Landmark Technology

LMG253-150XTN01

15" Sunlight Readable LCD Module

Introduction

The LMG253-150XTN01 is a 15" Sunlight Readable LCD module. The module consists of an AUO G150XTN01.0 TFT color LCD panel and a VHB (very high brightness) LED backlight in a side mount package of less than 14 mm maximum thickness.

At the maximum backlight power of 18 Watts, the LMG253-150XTN01 delivers a very high screen brightness of 1,750 Cd/m^2 (nits). At this level, the display is highly readable under direct sunlight. For applications in dark environments, the screen brightness can be adjusted down to less than 5 Cd/m^2 using a proper LED drive board with PWM dimming control.

Characteristics (Note 1, 2)

Parameters	Typical Value	Units	Conditions
LCD Screen Luminance	1,750	Cd/m^2	LCD displays the brightest white
Luminance Variation	±15% or better		Note 3
Backlight Power Consumption	18	Watts	Excluding LED driving board losses
Screen Dimming Ratio	20:1		With LD200A LED driving board
Typical LCD Contrast Ratio	700:1		White vs. Black (measured in the dark at the normal direction)
Typical Viewing Angles			
3:00 o'clock direction	80	Degrees	Contrast ratio ≥ 10
9:00 o'clock direction	80	Degrees	Contrast ratio ≥ 10
6:00 o'clock direction	80	Degrees	Contrast ratio ≥ 10
12:00 o'clock direction	60	Degrees	Contrast ratio ≥ 10
LCD Screen Chromaticity (x, y)			
White	(0.290, 0.325)		Measured at the normal direction
Red	(0.624, 0.342)		Measured at the normal direction
Green	(0.301, 0.625)		Measured at the normal direction
Blue	(0.144, 0.066)		Measured at the normal direction
LCD Module Weight	930	Grams	
Display Resolution	1,024 x 768		
Operating Temperature Range	-30 to 85	°C	

Note 1: Please refer to the AUO G150XTN01.0 data sheet for detailed LCD electrical specifications and general precautions.

Note 2: All data are measured at 25°C ± 2°C ambient temperature.

Note 3: Screen luminance is measured at 9-point positions as shown in the AUO G150XTN01.0 data sheet. The luminance variation is the percent deviation of the maximum and minimum values measured versus the average luminance value of the 9 points. .

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LED Backlight Driving Specifications

The LCD module has a VHB backlight with one LED lamp strip. The LED strip has 48 white LEDs that are electrically connected into 2 groups. Each group has 3 strings connected in parallel.

The LED strip has 2 JST BHRS-02VS-1 connectors for the 2 groups of LEDs. The JST mating connector part number is SM02-BHSS-1-TB.

At the maximum screen brightness setting of 1,750 nits, the driving conditions of each LED group are,

LED group driving voltage	25.3	Vdc (typ)
LED group driving current	360	mA

Thus, the LED strip with 2 groups consumes about 18 Watts. With Landmark's LD200A LED driving board (tuned for the LMG253-150XTN01), the total power drain from the 12V supply is 20 Watts.

Backlight Life

The half brightness life of the VHB backlight in the LMG253-150XTN01 sunlight readable module is rated at 50,000 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.

The lifetime of an LED backlight is mainly determined by the luminous decay of the LEDs. As the temperature of the LED chip rises, the LED luminance decay accelerates. This temperature effect on the LED life is relatively small if the LCD case temperature is maintained below 50 ºC.

Thermal Management

At full screen brightness of 1,750 nits, the backlight power consumption is about 18 Watts. This power will increase the temperature near the LED strip to about 50 ºC. Compare to a regular brightness LCD, this temperature is slightly higher but will not casue any major thermal management issues.

For outdoor display applications where the LCD may be subject to direct sunlight exposure, the LCD screen can absorb a large amount of solar heat. In the worst conditions, the heating power generated from strong sunlight exposure can reach 70 Watts, which is close to 4 times the LED backlight power. As a result, the LCD temperature can rise more than 40 ºC, particularly if there is a cover plate in front of the LCD.

Thus, for outdoor applications with direct sunlight exposure, the combined heating power from the sunlight and the VHB backlight can raise the LCD temperature possibly beyond 80^{o}C. At this temperature, the LCD still works without any problem. However, both the LED efficiency in Lumens per Watt and LED life span decrease when the ambient temperature rises beyond a certain level. Thus, it is necessary to implement some cooling measures to maintain the LCD temperature at 50 to 60 ºC region to ensure good display performances and long backlight life span.

For outdoor applications in cold winter weather, the ambient temperature may drop to below -30^{o}C which exceeds the mininum operating temperature of the LCD. Therefore, the thermal management (cooling and heating) system should be designed according to the worst case conditions anticipated for the LCD to ensure that the LMG253 LCD with its LED backlight will operate properly.

LCD Module Mechanical Dimensions

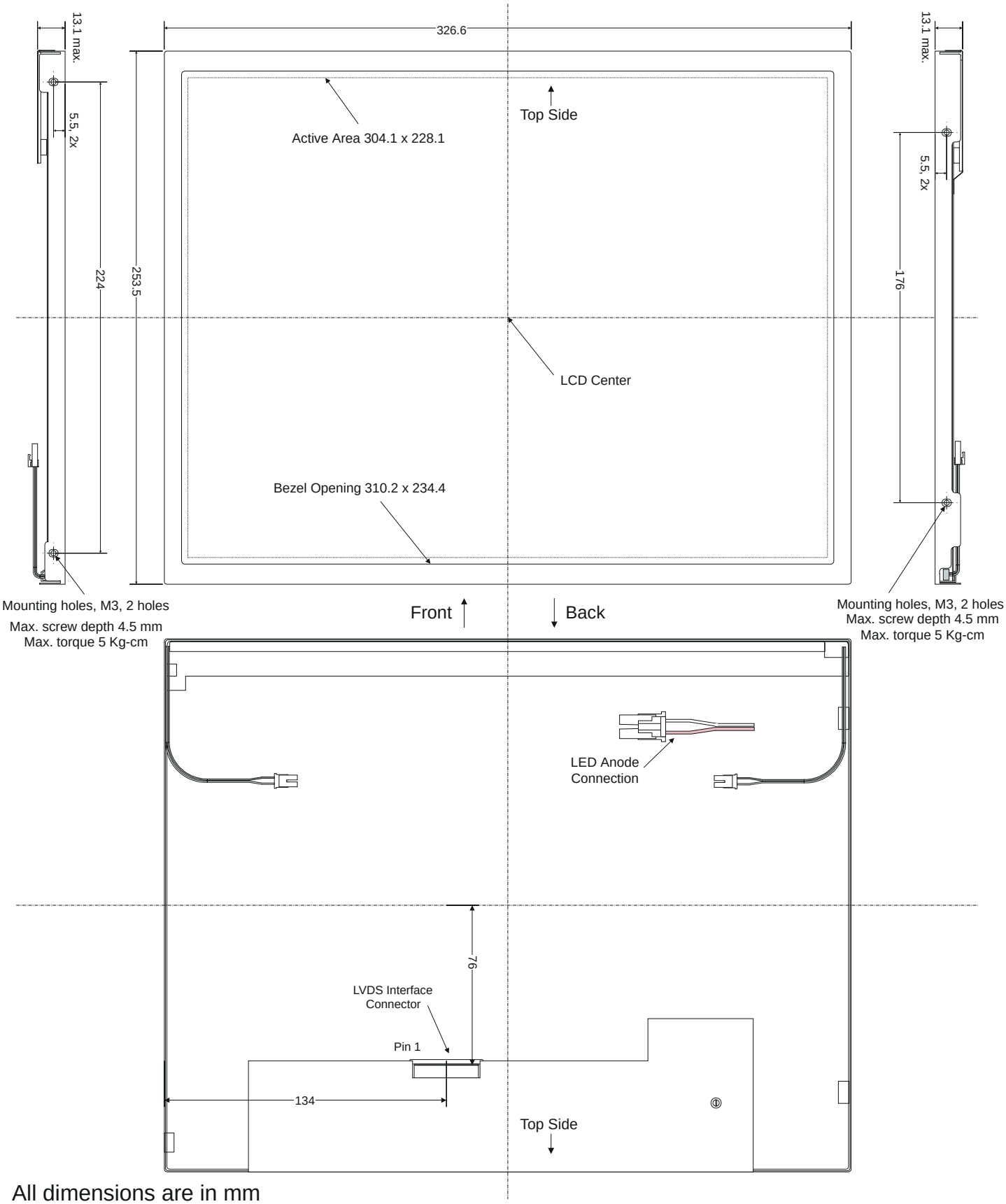
The mechanical dimensions of the LMG253-150XTN01 LCD module are shown on the next page. The drawing also shows the anode and cathode pins of the connectors to the LED strip.

The LMG253-150XTN01 is a side mount LCD module. There are four user mounting holes (2 on the left side and 2 on the right side). Please use four M3 screws to mount the LCD module onto the display case.

Caution:

The maximum depth of the screws penetrating inside the LCD module is 4.2 mm. The torque used to tighten the screws is 2.5 - 3.5 Kg-cm (2.2 - 3.0 lb-in). Excessive torque and longer screws can cause severe damage to the LCD

LMG253-150XTN01 Mechanical Dimensions



All dimensions are in mm