S902 User Guide

4K Quad View Event Controller

4x HDMI 2.0 input and dual UHD outputs

Maximum input: 4096*2160 @60Hz, 4:4:4 chroma sampling

With the same or different display Windows in each output

Multiple display windows with flexible image size, cropping, location and overlap

Seamless switching in single or multi-view display modes

Image Fade in, Fade out, Dissolve, Wipe & Blending

True 10-bit processing and up/down scaling

Full screen customized background

Image alpha blending

Allow Editing and Preview different layout while live time playback

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Introduction

The S902 is a 4x2 UHD four-screen image real-time control system that allows users to simultaneously display up to four 4K/60 sources on one or two UHD displays. Each window can be flexibly and seamlessly adjusted in terms of position, size, aspect ratio, cropping, and overlap priority in real time. Users can also seamlessly switch display modes from 12 preset multi-screen layouts and 20 custom profiles, providing a highly flexible and cost-effective solution.

Featuring 4 HDMI 2.0 inputs and 2 HDMI 2.0 outputs, the S902 supports VESA/CEA video standard timings up to 4096*2160 @60Hz with 4:4:4 chroma sampling. Each output port can accommodate up to 4 windows, with each window capable of selecting an input source from any input port. Users have the option to assign the same input source to multiple windows and can adjust input selection, image positioning, resizing, cropping, and color settings for each window.

Users can prioritize display windows when they overlap and select one or multiple windows with the same configuration for any output port. The device offers 16 transition modes, including high speed seamless switching, Fade-in, Fade-out, Dissolve, and Wipe, with selectable duration for transitions. It integrates HDMI embedded audio, RCA SPDIF digital audio, and analog 3.5mm R/L audio jack R/L, allowing users to assign audio from input ports to each audio output port as needed.

Customized background and image alpha blending are embedded. The background image resolution can be up to 4k2k/60Hz. Users can select background image from PC or any display Window. One programmable basic background color and 3 selectable background images can be stored in the system.

Control options for the unit include IR controller, front panel push button, USB, WebUI, RS232, UDP and Ethernet, providing versatile control methods for various applications. Users can recall up to 20 custom Profile Presets through different control systems. Designed for continuous operation in a 24/7 environment, the S902 offers easy configuration, low entry barriers, cost-effectiveness, reliability, and flexibility for a wide range of applications.

Application

- Live event
- Front end processor for large display, such as LED, edge blending system, video wall.
- Digital signage
- Presentation halls
- Security & surveillance systems
- Education
- Conference room
- Video content post production
- Video editing studio

Outlook

Front panel

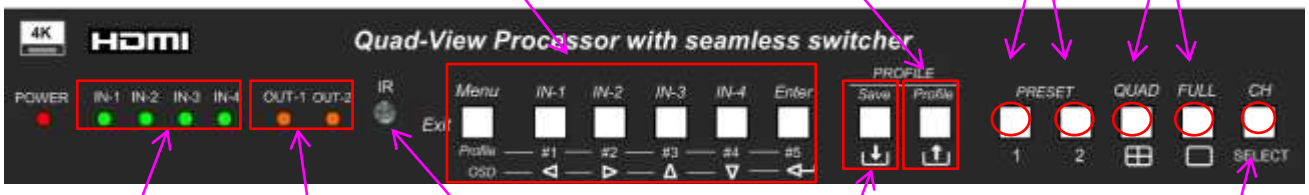
Two functions

1. Profile Index # keys when no OSD is activated. No Input selection function now.
2. OSD function key after activate OSD menu.

Hotkey to load Custom Profile

Preset-1 Preset-2

Quad / Single display hotkey



Input LED

Output LED

IR Receiver

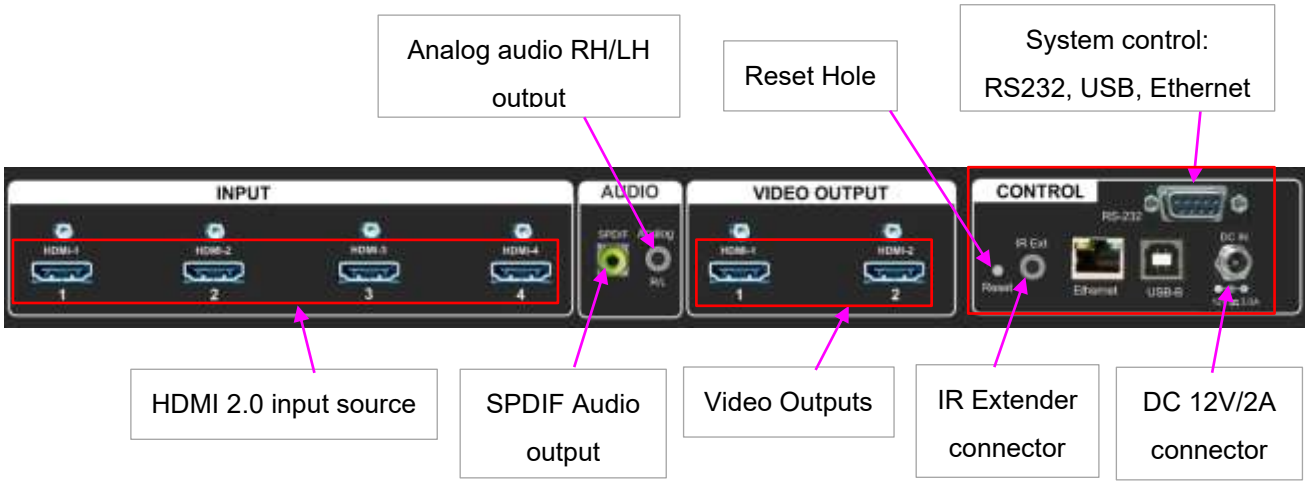
Hotkey to save Custom Profile

INFO key

1. Input LED will show RED light when S902 detects signal source signal in that input port. Once it had been selected to show on the Window, it will turn to GREEN light.
2. When turn-off Power by IR controller, the power LED will turn to RED. User can power up by IR Controller (P-100 or RC-902) or power switch.
3. The function in CH/SELECT key is changed to INFO key to show up input/output resolution.
4. Preset-1/Preset-2 keys is to recall system Preset-1 and Preset-2 with one window in Left and 3 windows in the Right side. One is PIP another is POP.
5. Profile Save: it will show “SAVE PROFILE” message. User can select Profile #1 to #5 key on front panel to save this Custom Profile.
6. Profile Recall key will show “LOAD PROFILE” message. User can recall Profile #1 to #5 directly.
7. These Custom Profile #1 to #5 are the same Profile Index as that inside OSD menu.
8. When power LED is blinking, the OSD menu had been locked.

Back panel

User can connect signal source to any of the input ports for two output ports.



1. OSD Menu can only show in Output-1 channel.
2. Window-1 and Window-2 will have full functions OSD menu. “De-Interlacing” and “Noise Reduction” OSD menu will only be available in Window-1 and Window-2.
3. Except OSD Menu difference, Window-3 and Window-4 will have the same function and video quality as Window-1 and Window-2 under progressive signal).
4. User can select audio source for each output port, SPDIF and Analog R/L output independently.
5. Every input signal source (HDMI-1 to HDMI-4) can be assigned to one or multiple Windows.

System Connection

Each display Window can select signal from any input port. Each output can display up to 4 windows. Each window can be located at any position with flexible resizing, cropping, aspect ratio, color correction and overlap priority setting.

Output ports configuration

- OSD can only be showed in Output-1.
- User can assign any display Window for each output. Maximum is 4 windows.
- If any Window is assigned to both output ports, the Window content, layout and position must be the same.
- If each output shows different Windows, user can flexibly manipulate the Windows without affecting another Output port.

Content in the packing box

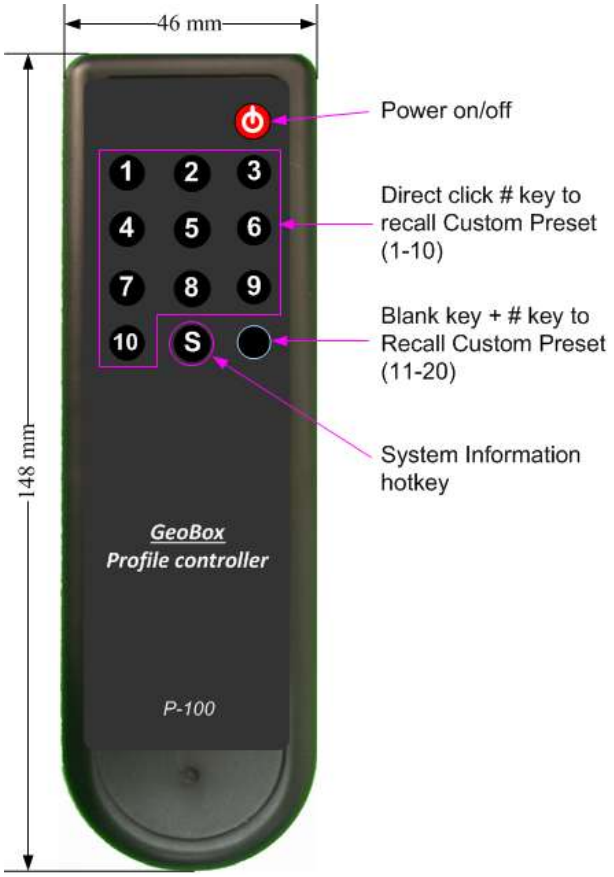
- The S902 Quad View Processor
- 1x RC-902 IR Controller
- 1x IR Extending Receiver with 1.8m cable
- 1x AC to DC Power supply unit with Power Cord
- Mounting bracket with screw (Option)
- P-100 Profile Control IR Controller (Optional)
- Please download User Guide & SCT Tool at https://www.vnstw.com/.

User Guide

1. How to use IR Remote Controller

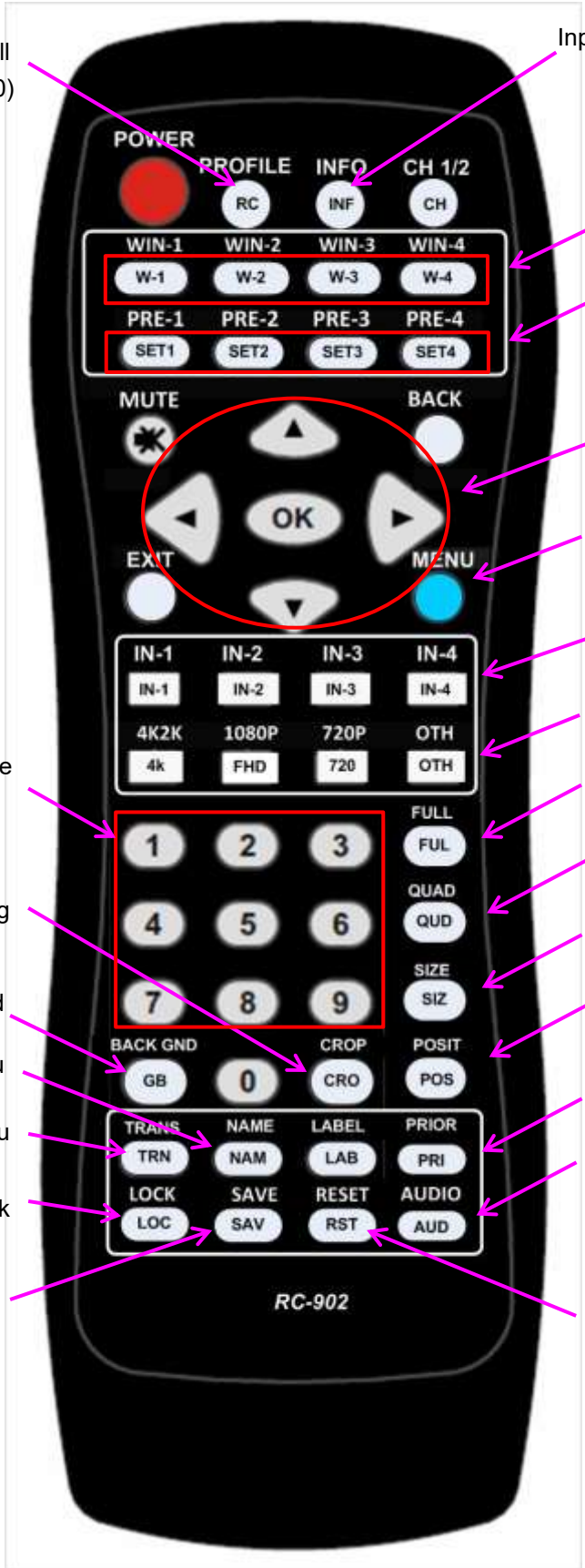
- **RC-902** is standard controller for system setup.
- **P-100** is simplified controller for end user. The operation will not affect system Setup. It is an option item to buy separately.

1.1. P-100 Controller for User Preset modes recall



- Directly click number keys 1-10 will recall Custom Profile 1-10.
- If click Blank key first, then click other number key, it can recall Custom Profile 11-20.
- Click “S” key will pop-up Input/Output and FW version system information.

1.2. RC-902 Controller for system Setup



1.3. Limitation in OSD Operation

- OSD Menu can only show in Output-1 channel.
- Window-1 and Window-2 will have full function OSD menu. “De-Interlacing” and “Noise Reduction” OSD menu will only be available in Window-1 and Window-2.
- User can select transparency and OSD display time.

1.4. IR Receiver Extender

- RC-902 controller is specific for the operation of S902.
- IR receiver is on Front Panel. One 3.5ø mm audio connector for IR extender is located at Back Panel of S902. 1.8m IR extension cable is equipped in the packing. User can add 2.5Ø audio cable to extend the control distance up to 20 meters.
- When multiple units are used, user needs to connect IR receiver with extension cable and places it at different locations for convenient control.

1.5. OSD Lock and Unlock

- To press LOCK key on RC-902 controller for 5 seconds will LOCK the OSD. [Menu Lock] message will show on the screen. To press another 5 seconds on LOCK key, it will UNLOCK the OSD. [Menu Unlock] message will show on the screen.
- On front panel, MENU key has the same function as LOCK key in IR controller.
- OSD Lock can also be used while multiple units of GeoBox are used simultaneously to prevent mutual interference.
- When OSD is locked, Power LED on front panel will be blinking.
- SCT has OSD Lock/Unlock function at the left lower corner in each control page.

1.6. OSD Menu keypads on the Front Panel

Front panel has OSD keypads. The functions are the same as IR controller. The only difference is in the hotkeys function. Please see more details in “Front Panel” section.

2. System structure

2.1 OSD Menu location

- OSD will only display on Output-1.
- OSD menu is location at top left corner.
- User can select transparency and OSD display time.

2.2 Display Window

- Maximum 4 display windows. Each Window can select signal source from any HDMI input port.
- Each Window can have independent size, cropping, position, aspect ratio and color settings.
- One HDMI signal can be assigned to multiple Windows.

2.3 Output ports

- Two simultaneous output ports. One output can display up to 4 Windows.
- Each Window can select signal from any HDMI input port.
- The same window displayed in two outputs shall have the same setup.

2.4 Limitations in output display

- OSD can only be showed in Output-1
- If all input is 4k 444 format with 4k output, the display is possible to be abnormal.
- The Window position, size and cropping in two output ports must be the same.
- User can select different Windows for each output with different setup.
- Window-3 and Window-4 will have no de-interlacing function. It will execute double scaling for interlaced signal. We suggest using progressive signal to get the best video quality.

3. System Reset

3.1. Complete system reset through RESET hole

- Inserting small pin into RESET hole on back panel for 5 seconds will reset the system to factory default settings. It will erase all Custom Preset Profile data.

3.2. Reset through IR controller or OSD

- User can Reset through OSD menu under [System]→ [Reset].
- Click IR control [RESET] key will Pop-Up System Reset OSD menu.
- Custom Profile Data will remain the same without being erased.

3.3. Reset through SCT and SWCT (please see Chapter 7)

4. System Control

4.1. Control method

- User can control S902 through IR controller, front panel keypads, USB, RS232, UDP and Ethernet.
- S902 SCT control tool is available for USB control and WebUI is embedded in S902 for Ethernet control.

4.2. RS232

- RS232 interface is designed with DB-9 connector. User can select 11520 or 9600 baud rates.
- The UART Protocol between GeoBox and a Host computer can be downloaded from website. The protocol can be executed via RS-232, Ethernet or other forthcoming communication methods.
- Box ID is available from OSD setting when multiple units are used at the same time.

4.3. Ethernet connection

- User can control and setup S902 through network connection and embedded WebUI.
- UTP cable can be used for direct connection between PC and GeoBox. User needs to set PC TCP/IPv4 with the same domain segment as GeoBox (for instance, to set IP address at (192.168.0.105) and subnet mask at (255.255.255.0).
- Open web browser (Google Chrome or Internet Explorer) and input S902 IP address (default is 192.168.0.100), user can see GeoBox WebUI and menu for further system operation. There is no additional software is required.
- If user can’t connect the network, please power off/on S902 again to let PC detect S902 network.
- If the connection is gone through WiFi router or switch/hub through RJ45 to Lan port, user can set DHCP IP or Static IP for the connection.
- If necessary, please [Renew] DHCP to get IP address for network connection.
- Each S902 can set different IP address for independent operation and control.
- If S902 is connected with WiFi Router (through LAN port), user can control S902 through WiFi via PC, iPad or mobile phone through the same SSID.
- User can set different IP in each S902 for individual control while multiple units are used.
- Default TCP server port is 1266.
- Default UDP port # is 5000. User has flexibility to set at different port number.

5. System Data Save / Restore / Erase

No matter by which method to Save the Profile Data, user can recall back by all kinds of methods, including IR controller, front panel keypads. SCT, SWCT, UDP or RS232.

5.1. Via IR Controller

- To use IR controller SAVE hotkey, then select Index # to store custom setting through OSD.
- To recall Custom profile setting by directly click # keys in the IR controller.

5.2. Via Front Panel keypads

- To click SAVE hotkey, then click Index # on Front Panel to save the setting
- To click the Index # on Front Panel directly to recall the profile directly.

5.3. Via SCT/SWCT

- SCT/SWCT has one Profile menu page for user to Save or Recall the profile Data.

5.4. Profile Data erase

- User can erase the Profile Data throw inserting small pin into back panel Reset Hole for 5 seconds or “Factory Rest” on System Page under SCT/SWCT to erase Profile Data.

6. PC Backup

- User can backup Profile Data to PC and load back through SCT/SWCT under SYSTEM page.
- The backup file can be copied to different Box.

7. OSD Menu structure

7.1. OUTPUT SETUP

Below is the menu under OUTPUT SETUP:

Preset mode	FULL, QUAD, PRE-1 to PRE-10		
Input select	WIN-1	OUTPUT-1, OUTPUT-2, BOTH, OFF	
	WIN-2		
	WIN-3		
	WIN-4		
Audio select	OUT-1	Win-1, Win-2, Win-3, Win-4, Mute	
	OUT-2	Win-1, Win-2, Win-3, Win-4, Mute	
	COAXIAL	Win-1, Win-2, Win-3, Win-4, Mute	
Resolution	1920x1080P60, 1920x1080P50, 3840x2160P60, 3840x2160P50, 3840x2160P30, 3840x2160P25, 3840x2160P24, 1280x720P60, 1280x720P50, 4096x2160P60, 4096x2160P50, 3840x2160P59.94, 1920x1080P59.94, 1280x720P59.94		
Transition	Seamless, Fade Out/In, Dissolve, Wipe/Left, Wipe/Right, Wipe/Top, Wipe/Bottom, Wipe/Center1, Wipe/Center2, Wipe Center3, Wipe/Shuttle1, Wipe/Shuttle2, Wipe/Shuttle3, Wipe/Top-L, Wipe/Top-R, Wipe/Bottom-L, Wipe/Bottom-R, Blending		
Duration	To set the time of transition		
Priority (Out1)	INITIAL	1234	
	LAYER 2	2134	
	LAYER 3	3214	
	LAYER 4	4321	
Priority (Out2)	INITIAL	1234	
	LAYER 2	2134	
	LAYER 3	3214	
	LAYER 4	4321	
HDCP	AUTO, ON, OFF		
Color Format	RGB444, YUV444, YUV422, Deep Color (ONOFF)		
Background	Selection	Off, Image-1, Image-2, Imag-3, RGB	
	Capture	Image-1	Win-1, Win-2, Win-3, Win-4
		Image-2	Win-1, Win-2, Win-3, Win-4
		Image-3	Win-1, Win-2, Win-3, Win-4
	RGB	RED (0-31), GREEN (0-63) , BLUE (0-31)	

➢ PRESET MODE

12 output modes can be selected, including single Window full screen display and Quad Window display.

➢ INPUT SELECT

- Each HDMI input signal can be assigned to any display Window.
- Each Window can be assigned to Output-1, Output-2, Both or turn off.

➢ AUDIO SELECT

User can select from 4 input sources audio for Output-1, Output-2, SPDIF output or Analog output. Analog output audio is abstracted from SPDIF audio.

➢ RESOLUTION

- User can select output resolution from 14 preset resolutions.
- Two output channels will have the same output resolution.

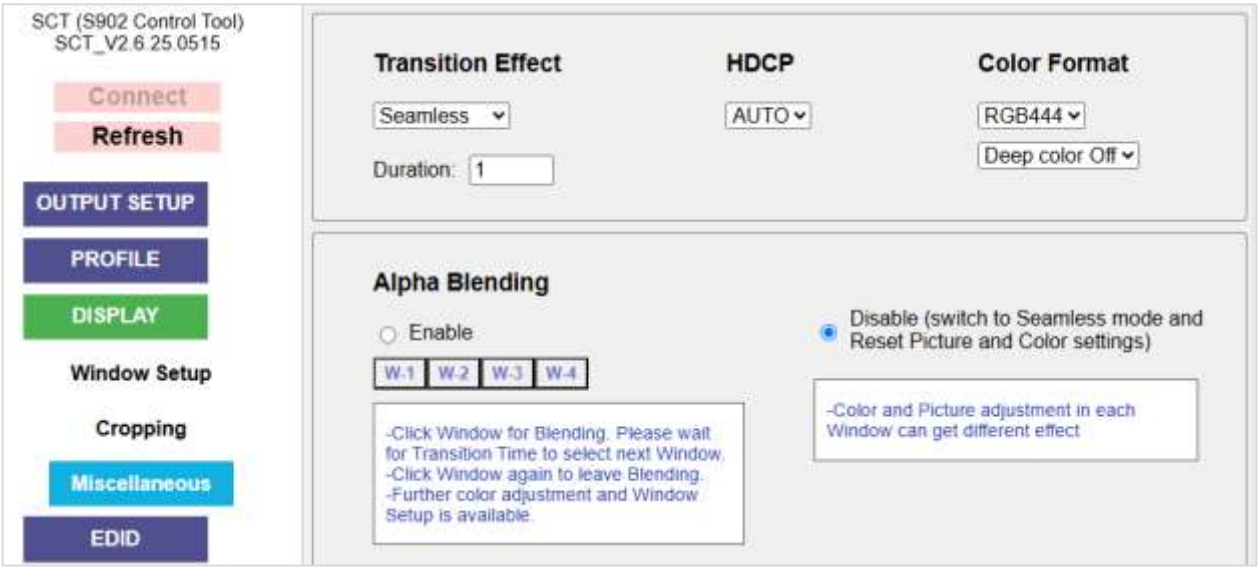
➢ TRANSITION / DURATION

- 19 transition effects are built in the processor. It includes Quick Seamless, Fade in/Fade out, Dissolve Wipe and alpha Blending.
- Transition effect only implemented during input source or display mode change.
- Each effect can select different duration.
- User can save Transition setting in Custom Profile mode together with input selection and Window configuration. When selects this Custom mode, user will see Transition effect.
- Fade-in/Fade-out can be executed in both single and multiple Windows display modes. Dissolve and Wipe transition modes can only be executed with single Window display.
- The duration range in different Transition modes may be different.

➢ TRANSITION / BLENDING (Alpha Blending) BY OSD

- Open Transition OSD menu and select [Blending] under Output Setup→Transition→Bending.
- Select Win-1 to Win-4 as Blending images by IR controller. User will see blending image. The input LED will turn to GREEN for Blending images. To click the same Window input selection key again, it will disable blending effect and the input LED will turn to RED.
- Once OSD is set at [Blanding], user can select or multiple windows as blending images.
- User can do Window setup in each blending image to get the best result, including image size, cropping, position, color/picture and gamma adjustment, then save to Custom Profile.
- User needs to disable [Blending] function through [Reset] or select Seamless mode or any Transition effect while normal display is required. SCT/SWCT will be more convenient to implement this function.

➢ Alpha Blending through SCT PC Tool



- **Enable Alpha Blending**
    a. Alpha Blending setup window is under Display→Miscellaneous→ Alpha Blending
    b. Select Duration time for blending.
    c. Click [Enable] button, it will turn on Alpha Blending function and enable all Windows in the display as Blending Windows. Win # will be highlighted.
    d. Click Win # to select window for “Enable” or “Disable” Alpha Blending function. The Window with Alpha Blending will be high-lighted.
    e. Please wait for the [Transaction Duration] before select next Window.
    f. User can open other menu to adjust the color, gamma, and advanced Window Setup to get desired Alpha Blending effect.
    g. Image with black background will get the best Alpha Blending effect.
- **Disable Alpha Blending**
    a. Click [Disable] will turn off Alpha Blending function and return to [Seamless] Transition Mode. The color/picture setting will be reset at the same time.
    b. Don’t forget to reset other settings and go back to normal display mode.

➢ PRIORITY (OUTPUT 1 / OUTPUT 2)

- To set each window display priority when they are overlapped. Each Window can be at different layer.
- Each Output can be set independently through OSD.
- More convenient Priority setting can be done through SCT PC tool and WebUI. User can set the priority directly from the display windows.
- The Menu in SCT is under “Window Setup” page.

➢ HDCP

- **AUTO:** When the input is HDCP compliant, the box will execute HDCP control in both input and output.
- **ON:** no matter input is HDCP compliant or not, it will always control HDCP.
- **Off:** When the input is HDCP compliant and the output is not HDCP compliant, the processor will turn off output display.

➢ Color Format:

- User can select output color format through this OSD menu. The color formats include: RGB444, YUV444, YUV422 and Deep Color (10-bits) on/off.
- Please note that 4k2k/60Hz 444 10-bits color can’t be displayed under HDMI2.0 specification.

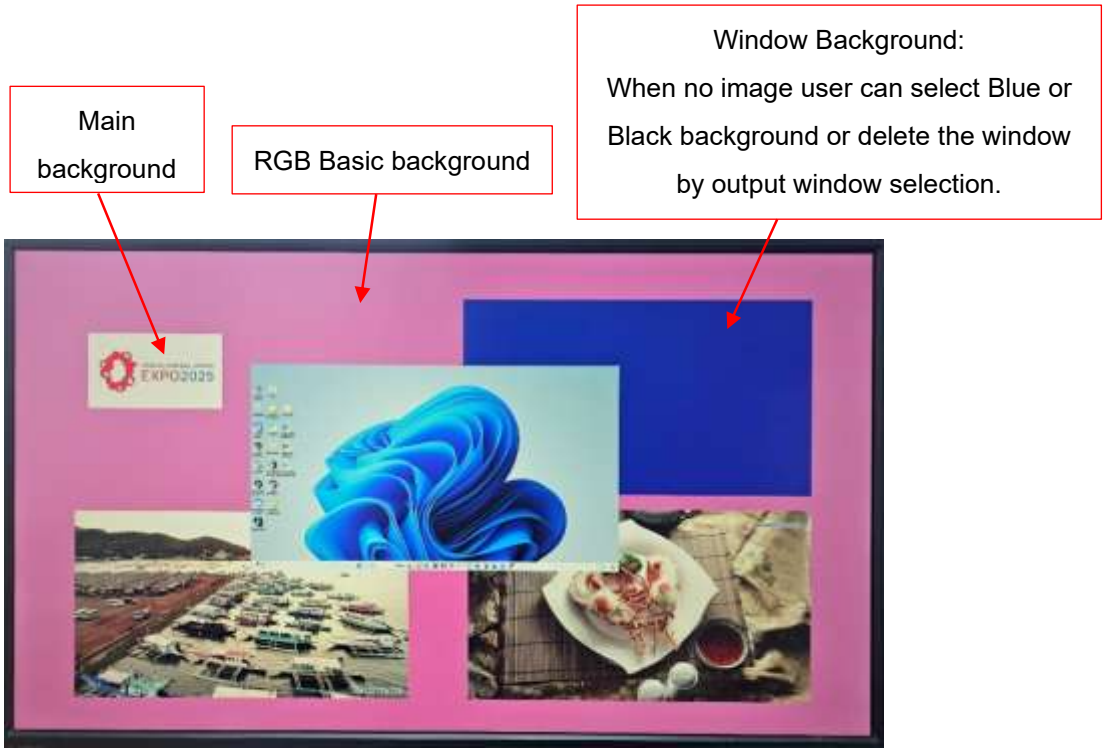
➢ Background

- Background source can be still image or video with resolution up to 4096*2160.
- The final image for background will be image with RGB656 (65,536 color).
- Maximum Background number:

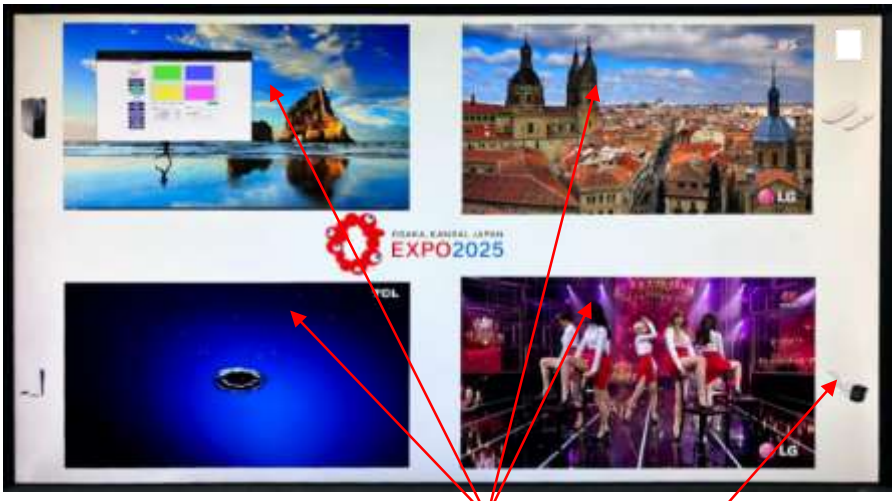
  Besides Display Windows, maximum 3 possible background colors in the screen.

  a. Basic Background: created by Background RGB menu. It will cover whole screen.
  b. Window Background: Blue or Black in non-content area in each window.

c. Main Background (Image or picture): any image captured from Display Window (either still image or video) or upload from PC (still image). It can be up to 4k2k full screen.



d. Application example:



➢ Create Background through OSD:

- **Basic background**
  a. Reduce Window size to let background area appear.
  b. Output Setup→ Background→ RGB, then adjust RGB value to get desire Basic background color.
- **Basic background + Main background image capture**
  a. Select [RGB] to show up basic background.

b. Adjust Main background image (or video) size and position, then click [Capture]→ Select [Image 1-3]→ Select video/image from Win-1-Win-4, then click [Enter].

c. Please wait for the image capture and upload process. For 4k2k image with 4k2k full screen size, the time is around 8 minutes. User can see the image upload progress.

d. The capture time depends on source and output image resolution and complexity.

- **Only capture Main Background image**
  a. Click [Selection], select [OFF] to turn off all background.
  b. Then follow the same procedures in previous section to upload the background image.
- **[Selection]**: to show up background
  a. User can select from Image-1, Image-2, Image-3 and RGB image. Only one item can be selected.
  b. If user wants to have Basic background plus Main background image, it should be created during [Capture] process while RGB background color is selected.
- **Turn Off background**
  a. Please use [Selection] menu and select [Off]. It will turn off all the background, including Basic Background and Main background.
- **Save:** Save the final result to Custom Profile Index.

➢ Procedures to create Background from SCT PC tool

- **Basic Background color**

  a. Please adjust RBG sliding bar to create desired color. The color will show up at side.
  b. When Background Screen selects [RGB], it will show up with full screen.
  c. Please select [Image-1 to Image-3] to change to other background.

- **Upload image as background**

  a. [Browse] the image and select from the PC, the image will show up in the SCT background window. Please adjust the image size and image location before Upload. “X”, “Y” is calculated based on the Top Left corner position of the image.
  b. After adjusting size and position, Click [Upload] to start upload process. The screen will be turned off and show up the image gradually.
  c. After finishing Upload, it will pop-up a message [Background is uploaded. Click “Save To” and select “Image-1 to Image-3” to save the background].
  d. Select [Image #] and click [Save To] to start Save process. User will see the “Erase” and “Save” % status in the window.
  e. After finish [Save] process, click “Done” to finish background upload process.
  f. The time for the whole process will take few minutes. It depends on the image resolution, size and screen resolution. To upload 4k2k into 4k2k output resolution may take about 8 minutes.
  g. If the image aspect ratio is not the same as setting size, it will show up some border.
  h. If to load image to 4096x2160 screen resolution is required, please check [upload for 4096x2160] block.
  i. If the Image plus Basic RGB background is required, please open RGB background before upload the Image. User will get Image and basic RGB background at the same time.
  j. If the image is captured from Video, please use OSD Menu to upload from selected window.
  k. The image resolution for background can be up to 4096x2160 resolution even the screen output resolution is only FHD.

- **Apply the background image**

  a. Five selections under Background Screen: Image-1 to Image 3, RGB and OFF
  b. User can only select one from the menu at one time. If necessary, user can select different background and Save to Custom Profiles.
  c. If the Image plus Basic RGB background is required, please open RGB background before upload the Image. User will get Image and basic RGB background at the same time.
  d. User can turn off background image by select “Off” from the selection.

- **Screen Display ON/OFF**

  Please click “Screen Display on/off” button to check the background image result.

7.2. WINDOW SETUP

WINDOW-1/WINDOW-2: with full function of OSD menu.

WINDOW-3/WINDOW-4: No DE-INTEERLACING and NOISE REDUCTION OSD Menu.

Input Select	HDMI-1	
	HDMI-2	
	HDMI-3	
	HDMI-4	
Scaling	RATIO	FULL, ASPECT
	CROP H-START	
	CROP V-START	
	CROP H-END	
	CROP V-END	
	ASPECT H-POS	
	ASPECT V-POS	
	RESET	NO/YES
WINDOW	H-POS	
	V-POS	
	WIDTH	
	HEIGHT	
	LEFT POS	
	TOP POS	
PICTURE	FORMAT	RGB, YUV444, YUV422, YUV420
	BRIGHTNESS	
	CONTRAST	
	H-SHARPNESS	
	V-SHARPNESS	
	HISTOGRAM	
COLOR	CHROMATICITY	
	HUE	
	COLOR TEMP	6500K, 9300K
	GAMMA1 MODE	Gamma 1.0, Gamma 1.8, Gamma 2.2, Gamma 2.6
	GAMMA2 MODE	Gamma 1.0, Gamma 1.8, Gamma 2.2, Gamma 2.6
	COLOR CORRECTION	BLUE 1-4, GREEN 1-4, SKIN TONE 1-4
DE-INTERLACING	ON/OFF	ON/OFF
	ENABLE 2:2 PD	ON/OFF
	2:2 PD time	1-15"
	ENABLE 2:3 PD	ON/OFF
	2:3 PD TIME	1-15"
	MOTION DETECTION	LEVEL 1 TO LEVEL 5
	DIAGONAL CORRECTI	1-3
	24PSF MODE	ON/OFF
NOISE REDUCTION	HORIZONTL	0-3
	VERTICAL	0-3
	TEMPORAL	0-3
	BLOCK	0-3
	MOSQUITO	0-3
	COMBING	0-3
MISCELLANEOUS	UP-SIDE DOWN	ON/OFF
	HORIZONTAL FLIP	ON/OFF
	FREEZE	ON/OFF
	BACKGROUND Color	BLACK/BLUE

➢ INPUT SELECTION

- Each Window can select any input signal source from HDMI-1 to HDMI-4.
- Each HDMI input signal can be assigned to multiple Windows.

➢ SCALING

- RATIO:
  a. FULL: Window size and aspect ratio can be adjusted freely.
  b. ASPECT: To show image with fixed aspect ratio same as source original aspect ratio.
  c. Different selection will affect Window size, position and cropping adjustment.
- CROP:
  a. To adjust image Horizontal and Vertical Start and End points coordinates.
  b. It can crop any location of the source image in each Window.
  c. IR controller CROP Hotkey can only ZOOM-IN / ZOOM-OUT source image from the center.
- ASPECT H-POS / V-POS: When the image is not full screen display in the Window, user can adjust the image position based on the same aspect ratio through this function.
- RESET: To reset the image to default setting in all functions under SCALING.

➢ WINDOW

- H-POS / V-POS: To adjust Horizontal and Vertical positions of the image. The image will keep the same aspect ratio.
- WIDTH: To adjust the image location in Right Edge with Left Edge at fixed location. It can change image horizontal aspect ratio. It will be affected by SCALING selection.
- HEIGHT: To adjust the image location in Bottom Edge with Top Edge at fixed location. It can change image vertical aspect ratio. It will be affected by SCALING selection.
- LEFT POD: To adjust image Left Edge position with Right Edge at fixed location. It can change horizontal aspect ratio. It will be affected by SCALING selection.
- TOP POS: To adjust image Top Edge position with Bottom Edge at fixed location. It can change vertical aspect ratio. It will be affected by SCALING selection.
- IR controller POSIT and SIZE hotkeys can implement the same function.

➢ PICTURE

- FORMAT: To show input source Format.
- BRIGHTNESS, CONTRAST, H-SHARPNESS, V-SHARPNESS
- HISTOGRAM: To show image histogram at real time.

➢ COLOR

- Color adjustment for Chromaticity color gain, Hue, Color Temperature (6500k/9300k)
- GAMMA1 MODE: input signal gamma curve selection.
- GAMMA2 MODE: output signal gamma curve selection. The vision feeling change in low brightness image will be more obvious.
- COLOR CORRECTION: Blue, Adjust color gain in Blue, Green and Skin Tone.

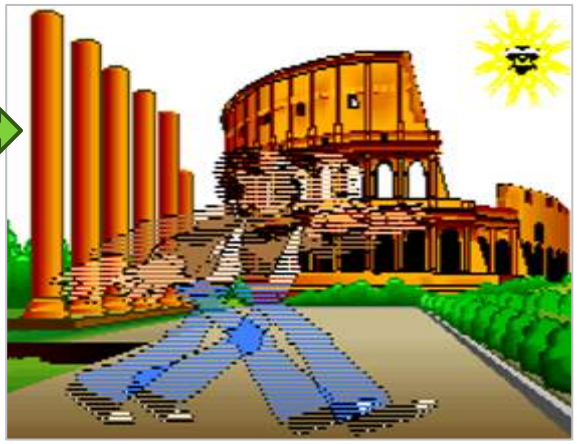
➢ DE-INTERLACING (Pictures from Genesis Microchip)

- This function is for user to select different de-interlacing method in video editing.
- The major application is for interlaced signal source such as 2160i, 1080i, 480i… which user can only see odd frame or even frame in one time. Properly conversion of interlaced signal into progressive signal will get the best video quality especially in motion picture.
- When de-interlacing is turned off, it will implement double scaling to fulfil complete video frame.
- Below are some examples:

ODD Field

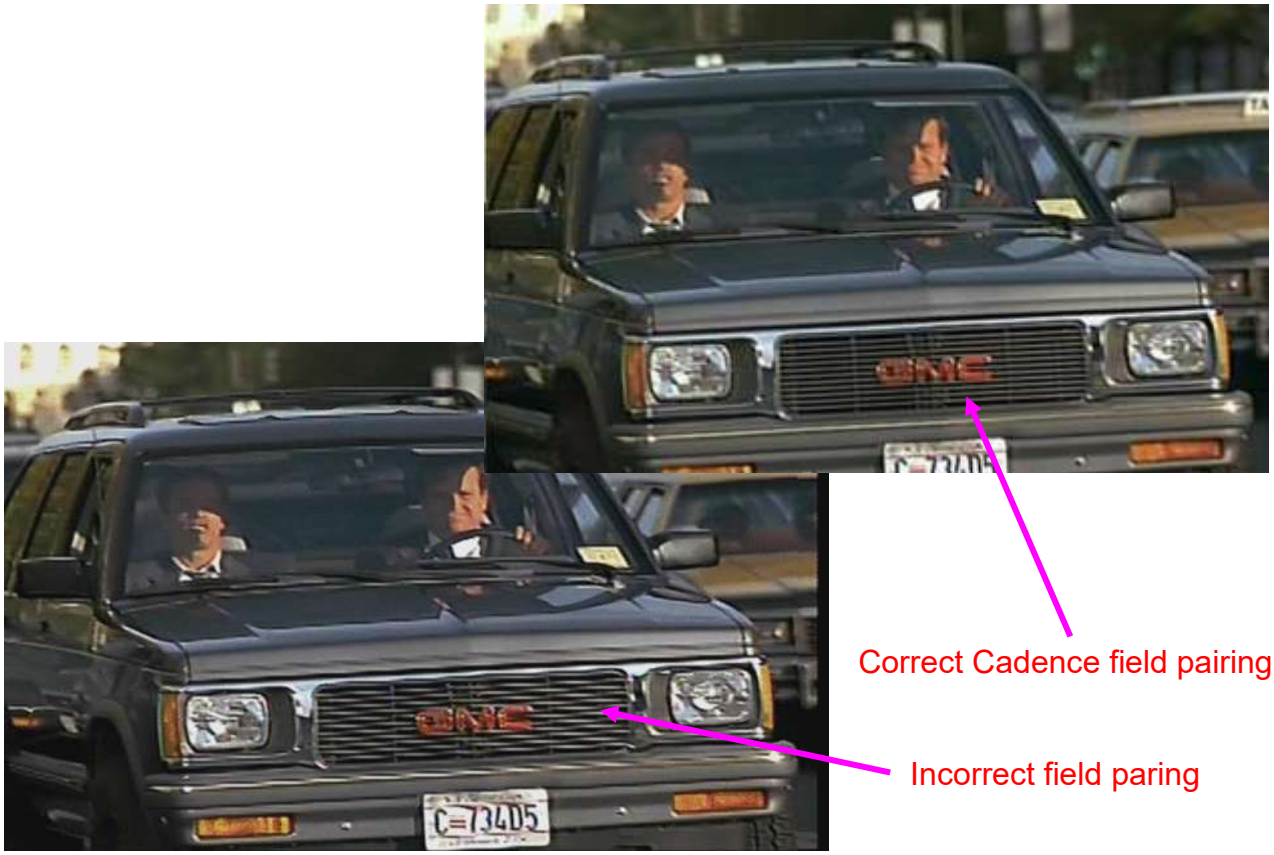
EVEN Field

Incorrect Pairing



Correct Pairing

- **Motion picture field pairing (2:3/2:2 Pull Down):**
  24 frames/second film transferred to 60/50 frames video:
  - **2:3 Pull-Down: 1st frame→2 frames, 2nd Frame→3 frames, 2 →5, 24 →60**
  - **2:2 Pull Down: increase film speed to 25 frames/second, then each frame transferred to 2 frames video. 2→4, 25→ 50**



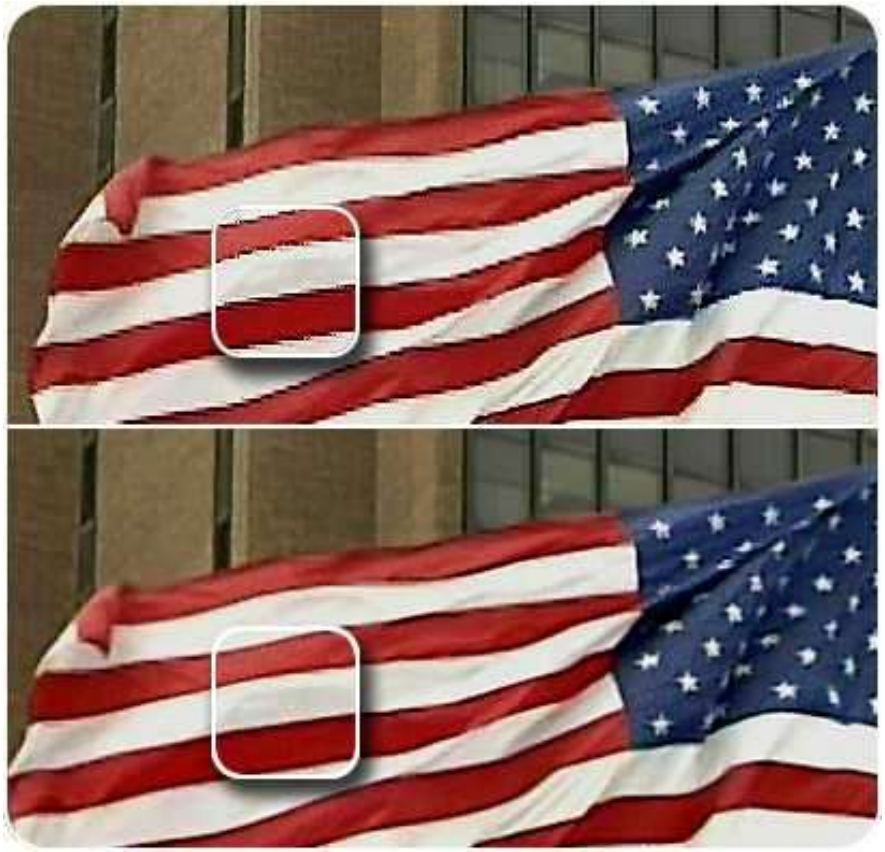
Incorrect 2:3/2:2 Pull Down

Correct 2:3/2:2 Pull Down

- **Diagonal Processing:**

Without Diagonal Correction

With Diagonal Correction



With correct cadence

Without correct cadence pairing

PS. Usually, the default is to turn on all functions under DE-INTERLACING. In some Lab, user can turn on/off some functions to verify the type of the video source (such as the video is 3:2 or 2:2 Pulldown) for further video editing. It can also be used in the school for video teaching class to under different video functions.

➢ NOISE REDUCTION

- The video content may come from different signal sources, such as PC, video camera, DVD, broadcasting, de-compressed video, de-compressed image… Each signal source may preserve different types of noise.
- S902 allows user to select different noise reduction type to execute the best noise reduction effect based on different video content.
- Only available in Window-1 and Window-2.

➢ MISCELLANEOUS

- S902 doesn't have image 90/270 degrees rotation function and only can do UP-SIDE DOWN and HORIZONTAL FLIP.
- FREEZE is to stop the video at some desired point.
- BACKGROUND COLOR: To set Black or Blue background color for each input Window. Only Black and Blue color background can be selected.

7.3. SYSTEM

Below are OSD structure under SYSTEM.

System	**PROFILE**	LOAD	PROFILE 1- PROFILE 20
		SAVE	PROFILE 1- PROFILE 20
	EDID	HDMI-1	3840/2160-60, 3840x2160-30, 1920x1080-60, 1024x769-60, 1280x720-60, 1280x800-60, 1920x1200-60, 2560x1440-60, 2560x1600-60, 3840x1080-60, 3840x2400-60, 3840x2400-30
		HDMI-2	
		HDMI-3	
		HDMI-4	
	OSD	TRANSPARENT	0-100%
		TIME-OUT	OFF-120
	STANDBY	OFF-300	
	ETHERNET	STATIC	IP ADDRESS, SUB MASK, DEFAULT GATEWAY
		DHCP	IP ADDRESS, SUB MASK, DEFAULT GATEWAY
		UDP PORT	4096-32767, Default: 5000
	RS232	115200/9600	
	BOX ID	0-99	
	NAME	WINDOW-1	
		WINDOW-2	
		WINDOW-3	
		WINDOW-4	
		HDMI-1	
		HDMI-2	
		HDMI-3	
		HDMI-4	
		RESET	
	RESET	YES/NO	
	VERSION	FW VERSION	

➢ PROFILE

- LOAD: Load custom Profile from PROFILE 1 - PROFILE 20.
- SAVE: Save custom Profile to PROFILE 1 - PROFILE 20.

➢ EDID

- Each input port can select different EDID.
- 12 preset EDID can be selected for each input port.

➢ OSD

- User can set OSD transparent effect from 0-100%.
- OSD turn off time can be from 0-120 seconds. When select “0”, the OSD will not disappear until touch OSD keypad or system mode change.

➢ STANDBY

- When no input signal, S902 will turn off output signal and get into sleeping mode.
- Once input signal is detected, the system will turn on automatically.
- The time to get into sleeping mode is from 0-300 seconds. When select “0”, the system will maintain active without turn off output signal.

➢ ETHERNET

- STATIC:
    a. Default static IP address is 192.168.0.100. User can open PC Chrome or Edge and input S902 IP address to get WebUI for system control.
    b. User can change IP address, Subnet Mask and Default Gateway manually.
- DHCP: User can also select DHCP when the system is connected with Ethernet switch/hub or router.
- UDP Port: User can select Custom Profile or tune on/off the system through UDP port #. It is programmable and Default UDP port # is 5000.
- After connection, user will see WebUI to execute S902 system setup and control. The same network segment setting in PC is required if connect PC and S902 directly with UTP cable.
- Apple Mac or iPad can be used for the control of S902 through USB or network connection.

➢ RS232:

Two baud rates can be selected: 115200 and 9600. RS232 Command is available in the website.

➢ BOX ID

- BOX ID is designed for independent GeoBox control in RS232 command. User can set different IP address in Ethernet to control multiple units of GeoBox.
- The range from BOX ID is from 0-99.
- Box ID is only implemented under RS232 but not under IR controller.

➢ NAME

- User can change the name in WINDOW 1-4 and input ports HDMI 1-4 by IR controller only.
- The maximum digital of the name is 10. Text, symbol and number are available for selection.
- User can reset the setting through RESET key under this menu.

➢ RESET

- User can OSD to Reset the system to default setting. Customer PROFILE will not be erased.
- User can also reset the system through RESET hole on the back panel by inserting small pin into RESET hole for 5 seconds and “Factory Reset” message will show up. This reset will erase all custom Profile data and the system will return to Factory Default.
- SCT/SWCT also has reset function under System Menu page. [All Reset] will keep Custom Profile Data and [Factory Reset] will erase all Custom Profile Data at the same time.

➢ VERSION

To show up Firmware Version of the system

8. S902 Control Tool (SCT) & Web UI (SWCT)

- S902 can be controlled through SCT or SWCT (S902 Web Control Tool).
- SCT is controlled by USB and WebUI is through Ethernet.
- Both SCT and SWCT have similar outlook and operation interface.
- User can change the size of SCT/SWCT in Scaling function under each web browser.
- The PC needs to support Web HID interface. Chrome/Edge/Opera can fully support it.
- Below is the compatibility list at this moment.

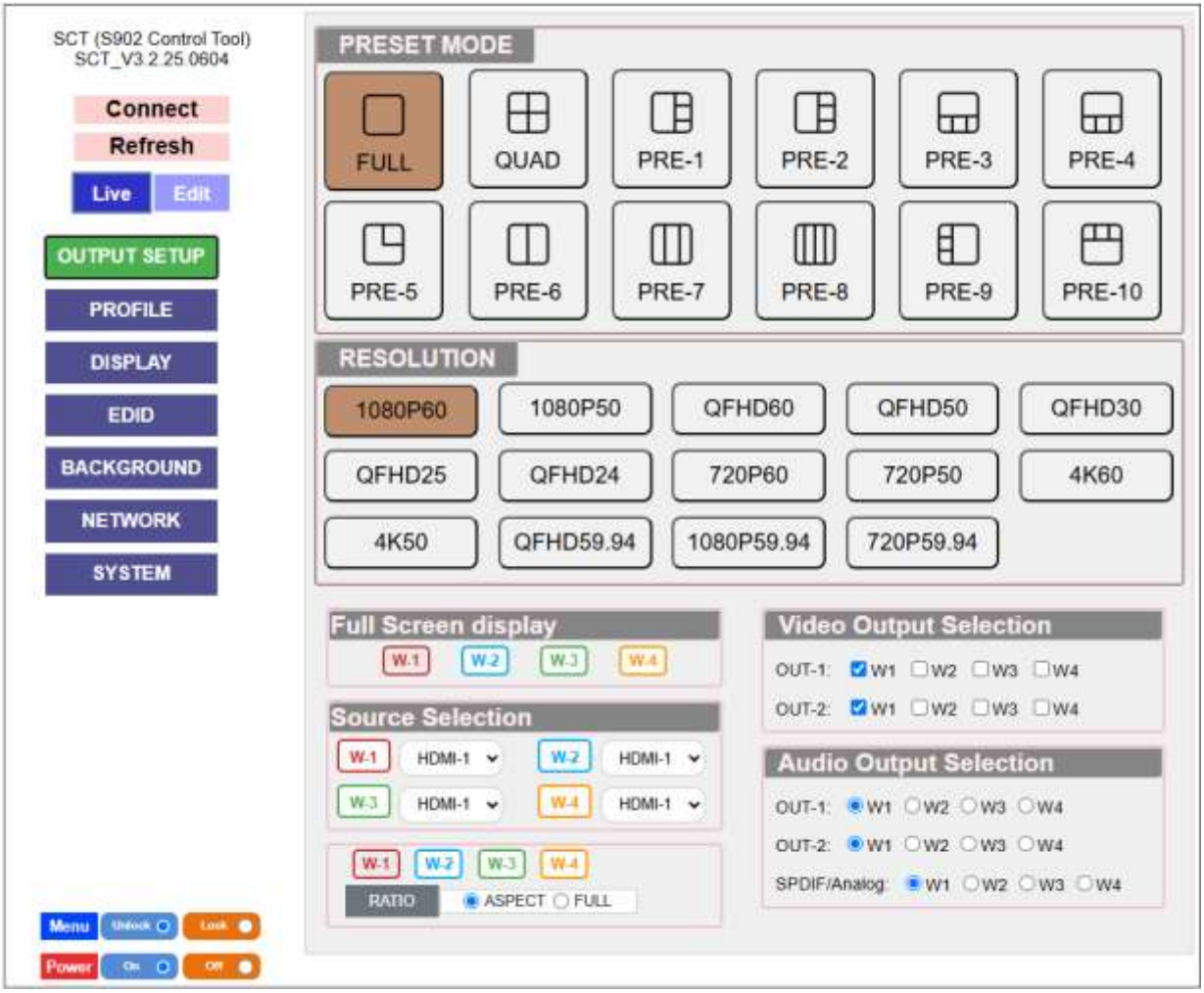
	Chrome	Edge	Firefox	Opera	Safari	Chrome Android	Firefox for Android	Opera Android	Safari on iOS	Samsung Internet	WebView Android
HID	✓ 89	✓ 89	✗ No	✓ 75	✗ No	✗ No	✗ No	✗ No	✗ No	✗ No	✗ No
connect event	✓ 89	✓ 89	✗ No	✓ 75	✗ No	✗ No	✗ No	✗ No	✗ No	✗ No	✗ No
disconnect event	✓ 89	✓ 89	✗ No	✓ 75	✗ No	✗ No	✗ No	✗ No	✗ No	✗ No	✗ No
getDevices	✓ 89	✓ 89	✗ No	✓ 75	✗ No	✗ No	✗ No	✗ No	✗ No	✗ No	✗ No
requestDevice	✓ 89	✓ 89	✗ No	✓ 75	✗ No	✗ No	✗ No	✗ No	✗ No	✗ No	✗ No

(Document from MDN Web Docs)

- WebUI (SWCT) is another control tool that is embedded inside S902 and need to connect through network. It can be used in any web browser. The outlook and operation of these two control tools are similar and SCT tool has more functions than WebUI. If direct Network connection is required with Cat 5/6 cable, please set the same Network segment in the host.
- The default static IP address of S902 is 192.168.0.100

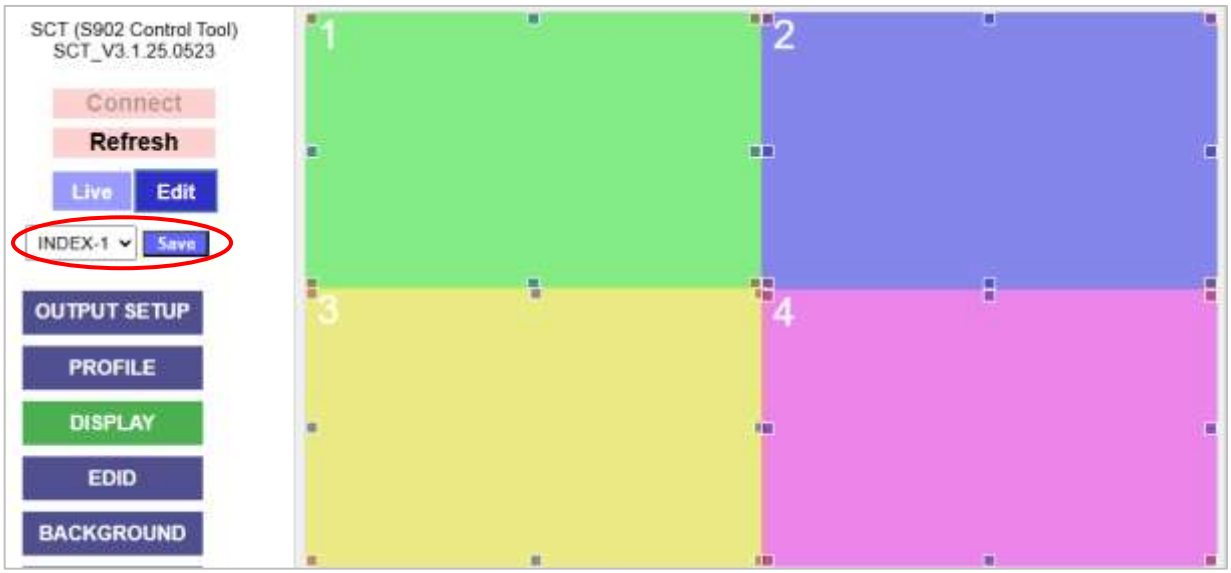
8.1. Open S902 Control Tool (SCT) and WebUI (SWCT)

- SCT Tool:
  - Please download SCT from website at https://www.vnstw.com/ under Support tab.
  - Decompress and click SCT to open the tool. It will show up Control Window.
  - Click [Connect] button and select USB for the connection.
  - When send SCT to others by e-mail, please use compressed file (Zip, rar or 7Zip…). Otherwise, some function may be changed by Google.
- WebUI or S902 Web Control Tool (SWCT):
  - User can also use all kind of Web Browser and S902 IP address to access WebUI.
  - Please change IPV4 setting to get the same Network segment and input S902 IP address for the connection. User will see WebUI control Window for further operation. Apple Mac and iPad can be used in SCT/WebUI control tool.
- Use can adjust the size of SCT/SWCT by change the scaling factor in the web browser.



8.2. LIVE & EDIT modes

- SCT has two operation modes for user to Edit the same or different Custom profile while one Profile is showed on the screen.
- When user selects Edit mode, one Custom Profile window will show up. User can select any Custom profie and open [Display→Window Setup] window to see the layout and execute further editing.
- After editing, user can save the result to the same profile or another custom profile Index.
- After return to Live mode, user can select Custom Profile and see the result.
- If user wants to edit Preset Mode, please load Preset mode then save to Custom profile first so that user can select if for further editing.



8.2.1. Live Mode

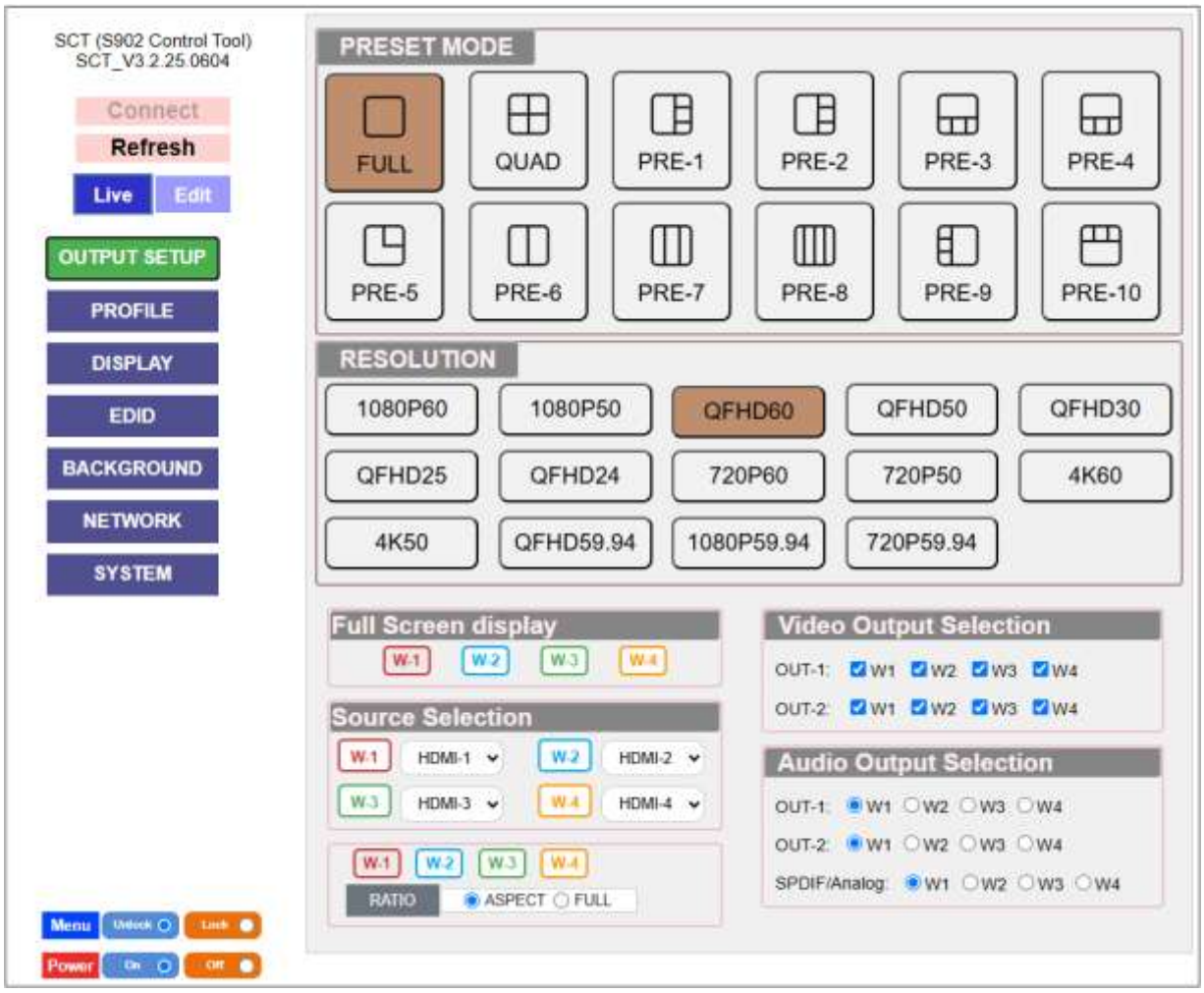
- All the operations are the same as original SCT without any difference.

8.2.2. Edit Mode

- After click Edit button, the profile Index window will show up.
- User can select Custom profile for further editing without affect the screen display.
- If user wants to Edit Preset mode, please load preset mode and save to Custom profile first.
- Next step is to open Window Setup window to see layout diagram and do further modification.
- **RATIO:** The RATIO setting in Window Setup will affect the layout result. If you select all windows with FULL ratio, the final result will be the same as layout diagram. If select ASPECT, each window final result will keep at the same aspect ratio as input source.
- **Save editing result:** Please click SAVE button next to [Edit], a pop up window will show up for user to put the Profile Index # and save the final result.
- **View the result:** Please return to Live mode and select Custom Profile to see the result.

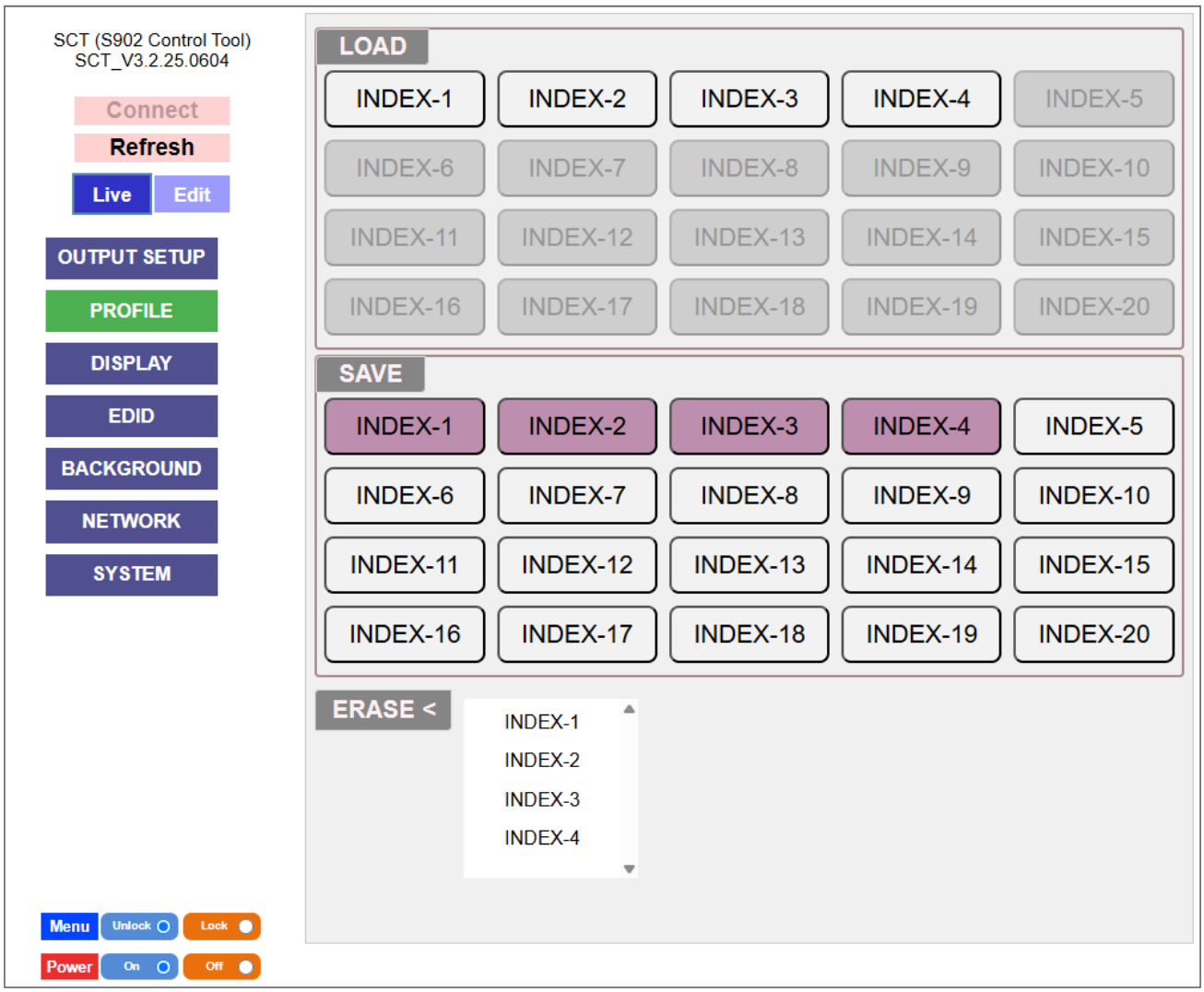
8.3. Output Setup

- Click OUTPUT SETUP, user can see below window to select system preset mode, output resolution and execute basic input and output settings.
- User can also click [Full Screen Display] to view each Windon in full screen Mode.



8.4. Profile

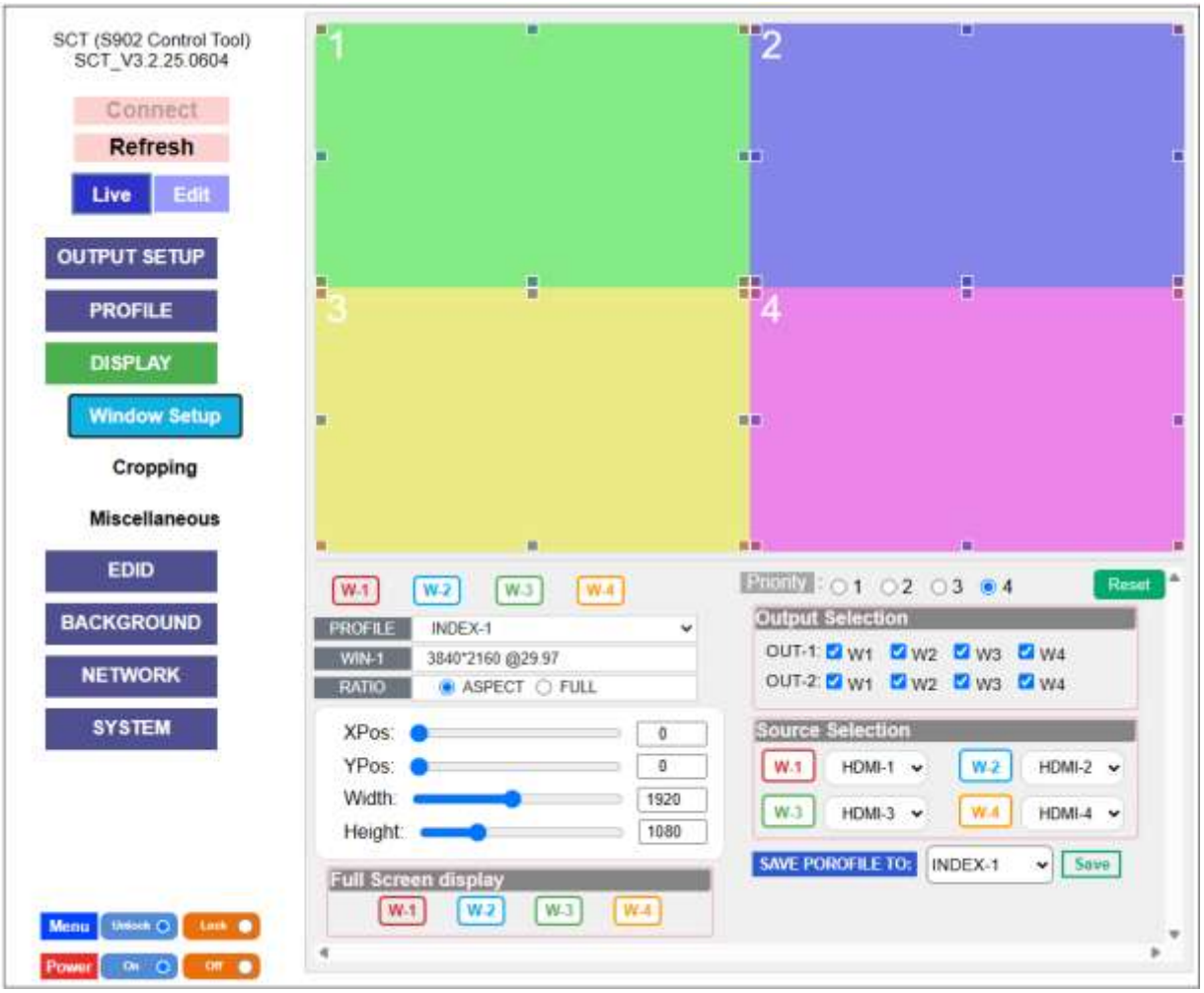
- In Profile menu, use can Save the settings and Load the Profile.
- The Profile Index will be highlighted once it has Custom Profile Data inside.
- User can erase Custom Profile Index by click ERASE button. It will show up all Custom Profile Index for Erase.



8.5. Display

- 3 sub-menu under Display:
  a. Window Setup
  b. Cropping
  c. Miscellaneous

8.5.1 WINDOW SETUP



- **Change layout**
  a. Allows user to change Window layout from control points.
  b. User can click each Window directly or click W-1 to W-4 icon to activate the adjustment.
- **Profile:** user can select Custom Profile for further layout adjustment.
- **Ratio**
  a. **Ratio is set to [Aspect]:** the Window aspect ratio will maintain the same aspect ratio as signal source no matter how the window layout is changed.
  b. **Ratio is set to [Full]:** the Window aspect ratio will follow the adjustment without maintaining the same aspect ratio as input source. It can be at any size, position or aspect ratio.
- **Priority setting**
  a. To select the overlap priority.
  b. It will affect the control point selection in Overlap region.
- **Output Selection**
  a. To determine the Window to be display in Output-1 or Output-2.
  b. It can erase any window display from each output port.

- **Source Selection**

  User can assign any input source to any display window.

- **Full Screen Display**

  a. To check video quality before adjustment.

  b. It will show up the selected window at full screen and reset all previous window settings. If user wants to keep adjusting result, please save to Custom profile first.

- **Save Profile**

  After finish the setup, user can select Custom Profile Index # to save the settings.

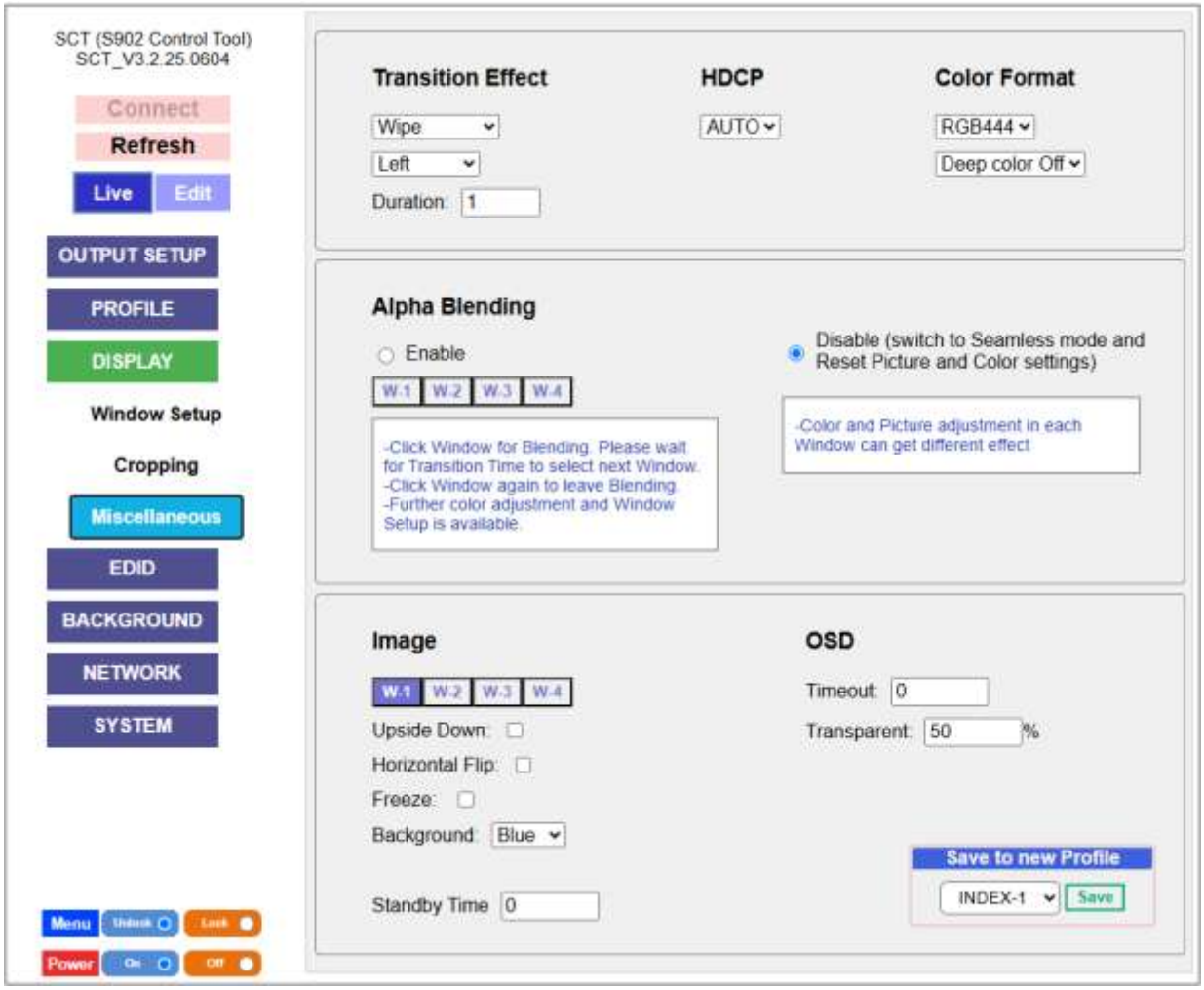
8.5.2 Cropping

- To select the Window and adjust the cropping area.
- User can select the adjusting point and draw the cropping area directly. The result will be showed directly on the screen.
- Two adjusting modes:

  a. **Ratio is set to [Aspect]:** the Window aspect ratio will maintain the same aspect ratio as signal source no matter the image cropping area and location.

  b. **Ratio is set to [Full]:** the Window aspect ratio will follow the adjustment without maintaining the same aspect ratio as input source. It can be at any cropping area or aspect ratio.

8.5.3 Miscellaneous



- **Transition Effect:**

  18 transition effects can be selected, including Seamless mode, Fade In/Out, Dissolve and 14 Wipe modes. “Blending” (Alpha Blending) is also inside the menu. When select “Blending” mode, it will jump to “Alpha Blending” menu for further setup.

- **HDCP:** three selections
  a. Auto: The system will open HDCP function based on the input signal. If it is HDCP compliant, the system will open HDCP function. It not, it will turn off HDCP function.
  b. ON: Input and Output HDCP is always ON.
  c. OFF: Input HDCP is always off. Only Non-HDCP content can be showed up.

- **Color Format:**
  a. To select the output signal color format.
  b. Deep color is to enable 10 bits output. If Deep Color is “ON”, the maximum output resolution is only up to 3840x2160 @30Hz.

- **Alpha Blending:**

  Please see more details in Section 7.1 [Output Setup]→ [Alpha Blending].

- **Image:**

  a. Image Flip: the image can be swapped at Vertical and Horizontal directions.
  b. Freeze: Video can be in Freeze at desired point.
  c. Background: this background function is to determine the background color in the display Window when no content is covered. Only “Blue” or “Black” can be selected.

- **Standby Time:**

  a. It is the time to turn off output signal when no signal is detected. The time range is 0-300 seconds.
  b. If it is set to “0”, the system will maintain at “ON” status (continuously output to display) no matter it detects input signal or not.

- **OSD:**

  a. Timeout: It decides the time for OSD display.
  b. Transparent: The transparency can be selected from 0 to 100%.

- **Save to new Profile:**

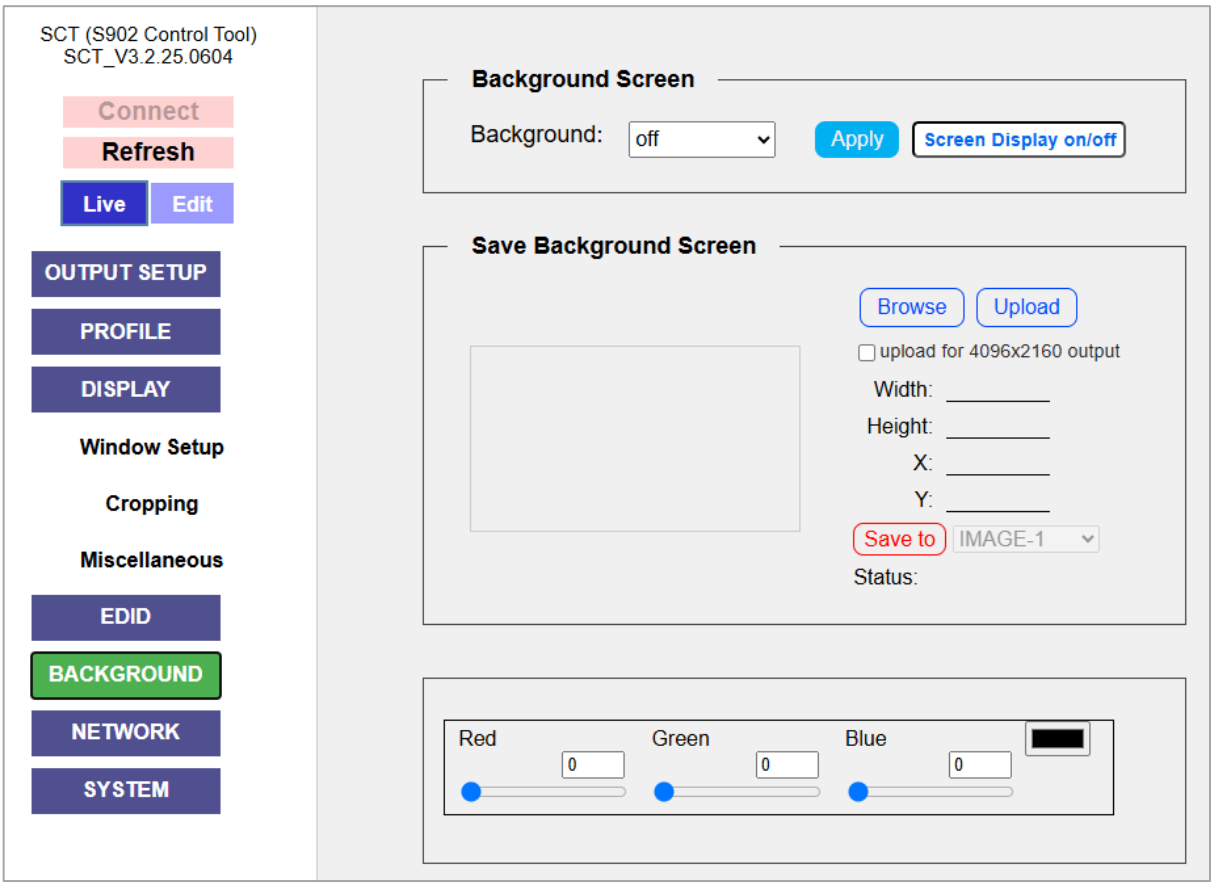
  User can select Profile Index # and save the settings.

8.6. EDID

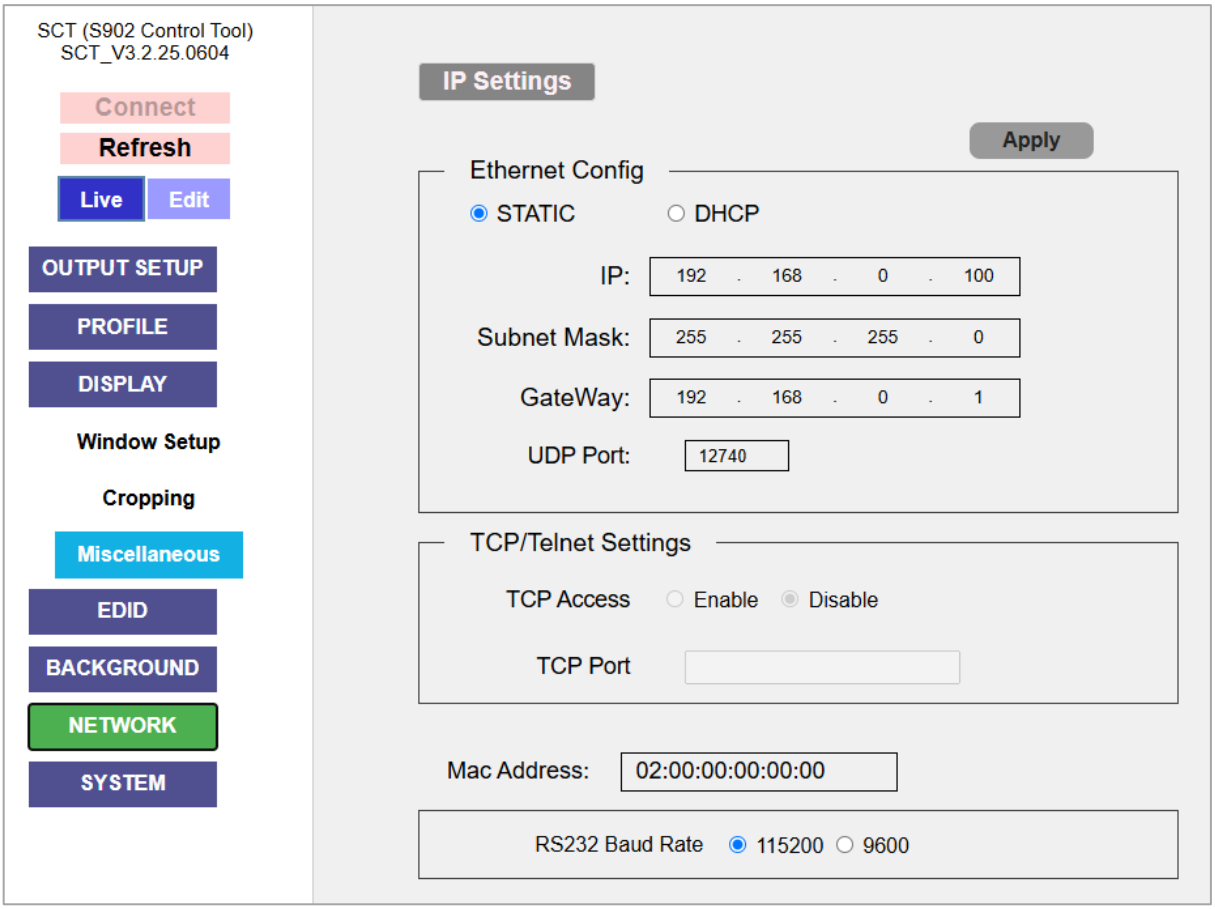
Each input port is designed with 12 preset EDID up to 3840*2400 @60Hz.

8.7. Background

- Please see details in Section 7.1 [Output Setup]→ [Background].

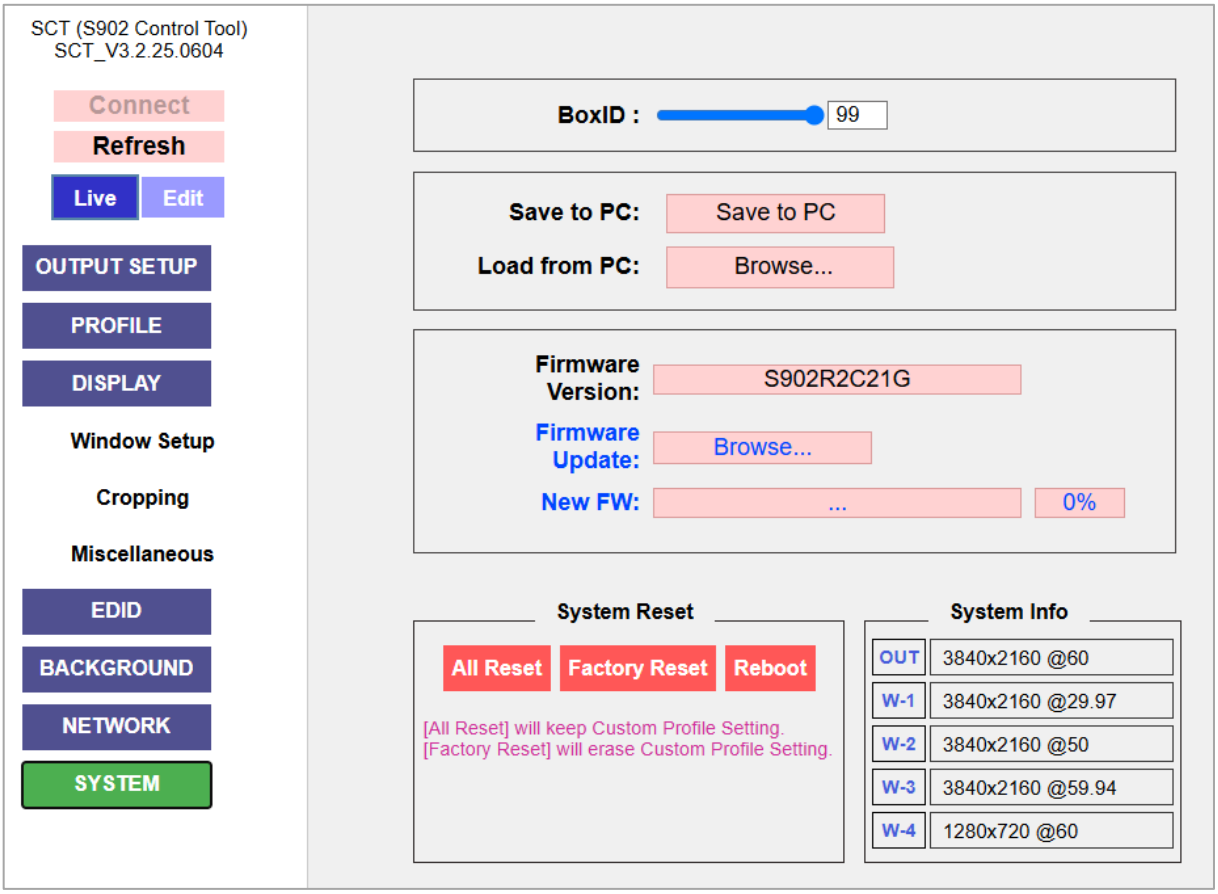


8.8. Network



- User can use UTP cable to connect PC directly to S902. PC needs to set the same IP segment, such as 192.168.0.10x before connection.
- STATIC IP:
    a. Default static IP address is 192.168.0.100. User can open PC Chrome or Edge and input S902 IP address to get WebUI for system control.
    b. User can change IP address, Subnet Mask and Default Gateway manually.
- DHCP IP: User can select DHCP when the system is connected with Ethernet switch/hub or router.
- After connection, user will see WebUI to execute S902 system setup and control. The same network segment setting in PC is required if connect PC and S902 directly with UTP cable.
- Apple Mac or iPad can be used for the control of S902 through network connection.
- Please also see more details in Section 4.3.

8.9. System



- **BoxID:** Each box can set different ID for individual control by RS232 but not by IR controller.
- **Save To PC:** Click [Save to PC] button will save current settings into PC “Download” Directory with “.vbk” file name. If it fails, please re-open SCT and try again.
- **Load From PC:** User can find the file under Download Directory to load back to S902.
- **Firmware Update:** Please decompress the file into “.bin” file before update. It will take around 40 seconds. The Profile Data will be kept without change.
- **System Reset:**
  a. **All Reset:** The same function as reset from OSD. It will keep Custom Profile Data.
  b. **Factory Reset:** The same function as reset from Reset Hole on the back panel. It will erase Custom profile Data at the same time.
  c. **Reboot:** The same function as reboot from Power Switch on the front panel.
- **System Info:** to show system Input and Output resolution status in each Window.

Call for technical support

- User can send e-mail to support@vnstw.com together with as much information as possible.
- The following information is required for a swift response.
  - Sink device (monitor): type and model number
  - Monitor layout or specific application details
  - GeoBox model No. and series No (On back label)
  - Detailed timing of signal source and resolution.
  - Press [Info] key to get System Information and send the data to us, including input/output timing and F/W version.
  - The exact nature of the problem. Please be as detailed as possible.
  - If possible, please attach the Pictures of the issue.
- Usually, we will response with 48 hours (working day)
- Please note that if the machine is sent back for repair, user needs to pay for return delivery cost.

9. Safety Precaution and Maintenance

- **Power Supply**

  Please connect electric power for all devices in the system from the same Power Distribution Box with correct grounding. Open the power after finishing system connection to reduce the risk for system damage from high floating voltage.
- **Working Environment**

  Please locate S902 in an environment free from dust, moisture and high temperature with good ventilation.
- **Maintenance and Repair**

  Apart from what is detailed in User Guide, maintenance should be carried out by competent technician assigned by VNS. If S902 is physically damaged, it should be returned for repair using VNS RMA procedures. If the unit is opened by user, it will lose the right for warranty protection.

10. Warranty and RMA policy

10.1. Warranty

This device is designed and tested to the highest standards and backed by two years' parts and labor warranty. Warranties are effective upon the first delivery date to the end customer and are non-transferable. Warranty period extension policy is available up to 5 years through paying extra charges.

10.2. RMA Policy

Return Material Authorization (RMA)

In the event that a product needs to be returned for repair, inform manufacturer and ask for a Return Material Authorization number.
RMA procedures:

1. Prior to returning any item, user must receive a Return Material Authorization (RMA) number.
2. All RMA numbers must appear on the return-shipping label.
3. All RMA numbers are valid for ten (10) days from the issue date.
4. All shipping and insurance charges in all RMAs must be prepaid by the customer.

Shipping charges and repair fees

1. Within warranty period: The customer shall pay shipping charges when the unit is returned for repair. Manufacturer will pay shipping charges for return shipment to customer. All the inspection, material and repairs fees shall be borne by manufacturer.
2. Outside warranty period:
   - User shall pay for the inspection, material and labor cost for the repairs and pay for all shipping freight and insurance cost.
   - Manufacture shall give quotation to user and user can make decision whether this repair shall be executed or not. If user decides to return the unit, user shall pay for the return cost.

Specifications

- ✧ Input ports: 4x HDMI 2.0. Max. input resolution: 4096*2160 @60Hz.
- ✧ Supports interleaved and progressive RGB/YUV input signals with 4:2:0/4:2:2/4:4:4, 8/10-bit color.
- ✧ Supports VESA/CEA standard video timings with high end scaling up and down up to 600 MHz.
- ✧ Two simultaneous HDMI 2.0 output with the same output resolution up to 4096*2160 @60Hz, shared the same signal sources and display Windows. Two outputs can select the same or different input signals.
- ✧ Each Window can select one input signal from any input port. The same signal source can be assigned to multiple windows.
- ✧ Each output display shows up to 4 Windows with flexible window location, resizing, scaling, positioning, cropping, overlap priority and color correction. PIP/POP and Overlapping are included.
- ✧ User can set Overlap priority in each output port separately.
- ✧ If two output ports select the same display Windows, it will show the same Window setup. If select different Windows, user can adjust Window setup independently.
- ✧ Support alpha blending, 16 Transition effects including Seamless, Fade-in, Fade-out, Dissolve and Wipe. Only Fade-in/Out is functional in multiple Windows mode switching.
- ✧ Quick seamless switching in source selection and display mode switching.
- ✧ Output format: selectable among RGB444, YUV444, YUV422 and Deep color (8-bit or 10-bit).
- ✧ HDCP: V2.2/V1.4 compliant.
- ✧ Support xvYCC 8/10/12-bit wide color gamut input signal processing.
- ✧ 1-2 frame latency based on different application: 16.7ms-33.3ms (V=60Hz)
- ✧ Preset 14 output timings and 12 EDID from XGA to 3840*2400 @60 for each input port.
- ✧ Support 24/25/30/50/60/59.94Hz input/output refresh rate.
- ✧ Selectable OSD transparency and turn-off time.
- ✧ Image freeze, flip and upside down.
- ✧ Designed with Alpha Blending function and full color background image.
- ✧ While playback one Profile, SCT [Live and Edit] mode allow preview or edit other Profile at the same time.
- ✧ Box ID # from 0-99 for multiple boxed individual control.
- ✧ Standby mode when no input signal is detected.
- ✧ 12 system presets and 20 custom Profile presets. The preset includes transition effect.
- ✧ Selectable high end video processing: 3:2/2:2 cadence, diagonal correction and noise reduction.
- ✧ High quality scaling engine for image scaling up and down in the range from XGA to 4k/2k.
- ✧ 3D motion adaptive de-interlace for interlaced input.
- ✧ Programmable background with customized picture and logo.
- ✧ Embedded HDMI audio, SPDIF digital and analog R/L 3.5mm Jack audio outputs (abstracted from SPIDIF audio). Each output can select independent audio signal source from the input ports.
- ✧ Control: Front panel keypad, IR remote controller, RS232, Ethernet (including UDP & WebUI), USB and SCT PC Tool.
- ✧ ESD Protection: ±15kV (Air-gap discharge), ±8kV (Contact discharge)
- ✧ DC power supply: DC adapter: 12V 2A (100V-240V), max. Power consumption: 22.5W, standby: 1.9W
- ✧ Working environment: 40° C, 10-90% RH
- ✧ Dimensions (Body only): 440mm*160mm*41mm (without protruding parts).
- ✧ Weight: 2.4kg (body only)
- ✧ CE/FCC/RoHS Certified
- ✧ 2 Year Warranty, extension package is available up to 5 years.

Disclaimer/Copyright Statement

Limited Warranty and RMA statement

This device is designed and tested to the highest standards and backed by two years' parts and labor warranty. Warranties are effective upon the first delivery date to the end customer and are non-transferable. Warranty related repairs include parts and labor, but do not include repair of faults resulting from user negligence, special modifications, abuse (mechanical damage), shipping damage, and/or other unusual damages. The customer shall pay shipping charges when the unit is returned for repair. Manufacturer will pay shipping charges for return shipments to customers.

Manufacturer does not assume responsibility for consequential damages, expenses or loss of revenue, inconvenience or interruption in operation experienced by the customer. Warranty service shall not automatically extend the warranty period.

User can pay extension fee to extend the warranty period. Please contact us for more details. In the event that a product needs to be returned for repair, inform manufacturer and ask for a Return Material Authorization number.

FCC/CE 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 residential / 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 is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Revision History

Revision	Date	Originator	Comments
V1.00	2024-0305	Steve Wang	First version
V1.01	2024-0315	Steve Wang	Add WebUI user guide
V1.02	2024-0322	Steve Wang	Content update
V1.03	2024-0524	Steve Wang	Modify WebUI term
V2.00	2025-0516	Steve Wang	Add SCT/SWCT, Alpha Blending and Background
V2.01	2025-0526	Steve Wang	Add Live and Edit modes in SCT