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Customer Approval Specification

To: 苏州与来视讯科技有限公司

Product Name: M101NWWB R6

Document Issue Date: 2017/11/29

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-7-30-0-009-03

Revision	Date	Page	Old Description	New Description	Remark
00	2017/11/29	All	--	First issue	

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1.0 General Descriptions

1.1 Introduction

The M101NWWB R6 is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driver circuit and a backlight system. This TFT LCD has a 10.1 inch diagonally measured active display area with WXGA resolution (1280 horizontal by 800 vertical pixels array).

1.2 Features

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

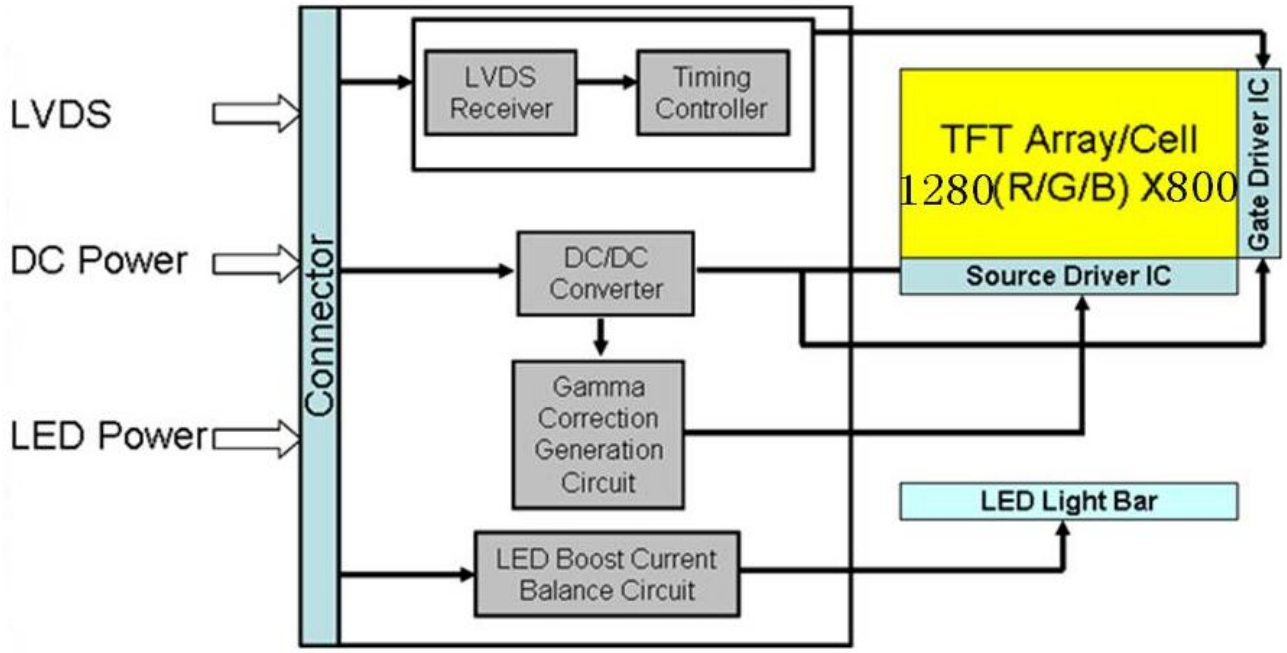
1.3 Product Summary

Items		Specifications	Unit
Screen Diagonal		10.1	inch
Active Area (H x V)		216.96 x135.6	mm
Number of Pixels (H x V)		1280 x800	-
Pixel Pitch (H x V)		0.1695×0.1695	mm
Pixel Arrangement		R.G.B. Vertical Stripe	-
Display Mode		Normally Black	-
White Luminance		350(Typ.)	cd /m^2
Contrast Ratio		800 (Typ.)	-
Response Time		25 (Typ.)	ms
Input Voltage		3.3 (Typ.)	V
Logical power consumption (At White Pattern)		1.0 (Max.)	W
Backlight power consumption (At White Pattern)		2.5 (Max.)	W
Weight		160 (Max.)	g
Outline Dimension (H x V x D)	w/o PCB	229.46(Typ.) ×149.1(Typ.)×2.8(Max.)	mm
	w/ PCB	229.46(Typ.) ×149.1(Typ.)×4.56(Max.)	mm
Electrical Interface (Logic)		LVDS	-
Support Color		16.7 M	-
NTSC		45 (Typ.)	%
Viewing Direction		All	-
Surface Treatment		Anti-glare	-

1.4 Functional Block Diagram

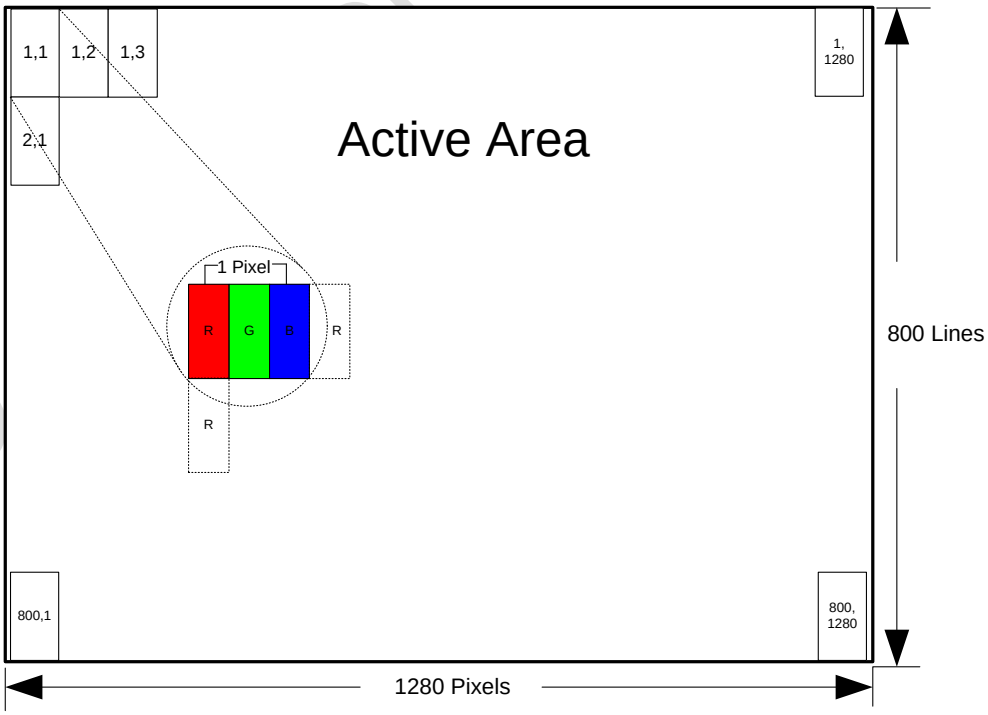
Figure 1 shows the functional block diagram of the LCD module.

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}	-0.3	7.0	V	(1),(2)
Operating Temperature	TOP	0	50	℃	(3),(4),(5),(6)
Storage Temperature	TST	-20	60	℃	
Vibration(Non-operating)	VB	-	1.5	G	(7)
Shock(Non-operating)	Shock	-	240	G	(8)

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.

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

Note (3) (T<=40℃) Note static electricity. Maximum wet bulb temperature at 39℃ or less. (T>40℃) No condensation.

Note (4) There is a possibility of causing deterioration in the irregularity and others of the screen and the display fineness though the liquid crystal module doesn't arrive at destruction when using it at 70~80℃ or -30~-20℃.

Note (5) There is a possibility of causing the fineness deterioration by the prolonged use in the (high temperature) humidity environment (60%RH or more).

Note (6) In the operating temperature item, the low temperature side is the ambient temperature regulations. The high temperature side is the panel surface temperature regulations.

Note (7) 10-500Hz, random vibration, 1h for X, Y, Z axis.

Note (8) 6ms, half sine wave, one time for X, Y, Z axis.

3.0 Optical Characteristics

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

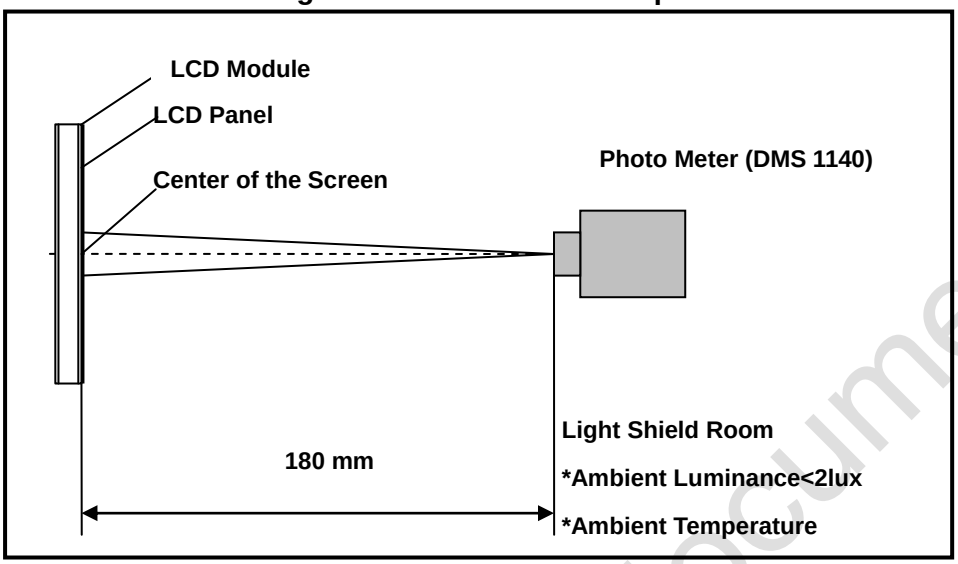
Table 2 Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle （CR>10）	Horizontal	θ_{x+}	75	85	-	degree	(1),(2),(3)
		θ_{x-}	75	85	-		
	Vertical	θ_{y+}	75	85	-		
		θ_{y-}	75	85	-		
Contrast Ratio	Center		600	800	-	-	(1),(2),(4) θx=θy=0°
Response Time	Rising + Falling		-	25	50	ms	(1),(2),(5) θx=θy=0°
Color Chromaticity (CIE1931)	Red x		Typ. -0.03	0.578	Typ. +0.03	-	(1),(2),(3) θx=θy=0°
	Red y			0.345		-	
	Green x			0.337		-	
	Green y			0.568		-	
	Blue x			0.159		-	
	Blue y			0.136		-	
	White x			0.313		-	
	White y			0.329		-	
NTSC	-		-	45	-	%	(1),(2),(3) θx=θy=0°
White Luminance	Center		300	350	-	cd/m^2	(1),(2),(6)
Luminance Uniformity	9 Points		70	-	-	%	(1),(2),(6) θx=θy=0°

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 3 Measurement Setup



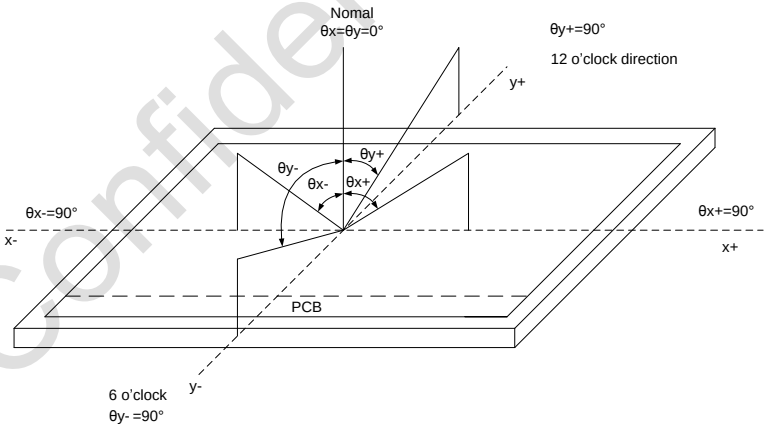
Note (2) The LED input parameter setting as:

V_LED: 12V

PWM_LED: duty 100 %

Note (3) Definition of Viewing Angle

Figure 4 Definition of Viewing Angle



Note (4) Definition Of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

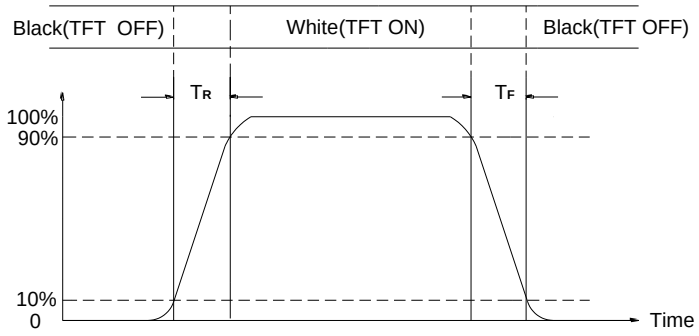
Contrast Ratio (CR) = L255 / L0

L63: Luminance of gray level 255, L0: Luminance of gray level 0

Note (5) Definition Of Response Time (T_R, T_F)

Figure 5 Definition of Response Time

.

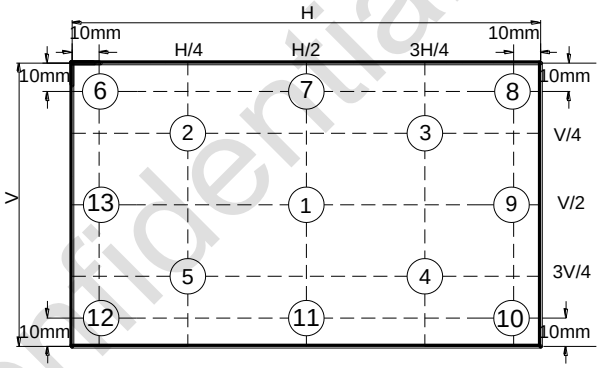


Note (6) Definition Of brightness Luminance

$$\text{Luminance uniformity} = \frac{\text{Min}(L1, L6, L7, L8, L9, L10, L11, L12, L13)}{\text{Max}(L1, L6, L7, L8, L9, L10, L11, L12, L13)} \times 100\%$$

H—Active area length V—Active area width

Figure 6 Measurement Locations of 9 Points



4.0 Electrical Characteristics

4.1 Interface Connector

Table 3 Signal Connector Type

Item	Description
Manufacturer / Type	Starconn / 300E40-0010RA-G3
Mating Receptacle / Type (Reference)	111B40-1211TA-G3 or Compatible

Table 4 Signal Connector Pin Assignment

Pin #	Signal Name	Description	Remarks
1	NC	No Connection	-
2	VDD	Power Supply	-
3	VDD	Power Supply	-
4	VDD_EDID	VDD_EDID	-
5	SCL_EDID	SCL_EDID	-
6	SDA_EDID	SDA_EDID	-
7	NC	No Connection	-
8	LV0N	-LVDS Differential Data Input	-
9	LV0P	+LVDS Differential Data Input	
10	GND	Ground	-
11	LV1N	-LVDS Differential Data Input	-
12	LV1P	+LVDS Differential Data Input	
13	GND	Ground	-
14	LV2N	-LVDS Differential Data Input	-
15	LV2P	+LVDS Differential Data Input	
16	GND	Ground	-
17	LVCLKN	-LVDS Differential Clock Input	-
18	LVCLKP	+LVDS Differential Clock Input	
19	GND	Ground	-
20	LV3N	-LVDS Differential Data Input	-
21	LV3P	+LVDS Differential Data Input	
22	GND	Ground	-
23	LED_GND	Ground for LED Driving	-
24	LED_GND	Ground for LED Driving	-
25	LED_GND	Ground for LED Driving	-

26	NC	No Connection	-
27	LED_PWM	PWM Input Signal for LED Driver	-
28	LED_EN	LED Enable Pin	-
29	NC	Reserved For CABC	-
30	NC	No Connection	
31	LED_VCC	Power Supply for LED Driver	
32	LED_VCC	Power Supply for LED Driver	
33	LED_VCC	Power Supply for LED Driver	
34	NC	No Connection	
35	BIST	BIST pin	
36	NC	No Connection	
37	NC	No Connection	
38	NC	No Connection	
39	NC	No Connection	
40	NC	No Connection	

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	Vth	-	-	+100	mV	V_{CM}=+1.2V
Differential Input Low	Vtl	-100	-	-	mV	V_{CM}=+1.2V
Magnitude Differential Input	$\|V_{ID}\|$	200	-	400	mV	-
Common Mode Voltage	V_{CM}	0.3+（VID/2）	-	VDD-1.2-（VID/2）	V	-
Common Mode Voltage	ΔV_{CM}	-	-	50	mV	V_{CM}=+1.2V

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 7 Voltage Definitions

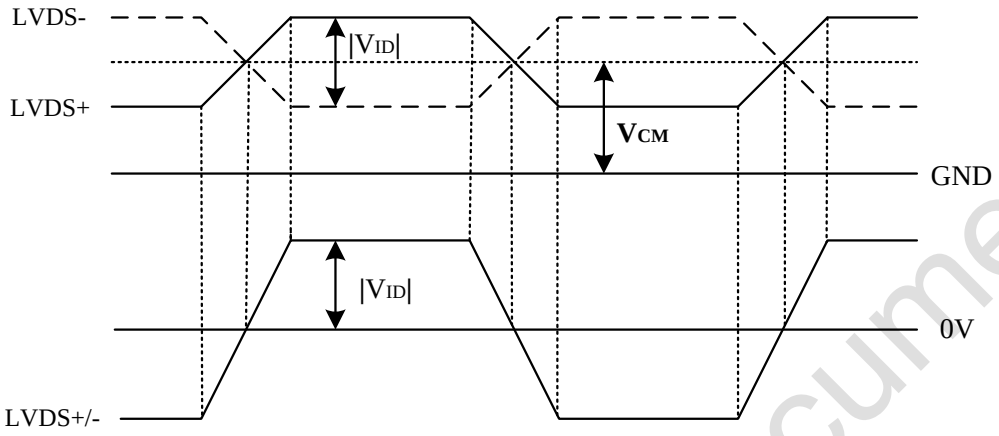
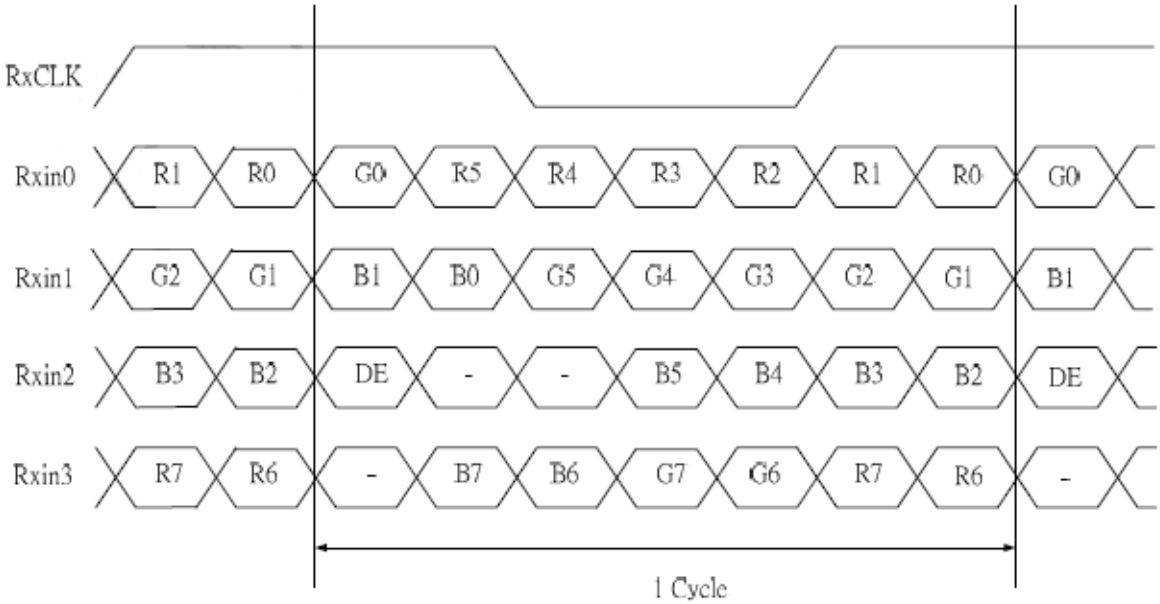


Figure 8 LVDS Data Mapping



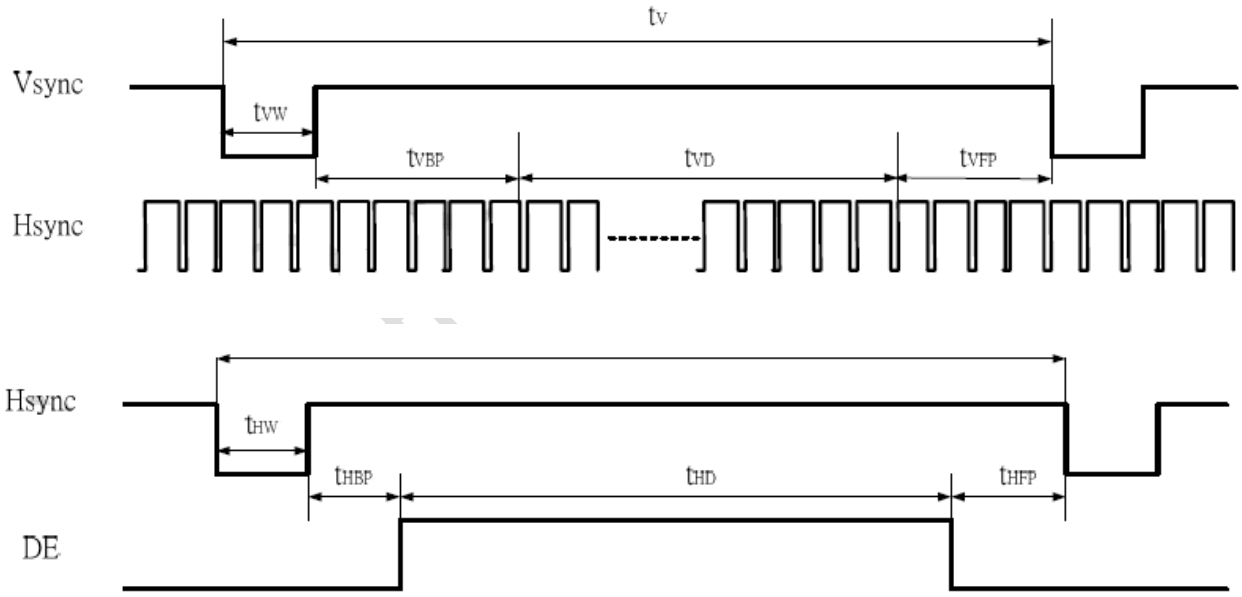
4.3 Interface Timings

Table 6 Interface Timings

Parameter	Symbol	Unit	Min.	Typ.	Max.
Frame Rate	--	Hz	-	60	-
Frame Period	t_V	line	815	823	1023
Vertical Display Time	t_{VD}	line		800	
Vertical Blanking Time	$t_{VW}+t_{VBP}+t_{VFP}$	line	15	23	223
1 Line Scanning Time	t_H	clock	1410	1440	1470
Horizontal Display Time	t_{HD}	clock		1280	
Horizontal Blanking Time	$t_{HW}+t_{HBP}+t_{HFP}$	clock	130	160	190
Clock Rate	$1/T_C$	MHz	68.9	71.1	73.4

4.3.1 Timing Diagram of Interface Signal (DE mode)

Figure 11 Timing Characteristics



4.4 Input Power Specifications

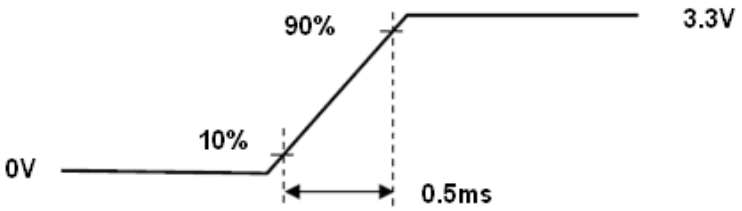
Input power specifications are as follows.

Table 7 Input Power Specifications

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
System Power Supply							
LCD Drive Voltage (Logic)		V_{DD}	3.0	3.3	3.6	V	(2), (4)
VDD Current	White Pattern	I_{DD}	-	0.27	-	A	(3),(4),
VDD Power Consumption	White Pattern	P_{DD}	-	-	1.0	W	
Rush Current		I_{Rush}	-	-	1.5	A	(1),(4),(5)
Allowable Logic/LCD Drive Ripple Voltage		V_{VDD-RP}	-	-	300	mV	(4)
LED Power Supply							
LED Input Voltage		V_{LED}	6	12	21	V	(4)
LED Power Consumption		P_{LED}	-	-	2.5	W	(4)
LED Forward Voltage		V_F	2.8	-	3.2	V	(4)
LED Forward Current		I_F	-	20	-	mA	(4)
PWM Signal Voltage	High	V_{PWM}	3.0	-	3.6	V	(4)
	Low		0	-	0.4		(4)
LED Enable Voltage	High	V_{LED_EN}	3.0	-	3.6	V	(4)
	Low		0	-	0.4		(4)
Input PWM Frequency		F_{PWM}	1	-	2	KHz	D_{DIM}≥1%
			2	-	5		D_{DIM}≥2.5
			5	-	10		D_{DIM}≥5
			10	-	20		D_{DIM}≥10
LED Life Time		LT	15000	-	-	Hours	(3)

Note (1) Measure Condition

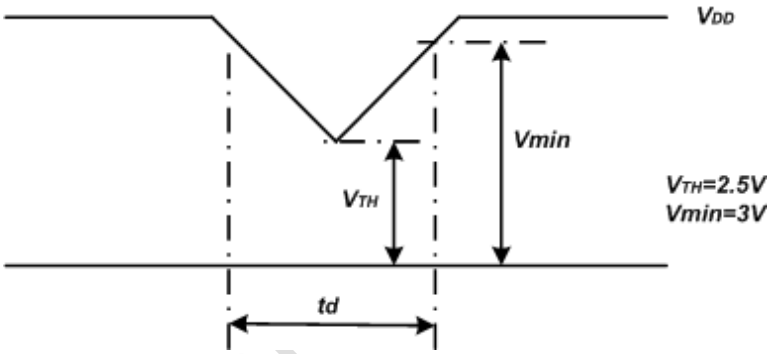
Figure 9 VDD Rising Time



Note (2) VDD Power Dip Condition

V_{TH}< V_{DD}≤ Vmin, td≤ 10ms (a time of the voltage return to normal), our panel can revive automatically.

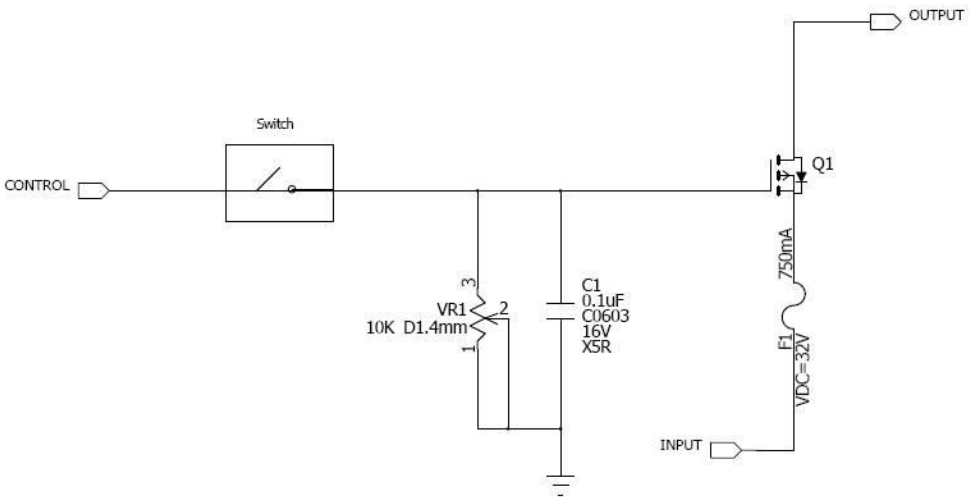
Figure 10 VDD Power Dip



Note (3) Frame Rate=60Hz, VDD=3.3V, DC Current.

Note (4) Operating temperature 25℃, humidity 55%RH.

Note (5) The reference measurement circuit of rush current.



Note (6) The LED life time define as the estimated time to 50% degradation of initial luminous.

4.5 Power ON/OFF Sequence

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.

Figure 11 Power Sequence

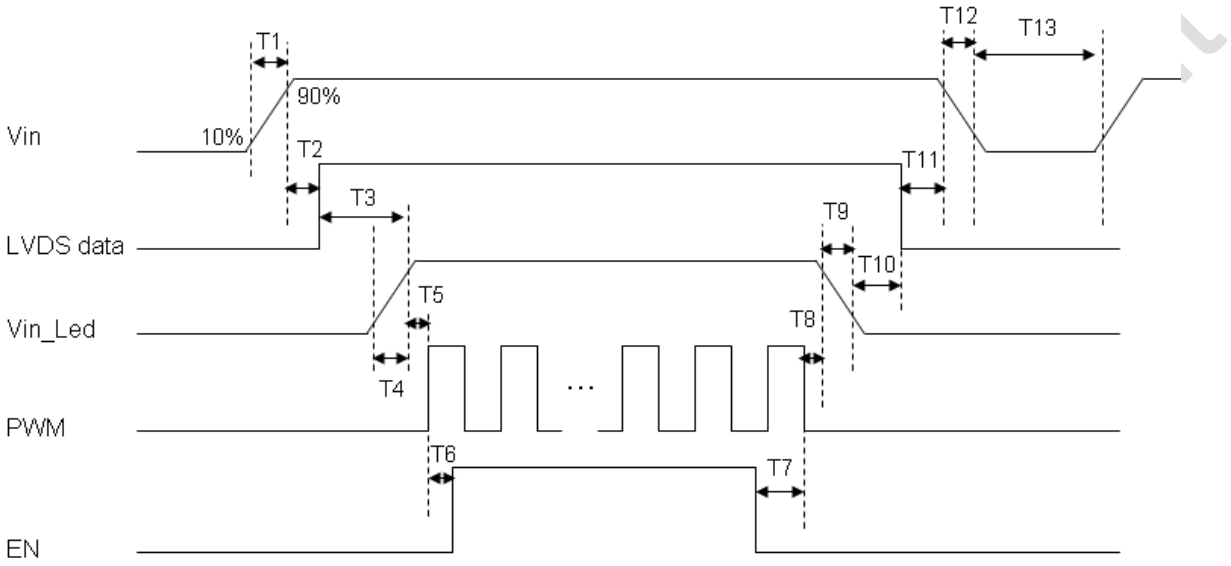


Table 8 Power Sequencing Requirements

Parameter	Symbol	Unit	Min	Typ.	Max
VIN Rise Time	T1	ms	0.5	--	10
VIN Good to Signal Valid	T2	ms	30	--	90
Signal Valid to Backlight On	T3	ms	200	--	--
Backlight Power On Time	T4	ms	0.5	--	--
Backlight VDD Good to System PWM On	T5	ms	10	--	--
System PWM ON to Backlight Enable ON	T6	ms	10	--	--
Backlight Enable Off to System PWM Off	T7	ms	0	--	--
System PWM Off to B/L Power Disable	T8	ms	10	--	--
Backlight Power Off Time	T9	ms	0.5	10	30
Backlight Off to Signal Disable	T10	ms	200	--	--
Signal Disable to Power Down	T11	ms	0	--	50
VIN Fall Time	T12	ms	0.5	10	30
Power Off	T13	ms	500	--	--

5.0 Mechanical Characteristics

5.1 Outline Drawing

Figure 12 Outline Drawing (Front Side)

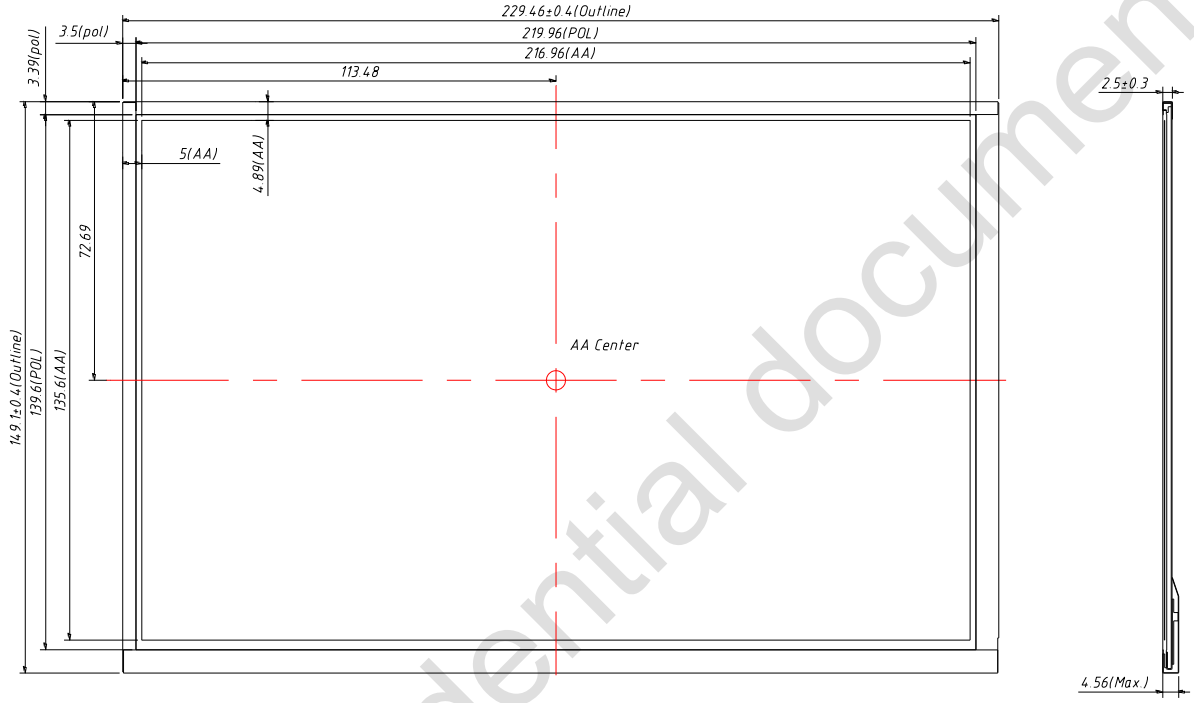
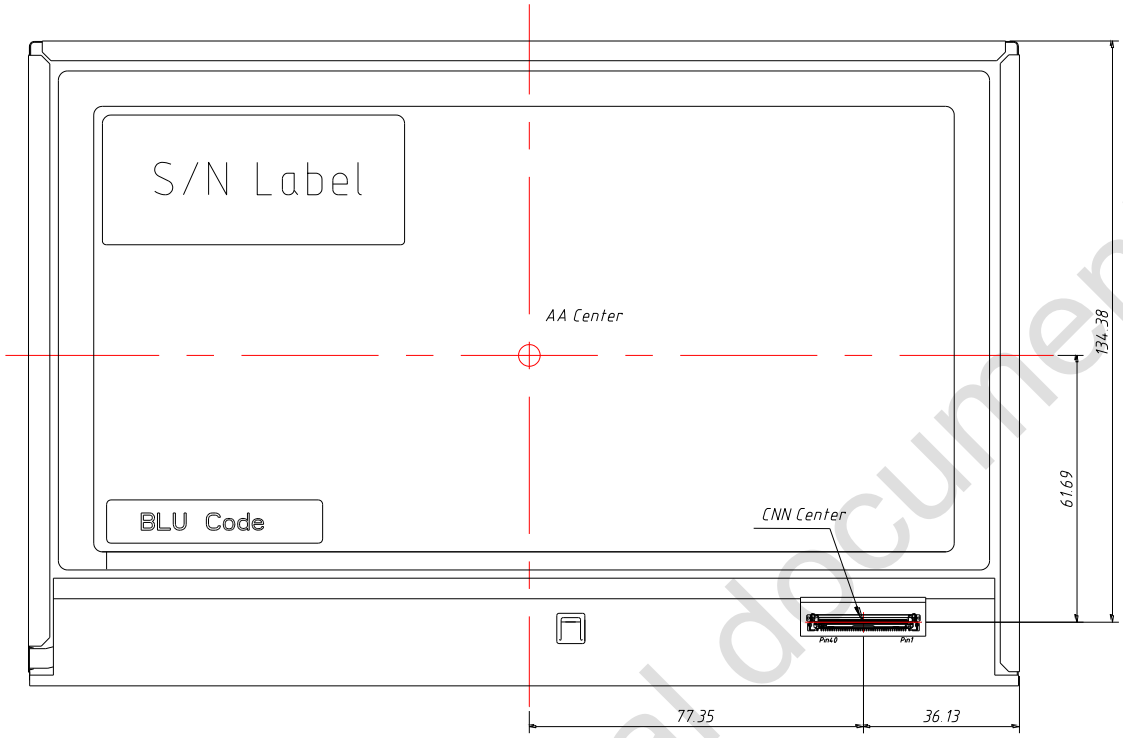


Figure 13 Outline Drawing (Back Side)



5.2 Dimension Specifications

Table 9 Module Dimension Specifications

Parameter	Min	Typ	Max	Unit
Width	229.06	229.46	229.86	mm
Height	148.7	149.1	149.5	mm
Depth w/o PCB	2.2	2.5	2.8	mm
Depth w/ PCB	-	-	4.56	mm
Weight	-	-	160	g

6.0 Reliability Conditions

Item	Package	Test Conditions		Note
High Temperature Operating Test	Module	50℃, 300 hours		(1),(2),(3),(4)
Low Temperature Operating Test	Module	0℃,300 hours		(1),(2),(3),(4)
High Temperature Storage Test	Module	60℃, 300 hours		(1),(2),(4)
Low Temperature Storage Test	Module	-20℃, 300hours		(1),(2),(4)
High Temperature/High Humidity Operating Test	Module	50℃,80%RH, 300 hours		(1),(2),(3),(4)
Shock Non-operating Test	Module	3 shock in each direction Peak acceleration:981m/s2 Half Sine Wave; 6ms.		(4)
Vibration Non-operating Test	Module	1.5G , 10~500 Hz , x、y、z each axis/1hour.		(4)
ESD Test	Module	Contact	± 4KV/± 6KV/±8KV	(5)
		Air	±10KV/± 12KV/±15KV	

Note (1) All the judgments are under room temperature and the sample need to be static more than 2 hours in the room temperature before judge.

Note (2) During measurement, the condensation water or remains shall not be allowed.

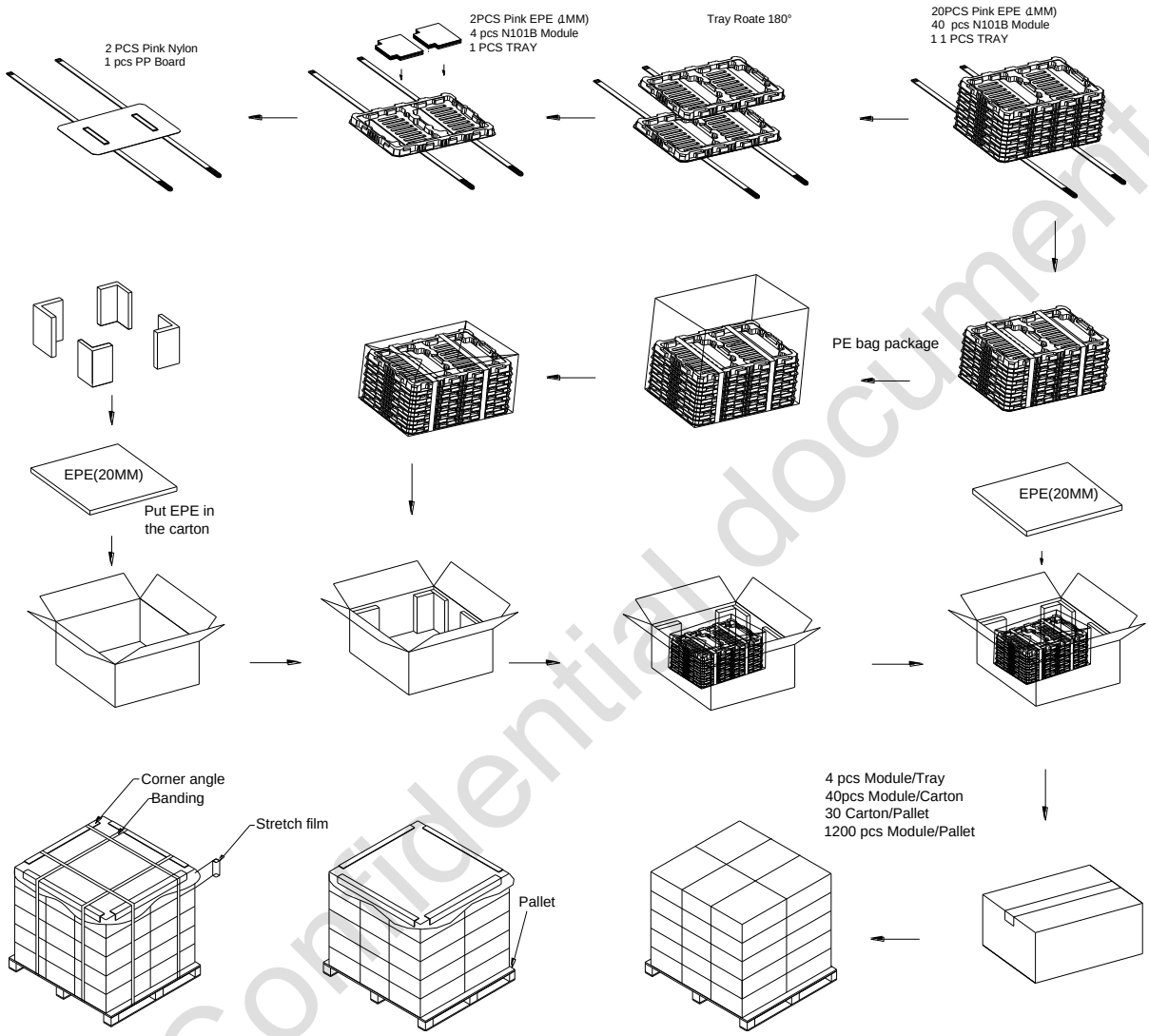
Note (3) In operating test, the backlight voltage and current must be in speccfication.

Note (4) There is no display function issue occurred, all the cosmetic specification is judged before the reliability stress.

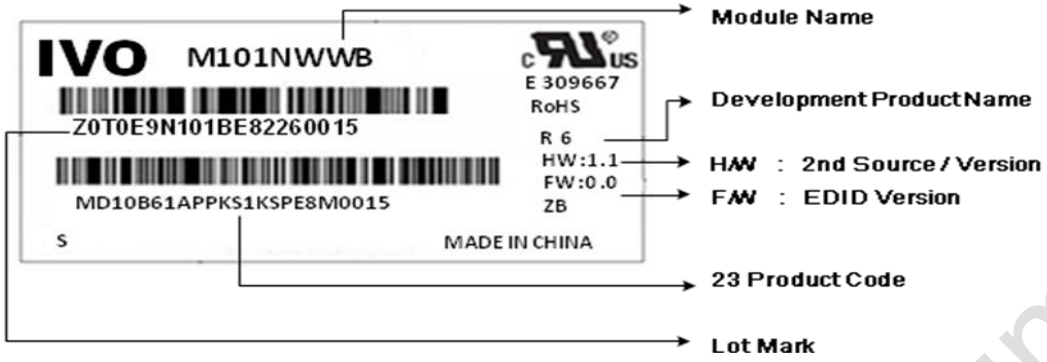
Note (5) In case of malfunction defect caused by ESD damage. If it would be recovered to normal state after resetting, it would be judge as pass.

7.0 Package Specification

Figure 14 Packing Method



8.0 Lot Mark



Note: This picture is only an example.

8.1 20 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 Day.
Code 17,18,19,20: Serial Number.

8.2 23 Product Barcode

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

Code 1,2: Manufacture District.
Code 3,4,5,6,7: IVO internal module name.
Code 8,9,10,13,16: IVO internal flow control code.
Code 11,12: Cell location Suzhou, China defined as “KS”.
Code 14 ,15: Module location Kunshan, China defined as “KS”; Yangzhou, China defined as “YZ”; Shenzhen, China defined as “SE”; Zhuhai, China defined as “ZH”; Suzhou, China defined as “SZ”.
Code 17,18,19 : Year, Month, Day refer to Note(1), Note(2) and Note(3).
Note (1) Production Year

Year	2006	2007	2008	2009	2010	2011	2012	2013	.....	2035
Mark	6	7	8	9	A	B	C	D	.....	Z

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

Note (3) Production Day: 1~V.
Code 20~23 : Serial Number.

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 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.

9.3 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 sunlight.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.

9.4 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 "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.

9.5 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.

9.6 Disposal

When disposing LCD module, obey the local environmental regulations.