Tentative Product Specification

To:

Product Name: M057GWV3 R0

Document Issue Date: 2022/11/17

Customer	InfoVision Optoelectronics
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Revision	Date	Page	Revised Content/Summary	Remark
00	2022/10/20	--	First issued.	-
01	2022/10/25	P17 P18 P19,20	Update Note (7) Update Table 7,add Note(1),(2) Update Figure 12,13	-
02	2022/11/07	P10 P12 P14 P19 P21	Update Table3,Table4 Update Note(4) Update Table5 Update Figure 12 Update Table8	-
03	2022/11/09	P15	Update Figure8	-
04	2022/11/17	P12 P16	Add Note(2) Update Figure9	-

CONTENTS

1.0 General Descriptions

1.1 Introduction

The M057GWV3 R0 is a Color Active Matrix Liquid Crystal Display with a back light system. The matrix uses a-Si Thin Film Transistor as a switching device. This TFT LCD has a 5.7 inch diagonally measured active display area with HD resolution (640horizontal by 480 vertical pixels array).

1.2 Features

- Supported 640*480 Resolution
- TTL Interface
- Wide View Angle
- Compatible with RoHS Standard

1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	5.7	inch
Active Area (H x V)	115.2 x 86.4	mm
Number of Pixels (H x V)	640 x 480	-
Pixel Pitch (H x V)	0.06 x 0.18	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally Black	-
White Luminance	(500) (Typ.)	cd /m^2
Contrast Ratio	(1000) (Typ.)	-
Response Time	(35) (Typ.)	ms
Input Voltage	(3.3) (Typ.)	V
Power Consumption	(1.622) (Max.) @ Mosaic pattern,FV=60Hz	W
Weight	(100)(Max.)	g
Outline Dimension (H x V x D)	(127.2) (Typ.) x (100.4)(Typ.) x(8) (Max.)	mm
Electrical Interface (Logic)	TTL	-
Support Color	262 K	-
NTSC	(72) (Typ.)	%
Surface Treatment	HC	-

1.4 Functional Block Diagram

Figure 1 shows the functional block diagram of the LCD module.

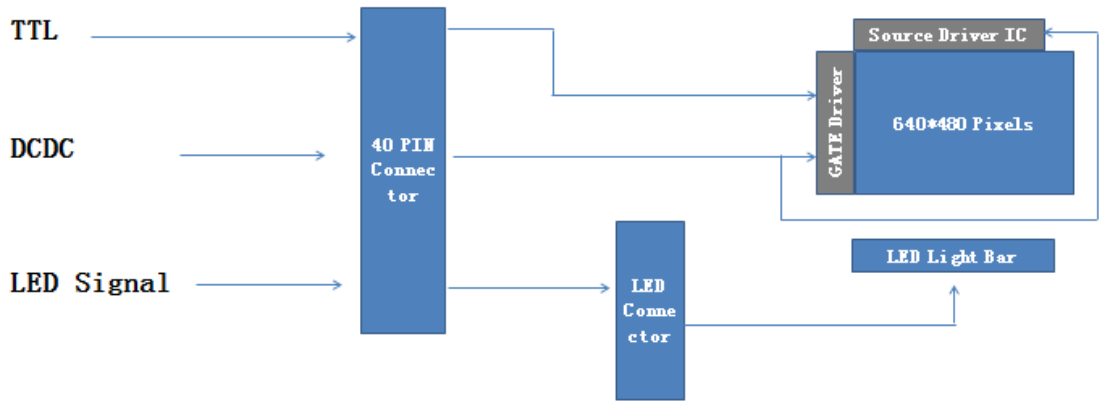


Figure 1 Block Diagram

1.5 Pixel Mapping

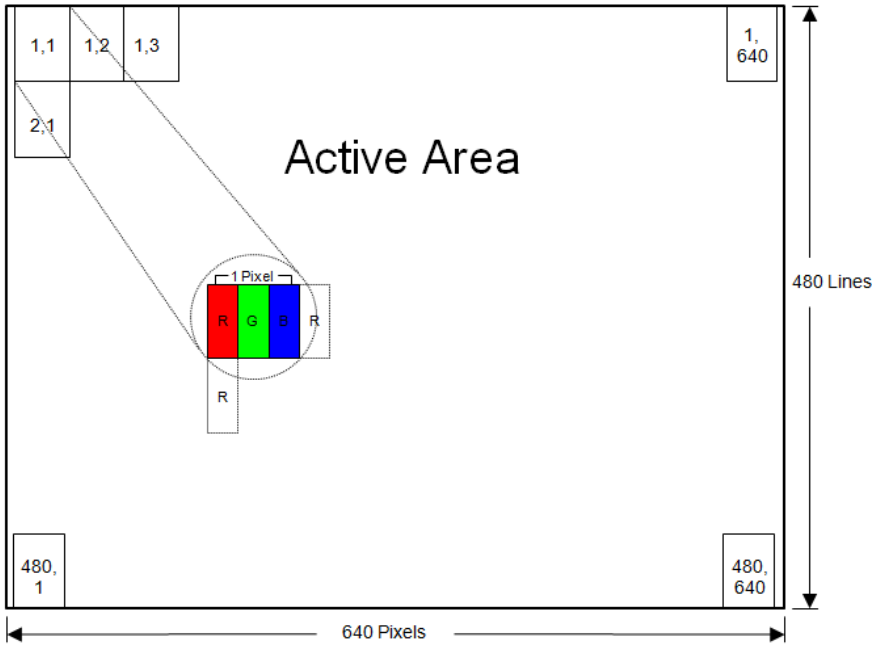


Figure2 Pixel Mapping

2.0 Absolute Maximum Ratings

Table 1 Electrical & Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Logic Supply Voltage	V_{DD}	(-0.5)	(5)	V	(1),(2),(3),(4)
Logic Input Signal Voltage	V_{Signal}	(-0.5)	(5)	V	
Operating Temperature	T_{gs}	(-20)	(70)	℃	
Storage Temperature	T_a	(-30)	(80)	℃	

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 38.3℃, and no condensation of water. Besides, protect the module from static electricity.

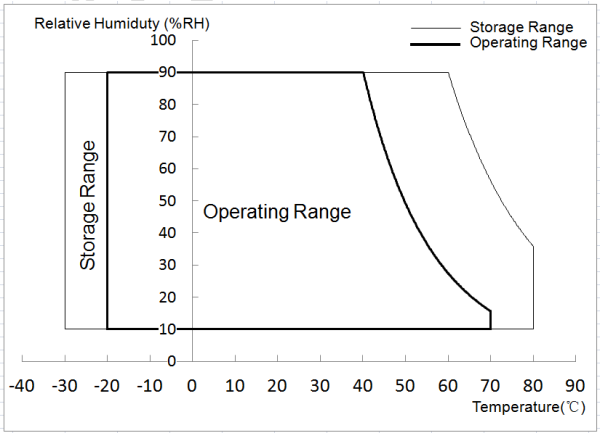


Figure 3 Absolute Ratings of Environment of the LCD Module

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),(4)(8)
		θ_{x-}	(80)	(85)	-		
	Vertical	θ_{y+}	(80)	(85)	-		
		θ_{y-}	(80)	(85)	-		
Contrast Ratio	Center		(700)	(1000)	-	-	(1),(2),(4),(8) θx=θy=0°
Response Time	Rising + Falling		-	TBD	(35)	ms	(1),(2),(5),(8) θx=θy=0°
Color Chromaticity (CIE1931)	Red x		TBD	TBD	TBD	-	(1),(2),(3),(8) θx=θy=0°
	Red y			TBD		-	
	Green x			TBD		-	
	Green y			TBD		-	
	Blue x			TBD		-	
	Blue y			TBD		-	
	White x		Typ. -0.05	(0.315)	Typ. +0.05	-	
	White y			(0.335)		-	
NTSC	-		TBD	(72)	-	%	(1),(2),(3),(8) θx=θy=0°
White Luminance	Center Points		(350)	(500)	-	cd/m^2	(1),(2),(6),(8) θx=θy=0°
Luminance Uniformity	9 Points		(75)	(80)	-	%	(1),(2),(7),(8) θx=θy=0°

Note (1) Measurement Setup:

The LCD module 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.

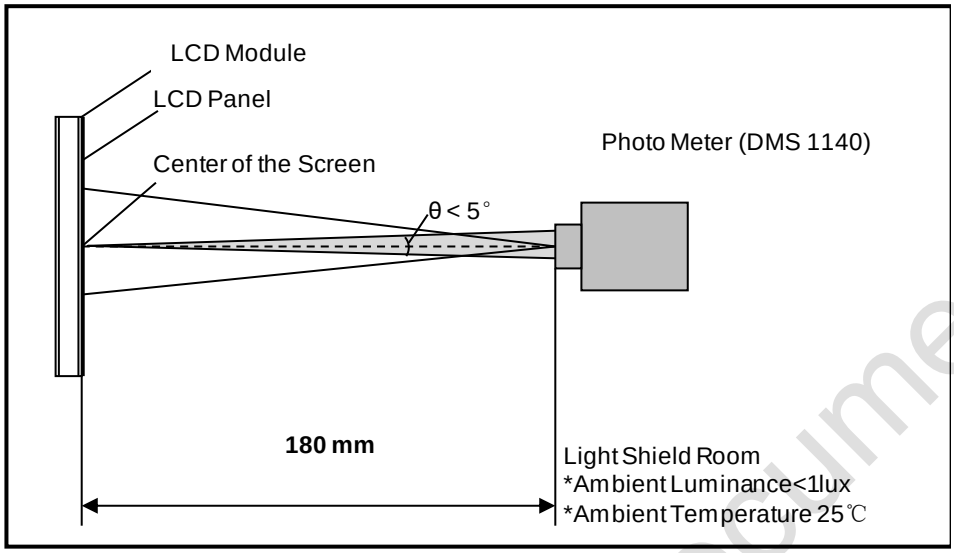


Figure 4 Measurement Setup

Note (2) The LED input parameter setting as:

I_{LED}: (60) mA

Note (3) Definition of Viewing Angle

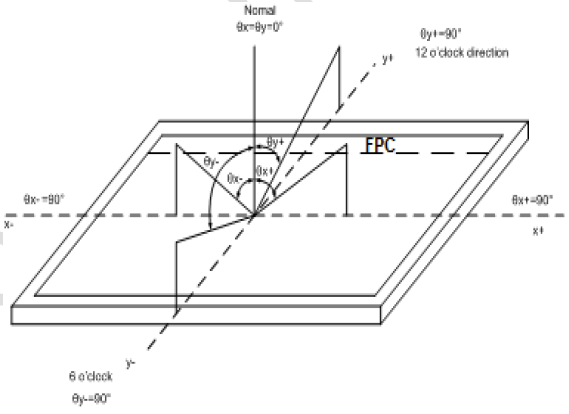


Figure 5 Definition of Viewing Angle

Note (4) 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 (5) Definition of Response Time (T_R, T_F)

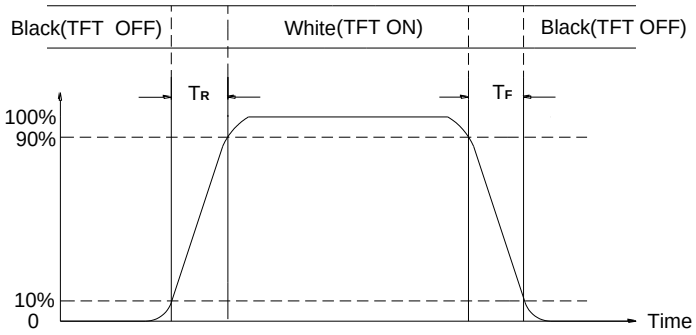


Figure 6 Definition of Response Time

Note (6) Definition of Luminance of White

Measure the luminance of White pattern (Ref.: Active Area)

Display Luminance=L1（center point）

H—Active Area Width, V—Active Area Height, L—Luminance

Note (7) Definition of Luminance Uniformity (Ref.: Active Area)

Measure the luminance of White pattern at X points.

Luminance Uniformity= Min.(L1, L2, ... L9) / Max.(L1, L2, ... L9)

H—Active Area Width, V—Active Area Height, L—Luminance

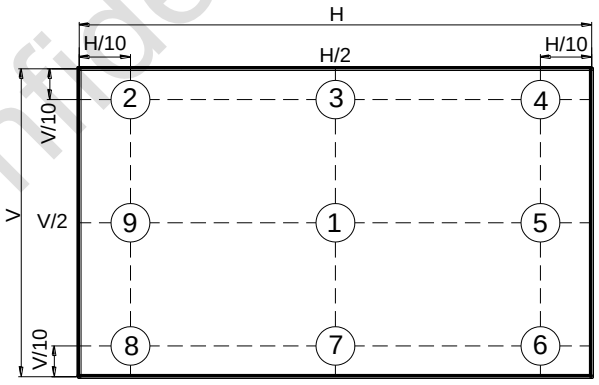


Figure 7 Measurement Locations of 9 Points

Note (8) 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	Remarks
Manufacturer / Type	IMSA-9637S-40Y801 (Products type after packaging) IMSA-9637S-40C-GFN4 (Single product type)	Note(1)

Table 4 Signal Connector Pin Assignment

Pin No.	Symbol	Description	Remarks
1	GND	GND	-
2	CK	Clock for input data, Data latched at falling edge	-
3	HSYNC	HORIZONTAL SYNCHRONOUS SIGNAL	Note(2)
4	VSYNC	VERYOCAL SYNCHRONOUS SIGNAL	Note(2)
5	GND	GND	-
6	R0	RED DATA SIGNAL(LSB)	-
7	R1	RED DATA SIGNAL	-
8	R2	RED DATA SIGNAL	-
9	R3	RED DATA SIGNAL	-
10	R4	RED DATA SIGNAL	-
11	R5	RED DATA SIGNAL(MSB)	-
12	GND	GND	-
13	G0	GREEN DATA SIGNAL(LSB)	-
14	G1	GREEN DATA SIGNAL	-
15	G2	GREEN DATA SIGNAL	-
16	G3	GREEN DATA SIGNAL	-
17	G4	GREEN DATA SIGNAL	-
18	G5	GREEN DATA SIGNAL(MSB)	-
19	GND	GND	-

20	B0	BLUE DATA SIGNAL(LSB)	-
21	B1	BLUE DATA SIGNAL	-
22	B2	BLUE DATA SIGNAL	-
23	B3	BLUE DATA SIGNAL	-
24	B4	BLUE DATA SIGNAL	-
25	B5	BLUE DATA SIGNAL(MSB)	-
26	BIST	For IVO Test Only When BIST="H" Panel will leave normal operation mode and starts to generate the BIST pattern panel without CK signal When BIST="L" Normal Operations(Default) Suggest Connecting to GND if not used, don't floating.	Note(3)
27	ENAB	Data Input Enable. Active High to enable the data input bus under "DE Mode".	-
28	VDD	Digital power	-
29	VDD	Digital power	-
30	R/L	Source Right or Left sequence control. L: Source Data scan from left to right; (Default Pull Low With 10K Resistance). H: Source Data scan from right to left.	Note (4)
31	U/D	Gate Driver Up/down scan setting. L：Gate scan from up to down; (Default Pull Low With 100K Resistance). H：Gate scan from down to up.	Note (4)
32	NC	NO connection	-
33	CA1	CATHODE ONE	-
34	CA2	CATHODE TWO	-

35	CA3	CATHODE THREE	-
36	CA4	CATHODE FOUR	-
37	AN1	ANODE ONE	-
38	AN2	ANODE TWO	-
39	AN3	ANODE THREE	-
40	AN4	ANODE FOUR	-

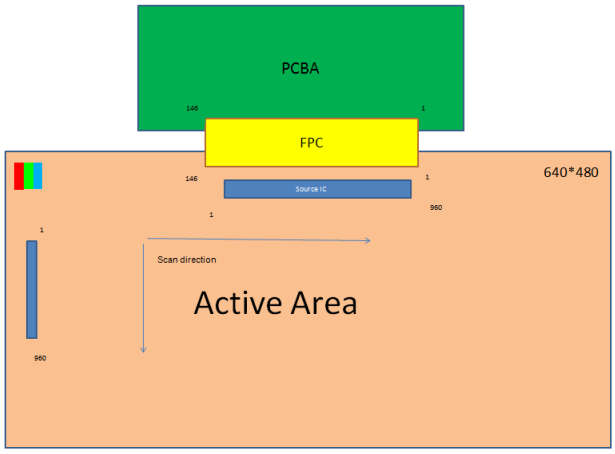
Note (1): IMSA-9637S-40Y801 (Products type after packaging) and IMSA-9637S-40C-GFN4 (Single product type) are the same product.

Note (2): In DE mode, PIN3 and PIN 4, whether connected to Floating, GND or H/V sync signal, there is no risk.

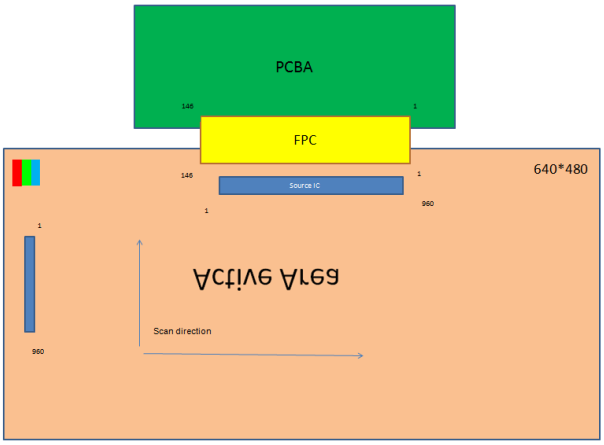
Note (3): H：2.3V~3.3V；L：0~0.99V.

Note (4): R/L&U/D should be pulled down when the module is displayed normally.

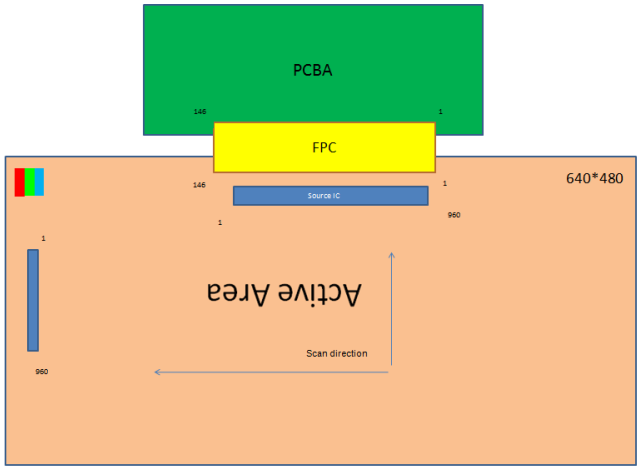
R/L: Low , U/D:Low



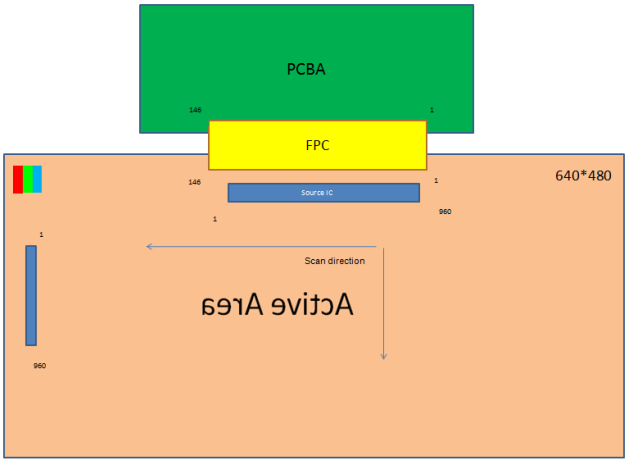
R/L: Low , U/D:High



R/L: High, U/D:Hight



R/L: High, U/D:Low



4.2 Interface Timings

4.2.1 Timing Characteristics

Synchronization method should be DE mode.

Table 5 Interface Timings

Parameter	Symbol	Min	Typ.	Max.	Unit	Remarks
Clock Frequency	Fclk	(23.7)	(25.2)	(30.2)	MHz	Note(1)
Horizontal Total	Tht	(770)	(800)	(900)	Clocks	
Horizontal Active Time	Tha	-	(640)	-	Clocks	Note(3)
Horizontal Synchronization	Ths	(5)	(30)	(30)	Clocks	Note(3)
Horizontal Back Porch	Thb	(107)	(114)	(145)	Clocks	Note(3)
Horizontal Front Porch	Thf	(16)	(16)	(85)	Clocks	Note(3)
Horizontal （Back Porch+ Synchronization）	The	(112)	(144)	(175)	Clocks	
Vertical Total Time	Tvt	(515)	(525)	(560)	Lines	
Vertical Active Time	Tva	-	(480)	-	Lines	Note(3)
Vertical Synchronization	Tvc	(1)	(3)	(5)	Lines	Note(3)
Vertical Back Porch	Tvb	(1)	(32)	(71)	Lines	Note(3)
Vertical Front Porch	Tvf	(4)	(10)	(33)	Lines	Note(3)
Vertical (Back Porch+ Synchronization)	Tve	(2)	(35)	(76)	Lines	
Frame Rate	Fv	-	(60)	-	Hz	

Note(1):23.7 MHz <= HT * VT *Frame Frequency<=30.2 MHz

Note(2): H Blanking Time and V Blanking Time can not be changed at every frame.

Note(3):

1.515<=(Tva+ Tvc+ Tvb+ Tvf)<=560

2.770<=(Tha +Ths + Thb+ Thf)<=900

Note(4): This product should select DE mode.

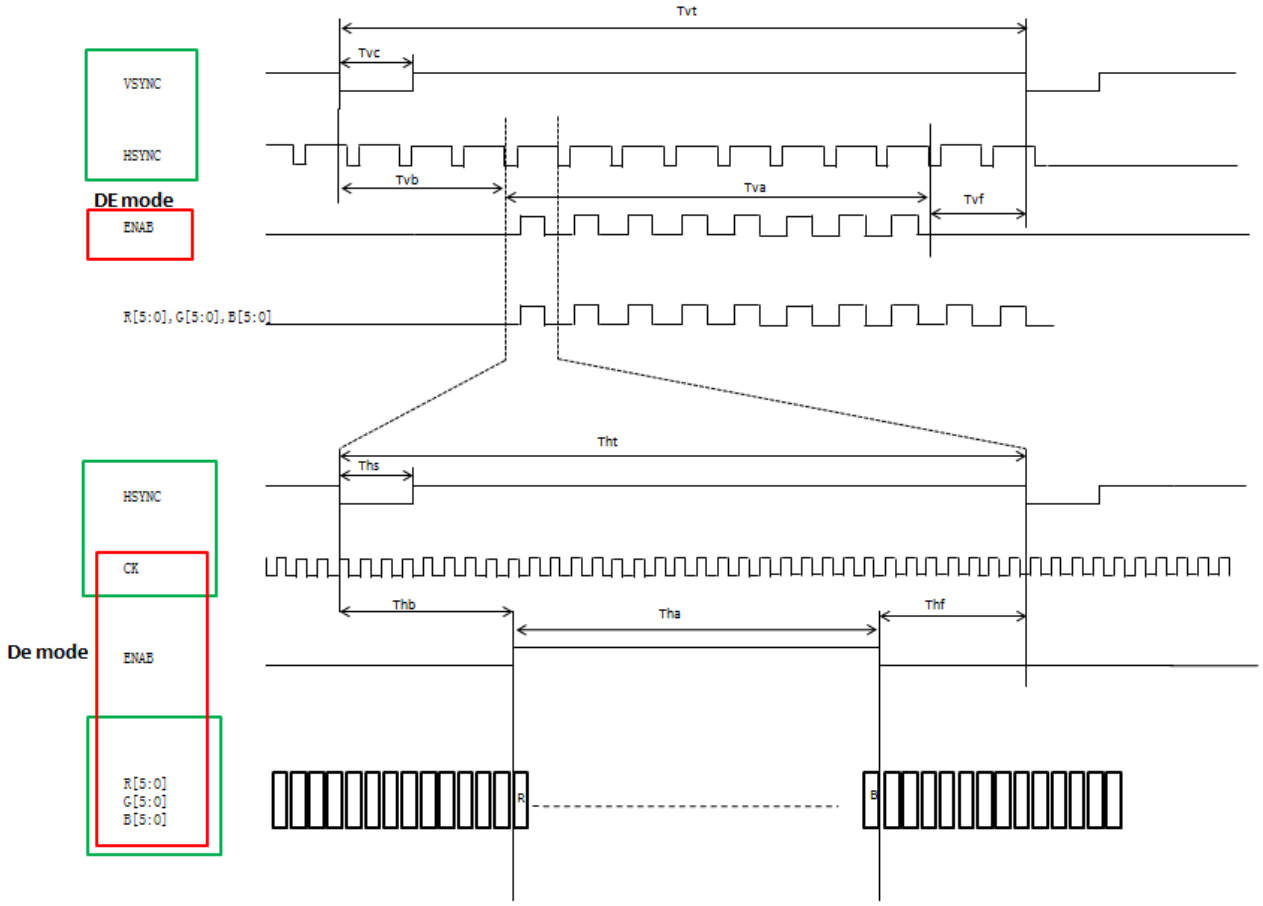


Figure 8 Timing Characteristics

4.2.2 Input setup timing requirement

Parameter	Symbol	Unit	Min.	Typ.	Max.
Clock period	PW_{CLK}	ns	-	(39.7)	-
Clock pulse high period	PWH	ns	(40%)	-	(60%)
Clock pulse low period	PWL	ns	(40%)	-	(60%)
Data setup time	t_{ds}	ns	(8)	-	-
Data hold time	t_{dh}	ns	(8)	-	-
DE setup time	t_{des}	ns	(8)	-	-
DE hold time	t_{deh}	ns	(8)	-	-
Hsync setup time	t_{hs}	ns	(8)	-	-
Hsync hold time	t_{hh}	ns	(8)	-	-
Vsync setup time	tvhs	ns	(8)	-	-
Vsync hold time	tvhh	ns	(8)	-	-

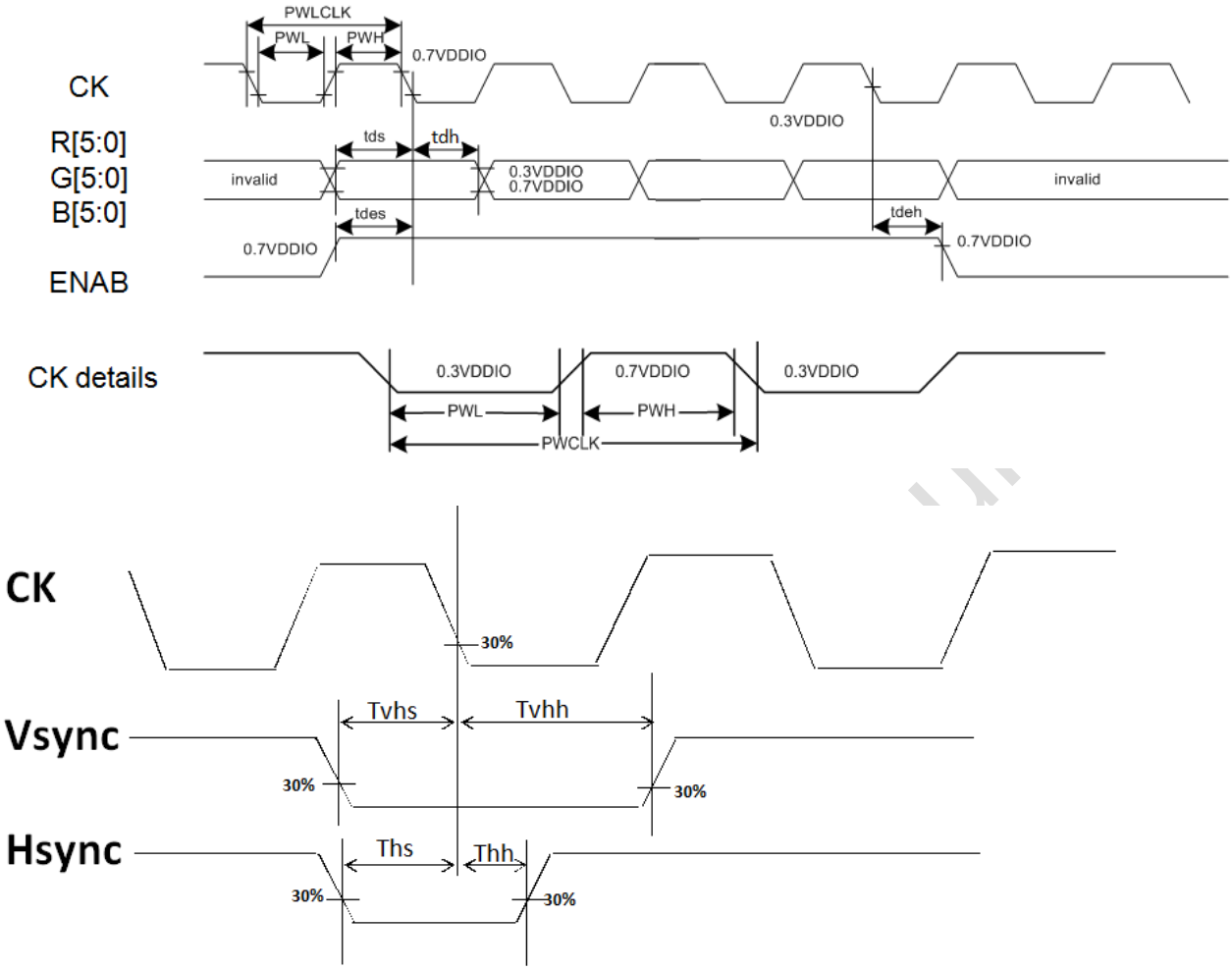


Figure 9 Input setup timing requirement

4.3 Input Power Specifications

Input power specifications are as follows.

Table 6 Input Power Specifications

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
System Power Supply							
LCD Drive Voltage (Logic)		V_{DD}	(3)	(3.3)	(3.6)	V	(1),(2)
VDD Current	Mosaic Pattern	I_{DD}	-	-	(0.175)	A	(1),(3)
VDD Power Consumption	Mosaic Pattern	P_{DD}	-	-	(0.578)	W	
Input signal Voltage	High level voltage	VIH	(0.7*VDD)	-	(VDD)	V	(1)
	Low level voltage	VIL	(0)	-	(0.3*VDD)	V	
Rush Current		I_{Rush}	-	-	(1.5)	A	(1)
Allowable Logic/LCD Drive Ripple Voltage		V_{VDD-RP}	-	-	(200)	mV	(1)
LED Power Supply							
LED Input Voltage		V_{LED}	(16.2）	-	(17.4)	V	(1),(2),(6)
LED Power Consumption		P_{LED}	-	-	(1.044)	W	(1),(6)
LED Forward Voltage		V_F	(2.7)	-	(2.9)	V	(1),(2)
LED Forward Current		I_F	-	(15)	-	mA	
LED Life Time		LT	-	(50000)	-	Hours	(1),(6)

Note (1) All of the specifications are guaranteed under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55± 10%RH.

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 Mosaic pattern..

Note (4) The figures below is the measuring condition of V_{DD}. Rush current can be measured when T_{RUSH} is 0.5 ms.

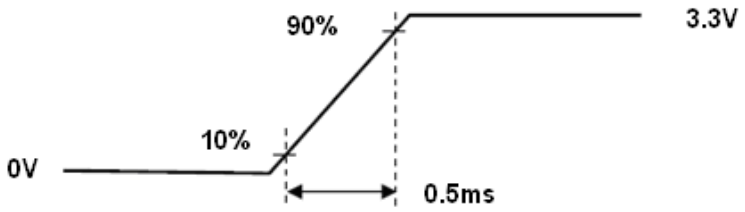


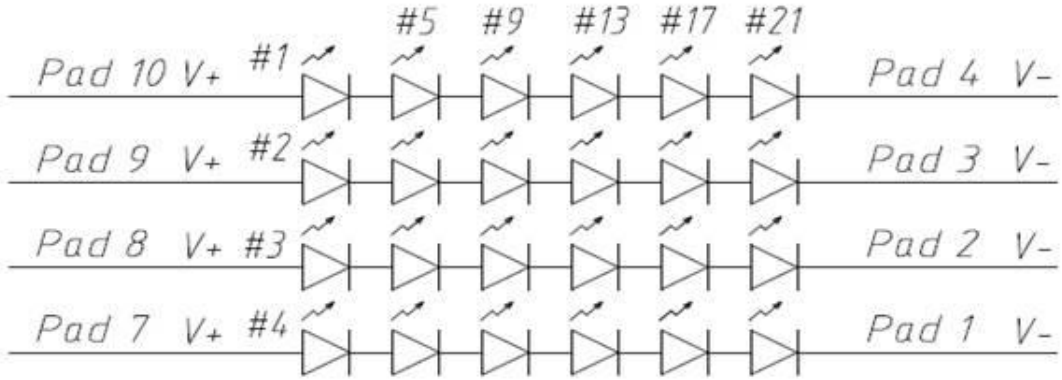
Figure 10 V_{DD} Rising Time

Note (5)Input signal: R[0：5],G[0：5],B[0：5], Hsync, Vsync , CLK，ENAB,R/L,U/D,BIST.

Note (6) The life time is determined as the sum of the lighting time till the luminance of LCD at the typical LED current reducing to 50% of the minimum value under normal operating condition.

Note (7) Definition of VLED and PLED

$V_{LED} = V_F \times 6$, $I_{LED} = I_F \times 4$, $PLED = V_{LED} \times I_{LED}$



4.4 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.

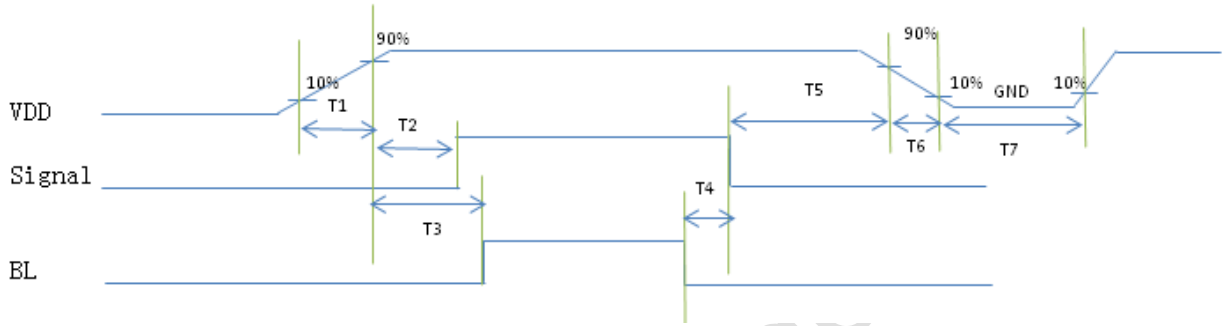


Figure 11 Power Sequence

Table 7 Power Sequencing Requirements

Parameter	Symbol	Unit	Min.	Typ.	Max.
VDD Rise Time (10% to 90%)	T1	ms	(0)	-	(20)
VDD to Signal Risinfg Edge	T2	ms	(0)	-	(50)
VDD Rise （90%）to BL	T3	ms	(250)		-
BL to Signal off	T4	ms	(200)	-	-
Signal to VDD off（90%）	T5	s	(0)	-	(1)
VDD fall time（90% to 10%)	T6	ms	(0)	-	(30)
VDD off time	T7	ms	(500)	-	-

Note1：The T1&T2&T3&&T4&T5&T6 set value must be greater than the minimum value, but not equal to the minimum value.

Note2：BL stands for ON/OFF of backlight.

5.0 Mechanical Characteristics

5.1 Outline Drawing

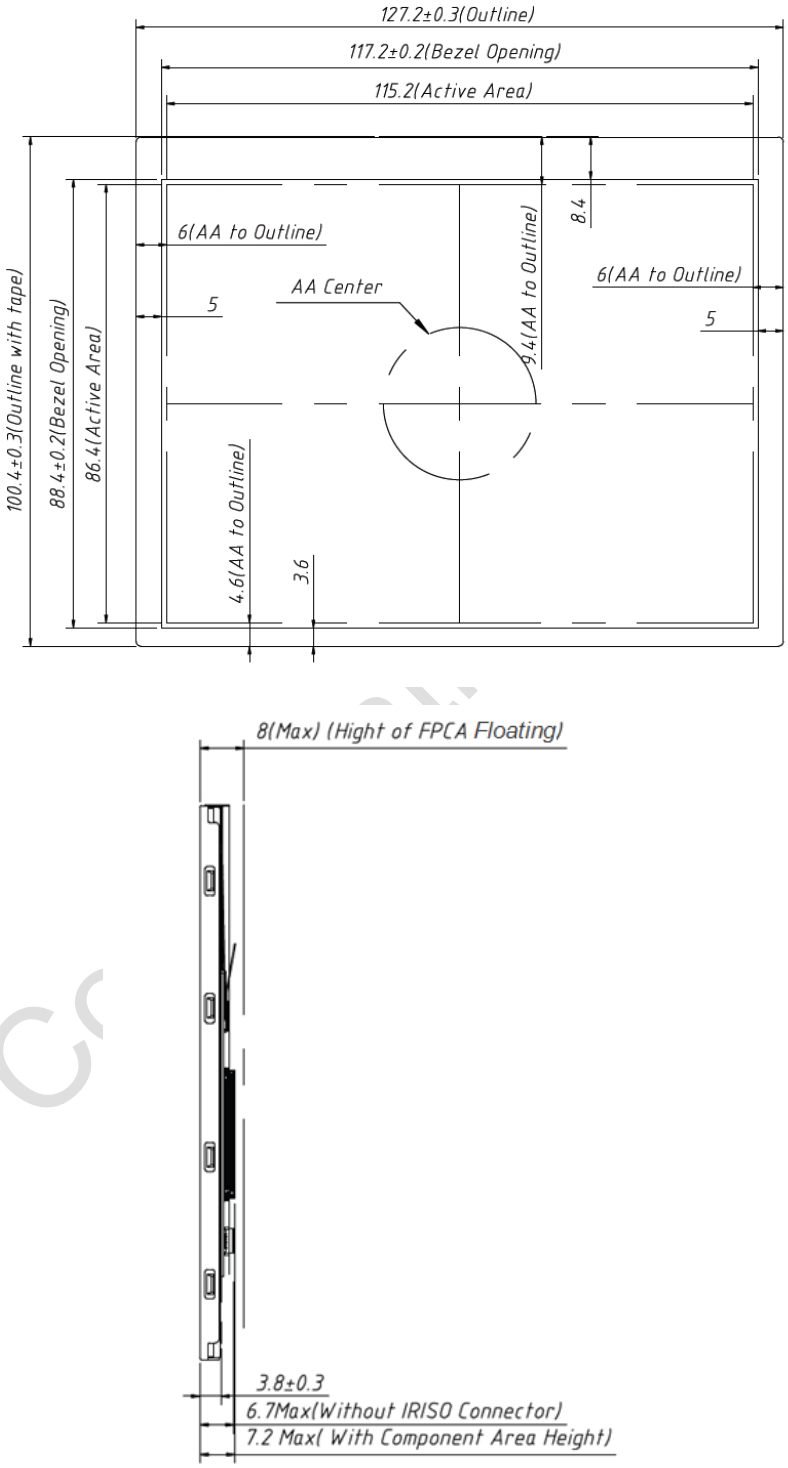


Figure 12 Reference Outline Drawing (Front Side)

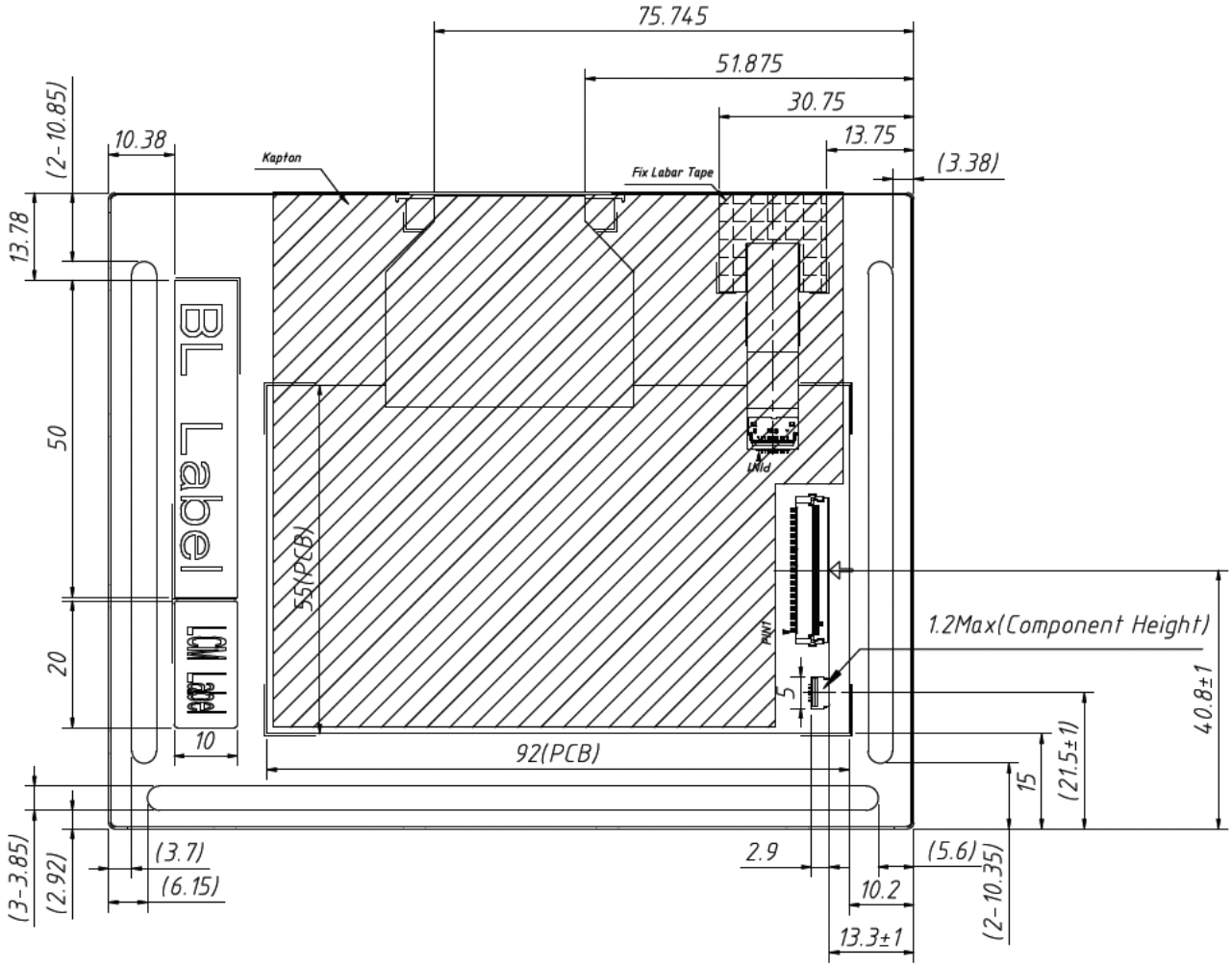


Figure 13 Reference Outline Drawing (Back Side)

Note (1) Unmarked tolerances: ±0.5mm;

5.2 Dimension Specifications

Table 8 Module Dimension Specifications

Item		Min.	Typ.	Max.	Unit
Width		(126.9)	(127.2)	(127.5)	mm
Height		(100.1)	(100.4)	(100.7)	mm
Thickness	With FPCA Floating	-	-	(8)	mm
	Without IRISO Connector	-	-	(6.7)	mm
	With Component Area Height	-	-	(7.2)	mm
	Without PCBA& Component Area	(3.5)	(3.8)	(4.1)	mm
Weight		-	-	(100)	g

Note：Outline dimension measure instrument: Length and width were measured using Coordinate Measuring Machine, and thickness test using Vernier Caliper.

6.0 Reliability Conditions

Table 9 Reliability Condition

Item		Package	Test Conditions		Note
High Temperature/High Humidity Operating Test		Module	T_{gs}=40℃, 90%RH, 240 hours		(1),(2),(3),(4)
High Temperature Operating Test		Module	T_{gs}=70℃, 240 hours		
Low Temperature Operating Test		Module	T_a=-20℃, 240 hours		
High Temperature Storage Test		Module	T_a=80℃, 240 hours		(1),(3),(4)
Low Temperature Storage Test		Module	T_a=-30℃, 240 hours		
Shock Non-operating Test		Module	100G,6ms,sin wave,±XYZ×3times,Total 18times		(1),(3),(5)
Vibration Non-operating Test		Module	half-sine Frequency: 8Hz ~ 33Hz Stroke: 1.3mm Sweep: 2.9G 33.3Hz ~ 400Hz X,Z Cycle : 15 minutes 2 hrs for each direction of X,Z ; 4 hours for Y direction		
ESD	operating	Module	Air	±15KV, 150pF, R=150Ω	(1),(6)
	Non-operating		Contact	±12KV, 150pF, R=330Ω	

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 IVO document before reliable test. Only check the function of the module 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 module 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) The module should be fixed firmly in order to avoid twisting and bending.

Note (6) It could be regarded as pass, when the module recovers from function fault caused by ESD after resetting.

7.0 Package Specification

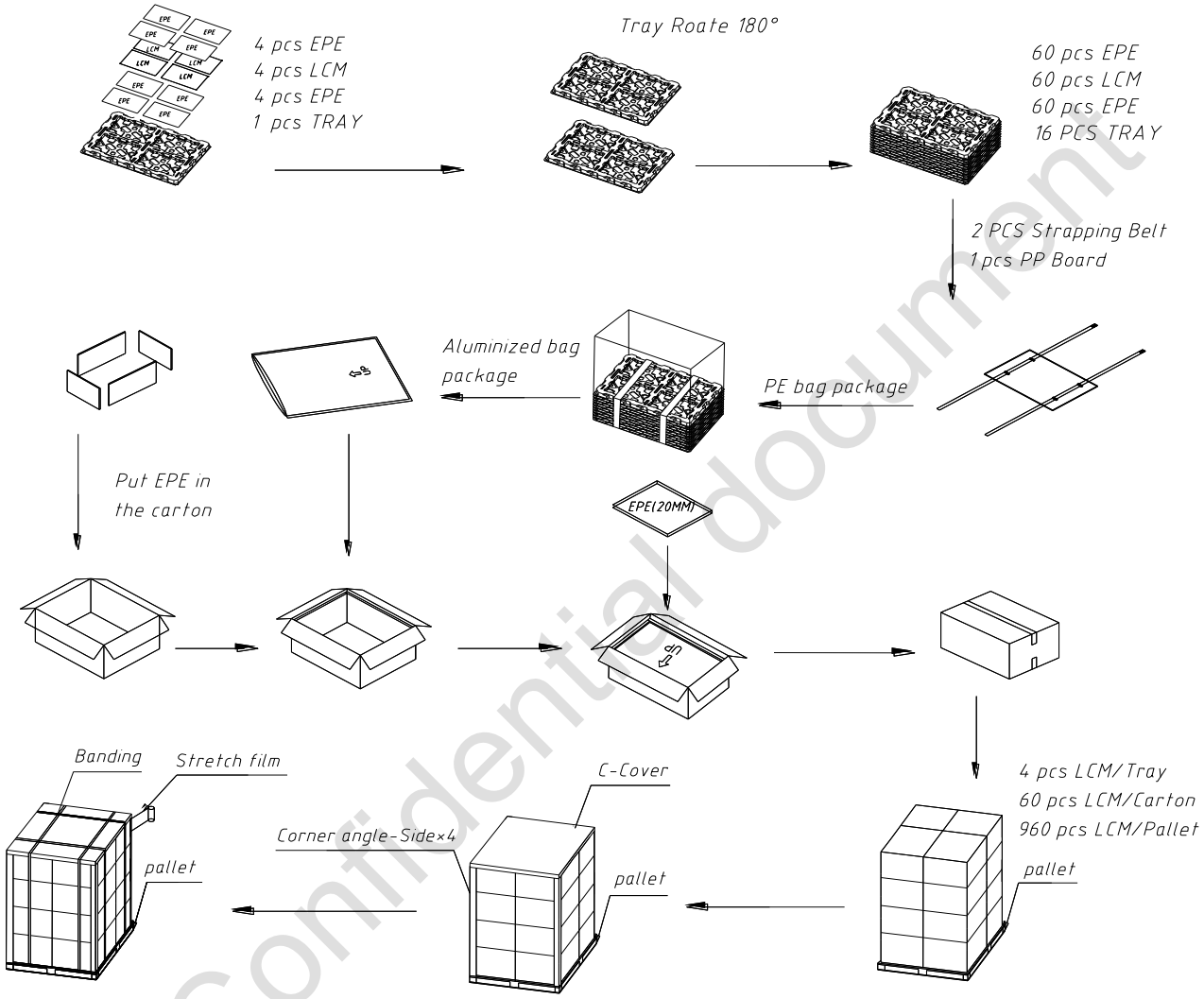


Figure 14 Packing Method

8.0 Lot Mark

TBD

9.0 General Precaution

9.1 Using Restriction

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

9.2 Operation Precaution

(1)The LCD product should be operated under normal conditions.

Normal conditions are defined as below:

Temperature: 25℃

Humidity: 55±10%

Display pattern: continually changing pattern (Not stationary)

(2) Brightness and response time depend on the temperature. (It needs more time to reach normal brightness in low temperature.)

(3) It is necessary for you to pay attention to condensation when the ambient temperature drops suddenly. Condensate water would damage the polarizer and electrical contacted parts of the module. Besides, smear or spot will remain after condensate water evaporating.

(4) If the absolute maximum rating value was exceeded, it may damage the module.

(5) Do not adjust the variable resistor located on the module.

(6) Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding may be important to minimize the interference.

(7) Image sticking may occur when the module displayed the same pattern for long time.

(8) Do not connect or disconnect the module in the “power on” condition. Power supply should always be turned on/off by the “power on/off sequence”

(9) Ultra-violet ray filter is necessary for outdoor operation.

9.3 Mounting Precaution

(1) All the operators should be electrically grounded and with Ion-blown equipment turning on when mounting or handling. Dressing finger-stalls out of the gloves is important for keeping the panel clean during the incoming inspection and the process of assembly.

(2) It is unacceptable that the material of cover case contains acetic or chloric. Besides, any other material that could generate corrosive gas or cause circuit break by electro-chemical reaction is not desirable.

(3) The case on which a module is mounted should have sufficient strength so that external force is not transmitted to the module directly.

(4) It is obvious that you should adopt radiation structure to satisfy the temperature specification.

(5) So as to acquire higher luminance, the cable of the power supply should be connected directly with a minimize length.

(6) It should be attached to the system tightly by using all holes for mounting, when the module is

assembled. Be careful not to apply uneven force to the module，especially to the PCB on the back.
(7) A transparent protective film needs to be attached to the surface of the module.
(8) Do not press or scratch the polarizer exposed with anything harder than HB pencil lead. In addition, don't touch the pin exposed with bare hands directly.
(9) Clean the polarizer gently with absorbent cotton or soft cloth when it is dirty.
(10) Wipe off saliva or water droplet as soon as possible. Otherwise, it may cause deformation and fading of color.
(11)
Clean the panel gently with absorbent cotton or soft cloth when it is dirty. Ethanol(C_2H_5OH) is allowed to be used. Ketone (ex. Acetone), Toluene, Ethyl acid, Methyl chloride, etc are not allowed to be used for cleaning the panel, which might react with the polarizer to cause permanent damage.
(12) Do not disassemble or modify the module. It may damage sensitive parts in the LCD module, and cause scratches or dust remains. IVO does not warrant the module, if you disassemble or modify the module.

9.4 Handling Precaution

(1) Static electricity will generate between the film and polarizer, when the protection film is peeled off. It should be peeled off slowly and carefully by operators who are electrically grounded and with Ion-blown equipment turning on. Besides, it is recommended to peel off the film from the bonding area.
(2) The protection film is attached to the polarizer with a small amount of glue. When the module with protection film attached is stored for a long time, a little glue may remain after peeling.
(3) If the liquid crystal material leaks from the panel, keep it away from the eyes and mouth. In case of contact with hands, legs or clothes, it must be clean with soap thoroughly.

9.5 Storage Precaution

When storing modules as spares for long time, the following precautions must be executed.
(1) Store them in a dark place. Do not expose to sunlight or fluorescent light. Keep the temperature between 5℃ and 35℃ at normal humidity.
(2) The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.
(3) It is recommended to use it in a short-time period, after it's unpacked. Otherwise, we would not guarantee the quality.

9.6 Others

When disposing LCD module, obey the local environmental regulations.