

To begin... What does LED stand for?

L. E. D. stands for Light-Emitting Diode. An LED is not a light bulb, but an efficient, effective, ultra bright alternative that doesn't burn out.

What is Pixel Pitch?

Pixel pitch is the distance between each pixel on your sign. One pixel is a cluster of two, three or four LEDs. The closer the pixels, the crisper and more life-like your image will be because there are more points of light used to portray your wording or image. For example, on a 16mm pitch LED Display each pixel is spaced 16mm apart. A 10mm display has spacing between pixels at 10mm. So a Display that is 48" high by 96" wide will contain:

- 16 mm Pixel Pitch = 72 pixels in height and 144 pixels in width = 10,368 total pixels
- 12 mm Pixel Pitch = 96 pixels in height and 192 pixels in width = 18,432 total pixels

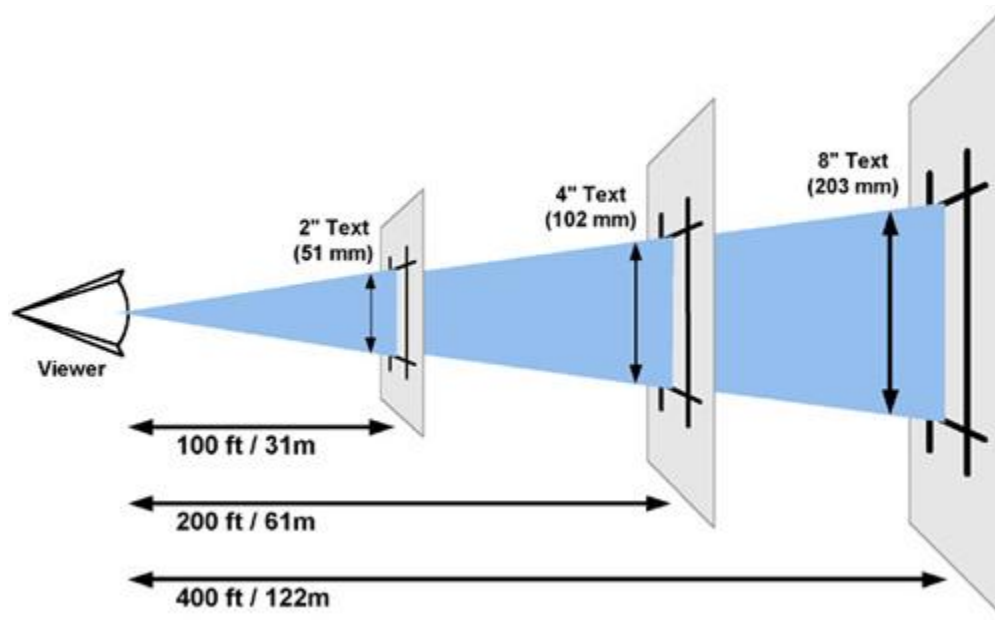
So, even though the overall sizes of the 2 displays in the example are the same, the 12 mm display has more pixels and will show more detail.

Viewing Distance and Time

PITCH	VIEWING DISTANCE	ACTIVE DISPLAY AREA
8.5mm	> = 15 ft. / 4.5 meters	3 ft. x 4 ft.
10mm	> = 25 ft. / 8 meters	3 ft. x 5 ft.
12.5mm	> = 33 ft. / 10 meters	3 ft. x 6 ft.
16mm	> = 45 ft. / 13.7 meters	3 ft. x 6 ft.
20mm	> = 55 ft. / 16.5 meters	4 ft. x 8 ft.
23mm	> = 75 ft. / 22.9 meters	4 ft. x 8 ft.
25mm	> = 100 ft. / 30.5 meters	5 ft. x 9 ft.
34mm	> = 150 ft. / 45.75 meters	6 ft. x 10 ft.

Viewing distance is one of the most important factors needed to determine the correct size of most electronic signs.

As a general rule: **1 Inch of text is viewable up to 50 feet away**¹ or **25mm of text is viewable up to 15m away**. The following diagram illustrates at what distance and character size that a stationary audience will recognize and understand the content of an electronic sign.



However, if the target audience is moving, then another factor, time, is required. An average of **at least three to four seconds** is required for a moving audience to adequately recognize and comprehend six to eight grouping of content on an electronic sign². The following chart lists the maximum time an audience will have to view an electronic sign with specific characters size. For example, an audience will have three seconds or less to view electronic signs with four inches of text. If the electronic signs have too much content, than the reader will not have sufficient time to comprehend the entire content.

As a summary:

- 2 inch text works well in most foot traffic areas, such as for indoor applications.
- 4 to 6 inch text is ideal for 45mph or under traffic, such as outdoor church and school applications.
- 8 inch text or larger works is suited for most outdoor applications where traffic is 60mph or slower.

Character Size		Max. Viewing Distance		Max. Viewing Time (seconds) ³				
Inch	mm	foot	meter	25mph / 40kph	35mph / 56kph	45mph / 72kph	55mph / 89kph	65mph / 104kph
2	51	100	31	2.7	1.9	1.5	1.2	1.0
4	102	200	61	5.5	3.9	3.0	2.5	2.1
5	127	250	76	6.8	4.9	3.8	3.1	2.6
6	152	300	91	8.2	5.8	4.5	3.7	3.1
8	203	400	122	10.9	7.8	6.1	5.0	4.2
9	229	450	137	12.3	8.8	6.8	5.6	4.7
10	254	500	152	13.6	9.7	7.6	6.2	5.2
12	305	600	183	16.4	11.7	9.1	7.4	6.3
16	406	800	244	21.8	15.6	12.1	9.9	8.4
20	508	1,000	305	27.3	19.5	15.2	12.4	10.5
24	610	1,200	366	32.7	23.4	18.2	14.9	12.6
36	914	1,800	549	49.1	35.1	27.3	22.3	18.9
48	1,200	2,400	732	65.5	46.8	36.4	29.8	25.2
60	1,542	3,000	914	81.8	58.4	45.5	37.2	31.5

Note:

1. LEDs emit light allowing the content to be visible further away than the same content on standard reflective surfaces.
2. Other factors, such as content size, traffic, distractions, weather, lighting conditions, etc. will affect the time required.
3. The values listed in the chart does not take into consideration the minimum required visibility distance (MRVD).
4. The information provided should not be taken as the definitive source on electronic sign visibility and viewing distance.

Viewing Angle

Viewing Angle is the angle at which the LEDs brightness is halved. An LED is at full brightness when you look at it straight on or dead center. If that level of brightness is halved by moving 35° from dead center, the viewing angle is considered to be double that number, or 70°. Reading angle is the angle at which people can adequately read your LED message, and, while typically greater than the viewing angle, it varies depending on lighting circumstances and a sign's environment.

Color vs. Monochrome

Single Color LED signs have long set the standard for effective LED signage and are a proven way to get results. They're particularly effective if you have a text-driven message you'd like to customize from time to time.

But if you have a product you'd like to show in all its splendor, or if you'd like to play snippets of videos or animation and take advantage of other advertising tactics previously only available on TV and the Internet, you might want to consider a **full color LED sign**.

TECHNICAL VOCABULARY WORDS

Display Matrix or Array – The display area of a programmable display is composed of rows and columns of **"pixels"**. The term pixel is short for "Picture Element". Turning on or activating specific patterns of pixels within the display matrix forms the characters and graphics of a message.

Full Matrix Display – A display in which the full display area is populated with LEDs. A full matrix display allows character size changes and use of graphics.

Character Matrix – A display in which only predetermined character areas are populated with LEDs. Character matrix displays can produce only the preset character height and are unsuitable for graphics.

Line Matrix – A display in which only predetermined line/row areas are populated with LEDs. Line matrix Displays are most often used for displaying text information in rows.

LED (Light Emitting Diode) – An LED is a tiny chip of silicon made to produce light in a variety of colors including red, green, orange, yellow, and blue.

LED and Display Colors – Bi-color LEDs are made in one of the following combinations; red and yellow, red and green, or orange and green. Discrete single color LEDs are enhanced by manufacturing the LED in a colored lens capsule. Most indoor programmable LED displays today use either all red LEDs or they use red and green bi-color LEDs. To a lesser extent, all amber is sometimes selected.

Numbers of Pixels – LED displays are described by the number of rows by the number of columns. Example a 32 x 128 display has 4096 pixels.

Types of Pixels – The pixel can be one or more LEDs. A discrete LED is one individual diode. LED blocks and clusters are multiple LEDs installed as a single unit.

Pixel Light Sources – LEDs are significantly less expensive than incandescent lamps. LEDs are also less expensive than monitors over a life of 10 years. LEDs have an expected life of · 100,000 hours of being lit, or from 11 to more than 20 years under normal operation. The longer life dramatically lowers maintenance expense compared to monitors or lamps. LEDs need very little power and generate less heat than other light sources. Less power and heat mean lower operating and maintenance costs. LEDs are small and lightweight. This lowers the cost of the enclosure and installation.

Discrete LEDs – Individual LEDs are inserted one at a time into a circuit board. The anode and cathode lead wires are then individually soldered to the circuit board. A pixel may be composed of either one LED or of several LEDs installed close together. LEDs grouped together appear as a single pixel when all the LEDs in the group are lighted at the same time. A group of LEDs in a single pixel may contain more than one color LED. Turning on the appropriate combination of LEDs in the pixel produces the various colors.