



RAYSTAR

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RFF80AB-AIW-DNS

SPECIFICATION

CUSTOMER:

APPROVED BY	
PCB VERSION	
DATE	

FOR CUSTOMER USE ONLY

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY

Release DATE:

TFT Display Inspection Specification: <https://www.raystar-optronics.com/download/products.htm>

Precaution in use of TFT module: <https://www.raystar-optronics.com/download/declaration.htm>

Revision History

VERSION	DATE	REVISED PAGE NO.	Note
0 A	2016/03/03 2016/08/11		First issue Modify Vibration test Remove Package Specification

Contents

1.Module Classification Information

2.Summary

3.General Specification

4.Interface

5.Contour Drawing

6.Block Diagram

7.Absolute Maximum Ratings

8.Electrical Characteristics

9.DC Characteristics

10.AC Characteristics

11.Optical Characteristics

12.Reliability

13.Touch Panel Information

14.Other

1.Module Classification Information

R	F	F	80	AB	-	A	I	W	-	D	N	S
1	2	3	4	5	-	6	7	8	-	9	10	11

Item	Description	
1	R : Raystar Optonics Inc.	
2	Display Type : F→TFT Type, J→ Custom TFT	
3	Solution: A: 128x160 B:320x234 C:320x240 D:480x234 E:480x272 F:800x480 G:640x480 H:1024x600 I:320x480 J:240x320 K:1280x800 L:240x400 M:1024x768 N:128x128 O:480x800 P:640x320 Q:800x600 S:480x128 T:800x320	
4	Display Size : 8.0" TFT	
5	Version Code.	
6	Model Type: A : TFT LCD E : TFT+FR+CONTROL BOARD J : TFT+FR+A/D BOARD N : TFT+FR+A/D BOARD+CONTROL BOARD S : TFT+FR+POWER BOARD (DC TO DC) 1 : TFT+CONTROL BOARD	6 : TFT+FR H : TFT+D/V BOARD I : TFT+FR+D/V BOARD B : TFT+POWER BD
7	Polarizer Type, Temperature range, View direction	I→Transmissive, W. T, 6:00 ; C→Transmissive, N. T, 6:00 L→Transmissive, W.T,12:00 ; F→Transmissive, N.T,12:00 Y→Transmissive,W.T, IPS TFT ; A→Transmissive, N.T, IPS TFT Z→Transmissive, W.T, O-TFT R→Transmissive, Super W.T, O-TFT N→Transmissive, Super W.T, 6:00; Q→Transmissive, Super W.T, 12:00 V→Transmissive, Super W.T, VA TFT
8	Backlight	W : LED, White H : LED, High Light White F : CCFL, White
9	Driver Method	D: Digital A: Analog L : LVDS M:MIPI
10	Interface	N : without control board A : 8Bit B : 16Bit S:SPI Interface R: RS232 U:USB I: I2C
11	TS	N : Without TS S : resistive touch panel C : capacitive touch panel capacitive touch panel (G-F-F) G : capacitive touch panel(G-G)

2.Summary

TFT 8.0" is a TN transmissive type color active matrix TFT liquid crystal display that use amorphous silicon TFT as switching devices. This module is a composed of a TFT_LCD module, It is usually designed for industrial application and this module follows RoHs.

RAYSTAR OPTRONICS

3.General Specifications

- Size: 8.0 inch
- Dot Matrix: 800 xRGBx480(TFT) dots
- Module dimension: 192.80 x 116.90 x 8.1 mm
- Active area: 176.64 x99.36 mm
- Dot pitch: 0.0736 x 0.2070 mm
- LCD type: TFT, Normally White, Transmissive
- View Direction: 12 o'clock
- Gray Scale Inversion Direction: 6 o'clock
- Backlight Type: LED,Normally White
- With /Without TP: With RTP
- Surface: Anti-Glare

*Color tone slight changed by temperature and driving voltage.

4.Interface

4.1. LCM PIN Definition

Pin	Symbol	I/O	Function	Remark
1	VLED+	P	Power for LED backlight(Anode)	
2	VLED+	P	Power for LED backlight(Anode)	
3	VLED-	P	Power for LED backlight(Cathode)	
4	VLED-	P	Power for LED backlight(Cathode)	
5	GND	P	Power ground	
6	VCOM	I	Common voltage	
7	DVDD	P	Power for Digital Circuit	
8	MODE	I	DE/SYNC mode select	Note 1
9	DE	I	Data Input Enable	
10	VS	I	Vertical Sync Input	
11	HS	I	Horizontal Sync Input	
12	B7	I	Blue data(MSB)	
13	B6	I	Blue data	
14	B5	I	Blue data	
15	B4	I	Blue data	
16	B3	I	Blue data	
17	B2	I	Blue data	
18	B1	I	Blue data	Note 2
19	B0	I	Blue data(LSB)	Note 2
20	G7	I	Green data(MSB)	
21	G6	I	Green data	
22	G5	I	Green data	
23	G4	I	Green data	
24	G3	I	Green data	
25	G2	I	Green data	
26	G1	I	Green data	Note 2
27	G0	I	Green data(LSB)	Note 2
28	R7	I	Red data(MSB)	
29	R6	I	Red data	
30	R5	I	Red data	
31	R4	I	Red data	
32	R3	I	Red data	
33	R2	I	Red data	
34	R1	I	Red data	Note 2
35	R0	I	Red data(LSB)	Note 2
36	GND	P	Power Ground	

37	DCLK	I	Sample clock	Note 3
38	GND	P	Power Ground	
39	L/R	I	Left / right selection	Note 4,5
40	U/D	I	Up/down selection	Note 4,5
41	VGH	P	Gate ON Voltage	
42	VGL	P	Gate OFF Voltage	
43	AVDD	P	Power for Analog Circuit	
44	RESET	I	Global reset pin.	Note 6
45	NC	-	No connection	
46	VCOM	I	Common Voltage	
47	DITHB	I	Dithering function	Note 7
48	GND	P	Power Ground	
49	NC	-	No connection	
50	NC	-	No connection	

I: input, O: output, P: Power

Note 1: DE/SYNC mode select. Normally pull high.

When select DE mode, MODE="1", VS and HS must pull high.

When select SYNC mode, MODE= "0", DE must be grounded.

Note 2: When input 18 bits RGB data, the two low bits of R,G and B data must be grounded.

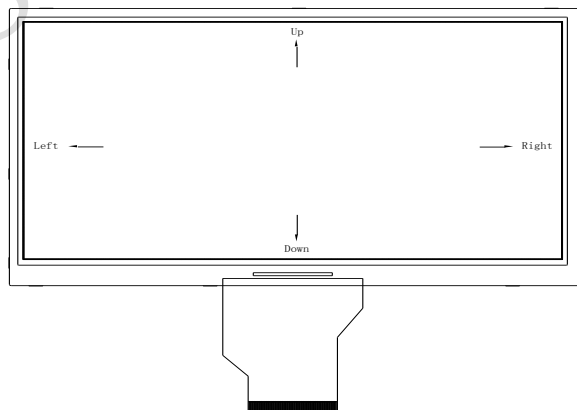
Note 3: Data shall be latched at the falling edge of DCLK.

Note 4: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	L/R	
GND	DVDD	Up to down, left to right
DVDD	GND	Down to up, right to left
GND	GND	Up to down, right to left
DVDD	DVDD	Down to up, left to right

Note 5: Definition of scanning direction.

Refer to the figure as below:



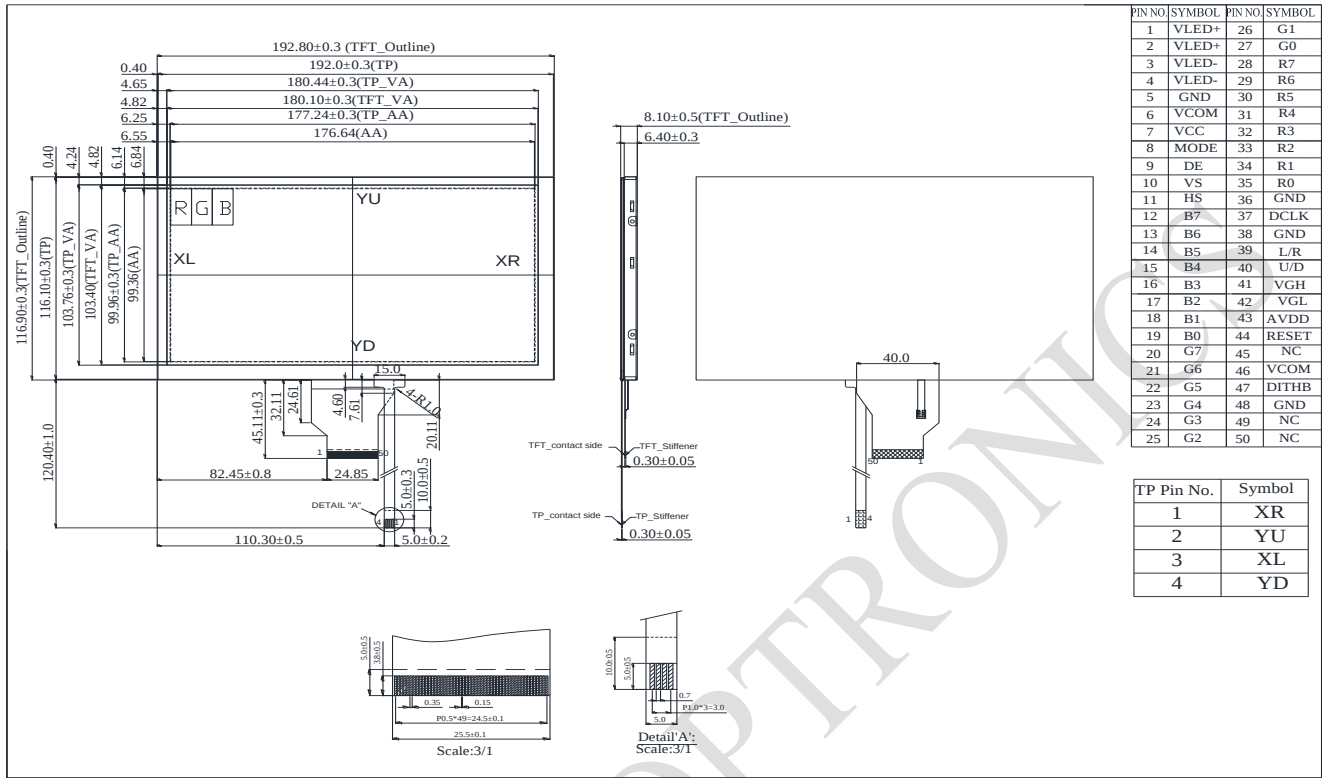
Note 6: Global reset pin. Active low to enter reset state. Suggest to connect with an RC reset circuit for stability. Normally pull high.

Note 7: Dithering function enable control, normally pull high.

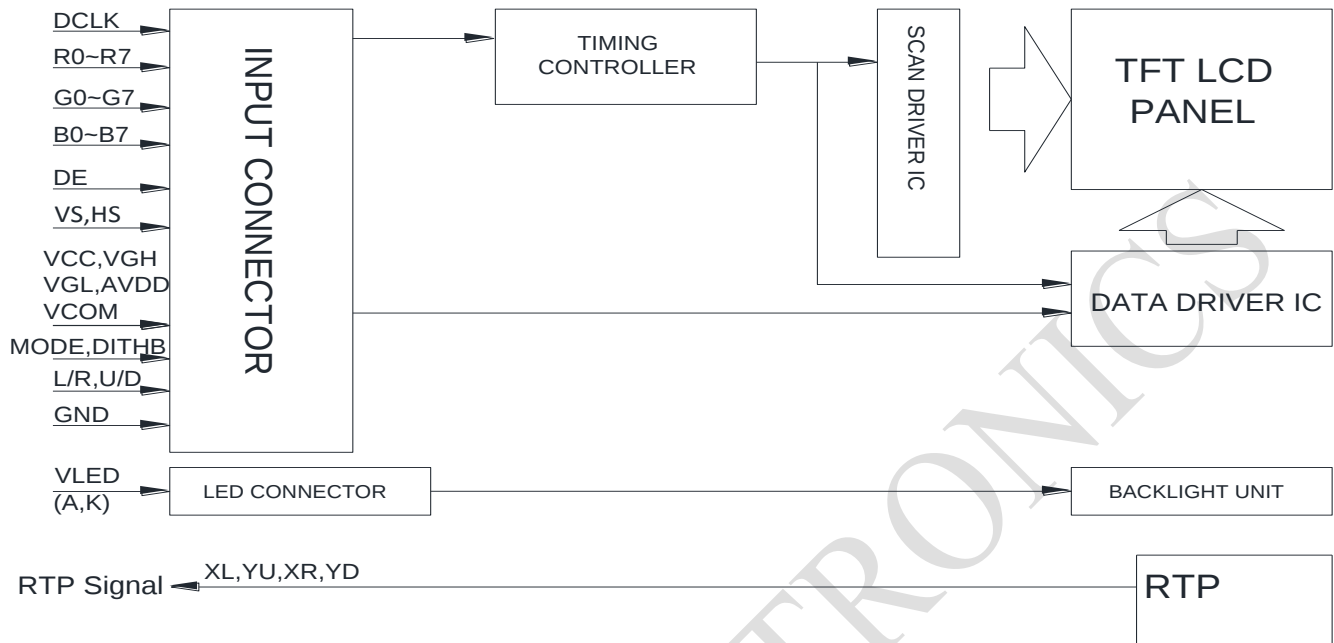
When DITHB="1", Disable internal dithering function,
When DITHB="0", Enable internal dithering function,

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5. Contour Drawing



6. Block Diagram

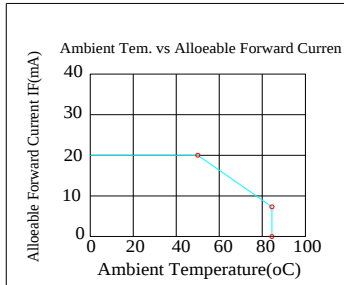


7.Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	T _{OP}	-30	—	+85	°C
Storage Temperature	T _{ST}	-30	—	+85	°C
Power voltage	DVDD	-0.3	—	5.0	V
	AVDD	6.5	—	13.5	V
	VGH	-0.3	—	40.0	V
	VGL	-20.0	—	0.3	V
	VGH-VGL	-	—	40.0	V

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

1. Temp. $\leq 60^{\circ}\text{C}$, 90% RH MAX. Temp. $> 60^{\circ}\text{C}$, Absolute humidity shall be less than 90% RH at 60°C



8. Electrical Characteristics

8.1. Operating conditions:

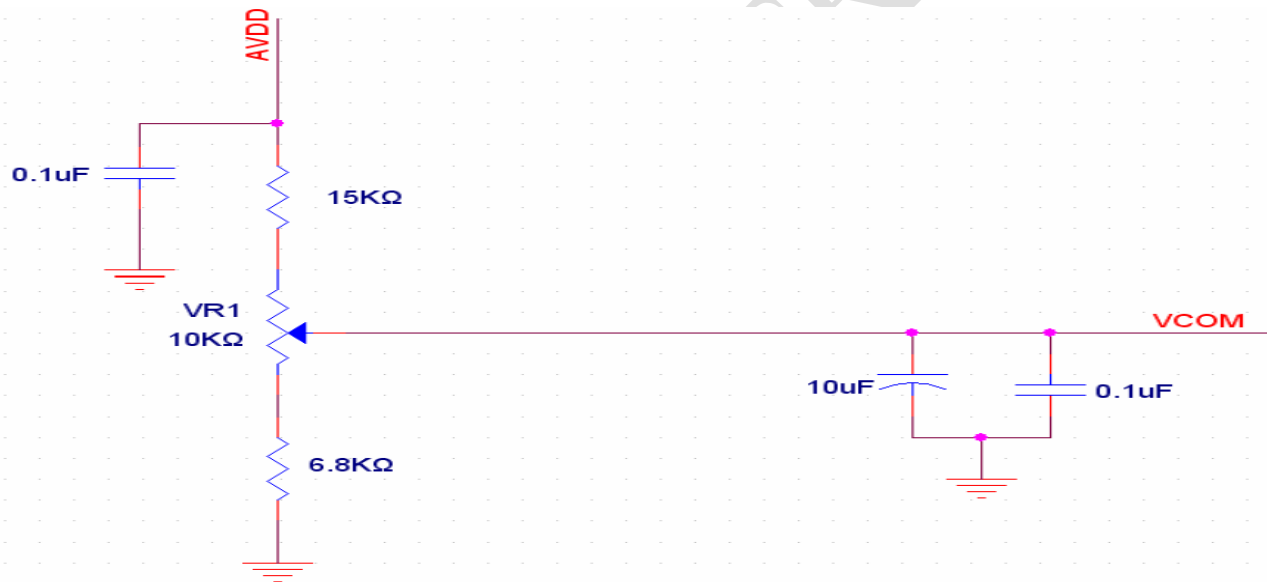
Item	Symbol	Min	Typ	Max	Unit	Remark
Power voltage	DVDD	3.0	3.3	3.6	V	Note 2
	AVDD	10.2	10.4	10.6	V	
	VGH	15.3	16.0	16.7	V	
	VGL	-7.7	-7.0	-6.3	V	
Input signal voltage	VCOM	3.4	4.4	5.4	V	Note 4

Note 1: Be sure to apply DVDD and VGL to the LCD first, and then apply VGH.

Note 2: DVDD setting should match the signals output voltage (refer to Note 3) of customer's system board.

Note 3: DCLK, HS, VS, RESET, U/D, L/R, DE, R0~R7, G0~G7, B0~B7, MODE, DITHB.

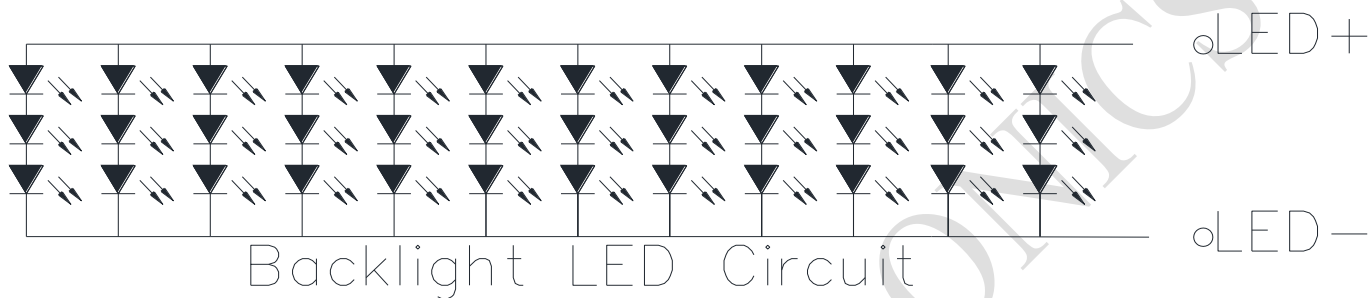
Note 4: Typical VCOM is only a reference value. It must be optimized according to each LCM. Please use VR and base on below application circuit.



8.2. LED driving conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	IL	216	240	264	mA	—
LED voltage	VBL+	8.4	9.3	10.2	V	Note 1
LED Life Time	—	20,000	—	—	Hr	Note 2,3,4

Note 1 : There are 1 Groups LED



Note 2 : Ta = 25 °C

Note 3 : Brightness to be decreased to 50% of the initial value

Note 4 : The single LED lamp case

9.DC CHARATERISTICS

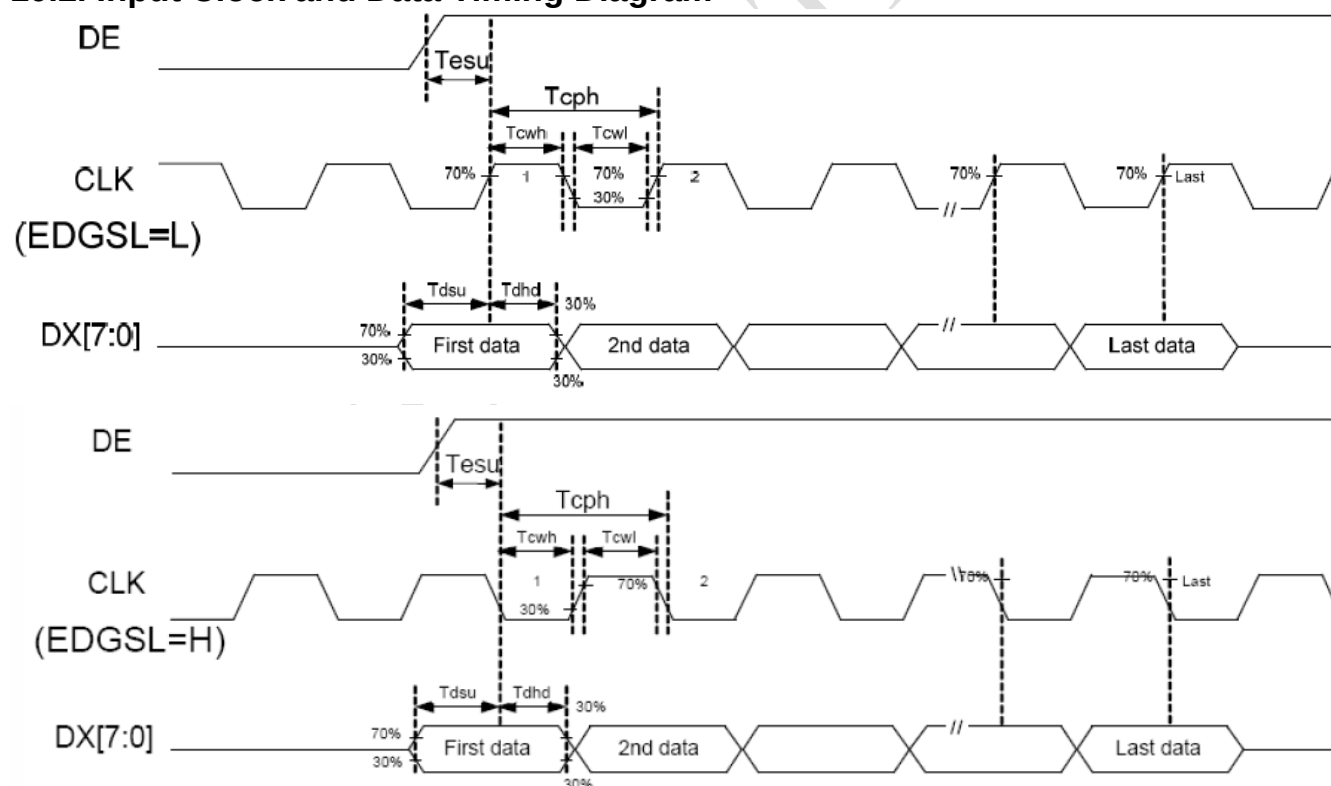
Parameter	Symbol	Rating			Unit	Condition
		Min	Typ	Max		
Low level input voltage	V_{IL}	0	-	0.3VCC	V	
High level input voltage	V_{IH}	0.7VCC	-	VCC	V	

10.AC CHARATERISTICS

10.1. Parallel DE mode RGB input timing table

Signal	Symbol	Min	Typ	Max	Unit
HS setup time	Thst	8	-	-	ns
HS hold time	Thhd	8	-	-	ns
VS setup time	Tvst	8	-	-	ns
VS hold time	Tvhd	8	-	-	ns
Data setup time	Tdsu	8	-	-	ns
Data hole time	Tdhd	8	-	-	ns
DE setup time	Tesu	8	-	-	ns
DE hole time	Tehd	8	-	-	ns
DVDD Power On Slew rate	TPOR	-	-	20	ms
RESET pulse width	TRst	1	-	-	ms
DCLK cycle time	Tcoh	20	-	-	ns
DCLK pulse duty	Tcwh	40	50	60	%

10.2. Input Clock and Data Timing Diagram



10.3. Timing

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK Frequency	fclk	26.4	33.3	46.8	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS pulse width	thpw	1	-	40	DCLK	
HS Blanking	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	210	354	DCLK	

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Vertical Display Area	tvd	-	480	-	TH	
VS period time	tv	510	525	650	TH	
VS pulse width	tvpw	1	-	20	TH	
VS Blanking	tvb	23	23	23	TH	
VS Front Porch	tvfp	7	22	147	TH	

10.4. Data Input Format



Figure 3. 1 Horizontal input timing diagram.

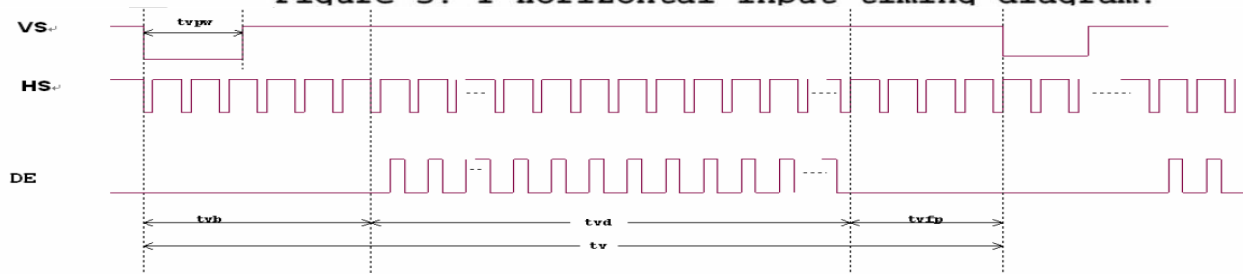


Figure 3. 2 Vertical input timing diagram.

11. Optical Characteristics

TFT LCD characteristic (Without Capacitive Touch Panel)

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles	θT	$CR \geq 10$	40	50	—	Degree	Note 1
	θB		60	70	—		
	θL		60	70	—		
	θR		60	70	—		
Contrast Ratio	CR	$\theta = 0^\circ$	400	500	—	—	Note 4,5
Response Time	TR	$25^\circ C$	—	10	20	ms	Note 3,5
	TF		—	15	30		
Chromaticity	White	Backlight is on	0.26	0.31	0.36	—	Note 2,6,7
			0.28	0.33	0.38		
Luminance	L	—	250	320	—	cd/m ²	Center of display

Ta=25±2℃

Note 1: Definition of viewing angle range

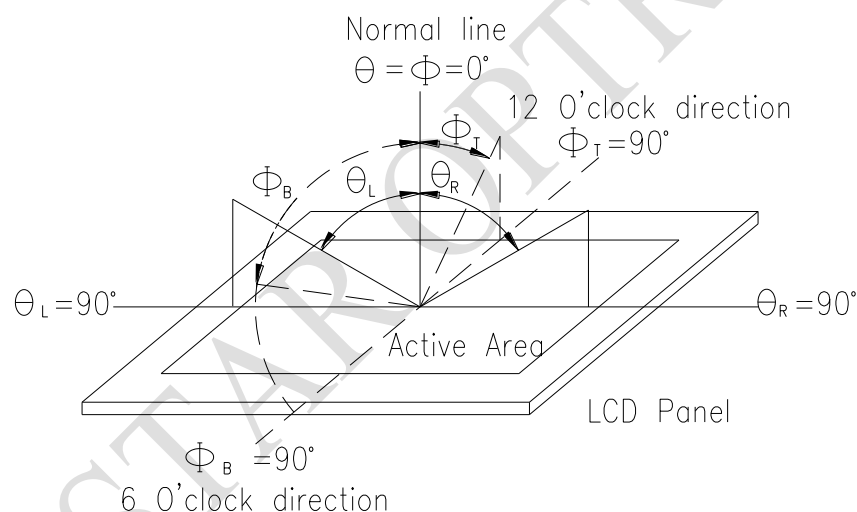


Fig. 11.1. Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7 or BM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

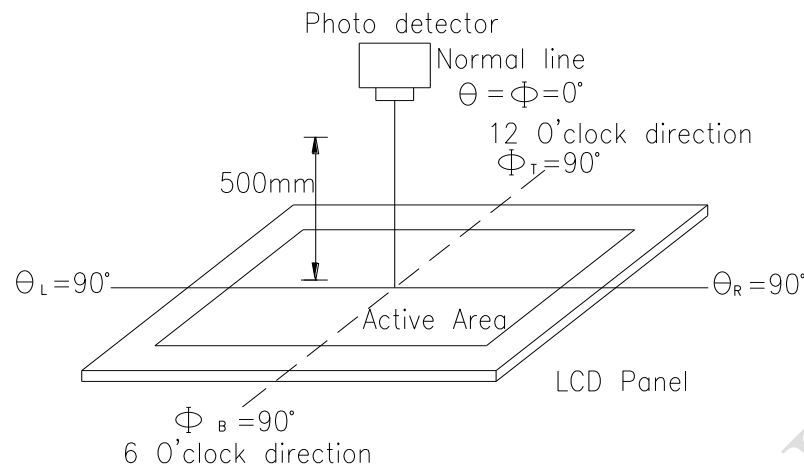
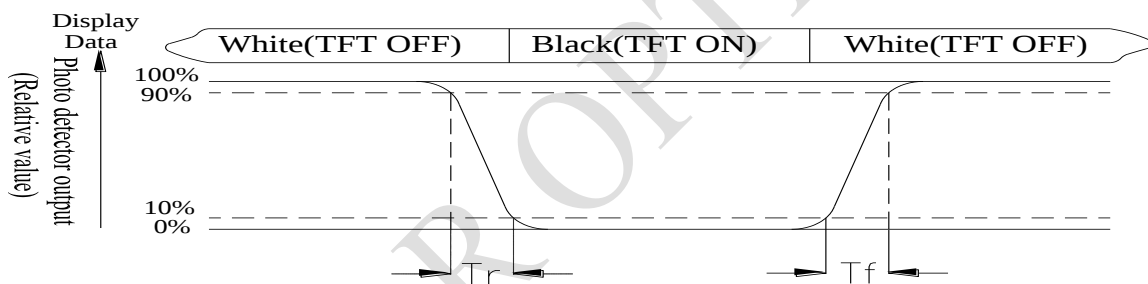


Fig. 11.2. Optical measurement system setup

Note 3: 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_r , is the time between photo detector output intensity changed from 90% to 10%. And fall time, T_f , is the time between photo detector output intensity changed from 10% to 90%



Note 4: Definition of contrast ratio:

The contrast ratio is defined as the following expression.

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

Note 5: White $V_i = V_{i50} \pm 1.5V$

Black $V_i = V_{i50} \pm 2.0V$

“ $\pm$ ” means that the analog input signal swings in phase with VCOM signal.

“ $\pm$ ” means that the analog input signal swings out of phase with VCOM signal.

The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

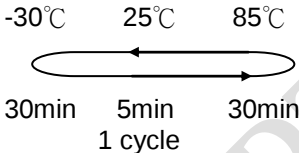
Note 6: Definition of color chromaticity (CIE 1931)

Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

12. Reliability

Content of Reliability Test (Super Wide temperature, -30°C ~85°C)

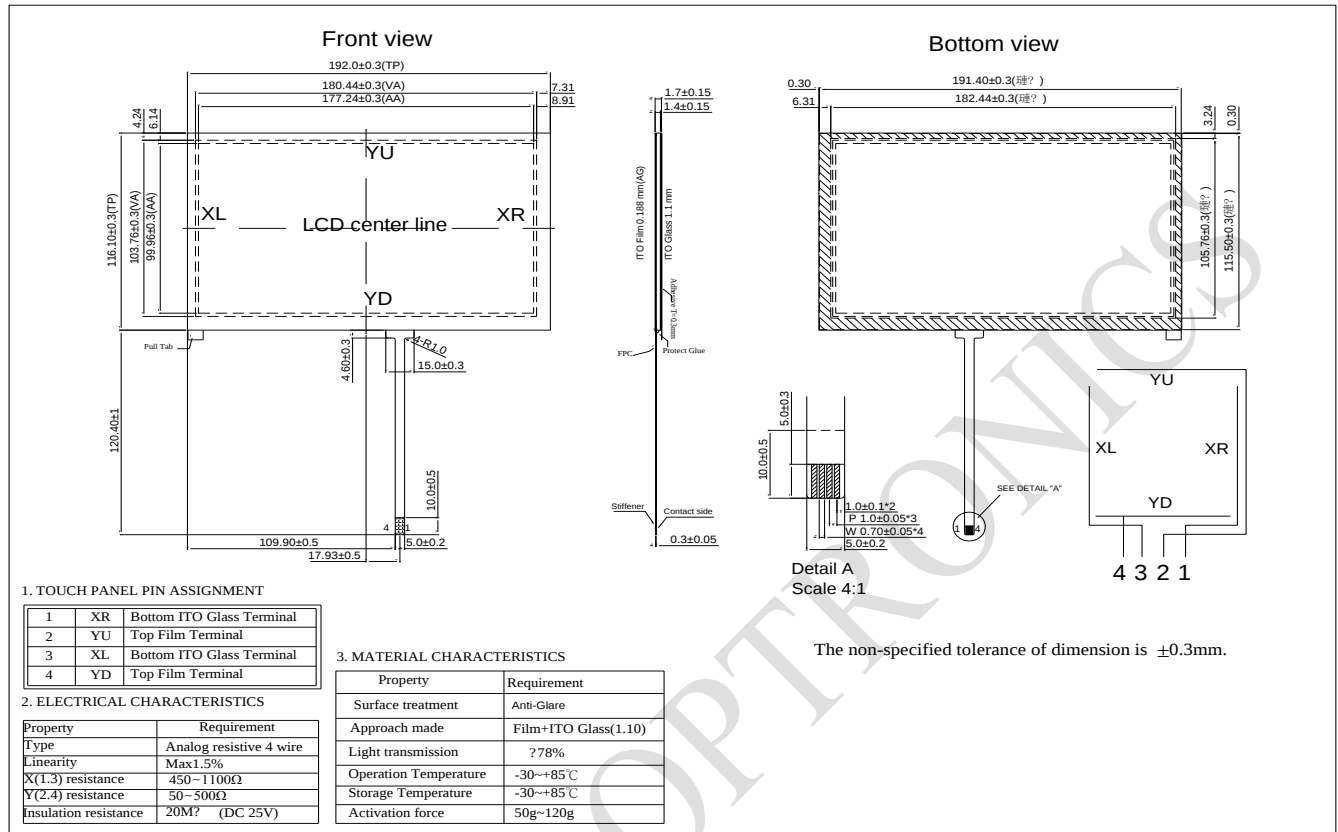
Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	85°C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	85°C 200hrs	—
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-30°C 200hrs	1
High Temperature/ Humidity storage	The module should be allowed to stand at 60°C,90%RH max	60°C,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation 	-30°C/85°C 10 cycles	—
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=±600V(contact) ,±800v(air), RS=330Ω CS=150pF 10 times	—

Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

Note3: The packing have to including into the vibration testing.

13.Touch Panel Information



LCM Sample Estimate Feedback Sheet		
Module Number : _____		
1 、 Panel Specification :		
1. Panel Type :	☐ Pass	☐ NG , _____
2. View Direction :	☐ Pass	☐ NG , _____
3. Numbers of Dots :	☐ Pass	☐ NG , _____
4. View Area :	☐ Pass	☐ NG , _____
5. Active Area :	☐ Pass	☐ NG , _____
6. Operating Temperature :	☐ Pass	☐ NG , _____
7. Storage Temperature :	☐ Pass	☐ NG , _____
8. Others : _____		
2 、 Mechanical Specification :		
1. PCB Size :	☐ Pass	☐ NG , _____
2. Frame Size :	☐ Pass	☐ NG , _____
3. Material of Frame :	☐ Pass	☐ NG , _____
4. Connector Position :	☐ Pass	☐ NG , _____
5. Fix Hole Position :	☐ Pass	☐ NG , _____
6. Backlight Position :	☐ Pass	☐ NG , _____
7. Thickness of PCB :	☐ Pass	☐ NG , _____
8. Height of Frame to PCB :	☐ Pass	☐ NG , _____
9. Height of Module :	☐ Pass	☐ NG , _____
10. Others :	☐ Pass	☐ NG , _____
3 、 Relative Hole Size :		
1. Pitch of Connector :	☐ Pass	☐ NG , _____
2. Hole size of Connector :	☐ Pass	☐ NG , _____
3. Mounting Hole size :	☐ Pass	☐ NG , _____
4. Mounting Hole Type :	☐ Pass	☐ NG , _____
5. Others :	☐ Pass	☐ NG , _____
4 、 Backlight Specification :		
1. B/L Type :	☐ Pass	☐ NG , _____
2. B/L Color :	☐ Pass	☐ NG , _____
3. B/L Driving Voltage (Reference for LED Type) : ☐ Pass ☐ NG , _____		
4. B/L Driving Current :	☐ Pass	☐ NG , _____
5. Brightness of B/L :	☐ Pass	☐ NG , _____
6. B/L Solder Method :	☐ Pass	☐ NG , _____
7. Others :	☐ Pass	☐ NG , _____

>> Go to page 2 <<

Module Number : _____

5 、 Electronic Characteristics of Module :

1.Input Voltage :	☐ Pass	☐ NG , _____
2.Supply Current :	☐ Pass	☐ NG , _____
3.Driving Voltage for LCD :	☐ Pass	☐ NG , _____
4.Contrast for LCD :	☐ Pass	☐ NG , _____
5.B/L Driving Method :	☐ Pass	☐ NG , _____
6.Negative Voltage Output :	☐ Pass	☐ NG , _____
7.Interface Function :	☐ Pass	☐ NG , _____
8.LCD Uniformity :	☐ Pass	☐ NG , _____
9.ESD test :	☐ Pass	☐ NG , _____
10.Others :	☐ Pass	☐ NG , _____

6 、 Summary :
Sales signature : _____

Customer Signature : _____

Date : / /