Document Title	M101GWT9 R4 Product Specification			Page No.	1/27
Document No.		Issue date	2015/03/05	Revision	00

Product Specification

To:

Product Name: M101GWT9 R4

Document Issue Date: 2015/03/05

Customer	InfoVision Optoelectronics
SIGNATURE _____ _____ _____ Please return 1 copy for your confirmation with your signature and comments.	**SIGNATURE** **REVIEWED BY CQM** _____ **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	2015/03/05		--	First issue.	--

CONTENTS

1.0 General Descriptions

1.1 Introduction

The M101GWT9 R4 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 WSVGA resolution (1,024 horizontal by 600 vertical pixels array).

1.2 Features

- ■ Supported WSVGA Resolution
- ■ LVDS Interface
- ■ Compatible with RoHS Standard

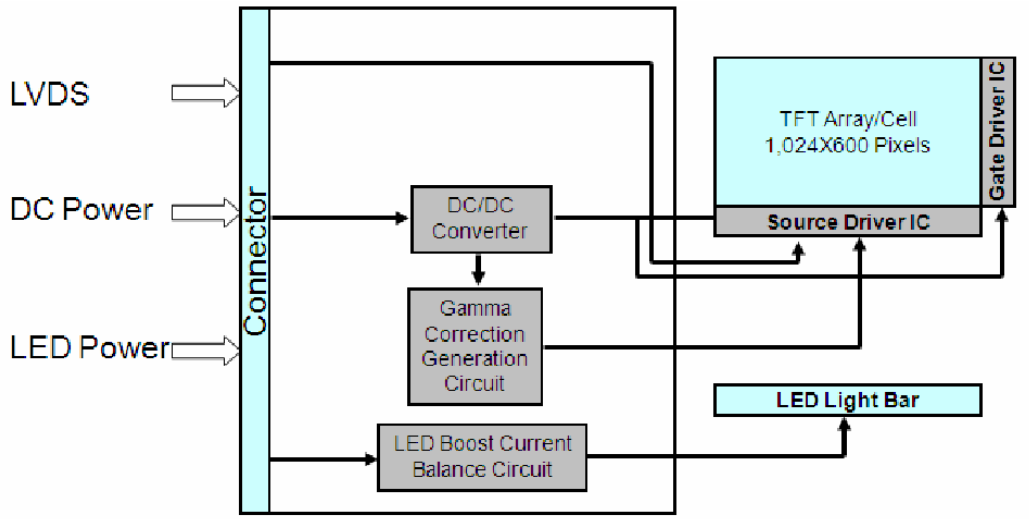
1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	10.1	inch
Active Area (H x V)	222.72(H) x125.28(V)	mm
Number of Pixels (H x V)	1,024 x 600	-
Pixel Pitch (H x V)	0.2175 x 0.2088	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally White	-
White Luminance	350 (Typ.)	cd /m^2
Contrast Ratio	500 (Typ.)	-
Response Time	16 (Typ.)	ms
Input Voltage	3.3 (Typ.)	V
Power Consumption	3.78 (max)	W
Weight	220 (max)	g
Outline Dimension (H x V x D)	235. 0 (Typ.) x 143.0(Typ.) x 5.20 (Max.)	mm
Electrical Interface (Logic)	LVDS	-
Support Color	262 K/16.7 M	-
NTSC	45 (Typ.)	%
Viewing Direction	6 O'clock	-
Surface Treatment	Anti-glare& hard-coating 3H	-

1.4 Functional Block Diagram

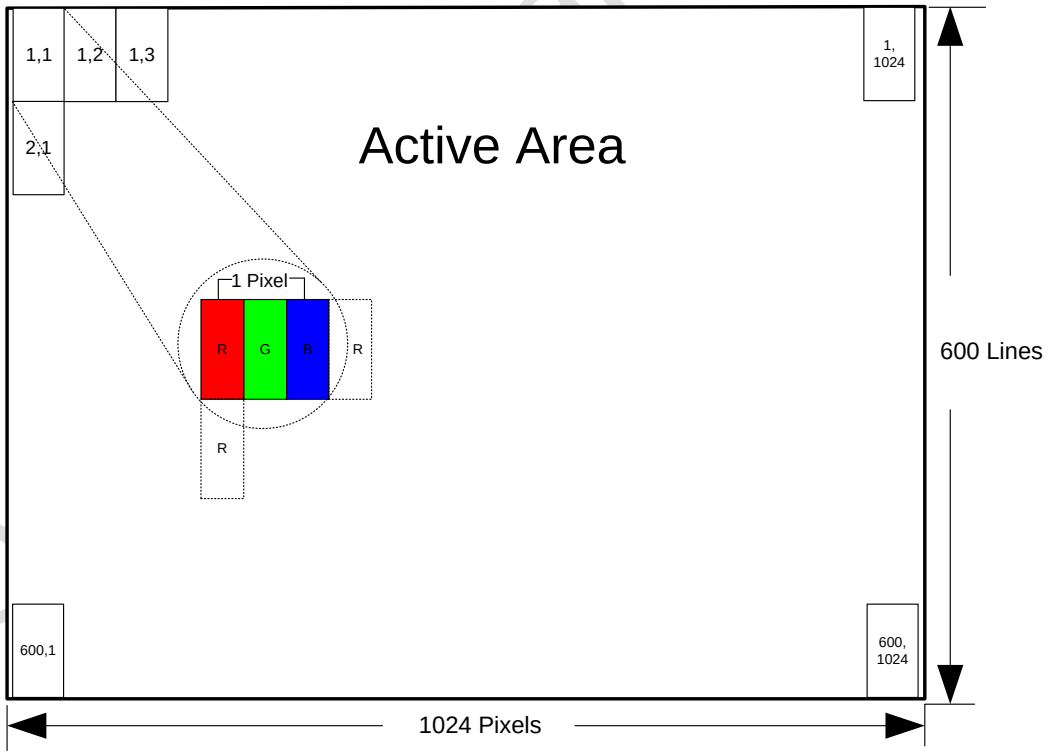
Figure 1 shows the functional block diagram of the LCD module.

Figure 1 Block Diagram



1.5 Pixel Mapping

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	3.96	V	(1),(2)
Logic Input Signal Voltage	V_{Signal}	0	3.6	V	
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 50~60℃ or -20~0℃.

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, 1hrs for X, Y, Z axis.

Note (8) 2ms, 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.

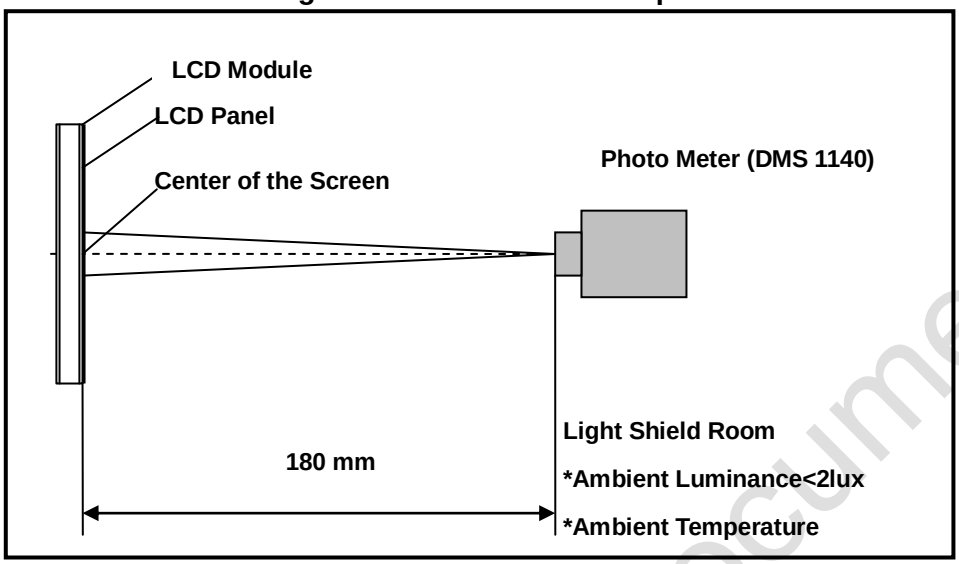
Table 2 Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle （CR>10）	Horizontal	θ_{x+}	60	70	-	degree	(1),(2),(3)
		θ_{x-}	60	70	-		
	Vertical	θ_{y+}	60	70	-		
		θ_{y-}	60	70	-		
Contrast Ratio	Center		400	500	-	-	(1),(2),(4) θx=θy=0°
Response Time	Rising + Falling		-	16	25	ms	(1),(2),(5) θx=θy=0°
Color Chromaticity (CIE1931)	Red x		Typ-0.03	0.584	Typ+0.03	-	(1),(2),(3) θx=θy=0°
	Red y			0.354		-	
	Green x			0.334		-	
	Green y			0.570		-	
	Blue x			0.155		-	
	Blue y			0.126		-	
	White x		0.255	0.305	0.355	-	
	White y		0.275	0.325	0.375	-	
NTSC	-		-	45	-	%	(1),(2),(3) θx=θy=0°
White Luminance	Center point		300	350	-	cd/m^2	(1),(2) θx=θy=0°
Luminance Uniformity	9 Points		75	80	-	%	(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



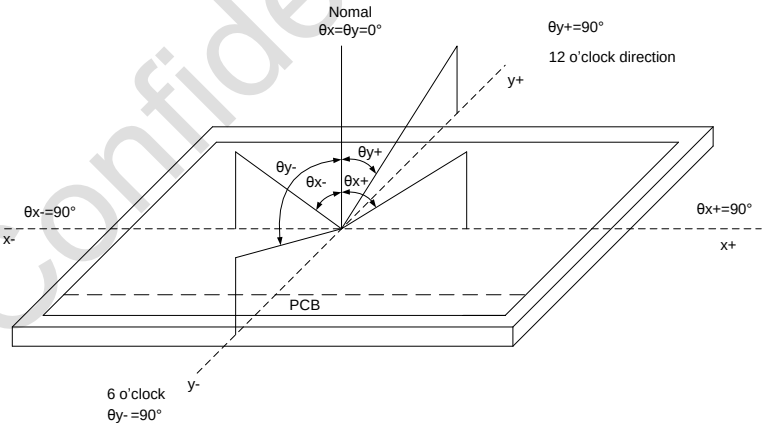
Note (2) The LED input parameter setting as:

I_LED: 80mA

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:

6bit: Contrast Ratio (CR) = L63 / L0

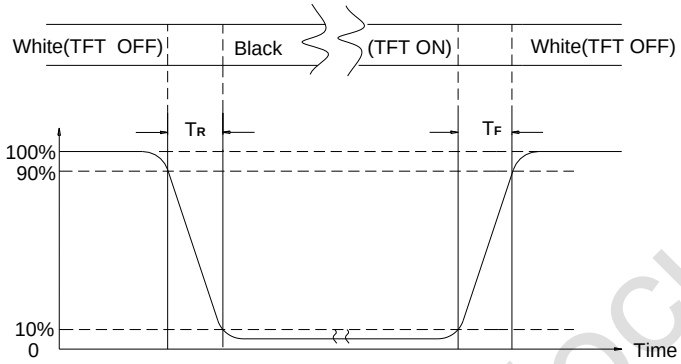
L63: Luminance of gray level 63, L0: Luminance of gray level 0

8bit: Contrast Ratio (CR) = L255 / L0

L255: 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 Luminance Uniformity (Ref.: Active Area)

6bit: Measure the luminance of gray level 63 at 9 points.

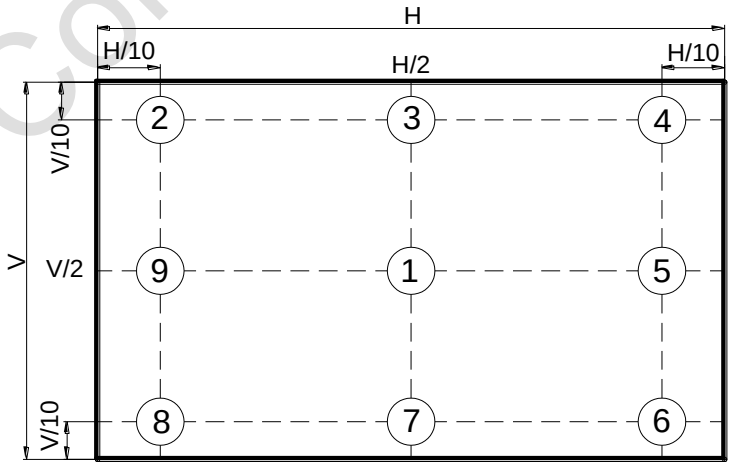
Luminance Uniformity= Min.(L1, L2, ... L9) / Max.(L1, L2, ... L9)

8bit: Measure the luminance of gray level 255 at 9 points.

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

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

Figure 6 Measurement Locations of 9 Points



4.0 Electrical Characteristics

4.1 Interface Connector

Table 3 Signal Connector Type

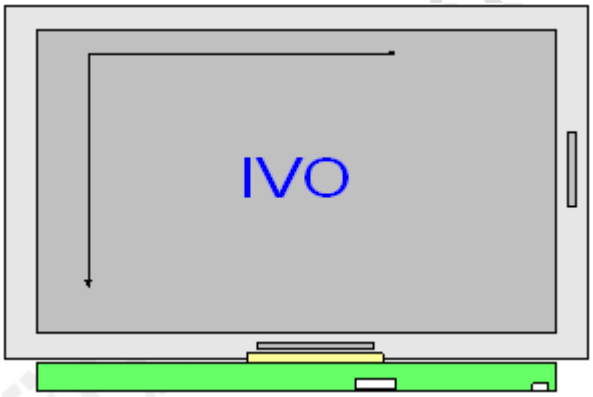
Item	Description
Manufacturer / Type	Starconn:300E40-0010RA-G3-D
Mating Receptacle / Type (Reference)	Starconn：111B40-1211TA-G3

Table 4 Signal Connector Pin Assignment

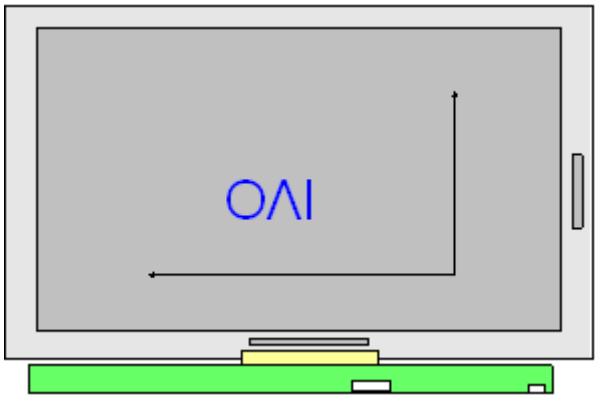
Pin No.	Symbol	Description	Remarks
1	BIST	LCD Panel Self Test Enable	H:Enable
2	VCC 3.3V	power supply(3.3V typ)	-
3	VCC 3.3V	power supply(3.3V typ)	-
4	V_EDID 3.3V	DDC 3.3V power	-
5	NC	No connection(reserve for CMO test)	-
6	CLK_EDID	DDC clock	-
7	Data_EDID	DDC data	-
8	Rxin0 -	LVDS differential data input	-
9	Rxin0 +	LVDS differential data input	-
10	VSS	Ground	-
11	Rxin1 -	LVDS differential data input	-
12	Rxin1 +	LVDS differential data input	-
13	VSS	Ground	-
14	Rxin2 -	LVDS differential data input	-
15	Rxin2 +	LVDS differential data input	-
16	VSS	Ground	-
17	RxCLK -	LVDS differential clock input	-
18	RxCLK +	LVDS differential clock input	-
19	VSS	Ground	-
20	Rxin3 -	LVDS differential clock input	-
21	Rxin3+	LVDS differential clock input	-
22	VSS	Ground	-
23	SEL68	6/8 bits LVDS data input selection	H:8bit L/Floating:6bit
24	REV	Reverse Scan selection	(1)
25	VSS	Ground	-
26	NC	No connection(Reserve)	-
27	NC	No connection(Reserve)	-
28	VSS	Ground	-

29	NC	No connection(Reserve)	-
30	NC	No connection(Reserve)	-
31	LED_GND	LED Ground	-
32	LED_GND	LED Ground	-
33	LED_GND	LED Ground	-
34	NC	No connection(Reserve)	-
35	LED_PWM	PWM control signal of LED converter	-
36	LED - EN	Enable control signal of LED converter	-
37	NC	No connection(Reserve)	-
38	LED_VCCS	LED power supply (4.5V~21V)	-
39	LED_VCCS	LED power supply (4.5V~21V)	-
40	LED_VCCS	LED power supply (4.5V~21V)	-

(1) REV = LOW/NC



REV = High



4.2 Signal Electrical Characteristics

4.2.1 Signal Electrical Characteristics For LVDS Receiver

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

Table 5 LVDS Receiver Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	Vth	-	-	+100	mV	V_{CM}=+1.2V
Differential Input Low Threshold	Vtl	-100	-	-	mV	V_{CM}=+1.2V
Magnitude Differential Input Voltage	$\|V_{ID}\|$	200	-	600	mV	-
Common Mode Voltage	V_{CM}	1.0	1.2	1.4	V	V_{th}-V_{tl}=200mV
Common Mode Voltage Offset	ΔV_{CM}	-50	-	+50	mV	V_{th}-V_{tl}=200mV

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

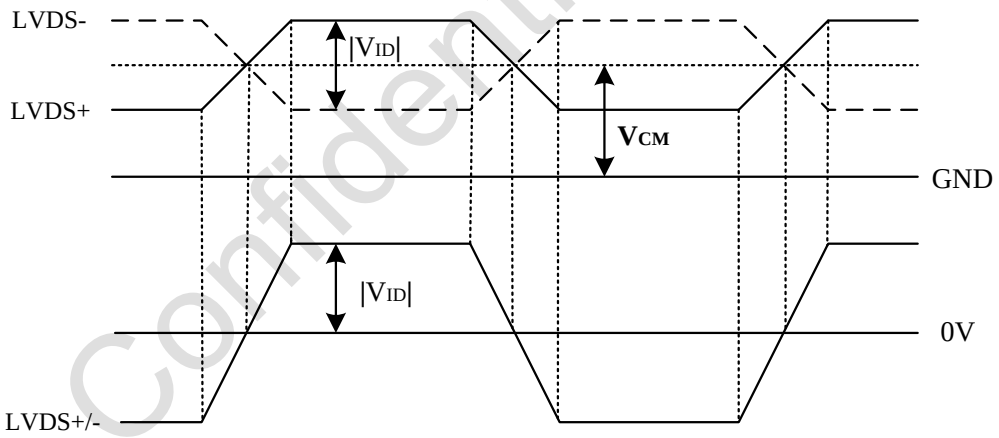


Figure 8 Measurement System

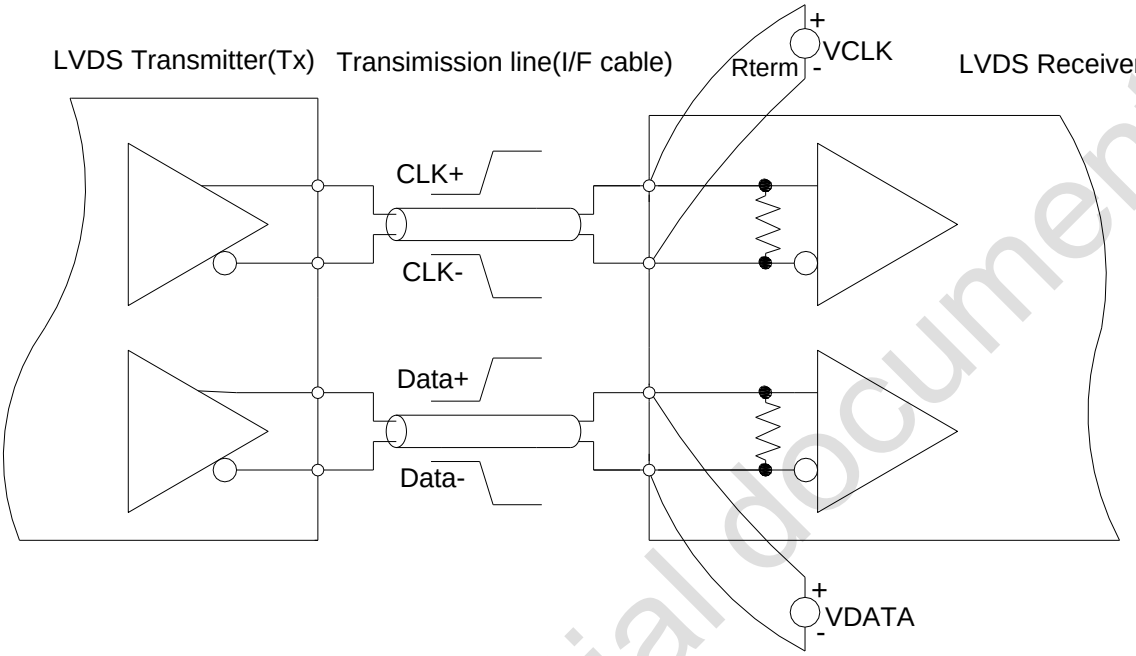
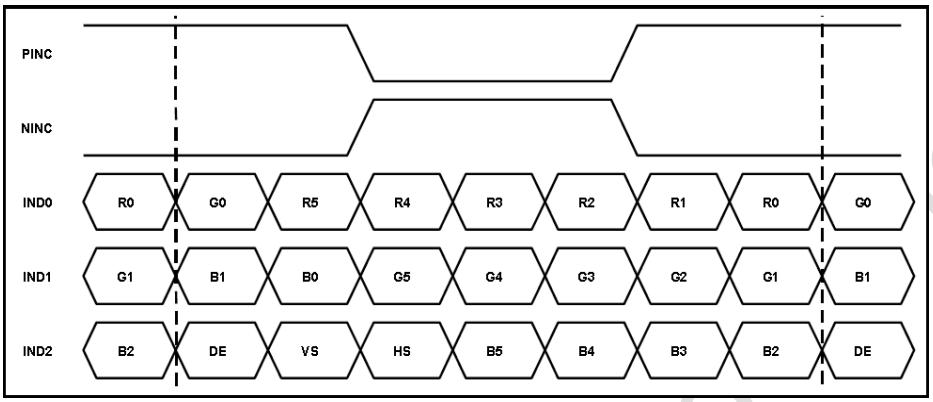
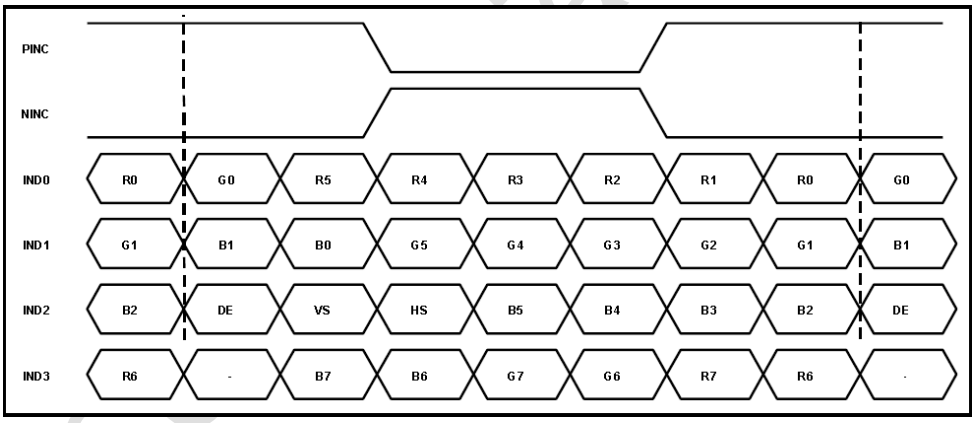


Figure 9 Data Mapping

Single 6 bit LVDS input



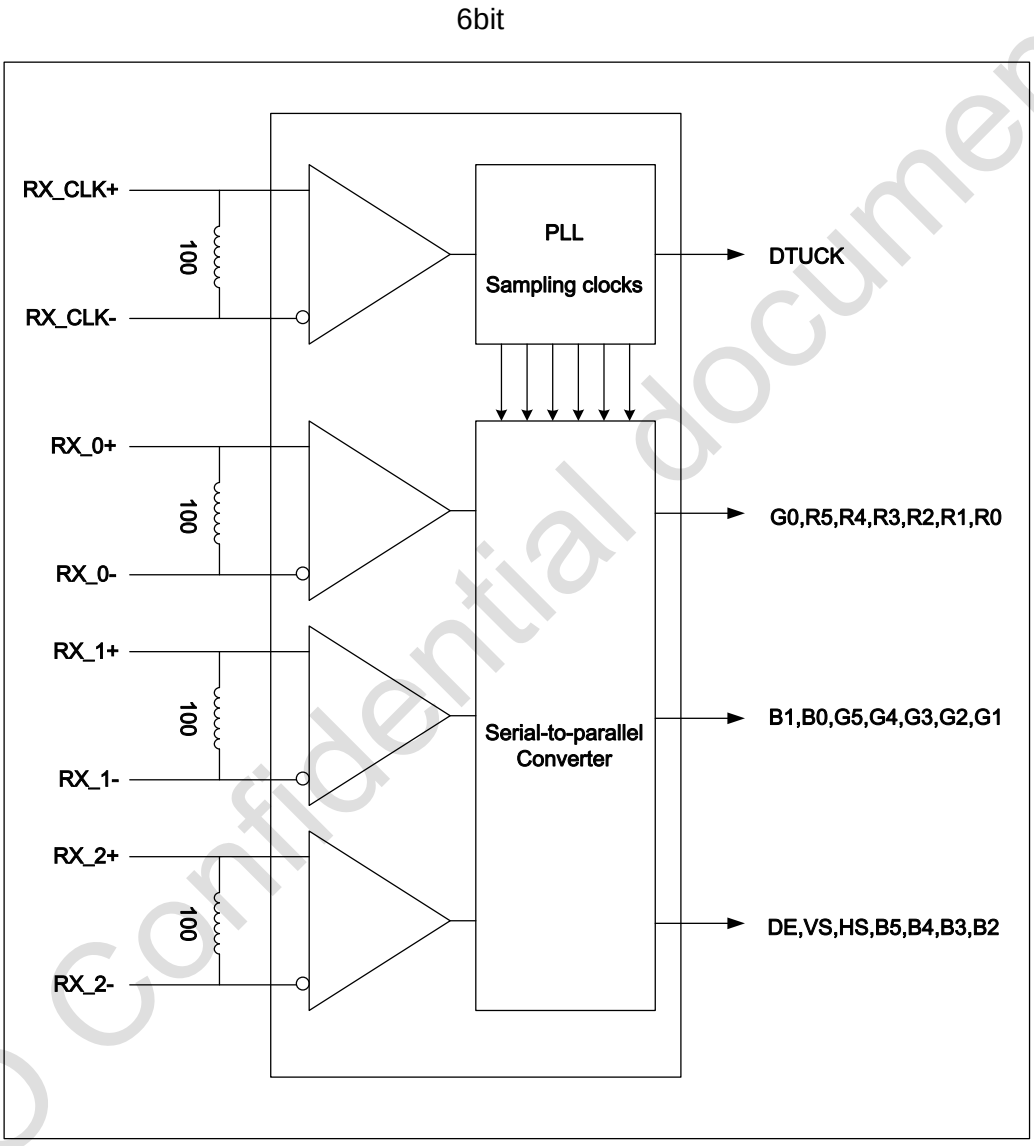
Single 8 bit LVDS input



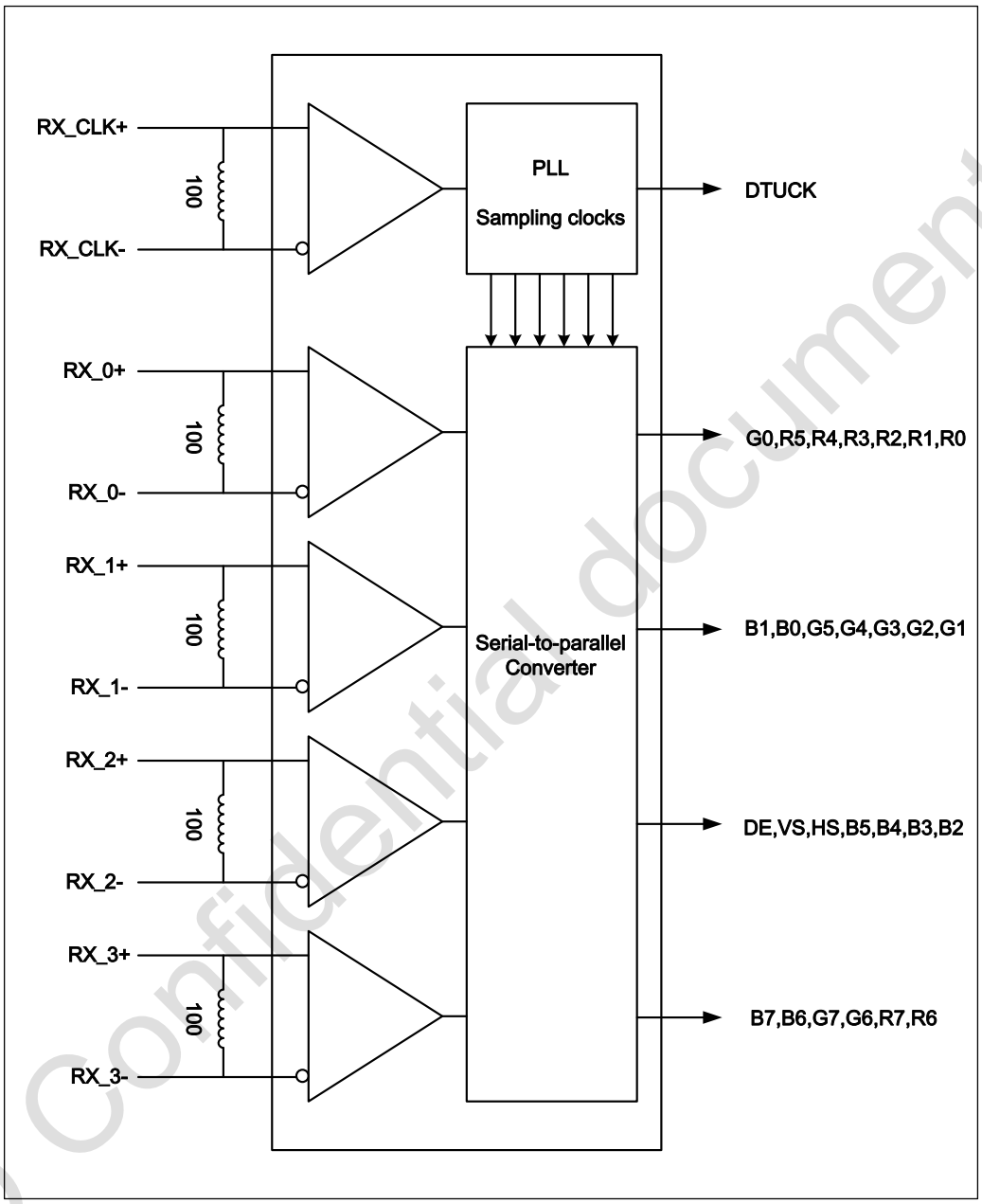
4.2.2 LVDS Receiver Internal Circuit

Figure 10 LVDS Receiver Internal Circuit shows the internal block diagram of the LVDS receiver. This LCD module equips termination resistors for LVDS link.

Figure 10 LVDS Receiver Internal Circuit



8bit



4.3 Interface Timings

Table 6 Interface Timings

Parameter	Symbol	Min.	Typ.	Max.	Unit
LVDS Clock Frequency	Fclk	45	51.2	57	MHz
H Total Time	HT	1,324	1,344	1,364	Clocks
H Active Time	HA	1,024	1,024	1,024	Clocks
V Total Time	VT	625	635	645	Lines
V Active Time	VA	600	600	600	Lines
Frame Rate	FV	55	60	65	Hz

Note: HT*VT*FV≤57MHz

4.4 Input Power Specifications

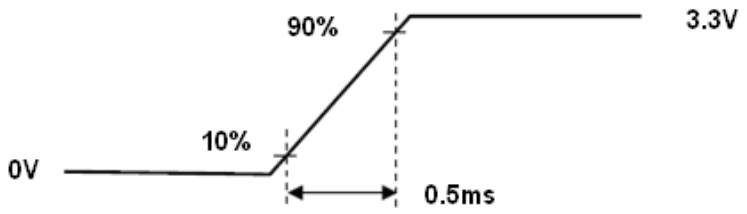
Input power specifications are as follows.

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	black Pattern	I_{DD}	-	-	0.22	A	(3),(4)
VDD Power Consumption	black Pattern	P_{DD}	-	-	0.726	W	
Rush Current		I_{Rush}	-	-	1.5	A	(1),(4),(5)
Allowable Logic/LCD Drive Ripple Voltage		V_{VDD-RP}	-	-	200	mV	(4)
LED Power Supply							
LED Input Voltage		V_{LED}	4.5	12	21	V	(4) (6)
LED Power Consumption		P_{LED}	-	-	3.05	W	
LED Forward Voltage		V_F	2.95	3.2	3.55	V	(4) (6)
LED Forward Current		I_F	-	20	-	mA	
PWM Signal Voltage	High	V_{PWM}	2.3	-	5.5	V	
	Low		0	-	0.5		
LED Enable Voltage	High	V_{LED_EN}	2.3	-	5.5	V	
	Low		0	-	0.5		
Input PWM Frequency		F_{PWM}	190	-	2,000	Hz	
Duty Ratio		PWM	5	-	100	%	
LED Life Time		LT	30,000	-	-	Hours	(4)(7)

Note (1) Measure Condition

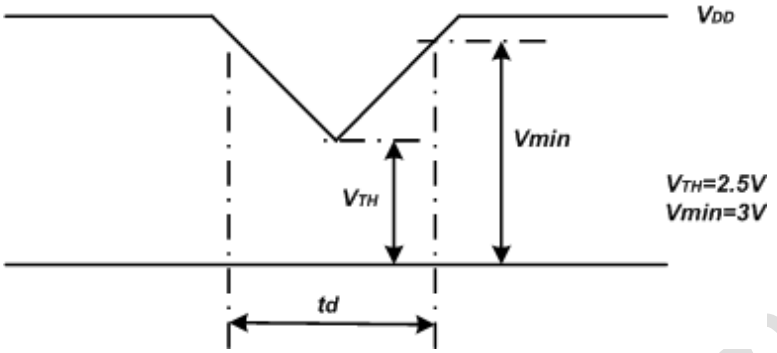
Figure 11 VDD Rising Time



Note (2) VDD Power Dip Condition

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

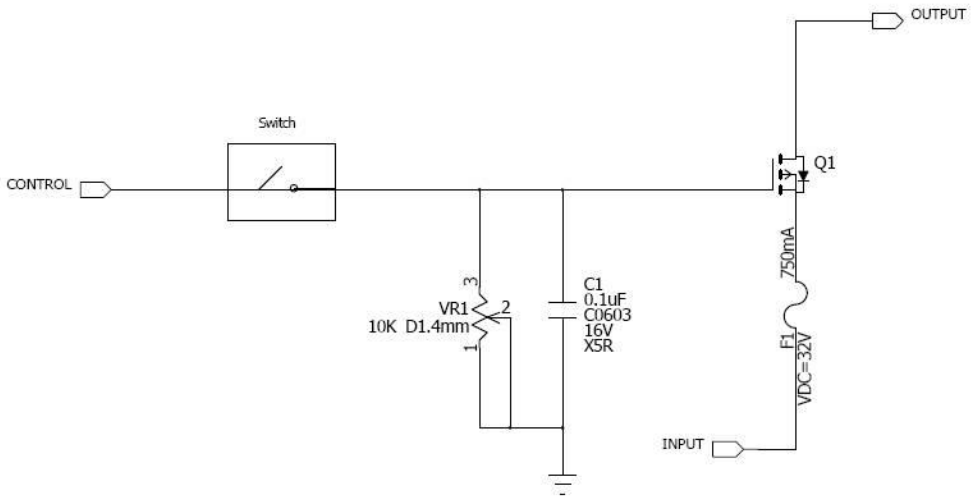
Figure 12 VDD Power Dip



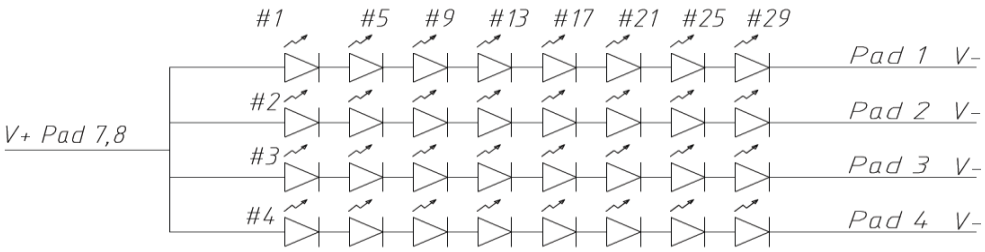
Note (3) Frame Rate=60Hz, VDD=3.3V, DC Current.

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

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



Note (6) Condition of LED



Note (7) 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 13 Power Sequence

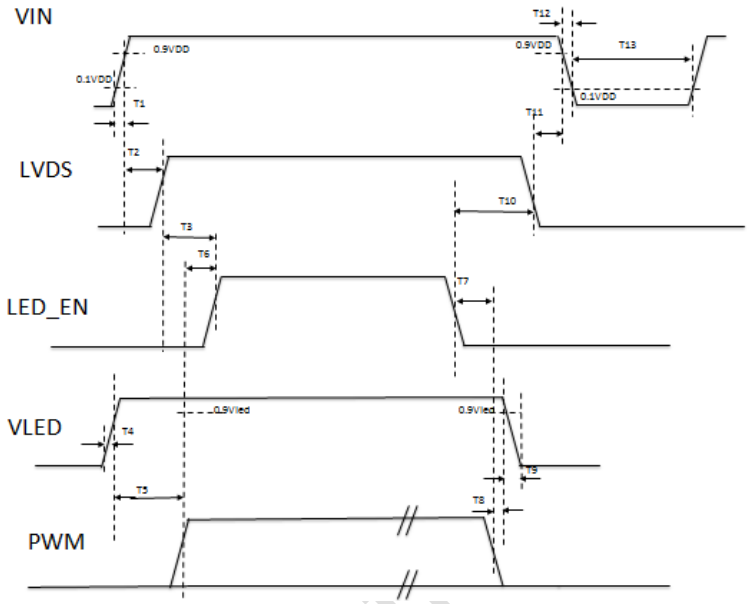


Table 8 Power Sequencing Requirements

Parameter	Symbol	Min.	Typ.	Max.	Unit
VIN Rise Time	T1	0.5	-	10	ms
VIN Good to Signal Valid	T2	10	-	90	ms
Signal Valid to Backlight On	T3	200	-	-	ms
Backlight Power On Time	T4	0.5	-	-	ms
Backlight VDD Good to System PWM On	T5	10	-	-	ms
System PWM ON to Backlight Enable ON	T6	10	-	-	ms
Backlight Enable Off to System PWM Off	T7	0	-	-	ms
System PWM Off to B/L Power Disable	T8	10	-	-	ms
Backlight Power Off Time	T9	1	10	30	ms
Backlight Off to Signal Disable	T10	200	-	-	ms
Signal Disable to Power Down	T11	0	-	50	ms
VIN Fall Time	T12	1	10	30	ms
Power Off	T13	500	-	-	ms

5.0 Mechanical Characteristics

5.1 Outline Drawing

Figure 14 Reference Outline Drawing (Front Side)

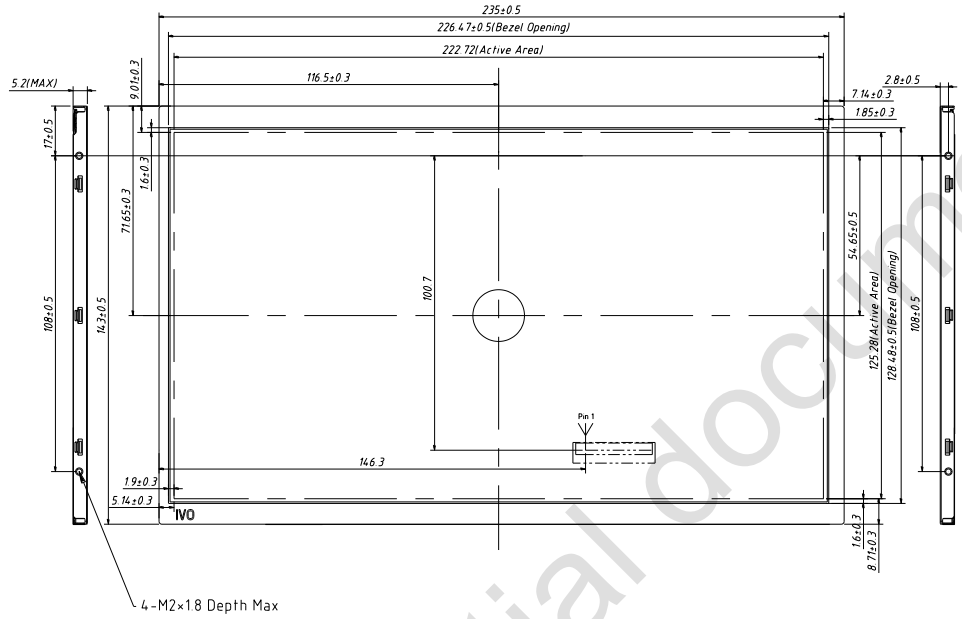
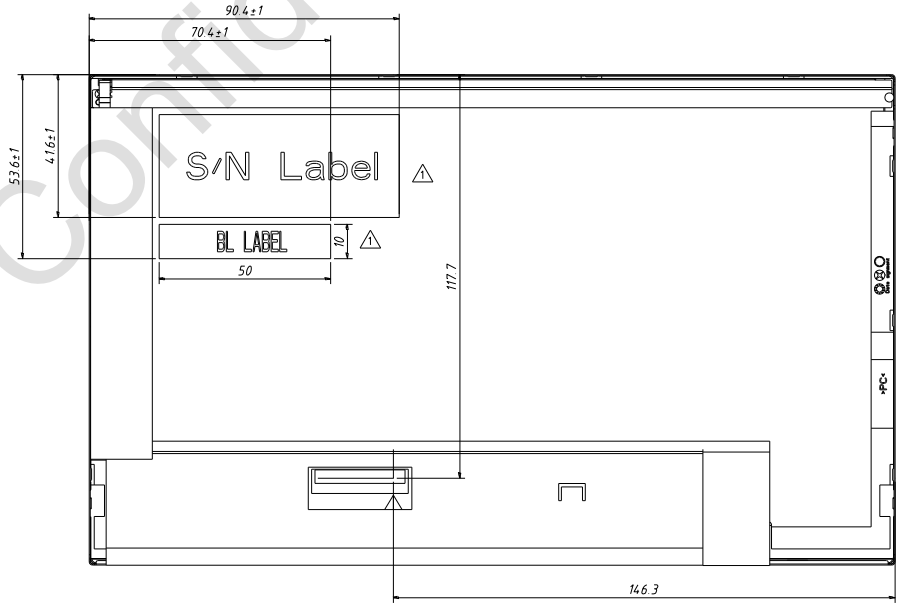


Figure 15 Reference Outline Drawing (Back Side)

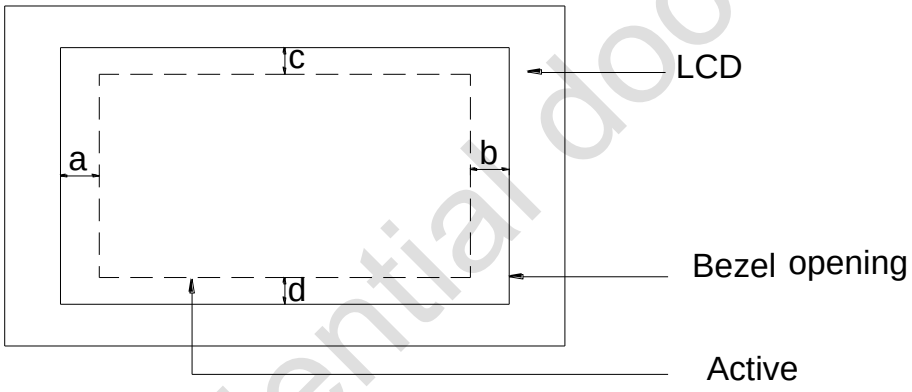


5.2 Dimension Specifications

Table 11 Module Dimension Specifications

Item	Min.	Typ.	Max.	Unit
Width	234.5	235	235.5	mm
Height	142.5	143	143.5	mm
Thickness	4.6	4.9	5.2	mm
Weight	-	-	220	g

Figure 16 BM Area



6.0 Reliability Conditions

Item		Package	Test Conditions		Note
Low Temperature Operating Test		Module	0℃, 240 hours		(1),(2),(3),(4)
High Temperature Storage Test		Module	60℃, 240 hours		(1),(2),(4)
Low Temperature Storage Test		Module	-20℃, 240 hours		(1),(2),(4)
High Temperature/High Humidity Operating Test		Module	50℃, 85%RH, 240 hours		(1),(2),(3),(4)
Shock Non-operating Test		Module	240G,2ms, 1time for ±x, ±y, ±z 6 directions		(4)
Vibration Non-operating Test		Module	1.5G , 10~500~10 Hz , x、y、z each axis/1hour.		(4)
ESD Test	Operating	Module	Contact	± 8 KV, 150pF(330Ohm)	(5)
			Air	± 15 KV, 150pF(330Ohm)	
	Non-operating		Contact	± 10 KV, 150pF(330Ohm)	
			Air	± 20 KV, 150pF(330Ohm)	

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.

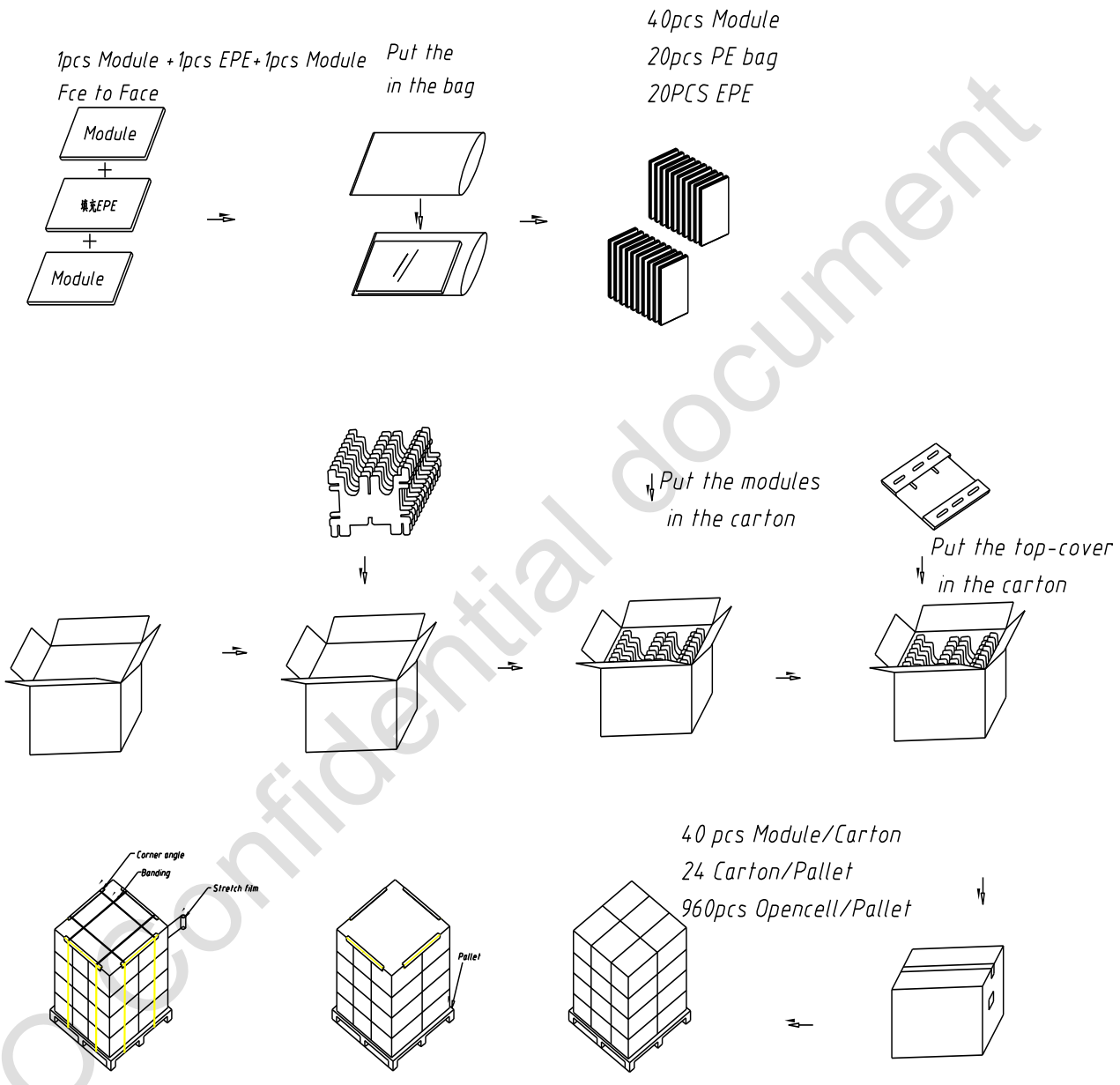
Note (3) In operating test, the backlight voltage and current must be in speccfication.

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

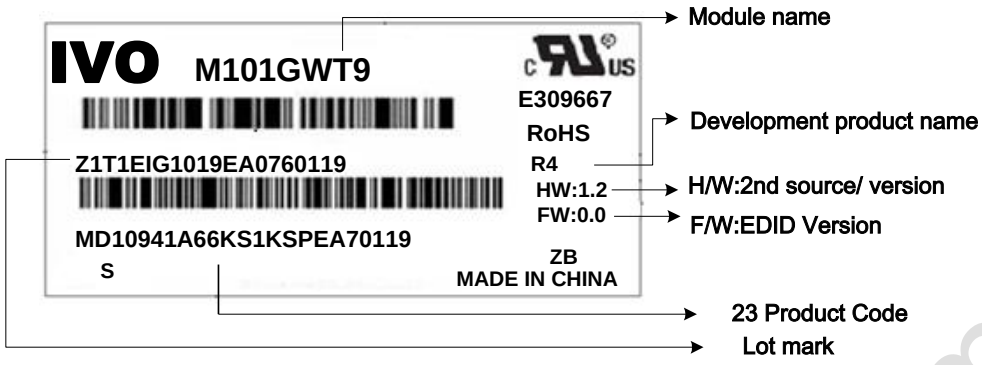
Note (5) In case of malfunction defect caused by ESD damage. If it would be recovered to normal state after resetting, it would be judge as pass.

7.0 Package Specification

Figure 17 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.