苏州芯显科技有限公司
Suzhou Xinxian Technology Co., LTD

SPECIFICATION FOR LCD MODULE

Customer : _____

Product Model: YH088IP36F60R0-01

Sample code: _____

Designed by	Checked by	Approved by

Final Approval by Customer

☐ **LCM Machinery OK**

Checked By _____

☐ **LCM Display OK**

Checked By _____

☐ **LCM OK**

☐ **NG，Problem survey:**

Approved By _____

※The specification of "TBD" should refer to the measured value of sample . If there is difference between the design specification and measured value, we naturally shall negotiate and agree to solution with customer.

Revision	Date	Page	Revised Content/Summary	Remark
00	2022/10/06	--	First issued.	

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1.0 General Descriptions

1.1 Introduction

The YH088IP36F60R0-01 is a Color Active Matrix Liquid Crystal Display. The matrix uses a-Si Thin Film Transistor as a switching device. This TFT LCD has a 8.8 inch diagonally measured active display area with HD resolution (1,280 horizontal by 480 vertical pixels array).

1.2 Features

- ■ Supported HD Resolution
- ■ LVDS Interface
- ■ Wide View Angle
- ■ Compatible with RoHS Standard

1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	8.8	inch
Active Area (H x V)	209.28 x 78.48	mm
Number of Pixels (H x V)	1,280 x 480	-
Pixel Pitch (H x V)	0.1635 x 0.1635	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally Black	-
Contrast Ratio	1000（Min.）	-
Response Time	25（Max.）@25℃	ms
Input Voltage	3.3 (Typ.)	V
Power Consumption	(TBD) (Max.)	W
Weight	(TBD) (Max.)	g
Outline Dimension (H x V x D)	229.7 (Typ.) x97.4 (Typ.) x 6.0(Typ.)	mm
Electrical Interface (Logic)	LVDS	-
Refectance(SCI)	5.6(Max.)	%
Support Color	16.7 M	-
NTSC	70(Typ.)	%
Optimum Viewing Direction	All	-
Surface Treatment	Hard Coating	-
Luminance	650(Typ.)	cd/m²

1.4 Functional Block Diagram

Figure 1 shows the functional block diagram.

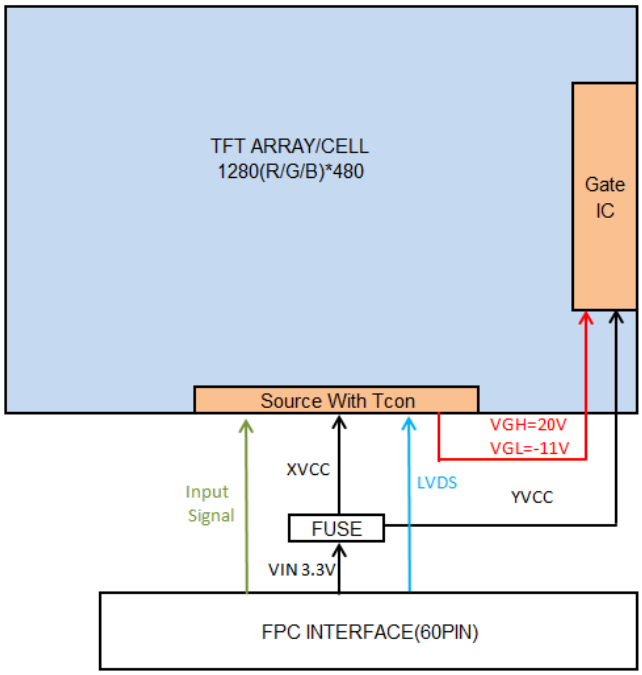


Figure 1 Block Diagram

1.5 Pixel Mapping

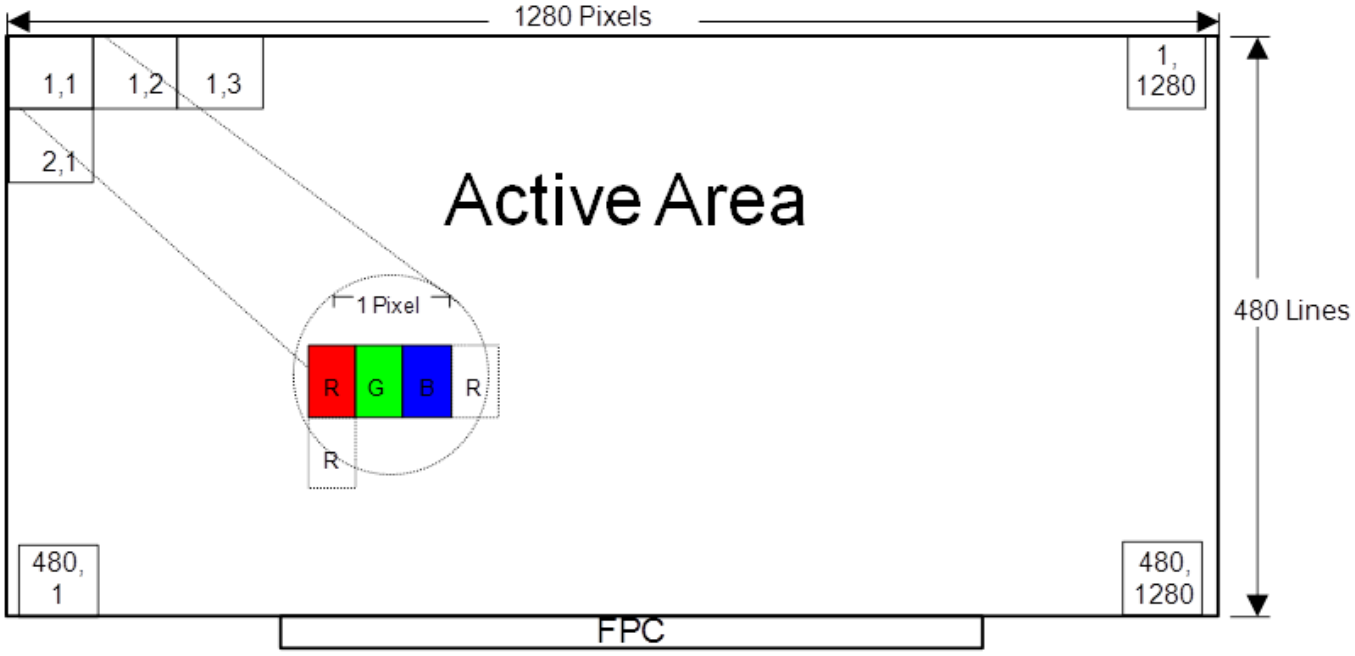


Figure 2 Pixel Mapping

2.0 Absolute Maximum Ratings

Table 1 Electrical & Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Logic Supply Voltage	V_{DD}	-0.3	4.0	V	(1),(2),(3),(4)
Logic Input Signal Voltage	V_{Signal}	-0.3	3.9	V	
Operating Temperature	T_{gs}	-30	85	℃	
Storage Temperature	T_a	-40	90	℃	

Note (1) All the parameters specified in the table are absolute maximum rating values that may cause faulty operation or unrecoverable damage, if exceeded. It is recommended to follow the typical value.

Note (2) All the contents of electro-optical specifications and display fineness are guaranteed under Normal Conditions. All the display fineness should be inspected under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55± 10%RH.

Note (3) Unpredictable results may occur when it was used in extreme conditions. T_a= Ambient Temperature, T_{gs}= Glass Surface Temperature. All the display fineness should be inspected under normal conditions.

Note (4) Temperature and relative humidity range are shown in the figure below. Wet bulb temperature should be lower than (57.8)℃, and no condensation of water. Besides, protect the FOG from static electricity.

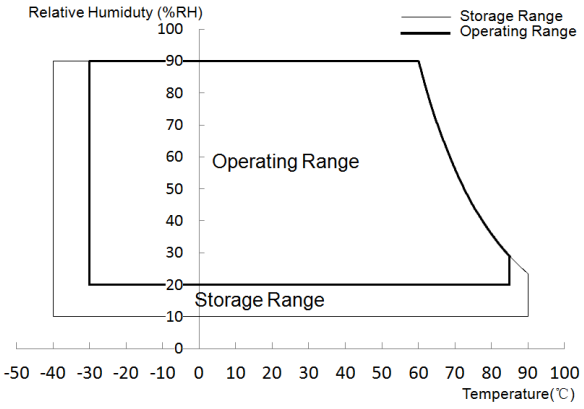


Figure 3 Absolute Ratings of Environment of the LCM

3.0 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes.

Table 2 Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle （CR≥10）	Horizontal	θ_{x+}	80	85	-	degree	(1),(2),(3),(6),(7)
		θ_{x-}	80	85	-		
	Vertical	θ_{y+}	80	85	-		
		θ_{y-}	80	85	-		
Contrast Ratio	Center		1000	TBD	-	-	(1),(2), (3) ,(6),(7) θx=θy=0°
Response Time	Rising + Falling (25℃)		-	-	25	ms	(1),(2), (4) ,(6),(7) θx=θy=0°
	Rising + Falling (-20℃)		-	-	200	ms	
	Rising + Falling (-30℃)		-	-	380	ms	
Luminance	L		600	650	-	%	(1),(5),(7)θx=θy=0°
Color Chromaticity (CIE1931)	Red x		Typ. -0.03	0.654	Typ. +0.03	-	(1),(5),(7) θx=θy=0°
	Red y			0.320		-	
	Green x			0.289		-	
	Green y			0.587		-	
	Blue x			0.139		-	
	Blue y			0.093		-	
	White x			0.300		-	
	White y			0.310		-	
NTSC	-		66	70	-	%	

Note (1) Measurement Setup:

The LCM should be stabilized at given ambient temperature (25℃) for 30 minutes to avoid abrupt temperature changing during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 30 minutes in the windless room.

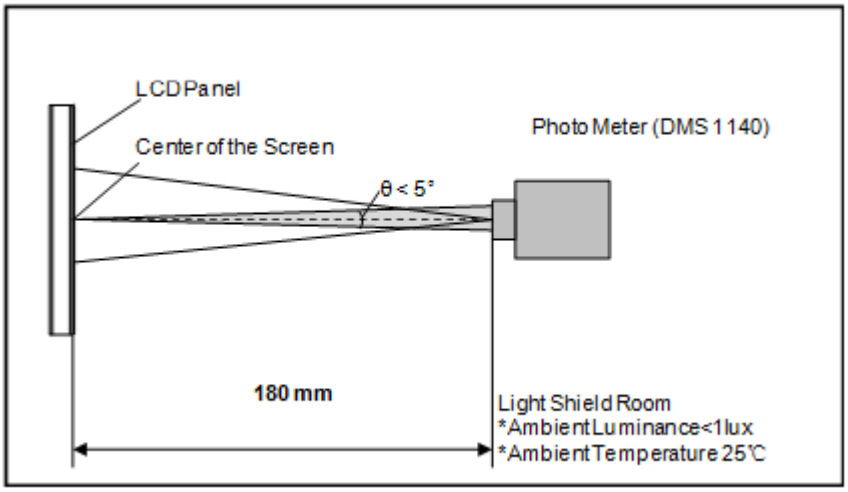


Figure 4 Measurement Setup

Note (2) Definition of Viewing Angle

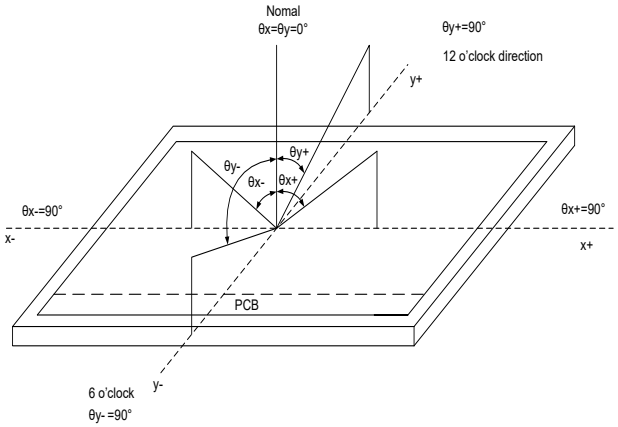


Figure 5 Definition of Viewing Angle

Note (3) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression:

Contrast Ratio (CR) = The luminance of White pattern/ The luminance of Black pattern

Note (4) Definition of Response Time (T_R, T_F)

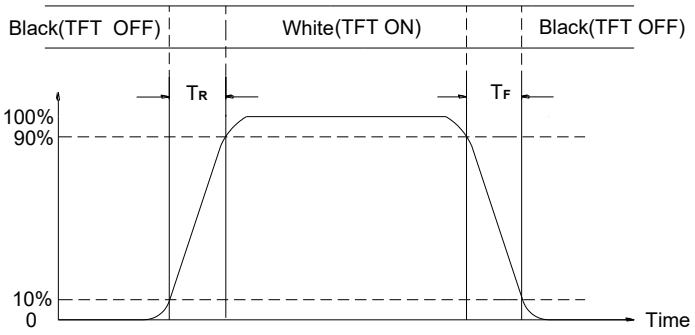


Figure 6 Definition of Response Time

Note (5) C-Light Spectrum

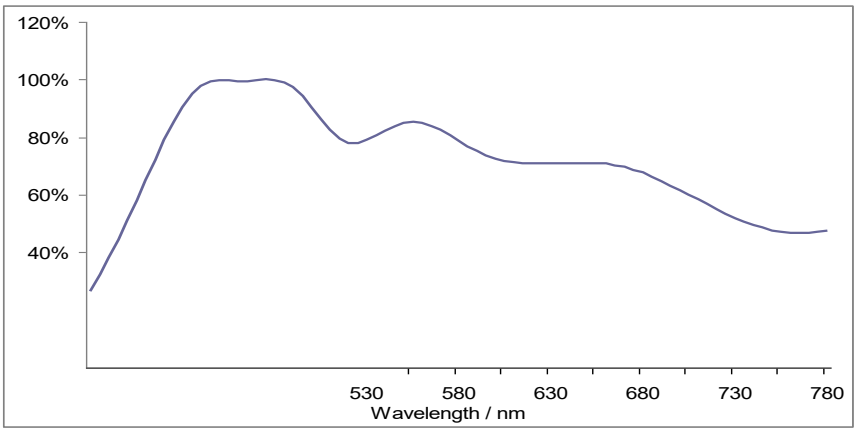


Figure 7 C-Light Spectrum

Note (6) Light source is the BL which is supplied by IVO.

TBD

Figure 8 Back Light Spectrum

Note (7) All optical data are based on IVO given system & nominal parameter & testing machine in this document.

4.0 Electrical Characteristics

4.1 Interface Connector

Table 3 Signal Connector Type

Item	Description
Mating Receptacle / Type (Reference)	IRISO/IMSA-9634S-60Y902_60PIN_0.5mm

Table 4 Signal Connector Pin Assignment

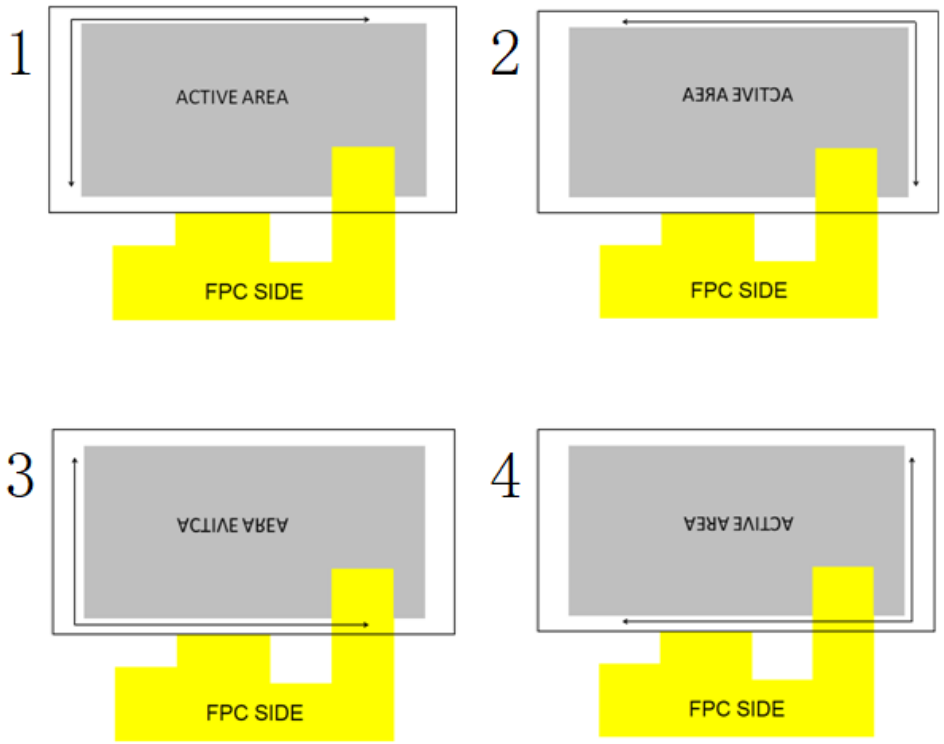
Pin No.	Symbol	Description	Remarks
1	GND	Ground	
2	NC	No Connection	
3	VDD	Digital Power(+3.3V)	3.0V-3.6V, 3.3V(TYP)
4	GND	Ground	
5	NC	No Connection	
6	VDD	Digital Power(+3.3V)	3.0V-3.6V, 3.3V(TYP)
7	GND	Ground	
8	FAIL_DET	Fail detection signal output FAIL_DET=H，on normal condition FAIL_DET=L，on error condition	
9	ATREN	Enable auto reload OTP / EEPROM every 60 frames. When stop reload or changing register values by SPI/I2C, ATREN should be kept 0. ATREN=H: Enable auto-reload OTP/EEPROM - ATREN=L: Disable auto-reload OTP/EEPROM	
10	NC	No Connection	
11	VDD_OTP	Power input for OTP programming (8.6V). Leave this pin open or connect it to VDD1 when not programming OTP	
12	NC	No Connection	
13	I2C_SCL	Serial interface clock input for I2C interface	
14	I2C_SDA	Serial Interface address and data input / output for I2C interface	

15	GND	Ground	
16	VDD	LVDS Power(+3.3V)	
17	GND	Ground	
18	PIND3	Positive LVDS differential data input	
19	NIND3	Negative LVDS differential data input	
20	GND	Ground	
21	PINC	Positive LVDS differential CLK input	
22	NINC	Negative LVDS differential CLK input	
23	GND	Ground	
24	PIND2	Positive LVDS differential data input	
25	NIND2	Negative LVDS differential data input	
26	GND	Ground	
27	PIND1	Positive LVDS differential data input	
28	NIND1	Negative LVDS differential data input	
29	GND	Ground	
30	PIND0	Positive LVDS differential data input	
31	NIND0	Negative LVDS differential data input	
32	GND	Ground	
33	GND	Ground	
34	RESET	Global Reset pin. Active low, If RESET connected to GND, the chip is in reset state. This pin must meet the sequence of power on/off.	
35	STBYB	Standby mode setting pin. Active low, Timing controller, output buffer, DAC and power circuit all off when STBYB is low This pin must meet the sequence of power on/off.	
36	RL	Horizontal shift direction (source output) selection RL=H, Forward (SOUT1→ SOUT2→...→SOUT1920) RL=L, Reverse (SOUT1920→SOUT1919→...→S1)	Note(1)
37	VDD	Digital Power(+3.3V)	3.0V-3.6V, 3.3V(TYP)

38	TB	Vertical shift direction(Gate output) selection TB = H, Forward,Top → Bottom TB = L, Reverse, Bottom → Top	Note(1)
39	GND	Ground	
40	NC	No Connection	
41	NC	No Connection	
42	NC	No Connection	
43	GND	Ground	
44	VDD	Digital Power(+3.3V)	3.0V-3.6V, 3.3V(TYP)
45	GND	Ground	
46	NC	No Connection	
47	NC	No Connection	
48	NC	No Connection	
49	BISTEN	Enable built-in self test (BIST) function BISTEN=H, BIST mode BISTEN=L, Normal mode (Please leave it to GND when normal operation)	
50	NC	No Connection	
51	NC	No Connection	
52	NC	No Connection	
53	GND	Ground	
54	VDD	Digital Power(+3.3V)	3.0V-3.6V, 3.3V(TYP)
55	SELB	8/6 bit mode selection SELB=H, 8bit SELB=L, 6bit	
56	NC	No Connection	
57	VDD	Digital Power(+3.3V)	3.0V-3.6V, 3.3V(TYP)
58	NC	No Connection	
59	GND	Ground	
60	NC	No Connection	

Note(1): Selection of scanning mode

Item	Setting of scan control input		Scanning Direction
	LR	TB	
1	H	H	Left to right, Up to down
2	L	H	Right to left,UP to down
3	H	L	Left to right, Down to up
4	L	L	Right to left, Down to up



4.2 Signal Electrical Characteristics

4.2.1 Signal Electrical Characteristics For LVDS Receiver

The built-in LVDS receiver is compatible with (ANSI/TIA/TIA-644) standard.

Table 5 LVDS Receiver Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	Vth	(100)	-	-	mV	V_{CM}=+1.2V
Differential Input Low Threshold	Vtl	-	-	(-100)	mV	V_{CM}=+1.2V
Magnitude Differential Input	$\|V_{ID}\|$	(150)	-	(600)	mV	-
Common Mode Voltage	V_{CM}	(0.45)	(1.2)	(1.7-|VID|/2)	V	-

Note (1) Input signals shall be low or Hi- resistance state when VDD is off.

Note (2) All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.

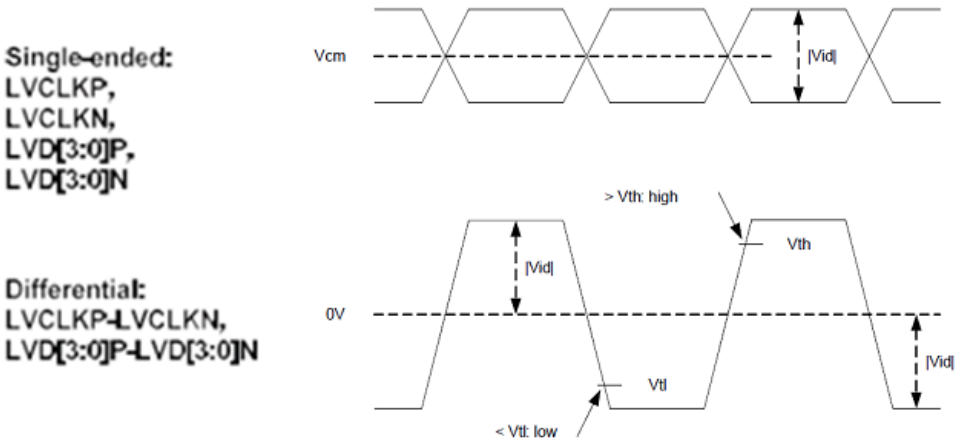


Figure 9 Voltage Definitions

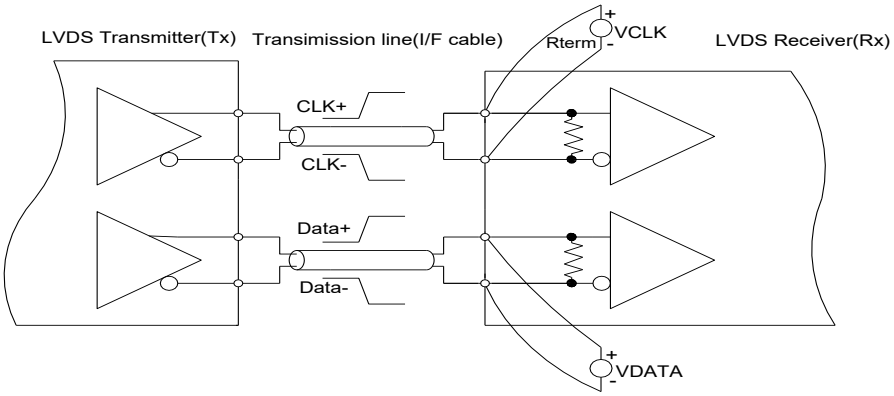


Figure 10 Measurement System

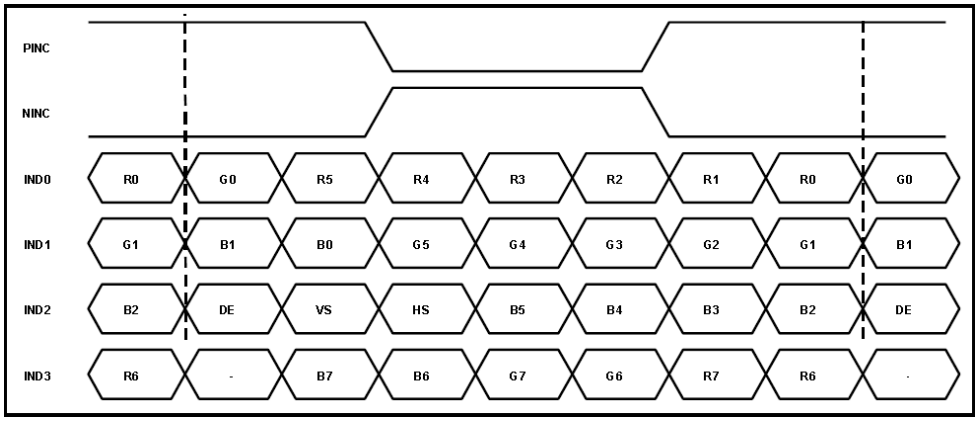


Figure 11 Data Mapping

4.2.2 LVDS Receiver Internal Circuit

Figure 12 shows the internal block diagram of the LVDS receiver. This FOG equips termination resistors for LVDS link.

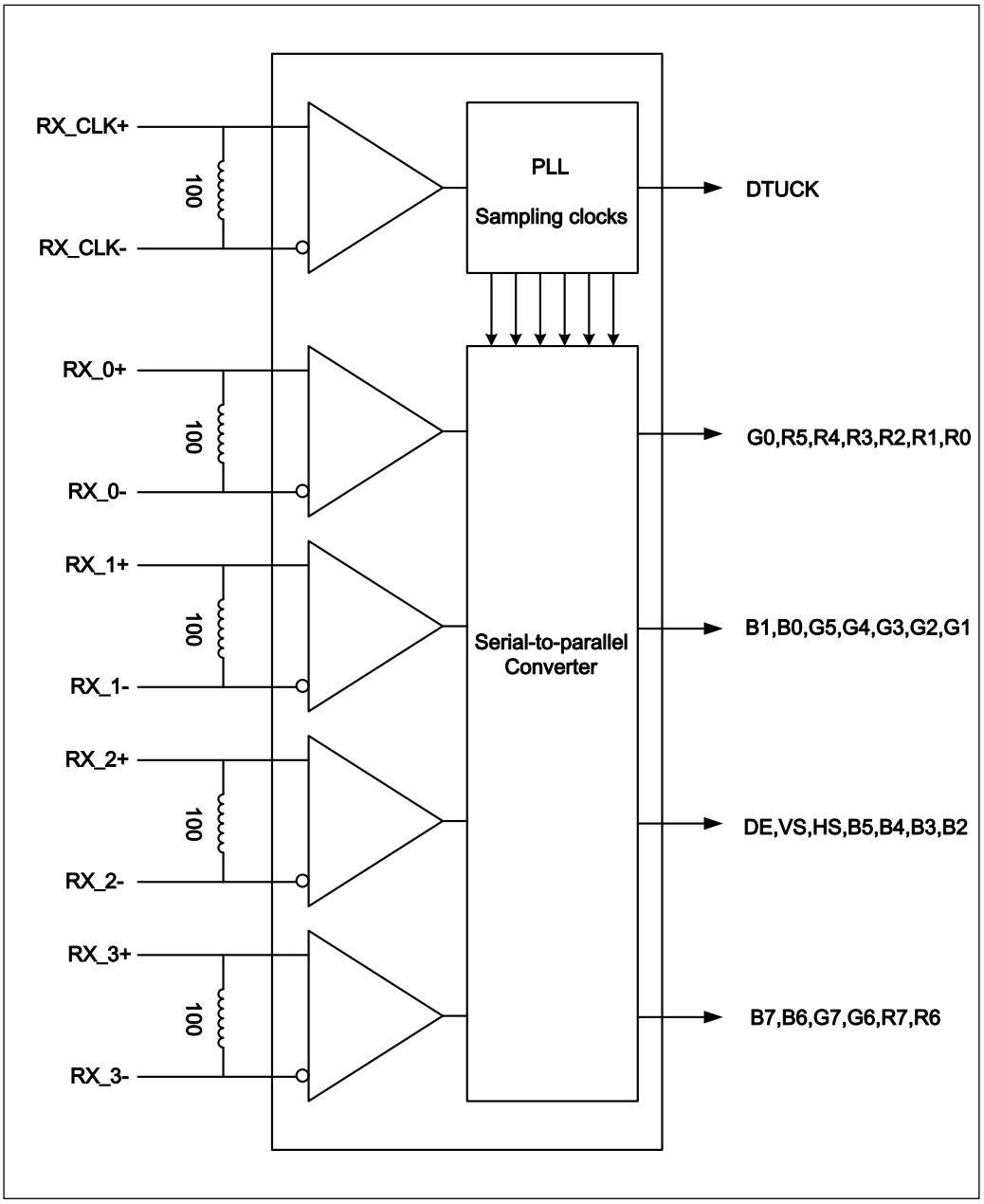


Figure 12 LVDS Receiver Internal Circuit

4.3 Interface Timings

Table 6 Interface Timings

Parameter	Symbol	Min.	Typ.	Max.	Unit
LVDS Clock Frequency	Fclk	40.1	40.5	42.3	MHz
H Total Time	HT	1,342	1,346	1,398	Clocks
H Active Time	HA		1,280		
V Total Time	VT	498	502	504	Lines
V Active Time	VA		480		
Frame Rate	FV	-	60	-	Hz

Note1：HT * VT *Frame Frequency≤(42.3) MHz

Note2: All reliabilities are specified for timing specification based on refresh rate of 60Hz.

4.4 Input Power Specifications

Input power specifications are as follows.

Table 7 Input Power Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
LOGIC :						
Power Supply Input Voltage	VDD	3.0	3.3	3.6	V	(1),(3)
Power Supply Input Current	IDD	-	-	232	mA	(1), (2)
Power Consumption	PDD	-	--	0.7	W	(1), (2)
Power Supply Inrush Current	IDD_P	-	-	1000	mA	(4)
Logic Input Signal High Level Voltage	VIH	0.7*VDD		VDD+0.3	V	(5)
Logic Input Signal Low Level Voltage	VIL	0		0.3*VDD	V	(5)

Note (1) All of the specifications are guaranteed under normal conditions. Normal conditions are defined as follow: Temperature: 25±2 ℃

Note (2) All of the absolute maximum ratings specified in the table, if exceeded, may cause faulty operation or unrecoverable damage. It is recommended to follow the typical value.

Note (3) The specified V_{DD} current and power consumption are measured under the V_{dd} = 3.3 V, FV= 60)Hz condition and White pattern.

Note(5) The below figures are the measuring VDD condition.

The Vdd condition is same as the minimum of T1 at Power on sequence.

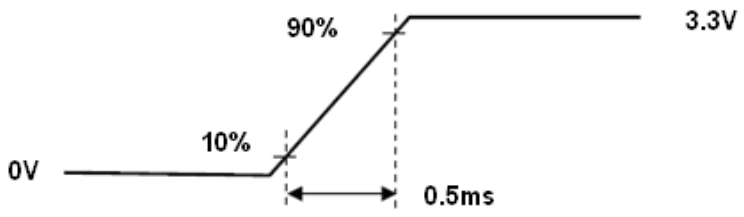


Figure 13 V_{DD} Rising Time

Note (5) Logic input signal include TB,RL, ATREN,BIST,SELB

4.5 Power ON/OFF Sequence

1.Interface signals are also shown in the chart. Signals from any system shall be Hi-resistance state or low level when VDD voltage is off.

2. When system first start up, should keep the VDD high time longer than 200ms, otherwise may cause image sticking when VDD drop off.

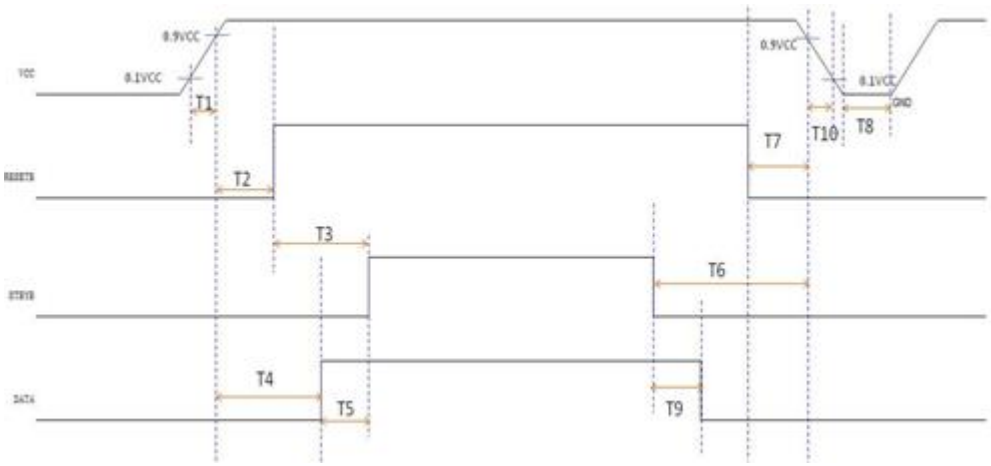


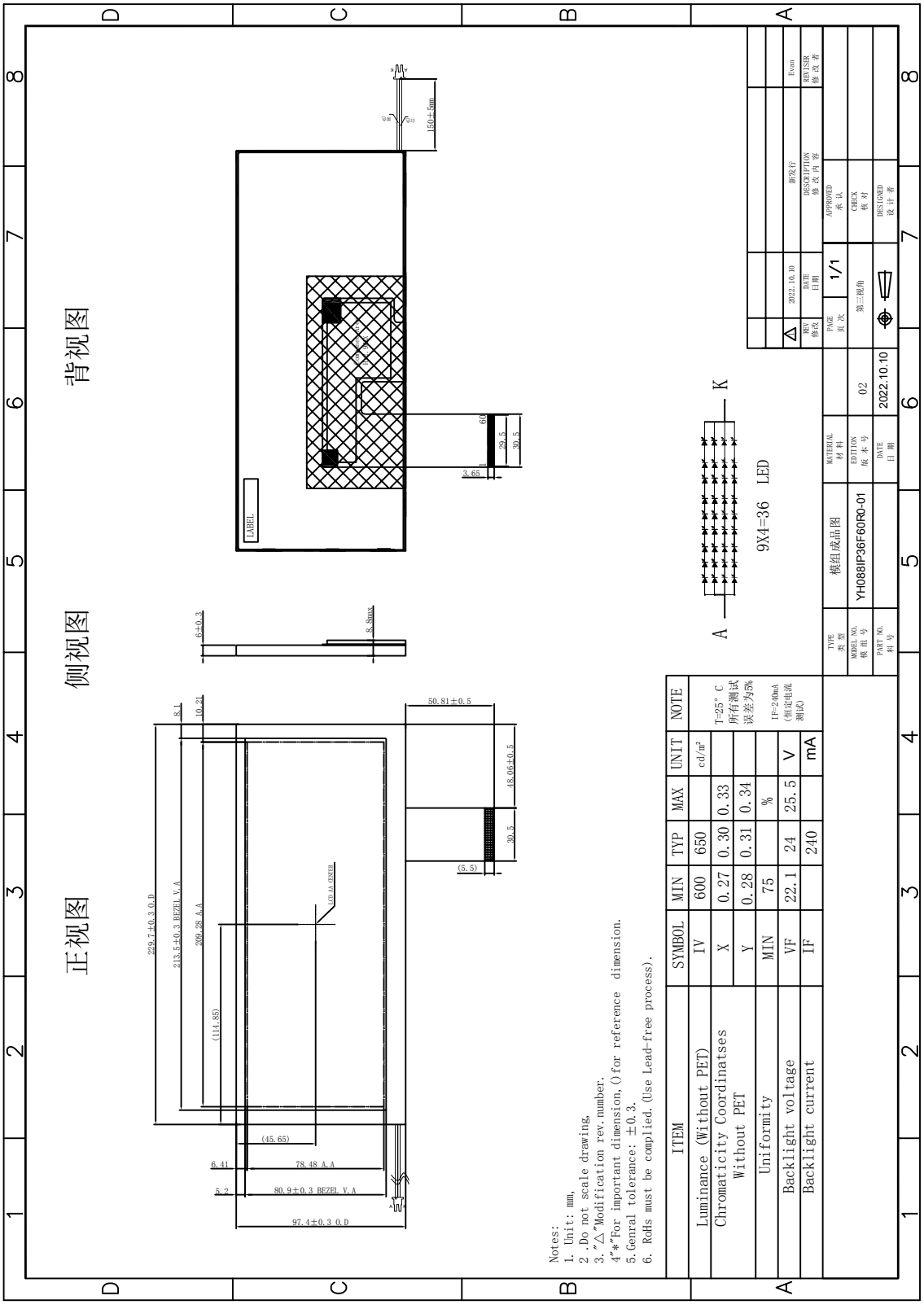
Figure 14 Power Sequence

Table 8 Power Sequencing Requirements

Parameter	Symbol	Unit	Min.	Typ.	Max.
VDD Rise Time (10% to 90%)	T1	ms	0.5	-	20
VDD to Reset	T2	us	100	-	-
Reset Good to STBYB	T3	ms	14	-	-
VDD Good to LVDS	T4	ms	0	-	50
LVDS to STBYB	T5	ms	1	10	-
STBYB to VDD off	T6	ms	-	33	83
RESET to VDD off	T7	ms	10	-	-
VDD off time	T8	ms	500	-	-
STBYB to DATA	T9	ms	1	-	16
VDD fall time (90% to 90%)	T10	ms	0.5	-	30

5.0 Mechanical Characteristics

5.1 Outline Drawing



ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Luminance (Without PET)	IV	600	650		cd/m²	Ta=25° C 所有测试误差为5%
Chromaticity Coordinates Without PET	X	0.27	0.30	0.33		
	Y	0.28	0.31	0.34		
Uniformity	MIN	75		%		IF=240mA (恒定电流测试)
Backlight voltage	VF	22.1	24	25.5	V	
Backlight current	IF		240		mA	

TYPE 类 型	模组成品图
MODEL NO. 模 组 号	YH088IP36F60R0-01
PART NO. 料 号	
MATERIAL 材 料	
EDITION 版 本 号	02
DATE 日 期	2022.10.10
REV 修改	2022.10.10
DATE 日 期	新发行
DESCRIPTION 修 改 内 容	Evan
APPROVED 承 认	KEVISIB
CHECK 核 对	
DESIGNED 设 计 者	
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第三视角	

5.2 Dimension Specifications

Table 9 FOG Dimension Specifications

Item	Min.	Typ.	Max.	Unit
Width	97.1	97.4	97.7	mm
Height	229.4	229.7	230	mm
Thickness	5.7	6.0	6.3	mm
Weight	-	-	TBD	g

Note：Outline dimension measure instrument: Coordinate Measuring Machine.

5.3 Backlight Unit

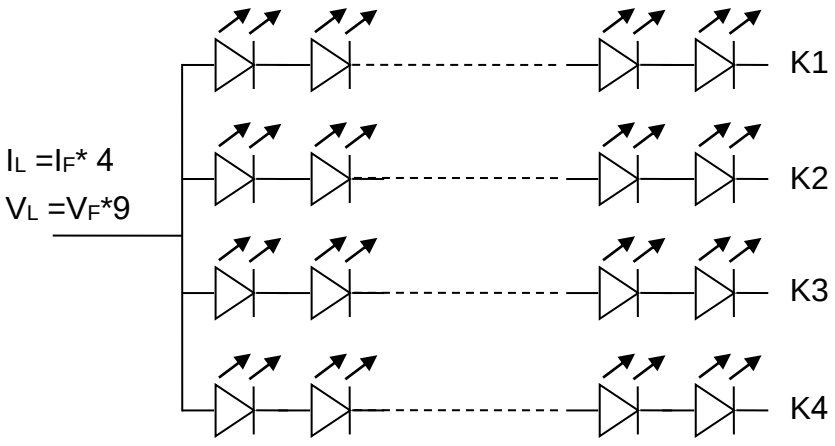
Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	I_L	--	240	--	mA	Ta=25℃
LED Voltage	V_L	25.2	27	28.8	Volt	Ta=25℃
LED Life-Time	N/A	20,000	--	--	Hour	Ta=25℃ I=240mA Note (2)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 °C, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note (2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL=240 A. The LED lifetime could be decreased if operating IL is larger than 240 mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit 9S4P =36pcs LED, $I_L = I_F * 4$, $V_L = V_F * 9$

LED temperature current curve：



6.0 Reliability Conditions

Table 10 Reliability Condition

Item	Test Conditions		Note
High Temperature/High Humidity Operating Test	T_{gs}=60℃, 90%RH, 500hours		(1),(2),(3),(4)
High Temperature Operating Test	T_{gs}=85℃, 500 hours		
Low Temperature Operating Test	T_a=-30℃, 500hours		
High Temperature Storage Test	T_a=90℃, 500 hours		(1),(3),(4)
Low Temperature Storage Test	T_a=-40℃, 500 hours		
ESD Operating Test	Contact	±8KV, 150pF(330Ohm)	(1),(2),(5)
	Air	±15KV, 150pF(330Ohm)	
Temperature Shock Test	-30°C <> +80°C, 30min/5min/30min,200cycles Non-Operating		

Note (1) A sample can only have one test. Outward appearance, image quality and optical data can only be checked at normal conditions according to the document before reliable test. Only check the function of the LCM after reliability test.

Note (2) The setting of electrical parameters should follow the typical value before reliability test.

Note (3) During the test, it is unaccepted to have condensate water remains. Besides, protect the FOG from static electricity.

Note (4) The sample must be released for 24 hours under normal conditions before judging. Furthermore, all the judgment must be made under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55±10%RH. T_a= Ambient Temperature, T_{gs}= Glass Surface Temperature.

Note (5) It could be regarded as pass, when the LCM recovers from function fault caused by ESD a few minutes later.

7.0 Package Specification

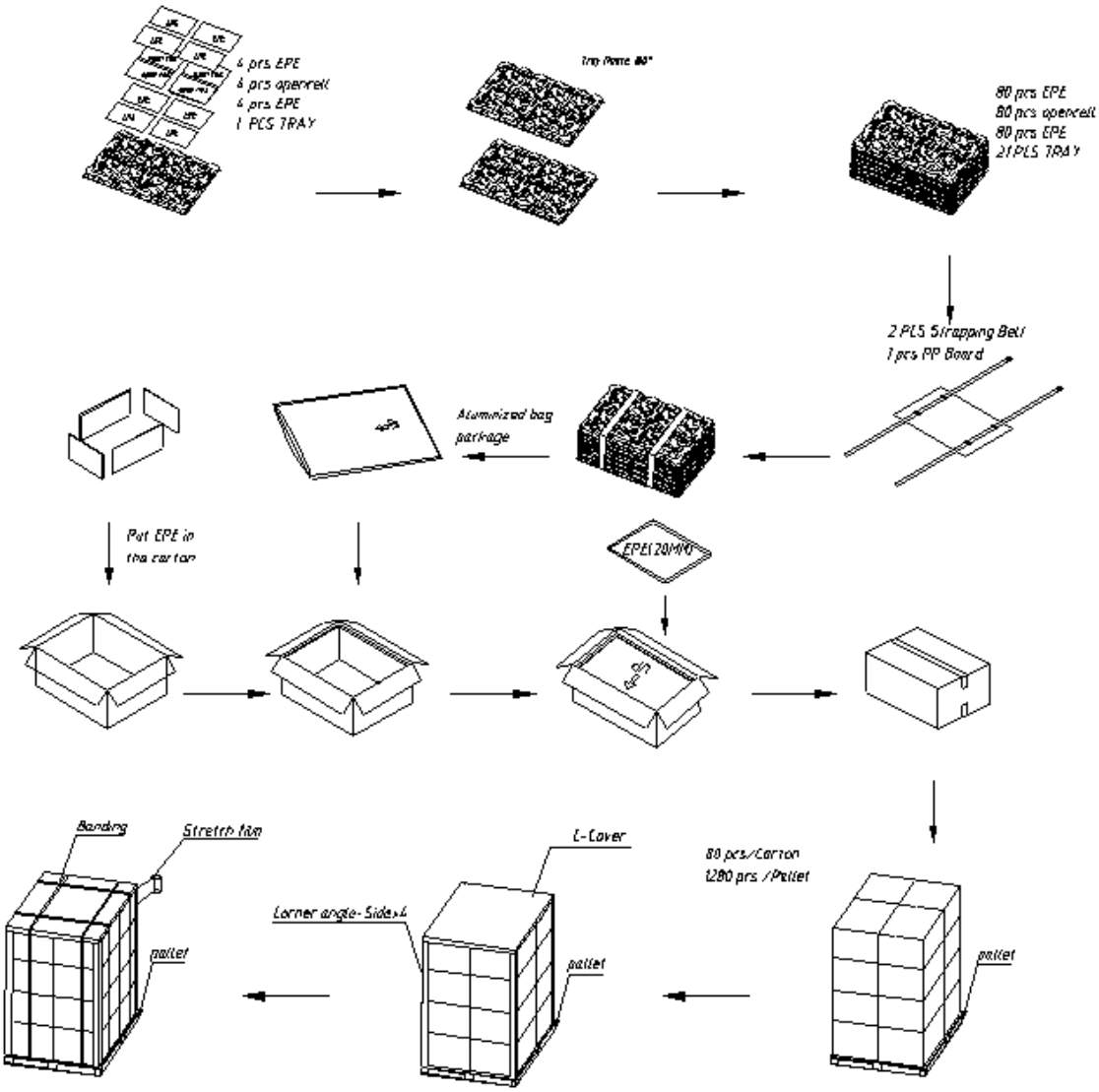


Figure 17 Packing Method

8.0 Lot Mark

TBD

9.0 GENERAL PRECAUTION

9.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

9.2 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. HannStar does not warrant the module, if customers disassemble or modify the module.

9.3 Breakage of LCD Panel

9.3.1. If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.

9.3.2. If liquid crystal contacts mouth or eyes, rinse out with water immediately.

9.3.3. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

9.3.4. Handle carefully with chips of glass that may cause injury, when the glass is broken.

9.4 Electric Shock

9.4.1. Disconnect power supply before handling LCD module.

9.4.2. Do not pull or fold the LED cable.

9.4.3. Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

9.5 Absolute Maximum Ratings and Power Protection Circuit

9.5.1. Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental t emperature, etc., otherwise LCD module may be damaged.

9.5.2. Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

9.5.3. It's recommended to employ protection circuit for power supply.

9.6 Operation

9.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

9.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

9.6.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

9.6.4 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.

9.6.5 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

9.7 Mechanism

Please mount LCD module by using mounting holes arranged in four corners tightly.

9.8 Static Electricity

9.8.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

9.8.2 Because LCD module use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.

9.9 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

9.10 Disposal

When disposing LCD module, obey the local environmental regulations.