

# LCM Specification

Preliminary specification

Final Specification

Project No. 项目编号	TFT-H070A5SVTFT8C40		
Customer 客户名称			
Module No. 客户型号			
Product type 产品内容	TFT LCD Module 800 x 3RGB x 480 Dots 7.0" TFT LCD		
Signature by customer: 客户确认签章:			
<input type="checkbox"/> Trial production		<input type="checkbox"/> Mass production	
编 制	电子审核	结构审核	批 准
Y. L			

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Shenzhen Hot Display Technology Co., Ltd

**1 Document revision history :**

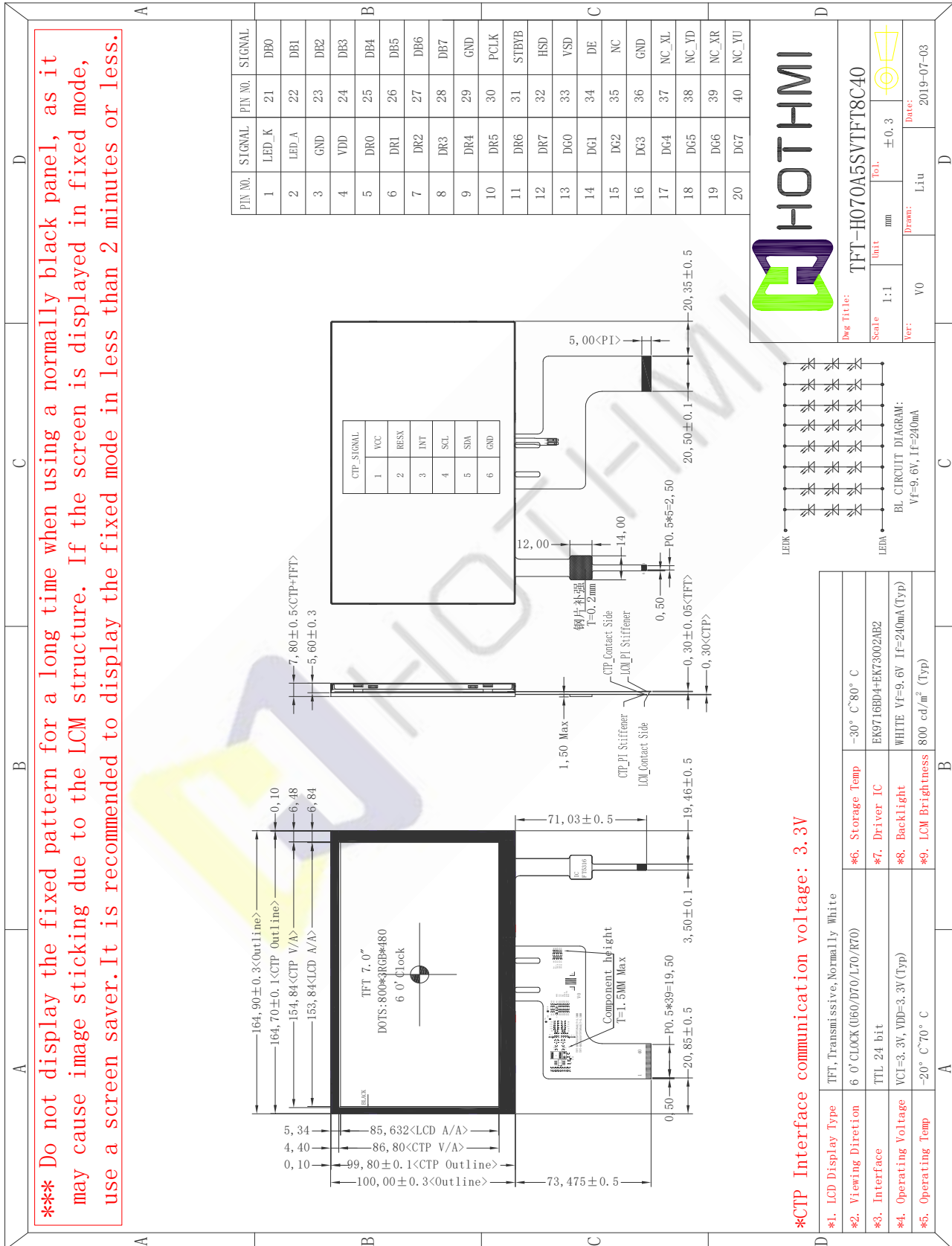
DOCUMENT REVISION	DATE	DESCRIPTION	PREPARED BY	APPROVED BY
0	2019-7-05	First Release.	Y.L	



## 1. General Feature:

Item	Standard Value	Unit
Display Size	7.0"	--
Number of Pixels	800(H)x3(RGB)*480(V)	--
Active Area	153.84(H) *85.632(V)	mm
Outline Dimension	164.90(H) ×100.00× 5.60(V)	mm
Viewing Direction	6 O'Clock	-
Interface	TTL 24 bit	-
Panel Driver IC	EK9716BD4+EK73002AB2	-
Panel Driver Condition	VCI=3.3V	V
Backlight	White LED	-
Touch Panel	With Touch Panel	-
Cap Touch Driver IC	FT5316	-
Cap Touch Driver Condition	VCC=3.3V	V
Operation Temperature	-20~70	°C
Storage Temperature	-30~80	°C

## 2. Outline Dimensions



### 3. Pin Description

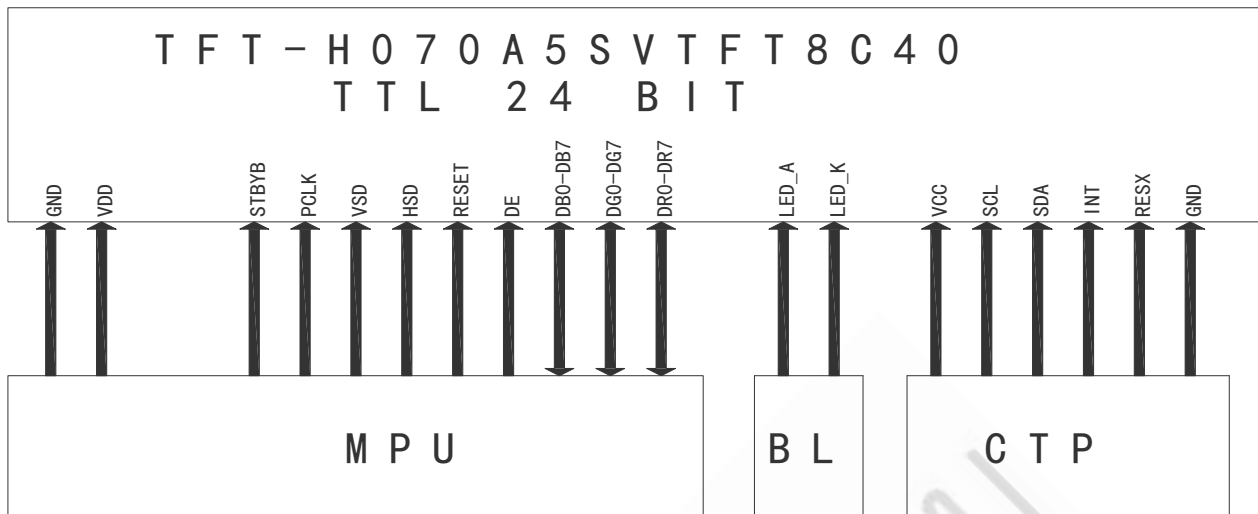
#### 3.1-1 TFT Pin Description

Pin NO.	Symbol	Description
1	LED_K	LED Cathode
2	LED_A	LED Anode
3	GND	Ground
4	VDD	Analog Power(2.5 ~ 3.6 V)
5-12	DR0-DR7	Red data bus
13-20	DG0-DG7	Green data bus
21-28	DB0-DB7	Blue data bus
29	GND	Ground
30	PCLK	Clock signal for data latching
31	STBYB	Display on/off mode control
32	HSD	Horizontal sync input with negative polarity
33	VSD	Vertical sync input with negative polarity
34	DE	Input data enable control / no connection
35	NC	No Connect
36	GND	Ground
37	NC_XL	No Connect
38	NC_YD	No Connect
39	NC_XR	No Connect
40	NC_YU	No Connect
-END-		

#### 3.1-2 CTP Pin Description

Pin NO.	Symbol	Description
1	VCC	Power Supply Voltage(3.3V)
2	RESX	Active LOW Reset signal (Do not tie to VCC)
3	INT	Interrupt request to the host
4	SCL	Serial I2C Clock input
5	SDA	Serial I2C Data input and output
6	GND	Ground

### 3.2 Wiring Diagram



## 4. Electrical Characteristics

### 4-1 TFT LCD Module Operating Conditions

Item	Symbol	Condition	Min	Type	Max	Unit
Analog Power supply	VCI	-	2.8	3.3	3.6	V
Power For Analog Circuit	AVDD	-	-	10.13	-	V
TFT Gate on voltage	VGH	VGH-VGL	-	18.0	-	V
TFT Gate off voltage	VGL	≤40V	-	-7.8	-	V
TFT Common Electrode Voltage	VCOM	-	3.0	-	3.8	V

### 4-2 LED back light specification (per chip)

Item	Symbol	Condition	Min	Type	Max	Unit
Forward voltage	Vt	If=20mA	9.0	9.6	10.2	V
Forward current	Ipn	/1-chip	-	240	-	mA
Luminance(With LCD)	Lv	If=240mA	-	800	-	cd/m <sup>2</sup>
Luminous color	White					

### **4-3 CTP Operating Conditions**

Item	Symbol	Condition	Min	Type	Max	Unit
Power Supply Voltages	VDD	-	2.8	3.3	3.6	V
I/O Digital Voltage	IOVDD	-	2.8	3.3	3.6	V

### **4-4 CTP Parameter**

Property	Requirement	Unit
Driver IC	FT5316	-
Structure	G+G	-
ITO Glass thickness	0.7	MM
Hardness	6	H
Transmittance	≥85%	-
Operating Temperature	-20°C~+70°C, ≤85%RH	-
Storage Temperature	-30°C~+80°C, ≤85%RH	-

## 5. OPTICAL SPECIFICATION

### 5.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance 1lux and temperature = 25 ± 2°C) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of  $\theta$  and  $\Phi$  equal to 0°. The center of the measuring spot on the Display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement.

### 5.2 Optical Specifications

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	$\Theta$ L	CR>10	60	70	-	Deg.	Note 1
		$\Theta$ R		60	70	-	Deg.	
	Vertical	$\Theta$ U		50	60	-	Deg.	
		$\Theta$ D		60	70	-	Deg.	
Contrast ratio		CR	$\Theta = 0^\circ$	-	500	-		Note2
Color Gamut		CG		-	50	-	%	
White Chromaticity		Wx		-	(0.306)	-		
		Wy		-	(0.344)	-		
Reproduction of color	Red	Rx	$\Theta = 0^\circ$	-	(0.597)	-		Note4 (Based on C Light)
		Ry		-	(0.319)	-		
	Green	Gx		-	(0.312)	-		
		Gy		-	(0.567)	-		
	Blue	Bx		-	(0.148)	-		
		By		-	(0.158)	-		
Response Time (Rising + Falling)		Tr+Tf	$\Theta = 0^\circ$ Ta= 25°C	-	-	-	ms	Note5
Transmittance(with Polarizer)		Tr		-	(5.5)	-	%	Note3

### Note:

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o' clock direction and the vertical or 6, 12 o' clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

2. Contrast measurements shall be made at viewing angle of  $\Theta = 0$  and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark



(black)state . (see FIGUR 1) Luminance Contrast Ratio (CR) is defined mathematically.

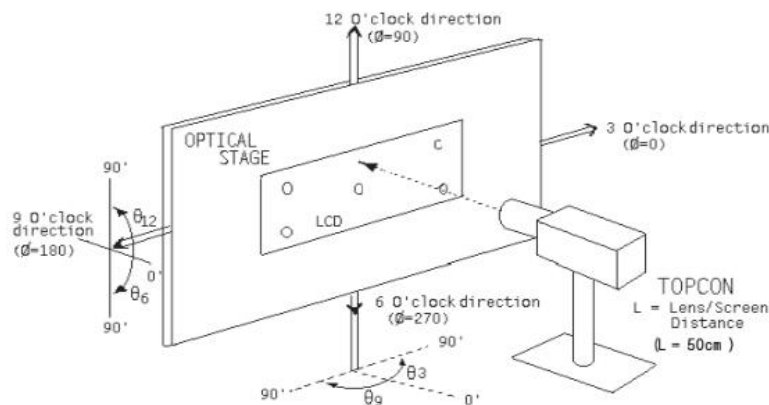
$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Transmittance is the Value without APF and without CG.

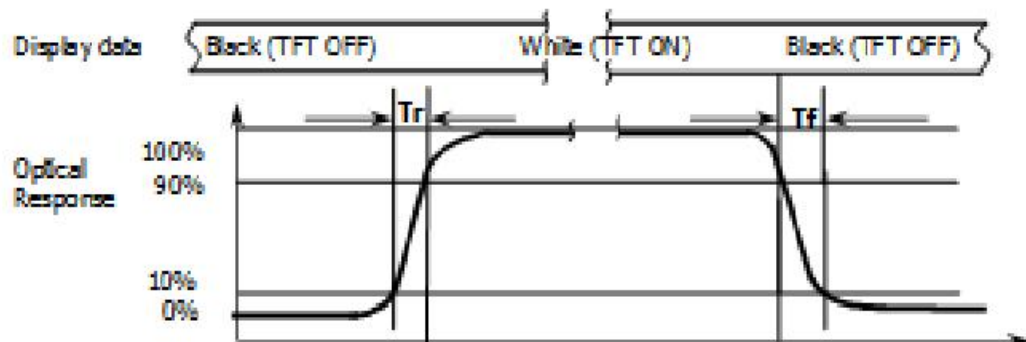
4. The color chromaticity coordinates specified in the above table shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

5. The electro-optical response time measurements shall be made as FIGURE 2 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is  $T_r$ , and 90% to 10% is  $T_f$ .

**Figure1 Measurement Set Up**



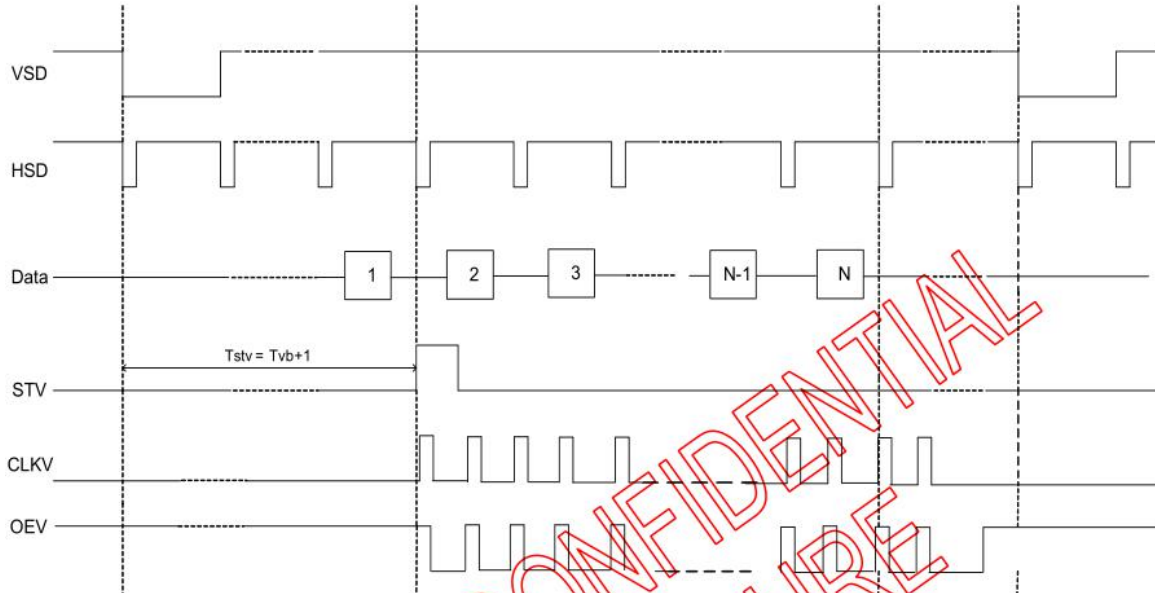
**Figure2 Response Time Testing**



## 6. Timing Characteristics of Input Signals

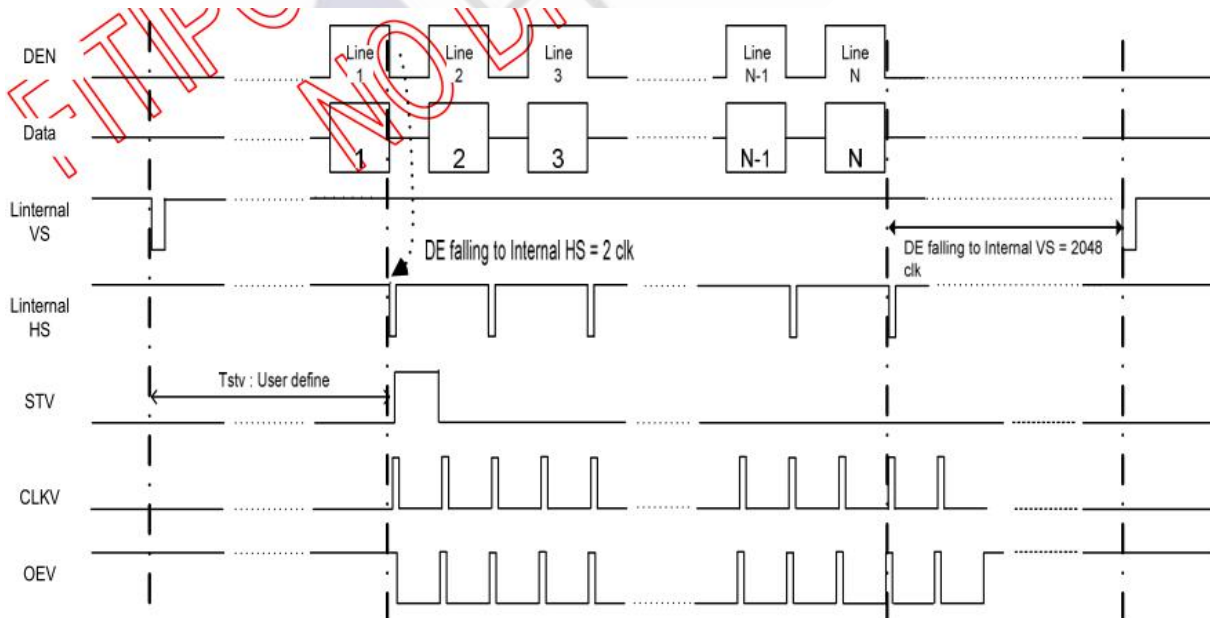
### 6-1 Panel Data Input Format for TTL Interface

#### 6-1-1 Vertical Timing Diagram HV mode



Vertical Timing Diagram HV mode

#### 6-1-2 Vertical Timing Diagram DE mode



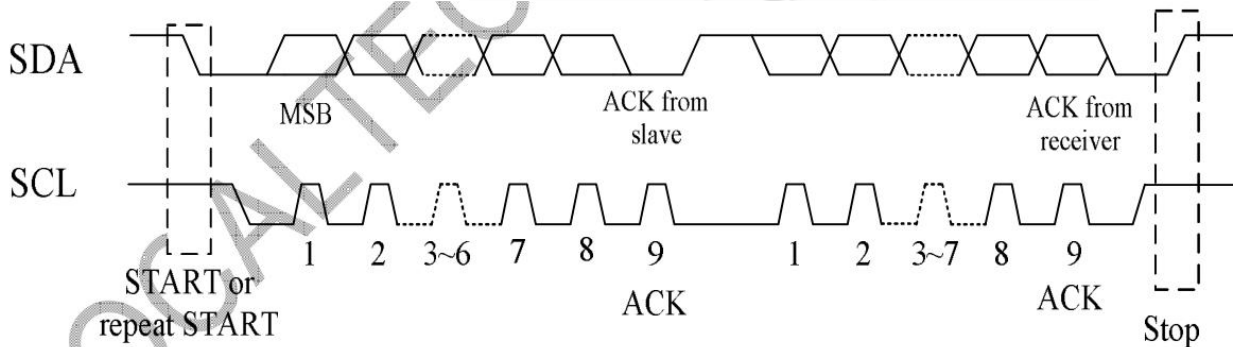
Vertical Timing Diagram DE mode

## Horizontal input timing

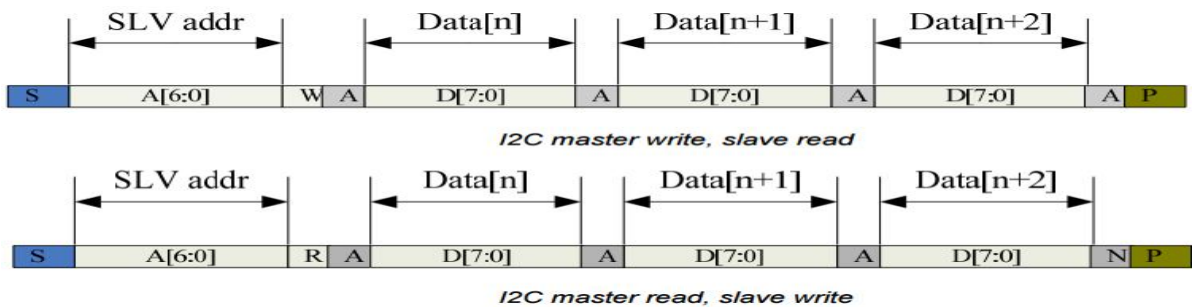
Parameter	Symbol	Value			Unit	Note
Horizontal display area	thd	800			DCLK	
DCLK frequency	fclk	Min.	Typ.	Max	MHz	
		20	33.3	50		
1 Horizontal Line	th	908	928	1088	DCLK	thb+thpw=88 DCLK is fixed
HSD pulse width	thpw	1	48	87		
HSD Back Porch (Blanking)	thb	87	40	1		
HSD Front Porch	thfp	20	40	200		

## Vertical input timing

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Vertical display area	tvd	480			H	
VSD period time	tv	517	525	712	H	tvpw+tvb=32H Is fixed
VSD pulse width	tvpw	1	1	3	H	
VSD Back Porch (Blanking)	tvb	31	31	29	H	
VSD Front Porch	tvfp	5	13	200	H	

**6-2 CTP I2C serial data transfer format**


Parameter	Min	Max	Unit
SCL frequency	10	400	KHz
Bus free time between a STOP and START condition	4.7	\	us
Hold time (repeated) START condition	4.0	\	us
Data setup time	250	\	ns
Setup time for a repeated START condition	4.7	\	us
Setup Time for STOP condition	4.0	\	us



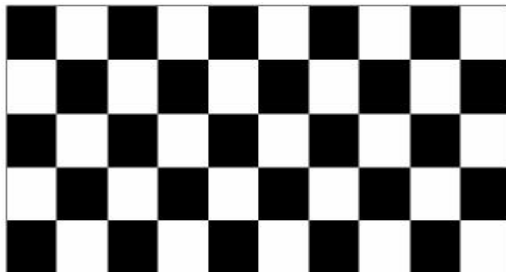
## 7. RELIABILITY TEST

### 7-1 Temperature and Humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Storage	Ta=+80 o C, 240hrs	
Low Temperature Storage	Ta=-30 o C, 240hrs	
High Temperature Operation	Ta=+70 o C, 240hrs	
Low Temperature Operation	Ta=-20 o C, 240hrs	
High Temperature and High Humidity (Operating)	Ta=+60 o C, 90%RH, 240hrs	

Note: (1) All tests above are practiced at module type.

(2) There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.



(a) Test Pattern (chess board Pattern )



(b) Gray Pattern

### 7-2 Shock and Vibration

ITEMS	CONDITIONS
Packing Shock (Non-Operation)	<ul style="list-style-type: none"> <li>● Shock level:980m/s<sup>2</sup></li> <li>● Waveform:1/2 Sine wave,6msec</li> <li>● ±X, ±Y ±Z,each axis 1 times</li> </ul>
Packing Vibration (Non-Operation)	<ul style="list-style-type: none"> <li>● Frequency range:8-33.3HZ</li> <li>● Stoke:1.0mm</li> <li>● Sweep: 10Hz-50Hz</li> <li>● x,y,z 2 hours for each direction</li> </ul>

### 7-3 Electrostatic Discharge

TEST ITEM	CONDITIONS
ESD (Non-operation)	150pF,330 Ω , Contact±4KV,Air :±8KV.Note 1
	200pF,0 Ω , ±200V Contact test.Note 2

Note:Measure Point:

- 1.LCD glass and metal bezel
- 2.IF connector pins

## 8.HANDDLING & CAUTIONS

### 8-1 Caution For Operation

◆Since the LCM is made of glass, do not apply strong mechanical impact or static load onto it. Handling with care since shock, vibration, and careless handling may seriously affect the product. If it falls from a high place or receives a strong shock, the glass maybe broken.

◆It is indispensable to drive the LCM within the specified voltage limit since the higher voltage than the limit causes LCM's life shorter. An electro-chemical reaction due to DC causes undesirable deterioration of the LCM so that the use of DC drive should avoid.

◆Do not connect or disconnect the LCM to or from the system when power is on.

◆Never use the LCM under abnormal conditions of high temperature and high humidity.

◆When expose to drastic fluctuation of temperature(hot to cold or cold to hot), the LCM may be affected; specifically, drastic temperature fluctuation from cold to hot, produces dew on the LCM's surface which may affect the operation of the polarizer on the LCM.

◆Response time will be extremely delay at lower temperature than the operating temperature range and on the other hand LCM may turn black at temperature above its operational range. However those phenomenon do not mean malfunction or out of order with the LCM. The LCM will revert to normal operation once the temperature returns to the recommended temperature range for normal operation.

◆Do not display the fixed pattern for a long time when using a normally black panel, as it may cause image sticking due to the LCM structure. If the screen is displayed in fixed mode, use a screen saver. It is recommended to display the fixed mode in less than 2 minutes or less.

◆Do not disassemble and/or re-assemble LCM module

### 8-2 Caution Against Static Charge

◆The LCM use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipments to protect against static electricity.

◆Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, if possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.

◆Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.

◆In handling the LCM, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary

## 9.LCD display initialization code

**This product does not require initialization code driver**

**-END-**