

# aura UHD studio

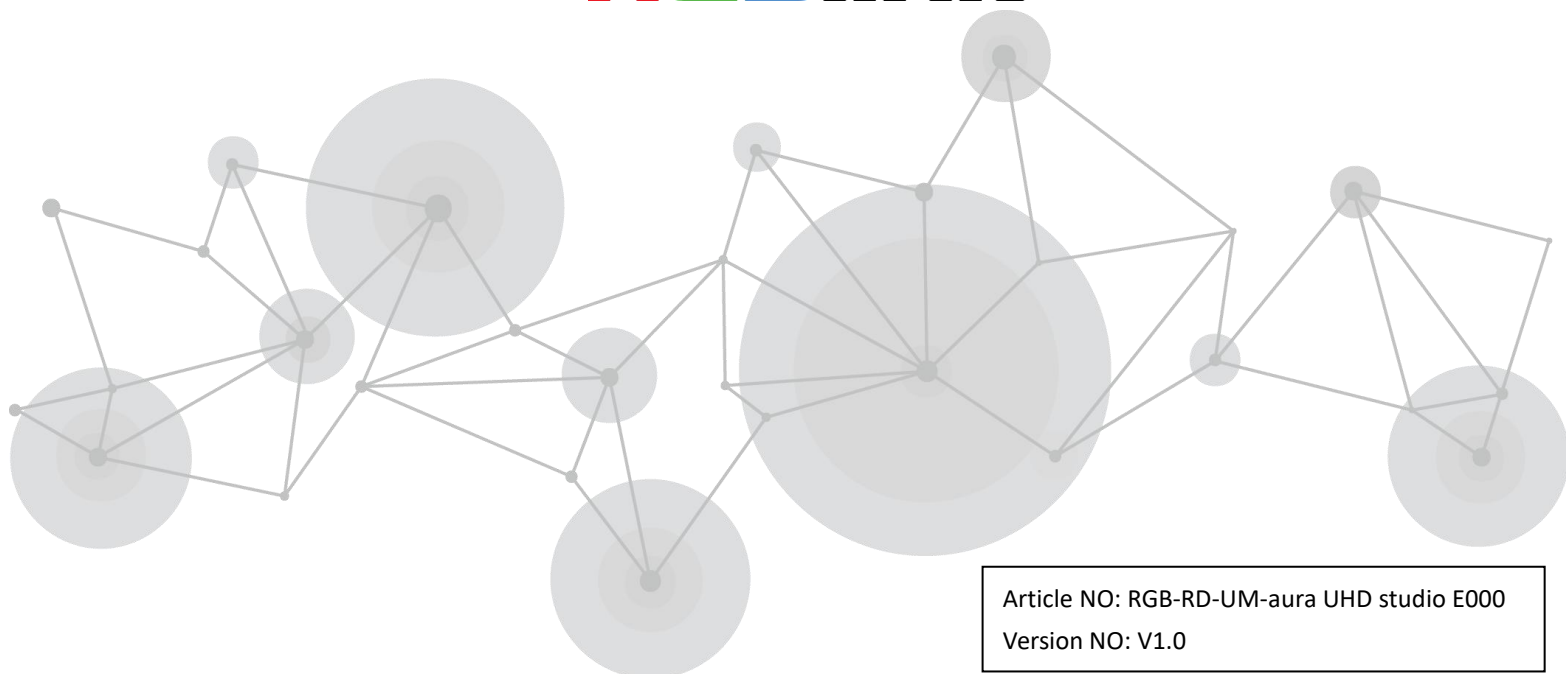
## aura UHD studio 24/27/32

12G-SDI Professional Film and Television Production  
Monitor



## User Manual

# RGBlink®



Article NO: RGB-RD-UM-aura UHD studio E000  
Version NO: V1.0

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**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

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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.

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# Chapter 1 Your Product

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## 1.1 In the Box



## 1.2 Product Overview

Next generation of RGBlink aura UHD monitors brings with it a new model, aura UHD studio, featuring capabilities to connect directly with applications such as Adobe PremierPro™ and DiVinci Resolve™ via Thunderbolt™ port.

aura UHD studio is broadcast-grade 4K HDR monitor, equipped with UHD (3840×2160) screen, supports quad link 12G SDI signal up to 8K input backward compatible with 4K@60Hz, supports high-precision 3D LUT with tetrahedral interpolation algorithm, supports HDR formats such as SMPTE ST2084(PQ), hybrid log-gamma HLG, various Gamma curves, camera Log and other professional functions which are widely used in film, television and advertisement industry.



## 1.2.1 Front Panel



|   |                      |                                                                                       |
|---|----------------------|---------------------------------------------------------------------------------------|
| ① | Speaker              | 2-channel speaker with HDMI and SDI embedded audio.                                   |
| ② | Base                 | Detachable.                                                                           |
| ③ | SDI 1~ 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 Button          | For switch between HDMI signal.                                                       |
| ⑥ | LAYOUT Button        | Multi-view layout selection button.                                                   |
| ⑦ | PRESET Button        | <ul style="list-style-type: none"> <li>• Preset setting for F buttons/GPI.</li> </ul> |

|   |                        |                                                                                                                                                                             |
|---|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                        | <ul style="list-style-type: none"> <li>• Save/load data.</li> </ul>                                                                                                         |
| ⑧ | F1 ~ F4 Buttons        | Soft Keys for customized function.                                                                                                                                          |
| ⑨ | CONTRAST/BRIGHT Button | Adjust contrast and brightness value.                                                                                                                                       |
| ⑩ | CHROMA/SHARP Button    | Adjust chroma and sharpness value.                                                                                                                                          |
| ⑪ | SELECT/ENTER Button    | Rotate to select, and press to confirm.                                                                                                                                     |
| ⑫ | MENU/EXIT Button       | <ul style="list-style-type: none"> <li>• Open/close OSD menu.</li> <li>• Go back to previous menu.</li> </ul>                                                               |
| ⑬ | Power Key              | <ul style="list-style-type: none"> <li>• For turn-on (blue light) or turn-off (red light).</li> <li>• 3-second long press for turn-off, short press for turn-on.</li> </ul> |

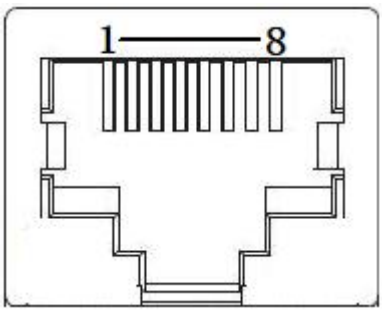
## 1.2.2 Rear Panel



|   |        |               |
|---|--------|---------------|
| ① | Handle | For carrying. |
|---|--------|---------------|

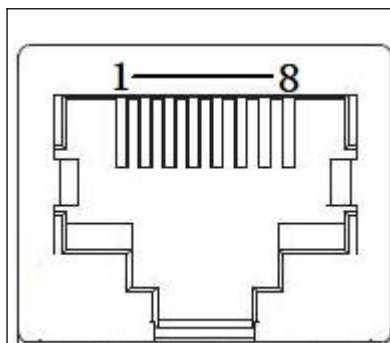
|   |                                     |                                                                                                                                                                                                                                                                                                |
|---|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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.                                                                                                                                                                                                                                                              |
| ⑪ | V mount battery plate<br>(optional) | <ul style="list-style-type: none"> <li>• aura UHD studio support to install V mount battery plate.</li> <li>• aura UHD studio 24 supports to install one V mount battery plate.</li> <li>• aura UHD studio 27 and aura UHD studio 32 support to install two V mount battery plates.</li> </ul> |

#### 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



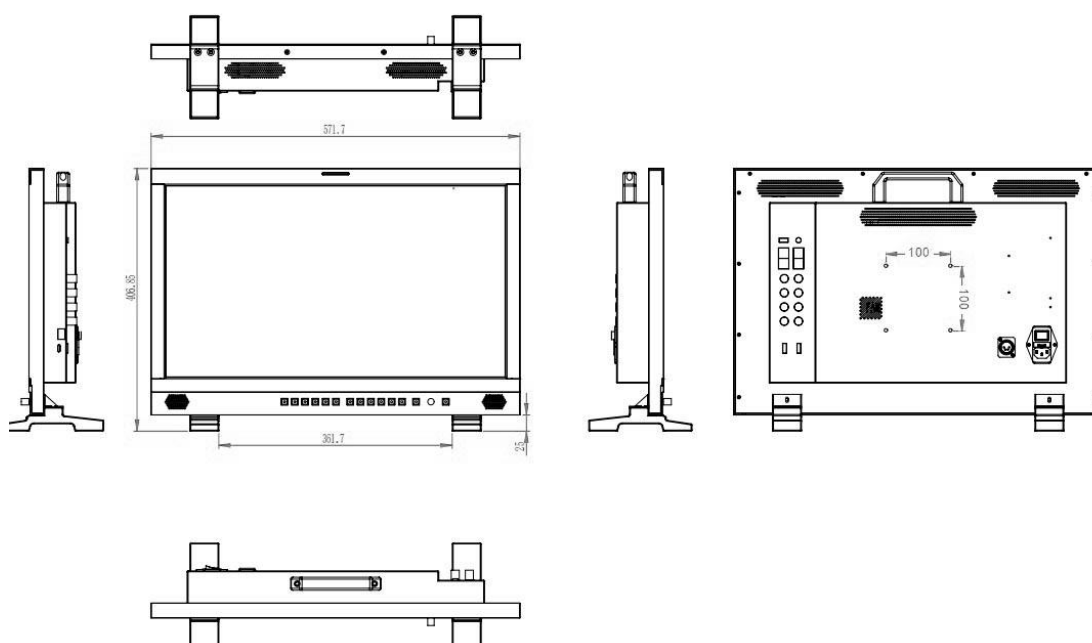
|   |                                      |                                                                                                                                                                                              |
|---|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ① | Thunderbolt 3/Type-C Input Interface | <ul style="list-style-type: none"><li>• Compatible with Thunderbolt 3/Type-C.</li><li>• Only for previewing Davinci app output, does not support desktop duplication or extension.</li></ul> |
| ② | SFP Interface                        | Insert optical fiber module (module is optional).                                                                                                                                            |

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## 1.2.4 Dimensions

Following is the dimension of monitor for your reference:

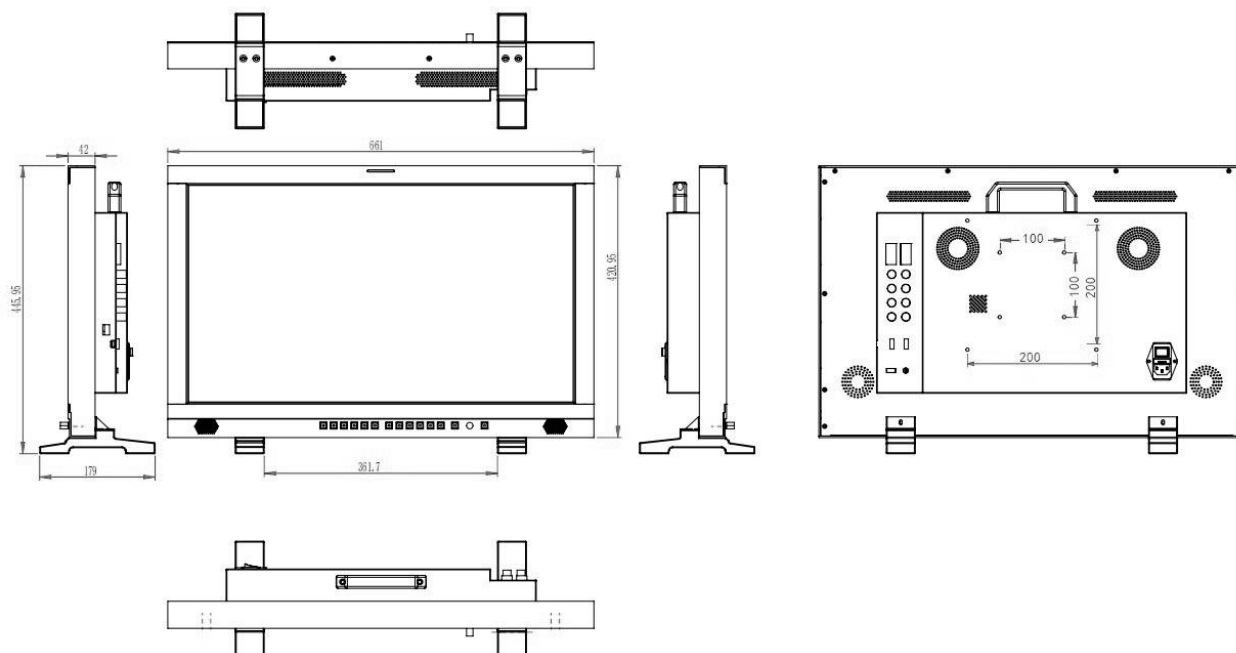
aura UHD Studio 24



Net Weight: 8.6kg

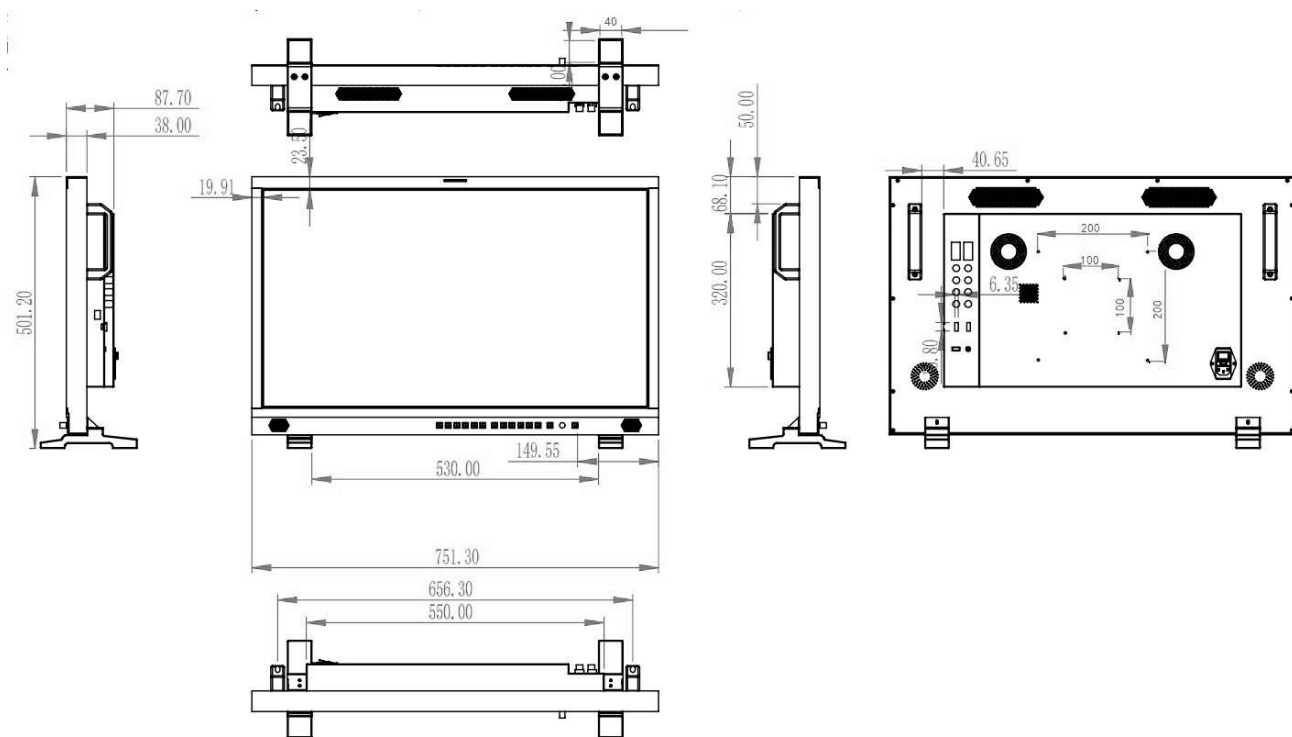
Dimension: 571.7mm × 160mm × 414.85mm

## aura UHD studio 27



Net Weight: 11.4kg

Dimension: 661mm × 420mm × 179mm



Weight: 15.3kg

Gross Weight: 751mm × 502mm × 179mm

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# Chapter 2 Use Your Product

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## 2.1 Menu

### Main Menu



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 | GPI Preset      |
| Display            | GPI1            |
| Marker             | GPI2            |
| Multi Screen       | GPI3            |
| Audio              | GPI4            |
| UMD                | GPI5            |
| System             | All Data Load   |
|                    | All Data Save   |

### F Button Preset

Four modes with different functions, which are corresponding to the F1-F4 shortcut keys on the front panel. Users can also modify the four preset modes.

### F1 to F4 Button

Functions of F1 to F4 buttons can be set as following:

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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 User Preset 1~5.

### **Data Save**

Save data of User Preset 1~5.

## **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,

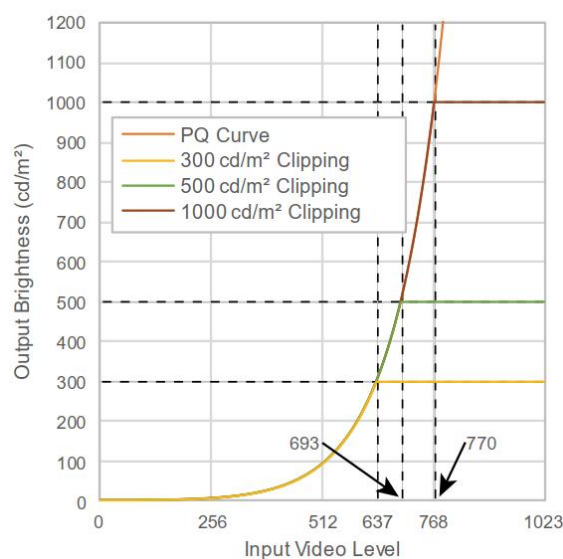
Canon Log, User Gamma LUT1-4

### 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:

Original, 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 Warning: 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

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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.

|                    |                   |
|--------------------|-------------------|
| Status Display     | Input Range       |
| User Preset        | Brightness        |
| Color Management   | Contrast          |
| Picture            | Chroma            |
| Scopes             | Aperture          |
| Auxiliary Function | Black Stretch     |
| Display            | Stretch Intensity |
| Marker             | Color Temp        |
| 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  |
| Color Management   | WFM Single Line |
| Picture            | WFM Line Count  |
| Scopes             | Vertical Height |
| Auxiliary Function | Vector Scope    |
| Display            | Vector Color    |
| Marker             | Histogram       |
| Multi Screen       | BG Transparency |
| Audio              | Scopes Position |
| UMD                |                 |
| System             |                 |

**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.

|                    |                            |
|--------------------|----------------------------|
| Status Display     | False Color                |
| User Preset        | Full-Blue/Black-White Mode |
| Color Management   | Auxiliary Focus            |
| Picture            | Focus Intensity            |
| Scopes             | Zebra Crossing             |
| Auxiliary Function | Zebra Crossing Intensity   |
| Display            | Time Code                  |
| Marker             | Test Signal                |
| Multi Screen       |                            |

|  |        |  |
|--|--------|--|
|  | Audio  |  |
|  | UMD    |  |
|  | System |  |

**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.

|                    |              |
|--------------------|--------------|
| Status Display     | Aspect Ratio |
| User Preset        | Scan Mode    |
| Color Management   | Zoom Mode    |
| Picture            | Flip Mode    |
| Scopes             | Freeze       |
| Auxiliary Function | Cross Hatch  |
| Display            |              |
| Marker             |              |
| Multi Screen       |              |
| Audio              |              |
| UMD                |              |
| System             |              |

### 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

**Screen Color Mode:** Choose color mode for Screen A and Screen B.

**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.

|                    |                   |
|--------------------|-------------------|
| Status Display     | Key Lock          |
| User Preset        | Language          |
| Color Management   | Menu Timer        |
| Picture            | Menu Position     |
| Scopes             | Menu Transparency |
| Auxiliary Function | Source Display    |
| Display            | Key LED           |
| Marker             | Factory Reset     |
| Multi Screen       |                   |
| Audio              |                   |
| UMD                |                   |

**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

|               |                                                  |
|---------------|--------------------------------------------------|
| 410-2380-01-1 | aura UHD studio 24 23.8 Inch 12G-SDI HDR Monitor |
| 410-2700-01-1 | aura UHD studio 27 27 Inch 12G-SDI HDR Monitor   |
| 410-3200-01-1 | aura UHD studio 32 32 Inch 12G-SDI HDR Monitor   |

### 3.2 Others

|               |                                                     |
|---------------|-----------------------------------------------------|
| 490-2000-01-0 | V mount battery plate kit for aura UHD studio 24    |
| 490-2000-02-0 | V mount battery plate kit for aura UHD studio 27/32 |

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# Chapter 4 Support

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## 4.1 Contact Us

[www.rgblink.com](http://www.rgblink.com)



### Inquiries

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🌐 [rgblink.com/support-me](http://rgblink.com/support-me)



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+rgblink



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Innovation Valley, No. 1  
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### Beijing Region Office

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☎ +010- 8577 7286

### Europe Regional Sales & Support

Eindhoven, Holland

Flight Forum Eindhoven  
5657 DW

☎ +31 (040) 202 71 83

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# Chapter 5 Upgrade

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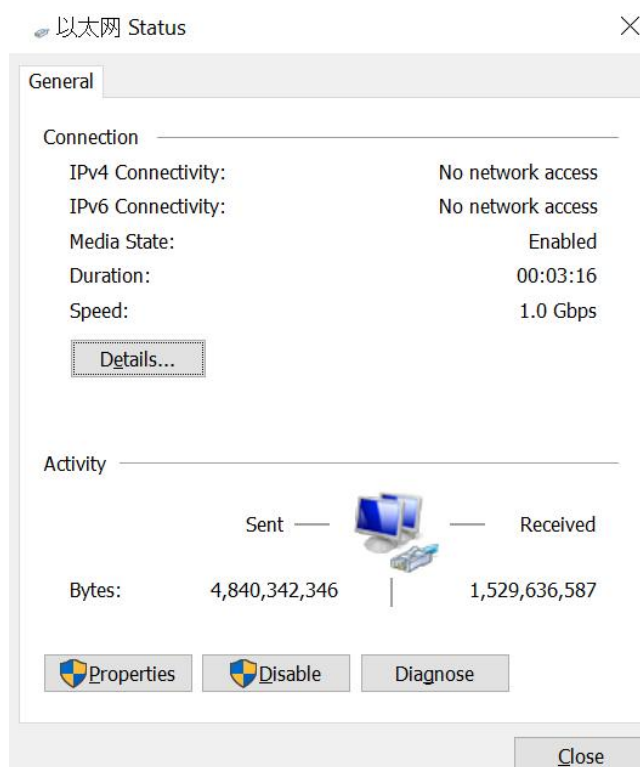
## 5.1 Network Upgrade Program Description

### Preparations before the upgrade:

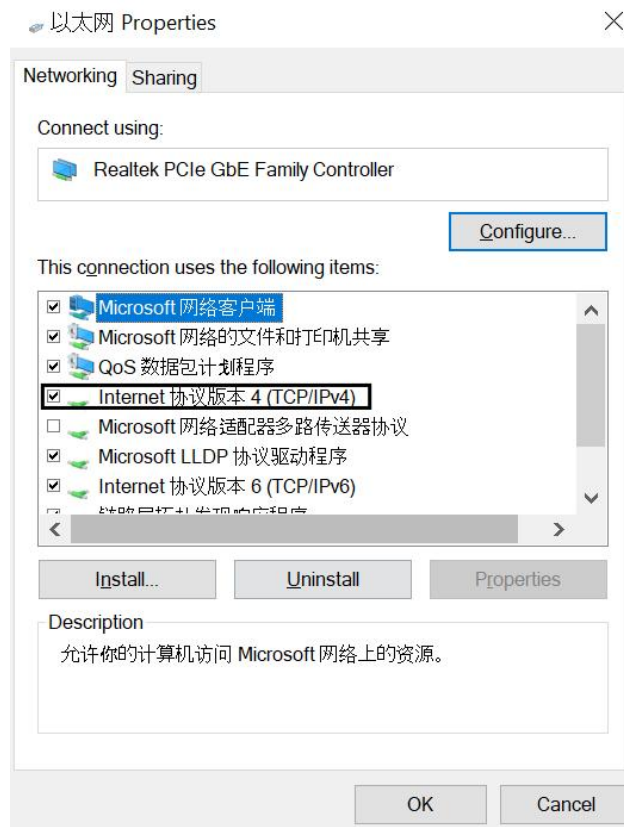
1. Connect the computer and monitor with Ethernet network cable. (The default IP address is 192.168.1.128.)



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.

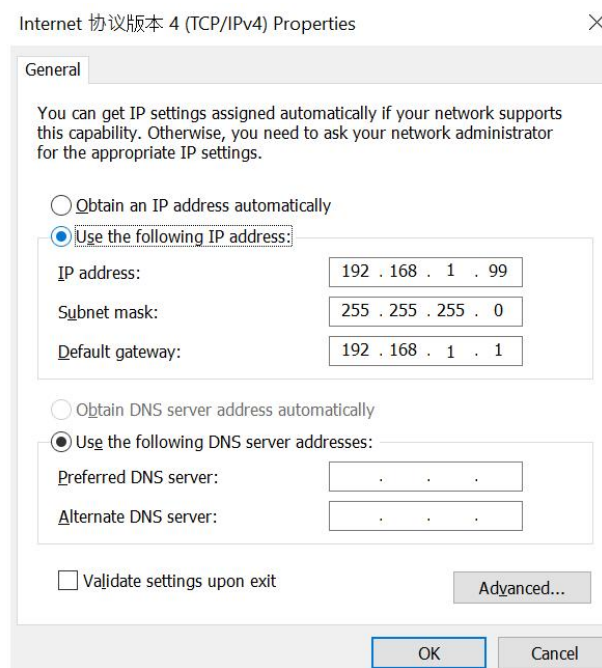


4. Double-click Internet Protocol Version 4(TCP/IPv4) on the Ethernet Properties page. The following page is displayed.

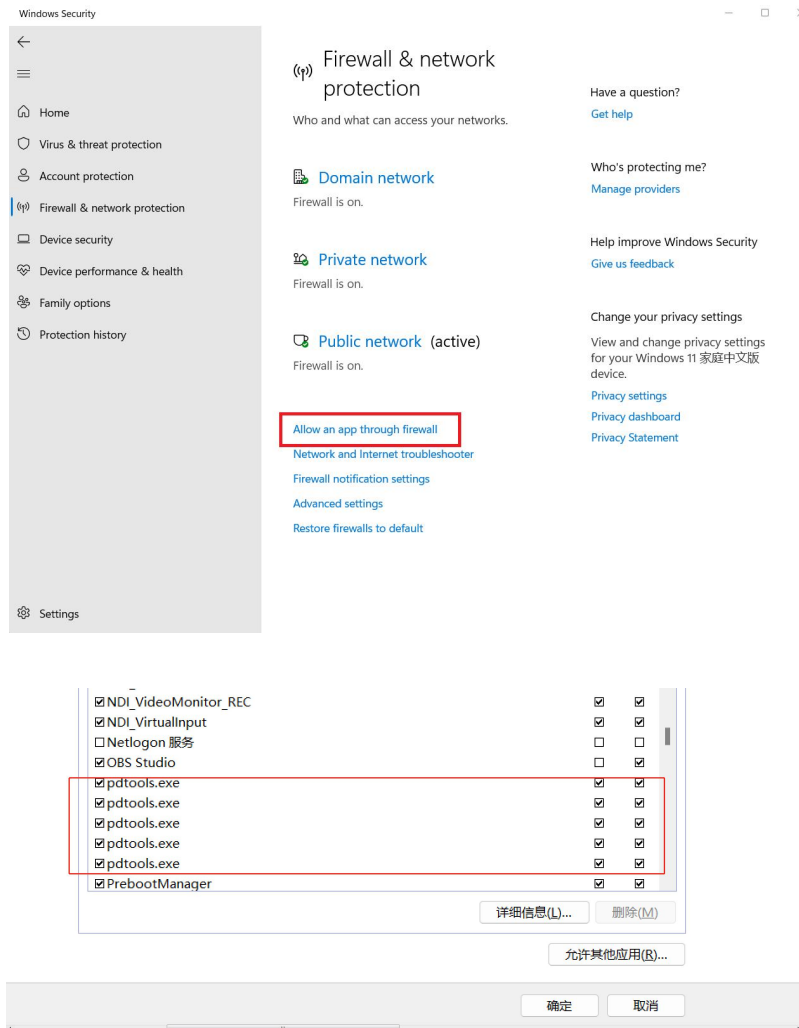


5. On the Internet Protocol Version 4(TCP/IPv4) Properties page, select Use the following IP addresses and set the following parameters: IP Address, Subnet Mask, Default Gateway.

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.

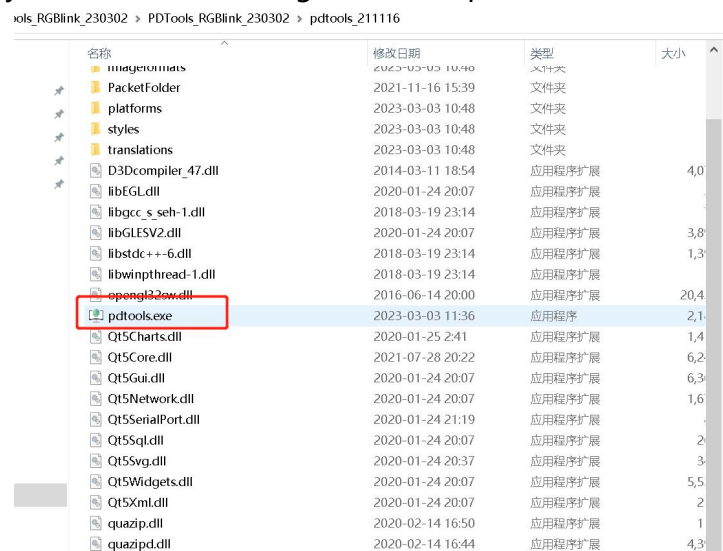


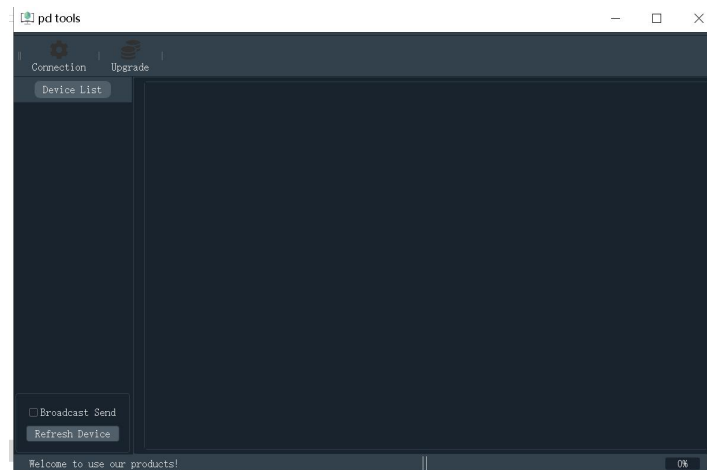
6. Shut down firewall or allow PD Tool through firewall.



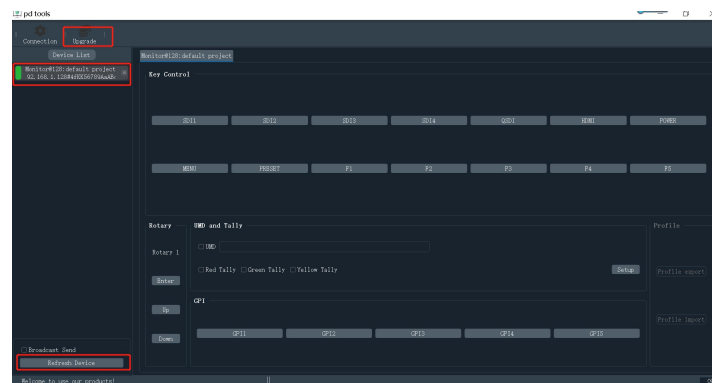
## Upgrade monitor program:

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



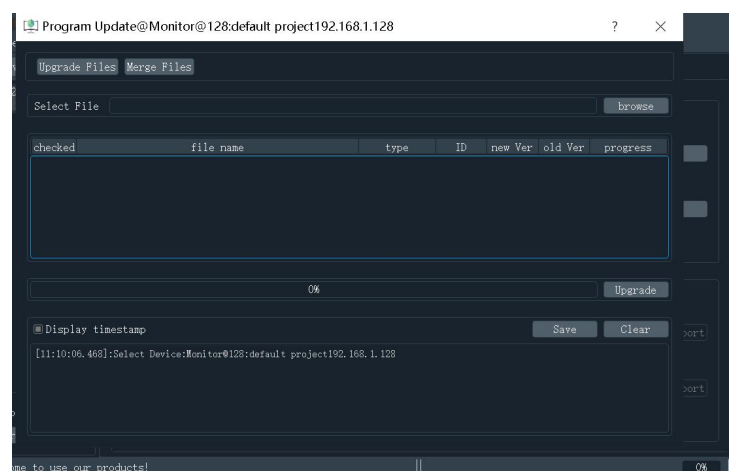


2. Click "Refresh Device" on the interface. If the computer is connected to the monitor normally, the following interface will be displayed.

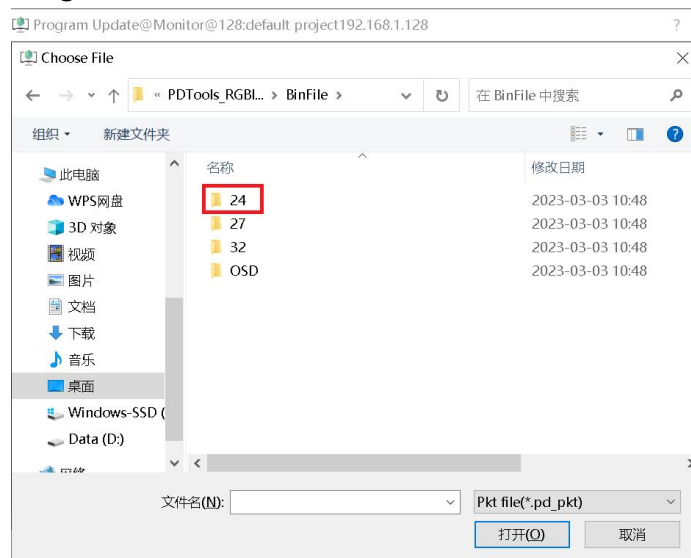


***If PD TOOL connection fails, disconnect wifi.***

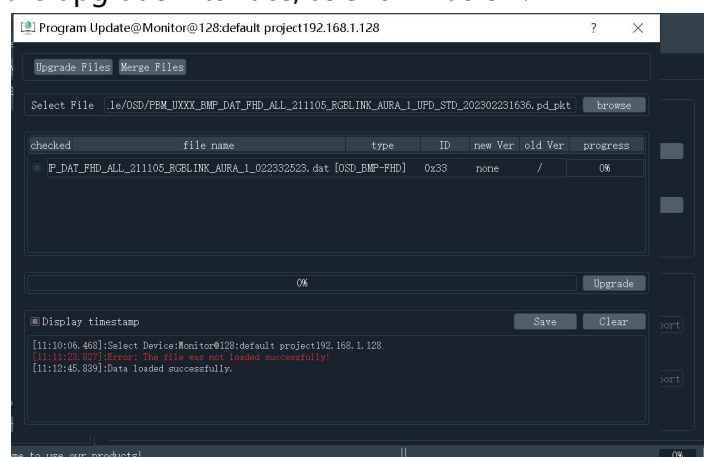
3. Click "Upgrade" in the above interface to display the upgrade interface, as shown in the following figure.



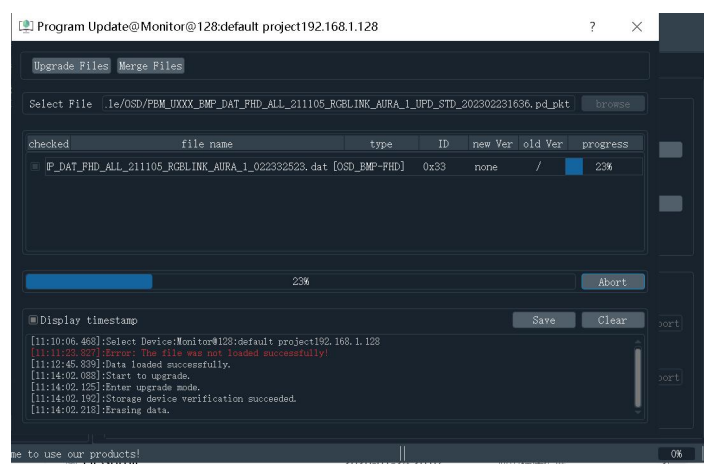
4.Click browse -choose target Bin File.



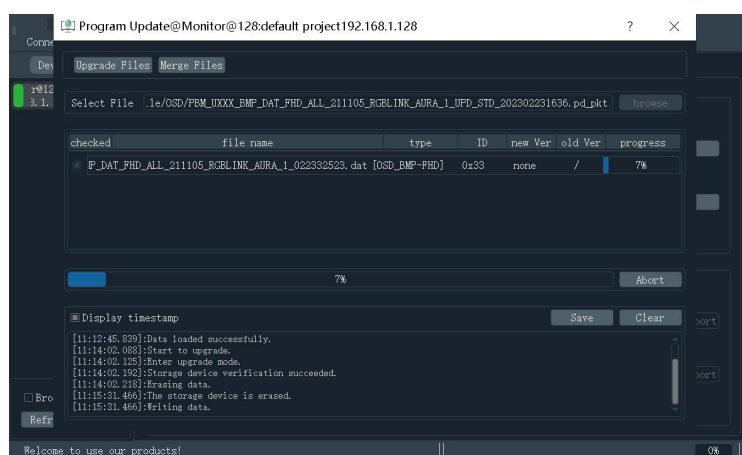
5.Click "Upgrade" on the upgrade interface, as shown below.



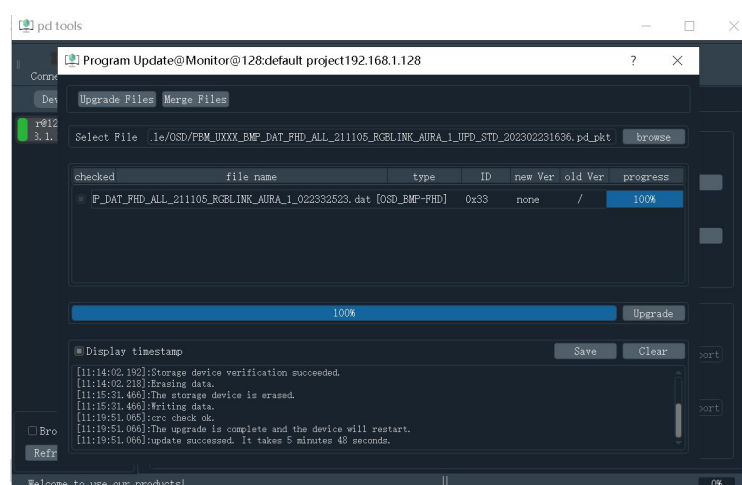
Upgrading.



Upgrading.



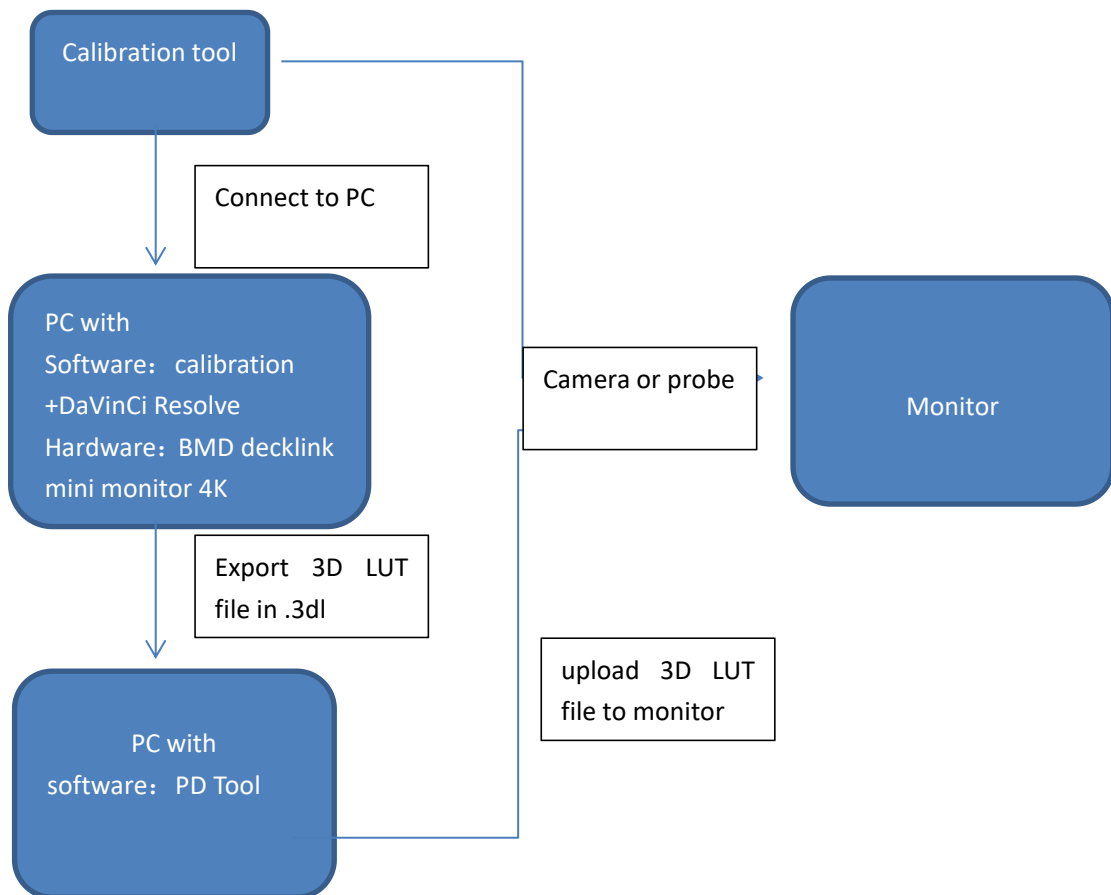
6.Update complete.



## 5.2 How to Calibrate Monitor

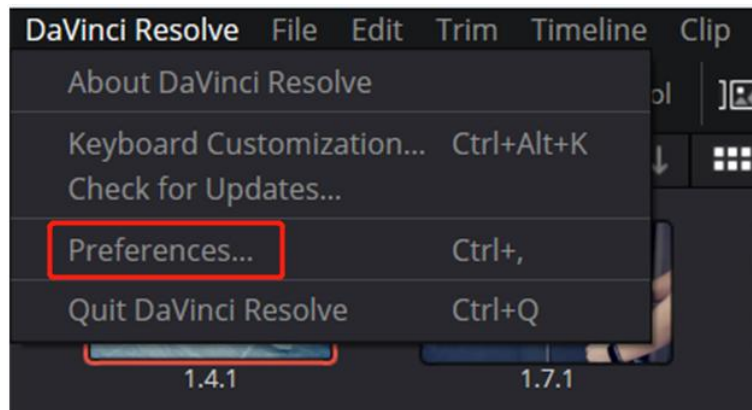
### 5.2.1 Universal Calibration

- 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

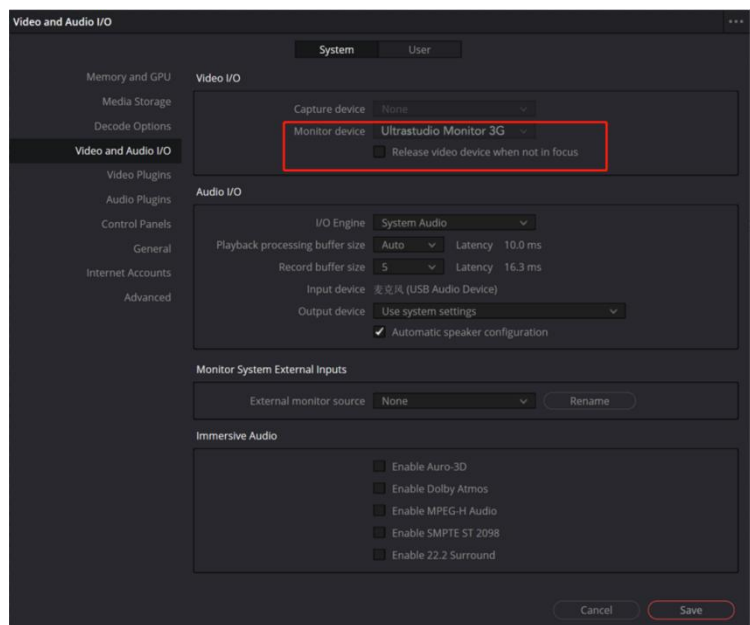


## 5.2.2 Thunderbolt Direct Connection

1. Install the Blackmagic\_Desktop\_Video\_Windows driver and download the latest version. ( Go to the Black Magic website for details.)
2. Install DaVinci Resolve software ( version 17 or above)
3. Connect the Thunderbolt cable directly between the monitor and the computer with Thunderbolt output.
4. Run DaVinci Resolve and create a new project.
5. Click "Preferences" .



4. Set "Monitor device" to UltraStudio Monitor 3G, then click "Save" .



5. Close DaVinci Resolve and restart it. Press the HDMI button on the monitor to select the Thunderbolt interface.

## 5.3 3D LUT File Upload Operating Instructions

### Prepare:

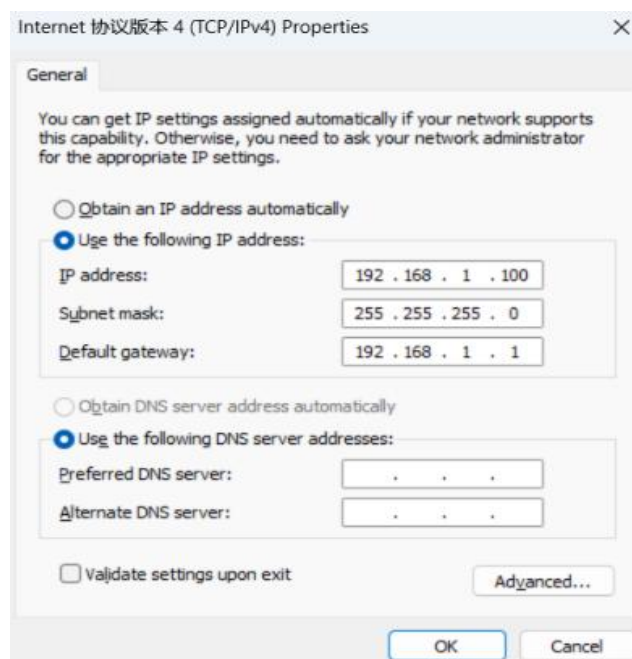
Before upgrade, unzip the PD tool package.

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.

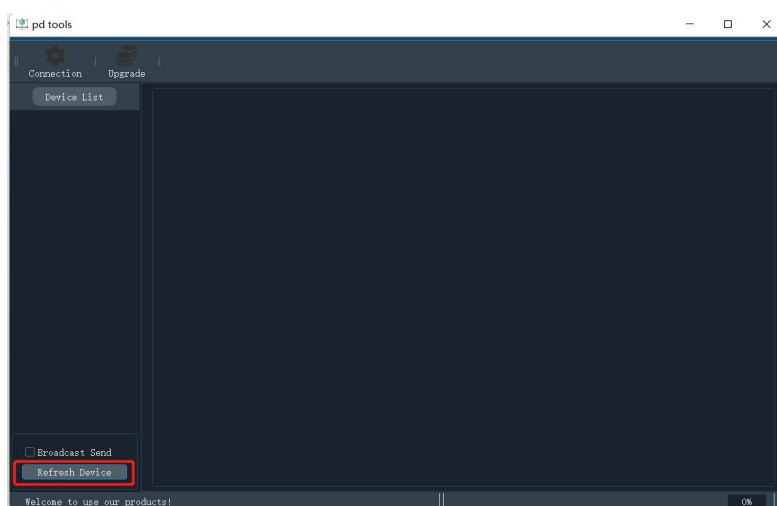
**Remark: IP address the 100 can be other values, as long as it does not conflict with 192.168.1.128, but it must on the same network segment.**



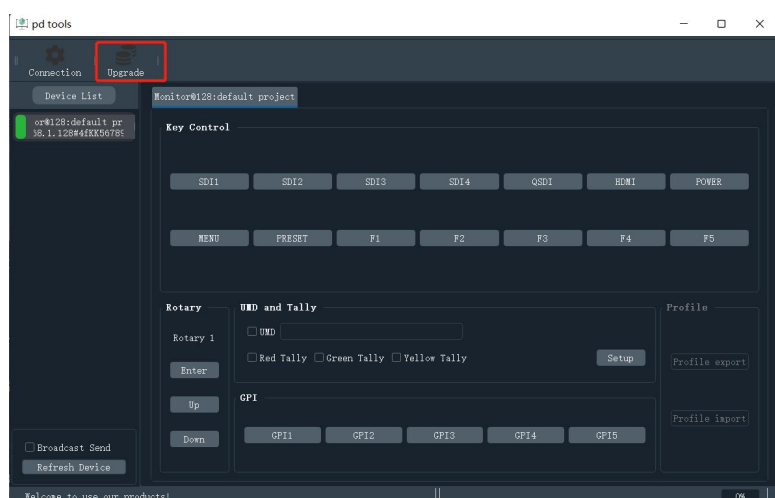
3. Double-click "pdtools.exe" to open the interface as follows. If a firewall pops up to prevent the software from being changed, click "Allow access".

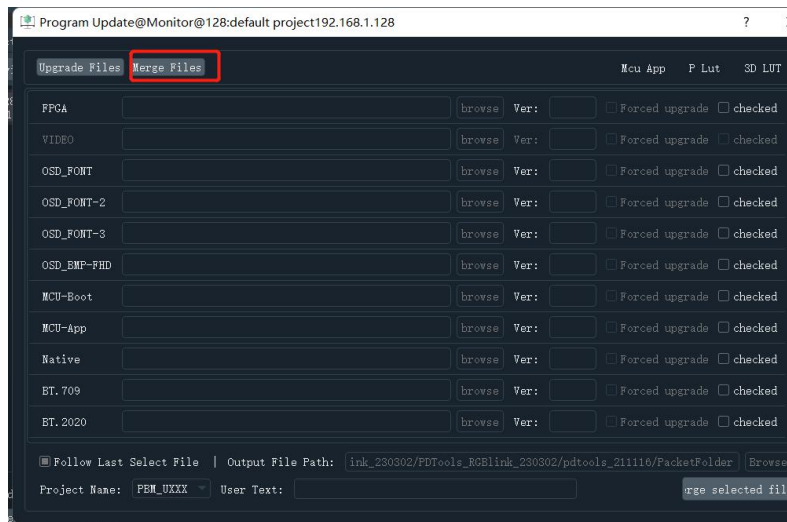
|                     |                  |        |      |
|---------------------|------------------|--------|------|
| libgcc_s_seh-1.dll  | 2018-03-19 23:14 | 应用程序扩展 |      |
| libGLESv2.dll       | 2020-01-24 20:07 | 应用程序扩展 | 3,8  |
| libstdc++-6.dll     | 2018-03-19 23:14 | 应用程序扩展 | 1,3  |
| libwinpthread-1.dll | 2018-03-19 23:14 | 应用程序扩展 |      |
| opengl32sw.dll      | 2016-06-14 20:00 | 应用程序扩展 | 20,4 |
| pdtools.exe         | 2022-09-14 1:01  | 应用程序   | 2,1  |
| Qt5Charts.dll       | 2020-01-25 2:41  | 应用程序扩展 | 1,4  |
| Qt5Core.dll         | 2021-07-28 20:22 | 应用程序扩展 | 6,2  |
| Qt5Gui.dll          | 2020-01-24 20:07 | 应用程序扩展 | 6,3  |
| Qt5Network.dll      | 2020-01-24 20:07 | 应用程序扩展 | 1,6  |

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

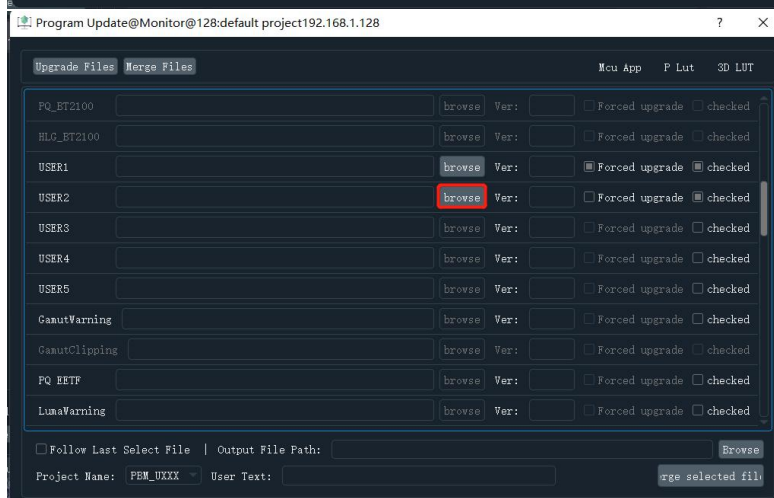
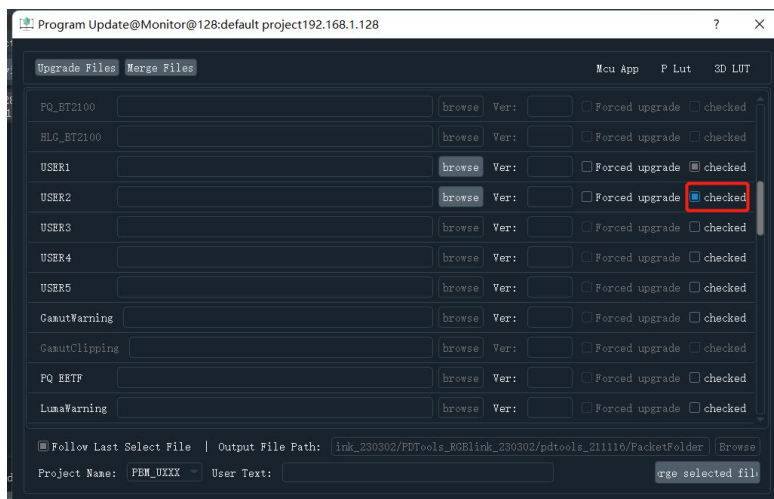


5. Click "Upgrade" in the interface, the pop-up interface is as follows, and click "merge files".

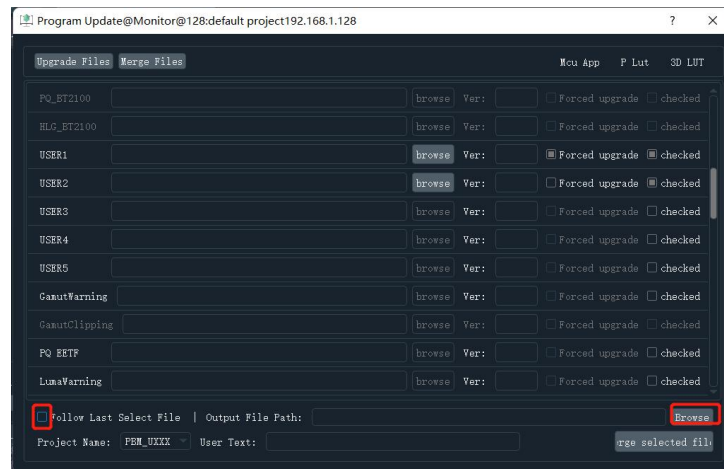




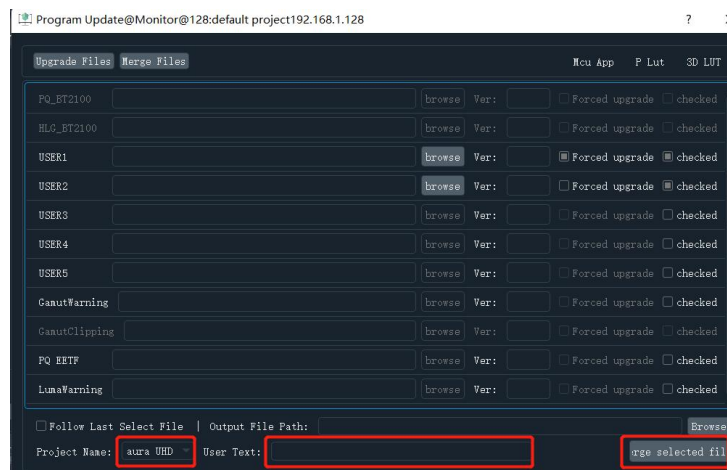
6. Click "Checked" behind USER1/USER2/USER3/USER4/USER5. If you only upgrade USER1 and USER2, you only need to click Select behind USER1 and USER2 to select, and then click "Browse" to select the 3D LUT file to be upgraded, the file should be in .3dl format. Choose 3D LUT.



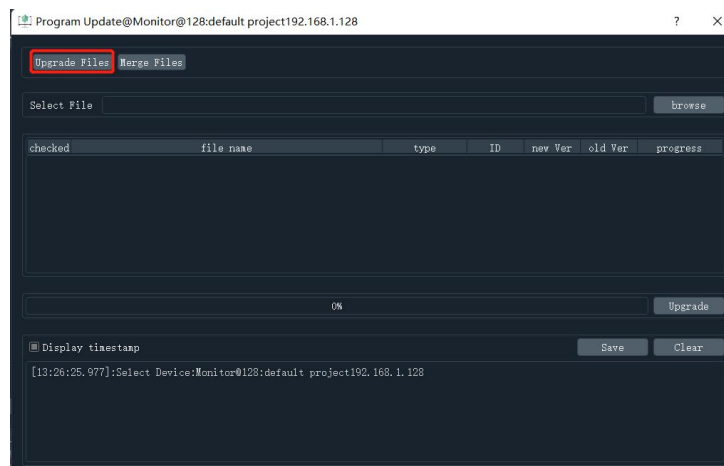
7.Finally, click "Browse" to select location file for merged 3d lut file "Merge Selected Files".



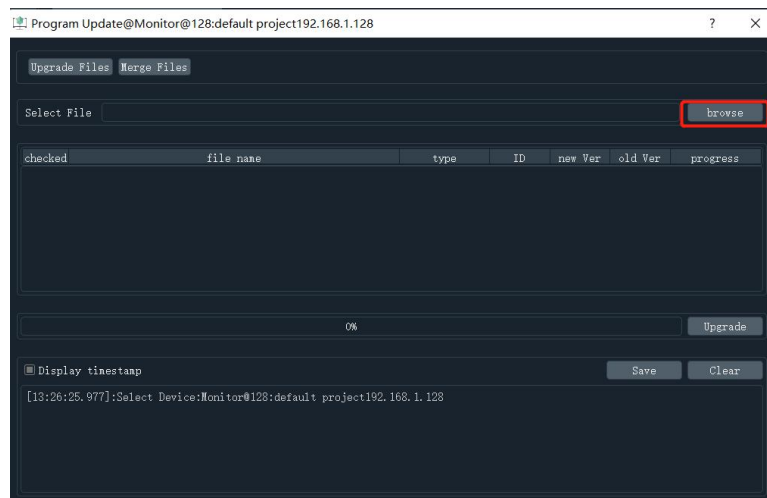
After output path is selected, optionally filling in project name and user text and then click "Merge selected files" . The merged file will be stored in the selected file path.



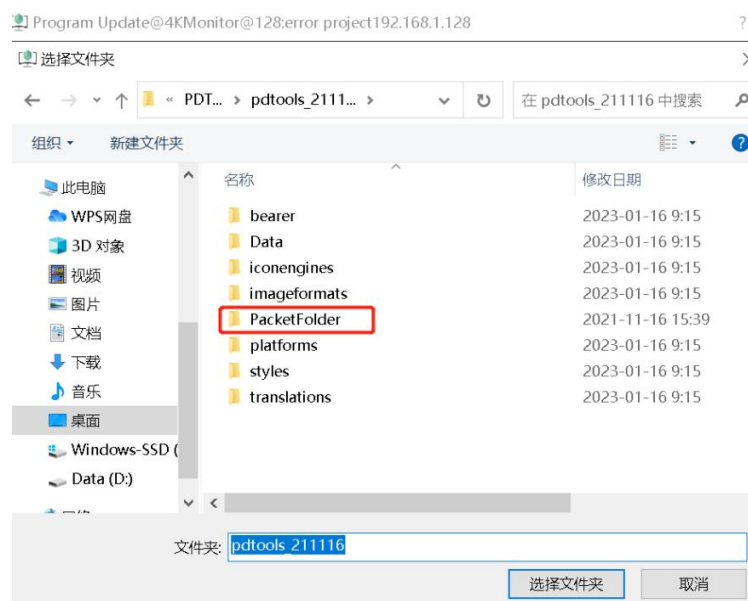
8.Click "Upgrade Files" on the upgrade interface, as shown below.



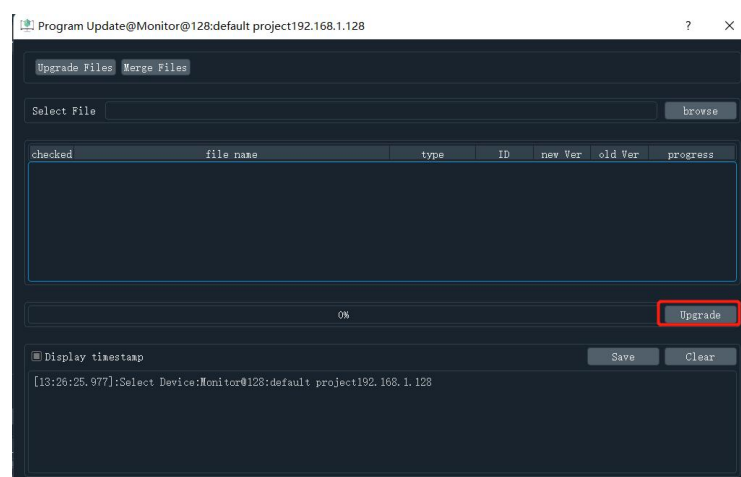
9. Select "browse".



Select the merged file generated from last step.



Finally, click "Upgrade".



## 5.4 Disassembly Notes

Step 1: Put the monitor on the protective cotton to prevent scratches, then remove the two screws of the back shell.



Step 2: Remove 6 fixing screws of the base as shown below.



Step 3: Remove 12 screws of back shell as shown below.

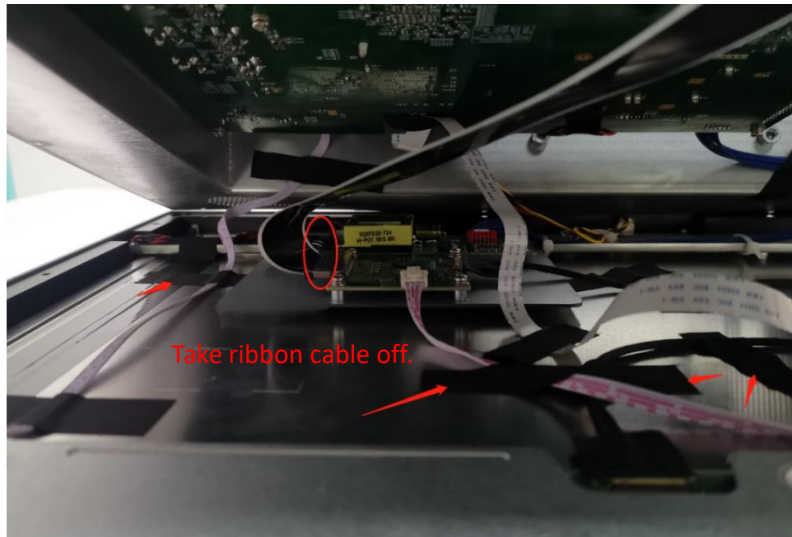


Step 4: Lift the back shell at a small angle. (Note: Please pay attention to the angle to prevent pulling the internal cables.)

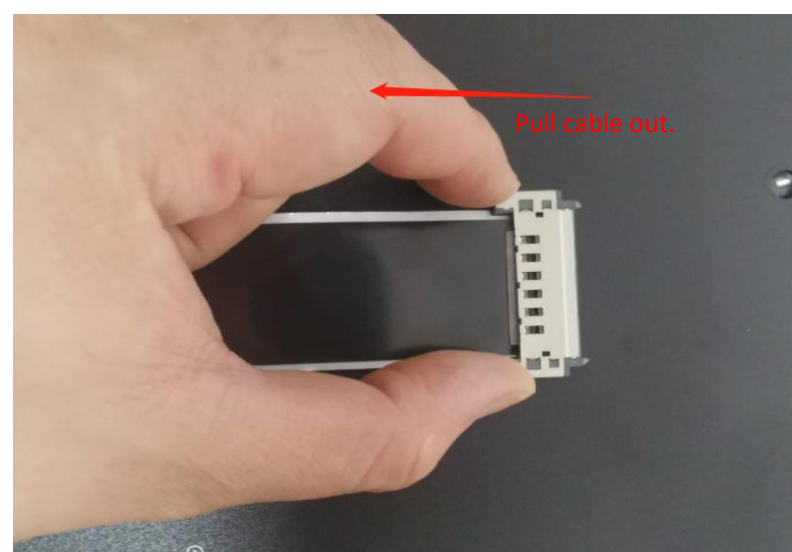
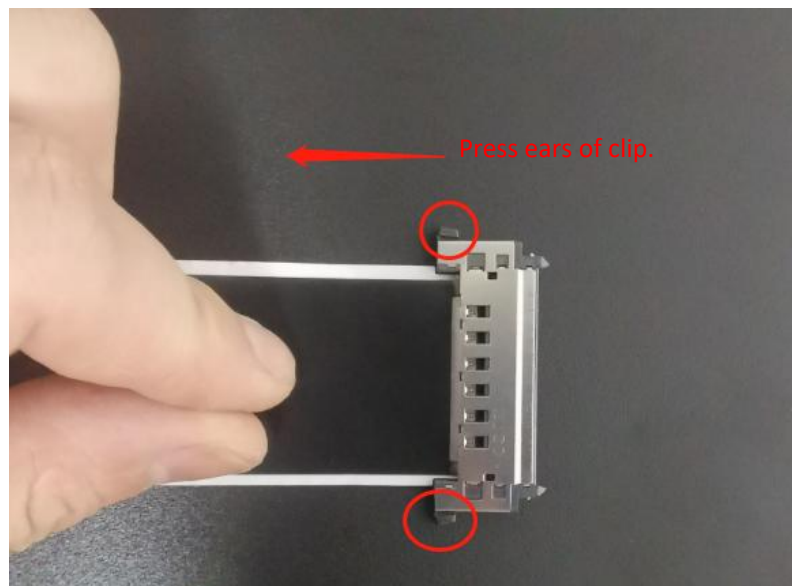


Step 5: Check whether the internal cables has fallen off or not.

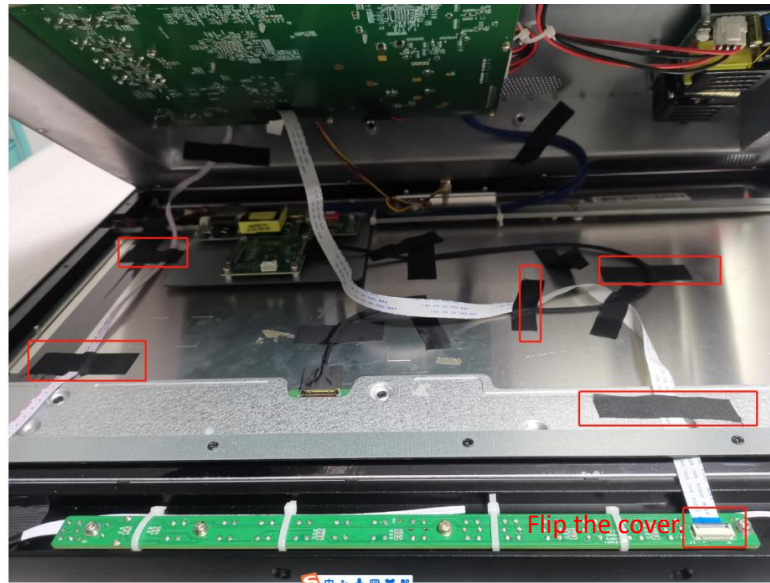
Step 6: For further disassembly, please remove the ribbon cable (Refer to Step 7 for operating details) and then tear off the tape between the cable and the screen.



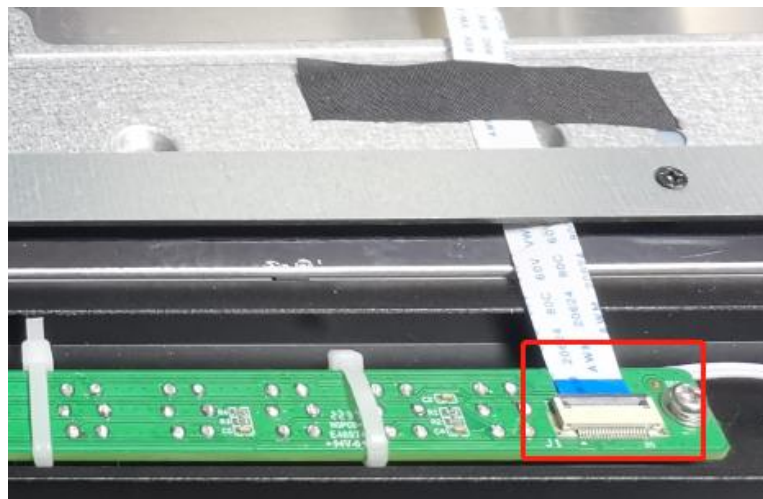
Step 7: Press clips on the side of cable and then pull them out.



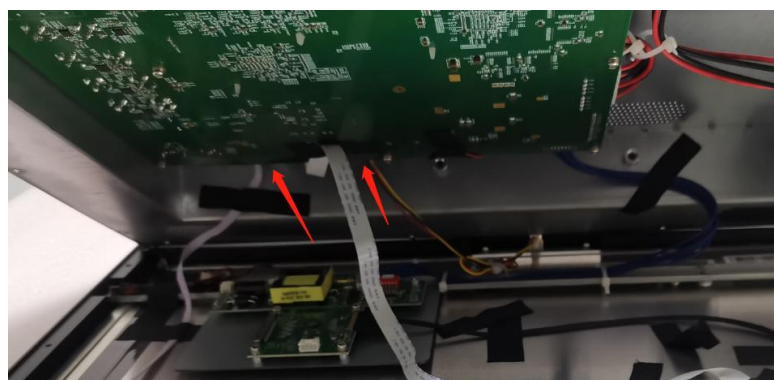
Step 8. Tear off the tape shown below.



Step 9: Take keyboard cable off.

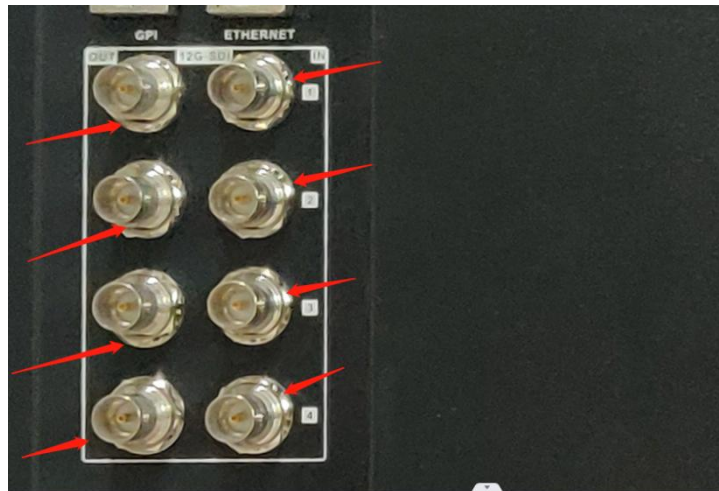


Step 10: Take cables off shown below ( Press the clip between cable and motherboard, then pull the cable out.)

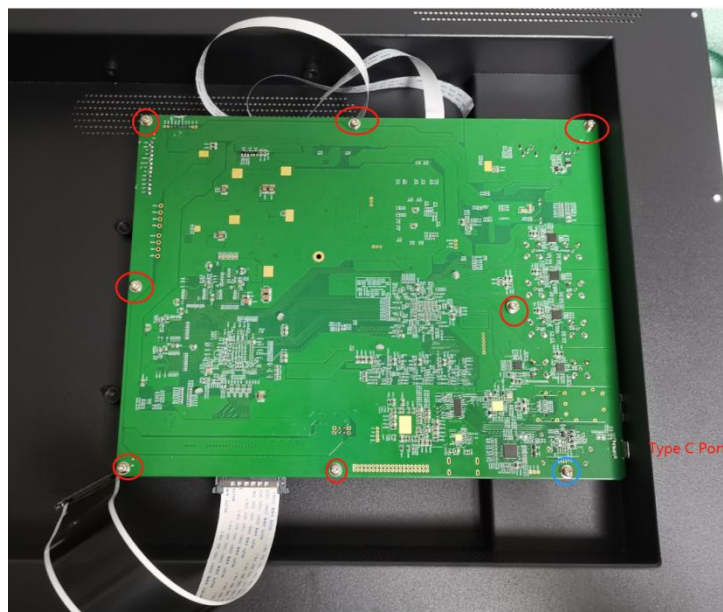


Step 11: Then separate the back shell and the front frame.

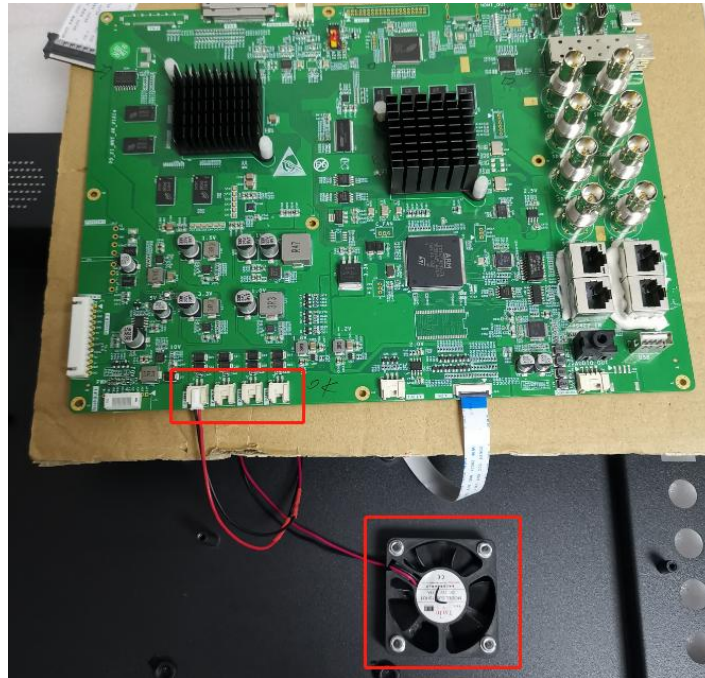
Step 12: Remove the nuts on BNC ports in the figure below.



Step 13: Remove the screws on motherboard. Please remember to keep the washer (near Type-C port) under the blue screw for the assembly when removing the motherboard.



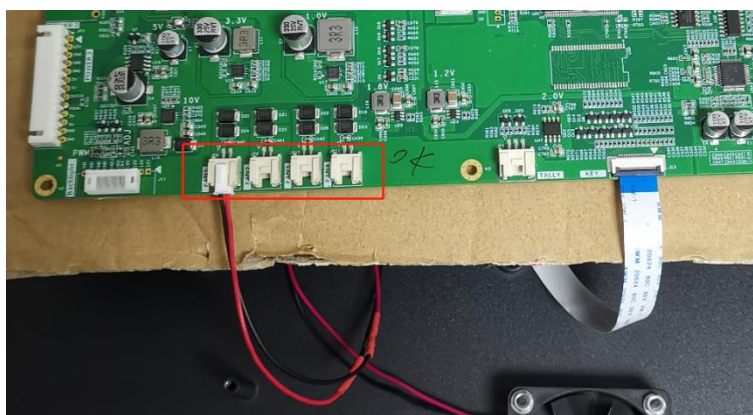
Step 14: Remove the four screws and washers of the fan shown in the figure below, and separate the fan cable from the motherboard.



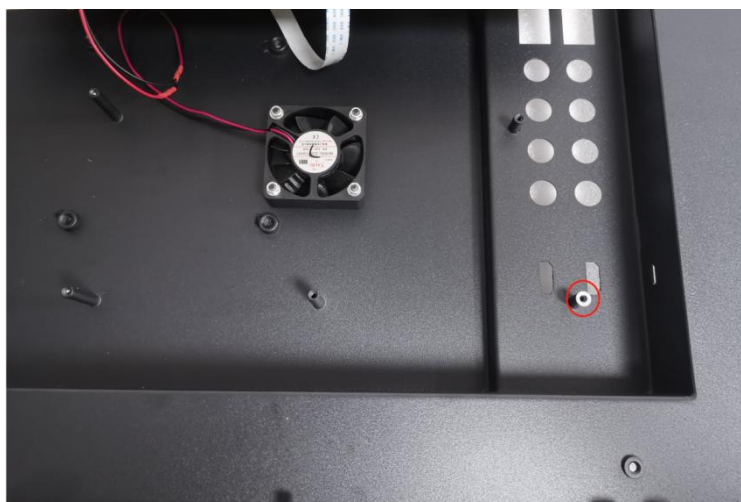
Step 15: Install a new fan with label facing up.



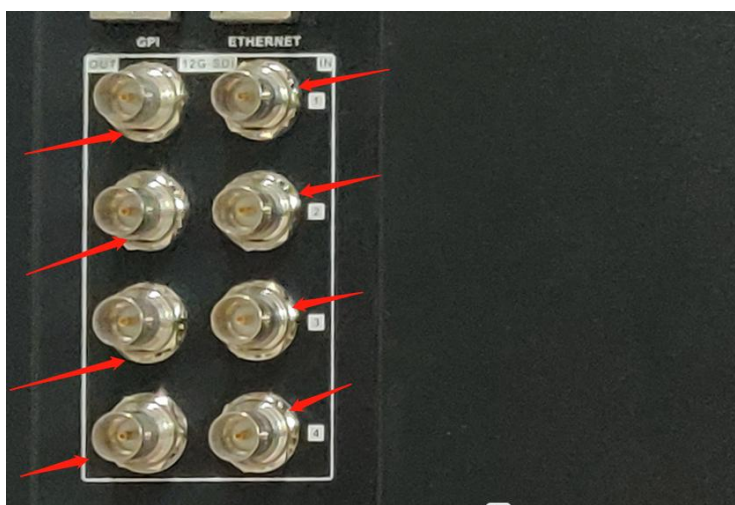
Step 16: Lock the new fan, connect fan cable to FAN 1 connector on the motherboard.



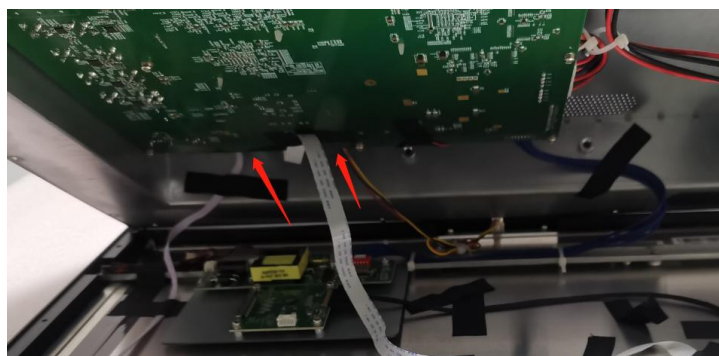
Step 17: After the fan replacement is completed, remember to place the dasher removed on the stub before installing the motherboard back into the back shell. Then place the motherboard, and lock screws to fix.



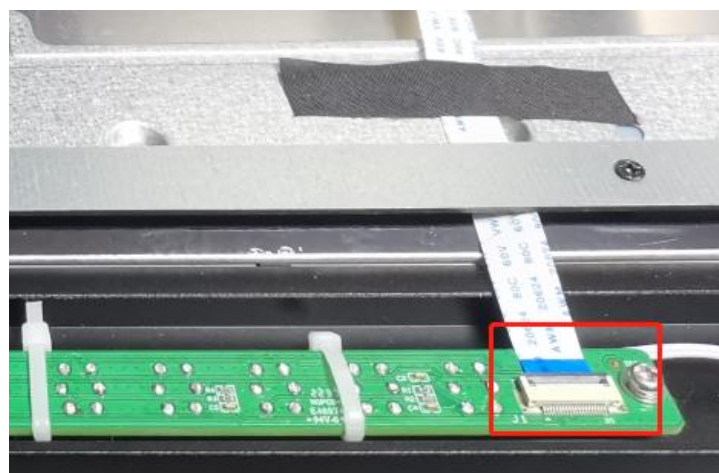
Step 18: Install the BNC nuts removed before.



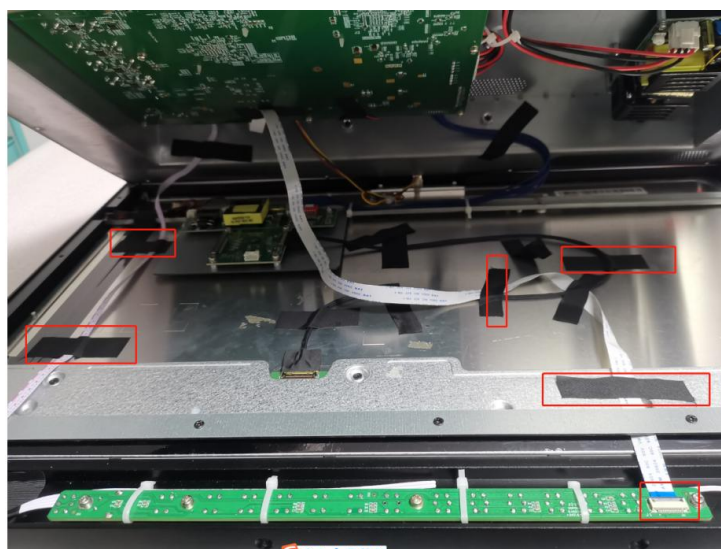
Step 19: Put front shell close to back shell, connect two cables shown as below.



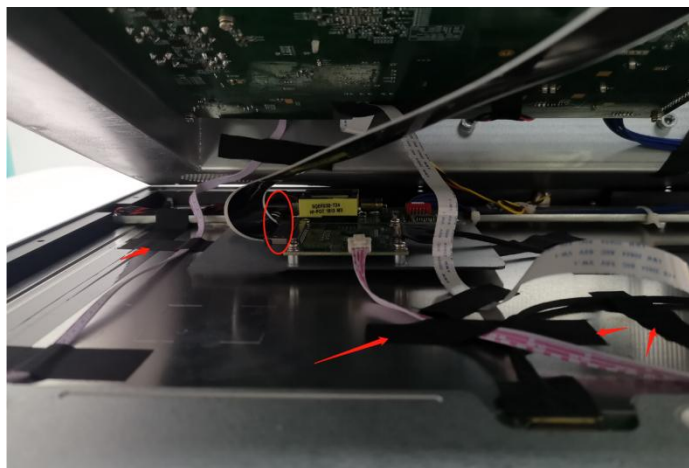
Step 20: Connect the keyboard cable back.



Step 21: Use tape to fix the ribbon cable.



Step 22: Connect the screen cable back.



Step 23: Put front and back shells together.

Step 24: Lock screws to fix.

## 5.5 Test Instructions after Installation

### Step 1: TALLY Light Test

Switch on 220V power supply to check TALLY status.

- Normal Status: TALLY in yellow
- Abnormal Status: Unlit/TALLY in red/TALLY in green

### Step 2: Signal Button Test

Press SDI1, SDI2, SDI3, SDI4, QSDI, HDMI one-by-one to check if the upper right of the screen displays right signal and the button light is on at the same time.

### Step 3: Shortcut Keys Test

Press the PRESET button continuously to check if the prompt menu in the lower right corner of the screen cycles in "F Button Preset-Preset 1~4" .

#### **Step 4: F1~F4 Button Test**

Set the PRESET key to "F Button Preset-Preset 2", then press F1 Button continuously to check if the prompt menu on the right side of the screen switches between OFF/ON. Do same operations to check F2~F4 Button.

#### **Step 5: Menu Button Test**

Press the MENU button to open OSD menu. Rotate SELECT/ENTER button to select and press to enter next menu, then press MENU button again to check if the menu returns back to previous level.

#### **Step 6: Power Switch Test**

Press and hold the power switch for 4 seconds to turn monitor off, then check if the power switch light is in orange. Press the power button slightly to turn monitor on, then check if the power switch light is in green.

#### **Step 7: SDI Signal Test**

- Input active SDI signal to SDI1-IN port, use a SDI cable to connect SDI1-OUT port and SDI2-IN port. Select SDI1 button to check if the screen displays normally, and select SDI2 button to check if the other screen displays normally.
- Input active SDI signal to SDI2-IN port, use a SDI cable to connect SDI2-OUT port and SDI3-IN port. Select SDI2 button to check if the screen displays normally, and select SDI3 button to check if the other screen displays normally.
- Input active SDI signal to SDI3-IN port, use a SDI cable to connect SDI3-OUT port and SDI4-IN port. Select SDI3 button to check if the screen displays normally, and select SDI4 button to check if the other screen displays normally.

- Input active SDI signal to SDI4-IN port, use a SDI cable to connect SDI4-OUT port and SDI1-IN port. Select SDI4 button to check if the screen displays normally, and select SDI1 button to check if the other screen displays normally.

#### **Step 8: HDMI Signal Test**

- Input active HDMI signal to HDMI1 port, select HDMI1 button to check if the screen displays normally.
- Input active HDMI signal to HDMI2 port, select HDMI2 button to check if the screen displays normally.

# Chapter 6 Appendix

## 6.1 Specification

| Model       |                     | aura UHD studio 24     |                            | aura UHD studio 27                                                                                    |  | aura UHD studio 32         |  |
|-------------|---------------------|------------------------|----------------------------|-------------------------------------------------------------------------------------------------------|--|----------------------------|--|
| Physical    | Net Weight          | 8.6kg                  |                            | 11.4kg                                                                                                |  | 15.3kg                     |  |
|             | Packaged Weight     | 12kg                   |                            | 15.3kg                                                                                                |  | 20.6kg                     |  |
|             | Net Dimensions      | 571.7 × 160 × 414.85mm |                            | 661 × 420 × 179mm                                                                                     |  | 751 × 502 × 179mm          |  |
|             | Packaged Dimensions | 800 ×250 × 555mm       |                            | 890 × 270 × 595mm                                                                                     |  | 980 × 270 × 675mm          |  |
| Interface   | Input               | 12G-SDI                |                            | 4xBNC                                                                                                 |  |                            |  |
|             |                     | HDMI 2.0               |                            | 2xHDMI-A (*HDCP not supported)                                                                        |  |                            |  |
|             |                     | SFP                    |                            | 12G Fiber                                                                                             |  |                            |  |
|             |                     | Type-C/Thunderbolt3    |                            | 1xUSB-C (*Only for previewing Davinci app output, does not support desktop duplication or extension.) |  |                            |  |
|             | Output              | 12G-SDI                |                            | 4×BNC                                                                                                 |  |                            |  |
| Performance | Screen              | Model                  | aura UHD studio 24         | aura UHD studio 27                                                                                    |  | aura UHD studio 32         |  |
|             |                     | Size                   | 23.8 inch                  | 27 inch                                                                                               |  | 32 inch                    |  |
|             |                     | Brightness             | 1000 cd/m2                 | 800 cd/m2                                                                                             |  | 1000 cd/m2                 |  |
|             |                     | Type                   | LCD Panel                  | LCD Panel                                                                                             |  | QLED Panel                 |  |
|             |                     | Resolution             | 3840 x 2160                | 3840 x 2160                                                                                           |  | 3840 x 2160                |  |
|             |                     | Pixel Pitch            | 0.1369 (H) × 0.1369 (V) mm | 0.1369 (H) × 0.1369 (V) mm                                                                            |  | 0.1369 (H) × 0.1369 (V) mm |  |
|             |                     | Aspect Ratio           | 16:9                       | 16:9                                                                                                  |  | 16:9                       |  |
|             |                     | Backlight              | LED                        | LED                                                                                                   |  | LED                        |  |
|             |                     | Contrast Ratio         | 1000:1                     | 1200:1                                                                                                |  | 1000:1                     |  |
|             |                     | Color Depth            | 10bits(1.07B)              | 10bits(1.07B)                                                                                         |  | 10bits(1.07B)              |  |
|             |                     | Image Processing       | 12bits                     | 12bits                                                                                                |  | 12bits                     |  |

|  |                     |                    |                                                                                                                                                                                                         |                    |                    |                    |
|--|---------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|--------------------|
|  |                     | Response           | 9ms                                                                                                                                                                                                     | 9ms                | 9ms                |                    |
|  |                     | Viewing Angle      | 178°/178°                                                                                                                                                                                               | 178°/178°          | 178°/178°          |                    |
|  | Video Signal Format | SDI Signal Format  | 1080p@50/59.94/60<br>1080p@23.98/24/25/29.97/30<br>720p@50/59.94/60<br>3840×2160p@23.98/24/25/29.97/30/50/59.94/60<br>2048×1080@23.98/24/25/29.97/30p/psf, 47.95/48/50/59.94/60p<br>3840×2160p@24/25/30 |                    |                    |                    |
|  |                     | HDMI Signal Format | 720p@50/59.94/60;1080i@50/59.94/60<br>1080p@23.98/24/25/29.97/30/50/59.94/60<br>3840×2160p@23.98/24/25/29.97/30/50/59.94/60<br>4096×2160p@23.98/24/25/29.97/30/50/59.94/60                              |                    |                    |                    |
|  | Audio               | Audio De-embedding | Support                                                                                                                                                                                                 |                    |                    |                    |
|  |                     | Audio Meter        | 16 channels (Up to 8 channels can be displayed simultaneously.)                                                                                                                                         |                    |                    |                    |
|  |                     | Built-in Speaker   | 1×8 ohm/0.5W                                                                                                                                                                                            |                    |                    |                    |
|  |                     | Headphone          | Stereo mini jack×1                                                                                                                                                                                      |                    |                    |                    |
|  | General             | Control/Update     | 1×RJ45                                                                                                                                                                                                  |                    |                    |                    |
|  |                     | GPI                | GPI1-5, 1×RJ-45                                                                                                                                                                                         |                    |                    |                    |
|  |                     | Serial Port        | RS-422, 2×RJ-45 (1 in   1 out)                                                                                                                                                                          |                    |                    |                    |
|  | Supported Standard  | HDMI IN1           | HDCP 1.X   HDCP 2.2                                                                                                                                                                                     |                    |                    |                    |
|  |                     | SDI                | SMPTE-425M-A/B<br>SMPTE-274M<br>SMPTE-296M<br>SMPTE ST 2036-1:2009<br>SMPTE ST 2048-2:2011<br>SMPTE ST 2081<br>SMPTE ST 2082                                                                            |                    |                    |                    |
|  | Power               | Input Voltage      | AC100~240V 50/60Hz                                                                                                                                                                                      |                    |                    |                    |
|  |                     | Power              | Model                                                                                                                                                                                                   | aura UHD studio 24 | aura UHD studio 27 | aura UHD studio 32 |

|                    |                       |                              |     |     |      |
|--------------------|-----------------------|------------------------------|-----|-----|------|
|                    | Consumption           | max                          | 90W | 98W | 140W |
| <b>Environment</b> | Operating Temperature | -10°C ~ 55°C (14°F to 155°F) |     |     |      |
|                    | Operating Humidity    | 30% ~ 85%, RH                |     |     |      |
|                    | Storage Humidity      | -20-60°C                     |     |     |      |

## 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<br>30PsF, 30/1.001PsF, 25PsF, 24PsF, 24/1.001PsF<br>60i, 60/1.001i, 50i | //                    | //              |
| SMPTE-2048 M-2 | 2048×1080  | 4:2:2, YCbCr, 10bit                                   | 30p, 30/1.001p, 25p, 24p, 24/1.001p<br>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<br>Level B-DL | //              |
| SMPTE-2048 M-2 | 2048×1080  | 4:2:2, YCbCr, 10bit                                   | 60p, 60/1.001p, 50p, 48p, 48p/1.001p                                                                        | Level A<br>Level B-DL | //              |
| SMPTE-296M     | 1280×720   | 4:4:4, RGB/RGBA, 10bit<br>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<br>4:4:4, YCbCr/               | 30p, 30/1.001p, 25p, 24p, 24/1.001p<br>30PsF, 30/1.001PsF, 25PsF,                                           | Level A<br>Level B-DL | //              |

|                   |           |                                                             |                                                                                                                   |                          |         |
|-------------------|-----------|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------------|---------|
|                   |           | YCbCrA, 10bit                                               | 24PsF, 24/1.001PsF<br>60i, 60/1.001i, 50i                                                                         |                          |         |
| SMPTE-2048<br>M-2 | 2048×1080 | 4:4:4, RGB/RGBA,<br>10bit<br>4:4:4, YCbCr/<br>YCbCrA, 10bit | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p<br>30PsF, 30/1.001PsF, 25PsF,<br>24PsF, 24/1.001PsF                        | Level A<br>Level<br>B-DL | //      |
| SMPTE-274M        | 1920×1080 | 4:4:4, RGB, 12bit<br>4:4:4, YCbCr, 12bit                    | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p<br>30PsF, 30/1.001PsF, 25PsF,<br>24PsF, 24/1.001PsF<br>60i, 60/1.001i, 50i | Level A<br>Level<br>B-DL | //      |
| SMPTE-2048<br>M-2 | 2048×1080 | 4:4:4, RGB, 12bit<br>4:4:4, YCbCr, 12bit                    | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p<br>30PsF, 30/1.001PsF, 25PsF,<br>24PsF, 24/1.001PsF                        | Level A<br>Level<br>B-DL | //      |
| SMPTE-274M        | 1920×1080 | 4:2:2, YCbCr, 12bit                                         | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p<br>30PsF, 30/1.001PsF, 25PsF,<br>24PsF, 24/1.001PsF<br>60i, 60/1.001i, 50i | Level A<br>Level<br>B-DL | //      |
| SMPTE-2048<br>M-2 | 2048×1080 | 4:2:2, YCbCr, 12bit                                         | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p<br>30PsF, 30/1.001PsF, 25PsF,<br>24PsF, 24/1.001PsF                        | Level A<br>Level<br>B-DL | //      |
|                   | 2048×1080 | 4:4:4, XYZ, 12bit                                           | 30p, 25p, 24p<br>30PsF, 25PsF, 24PsF                                                                              | Level A<br>Level<br>B-DL | //      |
| SMPTE-2036<br>M-1 | 3840×2160 | 4:2:2, YCbCr, 10bit                                         | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p                                                                            | MODE-1                   | 2SI/SQD |
| SMPTE-2048<br>M-2 | 4096×2160 | 4:2:2, YCbCr, 10bit                                         | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p                                                                            | MODE-1                   | 2SI/SQD |
| SMPTE-2036<br>M-1 | 3840×2160 | 4:2:2, YCbCr, 10bit<br>4:2:0, YCbCr, 10bit                  | 60p, 60/1.001p, 50p                                                                                               | MODE-1                   | 2SI/SQD |
| SMPTE-2048<br>M-2 | 4096×2160 | 4:2:2, YCbCr, 10bit                                         | 60p, 60/1.001p, 50p, 48p,<br>48p/1.001p                                                                           | MODE-1                   | 2SI/SQD |
| SMPTE-2036<br>M-1 | 3840×2160 | 4:4:4, RGB, 10bit<br>4:4:4, YCbCr, 10bit                    | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p                                                                            | MODE-1                   | 2SI/SQD |
| SMPTE-2048<br>M-2 | 4096×2160 | 4:4:4, RGB/RGBA,<br>10bit<br>4:4:4, YCbCr/<br>YCbCrA, 10bit | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p                                                                            | MODE-1                   | 2SI/SQD |
| SMPTE-2036<br>M-1 | 3840×2160 | 4:4:4, RGB, 12bit<br>4:4:4, YCbCr, 12bit                    | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p                                                                            | MODE-1                   | 2SI/SQD |

|                   |           |                                          |                                        |        |         |
|-------------------|-----------|------------------------------------------|----------------------------------------|--------|---------|
| SMPTE-2048<br>M-2 | 4096×2160 | 4:4:4, RGB, 12bit<br>4:4:4, YCbCr, 12bit | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p | MODE-1 | 2SI/SQD |
| SMPTE-2036<br>M-1 | 3840×2160 | 4:2:2, YCbCr, 12bit                      | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p | MODE-1 | 2SI/SQD |
| SMPTE-2048<br>M-2 | 4096×2160 | 4:2:2, YCbCr, 12bit                      | 30p, 30/1.001p, 25p, 24p,<br>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-2048<br>M-2 | 2048×1080  | 4:2:2, YCbCr, 10bit                      | 60p, 60/1.001p, 50p, 48p,<br>48p/1.001p                                                                           | //   | //              |
| SMPTE-274M        | 1920×1080  | 4:4:4, RGB, 10bit<br>4:4:4, YCbCr, 10bit | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p<br>30PsF, 30/1.001PsF, 25PsF,<br>24PsF, 24/1.001PsF<br>60i, 60/1.001i, 50i | //   | //              |
| SMPTE-2048<br>M-2 | 2048×1080  | 4:4:4, RGB, 10bit<br>4:4:4, YCbCr, 10bit | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p<br>30PsF, 30/1.001PsF, 25PsF,<br>24PsF, 24/1.001PsF                        | //   | //              |
| SMPTE-274M        | 1920×1080  | 4:4:4, RGB, 12bit<br>4:4:4, YCbCr, 12bit | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p<br>30PsF, 30/1.001PsF, 25PsF,<br>24PsF, 24/1.001PsF<br>60i, 60/1.001i, 50i | //   | //              |
| SMPTE-2048<br>M-2 | 2048×1080  | 4:4:4, RGB, 12bit<br>4:4:4, YCbCr, 12bit | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p<br>30PsF, 30/1.001PsF, 25PsF,<br>24PsF, 24/1.001PsF                        | //   | //              |
| SMPTE-274M        | 1920×1080  | 4:2:2, YCbCr, 12bit                      | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p<br>30PsF, 30/1.001PsF, 25PsF,<br>24PsF, 24/1.001PsF                        | //   | //              |
| SMPTE-2048<br>M-2 | 2048×1080  | 4:2:2, YCbCr, 12bit                      | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p                                                                            | //   | //              |
|                   | 2048×1080  | 4:4:4, XYZ, 12bit                        | 30p, 25p, 24p<br>30PsF, 25PsF, 24PsF                                                                              | //   | //              |

## Quad Link

|                   |           |                                                             |                                                                                            |                          |         |
|-------------------|-----------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------|---------|
| SMPTE 2082-1      | 7680×4320 | 4:2:2, YCbCr, 10bit                                         | 23.98p,24p,25p,29.97p,30p,50p,<br>59.94p,60p                                               | //                       | 2SI     |
| SMPTE<br>2082-10  | 8192×4320 | 4:2:2, YCbCr, 10bit                                         | 23.98p,24p,25p,29.97p,30p,50p,<br>59.94p,60p                                               | //                       | 2SI     |
| SMPTE-2036<br>M-1 | 3840×2160 | 4:2:2, YCbCr, 10bit                                         | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p<br>30PsF, 30/1.001PsF, 25PsF,<br>24PsF, 24/1.001PsF | //                       | SQD     |
| SMPTE-2048<br>M-2 | 4096×2160 | 4:2:2, YCbCr, 10bit                                         | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p<br>30PsF, 30/1.001PsF, 25PsF,<br>24PsF, 24/1.001PsF | //                       | SQD     |
| SMPTE-2036<br>M-1 | 3840×2160 | 4:2:2, YCbCr, 10bit<br>4:2:0, YCbCr, 10bit                  | 60p, 60/1.001p, 50p                                                                        | Level A<br>Level<br>B-DL | 2SI/SQD |
| SMPTE-2048<br>M-2 | 4096×2160 | 4:2:2, YCbCr, 10bit                                         | 60p, 60/1.001p, 50p, 48p,<br>48p/1.001p                                                    | Level A<br>Level<br>B-DL | 2SI/SQD |
| SMPTE-2036<br>M-1 | 3840×2160 | 4:4:4, RGB, 10bit<br>4:4:4, YCbCr, 10bit                    | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p                                                     | Level A<br>Level<br>B-DL | 2SI/SQD |
|                   | 3840×2160 | 4:4:4, RGB, 10bit<br>4:4:4, YCbCr, 10bit                    | 30PsF, 30/1.001PsF, 25PsF,<br>24PsF, 24/1.001PsF                                           | Level A<br>Level<br>B-DL | SQD     |
| SMPTE-2048<br>M-2 | 4096×2160 | 4:4:4, RGB/RGBA,<br>10bit<br>4:4:4, YCbCr/<br>YCbCrA, 10bit | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p                                                     | Level A<br>Level<br>B-DL | 2SI/SQD |
|                   | 4096×2160 | 4:4:4, RGB, 10bit<br>4:4:4, YCbCr, 10bit                    | 30PsF, 30/1.001PsF, 25PsF,<br>24PsF, 24/1.001PsF                                           | Level A<br>Level<br>B-DL | SQD     |
| SMPTE-2036<br>M-1 | 3840×2160 | 4:4:4, RGB, 12bit<br>4:4:4, YCbCr, 12bit                    | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p                                                     | Level A<br>Level<br>B-DL | 2SI/SQD |
|                   | 3840×2160 | 4:4:4, RGB, 12bit<br>4:4:4, YCbCr, 12bit                    | 30PsF, 30/1.001PsF, 25PsF,<br>24PsF, 24/1.001PsF                                           | Level A<br>Level<br>B-DL | SQD     |
| SMPTE-2048<br>M-2 | 4096×2160 | 4:4:4, RGB, 12bit<br>4:4:4, YCbCr, 12bit                    | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p                                                     | Level A<br>Level<br>B-DL | 2SI/SQD |
|                   | 4096×2160 | 4:4:4, RGB, 12bit<br>4:4:4, YCbCr, 12bit                    | 30PsF, 30/1.001PsF, 25PsF,<br>24PsF, 24/1.001PsF                                           | Level A<br>Level         | SQD     |

|                   |           |                     |                                        |                          |         |
|-------------------|-----------|---------------------|----------------------------------------|--------------------------|---------|
|                   |           |                     |                                        | B-DL                     |         |
| SMPTE-2036<br>M-1 | 3840×2160 | 4:2:2, YCbCr, 12bit | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p | Level A<br>Level<br>B-DL | 2SI/SQD |
| SMPTE-2048<br>M-2 | 4096×2160 | 4:2:2, YCbCr, 12bit | 30p, 30/1.001p, 25p, 24p,<br>24/1.001p | Level A<br>Level<br>B-DL | 2SI/SQD |
|                   | 4096×2160 | 4:4:4, XYZ, 12bit   | 30p, 25p, 24p,                         | Level A<br>Level<br>B-DL | 2SI/SQD |
|                   | 4096×2160 | 4:4:4, XYZ, 12bit   | 30PsF, 25PsF, 24PsF                    | Level A<br>Level<br>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.

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- **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.

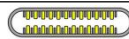
●**USB:** Universal Serial Bus is a standard that was developed in the mid-1990s that defines cables, connectors and communication protocols. This technology is designed to allow a connection, communication and power supply for peripheral devices and computers.

●**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-horizontal images (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.

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●**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 and 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 broadcast applications.

●**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).

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● **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 electronic 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.

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● **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.

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## 6.4 Revision History

The table below lists the changes to the User Manual.

| Format | Time       | ECO#  | Description   | Principal |
|--------|------------|-------|---------------|-----------|
| V1.0   | 2023-11-28 | 0000# | First release | Aster     |

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