



*The absolute opposite of ordinary*

## **M810 1-4 CH Edge Blending Processor Datasheet**

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

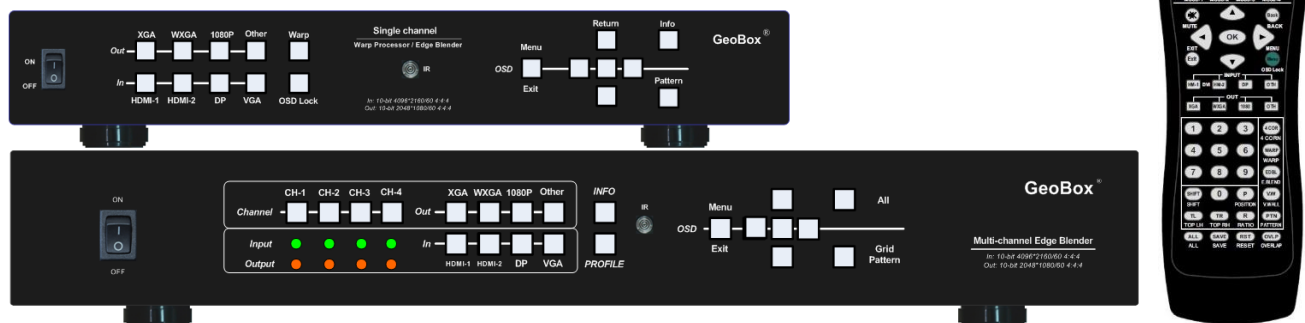
*Input: up to 7680\*2160 @30Hz, 7680\*1200 @60Hz,*

*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.*



Technical support:

E-mail: [sales@vnstw.com](mailto:sales@vnstw.com)

Tel: +886-2-2792-2819 Cell: +886-935-678-033

Skype: vns-inc

Version: 1.01

Website: [www.vnstw.com](http://www.vnstw.com)

## **Table of Contents**

<b><u>Introduction</u></b> .....	<b>3</b>
<b><u>Outlook</u></b> .....	<b>4</b>
<b><u>Difference between M810 &amp; M800</u></b> .....	<b>5</b>
<b><u>Specification</u></b> .....	<b>5</b>
<b><u>Function and Features</u></b> .....	<b>6</b>
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
<b><u>Features illustration</u></b> .....	<b>10</b>
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 region 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 upgrade model from M80x series. The major difference is to support 17\*9 geometry alignment and 120\*68 control points fine-tune in IR controller & PC Tool. Complete new GCT PC tool is adopted. It provides more friendly interface for PC tool operation and increase the accuracy. User 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 as well as 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. 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 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.

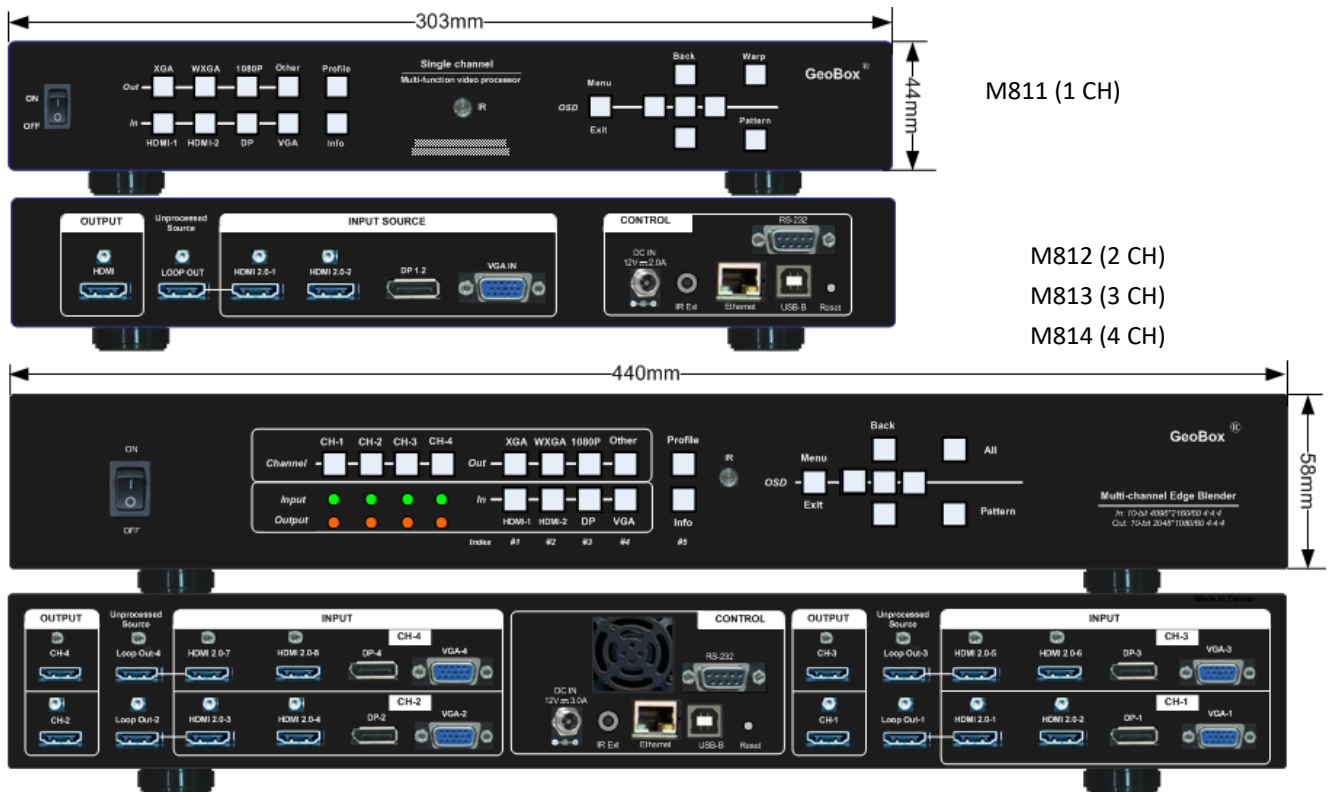
Advanced warp technology is embedded in M810. User can use IR controller, USB, WebPage and Ethernet to perform edge blending and sophisticated geometry alignment up to 120x68 control points. Linearity Grid Line Adjustment for compete line movement up to 17x9 control point and “W” type Corner Wall image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

HDMI loop out supports daisy chain connection up to 8k/2k @30Hz / 8k/1k @60Hz and allows large display with multiple units cascaded. Video wall function is to crop and allocate source image for each projector and set overlap pixels for edge blending. Complete curved edge blending can be achieved through IR controller, USB or Ethernet without additional devices except for signal source and projectors.

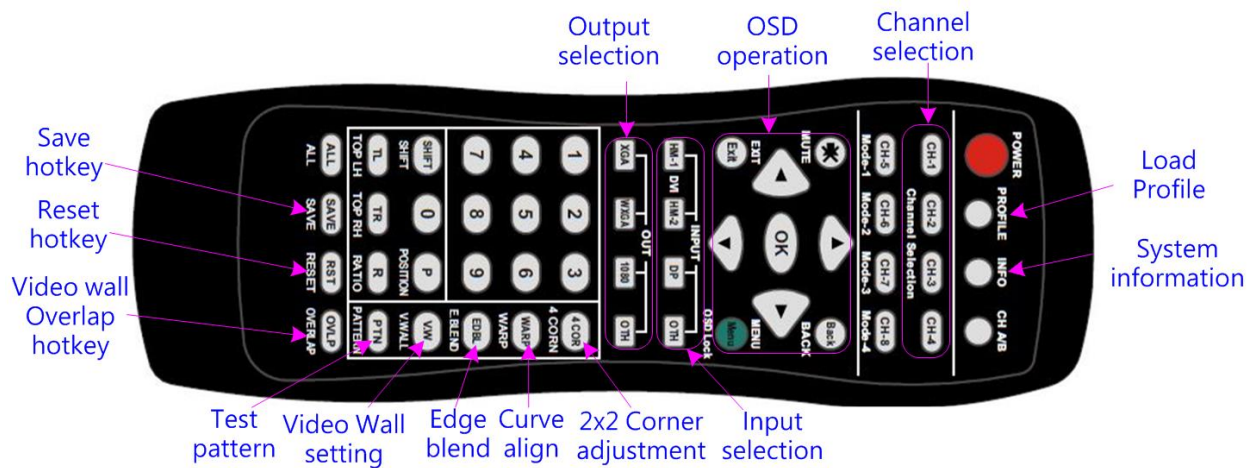
PIP (picture in picture) and POP (side by side) are standard functions. PIP image size is from 320\*180 up to 1920\*1200. In one M814, user can display up to 8 different input contents on the screen.

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

M810 is designed for 7/24 working condition. Using M810, users can replace high end projector with low-cost projector without lens shift, warp and edge blending function. It provides easy configuration, low entry barrier, cost effective, reliable and flexible solution.



(This back panel shows 4 CH model—M814)



## **Feature difference between M810 & M800**

1. Outlook: Same as M800. The only difference is 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 common PC tool for all new GeoBox models, including G90x, UD10x, M810, S901, S914.
  - Operated via USB or Ethernet
  - GCT setup result will be executed in the Box at real time.
  - User can switch the operation between GCT and IR control at any time without data loss.
  - Reduced Save and Load setting time under PC operation.
  - User 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 image to match square pillar at 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. Maximum adjusting points are 100 points.

- ✧ Geometry adjustment range 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 following 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 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 setting.
- ✧ Selectable grid pattern size from 8-120 pixels in H&V direction. 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  $\pm 1800$  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 continuous signal to output, no source searching required in projector when input source change.
- ✧ Support xvYCC & 8/10/12-bit deep color processing.
- ✧ Support High Dynamic Range (HDR) input signal and convert 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 not available when the main image is 90/270 degrees rotation.
- ✧ Selectable and programmable EDID in the range: H=1024-3840, V=720-2400.
- ✧ User can save up to 5 settings and can be recalled by IR controller, RS232, USB or network.
- ✧ ESD Protection:  $\pm 15\text{kV}$  (Air-gap discharge),  $\pm 8\text{kV}$  (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 in 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
- ✧ 2 Year Warranty, paid extension available up to 5 years.

## **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 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 none 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 source signal 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 full 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. Maximum adjusting points are 100 points.
- Geometry alignment range (4 corners + warp adjustment) is up to H=+\_ 1200 pixels and V=+\_ 1200 pixels in full HD output.

### **D. Linearity Grid Line Adjustment**

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

### **E. “W” shape Corner Wall Alignment**

Support “W” type Corner Wall adjustment in horizontal and V type in 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 operation at any time. The result will be executed into the Box at 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 light leakage in the projector. Low native contrast ratio projector will be more serious 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 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 in one projector. If PIP/POP across entire screen is required, please add one S901 at the front end. It will also have 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.
- PIP sub-image size, cropping area, position and aspect ratio can be further adjusted through Overlap function.
- Limitation:
  - When implement PIP/POP function, the main 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.
- 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 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 execute 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 progressive signal source to get the best video quality.

## **N. 120Hz signal output for active 3D display**

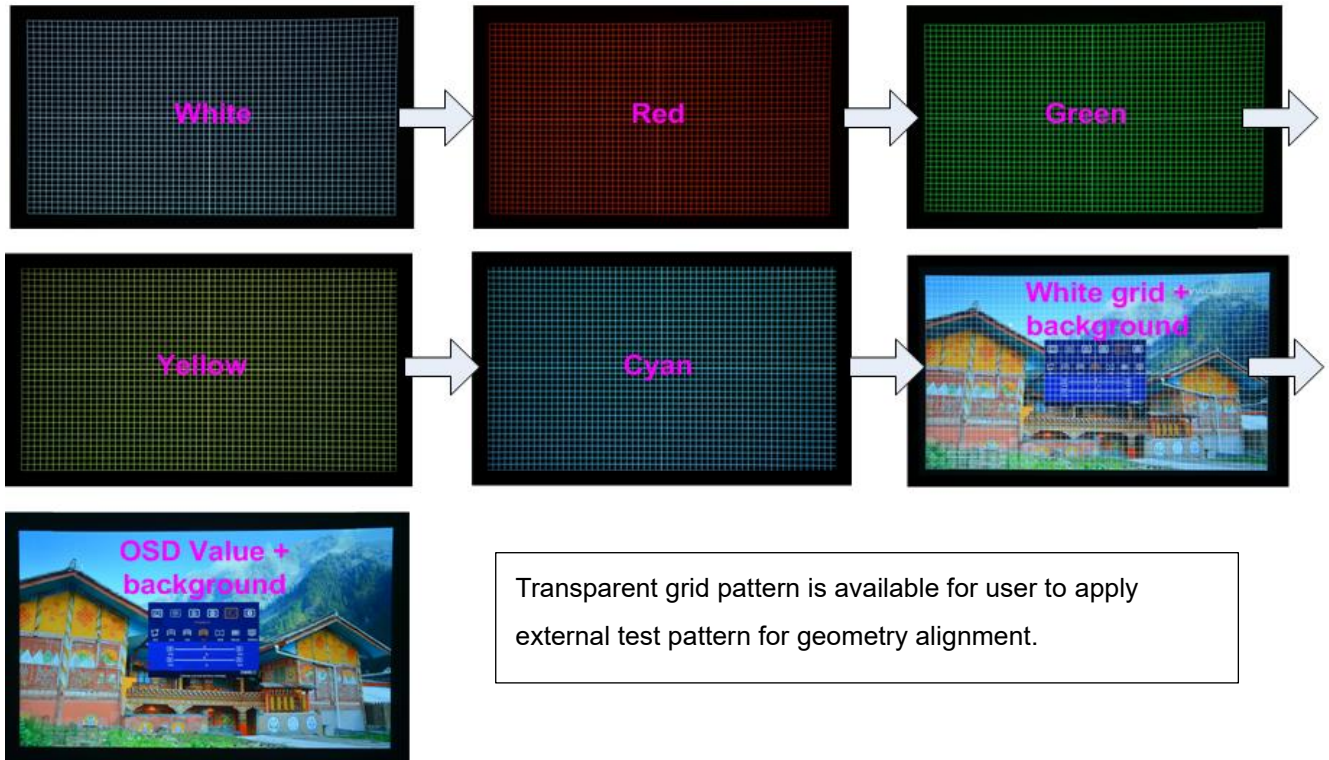
Support frame sequential FHD 120Hz input signal. After warp and edge blending, output XGA, 720P or WXGA 120Hz signal for multiple projectors in active 3D display application

## **O. System control and other features**

- Full 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 compatible with most of control system.
- User can select blue or black background color when no input signal is detected.
- Programmable EDID in the range at H=1024~3840, V=720~2400.
- BOX ID and programmable IP address for convenient multiple unit control at the same time.
- User can save up to 5 settings and can be recalled by IR controller, RS232, USB or network.
- System settings can be backup in PC, 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. User can power ON/OFF the system through the control in signal source.

## **Feature illustration**

### **Variable grid patterns for geometry alignment**

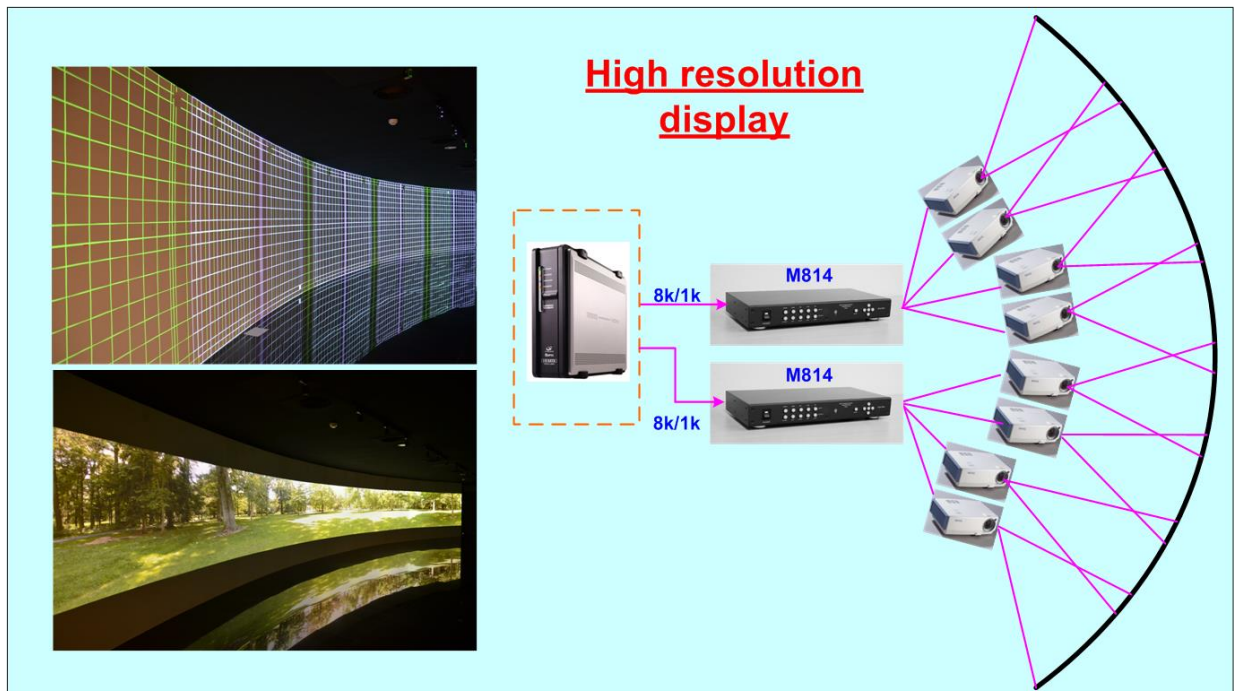


### **Selectable grid pattern size for geometry alignment**

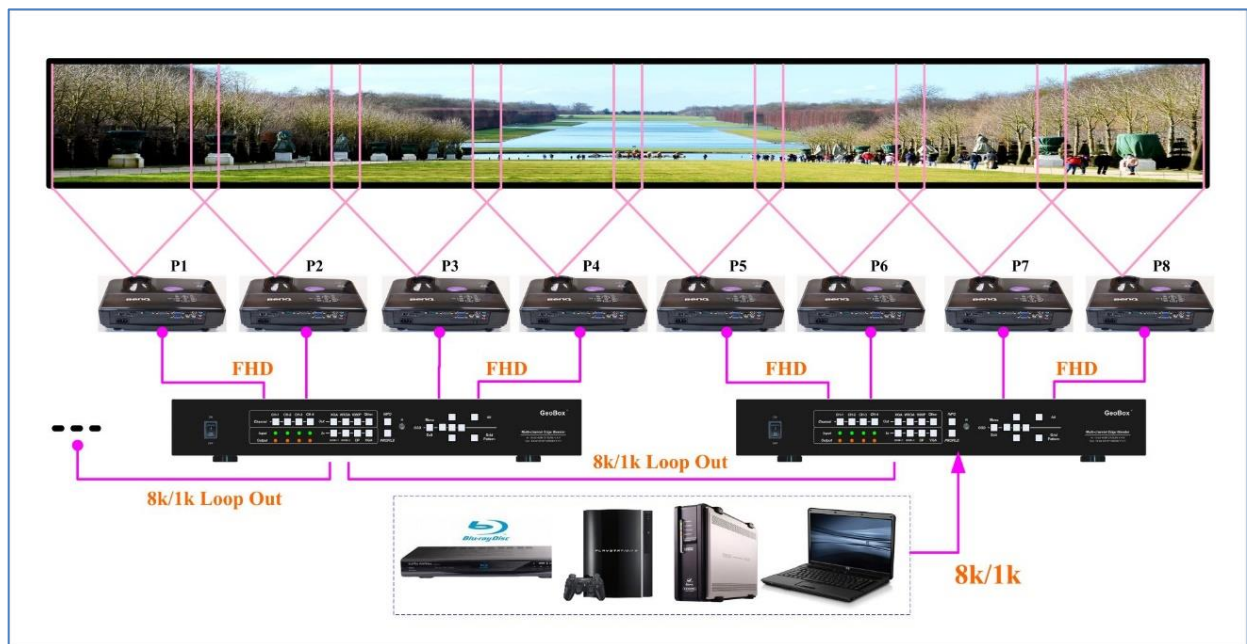
The pixel size in grid pattern for geometry alignment is selectable to meet high end simulation system geometry alignment requirements. The grid size in both horizontal and vertical directions is adjustable from 8 to 120 pixels with 1-pixel increasement. H&V grid size will be the same. User can select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



## High resolution daisy chain connection



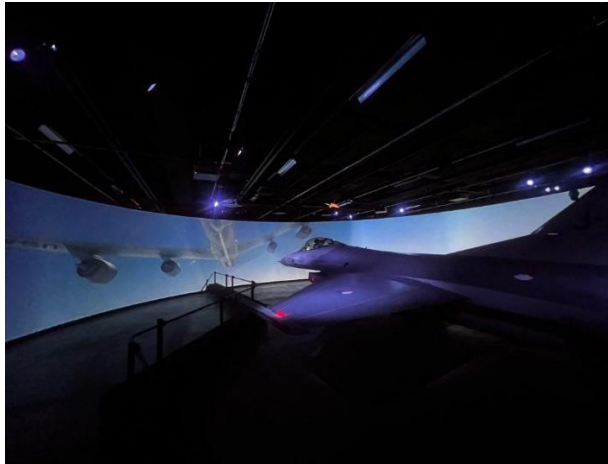
No additional device is required.



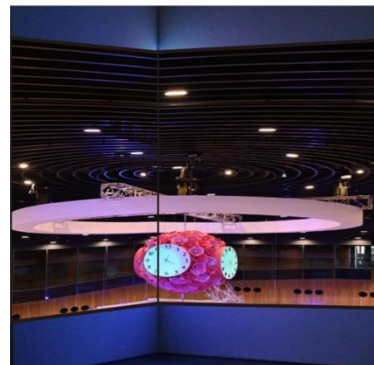
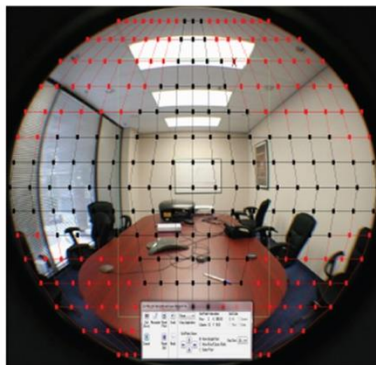
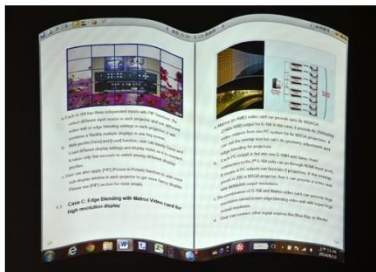


## **Edge blending on flat and curved screen**

Multiple units of GeoBox can be cascaded together for big scale high resolution edge blending system. Except signal source, projectors and HDMI cables, no PC or appropriate software is required.



## **Image warp and geometry alignment**



## **Corner Wall Alignment & Display**

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

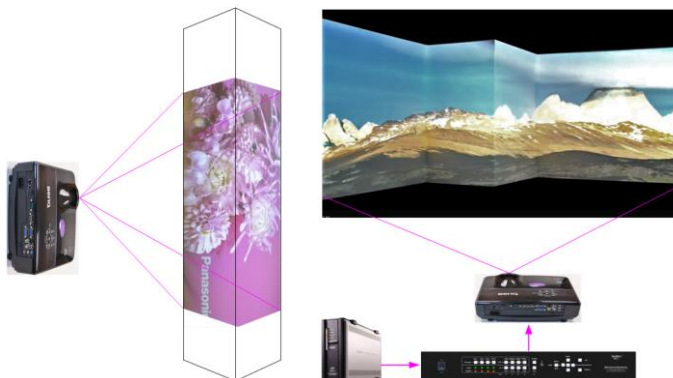
**In Horizontal and Vertical directions**



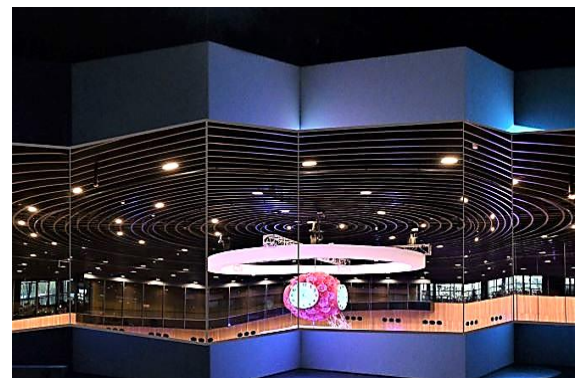
**At any location but not only at center**



**One projector Corner Wall application**



**Two projector Corner Wall application**



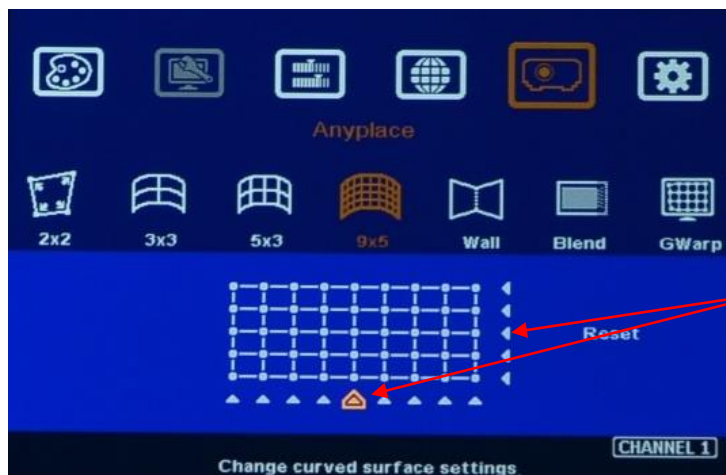
**Other corner wall applications**



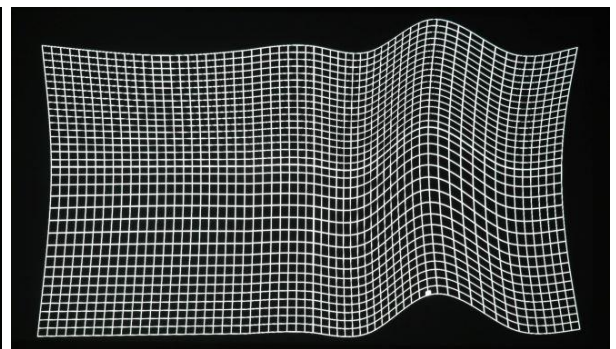
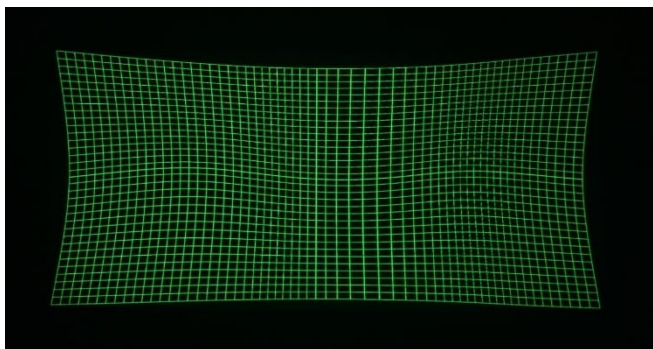
## Linearity grid line adjustment

When projector projects image on curved screen, the image will change the grid size gradually and cause different scaling factor on the center and both sides. Linearity grid line adjustment is to compensate this kind of effect and make complete image with the same scaling factor. Another application is to align images from adjacent projectors in overlap region, this function can reduce the alignment time quite a lot.

1. It can be applied to both horizontal and vertical directions.
2. The operation OSD menu is under 3x3, 5x3, 9x5 & 17x9 warp alignment menu and GCT PC tool under [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

Immersive system with 3 walls + one ceiling with sunny floor



## Multi-video display

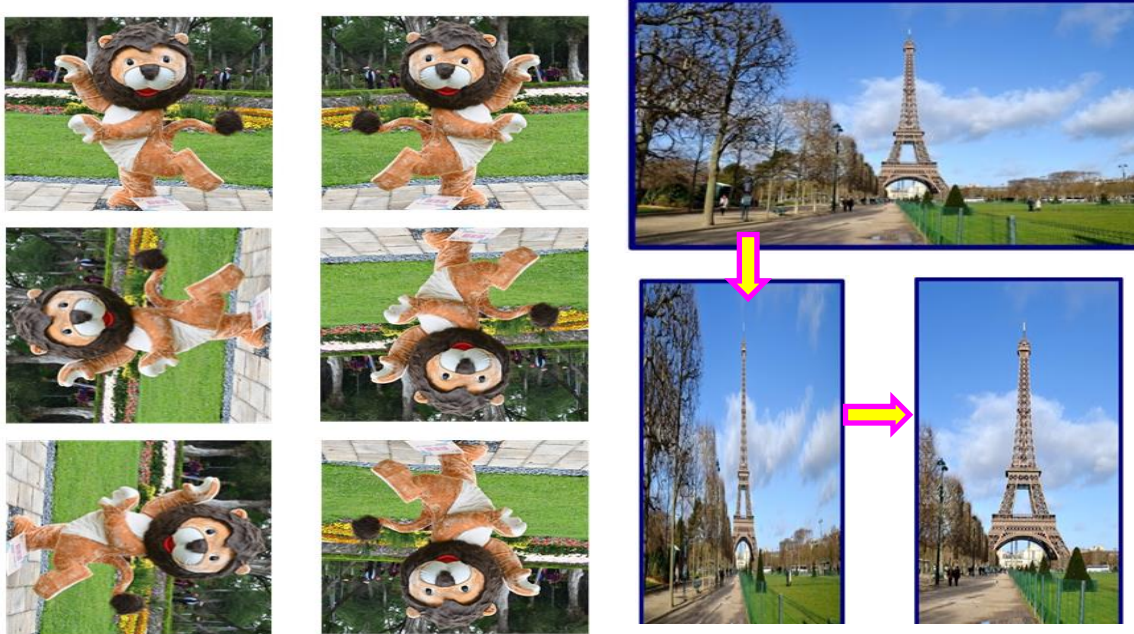
M810 has below flexible display functions:

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



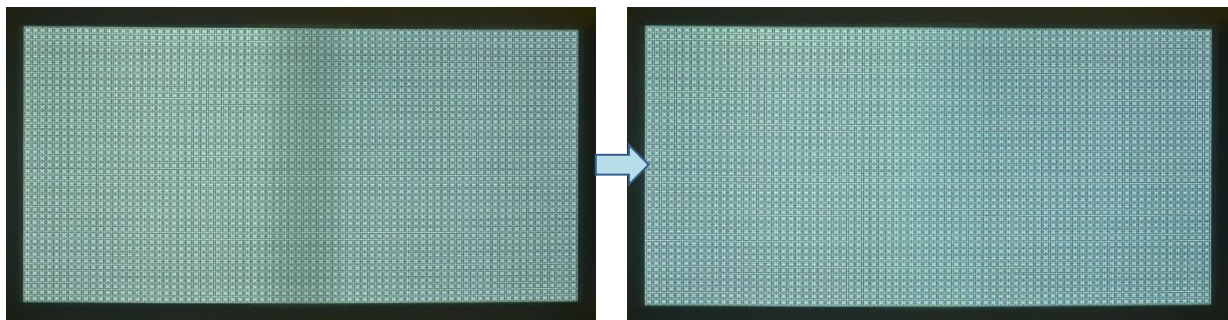
## Image Flip & Rotation

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



## Independent RGB gamma correction

Independent RGB gamma value adjustment in Overlapped region allows more capability to compensate color banding in overlapped region.





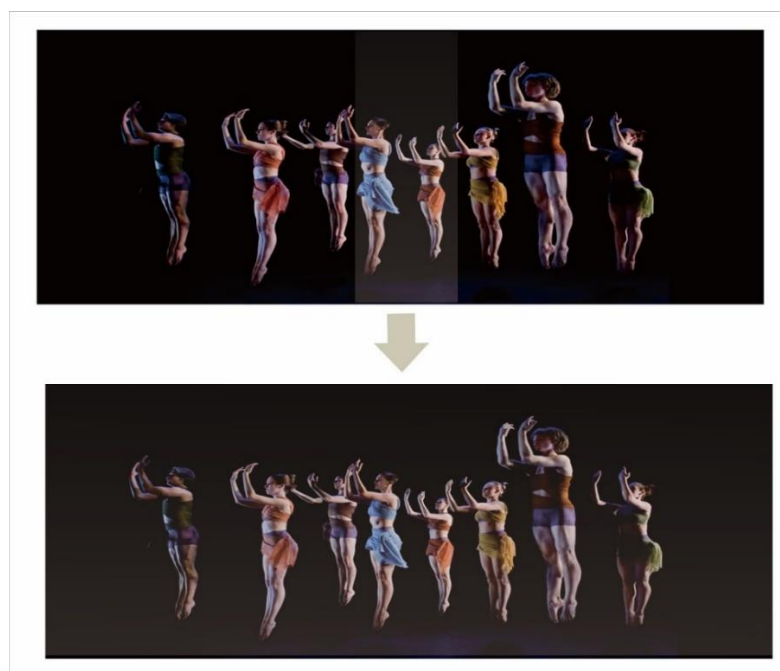
## **White balance & Color correction**

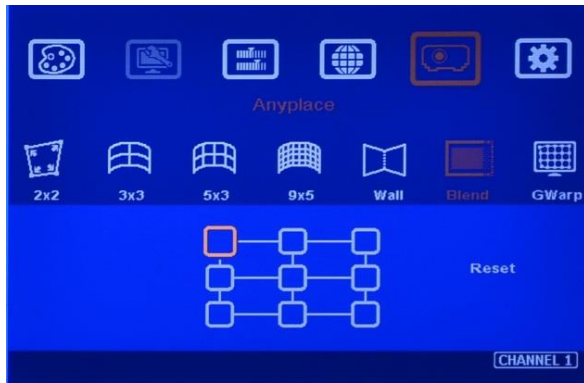
Each channel can be adjusted separately through RGB Gain and Offset value.



## **Nine region Black level uplift**

It can compensate the light leakage in the projectors, especially in low contrast ratio projector under dark working environment. The native contrast ratio is related to projector light leakage and can't be reduced through signal processing. Higher native contrast ratio will have less light leakage. Laser projector will have high contrast ratio and is the best choice for edge blending system. Separate RGB precise black level uplift can be executed in multiple regions (up to 9) in each output channel at 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 image [Shift] and another one is Edge [Mask] under 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 edge mask. When user moves the position for each control point it will result many kinds of edge mask pattern. 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 original edge position before geometry or [Shift] adjustment. Both functions can be implemented at the same time.



**Original Image after geometry alignment**

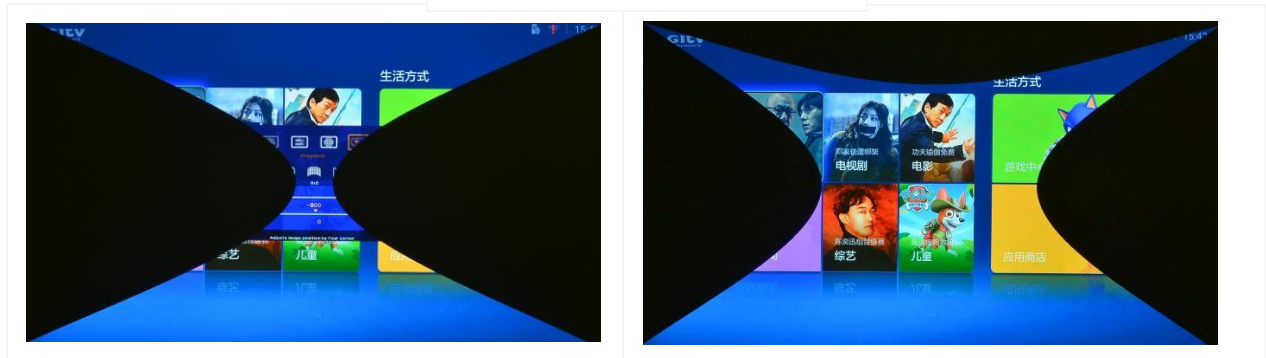


**Image [Shift] (Follow geometry curve)**



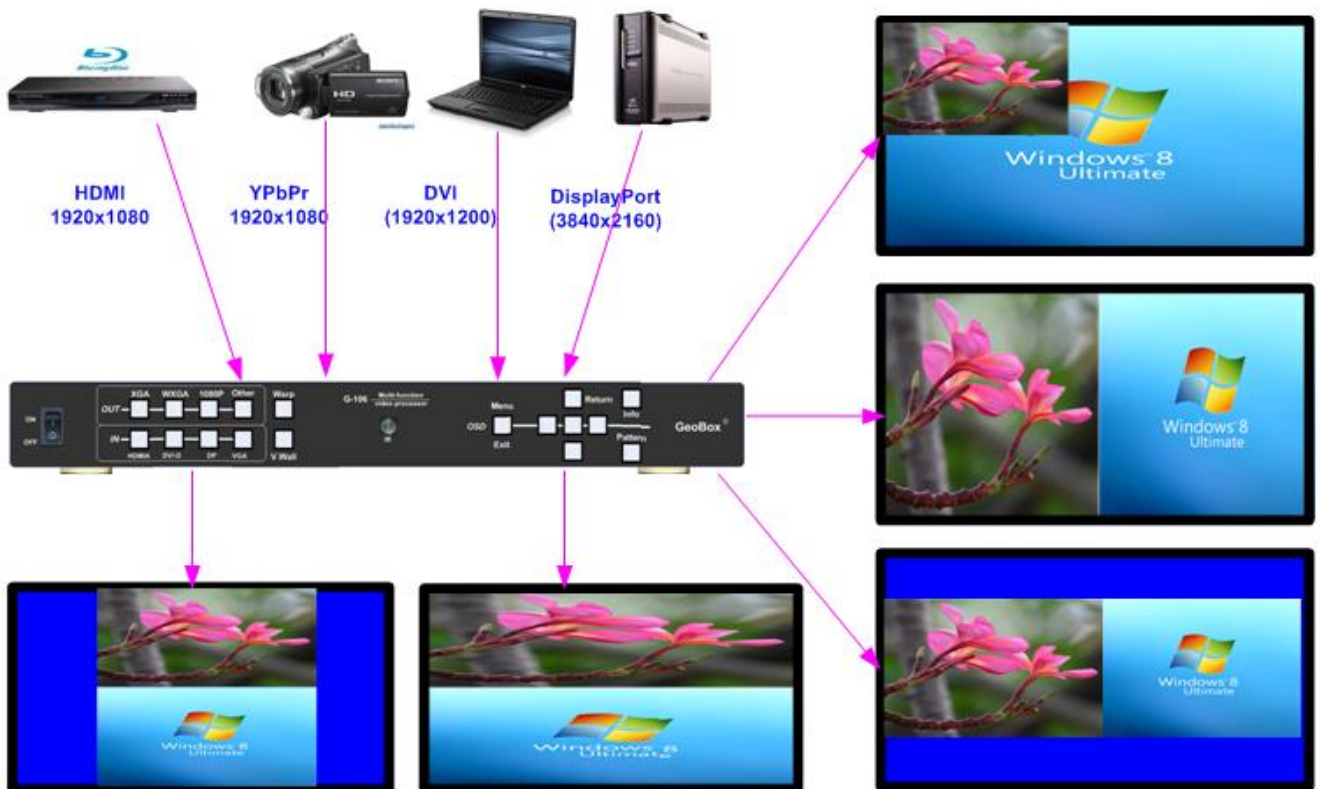
**Image [Mask] (executed by 8 control points)**

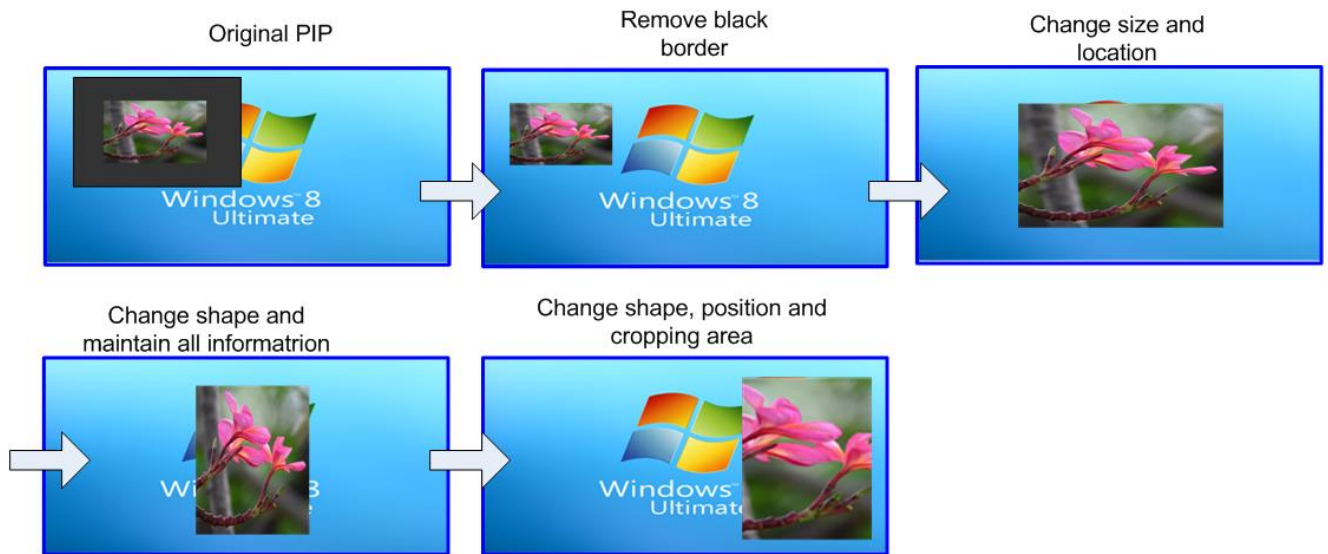
Example: Another Image [Mask]



## PIP/POP function

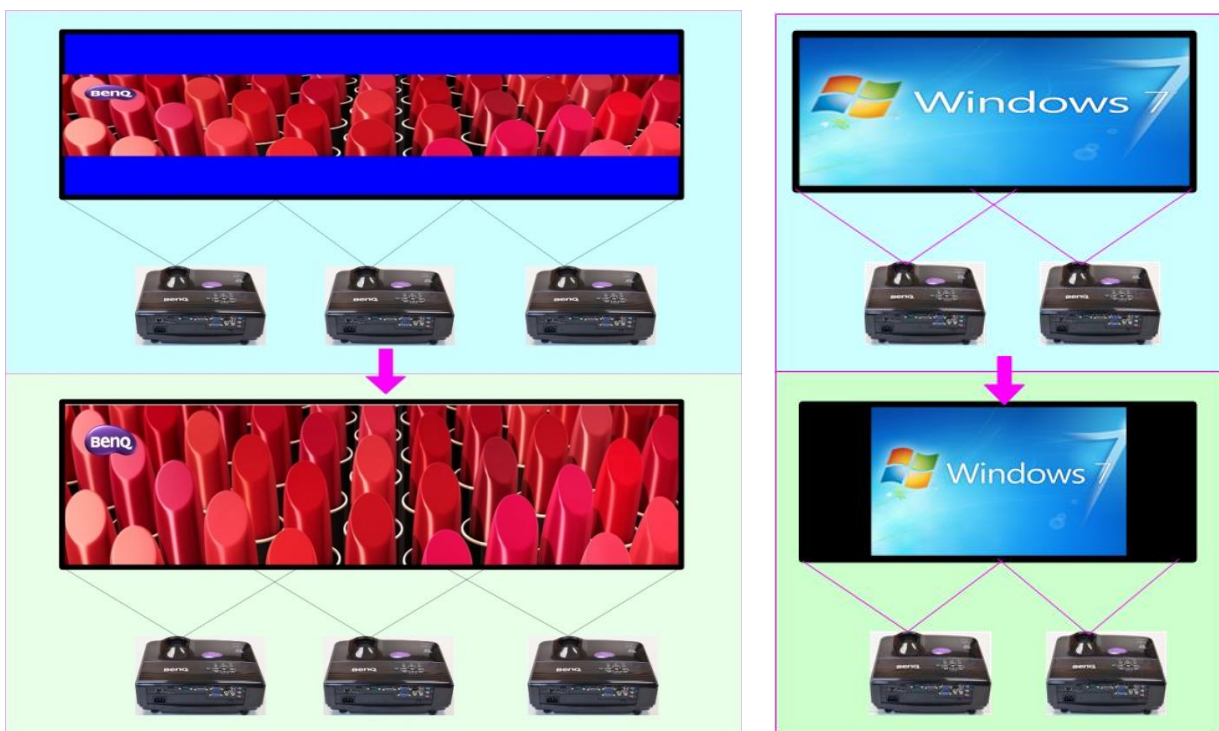
M810 is designed with PIP/POP function in each processing module. Each processing module can display two contents in PIP (Picture in Picture) or POP (Picture outside picture) styles. User can select two contents among HDMI, DP & VGA for PIP/POP display but can't select two HDMI input signals at the same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





### **Stretch image and change aspect ratio**

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



**Disclaimer/Copyright Statement**

Copyright 2022, VNS Inc. All Right Reserved

This information contained in this document is protected by copyright. All rights are reserved by VNS Inc.

VNS Inc. reserves the right to modify this document without any obligation to notify any person or entity of such revision. Copying, duplicating, selling, or otherwise distributing any part of this document without signing a non-disclosure agreement with an authorized representative of VNS Inc. is prohibited. VNS Inc. makes no warranty for the use of its products and bears no responsibility for any error of omission that may appear in this document.

Product names mentioned herein are used for identification purposes only and may be trademarks of their respective companies.