

# SPECIFICATION

**CUSTOMER PART NO. : XEA-068A01-DI9509-G020**

**PRODUCT NO. : TCXD068IBLMT-39A**

**VERSION : Ver 1.2**

**ISSUED DATE : 2023-3-8**

This module uses ROHS material

**FOR CUSTOMER:** \_\_\_\_\_

: APPROVAL FOR SPECIFICATION

: APPROVAL FOR SAMPLE

DATE	APPROVED BY

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## 1. Record of Revision

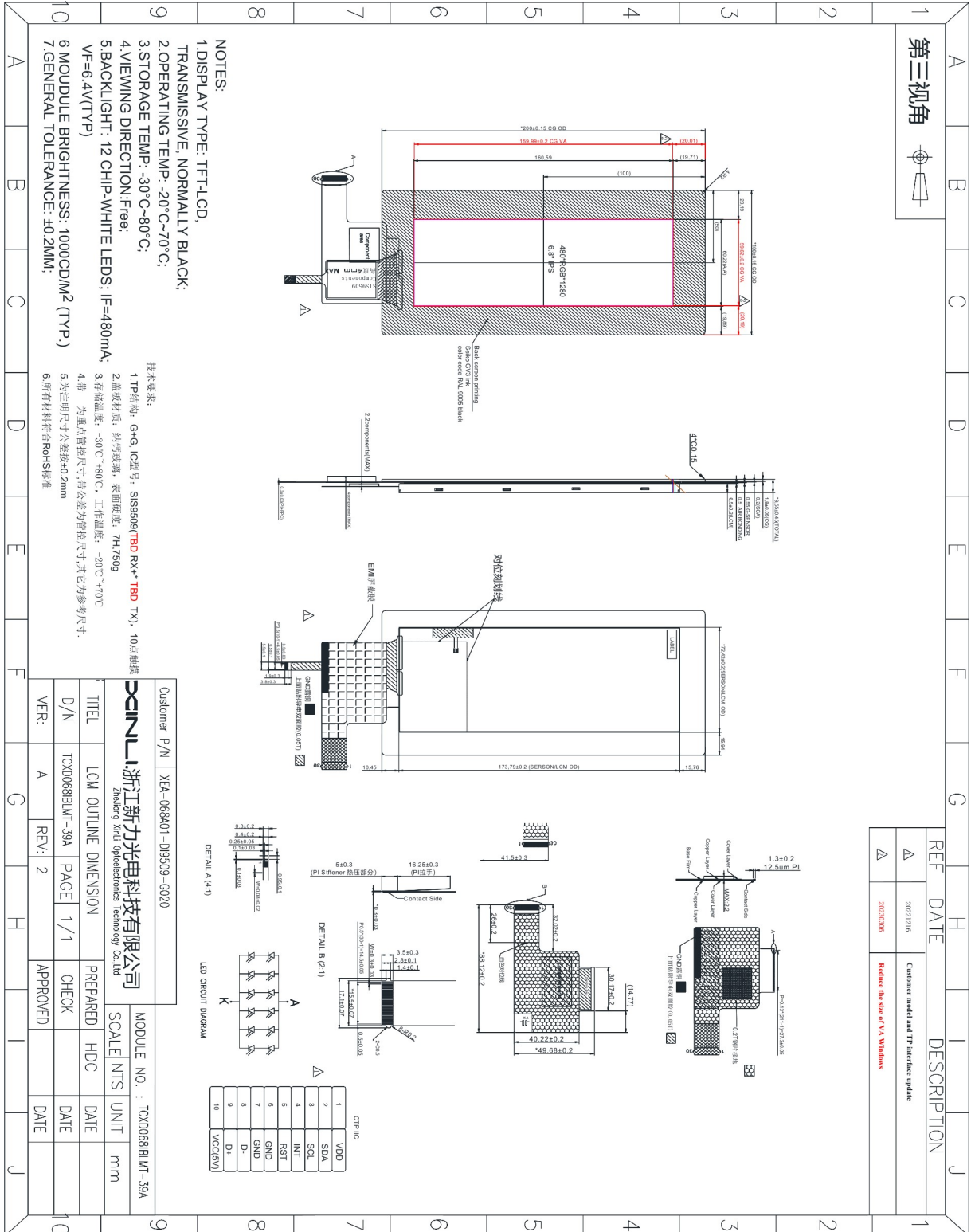
<b>Revision</b>	<b>Description</b>	<b>Date</b>
<b>1.0</b>	<b>Initial Release</b>	<b>2022/12/03</b>
<b>1.1</b>	<b>Customer model and TP interface update</b>	<b>2022/12/12</b>
<b>1.2</b>	<b>TP VA adjustment</b>	<b>2023/3/8</b>

## 2. General Description and Features

The 6.8 inch Module named TCXD068IBLMT-39A is a-Si TFT-LCD module, which is the type of transmissive. It is consisted of TFT-LCD Panel, Driver IC, FPC 、 Touch and Back-Light. Features of this product are listed in the following table.

NO	Item	Contents	Unit
(1)	Module Outline	100(H)*200(V)*9.55(T)	mm
(2)	LCD Active area	60.22(H)*160.59(V)	mm
(3)	<b>CG VA</b>	<b>59.62(H)*159.99(V)</b>	<b>mm</b>
(4)	Dot Number	480*3(RGB)*1280	/
(5)	Dot size	41.82*125.46	um
(6)	LCD type	Normally Black,Transmissive	/
(7)	Display Color	16.7M	/
(8)	Viewing direction	ALL	O'clock
(9)	Drive IC	SC7705	
(10)	Power Supply	3.3 (TYP)	V
(11)	Interface	FPC 0.5mm_Pitch 30 pin	/
(12)	Interface type	MIPI interface	/
(13)	Module weight	TBD	g

### 3. Mechanical Dimension

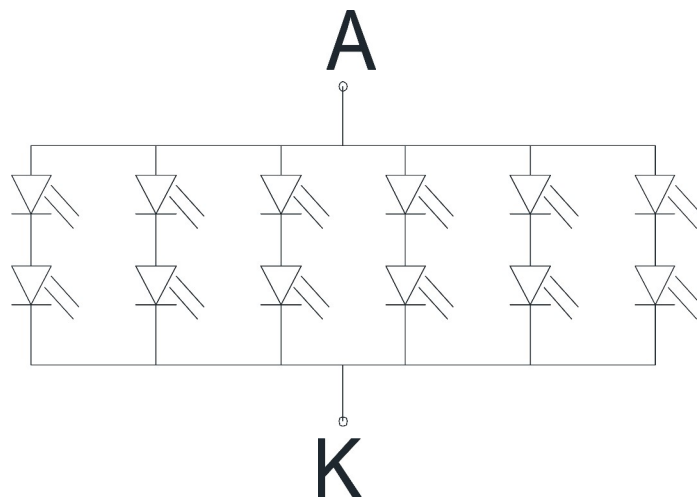
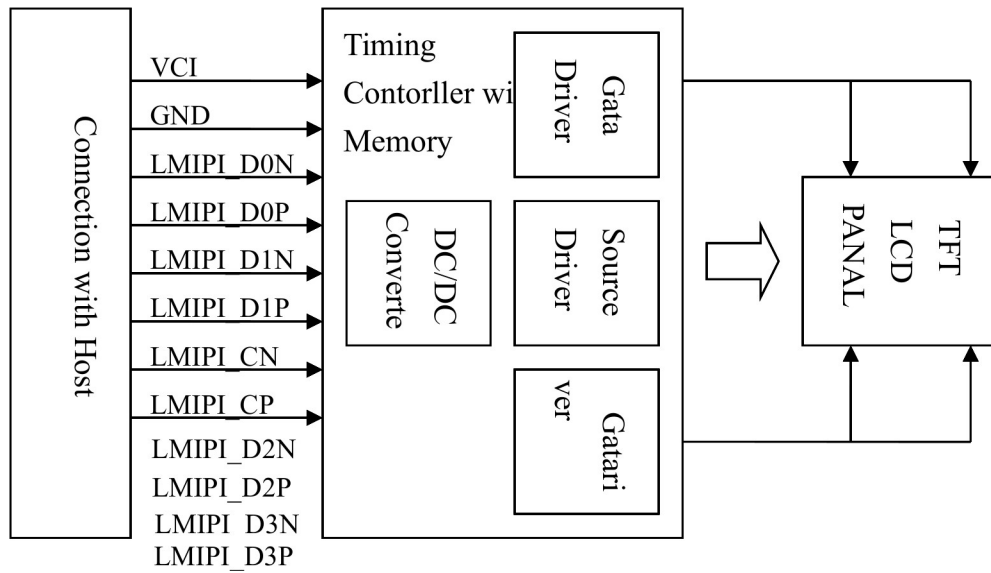


## 4. Interface Pin Connection

### LCM interface Pin

NO	Symbol	Level	Description
1	GND	P	Power ground
2	VCI	P	Power voltage
3	VCI	P	Power voltage
4	VCI	P	Power voltage
5	GND	P	Power ground
6	RESET	I	Reset pin
7	TE	P	Tearing effect output signal
8	GND	P	Power ground
9	GND	P	Power ground
10	D3N	I	MIPI data input
11	D3P	I	MIPI data input
12	GND	P	Power ground
13	D2N	I	MIPI data input
14	D2P	I	MIPI data input
15	GND	P	Power ground
16	CLKN	I	MIPI clock input
17	CLKP	I	MIPI clock input
18	GND	P	Power ground
19	D1N	I	MIPI data input
20	D1P	I	MIPI data input
21	GND	P	Power ground
22	D0N	I	MIPI data input
23	D0P	I	MIPI data input
24	GND	P	Power ground
25	ID1	O	Pull down to Ground with 1K resistor
26	ID2	O	Pull down to Ground with 1K resistor
27	LEDK	P	Backlight Ground
28	LEDK	P	Backlight Ground
29	LEDA	P	Backlight Anode
30	LEDA	P	Backlight Anode

### 5. Block Diagram



## 6. Maximum Rating

Item	Symbol	Rating	Unit
Operating temperature	Top	-20 to 70	°C
Storage temperature	Tst	-30 to 80	°C
Booster power supply	VCI	-0.3~ 3.6	V

## 7. Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power voltage	VCI	-	2.5	2.8	3.3	V
Logic input signal Voltage	H level	-	0.7*VCI	-	VCI	V
	L level		0	-	0.3*VCI	V

## 8. Backlight Characteristics

Item	syb	Min	Typ	Max	Unit	Condition
Voltage	Vf	5.4	6.4	6.8	V	IF=480mA
Luminance(module)	Lv	-	1000	-	cd/m2	
Number of LED	-	12			pcs	

## 9. Timing Characteristics

### 9.1. DSI DC Characteristics

LP Mode

Parameter	Symbol	Conditions	Spec.			Unit
			Min.	Typ.	Max.	
Logic high level input voltage	$V_{IHLPCD}$	LP-CD	450	-	1350	mV
Logic low level input voltage	$V_{ILLPCD}$	LP-CD	0	-	200	mV
Logic high level input voltage	$V_{IHLPRX}$	LP-RX(CLK, D0)	880	-	1350	mV
Logic low level input voltage	$V_{ILLPRX}$	LP-RX(CLK, D0)	0	-	550	mV
Logic low level input voltage	$V_{ILLPRXULP}$	LP-RX(CLK ULP mode)	0	-	300	mV
Logic high level output voltage	$V_{OHLPTX}$	LP-TX(D0)	1.1	-	1.3	V
Logic low level output voltage	$V_{OLLPTX}$	LP-TX(D0)	-50	-	50	mV
Logic high level input current	$I_{IH}$	LP-CD, LP-RX	-	-	10	$\mu$ A
Logic low level input current	$I_{IL}$	LP-CD, LP-RX	-10	-	-	$\mu$ A
Input pulse rejection	SGD	DSI-CLK+/-, DSI-D0+/-1	-	-	300	Vps

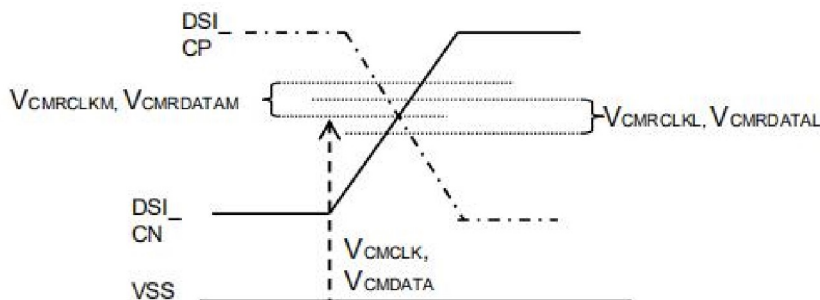
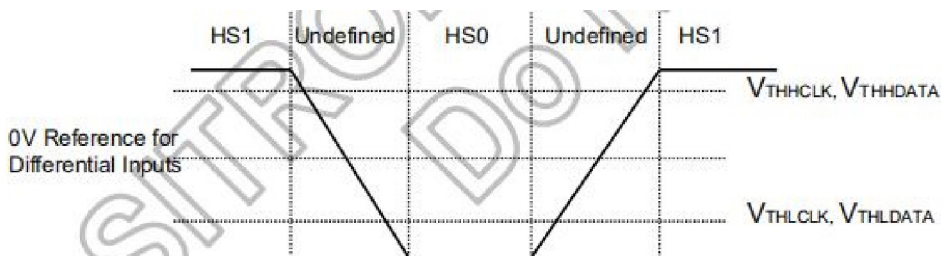


Input glitch rejections of low-power receivers



High Speed Mode

Parameter	Symbol	Conditions	Spec.			Unit
			Min.	Typ.	Max.	
Input common mode	$V_{CMCLK}$ $V_{CMDATA}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	70	-	330	mV
Input common mode variation <450 MHz	$V_{CMRCLKL}$ $V_{CMRDATAL}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-50	-	50	mV
Input common mode variation >450 MHz	$V_{CMRCLKM}$ $V_{CMRDATAM}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-	-	100	mV
Low-level differential Input threshold	$V_{THLCLK}$ $V_{THLDATA}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-70	-	-	mV
High-level differential Input threshold	$V_{THHCLK}$ $V_{THHDATA}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-	-	70	mV
Single ended input low voltage	$V_{ILHS}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-40	-	-	mV
Single ended input high voltage	$V_{IHHS}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-	-	460	mV
Differential input termination resistor	$R_{TERM}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	80	100	125	$\Omega$
Single-ended threshold voltage for termination enable	$V_{TERMEN}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-	-	450	mV
Termination capacitor	$C_{TERM}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-	-	-	pF



Differential voltage range and Command mode voltage

## 9.2.AC characteristics

### DSI Interface Timing Characteristics

High Speed Mode

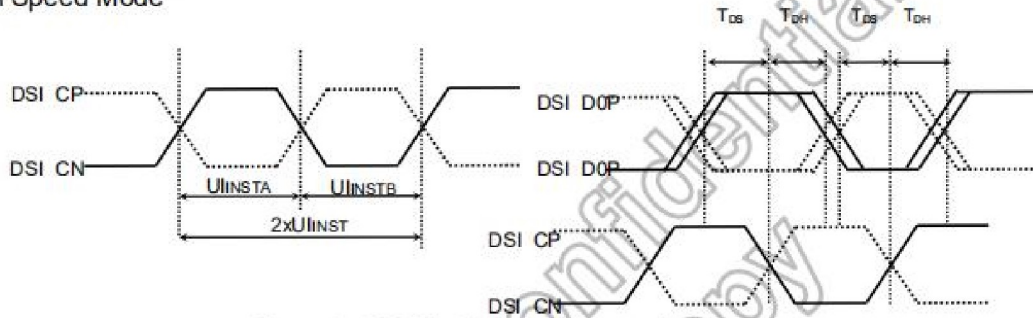
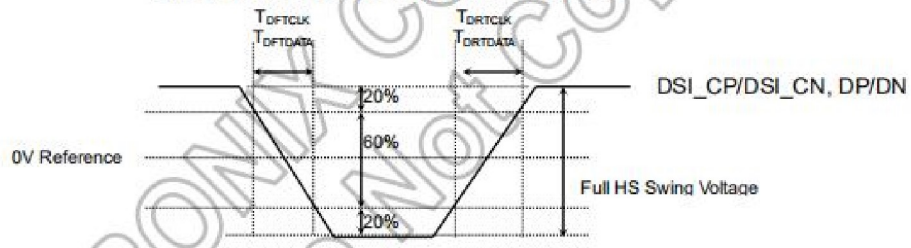


Figure 7.4: DSI clock timing Characteristics



Rising and falling time on clock and data channel

(VSSA=0V, IOVCC=1.65V to 3.3V, VCI=2.5V to 3.3V, TA = -30 to 70°C)

Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_CP/ DSI_CN	Double UI instantaneous	2xUIINST	TBD	-	25	ns
	UI instantaneous	UIINSTA UIINSTB	TBD	-	12.5	ns
DP/DN	Data to clock setup time	T <sub>DS</sub>	0.15xUI	-	-	ps
	Data to clock hold time	T <sub>DH</sub>	0.15xUI	-	-	ps
DSI_CP/ DSI_CN	Differential rise time for clock	T <sub>DRTCLK</sub>	150	-	0.3UI	ps
	Differential fall time for clock	T <sub>DFTCLK</sub>	150	-	0.3UI	ps
DP/DN	Differential rise time for data	T <sub>DRTDATA</sub>	150	-	0.3UI	ps
	Differential fall time for data	T <sub>DFTDATA</sub>	150	-	0.3UI	ps

DSI High Speed Mode characteristics

Low Power Mode

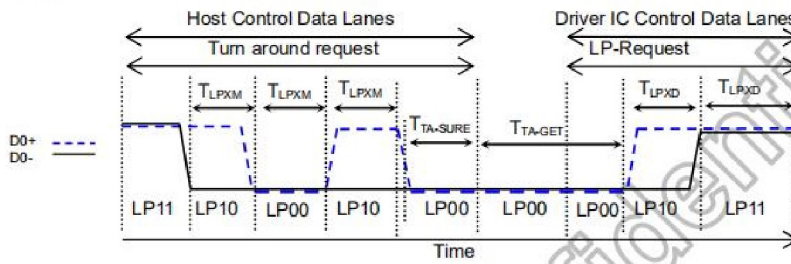
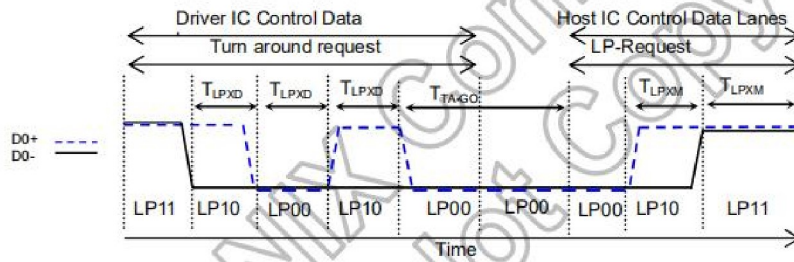


Figure 7.6: BTA from HOST to Display module Timing



(VSSA=0V, IOVCC=1.65V to 3.3V, VCI=2.3V to 3.3V, TA = -30 to 70°C)

Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_D0P/ DSI_D0P	Length of LP-00/LP01/LP10/LP11 Host → Display module	T <sub>LPXM</sub>	50	-	-	ns
	Length of LP-00/LP01/LP10/LP11 Display module → Host	T <sub>LPXD</sub>	50	-	-	ns
	Time-out before the MPU start driver	T <sub>TA-SURE</sub>	T <sub>LPXD</sub>	-	2xT <sub>LPXD</sub>	ns
	Time to drive LP-00 by display module	T <sub>TA-GET</sub>	5xT <sub>LPXD</sub>	-	-	ns
	Time to drive LP-00 after turnaround request Host	T <sub>TAGO</sub>	4xT <sub>LPXD</sub>	-	-	ns

DSI Low Power Mode characteristics

## 10. Application Circuit

Please consult our technical department for detail information.

## 11. Initial Code

Please consult our technical department for detail information.

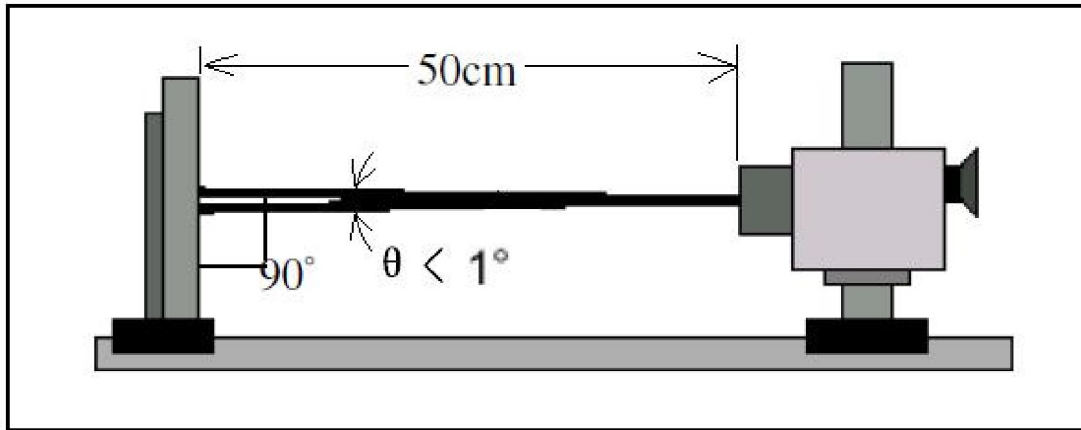
## 12. Electro-Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Response time	Tr+Tf	$\theta = 0^\circ$	-	25	35	ms	4
Uniformity (Five point)	$\delta$ WHITE	$\varnothing = 0^\circ$ Ta=25°C	70	80	-	%	7
Contrast ratio	Cr		1000	(1500)	-	-	3,5
Surface Luminance	Lv		-	1000	-	-	3,7
Viewing angle range	$\theta$	$\varnothing = 90^\circ$	70	80	-	deg	6
		$\varnothing = 270^\circ$	70	80	-	deg	
		$\varnothing = 0^\circ$	70	80	-	deg	
		$\varnothing = 180^\circ$	70	80	-	deg	
Color filter chromaticity (x, y)	White	X	$\theta = \phi = 0^\circ$	-0.025	TBD	+0.025	7
		Y			TBD		
	Red	X			TBD		
		Y			TBD		
	Green	X			TBD		
		Y			TBD		
	Blue	X			TBD		
		Y			TBD		

Note 1: Ambient temperature=25°C±2°C

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

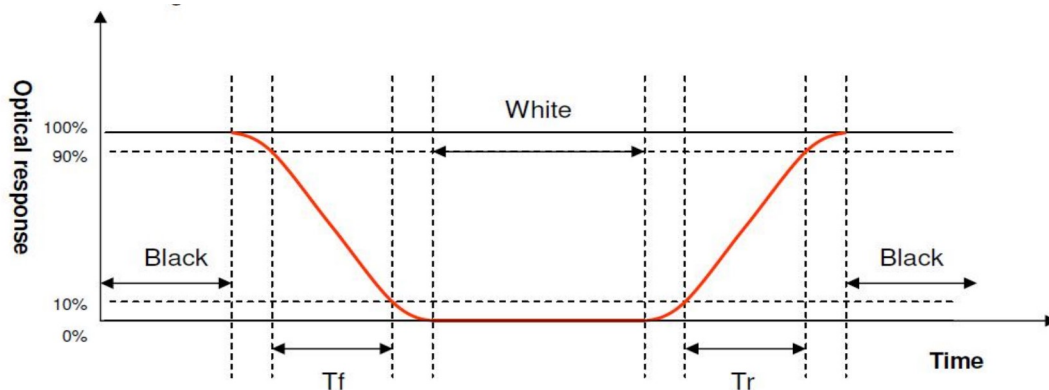
**Note 3:** To be measured at the center area of panel with a viewing cone of 1 by Topcon luminance meter BM-7A, after 10 minutes operation (module).



**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:**

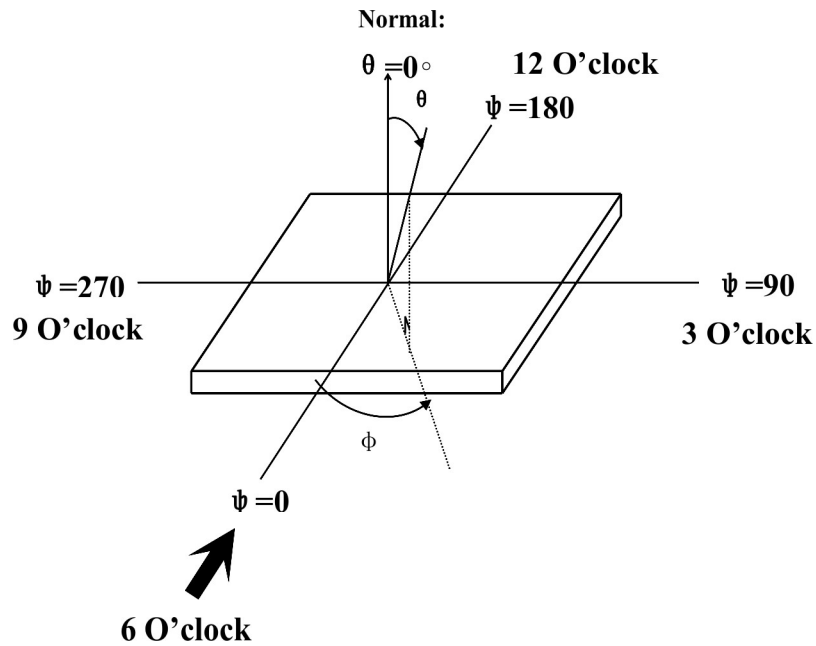
Contrast ratio is calculated with the following formula:

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

**Note 6. Definition of viewing angle**

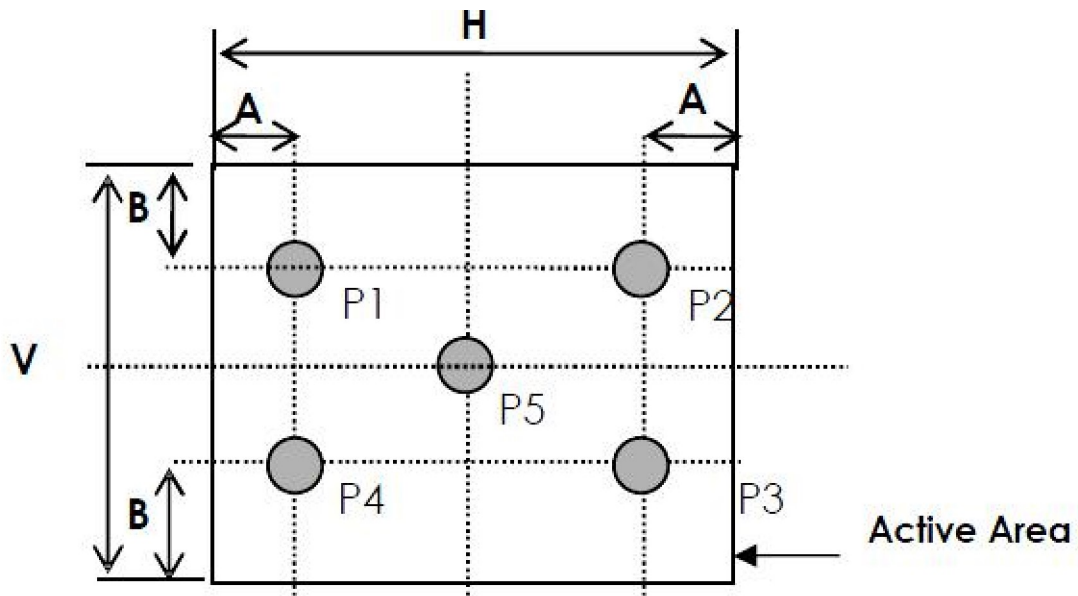
Viewing angle is the angle at which the contrast ratio is greater than 10 for TFT module. The angles are determined for the horizontal or x axis and the vertical or y axis

with respect to the z axis which is normal to the LCD surface.



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  $\varnothing=7\text{mm}$ , 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%

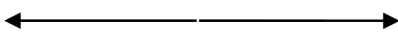
$L_v$  = Surface Luminance with all white pixels (P5)

### 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	80°C, 96 H
2	Low temperature storage	Endurance test applying the low storage temperature for a long time	-30°C, 96H
3	High temperature operation	Endurance test applying the electric stress under high temperature for a long time	70°C, 96H
4	Low temperature operation	Endurance test applying the electric stress under low temperature for a long time	-20°C, 96H
5	High temperature /humidity operation	Endurance test applying the high temperature and high humidity storage for a long time	50°C, 90% RH, 96H
6	Temperature Cycle (Non operation)	Endurance test applying the low and high temperature cycle $-20^{\circ}\text{C} \leftarrow \rightarrow 70^{\circ}\text{C}$ $60\text{min} \leftarrow \rightarrow 60\text{min}$  20 cycle	-20°C/70°C, 20 cycles
7	ESD Test	To check the product operating capability after electrostatic environment.	Air: $\pm 4\text{KV}$ 150pF/330 $\Omega$ 5 times Contact: $\pm 2\text{KV}$ 150pF/330 $\Omega$ 5 times

8	Packing vibration	Frequency range: 10Hz~50Hz Acceleration of gravity:5G X,Y,Z 30 min for each direction	
9	Drop Test	Height 80 cm, 1 comer, 3 edges, 6 surfaces	

## 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.