PRODUCT SPECIFICATIONS

Preliminary Specification

Module No: GV121WXM-N80CT01

PRODUCT TYPE: TFT MODULE

VERSION: A0

Huayuan:

APPROVED BY	CHECKED BY	DESIGNED BY
		Jiang

Customer:

APPROVED BY	TESTED BY	INSPECTION RESULT

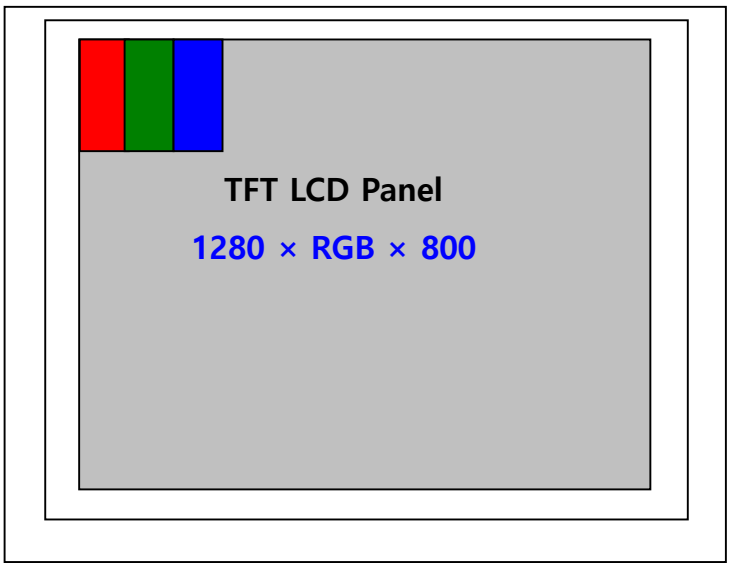
公司地址：深圳市宝安区大洋路中粮福安机器人智能产业园 15 栋 3 楼
工厂地址：湖南株洲市天元区泰山西路 1896 号高科汽配园智尚大厦 5 楼
电话：0731-28668968 传真：0731-28860280

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

GV121WXM - N80CT01 is a color active matrix TFT LCD using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 12.1 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.



1.2 Features

- GOA + dual Gate Design

1.3 Application

- HMI

1.4 General Specification

<Table 1. LCD Module Specifications>

Parameter	Specification	Unit	Remarks
LCD Size	12.1	inch	-
Active area	262.656(H)x164.16(V)	mm	-
Number of pixels	1280(H)x800(V)	pixels	-
Pixel pitch	0.2052(H)x0.2052(V)	mm	-
Pixel arrangement	RGB	-	-
Display colors	16.7M	colors	-
Display mode	Normal black	-	-
LCM Outline Dimension	278.00±0.5(W)×184.00±0.5(V) × 6.76(Max)	mm	9.91(Max)@PCB
Transmittance	6.0%	-	W/o APF
Color Gamut	Typ. 50% Min.45%	-	-
Inversion Type	2 dot inversion	-	Dual Gate
Response Time	Typ. 30ms, Max. 35ms	ms	
Power Consumption (TYP) @White pattern	Panel Power: 5.9W(含BLU) BLU Power: 5.1 W(Typ.)	W	
CR	Typ:1000 Min:800		
Brightness	Typ:450 Min:360	nits	9P
Brightness Uniformity	Typ:75% Min:70%	-	L255 @9P
Viewing angle (CR≧10)	Typ:85/85/85/85	-	Min：75
LCM Weight	535±5%	gram	
Driver IC	HX8245-E04*2	-	
Upper pol size	267.256×168.01（±0.2）	mm	HC
Lower pol size	267.256×168.11（±0.2）	mm	AG25
Interface	LVDS	-	
Crosstalk	<=2%	-	

2.0 ELECTRICAL SPECIFICATIONS

2.1 TFT LCD Module

< Table 1 . LCD Module Electrical Specifications > [Ta =25±2 ℃]

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}	-	350	450	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	-	0.8	1	W	@white pattern
	P_{BL}	-	5.1	5.6	W	W/O Driver
	P_{total}	-	5.9	6.6	W	@white pattern

Notes :
1. The supply voltage is measured and specified at the interface connector of LCM. The current draw and power consumption specified is for 3.2V at 25 ℃ Max value at White Pattern
2. Calculated value for reference (VLED X ILED)

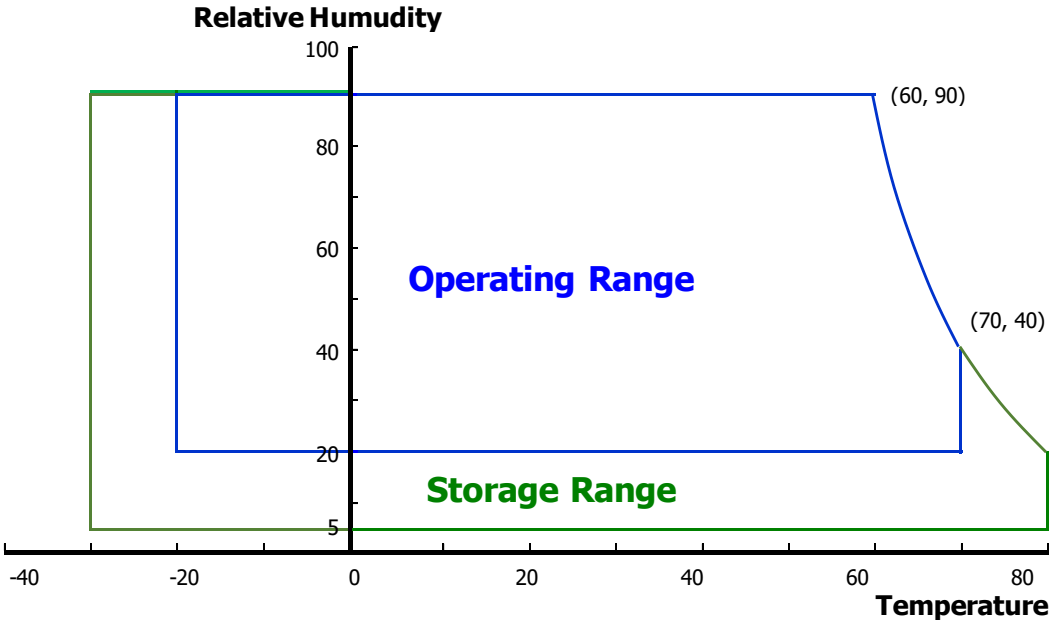
2.2 ABSOLUTE MAXIMUM RATINGS

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 ℃]

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	
BLU Supply Voltage	Vled	-0.3	12+1	V	
Operating Temperature	T_{OP}	-20	+70	℃	Note 1
Storage Temperature	T_{ST}	-30	+80	℃	

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



2.3 Power Consumption of Backlight

Test Condition : ILED=60mA LED 24PCS
Warning: LCM Brightness must match Optical Spec requirement when ILED=60mA
Backlight Unit Schematic:

Item	Symbol	Value			Unit	Remark
		Min	Typ	Max		
Forward current	IBL	-	180	-	mA	Note 1
Power Consumption	PBL	-	5100	5600	mW	
LED Quantity		24			pcs	
LED Rank		Luminous Flux: 2800			mcd	

Note 1 : When ILED=60mA, the VBL must be in the range of above table specified.
The FPC wire resistance between LED+ and LED- must be less than 0.15ohm
PBL= ILED X VBL

2.4 INTERFACE CONNECTION

2.4.1 Module Input Signal & Power

- WTB interface : 30 Pin.(LS100-L30B-C23)

<Table 3. 1Display Interface>

Pin No.	Symbol	Description
1	VLED	LED Power supply(12V)
2	VLED	LED Power supply(12V)
3	VLED	LED Power supply(12V)
4	NC	Not connect
5	ENLED	Backlight enable
6	Dimming	LED PWM control
7	GND	Ground
8	NC	Not connect
9	VCC	LCM power supply (3.3V)
10	VCC	LCM power supply (3.3V)
11	NC	NC
12	GND	Ground
13	RX0-	LVDS signal
14	RX0+	LVDS signal
15	GND	Ground
16	RX1-	LVDS signal
17	RX1+	LVDS signal
18	GND	Ground
19	RX2-	LVDS signal
20	RX2+	LVDS signal
21	GND	Ground
22	RXCLK-	LVDS signal
23	RXCLK+	LVDS signal
24	GND	Ground
25	RX3-	LVDS signal
26	RX3+	LVDS signal
27	GND	Ground
28	NC	Not connect
29	GND	Ground
30	GND	Ground

2.5 SIGNAL TIMING SPECIFICATION

2.5.1 Signal timing

ITEM	Symbol		Min	Typ	Max	Unit	Note
CLK	Period	t_{CLK}	-	-	-	ns	
	Frequency	-	-	71.88	-	MHZ	
Hsync	Period	t_{HP}	-	1440	-	t_{CLK}	HBP:12 HFP:16
	Frequency	f_H	-	-	-	KHz	
Vsync	Period	t_{VP}	-	832	-	t_{HP}	VBP:70 VFP:70
	Frequency	f_V	-	60	-	Hz	
Horizontal Active Display Term	Valid	t_{HV}	-	1280	-	t_{CLK}	Hsyn:4
	Total	t_{HP}	-	1440	-	t_{CLK}	
Vertical Active Display Term	Valid	t_{VV}	-	800	-	t_{HP}	Vsyn:20
	Total	t_{VP}	-	832	-	t_{HP}	

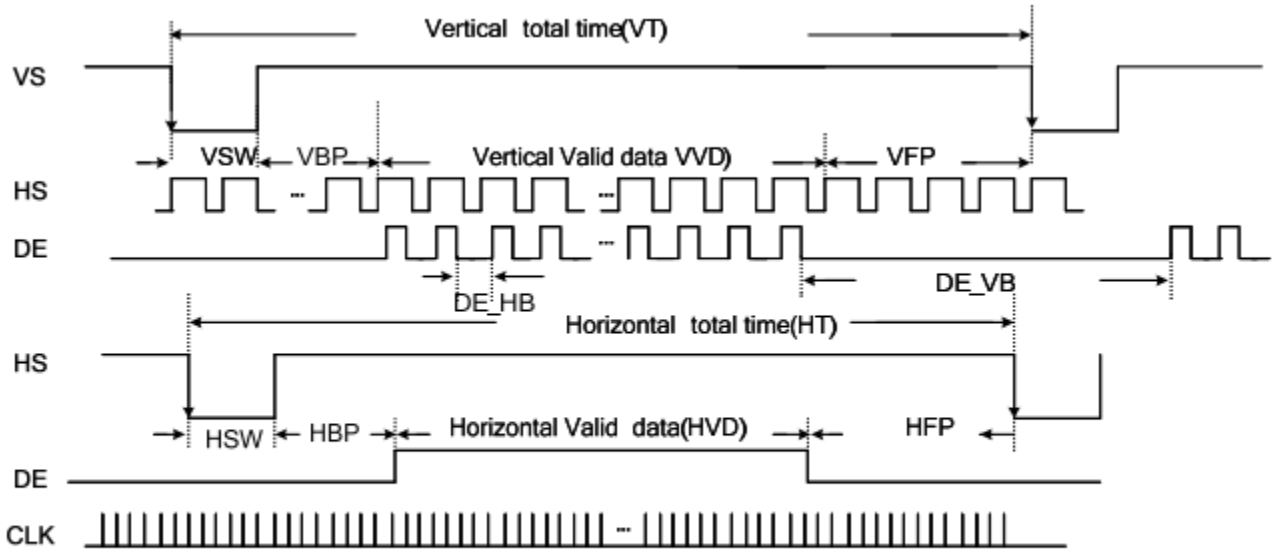
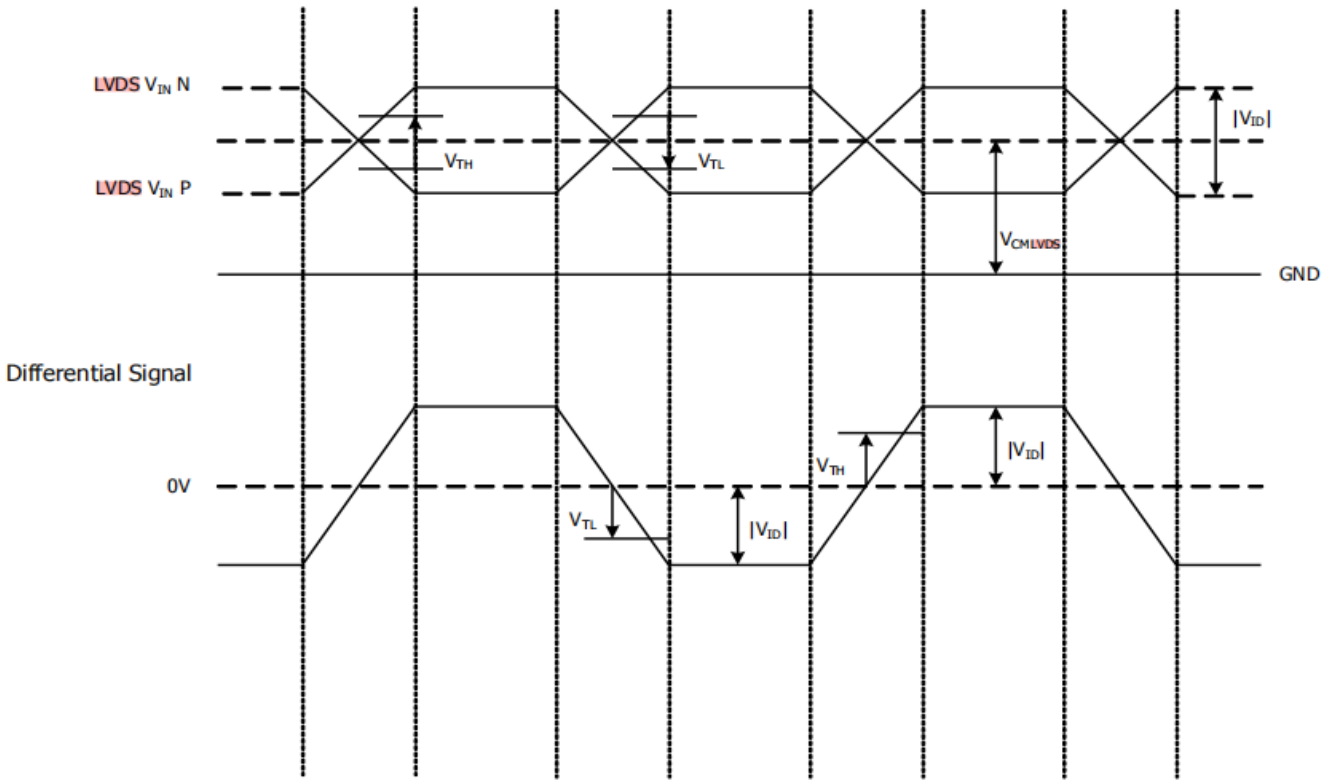


Figure 6.5: Input video signal format

2.5.2 LVDS Interface Timing Parameter

The specification of the LVDS interface timing parameter



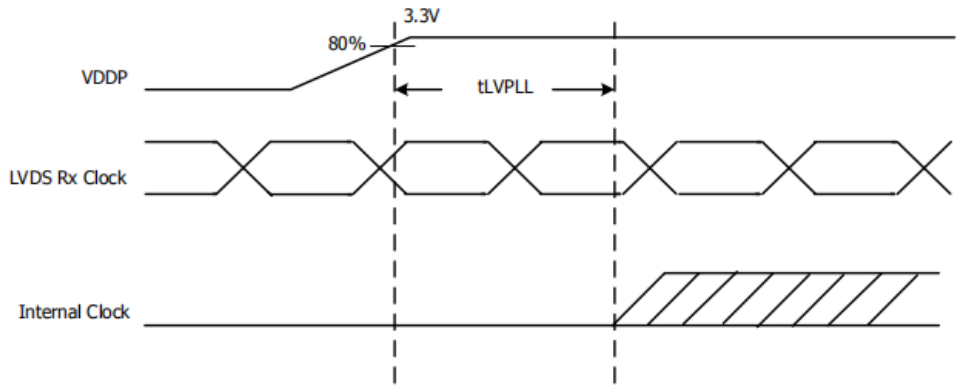
2.5.3 DC electrical character

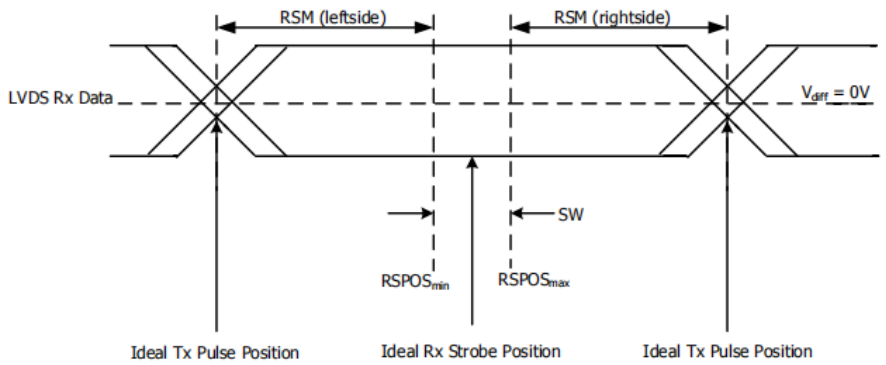
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
LVDS Input High Threshold	V_{TH}	V_{CMLVDS} = 1.2V			+100	mV
LVDS Input Low Threshold	V_{TL}	V_{CMLVDS} = 1.2V	-100			mV
Single-End Input Voltage Range	V_{IN}		0		VCC_LVDS	V
LVDS Input Common Mode Voltage	V_{CMLVDS}			1.2	VCC_LVDS-0.4-|VID|/2	V
Differential Input Voltage	$\|V_{ID}\|$		100		600	mV
Input Leakage Current	IN		-10		+10	μA

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Differential Output Voltage	VOD_MINI-LVDS[Note]	RL = 100 Ω		350		mV
Offset Voltage	VOS_MINI-LVDS[Note]			0.8/1.2		V
Output Current	|ID|			2.0		mA
Termination	RL			100		Ω

2.5.4 AC electrical character

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Clock Period	tLVCP		9.5	T	25	ns
Clock Frequency	1/tLVCP		40		105	MHz
Clock High Time	tLVCH			4T/7		ns
Clock Low Time	tLVCL			3T/7		ns
PLL Wake-Up Time	tLVPLL				1	ms
Strobe Width	tSW	V_{CMLVDS} =1.2V |VID|=400mV @65MHz	200			ps
Receiver Strobe Margin	tRSM		400			ps

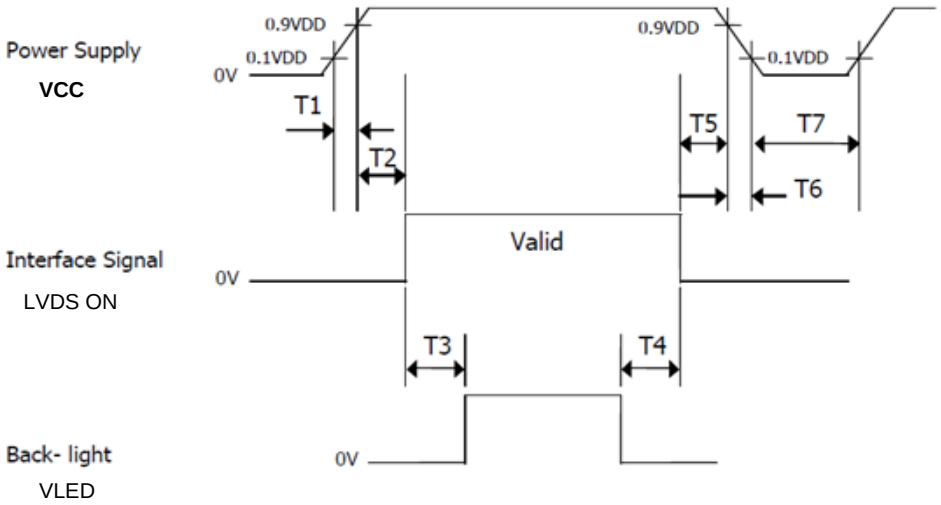




2.5.5 POWER SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below

Power-On/Off Timing Sequence:



Parameter	Values			Units
	Min	Typ	Max	
T1	0	-	10	ms
T2	0	-	50	ms
T3	200	-	-	ms
T4	200	-	-	ms
T5	0.5	-	50	ms
T6	0	-	10	ms
T7	500	-	-	ms

Notes:

1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on. Back Light must be turn on after power for logic and interface signal are valid.

3.0 Optical Specifications

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = 25±2℃) with the equipment of Luminance meter system (CA-310、BM-5A) 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°. We refer to $\theta_{Ø=0}$ (=θ_3) as the 3 o'clock direction (the "right"), $\theta_{Ø=90}$ (= θ_{12}) as the 12 o'clock direction ("upward"), $\theta_{Ø=180}$ (= θ_9) as the 9 o'clock direction ("left") and $\theta_{Ø=270}$(= θ_6) as the 6 o'clock direction ("bottom"). While scanning θ and/or Ø, the center of the measuring spot on the Display surface shall stay fixed. The measurement shall be executed after 30 minutes warm-up period. VDD shall be 3.3V +/-10% at 25°C. Optimum viewing angle direction is 6 'clock.

Item		Symbol	Condition	Value			Unit	Note
				Min	Typ	Max		
luminance		Bp	θ=0 Φ=0	360	450	--	cd/m2	Note 3
Maximum Brightness of Black Pattern		Bblk		---	---	0.65	cd/m2	
Uniformity		△Bp		70	75	--	%	Note 4
Color Uniformity		△u'△ v'-A				TBD		
		△u'△ v'-B				TBD		
		△E*ab				TBD		
Viewing Angle	Left	θ_L	Cr≥10	75	85	--	deg	Note 1
	Right	θ_R		75	85	--		
	Top	ψ_T		75	85	--		
	Bottom	ψ_B		75	85	--		
Contrast Ratio		Cr	θ=0 Φ=0	8000	1000	--	-	Note 2
Response Time		Tr+Tf		--	30	35	ms	Note 6
		Tgray		-	45	55	ms	
Color Coordinate of CIE1931	Red	**x**	θ=0 Φ=0	0.561	0.591	0.621	-	Note 5
		y		0.324	0.354	0.384		
	Green	**x**		0.312	0.342	0.372		
		y		0.570	0.600	0.630		
	Blue	**x**		0.125	0.155	0.185		
		y		0.099	0.129	0.159		
	White	**x**		0.273	0.303	0.333		
		y		0.303	0.333	0.363		
NTSC Ratio		NTSC	CEI1931	45	50	55	%	

Note :

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 Θ= 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 1point 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 luminance is measured by CA310 when the LED current is set at 16.8mA.

.

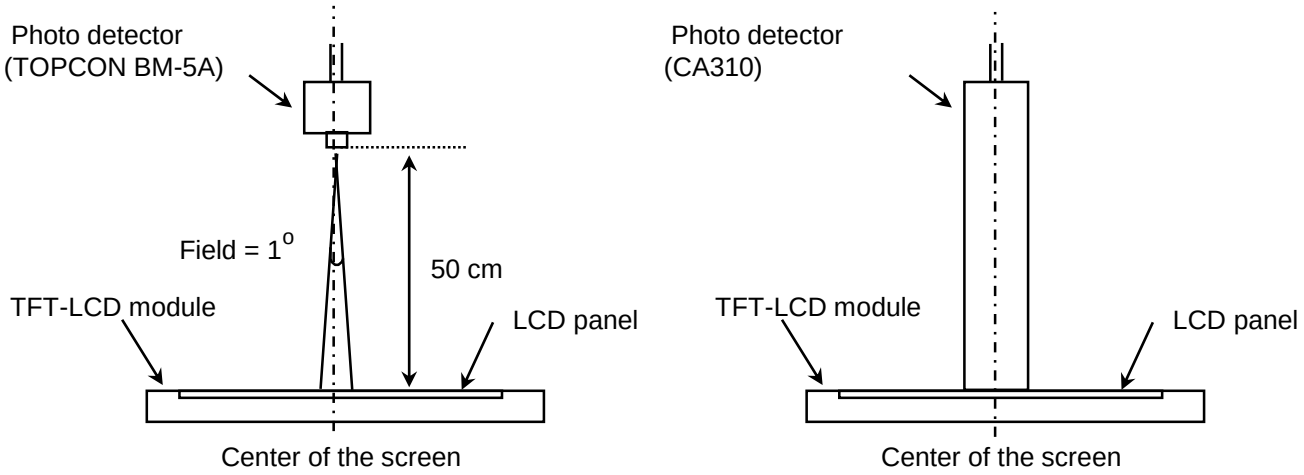
4. The White luminance uniformity on LCD surface is then expressed as : ΔY = Minimum Luminance of 13points / Maximum Luminance of 13points (see FIGURE 3).

5. The color chromaticity coordinates specified 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 color chromaticity coordinates specified 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.

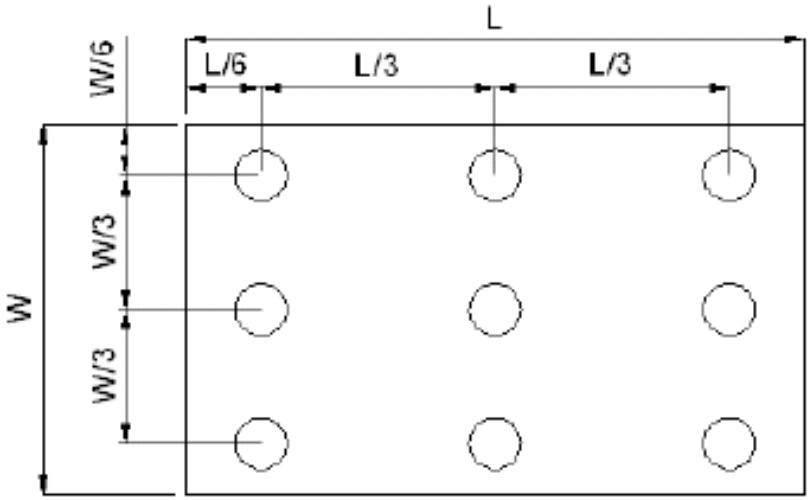
7. The electro-optical response time measurements shall be made as FIGURE 4 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

Figure 1. Measurement Set Up



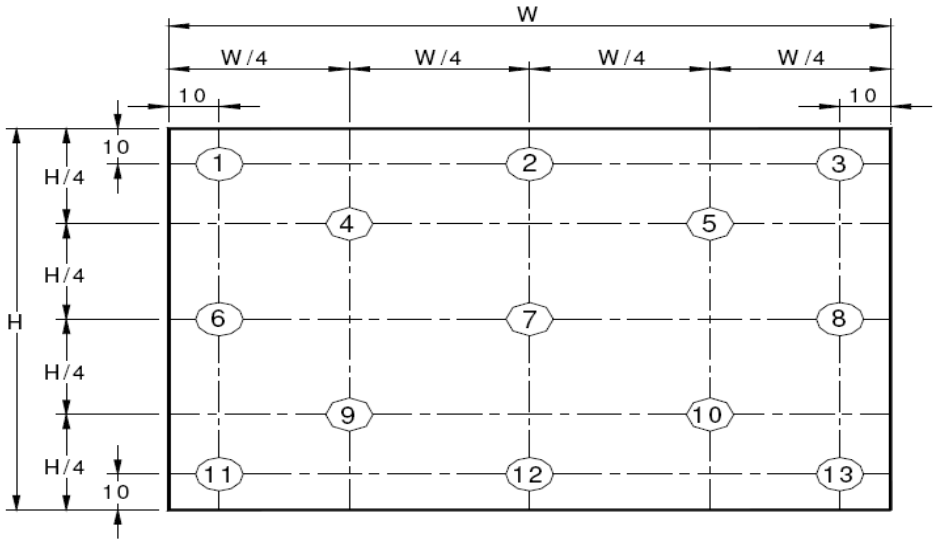
View angel range measurement setup Luminance , uniformity and color measurement setup

Figure 2. White Luminance and Uniformity Measurement Locations (9 points)



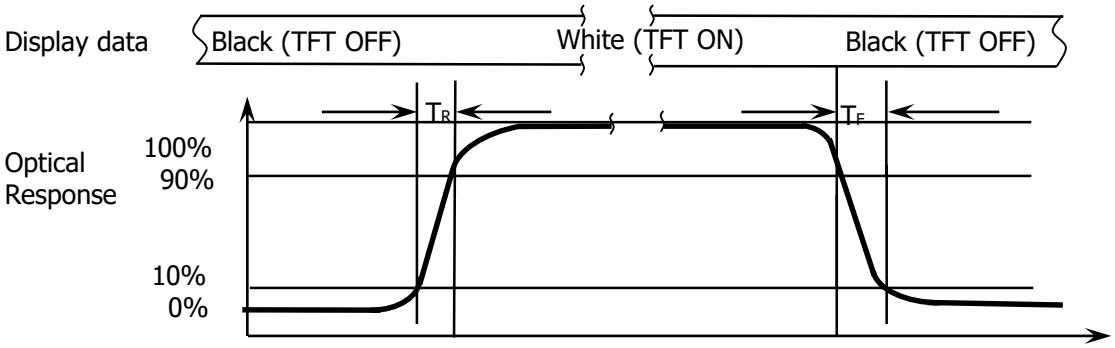
Center Luminance of white is defined as luminance values of center 5 points across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.
The White luminance uniformity on LCD surface is then expressed as : ΔY9 = Minimum Luminance of 9points / Maximum Luminance of 9points (see FIGURE 2).

Figure 3. Uniformity Measurement Locations (13 points)



The White luminance uniformity on LCD surface is then expressed as : ΔY13 = Minimum Luminance of 13 points /Maximum Luminance of 13 points (see FIGURE 3).
The White luminance uniformity of 5 point is the same test method as 13 point u sing FIGURE 3.

Figure 4. Response Time Testing



The electro-optical response time measurements shall be made as shown in FIGURE 3 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.

4.0 Reliability Test

No	Test Item	Test Condition	Remark
1	High temperature storage	80℃，240hr	-
2	Low temperature storage	--30℃，240hr	
3	High temperature/High humidity operating	60℃，90%,240hr	
4	High temperature operating	70℃，240hr	
5	Low temperature operating	-20℃，240hr	
6	Thermal Shock Storage	-30~70℃，1hr/Cycle，100Cycles	
7	ESD test (Component-LCD MDL)	Contact ±4KV；Air ±8KV	
8	Image Sticking	Burn in 5*5 chess board 1h@25℃，Inspection @L127 5s消失	

7.0 Handling & Cautions

7.1 Mounting Method

- The panel of the LCD consists of two thin glasses with polarizers which easily get damaged. So extreme care should be taken when handling the LCD.
- Excessive stress or pressure on the glass of the LCD should be avoided. Care must be taken to insure that no torsional or compressive forces are applied to the LCD unit when it is mounted.
- If the customer's set presses the main parts of the LCD, the LCD may show the abnormal display. But this phenomenon does not mean the malfunction of the LCD and should be pressed by the way of mutual agreement.
- To determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.
- Mount a LCD module with the specified mounting parts.

7.2 Caution of LCD Handling and Cleaning

- Since the LCD is made of glass, do not apply strong mechanical impact or static load onto it. Handling with care since shock, vibration, and careless handling may seriously affect the product. If it falls from a high place or receives a strong shock, the glass may be broken.
- The polarizers on the surface of panel are made from organic substances. Be very careful for chemicals not to touch the polarizers or it leads the polarizers to be deteriorated.
- If the use of a chemical is unavoidable, use soft cloth with solvent（recommended below）to clean the LCD ‘s surface with wipe lightly.
  -IPA(Isopropyl Alcohol), Ethyl Alcohol, Trichlorotriflorothane
- Do not wipe the LCD's surface with dry or hard materials that will damage the polarizers and others. Do not use the following solvent.
  -Water, Ketone, Aromatics
- It is recommended that the LCD be handled with soft gloves during assembly, etc. The polarizers on the LCD's surface are vulnerable to scratch and thus to be damaged by sharp particles.
- Do not drop water or any chemicals onto the LCD's surface.
- A protective film is supplied on the LCD and should be left in place until the LCD is required for operation.
- The ITO pad area needs special careful caution because it could be easily corroded. Do not contact the ITO pad area with HCFC,Soldering flux,Chlorine,Sulfur,saliva or fingerprint. To prevent the ITO corrosion, customers are recommended that the ITO area would be covered by UV or silicon.

7.3 Caution Against Static Charge

- The LCD modules use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipments to protect against static electricity.
- Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, If possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.
- Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
- In handling the LCD, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary.

7.4 Caution For operation

- It is indispensable to drive the LCD within the specified voltage limit since the higher Voltage than the limit causes the shorter LCD's life. An electro-chemical reaction due to DC causes undesirable deterioration of the LCD so that the use of DC drive should avoid.
- Do not connect or disconnect the LCD to or from the system when power is on.
- Never use the LCD under abnormal conditions of high temperature and high humidity.
- When expose to drastic fluctuation of temperature (hot to cold or cold to hot) ,the LCD may be affected; Specifically, drastic temperature fluctuation from cold to hot ,produces dew on the LCD's surface which may affect the operation of the polarizer and the LCD.
- Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD may turn black at temperature above its operational range. However those phenomena do not mean malfunction or out of order with the LCD. The LCD will revert to normal operation once the temperature returns to the recommended temperature range for normal operation.
- Do not display the fixed pattern for a long time because it may develop image sticking due to the LCD structure. If the screen is displayed with fixed pattern, use a screen saver.

7.5 Packaging

- Modules use LCD element, and must be treated as such.
  -Avoid intense shock and falls from a height.
  -To prevent modules from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity for long periods.

7.6 Storage

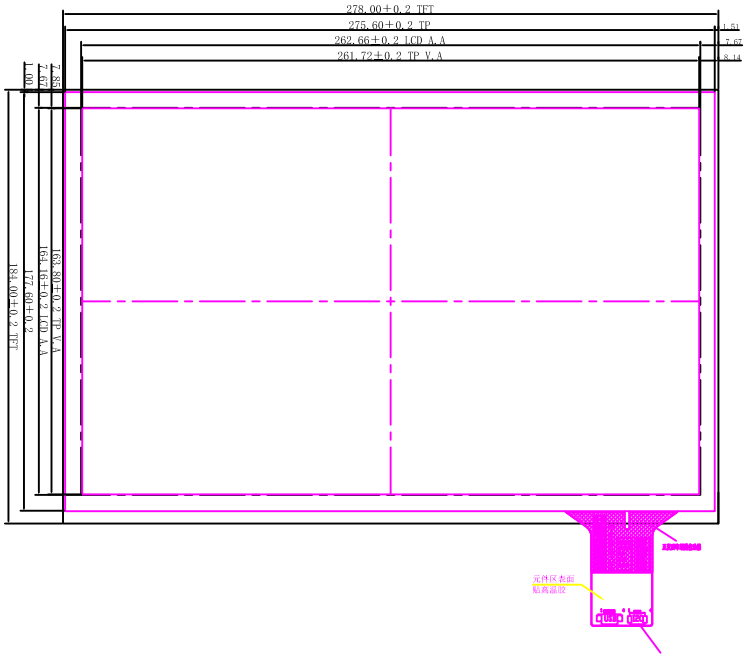
- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit. Relative humidity of the environment should therefore be kept below 60%RH.
- Original protective film should be used on LCD’ s surface (polarizer). Adhesive type protective film should be avoided, because it may change color and/or properties of the polarizers.
- Do not store the LCD near organic solvents or corrosive gasses.
- Keep the LCD safe from vibration, shock and pressure.
- Black or white air-bubbles may be produced if the LCD is stored for long time in the lower temperature or mechanical shocks are applied onto the LCD.
- In the case of storing for a long period of time for the purpose or replacement use, the following ways are recommended.
  -Store in a polyethylene bag with sealed so as not to enter fresh air outside in it.
  -Store in a dark place where neither exposure to direct sunlight nor light is.
  -Keep temperature in the specified storage temperature range.
  -Store with no touch on polarizer surface by the anything else. If possible, store the LCD in the packaging situation LCD when it was delivered.

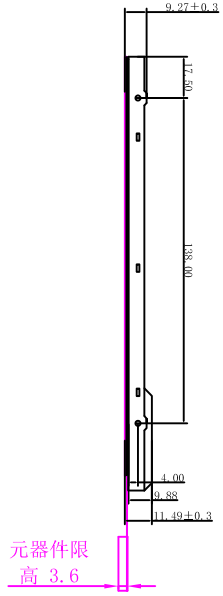
7.7 Safety

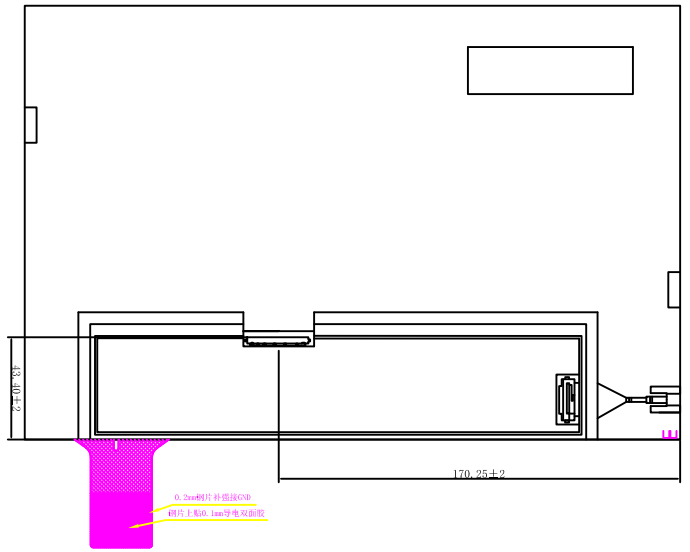
- For the crash damaged or unnecessary LCD, it is recommended to wash off liquid crystal by either of solvents such as acetone and ethanol an should be burned up later.
- In the case the LCD is broken, watch out whether liquid crystal leaks out or not. If your hands touch the liquid crystal, wash your hands cleanly with water an soap as soon as possible.
- If you should swallow the liquid crystal, first, wash your mouth thoroughly with water, then drink a lot of water and induce vomiting, and then, consult a physician.
- If the liquid crystal should get in your eyes, flush your eyes with running water for at least fifteen minutes.
- If the liquid crystal touches your skin or clothes, remove it and wash the affected part of your skin or clothes with soap and running water.

图纸名称：工程图　　版本：　A /0

正视图　　侧视图　　背视图







技术参数：
1. IC：GT9271
CG:0.7mm
SCA:0.2mm
ITO SENSOR:0.55mm
引　线:FPC (PINCH=1.25/0.5mm)
总厚度：1.45±0.15mm(不含辅料)
2. 工作电压：5V/3.3 V
3. 透光率：≥85%
4. 表面硬度：6H
5. 工作环境：-20℃~+70℃，≤90%RH
6. 储存环境：-30℃~+80℃，≤90%RH
7. 未注尺寸公差按±0.2mm

USB

PIN	Define
1	+5V
2	D-
3	D+
4	GND

I2C

PIN	Define
1	RST
2	VDD(3.3V)
3	GND
4	INT
5	SDA
6	SCL

设　计	THD	产品型号	12.1 TFT LCM
审　核	JC	规格名称	12.1寸彩屏
批　准	JC	产品代码	
日　期	2023-02-04	制订部门	研发部

更改单号	更改内容	签名	日期

比　例	单　位	第　页	版　次
1:1	mm	共　页 A/0	

深圳市华源显控技术股份有限公司
www.huayuan-lcd.com

由 Autodesk 教育版产品制作