

EL

Model EL6648MSS 512 x 256 Pixel Electroluminescent Display

Operations Manual

Product Profile

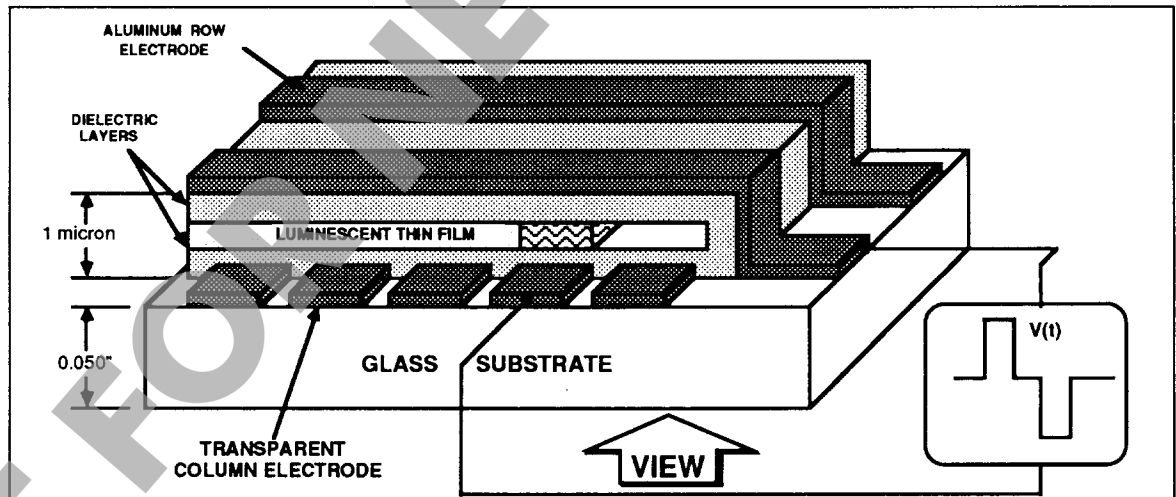
The EL6648MSS is a compact, rugged, high-resolution electroluminescent (EL) display which replaces the bulky CRT for virtually all microcomputer-based product designs. Its compact dimensions keep overall system size to an economical minimum. It is designed to function in extreme environments, and its crisp display is viewable under most lighting conditions at wide viewing angles. It is easy to install and reduces system integration costs.

The EL6648MSS is a 512 column by 256 row flat panel display. The EL6648MSS is a rugged integral assembly consisting of an EL glass panel, circuit board with control and drive electronics, and a mounted DC/DC converter. The pixel aspect ratio is 1:1.

The EL6648MSS display requires DC power and four basic signals to operate:

1. Video Data or pixel information (VID),
2. Video Clock, pixel clock, or dot clock (VCLK),
3. Horizontal Sync (HSYNC) and
4. Vertical Sync (VSYNC).

Technology



The display consists of an electroluminescent glass panel and a mounted circuit board with control electronics.

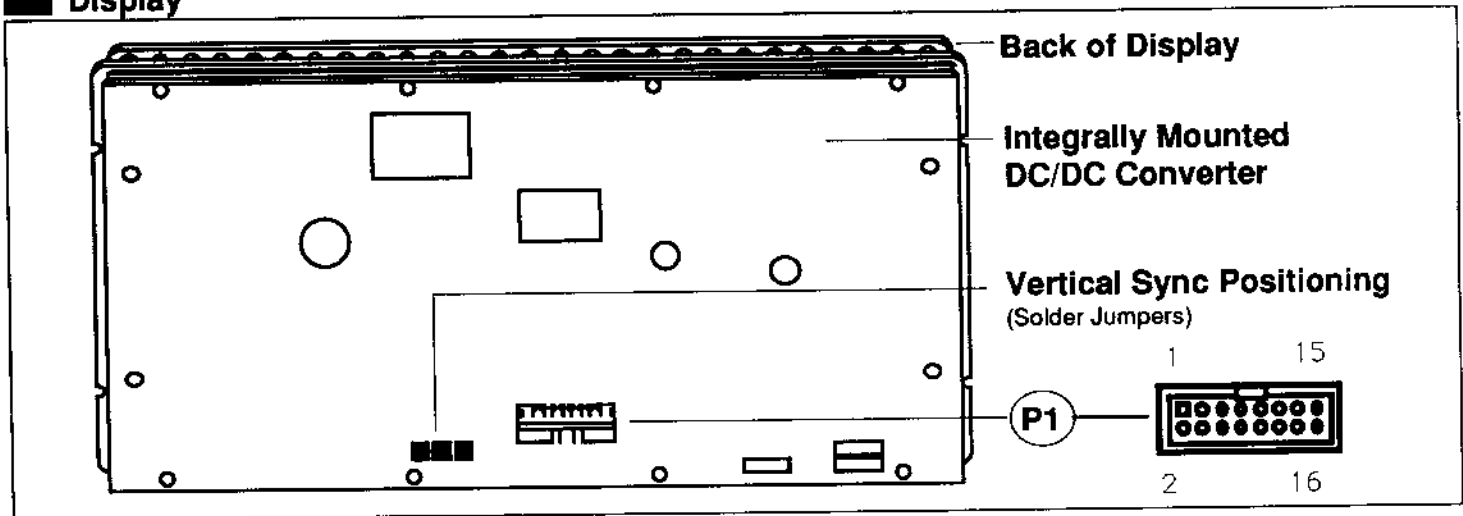
The EL glass panel is a solid-state device with a thin film luminescent layer sandwiched between transparent dielectric layers and a matrix of row and column electrodes. The row electrodes, in back, are aluminum; the column electrodes, in front, are transparent. The entire thin film device is deposited on a single glass substrate. A circuit board is connected to the back of the glass substrate. Components are mounted on this circuit board within the same area as the electroluminescent viewing area on the glass panel. The circuit board is connected to the glass with conductive silicone rubber interconnect technology. The result is a flat, compact, reliable and rugged display device.

In the EL6648MSS, the 512 column electrodes and 256 active row electrodes are arranged in an X-Y formation with the intersecting areas performing as pixels. Voltage must be applied to both the correct row electrode and the correct column electrode to cause a lit pixel. Operating voltages required are provided by the DC/DC converter which is integrally mounted to the display.

Electrical Characteristics

The EL6648MSS consists of a display with an integrally mounted DC/DC converter.

Display



Input to the DC/DC Converter at P1

Pin(s)	Signal	Symbol	Description
1 2	Voltage	VH	+12V. See also the descriptions of DC power requirements on page 4.
3 4	Not Used		
5 6	Ground	GND	Signal return.
7 8			
10 12			
14 16			
9	Vertical Sync	VSYNC	A new frame is initiated by the rising edge of VSYNC. To properly sync the EL display, this edge must occur during the horizontal sync period just before the first horizontal sync period of valid data as determined by the vertical positioning solder jumpers. See timing diagram on Page 3 for more information.
11	Horizontal Sync	HSYNC	The rising edge of HSYNC marks the beginning of valid data for any given row while the falling edge marks the end of valid data for that row. HSYNC must be high during active (valid) video data. If HSYNC is high for more than 512 pixel clock periods, then the last 512 pixels prior to the fall of HSYNC will be visible on the EL display. HSYNC must contain an even number of VCLK periods.
13	Video Clock	VCLK	VCLK provides the necessary signal to latch in the information present on VID. All control signals are referenced to the rising edge of VCLK.
15	Video Data	VID	Pixel information on VID is supplied from left to right and from top to bottom; the first bit of data on VID at the beginning of a frame is displayed as the pixel at the upper left corner of the display. Bit number 512 is at the upper right corner. Bit number 513 is directly beneath pixel number 1 and so on.

Vertical Sync Positioning (Solder Jumpers M1, M2, M3)

The Vertical Sync Positioning Solder Jumpers allow the user to set the start of frame to the HSYNC period before valid data (Line 0) or the first HSYNC period of valid data (Line 1). See timing diagram on Page 3.

FACTORY

M1 M2 M3

OPTIONAL

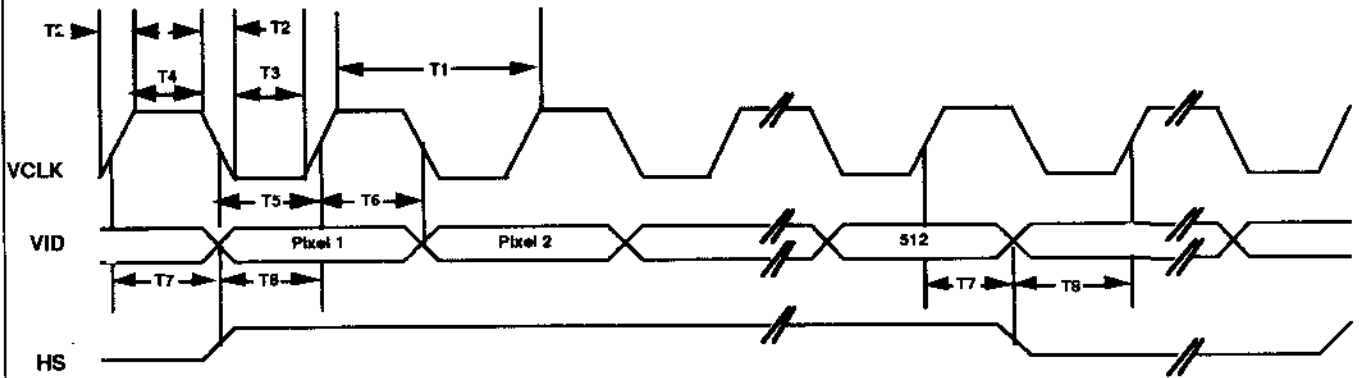
M1 M2 M3

The factory setting is with M1 and M2 shorted for start of frame set for Line 1. To change to the optional setting, remove trace between M1 and M2, and then connect M2 to M3.

Video Timing Input at P1

Data Signals

Video

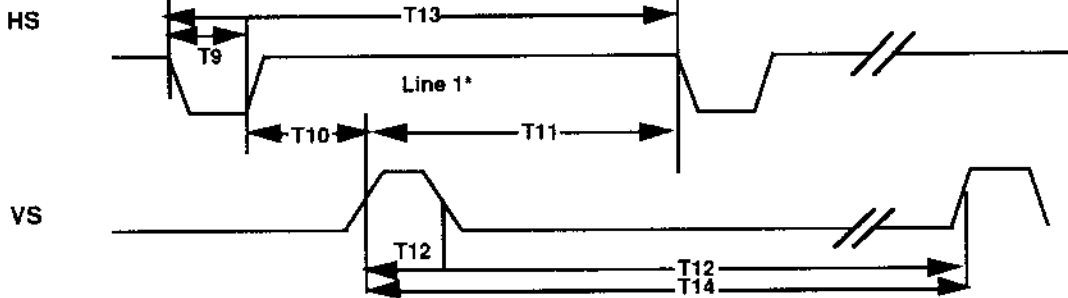


Description	Min	Max	Units
T1 Video Clock period (tVCLK)	66	—	nsec
T2 VCLK rise, fall time (tRF)	—	10	nsec
T3 VCLK low width (tWL)	20	—	nsec

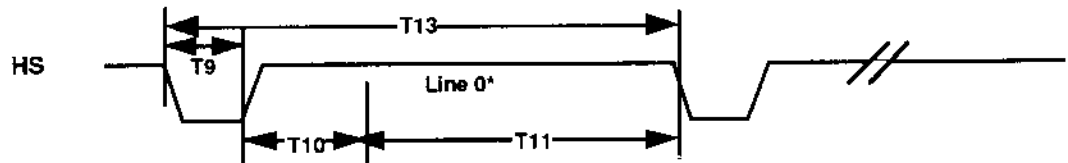
Description	Min	Max	Units
T4 VCLK high width (tWH)	20	—	nsec
T5 VID setup to VCLK (tSVID)	10	—	nsec
T6 VID hold from VCLK (tHVID)	10	—	nsec

Sync Signals

FACTORY



OPTIONAL



	Min	Max	Units
T7 HSYNC hold from VCLK (tHHS)	10	—	nsec
T8 HSYNC setup to VCLK fall (tSHS)	10	—	nsec
T9 HSYNC low time (tHSL)	4	—	tVCLK
(VCLK must be running)			
T10 VSYNC hold from HSYNC (tHVS)	0	—	nsec
T11 VSYNC setup to HYNCS (tVHS)	140	—	nsec
T12 VSYNC high/low width (tVSW)	20	—	tVCLK
T13 HSYNC period (tHS)	54.6	—	μsec
T14 VSYNC period (tVS)	260	—	tHS
Frame Rate	—	70	Hz

(Typical vertical frame rate: 60Hz)

* NOTE: Line 1 when M1 is shorted to M2 (factory setting).
Line 0 when M2 is shorted to M3 (optional setting).

Video Electrical Specifications (TTL compatible)

		Min	Max	Units
Vil	input low voltage	-0.3	0.8	V
Vih	input high voltage	2.4	5.0	V
Iil	input low current	—	-0.4	mA
Iih	input high current	—	10	μA
Absolute Maximum		+5.5V		

Ta = 0°C to 55°C unless otherwise stated

Note: All inputs are TTL compatible CMOS with 24KΩ pull-up resistors and 100Ω series resistors (to minimize under- and over-shoot of input signals).

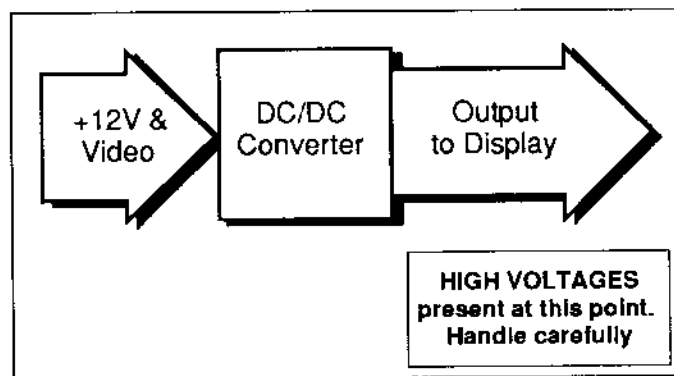
DC/DC Converter

The display and DC/DC converter are integrated at the factory.

DC Power Input Specifications

Description	Min	Nom	Max	Units
Input voltage (VH)	10.8	12.0	16.5	VDC
Input voltage absolute max. (VH)	—	—	18.0	VDC
Input current (IH) (VH=Min)	—	—	1.5	A

Ta = 0°C to 55°C unless otherwise stated



Interconnections

Connector at P1: 16 pin right angle four-box header, T & B Ansley 609-1607 or equivalent.

Operational Specifications

Environmental

Temperature

Operating 0°C to +55°C

Operating Survival 0°C to +70°C

Non-Operating -40°C to +75°C

The EL display will function at operating survival temperatures for a 24-hour period and incur no damage but may not meet some specifications above the +55°C operating limit.

Humidity

95% relative humidity (non-condensing) as verified by MIL-STD-202F method 106E.

Altitude

Operating 15,000 ft. (4,573 m) above sea level

Non-Operating 50,000 ft. (15,244 m) above sea level

Vibration (Operating)

5–25 Hz:

Sweeptime 10 min ea. axis, 1 min sweep rate

Amplitude 0.100 inches p-p displacement

Dwell at resonance 15 min each axis

If no resonance is found, dwell is performed at 55Hz, 0.060 inches p-p displacement, for 15 minutes.

25–55 Hz :

Sweeptime 5 min ea. axis, 1 min sweep rate

Amplitude 0.060 inches p-p displacement

Dwell at resonance 15 min each axis

If no resonance is found, dwell is performed at 55Hz, 0.060 inches p-p displacement, for 15 minutes.

Vibration (Non-operating)

55–500 Hz:

Sweeptime 120 min ea. axis, 3.2 min sweep rate

Amplitude 3 g peak acceleration

Dwell at resonance 30 min each axis

Dwell is performed at all resonances of $g(\text{out})/g(\text{in}) \geq 5$.

Shock

Magnitude 100 g (4 ms half sine) and 90 g (11 ms half sine) peak acceleration

Number of tests 3 on each of 6 surfaces

Mean Time to Failure

Greater than 33,000 hours

Electromagnetic Compatibility

The display is capable of being operated in a final product that complies with FCC Docket, Part 15, Subpart J, class B.

Optical

Display Color

Peak emission wavelength 585nm (Yellow-Orange)

Pixel Luminance

ON luminance Typical 38 fL
(130 cd/m² pixel)
Minimum 30 fL
(103 cd/m² pixel)

Luminance measured at center of display screen, 60 Hz full ON pattern, 25°C ambient temperature.

OFF luminance 0.3 fL maximum
(1.03 cd/m² pixel)

Luminance measured at center of display screen, 60 Hz full OFF pattern, 25°C ambient temperature.

ON luminance uniformity Maximum difference $\leq 26\%$
Measured between any two of five points (corners and center):
Non-uniformity % = $(1 - \text{min luminance}/\text{max luminance}) \times 100$.

ON luminance variation (temp.) Maximum variation $\pm 15\%$
From 25°C over 0°C to +55°C range.

ON luminance variation (time) Maximum difference $\pm 10\%$
At 25°C within 10,000 hours.

Fill Factor

53.8% luminance area / total active area.

Viewing Angle

Greater than 120° viewing cone (60° viewing angle for all axis about the normal display face).

Optional Filter

For best overall performance in high or low light levels, an amber or neutral gray circular polarizing filter with anti-reflective coating or etch is the usual choice. This filter will make the reflective electrodes of the display darker and will improve the contrast ratio. The anti-reflective coating on the filter should face the user, and the tape side of the filter should face the display.

Safety and Health

Safety

The display will not inhibit the end product from obtaining any of the following certifications: UL114/478, CSA 154, IEC 380.

Health

An inert, non-toxic, silicon-based oil is used in the construction of the electroluminescent panel.

Installation and Handling

Unpacking

Electrostatic Caution

The display and DC/DC converter assemblies use CMOS and power MOS-FET devices. These components are electrostatic sensitive. Unpack, assemble and examine these assemblies in a static-controlled area only. When shipping either assembly, use packing materials designed for protection of electrostatic-sensitive components.

Unpack and check contents of shipping container against invoice in a static-controlled area. Use anti-static bags for storage of displays and DC/DC converters awaiting assembly processes. Any discrepancies in materials received and invoiced should be noted to Planar within 10 days.

Cleaning

Display Face	Any non-abrasive mild glass cleaner can be used.
Filter	Do not clean the Planar-supplied acrylic filter with alcohol.
Circuit Boards	Only isopropyl alcohol should be used on the ECB assemblies.

Dimming Control Electronics

A port is available for use with an external dimming control. Contact Planar Systems, Application Engineering Department, for more information.

Avoiding Burn-in

As with any other display, it is prudent to use screen-saver software to avoid burn-in of images that remain on the screen for extended periods.

Mechanical Characteristics

Display External Dimensions

Height	5.73 in.	145 mm
Width	10.29 in.	260 mm
Depth	1.39 in.	35 mm
Weight	25 oz. max	710 grams

Display Viewing Area Characteristics

Active Area	Height	3.84 in	97.5 mm
	Width	7.68 in.	195 mm
Pixel pitch	Height	0.015 in.	0.381 mm
	Width	0.015 in.	0.381 mm
Pixel size	Height	0.011 in.	0.279 mm
	Width	0.011 in.	0.279 mm

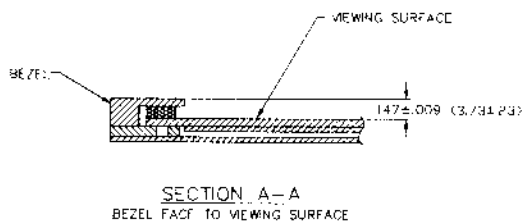
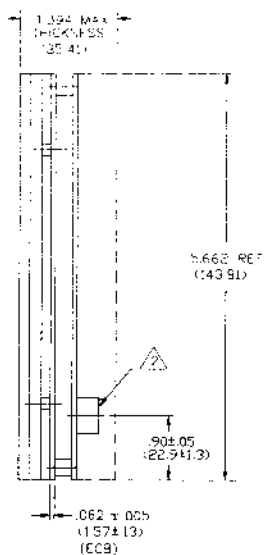
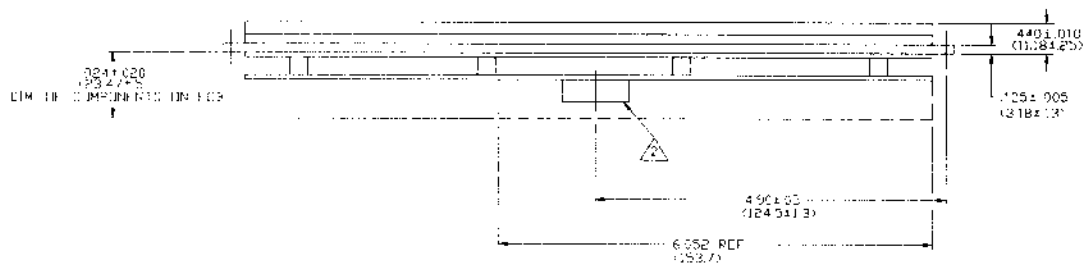
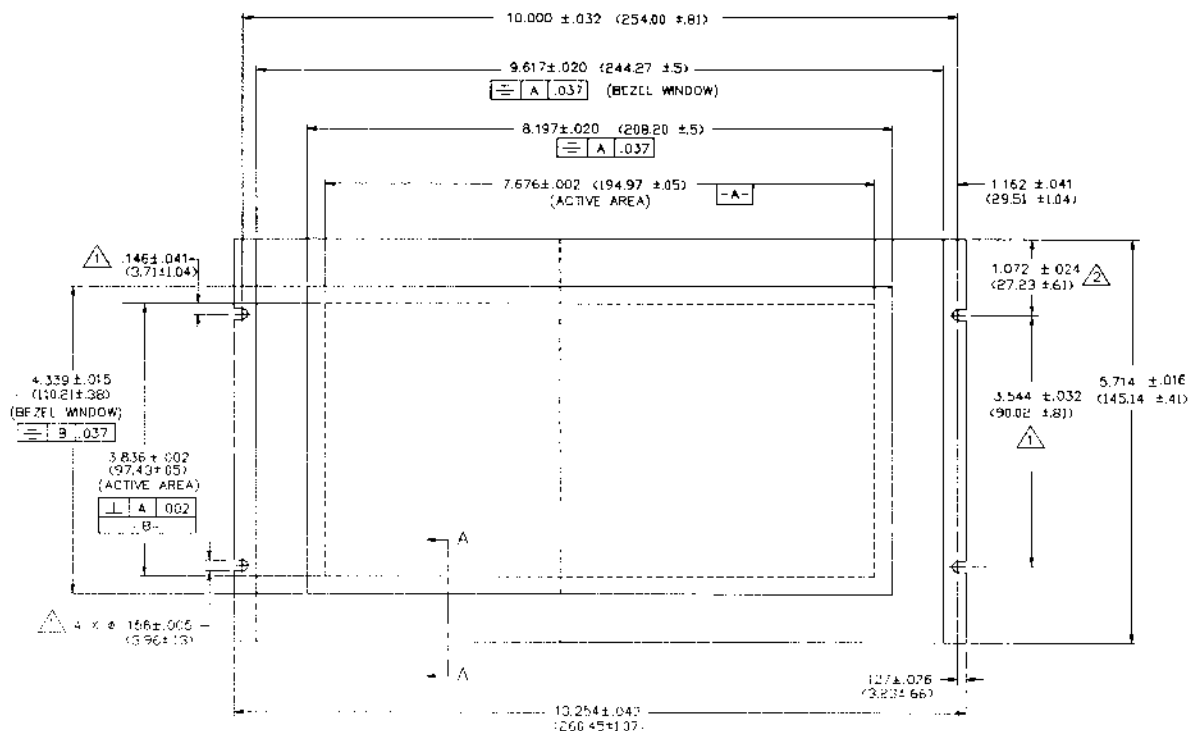
Pixel matrix organization:

512 pixels horizontal by 256 pixels vertical

Mounting and Connector Locations

As shown on Page 7, this unit has four mounting holes, two located on each side of the display. When mounting the display, use all four of these holes; failure to do so will invalidate the product warranty. To avoid breaking the glass, use appropriate length standoffs and avoid deflecting the mounting holes out of the plane of the display when tightening the mounting hardware. The vibration and shock specifications listed on Page 5 are accurate only if all four mounting holes are used.

Display External Dimensions



Description of Warranty

This description is not the full warranty, and should not be construed as a substitute for the full warranty. A copy of the full warranty is available upon request.

Planar warrants that the goods it sells will be free of defects in materials and workmanship, and that these goods will substantially conform to the specifications furnished by Planar, and to any drawings or specifications furnished to the Seller by the Buyer if approved by the Seller. This warranty is effective only if Planar receives notice of such defect or nonconformance during the period of warranty, which begins the day of delivery.

The goods Planar sells are warranted for a period of one year unless otherwise agreed to by Planar and the Buyer. The Buyer must return the defective or nonconforming goods, upon request, to Planar not later than 30 days after Planar's receipt of notice of the alleged defect or noncompliance. Buyer shall prepay transportation charges, and Planar shall pay for return of the goods to the Buyer. No goods are to be returned to Planar without prior written permission.

The warranty does not apply in cases of improper or inadequate maintenance by the Buyer, unauthorized modification of the goods, operation of the goods outside their environmental specifications, neglect or abuse of the goods, or modification or integration with other goods not covered by a Planar warranty when such modification or integration increases the likelihood of damage of the goods.

Easy to Use

There are many options available which make Planar EL displays easy to use, easy to interface, and easy to package. Examples of options which are typically available include RS232 Interface Adapter, Touch Bezels, Metallic Enclosures and AC Power Supplies. Call Planar for complete information and availability.

Support and Service

Planar Systems, Inc. is a U.S. company based in Beaverton, Oregon and Espoo, Finland with a world-wide sales distribution network. Full application engineering support and service are available to make the integration of Planar displays as simple and quick as possible for our customers.

RMA Procedure: For a Returned Material Authorization number, please contact Planar Systems, Inc., or Planar International's Customer Service Department with the model number(s) and original purchase order number(s). When returning goods for repair, please include a brief description of the problem, and mark the outside of the shipping container with the RMA number.

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