

A photograph of a modern office hallway with a high ceiling, recessed lighting, and large windows. The image is overlaid with a semi-transparent dark layer. In the foreground, several white silhouettes of people are walking through the hallway. On the left wall, there are several colorful, abstract art pieces. A sign on the left wall reads 'LG OLED TV'.

# LCD, Direct View LED, and OLED Explained



# TABLE OF CONTENTS

---

<b>Introduction</b> .....	<b>3</b>
<b>LCD Displays</b> .....	<b>4-5</b>
Explained.....	4
Placement Considerations.....	5
<b>Direct View LED Displays</b> .....	<b>6-7</b>
Explained.....	6
Placement Considerations.....	7
<b>OLED Displays</b> .....	<b>8-9</b>
Explained.....	8
Placement Considerations.....	9
<b>What to Look For</b> .....	<b>10</b>
<b>Conclusion</b> .....	<b>10</b>



## INTRODUCTION

---

Businesses of all kinds face strong competition, making it even more important for them to communicate their value proposition clearly and effectively. Product and service offers need to get noticed, and brand equity must continually be reinforced to maintain customer loyalty. The ability to stand out and get noticed is made even more challenging as digital devices deliver constant streams of communication, competing for our attention.

Savvy retailers are always looking for new opportunities to differentiate themselves from their competitors; to stand out, to delight, and create excitement. Other businesses strive for better ways to inform, educate, and provide new conveniences. And because each environment is unique, the solution must possess great flexibility.

Digital signage can be a strong differentiator. There are a variety of choices in digital displays, including advanced OLED displays that produce stunning images and offer new, exciting installation options.

This eBook will help you make a more informed decision on digital displays for your business. It will explain the differences between LCD/LED, Direct View LED and OLED displays, as well as highlight placement considerations in which digital displays can be employed by a variety of businesses to grab attention, deliver the right message, and stand out from the competition.

# LCD DISPLAYS

---

LCD (Liquid Crystal Display) displays offer bright, high-resolution images. When they were introduced, they forever changed the look, feel, and placement options previously afforded by their CRT predecessors. Their advanced technology, thin design, and lightweight made LCD displays perfect solutions for businesses looking to get their messages seen and remembered.

LCD displays require a light source to illuminate the pixels. First generation LCD displays used CCFL (Cold Cathode Fluorescent Lamps) to handle this task. CCFL backlights did a fine job of illuminating the display, but exhibited a few drawbacks. Their physical size limited the minimum depth of the overall panel; they required higher power, and had a limited life expectancy.

LEDs solved the challenges associated with CCFL. Using a LED (Light Emitting Diode) light source to illuminate the pixels, the overall panel could be thinner, while using less power. LEDs also have a much longer life expectancy. (Note: While commonly referred to as LED displays, they are actually LCD displays that use an LED light source.) Edge-Lit LED displays place the LED light source at the outer edges of the panel, and are available in many different options to suit a wide variety of installations.

Backlit-LED displays place the LED light source directly behind the pixels, rather than at the edges. This design characteristic provides more uniform illumination across the entire panel, delivering images with higher contrast and better color reproduction. Another exciting benefit of Backlit-LED is the ability to make a display with a dramatic reduction in the width of the bezel. This feature makes these displays a great choice if you're looking to put together multiple LCD displays to create a video wall, as their super narrow bezels virtually disappear, revealing nearly seamless images.

Edge-Lit and Backlit-LED displays come in many different sizes, including stretched displays with extreme aspect ratios of 58:9. Select models can be mounted in portrait or landscape mode, for even greater installation flexibility. Outdoor displays offer higher brightness levels and are built to withstand the elements, such as heat, cold, and moisture, as well as the demands of 24/7 usage.



Advanced touch-screen models invite personal interaction, and are perfect for interactive communication environments, such as classrooms, conference rooms, museums, shopping malls, and information desks.

LCD displays are available in Full-HD (1080p) or Ultra-HD (4k) resolution. While Full-HD (1080p) resolution displays provide crisp, sharp images, Ultra-HD (4K) designs, with 4X the amount of pixels, deliver images with amazing detail, insuring that every element on the screen pops. Brand logos and product attributes will stand out with engaging detail. Ultra-HD displays also make it possible for customers to be closer to a big screen without noticing any of the pixels that make up the image. For example, viewers would need to be a minimum of thirteen feet away from a 98-inch Full HD 1080p display before the pixels would disappear. But with a 98-inch 4K display they could be as close as seven feet. Ultra-HD displays allow you to have a much larger display, even a video wall, in a smaller space without sacrificing the visual experience.



## LCD DISPLAY PLACEMENT CONSIDERATIONS

**Retailers, Fast Casual and Quick Service Restaurants,** can employ LCD displays in a variety of ways. Starting outside of the store, digital displays designed for outdoor use can replace outdated manual reader boards, providing bright, crisp messaging that grabs attention. Once inside, digital displays can be used to highlight specific products, services, offers, or act as menu boards.

Software solutions make it easy to program customized messaging that can also be changed on the spot, allowing retailers to post a promotion real-time, based on inventory levels or customer traffic.

To really grab attention and get noticed, multiple displays in Ultra HD can be configured to create an impressive video wall that dazzles with larger than life images. Backlit-LED displays are perfect for video walls, as their ultra thin bezel design (as little as 1.8mm thin) allows the screens to blend in near seamless fashion.

From conference centers to classrooms, **Corporations and Schools** can employ touch LCD displays to support presenters with bright, sharp video playback, and allow them to interact with the content displayed. **Banks** can use digital displays to highlight services provided and loan offers. During busy times, strategically placed displays can entertain, inform, and relax customers while they wait to complete their transactions.

**Nightclubs and Performance Venues** employ video walls to create exciting stage backgrounds with more pizzazz, for a night to be remembered. To inform local citizens about upcoming meetings and events, **Municipal Offices** will benefit from the brightness and high-resolution images that can be achieved by an LCD display designed for outdoor use.

# DIRECT VIEW LED DISPLAYS

Direct View LED displays eliminate the LCD panel and use a surface array of LEDs as the actual display pixels. These displays feature incredible contrast ratios, vibrant colors, and brightness levels several times that of LCD displays. Direct View LED displays can also be made in virtually any size, including very large sizes of 100 feet or more, making them the perfect choice for outdoor spaces, such as sports arenas.

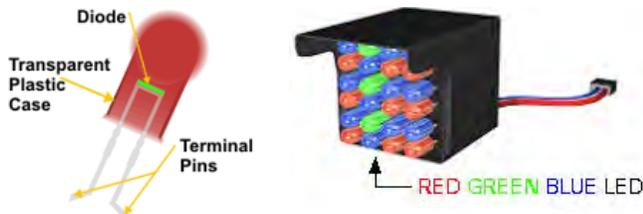
While LCD flat panels are available in resolutions of 1080P and 4K UHD, Direct View LED displays are measured by pixel pitch, which describes how close the LED pixels are to each other. The smaller the pitch, the closer viewers can get to the display before they see the pixels themselves. Outdoor configurations may have a

pitch of 10MM to 40MM, depending upon the viewing distance requirements. For use indoors, where viewers would be closer to the display, a pitch of 10MM or less would be required. When considering Direct View LED displays, it is important to know the minimum viewing distance required. Multiplying the pixel pitch by 1000 gives you a good rule of thumb for the minimum viewing distance.

Direct View LED displays are extremely bright, ranging from 4000 to 10000 nits. In comparison, LCD displays designed for indoor use can range from 300 nits to 700 nits, while models intended for outdoor use have a brightness of 2500 nits.

## Two Types of Direct View LEDs

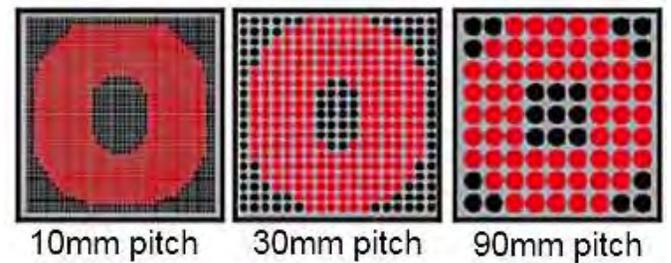
### Discrete (Oval Lamp)



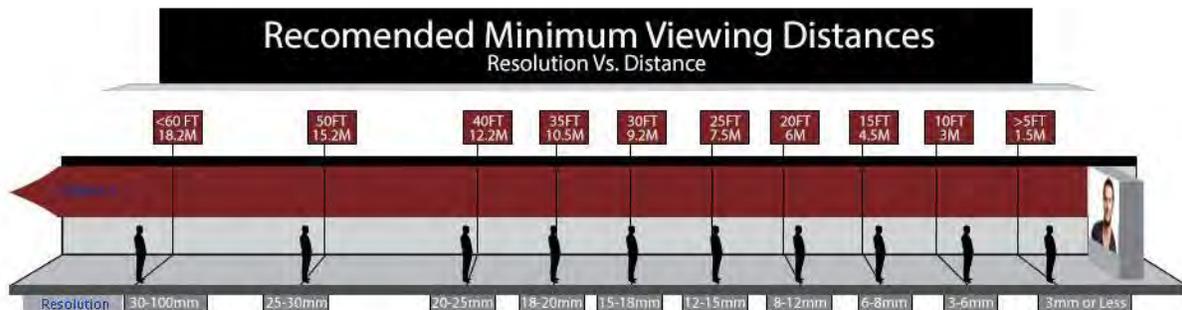
### SMD



## Depiction of Pixel Pitch



## Recommended Viewing Distances





## DIRECT VIEW LED DISPLAY PLACEMENT CONSIDERATIONS

---

While more expensive than LCD, if you're looking for a huge outdoor display with extreme brightness levels, Direct View LED displays are the perfect option. **Sports Arenas** can take full advantage of Direct View LED displays, which can be made in very large sizes of 100 feet or more. Their extreme brightness allows box scores, replays, and promotional messaging to be seen in dazzling color, even in very bright sunlight. **Cityscapes**, like Times Square in New York, are perfect locations for Direct View LED displays, which can show live news or other broadcasts, run ticker information, or display promotions for local area businesses.

Seamless video walls can be created, thanks to the bezel-free design of Direct View LED displays. The ability to produce breathtaking, large images is limited only by your imagination.

**Theaters and Performance Centers** can employ Direct View LED displays to create eye-catching marquees. Inside, they can be used to provide bright, stage backdrops - especially exciting for concerts. Large indoor spaces, such as **Airports, Malls, and Convention Centers**, can employ Direct View LED displays to create breathtaking visual landscapes that entertain, as well as inform viewers.

Smaller Direct View LED displays can be used as outdoor signs by a variety of businesses, such as **Retailers** and **Quick Service Restaurants**, looking to promote their products and services 24/7.

# OLED DISPLAYS

OLED displays incorporate the most advanced display technologies, and yield an unprecedented combination of picture quality and installation flexibility. OLED (Organic Light-Emitting Diode) displays eliminate the need for separate backlight, as each pixel emits its own light, resulting in a more exacting control of brightness down to the pixel-level.

OLED displays yield accurate, perfect color and perfect black images, with infinite contrast. They also provide superior viewing angles, up to an amazing 178°, a big advantage in larger environments. Fast action scenes are crisp, clear, and free from blur, thanks to very fast response times.

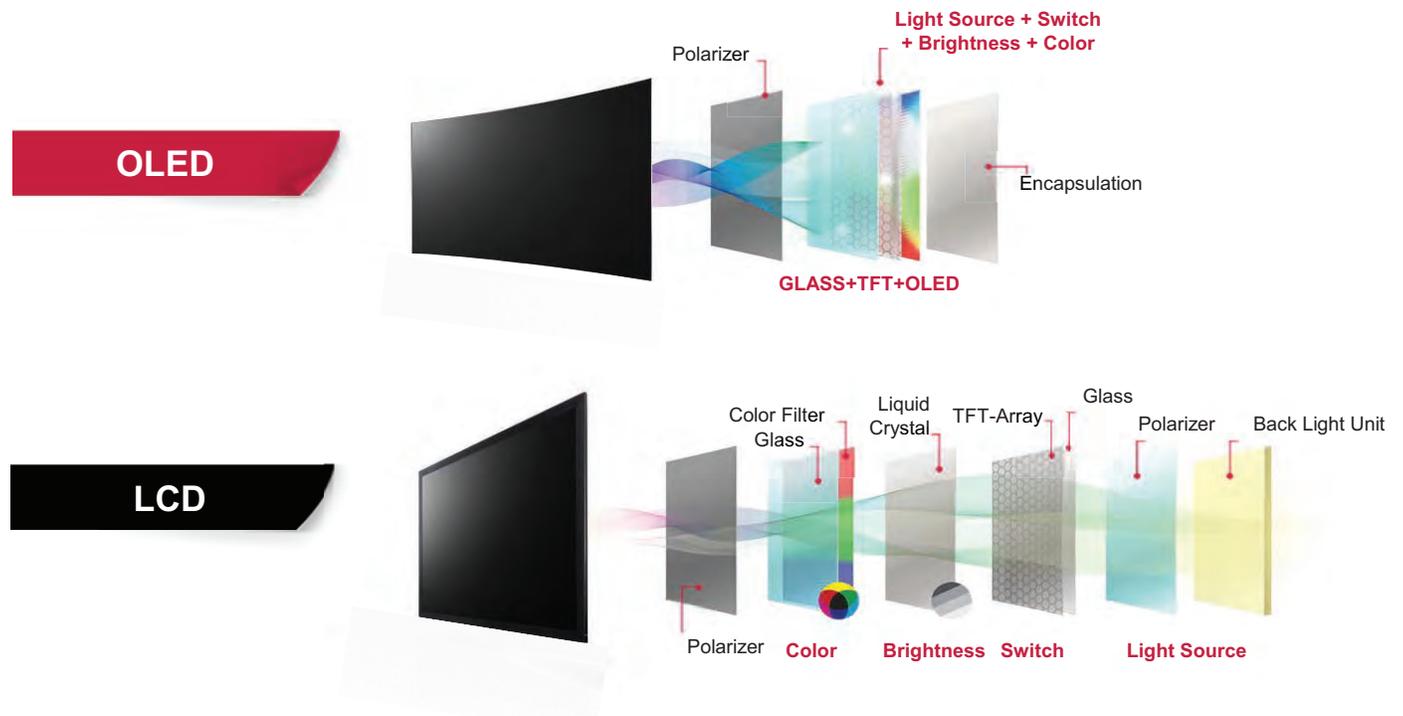
OLED displays are exciting, and their amazing versatility is quickly changing the perception of ways digital signage can be employed, providing absolute freedom from having to mount them on a wall. Their sleek, pencil-thin design allows them to be curved, concave or convex, to create a display array that can also serve as a primary architectural design element within the space itself.

Dual View OLED displays open up new opportunities in placement. The images can be the same (mirrored), or they can be swapped, moving from the front screen to the back screen. And their “off-the-wall” capability allows them to be mounted on floor stands, or from ceilings and walls. Dual View OLED displays can also be curved to create compelling partitions that can move viewers through an area while they enjoy breathtaking video.

Open-Framed OLED displays can be curved to seamlessly integrate into any environment. These Flat, pencil-thin designs provide a wealth of installation options; whether they’re mounted on free-standing floor stands, or hanging from ceilings, they become an eye-catching focal point that draws viewers and gets the message across.

OLED displays are available in Full-HD (1080p) or Ultra-HD (4k) resolution. No matter how they’re employed, OLED displays can become an integrated element of the space itself, inviting interaction like never before.

## OLED Structure





## OLED DISPLAY PLACEMENT CONSIDERATIONS

OLED Displays are perfect for **Premium** or **Specialty Retailers**, such as jewelry stores and fashion boutiques, looking to set themselves apart from the competition by creating exciting visual presentations that literally bring their products, services, and their brand to life. Blending harmoniously with the showroom and the merchandise, customers can completely immerse themselves in an experience like no other, especially key when competing against on-line retailers. Store Designers will begin to incorporate OLED displays into retail spaces in a variety of ways, including curved walls that delineate key areas, or even use them on easels, where they provide stunning images and, when paired with a camera, switch to become



a mirror. All of this adds up to a store that customers will want to shop in often, and talk about to their friends, generating strong loyalty, more sales and increased profits.

**Transportation Ports**, such as airports or cruise ship terminals, can take full advantage of Dual-View OLED displays that can deliver important messages to travellers, whether they are coming or going. They can also be employed in waiting areas, entertaining those waiting to begin their journey. Curved, Frameless OLED displays can be hung from the ceiling, completely changing the look and feel of a crowded terminal. As people move, they can feel more relaxed, as beautiful scenes are displayed overhead.

**Luxury Hotels** can set themselves apart with premium suites that have OLED displays for unparalleled viewing pleasure, while complementing the room's interior design. Public areas can be greatly enhanced with OLED displays that entertain, educate, and welcome engagement. They can set a mood, define a space, or be employed as way-finding signs. **Extended Care Facilities** and **Hospitals** can also employ OLED displays in a similar fashion to inform, entertain, and provide a relaxing environment.

**Museums** can bring exhibits to life with breathtaking, accurate images revealed by OLED displays. Dual-View displays can assist in wayfinding; Frameless displays can be hung from the ceiling to reveal the stars in the sky; and freestanding floor displays can be incorporated into exhibits to provide the audience with a wealth of information.

The benefits and versatility of OLED displays add a "wow-factor" to any environment, where stunning images and complete installation flexibility are required.

## WHAT TO LOOK FOR

---

It's important to choose commercial-grade displays, which are more durable, built to withstand high user rates, and provide the installation options to suit every business environment. Consumer-grade digital displays are not built to withstand the demands of commercial environments, and are not intended to be used 24/7. Their shorter life spans mean they are more likely to require replacement sooner, costing more in the long run. They also have limited warranties, which are actually void in a commercial environment.

True commercial displays have much longer warranty periods, backed by a process that is tailored to the differences of business implementation. In addition, for those environments that require it, Extended and White Glove warranty upgrades are available.

Another factor to consider is picture quality, which can make or break a digital signage campaign. Commercial-grade displays offer a much wider array of brightness and color options, allowing compatibility with the wide array of hardware systems companies use to project content.

Direct View LED displays should be certified to perform in harsh environments, where dust and moisture are a concern. They should provide easy management and be backed by a solid network of support.

OLED displays reveal the blackest blacks with vibrant and accurate color reproduction. They are available in sleek, pencil-thin, open-framed designs that can also be curved, convex or concave. Dual-view OLED displays show images on the front and back panels. The images can be the same, or they can be swapped. If you're considering an OLED display, make sure that it's a true OLED screen. A world leader in displays, LG's OLED display was awarded "Best in Show" for digital signage at InfoComm, 2016.

## CONCLUSION

---

The effective use of digital displays can create differentiation, from businesses looking to better engage their customers in an exciting, more memorable fashion, to companies that want to enhance presentations or provide valuable information in an efficient, attention-grabbing manner. The displays can be easily programmed with customized messaging and updated real-time, which allows retailers to maximize sales based on inventory levels or traffic patterns. This real-time capability also makes it easy to provide the most up-to-date information for installations like municipal offices and schools.

LCD Displays come in a variety of sizes and usage options, in Full-HD or Ultra-HD, insuring that there is an option for every installation. Advanced OLED Displays blend art and technology, reproducing stunning images that blend harmoniously with their environment. If you require a huge display with extreme brightness, especially in outdoor environments, Direct View LED displays are a perfect choice.

The net result is that virtually any company can employ digital displays to increase customer engagement and satisfaction levels, provide meaningful information, and increase efficiencies in supply chain allowing a company to manage inventory and promotions more effectively.

To learn more about LG's small format displays, [click here](#) or **contact us** today.

All images on screen are simulated. Design, specifications, and features subject to change without notice. This promotion is subject to change without notice. LG has the right to terminate this promotion at any time.

© Copyright 2016 LG Electronics USA, Inc. All rights Reserved. LG Life's Good is a registered trademark of LG Corp. All other product and brand names are trademarks or registered trademarks of their respective companies.