AZ DISPLAYS

SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY

CUSTOMER APPROVAL			
※ **PART NO. :** ATM0800D3 (AZ DISPLAYS) VER1.0			
APPROVAL		**COMPANY CHOP**	
CUSTOMER COMMENTS			

AZ DISPLAYS ENGINEERING APPROVAL		
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1. General Specifications

No.	Item	Specification	Remark
1	LCD size	8.0 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	800 × 3(RGB) × 600	
4	Display mode	Normally White, Transmissive	
5	Dot pitch	0.0675(W) × 0.2025(H) mm	
6	Active area	162.0(W) × 121.5(H) mm	
7	Module size	183.0(W) × 141.0(H) × 6.3(D) mm	Note 1
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	Digital	
11	Backlight power consumption	1.782W (Typ.)	
12	Panel power consumption	0.356W (Typ.)	
13	Weight	258g (Typ.)	

Note 1: Refer to Mechanical Drawing.

2. Pin Assignment

2.1. TFT LCD Panel Driving Section

1. FPC Connector is used for the module electronics interface. The recommended model is FH12A-50S-0.5SH manufactured by Hirose.
2. LED Light Bar Connector is used for the integral backlight system. The recommended model is BHSR-02VS-1 manufactured by JST.

Pin No.	Symbol	I/O	Function	Remark
1	NC		No connection	
2	NC		No connection	
3	NC		No connection	
4	NC		No connection	
5	GND	P	Power ground	
6	V_{COM}	I	Common voltage	
7	V_{CC}	P	Power for Digital circuit	
8	MODE	I	DE/SYNC mode select	Note3
9	DE	I	Data Input Enable	
10	VS	I	Vertical Sync Input	
11	HS	I	Horizontal Sync Input	
12	B7	I	Blue data(MSB)	
13	B6	I	Blue data	
14	B5	I	Blue data	
15	B4	I	Blue data	
16	B3	I	Blue data	
17	B2	I	Blue data	
18	B1	I	Blue data	
19	B0	I	Blue data(LSB)	
20	G7	I	Green data (MSB)	
21	G6	I	Green data	
22	G5	I	Green data	
23	G4	I	Green data	
24	G3	I	Green data	
25	G2	I	Green data	
26	G1	I	Green data	
27	G0	I	Green data (LSB)	
28	R7	I	Red data (MSB)	
29	R6	I	Red data	
30	R5	I	Red data	

31	R4	I	Red data	
32	R3	I	Red data	
33	R2	I	Red data	
34	R1	I	Red data	
35	R0	I	Red data (LSB)	
36	GND	P	Power ground	
37	DCLK	I	Sample clock	
38	GND	P	Power ground	
39	L/R	I	Right/ left selection	Note2,5
40	U/D	I	Up/down selection	Note2,5
41	V_{GH}	P	Gate ON voltage	
42	V_{GL}	P	Gate OFF voltage	
43	AV_{DD}	P	Power for Analog circuit	
44	RESET	I	Global reset pin.	Note1
45	NC		No connection	
46	V_{COM}	I	Common voltage	
47	DITHB	I	Dithering function	Note 4
48	GND	P	Power ground	
49	NC		No connection	
50	NC		No connection	

I: input, O: output, P: Power

Note 1: Global reset pin. Active Low to enter Reset State. Suggest to connecting with an RC reset circuit for stability. Normally pull high.

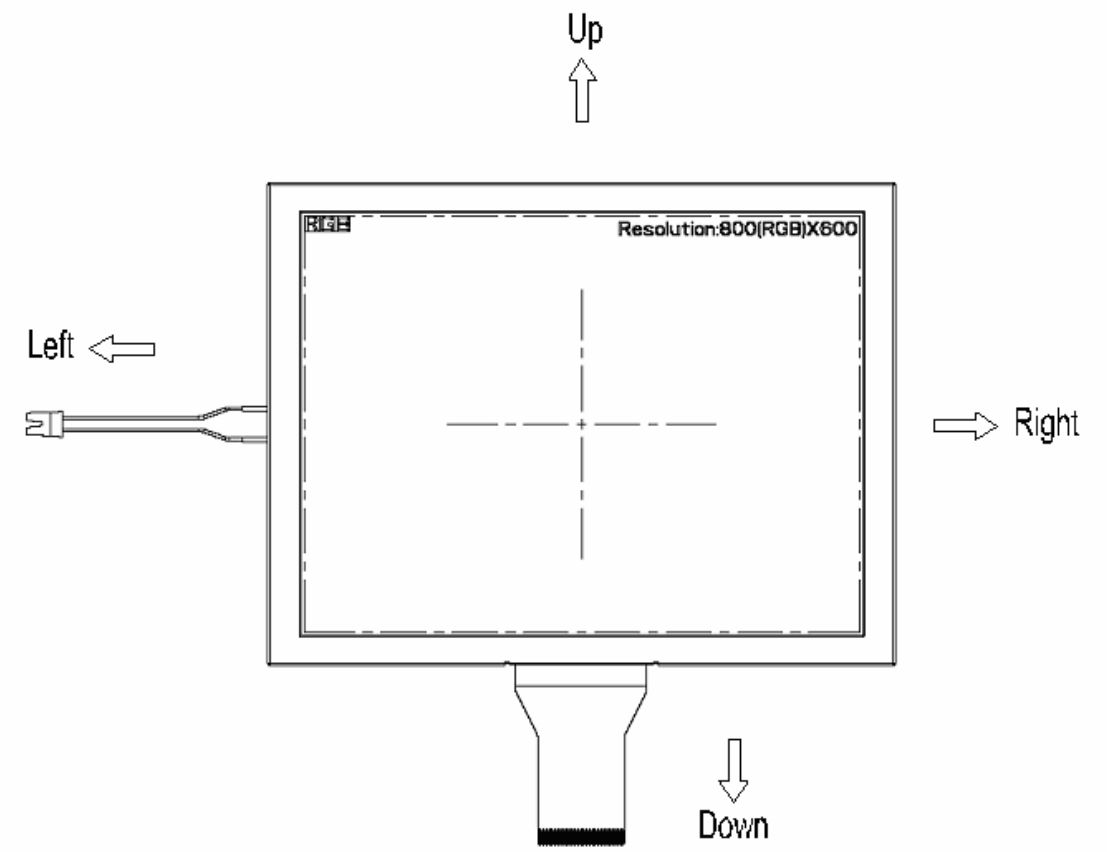
Note 2: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	R/L	
GND	V_{CC}	Up to down, left to right
V_{CC}	GND	Down to up, right to left
GND	GND	Up to down, right to left
V_{CC}	V_{CC}	Down to up, left to right

Note 3: DE/SYNC mode select, Normally pull high.
H: DE mode.
L: HS/VS mode.

Note4: Dithering function enable control.Normally pull high.
DITHB="1",Disable internal dithering function. For 18bit RGB interface, connect two LSB bits of all the R/G/B data buses to GND.
DITHB="0",Enable internal dithering function, For TTL 24bit parallel RGB image data input.

Note 5: Definition of scanning direction.
Refer to the figure as below:



2.2. Backlight Unit Section

Pin No.	Symbol	I/O	Function	Remark
1	V_{LED+}	P	Power for LED backlight anode	Pink
2	V_{LED-}	P	Power for LED backlight cathode	Black

3. Operation Specifications

3.1. Absolute Maximum Rating

(GND=AV_{SS}=0V, Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	V_{CC}	-0.3	5.0	V	
	AV_{DD}	-0.5	13.5	V	
	V_{GH}	13.0	19.0	V	
	V_{GL}	-12.0	-2.0	V	
	V_{GH}-V_{GL}	-	31.0	V	
Operation Temperature	T_{OP}	-20	70	℃	
Storage Temperature	T_{ST}	-30	80	℃	
LED Reverse Voltage	V_R	-	1.2	V	each LED Note 2
LED Forward Current	I_F	-	25	mA	each LED

3.1.1. Typical Operation Conditions

(GND=AV_{SS}=0V, Note 1)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	V_{CC}	3.0	3.3	3.6	V	Note 2
	AV_{DD}	10.2	10.4	10.6	V	
	V_{GH}	15.3	16.0	16.7	V	
	V_{GL}	-7.7	-7.0	-6.3	V	
Input signal voltage	V_{COM}	3.5	3.7	3.9	V	
Input logic high voltage	V_{IH}	$0.7V_{CC}$	-	V_{CC}	V	Note 3
Input logic low voltage	V_{IL}	0	-	$0.3V_{CC}$	V	

Note 1: Be sure to apply V_{CC} and V_{GL} to the LCD first, and then apply V_{GH}.
Note 2: V_{CC} setting should match the signals output voltage (refer to Note 3) of customer's system board .
Note 3: DCLK,HS,VS,RSTB,UPDN,STLR,MODE,DITHB.

3.1.2. Current Consumption

(GND=AV_{SS}=0V)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I_{GH}	-	0.2	0.5	mA	V_{GH} =16.0V
	I_{GL}	-	0.2	1.0	mA	V_{GL} = -7.0V
	I_{CC}	-	5.5	10.0	mA	V_{CC} =3.3V
	IAV_{DD}	-	32.0	50.0	mA	AV_{DD} =10.4V

3.1.3. Backlight Driving Conditions

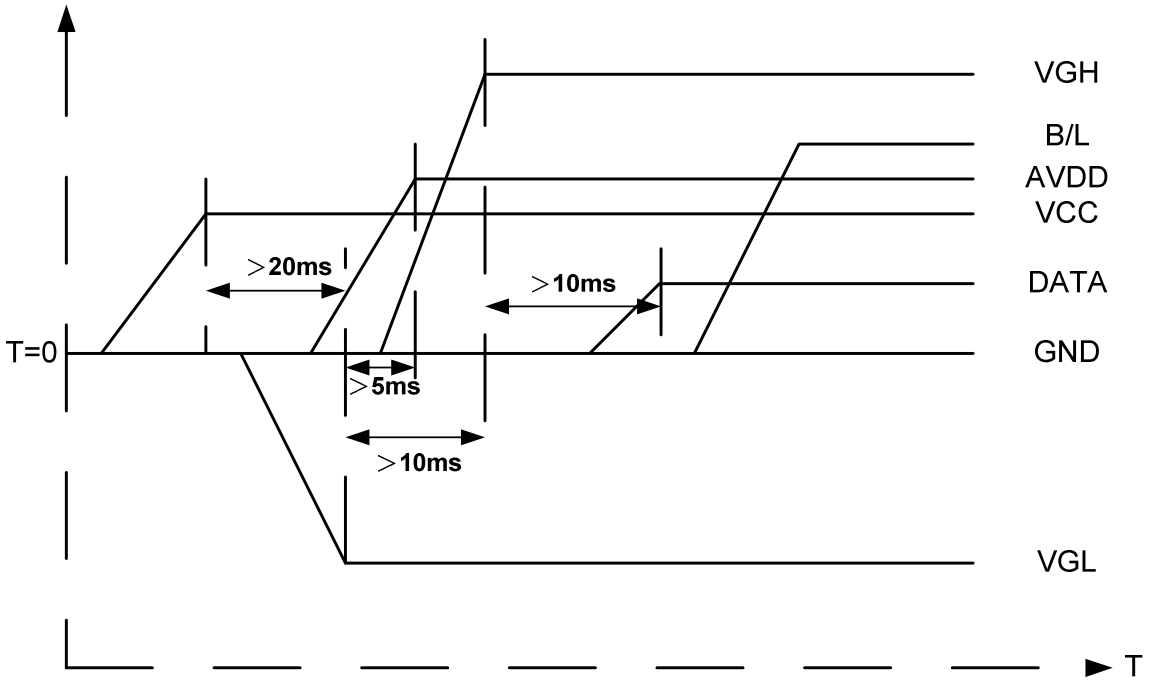
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V_L	9.3	9.9	10.5	V	Note 1
Current for LED backlight	I_L	162	180	198	mA	
LED life time	-	20,000	-	-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and I_L =180mA.

Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and I_L =180mA. The LED lifetime could be decreased if operating I_L is lager than 180 mA.

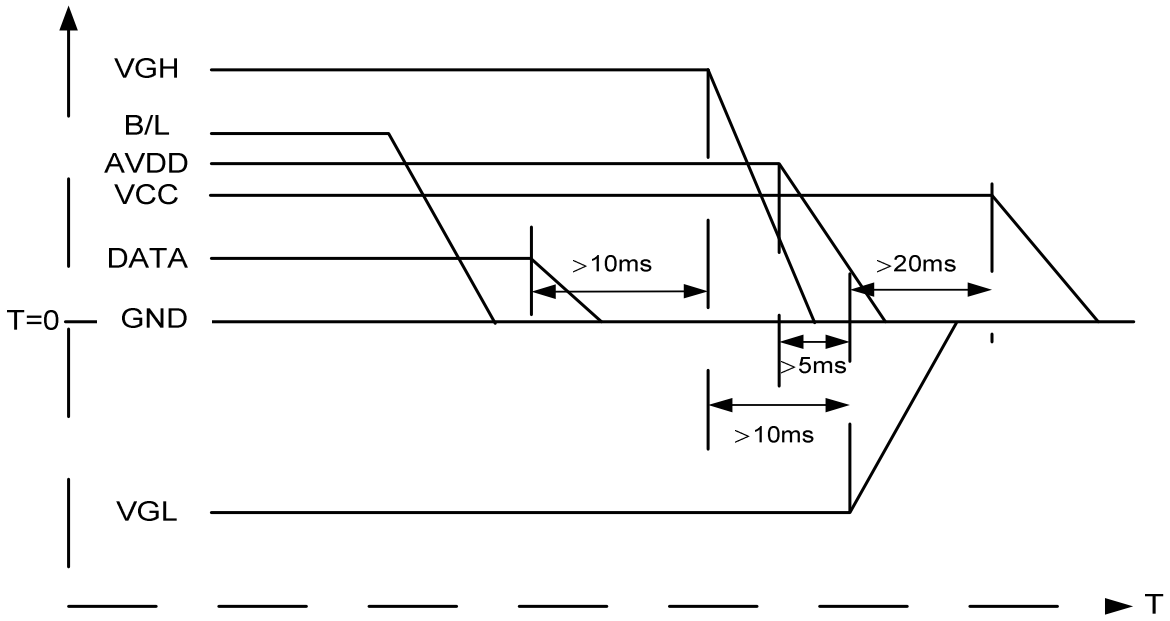
3.2. Power Sequence

3.2.1. Power on:



VCC→VGL→VGH→Data→B/L

3.2.2. Power off:



B/L→Data→VGH→VGL→VCC

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

3.3. Timing Characteristics

3.3.1. AC Electrical Characteristics

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
HS setup time	T_{hst}	8	-	-	Ns	
HS hold time	T_{hhd}	8	-	-	Ns	
VS setup time	T_{vst}	8	-	-	Ns	
VS hold time	T_{vhd}	8	-	-	Ns	
Data setup time	T_{dsu}	8	-	-	Ns	
Data hole time	T_{dhd}	8	-	-	Ns	
DE setup time	T_{esu}	8	-	-	Ns	
DE hole time	T_{ehd}	8	-	-	Ns	
VDD Power On Slew rate	T_{POR}	-	-	20	ms	
RSTB pulse width	T_{Rst}	10	-	-	us	
CLKIN cycle time	T_{coh}	20	-	-	Ns	
CLKIN pulse duty	T_{cwh}	40	50	60	%	
Output stable time	T_{sst}	-	-	6	us	

3.3.2. Timing

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK Frequency	fclk	-	40	50	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS pulse width	thpw	1	-	40	DCLK	
HS Back Porch(Blanking)	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	210	354	DCLK	

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Vertical Display Area	tvd	-	600	-	TH	
VS period time	tv	624	635	700	TH	
VS pulse width	tvpw	1	-	20	TH	
VS Back Porch(Blanking)	tvb	23	23	23	TH	
VS Front Porch	tvfp	1	12	77	TH	

3.3.3. Timing Diagram

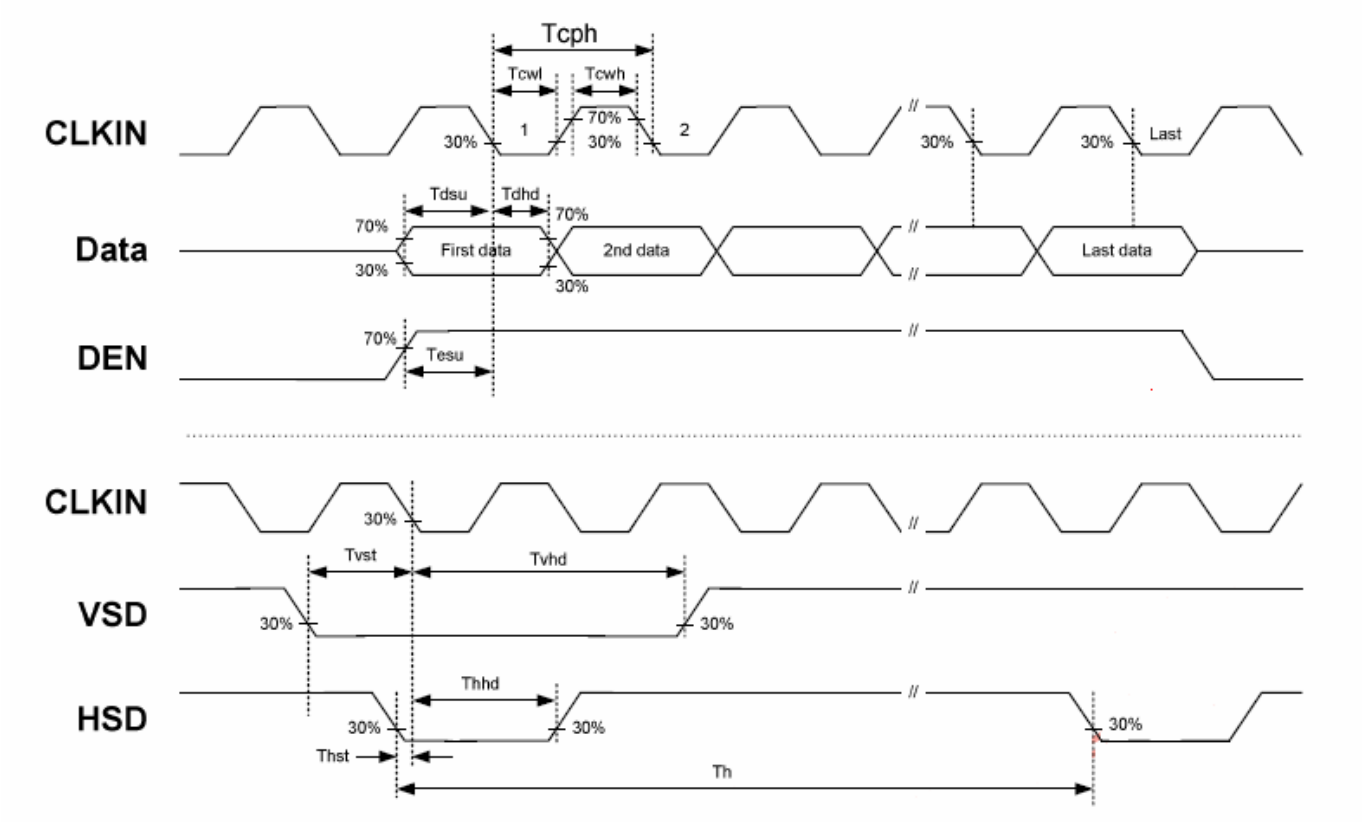


Figure 3.1 Input Clock and Data Timing Diagram

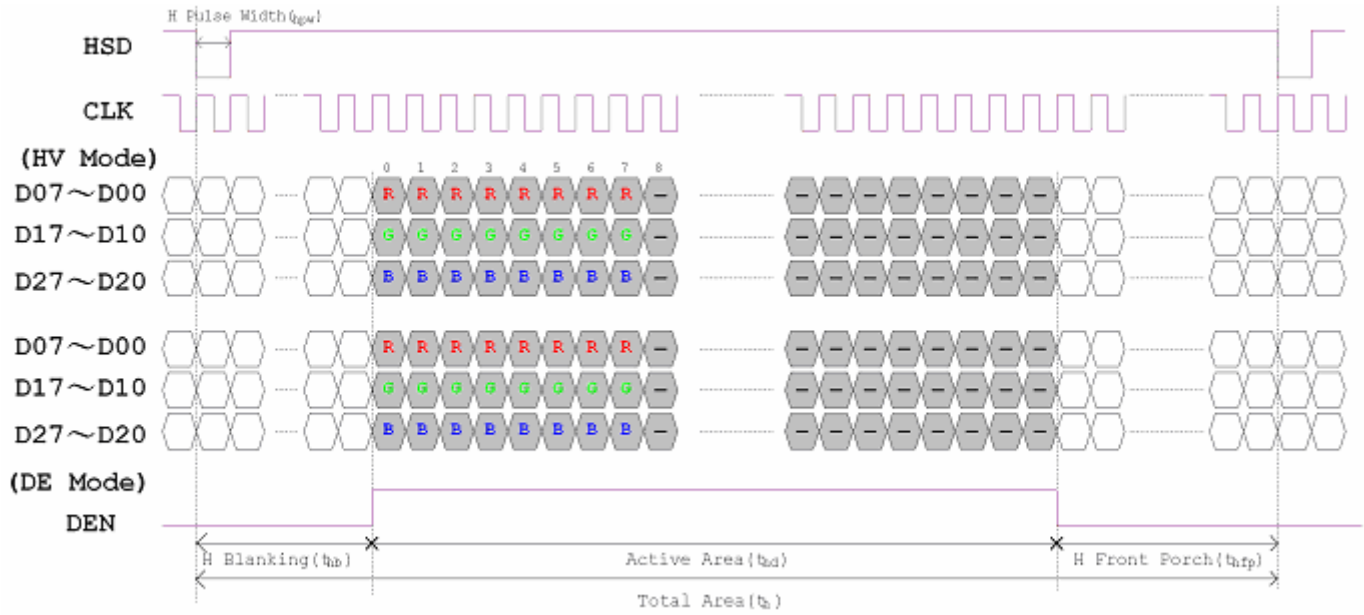


Figure 3.2 Horizontal input timing diagram.

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)	40	50	-		
	θ_B	Φ=270°(6 o'clock)	60	70	-		
Response time	T_{ON}	Normal θ=Φ=0°	-	10	20	msec	Note 3
	T_{OFF}		-	15	30	msec	Note 3
Contrast ratio	CR		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	L		200	250	-	cd/m²	Note 6
Luminance uniformity	Y_U		70	75	-	%	Note 7

Test Conditions:

1. V_{CC}=3.3V, I_L=180mA (Backlight current), the ambient temperature is 25℃.
2. The test systems refer to Note 2.

Note 1: Definition of viewing angle range

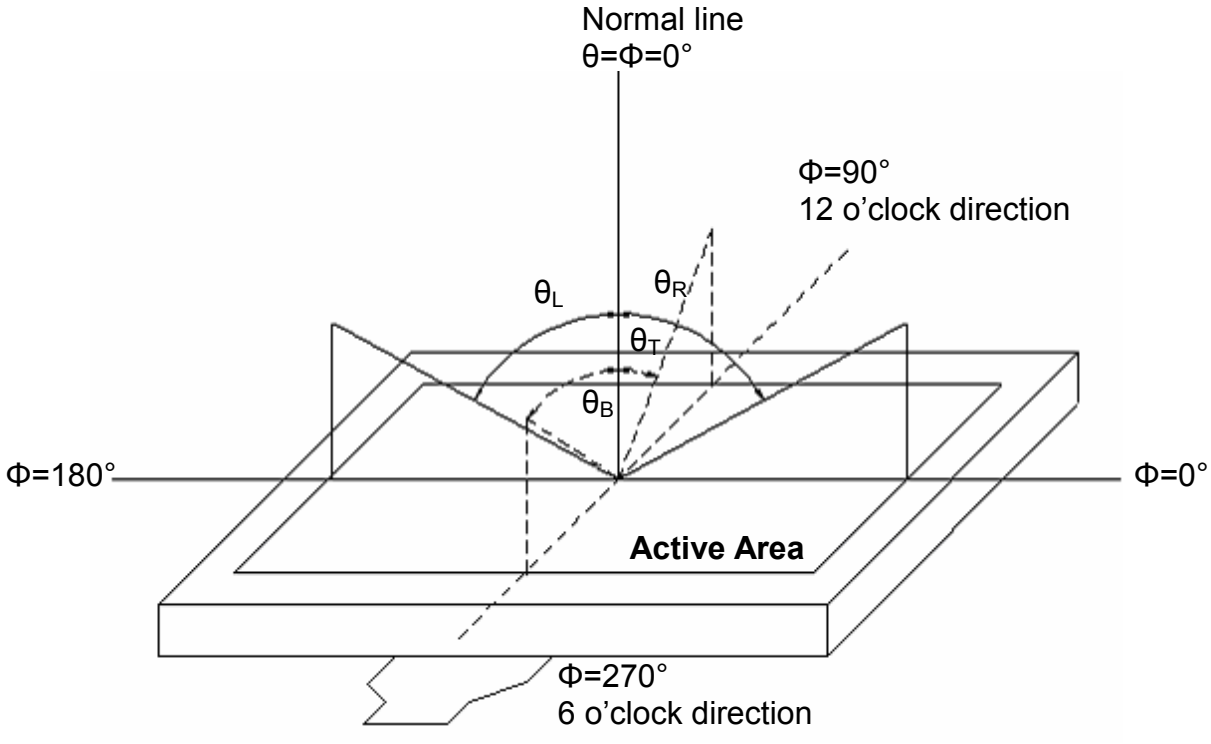


Fig. 4-1 Definition of viewing angle

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.)

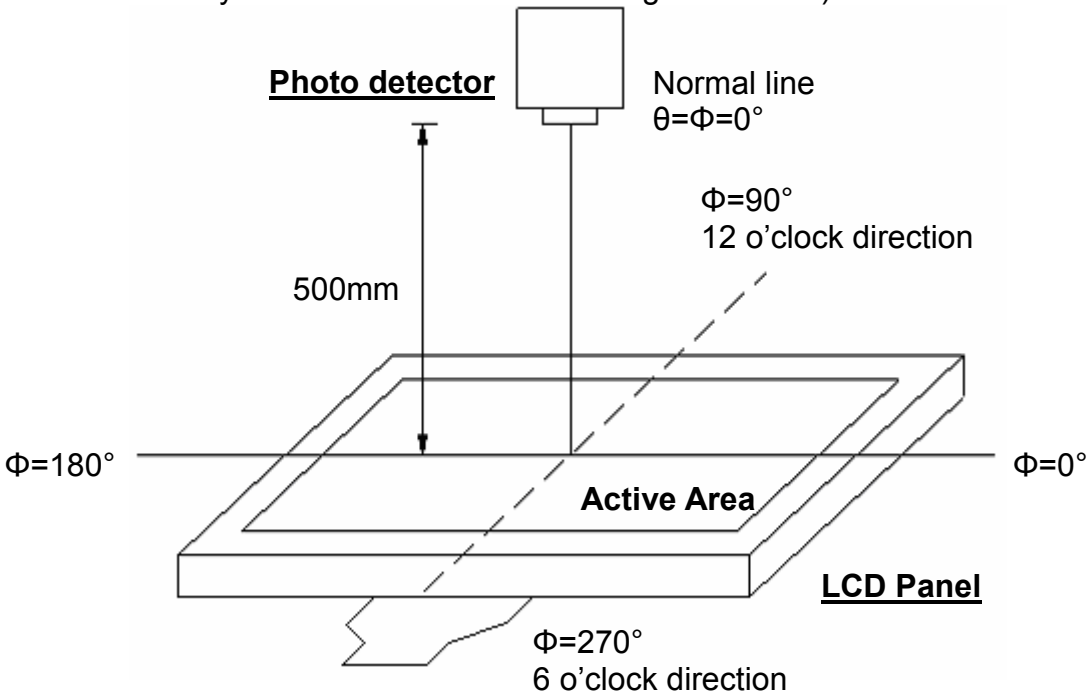


Fig. 4-2 Optical measurement system setup

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%.

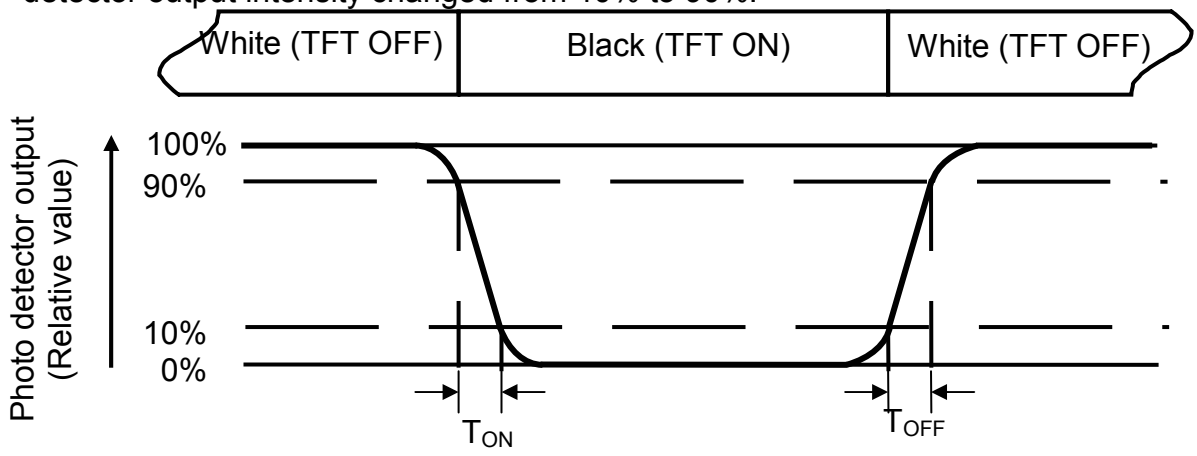


Fig. 4-3 Definition of response time

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=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.

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

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

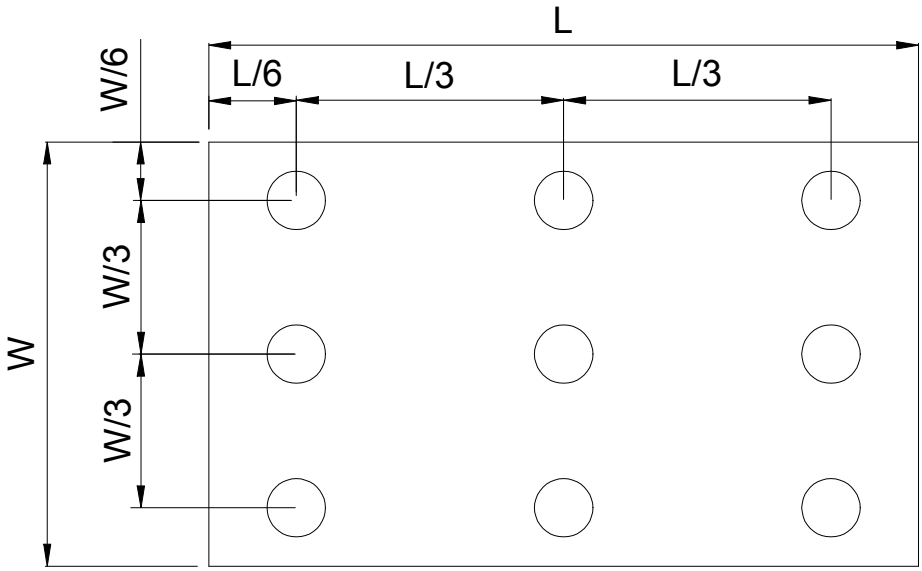


Fig. 4-4 Definition of measuring points

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

5. Reliability Test Items

(Note3)

Item	Test Conditions	Remark
High Temperature Storage	Ta = 80℃ 240hrs	Note 1，Note 4
Low Temperature Storage	Ta = -30℃ 240hrs	Note 1，Note 4
High Temperature Operation	Ts = 70℃ 240hrs	Note 2，Note 4
Low Temperature Operation	Ta = -20℃ 240hrs	Note 1，Note 4
Operate at High Temperature and Humidity	+40℃, 90%RH 240hrs	Note 4
Thermal Shock	-30℃/30 min ~ +80℃/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.

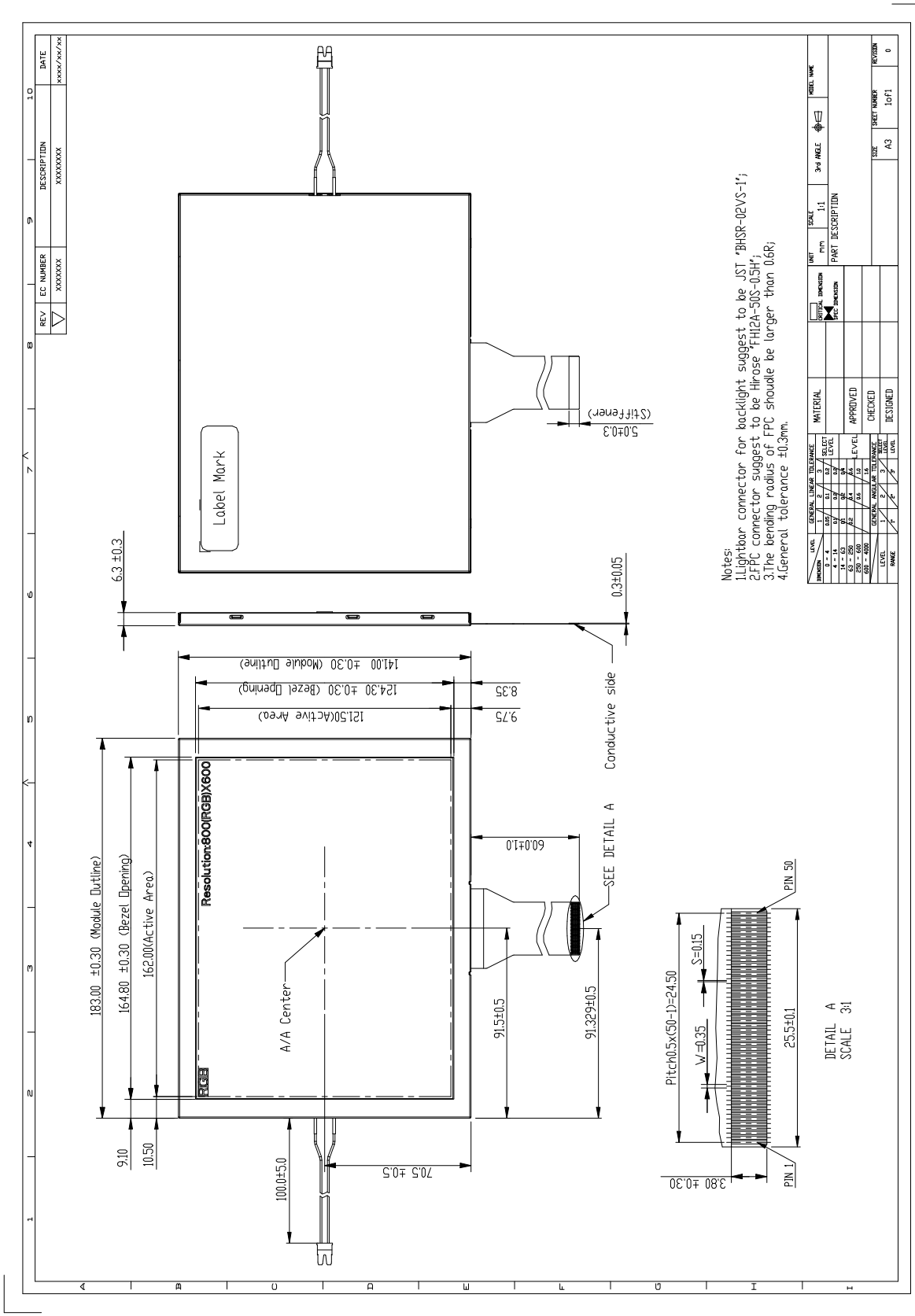
6.4. Storage

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

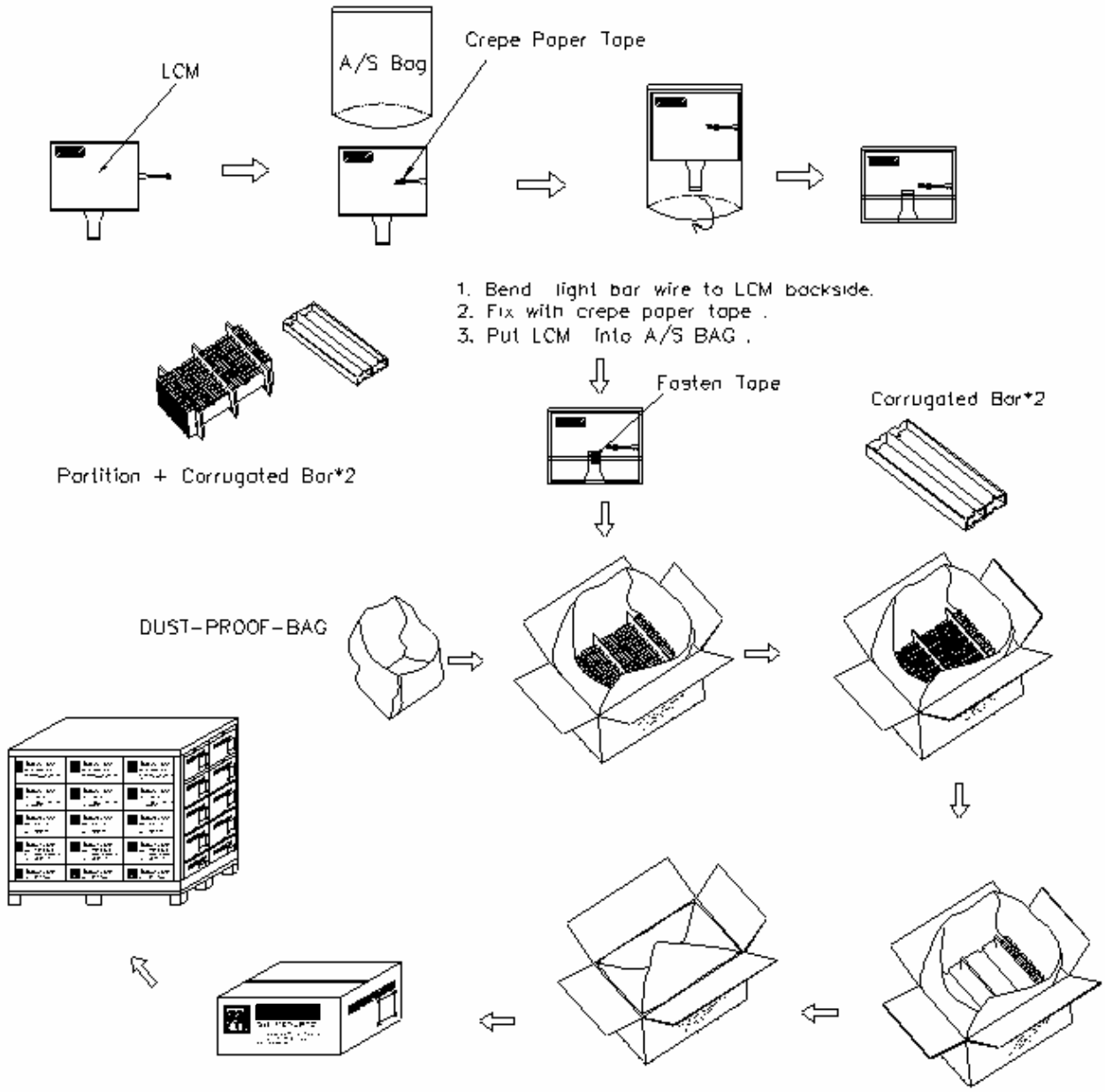


8. Package Drawing

8.1 Packaging Material Table

No.	Item	Model (Material)	Dimensions(mm)	Unit Weight (kg)	Quantity	Remark
1	LCM Module	ATM0800D3	183.0 × 141.0 × 6.3	0.253	30pcs	
2	Partition	BC Corrugated paper	512 × 349 × 226	1.184	1set	
3	Corrugated Bar	B Corrugated paper	349 × 186 × 38	0.155	4pcs	
4	Dust-Proof Bag	PE	700 × 530	0.060	1pcs	
5	A/S Bag	PE	220.0 × 200.0 × 0.2	0.003	30pcs	
6	Carton	Corrugated paper	530 × 355 × 255	1.100	1pcs	
7	Total weight	10.6±3%				

8.2 Packaging Quantity

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

8.3 Packaging Drawing