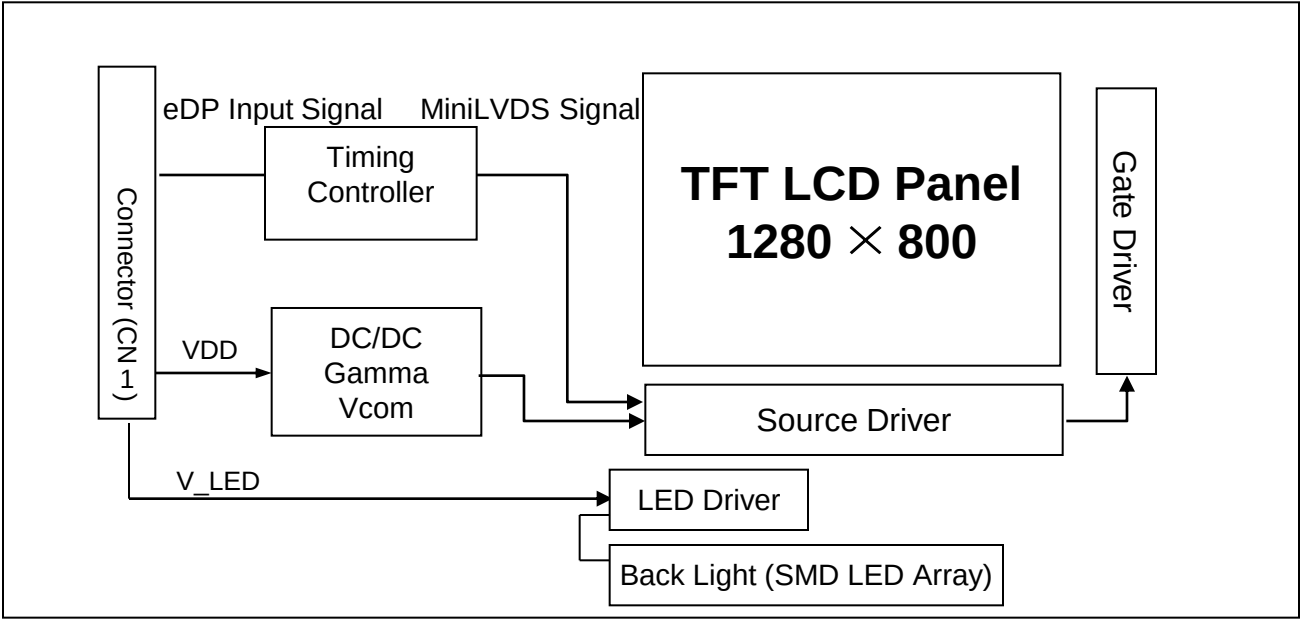


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1.0 GENERAL DESCRIPTION

1.1 Introduction

10.1WXGA is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 10.07 inch diagonally measured active area with WXGA resolutions (1280 horizontal by 800 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors. The TFT-LCD panel used for this module is adapted for a low reflection and higher color type.



1.2 Features

- 1Lane eDP1.2 Interface
- Thin and light weight
- Display 16.7M colors (Hi FRC)
- High luminance and contrast ratio, low reflection and wide viewing angle
- 3.3V for Logic Power
- RoHS Compliant

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1.3 Application

- Tablet

1.4 General Specification

< Table 1. General Specifications >

Parameter	Specification	Unit	Remarks
Active area	216.96(H) × 135.60(V)	mm	
Number of pixels	1280(H) × 800(V)	pixels	
Pixel pitch	56.5(H) × 169.5(V)	μm	
Pixel arrangement	Pixels RGB stripe arrangement		
Display colors	16.7M(6bits + Hi-FRC)	colors	
Display mode	Transmission mode. Normally Black		
Outline Dimension	228.3×149.05 × 2.4typ.	mm	
Weight	155(max)	gram	
Surface Treatment	HC Glare		
Back-light	Bottom edge side, 1-LED Lighting Bar Type		36* LED Array

2.0 ABSOLUTE MAXIMUM RATINGS

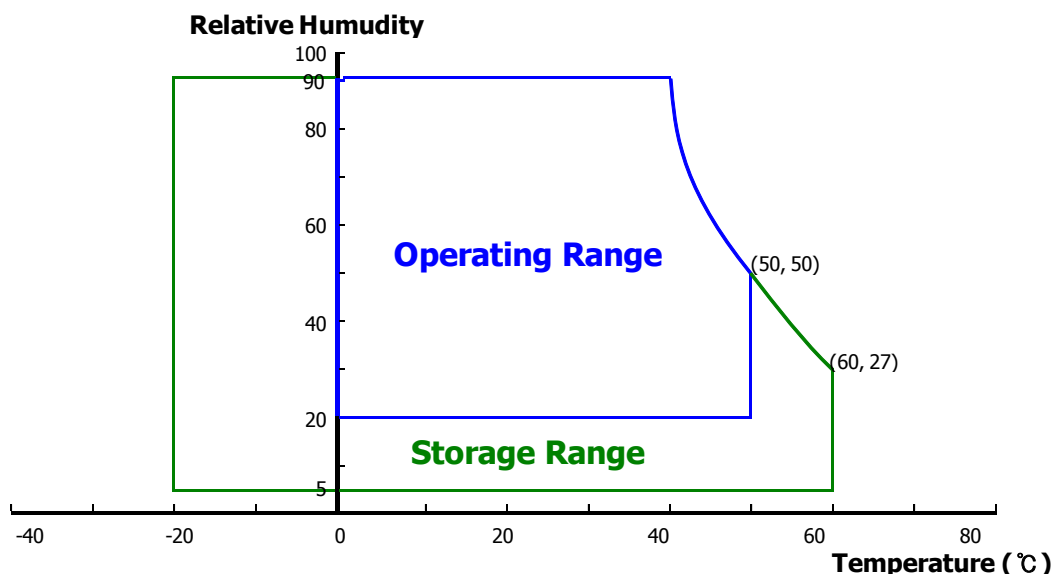
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. LCD Module Electrical Specifications >

[Ta =25±2 °C]

Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	-0.3	4.2	V	Note 1
Logic Supply Voltage	V_{IN}	$V_{SS}-0.3$	$V_{DD}+0.3$	V	
Operating Temperature	T_{OP}	-20	+60	°C	Note 2
Storage Temperature	T_{ST}	-20	+60	°C	

Note : 1) Temperature and relative humidity range are shown in the figure below.
Wet bulb temperature should be 39 °C max. and no condensation of water.



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3.0 ELECTRICAL SPECIFICATIONS

3.1 TFT LCD Module

< Table 3. LCD Module Electrical Specifications >

[Ta =25±2 °C]

Parameter		Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage	V _{DD}	3.0	3.3	3.6	V	Note 1
Power Supply Current	I _{DD}	-	212	272	mA	Note 1
Positive-going Input Thresh old Voltage	V _{IT+}	-	-	100	mV	V _{cm} = 1.2V typ.
Negative-going Input Thresh old Voltage	V _{IT-}	-100	-	-	mV	
Differential Input Voltage	V _{ID}	380	-	1200	mV	
Power Consumption	P _D	-	0.7	0.9	W	white pattern
	P _{BL}	-	1.46	1.62	W	W/I Driver
	P _{total}	-	2.16	2.52	W	

- Notes :

1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for 3.3V at 25 °C
Max value at White Pattern

2. Calculated value for reference (VLED X ILED)

3.2 Back-light Unit

< Table 4. LED Driving guideline specifications >

Ta=25+/-2°C

Parameter		Min.	Typ.	Max.	Unit	Remarks
LED Forward Voltage	V_F	-	2.9	3.0	V	-
LED Forward Current	I_F	-	14	15	mA	-
LED Power Consumption	P_{LED}	-	1.46	1.62	W	Note 1
LED Life-Time	N/A	15,000	-	-	Hour	IF = 14mA Note 2
Power supply voltage for LED Driver		V_{LED}	4.5	-	14	V
EN Control Level	Backlight on	-	2.5	-	5.0	V
	Backlight off	-	0	-	1.0	V
PWM Control Level	PWM High Level	-	2.5	-	5.0	V
	PWM Low Level	-	0	-	0.1	V
PWM Control Frequency		F_{PWM}	200	-	2K	Hz
Duty Ratio		-	5%	-	100%	%

Notes : 1. Power supply voltage 12V for LED Driver, Driver efficiency 85%,

Calculator Value for reference $IF \times VF \times 36 / 0.85 = P_{LED}$

2. The LED Life-time define as the estimated time to 50% degradation of initial luminous.

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4.0 OPTICAL SPECIFICATION

4.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1lux and temperature = 25±2℃) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. While scanning θand/or Ø, the center of the measuring spot on the Display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement. VDD shall be 3.3+/- 0.3V at 25°C. Optimum viewing angle direction is 6 'clock.

4.2 Optical Specifications

<Table 5. Optical Specifications>

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	80	85	-	Deg.	Note 1
		Θ_9		80	85	-	Deg.	
	Vertical	Θ_{12}		80	85	-	Deg.	
		Θ_6		80	85	-	Deg.	
Color Gamut				45	50	-	%	
Luminance Contrast ratio		CR	$\Theta = 0^\circ$	600	800	-		Note 2
Luminance of White	5 Points	Y_w	$\Theta = 0^\circ$	250	300	-	cd/m ²	Note 3
White Luminance uniformity	13 Points	$\Delta Y5$		62.5	71.4	-		Note 4
White Chromaticity		W_x	$\Theta = 0^\circ$	Typ. -0.03	0.314	Typ. +0.03		Note 5
		W_y			0.339			
Reproduction of color	Red	R_x	$\Theta = 0^\circ$	Typ. -0.03	0.589	Typ. +0.03		
		R_y			0.358			
	Green	G_x			0.332			
		G_y			0.567			
	Blue	B_x			0.156			
		B_y			0.116			
Response Time (Rising + Falling)		T_{RT}	Ta= 25° C $\Theta = 0^\circ$	-	30	-	ms	Note 6
Gamma Scale				2.0	2.2	2.4		
Cross Talk		CT	$\Theta = 0^\circ$	-	-	2.0	%	Note 7

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Notes : 1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

2. Contrast measurements shall be made at viewing angle of $\Theta = 0$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Center Luminance of white is defined as luminance values of 5point average across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display, the LED current is set at 20mA.

4. The White luminance uniformity on LCD surface is then expressed as : $\Delta Y = \text{Minimum Luminance of 5 (13)points} / \text{Maximum Luminance of 5(13) (points)}$ (see FIGURE 3).

5. The color chromaticity coordinates specified in Table 5 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

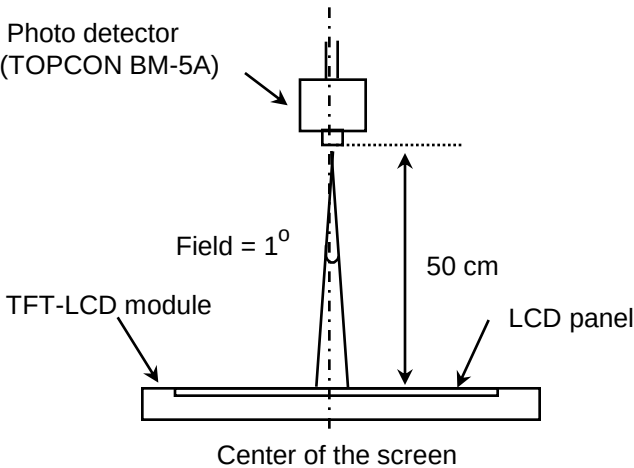
6. The electro-optical response time measurements shall be made as FIGURE 4 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

7. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (YB) of that same area when any adjacent area is driven dark. (See FIGURE 5).

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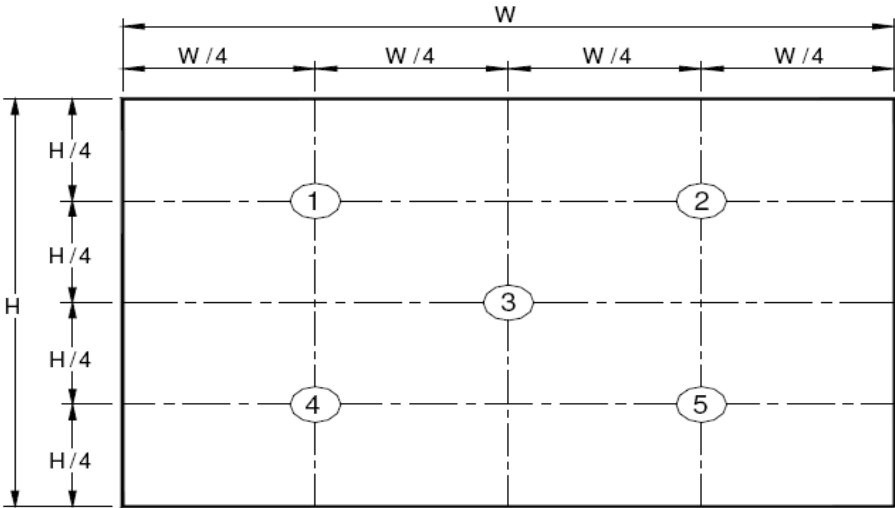
4.3 Optical measurements

Figure 1. Measurement Set Up



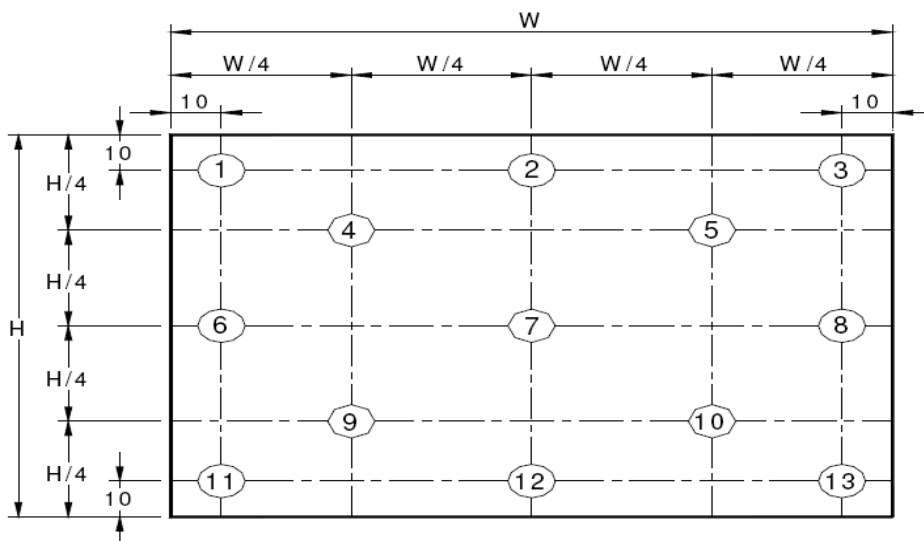
View angel range measurement setup

Figure 2. White Luminance and Uniformity Measurement Locations (5 points)



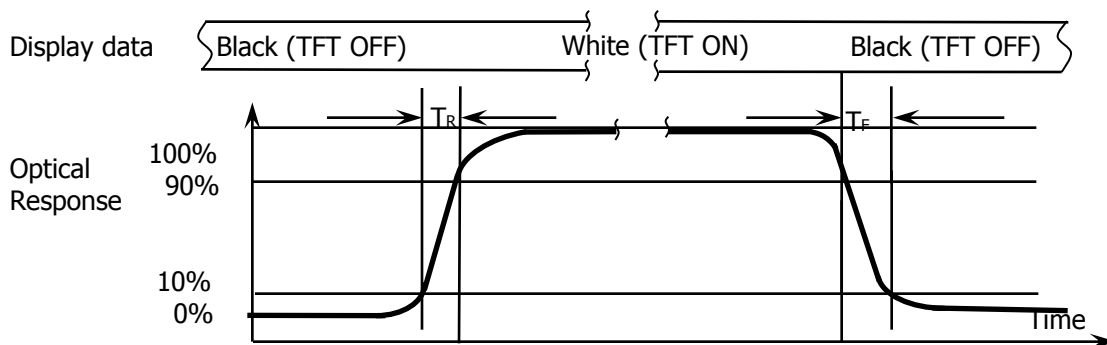
Center Luminance of white is defined as luminance values of center 5 points across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

The White luminance uniformity on LCD surface is then expressed as : $\Delta Y5 = \text{Minimum Luminance of 5 points} / \text{Maximum Luminance of 5points}$ (see FIGURE 2).

Figure 3. Uniformity Measurement Locations (13 points)

The White luminance uniformity on LCD surface is then expressed as : $\Delta Y_{13} = \text{Minimum Luminance of 13 points} / \text{Maximum Luminance of 13 points}$ (see FIGURE 3).

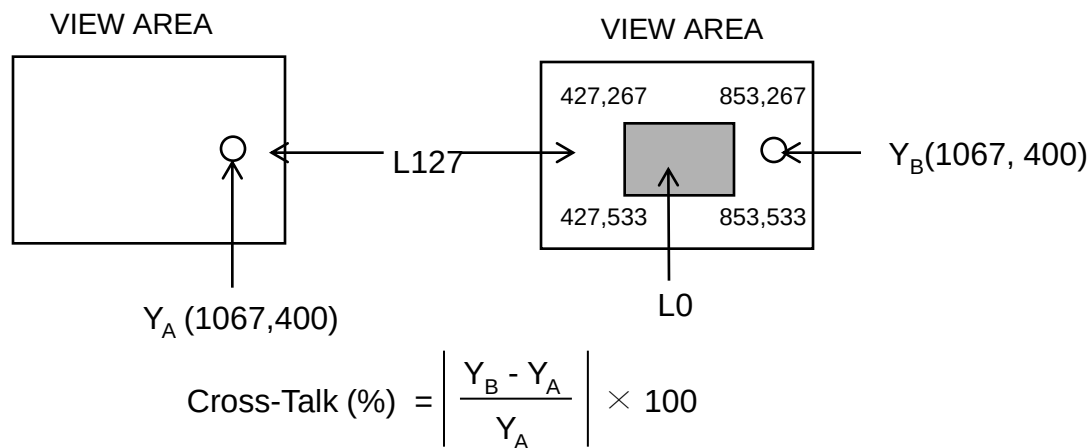
The White luminance uniformity of 5 point is the same test method as 13 point using FIGURE 2.

Figure 4. Response Time Testing

The electro-optical response time measurements shall be made as shown in FIGURE 4 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is T_r and 90% to 10% is T_d .

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Figure 5. Cross Modulation Test Description



Where:

- Y_A = Initial luminance of measured area (cd/m²)
- Y_B = Subsequent luminance of measured area (cd/m²)

The location measured will be exactly the same in both patterns.