IVO Product Information

To:

Product Name: P236MWF1

Development code: R0

Document Issue Date: 2009/07/07

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

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.

FQ-7-30-0-009-03D

Revision	Date	Page	Old Description	New Description	Remark
00	2009/07/07	-	-	First issued	-

Contents

1.0 General Descriptions

1.1 Introduction

The P236MWF1 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 23.6inch diagonally measured active display area with FHD resolution (1,920 vertical by 1,080 horizontal pixel array).

1.2 Features

- 23.6”FHD TFT LCD Panel
- Supported FHD(V:1,920 lines, H:1,080pixels) resolution
- Compatible with RoHS Standard

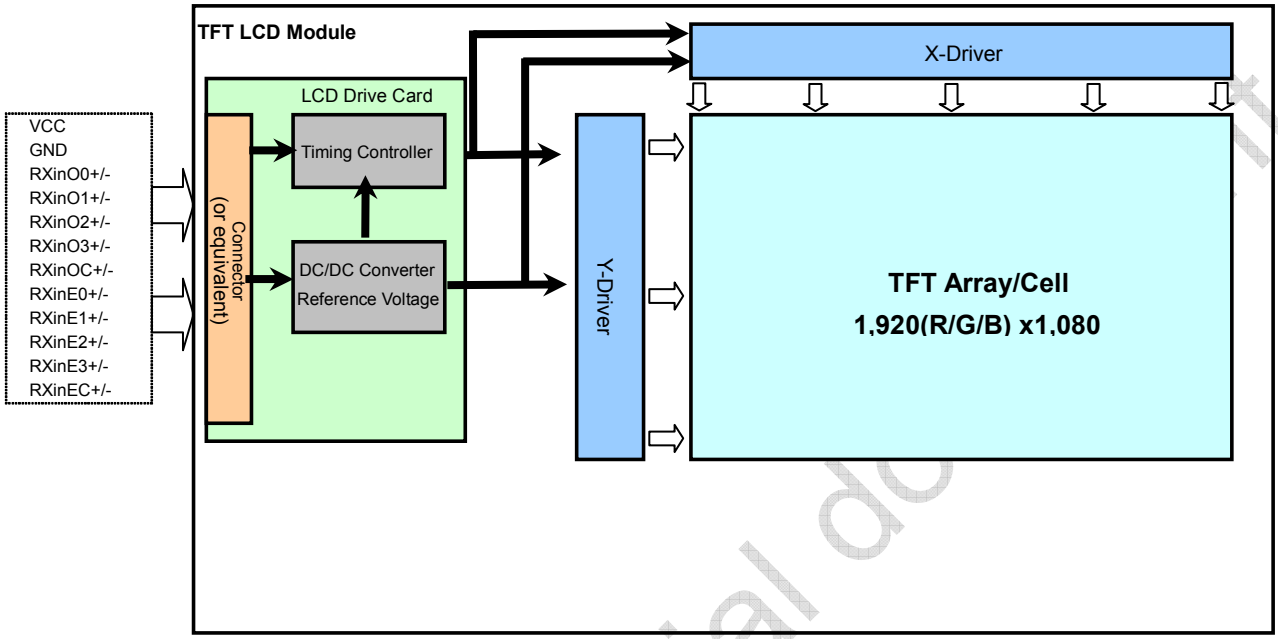
1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	23.6	Inch
Active Area	521.28 (H) x 293.22 (V)	mm
Pixels H x V	1, 920(x3) x 1,080	
Pixel Pitch	0.2715 (per one triad) x 0.2715	mm
Pixel Arrangement	R.G.B. Vertical Stripe	
Display Mode	Normally White	
Response Time	5 typical	msec
Input Voltage	+ 5.0 typical	V
Logic Power Consumption	4.5 typical (Black pattern, 60Hz)	Watt
Weight	690typ；	g
Electrical Interface (Logic)	6bit+Hi-FRC , dual LVDS	
Support Color	16.7M	
Optimum Viewing Direction	6 o’clock	
Surface Treatment	AG/3H	

1.4 Functional Block Diagram

错误！未找到引用源。

Figure 1 Block Diagram



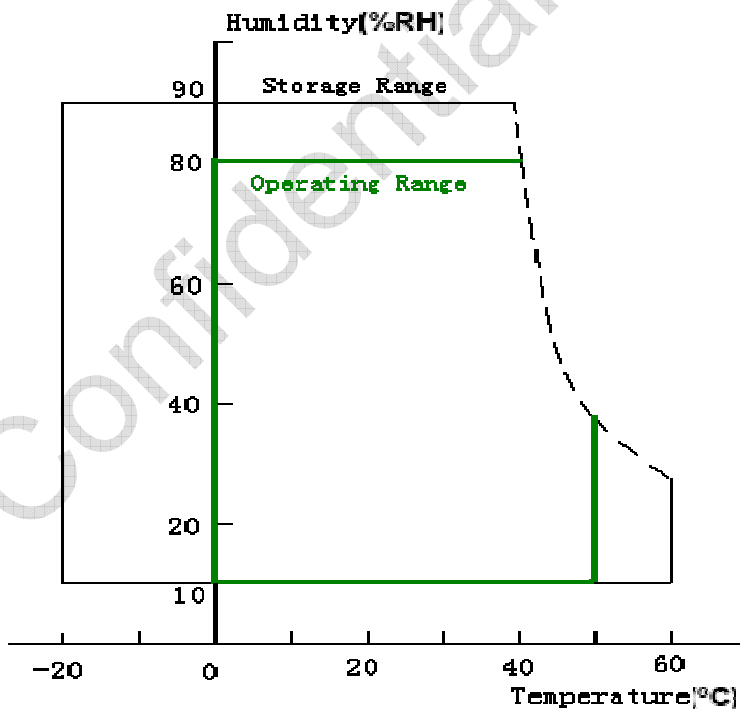
2.0 Absolute Maximum Ratings

Item	Symbol	Min	Max	Unit	Conditions
Supply Voltage	VDD	-0.3	+6.0	V	--
Input Signal	--	-0.3	+2.7	V	LVDS signals
Operating Temperature	TOP	0	+50	Deg. C	(Note)
Operating Humidity	HOP	10	80	%RH	(Note)
Storage Temperature	TST	-20	+60	Deg. C	(Note)
Storage Humidity	HST	10	90	%RH	(Note)

Note： (1) 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℃

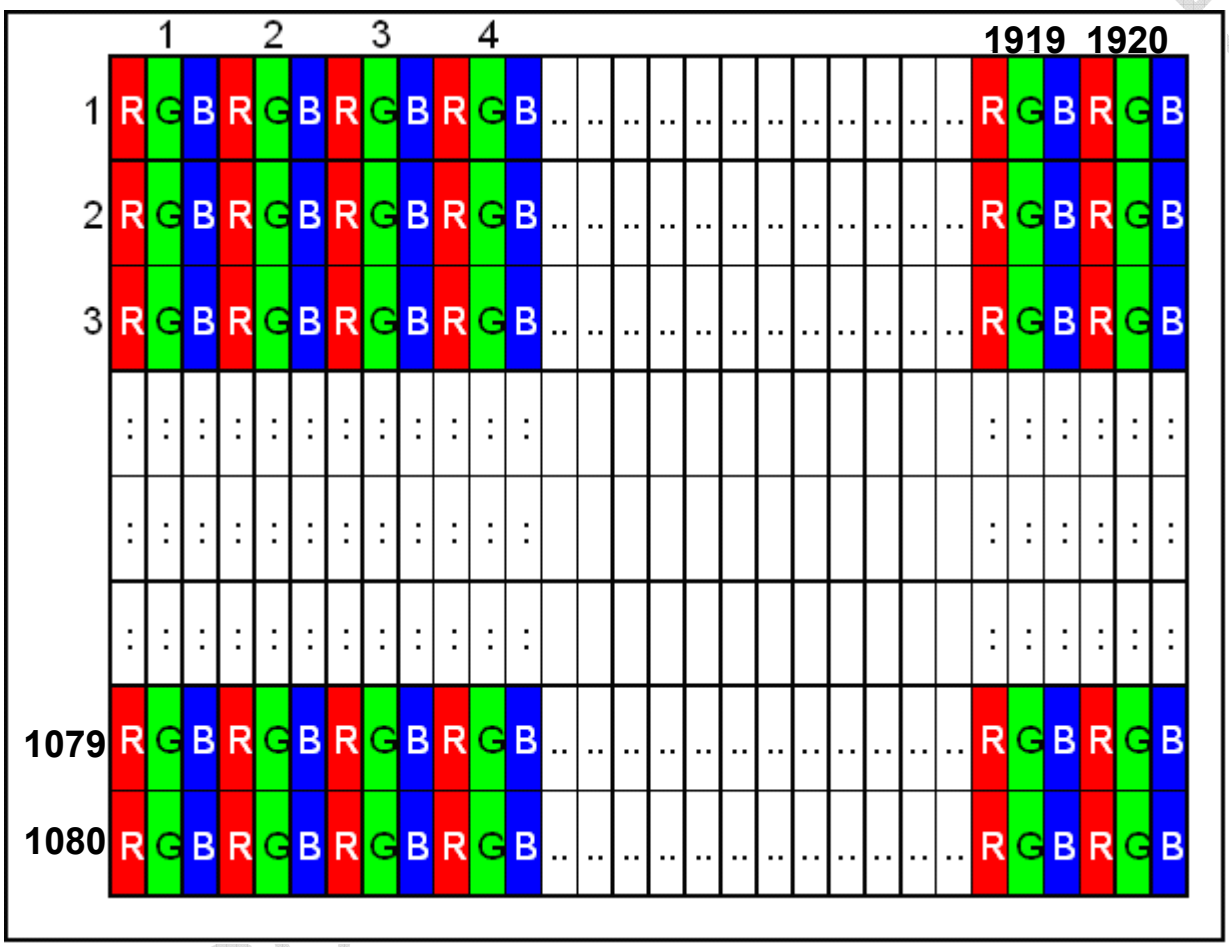
(3) Storage /Operating temperature



3.0 Pixel Format Image

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

Figure 2 Pixel Format



4.0 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes

Table 1 Optical Characteristics

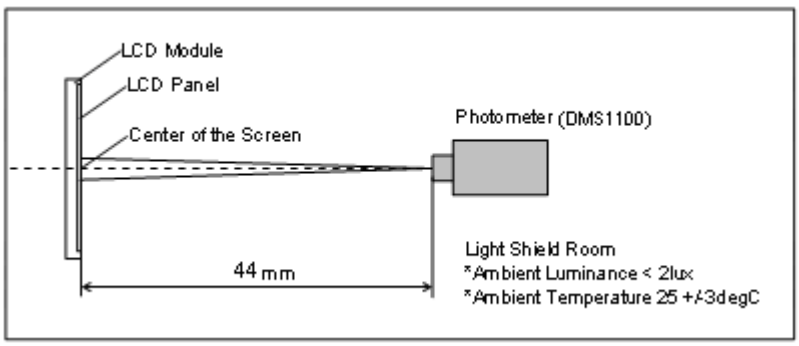
Item	Conditions	Specification			
		Min	Typ	Max	Note
Viewing Angle [degrees]	Horizontal (Right + Left)	150	170	--	A, B
K=Contrast Ratio>10	Vertical (Up + Down)	140	160	--	
Contrast ratio	L255 / L0	700	1,000	--	A, C
Response Time [ms]	Rising	--	3.5	5	
	Falling	--	1.5	3	
Color Chromaticity (CIE1931)	Red x	-0.03	0.642	+0.03	A,
	Red y		0.334		A,
	Green x		0.281		A,
	Green y		0.600		A,
	Blue x		0.144		A,
	Blue y		0.071		A,
	White x		0.313		A,
	White y		0.329		A,
Panel Transmittance（%）		5.07	5.45	---	A, E

Note: All the characteristics are measured under the condition using the IVO test inverter and the IVO black light set.

A. Measurement Setup:

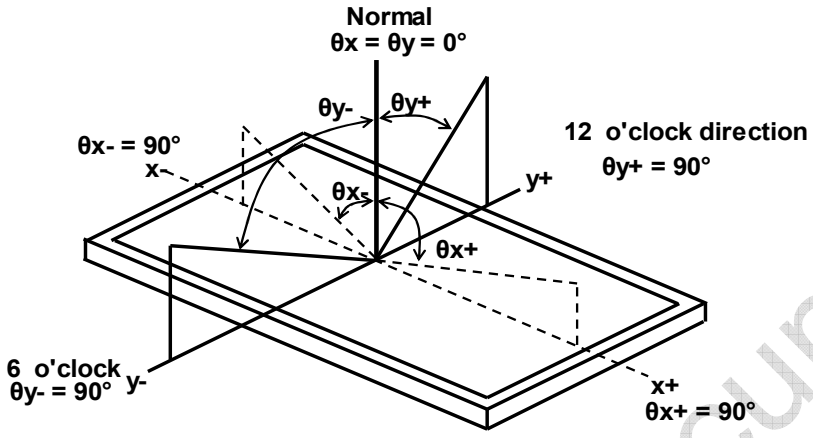
The LCD module should stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 30 minutes in a windless room.

Figure 3 Measurement Setup



B. Definition of Viewing Angle

Figure 4 Definition of Viewing Angle



C. Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

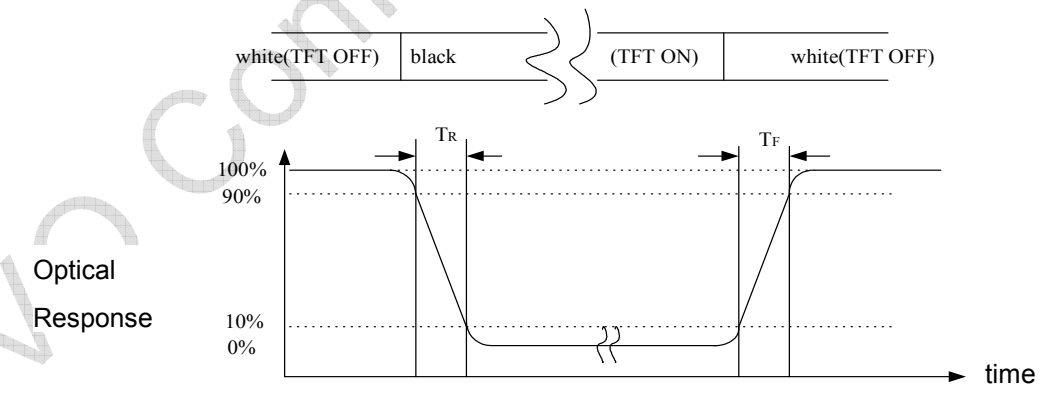
Contrast Ratio (CR) = L255 / L0

L255: Luminance of gray level 255

L0: Luminance of gray level 0

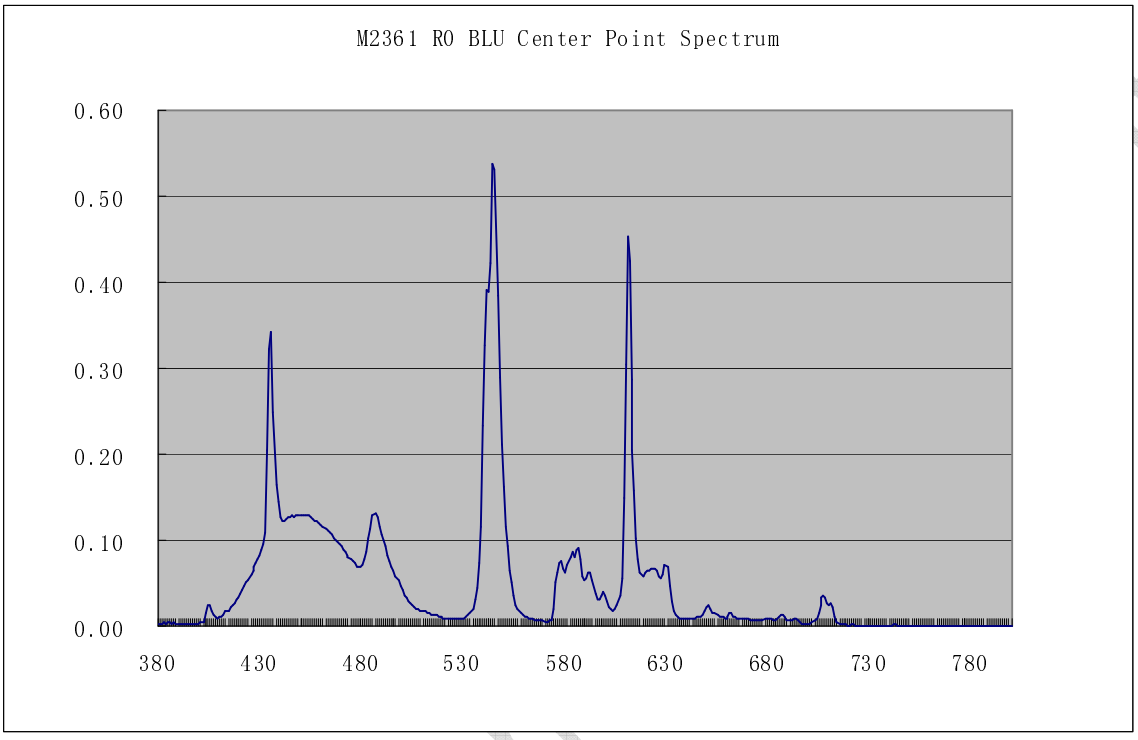
D. Definition of Response Time (T_R, T_F)

Figure 5 Definition of Response Time



E. Black light spectrum (reference)

Figure 6 Black light spectrum



F. Definition of Transmittance(module is without signal input)

$$\text{Transmittance} = \frac{\text{Luminance of LCD Module}}{\text{Luminance of Back light}} \text{ X100\%}$$

5.0 Electrical Characteristics

5.1 Interface Connector

Table 2 Connector Name / Designation

Manufacturer	JAE (or equivalent)
Type / Part Number	UJU IS100-L30B-C23
Mating Receptacle/Part Number	JAE FI-X30H(L), JAE FI-X30C*(L), JAE FI-X30M*

Table 3 Signal Pin Assignment

Pin #	Signal Name	Description	Remarks
1	RXinO0-	LVDS differential data input	
2	RXinO0+	LVDS differential data input	
3	RXinO1-	LVDS differential data input	
4	RXinO1+	LVDS differential data input	
5	RXinO2-	LVDS differential data input	
6	RXinO2+	LVDS differential data input	
7	GND	Ground	
8	RXOC-	LVDS differential data input	
9	RXOC+	LVDS differential data input	
10	RXinO3-	LVDS differential data input	
11	RXinO3+	LVDS differential data input	
12	RXinE0-	LVDS differential data input	
13	RXinE0+	LVDS differential data input	
14	GND	Ground	
15	RXinE1-	LVDS differential data input	
16	RXinE1+	LVDS differential data input	
17	GND	Ground	
18	RXinE2-	LVDS differential data input	
19	RXinE2+	LVDS differential data input	
20	RXEC-	LVDS differential data input	
21	RXEC+	LVDS differential data input	
22	RXinE3-	LVDS differential data input	
23	RXinE3+	LVDS differential data input	
24	GND	Ground	
25	NC	NO CONTACT	

26	BIST	BIST = HIGH & no any LVDS input internal pattern generator actives. Keep low for normal operation..	
27	NC	NO CONTACT	
28	VDD	Power Supply	
29	VDD	Power Supply	
30	VDD	Power Supply	

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

5.2 LVDS Characteristics

5.2.1 Signal Electrical Characteristics for LVDS Receiver

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

Table 4 LVDS Receiver Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Differential Input High Threshold	Vth	--	--	+100	mV	Vcm=+1.2V
Differential Input Low Threshold	Vtl	-100	--	--	mV	Vcm=+1.2V
Magnitude Differential Input Voltage	|Vid|	100	--	600	mV	--
Common Mode Voltage	Vcm	1.0	1.2	1.4	V	Vth - Vtl = 200mV
Common Mode Voltage Offset	ΔVcm	-50	--	+50	mV	Vth - Vtl = 200mV

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.

Table 5 Timing Requirements

Parameter	Symbol	Min	Typ	Max	Unit	Conditions	Note
Clock Frequency	Fc	63.5	73.3	96.7	MHz	--	--
Input Data Skew Margin	Trskm	-850	--	+850	ps	Fc=73.3MHz, |Vth-Vtl| = 400mV Vcm = 1.2V, ΔVcm = 0	(Figure 11)

Note: All values are at VDD=5.0V, Ta=25 degree C.

Figure 6 Voltage Definitions

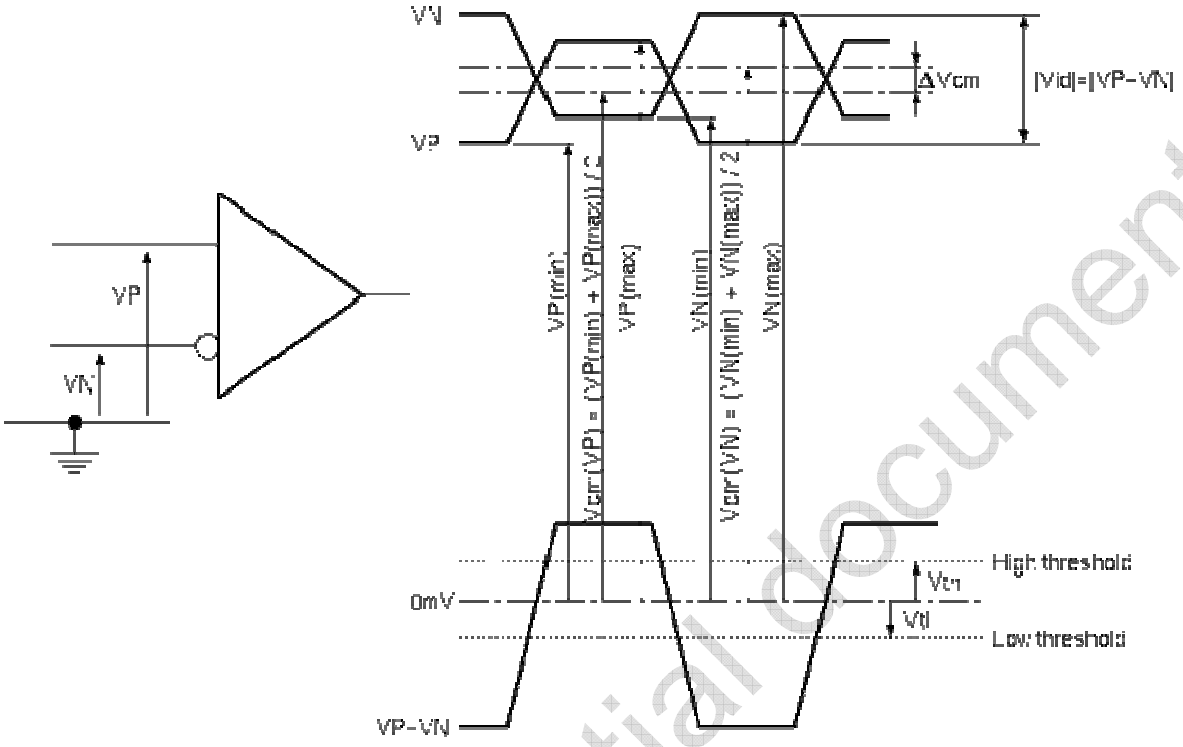


Figure 7 Measurement System

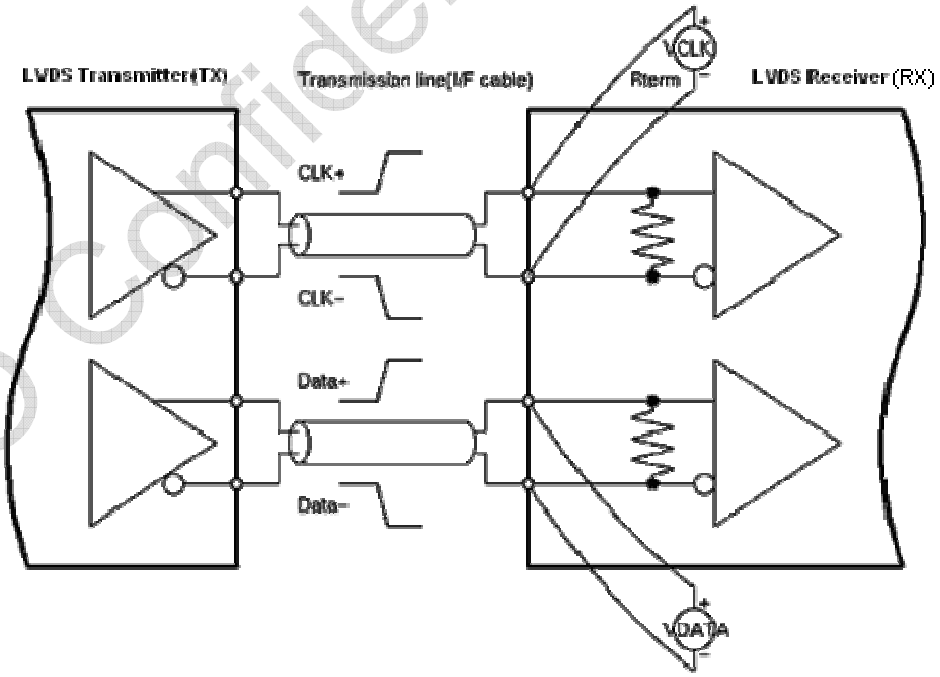


Figure 8 Data Mapping

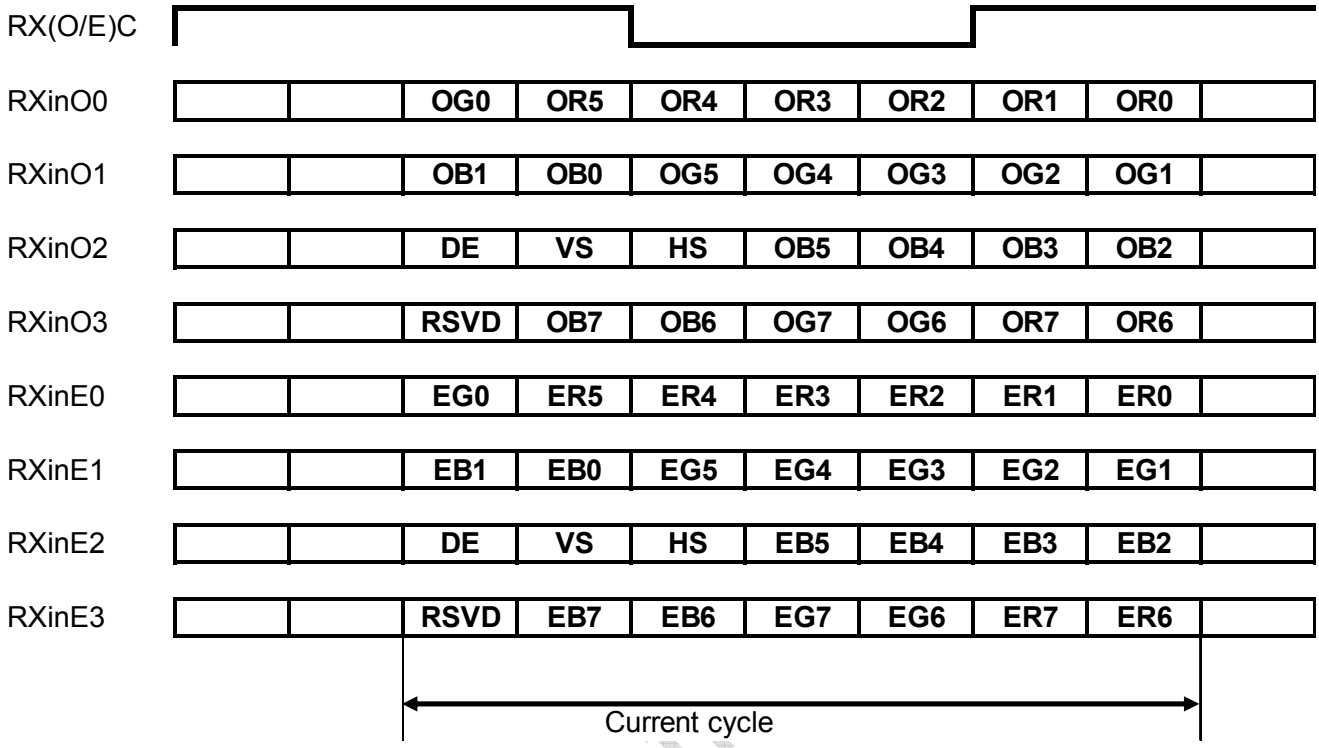
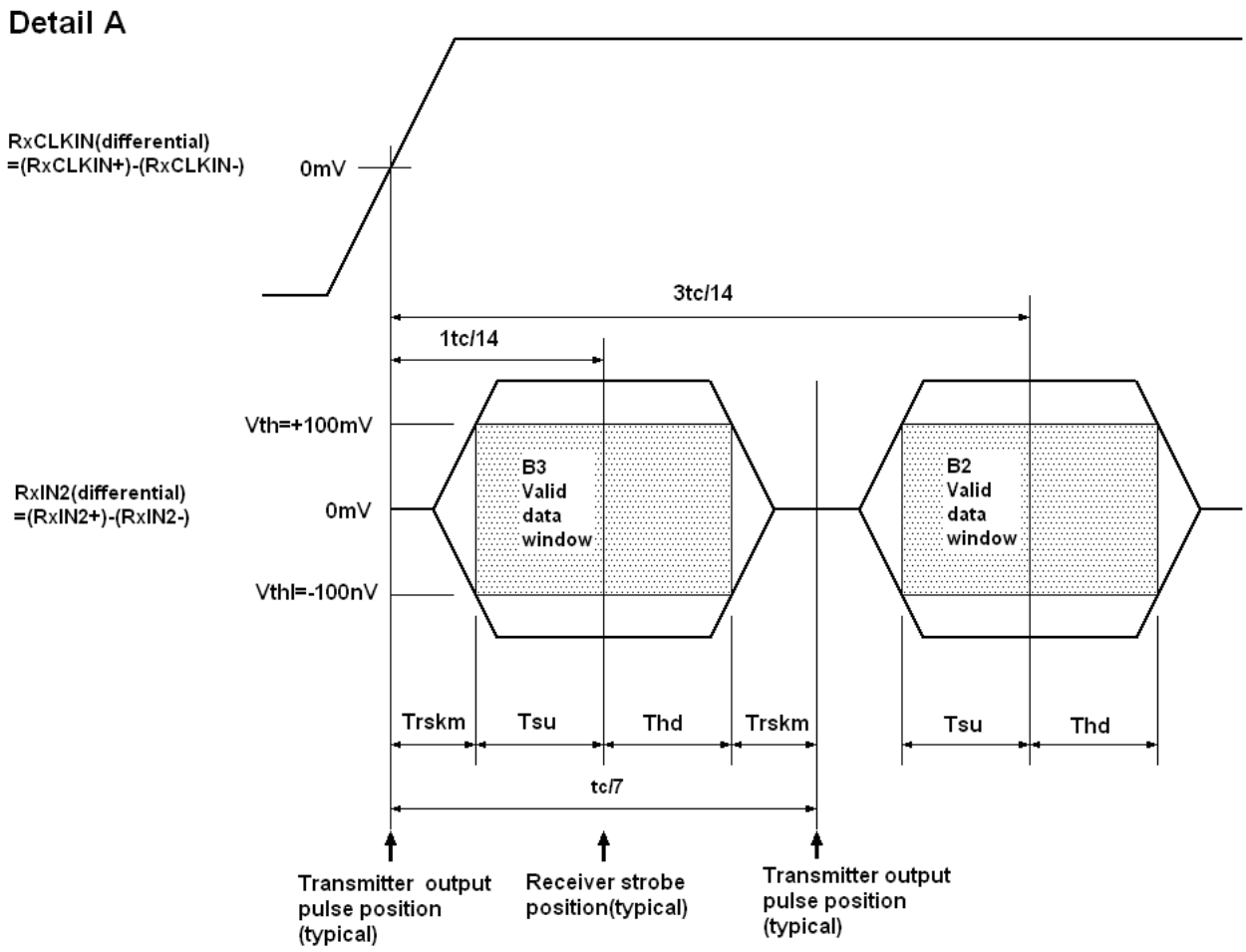


Figure 9 Timing Definition

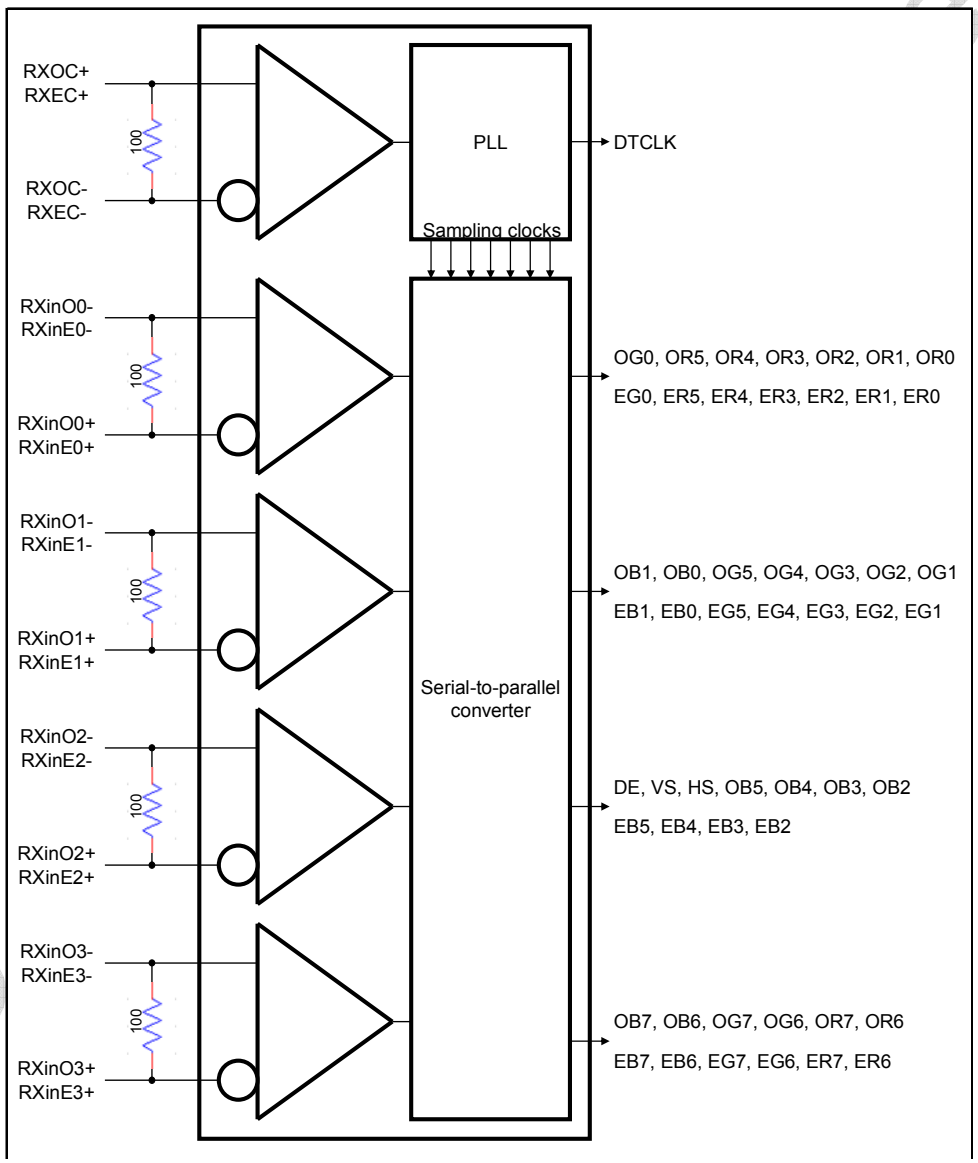


Note: Tsu and Thd is internal data sampling window of receiver. Trskm is the system skew margin; i.e., the sum of cable skew, source clock jitter, and other inter-symbol interference, shall be less than Trskm.

5.2.2 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



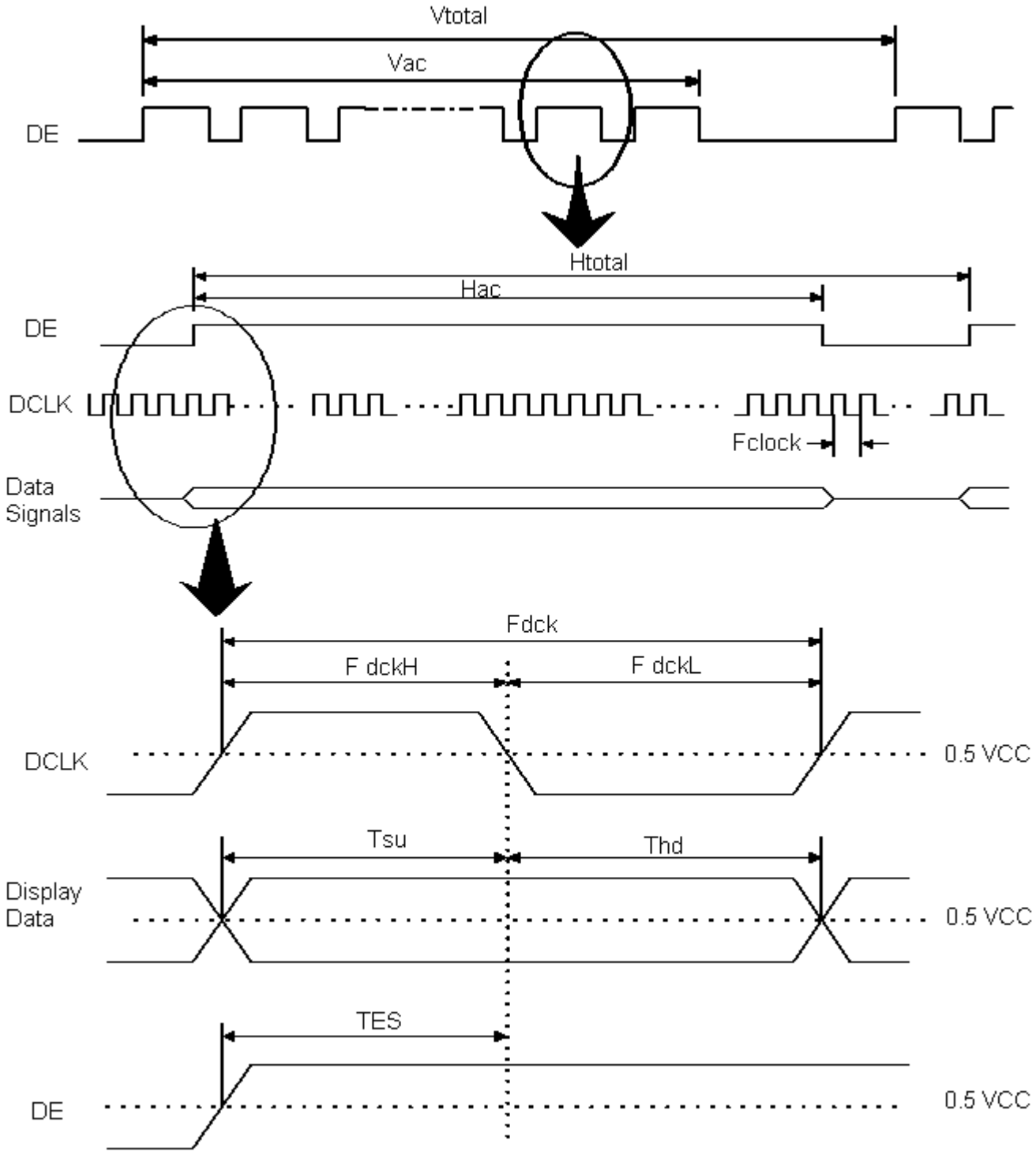
5.3 Timing Characteristics

Table 6 Interface Timings

Parameter	Symbol	Unit	min	Typ	Max
LVDS Clock Frequency(dual)	Fdck	MHz	63.5	73.3	96.7
H Total Time	Htotal	clocks	1,050	1,100	1,150
H Active Time	Hac	clocks	960	960	960
V Total Time	Vtotal	lines	1,100	1,110	1,121
V Active Time	Vac	lines	1,080	1,080	1,080
Frame Rate	Vsync	Hz	55	60	75

Note (1) This product is DE only mode.

Figure 11 Timing Characteristics



6.0 Power Consumption

Input power specifications are as follows.

Table 7 Power Consumption

Symbol L	Parameter	Min	Typ	Max	Units	Condition
VDD	Logic/LCD Drive Voltage	4.5	5.0	5.5	[V]	
IDD	VDD Current	--	0.85	1.02	[A]	All black pattern, 60Hz
		--	0.9	1.08	[A]	Max pattern, 60Hz
PDD	VDD Power	--	4.5	--	[W]	All black pattern, 60Hz
Irush	Rush Current	--	--	2.5	[A]	VDD rise time over 0.5ms. Oscilloscope Sampling over 2ms
VDDrp	Allowable Logic/LCD Drive Ripple Voltage	--	--	300	[mVp-p]	

7.0 Power ON/OFF Sequence

VDD power, interface signals, and lamp on/off sequence are shown in

Figure .Signals shall be Hi-Z state or low level when VDD is off.

Figure 12 Power Sequence

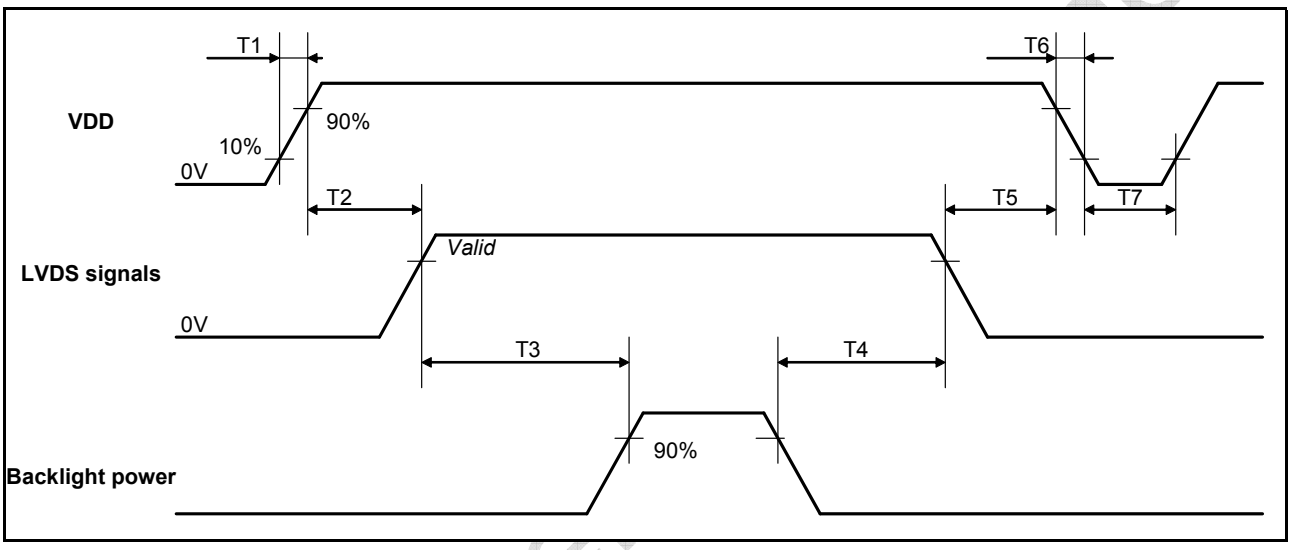
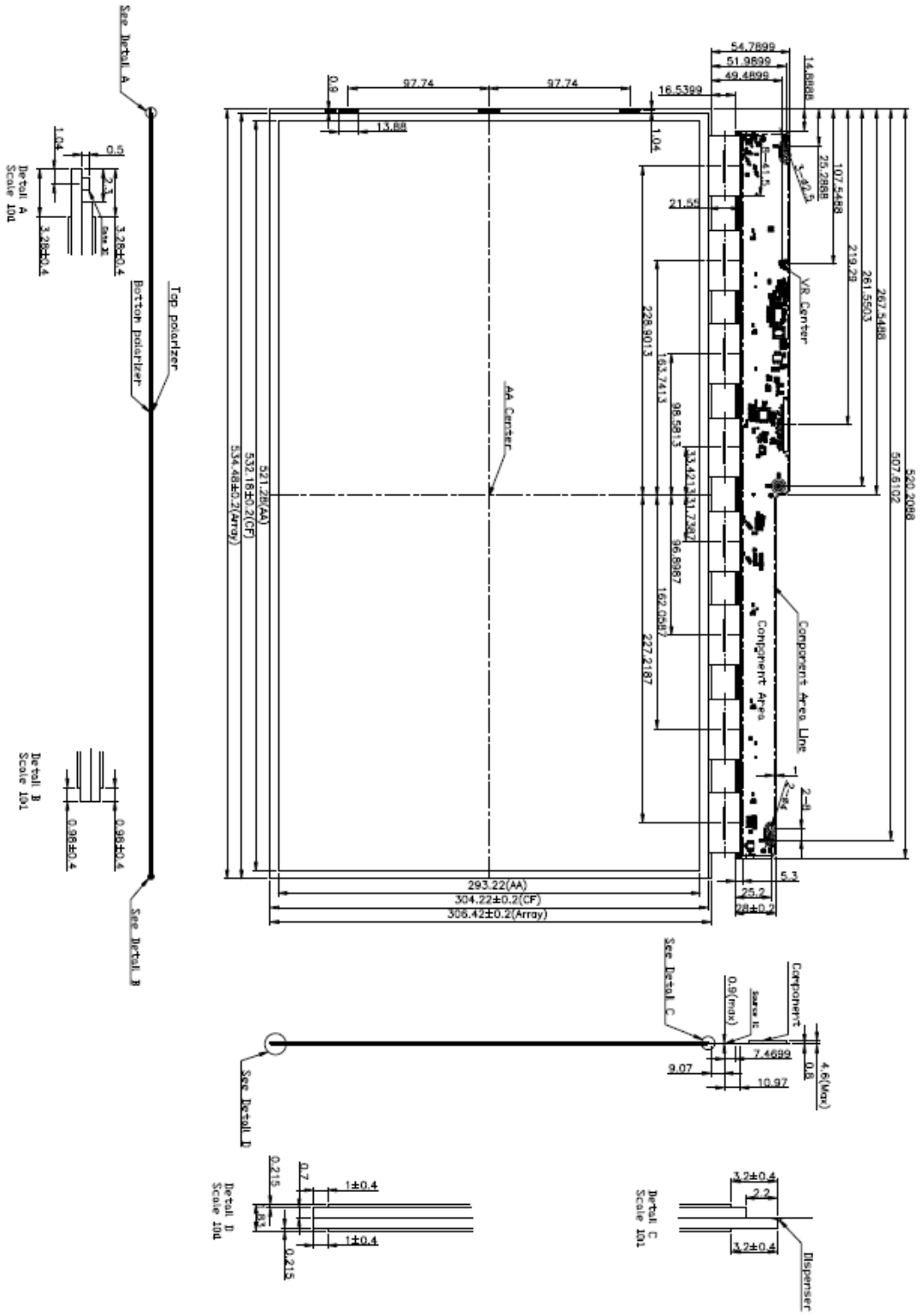


Table 8 Power Sequencing Requirements

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	--	450
Backlight Off to Signal Disable	T4	ms	200	--	450
Signal Disable to Power Down	T5	ms	0	--	50
VDD Fall Time	T6	ms	0	--	100
Power Off	T7	s	500	--	--

8.0 Mechanical Characteristics

Figure 13 Reference Outline Drawing

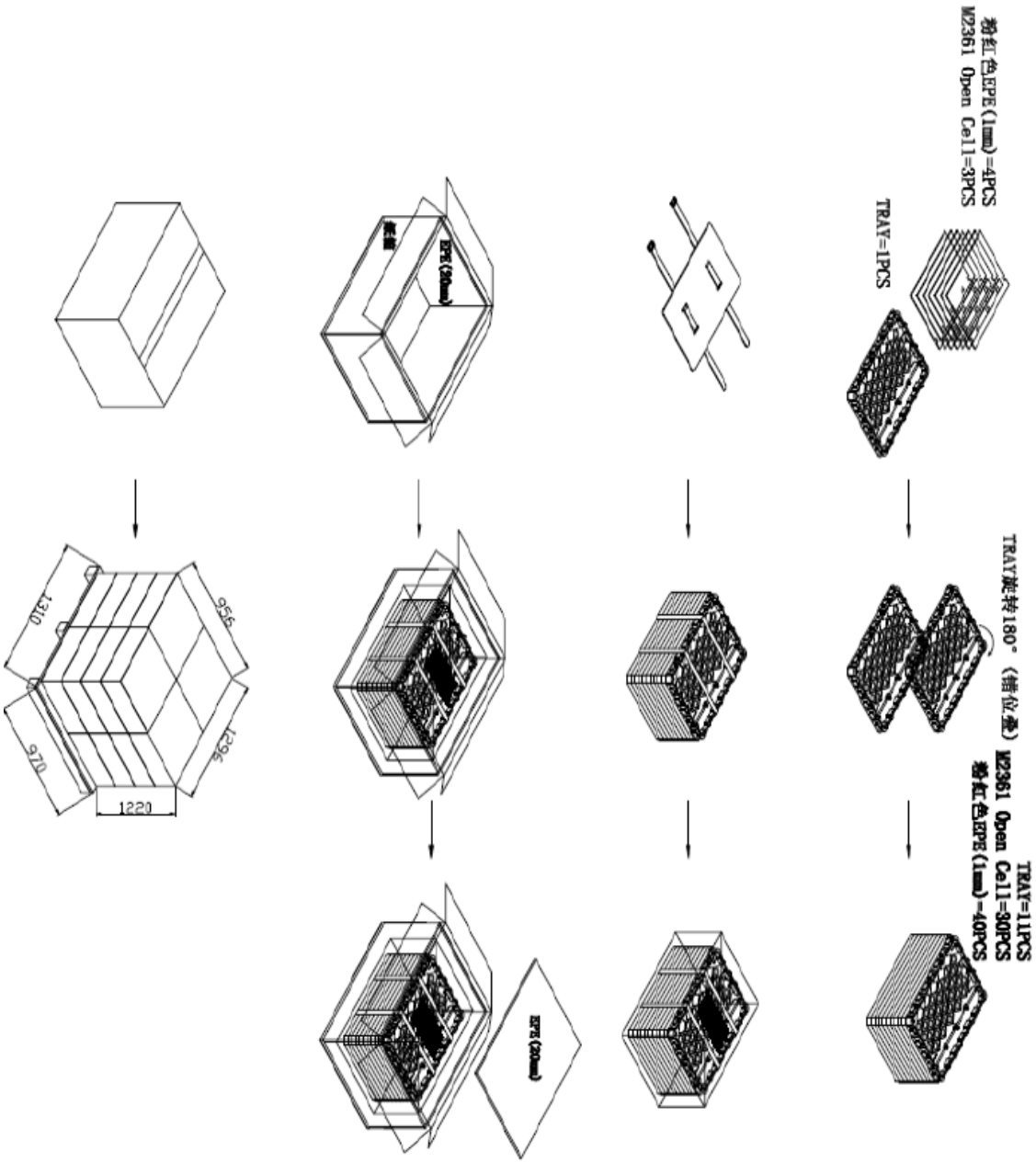


8.1 Dimension Specifications

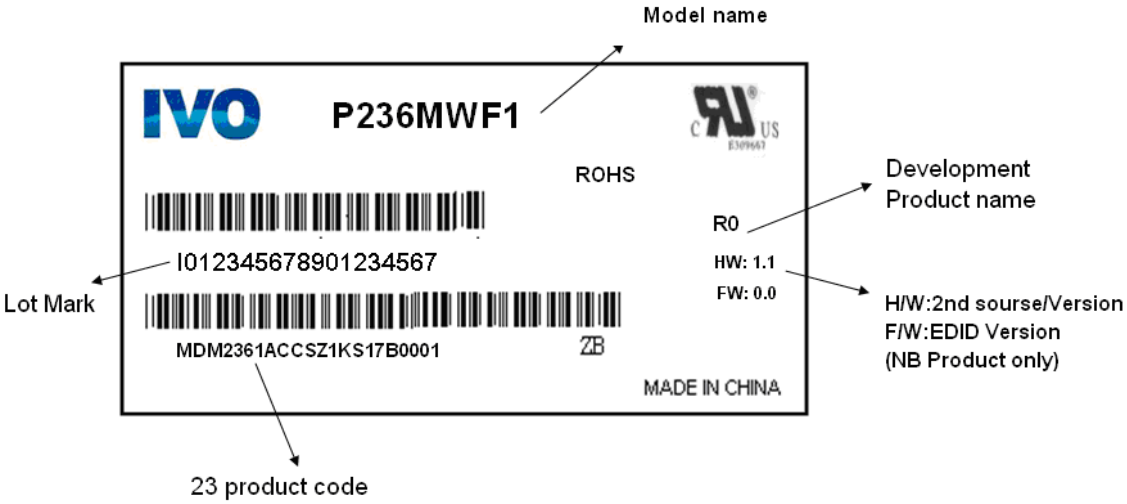
Width [mm]	534.48 ± 0.2

Height [mm]		361.2 ± 0.2
Thickness [mm]	Glass(cell)	1.83±0.2
	PCB	0.9±0.1
	Component	4.6(max)
Weight [g]		690typ

9.0 Package Specification


粉红色EPE(1mm)=4PCS
M2361 Open Cell=3PCS
TRAY=1PCS
TRAY底托180°(插位表)
M2361 Open Cell=30PCS
粉红色EPE(1mm)=40PCS
TRAY=11PCS
EPE(20mm)
1310
956
970
1296
1220

10.0 Lot Mark



10.1 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	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mark	6	7	8	9	A	B	C	D	F	G

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

10.2 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: 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 IVO barcode Note(1),Note(2).
code 20~23 : Serial Number.

11.0 General Precaution

11.1 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.

11.2 Disassembling or Modification

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.

11.3 Breakage of LCD Panel

11.2.1 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.

11.2.2 If liquid crystal contacts mouth or eyes, rinse out with water immediately.

11.2.3 If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and Rinse thoroughly with water.

11.2.4 Handle carefully with chips of glass that may cause injury, when the glass is

11.4 Absolute Maximum Ratings and Power Protection Circuit

11.4.1 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.

11.4.2 Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

11.4.3 It's recommended employing protection circuit for power supply.

11.5 Operation

11.5.1 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.

11.5.2 When the surface is dusty, please wipe gently with absorbent cotton or other soft Material

11.5.3 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

11.5.4 When cleaning the adhesives, please use absorbent cotton wetted with a little Petroleum benzene or other adequate solvent

11.6 Static Electricity

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

11.6.2 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

11.6.3 Persons who handle the module should be grounded through adequate methods.

11.7 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise,

Display characteristics may be changed.

11.8 Disposal

When disposing LCD module, obey the local environmental regulations.