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Document No.	A-M050SWN1-R1-239-03	Issue date	2012/12/25	Revision	V00

Customer Approved Specification

To:

Product Name: M050SWN1-R2

Document Issue Date: 2012/12/25

Customer	InfoVision Optoelectronics
SIGNATURE _____ _____ _____ Please return 1 copy for your confirmation with your signature and comments.	**SIGNATURE** **REVIEWED BY** **QA** _____ **PREPARED BY** **FAE** _____

Note: 1. Please contact InfoVision Company. before designing your product based on this product.
2. The information contained herein is presented merely to indicate the characteristics and performance of our products. No responsibility is assumed by IVO for any intellectual property claims or other problems that may result from application based on the module described herein.

FQ-7-30-0-009-03D

Revision	Date	Page	Old Description	New Description	Remark
00	2012/09/20	-	-	First issued.	-

Contents

1.0 General Descriptions

1.1 Introduction

The M050SWN1-2C1 is a color active matrix thin film transistor (TFT) liquid crystal Display Module(LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, embedded in driver IC. This TFT LCD has a 5.0-inch diagonally measured active display area with resolution (480 horizontal by 234 vertical) pixels arrays.

1.2 Features

- 5.0” TFT LCD Module
- Supported 480x234 pixels resolution
- Compatible with RoHS standard

1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	5.0	Inch
Active Area	110.88 (H) x62.478 (V)	mm
Pixels H x V	480(RGB) x234	-
Pixel Pitch	0.231(H)×0.267 (V)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally White	-
Contrast Ratio	500	-
Response Time	15(TYP.)	msec
Input Voltage	3.3	V
Weight	91.5	g
Electrical Interface (Logic)	TTL	-
Support Color	8 bits	-
Optimum Viewing Direction	6 O’ clock	-
Surface Treatment	AG,Hardness,2H	-

2.0 Absolute Maximum Ratings

Table 1 Electrical Absolute Rating

Item	Symbol	Min.	Max.	Unit
Power Supply Voltage	V_{DD}	-0.3	3.96	V

Note (1) Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.

(2)Operating temperature 25℃, humidity 55%.

Table 2 Reliability Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	TOP	-30	85	℃	(1),(2)
Storage Temperature	TST	-40	95	℃	(1),(2)

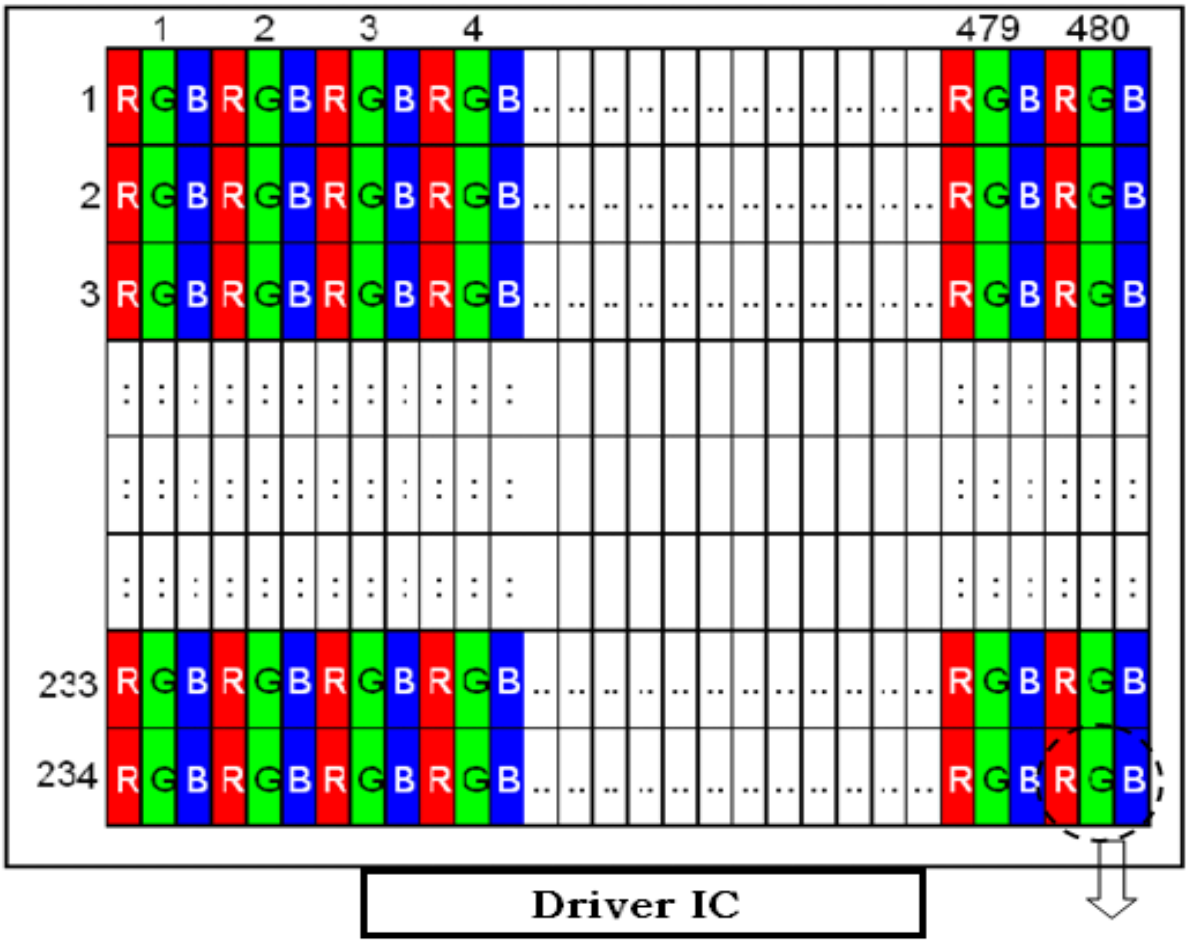
Note (1) There is no display function fail occurred, all the cosmetic specification is judged before the reliability stress. The criteria is fit by IVO provided IIS.

(2) The storage /operating temperature. Maximum Wet-Bulb should be 39 degree C. There is no condensation on the panel surface.

3.0 Pixel Format Image

Figure 1 shows the relationship of the input signals and LCD pixel format image.

Figure 1 Pixel Format



R+G+B dots=1 pixel

4.0 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes

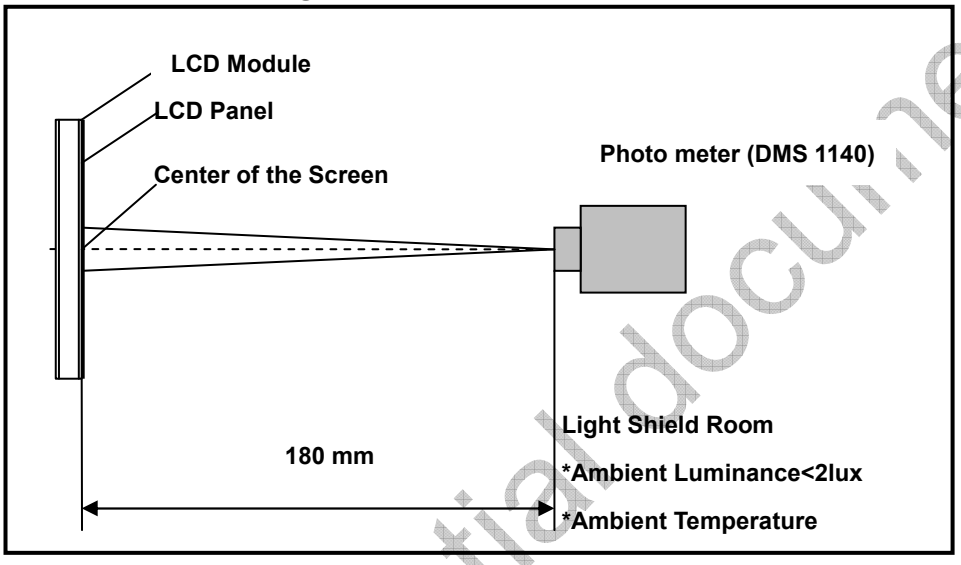
Table 3 Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle （CR>10）	Horizontal	θ L	60	70	-	degree	(1),(2),(3),(6)
		θ R	60	70	-		
	Vertical	θ T	40	50	-		
		θ B	50	60	-		
Contrast Ratio	Center		400	500	-	-	(1),(2),(4),(6)
Response Time （25°C）	Rising		-	4	10	ms	(1),(2),(6)
	Falling		-	11	25	ms	
	Rising + Falling		-	15	35	ms	
Color Chromaticity (CIE1931)	White x		Typ. -0.03	0.310	Typ. +0.03	-	(1),(2),(6)
	White y			0.326		-	
	Red x			0.590		-	
	Red y			0.345		-	
	Green x			0.315		-	
	Green y			0.590		-	
	Blue x			0.150		-	
	Blue y			0.050		-	
Panel Transmittance	-		5.5	6	-	%	(1),(5),(6)
Luminance of Module center	Current of LED 75mA		450	585	-		cd/m2

Note (1) Measurement Setup:

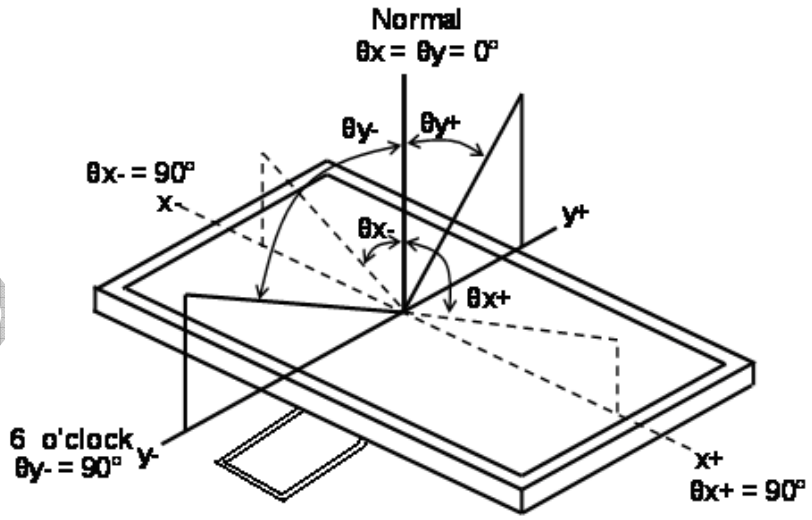
The LCD module should be stabilized at given temperature(25℃) for 15 minutes to Avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.

Figure 2 Measurement Setup



Note (2) Definition of Viewing Angle

Figure 3 Definition of Viewing Angle



Note (3) Definition Of Contrast Ratio (CR)

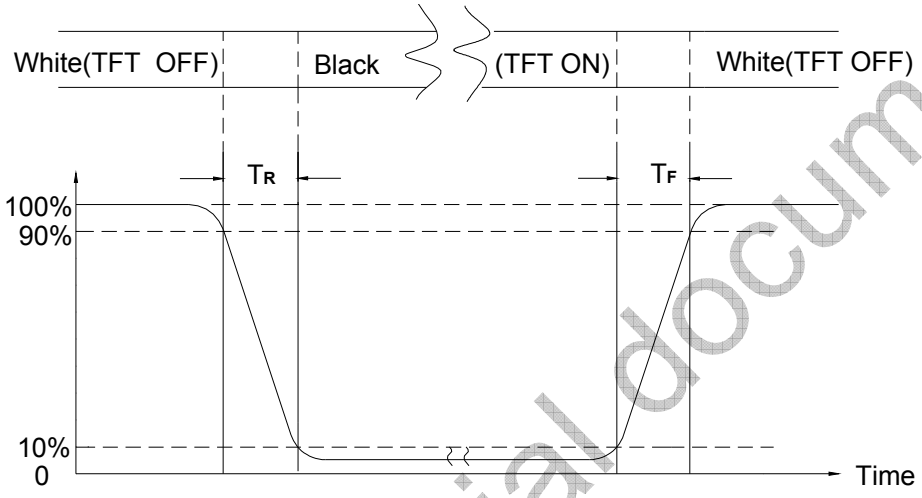
The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L255 / L0

L255: Luminance of gray level 255, L0: Luminance of gray level 0

Note (4) Definition Of Response Time (TR, TF)

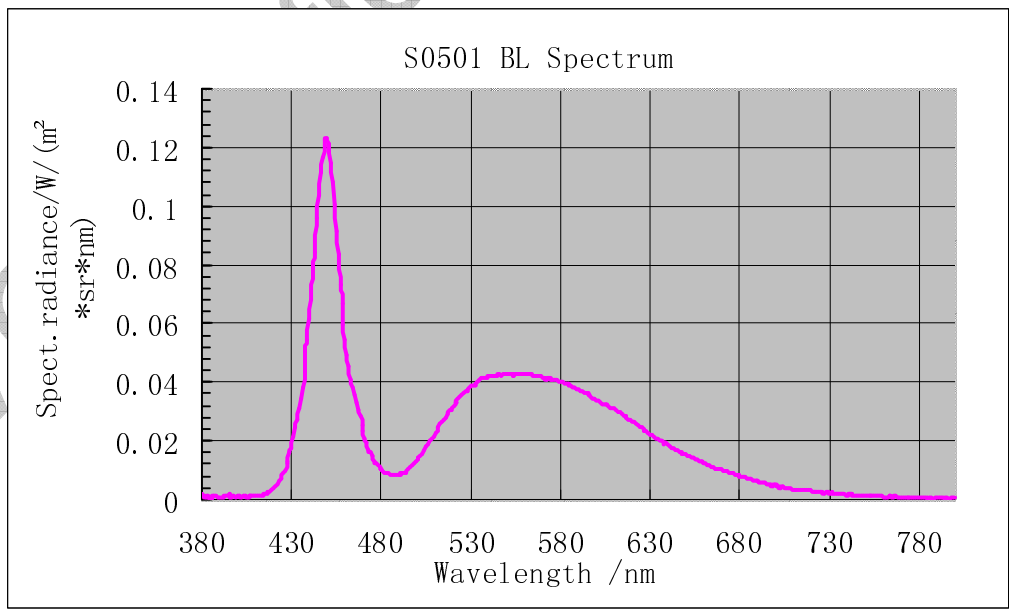
Figure 4 Definition of Response Time



Note (5) Definition of Transmittance (Module is without signal input).

$$\text{Transmittance} = \frac{\text{Luminance of LCD Module}}{\text{Luminance of Back light}} \text{ X100\%}$$

Note (6) The Reference BL Spectrum.



5.0 Electrical Characteristics

5.1 TFT LCD Open Cell Interface

Table 5 Connector Name / Designation

Item	Description
FPC Down Connector (40pin pitch=0.5mm)	Connector recommended model: FH19SC-40-0.5SH(0.5) Manufactured by BaiJia.

Table 6 Signal Pin Assignment

Pin-No	Symbol	Description
1	GND	Ground
2	VS	Vertical Sync. Input
3	HS	Horizontal Sync. Input
4	GND	Ground
5	UD	Scan Direction Selection Signal
6	DCLK	Clock Signal
7	GND	Ground
8	DB0	Blue Data 0
9	DB1	Blue Data 1
10	DB2	Blue Data 2
11	DB3	Blue Data 3
12	DB4	Blue Data 4
13	DB5	Blue Data 5
14	DB6	Blue Data 6
15	DB7	Blue Data 7
16	GND	Ground
17	DG0	Green Data 0
18	DG1	Green Data 1
19	DG2	Green Data 2
20	DG3	Green Data 3

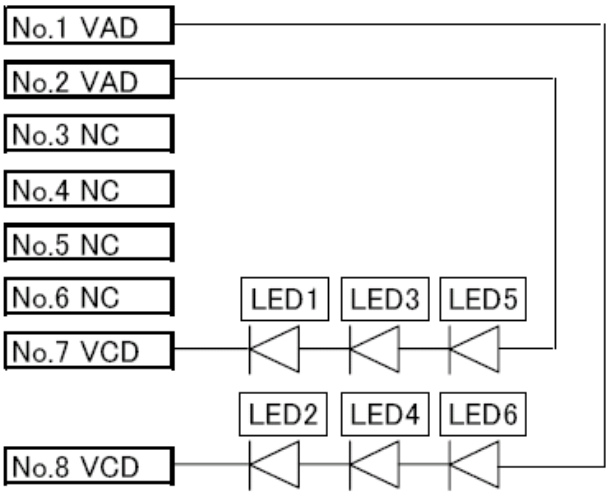
21	DG4	Green Data 4
22	DG5	Green Data 5
23	DG6	Green Data 6
24	DG7	Green Data 7
25	GND	Ground
26	DR0	Red Data 0
27	DR1	Red Data 1
28	DR2	Red Data 2
29	DR3	Red Data 3
30	DR4	Red Data 4
31	DR5	Red Data 5
32	DR6	Red Data 6
33	DR7	Red Data 7
34	RL	Shift direction selection signal
35	DISP	Display On/Off mode control
36	RESET	Active Low Global Reset Signal , Internally Pulled High
37	VDD	Power Supply for Logic IO
38	VDD	Power Supply for Logic IO
39	GND	Ground
40	GND	Ground

Note : All input signals shall be low or Hi-resistance state when VDD is off.

5.2 Back Light Interface

LED配列:3直列2並列(6個)
PIN配列:下図参照

＜結線図:3直×2系列＞



6.0Interface Timings

6.1 Timing Characteristics

Synchronization Method:

Table 7 Interface Timings

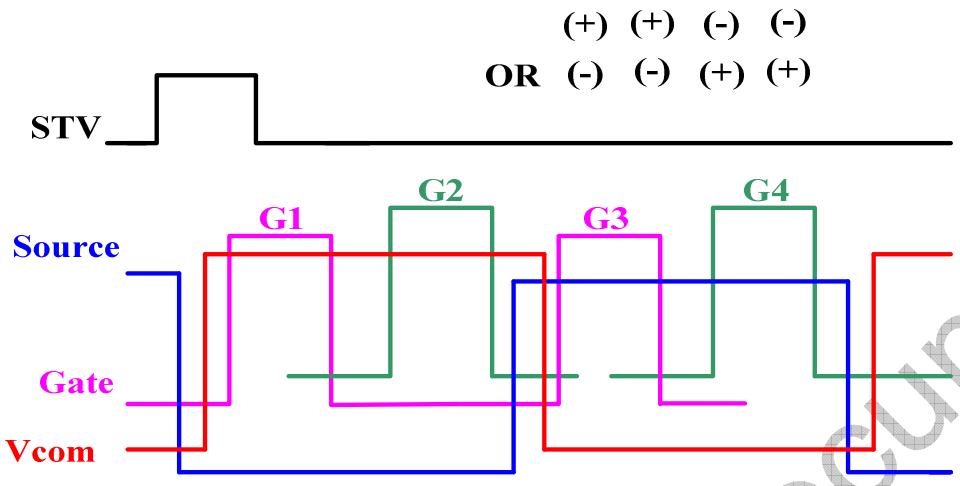
Parameter	Symbol	Unit	Min.	Typ.	Max.
DCLK	f_{dck}	MHz	5	9.6	15
H Total Time	T_{hp}	clocks	525	612	-
H Active Time	HA	clocks	480	480	480
H Front Porch	T_{hfp}	clocks	2	30	-
H Sync Pulse Width	HSPW	clocks	2	46	-
H Back Porch	T_{HBP}	clocks	2	56	-
V Total Time	T_{vp}	lines	243	262	275
V Active Time	VA	lines	3(dummy)+234+ 3(dummy)	3(dummy)+234+ 3(dummy)	3(dummy)+234+ 3(dummy)
V Front Porch	T_{vfp}	lines	1	4	-
V Sync Pulse Width	VSPW	lines	1	3	-
V Back Porch	T_{vbp}	lines	1	15	-
V Frequency	f_v	Hz	-	60	-

Note: To display normal screen in synchronous mode, it is necessary to keep VSPW+Tvbp=18, HSPW+ Thbp=102.

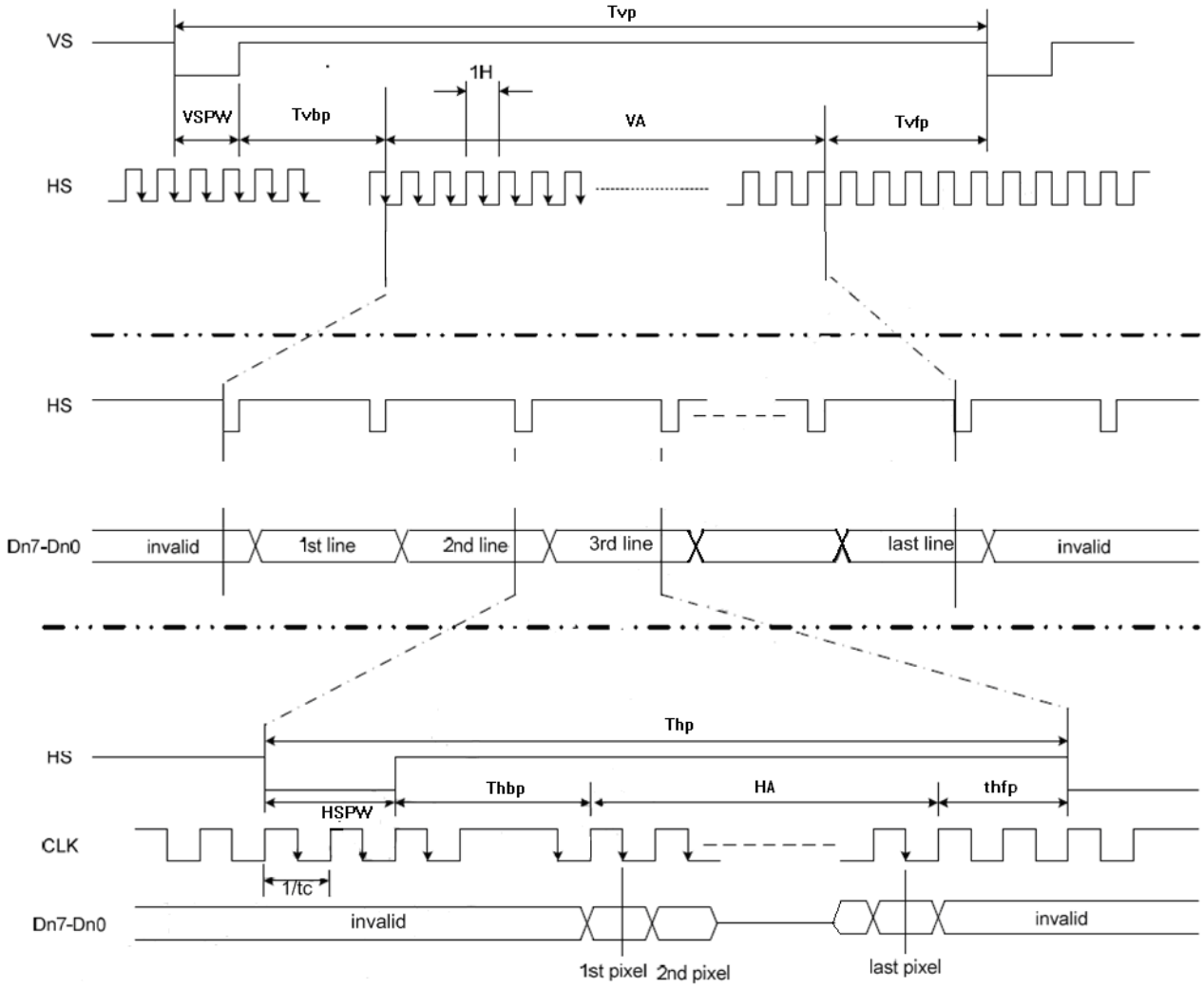
When input signal is not typical timing, It cannot display normal screen and the display screen will be shifted to the left or right or other.

There is special approved timing rule: screen shift is OK, but screen frozen is NG.

6.2 Line inversion (Dual Gate) Driver Method



6.3 Timing Diagram of Interface Signal



6.4 Power Voltage Specification

Input power voltage specifications are as follows.

Table 8 Power Voltage

Item	Symbol	Min.	Typ.	Max.	Units	Note
Supply Voltage	V DD	1.8	3.3	3.6	V	-
	V GH	16.7	17.7	-	V	-
	V GL	-11	-10	-9	V	-
Input signal voltage	VIH	1.75	-	3.6	V	
Input signal voltage	VIL	0	-	1.08	V	-
Module Open Cell Vdd Current	Ivdd	-	-	25	mA	
VCOM	VCOMH	4.70	4.85	5.00	V	-
	VCOML	-1.15	-1	-0.85	V	

6.5 Gamma Reference Voltage

Gamma Voltage		Unit
L0	5.030	V
L1	5.000	V
L8	3.728	V
L20	2.988	V
L43	2.396	V
L55	2.100	V
L62	1.509	V
L63	0.621	V
L63	5.030	V
L62	4.246	V
L55	3.984	V
L43	3.592	V
L20	2.776	V
L8	2.057	V
L1	0.196	V
L0	0.130	V

6.6 Backlight Electrical characteristic

Item	Unit	Standard		
		Min	Typ	Max
Upon forward current Characteristic inspection	mA	60.0	75.0	80.0
Total Vf value (If=75mA,Ts=25℃)	V	8.7	9.6	10.5
Vf variation between the parallel(If=75mA,Ts=25℃)	V	-	-	0.6
Thermistor resistance	kΩ	-	-	-

7.0 Power ON/OFF Sequence

Power on/off sequence is as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-resistance state or low level when VDD is off.

Figure 5 Power On Sequence

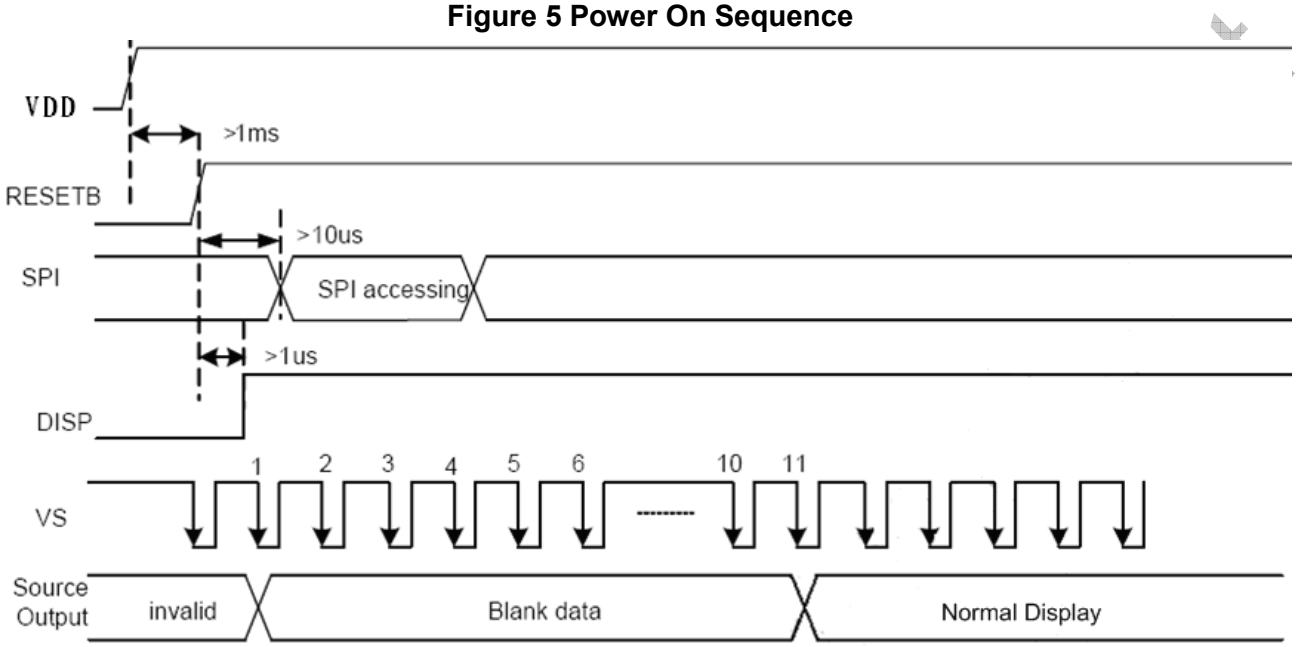
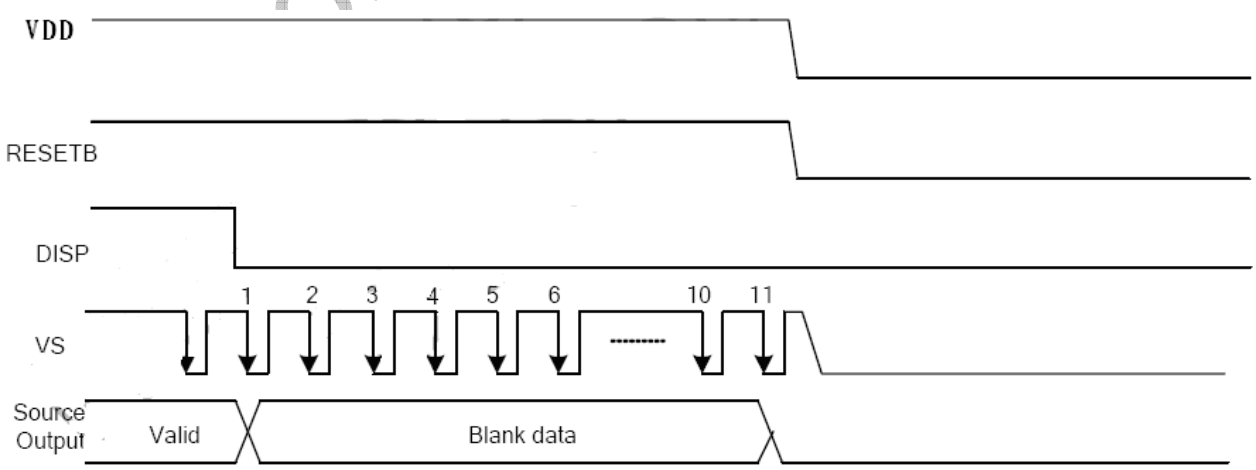


Figure 6 Power Off Sequence



8.0 Mechanical Characteristics

8.1 Outline Drawing

Figure 7.1 Outline Drawing

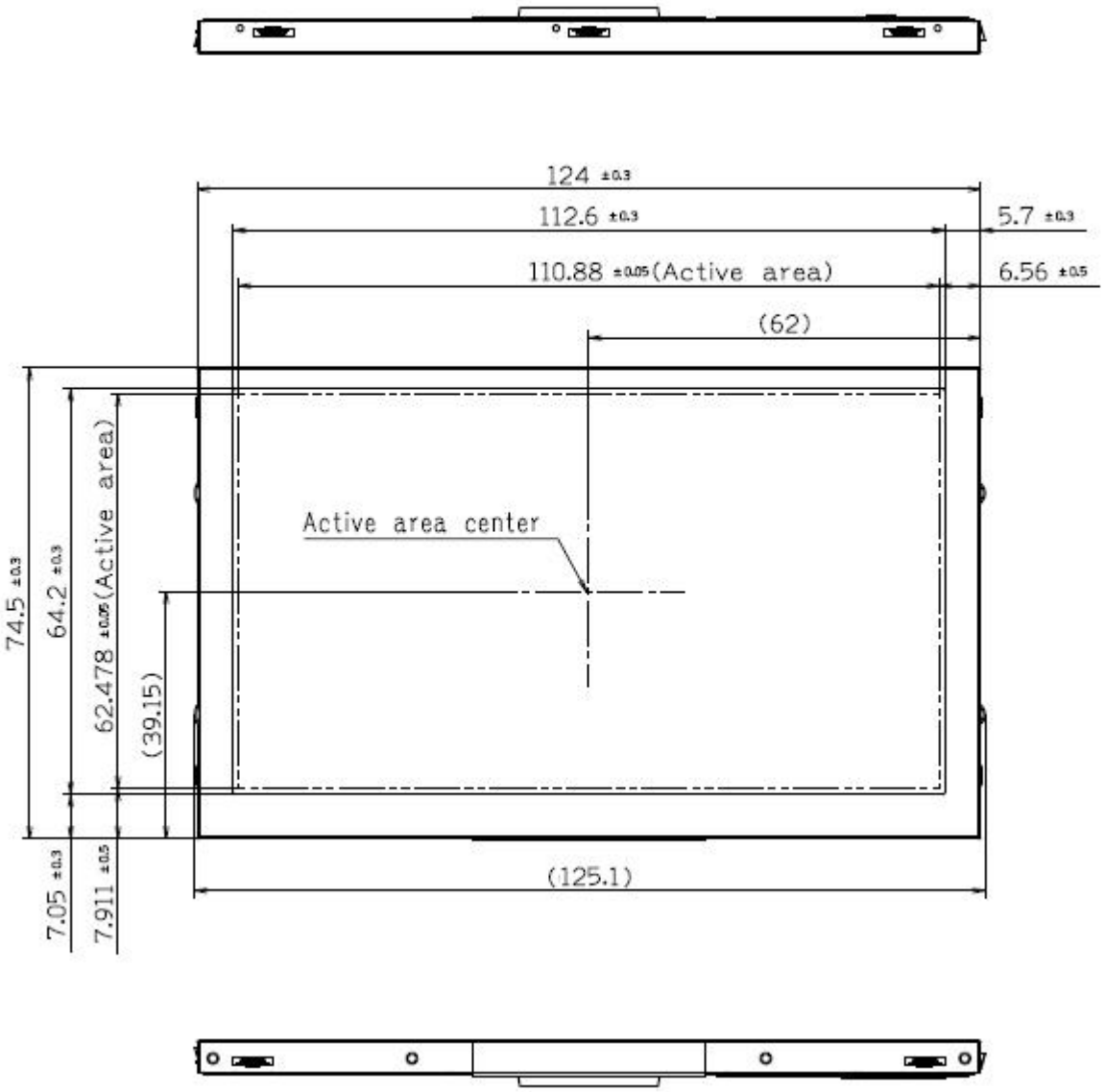
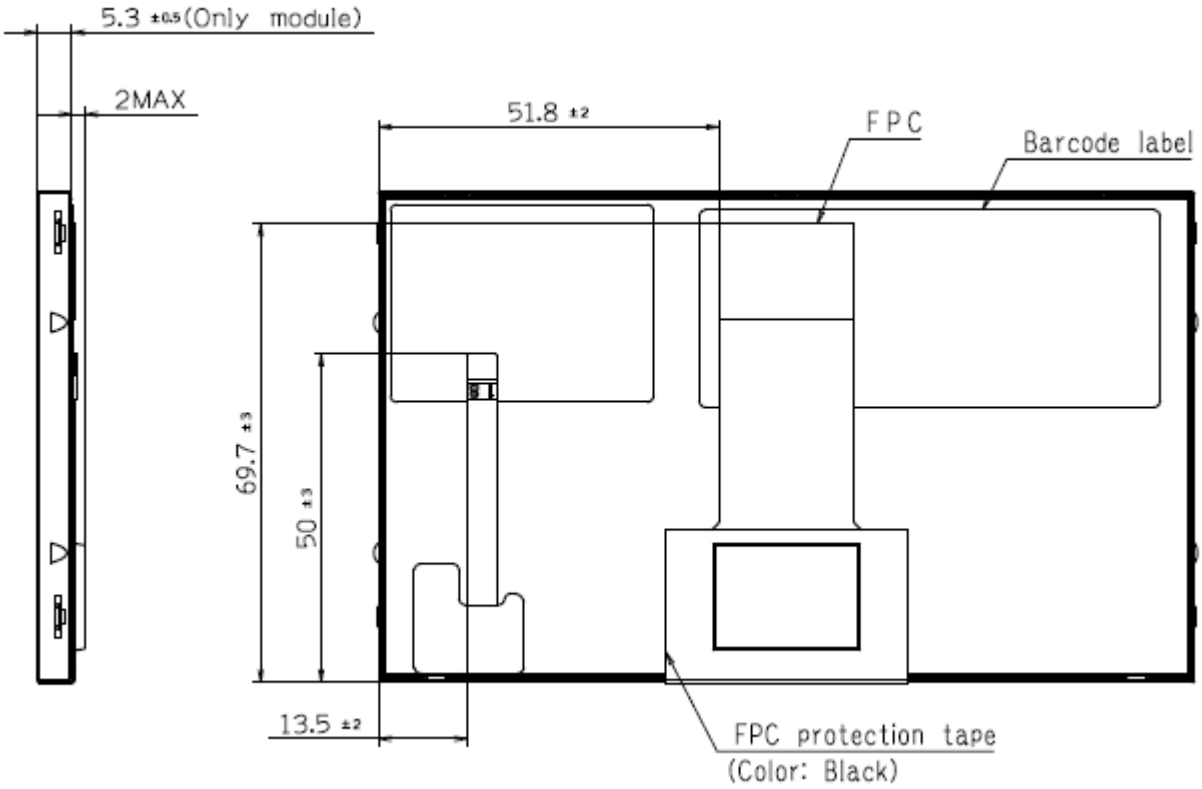
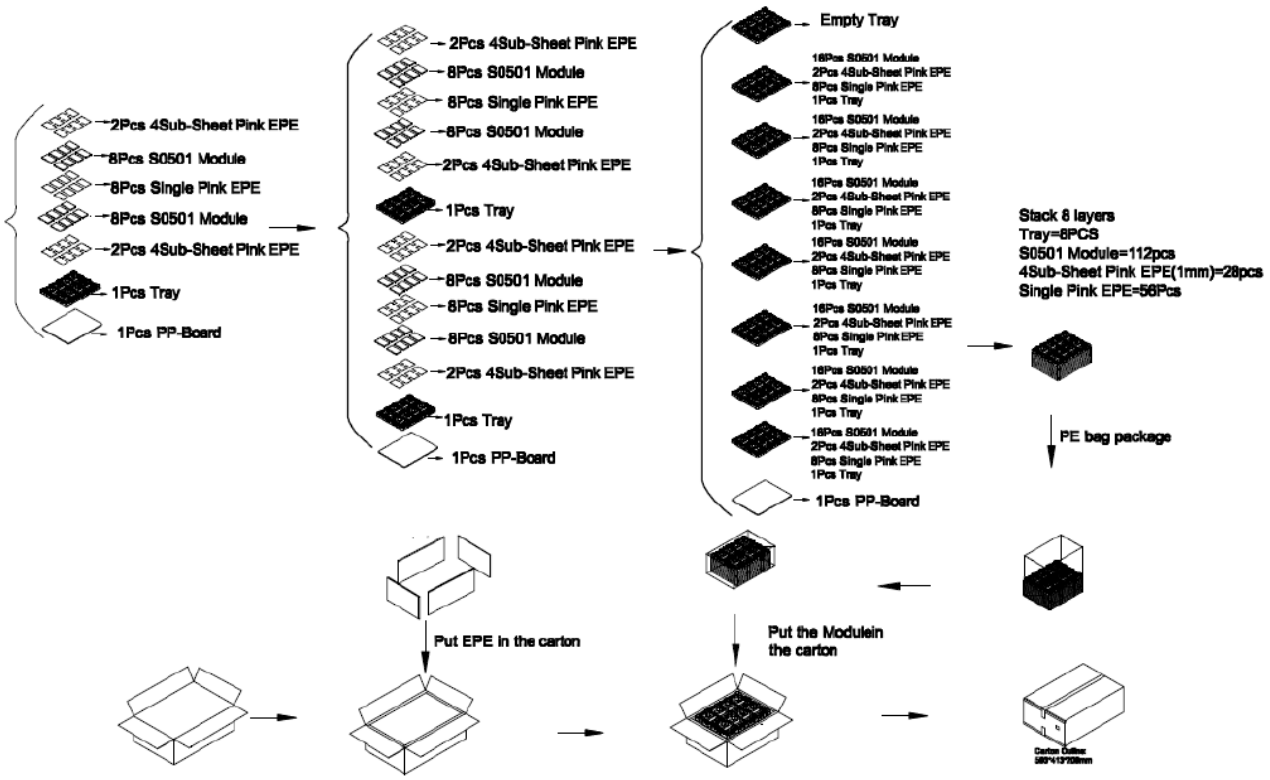


Figure 7.2 Outline Drawing

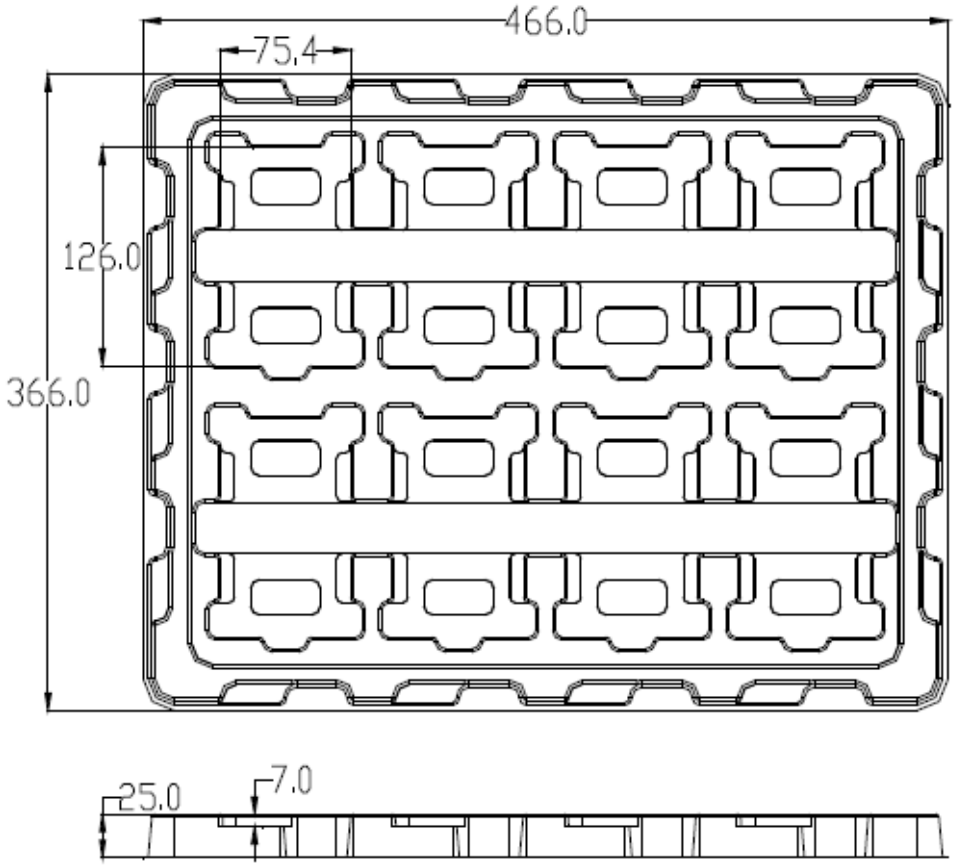


9.0 Package Specification

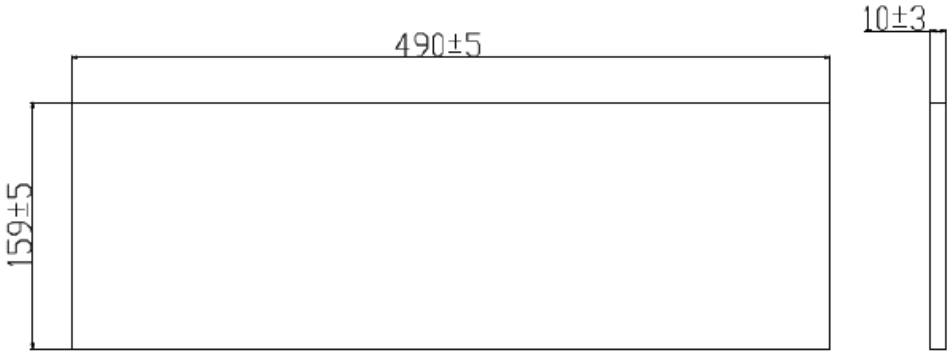
9.1Package diagram



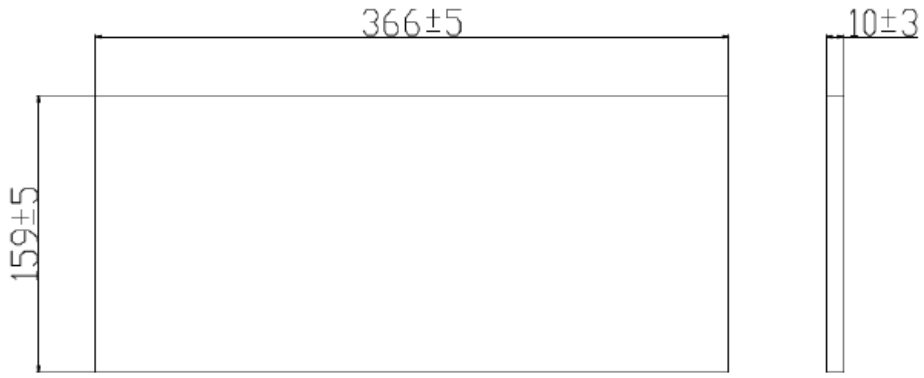
9.2 Tray(Unit:mm)



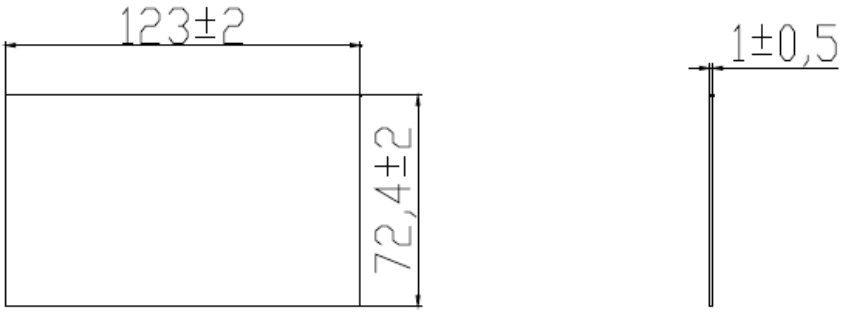
9.3 Front and Back EPE(Unit:mm)



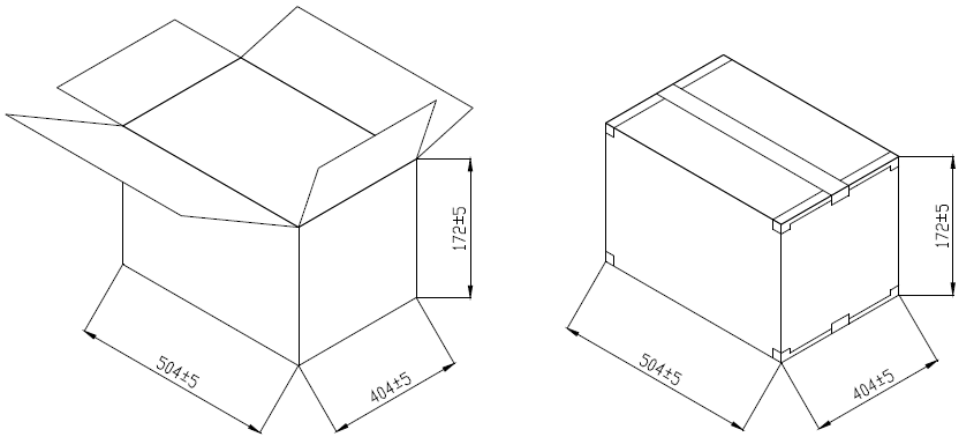
9.4 Left and Right EPE(Unit:mm)



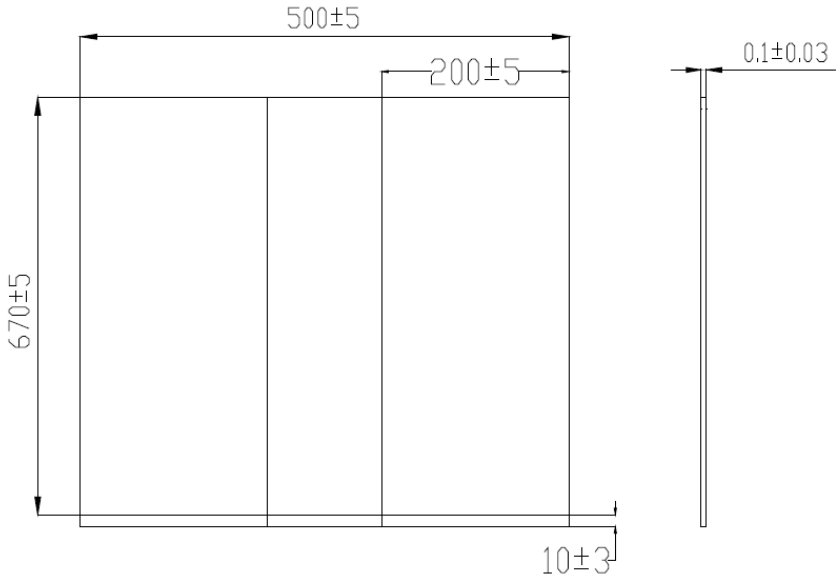
9.5 Pink EPE(Unit:mm)



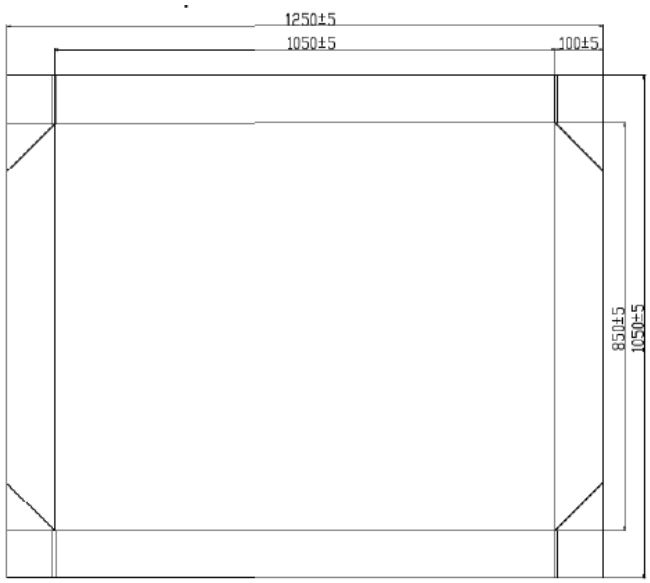
9.6Carton(Unit:mm)



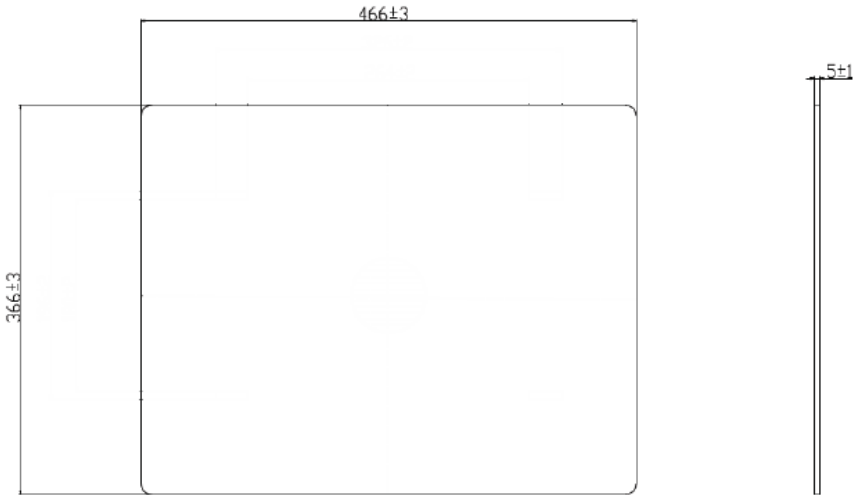
9.7 PE Bag(Unit:mm)



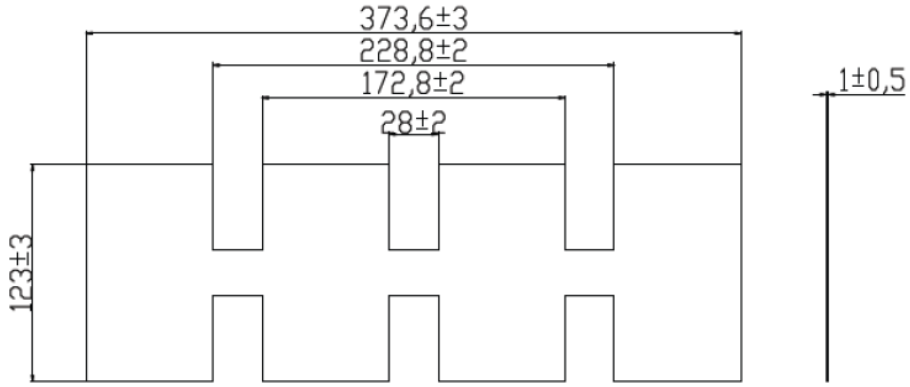
9.8 C-Cap(Unit:mm)



9.9PP-Borad(Unit:mm)



9.10 Sub-sheet Pink EPE(Unit:mm)

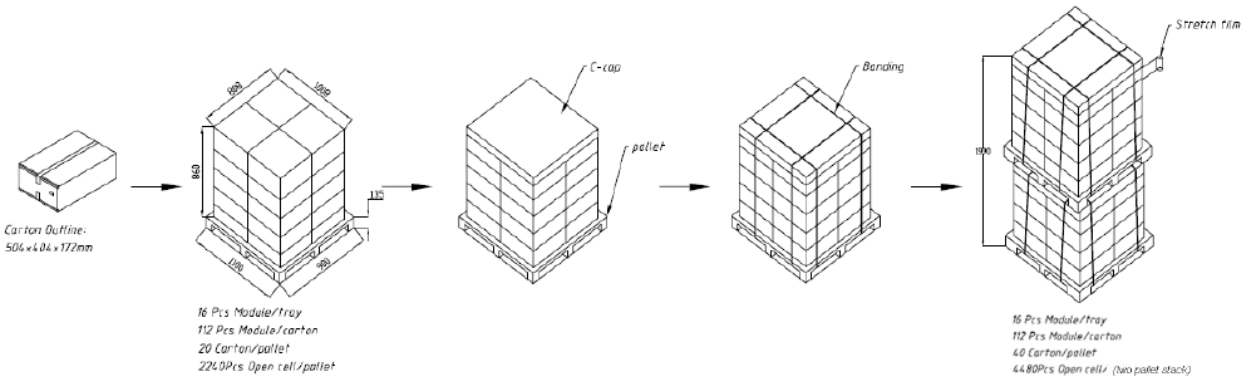


10.0 Shipping

10.1Pallet stacking

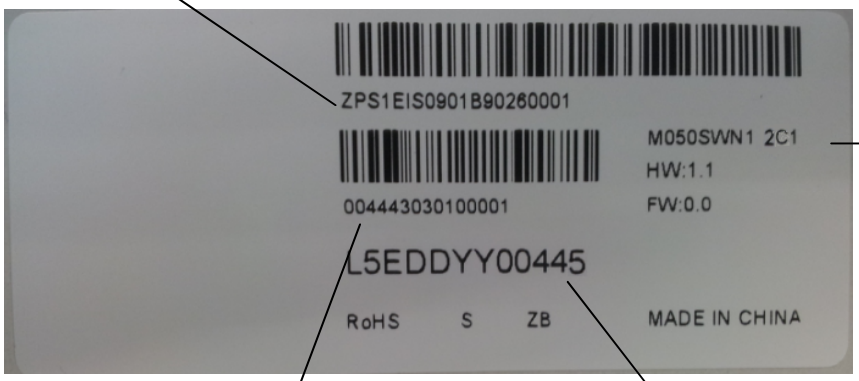
20cartons / pallet

Total 4480pcs / pallet (Two pallet stack)



11.0 Lot Mark

Lot Mark



Module Name

Customer Code

Customer Module

11.1 Lot Mark

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Code 1,2,4,5,6,7,8,9,10,11,16: IVO internal flow control code.
Code 3: production location.
Code 12: production year.
Code 13: production month.
Code 14,15: production date.
Code 17,18,19,20: serial number.

Note (1) Production Year

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mark	6	7	8	9	A	B	C	D	E	F

Note (2) Production Month

Month	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct	Nov.	Dec.
Mark	1	2	3	4	5	6	7	8	9	A	B	C

11.2 Customer Code：

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Code1-5: last five codes of Customer Module Name.
Code 6: production year.
Code 7-8: production month.
Code 9-10: production date.
Code11-15:serial number

11.3 Carton Label

12.0 General Precaution

12.1 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.

12.2 Handling Precaution

(1) Please mount LCD module by using mounting holes arranged in four corners tightly.
(2) Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. IVO does not warrant the module, if customers disassemble or modify the module.
(3) 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. If liquid crystal contacts mouth or eyes, rinse out with water immediately. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and Rinse thoroughly with water.
(4) Disconnect power supply before handling LCD module
(5) Refrain from strong mechanical shock and /or any force to the module.
(6) Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature; etc otherwise LCD module may be damaged. It's recommended employing protection circuit for power supply.
(7) Do not touch, push or rub the polarizer with anything harder than HB pencil lead. Use fingerstalls of soft gloves in order to keep clean display quality, when Persons handle the LCD module for incoming inspection or assembly.
(8) When the surface is dusty, please wipe gently with absorbent cotton or other soft Material. When cleaning the adhesives, please use absorbent cotton wetted with a little Petroleum benzene or other adequate solvent.
(9) 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.
(10) Protection film must remove very slowly from the surface of LCD module to Prevent from electrostatic occurrence.
(11) Because LCD module uses 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.
(12) Do not adjust the variable resistor located on the module.

12.3 Storage Precaution

(1) Please do not leave LCD module in the environment of high humidity and high temperature for a long time.
(2) The module shall not be exposed under strong light such as direct sun-light. Otherwise, Display characteristics may be changed.
(3) The module should be stored in a dark place. It is prohibited to apply sunlight or fluorescent light in storage.

12.4 Operation Precaution

(1) Do not connect or disconnect the module in the "Power On" condition.

(2) Power supply should always be turned on/off by 8.0 "Power on/off sequence"

(3) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference should be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.

(4) After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.

12.5 Reliability Item

M050SWN1-2C1 RA Test Condition					
Items		IVO Small size Module /Open Cell test condition			Piece
		Condition	Judge	Referrance	
RA test	High temperature/High humidity operate	60℃90%	300h	500h,1000h	3
	High temperature operate	85℃	300h	500h,1000h	3
	Low temperature operate	-30℃	300h	500h,1000h	3
	High temperature/High humidity storage	60℃90%	300h	500h,1000h	3
	High temperature Storage	95℃	300h	500h,1000h	3
	Low temperature Storage	-40℃	300h	500h,1000h	3
	Heat Shock test	-40℃/85℃ 30min.each	300cycle	500cycle, 1000cycle	3
	Image sticking	70℃ 30min. 5*7flag Pattern Gray 50% laster screen			3
	ESD test Module (non operating)	C=150pF R=150Ω ±5kV/10kV/15kV more than 3times both positive pole and negative pole			3

12.6 Others

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

(2) Avoid condensation of water which may result in improper operation or disconnection of electrode.

(3) If the module keeps displaying the same pattern for a long period of time, the image may be "sticked" to the screen.

(4) This module has its circuitry PCB's on the rear side and should be handled carefully in order not to be stressed.

12.7 Disposal

When disposing LCD module, obey the local environmental regulations.