SPECIFICATION

PRODUCT NO. : **TCXD088ABLGA-1**
VERSION   :   **Ver 1.3**
ISSUED DATE : **2022-11-09**

This module uses ROHS2.0 material

FOR CUSTOMER：_____

O：**APPROVAL FOR SPECIFICATION**
■：**APPROVAL FOR SAMPLE**

DATE	APPROVED BY

Xinli Optoelectronics ：

Presented by	Reviewed by	Organized by
黃文博	趙春曉	王俊傑

Note

1.Xinli Optronics reserves the right to make changes without further notice to any products herein to improve

 reliability, function or design.

2.All rights are reserved. No one is permitted to reproduce or duplicate the whole or part of this document

without Xinli Optronics' permission.

1. Revision Recode

Revision	Description	Date
1.0	Initial Release	2022/8/11
1.1	Modify power on / off timing and LVDS Signal Timing	2022/8/17
1.2	Modify power on / off timing	2022/8/22
1.3	FPC changed Gold finger face synchronously modified shape	2022/11/09

2. General Description and Features

The 8.8 inch Module named TCXD088ABLGA-1 is a-Si TFT-LCD module, which is the type of transmissive. It is consisted of TFT-LCD Panel, Driver IC, FPC and Back-Light unit. Features of this product are listed in the following table.

NO	Item	Contents	Unit
(1)	Module Outsize	231.37*100.92*6.88	mm
(2)	LCD Active area	209.28 * 78.48	mm
(3)	Dot Number	1280*RGB*480	/
4)	Pixel size	0.1635*0.1635	mm
(5)	LCD type	TFT Transmissive	/
(6)	Display Color	16.7M	/
(7)	Viewing direction	Free(IPS type)	O'clock
(8)	Backlight Type	28-chip LEDs	/
(9)	Power Supply	3.3（TYP）	V
(10)	Interface type	LVDS Interface	/
(11)	Module weight	300	g
(12)	NTSC	75（TYP）	%

3. Mechanical Dimension
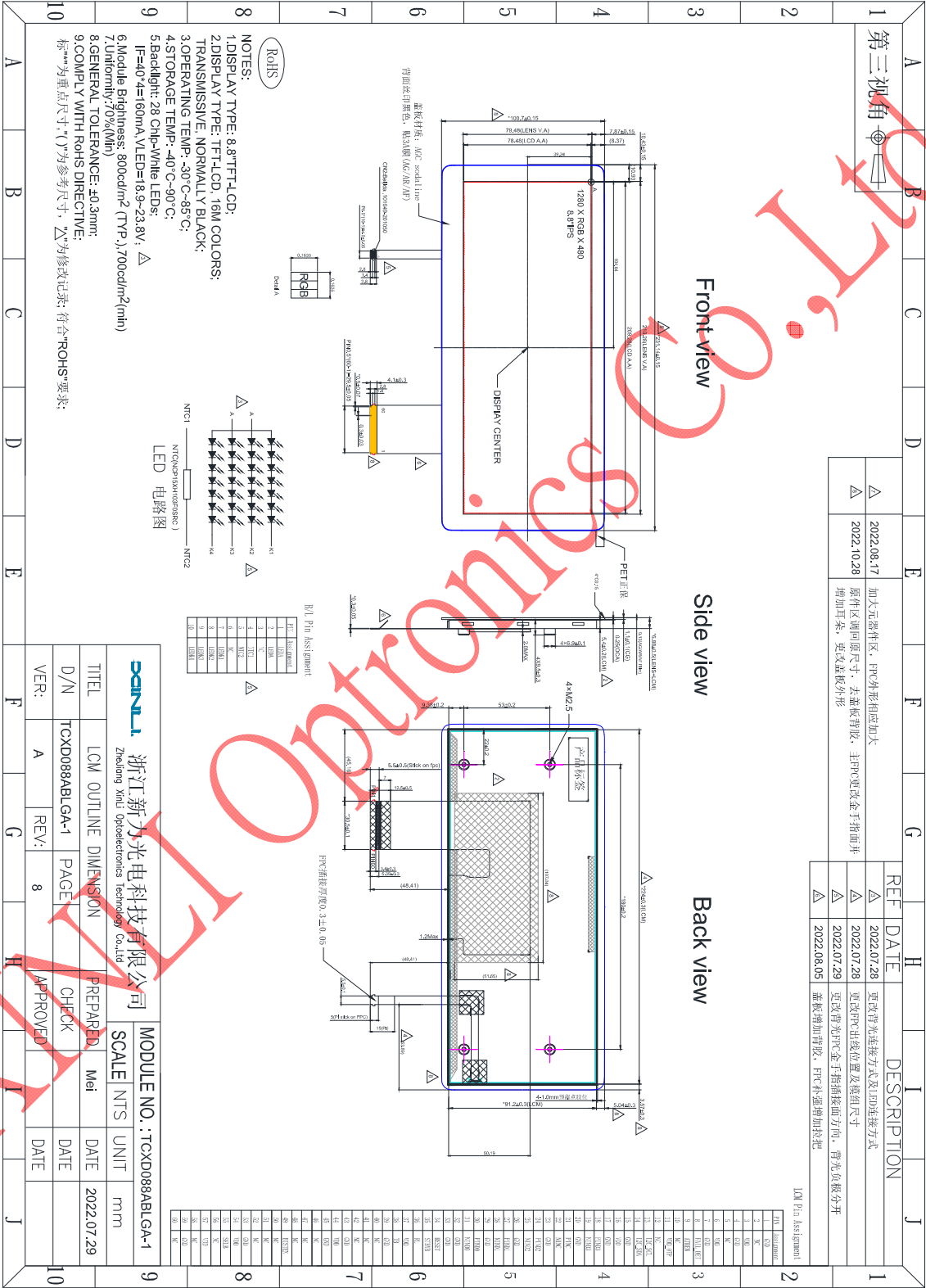
4. Interface Pin Connection

4.1 CN1 The LCD Module Electrical Interface Connection

<div align="center">

Recommended Connector typ: IMSA-9634S-60Y902_60PIN_0.5mm

</div>

NO	Symbol	Level	Description
1	GND	P	Ground
2	NC	-	No Connection
3	VDD	P	Digital Power(+3.3V)
4	GND	P	Ground
5	NC	-	No Connection
6	VDD	P	Digital Power(+3.3V)
7	GND	P	Ground
8	FAIL_DET	O	Fail detection signal output。 FAIL_DET=H，on normal condition FAIL_DET=L，on error condition
9	ATREN	I	Enable auto reload OTP / EEPROM every 60 frames. When stop reload or changing register values by SPI/I2C, ATREN should be kept 0. ATREN=H: Enable auto-reload OTP/EEPROM - ATREN=L: Disable auto-reload OTP/EEPROM For XINLI use only
10	NC	-	No Connection
11	VDD_OTP	P	Power input for OTP programming (8.6V). Leave this pin open or connect it to VCC1 when not programming OTP For XINLI use only
12	NC	-	No Connection
13	I2C_SCL	I	Serial interface clock input for I2C interface
14	I2C_SDA	I/O	Serial Interface address and data input / output for I2C interface
15	GND	P	Ground
16	VDD	P	LVDS Power(+3.3V)
17	GND	P	Ground
18	PIND3	I	Positive LVDS differential data input
19	NIND3	I	Negative LVDS differential data input

20	GND	P	Ground
21	PINCLK	I	Positive LVDS differential CLK input
22	NINCLK	I	Negative LVDS differential CLK input
23	GND	P	Ground
24	PIND2	I	Positive LVDS differential data input
25	NIND2	I	Negative LVDS differential data input
26	GND	P	Ground
27	PIND1	I	Positive LVDS differential data input
28	NIND1	I	Negative LVDS differential data input
29	GND	P	Ground
30	PIND0	I	Positive LVDS differential data input
31	NIND0	I	Negative LVDS differential data input
32	GND	P	Ground
33	GND	P	Ground
34	RESET	I	Global Reset pin. Active low, If RESET connected to GND, the chip is in reset state. This pin must meet the sequence of power on/off.
35	STBYB	I	Standby mode setting pin. Active low, Timing controller, output buffer, DAC and power circuit all off when STBYB is low This pin must meet the sequence of power on/off.
36	RL	I	Horizontal shift direction (source output) selection RL=H, Forward (SOUT1→ SOUT2→...→SOUT1920) RL=L, Reverse (SOUT1920→SOUT1919→...→S1)
37	VDD	P	Digital Power(+3.3V)
38	TB	I	Vertical shift direction(Gate output) selection TB = H, Forward,Top → Bottom TB = L, Reverse, Bottom → Top
39	GND	P	Ground
40	NC	-	No Connection
41	NC	-	No Connection
42	NC	-	No Connection
43	GND	P	Ground
44	VDD	P	Digital Power(+3.3V)
45	GND	P	Ground
46	NC	-	No Connection

47	NC	-	No Connection
48	NC	-	No Connection
49	BISTEN	-	Enable built-in self test (BIST) function BISTEN=H, BIST mode BISTEN=L, Normal mode (Please leave it to GND when normal operation)
50	NC	-	No Connection
51	NC	-	No Connection
52	NC	-	No Connection
53	GND	P	Ground
54	VDD	P	Digital Power(+3.3V)
55	SELB	I	8/6 bit mode selection SELB=H, 8bit SELB=L, 6bit
56	NC	-	No Connection
57	VDD	P	Digital Power(+3.3V)
58	NC	-	No Connection
59	GND	P	Ground
60	NC	-	No Connection

Remark:

1. For "I/O", "I" is input; "O" is output; "P" is power ; "C" is passive

Scan direction setting as the picture below;
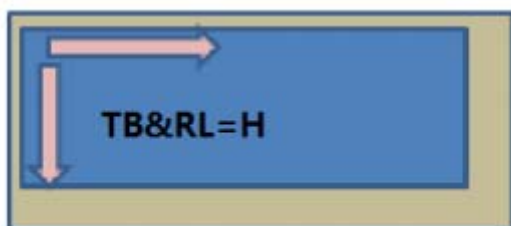
4.2 CN2

LED Board Pin Assignment:

CN2: FH28-10S-0.5SH (HRS)

NO	Symbol	Level	Description
1	PLED	P	LED anode power supply
2	PLED	P	LED anode power supply
3	NC	-	Keep floating
4	NTC1	O	LED Foil NTC
5	NIC2	O	LED Foil NTC
6	NC	-	Keep floating
7	NLED1	P	LED cathode power supply
8	NLED2	P	LED cathode power supply
9	NLED3	P	LED cathode power supply
10	NLED4	P	LED cathode power supply
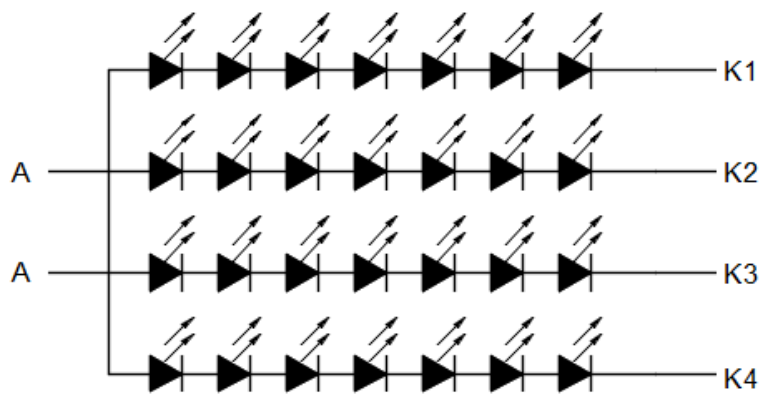
LED 电路图

5. Maximum Rating

Item	Symbol	Rating	Unit
Operating temperature	Top	-30 to 85	℃
Storage temperature	Tst	-40 to 90	℃
Power supply	VDD	-0.3V ~ 4.0	V

6.Electrical Characteristics

6.1 Description Dieplay Electronics

Ta=25℃

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Power supply		VDD	-	3.0	3.3	3.6	V
Power Supply Input Current		I_{DD}	-	-	200	400	mA
Logic input signal Voltage	H level	V_{IH1}	-	0.7*VDD	-	VDD	V
	L level	V_{IL1}		GND	-	0.3*VDD	V

Notes :

1: Current Max is based "Gray 255"; Current Typ is based "Vertical Color Bar" ；

6.2 Power on/off Timing Sequence

	MIN	TYP	MAX	unit
T1	0.5	-	20	ms
T2	100	-	-	us
T3	14	-	-	ms
T4	0	-	50	ms
T5	1	10	-	ms
T6	-	33	83	ms
T7	10	-	-	ms
T8	500	-	-	ms
T9	1	-	16	ms
T10	0.5	-	30	ms

T1:VCC RISE TIME
T2:VCC-RESTB
T3:RESTB-STBYB
T4:VCC-DATA
T5:DATA-STBYB
T6:STBYB-VCC
T7:RESSTB-VCC
T8:VCC POWER OFF
T9:STBYB TO L -DATA
T10:VCC FALL TIME
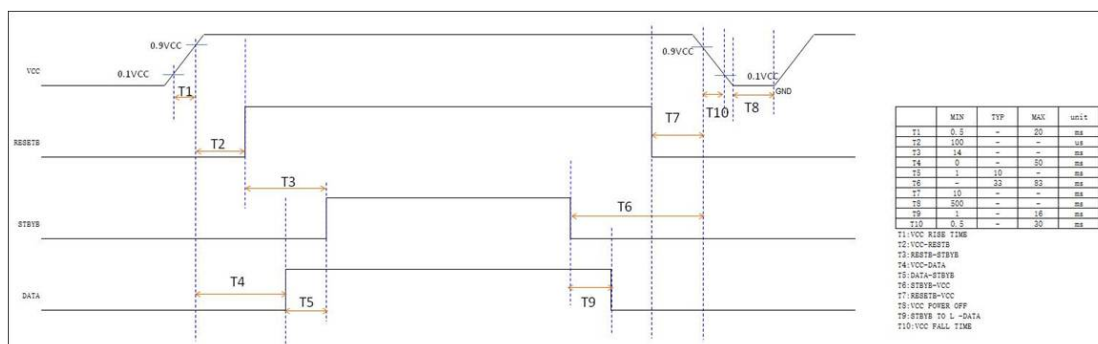
6.3.LVDS Signal Timing

Parameter	Symbol	Min	Typ	Max	Unit
Clock frequency	Rx FCLK	40.00	40.06	41.60	MHz
Horizontal Display Area	Thd		1280		DCLK
1horizontal line	Th	1342	1346	1398	
Vertical Display Area	Tvd		480		DCLK
1 vertical field	Tv	498	496	504	
Frame rate	FR		60		HZ

6.4. LVDS input

8 bit LVDS input
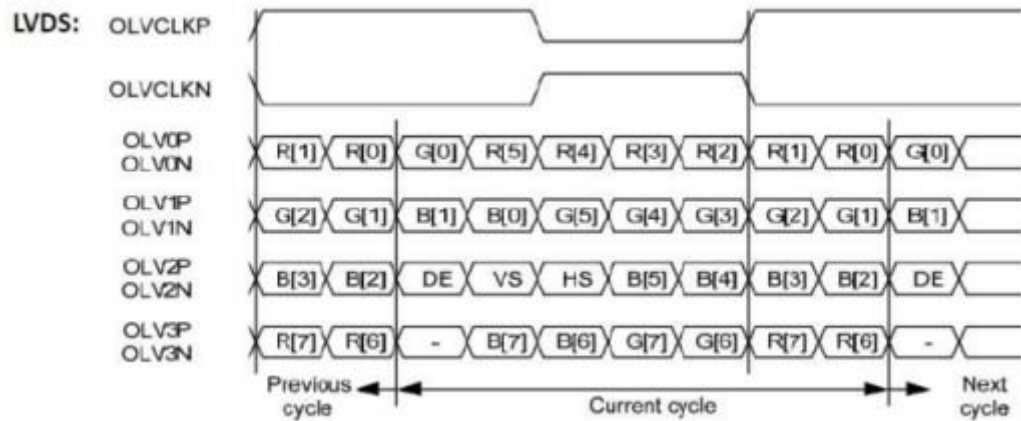
6.5. LVDS Characteristics

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Differential input high Threshold voltage	Vth	Vcm=1.2V	+0.10	-	-	V
Differential input low threshold voltage	Vtl	Vcm=1.2V	-	-	-0.10	V
Differential input common Mode voltage	V_{CM}	-	1	1.2	1.7-|Vid|/2	V
LVDS input voltage	V_{INLV}	-	0.7		1.7	V
Differential input voltage	|Vid|	-	0.1		0.6	V
Differential input leakage Current	Ilvleak	-	-10		+10	μA
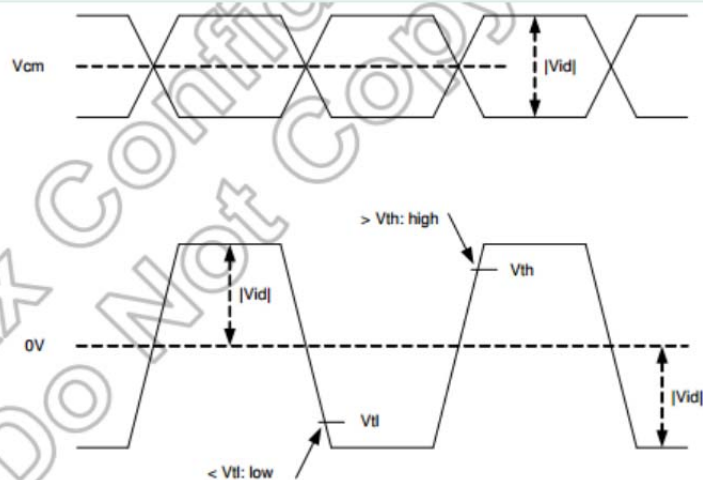
6.6.LVDS AC Characteristics

(VCC1=VCC1P=VCC2=VCCIF=3.0V to 3.6V, VSS1=VSS2=VSSA=0V, T_{OP}=-40~105°C)

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Clock frequency (1-port/2-port)	F_{LVCYC}	15	-	105/95	MHz
Clock period (1-port/2-port)	T_{LVCYC}	9.52/9.09	-	-	ns
1 data bit time	UI	-	1/7	-	T_{LVCYC}
Clock high time	T_{LVCH}	-	4	-	UI
Clock low time	T_{LVCL}	-	3	-	UI
Position 1	T_{POS1}	-0.2	0	0.2	UI
Position 0	T_{POS0}	0.8	1	1.2	UI
Position 6	T_{POS6}	1.8	2	2.2	UI
Position 5	T_{POS5}	2.8	3	3.2	UI
Position 4	T_{POS4}	3.8	4	4.2	UI
Position 3	T_{POS3}	4.8	5	5.2	UI
Position 2	T_{POS2}	5.8	6	6.2	UI
Input eye width	T_{EYEW}	0.6	-	-	UI
Input eye border	T_{EX}	-	-	0.2	UI
LVDS wake up time	T_{ENLVDS}	-	-	150	us
LVDS clock to clock skew	T_{skew_EO}	-1/7		1/7	UI
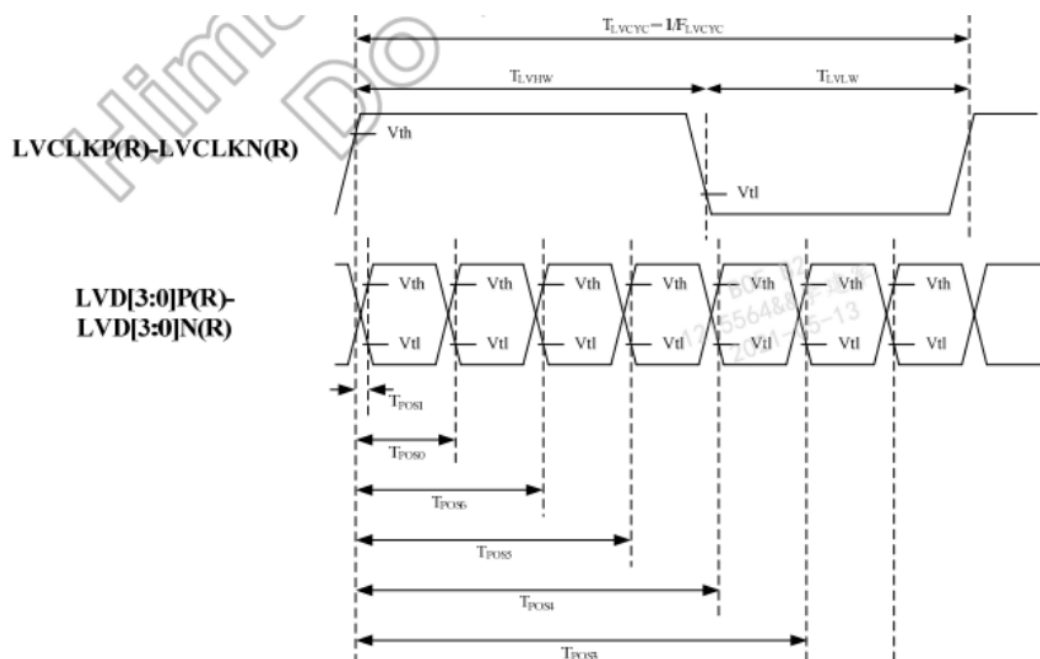
Single-ended:
LVD[3:0]P,
LVD[3:0]N
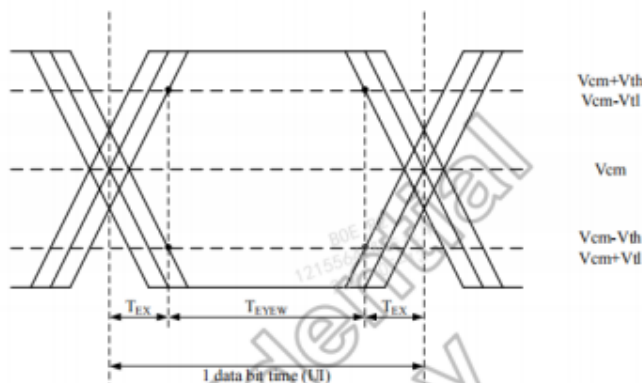
Differential:
LVD[3:0]P-LVD[3:0]N

STBYB

LVxP/N

Internal data

T_{ENLVDS}

LVDS wakeup time
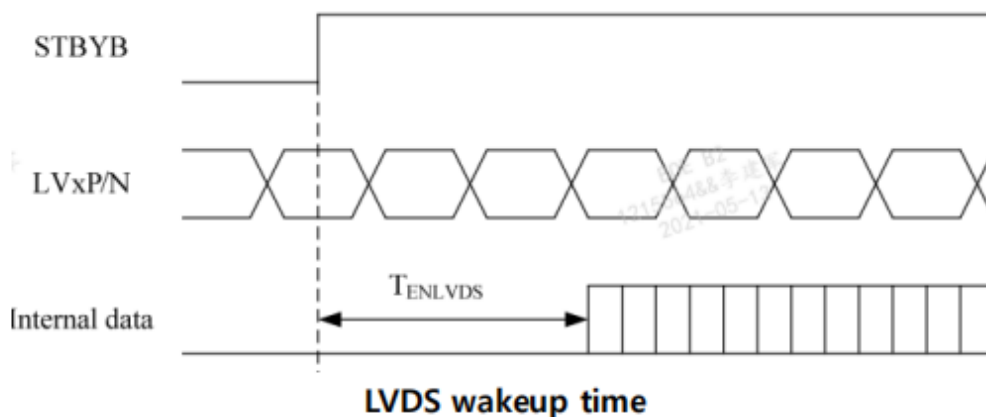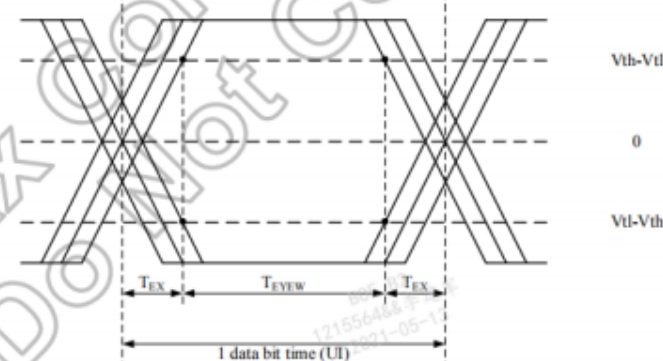
Note : AC and DS characteristics of the above LVDS is an acceptablespeci
fication for the driver IC, and the system output specification needs to be te sted and validated withthe entire module to meet the IC requirements .

7.Backlight Characteristics

Item	syb	Min	Typ	Max	Unit	Condition
Voltage	Vf	18.9	22.4	23.8	V	Note1
Number of LED	-	28			pcs	-
Life	-	-	30000	-	hrs	Note2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and IF 40mA*4=160mA.

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL = 160 mA. The LED lifetime could be decreased if operating IL is larger than 160mA.

8. Electro-Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Note
Response time		Tr+Tf	25℃	-	-	25	ms	4
			-20℃	-	-	200		
			-30℃	-	-	380		
Uniformity（Five point）		δ WHITE		75	80	-	%	7
Contrast ratio		Cr		900	1000	-	-	3 ,5
Surface Luminance		Lv		700	800	-	-	3 ,7
Viewing angle range	Horizontal	x+	CR > 10	80	85	-	deg	6
		x-		80	85	-	deg	
	Vertical	y+		80	85	-	deg	
		y-		80	85	-	deg	
Color filter chromaticity (x, y)	White	X	$\theta = \phi = 0°$	TBD	TBD	TBD	-	7
		Y		TBD	TBD	TBD		
	Red	X	$\theta = \phi = 0°$	TBD	TBD	TBD		
		Y		TBD	TBD	TBD		
	Green	X	$\theta = \phi = 0°$	TBD	TBD	TBD		
		Y		TBD	TBD	TBD		
	Blue	X	$\theta = \phi = 0°$	TBD	TBD	TBD		
		Y		TBD	TBD	TBD		

Note 1: Ambient temperature=25℃±2℃

Note 2: To be measured in the dark room with backlight unit.

Note 3: To be measured at the center area of panel with a viewing cone of 1 by Topcon luminance meter BM-7A, after 10 minutes operation (module).
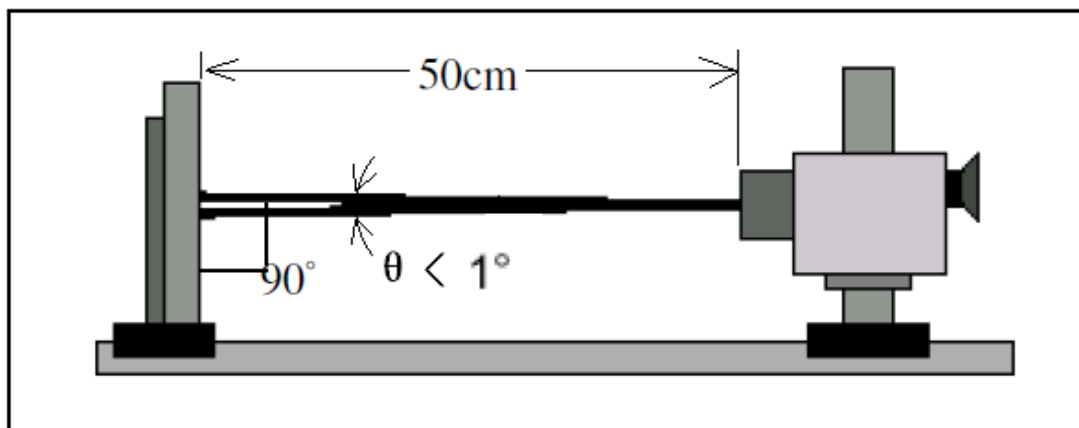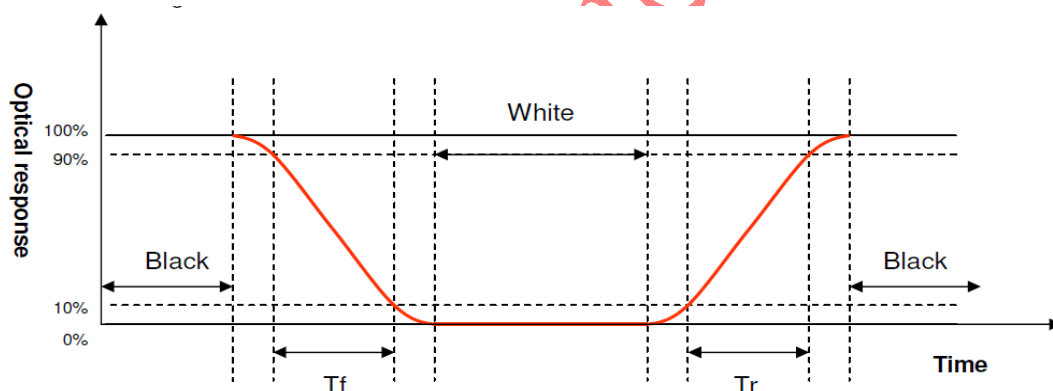
Note 4: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from "black" to "white" (rising time) and from "white" to "black" (falling time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes.

Refer to figure as below.



Note 5. Definition of contrast ratio:

Contrast ratio is calculated with the following formula:

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

Note 6. Definition of viewing angle

Viewing angle is the angle at which the contrast ratio is greater than 10 for TFT module. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface.

Normal:

θ =0°   **12 O'clock**
ψ =180

ψ =270   ψ =90
9 O'clock   **3 O'clock**

ψ =0

6 O'clock
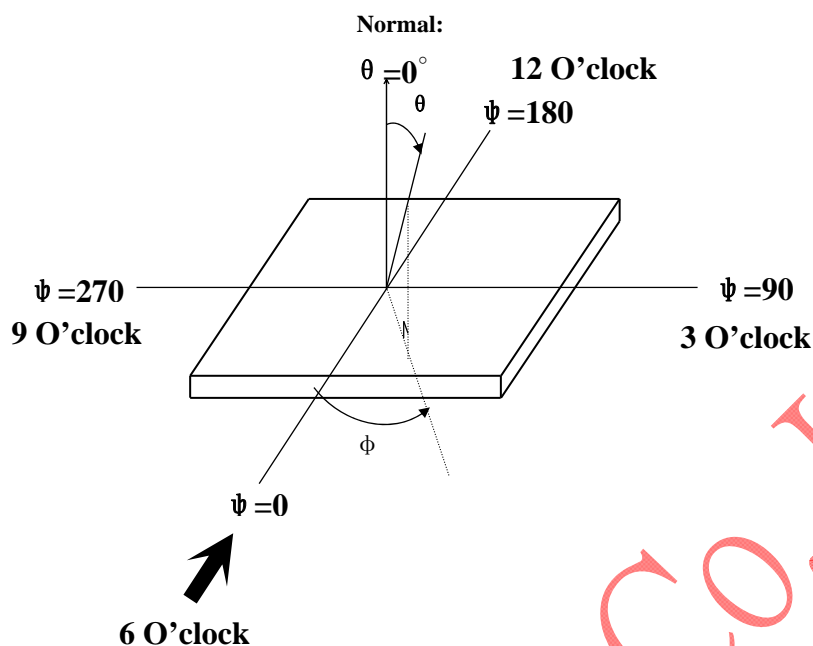
Note 7. Surface luminance is the LCD surface from the surface with all pixels displaying white. Refer to figure as below.

Measuring method for Contrast ratio, surface luminance, Luminance uniformity，CIE (x, y) chromaticity
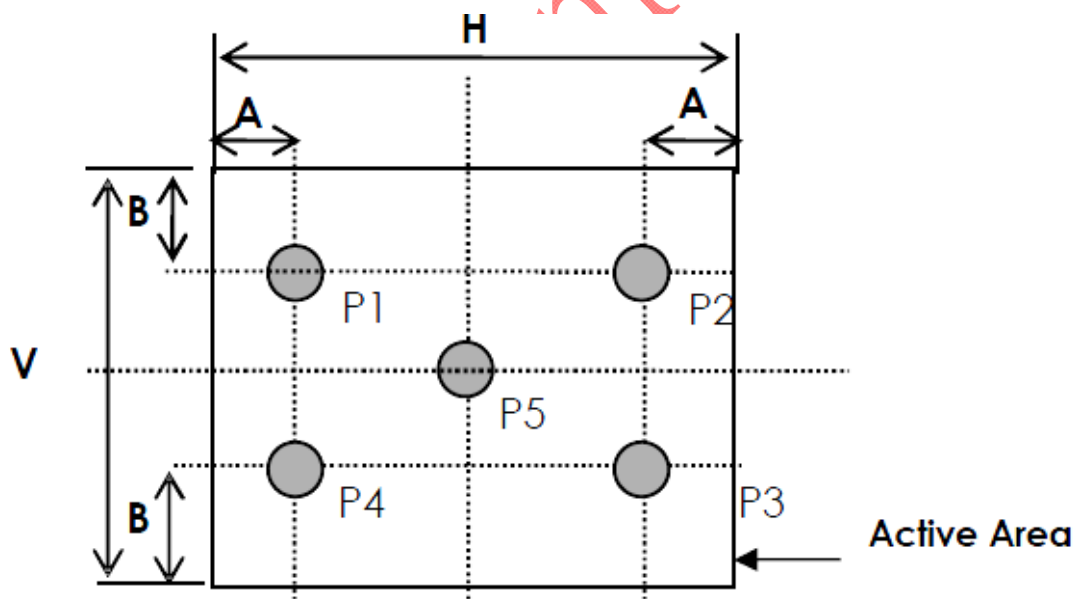
A : 5 mm   B : 5 mm   H,V : Active Area

Light spot size Æ=7mm, 500mm distance from the LCD surface to detector lens

measurement instrument is TOPCON's luminance meter BM-7A

Uniformity definition= [min of 5point/max of 5points]x100%

Lv = Average Surface Luminance with all white pixels (P5)

9．Reliability Test

This standard reliability test is done only for the first lot of MP products. Customer and supplier must hold a discussion if other reliability test is requested by customer.

NO.	Test Item	Test Condition	Remarks
1	High temperature storage	90℃,500 H	Note1 IEC60068-2-1:2007,GB2423.2-2008
2	Low temperature storage	-40℃, 500 H	IEC60068-2-1:2007 GB2423.1-2008
3	High temperature operation	85℃, 500 H	IEC60068-2-1:2007 GB2423.2-2008
4	Low temperature operation	-30℃, 500 H	IEC60068-2-1:2007 GB2423.1-2008
5	High temperature /humidity storage	60℃,90% RH,500H	Note2 IEC60068-2-78 :2001 GB/T2423.3―2006
6	Temperature Cycle (Non operation)	-40℃/85℃, 200 cycles	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,GB2423.22-2002
7	Electrostatic Discharge	-	R=330Ω,C=150pF Contact = ± 8 kV, class B; Air = ± 15 kV, class B; 1 time for each point.

10. Precautions for Operation and Storage

1. Precautions for Operation

(1)Since LCD panel made of glass,in order to prevent from glass broken or color tone change,please do not apply any mechanical shock or impact or excessive force to it when installing the LCD module.

(2)If LCD panel is broken and liquid crystal substance leaks out and contact your skin or clothes,please immediately wash it off by using soap and water.

(3)The polarizer on the LCD surface is soft and easily scratched.Please be careful when handling.

(4)If LCD surface becomes contaminated,please wipe it off gently by using moisten soft cloth with normal hexane,do not use acetone,ketone,ethanol, alcohol or water.If there is saliva or water on the LCD surface,please wipe it off immediately.

(5)When handing LCD module,please be sure that the body and the tools are properly grounded.And do not touch I/F pins with bare hands or contaminate I/F pins.

(6)Do not attempt to disassemble or process the LCD module.

(7)LCD module should be used under recommended operating conditions shown in chapter 6 and 7.

(8)Response time will be extremely slower at lower temperature than at specified temperature and LCD will show different color when at higher temperature.The phenomenon will disappear when returning to specified condition.

(9)Foggy dew,moisture condensation or water droplets deposited on surface and contact terminals will cause polarizer stain or damage,the deteriorated display quality and electrochemical reaction then leads to the shorter life time and permanent damage to the module probably.Please pay attention to the environmental temperature and humidity.

1. Precautions for Storage

(1)Please store LCD module in a dark place,avoid exposure to sunlight,the light of fluorescent lamp or any ultraviolet ray.

(2)Keep the environment temperature at between 10℃and 35 ℃ and at normal humidity.Avoid high temperature,high humidity or temperature below 0℃.

(3)That keeps the LCD modules stored in the container shipped from supplier before using them is recommended.

(4)Do not leave any article on the LCD module surface for an extended period of
 time.

2. Warranty period

Warrants for a period of 12 Months from the shipping date when stored or used
under normal condition.

11. Package Specification

TBD