PHOENIX DISPLAY
INTERNATIONAL, INC.

PHOENIX DISPLAY INTERNATIONAL, INC

SPECIFICATION FOR LCD MODULE

CUSTOMER	
PART NUMBER	PDIS080QXG04EA
DESCRIPTION	8.0" 1024 (RGB) x 768 Dots
VERSION	4.0
ISSUE DATE	21-Aug-17

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1. Record of Revision

Rev	Issued Date	Description	Editor
1.0	2016/08/29	First Release.	Li Huang
2.0	2016/10/10	Update PN	Jack Guo
3.0	2017/08/21	Update Input/Output Terminals	Jack Guo
4.0	2018/06/04	Add the 8bit LVDS input timing	ZHP

2. General Specifications

Feature		Spec
Characteristics	Size	8.0 inch
	Resolution	1024(horizontal)*768(Vertical)
	Interface	LVDS
	Connect type	Connector
	Display Colors	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.1583*0.1583
	Pixel Configuration	R.G.B.-Stripe
	Display Mode	Normally Black
	Driver IC	TBD
	Viewing Direction	Full view
Mechanical	LCM (W x H x D) (mm)	183.00*141.00*6.15
	Active Area(mm)	162.05*121.54
	Weight (g)	169 g
	LED Numbers	27 LEDs

Note 1: Requirements on Environmental Protection: RoHs
Note 2: LCM weight tolerance: +/- 5%

3. Input/Output Terminals

No.	Symbol	Description
1	VCOM	Common voltage
2	VDD	3.3V Power
3	VDD	3.3V Power
4	NC	Not connect
5	RESET	Global reset pin Active low enter reset state Suggest to connecting with an RC reset Normally pull hight(R=100K,C=1UF)
6	STBYB	Standby mode normally pull high STBYB="1",timing control ,source driver will turn off all output are high-Z
7	GND	System Ground
8	RXIN0-	Negative LVDS differential data input
9	RXIN0+	Positive LVDS differential data input
10	GND	System Ground
11	RXIN1-	Negative LVDS differential data input
12	RXIN1+	Positive LVDS differential data input
13	GND	System Ground
14	RXIN2-	Negative LVDS differential data input
15	RXIN12+	Positive LVDS differential data input
16	GND	System Ground
17	RXCLK-	Negative LVDS differential clock input
18	RXCLK+	Positive LVDS differential clock input
19	GND	System Ground
20	RXIN3-	Negative LVDS differential data input
21	RXIN3+	Positive LVDS differential data input
22	GND	System Ground
23	NC	Not connect
24	NC	Not connect
25	GND	System Ground
26	NC	Not connect
27	DIMO	Backlight CABC controller signal output
28	SELB	6bit/8bit mode select H:6bit /L:8bit Note1
29	AVDD	Power for Analog Circuit
30	GND	System Ground
31	NC	Not connect
32	NC	Not connect
33	L/R	Horizontal inversion Note3
34	U/D	Vertical inversion Note3

35	VGL	Positive power for TFT	
36	CABCEN1	CABC H/W enable	Note2
37	CABCEN0	CABC H/W enable	Note2
38	VGH	Positive power for TFT	
39	NC	Not connect	
40	NC	Not connect	

I: input, O: output, P: Power

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.

4. Absolute Maximum Rating

Item	Symbol	MIN	Typ	MAX	Unit	Remark
Supply Voltage	V_{DD}	-0.3	-	5	V	-
Operating Temperature	T_{OPR}	-10	-	50	℃	-
Storage Temperature	T_{STG}	-20	-	60	℃	

5. Electrical characteristics

5.1 Driving TFT LCD Panel

Parameter		Symbol	MIN	TYP	MAX	Unit	Remark
Digital supply Voltage		VDD	3.00	3.30	3.60	V	-
Analog supply Voltage		AVDD	9.8	10.0	10.2	V	-
Gate on voltage		VGH	18.6	18.9	19.2	V	-
Gate off voltage		VGL	-8.1	-7.8	-7.5	V	-
Common Electrode Driving Signal		VCOM	2.6	3.6	4.6	V	
Input Signal Voltage	Low Level	VIL	0	-	0.3*DVDD	V	RXIN0-,RXIN0+,RXIN1-,RXIN1+,RXIN2-.RXIN2+SELB,RESET,STBYB,L/R,U/D,
	High Level	VIH	0.7*DVDD	-	DVDD	V	
Current of digital supply voltage		IVDD	-	30	40	mA	VDD=3.3V color bar pattern
Current of analog supply voltage		IAVDD	-	60	70	mA	AVDD=10.0V color bar pattern
Current of Gate on voltage		IVGH	-	5.5	5.8	mA	VGH=18.9V
Current of Gate off voltage		IVGL	-	8.0	8.5	mA	VGL=-7.8V

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

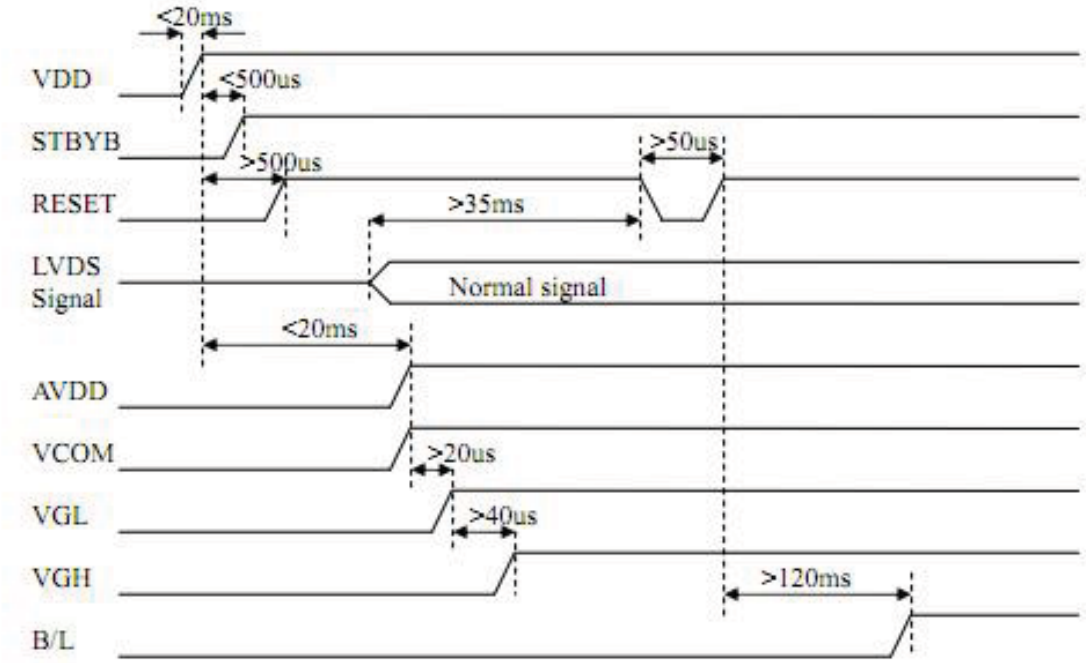
Note 2: VCC setting should match the signals output voltage (refer to Note 3) of customer's system board.

Note 3: Typical Vcom is only a reference value; it must be optimized according to each LCM, please use VR and base on below application circuit.

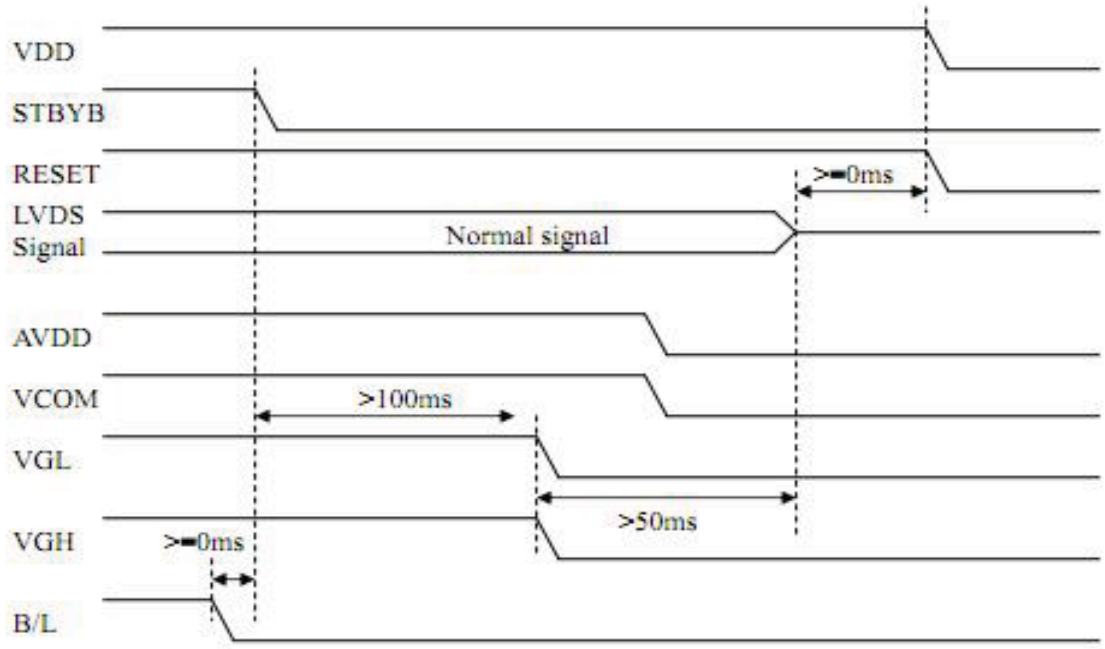
Note 4: Reset, stbyb, selb, L/R, U/D, cabcen0, cabcen 1.

5.2 Power ON.OFF sequence

5.2.1. Power on:



5.2.2. Power off:

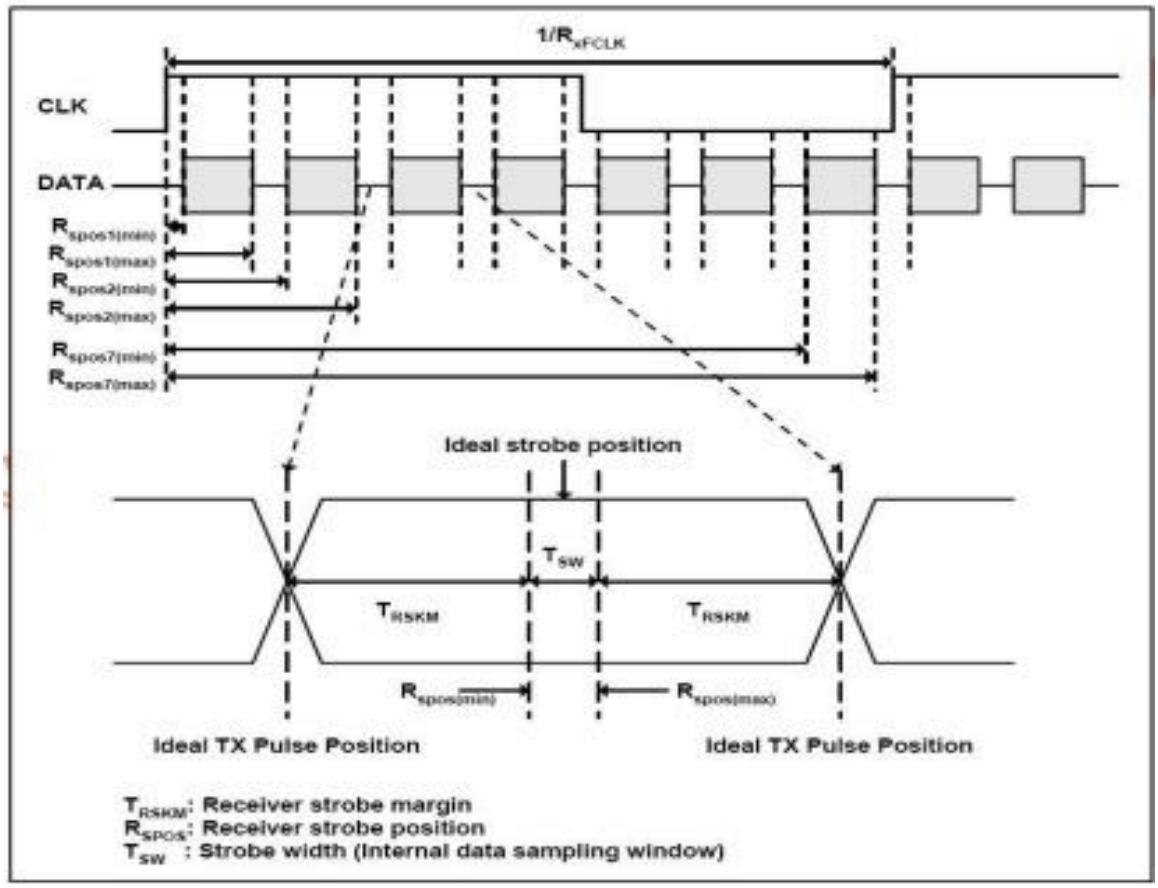


5.3 Timing Characteristics

5.3.1 AC electrical characteristics

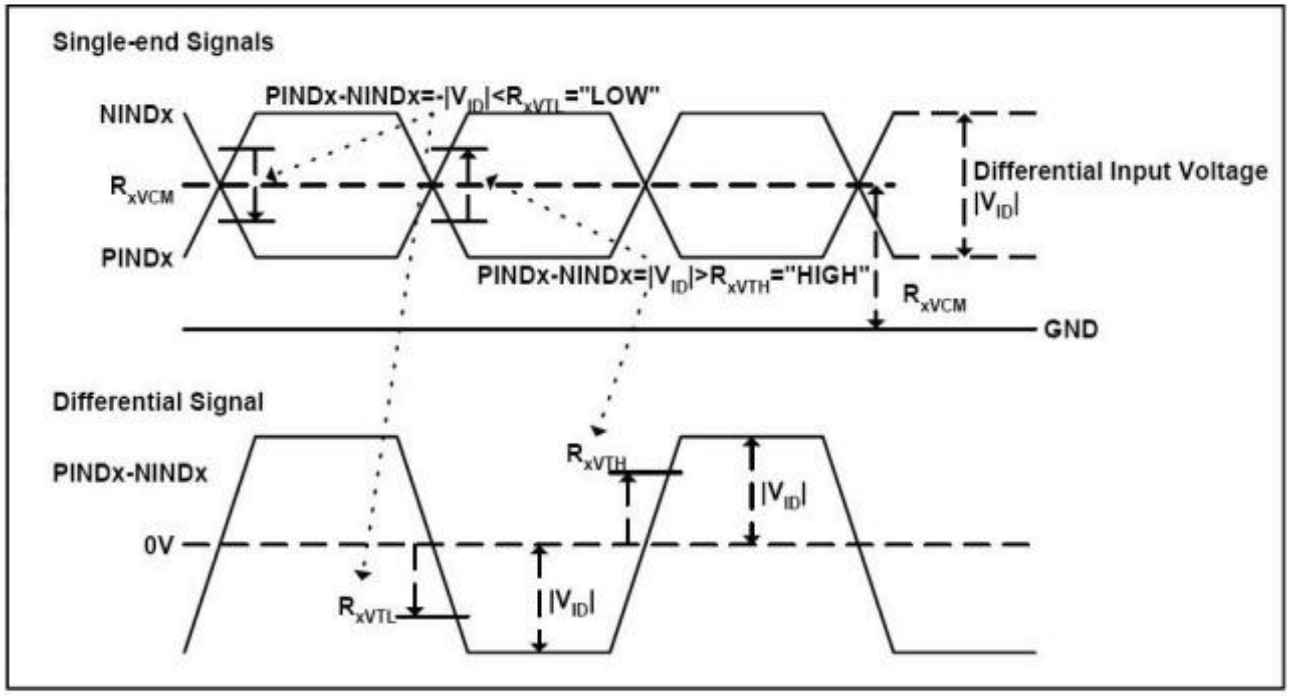
Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock frequency	R_{xFCLK}	20	-	71	MHz	
Input data skew margin	T_{RSKM}	500	-	-	ps	
Clock high time	T_{LVCH}	-	4/(7* R_{xFCLK})	-	ns	
Clock low time	T_{LVCL}	-	3/(7* R_{xFCLK})	-	ns	

5.3.2. Input Clock and Data Timing Diagram



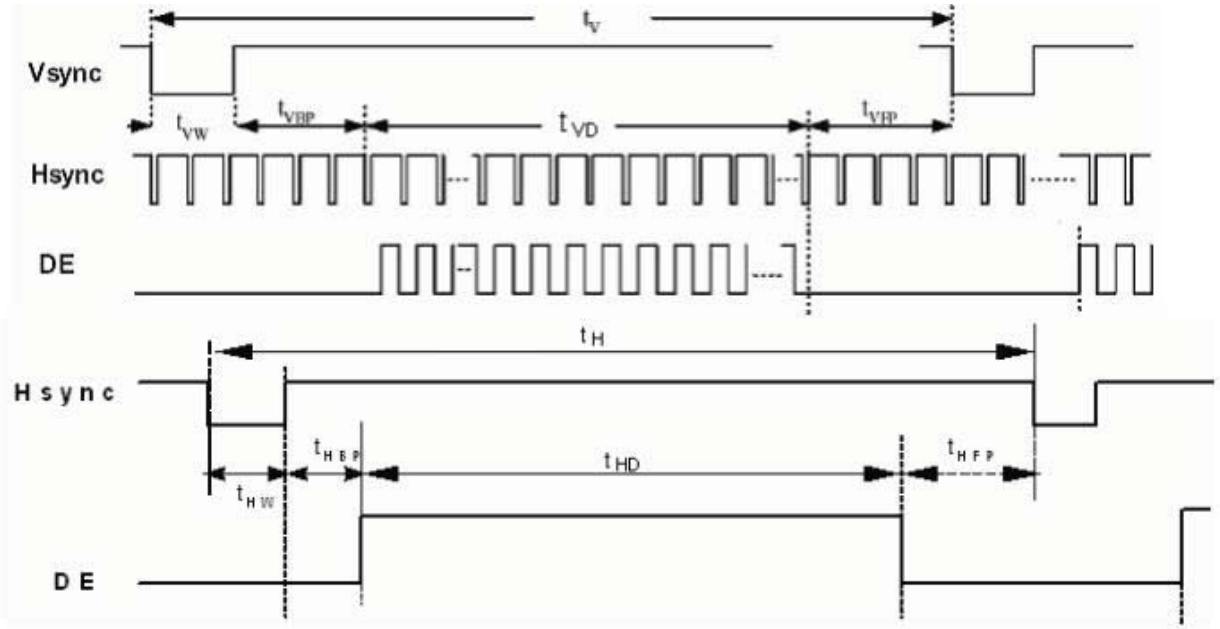
5.3.2 DC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Differential input high Threshold voltage	R_{xVTH}	-	-	+0.1	V	
Differential input low Threshold voltage	R_{xVTL}	-0.1	-	-	V	
Input voltage range (singled-end)	R_{xVIN}	0	-	2.4	V	
Differential input common mode voltage	R_{xVCM}	$\|V_{ID}\|/2$	-	$2.4-\|V_{ID}\|/2$	V	
Differential voltage	$\|V_{ID}\|$	0.2	-	0.6	V	
Differential input leakage current	RV_{xIIz}	-10	-	+10	uA	



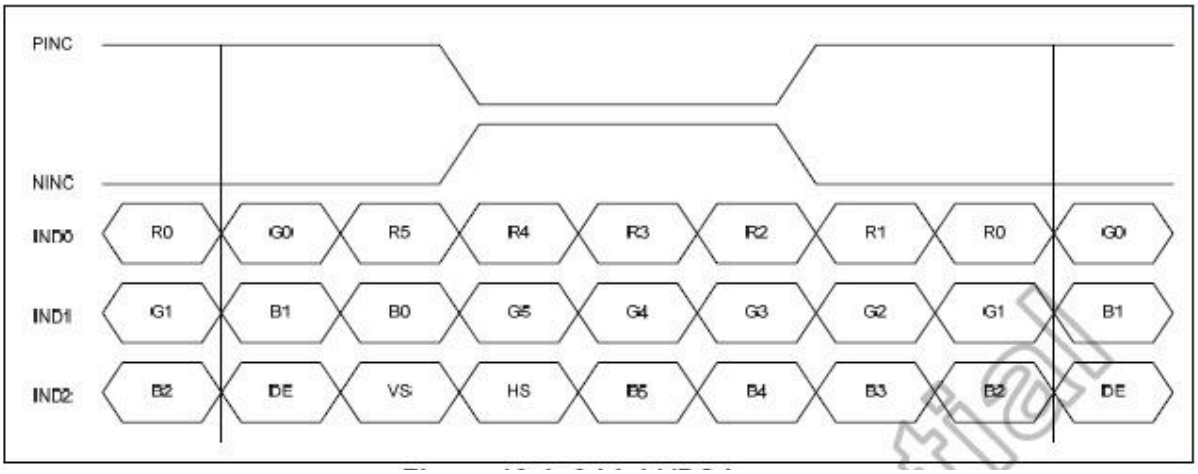
5.3.3 Timing Diagram

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	fclk	52	65	71	MHz	Frame rate =TBD
Horizontal display area	thd		1024			
HS period time	th	1114	1344	1400	DCLK	
HS Blanking	thb+thfp	90	320	376	DCLK	
Vertical display area	tvd		768			
VS period time	tv	778	806	845	H	
VS Blanking	tvb+tvfp	10	38	77	H	

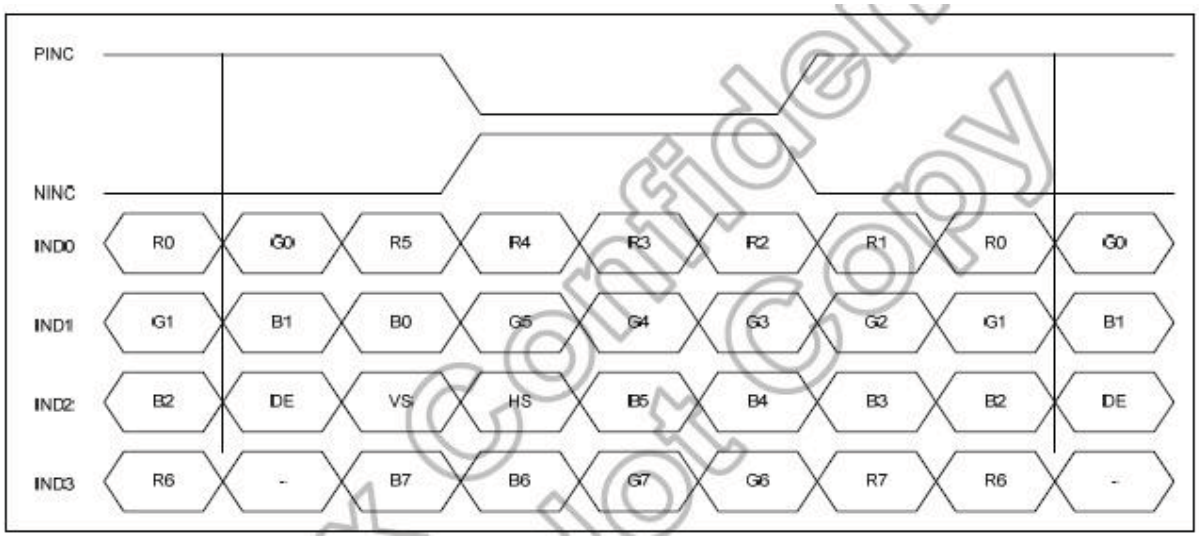


3.3.5. Data Input Format

6bit LVDS input



8bit LVDS input



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5.4 LED Driving Conditions

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	540	-	mA	
Forward Voltage	V_F	7.6	9.6	11.6	V	
Backlight Power consumption	W_{BL}	-	5.18	-	W	
LED Lifetime		50000	-	-	Hrs	

Note 1: Each LED: IF =60 mA, VF =3.2+/0.2V.
Note 2: Optical performance should be evaluated at Ta=25℃ 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.

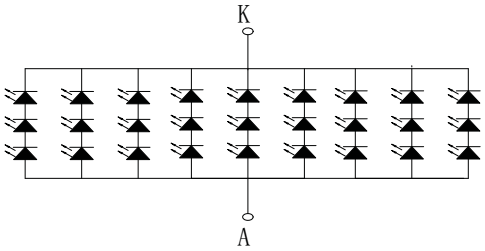


Figure: LED connection of backlight(Constant Current)

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			800	-	-	FIG.2	Note1
Surface luminance		LV	θ =0°	900	1000	-	cd/m2	FIG.2	Note2
Luminance uniformity		Yu	θ =0°	80	-	-	%	FIG.2	Note3
Viewing angle		θ Cr>10	∅=90°	70	85	-	deg	FIG.3	Note6
			∅=270°	70	85	-	deg	FIG.3	
			∅=0°	70	85	-	deg	FIG.3	
			∅=180°	70	85	-	deg	FIG.3	
Chromaticity	Red	R_X	θ =0° ∅=0° Ta=25°	0.539	0.589	0.639	-	FIG.2 CIE1931	Note5
		R_Y		0.298	0.348	0.398	-		
	Green	G_X		0.277	0.327	0.377	-		
		G_Y		0.512	0.562	0.612	-		
	Blue	B_X		0.096	0.146	0.196	-		
		B_Y		0.078	0.128	0.178	-		
	White	W_X		0.250	0.300	0.350	-		
		W_Y		0.284	0.334	0.384	-		

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

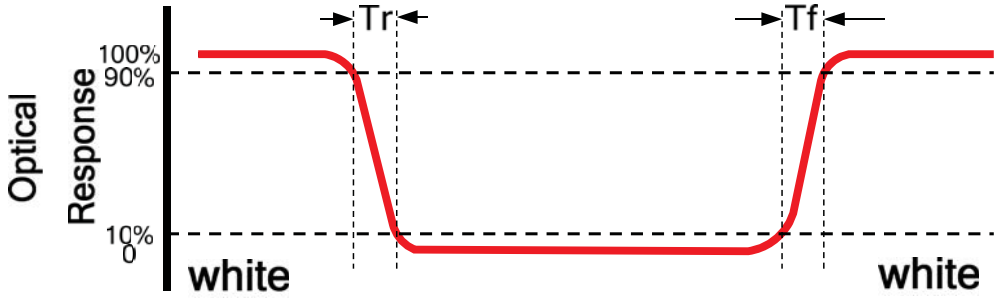


FIG.2. Measuring method for contrast ratio, surface luminance, luminance uniformity, CIE (x,y) chromaticity

Size : S≤5"(see Figure a) A : 5 mm B : 5 mm
H,V : Active area
Light spot size ∅=5mm(BM-5) or ∅=7.7mm (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).

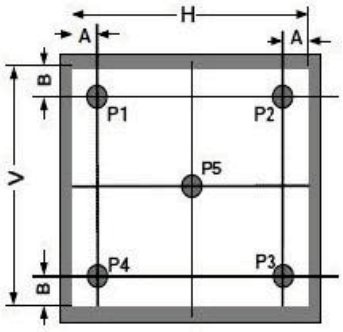


Figure a

Size : 5"＜S≤12.3"(see Figure b) H,V : Active area
Light spot size ∅=5mm(BM-5) or ∅=7.7mm (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).

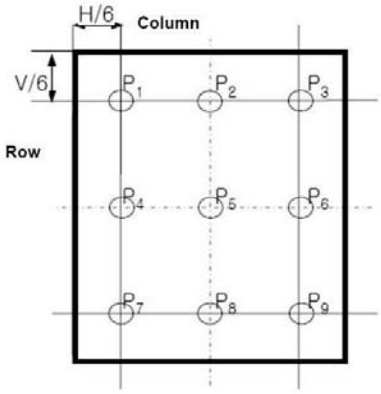


Figure b

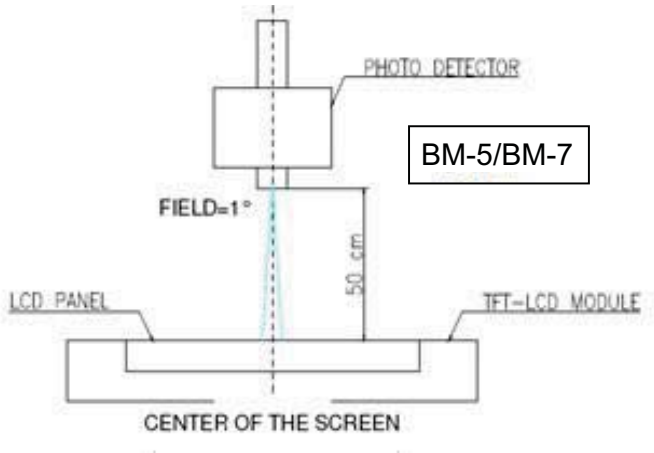
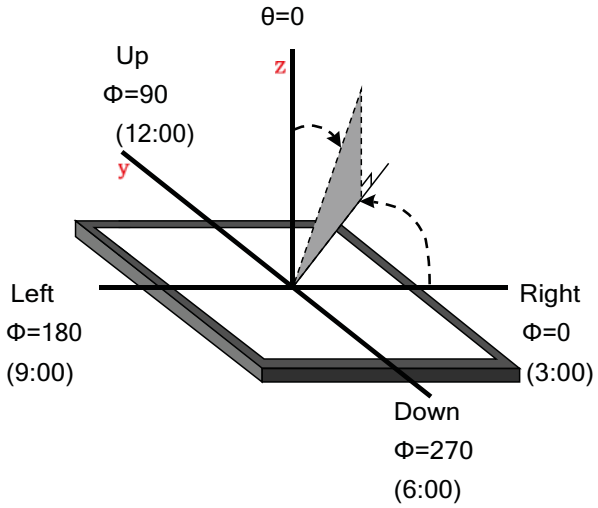


Figure c

FIG.3.The definition of viewing angle

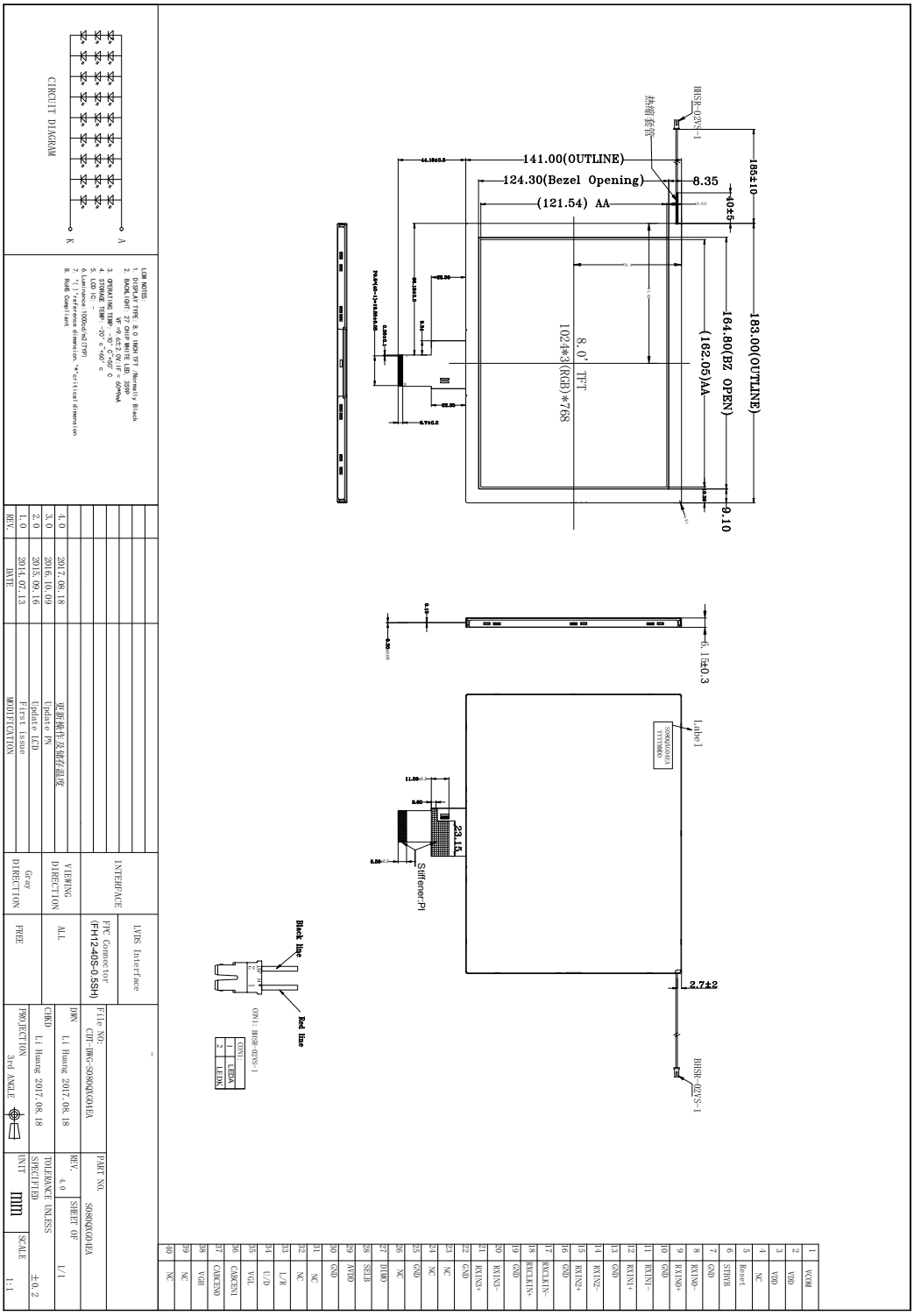


7. Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +50℃, 96hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -10℃, 96hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +60℃, 120hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -20℃, 120hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	Ta= +60℃, 90% RH max,120 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-20℃ 30 min ~ +60℃ 30 min Change time: 5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Static Discharge (Operation)	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15℃ ~ 35℃, 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

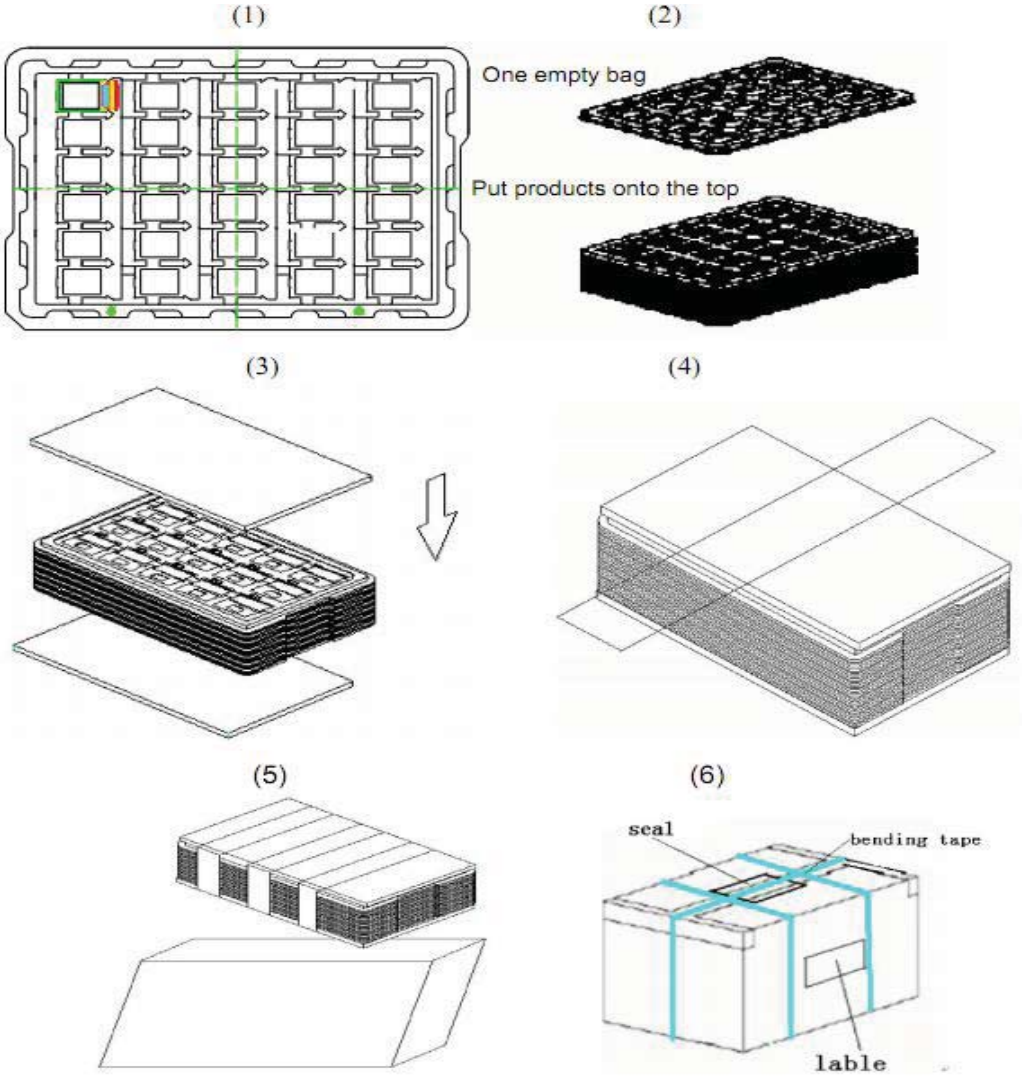
Note:1. Ts is the temperature of panel's surface.
2. Ta is the ambient temperature of sample.
3. The size of sample is 5pcs.

8. Mechanical Drawing



9. Packing

Packing Method



1. Put module into tray cavity:
2. Tray stacking
3. Put 1 cardboard under the tray stack and 1 cardboard above:
4. Fix the cardboard to the tray stack with adhesive tape:
5. Put the tray stack into carton.
6. Carton sealing with adhesive tape.

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

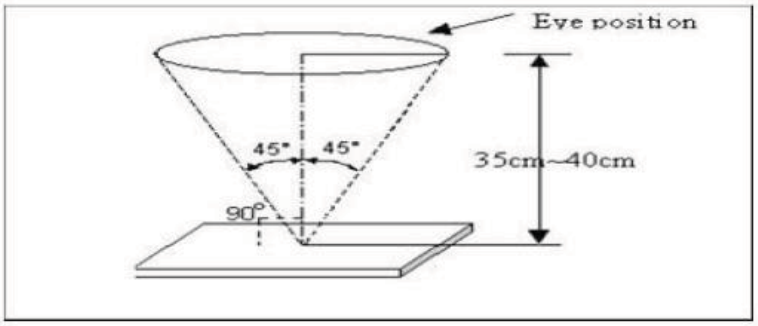
The customer shall inspect the modules within twenty calendar days of the delivery date（the “inspection period）at its own cost. The result of the inspection（acceptance or rejection）shall be recorded in writing, and a copy of this writing will be promptly sent to The seller, If the results of the inspecting 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=1.00

10.4 Inspection Conditions

4.1 Ambient conditions:
a. Temperature: Room temperature 25±5℃
b. Humidity: (60±10) ％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±5 ㎝.
4.3 Viewing Angle
U/D: 45 ° /45°, L/R: 45° /45°



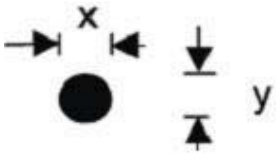
10.5 Inspection Criteria

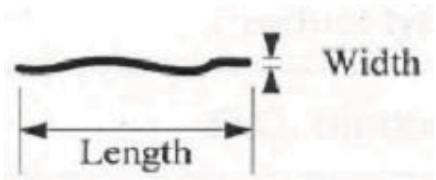
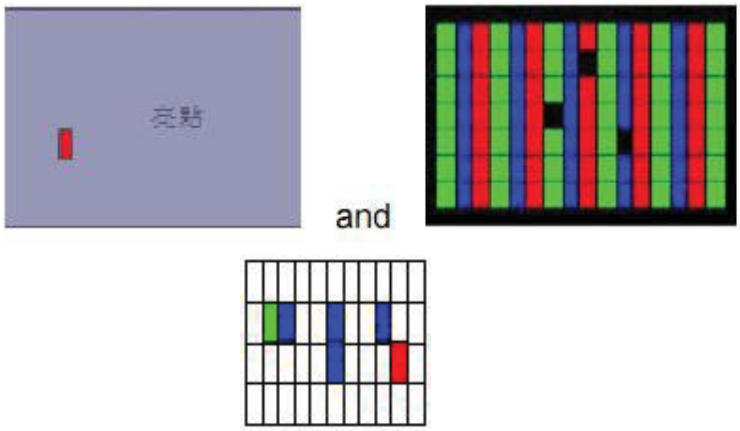
Defects are classified as major defects and minor defects according to the degree of Defectiveness defined herein.

10.5.1 Major defect

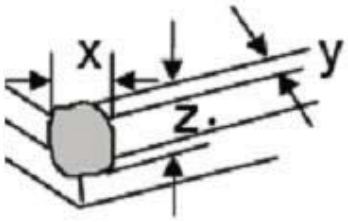
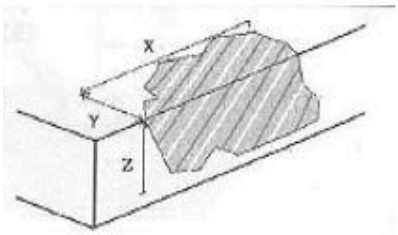
Item No	Items to be inspected	Inspection Standard
5.1.1	All functional defects	1) No display 2) Display abnormally 3) Short circuit 4) line defect
`5.1.2	Missing	Missing function component
5.1.3	Crack	Glass Crack

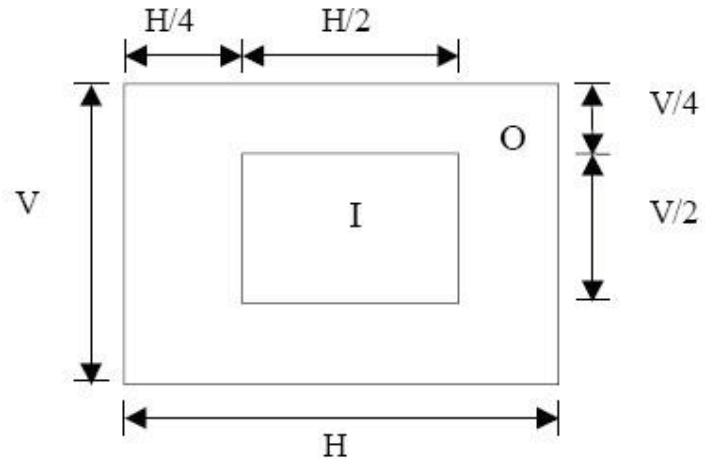
10.5.2 Minor defect

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 $\varphi = (x+y) / 2$  	
		Size φ(mm)	Acceptable Quantity
		φ≤0.2	Ignore
		0.2 < ϕ ≤0.5	3
		0.5< ϕ	Not allowed

<table>
<tr><td rowspan="5">5.2.2</td><td rowspan="5">Line Defect
Including Black line
White line Scratch</td><td colspan="3">Define:

</td></tr>
<tr><td colspan="2">Width(mm) Length(mm)</td><td>Acceptable Quantity</td></tr>
<tr><td colspan="2">W≤0.05</td><td>Ignore</td></tr>
<tr><td colspan="2">0.05 ＜W≤0.1
L≤2.5</td><td>3</td></tr>
<tr><td colspan="2">0.1＜W，or L>2.5</td><td>Not allowed</td></tr>
<tr><td rowspan="6">5.2.3</td><td rowspan="6">Polarizer
Dent/Bubble</td><td>Sizeφ(mm)</td><td colspan="2">Acceptable Quantity</td></tr>
<tr><td>ϕ≤0.2</td><td colspan="2">Ignore</td></tr>
<tr><td>0.2 ＜ ϕ≤0.3</td><td colspan="2">2</td></tr>
<tr><td>0.3 ＜ ϕ≤0.5</td><td colspan="2">1</td></tr>
<tr><td>0.5＜ϕ</td><td colspan="2">Not allowed</td></tr>
<tr><td>Total QTY</td><td colspan="2">3</td></tr>
<tr><td rowspan="6">5.2.4</td><td rowspan="6">Electrical Dot
Defect</td><td colspan="3">Bright and Black dot define:


Two Adjacent Dot</td></tr>
<tr><td colspan="3">Inspection pattern: Full white、Full black、Red、green and blue screens</td></tr>
<tr><td rowspan="2">Item</td><td colspan="2">Acceptable Quantity</td></tr>
<tr><td>I</td><td>O</td><td>Note</td></tr>
<tr><td>Black dot defect</td><td colspan="2">2</td><td rowspan="2">ϕ≤0.15
(5mm≤Distance)</td></tr>
<tr><td>Bright dot defect</td><td colspan="2">1</td></tr>
<tr><td>Total Dot</td><td colspan="2">1</td><td></td></tr>
</table>

<table>
<tr><td rowspan="5">5.2.5</td><td rowspan="5">Glass defect</td><td colspan="2">1.Corner Fragment:

</td></tr>
<tr><td>Size(mm)</td><td>Acceptable Quantity</td></tr>
<tr><td>X≤3mm
Y≤1mm
Z≤T</td><td>Ignore
T：Glass thickness
X: Length
Y: Width
Z: thickness</td></tr>
<tr><td colspan="2">2. Side Fragment:

</td></tr>
<tr><td>Size(mm)</td><td>Acceptable Quantity</td></tr>
<tr><td>X≤5.0mm
Y ≤1mm
Z≤T</td><td>T：Glass thickness
X: Length
Y: Width
Z: thickness</td></tr>
</table>



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℃ ～ 40℃ 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.