



# PHOENIX DISPLAY INTERNATIONAL, INC.

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## PHOENIX DISPLAY INTERNATIONAL, INC

### SPECIFICATION FOR LCD MODULE

<b>CUSTOMER</b>	
<b>PART NUMBER</b>	PDIS088SWX03NB
<b>DESCRIPTION</b>	8.8" WXGA 1280(RGB)x320 Dots
<b>VERSION</b>	4.0
<b>ISSUE DATE</b>	15-Feb-17

**COMPANY ADDRESS:**

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## 1. Record of Revision

Rev	Issued Date	Description	Editor
1.0	2016/03/18	First Release.	Dong cheng
2.0	2016/10/19	Update Part Number.	Jack Guo
3.0	2017/2/10	Update Driver IC&Timing.	Jack Guo
4.0	2017/2/15	Update Optical Characteristics .	Jack Guo

## 2. General Specifications

	Feature	Spec
Characteristics	Size	8.8 inch
	Resolution	1280(horizontal)*320(Vertical)
	Interface	LVDS
	Connect type	Connector
	Display Colors	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.1695*0.1695
	Pixel Configuration	R.G.B.-Stripe
	Display Mode	Normally White
	Driver IC	ILI5802-9G+ILI6127M2-9G
	Viewing Direction	6 O'clock
Mechanical	LCM (W x H x D) (mm)	229.66*67.50*3.50
	Active Area(mm)	216.96*54.24
	Weight (g)	97g
	LED Numbers	36 LEDs

Note 1: Requirements on Environmental Protection: RoHs

Note 2: LCM weight tolerance: +/- 5%

### 3. Input/Output Terminals

Pin No	Signal	I/O	Description
1	VCOM	P	Common Voltage
2~3	VDD	P	DC-DC circuit supply voltage(3V-4.2V)
4	NC	/	No connection
5	Reset	P	Global reset pin
6	STBYB	P	Stand
7	GND	P	Ground
8	RXIN0-	I	- LVDS differential data input
9	RXIN0+	I	+ LVDS differential data input
10	GND	P	Ground
11	RXIN1-	I	- LVDS differential data input
12	RXIN1+	I	+ LVDS differential data input
13	GND	P	Ground
14	RXIN2-	I	- LVDS differential data input
15	RXIN2+	P	+ LVDS differential data input
16	GND	I	GND
17	RXCLKIN-	I	- LVDS differential clock input
18	RXCLKIN+	P	+ LVDS differential clock input
19	GND	I	GND
20	RXIN3-	I	- LVDS differential data input
21	RXIN3+	I	+ LVDS differential data input
22	GND	P	Ground
23	SDA	P	NO CONNECT
24	SCL	P	NO CONNECT
25	GND	P	Ground
26	CS	I	Chip select
27	NC	/	No connection
28	NC	/	No connection
29	AVDD	I	Power for Analog Circuit
30	GND	P	Ground
31	LEDK-	P	LED Cathode
32	LEDK-	P	LED Cathode
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	LEDA+	P	LED Anode
40	LEDA+	P	LED Anode

#### 4. Absolute Maximum Rating

Item	Symbol	MIN	Typ	MAX	Unit	Remark
Supply Voltage	V <sub>DD</sub>	-0.3	-	5.0	V	-
Operating Temperature	T <sub>OPR</sub>	-10	-	50	°C	-
Storage Temperature	T <sub>STG</sub>	-20	-	60	°C	-

#### 5. Timing characteristics

##### 5.1 ELECTRICAL CHARACTERISTICS

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Supply Voltage	V <sub>DD</sub>	3.0	3.3	3.6	V	
Input Signal Voltage	Low Level	V <sub>IL</sub>	GND	-	0.3x VDD	V
	High Level	V <sub>IH</sub>	0.7x VDD	-	VDD	V
Output Signal Voltage	Low Level	V <sub>IL</sub>	-	-	VSS+0.4	V
	High Level	V <sub>IH</sub>	VDD-0.4	-	-	V
(Panel+LSI) Power Consumption	Black Mode (60Hz)	-	-	-	nW	
	Standby	-	-	-	uW	

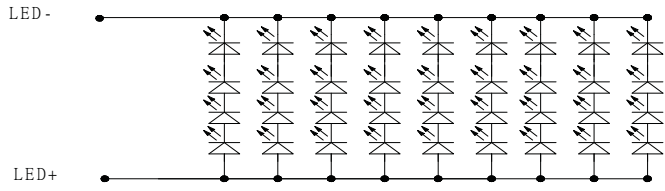
##### 5.2 LED Driving Conditions

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I <sub>F</sub>	-	200	-	mA	
Forward Voltage	V <sub>F</sub>	12	12.8	14.4	V	
Backlight Power consumption	W <sub>BL</sub>	2.4	2.56	2.88	W	
LED Lifetime		-	25000	-	Hrs	

Note 1: Each LED: I<sub>F</sub> =20 mA, V<sub>F</sub> =3.2±0.2V.

Note 2: Optical performance should be evaluated at Ta=25°C only.

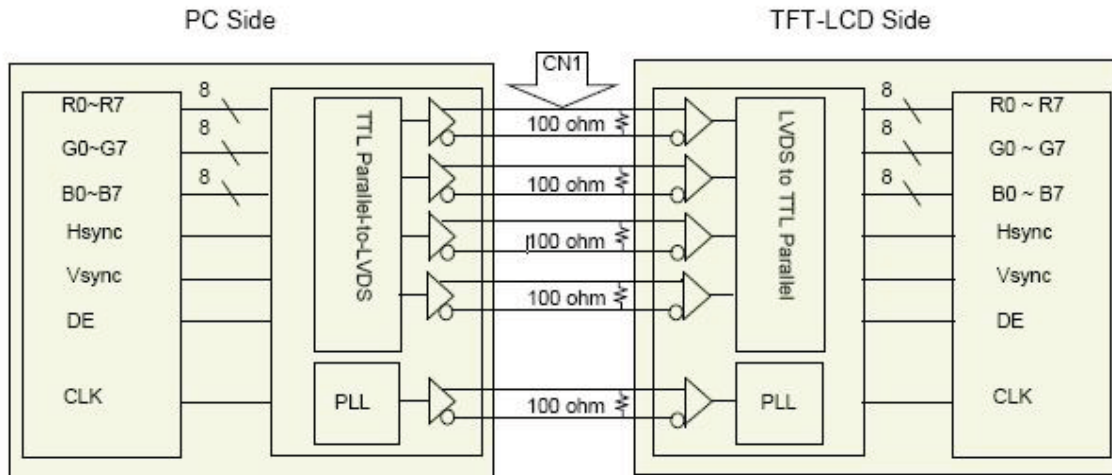
Note 3: If LED is driven by high current, high ambient temperature & humidity condition. The life Time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.



CIRCUIT DIAGRAM(4串9并)

Figure: LED connection of backlight(Constant Current)

### 5.3 LVDS Interface

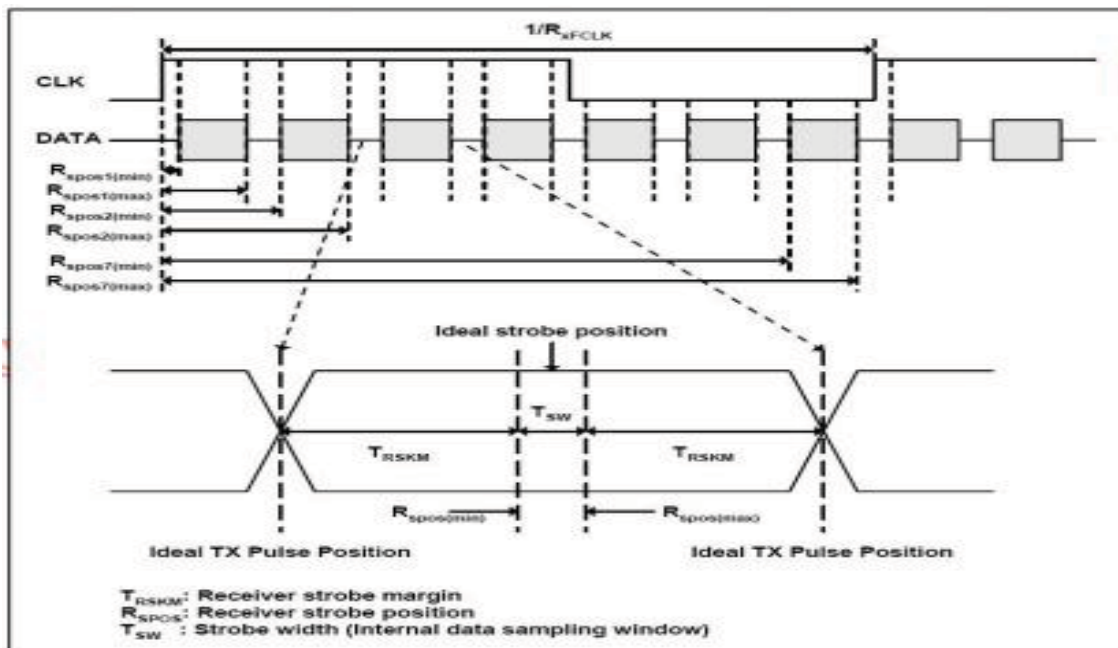
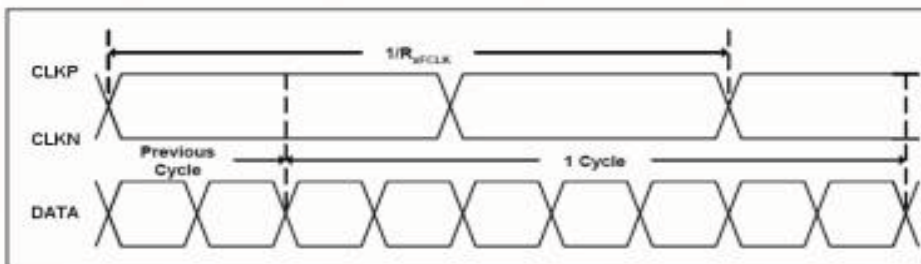


## 5.4 AC electrical Characteristics

### 5.1.1. AC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock frequency	$R_{xFCLK}$	20	72.4	81	MHz	
Input data skew margin	$T_{RSKM}$	300	-	-	ps	$ V_{ID} =400\text{Mv}$ $R_{xvcm}=1.2\text{V}$ $R_{xfclk}=81\text{MHZ}$
Clock high time	$T_{LVCH}$	-	$4/(7 * R_{xFCLK})$	-	ns	
Clock low time	$T_{LVCL}$	-	$3/(7 * R_{xFCLK})$	-	ns	

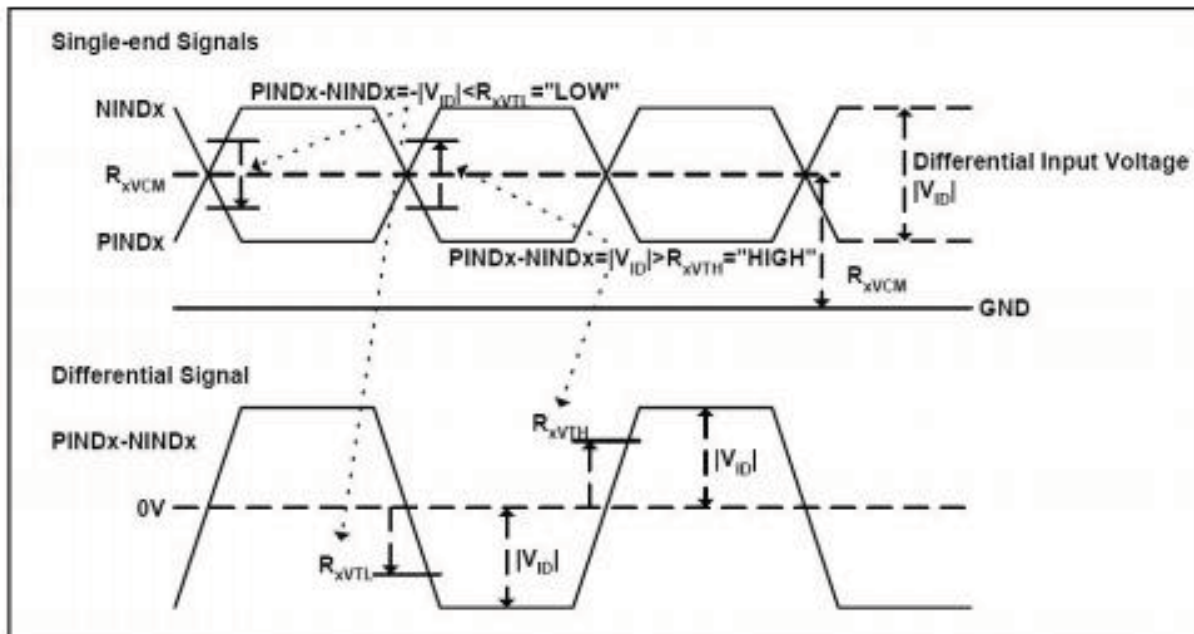
### 5.1.2. Input Clock and Data Timing Diagram





## 5.5 DC electrical Characteristics

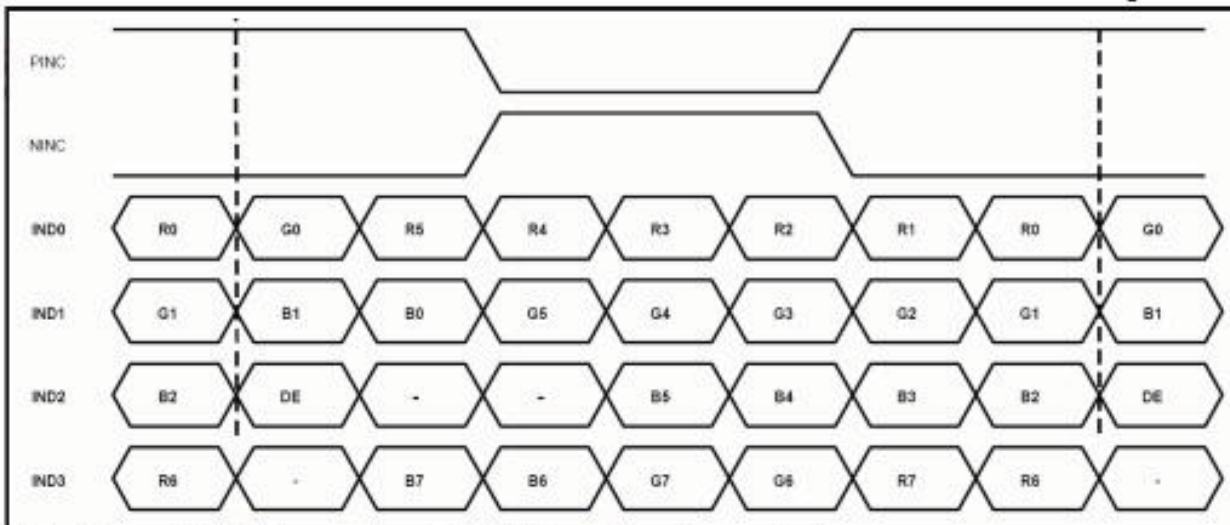
Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Differential input high Threshold voltage	$R_{xVTH}$	-	-	+0.1	V	$R_{xVCM}=1.2V$
Differential input low Threshold voltage	$R_{xVTL}$	-0.1	-	-	V	
Input voltage range (singled-end)	$R_{xVIN}$	0	-	$VDD-1.2+ V_{ID} /2$	V	
Differential input common mode voltage	$R_{xVCM}$	$ V_{ID} /2$	-	$VDD-1.2$	V	
Differential voltage	$ V_{ID} $	0.2	-	0.6	V	
Differential input leakage current	$R_{V_{xiz}}$	-10	-	+10	$\mu A$	
LVDS digital Operating Current	$I_{ddlvds}$	-	18	30	mA	Fclk=81MHz , VDD=3.3V
LVDS digital Standby Current	$I_{stlvds}$	-	90	150	$\mu A$	Clock & all Functions are stopped



## 5.6 Timing

Item	Symbol	Min.	Typ.	Max.	Unit
PCLK Frequency	FPCLK	-	30	-	MHz
Horizontal Synchronization	Hsync	-	10	-	PCLK
Horizontal Back Porch	HBP	-	72	-	PCLK
Horizontal Front Porch	HFP	-	22	-	PCLK
Hsync+HBP+HFP	-	-	104	-	PCLK
Horizontal Display Area	Hd	-	1280	-	PCLK
Horizontal cycle	-	-	1384	-	PCLK
Vertical Synchronization	Vsync	-	10	-	Line
Vertical Back Porch	VBP	-	8	-	Line
Vertical Front Porch	VFP	-	8	-	Line
Hsync+VBP+VFP	-	-	26	-	Line
Vertical Display Area	Vd	-	320	-	Line
Vertical cycle	-	-	346	-	Line
Frame Rate	-	-	60	-	Hz

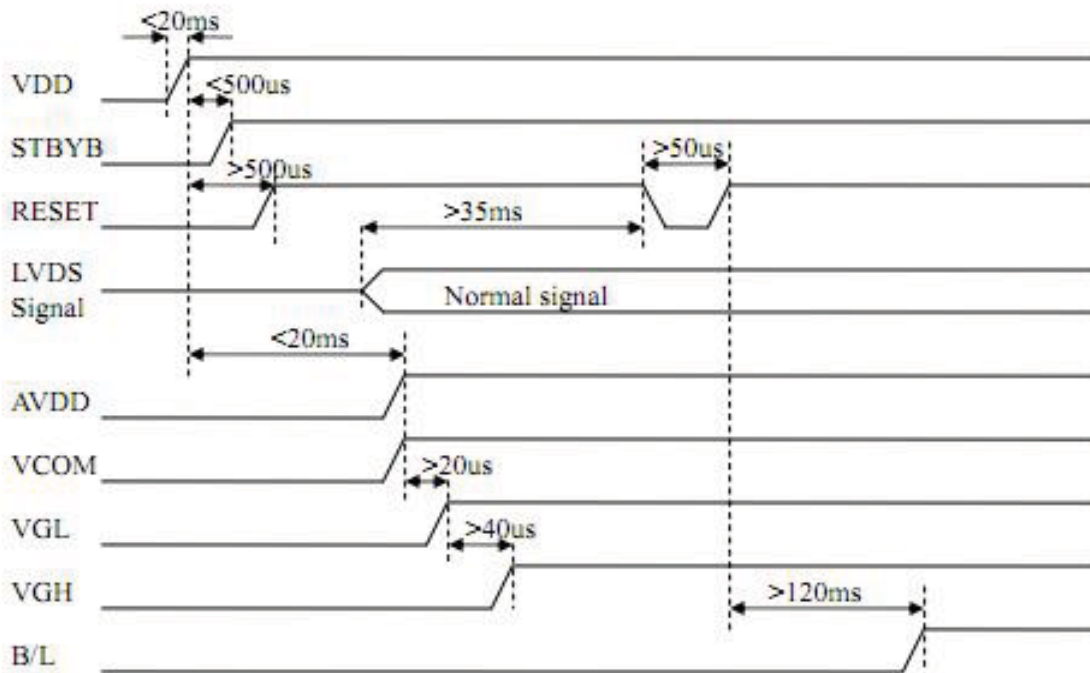
## 5.7 8bit LVDS input



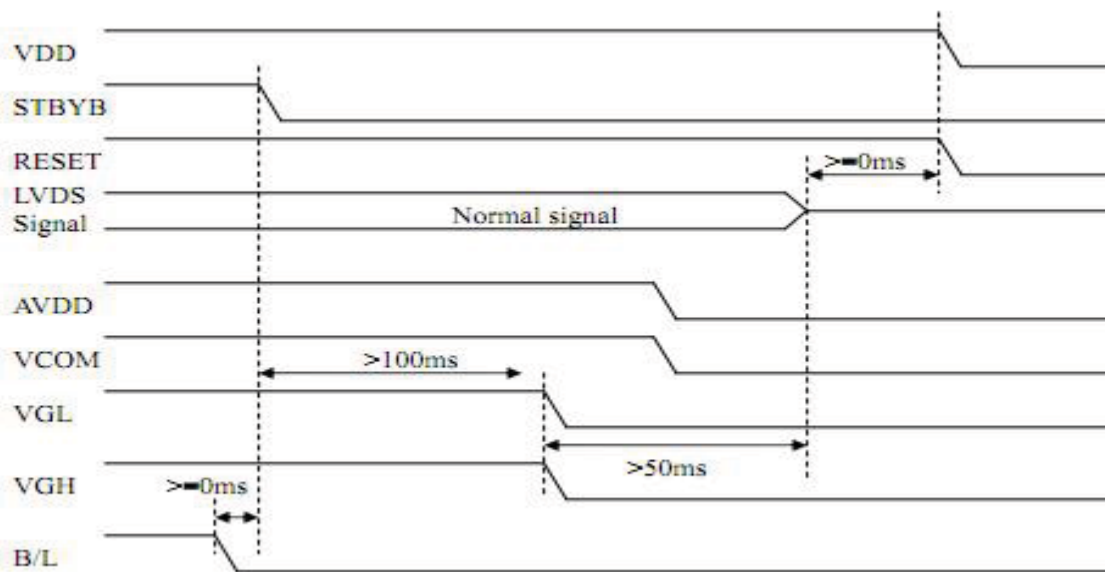
Note: Support DE timing mode only, SYNC mode not supported.

## 5.8 Power Sequence

### a. Power on:



### b. power off:



## 6 Optical Characteristics

Items	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	Note	
Response time	Tr+Tf	-	-	25	50	ms	FIG.1	Note4	
Contrast Ratio	CR		500	700	-	-	FIG.2	Note1	
Surface luminance	LV	$\theta = 0^\circ$	-	400	-	cd/m <sup>2</sup>	FIG.2	Note2	
Luminance uniformity	Yu	$\theta = 0^\circ$	-	80	-	%	FIG.2	Note3	
NTSC	-	$\theta = 0^\circ$	60	70	-	%	FIG.2	Note5	
Viewing angle	$\theta$ Cr>10	$\varnothing = 90^\circ$	-	65	-	deg	FIG.3	Note6	
		$\varnothing = 270^\circ$	-	55	-	deg	FIG.3		
		$\varnothing = 0^\circ$	-	65	-	deg	FIG.3		
		$\varnothing = 180^\circ$	-	65	-	deg	FIG.3		
Chromaticity	Red	R <sub>x</sub>	$\theta = 0^\circ$ $\varnothing = 0^\circ$ Ta=25°	0.61	0.63	0.65	-	FIG.2 CIE1931	Note5
		R <sub>y</sub>		0.33	0.35	0.37	-		
	Green	G <sub>x</sub>		0.34	0.36	0.38	-		
		G <sub>y</sub>		0.61	0.63	0.65	-		
	Blue	B <sub>x</sub>		0.13	0.15	0.17	-		
		B <sub>y</sub>		0.02	0.04	0.06	-		
	White	W <sub>x</sub>		0.29	0.31	0.33	-		
		W <sub>y</sub>		0.29	0.31	0.33	-		

**Note1. Definition of contrast ratio**

Contrast ratio(Cr) is defined mathematically by the following formula. For more information see FIG.2.

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

For contrast ratio, Surface Luminance, Luminance uniformity and CIE,the testing data is base on TOPCON' s BM-5 or BM-7 photo detector or compatible.

**Note2. Definition of surface luminance.**

Surface luminance is the luminance with all pixels displaying white. For more information see FIG.2.

Lv = Average Surface Luminance with all white pixels(P1,P2,P3, .....,Pn)

**Note3. Definition of luminance uniformity**

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance.For more information see FIG.2.

$$YU = \frac{\text{Minimum surface luminance with all white pixels (P1,P2,P3,.....,Pn)}}{\text{Maximum surface luminance with all white pixels (P1,P2,P3,.....,Pn)}}$$

**Note4. Definition of response time**

The response time is defined as the LCD optical switching time interval between "White" state and "Black"state.Rise time (Tr) is the time between photo detector output intensity changed from 90% to 10%. And fall time (Tf) is the time between photo detector output intensity changed from 10% to 90%.

For additional information see FIG1.

**Note5. Definition of color chromaticity (CIE1931)**

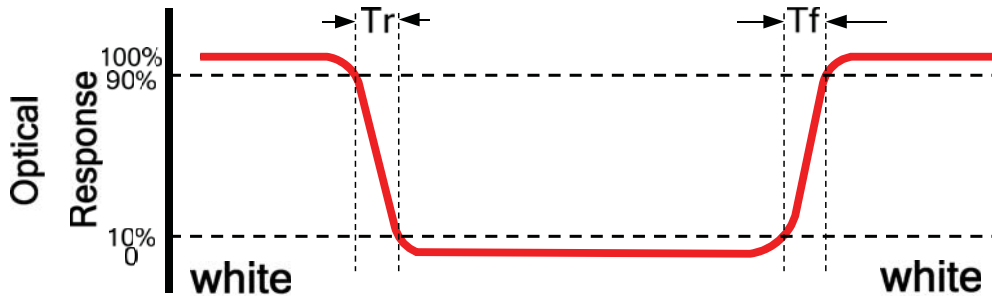
CIE (x,y) chromaticity,The x,y value is determined by screen active area center position P5.For more information see FIG.2.

**Note6. Definition of viewing angle**

Viewing angle is the angle at which the contrast ratio is greater than 10. Angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG.3.

For viewing angle and response time testing, the testing data is base on Autronic-Melchers' s ConoScope or DMS series Instruments or compatible.

**FIG.1.The definition of response Time**



**FIG.2. Measuring method for contrast ratio, surface luminance,**

**luminance uniformity, CIE (x,y) chromaticity**

Size :  $S \leq 5"$  (see Figure a) A : 5 mm B : 5 mm

H,V : Active area

Light spot size  $\varnothing = 5\text{mm}$  (BM-5) or  $\varnothing = 7.7\text{mm}$  (BM-7) 50cm distance or compatible distance from the LCD surface to detector lens.

test spot position : see Figure a.

measurement instrument : TOPCON's luminance meter BM-5 or BM-7 or compatible (see Figure c).

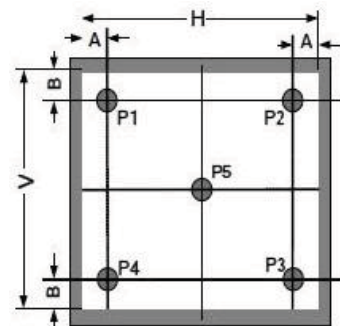


Figure a

Size :  $5" < S \leq 12.3"$  (see Figure b) H,V : Active area

Light spot size  $\varnothing = 5\text{mm}$  (BM-5) or  $\varnothing = 7.7\text{mm}$  (BM-7) 50cm distance or compatible distance from the LCD surface to detector lens.

test spot position : see Figure b.

measurement instrument : TOPCON's luminance meter BM-5 or BM-7 or compatible (see Figure c).

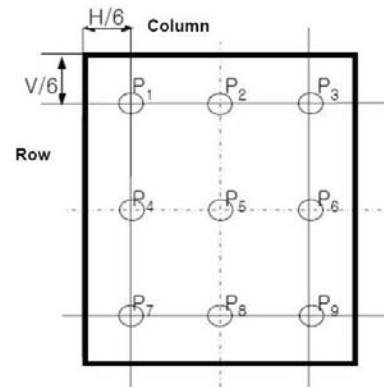


Figure b

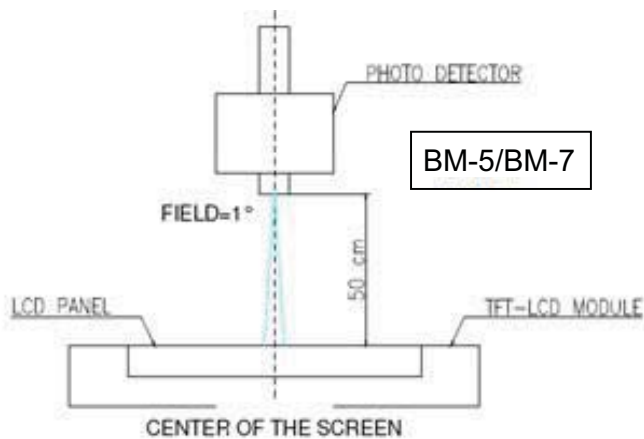
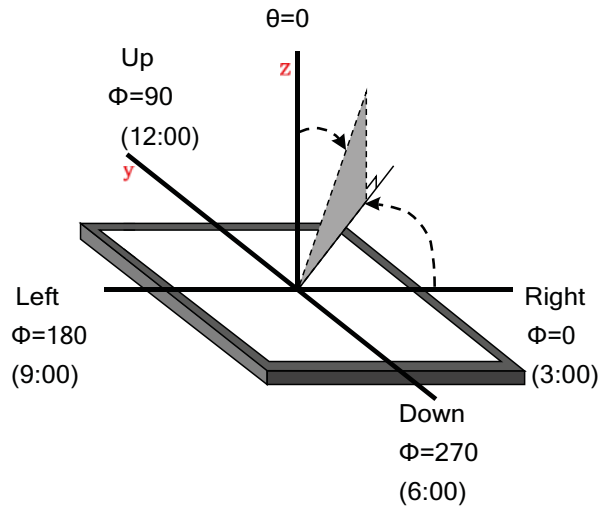


Figure c

FIG.3.The definition of viewing angle



## 7 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +50°C, 96hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -10°C, 96hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +60°C, 120hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -20°C, 120hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	Ta= +40°C, 90% RH max, 120 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-20°C 30 min ~ +60°C 30 min Change time: 5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Discharge (Operation)      Static	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15°C ~ 35°C, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2 GB/T17626.2-1998
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (package condition)	IEC60068-2-6 GB/T2423.5-1995
9	Shock (Non-operation)	60G 6ms, ± X, ±Y , ± Z 3 times for each direction	IEC60068-2-27 GB/T2423.5-1995
10	Package Drop Test	Height: 80 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8-1995

Note:1. Ts is the temperature of panel's surface.

2. Ta is the ambient temperature of sample.

3. The size of sample is 5pcs.



# 8 Mechanical Drawing

**Top View Dimensions:**  
 \*77.50±0.2 LCM OUTLINE  
 57.84±0.2 BZ OPENING  
 2.88  
 54.24 LCD AA  
 4.71  
 211.20±0.2 BZ OPENING  
 218.95 LCD AA  
 7.62  
 5.15  
 \*228.60±0.2 LCM OUTLINE  
 1280\*(RGB)\*320

**Side View Dimensions:**  
 \*1.60±0.2  
 MAX.3

**Detail View Dimensions:**  
 32.60±0.5  
 Label  
 118.60±0.5  
 Aluminum plate 0.3mm  
 Connector Pin: 120-05-038H

**Pin List:**

1	VCCOM
2	VDD
3	VDD
4	VDD
5	RESIST
6	STRGB
7	GND
8	Resist+
9	Resist+
10	GND
11	Resist-
12	Resist+
13	GND
14	Resist-
15	Resist+
16	GND
17	Resist-
18	Resist+
19	GND
20	Resist+
21	Resist+
22	GND
23	SDA
24	SCL
25	GND
26	CS
27	NC
28	NC
29	AVDD
30	GND
31	LEDK
32	LEDK
33	NC
34	NG
35	VGL
36	NC
37	NC
38	VGH
39	LED+
40	LED+

**LCM NOTES:**  
 1. DISPLAY TYPE: 8.8 INCH TFT/TRANSMISSIVE  
 2. BACKLIGHT: 36CHIP WHITE LED, 4SP  
 VF=12.8±1.0V/IF=20mA  
 3. OPERATING TEMP: -10°C~+50°C  
 4. STORAGE TEMP: -20°C~+60°C  
 5. LCD TYPE: TFT  
 6. Luminance:400cd/m2(TYP)  
 7. \*1)Reference dimension,\*\*critical dimension  
 8. RoHS Compliant

**CIRCUIT DIAGRAM(4排9并)**

REV.	DATE	MODIFICATION
Z10	2016/10/17	
T10	2016/03/18	按原图的规格更改型号

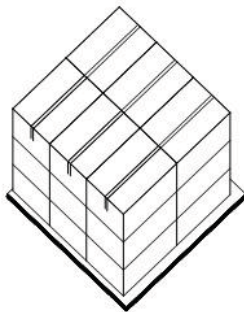
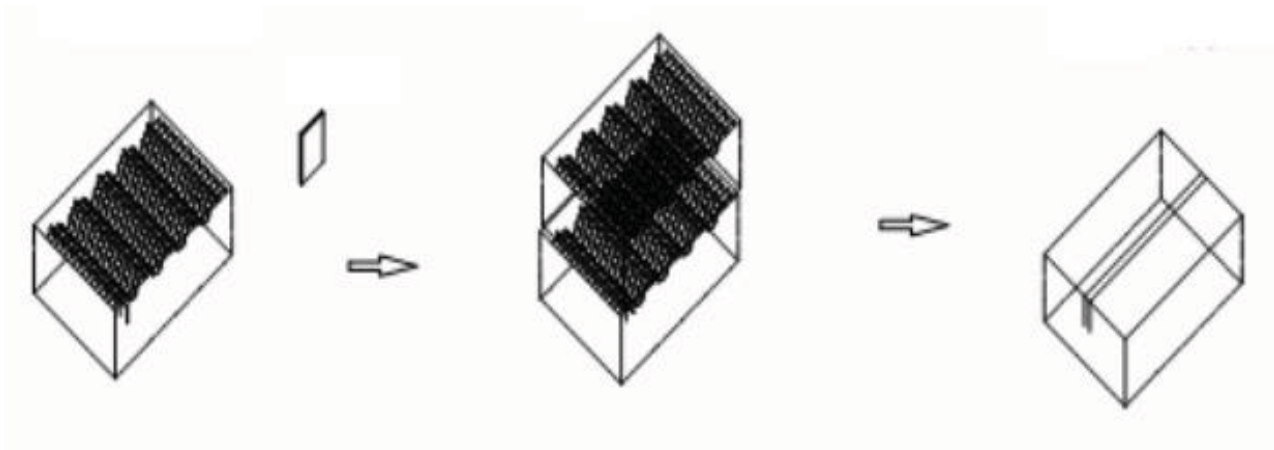
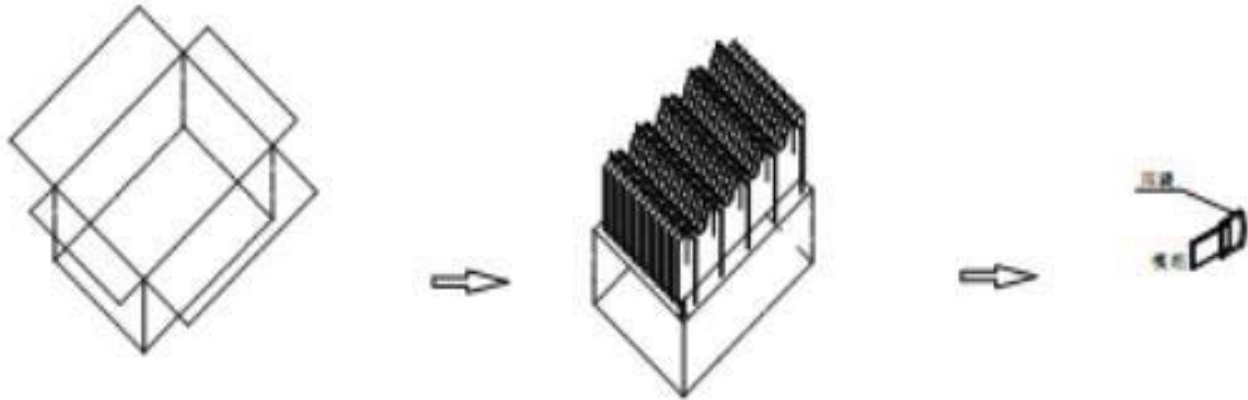
INTERFACE	RGB Interface
VIEWING DIRECTION	6 O'clock
DIRECTION	12 O'clock

FINI NO.	CD1-DWG-S0888-W030NB
DWN.	L.Huang 2016.10.17
CHKD.	L.Huang 2016.10.17
PROJECTION	3rd ANGLE

PART NO.	S0888W030NB
REV.	2.0
SHEET OF	1/1
TOLERANCE UNLESS SPECIFIED	±0.3
UNIT	mm
SCALE	1:1

# 9 Packing

## Packing Method



## **10 .TFT-LCD Module Inspection Criteria**

### **10.1 Scope**

The incoming inspection standards shall be applied to TFT - LCD Modules (hereinafter Called "Modules") that supplied by CDTech Technology LTD.

### **10.2 Incoming Inspection**

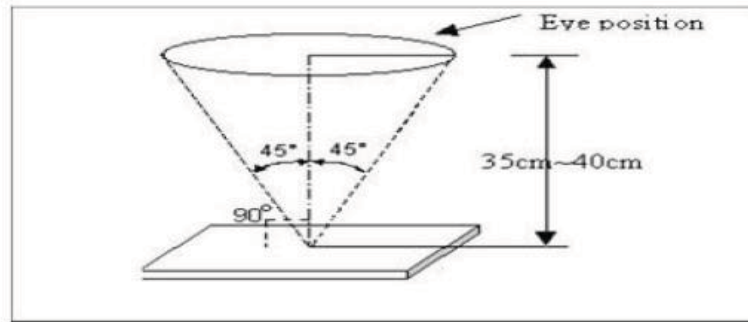
The customer shall inspect the modules within twenty calendar days of the delivery date (the "inspection period") at its own cost. The result of the inspection (acceptance or rejection) shall be recorded in writing, and a copy of this writing will be promptly sent to The seller, If the results of the inspecting from buyer does not send to the seller within twenty Calendar days of the delivery date. The modules shall be regards as acceptance. Should the customer fail to notify the seller within the inspection period, the buyers Right to reject the modules shall be lapsed and the modules shall be deemed to have Been accepted by the buyer

### **10.3 Inspection Sampling**

- 3.1. Lot size: Quantity per shipment lot per model
  - 3.2. Sampling type: Normal inspection, Single sampling
  - 3.3. Inspection level: II
  - 3.4. Sampling table: MIL-STD-105E
  - 3.5. Acceptable quality level (AQL )
- Major defect: AQL=0.65 Minor defect: AQL=1.50

### **10.4 Inspection Conditions**

- 4.1 Ambient conditions:
  - a. Temperature: Room temperature  $25 \pm 5^{\circ}\text{C}$
  - b. Humidity:  $(60 \pm 10) \% \text{RH}$
  - c. Illumination: Single fluorescent lamp non-directive (300 to 700 Lux)
- 4.2 Viewing distance  
The distance between the LCD and the inspector's eyes shall be at least  $35 \pm 5$  cm.
- 4.3 Viewing Angle  
U/D:  $45^{\circ} / 45^{\circ}$  , L/R:  $45^{\circ} / 45^{\circ}$



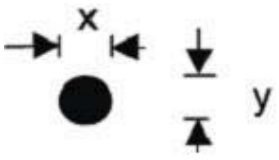
## 10.5 Inspection Criteria

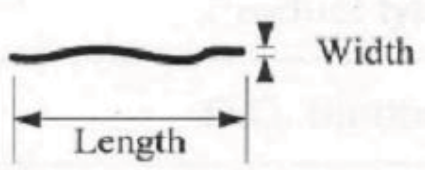
Defects are classified as major defects and minor defects according to the degree of Defectiveness defined herein.

### 10.5.1 Major defect

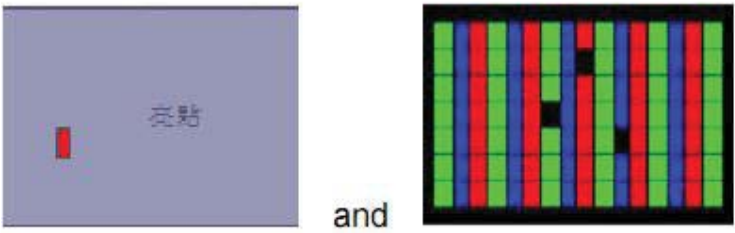
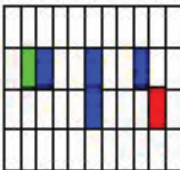
Item No	Items to be inspected	Inspection Standard
5.1.1	All functional defects	1) No display 2) Display abnormally 3) Short circuit 4) line defect
5.1.2	Missing	Missing function component
5.1.3	Crack	Glass Crack

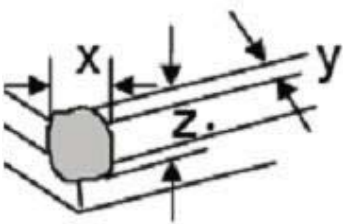
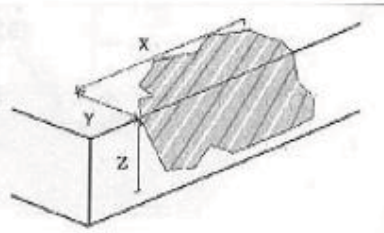
### 10.5.2 Minor defect

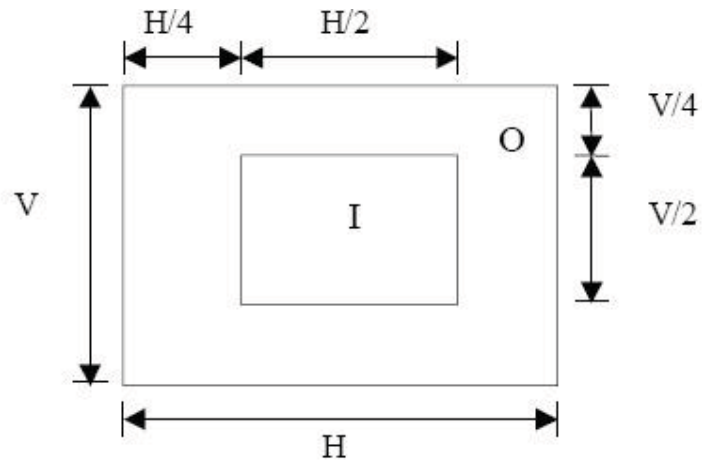
Item No	Items to be inspected	Inspection standard	
5.2.1	Spot Defect Including Black spot White spot Pinhole Foreign particle Polarizer dirt	For dark/white spot is defined $\phi = (x+y) / 2$ 	
		Size $\phi$ (mm)	Acceptable Quantity
		$\phi \leq 0.2$	Ignore
		$0.2 < \phi \leq 0.3$	$N \leq 5$
		$0.3 < \phi$	Not allowed

5.2.2	Line Defect Including Black line White line Scratch	Define:	
			
		Width(mm) Length(mm)	Acceptable Quantity
		$W \leq 0.05$	Ignore
		$0.05 < W \leq 0.1$ $0.3 < L \leq 3.0$	$N \leq 3$
$L > 3.0$	Not allowed		

5.2.3	Polarizer Dent/Bubble	Size $\phi$ (mm)	Acceptable Quantity
		$\Phi \leq 0.2$	Ignore
		$0.2 < \Phi \leq 0.3$	$N \leq 2$
		$\Phi > 0.3$	Not allowed

5.2.4	Electrical Dot Defect	Bright and Black dot define:		
				
				
		Two Adjacent Dot		
		Inspection pattern: Full white 、 Full black 、 Red 、 green and blue screens		
		Item	Acceptable Quantity	
	Single Dot	Adjacent 2dots	Total	
Black dot defect	4	2	4	
Bright dot defect	2	1	2	
Total Dot			6	

5.2.5	Glass defect	 <p><b>1. Corner Fragment:</b></p>	
		Size(mm)	Acceptable Quantity
		$X \leq 3\text{mm}$ $Y \leq 1\text{mm}$ $Z \leq T$	<b>Ignore</b> <b>T: Glass thickness</b> <b>X: Length</b> <b>Y: Width</b> <b>Z: thickness</b>
		<p><b>2. Side Fragment:</b></p> 	
		Size(mm)	Acceptable Quantity
		$X \leq 5.0\text{mm}$ $Y \leq 1\text{mm}$ $Z \leq T$	<b>T: Glass thickness</b> <b>X: Length</b> <b>Y: Width</b> <b>Z: thickness</b>



### I area & O area

- Note:
- 1). Dot defect is defined as the defective area of the dot area is larger than 50% of the dot area.
  - 2). The distance between two bright dot defects (red, green, blue, and white) should be larger than 15mm.
  - 3). The distance between black dot defects or black and bright dot defects should be more than 5mm apart.
  - 4). Polarizer bubble is defined as the bubble appears on active display area. The defect of polarizer bubble shall be ignored if the polarizer bubble appears on the outside of active display area.

## 10.6 Mechanics specification

As for the outside dimension, weight of the modules, please refer to product specification  
For more details

# 11. Precautions for Use of LCD modules

## 11.1 Handling Precautions

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

11.1.2. 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, promptly wash it off using soap and water.

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

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

11.1.5. If the display surface is contaminated, breathe on the surface and gently 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
- Ketene
- Aromatic solvents

11.1.6. Do not attempt to disassemble the LCD Module.

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

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

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

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

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

11.1.8.4. 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.

## 11.2 Storage Precautions

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

11.2.2. 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°C ~ 40°C      Relatively humidity: ≤80%

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



### **11.3 Transportation Precautions**

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