

SPECIFICATION FOR LCD MODULE

Customer : PV101028SL30W

Product Model: _____

Sample code: _____

Designed by	Checked by	Approved by

Final Approval by Customer

<input type="checkbox"/> LCM Machinery OK Checked By _____ <input type="checkbox"/> LCM Display OK Checked By _____	<input type="checkbox"/> LCM OK <input type="checkbox"/> NG, Problem survey: Approved By _____
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Revision History

Version	Contents	Date	Note
A	Original	2021.10.19	



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2. Scope

This specification applies to the TFT LCD module which is designed and manufactured by LCM Factory of Kingtech.

3. Normative Reference

GB/T4619-1996 《Liquid Crystal Display Test Method》

GB/T2424 《Basic environmental Testing Procedures for Electric and Electronic Products.》

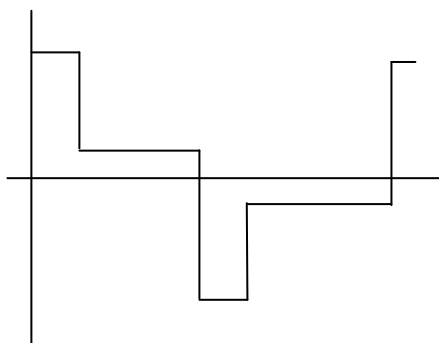
GB/T2423 《Basic Testing Procedures for Electric and Electronic Products》

IEC61747-1 《SIXTH PART GB2828`2829-87 《National Standard of PRC》

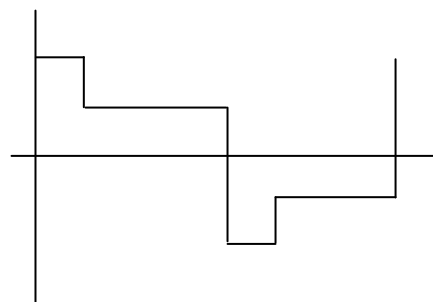
4. Definitions

4.1 Definitions of Vop

The definitions of threshold voltage V_{th1} , V_{th2} the following typical waveforms are applied on liquid crystal by the method of equalized voltage for each duty and bias.



【 selected waveform 】



【 non-selected waveform 】

① V_{th1} : The voltage which the brightness of segment indicates 50% of saturated value on the conditions of selected waveform

($f_r=80\text{Hz}$, $\Phi=10^\circ$ $\theta=270^\circ$ at 25°C)

② V_{th2} : The voltage which the brightness of segment indicates 50% of saturated value on the conditions of non-selected waveform

($f_r=80\text{Hz}$, $\Phi=10^\circ$ $\theta=270^\circ$ at 25°C)

③ V_{op} : $(V_{th1}(50\%)+V_{th2}(50\%))/2$ ($f_r=80\text{Hz}$, $\Phi=10^\circ$ $\theta=270^\circ$ at 25°C)

4.2 Definition of Response Time T_r , T_d

① T_r : The time required which the brightness of segment becomes 10% from 100% when waveform is switched to selected one from non-selected one. ($f_r=80\text{Hz}$, $\Phi=10^\circ$ $\theta=270^\circ$ at 25°C)

② T_d : The time required which the brightness of segment becomes 90% from 10% when waveform is switched to selected one from selected one. ($f_r=80\text{Hz}$, $\Phi=10^\circ$ $\theta=270^\circ$ at 25°C)

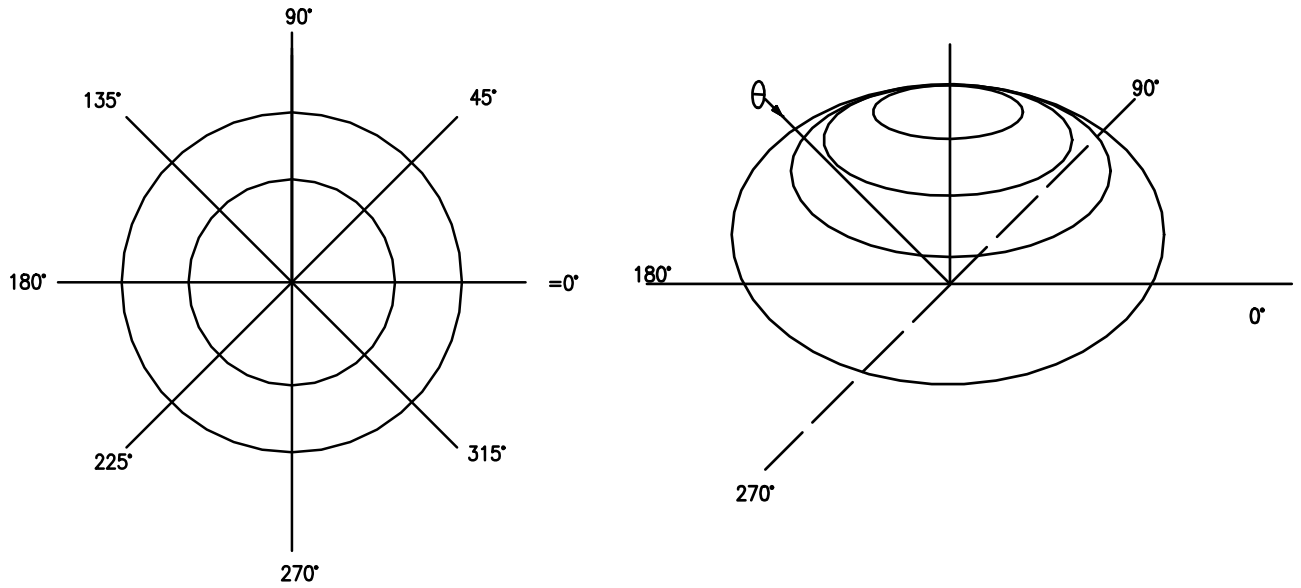


4.3 Definition of Contrast Ratio Cr

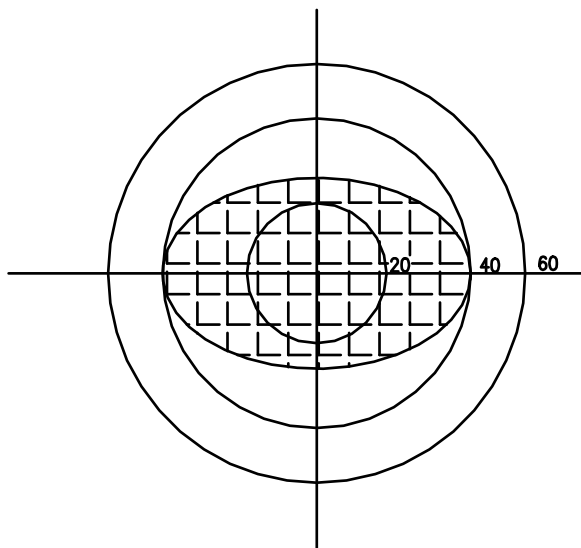
$$Cr=A/B$$

- ① A: Segments brightness in case of non-selected waveform
- ② B: Segments brightness in case of selected waveform

4.4 Definition of Angle and Viewing Range

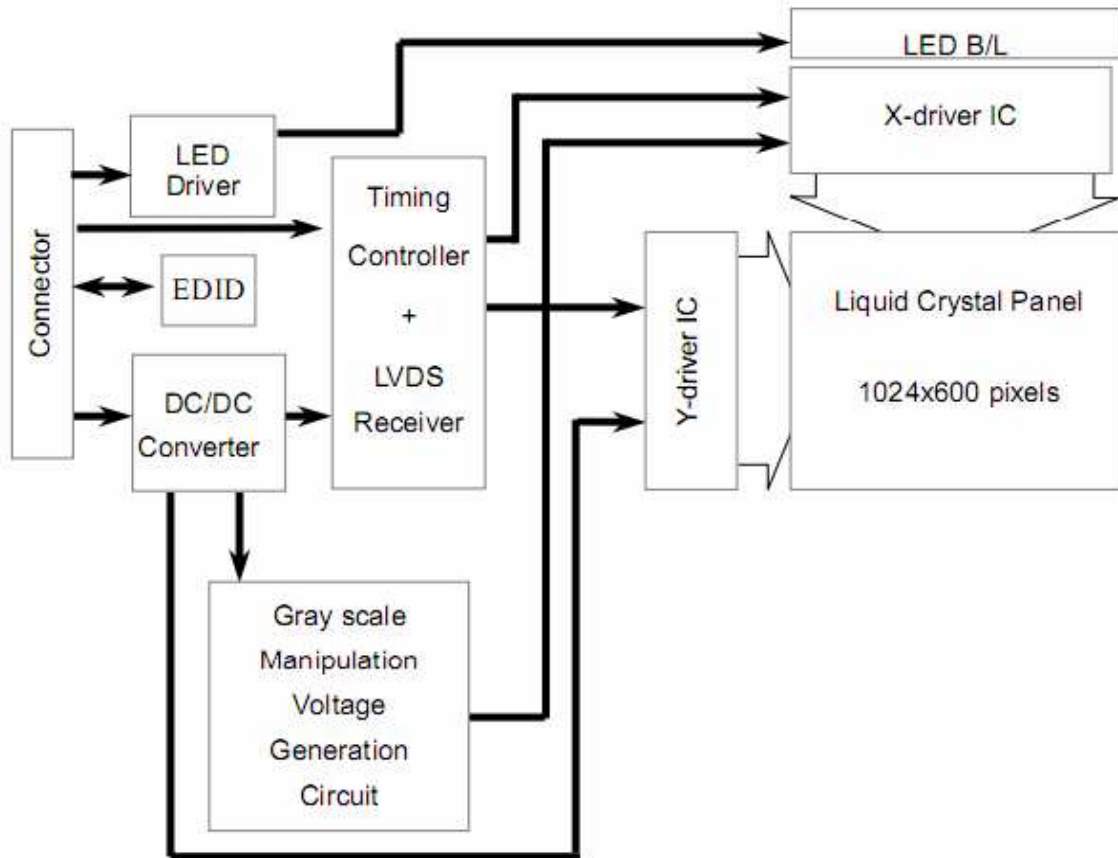


Angular Graph: Constrast Ratio



Such as:
Viewing Angle Range:
80(Cr>2) Horizontal
70(Cr>2) Vertical

5. Block Diagram



6. Technology Specifications

6.1 Features

This single-display module is suitable for use in Net Book products. The LCD adopts one backlight with High brightness 24-lamps white LED. Construction: 10.1" a-Si color TFT-LCD ,White LED backlight, FPC and T-CON.

6.2 General Specifications

No.	Item	Specification
1	LCD size	10.1 inch
2	Resolution	1024 (RGB)X600
3	Display mode	Normally white, Transmissive
4	Pixel pitch	0.2175(W)X0.2088(H) mm
5	Active area	222.72 (W)X125.28 (H) mm
6	Module size	234.9(W)X145.8(H)X5.5(max)(D) mm
7	Pixel arrangement	RGB-stripe
8	Interface	Digital (6bit LVDS)
9	Backlight power consumption	2.500W(Typ.)
10	Panel power consumption	0.26W(Typ.)
11	Weight	TBD

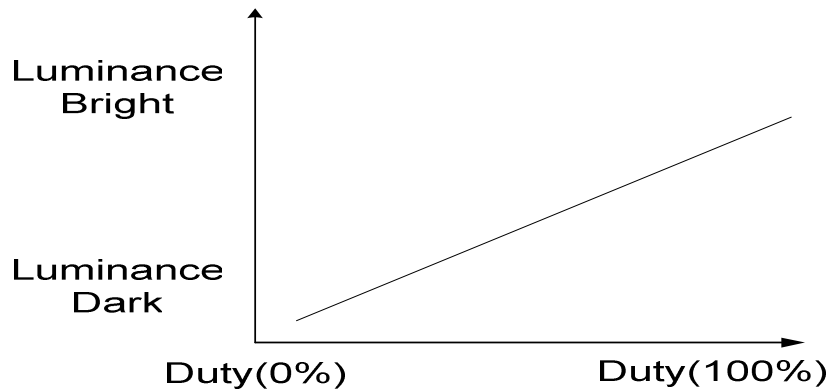
6.3 Interface Pin Connection

TFT LCD Module : CN1 (Input signal): FI-XB30SL-HF10 (JAE or equivalent)

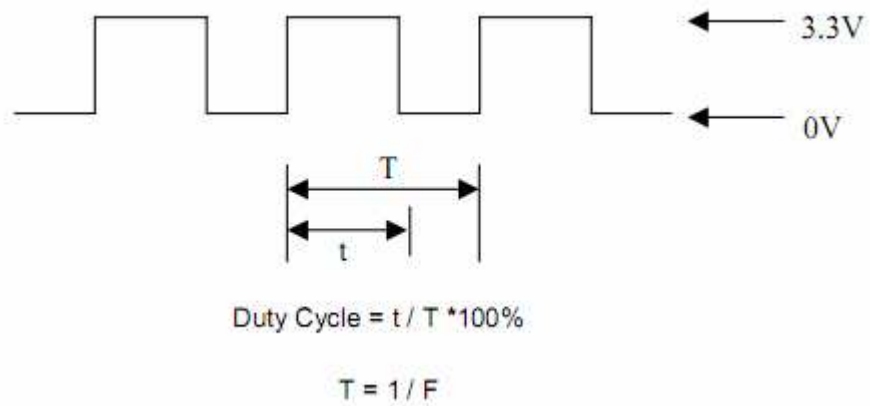
Pin No.	Signal	Description	
Pin No.	Signal	Description	
1	GND	Ground	
2	VDD	3.3V Power	
3	VDD	3.3V Power	
4	V_EDID	3.3V Power for EDID	
5	ADJ	Adjust for LED brightness	Note
6	CLK_EDID	EDID Clock Input	
7	DATA_EDID	EDID Data Input	
8	RXIN0-	LVDS Signal -	channel0-
9	RXIN0+	LVDS Signal+	channel0+
10	GND	Ground	
11	RXIN1-	Data Input	channel1-
12	RXIN1+	Data Input	channel1+
13	GND	Ground	
14	RXIN2-	Data Input	channel2-
15	RXIN2+	Data Input	channel2+
16	GND	Ground	
17	RXCLKIN-	Data Input	CLK-
18	RXCLKIN+	Data Input	CLK+
19	GND	Ground	
20	NC	NC	
21	NC	NC	
22	GND	Ground	
23	GND	Ground	
24	VLED	LED Power +5V	
25	VLED	LED Power +5V	
26	VLED	LED Power +5V	
27	NC	NC	
28	NC	NC	
29	NC	NC	
30	NC	NC	

Note : The brightness of LCD panel could be changed by adjusting PWM

Note1: PWM is used to adjust the B/Lbrightness.



Note 2: PWM signal=0~3.3V, Operation Frequency:100 Hz~20KHz,



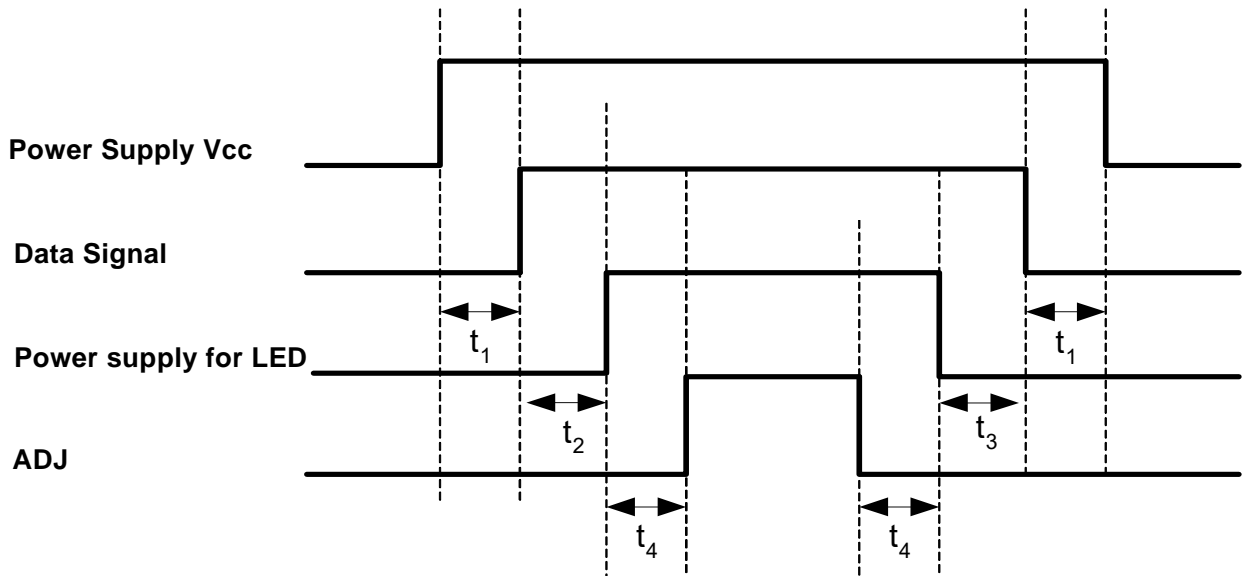
6.4 Absolute Max. Rating

Item	Symbol	Values		Unit
		Min.	Max.	
Power Voltage	V_{CC}	-0.3	4.0	V
	V_{LED}	-0.3	5.5	V
Input Signal Voltage	V_I	-0.3	V_{CC}	V
Operation Temperature	T_{OP}	-20	70	°C
Storage Temperature	T_{ST}	-30	80	°C

6.5 Typical Operation Conditions

Item	Symbol	Values			Unit
		Min.	Typ.	Max.	
Power Voltage	V_{CC}	3.0	3.3	3.6	V
	V_{LED}	-	9.5	-	V
Current Consumption	I_{CC}	-	TBD	-	mA
	I_{LED}	-	180	-	mA

6.6 Power Sequence



$$t_1 > 50 \text{ mSec}$$

$$t_2 \cong 200 \text{ mSec}$$

$$t_3 \cong 200 \text{ mSec}$$

$$t_4 \cong 50 \text{ mSec}$$

Note: Data Signal includes Rin0- ~ Rin2-, Rin0+ ~ Rin2+, CLKIN-, CLKIN+.

6.7 Timing Conditions

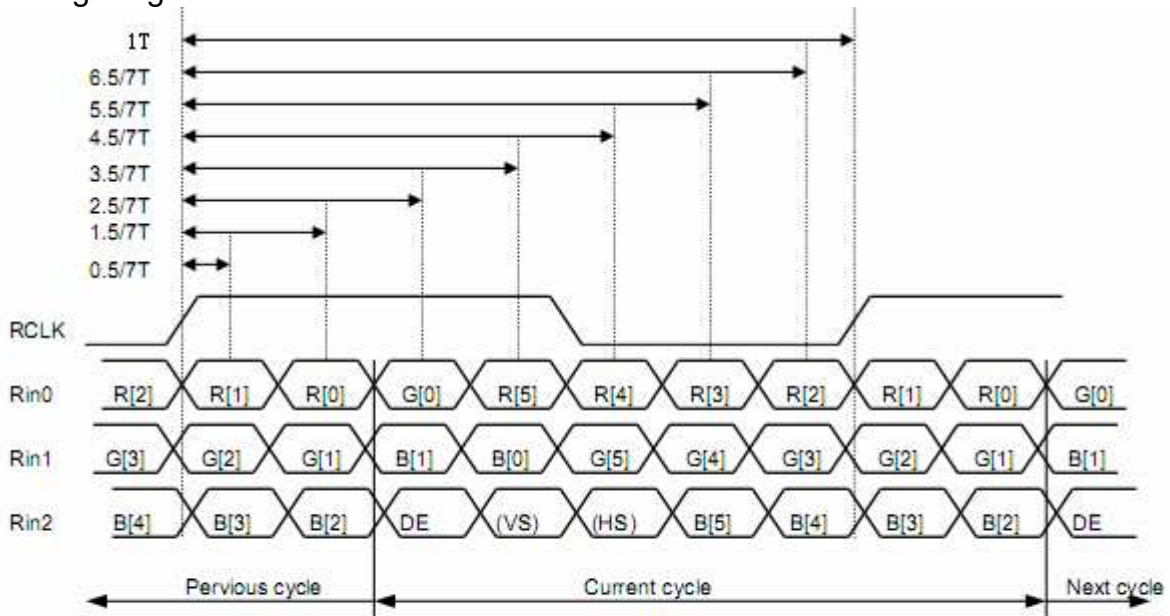
Switching Characteristics

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
RxCLKIN Period	t_{RCP}	11.76	T	50	ns	Note 1
RxCLKIN High Time	t_{RCH}	-	T/2	-	ns	
RxCLKIN Low Time	t_{RCL}	-	T/2	-	ns	
PAD0/1 to RxCLKIN Delay	t_{RCD}	-	3T/7	-	ns	
Data Setup to RxCLKIN	t_{RS}	1.9	-	-	ns	
Data Hold from RxCLKIN	t_{RH}	3.0	-	-	ns	
Input Data Position 0(T=11.76ns)	T_{RIP1}	-0.4	0	0.4	ns	Note 2
Input Data Position 1(T=11.76ns)	T_{RIP0}	T/7-0.4	T/7	T/7+0.4	ns	Note 2
Input Data Position 2(T=11.76ns)	T_{RIP6}	2T/7-0.4	2T/7	2T/7+0.4	ns	Note 2
Input Data Position 3(T=11.76ns)	T_{RIP5}	3T/7-0.4	3T/7	3T/7+0.4	ns	Note 2
Input Data Position 4(T=11.76ns)	T_{RIP4}	4T/7-0.4	4T/7	4T/7+0.4	ns	Note 2
Input Data Position 5(T=11.76ns)	T_{RIP3}	5T/7-0.4	5T/7	5T/7+0.4	ns	Note 2
Input Data Position 6(T=11.76ns)	T_{RIP2}	6T/7-0.4	6T/7	6T/7+0.4	ns	Note 2

Input Timing(only for DE Mode)

Parameter	Min	Typ	Max	Unit
H-Total	1185	1344	1800	CLK
H-Active	1024	1024	1024	CLK
H-Blanking	161	320	776	CLK
V-Total	628	635	650	LINE
V-Active	600	600	600	LINE
V-Blanking	28	35	50	LINE

Timing Diagram



LVDS Receiver Input Timing Definition
for 6bits LVDS input

6.8 Optical specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR \geq 10)	θ_L	$\Phi=180^\circ$ (9 o'clock)	-	60	-	degree	Note 1
	θ_R	$\Phi=0^\circ$ (3 o'clock)	-	60	-		
	θ_T	$\Phi=90^\circ$ (12 o'clock)	-	30	-		
	θ_B	$\Phi=270^\circ$ (6 o'clock)	-	50	-		
Response time Rise+Fall	T_{RT}	Normal $\theta=\Phi=0^\circ$	-	16	25	msec	Note 3
Contrast ratio	CR		400	500	-	-	Note 4
Color chromaticity	W_X		0.28	0.31	0.35	-	Note 2 Note 5 Note 6
	W_Y		0.29	0.33	0.36	-	
Luminance	L		-	200	-	Cd/m ² -	Note 6
Luminance uniformity	Y_U		70	75	-	%	Note 6,7

Note 1: Definition of viewing angle range

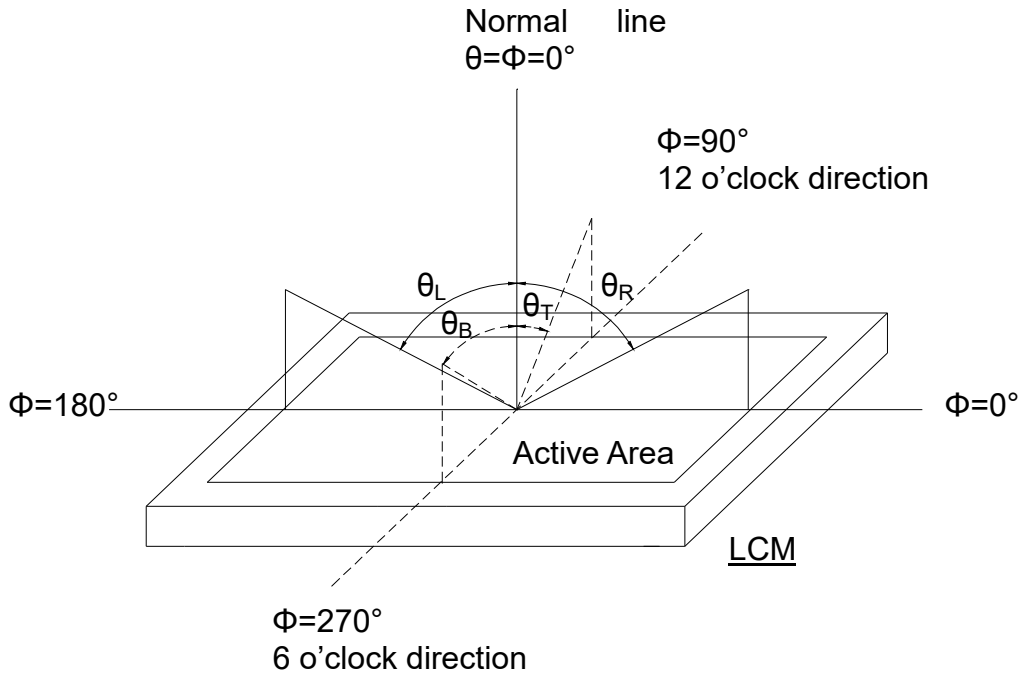


Fig. 4-1 Definition of viewing angle

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.)

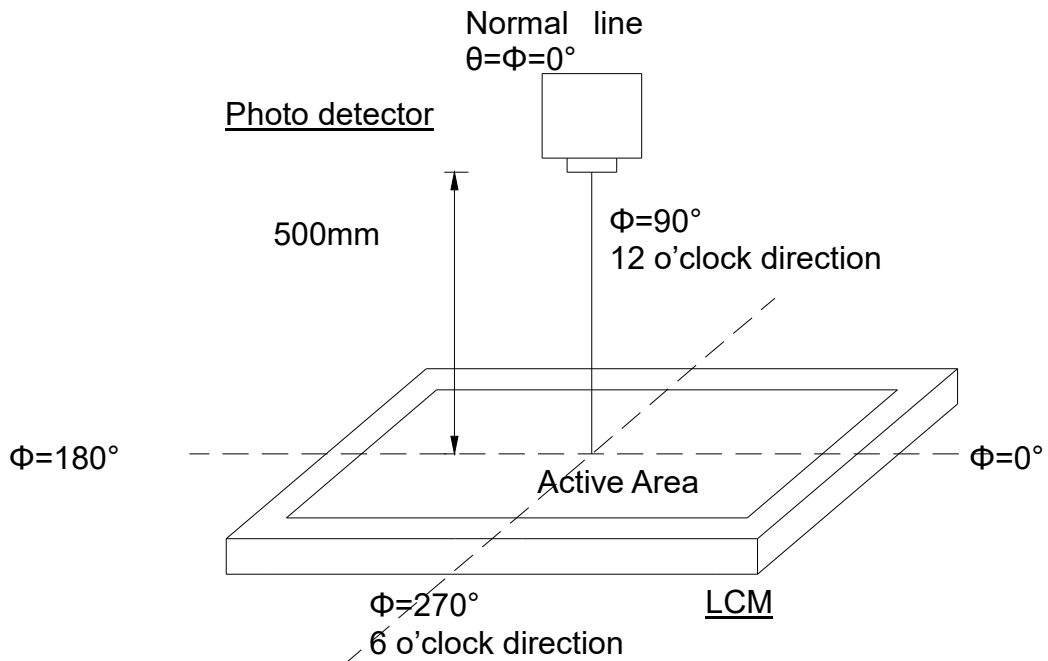


Fig. 4-2 Optical measurement system setup

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

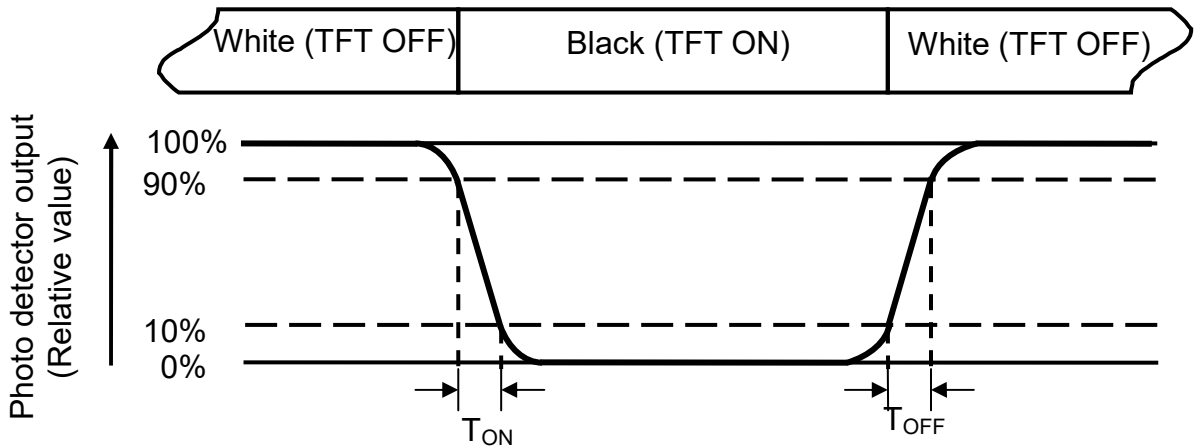


Fig. 4-3 Definition of response time

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 $V_{LED}=5.0V$.

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.

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

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

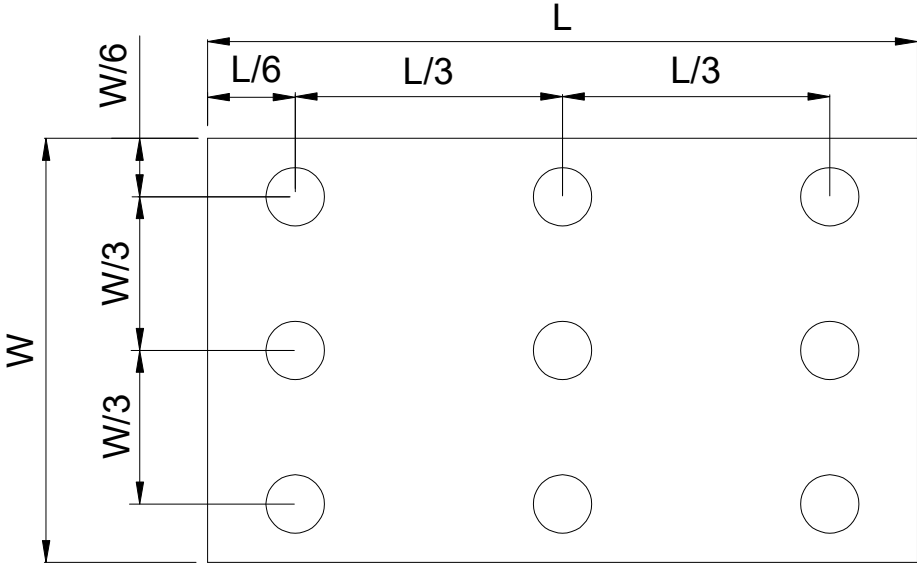


Fig. 4-4 Definition of measuring points

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

7. Reliability Test Conditions And Methods

Item	Test Conditions	Remark
High Temperature Storage	Ta = 80°C 96 hrs	
Low Temperature Storage	Ta = -30°C 96hrs	
High Temperature Operation	Ts = 70°C 96hrs	
Low Temperature Operation	Ta = -20°C 96hrs	
Operate at High Temperature and Humidity	+60°C, 90%RH max. 96 hrs	Operation
Thermal Shock	-20°C~ +70°C 100 cycles 2Hrs/cycle	Non-operation
Electrostatic Discharge	Contact=±4KV, class B Air=±8KV, class B	
Vibration Test	Frequency range:8~33.3Hz Stroke:1.3mm Sweep:2.9G 33.3~400Hz 2 hours for each direction of X. Y. Z. (6 hours for total)	Non-operation JIS C7021,A-10 ConditionA: 15minutes
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	Non-operation JIS C7021,A-7 ConditionC
Vibration(With Carton)	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ	IEC68-34
Drop(With Carton)	Height:60 cm 1 corner, 3 edges, 6 surfaces	
Electro Static Discharge	± 2KV, Human Body Mode, 100pF/1500Ω	

8. Handling Precautions

8.1 Mounting method

The LCD panel of Kingtech LCD module consists of two thin glass plates with polarizes which easily be damaged. And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

8.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent [recommended below] and wipe lightly

- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated:

- Soldering flux
- Chlorine (Cl) , Salfur (S)

If goods were sent without being sili8con coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (Cl), Salfur (S) from customer, Responsibility is on customer.

8.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you:

Connect any unused input terminal to Vdd or Vss, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

8.4 packing

- Module employ LCD elements and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity

8.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.
- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the maximum operating temperature, 50%Rh or less is required.

8.6 storage

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it . And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.

[It is recommended to store them as they have been contained in the inner container at the time of delivery from us

8.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and

wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.

- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water

9. Precaution for use

9.1

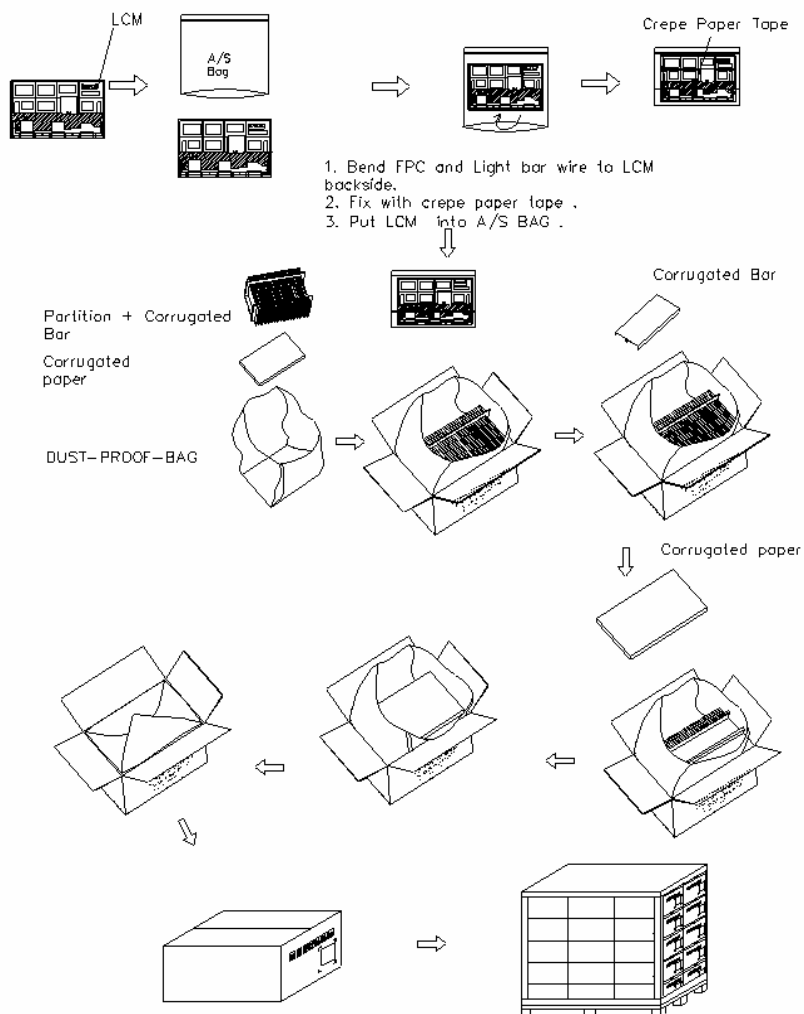
A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

9.2

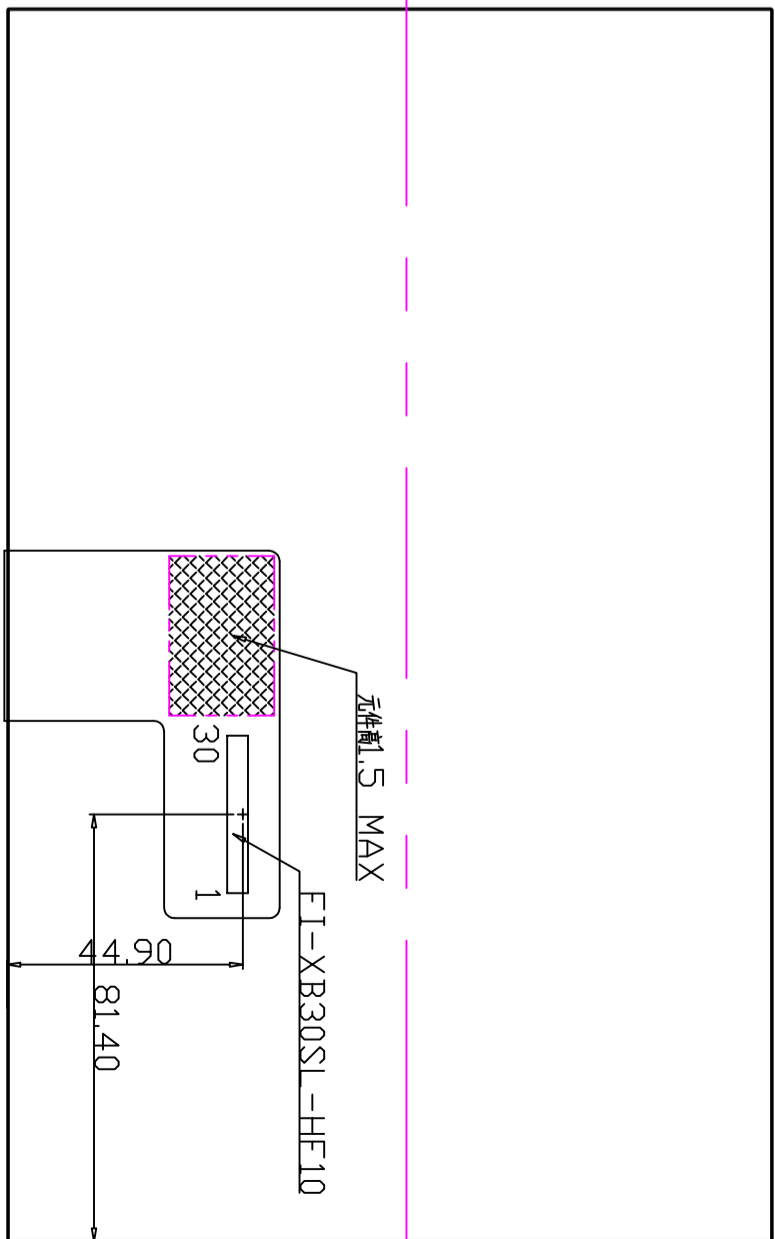
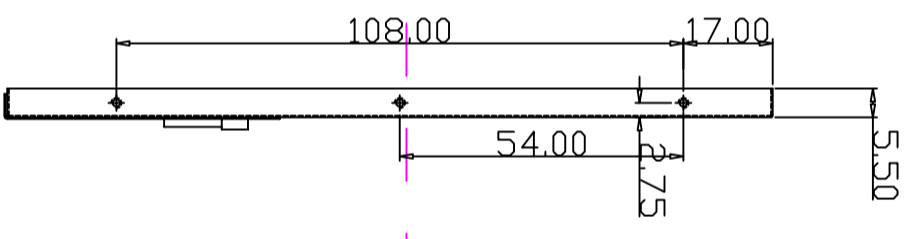
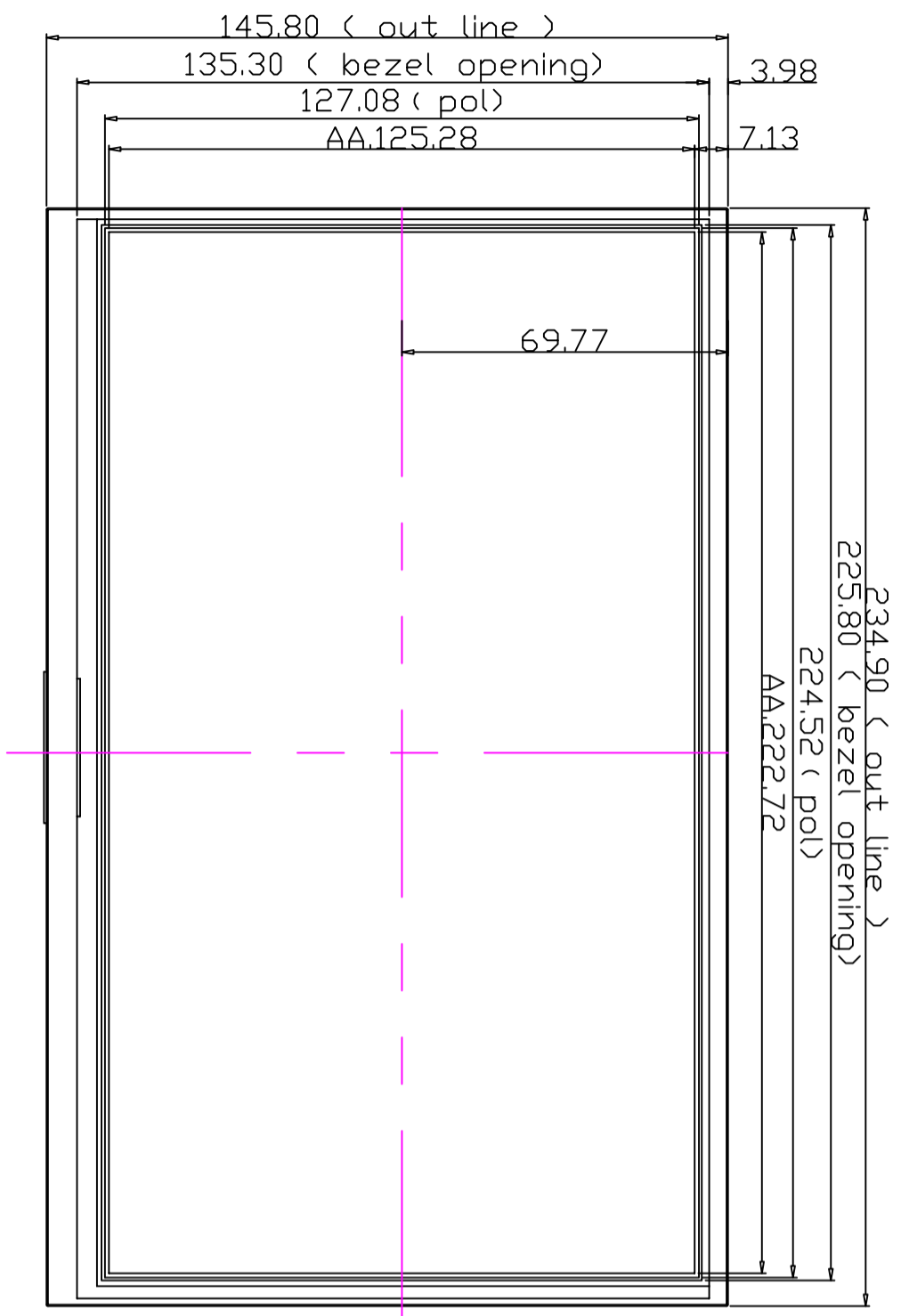
On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.


- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported to Daxian , and some problem is arisen in this specification due to the change
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

10. Package Drawing



REV	DATE	REVISER	REVISED DESCRIPTIONS



FIELD	TOLERANCES	MATERIAL NO. 物料编号	PV101028SL30W	Kingtech Group Co., Ltd.			
L ≤ 18.00	± 0.08	MATERIAL NAME 物料名称	模组图				
18.01 < L ≤ 100.00	± 0.10	MATERIAL 材质	EDITION 版本	A4	DESIGNED 设计	DATE 日期	
L > 100.01	± 0.15	 第三角法	UNIT 单位	mm	CHECK 审核	DATE 日期	
Angle	1°		SCALE 比例	1:1	APPROVED 确认	DATE 日期	