INNOLUX DISPLAY CORPORATION

LCD MODULE

SPECIFICATION

Customer: _____

Model Name: NJ101IA-01S

Date: 2023/12/21

Version: 03

☐ Preliminary Specification

■ Final Specification

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by
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Record of Revision

Version	Revise Date	Page	Content
Fin Spec01	20221020	all	Final Spec
Fin Spec02	20230818	6	Add power ripple requirement
		NA	PCBA LVDS layout change to F type
		9	Timing Table add note about frame rate range
		1	Modify inversion to 1+2line
		5	Update VGH/VGL current
		8	Update AC Electrical Characteristics table
Fin Spec03	2023/12/21	17	Update Mechanical Drawing(add BLU ID)

CHIMEI INNOLUX

Contents

1. General Specifications

No.	Item	Specification	Remark
1	LCD size	10.1 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1280 × 3(RGB) × 800	
4	Display mode	Normally Black, Transmissive	
5	Dot pitch	0.0565(W) × 0.1695(H) mm	
6	Active area	216.96(W) × 135.60(H) mm	
7	Module size	229.46(W) ×149.1(H) ×4.8(D) mm	Note 1
8	Surface treatment	HC	
9	Color arrangement	RGB-stripe	
10	Interface	LVDS	
11	Backlight power consumption	4.68W(Typ.)	
12	Panel power consumption	0.7W(Typ.)	Note 2
13	Weight	270.5 g(Typ)	
14	inversion	1+2line	
15	IC	ILI6192*2+ILI5801*1	

Note 1: Refer to Mechanical Drawing.
Note 2: Including power IC consumption, white pattern

2. Pin Assignment

A 40pin connector use for the module electronics interface. The recommended model connector is FH52-40S-0.5SH or FP260H-040G10M.

Pin No.	Symbol	I/O	Function	Remark
1	NC	-	No connection	
2	VDD	P	Power Supply	
3	VDD	P	Power Supply	
4	NC	---	Only for INX test	
5	NC	---	Only for INX test	
6	NC	---	Only for INX test	
7	GND	P	Ground	
8	Rxin0-	I	-LVDS Differential Data Input	R0-R5, G0
9	Rxin0+	I	+LVDS Differential Data Input	
10	GND	P	Ground	
11	Rxin1-	I	-LVDS Differential Data Input	G1~G5, B0,B1
12	Rxin1+	I	+LVDS Differential Data Input	
13	GND	P	Ground	
14	Rxin2-	I	-LVDS Differential Data Input	B2-B5,HS,VS, DE
15	Rxin2+	I	+LVDS Differential Data Input	
16	GND	P	Ground	
17	RxCLK-	I	-LVDS Differential Clock Input	LVDS CLK
18	RxCLK+	I	+LVDS Differential Clock Input	
19	GND	P	Ground	
20	Rxin3-	I	-LVDS Differential Data Input	R6, R7, G6, G7, B6, B7
21	Rxin3+	I	+LVDS Differential Data Input	
22	GND	P	Ground	
23	NC	---	Only for INX test	
24	NC	---	No connection	
25	GND	P	Ground	
26	NC	---	No connection	

27	NC	---	No connection	
28	NC	---	No connection	
29	AVDD	P	Power for Analog Circuit	
30	GND	P	Ground	
31	LED-	P	LED Cathode	
32	LED-	P	LED Cathode	
33	NC	---	Only for INX test	
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	LED+	P	LED Anode	
40	LED+	P	LED Anode	

I: input, O: output, P: Power

3. Operation Specifications

3.1. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	VDD	-0.3	6.5	V	
	AVDD	-0.3	18	V	
	V_{GH}	-0.3	42	V	
	V_{GL}	-20	0.3	V	
	V_{GH}-V_{GL}	12	40	V	
Operation Temperature	T_{OP}	-20	70	℃	
Storage Temperature	T_{ST}	-30	80	℃	
LED Reverse Voltage	V_R	---	5	V	Each LED
LED Forward Current	I_F	---	70	mA	Each LED

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. Current Consumption (White Pattern)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I_{GH}	0.30	0.68	1.00	mA	V_{GH} =12.5V
	I_{GL}	0.30	0.63	1.00	mA	V_{GL} = -13V
	IV_{DD}	12.5	25.4	42.0	mA	V_{DD} =3.3V
		24.5	35.9	49.0	mA	V_{DD} =2.5V
	IAV_{DD}	39.8	68.5	104.6	mA	AV_{DD} =8.2V

3.1.2. Backlight Driving Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V_L	16.8	19.5	20.4	V	Note 1
Current for LED backlight	I_L	228	240	252	mA	
LED life time	-	20000		-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and IL= 240mA.

Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and I_L =240mA. The LED lifetime could be decreased if operating I_L is lager than 240mA.

3.2. Typical Operation Conditions

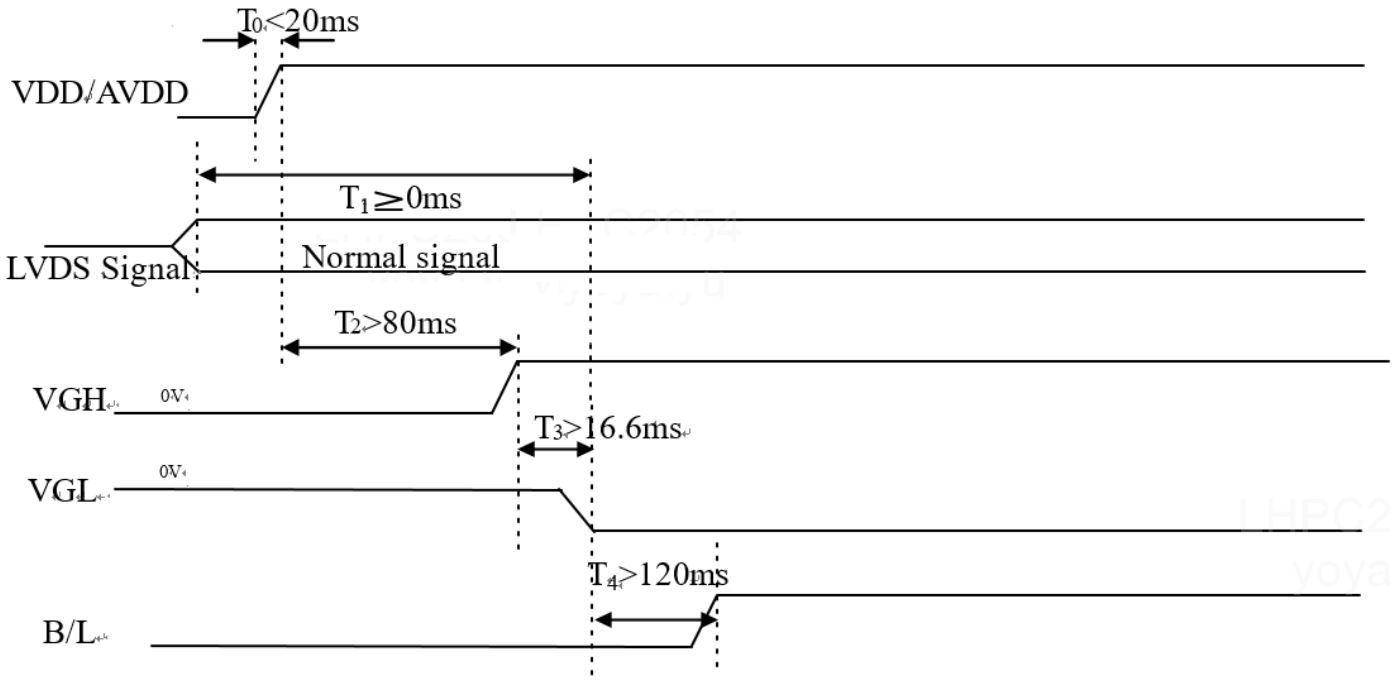
(Note 1)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	VDD	2.3	2.5/3.3	3.6	V	Note 2
	AVDD	8.0	8.2	8.4	V	
	V_{GH}	12	12.5	13	V	
	V_{GL}	-12.5	-13	-13.5	V	
Input signal voltage	VCOM	-	-	-	V	Note 3
Ripple voltage	VRP	-	-	150	mV	Note 4
Input logic high voltage	V_{IH}	0.8 VDD	-	VDD	V	
Input logic low voltage	V_{IL}	0	-	0.2 VDD	V	

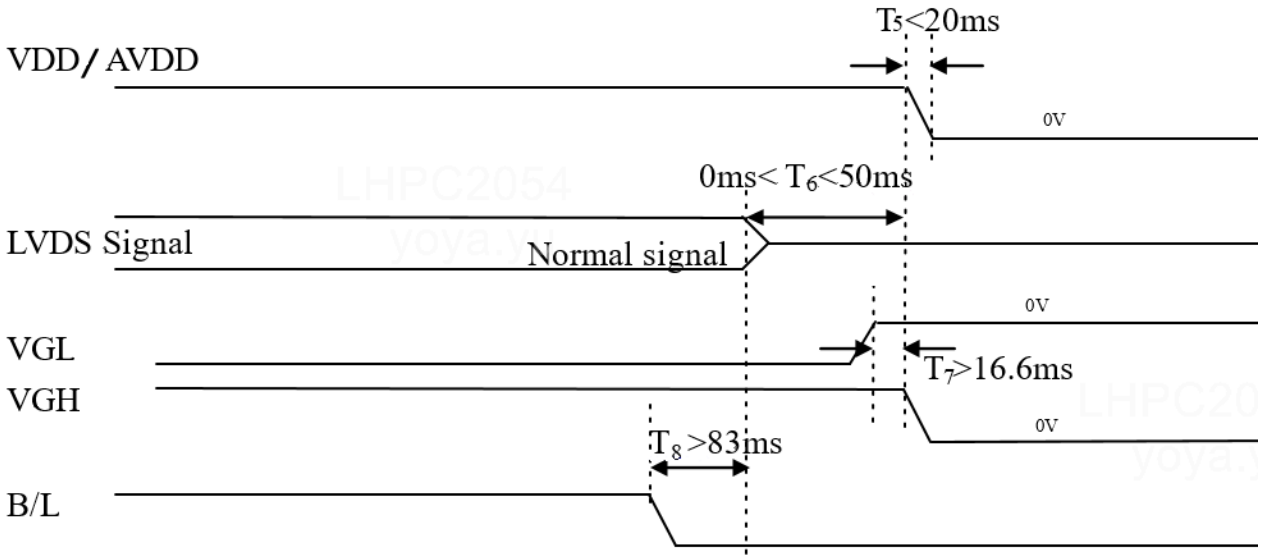
Note 1: Be sure to apply VDD and AVDD to the LCD first, and then apply V_{GH} apply V_{GL}.
Note 2: VDD setting should match the signals output voltage (refer to Note 3) of customer's system board.
Note 3: Auto Vcom，no Vcom voltage required.
Note 4:Including signal:VDD、AVDD、VGH、VGL

3.3. Power Sequence

a. Power on:



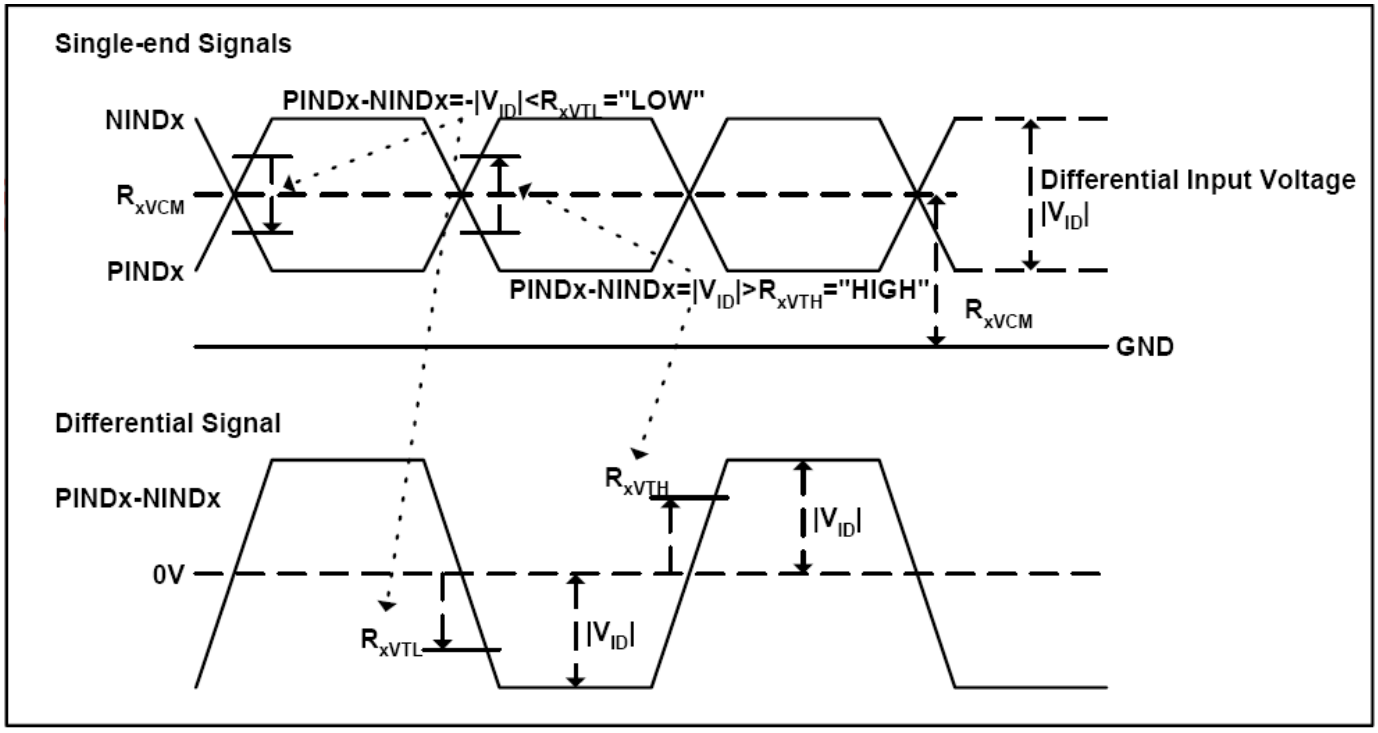
b. Power off:



3.4. LVDS Signal Timing Characteristics

3.4.1. AC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LVDS Differential input high Threshold voltage	R_{xVTH}	-	-	+200	mV	R_{XVCM}=1.2 V
LVDS Differential input low Threshold voltage	R_{xVTL}	-200	-	-	mV	
LVDS Differential input common mode voltage	R_{xVCM}	1	1.2	**1.7-| V_{ID} |/2**	V	
LVDS Differential voltage	$\|V_{ID}\|$	200	-	600	mV	

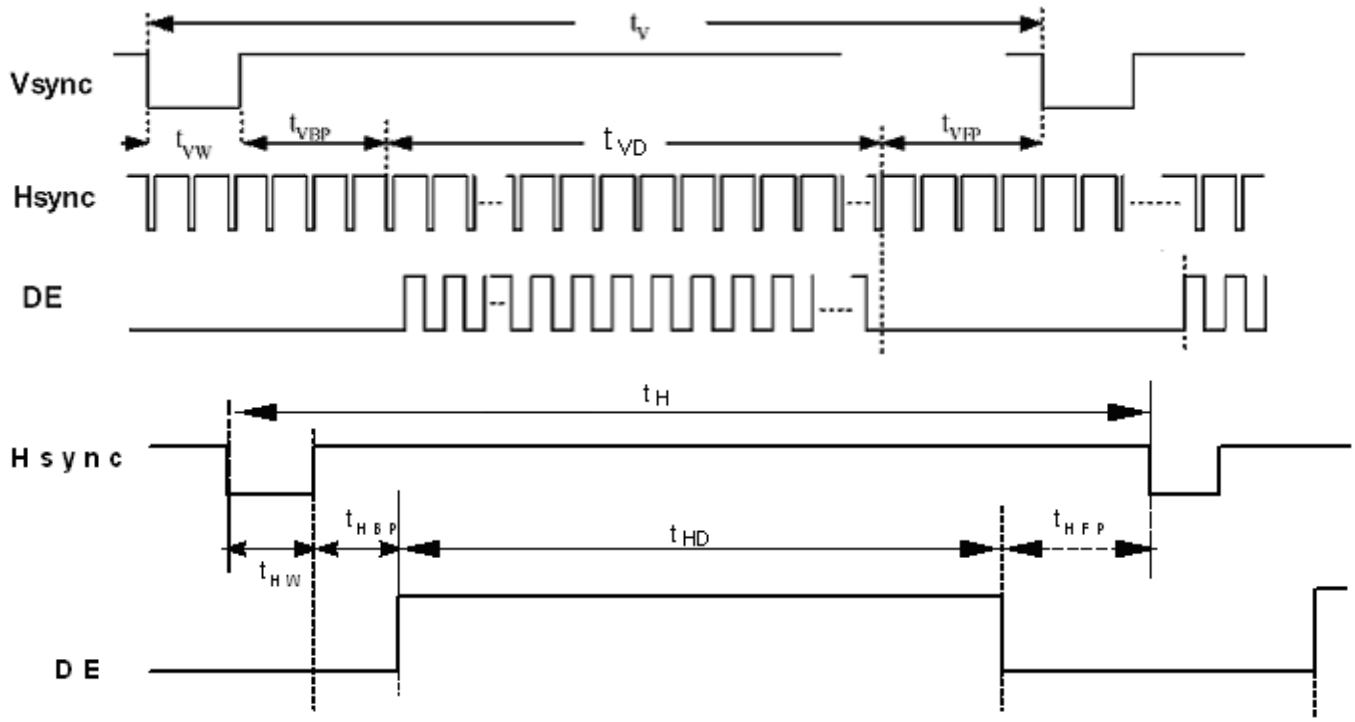


3.4.2. Timing Table

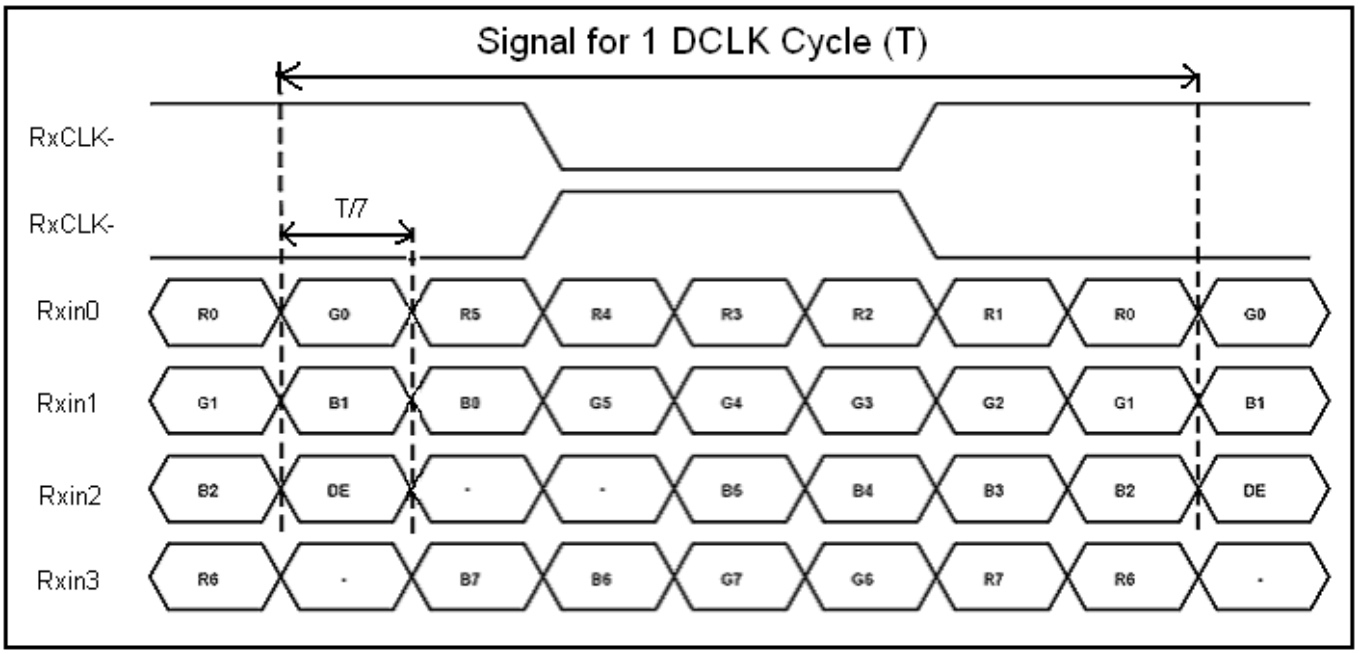
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	1/Tc	63.4	64.5	85	MHz	Frame rate =60Hz
Horizontal display area	t_{HD}		1280			
HS period time	t_H	1309	1322	1664	Tc	
HS Width +Back Porch +Front Porch	t_{HW}+ t_{HBP} +t_{HFP}	29	42	384	Tc	
Vertical display area	t_{VD}		800			
VS period time	tv	807	813	1040	t_H	
VS Width +Back Porch +Front Porch	t_{VW}+ t_{VBP} +t_{VFP}	7	13	240	t_H	

Note1: Frame rate is 60±5Hz, PCLK=Vtotal*Htotal*Frame Rate;

Note2: All the above conditions must be met.



3.4.3. LVDS Data Input Format



4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	Φ=180°(9 o'clock)	75	85	-	degree	Note 1
	θ_R	Φ=0°(3 o'clock)	75	85	-		
	θ_T	Φ=90°(12 o'clock)	75	85	-		
	θ_B	Φ=270°(6 o'clock)	75	85	-		
Response time	T_{ON}	Normal θ=Φ=0°	-	10	20	M sec	Note 3
	T_{OFF}		-	15	30	M sec	Note 3
Contrast ratio	CR		800	1000	-	-	Note 4
Color chromaticity	W_X		0.26	0.31	0.36	-	Note 2 Note 5 Note 6
	W_Y		0.27	0.32	0.37	-	
Luminance	L		500	650	-	cd/m²	Note 6
Luminance uniformity	Y_U		75	80	-	%	Note 7

Test Conditions:

1. VDD=2.5V, the ambient temperature is 25℃.
2. The test systems refer to Note 2.

3. Mark

Note 1: Definition of viewing angle range

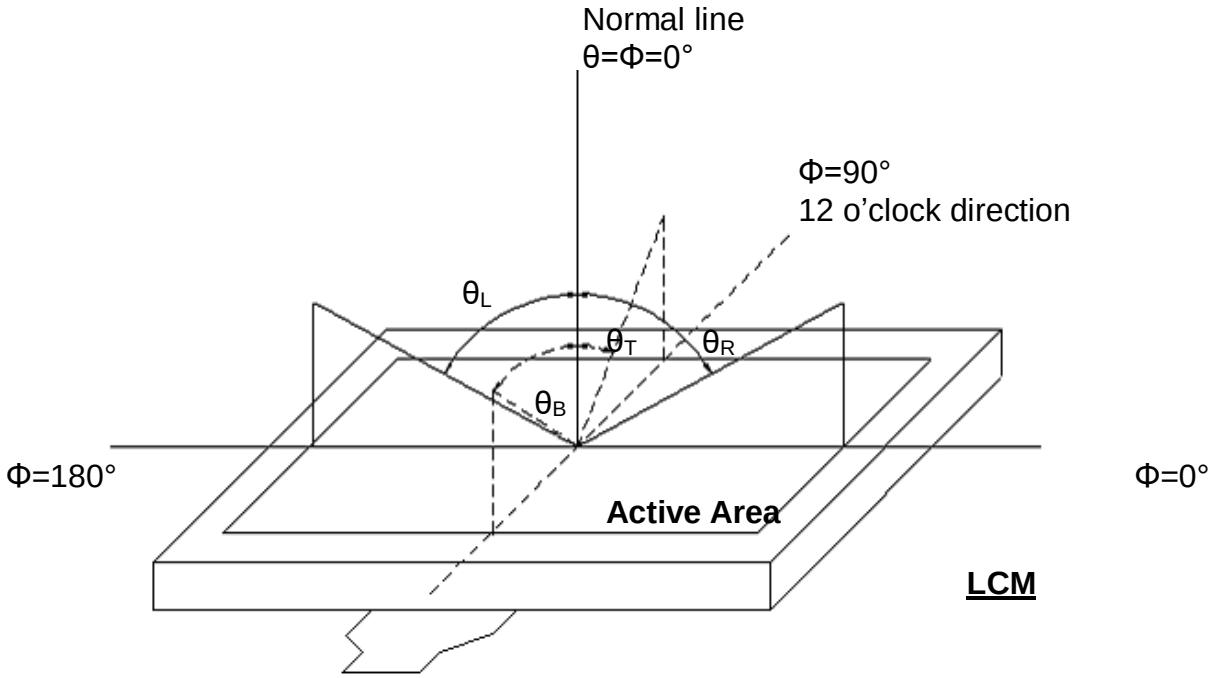


Fig. 4-1 Definition of viewing angle

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. (Viewing angle is measured by ELDIM-EZ contrast/Height :1.2mm, Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/ Field of view: 1° /Height: 500mm.)

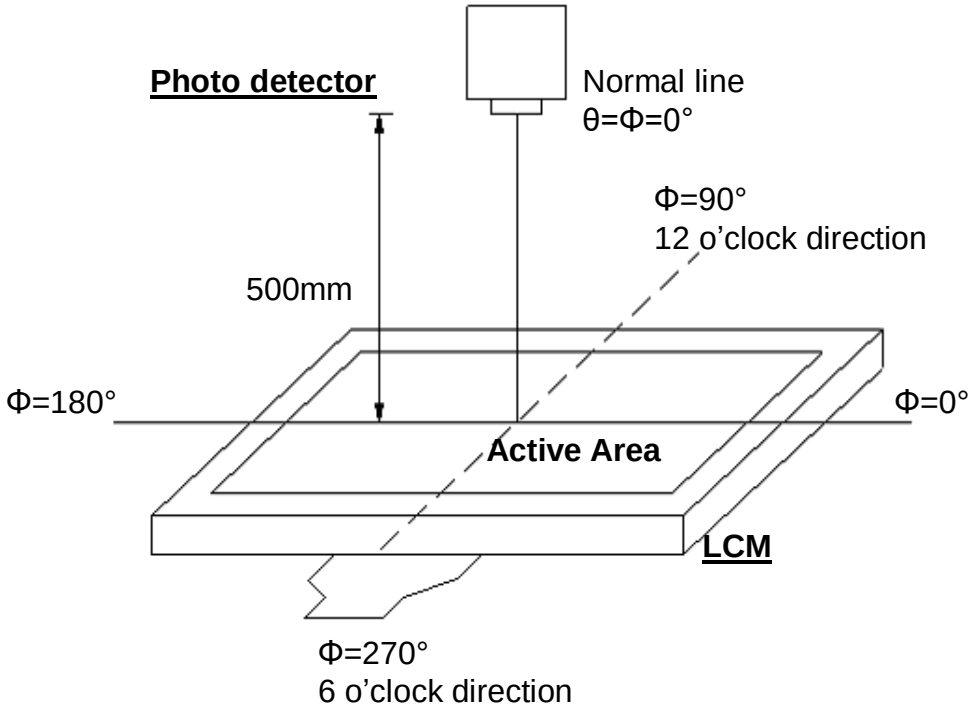


Fig. 4-2 Optical measurement system setup

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 10% to 90%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 90% to 10%.

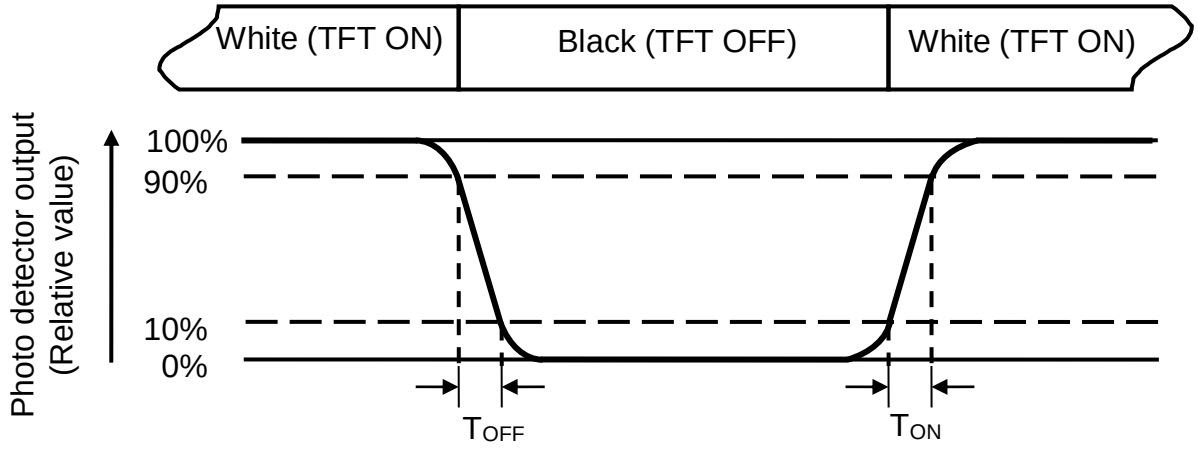


Fig. 4-3 Definition of response time

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=240mA .

Note 7: 、finition 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.

$$Luminance Uniformity(Yu) = \frac{B_{min}}{B_{max}}$$

L-------Active area length W----- Active area width

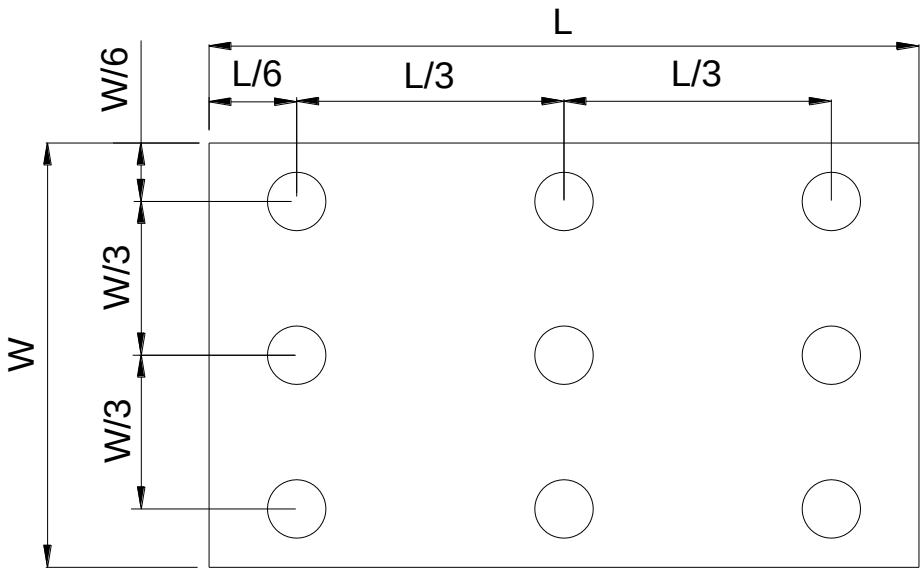


Fig. 4-4 Definition of measuring points

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

5. Reliability Test Items

Item	Test Conditions	Remark
High Temperature Storage	80℃ 240hrs	Note 1 Note 2 Note 3
Low Temperature Storage	-30℃ 240hrs	
High Temperature Operation	70℃ 240hrs	
Low Temperature Operation	-20℃ 240hrs	
Operate at High Temperature and Humidity	+60℃, 90%RH 240hrs	
Thermal Shock	-30℃/30 min ~ +80℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	
Vibration Test	1.5G / 10-500 Hz, Sine wave, 30 min/cycle, 1cycle for each X, Y, Z	
Package Vibration Test	Random Vibration : 1Hz~200Hz,Grms=0.53 Half hours for direction of Z.	
Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	
Electro Static Discharge	± 2KV, Human Body Mode, 100pF/1500Ω	

Note 1: 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 2: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note3: Under no condensation of dew.

6. General Precautions

6.1. 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.

6.2. 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.

6.3. 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.

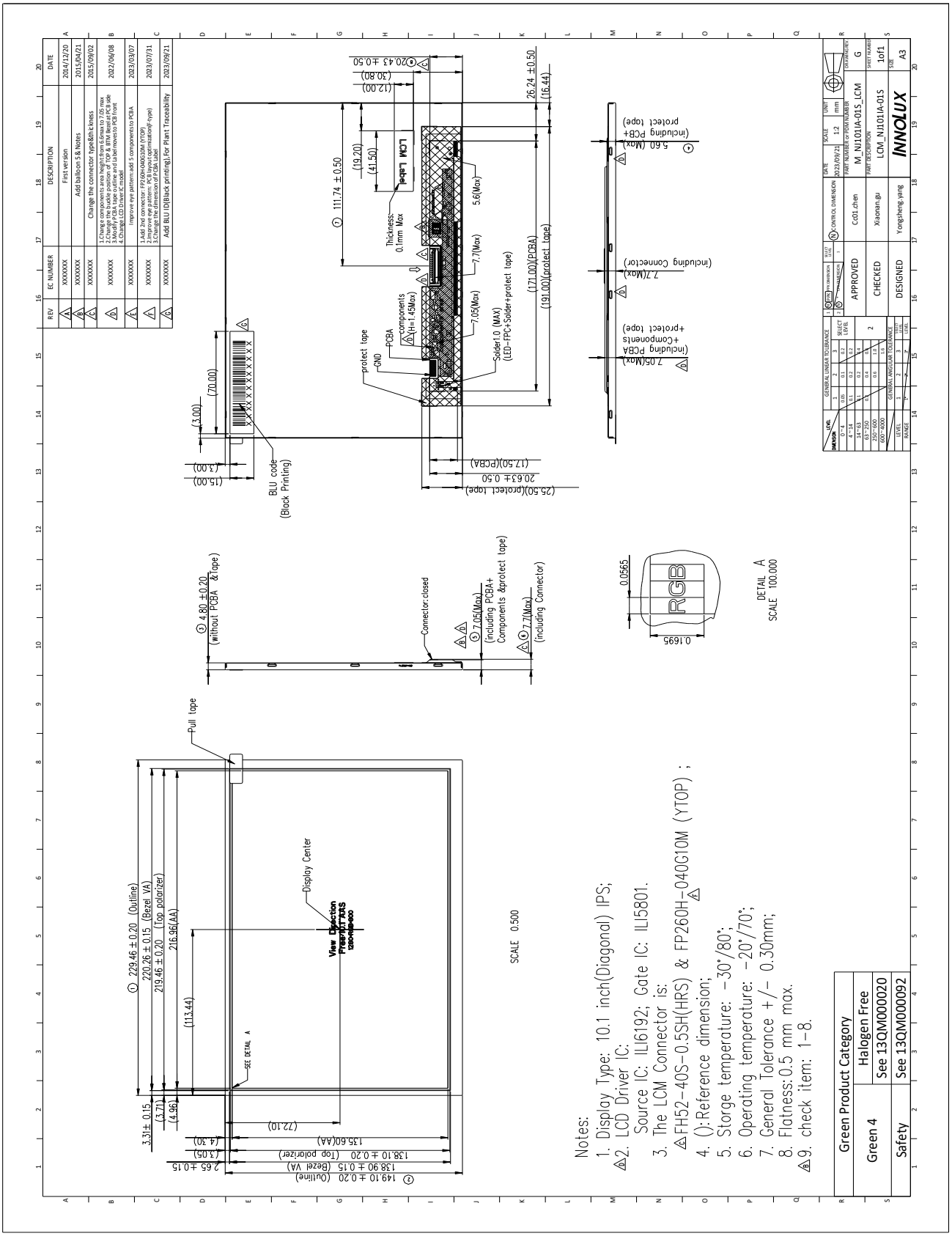
6.4. Storage

1. Store the module in a dark room where must keep at 25±10℃ 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.

6.5. 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.

7. Mechanical Drawing



8. Package Drawing

8.1. Packaging Material Table

No.	Item	Model (Material)	Dimensions(mm)	Unit Weight (kg)	Quantity	Remark
1	LCM Module	NJ101IA-01S	229.46*149.10*4.8	0.2705	25 pcs	NA
2	Partition	BC Corrugated paper	512 X 349X 230	1.963	1 set	NA
4	Dust-Proof Bag	aluminium foil	274 X 250 X 0.07	0.0124	25 pcs	NA
5	Drier	Montmorillonite	85x47x10	0.011	2 pcs	NA
6	Carton	Corrugated paper	530 X 367 X 260	0.95	1pcs	NA
7	Total weight	10 Kg±5%				

8.2. Packaging Quantity

Total LCM quantity in Carton: No. of Partition （1 Rows X Quantity per Row 25 ）= 25pcs

8.3. Packaging Drawing