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VM-4K-2X2
Seamless Video
Wall Processor

LIGHTSPEED Technologies VM-4K-2X2 Seamless Video Wall Processor Owner's Manual

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Contents

LIGHTSPEED Technologies VM-4K-2X2 Seamless Video Wall Processor

Product Information

Specifications:

- **General:**
  - **Operating Temperature:** TBD
  - **Storage Temperature:** TBD
  - **Humidity:** TBD
  - **ESD Protection:** Yes
  - **Power Supply:** DC 12V
  - **Power Consumption (Max):** 16W
  - **Dimension (W x H x D):** 215mm x 42mm x 140.2mm/8.46 x 1.65 x 5.52
  - **Product Weight:** 1.2kg/2.64lbs
- **Technical:**
  - **Input/Output Port:** 4 x HDMI IN, 4 x HDMI OUT, 1 x RS-232, 1 x LAN (RJ45), 2 x S/PDIF OUT, 2 x Analog AUDIO OUT, 1 x FW (Micro USB), 1 x DC 12V
  - **Input/Output Signal Type:** HDMI with 4K@60Hz 4:4:4
  - **Input/Output Resolution Supported:** Various resolutions supported, refer to the manual for details
  - **Audio Format:** Various formats are supported, refer to the manual for details
  - **Maximum Data Rate:** 18Gbps
  - **Control Method:** Front Panel Buttons, RS232, IR, LAN (Telnet &Web UI)
  - **Transmission Distance:** Various distances are supported, refer to the manual for details

Product Usage Instructions

Setup:

1. Connect the appropriate input sources to the HDMI IN ports.
2. Connect the display devices to the HDMI OUT ports.
3. Ensure all audio connections are made correctly.
4. Power on the Video Wall Processor using the provided DC 12V power supply.

Configuration:

1. Use the front panel buttons or remote control to select input and output ports.
2. Adjust settings for resolution and audio format as needed.
3. Utilize the control methods available for seamless operation.

Maintenance:
Regularly check and clean the device vents to prevent overheating. Ensure all cables are securely connected.

FAQ:

- **Q: What is the maximum resolution supported by the Video Wall Processor?**

  A: The processor supports various resolutions including 4K@60Hz. Refer to the manual for a full list of supported resolutions.

- **Q: How can I reset the IP settings of the device?**

  A: Press and hold the ENTER button on the front panel for about 10 seconds to reset the IP settings of the device.

Introduction

Overview
The LightSpeed® VW-4K-2X features a compact enclosure, instant switching, and free scaling up to 4K@60Hz SDR and HDR. It supports two video working modes including matrix switcher mode and video wall mode to meet different application requirements. In matrix switcher mode, it allows four HDMI inputs to be switched to four HDMI outputs. In video wall mode, the matrix supports a 2×2 video wall layout, which can select any input for video wall outputs, configure bezel correction, and set image rotation. It also provides both analog and digital S/PDIF audio de-embedding for outputs 1 & 2. The product can be easily managed and controlled, for example, through front panel buttons, IR, RS232, web UI, and TCP protocols.

Features

- Seamless switching without seeing a black screen between four HDMI inputs and outputs.
- Each HDMI input and output support video format up to 4K@60Hz SDR and HDR.
- HDCP 2.2 compliant and backward compatible.
- EDID management including EDID presets, EDID copy, and custom EDID.
- **Advanced video processing capabilities:**
  - Supports free scaling between 480p and 4K@60Hz.
  - Supports conversion between SDR and HDR formats.
  - Supports conversion on color space, chroma, and color bits.
  - Supports instant switching between sources so black screen transition is avoided.
  - Supports rich scaler processing modes, including auto scaler, manual scaler, and video bypass.
- **Supports two video working modes:**
  - Supports matrix switcher mode, which can route any input to any output.
  - Supports video wall mode (2×2 layout), and configures its output distribution, bezel correction, input selection, and image 180° rotation (to facilitate 2×2 video wall setup using TV display) through API commands and web UI.
- Can be easily managed and controlled through front panel buttons, IR, RS232, web UI, and TCP protocols.

- Supports firmware upgrade through web UI and Micro USB port.

Package Contents

- 1 x Matrix Switcher
- 1 x DC 12V 3A Power Adapter
- 1 x IR Remote Controller
- 1 x IR Receiver Cable
- 1 x AC Power Cord (with US Pins)
- 1 x 3.5mm 3-Pin Phoenix Male Connector
- 2 x 3.5mm 5-Pin Phoenix Male Connector
- 4 x Mounting Brackets (with Screws)

Specifications

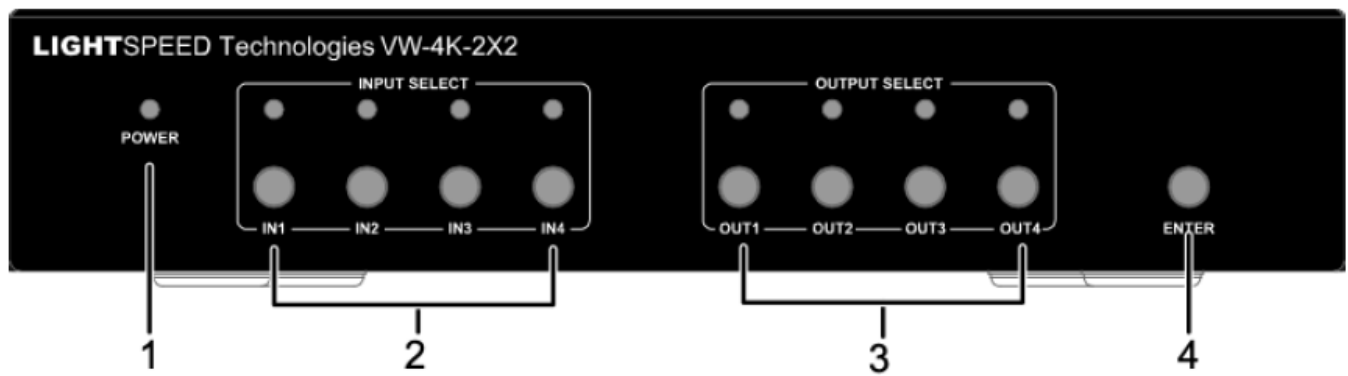| **General**	
Operating Temperature	0°C to 45°C (32°F to 113°F)
Storage Temperature	-20°C to 70°C (-4°F to 158°F)
Humidity	10% to 90%, non-condensing
ESD Protection	Human-body Model: ±8kV (Air-gap discharge)/ ±4kV (Contact discharge)
Power Supply	DC 12V
Power Consumption (Max)	16W
Dimension (W x H x D)	215mm x 42mm x 140.2mm/8.46" x 1.65" x 5.52"
Product Weight	1.2kg/2.64lbs
Technical	
Input/Output Port	4 x HDMI IN, 4 x HDMI OUT, 1 x RS-232, 1 x LAN (RJ45), 2 x S/PDIF OUT, 2 x Analog AUDIO OUT, 1 x FW (Micro USB), 1 x DC 12V
Input/Output Signal Type	HDMI with 4K@60Hz 4:4:4

Input/Output Resolution Supported	**VESA:** 800×6008, 1024×7688, 1280×7688, 1280×8008, 1280×9608, 1280×10248,1360×7688, 1366×7688, 1440×9008, 1600×9008, 1600×12008, 1680×10508,1920×12008 **SMPTE:** 720x576P6, 1280x720P6,7,8, 1920x1080P2,5,6,7,8, 3840×21602,3,5,6,8, 4096×21602,3,5,6,8 2 = at 24 Hz, 3 = at 25 Hz, 5 = at 30 Hz, 6 = at 50 Hz, 7 = at 59.94 Hz, 8 = 60 Hz
Audio Format	**HDMI IN/OUT:** Fully supports audio formats in HDMI 2.0 specification, including PCM 2.0/5.1/7.1, Dolby TrueHD, Dolby Atmos, DTSHD Master Audio, and DTS:X **AUDIO OUT:** Balance stereo audio **S/PDIF OUT:** PCM 2.0/5.1, Dolby Digital, and DTS up to 5.1 Channel
Maximum Data Rate	18Gbps
Control Method	Front Panel Buttons, RS232, IR, LAN (Telnet &Web UI)

Transmission Distance

| Cable Type	Range	Supported Video
HDMI	Input: 15m/50ft Output: 10m/33ft	1080P@60Hz 24bpp
	Input/Output: 10m/33ft	4K@30Hz 4:4:4 24bpp 4K@60Hz 4:2:0 24bpp
	Input/Output: 3m/10ft	4K@60Hz 4:4:4 24bpp

Panel Description

Front Panel

ID	Name	Description
1	**Power LED**	On: The device is powered on. Off: The device is powered off.
2	**INPUT SELECT**	Input selection LEDs and buttons for input ports (1-4). LED On: The input port is selected. LED Blinking: The input port is routed to a specific output. LED Off: The input port is not selected. Input selection buttons (1-4): press to select a specific input port.
3	**OUTPUT SELECT**	Output selection LEDs and buttons for output ports (1-4). LED On: The output port is selected. LED Blinking: The output port is routed to a specific input port. LED Off: The output port is not selected. Output selection buttons (1-4): press to select a specific output port.
4	**ENTER**	Press this button to perform the input and output selection. Hold the button for about 10s to reset the IP settings of the device.

Back Panel
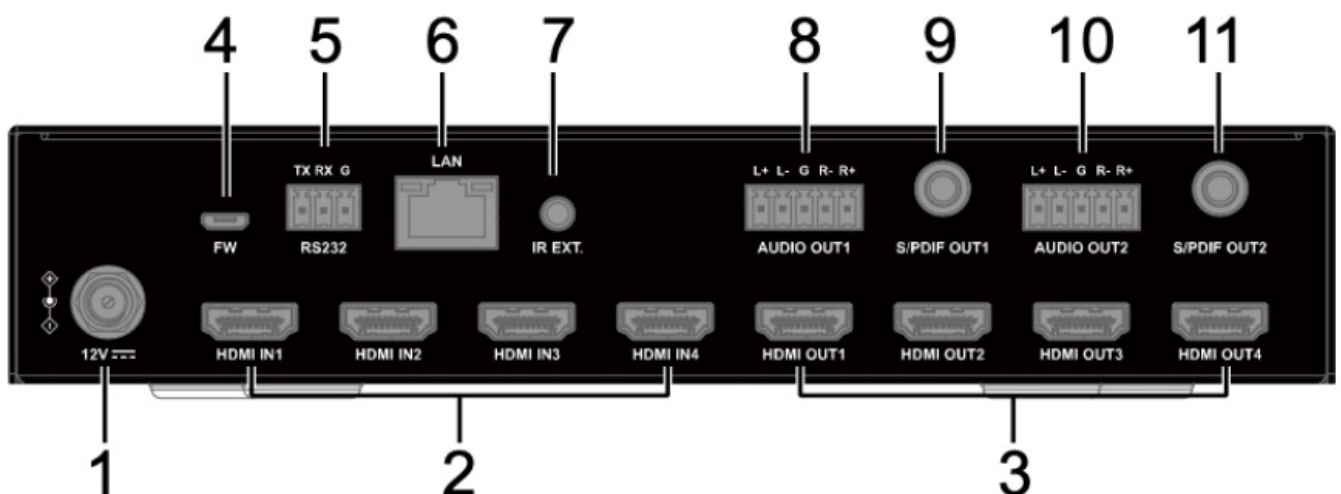
| ID	Name	Description
1	12V	Connect to the power adapter and AC power cord provided for power input.
2	HDMI IN (1-4)	Connect to the HDMI source devices.
3	HDMI OUT (1-4)	Connect to the HDMI display devices.
4	FW	Connect to the PC for firmware (ARM module) upgrade.
5	RS232	Connect to the PC for RS232 control on this device.
6	LAN	Connect to a network device (e.g., network switch, router, computer, etc.) for LAN control (Web UI & Telnet).
7	IR EXT.	IR extension port. Connect to the IR receiver cable.
8	AUDIO OUT1	Analog audio de-embedded output from HDMI out 1. Connect to an amplifier or a speaker.
9	SPDIF OUT 1	Digital audio de-embedded output from HDMI out 1. Connect to an A/V receiver or similar.
10	AUDIO OUT2	Analog audio de-embedded output from HDMI out 2. Connect to an amplifier or a speaker.
11	SPDIF OUT2	Digital audio de-embedded output from HDMI out 2. Connect to an A/V receiver or similar

Installation and Wiring

Warnings:
Before installation and wiring, disconnect power from the device. During wiring, connect and disconnect the cables gently.

Installation
Attach the bracket to one side of the enclosure using the screws provided. The bracket is attached to the enclosure as shown.
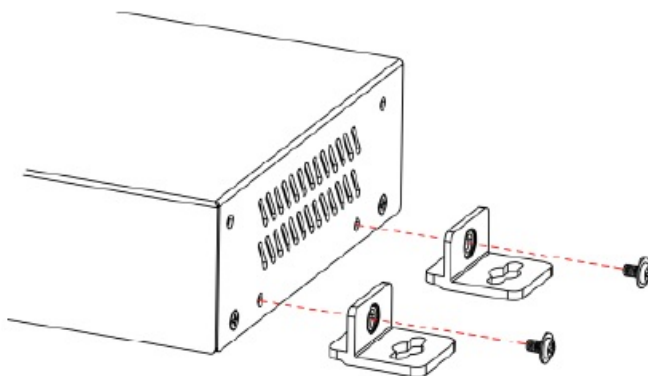
- Repeat step 1 for the other side of the enclosure.
- Attach the brackets to the surface or location desired using screws (not included in the package).

Wiring

The matrix supports two video working modes, including matrix switcher mode and video wall mode to meet different application requirements. Users can select working mode and configure corresponding settings through API commands or web UI. For detailed information, please refer to the separate document "API Command Set_VM-4K-2X2" or "Web UI" section.

Matrix Switcher Mode
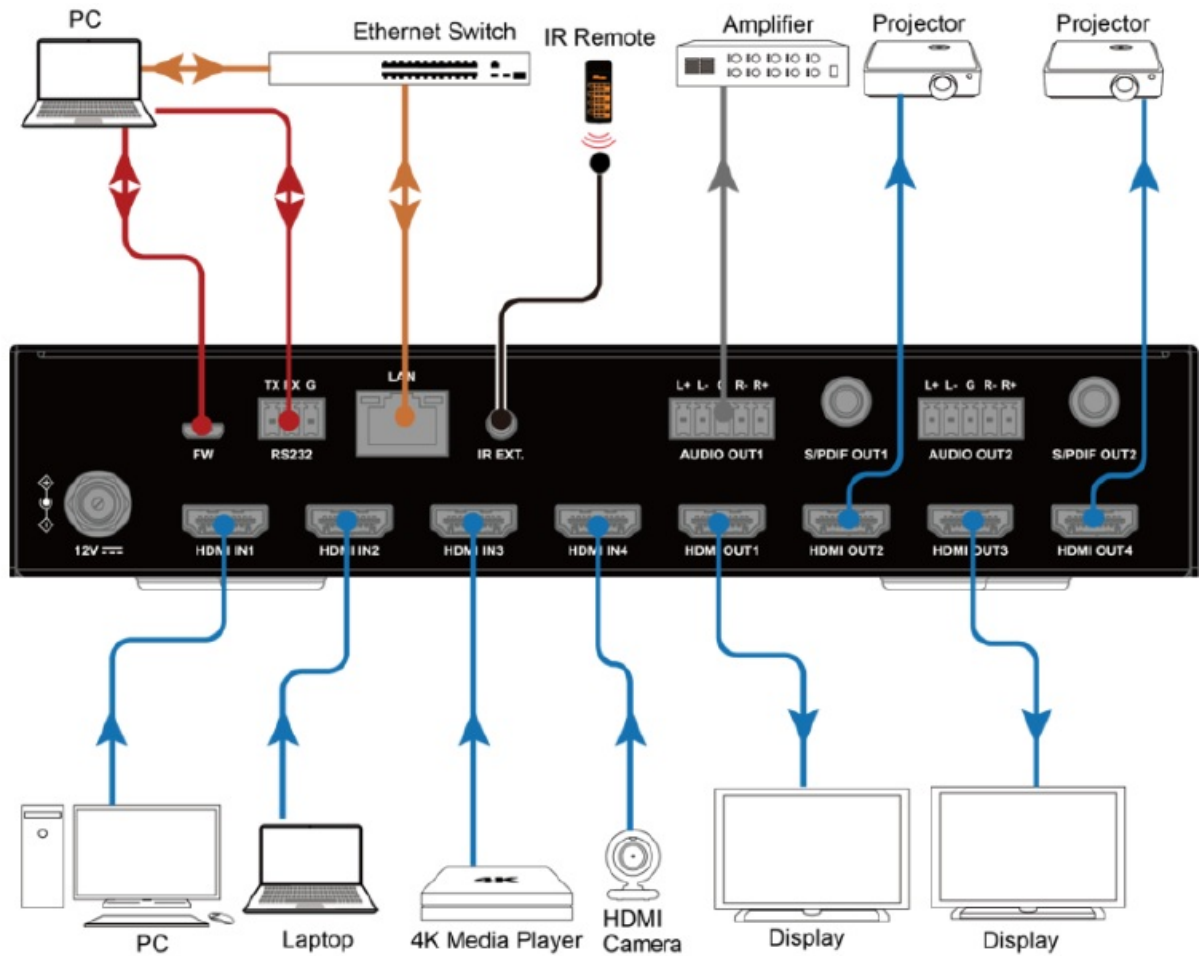
Video Wall Mode
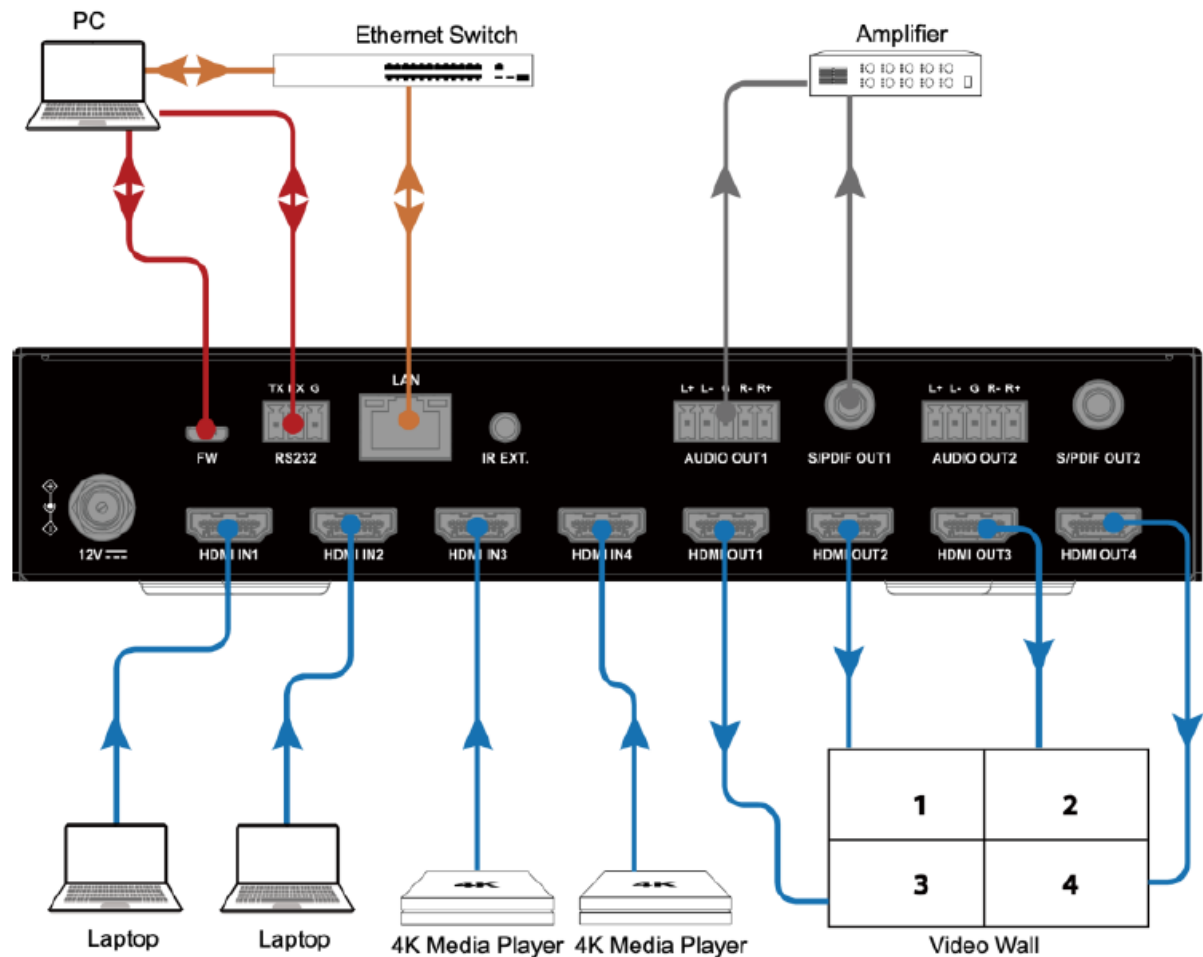
- The matrix supports a 2×2 video wall layout. Users can select any input as the source of the video wall, set output distribution, set bezel correction, and set 180° rotation of output image (to facilitate 2×2 video wall setup using TV display) through API commands or web UI. For detailed information, please refer to the separate document "API Command Set_VM-4K-2X2" or "Web UI" section. Button Control
- Users can perform basic switching of input sources to output displays using front panel buttons in matrix switcher mode.

To select an input source for the output display:

- Press one or multiple buttons of OUT 1-4 to select the output port(s). The LED will light up once a specific output port is selected.
- Press one button of IN 1-4 to select an input port. The LED will light up when one specific input port is selected. Press the ENTER button to implement the selection. The selection takes effect when the LEDs are off.

IR Control

The device can be controlled by the IR remote controller in matrix switcher mode. Connect the IR receiver cable to the IR EXT. port at the rear panel of the device and ensure the receiver eye is accessible to the remote controller.

To select an input source for one output display:

- Connect the IR receiver cable to the IR EXT. port at the rear panel of the device.
- Select the target output display from the column 1-4.

- Press the target input port number or previous (◀) / next (▶) button to select the desired input source.
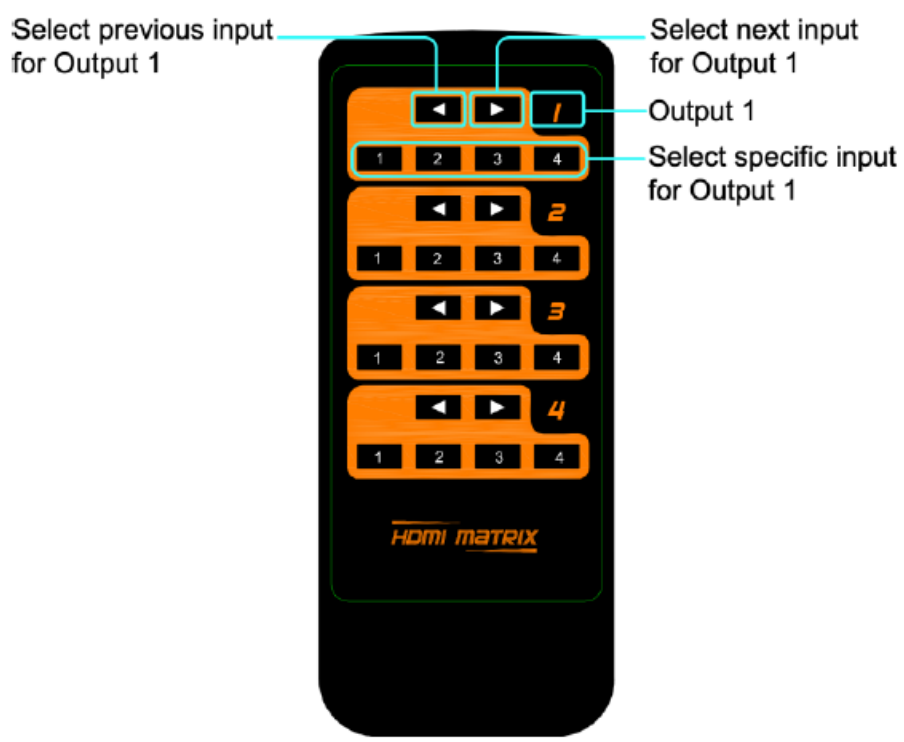
Command Control

Advanced users may need to control the device via API commands. Two methods are provided for controlling this device through API commands:

1. **RS232.**

   Connect a control PC to the RS232 port of the device. Before sending API commands to control the device, ensure the serial ports between this device and the PC are configured correctly. A professional RS232 serial interface software (e.g., Serial Assist) may be needed as well.

2. **Telnet.**

   Connect a control PC to the LAN port of the device. Before you intend to control the device through telnet API, you shall establish a connection

Parameters	Default Value
Baud Rate	**115200 bps**
Data bits	**8 bits**
Parity	**None**
Stop bits	**1 bit**
Flow control	**None**

between this device and your computer.

The form of the command for telnet connection is below telnet ip (port)

- **ip:** The device's IP address.
- **port:** The device's port number, this is non-required for some Telnet control tools. The default setting is 23.

For example, if the device's IP address is 192.168.11.143, the command for telnet connection shall be the following: telnet 192.168.11.143

**Obtain the IP Address of the Device**

To obtain the device's IP address:

1. Connect a control PC to the RS232 port of the device.
2. Configure RS232 parameters for the PC's serial port correctly through an RS232 serial port tool, such as Serial Assist.
3. Input the command GET IPADDR<CR><LF> and send. You will get a response with the IP address, see the following:
   - **Input:**
     GET IPADDR<CR><LF>
   - **Response:**
     IPADDR 172.16.18.173 MASK 255.255.255.0 GATEWAY 172.16.18.1
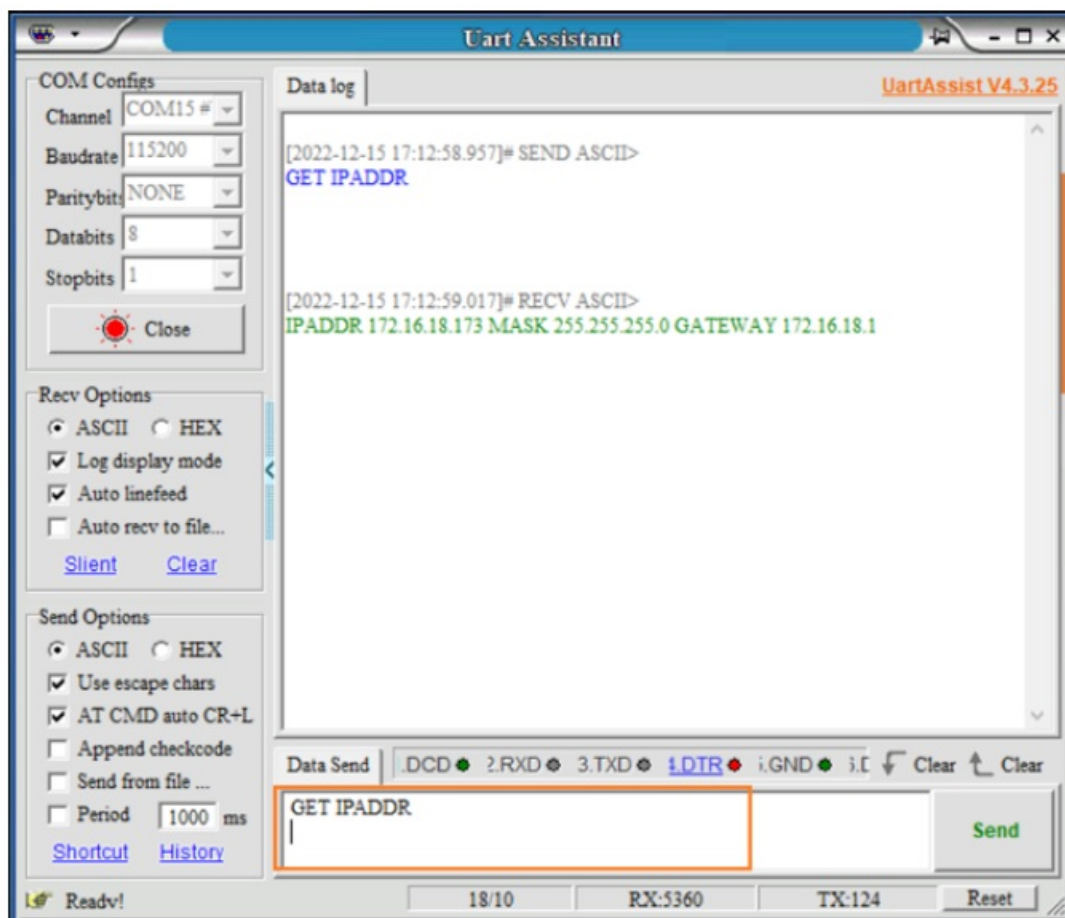
Note:
When all is configured properly, you can control the device through commands, which are available in the separate document "API Command Set_VM-4K-2X2".

Web UI

The Web UI designed for this device allows for basic controls and advanced settings. It can be accessed through a modern browser with the latest version, e.g., Chrome, Safari, Firefox, IE10+, etc.

To get access the Web UI:

1. Connect the LAN port of the device to a local area network. (Ensure there's a DHCP server in the network so that the device can obtain a valid IP address.)
2. Connect the PC to the same network as this device.
3. Input the device's IP address in the browser and press Enter, the following window will pop up. (Refer to Obtain IP Address of the section to get the device's IP address quickly).
4. The following window pops up. Input the password (default password: admin) and click Login.

5. Input a new password in the dialog box and click Apply to enter the main page. The password shall be alphanumeric with 4 to 16 characters in length.

The main page consists of three tabs: Matrix Control, General Setting, and Advanced Setting.

Matrix Control
VIDEO MODE

Matrix Switcher
If users selected Video wall mode before, click the circle (turn to green) in front of "Matrix switcher", and click "CONFIRM" in the following window to set the device to Matrix switcher mode.

When video mode is set to "Matrix Switcher", the device is used as a 4×4 matrix, this section manages the distribution of input sources to output displays.

Click the button in the table to select the input for the output display (the button turns from white to green once the selection is done).

- ALL OUTPUTS: Click to route INPUT (n) for all OUTPUTs.

  Default setting: Input 1 is routed to Output 1, …, Input (n) is routed to Output (n), n = 1, 2, 3, 4.

- **CEC Control:**
  - **On:** Click to power on the display connected to the output selected through CEC.
  - **Off:** Click to power off the display connected to the output selected through CEC.

- **Video Details:**

  Click to view detailed information on input and output ports including status, resolution, frame rate, etc., see the following:

Video Wall

Click the circle (turn to green) in front of "Video wall" and click "CONFIRM" in the following window to set the device to Video wall mode.

Video Mode

○ Matrix switcher ● Video wall

Input

Port [1 ∨] [Refresh]

Status	Signal	Resolution:
Connected	Valid	3840x2160

Frame Rate:	Color Space:	Color Depth:
60	RGB	8bit

HDCP Version
NO HDCP

Output

Port [1 ∨] [Refresh]

Status	Signal	Resolution:
Connected	Valid	3840x2160

Frame Rate:	Color Space:	Color Depth:
60	Ycbcr420	8bit

HDCP Version
HDCP2.2

Confirm   ×

Pay attention! The operation will turn off matrix. The outputs will change to work in videowall mode.

Do you want to continue?

[CANCEL] [CONFIRM]

Video Mode

○ Matrix switcher ● Video wall

Video wall layout
● 2x2

OUTPUT 1	OUTPUT 2
OUTPUT 3	OUTPUT 4

Bezel Adjustment

VW: [0]
OW: [0]
VH: [0]
OH: [0] [Apply]

Video wall outputs

	OUTPUT 1	OUTPUT 2	OUTPUT 3	OUTPUT 4
Top Left	■			
Top Right		■		
Bottom Left			■	
Bottom Right				■

Video wall input

	INPUT 1	INPUT 2	INPUT 3	INPUT 4
Source	■			

UNIT:1mm

Video wall flip ☐ OUTPUT 1 ☐ OUTPUT 2 ☐ OUTPUT 3 ☐ OUTPUT 4

When setting the video to "Video wall" mode, users can set video wall output distribution, select the input source, set bezel correction, and set video wall image rotation.

- **Video wall layout:** Shows the video wall layout is 2×2.
- **Video wall outputs:** Click the button in the table to set the positions of the outputs in the video wall (the button turns from white to green once selection is done).
- **Default Setting:**
  - OUTPUT 1: Top Left;
  - OUTPUT 2: Top Right;
  - OUTPUT 3: Bottom Left;
  - OUTPUT 4: Bottom Right.
- Video wall input: Click the button in the table to select the input source for the video wall (the button turns from white to green once the selection is done).
- Default Setting: INPUT 1
  - Video wall flip: Click the check box before the output 1-4 to set the corresponding image to be rotated 180°.
- Default setting: unchecked.
- Bezel Adjustment: Set bezel compensation, so that there is no position deviation of image from each screen in the video wall. Default settings: 0; Range: 0-10000
  - **OW/OH:** These are the outside width/height of each video wall display.
  - **VW/VH:** These are the inner width/height of each video wall display.
  - **Apply:** Click to apply the bezel correction settings.

Note: To ensure proper visual display, all video wall displays are recommended to be the same size.

HDMI A/V Mute

- **ON:** Select to mute video and audio for the selected HDMI output port.
- **OFF:** Select to unmute video and audio for selected HDMI output port.

Default setting: OFF

De-embedded Audio Mute

- **ON:** Select to mute de-embedded audio for selected audio output ports.
- **OFF:** Select to unmute de-embedded audio for selected audio output ports.

Default setting: OFF

Video output resolution

This section manages resolution configurations for Output 1-4. Three operation options are provided for each output.

- **Auto:** Select to automatically adapt to display EDID and resolution. E.g., If the display supports up to 4K@30Hz, the device will output a signal with 4K@30Hz.
- **Manual:** Select a desired output resolution from the Resolution dropdown menu for the selected output port.
- **Bypass:** Select to bypass the input video source to the selected output port. When "Bypass" is selected, a black screen may occur on the display if unsupported resolutions are switched to the display.

Default: Auto

Note:

- In Matrix switcher mode, "Auto" and "Manual" options are available for all output ports (1 to 4), while "Bypass" is available for Output 1 and Output 2 only.
- In Video wall mode, "Auto" and "Manual" options are available for all output ports (1 to 4).

Presets Matrix Control

This section saves or loads the settings of or to the Video Matrix Control section.
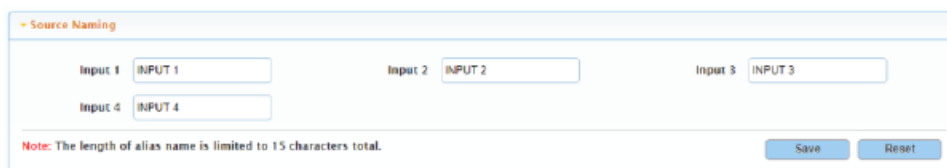
- **Save:** Click to save the settings of the Video Matrix Control section.
- **Load:** Click to load settings to the Video Matrix Control section.

To save a setting of Video Matrix to Preset 1:

1. Complete the input and output routing in the Video Matrix Control section.
2. Click "Save" in "Preset 1". Then the "Preset 1" is saved successfully.

General Setting
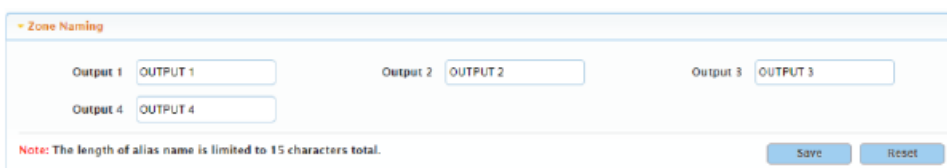
Source Naming

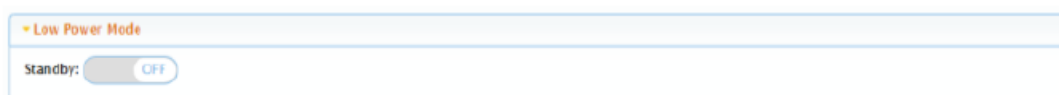This section allows you to change to new input ports' names.

- **Save:** Click to save and apply all changes.
- **Reset:** Click to reset all changes.

Note:
The length of each new name shall not exceed 15 characters.

Zone Naming

This section allows you to change to new output ports' names.

- **Save:** Click to save and apply all changes.
- **Reset:** Click to reset all changes.

Note:
The length of each new name shall not exceed 15 characters.

Advanced Setting

Lower Power Mode

This section provides the setting of Lower Power Mode. In Low Power Mode, the device will shut down all video outputs and enter standby status.

- **ON:** Select to turn on Lower Power Mode to make the device enter standby status.
  Note: When on is selected, the web UI page will log out, you need to re-login to enter the main page.
- **OFF:** Select to turn off Lower Power Mode to make the device work properly.

Default setting: OFF

EDID Preset

This section allows you to configure the EDID setting for each input port. Available EDID options are provided from the dropdown menu, click to select a desire option.

- Copy From Output 1
- Copy From Output 2
- Copy From Output 3
- Copy From Output 4
- 4K60 2.0CH PCM Audio with HDR
- 4K60 2.0CH PCM Audio with SDR (Default)
- 4K30 2.0CH PCM Audio with HDR
- 4K30 2.0CH PCM Audio with SDR
- 1080p@60Hz 2.0CH PCM Audio with HDR
- 1080p@60Hz 2.0CH PCM Audio with SDR
- EDID Write

EDID Read

Enter

EDID Setting

Select Port [1 ⌄] [Read] [Write] [Export] [Import]

Status:

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
01																
02																
03																
04																
05																
06																
07																
08																
09																
10																
11																
12																
13																
14																
15																
16																

Click Enter to enter the EDID Setting page, select the desired HDMI output, and click to "Read" its EDID information.

- **Read:** Click to read the selected output port's EDID information.
- **Write:** Click to write EDID information to the selected input port.
- **Export:** Click to export the EDID file to your local computer.
- **Import:** Click to import the EDID file from your local computer.

CEC Control

▾ CEC Control

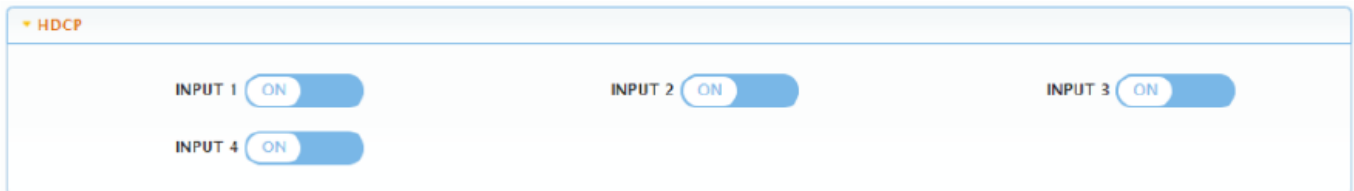| Output	Manual		Auto	
			On/Off	Delay Time(1~30min)
OUTPUT 1	Display On	Display Off	OFF	2
OUTPUT 2	Display On	Display Off	OFF	2
OUTPUT 3	Display On	Display Off	OFF	2
OUTPUT 4	Display On	Display Off	OFF	2

- **Display On:** Click to power on the display connected to the output selected.
- **Display Off:** Click to power off the display connected to the output selected.

- **Auto On/Off:** Select to enable or disable CEC Auto Control.

Default Setting: Off

- Auto Delay Time (1~30min): Click the up/down arrow to set the time for the display to power off automatically when no signal is present. For example, if the time is set to 2 minutes, the output display will power off automatically when there's no signal at the display for 2 minutes.
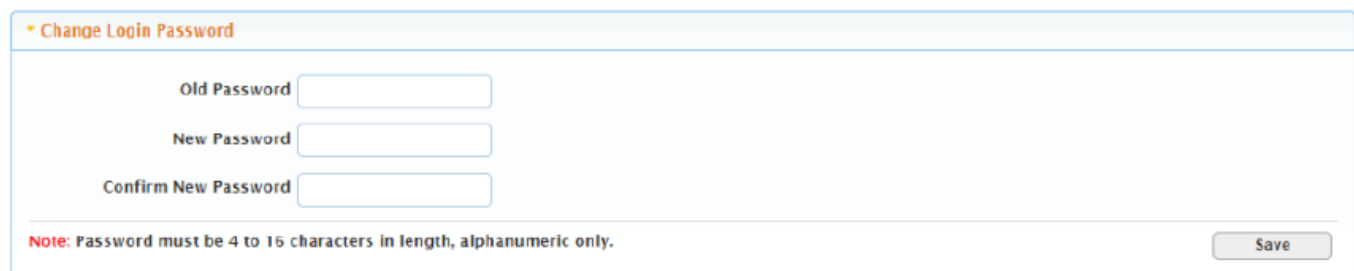
HDCP

This section allows you to enable or disable HDCP encryption of each input port.

- **ON:** Select to enable HDCP encryption for the selected input port.
- **OFF:** Select to disable HDCP encryption for the selected input port.

Default setting: ON

Change Login Password

This section is to change the login password.

Default setting: admin

Note:
Password must be 4 to 16 characters in length, alphanumeric only.

Network

This section is to set between the static and dynamic IP addresses.

- **IP Type:**
    - **DHCP:** When enabled, the IP address of the Matrix is assigned automatically by the DHCP server connected.

- **Static:** When enabled, you need to set up the IP address manually.

  Default setting: DHCP
- Save: Click to save and perform the network setting, and the setting change will take effect immediately.

  Note:
- When "Static" is selected, please ensure your PC is in the same network segment as the device.

Custom Web UI Logo

- This section allows you to create your logo for the Web UI.
- To create a customized Web UI logo: click "Browse" for the new logo file, and choose "Apply".

Note: The new logo used should be in PNG format and less than 300×60 pixels.

System Version

This section provides Web UI and MCU version information.

FW Update

To update the device's firmware:

1. Click "Browse" for the update file.

FW Update

File: MX0404_N301_000-WHOLE-V1.0.3.zip   [Browse]

[Update]

Note: Do not power off the matrix when updating.

2. Click "Update" to perform the upgrade. The update will be completed when the progress bar reaches 100%.

Update Progress   ☒

Please Wait Reboot

100%

Note:

- The device will reboot automatically when the firmware update is completed successfully. Please wait for about 2-3 minutes, then refresh and log in again.
- DO NOT power off the device during the updating process.

System

System

[Reboot]   [Factory Reset]

- **Reboot:** Click to reboot the device.
- **Factory Reset:** Click to reset the device to factory default.

Log

This section displays system setting change records. Click "Export Log" to download the log to your local computer.

Log

[Export Log]

**Note:** Please wait a few moments for log retrieval.

Firmware Upgrade

The device supports firmware upgrades through web UI and a micro-USB port on the rear panel. To upgrade firmware through Web UI, see the FW Update section.

**To upgrade firmware through a micro-USB port, perform the following:**

1. Download the upgrade file on your local PC.
2. Connect the device's micro-USB port to your PC. Send the command UPG UFU<CR><LF> to the device using

a RS232 serial tool.

3. Open the upgrade file folder and launch the USBDownloadTool2.1.exe software.
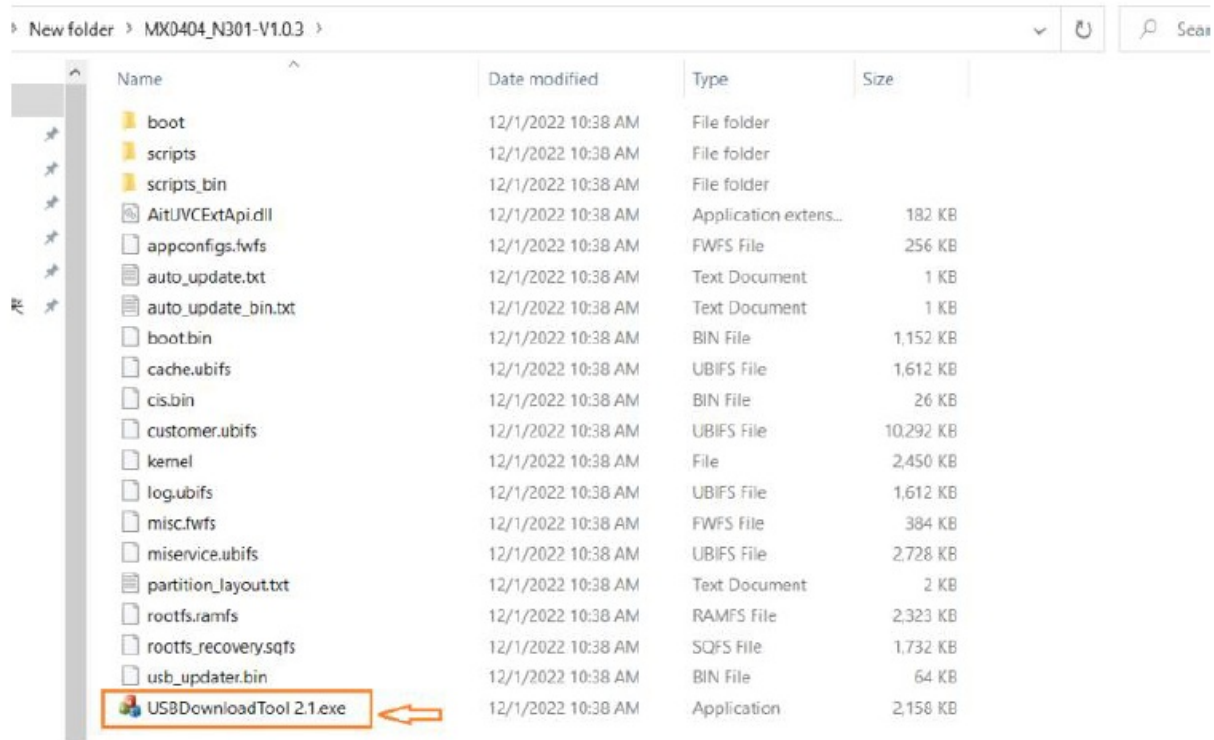
4. Click "Upgrade Firmware" to start the upgrade. A window will pop up, indicating that firmware is completed successfully.
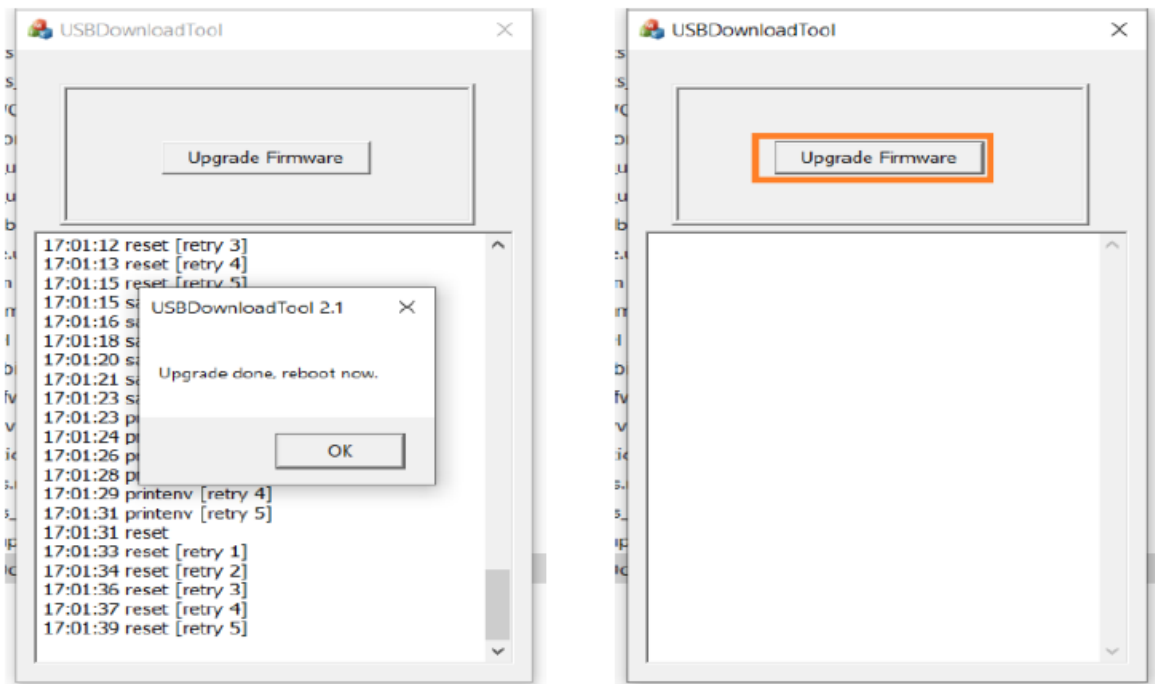
When the upgrade process is completed, the device will reboot.

Note:
Do not cut off the power during the upgrade process.

Available exclusively from Future Ready Solutions

- **www.lightspeed-tech.com**
- **Email: info@lightspeed-tech.com**

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Documents / Resources

LIGHTSPEED Technologies VM-4K-2X2 Seamless Video Wall Processor [pdf] Owner's Manual
VM-4K-2X2 Seamless Video Wall Processor, VM-4K-2X2, Seamless Video Wall Processor, Video Wall Processor, Wall Processor, Processor

References

- 🌐 **LightSpeed Technologies® - Future Ready Solutions**
- 🌐 **LightSpeed Technologies® - Future Ready Solutions**
- **User Manual**