

LED Technical Overview

What is an LED?

A light-emitting diode (LED) is a semiconductor device that emits visible light when current passes through it.

Most LED display systems are either monochrome (red or amber LEDs) or full color (a combination of red, blue, and green LEDs).



Light-emitting diode (LED)

What are the benefits of LEDs?

- Long life — 100,000 hours
- Low power consumption — drastically reduces energy cost
- Small in size — can produce a higher resolution
- Immediate light — LEDs can instantly reach 100% of their light output
- Auto-dimming — LED light output can be automatically dimmed based on ambient light
- Safe — compared to incandescent bulbs, LEDs generate virtually no heat
- Durability — LEDs are vibration- and shock-resistant, as there are no filaments to break

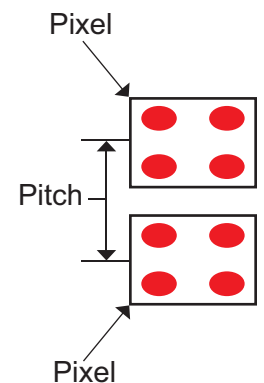
What is a pixel?

A pixel is the smallest individual component of an image, graphic, or display. A pixel on an LED display system can be composed of one or more LEDs. For example, the MARK IV 30 mm module utilizes four red or amber LEDs per pixel.

What is pixel pitch?

Pixel pitch is defined as the distance between pixels and is usually defined in terms of millimeters. The smaller the distance between pixels, the higher the resolution and the sharper the image. The smaller (or tighter) the pitch, the sharper the image.

MARK IV's 30 mm module has a distance of 30 mm from the center of one pixel to the center of the next pixel in both horizontal and vertical directions.



What is resolution?

Resolution is the overall number of pixels in a display, usually defined in terms of vertical and horizontal components. The higher the resolution, the better the picture quality. Each 30 mm module has a resolution or pixel matrix of 16 pixels by 16 pixels. However, to get a higher resolution to display graphics, 2 modules by 5 modules are needed, which produces a resolution of 32 pixels by 80 pixels.

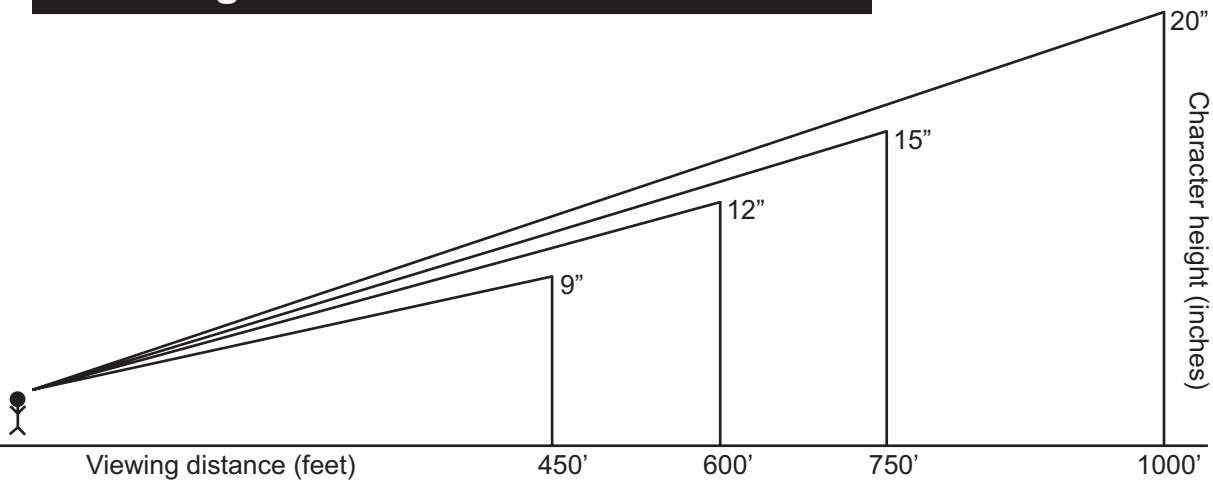
Two major components affect the resolution of a module: the overall display area of the sign and the pixel pitch. To get a higher resolution in a smaller area, a tighter pitch is necessary.

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Viewing Ranges

Character Height (inches)	Maximum Viewing Distance (feet)	Viewing Exposure (seconds)				
		20 mph (29.3)	30 mph (44.0)	40 mph (58.7)	50 mph (73.3)	60 mph (88.0)
9	450	15.4	10.2	7.7	6.1	5.1
15	750	25.6	17.0	12.8	10.2	8.4
18	900	30.7	20.5	15.3	12.3	10.2
24	1200	41.0	27.3	20.4	16.4	13.6
30	1500	51.2	34.1	25.6	20.5	17.0
36	1800	61.4	40.9	30.7	24.5	20.5
42	2100	71.7	47.7	35.7	28.6	23.9
48	2400	81.9	54.5	40.0	32.7	27.3
60	3000	102.4	68.2	51.1	40.9	34.1

Viewing Distances



Connectivity Options

Direct Connection

- RS232
- RS485
- Fiber optic
- Ethernet
- Existing network integration with network-ready sign
- Modem

Wireless Connection

- 2.4 GHz line of sight
- 802.11 wireless network integration

Dynamic Communication at the Speed of Light