



**RAYSTAR**

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## **RFK1010F-AAH-LNN**

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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:

## Revision History

VERSION	DATE	REVISED PAGE NO.	Note
0	2016/09/30		First issue

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## 2.Summary

This technical specification applies to 10.1' color TFT-LCD panel. The 10.1' color TFT-LCD panel is designed for camcorder, digital camera application and other electronic products which require high quality flat panel displays. This module follows RoHS.

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## 3.General Specifications

- Screen Diagonal: 10.1 inch
- Number of Pixels: 1280 x 3(RGB) x 800 dots
- Module dimension: 230.56 x 155.01 x 6.4 mm
- Active area: 216.96 (H) x 135.6(V) mm
- Pixel pitch: 0.1695 x 0.1695 mm
- Display Mode: Normally Black
- Pixel Arrangement: R.G.B. Vertical Stripe
- Backlight Type: LED, Normally White
- Electrical Interface (Logic): LVDS
- With /Without TP: Without TP
- Surface: Glare

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

## 4.Interface

### Interface Connector

A 40pin connector is used for the module electronics interface. The recommended model is F62240-H1210B manufactured by Vigorconn.

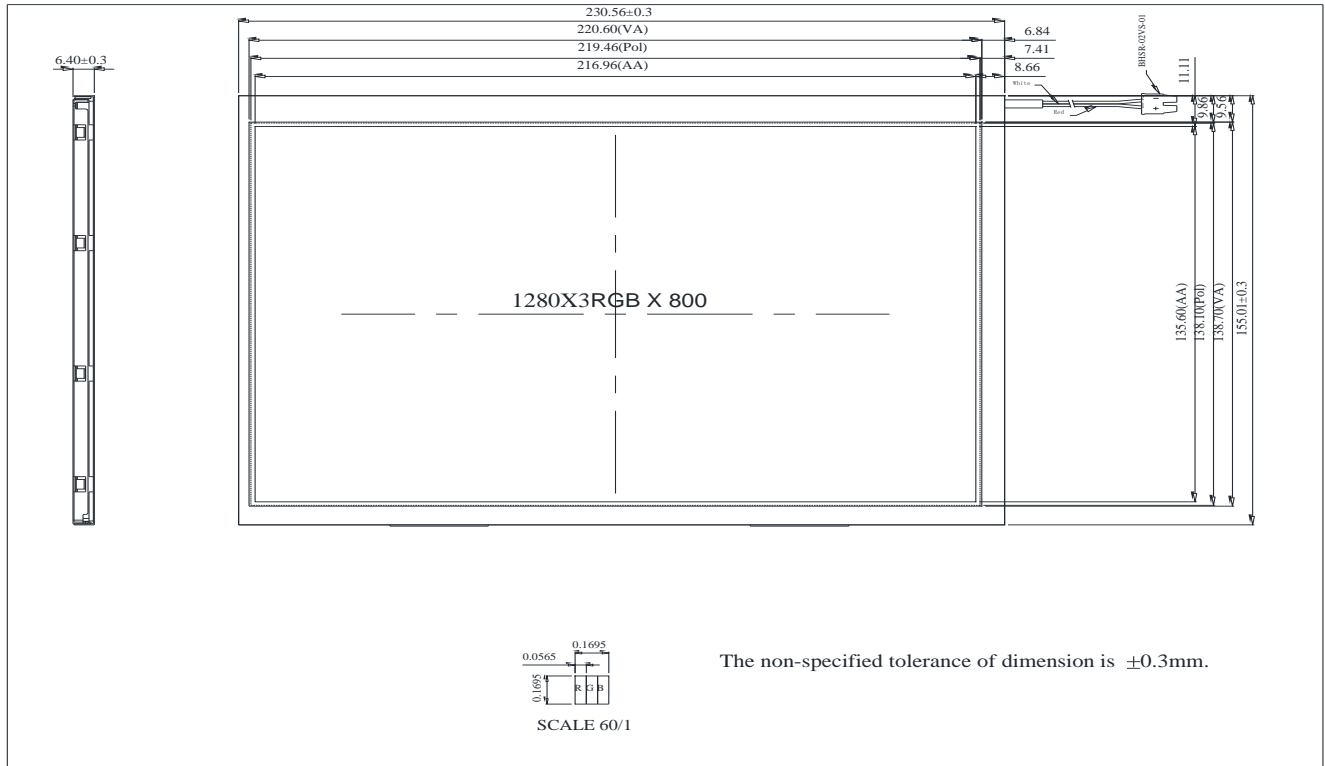
Pin No.	Symbol	I/O	Function	Remark
1	VCOM	P	Common Voltage	
2	VDD	P	Power Supply	
3	VDD	P	Power Supply	
4	NC	-	No connection	
5	NC	-	No connection	
6	NC	-	No connection	
7	GND	P	Ground	
8	Rxin0-	I	-LVDS Differential Data Input	R0-R5,G0
9	Rxin0+	I	+LVDS Differential Data Input	
10	GND	P	Ground	
11	Rxin1-	I	-LVDS Differential Data Input	G1G5,B0,B1
12	Rxin1+	I	+LVDS Differential Data Input	
13	GND	P	Ground	
14	Rxin2-	I	-LVDS Differential Data Input	B2-B5,HS,VS, DE
15	Rxin2+	I	+LVDS Differential Data Input	
16	GND	P	Ground	
17	RxCLK-	I	-LVDS Differential Clock Input	LVDS CLK
18	RxCLK+	I	+LVDS Differential Clock Input	
19	GND	P	Ground	
20	Rxin3-	I	-LVDS Differential Data Input	R6,R7,G6,G7, B6,B7
21	Rxin3+	I	+LVDS Differential Data Input	
22	GND	P	Ground	
23	NC	-	No connection	
24	NC	-	No connection	
25	GND	P	Ground	
26	NC	-	No connection	
27	NC	-	No connection	
28	NC	-	No connection	
29	AVDD	P	No connection	

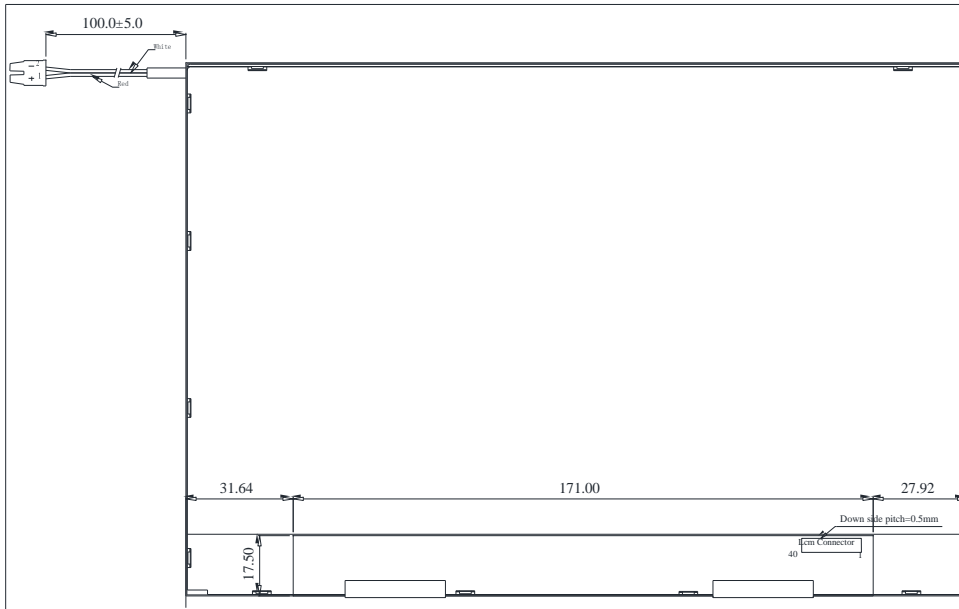
30	GND	P	Ground	
31	NC	-	No connection	
32	NC	-	No connection	
33	NC	-	No connection	
34	NC	-	No connection	
35	VGL	P	Gate OFF Voltage	
36	NC	-	No connection	
37	NC	-	No connection	
38	VGH	P	Gate ON Voltage	
39	NC	-	No connection	
40	NC	-	No connection	

I: input, O: output, P: Power



# 5. Contour Drawing





PIN NO.	SYMBOL	PIN NO.	SYMBOL
1	VCOM	21	Rxin3+
2	VDD	22	GND
3	VDD	23	NC
4	NC	24	NC
5	NC	25	GND
6	NC	26	NC
7	GND	27	NC
8	Rxin0-	28	NC
9	Rxin0+	29	AVDD
10	GND	30	GND
11	Rxin1-	31	NC
12	Rxin1+	32	NC
13	GND	33	NC
14	Rxin2-	34	NC
15	Rxin2+	35	VGL
16	GND	36	NC
17	RxCLK-	37	NC
18	RxCLK+	38	VGH
19	GND	39	NC
20	Rxin3-	40	NC

The non-specified tolerance of dimension is ±0.3mm.

PIN NO.	SYMBOL
1	LED+
2	LED-

## 6. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	0	—	+50	°C
Storage Temperature	TST	-20	—	+60	°C

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  $60^{\circ}\text{C}$

# 7. Electrical Characteristics

## 7.1. Typical Operation Conditions

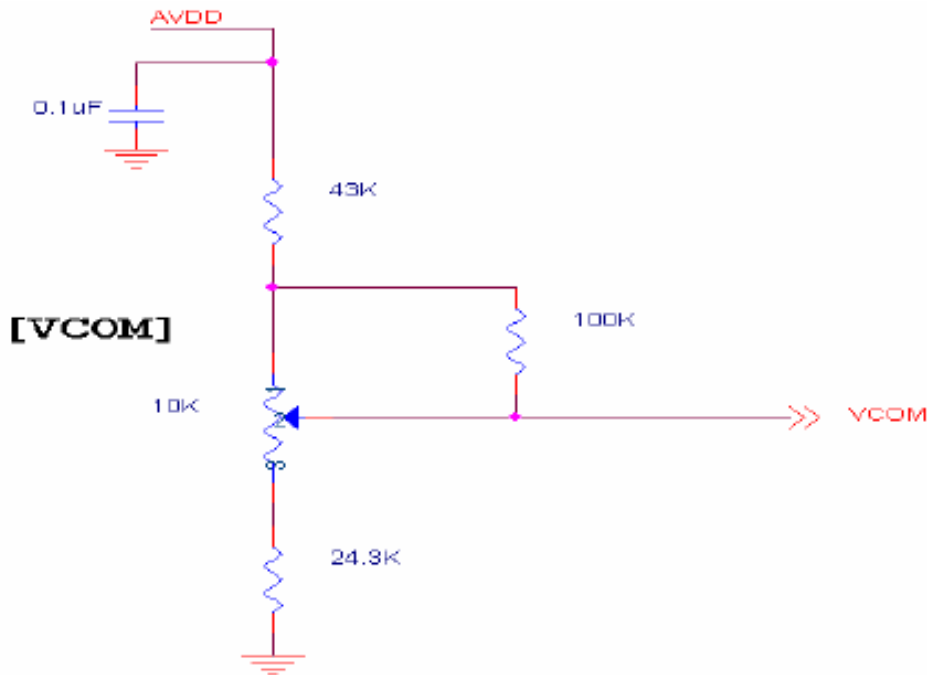
(Note 1)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	MAX.		
Power voltage	VDD	2.3	2.5	2.7	V	Note 2
	AVDD	8.0	8.2	8.4	V	
	VGH	21.7	22	22.3	V	
	VGL	-7.3	-7	-6.7	V	
Input signal voltage	TOP	2.7	3.0	3.3	V	Note 4
Input logic high voltage	TST	0.8VDD	-	3.6	V	Note 3
Input logic low voltage		0	-	0.2VDD	V	

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

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

Note 4: Typical VCOM is only a reference value, it must be optimized according to each LCM. Be sure to use VR.

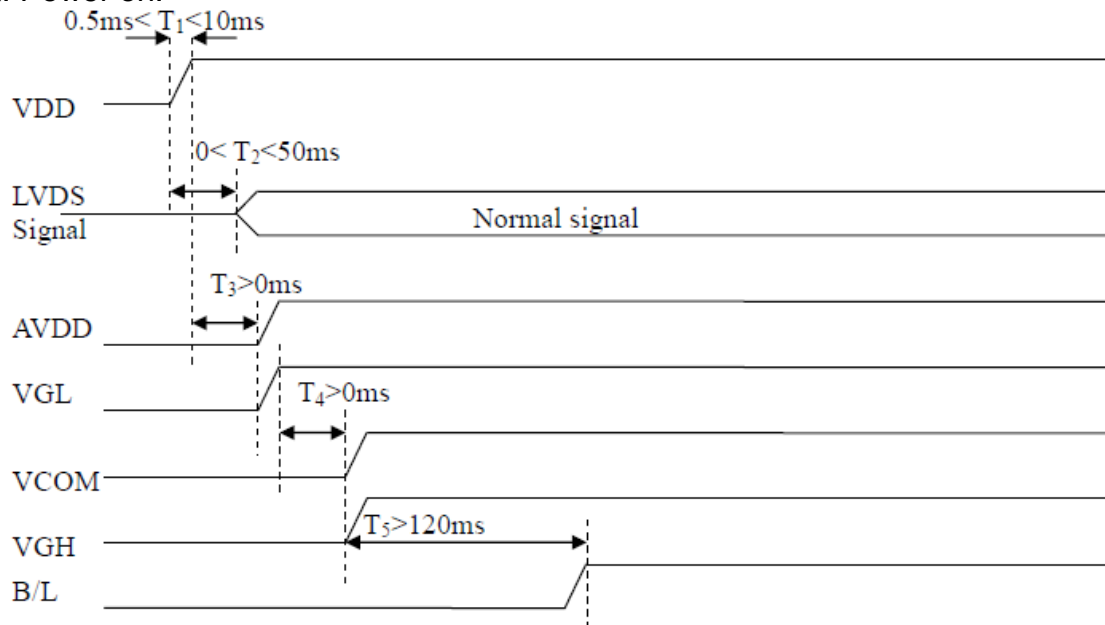


## 7.2. Current Consumption

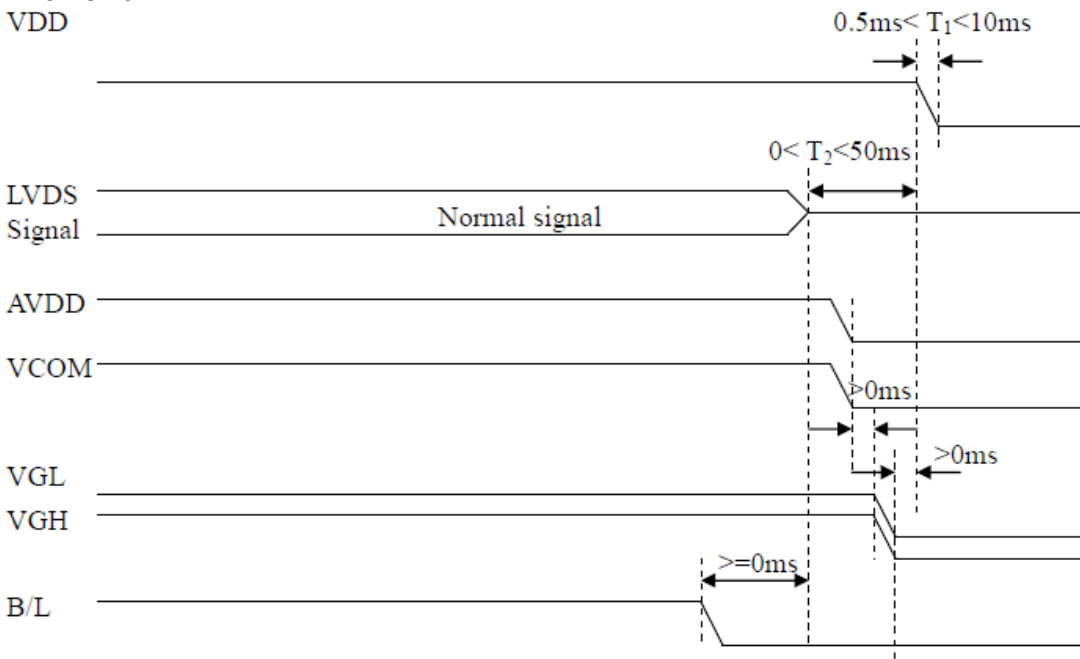
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	MAX.		
Current for Driver	IGH	-	705	750	uA	VGH =22V
	IGL	-	705	750	uA	VGL = -7V
	IVDD	-	95	120	mA	VDD =2.5V
	IAVDD	-	45	70	mA	AVDD=8.2V

## 7.3. Power Sequence

a. Power on:



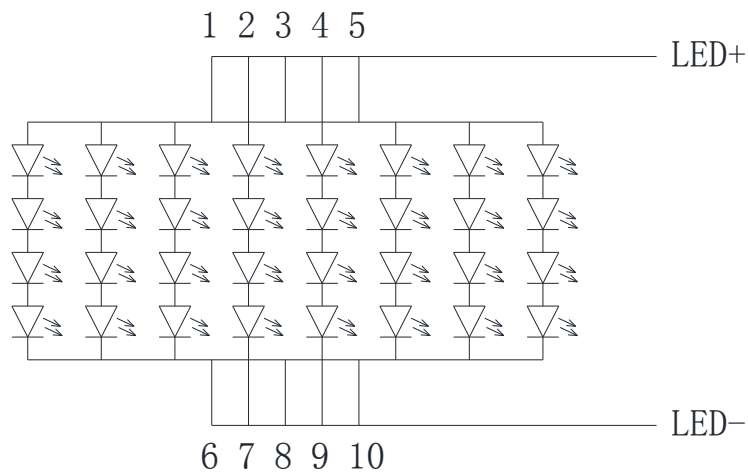
b. Power off:



**7.4. Backlight Characteristics**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply voltage of white LED backlight	VL	—	12.8	13.6	V	Note 1
Current for LED backlight	IL	—	480	—	mA	
LED life time	-	50000	-	-	Hr	Note 1

Note 1 : There are 1 Groups LED



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

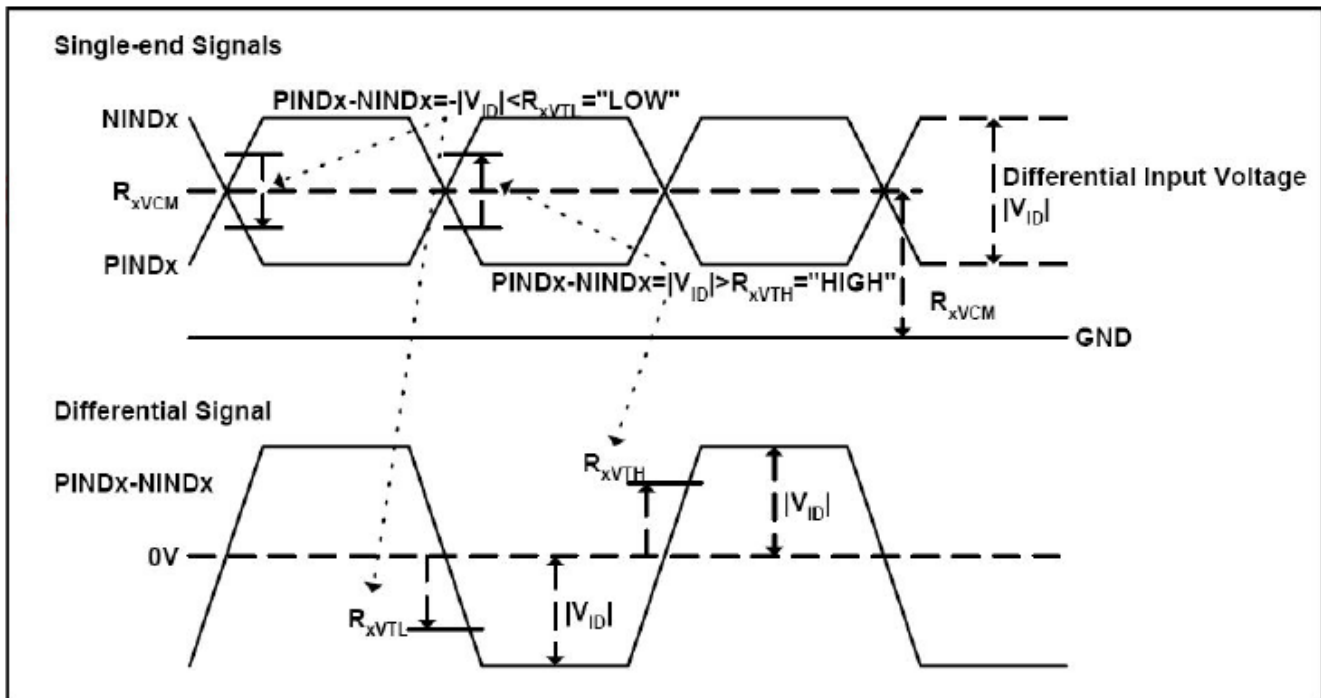
Note 3 : Brightness to be decreased to 50% of the initial value

Note 4 : The single LED lamp case

## 8.LVDS Signal Timing Characteristics

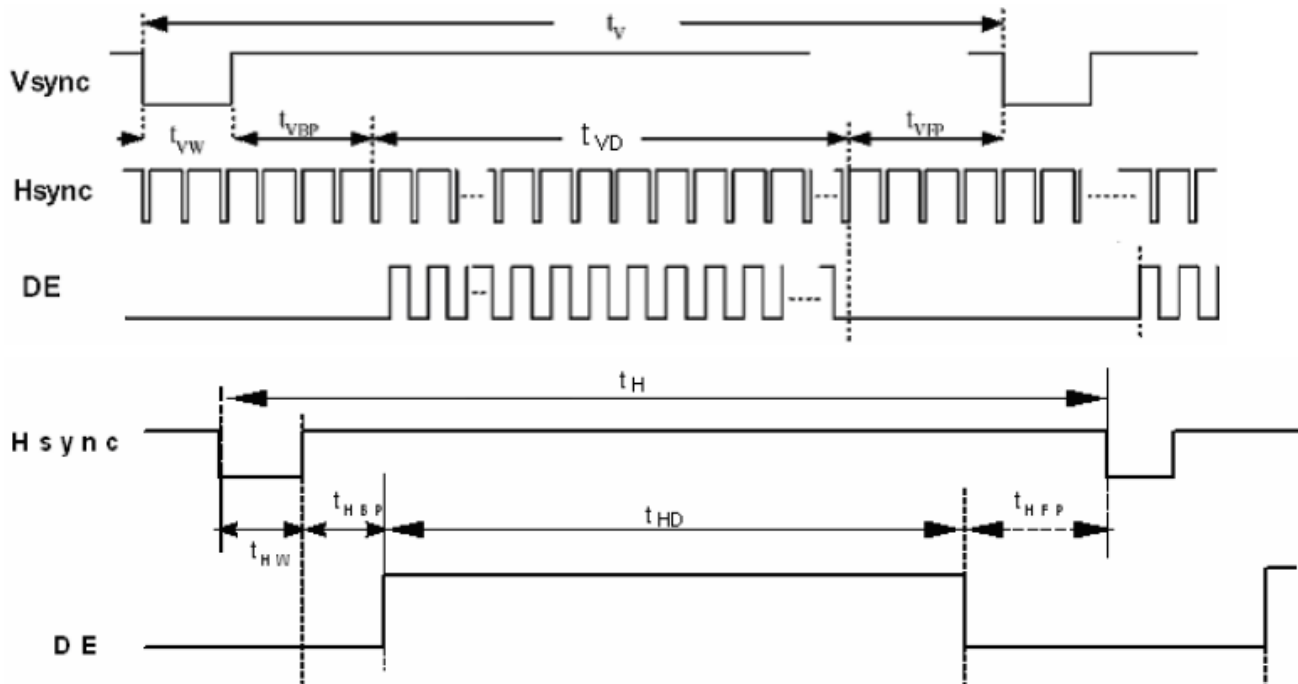
### 8.1. AC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	MAX.		
LVDS Differential input high Threshold voltage	RxVTH	-	-	+100	mV	RXVCM=1.2 V
LVDS Differential input low Threshold voltage	RxVTL	-100	-	-	mV	
LVDS Differential input common mode voltage	RxVCM	0.7	-	1.6	V	
LVDS Differential voltage	VID	200	-	600	mV	



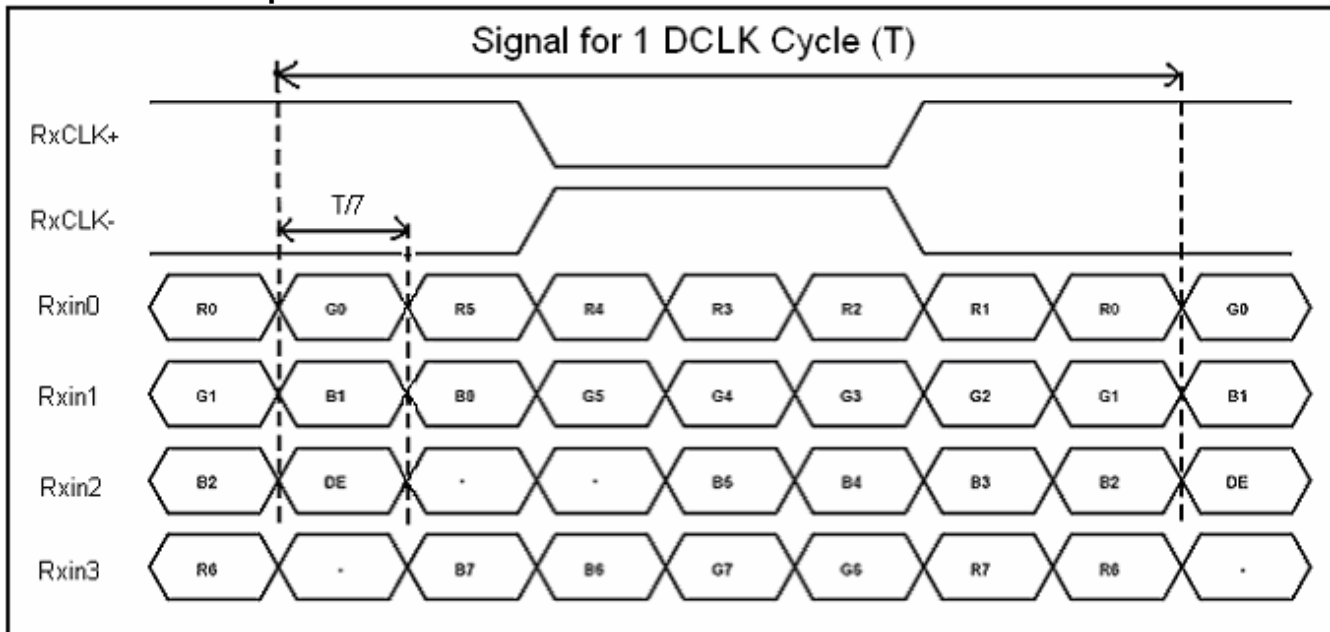
**8.2. Timing Table**

Parameter	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	1/Tc	68.9	71.1	73.4	Mhz	Frame rate =60Hz
Horizontal display area	thd	1280			Tc	
HS period time	th	1410	1440	1470	Tc	
HS Width +Back Porch +Front Porch	t <sub>HW</sub> + t <sub>HBP</sub> +t <sub>HFP</sub>	60	160	190	Tc	
Vertical display area	tvd	800			tH	
VS period time	tv	815	823	833	tH	
VS Width +Back Porch +Front Porch	t <sub>VW</sub> + t <sub>VBP</sub> +t <sub>VFP</sub>	15	23	33	tH	





### 8.3. LVDS Data Input Format



## 9. Optical Characteristics

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark	
Response time	$T_r$	$\theta=0^\circ, \phi=0^\circ$	-	10	20	.ms	Note 3	
	$T_f$		-	15	30			
Contrast ratio	CR	At optimized viewing angle	600	800	-	-	Note 4	
Color Chromaticity	White	$W_x$	$\theta=0^\circ, \phi=0^\circ$	0.26	0.31	0.36	-	Note 2,5
		$W_y$		0.28	0.33	0.38	-	
Viewing angle (Gray Scale Inversion Direction)	Hor.	$\theta_R$	$CR \geq 10$	75	85	-	Deg.	Note 1
		$\theta_L$		75	85	-		
	Ver.	$\phi_T$		75	85	-		
		$\phi_B$		75	85	-		
Brightness	-	-	1000	1100	-	cd/m <sup>2</sup>	Center of display	

Ta=25±2°C

Note 1: Definition of viewing angle range

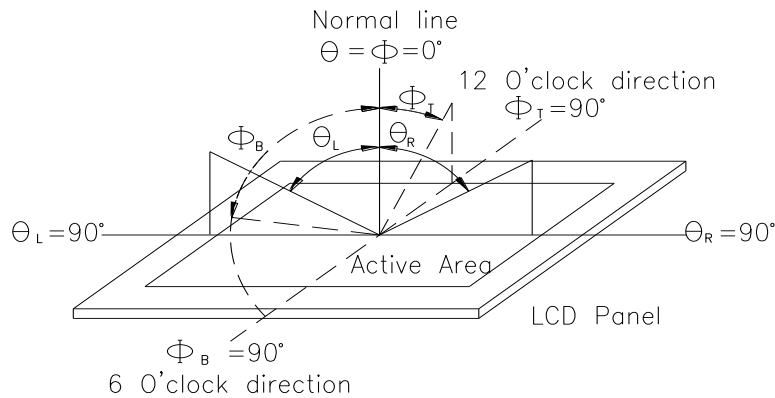


Fig. 9.1. Definition of viewing angle

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.

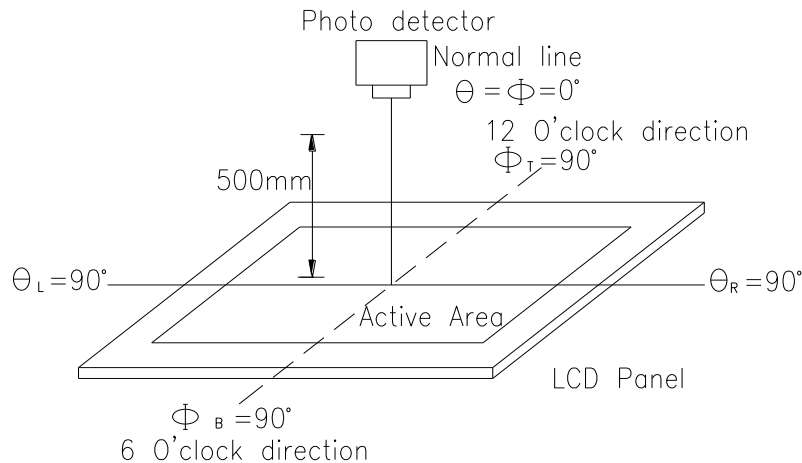
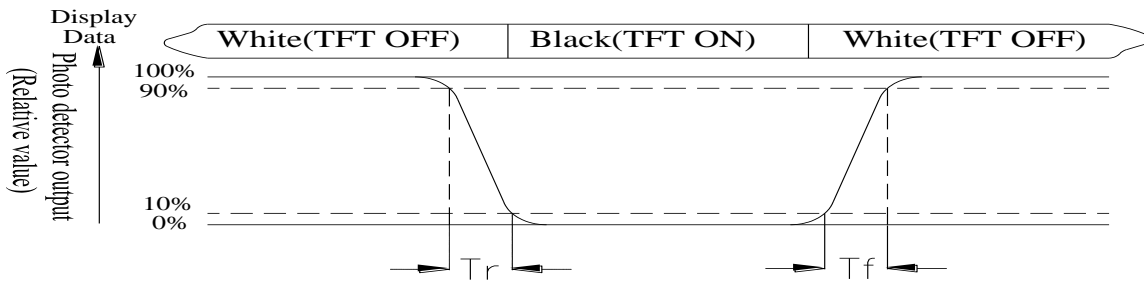


Fig. 9.2. Optical measurement system setup

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

“±” means that the analog input signal swings in phase with VCOM signal.

“±” 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.

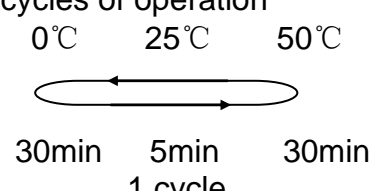
Note 6: Definition of color chromaticity (CIE 1931)

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.

# 10. Reliability

Content of Reliability Test (Wide temperature, 0°C~50°C)

<b>Environmental Test</b>			
<b>Test Item</b>	<b>Content of Test</b>	<b>Test Condition</b>	<b>Note</b>
High Temperature storage	Endurance test applying the high storage temperature for a long time.	60°C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-20°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.	50°C 200hrs	—
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	0°C 200hrs	1
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 <div style="text-align: center;">  <p>0°C    25°C    50°C</p> <p>30min    5min    30min</p> <p>1 cycle</p> </div>	0°C/50°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	<b>3</b>
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.

**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 , _____

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Module Number : _____		
<b>5 · <u>Electronic Characteristics of Module</u> :</b>		
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 , _____
<b>6 · <u>Summary</u> :</b>		
<p>Sales signature : _____</p> <p>Customer Signature : _____                      <u>Date</u> :   /   /   _____</p>		