

## AM Series 10.4" VGA Flat Panel Displays

This manual supports these Planar ICEBrite displays:

- ◆ EL640.480-AM1
- ◆ EL640.480-AM8 IN (Industrial version)
- ◆ EL640.480-AM8 ET (Extended Temperature version)

The AM series of 10.4" diagonal VGA products offers designers an affordable and easily-implemented path to incorporate flat panel solutions to meet display requirements.

Utilizing Planar's proprietary ICEBrite technology (Integrated Contrast and Brightness Enhancement), these displays excel in ambient light environments ranging from dark rooms to nearly sunlight. This proprietary technology achieves very high contrast and exceptionally clear images. These displays are easy to integrate, enabling the quick replacement of existing LCDs. This family utilizes a common 8-bit FPD-type interface compatible with most LCD video controller chips. Up to five distinct gray levels are enabled by frame rate modulation algorithms generated by the controller chips.

Through simple design and advanced manufacturing technologies, Planar's new VGA displays bring the visual performance and image quality of electroluminescence (EL), long life, and ruggedness into cost-sensitive applications.

### Features

- ◆ Excellent viewing characteristics
- ◆ High brightness and contrast
- ◆ Wide viewing angle
- ◆ Long life
- ◆ Extreme ruggedness
- ◆ Designed for low EMI
- ◆ Fast response time
- ◆ Lower power

### Options

Anti-glare and conformal coating options are available on this display.

The anti-glare option adds an anti-glare film to the front of the display to reduce specular reflections (see Application Note 135 for more information).

The conformal coating option adds a protective layer to the display for applications in which the display may be subjected to high humidity, dust, or salt mist (see Application Note 122 for more information).

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## Installation and Handling

The mechanical package consists of the display panel and electronic circuit board bonded together, plus a protective cover carrying the display mounting ears. The display is made of glass material and must be handled with care.

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**CAUTION:** The display uses CMOS and power MOS-FET devices. These components are electrostatic sensitive. Unpack, assemble, and examine this assembly in a static-controlled area only. When shipping, use packing materials designed for protection of electrostatic-sensitive components.

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Do not drop, bend, or flex the display. Do not allow objects to strike the surface of the display.

## Mounting

The EL640.480 AM displays were designed to facilitate the mounting of optical treatments and touchscreens on the viewing side of the display. To this end, the glass extends in front of the mounting bezel by approximately 0.5 mm (0.02 in.). It is imperative that any mounting scheme apply uniform pressure at all times across the glass. Pressure applied to the corners or edge of the glass is likely to cause breakage.

Mounting should be done using the mounting ears only. Use either metric M3 screws torqued to 350 Ncm maximum, or unified #4 screws torqued to 4.7 in/lb maximum.

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**CAUTION:** Properly mounted, this display can withstand high shock loads and severe vibration in aggressive environments. However, the glass panel used in this display will break when subjected to bending stresses, high impact, or excessive loads.

To prevent injury in the event of glass breakage, a protective overlay should be used on the viewer side of the display.

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**WARNING:** These products generate voltages capable of causing personal injury (high voltage pulses up to 230 V<sub>AC</sub>). Do not touch the display electronics during operation.

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## Cable Length

The maximum recommended cable length is 600 mm (24 in.). Longer cables may cause data transfer problems between the data transmitted and the display input connector. Excessive cable lengths can pick up and source unwanted EMI. There are third party products which allow this maximum cable length to be exceeded. Contact Planar Application Engineering for more information.

## Cleaning

As with any glass or coated surface, care should be taken to minimize scratching. Clean the display glass with mild, water-based detergents only. Apply the cleaner sparingly to a soft cloth, then wipe the display. Disposable cleaning cloths are recommended to minimize the risk of inadvertently scratching the display with particles embedded in a re-used cloth. Particular care should be taken when cleaning displays with anti-glare and anti-reflective films.

The TAB (tape-automated bonding) leads between the electronics and the display glass are very sensitive to handling. When cleaning the edges of the display glass, special care should be taken not to damage the leads.

## Avoiding Burn-In

As with other light emitting displays, displaying fixed patterns on the screen can cause burn-in, where luminance variations can be noticed. Use a screen saver or image inversion to avoid causing burn-in on the display.

# Specifications

The EL panel is a matrix structure with column and row electrodes arranged in an X-Y formation. Light is emitted when an AC voltage of sufficient amplitude is applied at a row-column intersection. The display operation is based on the symmetric, line at a time data addressing scheme. Operating voltages required are provided by a DC/DC converter.

Unless otherwise specified, performance characteristics are guaranteed when measured at 25°C.

## Power

The supply voltages required for the displays are shown in Table 1. All internal high voltages are generated from display supply voltage ( $V_H$ ). The logic supply voltage ( $V_L$ ) should be present whenever video input signals or  $V_H$  is applied.

Table 1. DC Input Voltage Requirements.

	AM1	AM8 IN/ET		Notes
		12 V	24 V	
$V_L$	+5 V $\pm$ 5%	+5 V $\pm$ 5%	+5 V $\pm$ 5%	absolute max 7.0 V
$V_H$	+12 V $\pm$ 10%	+12 V $\pm$ 10%	+24 V $\pm$ 10%	absolute max. 15 V and 30 V respectively
$I_L$ , max	75 mA	75 mA	75 mA	@ $V_L = +5$ V
$I_H$ , max	2.0 A	2.0 A	1.0 A	@ $V_H = +12$ V
Ptyp, 120 Hz	11 W	11 W	11 W	3840 'E' characters
Pmax, 120 Hz	24 W	24 W	24 W	50/50 2x2 checkerboard

CAUTION: Absolute maximum ratings are those values beyond which damage to the device may occur.

Table 2. Video Input Requirements.

Description	Min	Max	Notes
Video logic high voltage	3.7 V	5.0 V	All input thresholds are CMOS
Video logic low voltage	0 V	0.9 V	Video lines have 100 $\Omega$ series resistors
Video logic input current	? 10 ?A	+10 ?A	

There is no overcurrent protection on either the  $V_H$  or  $V_L$  inputs to protect against catastrophic faults. Planar recommends the use of a series fuse on the 12 volt supply. A general guideline is to rate the fuse at 1.8 to 2 times the display maximum current rating.

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