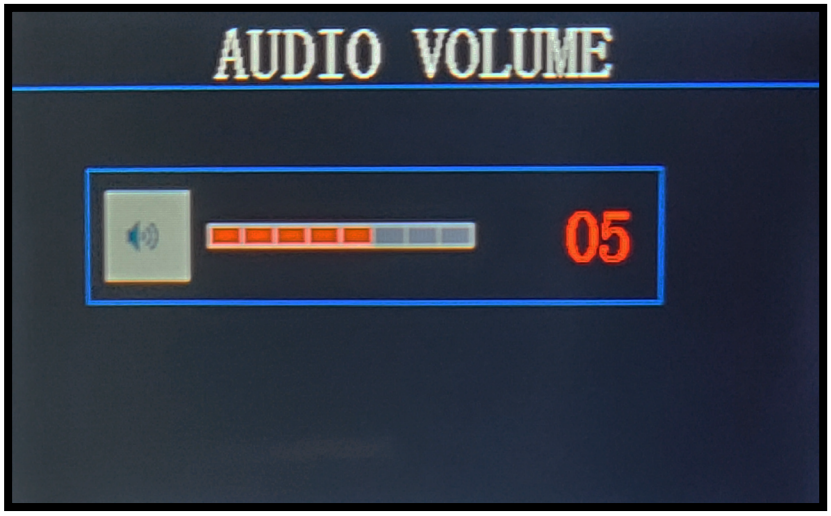
2. FAIL

NOTE: This test will fail 100% of the time if CEC is not ENABLED on the device you are testing. For specific instructions on how to enable CEC on the device you are testing, see the owner's manual of that device.

Audio Volume:

You can connect the SIX-A-8K to headphones or an external audio system using the 3.5mm L/R OUT on the Connections panel. The audio volume can be INCREASED/DECREASED using the UP/DOWN arrow buttons. If the audio volume is set to 0 (zero) this will mute the audio output of the SIX-A-8K.

NOTE: This only affects the audio output of the SIX-A-8K.

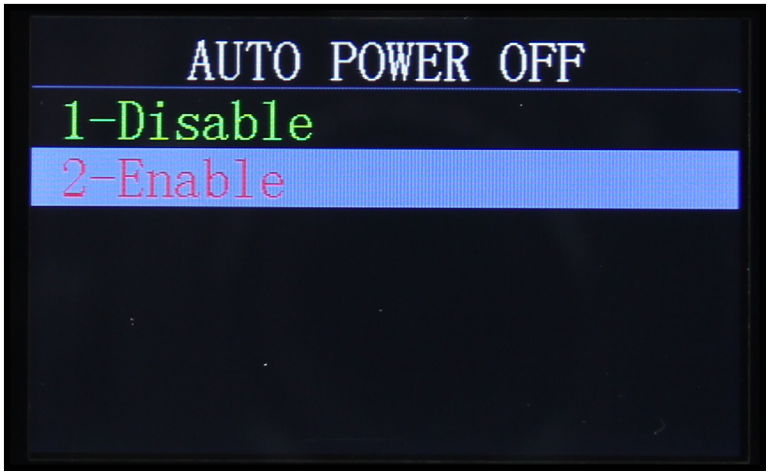


Auto Power Off:

You can set your SIX-A-8K to power off automatically when not in use. This will help save battery life. This menu contains the following options:

- DISABLE - The SIX-A-8K will remain powered on until you power if off manually.
- ENABLE - The SIX-A-8K will automatically power down after 10 minutes of inactivity.

NOTE: This setting is enabled by default.

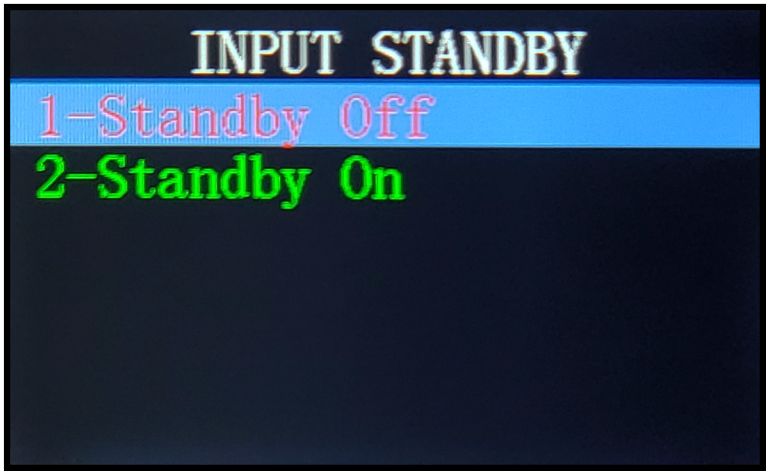


Input Standby:

You can set your SIX-A-8K to go into sleep mode. If no HPD (Hot Plug Detect) is detected after 10 minutes, the SIX-A-8K will go to sleep. If the SIX-A-8K is sleeping press any button to wake it up.

This menu contains the following options:

- STANDBY OFF - The SIX-A-8K will never go to sleep
- STANDBY ON - The SIX-A-8K will go to sleep after 10 minutes of inactivity



EDID Setup:

Use this menu to emulate an EDID from any device that has an EDID. There are 6 commonly used EDIDs included in the SIX-A-8K, or you can emulate a display by copying its EDID. See page XX for more details. To choose an EDID navigate to the EDID SETUP menu on the SIX-A-8K. Using the UP/DOWN buttons choose the EDID that you would like to use, then press the OK button to select.

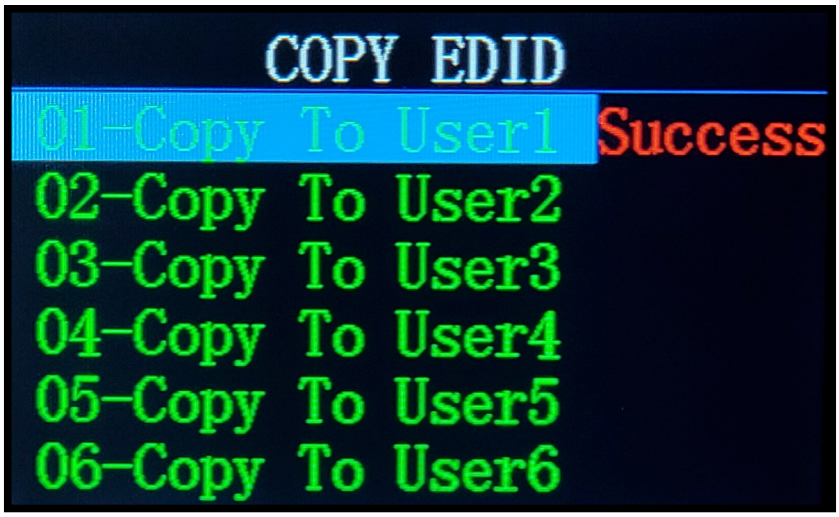
The SIX-A-8K is now emulating a sink device with the EDID you selected.

Copy EDID:

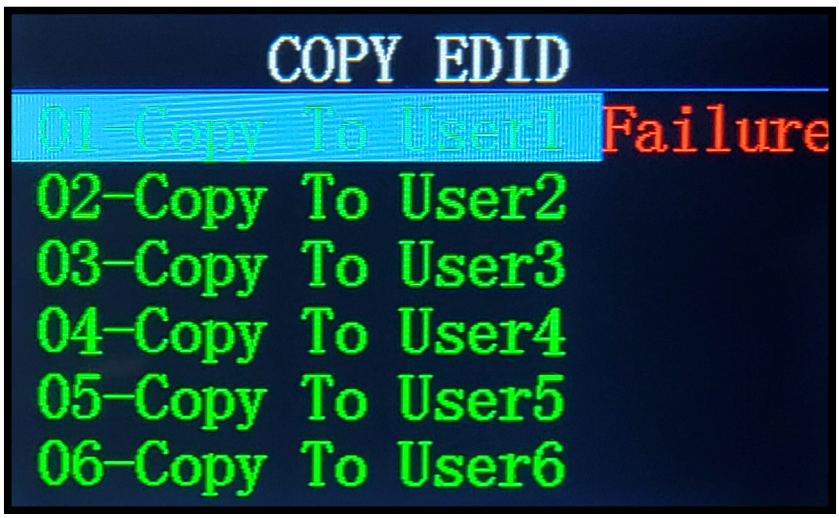
Use this menu to copy an EDID from any device that has an EDID. You can copy and save up to 10 USER EDIDs into the SIX-A-8K. This is helpful if you need to verify a distribution system prior to actual delivery of the displays. Once you have saved an EDID it will be listed in the EDID SETUP menu after the six included EDIDs. To copy and EDID:

1. Using an HDMI cable connect the SIX-A-8K to the device you would like to copy the EDID from.
2. Navigate to the COPY EDID menu.
3. Using the UP/DOWN buttons choose a memory slot to store the EDID (1-10).
4. Press the OK button

If the SIX-A-8K successfully saves the EDID you will see "SUCCESS" next to the slot/memory.



If the SIX-A-8K was not able to save the EDID you will see "FAILURE" next to the slot/memory. If this happens be sure the HDMI cable is fully inserted into the HDMI ports on both devices.
NOTE: You may need to power on the Display in order to successfully copy the EDID.

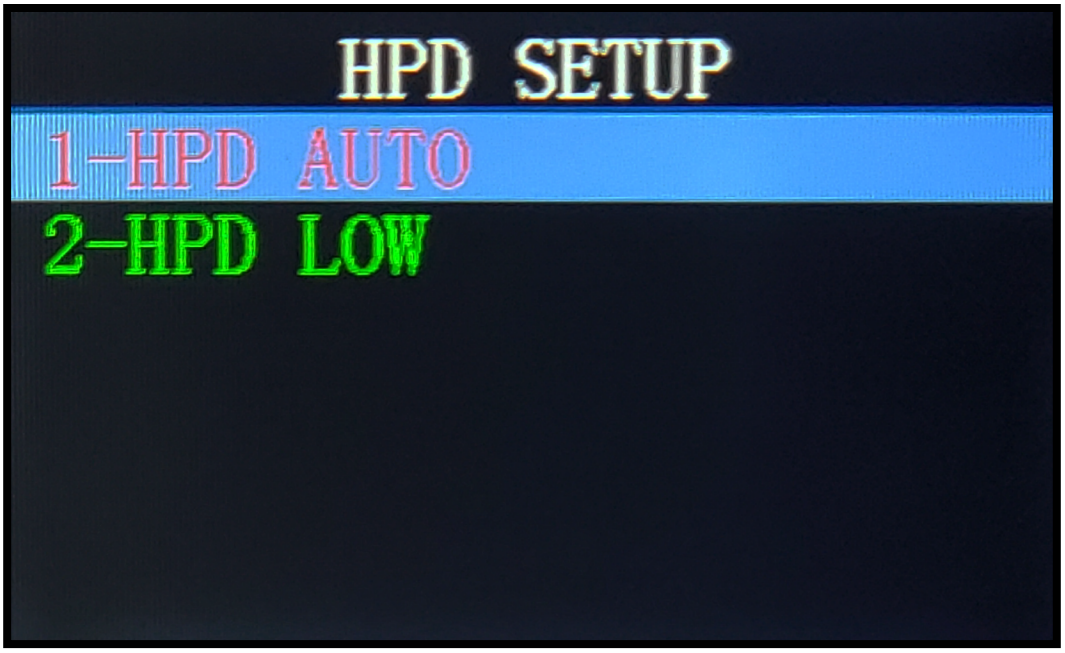


HPD Setup:

Use this menu to force a hot plug event while connected to an HDMI source. The HPD (Hot-Plug-Detect) is a communication mechanism between a source and a sink device that makes the source device aware that it has been connected/disconnected to/from the sink device. This menu contains the following options:

- HPD AUTO
- HPD LOW

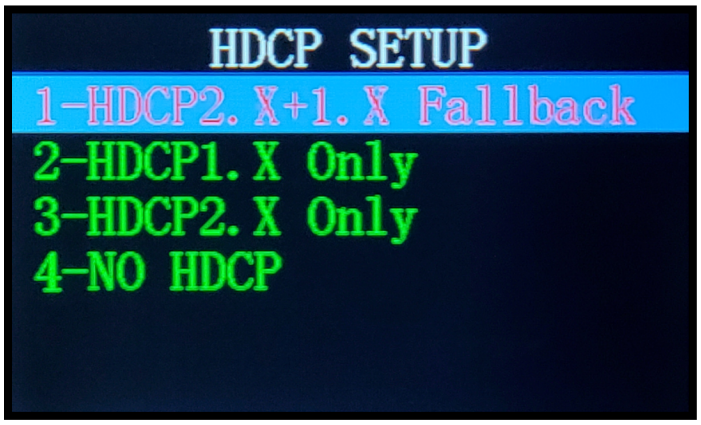
To initiate a Hot Plug Event use the UP/DOWN arrow buttons and choose HPD LOW, then press the OK button. Then use the UP/DOWN arrow button to choose HDP AUTO, then press the OK button. When HPD AUTO is selected the hot plug sequence will work as intended.

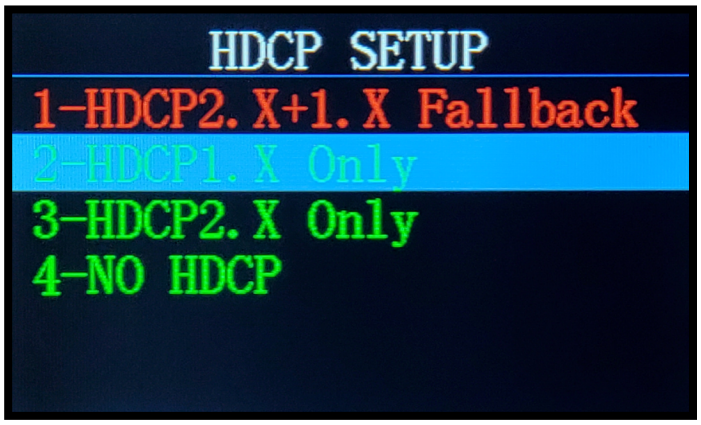


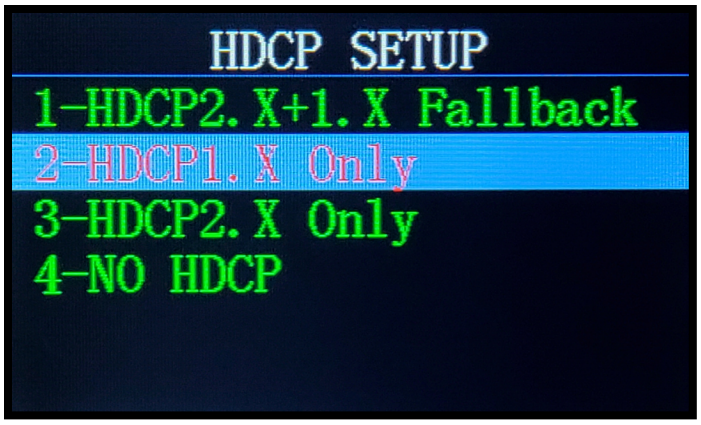
HDCP Setup:

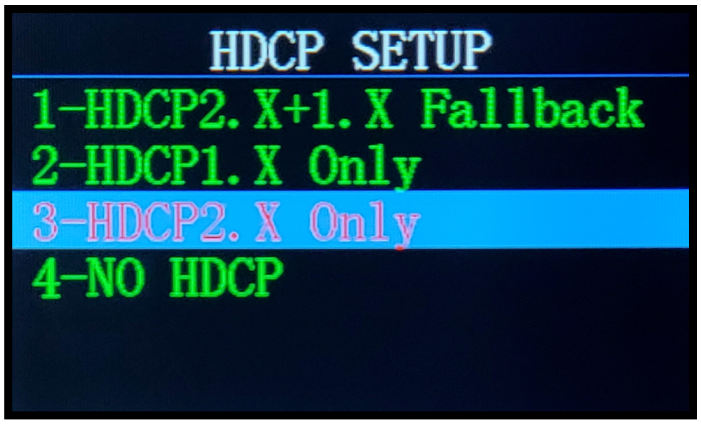
High-bandwidth Digital Content Protection (HDCP) is a form of digital copy protection developed by Intel Corporation to prevent copying of digital audio and video content as it travels across connections. This menu contains the following options:

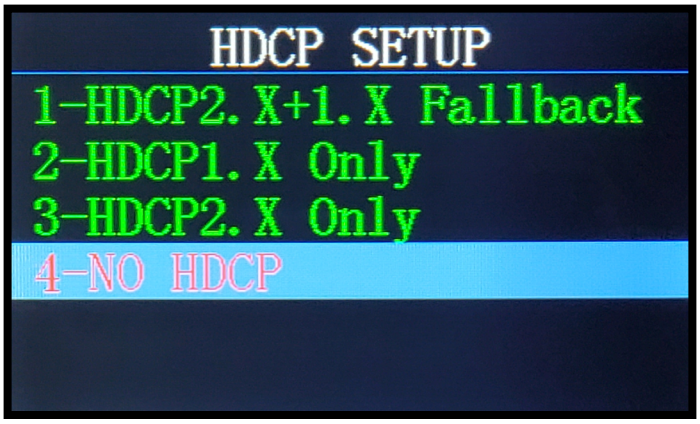
1. HDCP 2.x+1.x Fallback – Both HDCP 1.x and 2.x will be accepted from the source.
2. HDCP 1.x Enable – ONLY HDMI 1.x signal will be accepted.
3. HDCP 2.x Enable – ONLY HDMI 2.x signal will be accepted.
4. HDCP Disable – Only signals with NO HDCP will be accepted.







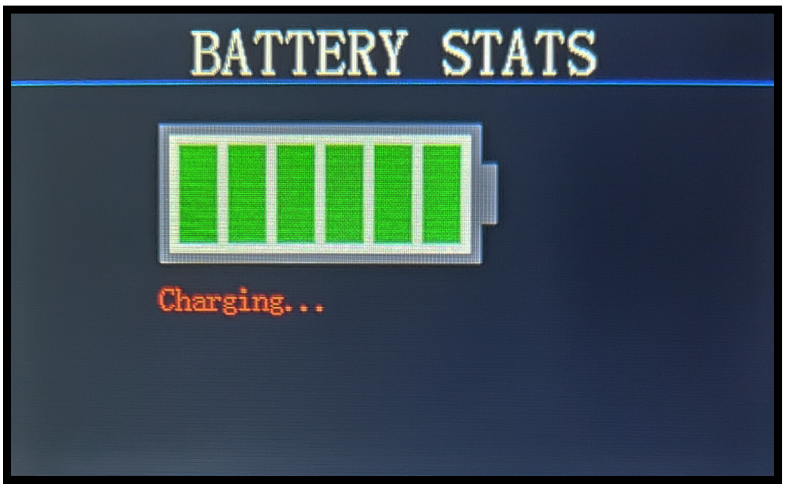


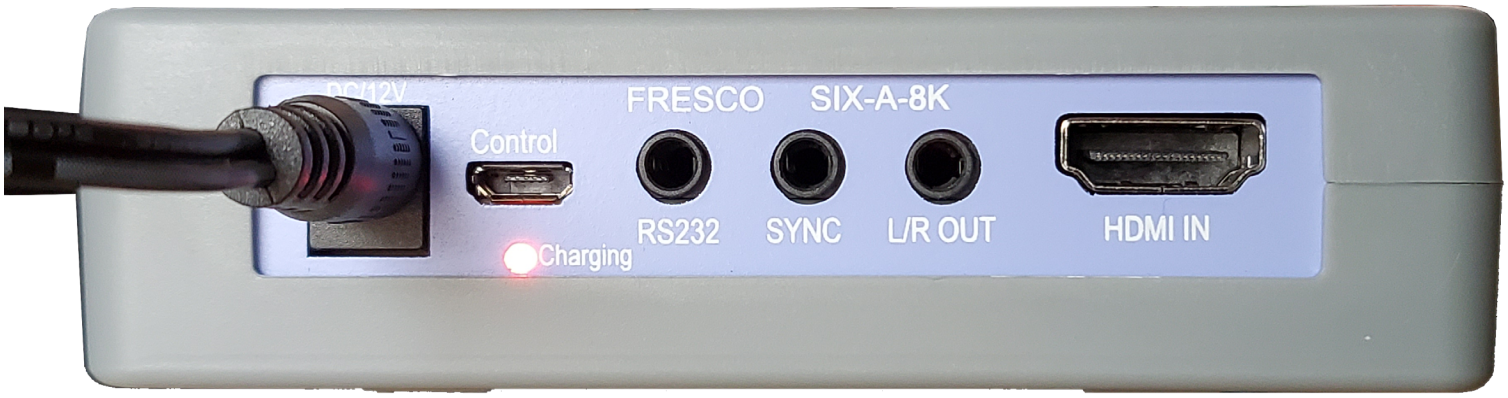


Battery Stats:

This menu will show you the current status of the SIX-A-8K's internal battery.

NOTE: If the SIX-A-8K's battery is low you can operate it while plugged into power. This will also charge the battery while the SIX-A-8K is in use.





Charging LED

Red LED that will illuminate when the device is charging and turn off when fully charged.

NOTE: Contact Murideo support if the Red LED only blinks while connected to the PSU.

Warranty and Getting Help

AVPro Global Holdings (DBA MURIDEO) offers a 2 year international limited warranty for its Murideo products. Any product first sold to you is guaranteed to be free from defects in both components and workmanship under regular uses. The warranty period commences on the date the item ships. Attention: Your invoice with the date of purchase, model number and serial number of the product is your proof of the date of purchase. The International Limited Warranty is applicable and shall be honored in every country where MURIDEO or its Authorized Service Providers offer warranty service subject to the terms and conditions provided in this International Limited Warranty Statement. Products included in this warranty:

- Murideo SEVEN Generator
- Murideo SIX G Generator
- Murideo SIX A Analyzer
- Murideo Fox & Hound Testing and Troubleshooting Kit`
- Murideo 4K HDMI Test Monitor

During the warranty period, the defective hardware of Murideo products will be either repaired or replaced, with new or like new products, at the discretion of Murideo. This International Limited Warranty covers the costs of service parts and labor required to restore your product to fully functional condition. MURIDEO will, at its discretion, repair or replace any defective products or parts thereof covered by this International Limited warranty with refurbished parts of the product that are equivalent to new or like new products in both functionality and performance. A product or part that is repaired or replaced under this International Limited Warranty shall be covered for the remainder of the original warranty period applying to the product or part, or for 90-days, whichever expires last. All exchanged parts and products under this International Limited Warranty will become the property of MURIDEO.

Obtaining the Warranty Service

Warranty service or Returned Merchandise Authorization (RMA) under this International Limited Warranty will be honored only if claims are made within the warranty period. For notifications to MURIDEO or products outside the warranty period, the process will be the same, but charges may apply. Contact details may be obtained on MURIDEO website https://www.murideo.com/

Customers are requested to perform the following actions before claiming MURIDEO product as defective:

(a) Owner must notify MURIDEO, during the warranty period, in writing of alleged defect, and allow MURIDEO a reasonable opportunity to inspect the allegedly defective product;

(b) No Product may be returned without MURIDEO's consent, The MURIDEO RMA# must accompany all returns, and all returns must be delivered to MURIDEO within the warranty period;

(c) Owner may, then at its own expense, return the allegedly defective Product, freight pre-paid and in the original packaging, accompanied by a brief statement explaining the alleged defect to MURIDEO;

(d) If MURIDEO determines that any returned Product is not defective, or if MURIDEO determines that the defect is not covered by the warranty, MURIDEO will return the Product to the Owner at Owner's expense, freight collect, and Owner agrees to pay MURIDEO's reasonable cost of handling and testing;

(e) Upon determining that a returned product is defective, to receive warranty service Owner will need to present the invoice showing the original purchase transaction. If shipping the product, Owner will need to package it carefully and send it, transportation prepaid by a traceable, insured method, to the MURIDEO Service Center. Package the product using adequate padding material to prevent damage in transit. The original container is ideal for this purpose. Include the RMA #, your name, return shipping address, email address and telephone number where you may be reached during business hours, inside the shipping package with the unit. Any replacement unit will be warranted under these Terms and Conditions for the remainder of the original warranty period or ninety (90) days whichever is longer.

Refer to user manual available for download on our website http://www.murideo.com/ for important tips on how to operate and troubleshoot the product.

- Damage caused by act of nature, such as fire, flood, wind, earthquake, lightning, etc.
- Damage or incompatibility caused by failure to perform a proper installation or to provide an appropriate operational environment for the product, including but not limited to unstable wired/wireless network connection and phone lines, bad grounding, external electro-magnetic fields, direct sunlight, high humidity and vibration.
- Damage caused by impact with other objects, dropping, falls, spilled liquids, or submersion in liquids.
- Damage caused by unauthorized repair or disassembling of the product.
- Damage caused by any other abuse, misuse, mishandling, or misapplication.
- Damage caused by third party peripherals (including but not limited to visible damages on motherboard or other electronic parts of the product such as burn spots after electric discharge, melting, fusing, splitting, etc.)
- Any unauthorized software or modification of built-in software not approved by MURIDEO.
- The serial number of the product (or serial number stickers of its parts) has been modified, removed, blurred or damaged.
- Defects caused by transportation, handling or customer abuse.

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This Limited Warranty gives you specific legal rights. You may also have other rights that may vary from state to state or from country to country. You are advised to consult applicable state or country laws for full determination of your rights. Some jurisdictions do not allow the exclusion or limitation of special, incidental or consequential damages, or limitations on how long a warranty lasts, so the above exclusion and limitations may not apply to everyone.

Getting Help

For service and support, contact your local dealer.

To find your dealer or to contact MURIDEO support, go to: https://support.murideo.com/

Or call

+1-605-330-8491 for worldwide technical support

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