Landmark Technology

LMG258-190ETN01 - 19"

Sunlight Readable LCD Module

Introduction

The LMG258-190ETN01 is a 19" sunlight readable LCD module using the AUO G190ETN01.2 LCD and a VHB (very high brightness) LED backlight to achieve a maximum screen brightness about 1,500 Cd/m^2 (nits). At 1,500 nits screen brightness, the power consumption of the LED backlight is only 17 Watt.

The LMG258 has a wide operating temperature from -30 to 85 ºC. In addition, the view angle of the LCD is very good.

Display Specifications

LCD Active Area Dimensions (mm)	376.3 (H) x 301.1 (H)
Outline Dimensions (mm)	396 (H) x 324 (V) x 15.18 (D) Typ.
Display Resolution	1280 x 1024
Operating Temperature	-30 to 85 ºC
LCD Module Weight	1.9 Kg
Front Surface Treatment	Hard coating (3H), anti-glare treatment

Optical Characteristics (note)

Parameters	Typical Value	Units	Conditions
LCD Screen Luminance	1,500	Cd/m^2	LCD displays the brightest White
Typical LCD Contrast Ratio	1,000:1		White vs. Black (measured in the dark along the normal direction)
Typical Viewing Angles			
3:00 - 9:00 directions	±85	Degrees	Contrast ratio ≥ 10
6:00 - 12:00 directions	±80	Degrees	Contrast ratio ≥ 10
LCD Screen Chromaticity (x, y)			
White	(0.286, 0.340)		Measured at the normal direction
Red	(0.626, 0.354)		Measured at the normal direction
Green	(0.296, 0.656)		Measured at the normal direction
Blue	(0.141, 0.048)		Measured at the normal direction

Note: Luminance measured at about 1 minute after initial turn on at 25º C ± 2º C ambient temperature.

TFT LCD Power Specifications

	Parameters	Min.	Typ.	Max	Units	Conditions
Vcc	Logic/LCD Drive Voltage	4.0	5.0	5.5	Volt	+/- 10%
Icc	Input Current	~	1.0	1.2	A	Vcc = 5V, all black pattern at 75 Hz
Irush	Inrush Current			3.0	A	
Vccrp	Logic/LCD Drive Ripple Volt.			100	mv (p-p)	Vcc = 5V, all black pattern at 75 Hz

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Operating LCD & Input Signal Specifications

Landmark MG36 controller card operates the LMG258-190ETN01 LCD with either VGA or DVI video input signal. The controller card includes an LVDS cable to connect to the LCD.

In case the LMG258 LCD is designed to be operated with another controller card or directly from a single board computer, please refer to the AUO G190ETN01.2 LCD data sheet for the LCD specification and the input signal characteristics such as pixel format, input data format, signal description, interface timing, as well as the LVDS interface input connector, and pin assignments.

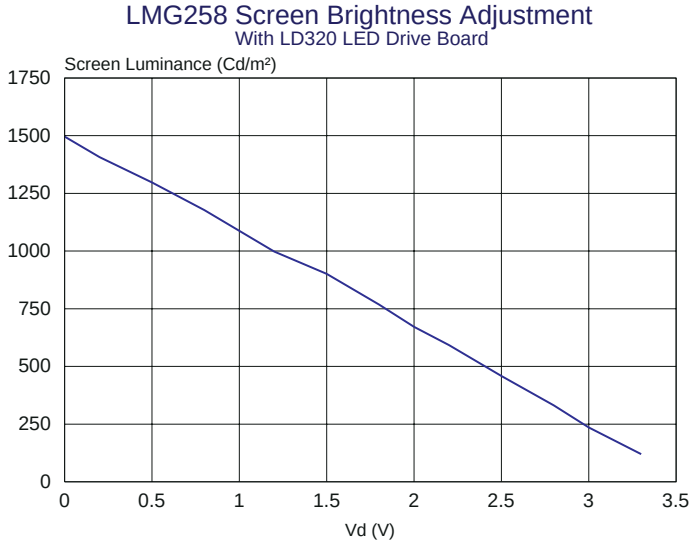
LED Backlight Driving Specifications

The LCD module has a VHB backlight with 2 LED strips Each LED strip is terminated with a JST 2-pin connector, BHRS-02VS-1. The JST mating connector part number is SM02-BHSS-1-TB.

At the maximum screen brightness setting of 1,500 nits, the driving conditions of each LED strip are:

LED strip driving voltage	37	Vdc (typ)
LED strip driving current	230	mA

Thus, it requires an LED drive board with 2 driving channels. Each channel provide a maximum driving current of 230 mA. At this level, the total power consumption of the backlight is about 17 Watts.



The Landmark LD320 drive board has 2 LED driving channels that is suitable to operates the LMG258 backlight. It uses a DC voltage for brightness adjustment (dimming). The figure on the left shows the LCD screen brightness versus the DC dimming voltage Vd.

At Vd = 3.3V, the screen brightness is dimmed down to about 120 nits. At Vd = 3.4V, the brightness can be adjusted to about 81 nits. It is not recommended to have Vd over 3.3V which may degrade the LCD brightness uniformity. For more detail information, please refer to the LD320 data sheet.

Backlight Life

The half brightness life of the VHB backlight in the LMG258-190ETN01 LCD module is rated at 30,000 hours. The half brightness life is the number of operating hours before the backlight luminance (seen as the LCD screen brightness) drops down to 50% of its initial value.

Thermal Management

The LED backlight in the LMG258-190ETN01 is very efficient. At 1,600 nits screen brightness, the backlight power is about 17 W. This small backlight power will not cause a significant increase of the LCD temperature.

Thermal Management (continue)

For outdoor applications, the LCD may be subject to direct sunlight exposure and can absorb a large amount of solar heat. In the worst case, a 19" LCD can absorb up to 110 Watts, which is about 6.5 times the LED backlight power. As a result, the LCD temperature can rise significantly, particularly if there is a cover plate in front of the LCD.

Since the maximum operating temperature of the LCD is at 85 ºC, it is unlikely that the LCD temperature will exceed the N - I (nematic to isotropic) transition point of the liquid crystal material which causes the LCD losing its display function. Thus, the display will not be black out.

However, as the temperature rises beyond certain level, both the LED efficiency and the LED life span decrease. Thus, it is important to implement cooling measures to maintain the LCD temperature significantly below 85 ºC to ensure good display performance and long backlight life span.

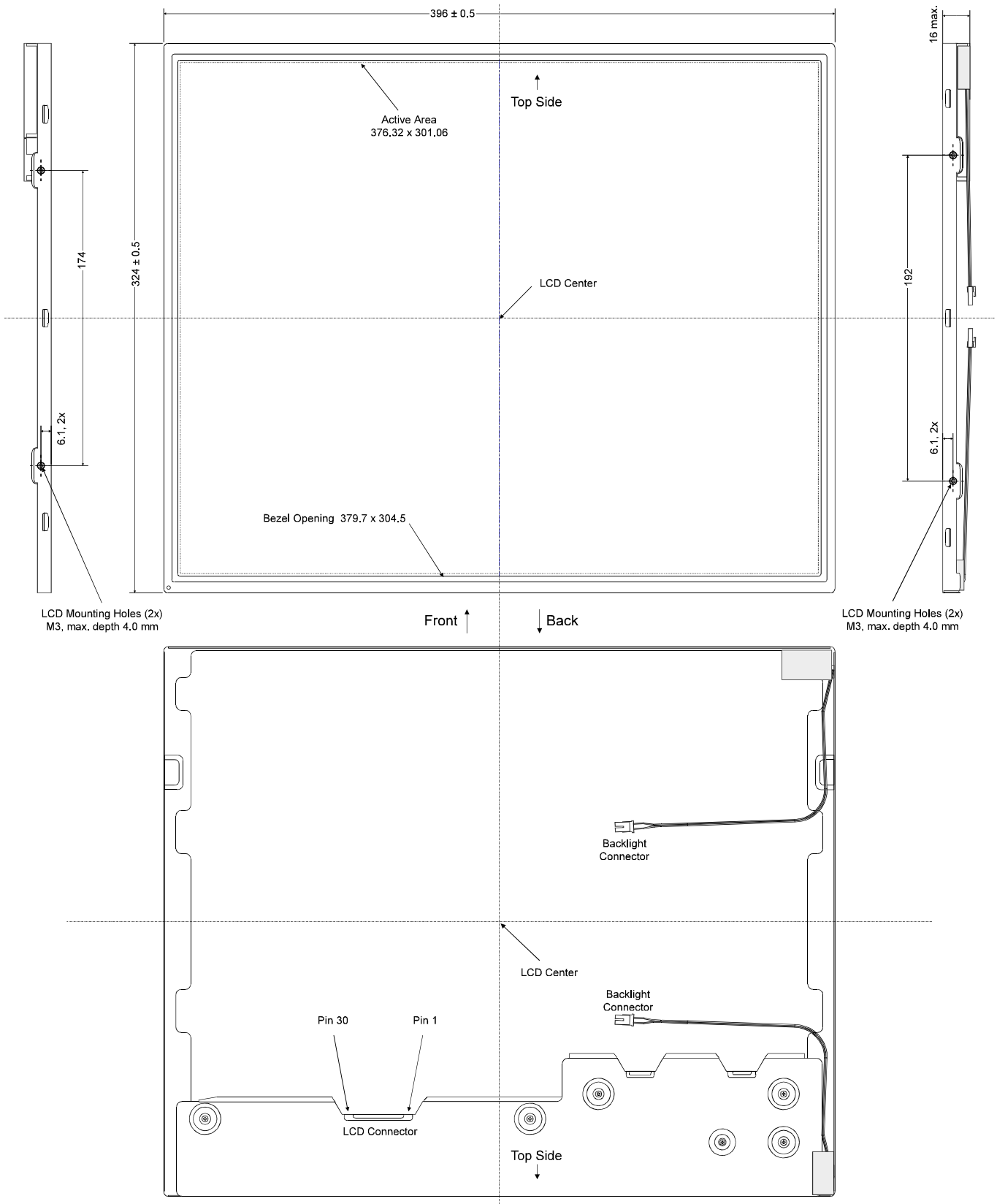
For outdoor applications in cold winter weather, the LCD can operate at - 30 ºC temperature. Unless the ambient temperature may drop well below -30^{O}C, then some heating element shell be used to maintain the temperature above -30 ºC level.

LCD Mounting

The LMG258-190ETN01 is a side mount LCD module. The locations of the mounting holes and the screw size are shown in the mechanical drawing.

Please use four M3 screws to mount the LMG258-190ETN01 LCD module. The maximum screw penetration depth inside the LCD module is 4 mm. The maximum torque used to tighten the screws is 5 kg-cm (4.3 lb-in). Excessive depth of penetration and amount of tightening torque can potentially cause unrecoverable damage to the LCD module

Mechanical Dimensions



All dimensions are in mm