InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P140NWR3 R1 Customer Approved Specification			Page No.	1/24
Document No.	A-P140NWR3-R1-71-02	Issue Date	2012/09/29	Revision	00

Customer Approved Specification

TO：

Product Name：P140NWR3 R1

Document Issue Date: 2012/09/29

	InfoVision Optoelectronics
SIGNATURE _____ _____ _____ Please return 1 copy for your confirmation with your signature and comments.	**SIGNATURE** **PREPARED 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.

Revision	Date	Page	Old Description	New Description	Remark
00	2012/09/29	all	--	First issue.	

CONTENTS

1.0 General Descriptions

1.1 Introduction

The P140NWR3 is a color active matrix thin film transistor (TFT) TN 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, column driver, and row driver circuit. This TFT LCD has a 14.0-inch diagonally measured active display area with resolution 1,366 horizontal by 768 vertical pixel array.

1.2 Features

- 14.0” TN TFT LCD Panel
- Supported HD (1,366x768 pixels) Resolution
- Compatible With RoHS Standard

1.3 Product Summary

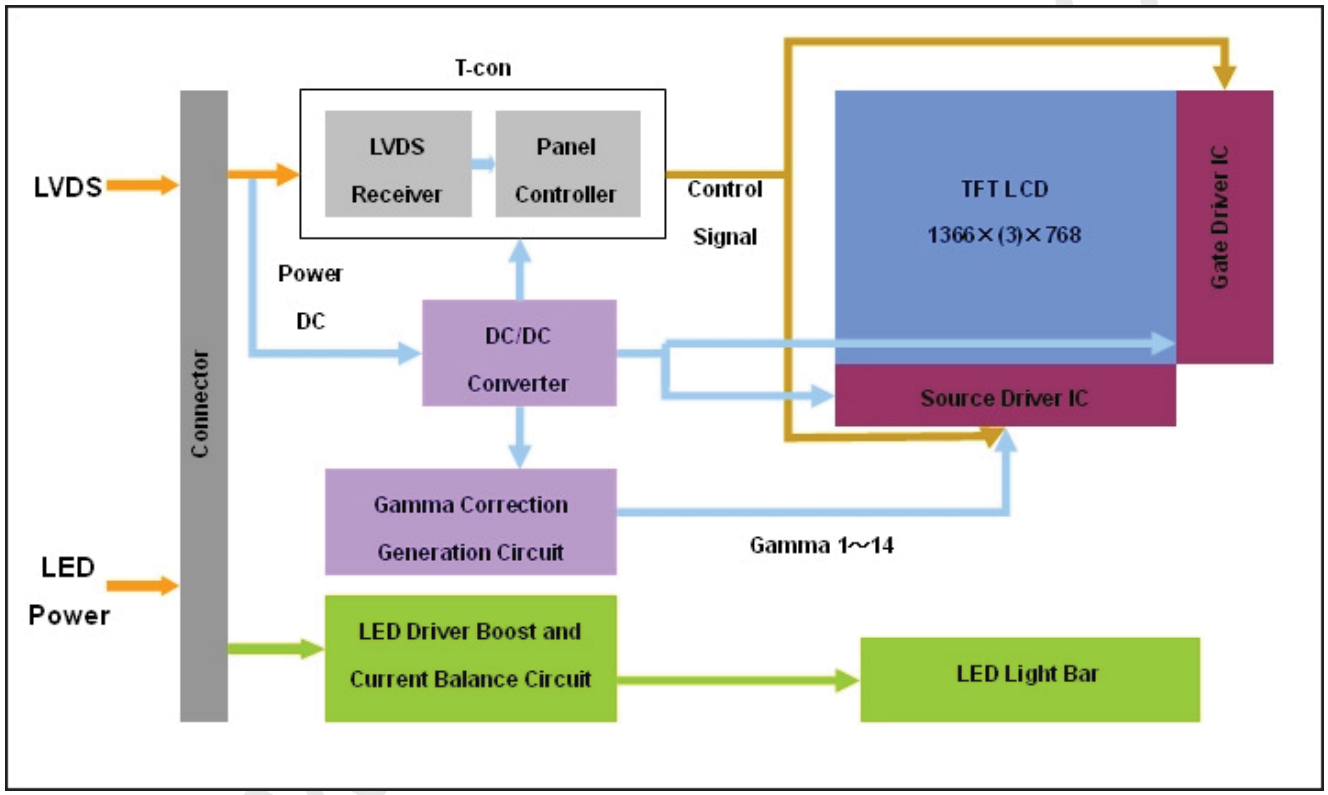
Items	Specifications	Unit
Screen Diagonal	14.0	Inch
Active Area	309.399 (H) x 173.952 (V)	mm
Pixels H x V	1,366 x3(RGB) x 768	-
Pixel Pitch	0.2265×0.2265	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally White (TN)	-
Contrast Ratio	500	-
Response Time	8	msec
Input Voltage	+3.3	V
Logic Power Consumption	1.0	watt
Weight	171	g
Electrical Interface (Logic)	Single LVDS	-
Support Color	262 K	-
Optimum Viewing Direction	6 o’colok	-
Surface Treatment	AG, Haze 25%	-

1.4 Functional Block Diagram

panel.

Figure 1 Shows the functional block diagram of the LCD panel.

Figure 1 Block Diagram



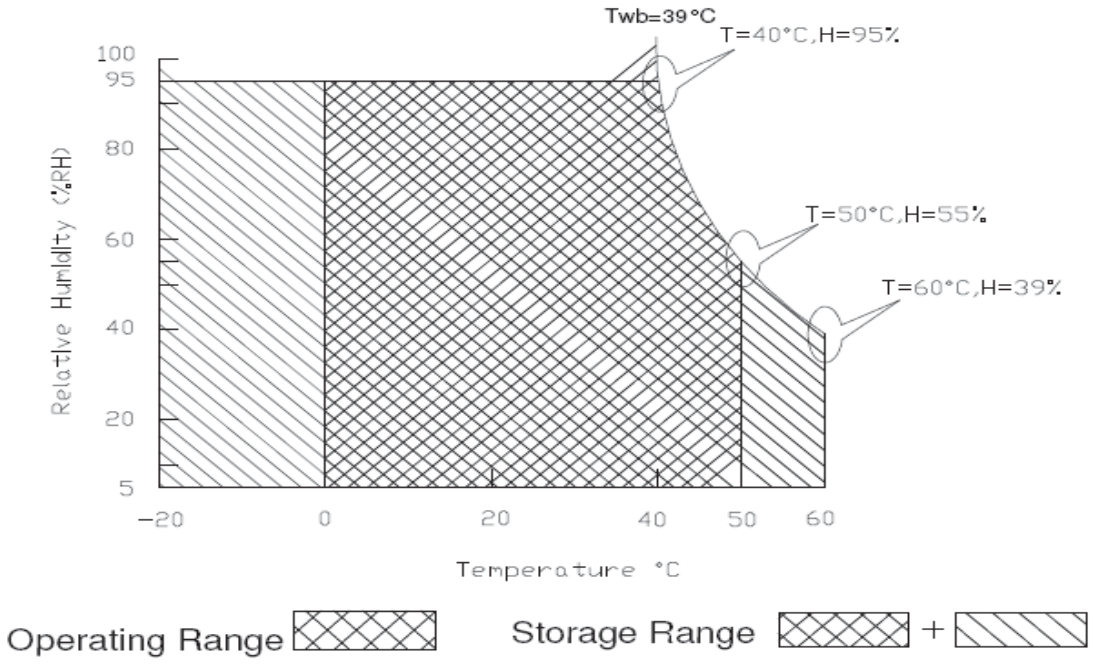
2.0 Absolute Maximum Ratings

Table 1 Absolute Ratings of Enviroment

Item	Symbol	Min.	Max.	Unit	Conditions
Supply Voltage	VDD	-0.3	+4.0	V	25℃
Supply V_LED Voltage	VLED	6	21	V	25℃
Operating Temperature	TOP	0	50	deg. C	-
Operating Humidity	HOP	5	95	%RH	-
Storage Temperature	TST	-20	60	deg. C	-
Storage Humidity	HST	5	95	%RH	-

Note：Permanent damage to the device may occur if exceed maximum values.

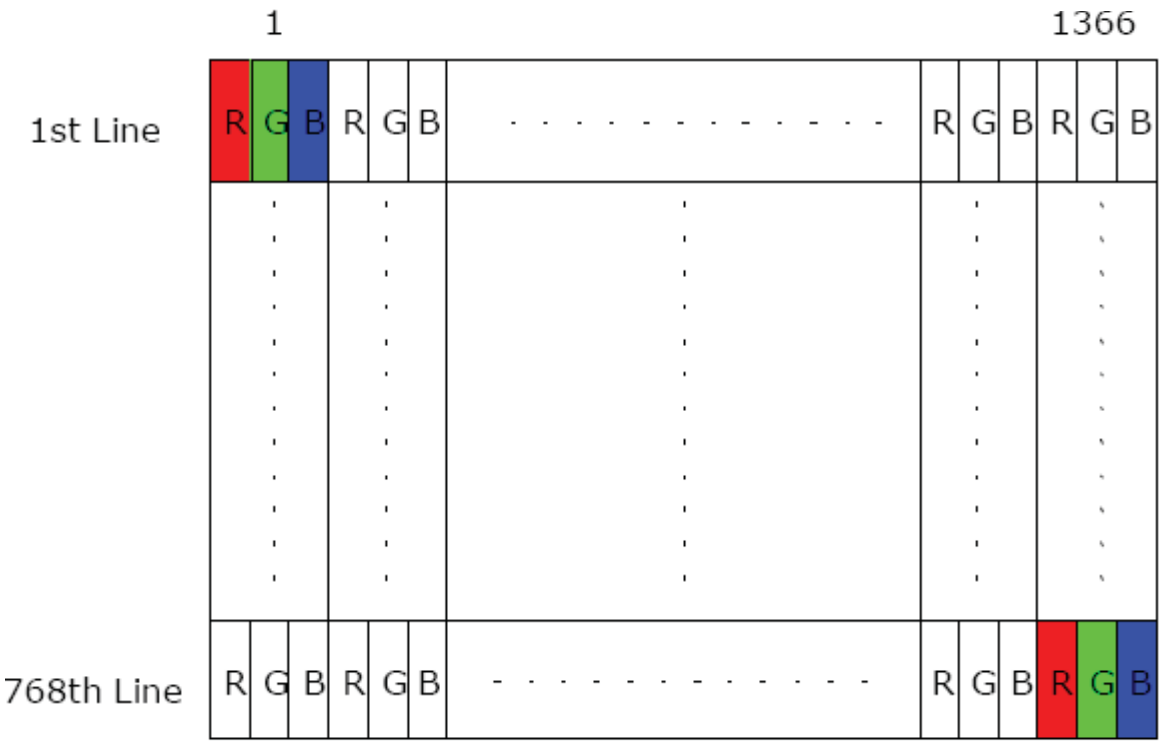
Figure 2 Absolute Ratings of Environment of the LCD Module



3.0 Pixel Format Image

Figure 3 shows the relationship of the input signals and LCD pixel format image.

Figure 3 Pixel Format



4.0 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes.

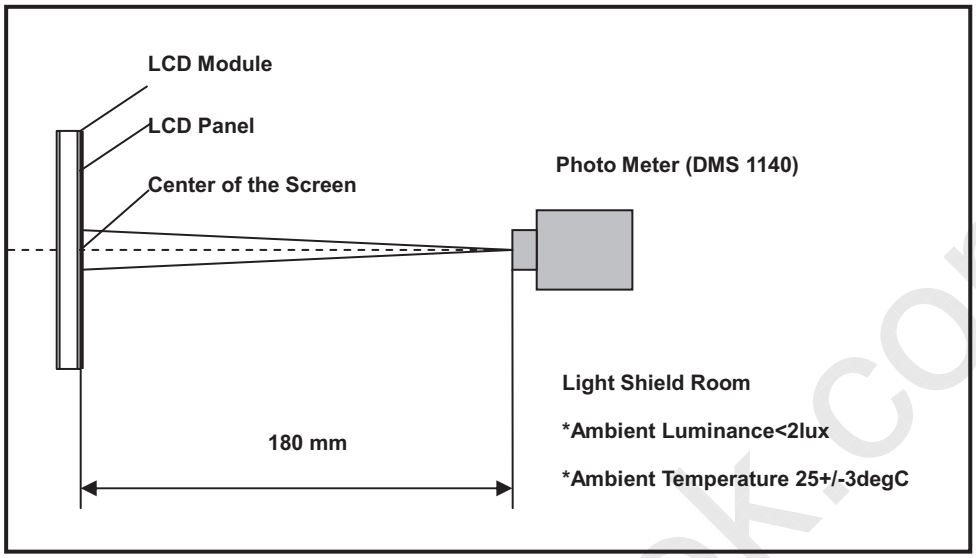
Table 2 Optical Characteristics

Item	Conditions		Specification			
			Min.	Typ.	Max.	Note
Viewing Angle (Degrees)	Horizontal CR=10	Left (θ_L)	40	45	-	A, B,C,F
		Right (θ_R)	40	45	-	
	Vertical CR=10	Up (ψ_H)	10	15	-	
		Down (ψ_L)	30	35	-	
Contrast Ratio	Center		400	500	-	A, B,D,F
Cross talk (%)	-		-	-	4	A,H
Response Time (ms)	Rising +Falling		-	8	16	A, B,E
Color /Chromaticity Coodinates (CIE1931)	Red x		Typ. -0.03	0.590	Typ. +0.03	A,B,F
	Red y			0.345		
	Green x			0.330		
	Green y			0.560		
	Blue x			0.150		
	Blue y			0.140		
	White x		0.283	0.313	0.343	
	White y		0.299	0.329	0.359	
Transmittance (%)	-		7.10	7.37	-	F,G

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.

Figure 4 Measurement Setup



B. The LED input parameter setting as:

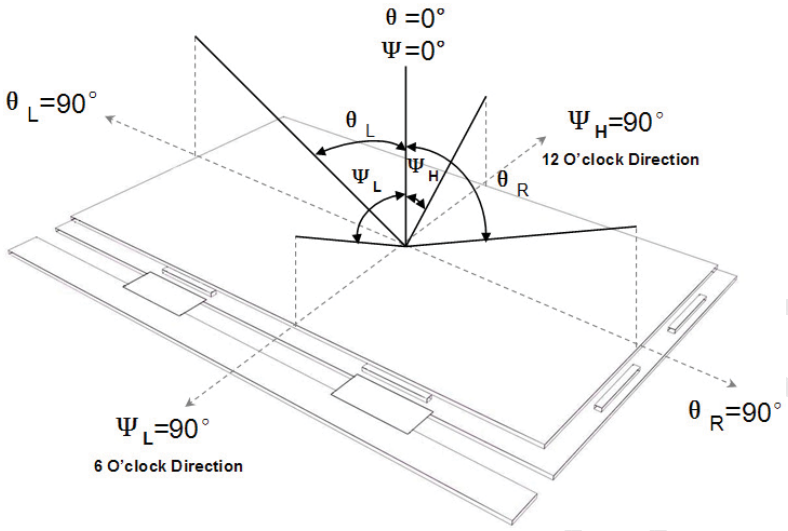
V_LED: 12V (±0.1V)

PWM_LED: Duty 100 %

C. Definition of Viewing Angle

Viewing angle is the measurement of contrast ratio ≧10, at the screen center, over a 180° horizontal an 180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as follows; 90°(θ) horizontal left and right and 90° (ψ) vertical, high (up) and low (down). The measurement direction is typically perpendicular to the display surface with the screen rotated about its center to develop the desired measurement viewing angle.

Figure 5 Definition of Viewing Angle



D. Definition Of Contrast Ratio (CR)

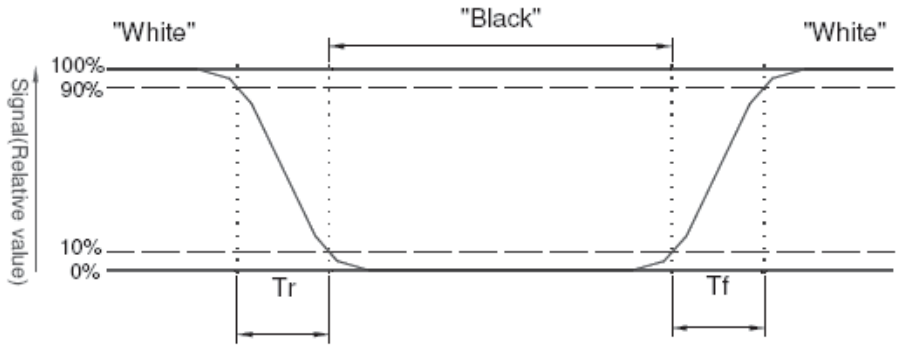
The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L63 / L0

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

E. Definition Of Response Time (T_R, T_F)

Figure 6 Definition of Response Time



F. Light source is the BLU which is supplied by customer.

G. Definition of Center Transmittance(module is without signal input)

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

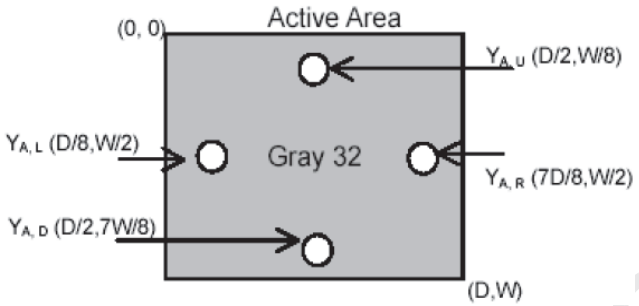
H. Definition of Cross Talk (CT)

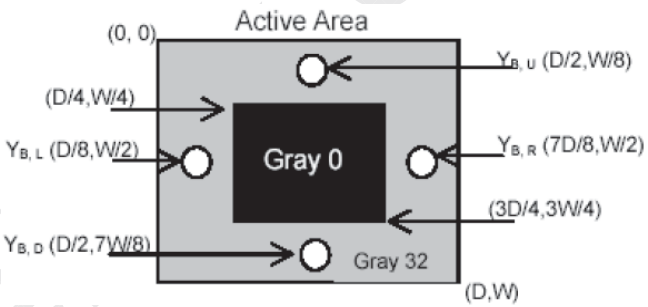
$CT = | Y_B – Y_A | / Y_A \times 100\ (\%)$

Where

Y_A = Luminance of measured location without gray level 0 pattern (cd/m^2)

Y_B = Luminance of measured location with gray level 0 pattern (cd/m^2)





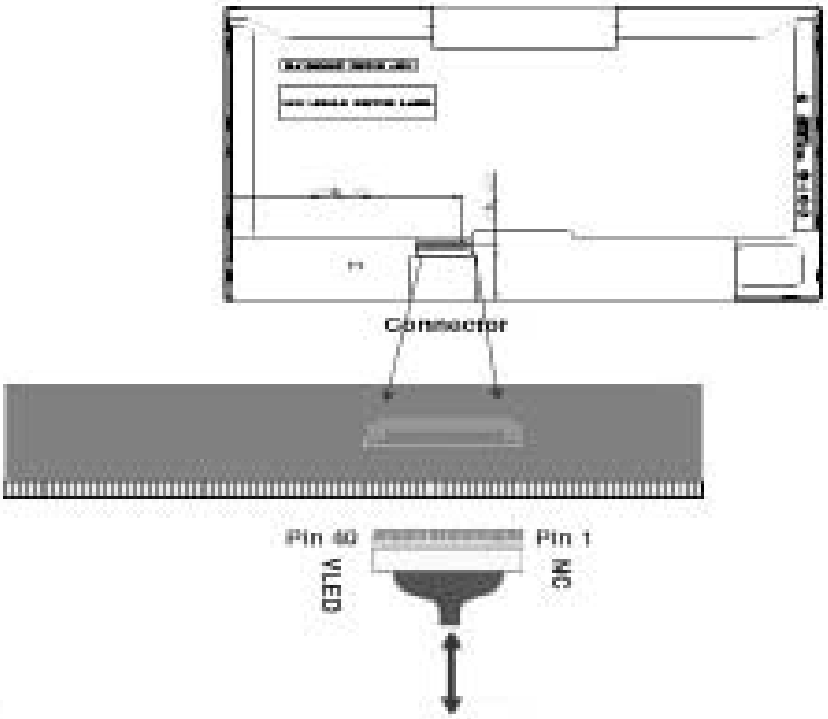
5.0 Electrical Characteristics

5.1 Interface Connector

Table 3 Signal Pin Assignment

Pin	Signal Name	Description
1	NC	No Connection (Reserve)
2	VDD	Power Supply +3.3V
3	VDD	Power Supply +3.3V
4	VEDID	EDID +3.3V Power
5	NC	No Connection (Reserve)
6	CLK_EDID	EDID Clock Input
7	DAT_EDID	EDID Data Input
8	RxOIN0-	-LVDS Differential Data Input (Odd R0-R5,G0)
9	RxOIN 0+	+LVDS Differential Data Input (Odd R0-R5,G0)
10	VSS	Ground
11	RxOIN 1-	-LVDS Differential Data Input (Odd G0-G5, B0-B1)
12	RxOIN 1+	+LVDS Differential Data Input (Odd R0-R5, B0-B1)
13	VSS	Ground
14	RxOIN 2-	-LVDS Differential Data Input (Odd B0-B5,HS,VS,DE)
15	RxOIN 2+	+LVDS Differential Data Input (Odd B0-B5, HS,VS,DE)
16	VSS	Ground
17	RxOCKIN-	-LVDS Differential Clock Input
18	RxOCKIN+	+LVDS Differential Clock Input
19	VSS	Ground
20	NC	No Connection (Reserve)
21	NC	No Connection (Reserve)
22	VSS	GND
23	NC	No Connection (Reserve)
24	NC	No Connection (Reserve)
25	VSS	GND
26	NC	No Connection (Reserve)
27	NC	No Connection (Reserve)
28	VSS	GND
29	NC	No Connection (Reserve)
30	NC	No Connection (Reserve)

31	VLED_GND	LED Ground
32	VLED_GND	LED Ground
33	VLED_GND	LED Ground
34	NC	No Connection (Reserve)
35	S PWMIN	System PWM Signal Input
36	BL_ON	LED Enable Pin
37	DBC_EN	Dynamic B/L Control Enable (High Enable)
38	VLED	LED Power Supply 6V-21V
39	VLED	LED Power Supply 6V-21V
40	VLED	LED Power Supply 6V-21V



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

5.2 LVDS Receiver

5.2.1 Signal Electrical Characteristics For LVDS Receiver

Input signals shall be low or High-impedance state when VDD is off.

Table 4 LVDS Receiver Electrical Characteristics

Parameter	Symbol	Min.	Max.	Unit
Differential Input High Threshold (V_{cm}=+1.2V)	V_{th}	-	+100	mV
Differential Input Low Threshold (V_{cm}=+1.2V)	V_{tl}	-100	-	mV
Differential Input Voltage	$\|V_{ID}\|$	100	600	mV
Differential Input Common Mode Voltage	V_{cm}	1.125	1.375	V

Figure 7 Voltage Definitions

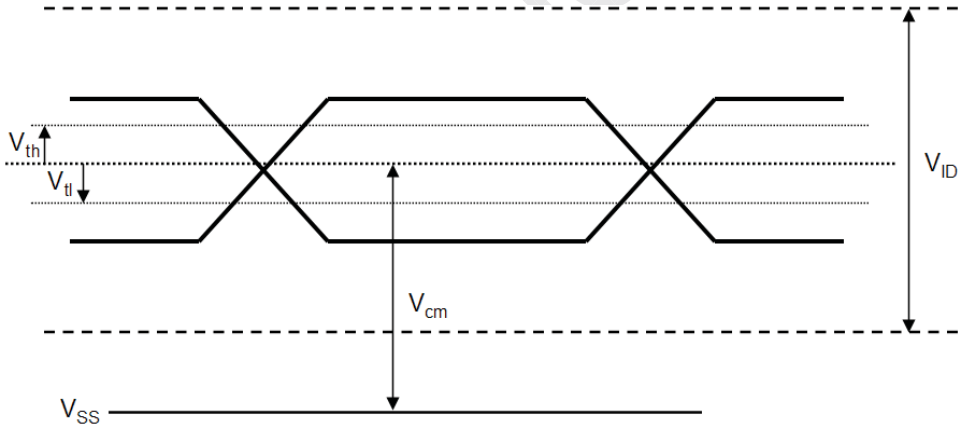
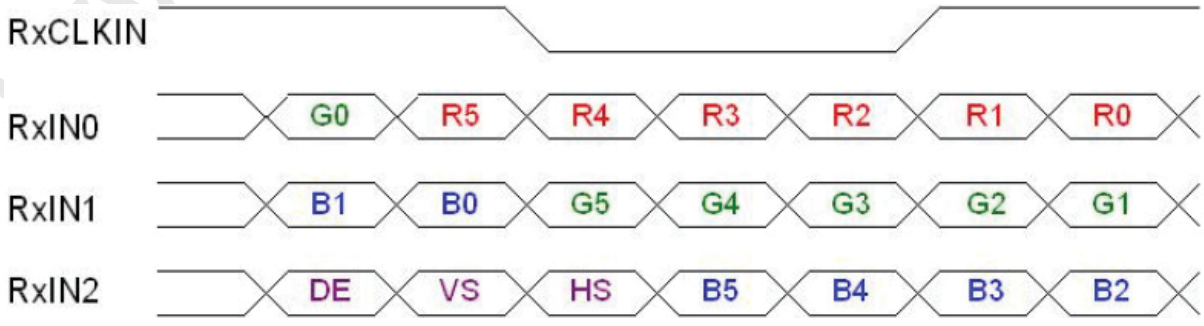


Figure 8 Data Mapping



Signal Name	Description	
R5 R4 R3 R2 R1 R0	Red Data 5 (MSB) Red Data 4 Red Data 3 Red Data 2 Red Data 1 Red Data 0 (LSB) Red-pixel Data	Red-pixel Data Each red pixel's brightness data consists of these 6 bits pixel data.
G5 G4 G3 G2 G1 G0	Green Data 5 (MSB) Green Data 4 Green Data 3 Green Data 2 Green Data 1 Green Data 0 (LSB) Green-pixel Data	Green-pixel Data Each green pixel's brightness data consists of these 6 bits pixel data.
B5 B4 B3 B2 B1 B0	Blue Data 5 (MSB) Blue Data 4 Blue Data 3 Blue Data 2 Blue Data 1 Blue Data 0 (LSB) Blue-pixel Data	Blue-pixel Data Each blue pixel's brightness data consists of these 6 bits pixel data.
RxCLKIN	Data Clock	The signal is used to strobe the pixel data and DE signals. All pixel data shall be valid at the falling edge when the DE signal is high.
DE	Display Timing	This signal is strobed at the falling edge of RxCLKIN. When the signal is high, the pixel data shall be valid to be displayed.
VS	Vertical Sync	The signal is synchronized to RxCLKIN .
HS	Horizontal Sync	The signal is synchronized to RxCLKIN .

Note: Output signals from any system shall be low or High-impedance state when VDD is off.

6.0 Interface Timings

6.1 Timing Characteristics

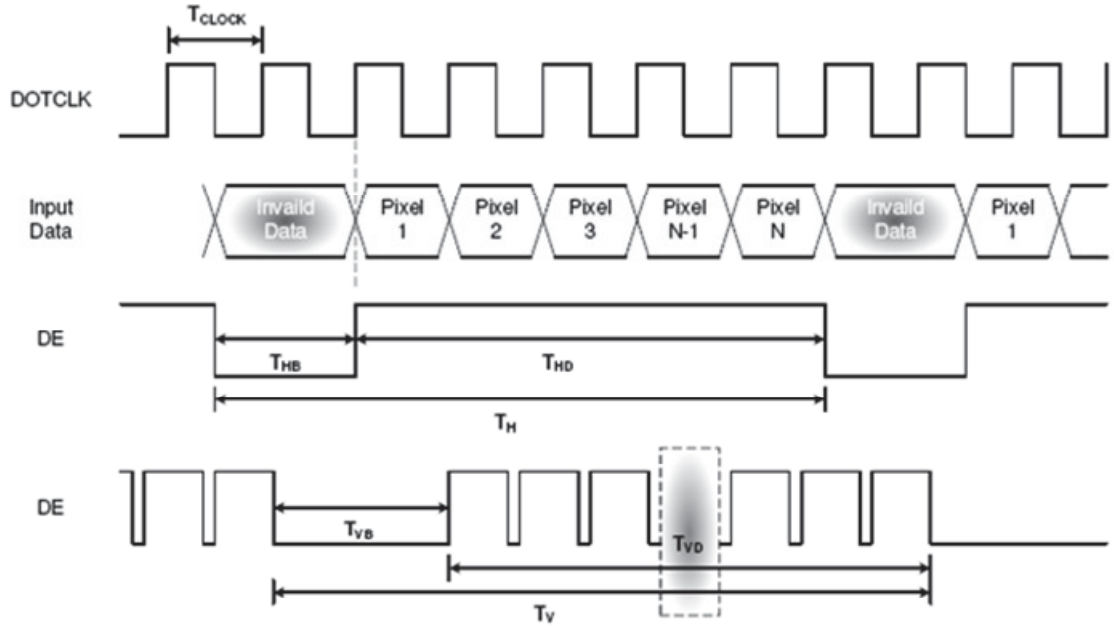
Basically, interface timings should match the 1366x768 /60Hz manufacturing guide line timing.

Table 5 Interface Timings

Parameter		Symbol	Min.	Typ.	Max.	Unit
Frame Rate		-	-	60	-	Hz
Clock Frequency		$1/T_{Clock}$	50	69.3	80	MHz
Vertical Section	Period	T_V	776	803	1023	T_{Line}
	Active	T_{VD}		768		
	Blanking	T_{VB}	8	35	255	
Horizontal Section	Period	T_H	1,396	1,436	2,047	T_{Clock}
	Active	T_{HD}		1,366		
	Blanking	T_{HB}	40	70	681	

Note : DE mode only.

Figure 9 Timing Characteristics Input Timing Definition(DE Mode)



7.0 Power Consumption

Input power specifications are as follows.

The power specification are measured under 25℃ and frame frenquency under 60Hz.

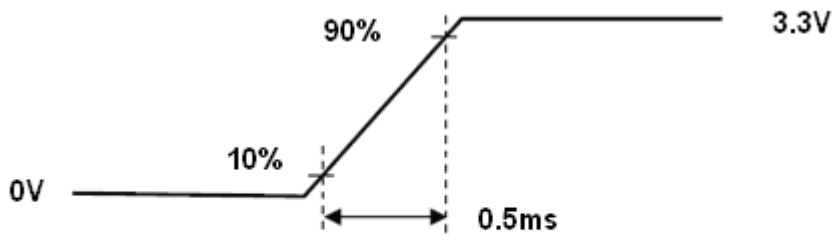
Table 6 Power Consumption

Symbol	Parameter	Min.	Typ.	Max.	Units	Condition
VDD	Logic/LCD Drive Voltage	3.0	3.3	3.6	[V]	-
IDD	VDD Current	-	267	333	[mA]	Black Pattern, 3.3V, 60Hz
PDD	VDD Power	-	0.8	1.0	[W]	Black Pattern, 3.3V, 60Hz
IRush	Inrush Current	-	-	2.0	[A]	Note
VDDrp	Allowable Logic/LCD Drive Ripple Voltage	-	-	100	[mV]	p-p

Note A : Maximum Measurement Condition: Black Pattern at 3.3V driving voltage. ($P_{max}=V_{3.3} \times I_{black}$)

Note B : Measure Condition.

Figure 10 VDD Rising Time



VDD rising time

8.0 Power ON/OFF Sequence

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

Figure 11 Power Sequence

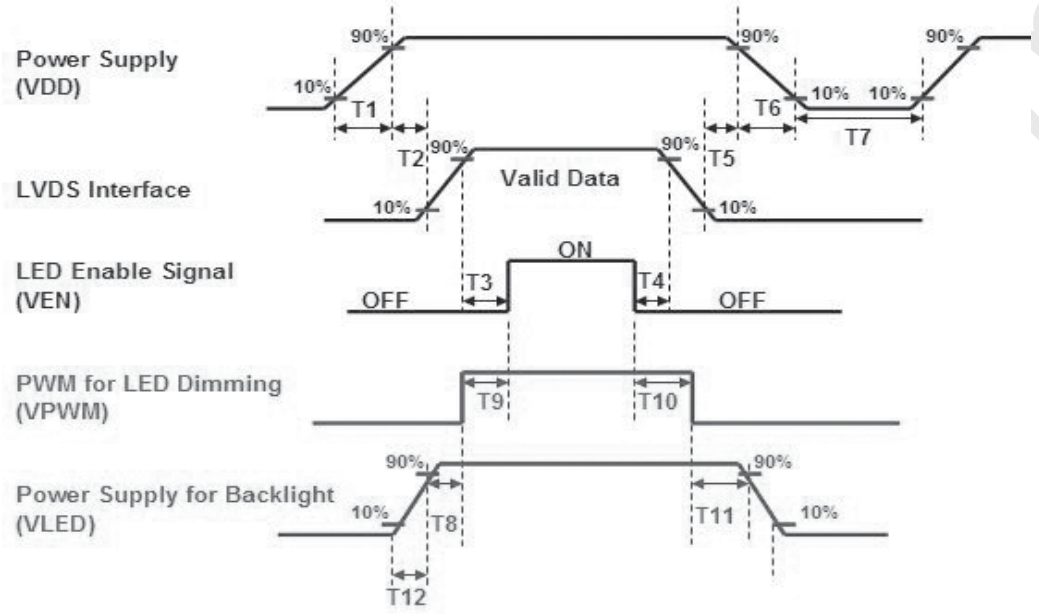


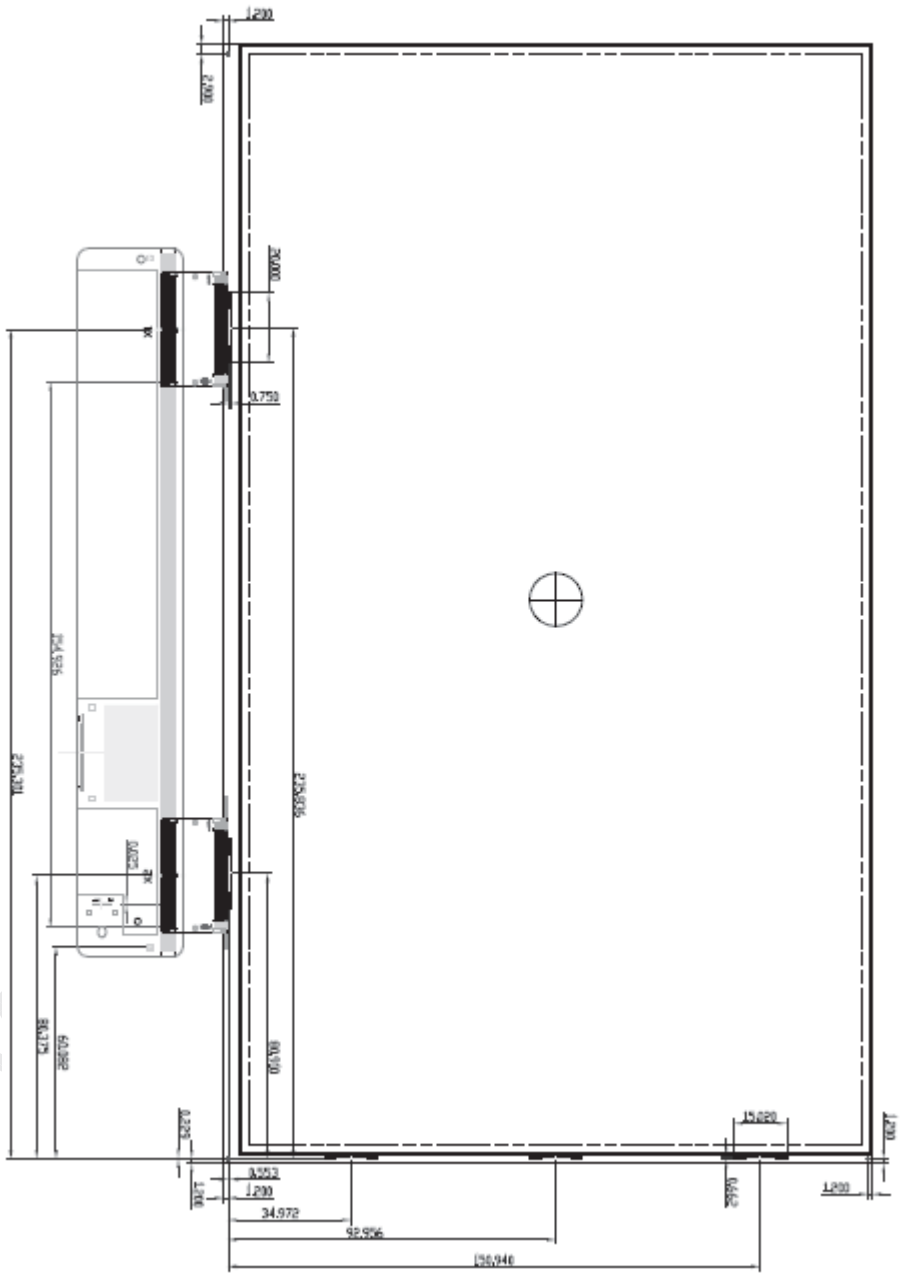
Table 7 Power Sequencing Requirements

Parameter	Unit	Min.	Typ.	Max.
T1	ms	0.5	-	10
T2	ms	0	-	50
T3	ms	200	-	-
T4	ms	200	-	-
T5	ms	10	-	50
T6	ms	0	-	10
T7	ms	500	-	-
T8	ms	10	-	-
T9	ms	10	-	180
T10	ms	10	-	180
T11	ms	10	-	-
T12	ms	0.5	-	10

Note: If T3,T5,T6 couldn't match above specifications,must request T3+T5+T6>200ms at least.

9.0 Mechanical Characteristics

Figure 12 Reference Outline Drawing (Front Side)

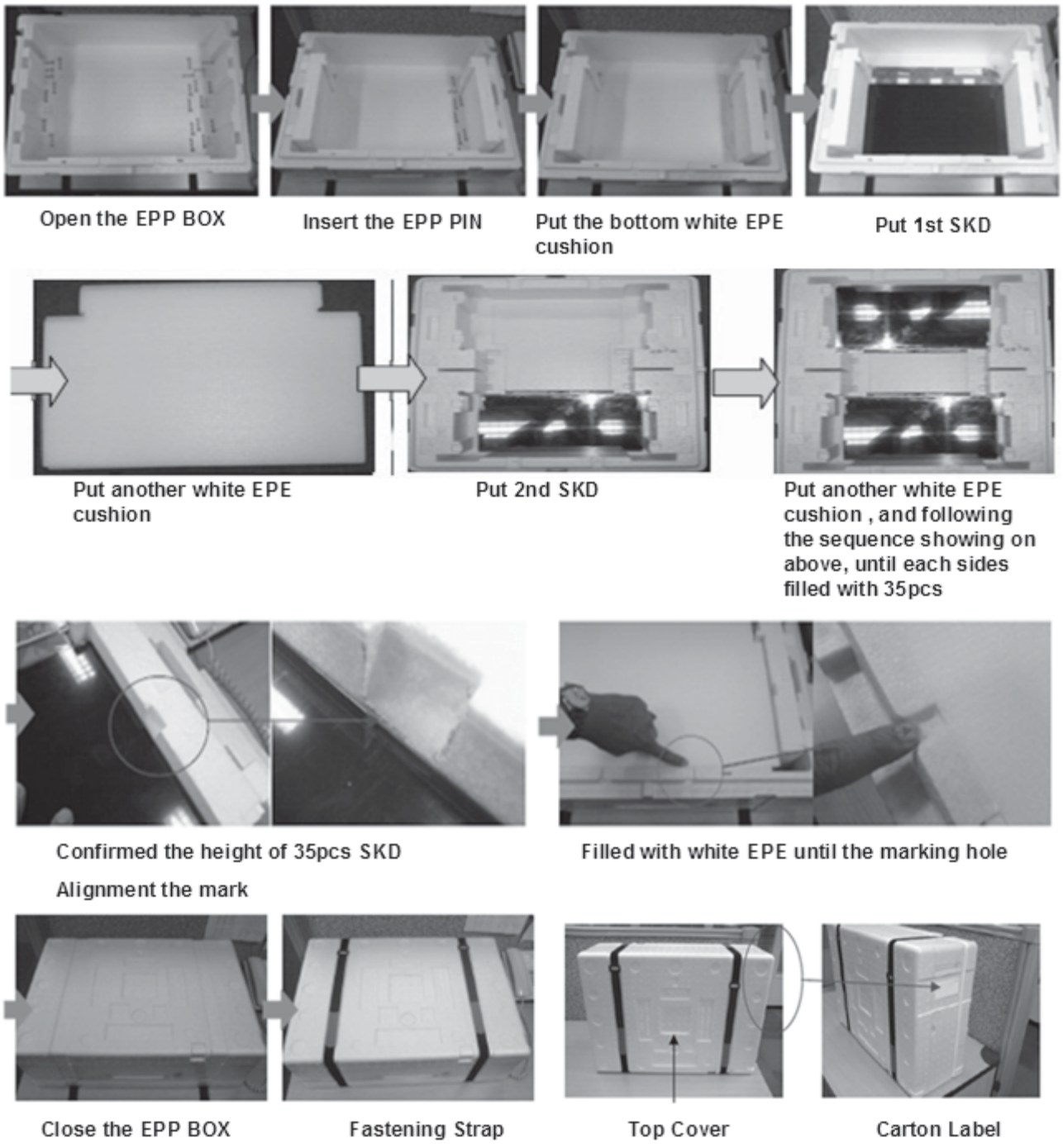


10.0 Dimension Specifications

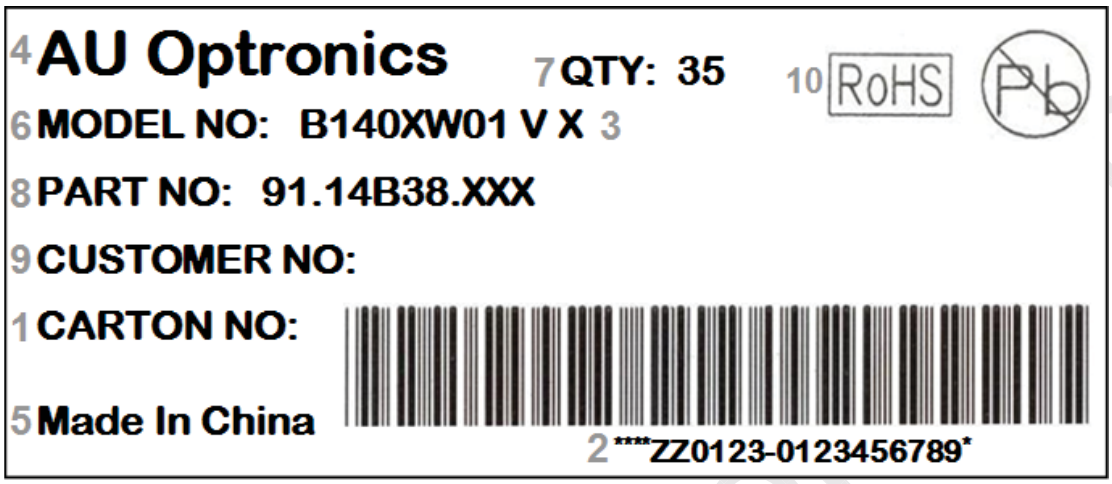
Table 8 Open Cell Dimension Specifications

Width [mm]		317.55±0.2
Height [mm]		183.95±0.2
Thickness[mm]	Single Glass	0.5
Weight [g]		171

11.0 Package Specification



12. 0 Carton Label



Note: This picture is only a sample.

1.carton_no(barcode)：”[barcode]”
final_grade(1 code)+site(3 code)+model_ext (2code) +year_code(2code) +month_code(1code)
+day_code(2code)+ serial number (5code)

2. carton_no(charachter)：”****ZZ0123-0123456789*”
"****"+
final_grade(1code)+site(3code)+model_ext(2code)+”-”+year_code(2code)+month_code(1code)
+day_code(2code)+ serial number (5code)+”*”(box not fulfilled)
"*"+final_grade(1code)+site(3code)+model_ext(2code)+”-”+year_code(2code)+month_code(1code)
+day_code(2code)+ serial number (5code)+”*”(box fulfilled)
final_grade(1code)+site(3code)+model_ext(2code) : “ZZ0123”
final_grade(1code)：the final grade include Z、P、N、U、V，but some site have another grade,A.
site(3code)：eg: Z05
model_ext(2code)：the last 2 characters of Part No.
year_code(2code)+month_code(1code)+day_code(2code) “01234”
year_code(2code)：the last 2 characters of that year.eg: if 2008 then 08
month_code(1code)：1、2、3、4、5、6、7、8、9、A、B、C mean january to december

3.model_ver(1code) “V X”："V"+model_ver
model_ver :the last 3rd characters of Part No.

4.company_name(AUO Optronics) “AU Optronics”：AU Logo, AU Optronics

5.made_in “Made In China” ：Origin

6.model_type “B140XW01”：model_type

7.qty “QTY: 35” : the quantity of Panel in this box. When these panels are Green products, this number will be printedat the left of Green Label. If not,it will be printed at the positon of Green Label.

8.part_no: “91.14B38.XXX” “XXX” eg: 821, 921.

9.customer_no: NA

10.Green logo: RoHS

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 Precaution

(1) Please mount LCD panel by using mounting holes arranged in four corners tightly.

(2) Do not disassemble or modify the panel. It may damage sensitive parts inside LCD panel, and may cause scratches or dust on the display. IVO does not warrant the panel, if customers disassemble or modify the panel.

(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 panel.

(5) Refrain from strong mechanical shock and /or any force to the panel.

(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 panel 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 panel 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 panel to prevent from electrostatic occurrence.

(11) Because LCD panel 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 panel should be grounded through adequate methods.

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

13.3 Storage Precaution

(1) Please do not leave LCD panel in the environment of high humidity and high temperature for a long time.

(2) The panel shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

(3) The panel should be stored in a dark place. It is prohibited to apply sunlight or fluorescent light in storage.

13.4 Operation Precaution

(1) Do not connect or disconnect the panel in the "Power ON" condition.

(2) Power supply should always be turned on/off by "Power ON/OFF Sequence".

(3) Panel 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 Panel into an enclosure, do not twist nor bend the TFT Panel even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Panel from outside. Otherwise the TFT Panel 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 panel keeps displaying the same pattern for a long period of time, the image may be "sticked" to the screen.

(4) This panel 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 panel, obey the local environmental regulations.