

GeoBox

M810 1-4 CH Edge Blending Processor Datasheet

M811 (1 CH), M812 (2 CH), M813 (3 CH), M814 (4 CH)

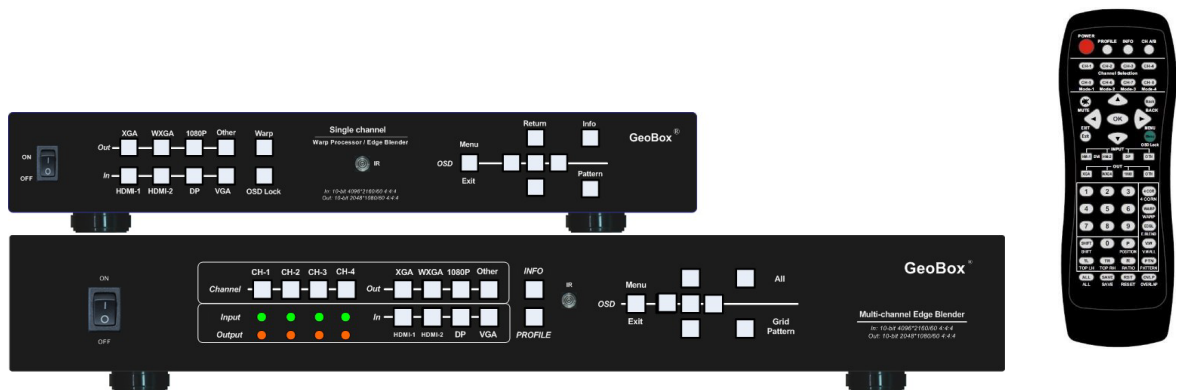
Input: up to 7680*2160 @30Hz, 7680*1200 @60Hz, 4096*2160 @60Hz

4:4:4 full-color sampling

Output: WUXGA, 2048*1080 @60Hz

New generation Warp & Edge blending engine

Full functions for edge blending. No PC is required.



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Table of Contents

<u>Introduction</u>	3
<u>Outlook</u>	4
<u>Difference between M810 & M800</u>	5
<u>Specification</u>	5
<u>Function and Features</u>	6
A. Structure	7
B. Input and output ports	7
C. Image warp and geometry alignment	7
D. Linearity Grid Line Adjustment	7
E. “W” shape Corner Wall alignment	7
F. Simultaneously PC Tool and IR controller setup	7
G. Edge Blending	8
H. Black Level Uplift	8
I. Edge Mask	8
J. High-end 10-bit video processing	8
K. PIP/POP	8
L. Video Wall function	9
M. Image rotation and flip	9
N. 120Hz signal output for active 3D display	9
O. System control and other features	9
<u>Features illustration</u>	10
Selectable grid pattern for geometry alignment	10
Selectable grid pattern size for geometry alignment	10
High-resolution daisy chain connection	11
Edge blending on flat and curved screen	12
Image warp and geometry alignment	12
“W” shape Corner Wall alignment and display	13
Linearity Grid Line Adjustment	14
Immersive display	15
Multi-video display	15
Image flip and rotation	16
Independent RGB Gamma correction	16
White balance & Color correction	17
Nine regions Black level uplift	17
Edge Mask	18
PIP/POP function	19
Stretch image and change aspect ratio	20
Disclaimer/Copyright Statement	21

Introduction

M810 is an upgraded model from the M80x series. The significant difference is to support 17*9 geometry alignment and 120*68 control points fine-tuning in the IR controller & PC Tool. A completely new GCT PC tool has been adopted. It provides a more friendly interface for PC tool operation and increases accuracy. Users can swap between GCT and IR control operations at any time. It supports up to 7680*2160/30Hz input resolution without additional settings.

M810 provides multiple processing modules to control from 1 to 4 projectors in one box. M811 is integrated with one processing module to control one projector, M812 for 2 projectors, M813 for 3 projectors, and M814 for 4 projectors. It was designed for sophisticated edge blending, image warping, and stacking. One M814 can execute 4 projector edge-blending without any additional equipment or splitter. Multiple M810 can be cascaded for large-scale display.

4 input ports (2x HDMI2.0, 1x DP1.2, 1x VGA) and 1x HDMI2.0 outputs are designed in each processing module. The digital input supports up to 7680*2160 @30Hz, 7680*1200 @60Hz/4096*2160 @60Hz with 4:4:4 full-color sampling. Output supports up to WUXGA/2048*1080 @60Hz. It is integrated with a 10-bit high-end processor, motion adaptive de-interlace, low angle smooth algorithm, 3:2/2:2 pull-down, and supports non-VESA standard input timings. Programmable EDID can optimize input timing to get the best video result.

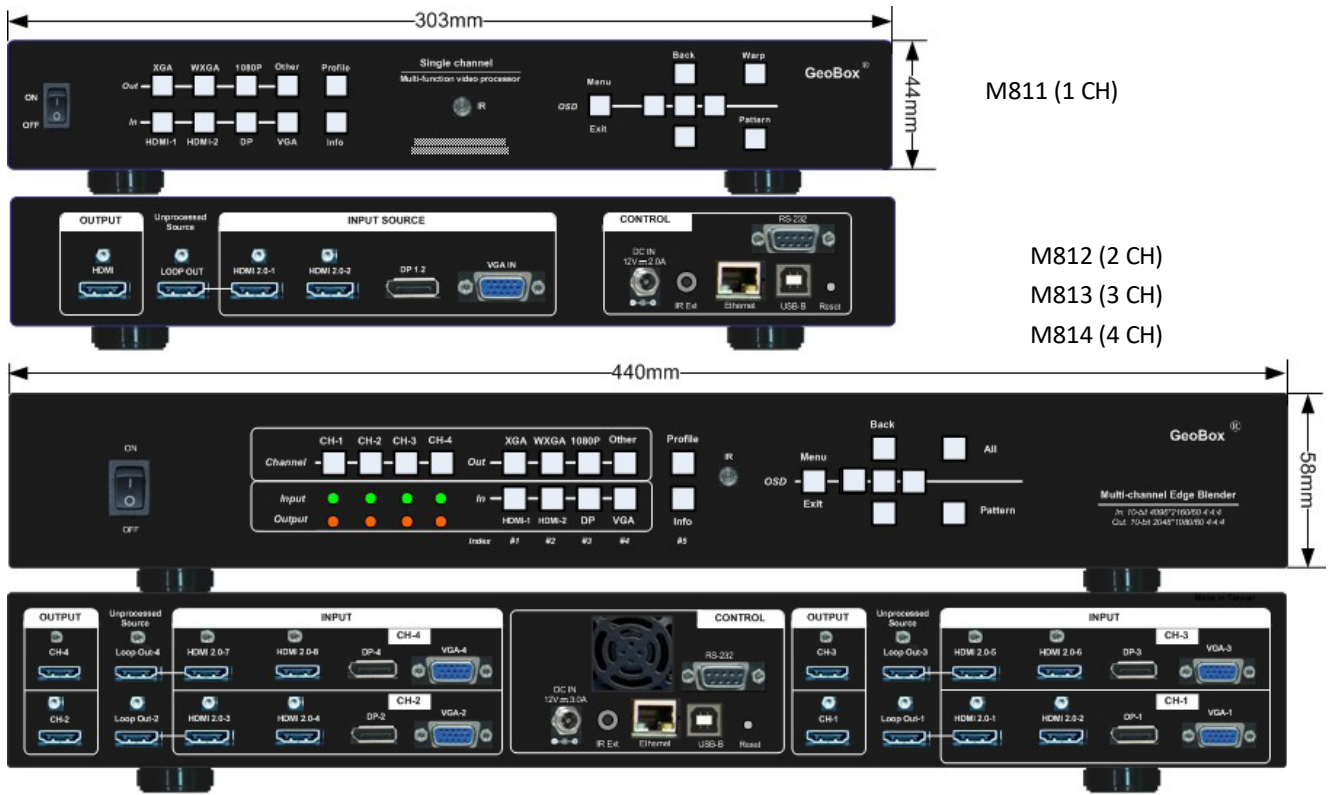
Advanced warp technology is embedded in M810. Users can use an IR controller, USB, Webpage, and Ethernet to perform edge blending and sophisticated geometry alignment up to 120x68 control points. Linearity Grid Line Adjustment for complete line moved up to the 17x9 control point and "W" type Corner Wall image adjustment are new functions in geometry alignment. Separate R, G, and B gamma correction for edge blending region color fine-tuning, individual color correction for each output, and 9 regions black level uplift to compensate for the projector's light leakage are standard functions in M810. Users can see real-time geometry and color adjustment to get optimized results.

HDMI loop out supports daisy chain connection up to 8k/2k @30Hz / 8k/1k @60Hz, allowing large displays with multiple units cascaded. The video wall function crops allocate source images for each projector, and sets overlap pixels for edge blending. Complete curved edge blending can be achieved through an IR controller, USB, or Ethernet without additional devices except for signal sources and projectors.

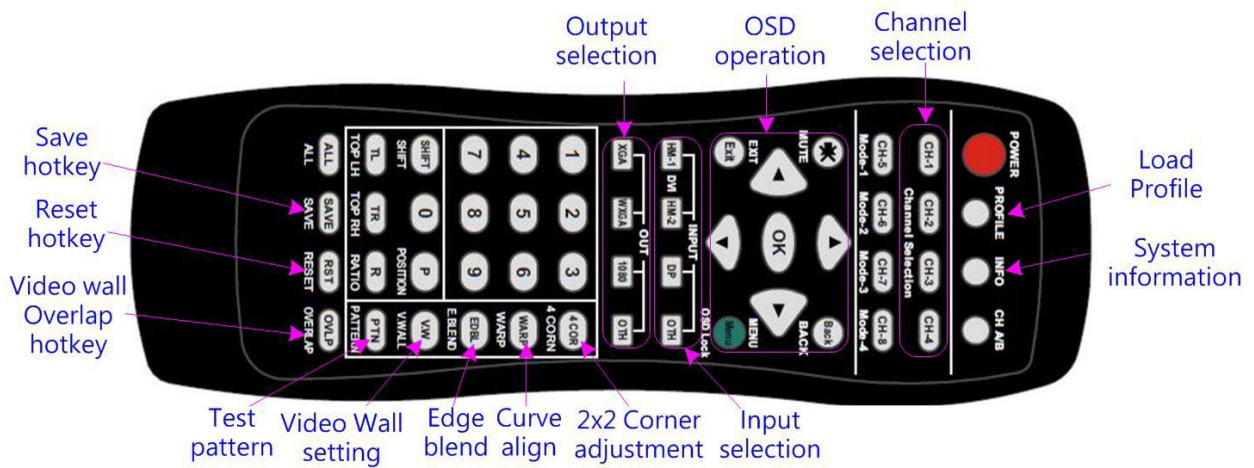
PIP (picture in picture) and POP (side by side) are standard functions. PIP image size is from 320*180 up to 1920*1200. In one M814, the user can display up to 8 input contents on the screen.

M810 is an ideal solution for simulation. It can connect with inputs from multiple PCs and combine them into one seamless image. Unnecessary images can be masked out. It also provides flexible displays in an edge blending system. For a 3x projector edge blending system, the user can configure a 1+1+1 independent display, 1+2 (two projectors blended), and all-in-one (three projectors blended). Users can also execute edge blending with a projector at the portrait position without rotating the source image to increase image height.

M810 is designed for 7/24 working conditions. Using M810, users can replace high-end projectors with low-cost projectors without lens shift, warp, and edge blending functions. It provides easy configuration, low entry barriers, and cost-effective, reliable, and flexible solutions.



(This back panel shows 4 CH model—M814)



Feature difference between M810 & M800

1. Outlook: Same as M800. The only difference is the model #.
2. Input/Output ports: same as M800
3. Functions: M810 will keep all the functions of M800 and add more.
4. New GCT (GeoBox Control Tool) is adopted in M810.
 - GCT is a standard PC tool for all new GeoBox models, including G90x, UD10x, M810, S901, and S914.
 - Operated via USB or Ethernet
 - GCT setup results will be executed in the Box in real time.
 - Users can switch the operation between GCT and IR control without data loss.
 - Reduced Save and Load setting time under PC operation.
 - Users can back up and copy the settings to different units.
5. New features:
 - Warp function:
 - IR controller up to 17x9 grid control points.
 - Pixel position fine-tune up to 120x68 grid control point through IR controller and GCT.
 - Linearity grid line adjustment up to 17*9 control points.
 - “W” type corner wall adjustment.: adjust the image to match the square pillar at the wall corner.
6. Input: up to 7680x1200/60Hz, 7680*2160/30Hz, RGB 4:4:4 without additional settings

Specification

- ✧ Each box has 1-4 processing modules.
 - M811: Single module processor
 - M812: Dual module processor
 - M813: Triple module processor
 - M814: Quad module processor
- ✧ Each processing module includes:
 - Input: 2x HDMI2.0b, 1x DP1.2a and 1x VGA
 - Output: 1x HDMI1.4
 - Loop output: 1x HDMI2.0b for daisy chain connection.
- ✧ HDCP compliance: Input: HDMI: HDCP V2.2/V1.4, DP: HDCP: V1.3, Output: HDCP V1.4.
- ✧ Max. input resolution: 7680*2160 30Hz, 7680*1200 @60Hz, 4096*2160 60Hz
- ✧ Input supports progressive and interlaced RGB/YUV signal, 4:4:4 Chroma sampling, up to 30 Color bits.
- ✧ Support non-VESA standard input timings for easy connection with various signal sources.
- ✧ 15 selectable Outputs: HDMI1.4 up to WUXGA, 2048*1080/60, progressive 4:4:4 RGB.
- ✧ 2 frames system latency: 33ms (@V=60Hz)
- ✧ Warp engine for geometry alignment up to 17*9 control points in IR control and GCT PC Tool.
- ✧ 120x68 grid pixel position fine-tune. Each control point can be adjusted with 1/4 pixel/step and moved up to 12.5 pixels adjustment range. The maximum adjusting points is 100 points.

- ◇ Geometry adjustment ranges up to 600 pixels in both H&V directions.
- ◇ Edge blending at 4 edges up to H=1920 pixels, V=1200 pixels with independent RGB gamma correction.
- ◇ 9 regions black level uplift to compensate light leakage from projector optical system.
- ◇ Edge Mask follows the result of geometry alignment up to 500 pixels.
- ◇ Edge Mask with 8 control points up to 900 pixels in H&V directions at each control point.
- ◇ Support “W” type Corner Wall adjustment in horizontal and V type in the vertical direction. The maximum adjusting range is 1200 pixels.
- ◇ Support Linearity Grid Line adjustment for quick H&V line position alignment.
- ◇ Embedded video wall function for image split, cropping, and edge blend overlapped pixel settings.
- ◇ Selectable grid pattern size from 8-120 pixels in H&V direction. The default is 32*32 pixels.
- ◇ Selectable grid pattern color with optional transparency to see background image for external pattern.
- ◇ Flexible aspect ratio adjustment in each edge up to +_ 1800 pixels position shift.
- ◇ 10-bit processor, 3:2/2:2 cadence, low angle smooth algorithm, high-quality scaling engine.
- ◇ 3D motion adaptive de-interlace.
- ◇ Frame lock function to get perfect synchronized outputs in all channels.
- ◇ Free-run mode provides a continuous signal to the output, and no source searching is required in the projector when the input source changes.
- ◇ Support xvYCC & 8/10/12-bit deep color processing.
- ◇ Support High Dynamic Range (HDR) input signal and convert it to SDR in the output.
- ◇ Individual color and white balance adjustment in each processing channel.
- ◇ Individual 90/180/270 rotation, flip, cropping, scaling & color adjustment in each channel up to 4k/60 input.
- ◇ PIP/POP function with PIP image size from 320*180 up to 1920*1200 resolution with flexible position and adjustable aspect ratio. This function is unavailable when the main image is 90/270 degrees in rotation.
- ◇ Selectable and programmable EDID in the range: H=1024-3840, V=720-2400.
- ◇ Users can save up to 5 settings and be recalled by IR controller, RS232, USB, or network.
- ◇ ESD Protection: ±15kV (Air-gap discharge), ±8kV (Contact discharge)
- ◇ Working environment: 45 ° C, 10-90% RH
- ◇ Control: keypads, IR, RS232, USB, Ethernet
- ◇ Save up to 5 system settings. System settings can be stored and backup on a PC.
- ◇ Power supply: DC: 12V 3.3A
- ◇ Max. Power consumption:
M811: 8.4W, M812: 14.4W, M813: 21.6W, M814: 28.8W
- ◇ Dimensions (Body only):
Without protruding parts: M811: 303mm*164mm*44mm, M812-M814: 440mm*190mm*58mm.
With protruding parts: M811: 303mm*175mm*55mm, M812-M814: 440mm*201mm*69mm
- ◇ Weight (Body only): M811: 1.5kg, M812: 2.5kg, M813: 2.6kg, M814: 2.8kg
- ◇ CE/FCC/RoHS Certified
- ◇ 30-month Warranty

Function and features:

A. Structure

Each M810 consists of 1-4 processing modules. Each processing module can control one projector, and multiple processing modules can be cascaded to control a big-scale display system.

B. Input and Output ports in each processing module

- Input: 2x HDMI, 1xVGA, 1x DisplayPort.
 - HDMI & DisplayPort support 7680*2160 @30Hz, 7680*1200/4096*2160 @60Hz with 4:4:4 chroma sampling without compression. VGA supports up to WUXGA or 205MHz analog input signal.
 - Connect with various video sources and support non VESA standard input resolution.
- Output ports: 1x HDMI. Selectable output resolutions: XGA, WXGA, 1280x720, 1280x1024, 1366x768, 1920x1080 (24/30/50/60Hz), 1920x1200 (30/60Hz), 2048x1080/60, 1024x768 @120Hz, 1280x720 @120Hz, 1280x800 @120Hz.
- Loop out port: 1x HDMI 2.0b, same as the source signals up to 8k/1k (1k/8k) @60Hz / 4096*2160 @60Hz.

C. Image warp and geometry alignment

- Selectable grid pattern size for geometry alignment from 8-120 pixels in H&V. Default size is 32*32 pixels.
- With complete functions for quick 4 corner alignment, vertical and horizontal keystone correction, Pincushion & Barrel adjustment, image warp, and image 90/180/270 degrees rotation and flip.
- Warp engine for geometry alignment up to 17*9 & 120x68 control points in IR control and PC Tool.
- 120x68 grid pixel position fine-tune. Each control point can be adjusted with 1/4 pixel/step and moved up to 12.5 pixels adjustment range. The maximum adjusting points is 100 points.
- The geometry alignment range (4 corners + warp adjustment) is up to H=+_ 1200 pixels and V=+_1200 pixels in total HD output.

D. Linearity Grid Line Adjustment

- Support Linearity Grid Line adjustment for quick H&V line position alignment.
- This function can be implemented with 3x3, 5x3, 9x5, and 17x9 warp alignments.

E. “W” shape Corner Wall Alignment

Support “W” type Corner Wall adjustment in horizontal and V type in the vertical direction. The maximum adjusting range is 1200 pixels.

F. Simultaneously PC Tool and IR controller setup

PC Tool and IR controller can work simultaneously and swap operations anytime. The result will be executed into the Box in real time.

G. Edge blending

- Four-direction edge blending up to H=1920, V=1200 overlapped pixels for flat, curved & cylindrical screens.
- Independent RGB gamma selection for edge blending color fine.
- White balance and individual color correction for each projector.

H. Black Level Uplift

Precise black level uplift at multiple selected areas up to 9 regions to compensate for light leakage in the projector. A low native contrast ratio projector will be more severe in light leakage.

I. Edge mask

Image [Shift] to execute edge mask up to 500 pixels following the image profile after geometry adjustment and [Edge Mask] with 8 adjustment points to provide an irregular shape edge mask with random edge position up to 900 pixels in each control point. These two functions can be executed at the same time.

J. High-end 10-bit video processing

- 10-bit high-end processor with 3D motion adaptive de-interlace, low angle smooth algorithm, and 3:2/2:2 film mode detect and recovery function.
- Complete color adjustment function, including brightness, contrast, hue, saturation, preset color mode, independent RGB gain adjustment, and white balance correction.

K. PIP/POP

- This function can only be implemented on one projector. If PIP/POP across the entire screen is required, please add one S901 at the front end. It will also have a seamless switcher and PIP/POP/MultiViewer functions.
- PIP (picture in picture): with flexible PIP size (320*180 to 1920*1200), location, and aspect ratio.
- POP (Picture outside picture): side by side or Top/Bottom images with full screen or maintain source signal aspect ratio.
- The Overlap function can further adjust PIP sub-image size, cropping area, position, and aspect ratio.
- Limitation:
 - When implementing PIP/POP function, the primary signal source can't be rotated at 90/270 degrees
 - Source: only one HDMI source can be displayed on PIP/POP screen. Another source shall be DP or VGA.

L. Video Wall function

- Image cropping and location assignment for each projector.
- The image pixel cropping range is up to +_1800 pixels for image position shift, aspect ratio adjustment, bezel compensation, and creating overlap region for edge blending.
- Serve as video wall controller for irregular video wall display up to 15x15 matrix displays from the single signal source.

M. Image rotation and flip

- Image 90/180/270 degrees rotation, flip and mirror up to 4k/60Hz input resolution.
- Image flip in Front/Rear, Left/Right, and Top/Bottom directions.
- When executing 90/270 degrees image rotation, no PIP/POP function is available.
- No 3D motion adaptive de-interlace function while the image is 90/270 degrees rotated. We propose to apply a progressive signal source to get the best video quality.

N. 120Hz signal output for active 3D display

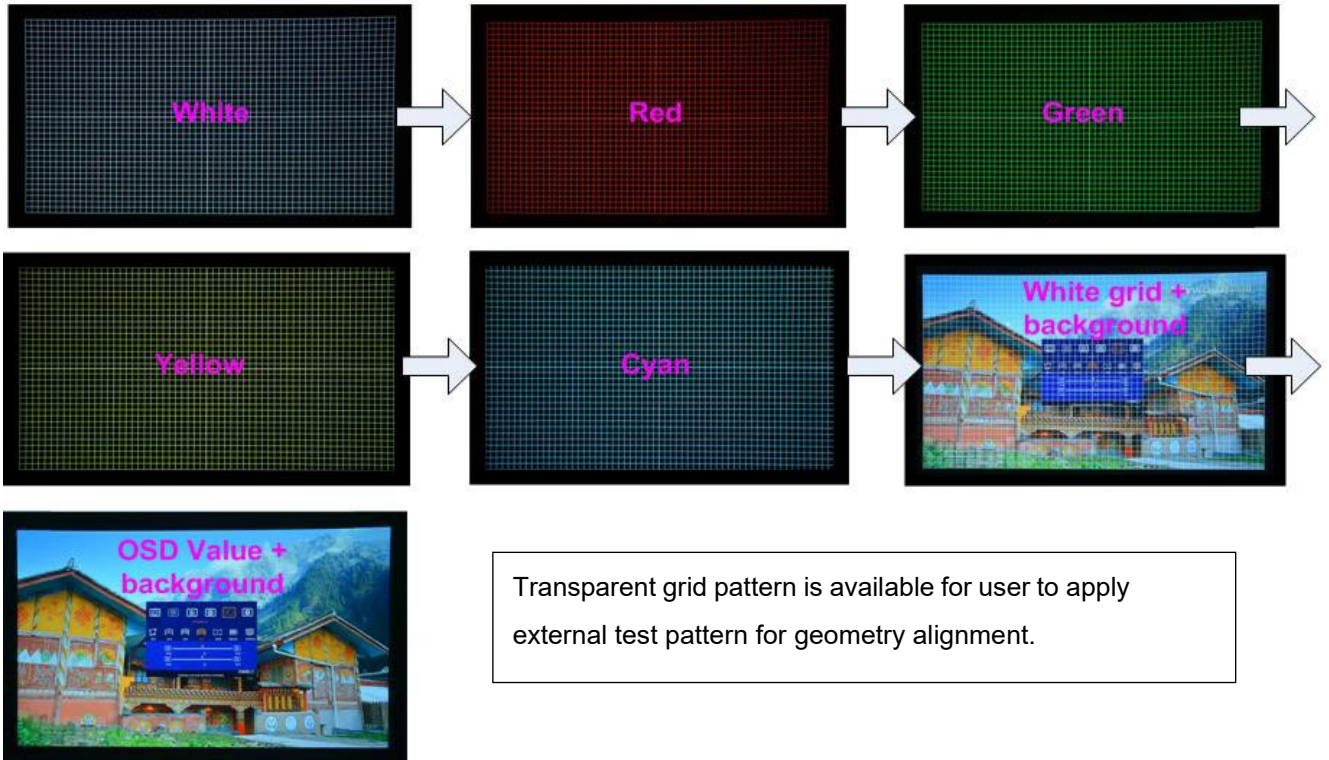
Support frame sequential FHD 120Hz input signal. After warp and edge blending, output XGA, 720P, or WXGA 120Hz signal for multiple projectors in an active 3D display application

O. System control and other features

- Entire function operation by front panel keypad, Webpage, IR, and Ethernet (Including through WiFi by PC, Mobile, or iPad).
- Firmware update via USB or Ethernet.
- GCT PC tool can control multiple processors simultaneously through USB or Ethernet.
- Internal grid pattern with selectable color and grid size for easy geometry alignment.
- RS232 & Ethernet control system is compatible with most of the control systems.
- Users can select blue or black background color when no input signal is detected.
- Programmable EDID in the range of H=1024~3840, V=720~2400.
- BOX ID and programmable IP address for convenient multiple unit control simultaneously.
- Users can save up to 5 settings and be recalled by IR controller, RS232, USB, or network.
- System settings can be backup to a PC or USB device and copied to another unit.
- Automatic power ON/OFF through input signal control. While no input signal is detected, it will shut down output automatically. Users can power ON/OFF the system through the control in the signal source.

Feature illustration

Variable grid patterns for geometry alignment

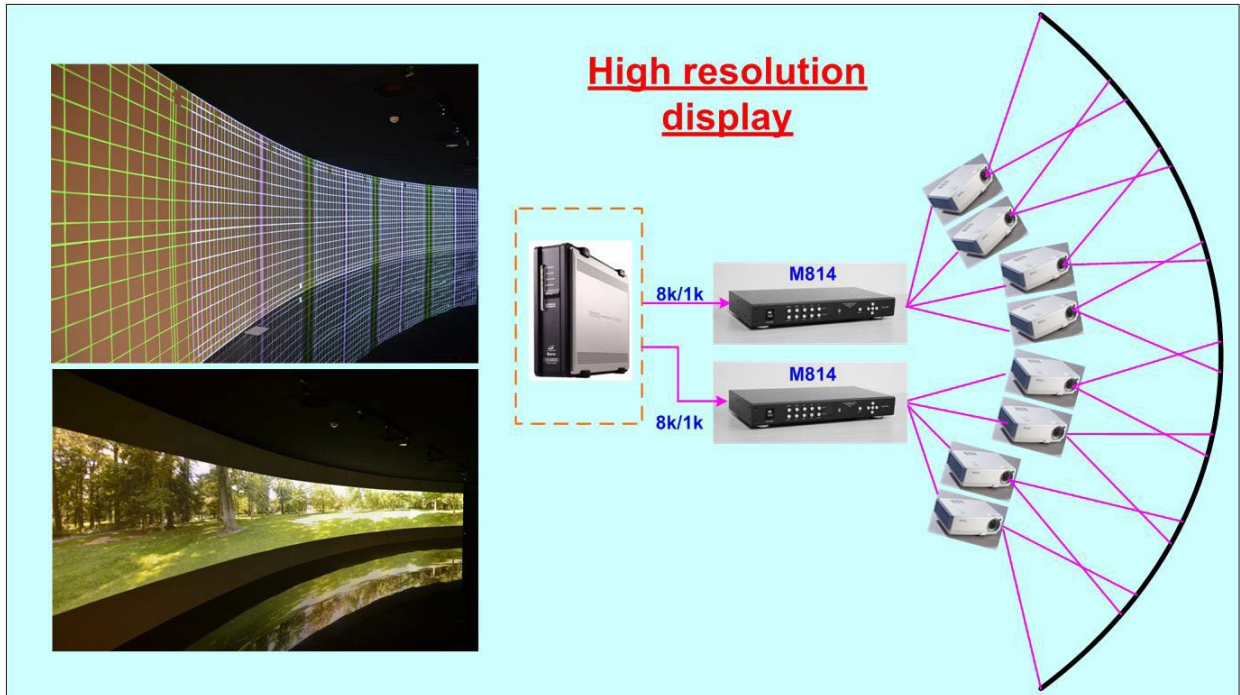


Selectable grid pattern size for geometry alignment

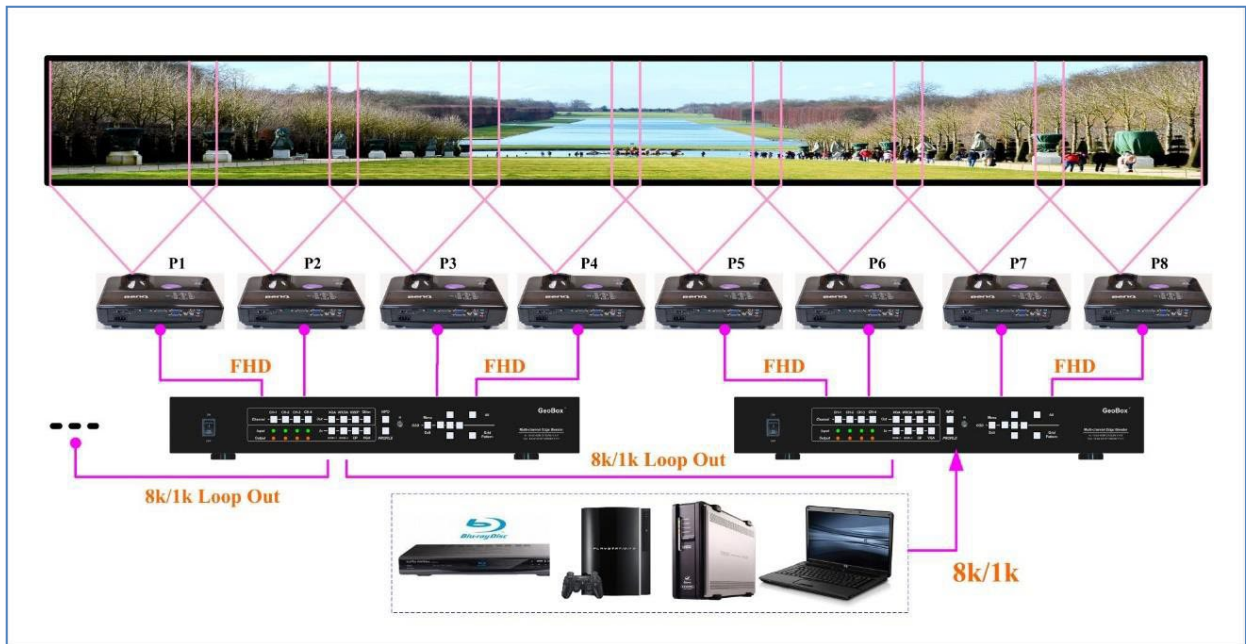
The pixel size in a grid pattern for geometry alignment is selectable to meet high-end simulation system geometry alignment requirements. The grid size in horizontal and vertical directions is adjustable from 8 to 120 pixels with a 1-pixel increment. H&V grid size will be the same. Users can select grid size under the [Edge Blend] menu.



High-resolution daisy chain connection



No additional device is required.

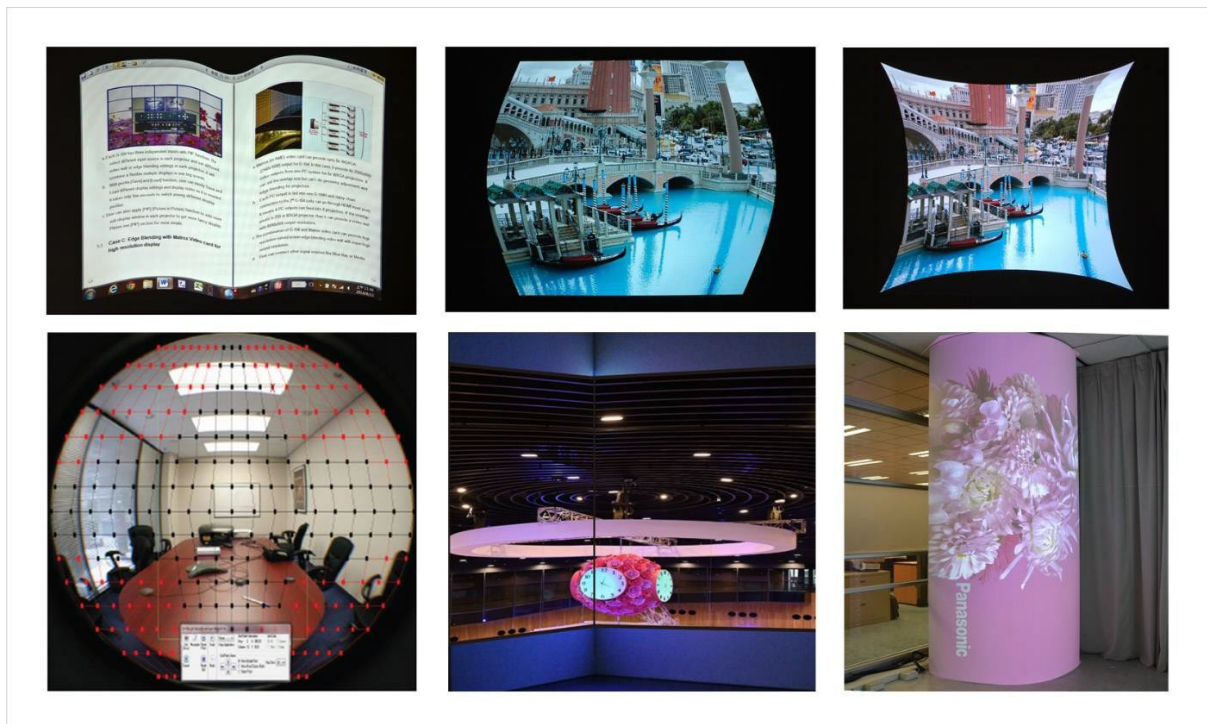


Edge blending on a flat and curved screen

Multiple units of GeoBox can be cascaded together for a big-scale high-resolution edge blending system. No PC or appropriate software is required except for signal sources, projectors, and HDMI cables.



Image warp and geometry alignment



Corner Wall Alignment & Display

The Corner Wall alignment function is functional either in the horizontal or vertical direction. Corner Wall geometry alignment ranges up to 1200 pixels in 4 corner positions and at the edge center in H&V directions. The curvature point position can be shifted +_ 1200 pixels. Example for horizontal adjustment: the control point can be moved down to 1200 pixels, and the curvature point can be +_ 1200 pixels away from the center point in the horizontal line. 4 Corner position alignment and Edge Blend function are still available with Corner Wall adjustment for easy image mapping and system setup.

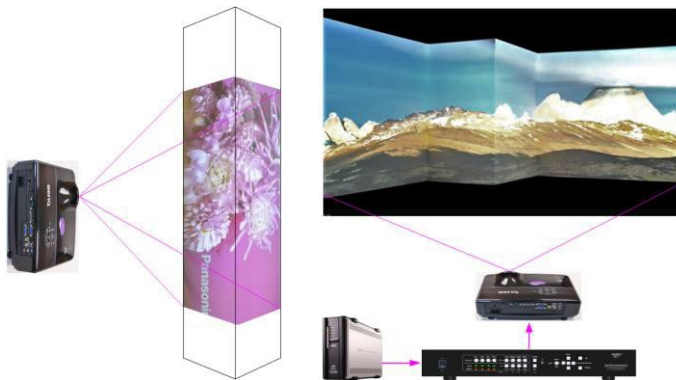
In Horizontal and Vertical directions



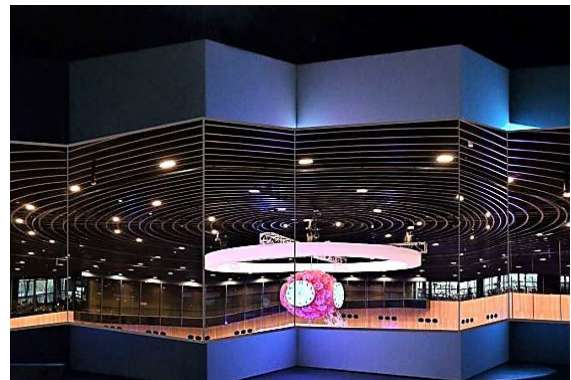
at any location but not only at the center



One projector Corner Wall application



Two projector Corner Wall application



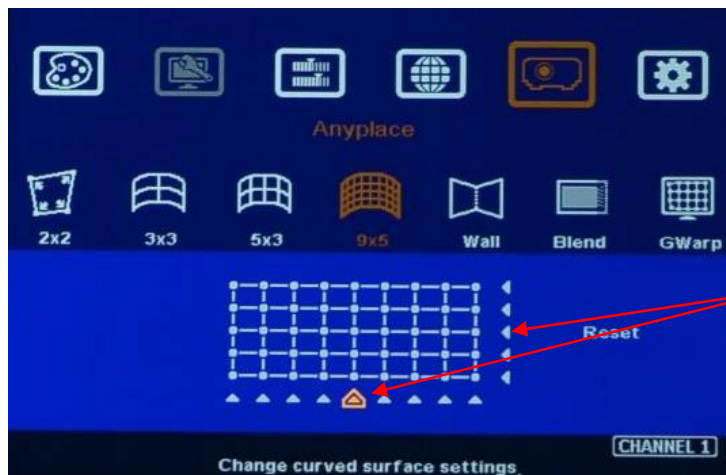
Other corner wall applications



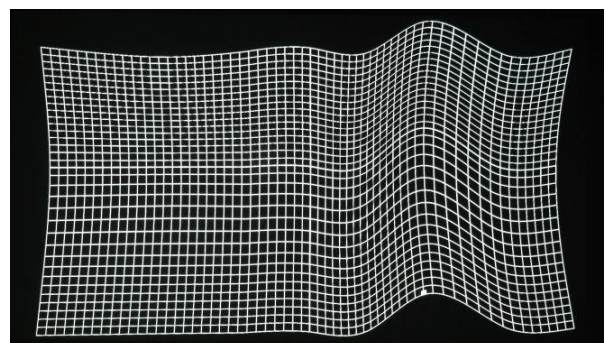
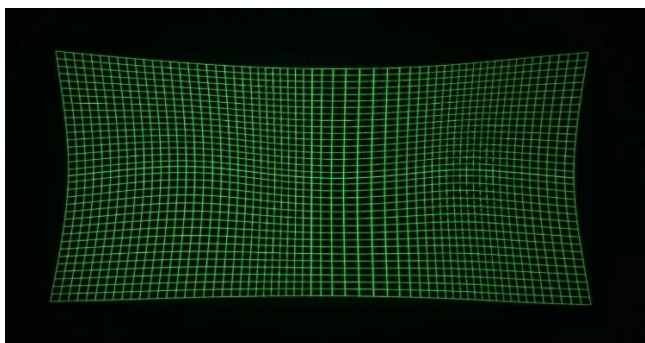
Linearity grid line adjustment

When a projector projects an image on a curved screen, the image will change the grid size gradually and cause different scaling factors on the center and both sides. Linearity grid line adjustment compensates for this effect and makes a complete image with the same scaling factor. Another application is to align images from adjacent projectors in an overlap region; this function can significantly reduce the alignment time.

1. It can be applied to both horizontal and vertical directions.
2. The operation OSD menu is under the 3x3, 5x3, 9x5 & 17x9 warp alignment menu, and the GCT PC tool is under the [Warp Adjust] menu.
3. Linearity grid line adjustment can be executed together with warp alignment & edge blending at the same time.



Control point for Linearity Grid
Line Adjustment



Immersive display

An immersive system with 3 walls + one ceiling with a sunny floor



Multi-video display

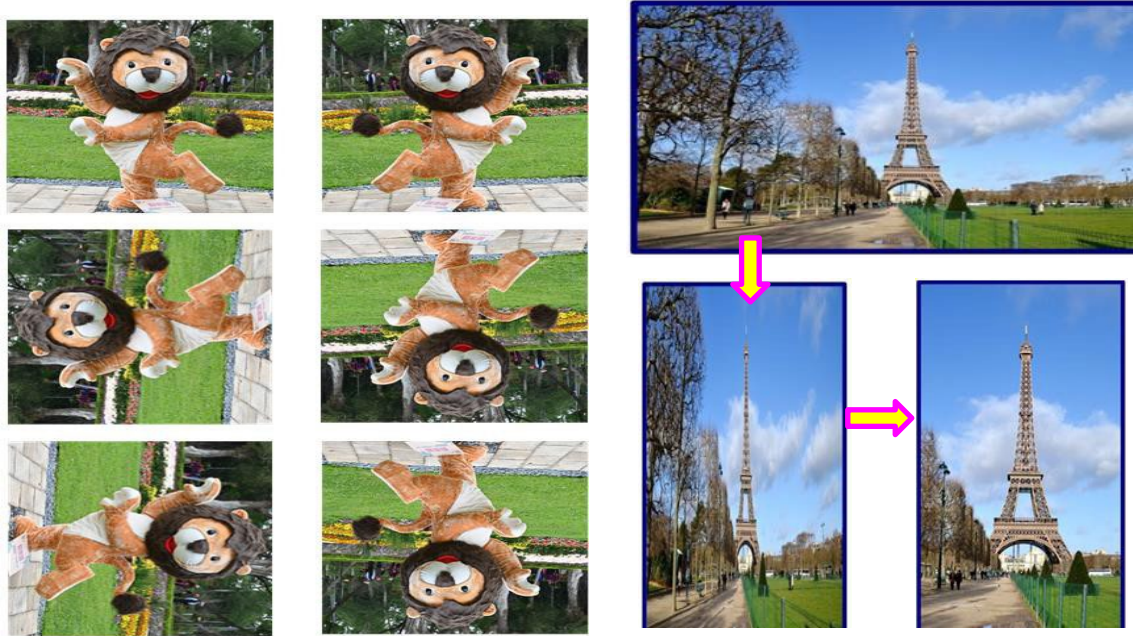
M810 has flexible display functions below:

1. One significant content edge blending on all screens.
2. Independent content display from each projector.
3. Multiple smaller edge blending systems.
4. 16:9 / 16:10 image at the required position.
5. Edge Blending with a projector at the portrait to increase image height.
6. PIP/POP in each projector.



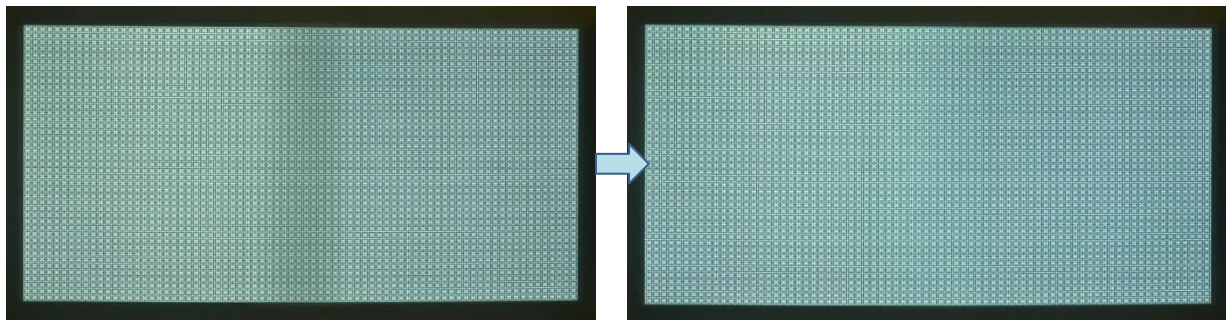
Image Flip & Rotation

Image 90/180/270 degrees rotation and flip up to 4k/60Hz resolution. The user can adjust the aspect ratio after image rotation or flip.



Independent RGB gamma correction

Independent RGB gamma value adjustment in the Overlapped regions allows more capacity to compensate for color banding in overlapped regions.



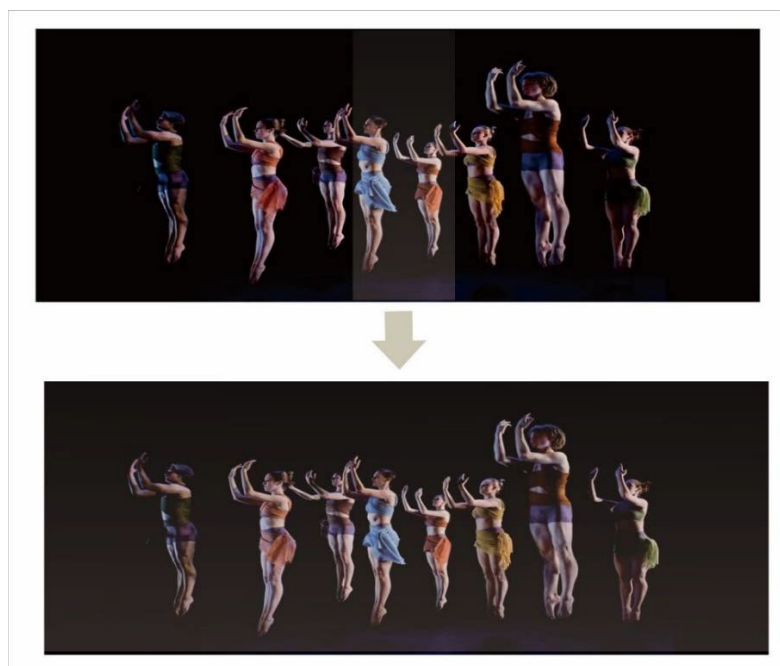
White balance & Color correction

Each channel can be adjusted separately through RGB Gain and Offset value.



Nine regions Black level uplift

It can compensate for the light leakage in the projectors, especially in low contrast ratio projectors under dark working environments. The native contrast ratio is related to projector light leakage and can't be reduced through signal processing. A higher native contrast ratio will have less light leakage. A laser projector will have high contrast ratio and is the best choice for an edge blending system. Separate RGB, precise black level uplift, can be executed in multiple regions (up to 9) in each output channel at a selectable position. 2x2 edge blending system black level uplift can be implemented through 9 regions black level uplift.





Nine regions black level uplift. Each region can set different RGB gain and offset.

Edge Mask

There are two edge mask functions in M810. One is the image [Shift], and the other is Edge [Mask] under the Edge blending menu.

1. [Shift]: Able to do edge mask with black background in each edge up to 500 pixels. The image mask location will follow the image position after geometry alignment.
2. [Edge Mask]: There are 8 control points for the edge mask. When a user moves the position for each control point, it will result in many kinds of edge mask patterns. The maximum position adjustment for each control point is +_ 900 pixels.
3. The adjusting range in [Shift] is based on the image position after geometry alignment, and the range in [Mask] is calculated from the original edge position before geometry or [Shift] adjustment. Both functions can be implemented at the same time.



Original Image after geometry alignment

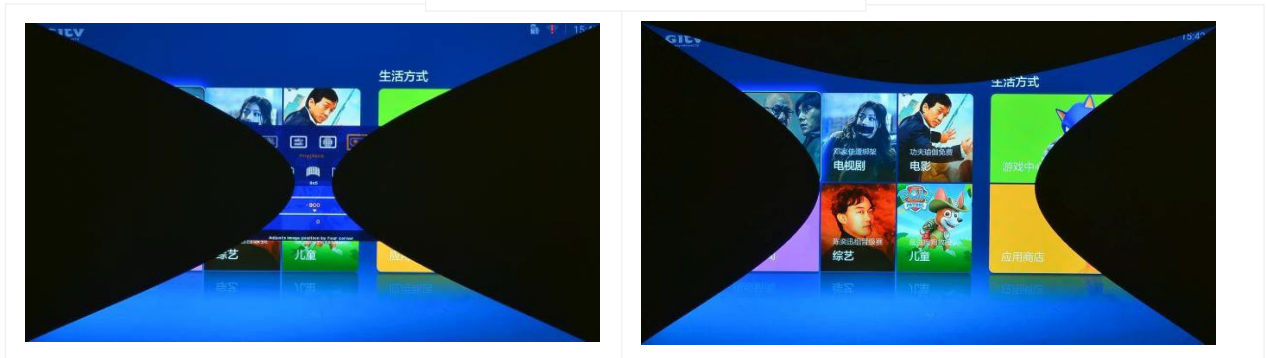


Image [Shift] (Follow geometry curve)



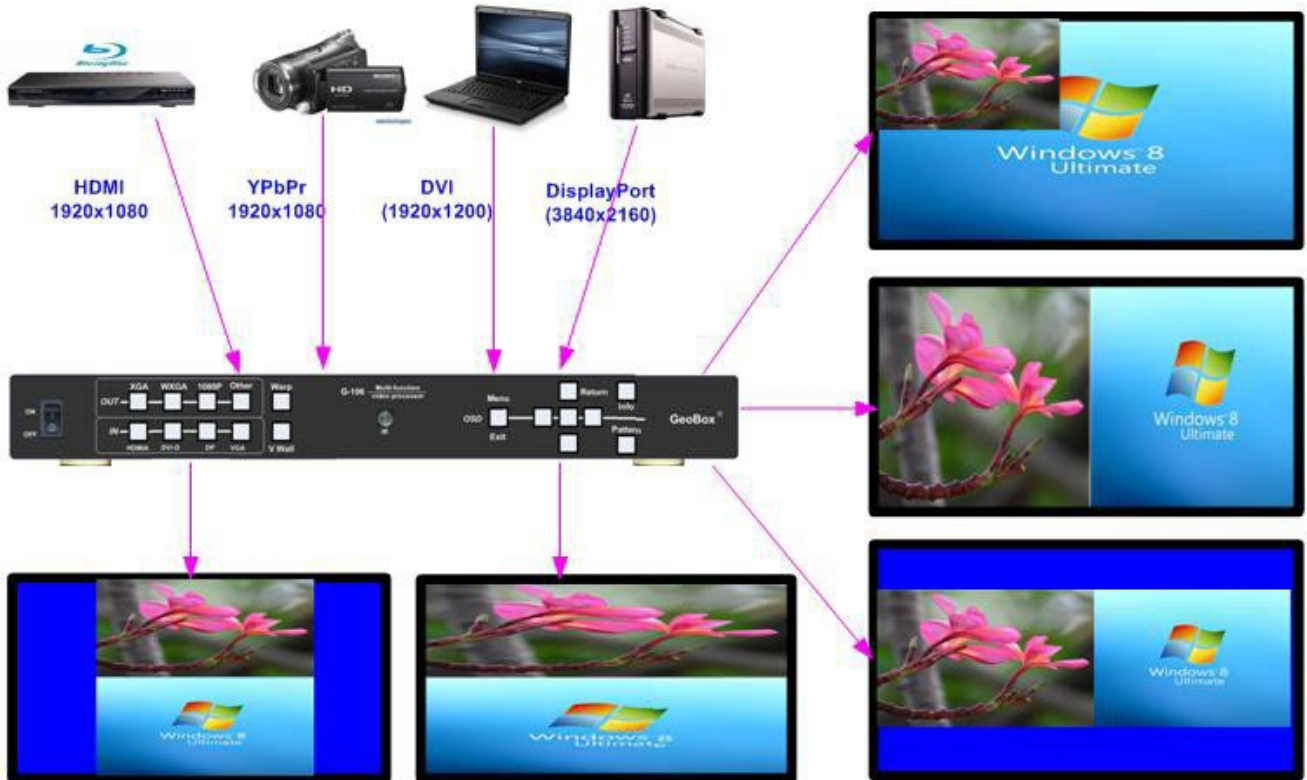
Image [Mask] (executed by 8 control points)

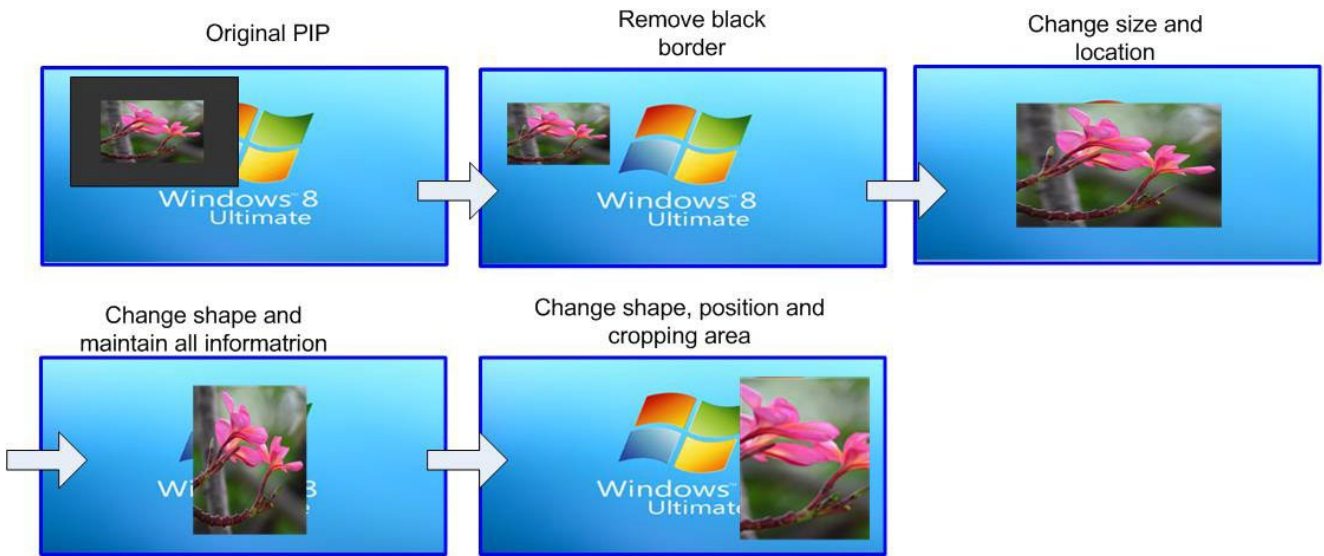
Example: Another Image [Mask]



PIP/POP function

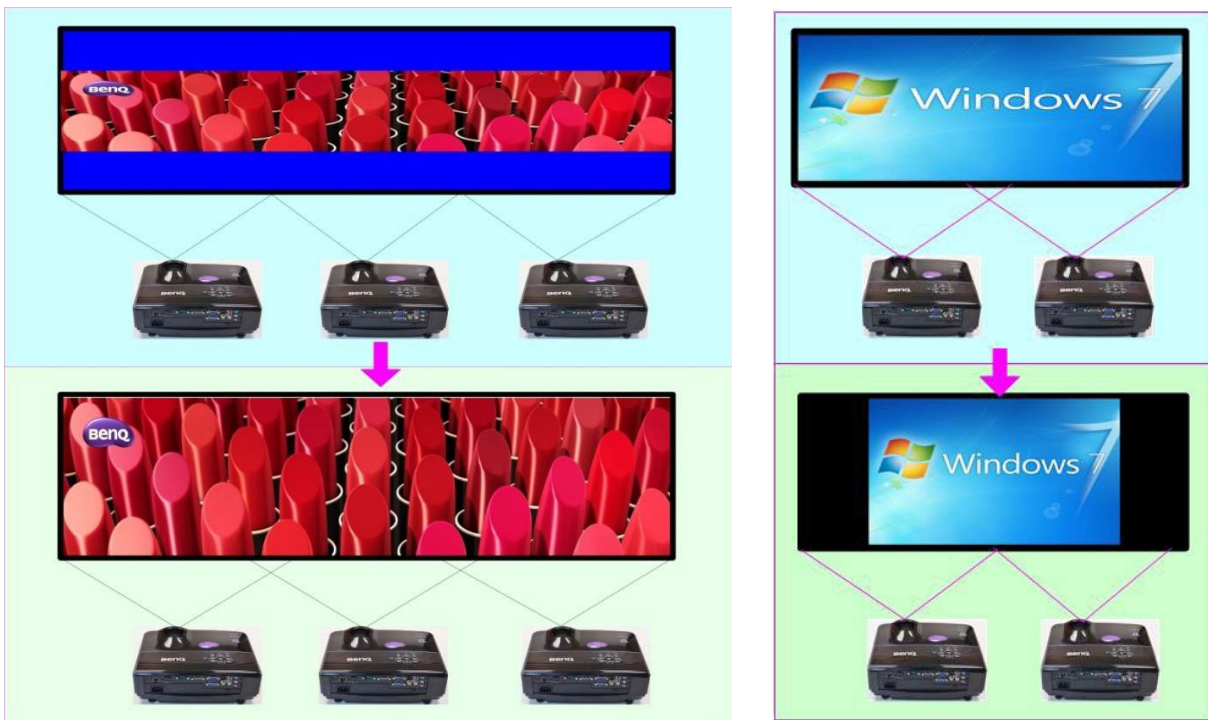
M810 is designed with PIP/POP function in each processing module. Each processing module can display two contents in PIP (Picture in Picture) or POP (Picture outside picture) styles. Users can select two contents among HDMI, DP & VGA for PIP/POP display but can't simultaneously select two HDMI input signals. The PIP image can be with variable sizes from 320*180 to 1920*1200 resolution. The location is flexible across the entire display zone in each projector. The POP images can be Side by Side or in the Top/Bottom position with full screen or keep the original aspect ratio.





Stretch image and change the aspect ratio

Geometry adjustment and Video wall cropping function can compensate for image size or change the aspect ratio. The adjusting range is up to 1800 pixels on each edge based on signal source resolution.



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