

GeoBox

GeoBox Edge Blending processor

Quick Installation Guide

(Step by step, for all models)

Version: 1.1

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GeoBox related video



<https://youtu.be/274trZdJ284>
Curved screen edge blending
tutorial video



<https://youtu.be/t0Fp6AXj0Ho>
Immersive display



<https://youtu.be/XS227KprJd0>
Interactive big scale event



[https://youtube.com/shorts/5ROkf
scjOes](https://youtube.com/shorts/5ROkfscjOes)
Projection mapping



<https://youtu.be/PgaVT4TQtRo>
4K Flat screen Edge blending
tutorial video



[https://blog.naver.com/electrosmit
h/222915726036](https://blog.naver.com/electrosmit
h/222915726036)
Korea Pokemon, the Dreamer

Please download related document and PC
tool under below website:

<https://www.vnstw.com/supp.php>

1. Datasheet
2. User Guide
3. PC Tool:
 - PC Tool for each model and user guide
 - Excel for Edge Blending Calculator

GeoBox Edge blending product comparison

<u>Function</u>	<u>M811-M814</u>	<u>G812/G814</u>	<u>UD101-UD104</u>	<u>G112</u>
I/O resolution	4k60 IN / WUXGA OUT	4k60 IN / WUXGA OUT	4k60 IN / 4K60 OUT	4k30 IN / WUXGA OUT
Input port	HDMI 2.0, DP1.2, VGA	HDMI 2.0, DP1.2, VGA	HDMI 2.0, DP1.4	1x HDMI 1.4
Max. input resolution	7680*2160/30 7680*1200/60	7680*1200/30	7680*2160/30 7680*1200/60	3840*2160/30
Output port	WUXGA	WUXGA	4K/2K/60 UHD	WUXGA
Loop out port	HDMI 2.0	HDMI 2.0	HDMI 2.0	NO
Black level uplift	Yes	Yes	Yes	NO
PIP/POP	Yes	No	PIP/POP Quad split Multi-view	NO
System control	IR/Keypad/RS232/USB/ Ethernet	IR/RS232/ Ethernet	IR/Keypad/RS232/USB/ Ethernet	IR/Keypad/RS232
PC Tool	GCT	GCT	GCT	NO
Geometry alignment	IR /GCT up to 17x9, 120x75 (WUXGA out)	IR /GCT up to 17x9, 120x75 (WUXGA out)	IR /GCT up to 17x9, 120x75 (WUXGA out)	IR controller up to 17x9 No PC Tool
Edge Blending Range	4 Edges, H=1920, V=1200	Same	Same	Same

Video quality and signal resolution

- Main factors to determine the video quality is system resolution and watching distance.
- System resolution is the minimum resolution in the whole pipe line: image content→ signal source→ video processor→ projector total resolution after edge blending.
- The system resolution will be determined by the lowest one in this pipe line. If user wants to achieve 4k quality, then starting from the content, source output resolution, video processor supporting resolution and projector total resolution after edge blending should be more than 4k.
- Watching distance: If the watching distance is 5M, the image pixel pitch should be less than 5mm. If the screen is 10M and apply FHD (1920*1080) to the system, the image pixel pitch will be $10M/1920=5.2mm$. The watching distance should be more than 5M away from the screen to get acceptable video quality. If apply 4k (3840*2160) resolution to 10M screen size, the pixel pitch will be only 2.5mm. The watching distance can be only 2.5M.

Determine the quantity of the projector

Rough estimation for conventional application

- One WUXGA projector with 5000 Lumens can project an image size of 4M x 2.5M (16:10) with 500 Lux illuminance. The standard image height is 2.5M and can be adjusted by geometry alignment function to get image height between 1.5M to 2.5M. The pixel pitch is around $4000/1920=2.1\text{mm}$. The ideal watching distance is more than 2M.
- Screen size and number of the projectors required
 - Less than 4M screen width: one projector
 - 4M-7M: 2 projectors (Overlap: 1M)
 - 7M-10M: 3 projectors (Overlap: 1M each, total 2M)
 - 10M-13M: 4 projectors (Overlap 1M each, total 3M)
- If the projector is high lumens (i.e. 10000 Lum) or the watching distance is large (i.e. 5M-10M), user can use Excel file to determine the number of the projectors.

Determine Overlap pixel between two projectors

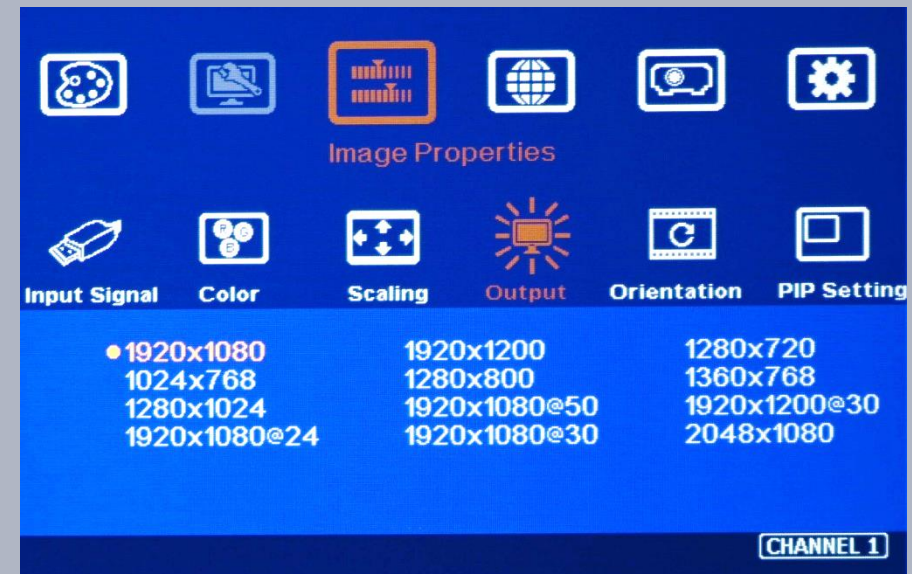
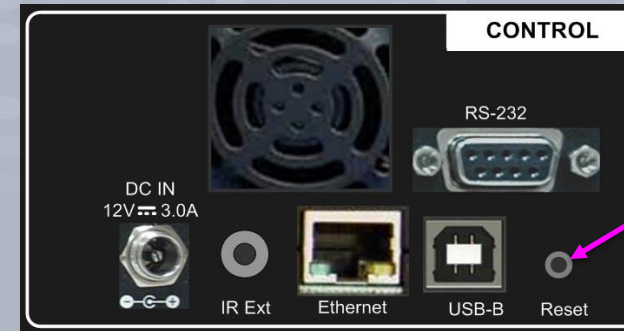
- The grid pattern size is 8 to 120 pixels. Default is 32x32. The overlap pixels should match this pattern size to get perfect grid stacking.
- The most common overlap region is about 20% to 40% based on single projector native resolution. For WUXGA projector, the ideal overlap range is 384~768 pixels (12-24 grids). For WXGA projector, the ideal overlap range is 256~512 pixels (8-16 grids). If the projector has accurate color and gamma curve, the overlapped pixel can be lower to 10%. User can use Edge Blending Calculator to do the simulation. Please see page 17.
- The actual pixel number can be determined based on Edge Blending Calculator. If the overlap pixels are increased, the image height will be also bigger. User can simulate with different overlap pixels to get bigger image height than required with reasonable 20%-40% overlap region. User can draw down the image height through 2x2 alignment. Reasonable overlap size will be easier for overlap color control.
- When user has different overlap pixels among multiple projectors, user can use Irregular spreadsheet under Edge Blending Calculator to do the simulation.

Important Tips for edge blending

- The final image of each projector needs to be the same size. Otherwise the grid will not be aligned.
- The output resolution of the GeoBox must be set the same as the native resolution of the projector, and each channel must be set separately.
- The best signal source resolution is to add all projector resolution together, then deduct the overlap pixels. For example, two 1920 * 1200 projectors are edge-blended horizontally, if the overlap is 20 grids (the preset grid size is 32 pixels), then the best horizontal resolution is $(1920 * 2) - (20 * 32) = 3200$, so the best input resolution is 3200 * 1200. If the PC is set to this resolution, the desktop will not be distorted.
- If the playback content is different from the aspect ratio of the screen, there will be image distortion problem. If the aspect ratio is the same, even the signal source resolution is not optimized, GeoBox can fill the entire screen with images without distortion.
- The input resolution is determined by the signal source, and GeoBox EDID can let the PC know the best resolution GeoBox required. If the required source resolution is exceeded 4k/2k, please visit our website → Technical [Support] → [Application note] → [PC 8k/6k Output Setup Procedures].
- The order of geometry adjustment should be from low (2x2) to high (9x5, 17x17) direction, and user can return to 2x2 for fine-tuning, but not back to 3x3, otherwise only 3x3 adjustment results will be kept.
- It will be easier to control the color in overlap region if the overlap region is larger. Sometimes, in order to reach the desired overlap size, the image height may exceed what you need. You can use geometry adjustment to draw it to the desired height.
- At least 12 grids or more (each grid is 32 pixels) overlap region is recommended in WUXGA projector, WXGA or XGA projector should have more than 8 grids. The overlap pixels can be up to 1920 in horizontal and 1200 pixels in vertical.
- The overlap grid number are calculated according to the resolution of the projector, and the Video Wall [overlap] setting pixels are calculated based on signal source resolution through Edge Blending Calculator Excel file. These two overlap pixels are not the same.
- After FW/MCU code update, please insert small pin into RESET hole for 5 seconds to reset all settings to default. It will erase all the Profile data.

Preparation before edge blending

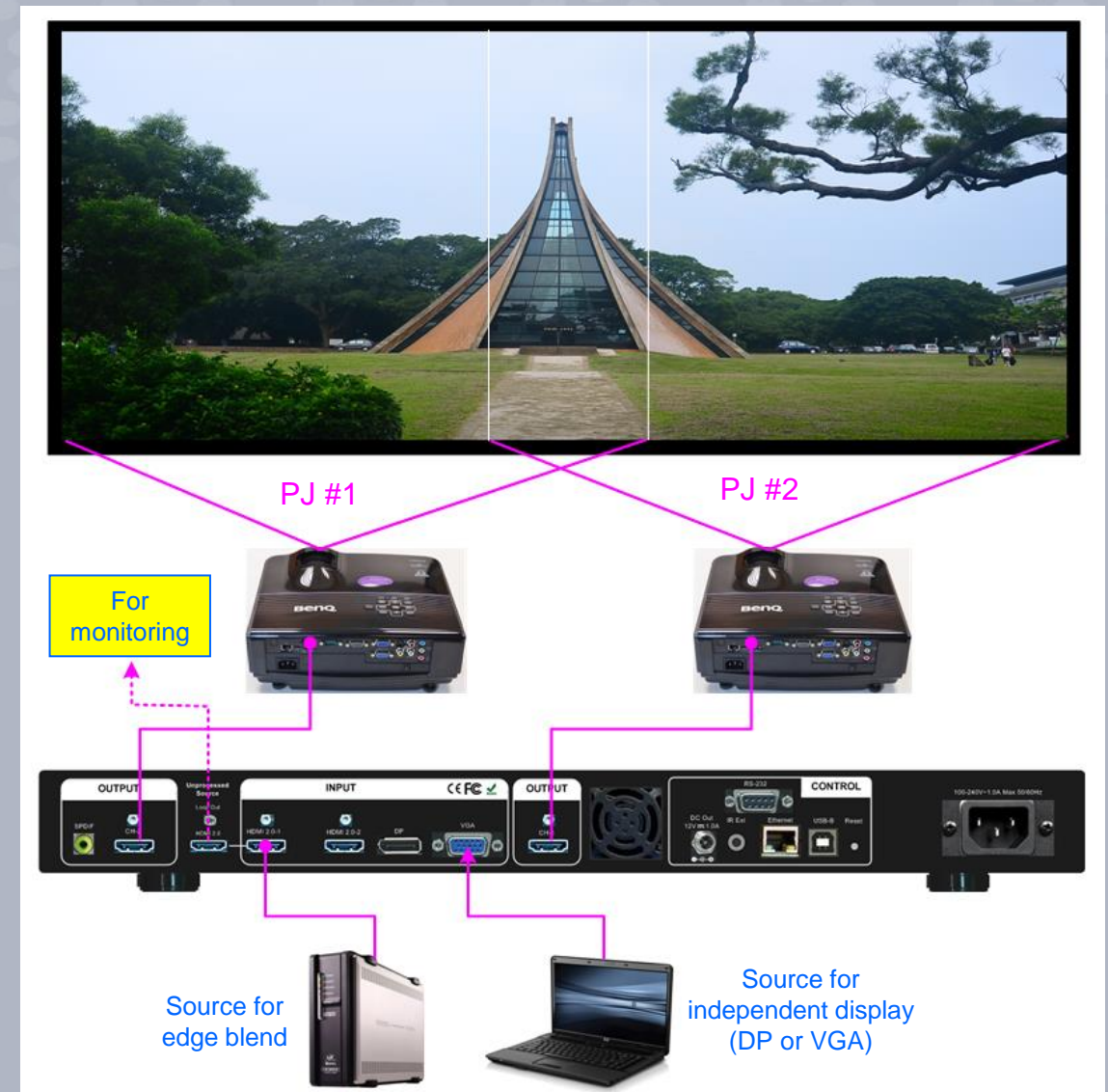
- Reset projectors to default settings. If necessary please also disable Brilliant color or Dynamic color. These functions may affect edge blending quality.
- Open the power after finishing system connection to avoid system damage due to floating voltage from poor power supply system. No special power turn-on sequence is required.
- Please reset all projectors to default setting.
- Using small pin to insert into Reset hole on back panel to reset GeoBox to default value. All channels will be reset at the same time.
- To set GeoBox output resolution same as projector native resolution. Each channel needs to be setup separately. To open OSD → [Image properties] → [Output setting] → select required output resolution.



System connection

(G812 for two projectors)

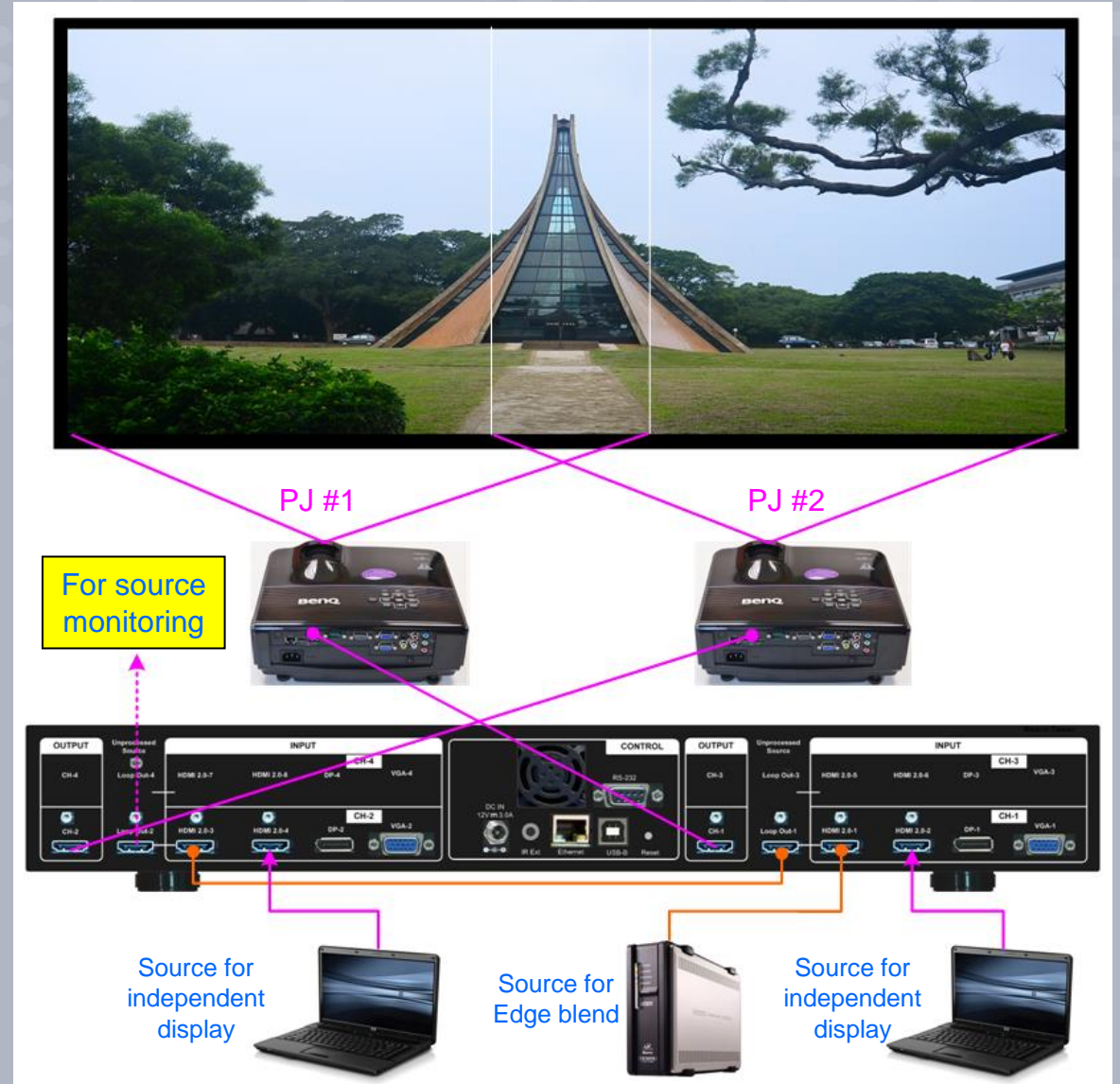
- Input signal is shared to two channels.
- Each projector can display discrete content. If one projector input is from HDMI, the second projector should be from DP or VGA input port.
- CH-1 output is connected to PJ #2. CH-2 output is connected to PJ #1. User can swap the connection and use [Video Wall]→ [PAN] to decide the connection location.
- Loop out port is to supply signal for multi-unit connection or source signal monitoring.



System connection

(M812/UD102 for two projectors)

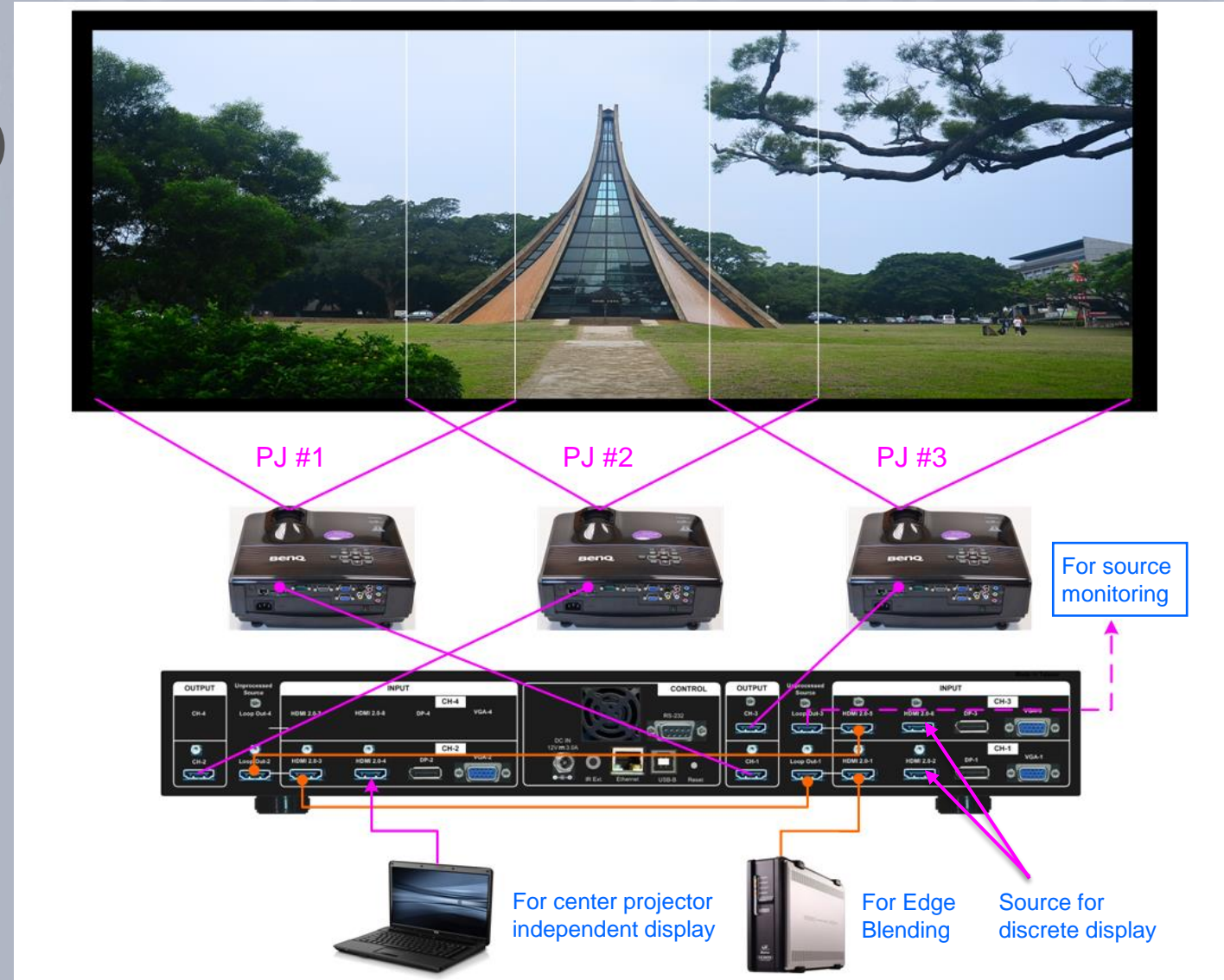
- Signal source for edge blending is connected to HDMI input port near loop out port and daisy chain connection to next channel.
- Signal for independent display can be connected to the second HDMI input port.
- CH-1 output is connected to PJ #1 and CH-2 output is connected to PJ #2. it is just for convenient operation purpose, no special sequence is required.
- Last Loop out port is to supply signal for multi-unit connection or source signal monitoring.



System connection

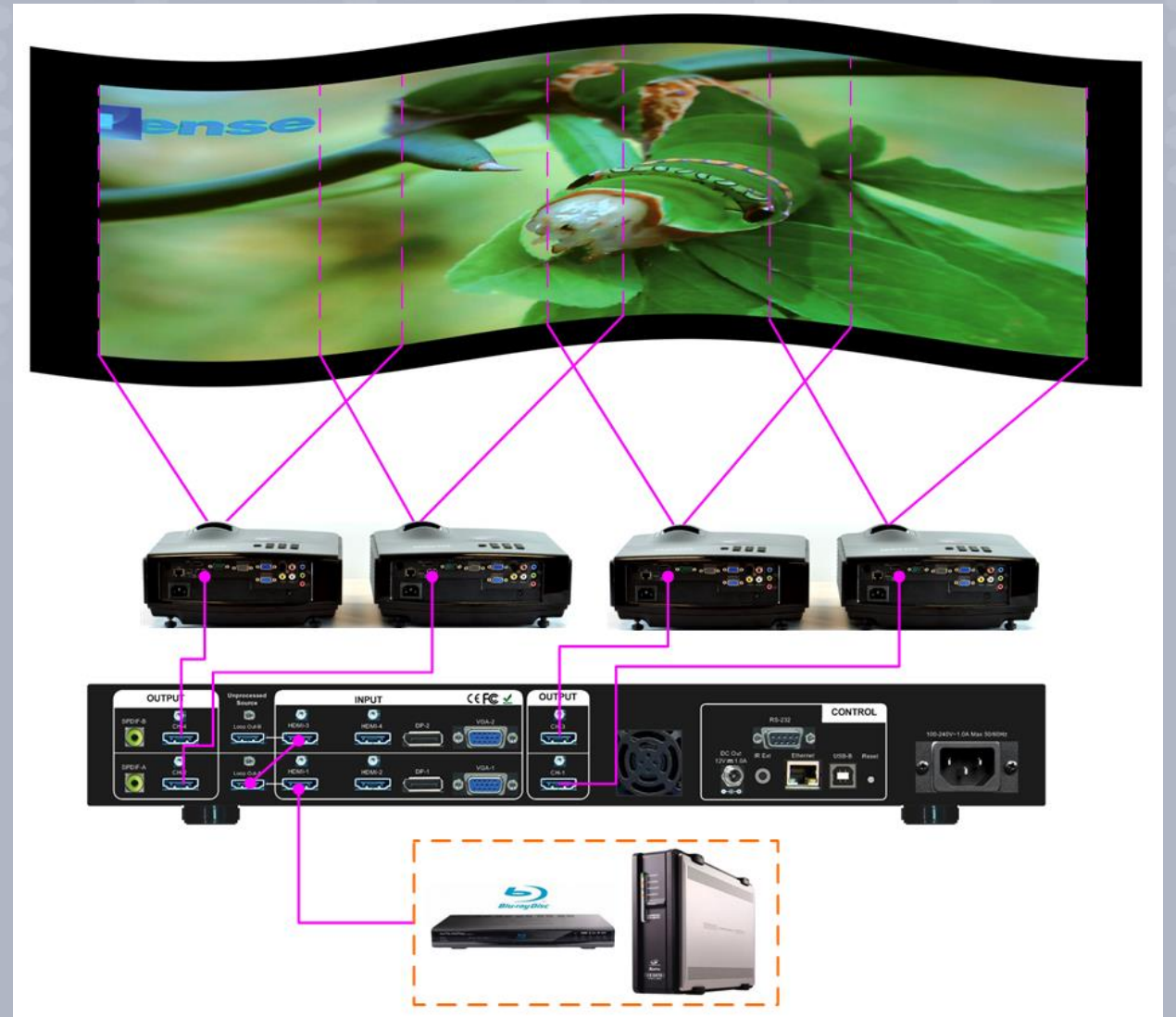
(M813/UD103 for 3 projectors)

- Signal source for edge blending needs to feed to all channel through loop out port.
- Signal for independent display can be connected to the second HDMI input port in each channel.
- CH-1 output is connected to PJ #1, CH-2 output to PJ #2, CH-3 output to PJ #3. It is just for convenient operation purpose, no special sequence is required.
- Last Loop out port is to supply signal for multi-unit connection or source signal monitoring.



System connection (G814 for 4 projectors)

- Signal source needs to feed to all channels through loop out port.
- The input is connected to any input port near Loop Out port.
- The output connection has no special sequence. The final location can be determined by [Video Wall]→ [Pan].
- Last Loop out port is to supply signal for multi-unit connection or source signal monitoring.



System connection

(M814/UD104 for 4 projectors)

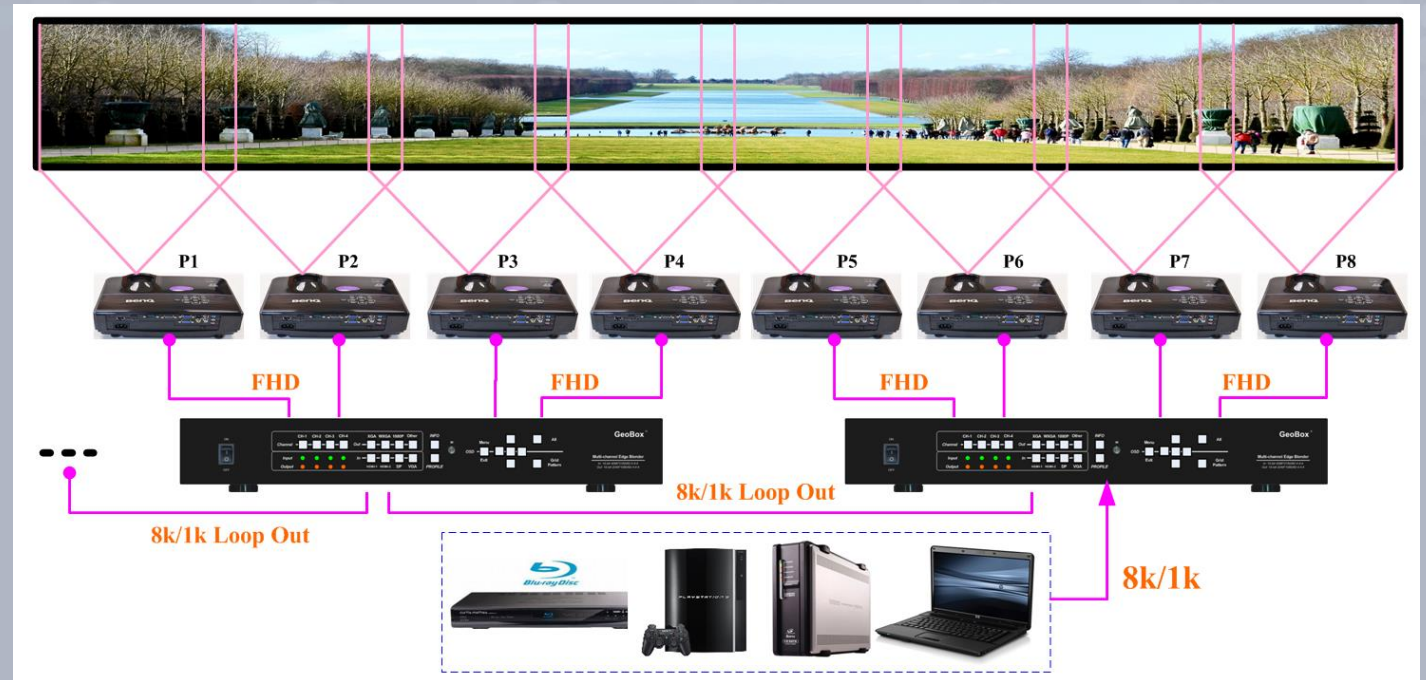
- Signal source needs to feed to all channels through loop out port.
- The input is connected to any input port near Loop Out port.
- The output connection has no special sequence. The final location can be determined by [Video Wall]→ [Pan].
- Last Loop out port is to supply signal for multi-unit connection or source signal monitoring.



System connection

(Two M814/UD104 for 8 projectors)

- Signal source connected to all channels through loop out port.
- The input can be connected to any input port near Loop Out port in the 1st box.
- The final loop out port in the 1st box needs to connect to the 2nd box input port, then daisy connected to all channels.
- The max. loop out connection is up to 10 channels. HDMI splitter at the front end is required for more than 10 channels.
- The output connection has no special sequence. The final location can be determined by [Video Wall] → [Pan].
- If two or more signal sources are used to increase the system resolution, user needs to set redundant contents among the signals by content creation or display card settings (such as Matrox M9148).



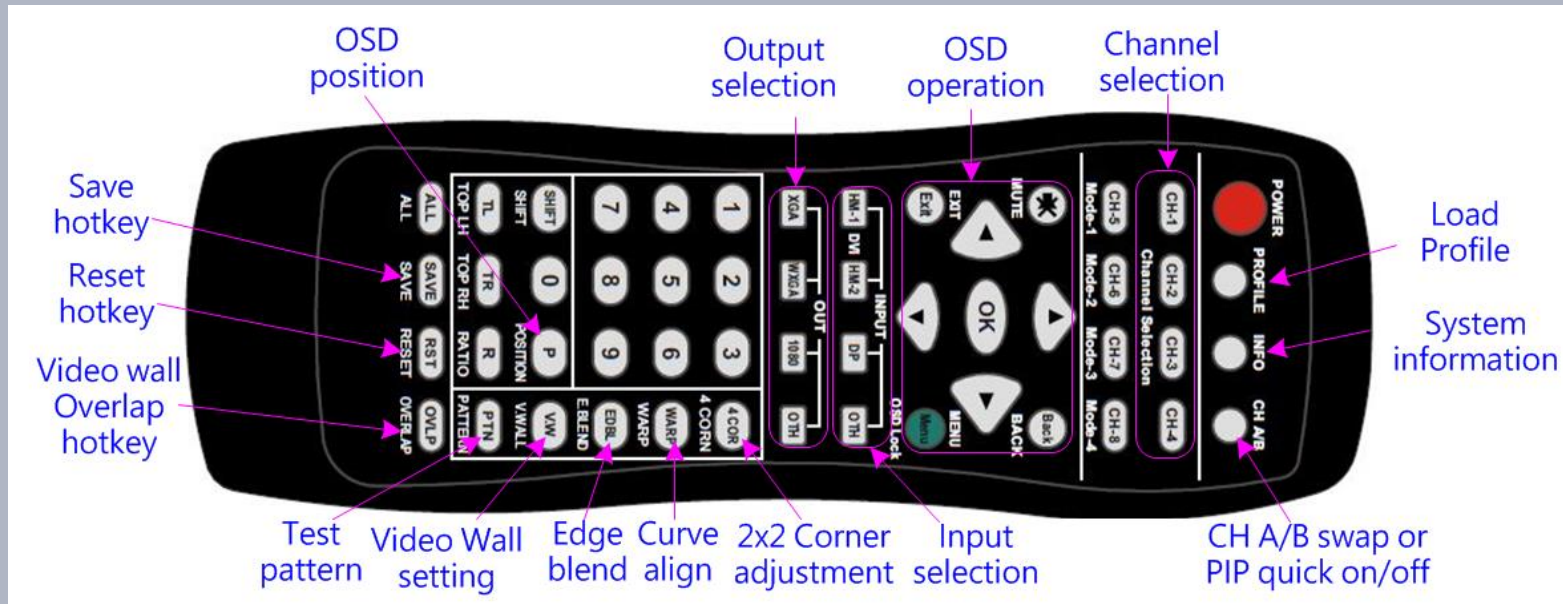
Max. input resolution in M804 is up to 7680*2160/30Hz and G804 is up to 7680*1200/30Hz. G800 will have less Loop out port connection.

How to use IR controller

When multiple units is stacked together, in order to prevent interference, please set each box with different Box ID, then user can control each box separately with one IR controller.

- After press 851 : only control Box ID #1
- After press 853 : only control Box ID #3
- After press 850 : User can control all boxes simultaneously.

- IR receiver extender can be extended through audio cable up to 20M.
- Press Menu key for 5 seconds, it will lock OSD. Press Menu key for 5 seconds again, it will unlock OSD.
- All channels should be setup separately.
- Box ID setting: [Options]→ [Setting]→ [Box ID]→ select #



Example for 3 projector Edge Blending Plan (Excel)

- Input data in yellow column**
- Input source resolution: 3840*1200
 - Projector native resolution: 1920*1200
 - Overlap region: 12 grids=384 pixels
 - Required screen size: 6.5m*1.5m

- Output Result**
- Image size for each projector: 2.5m*1.56m
 - Overlap region: 50cm
 - Projector installation distance: 1.98m-2.78m
 - The optimized input resolution is 4992*1200

Project basic data

Source resolution (H)	3840	Screen width	6.50	(m)
Source resolution (V)	1200	Screen height	1.50	(m)
Projector resolu. (H)	1920	Projector lumen	4000	(Lum)
Projector resolu. (V)	1200	Screen Aspect ratio	4.33	(required)

Overlap pixels (32 pixels per grid)	Overlap %	Recommended	
Overlap pixel (H)	384	20.0%	20%~40%
Overlap pixel (V)	0	0.0%	25%~40%

Recommended overlap region: Min. 50 cm width

Qty of projector (H)	3	Throw ratio (Min)	0.79
Qty of projector (V)	1	Throw ratio (Max)	1.11

Final output resolution

Horizontal resolution	4992	* Please apply Overlap pixels with 32x because default grid size for geometry adjustment is based 32x32 for each grid.
Vertical resolution	1200	
Extended pixel (H)	98	*User can change grid size via OSD to any grid size between 8-120 pixels.
Extended pixel (V)	0	

Video wall setting value

Position of projector (H)	1	2	3	4	5	6	7	8	9	10
LH edge overlap value	0	98	197	x	x	x	x	x	x	x
RH edge overlap value	197	98	0	x	x	x	x	x	x	x

Final result checking list (PJT: Projector)

Final Image size (meter)		Final Illuminance Lux (Lum/m2)		Image size for each PJT	
Width	6.50	PJT lumen	4000	Width (m)	2.500
Height	1.56	Final Illumin	1024	Height (m)	1.563

Overlap region size		Original aspect ratio		Projector throw distance	
Horiz. (m)	0.500	Projector	1.60	Min (m)	Max (m)
Vertic. (m)	0.000	Final result	4.16	1.98	2.78

* Final image height should be equal or larger than screen. User can shrink image to have the same image height as screen by GeoBox geometry adjustment.

* Standard luminance is 400-800 Lux for restaurant and big conference room, 1000-1500 Lux for trade show. 3D: 500 Lux (single projector)

* Theater: 172 Lux (16 foot-lamberts), SMTP display standard: 377 Lux

* Final brightness of the screen needs to multiple gain value of the screen.

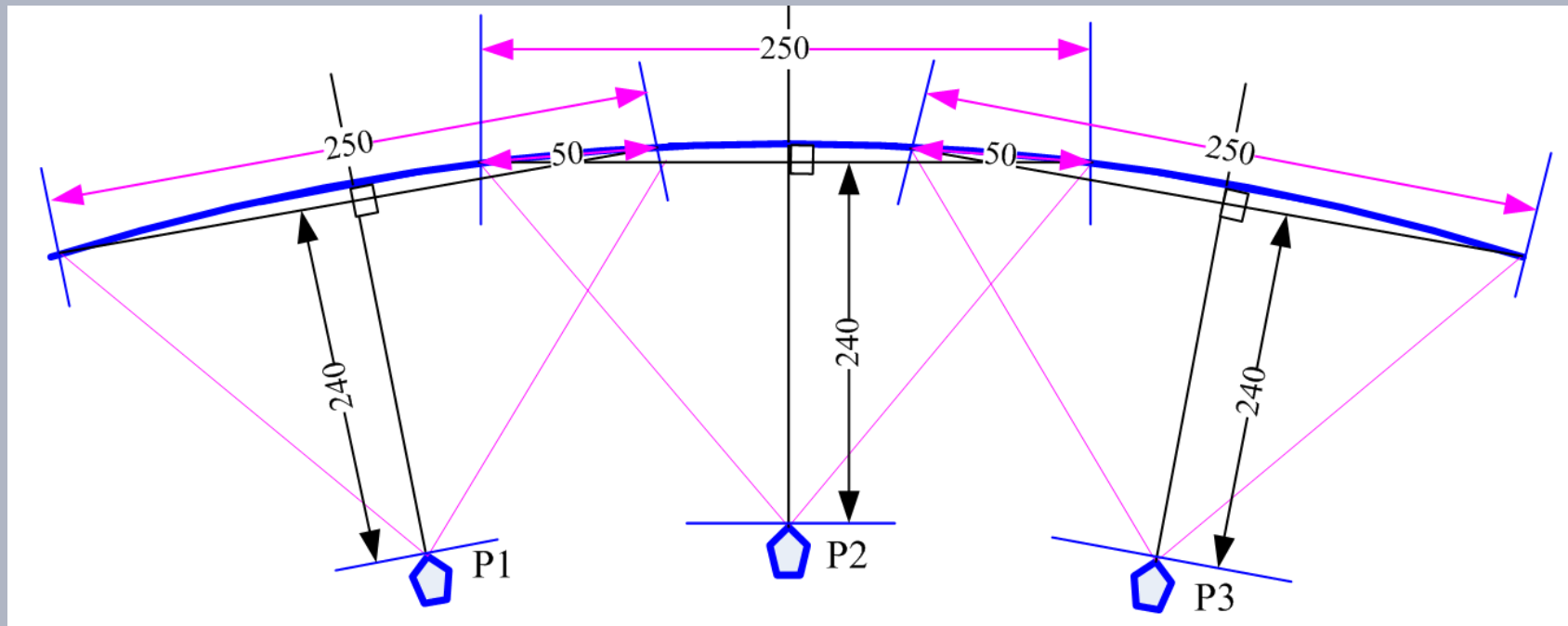
* The actual installation image size should be equal or larger than expected size.

* The best content resolution is the same as Final output resolution in cell D15& D16.

Input data in yellow column to get information for the installation & setup.
Please download Excel file from: https://www.vnstw.com/dl_file.php?id=898

How to determine Projector installation position

- Data based on Edge Blending Calculator in previous page. The image size for each projector is 250cm width, overlap is 50cm, installation distance is 198-278cm.
- Pre-mark with paper tape for the image location in each projector, including center lines in H&V directions.
- Projection image needs to cover all the required area without keystone before adjustment.
- Laser Level is recommended to get correct horizontal and vertical lines.

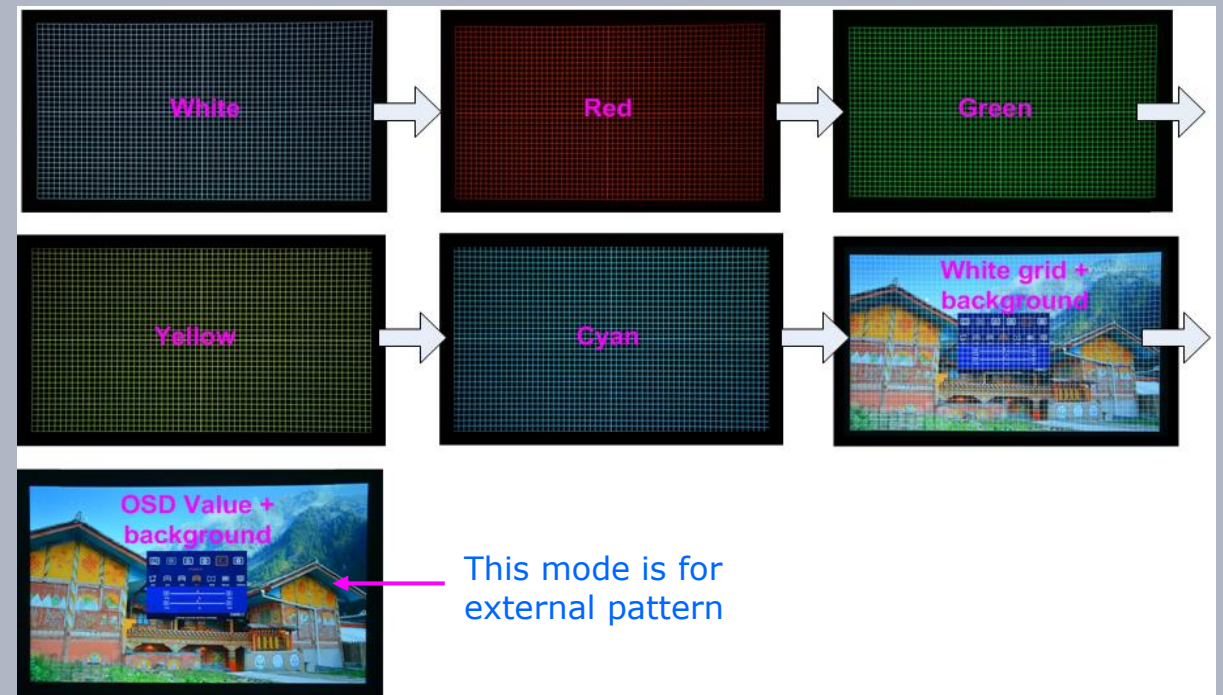
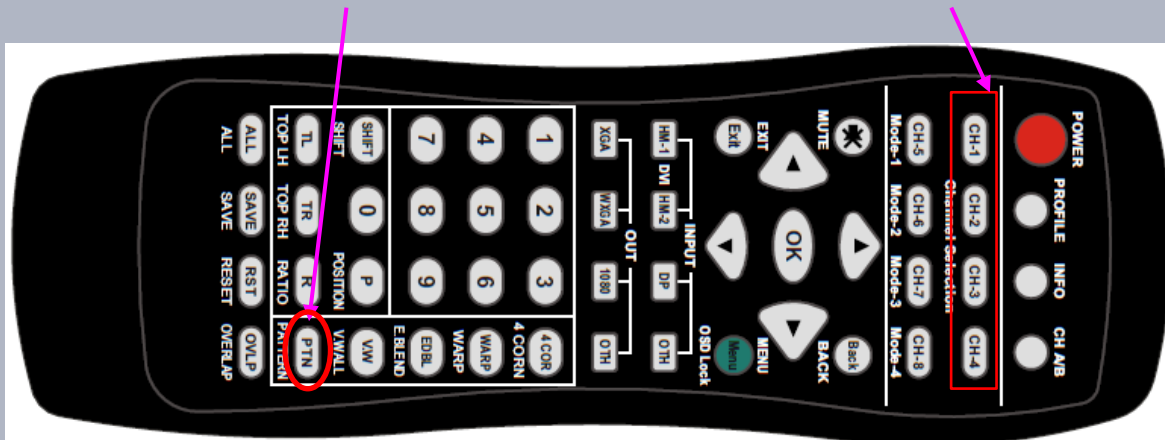


Open grid pattern for geometry alignment

- Select channel.
- Click [PTN] hotkey to open Grid pattern in each channel.
- Click [PTN] again to change color and let adjacent projectors with different color.
- External pattern can be applied under last pattern mode.

Pattern [PTN] hotkey

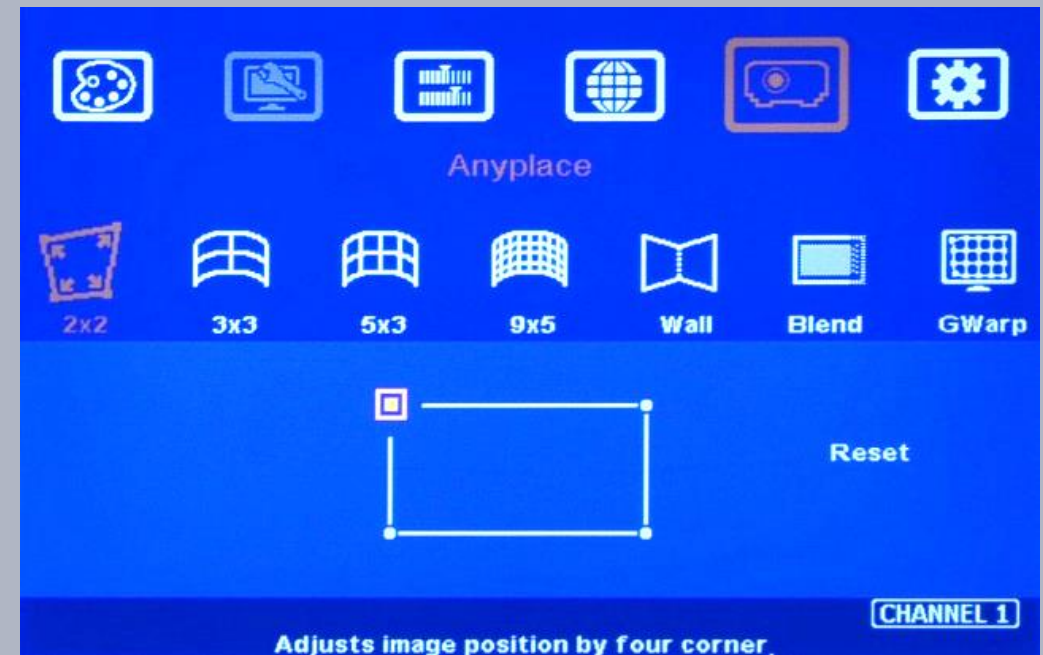
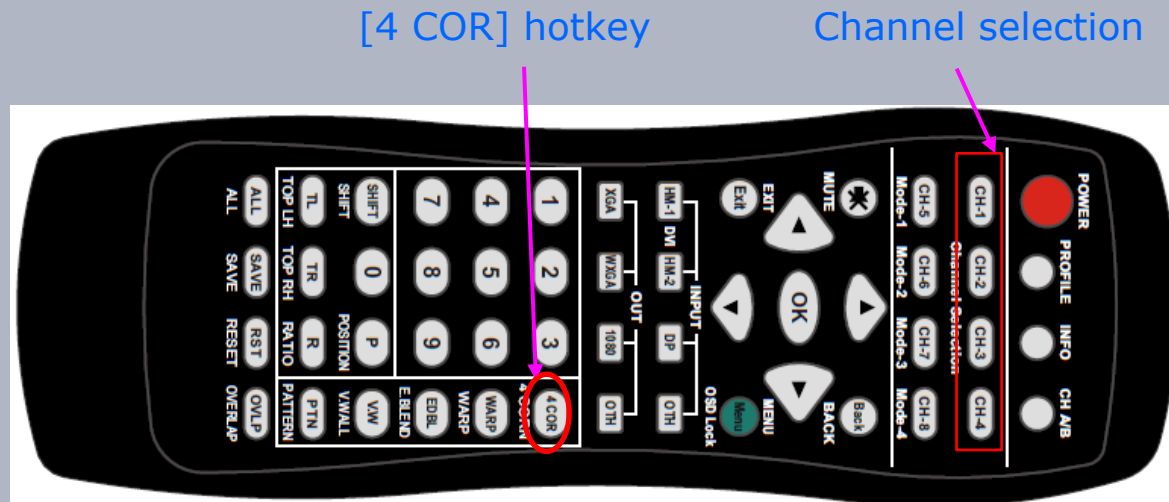
Channel selection



This mode is for external pattern

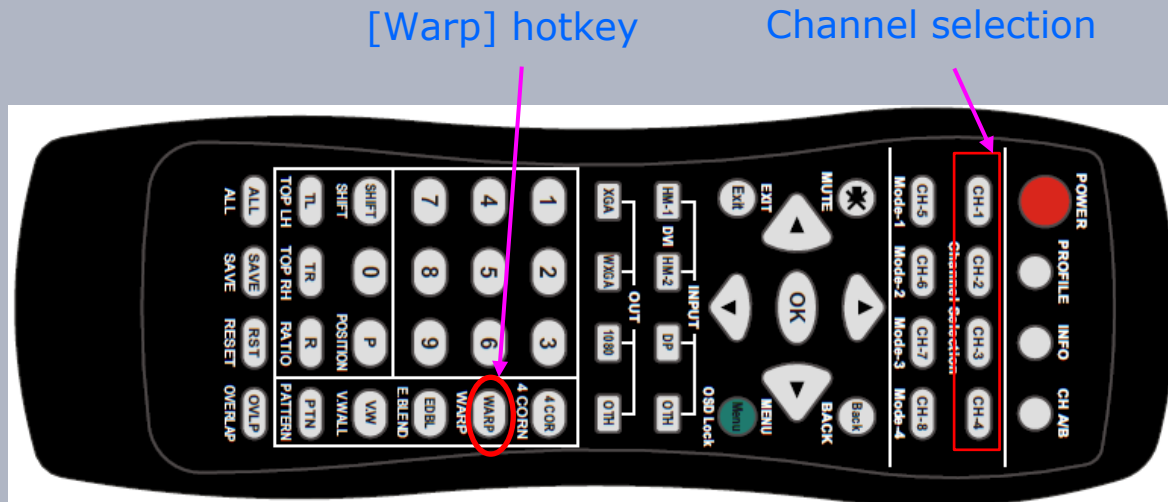
4 Corner Geometry alignment

- Select channel.
- Click [4 Cor] hotkey to open [2x2] OSD
- Select Corner → [OK] → position adjustment by OSD direction key → [OK] → select 2nd corner...
- To have the same image size for each projector without keystone effect.



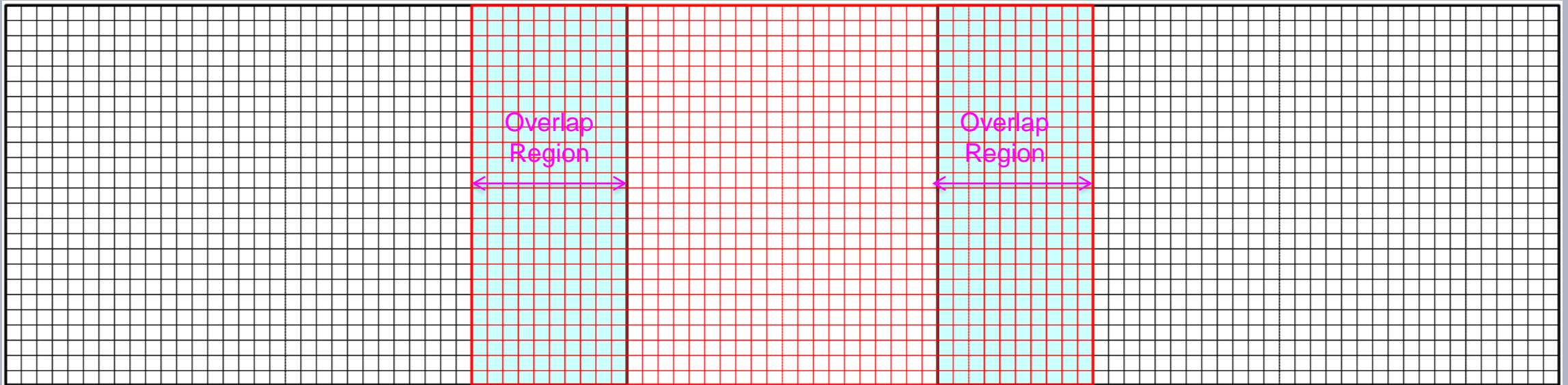
Warp Geometry alignment

- Select channel → Click [Warp] hotkey to open OSD.
- Select type of Warp (3x3) → Select adjusting point → [OK] → adjust position by OSD direction key → [OK] → select 2nd adjusting point → further adjustment...
- After finish [3x3] alignment → [OK] → [Back] → select [5x3] for further adjustment.
- [Warp] adjusting sequence: [3x3] → [5x3] → [9x5] ... If return to [3x3], only keep [3x3] warping data.
- Can fine-tune by [2x2] after [Warp] adjustment till all grid stacking perfectly.



Geometry alignment fine-tune

- Each projector should have the same image size.
- All the grids in overlap area should be aligned perfectly.
- After [9x5] or [17x9] adjustment, if return to [5x3], only [5x3] warp data will be kept.
- After [Warp] adjustment, user can use [2x2] for global position fine-tune. It will not erase Warp result.
- The recommended overlap region is 12-24 grids. If overlap pixels are different among overlap regions, please use [Irregular] spreadsheet to calculate Video Wall [Overlap] setting value.



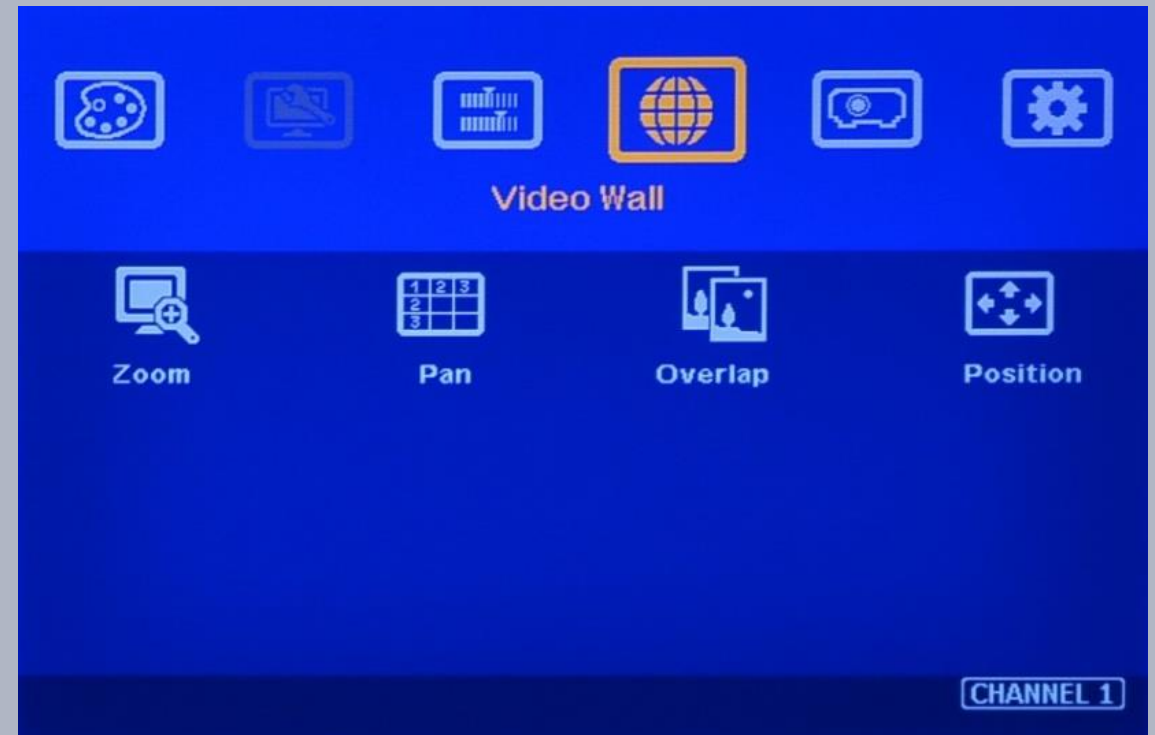
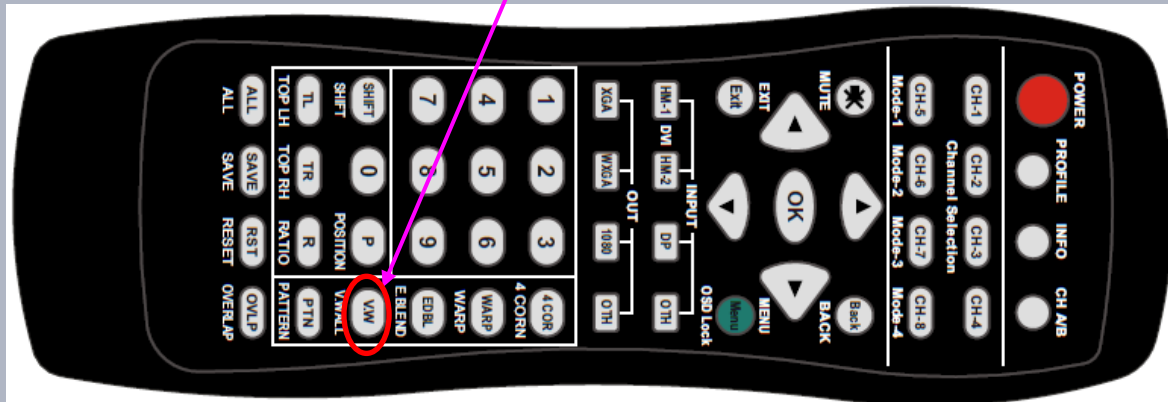
After finishing geometry alignment, please put mark with small paper label at each corner for each projector. It will be convenient for position calibration in the future. If any position shift due to earth quake, clean or change lamp, user can use [2x2] alignment to draw the image back to pre-mark position. It will save cost for after service.

Video Wall setting

Click [Video wall] hotkey to open OSD

- Zoom: split the image for each projector
- Pan: assign image location. The location is counted from Left to Right and Top to Bottom.
- Overlap: set cropping pixels in overlap region.

Video Wall [VW] hotkey

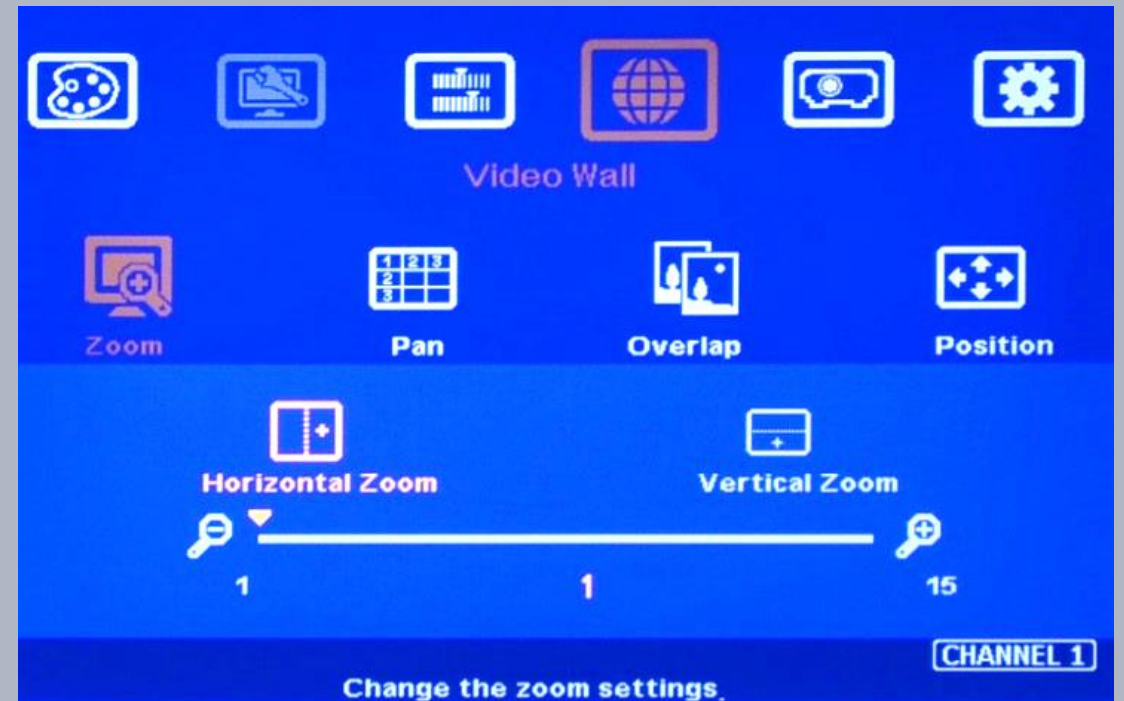
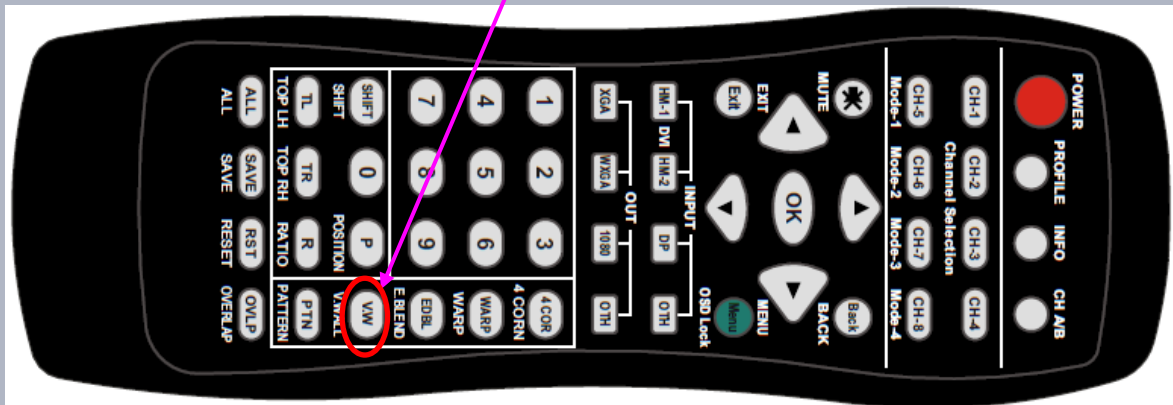


Split the image for each projector-Zoom

Set the same Zoom value in all channels for landscape display:

- Horizontal Zoom: H=2 (for 2 projectors), H=3 (for 3 projectors)
- Vertical Zoom: V=1 (for all single layer projector)
- After Zoom setting, the image will be extended.

Video Wall [VW] hotkey



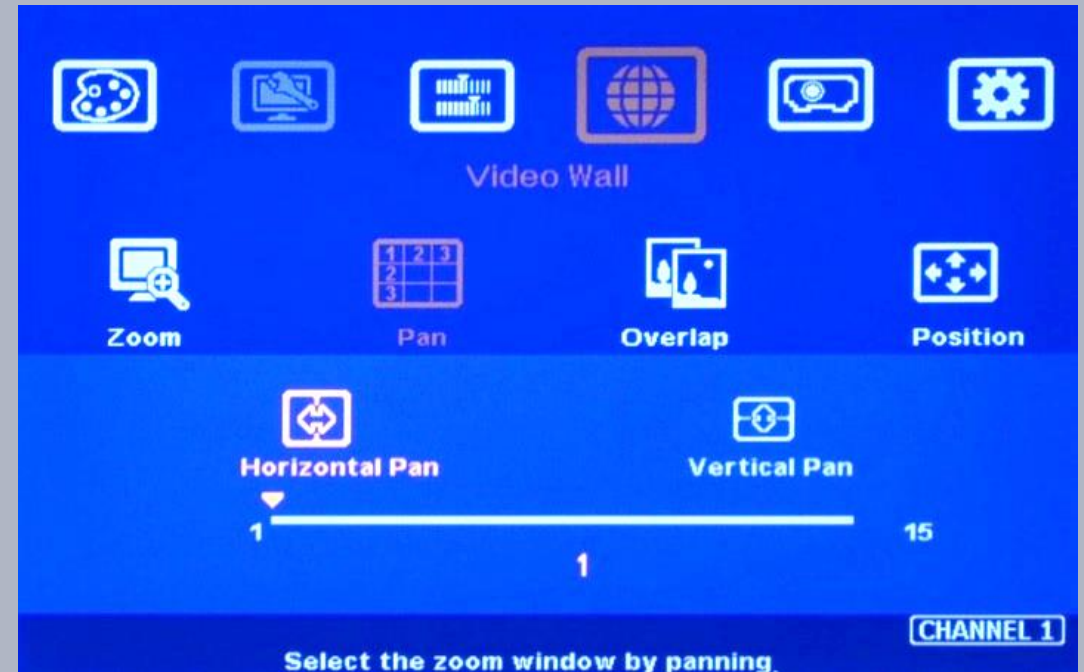
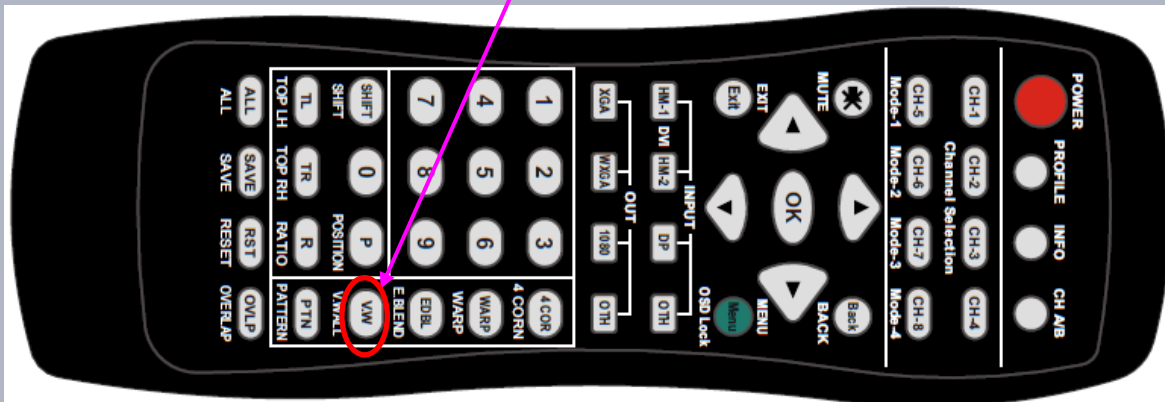
Assign the location for split image-Pan

For landscape edge blending:

Set Pan value based on projector location counted from LH to RH. **PAN should be set after ZOOM.**

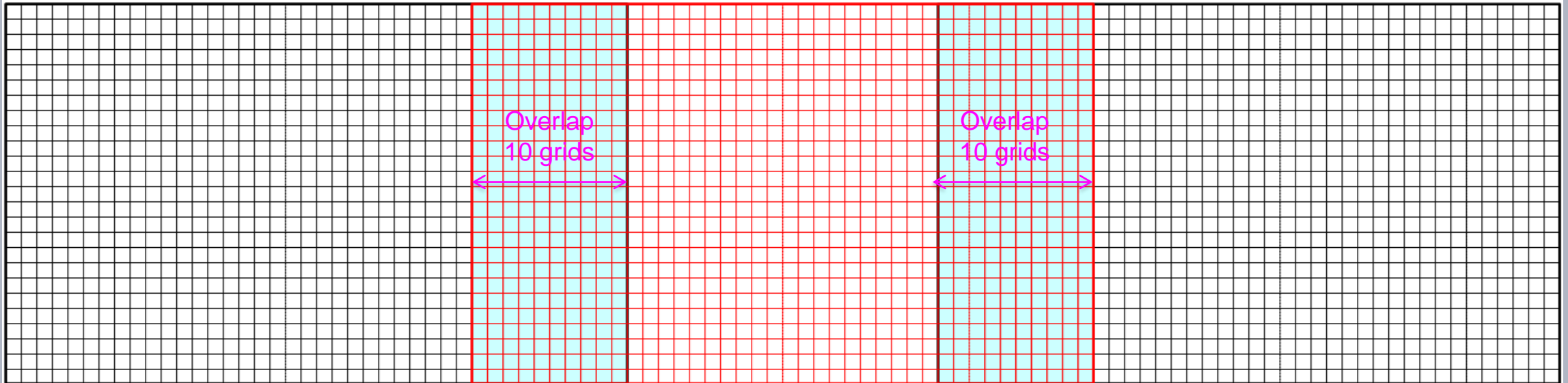
- 1st projector (LH): Horizontal Pan: H=1, Vertical Pan: V=1
- 2nd projector (Center): H=2, V=1
- 3rd projector (RH): H=3, V=1
- 4th projector: H=4, V=1 (in case of 4 projectors)

Video Wall [VW] hotkey



Cropping the image based on overlap size—Overlap (1)

- Use Excel Spread Sheet to get actual overlap setting pixels.
- Below picture shows 10 overlap grids in projector.
- Each default grid is 32 pixels, 10 grids=32*10=320 pixels. If 12 grids, it will be 12*32=384 pixels.
- 320 pixels are based on projector resolution but not signal source resolution. The Video Wall [Overlap] setting resolution is based on signal source resolution. It must be calculated from Edge Blending [Excel] plan file.
- If two overlap regions with different grid number, please use irregular Spread Sheet to get Overlap setting pixels under the same Excel file.



Cropping the image based on overlap size—Overlap (2)

- Click [INFO] key in IR controller to check the Input/Output resolution. The horizontal resolution should be the same, the vertical resolution can be different.
- Click [Pattern] to check Overlap pixels (384 Pixels for 12 overlap grids). These need to be the same as Excel Spread sheet.

Project basic data

Source resolution (H)	3840	Screen width	6.50	(m)
Source resolution (V)	1200	Screen height	1.50	(m)
Projector resolu. (H)	1920	Projector lumen	4000	(Lum)
Projector resolu. (V)	1200	Screen Aspect ratio	4.33	(required)

Overlap pixels (32 pixels per grid)	Overlap %	Recommended
Overlap pixel (H)	384	20%~40%
Overlap pixel (V)	0	25%~40%

Recommended overlap region: Min. 50 cm width

Qty of projector (H)	3	Throw ratio (Min)	0.79
Qty of projector (V)	1	Throw ratio (Max)	1.11

Final output resolution

Horizontal resolution	4992
Vertical resolution	1200
Extended pixel (H)	98
Extended pixel (V)	0

Projector Overlap value
(Edge blending value)

Video wall Overlap setting value

Video wall setting value

Position of projector (H)	1	2	3	4	5	6	7	8	9	10
LH edge overlap value	0	98	197	x	x	x	x	x	x	x
RH edge overlap value	197	98	0	x	x	x	x	x	x	x

Final result checking list (PJT: Projector)

Final Image size (meter)		Final Illuminance Lux (Lum/m ²)		Image size for each PJT	
Width	6.50	PJT lumen	4000	Width (m)	2.500
Height	1.56	Final Illumin	1024	Height (m)	1.563

Overlap region size		Original aspect ratio		Projector throw distance	
Horiz. (m)	0.500	Projector	1.60	Min (m)	Max (m)
Vertic. (m)	0.000	Final result	4.16	1.98	2.78

* Final image height

same image height

* Standard luminance

room, 1000-1500

* Theater: 172 Lux

* Final brightness o

* The actual installa

* The best content

The screenshot shows a projector's menu interface with the following options and values:

- Source resolution:** 3840x1200 (50kHz/60Hz) (HBR/RGB444)
- Projector resolution:** 1920x1200
- Model Name:** M803
- Microcode:** 800M1A02, M2A90320
- Input Mode:** HDMI-1 (HDCP)
- Output Mode:** (HBR/RGB444)
- Menu Options:** Information, Language, Reset, Accessibility, Setting
- Channel:** CHANNEL 1

Cropping the image based on overlap size—Overlap (3)

- Final overlap setting value:
 Projector 1 (LH): LH edge=0, RH edge=197
 Projector 2 (Center): LH edge= 98, RH edge= 98
 Projector 3 (RH): LH edge=197, RH edge=0

Project basic data			
Source resolution (H)	3840	Screen width	6.50 (m)
Source resolution (V)	1200	Screen height	1.50 (m)
Projector resolu. (H)	1920	Projector lumen	4000 (Lum)
Projector resolu. (V)	1200	Screen Aspect ratio	4.33 (required)

Overlap pixels (32 pixels per grid)	Overlap %	Recommended
Overlap pixel (H)	20.0%	20%~40%
Overlap pixel (V)	0.0%	25%~40%

Recommended overlap region: Min. 50 cm width

Qty of projector (H)	3	Throw ratio (Min)	0.79
Qty of projector (V)	1	Throw ratio (Max)	1.11

Final output resolution *	
Horizontal resolution	4992
Vertical resolution	1200
Extended pixel (H)	98 *
Extended pixel (V)	0

Video Wall Overlap setting value based on signal source resolution

Video wall setting value	1	2	3	4	5	6	7	8	9	10
Position of projector (H)	1	2	3	4	5	6	7	8	9	10
LH edge overlap value	0	98	197	x	x	x	x	x	x	x
RH edge overlap value	197	98	0	x	x	x	x	x	x	x

Final result checking list (PJT: Projector)

Final Image size (meter)		Final Illuminance Lux (Lum/m2)		Image size for each PJT	
Width	6.50	PJT lumen	4000	Width (m)	2.500
Height	1.56	Final Illumin	1024	Height (m)	1.563

Overlap region size		Original aspect ratio		Projector throw distance	
Horiz. (m)	0.500	Projector	1.60	Min (m)	Max (m)
Vertic. (m)	0.000	Final result	4.16	1.98	2.78

* Final mage height should be equal or larger than screen. User can shrink image to have the same image height as screen by GeoBox geometry adjustment.

* Standard luminance is 400-800 Lux for restaurant and big conference room, 1000-1500 Lux for trade show. 3D: 500 Lux (single projector)

* Theater: 172 Lux (16 foot-lamberts), SMTP display standard: 377 Lux

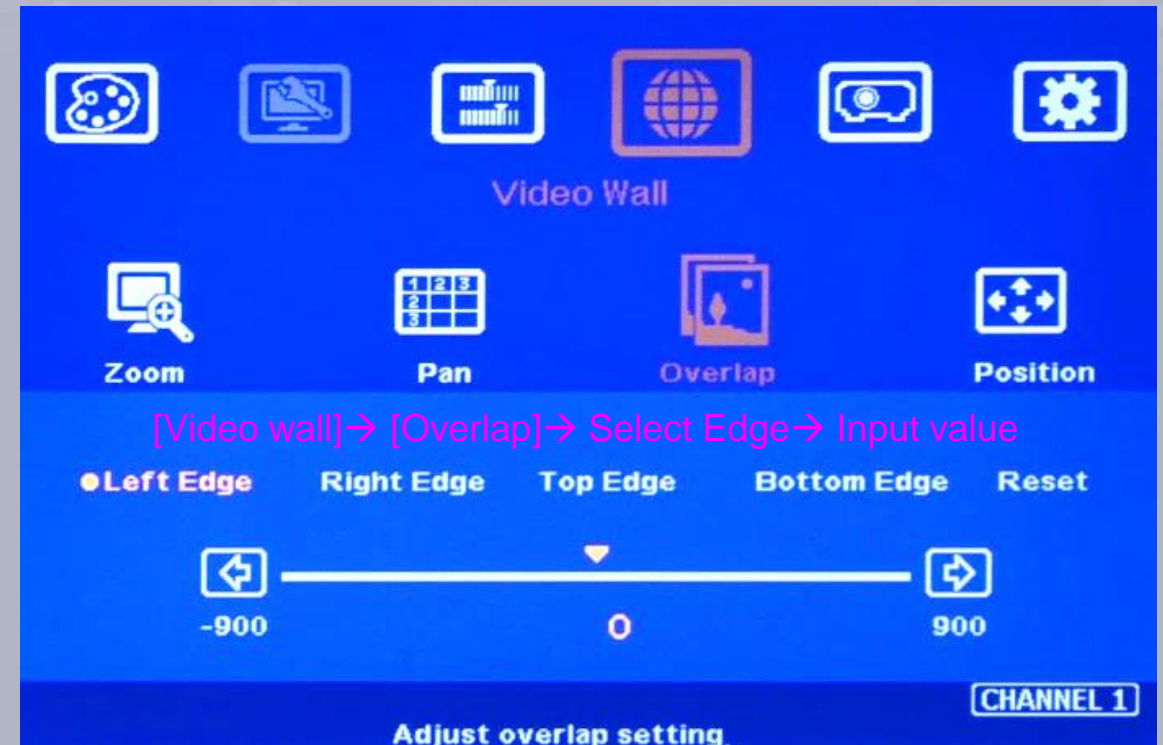
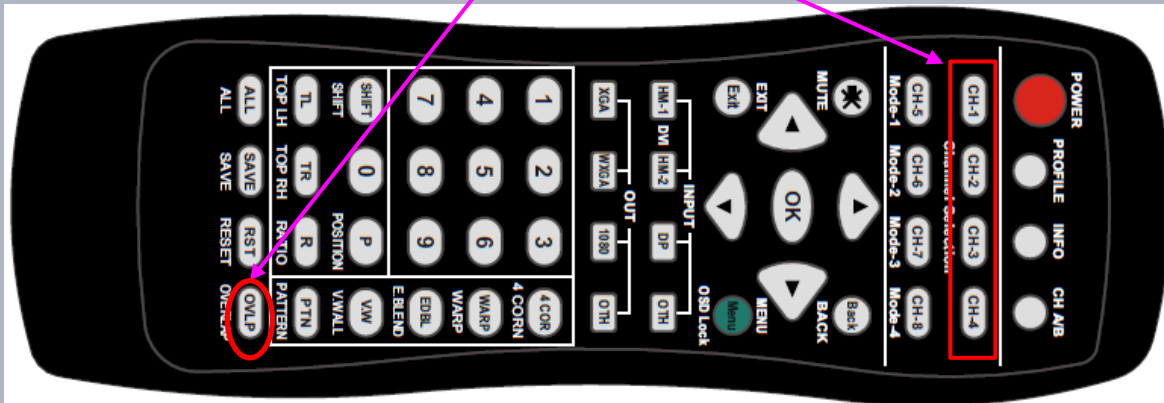
* Final brightness of the screen needs to multiple gain value of the screen.

* The actual installation image size should be equal or larger than expected size.

* The best content resolution is the same as Final output resolution in cell D15& D16.

Cropping the image based on overlap size—Overlap (4)

- Select channel, click Overlap [OVLP] hotkey → Select [Edge]→ Input [Overlap value] via OSD direction keys→ [OK]
- Continuously hold OSD Direction key will speed up the input speed.



Edge Blending setting (1)

- Edge Blending setting value is the same value as projector Overlap pixel.
- Select the Edge executing actual edge blending in each projector, then input the value via OSD direction key.
- Hold direction key to increase the input speed.

- Below are value for 3 projector edge blending:
 PJ #1 (LH): LH edge=0, RH edge=384
 PJ #2 (Center): LH edge= 384, RH edge= 384
 PJ #3 (RH): LH edge=384, RH edge=0

Final Overlap setting value

Project basic data			
Source resolution (H)	3840	Screen width	6.50 (m)
Source resolution (V)	1200	Screen height	1.50 (m)
Projector resolu. (H)	1920	Projector lumen	4000 (Lum)
Projector resolu. (V)	1200	Screen Aspect ratio	4.33 (required)

Overlap pixels (32 pixels per grid)	Overlap %	Recommended
Overlap pixel (H)	20.0%	20%~40%
Overlap pixel (V)	0.0%	25%~40%

Recommended overlap region: Min. 50 cm width

Qty of projector (H)	3	Throw ratio (Min)	0.79
Qty of projector (V)	1	Throw ratio (Max)	1.11

Final output resolution		* Please apply Overlap pixels with 32x because default grid size for geometry adjustment is based 32x32 for each grid. *User can change grid size via OSD to any grid size between 8-120 pixels.
Horizontal resolution	4992	
Vertical resolution	1200	
Extended pixel (H)	98	
Extended pixel (V)	0	

Video wall setting value

Position of projector (H)	1	2	3	4	5	6	7	8	9	10
LH edge overlap value	0	98	197	x	x	x	x	x	x	x
RH edge overlap value	197	98	0	x	x	x	x	x	x	x

Final result checking list (PJT: Projector)

Final Image size (meter)		Final Illuminance Lux (Lum/m2)		Image size for each PJT	
Width	6.50	PJT lumen	4000	Width (m)	2.500
Height	1.56	Final Illumin	1024	Height (m)	1.563

Overlap region size		Original aspect ratio		Projector throw distance	
Horiz. (m)	0.500	Projector	1.60	Min (m)	Max (m)
Vertic. (m)	0.000	Final result	4.16	1.98	2.78

* Final mage height should be equal or larger than screen. User can shrink image to have the same image height as screen by GeoBox geometry adjustment.

* Standard luminance is 400-800 Lux for restaurant and big conference room, 1000-1500 Lux for trade show. 3D: 500 Lux (single projector)

* Theater: 172 Lux (16 foot-lamberts), SMTP display standard: 377 Lux

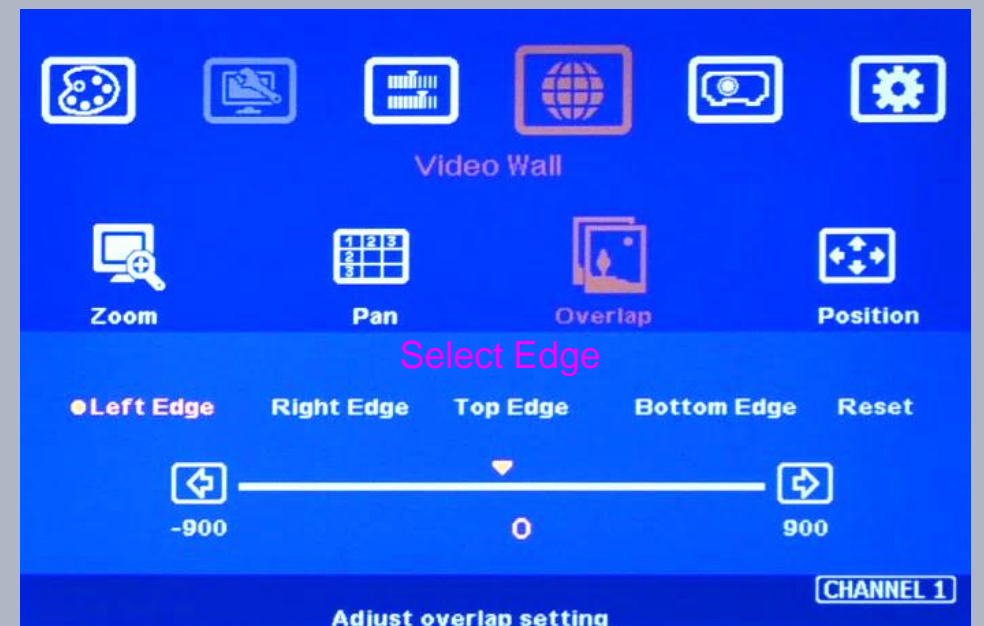
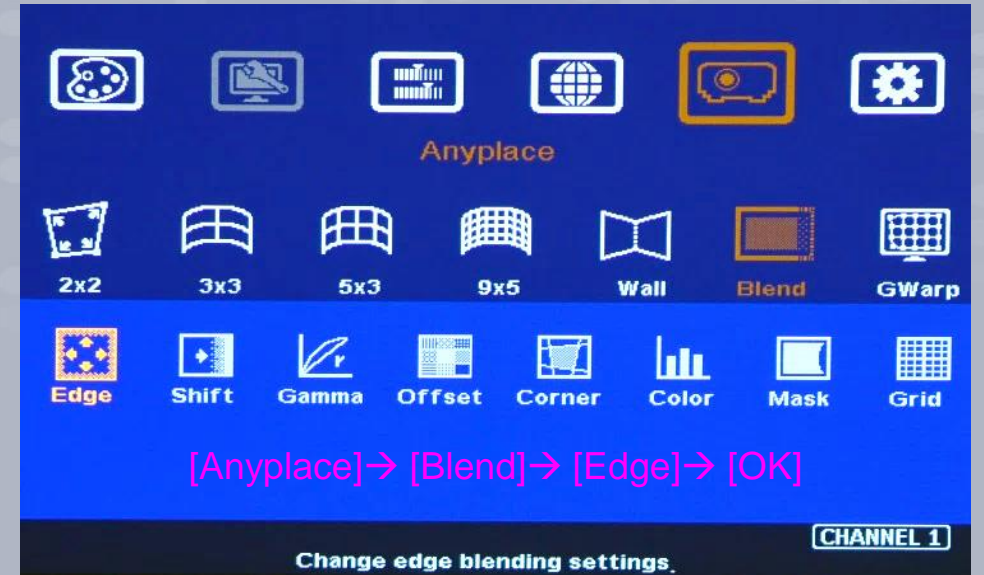
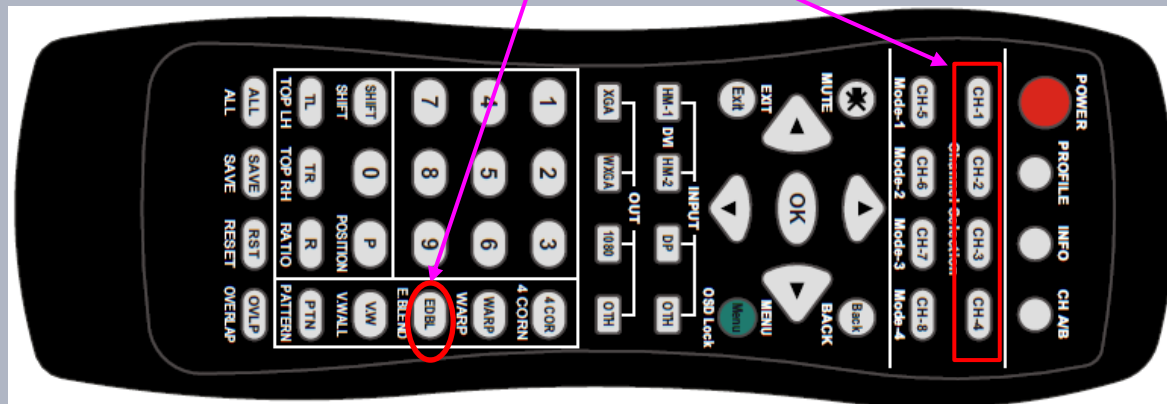
* Final brightness of the screen needs to multiple gain value of the screen.

* The actual installation image size should be equal or larger than expected size.

* The best content resolution is the same as Final output resolution in cell D15& D16.

Edge Blending setting (2)

- Select channel, click Edge Blend [EDBL] hotkey → Edge [Blend] OSD menu → Select [Edge] → Input value via OSD direction key → [OK] → Select another edge or channel.
- Hold direction key to increase the input speed.



Save final settings — Save

- User can save up to 10 settings in G112 & UD100 models. The rest models can only save up to 5 settings.

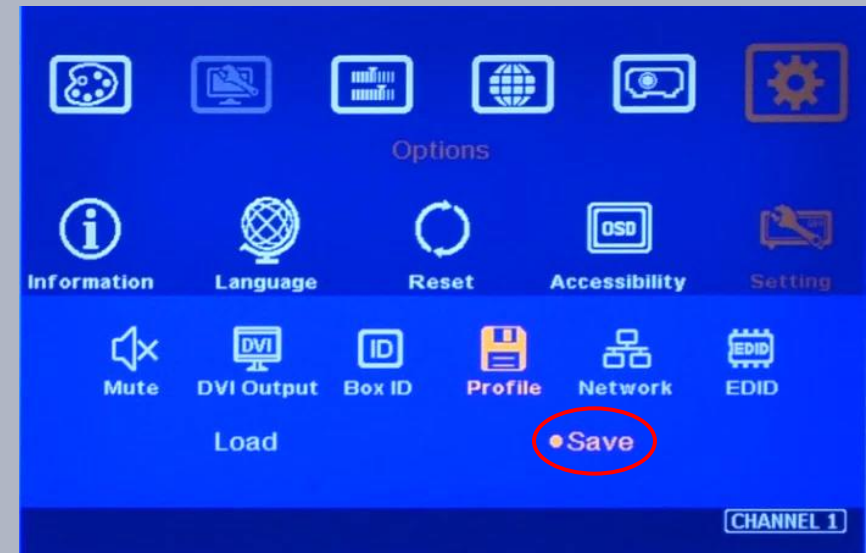
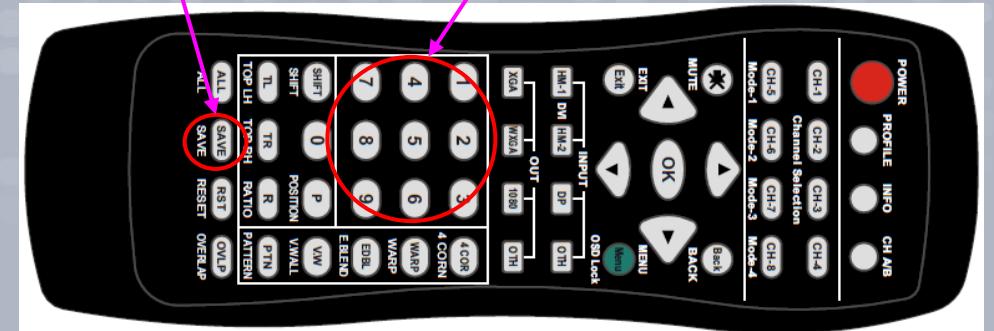
Save setting via IR controller:

- It will apply to all channels at the same time.
- Click [Save] hotkey → see [Enter Profile number] message → if select [Profile Number #2] → show [Profile #2 Saved] message → Finish.
- Number “0” represent Profile #10.

Save setting via OSD:

- It will apply to selected channel only. Each channel needs to execute separately.
- Select CH → Open OSD → [Options] → [Setting] → [Profile] → [Save] → select [Profile #] → [Exit]

Click [Save] hotkey Select Profile number



Load final settings — Profile

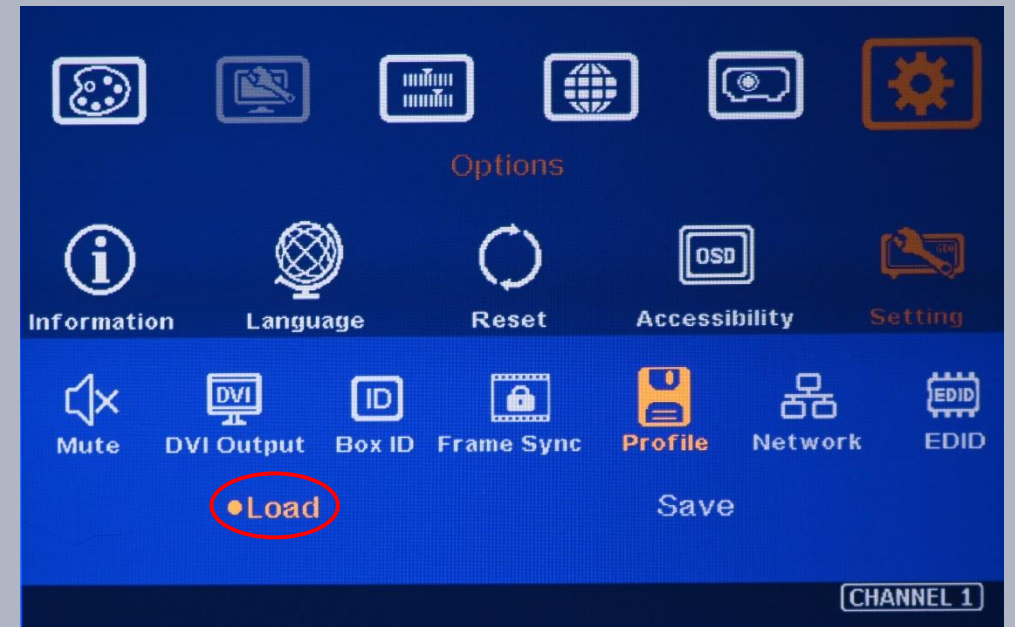
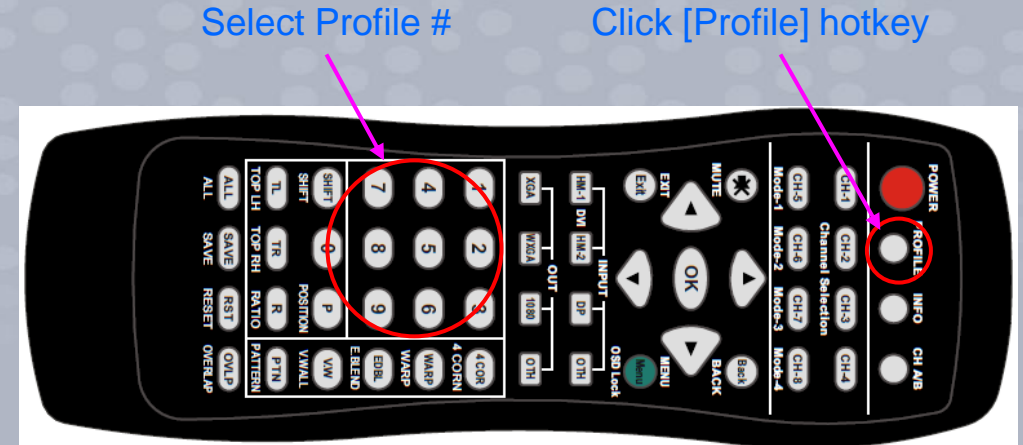
- User can recall final setting through IR, RS232, front panel keypad, WebGui, USB or Ethernet.

Load setting via IR controller:

- It will apply to all channels at the same time.
- Click [Profile] hotkey → show [Enter Profile number] message → If select [Profile Number #2] → Show [Load Profile #2] message → Finish
- Number “0” represent Profile #10.

Load setting via OSD:

- It will apply to selected channel only. Each channel needs to execute separately.
- Select CH → Open OSD → [Options] → [Setting] → [Profile] → [Load] → select [Profile #] → [Exit]



Flexible display Mode (Multi-window display) (1)

- M810/UD100 allows user to set different multi-window display modes and save into Profile Index. The settings can be recalled through IR controller, RS232, USB or Ethernet.
- User can create 16:9 or 16:10 display window for conventional content display.
- User must setup edge blending system and store in Profile Index first, then can spend short time to get other display modes.

G812/G814 also has flexible display function. Due to one HDMI input will share to two channels, this two channels will have the same content. Other possibility it to have different combination: HDMI+DP, HDMI+VGA or DP+VGA. It can't have HDMI+HDMI because main processor can only select one HDMI input.



Flexible display Mode (M813 as example) (2)

- Connect signal source for edge blending through Loop Out ports to feed all channel with the same signal.
- The signal source for independent display for each channel should be connected to the second HDMI input in each channel.
- Switch input port to the second HDMI input through remote controller or OSD: CH-1: HDMI-2, CH-2: HDMI-4, CH3: HDMI-6.
- Reset Video Wall setting in each channel through IR controller [RESET] key or OSD [Options]→ [Reset]→ [Video wall]→ [OK]
- Reset Edge Blending in each channel through IR [EDBL] hotkey or OSD [Anyplace]→ [Blend]→ [Edge]→ [Reset]
- Align image position through [2x2] & [Warp] to eliminate overlap between adjacent projector.
- User will see discrete content display in each projector.
- User can use Video Wall [Overlap] or Geometry alignment to adjust the top/bottom edge location to get correct aspect ratio.
- Save the final result to second Profile Index.

- Please note that if the overlap region is too big, it will affect the image size for independent display.
- User can use UD100 to display up to 4 different contents in one projector simultaneously.
- To add one G901/S901 as front end, it can display 1/2/3/4 contents across entire edge blending system.

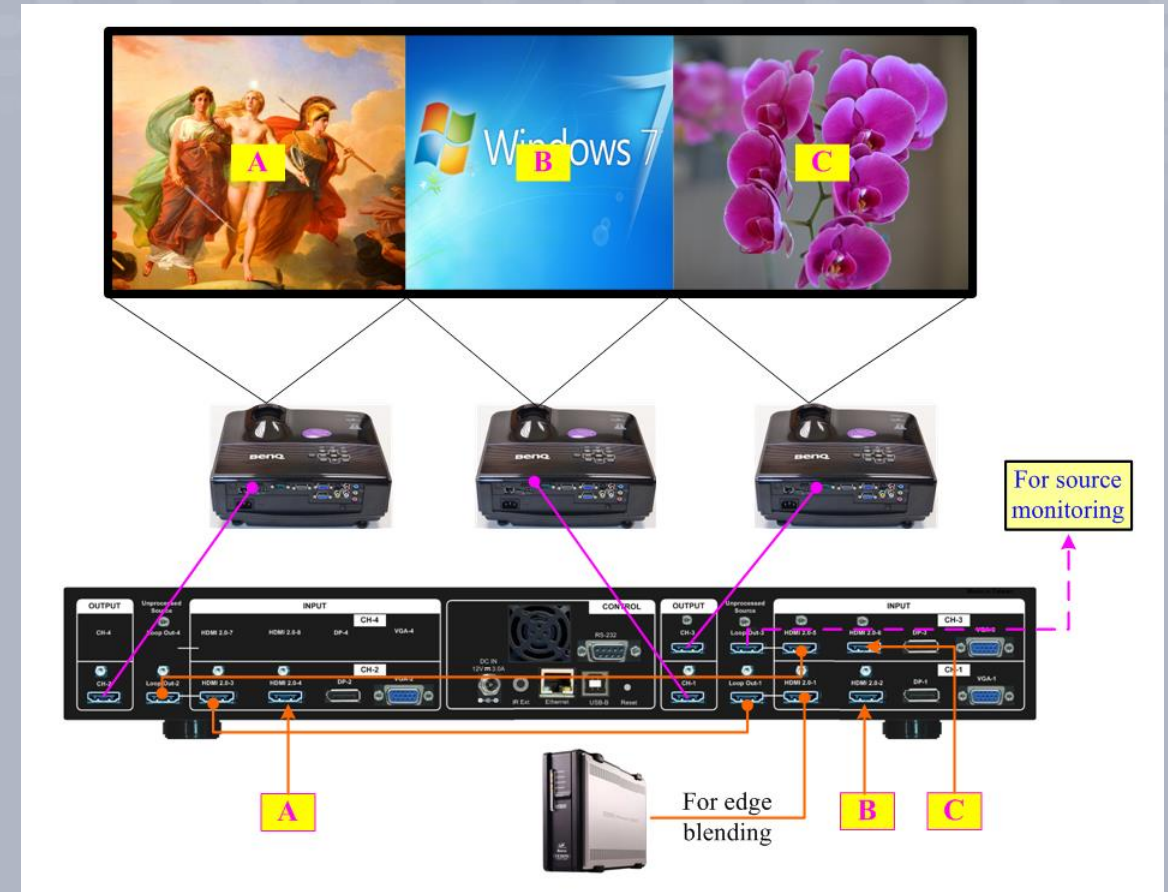


Image quality issue—Projector light leakage

- Projection image background is not pure dark. When two projector background overlapped together, it will create double black level and cause banding effect under dark environment.
- It is nothing to do with signal processing and can't be reduced through video processing.
- Higher NATIVE contrast ratio projector will have lower light leakage & is good for dark environment application.
- [Black Level Uplift] can adjust background black level in non-overlap area and improve the color difference. Please check Black Level uplift in User Guide.
- To put physic shield plate at the side of the projector lens will improve banding effect. User needs to try with difference distance and shape of the shielding plate.



Image quality issue—Banding in Overlap region (1)

- GeoBox default is 2.2 Gamma curve. If Projector gamma curve is not 2.2 or gamma curve is not accurate, it will cause color banding issue. Please set projector gamma curve with 2.2 if possible.
- Please make sure all projectors have the same gamma setting.
- Try to have the same color between adjacent projectors through projector internal color adjustment function.
- Replace with different Display mode setting in the projector and select the best Display mode.
- Disable Brilliant Color or Dynamic Color function in projector may improve banding issue.
- If it is still not perfect, please try to do GeoBox gamma adjustment in next page.

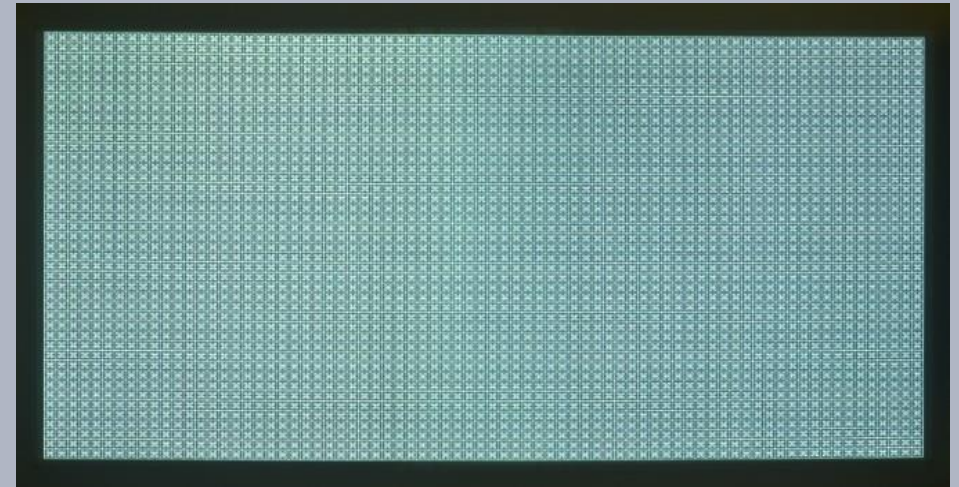
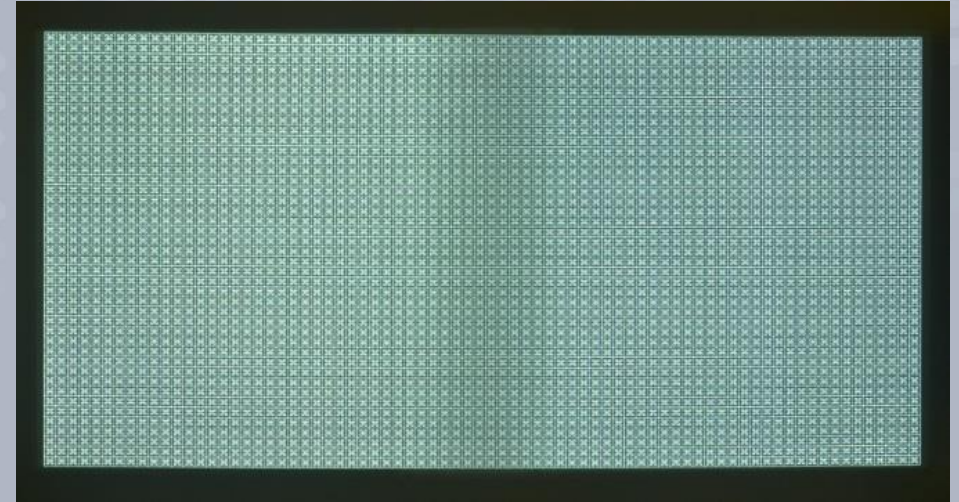
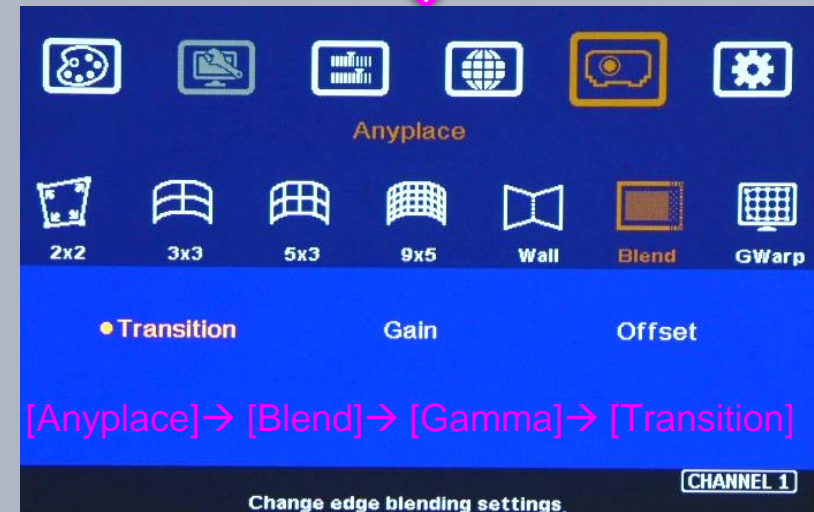
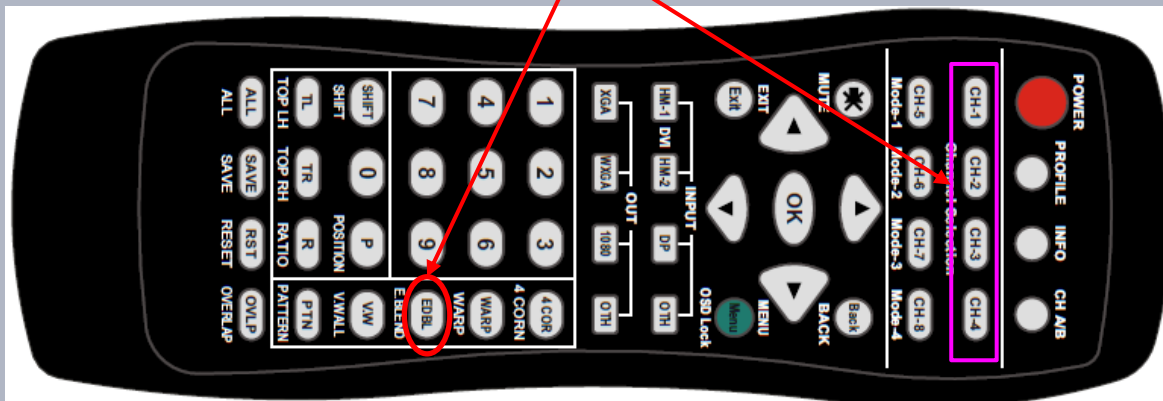


Image quality issue—Banding in Overlap region (2)

- Select Channel → click [EDBL] hotkey → Select [Gamma] → Select [Transition] → [Enter]
- If the color banding is too dark, increase the gamma value in R/G/B color in one channel, then execute the same in the nearby channel to see the final result.
- If the banding is too bright, decrease the gamma to test it.
- If the banding only happens in one color, please adjust the gamma in that color.
- For further adjustment, please access to [Gain] menu to adjust gamma curve in each projector. The value in each projector can be different. Please see User Guide for more details.

Select channel, then click [EDBL] hotkey



[Anyplace] → [Blend] → [Gamma] → [Transition]

Image blurred or double images in Overlap region (1)

Below are the possible reasons:

- Projector image shift.
- Image alignment between adjacent projector is not accurate.
- Wrong setting value in Video wall [Overlap] setting.

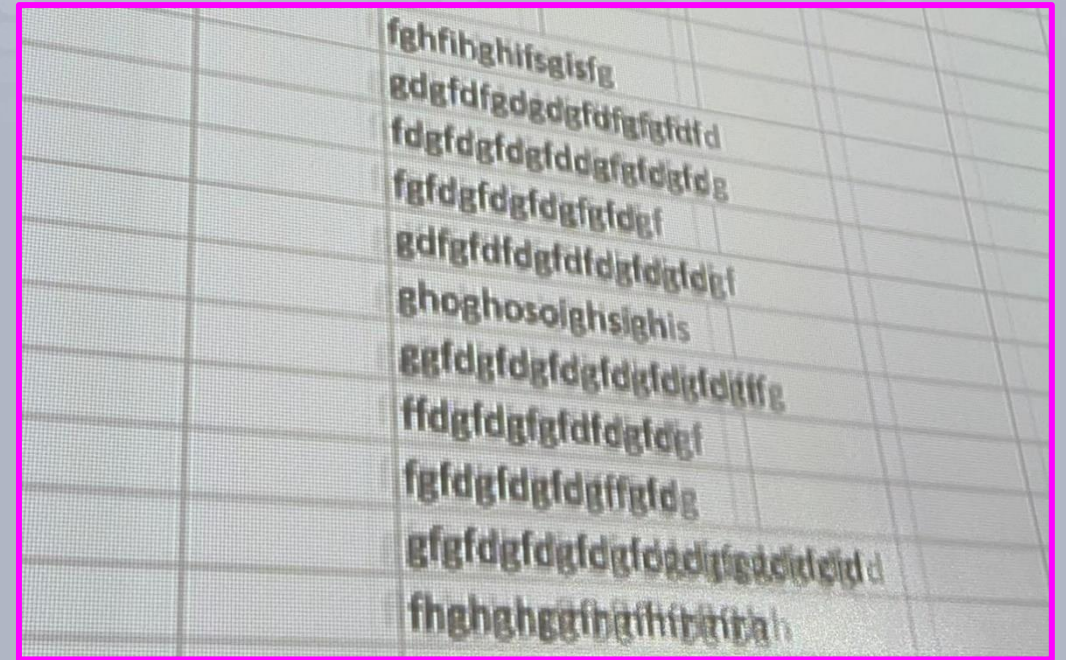
Projector image shift

- Thermal drift: projector image position may be different during start-up and after 20-30 minutes. It is called thermal drift.
- Projector will have some position shift during new installation and will be stable after at least one month. 1mm projector shift may induce 10x image shift on the screen.
- Position shift after maintenance or earth quake.

How to confirm projector position shift

GeoBox will not change image position for only few pixels. Once it is malfunctional, some function will totally not work.

- Turn on projector and connect with single pixel pattern or Excel Spread sheet file directly without going through GeoBox.
- Put some marks on the cross section of the image in the overlap region for each projector.
- Recheck the image position after some time. User can confirm whether the position shift is from projector or not.



Limitation in edge blending application

Problem for edge blending

- Edge blending is good for multimedia and Power point presentation but not good for single pixel file such as Excel file or Google browsing because any minor image shift will cause blurred image in overlap area.
- The image aspect ratio will change if the aspect ratio is not the same as screen. Notebook PC 16:9 content is not suitable to display on edge blending system due to big image distortion.
- The easiest way to solve these problems is to set flexible display mode—one display mode with full edge blending and another display mode is to display discrete content in each projector with one 16:9 image for notebook PC 16:9 display.
- The content for all-in-one image needs to have the same aspect ratio as the screen to avoid image distortion

Other suggestion

- Select installation projector will have less image shift and thermal drift.
- To set flexible display mode to support different input sources.
- Teach end user to use IR controller for image correction by [2x2] alignment once image shift happens. User needs to pre-mark on the 4 corners of the image for each projector after finishing geometry alignment. It will save cost for future after service.



Signal source and connection

Possible signal source issue

- The quality for Android media player box is not stable due to different IC solution. It may cause some compatibility issue in different devices.
- User can check the input LED to confirm if the input source is detected by GeoBox or not. If no input LED, please check signal source and connection cable.
- Usually the input will be 4k signal and output is only WUXGA (FHD). The input signal cable and looping connection cable should be 4k certified. Poor cable quality will cause no image or intermittent display.
- HDCP should be considered. Please make sure the system is HDCP compliant. GeoBox is HDCP compliant device.

How to solve the issue

- The input/output LED should be normally displayed. Click [INFO] key to check input/output connection status.
- If no image displayed, please click [MENU] key to check whether OSD is showed up. If OSD is normally display, it means the hardware should be functional.
- If the issue is still existed, please test with below:
 - Replace with 4K certified cable
 - Test with different signal source and monitor to see if it can display normally.
 - To add HDMI splitter (S914) or switcher may solve the system compatibility issue.
 - Please check signal extender. Different types of signal extender may have different compatibility issues especially in high resolution signal. HDBaseT is recommended for long distance connection.
 - Sometimes, the output set to DVI mode ([Options]→ [Setting]→ [DVI Output]→ [on]) will solve output signal connection issue because DVI signal has less signal control.

Image distortion and Content preparation (1)

Ideal content resolution

- Content resolution and signal (PC output) resolution can be different.
- Based on the same example with 3x WUXGA projectors & 384 overlap pixels, the ideal content horizontal resolution is $(1920*3)-(384*2)=4992$. The screen size is 6.5Mx1.5M. The optimized content vertical resolution should be $4992/6.5*1.5=1152$. It means the ideal content resolution is 4992*1152. If user can't provide too high resolution content, user needs to prepare a content with the same aspect ratio as the screen (6.5:1.5).
- Usually, except end user requires very accurate image aspect ratio, the content H&V resolution can have 10%-20% resolution deviation and the viewers will not see big difference.
- GeoBox will fill the screen with full screen image. Once the content aspect ratio is the same as the screen, no matter what kind of PC output resolution is, the system will show not distortion image once the PC is set to full screen display.

Signal source (PC output) resolution

- PC output (signal source) resolution should be as close as ideal content resolution to get the best video quality.
- If we use WUXGA (1920*1200) projector, user can select 4992*1200 as signal (PC) output resolution and set full screen display but not maintains original aspect ratio.
- User can set GeoBox EDID with the required resolution to let PC output the required output resolution.
- GeoBox can also adjust the final aspect ratio through Video Wall Overlap setting.
- If the content is fast motion or slow motion panning video, to take 60Hz content and signal source will let the image show much smooth result.
- GeoBox can support up to 7680x2160/30Hz or 7680*1200/60Hz input signal.
- If PC output resolution is beyond 4k/2k, user can't use EDID to get required PC output resolution. Please download [PC 8k/6k output setup procedures] application note from below website to apply Customized settings from display card.
<https://bit.ly/3uHXNhS>

Image distortion and Content preparation (2)

Non PC signal source:

- In case the signal source is from Media player or game console that can't output required resolution, user needs to prepare a content with aspect ratio same as the screen and set the player with highest output resolution with full screen display. GeoBox will expand the image to full screen to get no distortion image no matter the player or PC output is at what kind of output resolution.
- To set flexible display mode is one method to keep no distortion image under different using condition. (Please see "Flexible display mode" section)

EDID setting

- EDID is to tell signal source to output desired signal resolution to the system.
- EDID can be set to different resolution in different channels and input ports.
- If the input is looped to all input port in different modules, user only needs to set the first input port EDID. User can select different EDID directly from OSD list or use [Customize] function to create non-VESA standard timing.
- EDID setting range is H=1024-4080 (8 pixel/step), V= 720-3840 (1 pixel/step) in UD100. M810 & G810 will be less.
- PC or signal source may not follow GeoBox EDID setting due to hardware or software reason.
- If the required input resolution is beyond this range (such as 7680x1200 60Hz), user can set Customized output resolution in PC. GeoBox still can support all kinds of input timings under 600 MHz. It is nothing to do with EDID setting.
- Please download [PC 6k/8k Output Setup procedures] under below website: <https://bit.ly/3uHXNhS>
- PC system will remember the EDID in the first connection and may not follow the resolution in the second setting. Please solve this issue by below ways:
 - Switch to other EDID resolution→ press Enter→ see the result→ switch back to required EDID and check.
 - Select [Customize] menu under [EDID]→ set to the designed resolution→ press Enter. Please note that some resolution timing under [Customize] is reduce blanking signal. It has lower pixel clock and may affect 3D display.
 - To reset complete system through Insert small PIN into RESET hole for more than 5 seconds to reset the whole system and execute the EDID setting again. PC will treat it as new connection.
- Please check input/output timings under [INFO] key on remote controller.

Select projector for edge blending

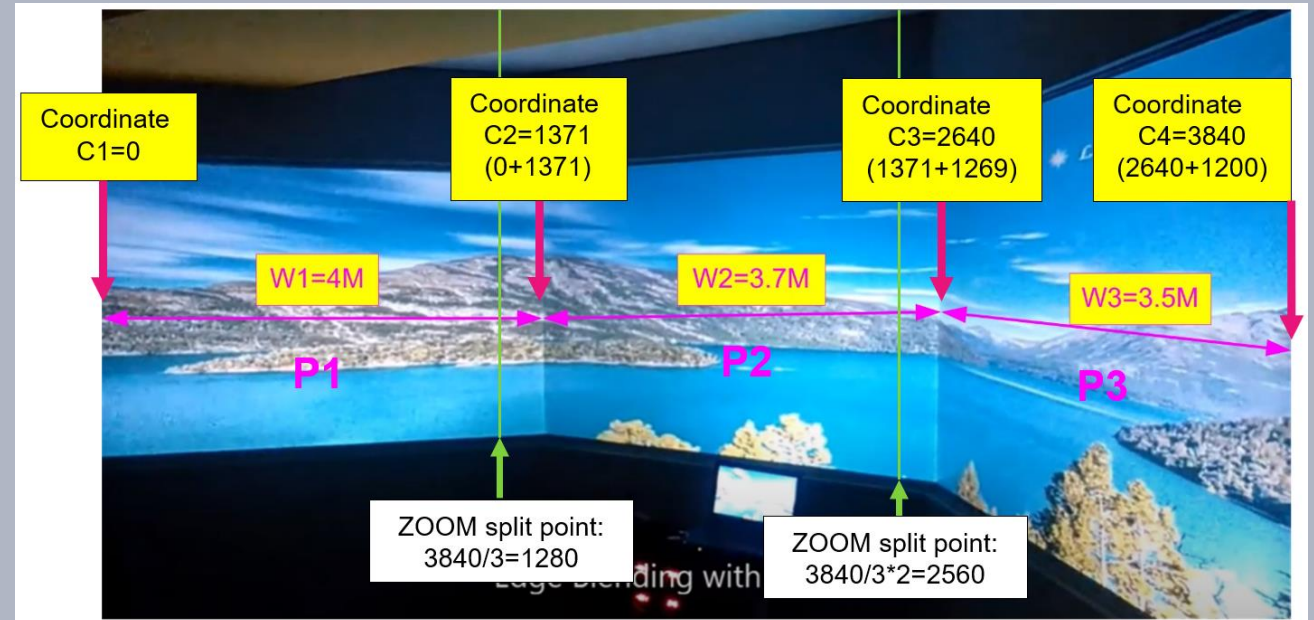
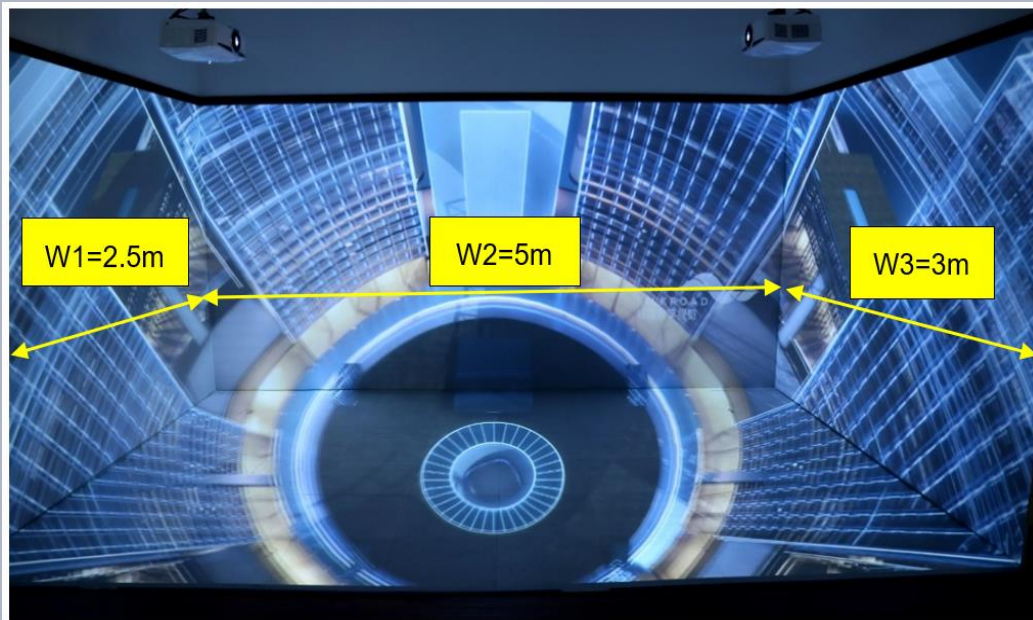
- Ultra-short throw ratio projector is not good solution for edge blending
 - Limitation in maximum image size.
 - Close to the screen with big reflection angle. Different viewing angle on overlap area may see different color banding.
 - Focus on single projector application. May have no standard gamma 2.2 for multiple projector application.
 - Poor color uniformity and lose image focus at edge.
 - Not suitable for rear projection screen.
- Higher NATIVE contrast ratio will reduce banding effect due to light leakage under dark environment. Native contrast ratio (full on/full off) is not the same as dynamic contrast ratio.
- Ultra-short throw ratio projector can't be used for curved screen due too big image distortion. Larger throw ratio will have less image distortion.
- To select projector with rigid structure and less thermal drift in image position.
- In normal application, please select installation projector to get better color uniformity and 2.2 gamma curve. The projector can be no lens shift, edge blending or warp function. If double curve screen is used, projector with warp may help image alignment in extreme alignment case.
- Projector throw ratio will affect installation distance. Longer throw ratio will get better video quality but may affect the free space for visitors or speaker. Usually throw ratio more than 0.6:1 is recommended for edge blending.
- Laser projector has long lamp source life and can be installed at portrait direction to increase image height.

Multi-wall Immersive Display (1)

Ideal Image size for immersive display

- Projector: WUXGA, 5000 Lumens
- Standard image size: 4m*2.5m (16:10)
- Ideal Wall dimensions:
Width: 2.5m-4m
Screen Height: 1.5m-2.5m

- Native projecting area for all projectors should be the same to get the same brightness. Select the largest wall dimension as standard dimension for all walls.
- User can apply single signal source and GeoBox can crop required pixels for each wall. If discrete content is used, user need to prepare the content based on the size in each wall to get the same scaling factor.



Multi-wall Immersive Display (2)

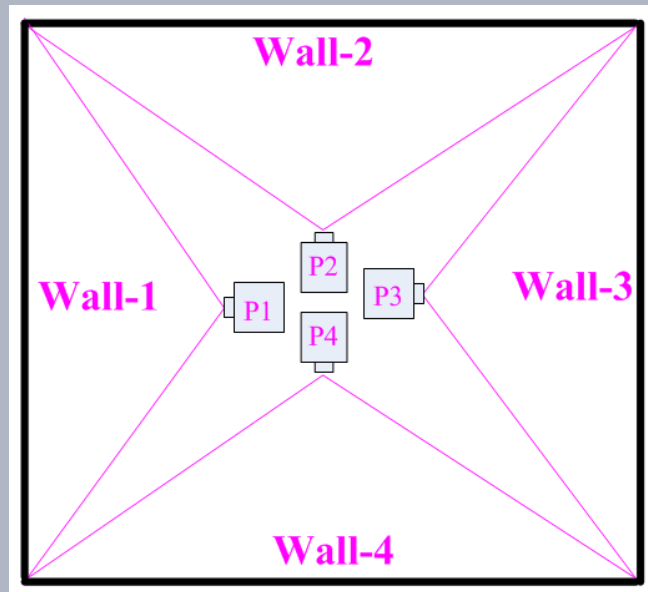
(3/4 walls, one projector for each wall)

Geometry alignment

- To adjust the image to match each wall size and stitch the image at wall corner.
- The horizontal grid lines in each projector needs to be aligned together.

Video wall setting (Example for 3 walls, 3 projectors)

- Wall size (cm): W1=400, W2=370, W3=350
- Projection image size: 4m*2.5m (16:10) for all projectors.
- Video wall ZOOM for all projector: H= 3 for 3 walls. V=1
- PAN: P1: H=1, P2: H=2, P3: H=3, P4: H=4, V=1



- OVERLAP Setting value for this example:
P1: LH= 0, RH= 91, P2: LH= -91, RH= 80,
P3: LH= -80, RH= 0

User can download the Spreadsheet for 3/4 walls with one projector for each wall from below website:
https://www.vnstw.com/dl_file.php?id=900

	H	V		
Signal source horizontal resolution	3840	1200		
Projector resolution	1920	1200		
Projector image height (cm)	250.0			
Actual projecting size (cm)	400.0	250.0		
No. of projector	3			
	Wall-1	Wall-2	Wall-3	Wall-4
Wall width (cm)	400	370	350	0
Video Wall OVERLAP setting	Projector-1	Projector-2	Projector-3	Projector-4
LH edge	0	-91	-80	0
RH edge	91	80	0	-1280
Pixel pitch (mm/Pixel)	2.92	Ideal watching distance (M)		2.92

Multi-wall Immersive Display (3)

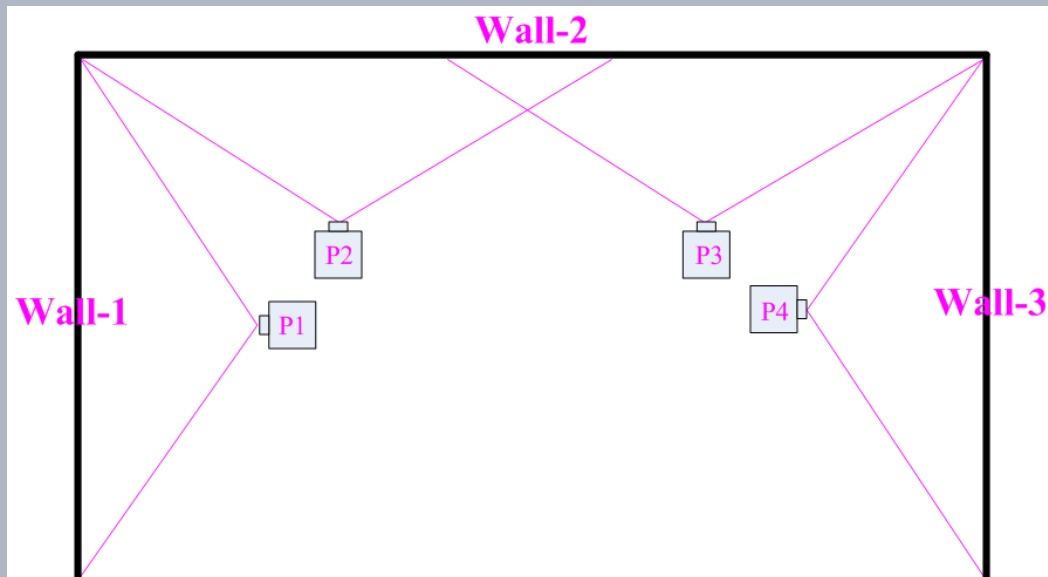
(3 walls, two projectors for center wall)

Geometry alignment

- Adjust image to match each wall size and stitch the image at wall corner.
- The horizontal grid lines in each projector needs to be aligned together.

Apply [Immersive Plan for 3W4P] Excel file to get setup data

- Example: Wall size (cm): W1=250, W2=600, W3=360, H=225cm
- Input Yellow column data to check the result.
- Projection image size needs to be larger or equal to largest wall size with single projector (W3). Adjust P2/P3 Overlap Grid # to get required image size ≥ 360 in Width and 225cm in height.
- Image size for all projector=W3=3.6m*2.25m (16:10)
- Video wall ZOOM for 4 projectors: H= 4 for 4 walls. V=1



- PAN: P1: H=1, P2: H=2, P3: H=3, P4: H=4, V=1 for all projectors.
- [OVERLAP] Setting value for below example:
P1: LH= 0, RH= -167, P2: LH= 167, RH= -16,
P3: LH= 365, RH= -182, P4: LH=182, RH=0

User can download the Spreadsheet for 3 walls with two projectors for center wall from below website:

https://www.vnstw.com/dl_file.php?id=902

	H	V		
Signal source	3840	1200		
Projector resolution	1920	1200		
P2/P3 overlap	Grid #	20	Overlap pixels	640
Projector image size	Horizontal (cm)	360	Vertical (cm)	225

	Wall-1	Wall-2	Wall-3	
Wall width (cm)	250	600	360	
Cropping Pixel for each wall	793	1904	1142	
Video Wall overlap setting value	Projector-1	Projector-2	Projector-3	Projector-4
LH edge	0	167	365	182
RH edge	-167	-16	-182	0
Pixel pitch (mm/Pixel)	3.15	Ideal watching distance (M)		3.15

More information at
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