Document Title	M141NWW1-103 Product Tentative Information			Page No.	1/29
Document No.		Issue date	2008/09/19	Revision	01

Product Tentative Information

To:

Product Name: **M141NWW1-103**

Document Issue Date: **2008/09/19**

www.jxlcd.com
IVO Confidential document

Note: 1. Please contact IVO Corp. 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.

Document Title	M141NWW1-103 Product Tentative Information			Page No.	2/29
Document No.		Issue date	2008/09/19	Revision	01

Revision	Date	Page	Old Description	New Description	Remark
01	2008/09/19			First issued	

www.jxlcd.com
IVO Confidential document

Contents

www.jxlcd.com
IVO Confidential document

1.0 GENERAL DESCRIPTIONS

1.1 Introduction

The M141NWW1 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 timing controller, voltage reference, common voltage driver, DC-DC converter, column driver, and row driver circuit. This TFT LCD has a 14.1-inch diagonally measured active display area with WXGA resolution (1280 vertical by 800 horizontal pixel array).

1.2 Features

- 14.1”WXGA TFT LCD Panel
- 1 CCFL Backlight System
- Supported WXGA (V:1280 lines, H:800 pixels) resolution
- Compatible with RoHS Standard
- VESA Compliant
- Anti-Pollute Polarizer

1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	14.1 inch Diagonal	Inch
Active Area	303.36(H) x 189.65(V)	mm
Pixels H x V	1280 (x3) x 800	
Pixel Pitch	0.237X0.237	mm
Pixel Arrangement	R.G.B. Vertical Stripe	
Display Mode	Normally White	
White Luminance	200 typical	cd/m^2 (CCFL current 6.0mA)
Contrast Ratio	350 : 1 typical	
Response Time	8 typical	msec
Input Voltage	+3.3 typical	V
Power Consumption	5.4W	Watt
Weight	400 max	g
Outline Dimension	205.5(W) x319.5 (H) x 5.5 (T) typical	mm
Electrical Interface (Logic)	LVDS	
Support Color	262 K	
Luminance Uniformity	1.18typical (@5points)	
Optimum Viewing Direction	6 o’colok	
Surface Treatment	Glare + HC+AP	

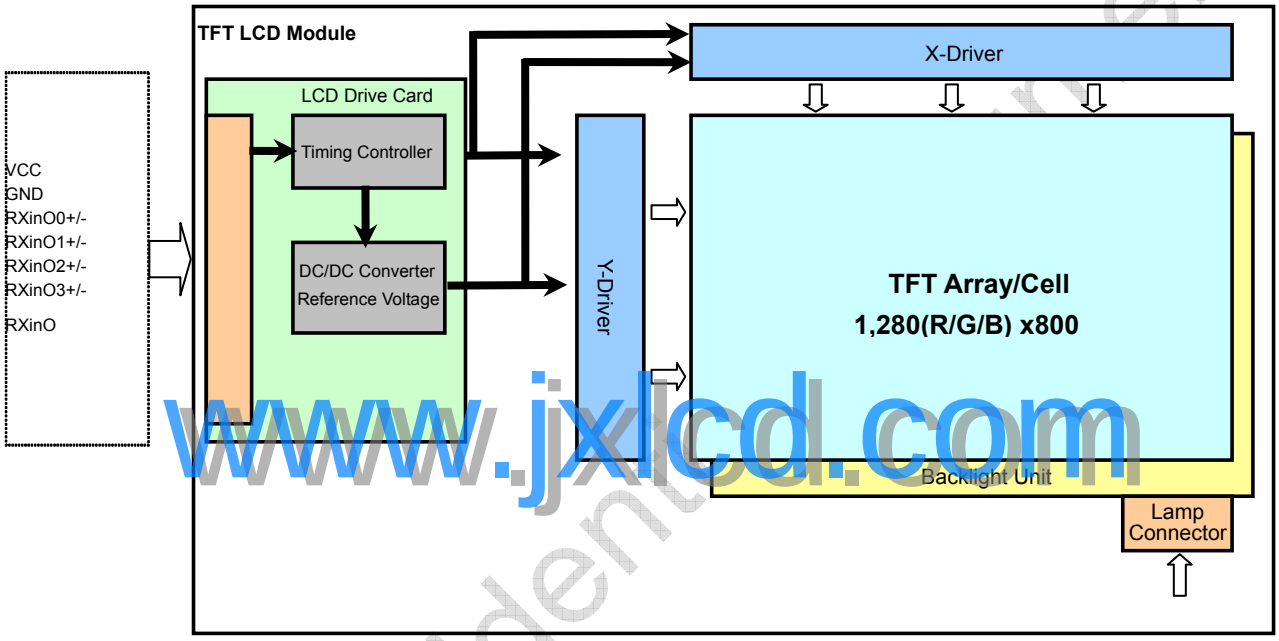
www.jxlcd.com
IVO Confidential Document

1.4 Functional Block Diagram

.

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

Figure 1 Block Diagram



www.jxlcd.com
IVO Confidential Document

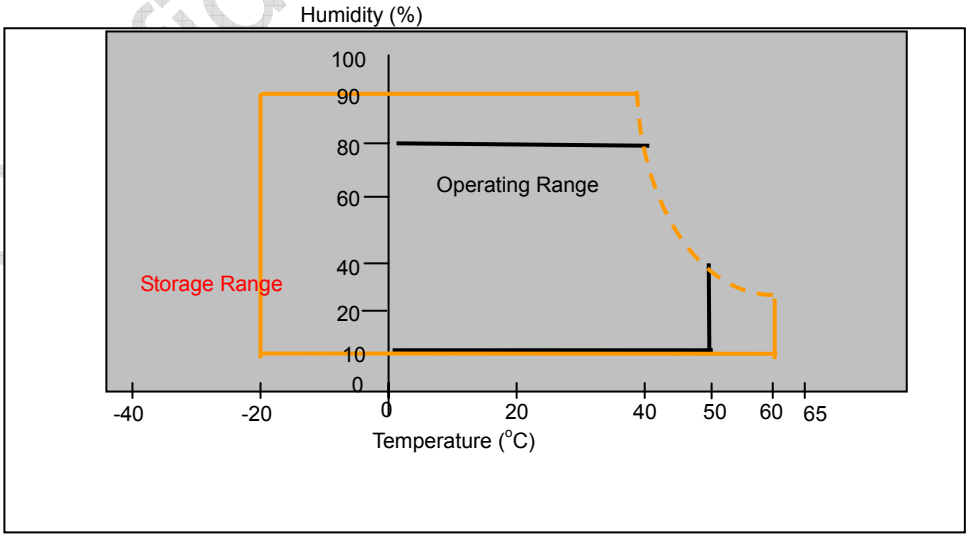
2.0 Absolute Maximum Ratings

Item	Symbol	Min	Max	Unit	Conditions
Supply Voltage	VDD	-0.5	3.6	V	
Input Signal	--	-0.5	1.2	V	LVDS signals
Operating Temperature	TOP	0	50	deg. C	(Note)
Operating Humidity	HOP	--	80	%RH	(Note)
Storage Temperature	TST	-20	60	deg. C	(Note)
Storage Humidity	HST	--	90	%RH	at Ta＜40℃, No condensation.
Vibration	--	--	1.5G 10-500-10Hz	G Hz	Random,30min for X, Y, Z axis
Shock	--	--	220G 2ms	G ms	Half sign wave ,one cycle for each x,y,z axis

www.jxlcd.com

Note (1)Storage /Operating temperature. Maximum Wet-Bulb should be 39 degree C. No condensation.

(2)When you apply the LCD module for OA system. Please make sure to keep the temperature of LCD module is less than 60℃

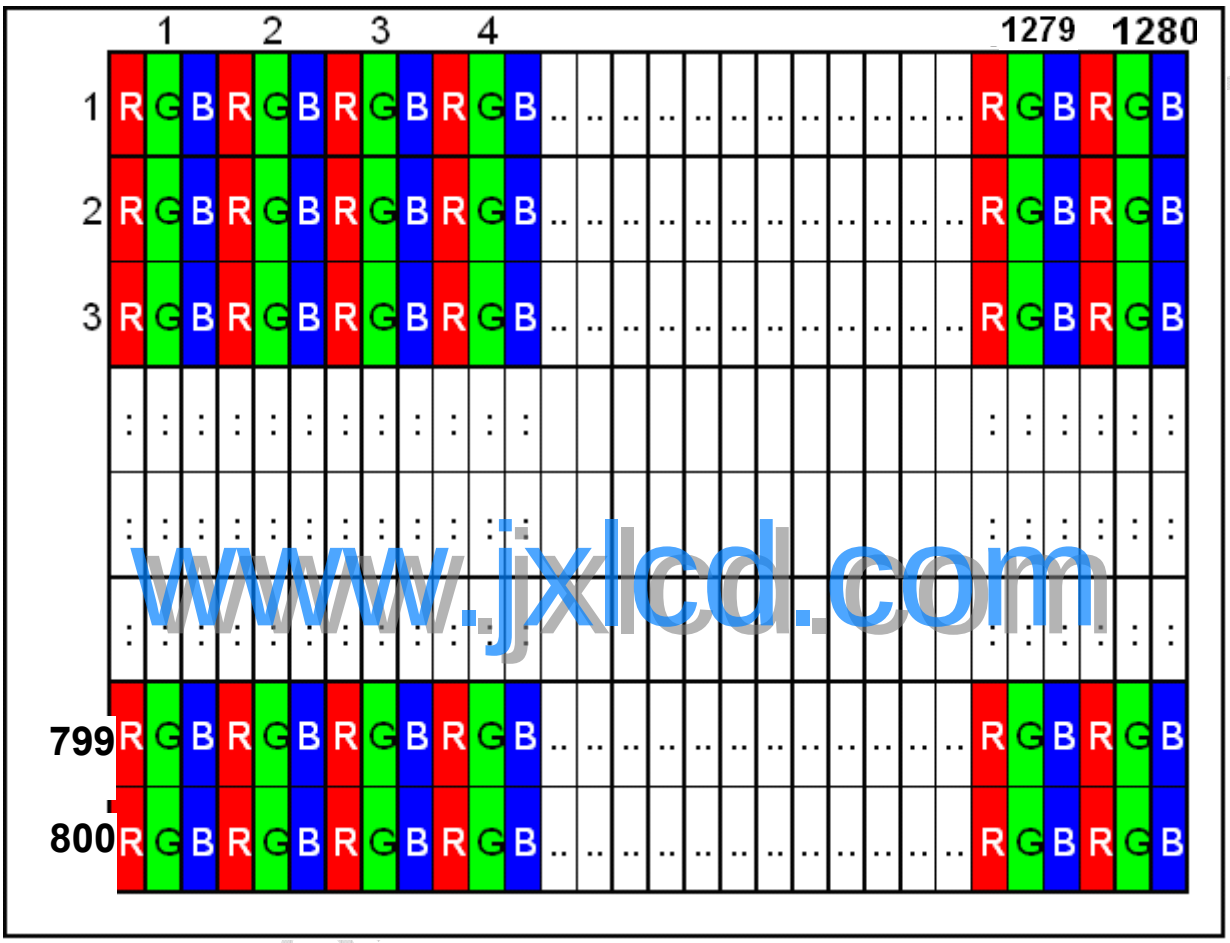


IVO Confidential document

3.0 Pixel Format Image

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

Figure 2 Pixel Format



www.jxlcd.com

4.0 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes

Table 1 Optical characteristics

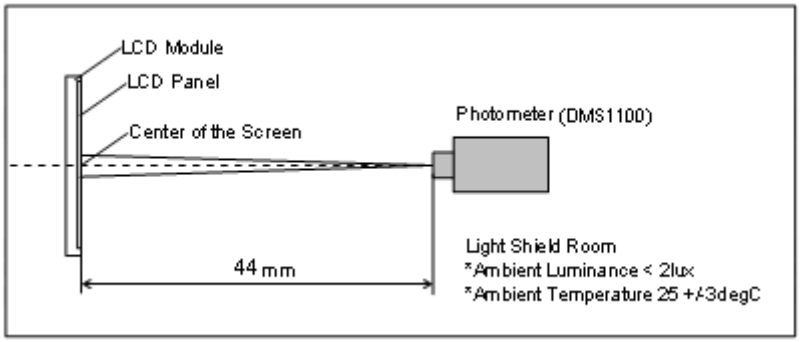
Item	Conditions		Specification			
			Min	Typ.	Max	Note
Viewing Angle [degrees] K=Contrast Ratio>10	Horizontal	Left	TBD	45	--	A, B
		Right	TBD	45	--	
	Vertical	Up	TBD	20	--	
		Down	TBD	45	--	
Contrast ratio	Center			350	--	A, C
Response Time [ms]	Rising + Falling		--	8	TBD	A, D
Color Chromaticity (CIE1931)	Red	x	Typ. -0.03	TBD	Typ. +0.03	A,
	Red	y		TBD		A,
	Green	x		TBD		A,
	Green	y		TBD		A,
	Blue	x		TBD		A,
	Blue	y		TBD		A,
	White	x		0.313		A,
	White	y		0.329		A,
White Luminance [cd/m^2]	ICCFL=6.0mA		TBD	200	--	5points A, E
Luminance Uniformity	ICCFL=6.0mA, 13points		--	1.33	TBD	A, F
	ICCFL=6.0mA, 5points		--	1.18	TBD	

Note: A. Measurement Setup:

The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 30 minutes in a windless room.

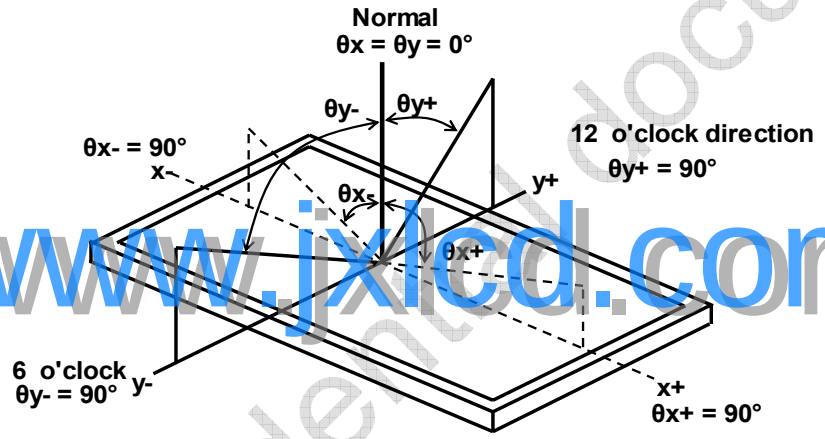
www.jxlcd.com
IVO Confidential document

Figure 3 Measurement Setup



B. Definition of Viewing Angle

Figure 4 Definition of Viewing Angle



www.jxlcd.com

C. Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

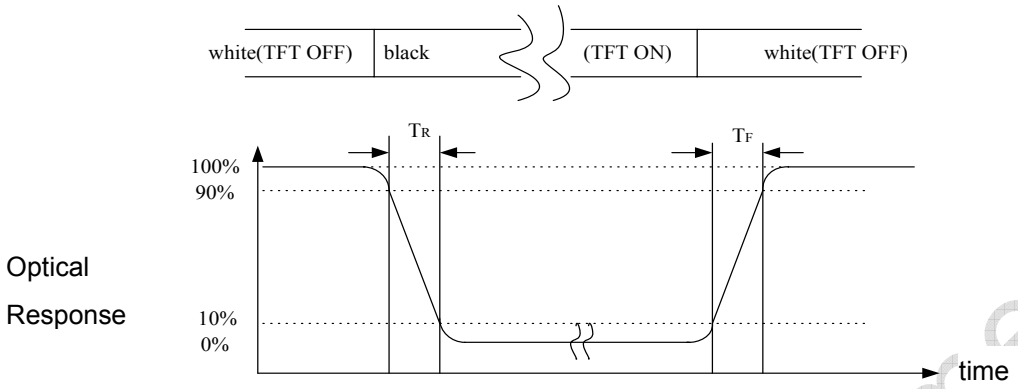
Contrast Ratio (CR) = L63 / L0

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

D. Definition of Response Time (T_R, T_F)

Figure 5 Definition of Response Time

IVO Confidential document



E. Definition of Luminance White

Average Luminance of 5 points= $\frac{Y_1 + Y_2 + Y_3 + Y_4 + Y_5}{5}$

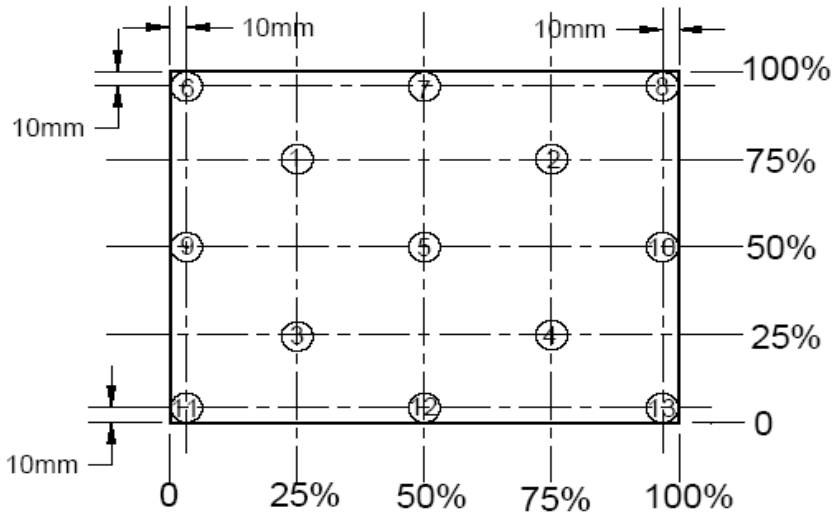
F. Definition of Luminance Uniformity(Variation)

Measure the luminance of gray level 63 at 13 points.

$$UNF(13pts) = \frac{\max(L1, L2, \cdots L13)}{\min(L1, L2, \cdots L13)} \qquad UNF(5pts) = \frac{\max(L1, L2, \cdots L5)}{\min(L1, L2, \cdots L5)}$$

www.jxlcd.com

Figure 6 Measurement Locations of 13 Points



Screen Uniformity Measurement Points (13)

5.0 Backlight Characteristics

5.1 CCFL Connector

Table 2 Connector Name / Designation

Manufacturer	JST
Type / Part Number	BHSR-02VS-1 or equivalent
Mating Type / Part Number	SM02B-BHSS-1-TBor equivalent

Table 3 Signal assignment

Pin #	Signal Name
1	Lamp High Voltage
2	Lamp Low Voltage

5.2 Parameter Guideline for CCFL Inverter

Table 4 Parameter guideline for CCFL Inverter

SYMBOL	PARAMETER	MIN	Design Point	MAX	UNITS	CONDITION
ICCFL	CCFL current	TBD	6.0	TBD	[mArms]	Ta=25[deg C] **(Note A)**
FCCFL	CCFL Frequency	TBD	50	TBD	[kHz]	Ta=25[deg C] **(Note B)**
VCCFLi	Inverter Ignition Voltage	--	--	TBD	[Vrms]	Ta=0[deg C] **(Note C)**
		--	--	TBD	[Vrms]	Ta=25[deg C] **(Note C)**
VCCFL	CCFL Voltage	TBD	655	TBD	[Vrms]	@ ICCFL=6mA Ta=25[deg C]
LT	Lamp Life Time	15,000	--	--	Hours	**(Note E)**

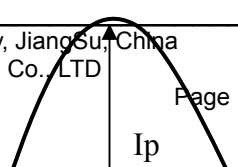
Note: A. If it exceeds MIN/MAX values, then "CCFL Life", "ON/OFF Cycle", and "SAFETY" will not be guaranteed.

B. CCFL Frequency should be carefully determined to avoid interference between inverter and TFT LCD.

C. The voltage over specified value (VCCFLi) should be applied to the lamp more than 1 second after startup. Otherwise, the lamp may not be turned on. The used lamp current is the lamp typical current.

D. The distortion tae of the waveform should be within √2±10%

The inverter output waveform should be better similar to the ideal sine wave.



IVO Confidential Document
www.jxlcd.com

Asymmetry rate = $|I_p - I_{-p}| / I_{rms} \times 100\%$
Distortion rate = I_p (or I_{-p}) / I_{rms}

Figure 7 Recommendation of Lighting Waveform

E. Ta=25+/-3degC and ICCFL=6.0mA, brightness becomes lower than 50% of initial value.

www.jxlcd.com
IVO Confidential Document

6.0 Electrical Characteristics

6.1 Interface Connector

Table 5 Connector Name / Designation

Manufacturer	**HRS (or equivalent)**
Type / Part Number	MDF76KBRW-30S-1H(58)
Mating Receptacle/Part Number	JAE FI-X30H(L), JAE FI-X30C*(L), JAE FI-X30M*

Table 6 Signal pin assignment

Pin #	**Signal Name**	**Description**	**Remarks**
1	Vss	Ground	
2	Vdd	Power supply 3.3V	
3	Vdd	Power supply 3.3V	
4	V_{EEDID}	DDC 3.3V power	
5	Tp	TEST point	
6	CLK_{EEDID}	DDC clock	
7	$Data_{EEDID}$	DDC data	
8	Odd Rin 0-	LVDS differential data input	
9	Odd Rin 0+	LVDS differential data input	
10	Vss	Ground	
11	Odd Rin 1-	LVDS differential data input	
12	Odd Rin 1+	LVDS differential data input	
13	Vss	Ground	
14	Odd Rin 2-	LVDS differential data input	
15	Odd Rin 2+	LVDS differential data input	
16	Vss	Ground	
17	Odd Clk in -	LVDS differential clock input	
18	Odd Clk in +	LVDS differential clock input	
19	Vss	Ground	
20	NC	Not connected	
21	NC	Not connected	
22	GND	GND	
23	NC	Not connected	
24	NC	Not connected	
25	GND	GND	
26	NC	Not connected	

www.jxlcd.com
IVO Confidential document

27	NC	Not connected	
28	GND	GND	
29	NC	Not connected	
30	NC	Not connected	

All input signals shall be low or Hi-Z state when VDD is off.

www.jxlcd.com
IVO Confidential document

LVDS Receiver

6.1.1 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	--	--	+50	mV	Vcm=+1.2V
Differential Input Low Threshold	Vtl	-50	--	--	mV	Vcm=+1.2V
Magnitude Differential Input Voltage	|Vid|	100	--	600	mV	--
Common Mode Voltage	Vcm	|Vid|/2+0.6	1.2	1.8-|Vid|/2	V	--
Common Mode Voltage Offset	ΔVcm	--	--	50	mV	Vcm=+1.2V

Note:

A. Input signals shall be low or Hi-Z state when VDD is off.

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

www.jxlcd.com

Table 8 Timing Requirements

Parameter	Symbol	Min	Typ	Max	Unit	Conditions	Note
Clock Frequency	Fc	TBD	71	TBD	MHz		
Input Data Skew Margin	Trskm	TBD TBD			ps ps	Fclk=68MHz Fclk=82MHz	(Figure 11)

Note: All values are at VDD=3.3V, Ta=25 degree C.

IVO Confidential document

Figure 8 Voltage Definitions

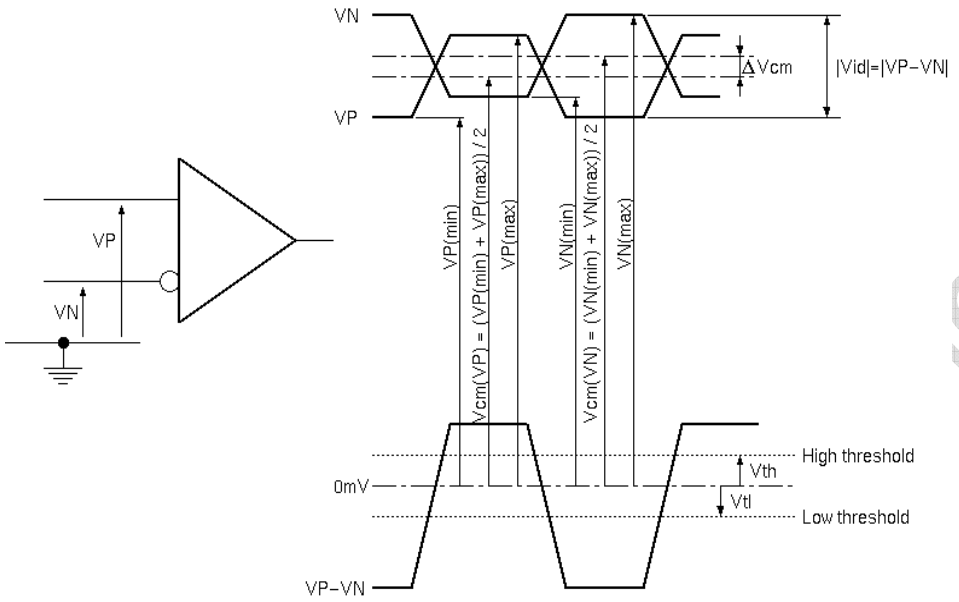
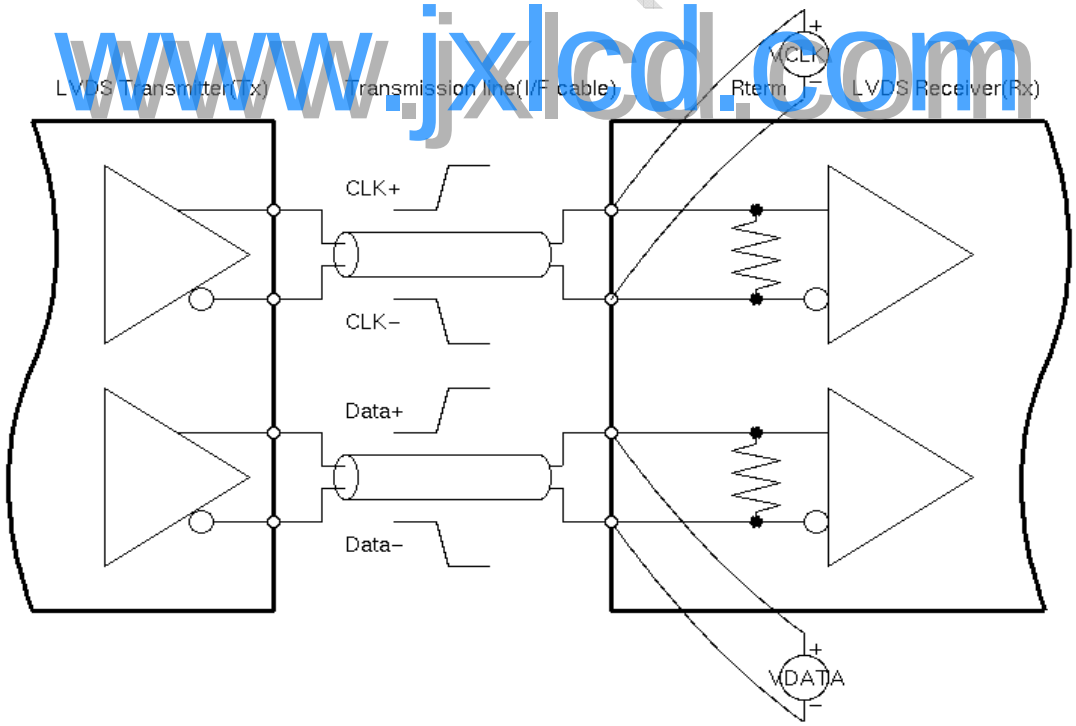
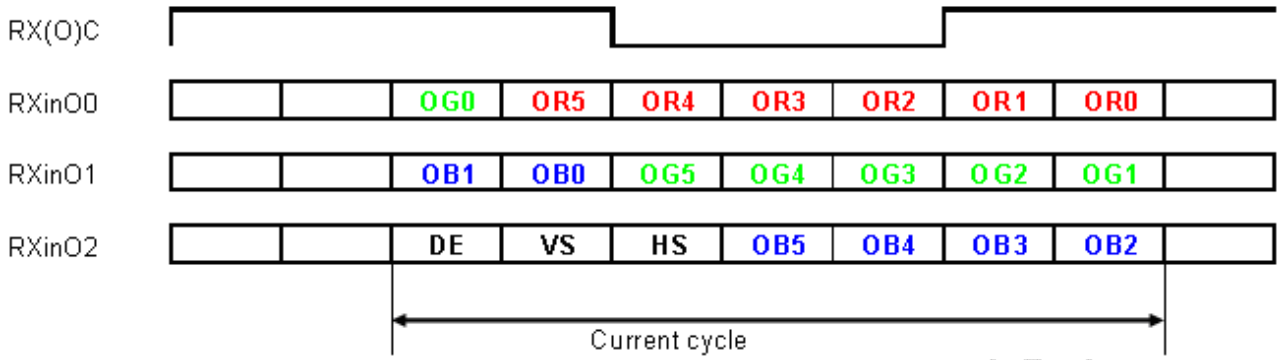


Figure 9 Measurement System



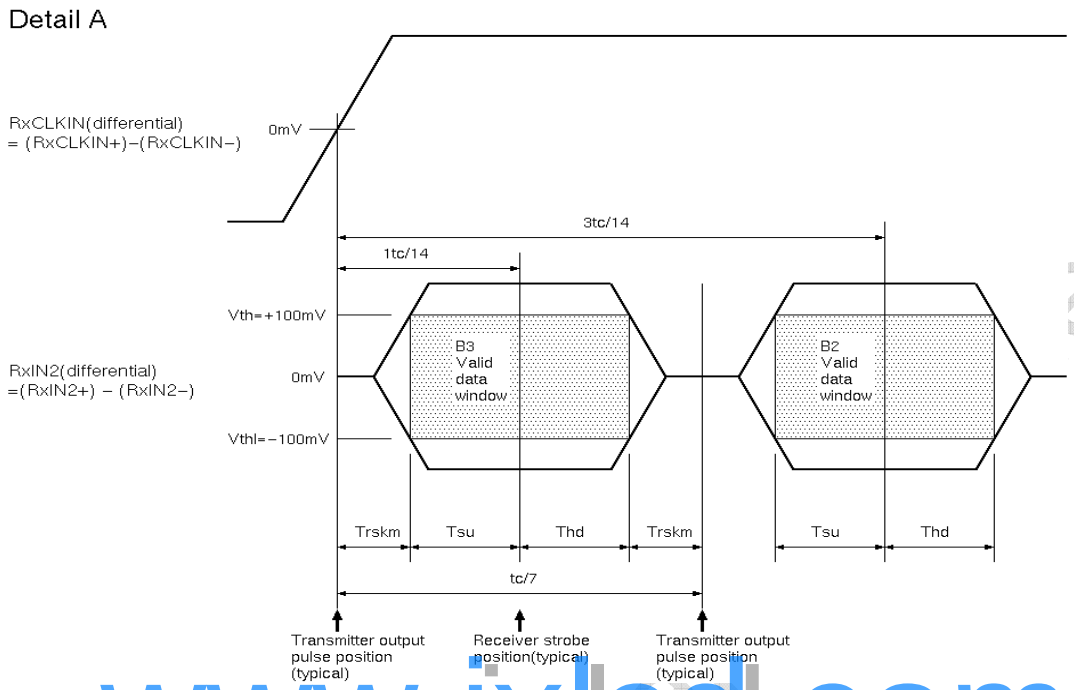
www.jxlcd.com

Figure 10 Data mapping



www.jxlcd.com
IVO Confidential docu

Figure 11 Timing Definition



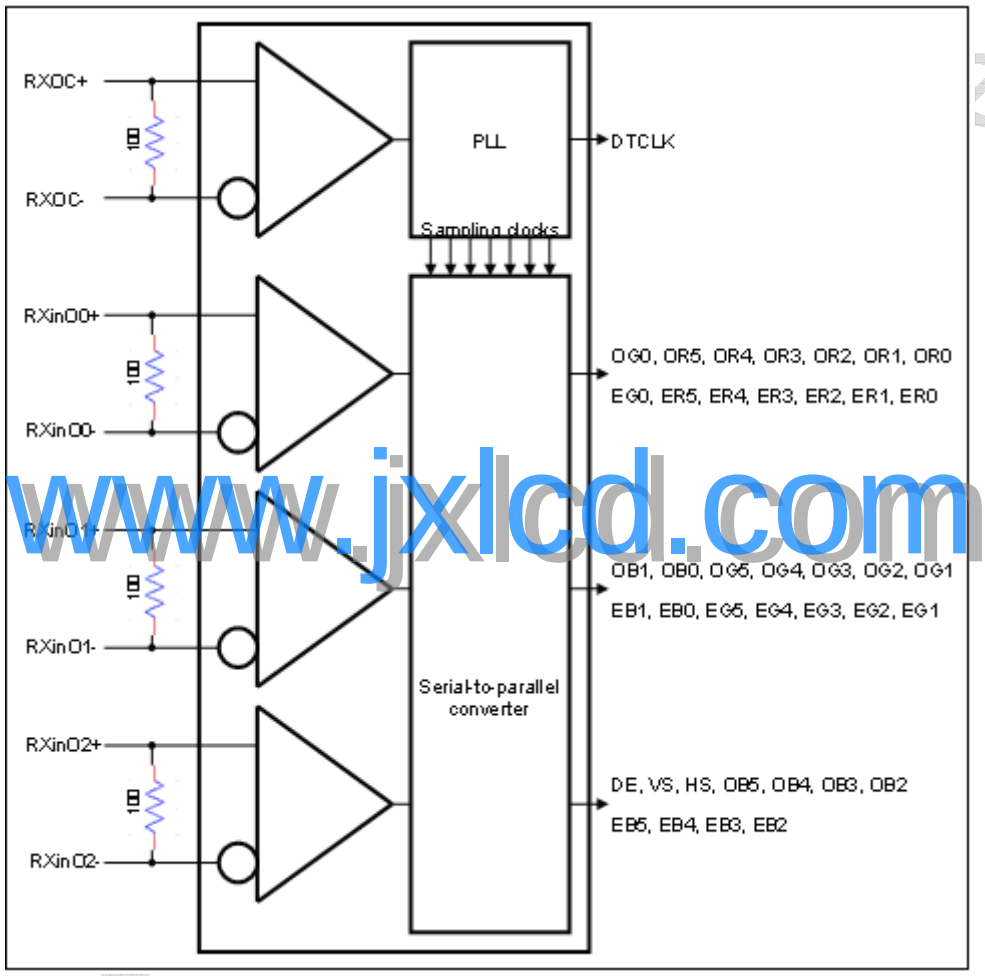
Note: Tsu and Thd is internal data sampling window of receiver. Trskm is the system skew margin; i.e., the sum of cable skew, source clock jitter, and other inter-symbol interference, shall be less than Trskm.

www.jxlcd.com
IVO Confidential

6.1.2 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



www.jxlcd.com

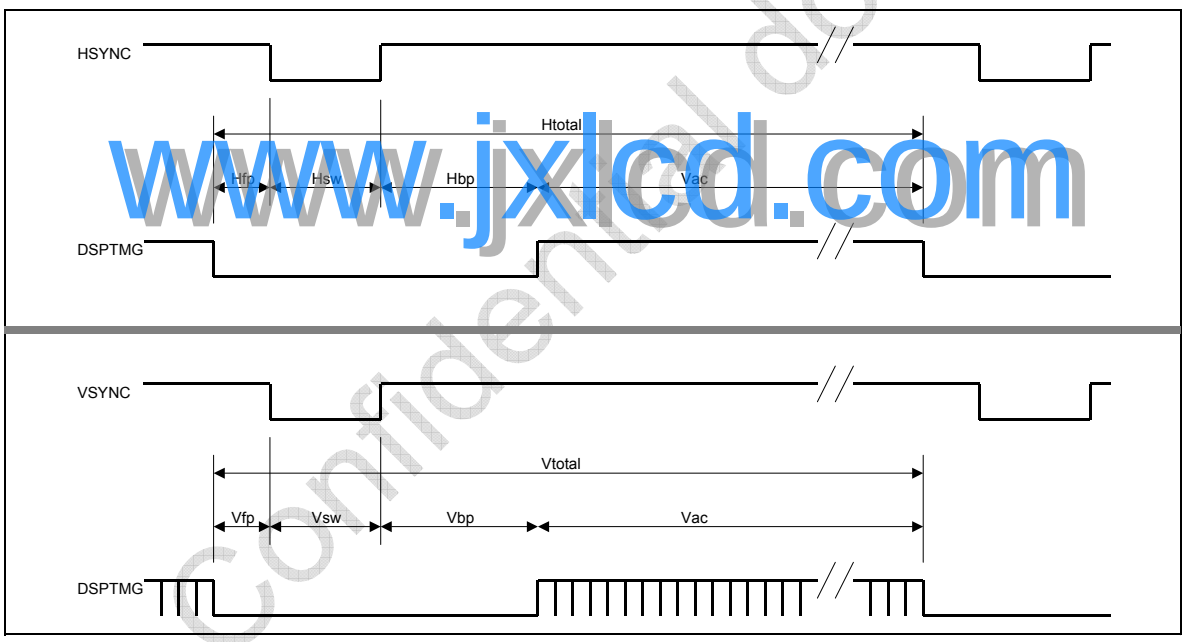
7.0 Interface Timings

7.1 Timing Characteristics

Table 9 Interface timings

Parameter	Symbol	Unit	min	typ	Max
LVDS Clock Frequency(single)	Fdck	MHz	TBD	71	TBD
H Total Time	Htotal	clocks	--	1440	--
H Active Time	Hac	clocks	1280	1280	1280
V Total Time	Vtotal	lines	--	832	--
V Active Time	Vac	lines	800	800	800
Frame Rate	Vsync	Hz	55	60	65

Figure 13 Timing Characteristics



www.jxlcd.com
IVO Confidential document

8.0 Power Consumption

Input power specifications are as follows.

Table 10 Power consumption

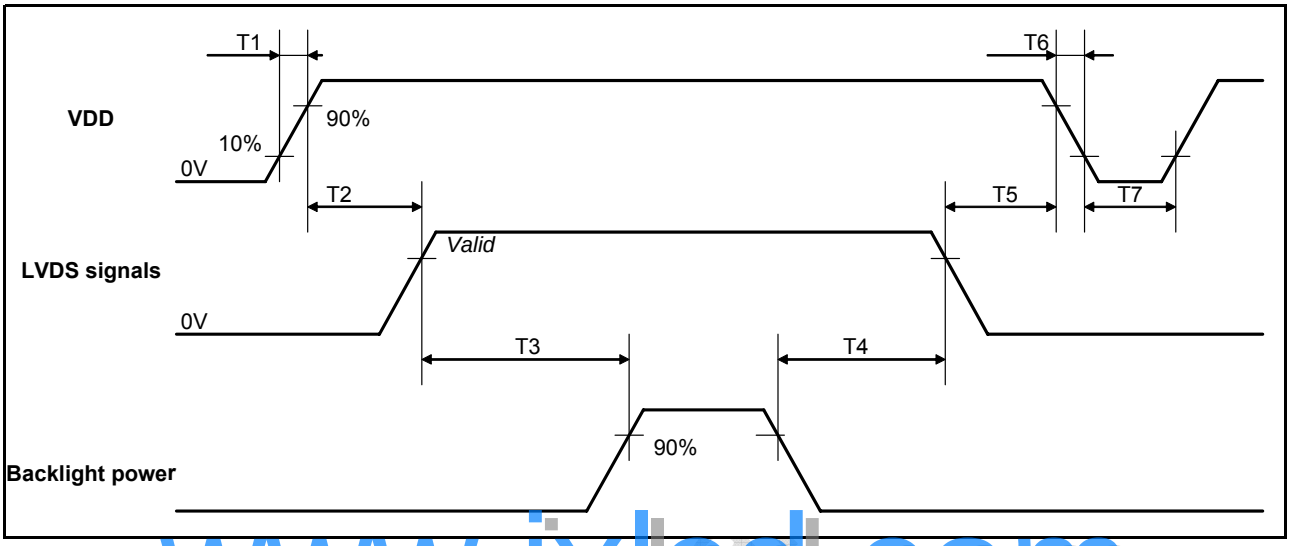
SYMBOL	PARAMETER	Min	Typ	Max	UNITS	CONDITION
VDD	Logic/LCD Drive Voltage	3.0	3.3	3.6	[V]	
IDD	VDD Current	TBD	0.27	TBD	[A]	All black pattern, 60Hz
		TBD	0.89	TBD	[A]	Max pattern, 60Hz
PDD	VDD Power	--	TBD	--	[W]	All black pattern, 60Hz
Irush	Rush Current	--	--	2	[A]	Vdd rising time over 0.5ms.Oscilloscope Sampling over 2ms
VDDrp	Allowable Logic/LCD Drive Ripple Voltage	--	200	300	[mVp-p]	

www.jxlcd.com
IVO Confidential document

9.0 Power ON/OFF sequence

VDD power, interface signals, and lamp on/off sequence are shown in Figure **14**.Signals shall be Hi-Z state or low level when VDD is off.

Figure 14 Power sequence



www.jxlcd.com

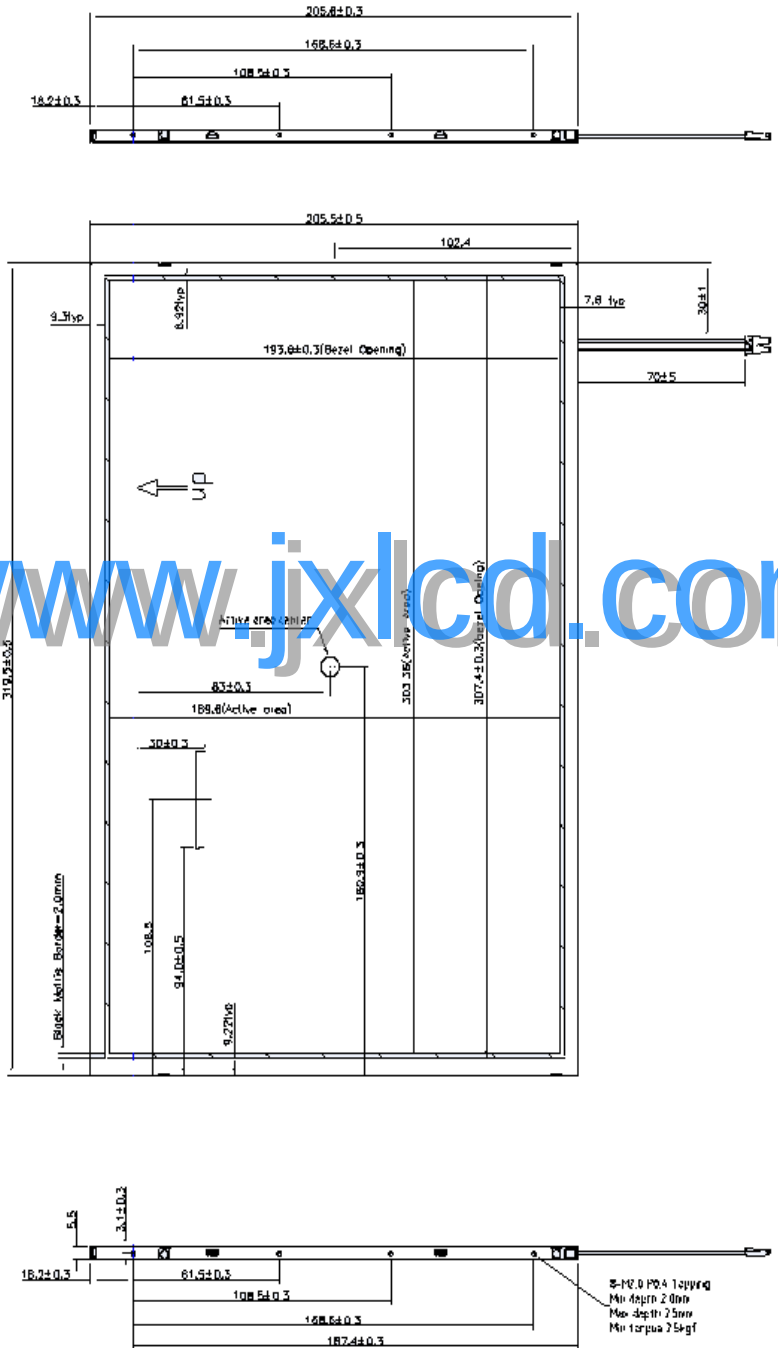
Table 11 Power Sequencing Requirements

Parameter	Symbol	Unit	min	typ	max
VDD Rise Time	T1	ms	0.5	10	--
VDD Good to Signal Valid	T2	ms	0	50	--
Signal Valid to Backlight On	T3	ms	200	--	--
Backlight Off to Signal Disable	T4	ms	200	--	--
Signal Disable to Power Down	T5	ms	0	50	--
VDD Fall Time	T6	ms	0	10	--
Power Off	T7	ms	200	--	--

IVO Confidential

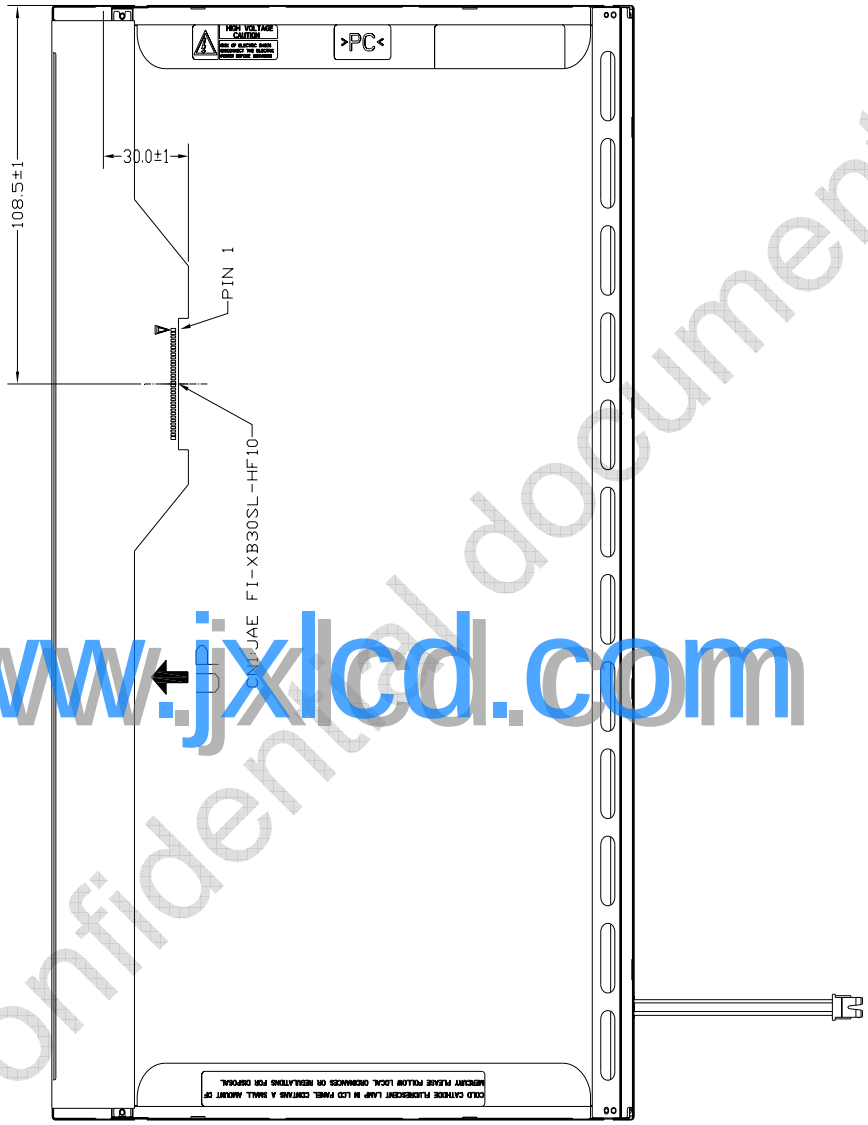
10.0 Mechanical Characteristics

Figure 15 Reference outline drawing (Front side)



www.jxlcd.com

Figure 16 Reference outline drawing (Back side)



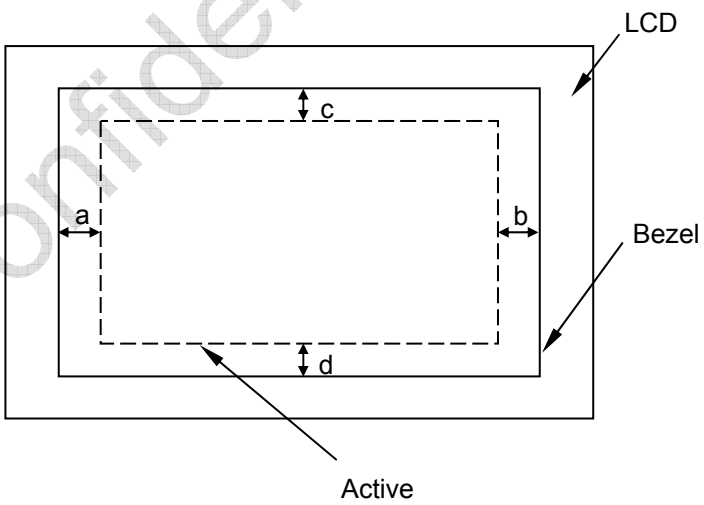
www.jxlcd.com
IVO Confidential document

10.1 Dimension Specifications

Table 12 Module Dimension Specifications

Width [mm]		319.5±0.5
Height [mm]		205.5±0.5
Thickness [mm]		5.2±0.3
Bezel Opening [mm]	X	307.4±0.3
	Y	193.6±0.3
Mounting Hole [mm]	A	18.1±0.3
	B	61.5±0.3
	C	108.5±0.3
	D	168.6±0.3
Module edge from Pin 1[mm]	X	108.5±1.0
Module edge from first customer hole[mm]	Y	30.0±0.5
CCFL harness length [mm]		70.0±5.0
Weight [g]		400max
BM : | a-b | & | c-d |		≤1.0mm

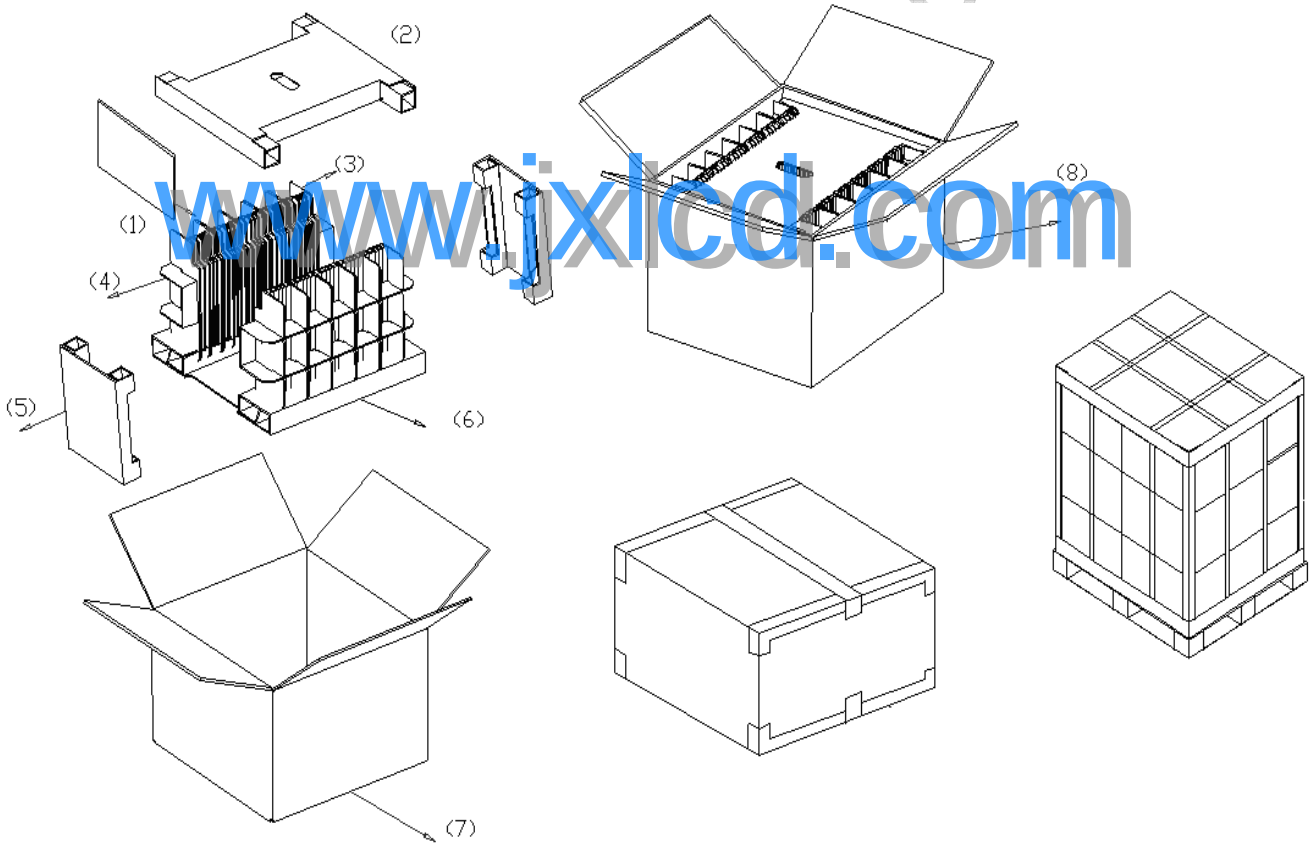
www.jxlcd.com
IVO Confidential document



11.0 PACKAGE SPECIFICATION

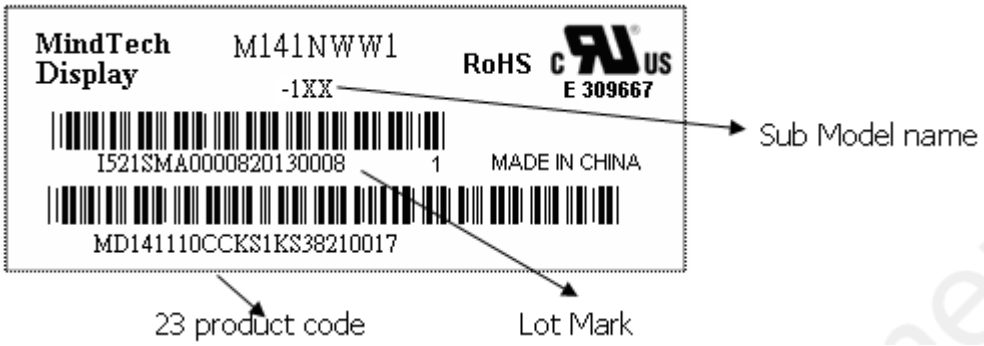
Total module quantity in one carton is 25 pcs

Item	Quantity	Mark
LCM	25	(1)
Top Cover	1	(2)
A	10	(3)
B	2	(4)
C	2	(5)
Bottom cushion	1	(6)
Carton	1	(7)
Carton Assembly	1	(8)



www.jxlcd.com

12.0 LOT MARK



12.1 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.

www.jxlcd.com

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

12.2 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: MD Mindtech Display.
code 3,4,5,6,7: MTDis internal module name.
code 8,9,10,13,16: MTDis 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 MTDis barcode Note(1),Note(2).
code 20~23 : Serial Number.

IVO Confidential document

13.0 GENERAL PRECAUTION

13.1 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.

13.2 Handling

(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. MTD 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. Do not pull or fold the CCFL cable. Do not touch the parts inside LCD modules and the fluorescent lamp's connector Or cables in order to prevent electric shock.

www.jxlcd.com

(5) Refrain from strong mechanical shock and /or any force to the module. In addition to damage, this may cause improper operation or damage to the module and CCFT back-light.

(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

IVO Confidential document

the module should be grounded through adequate methods.

(12) Do not adjust the variable resistor located on the module.

13.3 Storage

(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.

13.4 Operation

(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 methods may be important to minimize the interference.

(4) The cable between the back-light connector and its inverter power supply should be connected directly with a minimized length. A longer cable between the back-light and the inverter may cause lower luminance of lamp(CCFT) and may require higher startup voltage(Vs).

(5) 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.

13.5 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.

13.6 Disposal

When disposing LCD module, obey the local environmental regulations.

14.0 EDID data structure （TBD）

www.jxlcd.com
IVO Confidential document