昆山龙腾光电有限公司

InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	M121GNX2 R1 Product Information			Page No.	1/31
Document No.		Issue date	2013/09/11	Revision	01

Product Information

To:

Product Name: M121GNX2 R1

Document Issue Date: 2013/09/11

Customer	InfoVision Optoelectronics
SIGNATURE	**SIGNATURE**
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FQ-7-30-0-009-03C

Revision	Date	Page	Old Description	New Description	Remark
00	2013/09/11	all	--	First issue.	

Contents

1.0 General Descriptions

1.1 Introduction

The M121GNX2 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, a backlight system, column driver and row driver circuit. This TFT LCD has a 12.1-inch diagonally measured active display area with XGA resolution (1024 horizontal by 768 vertical) pixels arrays.

1.2 Features

- 12.1" TFT LCD Panel
- LED Backlight System
- Supported XGA 1024x768 pixels resolution
- Compatible with RoHS standard

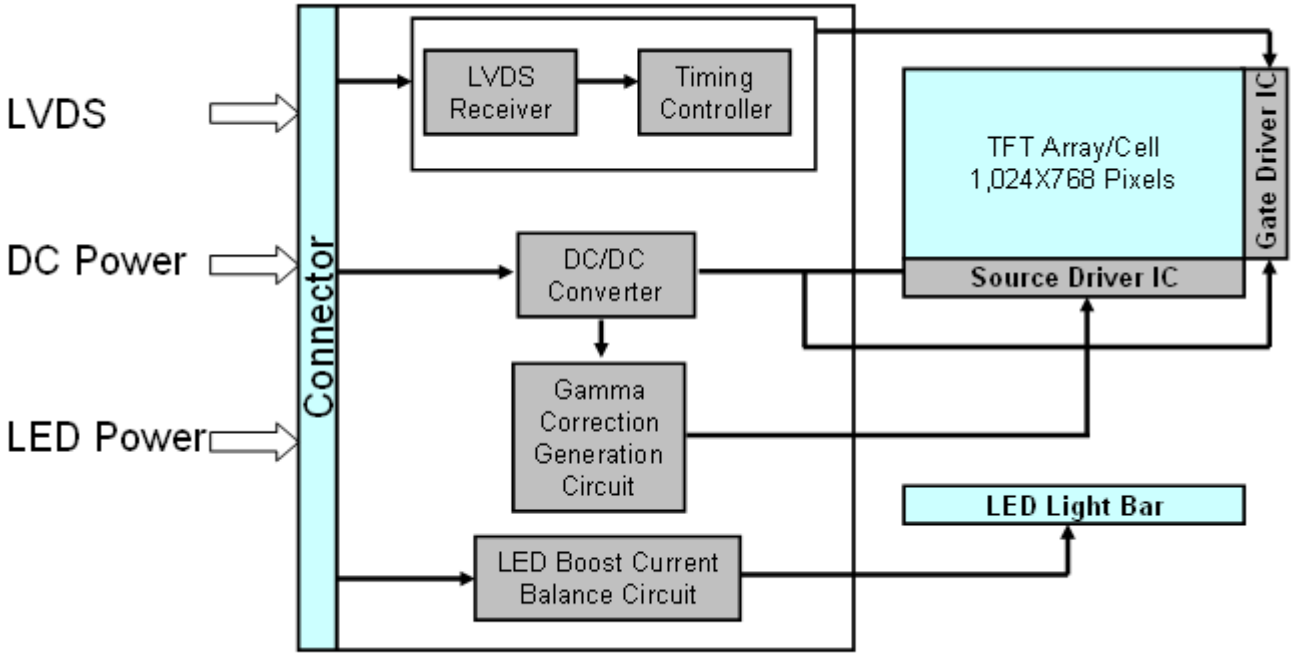
1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	12.1	Inch
Active Area	245.76 (H) x184.32 (V)	mm
Pixels H x V	1024(RGB) x768	-
Pixel Pitch	0.24(H)×0.24 (V)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally White	-
White Luminance	350（TYP）	cd /m^2
Contrast Ratio	800（TYP）	-
Response Time	（16）（TYP）	msec
Input Voltage	3.3	V
Power Consumption	(6.925) (Max）	W
Weight	(545) (Max）	g
Outline Dimension	279.0(H) ×209.0(V) ×9.0(D)	mm
Electrical Interface (Logic)	LVDS	-
Support Color	16.7M	-
Surface Treatment	Anti-glare & hardness 3H	-

1.4 Functional Block Diagram

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

Figure 1 Block Diagram



2.0 Absolute Maximum Ratings

Table 1 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Supply Voltage	V_{DD}	-0.5	5	V	(1)
Operating Temperature	TOP	-20	70	℃	(1) (2) (3) (4)
Operating Humidity	HOP	10	85	%RH	-
Storage Temperature	TST	-30	80	℃	-
Storage Humidity	HST	10	95	%RH	-

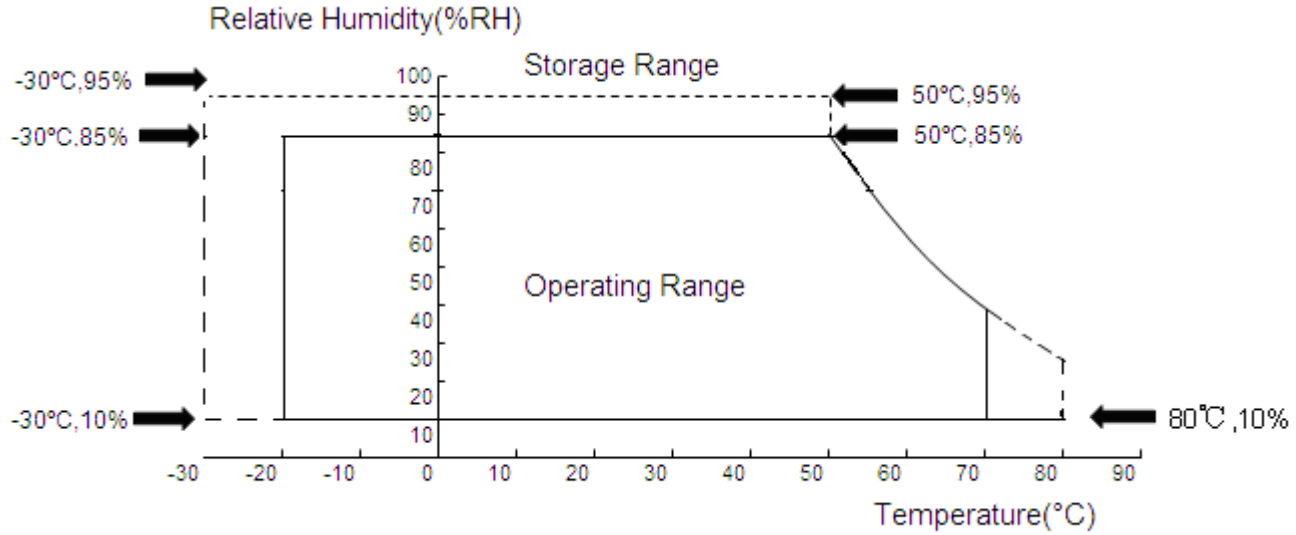
Note (1): Humidity: 85%RH Max. (T<=40℃) Note static electricity.
Maximum wet bulb temperature at 39℃ or less. (T>40℃) No condensation.

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 80~85℃ or -20℃.

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.

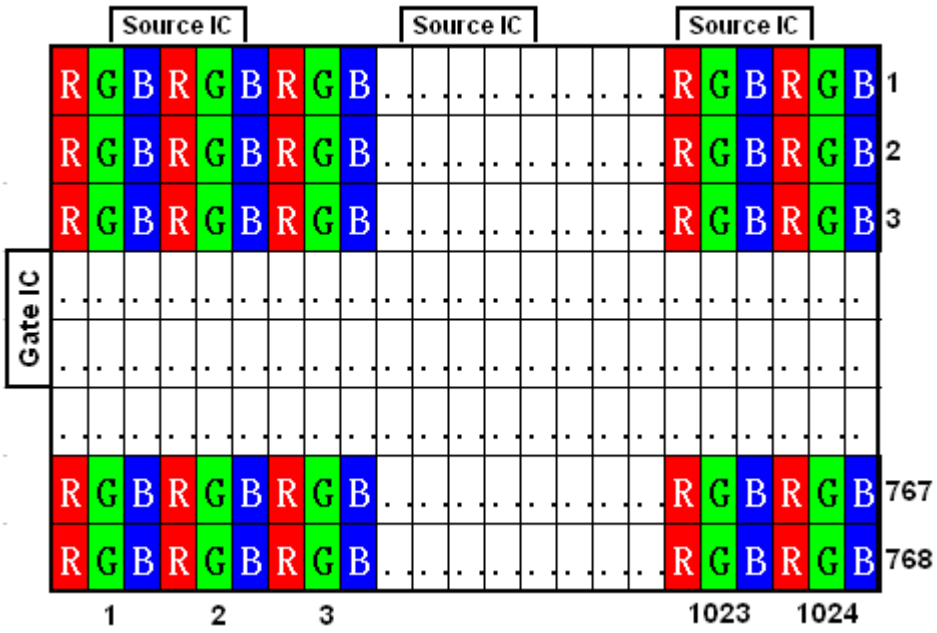
Note (5): Storage Range&Operating Range Picture:



3.0 Pixel Format Image

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

Figure 3 Pixel Format



R+G+B dots=1 pixel

4.0 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes

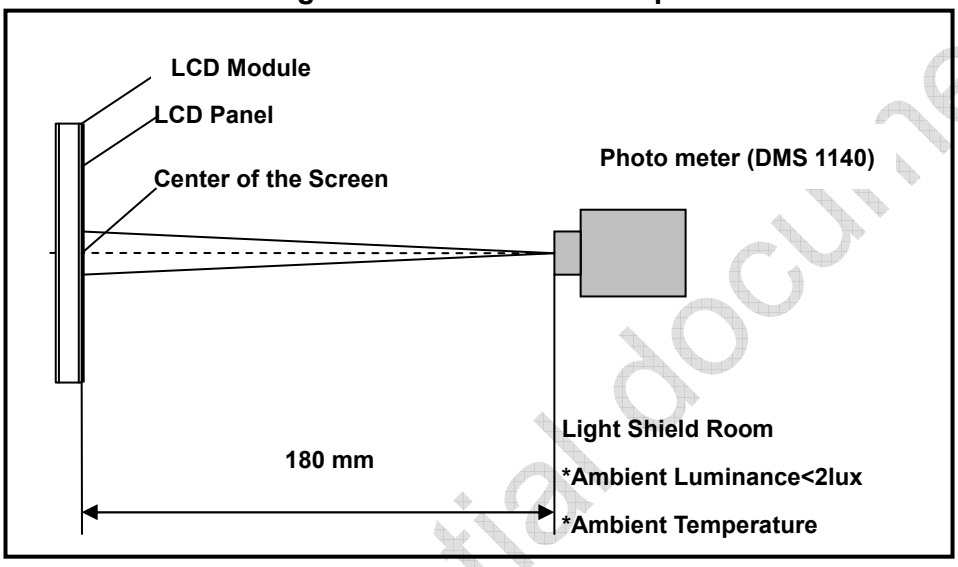
Table 3 Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle （CR>10）	Horizontal	θ_{x+}	70	80	-	degree	(1),(2),(3)
		θ_{x-}	70	80	-		
	Vertical	θ_{y+}	70	80	-		
		θ_{y-}	70	80	-		
Contrast Ratio	Center		720	800	-	-	(1),(2),(4)
Response Time	Rising + Falling		-	16	TBD	ms	(1),(2),(5)
Color Chromaticity (CIE1931)	Red x		Typ. -0.03	TBD	Typ. +0.03	-	(1),(2)
	Red y			TBD		-	
	Green x			TBD		-	
	Green y			TBD		-	
	Blue x			TBD		-	
	Blue y			TBD		-	
	White x		0.255	(0.305）	0.355	-	
	White y		0.275	(0.325)	0.375	-	
White Luminance	5 Points Average		315	350	-	cd/m^2	(1),(2),(6)
Luminance Uniformity	9 Points		(75)	(80)		%	(1),(2),(7)

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 4 Measurement Setup



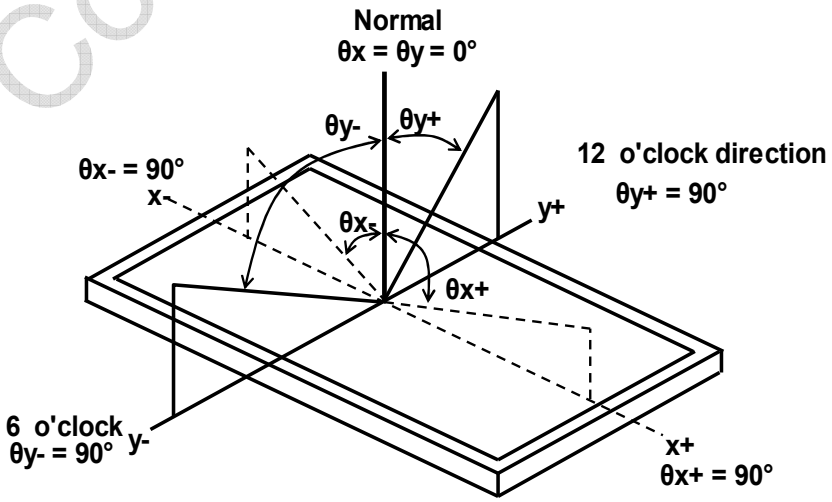
Note (2) The LED input parameter setting as: I_LED: 240mA

V_LED: 12V

PWM_LED: Duty 100%

Note (3) Definition of Viewing Angle

Figure 5 Definition of Viewing Angle



Note (4) Definition Of Contrast Ratio (CR)

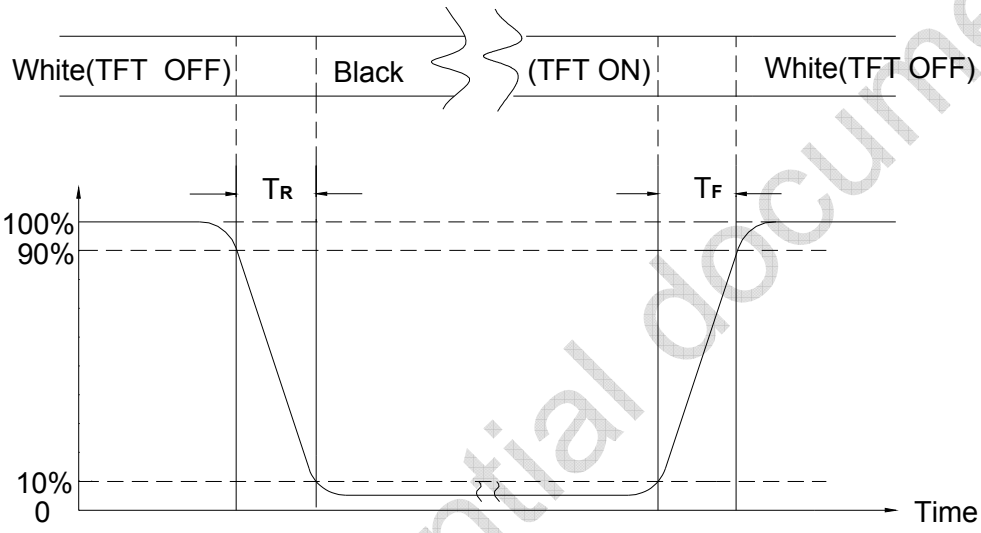
The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L255/ L0

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

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

Figure 6 Definition of Response Time



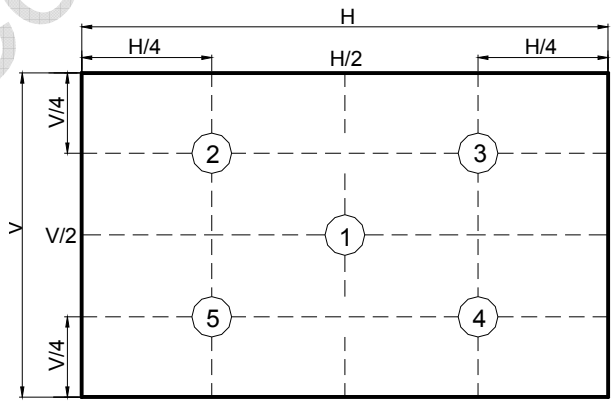
Note (6) Definition Of Luminance White

Measure the luminance of gray level L255 at center point (Ref.: Active Area)

Display Luminance=（L1+L2+L3+L4+L5）/5

H—Active area length, V—Active area width, L—Luminance

Figure 7 Measurement Locations Of 5 Points

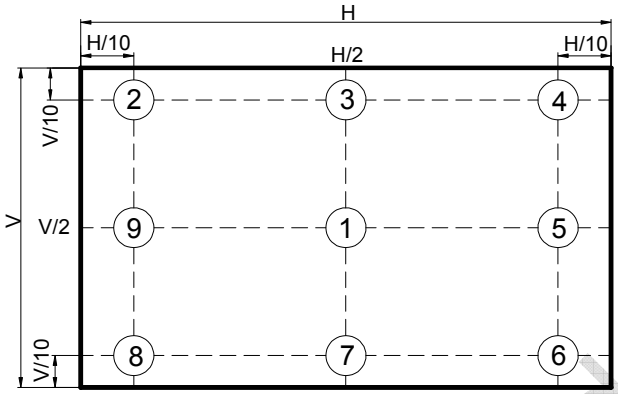


Note (7) Definition Of Luminance Uniformity (Ref.: Active Area)

Measure the luminance of gray level 255 at 9 points.

$$\mathrm{UNF(9pts)} = \frac{\mathrm{Min}(L1, L2, \cdots L9)}{\mathrm{Max}(L1, L2, \cdots L9)}$$

Figure 8 Measurement Locations of 9 Points



5.0 Backlight Characteristics

5.1 Parameter Guideline Of LED Backlight

Table 4 Parameter Guideline for LED Backlight

Item	Symbol	Min.	Typ.	Max.	Units	Conditon
LED Voltage	V_L	10.8	12	12.6	V	Ta=25℃
LED Current	I_L	-	240	-	m A	
LED Forward Voltage	V_F	2.8	3.3	3.6	V	
LED Forward Current	I_F		60		m A	
BL Power Consumption	P_L	-	-	6.1	W	
LED Life Time	-	(30,000)	-	-	Hours	Ta=25℃/I_L=240mA Note (1)

Note (1) The LED life time define as the estimated time to 50% degradation of initial luminous.

Note (1) The LED life time define as the estimated time to 50% degradation of initial luminous.

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

Note (3) A higher LED power supply voltage will result in better power efficiency. Keep the $V_{\_LED}$ between 12V and 12.6V is strongly recommended.

Figure 7 LED Rush Current Measure Condition

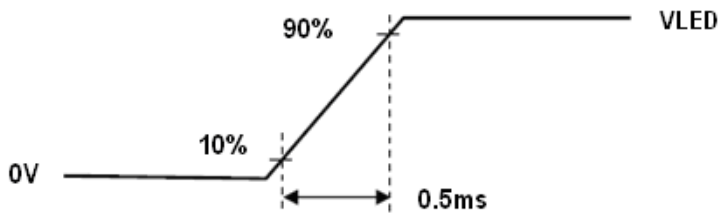


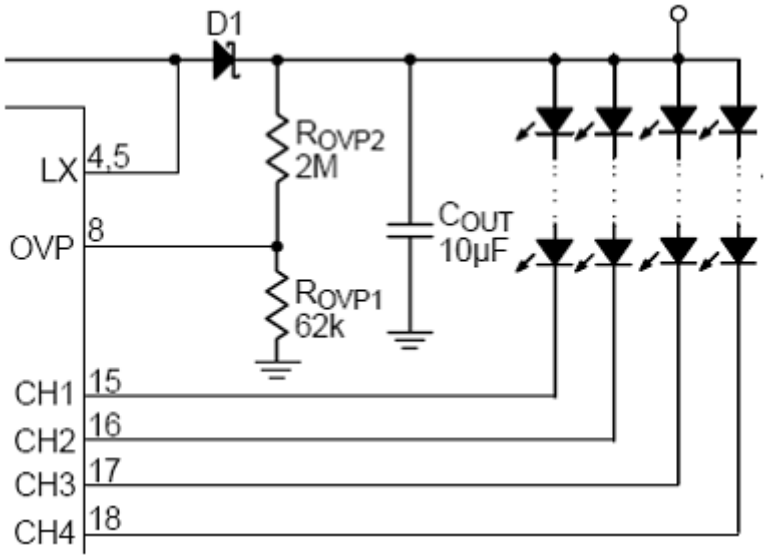
Table 5 Connector Name / Designation

Item	Description
Input LED	Connector model: MSB24038P5A Manufactured by STM

Table 6 Input LED Signal Pin Assignment

Pin #	Function
1	VCC(12V input)
2	GND
3	On/Off(5V-ON,0V-OFF)
4	Dimming(PWM)
5	NC

Figure 8 LED Circuit Diagram



6.0 Electrical Characteristics

6.1 Interface Connector

Table 7 Connector Name / Designation

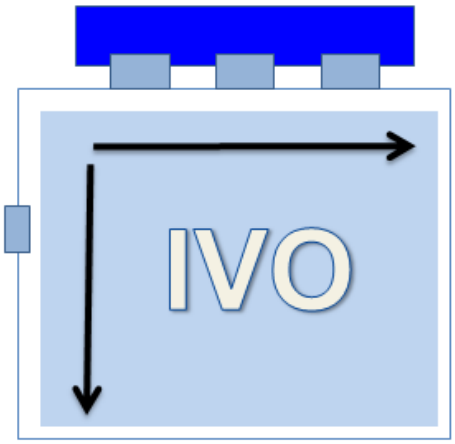
Item	Description
FPC Down Connector (20pin pitch=1.25mm)	Connector recommended model: MSB240420HE Manufactured by STM

Table 8 Signal Pin Assignment

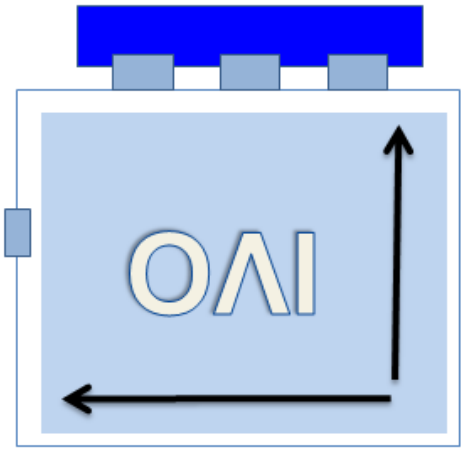
Pin #	Symbol	Description
1	VDD	Power Supply, 3.3V (typical)
2	VDD	Power Supply, 3.3V (typical)
3	VSS	Ground
4	REV	Reverse Scan selection {High:2.5(min), 3.3(typ),3.6(max); Low: 0.5(max)}
5	Rin1-	-LVDS differential data input (R0-R5,G0)
6	Rin1+	+LVDS differential data input (R0-R5,G0)
7	VSS	Ground
8	Rin2-	-LVDS differential data input (G1-G5,B0-B1)
9	Rin2+	+LVDS differential data input (G1-G5,B0-B1)
10	VSS	Ground
11	Rin3-	-LVDS differential data input (B2-B5,HS,VS,DE)
12	Rin3+	+LVDS differential data input (B2-B5,HS,VS,DE)
13	VSS	Ground
14	ClkIN-	-LVDS differential clock input
15	ClkIN+	+LVDS differential clock input
16	GND	Ground
17	Rin4-	-LVDS differential data input (R6-R7,G6-G7,B6-B7)
18	Rin4+	+VDS differential data input (R6-R7,G6-G7,B6-B7)
19	SEL68	6/8 bits LVDS data input selection(H:8bit L/NC:6bit)
20	Bist	Internal use

Note(1) : All input signals shall be low or Hi-resistance state when VDD is off.

Note (2) REV = LOW/NC



Note (3) REV = High



6.2 LVDS Receiver

6.2.1 Signal Electrical Characteristics For LVDS Receiver

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

Table 7 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	$\|V_{ID}\|$	100	-	600	mV	-
Common Mode Voltage	V_{CM}	|VID|/2+0.6	1.2	1.8-|VID|/2	V	-
Common Mode Voltage Offset	ΔV_{CM}	-	-	50	mV	V_{CM}=+1.2V

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

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

Figure 9 Voltage Definitions

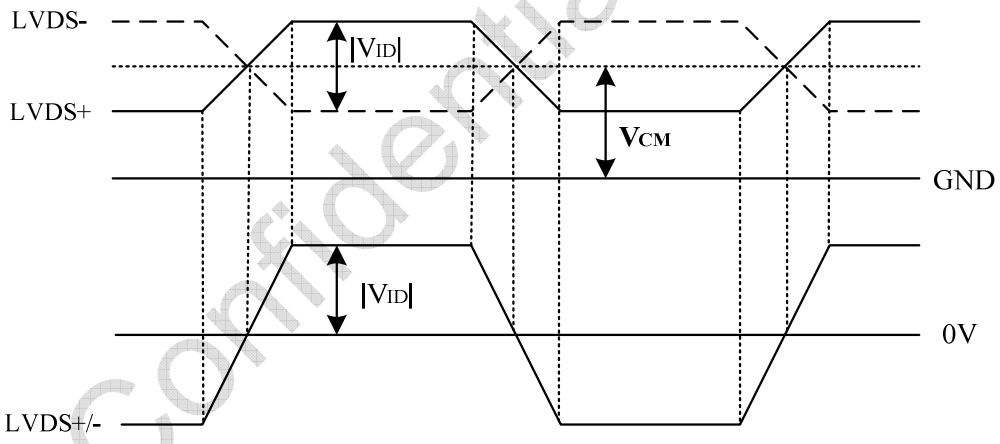


Figure 10 Measurement System

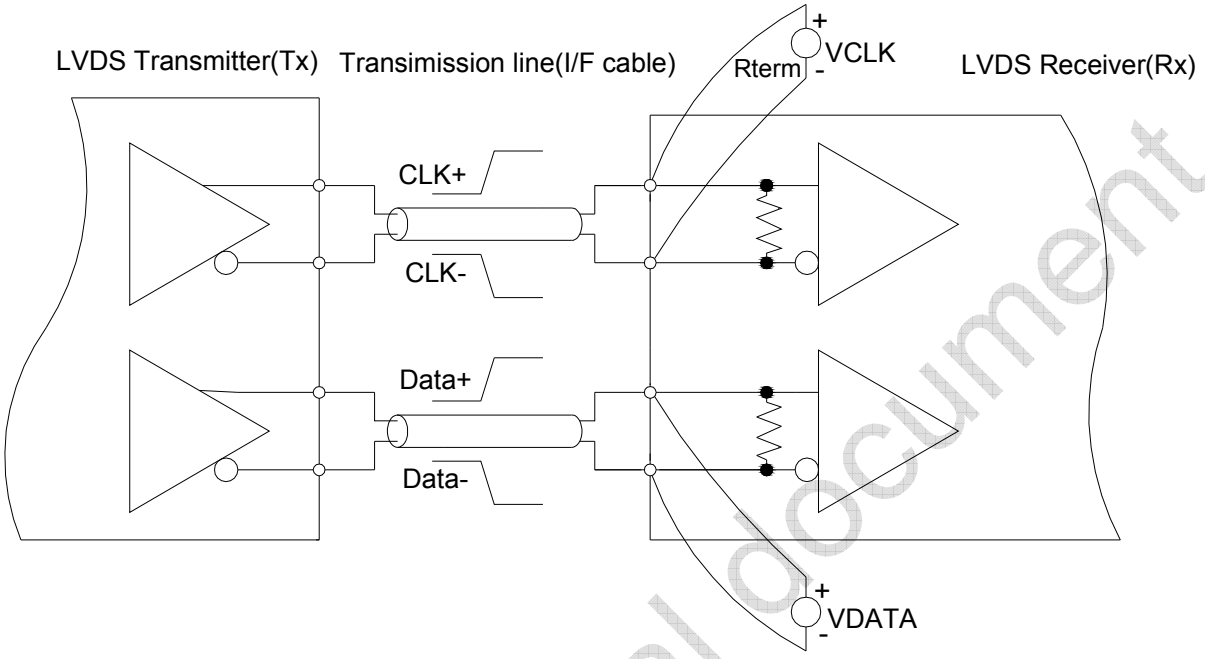
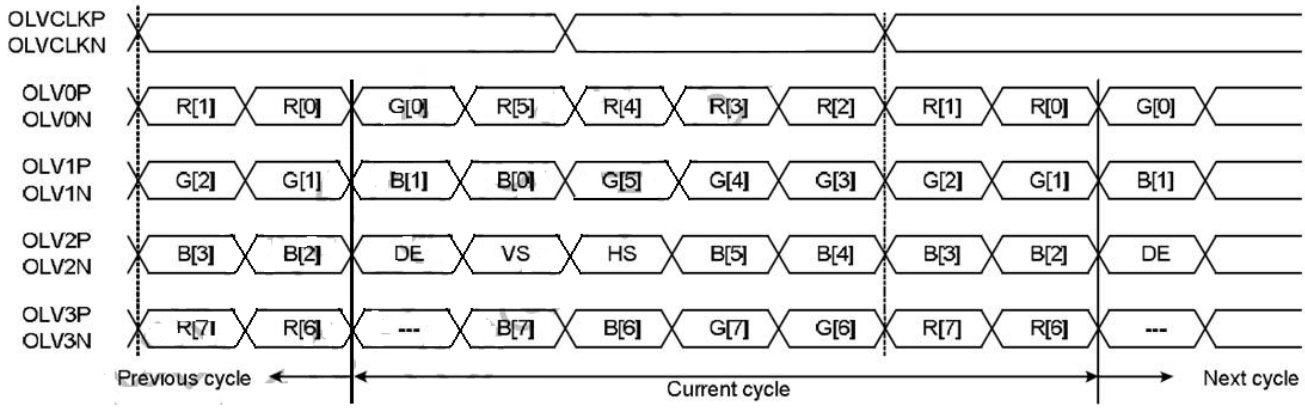


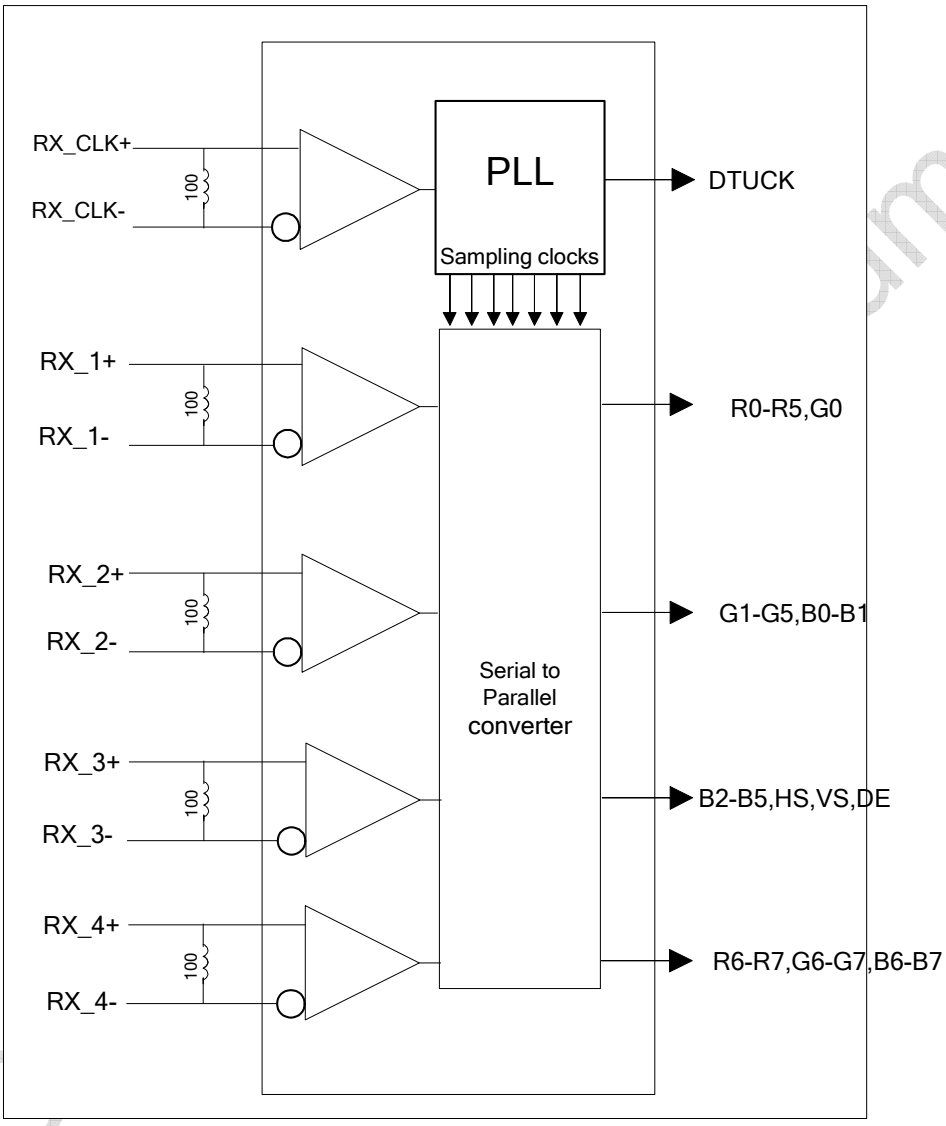
Figure 11 Data Mapping



6.2.2 LVDS Receiver Internal Circuit

Figure 12 LVDS Receiver Internal Circuit shows the internal block diagram of the LVDS receiver. This LCD module equips termination resistors for LVDS link.

Figure 12 LVDS Receiver Internal Circuit



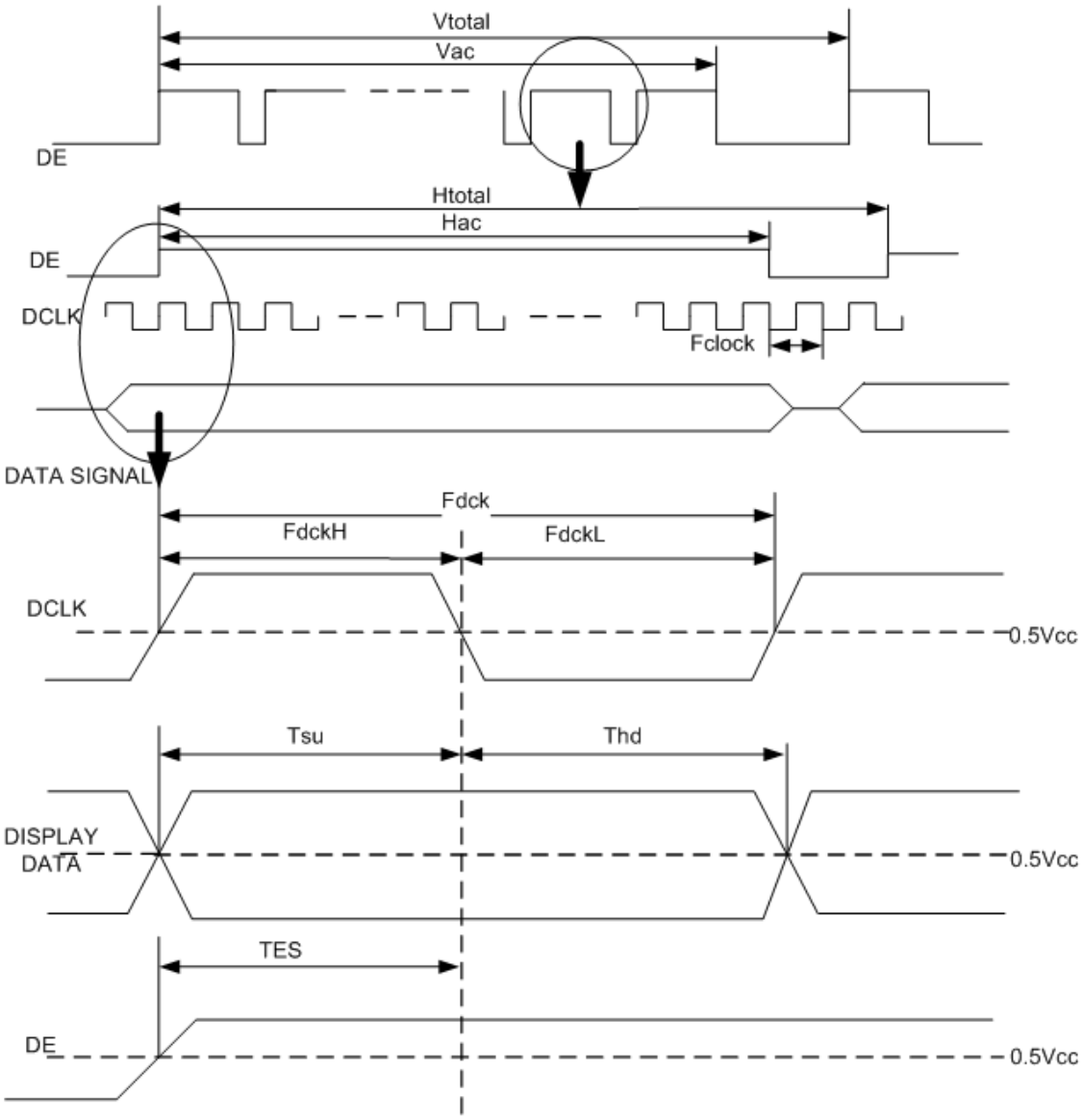
7.0 Interface Timings

Table 8 Interface Timings

Parameter	Symbol	Unit	Min.	Typ.	Max.
LVDS Clock Frequency	Fclk	MHz	50	65	80
H Total Time	HT	Clocks	1054	1344	2047
H Active Time	HA	Clocks	1024	1024	1024
H Blanking Time	HBL	Clocks	40	320	1023
V Total Time	VT	Lines	776	806	1023
V Active Time	VA	Lines	768	768	768
V Blanking Time	VBL	Lines	8	38	255
Frame Rate	Vsync	Hz	55	60	65

Note: H Blanking Time and V Blanking Time can not be changed at every frame.

Figure 13 Timing Characteristics



8.0 Power Consumption

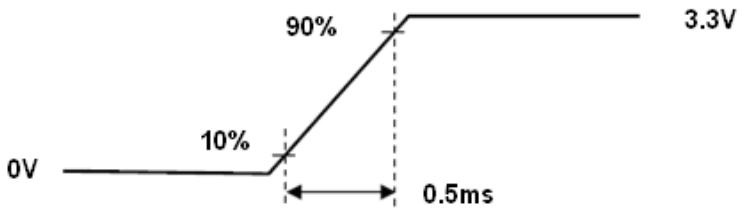
Input power voltage specifications are as follows.

Table 10 Power Voltage

Item		Symbol	Min.	Typ.	Max.	Units	Note
LCD Drive Voltage (Logic)		VDD	3.0	3.3	3.6	V	(2), (4)
VDD Current	Black Pattern	IDD	-	-	250	mA	(3),(4),(6)
VDD Power Consumption	Black Pattern	PDD	-	-	0.825	W	
Rush Current		Irush	-	-	3	A	(1),(4),(5)
Allowable Logic/LCD Drive Ripple Voltage		VDDrp	-	-	200	mV	(4)

Note (1) Measure Condition

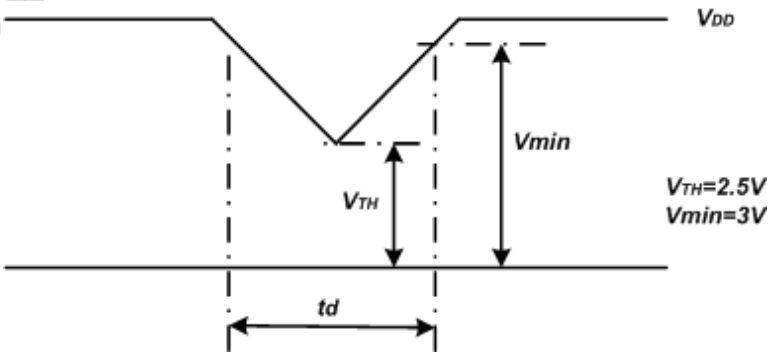
Figure 14 VDD Rising Time



Note (2) VDD Power Dip Condition

If VTH＜VDD≤Vmin，then td≤10ms；When the voltage returns to normal our panel must revive automatically.

Figure 15 VDD Power Dip



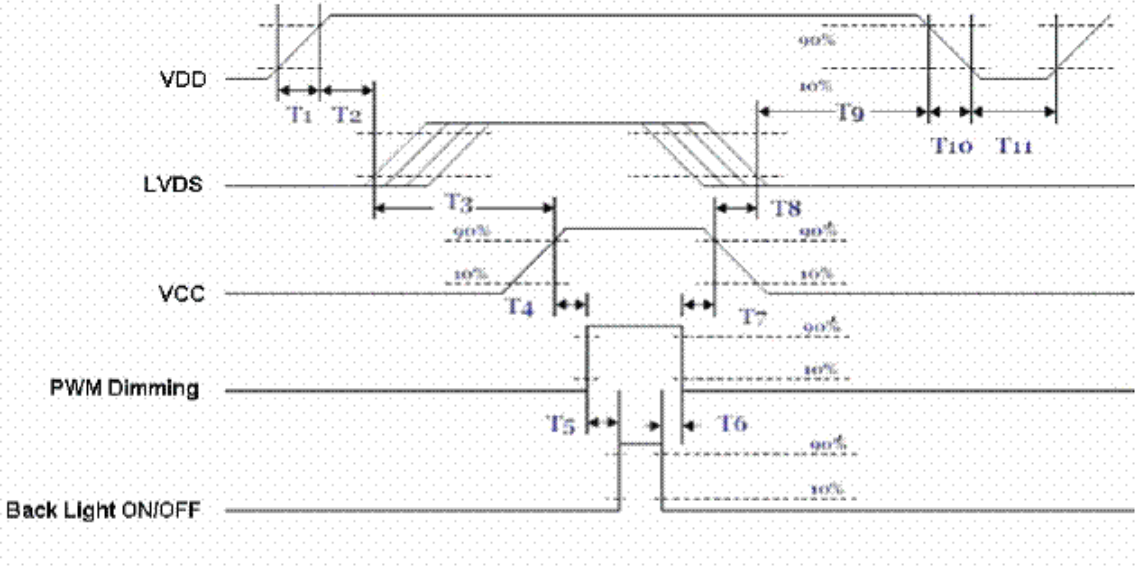
Note (3) Frame Rate=60Hz, VDD=3.3V,DC Current.

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

9.0 Power ON/OFF Sequence

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

Figure 10 Power Sequence



Power ON/OFF sequence timing

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	30	40	50	[ms]
T3	200	-	-	[ms]
T4	10	-	-	[ms]
T5	10	-	-	[ms]
T6	0	-	-	[ms]
T7	10	-	-	[ms]
T8	100	-	-	[ms]
T9	0	16	50	[ms]
T10	-	-	10	[ms]
T11	1000	-	-	[ms]

Note (1) Power On Sequence: VCC-> AVDD -> VGL -> VGH -> Data -> B/L

(2) Power Off Sequence: B/L-> Data -> VGH -> VGL -> AVDD -> VCC

10.0 Mechanical Characteristics

10.1 Outline Drawing

Figure 11 Outline Drawing (Front Side)

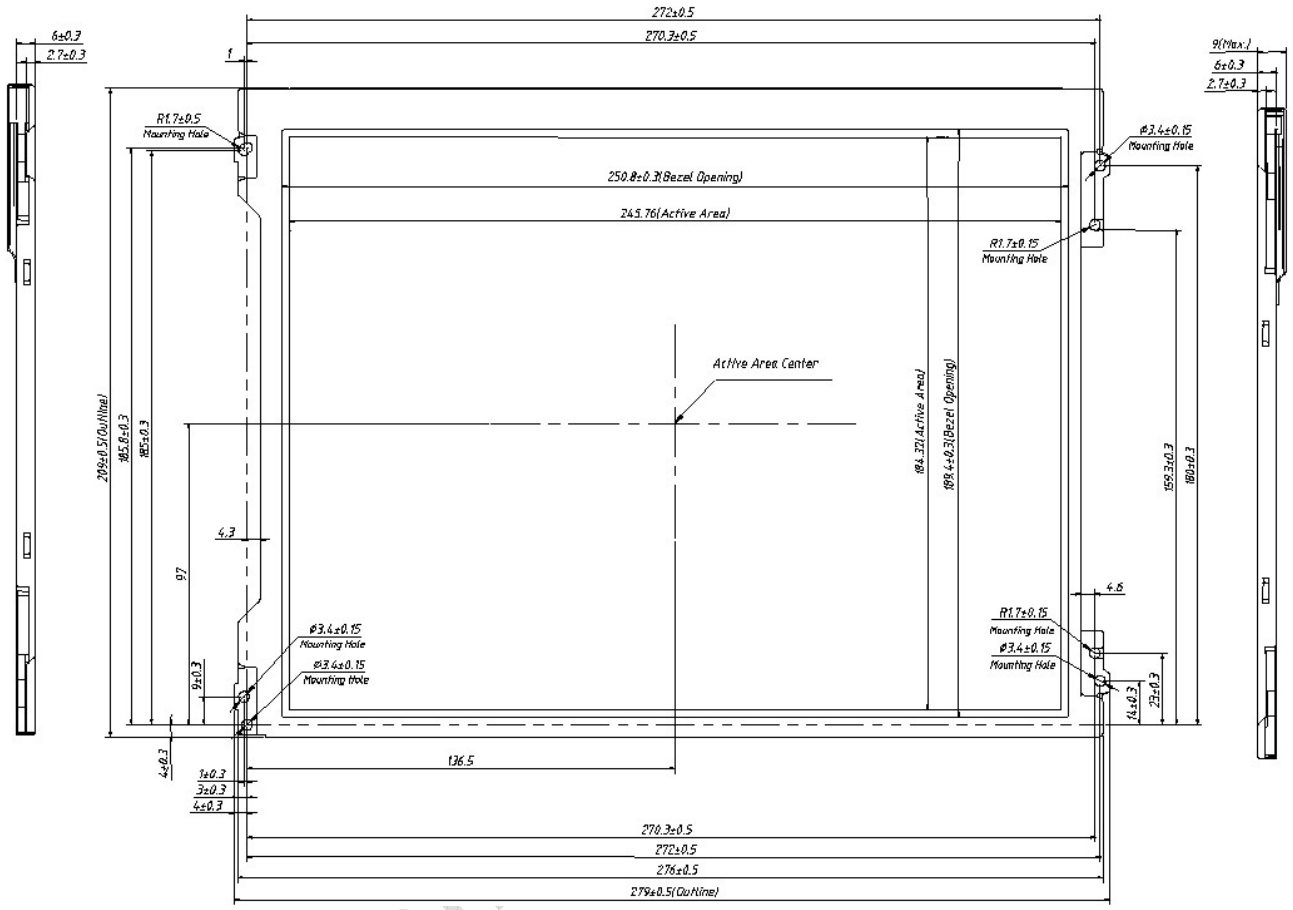
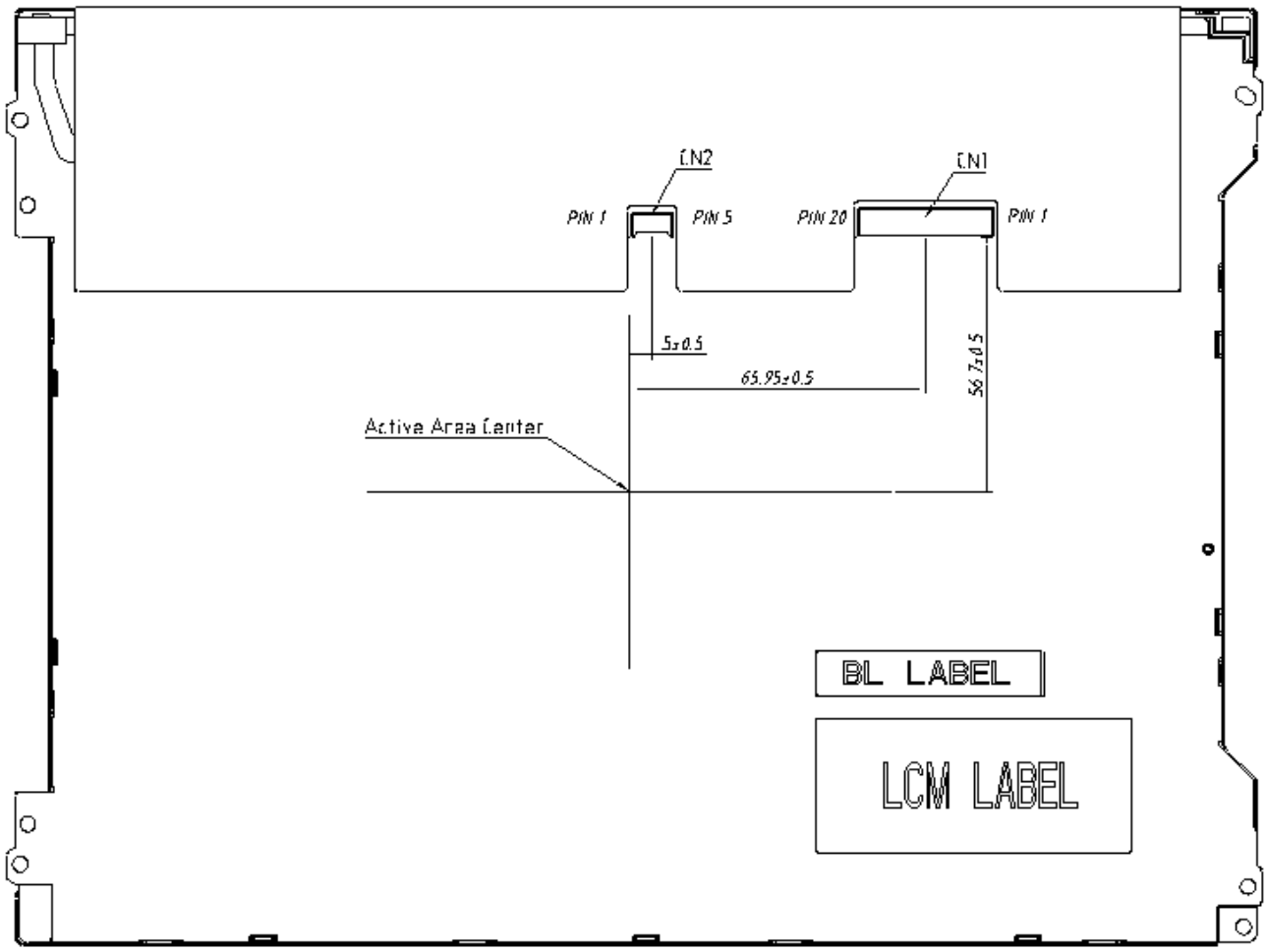


Figure 12 Outline Drawing (Back Side)

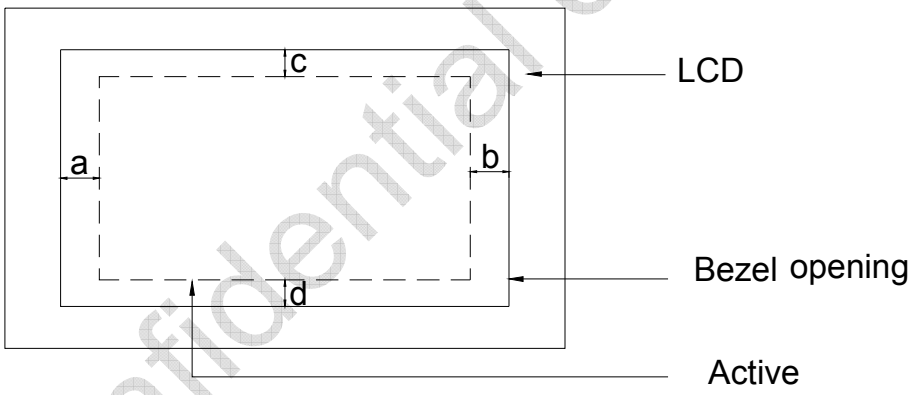


10.2 Dimension Specifications

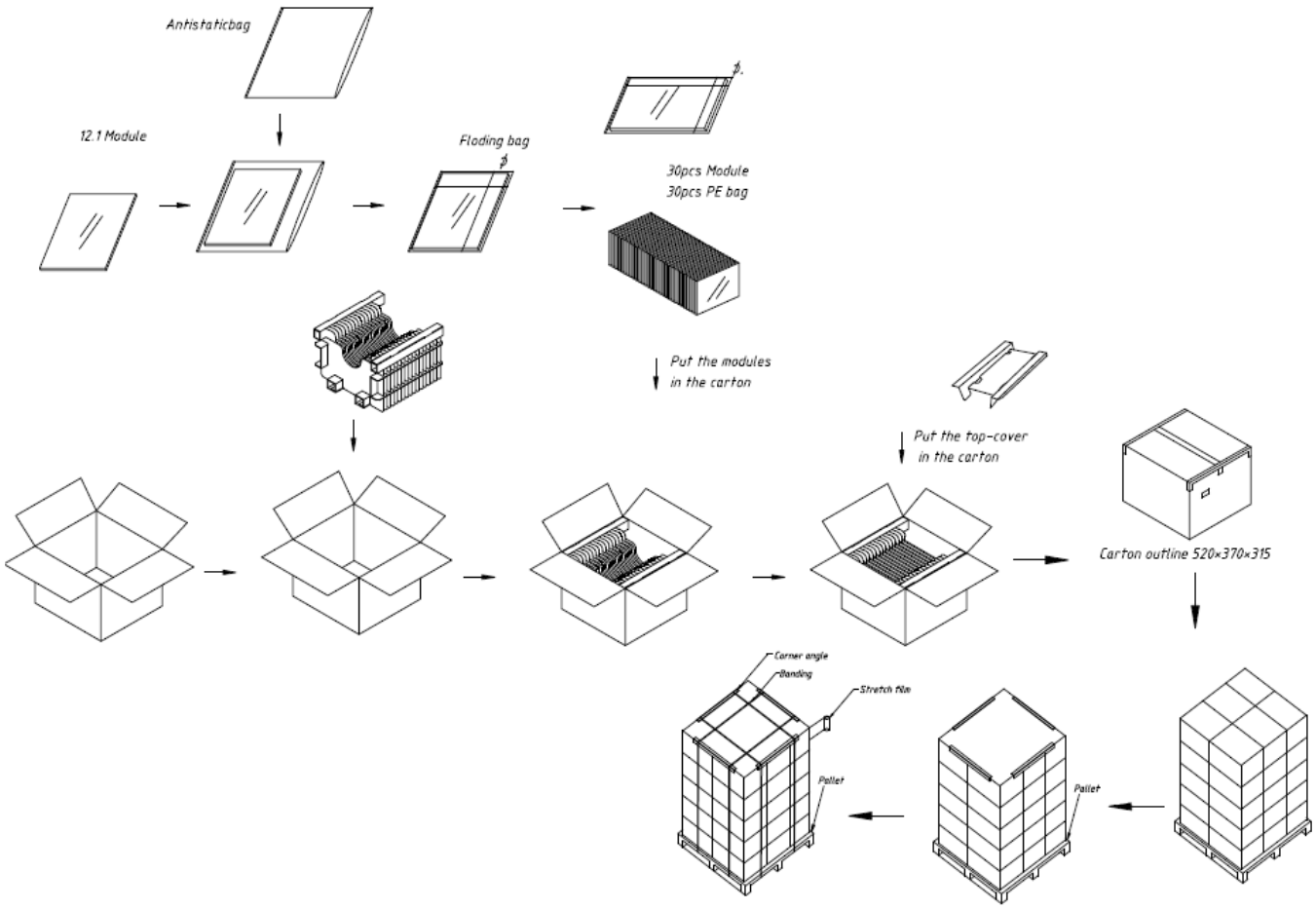
Table 12 Module Dimension Specifications

Item	Min.	Typ.	Max.	Units
Width	275.5	276	276.5	mm
Height	208.5	209	209.5	mm
Thickness	5.7(without PCBA)	6(without PCBA)	6.3(without PCBA)	mm
Weight	-	(518.7)	(545)	g
BM : | a-b | & | c-d |	≤1.0			mm

Figure 19 BM Area



11.0 Package Specification



12.0 Reliability Conditions

Item		Package	Test Conditions		Note
High Temperature Operation Test		Module	70℃, 500hrs		1,4,5,6,7,8
Low Temperature Operating Test		Module	-20℃, 500hrs		1,4,5,6,7,8
High Temp./High Humidity Operating Test		Module	50℃, 85%, 500hrs		1,4,5,6,7,8
High Temp./High Humidity Storage Test		Module	50℃, 90%, 500hrs		1,5,6,7,8
Thermal Shock Non-operation Test		Module	-30℃~80℃, 1hr/each cycle,100cycles (200cycles for reference)		1,5,6,7,8
Shock(single chip)		Module	3 shock in each direction Peak acceleration:981m/s2 Half Sine Wave; 6ms		1,7,8
Vibration (single chip)		Module	1.5G , 10~500 Hz , x、y、z each axis/1h		1,7,8
Drop Test		With package	65cm, 1corner,3 arris,6 side		1,8
Vibration Test		With package	1.5G , 10~500 Hz , x、y、z each axis/1h		1,8
ESD Test	operating	Module	contact	± 8 KV	2,4,5,7,8
			air	± 15 KV	
	non-operating		contact	± 10 KV	
			air	± 20 KV	
Image Sticking test		Module	5*7 Chess pattern； 1、Normal temperature：50% Grayscale，2h 10s/4h 10s/8h 2min/24h 5min ND 8%OK 2、high temperature 70℃： 50% Grayscale，2h 10s/4h 10s/8h 2min/24h 10min ND 8% OK		3,4,6,7,8

Note:

1. There is no function defect and occurrence of any new defective shall not be allowed.
2. 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.
3. 25℃: Image Sticking is not visible through 8% ND filter after 5 min with pattern L127.
   70℃: Image Sticking is not visible through 8% ND filter after 10 min with pattern L127.
4. In Operating test, the B/L voltage and current must be in spec.
5. All the judgments are under normal temperature and the sample need to be static more than 2 hours in the normal temperature before judge.
6. During measurement, the condensation water or remains shall not be allowed.
7. The minimum sample quantity of test is 3pcs.
8. There is no display function fail issue occurred, all the cosmetic specification is judged before the reliability stress.

13.0 Lot Mark

TBD

13.1 Lot Mark

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

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

Note (1) Production Year

Year	2,006	2,007	2,008	2,009	2,010	2,011	2,012	2,013	2,014	2,015
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

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 defined as “SZ”.
code 14 ,15: Module line kunshan defined as” KS”.
code 17,18,19 : Year, Month, Day Refer to Note(1) and Note(2) of Lot Mark.
code 20~23 : Serial Number.

14.0 General Precaution

14.1 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.

14.2 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.

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 "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.

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.