

Introduction

The LMT269-150XTN01 is a 15" sunlight readable LCD module with a PCAP touch screen. The LCD resolution is 1,024 x 768 (XGA). The module uses a VHB (very high brightness) LED backlight to achieve a screen luminance of 1,550 Cd/m² (nits). At this level, the backlight power consumption is about 18 Watts

With 1,550 nits screen brightness, the display is highly readable under direct sunlight. Also, the operating temperature range of LMT269-150XTN01 is from -30 to +85°C, making this LCD module specifically suitable for demanding outdoor applications with multi-touch function.

Characteristics (Note 1, 2)

Parameters	Specification	Units	Conditions
LCD Screen Luminance	1,550	Cd/m ²	With the PCAP Touch Screen LCD in OFF state (normally White)
Luminance Uniformity	75% or better		Note 3
Backlight Power Consumption	18	Watts	Excluding LED driver board losses
Screen Luminance Dimming Ratio	20:1		With LD200A LED driving board
Typical LCD Contrast Ratio	700:1		White vs. Black (measured in the dark along the normal direction)
Typical Viewing Angles			
3:00 direction	80	Degrees	Contrast ratio ≥ 10
9:00 direction	80	Degrees	Contrast ratio ≥ 10
6:00 direction	80	Degrees	Contrast ratio ≥ 10
12:00 direction	60	Degrees	Contrast ratio ≥ 10
LCD Screen Chromaticity (x, y)			
White	(0.290, 0.325)		Measured at the normal direction
Red	(0.625, 0.343)		Measured at the normal direction
Green	(0.301, 0.627)		Measured at the normal direction
Blue	(0.143, 0.063)		Measured at the normal direction
PCAP Touch Function	Multi Touch		
PCAP Touch Interface	USB		
LCD Module Weight	1,390	Grams	

Note 1: Please contact Landmark for the detailed electrical specification of this LCD.

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

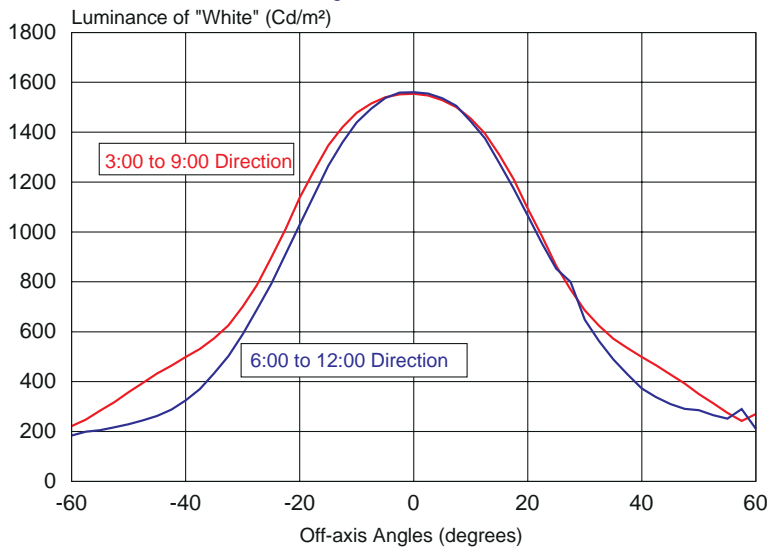
Note 3: Uniformity = (Lmin / (Lmax)) where Lmax (Lmin) is the maximum (minimum) luminance measured over the 5 points (the center point plus 4 points half way toward the corner) of the active area.

LCD Module Optical Performances

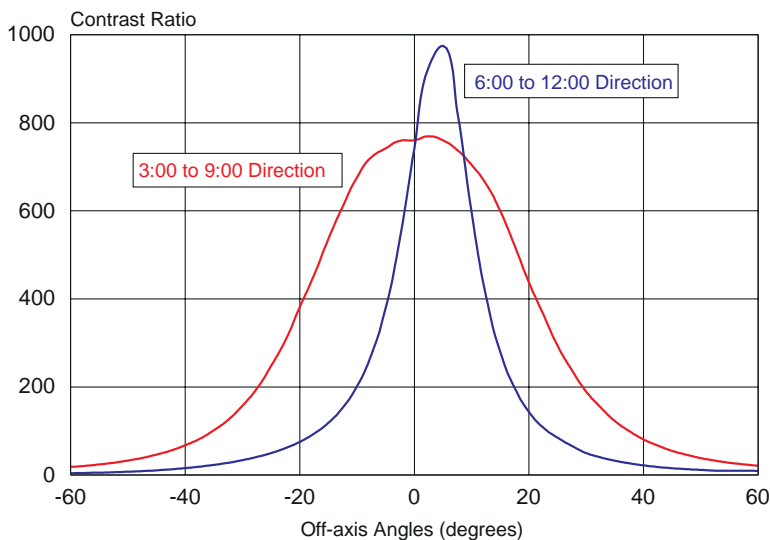
Luminance & Contrast Ratio

The typical LMT269-150XTN01 LCD module screen luminance and contrast ratio are shown in the figures below: The peak 1,550 Cd/m² brightness at the normal viewing direction is measured with the LCD in the “Off” state (i.e. the pixels are not energized). The “white” color displayed on the screen when the video signal is applied may have a slightly lower luminance which can be caused by the improper settings of the LCD controller and/or the graphics card. When the LCD is properly driven, the measured luminance of the “white” color displayed on the screen should be within 10% of the specified value.

LMT269-150XTN01 Screen Luminance
Angular Distribution



LMT269-150XTN01 LCD Contrast Ratio
Angular Distribution



The LMT269-150XTN01 LCD module also has a high contrast ratio (CR) of about 700:1 measured on axis. For all the practical viewing angles, the CR value exceeds 50:1. These CR values are measured in a dark room. Under ambient lighting, particularly in bright outdoor environments, the CR value of the display drops significantly. Basically the front surface of the LCD reflects the ambient illumination. Thus, the luminance of the black color increases significantly which reduces the CR value. For details, please refer to Landmark Tecknote TK0101.

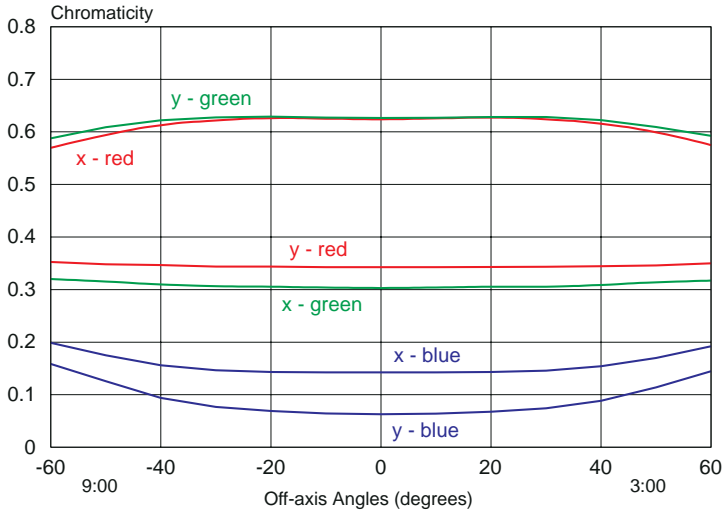
Chromaticity

The figures on the next page present the chromaticity (x, y) data of the R, G, B primary colors displayed on the screen.

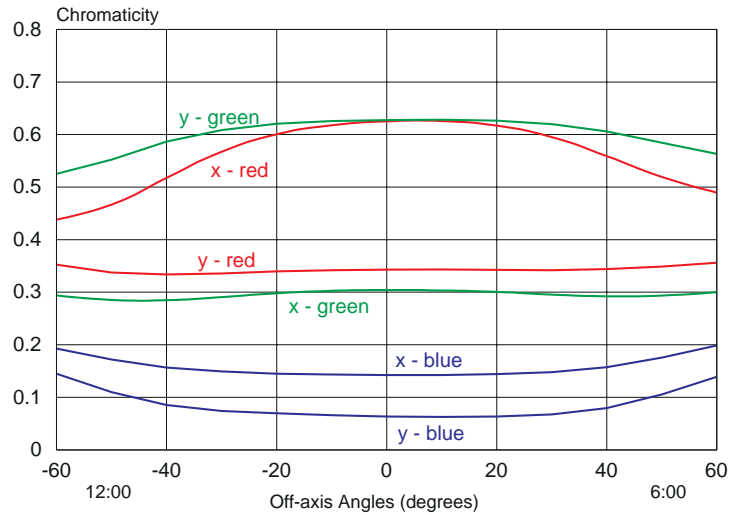
Along the 3:00 to 9:00 (horizontal) directions, the chromaticity values do not change significantly. Thus the color shift along the horizontal direction is small.

Along the 6:00 to 12:00 (vertical) directions, the red and the green primary colors have significant changes as the viewing angles reach 45° and beyond. In particular, along the 12:00 direction, the R primary color shifts significantly toward the white color. As a result, at off axis angle beyond 35° along the 12:00 direction, the color of the imager displayed on the screen shifts toward green and blue. Meanwhile, the image contrast ratio also drops down significantly.

LMT269-150XTN01 Color Shift along the 3:00 - 9:00 Directions
(Positive Angles are along the 3:00 Direction)



LMT269-150XTN01 Color Shift along the 6:00 - 12:00 Directions
(Positive Angles are along the 6:00 Direction)



LED Backlight Driving Specifications

The LMT269 LCD module has a VHB backlight with one LED strip. The LED strip has 48 white LEDs that are electrically connected into 2 groups, Each group has 3 LED 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.

The driving voltage and current for the LED strip is listed below:

LED strip driving voltage 25.3 V (typ)

LED strip driving current 360 mA

At this driving condition, the backlight delivers 1,550 Cd/m² of LCD screen luminance with the PCAP touch screen.

Projected Capacitive Touch

Items	Symbol	Specification			Unit
		Min	Typ.	Max	
Power Supply Voltage	Vdd	4.8	5.0	5.2	V
Power Supply Current	Idd		32.2	45.1	mA
Output Threshdold Voltage (High)	VOH	2.8			V
Output Threshdold Voltage (Low)	VOL			0.8	V
Differential Input Sensitivity I(D+) - (D-)	VDI	0.2			V
Differential Input Common Mode Range	VCM	0.8		2.5	V
Power Consumption	PL		161	235	mWatt

Projected Capacitive Touch Connector Pin Assignments

Connector CN1 (JST S5B-PH-SM4TB)					
Pin #	Symbol	Function	Pin #	Symbol	Function
1	V _{DD}	+5.0 V DC Input	4	GND	System Ground
2	D-	USB D-	5	NC	No Connection
3	D+	USB D+			

Thermal Management

The backlight power consumption of the LMT269 LCD module is about 18 Watts at 1,550 nits. This power will increase the temperature near the LED strip to about 50°C. Compare to a regular brightness LCD, this temperature is slightly higher but will not cause 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. Since there is a touch panel in front of the LCD, most of this heat is trapped inside and can cause a significant rise of the LCD temperature.

The LMT269-150XTN01 LCD has an operating temperature range from -30 to 85 °C, which reduces the thermal management issue. Some cooling fans can be used to maintain the LCD temperature in the operating temperature range. However, both the LED efficiency (in Lumens per Watt) and the LED life span decrease when the ambient temperature rises beyond a certain level. Thus, please implement cooling measures to maintain the LCD temperature below 60 °C to ensure good display performance and long backlight life.

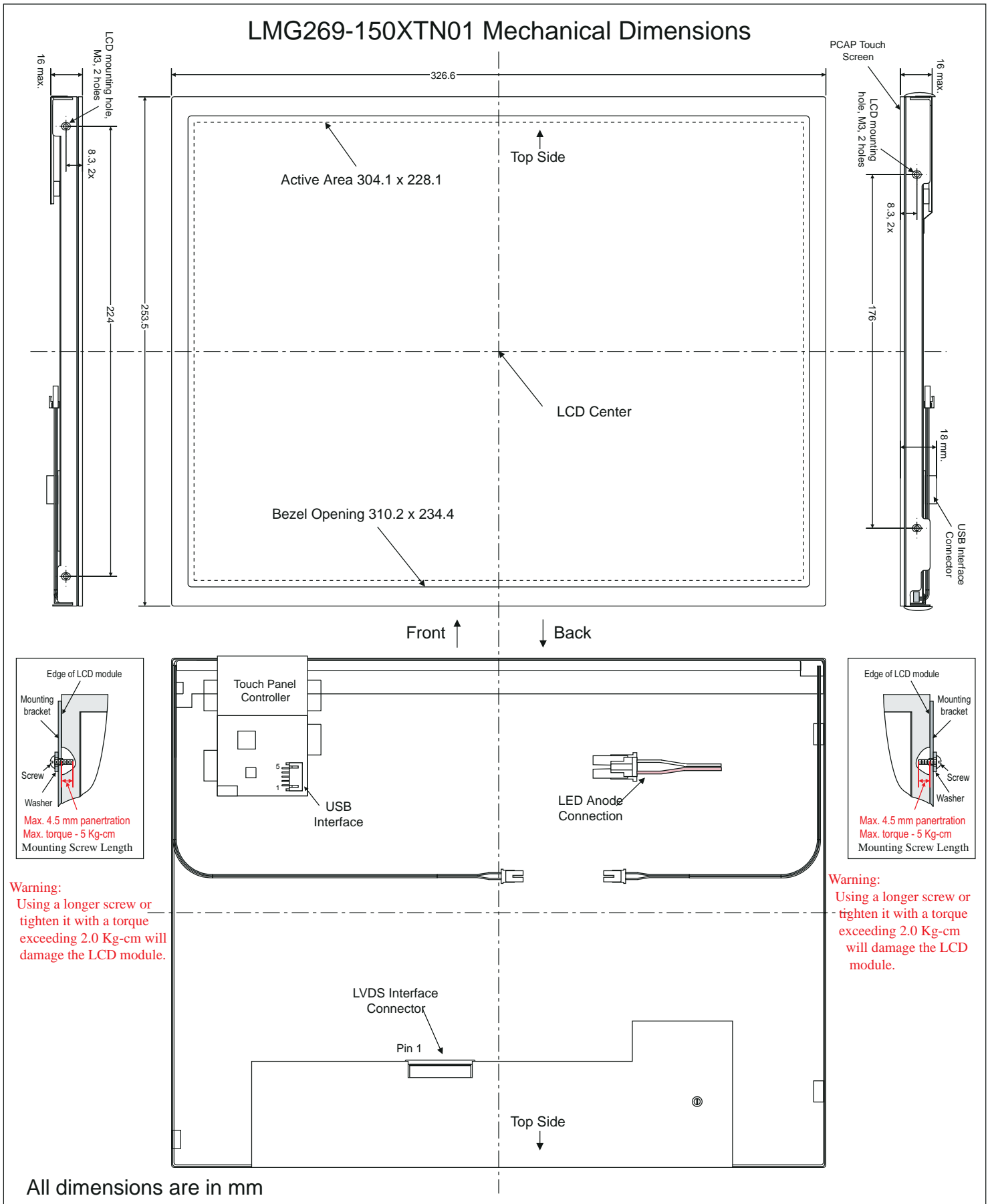
For outdoor applications in very cold weather, the ambient temperature may drop below -30° C. Therefore, the thermal management (cooling and heating) system should be designed according to the worst case conditions anticipated for the LCD to ensure that the LMT269 LCD with its LED backlight will operate properly.

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LMG269-150XTN01 Mechanical Dimensions



All dimensions are in mm