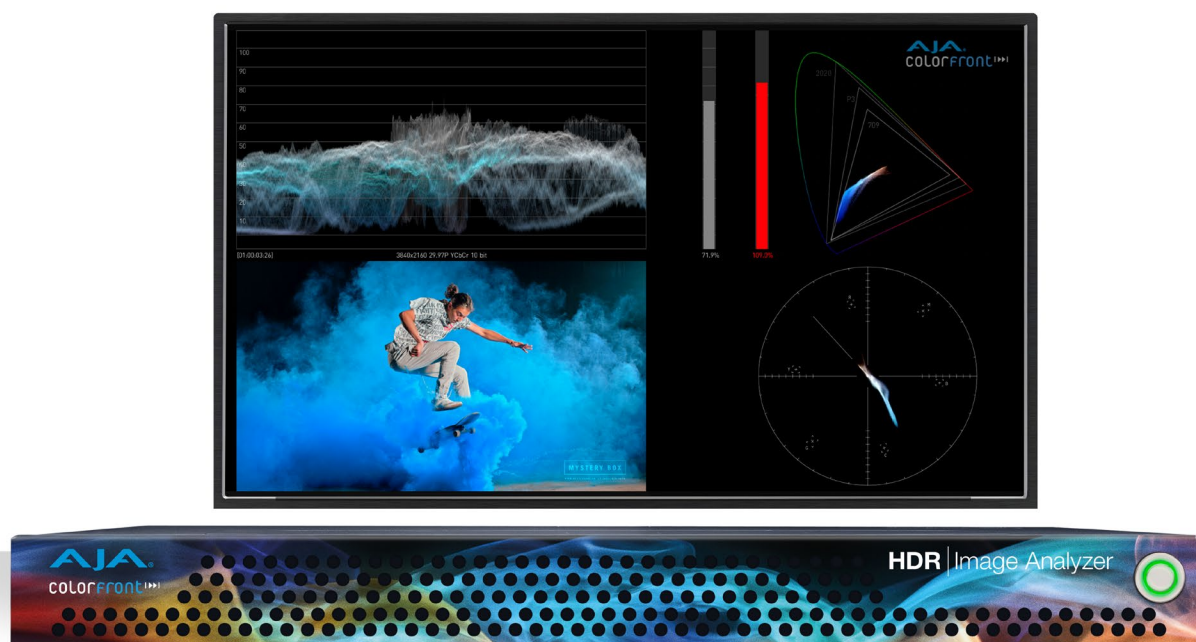


HDR Image Analyzer

HDR Monitoring Solution



Installation and Operation Guide

Version 1.0r3
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colorfront

AJA
VIDEO SYSTEMS

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When calling for support, have all information at hand prior to calling. To contact AJA for sales or support, use any of the following methods:

Telephone	+1.530.271.3190
FAX	+1.530.271.3140
Web	https://www.aja.com
Support Email	support@aja.com
Sales Email	sales@aja.com

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Chapter 1 – Introduction

Overview

AJA's HDR Image Analyzer simplifies monitoring and analysis of 4K/UltraHD/2K/HD, HDR and WCG content in production, post, quality control (QC) and mastering. Tools include waveform, histogram, and vectorscope displays and Nit-level HDR monitoring.

Combining AJA's production-proven and powerful video and audio I/O with HDR analysis tools from Colorfront in a compact 1RU chassis, the HDR Image Analyzer offers a flexible solution for monitoring and analyzing HDR formats including PQ (Perceptual Quantizer), Hybrid Log Gamma (HLG) and Rec.2020 for 4K/UltraHD workflows. Colorfront has exclusively licensed its Colorfront Analyzer software to AJA.

Software Features

- Precise, high quality UltraHD UI for native-resolution picture display
- Advanced out of gamut and out of brightness detection with error tolerance
- Support for SDR (Rec.709), ST2084/PQ and HLG analysis
- CIE graph, Vectorscope, Waveform
- Out of gamut false color mode to easily spot out of gamut/out of brightness pixels
- Data analyzer with pixel picker
- Up to 4K/UltraHD 60p over 4x 3G-SDI inputs
- SDI auto signal detection
- File base error logging with timecode
- Display and color processing look up table (LUT) support
- Line mode to focus on a single horizontal line as the region of interest
- Loop through output to broadcast monitors
- Still store
- Nit levels, audio levels, and phase metering
- Built-in support for color spaces (including camera colorspace)

Hardware Features

- One RU height chassis
- Hot swappable redundant power supplies
- Four DisplayPort outputs
- Four USB 3.0 connectors
- Two Network Interface Cards
- Three year warranty

Chapter 2 – HDR Image Analyzer Hardware

Overview

AJA's HDR Image Analyzer is a 1RU hardware appliance equipped with AJA input and output. The system is designed for immediate use, automatically powering up to the Colorfront Analyzer application.

Chassis Front

Figure 1. HDR Image Analyzer Chassis Front View

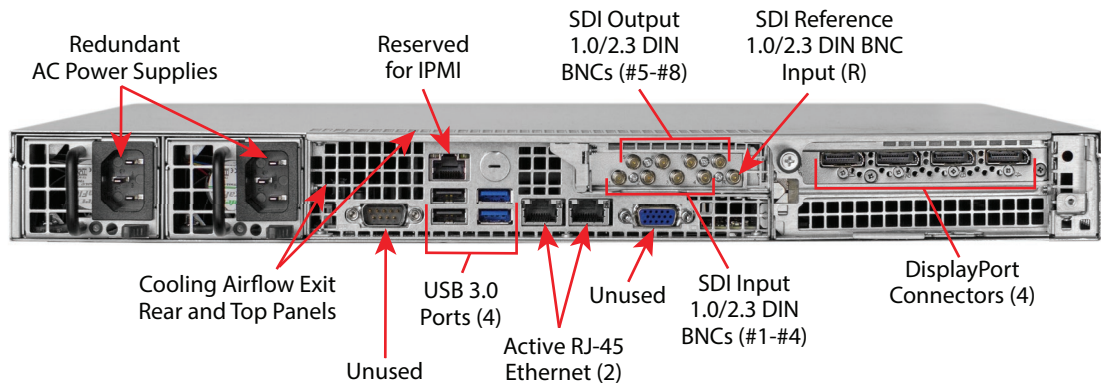


Chassis Power Button

The main power switch is used to apply or remove power from the power supply to the system. Turning off system power with this button removes the main power but keeps standby power supplied to the system. Therefore, you must unplug all system power cords before servicing.

Chassis Rear

Figure 2. HDR Image Analyzer Chassis Rear View



Rear Panel Power Supply LEDs

On the rear of each power supply module an LED indicates its status as follows.

- Solid Green: When illuminated, indicates that the power supply is on.
- Solid Amber: When illuminated, indicates the power supply is plugged in and turned off, or the system is off but in an abnormal state.
- Blinking Amber: When blinking, this system power supply temperature has reached 63°C. The system will automatically power-down when the power supply temperature reaches 70°C and restarts when the power supply temperature goes below 60°C.

Chapter 3 – System Installation

Installation Summary

1. Unpack the shipping box, removing the HDR Image Analyzer, two power cords, and nine BNC adapter cables.
2. Mount the physical chassis as desired, using the provided sliding rails. Cooling airflow enters the chassis from the front, and exits from the rear and top panels. Do not obstruct these air vents.
3. Connect the two HDR Image Analyzer power cords to mains AC. For redundancy, use both power supplies and connect them to separate branch circuits so that the HDR Image Analyzer will continue to operate even if a circuit breaker opens on one branch.
4. Connect a computer monitor (user supplied) to one of the rear DisplayPort ports.
5. Connect a keyboard and mouse (user supplied) to available rear USB 3.0 connectors.
6. Connect the 1.0/2.3 DIN to full-size BNC adapter cables to the HDR Image Analyzer inputs and output connectors.
7. Connect the HDR Image Analyzer inputs to your video source, and outputs to your mastering display monitor, if used.
8. Power up the chassis. The system will boot up to the Analyzer application.

Hardware Installation

Shipping Box Contents

An HDR Image Analyzer is shipped with two AC power cords. Rackmount brackets are provided as part of the chassis.

As you unpack the shipping box, carefully examine the contents. Ensure you received everything and that nothing was damaged during shipment. If you find any damage, immediately notify the shipping service and supply them with a Description of the damage. AJA will repair or replace damaged items.

If you find shipping damage, contact your AJA dealer or distributor for details on how to have your HDR Image Analyzer repaired or replaced.

NOTE: Save packing materials and the shipping box. If your HDR Image Analyzer ever requires service or you move your system, use the packaging materials and box for safe shipment.

Rack Mounting the Chassis

Install the HDR Image Analyzer chassis into a standard 19-inch wide equipment rack, allowing space for cooling airflow. The chassis occupies only one vertical rack unit.

Two rack rail assemblies are included in the rack mounting kit. Each assembly consists of two sections: an inner fixed chassis rail that secures directly to the server chassis and an outer fixed rack rail that secures directly to the rack itself.

The rail assemblies are shipped with rack adapters installed for use with IT (square hole) style rack frames. For IT racks, simply slide the unit into place, as the rails will lock automatically. For use with a standard round hole rack frame, you will need to remove the adapters using a small Philips head screwdriver.

Network Configuration

The HDR Image Analyzer ships configured for DHCP operation. If your facility uses DHCP, simply connect one of the active Ethernet RJ-45 connectors to your network.

To manually configure your HDR Image Analyzer's IP addresses, on the Analyzer application press the Tab key on the keyboard when no dropdown menu is visible to open the Settings screen, and select NETWORK.

See "[NETWORK Tab](#)" on [page 33](#) for more information.

Initial System Startup

On initial system startup, no login is required, but you will need to accept EULA for Microsoft and NVidia. EULA is displayed on the first startup and after every update.

Software Update

AJA's HDR Image Analyzer ships with Colorfront's Analyzer software preinstalled with the latest version.

Updates to the software are available at:

<https://www.aja.com/products/support/hdr-image-analyzer>

To update HDR Image Analyzer software:

1. Download the .zip file and extract and copy the .ajas file to a USB stick.
2. Insert the USB stick into a rear USB port on the HDR Image Analyzer chassis.
3. Go to Help > Update Analyzer.
4. Select the downloaded .ajas file and click Select File.
5. The software will be installed, and when complete the message "Preparation Complete, please restart Analyzer" appears.
6. Click on the Analyzer > Application Restart menu item to complete the update.

Licensing

The HDR Image Analyzer comes with an internal license already activated. No user involvement is required for licensing.

NOTE: The Help > License Utility menu is for future use.

Chapter 4 – HDR Image Analyzer GUI

Overview

HDR Image Analyzer is a real time video analyzer for QC, Mastering, Grading and Broadcast. The simple, easy to use graphical user interface features unique options designed specifically for HDR work. When the HDR Image Analyzer hardware starts up, the GUI automatically launches.

Views

The Analyzer uses screen layouts with either a Quadrants view or Single view.

Figure 3. Quadrants View Example (Default)

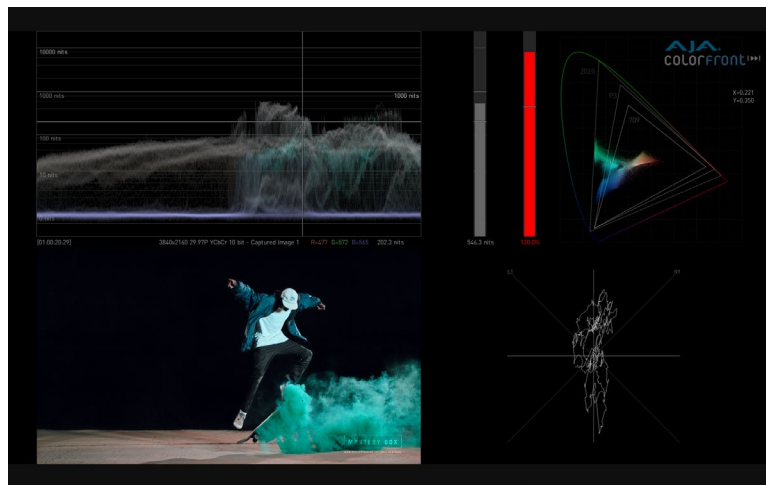
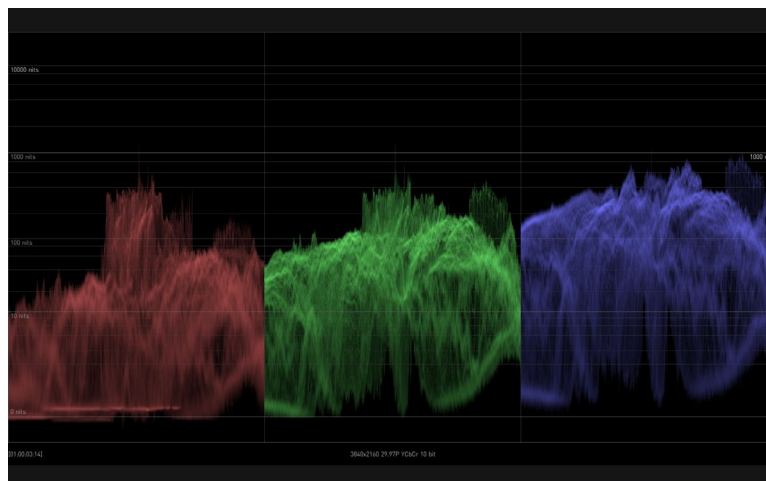


Figure 4. Single View Example, Waveform RGB Color

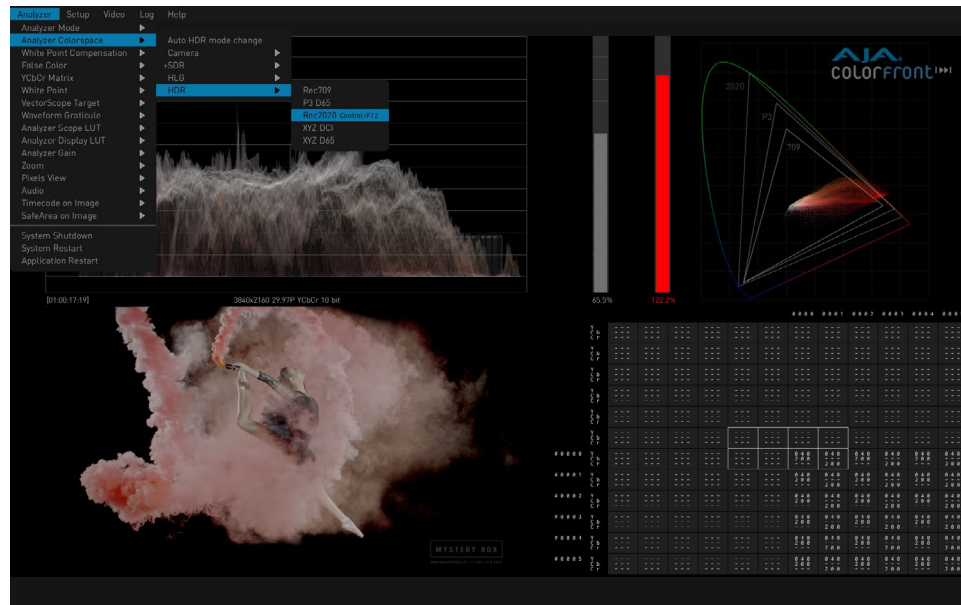


Drop-Down Menu Navigation

A top menu bar appears when the cursor is moved to the top of the screen. These menus can be used to select layouts and configure settings. Clicking on a menu name opens that menu.

Pressing the ESC key also displays the Drop-Down menus.

Figure 5. Selecting Colorspace Using Drop-down Menu



When a drop-down menu is displayed:

- The currently selected setting is indicated with a (+) in front of that menu item.
- The left and right arrow keys can be used to move to an adjacent menu, or open an additional parameter menu for the current menu selection.
- The up and down arrow keys moves the selection up or down that drop-down menu.
- Pressing the TAB key selects the next drop-down menu to the right. Shift TAB moves the drop-down menu selection to the left.

NOTE: When the menu bar is not displayed, the TAB key opens the Settings screen. See ["Settings Screen" on page 32](#) for more information.

Selecting Views with the Keyboard

When a drop-down menu is not open, computer keyboard function keys can also be used to activate the layouts.

Table 1. Analyzer Mode Shortcuts

Function Key	Activated Layout
F1	Show Single View video image
F2	Show Single View Waveform
F3	Show Single View Gamut
F4	Show Single View Vectorscope
F5	Show Quadrants with Audio (either Phase or Level)
F6	Show Quadrants with Color Picker
F7	Show Quadrants with Vectorscope
F8	Show Quadrants with Log
F9	Show Quadrants with Info Page

The following shortcuts, using the CTRL key, also affect the current view.

Shortcut	Waveform/Histogram Display
CTRL+F1	Select Luminance Waveform
CTRL+F2	Select Luminance Waveform with Colors
CTRL+F3	Select Color Waveform
CTRL+F4	Select RGB Color Waveform
CTRL+F5	Select RGB Waveform
CTRL+F6	YCbCr Waveform
CTRL+F7	Select YRGB Waveform
CTRL+F8	Select Histogram Luminance
CTRL+F9	Select Histogram Color

In addition, the following useful shortcuts are available:

Shortcut	Color Space Setting
CTRL+F10	Sets Color Space to SDR Rec 709
CTRL+F11	Sets Color Space to HLG Rec 2020
CTRL+F12	Sets Color Space to HDR Rec 2020
CTRL+space	Toggles Single Line Mode ON and Off

Keystrokes for each shortcut are listed in the drop-down menus. See "[Chapter 6 Menu Reference](#)" for a complete listing of all keyboard shortcuts.

Analyzer Modes

The waveform, histogram, and vectorscope are a form of oscilloscope and are used to monitor video brightness, contrast, hue, and color saturation.

- The waveform displays the luminosity or brightness and contrast of the pixels in the video frame, with the top of the y-axis indicating a high luminosity level, and the bottom indicating a low luminosity level.

NOTE: Waveform views can be magnified 4x using the Waveform Zoom control. Use the mouse to move up and down the display.

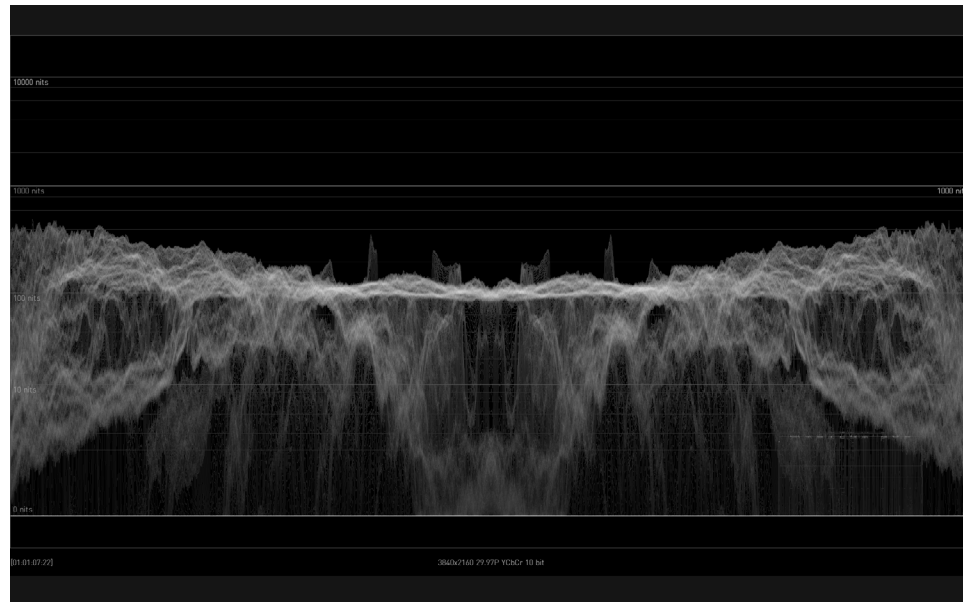
- The histogram shows the number of pixels in relation to a given list of luminance, or colors in a specific color space.
- The vectorscope displays values for hue and color saturation. The color saturation of each pixel in the video frame is shown, with the middle of the circle indicating a lower saturation level, and the edge of the circle indicating a higher saturation level. Hue is represented by placement in the 360 degree angle of the circle.

NOTE: The Vectorscope view can be displayed at either a 75% or 100% size (the percentage changes the graticules on the Vectorscope, not the rasterized image), and can be magnified with the Vectorscope Zoom control.

- The gamut screen shows a CIE xy gamut graph reporting the color values present in the image, with a graticule showing the limits for various standards (709, P3, 2020).

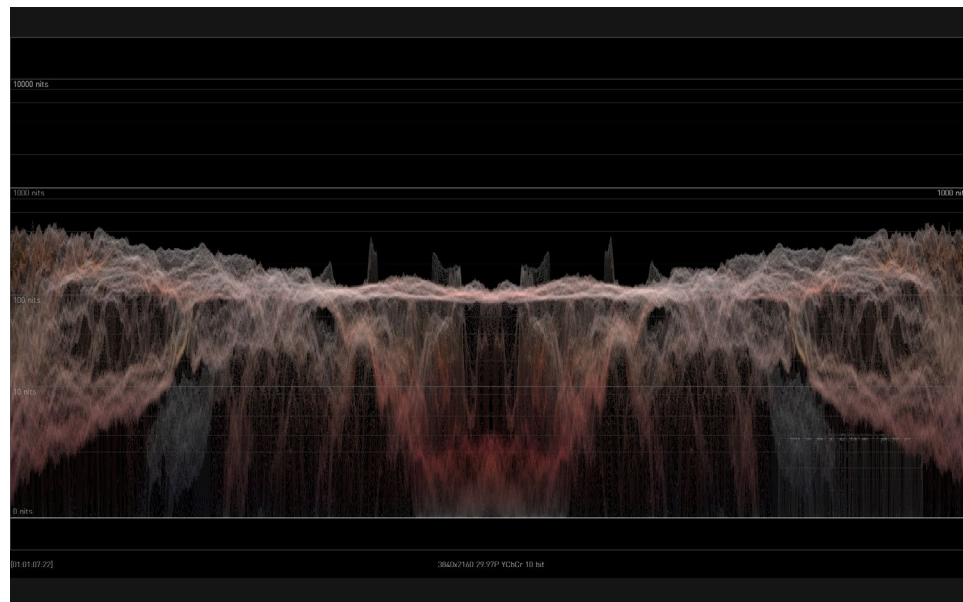
Several Analyzer view modes are available.

Figure 6. Waveform Luminance Mode



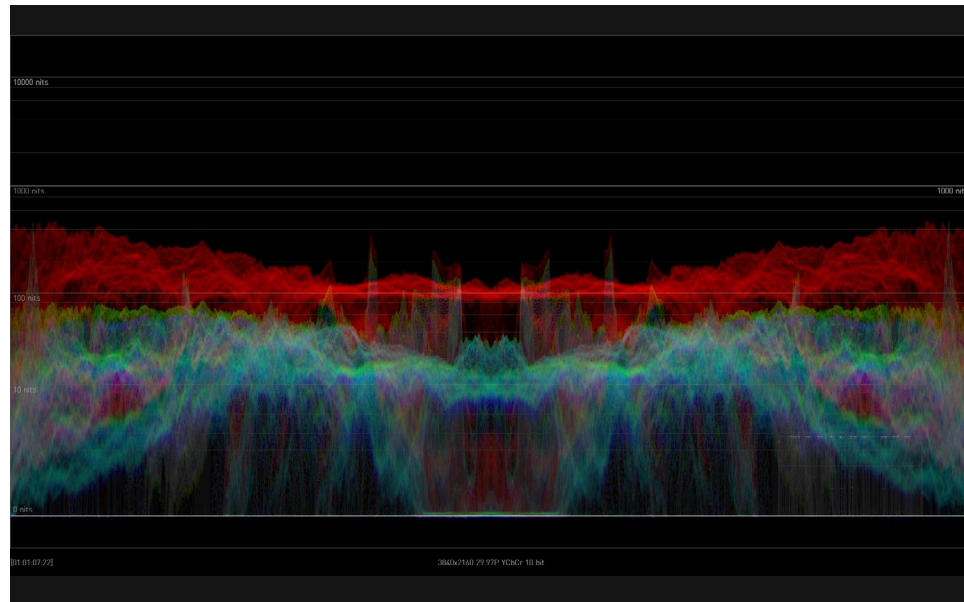
Waveform showing only luminance (Y) and no color information. Each pixel on the graph shows the frequency of the corresponding luminance value in the given column. Higher luminance value means lighter image content, lighter pixel means higher frequency of that luminance value.

Figure 7. Waveform Lumi Color Mode



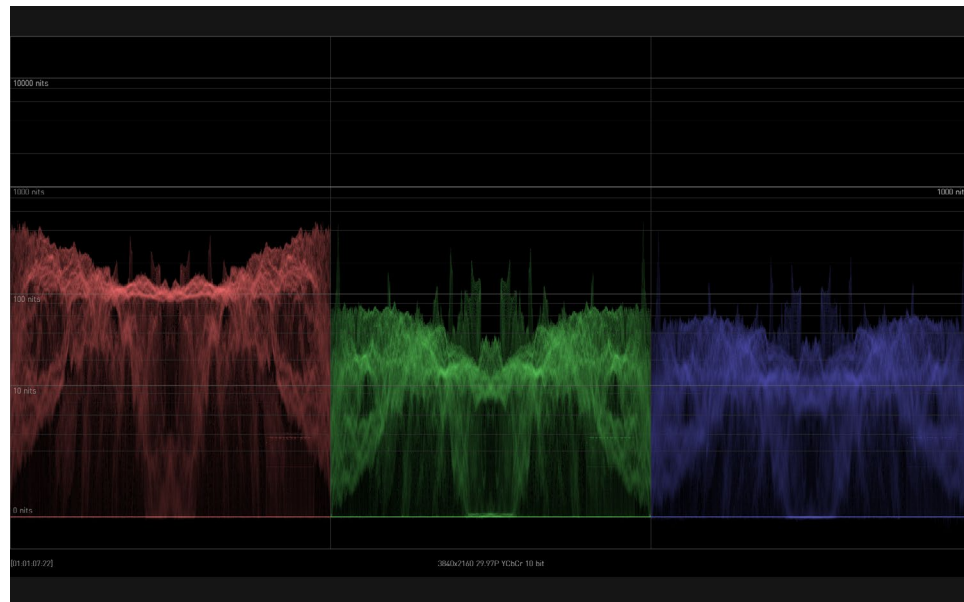
Waveform showing both luminance and color information. Here, in addition to the Waveform Luminance mode, the graph is colored according to color information. The hue and saturation of a pixel shows the sum of the dominant colors having the corresponding luminance value.

Figure 8. Waveform Color Mode



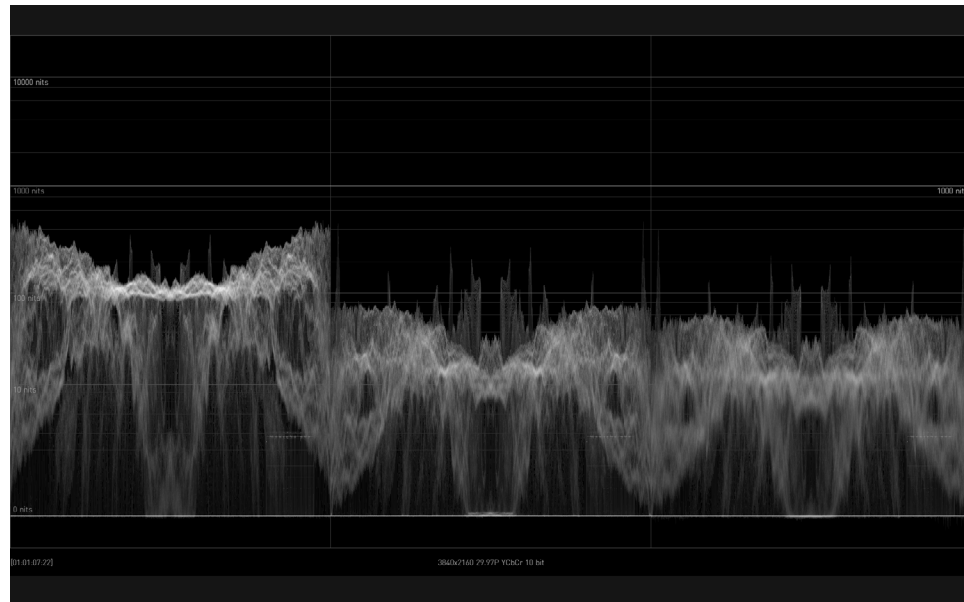
Waveform showing the RGB channels superposed in one graph.

Figure 9. Waveform RGB Color Mode



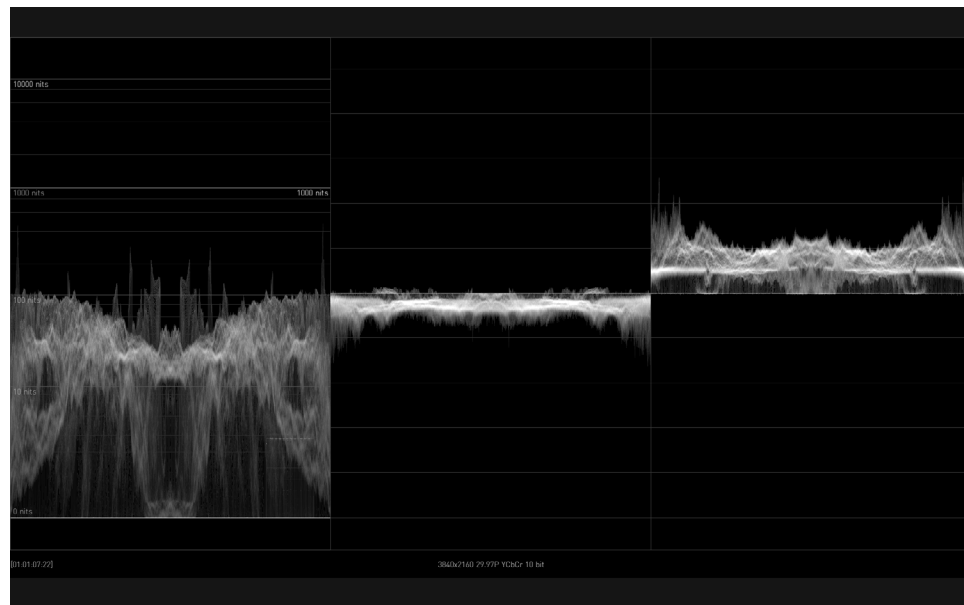
Waveform showing the RGB channels in a split view, where each graph is shown in its respective color.

Figure 10. Waveform RGB Mode



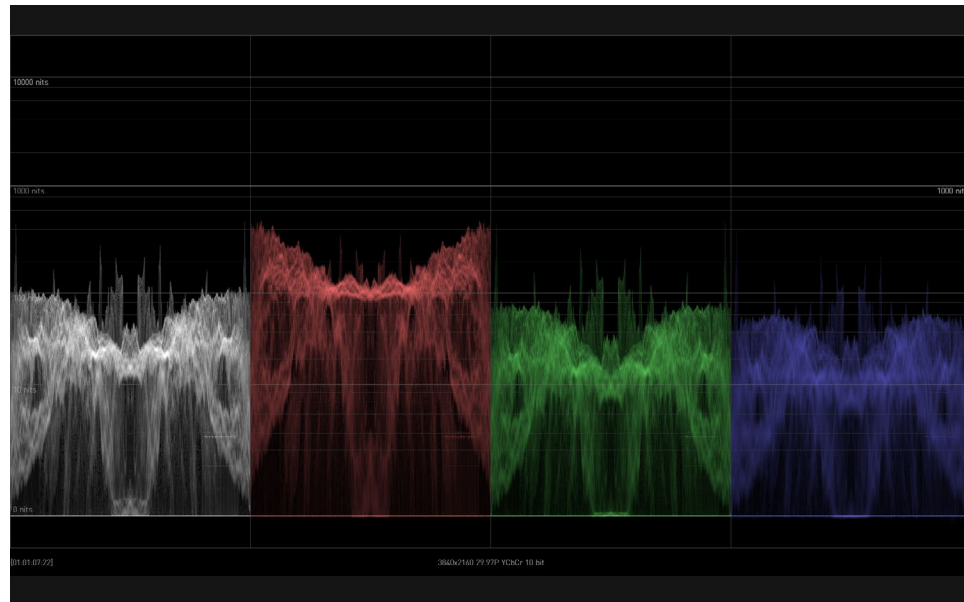
Waveform showing the RGB channels in a split view, where each graph is shown in monochrome.

Figure 11. Waveform YCbCr Mode



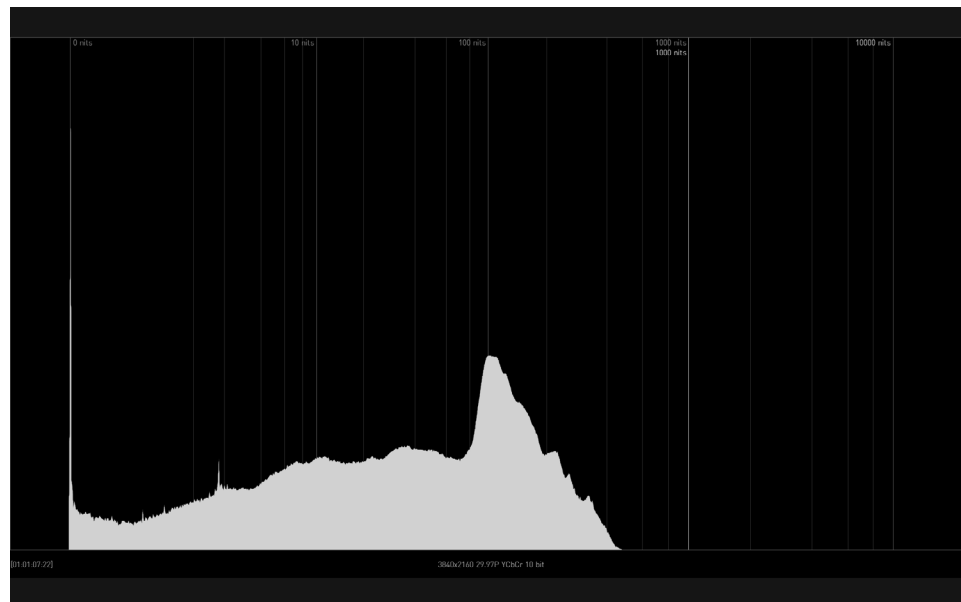
Waveform showing luma (Y), blue minus luma (Cb), and red minus luma (Cr) in a split view.

Figure 12. Waveform YRGB Mode



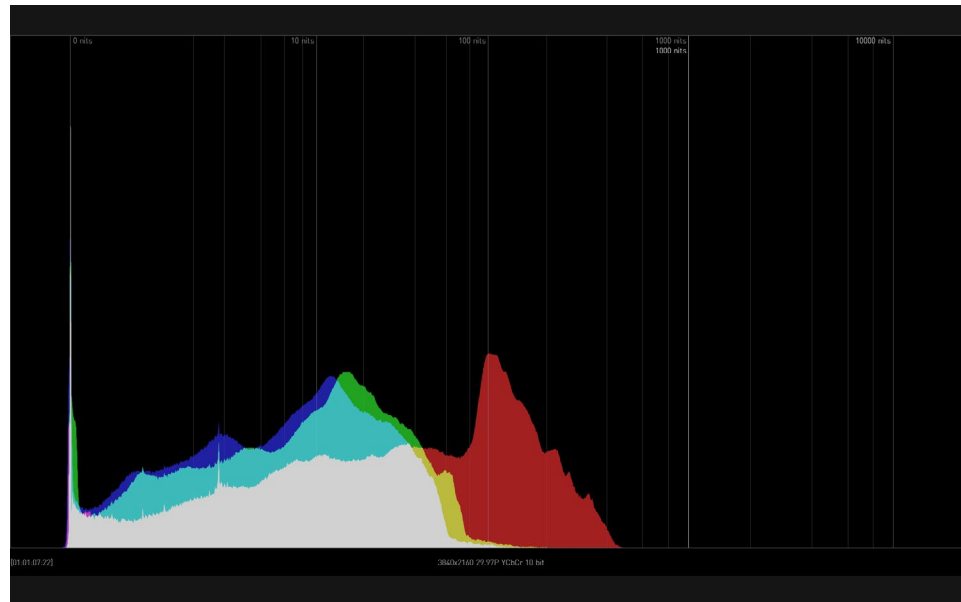
Waveform showing luminance and RGB channels in a split view, where each color channel graph is shown in its respective color.

Figure 13. Histogram Luminance Mode



Histogram Luminance is showing the frequency of luminance values throughout the current image content. Left-hand part is for darker, right-hand part is for lighter image content.

Figure 14. Histogram Color YCbCr Mode



Histogram Color showing the frequency of RGB channel values throughout the current image content, superposed. For each channel, the left-hand part is represents image content for "0" or Black, while right-hand part represents image content for "1" and White. The 0-1 range is a scale, also represented as code values: (0 = 0,0,0 and 1 = 1023,1023,1023) in 10 bit code value for R, G & B.

Figure 15. Vectorscope Mode with markers indicating 75% values

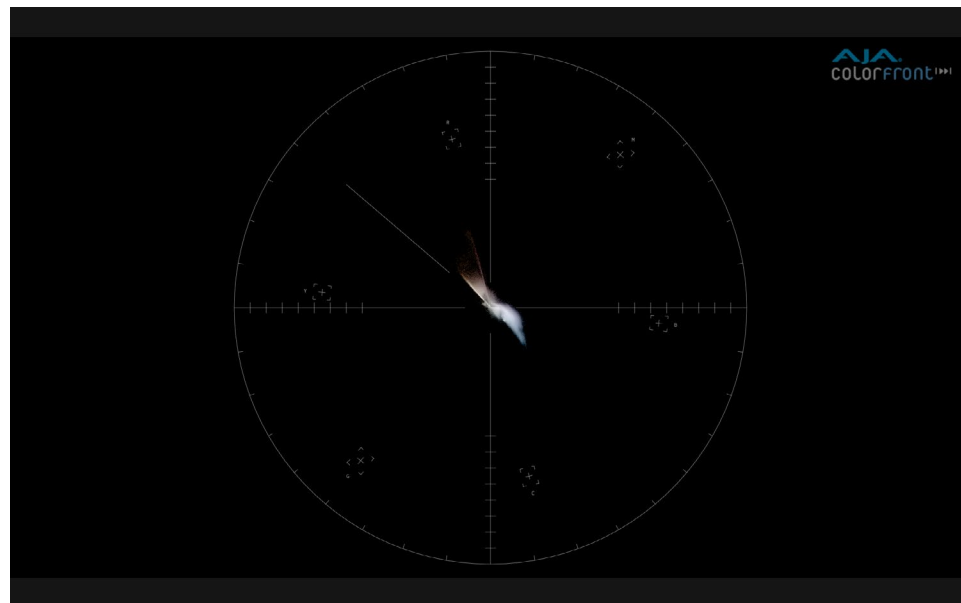
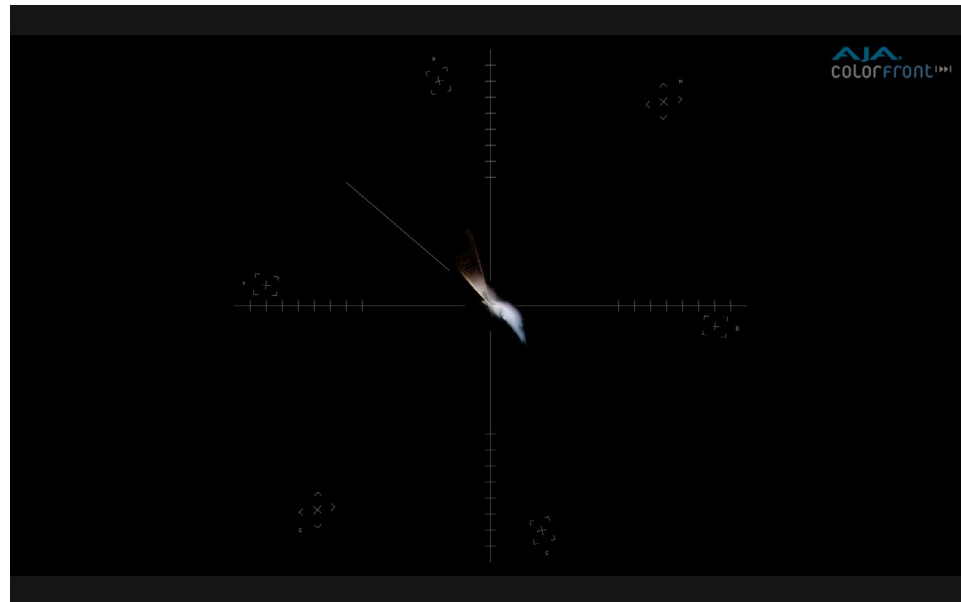


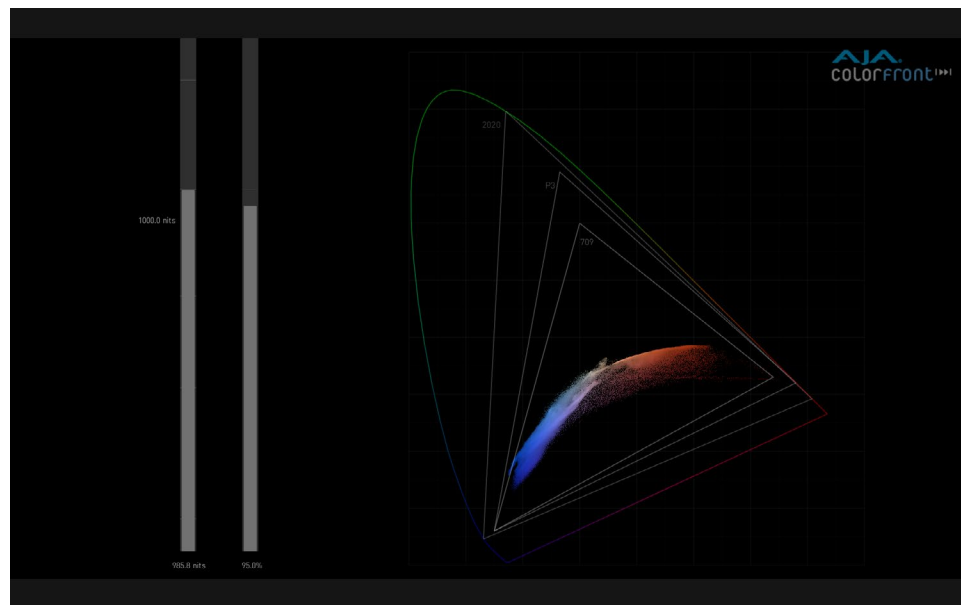
Figure 16. Vectorscope Mode with markers indicating 100% values



Vectorscope is showing the hue and saturation of all pixels throughout the current image content. The middle of the circle indicates a lower level of saturation, while the edge of the circle indicates a higher level of saturation. The brightness of the graph shows the frequency of the respective color in the image content.

NOTE: A skin tone line is also available on the Vectorscope graticule, adjustable using the Skin Tone X and Y controls in the Settings menu.

Figure 17. Gamut Mode (CIE xy Graph)



This mode displays a CIE xy Gamut, showing various output referred color gamut standard limits, and also has Brightness and Gamut bars.

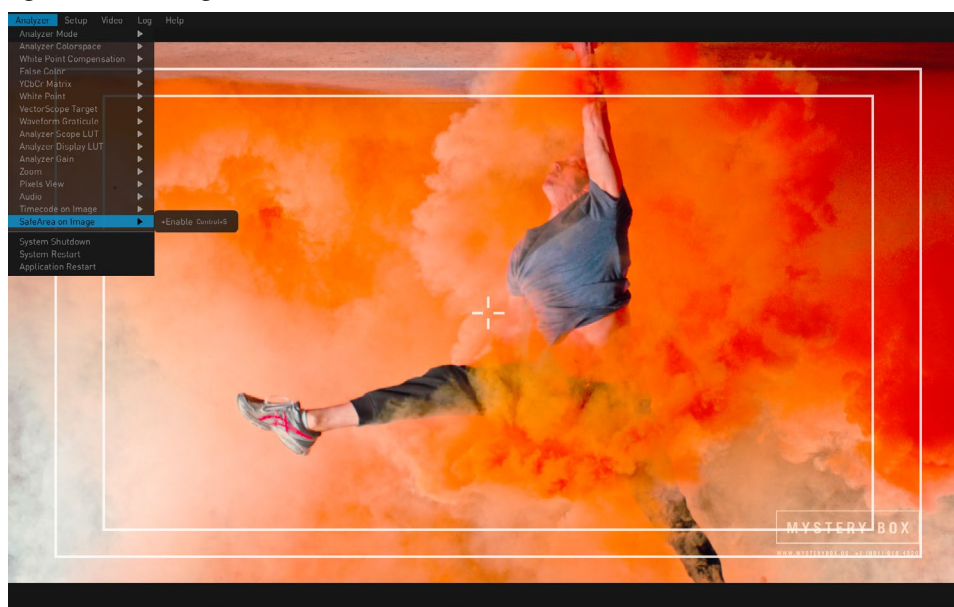
Brightness and Gamut Bars

This view also contains two bars: the brightness bar on the left indicates the brightest pixel detected, the gamut bar on the right shows if the colors are within the legal color gamut. The maximum values are calculated using the Tolerance parameters available in the Settings Screen. The P3 color space is the limit.

Framing Guides

HDR Image Analyzer supports two framing guides, Safe Title and Safe Action. Enabling "Safe Area on Image" displays the guides configured in the SAFEAREA sub-page of the Settings screen. You can display either the Safe Title, Safe Action, or both boundaries. The CTRL+s hotkey combination enables and disables the framing guide display.

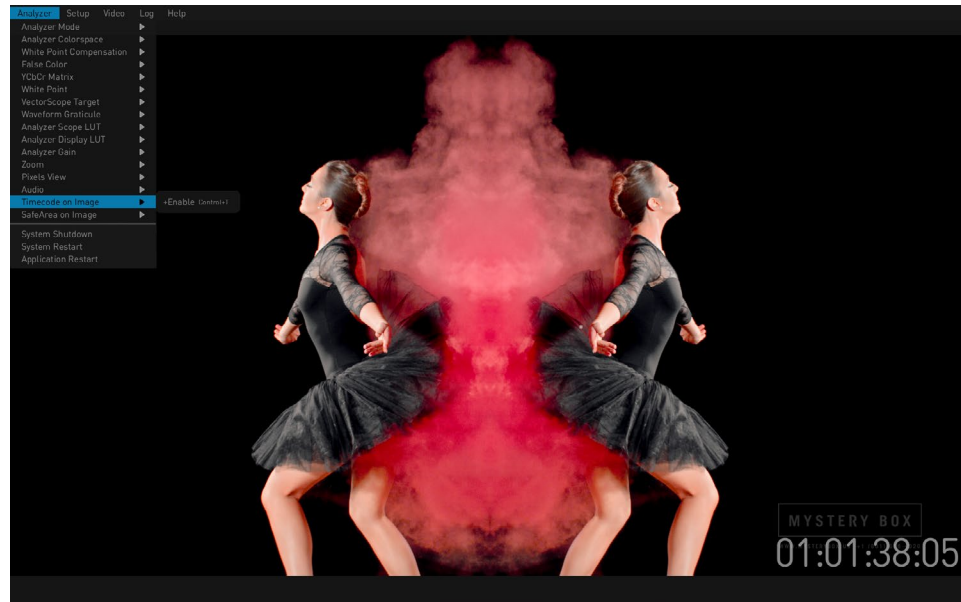
Figure 18. Framing



Timecode on Image

The timecode is captured from several areas including the SDI and may be displayed on the image by selecting the Window › Timecode on Image menu option.

Figure 19. Timecode on Display Image



Lower Right Quadrant Displays

The lower right quadrant of the HDR Image Analyzer GUI can display audio information, a Pixel Picker, Log data, or Incoming Video Signal Info Page.

When in a quadrant mode, Gamut information is displayed in the upper right quadrant.

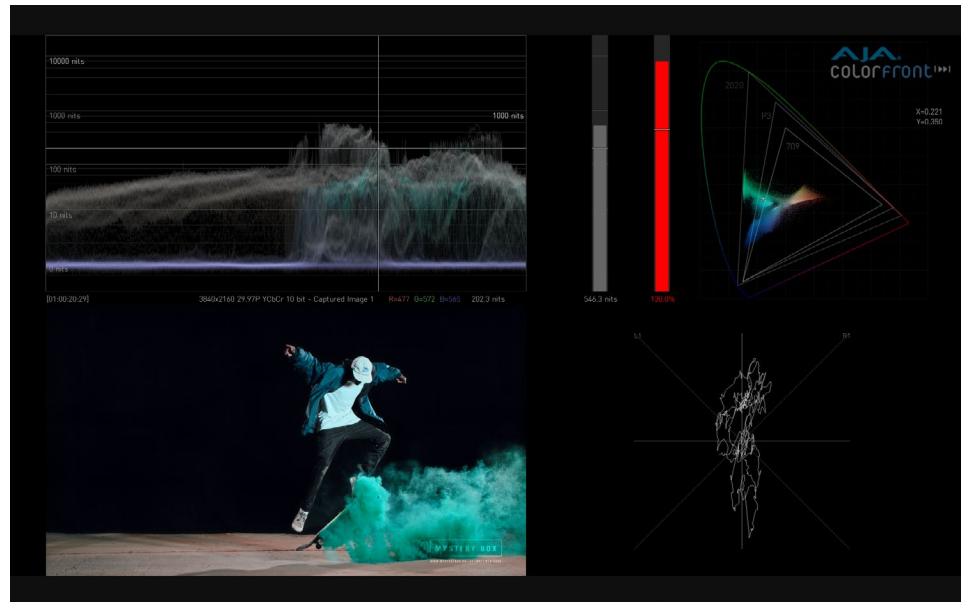
Audio Monitoring

The lower right quadrant of the HDR Image Analyzer GUI can display audio information.

Audio Phase Meter

Analyzer supports an audio phase meter which can be configured to display either two channel (stereo) or eight channel (surround) audio. When configured to display two channels, channels 1-2, 3-4, 5-6, or 7-8 may be displayed. When configured to display 8 channels, channels 1-8, or 9-16 may be displayed.

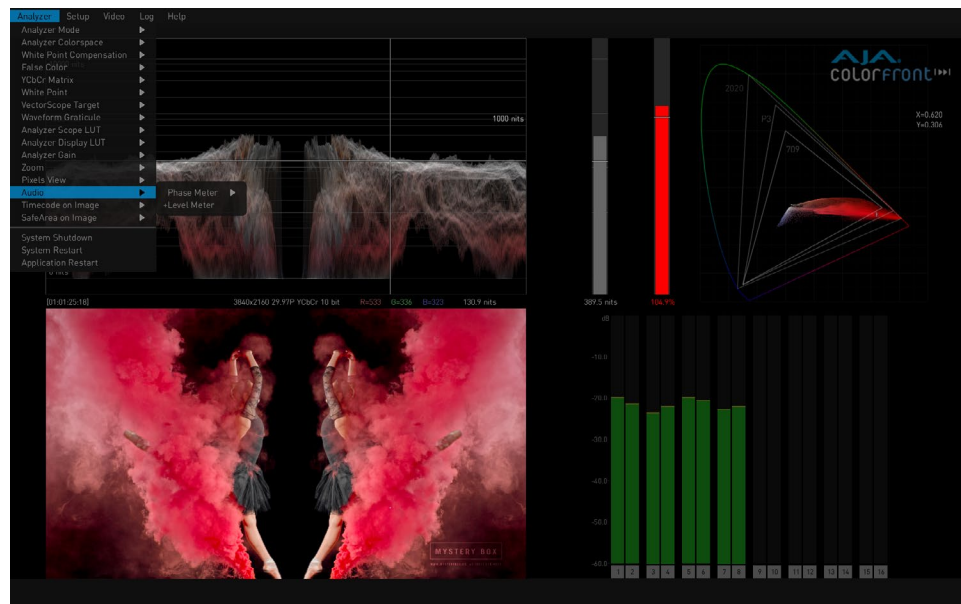
Figure 20. Audio Phase Meter



Audio Level Meter

Analyzer supports an audio level meter with up to 16 channels which can be used to monitor audio levels and also display peak DB levels.

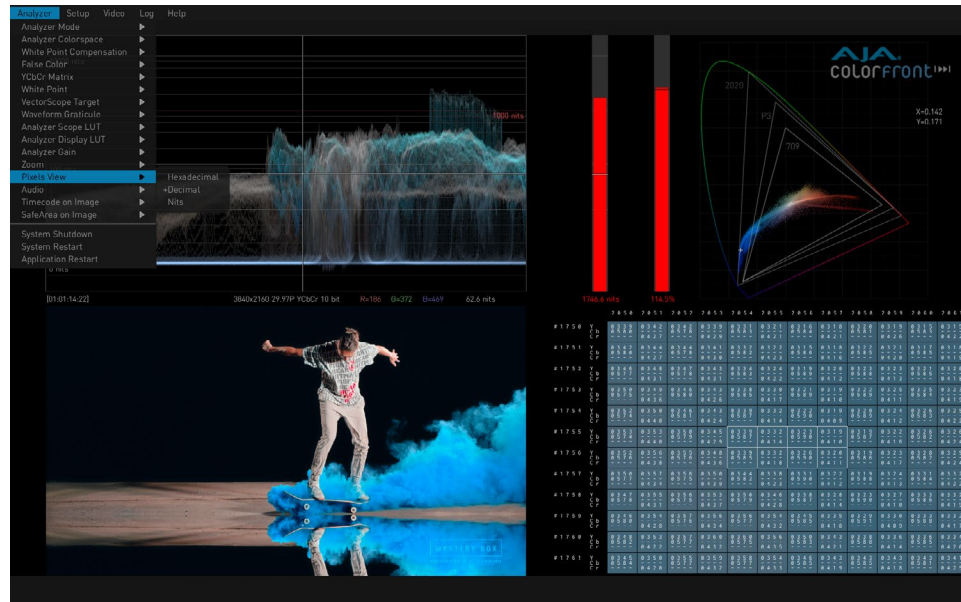
Figure 21. Audio Level Meter



Pixel Picker

The lower right quadrant of the HDR Image Analyzer GUI can display the Pixel Picker information. See ["Pixel Picker" on page 29](#) for more information

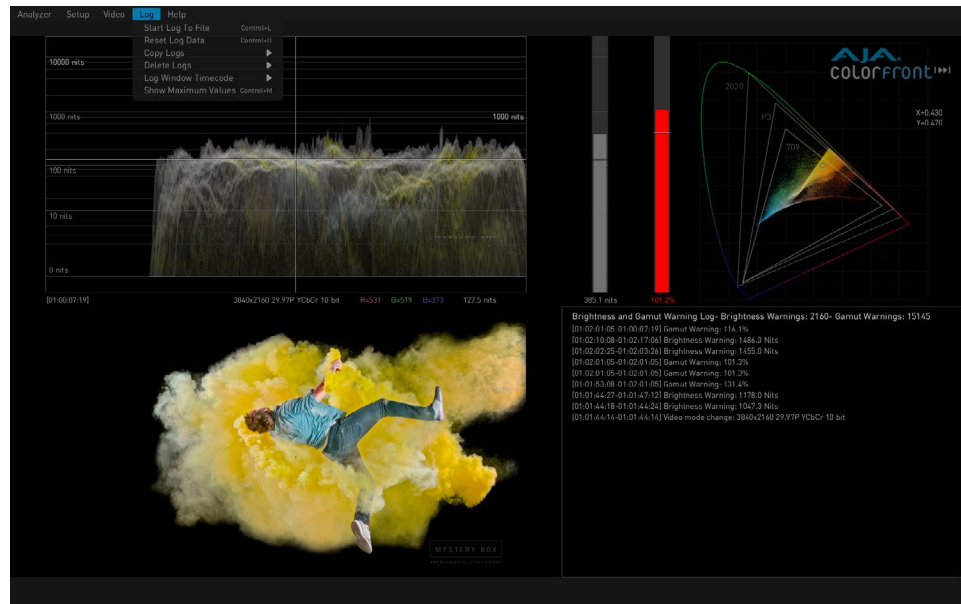
Figure 22. Pixels Quadrant View



Log Data

Selecting "Combined with Log" displays the current log data. This information can be saved to log files. See ["Logging" on page 32](#) for more information.

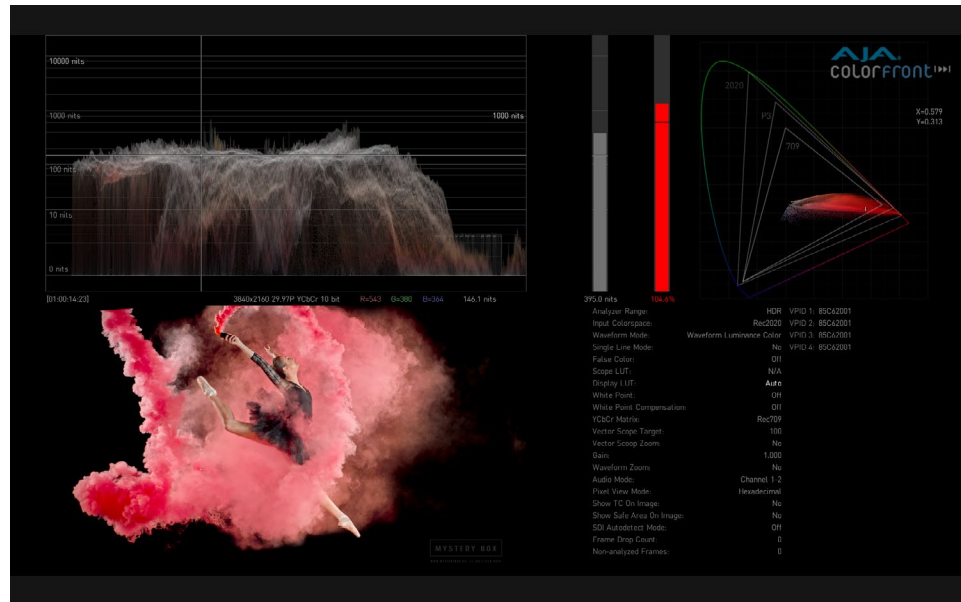
Figure 23. Log Data Quadrant View



Info Page

Selecting "Combined with Info Page" displays useful information about the current HDR Image Analyzer settings.

Figure 24. Info Page Quadrant View



Other Features

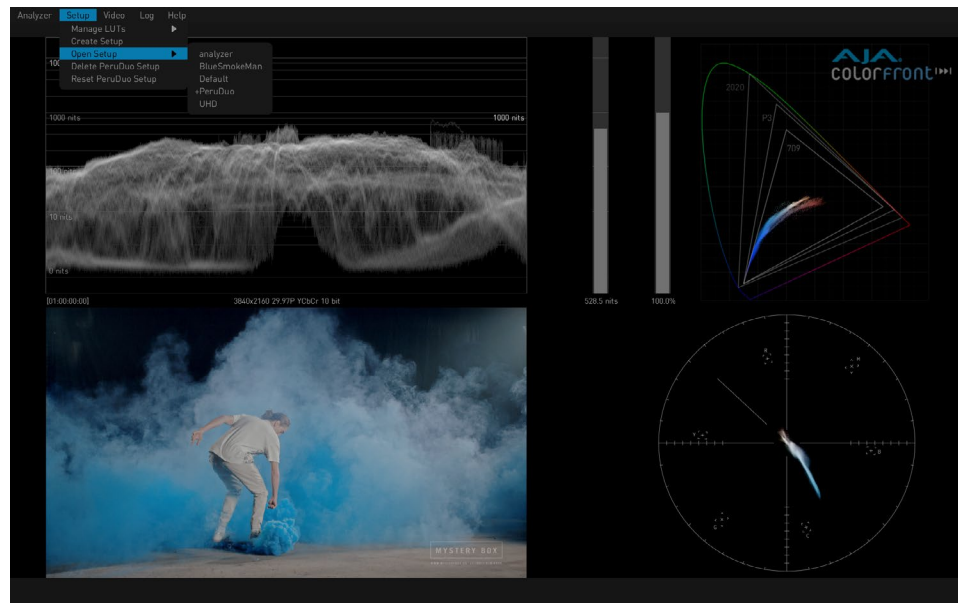
Other configuration options are available in the various HDR Image Analyzer menus. See "[Chapter 6 Menu Reference](#)" for additional information.

Chapter 5 – Using HDR Image Analyzer

HDR Image Analyzer Setups

The top menu bar Setup menu is used to create, select, and save Setups of views and parameter settings.

Figure 25. Setup Menu



Setups are always updated with the currently selected settings. If you want to retain the current settings of a Setup, after the Setup has the desired settings create or load a different Setup. Then any subsequent parameter changes made will be applied to that new Setup. When you open the original Setup in the future it will have all the desired settings.

Create Setup

Opens a window to name and create a setup of the current settings.

Open Setup

Displays a list of the current setups for selection.

Delete Setup

When a Setup has been opened, you can delete it with this choice. The default “analyzer” setup then gets loaded.

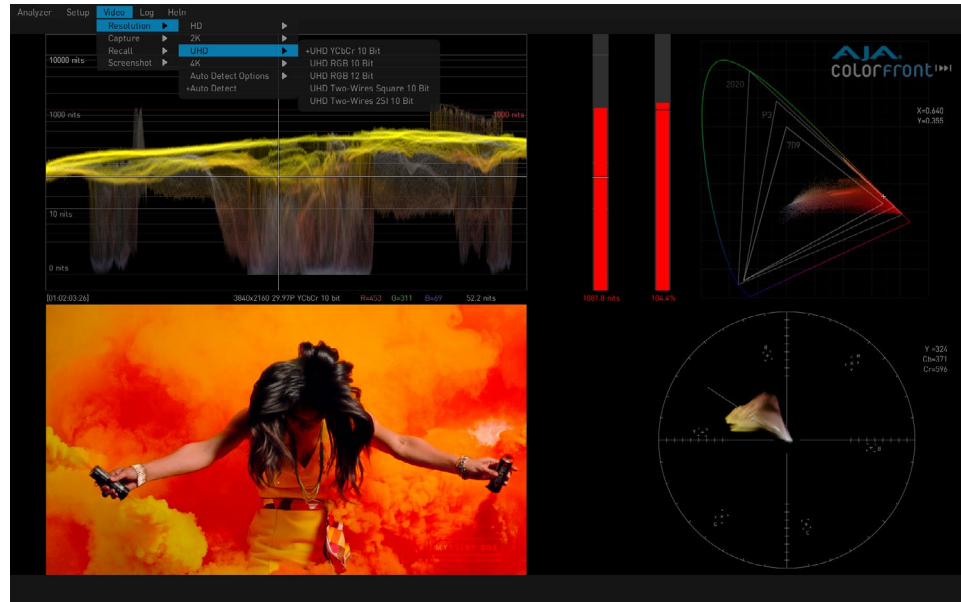
Reset Setup

Resets the current Setup to factory default values.

Video Menu

The top menu bar Video drop-down menu is used to define the characteristics of the video signal being analyzed, and can be used to capture and recall still video images for detailed analysis.

Figure 26. Video Menu



Resolution

Drop-down menus permit selecting HD, 2K, UltraHD, or 4K resolution and related settings to manually match the incoming video being analyzed.

Auto Detect Options

The Auto Detect Options setting is used to make the HDR Image Analyzer automatically select the number of incoming video signals to be used, depending on the detected video, or to force the use of only the first BNC input connector, or force the use of all four input connectors. The auto detection is based on the VPID video payload identifier (SMPTE 352M).

Auto Mode - HDR Image Analyzer automatically detects incoming video and uses either one link, or four links as appropriate.

Forced 1x SDI Connection Mode - Forces use of only BNC input connector one.

Forced 4x SDI Connection Mode - Forces use of all four input BNC connectors.

Auto Detect

The incoming video is examined and matching settings are applied. The Auto Detect Options above can be used to force single or four link connection mode. The auto detection is based on the VPID video payload identifier (SMPTE 352M).

2SI LFR and HFR Input

For LFR (Low Frame Rate) 2SI video the Analyzer only uses SDI input 1 and 2 (four wire LFR 2SI is not supported at this time).

For HFR (High Frame Rate) 2SI video all 4 SDI inputs are used.

Capture

Captures the current video image. Up to four frames can be captured.

NOTE: Captured images are volatile, and will be lost when the HDR Image Analyzer is turned off.

Recall

Recalls the selected captured video image for display and detailed analysis.

Screenshot

The Screenshot menu lets you capture the current Analyzer UI screen displayed on the connected computer, complete with all the current analysis values. Screenshots are saved as .png files to the local host computer, and can then be copied into a different folder (for example an attached USB flash drive).

Save Screenshot

Captures the current Analyzer UI screen. You can also use the CTRL+e hotkey.

Copy Screenshots

Copy All Screenshots - Opens a file browser window allowing you to select the drive and folder into which all the currently captured screenshots will be copied.

Copy Today's Screenshots - Copies only the screenshots captured today.

Copy All Except Today's Screenshots - Copies all captured screenshots except those captured today.

Delete Screenshots

Delete All Screenshots - Deletes all currently captured screenshots. Does not affect screenshot files that have been copied into another folder.

Delete Today's Screenshots - Deletes only the screenshots captured today.

Delete All Except Today's Screenshots - Deletes all captured screenshots except those captured today.

Analyzer Color Space and Range

You can find the analyzer range configuration options in Analyzer > Analyzer Color Space menu.

The Analyzer supports Camera Log, and SDR and HDR (HLG and PQ) color space modes. Select the appropriate option from the Analyzer > Analyzer Color Space menu that matches the current image result.

Camera Log Analysis

Several original camera log curves are supported for processing media in the original capture color space. Supported formats are the following:

- ARRI LogC WideGamut
- CanonLog2
- CanonLog3
- Panasonic VLog/VGamut

- Red WideGamut/Log3G10
- Sony SLog3/BT2020
- Sony SLog3/SGamut3
- Sony SLog3/SGamut3Cine
- ACEScct

In these modes, the waveform graticules are displayed in camera stops. To set up the base level and the warning level, adjust the following settings in the QC section of the Settings page (open with Tab):

CameraBaseGrey - Base grey level in nits; the 0 exposure line will be drawn at this level.

CameraWhiteStopsOverGrey - Brightness warning level; it stops over base level.

SDR Analysis

For working with SDR gamma encoded broadcast or cinema signal, set the Analyzer Range to SDR. Possible color primary options are the following:

- Rec.709
- P3 DCI
- P3 D65
- Rec.2020
- XYZ DCI

HLG Analysis

HLG mode supports the variable Hybrid Log-Gamma color encoding. In this mode, code values range from 0 to 1 and pixels do not have a specific nit level interpretation. Possible color primary options are the following:

- Rec.709
- Rec.2020 (with gamut warning for colors outside of P3)

HDR Analysis

HDR mode supports High Dynamic Range analysis. Peak brightness values above the maximum allowed nit level are indicated red on all graphs.

Possible color primary options are the following:

- Rec.709
- P3 D65

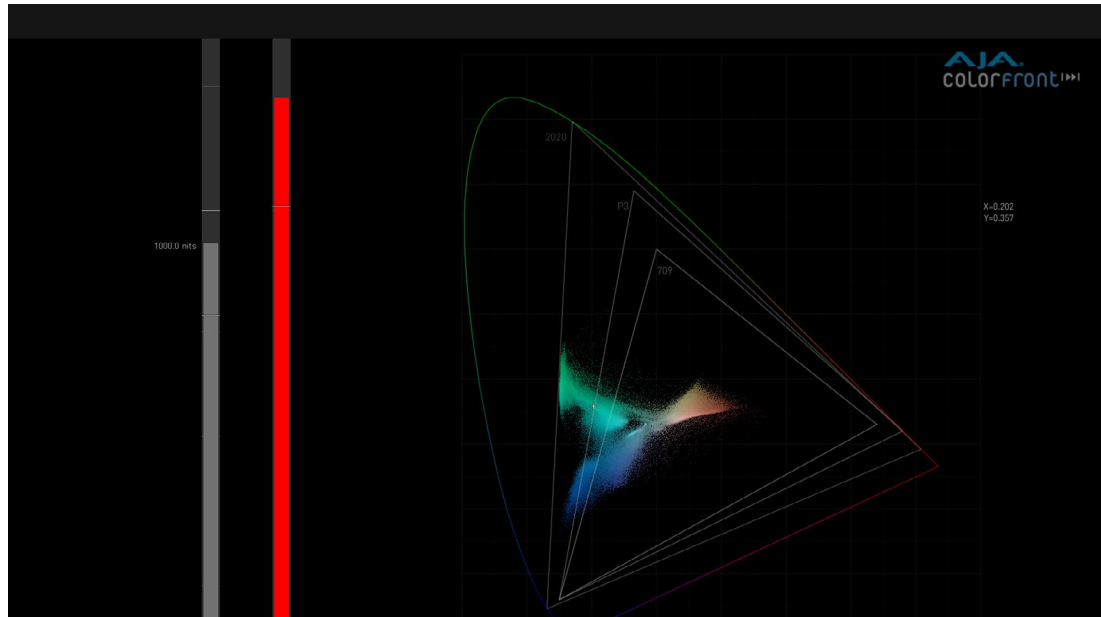
NOTE: *By default, the peak brightness threshold is set to 1000 nits according to the HDR10 standard. When working with PQ masters of higher peak brightness, the corresponding maximum brightness needs to be adjusted on the QC section of the Settings page (open with Tab).*

- Rec.2020 (with gamut warning for colors outside of P3)
- XYZ DCI
- XYZ D65

CIE xy Gamut View

The CIE xy Gamut View can be used to check the encoded colors on a standard CIE xy graph, and to see if they are within the valid color range in case a specific gamut constrain is to be enforced. This is relevant when working in the Rec.2020 color space, so the operator can identify that the colors are outside of the P3 gamut. This is a requirement for several currently popular delivery formats.

Figure 27. CIE xy Graph with Brightness and Gamut Bars



This view also contains two bars. The one on the left is the brightness bar that indicates the brightest pixel detected on the actual frame. The one on the right is the gamut bar that shows if the colors of the actual frame are within the legal color gamut (P3 in case of Rec.2020 input color space).

HDR Image Analyzer uses thresholds when detecting these extremes, so using the default settings a few pixels are allowed to exceed the legal limits without triggering a warning.

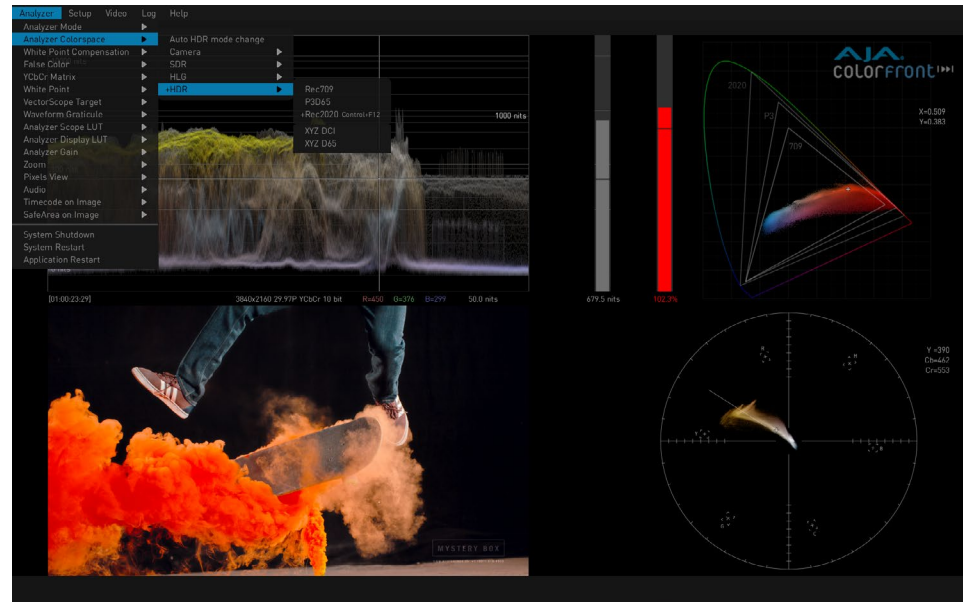
NOTE: Cumulative maximum values can be displayed on the Brightness and Gamut bars using the Log > Show Maximum Values parameter.

YCbCr Matrix

For the purpose of showing YCbCr components in various graphs (such as the vectorscope or the waveform YCbCr), the result image is converted to the YUV space. Select from the following formats for the specific matrix transformation:

- Rec.2020
- Rec.709

Figure 28. Signal Analysis with CIE xy Gamut Graph and Vectorscope



NOTE: The above settings will be reflected in the CIE xy graph and the gamut meter.

White Point Compensation

White point is a marker on the CIE graph. White point compensation D65 however is an option to change processing, so that if you are in XYZ Gamma2.6 colorspace (Digital Cinema) you can change the Vectorscope and Waveform processing so that the balanced white would be D65 instead of DCI. By default DCI white would be in the center of the Vectorscope, and DCI white would have the same level in the three channels of the waveform. If you turn on White Point Compensation to D65, then D65 white would be in the center of the Vectorscope and D65 white would have the same level in the three channels.

- The **White Point Compensation** parameter in the Analyzer menu turns compensation On and Off, which will change the analysis of the incoming video.
- The **White Point** parameter simply displays a box for either D65 or DCI on the CIE graph, and does NOT alter the analysis of the incoming video.

False Color

It is possible to use QC Player for checking illegal or near-illegal brightness and gamut levels by enabling the False Color mode. The available False Color display modes are the following:

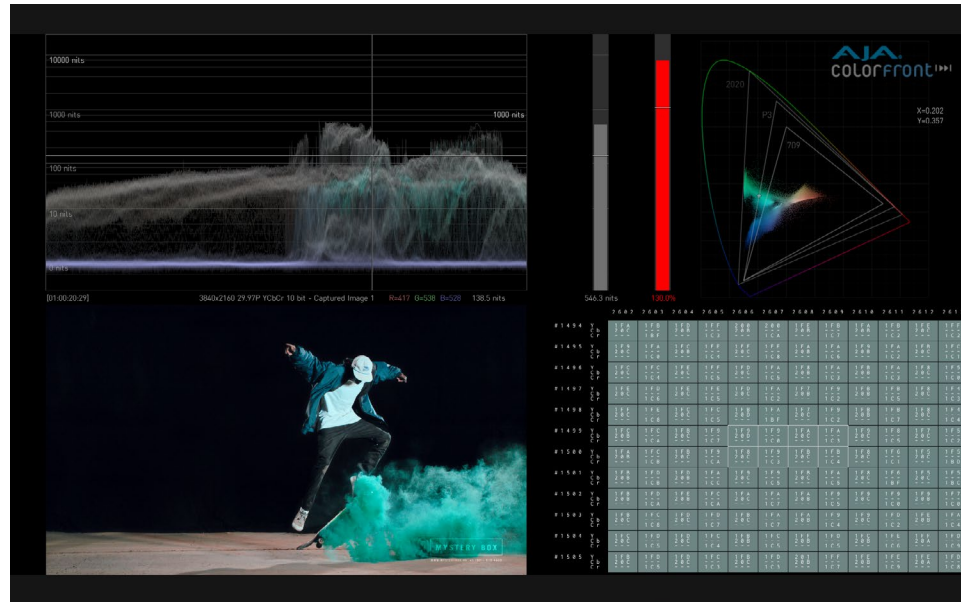
- Brightness
- Brightness Warning
- Gamut
- Gamut Warning

In the Warning modes, pixels that are too bright or out of gamut are colored red. Values at 90% of threshold are orange. The rest of the pixels are displayed in grayscale.

Pixel Picker

The Pixel Picker is always active. With a left click of the mouse you can pick any pixel on the image (Full Screen or Lower Left Quadrant.) Pressing F6 activates the Lower Right mode, providing an extra precision view with per-pixel granularity.

Figure 29. Pixel Picker



Pixel Picker Modes

From the menu the operator can choose how to inspect the pixel color values. The options are:

Hexadecimal mode - Displays the hex code values of the pixels.

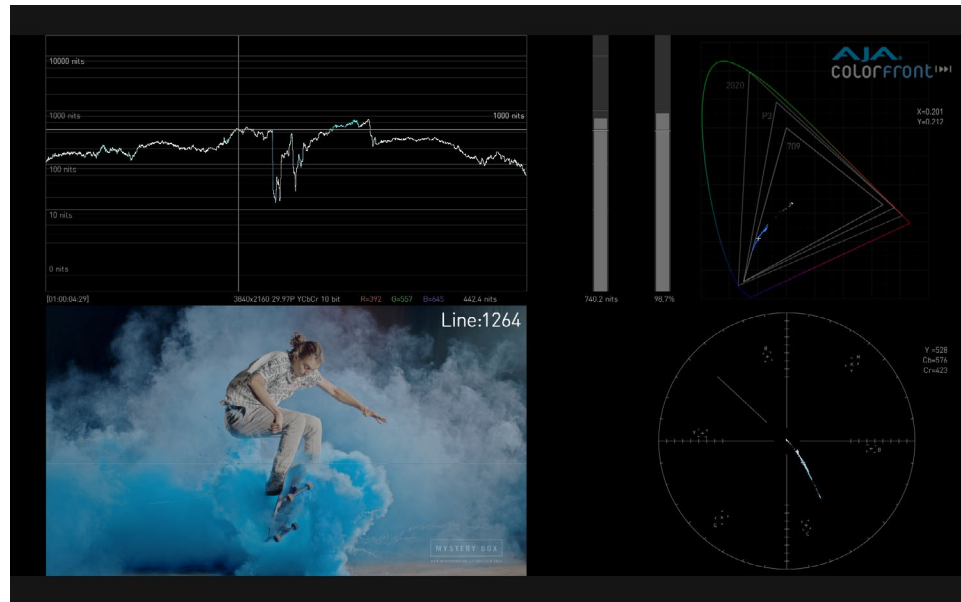
Decimal mode - Displays the decimal code values of the pixels.

Nit value mode - Displays the pixel brightness in Nit level.

Single Line Mode

Single Line Mode limits the analysis to a single horizontal line of video. This mode can be used by a QC operator to verify blanking.

Figure 30. Single Line Mode



The line being analyzed is indicated with a contrastingly colored line, and the number of the line is shown on the upper right.

Single Line Mode is turned on and off with the Analyzer Mode menu, or with the CTRL+space hotkeys. Additionally the hotkey CTRL + Up/Down Arrow moves the single line mode up and down one line at the time.

LUTs

Overview

Lookup Tables (LUTs) allow the mapping of colors between color spaces.

The HDR Image Analyzer allows external Lookup Tables (LUTs) to be used for two different purposes:

- A Display LUT is only applied to the image being shown and does not affect the actual analysis of the pixel values. This can allow an operator to look at a correct image on a display device that does not match the current video signal type.
- A Scope LUT is applied to the video signal being processed, so all scopes, waveforms etc. will be based on the remapped image.

No external LUTs are provided with the HDR Image Analyzer. Users can create and load custom LUTs, if desired, provided they are formatted as either a *.cube or *.3dmesh LUT file.

LUT files are loaded into and deleted using the Setup > Manage LUTs menu ([Figure 31 on page 31](#)), but are not active until selected for use as either an Analyzer Scope LUT or an Analyzer Display LUT ([Figure 32 on page 31](#)), using the Analyzer menu selections.

Figure 31. Manage LUTs Menu

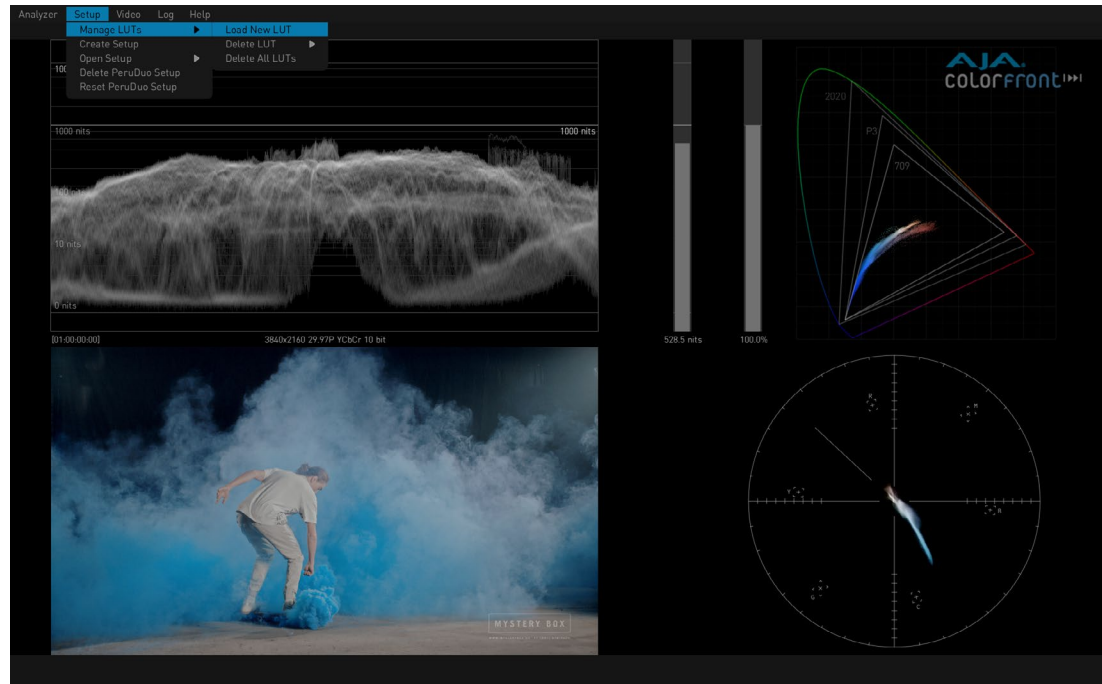
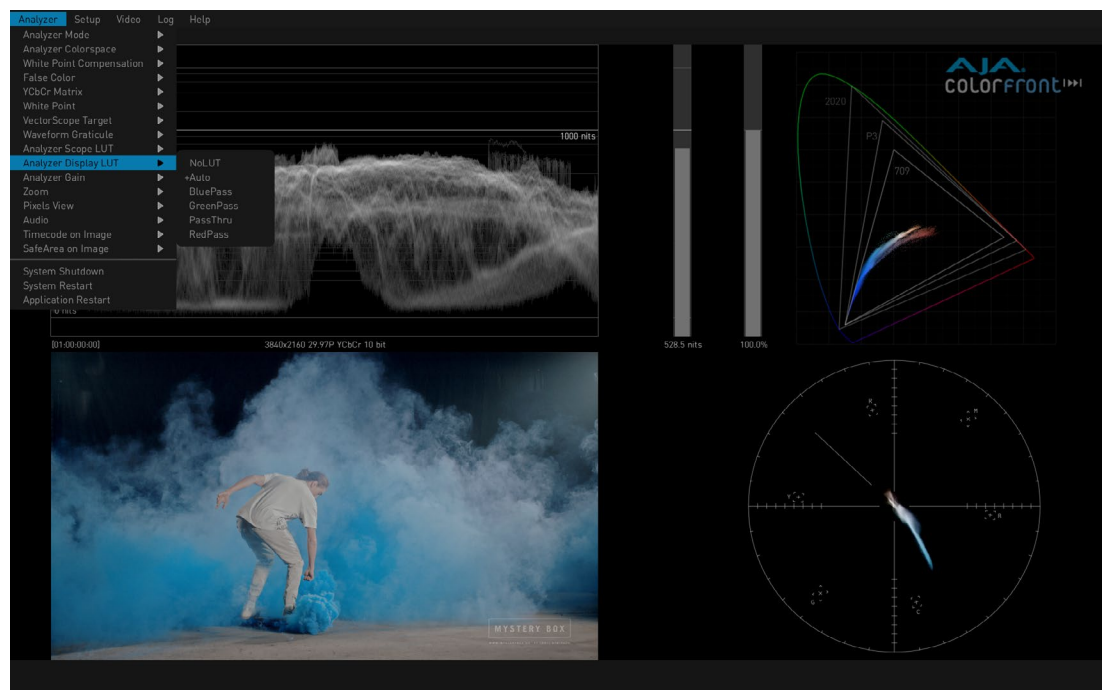


Figure 32. Analyzer Display LUT Menu



Analyzer Scope LUT

Generally the **No LUT** Analyzer Scope LUT setting should be used to maintain the correct color analysis.

Display Scope LUT

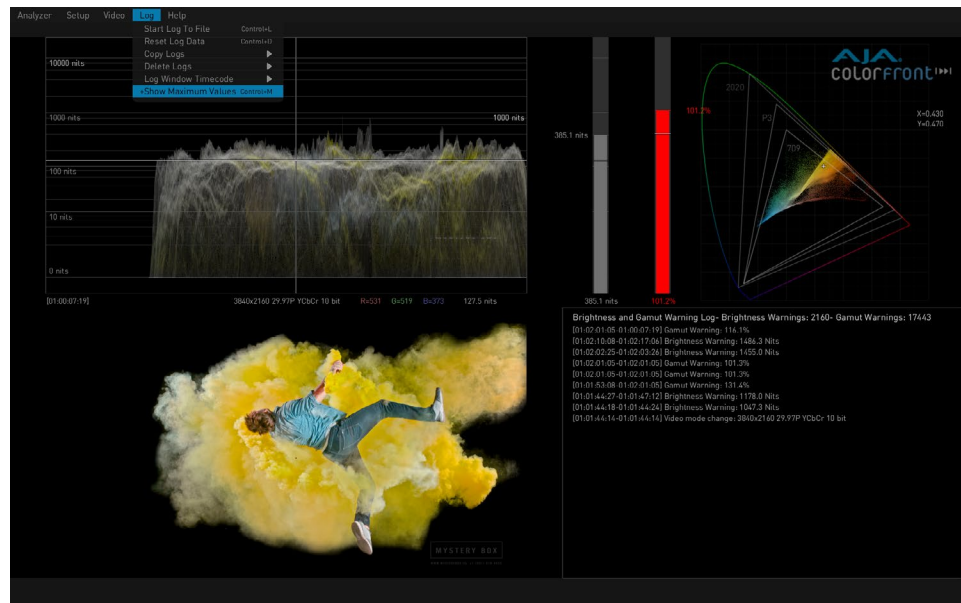
Generally the **Auto** Analyzer Display setting should be used, which enables HDR Image Analyzer to use its internal, calibrated LUTs for proper display.

Logging

Analyzer detects the events below and logs them with time stamps in a log file and on screen:

- Gamut violations of the current colorspace.
- For HDR, P3 Gamut violation if HDR Colorspace is set to Rec2020.
- For HDR, Brightness violation. Max brightness for HDR is configured in the Settings > QC tab.
- Time Code break

Figure 33. Logging with Show Maximum Values Selected.



A new log file can be created by starting a QC session from the Log drop-down menu:

- Start Log to File (CTRL+I)
- Clear Log Data (CTRL+d)

You can also select the timecode or session clock to be used in the log:

- Log Window Timecode

Settings Screen

Advanced features are available on the Settings screen, allowing customization of the HDR Image Analyzer GUI for special purposes. The Settings screen is accessed by pressing the TAB key when the top menu line is not displayed. Click on the desired tab to display the available parameters.

QC Tab

These advanced settings are for experienced colorists and QC professionals, permitting customization of the values used for analysis.

The QC parameters are saved in Setups. If you Reset a Setup, all values in QC are returned to Defaults.

Figure 34. Setting Screen, QC Tab

Parameter	Value	Note
Maximum Brightness For HDR	1000	Valid values are between 100.0 and 10000.0
Additional Marker For HDR	-1	Valid values are between 100.0 and 10000.0. -1 turns off
Minimum Brightness For CIEXY	0.2	Minimum brightness of pixels to show up on HDR Analyzer
Gamut Tolerance	0.2	Percentage of the most saturated pixels to ignore
Brightness Tolerance	0.02	Percentage of the brightest pixels to ignore
Camera Base Grey	18	Brightness of Grey Card in nits
Camera White Stops Over Grey	4	Camera stops for white clipping warning over base grey
Skin Tone X	0.407	Skin tone CIE x coordinate
Skin Tone Y	0.38	Skin tone CIE y coordinate
Audio Level Warning	-18	Warning level for audio, should be between -30 and -8

The parameters are largely self explanatory, but the following special features are available.

Additional Marker for HDR

This control lets you add an additional custom level marker line to the Waveform view. As an example, if mastering for 600 Nits Rec2020, you may want to add a "600" line for visual reference.

- Range 1000.0 to 10,000.0
- Enter -1 to hide the custom level marker line

Skin Tone

You can adjust the location of the skin tone line on the vectorscope display by entering X and Y CIE coordinates. The default location of the skin tone line varies depending on the color space being used.

Audio Level Warning

Customizes the audio level warning threshold, which can vary depending on the country standard.

NETWORK Tab

The Network settings are used to configure the two network interface cards (NICs) installed in the HDR Image Analyzer chassis.

Figure 35. Setting Screen, Network Tab

Settings

QC

NETWORK

SAFEAREA

Ethernet-1

DHCP

Enabled

Disabled

When DHCP is enabled then the system will automatically obtain an IP address

IP Address

169.254.144.211

IP address if DHCP is disabled

Subnet Mask

255.255.0.0

Subnet mask if DHCP is disabled

Default Gateway

0.0.0.0

Default Gateway if DHCP is disabled

DHCP DNS

Enabled

Disabled

When DHCP DNS is enabled then the system will automatically obtain the DNS Servers

DNS Server 1

10.0.0.8

DNS Server if DHCP DNS is disabled

DNS Server 2

10.0.0.12

Alternative DNS Server if DHCP DNS is disabled

Ethernet-2

DHCP

Enabled

Disabled

When DHCP is enabled then the system will automatically obtain an IP address

IP Address

169.254.144.211

IP address if DHCP is disabled

Subnet Mask

255.255.0.0

Subnet mask if DHCP is disabled

Default Gateway

0.0.0.0

Default Gateway if DHCP is disabled

DHCP DNS

Enabled

Disabled

When DHCP DNS is enabled then the system will automatically obtain the DNS Servers

DNS Server 1

10.0.0.8

DNS Server if DHCP DNS is disabled

DNS Server 2

10.0.0.12

Alternative DNS Server if DHCP DNS is disabled

SAFE AREA Tab

These settings are used to customize the Safe Area box displays, including the ability to choose which (or both) regions to display.

Figure 36. Settings Screen, Safe Area Tab

The screenshot displays the 'Settings' screen with the 'SAFEAREA' tab selected. The left sidebar contains the following menu items: 'Settings', 'QC', 'NETWORK', and 'SAFEAREA'. The main content area lists the following parameters:

- Safe Area Aspect:** A grid of 10 buttons with values: 1.0, 1.33, 1.37, 1.66, 1.78 (selected), 1.85, 1.89, 2.0, 2.35, and 2.39. Below the grid is the label 'Safearea aspect'.
- Safe Area Letterbox Opacity:** A slider set to 50. Below the slider is the label 'Safearea Letterbox opacity in percent'.
- Safe Title:** A toggle switch set to 'On'. Below the switch is the label 'Show Safe Title Area'.
- Safe Title Percent:** A slider set to 20. Below the slider is the label 'Safearea Title in percent'.
- Safe Action:** A toggle switch set to 'On'. Below the switch is the label 'Show Safe Action Area'.
- Safe Action Percent:** A slider set to 10. Below the slider is the label 'Safearea Action in percent'.
- Safe Area Line Opacity:** A slider set to 80. Below the slider is the label 'Safearea line opacity'.
- Safe Area Line Width:** A slider set to 4. Below the slider is the label 'Line width for safearea lines'.

The Safe Area parameters are saved in Setups.

Chapter 6 – Menu Reference

Analyzer Menu Guide

Table 2. Analyzer Menu > Analyzer Mode

Sub Menu	Menu Option 1	Description	Keyboard Shortcut
Analyzer Mode	Waveform Luminance	Select Luminance Waveform	CTRL+F1
	Waveform Lumi Color	Select Luminance Waveform with Colors	CTRL+F2
	Waveform Color	Select Color Waveform	CTRL+F3
	Waveform RGB Color	Select RGB Color Waveform	CTRL+F4
	Waveform RGB	Select RGB Waveform	CTRL+F5
	Waveform YCbCr	Select YCbCr Waveform	CTRL+F6
	Waveform YRGB	Select YRGB Waveform	CTRL+F7
	Histogram Luminance	Select Histogram Luminance	CTRL+F8
	Histogram Color	Select Histogram Color	CTRL+F9
	Image	Show Single View video image	F1
	Waveform	Show Single View Waveform	F2
	Gamut	Show Single View Gamut	F3
	Vectorscope	Show Single View Vectorscope	F4
	Combined with Audio	Show Quadrants with Audio (either Phase or Level)	F5
	Combined with Pixel Picker	Show Quadrants with Color Picker	F6
	Combined with Vectorscope	Show Quadrants with Vectorscope	F7
	Combined with Log	Show Quadrants with Log	F8
	Combined with Info Page	Show Quadrants with Info Page	F9
	Single Line Mode	Enable Single Line Mode	CTRL+space

Table 3. Analyzer Menu > Analyzer Colorspace, White Point Compensation, False Color, YCbCr Matrix, White Point

Menu	Menu Option 1	Menu Option 2	Description	Keyboard Shortcut
Analyzer Colorspace	Auto HDR mode change		When On, color space is adjusted automatically according to the SDI flagging between Rec.709, HLG Rec.2020 and HDR Rec.	
	Camera	Arri LogC Wide Gamut	Set Arri LogC Wide Gamut colorspace	
		Canon Log2	Set Canon Log2 colorspace	
		Canon Log3	Set Canon Log3 colorspace	
		Panasonic VLog/Gamut	Set Panasonic VLog/Gamut colorspace	
		Red WideGamut/Log3G10	Set Red WideGamut/Log3G10 colorspace	
		Sony SLog3/BT2020	Set Sony SLog3/BT2020 colorspace	
		Sony SLog3/SGamut3	Set Sony SLog3/SGamut3 colorspace	
		Sony SLog3/SGamut3Cine	Set Sony SLog3/SGamut3Cine colorspace	
	SDR	Rec709	Set SDR Rec709 colorspace	CTRL+F10
		P3DCI	Set SDR P3DCI colorspace	
		P3D65	Set SDR P3D65 colorspace	
		Rec2020	Set SDR Rec2020 colorspace	
		XYZ DCI	Set SDR XYZ DCI colorspace	
	HLG	Rec709	Set HLG Rec709 colorspace	
		Rec2020	Set HLG Rec2020 colorspace	CTRL+F11
	HDR	Rec709	Set HDR Rec709 colorspace	
		P3D65	Set HDR RecP3D65 colorspace	
		Rec2020	Set HDR Rec2020 colorspace	CTRL+F12
White Point Compensation	Off		No white point compensation	
	D65		Apply D65 white point compensation to the analysis.	
False Color	Brightness		Apply false color to entire Brightness	ALT+F1
	Brightness Warning		Apply false color to Brightness above warning level	ALT+F2
	Gamut		Apply false color to entire Gamut	ALT+F3
	Gamut Warning		Apply false color to Gamut above warning level	ALT+F4
	Off		No false color	ALT+F5
YCbCr Matrix	Rec709		Image is converted to the YUV space, using Rec709.	
	Rec2020		Image is converted to the YUV space, using Rec2020.	
White Point	D65		Display a box on the CIE xy graph showing the position of the D65 white point. Analysis is not affected.	
	DCI		Display a box on the CIE xy graph showing the position of the DCI white point. Analysis is not affected.	
	Off		Hide the white point box on the CIE xy graph.	

Table 4. Analyzer Mode > Vectorscope Target, Waveform Graticule, Scope and Display LUTs, Analyzer Gain, Zoom, Pixels View

Menu	Menu Option 1	Description	Keyboard Shortcut
Vectorscope Target	75%		
	100%		
Waveform Graticule	Default		
	Code Values		
Analyzer Scope LUT	NoLUT	No LUT applied to input signal.	
	(selection list)	Optionally apply a variety of LUTs to the input signal being analyzed.	
Analyzer Display LUT	Display LUT	No LUT applied to display signal.	
	Auto	The LUT is automatically selected in a way that the incoming image looks correct on a 709 SDR monitor.	
	(selection list)	Optionally apply a variety of LUTs to the displayed video image, analysis is not affected.	
Analyzer Gain	Increase Gain	Simple increase of display gain.	CTRL+NumPad Plus Sign
	Decrease Gain	Simple decrease of display gain.	CTRL+NumPad Minus Sign
	Reset Gain	Simple reset of display gain.	CTRL+ENTER
Zoom	Vectorscope Zoom	Apply a 5x magnification to the Vectorscope display.	CTRL+v
	Waveform Zoom	Apply a 4x magnification to the Waveform display.	CTRL+w
Pixels View	Hexadecimal	Color picker displays hexadecimal values	
	Decimal	Color picker displays decimal values	
	Nits	Color picker displays nits (RGB only)	

Table 5. Analyzer Mode > Audio, Timecode, SafeArea

Menu	Menu Option 1	Menu Option 2	Description	Keyboard Shortcut
Audio	Phase Meter	Channel 1-2	Show audio phase between Ch 1&2	
		Channel 3-4	Show audio phase between Ch 3&4	
		Channel 5-6	Show audio phase between Ch 5&6	
		Channel 7-8	Show audio phase between Ch 7&8	
		Channel 1-8	Show four phase diagrams of Ch 1&2, thru Ch 7&8	
		Channel 9-16	Show four phase diagrams of Ch 9&10, thru Ch 15&16	
	Level Meter		Display Level Meter	
Timecode on Image	Enable (on/off)		Show Timecode box on the image.	CTRL+t
SafeArea on Image	Enable (on/off)		Show framing guides on the image.	CTRL+s
System Shutdown			Closes the application and powers off the system.	
System Restart			Restarts the system and automatically relaunches the application.	
Application Restart			Restarts the application without shutting down the system.	

Setup Menu Guide

Table 6. Analyzer Mode > Audio, Timecode, SafeArea

Menu	Menu Option 1	Description	Keyboard Shortcut
Manage LUTs	Load New LUT	Opens the Windows Explorer browser used to navigate to and load a 3d Mesh or a .cube LUT file.	
	Delete LUT	Opens a list of the currently loaded LUTs that you can select for deletion.	
	Delete All LUTs	Deletes all currently loaded LUTs.	
Create Setup		Opens a dialog box for naming and saving a new Setup file. This file will have the current operational settings.	
Open Setup	analyzer	Selects the "analyzer" Setup file, which is the original setup file which may have been changed.	
	(selection list)	Reloads the selected Setup file.	
Delete Setup		Deletes the currently open Setup file.	
Reset Setup		Resets the currently open Setup file to factory defaults.	

Video Menu Guide

Table 7. Video Menu Options

Menu	Menu Option 1	Menu Option 2	Description	Keyboard Shortcut
Resolution	HD	HD YCbCr 10Bit HD RGB 10 Bit HD RGB 12 Bit HD RGB Dual-Link 10Bit HD RGB Dual-Link 12Bit	Defines an HD input video signal.	
		2K YCbCr 10Bit 2K RGB 10 Bit 2K RGB 12 Bit 2K RGB Dual-Link 10Bit 2K RGB Dual-Link 12Bit	Defines a 2K input video signal.	
		UHD YCbCr 10Bit UHD RGB 10 Bit UHD RGB 12 Bit UHD Two-Wires Square 10Bit UHD Two-Wires 2SI 10Bit	Defines a UHD input video signal.	
		4K YCbCr 10Bit 4K RGB 10 Bit 4K RGB 12 Bit 4K Two-Wires Square 10Bit 4K Two-Wires 2SI 10Bit	Defines a 4K input video signal	
		Auto Mode	Automatically detects input video links	
	AutoDetect Options	Forces 1x SDI Connection Mode	Forces single link input.	
		Forced 4x SDI Connection Mode	Forces four link input.	
		AutoDetect	Toggles Auto Detect of the incoming video resolution On or Off.	

Menu	Menu Option 1	Menu Option 2	Description	Keyboard Shortcut
Capture	Capture 1		Captures current image and stores in memory 1	ALT+NumPad 1
	Capture 2		Captures current image and stores in memory 2	ALT+NumPad 2
	Capture 3		Captures current image and stores in memory 3	ALT+NumPad 3
	Capture 4		Captures current image and stores in memory 4	ALT+NumPad 4
Recall	Show Live		Show live video signal	CTRL+NumPad 5
	Show Captured 1		Show memory 1	CTRL+NumPad 1
	Recall › Show Captured 2		Show memory 2	CTRL+NumPad 2
	Recall › Show Captured 3		Show memory 3	CTRL+NumPad 3
	Recall › Show Captured 4		Show memory 4	CTRL+NumPad 4
Screenshot	Save Screenshot		Captures a screenshot of the Analyser UI to the host computer.	CTRL+e
	Copy Screenshot (Opens a file browser for selection of a folder to copy to.)	Copy All	Copies all captured screenshots into the selected folder.	
		Copy Today's	Copies only screenshots captured today into the selected folder.	
		Copy All Except Today's	Copies all screenshots except those captured today into the selected folder	
	Delete Screenshot	Delete All	Deletes all captured screenshots from the host computer.	
		Delete Today's	Deletes only screenshots captured today from the host computer.	
		Delete All Except Today's	Deletes all screenshots except those captured today from the host computer.	

Log Menu Guide

Table 8. Log Menu Options

Menu	Menu Option 1	Description	Keyboard Shortcut
Start Log To File		Creates a new log file for a new QC session on disk	CTRL+I
Reset Log Data		Clears current log data.	CTRL+d
Copy Logs	Copy All Log Files		
	Copy Today's Log Files		
	Copy All Except Today's Log Files		
Delete Logs	Delete All Log Files		
	Delete Today's Log Files		
	Delete All Except Today's Log Files		

Menu	Menu Option 1	Description	Keyboard Shortcut
Timestamp		Comments in the Log Window to be tagged based on session clock.	
Timecode		Comments in the Log Window to be tagged based on SDI time code.	
Auto Timecode/ Timestamp		Shows timecode, timestamp, or both in the Log Window if the information is present on the incoming signal.	
Timestamp - Timecode		Show both time stamps with session clock priority.	
Timecode - Timestamp		Show both time stamps with SDI time code priority.	

Help Menu Guide

Table 9. Help Menu Options

Menu	Description	Keyboard Shortcut
About	Displays the Application name and Version information.	ALT+Forward Slash(/)
Update Analyzer	Opens a browser allowing HDR Image Analyzer software update.	
License Utility	Future use.	

Other Keyboard Shortcuts

Keyboard Shortcut	Description
ALT+h	Hide all popup windows (i.e. Help, Performance)
CONTROL+p	Show/Hide Performance window
CTRL + Up/Down Arrow	Moves the single line mode analysis up and down one line at the time.

Appendix A – Specifications

HDR Image Analyzer Specs

Video Formats

- (4K) 4096 x 2160p 23.98, 24, 25, 29.97, 30, 48 A/B, 50 A/B, 59.94 A/B, 60 A/B
- (UltraHD) 3840 x 2160p 23.98, 24, 25, 29.97, 30, 48 A/B, 50 A/B, 59.94 A/B, 60 A/B
- (2K) 2048 x 1080p 23.98, 24, 25, 29.97, 30, 48 A/B, 50 A/B, 59.94 A/B, 60 A/B
- (2K) 2048 x 1080PsF 23.98, 24, 25, 29.97, 30, 48 A/B, 50 A/B, 59.94 A/B, 60 A/B
- (HD) 1080i 50, 59.94, 60
- (HD) 1080PsF 23.98, 24, 25, 29.97, 30
- (HD) 1080p 23.98, 24, 25, 29.97, 30, 50 A/B, 59.94 A/B, 60 A/B
- (HD) 720p 50, 50.94, 60

Video Input Digital

- 4x 3G-SDI BNC

Video Output Digital

- 4x 3G-SDI BNC

Audio Input Digital

- 16-Channel 24-bit SDI embedded, 48 kHz synchronous

Audio Output Digital

- 16-Channel 24-bit SDI embedded, 48 kHz synchronous

Computer Monitor Output

- DisplayPort Output:
 - Up to UltraHD 60p

Reference Input

- Signal: Analog video sync (Blackburst or Tri-Level)

Size: (w x d x h)

- 1RU form factor
- 17.2" x 16.9" x 1.7" (436.88 x 429.26 x 43.18 mm)

Weight

- 28 lb (12.7kg) in box
- 18 lb (8.2kg) server only

Power

- 100-240 VAC 50/60 Hz (Dual, redundant power supplies)
- 190W typical, 245W Maximum

Environment

- Safe Operating Temperature: 5 to 35 C (41 to 95 F)
- Safe Storage Temperature (Power OFF): -40 to 60 C (-40 to 140 F)
- Operating Relative Humidity: 8-90% noncondensing
- Nonoperating Relative Humidity: 5-95% noncondensing

Appendix B – Safety and Compliance

Federal Communications Commission (FCC) Compliance Notices

Class A Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15, Subpart B 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 of the following measures:

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

FCC Caution

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.

Canadian ICES Statement

Canadian Department of Communications Radio Interference Regulations

This digital apparatus does not exceed the Class A limits for radio-noise emissions from a digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications. This Class A digital apparatus complies with Canadian ICES-003.

Règlement sur le brouillage radioélectrique du ministère des Communications

Cet appareil numérique respecte les limites de bruits radioélectriques visant les appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique du ministère des Communications du Canada. Cet appareil numérique de la Classe A est conforme à la norme NMB-003 du Canada.

European Union and European Free Trade Association (EFTA) Regulatory Compliance

This equipment may be operated in the countries that comprise the member countries of the European Union and the European Free Trade Association. These countries, listed in the following paragraph, are referred to as The European Community throughout this document:

AUSTRIA, BELGIUM, BULGARIA, CYPRUS, CZECH REPUBLIC, DENMARK, ESTONIA, FINLAND, FRANCE, GERMANY, GREECE, HUNGARY, IRELAND, ITALY, LATVIA, LITHUANIA, LUXEMBOURG, MALTA, NETHERLANDS, POLAND, PORTUGAL, ROMANIA, SLOVAKIA, SLOVENIA, SPAIN, SWEDEN, UNITED KINGDOM, ICELAND, LICHTEINSTEIN, NORWAY, SWITZERLAND

Declaration of Conformity

Marking by this symbol indicates compliance with the Essential Requirements of the EMC Directive of the European Union 2014/30/EU.



This equipment meets the following conformance standards:

EN 60065: 2014 (T-Mark License),

IEC 60065: 2014 (CB Scheme Report/Certificate)

Additional licenses issued for specific countries available on request.

Emissions

EN 55032: 2012 + AC: 2013, CISPR 32: 2015,

EN 61000-3-2: 2014, EN 61000-3-3: 2013

Immunity

EN 55103-2: 2009, EN 61000-4-2:2009, EN 61000-4-3: 2006 + A1:2008 + A2:2010,

EN 61000-4-4: 2004 + A1:2010, EN 61000-4-5:2006, EN 61000-4-6:2009,

EN 61000-4-11:2004

Environments: E2, E3 and E4

The product is also licensed for additional country specific standards as required for the International Marketplace.



Warning! This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take appropriate measures.

Achtung! Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Attention! Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées..

Recycling Notice



This symbol on the product or its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste for recycling, please contact your local authority, or where you purchased your product.

Korea KCC Compliance Statement

A급 기기 (업무용 방송통신기자재)	이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
Class A (Broadcasting Communication Equipment for Office Use)	As an electromagnetic wave equipment for office use (Class A), this equipment is intended to use in other than home area. Sellers or users need to take note of this.

Taiwan Compliance Statement

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

This is a Class A product based on the standard of the Bureau of Standards, Metrology and Inspection (BSMI) CNS 13438, Class A. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Japan Compliance Statement

この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI-A

This is a Class A product based on the standard of the VCCI Council (VCCI 32: 2016). If this equipment is used in a domestic environment, radio interference may occur, in which case, the user may be required to take corrective actions.

China Compliance Statement

This product has been tested to the following Chinese standards:

GB/T13837-2012, GB8898-2011, and GB17625.1-2012

This product meets the requirements of implementation rules for compulsory certification (REF NO. CNCA-C08-01:2014) under certificate number 2019010805151936

Translated Warning and Caution Messages

The following caution statements, warning conventions, and warning messages apply to this product and manual.



Warning Symbol



Hazard Symbol



Caution Symbol

Before Operation Please Read These Instructions



Warning! Read and follow all warning notices and instructions marked on the product or included in the documentation.

Avertissement! Lisez et conformez-vous à tous les avis et instructions d'avertissement indiqués sur le produit ou dans la documentation.

Warnung! Lesen und befolgen Sie die Warnhinweise und Anweisungen, die auf dem Produkt angebracht oder in der Dokumentation enthalten sind.

¡Advertencia! Lea y siga todas las instrucciones y advertencias marcadas en el producto o incluidas en la documentación.

Aviso! Leia e siga todos os avisos e instruções assinalados no produto ou incluídos na documentação.

Avviso! Leggere e seguire tutti gli avvisi e le istruzioni presenti sul prodotto o inclusi nella documentazione.



Warning! Do not use this device near water and clean only with a dry cloth.

Avertissement! N'utilisez pas cet appareil près de l'eau et nettoyez-le seulement avec un tissu sec.

Warnung! Das Gerät nicht in der Nähe von Wasser verwenden und nur mit einem trockenen Tuch säubern.

¡Advertencia! No utilice este dispositivo cerca del agua y límpielo solamente con un paño seco.

Aviso! Não utilize este dispositivo perto da água e limpe-o somente com um pano seco.

Avviso! Non utilizzare questo dispositivo vicino all'acqua e pulirlo soltanto con un panno asciutto.



Warning! Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

Avertissement! Ne bloquez aucune ouverture de ventilation. Suivez les instructions du fabricant lors de l'installation.

Warnung! Die Lüftungsöffnungen dürfen nicht blockiert werden. Nur gemäß den Anweisungen des Herstellers installieren.

¡Advertencia! No bloquee ninguna de las aberturas de la ventilación. Instale de acuerdo con las instrucciones del fabricante.

Aviso! Não obstrua nenhuma das aberturas de ventilação. Instale de acordo com as instruções do fabricante.

Avviso! Non ostruire le aperture di ventilazione. Installare in conformità con le istruzioni del fornitore.



Warning! Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

Avertissement! N'installez pas l'appareil près d'une source de chaleur telle que des radiateurs, des bouches d'air de chauffage, des fourneaux ou d'autres appareils (amplificateurs compris) qui produisent de la chaleur.

Warnung! Nicht in der Nähe von Wärmequellen wie Heizkörpern, Heizregistern, Öfen oder anderen Wärme erzeugenden Geräten (einschließlich Verstärkern) aufstellen.

¡Advertencia! No instale cerca de fuentes de calor tales como radiadores, registros de calor, estufas u otros aparatos (incluidos amplificadores) que generan calor.

Aviso! Não instale perto de nenhuma fonte de calor tal como radiadores, saídas de calor, fogões ou outros aparelhos (incluindo amplificadores) que produzam calor.

Avviso! Non installare vicino a fonti di calore come termosifoni, diffusori di aria calda, stufe o altri apparecchi (amplificatori compresi) che emettono calore



Warning! Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

Avertissement! La sécurité de la prise polarisée ou de la prise de type mise à la terre ne doit en aucun cas être empêchée de fonctionner. Une prise polarisée a deux broches, l'une étant plus large que l'autre. Une prise de type mise à la terre a deux broches et une troisième broche pour la mise à la terre. La broche large ou la troisième broche sont fournies pour votre sécurité. Si la prise fournie ne s'insère pas dans votre prise femelle, consultez un électricien pour le remplacement de la prise femelle obsolète.

Warnung! Der Sicherheitszweck des gepolten bzw. Schukosteckers ist zu berücksichtigen. Ein gepolter Stecker verfügt über zwei Pole, von denen einer breiter als der andere ist. Ein Schukostecker verfügt neben den zwei Polen noch über einen dritten Pol zur Erdung. Der breite Pol bzw. der Erdungspol dienen der Sicherheit. Wenn der zur Verfügung gestellte Stecker nicht in Ihren Anschluss passt, konsultieren Sie einen Elektriker, um den veralteten Anschluss zu ersetzen.

¡Advertencia! No eche por tierra la finalidad del tipo de enchufe polarizado con conexión a tierra. Un enchufe polarizado tiene dos espigas, una más ancha que la otra. Un enchufe con conexión a tierra tiene dos espigas iguales y una tercera espiga que sirve para la conexión a tierra. La espiga ancha, o la tercera espiga, sirven para su seguridad. Si el enchufe suministrado no encaja en el tomacorriente, consulte con un electricista para reemplazar el tomacorriente obsoleto.

Aviso! Não anule a finalidade da segurança da ficha polarizada ou do tipo ligação terra. Uma ficha polarizada tem duas lâminas sendo uma mais larga do que a outra. Uma ficha do tipo de ligação à terra tem duas lâminas e um terceiro terminal de ligação à terra. A lâmina larga ou o terceiro terminal são fornecidos para sua segurança. Se a ficha fornecida não couber na sua tomada, consulte um electricista para a substituição da tomada obsoleta.

Avviso! Non compromettere la sicurezza della spina polarizzata o con messa a terra. Una spina polarizzata ha due spinotti, di cui uno più largo. Una spina con messa a terra ha due spinotti e un terzo polo per la messa a terra. Lo spinotto largo o il terzo polo sono forniti per motivi di sicurezza. Se la spina fornita non si inserisce nella presa di corrente, contattare un elettricista per la sostituzione della presa obsoleta.



Warning! Since the Mains plug is used as the disconnection for the device, it must remain readily accessible and operable.

Avertissement! Puisque la prise principale est utilisée pour débrancher l'appareil, elle doit rester aisément accessible et fonctionnelle.

Warnung! Da der Netzstecker als Trennvorrichtung dient, muss er stets zugänglich und funktionsfähig sein.

¡Advertencia! Puesto que el enchufe de la red eléctrica se utiliza como dispositivo de desconexión, debe seguir siendo fácilmente accesible y operable.

Aviso! Dado que a ficha principal é utilizada como a desconexão para o dispositivo, esta deve manter-se prontamente acessível e funcional.

Avviso! Poiché il cavo di alimentazione viene usato come dispositivo di sconnessione, deve rimanere prontamente accessibile e operabile.



Warning! Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the device.

Avertissement! Protégez le cordon d'alimentation pour que l'on ne marche pas dessus ou qu'on le pince, en particulier au niveau des prises mâles, des réceptacles de convenance, et à l'endroit où il sort de l'appareil.

Warnung! Vermeiden Sie, dass auf das Netzkabel getreten oder das Kabel geknickt wird, insbesondere an den Steckern, den Steckdosen und am Kabelausgang am Gerät.

¡Advertencia! Proteja el cable de energía para que no se le pise ni apriete, en especial cerca del enchufe, los receptáculos de conveniencia y el punto del que salen del equipo.

Aviso! Proteja o cabo de alimentação de ser pisado ou de ser comprimido particularmente nas fichas, em tomadas de parede de conveniência e no ponto de onde sai do dispositivo.

Avviso! Proteggere il cavo di alimentazione in modo che nessuno ci cammini sopra e che non venga schiacciato soprattutto in corrispondenza delle spine e del punto in cui esce dal dispositivo.



Warning! Unplug this device during lightning storms or when unused for long periods of time.

Avertissement! Débranchez cet appareil pendant les orages avec éclairsou s'il est inutilisé pendant de longues périodes.

Warnung! Das Gerät ist bei Gewitterstürmen oder wenn es über lange Zeiträume ungenutzt bleibt vom Netz zu trennen.

¡Advertencia! Desenchufe este dispositivo durante tormentas eléctricas o cuando no se lo utilice por largos periodos del tiempo.

Aviso! Desconecte este dispositivo da tomada durante trovoadas ou quando não é utilizado durante longos períodos de tempo.

Avviso! Utilizzare soltanto i collegamenti e gli accessori specificati e/o venduti dal produttore, quali il treppiedi e l'esoscheletro.



Warning! Refer all servicing to qualified service personnel. Servicing is required when the device has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the device, the device has been exposed to rain or moisture, does not operate normally, or has been dropped.

Avertissement! Référez-vous au personnel de service qualifié pour tout entretien. L'entretien est exigé quand l'appareil a été endommagé de quelque manière que ce soit, par exemple lorsque le cordon d'alimentation ou la prise sont endommagés, que du liquide a été versé ou des objets sont tombés dans l'appareil, que l'appareil a été exposé à la pluie ou à l'humidité, ne fonctionne pas normalement ou est tombé.

Warnung! Das Gerät sollte nur von qualifizierten Fachkräften gewartet werden. Eine Wartung ist fällig, wenn das Gerät in irgendeiner Weise beschädigt wurde, wie bei beschädigtem Netzkabel oder Netzstecker, falls Flüssigkeiten oder Objekte in das Gerät gelangen, das Gerät Regen oder Feuchtigkeit ausgesetzt wurde, nicht ordnungsgemäß funktioniert oder fallen gelassen wurde.

¡Advertencia! Consulte al personal calificado por cuestiones de reparación. El servicio de reparación se requiere cuando el dispositivo ha recibido cualquier tipo de daño, por ejemplo cable o espigas dañadas, se ha derramado líquido o se han caído objetos dentro del dispositivo, el dispositivo ha sido expuesto a la lluvia o humedad, o no funciona de modo normal, o se ha caído.

Aviso! Remeta todos os serviços de manutenção para o pessoal de assistência qualificado. A prestação de serviços de manutenção é exigida quando o dispositivo foi danificado mediante qualquer forma, como um cabo de alimentação ou ficha que se encontra danificado/a, quando foi derramado líquido ou caíram objectos sobre o dispositivo, quando o dispositivo foi exposto à chuva ou à humidade, quando não funciona normalmente ou quando foi deixado cair.

Avviso! Fare riferimento al personale qualificato per tutti gli interventi di assistenza. L'assistenza è necessaria quando il dispositivo è stato danneggiato in qualche modo, ad esempio se il cavo di alimentazione o la spina sono danneggiati, è stato rovesciato del liquido è stato rovesciato o qualche oggetto è caduto nel dispositivo, il dispositivo è stato esposto a pioggia o umidità, non funziona correttamente o è caduto



Warning! Do not open the chassis. There are no user-serviceable parts inside. Opening the chassis will void the warranty unless performed by an AJA service center or licensed facility.

Avertissement! Ne pas ouvrir le châssis. Aucun élément à l'intérieur du châssis ne peut être réparé par l'utilisateur. La garantie sera annulée si le châssis est ouvert par toute autre personne qu'un technicien d'un centre de service ou d'un établissement agréé AJA.

Warnung! Öffnen Sie das Gehäuse nicht. Keine der Geräteteile können vom Benutzer gewartet werden. Durch das Öffnen des Gehäuses wird die Garantie hinfällig, es sei denn, solche Wartungsarbeiten werden in einem AJA-Service-Center oder einem lizenzierten Betrieb vorgenommen.

¡Advertencia! No abra el chasis. El interior no contiene piezas reparables por el usuario. El abrir el chasis anulará la garantía a menos que se lo haga en un centro de servicio AJA o en un local autorizado.

Advertência! Não abra o chassi. Não há internamente nenhuma peça que permita manutenção pelo usuário. Abrir o chassi anula a garantia, a menos que a abertura seja realizada por uma central de serviços da AJA ou por um local autorizado.

Avvertenza! Non aprire lo chassis. All'interno non ci sono parti riparabili dall'utente. L'apertura dello chassis invaliderà la garanzia se non viene effettuata da un centro ufficiale o autorizzato AJA.



Warning! Disconnect the external AC power supply line cord(s) from the mains power before moving the unit.

Avertissement! Retirez le ou les cordons d'alimentation en CA de la source d'alimentation principale lorsque vous déplacez l'appareil.

Warnung! Trennen Sie die Wechselstrom-Versorgungskabel vom Netzstrom, bevor Sie das Gerät verschieben.

¡Advertencia! Cuando mueva la unidad desenchufe de la red eléctrica el/los cable(s) de la fuente de alimentación CA tipo brick.

Advertência! Remova os cabos CA de alimentação brick da rede elétrica ao mover a unidade.

Avvertenza! Scollegare il cavo dell'alimentatore quando si sposta l'unità.



Warning! Only use attachments and accessories specified and/or sold by the manufacturer.

Avertissement! Utilisez seulement les attaches et accessoires spécifiés et/ou vendus par le fabricant.

Warnung! Verwenden Sie nur Zusatzgeräte und Zubehör angegeben und / oder verkauft wurde durch den Hersteller.

¡Advertencia! Utilice solamente los accesorios y conexiones especificados y/o vendidos por el fabricante.

Aviso! Utilize apenas equipamentos/acessórios especificados e/ou vendidos pelo fabricante.

Avviso! Utilizzare soltanto i collegamenti e gli accessori specificati e/o venduti dal produttore.



Hazard! High Voltage. This situation or condition can cause injury due to electric shock.

Avertissement! Tension élevée. Cette situation ou condition peut causer des blessures dues à un choc électrique.

Warnung! Hochspannung. Diese Situation oder Bedingung kann zu Verletzungen durch Stromschlag führen.

¡Advertencia! Alto voltaje . Esta situación o condición puede causar lesiones debidas a una descarga eléctrica.

Aviso! Alta Tensão . Esta situação ou condição pode causar danos devido a choques elétricos.

Avviso! Alta tensione. Questa situazione o condizione può causare lesioni a causa di scosse elettriche.



Warning! Dual Power Cord Notice—please read this. To reduce the risk of electrical shock, disconnect both power cords before servicing equipment.

Avertissement! Avis concernant la double alimentation électrique — à lire soigneusement. Pour éviter tout risque d'électrocution, débranchez les deux câbles électriques avant d'intervenir sur l'équipement.

Achtung! Hinweis auf Doppel-Netzkabel—bitte lesen. Um das Risiko eines Elektroschocks zu verringern, müssen beide Netzkabel ausgestöpselt werden, bevor die Vorrichtung gewartet wird.

Avvertenza. Avviso concernente il cavo di alimentazione doppio – leggere attentamente. Per ridurre il rischio di elettrocuzione, scollegare entrambi i cavi di alimentazione prima di eseguire la manutenzione o riparazioni di questo apparecchio.

Aviso! Aviso de Cabo Elétrico Duplo - por favor, leia isto. Para reduzir o risco de choque elétrico, desconecte ambos os cabos elétricos antes de fazer manutenção ao equipamento.

¡Advertencia! Aviso del doble cable de alimentación - leer esto por favor. Para reducir el riesgo de descarga eléctrica, desconecte ambos cables de alimentación antes de dar servicio al equipo.



Caution! To meet safety regulations for leakage current, connect the dual power supplies to separate branch circuits.

¡Advertencia! Para cumplir con las normas de seguridad para la corriente de fuga, conecte las dos fuentes de alimentación para circuitos derivados diferentes.

Attention! Pour répondre aux mesures de sécurité concernant le courant de fuite, raccorder les sources d'alimentation doubles à des circuits de dérivation distincts.

Warnung! Zur Erfüllung der Sicherheitsbestimmungen bezüglich Reststrom schließen Sie bitte die zwei Netzteile an unterschiedlichen Abzweigleitungen an.

Cuidado! Para atender aos regulamentos de segurança para correntes de fuga, conecte as fontes duplas a circuitos elétricos separados.

Attenzione! Per soddisfare le norme di sicurezza sulla corrente di perdita, collegare i doppi alimentatori a circuiti derivati separati.



Warning! Hazardous Voltages! The safe operation of this product requires that a protective earth connection be provided. This protective earth is provided by the grounding conductor in the equipment's supply cord. To reduce the risk of electrical shock to operator and service personnel, this ground conductor must be connected to an earthed ground.

Avertissement : tensions dangereuses — Pour utiliser ce produit en toute sécurité, il faut un raccordement à la terre. Ce raccordement s'effectue par l'intermédiaire du connecteur de terre dans le cordon d'alimentation de l'équipement. Pour réduire le risque d'électrocution de l'opérateur ou du personnel de maintenance, ce cordon avec conducteur de terre doit être branché sur une prise reliée à la terre.

Achtung! Gefährliche Spannungen — Sichere Bedienung dieses Geräts erfordert, dass ein Schutzleiteranschluss vorgesehen wird. Dieser Schutzleiteranschluss wird mittels der Erdungsleitung im Netzkabel der Vorrichtung vorgesehen. Um die Gefahr eines Elektroschocks für Bedien- und Wartungspersonal zu verringern, muss diese Erdungsleitung mit einer geerdeten Masse verbunden werden.

Avvertenza – Alte tensioni – Il funzionamento in sicurezza di questo prodotto richiede una presa di terra, che viene fornita dal conduttore di messa a terra presente nel cavo di alimentazione dell'apparecchio. Per ridurre il rischio di elettrocuzione per l'operatore e il personale di manutenzione, tale conduttore deve essere collegato a un punto al potenziale di terra.

Advertencia de voltajes peligrosos — El funcionamiento seguro de este producto requiere que se proporcione una conexión terrestre protegida. Esta protección terrestre es proporcionada por el conductor de conexión en la tierra del cable de alimentación del equipo. Para reducir el riesgo de descarga eléctrica al operador y el personal de servicio, este conductor de conexión de la tierra debe ser conectado a la misma tierra.

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FreeType 2.3.9, 2.3.5

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FTGL - OpenGL font library 2.1.3

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Inconsolata font

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