LCM Specification

☑Preliminary specification

☐Final Specification

Project No. 项目编号	TFT-H101A2WSIFT7N40
Customer 客户名称	
Module No. 客户型号	
Product type 产品内容	TFT LCD Module 1024 x 3RGB x 600 Dots 10.1”TFT LCD
Signature by customer: 客户确认签章： ☐Trial production ☐Mass production	

编　　制	电子审核	结构审核	批　　准
Y.L			

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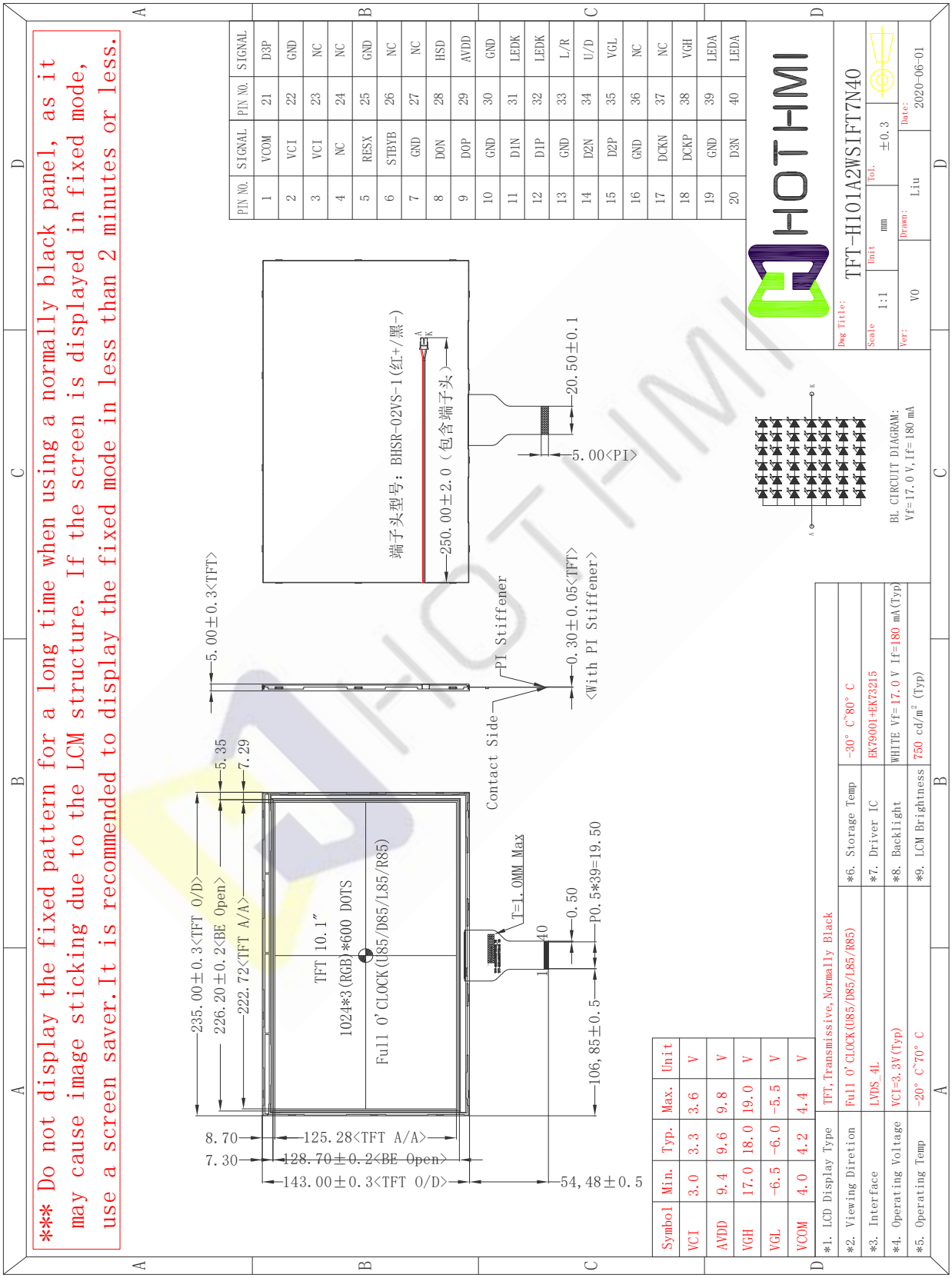
1 Document revision history :

DOCUMENT REVISION	DATE	DESCRIPTION	PREPARED BY	APPROVED BY
0	2020-06-01	First Release.	Y.L	

1. General Feature:

Item	Standard Value	Unit
Display Size	10.1”	--
Number of Pixels	1024(H)x3(RGB)*600(V)	--
Active Area	222.72(H) *125.28(V)	mm
Outline Dimension	235.00(H) ×143.00(V)× 5.00(T)	mm
Viewing Direction	FULL O’Clock	-
Interface	LVDS	-
Panel Driver IC	EK79001+EK73215	-
Panel Driver Condition	VCI=3.3V	V
Backlight	White LED	-
Touch Panel	Whitout Touch Panel	-
Cap Touch Driver IC	- - -	-
Cap Touch Driver Condition	- - -	V
Operation Temperature	-20~70	℃
Storage Temperature	-30~80	℃

2.Outline Dimensions



PIN NO.	SIGNAL	PIN NO.	SIGNAL
1	VCOM	21	D3P
2	VCI	22	GND
3	VCI	23	NC
4	NC	24	NC
5	RESX	25	GND
6	STBYB	26	NC
7	GND	27	NC
8	DON	28	HSD
9	DOP	29	AVDD
10	GND	30	GND
11	D1N	31	LEDK
12	D1P	32	LEDK
13	GND	33	L/R
14	D2N	34	U/D
15	D2P	35	VGL
16	GND	36	NC
17	DCKN	37	NC
18	DCKP	38	VGH
19	GND	39	LEDA
20	D3N	40	LEDA

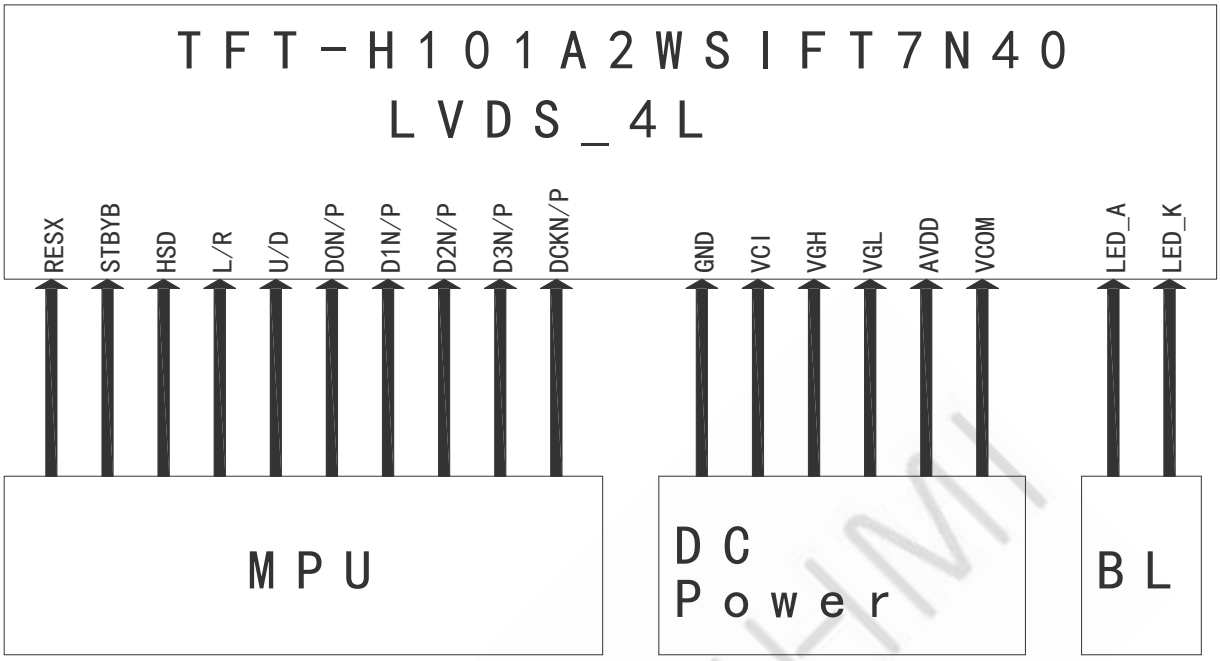
Symbol	Min.	Typ.	Max.	Unit
VCI	3.0	3.3	3.6	V
AVDD	9.4	9.6	9.8	V
VGH	17.0	18.0	19.0	V
VGL	-6.5	-6.0	-5.5	V
VCOM	4.0	4.2	4.4	V

*1. LCD Display Type	TFT,Transmissive,Normally Black	*6. Storage Temp	-30° C~80° C
*2. Viewing Diretion	Full 0'CLOCK(U85/D85/L85/R85)	*7. Driver IC	EK79001+EK73215
*3. Interface	LVDS_4L	*8. Backlight	WHITE Vf=17.0 V If=180 mA(Typ)
*4. Operating Voltage	VCI=3.3V(Typ)	*9. LCM Brightness	750 cd/m² (Typ)
*5. Operating Temp	-20° C~70° C		

3. Pin Description

Pin NO.	Symbol	Description
1	VCOM	VCOM buffer input voltage
2,3	VCI	Power supply for digital circuits
4	NC	No Connect
5	RESX	Global reset pin
6	STBYB	Standby mode mode control. STBYB = “1”,normal operation;STBYB = “0”,Standby mode
7	GND	Ground
8	D0N	-LVDS differential data input
9	D0P	+LVDS differential data input
10	GND	Ground
11	D1N	-LVDS differential data input
12	D1P	+LVDS differential data input
13	GND	Ground
14	D2N	-LVDS differential data input
15	D2P	+LVDS differential data input
16	GND	Ground
17	DCKN	-LVDS differential clock input
18	DCKP	+LVDS differential clock input
19	GND	Ground
20	D3N	-LVDS differential data input
21	D3P	+LVDS differential data input
22	GND	Ground
23,24	NC	No Connect
25	GND	Ground
26,27	NC	No Connect
28	HSD	6bot/8bit mode select ， L=8 BIT ， H=6BIT
29	AVDD	Power supply for analog circuits
30	GND	Ground
31,32	LED_K	LED Cathode/No Connect
33	L/R	Horizontal inversion
34	U/D	Vertical inversion
35	VGL	Gate OFF Voltage
36,37	NC	No Connect
38	VGH	Gate ON Voltage
39,40	LED_A	LED Anode/No Connect
-END-		

3.2 Wiring Diagram



Symbol	Min.	Typ.	Max.	Unit
VCI	3.0	3.3	3.6	V
AVDD	9.4	9.6	9.8	V
VGH	17.0	18.0	19.0	V
VGL	-6.5	-6.0	-5.5	V
VCOM	4.0	4.2	4.4	V

STBYB	STBYB = “1”, Normal operation
	STBYB = “0”, Standby mode
HSD	HSD = “1”, 6 bit
	HSD = “0”, 8 bit
U/D	U/D = “1”, Down or Up scan
	U/D = “0”, Up or Down scan
L/R	L/R = “1”, shift right
	L/R = “0”, shift left

4. OPTICAL SPECIFICATION

4.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance 1lux and temperature = 25 2℃) 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 θ and Φ 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.

4.2 Optical Specifications

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	Θ L	CR>10	-	85	-	Deg.	Note 1
		Θ R		-	85	-	Deg.	
	Vertical	Θ U		-	85	-	Deg.	
		Θ D		-	85	-	Deg.	
Contrast ratio		CR	Θ = 0°	-	800	-		Note2
Color Gamutt (C light)		CG		-	50	-	%	
White Chromaticity		Wx	Θ = 0°	-0.03	0.307	+0.03		
		Wy			0.338			
Reproduction of color	Red	Rx			0.605			Note4 (Based on C Light)
		Ry			0.336			
	Green	Gx			0.297			
		Gy			0.552			
	Blue	Bx			0.139			
		By			0.132			
Response Time (Rising + Falling)		Tr+Tf	Θ = 0° Ta= 25℃	-	30	40	ms	Note5
Transmittance		Tr		-	5.8		%	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 5).

2. Contrast measurements shall be made at viewing angle of Θ = 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 FIGURE 5) 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 with Polarizer.

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 6 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

Figure 4. The Definition of Vth & Vsat

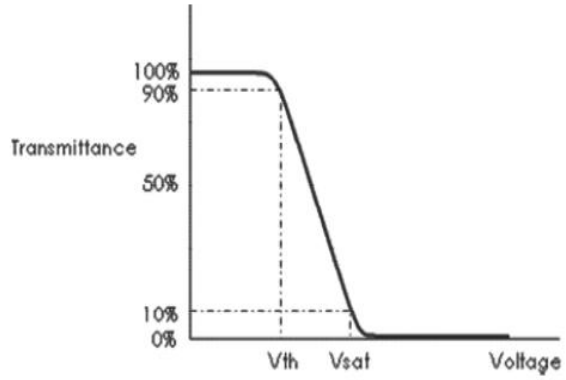


Figure 5. Measurement Set Up

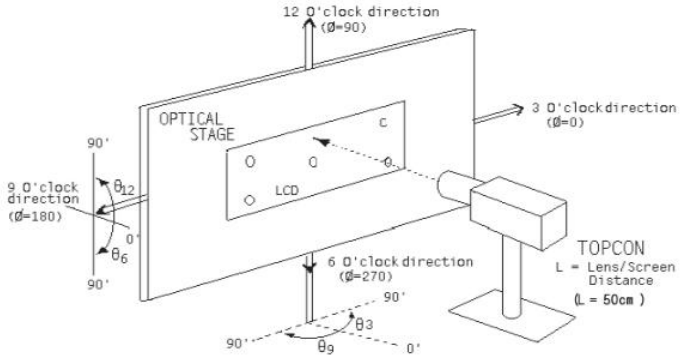
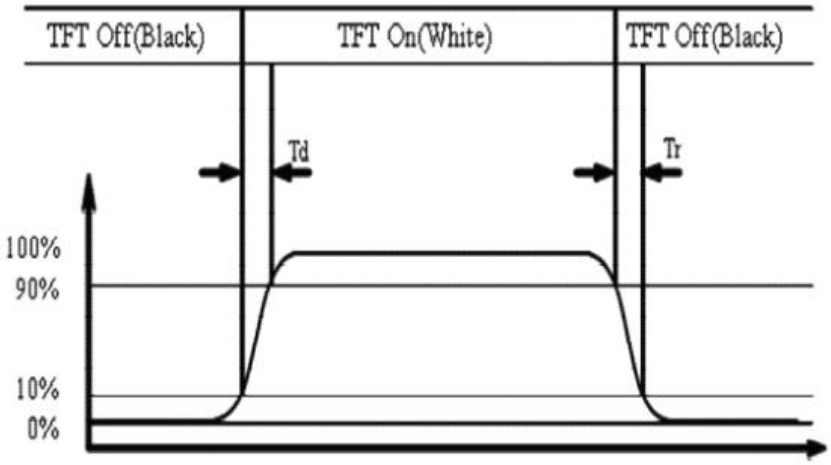


Figure 6. Response Time Testing



5. Electrical Characteristics

5-1 TFT LCD Module Operating Conditions

Item	Symbol	Condition	Min	Type	Max	Uint
Analog Power supply	VCI	-	3.0	3.3	3.6	V
TFT Gate on voltage	VGH	-	17.0	18.0	19.0	V
TFT Gate off voltage	VGL	-	-6.5	-6	-5.5	V
TFT Common Electrode Voltage	VCOMH	-	-	4.4	-	V
	VCOML	-	-	4.0	-	

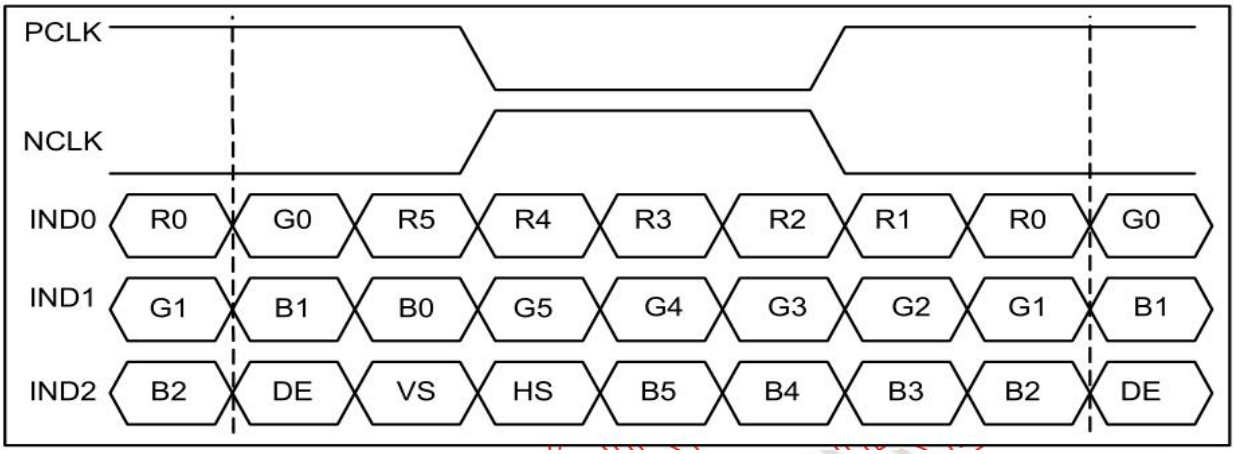
5-2 LED back light specification

Item	Symbol	Condition	Min	Type	Max	Uint
Forward voltage	Vt	If=30mA /1-chip	-	17.0	-	V
Forward current	Ipn		-	180	-	mA
Luminance(With LCD)	Lv	If=280mA	-	750	-	cd/m2
Luminous color	White					

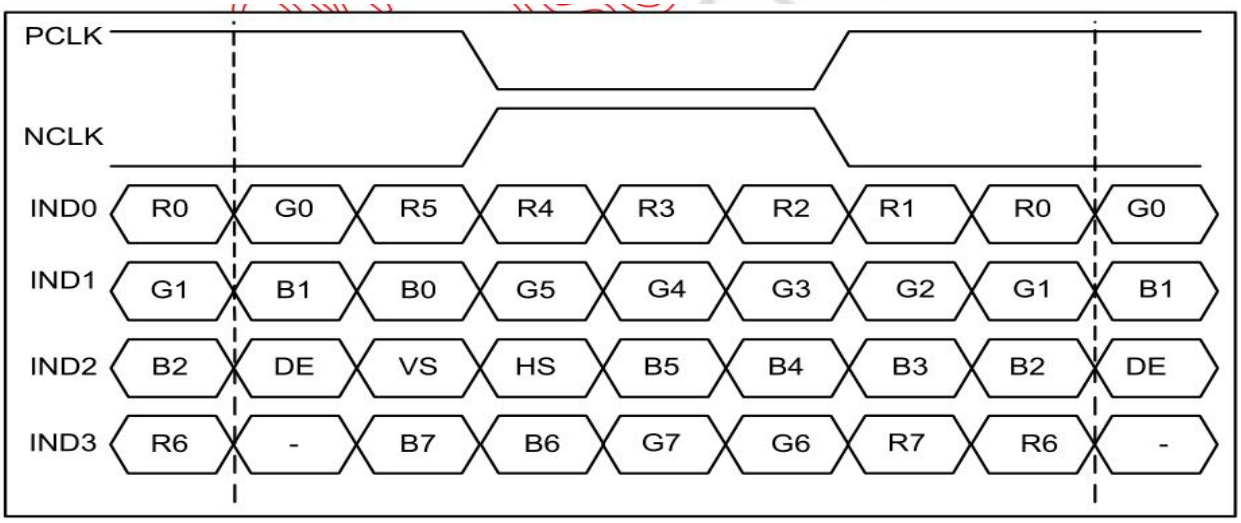
6.Timing Characteristics of Input Signals

6-1 Data Input Format for LVDS

6-1-1 6-bit LVDS input(HSD=”H”)



6-1-2 8-bit LVDS input(HSD=”L”)



Output Timing Table

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
DCLK frequency	Fclk	-	65	71	MHz	VDD =2.3~3.6V
DCLK cycle time	Tclk	14.1	15.4		ns	
DCLK pulse duty	Tcwh	40	50	60	%	Tclk
Time from HSD to Source Output	Thso	-	64	-	DCLK	
Time from HSD to LD	Thld	-	64	-	DCLK	
Time from HSD to STV	Thstv	-	2	-	DCLK	
Time from HSD to CKV	Thckv	-	20	-	DCLK	
Time from HSD to OEV	Thoev	-	4	-	DCLK	
LD pulse width	Twld	-	10	-	DCLK	
CKV pulse width	Twckv	-	66	-	DCLK	
OEV pulse width	Twoev	-	74	-	DCLK	

6-1-3 Timing Characteristic

DE mode

DE mode					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	40.8	51.2	67.2	Mhz
Horizontal display area	thd		1024		DCLK
HSYNC period time	th	1114	1344	1400	DCLK
HSYNC blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd		600		H
VSYNC period time	tv	610	635	800	H
VSYNC blanking	tvb+tvfp	10	35	200	H

HV mode(1)

HV mode Horizontal input timing						
Parameter		Symbol	Value			Unit
Horizontal display area		thd	1024			DCLK
DCLK frequency@ Frame rate=60hz		fclk	Min.	Typ.	Max.	
			44.9	51.2	63	Mhz
1 Horizontal Line		th	1200	1344	1400	DCLK
HSYNC pulse width	Min.	thpw	1			
	Typ.		—			
	Max.		140			
HSYNC back porch		thbp	160	160	160	
HSYNC front porch		thfp	16	160	216	

HV mode(2)

Vertical input timing					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd		600		H
VSYNC period time	tv	624	635	750	H
VSYNC pulse width	tvpw	1	—	20	H
VSYNC back porch	tvb	23	23	23	H
VSYNC front porch	tvfp	1	12	127	H

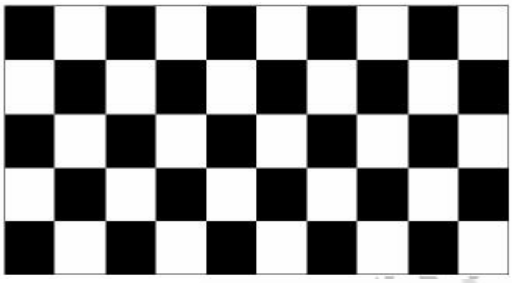
7. RELIABILITY TEST

7-1 Temperature and Humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	70℃ ; 120hrs	
High Temperature Storage	80℃ ; 120hrs	
High Temperature High Humidity Operation	60℃; 90%RH ; 120hrs (No condensation)	
Low Temperature Operation	-20℃ ; 120hrs	
Low Temperature Storage	-30℃ ; 120hrs	
Thermal Shock	-30℃ (0.5hr) ~ 80℃ (0.5hr) ; 100 Cycles	Non-Operating

Note 1: Condition of Image Sticking test：25℃ ±2℃

Operation with test pattern sustained for 4 hrs, then change to gray pattern immediately.After 5 mins, the mura must be disappeared completely .



(a) Test Pattern (chess board Pattern)

(b) Gray Pattern

7-2 Shock and Vibration

ITEMS	CONDITIONS
Packing Shock (Non-Operation)	● Shock level:980m/s^2 ● Waveform:1/2 Sine wave,6msec ● ±X, ±Y ±Z,each axis 1 times
Packing Vibration (Non-Operation)	● Frequency range:8-33.3HZ ● Stoke:1.0mm ● Sweep: 10Hz-50Hz ● x,y,z 2 hours for each direction

7-3 Electrostatic Discharge

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