昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	1/27
Document No.		Issue date	2012/08/10	Revision	00

Product Information

To:　Samsung

Product Name: P133NWN1 R2

Document Issue Date: 2012/08/10

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.

昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	2/27
Document No.		Issue date	2012/08/10	Revision	00

Revision	Date	Page	Old Description	New Description	Remark
00	2012/08/10	all	--	First issue.	
			--		

昆山龙腾光电有限公司

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Contents

昆山龙腾光电有限公司
IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	4/27
Document No.		Issue date	2012/08/10	Revision	00

1.0 General Descriptions

1.1 Introduction

The P133NWN1 is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) panel 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 panel has a 13.3-inch diagonally measured active display area with HD resolution 1,366 horizontal by 768 vertical pixel arrays.

1.2 Features

■ 13.3" TFT-LCD Panel
■ Supported HD1,366x768 pixels resolution
■ Compatible with RoHS standard

1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	13.3	Inch
Active Area	293.42x164.97	mm
Pixels (H x V)	1366x3(RGB)x768	-
Pixel Pitch	0.2148(H)*0.2148(V)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally White	-
Contrast Ratio	500	-
Response Time	8	msec
Input Voltage	3.3	V
Power Consumption	0.85(Typ.)	W
Weight	144.43(Max.)(without POL protect film)	g
Electrical Interface (Logic)	LVDS	-
Support Color	262 K	-
Optimum Viewing Direction	6 o'clock	-
Surface Treatment	AG+AG	-

昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	5/27
Document No.		Issue date 2012/08/10	Revision	00

1.4 Functional Block Diagram

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

Figure 1 Block Diagram
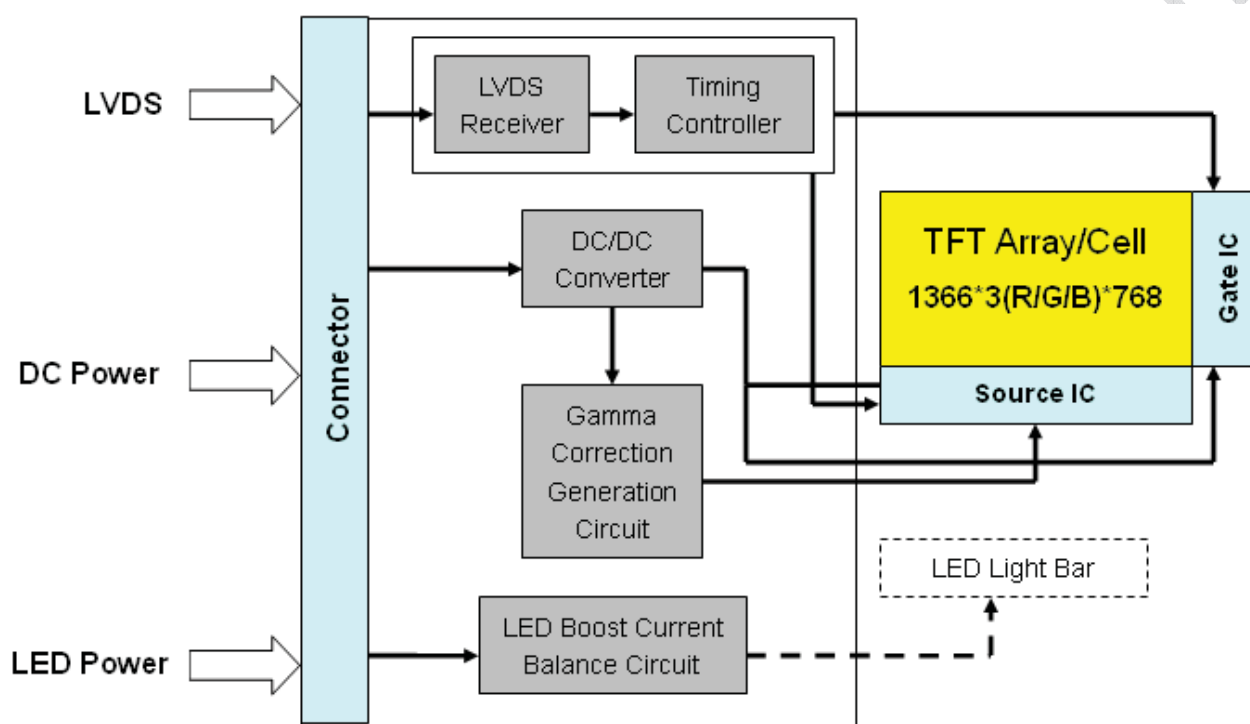
昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	6/27
Document No.		Issue date	2012/08/10	Revision	00

2.0 Absolute Maximum Ratings

Table 1 Electrical Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Logic Supply Voltage	V_{DD}	-0.3	4.0	V	(1),(2)
Logic Input Signal Voltage	-	-0.3	3.6	V	

Note (1) Permanent damage may occur to the LCD panel if beyond this specification. Functional

operation should be restricted to the conditions described under normal operating conditions.

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

Table 2 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Operating Temperature	TOP	0	+50	℃	(1),(2),(3)
Operating Humidity	HOP	10	80	%RH	
Storage Temperature	TST	-20	+60	℃	
Storage Humidity	HST	10	90	%RH	

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

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

(3) Storage /Operating temperature

### Figure 2 Absolute Ratings of Environment of the LCD Panel
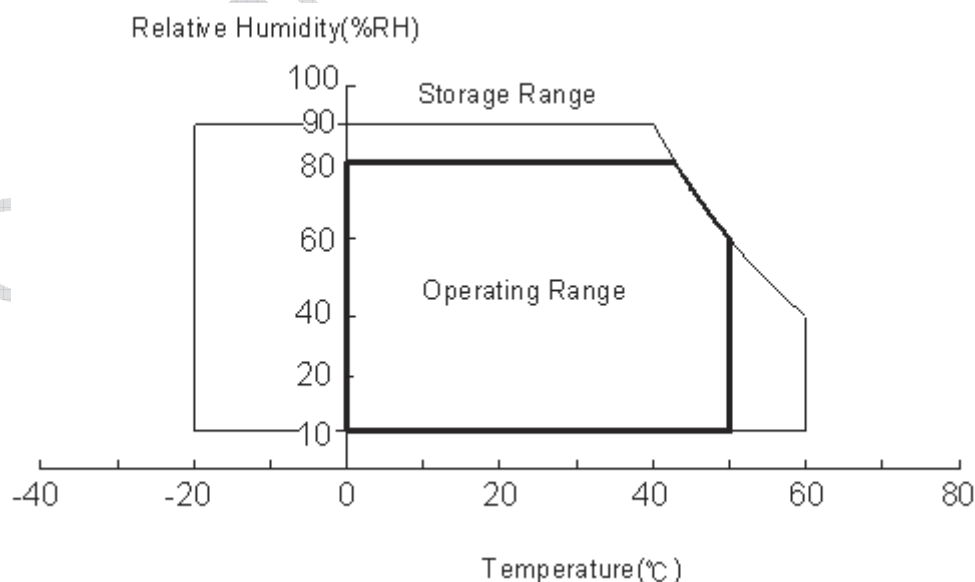
www.panelook.com 屏库:全球液晶屏交易中心

昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	7/27
Document No.		Issue date	2012/08/10	Revision	00

3.0 Pixel Format Image

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

Figure 3 Pixel Format
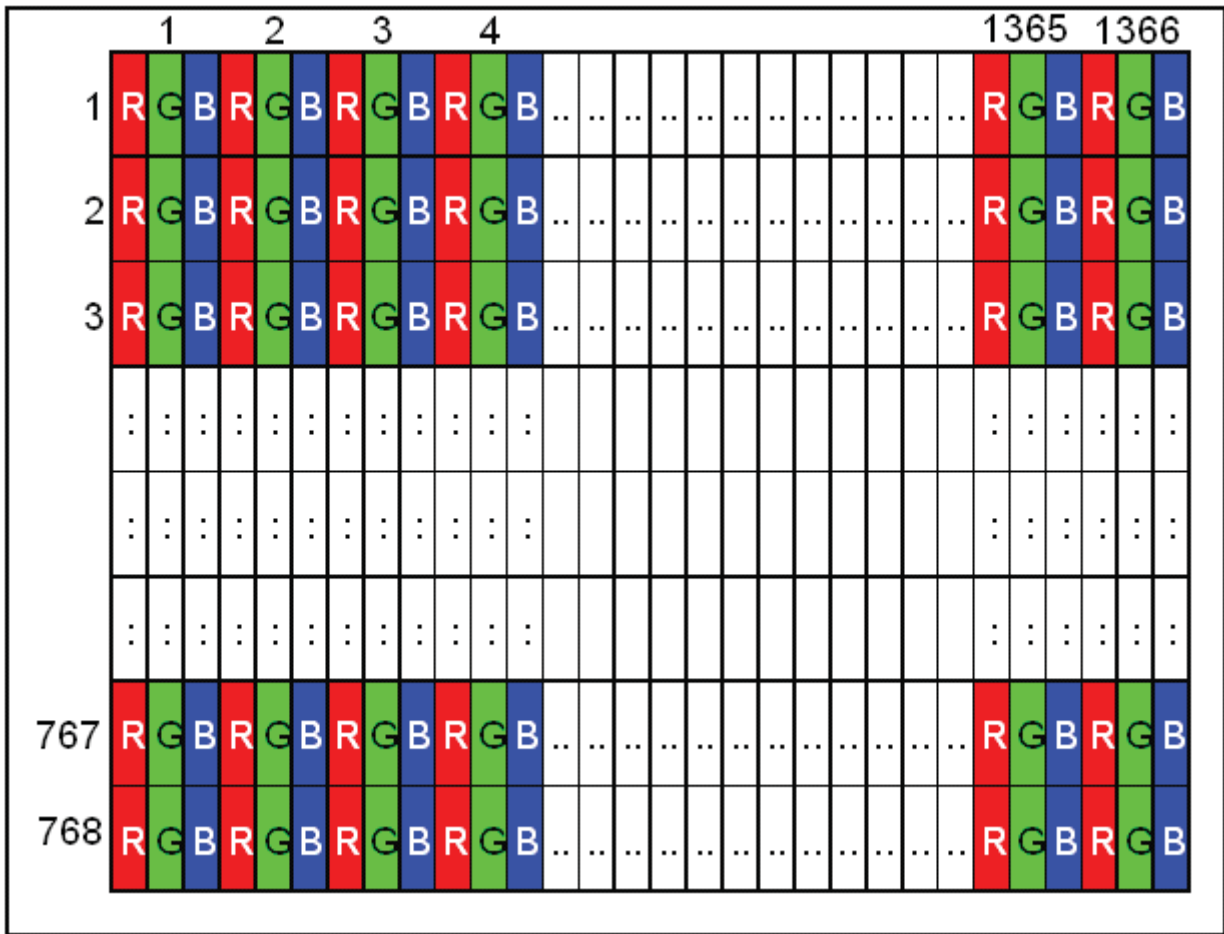
R+G+B dots=1 pixel

昆山龙腾光电有限公司
IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	8/27
Document No.		Issue date	2012/08/10	Revision	00

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	40	45	-	degree	(1),(2),(3),(7)
		θ_R	40	45	-		
	Vertical	θ_T	10	15	-		
		θ_B	30	35	-		
Contrast Ratio	Center		300	500	-	-	(1),(2),(4),(7)
Response Time	Rising		-	-	-	ms	(1),(2),(5),(7)
	Falling		-	-	-	ms	
	Rising + Falling		-	8	16	ms	
Color Chromaticity (CIE1931)	Red x		Typ. -0.03	(0.580)	Typ. +0.03	-	(1),(2),(7)
	Red y			(0.335)		-	
	Green x			(0.330)		-	
	Green y			(0.565)		-	
	Blue x			(0.155)		-	
	Blue y			(0.140)		-	
	White x			0.313		-	
	White y			0.329		-	
Panel Transmittance	-		5.89	6.22	-	(%)	(1),(2),(6),(7)

Note (1) Measurement Setup:

The LCD panel 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.

昆山龙腾光电有限公司

InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	9/27
Document No.		Issue date	2012/08/10	Revision	00

Figure 4 Measurement Setup
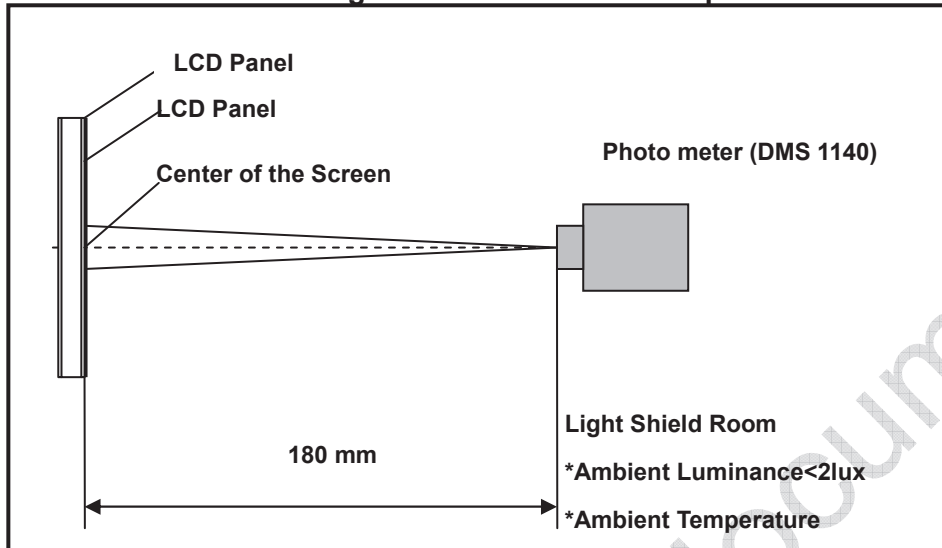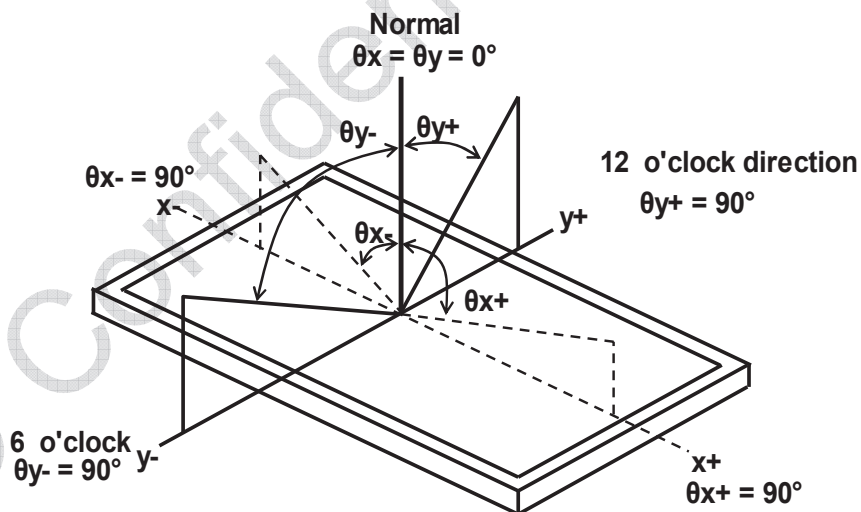

Note (2) The LED input parameter setting as:

V_LED: 12V (±0.1V)

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) = L63 / L0

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

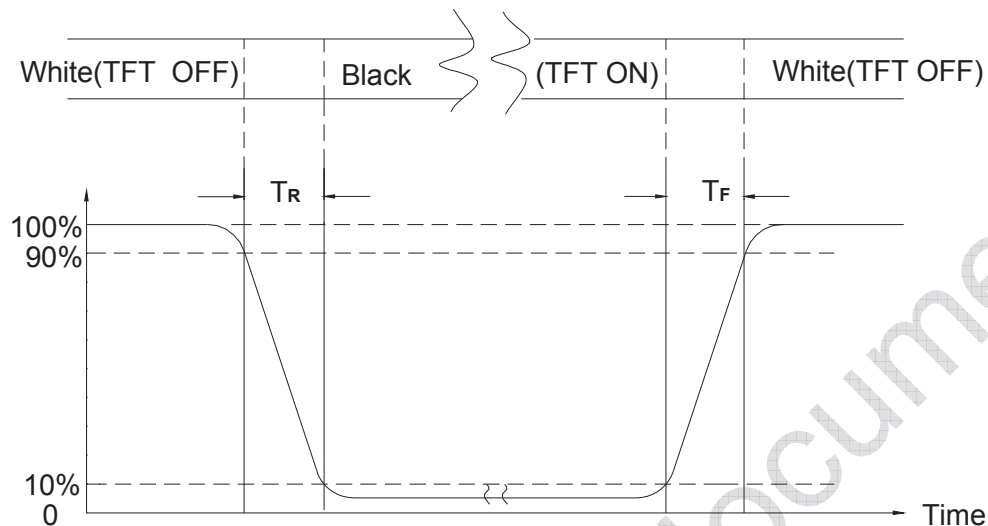Note (5) Definition Of Response Time (TR, TF)

昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	10/27
Document No.		Issue date 2012/08/10	Revision	00

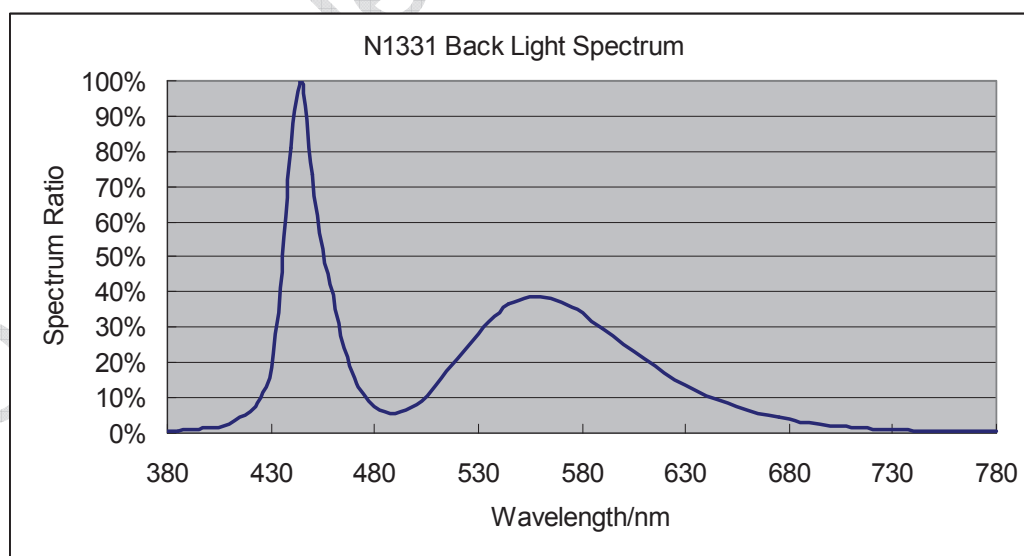### Figure 6 Definition of Response Time

Note (6) Definition of Transmittance(Panel is without signal input)

$$\text{Transmittance} = \frac{\text{Luminance of LCD Panel}}{\text{Luminance of Back Light}} \times 100\%$$

Note (7) Light source is the BLU which is supplied by IVO.

Figure 7 Back Light Spectrum

昆山龙腾光电有限公司

InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	11/27
Document No.		Issue date 2012/08/10	Revision	00

5.0 Backlight Characteristics(Reference)

Table 4 Parameter Guideline for LED Backlight

Item	Symbol		Min.	Typ.	Max.	Units	Note
LED Input Voltage	V_{LED}		6	12	21	V	(1),(2)
PWM Signal Voltage	V_{PWM_EN}	High	2.5	3.3	5.5	V	(2)
		Low	-	-	0.8		
LED Enable Voltage	V_{LED_EN}	High	2.0	3.3	5.5	V	
		Low	-	-	0.8		
Input PWM Frequency	FPWM		180	200	1K	Hz	
Duty Ratio	PWM		10	-	100	%	(2)

Note (1) A higher LED power supply voltage will result in better power efficiency. Keep the V_LED between 12V and 21V is strongly recommended.

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

昆山龙腾光电有限公司

InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	12/27
Document No.		Issue date 2012/08/10	Revision	00

6.0 Electrical Characteristics

6.1 Interface Connector

6.1.1 Interface Connector

Table 5 Connector Name / Designation

Manufacturer	UJU/STARCONN (or equivalent)
Type / Part Number	IS050-L40B-C10
Mating Receptacle/Part Number	300E40-0010RA-G3(Starconn)

Table 6 Signal Pin Assignment

Pin #	Signal Name	Description	Remarks
1	BIST	LCD Panel Self Test Enable	-
2	VDD	Power Supply	3.3V(typical)
3	VDD	Power Supply	3.3V(typical)
4	DVDD	EDID +3.3V Power	-
5	NC	No Connection (Reserve)	-
6	SCL	EDID Clock Input	-
7	SDA	EDID Data Input	-
8	RIN0-	-LVDS Differential Data INPUT	R0-R5,G0
9	RIN0+	+LVDS Differential Data INPUT	R0-R5,G0
10	GND	Ground	-
11	RIN1-	-LVDS Differential Data INPUT	G1-G5,B0-B1
12	RIN1+	+LVDS Differential Data INPUT	G1-G5,B0-B1
13	GND	Ground	-
14	RIN2-	-LVDS Differential Data INPUT	B2-B5,HS,VS,DE
15	RIN2+	+LVDS Differential Data INPUT	B2-B5,HS,VS,DE
16	GND	Ground	-
17	CLK-	-LVDS Odd Differential Clock INPUT	-
18	CLK+	+LVDS Odd Differential Clock INPUT	-
19	GND	Ground	-
20	RIN3-	-LVDS Differential Data INPUT	R/G/B 6-7
21	RIN3+	+LVDS Differential Data INPUT	R/G/B 6-7
22	GND	Ground	-
23	NC	No Connection	-
24	NC	No Connection	-

昆山龙腾光电有限公司

InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	13/27
Document No.		Issue date 2012/08/10	Revision	00

25	GND	Ground	-
26	NC	No Connection	-
27	NC	No Connection	-
28	GND	Ground	-
29	NC	No Connection	-
30	NC	No Connection	-
31	VSSLED	LED Ground	-
32	VSSLED	LED Ground	-
33	VSSLED	LED Ground	-
34	NC	No Connection	-
35	PWM	PWM logic input level	-
36	LED_EN	LED enable input level	-
37	NC	No Connection	-
38	VDDLED	LED Power Supply 6V-21V	-
39	VDDLED	LED Power Supply 6V-21V	-
40	VDDLED	LED Power Supply 6V-21V	-

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

6.1.2 LED Driving Specification

Table 7 Connector Name / Designation

Manufacturer	UJU (or equivalent)
Type / Part Number	KYOCERA 046298708100883+

Table 8 Pin Assignment

Pin #	Signal Name Description	Note
1	LED Anode	-
2	LED Anode	-
3	LED Anode	-
4	NC	
5	LED cathode	-
6	LED cathode	-
7	LED cathode	-
8	LED cathode	-

昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	14/27
Document No.		Issue date 2012/08/10	Revision	00

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 9 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}	1.0	1.2	2.4	V	V_{th}-V_{tl}=200mV

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

(2) All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.
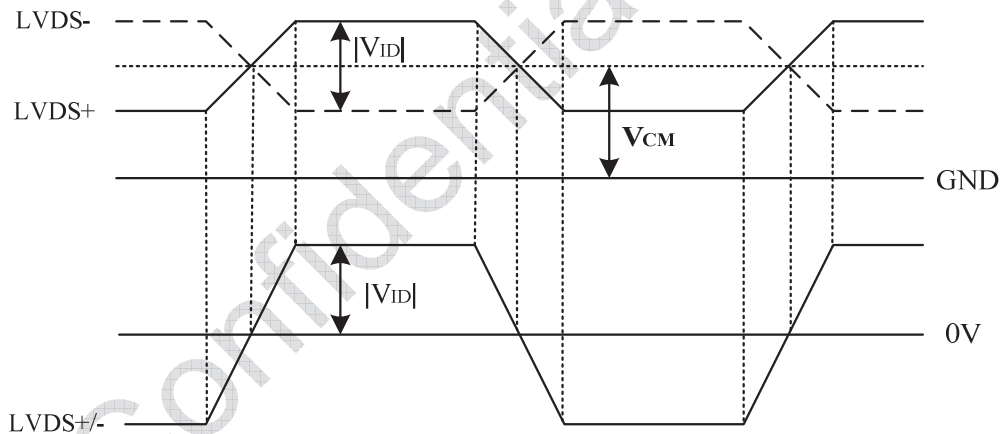
Figure 8 Voltage Definitions

Figure 9 Measurement System

昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	15/27
Document No.		Issue date	2012/08/10	Revision	00
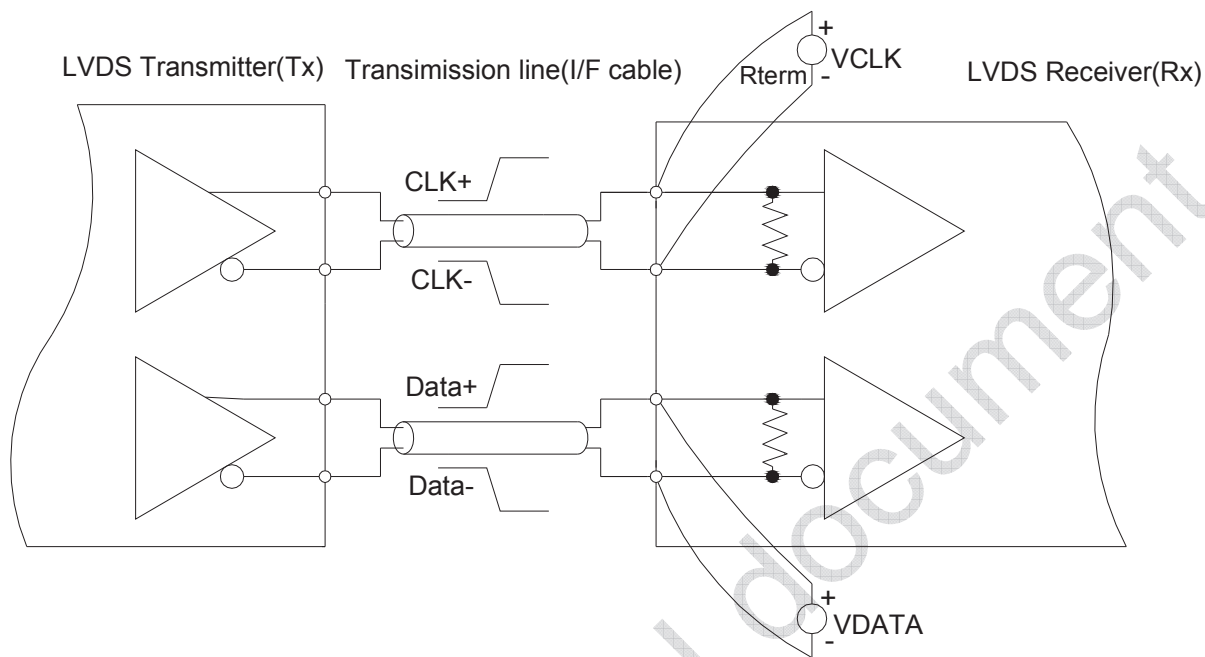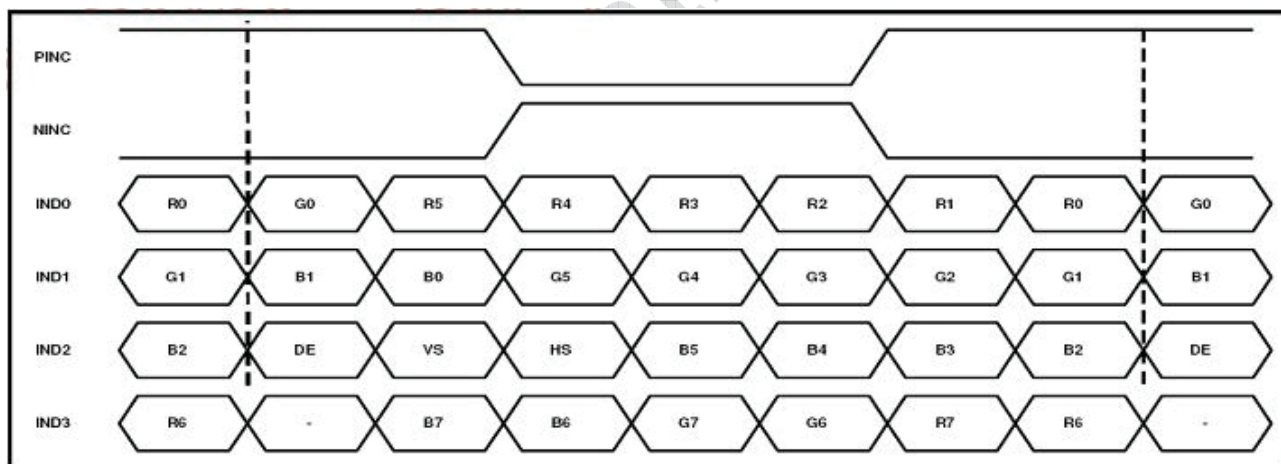
LVDS Transmitter(Tx)   Transimission line(I/F cable)   Rterm   VCLK   LVDS Receiver(Rx)

CLK+
CLK-
Data+
Data-
VDATA

Figure 10 Data Mapping

PINC									
NINC									
IND0	R0	G0	R5	R4	R3	R2	R1	R0	G0
IND1	G1	B1	B0	G5	G4	G3	G2	G1	B1
IND2	B2	DE	VS	HS	B5	B4	B3	B2	DE
IND3	R6	-	B7	B6	G7	G6	R7	R6	-

昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	16/27
Document No.		Issue date 2012/08/10	Revision	00

6.2.2 LVDS Receiver Internal Circuit

Figure 11 LVDS Receiver Internal **Circuit** Shows the internal block diagram of the LVDS receiver. This LCD panel equips termination resistors for LVDS link.

Figure 11 LVDS Receiver Internal Circuit
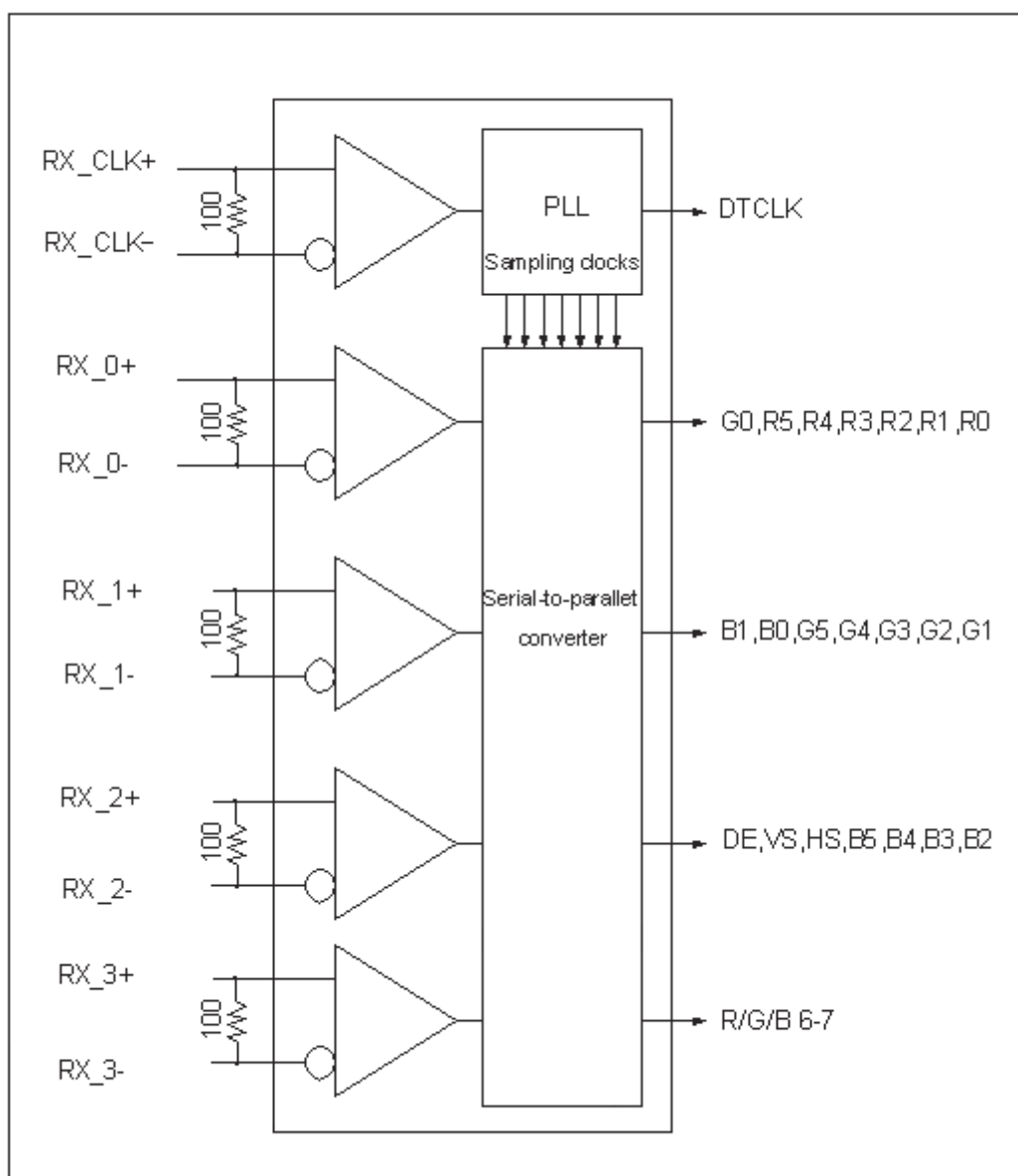
昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	17/27
Document No.		Issue date	2012/08/10	Revision	00

昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	18/27
Document No.		Issue date 2012/08/10	Revision	00

7.0 Interface Timings

7.1 Timing Characteristics

Table 10 Interface Timings

Parameter	Symbol	Unit	Min.	Typ.	Max.
LVDS Clock Frequency(single)	Fdck	MHz	57.3	75.4	83
H Total Time	Htotal	Clocks	1,450	1,560	1,690
H Active Time	Hac	Clocks	1,366	1,366	1,366
V Total Time	Vtotal	Lines	790	806	850
V Active Time	Vac	Lines	768	768	768
Frame Rate	Vsync	Hz	50	60	65

Figure 12 Timing Characteristics
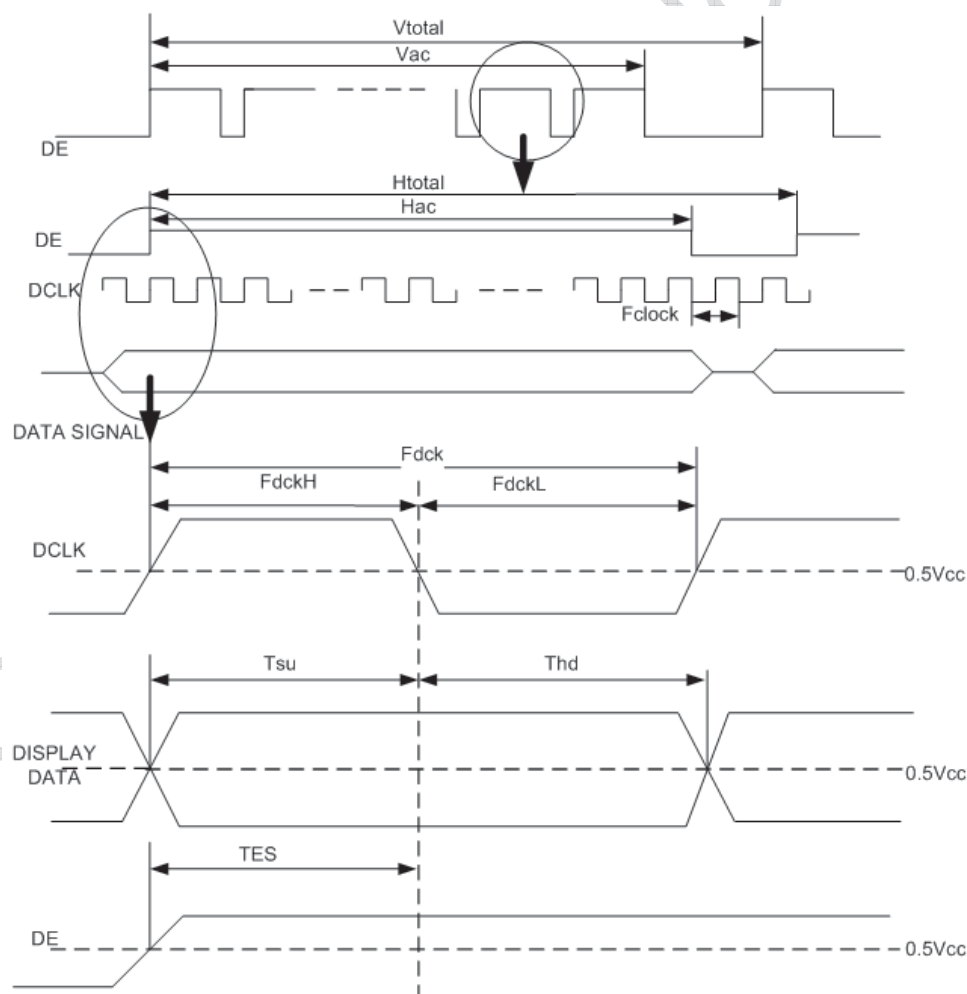
昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	19/27
Document No.		Issue date	2012/08/10	Revision	00

Note: TES is data enable signal setup time.

8.0 Power Consumption

Input power specifications are as follows.

Table 11 Power Consumption

Item		Symbol	Min.	Typ.	Max.	Units	Note
Logic/LCD Drive Voltage		VDD	3.0	3.3	3.6	V	(2), (4)
VDD Current	Black Pattern	IDD	-	258	TBD	mA	(3),(4)
VDD Power	Black Pattern	PDD	-	0.85	TBD	W	
Rush Current		Irush	-	-	1.5	A	(1),(4)
Allowable Logic/LCD Drive Ripple Voltage		VDDrp	-	-	200	mV	(4)

Note (1) Measure Condition

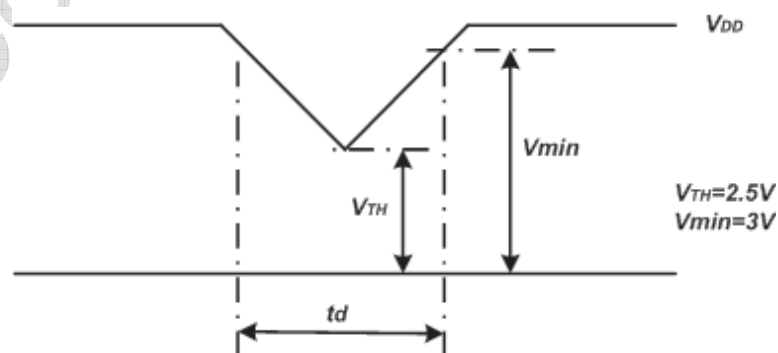**Figure 13 VDD rising time**
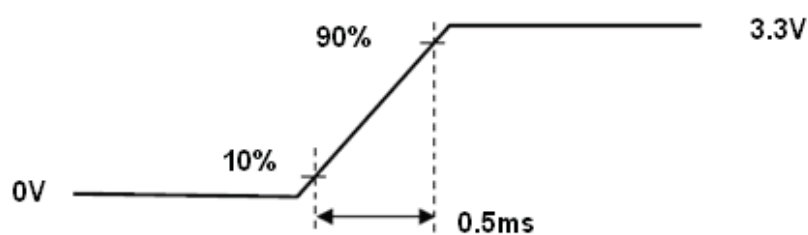
Note (2) VDD Power Dip Condition

Figure 14 VDD Power Dip

If $V_{TH} < V_{DD} \le V_{min}$，then $t_d \le 10ms$；when the voltage return to normal our panel must revive automatically.

昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	20/27
Document No.		Issue date	2012/08/10	Revision	00

Note (3) Fv=60Hz, VDD=3.3V, DC Current

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

昆山龙腾光电有限公司
## InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information			Page No.	21/27
Document No.		Issue date	2012/08/10	Revision	00

9.0 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 High-impedance state or low level when VDD is off.

Figure 15 Power Sequence
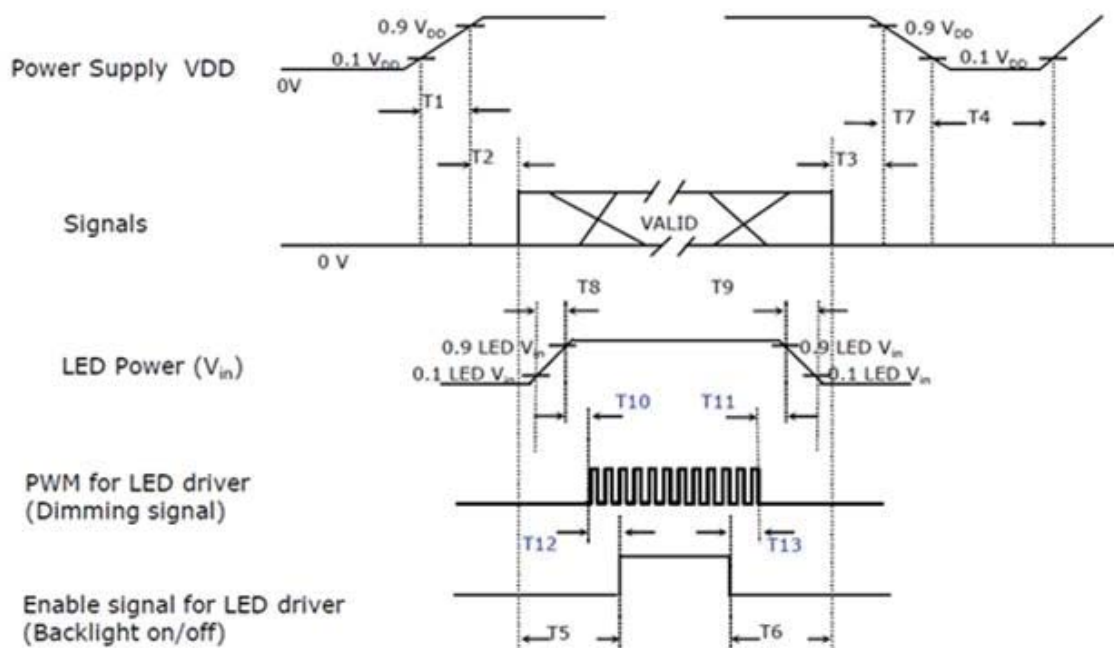
Power ON/OFF Sequence

| Timing (ms)	Remarks
$0.5 < T1 \leq 10$	V_{DD} rising time from 10% to 90%
$0 < T2 \leq 50$	Delay from V_{DD} to valid data at power ON
$0 < T3 \leq 50$	Delay from valid data OFF to V_{DD} OFF at power Off
$500 \leq T4$	V_{DD} OFF time for Windows restart
$200 \leq T5$	Delay from valid data to B/L enable at power ON
$200 \leq T6$	Delay from valid data off to B/L disable at power Off
$0 < T7 \leq 10$	V_{DD} falling time from 90% to 10%
$0.5 < T8 \leq 10$	LED V_{in} rising time from 10% to 90%
$0.5 < T9 \leq 10$	LED V_{in} falling time from 90% to 10%
$0 \leq T10$	Delay from LED driver Vin rising time 90% to PWM ON
$0 \leq T11$	Delay from PWM Off to LED driver Vin falling time 10%, Must Keep rule
$0 \leq T12$	Delay from PWM ON to B/L Enable ON, Must Keep rule
$0 \leq T13$	Delay from B/L Enable Off to PWM Off

昆山龙腾光电有限公司

IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	22/27
Document No.		Issue date　2012/08/10	Revision	00

10.0 Mechanical Characteristics

10.1 Outline Drawing

Figure 16 Reference Outline Drawing (Front Side) (Tentative)
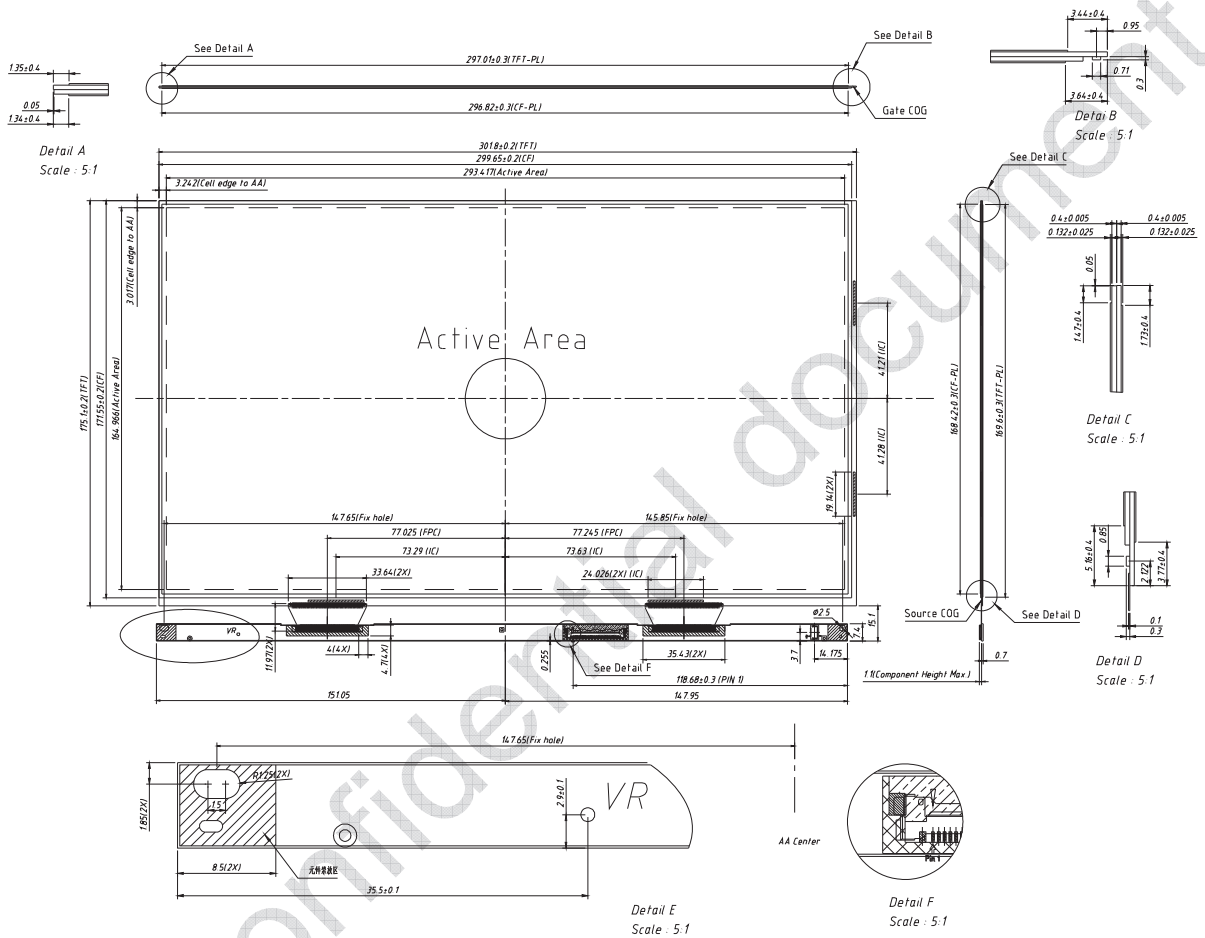
昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	23/27
Document No.		Issue date　2012/08/10	Revision	00

10.2 Dimension Specifications

Table 12 Panel Dimension Specifications

Parameter			Unit
Width		301.8	mm
Height		175.1	mm
Thickness	Glass(Cell)	1.08	mm
	PCB	0.7(Max.)	mm
	Component	1.1	mm
Weight		144.43(Max.)	g

昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	24/27
Document No.		Issue date	2012/08/10	Revision	00

11.0 Package Specification
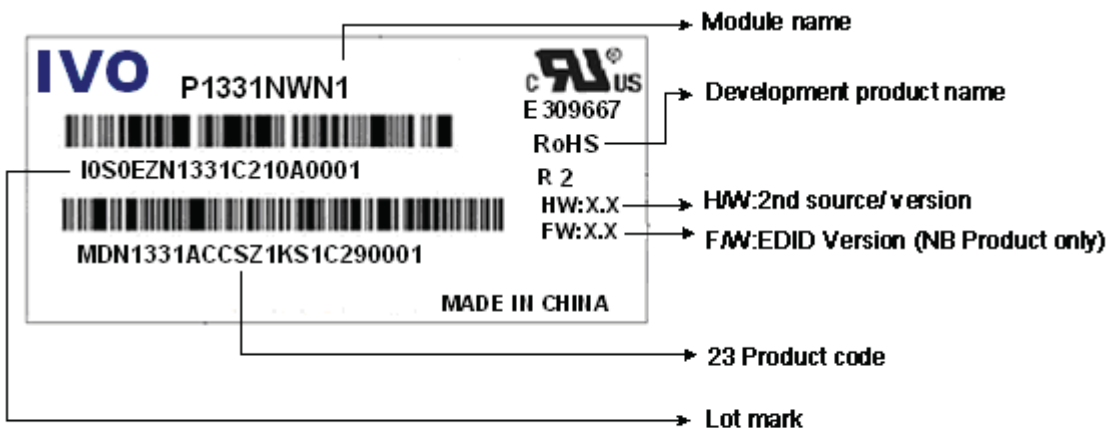TBD

昆山龙腾光电有限公司

InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	25/27
Document No.		Issue date	2012/08/10	Revision	00

12.0 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

12.0 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

昆山龙腾光电有限公司
IVO InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	26/27
Document No.		Issue date	2012/08/10	Revision	00

code 3,4,5,6,7: IVO internal panel name.

code 8,9,10,13,16: IVO internal flow control code.

code 11,12: Cell location Suzhou defined as "SZ".

code 14 ,15: Panel 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.

昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information			Page No.	27/27
Document No.		Issue date	2012/08/10	Revision	00

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 9.0 "Power on/off sequence"

昆山龙腾光电有限公司
InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	P133NWN1 R2 Product Information		Page No.	28/27
Document No.		Issue date　2012/08/10	Revision	00

(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.