深圳显旸光电科技有限公司
Shenzhen Xianyang Optoelectronic Technology Co., Ltd

LCD MODULE SPECIFICATION

Customer: ____________________________

Module No.: XY050HDV35CT2-H1311A

Date: 2022-04-27

Version: 3.0

For Customer's Acceptance:

Approved by	Comment

Approved by	Checked by	Prepared by

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Record of Revision

Rev.	Date	Description	Editor
1.0	2022-2-18	First release	ping.Yang
2.0	2020-4-23	Add led life time	ping.Yang
3.0	2022-4-27	Update parameter	lin.Zhong

1 General Specifications

No.	Item	Specification	Remark
1	LCD Size	5.0 inch (Diagonal)	
2	Driver Element	a-Si TFT active matrix	
3	Resolution	720 (RGB) ×1280	
4	Display Mode	Normally Black, Transmissive	
5	Pixel Pitch	0.08625 (H) × 0.08625 (V)	
6	Display Colors	16.7M	
7	Surface Treatment	--	
8	Color Arrangement	RGB-Stripe	
9	Interface	MIPI	
10	Viewing Direction	All	
11	Gray Scale Inversion Direction	/	Note 1
12	OuXYine Dimension (mm)	70.70 (W) × 130.2 (H) × 3.02(T)	
13	Active Area (mm)	62.1 (W) × 110.4 (H)	
14	Touch Screen	With CTP	
15	Display Driver IC	ILI9881C	
16	Touch Driver IC	GT911	

Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180°shift.

Note 2: RoHS compliant.

2 Pin Assignment

2.1 LCD Pin assignment

Match connector: FH26-25S-0.3SHW(hirose) or equivalent

PIN	Symbol	I/O	Description	Remark
1	NC	--		
2	VDD	P	Power Supply 2.8V	
3	IOVCC	P	Power Supply 1.8V-2.8V	
4	NC	--		
5	LRESET	I	LCM Reset input signal	
6	TE	I	Tearing effect output	
7	NC	--		
8	LEDN	P	LED Cathode	
9	LEDP	P	LED Anode	
10	GND	P	Ground	
11	D0N	I/O	DSI-D0- data signals	
12	D0P	I/O	DSI-D0+ data signals	
13	GND	P	Ground	
14	CLKN	I	DSI-Clock-	
15	CLKP	I	DSI-Clock+	
16	GND	P	Ground	
17	D1N	I	DSI-D1- data signals	
18	D1P	I	DSI-D1+ data signals	
19	GND	P	Ground	
20	D2P	I	DSI-D2+ data signals	
21	D2N	I	DSI-D2- data signals	
22	GND	P	Ground	
23	D3P	I	DSI-D3+ data signals	
24	D3N	I	DSI-D3- data signals	
25	GND	P	Ground	

I---Input, O---Output, P--- Power/Ground

2.2 Touch panel pin assignment

Match connector: XF2M-0615-1A by OMRON or equivalent

No.	Symbol	Description
1	TP-SDA(1.8V)	I2C_SDA
2	TP-SCL(1.8V)	I2C _SCL
3	RESET(1.8V)	External reset
4	INT(1.8V)	External interrupt
5	VCC(2.8V)	2.8V Power
6	GND	Ground

3 Absolute Maximum Ratings

Ta = 25℃

Item	Symbol	Min.	Max.	Unit	Remark
Power Voltage	VDD	-0.30	+6.6	V	
	IOVCC	-0.30	+5.5	V	
	VCC(2.8V)	-0.30	+3.6	V	TP Power
Operating Temperature	Top	-20.0	70.0	℃	
Storage Temperature	T_{st}	-30.0	80.0	℃	
Operating and Storage Humidity	H_{stg}	10%	90%	%(RH)	

4. Electrical Characteristics

4.1 Recommended Operating Condition

VDD=3.3V，GND=0V，Ta = 25℃

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Digital supply Voltage		IOVCC	1.65	1.8	3.3	V	
Analog supply Voltage		VDD	2.5	2.8	3.3	V	
TP Power		VCC(2.8V)	2.8	-	3.3	V	TP Power
Input Signal Voltage	Low Level	V_{IL}	0	-	0.3 x IOVCC	V	
	High Level	V_{IH}	0.7 x IOVCC	-	IOVCC	V	
Current of digital supply voltage		I_{IOVCC}	-	-	10	mA	VDD=3.3V, color bar pattern
Current of analog supply voltage		I_{DD}	-	-	50	mA	

4.2 Backlight Unit Driving Condition

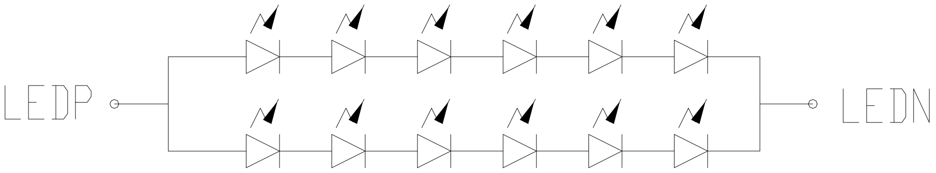
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Forward Current	I_F	-	40	50	mA	12 LEDs (6 LED Serial, 2 LED Parallel)
Forward Current Voltage	V_F	-	19.2	21	V	
Backlight Power Consumption	W_{BL}	-	768	1050	mW	
Operating Life Time	--	20000	--	--	hrs	Note 2, Note 3

Note1: The LED driving condition is defined for each module (6 LED Serial, 2 LED Parallel).

Note2: When LCM is operated, the stable forward current should be inputted. And forward voltage is for reference only.

Note3: Optical performance should be evaluated at Ta=25℃ When LED is driven at high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

Note4: The LED driving condition is defined for each LED module.



5 Timing Chart

5.1 DSI Interface Timing Characteristics: high speed mode-clock channel timing

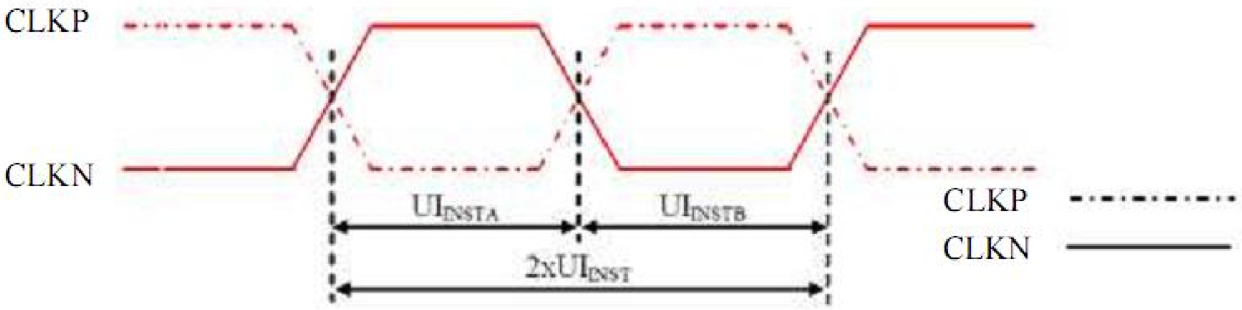


Figure : DSI Clock Channel Timing

Table : DSI Clock Channel Timing

Signal	Symbol	Parameter	Min	Max	Unit
CLKP/N	2xUI$_{INST}$	Double UI instantaneous	*Note 2*	25	ns
CLKP/N	UI$_{INSTA}$,UI$_{INSTB}$ (Note 1)	UI instantaneous Half	*Note 2*	12.5	ns

Notes:

1. UI = UIINSTA = UIINSTB

2. Define the minimum value, see Table .

Table : Limited Clock Channel Speed

Data type	Two Lanes speed	Three Lanes speed	Four Lanes speed
Data Type = 00 1110 (0Eh), RGB 565, 16 UI per Pixel	566 Mbps	466 Mbps	366 Mbps
Data Type = 01 1110 (1Eh), RGB 666, 18 UI per Pixel	637 Mbps	525 Mbps	412 Mbps
Data Type = 10 1110 (2Eh), RGB 666 Loosely, 24 UI per Pixel	850 Mbps	700 Mbps	550 Mbps
Data Type = 11 1110 (3Eh), RGB 888, 24 UI per Pixel	850 Mbps	700 Mbps	550 Mbps

5.2 High speed mode-Data Clock Channel Timing

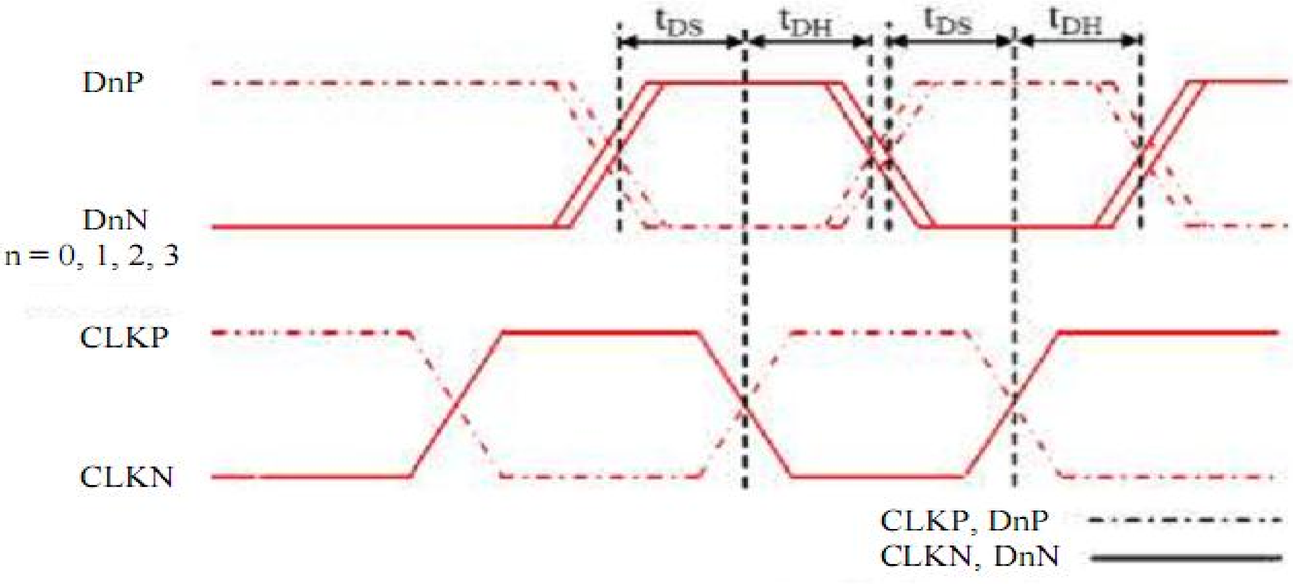
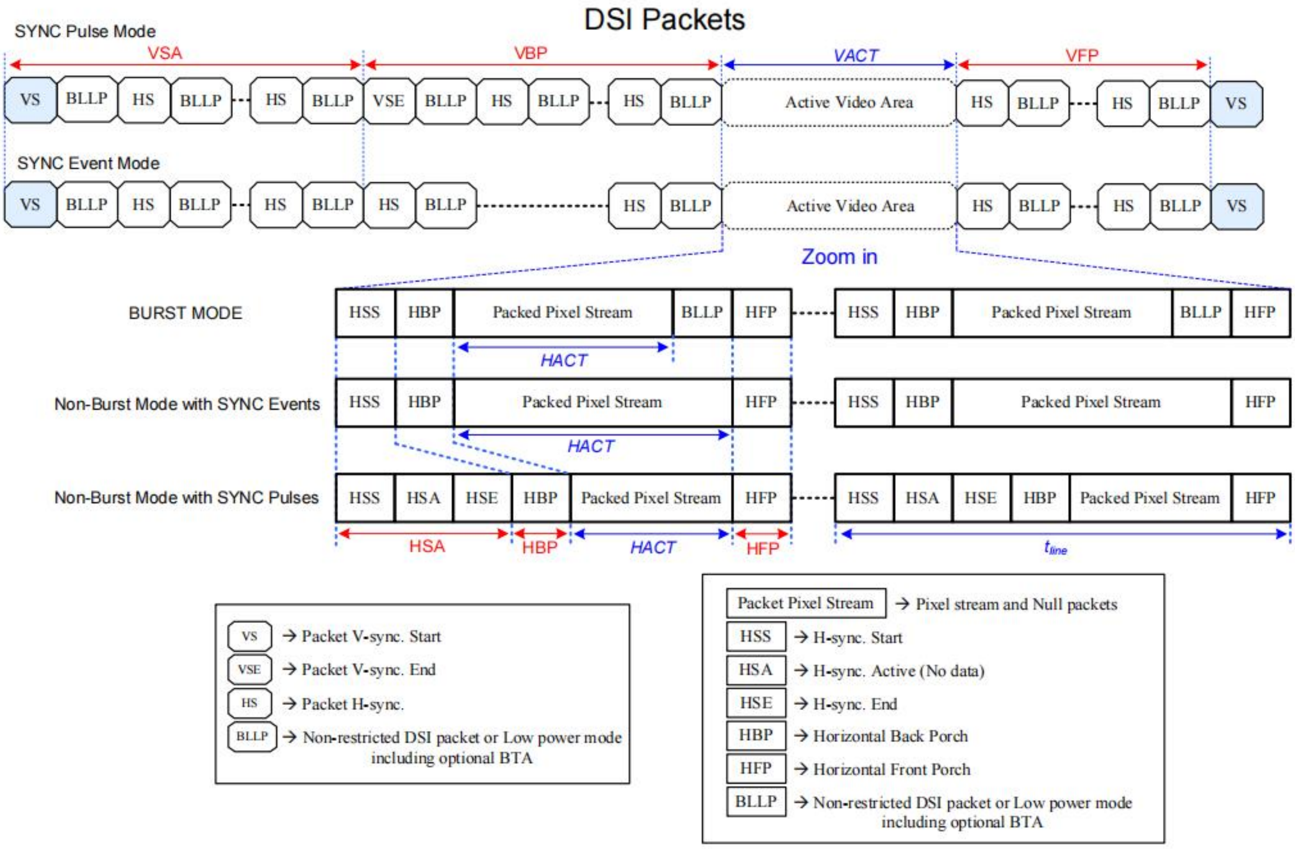

t_{DS}
t_{DH}
t_{DS}
t_{DH}
DnP
DnN
n = 0, 1, 2, 3
CLKP
CLKN
CLKP, DnP
CLKN, DnN

Figure : DSI Data to Clock Channel Timings

Table : DSI Data to Clock Channel Timings

Signal	Symbol	Parameter	Min	Max
DnP/N , n=0 and 1	t_{DS}	Data to Clock Setup time	0.15xUI	-
	t_{DH}	Clock to Data Hold Time	0.15xUI	-

5.3 Timing for DSI video mode


DSI Packets
SYNC Pulse Mode
VSA
VBP
VACT
VFP
VS
BLLP
HS
VSE
Active Video Area
SYNC Event Mode
Zoom in
BURST MODE
Non-Burst Mode with SYNC Events
Non-Burst Mode with SYNC Pulses
HSS
HBP
Packed Pixel Stream
HFP
HSA
HSE
HACT
t_{line}
VS → Packet V-sync. Start
VSE → Packet V-sync. End
HS → Packet H-sync.
BLLP → Non-restricted DSI packet or Low power mode including optional BTA
Packet Pixel Stream → Pixel stream and Null packets
HSS → H-sync. Start
HSA → H-sync. Active (No data)
HSE → H-sync. End
HBP → Horizontal Back Porch
HFP → Horizontal Front Porch
BLLP → Non-restricted DSI packet or Low power mode including optional BTA

Parameters	Symbols	Min.	Typ.	Max.	Units
Vertical sync. active	VSA	2 (Note 6)	-	-	Line
Vertical Back Porch	VBP	14 (Note 6)	-	-	Line
Vertical Front Porch	VFP	8 (Note 6)	-	-	Line
Active lines per frame	VACT	-	1280	-	Line
Horizontal sync. active	HSA	2	-	-	Pixel
Horizontal Porch period	HSA + HBP + HFP	1.6	-	-	us
Active pixels per line	HACT	-	720	-	Pixel
Bit rate	BR_{bps}	385		Note 5	Mbps/lane

1 UI=1/Bit rate

HSA(pixel)= (tHSA*lane number) / (UI* pixel format)

HBP(pixel)= (tHBP*lane number) / (UI* pixel format)

HFP(pixel)= (tHFP*lane number) / (UI* pixel format)

$$\text{Frame Rate} = \frac{BR_{bps} \times Lane_{num}}{(VACT+VSA+VBP+VFP) \times (HACT+HSA+HBP+HFP) \times \text{Pixel Format}}$$

Example：BR_{bps} = 457Mbps/lane, 1UI=2.1883ns, Frame rate=60Hz, VACT=1280, VSA=2, VBP=30, VFP=20, HACT=720, HSA=33, HBP=100, HFP=100, $Lane_{num}$=4(lane), Pixel Format=24(bit).

5.4 Reset input timing

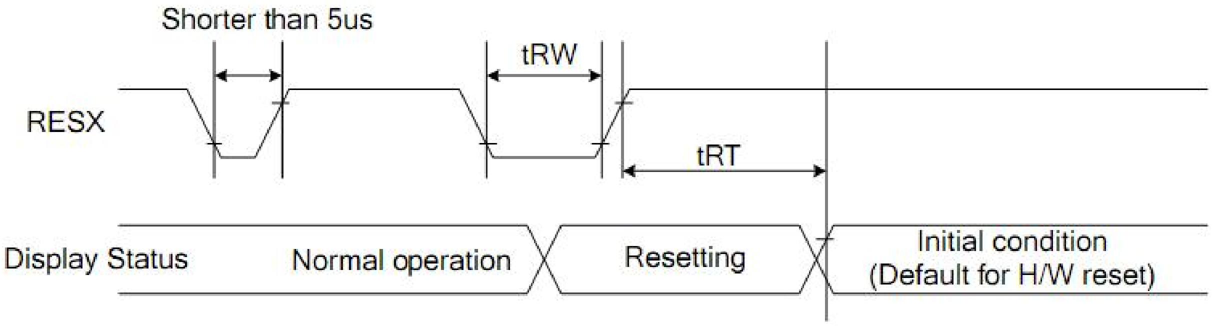
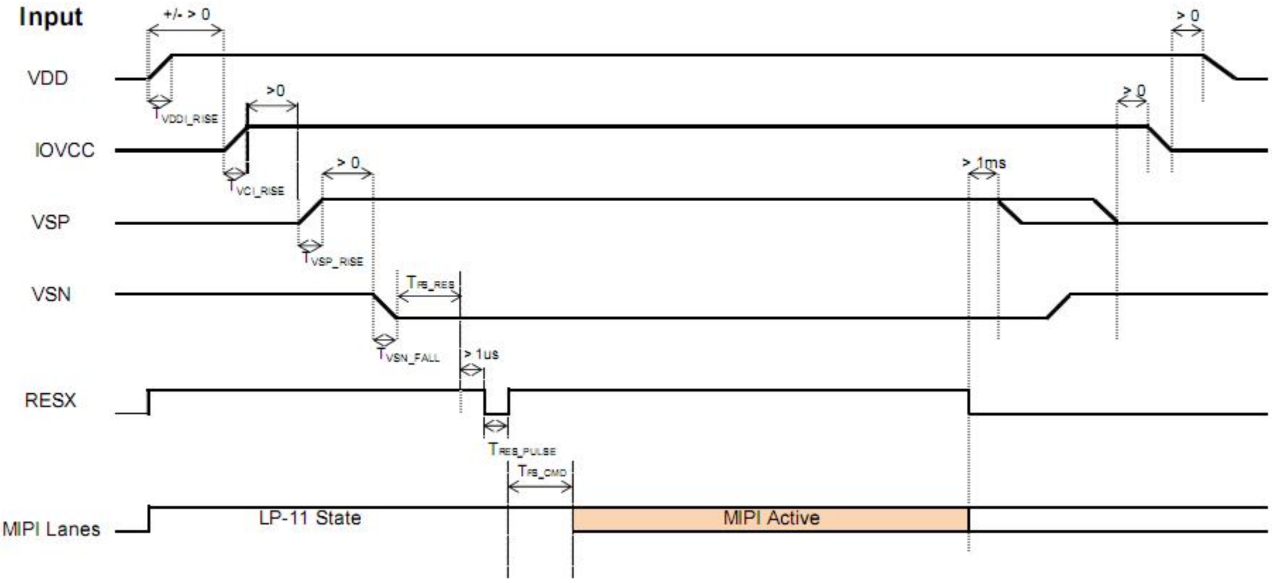

Shorter than 5us
tRW
RESX
tRT
Display Status
Normal operation
Resetting
Initial condition
(Default for H/W reset)

Figure : Reset Timing

Table : Reset Timing

Signal	Symbol	Parameter	Min	Max	Unit
RESX	tRW	Reset pulse duration	10		uS
	tRT	Reset cancel		5 (note 1,5)	mS
				120 (note 1,6,7)	mS

5.5 Power On Timing


Input
+/- > 0
VDD
T_{VDDI_RISE}
>0
IOVCC
T_{VCI_RISE}
> 0
VSP
T_{VSP_RISE}
T_{FB_RES}
VSN
T_{VSN_FALL}
> 1us
RESX
T_{RES_PULSE}
T_{FB_CMD}
MIPI Lanes
LP-11 State
MIPI Active
> 1ms
> 0
> 0

6 Optical Characteristics

Ta=25℃

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
View Angles		θT	CR≧10	-	80	-	Degree	Note 2
		θB		-	80	-		
		θL		-	80	-		
		θR		-	80	-		
Contrast Ratio		CR	θ=0°	640	800	-		Note1 Note3
Response Time		T_{ON}	25℃	-	30	40	ms	Note1 Note4
		T_{OFF}						
Chromaticity	White	x	Backlight is on	0.283	0.303	0.323		Note1 Note5
		y		0.303	0.323	0.343		
	Red	x		0.634	0.654	0.675		
		y		0.299	0.319	0.339		
	Green	x		0.239	0.259	0.278		
		y		0.554	0.574	0.594		
	Blue	x		0.120	0.140	0.160		
		y		0.064	0.086	0.104		
Uniformity		U		75	80	-	%	Note1 Note6
NTSC				-	70	-	%	Note 5
Luminance		L		270	300	-	cd/m^2	Note1 Note7

Test Conditions:

1. I_F= 40 mA, V_F=19.2 V and the ambient temperature is 25±2℃.humidity is 65±7%
2. The test systems refer to Note 1 and Note 2.

Note 1: Definition of optical measurement system.

Properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.

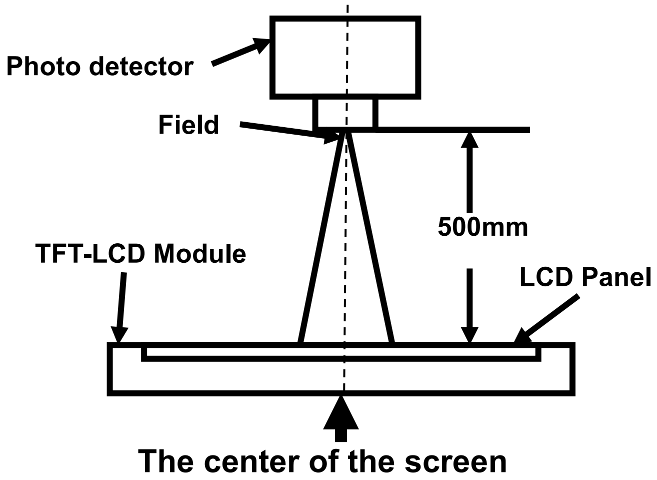
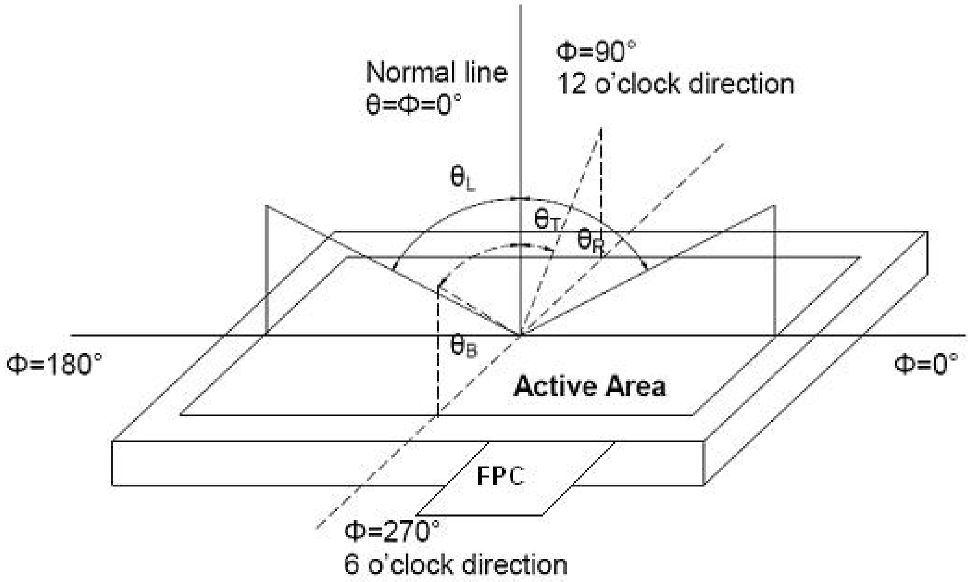


Photo detector
Field
500mm
TFT-LCD Module
LCD Panel
The center of the screen

Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

Note 2: Definition of viewing angle range and measurement system.

Viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80)。


Normal line
θ=Φ=0°
Φ=90°
12 o'clock direction
θL
θT
θR
θB
Φ=180°
Φ=0°
Active Area
FPC
Φ=270°
6 o'clock direction

Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

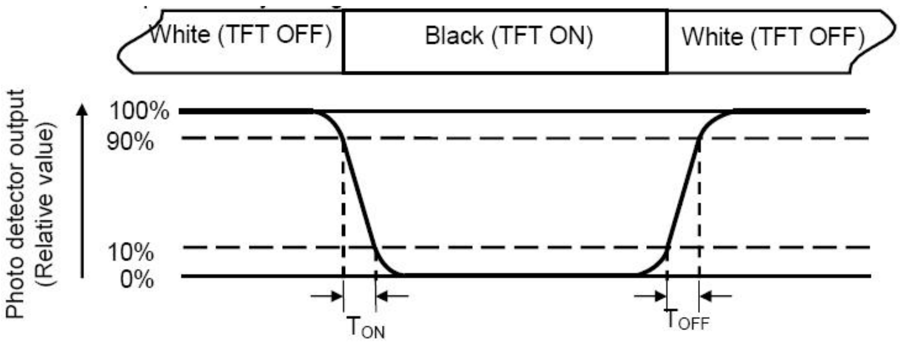
“White state “: The state is that the LCD should drive by Vwhite.

“Black state”: The state is that the LCD should drive by Vblack.

Vwhite: To be determined   Vblack: To be determined.

Note 4: Definition of response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.



Note 5: Definition of color chromaticity (CIE1931)

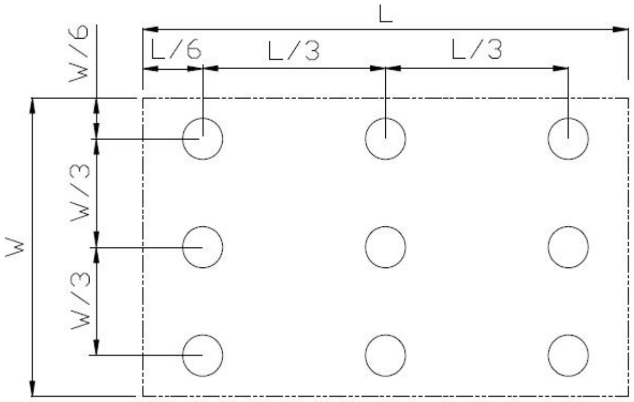
Color coordinates measured at center point of LCD.

Note 6: Definition of luminance uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = Lmin/ Lmax

L-------Active area length W----- Active area width



Lmax: The measured Maximum luminance of all measurement position.

Lmin: The measured Minimum luminance of all measurement position.

Note 7: Definition of luminance:

Measure the luminance of white state at center point.

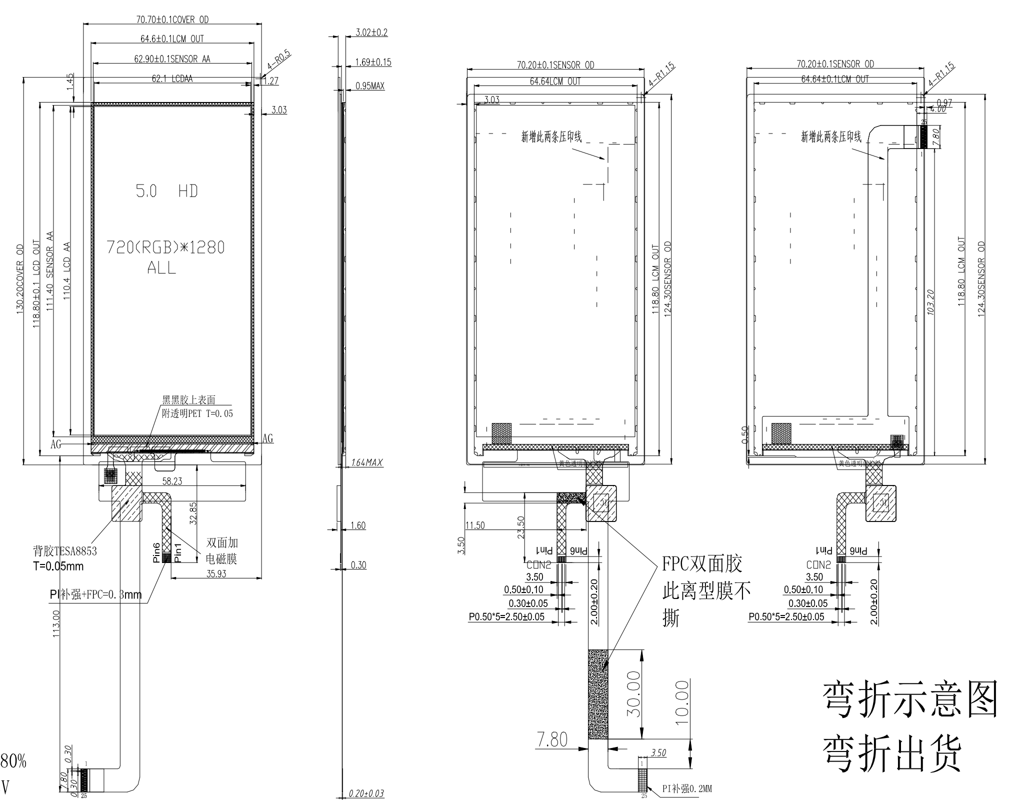
7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts = +70℃, 120 hours	No abnormalities in functions
2	Low Temperature Operation	Ta = -20℃, 120 hours	No abnormalities in functions
3	High Temperature Storage	Ta = +80℃, 120 hours	No abnormalities in functions
4	Low Temperature Storage	Ta = -30℃, 120 hours	No abnormalities in functions
5	Storage at High Temperature and Humidity	Ta = +60℃, 90% RH max,120hours	No abnormalities in functions
6	Thermal Shock (non-operating)	-30℃ 30 min~ +70℃ 30 min, Change time: 0.5 hour ← 5 min → 0.5 hour.10 Cycle	Start with cold temperature, End with high temperature,
7	ESD	C=150pF, R=330Ω,5point/panel Air: ±8Kv, 5times; Contact:±4Kv,5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	No abnormalities in functions

Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of samples.

8 Mechanical Drawing

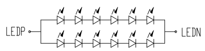

70.70±0.1COVER OD
64.6±0.1LCM OUT
62.90±0.1SENSOR AA
62.1 LCDAA
4-R0.5
1.27
3.03
1.45
130.20COVER OD
118.80±0.1 LCD OUT
111.40 SENSOR AA
110.4 LCD AA
5.0 HD
720(RGB)*1280
ALL
黑黑胶上表面
附透明PET T=0.05
AG
58.23
32.85
背胶TESA8853
T=0.05mm
Pin6
Pin1
双面加
电磁膜
35.93
PI补强+FPC=0.3mm
113.00
7.80
0.30
3.02±0.2
1.69±0.15
0.95MAX
1.64MAX
1.60
0.30
0.20±0.03
70.20±0.1SENSOR OD
64.64LCM OUT
4-R1.15
3.03
新增此两条压印线
118.80 LCM OUT
124.30SENSOR OD
11.50
23.50
3.50
CON2
0.50±0.10
0.30±0.05
P0.50*5=2.50±0.05
2.00±0.20
FPC双面胶
此离型膜不
撕
30.00
10.00
PI补强0.2MM
0.97
4.00
103.20
0.50
弯折示意图
弯折出货

备注:
1. 结构：G+F+F，GT911　TP透过率>80%
2. 通信电压：1.8V　供电电压：2.8V
3. 操作温度：-20° C~+60° C，≤90%RH;
4. 贮存温度：-30° C~+70° C，≤90%RH;
5. 未注尺寸公差：±0.20mm，带<N>为重点管控尺寸，
6. 表面硬度6H以上。FPC双面喷屏蔽层。

NOTES:

1. Unit:mm.
2. ⚠ Modification rev.number.
3. All radii without dimension R0.3mm.
4. All draft angles to be 1.5°
5. Unspecified Tolerances is :±0.30mm.
6. Driver IC:ILI9881C GT911
7. LCM Driver Voltage :2.8±0.3V
8. Back Light: LED (WHITE)
9. Operating Temperature : -20° -- +70° C
10. Storage Temperature : -30° -- +80° C
11. Requirements on Environmental Protection: ROHS HSF

LED CIRCUIT DIAGRAM:



PIN	DESCRIPTION
1	NC
2	VDD
3	IOVCC
4	NC
5	LRST
6	TE
7	NC
8	LEDN
9	LEDP
10	GND
11	D0N
12	D0P
13	GND
14	CKN
15	CKP
16	GND
17	D1N
18	D1P
19	GND
20	D2P
21	D2N
22	GND
23	D3P
24	D3N
25	GND

1	TP-SDA(1.8V)
2	TP-SCL(1.8V)
3	RESET(1.8V)
4	INT(1.8V)
5	VCC(2.8V)
6	GND

标示	日 期	更改内容	签 署
02	2018.6.23	增加TP R脚标注	

Customer Name: 客户名称		Approval Date: 承认日期		Approved By: 承认		Please Confirm This Drawing On/Before 请 签 回 此 图	

9 Precautions for Use of LCD Modules

Handling Precautions

9.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

9.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, prompXYy wash it off using soap and water.

9.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

9.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

9.1.5 If the display surface is contaminated, breathe on the surface and genXYy wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketone
- Aromatic solvents

9.1.6 Do not attempt to disassemble the LCD Module.

9.1.7 If the logic circuit power is off, do not apply the input signals.

9.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

9.1.8.1 Be sure to ground the body when handling the LCD Modules.

9.1.8.2 Tools required for assembly, such as soldering irons, must be properly ground.

9.1.8.3 To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

9.1.8.4 The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

Storage Precautions

9.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

9.2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is: Temperature : 0℃ ～ 40℃ Relatively humidity: ≤80%

9.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

Transportation Precautions

9.3.1 The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.