

INNOLUX DISPLAY CORPORATION

LCD MODULE

SPECIFICATION

Customer: _____
Model Name: EJ101IA-01G
Date: 2023/10/18
Version: 16

- Preliminary Specification
 Final Specification

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by
MENGHSUAN.LU	CHIEN.CHAN	WINNIE.CHEN

Record of Revision

Version	Revise Date	Page	Content
Pre-Spec.01	2012/11/13	All	Initial Release
Fin-Spec.01	2013/05/27	1	Update Backlight & Panel power consumption& Weight
		4	Update 3.1.1 Current Consumption
		6	Update Vcom
		7	Modify Power Sequence
		8	Update LVDS Differential voltage min Values
		9	Update Timing Table
		11	Update Test conditions 1
		17	Modify Mechanical Drawing
		19	Modify Package Drawing
Fin-Spec.02	2014/01/24	1	Update Backlight power consumption
		2	Update connect type
		7	Update power sequence
		14	Update definition of Luminance Uniformity
Fin-Spec.03	2014/08/18	18	Update LCM dimensions
Fin-Spec.04	2015/01/28	5	Current for Driver
		5	Voltage for LED backlight
		5	Current for LED backlight
Fin-Spec.05	2015/06/29	17	Mechanical Drawing
		5	Current Consumption
Fin-Spec.06	2016/09/23	1	Update General Specifications
		5	Update Current Consumption
		7	Update Power Sequence
		10	Update Timing Table
		18	Modify Mechanical Drawing
Fin-Spec.07	2018/07/12	2-3	Modify Pin Assignment
		4	Modify Operation Specifications
		7-8	Modify Power Sequence
		15	Modify Reliability Test Items
		17	Modify Mechanical Drawing
		18-19	Modify Package Drawing
Fin-Spec.08	2018/09/07	3	Modify Pin Assignment Description
Fin-Spec.09	2018/09/07	17	Modify Mechanical Drawing
Fin-Spec.10	2020/08/14	17	Modify Mechanical Drawing

Version	Revise Date	Page	Content		
Pre -Spec.11	2022/01/17	1	1. General Specifications		
		15	5. Reliability Test Items		
		18	7. Mechanical Drawing		
	2022/02/24	2	2. Pin Assignment		
Pre -Spec.12	2022/03/21	6	3.1.2 Backlight Driving Conditions		
Pre -Spec.13	2022/05/05	2	1. General Specifications		
		3-4	2. Pin Assignment		
		5	3.1 Absolute Maximum		
		6	3.1.1 Current Consumption		
		6	3.1.2 Backlight Driving Conditions		
		7	3.2 Typical Operation Conditions		
		8	3.3 Power Sequence		
		10	3.4.2 Timing Table		
		Pre -Spec.14	2022/05/16	2	1. General Specifications
				5	3.1 Absolute Maximum Ratings
12	4. Optical Specifications				
19	8.1 Packaging Material Table				
	2022/06/07			14	Note.3 description
Fin-Spec.15	2022/06/30	3	2. Pin Assignment		
		6	3.1.1 Current Consumption		
		7	3.2 Typical Operation Conditions		
		18	7. Mechanical Drawing		
	2022/08/23	18	7. Mechanical Drawing		
Fin-Spec.16	2023/10/18	19	8. Packing Drawing		
		2	Modify inversion to 1+2line		
		6	Update VGH/VGL current		
		7	Add VCOM and power ripple requirement		
		9	Update AC Electrical Characteristics table		
		10	Timing Table add note about frame rate range		
		18	Mechanical Drawing		

Contents

Modify Mechanical Drawing	1
Update connect type.....	1
Update power sequence	1
1. General Specifications	2
2. Pin Assignment.....	3
3. Operation Specifications.....	5
3.1. Absolute Maximum Ratings	5
3.1.1. Current Consumption (White Pattern).....	6
3.1.2. Backlight Driving Conditions	6
3.2. Typical Operation Conditions	7
3.3. Power Sequence	8
3.4. LVDS Signal Timing Characteristics	9
3.4.1. AC Electrical Characteristics	9
3.4.2. Timing Table	10
3.4.3. LVDS Data Input Format	11
4. Optical Specifications	12
5. Reliability Test Items	16
6. General Precautions.....	17
6.4. Safety.....	17
6.5. Handling	17
6.6. Static Electricity.....	17
6.7. Storage.....	17
6.8. Cleaning.....	17
7. Mechanical Drawing	18
8. Package Drawing.....	19

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) × 2.50(D) mm	Note 1
8	Surface treatment	HC	
9	Color arrangement	RGB-stripe	
10	Interface	Digital	
11	Backlight power consumption	1.76 W(Typ.)	
12	Panel power consumption	0.7W(Typ.)	Note 2
13	Weight	0.183KG(Typ.)	
14	inversion	1+2line	
15	IC	S-IC: ILI6192, G-IC:ILI5801	

Note 1: Refer to Mechanical Drawing.

Note 2: Power consumption is white pattern

2. Pin Assignment

A 40pin connector is used for the module electronics interface. This model used 196479-40041-3 and FP225H-040611M.

Pin No.	Symbol	I/O	Function	Remark
1	NC	---	No connection	
2	VDD	P	Power Supply	
3	VDD	P	Power Supply	
4	NC	---	Only INX test	
5	NC	---	Only INX test	
6	NC	---	Only 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 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 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	4	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}	-10	60	°C	
Storage Temperature	T _{ST}	-20	70	°C	

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
	I _{VDD}	18.1	32.5	44.6	mA	V _{DD} =2.5V
	I _{AVDD}	46.7	72.1	115.9	mA	A _{VDD} =8.2V

3.1.2. Backlight Driving Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	T _L	8.4	8.8	9.3	V	Note 1
Current for LED backlight	I _L	198	200	202	mA	
LED life time	-	15000		-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25°C and I_L =200mA.

Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and I_L =200mA. The LED lifetime could be decreased if operating I_L is larger than 200mA.

3.2. Typical Operation Conditions

(Note 1)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	VDD	2.3	2.5	2.7	V	Note 2
	AVDD	8.0	8.2	8.4	V	
	V _{GH}	12	12.5	13	V	
	V _{GL}	-13.5	-13	-12.5	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 DV _{DD}	V	

Note 1: Be sure to apply VDD and AVDD to the LCD first, and then apply V_{GH} and V_{GL}.

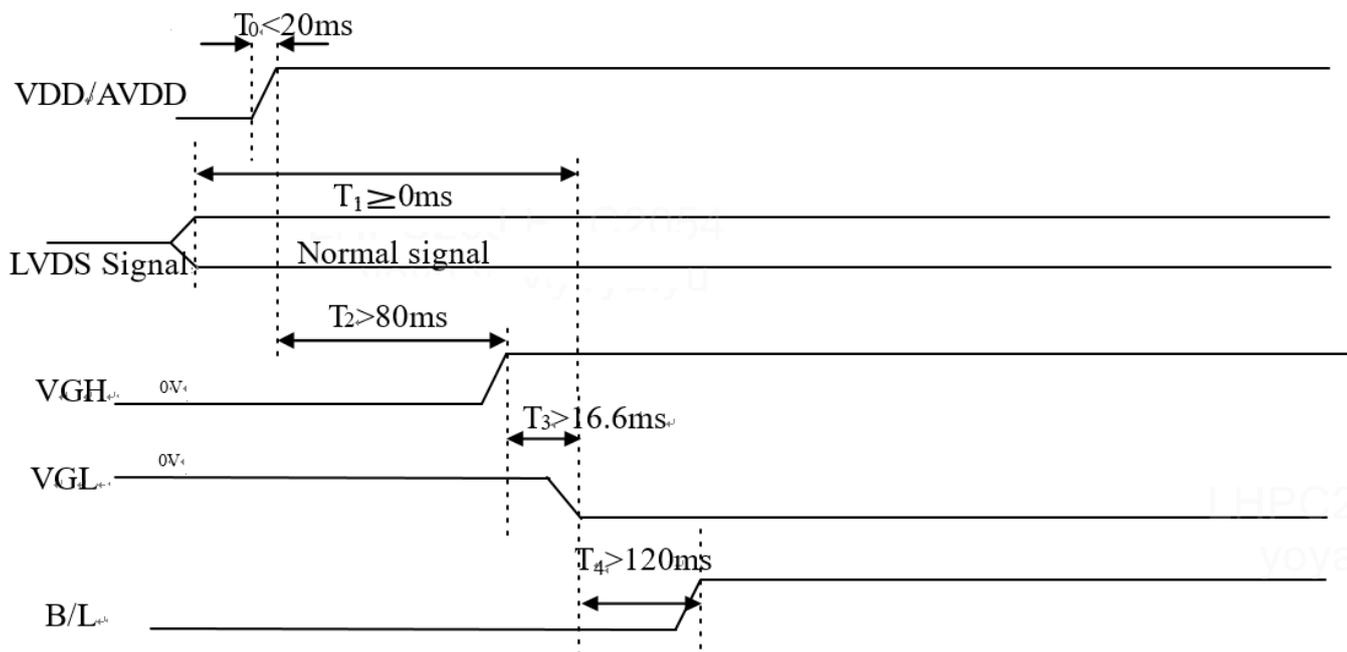
Note 2: VDD setting should match the signals output voltage of customer's system board.

Note 3: Auto Vcom, no Vcom voltage required.

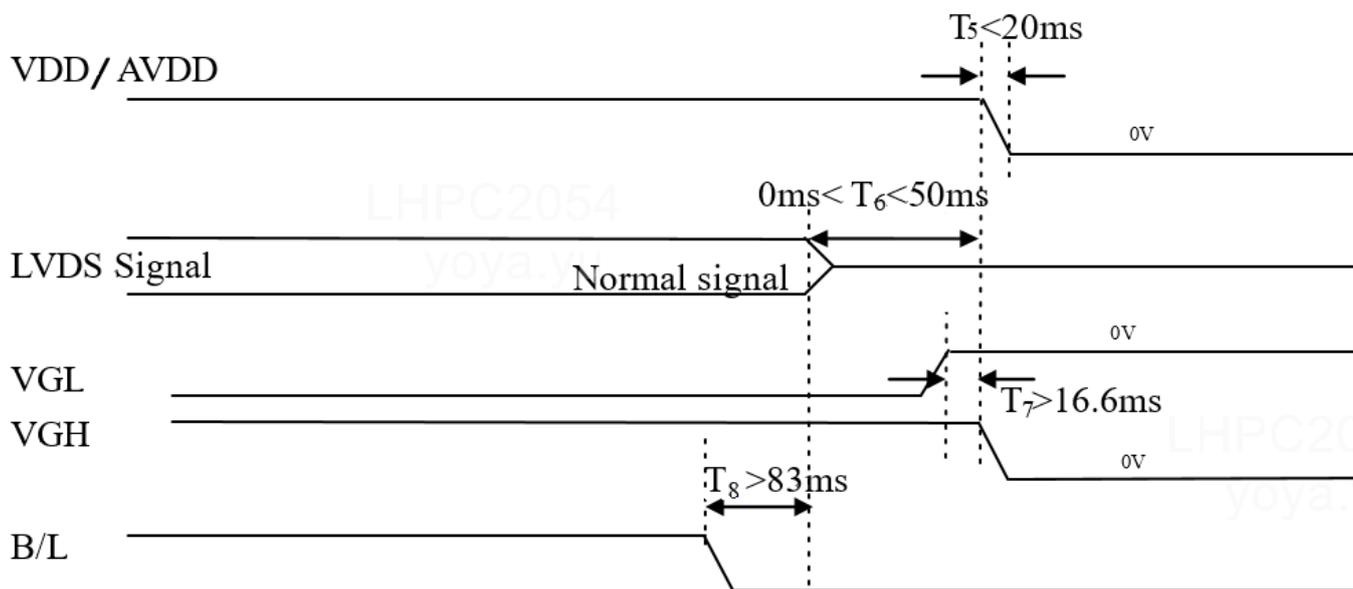
Note 4: Including signal: VDD、AVDD、V_{GH}、V_{GL}

3.3. Power Sequence

a. Power on:



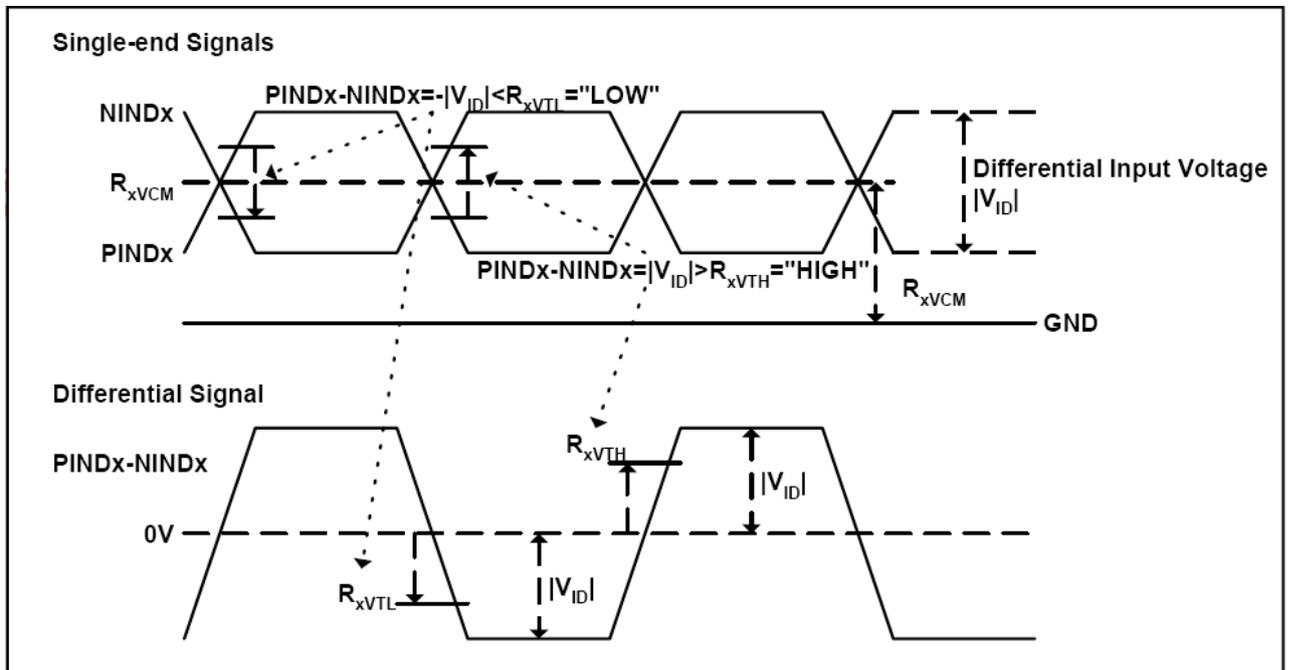
b. Power off:



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	$R_{xVCM}=1.2V$
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	

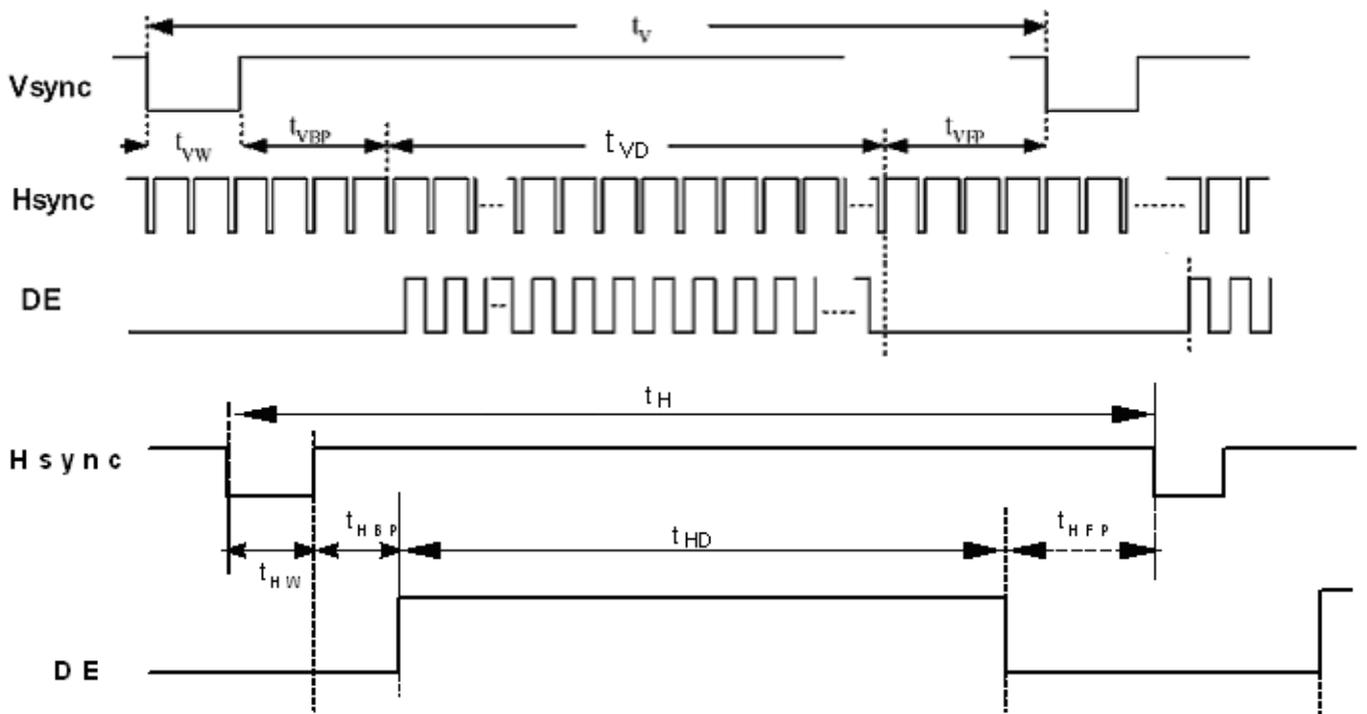


3.4.2. Timing Table

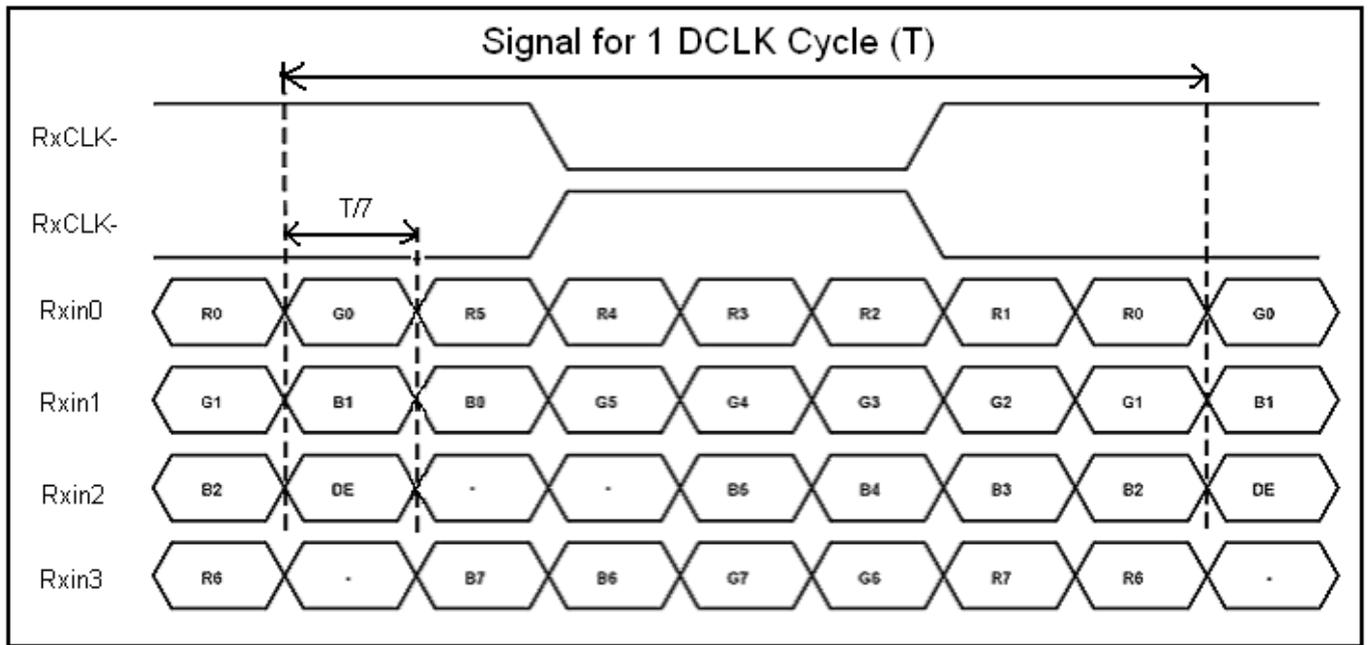
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	1/Tc	63.4	64.5	85.0	MHz	Frame rate =60Hz
Horizontal display area	tHD	1280				
HS period time	tH	1309	1322	1664	Tc	
HS Width +Back Porch +Front Porch	tHW+ tHBP +tHFP	29	42	384	Tc	
Vertical display area	tVD	800				
VS period time	tV	807	813	1040	tH	
VS Width +Back Porch +Front Porch	tVW+ tVBP +tVFP	7	13	240	tH	

Note1: Frame rate is $60 \pm 5\text{Hz}$, $PCLK=V_{total} \times H_{total} \times \text{Frame Rate}$;

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	$\Phi=180^\circ$ (9 o'clock)	75	85	-	degree	Note 1
	θ_R	$\Phi=0^\circ$ (3 o'clock)	75	85	-		
	θ_T	$\Phi=90^\circ$ (12 o'clock)	75	85	-		
	θ_B	$\Phi=270^\circ$ (6 o'clock)	75	85	-		
Response time	T_{ON}	Normal $\theta=\Phi=0^\circ$	-	10	20	msec	Note 3
	T_{OFF}		-	15	30	msec	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		0.28	0.33	0.38	-	
Luminance	L		440	550	-	cd/m ²	Note 6
Luminance uniformity	Y_U		75	80	-	%	Note 7

Test Conditions:

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

Note 1: Definition of viewing angle range

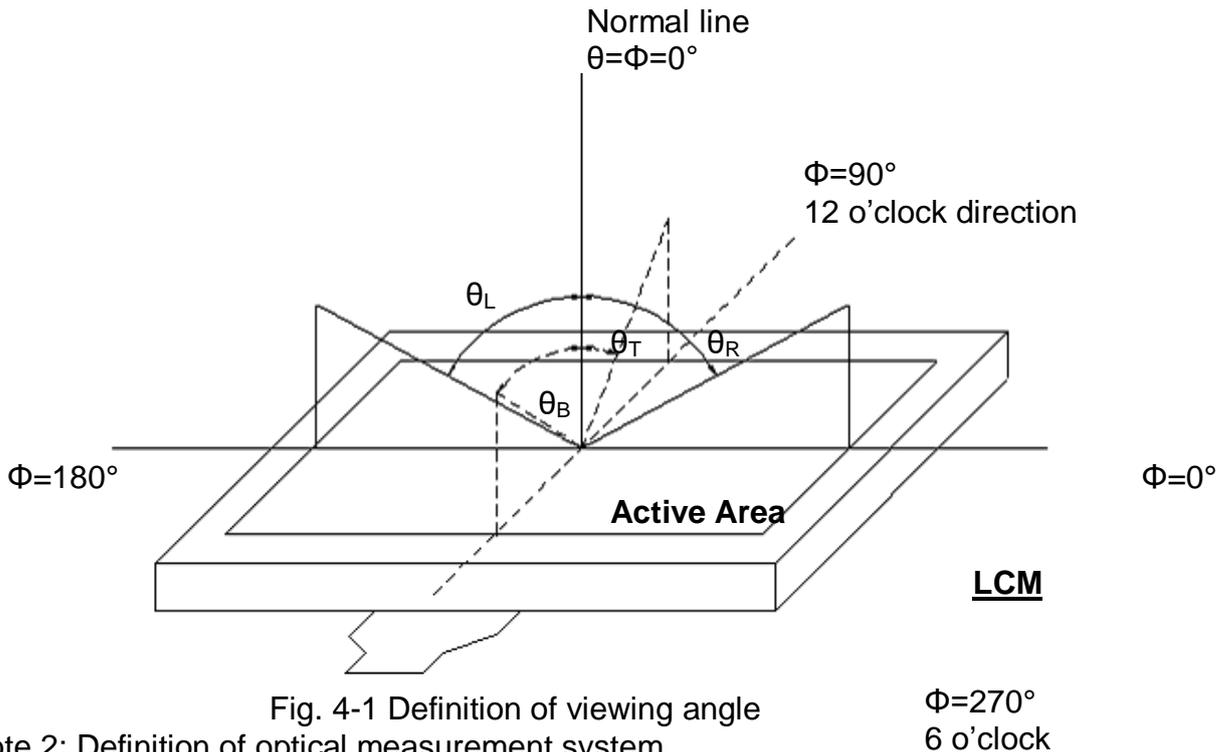


Fig. 4-1 Definition of viewing angle

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. (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.)

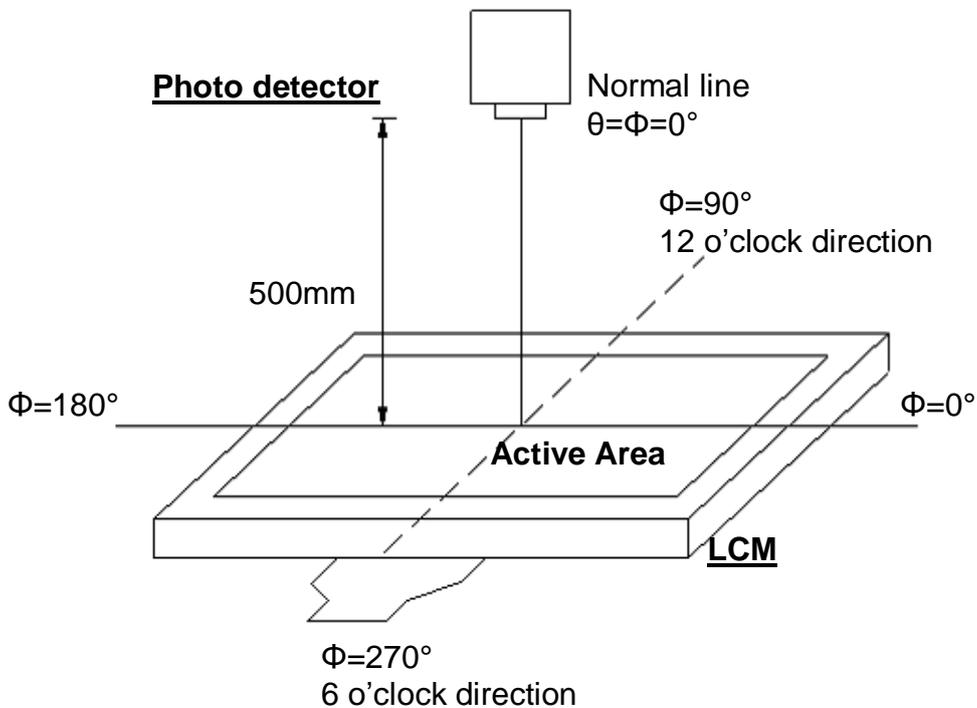


Fig. 4-2 Optical measurement system setup

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%.

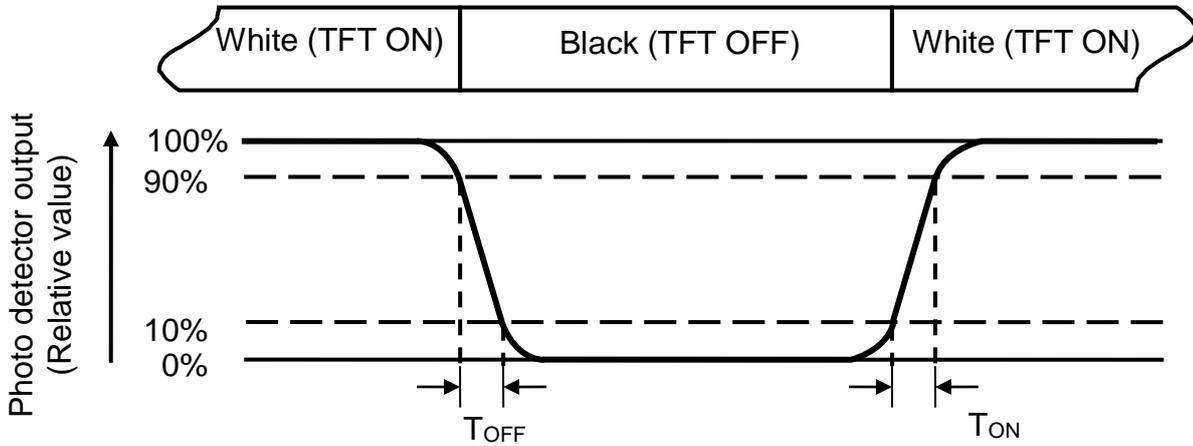


Fig. 4-3 Definition of response time

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 $I_L=200\text{mA}$.

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.

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

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

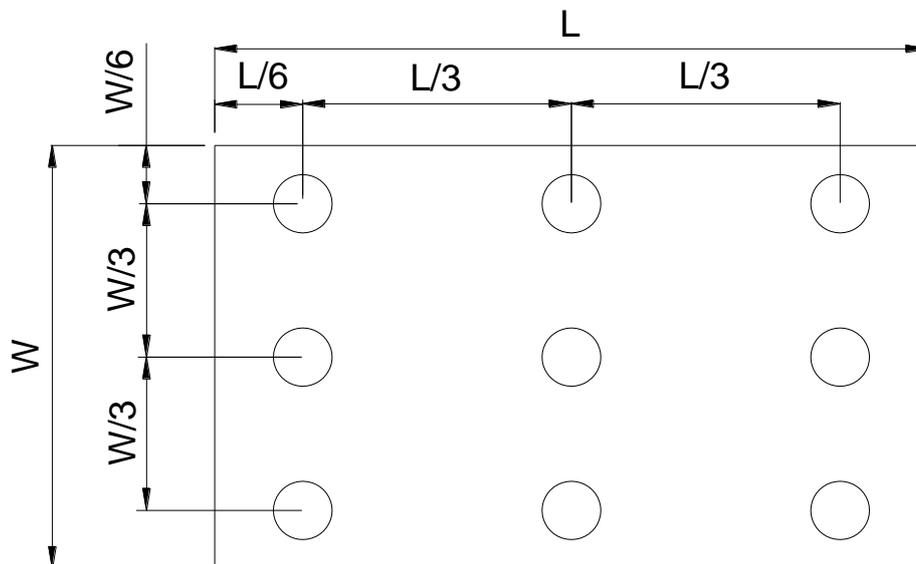


Fig. 4-4 Definition of measuring points

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

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

6. General Precautions

6.4. 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.

6.5. 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.

6.6. 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.

6.7. Storage

1. Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ 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.

6.8. Cleaning

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

7. Mechanical Drawing

