

LED

LED is an abbreviation for light emitting diode. An LED is a solid-state electronic device that is much more efficient at creating light than an incandescent lamp. LEDs contain chemical compounds that emit light when electric current passes through them. Different chemical compounds emit different colors of light. Unlike incandescent lamps, LEDs have no filaments that can burn out or fail. Daktronics uses the highest quality LEDs from the top manufacturers in the world. LEDs are available in various colors. Throughout the catalog, LED color choices are shown in the following manner:

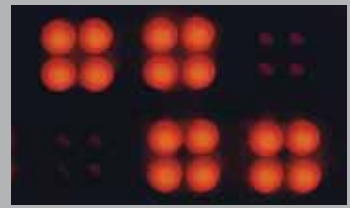
- R – red RG – red, green
- A – amber RGB – red, green, blue



Individual red LED

Pixel

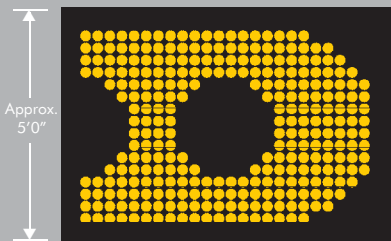
Pixel is short for picture element. Pixels are points of light that illuminate to form letters, words, graphics, animation and video images. A pixel can be made up of a single LED, multiple LEDs of the same color or multiple LEDs of different colors. A pixel is the smallest element of the electronic display system that can be individually controlled. It can be turned off or on at various brightness levels.



Pixels can be a single LED or multiple LEDs grouped together (six pixels, four LEDs per pixel are shown)

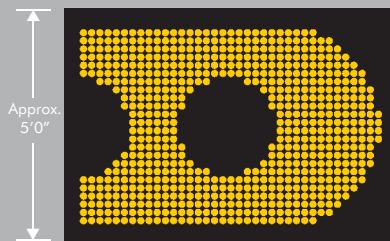
Resolution

Resolution is defined as the number of pixels contained in the physical area of an electronic display. The greater the number of pixels per square foot, the greater the amount of detail displayed. The three examples below show the Daktronics logo as it was displayed on electronic message centers with different pixel spacing. Each of these three images represents part of an electronic display approximately five feet high.



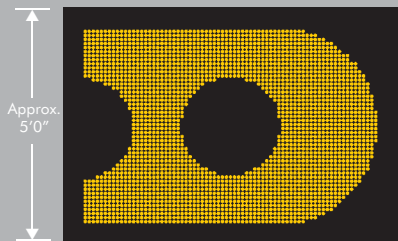
Approx. 5'0"

Galaxy® display
 Pixels on 89 mm (3.5") spacing
 16 pixels high
 12 pixels per square foot



Approx. 5'0"

Galaxy® display
 Pixels on 64 mm (2.5") spacing
 24 pixels high
 23 pixels per square foot

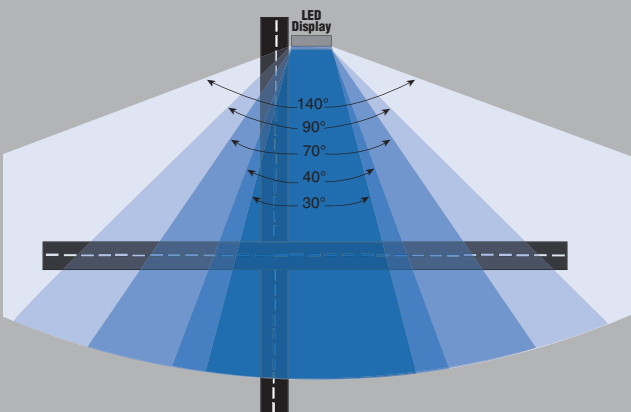


Approx. 5'0"

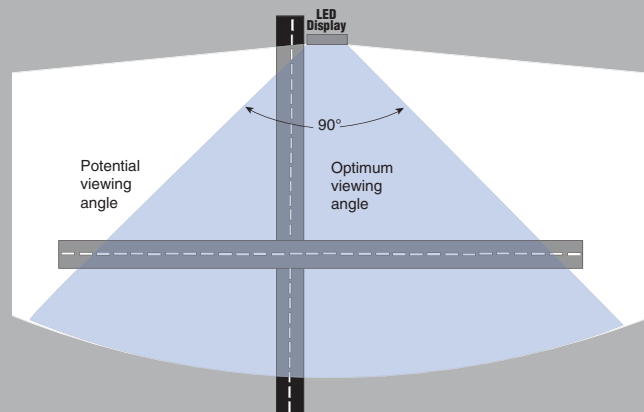
Galaxy® display
 Pixels on 34 mm (1.33") spacing
 48 pixels high
 82 pixels per square foot

Viewing Angle Comparison

Daktronics offers displays with various viewing angles to meet the needs of different viewing situations. Some applications require a wide viewing angle, others a focused viewing angle.



Optimum viewing angle is determined by the horizontal and vertical points at which the measured light intensity is 50% of that measured directly in front of the display.



Viewing area may exceed the optimum viewing angle depending on site-specific circumstances and ambient light conditions.

Viewing, Resolution, Color



Viewing Ranges (approximate)

Use this table to help determine the appropriate character size for a display based on viewing distance or the speed at which the viewer may be traveling.

Character Size		Max. Viewing Distance		Maximum Viewing Time (seconds)							
inches	mm	feet	meters	5 mph (8 km/h)	15 mph (24 km/h)	25 mph (40 km/h)	35 mph (56 km/h)	45 mph (72 km/h)	55 mph (89 km/h)	65 mph (105 km/h)	75 mph (121 km/h)
2	51	100	30	13.7	4.6	2.7	1.9	1.5	1.2	1.1	0.9
6	152	300	91	41.1	13.7	8.2	5.8	4.6	3.7	3.2	2.7
9	229	450	137	61.6	20.5	12.3	8.8	6.8	5.6	4.7	4.1
13	330	650	198	89.0	29.7	17.8	12.7	9.9	8.1	6.8	5.9
18	457	900	274	123.3	41.1	24.6	17.5	13.7	11.2	9.5	8.2
24	610	1,200	366	164.4	54.8	32.8	23.4	18.2	14.9	12.6	10.9
36	914	1,800	549	246.6	82.2	49.2	35.1	27.3	22.3	18.9	16.4
48	1,219	2,400	732	328.8	109.6	65.6	46.8	36.4	29.8	25.2	21.8

Shaded areas represent an acceptable exposure time

Galaxy® Resolution Recommendation Chart (approximate)

Galaxy® displays have the capability to show text and graphics. Effective use of an electronic display for drive-by traffic must take into account the speed of the viewer's vehicle and the viewing distance. The table below can be used to determine the appropriate pixel pitch for a display application based on traffic speed and desired display content.

Speed	Galaxy® Message Center Resolution Recommendation Chart*				
	7.62 mm (0.3")	20 mm (0.78")	34 mm (1.33")	64 mm (2.5")	89 mm (3.5")
5 mph (8 km/h)					
15 mph (24 km/h)					
25 mph (40 km/h)					
35 mph (56 km/h)					
45 mph (72 km/h)					
55 mph (89 km/h)					
65 mph (105 km/h)					
75+ mph (121 km/h)					

Text and Graphics Recommendation

Text Only Recommendation

*Based on a 12-15 second exposure time

Galaxy® Shading and Color

Many Daktronics displays have the capability to show images with depth using shading. These are examples of the level of clarity that can be achieved.



Monochrome 64 shades of red



RGB 32,768 colors

Choosing the Right Display

Since every signage application is different, it is important to choose the right display for each installation. Choosing the right display maximizes the potential of a new display system. Below is a list of questions that should be asked when considering an electronic display. These questions are intended to yield answers that will allow the right display to be chosen for each application.

Is this an indoor or an outdoor application?

LED displays are specifically designed for indoor or outdoor use. There are two main factors that differentiate an indoor display from an outdoor display. The first is weather durability. Outdoor displays are designed to function properly in extreme weather conditions while indoor displays are not built to the same environmental standards.

The second consideration is display intensity. LEDs used for indoor applications are not bright enough to compete with outdoor ambient light conditions. Outdoor displays use LEDs that are designed to be bright enough for outdoor use. Refer to the Table of Contents to find the correct section for indoor or outdoor product lines or use the color-coded bars on the side of each page to identify the correct section of the catalog.

Where will the display be mounted in reference to the intended viewing audience?

The exact placement of an electronic display in reference to the viewing audience is an important factor in determining the right product for an application. There are two points to consider when choosing a display based on where it will be installed. First, the placement of the display will affect the minimum and maximum viewing distances. This point will be discussed in the next section. Secondly, the angle at which the display can be effectively viewed must be considered. This is typically referred to as the viewing angle. Often, different LED displays have different viewing angles. It is important to make sure that the intended viewing audience is within the viewing cone of the display. See the chart titled Viewing Angle Comparison on page 8 for a visual explanation of this subject.

Who is the intended audience and what are their minimum and maximum viewing distances?

Different types of audiences require different display sizes and technologies. First, let's define some possible audience types: Freeway Traffic (60-75 mph) • Highway Traffic (45-60 mph) • City Traffic (25-45 mph) • Pedestrian Traffic (on foot)

In order to comprehend a message on an electronic display, one must have sufficient time to read the message. The concept of displaying size-appropriate images and text on an electronic display is easy to understand when maximum and minimum viewing distances and the speed at which the audience is traveling (in a vehicle or on foot) are considered.

Imagine trying to read a message formed with 6 inch letters on a sign while traveling at 70 mph on a freeway. It would be very difficult. In a freeway traffic scenario, one may only have a few seconds to read that message. It is ideal to strive to achieve a minimum of 12 seconds of readable exposure time for any electronic message display. The larger the image or character size, the farther away it can be read, which gives the audience additional time to read it as they approach the display. A 24-inch character is most appropriate for longer viewing distances up to 1,200 feet (360 m).

Consider a traffic application in a city. In this case, a much slower traveling audience and a much shorter maximum viewing distance would be common. It is important to not only consider the maximum viewing distance, but the minimum viewing distance as well. In this scenario, the public needs to be able to understand the messages being displayed right up until they are nearly parallel to the sign. For example: If one were to install a display in a city traffic scenario that is only capable of showing a 24-inch character, the viewing audience would find this message very difficult to read when close to the display. In this situation, a display with a 6-inch to 10-inch character would be the best solution.

Please review the charts titled Viewing Ranges and Galaxy® Resolution Recommendation on page 9. These charts can help define the best display for an application based on character size and traffic speed.

What type of content will be on the display?

Understanding the communication wants and need of the display owner is a very important factor in determining the right product for a specific application. Ask questions like: Is color wanted in my messages? Will the display show graphics as well as text? Will the display need to show video images? How many lines of copy will need to be displayed at one time? What type of messages will be communicated to the intended audience? The answers to questions like these will help lead to the right technology.

What method will be used to communicate with the display?

There are many different ways to communicate to electronic message displays. Understanding the requirements of the display in this regard will help in choosing the right technology for the application. Some installations may have specific communication requirements. For example, some government entities require that their displays are able to communicate using a special communication protocol. See page 7 for more information on what type of communication options are available.

Customer Satisfaction



Daktronics—Committed to Serving Customers

Daktronics has built a strong reputation by listening to customers and helping them determine what product works best for them. The same is true with product maintenance. In order to provide better service, Daktronics has developed many service plans and maintenance agreements that keep customer display systems operating at maximum impact. It all starts with a high-quality Daktronics product designed to be serviced quickly and easily.

Daktronics Help Desk is staffed with technicians who have experience designing and installing products, along with assisting customers. The resources of Daktronics customer and product documentation databases are key to offering this assistance.

Knowledgeable Help Desk service coordinators are thoroughly familiar with service agreement options, ordering parts, shipping, receiving, Return Material Authorization (RMA) processing and accessing account status information.

NETSM Service

Nationwide Electronic Technical (NETSM) Service enhances the depth and breadth of Daktronics service offerings. Daktronics NET Service offers:

- Nationwide service with technicians trained to service Daktronics products.
- Resources to take responsibility for display operation and service.
- All levels of on-site service support.

Renewable Service Plans

In addition to standard one-year warranties (SL02374), Daktronics offers:

- Extended service plans for additional services.
- Renewable maintenance agreements allow continued or expanded product coverage.
- Technical support both during and after regular working hours.

No matter the age of the display, Daktronics has a renewable service plan or maintenance agreement available.

Extended Service Plans and Maintenance Agreements

Extended service plans and maintenance agreements usually fall into one of the following service types:

- **Gold** - Electronic Parts Coverage
- **Platinum** - Electronic Parts Coverage plus On-Site Labor
- **Platinum Plus** - Electronic Parts Coverage, On-Site Labor, plus Routine Maintenance
- **Custom**: Custom agreements can be written for an individual site, customer or service.

Rapid PartsSM Exchange Program

Daktronics has developed a unique parts exchange program that offers a quick and economical way to minimize downtime. The exchange unit sent from Daktronics includes a prepaid shipping label (U.S. only) to be used for return of the unit to be repaired. This service is provided to qualified customers who follow program guidelines.

Repair and Return Program

In addition to the exchange program, Daktronics also offers a repair and return service. In order to ensure prompt and accurate repair of equipment, Daktronics will provide a Return Material Authorization number for items returned to Daktronics for repair.

Upgrades of Software and Hardware

Daktronics is not only committed to ongoing product support in the field, but also to improving products and adding features. Daktronics strives to make these advances available to new and existing customers.

**Venus[®] 1500
Display Support**
877-605-1113 or
605-697-4034

**Venus[®] 7000
Display Support**
877-605-1114 or
605-697-4035



CUSTOMER SATISFACTION

DAKTRONICS