

# GeoBox

## G810 2/4 Channel Edge Blender Datasheet

**G812 (2 CH), G814 (4 CH)**

**Input: up to 4096\*2160 @60Hz, 7680\*1200 @30Hz 4:4:4**

**Output: 2048\*1080@60Hz**

**New generation Warp & Edge blending engine**  
**Full functions in one box, simple, easy-of-use**



**Sales & Technical support**

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## Table of Contents

<b>Introduction.....</b>	<b>3</b>
<b>Outlook.....</b>	<b>4</b>
<b>Specification.....</b>	<b>5</b>
<b>Function and Features.....</b>	<b>7</b>
<b>Feature illustration.....</b>	<b>10</b>
<b>Selectable Grid pattern for geometry alignment.....</b>	<b>10</b>
<b>Selectable grid pattern size.....</b>	<b>10</b>
<b>4k/60 (8k/1k) daisy chain connection.....</b>	<b>11</b>
<b>Image geometry alignment and warp.....</b>	<b>11</b>
<b>Edge blending on flat and curved screen.....</b>	<b>12</b>
<b>Corner wall alignment and display.....</b>	<b>13</b>
<b>Linearity Grid Line Adjustment.....</b>	<b>14</b>
<b>Immersive display.....</b>	<b>15</b>
<b>Big scale display.....</b>	<b>15</b>
<b>Flexible display.....</b>	<b>15</b>
<b>Image flip and rotation.....</b>	<b>16</b>
<b>Independent RGB Gamma correction.....</b>	<b>17</b>
<b>White balance &amp; Color correction.....</b>	<b>17</b>
<b>Nine region Black level uplift.....</b>	<b>18</b>
<b>Stretch image and change aspect ratio.....</b>	<b>19</b>
<b>Image stacking.....</b>	<b>19</b>
<b>Edge Mask.....</b>	<b>20</b>
<b>Scaler switcher and format conversion.....</b>	<b>21</b>

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## **Introduction**

G810 is upgrade model from G800 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.

G812 is a dual channel professional curved screen edge blending processor designed for sophisticated edge blending as well as image warping and stacking. G814 is 4 channel edge blending processor designed with two G812 modules.

Each G812 has 4 inputs (2x HDMI, 1x DP, 1x VGA) and 2x HDMI outputs and G814 has double input and output ports. Input supports up to 4096\*2160 @60Hz, 7680\*1200 @30Hz with 4:4:4 full color sampling. Output supports up to 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 timing

Advanced warp technology is embedded in G810. 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 G810. Users can see real time geometry and color adjustment to get optimized result.

.HDMI 2.0 loop out supports daisy chain connection up to 7680\*1080 @30Hz and allows large display with multiple units cascaded. Video wall function in G812 is to crop and allocate source image for each projector and set overlap pixels for edge blending. Complete curved screen edge blending can be achieved through remote controller or Ethernet without PC software, video distributor and splitter.

G810 is designed to support programmable EDID and non-VESA standard input. User can create any EDID timing in the range between 1024x768 and 3840x2400 in order to optimize video performance.

Using G812, users can replace high end projector with low cost projector without lens shift, warp and edge blending. It provides easy configuration, low entry barrier, cost effective, reliable and flexible solution.

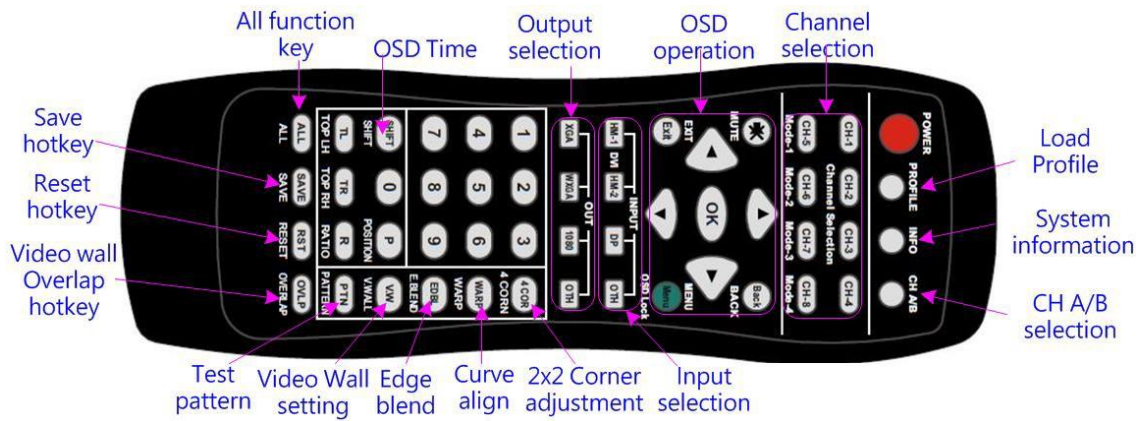
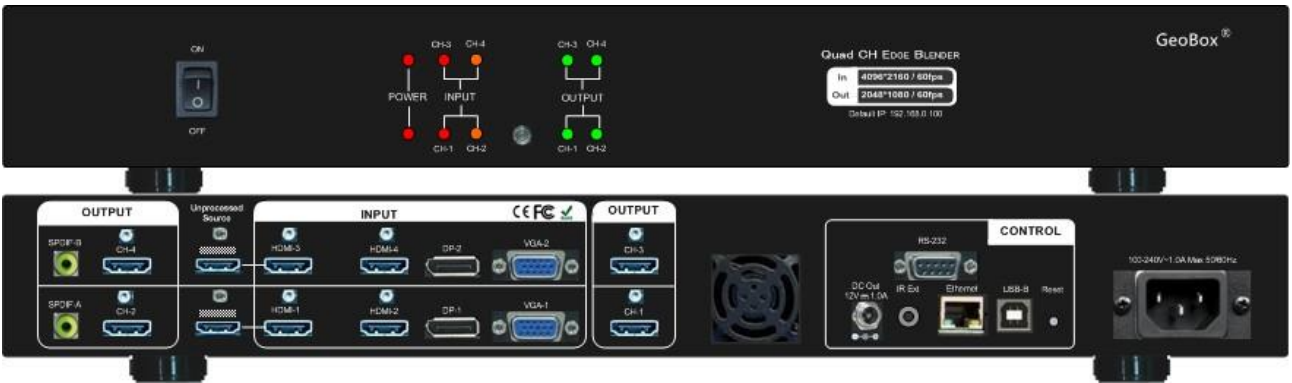
Dual power supply system is embedded in G812. User can use either AC power 100V-240V power supply or DC 12V 2A power supply with external DC 12V power adapter. When apply AC power supply, user will have one DC 12V 1A output for signal extender.

# Outlook

**G812 (440x161x44mm)**



**G814 (440x161x58mm)**



## **Specification**

- G812: single processing model, G814: dual processing models
- Each processing module: Input: 2x HDMI 2.0b, 1x DP1.2a, 1x VGA.
- HDCP: HDMI V2.2/V1.4, DP: HDCP: V1.3.
- Max. input resolution: 4096x2160 @60Hz, 7680\*1200 @30Hz.
- Support non-VESA standard input timings.
- Output: G812: 2x HDMI, G814: 4x HDMI, up to 2048x1080 @60Hz & WUXGA.
- Input / Output signal is 10 bits, 4:4:4 chroma sampling. Input support RGB/YUV progressive and interlaced signals. Output is progressive RGB.
- G812: 1x HDMI 2.0b loop out ports for multiple unit daisy chain connection. G814: 2x HDMI loop out.
- 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.
- Two frame latency: 33ms (at V=60Hz)
- Edge blending at 4 edges up to H= 1920 pixels, V=1200 pixels with independent RGB gamma correction and 9 area black level uplift.
- Support "W" type Corner Wall adjustment in H&V at flexible location with the same image scaling factor. The adjustment range in 4 corners, horizontal / vertical and curve point are 1200 pixels each.
- Support Linearity Grid Line adjustment for quick H&V line position alignment via remote controller.
- Edge Mask up to 500 pixels following the result of geometry alignment.
- Edge Mask up to 900 pixels in H&V directions through 8 control points around image border.
- Embedded full function video wall function for image split, cropping and overlap pixel setting.
- 15 preset output resolution up to 2048\*1080 @60Hz. Support refresh rate 24/30/50/60/120 in some output timings.
- Input support xvYCC & 8/10/12-bit deep color processing.
- System settings can be stored and backup.
- Selectable grid pattern size from 8-120 pixels in H&V direction. Default is 32\*32 pixels.
- 50Hz in/out & frame rate conversion.
- Selectable grid pattern color and with optional transparency to see background image.
- Flexible aspect ratio adjustment in each edge up to +\_ 1800 pixels cropping range.
- 10-bit processor, 3:2/2:2 cadence, low angle smooth algorithm, high quality scaling engine.
- 3D motion adaptive de-interlace.
- Frame lock for multiple channel synchronized outputs.
- Support HDR input signal but no HDR effect in the output.
- Individual color and white balance adjustment in each output channel.
- Individual 90/180/270 rotation, flip, cropping, scaling & color adjustment in each channel
- 90/270 degrees rotation and flip only available under 4k/30Hz input resolution.

- Embedded HDMI & SPDIF audio outputs
- Selectable and programmable EDID in the range: H=1024-3840, V=720-2400.
- ESD Protection: ±8kV (Air-gap discharge), ±4kV (Contact discharge)
- Dual power supply in G810. User can use either AC 100-240V or DC 12V power supply. When use AC power supply, there is a DC 12V 1A output for signal extender.
- Power consumption:
  - ✓ Without DC12V/1A output: G812: AC 240V, 0.05A/11.9W, 110V: 0.106A/11.7W, G814: AC240V 0.139A/33.4W, AC110V: 0.295A/32.5W
  - ✓ With DC12V/1A output: G812: AC 240V: 0.10A/23.9W, 110V: 0.215A/23.7W, G814: AC240V: 0.139A/33.4W, AC110V: 0.295A/32.5W
- Working environment: 45° C, 10-90% RH
- Control: IR, RS232, WebGui & PC tool for USB & Ethernet
- Dimensions (Body only): G812: 440mm\*161mm\*44mm, G814: 440mm\*161mm\*58mm
- Weight: G812: 2.10 kg, G814: 2.46kg (body only)
- CE/FCC/RoHS Certified
- 30 Month Warranty, paid extension available up to 5 years.

## **Function and features:**

### **A. Input and output:**

- G812: single processing model, G814: dual processing modules.
- Each processing module has below input and output ports:
  - ✓ Input ports: 2x HDMI, 1xVGA, 1x DisplayPort.
  - ✓ HDMI & DisplayPort support 4096\*2160 @60Hz, 3840\*2400 @60Hz with 4:4:4 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: 2x 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 (supports 4096x2160@60Hz & 7680x1200@30Hz)

### **B. 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.

### **C. 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.

### **D. “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.

### **E. 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.

### **F. 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.

## **G. 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.

## **H. 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.

## **I. 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.

## **J. 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.

## **K. Image rotation and flip**

- Image 90/180/270 degrees rotation, flip and mirror up to 4k/30Hz 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.

## **L. Decode 3D signal for passive 3D display**

Support side by side and top/bottom 3D input signal. After warp and edge blending, output RH/LH eye frames signals for passive 3D display.



## M. Background white balance

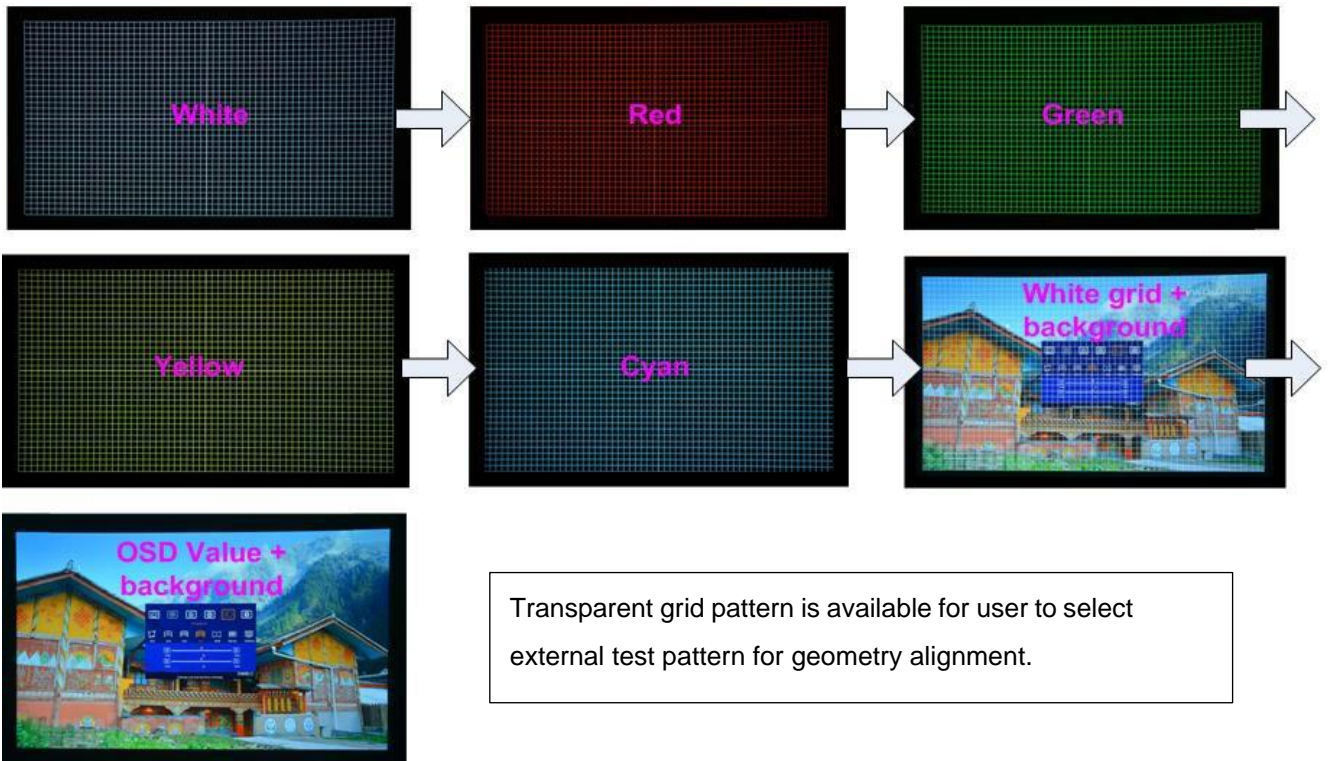
White balance and individual color correction for each output channel.

## N. 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

### Selectable Grid Pattern for geometry alignment



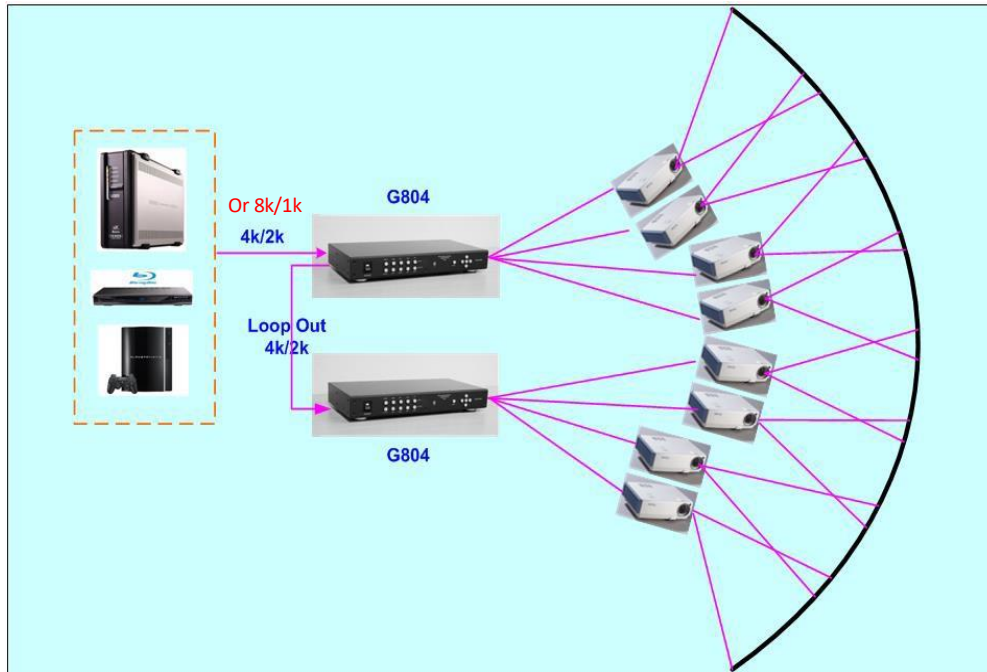
### Selectable grid pattern size

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 increase. H&V grid size will be the same. User can select grid size under [Edge Blend] menu.

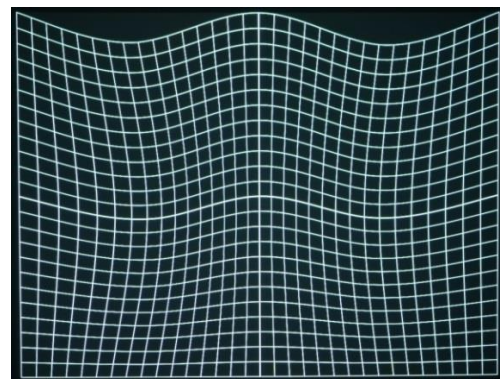
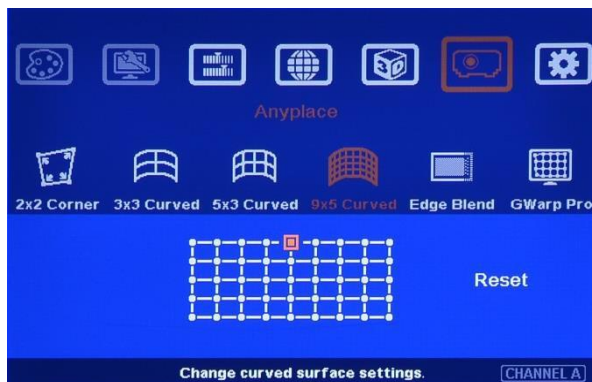


### 4K/60 (8k/1k) daisy chain connection

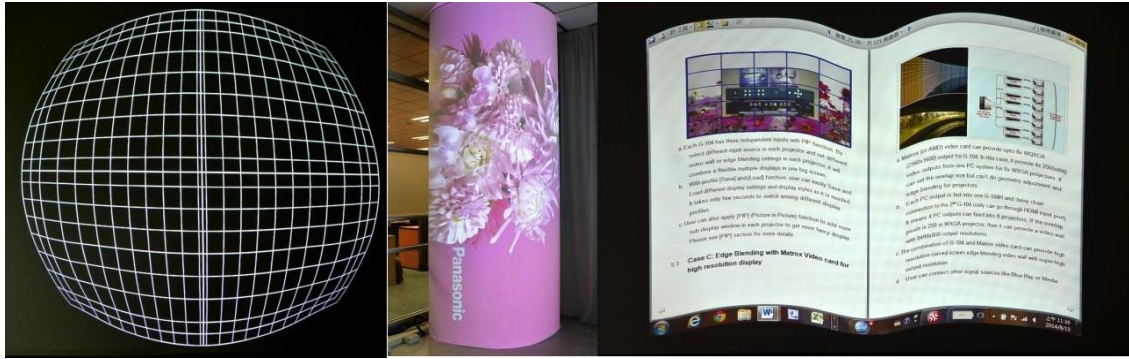
2x G814 can control up to 8 projectors. It can be replaced with 4x G812 with the same result. User can cascade more G810 to control more projectors. Maximum control projectors from single signal source are 15 projectors. There is no limitation in multiple signal sources edge blending.



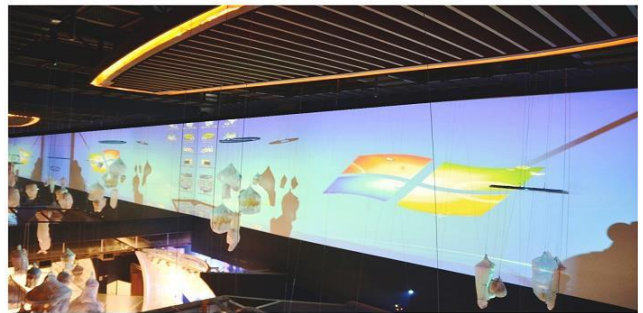
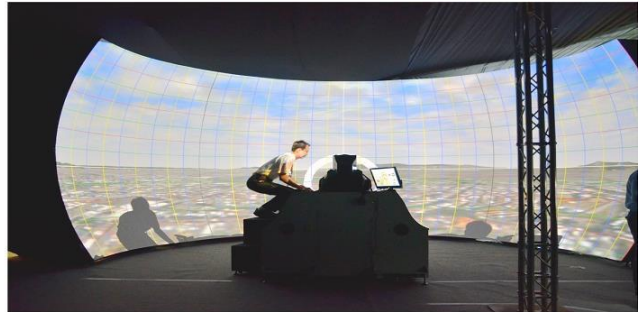
### Image geometry alignment and warp







**Edge blending on flat and curved screen**



### “W” shape 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 +\_ 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 horizontal line. 4 Corner position alignment and Edge Blend function are still available with Corner Wall adjustment for easy image mapping and system setup.

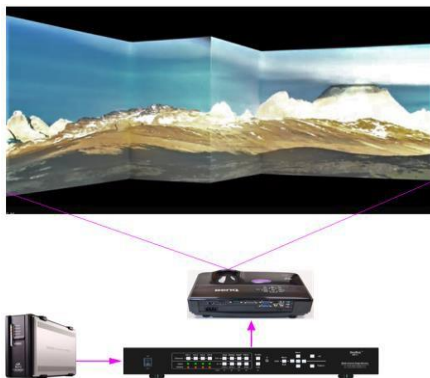
**In Horizontal and Vertical directions**



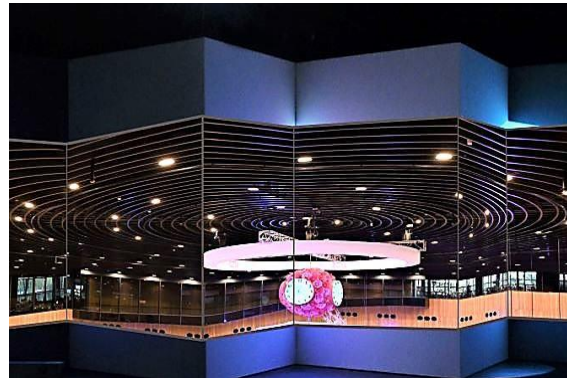
**At any location but not only at center**



**One projector Corner Wall application (W shape)**



**Two projector Corner Wall application**



### **Other corner wall applications**

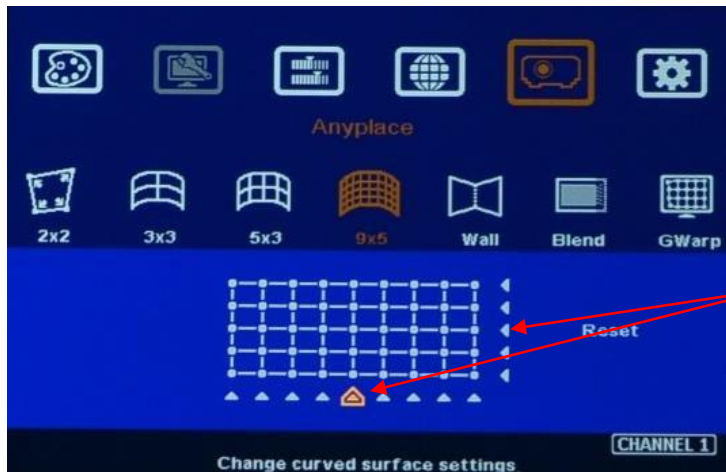




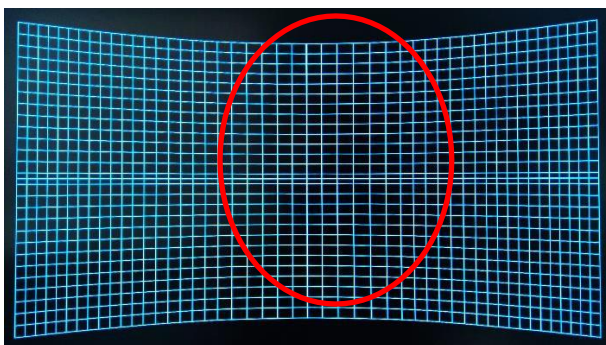
## Linearity grid line adjustment

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.

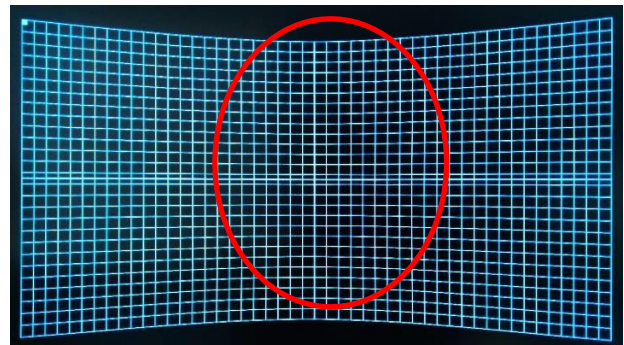
1. It can be applied to both horizontal and vertical directions.
2. The operation OSD menu is under 3x3, 5x3, 9x5 & 17x9 warp alignment menu and GCT PC tool under [Warp Adjust] menu.
3. Linearity grid line adjustment can be executed together with warp alignment & edge blending at the same time.



Control point for Linearity Grid  
Line Adjustment

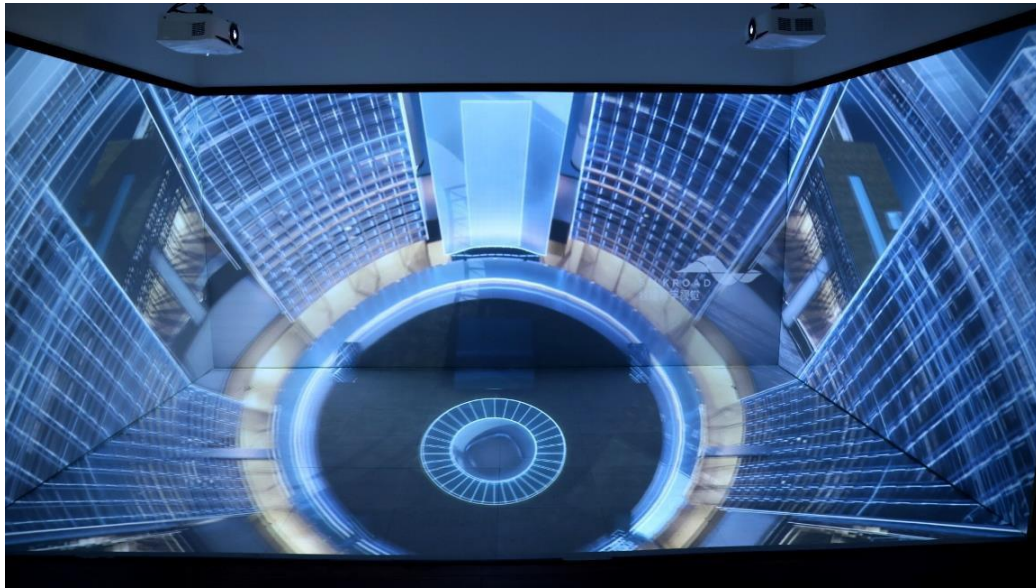


Original curved screen image  
(Center grid size is larger)



After Linearity grid line adjustment  
(All the grid size will be even)

## Immersive display



Immersive system with 3 walls and one floor

## Big scale display



## Flexible display

One G812 has below flexible display functions: (G814 can display up to 4 discrete contents)

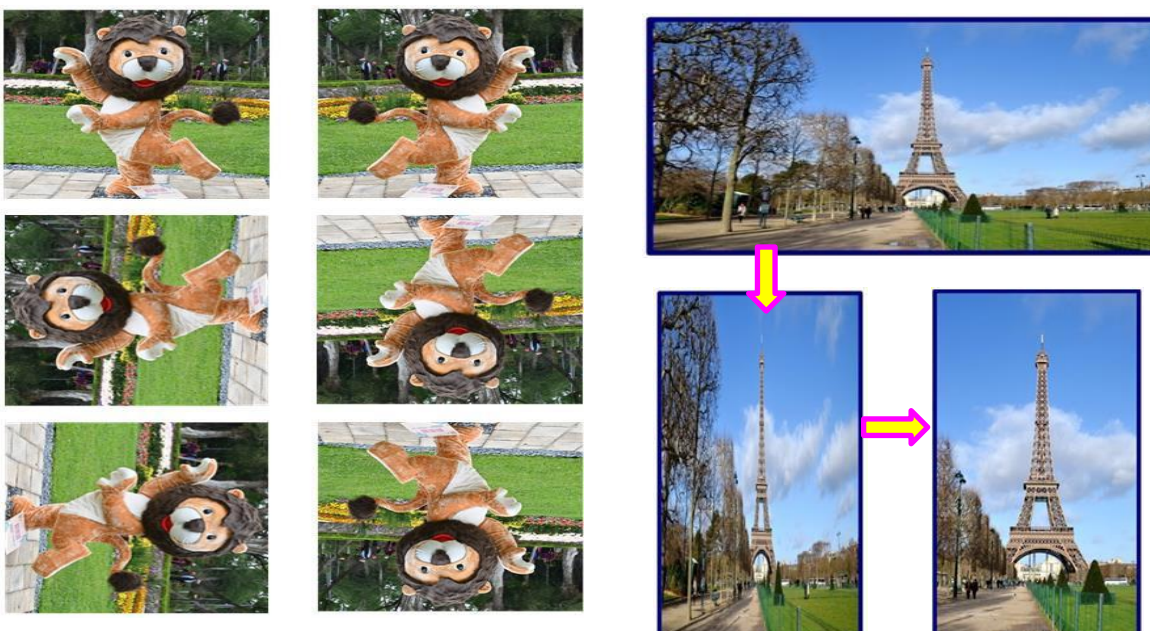
1. One big content edge blending.
2. Independent content display from each projector.
3. 16:9/16:10 image at the center
4. Edge Blending with projector at portrait to increase image height.
5. If user selects two inputs for two discrete displays in two projectors, the input source can't be two HDMI. It should be HDMI+DP, HDMI +VGA or DP+VGA.





### Image Flip & Rotation

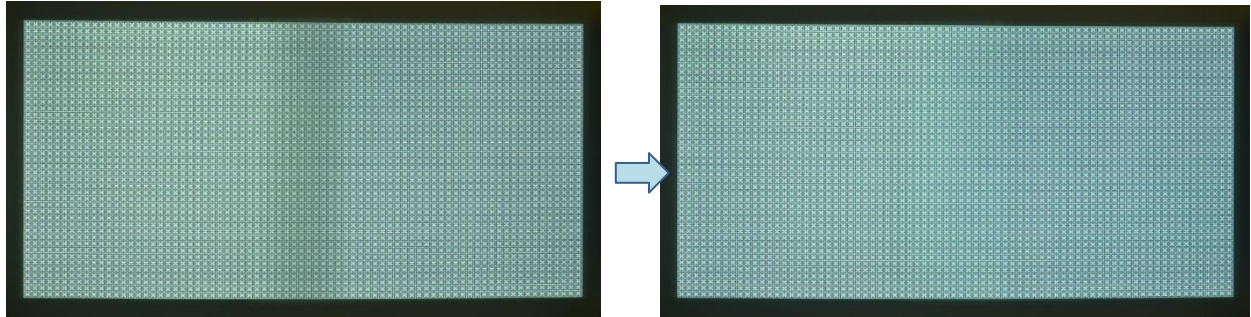
Image 90/270 degrees rotation and flip under 4k/30Hz resolution. Landscape and top/bottom flip support up to 4k/60Hz. After image rotation or flip, user can also adjust the aspect ratio.





### Independent RGB gamma correction

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

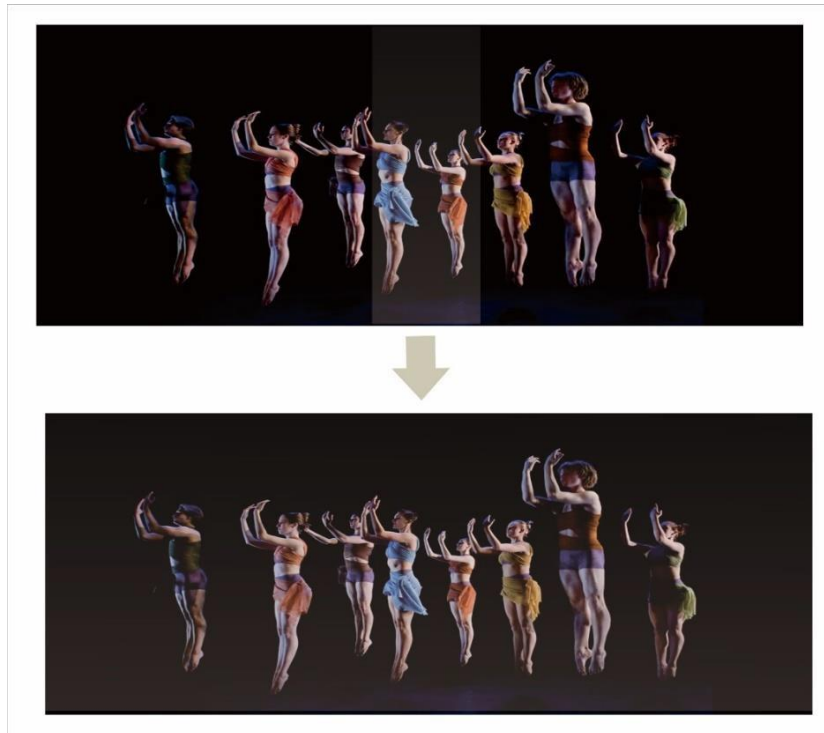


### White balance & Color correction

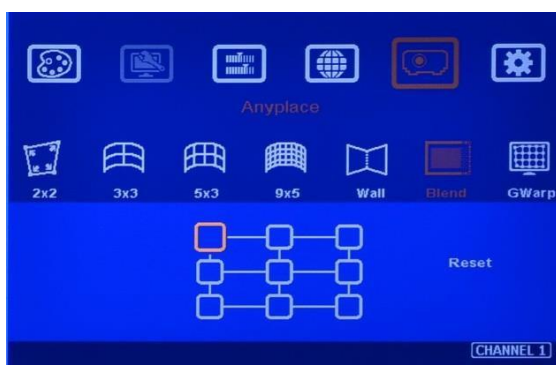


## Nine region Black Level Uplift

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. Usually, 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.

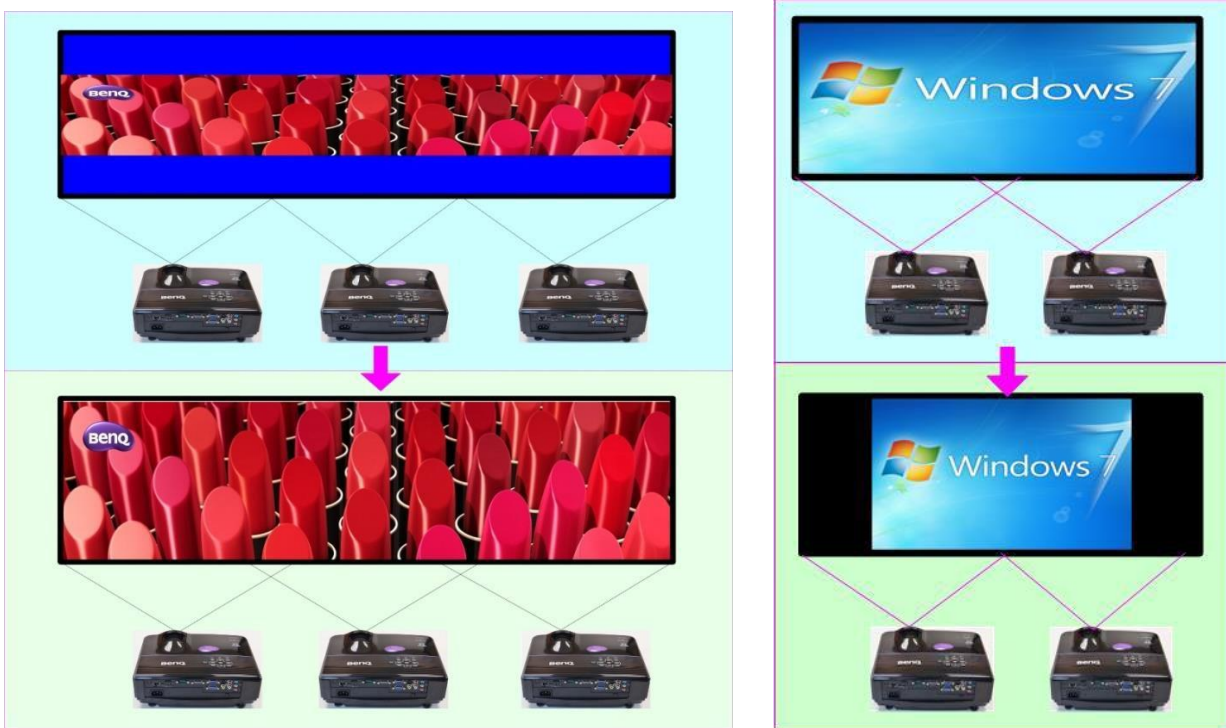


***Nine regions black level uplift. Each region can set different RGB offset value.***



### Stretch image and change aspect ratio

Geometry adjustment and Video wall cropping function can compensate image size or change aspect ratio. If adjusting from Video Wall [Overlap] function, the adjusting range is up to +\_1800 Px based on source resolution.



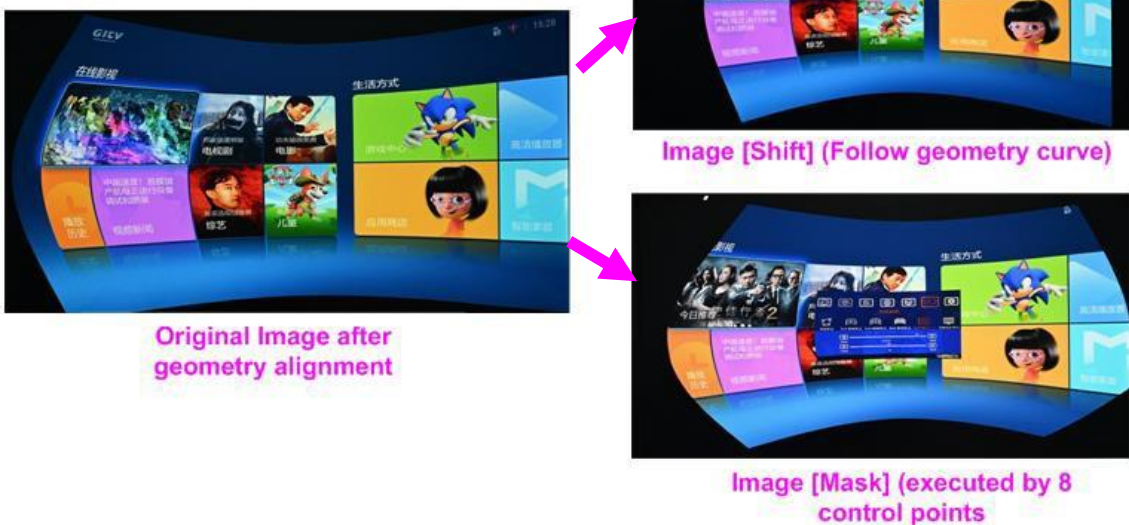
### Image stacking to increase the brightness



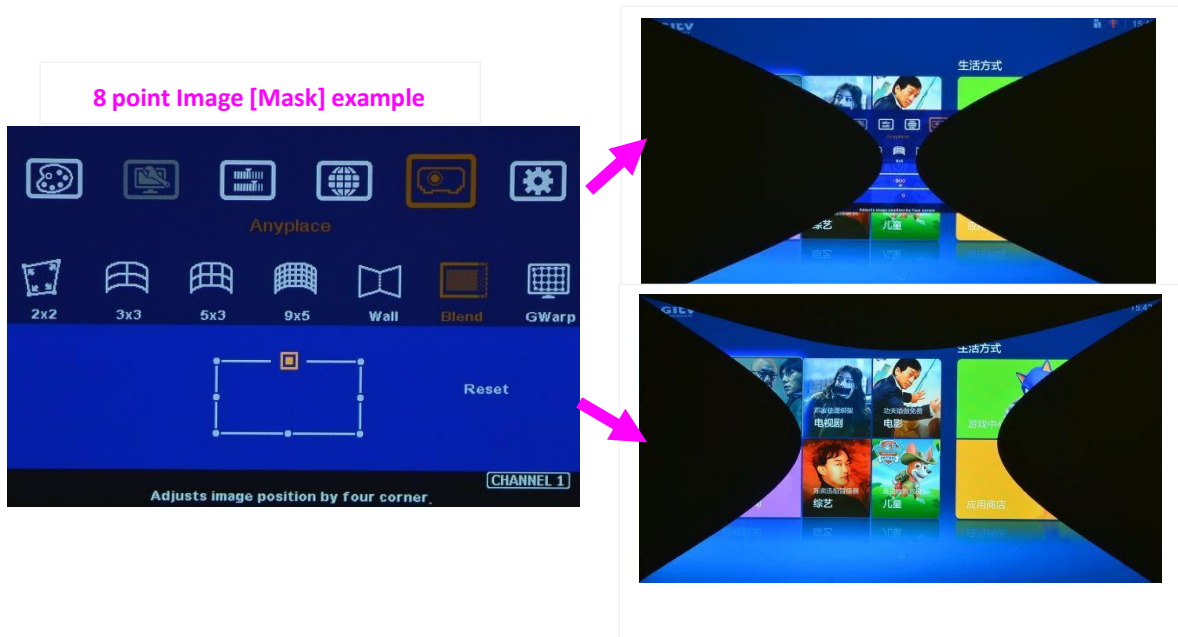
## Edge Mask

There are two edge mask functions in GeoBox. 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  $\pm 900$  pixels.
3. The adjusting range for [Shift] is based on the image position after geometry alignment and the range for [Mask] is calculated from the original edge position before geometry alignment and [Shift] edge adjustment.
4. User can apply both [Shift] + [Mask] at the same time to create more flexible edge mask effect.







**Scaler switcher and format conversion**

Two outputs can have different input port, color, geometry, image cropping, rotation angle and output resolution settings for different display devices. Input port can be HDMI, DP and VGA. The output format is progressive RGB via HDMI. Input resolution is up to 7680\*1200 @30Hz / 4096\*2160 @60Hz with selectable outputs up to 2048x1080 @60Hz.

