SPECIFICATION

PRODUCT NO. : **TCXD028IBLON-26**
VERSION : **Ver 1.1**
ISSUED DATE : **2023-03-31**

This module uses ROHS material

FOR CUSTOMER： ____________________

☐：APPROVAL FOR SPECIFICATION
■：APPROVAL FOR SAMPLE

DATE	APPROVED BY

Xinli Optoelectronics ：

Presented by	Reviewed by	Organized by
黃文博	何定川	王俊傑

Note:

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1. Record of Revision

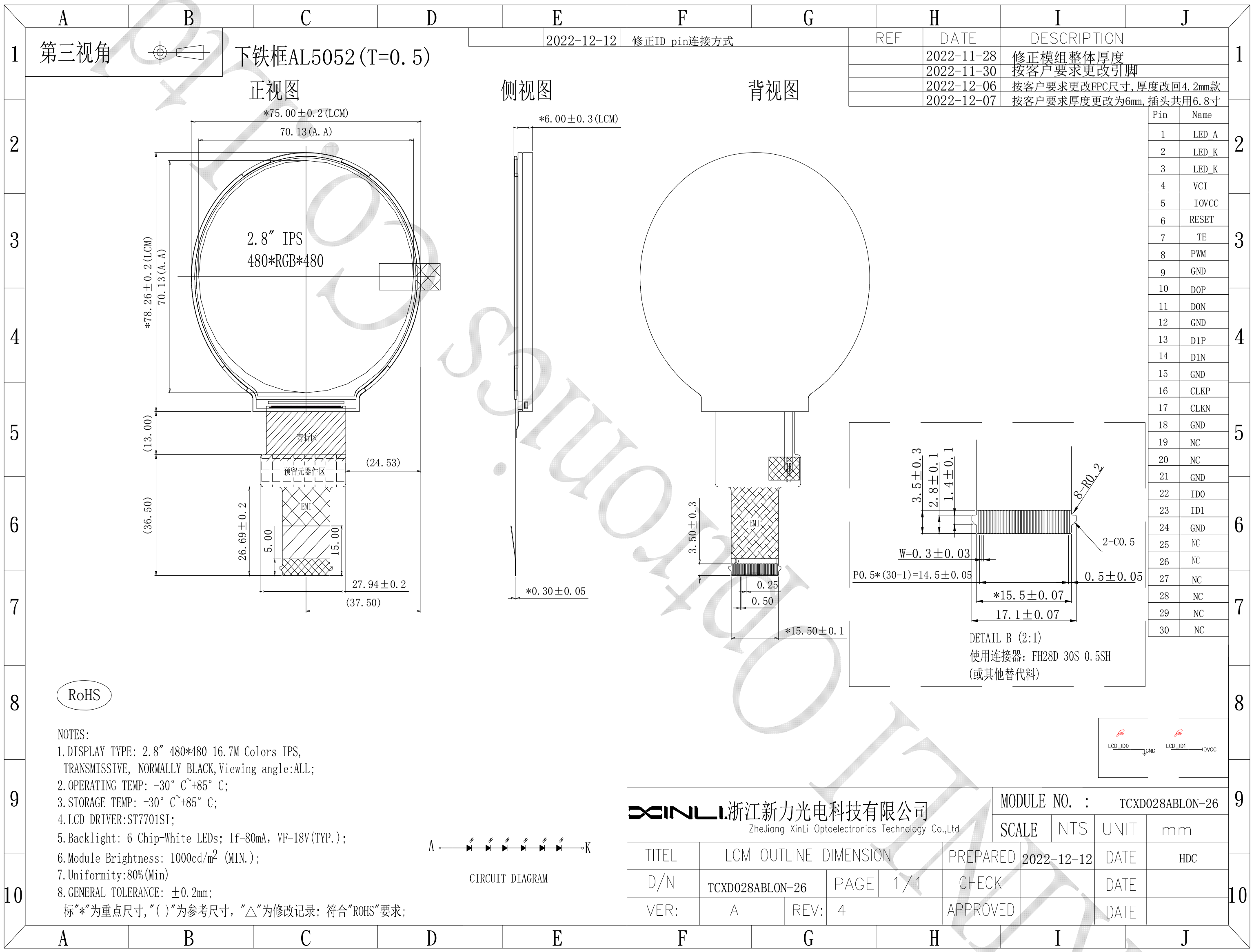
Revision	Description	Date
1.0	Initial Release	2023/01/03
1.1	Fixed the ID pin	2023/03/31

2. General Description and Features

The 2.76 inch Module named TCXD028IBLON-26 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. Features of this product are listed in the following table.

NO	Item	Contents	Unit
(1)	Module Outline	75(H)*78.26(V)*6.0T)	mm
(2)	LCD Active area	Φ=70.128	mm
(3)	Dot Number	480*3(RGB)*480	/
(4)	Pixel pitch	0.1461(H)*0.1461(V)	um
(5)	LCD type	Normally Black,Transmissive	/
(6)	Display Color	16.7M	/
(7)	Viewing direction	ALL	O’clock
(8)	Drive IC	ST7701SI	
(9)	Power Supply	3.3（TYP)	V
(10)	Interface	FPC 0. 5mm_Pitch 30 pin	/
(11)	Interface type	MIPI interface 2 Lane	/
(12)	Module weight	TBD	g

3. Mechanical Dimension


第三视角
下铁框AL5052(T=0.5)
正视图
侧视图
背视图
*75.00±0.2(LCM)
70.13(A.A)
*78.26±0.2(LCM)
70.13(A.A)
2.8″ IPS
480*RGB*480
(13.00)
(36.50)
(24.53)
弯折区
预留元器件区
EMI
26.69±0.2
5.00
15.00
27.94±0.2
(37.50)
*6.00±0.3(LCM)
*0.30±0.05
3.50±0.3
0.25
0.50
*15.50±0.1
3.5±0.3
2.8±0.1
1.4±0.1
8-R0.2
2-C0.5
W=0.3±0.03
P0.5*(30-1)=14.5±0.05
0.5±0.05
*15.5±0.07
17.1±0.07
A
K
CIRCUIT DIAGRAM
LCD_ID0
GND
LCD_ID1
IOVCC
A B C D E F G H I J
1 2 3 4 5 6 7 8 9 10

DETAIL B (2:1)
使用连接器：FH28D-30S-0.5SH
(或其他替代料)

2022-12-12	修正ID pin连接方式

REF	DATE	DESCRIPTION
	2022-11-28	修正模组整体厚度
	2022-11-30	按客户要求更改引脚
	2022-12-06	按客户要求更改FPC尺寸，厚度改回4.2mm款
	2022-12-07	按客户要求厚度更改为6mm，插头共用6.8寸

Pin	Name
1	LED_A
2	LED_K
3	LED_K
4	VCI
5	IOVCC
6	RESET
7	TE
8	PWM
9	GND
10	D0P
11	D0N
12	GND
13	D1P
14	D1N
15	GND
16	CLKP
17	CLKN
18	GND
19	NC
20	NC
21	GND
22	ID0
23	ID1
24	GND
25	NC
26	NC
27	NC
28	NC
29	NC
30	NC

RoHS

NOTES:

1. DISPLAY TYPE: 2.8″ 480*480 16.7M Colors IPS, TRANSMISSIVE, NORMALLY BLACK, Viewing angle:ALL;
2. OPERATING TEMP: -30° C~+85° C;
3. STORAGE TEMP: -30° C~+85° C;
4. LCD DRIVER:ST7701SI;
5. Backlight: 6 Chip-White LEDs; If=80mA, VF=18V(TYP.);
6. Module Brightness: 1000cd/m^2 (MIN.);
7. Uniformity:80%(Min)
8. GENERAL TOLERANCE: ±0.2mm;

标"*"为重点尺寸，"( )"为参考尺寸，"△"为修改记录；符合"ROHS"要求；

浙江新力光电科技有限公司
ZheJiang XinLi Optoelectronics Technology Co.,Ltd

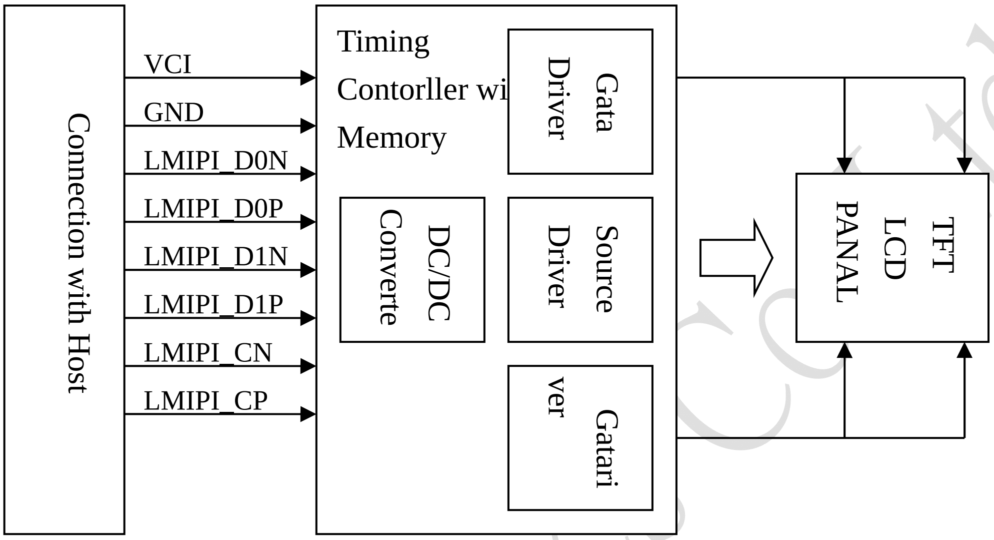
MODULE NO. :	TCXD028ABLON-26						
SCALE	NTS	UNIT	mm				
TITEL	LCM OUTLINE DIMENSION			PREPARED	2022-12-12	DATE	HDC
D/N	TCXD028ABLON-26	PAGE	1/1	CHECK		DATE	
VER:	A	REV:	4	APPROVED		DATE	

4. Interface Pin Connection

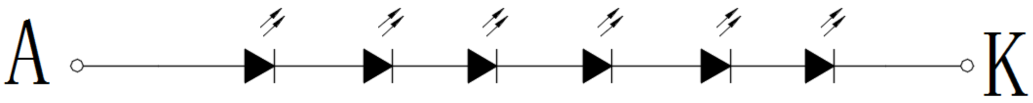
LCM interface Pin(connector:FH28D-30S-0.5SH)

NO	Symbol	Level	Description
1	LEDA	P	Backlight Anode
2	LEDK	P	Backlight Ground
3	LEDK	P	Backlight Ground
4	VCI	P	Power voltage
5	IOVCC	P	Power voltage
6	RESET	I	Reset pin
7	TE	P	Tearing effect output signal
8	PWM	O	The PWM frequency output for LCD driver control
9	GND	P	Power ground
10	D0P	I/O	MIPI data input/output
11	D0N	I/O	MIPI data input/output
12	GND	P	Power ground
13	D1P	I	MIPI data input
14	D1N	I	MIPI data input
15	GND	P	Power ground
16	CLKP	I	MIPI clock input
17	CLKN	I	MIPI clock input
18	GND	P	Power ground
19	NC	-	Not connect
20	NC	-	Not connect
21	GND	P	Power ground
22	ID0	O	Internally connect to Ground
23	ID1	O	Internally connected to IOVCC
24	GND	P	Power ground
25	NC	-	Not connect
26	NC	-	Not connect
27	NC	-	Not connect
28	NC	-	Not connect
29	NC	-	Not connect
30	NC	-	Not connect

5. Block Diagram


Connection with Host
VCI
GND
LMIPI_D0N
LMIPI_D0P
LMIPI_D1N
LMIPI_D1P
LMIPI_CN
LMIPI_CP
Timing
Contorller wi
Memory
Gata
Driver
DC/DC
Converte
Source
Driver
Gatari
ver
TFT
LCD
PANAL

``



CIRCUIT DIAGRAM

6. Maximum Rating

Item	Symbol	Rating	Unit
Operating temperature	Top	-30 to 85	℃
Storage temperature	Tst	-30 to 85	℃
Booster power supply	VCI	-0.3~ 4.6	V

7. Electrical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Power voltage		VCI	-	2.5	2.8	3.6	V
Interface Operation Voltage		IOVCC	-	1.65	1.8	3.6	
Logic input signal Voltage	H level	V_{IH1}	-	0.7*IOVCC	-	IOVCC	V
	L level	V_{IL1}		0	-	0.3*IOVCC	V

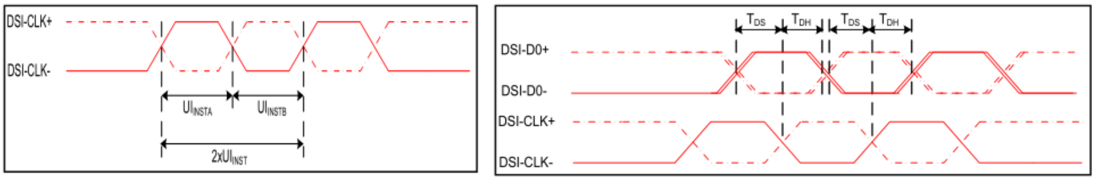
8. Backlight Characteristics

Item	syb	Min	Typ	Max	Unit	Condition
Voltage	Vf	16.8	18	20.4	V	IF=80mA
Luminance(module)	Lv	1000	-	-	cd/m2	
Number of LED	-	6			pcs	

9. Timing Characteristics

9.1. MIPI Interface Characteristics

High Speed Mode


DSI-CLK+
DSI-CLK-
UI_{INSTA}
UI_{INSTB}
$2xUI_{INST}$
T_{DS}
T_{DH}
T_{DS}
T_{DH}
DSI-D0+
DSI-D0-
DSI-CLK+
DSI-CLK-

DSI clock channel timing

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 ℃

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DSI-CLK+/-	$2xUI_{INSTA}$	Double UI instantaneous	2.5	25	ns	
DSI-CLK+/-	UI_{INSTA} UI_{INSTB}	UI instantaneous halfs	1.25	12.5	ns	$UI = UI_{INSTA} = UI_{INSTB}$
DSI-Dn+/-	tDS	Data to clock setup time	0.15	-	UI	
DSI-Dn+/-	tDH	Data to clock hold time	0.15	-	UI	

Mipi Interface- High Speed Mode Timing Characteristics

Lowe Power Mode

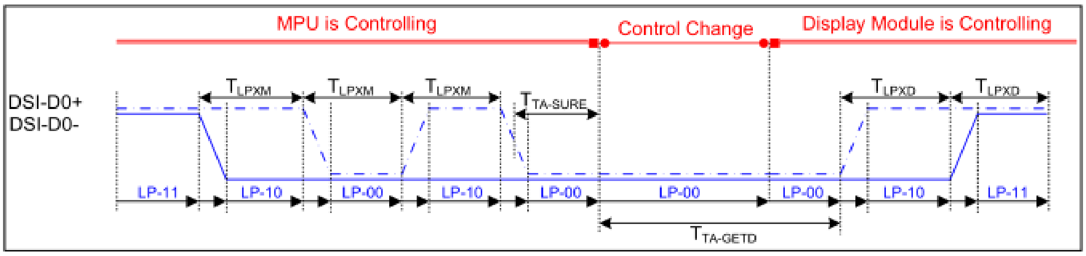
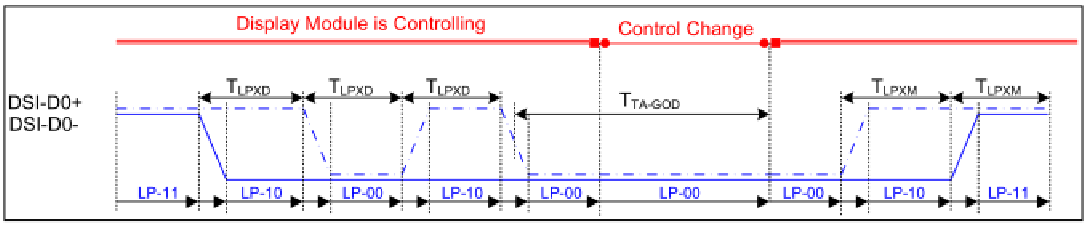

MPU is Controlling
Control Change
Display Module is Controlling
DSI-D0+
DSI-D0-
T_LPXM
T_LPXM
T_LPXM
T_TA-SURE
T_LPXD
T_LPXD
LP-11
LP-10
LP-00
LP-10
LP-00
LP-00
LP-00
LP-10
LP-11
T_TA-GETD

Figure 6 Bus Turnaround (BTA) from display module to MPU Timing


Display Module is Controlling
Control Change
DSI-D0+
DSI-D0-
T_LPXD
T_LPXD
T_LPXD
T_TA-GOD
T_LPXM
T_LPXM
LP-11
LP-10
LP-00
LP-10
LP-00
LP-00
LP-00
LP-10
LP-11

VDDI=1.8, VDD=2.8, AGND=DGND=0V, Ta=25 ℃

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DSI-D0+/-	TLPXM	Length of LP-00,LP-01, LP-10 or LP-11 periods MPU→Display Module	50	75	ns	Input
DSI-D0+/-	TLPXD	Length of LP-00,LP-01, LP-10 or LP-11 periods MPU→Display Module	50	75	ns	Output
DSI-D0+/-	TTA-SURED	Time-out before the MPU start driving	T_{LPXD}	$2xT_{LPXD}$	ns	Output
DSI-D0+/-	TTA-GETD	Time to drive LP-00 by display module	$5xT_{LPXD}$		ns	Input
DSI-D0+/-	TTA-GOD	Time to drive LP-00 after turnaround request-MPU	$4xT_{LPXD}$		ns	Output

9.2.Reset

Timing:

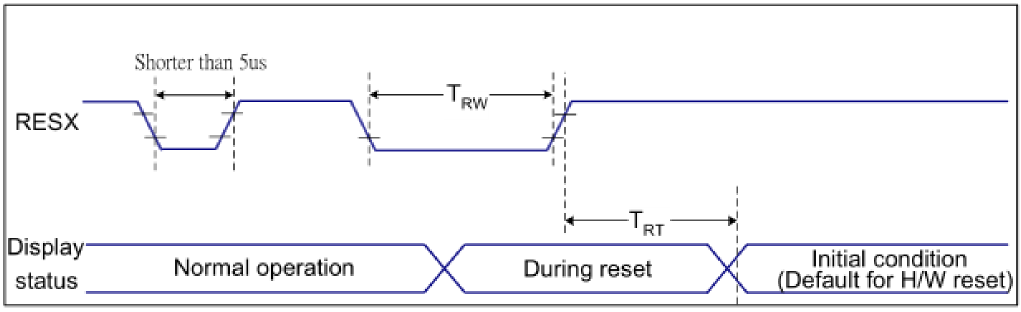

Shorter than 5us
RESX
T_{RW}
T_{RT}
Display status
Normal operation
During reset
Initial condition
(Default for H/W reset)

Figure 9 Reset Timing

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 ℃

Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120(Note 1, 6, 7)	ms

Notes:

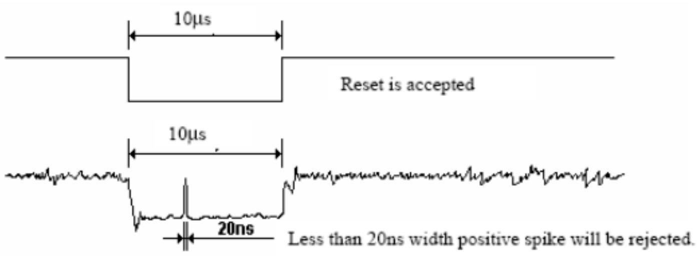
1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.

2. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below:

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9us	Reset starts

3. During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode.) and then return to Default condition for Hardware Reset.

4. Spike Rejection also applies during a valid reset pulse as shown below:



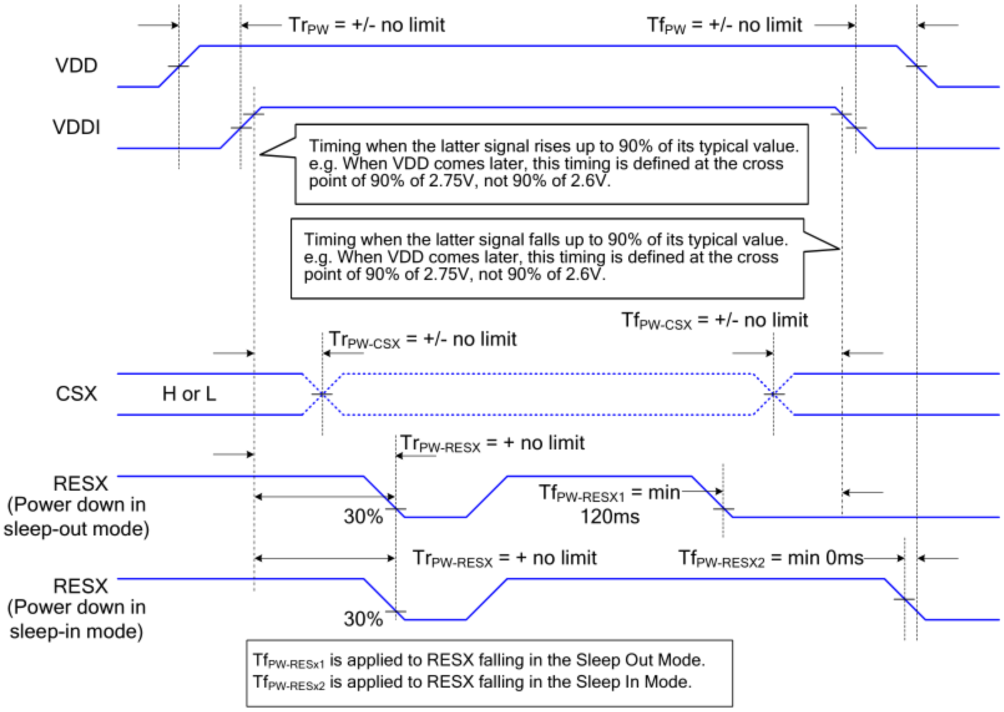
5. When Reset applied during Sleep In Mode.

6. When Reset applied during Sleep Out Mode.

7. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

9.3.POWER ON/OFF SEQUENCE

The power on/off sequence is illustrated below


Tr_{PW} = +/- no limit
Tf_{PW} = +/- no limit
VDD
VDDI
Tr_{PW-CSX} = +/- no limit
Tf_{PW-CSX} = +/- no limit
CSX
H or L
$Tr_{PW-RESX}$ = + no limit
RESX
(Power down in
sleep-out mode)
30%
$Tf_{PW-RESX1}$ = min
120ms
$Tr_{PW-RESX}$ = + no limit
$Tf_{PW-RESX2}$ = min 0ms
RESX
(Power down in
sleep-in mode)
30%

Timing when the latter signal rises up to 90% of its typical value.
e.g. When VDD comes later, this timing is defined at the cross point of 90% of 2.75V, not 90% of 2.6V.

Timing when the latter signal falls up to 90% of its typical value.
e.g. When VDD comes later, this timing is defined at the cross point of 90% of 2.75V, not 90% of 2.6V.

$Tf_{PW-RESx1}$ is applied to RESX falling in the Sleep Out Mode.
$Tf_{PW-RESx2}$ is applied to RESX falling in the Sleep In Mode.

10. Application Circuit

Please consult our technical department for detail information.

11. Initial Code

Please consult our technical department for detail information.

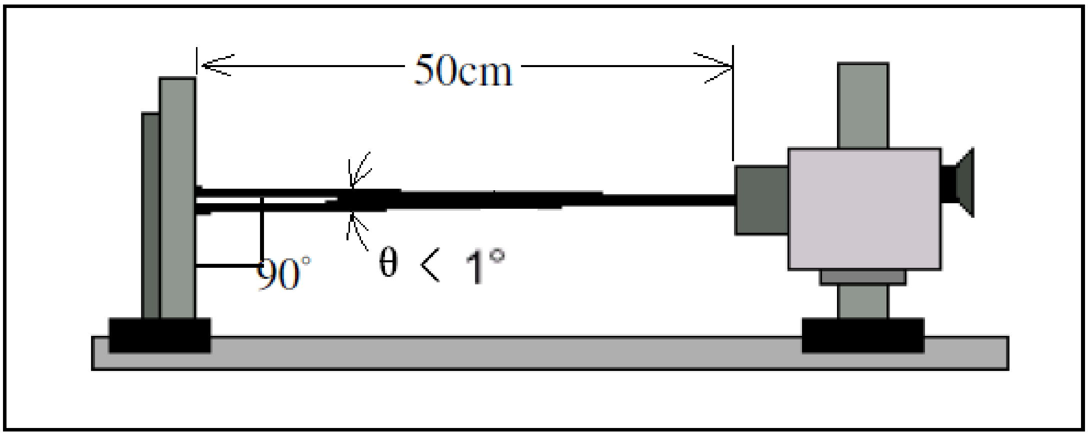
12. Electro-Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Note
Response time		Tr+Tf	θ =0° ∅=0° Ta=25℃	-	35	40	ms	4
Uniformity （Five point）		δ WHITE		70	80	-	%	7
Contrast ratio		Cr		1000	(1200)	-	-	**3 ,5**
Surface Luminance		Lv		1000	-	-	-	**3 ,7**
Viewing angle range		θ	∅ = 90°	80	85	-	deg	**6**
			∅ = 270°	80	85	-	deg	
			∅ = 0°	80	85	-	deg	
			∅ = 180°	80	85	-	deg	
Color filter chromaticity (x, y)	White	X	θ = ϕ = 0°	-0.04	TBD	+0.04		**7**
		Y			TBD			
	Red	X			TBD			
		Y			TBD			
	Green	X			TBD			
		Y			TBD			
	Blue	X			TBD			
		Y			TBD			

Note 1: Ambient temperature=25℃±2℃

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

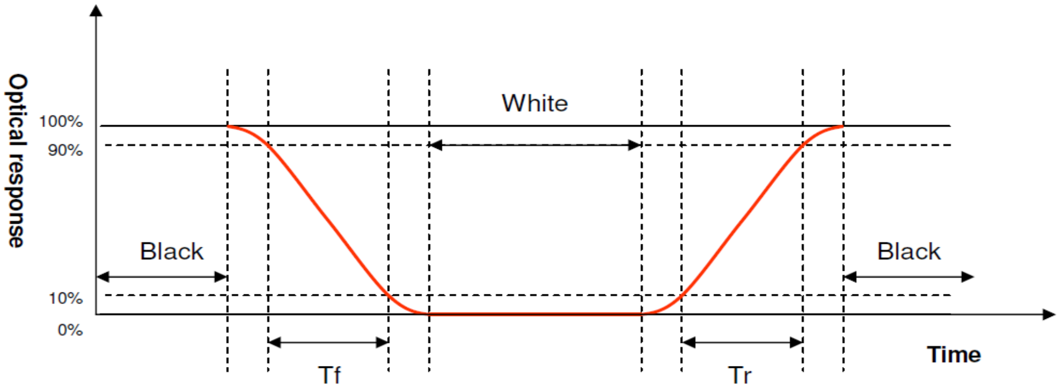
Note 3: To be measured at the center area of panel with a viewing cone of 1 by Topcon luminance meter BM-7A, after 10 minutes operation (module).



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:

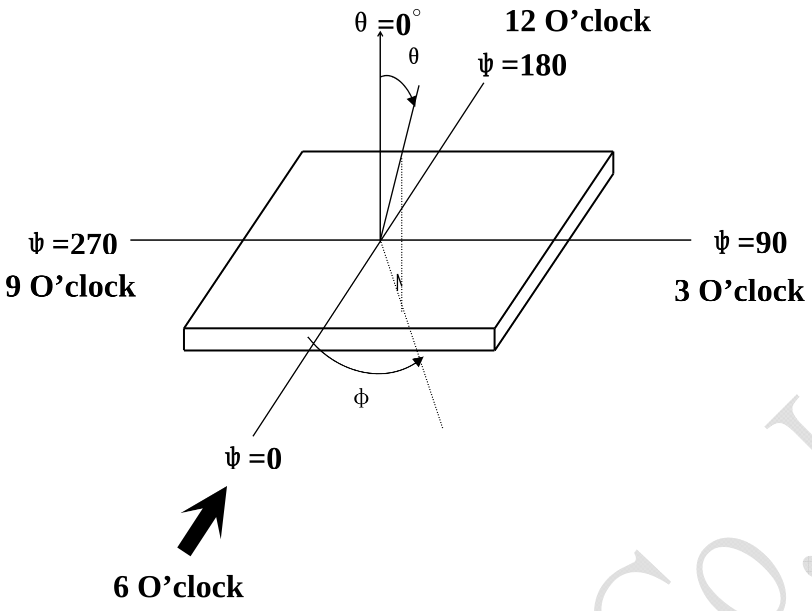
Contrast ratio is calculated with the following formula:

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

Note 6. Definition of viewing angle

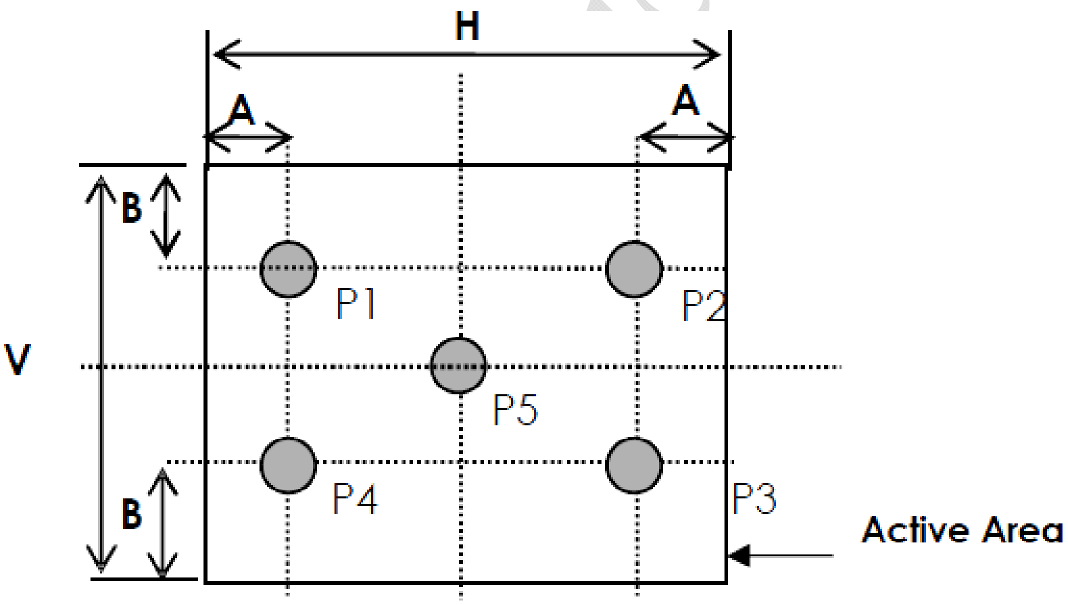
Viewing angle is the angle at which the contrast ratio is greater than 10 for TFT module. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface.

Normal:


θ =0°
12 O'clock
θ
ψ =180
ψ =270
9 O'clock
ψ =90
3 O'clock
ϕ
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


H
A
A
B
V
B
P1
P2
P5
P4
P3
Active Area

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 = Surface Luminance with all white pixels (P5)

13. 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.
If there is any abnormality, the normal temperature and humidity recovery 2 hours after the display is OK, the result is judged as OK.

NO.	Test Item	Description	Test Condition
1	High temperature storage	Endurance test applying the high storage temperature for a long time	85℃,240 H
2	Low temperature storage	Endurance test applying the low storage temperature for a long time	-30℃,240 H
3	High temperature operation	Endurance test applying the electric stress under high temperature for a long time	85℃,240 H
4	Low temperature operation	Endurance test applying the electric stress under low temperature for a long time	-30℃,240 H
5	High temperature /humidity operation	Endurance test applying the high temperature and high humidity storage for a long time	60℃,90% RH, 240H
6	Temperature Cycle (Non operation)	Endurance test applying the low and high temperature cycle -30℃← 25℃ →80℃ 60min← →60min ←——————→ 20 cycle	-30℃/80℃, 20 cycles
7	ESD Test	To check the product operating capability after electrostatic environment.	Air: ± 4KV 150pF/330 Ω 5 times Contact: ± 2KV 150pF/330 Ω 5 times

14. 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.

2、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 between 10° C and 35° C, and humidity below 85%RH. Please maintain within 72 hours of accumulated length of storage time, with conditions of 60° C and room humidity of 90%RH.

(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.

3、Warranty period

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

15.Package Specification

TBD.