CHRISTIE

WhitePaper

LED VIDEO WALLS 101:

YOUR GUIDE TO A BRILLIANT LED DISPLAY SOLUTION

Whether you need to entertain or share information, LED video walls are a perfect choice. But before you invest, you likely have questions: How do they work? What are the key strengths and advantages of LED technology? What do I need to consider while planning an LED video wall?

Let's dive into all these questions and more.

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Christie® Core Series III LED

Available in a range of pixel pitches, Core Series III delivers the performance and reliability you expect with even better value.

The science behind LED technology

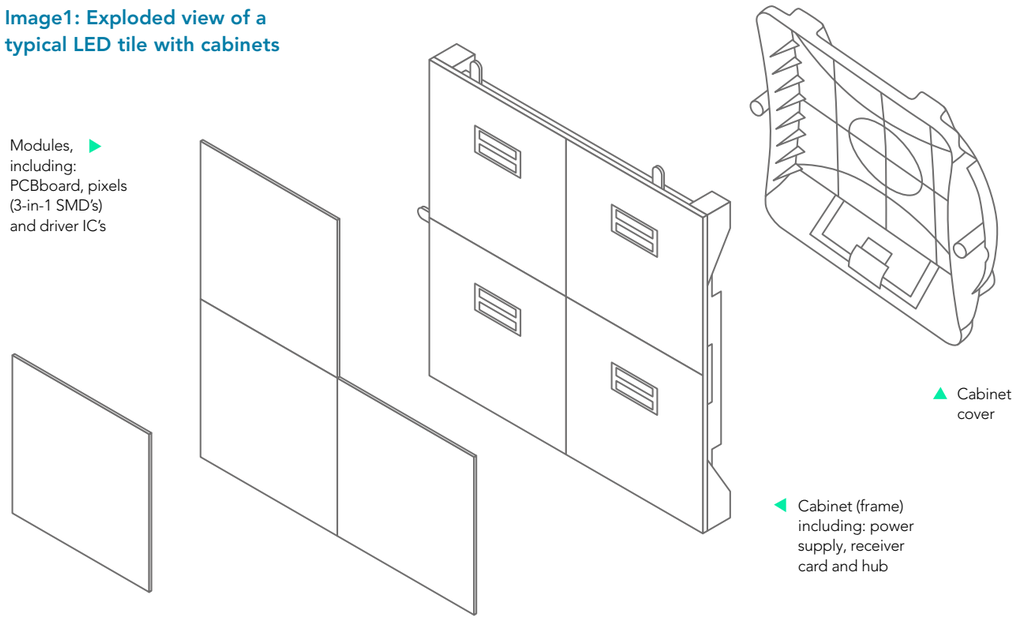
What is LED?
An LED (light emitting diode) produces light when electricity passes through a small chip, making it a bright, efficient, and reliable way to illuminate. The science behind that chip is happening all around us as a source of lighting used in everything from the phones we carry to large-scale billboards in cities. It's also happening behind LED video walls in control rooms, corporate lobbies, retail spaces, and so much more.

How do LED video walls work?
LED video walls use individual standard LEDs in three colors for each pixel: red, green, and blue. The LEDs can be combined into a surface mount device (SMD). Each color of LED, also known as a sub-pixel, receives its own drive signal based on video content that allows millions of colors to be generated.

A modular difference
LED video walls use modular panels or tiles to create a large display area. Each tile is composed of a series of identical LED modules containing circuit boards that are electrically connected to ensure each pixel receives its intended and unique RGB drive signals and the power from the tile's power supply.

The modular design makes servicing LED video walls easier. If an LED fails, you only need to replace the module with the faulty LED instead of the entire wall. These modules are typically housed in a cabinet that contains the power supply and the electronics that control each module and allow a connection for a video signal (see image 1). Some tile designs place the power supply and control electronics in a separate enclosure that attaches to a frame holding the LED modules. There are also products with processing functions outside the cabinets.

Image1: Exploded view of a typical LED tile with cabinets



High-performance LED on an impressive scale

Using Christie® LED video wall solutions, Interactive Corp in New York City created a 120' video wall that nearly spans an entire city block.

Read the story

IAC lobby, NYC, U.S.

Christie LED video wall solution with Spyder X80 image processor

A clear advantage:
What makes LED a brilliant choice

The advantages of LED video walls are clear, especially when you want to create a great viewing experience. Let's look at how and why LED stands out from the crowd.

Brightness
LED displays offer a range of brightness levels that other display options can't, ranging from less than 2,000 nits (cd/m2) to as high as 12,000 nits. This ability to achieve high brightness levels is a benefit for both outdoor LED displays as well as indoor environments with high ambient light, such as lobbies or atriums.

When it comes to large-scale applications, other technologies either can't compete or require more complex systems, like a multi-projector setup, to achieve brightness levels that rival LED video walls.

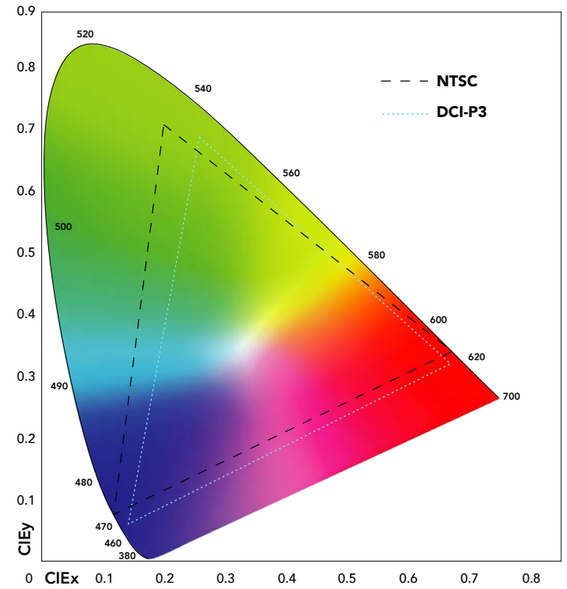
Ambient light
Another strength of LED video walls is the ability to stand out in high levels of ambient light. It's not just their high brightness but their high contrast ratios that make LED video walls well-suited for ambient light. LED video walls deliver outstanding perceived levels of black that result in a high-contrast image, even in elevated levels of indoor ambient light.

Color reproduction
LED video walls offer a broader color gamut with more vibrant, superior clarity and lifelike colors, making them ideal for applications requiring high color accuracy. To understand why, we need to look at two key industry standards for color reproduction: **DCI-P3** and **NTSC** (see image 2).

DCI-P3 is used primarily in critical viewing conditions like control rooms, while **NTSC**, a standard in broadcast television, provides excellent color consistency and is widely used for LED displays found in corporate lobbies and digital signage applications.

Longer life
The lifetime of a display's light source is often defined by the number of hours it takes to reach half of the initial brightness. LED video walls can operate for up to 100,000 hours before they reach half-brightness, which is when they're typically replaced. So, if an LED video wall is

Image 2: Comparison of LED color gamut with standard HG gamut



operated 24/7 for an entire year, you could expect a lifespan of over 11 years from your video wall. Since most LED video walls operate at far less capacity, the long life of the LED pixels results in a longer life for your investment.

Energy efficiency
All displays consume power and require cooling, but not all display technologies are created equally when it comes to efficiency. With flip-chip technology, LED video walls consume energy more efficiently, sometimes as much as 200% or more efficient than other display technologies. This energy efficiency translates into less heat and less audible noise from the cooling required to dissipate the heat.

Seamless images
The perceptually seamless nature of images is one of the stand-out benefits of LED video walls. Tiles in an LED display wall are designed to touch each other without increasing the distance between the pixels from one tile to the next. The area surrounding the LEDs in a typical tile makes it difficult to see where they join from an average viewing distance.

Factors to consider before installing an LED video wall

When it comes to creating an LED video wall, there are several key factors to keep in mind as you plan your installation.

Space
The space for your planned LED video wall may be the most important consideration when it comes to installation. You'll notice it factors into almost every other consideration we'll look at.

As you get started with your installation, you'll want to carefully consider your space and check the dimensions and placement of your planned video wall for optimal viewing. To do this, you need to consider the different viewing angles throughout your space to ensure everyone can see the video wall clearly.

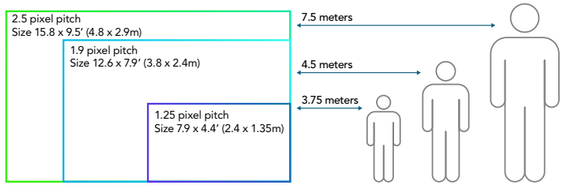
Some LED video wall solutions, like Christie MicroTiles®, can be arranged in near limitless ways, including 90-degree inside or outside corners, concave or convex curves, and even 3D shapes, offering you more possibilities for your application.

Structure
It may seem obvious, but it's worth noting that you need to consider the size and weight of the LED video wall you plan to install and ensure the wall or surface can support it.

Pixel pitch
There is a wide range of pixel pitches to choose from, but the right choice is the one that fits your application and the viewing distance from your planned video wall. A smaller pixel pitch offers higher resolution and superior clarity for applications like control rooms, but this pixel pitch isn't necessary for long-distance viewing in a corporate lobby.

Viewing distance
There are no hard and fast rules for the optimal viewing distances for different pixel pitches. By choosing the right pixel pitch for your display, you can achieve the maximum impact for your audience. For example, when it's difficult to see individual pixels from the typical viewing distance and intended resolution, your video wall still fills the viewer's field of vision with brilliant light, color, and contrast.

Image: Your audience's viewing distance can determine the pixel pitch and display size. For example, the display size needed to achieve HD (1920 x 1080) pixel resolution varies for each of these pixel pitches.
(estimate to be used as a guideline only)



Suggested optimal viewing distances for LED video walls

LED display pixel pitch (mm)	Pixel pitch x viewing distance*	Optimal viewing distance
0.8mm	0.8mm x 3m	2.4m (7.87')
1.0mm	1.0mm x 3m	3m (9.84')
1.25mm	1.25mm x 3m	3.75m (12.3')
1.5mm	1.5mm x 3m	4.5m (14.76')
1.9mm	1.9mm x 3m	5.7m (18.7')
2.5mm	2.5mm x 3m	7.5m (24.6')

*Calculating optimal viewing distance should be done in meters rather than feet. The formula for viewing distance is an estimate to be used as a guideline only.

Power and connectivity
Ensure the installation has adequate power supply and proper cable management for video input, power, and control connections.

Brightness and environment
The environment — whether indoors or outdoors — needs to be factored into your installation so you can adjust brightness levels to ensure clear visibility without glare, calibrate colors, and ensure precise alignment of panels for seamless visuals and uniform brightness across the entire display.

Cooling, ventilation, and maintenance
Proper cooling and ventilation are essential to prevent overheating, especially in larger installations.

Depending on your application, you may want to plan for easy front access to the modules for repairs and servicing to reduce downtime since you won't need to dismantle the entire structure.

A complete AV solution: Content and control management

Of course, there's more to an LED video wall than just tiles. A video wall is part of a complete AV solution consisting of content and control management systems working behind the scenes, like the brain of your LED video walls.

Content management systems handle the delivery, scheduling, and display of media across the wall, while control systems ensure video processing, scaling, and signal distribution are managed efficiently. The combination of technology required for your video wall is designed based on what your application calls for.

Christie® offers a range of hardware and software solutions that can help you create a complete LED video wall solution.

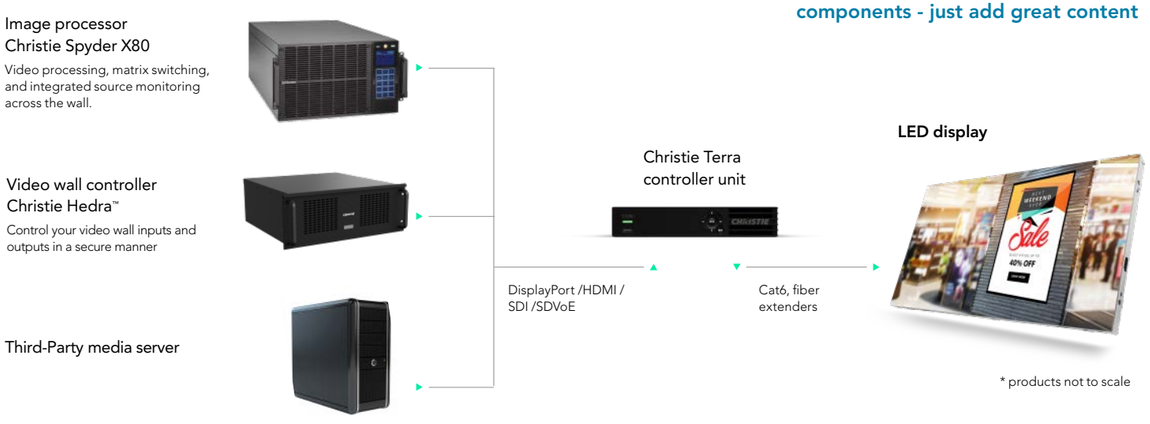
Spyder X80 is a powerful multi-window processor that delivers up to 80 million pixels to your video wall, enabling dynamic and flexible content management across large LED video walls with no latency. It lets you manage multiple content sources and layers across displays, allowing you to control complex visuals with ease and precision.

Hedra™ is designed for streamlined control and collaboration in video walls, offering multi-windowing capabilities and easy content management. With Hedra, users can manage multiple inputs and display configurations, making it ideal for dynamic environments like control rooms and corporate spaces.

Terra® provides an advanced AV-over-IP solution, securely delivering uncompressed, zero-latency 4K content across the video wall. It simplifies signal distribution and control, integrating seamlessly with video walls for high-quality content streaming and precise control over multiple displays.

The smart tech behind LED video wall solutions

Image 3: LED video wall solution components - just add great content



* products not to scale

Christie
MicroTiles LED

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Core Series III LED

A brilliant solution

Compared to other image-display technologies, LED video walls are a brilliant solution that stands out as an option for your project.

With LED technology, you get brightness, color, service life, energy efficiency, and form factor that you won't find elsewhere. You also get a technology that's uniquely adaptable to a wide variety of applications, giving you more options when it comes to size, shape, and viewing distance.

Think LED. Think Christie.

Christie MicroTiles LED: Stunning visuals and limitless design freedom
Unleash your creativity and design outside the box with Christie MicroTiles® LED. The proprietary cabinet-free Click-n-Go™ LED tiles can be seamlessly arranged in near-limitless ways. The award-winning MicroTiles LED features advanced LED display technology and powerful processing and control capabilities to produce an extraordinary, blur-free viewing experience.

Core Series III LED: Solid performance meets excellent value
Christie® Core Series III LED delivers the performance and reliability you expect with brilliant visuals and even better value, including lower power consumption. Core Series III video walls are ideal for any size installation where price is a factor, such as corporate lobbies, meeting rooms, and digital signage applications.

Want to know how LED technology can work for you?

We're here to help!

At Christie, we have everything you need to build dynamic and engaging video walls, including LED video walls to fit your application and budget, content management solutions, and fully customizable services and support from Professional Services.

We know there's a lot to consider, but it doesn't have to be overwhelming. Get in touch with us today, and we'll connect you with a Christie LED video wall expert.

Contact us

Learn more about our end-to-end video wall solutions: christiedigital.com/videowalls

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