SOFTWARE USER MANUAL

# AutoLED LED Display Configuration Software

Installation, screen commissioning, monitoring, redundancy, calibration, and multifunction-card control

| | |
|---|---|
| **DOCUMENT VERSION** | 3.0.2 |
| **SOFTWARE VERSION** | 3.141.235 |
| **RELEASE** | July 2026 |
| **LANGUAGE** | English |
| **PUBLISHED BY** | Shenzhen Mooncell Electronics Co., Ltd. |

**APPLICATION SCOPE**

LED sending controller setup | Receiver-card configuration | Standard and advanced screen commissioning | Brightness and calibration control | Hardware monitoring

# Document Control

## Purpose

This manual explains how to install, connect, configure, commission, monitor, and maintain a Mooncell LED display control system with AutoLED software version 3.141.235.

## Terminology

| Term | Meaning in this manual |
|---|---|
| **LED sending controller** | The sending device that receives the video signal and transmits display data to receiver cards. |
| **Sender (AutoLED label)** | The AutoLED page used to configure an LED sending controller. The hardware is called an LED sending controller throughout this manual. |
| **Receiver card** | The cabinet-side control card that drives LED modules. |
| **Save to Hardware** | Stores transmitted data in non-volatile device memory so it remains after a power cycle. |
| **Standard Screen Configuration** | Workflow for regular cabinet arrays and conventional receiver-card chains. |
| **Advanced Screen Configuration** | Visual workflow for irregular, creative, or mixed-cabinet displays. |

**BEFORE COMMISSIONING**

Back up the current configuration before changing receiver-card parameters or upgrading firmware. Verify the target device model and firmware family before every upgrade. Apply changes to a test area first whenever the installed display is already in service.

## Interface Conventions

Menu paths are written as Page > Command. Hardware is called an LED sending controller throughout this manual, while the current AutoLED interface labels its configuration page Sender. Click paths retain Sender and other on-screen labels exactly wherever practical. Labels can vary slightly with hardware model, firmware, or software localization; when they do, use the illustrated screen position and the described function as the reference.

# Contents

# 1. Introduction

AutoLED is Mooncell's dedicated configuration and commissioning application for synchronous LED display control systems. Used with LED sending controllers, receiver cards, and multifunction cards, it provides intelligent screen setup, power control, brightness management, and real-time operating-status monitoring.

**Key AutoLED capabilities**

- Hot-backup redundancy for dual receiver cards and dual LED sending controllers.
- High refresh rate, high grayscale performance, and high brightness with standard driver ICs.
- Pixel-level brightness and chromaticity calibration, including three-dimensional color-space transformation.
- Receiver-card parameter readback, environmental monitoring, and communication-fault detection.
- Automatic online testing of receiver cards.
- 8-bit and 10-bit input color depth.
- Configurable scan ratios up to 1/64 scan.

# 2. Operating Environment

## 2.1 Hardware Requirements

**Processor:** Intel Pentium 2.6 GHz or faster.

**Memory:** 512 MB RAM or more.

## 2.2 Software Requirements

**Operating system:** Windows NT, Windows XP, Windows Vista, Windows 7, Windows 8, Windows 10, or Windows 11.

# 3. Hardware Connection and Display Setup

## Step 1 - Connect the LED Sending Controller

Install the LED sending controller in a desktop PC expansion slot, or connect an external controller with its own power supply. Connect the HDMI, DVI, or VGA video cable and the USB or Ethernet commissioning cable, as shown in Figure 3-1.

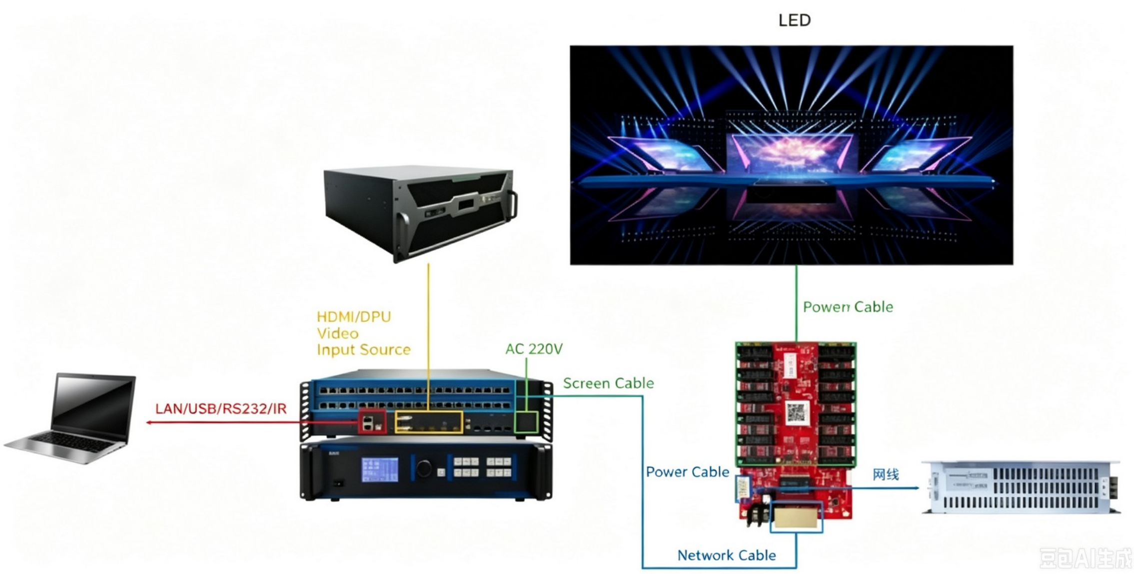



Figure 3-1 Typical hardware connection

## Step 2 - Connect and Power the Receiver Cards

Power the receiver cards and the LED display under commissioning. Connect the LED sending controller to the receiver-card chain with Ethernet cables wired to the T568B pinout. Flashing status indicators on both the controller and receiver cards confirm normal hardware communication.

## Step 3 - Verify Communication in AutoLED

Launch AutoLED and confirm that the software has established communication with the LED sending controller and receiver cards, as shown in Figure 3-2.

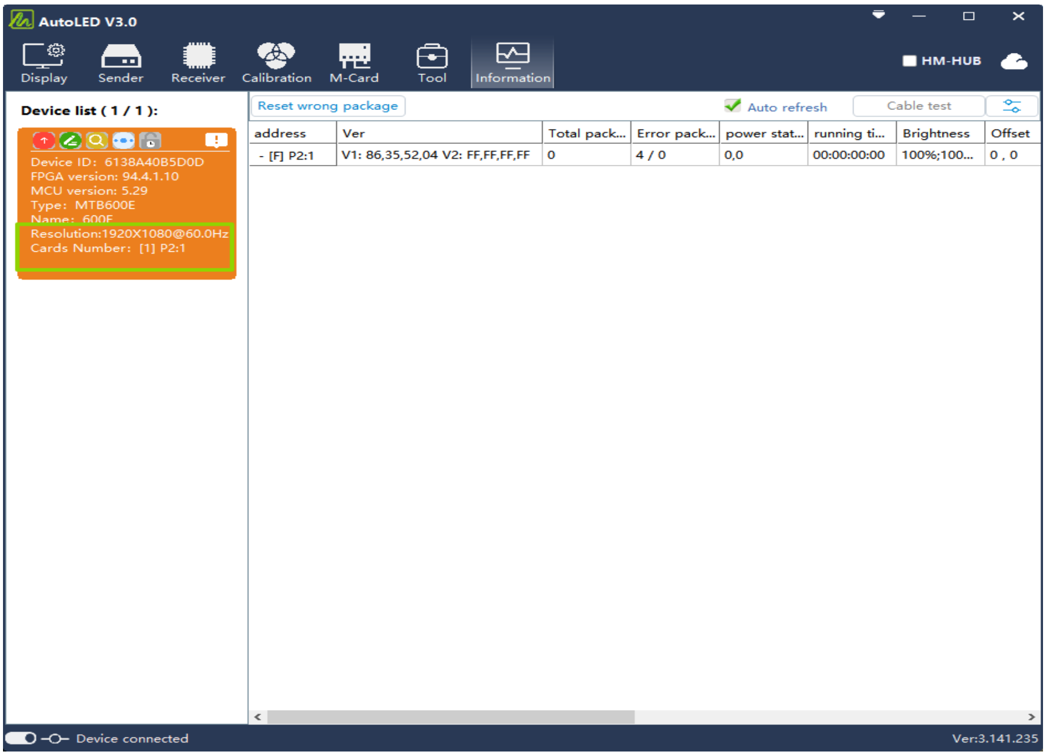



Figure 3-2 Communication status between AutoLED and the LED sending controller

> **COMMISSIONING TIP**
>
> Use the communication indicators shown in Figure 3-2 to confirm that AutoLED recognizes the LED sending controller and receiver cards.

## Step 4 - Configure the Windows Display Mode

### Windows 10 and Windows 11

Right-click the desktop and select Display settings. Under Multiple displays, choose Duplicate these displays or Extend these displays, as required. You can also press Windows+P and select Duplicate or Extend directly.

### Windows 7 and Windows 8

Right-click the desktop, select Screen resolution, click Detect, and choose a duplicate-display mode. Alternatively, press Windows+P and select Duplicate.

### Windows XP

#### ATI graphics adapter

Right-click an empty area of the desktop, select Properties > Settings > Advanced, open the graphics-driver control panel, choose Display Management, and enable display cloning.

**NVIDIA graphics adapter**

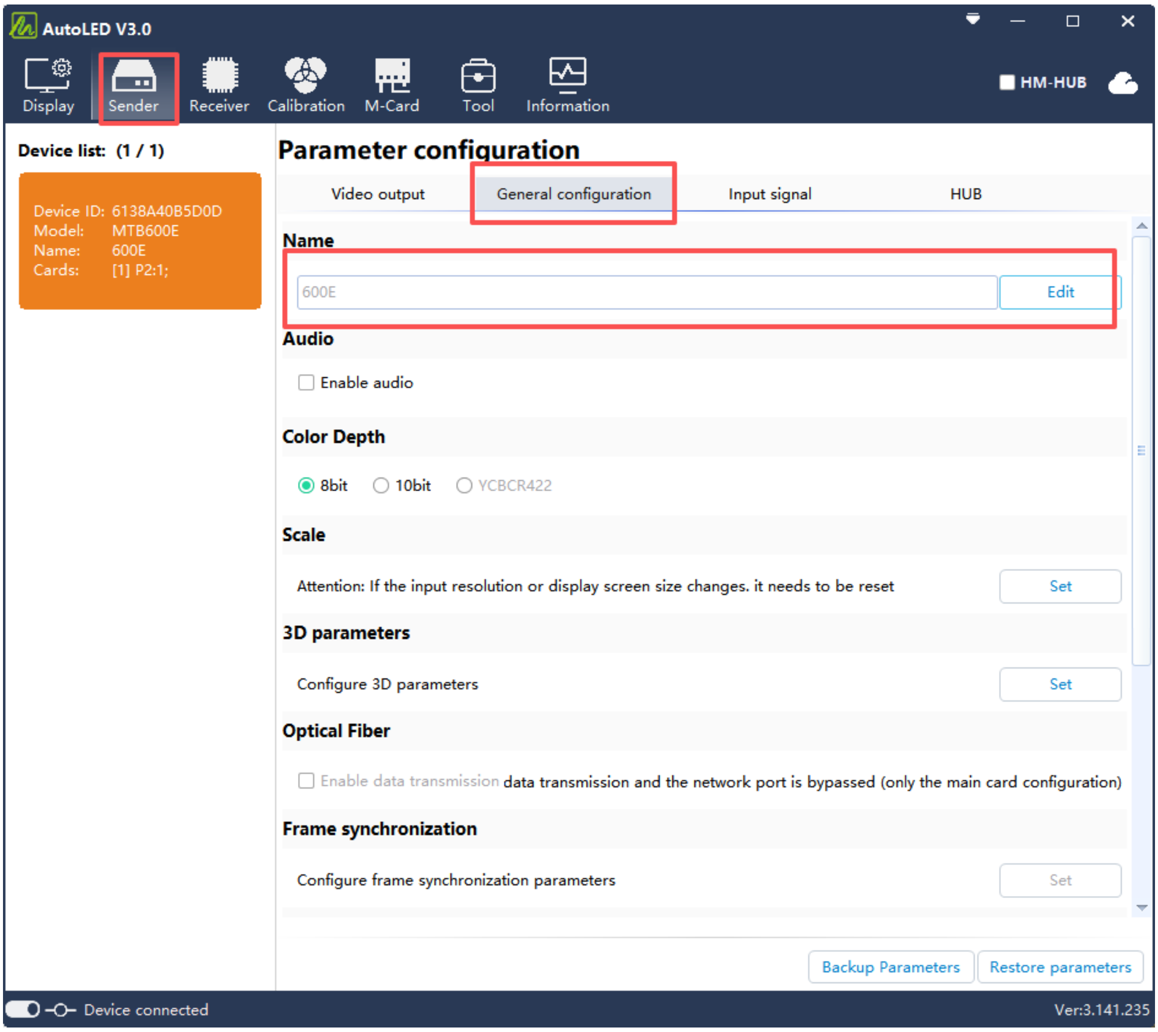
Right-click an empty area of the desktop, select Properties > Settings > Advanced, open the NVIDIA control panel, choose Set up multiple displays, and select Clone mode.

# 4. Screen Configuration

## 4.1 LED Sending Controller Settings

### 4.1.1 Rename an LED Sending Controller

On the Sender page, select General configuration > Name and click Edit. Assigning clear device names makes it easier to identify the correct LED sending controller and send data efficiently when several controllers are commissioned at the same time.




LED sending controller naming

### 4.1.2 Input Resolution and Refresh-Rate Settings (EDID)

The video source and controller input must use the same resolution and refresh rate. A mismatch can cause incorrect scaling, distortion, ghosting, or flicker. Correct it by changing the source output or by editing the input's EDID. Video processors and video-wall processors generally force a fixed output format; in that case, no controller EDID change is normally required, and AutoLED shows the detected resolution in the device-information panel. Edit resolution changes the EDID presented to the source; it does not scale the incoming image. To edit the EDID, select Sender > Input signal, select the required input, click Edit resolution, and enter the horizontal pixels, vertical pixels, and refresh rate required by the source.

**EDID NOTE**

Enable Extended Data when a resolution above 1920 x 1080 at 60 Hz is required or when the EDID must advertise embedded-audio support. Advanced Parameters exposes blanking and synchronization values for custom video formats and should be changed only by qualified Mooncell technical personnel.

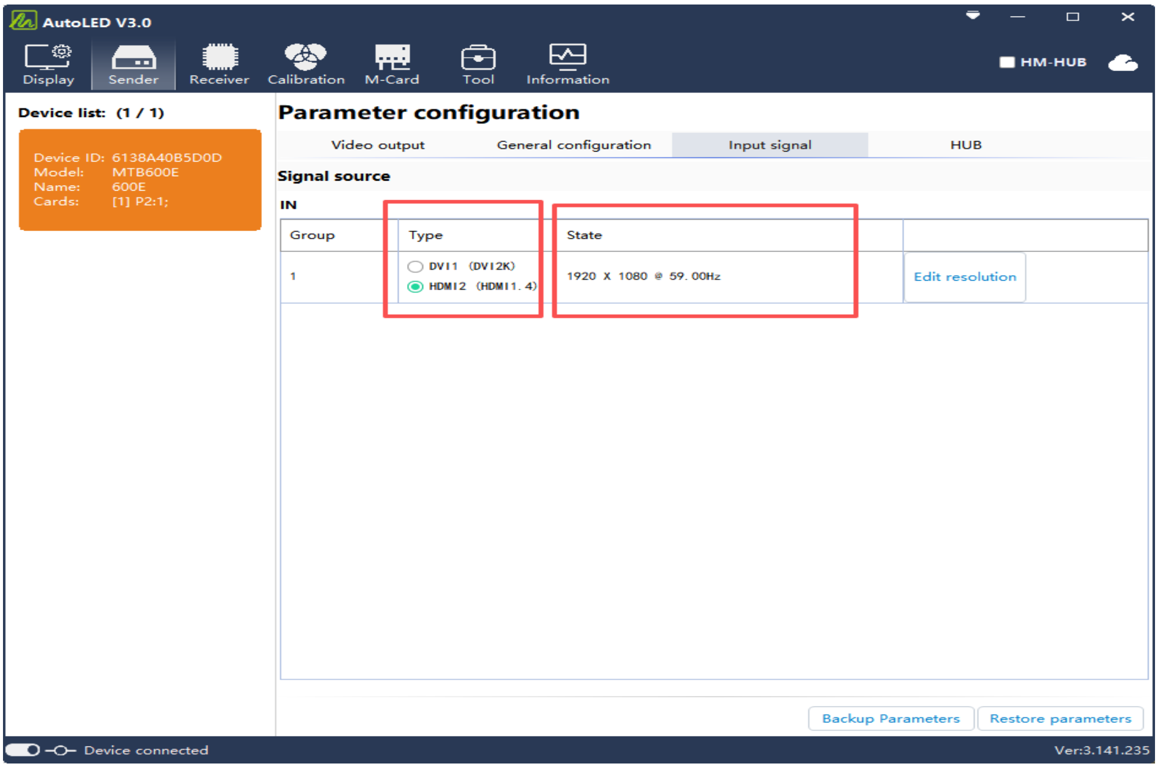



Figure 4-1-1A LED sending controller input-resolution settings

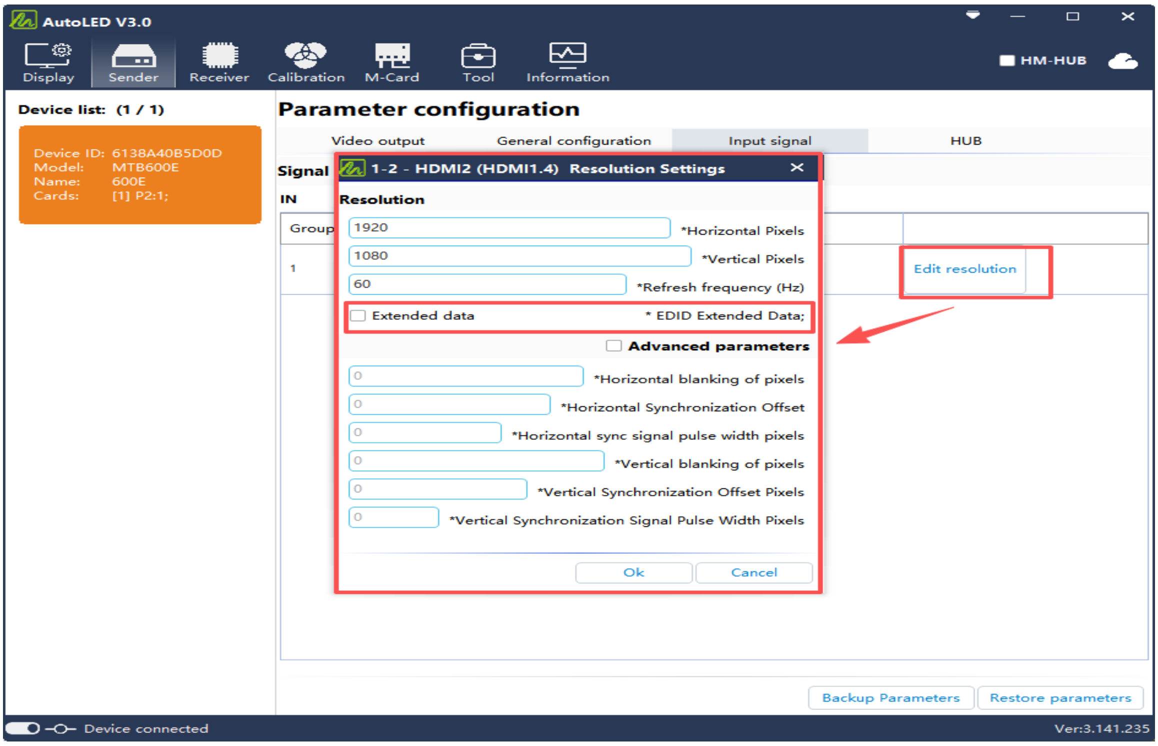



Figure 4-1-1B Custom resolution and EDID settings

### 4.1.3 Limited-to-Full RGB Range Conversion (Supported Devices Only)

On the Sender > Input signal page, click More settings.

Select the checkbox to enable limited-to-full range conversion.

Signal-range behavior (the actual low-gray response depends on the LED display):

### Conversion disabled

- Limited-range RGB input -> limited-range RGB output; visible grayscale begins at code value 16.
- Full-range RGB input -> full-range RGB output; visible grayscale begins at code value 1.
- YUV 4:2:2 or YUV 4:4:4 input -> limited-range RGB output; visible grayscale begins at code value 16.

### Conversion enabled

- Limited-range RGB input -> full-range RGB output; visible grayscale begins at code value 1.
- Full-range RGB input -> full-range RGB output; visible grayscale begins at code value 16.
- YUV 4:2:2 or YUV 4:4:4 input -> full-range RGB output; visible grayscale begins at code value 1.

## 4.1.4 Image Cropping and Multi-Controller Splicing

On Sender > Video output, set the Image Clipping region to define the portion of the source displayed by each controller. The default start coordinate is (0, 0). Other output positions are calculated automatically from the screen-connection layout, or can be entered manually to splice the images of multiple LED sending controllers. Settings on this page are applied and saved to hardware when sent, as shown in Figure 4-1-2.

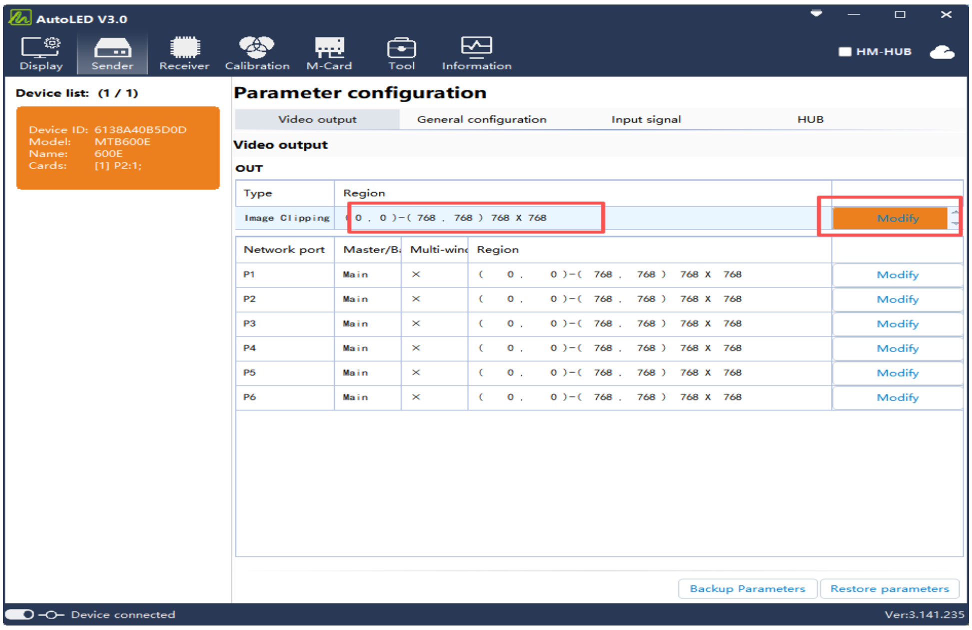



Figure 4-1-2 Output position and source-cropping settings

> **LOAD-CAPACITY LIMIT**
>
> When multiple LED sending controllers are used for image splicing, the configured pixel count (horizontal pixels x vertical pixels) for each controller must remain within that controller's load capacity.

## 4.1.5 Enable Audio Transmission

Connect audio from the source device to the audio input of the LED sending controller. Audio is transported over the Gigabit Ethernet link and output through the multifunction card's audio connector. After verifying the hardware connection, enable audio under Sender > General configuration, then connect the multifunction-card audio output to the amplifier or other downstream audio equipment.

## 4.1.6 Input Bit Depth and Color Format

Under Color Depth, AutoLED provides 8-bit, 10-bit, and YCbCr 4:2:2 selections, as shown in Figure 4-1-3. The 8-bit and 10-bit selections specify input bit depth; YCbCr 4:2:2 specifies the input color-sampling format. YCbCr 4:2:2 is available only on supported hardware revisions running compatible firmware. A disabled option indicates that the connected hardware or firmware does not support that selection.

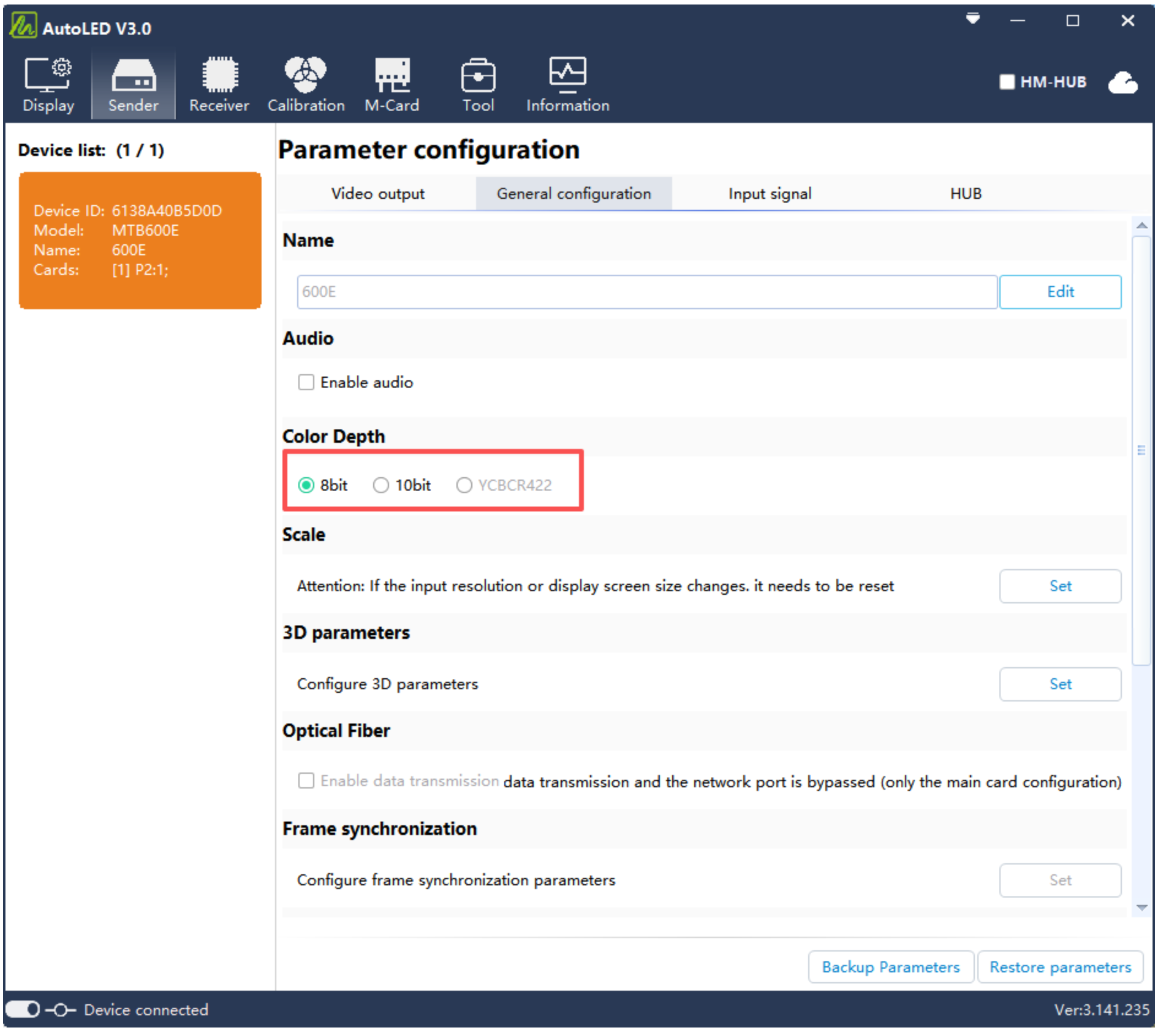



Figure 4-1-3 Input bit-depth and color-format selection

### 4.1.7 3D Parameters

The 3D Parameters page provides image-mode, SYNC-OUT polarity, and SYNC-OUT delay settings. Connected devices may require different synchronization polarities. When two or more devices require opposite SYNC-OUT polarities, invert the polarity as needed to maintain correct frame synchronization between the devices.

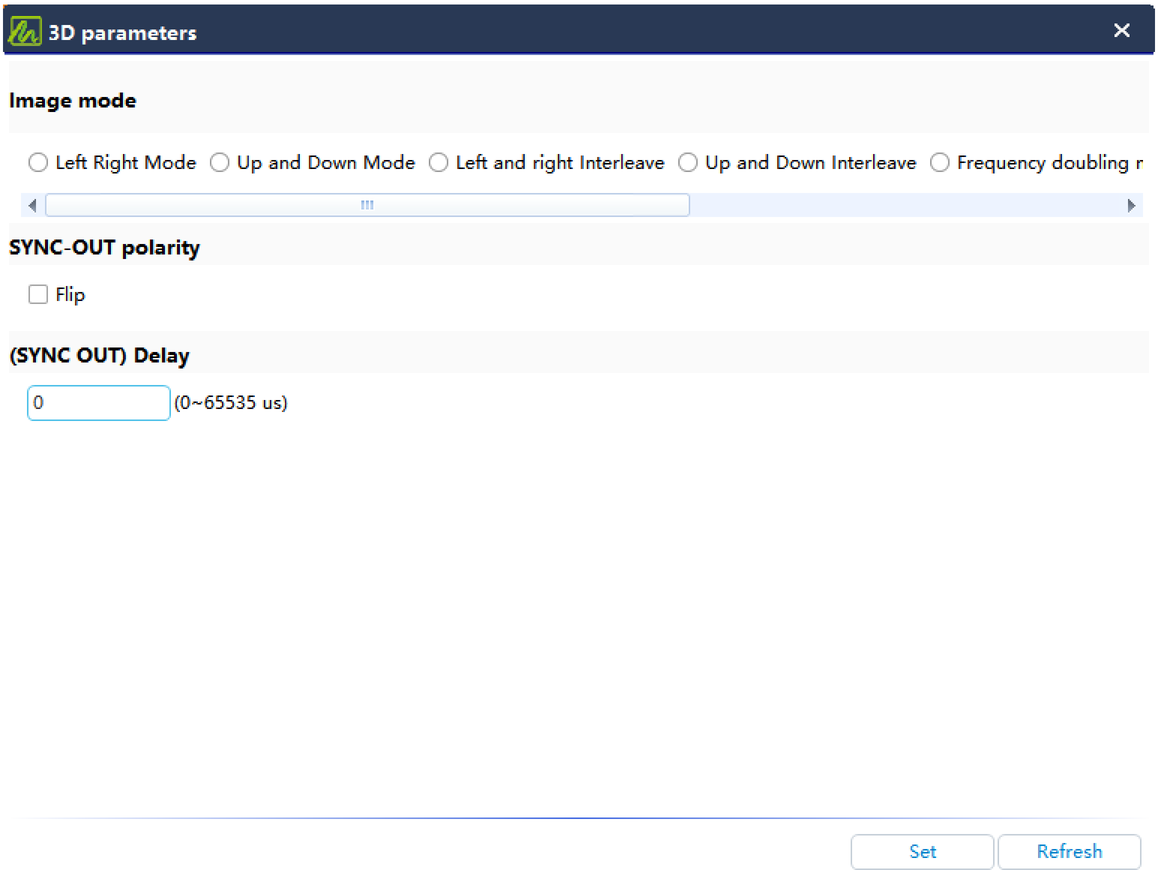



Figure 4-1-3A 3D synchronization parameters

### 4.1.8 All-in-One Video Processor

**Connection:** With USB, AutoLED detects the all-in-one video processor directly. For 100 Mbps Ethernet communication, enable the network switch at the lower-left corner of AutoLED, as shown in Figure 4-1-4. Both a direct Ethernet connection and a same-subnet LAN connection are supported. A device can communicate with only one PC at a time.

After connecting the all-in-one video processor, select Sender > Input signal, as shown in Figure 4-1-5. To change the input resolution and refresh rate, select the input, click Edit resolution, enter the horizontal pixels, vertical pixels, and refresh rate, then click OK, as shown in Figure 4-1-6. To change the output crop, select Sender > Video output, choose Image Clipping, and enter the horizontal offset, vertical offset, image width, and image height. To change the image offset for an Ethernet output, select the port number, click Modify, and enter its horizontal and vertical offsets, as shown in Figure 4-1-7.

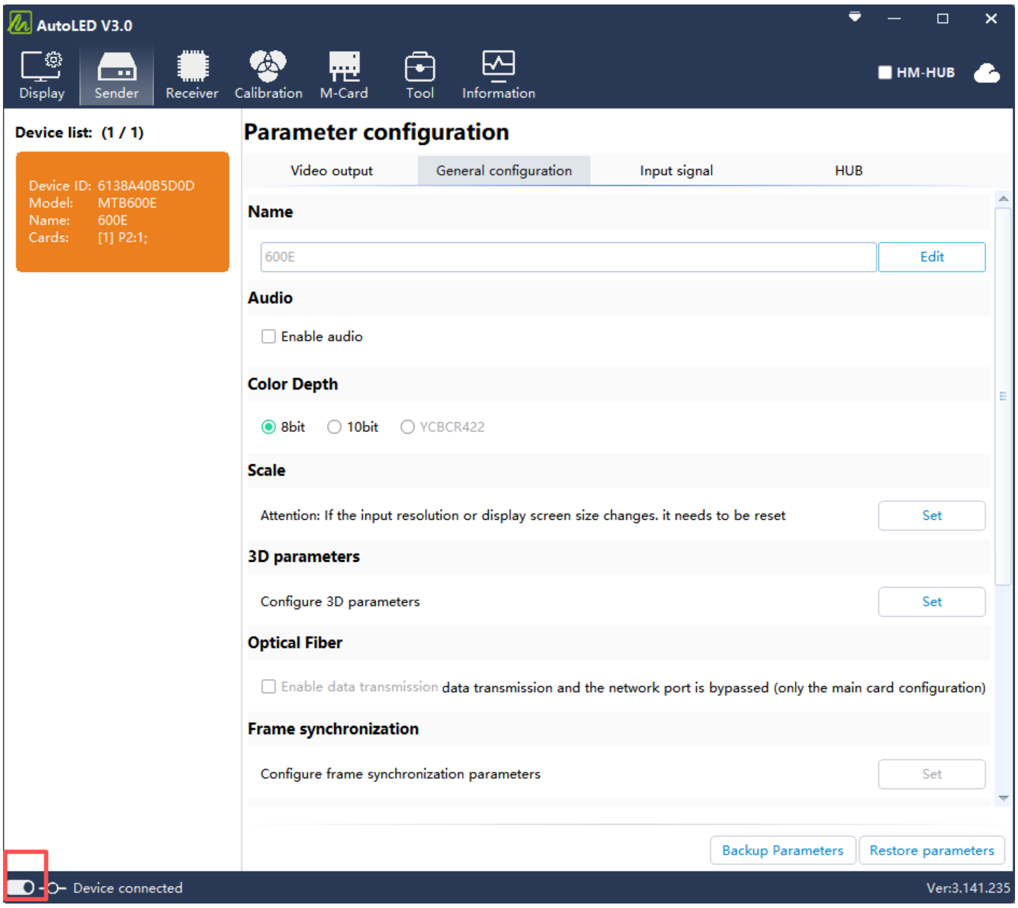



Figure 4-1-4 Connecting an all-in-one video processor

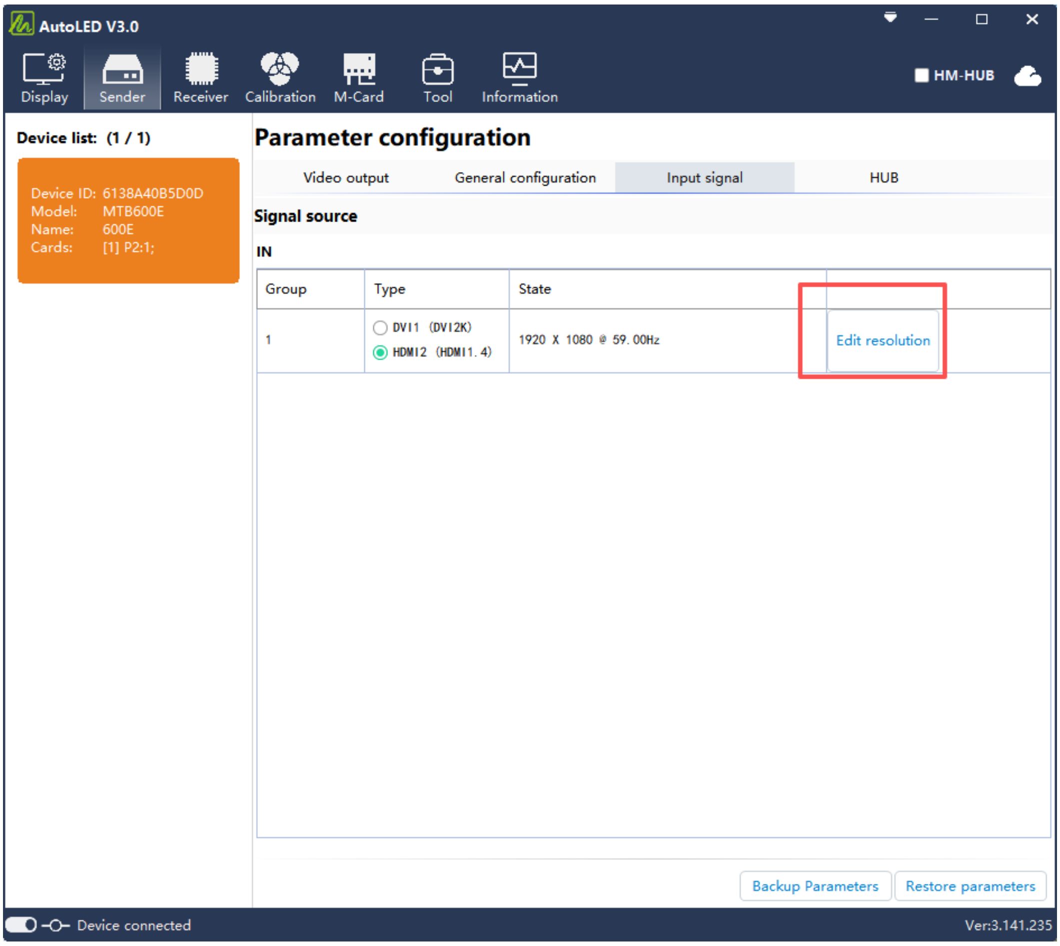



Figure 4-1-5 Input-signal settings

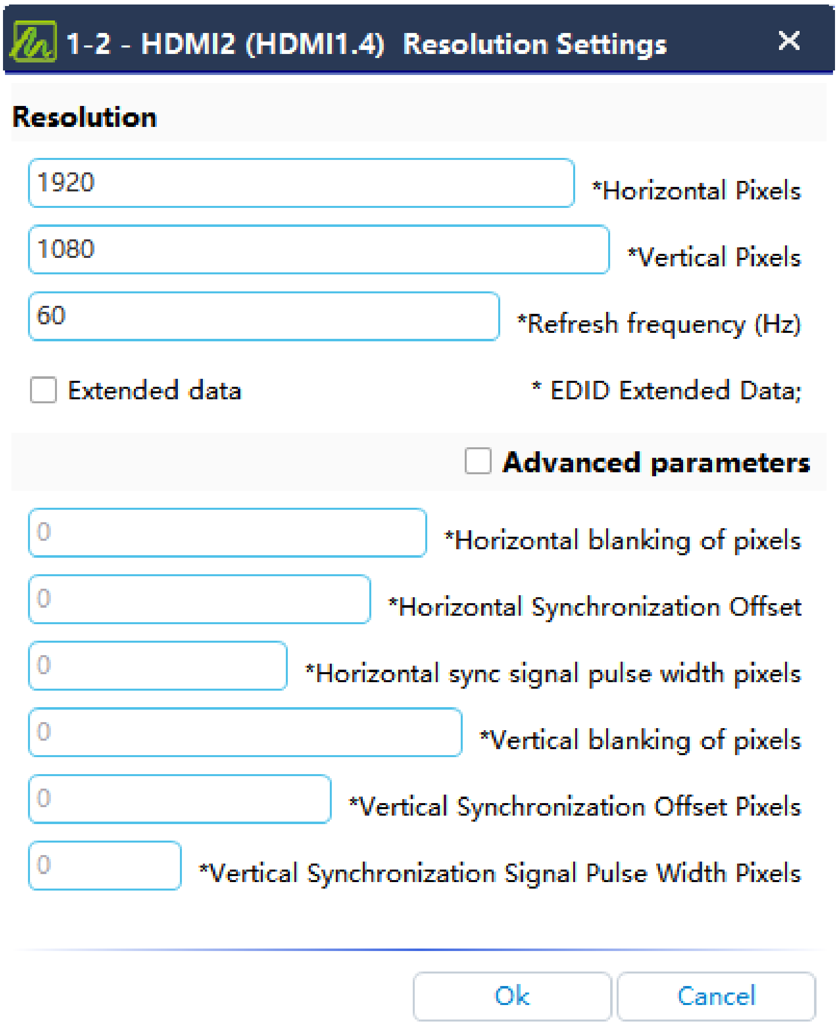



Figure 4-1-6 Setting the input resolution and refresh rate

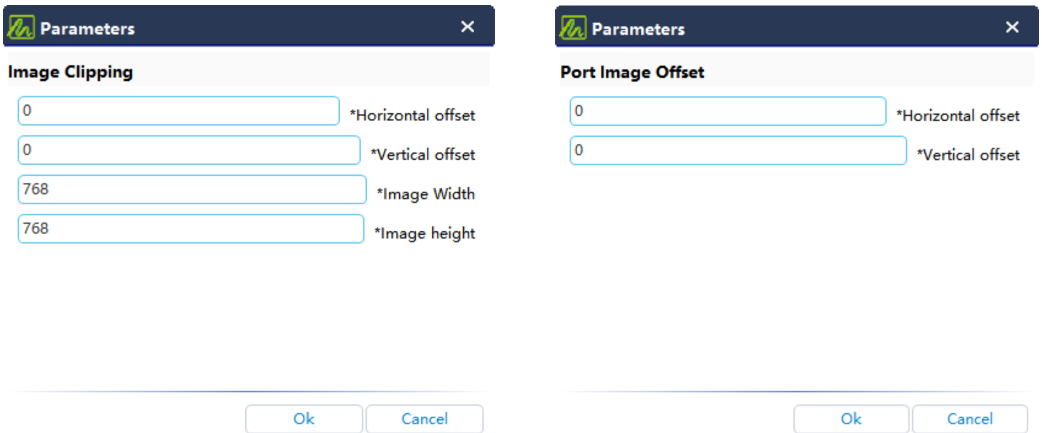



Figure 4-1-7 Image cropping and Ethernet-output image offsets

### 4.1.9 General Configuration for an All-in-One Video Processor

Select Sender > General configuration to rename the device, enable or disable audio, and select the input bit depth or color format, as shown in Figure 4-1-8.

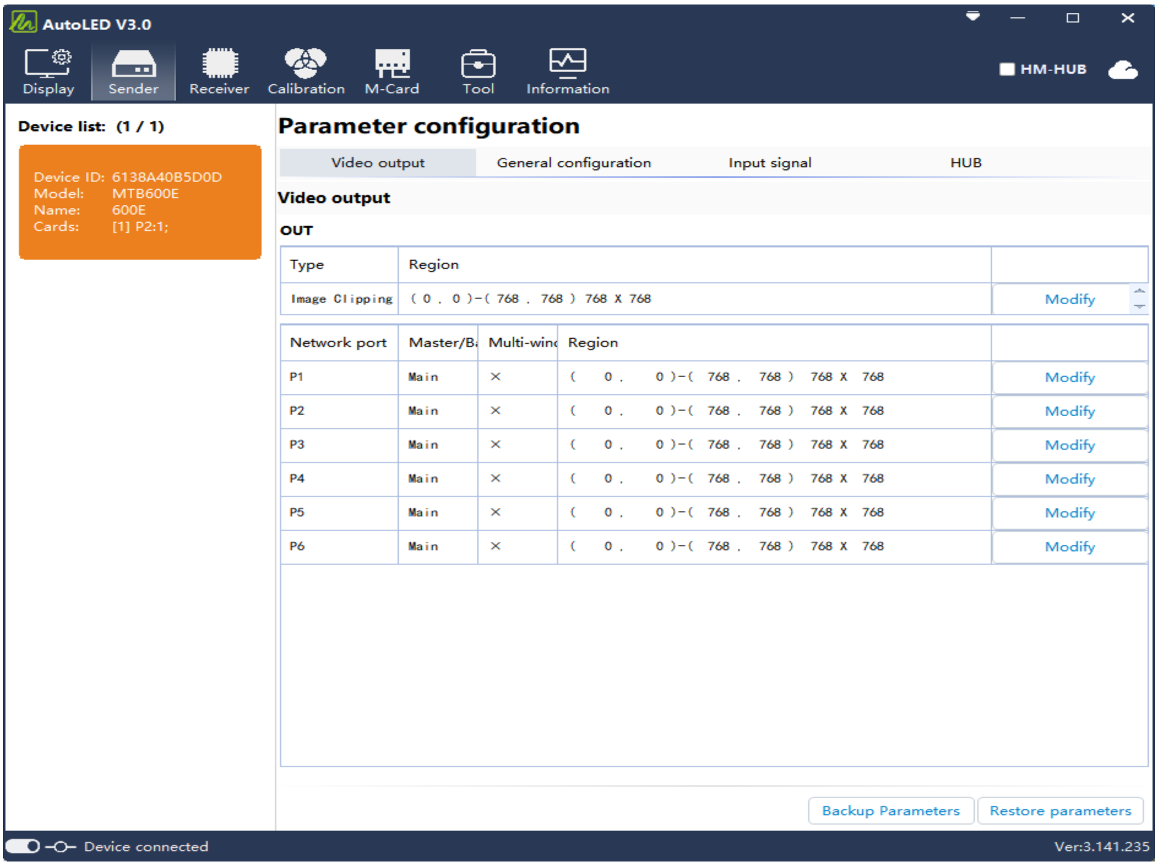



Figure 4-1-8 General configuration

### 4.1.10 Canvas and Image-Splicing Mode

As shown in Figure 4-1-9, enable Automatically Create Scene During Commissioning to create a scene automatically when a screen-connection file is sent. The default scene number is 1. If the option is disabled, no scene is created.

**Window creation mode:** Select Crop for pixel-to-pixel source cropping, or Full Screen to scale the complete source into the output canvas.

**Scene:** Select a scene number and choose Recall and Set as Default to recall it immediately and make it the startup scene. Select Edit to configure the chosen scene. See Section 4.1.11 for details.

**Canvas settings:** Click Modify to set the output canvas width, height, and refresh rate, as shown in Figure 4-1-10.

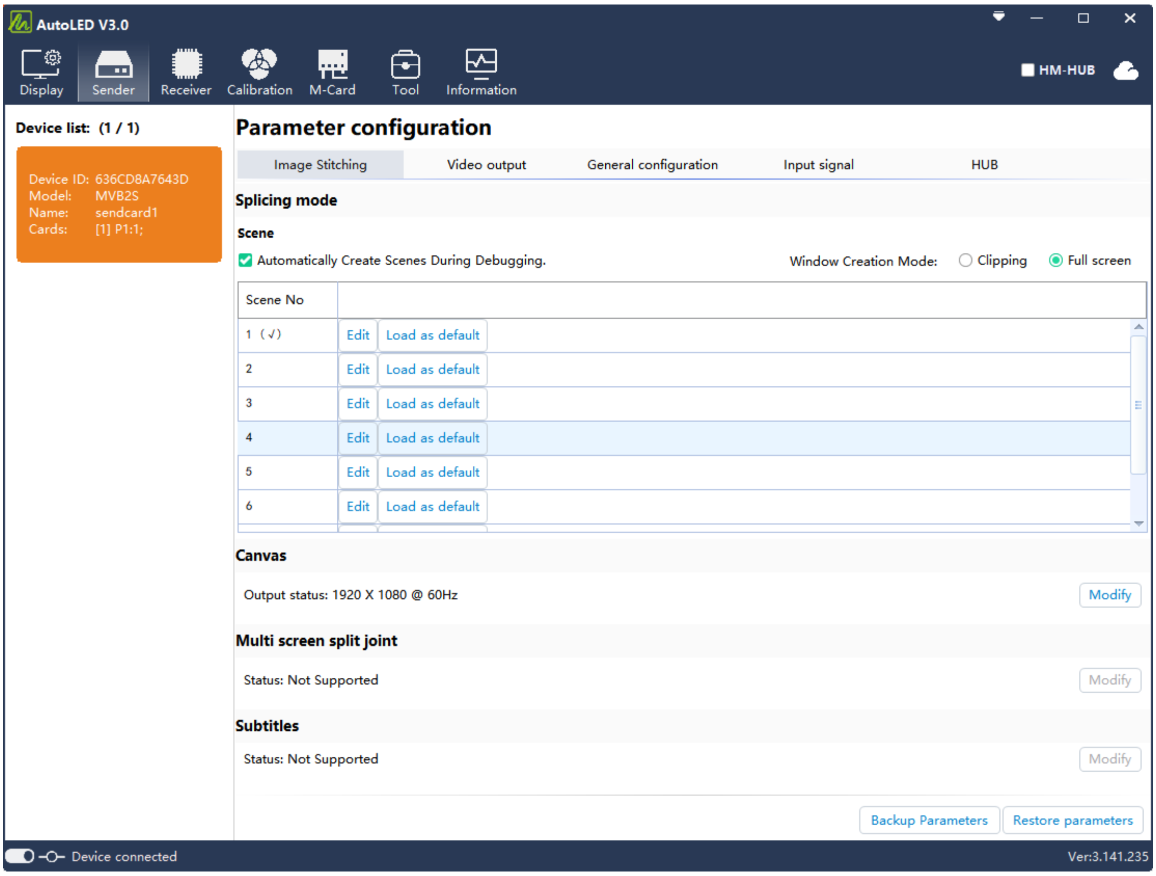



Figure 4-1-9 Canvas and image-splicing mode

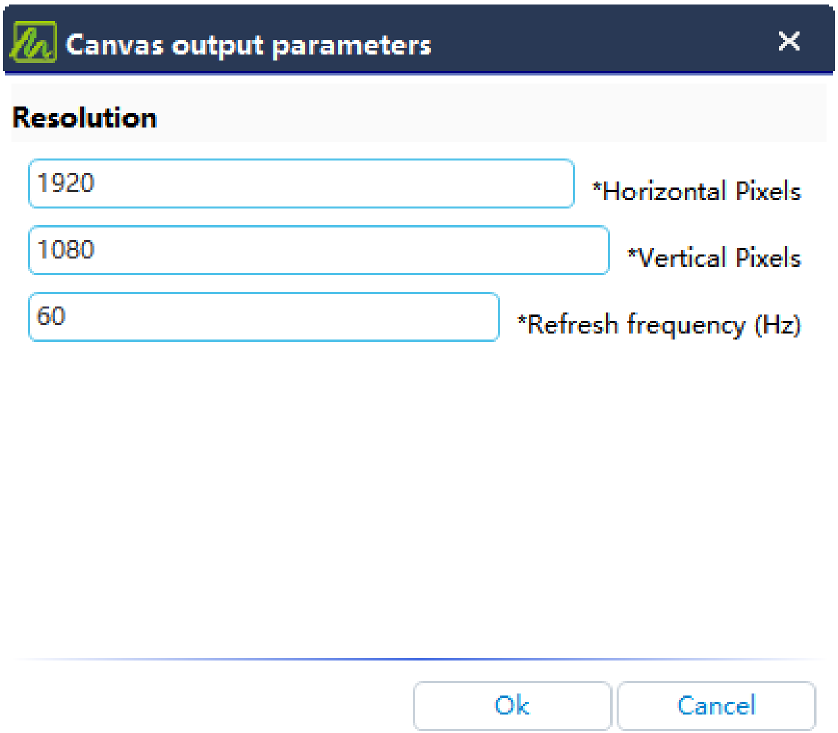



Figure 4-1-10 Canvas output parameters

### 4.1.11 Scene Configuration

As shown in Figure 4-1-11, select an input source at the upper-left, then click and drag on the canvas to create a window. When editing is complete, click Save and then Send to apply the scene to the device.

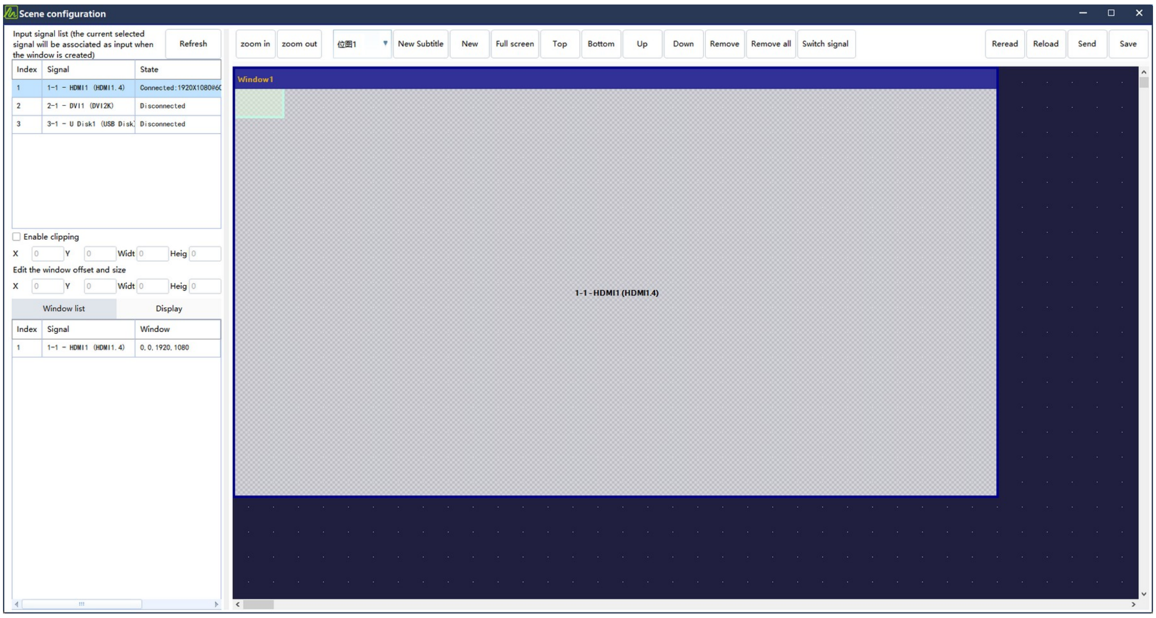


Figure 4-1-11 Scene configuration

- **Enable Crop:** Crops the selected window from its video source.
- **Edit Window:** Changes the size and position of the selected window.
- **Zoom In / Zoom Out:** Changes the display scale of the window-layout and screen-connection workspaces in AutoLED without changing the hardware output.
- **New:** Creates a new window using the currently selected input source. The default position is the upper-left corner.
- **Full Screen:** Expands the selected window to fill the entire canvas.
- **Bring to Front / Send to Back:** Moves the selected window to the top or bottom of the layer stack.
- **Move Up / Move Down:** Moves the selected window one level at a time in the layer stack.
- **Delete / Delete All:** Deletes the selected window or all windows.
- **Switch Source:** Select a window and an input source, then click Switch Source to assign the selected input to that window.
- **Read Back Windows:** Reads the active, unsaved window configuration from the hardware.
- **Reload Windows:** Restores the window data previously saved in the current scene.
- **Send:** Sends the window configuration from AutoLED to the hardware for immediate display.
- **Save:** Stores the window configuration in the selected hardware scene preset.

## 4.2 Standard Screen Configuration

### 4.2.1 Smart Setting

Click Standard Screen Configuration on the AutoLED home page to open the Receiver Card Configuration window. Click Smart Setting at the lower-left to open the intelligent pixel-mapping wizard, then enter the parameters for the connected LED module, as shown in Figure 4-2-1.

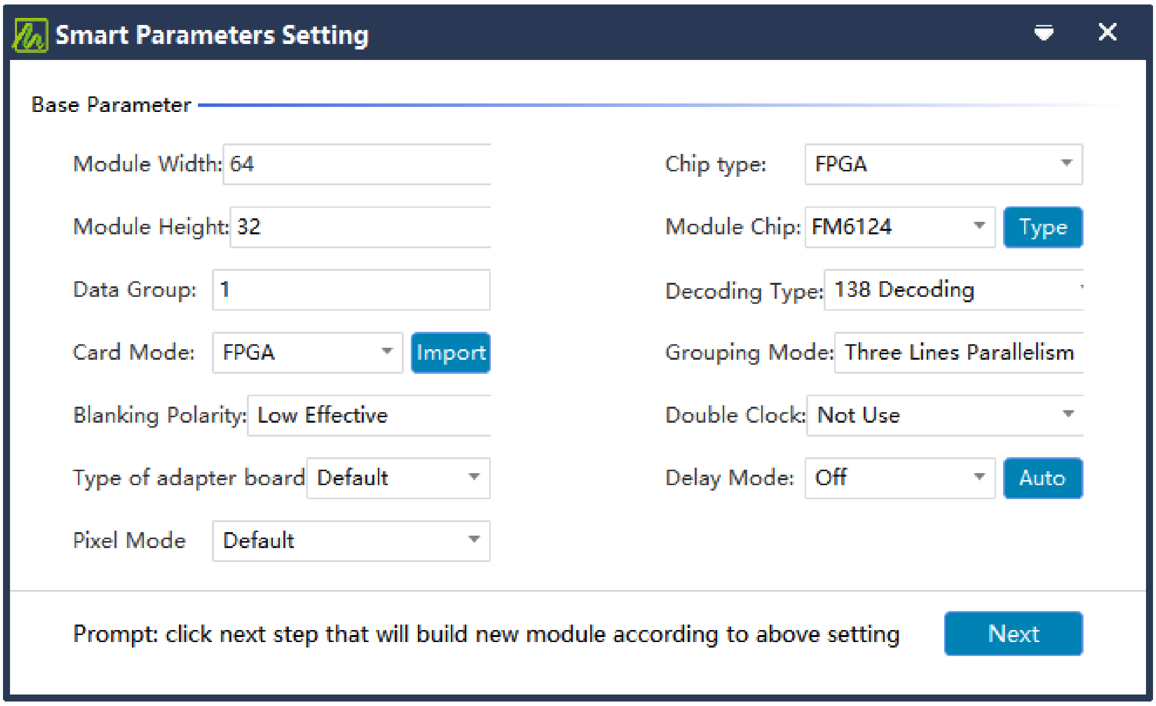



Figure 4-2-1 Smart Setting - module parameters

- **Module Width / Height:** Enter the LED module resolution in pixels (width and height).
- **Number of Data Groups:** Inspect the module input-connector pinout and determine the number of independent RGB data groups. Three-line parallel data normally uses one R/G/B set per group; for example, a module with two RGB sets uses two data groups.
- **Receiver-Card Type:** Select the receiver-card model used for commissioning. The model is printed on the card.
- **OE Polarity:** Select Active Low or Active High. Use the default unless the module design requires otherwise.
- **Receiver-Card Platform:** Select T6 or FPGA according to the receiver-card hardware.
- **Driver IC:** Select the driver-IC model used by the LED module.
- **Row-Decoding Method:** Select the decoding method used by the LED module.
- **Data Grouping:** Inspect the module input pinout. Select Three-Line Parallel when separate R, G, and B data signals drive separate, non-cascaded color-channel IC chains. Select RGB Serial when a single color-data signal, or a single R-data signal on a full-color module, drives serially cascaded red, green, and blue channels.
- **Dual Clock:** For dual-clock modules, select D, E, or F as the second clock signal. Leave this disabled for standard single-clock modules.
- **Low-Latency Mode:** Select On to enable the receiver card's low-latency processing mode; select Off to disable it.

Click Next to open the Scan Lines page. Select the scan ratio (number of scan rows) that matches the LED module, as shown in Figure 4-2-2.

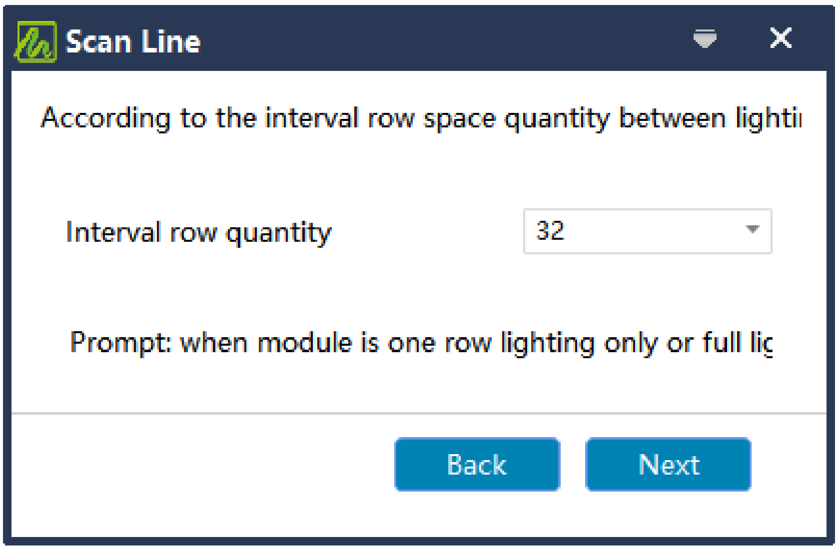



Figure 4-2-2 Smart Setting - scan-line selection

Click Next to open the Data-Line Color page. Select States 1 through 3 in turn and choose the color shown by the LED module for each state, as shown in Figure 4-2-3.

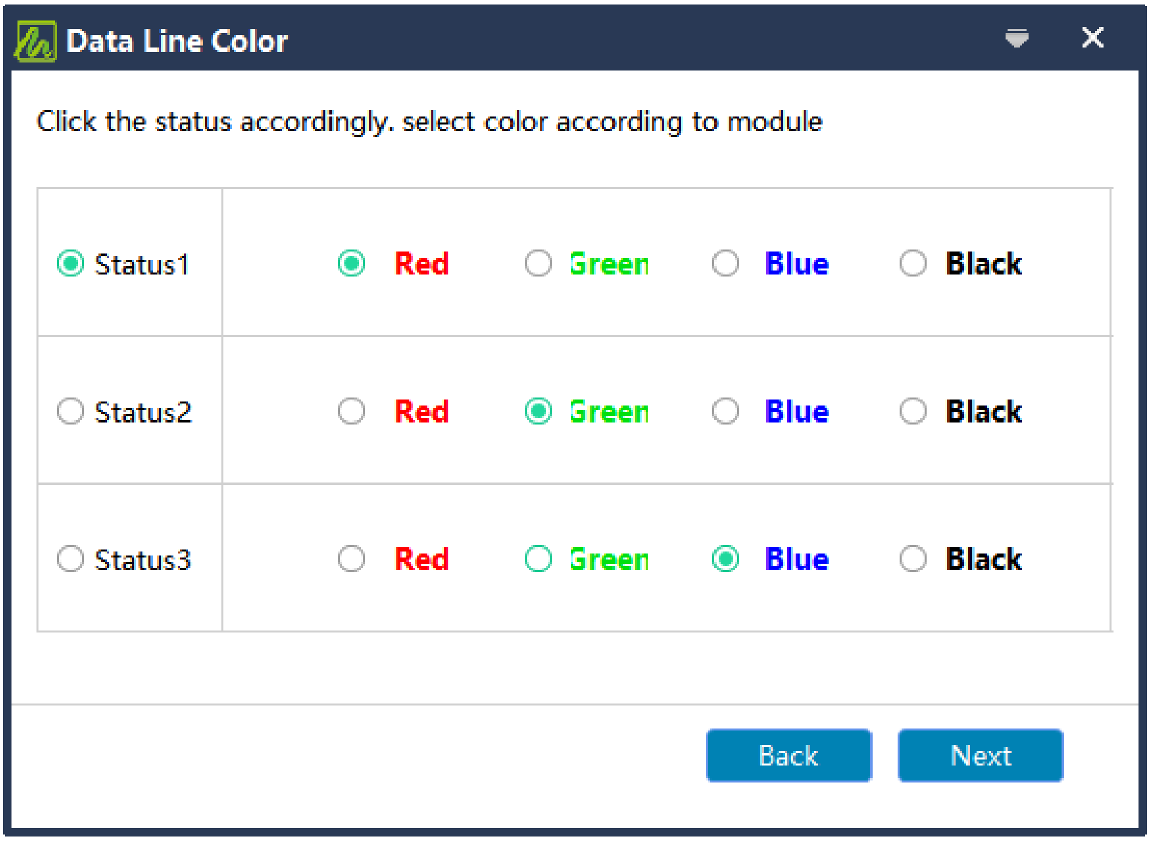



Figure 4-2-3 Smart Setting - data-line color identification

Click Next to begin pixel mapping. Follow the actual flashing-pixel sequence on the module. If no pixel flashes, connect the module to the receiver card's first data-group connector, set the data-line selection to All Connectors, or insert dummy pixels where required by the module design. When the wizard reports completion, click Finish, click Complete Pixel Mapping, and send the resulting data to the device, as shown in Figure 4-2-4.

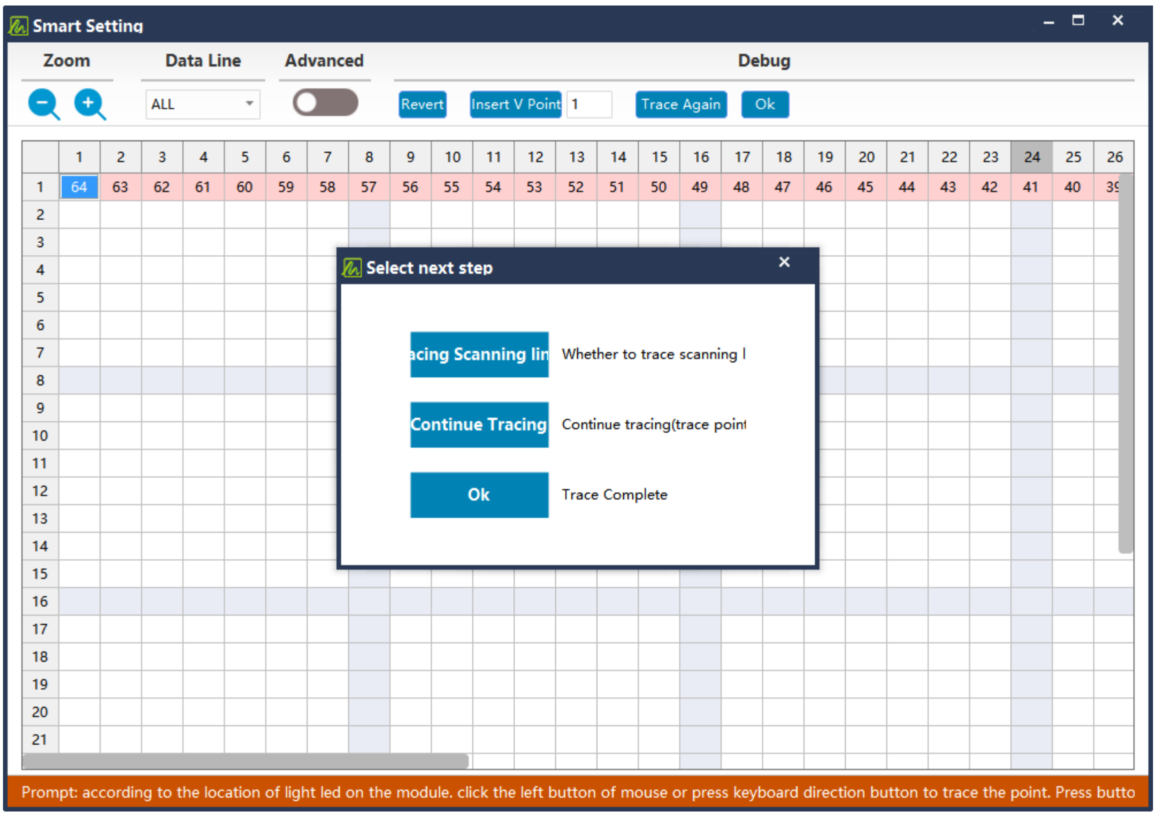



Figure 4-2-4 Smart Setting - pixel mapping complete

### 4.2.2 Receiver-Card Configuration

Open Receiver-Card Configuration after completing Smart Setting, loading a predefined module file with Select Module for a T6 or FPGA receiver, or loading a saved cabinet/module configuration with Open Configuration, as shown in Figure 4-2-5.

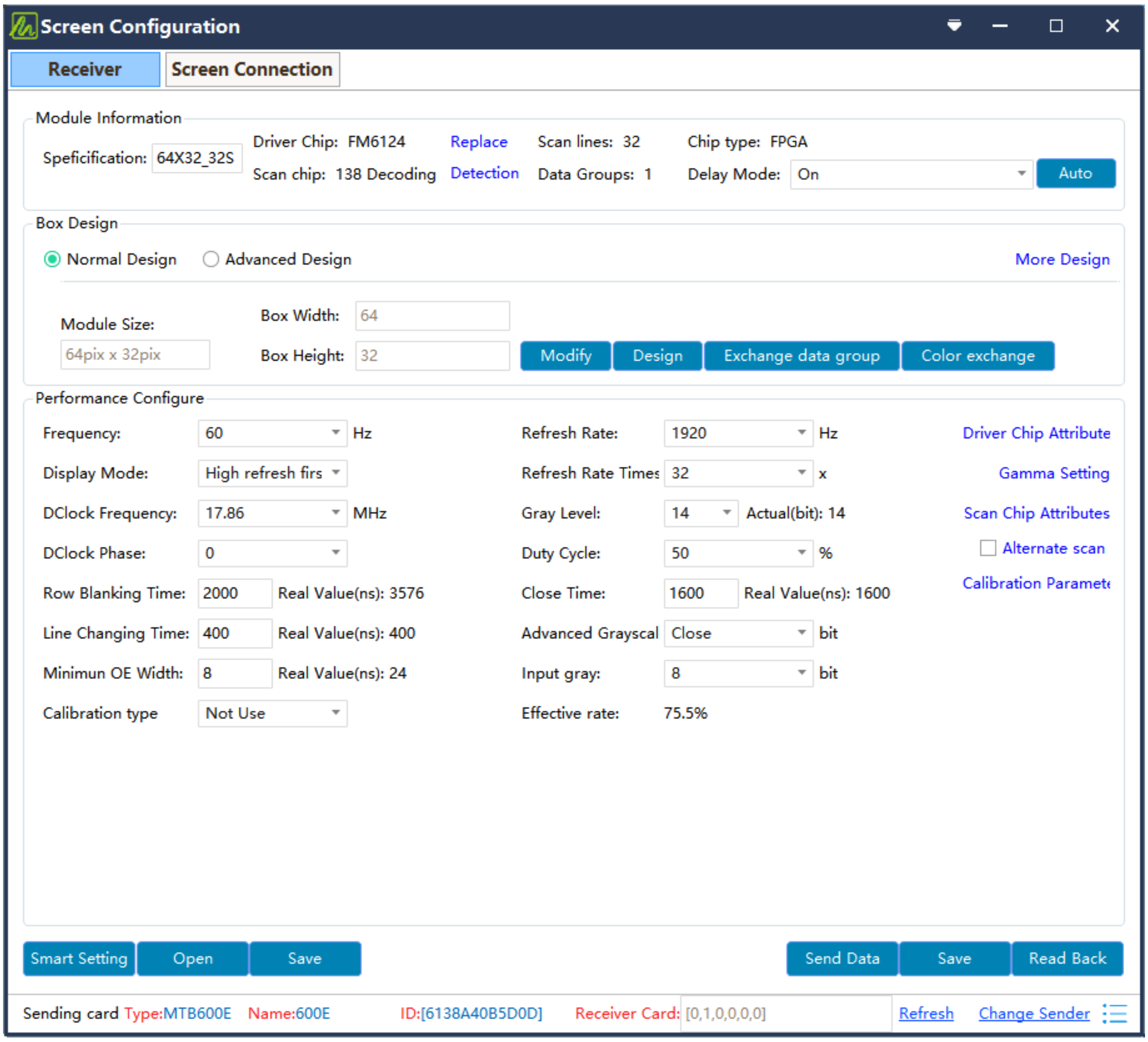



Figure 4-2-5 Receiver-card parameter configuration

Under Cabinet Design, select Standard Design and click Modify. Enter the cabinet pixel width and height driven by one receiver card, the ribbon-cable cascade direction, and the required split-output mode, as shown in Figure 4-2-6.

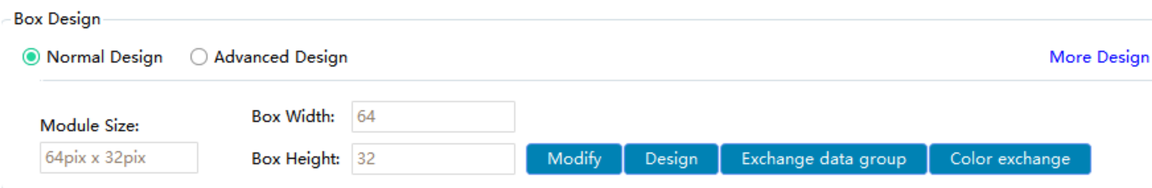



Figure 4-2-6 Standard cabinet design

**Split-Output Mode:** Two-way, three-way, and four-way split outputs are available. Splitting the data path can improve receiver-card utilization and support a higher refresh rate. The following examples assume that modules cascade from right to left.

- **No Split:** All module data is carried as one continuous vertical data column.
- **2-Way Split:** The data path is divided into two columns with equal load width and height.
- **3-Way Split:** The data path is divided into three columns with equal load width and height.
- **4-Way Split:** The data path is divided into four columns with equal load width and height.

**Complex cabinet construction:** Select Advanced Design under Cabinet Design, then click Advanced Layout to open the cabinet-layout editor and build a non-standard cabinet, as shown in Figure 4-2-7.


Figure 4-2-7 Advanced cabinet design

If the driver IC or row-decoding method is incorrect under Cabinet Basic Information, click Replace. Enable Driver IC and/or Decoding Method, perform a fuzzy search, select the correct result, and click OK.

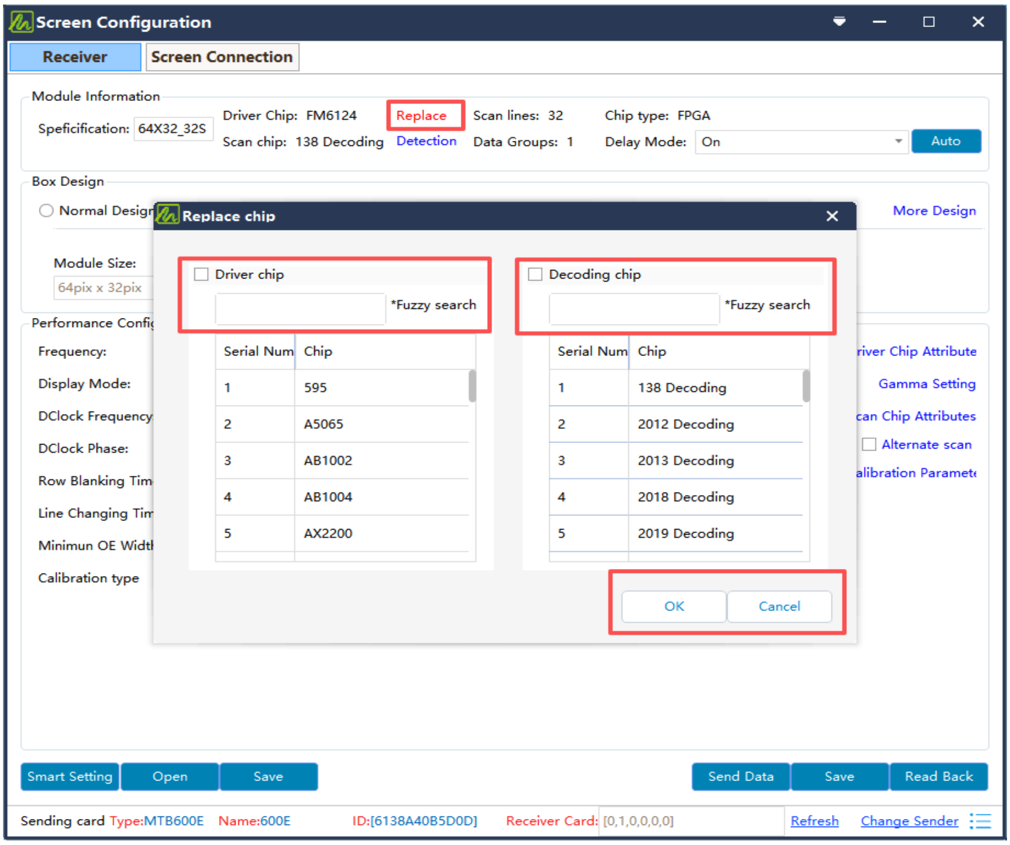



Figure 4-2-7A Driver IC and row-decoding replacement

**Module Processing:** Click Convert in the Edit area, select the required modules, and apply stretch, rotation, mirror, alignment, or crop operations, as shown in Figure 4-2-8.

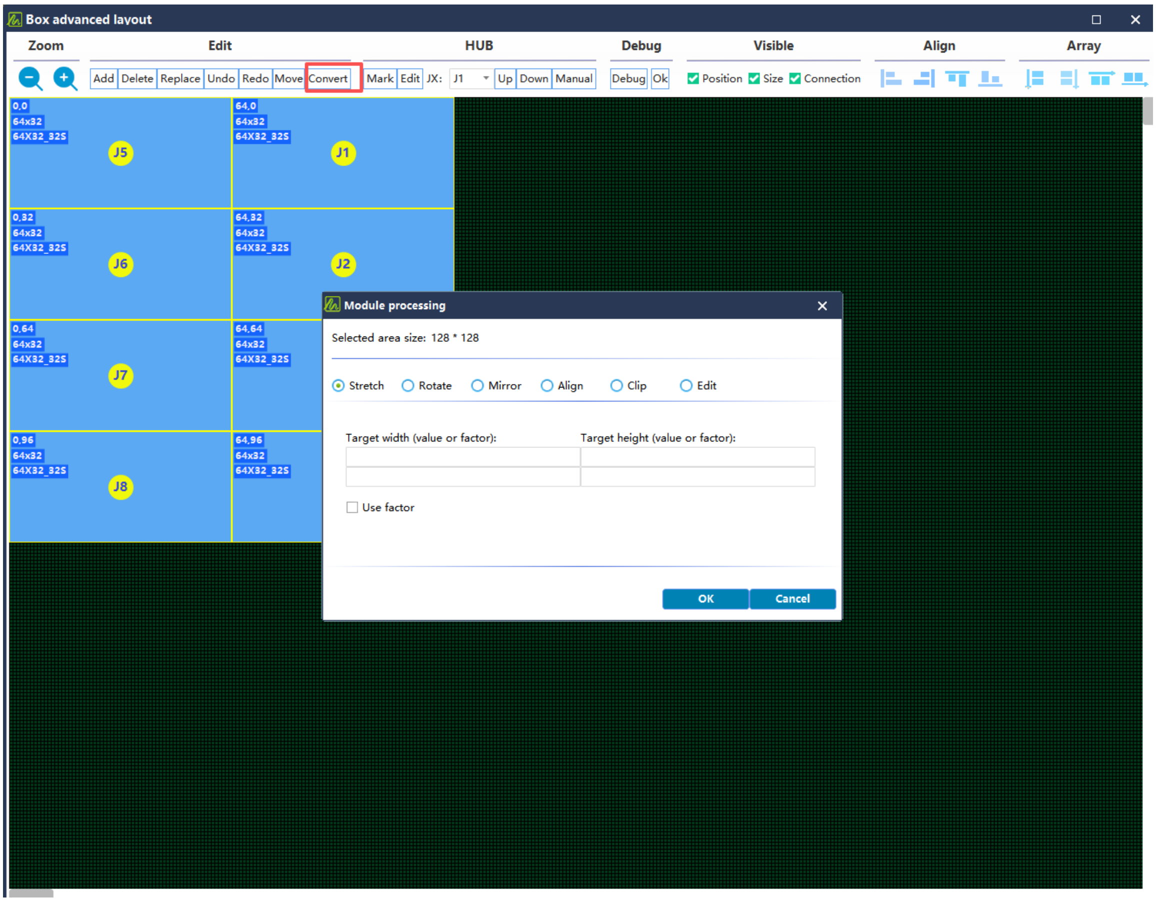



Figure 4-2-8 Module processing

**Module Marking:** Under HUB, click Mark, enter the number of virtual connectors (HUB outputs) and the number of serially connected modules, then click Mark in the Module Marking area. Specify an Ethernet output or receiver card to display module markers, as shown in Figure 4-2-9.

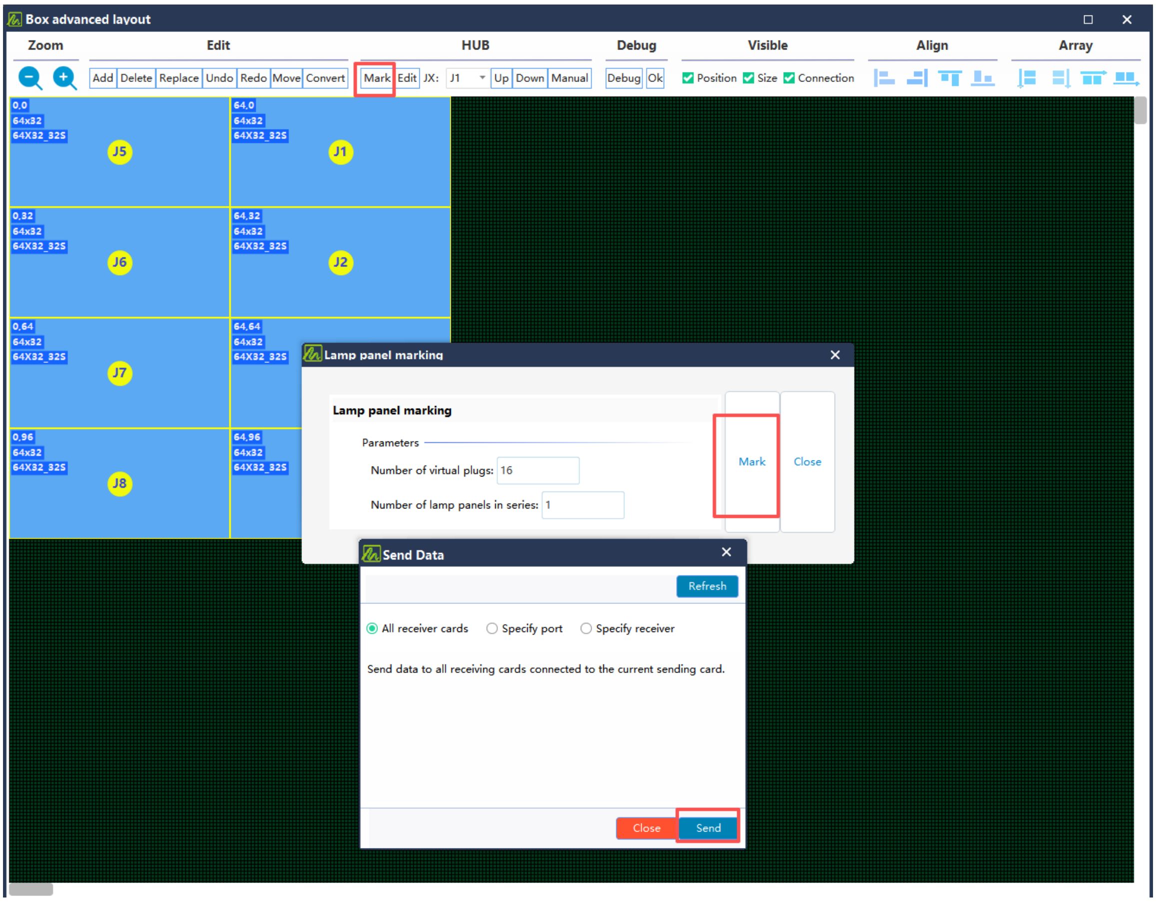



Figure 4-2-9 Module marking

**Swap HUB Outputs:** Select the module and change its assigned HUB output to match the physical connection, or move modules to exchange their assignments.

**Swap Data Lines:** Under HUB, click Edit to open the Data Address Editor. Enable Data-Line Output Test and identify the physical HUB output in the Jx column. Change its address in Swap Address until the color displayed by the cabinet matches the color in the corresponding Address row and the HUB output matches the module-layout position. Repeat until every HUB/data-line address is defined, disable Data-Line Test, and click Finish.

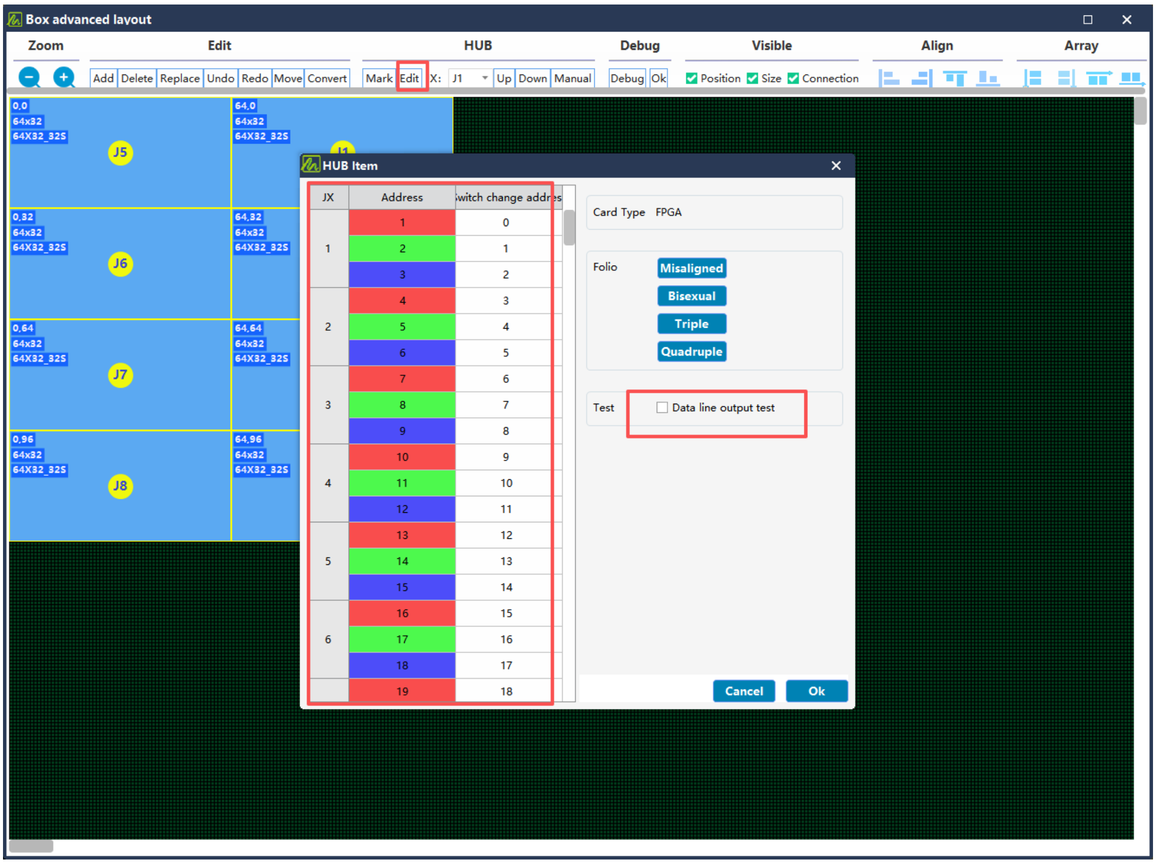



Figure 4-2-9A HUB data-line mapping editor

After the receiver-card load width and height are entered, AutoLED calculates performance parameters automatically. If the display result is not satisfactory, adjust the parameters manually, as shown in Figure 4-2-9B.

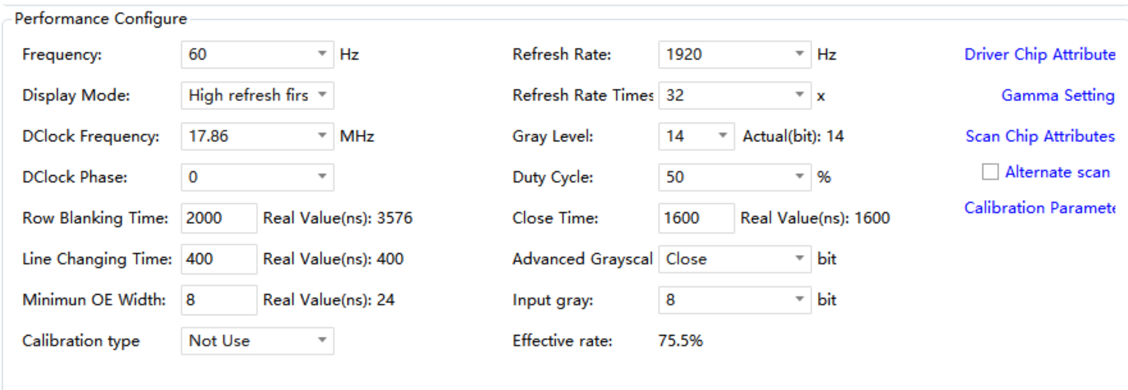



Figure 4-2-9B Receiver-card performance parameters

- **Refresh Rate:** A key display-quality parameter. Increasing refresh rate reduces rolling bands or water-ripple artifacts when the LED display is recorded by a camera.
- **Display Priority:** Refresh Priority sacrifices some effective brightness to achieve a substantially higher module refresh rate. Grayscale Priority preserves better low-brightness grayscale performance.
- **Refresh-Rate Multiplier (Refresh Rate Times):** Multiplies the internal refresh cycle to increase the effective display refresh rate. The default value is 16.
- **Data-Clock Frequency:** The maximum reliable clock depends on the LED module circuit and driver IC. A well-designed high-refresh module can operate at a higher data clock and therefore support greater grayscale depth and refresh rate at the same pixel load.
- **Grayscale Bit Depth (Gray Level):** Select the required grayscale depth. Higher bit depth improves tonal detail and low-brightness image quality. Typical values are 12 to 14 bits; 12-bit grayscale provides 4,096 levels.
- **Data-Clock Phase (DClock Phase):** Shifts the sampling phase of the data clock. Adjust it only when troubleshooting flashing pixels, corrupted image data, or other data-capture errors; otherwise retain the default. The 12.5 to 17.86 MHz range applies to DClock Frequency, not DClock Phase.

- **Data-Clock Duty Cycle:** Sets the high-to-low ratio of the data clock. A 50% duty cycle is typical; adjust it only when required to maintain reliable operation at a higher data-clock frequency.
- **Row-Transition Parameters:** Row Blanking Time, Close Time, and Line Changing Time control the blanking interval and the transition between scan rows. Increase the relevant blanking or line-change value if severe ghosting persists; otherwise retain the defaults.
- **Minimum OE Pulse Width:** Sets the shortest Output Enable (OE) pulse. Reducing it may permit a higher refresh rate, but an excessively small value can cause low-grayscale color shift.

**Gamma Configuration:** Gamma describes the relationship between the input signal and displayed luminance. Adjust Gamma as required; the default is 2.8. You may edit a custom gamma curve or load an external gamma table, as shown in Figure 4-2-10. Click Send to apply the result to the receiver card.

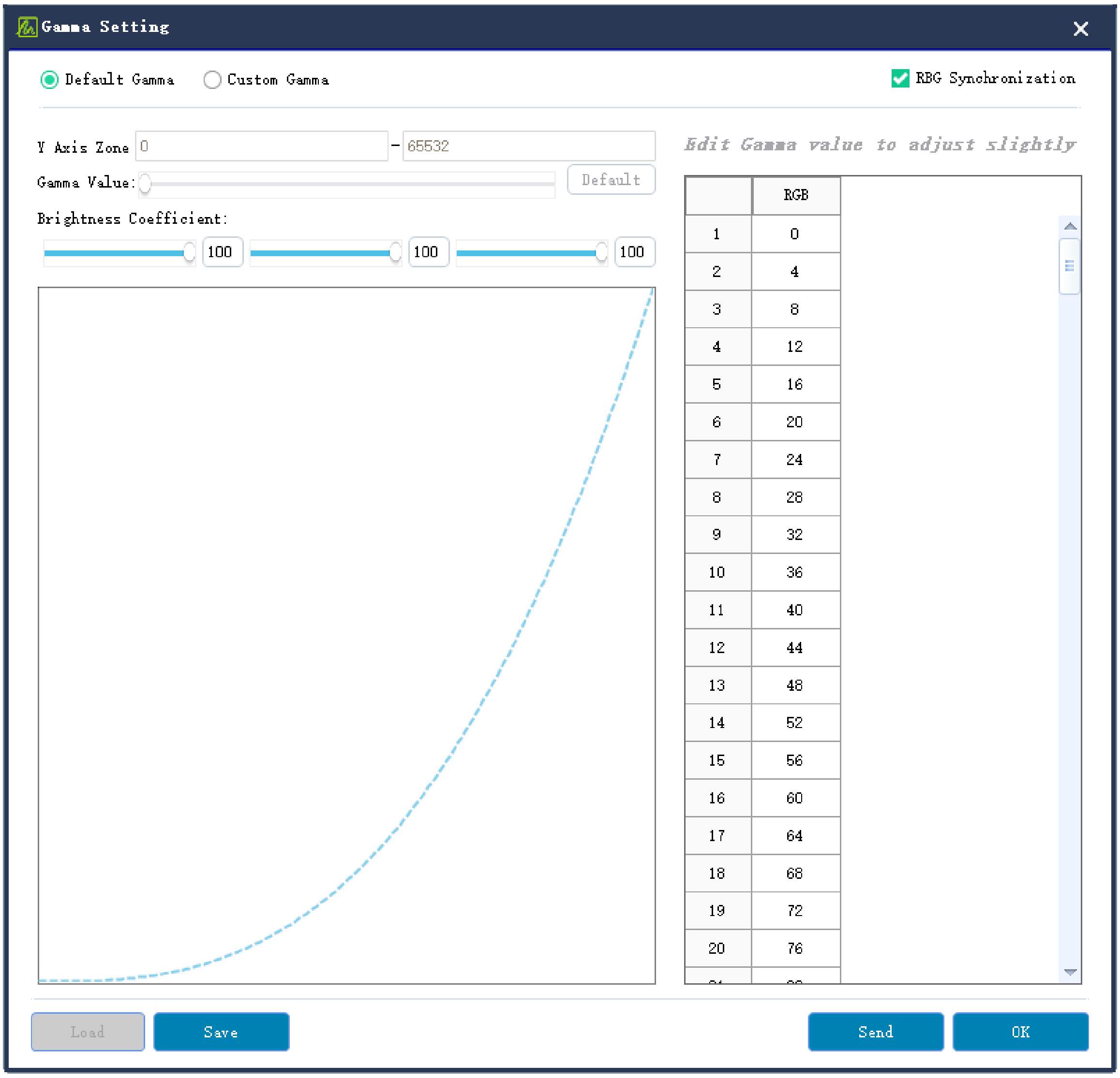



Figure 4-2-10 Custom gamma configuration

Click Send Data to transmit the receiver-card configuration. You may target a specific Ethernet output or receiver card, or reset receiver positions so all cards use the origin and display the same source area. Verify that every cabinet displays correctly. Click Save to Hardware to store the data in the receiver cards so it survives a power cycle, then click Save Configuration to save the cabinet configuration file on the PC.

### 4.2.3 Screen Connection

After configuring the receiver-card parameters, click Screen Connection on the Receiver-Card Configuration toolbar to open the screen-connection workspace, as shown in Figure 4-2-11.

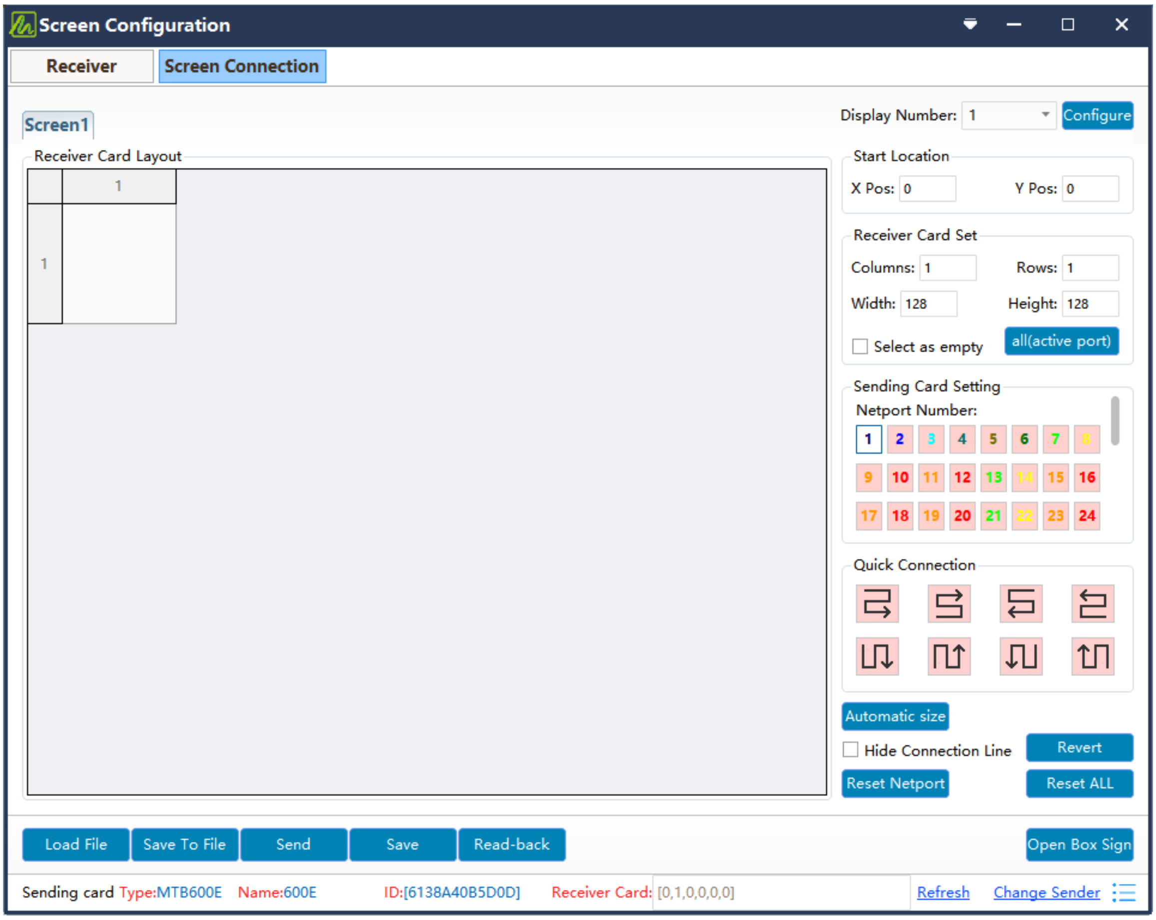



Figure 4-2-11 Screen-connection settings

Before editing the current display connection, click Refresh at the lower-right to detect every receiver card connected to the selected LED sending controller. Confirm that the detected receiver-card count matches the physical installation. If the counts differ, check receiver-card power and Ethernet cabling. When several LED sending controllers are connected, select the controller that carries the target display area before commissioning.

- **Load from File:** Loads a previously saved screen-configuration file from the control PC.
- **Save File:** Saves the screen-connection configuration to the PC as a .dcc file.
- **Send to Hardware / Save to Hardware:** Sends the screen configuration to the LED sending controller and receiver cards. After verifying the result, save it to the devices so the connection and position data remain available after a power cycle.
- **Read from Hardware:** Reads the screen connection saved in the LED sending controller for rapid recovery or retransmission.
- **Enable Cabinet Marking:** Displays cabinet identifiers to simplify physical-to-logical mapping.
- **Current LED Sending Controller:** Shows the controller type, name, and ID. Use the ID to distinguish devices; the name can be edited on the LED Sending Controller page.
- **Receiver-Card Count:** Shows the number of receiver cards on each LED sending controller output. The eight values correspond to the controller's individual Ethernet outputs.
- **Switch LED Sending Controller:** When multiple controllers are connected, click Switch LED Sending Controller to open the device-selection window shown in Figure 4-2-12.

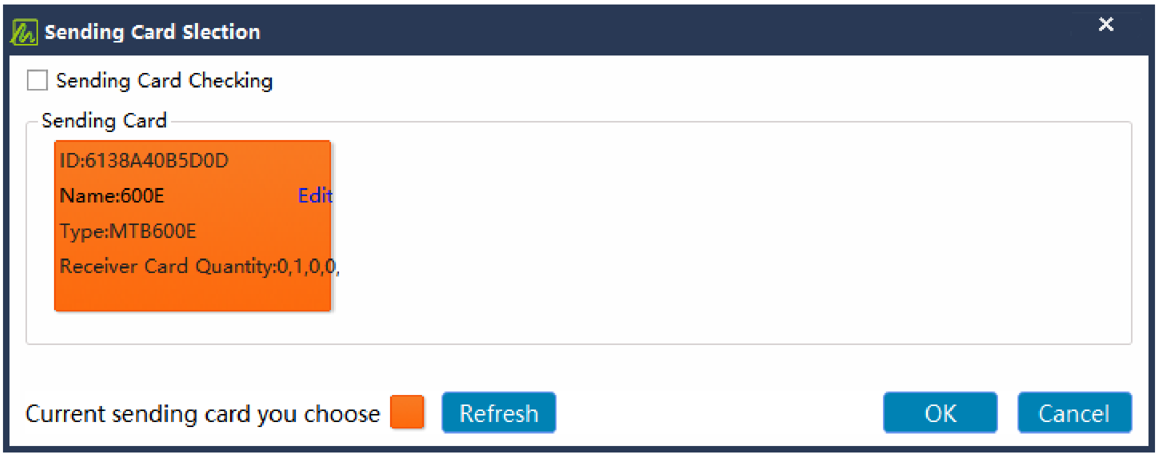



Figure 4-2-12 LED sending controller selection

- Click Refresh to detect receiver cards connected to each LED sending controller. Enable LED Sending Controller Detection; when a controller is selected, the already-configured cabinets carried by that controller flash, making the corresponding display area easy to identify. After confirming the area, click Edit to assign the controller a clear name.
- In the Screen Connection workspace, set the receiver-card cascade direction and the load width and height for each card to match the physical display. Individual cards may use different load dimensions, as shown in Figure 4-2-13.

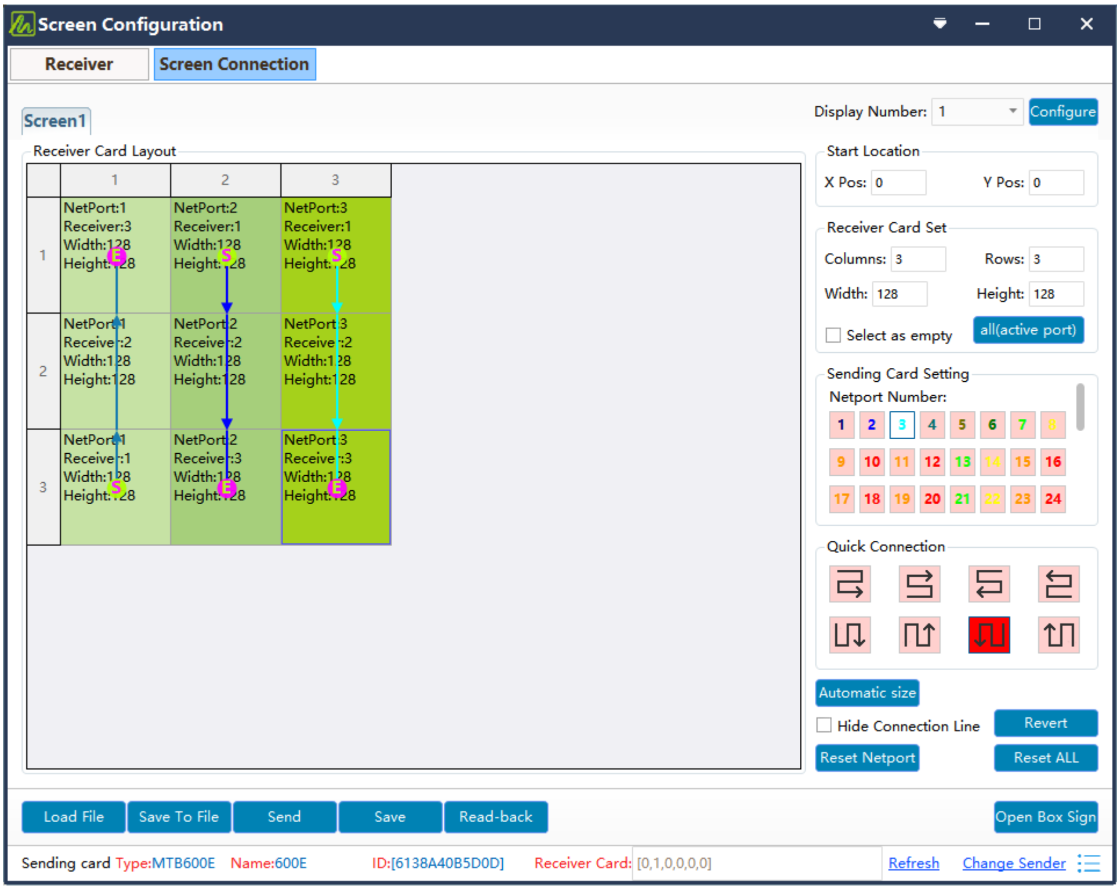



Figure 4-2-13 Receiver-card cascade direction

- **Number of Screens:** Select the number of independent displays and click Configure. If a screen connection is already present, edit it as required or create a new configuration.
- **Start Position:** Defines the point at which the LED display begins cropping the input source. The default (0, 0) starts at the upper-left pixel of the source.
- **Receiver-Card Layout:** Enter the number of card columns and rows and the load width and height of each card according to the installed display.
- **Select Empty Positions:** Enable this option and click cabinet positions that are intentionally unoccupied. Disable the option after all required gaps have been marked.

- **Apply to Current Ethernet Output:** Applies the current receiver-card Width and Height values to every receiver card connected to the selected Ethernet output.
- **LED Sending Controller Output:** Select the Ethernet output that carries the current receiver-card chain.
- **Quick Connect:** Use this function when the entire display is carried by a single Ethernet cable and the receiver cards follow a regular cascade pattern.
- **Hide Wiring:** Hides the connection-path overlay in the screen workspace.
- **Undo:** Reverses the last editing operation.
- **Reset Current Output:** Clears all settings associated with the selected Ethernet output.
- **Reset All:** Clears the connection settings for all Ethernet outputs.
- **Connect an Ethernet Distributor:** If the display uses an Ethernet distributor or splitter, complete the following steps.
- Enable Connect Distributor in the Screen Connection workspace.
- Select the LED sending controller's connected Ethernet output and configure the distributor address.
- Select the required distributor address and complete the screen connection, as shown in Figure 4-2-14.

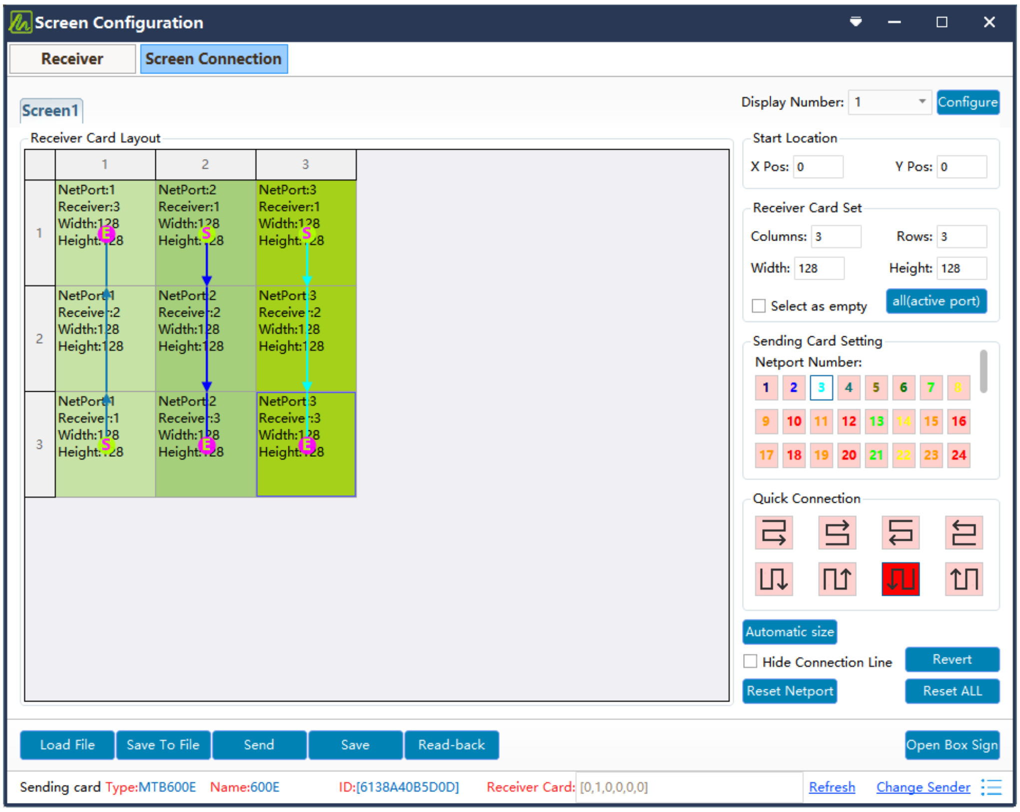



Figure 4-2-14 Screen connection through an Ethernet distributor

**Dual-Controller Backup:** On the primary controller, select Set as Primary LED Sending Controller, send the configuration, and save it to hardware. Click Switch LED Sending Controller, select the backup controller, choose Set as Backup LED Sending Controller, send the same configuration, and save it to hardware, as shown in Figure 4-2-15.

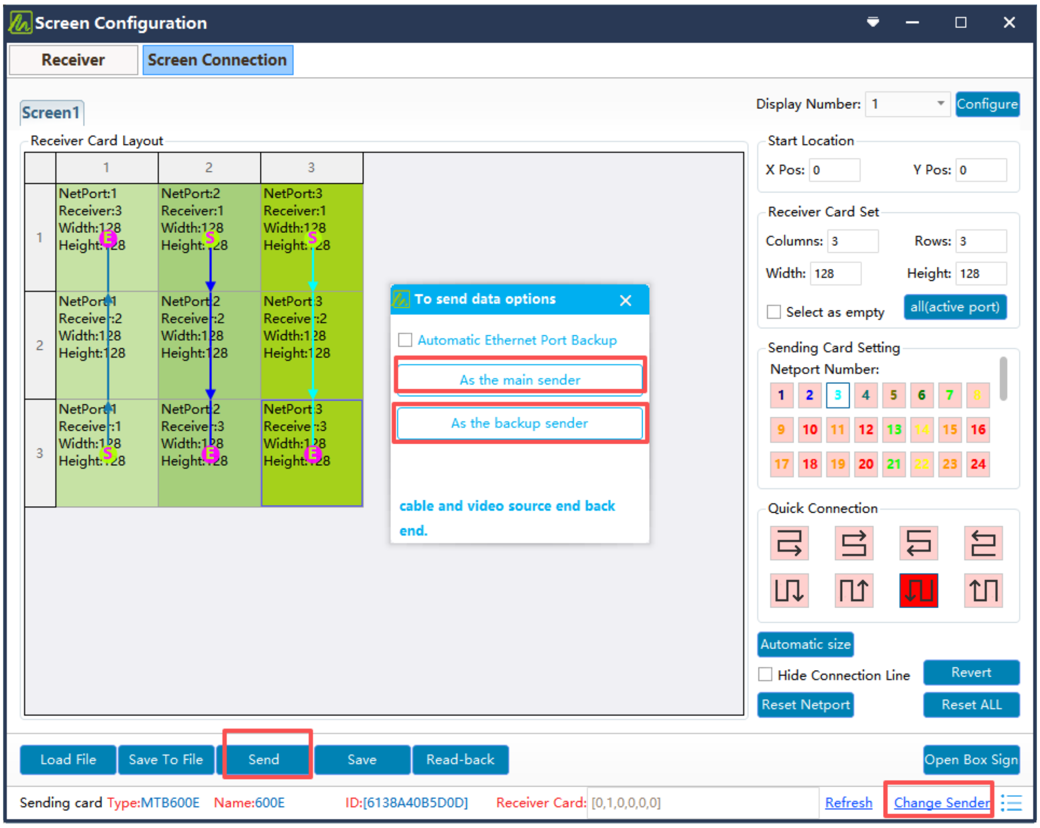



Figure 4-2-15 Dual-controller backup configuration

## 4.2.4 Merge Modules

Before creating a dual-clock composite module, complete Smart Setting for each single-clock section. Note the generated module-file path and save the module file after pixel mapping is complete.

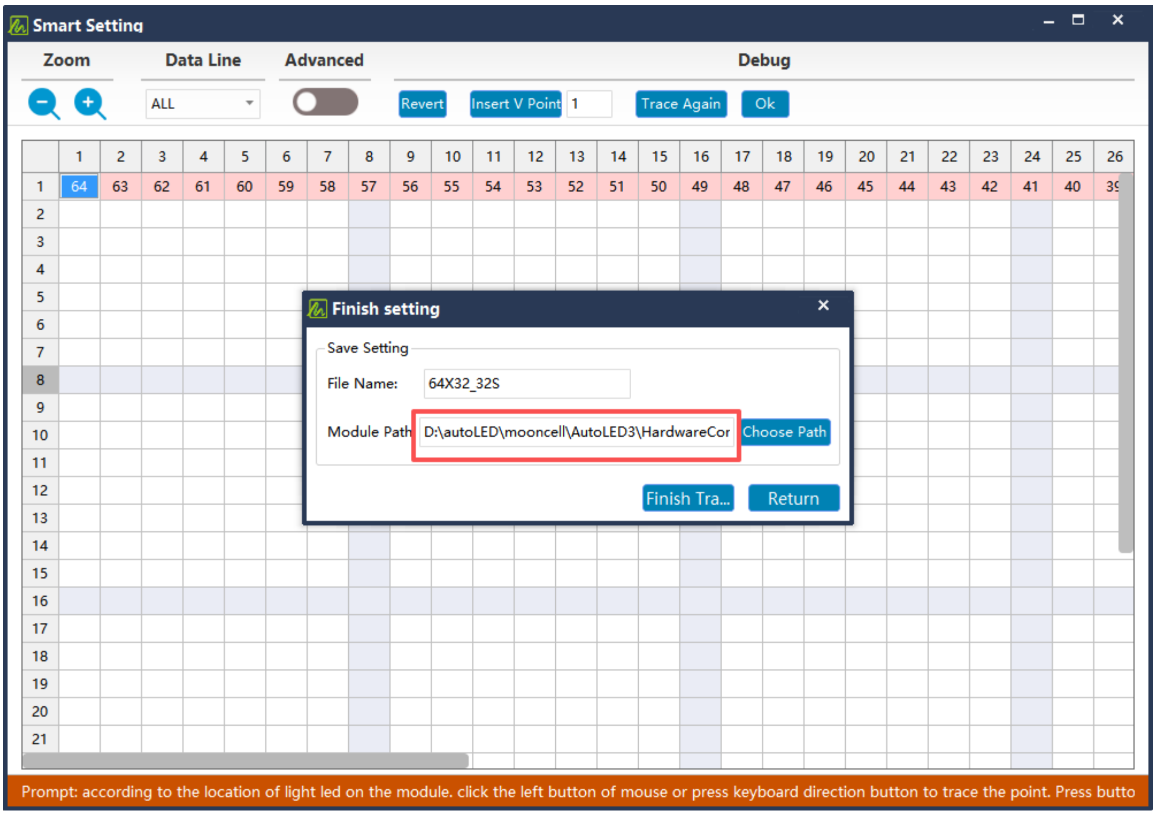



Figure 4-2-15A Opening the Merge Modules tool

In Receiver-Card Configuration, click the diamond-shaped Merge Modules button and enable Dual Clock. Load the module files into Module 1 and Module 2, then assign the coordinates of both modules according to the physical layout. Click Export to save a new composite module file, or click Apply to replace the current single-clock parameters immediately. If Module 1 and Module 2 carry different pixel counts, complete and save Smart Setting for each section separately, import both module files, and then repeat the merge process.

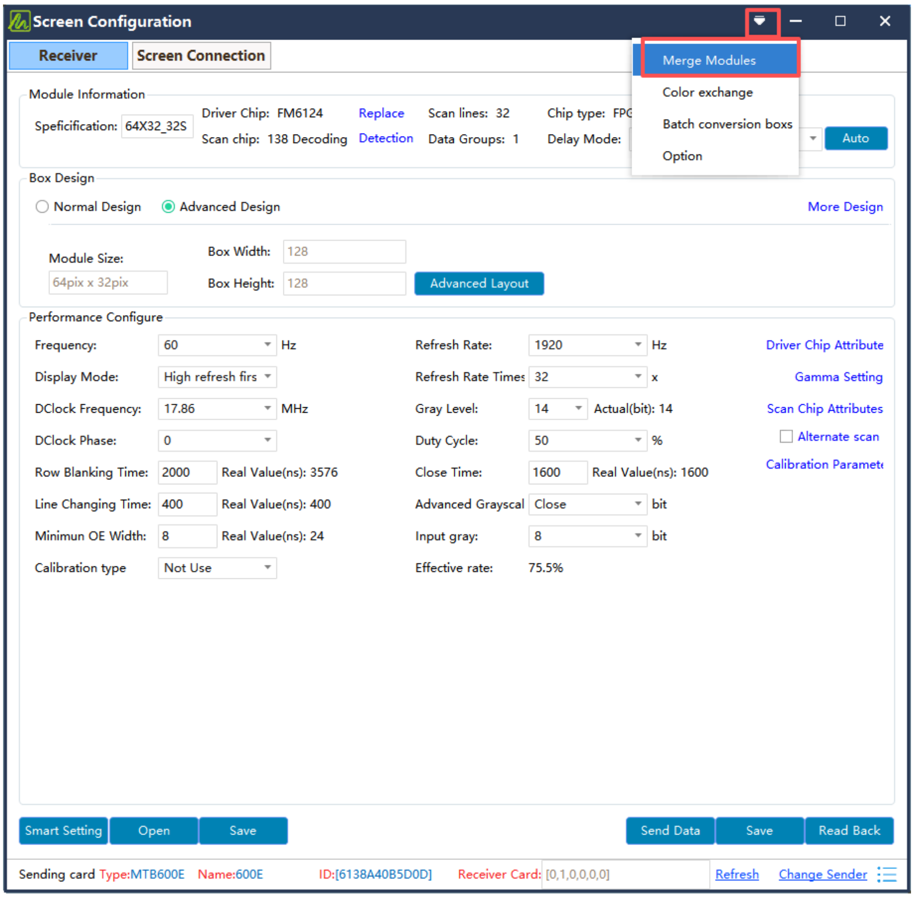



Figure 4-2-15B Loading and positioning dual-clock module files

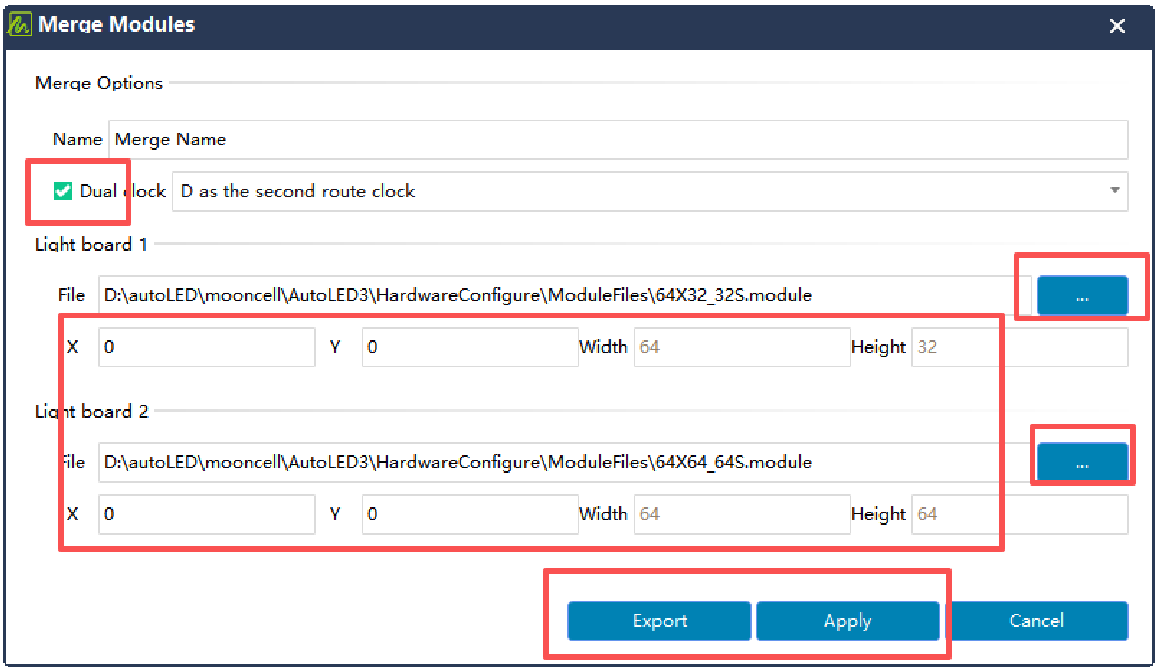



Figure 4-2-15C Exporting or applying the merged module

## 4.3 Advanced Screen Configuration

Advanced Screen Configuration is designed for irregular, creative, and mixed-cabinet LED displays. It provides a fast visual workflow for constructing any cabinet geometry and mapping receiver-card Ethernet chains in any physical order.

### 4.3.1 Load Cabinet Files

Load every cabinet configuration required by the display. AutoLED cabinet files use the .box-conf extension.

Click Advanced Screen Configuration on the AutoLED home page. In the advanced workspace, click + on the toolbar to open the file-loading wizard, then select the appropriate cabinet-file loading method, as shown in Figure 4-3-1.

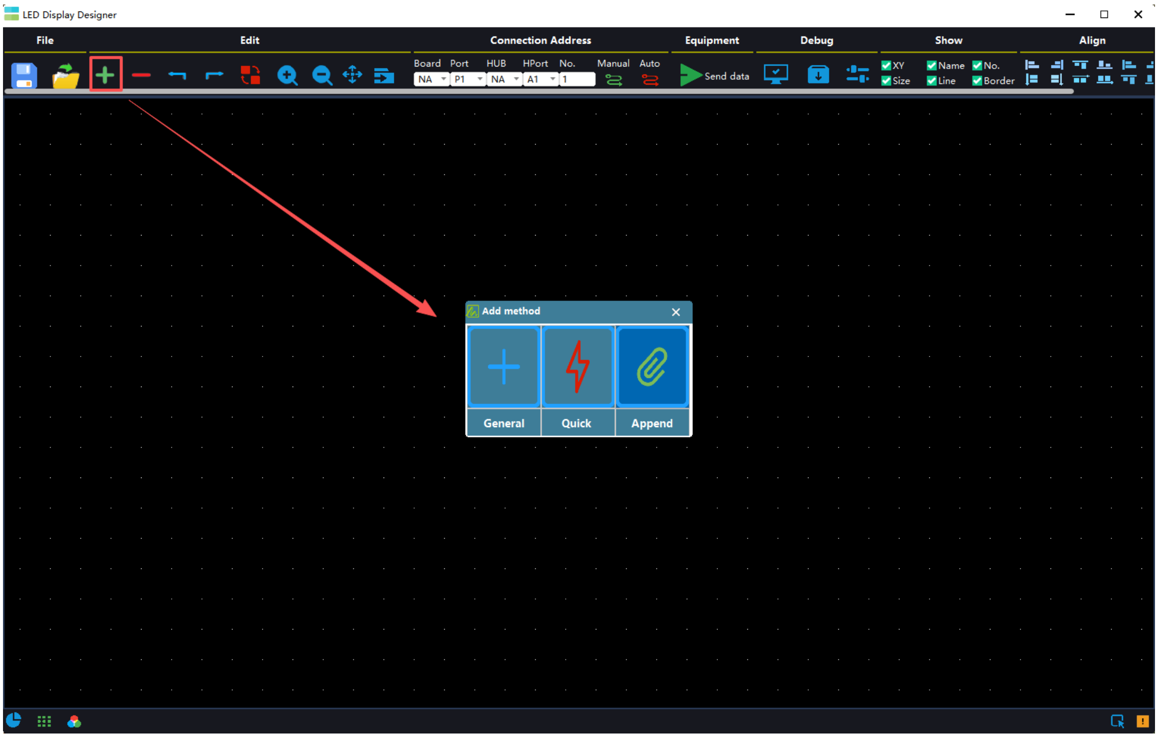



Figure 4-3-1 Cabinet-file loading methods

**Standard Add:** Use this mode when the display contains multiple cabinet types, sizes, driver ICs, or module designs. Select Standard Add, click Browse, and load the required cabinet configuration files, as shown in Figure 4-3-2.

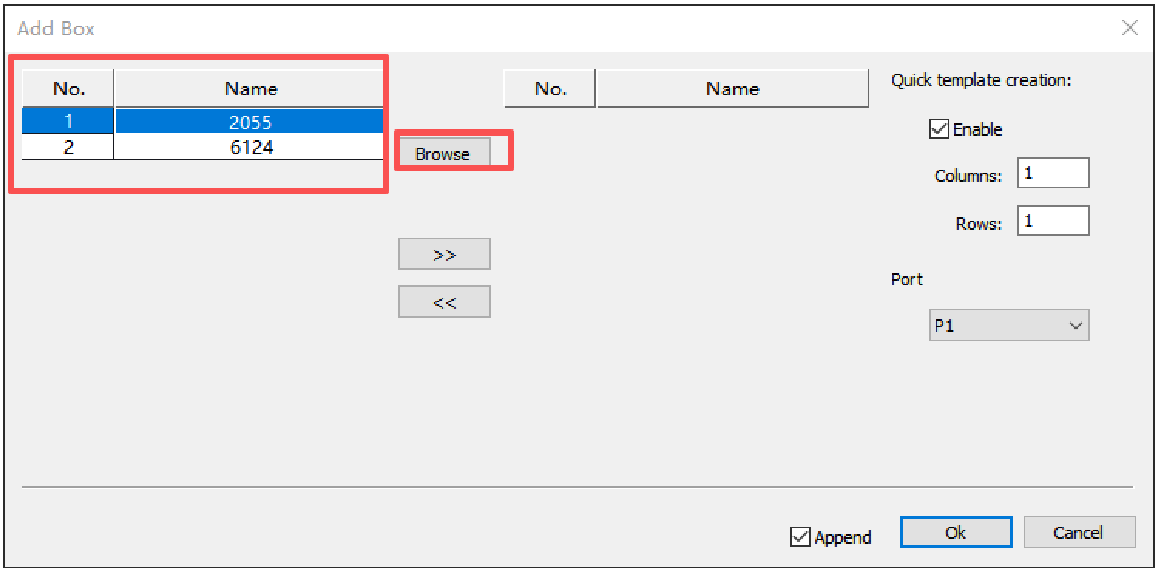



Figure 4-3-2 Loading cabinet configurations

After loading the cabinet files, select a configuration and click the left-arrow button to create a quick template. Enter the horizontal and vertical quantities to build the cabinet array. Under Target Ethernet Output, assign the newly added cabinets to the correct output. Enable Append to add cabinets to the existing connection; leave it disabled to create a new blank connection. Click OK to add the cabinets, as shown in Figure 4-3-3.

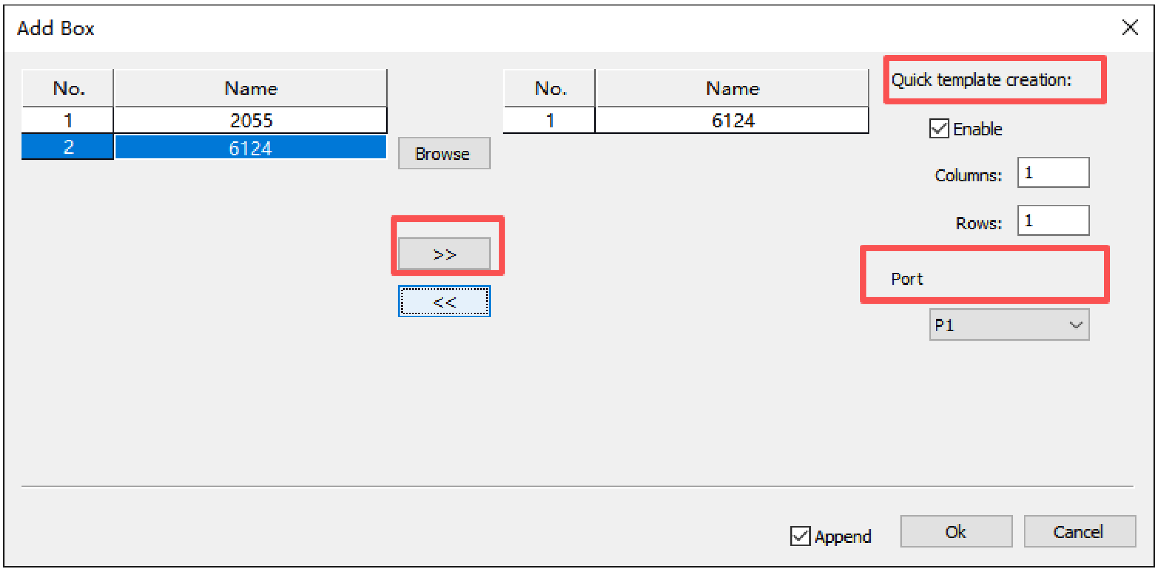



Figure 4-3-3 Standard cabinet-array creation

**Quick Add:** Use this mode when adding one cabinet type. Select File, Receiver Card (manually select the card to read), or Selected Cabinet as the source. Enter the horizontal and vertical quantities, assign the cabinets to the correct target Ethernet output, and enable Append if they must be added to the current connection. Click OK to complete the addition, as shown in Figure 4-3-4.

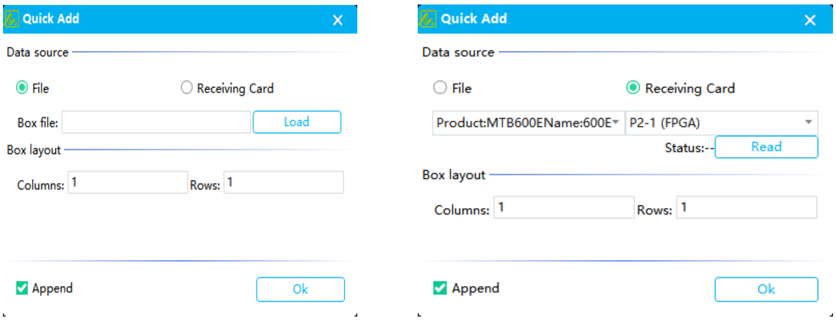



Figure 4-3-4 Quick cabinet-array creation

**Append Design:** Use this option to merge the current display connection with another saved screen-connection file.

## 4.3.2 Build the Cabinet Layout

Move each cabinet to match its physical position in the installed display, as shown in Figure 4-3-5.

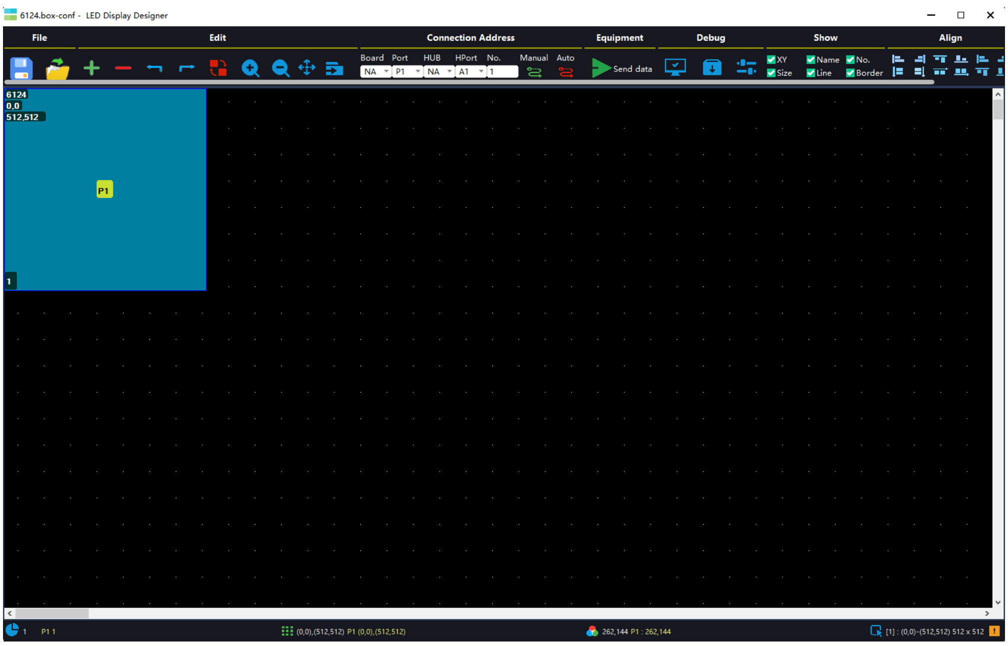



Figure 4-3-5 Cabinet layout

**Assign cabinets to LED sending controller outputs:** Select the receiver cards connected to each controller output and assign every cabinet to the correct output, as shown in Figure 4-3-6.

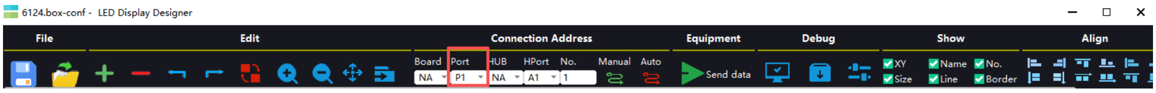



Figure 4-3-6 Assigning receiver cards to Ethernet outputs

**Set the receiver-card cable order:** Click Manual. The default starting sequence number is 1; enter a different start value in the Sequence field if required, as shown in Figure 4-3-7.

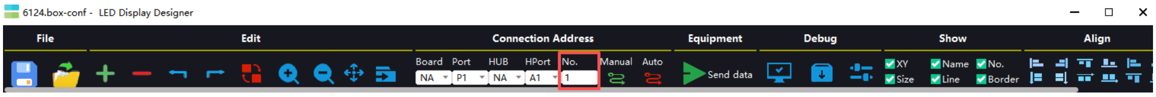



Figure 4-3-7 Manual receiver-card connection order

Click the cabinets in the actual Ethernet-cable order. AutoLED increments the cabinet sequence number after each selection. If a cabinet is selected incorrectly, right-click to return to the last correct number and continue. After completing the selected output, press Esc to exit sequence editing. Repeat for every output, as shown in Figure 4-3-8.

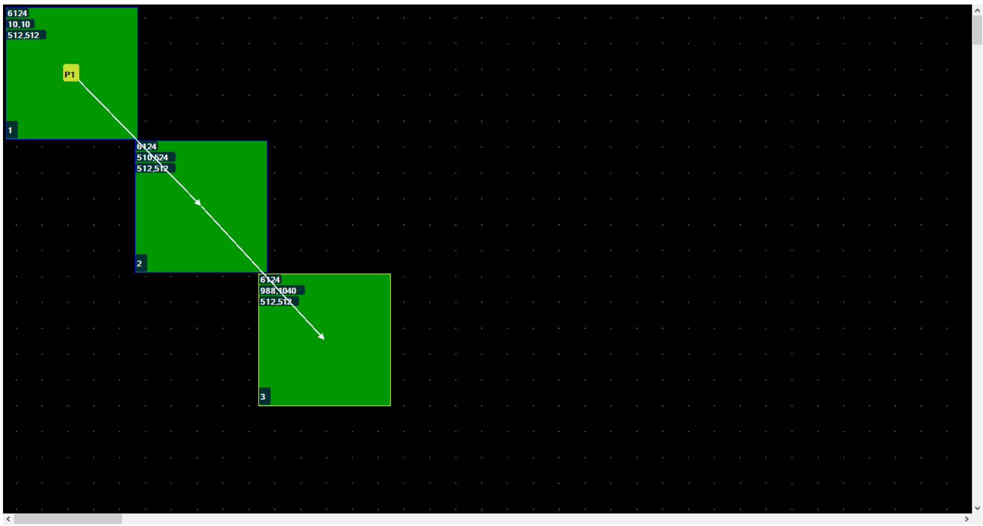



Figure 4-3-8 Receiver-card sequence on an Ethernet output

**Automatic Connection:** Click Auto to open the automatic cable-routing window. Use this function for regularly arranged rectangular cabinet arrays, as shown in Figure 4-3-9.

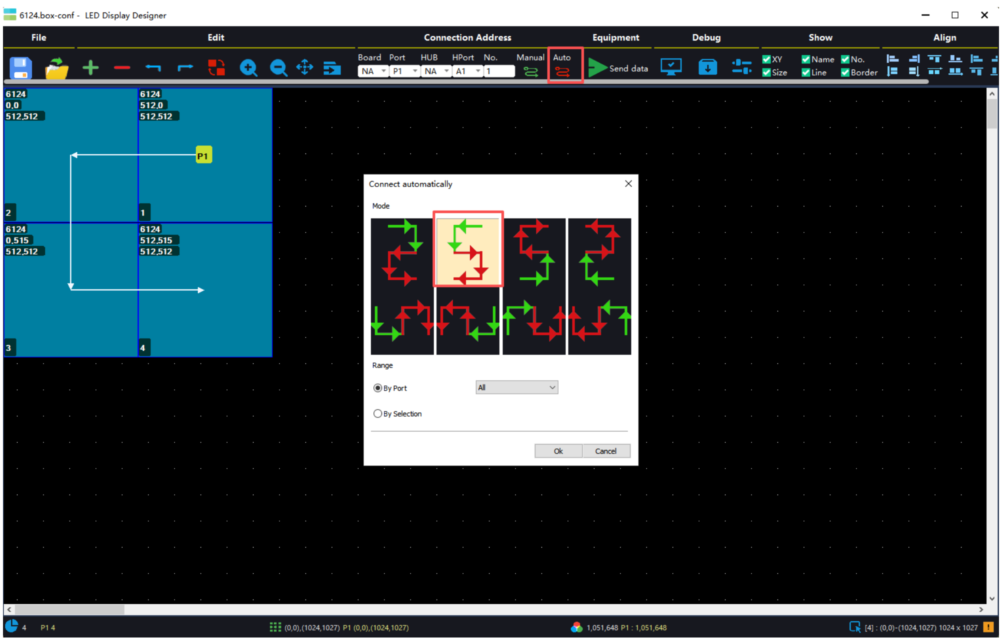



Figure 4-3-9 Automatic cable-routing settings

**Send and Save to Hardware:** After completing the screen connection, click Send Data. By default, AutoLED includes receiver-card configuration data, receiver positions, and LED sending controller configuration data. Click Send and verify the display. When the result is correct, click Save to Hardware to store the configuration in the receiver cards and LED sending controller. You can also send only the selected area or distribute a single-cabinet file to multiple cabinets, as shown in Figure 4-3-10.

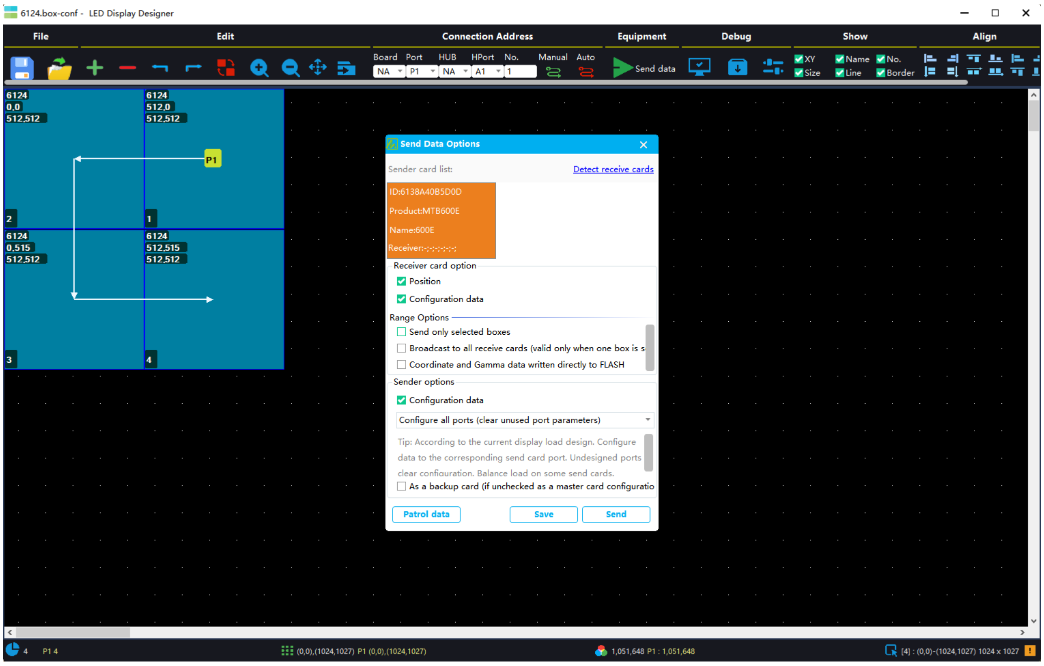



Figure 4-3-10 Selective configuration transmission

### 4.3.3 Commissioning and Diagnostics

**Display Test Patterns:** Select an LED sending controller for global control, or select individual cabinets. Available patterns include Cabinet Marking, Red, Green, Blue, White, Horizontal Lines, Vertical Lines, Diagonal Lines, Power-On Time, and Grayscale, as shown in Figure 4-3-11.

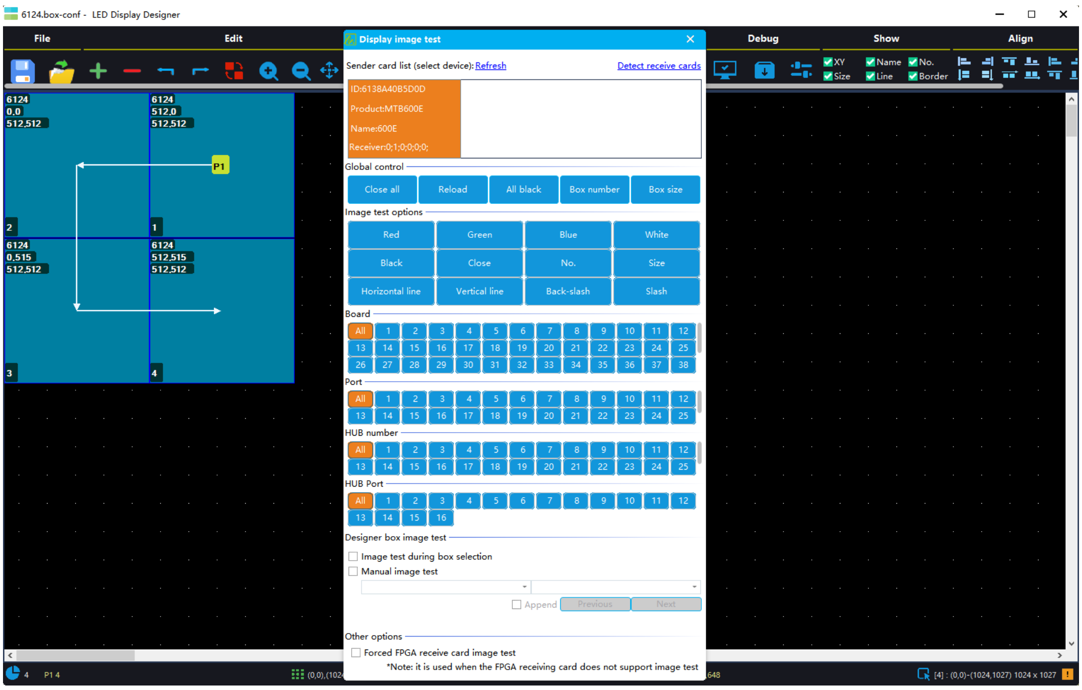



Figure 4-3-11 Display test and commissioning tools

**Read Back Data:** Select an LED sending controller and read the saved parameters and connection positions from all receiver cards. After the readback is complete, the display connection can be restored and resent, as shown in Figure 4-3-12.

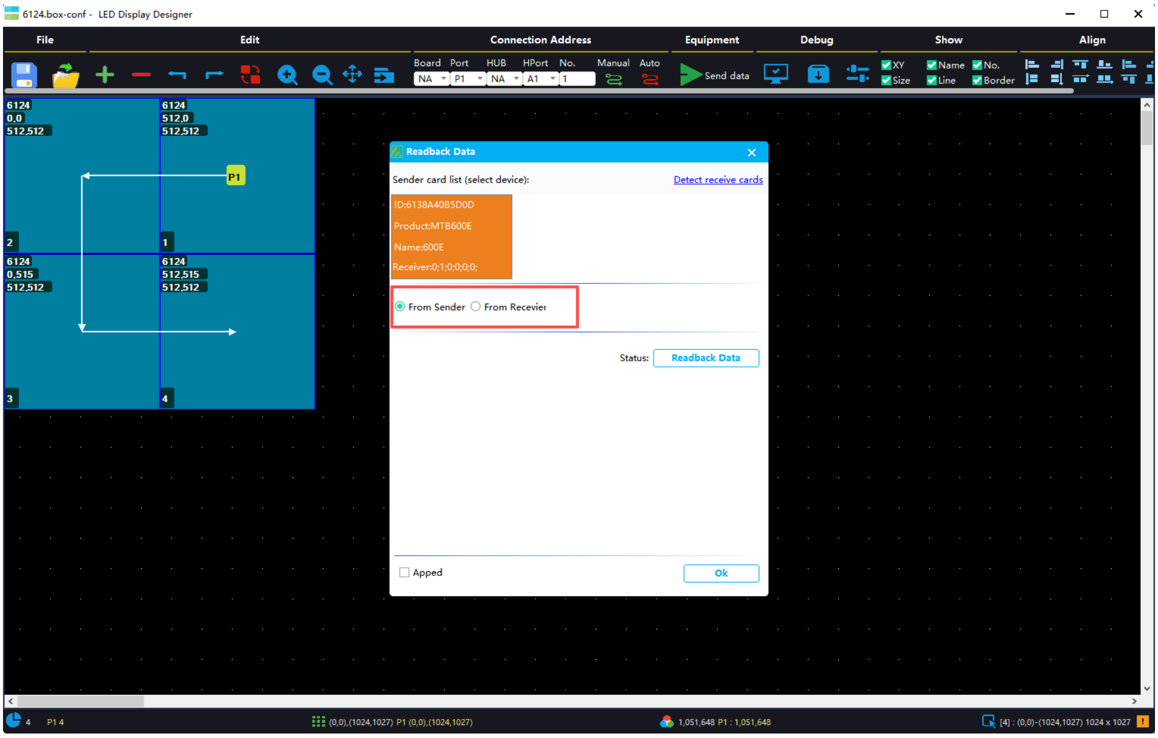



Figure 4-3-12 Reading configuration data from hardware

**Control Panel:** Select an LED sending controller to adjust cabinet brightness, perform quick calibration, send calibration data, set a standby image, or apply seam correction. When cabinets are selected, changes apply only to those cabinets; with no selection, changes apply to every cabinet carried by the selected LED sending controller, as shown in Figure 4-3-13.

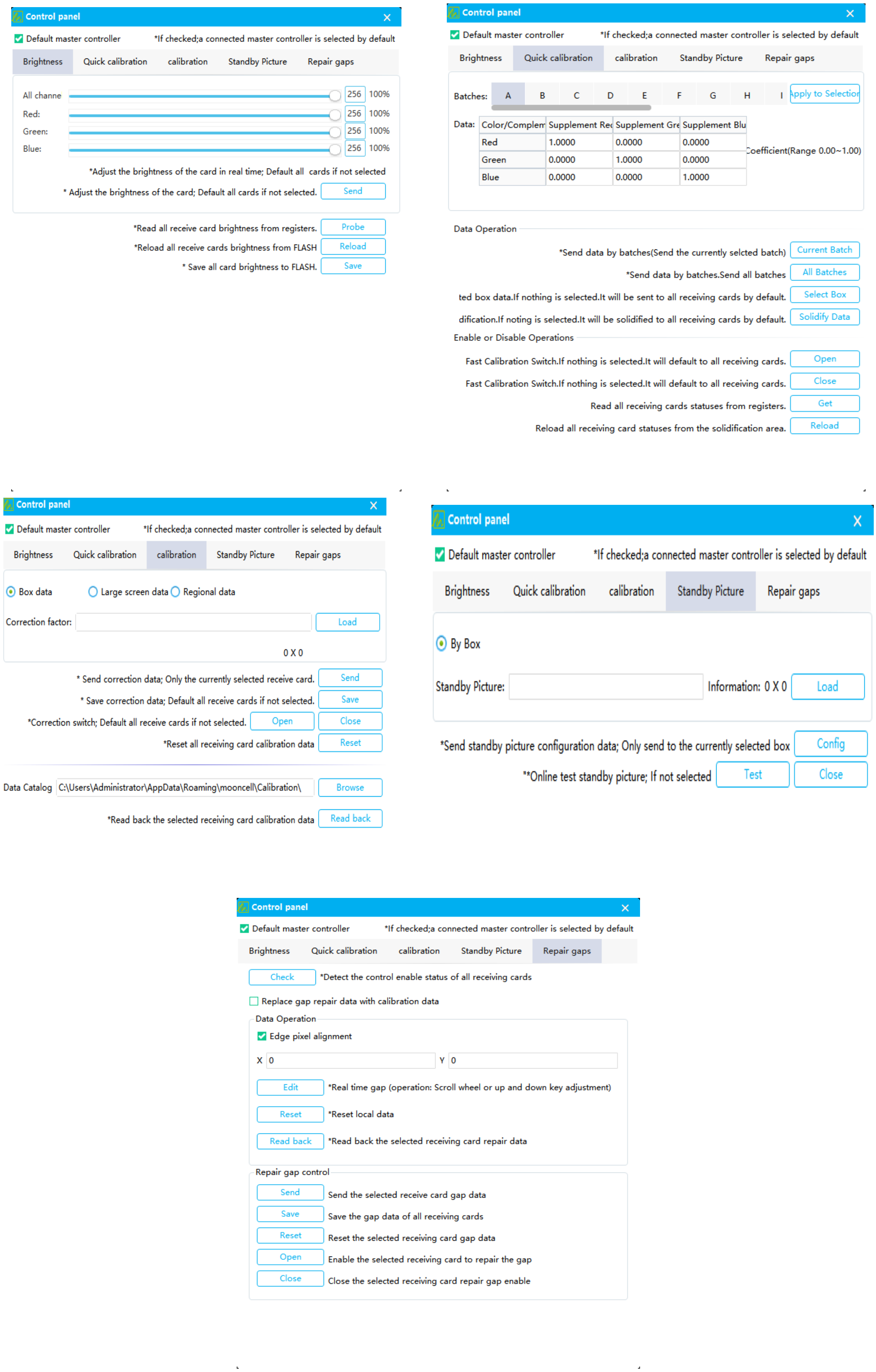



Figure 4-3-13 Advanced screen control panel

The Advanced Screen Configuration toolbar is identified in Figure 4-3-14.

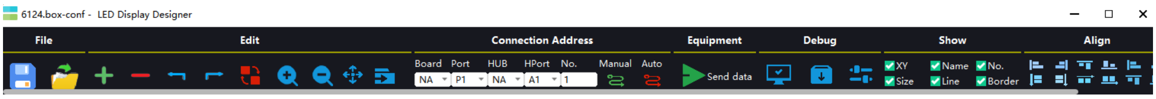



Figure 4-3-14 Advanced Screen Configuration toolbar

### 4.3.4 Context-Menu Commands

**Move Cabinets:** Select one or more cabinets, right-click, and choose Move Cabinets. Enter the X and Y coordinates to reposition the selected cabinets, as shown in Figure 4-3-15.

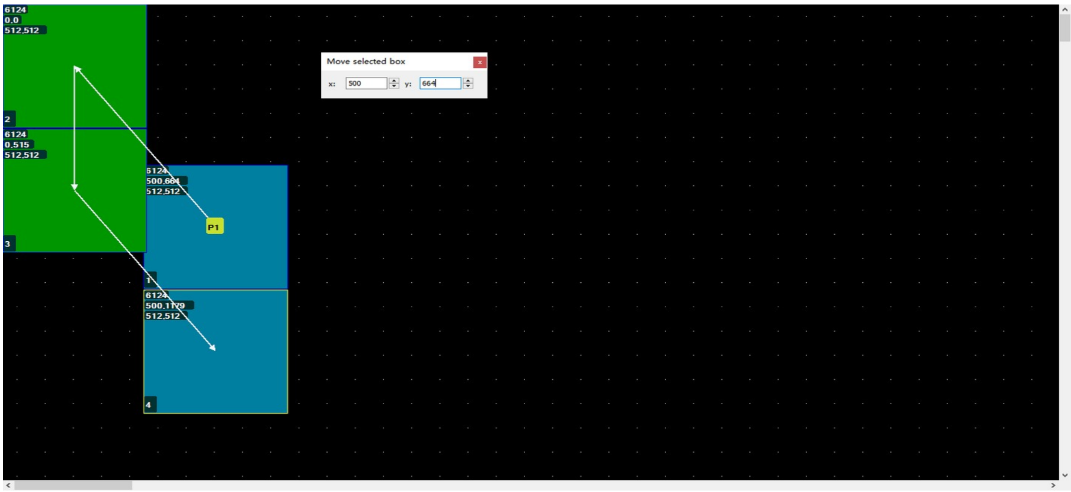



Figure 4-3-15 Moving selected cabinets

**Quick Select:** Right-click and choose Quick Select, then select an Ethernet-output number. AutoLED selects every cabinet assigned to that output, as shown in Figure 4-3-16.

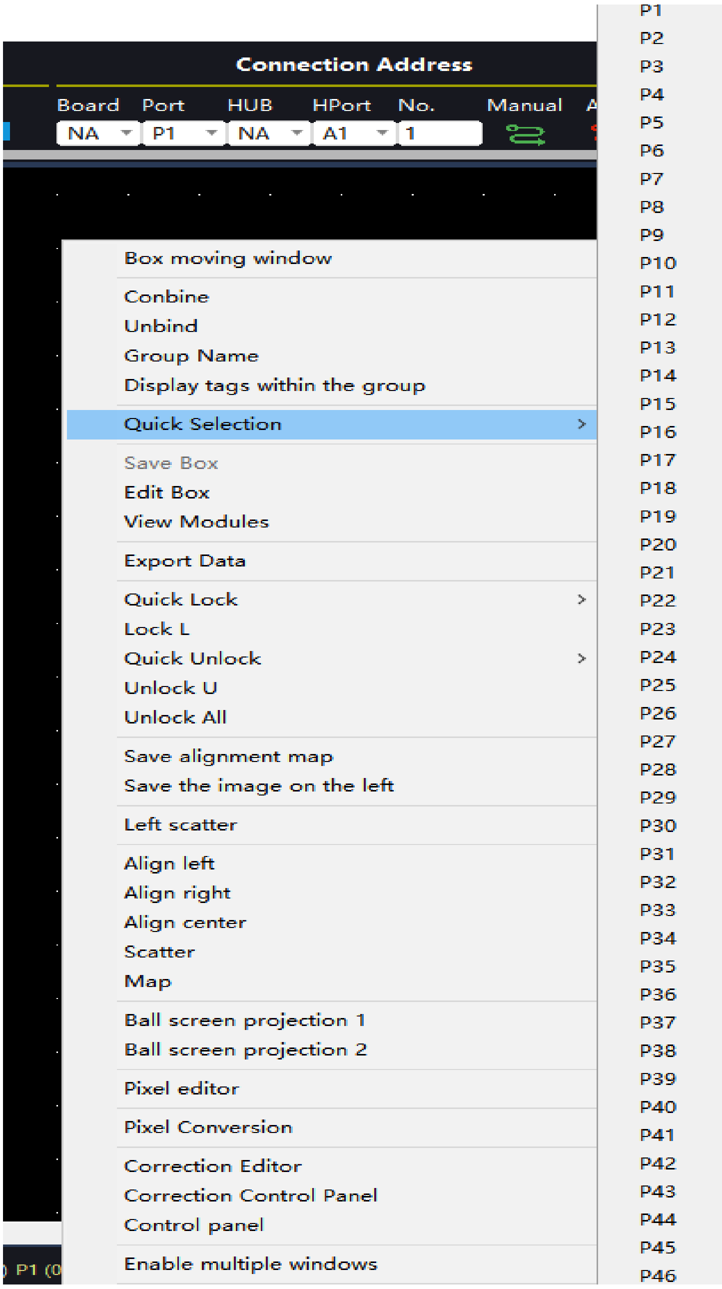



Figure 4-3-16 Quick cabinet selection

- **Save Cabinet:** Select one cabinet, right-click, choose Save Cabinet, and save its cabinet file locally.
- **Edit Cabinet:** Select one cabinet, right-click, and choose Edit Cabinet to open its design parameters. After editing, click Replace Cabinet to replace the selected cabinet with the revised definition.
- **View Modules:** Select one cabinet, right-click, and choose View Modules to open its cabinet-information window, as shown in Figure 4-3-17.


Figure 4-3-17 Cabinet information

- **Quick Lock:** Right-click and choose Quick Lock, then select an Ethernet-output number. AutoLED locks every cabinet assigned to that output, as shown in Figure 4-3-18.

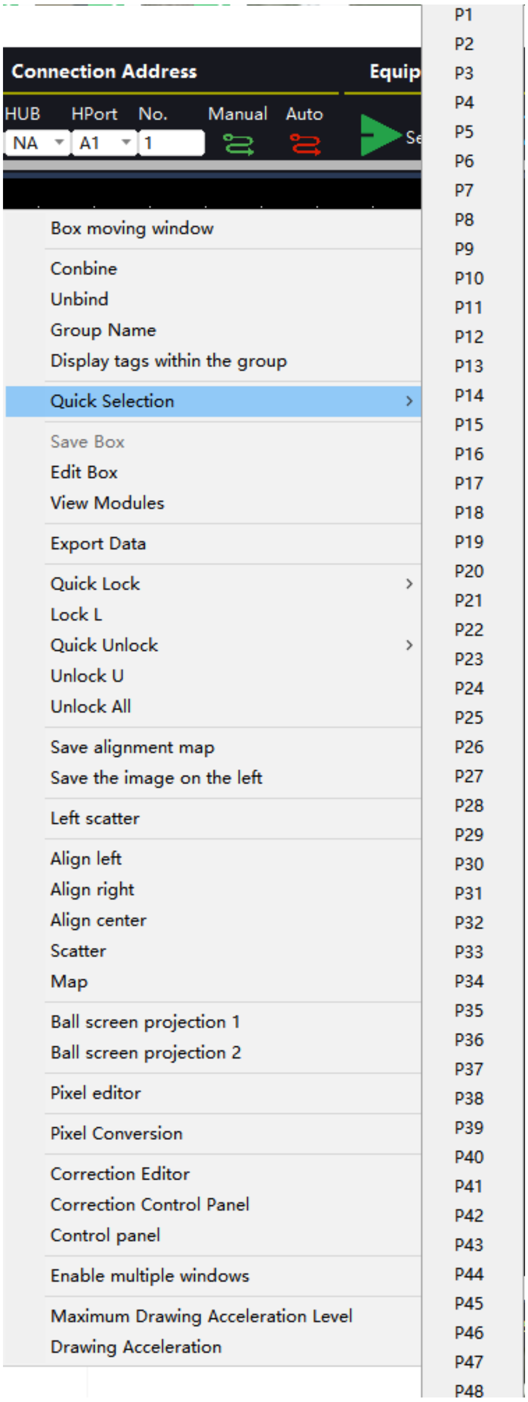



Figure 4-3-18 Quick Lock

- **Lock:** Select one or more cabinets, right-click, and choose Lock to prevent accidental editing.
- **Quick Unlock:** Right-click and choose Quick Unlock, then select an Ethernet-output number. AutoLED unlocks every cabinet assigned to that output, as shown in Figure 4-3-19.

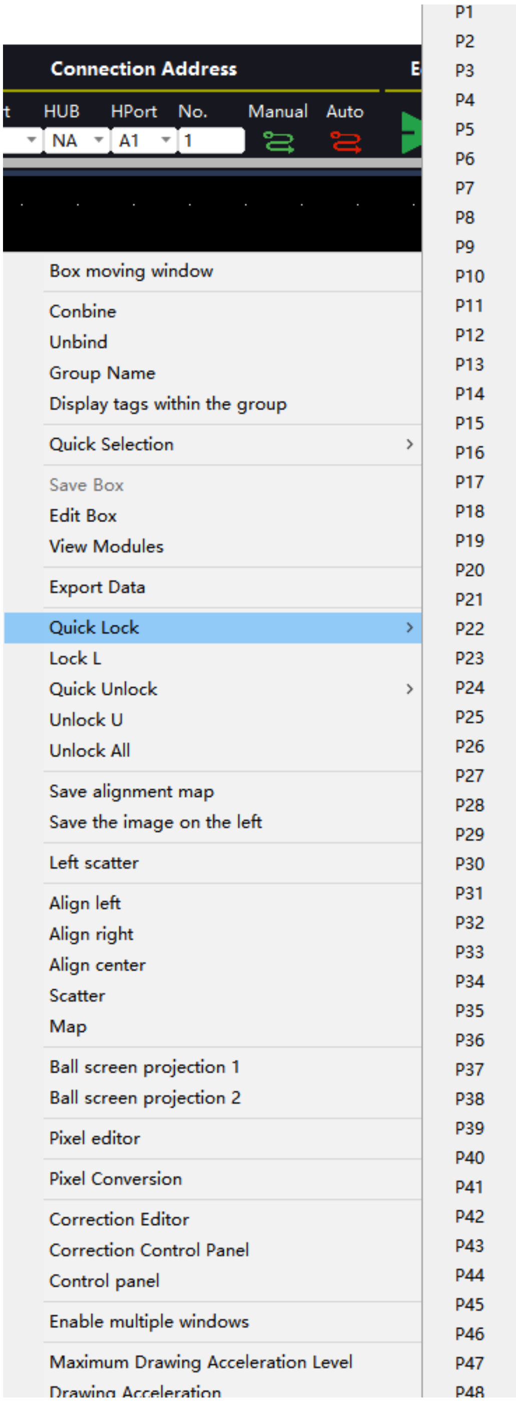



Figure 4-3-19 Quick Unlock

- **Unlock:** Select one or more cabinets, right-click, and choose Unlock.
- **Unlock All:** Right-click and choose Unlock All to unlock every cabinet in the design.
- **Save Alignment Map:** Exports a cabinet-to-pixel mapping reference image in either compressed-image mode or original-pixel mode, as shown in Figure 4-3-20.

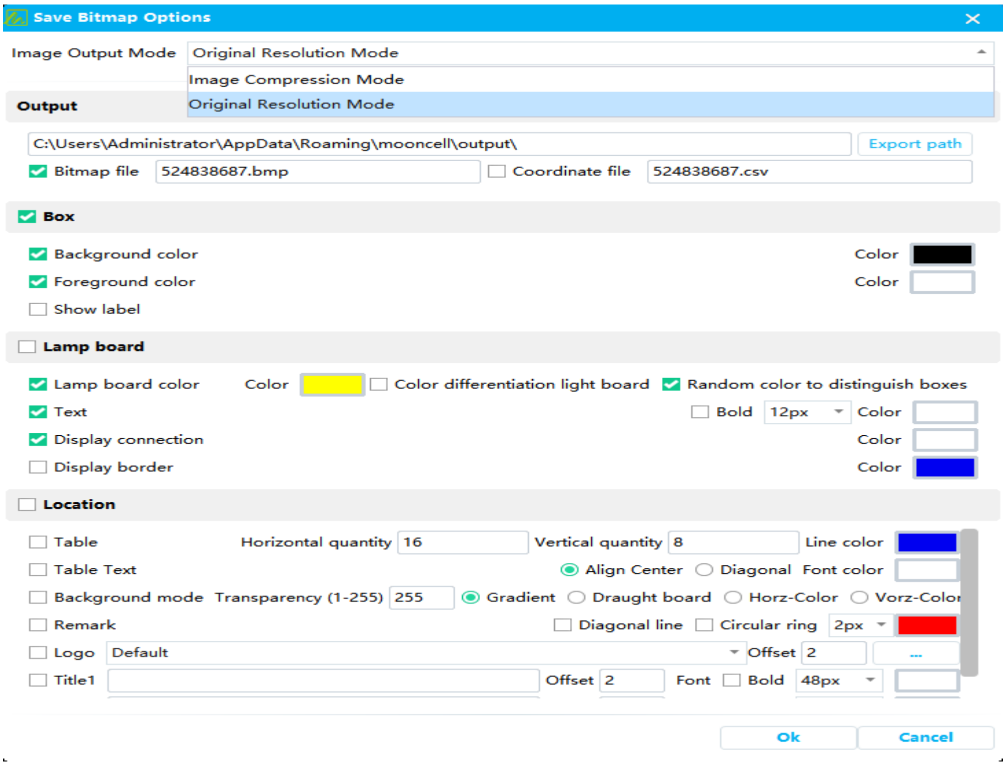



Figure 4-3-20 Alignment-map save options

- **Save the Image on the Left:** Exports the mapping reference image left-aligned with the specified number of pixels per row, as shown in Figure 4-3-21.

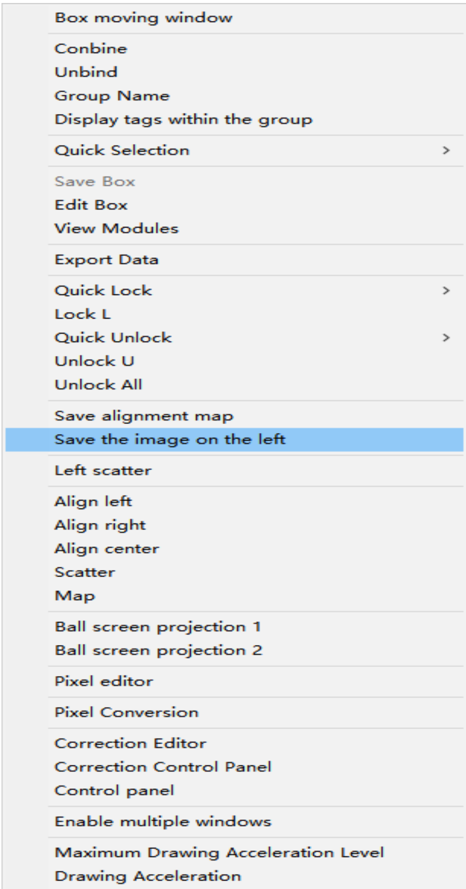



Figure 4-3-21 Left-aligned mapping-reference image

- **Pixel Conversion:** Select cabinets, right-click, and choose Pixel Conversion. In the Pixel Processing window, stretch, rotate, mirror, or scatter the selected cabinet geometry, then click Convert, as shown in Figure 4-3-22.

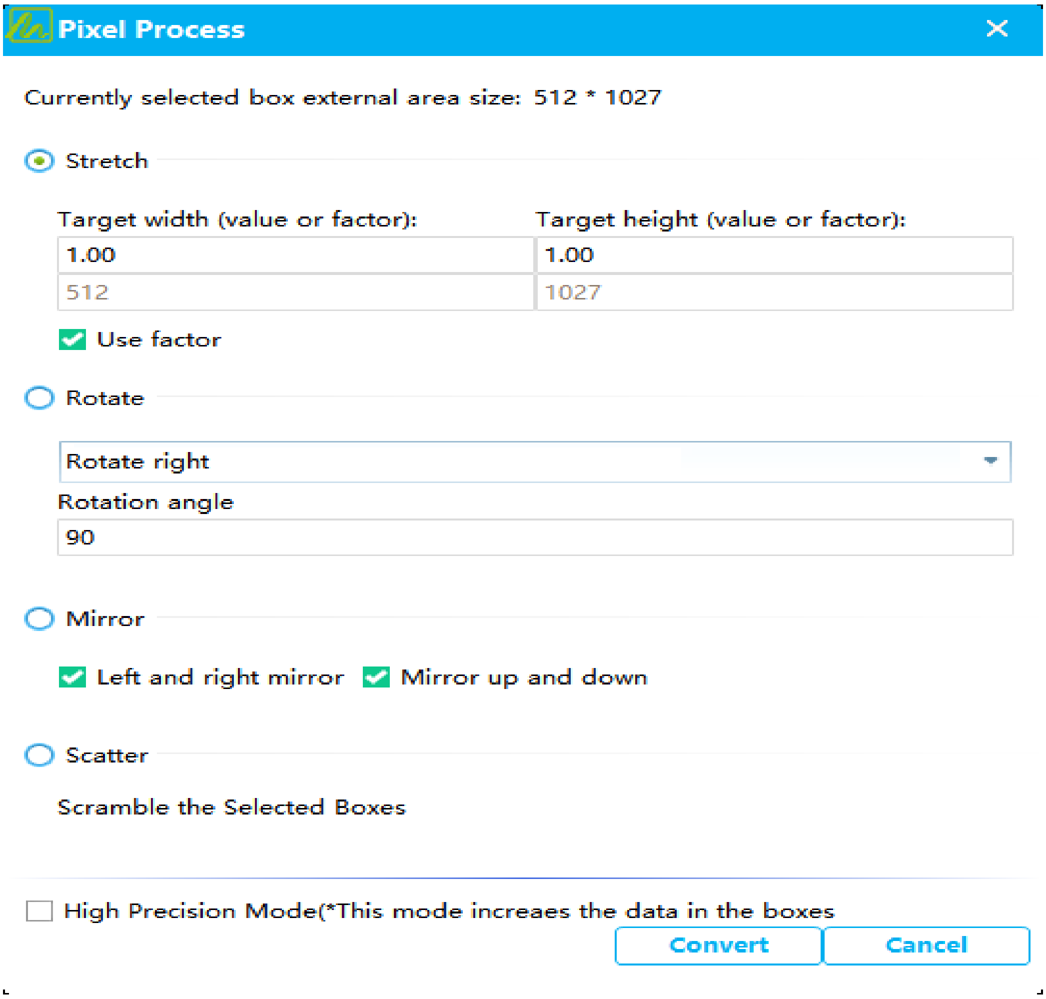



Figure 4-3-22 Pixel conversion

• **Calibration Editor:** Select a cabinet, right-click, and choose Calibration Editor. Edit calibration by pixel, load or save calibration parameters, send data, and save it to hardware, as shown in Figure 4-3-23.

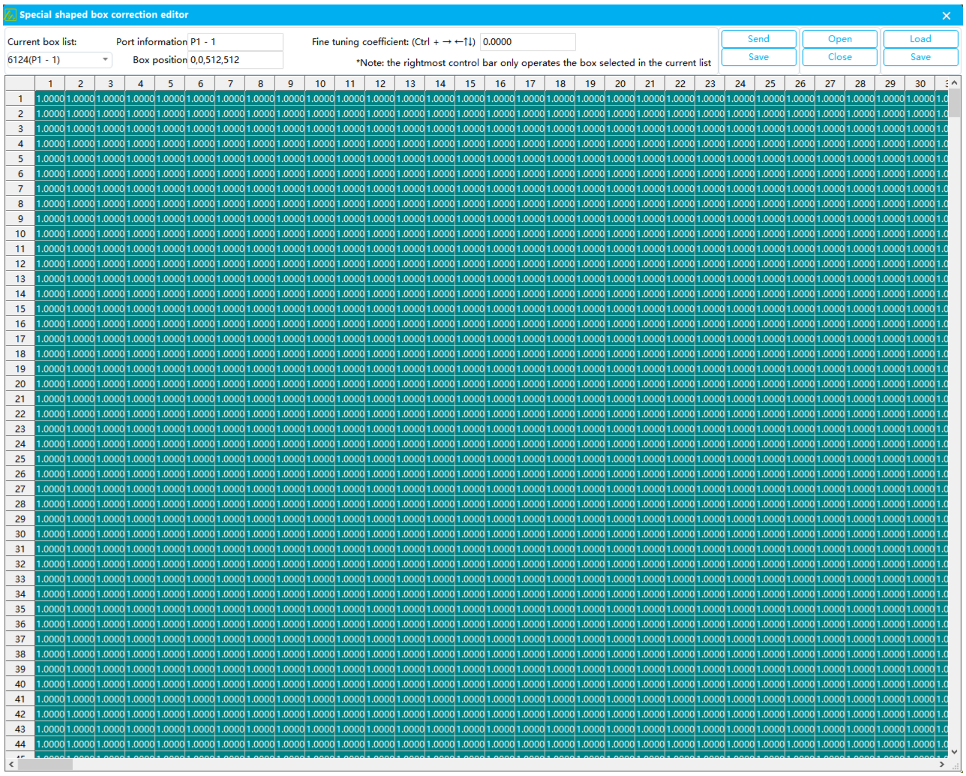



Figure 4-3-23 Cabinet Calibration Editor

- **Calibration Control Panel:** Opens the calibration control panel, where a saved local calibration file can be loaded, sent, verified, and saved to hardware.
- **Enable Multiple Windows:** Enabling this mode adds Cabinet Priority, Area Priority, and Display Result options. The Gigabit Ethernet status changes to Multiple-Window Mode, and AutoLED calculates the load position of each cabinet window. Results are shown in the status panel at the lower-right of Advanced Screen Configuration, as shown in Figure 4-3-25.

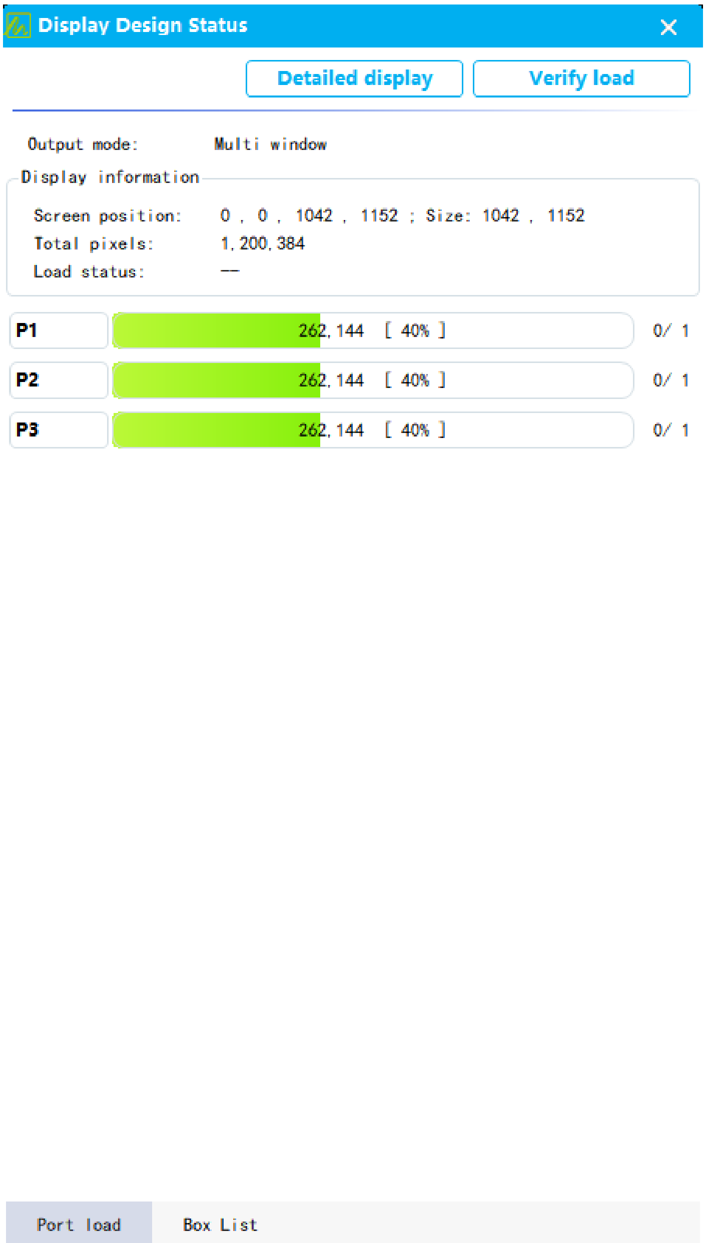



Figure 4-3-25 Multiple-window status panel

- **Maximum Drawing Acceleration:** Uses the highest acceleration level to improve responsiveness while editing cabinet designs.
- **Drawing Acceleration:** Enables graphics acceleration to improve cabinet-design responsiveness.

## 4.4 Configuration Backup and Automatic Recovery (Patrol Data)

When a receiver card, receiver-side control device, or LED sending controller is replaced, the new hardware normally requires the correct screen parameters before it can display properly. The Patrol Data function backs up these parameters and allows the control system to restore them automatically, without requiring the operator to reopen AutoLED, even when the replacement device initially contains no valid configuration.

**The recovery dataset includes:** (1) LED sending controller position data - image-cropping and Ethernet-output offset parameters, excluding scaling parameters; and (2) receiver-card position and configuration data, including brightness values set through the Advanced Screen Configuration control panel described in Section 4.3.3.

Before using automatic recovery, create and store the Patrol Data dataset. Complete the cabinet design in Advanced Screen Configuration, then select Send Data > Patrol Data. Choose Save File to write the dataset to an SD card for devices that support SD-card recovery, or choose Save Data to store it in the device's internal memory, as shown in Figure 4-4-1.

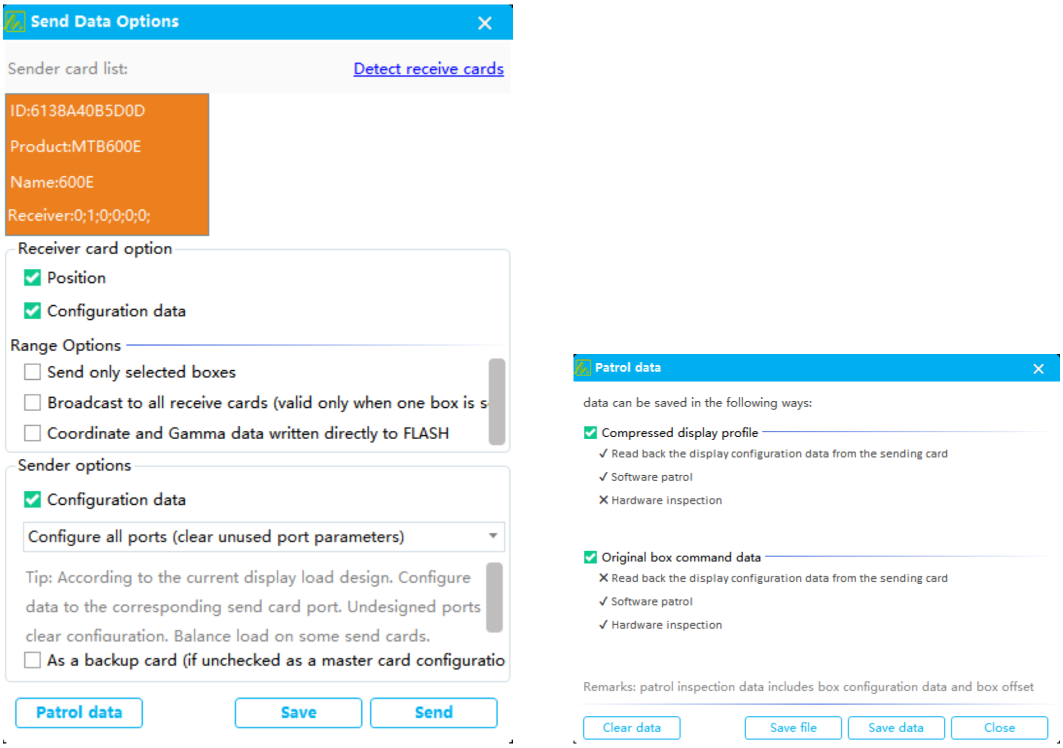



Figure 4-4-1 Saving the Patrol Data recovery dataset

On the AutoLED home page, select Display > Repair to open the configuration-recovery page, as shown in Figure 4-4-2.

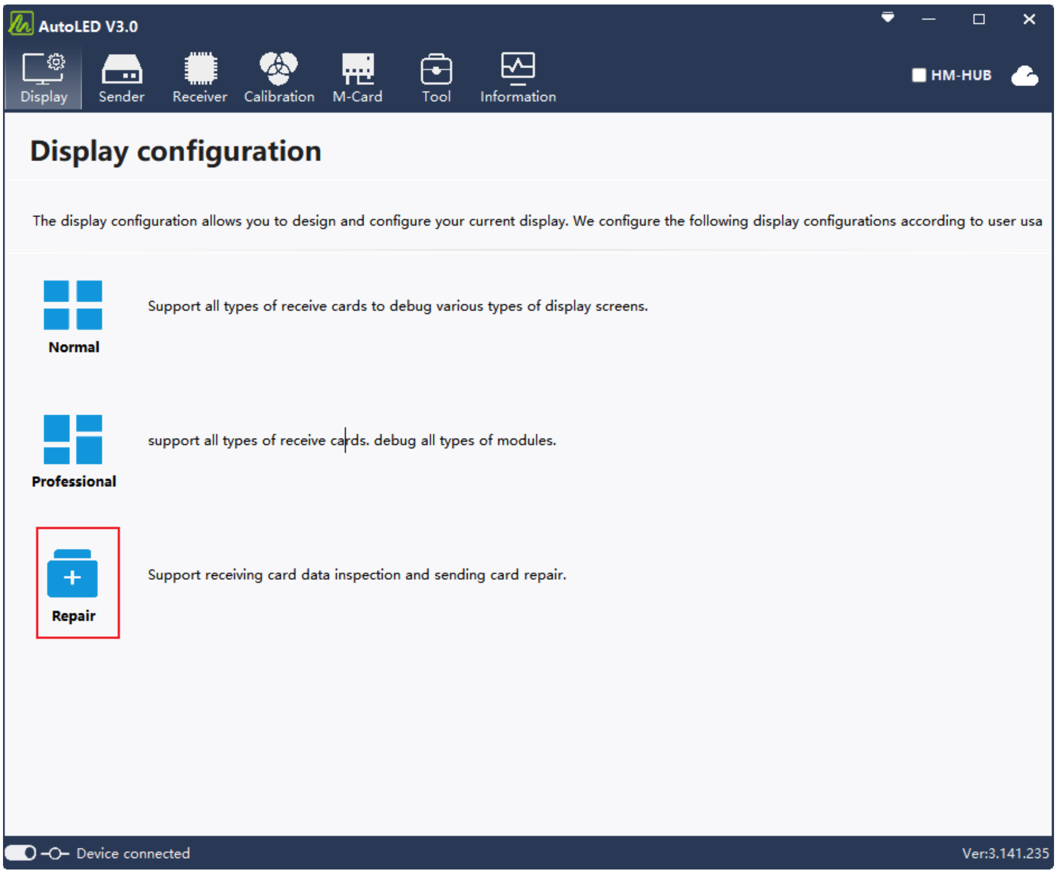



Figure 4-4-2 Configuration recovery (Repair)

Click Force Repair and wait until the status window reports Force Update > Complete.

## 4.5 Brightness Control

### 4.5.1 Manual Brightness Adjustment

Adjust the required brightness on the Brightness slider, then click Save to Hardware to store the value in the receiver card, as shown in Figure 4-5-1.

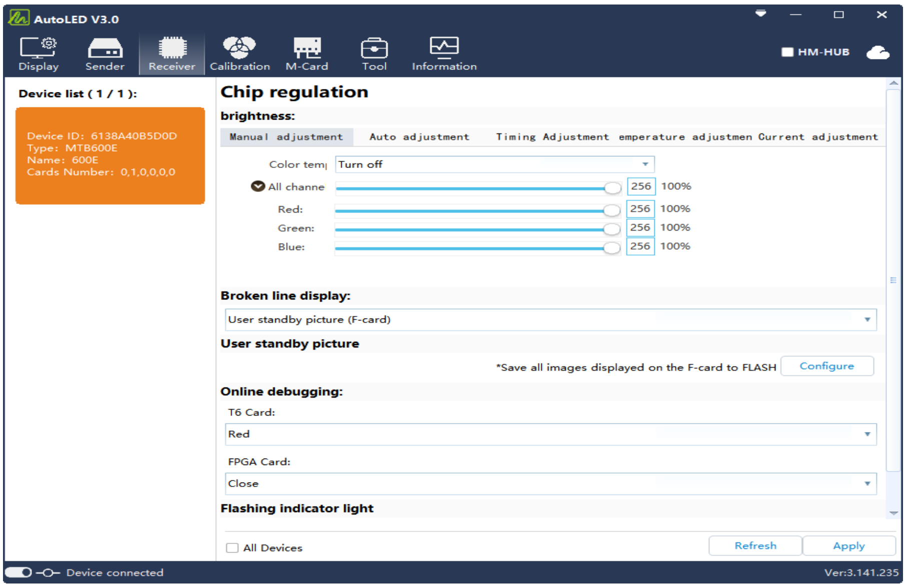



Figure 4-5-1 Receiver-card brightness adjustment

## 4.5.2 Automatic Brightness Adjustment

### Automatic brightness control

**AutoLED supports two ambient-light input methods:** (1) connect an ambient-light sensor to a multifunction card; or (2) connect an RS-485 ambient-light sensor to an expansion board. When the RS-485 sensor is communicating, the RS485 indicator on the keypad board flashes.

### Requirements and precautions

Automatic brightness control and temperature-based brightness control are mutually exclusive. Disable one function before enabling the other.

Commission automatic brightness control over the 100 Mbps Ethernet connection. USB commissioning does not support this function.

### Automatic brightness control for one LED sending controller

**As shown in Figure 4-5-2:** (1) click Automatic Adjustment on the Screen Control page; (2) enable automatic adjustment; (3) click Edit and configure the sensor and ambient-light range; and (4) define the segmented mapping between ambient illuminance and LED display brightness.

For a multifunction-card light sensor, follow Figure 4-5-3A. For a light sensor connected directly to an LED sending controller, follow Figure 4-5-3B.

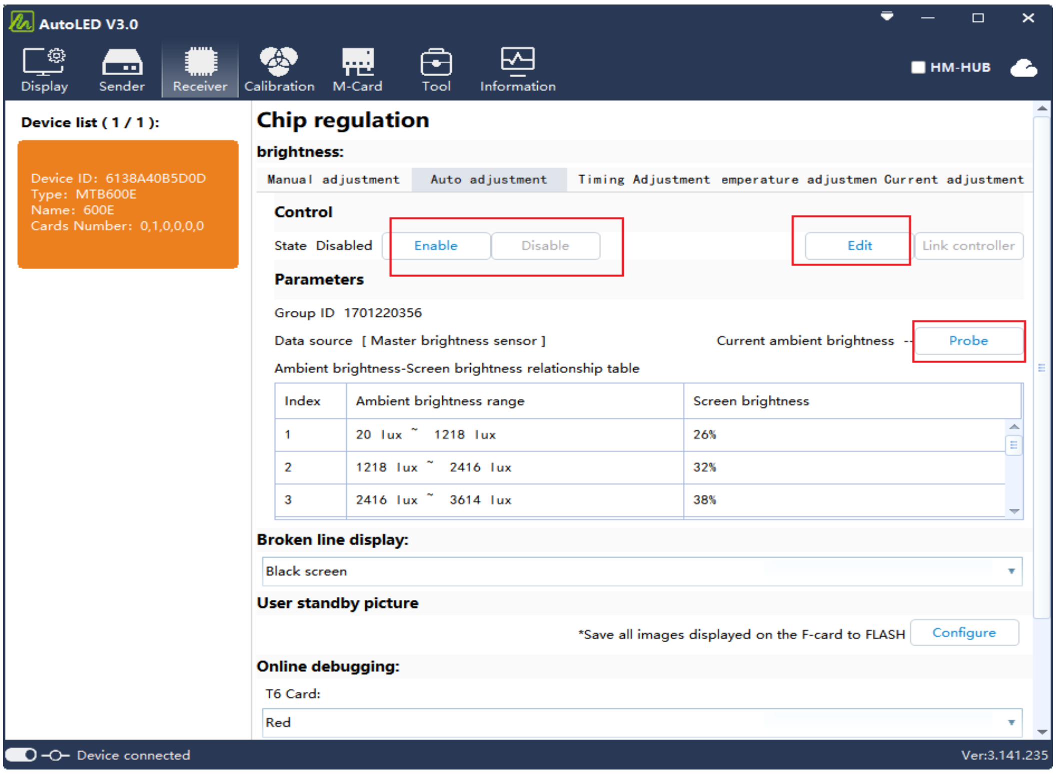



Figure 4-5-2 Automatic brightness adjustment

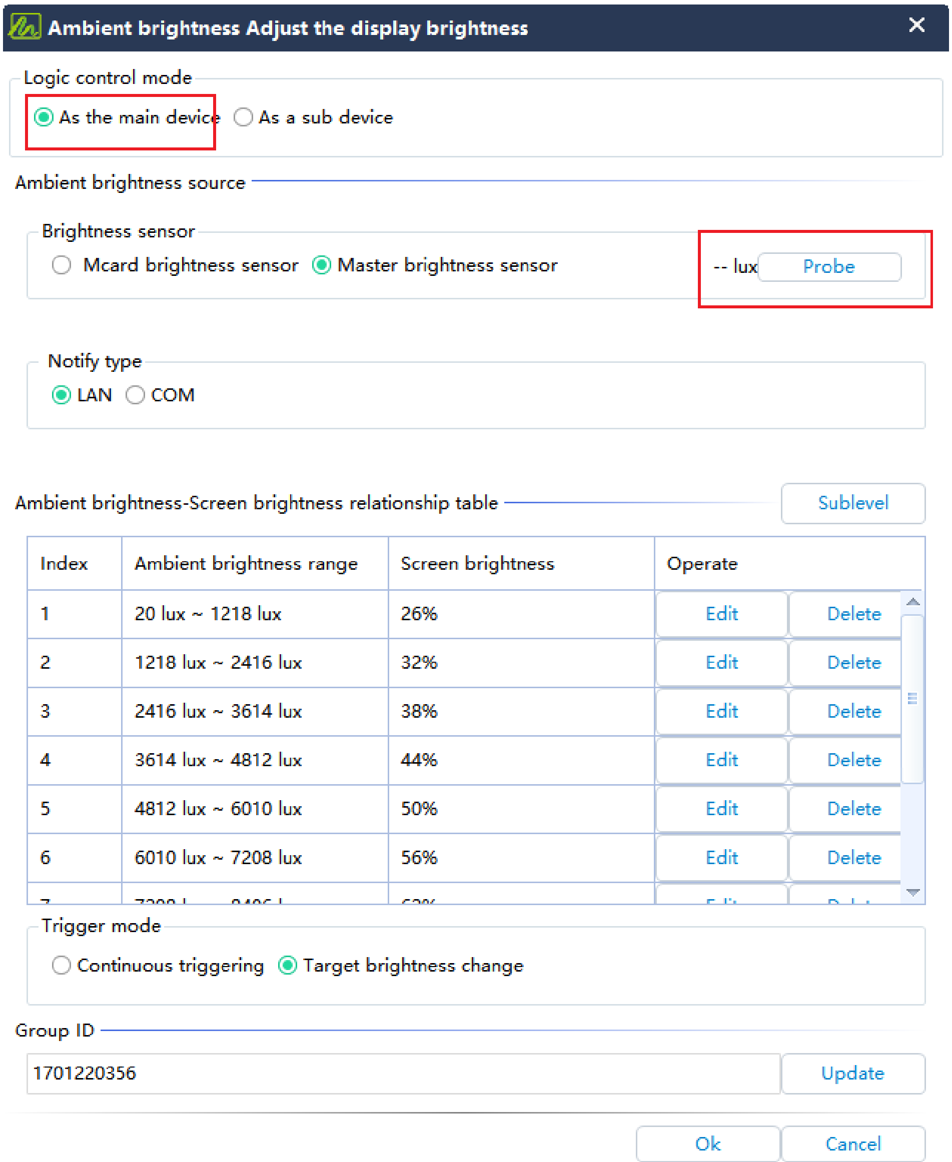



Figure 4-5-3A Multifunction-card ambient-light sensor

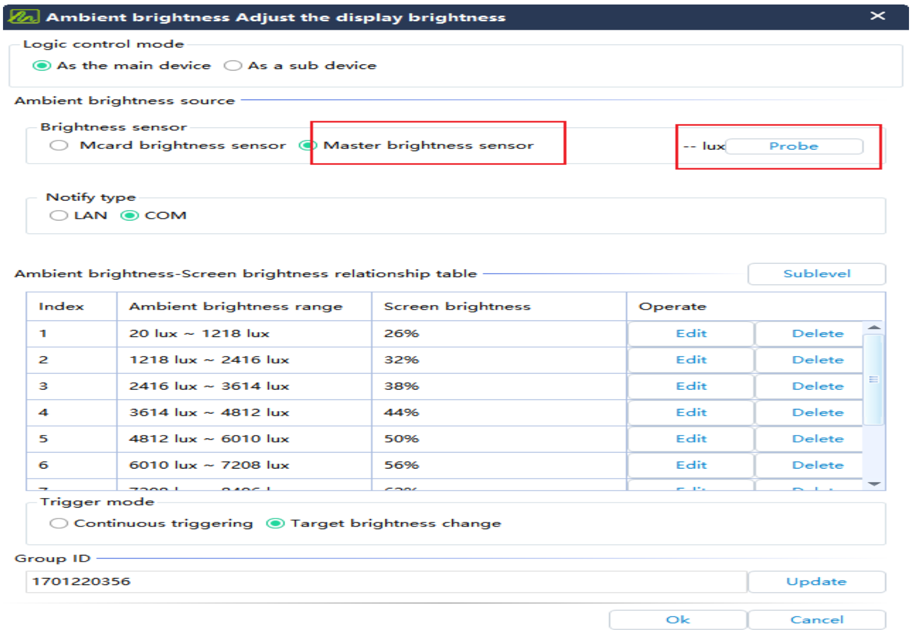



Figure 4-5-3B LED sending controller ambient-light sensor

(5) Click Detect beside Brightness Sensor to read the current sensor value. (6) For a multifunction-card sensor, click Detect beside Multifunction Card Address and select the correct card from the address list. A sensor connected directly to the LED sending controller does not require an address scan. (7) Select the method used to notify or cascade other LED sending controllers. For serial cascading, configure the serial port on the first controller as well, as shown in Figure 4-5-3C.

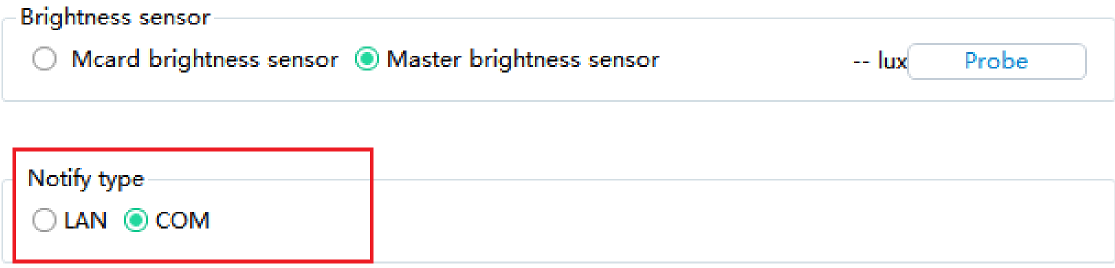



Figure 4-5-3C Controller cascading method

(8) Click Segments to open the ambient-light-to-screen-brightness mapping page. (9) Set the lower and upper limits for ambient light and screen brightness and enter the number of segments, as shown in Figure 4-5-3D.

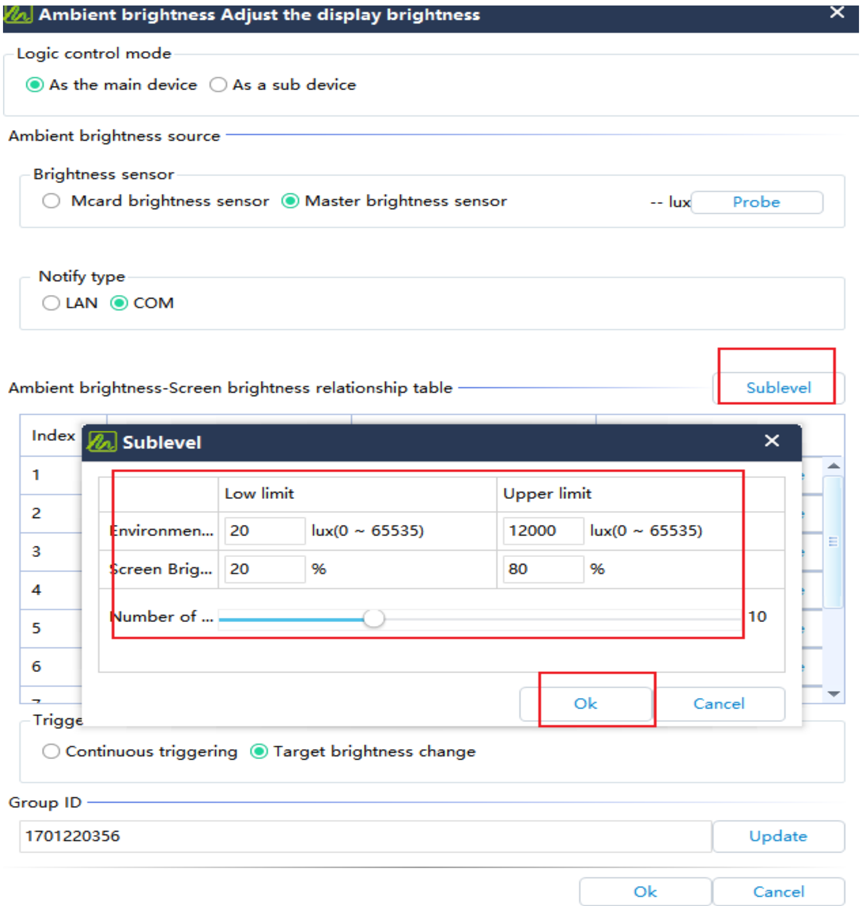



Figure 4-5-3D Brightness-mapping segments

(10) Select the trigger mode. Continuous Trigger applies the mapped screen brightness every 10 seconds. Target Brightness Change checks the ambient-light segment every 10 seconds and updates the display only when the sensor moves into a different segment. (11) Set the Group ID for coordinated multi-controller operation. (12) Click OK to save the settings.

### Linked automatic brightness control for multiple controllers

**Hardware requirement:** Connect all participating devices to the same local-area network.

First configure automatic brightness on one controller. On the Screen Control page, click Linked Devices, select LAN as the communication method, and click Detect, as shown in Figure 4-5-3E. Ensure every required device is enabled, then click Link. AutoLED assigns the devices a common Group ID automatically.

### Troubleshooting linked-device discovery

**If Linked Devices > Detect does not find the participating controllers:**

Confirm that every device is on the same LAN. If discovery still fails, set AutoLED's network-interface address to the PC's active local IPv4 address, following the illustrated procedure.

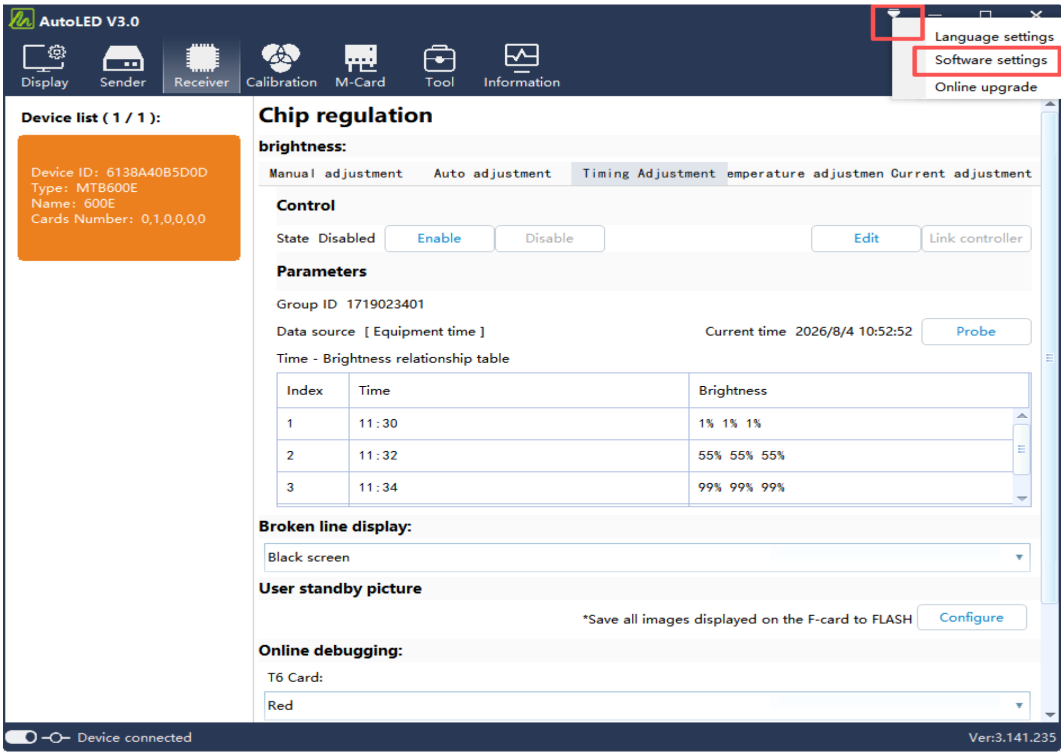



Figure 4-5-3E Linked-device discovery

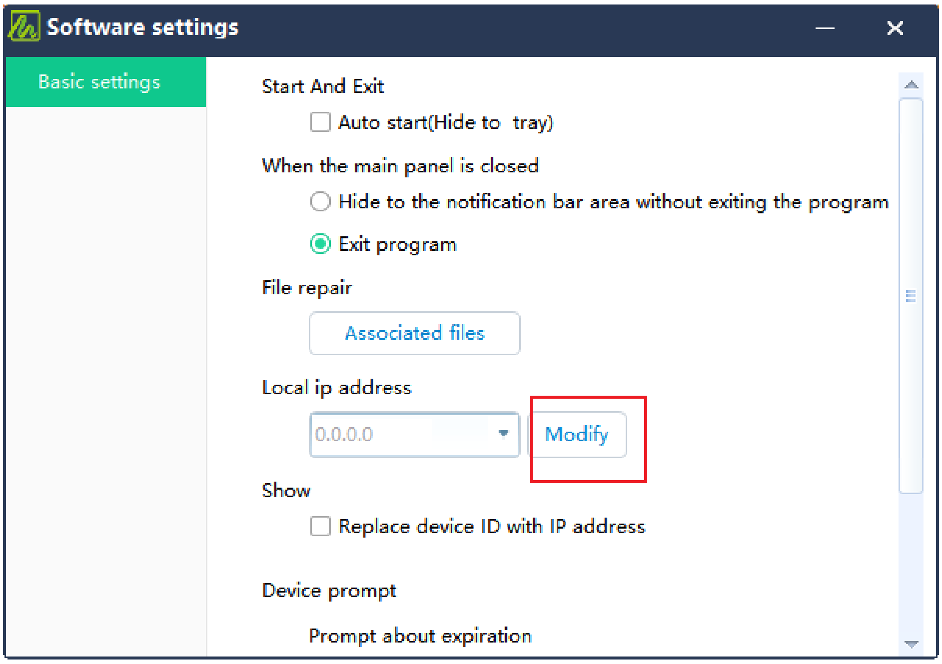



Figure 4-5-3F Selecting the active PC network interface

### 4.5.3 Scheduled Brightness Adjustment

As shown in Figure 4-5-4, open Scheduled Adjustment, enable the function, click Edit, click Add, enter the date, time, and brightness value, then click OK.

**CONNECTION REQUIREMENT**

Disconnect the USB commissioning cable before using scheduled brightness adjustment.

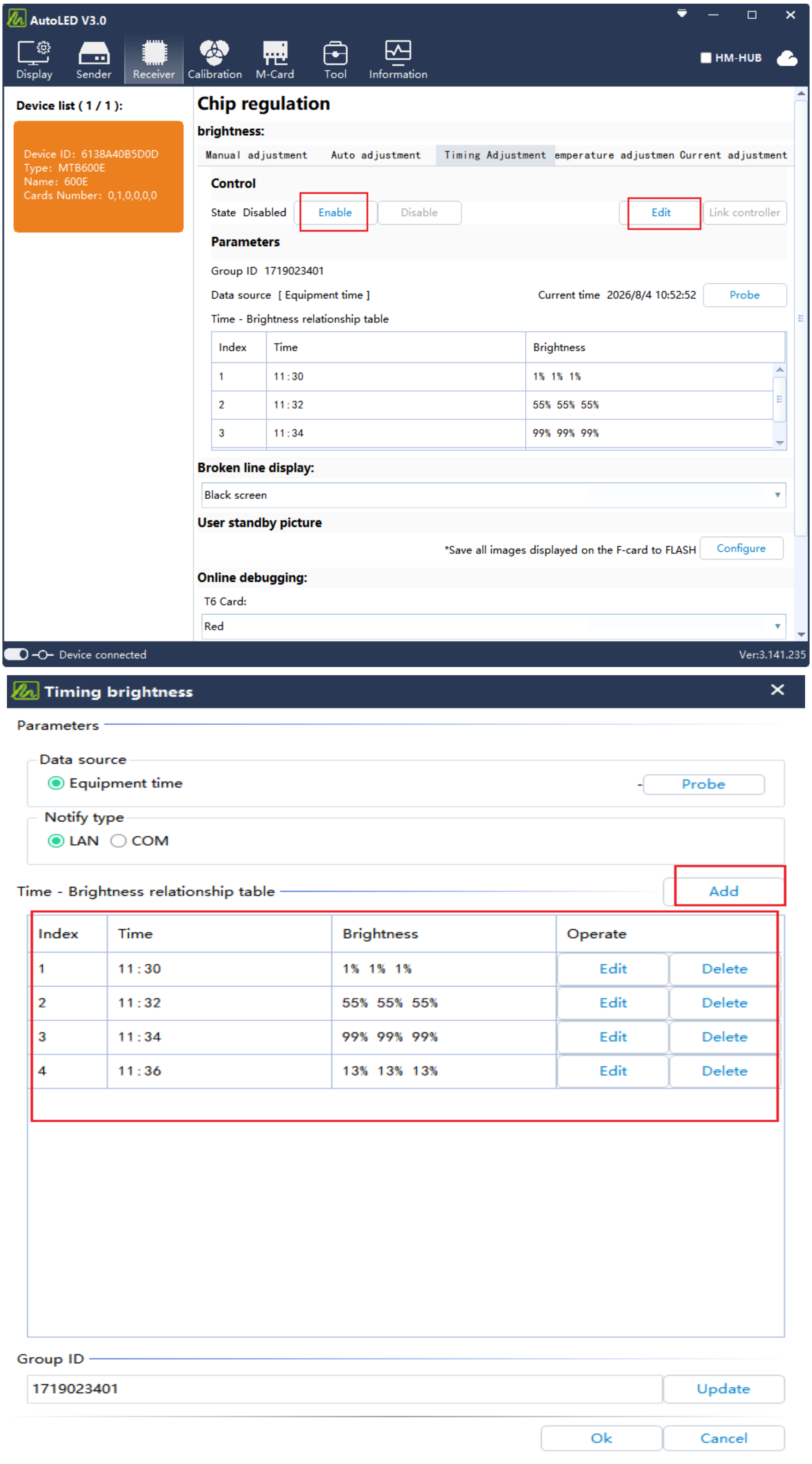



Figure 4-5-4 Scheduled brightness adjustment

### 4.5.4 Temperature-Based Brightness Control

Temperature-based control uses either an external temperature probe connected to a multifunction card or the multifunction card's onboard sensor. AutoLED maps measured temperature to LED display brightness. The operating requirements are the same as those for automatic ambient-light control.

Temperature-based brightness control and automatic ambient-light control affect the same output. Disable automatic brightness adjustment before enabling temperature control.

Commission temperature-based control over the 100 Mbps Ethernet connection. USB commissioning does not support this function.

**Configuration procedure:** (1) click Screen Control to open the sensor-control page; (2) select Temperature Adjustment; (3) click Edit; (4) click Detect to locate the multifunction card; (5) select External Sensor or Onboard Sensor; (6) click Detect to read the current temperature; (7) click Segments to open the temperature-to-brightness mapping page; (8) set the lower and upper temperature and brightness limits and the number of segments; (9) select Continuous Trigger to apply the mapped brightness every 10 seconds, or Target Brightness Change to update brightness only when the temperature enters a different segment; (10) set the Group ID for coordinated multi-controller operation; and (11) click OK.

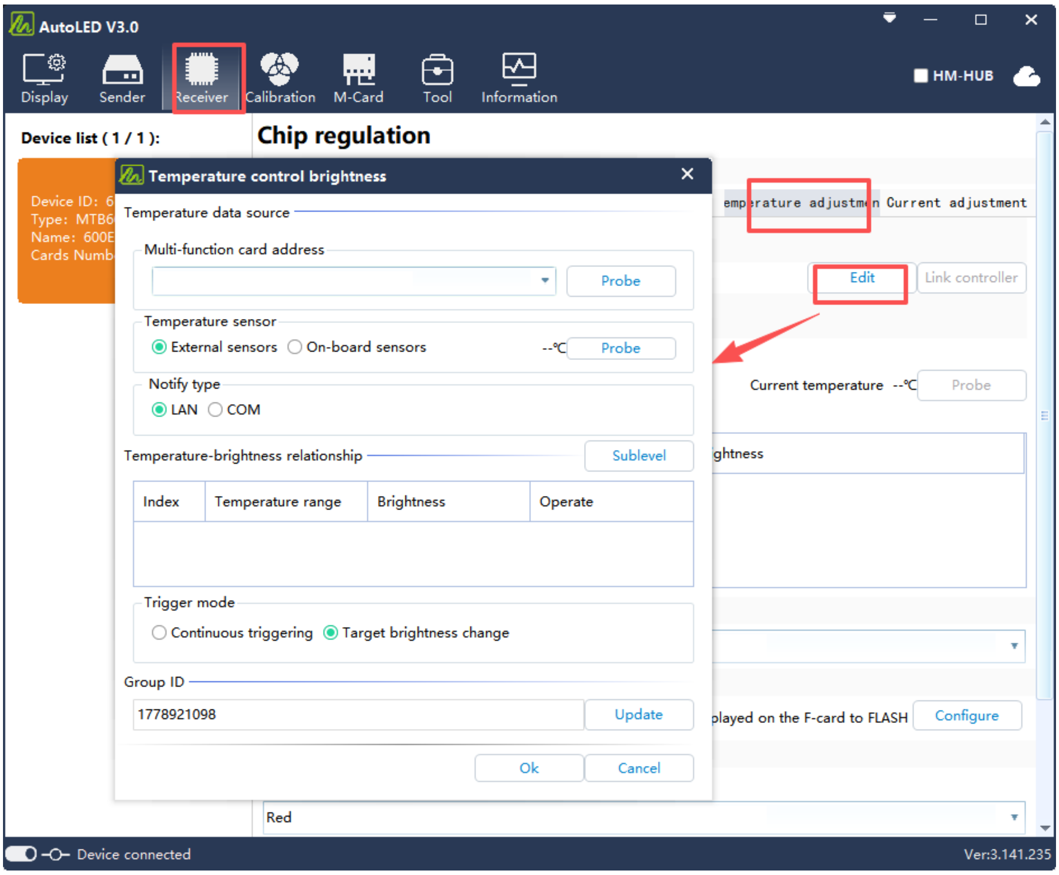



Figure 4-5-5A Temperature-adjustment settings

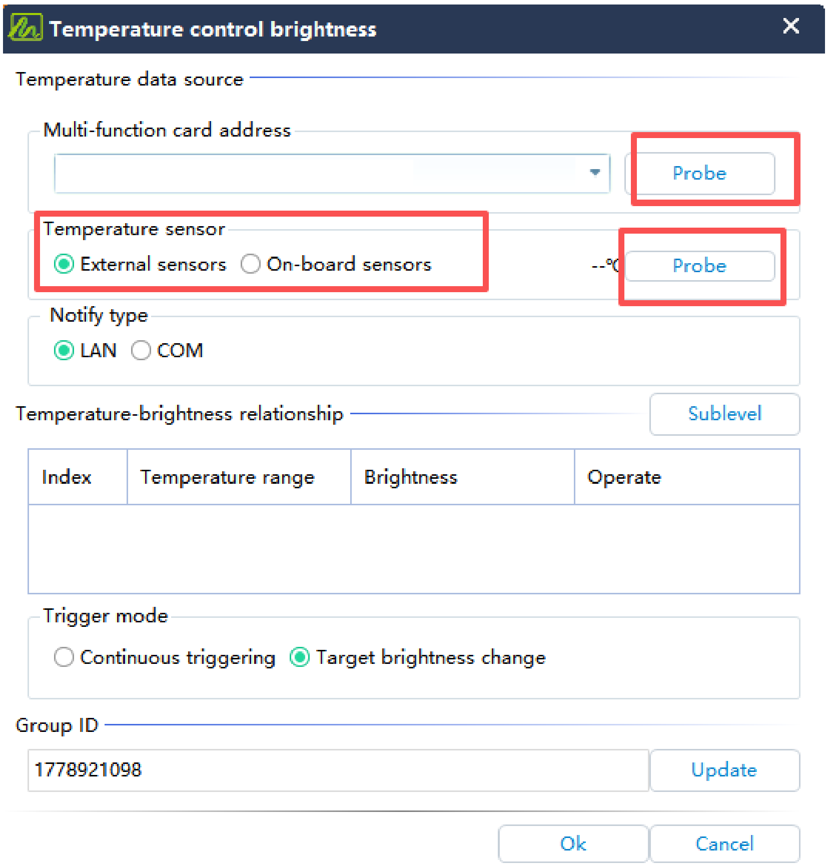



Figure 4-5-5B Multifunction-card and temperature-sensor selection

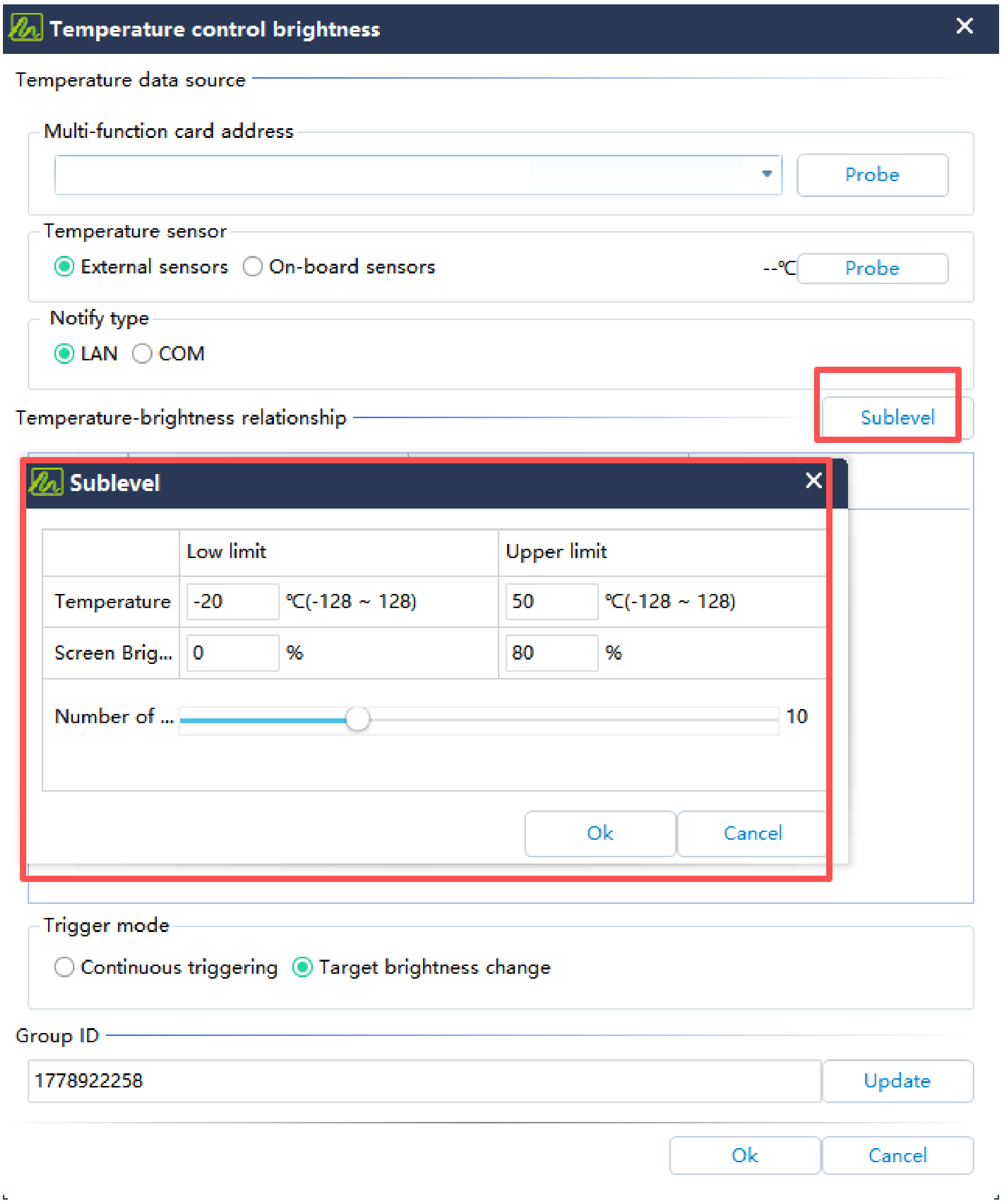



Figure 4-5-5C Temperature-to-brightness mapping

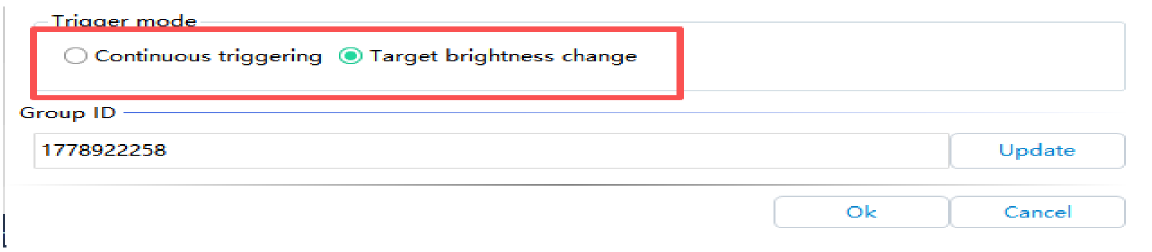



Figure 4-5-5D Linked temperature-control devices

### Linked temperature control for multiple controllers

Connect all participating devices to the same LAN. After configuring temperature control on one controller, click Linked Devices on the Temperature Adjustment page, select LAN, and click Detect. Enable the required devices and click Link; AutoLED assigns them a common Group ID automatically. Click OK to save the linked configuration.

## 4.6 Display Behavior and Online Diagnostics

### 4.6.1 Display on Communication Loss

Display on Communication Loss (labeled Broken line display in the interface) defines what the receiver cards show if data communication with the LED sending controller is interrupted. The interface provides Black screen, Standby mode, Last frame, Standby image (user)/Automatic testing, and User standby picture (F-card), as shown in Figure 4-6-1-1. For the first four options, complete the configuration and click Save to Hardware. User standby picture (F-card) currently requires an L8S V3.0.0 64M F-series receiver card running compatible firmware. Select Broken line display > User standby picture (F-card) > Configure, as shown in Figure 4-6-1-2.

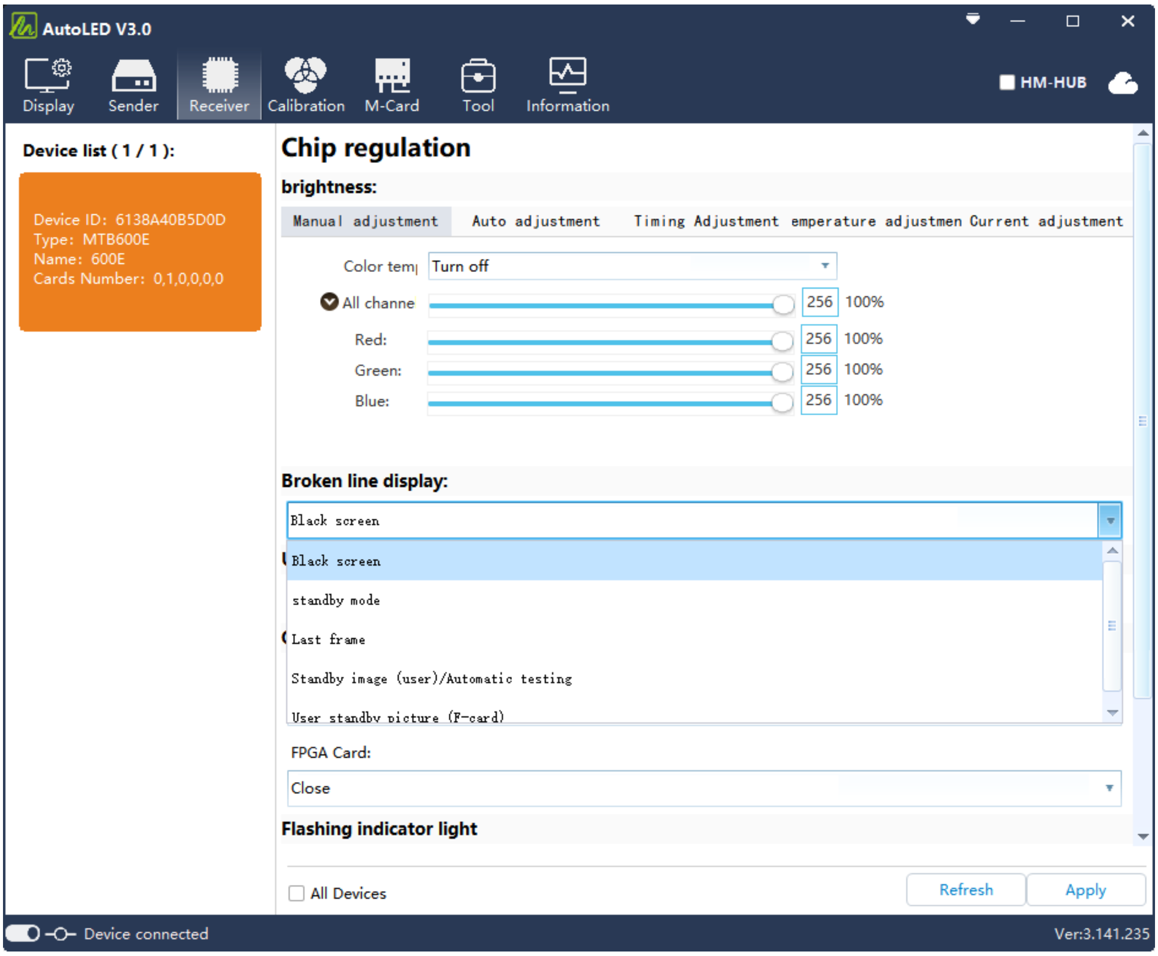



Figure 4-6-1-1 Display behavior on communication loss

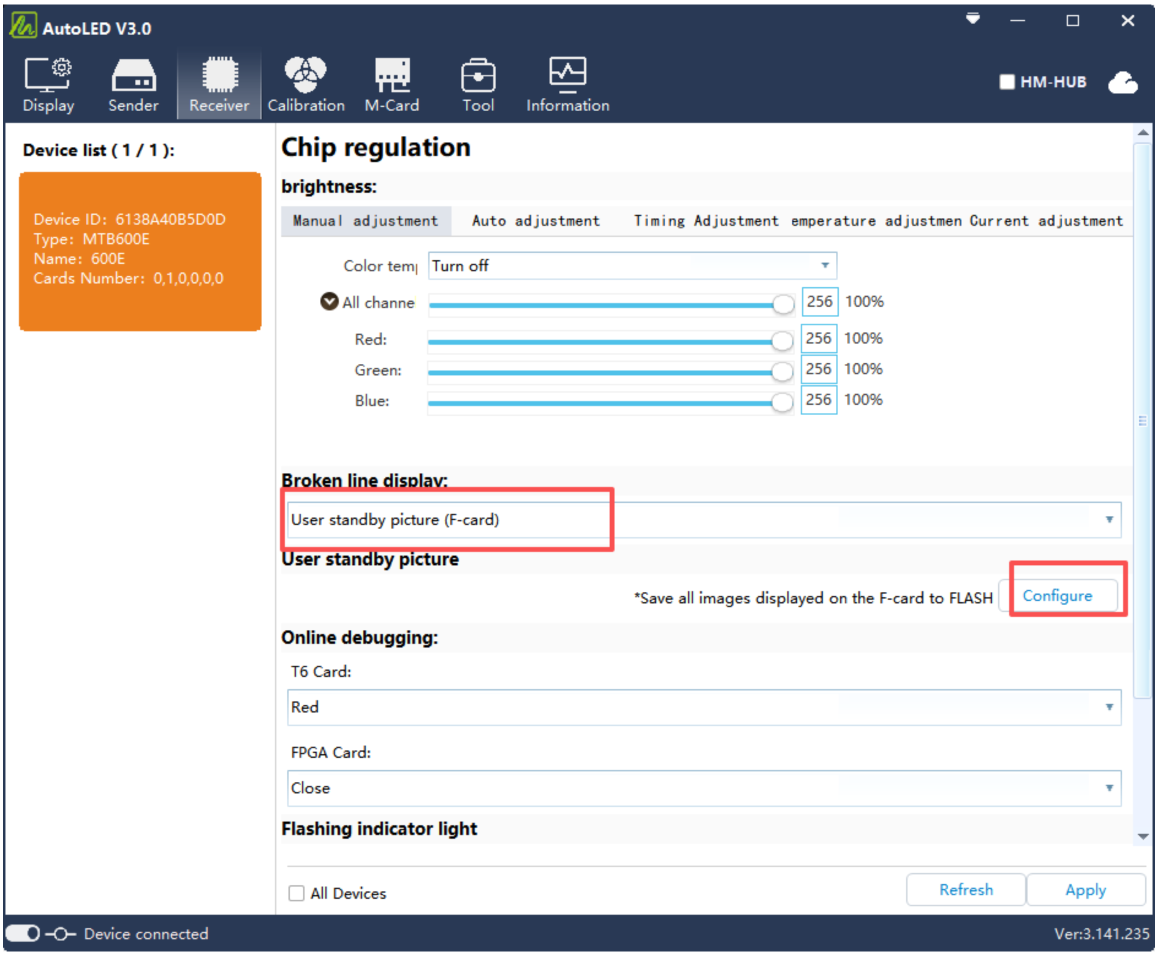



Figure 4-6-1-2 F-card user standby image

## 4.6.2 Online Debugging

Online Debugging controls the receiver-card indication shown while the card remains connected. T6 and FPGA receiver cards use the same workflow. On Screen Control > Manual Adjustment, open the Online Debugging list for the receiver-card type, select the required identification pattern, and click Save to Hardware, as shown in Figure 4-6-2.

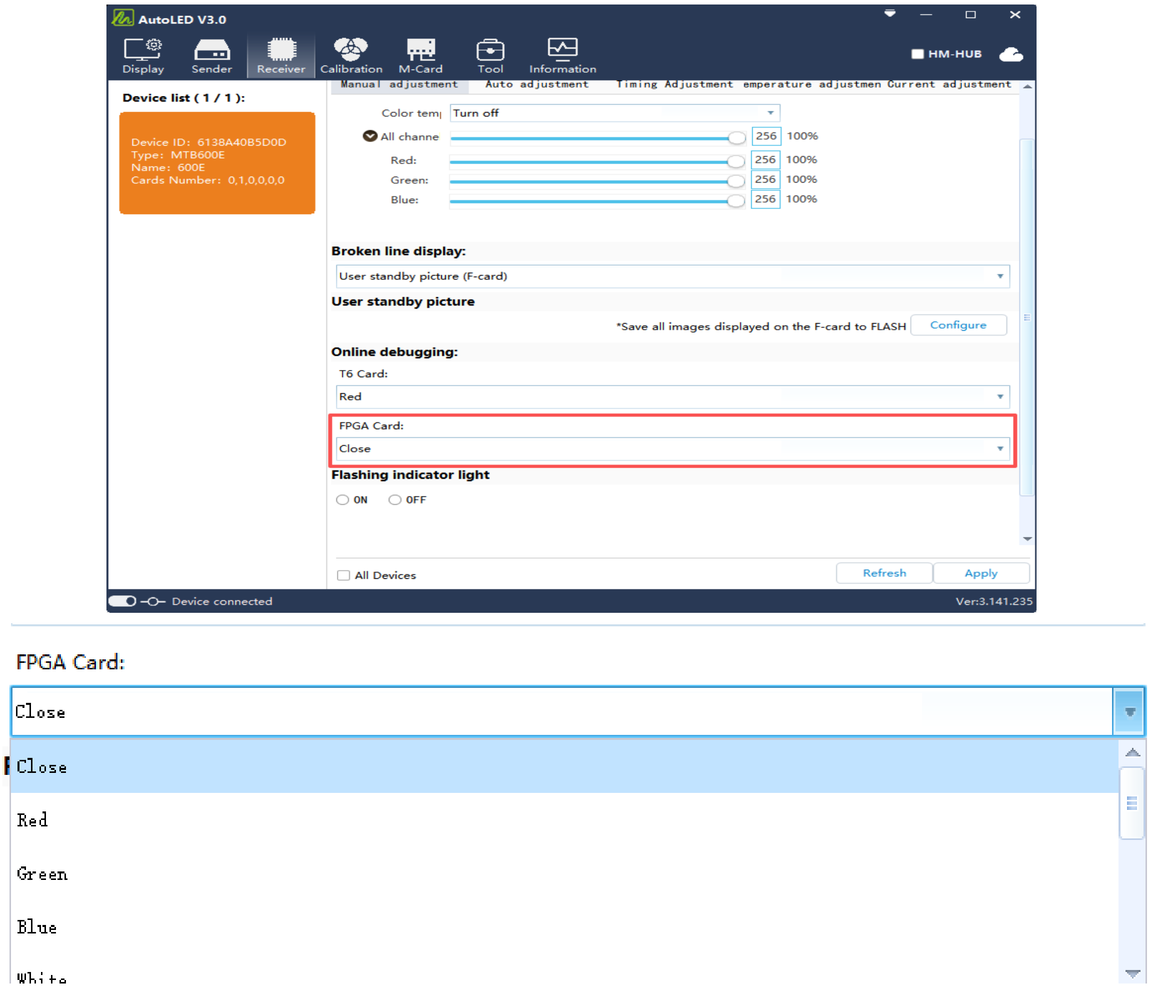



Figure 4-6-2 Receiver-card online debugging

## 4.7 Ethernet and DVI Redundancy

**Ethernet-loop redundancy:** Connect the receiver cards in a closed Ethernet loop. Connect the two ends of the loop to the primary and backup outputs of the LED sending controller. If one cable in the loop fails, the controller takes over the receiver cards downstream of the fault so the LED display continues operating.

**Single-Controller Redundancy:** When one LED sending controller uses only one Ethernet output for the display, its second output can provide automatic backup. For displays exceeding approximately 650,000 pixels, use dual-controller redundancy. After commissioning, connect the return cable from the receiver-card loop to the controller's second output, as shown in Figure 4-7-1.

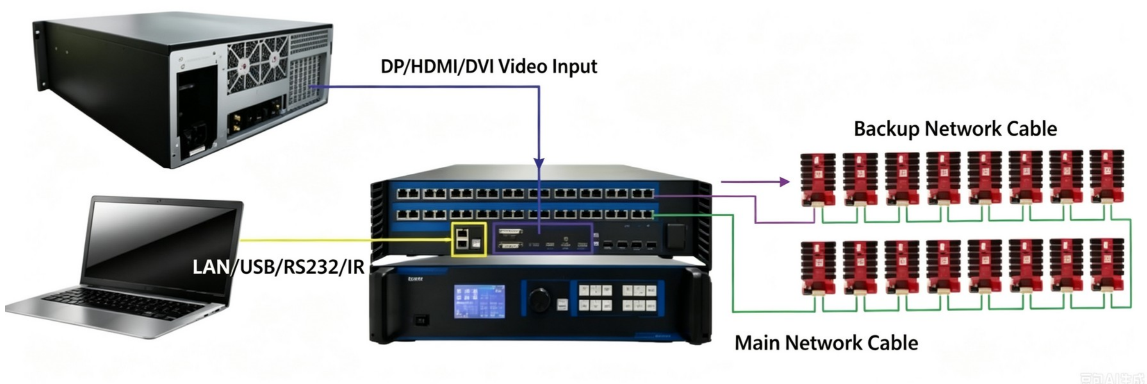



Figure 4-7-1 Single-controller Ethernet-loop redundancy

**Dual-Controller, Matching-Output Redundancy:** When the primary LED sending controller uses two Ethernet outputs, connect the two return cables to the corresponding outputs of the backup controller, as shown in Figure 4-7-2. Initially disconnect the backup controller's return cables. After commissioning the primary controller, send the saved screen-connection file to the backup controller and save it to hardware. Reconnect the return cables to complete the redundant loop.

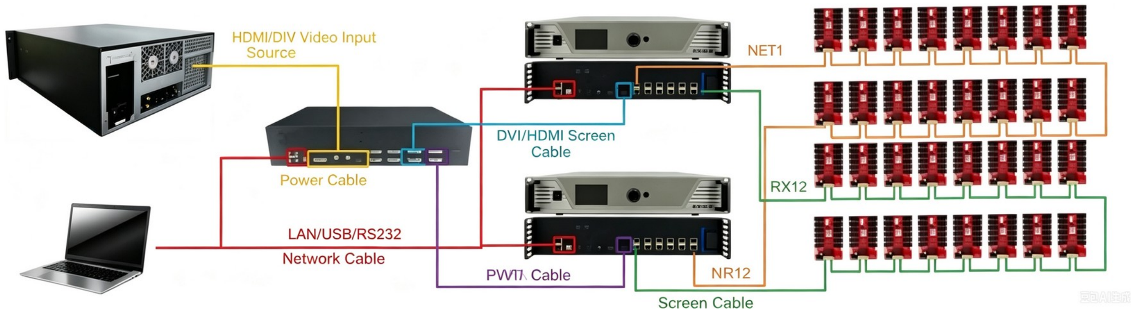



Figure 4-7-2 Dual-controller, matching-output redundancy

**Dual DVI Redundancy:** DVI input redundancy is available only with a dual-controller backup configuration. Complete the dual-controller Ethernet backup, then feed an independent DVI signal to each controller, as shown in Figure 4-7-3.

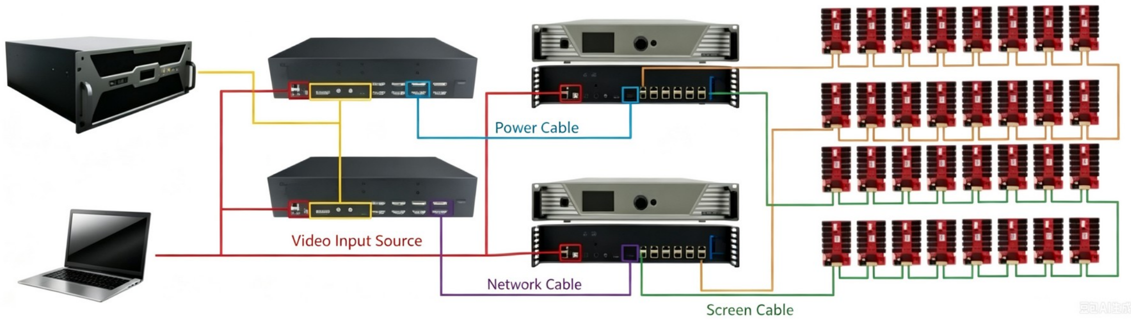



Figure 4-7-3 Dual DVI input redundancy

If the DVI signal from Video Processor 1 to LED Sending Controller 1 is lost, the system automatically changes to the DVI path from Video Processor 2 through LED Sending Controller 2.

## 4.8 Calibration

### 4.8.1 Prepare and Load Calibration Data

All LED displays have some luminance and color non-uniformity when manufactured. Differences in LED aging and operating conditions increase this non-uniformity over time. Pixel-level calibration compensates for these differences and restores a more uniform display. This section explains how to prepare and load calibration data in AutoLED.

Calibration capability must first be enabled in the cabinet configuration. On the Receiver-Card page, select the required calibration type, send the configuration, save it to hardware, and then complete the screen connection. Select Brightness Calibration for luminance-only correction. Select Chromaticity Calibration for chromaticity correction or combined brightness-and-chromaticity correction, as shown in Figure 4-8-1.

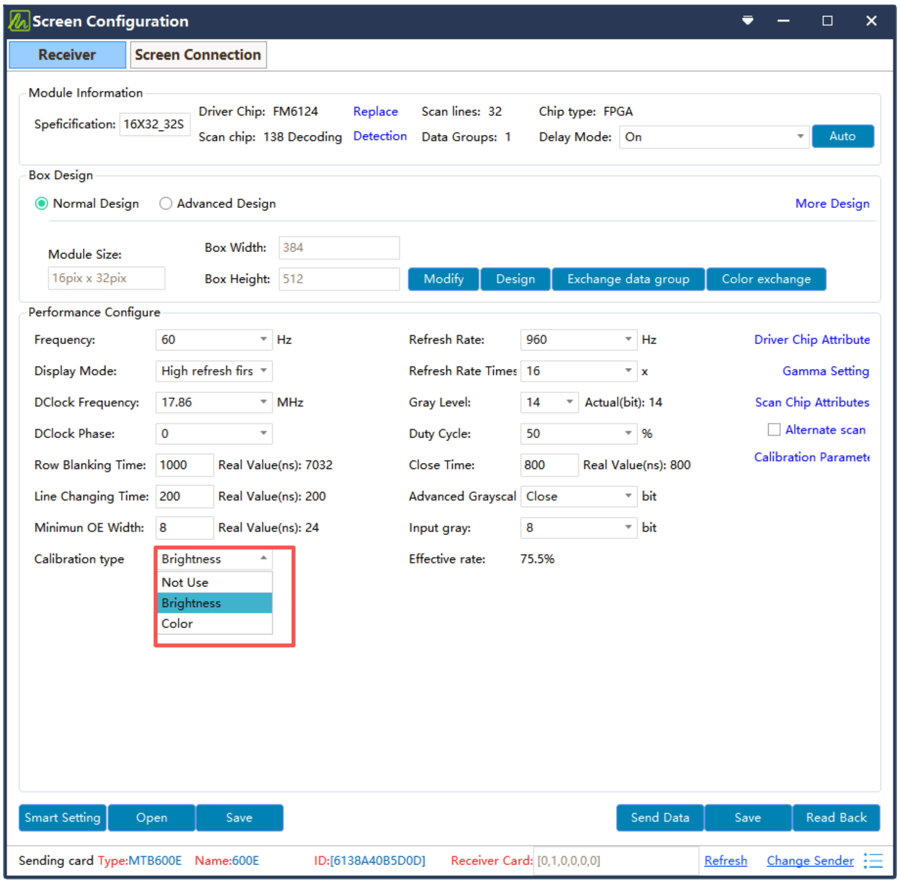



Figure 4-8-1 Calibration-type selection

**Module Flash calibration storage:** If each LED module includes Flash memory for calibration data, define the Flash-memory layout on the Receiver-Card page. The entry point is shown in Figure 4-8-2.

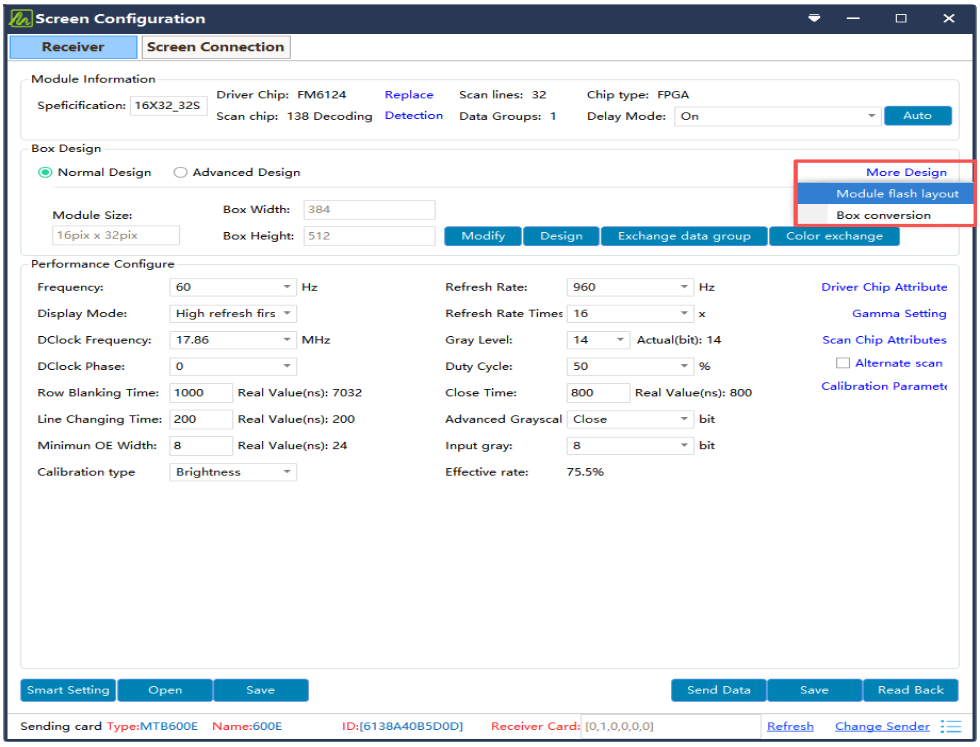



Figure 4-8-2 Module Flash layout - entry point

In Module Flash Layout, add each Flash device and enter its X and Y position, bus address, and covered pixel area according to the module design, as shown in Figure 4-8-3.

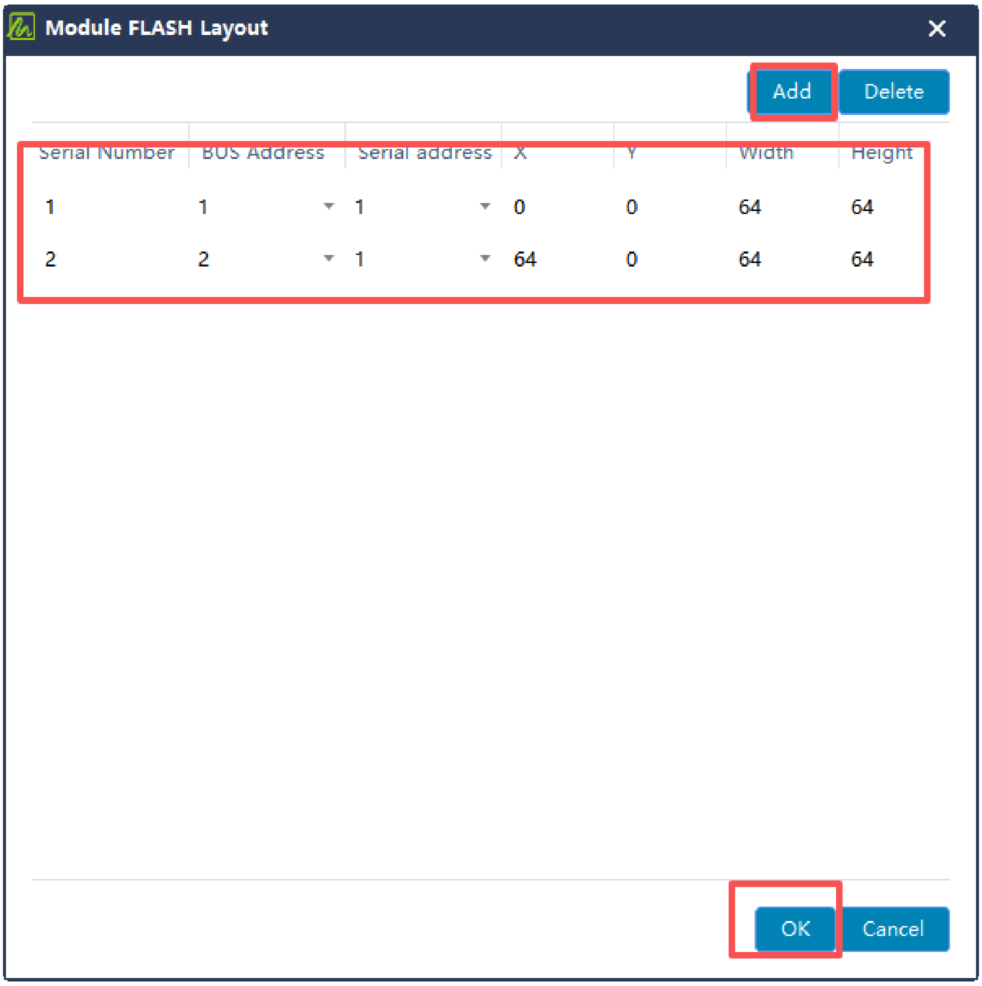



Figure 4-8-3 Module Flash layout

### 4.8.2 Standard Calibration

A calibration file uses the .ccd format. It may be created by manual editing in calibration software or generated from brightness and chromaticity measurements captured from the LED display. Use the following procedure.

- Click Calibration File > Load and select the .ccd calibration file.
- After the file loads, click Send Data to transmit the calibration coefficients to the receiver cards.
- Enable Calibration Control and verify the result on the display.
- If the result is correct, click Save to Hardware to store the calibration coefficients in the receiver cards.
- If the hardware supports LED-module Flash memory, calibration data can also be saved to or loaded from the module.
- **Seam Correction:** Enable or disable edge/seam compensation as required.

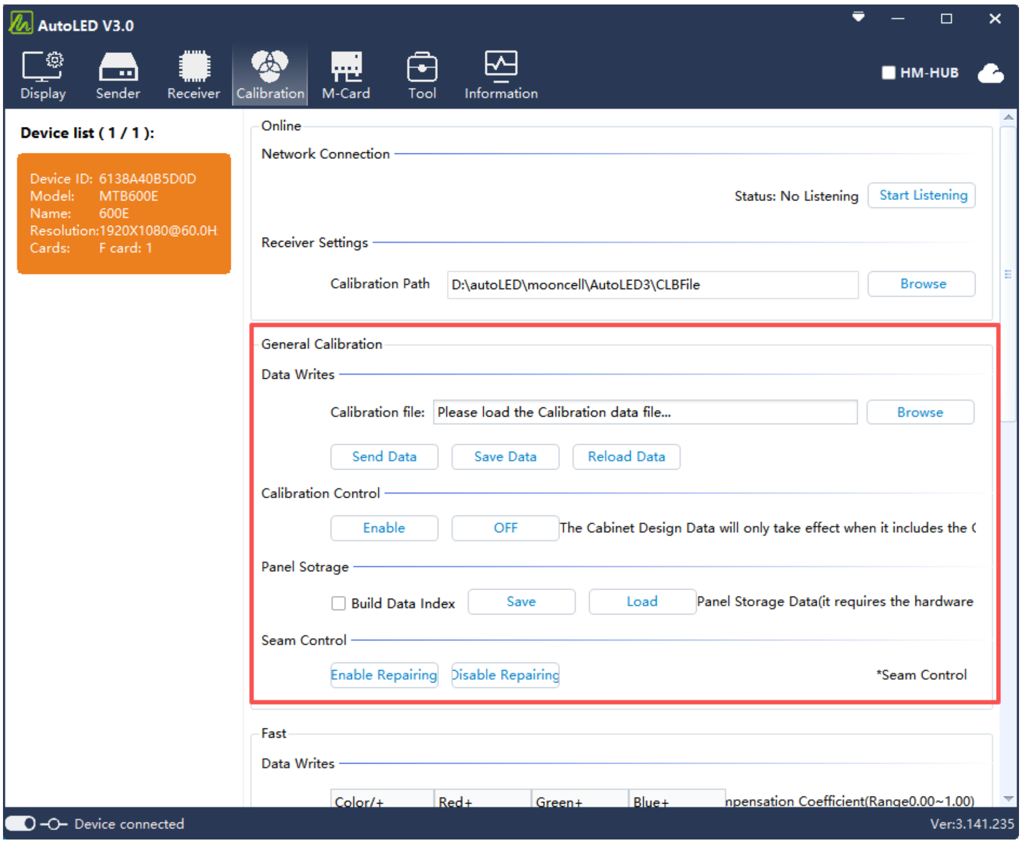



Figure 4-8-4 Loading and applying standard calibration data

### 4.8.3 Quick Calibration

Adjust the compensation coefficient and click Send Data. When transmission is complete, select Calibration Control > Enable and verify the result. If the result meets the requirement, click Save to Hardware to store the coefficients in the receiver cards, as shown in Figure 4-8-5.

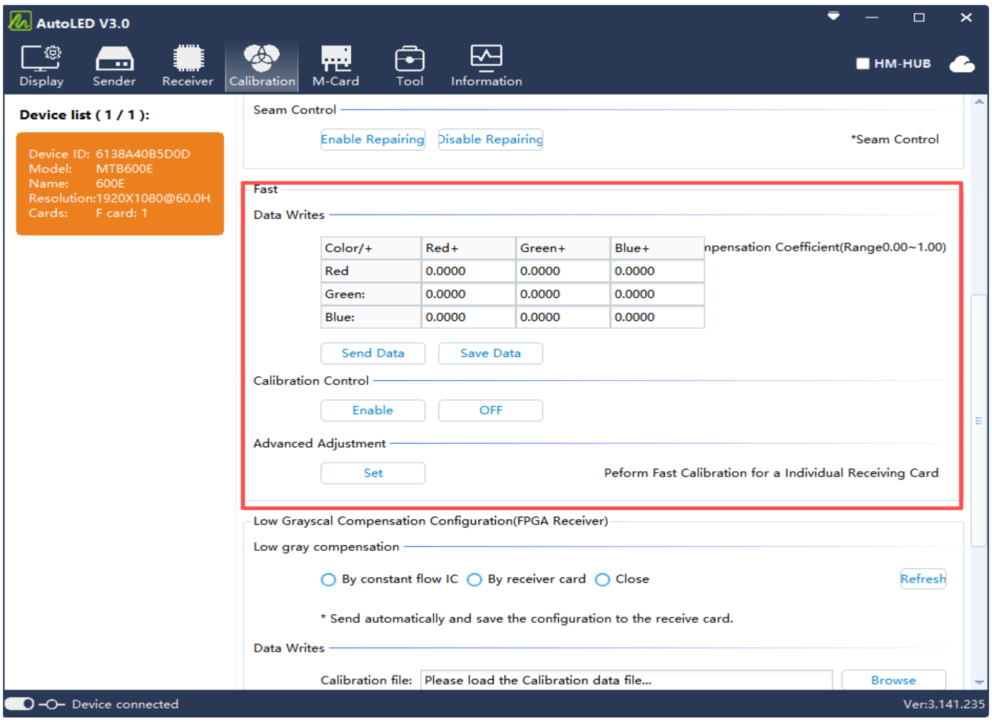



Figure 4-8-5 Quick Calibration

If the calibrated display contains several cabinet production batches, select Advanced Adjustment and click Advanced Adjustment > Settings to open Quick Adjustment - Advanced Configuration, as shown in Figure 4-8-6. Refresh the receiver-card list, select the required cards and cabinet-batch number, edit and send the current batch data, and verify every batch. Then send all batch data to the receiver cards and save it to hardware. Batch data may also be saved locally for later reuse.

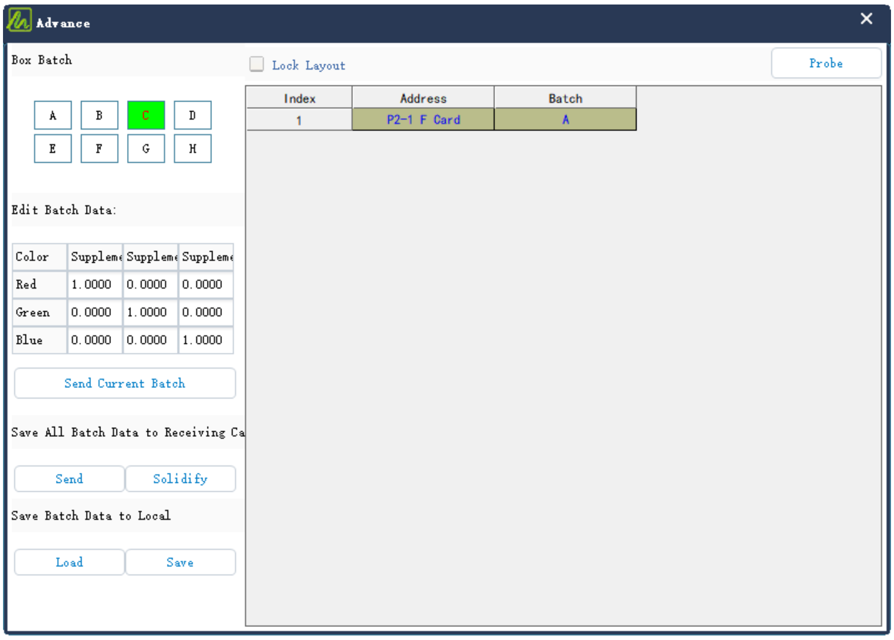



Figure 4-8-6 Quick Calibration - advanced configuration

### 4.8.4 Low-Gray Compensation

#### FPGA receiver-card low-gray compensation

FPGA low-gray compensation requires compatible receiver-card firmware. Select Constant-Current Driver IC Implementation, Receiver-Card Internal Low-Gray Compensation, or No Low-Gray Compensation according to the hardware. Load the low-gray calibration data, send it, verify the result, and save it to hardware.

#### T6 receiver-card low-gray compensation

Select Calibration Control > Enable. In the Data Write window, set Threshold from 0 to 1023, Range L1 from 0 to 128, and Range L2 from 0 to 128. Click Start Write after completing the settings, as shown in Figure 4-8-7.

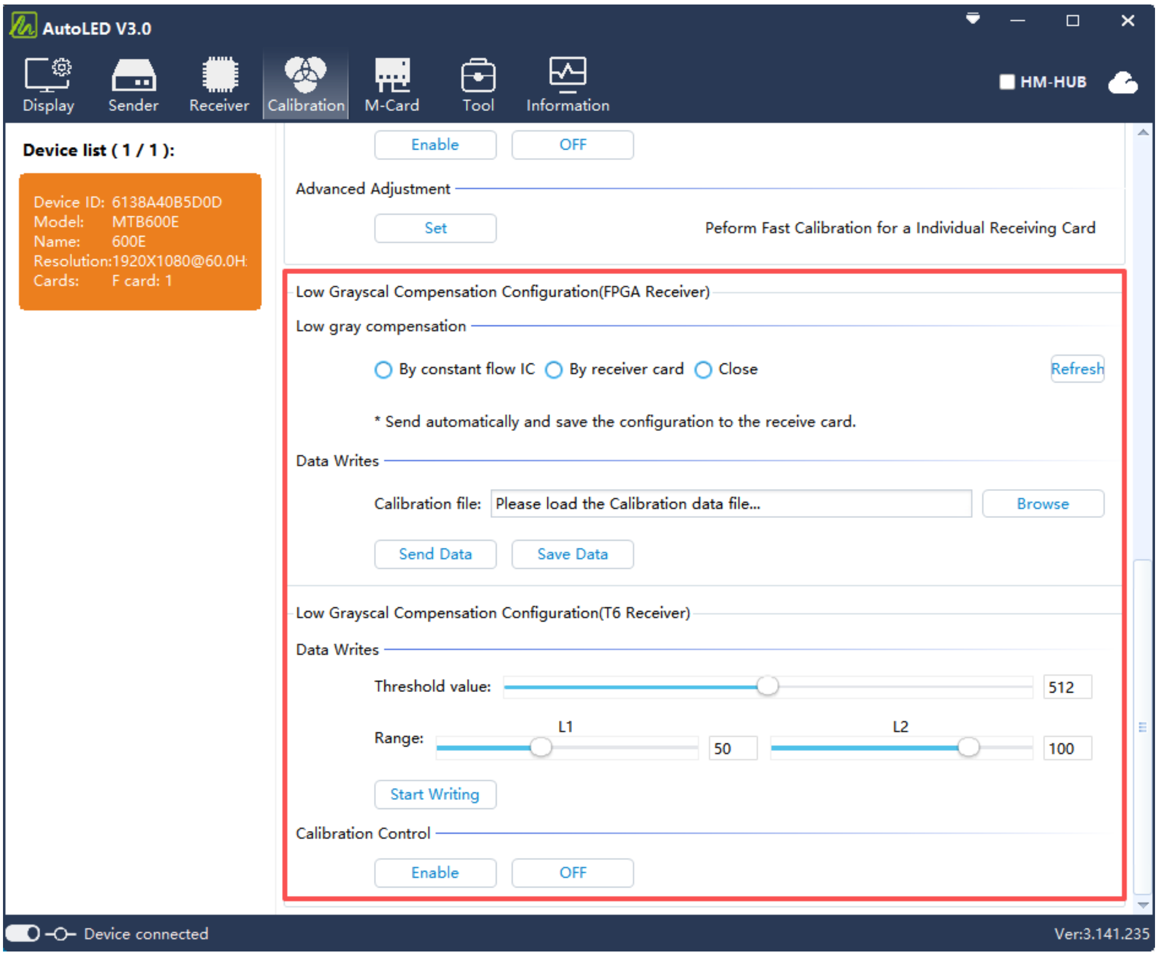



Figure 4-8-7 Low-gray compensation configuration

# 5. Tools

## 5.1 Image Test

The Image Test utility displays test patterns for checking LED-screen mapping, image quality, and burn-in performance. On the AutoLED home page, select Tool > Image Test. In the LED DISPLAY CHECKER window, choose Color, Gamma, Aging Testing, Fixed Position, or Scan and configure the required pattern. Use Image Test to verify 1:1 pixel mapping, locate display-position errors, and assess brightness, grayscale, color, and scan performance, as shown in Figures 5-1-1 and 5-1-2.

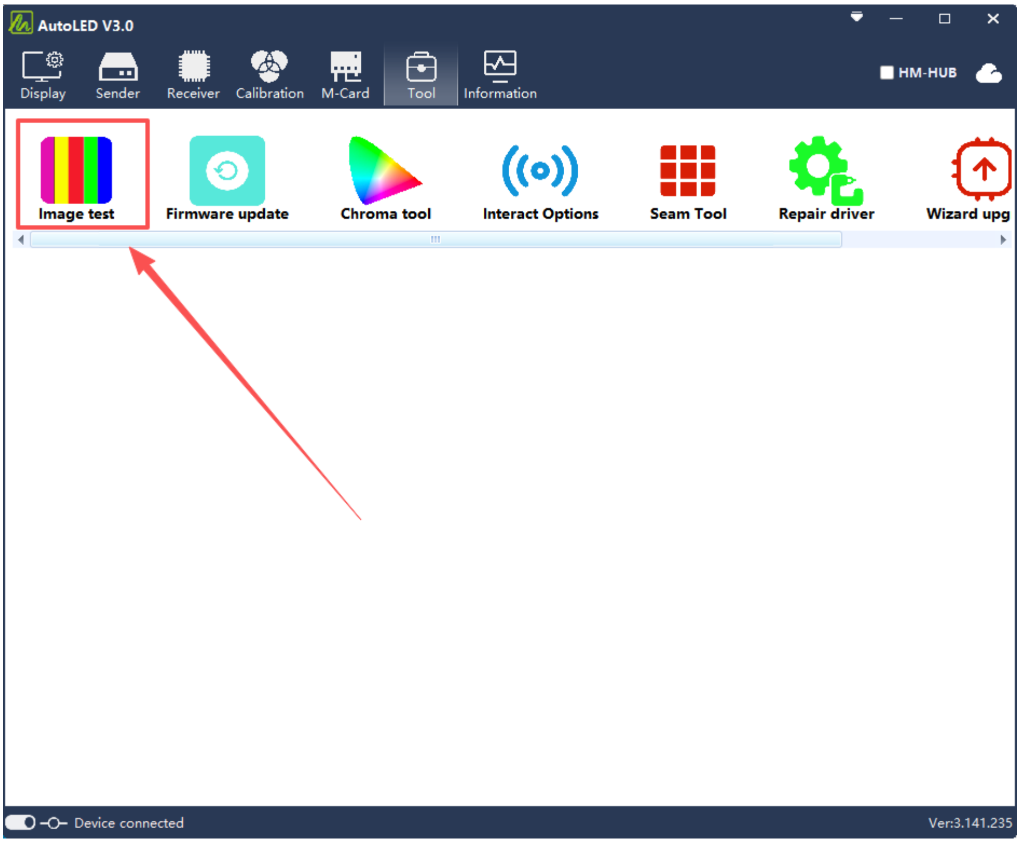



Figure 5-1-1 Selecting Image Test

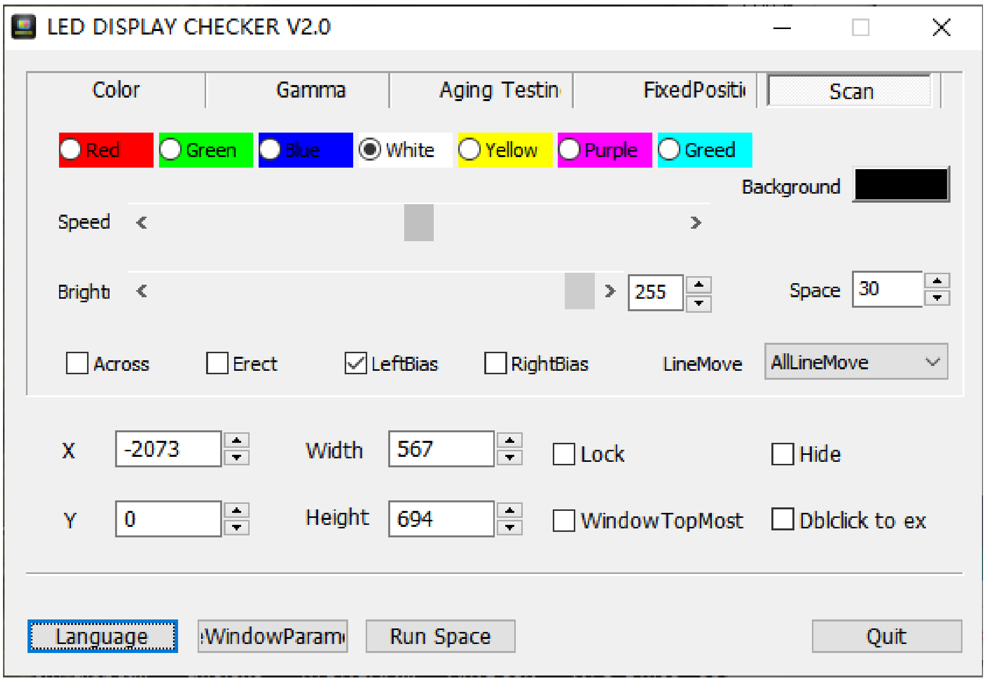



Figure 5-1-2 Image Test controls

## 5.2 Firmware Update

On the AutoLED home page, select Tool > Firmware Update to open the firmware-maintenance window. Use this module to update receiver cards and other receiver-side devices, LED sending controllers, and splicers. Before updating, verify that the firmware package matches the exact device model and hardware platform. Do not disconnect power or data cables during an update, as shown in Figure 5-2.

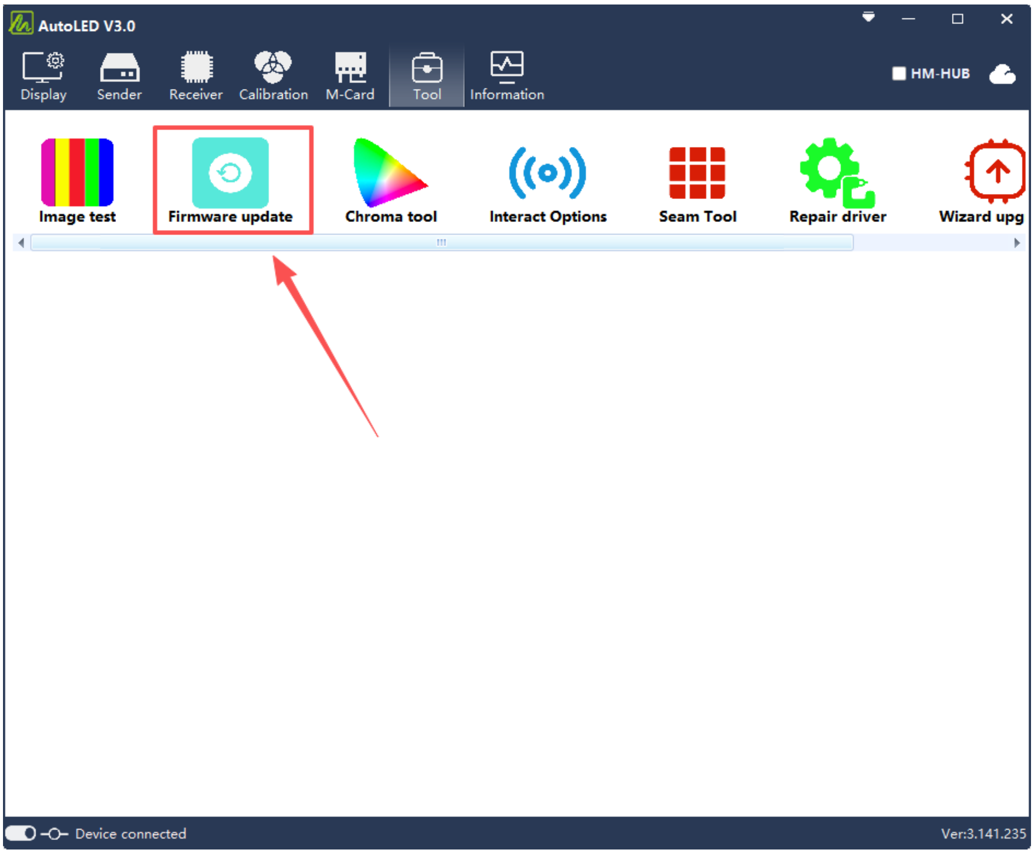



Figure 5-2 Selecting Firmware Update

### 5.2.1 Update Receiver-Side Device Firmware

In the Firmware Update window, select Upgrade rcard (the interface label for receiver-side device updates). Select the LED sending controller from Master controller list, click Refresh, then choose the required Sub controller type: F-Card, T6-Card, M-Card, or HUB, as shown in Figure 5-2-1.

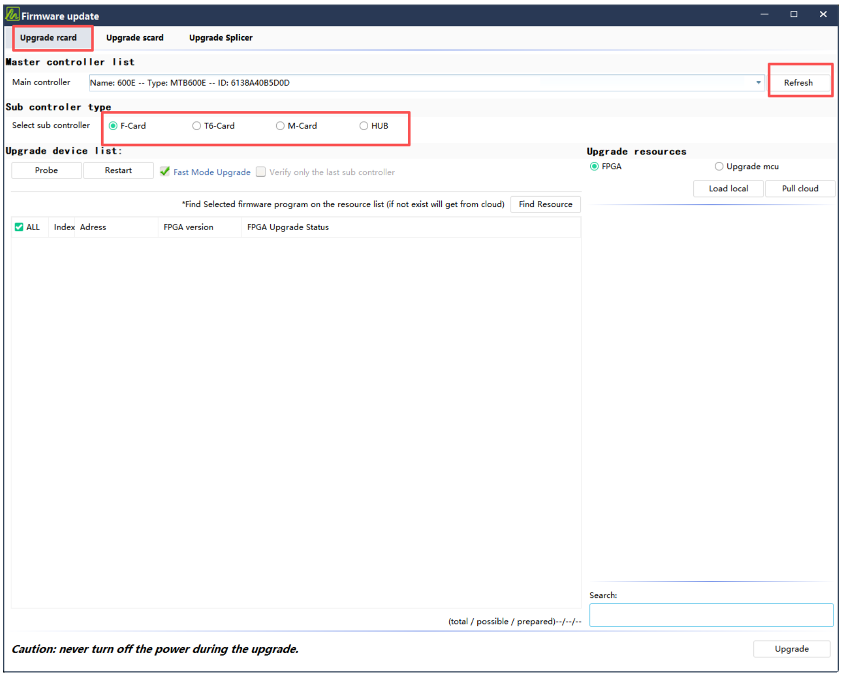



Figure 5-2-1 Selecting a receiver-side firmware-update target

Click Probe to retrieve the connected device list, then select the devices to update. For an FPGA receiver card, choose FPGA or Upgrade mcu as required. For a T6 receiver card, choose CPU0 or CPU1. M-Cards and HUB devices do not require a resource-type selection.

Click Pull cloud to retrieve online packages, or Load local to select a local firmware file. Select the correct package, click Upgrade, and wait until completion. Do not remove power during the update. Power-cycle the device only when instructed.

### 5.2.2 Update LED Sending Controller Firmware

Select Upgrade scard (the interface label for LED sending controller updates), click Probe to list the connected controllers, and select the controller to update, as shown in Figure 5-2-3.

**FPGA firmware:** The LED sending controller must be in Normal Mode. If necessary, click Enter normal mode and wait for the device to restart. Select FPGA, click Pull cloud or Load local, choose the correct package, click Upgrade, and wait until completion, as shown in Figure 5-2-4.

**MCU and other resources:** The LED sending controller must be in Upgrade Mode. Click Enter upgrading mode and wait for the mode change to complete. Select the required item - Upgrade mcu, Upgrade EDID, Upgrade the expand data (extended data), or Device ID - click Pull cloud or Load local, choose the correct package, and click Upgrade.

Extended data is used on devices with an integrated LCD to update the font library or startup logo.

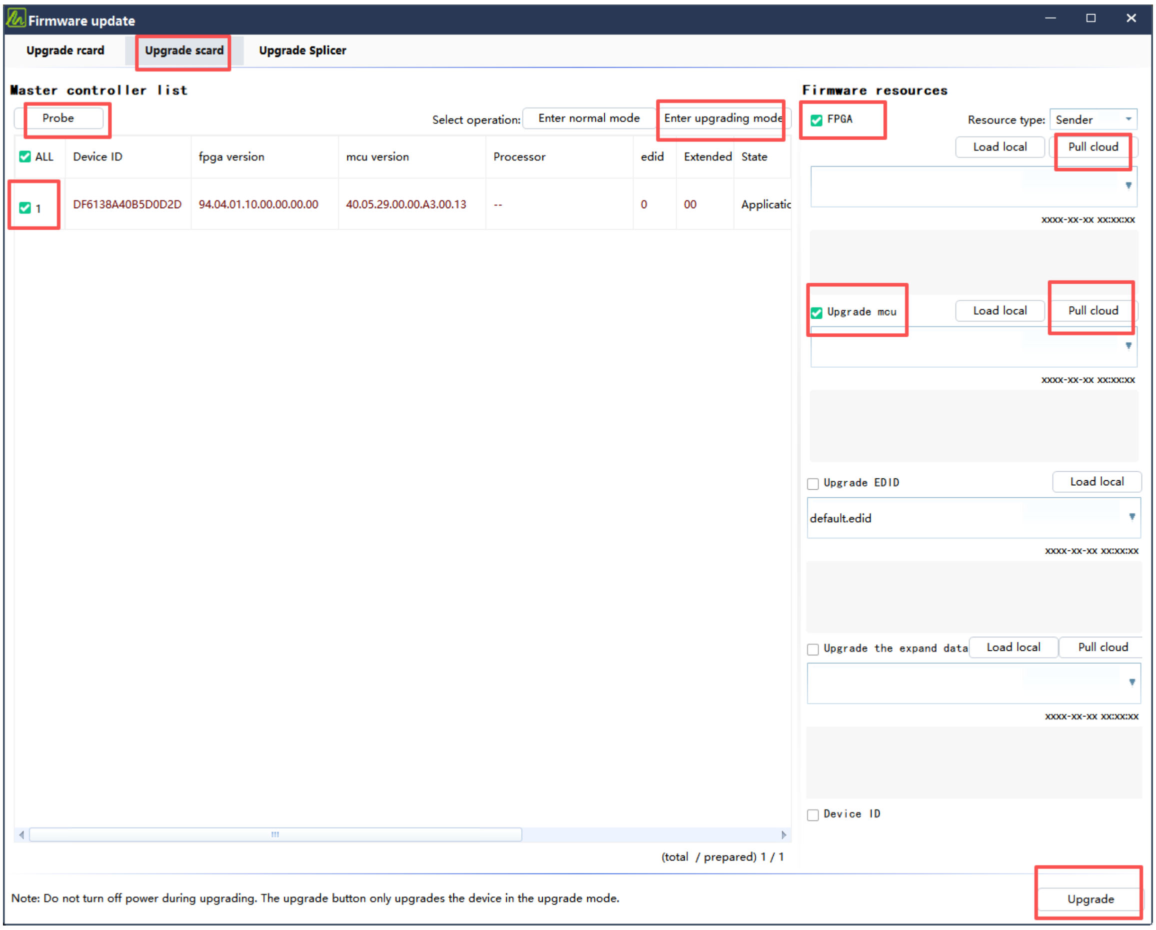



Figure 5-2-3 LED sending controller firmware update

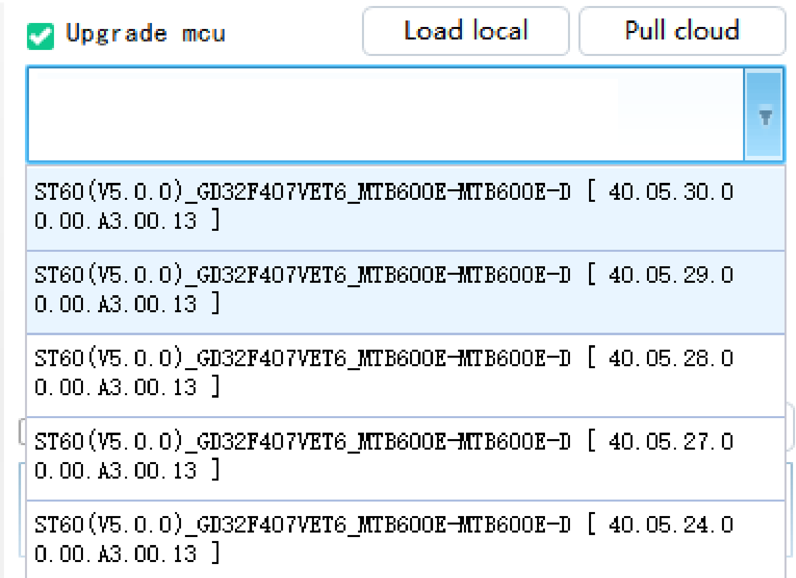



Figure 5-2-4 Selecting a firmware package from the cloud

# 6. Hardware Information Monitoring

Click Hardware Information on the AutoLED home page to open the monitoring workspace shown in Figure 6-1.

The device list on the left shows each connected device's ID, FPGA version, MCU version, model, name, input resolution, and receiver-card count. Click an entry to switch to that LED sending controller.

The right pane shows the firmware version, Ethernet packet-error count, power status, and current LED brightness for the receiver cards connected to the selected LED sending controller. Poor Ethernet communication causes the affected receiver card's error-packet value to exceed 4 and continue increasing. Inspect the first receiver card on that output that reports errors and the signal output of the preceding card. After correcting the fault, click Reset Error Count. If Enable Error-Count Debugging is selected, a cabinet receiving abnormal data automatically cycles through red, green, blue, scan, and other self-test patterns until communication is restored. Disable Error-Count Debugging after service is complete.

Icons in the device list indicate the functions authorized for each device. See Figure 6-2 for the icon definitions.

The Product Information page includes the device's unique serial number. Click Sync to synchronize device time with network time. If an authorization period has expired, paste the authorization code into the appropriate field and click Apply. Click Details to review device logs and other diagnostic information, as shown in Figure 6-3.

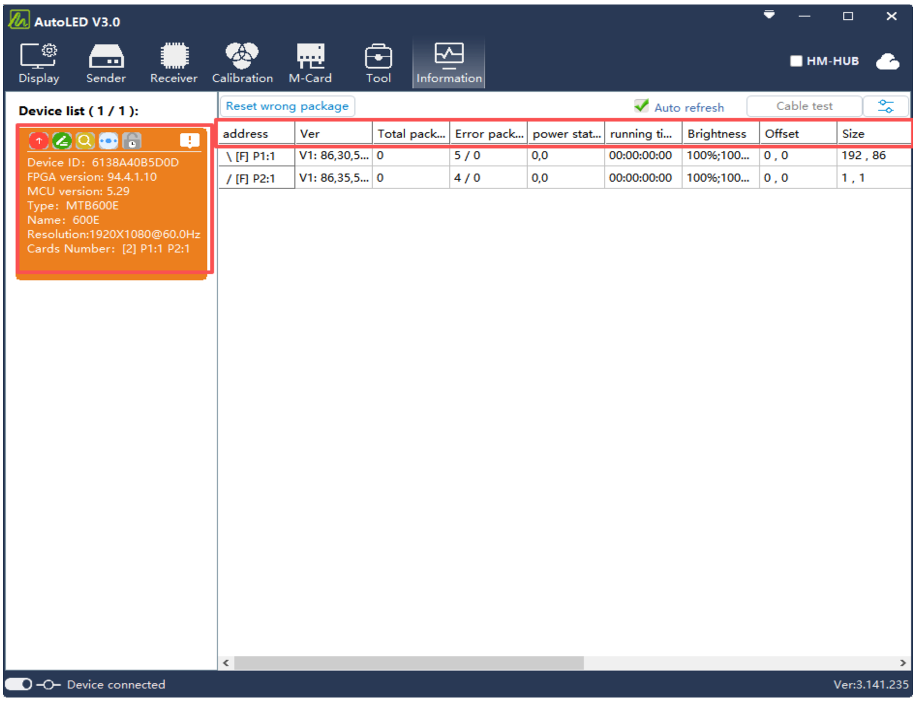



Figure 6-1 Hardware Information monitoring

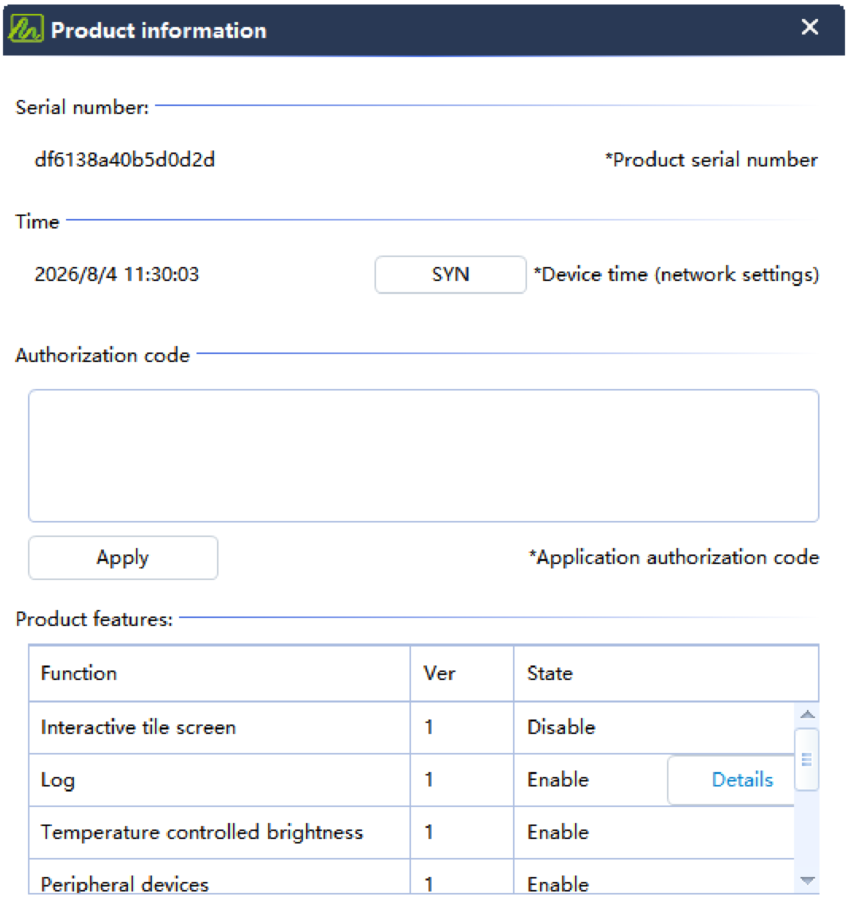



Figure 6-2 and Figure 6-3 Device permissions and product information

# 7. Multifunction Card Operation

## 7.1 Interface Overview

- **Settings:** Click Multifunction Card to open the settings page. After connecting the hardware, click Add > Auto Detect to identify and add a multifunction card under the selected LED sending controller.

- **Status:** Displays current status and monitoring values. Data is not refreshed automatically; click Refresh in the Onboard Monitoring Data area. The ambient-light value shown here should match the value shown under Receiver Card > Chip Adjustment > Automatic Adjustment.
- **Upgrade:** Installs firmware that adds functions or corrects device issues, allowing the multifunction card to be maintained as new releases become available.

## 7.2 Multifunction Card Functions

### 7.2.1 Add a Multifunction Card

- Complete automatic detection and add the multifunction card to the device list.
- After the card is added, orange indicates the selected device and blue indicates an unselected device.
- The power-control switches at the right become active and can be operated.

### 7.2.2 Set the Power-Management Clock

**Synchronize the multifunction-card clock with the PC:** Set writes the PC time to the card; Read refreshes and displays the card's current real-time clock.

### 7.2.3 Power Control

- Manual control is enabled by default. Click a circuit switch to operate the corresponding multifunction-card relay. The card switches the circuit and sounds a confirmation tone; the startup tone may be delayed by approximately two seconds. Use the Notes field to identify the equipment connected to each circuit.
- Open All turns on every circuit that is currently off. Emergency Stop turns off every circuit that is currently on. Circuits can also be placed under automatic schedule control.
- Click Edit to open the automatic circuit-control editor.
- Create on and off commands for the required circuits, dates, and times. Click Add to place each command in the custom power-control list, then click OK to return to the main page. The multifunction card executes the stored schedule even when AutoLED is closed. Up to 64 custom commands are supported.

## 7.3 Multifunction Card Monitoring

### 7.3.1 Relay Monitoring

- Monitor and query relay operating time and relay switching-event records.
- Detect the multifunction-card list and select the required card.
- **Operating-Time Query:** Select Operating Time > Settings, enable the function, and click Clear Data if existing history must be removed. Select Operating Time > Query to display relay operating time.

#### Switching-Event Records

- Select Switching Records > Settings and enable the function.
- Select Switching Records > Filter, choose the start and end dates, relays, and states, then click OK.
- Select Switching Records > Query to display matching relay on/off events.
- Select Switching Records > Export to export the results to an Excel workbook.

### 7.3.2 Sensor Monitoring

- Select Sensor Monitoring > Settings, enable the function, set the logging interval from 10 to 100 minutes, and click Set.
- Select Sensor Monitoring > Filter, enter the date range and the required ranges for temperature, humidity, smoke-sensor readings, and brightness, then click OK.
- Select Sensor Monitoring > Query to display sensor records that match the filter.
- Select Sensor Monitoring > Export to export the results to an Excel workbook.

# 8. Troubleshooting

## 8.1 AutoLED and LED Control-System Issues

### Q1. AutoLED cannot find the LED sending controller.

If AutoLED cannot detect the controller after the hardware is connected, perform the following checks.

- Disconnect and reconnect the USB cable.
- Check the USB cable and try another USB port on the PC.
- Reinstall AutoLED, including its USB driver.
- Restart the LED sending controller or test with another compatible controller.
- Open Windows Device Manager. Under Universal Serial Bus controllers, confirm that LEDSmartCard is listed. If it is not listed, reinstall the driver or correct the USB connection.

### Q2. The LED display image is blurred or unclear.

- Confirm the video source's output resolution and refresh rate. On the Sender page, set Preset resolution to the same resolution and refresh rate as the source. If the required resolution is not listed, create a custom resolution.
- Test with another known-good video source.
- Confirm that the cabinet driver parameters are correct for the installed LED modules.

### Q3. AutoLED cannot find the receiver cards.

- Check the receiver-card indicators. The red power indicator should remain on and the green communication indicator should flash. If red is off, check receiver-card power. If green is off, check the Ethernet path between the LED sending controller and receiver-card chain.
- Confirm that the LED sending controller and receiver-card models are compatible and that both use the corresponding T6 or FPGA firmware family.
- On the AutoLED Receiver Card page, refresh the receiver-card list. If several LED sending controllers are connected, switch to the controller carrying the required cards.

## 8.2 Multifunction Card Issues

### Q1. Sensor data is returned with a delay.

Sensor communication requires processing time. After a device is connected for the first time, allow approximately one to two minutes. Typical delays include:

- The first ambient-light reading under Receiver Card > Chip Adjustment > Automatic Adjustment.
- The interval between automatic-brightness data transmission and the visible change in LED display brightness.
- Normal gradual changes in measured temperature.

### Q2. Automatic brightness control shows no ambient-light or current-brightness value.

- Check for unstable cabling, a loose connector, or a disconnected sensor.
- Confirm that AutoLED shows the device as connected at the lower-left. On the Multifunction Card page, confirm that the card status in the device list is normal.
- If the hardware connection is normal and the values remain unavailable, contact Mooncell technical support.

### Q3. A scheduled power-control command did not execute.

- Confirm that the power-management board clock is synchronized with the PC. Automatic commands are time-based and cannot execute correctly if the clocks differ.
- Check that the scheduled start time is later than the current PC time and earlier than the configured end time.
- Confirm that the command was sent successfully and appears in the custom power-control list.
- Confirm that the present circuit state is compatible with the scheduled operation.
- If the problem persists, contact Mooncell technical support.

### Note on manual and automatic brightness priorities

When automatic brightness adjustment is enabled, its calculated value takes priority over the manual brightness setting. For example, if the automatic-control maximum is 80%, setting the manual slider to 256 (100%) still produces 80% output. The manual value is sent to the LED sending controller, but the receiver cards continue to enforce the automatic value. Disable automatic brightness adjustment before a manual brightness value can take full effect.