Applied Green Light Inc.

SPECIFICATION

7" High Brightness
Color TFT-LCD Display

Customer : _____

Model Number :   VM07_____

Control Code :   VM07B1 VA_____

Date :   May/31/2023_____

Version :   1.0_____

☐ Preliminary Specification

☑ Final Specification

RECORD OF REVISION

Version and Date	Page	Old description	New description	Remark
0.1 2014/08/28	All	First Edition for customer		
0.2 2017/08/16	10		SYNC V-active: 480	
0.3 2023/05/31	4	LVDS connector：DF19G-20P-1.25H	LVDS connector：L52420-HC61A02	

Contents

1. General Specifications

No.	Item	Specification	Remark
1	LCD size	7.0 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	800 × 3(RGB) × 480	
4	Display mode	Normally White, Transmissive	
5	Dot pitch	0.0642(W) × 0.1790(H) mm	
6	Active area	154.08(W) × 85.92(H) mm	
7	Module size	164.9(W) × 100.0(H) × 12.6(D) mm	Note 1
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	LVDS	
11	Backlight power consumption	3.6W @ 1,000 nits	
12	Panel power consumption	0.259W (Typ.)	
13	Weight	150 g (Typ.)	

Note 1: Refer to Mechanical Drawing.

2. Pin Assignment

2.1. TFT LCD Panel Driving Section
CN1: L52420-HC61A02 or equivalent

Pin No	Symbol	Description	Remark
1	VCC	Power supply +3.3V	
2	VCC	Power supply +3.3V	
3	GND	Power ground	
4	GND	Power ground	
5	IN0-	Negative LVDS differential data input	
6	IN0+	Positive LVDS differential data input	
7	GND	Power ground	
8	IN1-	Negative LVDS differential data input	
9	IN1+	Positive LVDS differential data input	
10	GND	Power ground	
11	IN2-	Negative LVDS differential data input	
12	IN2+	Positive LVDS differential data input	
13	GND	Power ground	
14	CLK-	Negative LVDS differential clock input	
15	CLK+	Positive LVDS differential clock input	
16	GND	Power ground	
17	VLED	LED Power supply +5V	
18	VLED	LED Power supply +5V	
19	Enable	Backlight Enable	
20	ADJ	Backlight Dimming (Analog)	

3. Operation Specifications

3.1. Absolute Maximum Rating

(GND=AV$_{SS}$=0V, Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Input voltage	V$_{CC}$	-	4.0	V	
	V$_{LED}$	-	8.0	V	
Operation temp.	T$_{OP}$	-30	80	℃	
Storage temp.	T$_{ST}$	-30	80	℃	

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

3.1.1 Typical Operation Condition

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks (Test Condition)
Input Specification						
Input Voltage	V_{CC}	3.0	3.3	3.6	V_{DC}	
	V_{LED}	4.5	5	7	V_{DC}	
Input Current	I_{VCC}	-	5	10	mA	
	I_{LED}	-	1.0	1.2	A	V_{LED} =5V, Dim=Max
Input Power	P_{VCC}	-	16.5	33	mW	Typical
	P_{LED}	-	5.0	6	W	Typical
On/Off control	ON/OFF	-	3	-	V_{DC}	ON STATE
		-	0	-		OFF STATE
Dimming Control	DIM	-	5	-	V_{DC}	MIN BRIGHTNESS
		-	0	-		MAX BRIGHTNESS

3.1.2 Backlight Section (Reference only)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	VL		9.9	10.5	V	Note 1
Current for LED backlight	IL		300	560	mA	
LED life time	-	30K	50K	-	Hr	Note 2

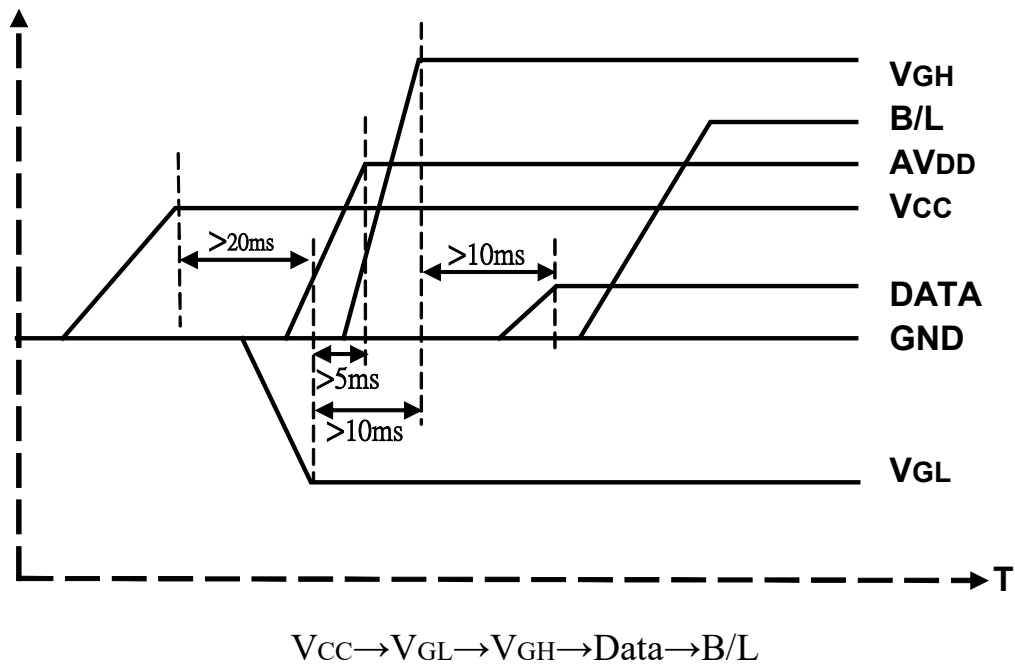Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25°C and IL =360mA.
Note 2: The "LED life time" is defined as the module brightness decrease to 50% original
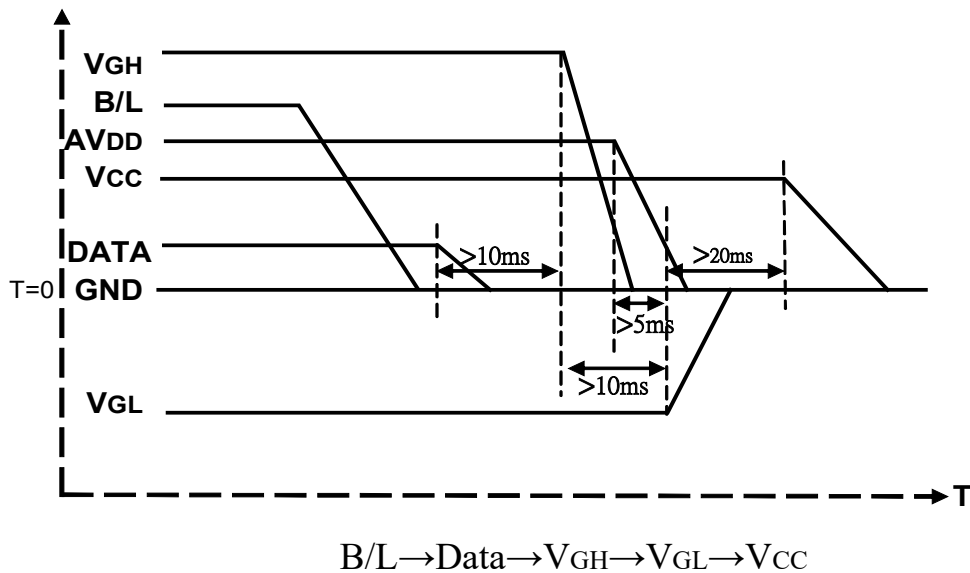brightness at Ta=25°C and IL =300mA.

3.1.3 LVDS

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V_{CC}	3.1	3.3	3.5	V	
LVDS_Board Current Consumption	I_{CC}	—	TBD	—	mA	Note 1
Differential Input High Threshold	V_{THLVDS}			100	mV	
Differential Input Low Threshold	V_{TLLVDS}	-100			mV	
Input current	I_{IN}			±10	uA	

3.2 Power Sequence

3.2.1. Power on:

$$V_{CC} \rightarrow V_{GL} \rightarrow V_{GH} \rightarrow Data \rightarrow B/L$$

3.2.2. Power off:

$$B/L \rightarrow Data \rightarrow V_{GH} \rightarrow V_{GL} \rightarrow V_{CC}$$

Note: Data include R0~R5, B0~B5, GO~G5, STLR,UPDN, DCLK, HS,VS,DE.

4. Timing Characteristics

4.1 Timing conditions (VDD=3.3V, Ta=25℃)

Item	Symbol	Value			Unit	Note
		Min	Typ.	Max		
RxCLKIN Period	tRCP	11.76	T	50	ns	T= RxCLKIN Period
RxCLKIN High Time	tRCH	-	T/2	-	ns	
RxCLKIN Low Time	tRCL	-	T/2	-	ns	
PAD0/1 to RxCLKIN Delay	tRCD	-	3T/7	-		
Data Setup to RxCLKIN	tRS	1.9	-	-	ns	
Data Hold from RxCLKIN	tRH	3.0	-	-	ns	
Input Data Position 0(T=11.76ns)	TRIP1	-0.4	0	0.4	ns	
Input Data Position 1(T=11.76ns)	TRIP0	T/7-0.4	T/7	T/7+0.4	ns	
Input Data Position 2(T=11.76ns)	TRIP6	2T/7-0.4	2T/7	2T/7+0.4	ns	
Input Data Position 3(T=11.76ns)	TRIP5	3T/7-0.4	3T/7	3T/7+0.4	ns	
Input Data Position 4(T=11.76ns)	TRIP4	4T/7-0.4	4T/7	4T/7+0.4	ns	
Input Data Position 5(T=11.76ns)	TRIP3	5T/7-0.4	5T/7	5T/7+0.4	ns	
Input Data Position 6(T=11.76ns)	TRIP2	6T/7-0.4	6T/7	6T/7+0.4	ns	

Item		Value			Unit	Note
		Min	Typ.	Max		
SYNC	Clock Frequency	-	40	50	MHZ	Note1
	H-sync Total	862	1056	1200	CLK	
	H-sync Pluse Width	1		40	CLK	
	H-sync Back Porch	46	46	46	CLK	
	H-sync Front Porch	16	210	354	CLK	
	H-Active		800		CLK	
	V-sync Total	624	635	700	LINE	
	V-sync Pluse Width	1		20	LINE	
	V-sync Back Porch	23	23	23	LINE	
	V-sync Front Porch	1	12	77	LINE	
	V-Active		480		LINE	

4.2Timing Diagram

R/G/B[7]s are MSBs and R/G/B[0]s are LSBs
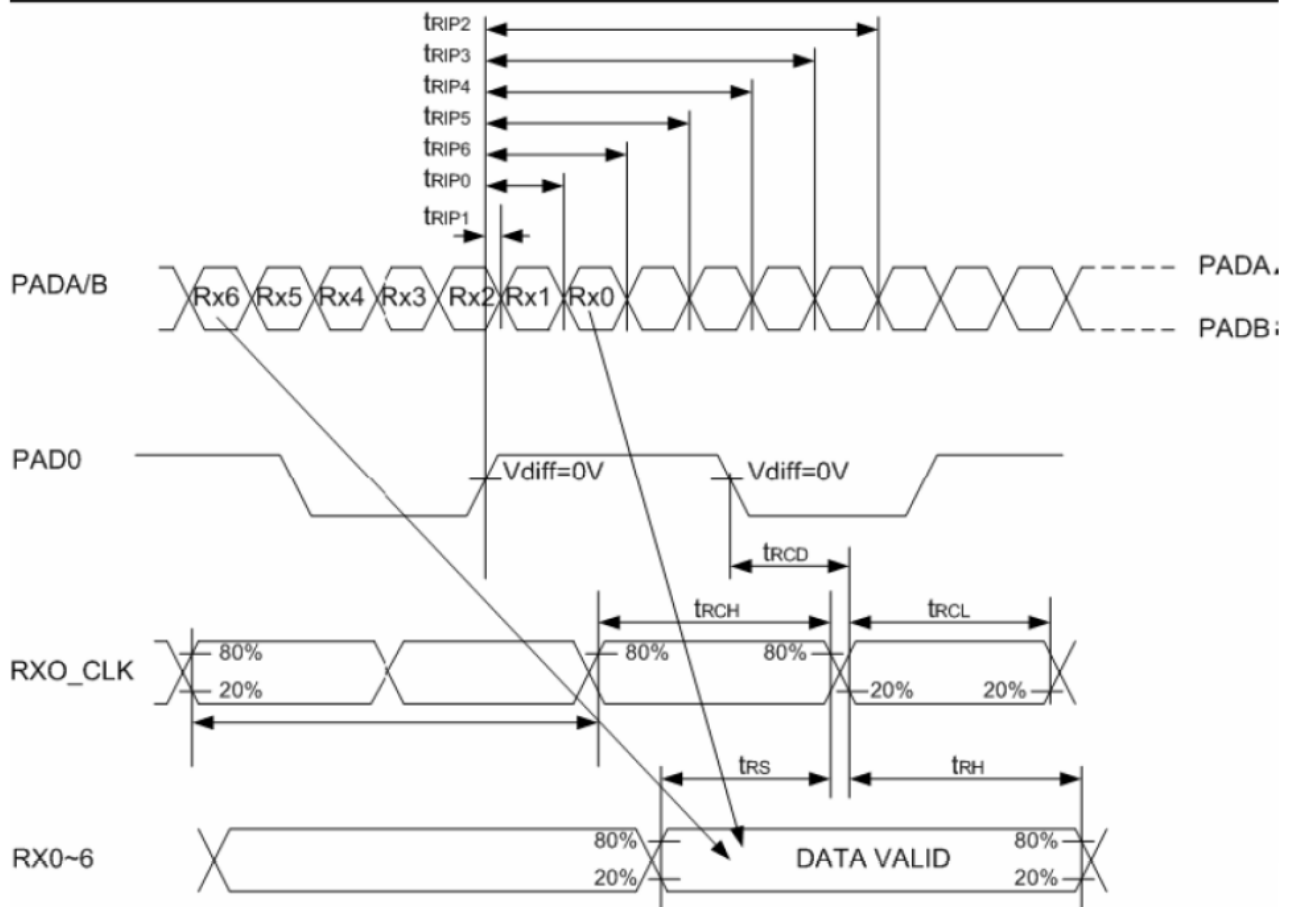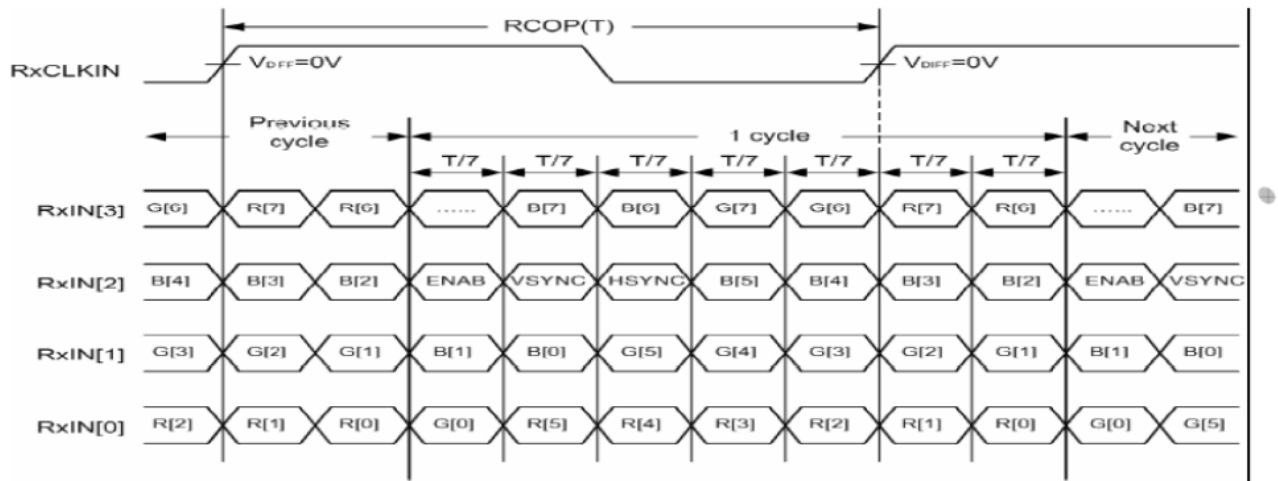
LVDS AC Timing Diagrams

5. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	**Typ.**	**Max.**		
View angle (CR≧10)	θ_L	$\Phi=180^o$(9 o'clock)	60	70	-	degree	Note 1
	θ_R	$\Phi=0^o$(3 o'clock)	60	70	-		
	θ_T	$\Phi=90^o$(12 o'clock)	40	50	-		
	θ_B	$\Phi=270^o$(6 o'clock)	60	70	-		
Response time	T_{ON}		-	10	20	msec	Note 3
	T_{OFF}		-	15	30	msec	Note 3
Contrast ratio	CR	Normal $\theta=\Phi=0^o$	400	500	-	-	Note 4
Color chromaticity	W_X		0.26	0.31	0.36	-	Note 2 Note 5 Note 6
	W_Y		0.28	0.33	0.38	-	
Luminance			800	1000	-	Cd/m^2	Note 6
Uniformity			-	70	-	%	Note 7

Test Conditions:
1. V_{CC}=3.3V, I_L=400mA (Backlight current), the ambient temperature is 25°C.
2. The test systems refer to Note 2.

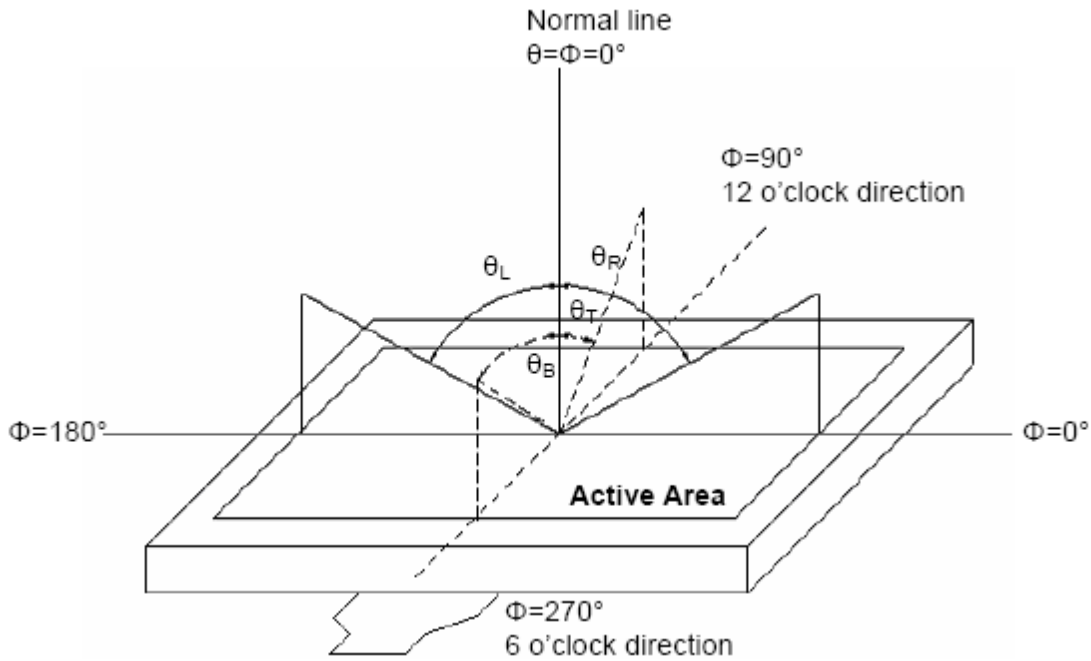Note 1 : Definition of viewing angle range

Fig. 4.1 Definition of viewing angle

Note 2: Definition of optical measurement system.

     The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° /Height: 500mm.)
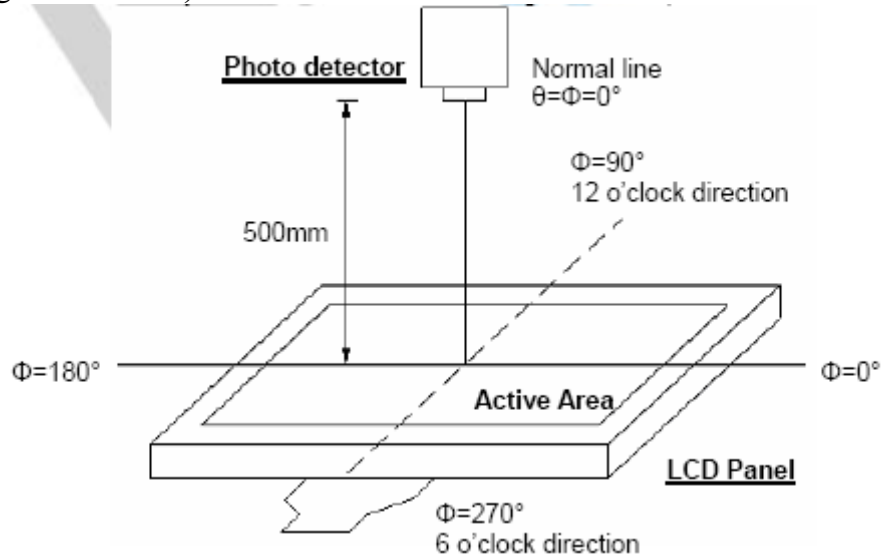

Fig. 4.2 Optical measurement system setup

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_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.
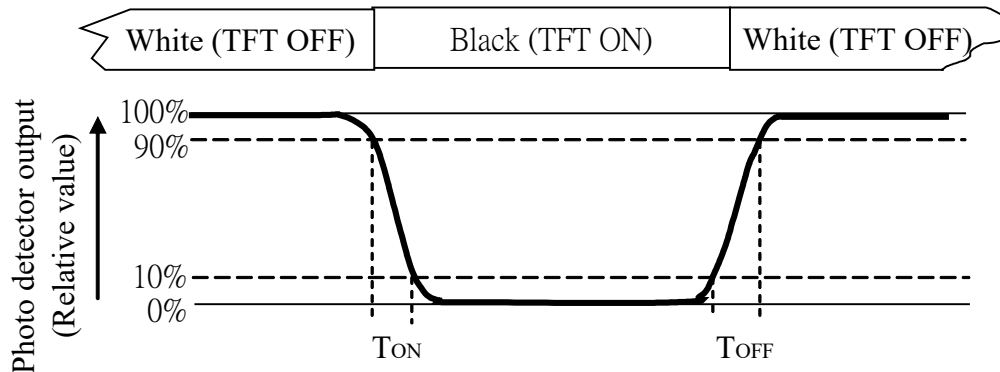
Note 4: Definition of Contrast ratio

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

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is I_L=180mA .

Note 7: Definition of Luminance Uniformity
     Active area is divided into 9 measuring areas (Refer to Fig. 4.4).
     Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{min}}{B_{max}}$$
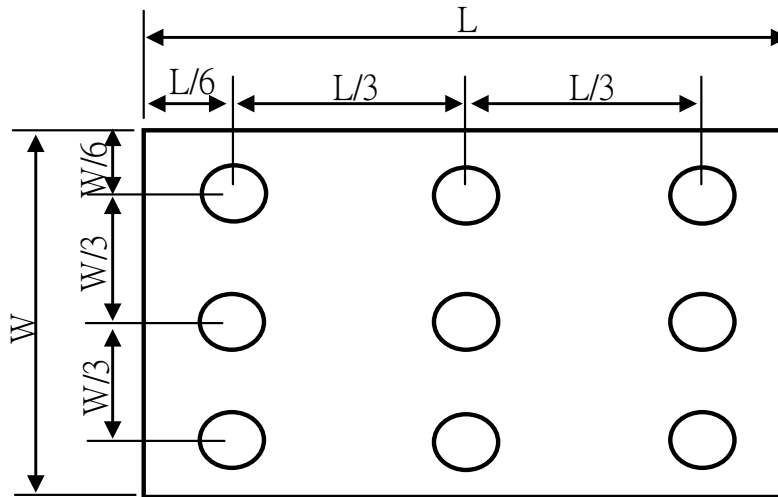
L ----- Active area length W ----- Active area width

Fig. 4.4 Definition of measuring points

B_{max}: The measured maximum luminance of all measurement position.
B_{min}: The measured minimum luminance of all measurement position.

6. Reliability Test Items

Item	Test Conditions	Remark
High Temperature Storage	Ta = 80℃ 240hrs	Note 1, 4
Low Temperature Storage	Ta = -30℃ 240hrs	Note 1, 4
High Temperature Operation	Ts = 80℃ 240hrs	Note 2, 4
Low Temperature Operation	Ta = -30℃ 240hrs	Note 1, 4
Operate at High Temperature and Humidity	+40℃, 80%RH 240hrs	Note 4
Thermal Shock	-10℃/30 min ~ +50℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	Note 4
Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X. Y. Z. (6 hours for total)	
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	
Electro Static Discharge	± 2KV, Human Body Mode, 100pF/1500Ω	

Note 1: Ta is the ambient temperature of samples.
Note 2: Ts is the temperature of panel's surface.
Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.
Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

7. General Precautions

7.1. Safety
Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

7.2. Handling
1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

7.3. Static Electricity
1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

7.4. Storage
1. Store the module in a dark room where must keep at 25±10°C and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

7.5. Cleaning
1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

8. Mechanical Drawing

CN1

3.92
2.71

164.90(Outline)
156.70(Bezel opening)
154.08(A-A)

7.33
9.30

85.92(A-A)
89.10(Bezel opening)
100(Outline)

出線端

12.60(MAX)

112.95

91