



RAYSTAR

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## RFH70AD5-AWH-LNG

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### SPECIFICATION

CUSTOMER:

<b>APPROVED BY</b>	
<b>PCB VERSION</b>	
<b>DATE</b>	

FOR CUSTOMER USE ONLY

<b>SALES BY</b>	<b>APPROVED BY</b>	<b>CHECKED BY</b>	<b>PREPARED BY</b>

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	2025/03/18		First issue
A	2025/04/23		Modify Reliability

RAYSTAR OPTRONICS

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## 2.Summary

The specification RF70D5 is a 7.0" a-Si TFT Liquid Crystal Display ODF cell.

The a-Si TFT-LCD cell will applied to a high transmittance operating in the normally black mode a-Si TFT -LCD product.

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### 3. General Specifications

- Size: 7.0 inch
- Dot Matrix: 1024 x RGB x 600(TFT) dots
- Module dimension: 202.0(W) x 135.5(H) x 8.4(D) mm
- Active area: 154.2144 x 85.92 mm
- Pixel pitch: 0.1506x 0.1432 mm
- LCD type: TFT, Normally Black, Transmissive
- View Angle: 80/80/80/80
- TFT Driver IC: JD9165BA or Equivalent
- Backlight Type: LED, Normally White
- TFT Interface: LVDS
- CTP IC: GT911 or equivalent
- CTP Interface: I2C
- CTP FW Version: 67
- CTP Resolution: 1024\*600
- With /Without TP: With CTP
- Surface: Glare

\*Color tone slight changed by temperature and driving voltage.

## 4.Interface

### 4.1. LCM PIN Definition

Pin No.	Symbol	Function	Remark
1	VCOM	Common Voltage	
2	VDD	Digital circuit	
3	VDD	Digital circuit	
4	NC	No connection	
5	RESET	Global reset pin	
6	STBYB	Standby mode, Normally pulled high STBYB = "1", normal operation STBYB = "0", timing controller, source driver will turn off, all output are High-Z	
7	GND	Ground	
8	RXIN0-	Negative LVDS differential data input	
9	RXIN0+	Positive LVDS differential data input	
10	GND	Ground	
11	RXIN1-	Negative LVDS differential data input	
12	RXIN1+	Positive LVDS differential data input	
13	GND	Ground	
14	RXIN2-	Negative LVDS differential data input	
15	RXIN2+	Positive LVDS differential data input	
16	GND	Ground	
17	RXCLKIN-	Negative LVDS differential clock input	
18	RXCLKIN+	Positive LVDS differential clock input	
19	GND	Ground	
20	RXIN3-	Negative LVDS differential data input	
21	RXIN3+	Positive LVDS differential data input	
22	GND	Ground	
23	NC	No connection	
24	NC	No connection	
25	GND	Ground	
26	NC	No connection	
27	NC	No connection	
28	SELB	6bit/8bit mode select H:6bit / L:8bit	

29	AVDD	Power for Analog Circuit	
30	GND	Ground	
31	VLED-	LED_ Cathode	
32	VLED-	LED_ Cathode	
33	L/R	Horizontal inversion	Note
34	U/D	Vertical inversion	Note
35	VGL	Negative power for TFT	
36	NC	No connection	
37	NC	No connection	
38	VGH	Positive power for TFT	
39	VLED+	LED_ Anode	
40	VLED+	LED_ Anode	

**Note**

When L/R="0",set right to left scan direction.

When L/R="1",set left to right scan direction.

When U/D="0",set top to bottom scan direction.

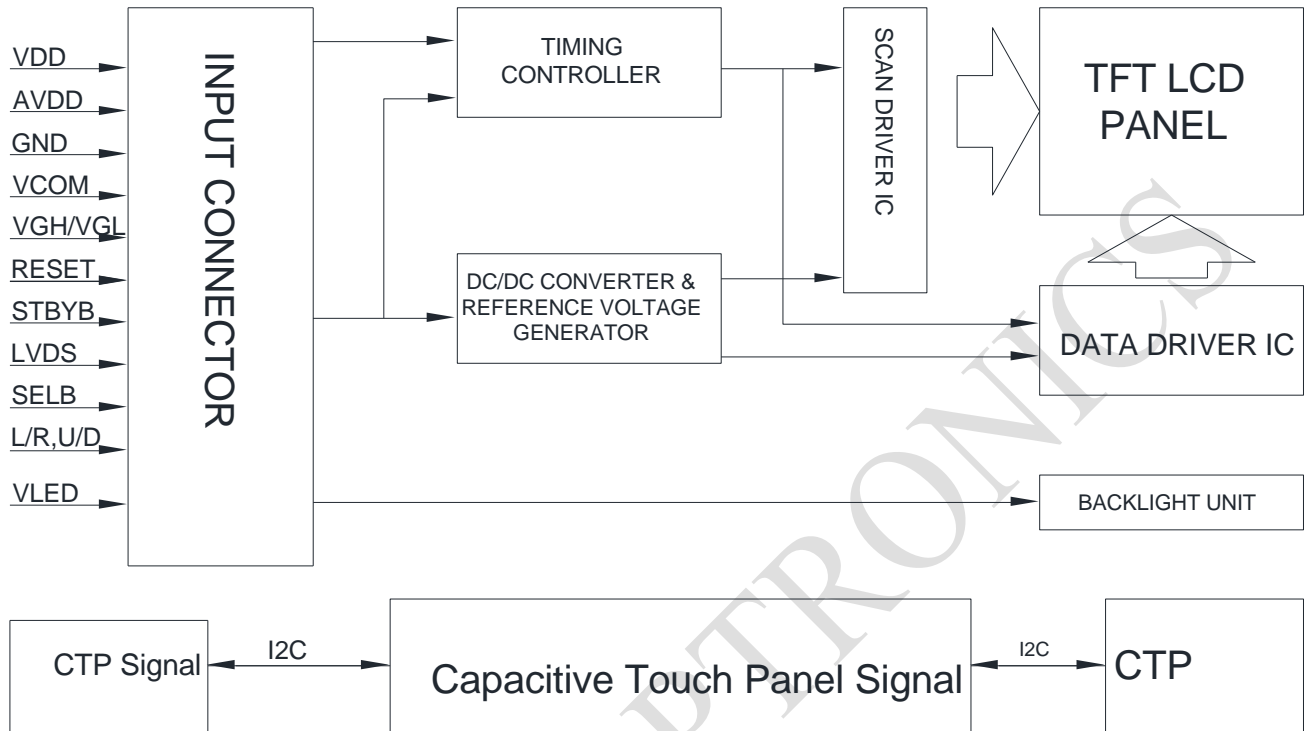
When U/D="1",set bottom to top scan direction

**4.2. CTP PIN Definition**

Pin	Symbol	Function	Remark
1	VSS	Ground for analog circuit	
2	VDDT	Power Supply : +3.3V	
3	SCL	I2C clock input	
4	NC	No connect	
5	SDA	I2C data input and output	
6	NC	No connect	
7	/RST	External Reset, Low is active	
8	NC	No connect	
9	/INT	External interrupt to the host	
10	VSS	Ground for analog circuit	



## 6. Block Diagram



## 7. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-30	—	+85	□
Storage Temperature	TST	-30	—	+85	□

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

- Temp. □60□, 90% RH MAX. Temp. > 60□, Absolute humidity shall be less than 90% RH at 60□

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## 8. Electrical Characteristics

### 8.1. Operating conditions:

#### Typical Operation Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	VDD	3.0	3.3	3.6	V	
Analog Power	AVDD	-	11	-	V	
TFT Gate ON Voltage	VGH	19.5	20	20	V	Note1
TFT Gate OFF Voltage	VGL	-8.5	-8	-7.5	V	Note2
TFT Common Voltage	Vcom	-	4.9	-	V	Note3
Power Current	IDD	-	18	27	mA	VDD=3.3V
Analog Power Current	IAVDD	-	20.94	-	mA	AVDD=11V
TFT Gate ON Current	IVGH	-	1.5	-	mA	VGH=20V
TFT Gate OFF Current	IVGL	-	1.5	-	mA	VGL=-8V
TFT Common Current	IVCOM	-	1	-	uA	VCOM=4.9V
Supply CTP	VDDT	3.1	3.3	3.5	V	
	I <sub>CTP</sub>	-	16	24	mA	

Note 1. VGH is TFT Gate operating Voltage.

Note 2. VGL is TFT Gate operating Voltage.

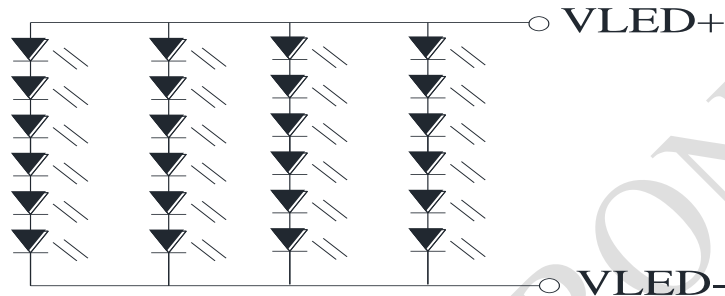
The storage structure of this model is CST (Storage on Common)

Note 3. Vcom must be adjusted to optimize display quality Crosstalk, Contrast Ratio and etc.

**8.2. LED driving conditions**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	—	—	240	—	mA	-
LED voltage	VLED+	16.2	19.2	21.0	V	Note 1
LED Life Time	—	50,000	—	—	Hr	Note 2,3,4

Note 1 : There are 1 Groups LED



**B/L CIRCUIT DIAGRAM**

Note 2 :  $T_a = 25\text{ }^\circ\text{C}$

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

Note 4 : The single LED lamp case

## 9.LVDS Input Timing

### 9.1. LVDS data input format

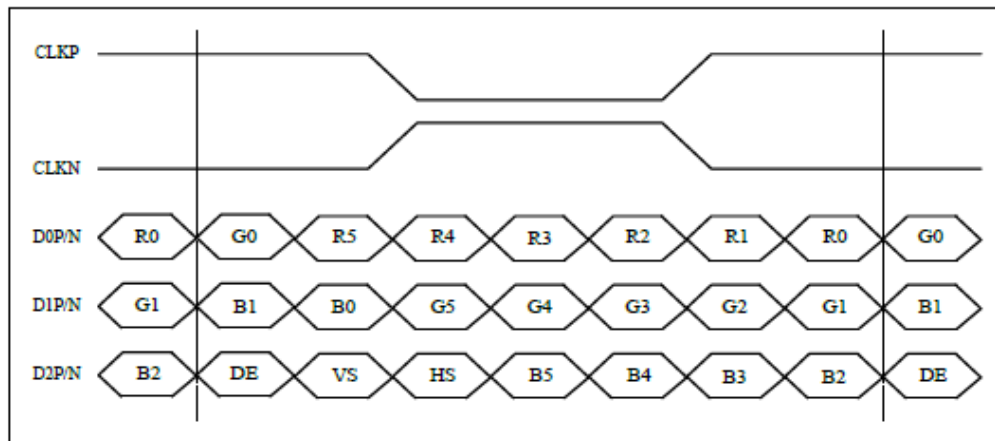


Figure 1: 6-bit LVDS input timing

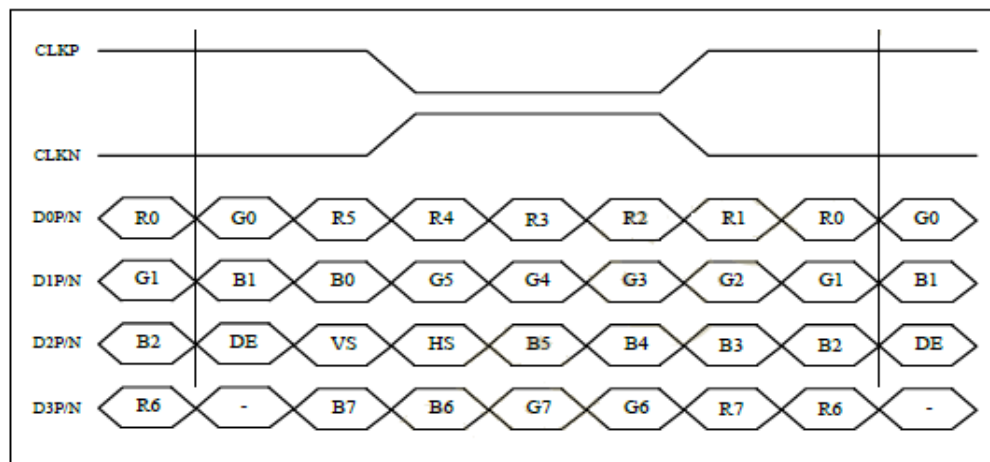


Figure 2: 8-bit LVDS VESA input timing

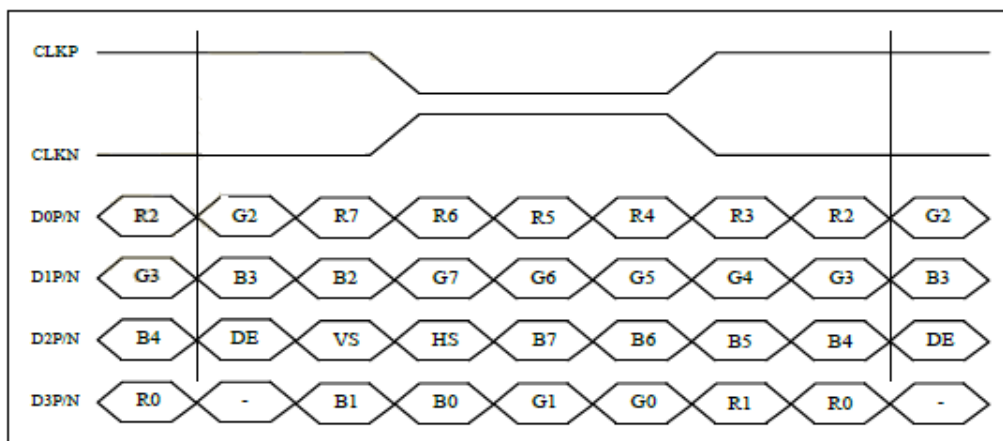


Figure 3: 8-bit LVDS JEIDA input timing

**9.2. LVDS timing characteristic**

LVDS Input Timing	Symbol	1024RGBx600			Unit
		Min	Typ	Max	
DCLK Frequency	-	41.4	51.2	67.2	MHZ
Horizontal Total	tht	1114	1344	1400	DCLK
Hsync Pulse width	ths	1	24	HBP-1	DCLK
Horizontal Back Porch	thb	60	160	160	DCLK
Horizontal Valid Data	thd	1024			DCLK
Horizontal Front Porch	thfp	30	160	216	DCLK
Vertical Total	tvf	620	635	800	THT
Vsync Pulse Width	tvf	1	2	VBP-1	THT
Vertical Back Porch	tvb	8	23	100	THT
Vertical Valid Data	tvf	600			THT
Vertical Front Porch	tvfp	12	12	100	THT



**9.4. LVDS AC electrical characteristic**

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Clock frequency	$R_{xFCLK}$	20	-	71	MHz	Refer to input timing table for each display resolution
Input data skew margin	$T_{RSKM}$	-0.2	-	0.2	UI	$ VID  = 200mV$ $RxVCM = 1.2V$ $1UI = 1/(R_{xFCLK} \times 7)$
Clock high time	$T_{LVCH}$	-	$3.5/(7 * R_{xFCLK})$	-	ns	
Clock low time	$T_{LVCL}$	-	$3.5/(7 * R_{xFCLK})$	-	ns	
PLL wake-up time	$T_{enPLL}$	-	-	150	us	

Table 2: LVDS mode AC electrical characteristics

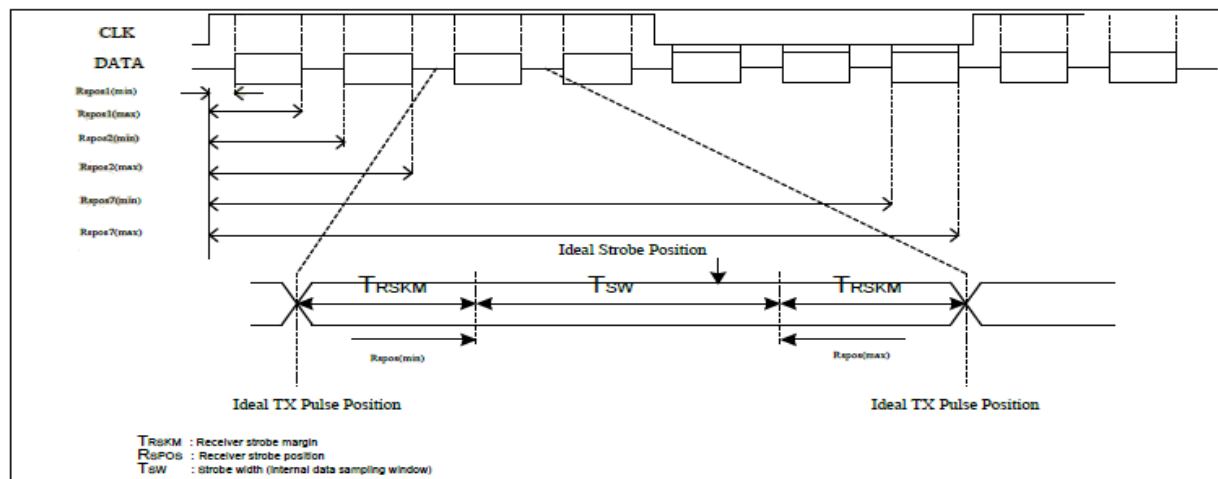
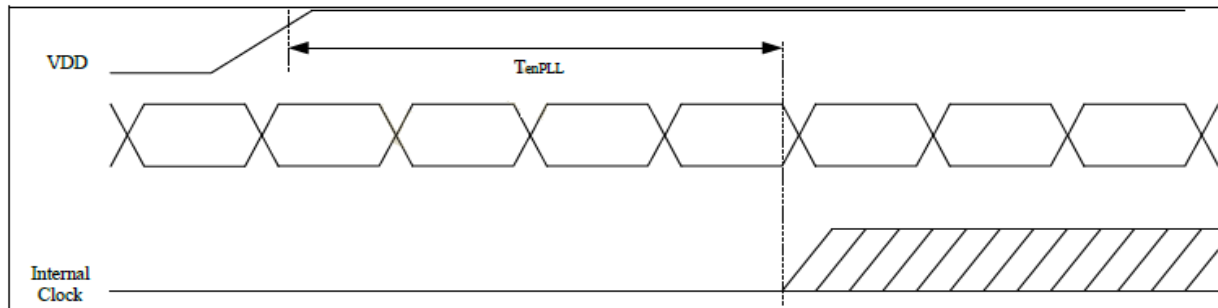
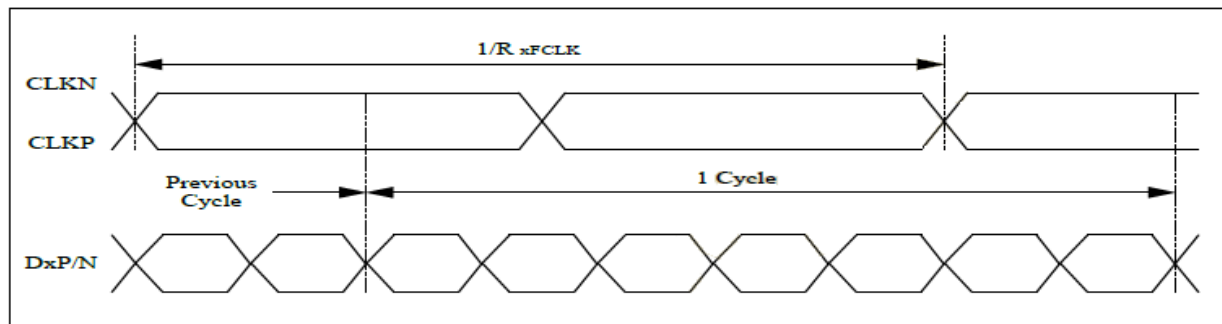


Figure 4: LVDS figure

# 10. Power Sequence

## 10.1. Power On Sequence

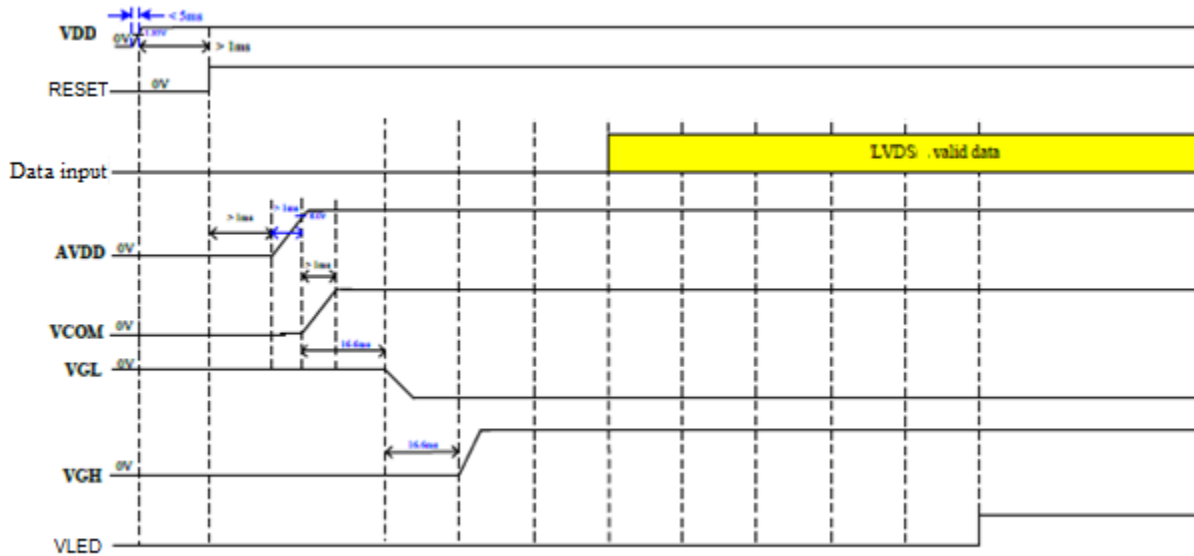


Figure 5: Power On timing chart

## 10.2. Power Off Sequence

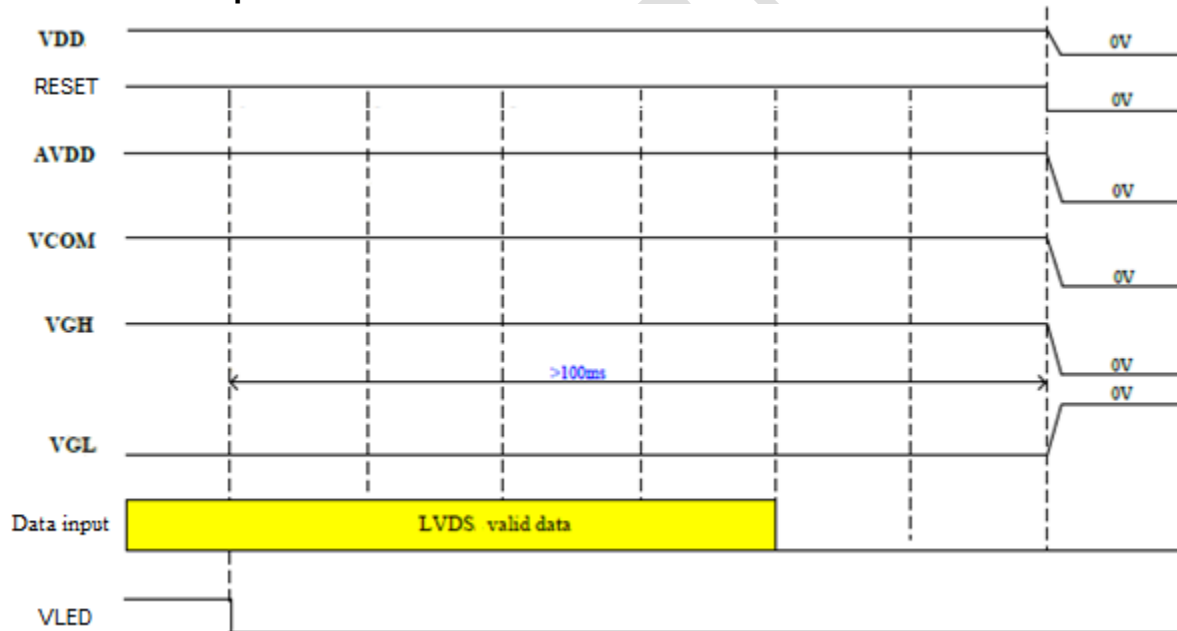


Figure 6: Power Off timing chart

# 11. Optical Characteristics

## TFT LCD characteristic

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark	
Response time	Tr+ Tf	$\theta=0^\circ$ 、 $\Phi=0^\circ$	-	30	35	.ms	Note 3	
Contrast ratio	CR	At optimized viewing angle	700	1000	-	-	Note 4	
Color Chromaticity	White	Wx	$\theta=0^\circ$ 、 $\Phi=0$	0.264	0.314	0.364	-	Note 2,6,7
		Wy		0.272	0.322	0.372	-	
Viewing angle	Hor.	$\Theta_R$	$CR \geq 10$	70	80	-	Deg.	Note 1
		$\Theta_L$		70	80	-		
	Ver.	$\Phi_T$		70	80	-		
		$\Phi_B$		70	80	-		
Brightness	-	-	950	1000	-	cd/m <sup>2</sup>	Center of display	
Uniformity	(U)	-	75	-	-	%	Note 5	

Ta=25±2°C,

Note 1: Definition of viewing angle range

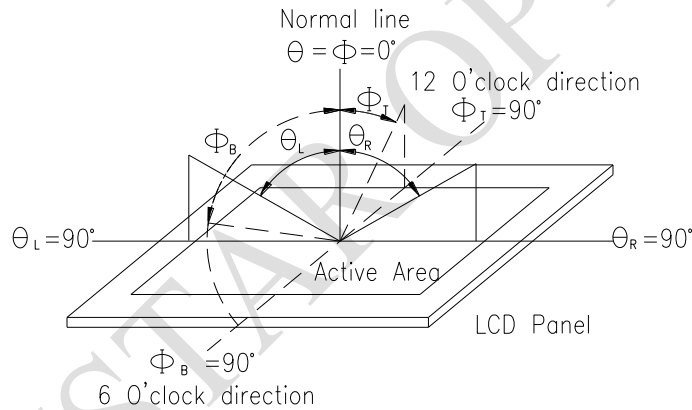


Fig.11.1. Definition of viewing angle

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-7orBM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

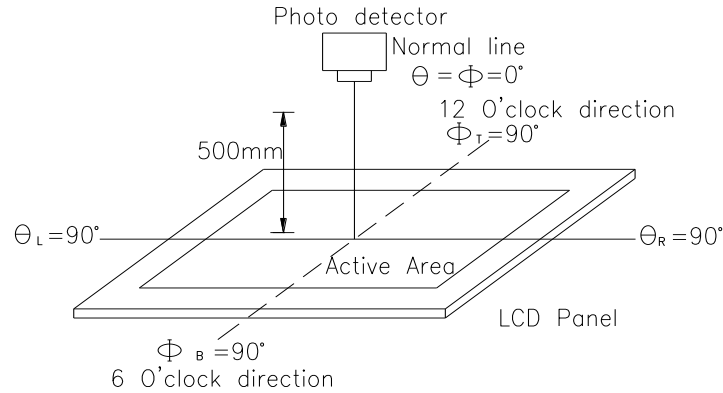
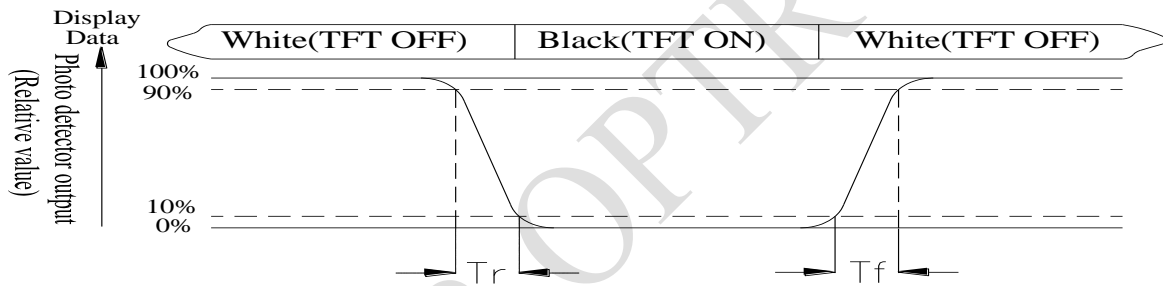


Fig. 11.2. Optical measurement system setup

**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: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (reference the picture in below). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) =  $L_{\min}/L_{\max} \times 100\%$

L = Active area length

W = Active area width

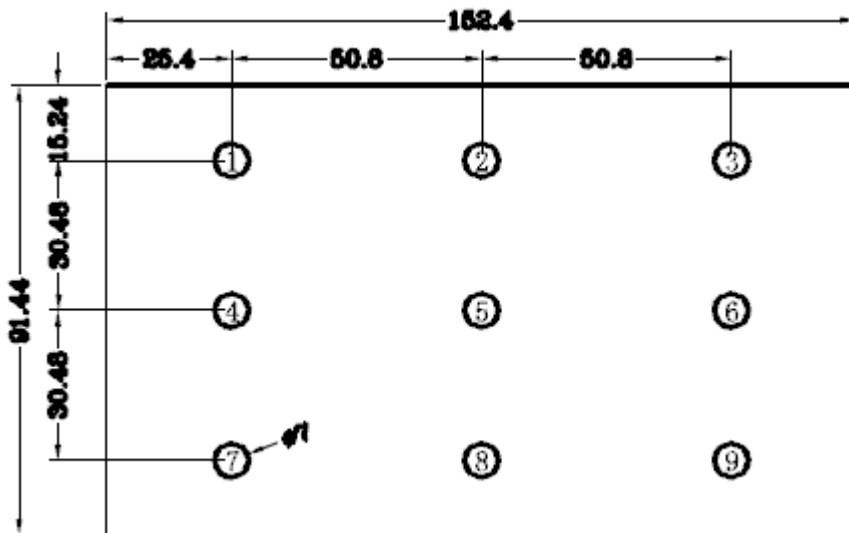


Fig11.3. Definition of uniformity

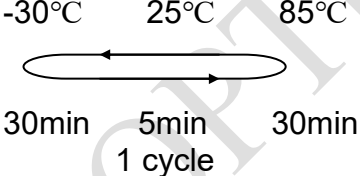
Note 6: Definition of color chromaticity (CIE 1931)

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	2
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-30°C 200hrs	1,2
High Temperature/ Humidity Operation	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	2
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=±4KV(Contact), ±4KV (air), RS=330Ω CS=150pF 10 times	4

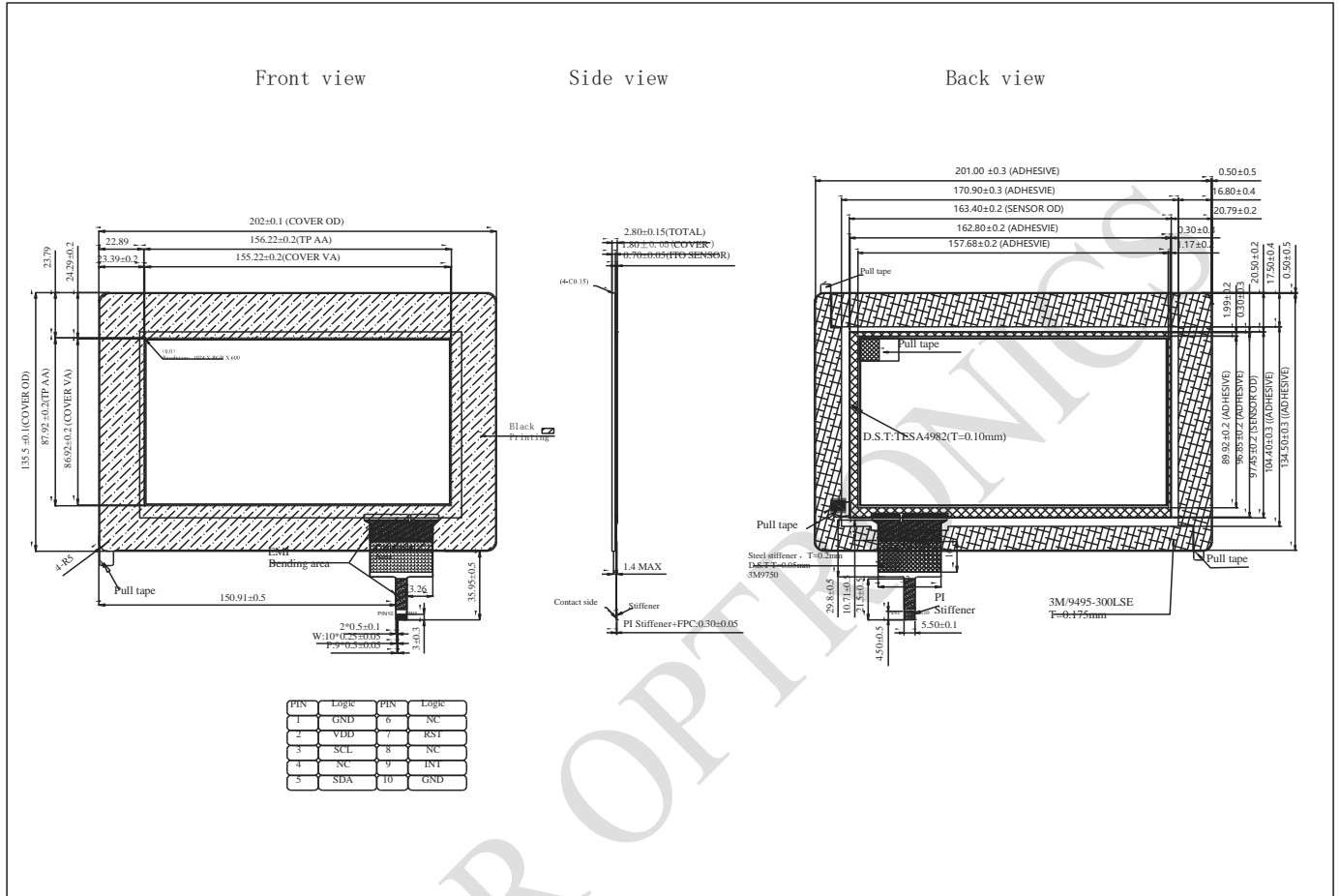
Note1: No dew condensation to be observed.

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.

Note4: Endurance test applying the electric stress to the finished product housing

# 13.Touch Panel Information



**LCM Sample Estimate Feedback Sheet**

**Module Number :** \_\_\_\_\_

**1 、 Panel Specification :**

1. Panel Type :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
2. View Direction :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
3. Numbers of Dots :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
4. View Area :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
5. Active Area :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
6. Operating Temperature :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
7. Storage Temperature :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
8. Others :	_____	

**2 、 Mechanical Specification :**

1. PCB Size :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
2. Frame Size :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
3. Material of Frame :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
4. Connector Position :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
5. Fix Hole Position :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
6. Backlight Position :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
7. Thickness of PCB :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
8. Height of Frame to PCB :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
9. Height of Module :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
10. Others :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____

**3 、 Relative Hole Size :**

1. Pitch of Connector :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
2. Hole size of Connector :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
3. Mounting Hole size :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
4. Mounting Hole Type :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
5. Others :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____

**4 、 Backlight Specification :**

1. B/L Type :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
2. B/L Color :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
3. B/L Driving Voltage (Reference for LED Type) :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
4. B/L Driving Current :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
5. Brightness of B/L :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
6. B/L Solder Method :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
7. Others :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____

>> Go to page 2 <<

Module Number : \_\_\_\_\_

**5、Electronic Characteristics of Module :**

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

**6、Summary :**

Sales signature : \_\_\_\_\_

Customer Signature : \_\_\_\_\_

Date : / /