

# **FHD552-X LCD Panel**

**User Manual**

020-000741-02



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## NOTICES

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- l. Image retention on LCD flat panels.
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CAN ICES-3 (A) / NMB-3 (A)

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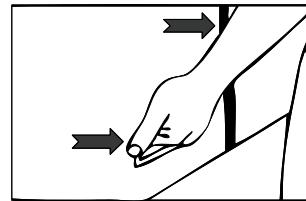
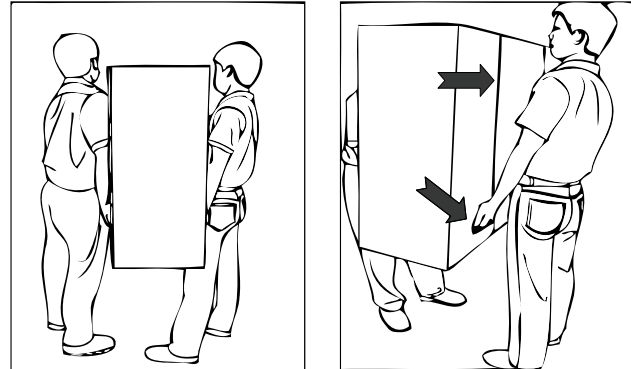
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# Package Handling

## **⚠ DANGER**

Failure to comply with the following could result in death or serious injury:

- Do not drop the panel (even a short distance), or apply pressure to the sides of the bezel. The small size of the bezel, which enables minimal image-to-image gaps, means there is reduced protection of the LCD glass and components. Dropping the panel or applying unnecessary force to the sides of the bezel will result in permanent damage.
- To avoid serious injury and/or serious damage to the LCD panel, moving the panel requires at least two people. Hold the white handles on the shipping package when moving/shipping. Failure to properly handle the package may result in serious injury.
- Extreme care must be taken when pushing the mounted display into its locked position. Always handle the display on the opposing corners of the frame to avoid direct contact with the LCD glass.



## **NOTICE**

Due to the delicate nature of the display, we strongly recommend that you use the provided packing materials and secure the package onto a pallet during shipment.

# Unpacking

Each LCD panel is packed inside a box carton. To protect the panel during transportation, additional packing material has been placed within the carton. Before unpacking, prepare a stable, level and clean surface near a wall outlet for your LCD panel. Set the box in an upright position and pull out the white carton locks. Lift up the top cover carton. Remove the ESD bag before removing the display from the bottom tray carton.

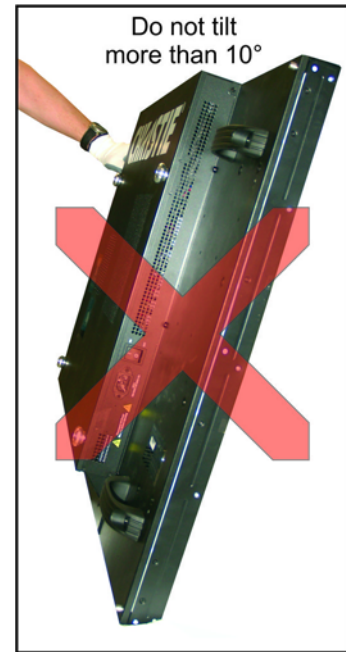
## Handling and Care

### **WARNING**

Make sure the power connector and any other cables are unplugged before moving the product. Failure to comply could result in minor or moderate injury.

To avoid damaging your LCD panel, follow these guidelines when handling or moving the panel:

- Always use the handles on the back of the LCD panel. Do not hold onto the frame when transporting.
- Two people are required when moving or raising the LCD panel. Use both hands, one positioned on the top handle and the other on the bottom handle.
- Hold and support the LCD panel at each side and keep at an even height above the ground.
- Do not twist or bend the panel.
- Use a cart to move several panels at one time.
- When the panel is sitting on a surface, do not tilt it more than 10° to avoid damaging the screen.



## Cleaning

### **NOTICE**

Unplug the power cord before cleaning the LCD panel. Do not use a liquid, spray cleaners, or any abrasive cleaners to clean the LCD panel. Failure to comply may result in equipment damage.

Use a cloth dampened with water or methyl alcohol to clean the screen surface. It is recommended you keep the protective plastic sheet shipped with the panel to replace it each time the panels are packed and shipped.

# Introduction

## About This Manual

This User Manual describes how to install, set up and operate the FHD651-P and FHD651-T LCD Panels.

## Target Audience

The manufacturer has prepared this manual to help end users get the most out of the display.

The manufacturer has made every effort to ensure that this manual is accurate as of the date it was printed. However, because of ongoing product improvements and customer feedback, it may require updating from time to time.

## Textual and Graphic Conventions

### Text Conventions

The following conventions are used in this manual, in order to clarify the information and instructions provided:

- Remote and built-in keypad button identifiers are set in upper-case bold type; for example, "Press **EXIT** to return to the previous menu."
- Computer input (commands you type) and output (responses that appear on-screen) is shown in monospace (fixed-width) type; for example: "To change the aspect ratio to Letterbox, type 07 00 02 41 53 50 03 08 **<Enter>**."
- All keys with functional names are initial-capped, set in bold type and enclosed in angle brackets. These keys are the following: **<Enter>**, **<Spacebar>**, **<Control>**, **<Esc>** and **<Tab>**.
- **<Enter>** indicates that you may press either the RETURN or ENTER key on your keyboard if it has both keys.

In addition to these conventions, underlining, boldface and/or italics are occasionally used to highlight important information, as in this example:



A carriage return **must** be used after each command or string.

## Graphic Conventions

These symbols appear in numerous places throughout the manual, to emphasize points that you must keep in mind to avoid problems with your equipment or injury:



TIPS highlight time-saving short cuts and helpful guidelines for using certain features.

### NOTICE

NOTICE emphasize text with unusual importance or special significance. They also provide supplemental information.



CAUTIONS alert users that a given action or omitted action can degrade performance or cause a malfunction.



WARNINGS appear when a given action or omitted action can result in damage to the equipment, or possible non-fatal injury to the user.



DANGER appears when a given action can cause severe injury or death.

## Using This Manual

Use the following table to locate the specific information you need in this manual.

If you need...	... Turn to page:
General information about the FHD651-P and FHD651-T LCD Panels	14
Installation instructions	21
First-time configuration instructions	33
Advanced configuration instructions	42
Troubleshooting tips	48
Product specifications	64

## Description, Features and Benefits

The FHD651-P and FHD651-T LCD Panels is a cutting-edge direct-view LCD that, when tiled with multiple units, can create enormous images in multiple configurations. The display combines a simple and slim design with unparalleled image quality with configurable I/O to provide a perfect building block for large-format video walls, which are ideal in digital signage and control-room applications.

## Key Features and Benefits

The display offers these key features and benefits:

- Full-HD Native Resolution: 1920 x 1080 (16:9 Native Aspect Ratio)
- High Brightness: Up to 500 nits
- 178-degree Viewing Angle
- DisplayPort 1.1a, HDMI and DVI Inputs with High-bandwidth Digital Content Protection (HDCP)
- Video Signal Looping
- Direct LED Backlight
- Video Wall Toolbox software [included] simplifies setting up a large video wall, with up to 25 displays, using a Windows PC
- Portrait- and Landscape-Mode Compatible

## Parts List

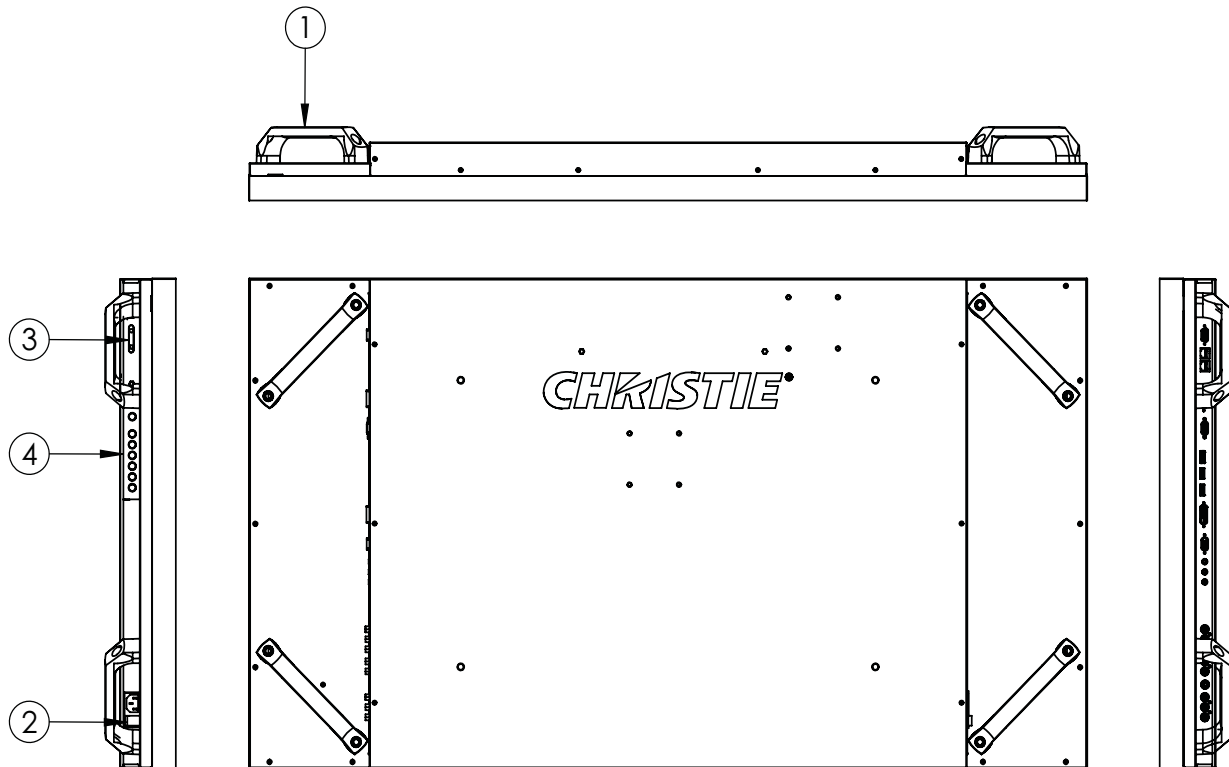
Your display is shipped with the following items. If any items are missing or damaged, please contact your dealer.

- FHD552-X LCD Panel
- Remote Control Unit and batteries
- AC Power cord
- DVI Cable
- RS232 Communications Cable
- RS485 Communications Cable
- IR Extender Cable
- Video Wall ToolBox Installation CD

# Controls and Functions

## Display at a Glance

The illustration below shows the key display components, and the paragraphs that follow describe them.



**1. HANDLES**

**Always use the handles when carrying the display.** DO NOT touch or hold the screen face.

**2. MAIN POWER SWITCH**

Connects or disconnects the display panel from the AC power source.

**3. STATUS LED**

Lights orange to indicate that the display is in standby mode; blinks orange if no input signal is present; off if the main power switch is set to off.

#### 4. KEYPAD

You can use the keypad instead of the remote control unit to operate the on-screen display (OSD) controls. The keypad operates as follows:

##### On/Standby ( )

Press once to toggle from standby mode to on mode. Press it again to return to standby mode.

##### SOURCE

To select a source, press the **SOURCE** button repeatedly (with no menus visible on-screen).



When a menu is visible on-screen, this button operates identically to the right-arrow (or **ENTER**) button on the display remote control unit.



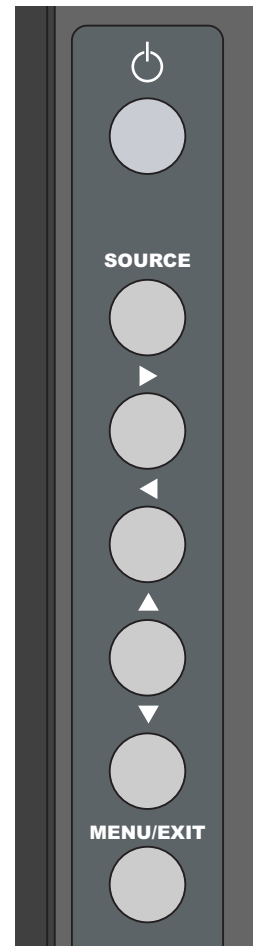
When a menu is visible on-screen, this button operates identically to the left-arrow button on the display remote control unit.



When a menu is visible on-screen, these buttons operate identically to the up- and down-arrow buttons on the display remote control unit.

##### MENU/EXIT

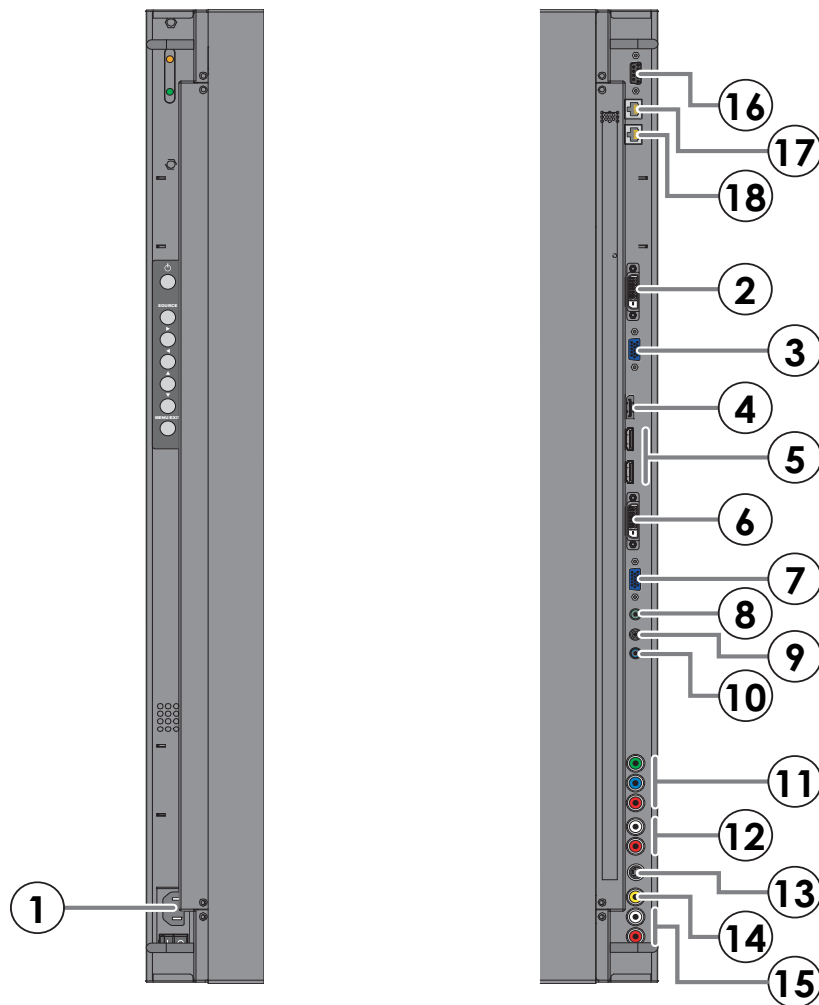
Press this button to access the on-screen display (OSD) controls, or to exit the current menu and return to the previous one.





# Input Panel

The illustration below shows the display input panel.



1. **Power Input (100 to 240 VAC)**  
Connect the display to power here.
2. **DVI-D Out (HDCP-compliant)**  
VESA-standard digital video output from the display to the next display in a video wall.
3. **VGA Out (15-pin D-Sub)**  
VESA-standard analog video output from the display to the next display in a video wall.
4. **DisplayPort**  
DisplayPort 1.1a and DisplayPort-HDCP 1.1 compliant, SD/HD input for connecting SDTV, EDTV or HDTV component video sources.
5. **HDMI 1, HDMI 2**  
Two (2) HDCP-compliant digital video inputs for connecting HDMI or DVI sources.

6. **DVI-D In (HDCP-compliant)**

VESA-standard digital video input from a personal computer, or digital video from a DVD player or HD set-top box.

7. **VGA In (15-pin D-Sub)**

For connecting components that have RGB or component output jacks such as a personal computer or external DTV decoder (a break-out cable is needed for BNC-type connection).

8. **PC Audio In**

Connect the audio output from a personal computer here.

9. **IR Extender**

Connect the IR Extender cable provided with the display to this input.

10. **Audio Out**

For connecting external, powered speakers or an external audio receiver/amplifier.

11. **Component**

Standard- or high definition (up to 1080p), YPrPb component video input.

12. **Comp. Audio**

Stereo audio input from the Component video source.

13. **S-Video**

Standard S-video input for connecting a VCR, camcorder, gaming console, Super VHS (S-VHS) VCR or other S-video source.



If both the Composite and S-video inputs are connected to sources, the S-video input takes precedence.

14. **Video**

Standard composite input for connecting a VCR, camcorder, gaming console or other composite video source.

15. **Video / S-V Audio**

Stereo audio input from the Composite or S-video source.

16. **RS232C In**

A female, 9-pin D-sub connector for interfacing with a PC or home theater automation/control system.

17. **RS485 In**

A female, 8-pin RJ-45 connector that connects to the previous display in a video wall.



18. **RS485 Out**

A female, 8-pin RJ-45 connector that connects to the next display in a video wall.

## Remote Control Unit

The illustration below shows the display remote control, and the table that follows describes its functionality.



	Label	Description
1		Turns the monitor on and off
2	INFO	Provides source and resolution information
3	VGA	Selects the PC RGB source
	DVI	Selects the PC DVI source
	HDMI1	Selects the HDMI source 1
	COMP	Selects the Component source
	AV	Selects the Composite Video source
	HDMI2	Selects the HDMI source 2
4	P-POSITION	Selects the PIP position
	DISPLAYPORT	Select the DisplayPort source
	PIP	Turns the PIP feature on and off
	S-V	Selects the S-video source
5	P-SOURCE	Selects the secondary sub-source
6	SWAP	Swaps the main and PIP source
7	MENU	Opens the monitor's on-screen menu system. When the menu system is already open, pressing this button will select the previous submenu
		Navigates through submenus and settings
8	ENTER	Selects highlighted menu choices
9	EXIT	Closes the menu system
10	SCALING	Selects each aspect ratio, in sequence: Full Screen, Native, Letter Box and Pillar Box
	FREEZE	Freezes the current source image
	MUTE	Turns off the sound
	BRIGHT	Adjusts the brightness
	CONTRAST	Adjusts the contrast
	AUTO	Auto adjustment of VGA source
	SOURCE	Selects each source, in sequence
	VOLUME-	Decreases the sound volume
	VOLUME+	Increases the sound volume

# Installation

**NOTICE**

Installation **must** be performed by a qualified custom video installation specialist.

## Remote Control

To install batteries in the remote control:

1. Press down the tab on the cover and pull the cover up.
2. Insert the included batteries. Ensure that the polarities correctly match the  $\oplus$  and  $\ominus$  markings inside the battery compartment.
3. Insert the lower tab of the cover into the opening, and press down the cover until it clicks in place.

## Notes on Batteries

- Make sure that the battery polarities are correct when installing the batteries.
- Do not mix an old battery with a new one or different types of batteries.
- If you will not use the remote control for a long time, remove the batteries to avoid damage from battery leakage.
- Do not expose batteries to excessive heat such as from sunshine, fire or the like.

## Notes on Remote Control Operation

- Make sure that there is nothing obstructing the infrared beam between the remote control and the IR receiver on the display.
- If the effective range of the remote control decreases, or it stops working, replace the batteries with new ones.
- The remote control may fail to operate if the infrared remote sensor is exposed to bright sunlight or fluorescent lighting.
- Ambient conditions may possibly impede the operation of the remote control. If this happens, point the remote control at the display, and repeat the operation.

## Locking and Unlocking the Remote Control

You can lock the remote control buttons to prevent unauthorized persons from changing settings on the display. To do this, press **ENTER**, **ENTER**, **EXIT**, **EXIT**, **ENTER** and **EXIT**, in sequence. To unlock a locked remote control unit, use the same sequence of button presses.

## Quick Setup

Here is a quick overview of the display installation process. The sections following this one provide detailed instructions.

Step	Procedure	For Details, Refer to page...
1	Mount the display(s) on a wall (optional)	23
2	Connect other external equipment to the display (optional): <ul style="list-style-type: none"> <li>• Automation/control system (RS232 or Ethernet)</li> <li>• IR extender</li> </ul>	24 25
3	Connect signal sources to the display	25
4	For video wall installations, connect video cables and control cables to each display in a series (optional)	
5	Apply power to the display	28
6	Change the OSD language (optional)	30
7	Display calibration: adjust the following <b>for each input</b> : <ul style="list-style-type: none"> <li>• Aspect ratio</li> <li>• Brightness</li> <li>• Contrast</li> <li>• Color temperature and white balance</li> <li>• Color level</li> <li>• Tint</li> <li>• Input position</li> </ul>	33

## Installation Considerations

Proper installation of your display will ensure a satisfying viewing experience. Whether you are installing a display temporarily or permanently, you should take the following into account to ensure your display performs optimally.

### Handling Guidelines

Super-narrow bezel displays are inherently very fragile devices. To avoid damaging your LCD panel, follow these guidelines when handling or moving the panel. Please note that damage due to improper handling is not covered under warranty.

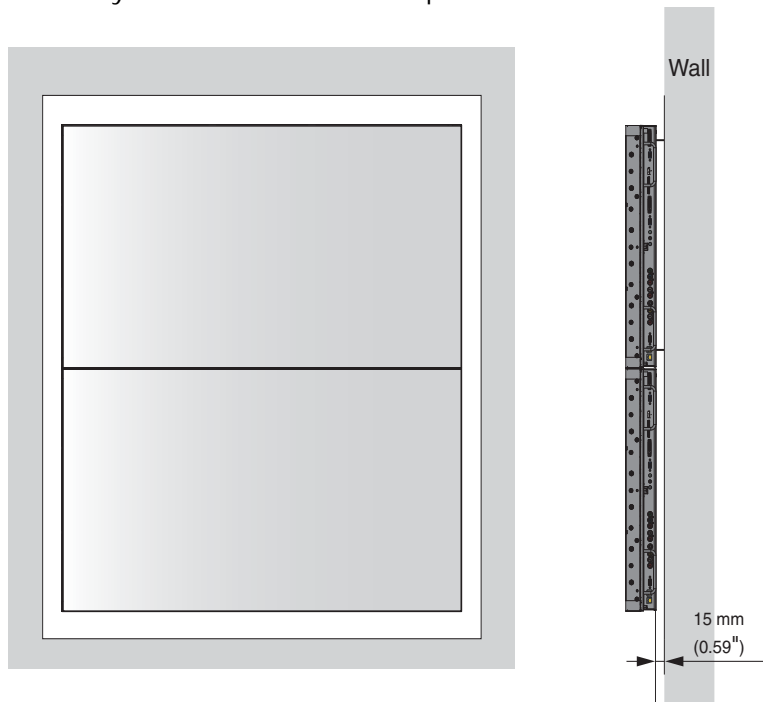
- Always use the handles on the back of the LCD panel. Do not hold the display by its edges (outer bezel).
- Two people are required when moving or raising the LCD panel. Use both hands, one positioned on the top handle and the other on the bottom handle.
- Do not twist or bend the panel.
- Hold and support the LCD panel at each side and keep at an even height above the ground.
- Use a cart to move multiple panels at one time.
- When the panel is sitting on a surface, do not tilt it more than 10° to avoid damaging the screen.

## Ambient Heat

Keep the ambient temperature constant and below 40°C (104°F). Keep the display away from heating and/or air conditioning vents.

## Ventilation

If you are mounting the display in an enclosure, leave sufficient space on all sides between it and surrounding objects, as shown below. This allows heat to disperse, maintaining the proper operating temperature. For very thin installations, to mount the display close to a wall it may be necessary to remove the handles prior to installation.



## Mounting the Display

You can mount the display on a wall.

If you do decide to wall-mount the display, ensure that the wall-mount bracket is installed according to the instructions included with it. The wall must be capable of supporting a redundant weight factor three (3) times the weight of the display, or be reinforced.

We recommend that this be done by a custom installation specialist.

### NOTICE

Use only the approved wall-mount kit designed for your display.

## Connections to the Display

Proceed as follows to connect the display to your video sources, external controller(s) – if present – and AC power.

When connecting your equipment:

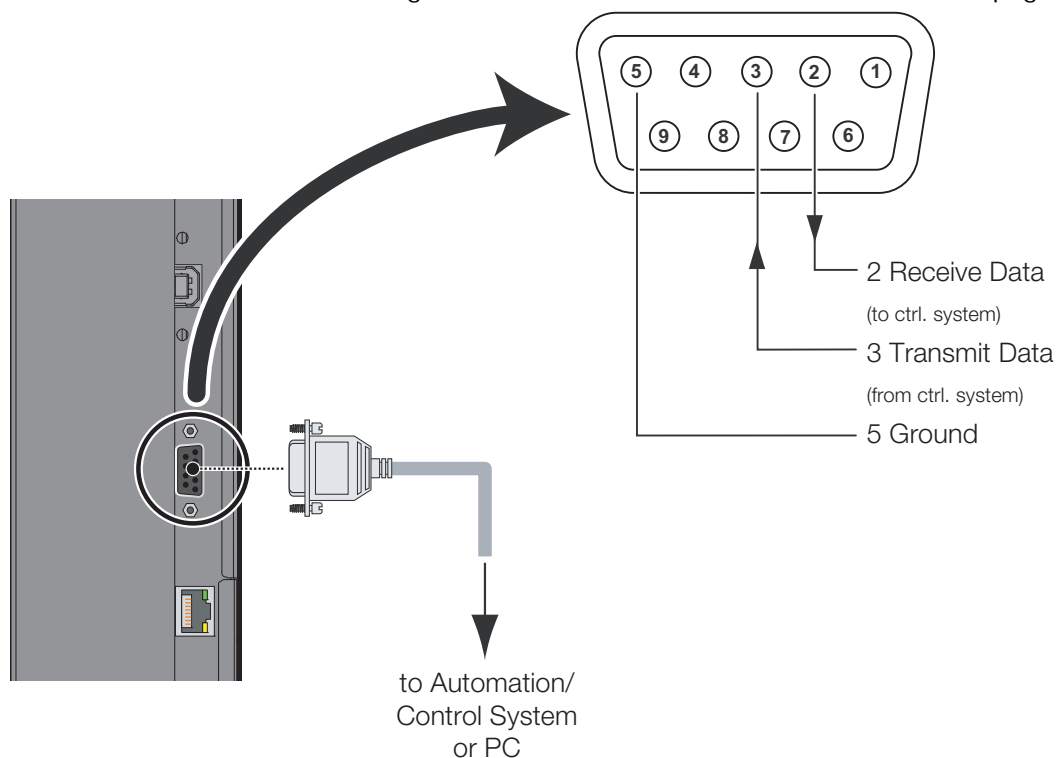
- Turn off all equipment before making any connections.
- Use the correct signal cables for each source.
- For best performance and to minimize cable clutter, use high-quality cables that are only as long as necessary to connect two devices. (Don't use a 20-foot cable when a 6-foot cable will suffice.)
- Ensure that the cables are securely connected. Tighten the thumbscrews on connectors that have them.

## Connecting a Control System or PC

### RS232 Connection

Use a straight-through RS232 cable with a 9-pin male connector to connect a PC or home theater control/automation system (if present) to the RS232 port on the display.

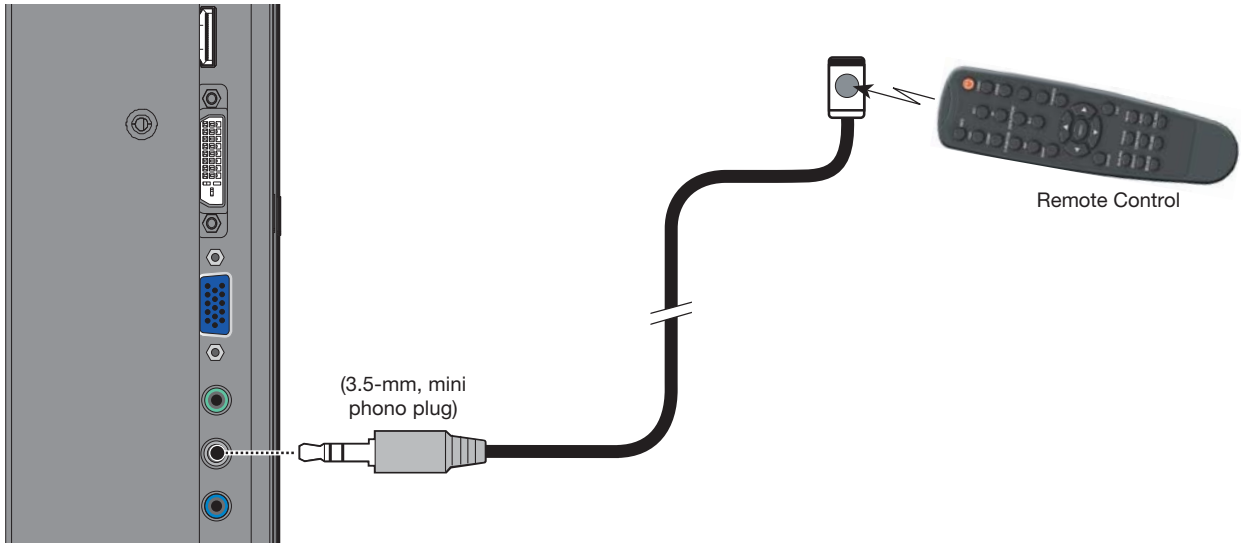
For more information about using this connection, refer to [External Control](#) on page 50.





## IR Extender Connection

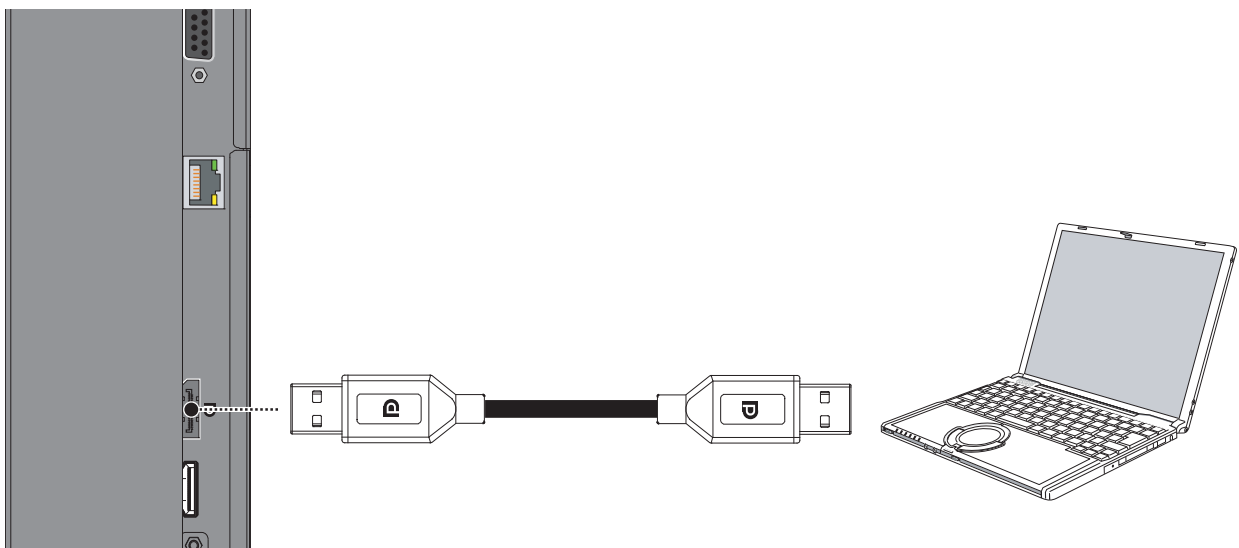
Connect the provided IR extender cable to the IR Extender input as shown below.



## Connecting Source Components to the Display

Connect your video sources to the display as shown and described in the sections that follow.

### DisplayPort Source Connection



## HDMI and DVI-D Source Connections



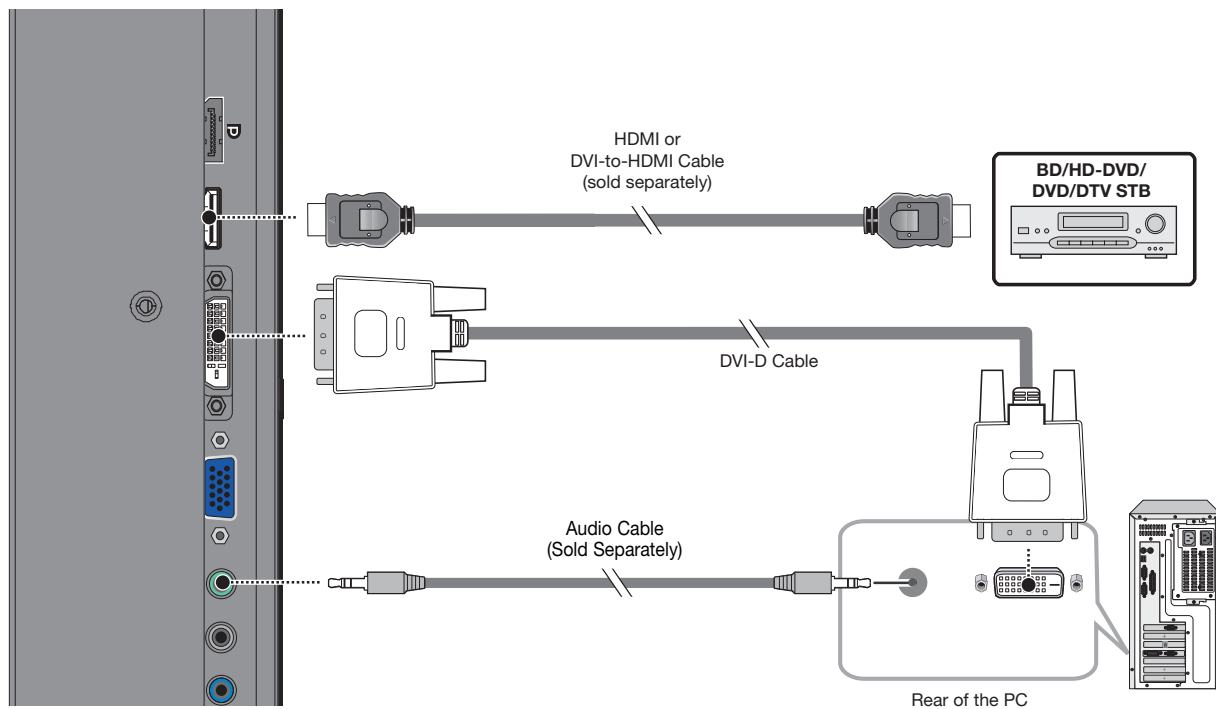
Use the HDMI inputs whenever possible. This ensures the highest video quality because the signal is carried in the digital domain throughout the entire signal path, from source component output into the display.



You can also connect computers with DVI output to these inputs. Refer to [Supported Timings](#) on page 66 for a list of compatible input signals.

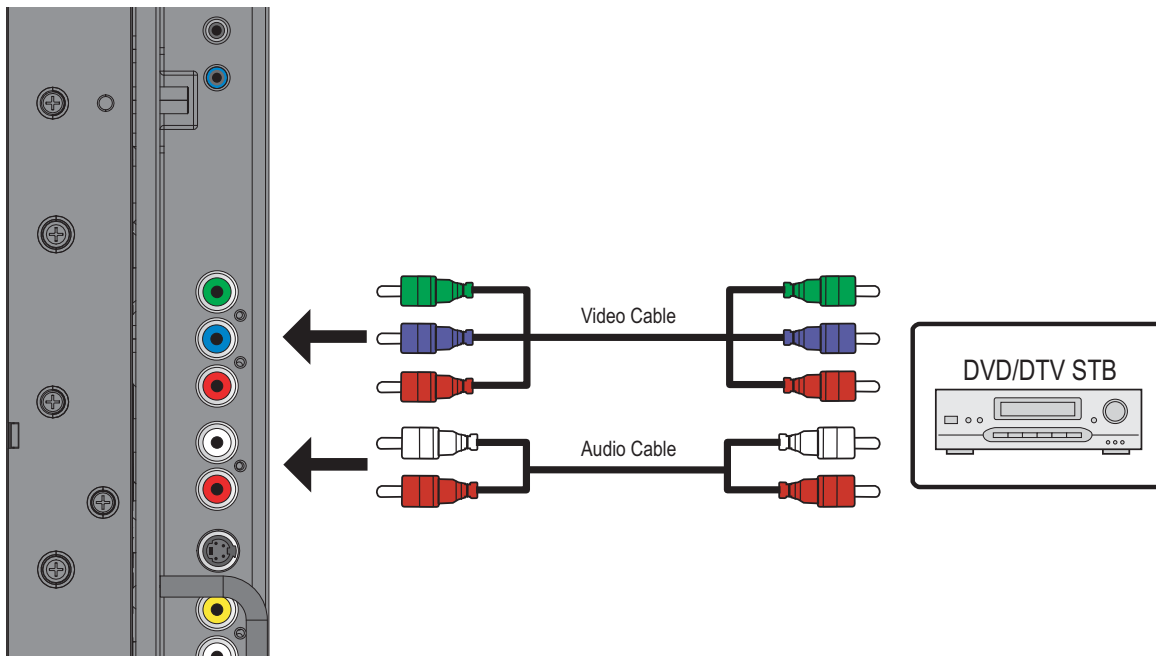
This display supports the VESA Display Data Channel (DDC) standard. This standard provides "Plug and Play" capability; the display and a VESA DDC-compatible computer communicate their setting requirements, allowing for quick and easy setup.

For Plug and Play to work correctly, you must turn on the display before you turn on the connected computer.



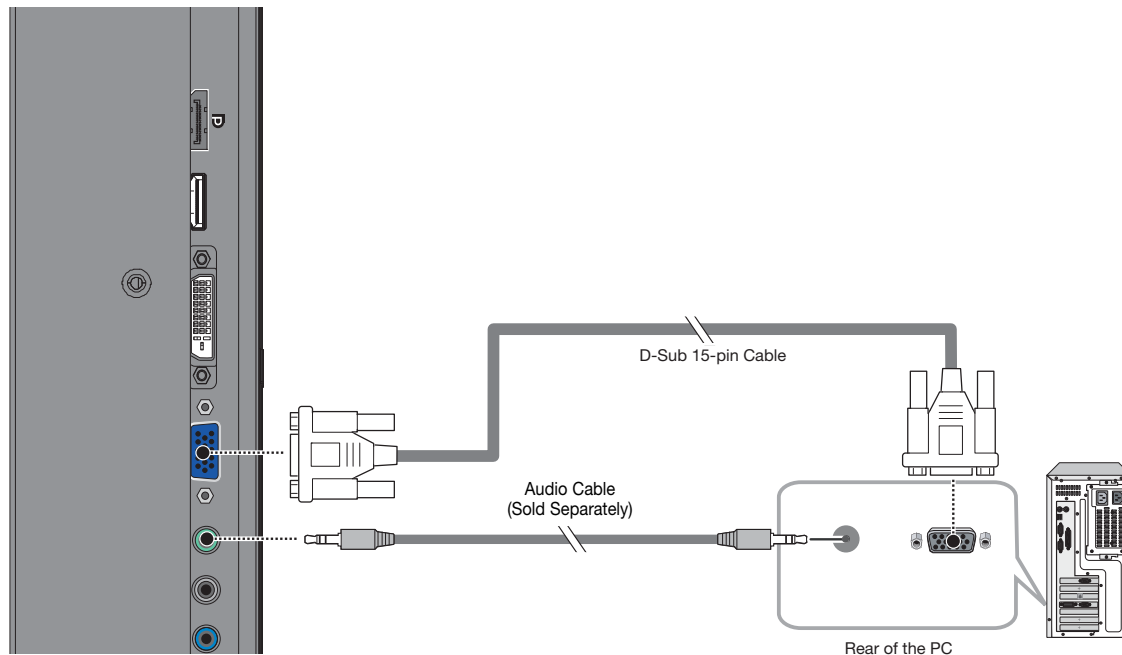
## Component Video Source Connection

Connect your component video source to the Component inputs as shown below.



## RGBHV (VGA) Source Connection

Connect a personal computer or other RGB source to the VGA input as shown below.

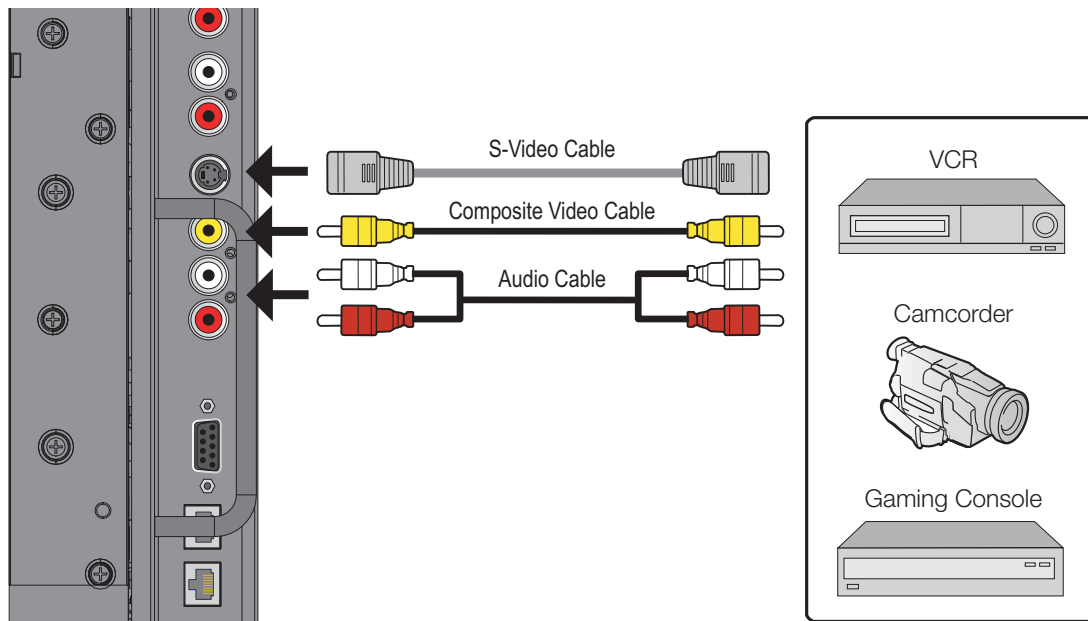


Refer to [Supported Timings](#) on page 66 for a list of compatible input signals.

## Composite and S-Video Source Connection



If both the Composite and S-Video inputs are connected to sources, the S-Video input takes precedence.

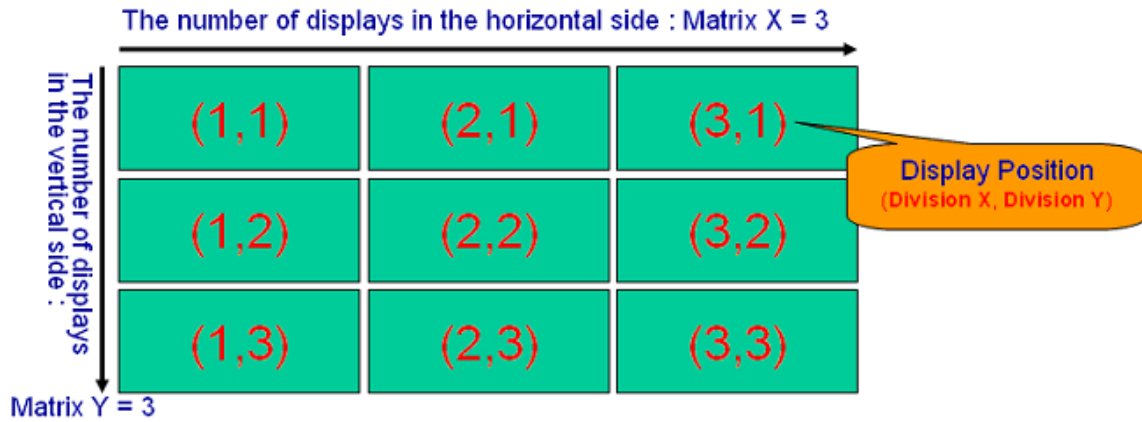


## Setting Up a Video Wall

The maximum supported video wall size depends on the type of video source, as follows:

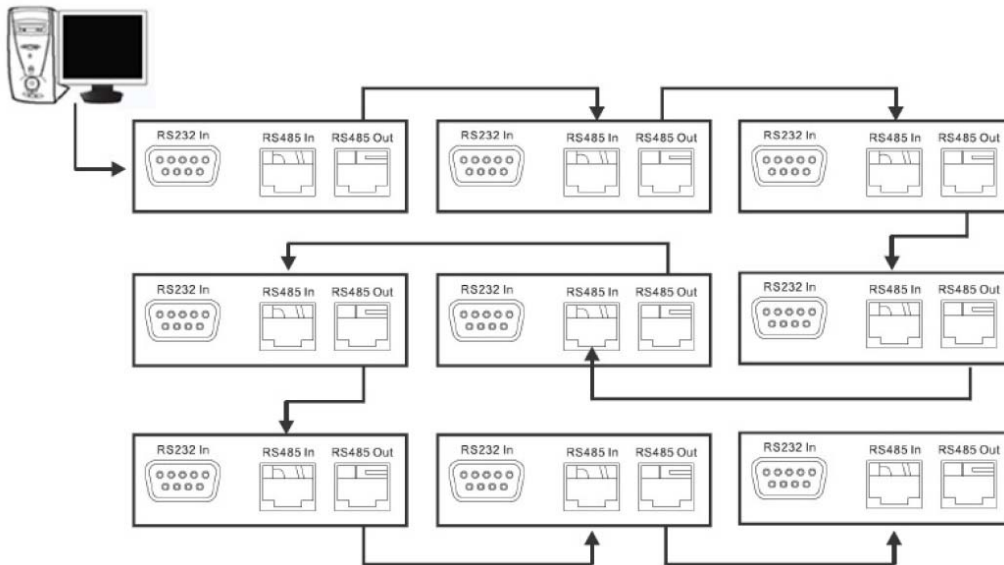
- Maximum video wall size using a single digital source and DVI pass through connectors: 3x3
- Maximum video wall size using a single analog source and VGA pass through connectors: 2x2
- Maximum video wall size using multiple source signals from an external splitter or distribution amplifier: 5x5

The example below shows a 3x3 matrix (9 displays):





## RS232 Routing

The external RS232 controller should be connected to the upper leftmost display, as shown in the illustration below. The remaining monitors should be connected via their RS485 connectors in the sequence shown below, using the RJ45 cables provided.



# Operation

## Turning on the Power

1. Turn on your source components.
2. Plug the female end of the supplied power cord into the AC receptacle on the side of the display (AC 100V ~ 240V).
3. Connect the other end to your AC power source.
4. Turn on the main power switch at the side of the display. The power indicator lights orange to indicate that the display is in “standby” mode.
5. Press the power button (  ) on the remote control to turn on the display (or press the power button (  ) on the keypad). After a brief warm-up period, the display will display an image.



## Changing the OSD Language

The display OSD language is initially set to English, but can also display the menus in Simplified Chinese, French, German, Italian, Portuguese, Russian, Spanish, Korean or Japanese. To change the OSD language:

1. Press **MENU**.
2. Select Basic Settings from the Main Menu.
3. Select **OSD Language** from the Basic Settings Menu.
4. Press ◀ or ▶ to select the desired language and press **ENTER**. The change takes effect immediately.

## Avoiding Image Retention



Do not display static (non-moving) content on the display for long periods of time. This may cause image “burn-in” or image retention, which is not covered under warranty.

Follow the recommendations below to prolong the life of the display.

### Operate the Display Within Its Rated Ambient Environment

- Operating temperature: 0°C to 40°C (32°F to 104°F)
- Relative humidity: 85%, maximum.

### **Avoid Static Content**

- Display dynamic (moving) images whenever possible
- Consider using a screen saver to avoid displaying static (fixed) video content continuously.
- Turn off the display when not in use, or use the Real Time Clock feature (refer to [Real Time Clock](#) on page 41) to automatically turn off the display at preset times of the day.

### **Set IRFM to ON**

To help prevent image retention, set IRFM (refer to [Advanced Settings](#) on page 42) to **On**.

## Using the On-Screen Menus

To display the on-screen menus, press **MENU** on the remote control or built-in keypad.

To select a sub-menu, use the ▲ and ▼ buttons to highlight it. Then, press ► to enter that sub-menu.

To select a menu item, use the ▲ and ▼ buttons to highlight it. Then, press ◀ or ▶ to adjust that setting and press **ENTER**.

The OSD menus are arranged hierarchically, as shown here and on the next page. Depending on the selected input source and signal characteristics, some menu options may not be available.

<b>Image Settings</b>	Scheme	<b>User</b> , Vivid, Cinema, Game or Sport	
	Brightness	0, 1, 2 ... <b>50</b> ... 99, 100	
	Contrast	0, 1, 2 ... <b>6</b> , 7, 8	
	Sharpness	0, 1, 2 ... <b>50</b> ... 99, 100	
	Saturation	0, 1, 2 ... <b>50</b> ... 99, 100	
	Hue	0, 1, 2 ... <b>80</b> ... 99, 100	
	Backlight	Off or <b>2.2</b>	
	Color Temperature & Gamma	3200K, 3300K, 3400K, <b>9600K</b> or User	
	Red / Green / Blue Gain	128, 129, 130 .. <b>256</b> ... 382, 383	
	Red / Green / Blue Offset	-50, -49, -48 ... <b>0</b> ... 48, 49, 50	
<b>Display Settings</b>	Aspect Ratio	<b>Full Screen</b> , Pillarbox or Auto	
	Auto Scan	<b>On</b> or Off	
	Select Source	<b>VGA</b> , HDMI1, DVI, or DisplayPort	
	Main	Aspect Ratio	<b>Full Screen</b> , Letterbox, Pillarbox or Native
		Zoom	<b>0</b> , 1, 2 ... 9, 10
		Auto Scan	<b>On</b> or Off
		Select Source	<b>VGA</b> , HDMI1, HDMI2, DVI, DisplayPort, S-Video, Video or Component
	PIP	PIP Mode	<b>Off</b> , Large PIP, Medium PIP, Small PIP or Side-by-Side
		PIP Position	<b>Bottom Right</b> , Top Left, Top Right or Bottom Right
		Aspect Ratio	<b>Full Screen</b> , Letterbox or Pillarbox
		Side-by-Side Scale	Zoom In, Zoom out, Main PIP
		Auto Scan	<b>On</b> or Off
		Select Source	VGA, HDMI1, HDMI2, DVI, DisplayPort, S-Video, <b>Video</b> or Component
<b>Audio Settings</b>	Volume	0, 1, 2 ... <b>50</b> ... 99, 100	
	Bass	0, 1, 2 ... <b>10</b> ... 19, 20	
	Treble	<b>HDMI</b> or PC Audio	
	Balance	<b>DisplayPort</b> or PC Audio	
	HDMI Audio Input	<b>0</b> , 1, 2 ... 99, 100	
<b>Basic Settings</b>	DP Audio Input	Up, Down, Left, Right	
	OSD Transparent	<b>Off</b> or On	
	OSD Location	<b>Landscape</b> or Portrait	
	OSD Zoom	<b>English</b> , 简体中文 (Simplified Chinese), Français, Deutsch, Italiano, Português, Русский (Russian), Español, 한국어 (Korean) or 日本語 (Japanese)	
	OSD Rotation	5, 6, 7 ... <b>30</b> ... 119, 120 seconds	
	OSD Language	<b>On</b> or Off	
	OSD Timeout	Current Date and Time	
	Power LED	Timer Mode	
	Real Time Clock	User, Same Settings on All or Same Settings on Work Days (Monday ... Friday)	
		<b>Disable</b> or Enable	
		Power-On Timer	

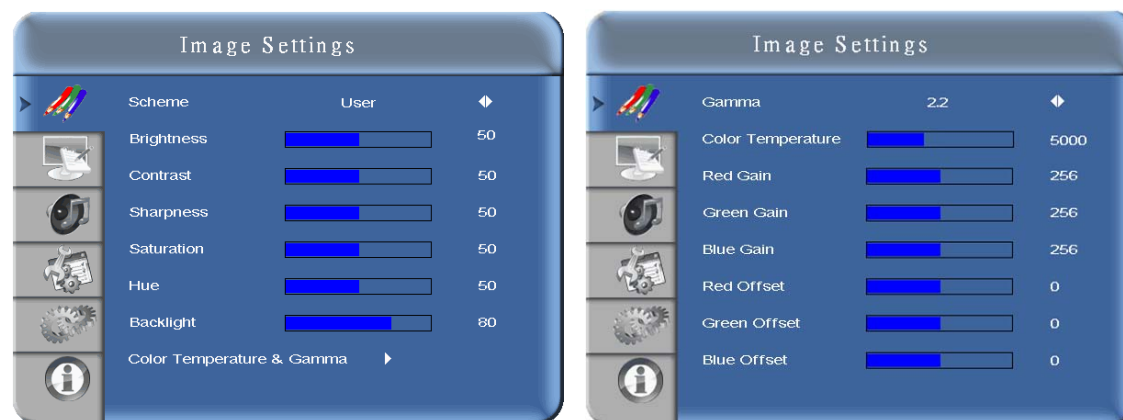
**Note:** Default settings appear in **bold type**.



<b>Advanced Settings</b>	Auto Adjustment	<b>No</b> or Yes	
	Image Position (VGA mode)	Up, Down, Left, Right	
	Phase (VGA mode)	0, 1, 2 ... 63	
	Clocks (VGA mode)	0, 1, 2 ... 100	
	VGA ADC Settings	User ADC Calibration	
	Flesh Tone (Video Mode)	<b>Off</b> , Low, Medium or High	
	IRFM	<b>Off</b> or Standard or Video Wall	
	Baud Rate	<b>115200</b> , 38400, 19200 or 9600	
	Smart Light Control	Off or Local Dimming	
	Wake Up from Sleep	<b>VGA Only</b> , VGA, Digital, RS232 or Never Sleep	
	Temperature & Fan Status	Temperature (°C, °F) Fan 1 Speed / Fan 2 Speed	
	Multi Display Control	Monitor ID	1, 2, 3 ... 24, 25
		Video Wall	Yes or <b>No</b>
		DVI Indemnity	Yes or <b>No</b>
		Power On Delay	<b>0</b> , 0.05, 0.10, 0.15, 0.20 ... 29.90, 29.95 or 30 sec.
		Frame	<b>Yes</b> or No
		Matrix X	1~10
		Matrix Y	1~10
		Division X	1~Matrix X
		Division Y	1~Matrix Y
		IR Mode	Off or Target or All
		Recipient ID	1~100
		Auto Video Wall Setup	Bottom-Left or Top-Left
	Factory Reset	Yes or <b>No</b>	
<b>System Status</b>	Channel Information	Main PIP	Active Source / Signal Resolution and Refresh Rate
	Total Hours		
	Firmware Version		

**Note:** Default settings appear in **bold type**.

## Image Settings



Use the controls in the Image Settings Menu to calibrate each display input to achieve optimum picture quality.

Connect your test pattern source to the input that you are calibrating and proceed as follows.

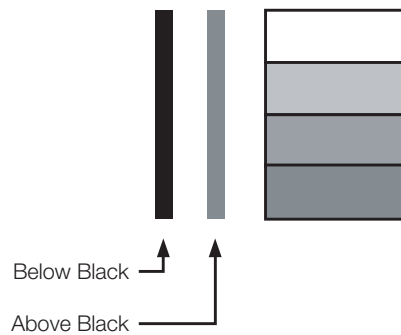
**Perform the adjustments in the order listed here.**

## Scheme

Select Scheme from the Image Settings menu, then press ◀ or ▶ to select one of four image quality presets (Vivid, Cinema, Game or Sport) depending on the type of program material you are viewing. These presets automatically adjust the other image settings for optimal image quality. Or, select **User** to adjust Brightness, Contrast and other settings manually.

## Brightness

On your external test pattern source, select a PLUGE pattern. (PLUGE is an acronym for “Picture Line-Up Generation Equipment.”)



PLUGE patterns vary but generally consist of some combination of black, white and gray areas against a black background. The example above includes two vertical bars and four shaded boxes.

Select Brightness from the Image Settings menu and press ◀ or ▶ to adjust the brightness so that:

- The darkest black bars disappear into the background.
- The dark gray areas are barely visible.
- The lighter gray areas are clearly visible.
- The white areas are a comfortable level of true white.
- The image contains only black, gray and white (no color).

## Contrast

On your external test pattern source, select a stepped, gray-bar pattern like the one shown below.



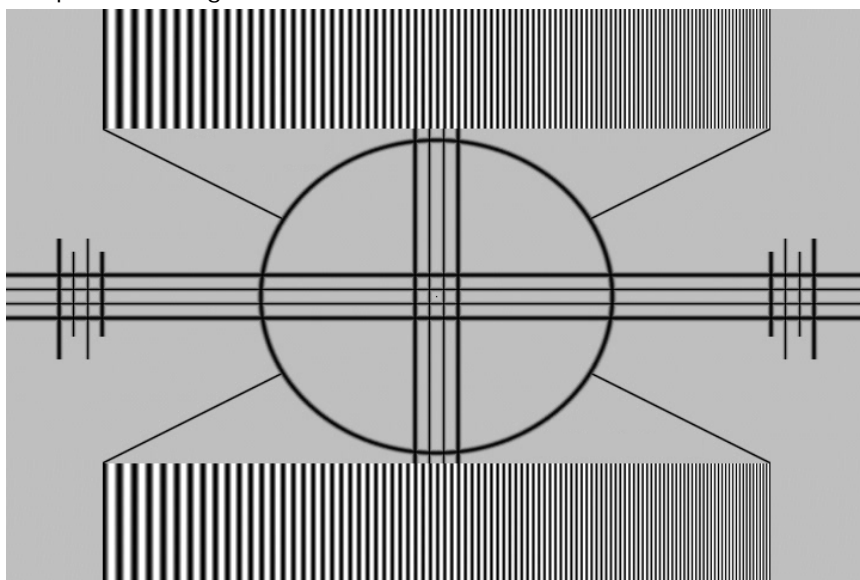
Select Contrast and press ◀ or ▶ to adjust the contrast to a point just below which the white rectangle starts to increase in size.



Brightness and contrast controls are interactive. A change to one may require a subtle change to the other in order to achieve the optimum setting.

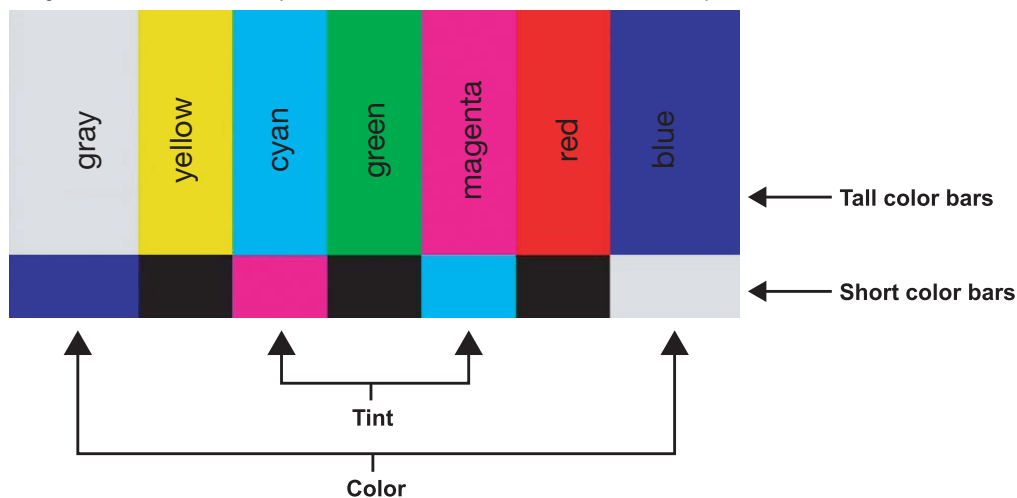
## Sharpness

“Sharpness” is the amount of high-frequency detail in the image. To adjust sharpness, select Sharpness from the Image Settings menu. On your external test pattern source, select a pattern like the one shown below. Adjust as needed, looking for white edges around the transitions from black to gray and differently-sized lines in the “sweep” patterns at the top and bottom. Lower the sharpness setting to eliminate them.

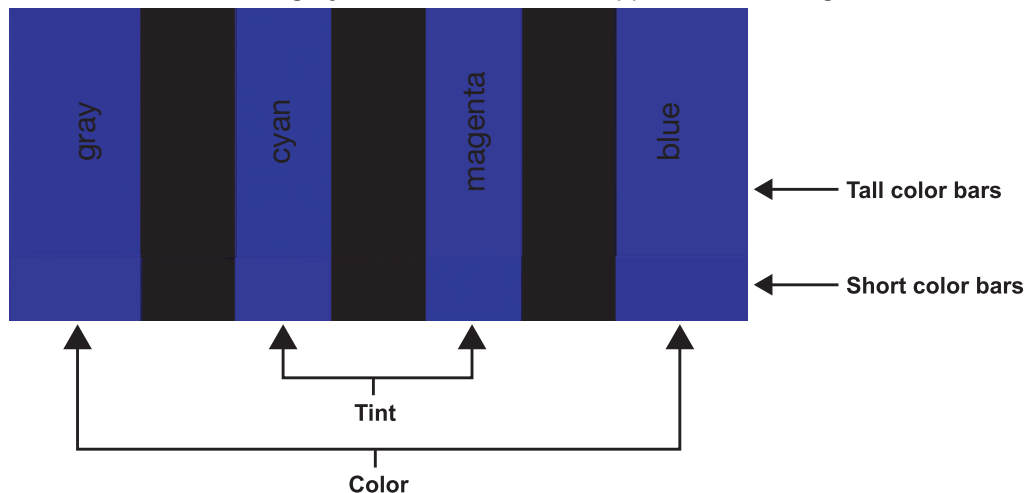


## Saturation

On your external test pattern source, select a color bar pattern like the one shown here.



1. Press **MENU** on the remote control or keypad.
2. Select Saturation from the Image Settings menu.
3. While looking at the color bar pattern through a blue filter, adjust the color saturation level until the outermost (gray and blue) color bars appear to be a single shade of blue:



## Hue

"Hue" (or "tint") is essentially the ratio of red to green in the color portion of the image. When hue is decreased, the image appears redder; when it is increased the image appears greener.

To adjust the hue, use a blue filter when viewing the color bar pattern, as you would for adjusting color saturation (refer to the previous section, [Saturation](#) on page 35).

Select Hue from the Image Settings menu and press ◀ or ▶ to adjust it until the cyan and magenta color bars (on either side of the green bar) appear to be a single shade of blue.



Like the brightness and contrast controls, the color and tint controls are interactive. A change to one may require a subtle change to the other in order to achieve the optimum setting.

## Backlight

The Backlight control changes the apparent brightness of the displayed image. Its effect is similar to that of a lamp intensity control on a projector.

## Gamma

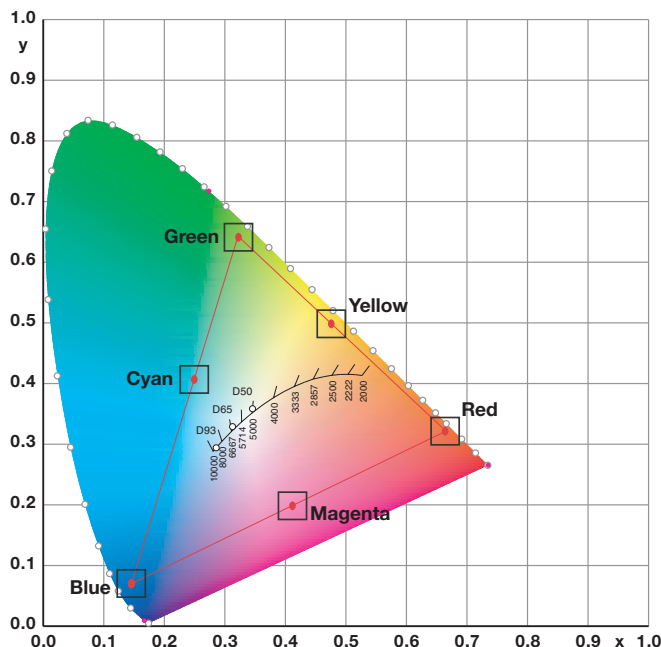
Select Gamma from the Image Settings menu and choose either **2.2** (default) or **Off**.

## Color Temperature

Select Color Temperature from the Image Settings menu to adjust the color temperature. Color temperature establishes the "color of gray" by adjusting the 75% white point to various color points.

## What are “color points?”

A “color point” is an x/y coordinate pair that defines a color’s location on the standard CIE chromaticity graph, shown below. (CIE stands for “Commission Internationale de l’Éclairage” (International Commission on Illumination), the organization responsible for color measurement and management standards.)



Select a value of from 3200K to 9600K. Higher settings produce a “bluer” picture; lower ones impart a reddish hue to the image. To select a custom color temperature, select User and set the Gain and Offset as described below.

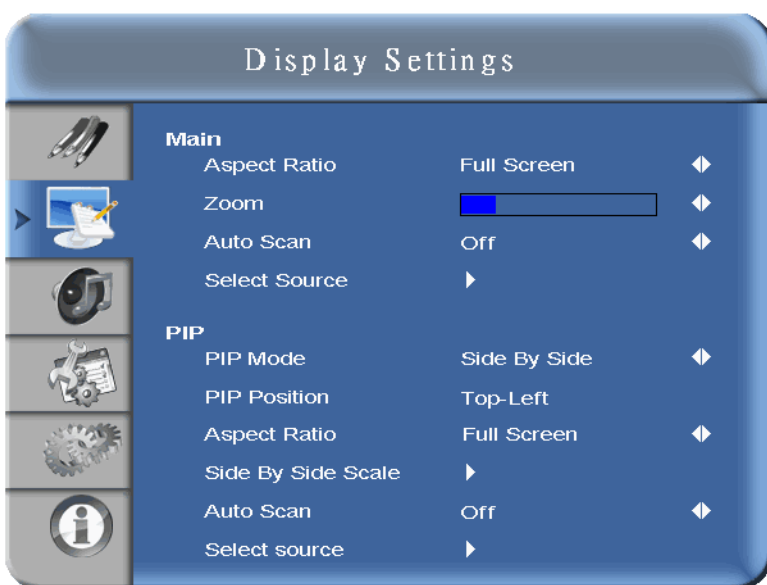
## Gain

Use the Gain controls to correct color imbalances in the bright areas of the image. A good way to do this is to use a test pattern consisting mostly of solid white areas, such as an 80 IRE “window” pattern. If the white areas contain traces of red, green or blue, decrease the Gain for that color.

## Offset

Use the Offset controls to correct color imbalances in the dark areas of the image. A good way to do this is to use a test pattern consisting mostly of dark gray areas, such as a 30 IRE “window” pattern. If the gray areas contain traces of red, green or blue, decrease the Offset for that color.

## Display Settings



### Aspect Ratio

To change the aspect ratio (size and shape) of the displayed image, select Aspect Ratio from the Display Settings menu and press **ENTER**. Select the appropriate aspect ratio for the type of program material being viewed.

Note that some aspect ratios are unavailable and/or not useful with certain types of source material. The optimal setting depends on a number of factors, such as:

- The aspect ratio of the source material, as broadcast or encoded on the playback medium.
- The “display type” (16:9 or 4:3) and output resolution settings at the source component. Most modern DVD/BD players and set-top boxes have such controls.
- Viewer preference (original aspect ratio with “black bars,” or a full-screen presentation with some distortion or cropping).

### Zoom

Choose Zoom from the Display Settings menu and press ◀ or ▶ to choose one of 10 zoom levels.

### Auto Scan

Select Auto Scan from the Display Settings menu and press ◀ or ▶ to turn this feature on or off. When set to **On**, Auto Scan causes the Main or PIP input select functions (using the **SOURCE** button on the remote control unit or keypad, or the **P-Source** button on the remote control unit) to skip over unused inputs, saving time.

## Select Source

Choose Select Source from the Display Settings menu and press ◀ or ▶ to select the video source.

## PIP Mode

Choose PIP Mode from the Display Settings menu and press ◀ or ▶ to enable Picture-in-Picture mode and set the size of the PIP window.

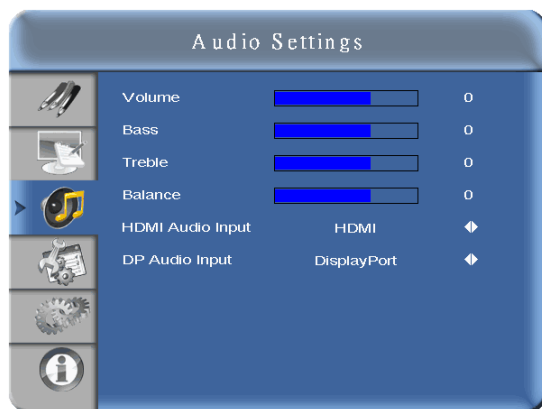
## PIP Position

Choose PIP Mode from the Display Settings menu and press ◀ or ▶ to set the location of the PIP menu.

## Side By Side Scale

Choose Side By Side Scale from the Display Settings menu and press ◀ or ▶ to select PIP, Main, Zoom In or Zoom Out.

## Audio Settings



## Volume

Select Volume from the Audio Settings menu and press ◀ or ▶ to change the audio volume.

## Bass

Select Bass from the Audio Settings menu and press ◀ or ▶ to cut or boost the low audio frequencies.

## Treble

Select Treble from the Audio Settings menu and press ◀ or ▶ to cut or boost the high audio frequencies.

## Balance

To adjust the left/right speaker balance, select Balance from the Audio Settings menu and press ◀ or ▶ to make one channel louder than the other.

## HDMI Audio Input

If you are using one of the HDMI inputs with a PC or other device that does not support audio output via HDMI, set HDMI Audio Input to **PC** for that input. (Also connect the audio output from your source.) This setting associates the **PC Audio In** input with that HDMI input.

## DP Audio Input

If you are using the DisplayPort input with a PC or other device that does not support audio output via DisplayPort, set DP Audio Input to **PC** for that input. (Also connect the audio output from your source.) This setting associates the **PC Audio In** input with the DisplayPort input.

## Basic Settings



## OSD Transparent

Select OSD Transparent from the Basic Settings menu and press ◀ or ▶ to adjust the degree of translucence (show-through) in the menus and message boxes. Zero (0) means that the menus are opaque.

## OSD Location

Select OSD Location from the Basic Settings menu and press ◀ or ▶ to move the OSD menu to the desired location.

## OSD Zoom

Select OSD Zoom from the Basic Settings menu and press ◀ or ▶ to choose either a normal-sized or enlarged OSD menu.



## OSD Rotation

Select OSD Rotation from the Basic Settings menu and press ◀ or ▶ to change the orientation of the OSD menu to match that of the display.

## OSD Language

Select OSD Language from the Basic Settings menu and press ◀ or ▶ to select the OSD Language (English, 简体中文 (Simplified Chinese), Français, Deutsch, Italiano, Español, Português, Русский (Russian), 한국어 (Korean) or 日本語 (Japanese)).

## OSD Timeout

Select OSD Timeout from the Basic Settings menu to specify how long the menus remain on-screen after selecting them. Select from 5 to 120 seconds, in five-second increments.

## Sleep Timer

Select Sleep Timer from the Basic Settings menu to turn off the display after a specified interval. Press ◀ or ▶ to select Off, 15 Minutes, 30 Minutes, 60 Minutes, 90 Minutes or 2 Hours.

## Power LED

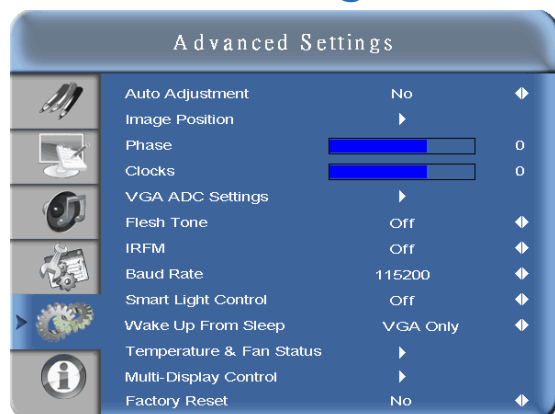
Select Power LED from the Basic Settings menu to change the behavior of the status indicator LED during standby mode. When set to **On**, the LED lights orange to indicate that the display is in standby mode. When set to **Off**, the LED is always off, regardless of the operational state of the display.

## Real Time Clock

Select Real Time Clock from the Basic Settings menu to set the display's internal real-time clock. From this menu, you can also program the display to turn on and off at specified times of day and days of the week:

- To set power-on and power-off times for each day of the week independently, set the Timer Mode to **User**.
- To set the same power-on and power-off times for every day of the week, set the Timer Mode to **All Days**.
- To set the same power-on and power-off times for Monday through Friday, set the Timer Mode to **Work Days**.

## Advanced Settings



### Auto Adjustment

Select Auto Adjustment from the Advanced Settings menu to force the display to reacquire and lock to the input signal. This is useful when the signal quality is marginal.

### Image Position (VGA sources)

Use the controls in the Image Position (VGA sources) Menu to fine-tune the image position.

- **Left/Right:** Select Left/Right from the Input Position menu to shift the projected image horizontally. Press ▶ to shift the image to the right; press ◀ to shift it to the left.
- **Up/Down:** Select Up/Down from the Input Position menu to shift the projected image vertically. Press ▶ to shift the image upward; press ◀ to shift it downward.

### Phase (VGA sources)

This control adjusts the phase of the pixel sampling clock relative to the incoming signal. Adjust the phase when an image still shows shimmer or “noise” after the Clock setting has been optimized.



Adjust the Phase after adjusting Clock (see below).

For best results, use a good test pattern such as a smooth gray consisting of a clear pattern of black and white pixels, or a similar “half on, half off” graphic image. Adjust the slider until the image stabilizes and each pixel is clearly defined. You may notice that you can stabilize the image at more than one point. Use either setting in such cases.

### Clocks (VGA sources)

This control sets the frequency of the pixel sampling clock, indicated by the number of incoming pixels per line, so that all pixels generated by a particular source are sampled.

Steady flickering or several soft vertical stripes or bands across the entire image indicates poor pixel tracking. Proper pixel tracking helps ensure that the image quality is consistent across the screen, that aspect ratio is maintained and that pixel phase (see above) can be optimized.

## VGA ADC Settings

Select VGA ADC Settings from the Advanced Settings menu to calibrate the display's analog-to-digital converter (ADC) for VGA sources.

## Flesh Tone

Select Flesh Tone from the Advanced Settings menu to lighten or darken the flesh-colored areas of the image. (This setting is only available with Video sources.)

## IRFM

Select IRFM from the Advanced Settings menu and press ◀ or ▶ to enable or disable this feature, which creates slight frame motion to help avoid image retention.

## Baud Rate

Select Baud Rate from the Advanced Settings menu and press ◀ or ▶ to set the data rate of the RS232 communication link.

## Smart Light Control

Select **ON** to enable the dimming feature of the display. Local dimming improves the black level and contrast of the display by adjusting the backlight to match the image, but is not ideal for all content.

## Wake Up From Sleep

Select Wake Up From Sleep from the Advanced Settings menu and press ◀ or ▶ to control this feature, which operates as follows:

- **VGA Only:** The display wakes up from power-saving mode when it receives an active video signal on its VGA (analog) input.
- **VGA, Digital, RS232:** The display wakes up when it receives an active signal from its VGA, HDMI, Display Port or DVI inputs, or receives a valid RS232 command.
- **Never Sleep:** The display never enters power-saving mode.

## Temperature & Fan Status

Select Temperature & Fan Status from the Advanced Settings menu and press ◀ or ▶ to display information about the health of the display: the internal operating temperature and the cooling fan speeds.

## Multi-Display Control

Select Multi-Display Control from the Advanced Settings menu and press ▶ to configure your video wall. This sub-menu provides the following controls:

- **Monitor ID:** This control lets you manually set the Monitor ID of each display in the video wall.

- **Power On Delay:** When powering on a video wall, this control staggers the power-on sequence so that all monitors will not turn on at once, reducing current requirements. Select a value of from 0 to 30 seconds (inclusive) per monitor.
- **DVI Indemnity:** For large matrixes using a single digital source and a DVI pass-thru cables, setting this to **On** may enhance the video quality and reliability of the pass-thru signals.
- **Video Wall:** Use this control to enable or disable video wall mode.

When video wall is set to **Yes**, these additional settings are available:

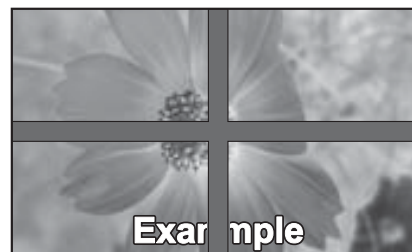
- **Frame:** This control enables or disables frame compensation, which joins the edges of adjacent displays in a video wall together in such a way as to compensate for the gap between them. This causes moving objects to appear to move “behind” the gap, for better continuity of motion across the wall:

**ON** hides joints between displays:



(suitable for moving image display)

**OFF** shows joints between displays:



(suitable for still image display)

- **Matrix X:** This control lets you specify the number of columns in the video wall.
- **Matrix Y:** This control lets you specify the number of rows in the video wall.
- **Division X:** This control lets you specify a display's horizontal position (column) in a video wall.
- **Division Y:** This control lets you specify a display's vertical position (row) in a video wall.
- **IR Mode:** Selects whether the remote control controls all displays in a video wall (**All**), none of the video displays in the video wall (**Off**), or one display at a time (**Target**).
- **Recipient ID:** Selects which display in a video wall is controlled by the remote control. This feature is only active when **IR Mode** is set to **Target**.

#### NOTICE

*To change a display's position in a video wall, first select that display's Monitor ID using the pull-down menu.*

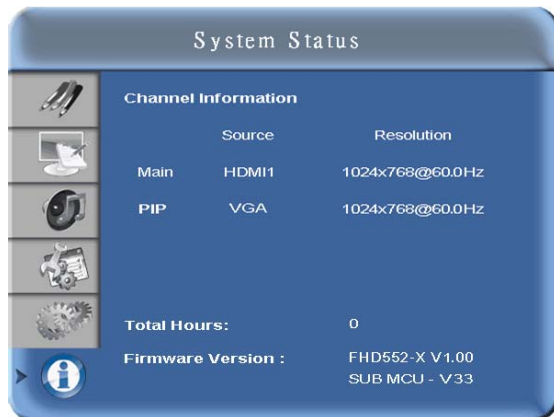
## Factory Reset

To reset ALL display settings (including image settings) back to their factory defaults, choose Factory Reset from the Advanced Settings menu.



This action is not reversible. Proceed with caution!

## System Status



The read-only System Status menu provides the following status information about the display:

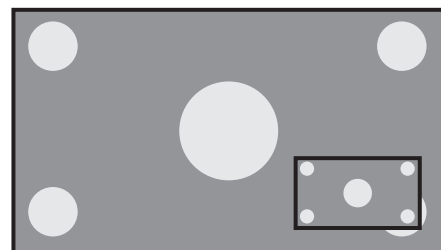
- The resolution and refresh rate of the Main and PIP sources;
- The number of hours the display has been in operation; and
- The currently-installed firmware version.

## Using the Picture-in-Picture (PIP)

To use PIP, press the **PIP** button.



The PIP window appears inside the main image window.



Press **PIP** again to turn PIP off.

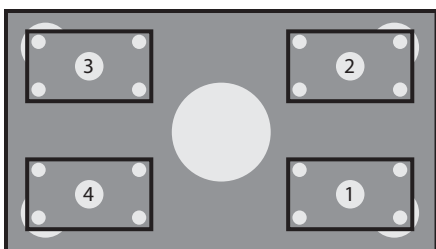
Press the P-Source button to select a PIP signal source. For each source, the table below shows which of the other sources are available as a PIP source.

Main Input Source									
		VGA	HDMI 1	HDMI 2	DVI	DisplayPort	Video	S-Video	Component
PIP Input Source	VGA	–	✓	✓	✓	✓	✓	✓	✓
	HDMI 1	✓	–	–	–	✓	✓	✓	✓
	HDMI 2	✓	–	–	–	✓	✓	✓	✓
	DVI	✓	–	–	–	✓	✓	✓	✓
	DisplayPort	✓	✓	✓	✓	–	✓	✓	✓
	Video	✓	✓	✓	✓	✓	–	–	✓
	S-Video	✓	✓	✓	✓	✓	–	–	✓
	Component	✓	✓	✓	✓	✓	✓	✓	–

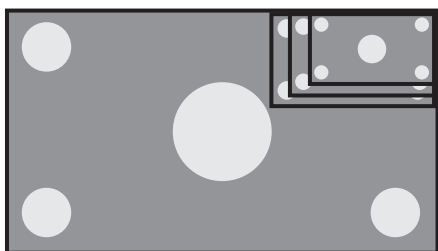
**Note:** "✓" means that source is available as a PIP source when that input is selected; "–" means that it is not.

## Changing the PIP Position

To change the PIP window position, press the P-POSITION button on the remote control repeatedly until the window is in the desired position.



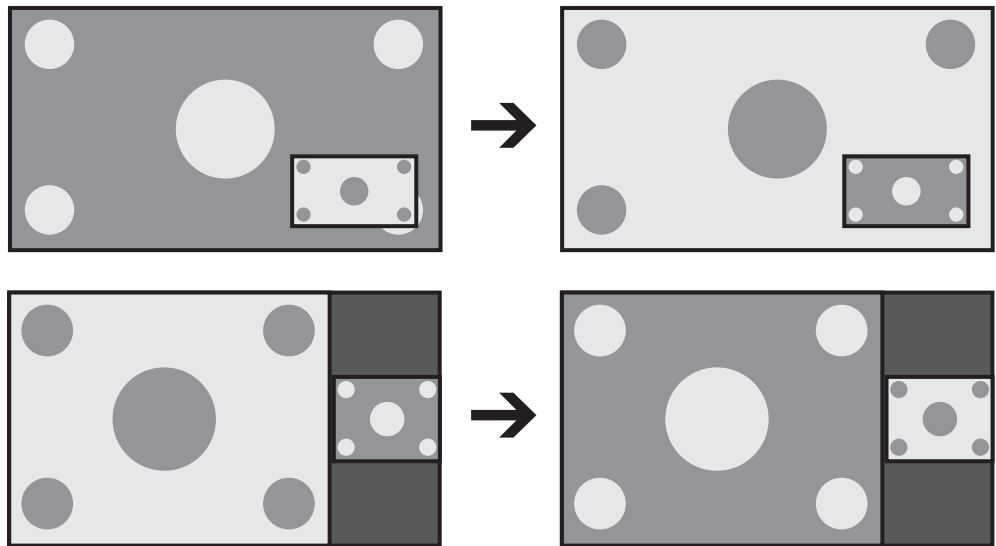
## Changing the PIP Size or Selecting Side-by-Side PIP Mode



Select PIP Mode from the Display Settings menu and press ◀ or ▶ to change the PIP window size or to enable "side-by-side" PIP.

## Swapping the Main and PIP Images

To swap the main and PIP images, press the SWAP button on the remote control.



# Maintenance and Troubleshooting

## Maintenance

The FHD651-P and FHD651-T LCD Panels does not require any routine maintenance. There are no user-serviceable or -replaceable parts. Unless you are a qualified, factory-trained technician, **do not attempt to repair or replace any system component yourself**. You will void the product warranty if you do so.

## Troubleshooting

The table below provides some general guidelines for troubleshooting problems you may encounter with your display. If the suggested solutions fail to resolve the problem or if you encounter an issue not described here, please contact your dealer.

Symptom	Possible Cause(s)	Solution
The display does not turn on.	<ul style="list-style-type: none"><li>• The display is not plugged in or the AC outlet is not active.</li><li>• The main power switch is off.</li><li>• The remote control batteries have run out.</li></ul>	<ul style="list-style-type: none"><li>• Ensure that the display is plugged in and that the AC outlet is active.</li><li>• Set the main power switch (see <a href="#">Display at a Glance</a> on page 15) to the on position.</li><li>• Replace the batteries.</li></ul>
The display is on and menus appear, but there is no picture.	<ul style="list-style-type: none"><li>• Incorrect source selection.</li><li>• Source component is not turned on.</li><li>• Source component is connected incorrectly or not at all.</li></ul>	<ul style="list-style-type: none"><li>• Select the correct source.</li><li>• Turn on the source component.</li><li>• Check connections from the source component to the display.</li></ul>
The remote control does not work.	<ul style="list-style-type: none"><li>• The remote control batteries have run out.</li><li>• The buttons are locked.</li><li>• IR extender is not connected.</li></ul>	<ul style="list-style-type: none"><li>• Replace the batteries.</li><li>• Unlock the buttons by pressing <b>ENTER, ENTER, EXIT, EXIT, ENTER</b> and <b>EXIT</b>, in sequence.</li><li>• Verify that the IR extender cable is correctly connected (see <a href="#">IR Extender Connection</a> on page 25).</li></ul>
Image geometry is incorrect.	<ul style="list-style-type: none"><li>• Incorrect aspect ratio selection.</li></ul>	<ul style="list-style-type: none"><li>• Select a different aspect ratio.</li></ul>



Symptom	Possible Cause(s)	Solution
The display is jittery or unstable.	<ul style="list-style-type: none"> <li>Poor-quality or improperly connected source.</li> <li>The horizontal or vertical scan frequency of the input signal may be out of range for the display.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure that the source is properly connected and of adequate quality for detection.</li> <li>Correct at the source.</li> </ul>
Image is too bright and/or lacks definition in the bright areas of the image.	<ul style="list-style-type: none"> <li>Contrast is set too high.</li> </ul>	<ul style="list-style-type: none"> <li>Decrease the contrast setting.</li> </ul>
Image appears “washed out” and/or dark areas appear too bright.	<ul style="list-style-type: none"> <li>Brightness is set too high.</li> </ul>	<ul style="list-style-type: none"> <li>Decrease the brightness setting.</li> </ul>
Image is too dark.	<ul style="list-style-type: none"> <li>Brightness and/or Backlight are set too low.</li> </ul>	<ul style="list-style-type: none"> <li>Increase the brightness and/or backlight settings.</li> </ul>
Images from an HDMI source do not display.	<ul style="list-style-type: none"> <li>The resolution and frequency of the video card in the computer are not compatible with the display.</li> <li>HDMI cable from source to display is either defective or too long.</li> </ul>	<ul style="list-style-type: none"> <li>Select a compatible resolution and vertical frequency (refer to <a href="#">Supported Timings</a> on page 66).</li> <li>Try a known-good and/or shorter HDMI cable.</li> </ul>
Computer images do not display correctly.	<ul style="list-style-type: none"> <li>The resolution and frequency of the video card in the computer are not compatible with the display.</li> <li>Clock and Phase settings need adjustment.</li> </ul>	<ul style="list-style-type: none"> <li>Select a compatible resolution and vertical frequency (refer to <a href="#">Supported Timings</a> on page 66).</li> <li>Adjust Clock and Phase settings (refer to <a href="#">Clocks (VGA sources)</a> on page 42 and <a href="#">Phase (VGA sources)</a> on page 42).</li> </ul>
Images from A Composite video source do not display.	<ul style="list-style-type: none"> <li>Both the Composite and S-Video inputs are connected to sources</li> </ul>	<ul style="list-style-type: none"> <li>Disconnect the S-Video source.</li> </ul>

# External Control

In addition to using the display keypad or remote control unit, you can control the display using a serial (RS232/RS485) link to send ASCII commands and receive responses to those commands.

You also use discrete infrared (IR) control codes to program a third-party remote control unit. For more information, refer to [Using Discrete IR Codes](#) on page 62.

## Serial Communications

The display uses a simple text-based control protocol to take requests from control devices and to provide responses to such devices. This section describes how to send control messages over a serial link between the display and an automation/control system or a PC running either of the following:

- A terminal emulation program such as Windows® HyperTerminal or TeraTerm; or
- The Video Wall Toolbox, a Windows application that provides a graphical user interface that mimics the remote control buttons, as well as the ability to send serial commands and receive responses to those commands.

## RS232 Connection and Port Configuration

Connect your control system or PC to the RS232 input of the display; refer to [Connecting a Control System or PC](#) on page 24.

Configure the RS232 controller or PC serial port as follows: no parity, 8 data bits, 1 stop bit and no flow control. Set the baud rate to 115200, to match that of the display RS232 port.

## Command and Response Format

Commands sent from an automation/control system or PC to the display must have this format:

[STX] [IDT] [TYPE] [CMD] ([VALUE] or [REPLY]) [ETX] [CR]

Where:

- [STX] indicates the start of the command data (always 07).
- [IDT] is the display ID Use hexadecimal values 01 to 19 inclusive to address a single display. Use 00 to broadcast a command to all panels in a video wall.
- [TYPE] is the command type:
  - 00 = return to host (response from the LCD panel)
  - 01 = read/action
  - 02 = write
- [VALUE] is the parameter setting for the command.

- [REPLY] is the parameter setting for the command, acknowledged by the display in its response to a command.
- [ETX] indicates the end of the command data (always 08).
- [CR] is the ASCII carriage return key (0x0D).

## Command and Response Examples

Here are some examples of serial commands and their responses:

Description	Command Sent to LCD Panel	Response Received from LCD Panel
Turn LCD panel power off.	07 01 02 50 4F 57 00 08	07 01 00 50 4F 57 00 08
Turn LCD panel power on.	07 01 02 50 4F 57 01 08	07 01 00 50 4F 57 01 08
Request LCD panel power status.	07 01 01 50 4F 57 08	07 01 00 50 4F 57 XX 08 (XX = 0 when off or 1 when on)
Set the LCD panel contrast to 30 (1E hex).	07 02 02 43 4F 4E 1E 08	07 02 00 43 4F 4E 1E 08
Request the LCD panel to use large PIP	07 19 02 50 53 43 03 08	07 19 00 50 53 43 03 08
Reset the LCD panel display settings.	07 02 02 41 4C 4C 00 08	07 02 00 41 4C 4C 00 08
Request LCD panel serial number.	07 01 01 53 45 52 08	07 01 00 53 45 52 S(0)...S(12) 08 S(0) ...S(12) = the serial number in ASCII
Request LCD panel firmware version.	07 01 01 47 56 45 08	07 01 00 47 56 45 S(0)...S(5) 08 S(0) ...S(5) = the firmware version in ASCII

## Serial Command List

Main Item	Control Item	CMD	Type	Value (DEC)	Reply (DEC)	Content	CMD (HEX)
Power Control and Input Source	Power Control	POW	W/R	00	00	Off (soft power) (For advanced A/D boards – optional)	50 4F 57
				01	01	On (soft power)	
	Input Source	MIN	W/R	00	00	VGA	4D 49 4E
				01	01	Digital DVI	
				02	02	S-Video	
				03	03	Composite Video	
				04	04	Component	
				09	09	HDMI 1	
				10	10	HDMI 2	
				13	13	DisplayPort	

Main Item	Control Item	CMD	Type	Value (DEC)	Reply (DEC)	Content	CMD (HEX)
Display Adjustment	Display Adjustment	BRI	W/R	0~100	Current value	Back Light Brightness	42 52 49
		BRL	W/R	0~100	Current value	Digital Brightness Level	42 52 4C
		BLC	W/R	00	00	Off (Back Light)	42 4C 43
				01	01	On (Back Light)	
		CON	W/R	0~100	Current value	Contrast	43 4F 4E
		HUE	W/R	0~100	Current value	Hue	48 55 45
		SAT	W/R	0~100	Current value	Saturation	53 41 54
		COT	W/R	00	00	User	43 4F 54
				01	01	6500K	
				02	02	9300K	
				06	06	5000K	
				07	07	7500K	
		GAC	W/R	00	00	Off (Gamma)	47 41 43
				01	01	2.2 (Gamma)	
		USR	W/R	0~255	Current value	Red Gain (128~383)	55 53 52
		USG	W/R	0~255	Current value	Green Gain (128~383)	55 53 47
		USB	W/R	0~255	Current value	Blue Gain (128~383)	55 53 42
		UOR	W/R	0~100	Current value	Red Offset (-50~50)	55 4F 52
		UOG	W/R	0~100	Current value	Green Offset (-50~50)	55 4F 47
		UOB	W/R	0~100	Current value	Blue Offset (-50~50)	55 4F 42
		PHA	W/R	0~63	Current value	Phase	50 48 41
		CLO	W/R	0~100	Current value	Clock	43 4C 4F
		HOR	R		Current value	Horizontal Position	48 4F 52
		VER	R		Current value	Vertical Position	56 45 52
		ADJ	W	00	00	Auto Adjust	41 44 4A

Main Item	Control Item	CMD	Type	Value (DEC)	Reply (DEC)	Content	CMD (HEX)
Display Adjustment (cont.)	Video Mode	SHA	W/R	0~24	Current value	Sharpness	53 48 41
Other Control	Pip Adjust	PSC	W/R	00	00	PIP OFF	50 53 43
				01	01	PIP Small	
				02	02	PIP Medium	
				03	03	PIP Large	
				04	04	PIP Side-by-Side	
	PIP Source Selection	PIN	W/R	00	00	VGA	50 49 4E
				01	01	Digital DVI	
				02	02	S-Video	
				03	03	Composite Video	
				04	04	Component	
				09	09	HDMI 1	
				10	10	HDMI 2	
				13	13	DisplayPort	
	PIP Position	PPO	W/R	00	00	PIP Position Bottom-Left	50 50 4F
				01	01	PIP Position Bottom-Right	
				02	02	PIP Position Top-Left	
				03	03	PIP Position Top-Right	
	PIP/Main Swap	SWA	W	00	00	Swap Main and PIP	53 57 41
	Scaling	ASP	W/R	00	00	Native	41 53 50
				01	01	Full Screen	
				02	02	Pillar Box	
				03	03	Letter Box	
		ZOM	W	00	00	Zoom In	5A 4F 4D
				01	01	Zoom Out	
	Baud Rate Adjustment	BRA	W/R	00	00	115200	42 52 41
				01	01	38400	
				02	02	19200	
				03	03	9600	

Main Item	Control Item	CMD	Type	Value (DEC)	Reply (DEC)	Content	CMD (HEX)
Other Control (Cont.)	Other Control	RCU	W	00	00	MENU Key	52 43 55
				01	01	INFO Key	
				02	02	UP Key	
				03	03	DOWN Key	
				04	04	LEFT Key	
				05	05	RIGHT Key	
				06	06	ENTER Key	
				07	07	EXIT Key	
				08	08	VGA Key	
				09	09	DVI Key	
				10	10	HDMI1 Key	
				11	11	HDMI2 Key	
				12	12	DISPLAYPORT Key	
				13	13	COMP Key	
				14	14	S-V Key	
				15	15	AV Key	
				18	18	SOURCE Key	
				19	19	P-SOURCE Key	
				20	20	PIP Key	
				21	21	P-POSITION Key	
				22	22	SWAP Key	
				23	23	SCALING Key	
				24	24	FREEZE Key	
				25	25	MUTE Key	
				26	26	BRIGHT Key	
				27	27	CONTRAST Key	
				28	28	AUTO Key	
				29	29	VOLUME+ Key	
				30	30	VOLUME- Key	

Main Item	Control Item	CMD	Type	Value (DEC)	Reply (DEC)	Content	CMD (HEX)
Other Control (Cont.)	Other Control	All	W	00	00	Reset All	41 4C 4C
		KLC	W/R	00	00	Un-Lock Keys	4B 4C 43
				01	01	Lock Keys	
		SER	R		13 bytes	Read Serial Number	53 45 52
		MNA	R		13 bytes	Read Model Name	4D 4E 41
		GVE	R		6 bytes	Read Firmware Version	47 56 45
		RTV	R		Current Value	Read RS232C Table Version	52 54 56
		RTT	R		Current Value	Read the temperature of the internal thermal sensor	52 54 54
		RSF	W	0~255	00	Read speed of fan 0 (RPM)	
				0~255	01	Read speed from fan 1 (RPM)	
		WFS	W/R	00	00	Wake Up from Sleep = VGA Only	57 46 53
				01	01	Wake Up from Sleep = VGA, Digital, RS232	
				02	02	Wake Up from Sleep = Never Sleep	
	Audio	VOL	W/R	0~100	Current Value	Volume	56 4F 4C
		MUT	W/R	00	00	Mute Off	4D 55 54
				01	01	Mute On	
	Scheme Selection	SCM	W/R	00	00	User	53 43 4D
				01	01	Sport	
				02	02	Game	
				03	03	Cinema	
				04	04	Vivid	



## Using Video Wall Toolbox

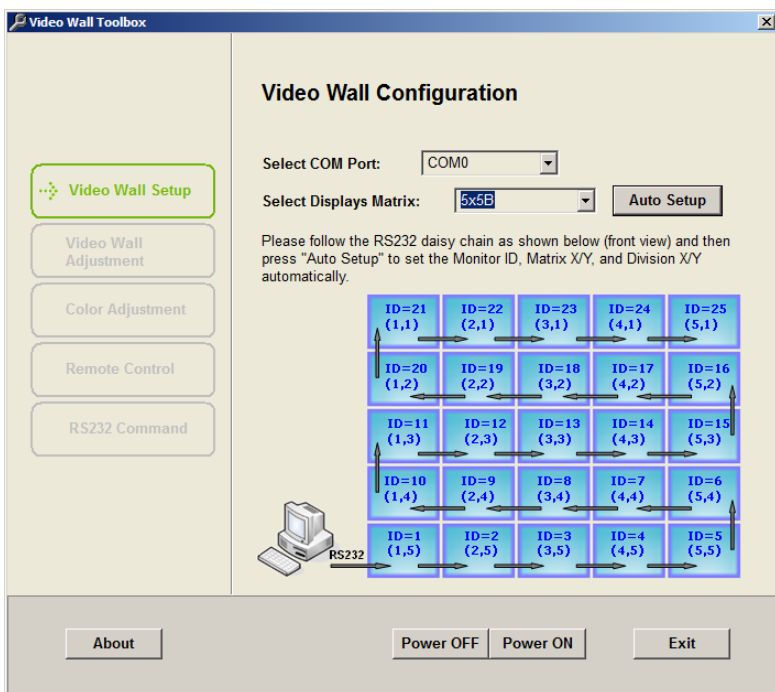
The Video Wall Toolbox software (included with the display) simplifies setting up a video wall using a PC running Windows XP, Vista or 7. It can also be used to configure and control a single display.

Video Wall Toolbox provides an alternative to using the remote control unit or built-in keypad to control the display, presenting all of the controls in the OSD menus within an attractive, intuitive graphical user interface.

### Installation and Initial Setup

To use the Video Wall Toolbox, proceed as follows:

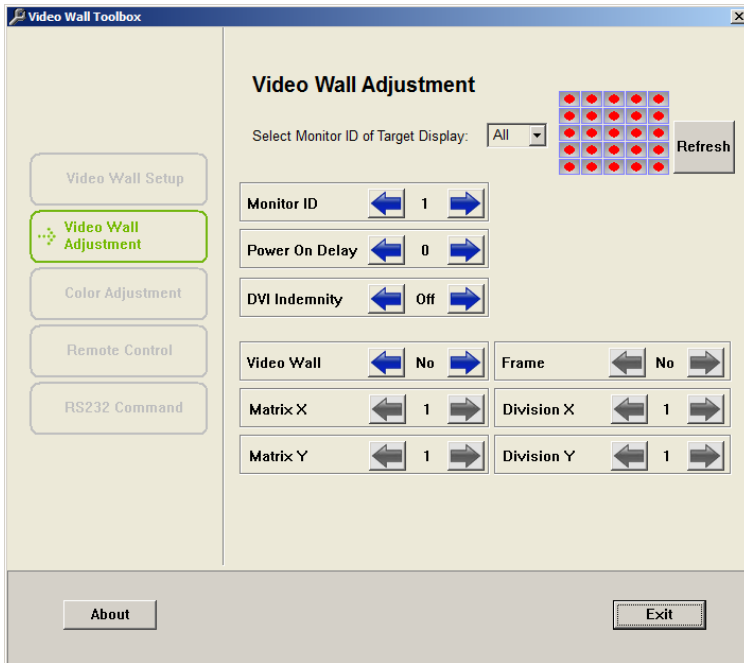
1. Install the software on a Windows PC using the CD provided.
2. Connect the PC to the video wall as described in the section [RS232 Routing](#) on page 29.
3. Ensure the baud rate of the PC RS232 connection matches the baud rate of the monitor. The default baud rate is 115200.
4. Launch the Video Wall Toolbox software to display the Video Wall Configuration screen, shown below.



5. Select the COM port you are using to connect to the video wall from the **SELECT COM Port:** pull-down menu.
6. Select your video wall size from the **Select Displays Matrix:** pull-down menu.
7. Press Auto Setup and the Video Wall Toolbox software automatically assigns the proper Monitor IDs to all displays in the video wall.

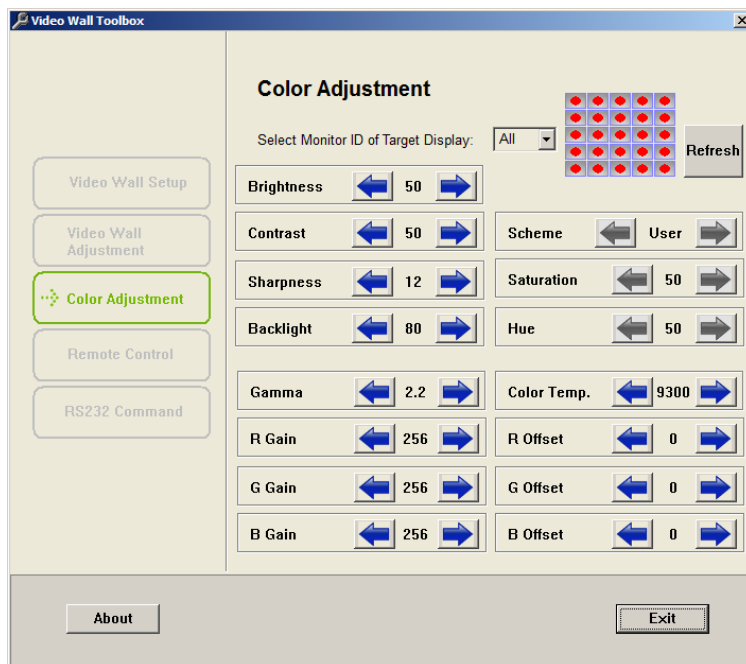
## Video Wall Adjust Screen

The Video Wall Adjust screen, shown below, provides the same controls as the Multi-Display Control OSD menu (refer to [Multi-Display Control](#) on page 43).



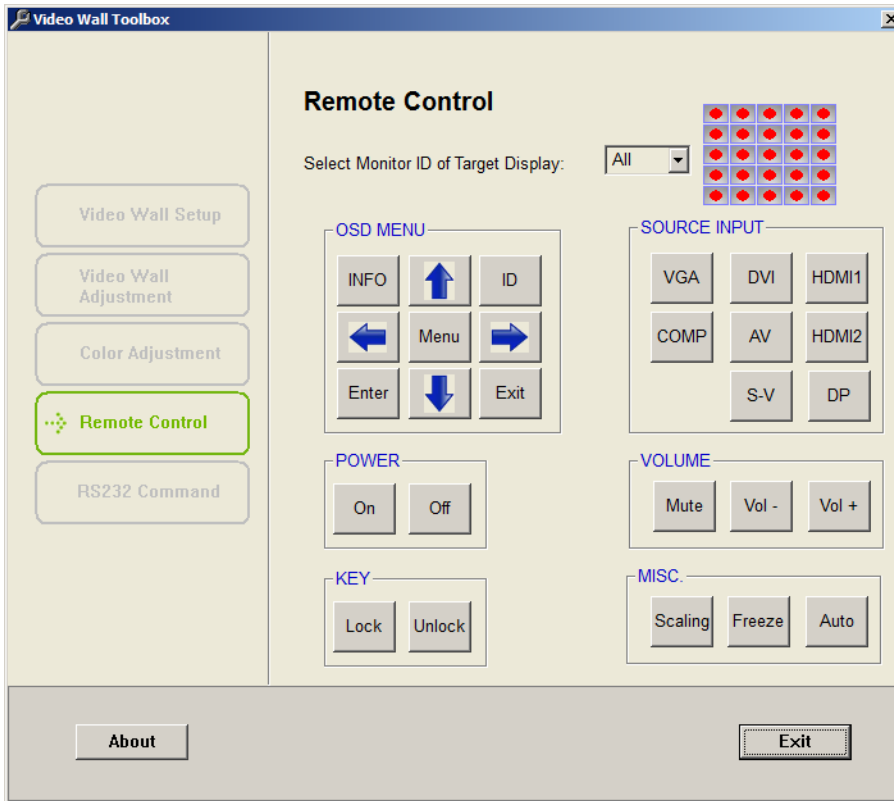
## Color Adjustment Screen

The Color Adjustment screen, shown below, provides the same image quality controls as the Image Settings OSD menus (refer to [Image Settings](#) on page 33).



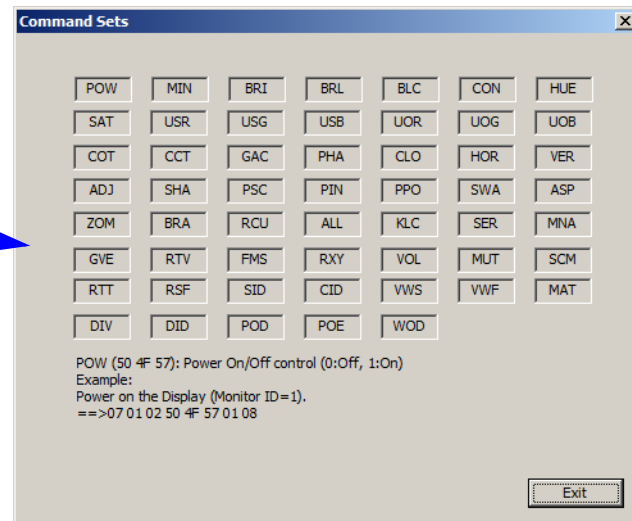
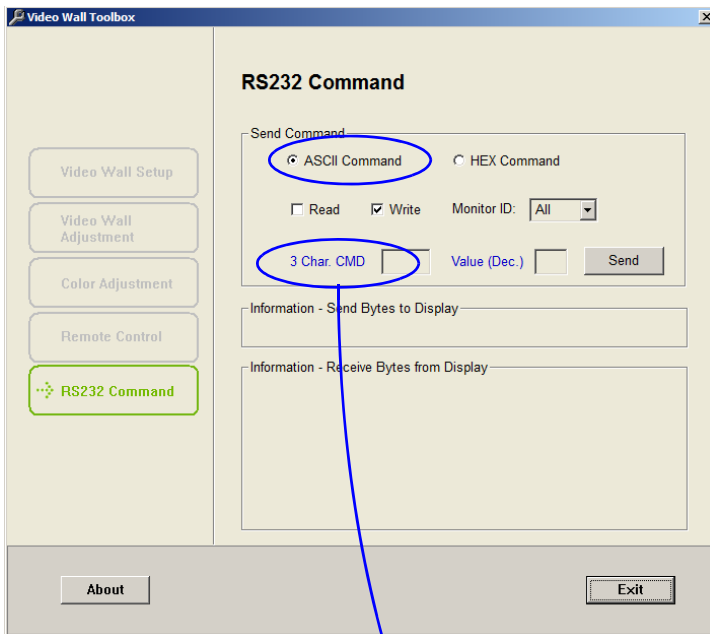
## Remote Control Screen

The Remote Control Screen, shown below, provides the same functionality as the hand-held remote control unit.



## RS232 Command Screen

The RS232 Command screen, shown below, enables you to manually enter supported RS232 commands in either ASCII or hexadecimal format (Refer to [Serial Command List](#) on page 52 for all supported commands).



To send a command in ASCII format:

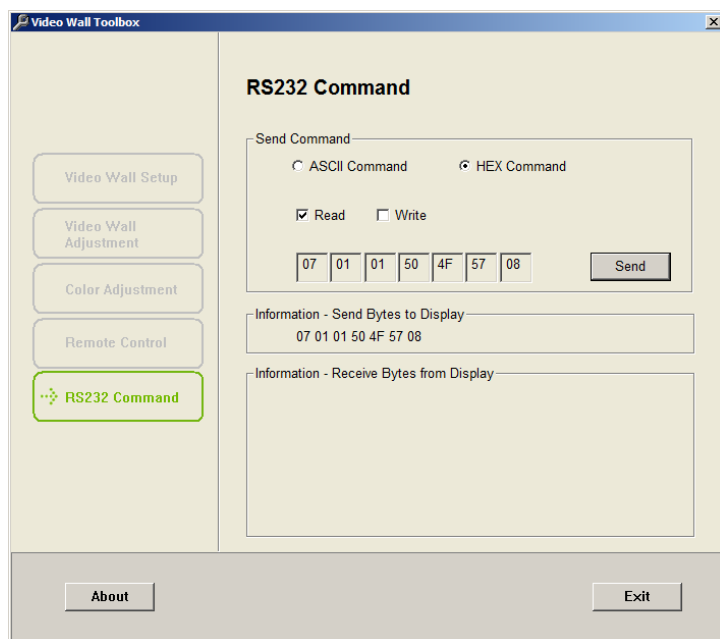
1. Click the **ASCII Command** radio button.
2. Check **Read** or **Write** to select that command type.
3. Use the **Monitor ID**: pull-down menu to select the command destination.

- Click the text box labeled **3 Char. CMD** and enter a valid three-character command from those in the [Serial Command List](#) on page 52.

–OR–

Click **3 Char. CMD** to display the command selection window. When you move the mouse pointer over a command, a brief description of the command and an example (in hexadecimal format) appear at the bottom of the window. Click on a command to select it.

- For Write commands, click the text box labeled **Value (Dec.)** and enter a decimal parameter value to send with the command. Or, click **Value (Dec.)** to change the parameter entry mode to **Value (Hex)** and enter a hexadecimal value.
- Click **Send**. If the command executes successfully, the sent command and the response from the target display appear in the window.



To send a command in hexadecimal format:

- Click the **HEX command** radio button.
- Check **Read** or **Write** to select that command type.
- Click the left-most text box and enter 07.
- Enter the Monitor ID in the second text box.
- Enter 01(read) or 02(write) in the third text box.
- Enter the command in the next three text boxes.
- For Write commands, enter a parameter value to send with the command.
- Enter 08 in the right-most text box.
- Click **Send**. If the command executes successfully, the sent command and the response from the target display appear in the window.

## Using Discrete IR Codes

The display accepts commands in the form of infrared (IR) signals that conform to the NEC protocol. Each display remote control button has an IR control code associated with it.

You can use these codes to program a third-party, “universal” remote control unit to work with the display. These third-party products usually come with a computer software application for this purpose. For more information, consult the documentation provided with the remote control unit.

## IR Command Protocol

The IR control codes have the following characteristics:

- Each code consists of the following:
  - A leader pulse (a modulated pulse of 9 ms followed by a non-modulated pulse of 4.5 ms);
  - 16 address bits (also called a “custom code”): eight (8) bits for the address followed by the logical inverse of the address. The custom code for the display is 16559 decimal (0x40AF, binary 01000000 10101111).
  - 16 data bits: eight (8) bits for the command followed by the logical inverse of the command; and
  - An end pulse (a modulated pulse of 0.56 ms, similar to the modulated pulse in the ‘0’ and ‘1’ bits). The end of the modulated pulse constitutes the end of the data transmission.
- The carrier frequency is 38 kHz, with the modulated pulses having a 33% duty cycle.
- Commands are sent at a maximum rate of 9 Hz.

For example, here is the NEC control code for the **POWER** button on the display remote control unit:

Hex	40	AF	1C	E3
Binary	01000000	10101111	00011100	11100011
Function	Cust. Code Byte 1	Cust. Code Byte 2	Command	Command (Logical Inverse)

## IR Control Code List

Customer Code	Data Code	Function
40AF	04FB	INFO
40AF	1CE3	POWER
40AF	07F8	VGA
40AF	08F7	DVI
40AF	09F6	HDMI 1
40AF	0AF5	COMP
40AF	0BF4	AV
40AF	0CF3	HDMI 2
40AF	1AE5	PIP POSITION
40AF	15EA	DISPLAY PORT
40AF	11EE	PIP
40AF	0DF2	S-V
40AF	06F9	SWAP
40AF	13EC	PIP SOURCE
40AF	0EF1	MENU
40AF	12ED	ENTER
40AF	05FA	EXIT
40AF	14EB	SCALING
40AF	43BC	FREEZE
40AF	00FF	MUTE
40AF	17E8	BRIGHTNESS
40AF	18E7 s	CONTRAST
40AF	1EE1	AUTO
40AF	0FF0	SOURCE
40AF	1BE4	VOLUME -
40AF	1DE2	VOLUME +

# Specifications

## Display Specifications

LCD PANEL	
Brightness	500 cd/m <sup>2</sup>
Contrast Ratio	1400:1
Viewing Angle	H:178° / V:178°
Response Time	12 ms (GTG)
Supported Colors	1.07 billion colors
Display Resolution	1920 x 1080 (16:9)
Display Frame Rate	60 Hz
SIGNAL COMPATIBILITY / CONNECTIVITY	
Horizontal / Vertical Frequency	31 ~ 91 KHz / 56 ~ 85 Hz
Input Resolution	1920 x 1080 @ 60 Hz (Analog); 1920 x 1080 @ 60 Hz (Digital)
Connectors	DisplayPort / HDMI x 2 / DVI-D (In/Out) / VGA (In/Out) / PC Audio In / IR Extender / Audio Out / Component / S-Video / Composite
Communication Ports	RS232C In, RS485 In/Out
MECHANICAL	
Dimensions	See <a href="#">Overall Dimensions</a> on page 68.
Weight	Net: 33.2 kg / 75 lbs; Gross: 44 kg / 99 lbs
Wall Mount	600mm x 400mm VESA
OSD FUNCTIONS	
Control	RS232C, Built-in Keypad, IR Remote Controller
Language	English, 简体中文 (Simplified Chinese), Français, Deutsch, Italiano, Português, Русский (Russian), Español, 한국어 (Korean) or 日本語 (Japanese)
Picture Options	PIP, PBP (Side-by-Side, Zoom)
Source Auto Detect	Yes
Key Lock	Yes
ELECTRICAL	
Power Supply	AC 100V ~ 240V (50/60 Hz), 3.0 Amps, maximum
Power Consumption (normal operation)	170 W (typical), 213 W (max)
Power Consumption (standby mode)	0.5 W
ENVIRONMENTAL	



Operating Temperature	0°C ~ 40°C, 85% RH
Storage Temperature	-20°C ~ 60°C, 85% RH
<b>SOFTWARE</b>	
Video Wall Toolbox	Requires Windows operating system
<b>DIMENSIONS</b>	
Bezel Width	2.25 mm / 0.14 inch (Top/Left) 1.15 mm / 0.08 inch (Bottom/Right)
Image to Image	3.8 mm (typical)
<b>Specifications are subject to change without notice.</b>	

## Supported Timings

Timing		fH (kHz)	fV (Hz)	Dot clock (MHz)	HDMI	PC	Component	S-Video	Composite	DVI	DisplayPort
VESA	VGA 640x480	31.469	59.94	25.175	O O	O ●	-	-	O	O ●	O
		37.861	72.809	31.5	O	O	-	-	O	O	O
		37.5	75	31.5	O	O	-	-	O	O	O
		43.269	85.008	36	O	O	-	-	O	O	O
	SVGA 800x600	35.156	56.25	36	O	O	-	-	O	O	O
		37.879	60.317	40	O	O ●	-	-	O	O ●	O
		48.077	72.188	50	O	O	-	-	O	O	O
		46.875	75	49.5	O	O	-	-	O	O	O
		53.674	85.06	56.25	O	O	-	-	O	O	O
	XGA 1024x768	48.363	60.004	65	O	O ●	-	-	O	O ●	O
		56.476	70.069	75	O	O	-	-	O	O	O
		60.023	75.029	78.75	O	O	-	-	O	O	O
		68.677	84.997	94.5	O	O	-	-	O	O	O
	WXGA1360x768	47.712	60.015	85.5	O	O ●	-	-	O	O ●	O
	1280 x 720	44.444	59.98	64	O	O ●	-	-	O	O ●	O
		44.772	59.86	74.5	O	O ●	-	-	O	O ●	O
		56.456	74.78	95.75	O	O	-	-	O	O	O
	1280 x 768	47.776	59.87	79.5	O	O ●	-	-	O	O ●	O
		47.396	59.995	68.25	O	O ●	-	-	O	O ●	O
		68.633	84.837	117.5	O	O	-	-	O	O	O
	1280 x 800	49.306	59.91	71	O	O ●	-	-	O	O ●	O
		49.702	59.81	83	O	O ●	-	-	O	O ●	O
	SXGA	1152x864	67.5	75	O	O	-	-	O	O	O
			63.981	60.02	O	O	-	-	O	O	O
		1280x1024	79.976	75.025	O	O	-	-	O	O	O
			91.146	85.024	O	O	-	-	O	O	O

O = Compliant timing. ● = Compliant timing for video wall.

480i means supported 480i@60Hz (YPbPr). 576i means supported 576i@50Hz (YPbPr).

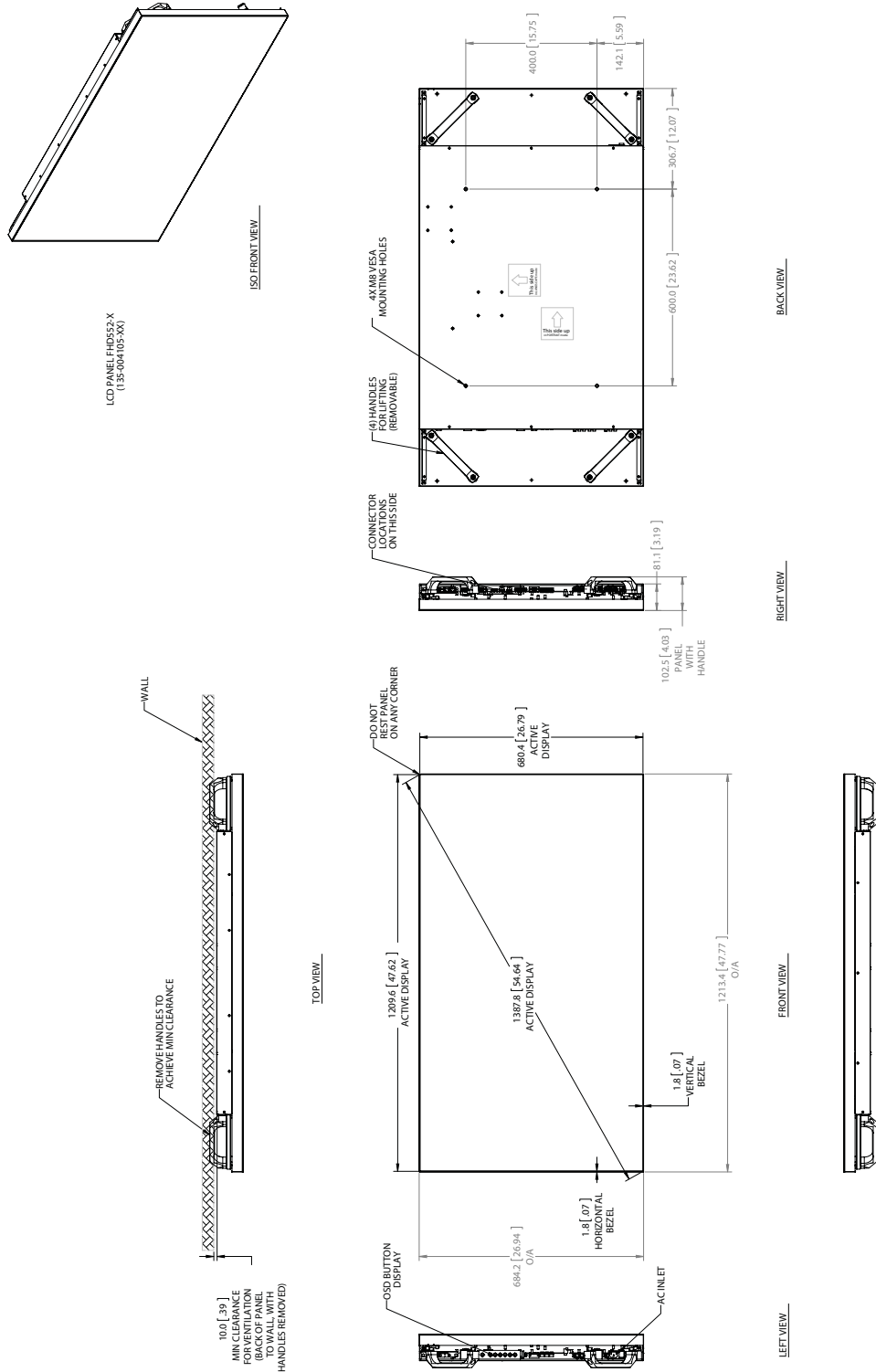
Timing			fH (kHz)	fV (Hz)	Dot clock (MHz)	HDMI	PC	Component	S-Video	Composite	DVI	DisplayPort
VESA (cont.)	SXGA+ 1400 x 1050		64.744	59.95	101	O	O	-	-	-	O	O
			65.317	59.98	121.75	O	O	-	-	-	O	O
	1440 x 900		55.469	59.901	88.75	O	O	-	-	-	O	O
			55.935	59.88	106.5	O	O	-	-	-	O	O
	WSXGA+ 1680 x 1050		64.674	59.883	119	O	O ●	-	-	-	O ●	O
			65.29	59.954	146.25	O	O ●	-	-	-	O ●	O
	UXGA 1600 x 1200		75	60	162	O	O ●	-	-	-	O ●	O
	1920 x 1080		66.587	59.93	138.5	O	O ●	-	-	-	O ●	O
SDTV	NTSC		15.734	29.97	13.5	-	-	480i	O	O	-	-
	PAL		15.625	25	13.5	-	-	576i	O	O	-	-
EDTV	480p		31.5	60	27.03	O	-	O		-	O ●	O
	576p		31.25	50	27	O	-	O		-	O ●	O
HDTV	720p 1280x720		37.5	50	74.25	O	-	O		-	O ●	O
			44.995	59.94	74.176	O	-	O		-	O ●	O
			45	60	74.25	O	-	O		-	O ●	O
	1080i 1920x1080		28.13	50	74.25	O	-	O		-	O	O
			33.716	59.94	74.176	O	-	O		-	O ●	O
			33.75	60	74.25	O	-	O		-	O ●	O
	1080p 1920x1080		27	24	74.25	O	-	-		-	-	O
			28.125	25	74.25	-	-	-		-	-	-
			33.716	29	74.18	-	-	-		-	-	-
			33.75	30	74.25	-	-	-		-	-	-
			56.25	50	148.5	O	-	O		-	O ●	O
			67.433	59.94	148.352	O	-	O		-	O ●	O
			67.5	60	148.5	O	-	O		-	O ●	O

O = Compliant timing. ● = Compliant timing for video wall.

480i means supported 480i@60Hz (YPbPr). 576i means supported 576i@50Hz (YPbPr).

# Overall Dimensions

All dimensions are in millimeters [inches].





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