Document Title	M101GWN9 R2 Product Specification			Page No.	1/23
Document No.		Issue date	2014/5/16	Revision	00

Product Specification

To:

Product Name: M101GWN9 R2

Document Issue Date: 2014/05/16

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

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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.

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Revision	Date	Page	Old Description	New Description	Remark
00	2014/05/16	all	--	First issue.	

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Contents

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1.0 General Descriptions Introduction

1.1 Introduction

The M101GWN9 R2 is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, column driver and row driver circuit. This TFT LCD has a 10.1-inch diagonally measured active display area with WSVGA resolution (1024 horizontal by 600 vertical pixels array).

1.2 Features

- 10.1" TFT LCD Panel
- Supported WSVGA resolution
- Compatible with RoHS standard

1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	10.1	Inch
Active Area	222.72(H) x 125.28(V)	mm
Pixels H x V	1024(RGB) x600	-
Pixel Pitch	0.2175(H) x 0.2088(V)	mm
Pixel Arrangement	RGB Vertical Stripe	-
Display Mode	Normally White	-
Contrast Ratio	(500) (Typ.)	-
Response Time	16 (Typ.)	ms
Input Voltage	+3.3 (Typ.)	V
Weight	310 (Typ.)	g
Outline Dimension (H x V x D)	235(Typ.) x 143(Typ.) x 7.54(Typ.)	mm
Electrical Interface (Logic)	LVDS	-
Support Color	16.7M	-
Surface Treatment	Anti-glare, Hard-Coating (3H)	-

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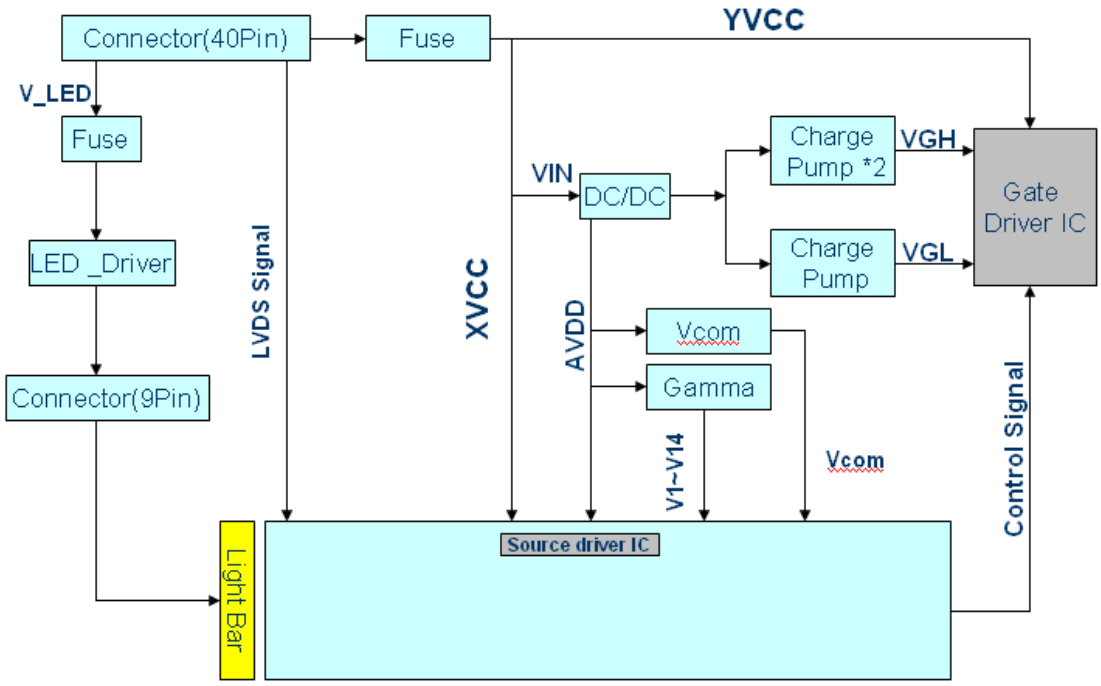
1.4 Functional Block Diagram

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

Figure 1 Block Diagram



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2.0 Absolute Maximum Ratings

Table 1 Electrical Absolute Rating

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
Supply Voltage	V_{IN}	-0.3	3.96	V	Logic power supply voltage
		-0.3	12	V	LED Driver Vin
Power Supply Fuse Current Setting	I_{FUSE}	-	1.5	A	Vin from10% ～ 90% ，rise time 500us
Input Signal	V_S	-	3.6	V	LVDS signals
EN/PWM Voltage	V_{PWM}	-0.3	12	V	EN/PWM Voltage

Table 2 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Operating Temperature	TOP	-20	70	℃	(1) (2) (3) (4)
Operating Humidity	HOP	10	85	%RH	-
Storage Temperature	TST	-30	80	℃	-
Storage Humidity	HST	10	90	%RH	-

Note (1): Humidity: 85%RH Max. (T<=40℃) Note static electricity. Maximum wet bulb temperature at 39℃ or less. (T>40℃) No condensation.

Note (2): 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 60~70℃ or -20~0℃.

Note (3): There is a possibility of causing the fineness deterioration by the prolonged use in the (high temperature) humidity environment (60% or more).

Note (4): In the operating temperature item, the low temperature side is the ambient temperature regulations. The high temperature side is the panel surface temperature regulations.

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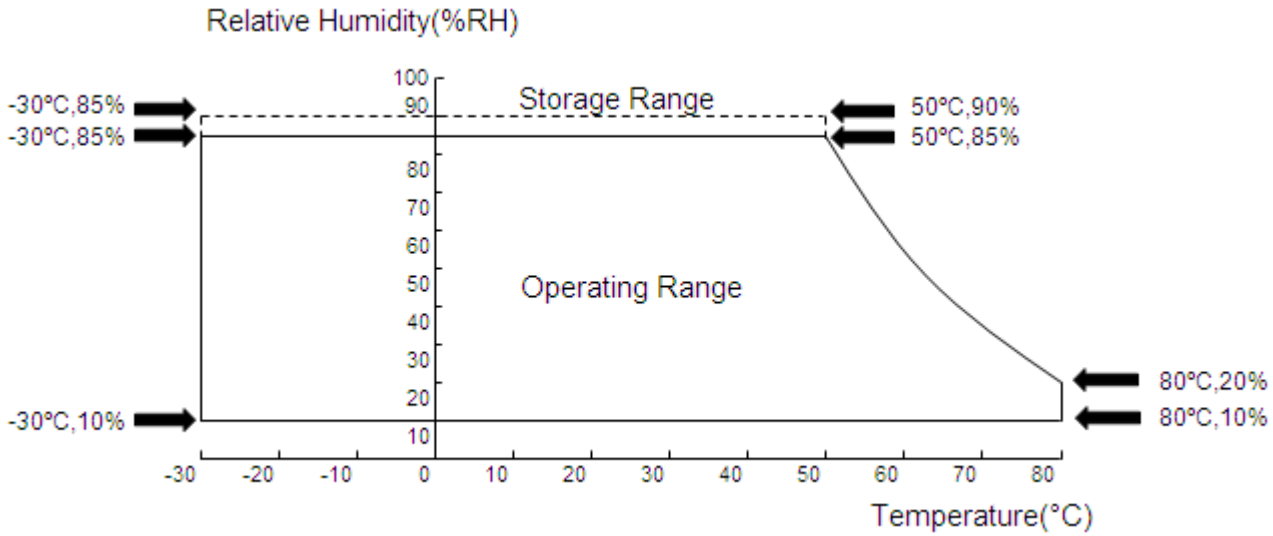
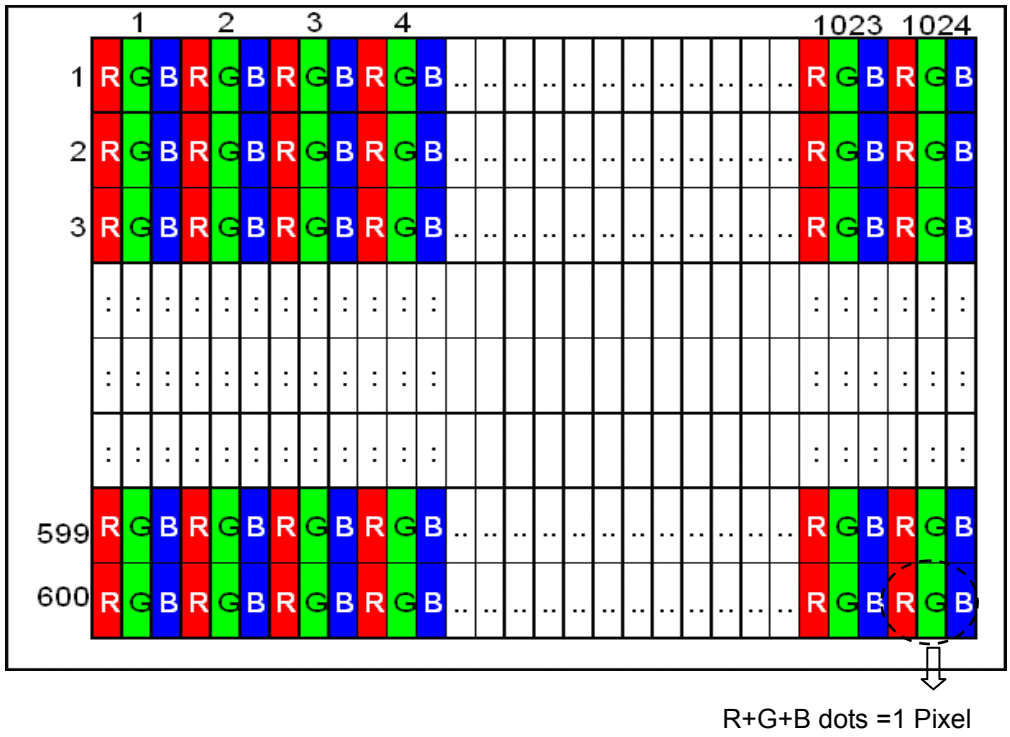


3.0 Pixel Format Image

Figure 2 shows the relationship of the input signals and LCD pixel format image.

Figure 2 Pixel Format



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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	(70)	(80)	-	degree	(1),(2), (3)
		θ_R	(70)	(80)	-		
	Vertical	θ_T	(70)	(80)	-		
		θ_B	(70)	(80)	-		
Contrast Ratio	Center		(400)	(500)	-	-	(1),(2), (4)
Response Time	Rising		-	(6)	(12)	ms	(1),(2),(5)
	Falling		-	(10)	(20)	ms	
	Rising + Falling		-	16	(32)	ms	
Chromaticity (CIE1931)	NTSC		(42)	(45)	-	%	(1),(2)
	Red x		Typ. -0.03	(0.582)	Typ. -0.03	-	
	Red y			(0.344)		-	
	Green x			(0.333)		-	
	Green y			(0.595)		-	
	Blue x			(0.162)		-	
	Blue y			(0.143)		-	
	White x		(0.255)	(0.305)	(0.355)	-	
	White y		(0.275)	(0.325)	(0.375)	-	
White Luminance	Center		(280)	(350)	-	cd/m^2	(1),(2),(6)
Luminance Uniformity	9Points		(75)	(80)	-	%	(1),(2),(6)

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.

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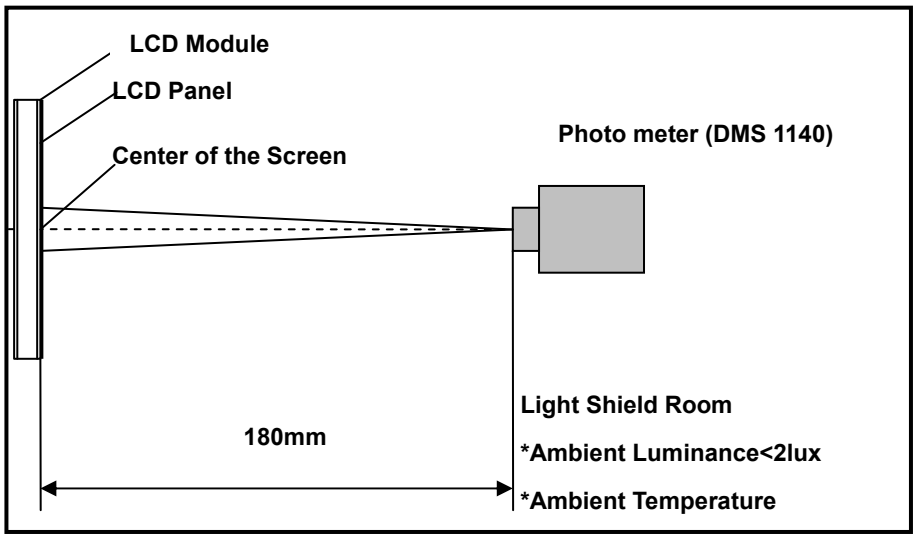
Figure 3 Measurement Setup



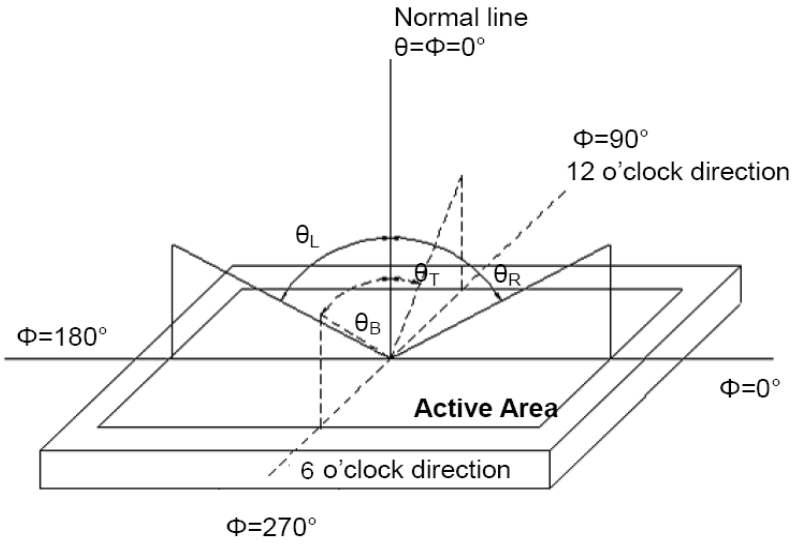
Note (2) The LED input parameter setting as:

VLED: 5V;

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

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

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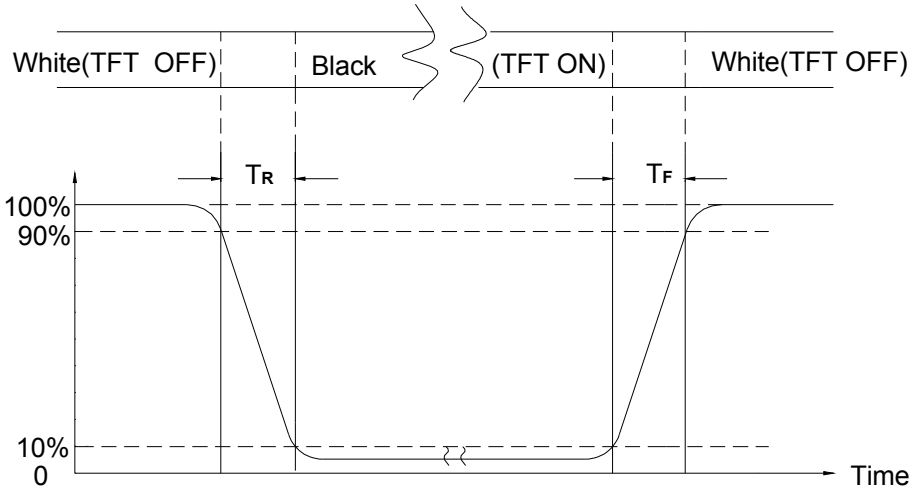
Note (5) Definition of Response Time (T_R, T_F)

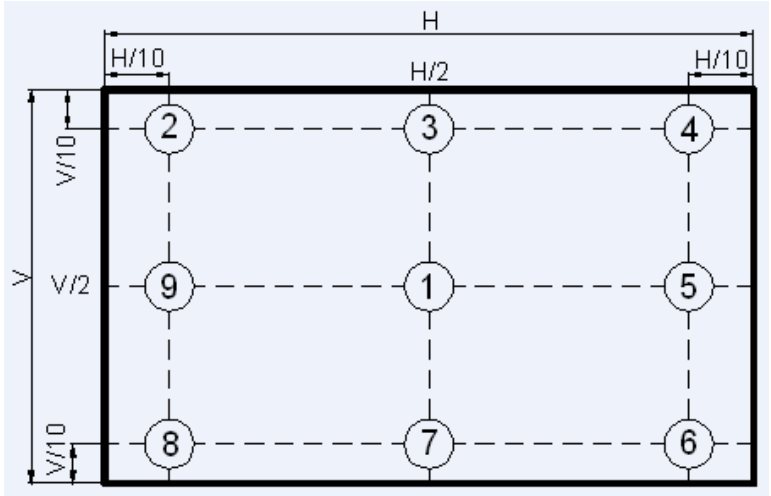
Figure 5 Definition of Response Time



Note (6) Definition of Brightness Luminance

$$\text{Luminance Uniformity} = \frac{(\text{MinLuminanceof 9 points})}{(\text{MaxLuminanceof 9 points})} \times 100\%$$

Figure 6 Measurement Locations



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5.0 Backlight Characteristics (Reference)

Table 4 LED driver Input and Output Specifications

ITEM		UNIT	MIN	TYP	MAX	CONDITION
VIN_LED		V	4.5	5	5.5	DUTY=100%
I_{VIN_LED}		mA	-	-	586	V_LED=4.5V ，η=85%
F_{DIM}		Hz	200	-	1K	-
DUTY		%	5	-	100	-
EN/PWM	VIH	V	2	-	5	-
	VIL	V	0	-	0.5	-
Vout		V	11.6	13.2	14	-
I_{OUT}		mA	-	159	-	-
L_T		Hours	(30,000)	-	-	LED Life Time

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

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6.0 Electrical Characteristics

Table 5 Connector Name / Designation

Item	Description
Connector	MSAK24025P40D

Table 6 Pin Assignment

Pin #	Signal Name	Description	Remarks
1	BIST	BIST MODE SELECT(High Enable)	FOR INTERNAL TEST
2	VDD	LCD power supply (Typ. +3.3V)	
3	VDD	LCD power supply (Typ. +3.3V)	
4	V_EDID	EDID power supply	
5	NC	No connection	
6	CLK_EDID	EDID CLK signal	
7	Data_EDID	EDID Data signal	
8	LVDS input 0-	LVDS CH0 data signal(-)、R0～R5、G0	
9	LVDS input 0+	LVDS CH0 data signal(+)、R0～R5、G0	
10	GND	GND	
11	LVDS input 1-	LVDS CH1 data signal(-)、G1～G5、B0、B1	
12	LVDS input 1+	LVDS CH1 data signal(+)、G1～G5、B0、B1	
13	GND	GND	
14	LVDS input 2-	LVDS CH2 data signal(-)、B2～B5、DE	
15	LVDS input 2+	LVDS CH0 data signal(+)、B2～B5、DE	
16	GND	GND	
17	LVDS CLK -	LVDS CLK data signal(-)	
18	LVDS CLK +	LVDS CLK data signal(+)	
19	GND	GND	
20	LVDS input 3-	LVDS CH3 data signal(-)、R6~R7、G6~G7、B6~B7	
21	LVDS input 3+	LVDS CH3 data signal(-)、R6~R7、G6~G7、B6~B7	
22	GND	GND	
23	NC	No connection	
24	NC	No connection	

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25	GND	GND	
26	NC	No connection	
27	NC	No connection	
28	GND	GND	
29	NC	No connection	
30	NC	No connection	
31	GND	GND	
32	GND	GND	
33	GND	GND	
34	NC	No connection	
35	PWM	LED dimming signal	
36	LED_EN	LED Enable signal	
37	NC	No connection	
38	VLED	LED power supply (Typ. 5V)	
39	VLED	LED power supply (Typ. 5V)	
40	VLED	LED power supply (Typ. 5V)	

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Table 7 Electrical Characteristics

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
System Power Supply						
Input Power Supply Voltage	V_{IN}	3.0	3.3	3.6	V	
Input Power Supply Current	I_{VIN}	-	-	217	mA	Black pattern，60Hz
Input Inrush Current	I_{RUSH}	-	-	1.5	A	0.5ms rise time (10%~90%)
Input Power Voltage Ripple	V_{RPL}	-	-	200	mV	Vp-p
LED Power Supply						
Input Power Supply Voltage	V_{LED-IN}	4.5	5	5.5	V	
Input Power Supply Current	I_{IN}	-	-	586	mA	V_LED=4.5V,η=85%
EN/PWM	VH	2.0	-	5.0	V	
	VL	0	-	0.5	V	
LVDS Signals						
Differential Input High Threshold	V_{th}	-	-	+100	mV	V_{cm}=+1.2V
Differential Input Low Threshold	V_{tl}	-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
EDID Power Supply						
Input Power Supply Voltage	V_EDID	3.0		3.6	V	

Note: A. Input signals shall be low or Hi-Z state when VIN is off.

B. All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.

C. White Pattern at 3.3V driving voltage.

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7.0 Interface Timings

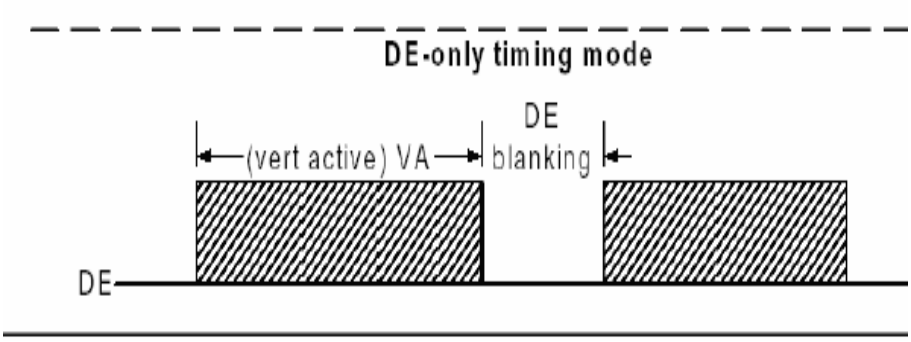
7.1 Timing Characteristics

Table 8 Interface Timings

Synchronization Method : DE only

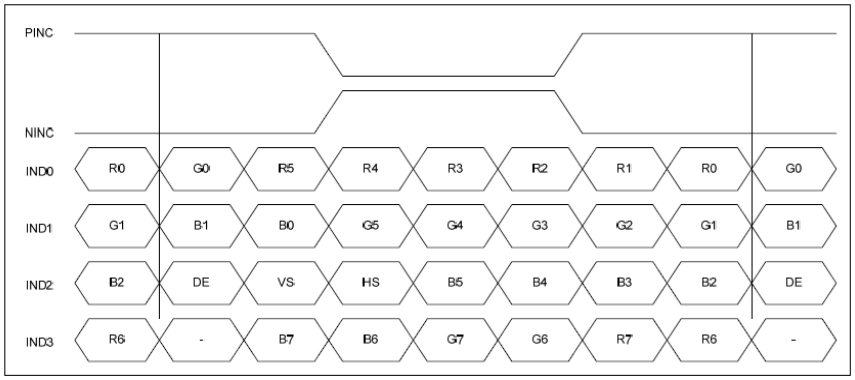
Parameter	Symbol	Unit	Min.	Typ.	Max.
LVDS Clock Frequency **<single>**	f_{dck}	MHz	45	51.2	65
H Total Time	T_{hp}	clocks	1,324	1,344	1,364
H Active Time	HA	clocks	1,024	1,024	1,024
H Blanking Time	TH_{BLANK}	clocks	300	320	340
V Total Time	T_{vp}	lines	615	635	645
V Active Time	VA	lines	600	600	600
V Blanking Time	TV_{BLANK}	lines	15	35	45
V Frequency	f_v	Hz	55	60	65

Figure 7 DE-only timing mode



7.2 Timing Diagram of Interface Signal

Figure 8 LVDS Data Mapping



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8.0 Power Consumption

Input power specifications are as follows.

Table 9 Power Consumption

Item	Symbol	Min.	Typ.	Max.	Units	Note
Input Power Supply Voltage	V_{IN}	3.0	3.3	3.6	V	
Input Power Supply Current	I_{VIN}	-	-	217	mA	Black pattern，60Hz
Input Inrush Current	I_{RUSH}	-	-	1.5	A	0.5ms rise time (10%~90%)
Input Power Voltage Ripple	V_{RPL}	-	-	200	mV	Vp-p

9.0 Power ON/OFF Sequence

Figure 9 Power Sequence

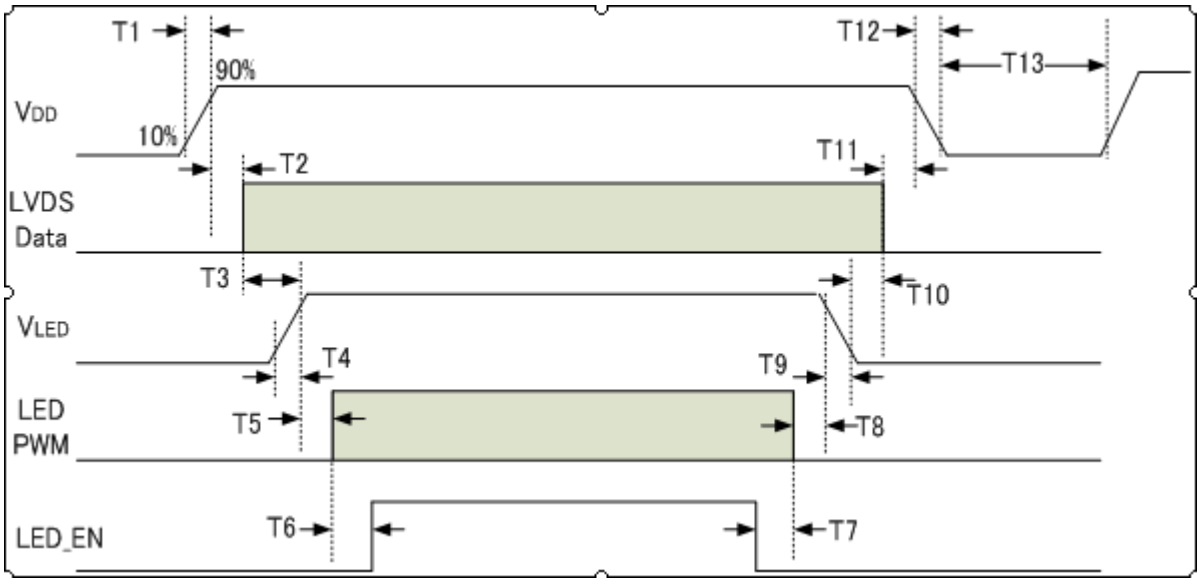

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Table 10 Power Sequencing Requirements

Parameter	Symbol	Unit	min	Typ.	max
VDD rising Time	T1	ms	0.5	--	10
VDD 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	1	10	30
Backlight off to signal Disable	T10	ms	200	--	--
Signal Disable to Power Down	T11	ms	0	--	50
VDD Falling Time	T12	ms	1	10	30
Power Off	T13	ms	500	--	--

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10.0 Reliability Test Criteria

Table 11 Reliability Test Criteria

Items	Required Condition	Note
High Temperature Operating Test	70℃, 300hrs	
Low Temperature Operating Test	-20℃, 300hrs	
High Temperature Storage Test	80℃, 300hrs	
Low Temperature Storage Test	-30℃, 300hrs	
High Temperature/High Humidity Operation Test	50℃, 85%, 300hrs	
Thermal Shock Test	-20℃~60℃, 1h/each cycle,100cycles	
Shock Test (Non-Operating)	50G,20ms,Half Sine Wave, (±X, ±Y,±Z)	
Vibration Test (Non-Operating)	1.5G ,10~200 Hz, x、y、z each axis/30min	
ESD test	Contact Discharge: ±8KV,150pF(330Ω) ; Air Discharge: ±15KV,150pF(330Ω)	1

Note1: ESD class C: Performance could be recovered by reset if temporary failure happened.

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11.0 Mechanical Characteristics

Figure 10 Reference Outline Drawing (Front Side)

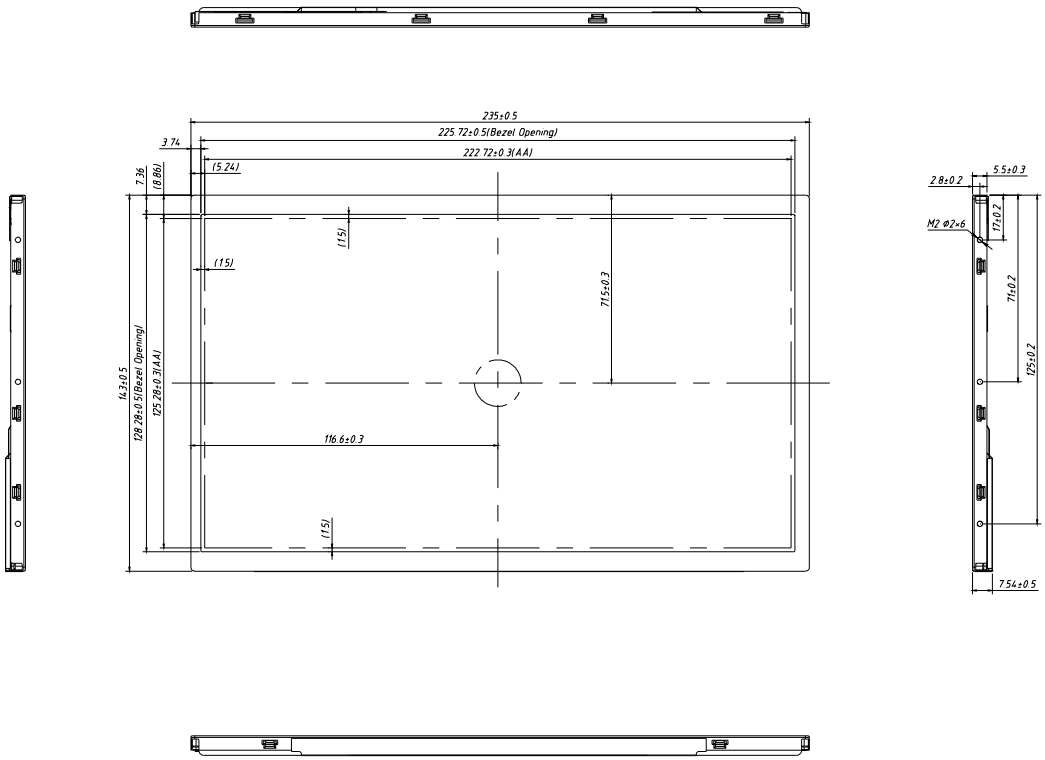
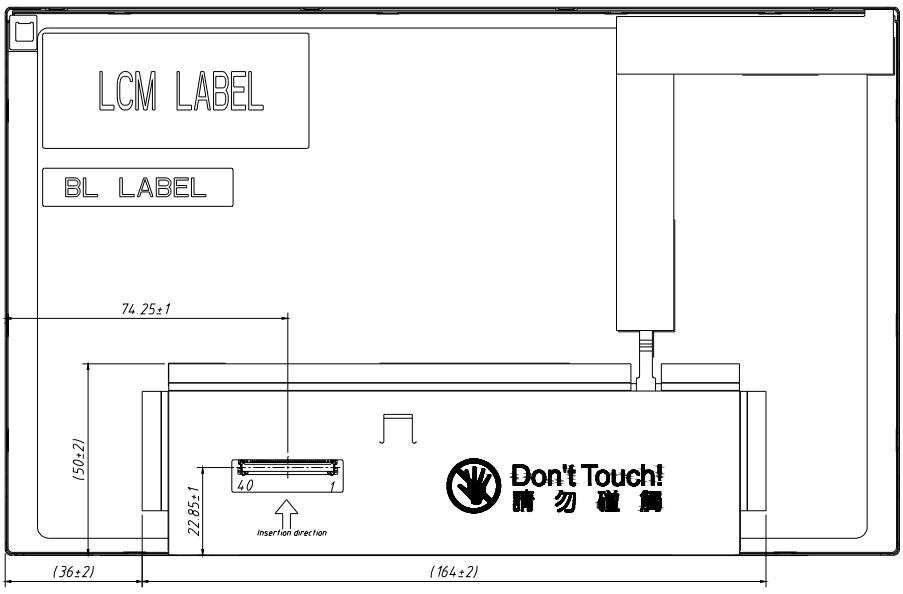


Figure 11 Reference Outline Drawing (Back Side)



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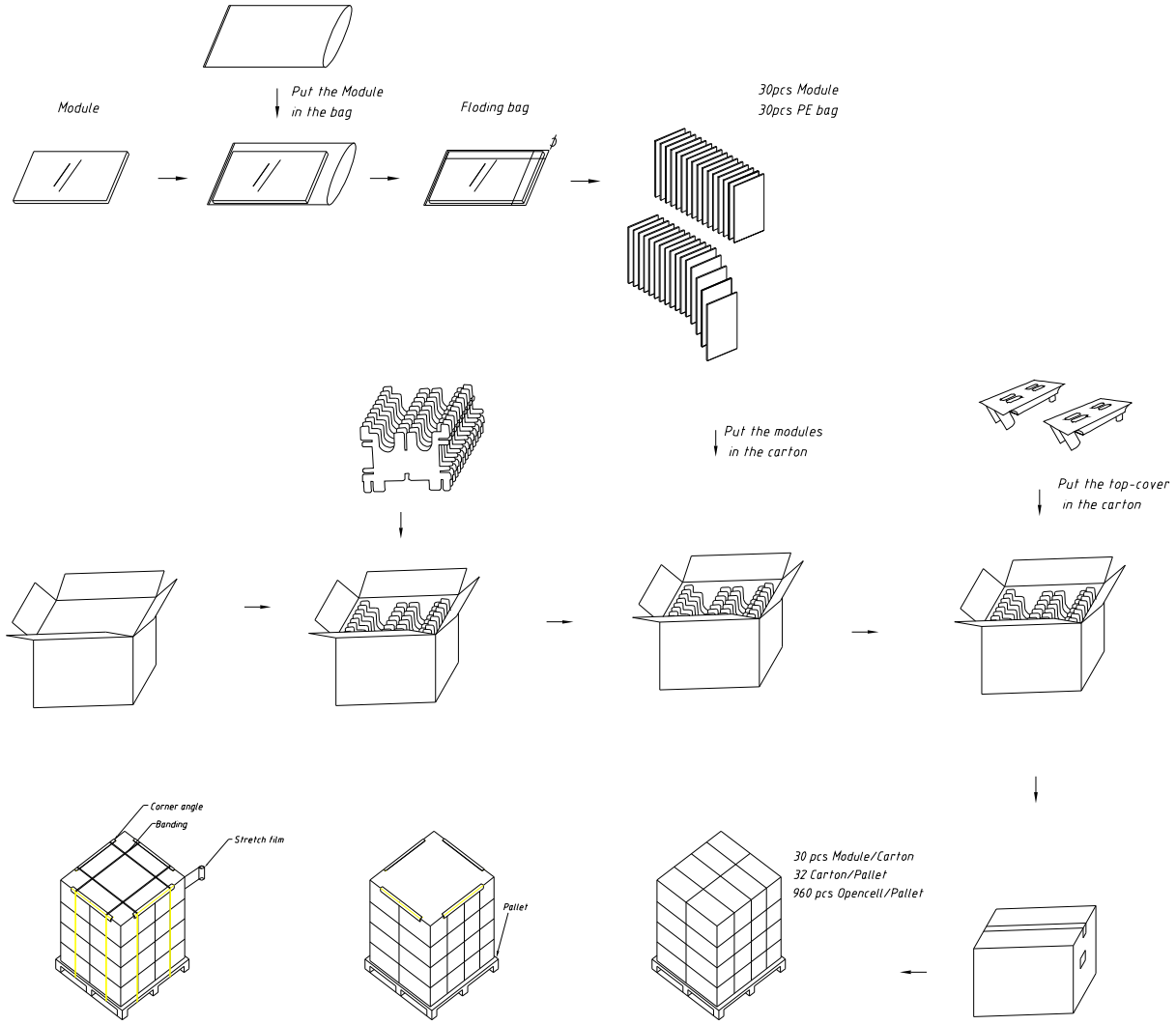
12.0 Package Specification



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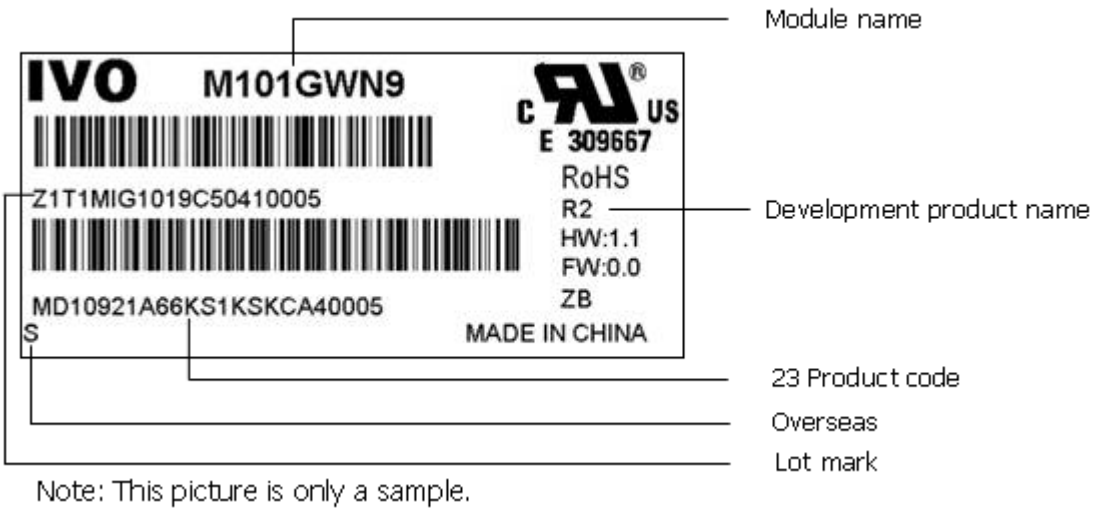
13.0 Lot Mark



Note: This picture is only a sample.

13.1 Lot Mark

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

Code1,2,4,5,6,7,8,9,10,11,16: IVO internal flow control code.
Code3: Production location.
Code12: Production year.
Code13: Production month.
Code14, 15: Production date.
Code17, 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

13.2 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

Code1, 2: Manufacture District.
Code3, 4, 5, 6, 7: IVO internal module name.
Code8, 9, 10, 13, 16: IVO internal flow control code.
Code11, 12: Cell location Suzhou defined as “SZ”.
Code14, 15: Module line Kunshan defined as” KS”.
Code17, 18, 19: Year, Month, Day Refer to Note (1) and Note (2) of Lot Mark.
Code20~23: Serial Number.

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14.0 General Precaution

14.1 Use Restriction

In case of using the device for life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic, take into consideration that appropriate measures such as fail-safe functions and redundant system design should be taken.

14.2 Handling Precaution

(1) 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.

(2) 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.

(3) Disconnect power supply before handling LCD module

(4) Refrain from strong mechanical shock and /or any force to the module.

(5) 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.

(6) 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.

(7) 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.

(8) 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.

(9) Protection film must remove very slowly from the surface of LCD module to Prevent from electrostatic occurrence.

(10) 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.

14.3 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.

14.4 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 9.0 "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

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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.

14.5 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.

14.6 Disposal

When disposing LCD module, obey the local environmental regulations.

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