INNOLUX
群創光電

PRODUCT SPECIFICATION

Doc. Number:

□Tentative Specification

□ Preliminary Specification

■Approval Specification

MODEL NO.: NJ080IA
SUFFIX: 10D

Customer:

APPROVED BY **SIGNATURE**

Name / Title

Only for reference

Please return 1 copy for your confirmation with your signature and comments.

Approved By	Checked By	Prepared By

Record of Revision

Version	Revise Date	Page	Content
Pre-Spec.01	2016/06/01	All	Initial Release
Final-Spec.01	2016/08/30	Page8	Absolute Maximum Ratings—Note2 & Note3
Final-Spec.02	2016/11/09	Page4	Panel power consumption
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Contents

1. Purpose

The specification NJ080IA-10D is a 8 ”(1024x600) TFT Liquid Crystal Display module with LED Backlight unit , 40 pin LVDS interface, normally black transmissive display mode.

1.1 General Specifications

No.	Item	Specification	Remark
1	LCD size	8.0 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1024 × 3(RGB) × 600	
4	Display mode	Normally Black, Transmissive	
5	Dot pitch	0.1725(W) × 0.1656(H) mm	
6	Active area	176.64(W) × 99.36(H) mm	
7	Module size	192.8(W) × 116.9(H) ×6.4(D) mm	Note 1
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	LVDS	
11	View direction(Gray Inversion)	Free	
12	Panel power consumption	634mW(Typ.)	
13	Weight	184g(Typ.)	
14	IC	ILI5120 & ILI6150M5	
15	Inversion	1+2dot	

Note 1: Refer to Mechanical Drawing.

2. Pin Assignment

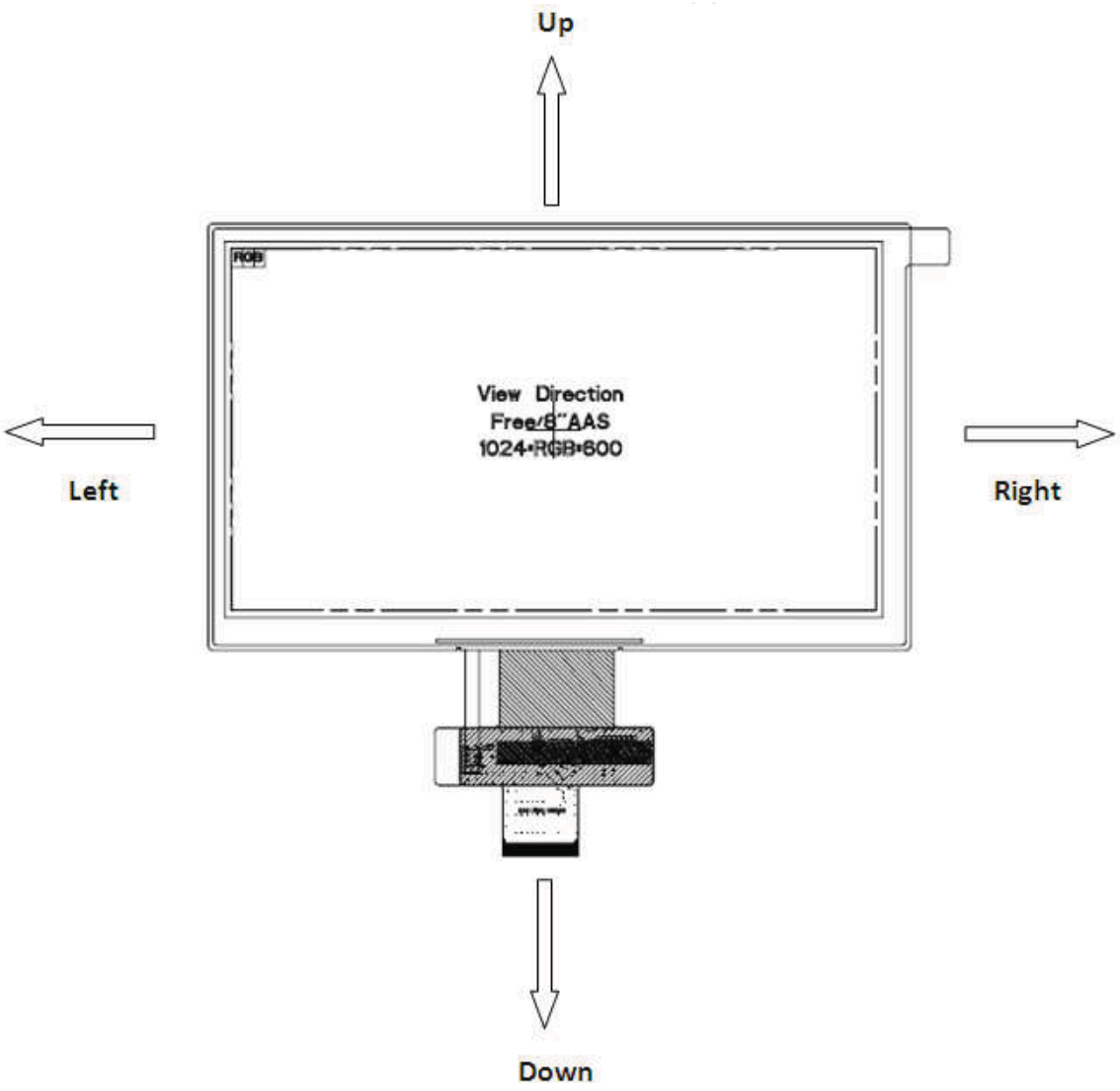
FPC Connector is used for the module electronics interface. The recommended model is FH12A-40S-0.5SH manufactured by Hirose.

Pin No.	Symbol	I/O	Function	Remark
1	NC	---	No connection	Note4
2	VDD	P	Power Voltage for digital circuit	
3	VDD	P	Power Voltage for digital circuit	
4	NC	---	No connection	Note4
5	Reset	I	Global reset pin	
6	STBYB	I	Standby mode, Normally pulled high STBYB = “1”, normal operation STBYB = “0”, timing controller, source driver will turn off, all output are High-Z	
7	GND	P	Ground	
8	RXIN0-	I	- LVDS differential data input	
9	RXIN0+	I	+ LVDS differential data input	
10	GND	P	Ground	
11	RXIN1-	I	- LVDS differential data input	
12	RXIN1+	I	+ LVDS differential data input	
13	GND	P	Ground	
14	RXIN2-	I	- LVDS differential data input	
15	RXIN2+	I	+ LVDS differential data input	
16	GND	P	Ground	
17	RXCLKIN-	I	- LVDS differential clock input	
18	RXCLKIN+	I	+ LVDS differential clock input	
19	GND	P	Ground	
20	RXIN3-	I	- LVDS differential data input	
21	RXIN3+	I	+ LVDS differential data input	
22	GND	P	Ground	
23	NC	-	No connection	Note4
24	NC	-	No connection	Note4

25	GND	P	Ground	
26	NC	---	No connection	Note4
27	DIMO	O	Backlight CABC controller signal output	Note3
28	SELB	I	6bit/8bit mode select	Note1
29	AVDD	P	Power for Analog Circuit	
30	GND	P	Ground	
31	LED-	P	LED Cathode	
32	LED-	P	LED Cathode	
33	L/R	I	Horizontal inversion	Note2
34	U/D	I	Vertical inversion	Note2
35	VGL	P	Gate OFF Voltage	
36	CABCEN1	I	CABC H/W enable	Note3
37	CABCEN0	I	CABC H/W enable	Note3
38	VGH	P	Gate ON Voltage	
39	LED+	P	LED Anode	
40	LED+	P	LED Anode	

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 L/R="0", set right to left scan direction.
When L/R="1", set left to right scan direction.
When U/D="0", set up to down scan direction.
When U/D="1", set down to up scan direction.
Note3: When CABC_EN[1:0]="00", CABC OFF(Default)
When CABC_EN[1:0]="01", user interface image.
When CABC_EN[1:0]="10", still picture.
When CABC_EN[1:0]="11", moving image.
If CABC no using, DIMO must be NC, Else DIMO is controlled by CABC.
Note4: NC pin must be floated.

Note5: Definition of scanning direction.
Refer to the figure as below:



3. Operation Specifications

3.1. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	DV_{DD}	-0.3	5.0	V	
	AV_{DD}	6.5	13.5	V	
	V_{GH}	-0.3	42	V	
	V_{GL}	-20.0	0.3	V	
	V_{GH}-V_{GL}	-	40	V	
Operation Temperature (LCD panel surface overall)	T_{OP}	-20	70	℃	Note 2 Note 3
Storage Temperature	T_{ST}	-30	80	℃	Note 2 Note 3

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.

Note 2: If users use the product out of the environmental operation range（temperature and humidity）, it will have visual quality concerns.

Note 3: If the product were used out of the operation and storage range, it will have quality issue.

3.1.1. Typical Operation Conditions

(Note 1)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	DV_{DD}	3.0	3.3	3.6	V	Note 2
	AV_{DD}	12.9	13	13.1	V	
	V_{GH}	23.5	24.0	24.5	V	
	V_{GL}	-6.1	-5.6	-5.1	V	
Input logic high voltage	V_{IH}	$0.7DV_{DD}$	$0.9\ DV_{DD}$	DV_{DD}	V	Note 3
Input logic low voltage	V_{IL}	0	$0.1DV_{DD}$	$0.3DV_{DD}$	V	

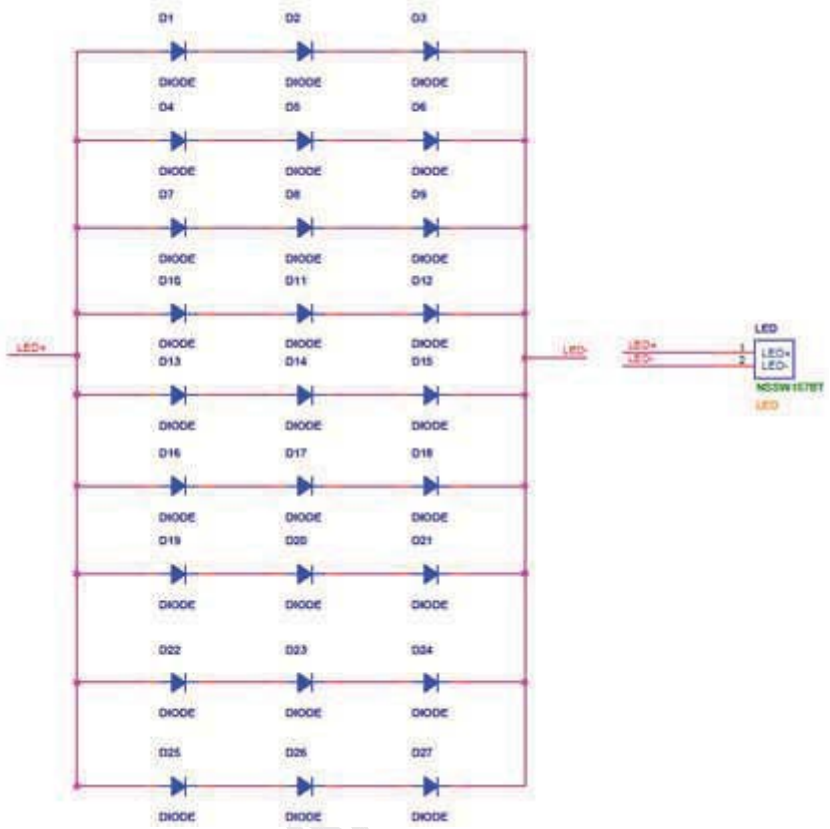
Note 1: Be sure to apply DV_{DD} and V_{GL} to the LCD first, and then apply V_{GH}.
Note 2: DV_{DD} setting should match the signals output voltage (refer to Note 3) of customer's system board.
Note 3: RESET,STBYB,SELB,L/R,U/D,CABCEN0,CABCEN1.

3.1.2. Current Consumption

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I_{GH}	0.07	0.30	1.0	mA	-
	I_{GL}	0.08	0.31	1.0	mA	-
	IDV_{DD}	6	24	40	mA	-
	IAV_{DD}	10.5	42	70	mA	-

3.1.3. Backlight Driving Conditions

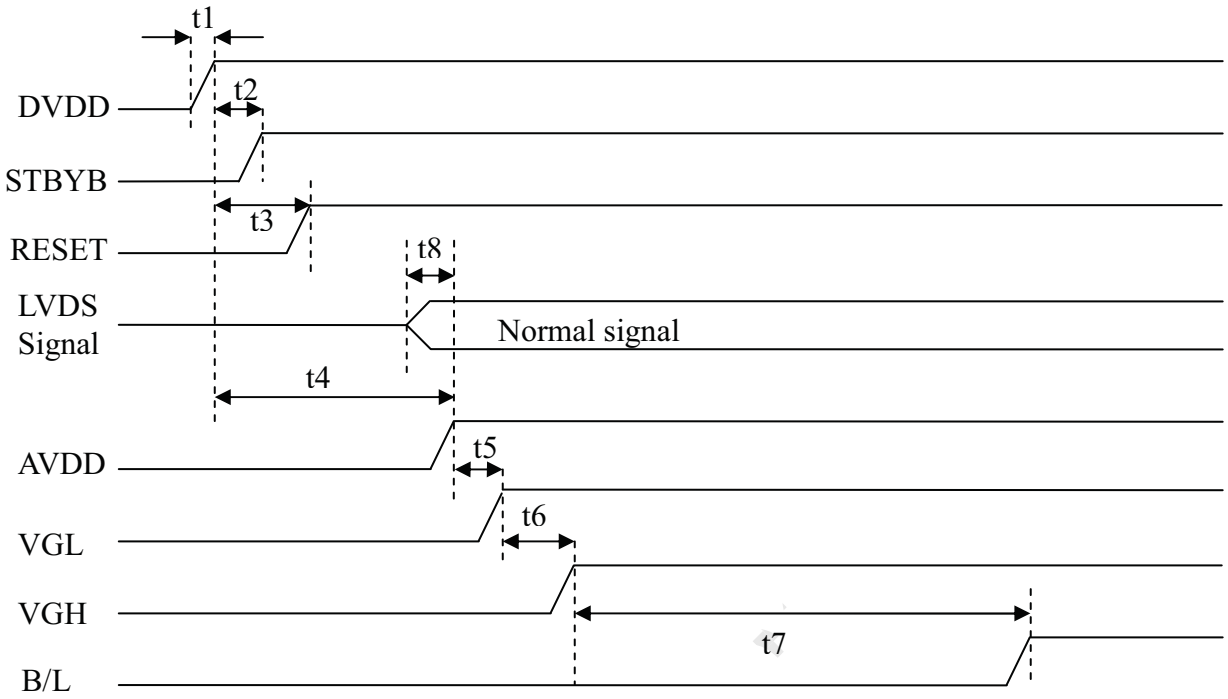
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V_L	8.4	9.3	10.2	V	Note 1
Current for LED backlight	I_L	-	540	585	mA	
LED life time		(20000)			Hr	Note 2



Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and I_L=((TBD))
Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and I_L=((TBD)). The LED lifetime could be decreased if operating I_L is larger than ((TBD)).

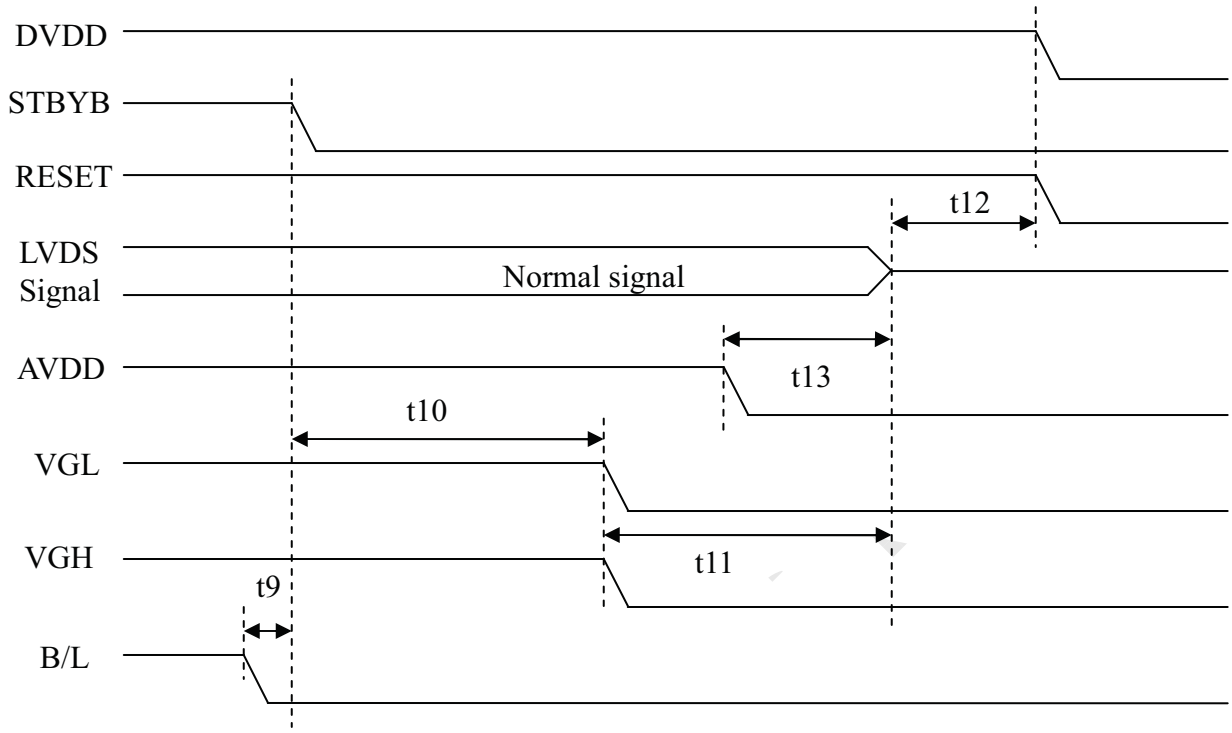
3.2. Power Sequence

a. Power on:



Symbol	SPEC			Unit
	Min.	Typ.	Max.	
t1	1	10	20	ms
t2	20	35	50	us
t3	0.5	1	16	ms
t4	16	50	100	ms
t5	20	70	120	us
t6	40	90	140	ms
t7	150	170	200	ms
t8	0.1	1	16	ms

b. Power off:

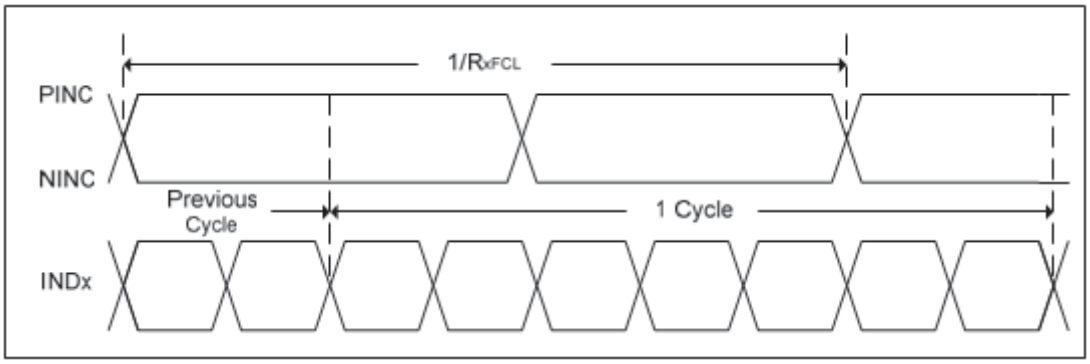


Symbol	SPEC			Unit
	Min.	Typ.	Max.	
t9	0.1	1	10	ms
t10	100	120	200	ms
t11	50	100	200	ms
t12	0.1	10	100	ms
t13	1	10	20	ms

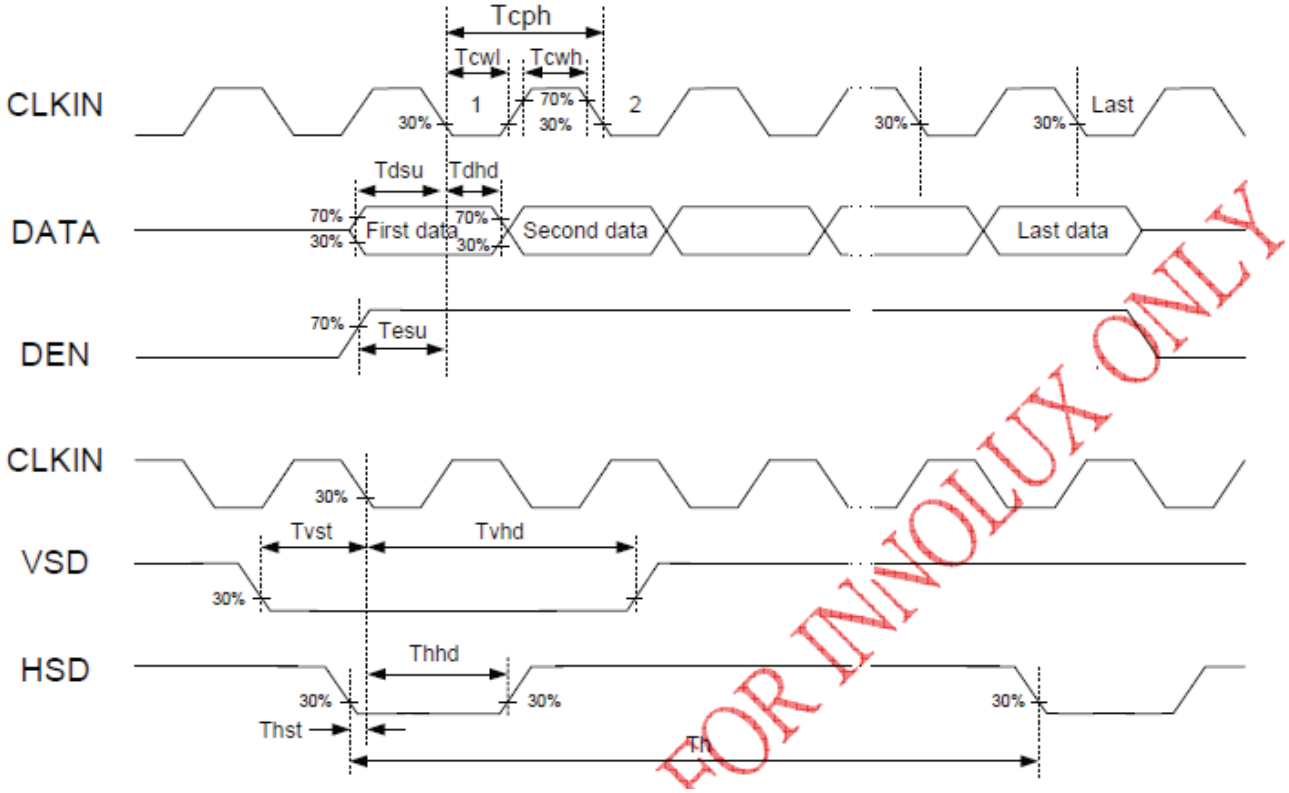
3.3. Timing Characteristics

3.3.1. AC Electrical Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit	Conditions
Clock frequency	RxFCLK	26.2	51.2	71	MHz	
Input data skew margin	TRSKM	500	500	1/(2x RxFCLK)	ps	|VID|=400mv RxVCM=1.2V RxFCLK=71MHz VDD_LVDS=3.3V
Clock high time	TLVCH	4/(7x RxFCLK)			ns	
Clock low time	TLVCL	3/(7xRxFCLK)			ns	
VSD setup time	TenPLL	0<TenPLL<150			us	

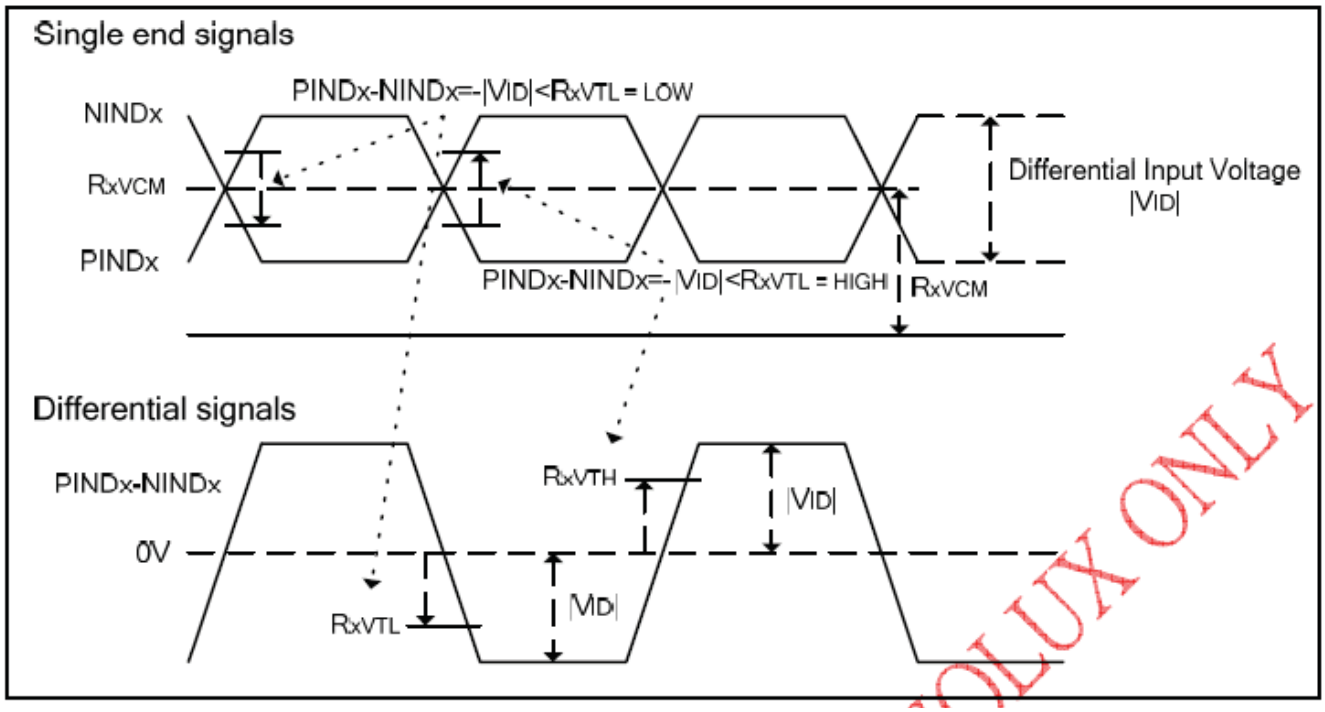


3.3.2. Input Clock and Data Timing Diagram



3.3.3. DC Electrical Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit	Conditions
Differential input high threshold voltage	RxVTH	0.1	0.2	|VID|	V	RxVCM=1.2V
Differential input low threshold voltage	RxVTL	-|VID|	-0.2	-0.1	V	
Input voltage range (singled-end)	RxVIN	0	1.2±0.4	2.4	V	
Differential input common mode voltage	RxVCM	|VID|/2	1.2	2.1-|VID|/2	V	
Differential input voltage	|VID|	0.2	0.4	0.6	V	
Differential input leakage current	RVxliz	-10	0	+10	uA	
LVDS Digital Operating Current	Iddlvds	8	22	30	mA	Fclk=65MHz,VDD=3.3V
LVDS Digital Standby Current	Istlvds	0	200	300	uA	Clock & all Functions are stopped



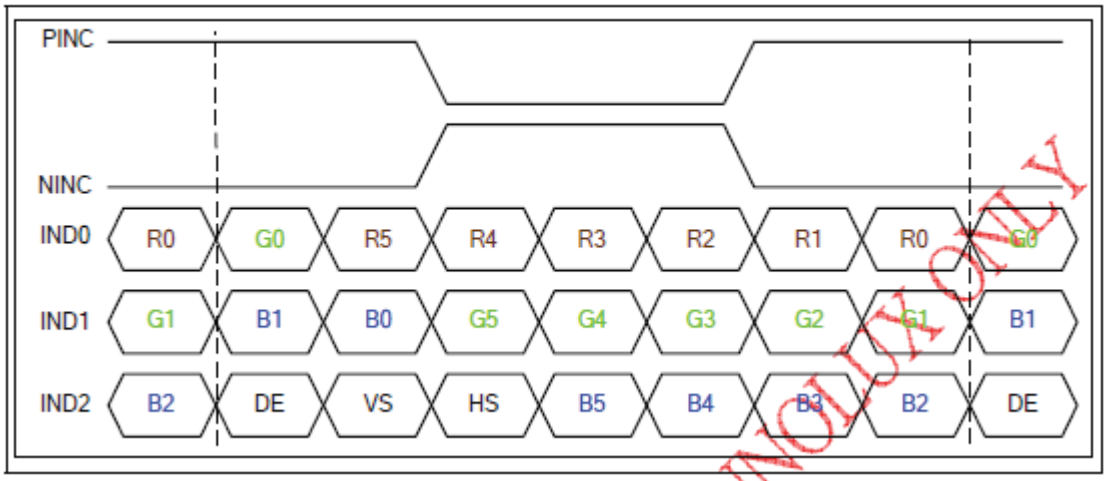
3.3.4. Timing

Parameter	Symbol	Value			Unit
		Min	Typ.	Max	
DCLK frequency Frame rate = 60Hz	fclk	42.6	51.2	67.2	MHz
Horizontal display area	thd		1024		DCLK
HSYNC period time	th	1164	1344	1400	DCLK
HSYNC blanking	thb+thfp	140	320	376	DCLK
Vertical display area	tvd		600		H
VSYNC period time	tv	610	635	800	H
VSYNC blanking	tvb+tvfp	10	35	200	H

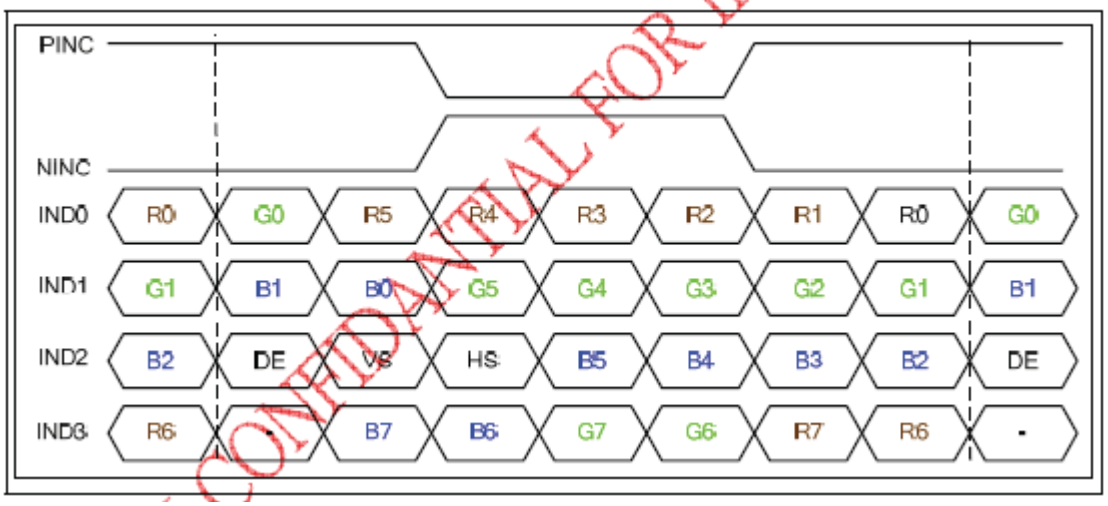
Note：Frame rate is 60Hz.

3.3.5. Data Input Format

6bit LVDS input



8bit LVDS input



Note: Support DE mode only, SYNC mode not support.

4. Optical Specifications

Note ：Base on INNOLUX LCM

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10) B/L ON	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	$T_{ON}+T_{OFF}$	Normal θ=Φ=0°	-	25	50	msec	Note 2 Note 3
Contrast ratio	CR		600	1000	-	-	Note 4 Note 6
Color chromaticity	W_X		0.27	0.31	0.35	-	Note 2 Note 5 Note 6 Note 7
	W_Y		0.29	0.33	0.37	-	
Luminance	L		400	500	-	cd/m²	Note 2 Note 6 Note 7
Luminance uniformity	Y_U		70	75		%	Note 2 Note 8
NTSC			65	70		%	Note 2 Note 5 Note 6 Note 7

Test Conditions:

1. DV_{DD}=3.3V, the ambient temperature is 25℃.
2. The test systems refer to Note 2.

Note 1: Definition of viewing angle range

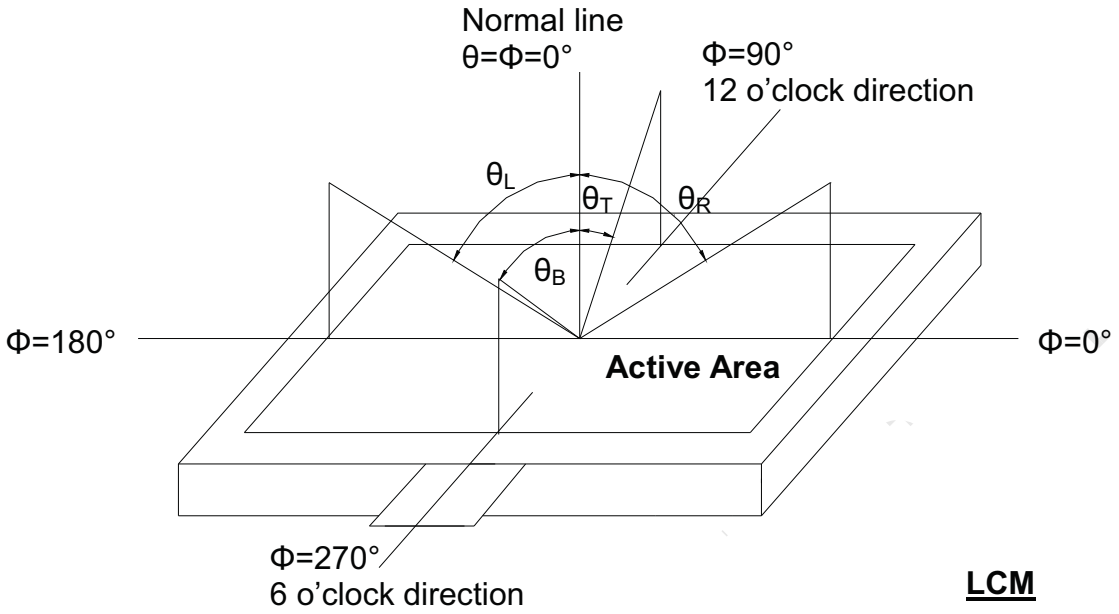


Fig. 4-1 Definition of viewing angle

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 bySR3-AR/ Field of view: 1°/Height: 500mm .)

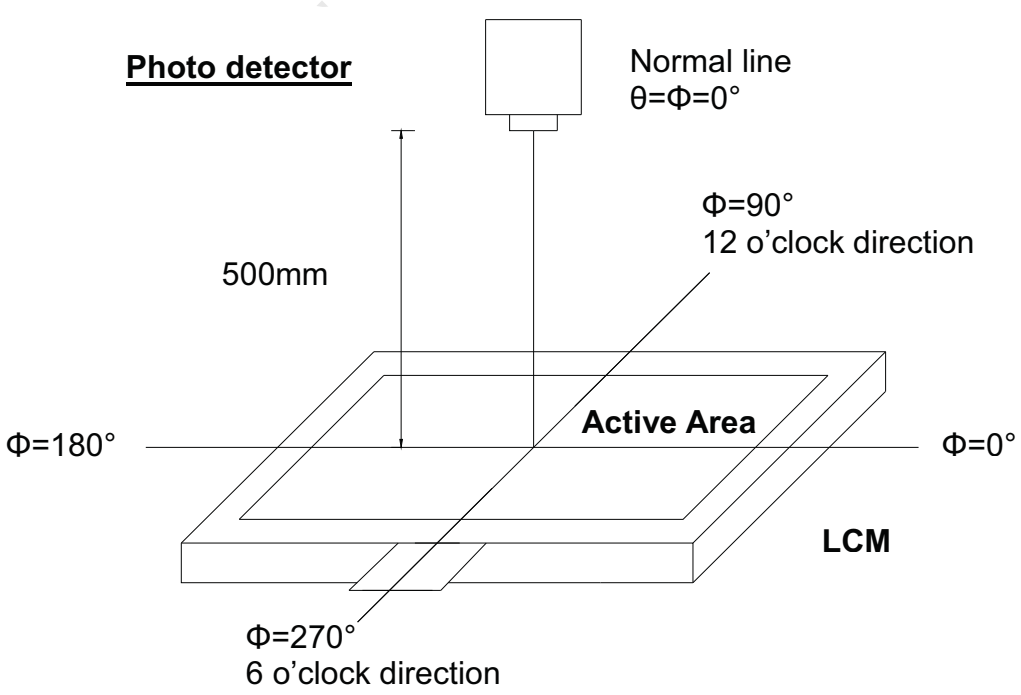


Fig. 4-2 Optical measurement system setup

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%.

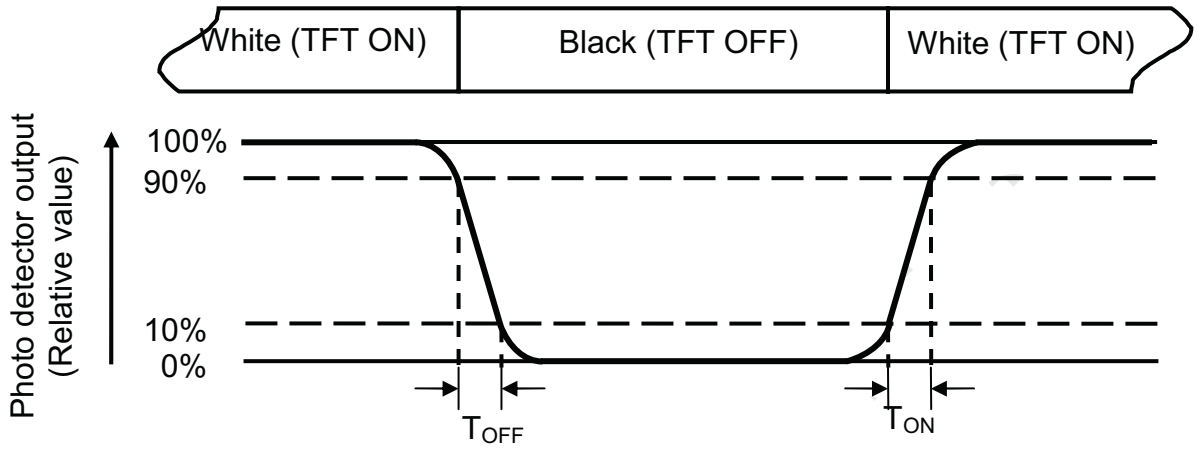


Fig. 4-3 Definition of response time

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.

Note 7: Base on backlight structure of LCM is 3014C-W3M6 sa626&627
BS530+KL77-215+SH26-155+LGP(T=2mm） E6SR-188

Note 8: 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.

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

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

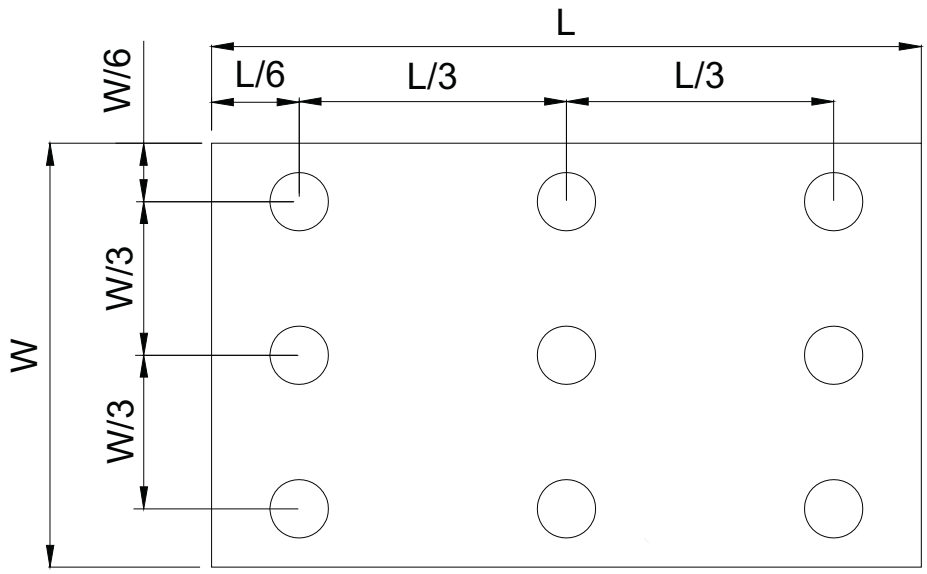


Fig. 4-4 Definition of measuring points

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	Ta = 80℃ 240hrs	Note 1，Note3，Note 4 ,Note5
Low Temperature Storage	Ta = -30℃ 240hrs	Note 1，Note3，Note 4
High Temperature Operation	Ts = 70℃ 240hrs	Note 2，Note3，Note 4 , Note5
Low Temperature Operation	Ta = -20℃ 240hrs	Note 1，Note3，Note 4
Operate at High Temperature and Humidity	+60℃, 90%RH 240hrs	Note3，Note 4 Note5
Thermal Shock	-30℃/30 min ~ +80℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	Note3，Note 4 Note5
Vibration Test	Frequency: 10 ~55~10Hz; Sweep Mode: Log SweepSweep time: 1Oct/min;Acceleration: 0.5G; Test time:2hrs for each direction of X, Y, Z.	
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	
Package Vibration Test	1.47Grms X, Y, Z three axis (30min /axis) [Spectrum：5Hz(0.015G2/Hz)，100Hz(0.015G2/Hz)，200Hz(0.0037G2/Hz)]	
Package Drop Test	Height: 0kg≦W<10kg：76cm, 10kg≦W<19kg：61cm, 19kg≦W <28kg：46cm, 28kg≦W<45kg：31cm, 45kg≦W≦68kg：20cm 1 corner, 3 edges, 6 surfaces	
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.

Note 5: A certain level of Mura (non-uniformity) of dark / black image will happen several days after high temperature testing (H.T.T.). There is a slowly part recovery over a long time (several months). Such a long exposure time like in H.T.T. will normally not happen in a real application. Therefore the test H.T.T. was introduced to simulate cycles with normal conditions in-between but with the same total exposure time what show a significant reduced Mura.
The root cause is related to tension generated due to different amount of shrinking in the stack of layers in the polarizer sheet. The effect is more significant on larger displays like this size. An investigation into alternative polarizer material showed that there is no better alternative currently available.

6. General Precautions

6.1. Safety

1.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.
2.The temperature for using is no more than this product SPEC, otherwise, only promise the function is OK, but the quality may be changed.

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.

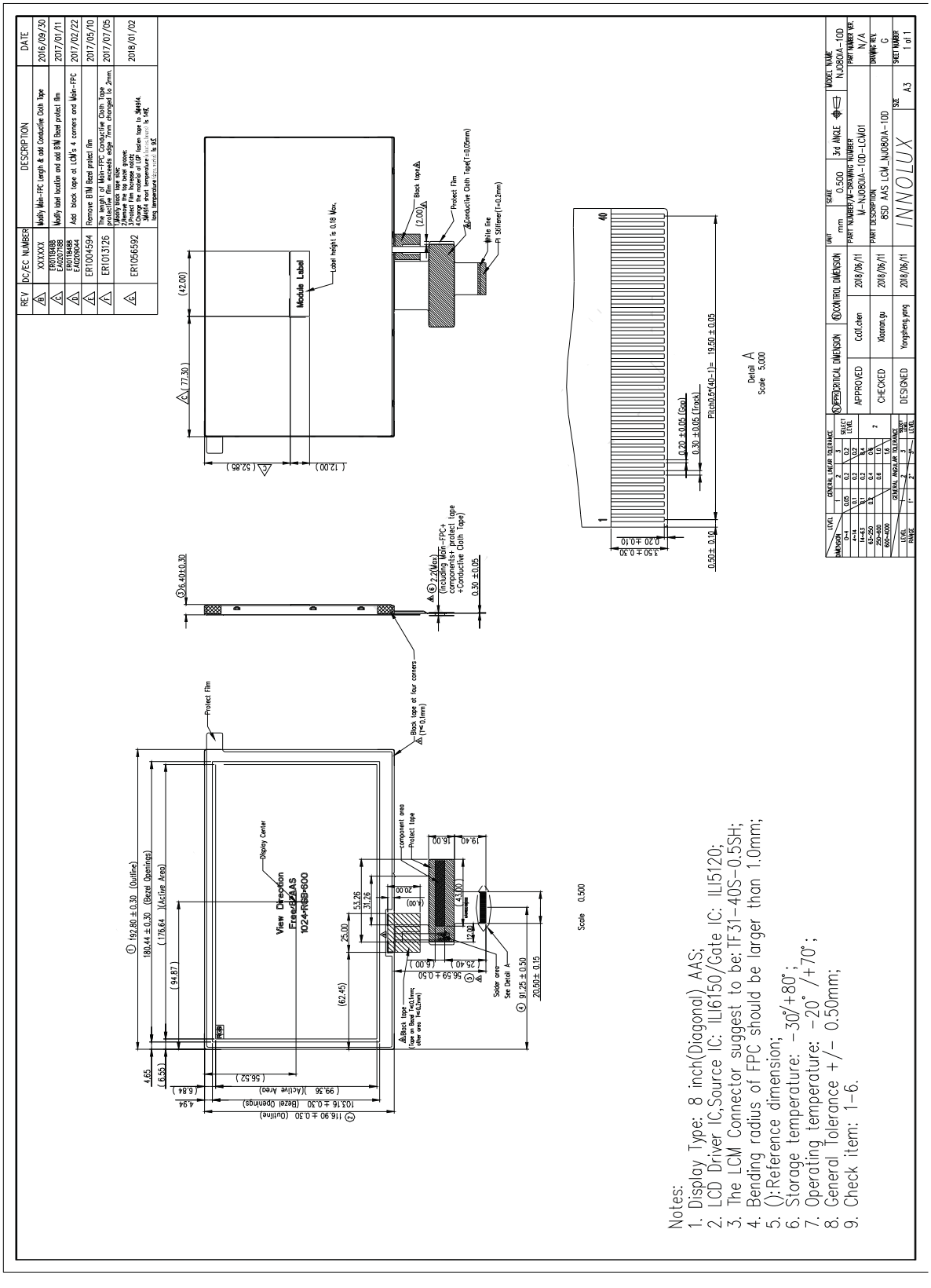
6.4. Storage

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（PCS）	Remark
1	LCM Module	NJ080IA-10D	192.8×116.9 ×6.4	0.184	30pcs	
2	Partition	BC Corrugated paper	512 × 349 × 230	1.184	1set	
3	Cushion	EPE	251.2x178.6x45.5	0.155	4pcs	
4	AL Bag	LLDPE/ AL	213.0 ×182.0 × 0.2	0.0088	30pcs	
5	Carton	Corrugated paper	530 × 355 × 255	0.95	1pcs	
6	Total weight	8.54kg ±5%Kg				

8.2. Packaging Quantity

Total LCM quantity in Carton: no. of Partition 2 Rows × quantity per Row 15 = 30

8.3. Packaging Drawing