Customer Approved Specification

To:

Product Name: M101AWAJ R0

Document Issue Date: 2023/3/10

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

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NO.1 Long Teng Road, KunShan City, JiangSu, China
InfoVision Optoelectronics (Kunshan) Co., LTD
Tel:0512-57278888
Fax:0512-57278900

Revision	Date	Page	Old Description	New Description	Remark
00	2023/3/10	all	-	First Issued	

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1.0 General Descriptions

1.1 Introduction

The M101AWAJ 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 10.1 inch diagonally measured active display area with HD resolution (1280horizontal by 720vertical 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		10.1	inch
Active Area (H x V)		223.68 x 125.82	mm
Number of Pixels (H x V)		1,280 x 720	-
Pixel Pitch (H x V)		0.17475 x 0.17475	mm
Pixel Arrangement		R.G.B. Vertical Stripe	-
Display Mode		Normally Black	-
White Luminance		(900) (Typ.)	cd /m2
Contrast Ratio		(1,000) (Typ.)	-
Response Time		(25) (Typ.) @ 25℃	ms
Input Voltage		3.3 (Typ.)	V
Power Consumption		(8.71)(Max.)@ White pattern ,FV=60Hz	W
Weight		(380) (Max.)	g
Outline Dimension (H x V x D)	W/O FPC	(236.08)(Typ.) x (140.25)(Typ.) x (7.45)(Max.)	mm
	With FPC	(236.08)(Typ.) x (140.25)(Typ.) x (9.5) (Max.)	
Electrical Interface (Logic)		LVDS	-
Support Color		16.7 M	-
NTSC		(75) (Typ.)	%
Surface Treatment		Anti-glare,3H	-

1.4 Functional Block Diagram

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

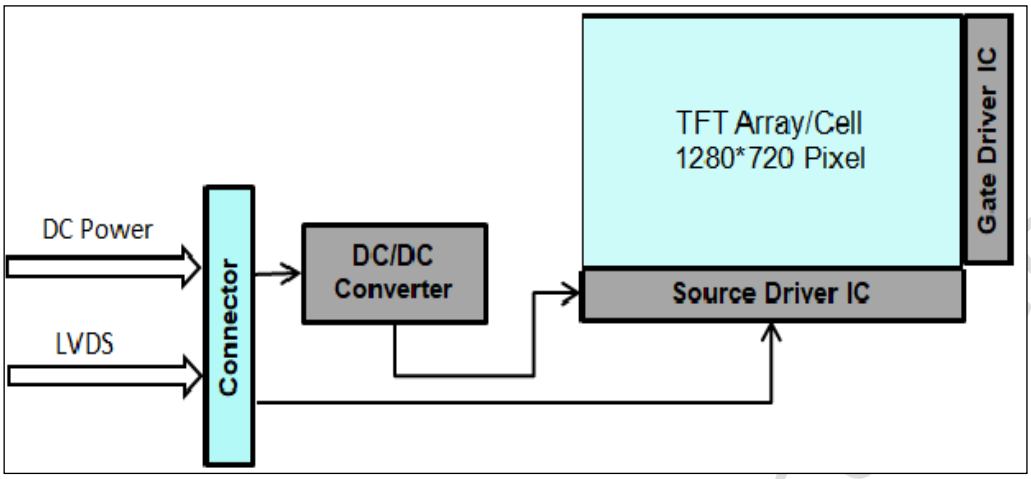


Figure 1 Block Diagram

1.5 Pixel Mapping

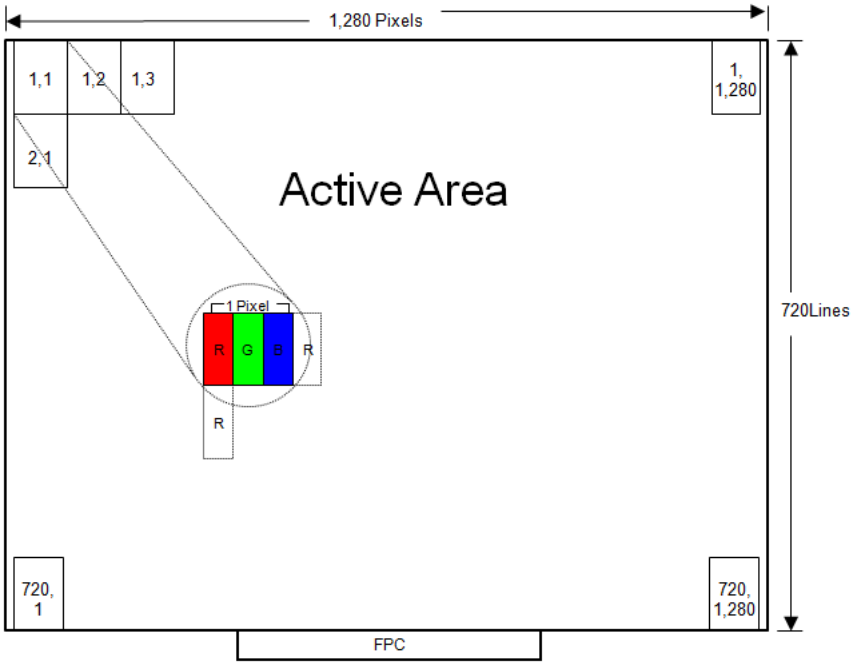


Figure 2 Pixel Mapping

2.0 Absolute Maximum Ratings

Table 1 Electrical & Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{cc}	(-0.3)	(3.6)	V	(1),(2),(3),(4)
Logic Signal Voltage	V_I	(-0.3)	(3.6)	V	
LVDS Signal Voltage	V_{Signal}	(-0.3)	(3.6)	V	
Operating Temperature	Ta	(-30)	(85)	℃	
Storage Temperature	Ta	(-40)	(95)	℃	

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. 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 module from static electricity.

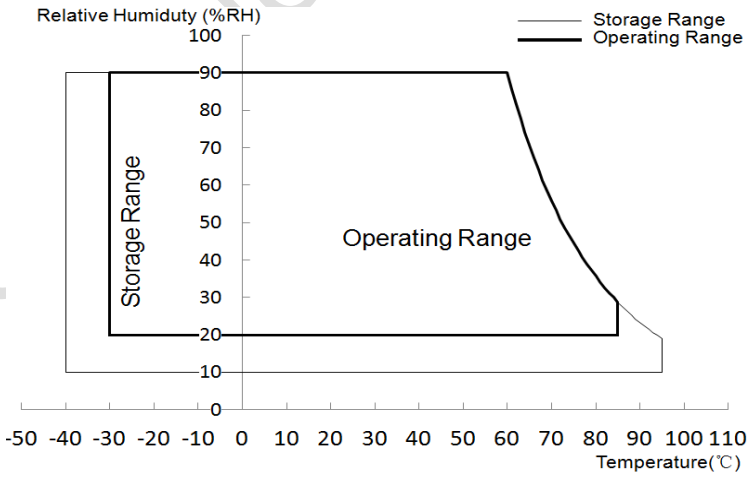


Figure 3 Absolute Ratings of Environment of the LCD Module

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		(800)	(1,000)	-	-	(1),(2),(4),(8) θx=θy=0°
Response Time	Rising + Falling	25℃	-	(25)	(30)	ms	(1),(2),(5),(8) θx=θy=0°
		-30℃	-	-	(400)	ms	(1),(2),(5),(8) θx=θy=0°
Color Chromaticity (CIE1931)	Red x		Typ. -0.04	(0.652)	Typ. +0.04	-	(1),(2),(3),(8) θx=θy=0°
	Red y			(0.334)		-	
	Green x			(0.294)		-	
	Green y			(0.626)		-	
	Blue x			(0.149)		-	
	Blue y			(0.065)		-	
	White x			(0.307)		-	
	White y			(0.324)		-	
NTSC	-		(70)	(75)	-	%	(1),(2),(3),(8) θx=θy=0°
White Luminance	Center		(700)	(900)	-	cd/m^2	(1),(2),(6),(8) θx=θy=0°
Luminance Uniformity	9 Points		(70)	(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.

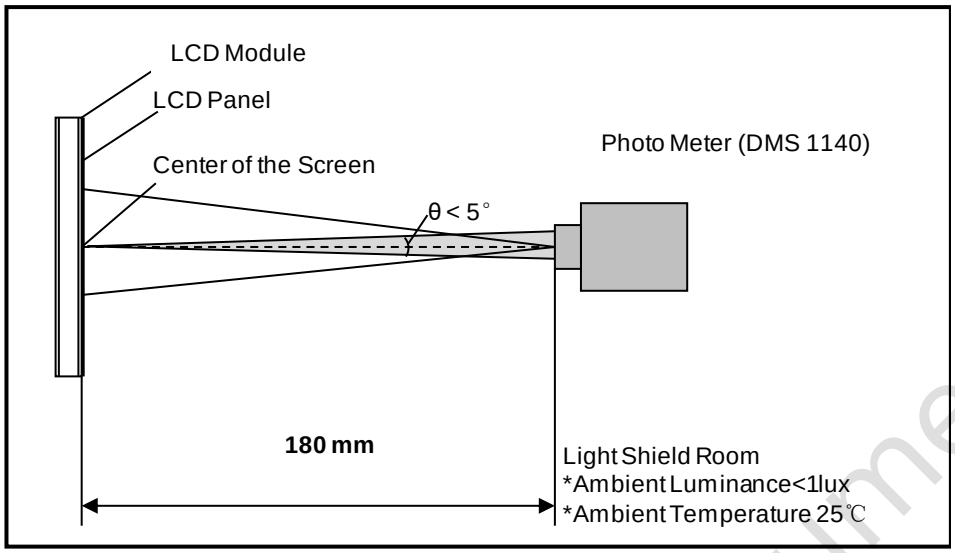


Figure 4 Measurement Setup

Note (2) The LED input parameter setting as:

I_{LED}:(266)mA, I_{LED}=(66.5)mA*4

Note (3) Definition of Viewing Angle

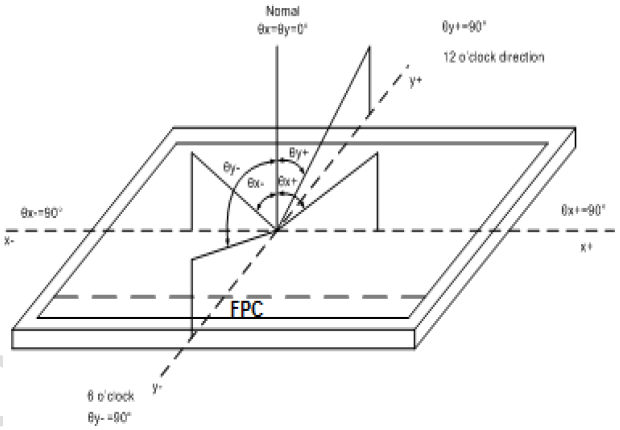


Figure 5 Definition of Viewing Angle

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)

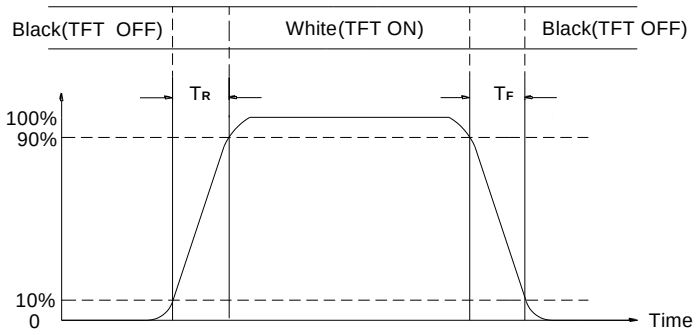


Figure 6 Definition of Response Time

Note (6) Definition of Luminance of White

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

Display Luminance=L1(center point)

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

Measure the luminance of White/Black pattern at 9 points.

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

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

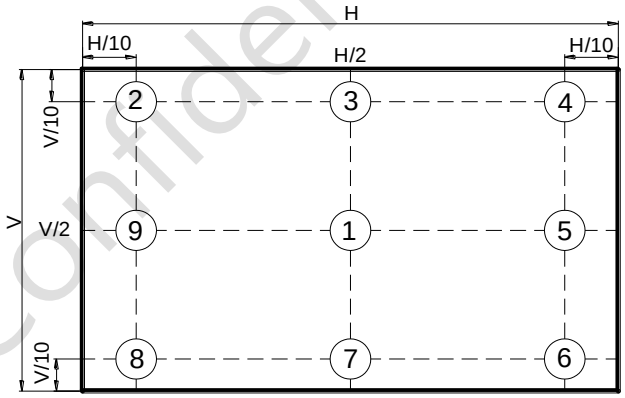


Figure 7 Measurement Locations of 9 Points

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
Mating Receptacle / Type (Reference)	IRISO/IMSA-9637S-40Y801

Table 4 Signal Connector Pin Assignment

Pin No.	Symbol	Description	Remarks
1	NC	No connection	-
2	VCC	Digital Power (Vin= 3.3V)	-
3	VCC	Digital Power (Vin= 3.3V)	-
4	NC	No connection	-
5	GND	Ground	-
6	BIST	Enable built-in self test (BIST) function BIST=H, BIST mode BIST=L, Normal mode (Please leave it to GND when normal operation)	Note(2)
7	NC	No connection	-
8	GND	Ground	-
9	SHLR	Horizontal shift direction (source output) selection SHLR =H, Forward (SOUT1→ SOUT2→...→SOUT1920) SHRL=L, Reverse (SOUT1920→SOUT1919→...→S1) Default Pull High	Note(3)
10	UPDN	Vertical shift direction(Gate output) selection UPDN = H, Forward, Top → Bottom UPDN = L, Reverse, Bottom → Top Default Pull High	Note(3)
11	GND	Ground	-
12	NC	No connection	-
13	NC	No connection	-
14	GND	Ground	-
15	NC	No connection	-
16	NC	No connection	-
17	STBYB	Standby mode setting pin. STBYB=H, normal operation STBYB=L, timing controller, output buffer, DAC and power circuit all off.	-

		This pin must meet the sequence of power on/off.	
18	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.	-
19	GND	Ground	-
20	LVDS3P	Positive LVDS differential data input	-
21	LVDS3N	Negative LVDS differential data input	-
22	GND	Ground	-
23	LVDS_CKP	Positive LVDS differential clock input	-
24	LVDS_CKN	Negative LVDS differential clock input	-
25	GND	Ground	-
26	LVDS2P	Positive LVDS differential data input	-
27	LVDS2N	Negative LVDS differential data input	-
28	GND	Ground	-
29	LVDS1P	Positive LVDS differential data input	-
30	LVDS1N	Negative LVDS differential data input	-
31	GND	Ground	-
32	LVDS0P	Positive LVDS differential data input	-
33	LVDS0N	Negative LVDS differential data input	-
34	GND	Ground	-
35	VDDOTP	Power input for OTP programming (8.6V). (IVO use on it, Please leave this pin open or connect it to VCC when not programming OTP)	Note(1)
36	NC	No connection	-
37	ATREN	Enable auto reload OTP/EEPROM every 60 frames. (IVO use on it, Please leave this pin open) ATREN=H：Enable auto reload OTP/EEPROM. ATREN=L: Disable auto reload OTP/EEPROM.	Note(1)
38	SPI_SDA	Serial interface address and data input/output for SPI interface. (IVO use on it, Please leave this pin open)	Note(1)
39	SPI_SCL	Serial interface clock input for SPI interface. (IVO use on it, Please leave this pin open)	Note(1)
40	SPI_CSB	Serial interface chip enable signal for SPI interface. (IVO use on it, Please leave this pin open)	Note(1)

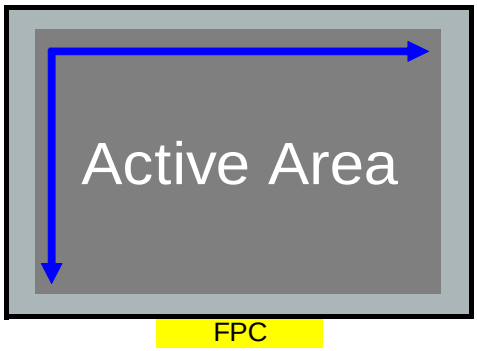
Note(1): 35、37、38、39、40pin for IVO Test SPI/OTP programming. Customer should keep floating.

Note(2): Bist mode：

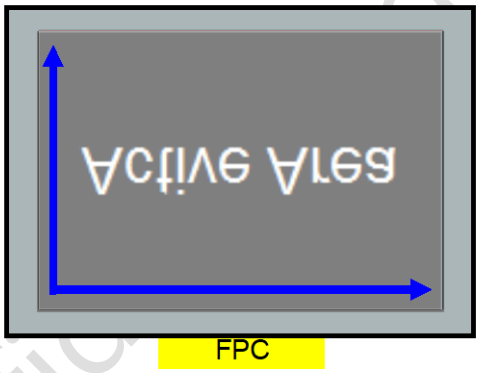
High=3.0~3.6V；Bist Mode

Low=0V(Default)；Normal Mode

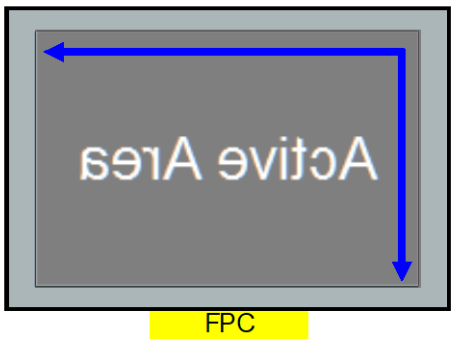
Note(3): SHLR：High(3.0~3.6V) (Default),UPDN：High(3.0~3.6V) (Default)



SHLR：High(3.0~3.6V) (Default),UPDN：Low(0)



SHLR：Low(0V),UPDN：High(3.0~3.6V) (Default)



SHLR：Low(0V), UPDN：Low(0)

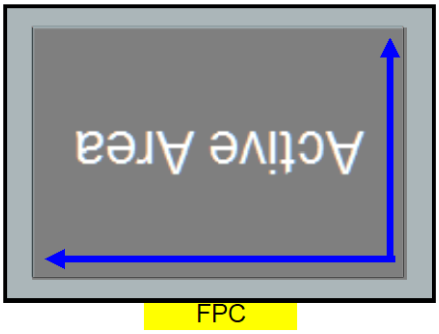


Table 5 Backlight Connector Pin Assignment

Pin No.	Symbol	Description
1	LED-PIN1	V+
2	LED-PIN2	V+
3	LED-PIN3	/
4	LED-PIN4	V-
5	LED-PIN5	V-
6	LED-PIN6	V-
7	LED-PIN7	V-
8	LED-PIN8	/
9	LED-PIN9	NTC1
10	LED-PIN10	NTC2

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 6 LVDS Receiver Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	Vth	-	-	(+150)	mV	V_{CM}=+1.2V
Differential Input Low Threshold	Vtl	(-150)	-	-	mV	V_{CM}=+1.2V
Magnitude Differential Input Voltage	$\|V_{ID}\|$	(150)	-	(600)	mV	-
Common Mode Voltage	V_{CM}	(1.0)	(1.2)	(1.7-|Vid|/2)	V	-

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

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

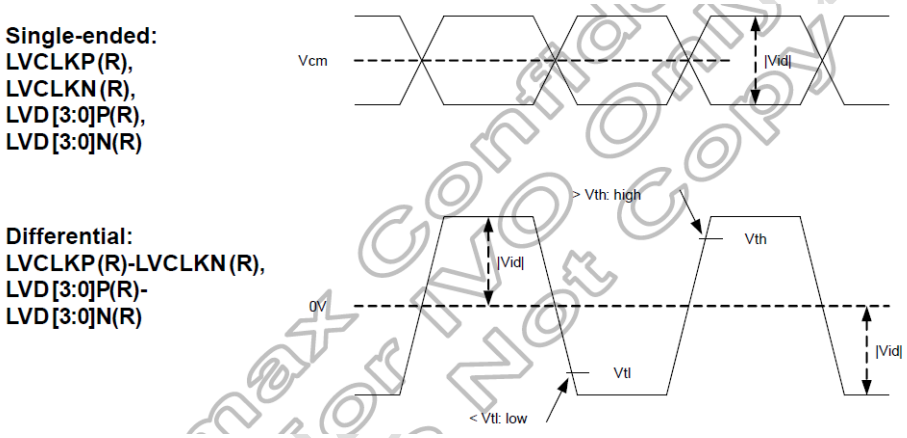


Figure 8 Voltage Definitions

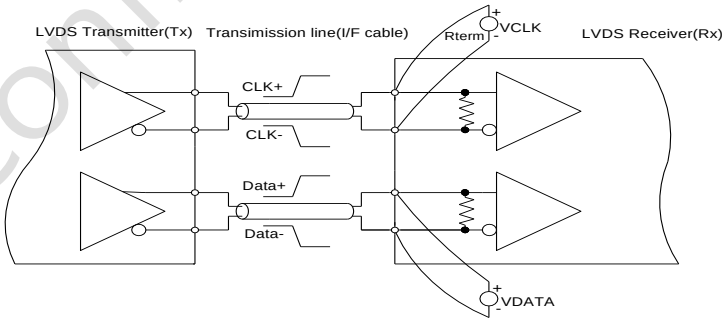


Figure 9 Measurement System

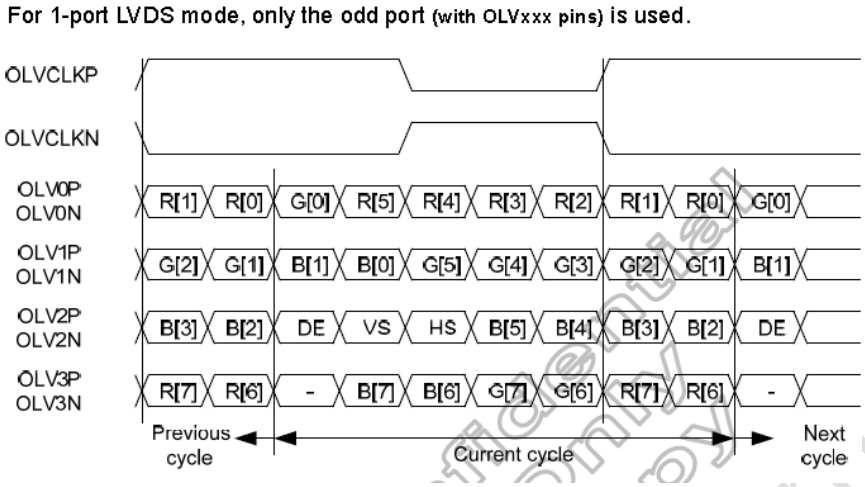


Figure 10 Data Mapping(1port VESA Standard)

Note (3) LVDS AC electrical characteristics

Parameter	Symbol	Spec			Unit
		Min	Typ	Max	
Clock frequency(1-port)	Flvcyc	(57.1)	(58.1)	(85)	MHz
Clock period(1-port)	Tlvcyc	(11.7)	-	(17.5)	ns
1 data bit time	UI	-	(1/7)	-	Tlvcyc
Clock high time	TLVHW	-	(4)	-	UI
Clock low time	TLVLW	-	(3)	-	UI
Position1	Tpos1	(-0.2)	(0)	(0.2)	UI
Position0	Tpos0	(0.8)	(1)	(1.2)	UI
Position6	Tpos6	(1.8)	(2)	(2.2)	UI
Position5	Tpos5	(2.8)	(3)	(3.2)	UI
Position4	Tpos4	(3.8)	(4)	(4.2)	UI
Position3	Tpos3	(4.8)	(5)	(5.2)	UI
Position2	Tpos2	(5.8)	(6)	(6.2)	UI
Input eye width	TEYEW	(0.6)	-	-	UI
Input eye border	TEX	-	-	(0.2)	UI
LVDS wake up time	TENLVDS	-	-	(150)	us

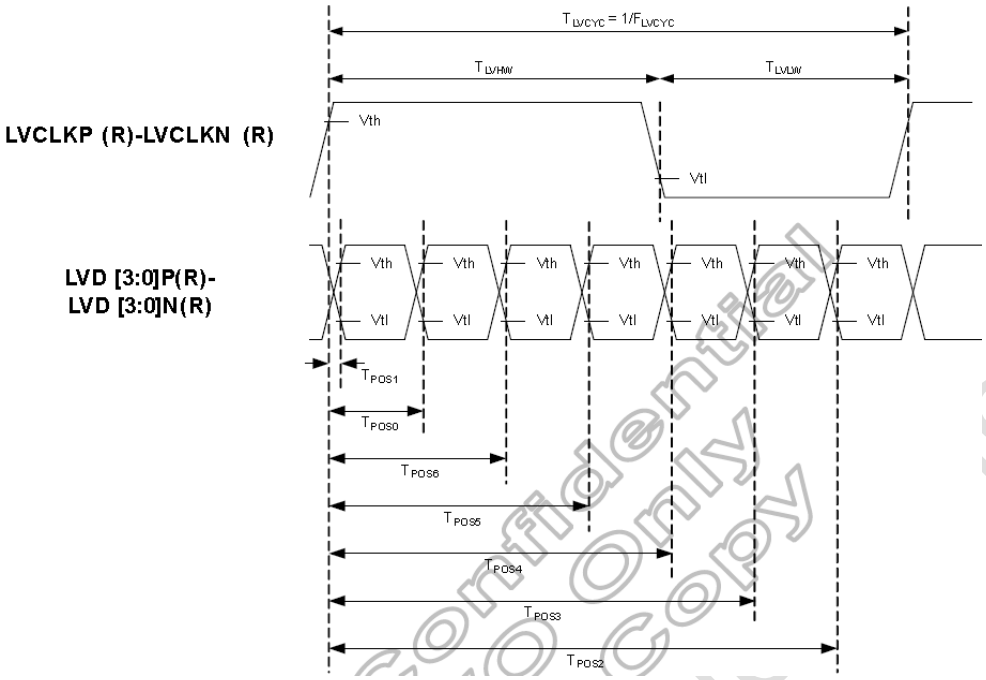
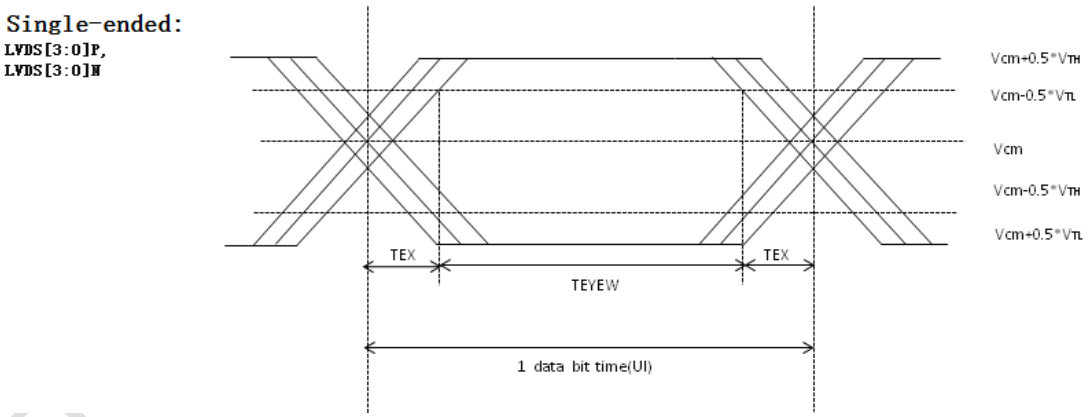


Figure 11 LVDS Input Timing



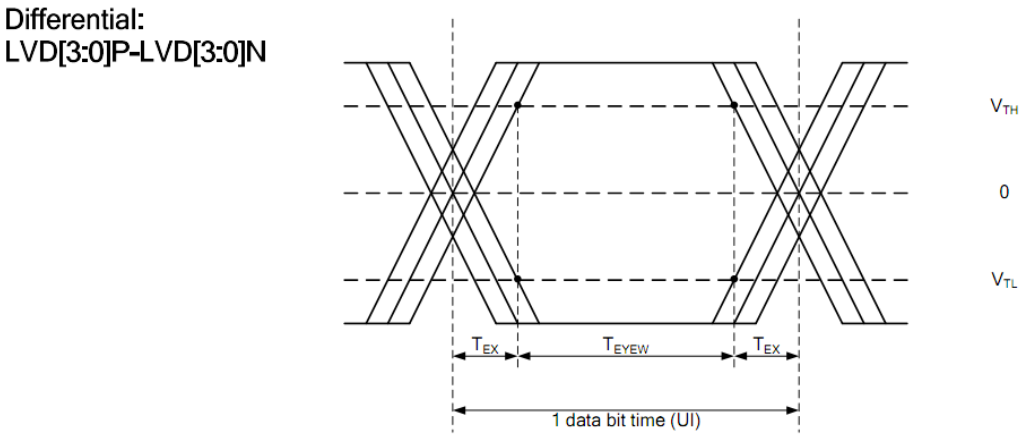


Figure 12 LVDS Input Eye Diagram

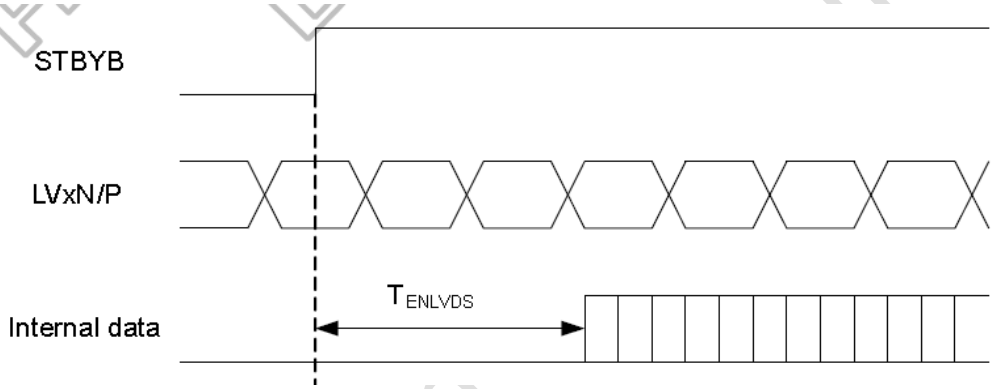


Figure 13 LVDS Wake Up Time

4.2.2 LVDS with SSC

The LVDS receiver can support Spread Spectrum Clock(SSC).Limitation is listed as below.

Table 7 SSC limitation of LVDS interface

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Modulation Frequency	SSC_{MF}	LVDS clock frequency center at 80MHz	-	-	(200)	KHz
		LVDS clock frequency center at 60MHz	-	-	(150)	KHz
		LVDS clock frequency center at 40MHz	-	-	(100)	KHz
		LVDS clock frequency center at 20MHz	-	-	(50)	KHz
Modulation Rate	SSC_{MR}	LVDS clock frequency + SSCMR in the range of 20MHz～85MHz	-	-	(±5)	%

4.2.3 LVDS Receiver Internal Circuit

Figure 11 shows the internal block diagram of the LVDS receiver. This LCD module equips termination resistors for LVDS link.

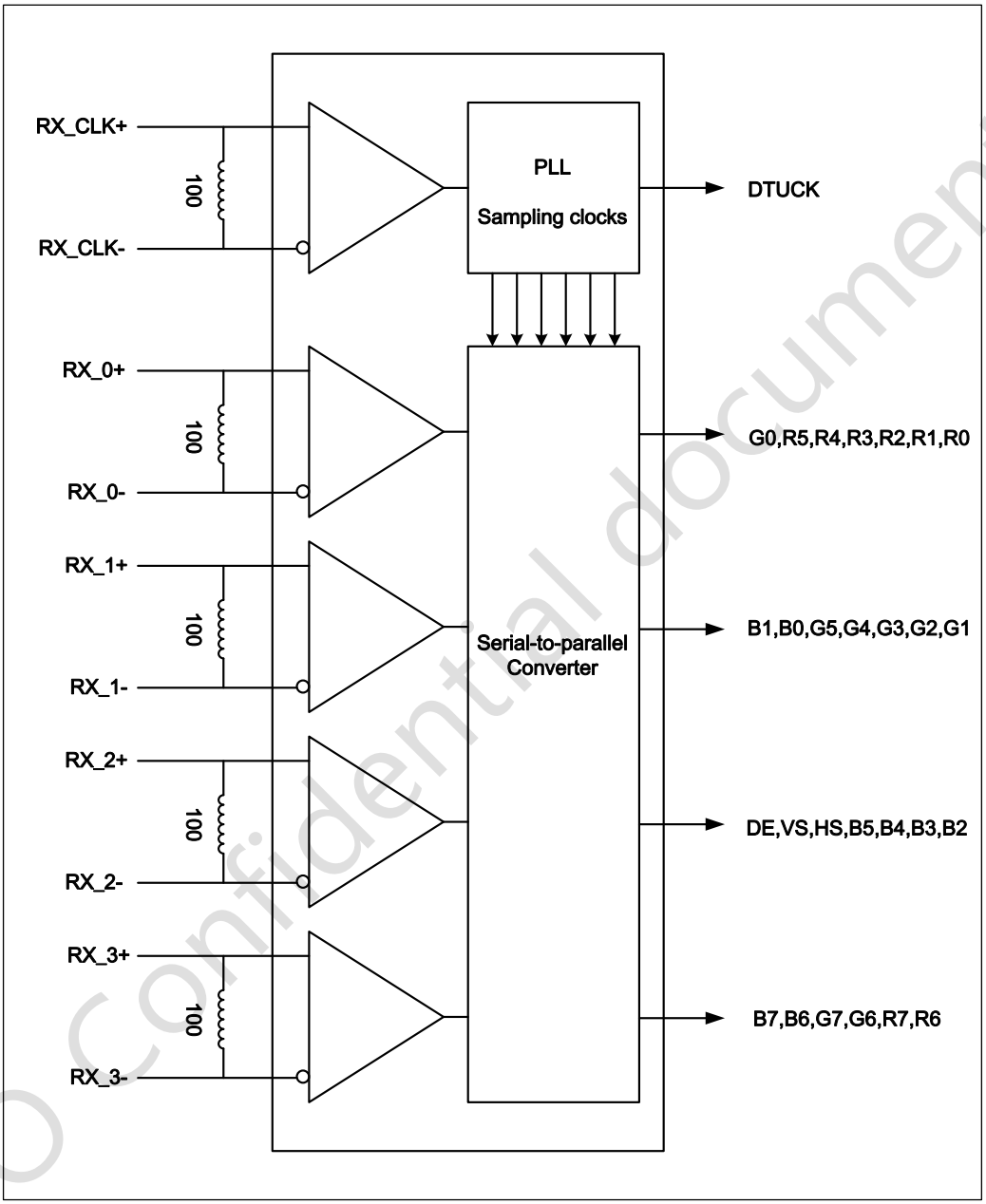


Figure 14 LVDS Receiver Internal Circuit

4.3 Interface Timings

Table 8 Interface Timings

Parameter	Symbol	Min.	Typ.	Max.	Unit
LVDS Clock Frequency	Fclk	-	(58.1)	-	MHz
H Total Time	HT	-	(1322)	-	Clocks
H Active Time	HA		1,280		Clocks
V Total Time	VT	-	(733)	-	Lines
V Active Time	VA		720		Lines
Frame Rate	FV	-	(60)	-	Hz

Note1：HT * VT *Frame Frequency≤TBD MHz

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

M101AWAJ R0 is secured only for function under lower refresh rate; 60Hz at Normal mode

4.4 Input Power Specifications

Input power specifications are as follows.

Table 9 Input Power Specifications

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
System Power Supply							
LCD Drive Voltage (Logic)		V_{CC}	(3.0)	(3.3)	(3.6)	V	(1),(2)
VCC Current	White Pattern	I_{CC}	-	-	(0.447)	A	(1),(4)
VCC Power Consumption	White Pattern	P_{CC}	-	-	(1.47)	W	
Logic Input Signal	High level voltage	V_{Logic}	(0.7*VCC)	-	(3.6)	V	(1) ,(3)
	Low level voltage		(0)	-	(0.3*VCC)	V	
Rush Current		I_{Rush}	-	-	(1)	A	(1),(5)
Allowable Logic/LCD Drive Ripple Voltage		V_{VCC-RP}	-	-	(200)	mV	(1),(5)
LED Power Supply							
LED Input Voltage		V_{LED}	(21.6)	(24)	(27.2)	V	(1),(2),(7)
LED Power Consumption		P_{LED}	-	-	(7.24)	W	(1), (7)
LED Forward Voltage		V_F	(2.7)	(3)	(3.4)	V	(1),(2) ,(8)
LED Forward Current		I_F	-	(66.5)	-	mA	
LED Life Time		LT	(10,000)	(30,000)	-	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) Logic input signal include Bist/SHLR/UPDN/STBYB/RESET.

Note (4) The specified V_{CC} current and power consumption are measured under the V_{CC} = (3.3) V, FV= (60) Hz condition and White pattern.

Note (5) The figures below is the measuring condition of V_{cc}. Rush current can be measured when T_{RUSH} is 0.5 ms.

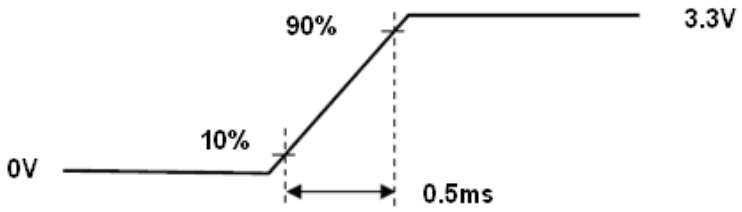
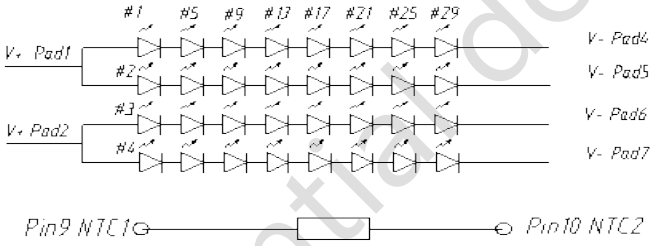


Figure 15 V_{cc} Rising Time

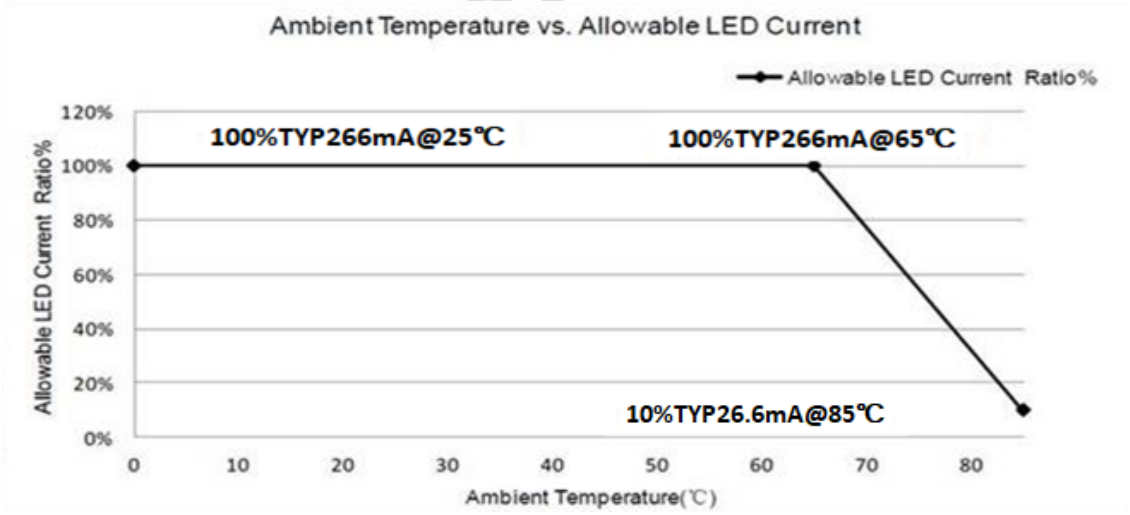
Note (6) When the LED life is less than 30K Hours,the life time is determined as the sum of the lighting time till the luminance of LCD at the typical LED current reducing to 70% of the minimum value under normal operating condition.

Note (7) Definition of VLED and PLED

V_{LED} =V_F×8, I_{LED} =I_F×4, PLED (max.)= $V_{LED(max.)}$×$I_{LED(Typ.)}$



Note (8) The allowable forward current of LED vary with environmental temperature



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 VCC voltage is off.

2. When system first start up, should keep the VCC high time longer than 200ms, otherwise

may cause image sticking when VCC drop off.

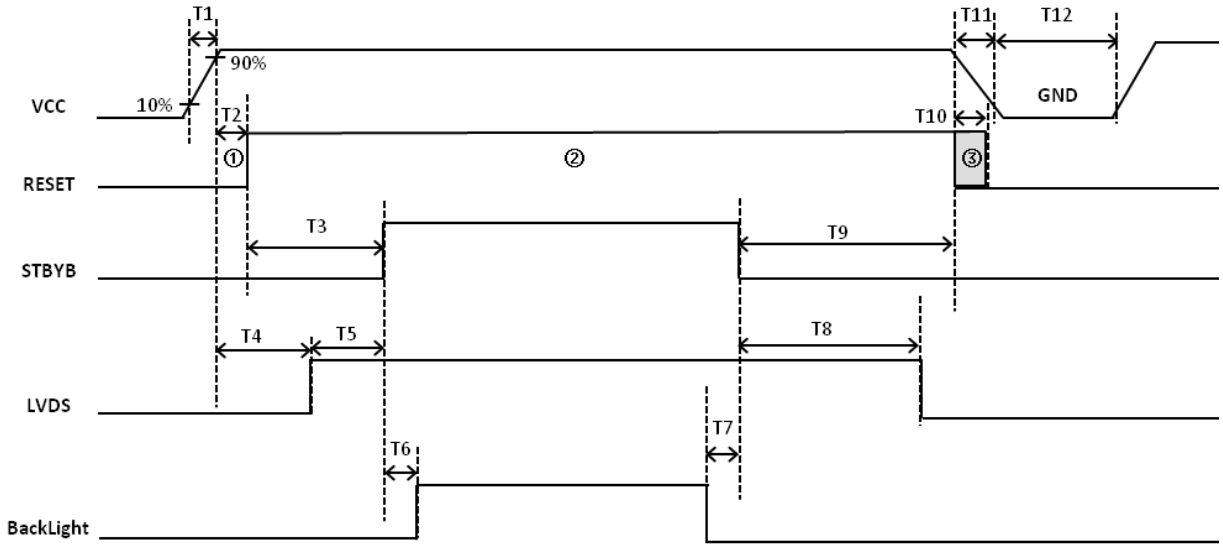


Figure 16 Power Sequence

Table 10 Power Sequencing Requirements

Parameter	Symbol	Min.	Typ.	Max.	Unit
VCC Rise Time	T1	(0.5)	-	(10)	ms
VCC Good to RESET pull H	T2	(10)	-	-	us
RESET pull H to STBYB pull H	T3	(16)	-	-	ms
VCC Good to Signal Valid	T4	(0)	-	(50)	ms
Signal Valid to STBYB pull H	T5	(0)	(10)	-	ms
STBYB pull H to Backlight Power On	T6	(200)	-	-	ms
Backlight Power Off to STBYB pull L	T7	(200)	-	-	ms
STBYB Pull L to Signal Disable	T8	(0)	(15)	(18)	ms
STBYB pull L to VCC Power off	T9	(0)	(15)	(18)	ms
VCC Power off to RESET off	T10	(0)	-	-	ms
VCC Fall Time	T11	(0.5)	-	(30)	ms
VCC Power off	T12	(500)	-	-	ms

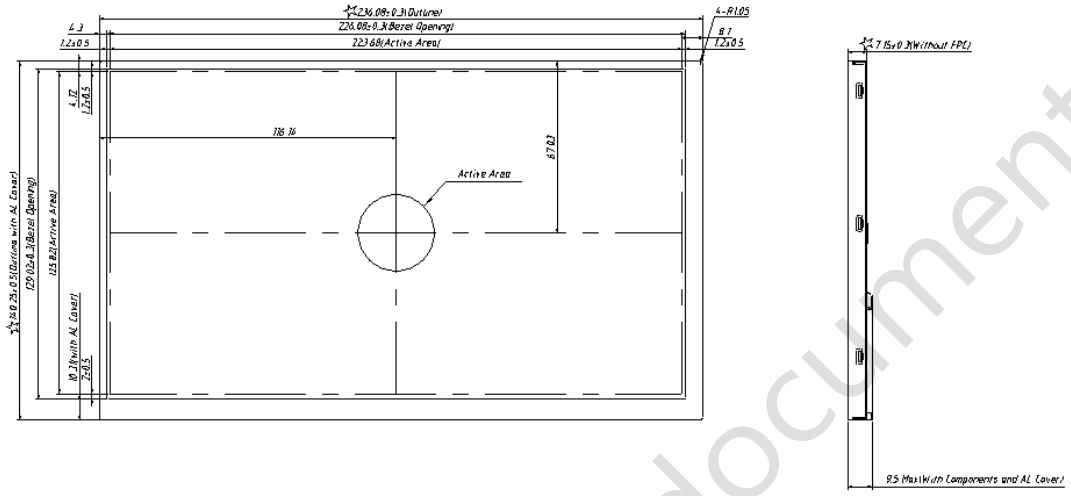
Note:

(1)RESET has 3 status in the sequence: ①Pull Low Voltage status ②Pull High Voltage Status③Hi-Z status. Please make sure RESET change to Hi-Z status while module is shutting down.

(2)T8 and T9 are suggested to be typical value and make sure T8 is equal to T9.

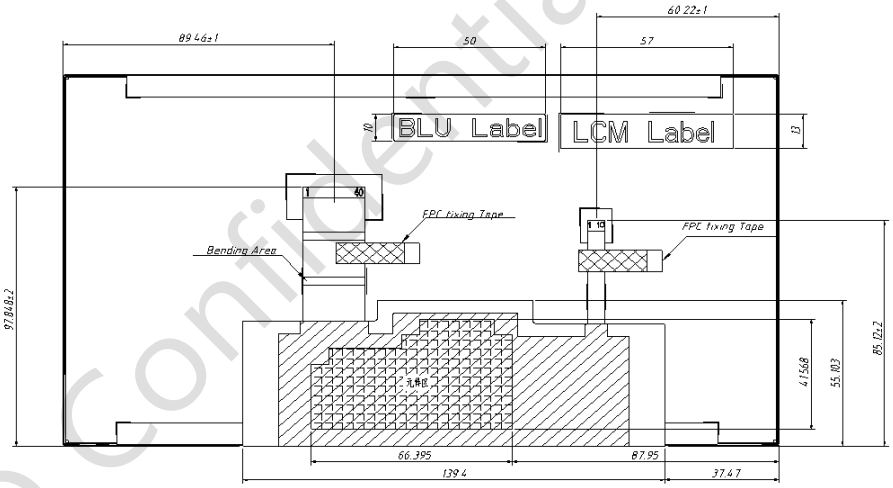
5.0 Mechanical Characteristics

5.1 Outline Drawing



Unit：mm

Figure 17 Reference Outline Drawing (Front Side)



Unit：mm

Figure 18 Reference Outline Drawing (Back Side)

Note: (1)Unnoted tolerance ±0.5mm;

5.2 Dimension Specifications

Table 10 Module Dimension Specifications

Item		Min.	Typ.	Max.	Unit
Width		(235.78)	(236.08)	(236.38)	mm
Height		(139.75)	(140.25)	(140.75)	mm
Thickness	Without FPC	(6.85)	(7.15)	(7.45)	mm
	With FPC	-	-	(9.5)	mm
Weight		-	(350)	(380)	g
BM: | a-b | & | c-d |		-	-	(1.8)	mm

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

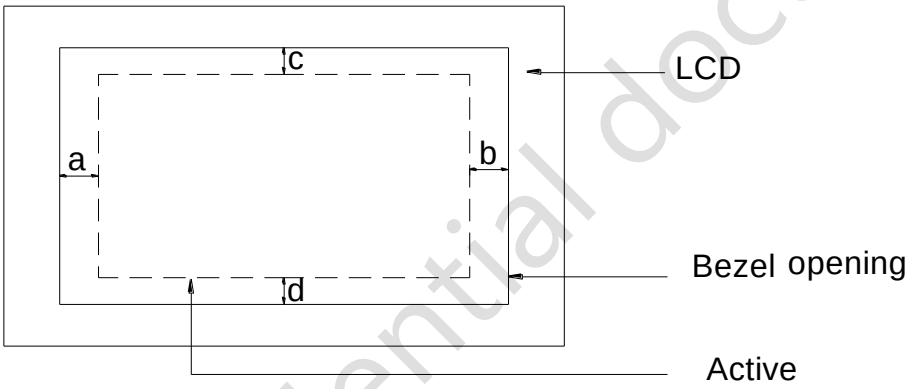


Figure 19 BM Area

6.0 Reliability Conditions

Table 11 Reliability Condition

Item		Package	Test Conditions		Note
High Temperature/High Humidity Operating Test		Module	T_a=60℃, 90%RH, 500 hours		(1),(2),(3),(4)
High Temperature Operating Test		Module	T_a=85℃, 500 hours		
Low Temperature Operating Test		Module	T_a = -30℃, 500 hours		
High Temperature Storage Test		Module	T_a=95℃, 500 hours		(1),(3),(4)
Low Temperature Storage Test		Module	T_a= - 40℃, 500 hours		
Temperature Shock Test		Module	T_a= -40℃(30min.)~85℃(30min.) , 500cycles		
ESD Test	Non-operating	Module	Contact	±8KV, 150 pF, R=330Ω	(1),(2),(6)
			Air	±15KV, 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

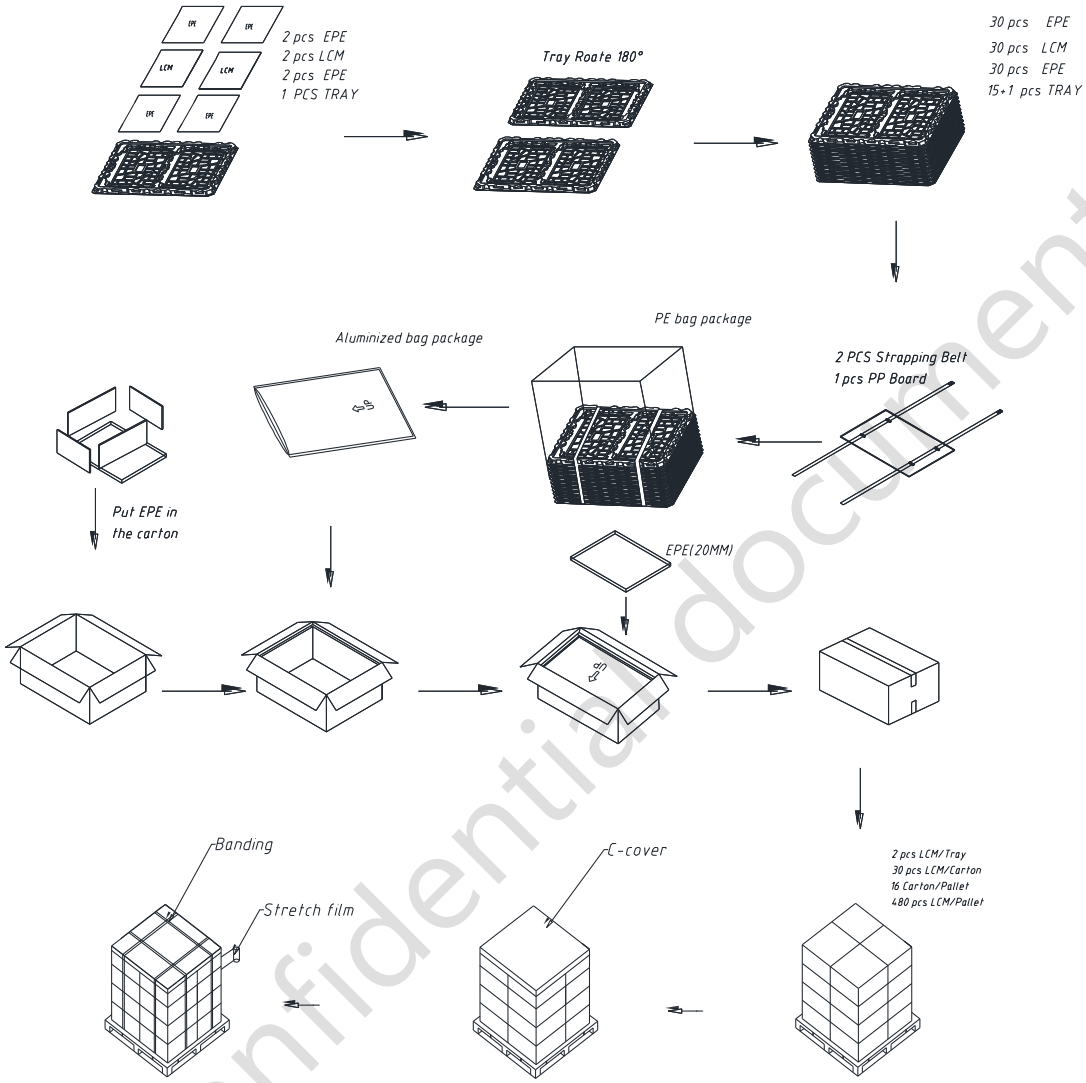
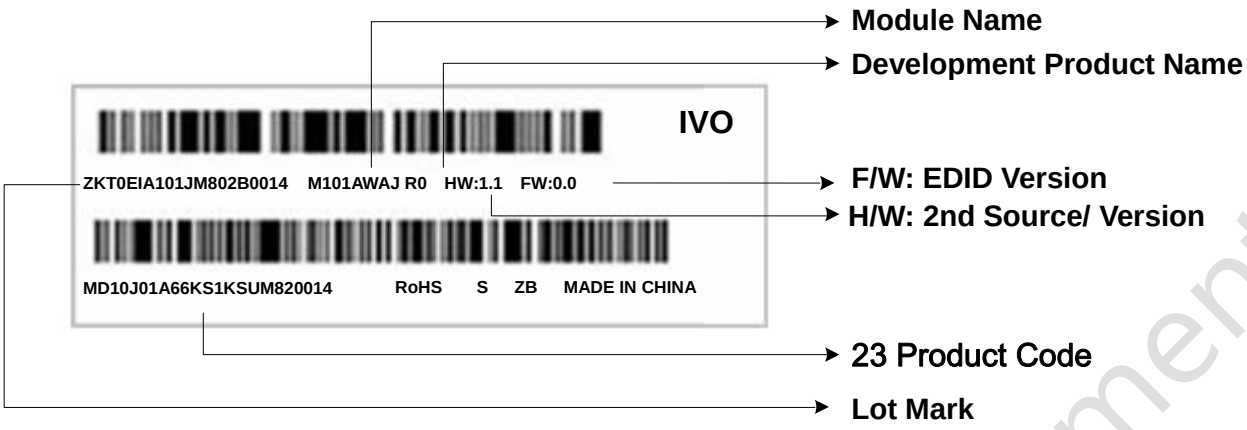


Figure 20 Packing Method

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 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.