CHIMEI INNOLUX DISPLAY CORPORATION

LCD MODULE

SPECIFICATION

Customer: _____

Model Name: EJ090NA-01B

Date: 2011/03/30

Version: 01

■ 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
Pre-Spec.01	2011/03/30		Initial Release.

Contents

1. General Specifications

No.	Item	Specification	Remark
1	LCD size	9.0 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1280 × 3(RGB) × 800	
4	Display mode	Normally White, Transmissive	
5	Dot pitch	0.0505(W) × 0.1515(H) mm	
6	Active area	193.920(W) × 121.200(H) mm	
7	Module size	206.76 (W) ×135.06(H) ×3.6(D) mm	Note 1
8	Surface treatment	Hard Coating	
9	Color arrangement	RGB-stripe	
10	Interface	Digital	
11	View direction(Gray Inversion)	12 O'Clock	
12	Backlight power consumption	2.232W (Typ.)	
13	Panel power consumption	TBD	
14	Weight	TBD	

Note 1: Refer to Mechanical Drawing.

2. Pin Assignment

FPC Connector is used for the module electronics interface. The model is F82151-H1210PI manufactured by Vigorconn

Pin No.	Symbol	I/O	Function	Remark
1	VDD	P	Power supply input	
2	GND	P	Ground	
3	Reset	I	Reset	
4	SCL	I	Clock pin for I2C communication	
5	SDA	I/O	Data pin for I2C communication	
6	INT	O	Interrupt pin	
7	NC		Not connected	
8	NC		Not connected	
9	GND	P	Ground	
10	GND	P	Ground	
11	GND	P	Ground	
12	VCOM	P	Common Voltage	
13	VDD	P	Power Voltage for digital circuit	
14	VDD	P	Power Voltage for digital circuit	
15	NC	---	No connection	
16	Reset	I	Global reset pin	
17	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	
18	GND	P	Ground	
19	RXIN0-	I	- LVDS differential data input	
20	RXIN0+	I	+ LVDS differential data input	
21	GND	P	Ground	
22	RXIN1-	I	- LVDS differential data input	
23	RXIN1+	I	+ LVDS differential data input	
24	GND	P	Ground	
25	RXIN2-	I	- LVDS differential data input	

26	RXIN2+	I	+ LVDS differential data input	
27	GND	P	Ground	
28	RXCLKIN-	I	- LVDS differential clock input	Note1
29	RXCLKIN+	I	+ LVDS differential clock input	
30	GND	P	Ground	
31	RXIN3-	I	- LVDS differential data input	
32	RXIN3+	I	+ LVDS differential data input	
33	GND	P	Ground	Note3
34	NC	---	No connection	Note3
35	NC	---	No connection	
36	GND	P	Ground	Note2
37	NC	---	No connection	Note2
38	DIMO	O	Backlight CABC controller signal output	
39	SELB	I	6bit/8bit mode select	
40	AVDD	P	Power for Analog Circuit	
41	GND	P	Ground	
42	LED-	P	LED Cathode	
43	LED-	P	LED Cathode	
44	L/R	I	Horizontal inversion	
45	U/D	I	Vertical inversion	
46	VGL	P	Gate OFF Voltage	
47	CABCEN1	I	CABC H/W enable	
48	CABCEN0	I	CABC H/W enable	
49	VGH	P	Gate ON Voltage	
50	LED+	P	LED Anode	
51	LED+	P	LED Anode	

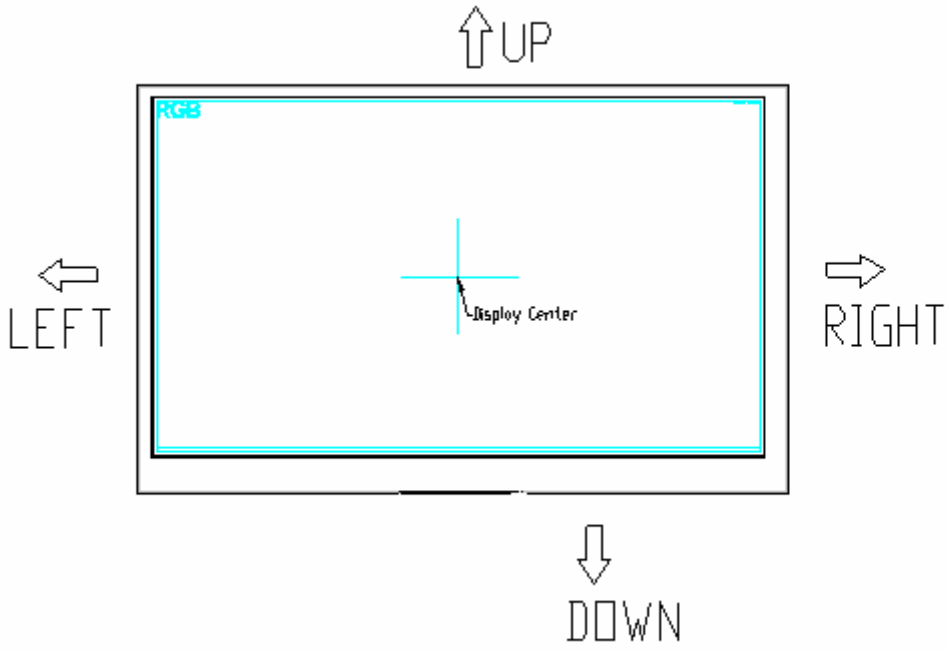
I: input, O: output, P: Power

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 CABC_EN=”00”, CABC OFF.
When CABC_EN=”01”, user interface image.
When CABC_EN=”10”, still picture.
When CABC_EN=”11”, moving image.
When CABC off, don’t connect DIMO, else connect it to backlight.

Note3: 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 top to bottom scan direction.
When U/D="1", set bottom to top scan direction.

Note: 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	15	V	
	V_{GH}	-0.3	42.0	V	
	V_{GL}	-20.0	0.3	V	
	V_{GH}-V_{GL}	-	40.0	V	
Operation Temperature	T_{OP}	-10	50	℃	
Storage Temperature	T_{ST}	-20	60	℃	
LED Reverse Voltage	V_R	-	-	V	Each LED
LED Forward Current	I_F	-	-	mA	Each LED

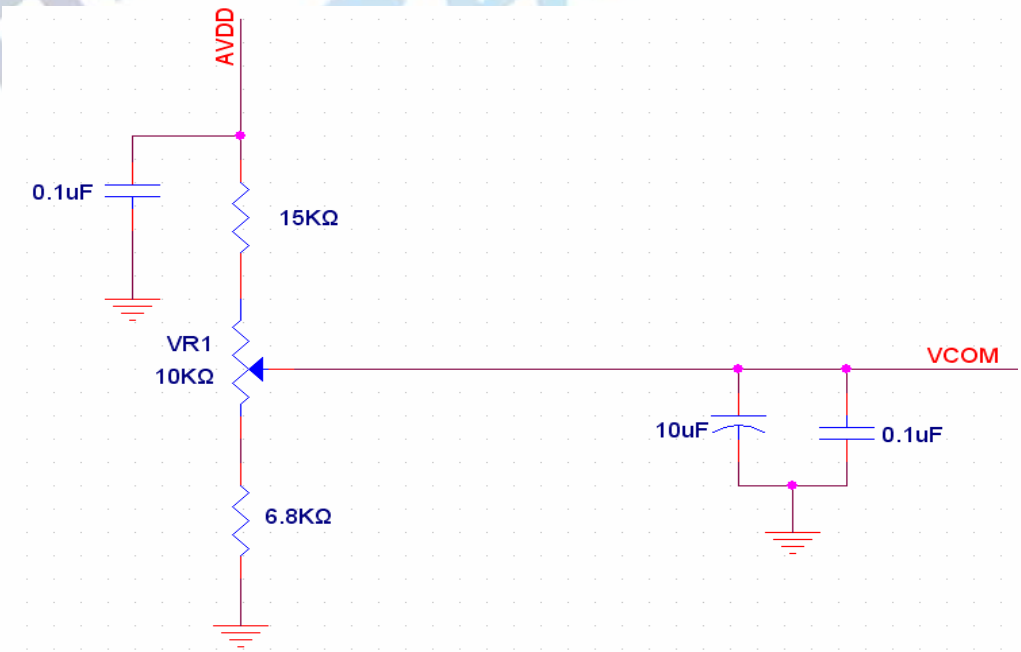
Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

3.1.1. Typical Operation Conditions

(Note 1)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	DV_{DD}	3.1	3.3	3.5	V	Note 2
	AV_{DD}	10.8	11	11.2	V	
	V_{GH}	19.7	20	20.3	V	
	V_{GL}	-6.5	-6.8	-7.1	V	
Input signal voltage	V_{COM}	3.4	3.5	3.6	V	Note 4
Input logic high voltage	V_{IH}	$0.8DV_{DD}$	-	DV_{DD}	V	Note 3
Input logic low voltage	V_{IL}	0	-	$0.2\ DV_{DD}$	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: LVDS, Reset.
Note 4: Typical V_{COM} is only a reference value, it must be optimized according to each LCM. Be sure to use VR.



3.1.2. Current Consumption

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I_{GH}	-	TBD	TBD	mA	V_{GH} =20V
	I_{GL}	-	TBD	TBD	mA	V_{GL} = -6.8V
	IDV_{DD}	-	TBD	TBD	mA	DV_{DD} =3.3V
	IAV_{DD}	-	TBD	TBD	mA	AV_{DD} =11V

3.1.3. Backlight Driving Conditions

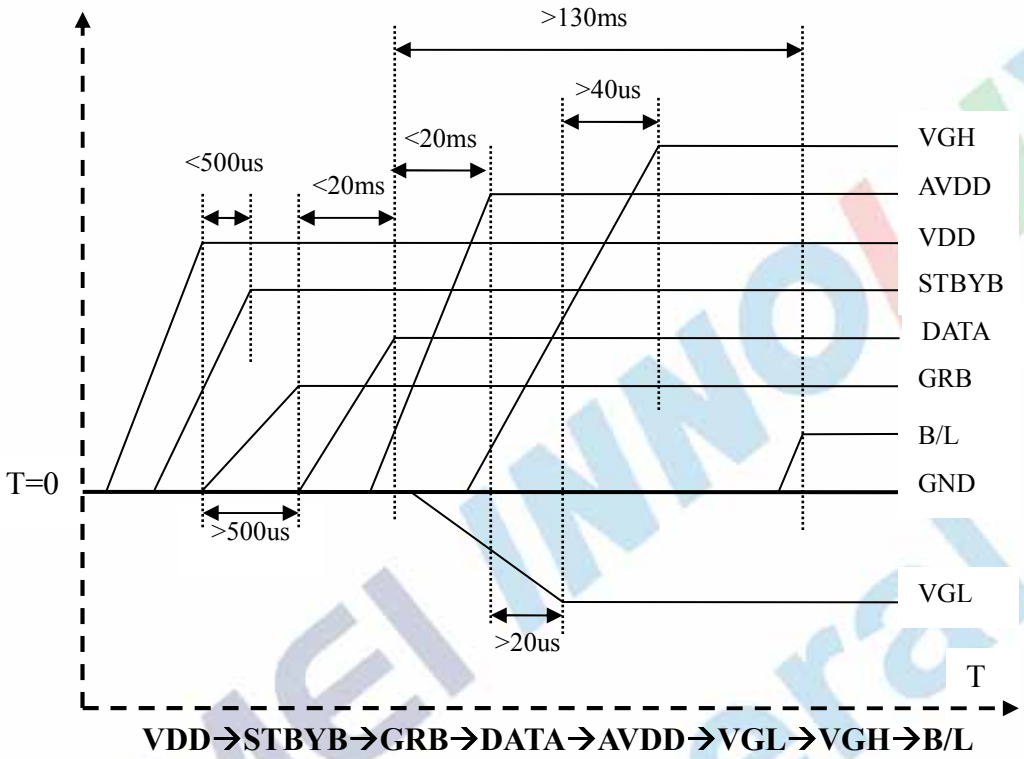
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V_L	--	9.3	10.2	V	Note 1
Current for LED backlight	I_L	--	240	-	mA	
LED life time	-	-	20,000	-	Hr	Note 2

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

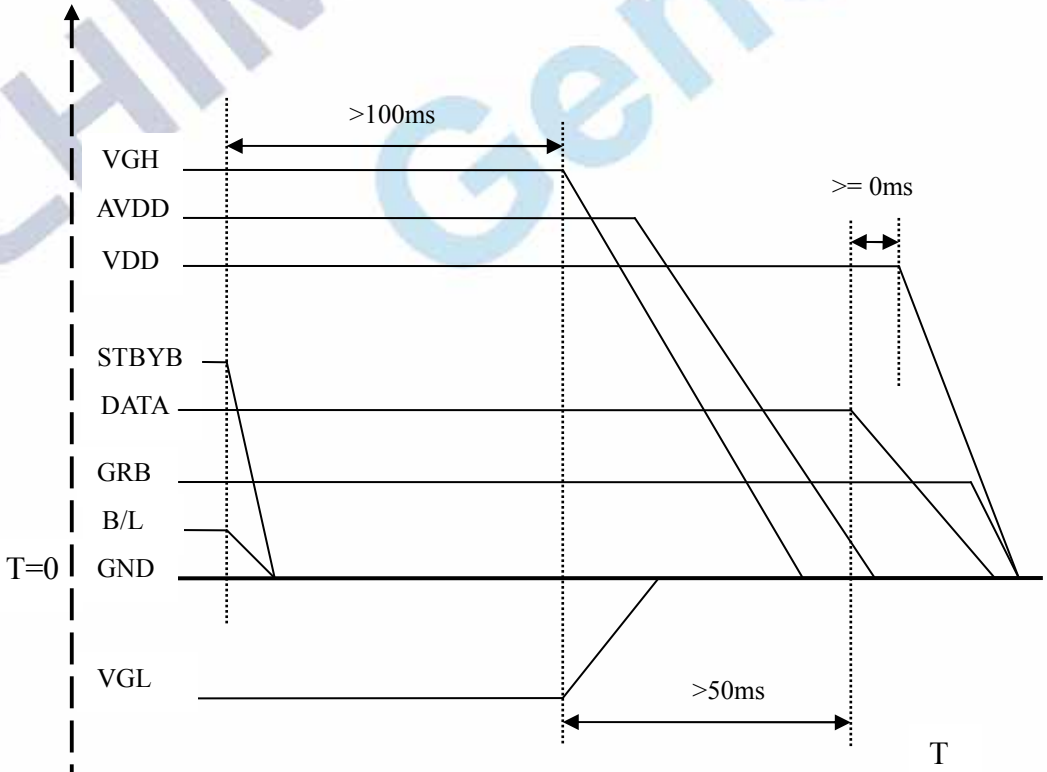
3.2. Power Sequence

a. Power on:



VDD→STBYB→GRB→DATA→AVDD→VGL→VGH→B/L

b. Power off:



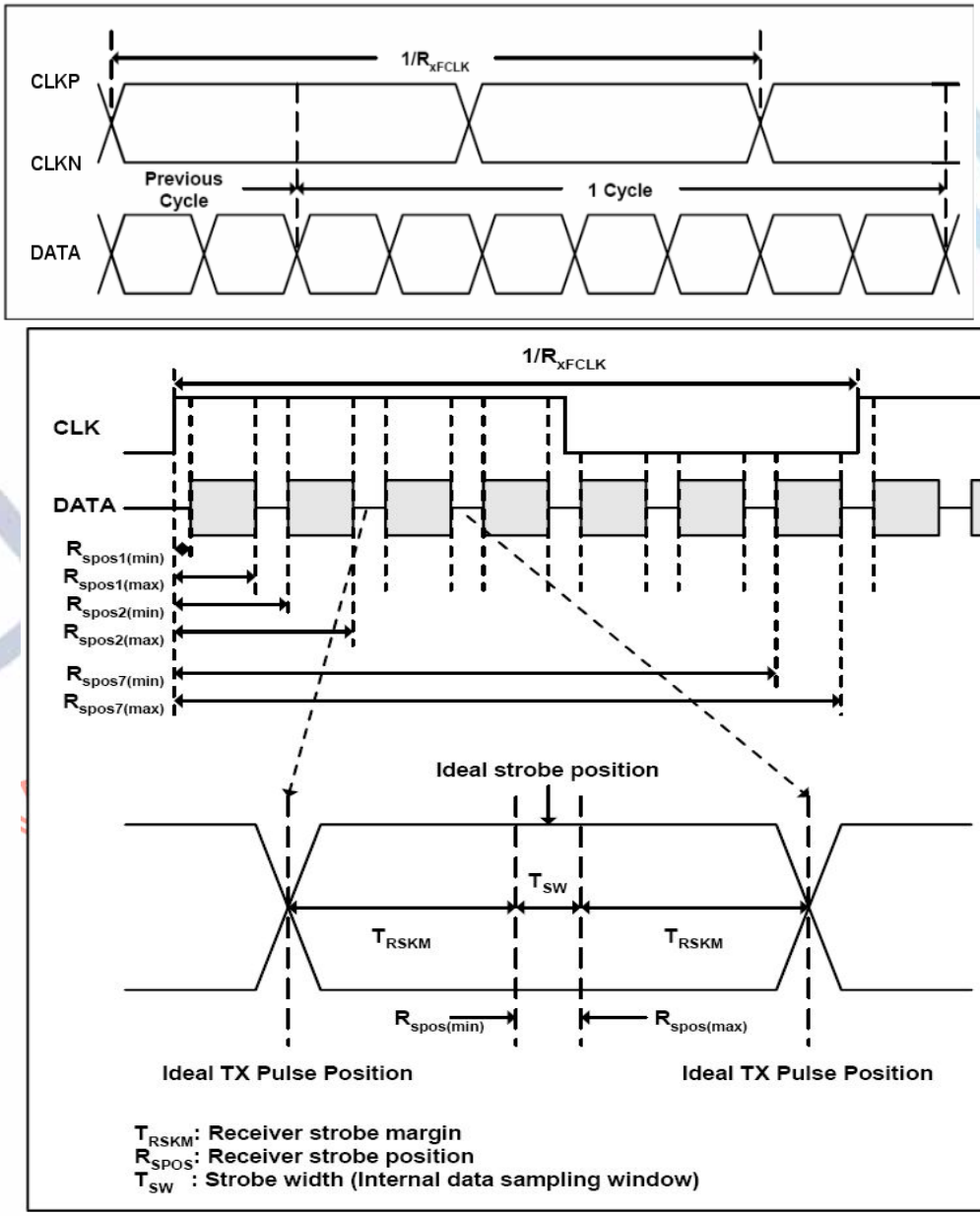
B/L→STBYB→VGL→VGH→AVDD→DATA→VDD

3.3. Timing Characteristics

3.3.1. AC Electrical Characteristics

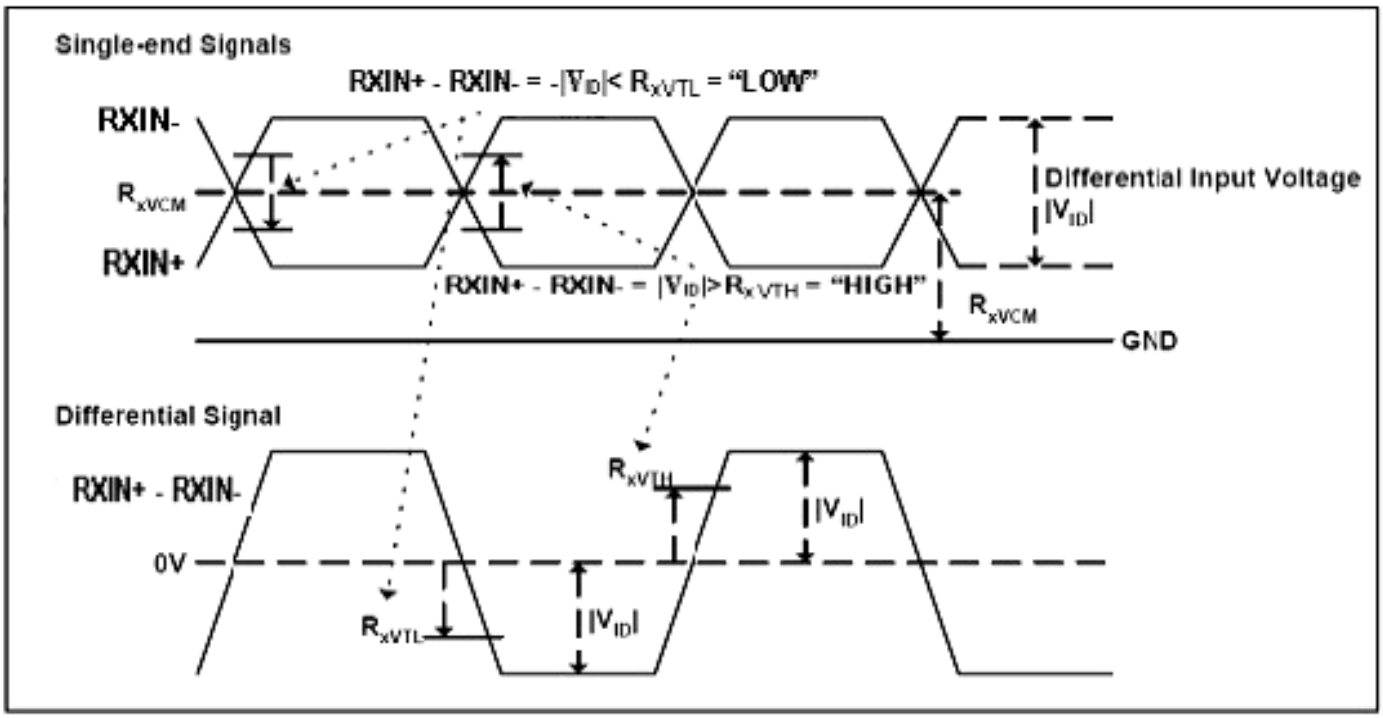
Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock frequency	R_{xFCLK}	20	-	81	MHz	
Input data skew margin	T_{RSKM}	500	-	-	ps	
Clock high time	T_{LVCH}	-	4/(7* R_{xFCLK})	-	ns	
Clock low time	T_{LVCL}	-	3/(7* R_{xFCLK})	-	ns	

3.3.2. Input Clock and Data Timing Diagram



3.3.3. DC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Differential input high Threshold voltage	R_{xVTH}	-	-	+0.1	V	R_{XVCM}=1.2V
Differential input low Threshold voltage	R_{xVTL}	-0.1	-	-	V	
Input voltage range (singled-end)	R_{xVIN}	0	-	2.4	V	
Differential input common mode voltage	R_{xVCM}	$\|V_{ID}\|/2$	-	$2.4-\|V_{ID}\|/2$	V	
Differential voltage	$\|V_{ID}\|$	0.2	-	0.6	V	
Differential input leakage current	RV_{xliz}	-10	-	+10	uA	

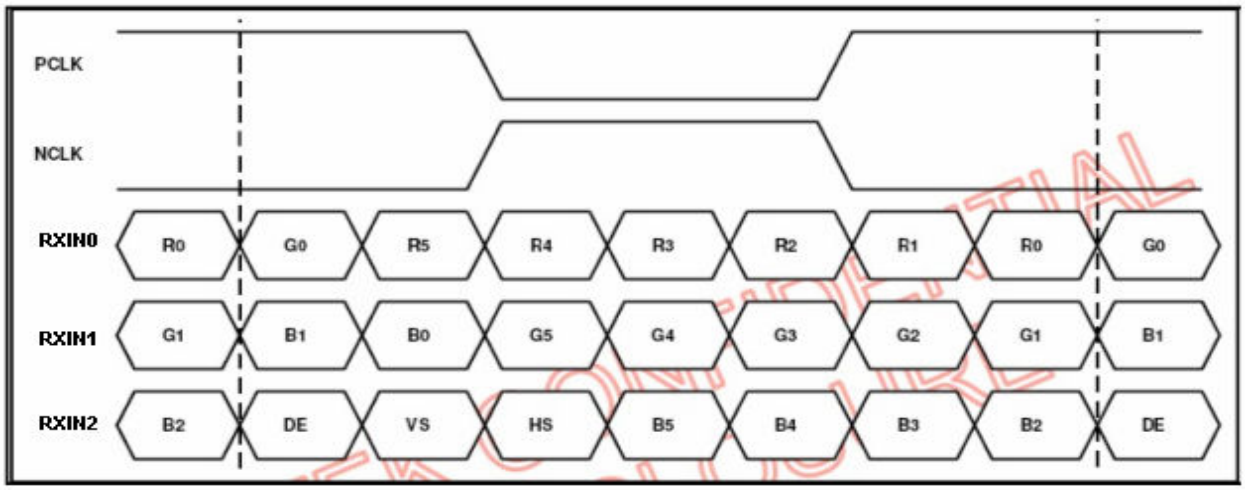


3.3.4. Timing

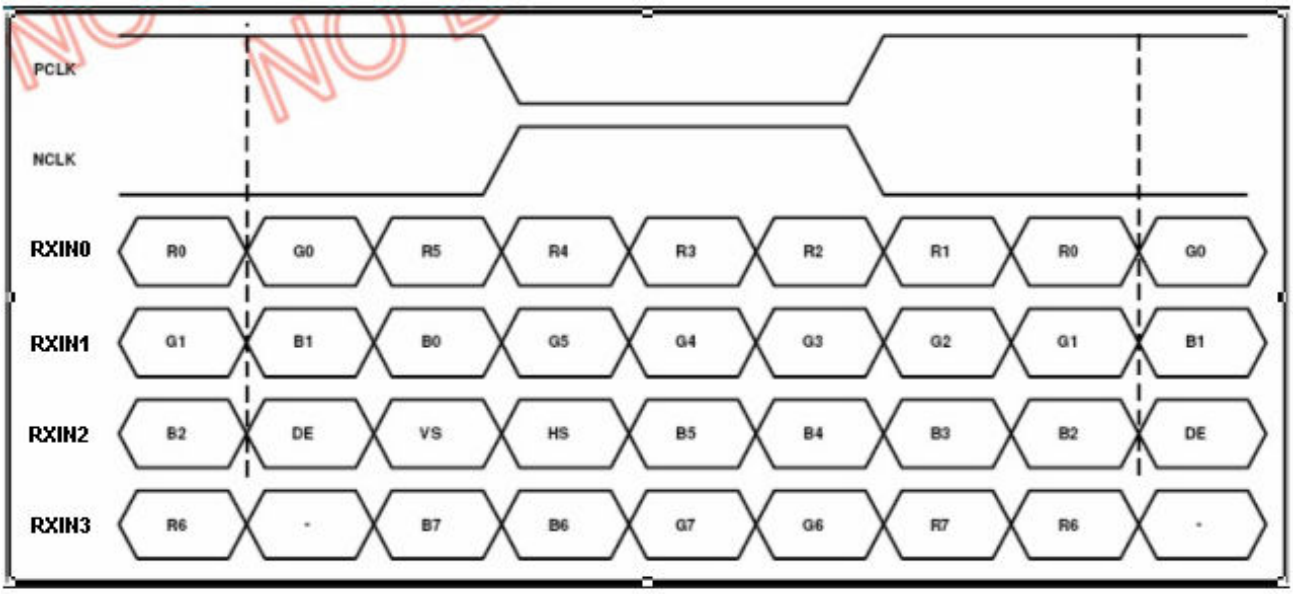
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	fclk	66.6	72.4	78.9	MHz	Frame rate =60Hz
Horizontal display area	thd		1280			
HS period time	th	1370	1440	1500	DCLK	
HS Blanking	thb	90	160	220	DCLK	
Vertical display area	tvd		800			
VS period time	tv	810	838	877	H	
VS Blanking	thb	10	38	77	H	

3.3.5. Data Input Format

6bit LVDS input



8bit LVDS input



Note: Support DE timing mode only, SYNC mode not supported.

4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	Φ=180°(9 o'clock)	60	70	-	degree	Note 1
	θ_R	Φ=0°(3 o'clock)	60	70	-		
	θ_T	Φ=90°(12 o'clock)	60	70	-		
	θ_B	Φ=270°(6 o'clock)	40	50	-		
Response time	T_{ON}	Normal θ=Φ=0°	-	10	20	msec	Note 3
	T_{OFF}		-	15	30	msec	Note 3
Contrast ratio	CR		500	700	-	-	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		200	250	-	cd/m²	Note 6
Luminance uniformity	Y_U		70	75	-	%	Note 7

Test Conditions:

1. DV_{DD}=3.3V, I_L=240mA (Backlight current), the ambient temperature is 25℃.
2. The test systems refer to Note 2.

Note 1: Definition of viewing angle range

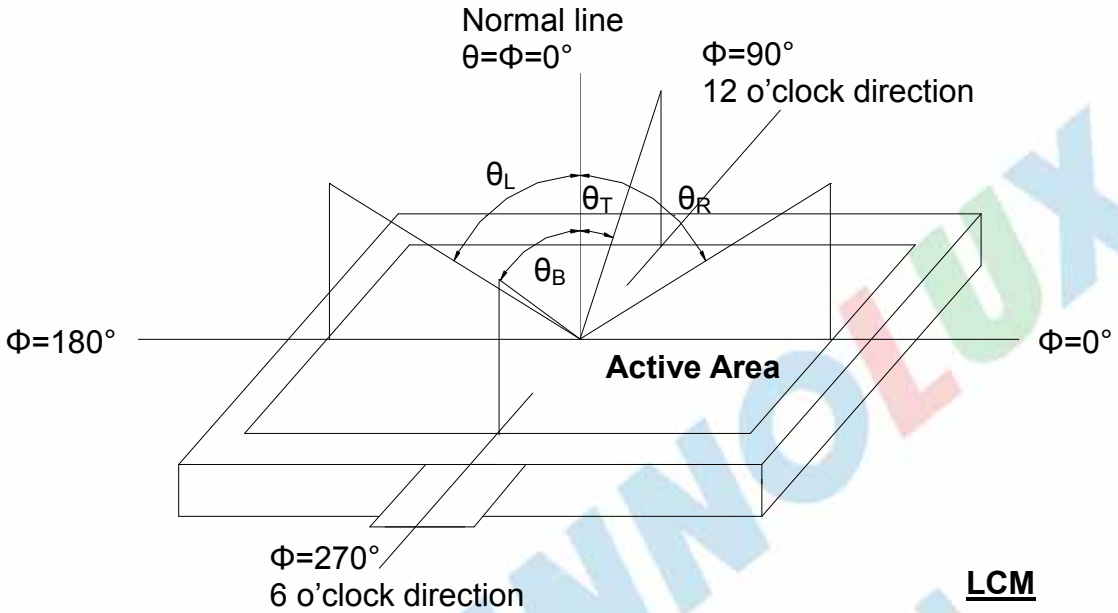


Fig. 4-1 Definition of viewing angle

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

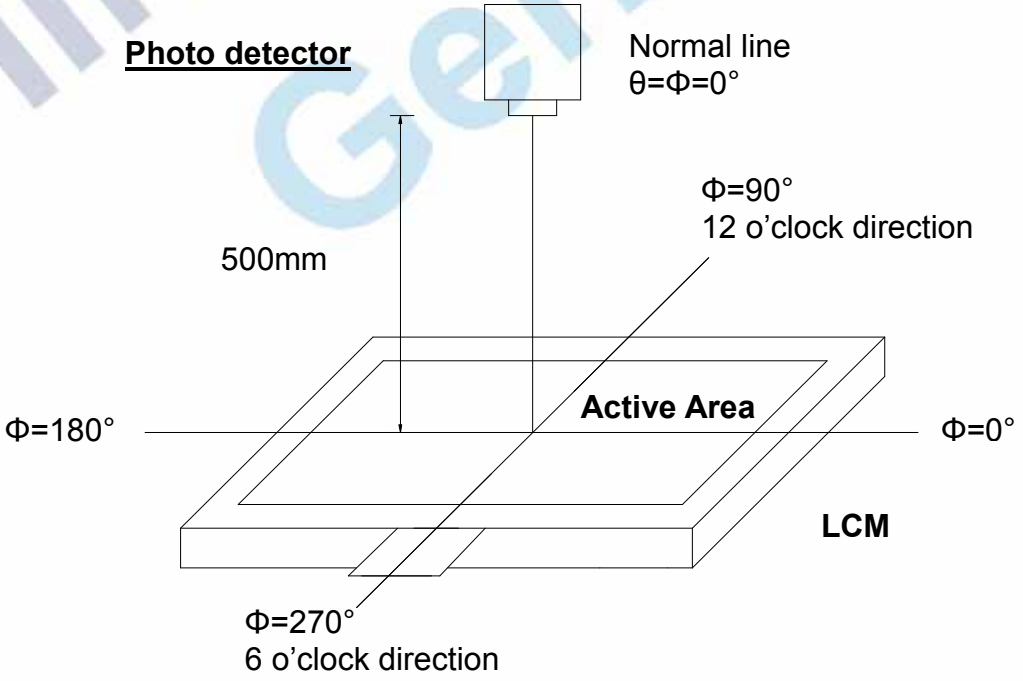


Fig. 4-2 Optical measurement system setup

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%.

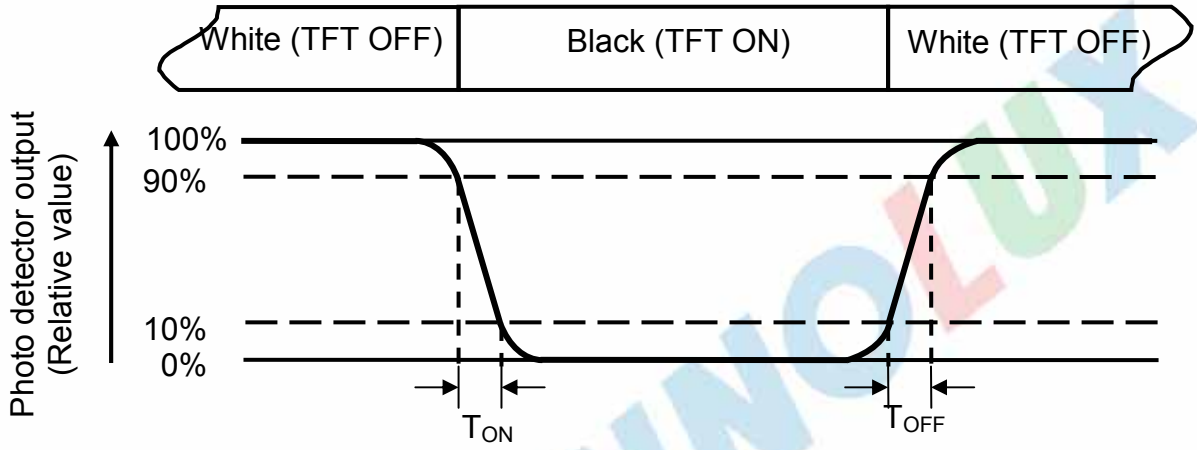


Fig. 4-3 Definition of response time

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: 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

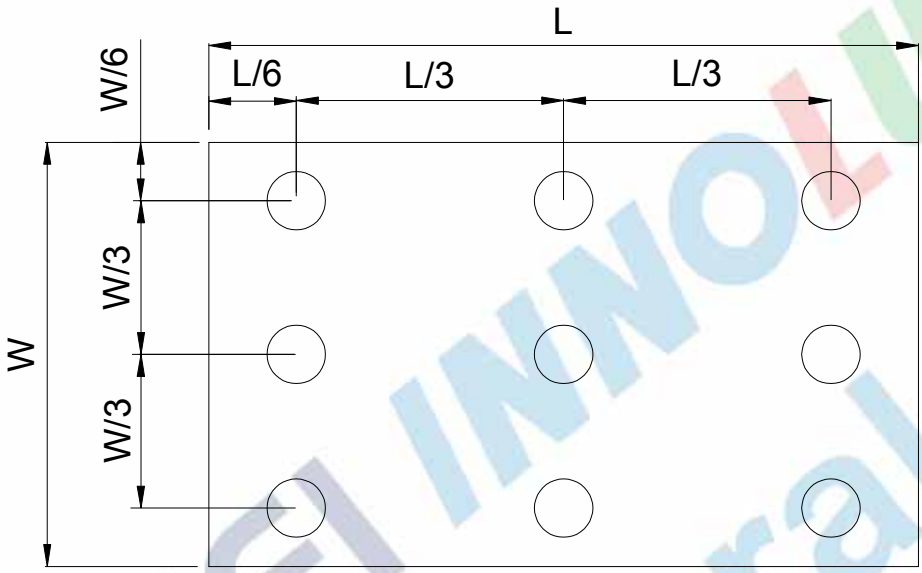


Fig. 4-4 Definition of measuring points

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

5. Reliability Test Items

(Note3)

Item	Test Conditions	Remark
High Temperature Storage	Ta = 60℃ 240hrs	Note 1，Note 4
Low Temperature Storage	Ta = -20℃ 240hrs	Note 1，Note 4
High Temperature Operation	Ts = 50℃ 240hrs	Note 2，Note 4
Low Temperature Operation	Ta = -10℃ 240hrs	Note 1，Note 4
Operate at High Temperature and Humidity	+40℃, 90%RH 240hrs	Note 4
Thermal Shock	-20℃/30 min ~ +60℃/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	
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	
Package Drop Test	Height:60 cm 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.

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.

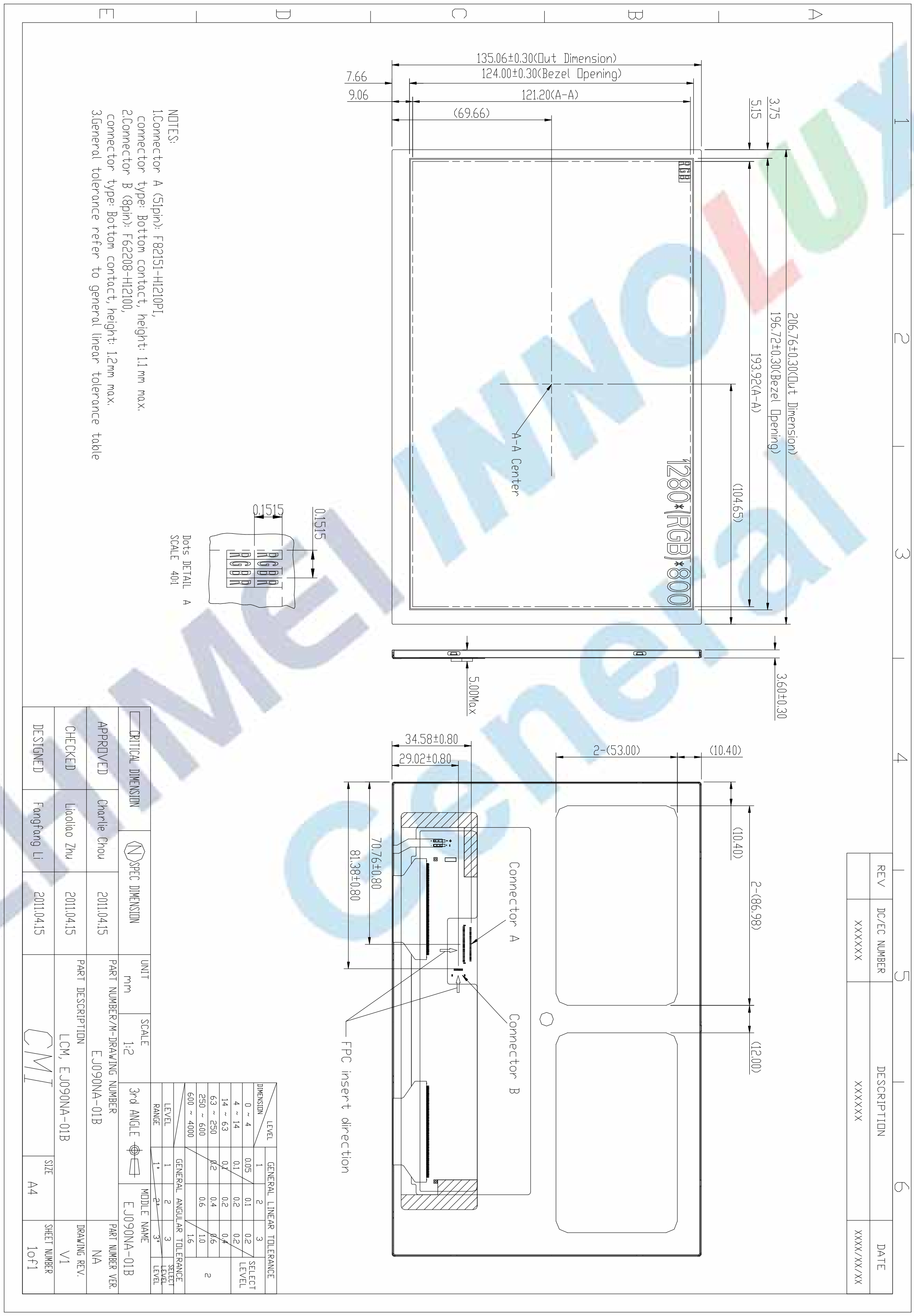
6.4. Storage

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	EJ090NA-01B	206.76 × 135.06 × 3.6	TBD	30	
2	Anti-Static Bag	PE	215 × 175	0.0038	30pcs	
3	Corrugated Paper	B Corrugated paper	349 × 206	0.0343	4pcs	
4	Partition	BC Corrugated paper	513 × 350 × 232	1.155	1set	
5	Dust-Proof Bag	PE	700 × 530	0.048	1pcs	
6	Carton	Corrugated paper	530 × 355 × 255	1.100	1pcs	
8	Total weight	TBD				

8.2. Packaging Quantity

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

8.3. Packaging Drawing