aura UHD Series

aura UHD 24 / aura UHD 27 / aura UHD 32

12G-SDI 4K/8K HDR Monitor

User Manual

RGBlink

Article NO: RGB-RD-UM-HDR Monitor E002
Version NO: V1.2

Content

Thank you for choosing our product!
This User Manual is designed to show you how to use this monitor quickly and make use of all the features. Please read all directions and instructions carefully before using this product.

Declarations

FCC/Warranty

Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference, in which case the user will be responsible for correcting any interference.

Guarantee and Compensation

We provide a guarantee relating to perfect manufacturing as part of the legally stipulated terms of guarantee. On receipt, the purchaser must immediately inspect all delivered goods for damage incurred during transport, as well as for material and manufacturing faults.

The period of guarantee begins on the date of transfer of risks, in the case of special systems and software on the date of commissioning, at latest 30 days after the transfer of risks. In the event of justified notice of compliant, we can repair the fault or provide a replacement at its own discretion within an appropriate period. If this measure proves to be impossible or unsuccessful, the purchaser can demand a reduction in the purchase price or cancellation of the contract. All other claims, in particular those relating to compensation for direct or indirect damage, and also damage attributed to the operation of software as well as to other service provided by us, being a component of the system or independent service, will be deemed invalid provided the damage is not proven to be attributed to the absence of properties guaranteed in writing or due to the intent or gross negligence or part of our company.

If the purchaser or a third party carries out modifications or repairs on goods delivered by us, or if the goods are handled incorrectly, in particular if the systems are commissioned operated incorrectly or if, after the transfer of risks, the goods are subject to influences not agreed upon in the contract, all guarantee claims of the purchaser will be rendered invalid. Not included in the guarantee coverage are system failures which are attributed to programs or special electronic circuitry provided by the purchaser, e.g. interfaces. Normal wear as well as normal maintenance are not subject to the guarantee provided by us either.

The environmental conditions as well as the servicing and maintenance regulations specified in this manual must be complied with by the customer.

Operators Safety Summary

The general safety information in this summary is for operating personnel.

Do Not Remove Covers or Panels

There are no user-serviceable parts within the unit. Removal of the top cover will expose dangerous voltages. To avoid personal injury, do not remove the top cover. Do not operate the unit without the cover installed.

Power Source

This product is intended to operate from a power source that will not apply more than 230 volts rms between the supply conductors or between both supply conductor and ground. A protective ground connection by way of grounding conductor in the power cord is essential for safe operation.

Do Not Operate in Explosive Atmospheres

To avoid explosion, do not operate this product in an explosive atmosphere.

Installation Safety Summary

Safety Precautions

For all product installation procedures, please observe the following important safety and handling rules to avoid damage to yourself and the equipment.
To protect users from electric shock, ensure that the chassis connects to earth via the ground wire provided in the AC power Cord.
The AC Socket-outlet should be installed near the equipment and be easily accessible.

Unpacking and Inspection

Before opening product shipping box, inspect it for damage. If you find any damage, notify the shipping carrier immediately for all claims adjustments. As you open the box, compare its contents against the packing slip. If you find any shortages, contact your sales representative.
Once you have removed all the components from their packaging and checked that all the listed components are present, visually inspect the system to ensure there was no damage during shipping. If there is damage, notify the shipping carrier immediately for all claims adjustments.

Site Preparation

The environment in which you install your product should be clean, properly lit, free from static, and have adequate power, ventilation, and space for all components.

Chapter 1 Your Product

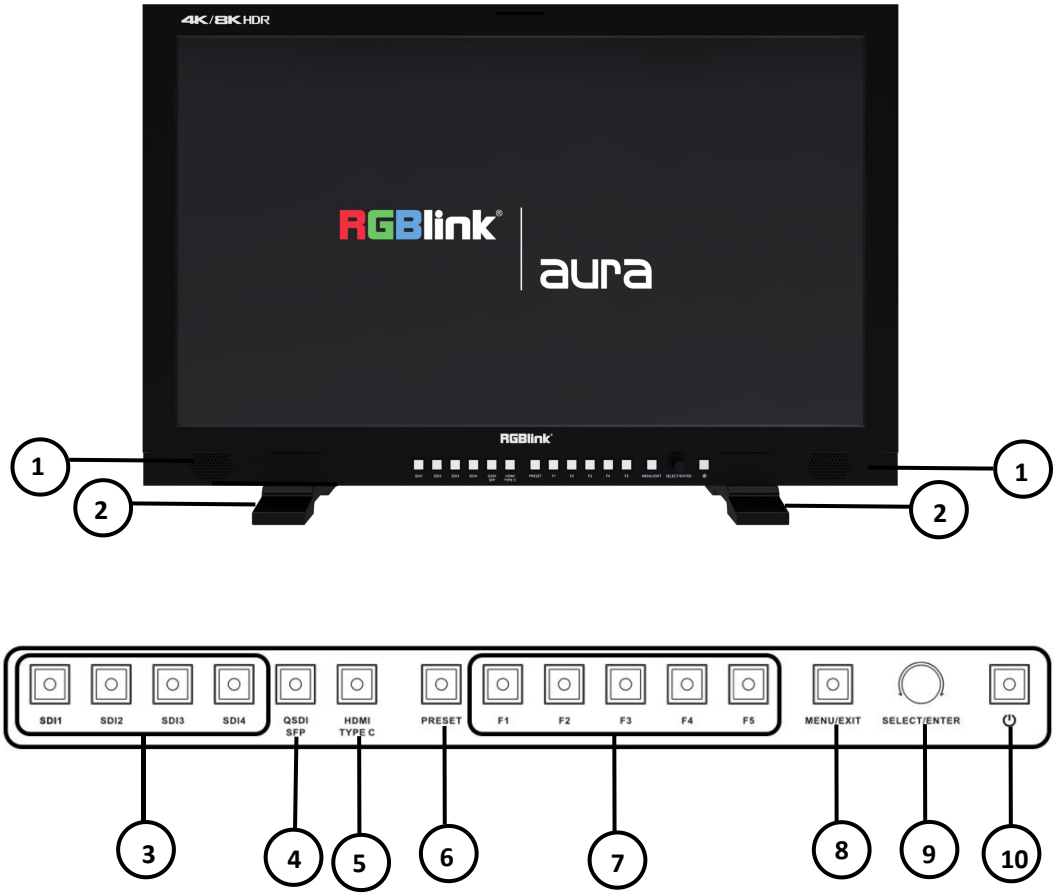
1.1 In the Box

Power Adapter

1.2 Product Overview

RGBlink aura UHD series of model aura UHD 24/aura UHD 27/aura UHD 32 is 12G SDI 4K/8K monitor, equipped with 4*12G SDI input , support up to 8K on native 3840 x 2160 pixels LCD screen, 16:9 aspect ratio, 98% DCI-P3 wide color gamut, custom 3D LUT import, designed for professional production and post production workflow. aura UHD series provide precise color reproduction and the unique and supports various HDR gamma curves, such as PQ, HLG, S-Log3.

1.2.1 Front Panel

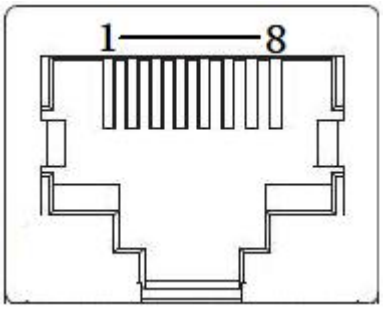


①	Speaker	2-channel speaker with HDMI and SDI embedded audio.
②	Base	Detachable.
③	SDI 1 to SDI 4 Buttons	For SDI 1-4 signal selection.
④	QSDI/SFP Button	Switch between 4-image division mode and optical fiber signal.
⑤	HDMI/Type C Button	For switch between HDMI and Type C signal.
⑥	Preset Button	Preset Mode.
⑦	F1 to F5 Buttons	Soft Keys.
⑧	MENU/EXIT Button	Open/close OSD menu, or go back to previous menu.
⑨	SELECT/ENTER Button	Rotate to select, and press to confirm.
⑩	Power Key	For turn-on (blue light) or turn-off (red light) , 3-second long press for turn-off, short press for turn-on.

1.2.2 Rear Panel

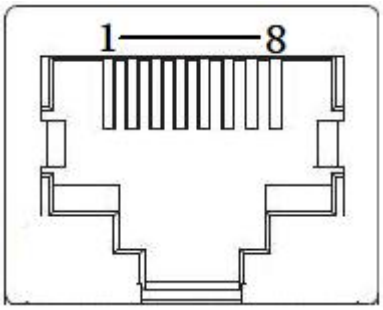
①	Handle	For carrying.
②	3.5mm Earphone Jack	The speaker will be turned off when earphone is connected.
③	USB Interface	For software upgrade.
④	RS422 Interface	In and Loop.
⑤	GPI	GPI interface to achieve remote control.
⑥	Network Port	For connecting network cable.
⑦	12G-SDI Interface	Quad 12G-SDI (In | Loop).
⑧	HDMI Interface	Dual HDMI inputs.
⑨	DC input terminal	4-Pin Cannon interface.
⑩	AC input terminal	220V interface with power switch.

RS422 In/Out Interface Definition：



PIN	Name	Description
1	GND	GND
2	GND	GND
3	TX-	Data transmission (-)
4	RX+	Data reception (+)
5	RX-	Data reception (-)
6	TX+	Data transmission (+)
7	NC	Not Connected
8	NC	Not Connected

GPI Interface Definition：



PIN	Name	Description
1	GPI1	Low level trigger；preset functions in menu.
2	GPI2	Low level trigger；preset functions in menu.
3	GPI3	Low level trigger；preset functions in menu.
4	GPI4	Low level trigger；preset functions in menu.
5	GPI5	Low level trigger；preset functions in menu.
6	NC	Not Connected
7	NC	Not Connected
8	GND	GND

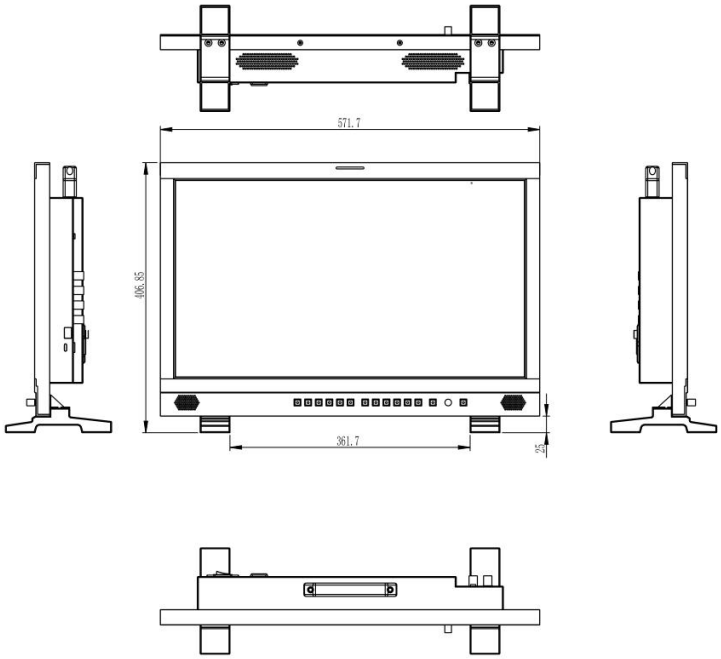
1.2.3 Side Panel

①	Handle	For carrying.
②	SFP Interface	Insert optical fiber module (module is optional).
③	Thunderbolt 3/Type C Input Interface	Compatible with Thunderbolt 3/Type-C.

1.2.4 Dimensions

Following is the dimension of monitor for your reference:

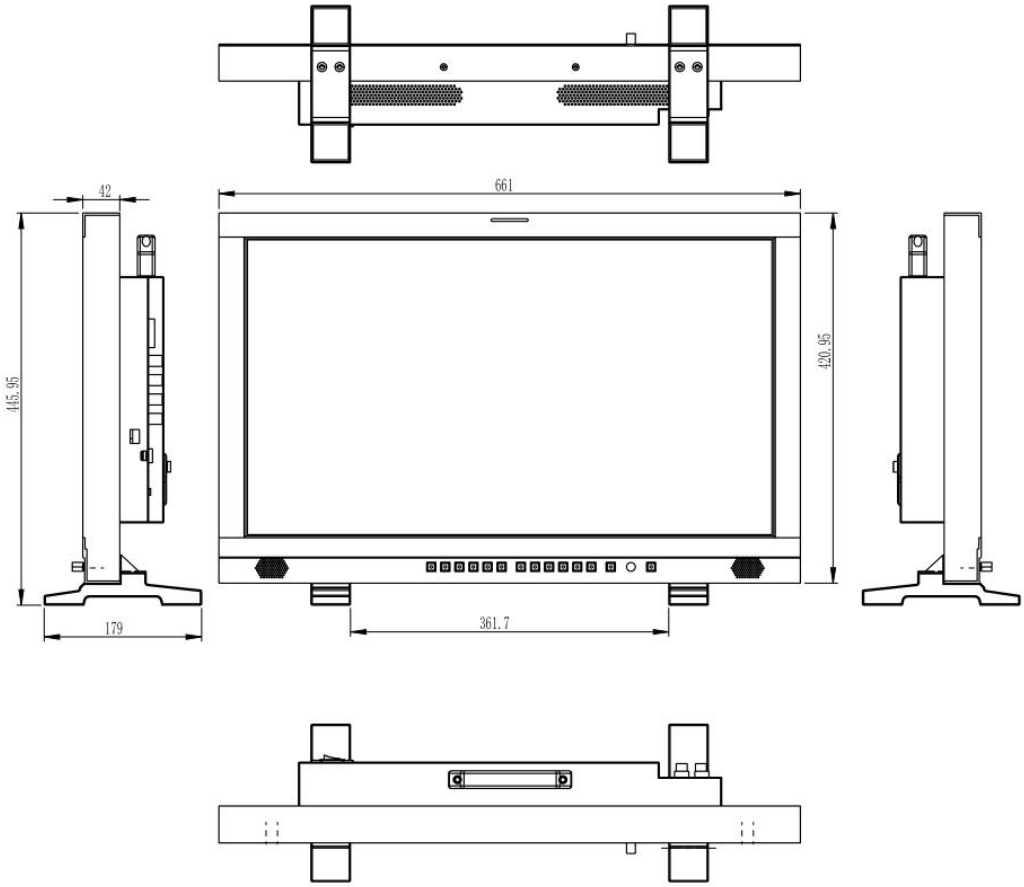
aura UHD 24



Net Weight：8.6kg

Dimension：572mm×407mm×160mm

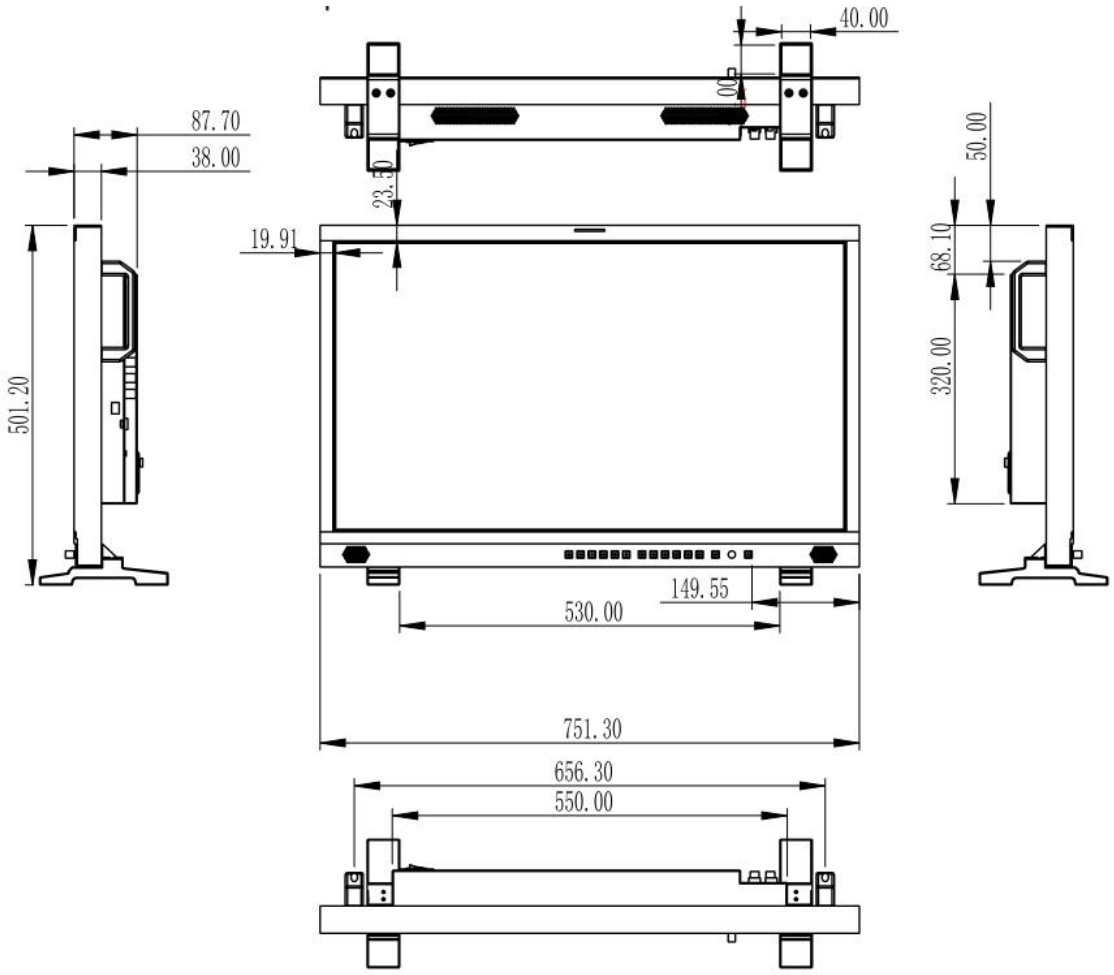
aura UHD 27



Net Weight：11.4kg

Dimension：661mm×179mm×420mm

aura UHD 32



Net Weight： 15.3kg

Gross Weight： 751mm×179mm×502mm

Chapter 2 Use Your Product

2.1 Menu

Main Menu

Status Display
User Preset
Color Management
Picture
Scopes
Auxiliary Function
Display
Marker
Multi Screen
Audio
UMD
System

The monitor comes with OSD menu for parameters adjustment and setting, such as image quality adjustment, input signal setting and more.
Use the MENU/EXIT button on the front panel for specific operations of menu.

2.1.1 Status Display

Status Display: Show current settings and status information of monitor.

Status Display	Basic
User Preset	Color Info
Color Management	Scopes & Auxiliary
Picture	SDI Info
Scopes	Hardware Info
Auxiliary Function	
Display	
Marker	
Multi Screen	
Audio	
UMD	
System	

Basic Information

Show Input Source, Resolution, Image Division, Scan Mode, Aspect Ratio, Zoom Mode, Freeze, Flip Mode, Multi

Screen Mode, Key Lock, Audio Source, Volume.

Color Information

Show Color Preset Mode, Color Temp, Color Gamut, Gamma (EOTF), HDR Auto Setting, Backlight, Input Range, Contrast, Brightness, Chroma, Aperture.

Scopes & Auxiliary Information

Show Waveform, Histogram, Vector Scope , False Color, Zebra, Test Signal, SDI Eye Diagram, Blue Only/Mono , Screen Saver.

SDI Info

Show SDI Input, Payload ID, Video Standard, Sampling, Picture Rate, Scanning Mode, Bit Depth, Link Assignment, Colorimetry, Transfer Type.

Hardware Information

Show Hardware Version, Software Version, FPGA Version, Serial Number, Model Name, IP address, Subnet Mask, Gateway and Port Number.

2.1.2 User Preset

User Preset: Preset function keys and GPI, and store, load and restore the preset values.

Status Display	F Button Preset
User Preset	F1 Button
Color Management	F2 Button
Picture	F3 Button
Scopes	F4 Button
Auxiliary Function	F5 Button
Display	GPI Preset
Marker	GPI1
Multi Screen	GPI2
Audio	GPI3
UMD	GPI4
System	GPI5
	All Data Load
	All Data Save

F Button Preset

Five modes with different functions, which are corresponding to the F1-F5 shortcut keys on the front panel. Users can also modify the five preset modes.

F1 to F5 Button

Functions of F1 to F5 buttons can be set as following:

Color preset mode, gamut, gamut contrast, gamut warning, camera log, color temperature, black level expansion, window selection, flip mode, static frame, waveform, single-line waveform, vector, histogram, audio table, auxiliary focus, false color, zebra, UMD, marker display, cross hatch, all-blue/black-white mode, time code, audio signal source, and so on.

GPI Preset

5 presets available, which can achieve distant control, storage and load.

GPI1 to GPI5

Functions of GPI1 to GPI5 can be set as following:

SFP, SDI1-4, 4XSDI(SQD), 4XSDI(2SI), HDMI, UMD, marker display, cross hatching, red Tally, green Tally, yellow Tally, time code, static frame, flip mode, auxiliary focus, false color, zebra crossing, waveform, single-line waveform , histogram, vector, audio signal source, audio table.

Data Load

Load data of preset F1-F5.

2.1.3 Color Management

Color Management: For color setting and adjustment.

Status Display	Color Preset Mode
User Preset	Backlight
Color Management	Gamma(EOTF）
Picture	PQ Option
Scopes	HLG System Gamma
Auxiliary Function	Color Gamut
Display	Color Gamut Warning
Marker	Color Gamut Clipping
Multi Screen	Luminance Warning
Audio	EETF
UMD	Camera Log
System	User Camera Log
	HDR Auto Setting
	Gamut Comparison
	Left Color Gamut
	Right Color Gamut

Color Preset Mode

Show BT.709, BT.2020, DCI-P3, PQ_DCI-P3, PQ_BT.2100, HLG_BT.2100, User 1-5

Backlight

0~100 adjustable.

Gamma(EOTF)

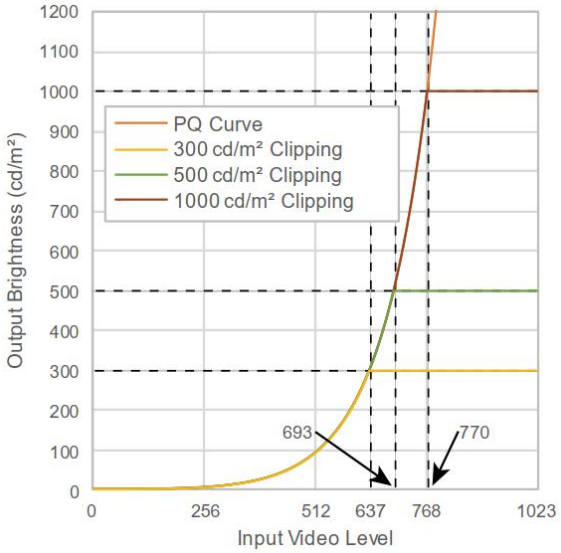
Set Gamma（EOTF）as following：

Gamma2.0, Gamma2.2, Gamma2.4, Gamma2.6, SMPTE ST 2084(PQ), ITU-R BT.2100(HLG), S-Log3, Canon Log, User Gamma LUT1-4

PQ Option

Show different brightness value:

PQ-300, PQ-500, PQ-1000



HLG System Gamma：

1.0, 1.1, 1.2, 1.3, 1.4, 1.5

Color Gamut:

Choose from：

Origian, ITU-R BT.709,SMPTE-C,EBU,DCI-P3,ITU-R BT.2020,User 1-5

Gamut Warning: ON/OFF

This function will show image beyond BT.709 in magenta, reminding that the image will not be able to display the color of the part beyond the monitor screen when editing with Rec.709. This function is only effective under BT.2020 color gamut.

Luminance Warming: ON/OFF

Maximum brightness shows in magenta.(Only can be chosen under PQ_BT.2100,HLG_BT.2100)

EETF:ON/OFF

This is a conversion function of HDR signal, which can display the HDR information of the monitor's actual brightness. When this function is turned on, the highest brightness of HDR is automatically mapped to the highest brightness of the

monitor, and the details of the image will be preserved. When this function is turned off, the part of the image that exceeds the real brightness of the monitor will be saturated. This function is only available in PQ mode.

Camera Log

Choose from：

OFF

SLog3 To LC-709TypeA

SLog3 To SLog2-709

SLog3 To Cine+709

SLog3 to Rec709

SLog2 to Rec709

Canon Log to Rec709

Canon Log to Cineon

Arri LogC to Rec709

V-Log to V-709

User Log

User Camera Log

Log1-8 can be customized, which can be achieved via network or USB.

HDR Auto Setting: ON/OFF

The monitor will automatically select the color gamut and EOTF(PQ or HLG) curve according to the payload id of SDI signal source.

Gamut Comparison: ON/OFF

Can achieve comparison between left and right windows of different color gamut.

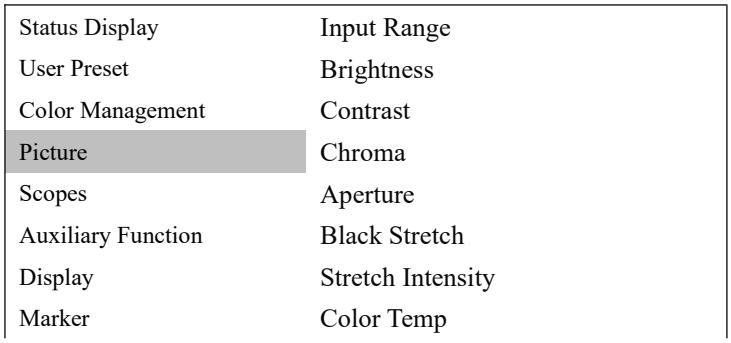
Left/Right Color Gamut

Choose from：

Original,ITU-R BT.709,SMPTE-C,EBU,DCI-P3,ITU-R BT.2020,User 1-5.

2.1.4 Picture

Picture：For adjustment of picture parameter.



Multi Screen	Red Gain
Audio	Green Gain
UMD	Blue Gain
System	Red Bias
Status Display	Green Bias
	Blue Bias
	Copy

Input Range
Limited: 64-940
Full Range: 0-1023
SDI Range 4-1019
Extension: 64-1019

Brightness:-1024~1023 (Default:0)

Contrast:-1024~1023 (Default:1024)

Chroma: -50~50 (Default:0)

Aperture: 0~100 (Default:50)

Black Stretch: ON/OFF
This function can enhance contrast

Stretch Intensity:0~1023 (Default:512)

Color Temp: Choose from D55,D65（default）,D93,DCI-P3,User 1-3(Set the color temperature to save and load.)

Red, Green, Blue Gain: 0~2047 (Default:1024)

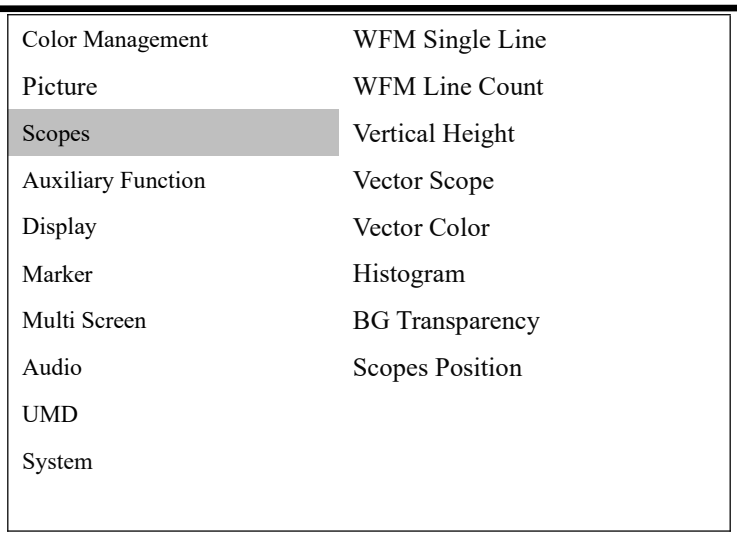
Red, Green, Blue Bias: -512~511 (Default:0)

Copy: For copy of white balance data of selected color temperature.
Choose from: D55,D65,D93,DCI-P3,User 1-3

2.1.5 Scopes

Scopes：To monitor, analyze and adjust video signals.

Status Display	Waveform
User Preset	Waveform Color



Waveform: OFF/Brightness Waveform/Component Waveform, RGB Waveform, RGB Superimposed Waveform

Waveform Color: white, green, yellow

WFM Single Line: ON/OFF

WFM Line Count:
Adjust the waveform with specific lines when displaying single-line waveform. (Only available under single-line waveform, and the range of line number depends on the current signal format.)

Vertical Height:
Display height of single-line waveform, choose from 128-lines, 256-lines and 512-line.

Vector Scope: ON/OFF
The color and saturation of the image are represented by waveform in a vector oscilloscope. The higher the saturation, the more stretched the waveform.

Vector Color: white or green

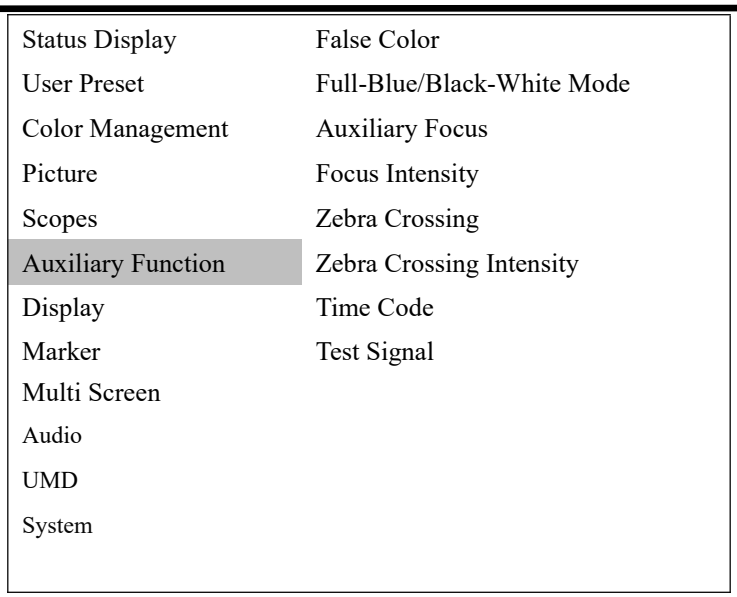
Histogram:
Choose from：OFF,Brightness Histogram, RGB Histogram, RGB Superposition Histogram.

BG Transparency: Dark, low and high

Scopes Position: low, medium and high

2.1.6 Auxiliary Function

Auxiliary Function: To monitor, analyze and adjust video signals.



False Color: ON/OFF
Different false-color images are displayed when there are different exposure pictures in the image.

Blue Only/Mono:
Monochrome Mode Setting：OFF, All-Blue, Black-White, All-Red, All-Green

Focus Assist:
Choose from: OFF, Red, Blue, Green

Focus Intensity: Set auxiliary focus intensity

Zebra: ON/OFF
Count the display area in the image where the Y value is greater than the set value, and mark it with a white slash.

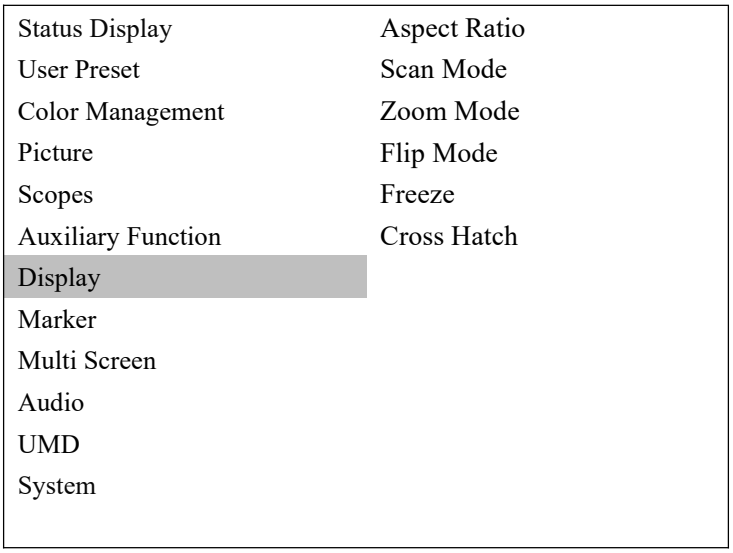
Zebra Intensity:
Adjust zebra crossing intensity

Time Code:
Set the time code format.：OFF,LTC,VITC

Test Signal: OFF, Color Bar, White, Red, Green, Blue
This function can directly display the stored color bar or solid color picture without external signal input, serving as the standard reference color or detecting the monitor screen.

2.1.7 Display

Display: Settings of various display modes.



Aspect Ratio

Choose from：AUTO,1:1,16:9,4:3,2.35:1,1.85:1,15:9,16:10

Scan Mode

Choose from: Zero Scan, Overscan.

Zoom Mode: Achieve a partial amplification of the image.

Choose from: OFF, Upper Left, Top, Upper Right, Left, Right, Bottom, Bottom Left, Bottom Right, Middle

Flip Mode

Choose from:OFF, Horizontal Flip, Vertical Flip, Simultaneous Flip

Freeze

ON: To capture and display a current image.

OFF: Continue to play the video.

Cross Hatch: OFF/ON

This function can display grid lines to help focus different objects.

2.1.8 Marker

Marker：Settings of various marking lines.

Status Display	Marker Display
User Preset	Aspect Marker
Color Management	Center Marker
Picture	Safety Area
Scopes	Fit Marker
Auxiliary Function	Marker Outside
Display	Line Color
Marker	Line Thickness
Multi Screen	
Audio	
UMD	
System	

Mark Display:ON/OFF

Aspect Marker：
Choose from:OFF,16:9,15:9,14:9,13:9,4:3,2.35:1,1.85:1

Center Mark: OFF,Type 1,Type 2

Safety Area
Choose from: OFF,80%,85%,88%,90%,93%

Fit Marker: ON/OFF
ON: Safe area with aspect ratio
OFF: Safe area with screen ratio

Marker Outside:
Choose from: OFF, Black, Gray, Translucent

Line Color
Choose from：White, Red, Green, Blue, Black, Gray

Line Thickness
Choose from：2 pixels, 4 pixels, 6 pixels, 8 pixels

2.1.9 Multi Screen

Multi Screen：Simultaneous monitoring of multiple screens.

Status Display	Multi Screen Mode
User Preset	Screen A Input
Color Management	Screen B Input

Picture	Screen C Input
Scopes	Screen D Input
Auxiliary Function	Screen A Color Mode
Display	Screen B Color Mode
Marker	Screen C Color Mode
Multi Screen	Screen D Color Mode
Audio	Screen Border
UMD	Screen A Border Color
System	Screen B Border Color
	Screen C Border Color
	Screen D Border Color

Multi Screen Mode: Display multiple signal sources on the same screen
Choose from: OFF, Side 3-Split, Bottom 3-Split, Live Broadcast Mode, PBP, PAP

Screen A-D Input:
Input signal can be chosen from: SDI1,SDI2,SDI3,SDI4,HDMI,SFP,HDMI2,TYPE C
(Note: Screen C can only display HDMI2 and TYPE C.)

Screen Color Mode: Choose color mode of Screen A-D.

Screen Border:
Border thickness of screen can be chosen from: OFF, 2 pixels, 4 pixels, 6 pixels, 8 pixels

Border Color
Choose from: Red, Green, Blue, White, Yellow

2.1.10 Audio

Audio: Settings of audio and audio meter table.

Status Display	Audio Source
User Preset	Speaker Out Left
Color Management	Speaker Out Right
Picture	Volume
Scopes	Audio Level Meter
Auxiliary Function	Meter Direction

Display
Marker
Multi Screen
Audio
UMD
System

Audio Source

Choose from：Undefined, embedded audio

Speaker Out Left/Right：

Choose from CH1,CH2,CH3,CH4,CH5,CH6,CH7,CH8,CH9,CH10,CH11,CH12,CH13,CH14,CH15,CH16

Volume: 0~100 (Default:30)

Audio Level Meter: OFF,G1

Meter Direction

Choose from: vertical and horizontal.

2.1.11 UMD

UMD：Settings of UMD, TSL, Baud Rate.

Status Display	UMD Display
User Preset	Character Color
Color Management	UMD Position
Picture	UMD Size
Scopes	UMD Transparency
Auxiliary Function	Display Type
Display	UMD Standard
Marker	UMD ID
Multi Screen	Baud Rate
Audio	Source Name
UMD	
System	

UMD Display: ON/OFF

Character Color

Choose from: White, Red, Green, Yellow, Cyan, Magenta

UMD Position

Position can be set from top or bottom.

UMD Size
Set UMD size to be large or small.

UMD Transparency
Choose from：OFF,Low,High

Display Type: Source ID,UMD

UMD Standard: OFF,TSL V3.1,TSL V4.0,TSL V5.0

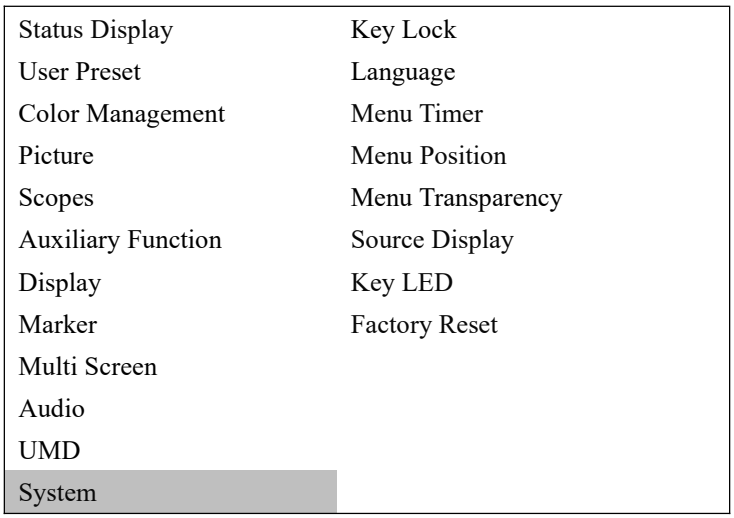
UMD ID: 0~127 (Default: 0)

Baud Rate: 38400,8,e,1 ; 115200,8,e,1

Source Name: Set name of UMD source

2.1.12 System

System: Settings of Key Lock, Language, Menu Transparency and more.



Key Lock: OFF/Full Lock
Full Lock: All function keys are locked and cannot be used. Users need to enter the menu to select OFF for reuse.

Language: English/Simplified Chinese

Menu Timer: 5s, 10s, 30s, 60s (OSD disappears after the corresponding time.)

Menu Position:
Choose from: Top Left, Top Right, Middle, Left, Right

Menu Transparency
Increase transparency to see the background image directly.

Source Display: OFF/ON

Key LED: OFF/ON

Factory Reset: NO/Reset All Settings

Chapter 3 Ordering Codes

3.1 Product Code

400-2380-02-0	aura UHD 24	23.8 Inch 12G-SDI HDR Monitor
400-2700-02-0	aura UHD 27	27 Inch 12G-SDI HDR Monitor
400-3200-02-0	aura UHD 32	32 Inch 12G-SDI HDR Monitor

Chapter 4 Support

4.1 Contact Us

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Beijing Region Office
Beijing, China

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+010- 8577 7286

Europe Regional Sales & Support
Eindhoven, Holland

Flight Forum Eindhoven 5657 DW

+31 (040) 202 71 83

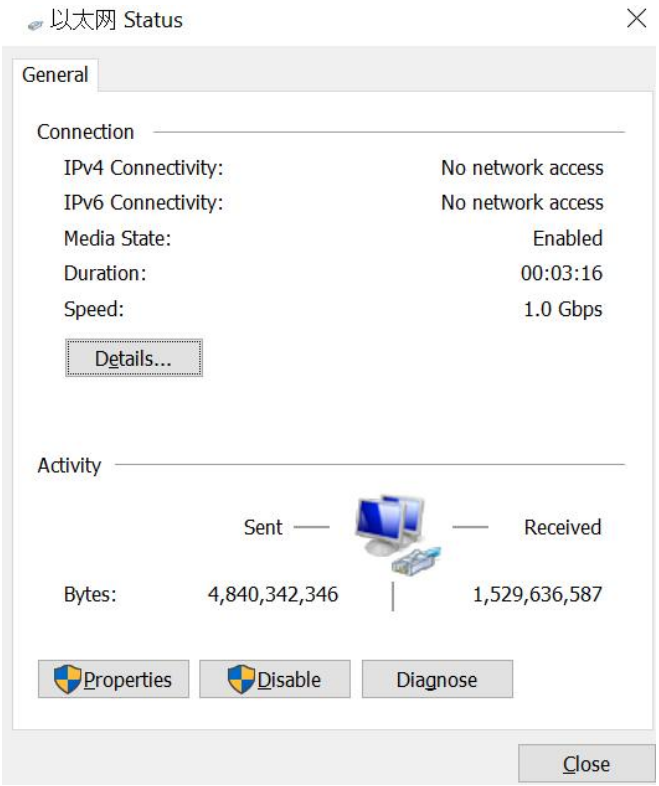
Chapter 5 Upgrade

5.1 Network Upgrade Program Description

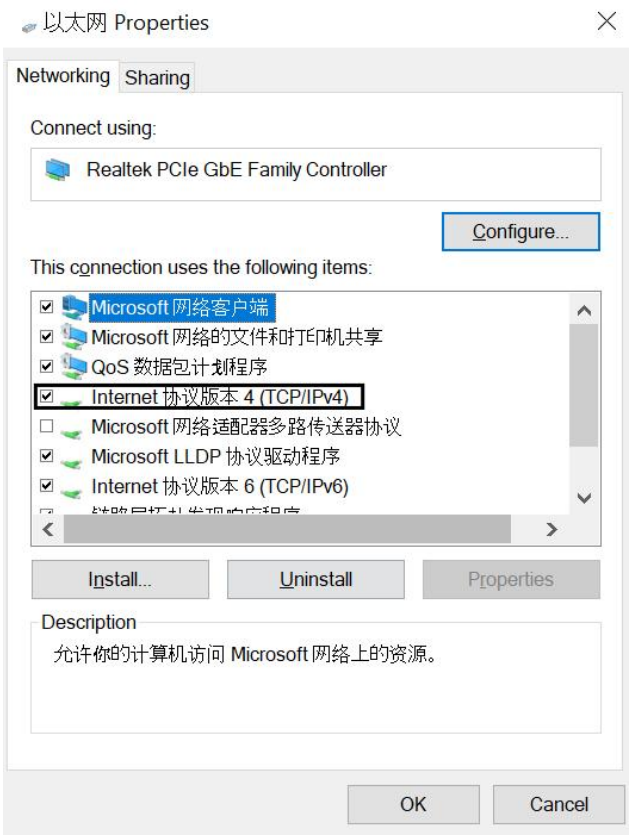
Preparations before the upgrade:

1. Connect the computer and monitor with Ethernet network cable. (The default IP address is 192.168.1.128.)

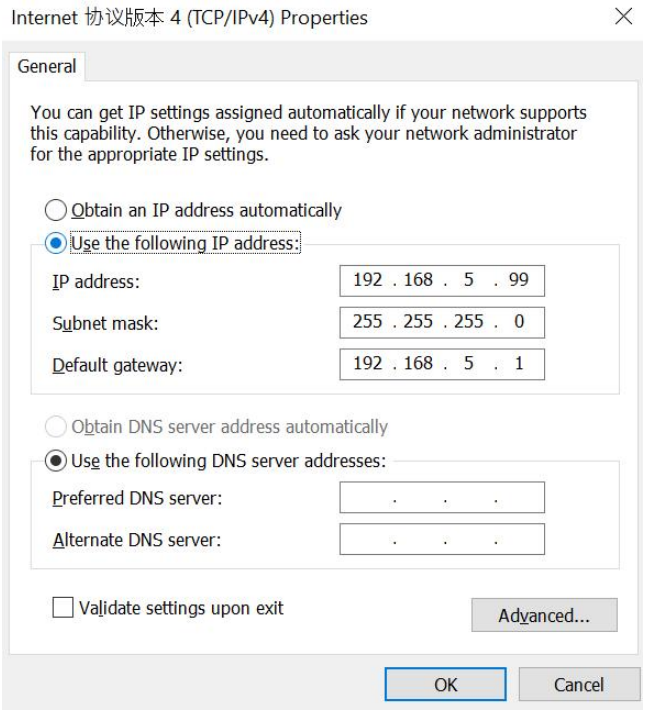
2. Set the Ethernet to a fixed IP address on the PC.
3. Open the "Network Connection" page on the PC, select the corresponding "Ethernet", double-click, the following interface is displayed.



4. Double-click Internet Protocol Version 4(TCP/IPv4) on the Ethernet Properties page. The following page is displayed.

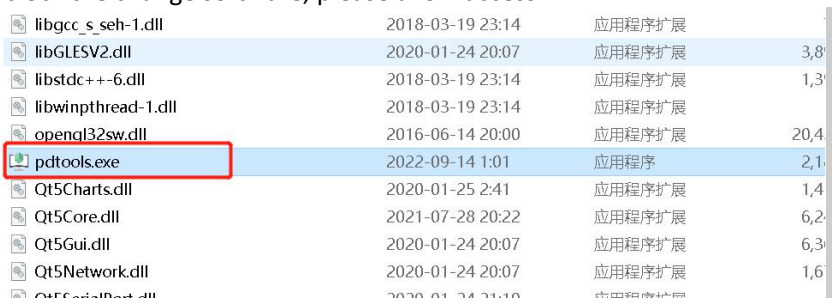


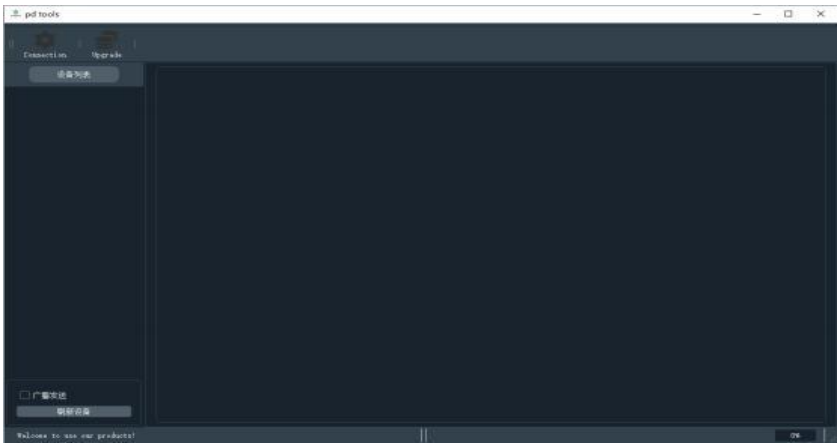
5. On the Internet Protocol Version 4(TCP/IPv4) Properties page, select Use the following IP addresses and set the following parameters: IP Address, Subnet Mask, Default Gateway.
Note: 100 in the IP Address figure can be other values as long as it does not conflict with 192.168.1.128 in the monitor, but it must be on the same network segment.



Upgrade monitor program:

1. Double-click pdtools.exe in the pdtools_210816 folder. The following page is displayed. If a firewall is displayed to block the change software, please allow access.





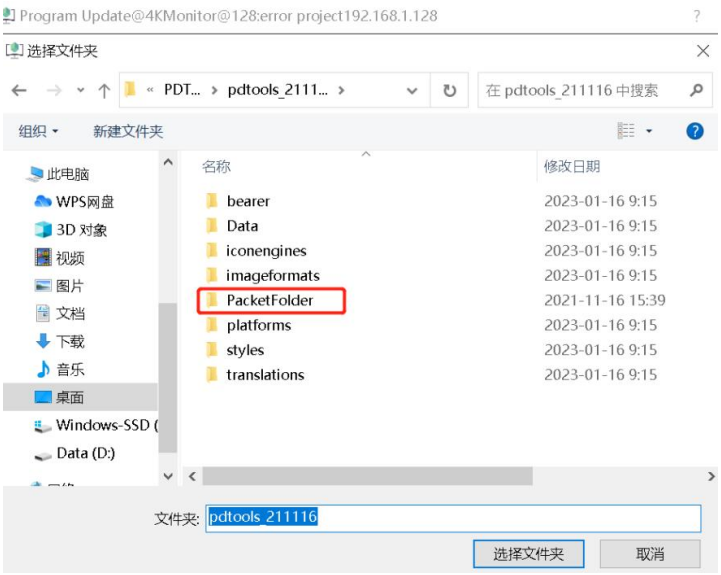
2. Click "Refresh List" on the interface. If the computer is connected to the monitor normally, the following interface will be displayed.

3. Click "Upgrade" in the above interface to display the upgrade interface, as shown in the following figure.

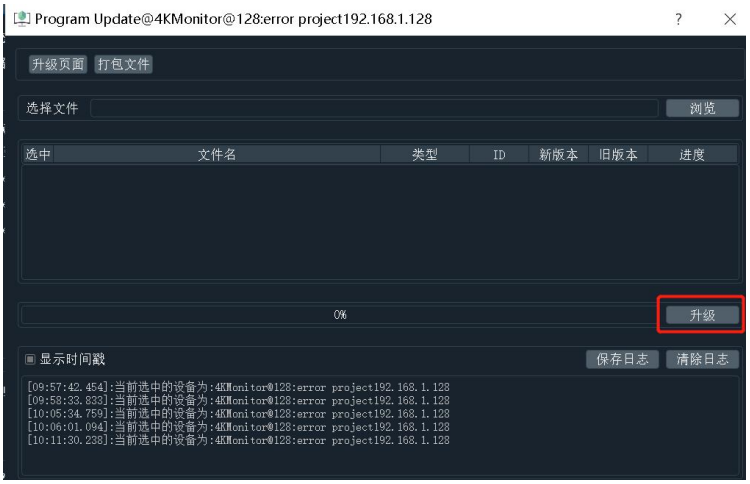
4. Click "Upgrade Page/升级页面" on the upgrade interface, as shown below.

5. Select "Browse/浏览".

6. Select the upgrade.bin file



7. Finally click 升级/Upgrade.



5.2 How to Calibrate Monitor

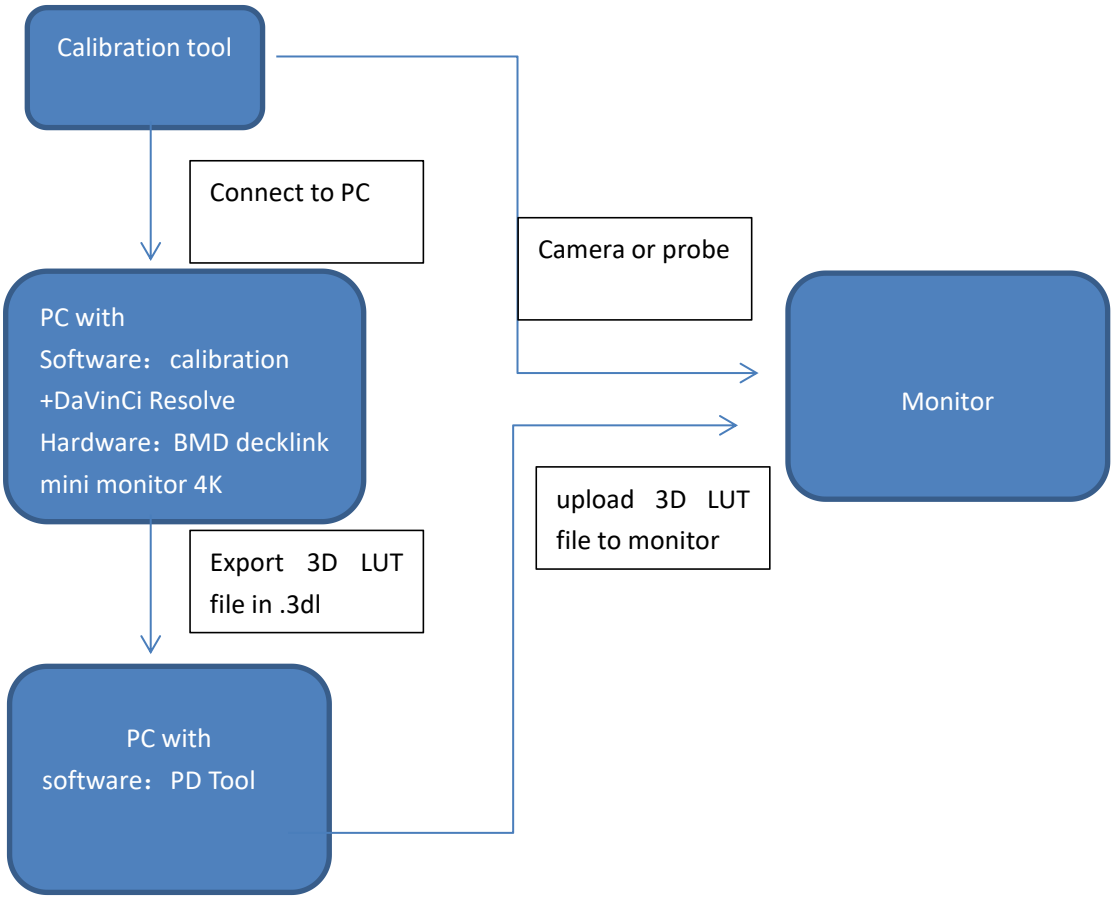
Prepare:

1.Calibrate software-installed on PC

2.Calibration tool-connect to the same PC

3.DaVinci Resolve+BMD DeckLink Mini Monitor 4K(or other SDI PCIe output card) --installed on the same PC

4.Monitor



5.3 3D LUT File Upload Operating Instructions

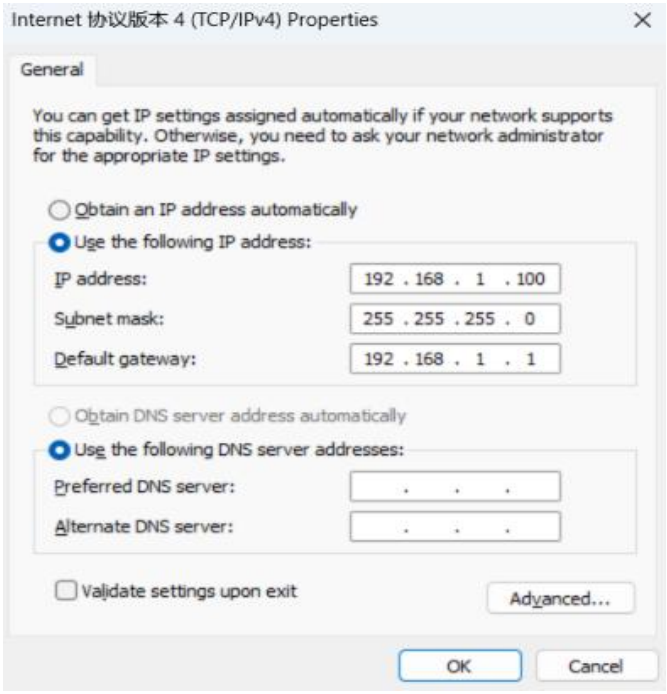
Prepare:

Before upgrade, unzip the PD tool package.

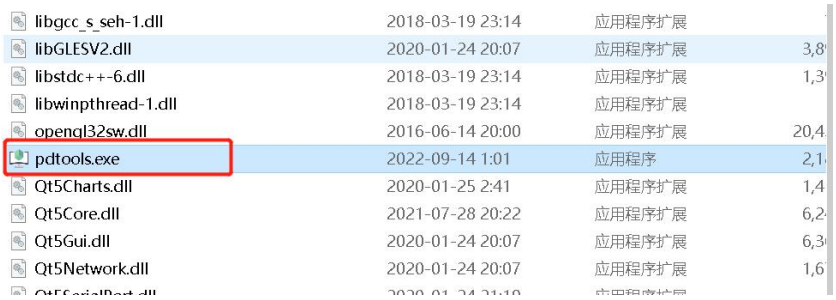
1.Connect the computer and monitor with Ethernet cable (default IP address is 192.168.1.128).

2.Set Ethernet as fixed IP address at the computer, as shown below, in ***Internet Protocol Version 4 (TCP/IPv4) Properties*** interface, choose Use the following IP address, fill the IP address, Subnet mask, Default gateway.

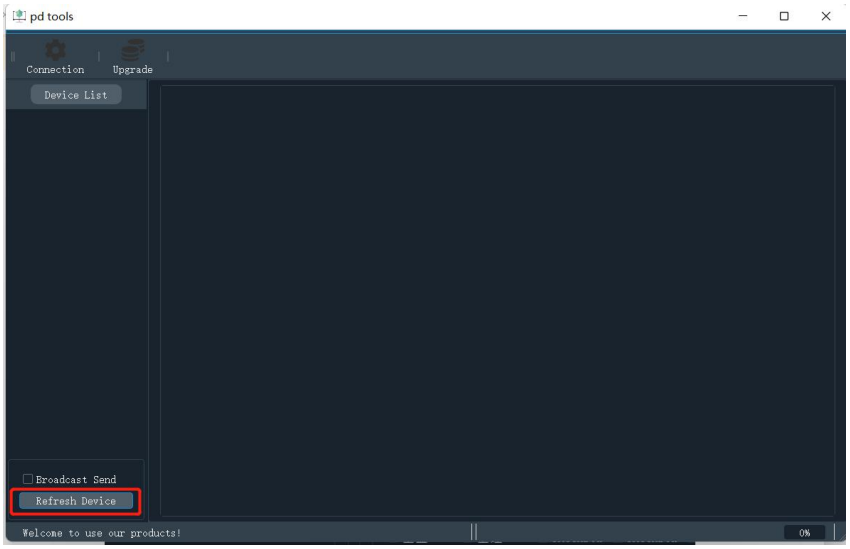
Remark: IP address the 100 can be other values, as long as it does not conflict with 192.168.1.128, but it must on the same network segment.



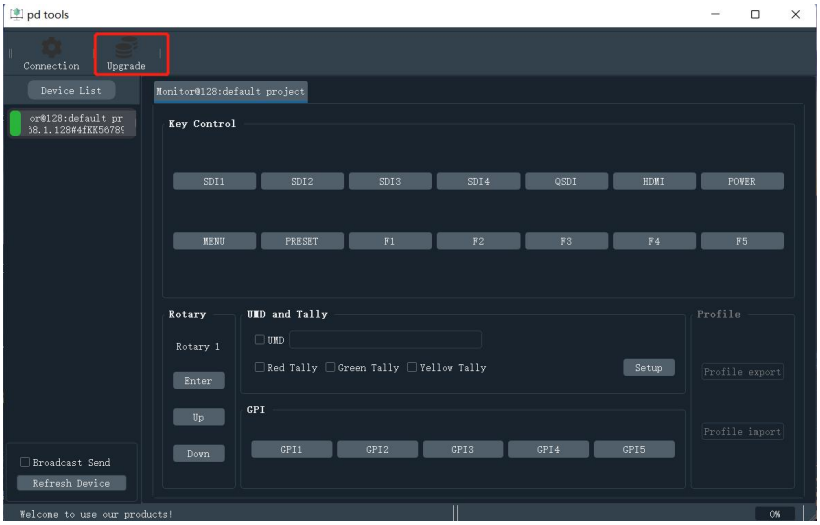
3. Double-click "pdtools.exe" to open the interface as follows. If a firewall pops up to prevent the software from being changed, click "Allow access".

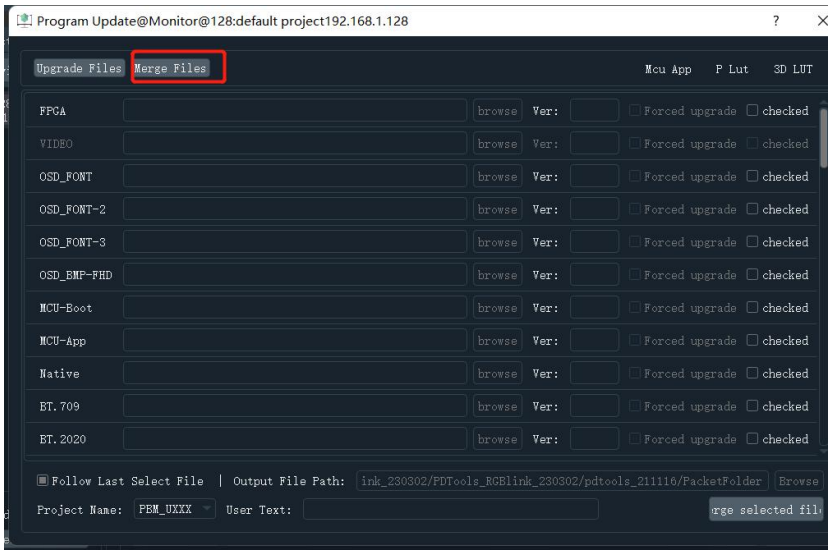


4. Click "Refresh Device" on the interface. If the computer and monitor are connected correctly, will display the following interface.

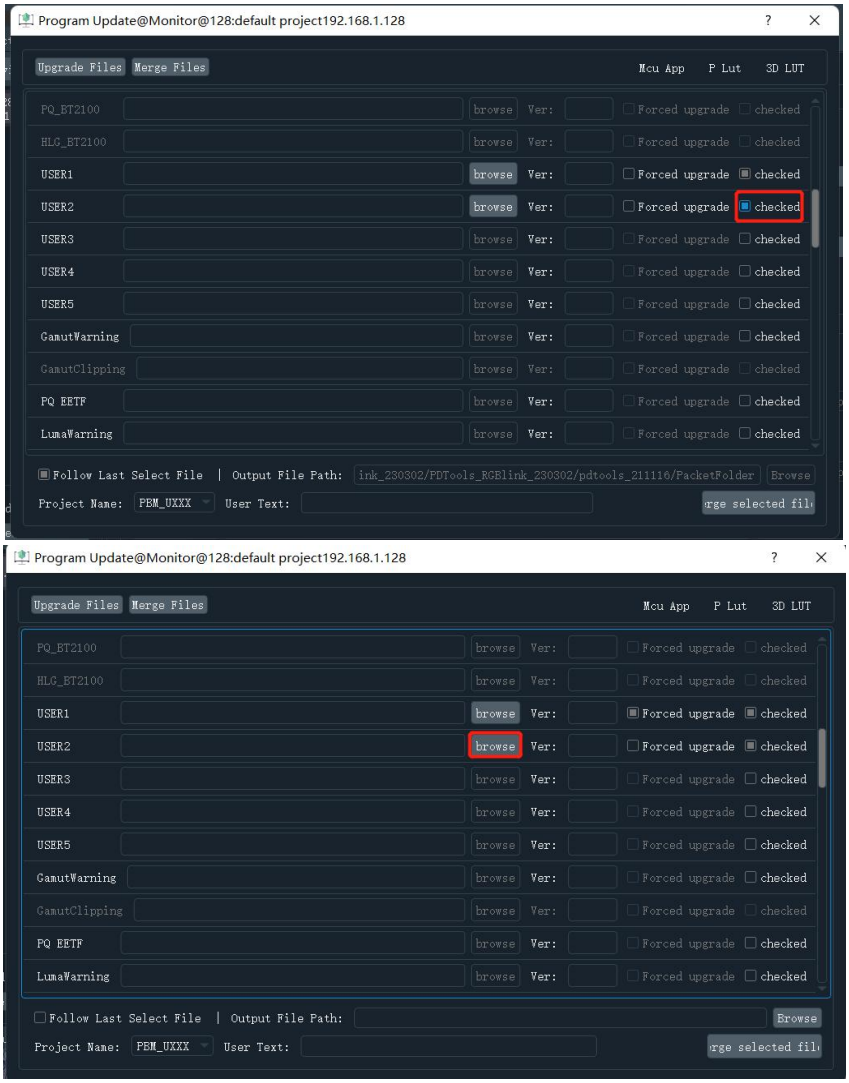


5.Click "Upgrade" in the interface, the pop-up interface is as follows, and click "merge files".

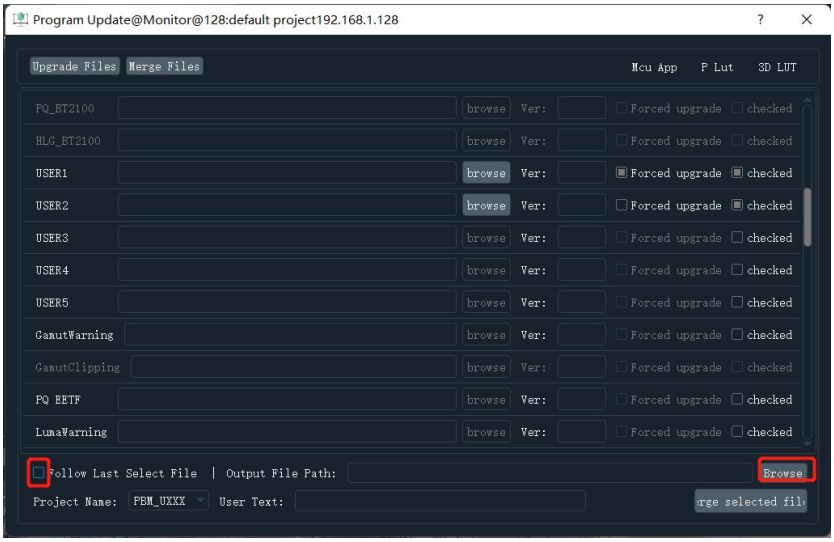




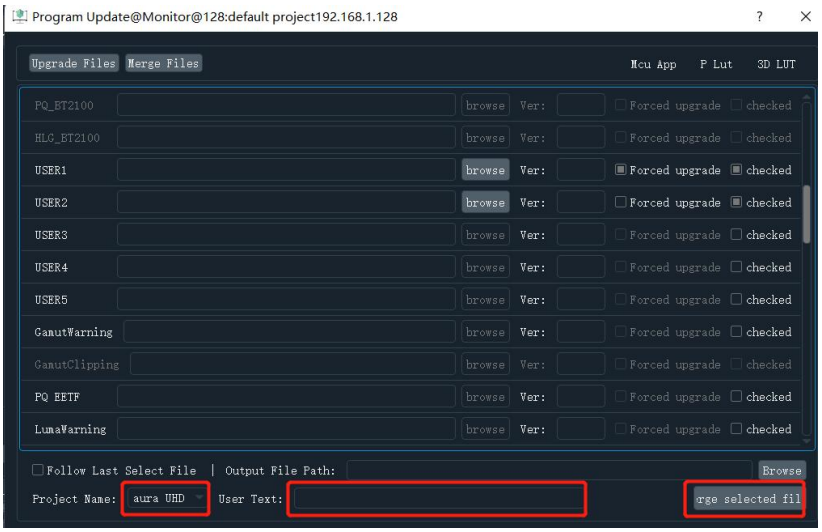
6.Click "Checked" behind USER1/USER2/USER3/USER4/USER5. If you only upgrade USER1 and USER2, you only need to click Select behind USER1 and USER2 to select, and then click "Browse" to select the 3D LUT file to be upgraded, the file should be in .3dl format. Choose 3D LUT.



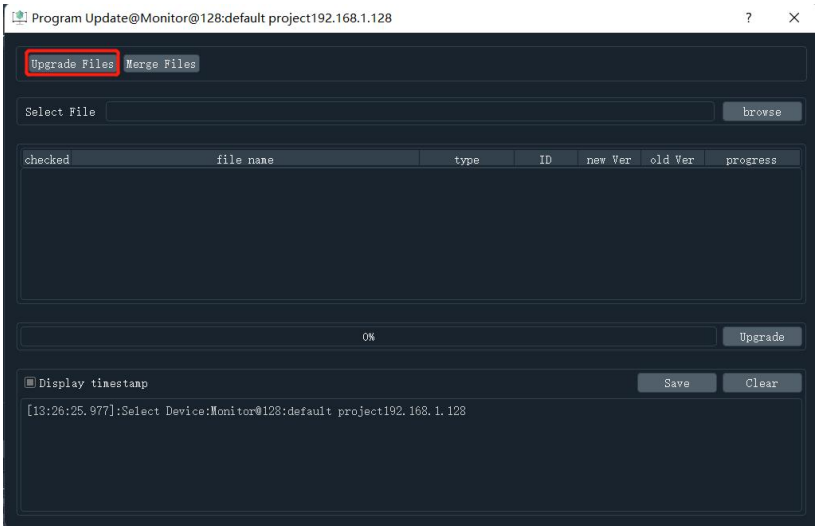
7.Finally, click “Browse” to select location file for merged 3d lut file "Merge Selected Files".



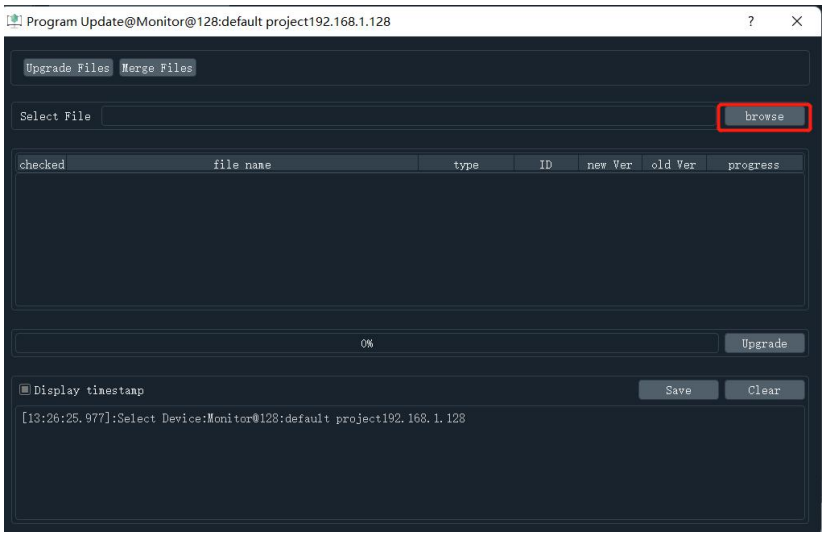
After output path is selected, optionally filling in project name and user text and then click “Merge selected files” . The merged file will be stored in the selected file path.



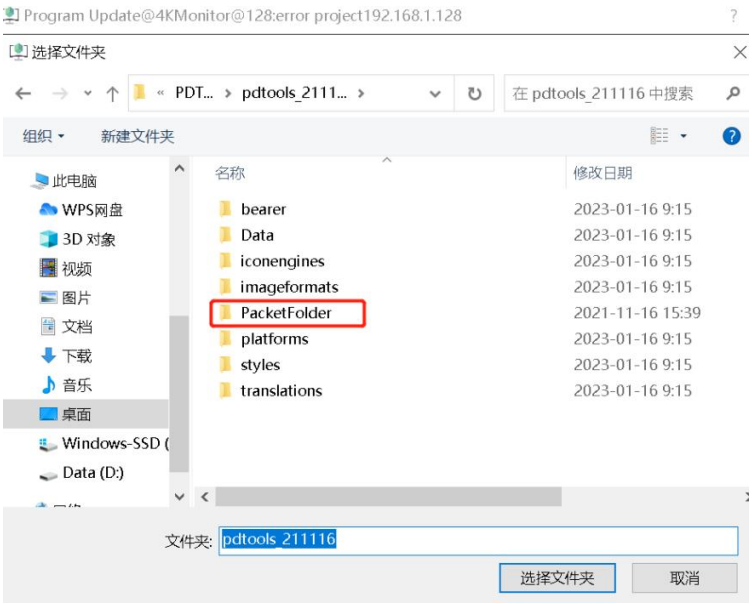
8.Click "Upgrade Files" on the upgrade interface, as shown below.



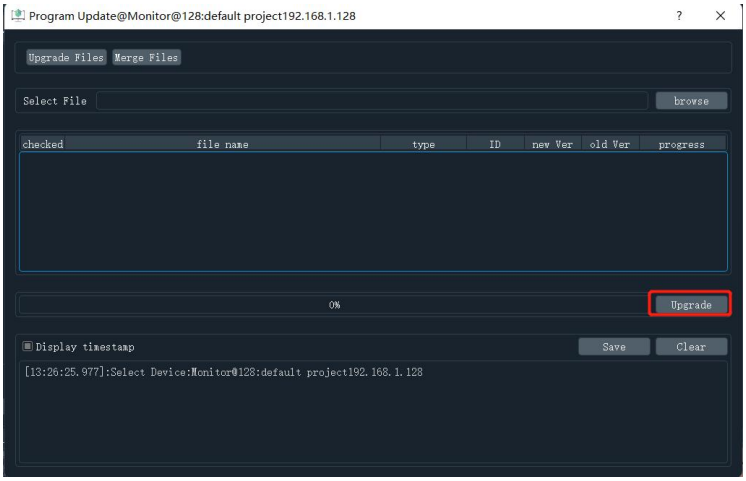
9.Select "browse".



Select the merged file generated from last step.



Finally, click “Upgrade”.



Chapter 6 Appendix

6.1 Specification

Screen	Model	IPS LCD screen
	Size	23.8 Inch / 27 Inch / 32 Inch
	Resolution	3840 x 2160
	Dot Pitch	0.1369（H）×0.1369（V）mm
	Aspect Ratio	16:9 / 4:3 convertible
	Backlight	LED
	Brightness	540 cd/m^2, 800 cd/m^2, 700 cd/m2
	Contrast	1200:1
	Color Depth	10bits
	Image Processing	12bits
	Response Time	9ms
	View Angle	Pan:178° / Tilt:178°
Input	12G-SDI	BNC x 4
	HDMI2.0	x 2
	SFP	12G transmission rate
	Type-C(Compatible with Thunderbolt 3)	x 1
Output	12G-SDI	BNC x 4
Audio	Audio De-embedding	Support
	Audio Level Meter	16-way（Up to 8 channels can be displayed simultaneously.）
	Built-In Speaker	1-way×8Ω /0.5W
	Earphone Monitoring	Stereo mini jack x1
Universal	Network Port x 1	Control/upgrade，RJ-45 input
	GPI x 1	GPI1-5 ,RJ-45P
	Serial Port x 2	RS-422，RJ-45P In/Loop
	Input Voltage	AC 100 V to 240 V, 2.8 A to 1.2 A, 50/60 Hz
	Power Consumption	150W (Max)，75W(Average)
	Working Temperature	-10° C to 55° C (14° F to 155° F)
	Storage Temperature	-20-60℃
	Working Humidity	30%-85%, RH

6.2 Supported Signal Format

SDI Signal Format

Single Link

Protocol	Resolution	Color Space	Frame Rate	Mode	Division Method
SMPTE-296M	1280×720	4:2:2, YCbCr, 10bit	60P, 60/1.001p, 50p, 30P, 30/1.001p, 25p, 24p, 24/1.001p	//	//
SMPTE-274M	1920×1080	4:2:2, YCbCr, 10bit	30p, 30/1.001p, 25p, 24p, 24/1.001p 30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF 60i, 60/1.001i, 50i	//	//
SMPTE-2048M-2	2048×1080	4:2:2, YCbCr, 10bit	30p, 30/1.001p, 25p, 24p, 24/1.001p 30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF	//	//
SMPTE-274M	1920×1080	4:2:2, YCbCr, 10bit	60p, 60/1.001p, 50p	Level A Level B-DL	//
SMPTE-2048M-2	2048×1080	4:2:2, YCbCr, 10bit	60p, 60/1.001p, 50p, 48p, 48p/1.001p	Level A Level B-DL	//
SMPTE-296M	1280×720	4:4:4, RGB/RGBA, 10bit 4:4:4, YCbCr/ YCbCrA, 10bit	60P, 60/1.001p, 50p, 30P, 30/1.001p, 25p, 24p, 24/1.001p	Level A	//
SMPTE-274M	1920×1080	4:4:4, RGB/RGBA, 10bit 4:4:4, YCbCr/ YCbCrA, 10bit	30p, 30/1.001p, 25p, 24p, 24/1.001p 30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF 60i, 60/1.001i, 50i	Level A Level B-DL	//
SMPTE-2048M-2	2048×1080	4:4:4, RGB/RGBA, 10bit 4:4:4, YCbCr/ YCbCrA, 10bit	30p, 30/1.001p, 25p, 24p, 24/1.001p 30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF	Level A Level B-DL	//
SMPTE-274M	1920×1080	4:4:4, RGB, 12bit 4:4:4, YCbCr, 12bit	30p, 30/1.001p, 25p, 24p, 24/1.001p 30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF 60i, 60/1.001i, 50i	Level A Level B-DL	//
SMPTE-2048M-2	2048×1080	4:4:4, RGB, 12bit 4:4:4, YCbCr, 12bit	30p, 30/1.001p, 25p, 24p, 24/1.001p 30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF	Level A Level B-DL	//
SMPTE-274M	1920×1080	4:2:2, YCbCr, 12bit	30p, 30/1.001p, 25p, 24p, 24/1.001p 30PsF, 30/1.001PsF, 25PsF, 24PsF,	Level A Level	//

			24/1.001PsF 60i, 60/1.001i, 50i	B-DL	
SMPTE-2048M-2	2048×1080	4:2:2, YCbCr, 12bit	30p, 30/1.001p, 25p, 24p, 24/1.001p 30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF	Level A Level B-DL	//
	2048×1080	4:4:4, XYZ, 12bit	30p, 25p, 24p 30PsF, 25PsF, 24PsF	Level A Level B-DL	//
SMPTE-2036M-1	3840×2160	4:2:2, YCbCr, 10bit	30p, 30/1.001p, 25p, 24p, 24/1.001p	MODE-1	2SI/SQD
SMPTE-2048M-2	4096×2160	4:2:2, YCbCr, 10bit	30p, 30/1.001p, 25p, 24p, 24/1.001p	MODE-1	2SI/SQD
SMPTE-2036M-1	3840×2160	4:2:2, YCbCr, 10bit 4:2:0, YCbCr, 10bit	60p, 60/1.001p, 50p	MODE-1	2SI/SQD
SMPTE-2048M-2	4096×2160	4:2:2, YCbCr, 10bit	60p, 60/1.001p, 50p, 48p, 48p/1.001p	MODE-1	2SI/SQD
SMPTE-2036M-1	3840×2160	4:4:4, RGB, 10bit 4:4:4, YCbCr, 10bit	30p, 30/1.001p, 25p, 24p, 24/1.001p	MODE-1	2SI/SQD
SMPTE-2048M-2	4096×2160	4:4:4, RGB/RGBA, 10bit 4:4:4, YCbCr/ YCbCrA, 10bit	30p, 30/1.001p, 25p, 24p, 24/1.001p	MODE-1	2SI/SQD
SMPTE-2036M-1	3840×2160	4:4:4, RGB, 12bit 4:4:4, YCbCr, 12bit	30p, 30/1.001p, 25p, 24p, 24/1.001p	MODE-1	2SI/SQD
SMPTE-2048M-2	4096×2160	4:4:4, RGB, 12bit 4:4:4, YCbCr, 12bit	30p, 30/1.001p, 25p, 24p, 24/1.001p	MODE-1	2SI/SQD
SMPTE-2036M-1	3840×2160	4:2:2, YCbCr, 12bit	30p, 30/1.001p, 25p, 24p, 24/1.001p	MODE-1	2SI/SQD
SMPTE-2048M-2	4096×2160	4:2:2, YCbCr, 12bit	30p, 30/1.001p, 25p, 24p, 24/1.001p	MODE-1	2SI/SQD
	4096×2160	4:4:4, XYZ, 12bit	30p, 25p, 24p	MODE-1	2SI/SQD

Dual Link

Protocol	Resolution	Color Space	Frame Rate	Mode	Division Method
SMPTE-274M	1920×1080	4:2:2, YCbCr, 10bit	60p, 60/1.001p, 50p	//	//
SMPTE-2048M-2	2048×1080	4:2:2, YCbCr, 10bit	60p, 60/1.001p, 50p, 48p, 48p/1.001p	//	//
SMPTE-274M	1920×1080	4:4:4, RGB, 10bit 4:4:4, YCbCr, 10bit	30p, 30/1.001p, 25p, 24p, 24/1.001p 30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF	//	//

			60i, 60/1.001i, 50i		
SMPTE-2048M-2	2048×1080	4:4:4, RGB, 10bit 4:4:4, YCbCr, 10bit	30p, 30/1.001p, 25p, 24p, 24/1.001p 30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF	//	//
SMPTE-274M	1920×1080	4:4:4, RGB, 12bit 4:4:4, YCbCr, 12bit	30p, 30/1.001p, 25p, 24p, 24/1.001p 30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF 60i, 60/1.001i, 50i	//	//
SMPTE-2048M-2	2048×1080	4:4:4, RGB, 12bit 4:4:4, YCbCr, 12bit	30p, 30/1.001p, 25p, 24p, 24/1.001p 30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF	//	//
SMPTE-274M	1920×1080	4:2:2, YCbCr, 12bit	30p, 30/1.001p, 25p, 24p, 24/1.001p 30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF	//	//
SMPTE-2048M-2	2048×1080	4:2:2, YCbCr, 12bit	30p, 30/1.001p, 25p, 24p, 24/1.001p	//	//
	2048×1080	4:4:4, XYZ, 12bit	30p, 25p, 24p 30PsF, 25PsF, 24PsF	//	//

Quad Link

SMPTE 2082-1	7680×4320	4:2:2, YCbCr, 10bit	23.98p,24p,25p,29.97p,30p,50p,59.94p,60p	//	2SI
SMPTE 2082-10	8192×4320	4:2:2, YCbCr, 10bit	23.98p,24p,25p,29.97p,30p,50p,59.94p,60p	//	2SI
SMPTE-2036M-1	3840×2160	4:2:2, YCbCr, 10bit	30p, 30/1.001p, 25p, 24p, 24/1.001p 30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF	//	SQD
SMPTE-2048M-2	4096×2160	4:2:2, YCbCr, 10bit	30p, 30/1.001p, 25p, 24p, 24/1.001p 30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF	//	SQD
SMPTE-2036M-1	3840×2160	4:2:2, YCbCr, 10bit 4:2:0, YCbCr, 10bit	60p, 60/1.001p, 50p	Level A Level B-DL	2SI/SQD
SMPTE-2048M-2	4096×2160	4:2:2, YCbCr, 10bit	60p, 60/1.001p, 50p, 48p, 48p/1.001p	Level A Level B-DL	2SI/SQD
SMPTE-2036M-1	3840×2160	4:4:4, RGB, 10bit 4:4:4, YCbCr, 10bit	30p, 30/1.001p, 25p, 24p, 24/1.001p	Level A Level B-DL	2SI/SQD
	3840×2160	4:4:4, RGB, 10bit 4:4:4, YCbCr, 10bit	30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF	Level A Level B-DL	SQD

SMPTE-2048M-2	4096×2160	4:4:4, RGB/RGBA, 10bit 4:4:4, YCbCr/ YCbCrA, 10bit	30p, 30/1.001p, 25p, 24p, 24/1.001p	Level A Level B-DL	2SI/SQD
	4096×2160	4:4:4, RGB, 10bit 4:4:4, YCbCr, 10bit	30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF	Level A Level B-DL	SQD
SMPTE-2036M-1	3840×2160	4:4:4, RGB, 12bit 4:4:4, YCbCr, 12bit	30p, 30/1.001p, 25p, 24p, 24/1.001p	Level A Level B-DL	2SI/SQD
	3840×2160	4:4:4, RGB, 12bit 4:4:4, YCbCr, 12bit	30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF	Level A Level B-DL	SQD
SMPTE-2048M-2	4096×2160	4:4:4, RGB, 12bit 4:4:4, YCbCr, 12bit	30p, 30/1.001p, 25p, 24p, 24/1.001p	Level A Level B-DL	2SI/SQD
	4096×2160	4:4:4, RGB, 12bit 4:4:4, YCbCr, 12bit	30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF	Level A Level B-DL	SQD
SMPTE-2036M-1	3840×2160	4:2:2, YCbCr, 12bit	30p, 30/1.001p, 25p, 24p, 24/1.001p	Level A Level B-DL	2SI/SQD
SMPTE-2048M-2	4096×2160	4:2:2, YCbCr, 12bit	30p, 30/1.001p, 25p, 24p, 24/1.001p	Level A Level B-DL	2SI/SQD
	4096×2160	4:4:4, XYZ, 12bit	30p, 25p, 24p,	Level A Level B-DL	2SI/SQD
	4096×2160	4:4:4, XYZ, 12bit	30PsF, 25PsF, 24PsF	Level A Level B-DL	SQD

HDMI Signal Format

4096×2160p (60 / 59.94 / 50 / 30 / 29.97 / 25 / 24 / 23.98)
3840×2160p (60 / 59.94 / 50 / 30 / 29.97 / 25 / 24 / 23.98)
1080p (60 / 59.94 / 50 / 30 / 29.97 / 25 / 24 / 23.98)
1080i (60 / 59.94 / 50)
720p (60 / 59.94 / 50)

6.3 Terms & Definitions

● **RCA:** Connector used primarily in consumer AV equipment for both audio and video. The RCA connector was developed by the Radio Corporation of America.

●**BNC:** Stands for Bayonet Neill-Concelman. A cable connector used extensively in television (named for its inventors). A cylindrical bayonet connector that operates with a twist-locking motion .

●**CVBS:** CVBS or Composite video, is an analog video signal without audio. Most commonly CVBS is used for transmission of standard definition signals. In consumer applications the connector is typically RCA type, while in professional applications the connector is BNC type.

●**YPbPr:** Used to describe the colour space for progressive-scan. Otherwise known as component video.

● **VGA:** Video Graphics Array. VGA is an analog signal typically used on earlier computers. The signal is non-interlaced in modes 1, 2, and 3 and interlaced when using in mode.

● **DVI:** Digital Visual Interface. The digital video connectivity standard that was developed by DDWG (Digital Display Work Group). This connection standard offers two different connectors: one with 24 pins that handles digital video signals only, and one with 29 pins that handles both digital and analog video.

●**SDI:** Serial Digital Interface. Standard definition video is carried on this 270 Mbps data transfer rate. Video pixels are characterized with a 10-bit depth and 4:2:2 color quantization. Ancillary data is included on this interface and typically includes audio or other metadata. Up to sixteen audio channels can be transmitted. Audio is organised into blocks of 4 stereo pairs. Connector is BNC.

●**HD-SDI:** High-definition serial digital interface (HD-SDI), is standardized in SMPTE 292M this provides a nominal data rate of 1.485 Gbit/s.

●**3G-SDI:** Standardized in SMPTE 424M, consists of a single 2.970 Gbit/s serial link that allows replacing dual link HD-SDI.

●**6G-SDI:** Standardized in SMPTE ST-2081 released in 2015, 6Gbit/s bitrate and able to support 2160p@30.

●**12G-SDI:** Standardized in SMPTE ST-2082 released in 2015, 12Gbit/s bitrate and able to support 2160p@60.

●**U-SDI:** Technology for transmitting large-volume 8K signals over a single cable. a signal interface called the ultra high definition signal/data interface (U-SDI) for transmitting 4K and 8K signals using a single optical cable. The interface was standardized as the SMPTE ST 2036-4.

●**HDMI:** High Definition Multimedia Interface: An interface used for the transmission of uncompressed high definition video, up to 8 channels of audio, and control signals, over a single cable.
●**HDMI 1.3:** Released on June 22 2006, and increased the maximum TMDS clock to 340 MHz (10.2 Gbit/s). Support

resolution 1920 × 1080 at 120 Hz or 2560 × 1440 at 60 Hz). It added support for 10 bpc, 12 bpc, and 16 bpc color depth (30, 36, and 48 bit/px), called deep color.

●**HDMI 1.4:** Released on June 5, 2009, added support for 4096 × 2160 at 24 Hz, 3840 × 2160 at 24, 25, and 30 Hz, and 1920 × 1080 at 120 Hz. Compared to HDMI 1.3, 3 more features added which are HDMI Ethernet Channel (HEC) , audio return channel (ARC),3D Over HDMI, a new Micro HDMI Connector, an expanded set of color spaces.

●**HDMI 2.0:** Released on September 4, 2013 increases the maximum bandwidth to 18.0 Gbit/s. Other features of HDMI 2.0 include up to 32 audio channels, up to 1536 kHz audio sample frequency, the HE-AAC and DRA audio standards, improved 3D capability, and additional CEC functions.

●**HDMI 2.0a:** Was released on April 8, 2015, and added support for High Dynamic Range (HDR) video with static metadata.

● **HDMI 2.0b:** Was released March, 2016, support for HDR Video transport and extends the static metadata signaling to include Hybrid Log-Gamma (HLG).

● **HDMI 2.1:** Released on November 28, 2017. It adds support for higher resolutions and higher refresh rates, Dynamic HDR including 4K 120 Hz and 8K 120 Hz.

●**DisplayPort:** A VESA standard interface primarily for video, but also for audio, USB and other data. DisplayPort (or DP) is backwards compatible with HDMI, DVI and VGA.

● **DP 1.1:** Was ratified on 2 April 2007, and version 1.1a was ratified on 11 January 2008. DisplayPort 1.1 allow a maximum bandwidth of 10.8 Gbit/s (8.64 Gbit/s data rate) over a standard 4-lane main link, enough to support 1920x1080@60Hz

●**DP 1.2:** Introduced on 7 January 2010, effective bandwidth to 17.28 Gbit/s support increased resolutions, higher refresh rates, and greater color depth, maximum resolution 3840 × 2160@60Hz

● **DP 1.4:** Publish on 1 Mar, 2016.overall transmission bandwidth 32.4 Gbit/s ,DisplayPort 1.4 adds support for Display Stream Compression 1.2 (DSC), DSC is a "visually lossless" encoding technique with up to a 3:1 compression ratio. Using DSC with HBR3 transmission rates, DisplayPort 1.4 can support 8K UHD (7680 × 4320) at 60 Hz or 4K UHD (3840 × 2160) at 120 Hz with 30 bit/px RGB color and HDR. 4K at 60 Hz 30 bit/px RGB/HDR can be achieved without the need for DSC.

●**Multi-mode Fiber:** Fibers that support many propagation paths or transverse modes are called multi-mode fibers, generally have a wider core diameter and are used for short-distance communication links and for applications where high power must be transmitted.

●**Single-mode Fiber:** Fiber that support a single mode are called single-mode fibers. Single-mode fibers are used for most communication links longer than 1,000 meters (3,300 ft).

● **SFP:** Small form-factor pluggable , is a compact, hot-pluggable network interface module used for both telecommunication and data communications applications.

● **Optical Fiber Connector:** Terminates the end of an optical fiber, and enables quicker connection and

disconnection than splicing. The connectors mechanically couple and align the cores of fibers so light can pass. 4 most common types of optical fiber connectors are SC, FC, LC,ST.

● **SC:** (Subscriber Connector), also known as the square connector was also created by the Japanese company – Nippon Telegraph and Telephone. SC is a push-pull coupling type of connector and has a 2.5mm diameter. Nowadays, it is used mostly in single mode fiber optic patch cords, analog, GBIC, and CATV. SC is one of the most popular options, as its simplicity in design comes along with great durability and affordable prices.

● **LC :** (Lucent Connector) is a small factor connector (uses only a 1.25mm ferrule diameter) that has a snap coupling mechanism. Because of its small dimensions, it is the perfect fit for high-density connections, XFP, SFP, and SFP+ transceivers.

● **FC:** (Ferrule Connector) is a screw type connector with a 2.5mm ferrule. FC is a round shaped threaded fiber optic connector,mostly used on Datacom, telecom, measurement equipment, single-mode laser.

● **ST:** (Straight Tip) was invented by AT&T and uses a bayonet mount along with a long spring-loaded ferrule to support the fiber.

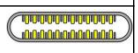
● **USB:** Universal Serial Bus is a standard that was developed in the mid-1990s that defines cables, connectors and communication protocols. This technology is designed to allow a connection, communication and power supply for peripheral devices and computers.

● **USB 1.1:** Full–Bandwidth USB, specification was the first release to be widely adopted by the consumer market. This specification allowed for a maximum bandwidth of 12Mbps.

● **USB 2.0:** or Hi–Speed USB, specification made many improvements over USB 1.1. The main improvement was an increase in bandwidth to a maximum of 480Mbps.

● **USB 3.2:** Super Speed USB with 3 varieties of 3.2 Gen 1(original name USB 3.0), 3.2Gen 2(original name USB 3.1), 3.2 Gen 2x2 (original name USB 3.2) with speed up to 5Gbps,10Gbps,20Gbps respectively.

USB version and connectors figure:

	Type A	Type B	Mini A	Mini B	Micro-A	Micro -B	Type C
USB 2.0							
USB 3.0							
USB 3.1&3.2							

● **NTSC:** The colour video standard used in North America and some other parts of the world created by the National Television Standards Committee in the 1950s. NTSC utilizes an interlaced video signals.

● **PAL:** Phase Alternate Line. A television standard in which the phase of the colour carrier is alternated from line to line. It takes four full images (8 fields) for the colour-to-horizontalimages (8 fields) for the colour-to-horizontal phase relationship to return to the reference point. This alternation helps cancel out phase errors. For this reason, the hue control is not needed on a PAL TV set. PAL, is widely used in needed on a PAL TV set. PAL, is widely used in Western Europe, Australia, Africa, the Middle East, and Micronesia. PAL uses 625-line, 50-field (25 fps) composite colour transmission system.

● **SMPTE:** Society of Motion image and Television Engineers. A global organization, based in the United States, that sets standards for baseband visual communications. This includes film as well as video and television standards.

● **VESA:** Video Electronics Standards Association. An organization facilitating computer graphics through standards.

● **HDCP:** High-bandwidth Digital Content Protection (HDCP) was developed by Intel Corporation an is in wide use for protection of video during transmission between devices.

● **HDBaseT:** A video standard for the transmission of uncompressed video (HDMI signals) and related features using Cat 5e/Cat6 cabling infrastructure.

● **ST2110:** A SMPTE developed standard, ST2110 describes how to send digital video over and IP networks. Video is transmitted uncompressed with audio and other data in a separate streams.
SMPTE2110 is intended principally for broadcast production and distribution facilities where quality and flexibility are more important.

● **SDVoE:** Software Defined Video over Ethernet (SDVoE) is a method for transmission, distribution and management AV signals using a TCP/IP Ethernet infrastructure for transport with low latency. SDVoE is commonly used in integration applications.

● **Dante AV:** The Dante protocol was developed for and widely adopted in audio systems for the transmission of uncompressed digital audio on IP based networks. The more recent Dante AV specification includes support for digital video.

● **NDI:** Network Device interface (NDI) is a software standard developed by NewTek to enable video-compatible products to communicate, deliver, and receive broadcast quality video in a high quality, low latency manner that is frame-accurate and suitable for switching in a live production environment over TCP (UDP) Ethernet based networks. NDI is commonly found in broadcastapplications.

● **RTMP:** Real-Time Messaging Protocol (RTMP) was initially a proprietary protocol developed by Macromedia (now Adobe) for streaming audio, video and data over the Internet, between a Flash player and a server.

● **RTSP:** The Real Time Streaming Protocol (RTSP) is a network control protocol designed for use in entertainment and

communications systems to control streaming media servers. The protocol is used for establishing and controlling media sessions between end points.

● **MPEG:** Moving Picture Experts Group is a working group formed from ISO and IEC developing standards that allow audio/video digital compression and Transmission.

● **H.264:** Also known as AVC (Advanced Video Coding) or MPEG-4i is a common video compression standard. H.264 was standardized by the ITU-T Video Coding Experts Group (VCEG) together with the ISO/IEC JTC1 Moving Picture Experts Group (MPEG).

● **H.265:** Also known as **HEVC** (High Efficiency Video Coding) H.265 is the successor to the widely used H.264/AVC digital video coding standard. Developed under the auspices of ITU, resolutions up to 8192x4320 may be compressed.

● **API:** An Application Programming Interface (API) provides a predefined function which allows access capabilities and features or routines via a software or hardware, without accessing source code or understanding the details of inner working mechanism. An API call may execute a function and/or provide data feedback/report.

● **DMX512:** The communication standard developed by USITT for entertainment and digital lighting systems. The wide adoption of the Digital Multiplex (DMX) protocol has seen the protocol used for a wide range of other devices including video controllers. DMX512 is delivered over cable of 2 twisted pairs with 5pin XLR cables for connection.
● **ArtNet:** An ethernet protocol based on TCP/IP protocol stack, mainly used in entertainment/events applications. Built on the DMX512 data format, ArtNet enables multiple "universes" of DMX512 to be transmitted using ethernet networks for transport.

● **MIDI:** MIDI is the abbreviation of Musical Instrument Digital Interface. As the name indicates the protocol was developed for communication between electronical musical instruments and latterly computers. MIDI instructions are triggers or commands sent over twisted pair cables, typically using 5pin DIN connectors.

● **OSC:** The principle of Open Sound Control (OSC) protocol is for networking sound synthesizers, computers, and multimedia devices for musical performance or show control. As with XML and JSON, the OSC protocol allows sharing data. OSC is transported via UDP packets between devices connected on an Ethernet.

● **Brightness:** Usually refers to the amount or intensity of video light produced on a screen without regard to colour. Sometimes called black level.

● **Contrast Ratio:** The ratio of the high light output level divided by the low light output level. In theory, the contrast ratio of the television system should be at least 100:1, if not 300:1. In reality, there are several limitations. Well-controlled viewing conditions should yield a practical contrast ratio of 30:1 to 50:1.

● **Colour Temperature:** The colour quality, expressed in degrees Kelvin (K), of a light source. The higher the colour temperature, the bluer the light. The lower the temperature, the redder the light. Benchmark colour temperature for the A/V industry include 5000°K, 6500°K, and 9000°K.

● **Saturation:** Chroma, Chroma gain. The intensity of the colour, or the extent to which a given colour in any image is free from white. The less white in a colour, the truer the colour or the greater its saturation. Saturation is the amount of pigment in a colour, and not the intensity.

● **Gamma:** The light output of a CRT is not linear with respect to the voltage input. The difference between what you should have and what is actually output is known as gamma.

● **Frame:** In interlaced video, a frame is one complete image.A video frame is made up of two fields, or two sets of interlaced lines. In a film, a frame is one still image of a series that makes up a motion image.

● **Genlock:** Allows synchronisation of otherwise video devices. A signal generator provides a signal pulses which connected devices can reference. Also see Black Burst and Color Burst.

● **Blackburst:** The video waveform without the video elements.It includes the vertical sync, horizontal sync, and the Chroma burst information. Blackburst is used to synchronize video equipment to align the video output.

● **Colour Burst:** In colour TV systems, a burst of subcarrier frequency located on the back part of the composite video signal. This serves as a colour synchronizing signal to establish a frequency and phase reference for the Chroma signal. Colour burst is 3.58 MHz for NTSC and 4.43 MHz for PAL.

● **Colour Bars:** A standard test pattern of several basic colours (white, yellow, cyan, green, magenta, red, blue, and black) as a reference for system alignment and testing. In NTSC video, the most commonly used colour bars are the SMPTE standard colour bars. In PAL video, the most commonly used colour bars are eight full field bars. On computer monitors the most commonly used colour bars are two rows of reversed colour bars

● **Seamless Switching:** A feature found on many video switchers. This feature causes the switcher to wait until the vertical interval to switch. This avoids a glitch (temporary scrambling) which often is seen when switching between sources.

● **Scaling:** A conversion of a video or computer graphic signal from a starting resolution to a new resolution. Scaling from one resolution to another is typically done to optimize the signal for input to an image processor, transmission path or to improve its quality when presented on a particular display.

● **PIP:** Picture-In-Picture. A small image within a larger image created by scaling down one of image to make it smaller. Other forms of PIP displays include Picture-By-Picture (PBP) and Picture- With-Picture (PWP), which are commonly used with 16:9 aspect display devices. PBP and PWP image formats require a separate scaler for each video window.

● **HDR:** is a high dynamic range (HDR) technique used in imaging and photography to reproduce a

greater dynamic range of luminosity than what is possible with standard digital imaging or photographic techniques. The aim is to present a similar range of luminance to that experienced through the human visual system.

●**UHD:** Standing for Ultra High Definition and comprising 4K and 8K television standards with a 16:9 ratio, UHD follows the 2K HDTV standard. A UHD 4K display has a physical resolution of 3840x2160 which is four times the area and twice both the width and height of a HDTV/FullHD (1920x1080) video signal.

●**EDID:** Extended Display Identification Data. EDID is a data structure used to communicate video display information, including native resolution and vertical interval refresh rate requirements, to a source device. The source device will then output the provided EDID data, ensuring proper video image quality.

6.4 Revision History

The table below lists the changes to the User Manual.

Format	Time	ECO#	Description	Principal
V1.0	2022-12-21	0000#	Release	Aster
V1.1	2023-01-29	0001#	Add upgrade guidance	Aster
V1.2	2023-02-23	0002#	Revise product pictures	Aster

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