



# PHOENIX DISPLAY INTERNATIONAL, INC.

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## PHOENIX DISPLAY INTERNATIONAL, INC

### SPECIFICATION FOR LCD MODULE

<b>CUSTOMER</b>	
<b>PART NUMBER</b>	PDI070WSBH-21
<b>DESCRIPTION</b>	7" 1024*3(RGB)*600
<b>VERSION</b>	V1.0
<b>ISSUE DATE</b>	4/27/2018

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## Document Revision History

Revision	Date	Page	Description	Changed BY
A01	2018/4/27	--	First issue	Aron

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# 1. LCM Specification

## 1.1 Description

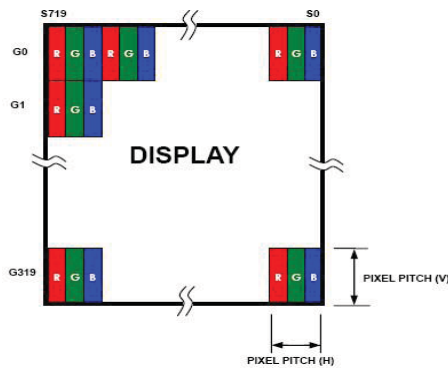
PDI070WSBH-21 is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT LCD panel, a drive IC, a FPC, and a WLED-backlight unit. The active display area is 7.0 inches diagonally measured and the native resolution is 1024\*RGB\*600. Features of this product are listed in the following table.

## 1.2 Functions & Features

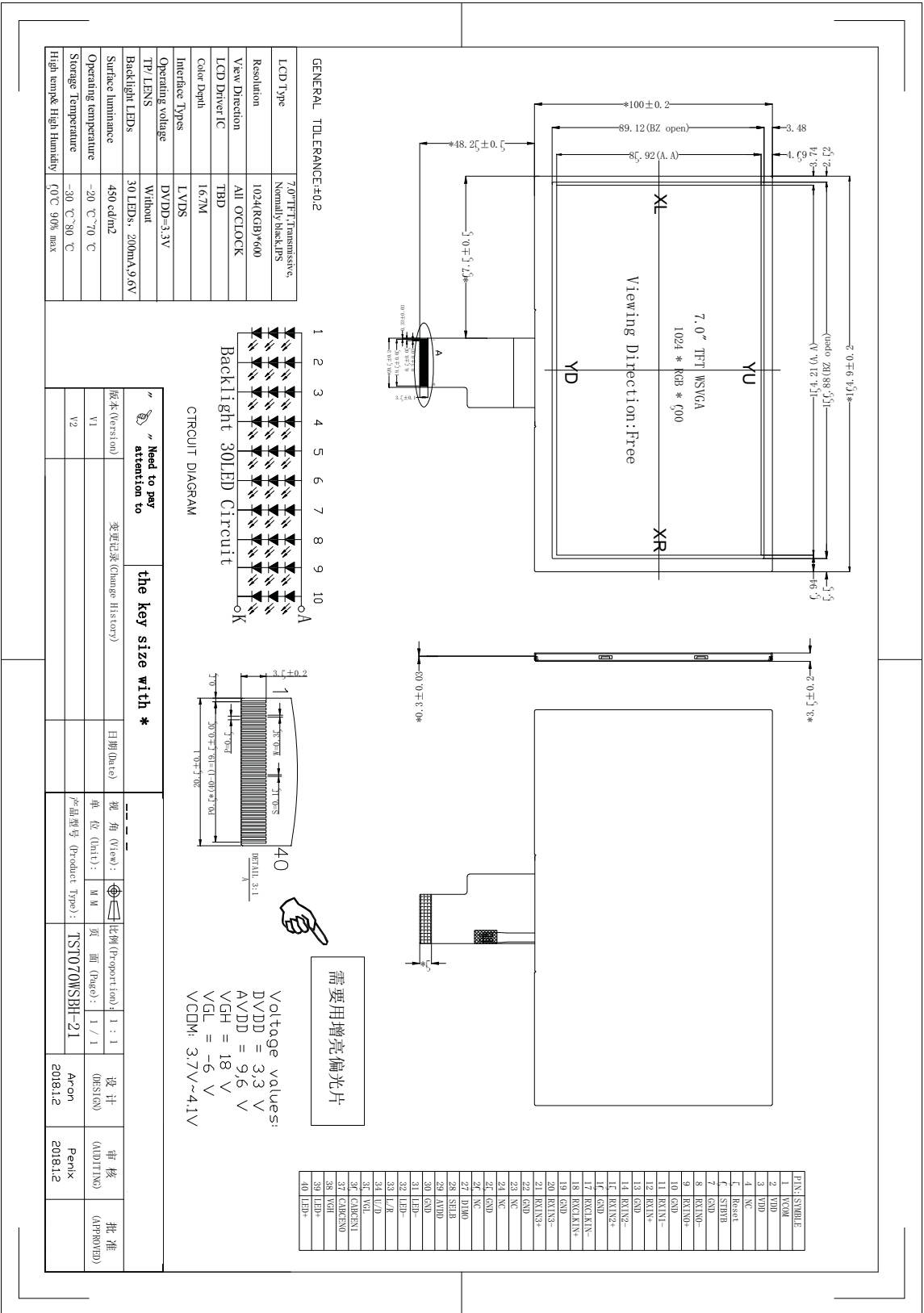
Table1.1 Module Functions & Features

Parameter	Value	Unit
LCD Mode	a-Si TFT/transmissive	-
Number of Color	16.7M	-
Display Resolution	1024*3(RGB)*600	pixels
Outline Dimension	164.9(W) *100(H) *3.5(T)	mm
Active Area(A.A)	85.92*(H) *154.2144(W)	mm
Pixel pitch	0.1506(H) x 0.1432(V)	mm
Pixel Arrangement	RGB-Vertical stripe	-
Viewing Direction	Free	
Display Mode	Normally Black	
Back-light	White LED-30	PCS

### Pixel Arrangement



## 2. Mechanical Specification



### 3. Electrical Units

#### 3.1 ABSOLUTE MAXIMUM RATINGS

<Table3. Electrical specifications>

Item	Symbol	Conditions	Unit	Min	Max	Note
Power Supply Voltage for LCD	VCC	GND=0	V	-0.3	3.96	
	AVDD	AVSS=0	V	-0.5	14.85	
	VGH	GND=0	V	-0.3	40	-
	VGL		V	-20	0.3	
	VGH-VGL	GND=0	V	12	40	
Signal input voltage	Vi		V	-0.2	AVDD+0.2	Note1
	VI	S	V	-0.3	VCC+0.3	Note2
Operating temperature	Topa		°C	-20	70	
Storage temperature	Tstg		°C	-30	80	

Note1: If users use the product out of the environment al operation range (temperature and humidity) , it will have visual quality concerns.

### 3.2 Pin Descriptions

#### 3.2.1 TFT LCD Panel interface FPC Pin Descriptio

Pin NO.	Function Descriptions	Symbol
1	Common Voltage	VCOM
2	Digital Power	VDD
3	Digital Power	VDD
4	Not connect	NC
5	Global rest pin	RESET
6	Standby mode, Normally pulled high STBYB = "1" , normal operation STBYB = "0" , timing controller, source driver will turn off, all output are High-Z	STBYB
7	Power ground	GND
8	- LVDS differential data input	RXIN0-
9	LVDS differential data input	RXIN0+
10	Power ground	GND
11	- LVDS differential data input	RXIN1-
12	LVDS differential data input	RXIN1+
13	Power ground	GND
14	- LVDS differential data input	RXIN2-

15	LVDS differential data input	RXIN2+
16	Power ground	GND
17	- LVDS differential clock input	RXCLKIN-
18	+LVDS differential clock input	RXCLKIN+
19	Power ground	GND
20	- LVDS differential data input	RXIN3-
21	LVDS differential data input	RXIN3+
22	Power ground	GND
23	Not connect	NC
24	Not connect	NC
25	Power ground	GND
26	Not connect	NC
27	Backlight CABC controller signal output	DIMO
28	6bit/8bit mode select	SELB
29	Power for Analog Circuit	AVDD
30	Power ground	GND
31	LED Cathode	LED-
32	LED Cathode	LED-
33	Horizontal inversion	L/R
34	Vertical inversion	U/D
35	Gate OFF Voltage	VGL
36	CABC H/W enable	CABCEN1
37	CABC H/W enable	CABCEN0
38	Gate ON Voltage	VGH
39	LED Anode	LED+
40	LED Anode	LED+

Note1: If LVDS input data is 6 bits ,SELB must be set to High;

If LVDS input data is 8 bits ,SELB must be set to Low.

Note2: When CABC\_EN=" 00" , CABC OFF.

When CABC\_EN=" 01" , user interface image.

When CABC\_EN=" 10" , still picture.

When CABC\_EN=" 11" , moving image.

When CABC off, don' t connect DIMO, else connect it to backlight.

Note3: 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.

### 3.3.1 Electrical characteristics

#### 3.3.2 (Ta=25°C) Typical conditions

Item	Symbol	Unit	Min	Value	Max	Note
Common Voltage	VCOM	V	3.7	3.9	4.1	Note1
Power Supply Voltage	VGH	V	17	18	19	
	VGL	V	-6.6	-6	-5.4	
	AVDD	V	9.4	9.6	9.8	
	VCC	V	3	3.3	4.1	
Input Signal Voltage	V <sub>IH</sub>	V	0.7VCC	-	VCC	
	V <sub>IL</sub>	V	GND	-	0.3VCC	

Note1: Please adjust VCOM to make the flicker level be minimum.

### 3.3.2 DC characteristics

Table 3.2: DC Characteristic (VCC=2.4~3.3V, Ta=0~60°C)

Item	Symbol	Unit	Test Condition	Min	Typ.	Max	Note
Drive Current	I <sub>GH</sub>	mA	VGH=18V	-	0.5	1	Note1
	I <sub>GL</sub>	mA	VGL=-6V	-	0.5	1	Note1
	I <sub>CC</sub>	mA	VCC=3.3V	-	30	45	Note1
	I <sub>DD</sub>	mA	AVDD=9.6V	-	35	45	Note1

Note1: Typ.specification:Gray-level test Pattern

Max.specification:Black test Pattern



(a)Gray-level Pattern



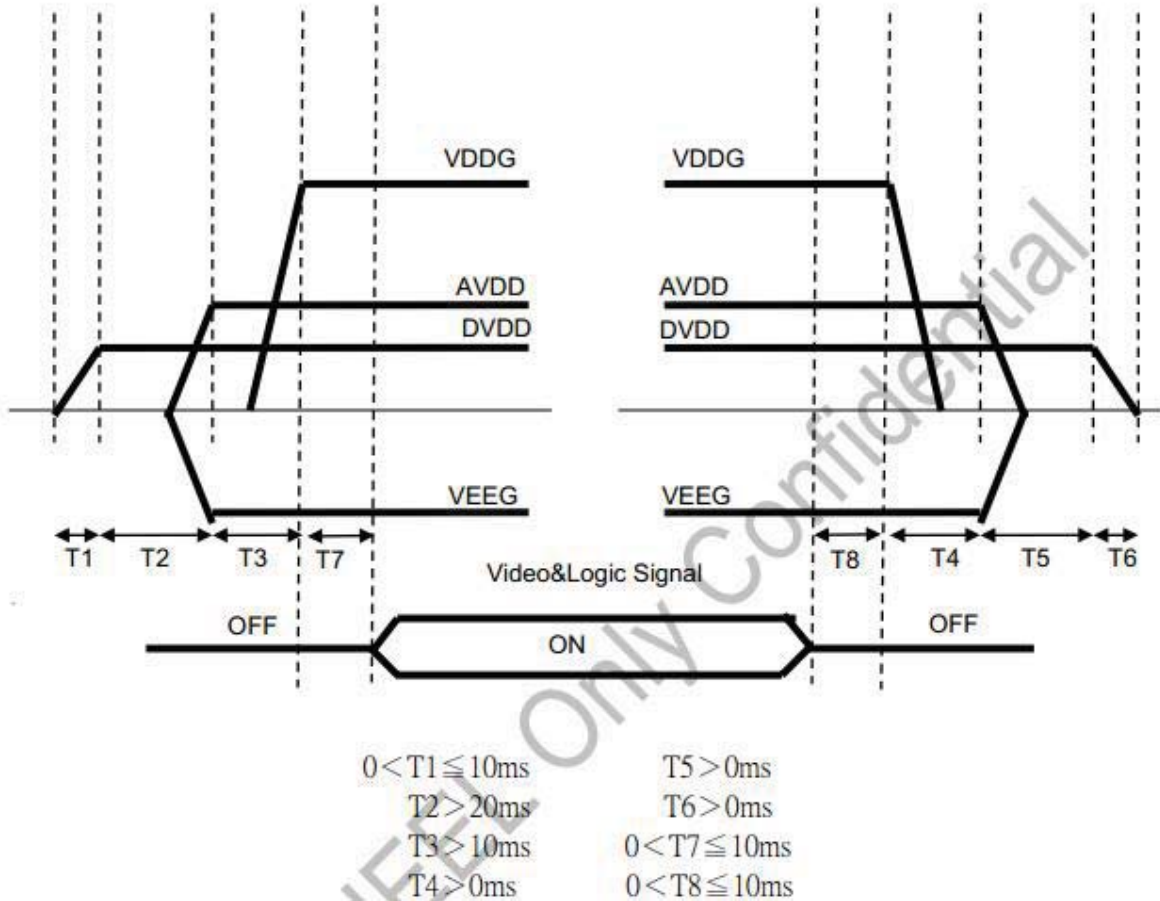
(b)Black Pattern

### 3.3.3 Power、Signal sequence

Power On: DVDD → AVDD/V EEG → VDDG → Video & Logic Signal



Power Off: Video & Logic Signal → VDDG → AVDD/VEEG → DVDD



### 3.3 Back-light Specification

Table 3.3 Back-light Specification

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	VF	Only	8.4	9.6	10.2	V
Supply Current	IF	Backlight	20*10=200			mA
Average Brightness	IV	Backlight Current IF=200mA	-		-	Cd/m <sup>2</sup>
CIE Color Coordinate	X	Backlight Current IF=200mA				-
	Y					
Uniformity	B	Backlight Current IF=200mA	70	-	-S	(%)
Color	White					

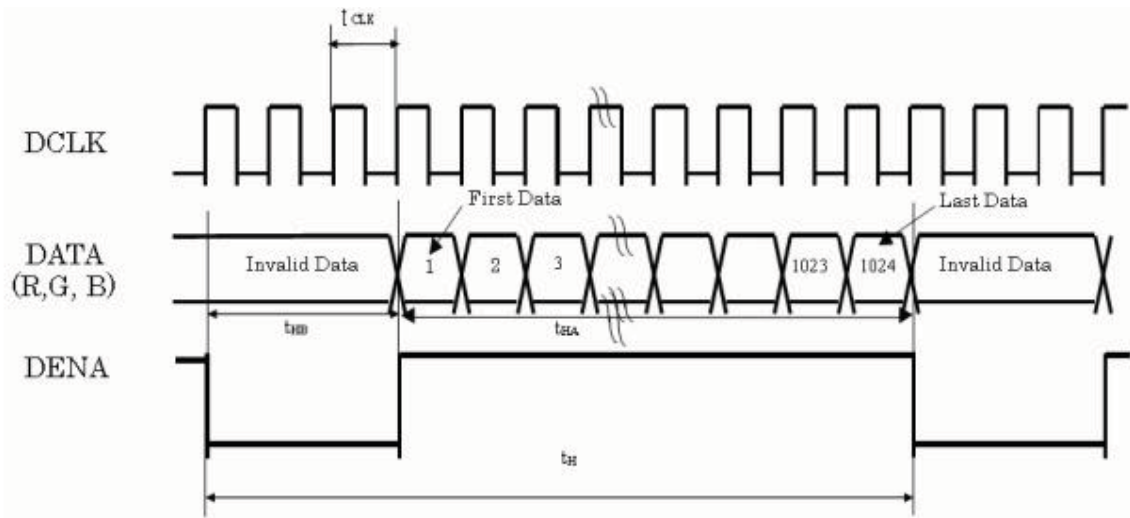
### 4 Timing characteristics of input signals

## 4.1. Timing characteristics of input signals

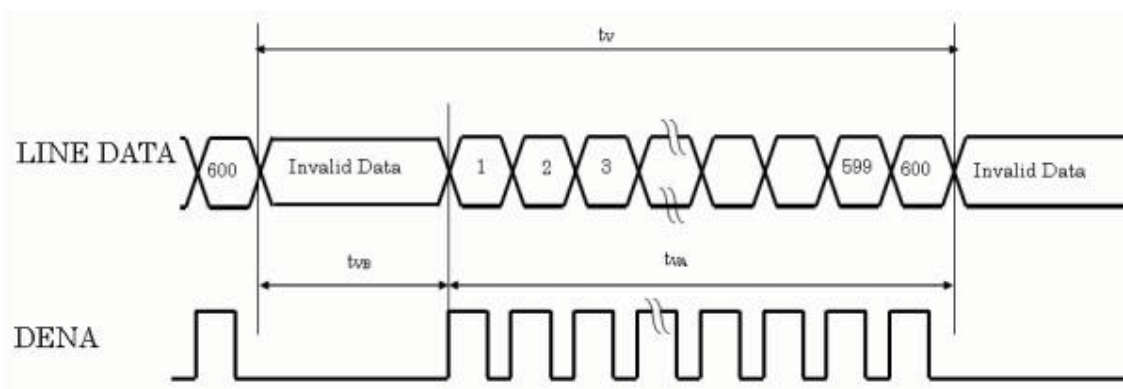
ITEM			SYMBOL	MIN	TYP	MAX	UNIT	
LVDS input signal sequence	CLK Frequency		tclk	45	51.2	57	MHz	
LCD input signal sequence (Input LVDS Transmitter)	DENA	Horizontal	Horizontal total Time	$t_H$	1324	1344	1364	tCLK
			Horizontal effective Time	$t_{HA}$	1024			tCLK
			Horizontal Blank Time	$t_{HB}$	300	320	340	tCLK
	Vertical	Vertical total Time	$t_V$	625	635	645	$t_H$	
		Vertical effective Time	$t_{VA}$	600			$t_H$	
		Vertical Blank Time	$t_{VB}$	25	35	45	$t_H$	

## 4.2. Timing sequence (Timing chart)

### 4.2.1 Horizontal Timing Sequence

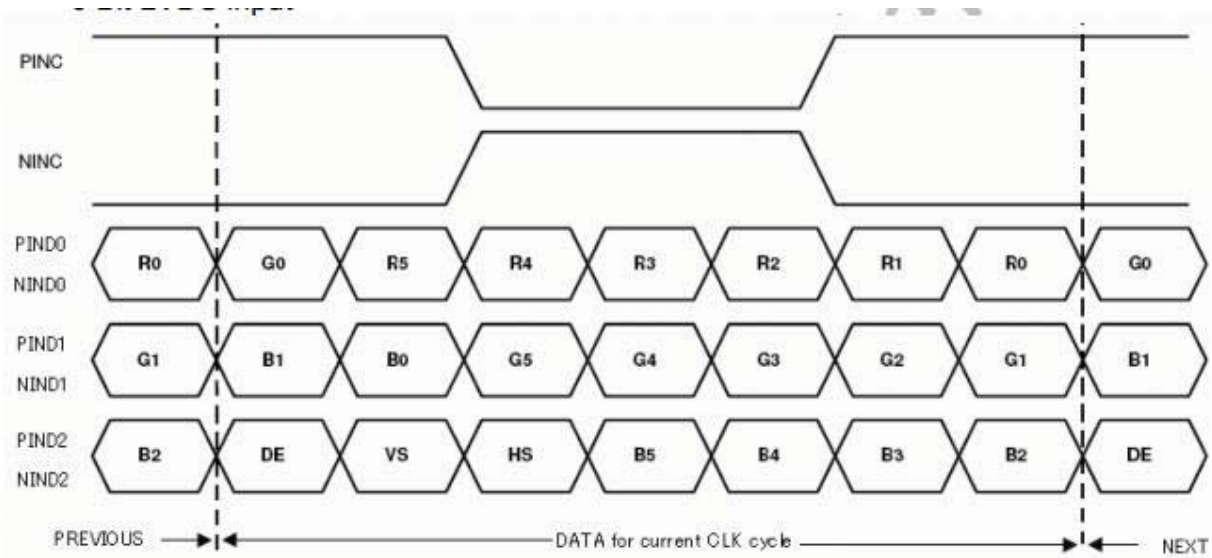


### 4.2.2 Vertical Timing Sequence

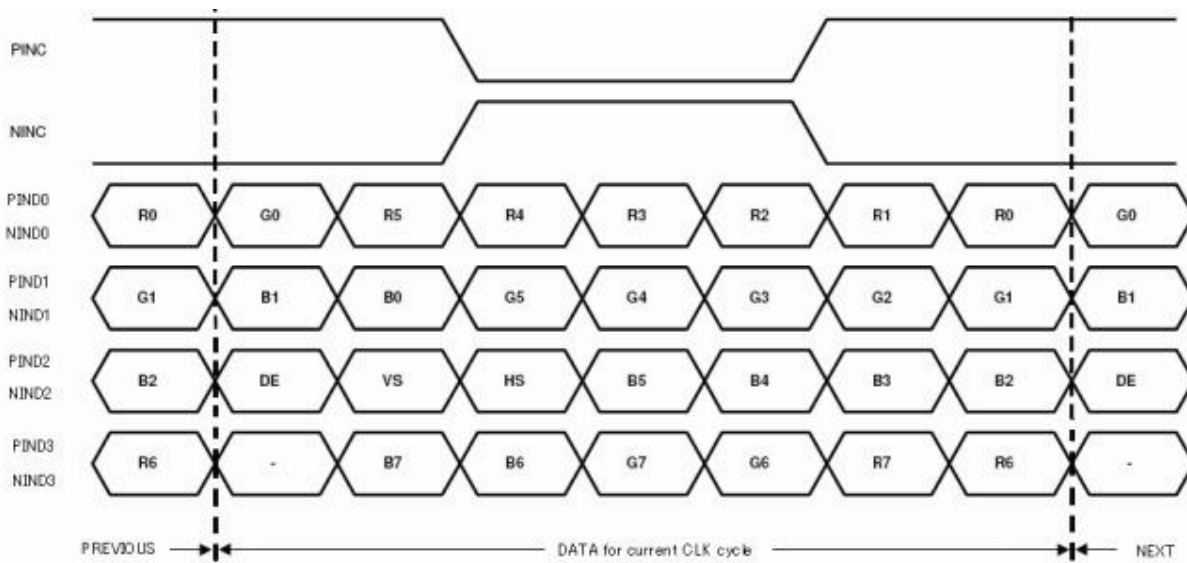


## 4.2.3 LVDS Input Data mapping

### 6Bit LVDS input



### 8Bit LVDS input



## 5. Optical Specifications

### 3.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Threshold voltage		Vsat		—		—		(6)	
		Vth		—		—		(6)	
Transmittance (With PZ)		T		3.8	4.1	—	%		
Contrast		CR		600	800	—		(1)(2)	
Response time	Rising	TR	⊖=0 Normal viewing angle	—	10	20	msec	(1)(3)	
	Falling	TF		—	15	30			
White luminance(center)		YL			400	450	-	Cd/m <sup>2</sup>	I=200mA
Color gamut		S			—	-	—	%	C light
Color chromaticity (CIE1931)	White	Wx							(1)(4) CF Glass C light
		Wy							
	Red	Rx							
		Ry							
	Green	Gx							
		Gy							
Blue	Bx								
	By								
Viewing angle	Hor.	⊖ L	CR>10	80	85	—			
		⊖ R		80	85	—			
	Ver.	⊖ U		80	85				
		⊖ D		80	85				
Optima View Direction				Free				(5)	

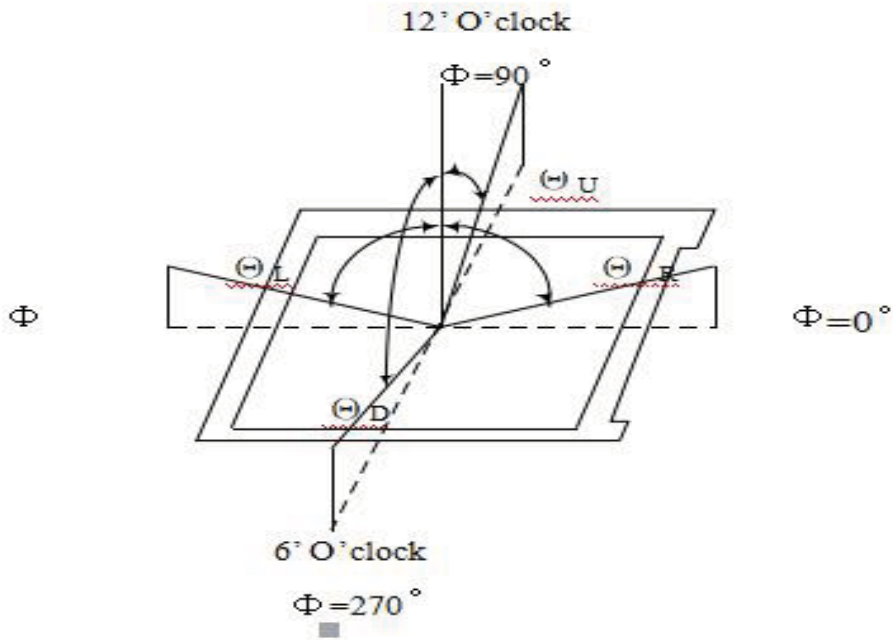
### 3.2 Measuring Condition

- Measuring surrounding: dark room
- LED current I<sub>L</sub>: 200mA
- Ambient temperature: 25±2°C
- 15min. warm-up time.

### 3.3 Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.
- Measuring spot size: 20 ~ 21m

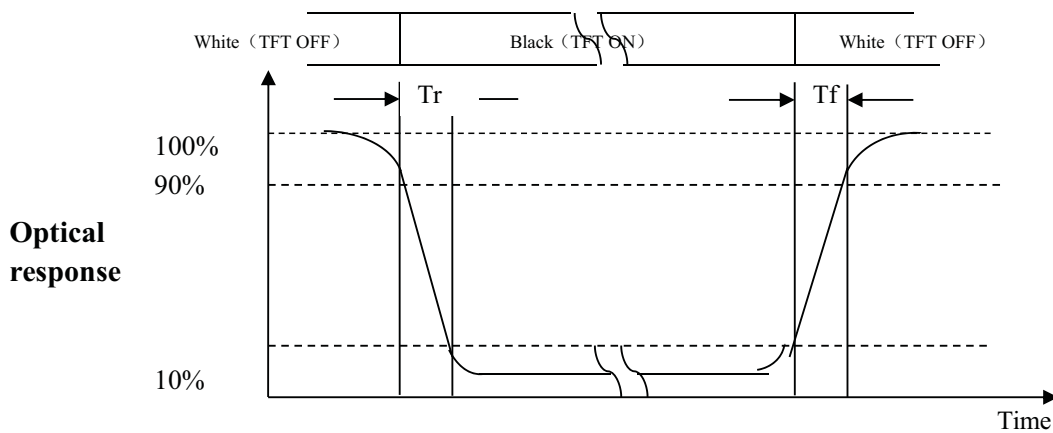
Note (1) Definition of Viewing Angle:



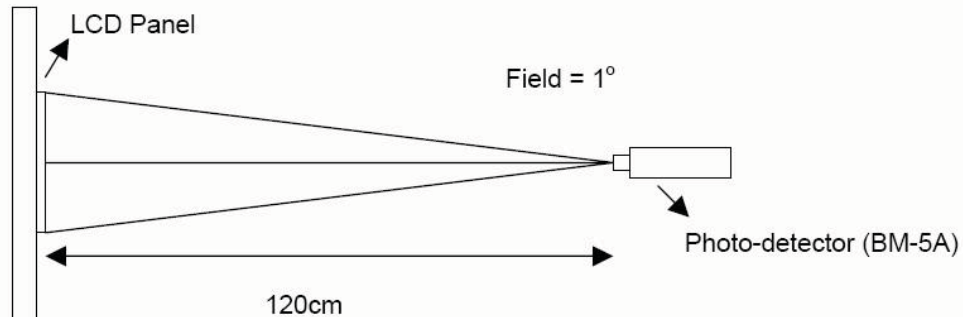
Note (2) Definition of Contrast Ratio (CR):  
 measured at the center point of pane

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note (3) Definition of Response Time: Sum of  $T_R$  and  $T_F$

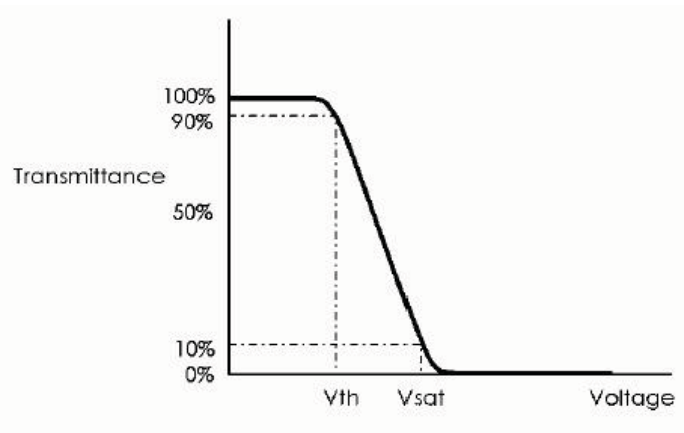


Note (4) Definition of optical measurement setup



Note (5) Rubbing Direction (The different Rubbing Direction will cause the different optimal view direction).

Note (6) Definition of  $V_{sat}$  and  $V_{th}$  (at 20°C)



## 6 Reliability Test Items

NO.	Test Item	Test Condition	Check Time
1	High temp storage	$T=70$	240hrs
2	Low temp storage	$T=-30$	240hrs
3	High temp operation	$T=50$	240hrs
4	Low temp operation	$T= -20$	240hrs
5	High temp&high humidity	$T=50$ H=90%	240hrs

**Reliability Test Criteria:**

**Display function should be no change under normal operating condition.**

## **7. Handling Precautions**

### **7.1 Safety**

The liquid crystal in the LCD is poisonous. Keep away from your mouth and eyes. If the liquid crystal contacts with your skin, mouse or clothes, use soap to wash it off immediately.

### **7.2 Handling**

- i. The LCD panel is made by thin glass. Prevent the panel from mechanical shock or putting excessive force on its surface.
- ii. The polarizer attached on the display is very easy to be damaged, handle it with special attention.
- iii. To avoid contamination on the display surface, do not touch the display surface with bare hands.
- iv. The transparent electrodes may be disconnected if you use the LCD panel under dew-condensing environment.
- v. The characteristics of the semiconductor devices may be affected when they are exposed to light, possibly resulting in malfunctioning of the ICs. To prevent such malfunctioning of the ICs, make sure the application and the mounting of the panel are designed so that the IC is not exposed to light.

### **7.3 Static Electricity**

Ground soldering iron tips, tools and testers when you operate. Also ground your body when handling the products and store the products in an anti-electrostatic container.

### **7.4 Storage**

Store the products in a dark place where the temperature is within the range of  $25\pm 10$  and with low humidity (65%RH or less). Do not store the LCD product in an atmosphere containing organic solvents or corrosive gases.

### **7.5 Cleaning**

Do not wipe the polarizer with dry cloth, as it might cause scratching. Wipe the polarizer with a soft cloth soaked with petroleum IPA. Other chemical might damage the panel.