M U R I D E O

Murideo
Fresco SIX-G

HDMI 2.0(a) Test Pattern Generator
HDCP 2.2 Tester

Using HDR (Appendix A)

Version 1.00

Important Safety Information

- Follow all instructions
- Use only a dry cloth to clean
- Use caution not to block side vents on unit
- Indoor use only: To reduce the risk of electric shock, do not use near water or expose to rain or moisture. Keep away from excess moisture
- Do not use near heat sources such as room heaters, hot A/V equipment
- Read all warnings
- Use only accessories provided by Murideo
- Unplug the device during lightning storms or when unused for long periods of time
- Keep away from open flames
- Protect all connected cords including power cords from being pinched, compressed, and stepped on
- Do not open the case. All servicing should be done only by qualified and approved service personnel and will void the warranty.
- Electrical Input Rating: Power over 5V/DC 700mA. Caution: Use only the supplied AC/DC Adapter
- Operating temperature range: e.g. 0 to 40C.
- For charging use the provided 5V/ DC 3A supply only
- To disconnect power sources, remove the AC/DC adapters from the wall outlets.

Attention:

1. In order to protect your SIX-G and complete system under test from possible damages, please don't turn on the SIX-G power switch before generator Output is attached to tested device (repeater, video processor or display) input.
   Please make sure that system under test is completely powered off before you insert or extract HDMI cable to any of involved devices.

2. Please insert and extract HDMI cables from your SIX-G gently and with high level of care.

3. During Hot-Plug between HDMI connector and receptacle (when tested device is On) ESD discharge can occur due to the potential differences (possible ground -loop) between powered equipments. These potential differences can be on extremely high level.
   Our Fresco SIX-G HDMI output is protected against ESD discharge till 7KV on all active HDMI lines, but in case if massive discharge will be over that value, will cause serious damage to SIX-G internal circuitry and can make SIX-G HDMI output completely inoperable. We have sophisticated methods to measure directly on High voltage protection chips evidences of such unwanted ESD event, but unfortunately, that will automatically void SIX-G warranty. In your own interest please pay full attention and prevent your workplace from occurrence of ESD by trying to create Static-safe working environment.

Table of Contents

- Using Software **Must be done prior to using front panel controls**
- Front Panel Controls
- Using Calman

Overview

Verifying and calibrating HDR is one of the most difficult things in the current UHD landscape. HDR is a key element in HDMI 2.0(a) specifications. Most manufactures have already (or have plans to) implement HDR into their display devices in one way or another. The current landscape of HDR as of this writing (Jan, 2016), contains various theories and concepts on proper implementation. There are many resources I highly recommend reading on the last page of this document to help you see exactly what it happening out there as it pertains to HDR. Even though there are differing theories on how HDR should be "decoded" a mastering process is already in place, so the implementation is sound.

In this document you will see how to use the Fresco SIX-G to get the "HDR Mode" response from displays so you can examine how HDR effects greyscales, etc.

We are continuously working with our partners like SpectraCal to define a color correction process when this mode is active as the luminance is typically "through the roof" and it uses an entirely different Gamma curve.

There is already HDR Mastered content available from sources like VUDU, Amazon and soon Netflix. As well at the UHD Blu-Ray on its heels, so from an integrators/calibrator standpoint you need to understand how HDR content effects these displays and how to get it reproduced properly.

Key Features:

- "3-Ways" of operation
  - Free PC Software
  - Front Panel Control
  - CalMan Calibration Software (Coming Soon)
- HDR Metadata can "ride" on any pattern in the device
- Can initiate "HDR Mode" from front panel with no need for software
- Can read HDR metadata
- Can input any Infoframe manually
- Can store 2 separate "infoframe injections" for various configurations
- Can use CalMan to measure against Gamma throughout Greyscale

What Is HDR?

HDR (High Dynamic Range) is mastering process by which content creators can use higher peak luminance and a lower minimum luminance. While "High Dynamic Range" is straightforward in a basic since, it does open up new possibilities not previously explored.

This addition of light and contrast really adds something special to the 4K UHD landscape. Some immediate advantages of HDR in the real world are:

- More light, a lot more light. This means that in commercial, and even lots of common residential applications, viewers will get a "fuller" image with better contrast ratios, even in high ambient light situations.
- Ability to "localize" or concentrate light. Allows for unique effects in dark scenery, for instance a street light can appear to cast a longer, more defined beam of light before it blurs.
- Better perceived sharpness – Our eyes interoperate this light as a better picture. We are pleased by light. This is a major victory in the world of calibration especially, because you no longer have to sacrifice a noticeable amount of light to achieve perfect colors.
- More natural perceived motion – This is one of the most interesting anomalies. When HDR is implemented, our eyes are behaving differently. Motion appears more lifelike and true to form.
- Content creators are using new gamma, greyscale and color targets to create an infinitely more robust viewing experience.

From a reproduction standpoint manufacturers are "decoding" the content differently, and essentially placing the end sync device in an entirely new mode that can only be activated by the proper infoframe injection. Without this it is impossible to initiate an HDR viewing experience.

For more a more in depth, technical, understanding please see some of the resources on the last page.

Using HDR Function on Murideo Fresco SIX-G

There are 3 ways to use HDR on the SIX-G:
- Free PC Control Software
- Front Panel Control
- CalMAN Control (Coming Soon)

Using HDR Function on Murideo Fresco SIX-G: Free PC Software

NOTE: You must set the Infoframe Metadata using the software to activate the front panel controls

To use the Free PC Software, you must connect to a PC and open the "MURIDEO SIX-G" software, version 1.10 or later. This is available for download from our website.

Once you have opened the software you will see a tab that says "HDR". This tab look like the image below (Page 7):

The buttons on this screen are as follows:

"Turn off HDR" – Turns off HDR completely

"HDR Test Info 1" – Sends the metadata stored in "1"

"HDR Test Info 2" – Sends the metadata stored in "2"

"Infoframe Injection" – Allows user to manually input an infoframe and either send it to the display or DUT or save it in one of the 2 memories.

"Send IF" - Sends the manually input infoframe or a read infoframe

"Save To" – Use the radio button to choose slot 1 or 2 and press "Save to" to save either a manually input infoframe or a read infoframe

"Read Test Info Data" – Reads the HDR Data from Display (Can then be saved for later use)

See Page 8 for common operation Step-By-Step
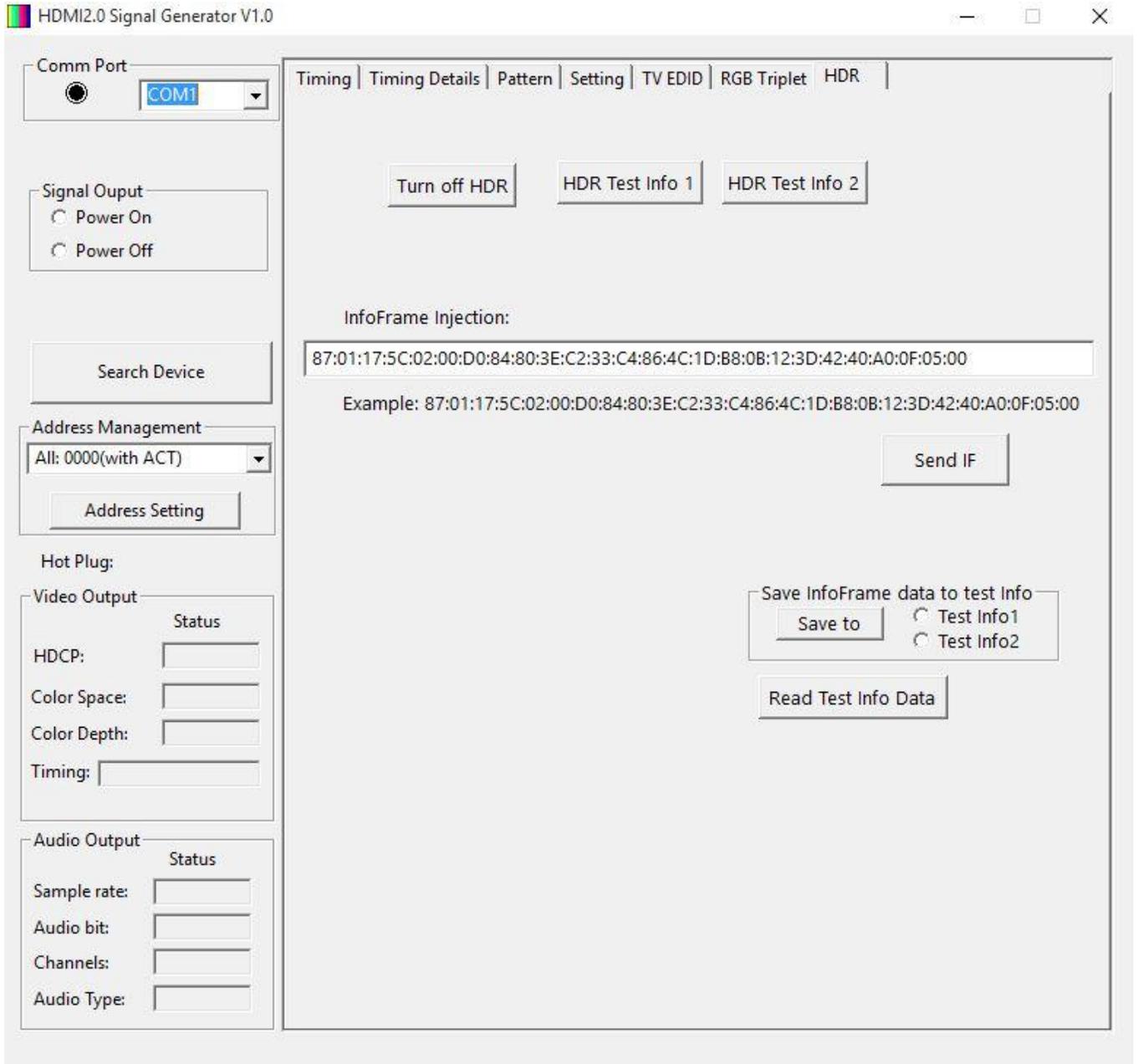
HDR Control Panel

To send and infoframe:

1. Fill in the "infoframe Injection space with the desired metadata.

   a. NOTE: One is provided to you and we are accumulating a database of metadata that is available upon request pending available

2. Now simply press "Send IF" and you should now have the display in HDR Mode.

To store and save an infoframe for to a memory for future use from front panel controls:

1. Follow steps 1 & 2 above to send an Infoframe.

2. Click the radio button next to "Test Info 1" or "Test Info 2" dependent on which memory you would like the infoframe store in.

3. Press the "Save to" Button to store the infoframe.

4. Now you can send this infoframe while not being connected to any form of software

To read and store and infoframe from a display:

1. Connect to the display and generator

2. With this software you can now click "Read Test Info Data"

3. It will pull in a metadata from the display

   a. NOTE: It may not be HDR Metadata and is for testing purposes only.

4. This Metadata may now be stored for later use.

We recommend creating a database of known good info frames for your use.

Using HDR Function on Murideo Fresco SIX-G: Front Panel Controls

Manual operation is well suited for testing video distribution system components prior to installation or for step-by-step diagnostics and to isolate faulty component within an installed system.

Typical manual operation steps:

1. Connect the SIX-G generator to the unit under test using an HDMI cable.

2. Power ON the SIX-G generator using the internal battery or the supplied AC power adapter.

3. Power ON the unit under test.

4. Use the navigation keys of the SIX-G to select the resolution, pattern and HDMI setting desired for testing.

5. The unit under test will display the selected test pattern if it is compatible with the test signal timing and signal parameters. (We recommend a grey step pattern for easy identification of HDR)

6. Use the navigation menu by:

    6.1 Pressing "OK"

    6.2 Navigate to the left through the screens

    6.3 Once you are at HDR you may select one of the stored Infoframes you set up on page 8.

Using HDR Function on Murideo Fresco SIX-G: CalMAN

COMING SOON!

Additional Information:

http://www.dolby.com/us/en/technologies/dolby-vision/dolby-vision-white-paper.pdf

http://www.movielabs.com/md/md/v2.3/Common_Metadata_v2.3-diff-v2.2.pdf

http://www.ericsson.com/res/docs/whitepapers/wp-uhd.pdf

https://www.smpte.org/sites/default/files/2014-05-06-EOTF-Miller-1-2-handout.pdf

Murideo Fresco SIX-G API

A comprehensive API document is available upon request for software developers.

Updating Firmware

Field firmware updates are available via USB port. Firmware updates, when available will be posted on the Murideo.com web site, along with instructions.

FCC Interference and Compliance Statement

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

FCC WARNING

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment

off and on, the user is encouraged to try to correct the interference by one or more ofthe following measures:

•Reorient or relocate the receiving antenna.
•Increase the separation between the equipment and the receiver.
•Connect the equipment into an outlet different from that to which the receiver is connected.
•Consult the dealer or an experienced radio/TV technician for help.

Caution

To comply with the limits for an FCC Class B computing device, always use the shielded signal cord supplied with this unit. The Federal Communications Commission warns that changes or modifications of the unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

CE mark for Class B ITE (Following European standard EN55022/1998; EN61000-3-2/1995; EN61000-3-3/1995,EN55024/1998, EN60950-1/2001)

Radio Frequency Interference Statement Warning: This is a Class B product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

Warranty and Getting Help

General Warranty Terms
AVPro Global Holdings (DBA MURIDEO) offers a 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.

MURIDEO Products Warranty Period

The warranty terms for MURIDEO products are: Domestic & Asia EU & UK

MURIDEO – Fresco Six-G HDMI 2.0, 4K Test Pattern Generator &1 Year & 2 Year
MURIDEO – Prisma Networked Video Processor 1 Year & 2 Year

System Warranty

Call the AVPro Team at –North America 877-886-5112 International +1-605-274-6055

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 except in the cases listed in the Limitation of Liability Clause of this document. 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 websitehttp://http://avpro.r n maportal.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 enclosed within the product package and/or information on http://www.murideo.com/generators.html for important tips on how to operate and troubleshoot the product.

International Warranty

Warranty may be valid when a MURIDEO product is purchased in one country and transferred to another country, without voiding the warranty. Please be advised that service availability and response time may vary from country to country. Warranty is transferrable within the warranty period.

MURIDEO is not responsible for any export and import control issues, handling fees, tariffs, import duties, and all other related fees where owner is responsible for shipping its products. This International Limited warranty does not affect your statutory rights.

Limitation of Liability

MURIDEO reserves the right to refuse warranty service of products under disputable conditions. MURIDEO also holds the rights to declare final decision whether products are within warranty conditions. The following actions and damages will result in voiding the limited warranty:
• 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.

Disclaimer of Warranty

THIS WARRANTY IS EXPRESSED IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY, THE IMPLIED WARRANTY OF FITNESS FOR APARTICULAR PURPOSE AND OF ALL OTHER OBLIGATIONS OR LIABILITIES ON MURIDEO'S PART, AND ITNEITHER ASSUMES NOR AUTHORIZES ANY OTHER PARTY TO ASSUME FOR MURIDEO ANY OTHERLIABILITIES. THE FOREGOING CONSTITUTES THE BUYER'S SOLE AND EXCLUSIVE REMEDY FOR THEFURNISHING OF DEFECTIVE OR NONCONFORMING PRODUCTS AND MURIDEO WILL NOT IN ANY EVENT BELIABLE FOR COST OF SUBSTITUTE OR REPLACEMENT, COST OF

FACILITIES OR SERVICE, DOWNTIMECOSTS, LOSS OF PROFITS, REVENUES OR GOODWILL, RELIANCE DAMAGES, LOSS OF DATA, LOSS OFUSE IF OR DAMAGE TO ANY ASSOCIATED EQUIPMENT, OR ANY OTHER INDIRECT, INCIDENTAL, SPECIAL,OR CONSEQUENTIAL DAMAGES BY REASON OF THE FACT THAT SUCH PRODUCTS WILL HAVE BEENDETERMINED TO BE DEFECTIVE OR NONCONFORMING. THE RIGHTS AND OBLIGATIONS OF THE PARTIES UNDER THIS AGREEMENT SHALL NOT BE GOVERNED BY THE PROVISIONSOF THE 1980 U.S. CONVENTION ON CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS OR THE UNITED NATIONSCONVENTION ON THE LIMITATION PERIOD IN THE INTERNATIONAL SALE OF GOODS, AS AMENDED (COLLECTIVELY, THE"CONVENTIONS"); RATHER, THE RIGHTS AND OBLIGATIONS OF THE PARTIES SHALL BE GOVERNED BY THE LAWS OF THE STATE of SOUTH DAKOTA, INCLUDING ITS PROVISIONS OF THE UNIFORM COMMERCIAL CODE, AS APPLICABLE. FOR THE
AVOIDANCE OF DOUBT, THE CONVENTIONS ARE HEREBY EXCLUDED.

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 longa 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:
http://www.murideo.com/

or call

+1-605-782-2462 for worldwide technical support

MURIDEO Inc.
3518 N Casco Ave
Sioux Falls, SD 57104

Legal notices
MURIDEO® Logos are trademarks or registered trademarks of AVPro Global Holdings, Inc. in the United States or other countries. ISF® and the ISF logo are trademarks or registered trademarks of, and are used under license from, Imaging Science Foundation, LLC. in the United States or other countries.

All other trademarks and registered trademarks are the property of their respective owners in the United States or other countries. The absence of a trademark symbol does not constitute a waiver

of Silicon Image's trademarks or other intellectual property rights with regard to a product name, logo or slogan.