SPECIFICATION

PRODUCT NO. : **TCXD101IBLON-132**
VERSION : **Ver 1.0**
ISSUED DATE : **2023-06-06**

This modue is RoHS compliant

FOR CUSTOMER: _____

□: APPROVAL FOR SPECIFICATION

■: APPROVAL FOR SAMPLE

DATE	APPROVED BY

Xinli Optoelectronics :

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Revision	Description	Date
1.0	Initial Release	2023/06/06

1.0 General Descriptions

1.1 Introduction

The TCXD101IBLON-132 is a Color Active Matrix Liquid Crystal Display. The matrix uses a-Si Thin Film Transistor as a switching device. This TFT LCD has a 10.1 inch diagonally measured active display area with WXGA resolution (1,280 horizontal by 800 vertical pixels array).

1.2 Features

- ■ Supported WXGA Resolution
- ■ LVDS Interface
- ■ Wide View Angle
- ■ Compatible with RoHS Standard

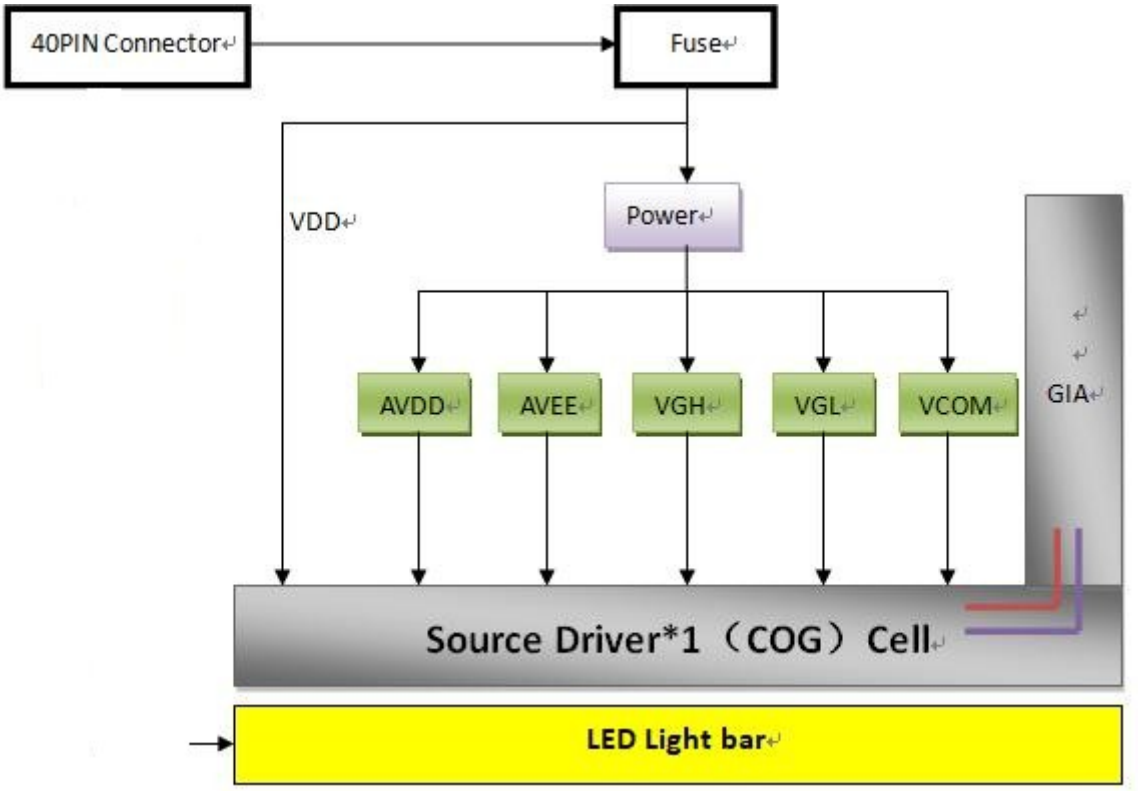
1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	10.1	inch
Module Outline	230 x 149.2 x 6.25	
Active Area (H x V)	216.96 x 135.6	mm
Number of Pixels (H x V)	1280x800	-
Pixel Pitch (H x V)	0.1695×0.1695	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally Black	-
White Luminance	(1000) (Typ.)	cd /m^2
Contrast Ratio	800 (Typ.)	-
Response Time	25 (Typ.)	ms
Input Voltage	3.3 (Typ.)	V
power consumption	1.0(Max.)@White Pattern(only for LCD)	W
Weight	TBD	g
Electrical Interface (Logic)	LVDS	-
Support Color	16.7 M	-
NTSC	45 (Typ.)	%
Viewing Direction	All	-

1.4 Functional Block Diagram

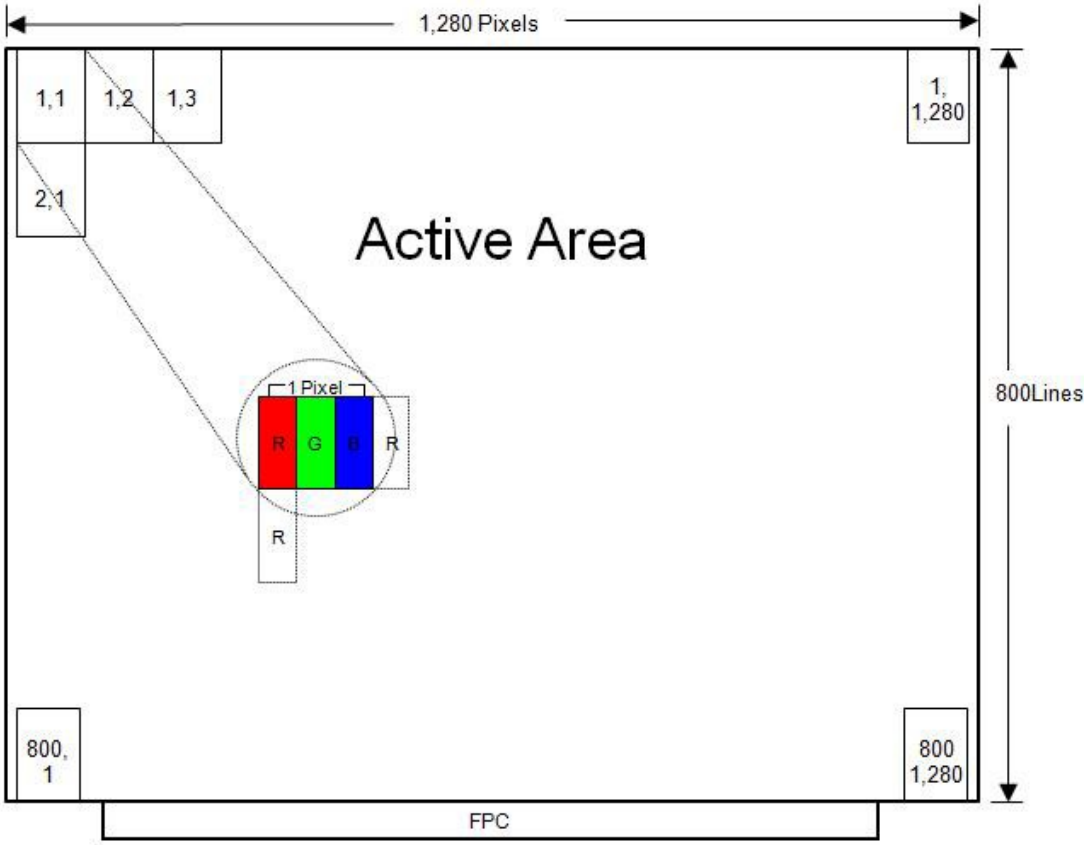
Figure 1 shows the functional block diagram of the LCD open-cell.

Figure 1 Block Diagram



1.5 Pixel Mapping

Figure2 Pixel Mapping



2.0 Absolute Maximum Ratings

Table 1 Electrical & Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Logic Supply Voltage	V_{DD}	-0.3	4	V	
Logic Input Signal Voltage	V_{Signal}	-0.3	4	V	
Operating Temperature	T_{gs}	-20	70	℃	(Front and rear surface)
Storage Temperature	T_a	-30	80	℃	

Note (1) All the parameters specified in the table are absolute maximum rating values that may cause faulty operation or unrecoverable damage, if exceeded. It is recommended to follow the typical value.

Note (2) All the contents of electro-optical specifications and display fineness are guaranteed under Normal Conditions. All the display fineness should be inspected under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55±10%RH.

Note (3) Unpredictable results may occur when it was used in extreme conditions. T_a= Ambient Temperature, T_{gs}= Glass Surface Temperature. All the display fineness should be inspected under normal conditions.

Note (4) Temperature and relative humidity range are shown in the figure below. Wet bulb temperature should be lower than 57.8℃, and no condensation of water. Besides, protect the open-cell from static electricity.

3.0 Optical Characteristics

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

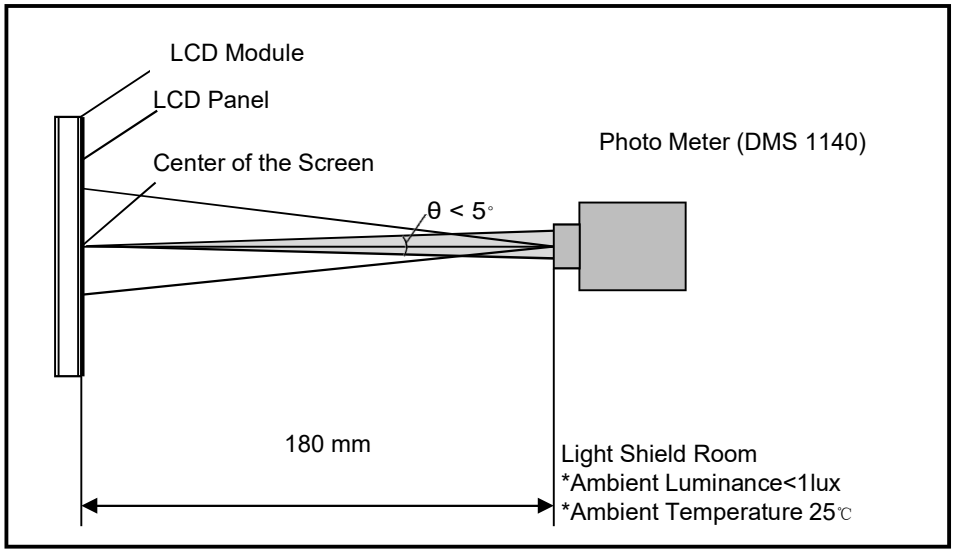
Table 2 Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle （CR≥10）	Horizontal	θ x+	75	85	-	degree	(1),(2),(3),(4),(8)
		θ x-	75	85	-		
	Vertical	θ y+	75	85	-		
		θ y-	75	85	-		
Contrast Ratio	Center		600	800	-	-	(1),(2),(4),(8) θx=θy=0°
Response Time	Rising + Falling		-	25	50	ms	(1),(2),(5),(8) θx=θy=0°
Color Chromaticity (CIE1931)	Red x		Typ. -0.05	TBD	Typ. +0.05	-	(1),(2),(3),(8) θx=θy=0°
	Red y			TBD		-	
	Green x			TBD		-	
	Green y			TBD		-	
	Blue x			TBD		-	
	Blue y			TBD		-	
	White x			TBD		-	
	White y			TBD		-	
NTSC	-		42	45	-	%	(1),(2),(3),(8) θx=θy=0°
White Luminance	Center		800	1000	-	cd/m2	(1),(2),(6),(8) θx=θy=0°
Luminance Uniformity	9 Points		(70)	(75)	-	%	(1),(2),(7),(8) θx=θy=0°

Note (1) Measurement Setup:

The LCD module should be stabilized at given ambient temperature (25℃) for 30 minutes to avoid abrupt temperature changing during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 30 minutes in the windless room.

Figure 4 Measurement Setup



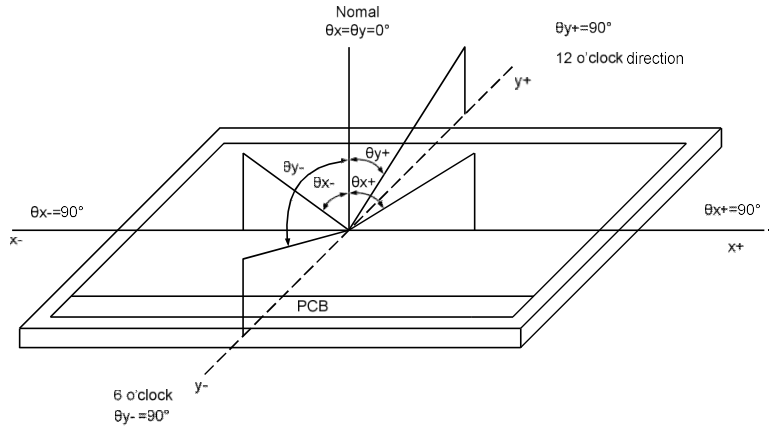
Note (2) The LED input parameter setting as:

V_LED: (12) V

PWM_LED: duty 100 %

Note (3) Definition of Viewing Angle

Figure 5 Definition of Viewing Angle



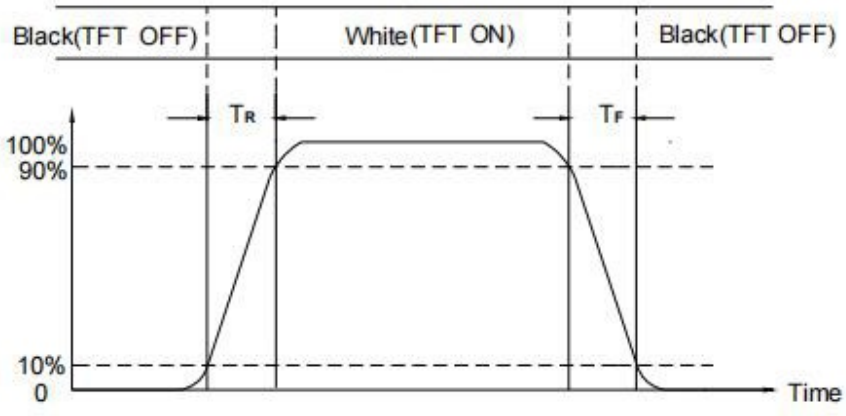
Note (4) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression:

Contrast Ratio (CR) = The luminance of White pattern/ The luminance of Black pattern

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 White pattern (Ref.: Active Area) D

isplay Luminance=L1(center point)

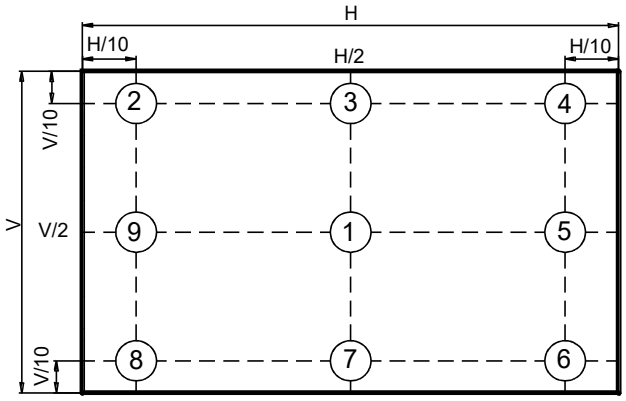
Note (7) Definition of Luminance Uniformity (Ref.: Active Area)

Measure the luminance of White pattern at 9 points.

Luminance Uniformity= Min.(L1, L2, ... L9) / Max.(L1, L2, ... L9)

H—Active Area Width, V—Active Area Height, L—Luminance

Figure 7 Measurement Locations of 9 Points



Note (8) All optical data are based on XINLI given system & nominal parameter & testing machine in this document.

4.0 Electrical Characteristics

4.1 Interface Connector

Table 3 Signal Connector Type

Item	Description
Manufacturer / Type	IPEX / 20455-040E-66

Table 4 Signal Connector Pin Assignment

Pin #	Signal Name	Description	Remarks
1	NC	No Connection	-
2	VDD	Power supply	-
3	VDD	Power supply	-
4	VDD_EDID	VDD_EDID	-
5	SCL_EDID	SCL_EDID	-
6	SDA_EDID	SDA_EDID	-
7	NC	No Connection	-
8	LV0N	-LVDS Differential Data Input	-
9	LV0P	+LVDS Differential Data Input	
10	GND	Ground	-
11	LV1N	-LVDS Differential Data Input	-
12	LV1P	+LVDS Differential Data Input	
13	GND	Ground	-
14	LV2N	-LVDS Differential Data Input	-
15	LV2P	+LVDS Differential Data Input	
16	GND	Ground	-
17	LVCLKN	-LVDS Differential Clock Input	-
18	LVCLKP	+LVDS Differential Clock Input	
19	GND	Ground	-
20	LV3N	-LVDS Differential Data Input	-
21	LV3P	+LVDS Differential Data Input	
22	GND	Ground	-
23	LED_GND	Ground for LED Driving	-
24	LED_GND	Ground for LED Driving	-
25	LED_GND	Ground for LED Driving	-
26	NC	No Connection	-
27	LED_PWM	PWM Input Signal for LED Driver	-
28	LED_EN	LED Enable Pin	-

29	NC	No Connection	-
30	NC	No Connection	-
31	LED_VCC	Power Supply for LED Driver	-
32	LED_VCC	Power Supply for LED Driver	-
33	LED_VCC	Power Supply for LED Driver	-
34	NC	No Connection	-
35	BIST	LCD Panel Self Test Enable, When it is not used, please don't connect to GND, connecting to Normal High(3.3V) is recommended	Active Low(0V) Normal High (3.3V)
36	CSB	Serial communication enables. (For XINLI use only)	-
37	SCL	Serial communication clock input. (For XINLI use only)	-
38	SDA	Serial communication data input. (For XINLI use only)	-
39	SCL_I2C	Serial communication clock input. (For XINLI use only)	-
40	SDA_I2C	Serial communication data input. (For XINLI use only)	-

4.2 Signal Electrical Characteristics

4.2.1 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
Input voltage range(singled-end)	RXVIN	0.7		1.7	V	-
Magnitude Differential Input Voltage	$\|V_{ID}\|$	200	-	600	mV	-
Common Mode Voltage	V_{CM}	1	1.2	1.4	V	|VID|=0.2

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

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

Figure 9 Voltage Definitions

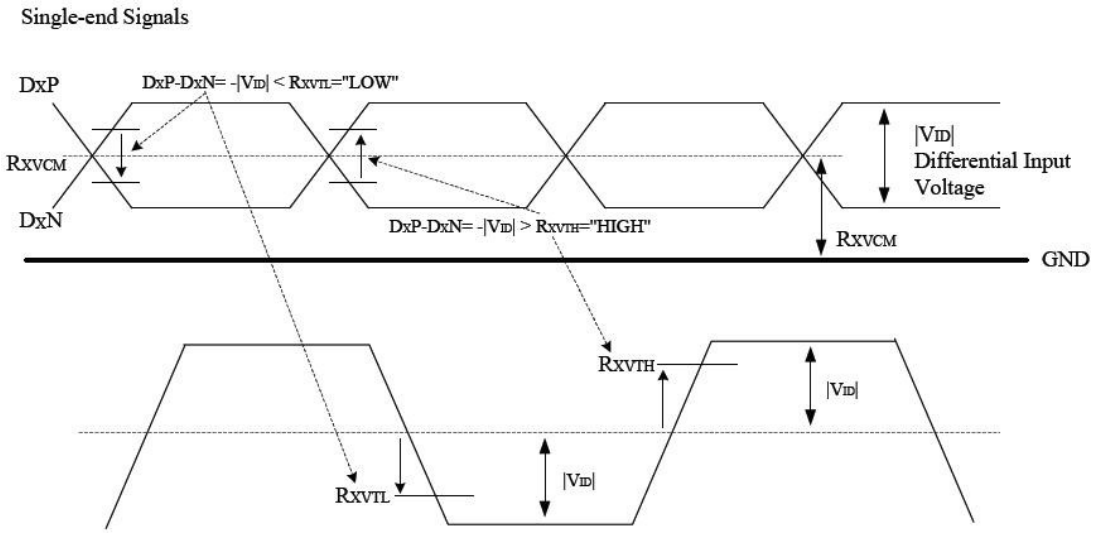
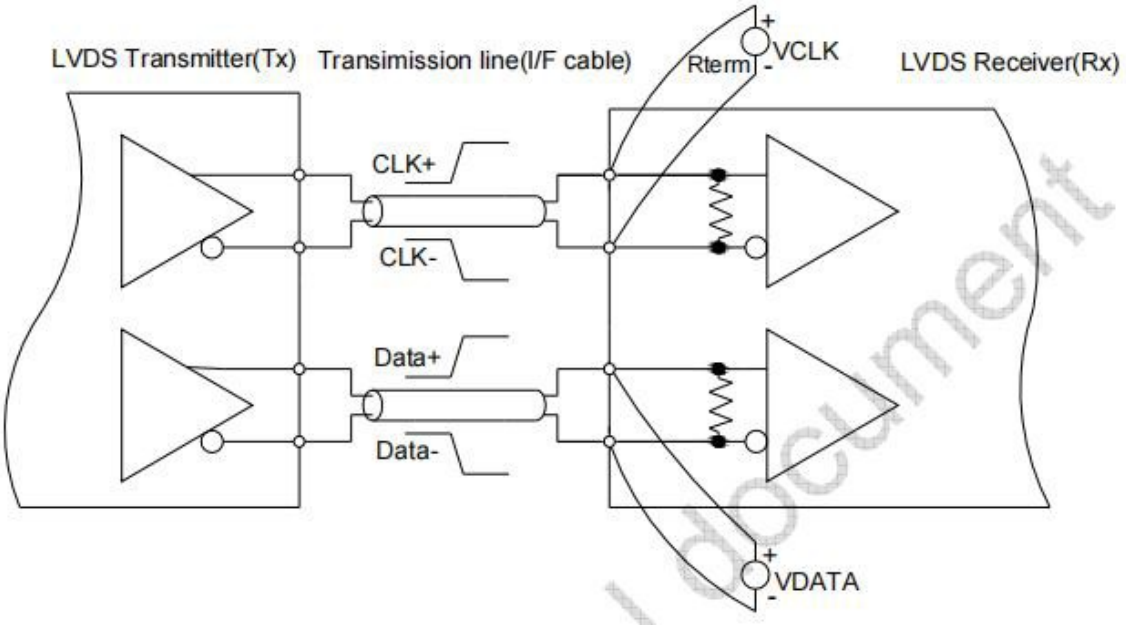


Figure 10 Measurement System



4.2.2 LVDS Receiver Internal Circuit

Figure 10 shows the internal block diagram of the LVDS receiver. This LCD module equips termination resistors for LVDS link.

Figure 11 LVDS Receiver Internal Circuit

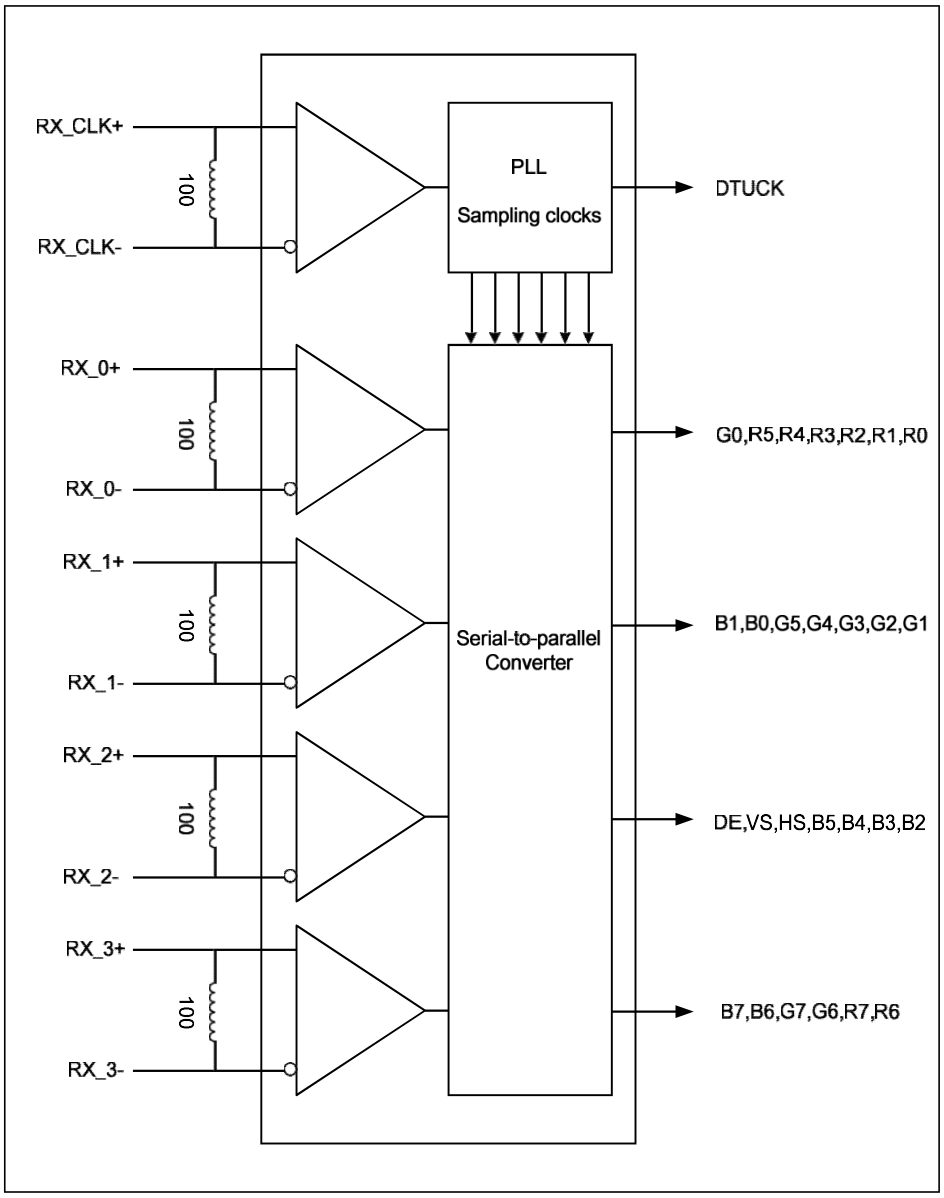
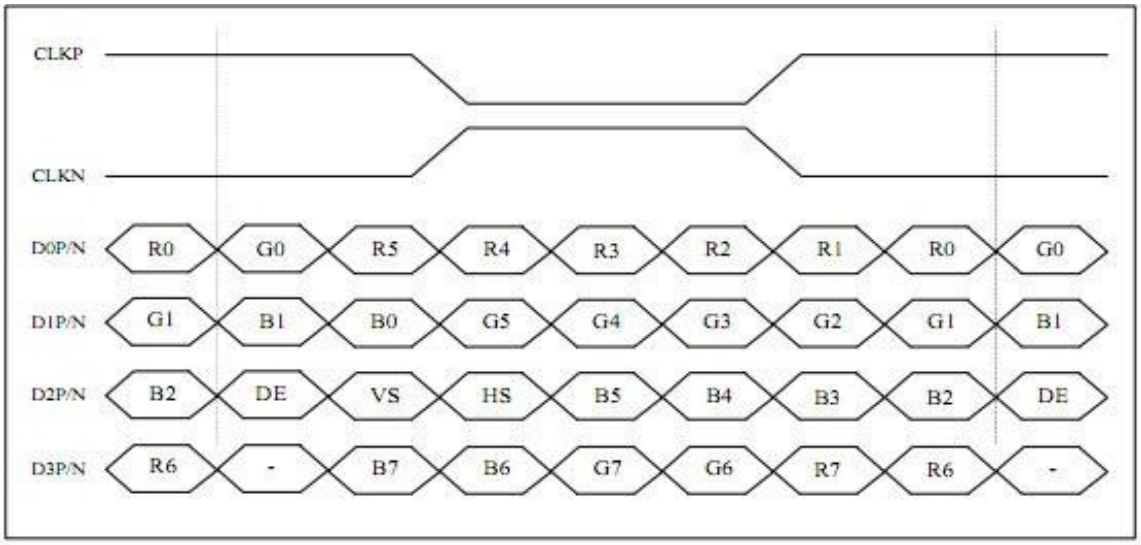


Figure 12 Data Mapping



4.3 Interface Timings

Table 8 Interface Timings

Parameter	Symbol	Min.	Typ.	Max.	Unit
LVDS Clock Frequency	Fclk	70.0	72.4	76.6	MHz
H Total Time	HT	1,410	1,440	1,470	Clocks
H Active Time	HA		1,280		Clocks
V Total Time	VT	828	838	868	Lines
V Active Time	VA		800		Lines
Frame Rate	FV	-	60	-	Hz

Note1：HT * VT *Frame Frequency≤(76.6) MHz

Note2: All reliabilities are specified for timing specification based on refresh rate of 60Hz.

4.4 Input Power Specifications

Input power specifications are as follows.

Table 9 Input Power Specifications

Parameter		*Symbol*	*Min.*	*Typ.*	*Max.*	*Unit*	*Note*
System Power Supply							
LCD Drive Voltage (Logic)		VDD	3.0	3.3	3.6	V	(1),(2),(3)
VDD Current	White pattern	I_{DD}	-	-	TBD	A	(1),(4)
VDD Power Consumptio n		P_{DD}	-	-	TBD	W	
Rush Current		I_{Rush}	-	-	1.5	A	(1),(5)
Allowable Logic/LCD Drive Ripple Voltage		V_{VDD-RP}	-	-	300	mV	(1)

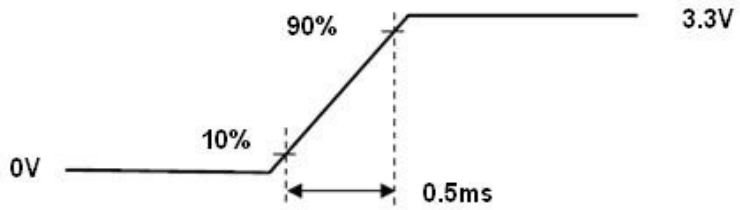
Note (1) All of the specifications are guaranteed under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55± 10%RH.

Note (2) All of the absolute maximum ratings specified in the table, if exceeded, may cause faulty operation or unrecoverable damage. It is recommended to follow the typical value.

Note (3) The specified VDD current and power consumption are measured under the VDD = 3.3 V, F_V = 60 Hz condition and white pattern.

Note (4) The figure below is the measuring condition of VDD. Rush current can be measured when T_{RUSH} is 0.5 ms.

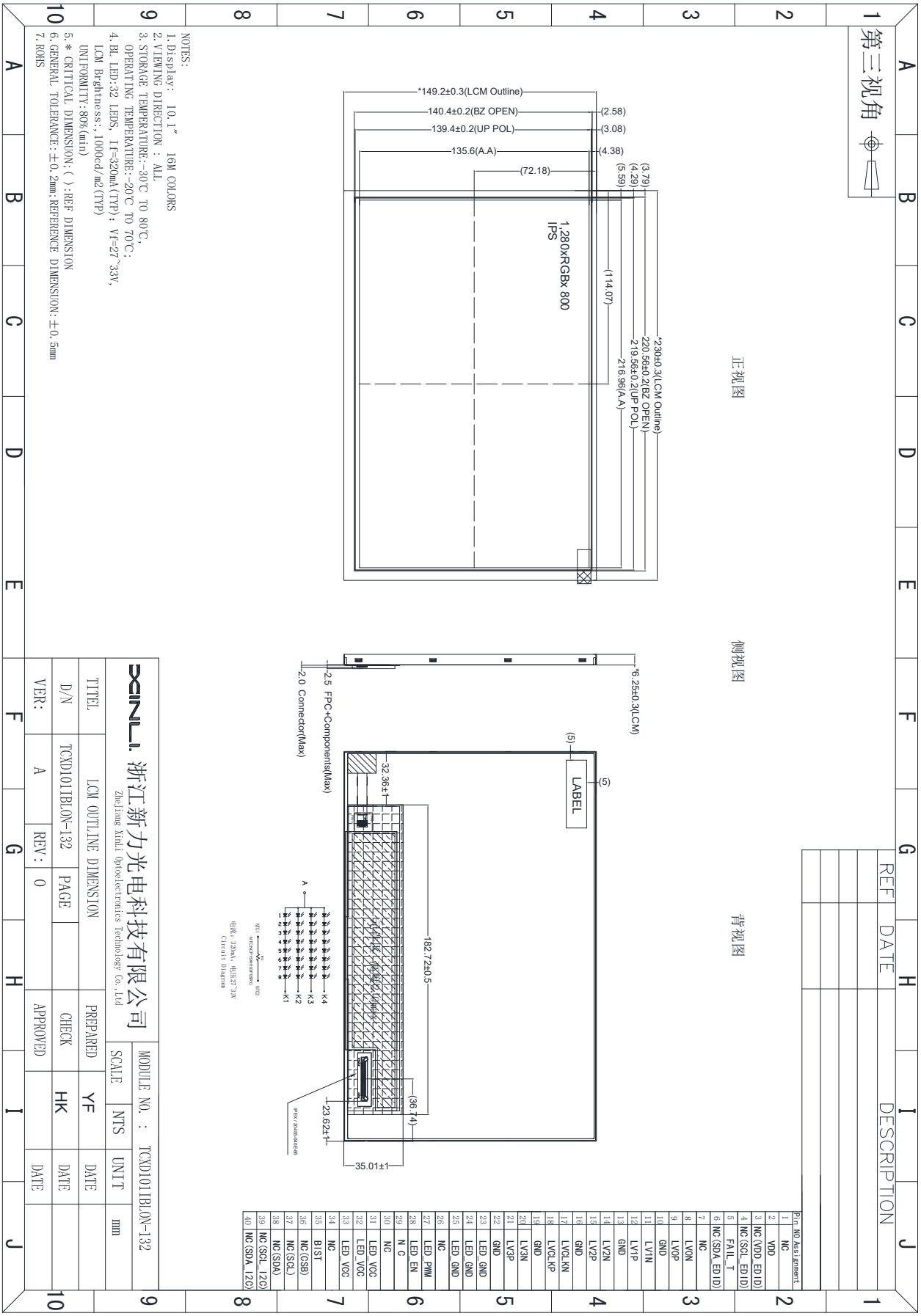
Figure 13 VDD Rising Time



4.5 Backlight Characteristics

Item	syb	Min	Typ	Max	Unit	Condition
LED VCC Voltage	Vf	5	12	24	V	
Number of LED	-		32		pcs	-
LED Forward Voltage	-	2.8	3	3.6	V	-
LEDForward Current	-	-	80mA	-	mA	-
LED Enable	-	0	-	3.3	V	-
Input PWM Frequency	-	0	-	3.3	V	-
PWM Dimming Frequency	fpwm	0.1	-	20	KHz	
LED life-span	-	-	(30000)	-	Hrs	-

5.0 Mechanical Dimension



6.0 ReliabilityConditions

Table 12 Reliability Condition

Item		Package	Test Conditions		Note
High Temperature/High Humidity Operating Test		Open-cell	T_{gs}=60℃, 90%RH, 240 hours		(1),(2),(3), (4)
High Temperature Operating Test		Open-cell	T_{gs}=80℃, 240 hours(Front and rear surface)		
Low Temperature Operating Test		Open-cell	T_a=-30℃, 240 hours		
Low Temperature Storage Test		Open-cell	T_a=-30℃, 240 hours		(1), (3),(4)
High Temperature Storage Test		Open-cell	T_a=80℃，240 hours		
ESD Test	Operating	Open-cell	Contact	±4KV, 150pF(330Ohm)	(1),(2),(5)
			Air	±4KV, 150pF(330Ohm)	

Note (1) A sample can only have one test. Outward appearance, image quality and optical data can only be checked at normal conditions according to the XINLI document before reliable test. Only check the function of the open-cell after reliability test.

Note (2) The setting of electrical parameters should follow the typical value before reliability test. Note (3) During the test, it is unaccepted to have condensate water remains. Besides, protect the open-cell from static electricity.

Note (4) The sample must be released for 24 hours under normal conditions before judging. Furthermore, all the judgment must be made under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55± 10%RH. T_a= Ambient Temperature, T_{gs}= Glass Surface Temperature.

Note (5) It could be regarded as pass, when the open-cell recovers from function fault caused by ESD after resetting.

7.0 Package Specification

TBD

8.0 General Precaution

8.1 Using Restriction

This product is not authorized for using in life supporting systems, aircraft navigation control systems, military systems and any other appliance where performance failure could be life-threatening or lead to be catastrophic.

8.2 Operation Precaution

(1) The LCD product should be operated under normal conditions.
Normal conditions are defined as below:

Temperature: 25℃ Humidity:
55±10%

Display pattern: continually changing pattern (Not stationary)

(2) Brightness and response time depend on the temperature. (It needs more time to reach normal brightness in low temperature.)

(3) It is necessary for you to pay attention to condensation when the ambient temperature drops suddenly. Condensate water would damage the polarizer and electrical contacted parts of the open-cell. Besides, smear or spot will remain after condensate water evaporating.

(4) If the absolute maximum rating value was exceeded, it may damage the open-cell.

(5) Do not adjust the variable resistor located on the open-cell.

(6) Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding may be important to minimize the interference.

(7) Image sticking may occur when the panel displayed the same pattern for long time.

(8) Do not connect or disconnect the open-cell in the “power on” condition. Power supply should always be turned on/off by the “power on/off sequence”

(9) Ultra-violet ray filter is necessary for outdoor operation.

8.3 Mounting Precaution

(1) All the operators should be electrically grounded and with Ion-blown equipment turning on when mounting or handling. Dressing finger-stalls out of the gloves is important for keeping the panel clean during the incoming inspection and the process of assembly.

(2) It is unacceptable that the material of cover case contains acetic or chloric. Besides, any other material that could generate corrosive gas or cause circuit break by electro-chemical reaction is not desirable.

(3) Do not damage the PCBA. And it is recommended to use packing trays while carrying

(4) The mounting structure should be taken into consideration so that uneven force (ex. Twisted stress) is not applied to the open-cell. The case on which an open-cell is mounted should have sufficient strength so that external force is not transmitted to the open-cell directly.

(5) It is obvious that you should adopt radiation structure to satisfy the temperature specification.

(6) A transparent protective film needs to be attached to the surface of the open-cell.

(7) Do not press or scratch the polarizer exposed with anything harder than HB pencil lead. In addition, don't touch the pin exposed with bare hands directly.

(8) Clean the polarizer gently with absorbent cotton or soft cloth when it is dirty.

(9) Wipe off saliva or water droplet as soon as possible. Otherwise, it may cause deformation and fading of color.

(10) Desirable cleaners are IPA (Isopropyl Alcohol) or hexane. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.

(11) Do not disassemble or modify the open-cell. It may damage sensitive parts in the LCD open-cell, and cause scratches or dust remains. XINLI does not warrant the open-cell, if you disassemble or modify the open-cell.

8.4 Handling Precaution

(1) Static electricity will generate between the film and polarizer, when the protection film is peeled off. It should be peeled off slowly and carefully by operators who are electrically grounded and with Ion-blown equipment turning on. Besides, it is recommended to peel off the film from the bonding area.

(2) The protection film is attached to the polarizer with a small amount of glue. When the open-cell with protection film attached is stored for a long time, a little glue may remain after peeling.

(3) If the liquid crystal material leaks from the panel, keep it away from the eyes and mouth. In case of contact with hands, legs or clothes, it must be clean with soap thoroughly.

8.5 Storage Precaution

When storing the open-cell as spares for long time, the following precautions must be executed.

(1) Store them in a dark place. Do not expose to sunlight or fluorescent light. Keep the temperature between 5℃ and 35℃ at normal humidity.

(2) The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.

(3) It is recommended to use it in a short-time period, after it's unpacked. Otherwise, we would not guarantee the quality.

8.6 Others

When disposing LCD open-cell, obey the local environmental regulations.