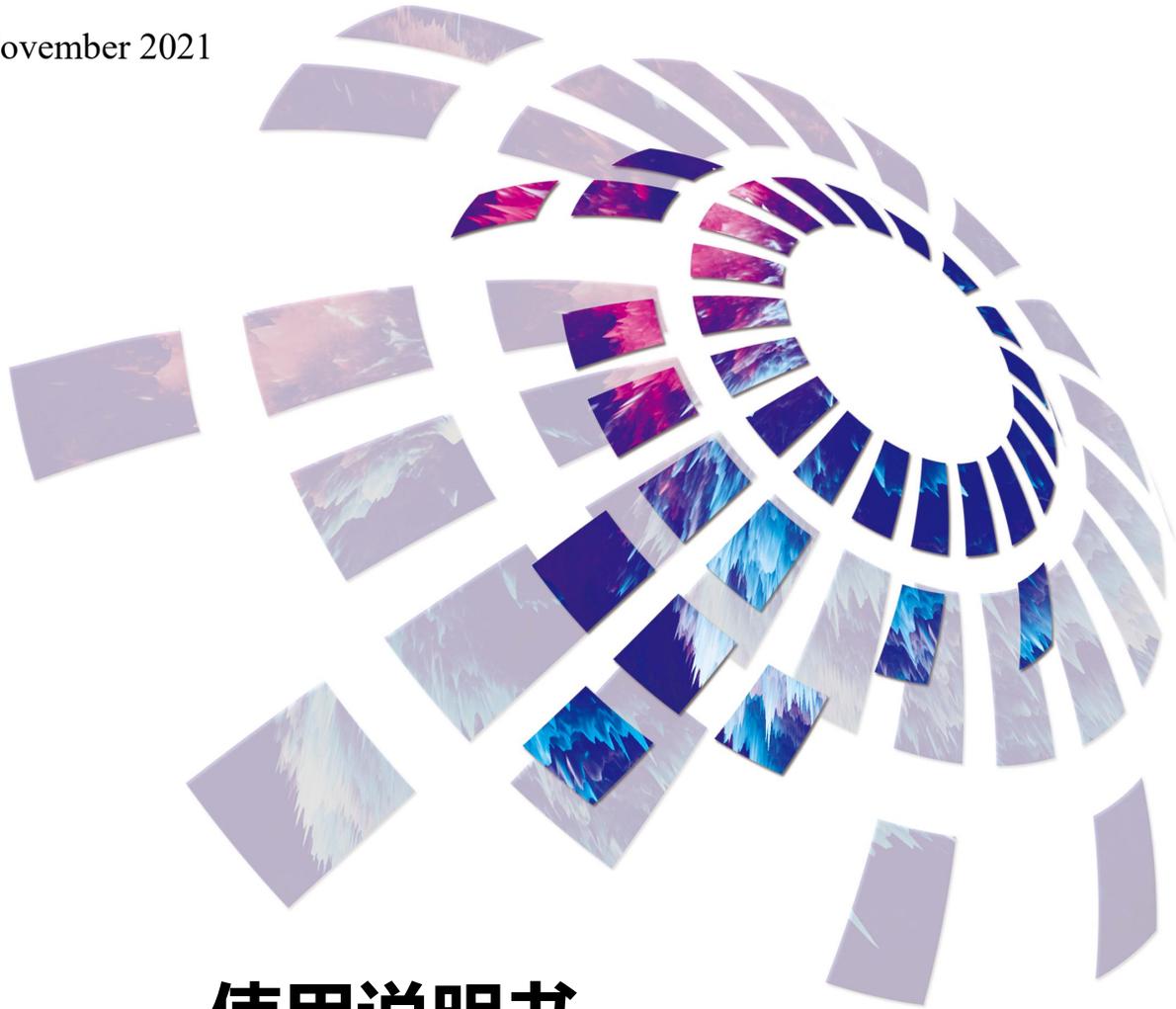


LS16

Sixteen port 2 in 1 controller LS16

Version: V2.3

Release Date: November 2021



使用说明书



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Control system integrated solution and service provider

Version record

version number	Change details	release time
V1.0	First edition released	2019.08.18
V2.0	Modify device interface description information Modify device picture Modify device function description Adjusting the K-HDR support source Modify equipment debugging steps Unified arrangement of 16 network ports layout,	2020.12.09
V2.1	Modify K-HDR function description	2021.10.15
V2.2	Modify the cover	2021.10.25
V2.3	Correct size data	2021.11.18

Summary

Ls16 is a splice control processor designed for live performance LED large screen. It adopts the industry's top design technology and conforms to international and industry standards. It's industry support 4K@60Hz Input 2U device. Support k-hdr, make ordinary SDR material present HDR display effect, solve the pain of less HDR material.

The whole machine has 9.6 million pixels of customized load, which meets most of the field needs.

Functional features

- The single network port has a load of 650000 pixels, the maximum load of the whole machine is 9600000 pixels, the maximum width can reach 16000 points, and the maximum height can reach 8000 points. The single machine has 16 network port output
- A total of 8 input signals including dvix2, hdmix3, dpx2 and sdix1 can be accessed, among which DP1, DP2 and HDMI3 can support 3840x2160@60Hz or 7680x1080@60Hz input
- Support 8 screen display, screen position arbitrary layout, support arbitrary video capture
- Pure hardware FPGA Architecture: no CPU, no kernel, no poisoning and crash risk, the system runs stably. MTBF > 30000 hours, support 365 × 24-hour continuous operation
- All layers support matting and transparency adjustment for the best effect
- Support signal source hot backup
- Humanized interactive control interface, with front-end switch, LCD information color screen, crystal keys and knobs
- EDID configuration management: support the reading, modification and customization of EDID (extended display identification data)
- Support one button black screen / still
- Black edge removal / clipping function: solve the problem of black edge generated by front-end signal, and make arbitrary clipping for any signal source (still maintain full screen state)
- Support key locking to prevent misoperation
- Color restore settings: in the client software with color restore settings options
- Support K-HDR, make common SDR material present HDR display effect, solve the pain of less HDR material
- Monitor port output supports both monitor input and output at the same time, and supports configuration to look back at output.

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I. Product Discussions

With the rapid development and application demand of LED display industry, various control requirements for large screen control system emerge as the times require. However, due to the limitations of the large screen control system in image processing, picture control and signal format conversion, there are some weak links in the large screen control system of LED, which can not meet the needs of users. The main problems are as follows:

1.The signal source access format of large LED screen control system is limited. At present, only digital DVI signal is commonly used. Many signal sources (such as VGA) can not be displayed directly on the large LED screen through the control system.

2.The image processing effect of traditional signal acquisition card is poor, which causes great loss to the clarity of the picture while converting the signal format.

3.The large LED screen control system can only capture the corresponding points of the large LED screen for display, while in some customer sites, it is necessary to display any size or complete computer desktop screen at will.

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In view of the above problems, our company independently developed a number of video processing products. The product adopts advanced control and image processing technology, which can not only realize switching between signals quickly and steadily, but also process multi-level pictures. In addition, the product can be controlled by keyboard and PC computer on the device, which makes the operation simple and convenient.

II、 Product characteristics

- The single network port has a load of 650000 pixels, the maximum load of the whole machine is 9600000 pixels, the maximum width can reach 16000 points, and the maximum height can reach 8000 points. The single machine has 16 network port output
- A total of 8 input signals including dvix2, hdmix3, dpx2 and sdix1 can be accessed, among which DP1, DP2 and HDMI3 can support 3840x2160@60Hz or 7680x1080@60Hz input
- Support 8 screen display, screen position arbitrary layout, support arbitrary video capture
- Pure hardware FPGA Architecture: no CPU, no kernel, no poisoning and crash risk, the system runs stably. MTBF > 30000 hours, support 365 × 24-hour continuous operation
- All layers support matting and transparency adjustment for the best effect
- Support signal source hot backup
- Humanized interactive control interface, with front-end switch, LCD information color screen, crystal keys and knobs
- EDID configuration management: support the reading, modification and customization of EDID (extended display identification data)
- Support one button black screen / still
- Black edge removal / clipping function: solve the problem of black edge generated by front-end signal, and make arbitrary clipping for any signal source (still maintain full screen state)
- Support key locking to prevent misoperation
- Color restore settings: in the client software with color restore settings options
- Support K-HDR, make common SDR material present HDR display effect, solve the pain of less HDR material
- Monitor port output supports both monitor input and output at the same time, and supports configuration to look back at output.

III. Technical Indicators

The 16 network port two-in-one controller adopts the latest patented video processing technology, and has the video conversion capability of any format input and corresponding format output. Signals including DVI, HDMI, DP and SDI can be processed and enhanced to meet customer application requirements. The detailed specifications are as follows:

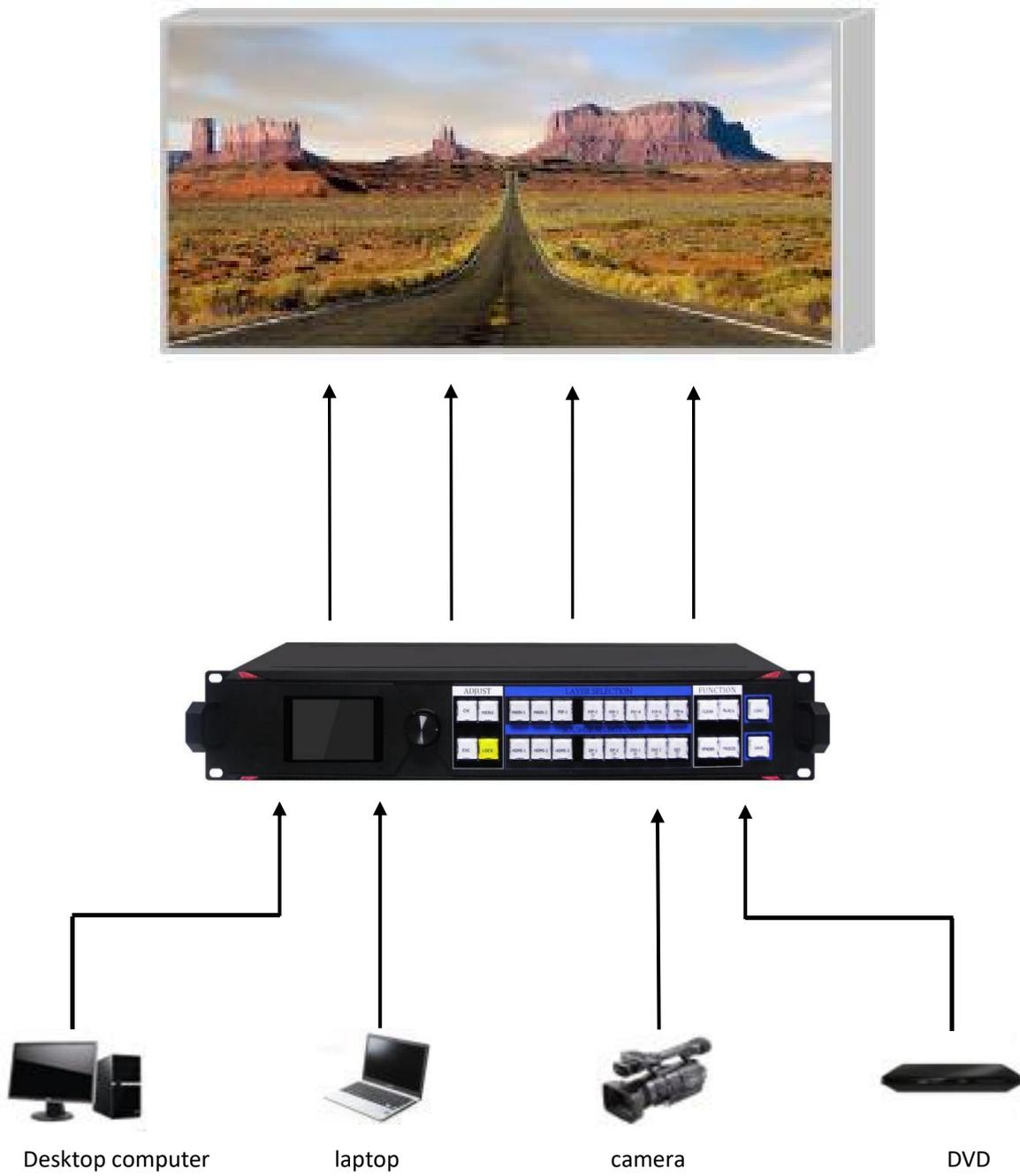
Input port		
Type	number	Specifications
DVI	2	1.3 standard, maximum support 1920 × 1080@60Hz
SDI (BNC)	1+1 (LOOP)	Support SD/HD/3G-SDI
HDMI	2	1.3A standard, maximum support 1920 × 1080@60Hz
HDMI2.0	1	Hdmi 2.0 standard, up to 3840 × 2160@60Hz or 7680x1080@60Hz
DP1.2	2	DisplayPort 1.2 standard, maximum support 3840 × 2160@60Hz or 7680x1080@60Hz

Output port		
Type	number	Specifications
LAN	16	LAN port, used to transmit data to receiving card, with a maximum load
DVI-I	1	Monitor port, resolution 1920 × 1080@60Hz

Control port		
Type	number	Specifications
USB (Type-B)	1	USB-cfg interface is used to connect PC to control
RS-232 (DB-9)	1	The data transmission rate is 50、75、100、150、300、600、1200、2400、4800、9600、19200、38400 (BT)
RJ-45	1	100M

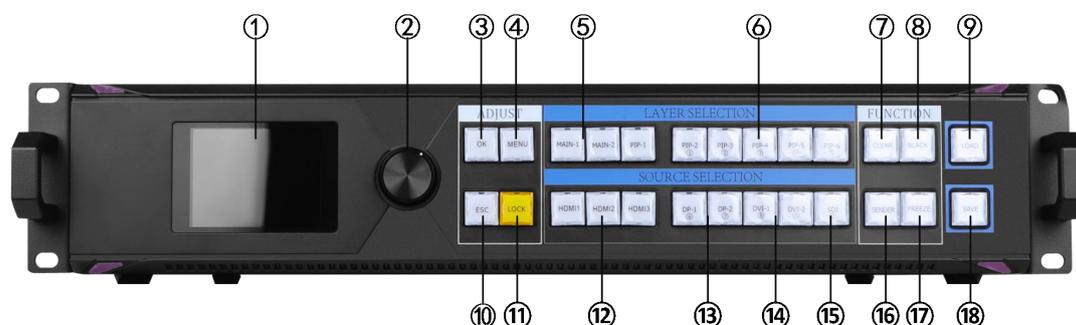
Whole machine specification	
Input power	100-240V AC~50/60Hz 0.6A
working temperature	0-45°C
Dimensions	488×360×89mm (L×W×H)
Net weight	6KG
Overall power consumption	55W

IV、 Working sketch



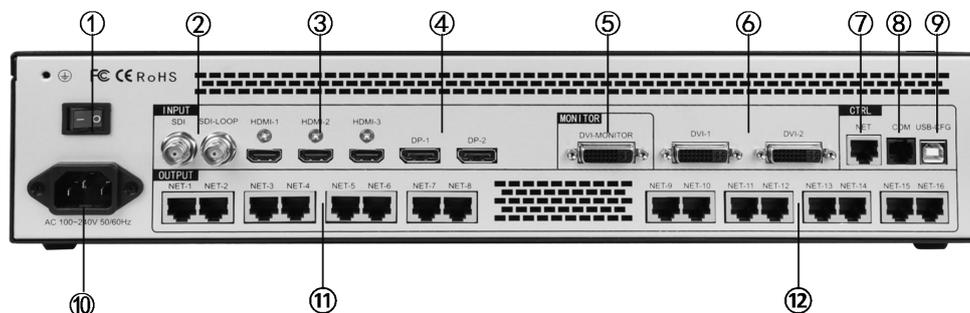
V. Panel Structure

Front panel



1. LCD-----Text display screen, displaying menus, parameters and other information
2. Knob-----Knob increase and decrease key, press to confirm
3. OK -----Enter
4. MENU-----menu
5. MAIN-1-----Main screen-1
6. MAIN-2-----Main screen-2
7. PIP-1-----Picture-in-Picture-1; open window button
8. PIP-2-----Picture-in-picture-2; open window button; number key 1
9. PIP-3-----Picture-in-Picture-3; open window button; number button 2
- 10.PIP-4-----Picture-in-Picture-4;open window button; number key 3
- 11.PIP-5-----Picture-in-Picture-5;open window button; number key 4
- 12.PIP-6-----Picture-in-Picture-6; open window button; number key 5
- 13.CLEAR-----Delete screen button
- 14.BLACK-----Normal and black screen switch
- 15.LOAD-----Preset recall button
- 16.ESC-----Back button
- 17.LOCK-----Key lock
- 18.HDMI1-----Signal source HDMI-1
- 19.HDMI2-----Signal sourceHDMI-2
- 20.HDMI3-----Signal sourceHDMI-3
- 21.DP-1-----Signal source DP-1; number key6
- 22.DP-2-----Signal source DP-2; number key7
- 23.DVI-1-----Signal source DVI-1; number key8
- 24.DVI-2-----Signal source DVI-2; number key9
- 25.SDI-----Signal source SDI; number key10
- 26.SENDER-----Related operation buttons of control system
- 27.FREEZE-----Freeze picture
- 28.SAVE-----Save preset

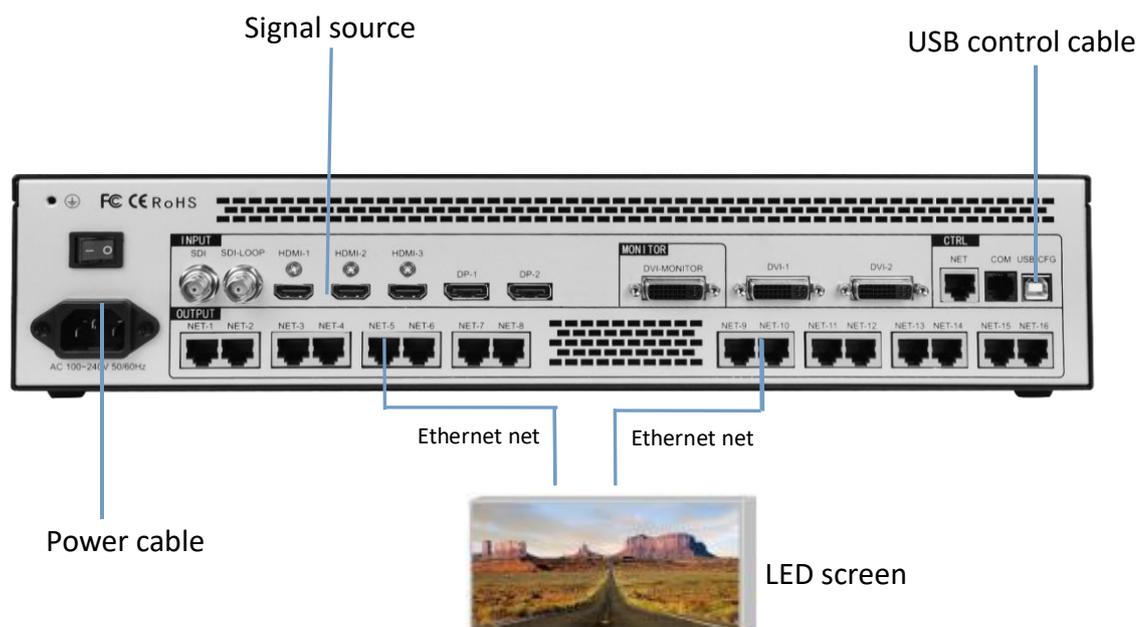
back panel



- 1. POWER-----Device switch
- 2. SDI-----SDI HD signal input port; ring exit
- 3. HDMI1-HDMI3-----HDMI Input channel
- 4. DP1 and DP2-----DP input channel,
- 5. DVI MONITOR-----Monitoring port
- 6. DVI1 and DVI2-----DVI Input channel
- 7. NET-----RJ45 Network port
- 8. COM-----COM port
- 9. USB-CFG-----Serial debugging port
- 10. AC-----Power socket
- 11. NET1-8-----Network port1-8
- 12. NET2-16-----Network port9-16

VI.Wiring and Installation

Wiring diagram



Installation steps

1. Wiring as shown, the HDMI port of the graphics card is connected to the HDMI input interface of the 2-in-1 controller;
2. Wiring as shown in the figure, using a network cable to connect the output network port of the 2-in-1 controller to the receiving card;
3. Wiring as shown in the figure, use a USB debugging cable to connect the USB port of the computer to the serial port of LS16;
4. Make sure the wiring is correct and power on and turn on the 2-in-1 controller.

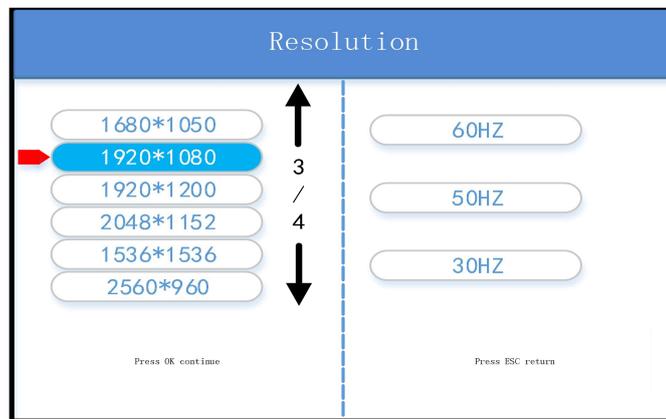
VIII Equipment commissioning

LS16 has 16 Ethernet ports output, and the 16 network ports can be arranged arbitrarily. The load of the whole machine is determined by the device splice mode and output resolution, and that more then the LED screen resolution. For example, cross splice, the output resolution is 1920*1080, then the load of the whole machine is 3840*2160

1. Video processor debugging

(1) Set output resolution

The output resolution function module can define the load and output frequency of each part of the output port of LS16. The output resolution have regular resolution and custom resolution. The custom resolution is that you can define the resolution of each output port according to specific needs when the conventional resolution does not meet the conditions.



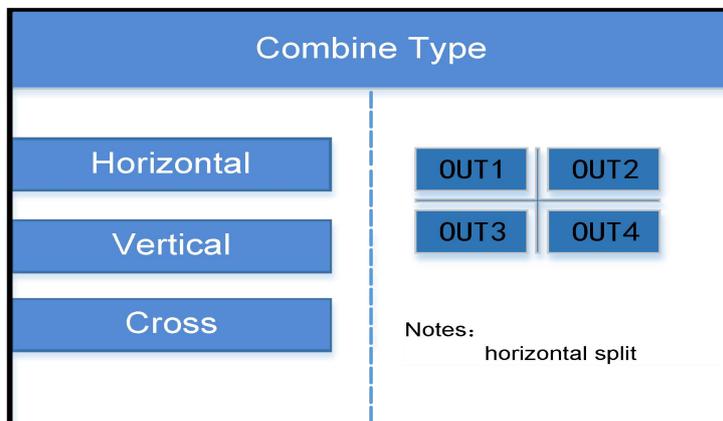
(2) splice mode

The splicing mode function module contains 3 options: horizontal splicing, vertical splicing, and cross splicing. Select the appropriate mode according to the distribution of the loading area of the sending card behind the LED screen.

Horizontal stitching: The 4 output ports of the stitcher are arranged horizontally and stitched into a complete image.

Vertical splicing: The 4 output ports of the splicer are vertically arranged and spliced into a complete image.

Field word stitching: The four output ports of the splicer are stitched together into a complete image.



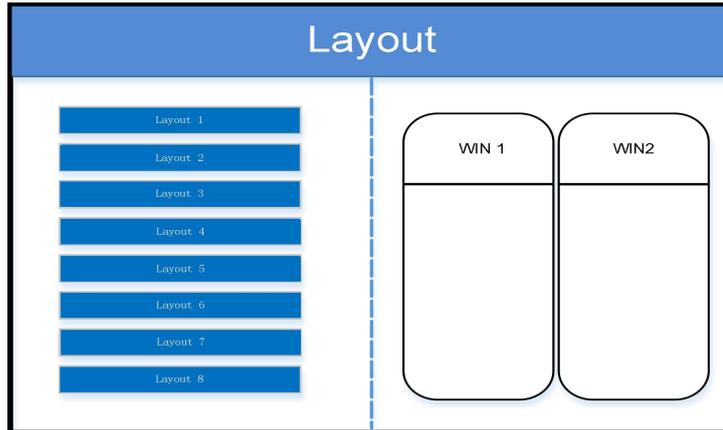
(3) window layout

The screen layout function module contains eight fixed layout templates. The layout of the layers opened through the screen layout is fixed.

Layout 1: open a single layer, one layer covers the entire screen. (Or keep press the MAIN-1 button open window)

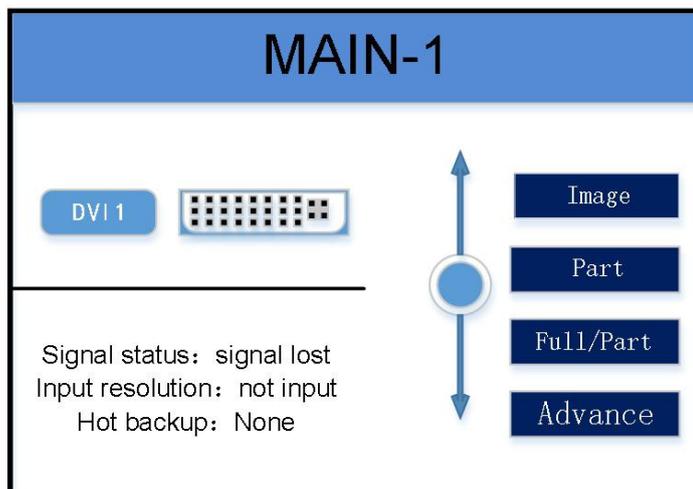
Layout 2: Open two layers, the layer arrangement is as shown in the figure below. (Or keep press the MAIN-2 button open window)

Layout 3 and layout 4 and so on.



(4) Image parameters (window size)

- 1) On the image parameter page, the following operations can be performed
- 2) Information display: You can view the information and input source status of the current screen.
- 3) Input source switching: You can switch the signal source on this page.
- 4) Image Parameters: Set the image size and position.
- 5) Local Settings: Set the position and size of the local interception.
- 6) Panorama partial switch: used to switch the panorama or partial picture displayed on the current screen.
- 7) Advanced Settings: You can set the cutout, transparency, and level of the current image.



(5) save setting

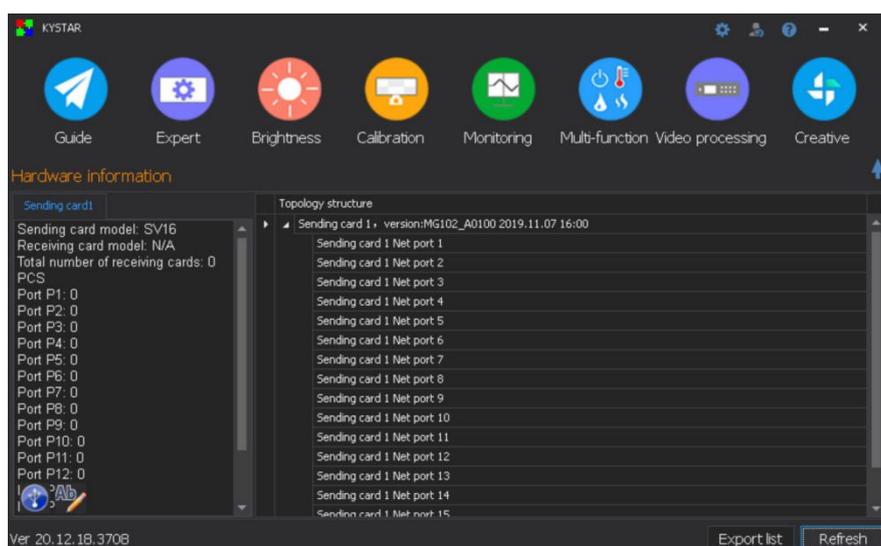
The currently set parameters can be saved to the device mode, which is convenient for direct recall in the future. 32 patterns can be saved.

2. software debugging

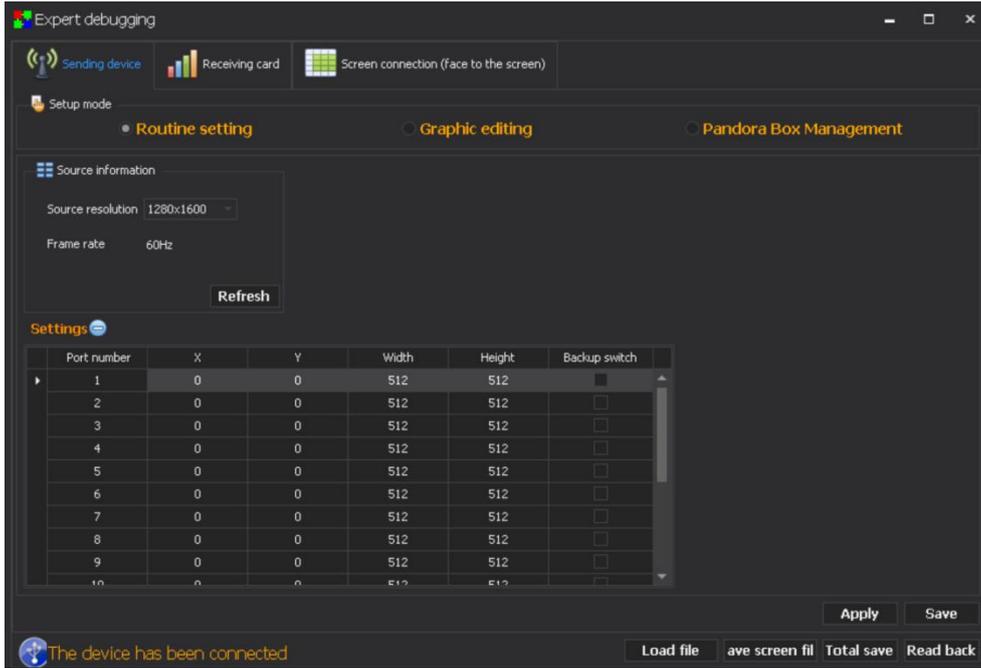
The software debugging is the control system debugging page. After debugging the control system, it is necessary to set the splicing method, loading information and screen resolution of the four output through the LS16 hardware panel or the software video processor interface.

The following shows the debugging interface of KYSTAR control system, without in-depth main control system debugging explanation. If you need to do main control system debugging, you can refer to the KYSTAR control system software setting manual.

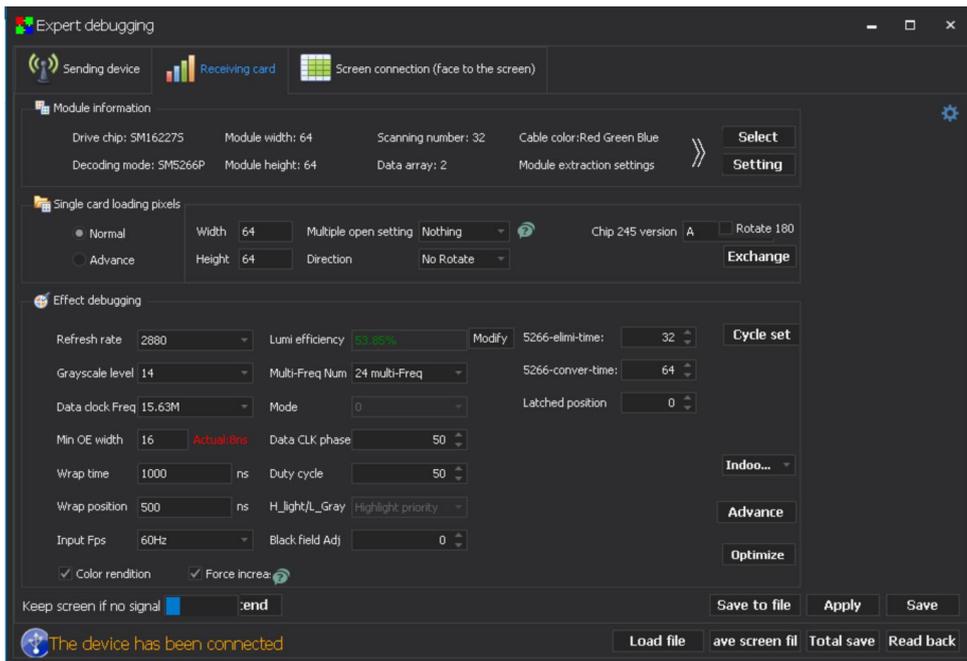
(1) Software detects sending device and receiving card



(2) Send device interface without setting



(3) Receiving card parameter interface



First select the module manufacturer: select the corresponding module manufacturer; the specifications of the modules, the driver chip and the decoding method should be consistent

Set receiving card Card Load:width and height of the Receiving card

Effect debugging: Debug data clock frequency and multiplier, debug refresh to 1920 (PWM chip debug gray clock frequency, refresh to 3840)

Effective means to improve the display effect:

1、 **Increase the data clock:** the frequency is not affected by other parameters, which is the first condition; if there is a blurry screen, reduce it one by one; try to adjust the clock phase if it is slightly blurred; 32-scan modules are generally adjusted to 20.83; too high has a greater impact on the module itself. Large and troublesome to maintain.

2、 **Decrease the OE width:** the default is 32ns, in units of 8, decrease one by one; note that too low will affect the low gray effect.

3、 **Adjust the output gray level:** conventional modules, generally adjusted to 12-14; 12 represents the 12th power of 2, that is, 4096.

4、 **Appropriately reduce the parameter value, and then save:** After the display effect is normal, reduce the above data appropriately without affecting the refresh rate and brightness efficiency. At present, it is to reduce power consumption and increase the life of the screen.

Note: Display scheme, generally use refresh priority, the disadvantage is that it may lead to poor low gray effect. Grayscale priority is good for see directly

(4) Screen connection interface

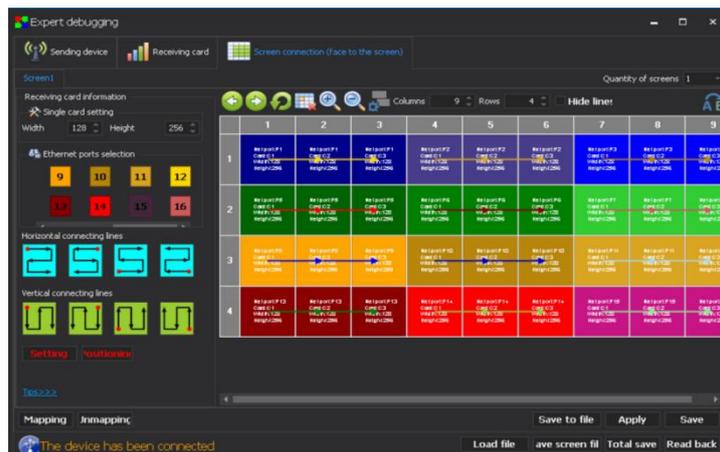
Single card setting: set the receiving card load size

Network port selection: select the corresponding network port settings

screen connection mode (horizontal/vertical): the connection mode between the receiving card and the receiving card

Setting: According to the flickering of the screen, click the corresponding area to intelligently identify the connection method of the network port and network cable.

Complex display connection: used to individually adjust the load and location information of each receiving card



(5) Separate save the sending device, receiving card parameters and display connection. If the parameters of all receiving cards are unified, you can use all curing. If the parameters are not unified, you need to cure separately. You can right-click the curing button to cure individually.

Before using the one-key repair function, it must be fully cured before using the one-key repair function after replacing the device.

VX Control menu

Advanced menu	language settings	Chinese
		ENGLISH
	Factory settings	Ok
		Cancel
	Mode deletion	single delete
		delete continuously
	Multi-machine cascade	Close
		Open
	signal loss concealment	Close
		Open
	Communication settings	Com set
		IP set
	K-HDR	select input source
		Network port settings
		Network port settings
	Monitoring port settings	monitor single input
		monitor input and output
	Network port settings	Set the size and coordinates of each network port

1. language settings
switch the language displayed on the hardware panel of the device,
2. Factory
Restore the setting information stored in the machine to the factory state, please be careful in this operation.
3. Mode delete
Delete the pattern data stored in the device, select single deletion or continuous deletion.
Single delete: select the mode number, delete after confirmation.
Continuous deletion: Set the mode start number and end number, and delete after confirmation.

4. Multi-machine cascade

It is used for splicing large screens with multiple devices and can be turned on and off on here.

After it is turned on, turn to the synchronization source selection page. All input sources of the current device can be set as synchronization sources, and the input source where the blue background is located is the input source selected by the current device.

5. signal loss concealment

When the input source is lost, the screen window where it is located is automatically hidden, which can be used for multi-screen and multi-input source backup to avoid black screen caused by signal loss.

6. Communication settings

Serial port settings: including baud rate, parity bit, data bit, stop bit and other information. The default serial port is COM port; the default baud rate is 115200; the default parity bit is NONE; the default data bit is 8; the default stop bit is 1.

IP settings: IP address, subnet mask, gateway can be set. The default IP address is 192.168.0.100; the default subnet mask is 255.255.255.0; the default gateway is 192.168.0.254.

7. K-HDR

K-HDR is a unique technology of Kystar , which can improve the current image display and achieve the effect of HDR.

Input source selection: DVI1, DP1, HDMI3, other input sources do not support K-HDR. Please select the input source reasonably.

K-HDR function switch: Used to turn on and off the K-HDR function of the current device.

K-HDR function level: The K-HDR display effect can be adjusted at levels 0-31. The larger the number, the more obvious the effect. Users can choose according to the actual situation. The default value is 8.

K-HDR effective area switch: You can choose the K-HDR effective display area as global or local. If you select global, it will take effect immediately within the screen display range. If you select local, enter the effective area parameter setting page. The default is global.

K-HDR effective area parameters: You can set the width, height, starting row and starting column parameters of the effective area.

K-HDR demo mode: After the demo mode is turned on, the K-HDR and non-HDR effects are automatically displayed side by side on the screen.

8. Monitoring port settings

DVI monitoring port can be set to monitor a single input signal or monitor input and output signals.

IX、 frequently asked questions

Q1: DVI、 HDMI、 DP、 SDI Port definition.

A:

DVI: Digital (high-definition) video signal is an interface standard introduced by Silicon Image, Intel (Intel) and other companies in 1999 to form the DDWG (Digital Display Working Group). It has been carried out in terms of speed, resolution and HDCP protocol. Optimize well. The signal source is generally a desktop computer, a notebook, etc.;

HDMI: High-definition multimedia interface is a digital video/audio interface technology. It is a dedicated digital interface suitable for image transmission. It can transmit audio and video signals at the same time. The maximum data transmission speed is 5Gbps. The signal source is generally a camera, a notebook, an information distribution system, etc.

DP: DisplayPort interface, a high-definition audio and video stream transmission interface. It is also the main interface standard for future display devices and will replace the current DVI and VGA, and even HDMI.

SDI: Acronym for serial digital interface. The serial interface is an interface that sequentially transmits each bit of the data word and the corresponding data through a single channel. Due to the high data rate of serial digital signals, they must be processed before transmission.

Q2: Briefly describes the connection mode of video card, video processor, receiving card and large LED screen. .

A: The video card's DVI (VGA) output port is connected to the DVI-IN (VGA-IN) input of the video processor. The output of the video processor's network port is connected to the terminal receiving card behind the screen through the network cable. The receiving card connects and controls part of the screen and cascades the whole screen

Q3: What are the reasons why the host computer can not detect the device?

A: It is necessary to connect its command transmission line to control the video processor with a trial computer. That is the serial line.

Failure to connect may be caused by the following conditions.

- ① The device is not powered on;

- ② The USB cable driver is not installed in the computer or the USB driver is damaged;
- ③ The serial cable is not connected well or the cable is damaged;

If the above suggestions do not finally solve your problem, please contact our company's customer service staff in time. We will assist you to solve the problems encountered within the first time.

Q4: The screen appears black after the computer is connected to the video processor input source.

A: ① The problem of the signal source. When connecting the computer graphics card, you need to set the copy mode of the graphics card. If you do not set it, the DVI port of the graphics card does not output data. Setup steps: turn off the power of the video processor-re-plug the video card to the video processor-ATI graphics card automatically reads the copy mode, NVIDIA graphics card needs to enter the graphics card control center, set up multiple monitors + dual-screen copy mode.

② The problem with the connection cable. When the signal cable interface is not in good contact or there is a problem inside the wire, abnormal phenomena such as color bars and flower screens will appear on the large screen. Carefully check whether the pin in the signal cable is broken or slanted and replace the signal cable;

If the above suggestions do not finally solve your problem, please contact our company's customer service staff in time. We will assist you to solve the problems encountered within the first time.