



PHOENIX DISPLAY INTERNATIONAL, INC.

PHOENIX DISPLAY INTERNATIONAL, INC

SPECIFICATION FOR LCD MODULE

CUSTOMER	
PART NUMBER	PDI070WSBH-56
DESCRIPTION	7.0" 1024 * (RGB) * 600
VERSION	V1.0
ISSUE DATE	28-Mar-19

COMPANY ADDRESS:

Phoenix Display International, Inc.
6150 W. Gila Springs Place Unit 2
Chandler, AZ 85226
USA
www.phoenixdisplay.com
(630) 359-5700 office
(630) 359-5701 fax

CONTENTS

1 GENERAL CHARACTERISTICS..... - 3 -

2 PRODUCT DRAWINGS..... - 4 -

3 INTERFACE DESCRIPTION..... - 5 -

4 DATA INPUT TIMING..... - 7 -

5 ABSOLUTE MAXIMUM RATINGS..... - 9 -

6 ELECTRICAL CHARACTERISTICS..... - 9 -

7 BACKLIGHT CHARACTERISTICS..... - 9 -

8 LCD OPTICAL SPECIFICATIONS..... - 10 -

9 RELIABILITY TEST..... - 12 -

10 SUGGESTIONS FOR USING LCD MODULES..... - 13 -

 10.1 HANDLING OF LCM..... - 13 -

 10.2 STORAGE..... - 13 -


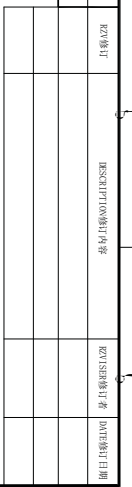
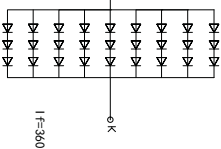
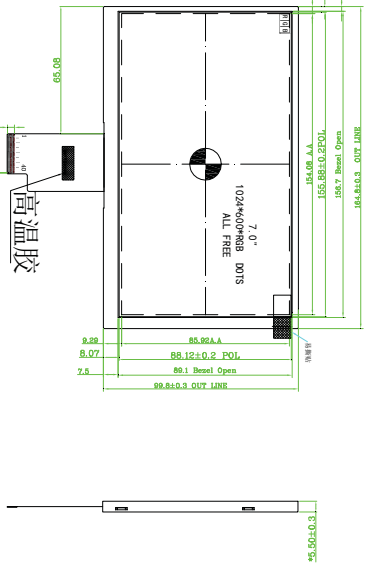
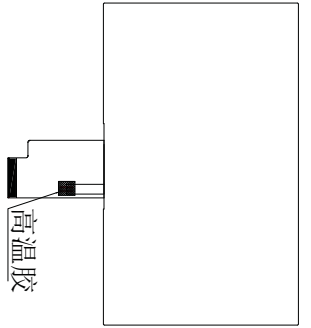
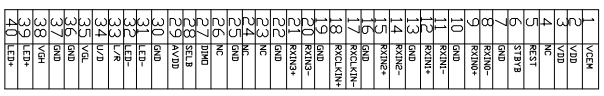
1 General Characteristics

ITEM	Specification	Unit
LCD Type	a-Si TFT, Transmissive, Normally black, IPS	-
LCD Size	7.0	inch
Resolution (W x H)	1024x (RGB) × 600	pixel
LCM size	164.8(H) x 99.8(V) x 5.5(T)	mm
Active Area	154.215 (H) x 85.92 (V)	mm
Dot Pitch	0.0502(H) × 0.1432(V)	mm
Viewing Direction	ALL o'clock	-
Color Depth	16.7M	-
Pixel Arrangement	RGB-stripe	-
Backlight Type	Side-Light (27leds) , 360mA, 9.3V(REF.)	-
Surface Luminance	1000Min, 1200TYP	cd/m ²
Surface Treatment	Anti-glare	-
LCD Driver IC	HX8282+HX8696	-
Interface Type	LVDS	-
Input Voltage	3.3	V
With/Without TP	Without	-
Weight	TBD	g

Note 1: RoHS compliant

Note 2: LCM weight tolerance: ± 5%.

2 Product drawings

1	2	3	4																																																																																											
客户 For Customer:	客户料号: 承认签名:	客户版本: 承认日期:																																																																																												
																																																																																														
																																																																																														
<p>Notes:</p> <p>1. LED CIRCUIT DIAGRAM:</p> <p>2. RoHS must be complied.</p> <p>3. L.O.D IC: ---</p> <p>4. Display mode: Normally Black</p> <p>5. All radii without dimension R0.3. (Unspecified Tolerances 1s: ±0.2</p> <p>Electrical-Optical Characteristics (Ta=25° C):</p>																																																																																														
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Item (项目)</th> <th>Symbol (符号)</th> <th>min (最小)</th> <th>Typ. (典型)</th> <th>max. (最大)</th> <th>Unit (单位)</th> <th>Condition (测试条件)</th> </tr> </thead> <tbody> <tr> <td>Main Luminance (亮度)</td> <td>Lv</td> <td>1000 (透射) 1200 (透射)</td> <td></td> <td></td> <td>cd/m²</td> <td>f=360 mA (恒定电流测试)</td> </tr> <tr> <td>Uniformity (均匀度)</td> <td>Avg</td> <td>80</td> <td>85</td> <td>0.32</td> <td>%</td> <td></td> </tr> <tr> <td>Colour (色度坐标)</td> <td>X</td> <td>0.26</td> <td></td> <td>0.32</td> <td></td> <td></td> </tr> <tr> <td>Coordinate</td> <td>Y</td> <td>0.26</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Luminance (亮度)</td> <td>Lv</td> <td>---</td> <td>---</td> <td>---</td> <td>cd/m²</td> <td>MeasureZ tolerance:</td> </tr> <tr> <td>Uniformity (均匀度)</td> <td>Avg</td> <td>---</td> <td>---</td> <td>---</td> <td>%</td> <td>Luminance: ±15%</td> </tr> <tr> <td>Colour (色度坐标)</td> <td>X</td> <td>---</td> <td>---</td> <td>---</td> <td></td> <td>Colour coordinate: ±0.008</td> </tr> <tr> <td>Coordinate</td> <td>Y</td> <td>---</td> <td>---</td> <td>---</td> <td></td> <td>Voltage: ±0.1V</td> </tr> <tr> <td>Forward Voltage (正向电压)</td> <td>Vf</td> <td>8.8</td> <td>9.3</td> <td>9.5</td> <td>V</td> <td>Vf=0.8 V</td> </tr> <tr> <td>Reverse Current (反向电流)</td> <td>Ir</td> <td>---</td> <td>---</td> <td>---</td> <td>mA</td> <td></td> </tr> <tr> <td>Operating Temperature (工作温度)</td> <td></td> <td colspan="2">-20~+70° C</td> <td></td> <td></td> <td>Storage Temperature (贮存温度): 30~+70° C</td> </tr> <tr> <td>Storage condition Recommended: (推荐)</td> <td></td> <td colspan="2">temperature: 25° C ±5° C and humidity: (65RH ±20RH)</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				Item (项目)	Symbol (符号)	min (最小)	Typ. (典型)	max. (最大)	Unit (单位)	Condition (测试条件)	Main Luminance (亮度)	Lv	1000 (透射) 1200 (透射)			cd/m ²	f=360 mA (恒定电流测试)	Uniformity (均匀度)	Avg	80	85	0.32	%		Colour (色度坐标)	X	0.26		0.32			Coordinate	Y	0.26					Luminance (亮度)	Lv	---	---	---	cd/m ²	MeasureZ tolerance:	Uniformity (均匀度)	Avg	---	---	---	%	Luminance: ±15%	Colour (色度坐标)	X	---	---	---		Colour coordinate: ±0.008	Coordinate	Y	---	---	---		Voltage: ±0.1V	Forward Voltage (正向电压)	Vf	8.8	9.3	9.5	V	Vf=0.8 V	Reverse Current (反向电流)	Ir	---	---	---	mA		Operating Temperature (工作温度)		-20~+70° C				Storage Temperature (贮存温度): 30~+70° C	Storage condition Recommended: (推荐)		temperature: 25° C ±5° C and humidity: (65RH ±20RH)				
Item (项目)	Symbol (符号)	min (最小)	Typ. (典型)	max. (最大)	Unit (单位)	Condition (测试条件)																																																																																								
Main Luminance (亮度)	Lv	1000 (透射) 1200 (透射)			cd/m ²	f=360 mA (恒定电流测试)																																																																																								
Uniformity (均匀度)	Avg	80	85	0.32	%																																																																																									
Colour (色度坐标)	X	0.26		0.32																																																																																										
Coordinate	Y	0.26																																																																																												
Luminance (亮度)	Lv	---	---	---	cd/m ²	MeasureZ tolerance:																																																																																								
Uniformity (均匀度)	Avg	---	---	---	%	Luminance: ±15%																																																																																								
Colour (色度坐标)	X	---	---	---		Colour coordinate: ±0.008																																																																																								
Coordinate	Y	---	---	---		Voltage: ±0.1V																																																																																								
Forward Voltage (正向电压)	Vf	8.8	9.3	9.5	V	Vf=0.8 V																																																																																								
Reverse Current (反向电流)	Ir	---	---	---	mA																																																																																									
Operating Temperature (工作温度)		-20~+70° C				Storage Temperature (贮存温度): 30~+70° C																																																																																								
Storage condition Recommended: (推荐)		temperature: 25° C ±5° C and humidity: (65RH ±20RH)																																																																																												
																																																																																														
<p>MODEL NO.: TST070WSBH-56</p> <p>型号: TST070WSBH-56</p> <p>Drawing No: 图号: TST070WSBH-56</p> <p>UNIT (单位): THE THIRD ANGLE PROJECTION 第三角法</p> <p>DESIGN 设计: DATE 日期: 2019.03.28</p> <p>CHECKED 审核: DATE 日期: 2019.03.28</p> <p>APPROVED 批准: DATE 日期:</p>																																																																																														
																																																																																														

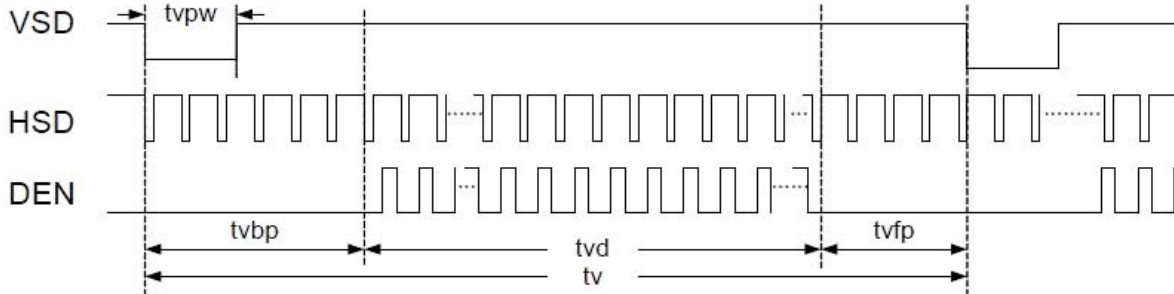
3 Interface description

PIN NO.	Symbol	description
1	VCOM	Common voltage
2-3	VDD	Power voltage for digital circuit
4	NC	No connect
5	RESET	Global reset pin
6	STBYB	Standby mode control. Normally pull High. When STBYB=H, all the functions are on. (Default pulls high) When STBYB=L, TCON and source driver are off and all output are GND.
7	GND	Power ground
8	RXIN0-	Negative LVDS differential data input
9	RXIN0+	Positive LVDS differential data input
10	GND	Power ground
11	RXIN1-	Negative LVDS differential data input
12	RXIN1+	Positive LVDS differential data input
13	GND	Power ground
14	RXIN2-	Negative LVDS differential data input
15	RXIN2+	Positive LVDS differential data input
16	GND	Power ground
17	RXCLKIN-	Negative LVDS differential clock input
18	RXCLKIN+	Positive LVDS differential clock input
19	GND	Power ground
20	RXIN3-	Negative LVDS differential data input

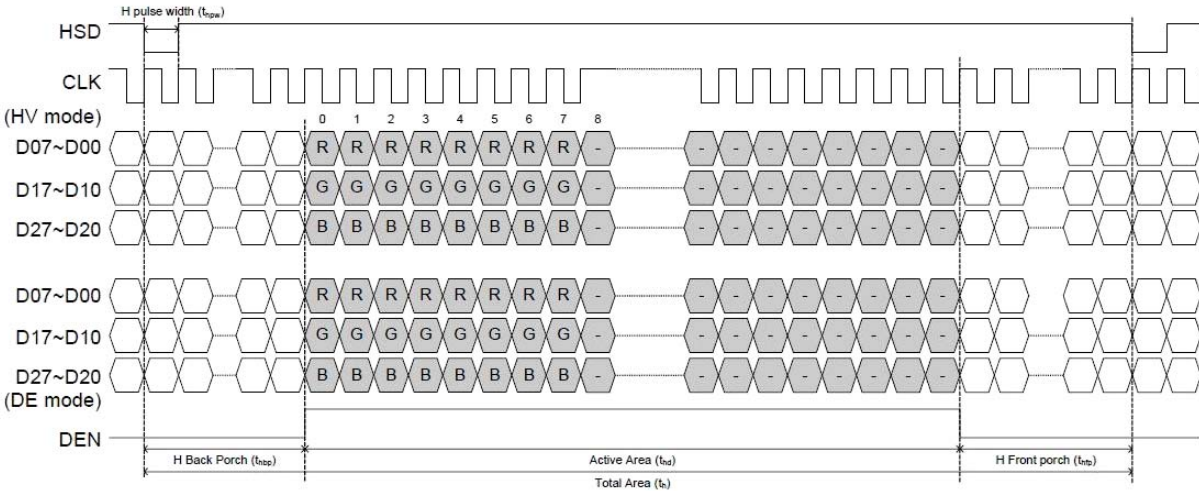
21	RXIN3+	Positive LVDS differential data input
22	GND	Power ground
23-24	NC	No connect
25	GND	Power ground
26-27	NC	No connect
28	SELB	In LVDS mode, used as 6-bit/8-bit input select When SELB=0, 8-bit input; When SELB=1, 6bit input;
29	AVDD	Power for Analog Circuit
30	GND	Power ground
31-32	LEDK	LED Cathode
33	L/R	Horizontal inversion
34	U/D	Vertical inversion
35	VGL	Gate OFF Voltage
36-37	NC	No connect
38	VGH	Gate ON Voltage
39-40	LEDA	LED Anode

4 Data Input Timing

Vertical timing

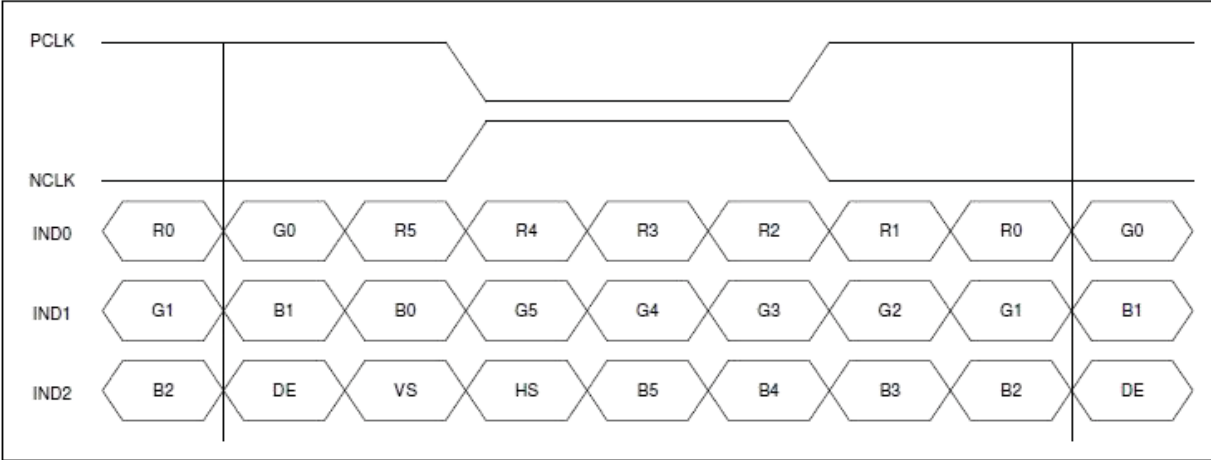


Horizontal timing

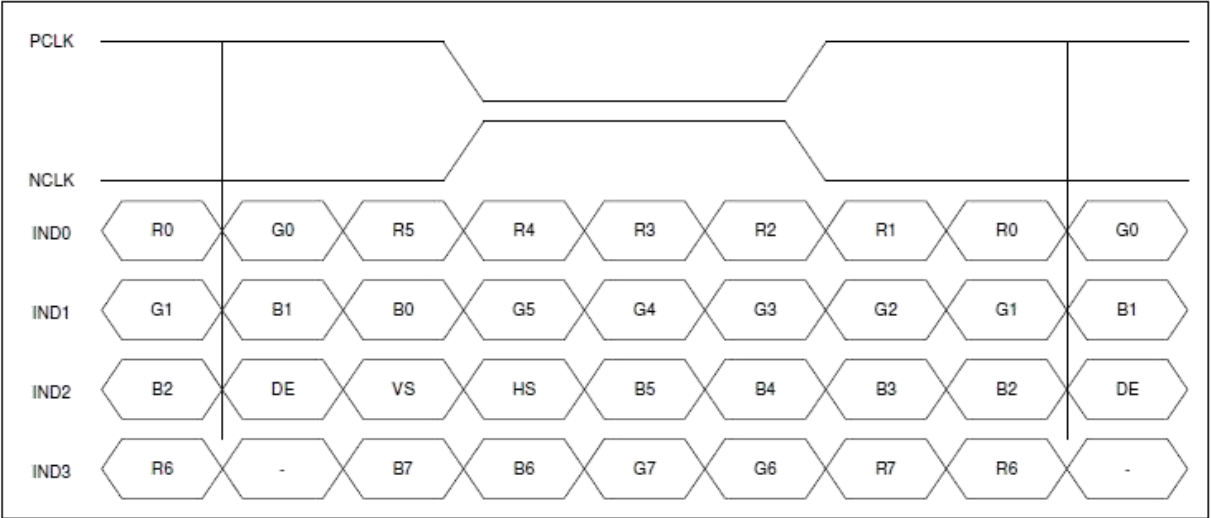


Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	40.8	51.2	67.2	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	th	1114	1344	1600	DCLK
HSD Blanking	thb+ thfp	90	320	376	DCLK
Vertical Display Area	tvd	600			T_H
VSD Period	tvbp	610	635	800	T_H
VSD Blanking	tvbp+ tvfp	10	35	200	T_H

6-bit LVDS input



8-bit LVDS input



5 Absolute Maximum Ratings

PARAMETER	SYMBOL	MIN	MAX	UNIT
Digital Supply Voltage	VDD	-0.5	5.0	V
Analog Supply Voltage	AVDD	-0.5	15	V
Gate On Voltage	VGH	-0.3	40	V
Gate Off Voltage	VGL	-20	0.3	V
Operating Temperature	TOP	-20	70	° C
Storage Temperature	TST	-30	80	° C
Humidity	RH	-	90%(Max 60° C)	RH

6 Electrical Characteristics

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Digital Supply Voltage	VDD	3.0	3.3	3.6	V
Analog Supply Voltage	AVDD	9.5	9.6	9.8	V
Gate On Voltage	VGH	17	18	19	V
Gate Off Voltage	VGL	-6.5	-6.0	-5.7	V
Common Supply Voltage	VCOM	3.0	3.2	3.5	V

Notes:

1. VGH is TFT Gate operating voltage.
2. VGL is TFT Gate operating voltage. The low voltage level of VGL signal must be fluctuates with same phase as Vcom.
3. Vcom must be adjusted to optimize display quality, as Crosstalk and Contrast Ratio etc..
4. The value is just the reference value. The customer can optimize the setting value by the different D-IC.

7 Backlight Characteristics

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
Voltage for LED backlight	V _f	-	9.3	-	V
Current for LED backlight	I _f	-	360	-	mA
Power consumption	W _{bl}	-	3348	-	mW
Uniformity	Avg	75	80	-	%
LED Life Time	-	30000	40000	-	Hrs

Note:

1. The LED life time is defined as the module brightness decrease to 50% original brightness at Ta=25°C, 60%RH ±5 %.
2. The life time of LED will be reduced if LED is driven by high current, high ambient temperature and humidity conditions.
3. Typical operating life time is an estimated data.
4. Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded .Functional operation should be restricted to the conditions described under normal operating conditions.

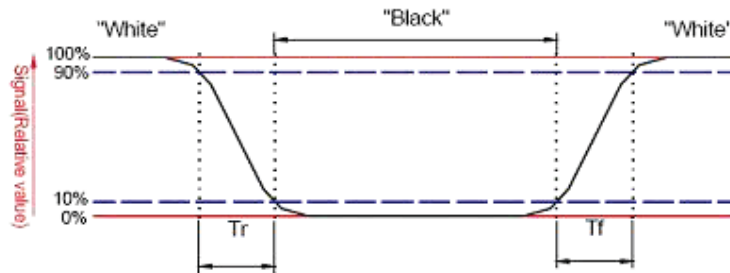
8 LCD Optical specifications

Item	Symbol	Condition	Specification			Unit	Remark
			Min	Typ	Max		
Response time (By Quick)	Tr+Tf	-	-	25	-	ms	Note 2
Contrast ratio	CR	-	-	800	-	-	Note 3
Surface luminance	Lv	$\theta=0^\circ$	1000	1200	-	Cd/m ²	Note 4
Luminance uniformity	Yu	$\theta=0^\circ$	75	80	-	%	Note 6
NTSC	-	$\theta=0^\circ$	45	50	-	%	Note 6
Viewing angle	Top	CR \geq 10	70	80	-	Deg.	Note 7
	Bottom	CR \geq 10	70	80	-		
	Left	CR \geq 10	70	80	-		
	Right	CR \geq 10	70	80	-		
CIE(x,y) chromaticity	Wx	$\theta=0^\circ$	Typ -0.04	0.303	Typ +0.04		Note 5
	Wy			0.333			
	Rx			0.618			
	Ry			0.326			
	Gx			0.285			
	Gy			0.539			
	Bx			0.146			
	By			0.148			

Note 1: Ambient temperature = 25°C.

Note 2: Definition of response time:

The output signals of TRD-100 are measured when the input signals are changed to "White" (falling time) and from "White" to "Black" (rising time), respectively. The interval is between the 10% and 90% of amplitudes. Refer to figure as below.



Note 3: Definition of contrast ratio:

Contrast ratio is calculated by the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "white" state}}{\text{Brightness on the "black" state}}$$

Measured at the center area of the LCD.

Note 4: Definition of surface luminance

Surface luminance is the luminance with all pixels displaying white

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

Size : $S \leq 4.3''$ (see Figure A B)

H,V : Active area

Light spot size=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-7 or compatible.

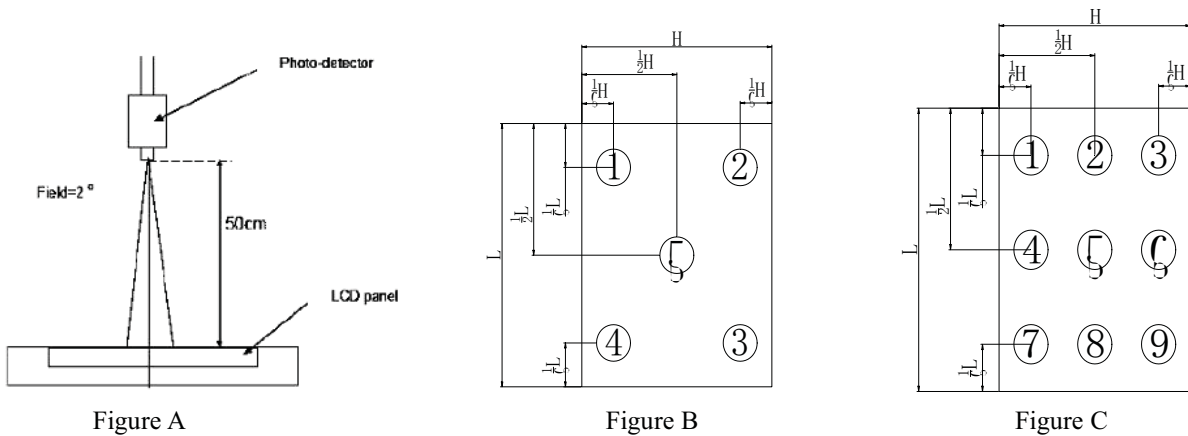
Size : $4.3 < S \leq 12.3''$ (see Figure A C)

H,V : Active area

Light spot size=7.7mm (BM-7)50cm distance or compatible distance from the LCD surface to detector lens.

test spot position : see Figure C.

measurement instrument : TOPCON's luminance meter BM-7 or compatible.



Note 6: Definition of Luminance Uniformity

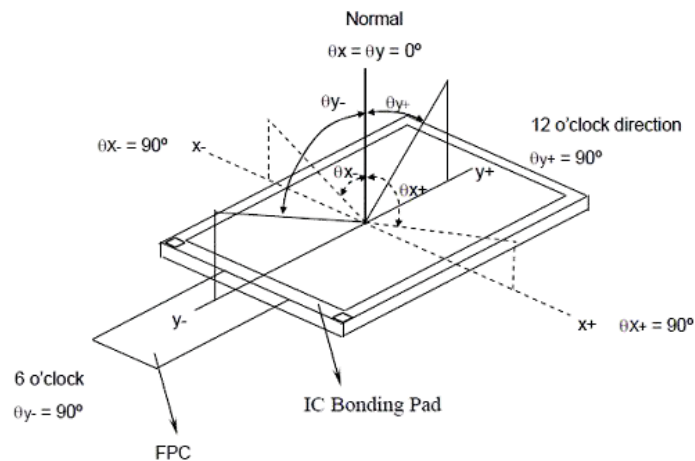
Active area is divided into 5 or 9 measuring areas, Every measuring point is placed at the center of each measuring area

Bmax: The measured maximum luminance of all measurement position.

Bmin: The measured minimum luminance of all measurement position.

Luminance Uniformity (Yu) = (Bmin/Bmax) x 100%

Note 7: Definition of viewing angle



9 RELIABILITY TEST

NO.	TEST ITEM	TEST CONDITION	INSPECTION AFTER TEST
1	High Temperature Storage	80±2°C/96 hours	<p>Inspection after 2~4 hours storage at room temperature and humidity. The condensation is not accepted. The sample shall be free from defects:</p> <ol style="list-style-type: none"> 1. Air bubble in the LCD 2. Seal leak 3. Non-display 4. Missing segments 5. Glass crack
2	Low Temperature Storage	-30±2°C/96 hours	
3	High Temperature Operating	70±2°C/96 hours	
4	Low Temperature Operating	-20±2°C/96 hours	
5	Temperature Cycle	-30±2°C ~ 25~ 80± 2°C × 10 cycles (30 min.) (5min.) (30min.)	
6	Damp Proof Test	60°C ±5°C × 90%RH/96 hours	
7	Vibration Test	Frequency 10Hz~55Hz Stroke: 1.5mm Sweep: 10Hz~150 Hz~10Hz 2 hours For each direction of X, Y, Z	
8	Packing Drop Test	Height: 50 cm 1 corner, concrete floor	
9	Electrostatic Discharge Test	C=150pF, R=330 Ω Air: ±8KV 150pF/330Ω 30 times Contact: ±4KV,20 times	

10 Suggestions for using LCD modules

10.1 Handling of LCM

1. The LCD screen is made of glass. Don't give excessive external shock, or drop from a high place.
2. If the LCD screen is damaged and the liquid crystal leaks out, do not lick and swallow. When the liquid is attach to your hand, skin, cloth etc, wash it off by using soap and water thoroughly and immediately.
3. Don't apply excessive force on the surface of the LCM.
4. If the surface is contaminated, clean it with soft cloth. If the LCM is severely contaminated, use Isopropyl alcohol/Ethyl alcohol to clean. Other solvents may damage the polarizer. The following solvents is especially prohibited: water , ketone Aromatic solvents etc.
5. Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.
6. Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.
7. Don't disassemble the LCM.
8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - Be sure to ground the body when handling the LCD modules.
 - Tools required for assembling, such as soldering irons, must be properly grounded.
 - To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions.
 - The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.
9. Do not alter, modify or change the the shape of the tab on the metal frame.
10. Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
11. Do not damage or modify the pattern writing on the printed circuit board.
12. Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector
13. Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
14. Do not drop, bend or twist LCM.

10.2 Storage

1. Store in an ambient temperature of 5 to 45 C, and in a relative humidity of 40% to 60%. Don't expose to sunlight or fluorescent light.
2. Storage in a clean environment, free from dust, active gas, and solvent.
3. Store in antistatic container.