SPECIFICATION
FOR
TFT LCD MODULE

CUSTOMER : _____

CUSTOMER MODULE : _____

HG MODEL : HG101WS040

☐**Preliminary Specification**

■**Final Specification**

Customer Confirmation column:

Approved by : _____ Dept. : _____ Data : _____

Please return one of the copies of the specification with your signature to us within two weeks after you receive this document. If it is not returned, we will assume that you agree to the entire contents of this specification document.

Designed by	Checked by	Approved by

Revision History

Version NO.	DATE	Description	Remak
V1.0	2021.05.19	FIRST ISSUE	

CONTENTS

1. GENERAL INFORMATION

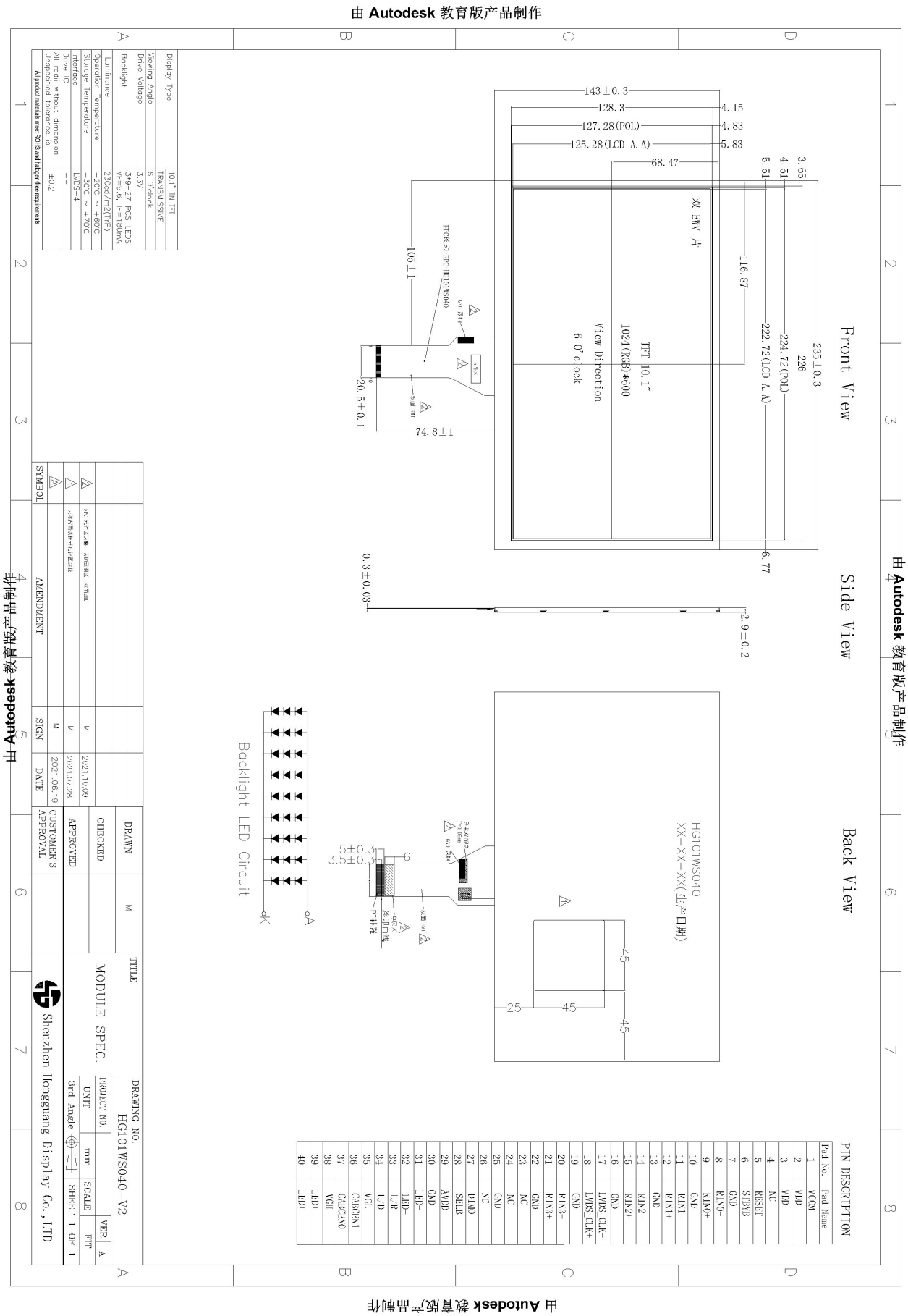
1.1 features

1) Structure: TFT PANNEL+IC+FPC+BL
2) IPS Type LCD 1024 dot-segment and 600 dot-common outputs
3) 16.7M Color can be selected by software
4) White LED back light
5) LVDS interface
6) Operation Temperature : -20~60℃
7) Storage Temperature : - 30~70℃
8) CTP cover lens : -/
9) CTP structure : -/
10) LED life time: -/

1.2 General specification

Item of	Contents	Unit
Panel Size	10.1	inch
LCD Type	a-si/TRANSMISSIVE	/
Display mode	Normally White	/
Pixel arrangement	1024*3(RGB)*600	Dots
Pixel pitch (W*H)	72.5 x 208.8	um
Active Area	222.72(H) x 125.28(V)	Mm
Module area (W*H*T)	235 (H)*143(V)*2.9(T)	Mm
Recommended Viewing Direction	6	O' clock
IC	TBD	/
Interface	LVDS-4	/
Luminance for LCM	230	cd/m2
Weight	TBD	g

2. DIAGRAM FOR LCM



3. I/O CONNECTION & BLOCK DIAGRAM

Pin No.	Symbol	I/O	Function	Remark
1	VCOM	P	Common Voltage	
2	VDD	P	Power Voltage for digital circuit	
3	VDD	P	Power Voltage for digital circuit	
4	NC	---	No connection	
5	Reset	I	Global reset pin	
6	STBYB	I	Standby mode, Normally pulled high STBYB = "1", normal operation STBYB = "0", timing controller, source driver will turn off, all output are High-Z	
7	GND	P	Ground	
8	RXIN0-	I	- LVDS differential data input	
9	RXIN0+	I	+ LVDS differential data input	
10	GND	P	Ground	
11	RXIN1-	I	- LVDS differential data input	
12	RXIN1+	I	+ LVDS differential data input	
13	GND	P	Ground	
14	RXIN2-	I	- LVDS differential data input	
15	RXIN2+	I	+ LVDS differential data input	
16	GND	P	Ground	
17	RXCLKIN-	I	- LVDS differential clock input	
18	RXCLKIN+	I	+ LVDS differential clock input	
19	GND	P	Ground	
20	RXIN3-	I	- LVDS differential data input	
21	RXIN3+	I	+ LVDS differential data input	
22	GND	P	Ground	
23	NC	---	No connection	
24	NC	---	No connection	
25	GND	P	Ground	
26	NC	---	No connection	
27	DIMO	O	Backlight CABC controller signal output	
28	SELB	I	6bit/8bit mode select	Note1
29	AVDD	P	Power for Analog Circuit	
30	GND	P	Ground	
31	LED-	P	LED Cathode	
32	LED-	P	LED Cathode	
33	L/R	I	Horizontal inversion	Note3
34	U/D	I	Vertical inversion	Note3
35	VGL	P	Gate OFF Voltage	
36	CABCEN1	I	CABC H/W enable	Note2
37	CABCEN0	I	CABC H/W enable	Note2
38	VGH	P	Gate ON Voltage	
39	LED+	P	LED Anode	
40	LED+	P	LED Anode	

I: input, O: output, P: Power

Note1: If LVDS input data is 6 bits ,SELB must be set to High;
If LVDS input data is 8 bits ,SELB must be set to Low.

Note2: When CABC_EN="00", CABC OFF.
When CABC_EN="01", user interface image.
When CABC_EN="10", still picture.
When CABC_EN="11", moving image.
When CABC off, don't connect DIMO, else connect it to backlight.

Note3: When L/R="0", set right to left scan direction.
When L/R="1", set left to right scan direction.
When U/D="0", set top to bottom scan direction.
When U/D="1", set bottom to top scan direction.

4. ABSOLUTE MAXIMUM RATINGS

(GND=AGND=0V)

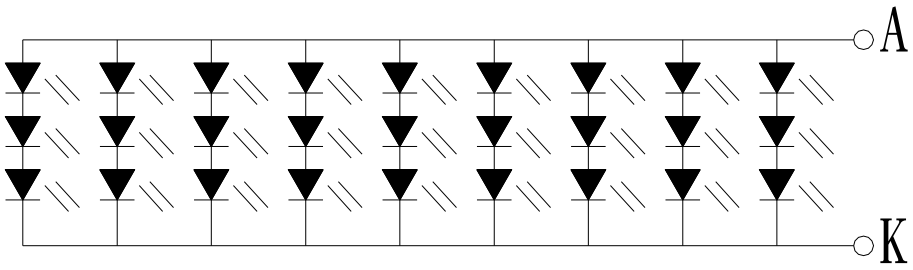
Parameter of absolute maximum ratings 参数	Symbol 符号	Min 最小值	Max 最大值	Unit 单位
Power supply voltage2	VCC	-0.3	7	V
Backlight forward current	I_{LED}	-0.001	30	mA(For each led)
Reverse Voltage	V_R	-	10	V
Operating temperature	Top	-20	60	°C
Storage temperature	Tst	-30	70	°C
Humidity	RH	-	90%(Max)/60°C	RH

5. ELECTRICAL CHARACTERISTICS

5.1 Typical Operation Conditions

Item	Symbol	Values			Unit	Remarks
		Min.	Typ.	Max.		
Power Voltage Supply	VCC	2.3	3.3	3.6	V	
Backlight Forward Voltage	Vf	8.7	9.6	10.2	V	-
LED Forward Current	If	-	180	-	mA	Note

Note:The “LED life time” is defined as the module brightness decrease to 50% of original brightness at I_L=20Ma(for each led). The LED life time could be decreased if operating $I_L$is larger than 20mA

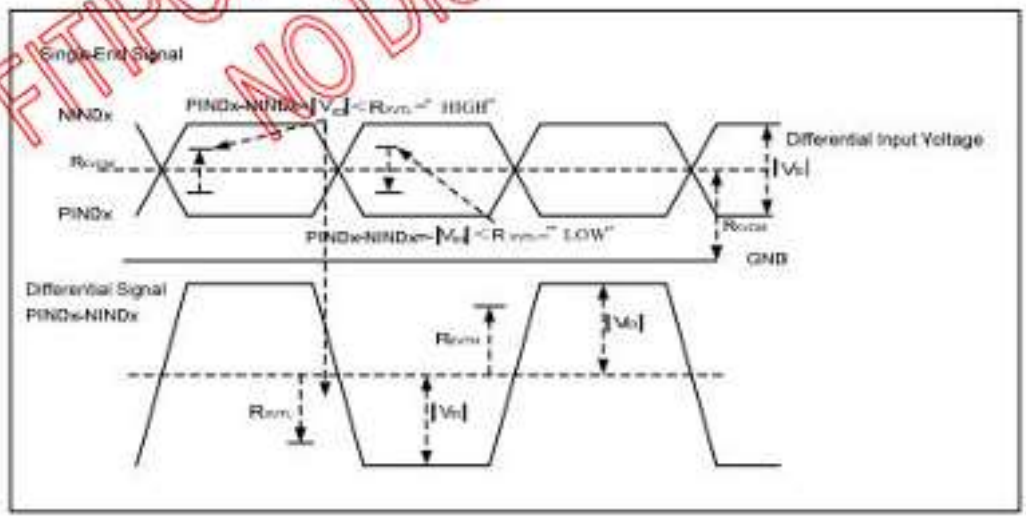


5.2 DC CHARACTERISTICS

(TA = -20 to 85°C, VDD = 2.3 to 3.6V, AVDD = 8 to 13.5V, GND = AGND = GND_LVDS = 0V)

LVDS DC characteristic

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential input high threshold voltage	RxVTH			+0.1V	V	RxVCM=1.2V
Differential input low threshold voltage	RxVTL	-0.1			V	
Input voltage range(single-end)	RxVIN	0		2.4	V	
Differential input common mode voltage	RxVCM	$\|V_{ID}\|/2$		2.4 -$\|V_{ID}\|/2$	V	
Differential input voltage	$\|V_{ID}\|$	0.2		0.6	V	
Differential input leakage current	RxVTH	-10		+10	uA	
LVDS Digital Operating Current	Iddlvsd	-	40(TBD)	50	mA	Fclk=65Mhz, VDD=3.3V
LVDS Digital Standby Current	Istlvds	-	10(TBD)	50	uA	Clock & all functions are stop



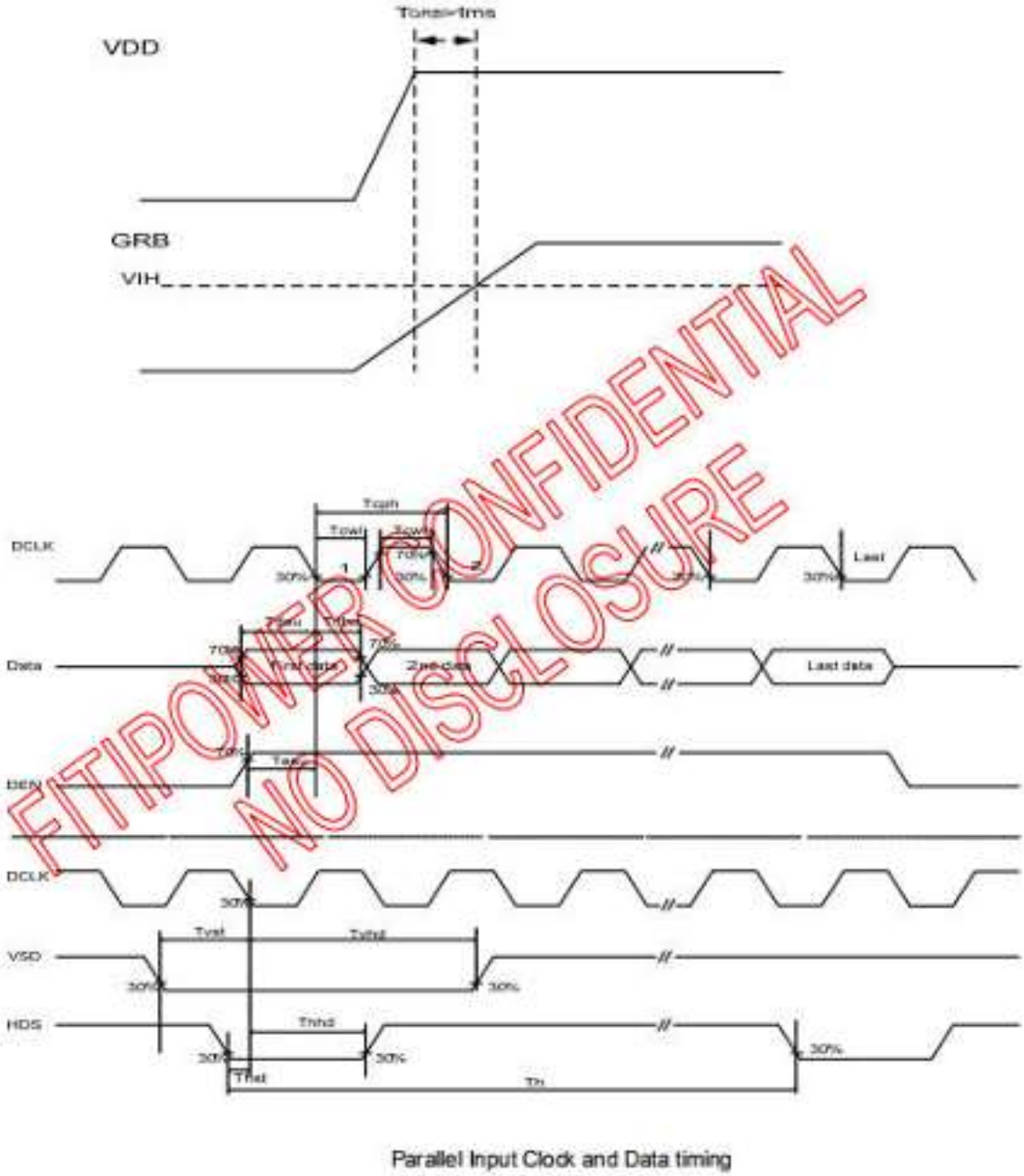
Power

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Base drive current for PWM	IDRV	–	–	60	mA	DRVA = 0.7V
DRV output voltage for PWM	VDRV	0	–	VDD	V	
Feedback voltage for PWM	VFB	1.1	1.2	1.3	V	
Duty cycle maximum	Dmax	–	–	85	%	
VCOM buffer input voltage	VCOMI	1	–	AVDD	V	
VCOM buffer output voltage	VCOMO	VCOMI-0.2	VCOMI	VCOMI+0.2	V	
VCOM buffer output current	IVCOM	–	–	10	mA	VCOMO= 5V vs 4.9V

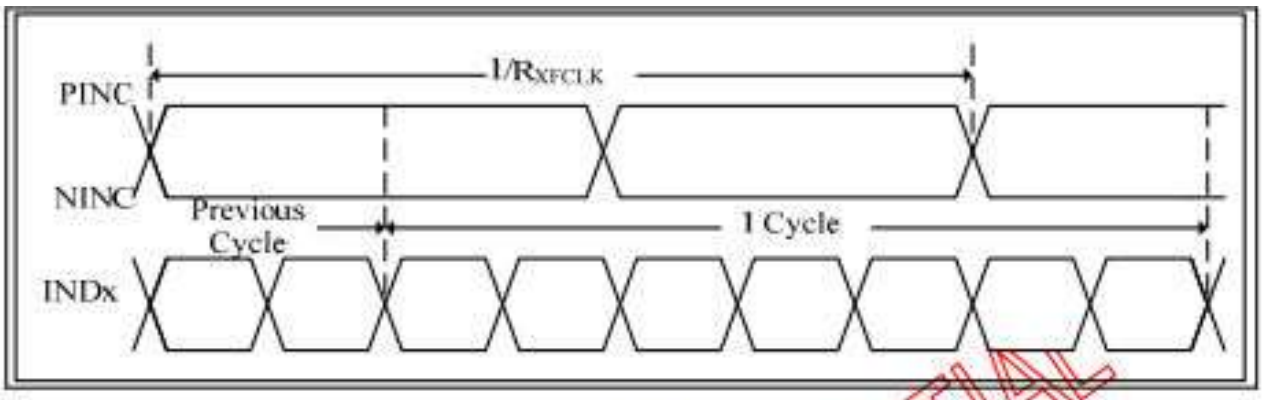
5.3 AC Characteristics

LVDS mode

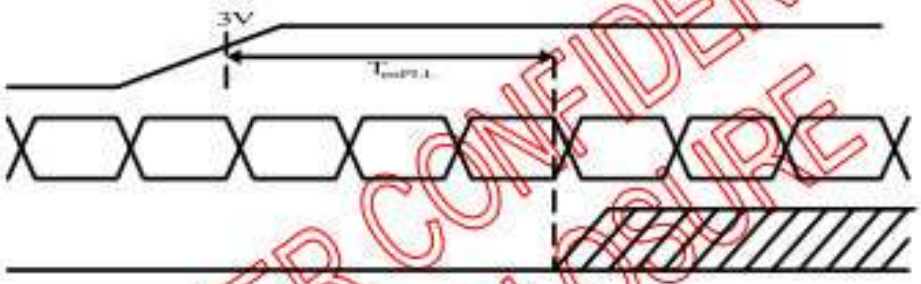
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Clock Frequency	RxFCLK		20	-	71	MHz
Input data skew margin	TRSKM	|VID|=400mV RxVCM=1.2V RxFCLK=71MHz	500			ps
Clock High Time	TLVCH			4/(7* RxFCLK)		ns
Clock Low Time	TLVCL			3/(7* RxFCLK)		ns
PLL wake-up-time	TenPLL				150	us



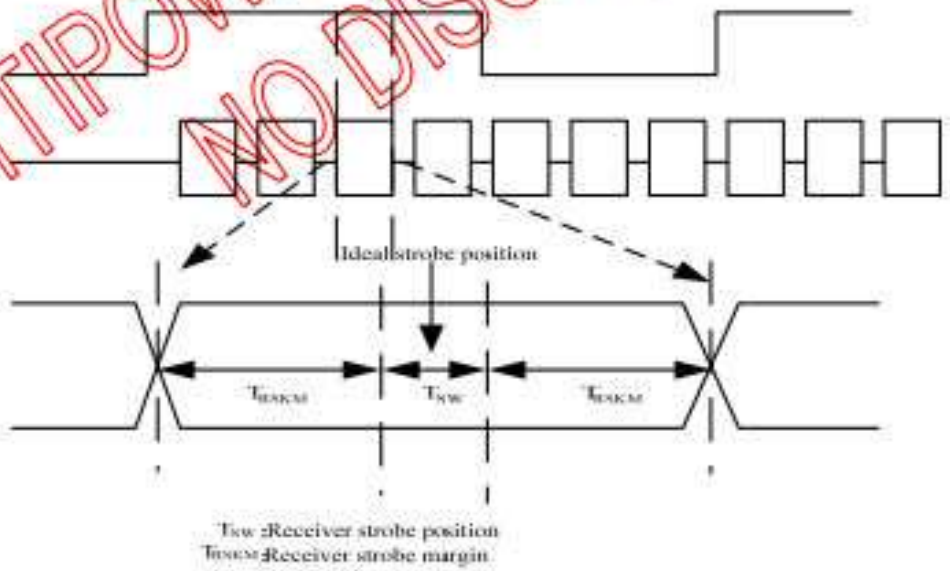
Parallel Input Clock and Data timing



LVDS timing(1)



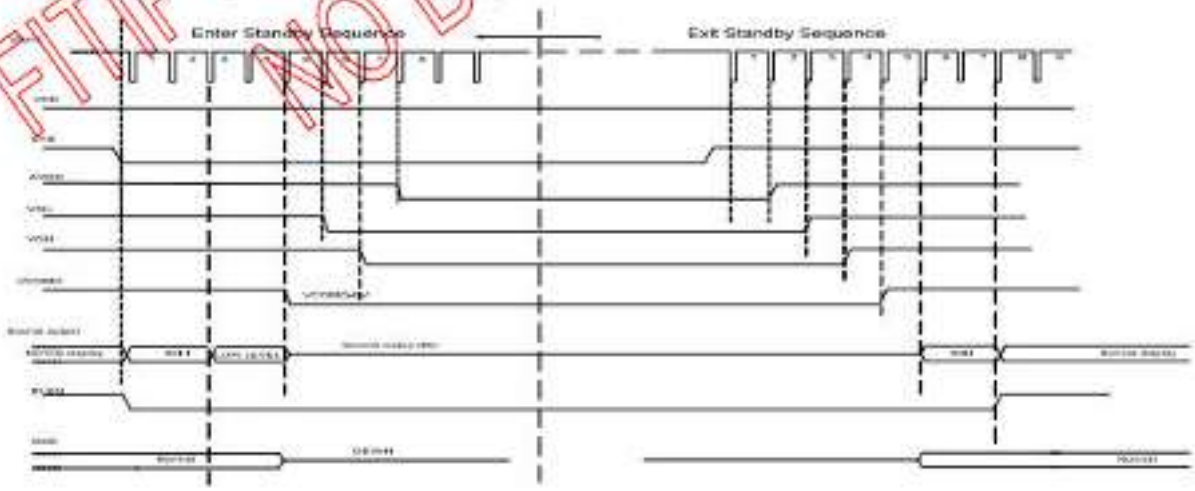
LVDS timing(2)



LVDS timing(3)

5.4 Power Mode

Power On/Off timing chart



Enter and Exit Standby Mode timing chart

Note: Low level=3Fh,when NBW=L(Normally white)
Low level=00h,when NBW=H(Normally black)

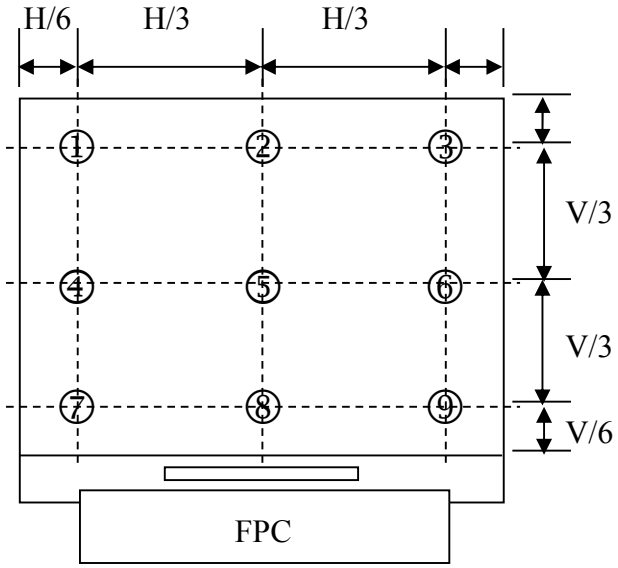
6. ELECTRO-OPTICAL CHARACTERISTICS

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio (Center point)		C/R	-	-	500	-	-	Note(1)
Luminance uniformity		U_W	θ = 0. Normal viewing angle B/L On Note(1)	75	80	-	%	Note(2)
Response Time		Tr + Tf		-	25	-	ms	Note(3)
Color Chromaticity (CIE 1931)	White	W_X			0.314		参考值	Note(5)
		W_Y			0.334			
	Red	R_X			0.574			
		R_Y			0.352			
	Green	G_X		-0.02	0.345	+0.02		
		G_y			0.557			
	Blue	B_X			0.148			
		B_Y			0.128			
Viewing Angle	Hor.	∅ 3R	C/R≥10	40	45	-	Deg	Note(4)
		∅ 9L		40	45	-		
	Ver.	∅ 12U		10	15	-		
		∅ 6D		30	35	-		

Note1 Definition of Contrast Ratio (CR):

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note2: Definition of Luminance Uniformity: Active area is divided into 9 measuring areas (Shown in below), every measuring point is placed at the center of each measuring area.



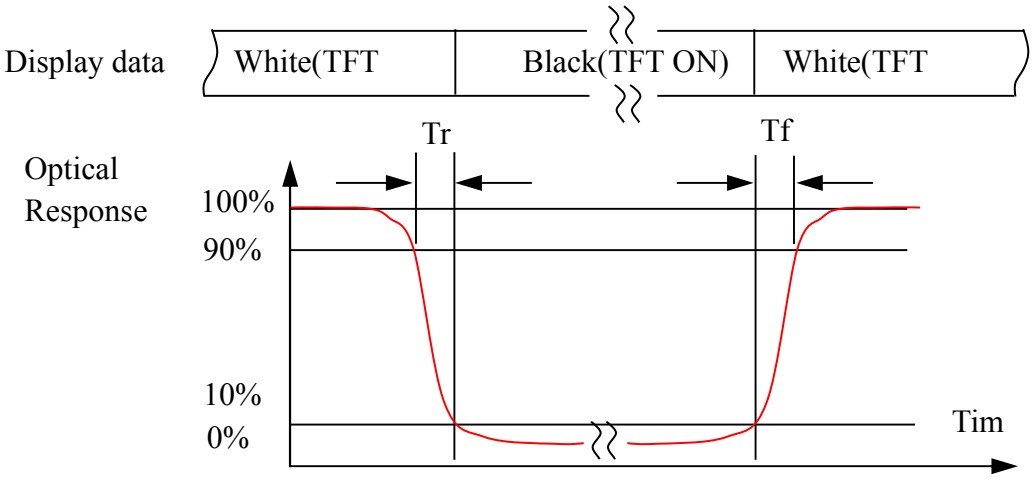
The spot locations for luminance measurement

$$\text{Luminance Uniformity} = \frac{H/6}{V/6} \cdot \frac{B_{min}}{B_{max}} \times 100\%$$

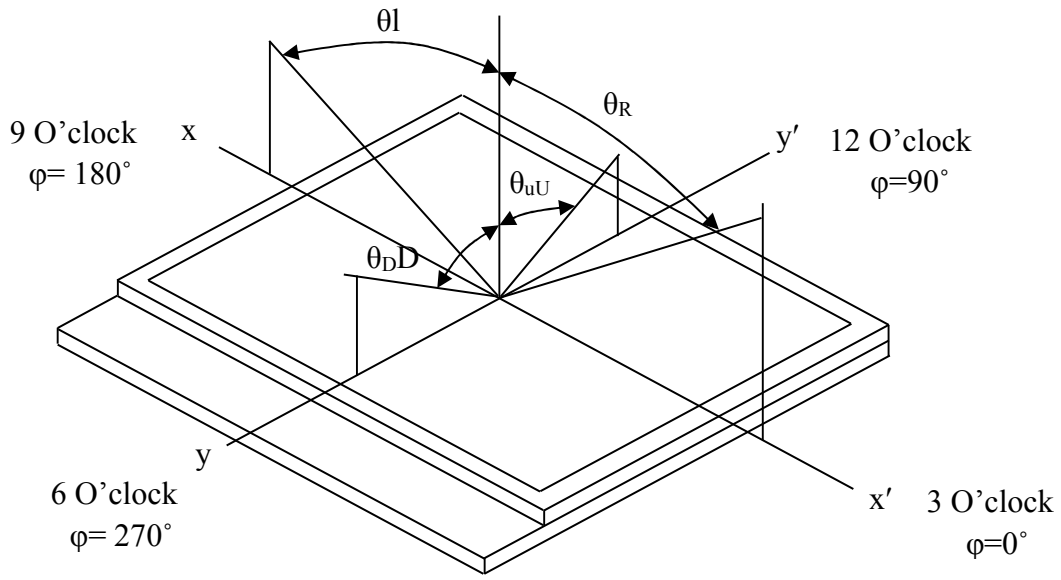
B_{max}: The measured maximum luminance of all measurement position.

B_{min}: The measured minimum luminance of all measurement position.

Note 3:Definition of Response time: Sum of Tr and Tf



Note4.Definition of Viewing Angle: The viewing angle range that the CR≥10



Note 5: Definition of Color Chromaticity (CIE 1931)
Color coordinate of white & red, green, blue at center point.

7. RELIABILITY TEST CONDITIONS

No	Test Item	Test Condition	STANDARD
1	High Temperature Storage	+70°C / 96Hours	1. Functional test is OK. Missing Segment, short, unclear segment, on-display, display abnormally and liquid crystal leak are un-allowed. 2. No low temperature bubbles, end seal loose and fall, frame rainbow.
2	Low Temperature Storage	-30°C / 96Hours	
3	High Temperature Operating	+60°C / 96Hours	
4	Low Temperature Operating	-20°C / 96Hours	
5	Thermal and cold shock	0°C⇆+50°C x 10cycles (30min) (5min) (30min)	
6	Operate at High Temperature and Humidity	50°C x 90%RH / 24H	
7	Vibration Test	Frequency: 10Hz~55Hz~10Hz Amplitude:1.5mm, 2 hours for each direction of X, Y, Z	1. Function test is OK. 2. No glass crack, chipped glass, end seal loose and fall, epoxy frame crack and so on. 3. No structure loose and fall.
8	Dropping test	Drop to the ground from 1m height, 1 corner, 3 edges, 6 surfaces.	
9	ESD test	Contact: ±4KV Air: ±8KV 150PF/330Ω,5Points/panel,5times	The test results shall be subject to the whole machine test.

NOTE:

1. The reliability items will be fully performed in new sample qualification,
2 .The reliability status will be tested as monitor during mass production. Individual reliability test shall be performed by lot , Moreover, the individual reliability item shall be decided according to reliability plan.
3. All samples are inspected after keeping in the room with normal temperature and humidity for 2 hours or above.
4. Vibration test: It is not necessary to test for those products without assembly frame , backlight , PCB and so on.
5. Dropping test : It is necessary for affirming new package.
6. For the high temperature and high humidity test, pure water of over 10 MΩ.cm should be used.
7. Each test item applies for test LCM only once .Then tested LCM cannot be used again in any other test item.
8. The quantity of LCM examination for each test item is 5pcs to 10pcs.

8. INSPECTION STANDARDS

8.1 AQL Sampling inspection standard

使用 GB/T 2828-2003 一般 II 水平,采用正常检查一次抽样方式；具体抽检方式参照《成品检验管理程序》、《抽样管理规范》

缺陷区分	AQL 允收水准
严重缺陷	0 收 1 退
重缺	0.4
轻缺	1.0

8.2 Inspect the condition

8.2.1 在 20—40W 日光灯的照明条件下，样品离检查者眼睛约 30cm 处进行检查。检验方向以垂直线前后左右 45°（以时钟 3 点、6 点、9 点、12 点）

8.2.2 检验者视力需达到标准视力 1.0 以上。

8.2.3 检验者需戴静电手环、两手八个手指套。

8.2.4 外观检验者以目视检查或以菲林对比卡比对。

8.2.5 电性测试使用电测测架,主板,电源线及单片机。

8.2.6 若标准与规格书不符时，以产品发行之规格书特殊检验规格、工程变更为准

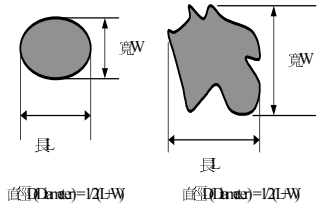
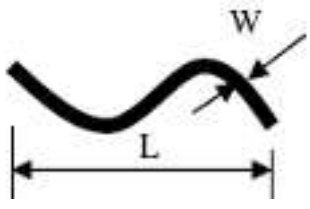
8.2.7 辉色度检测请参照样品,检测方法依照辉色度检验标准。

8.2.8 电测检验环境:照度为 200LUX 以下,外观检验环境：照度为 600LUX-1000LUX，检验时间：1 秒-3 秒。

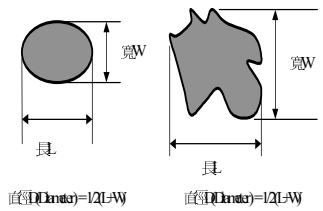
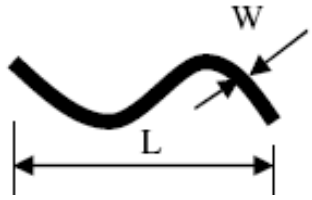
8.2.9 检验工具:电测测架,主板,电源线及单片机,菲林对比卡,游标卡尺,放大镜,实体显微镜(必要时)等等。

8.3 Judgment criterion

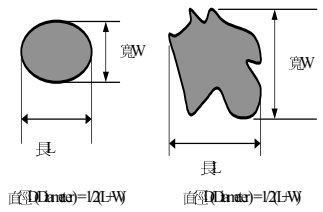
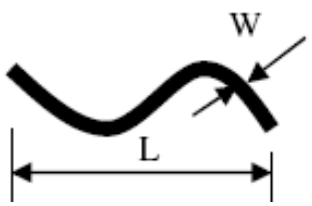
小尺寸点、线判定标准：（6.2 寸以内）

1	点状缺陷（磨伤、异物、针孔、凹痕、缺膜、气泡，白点、彩点、脏点）		判定（A/B/C 区）	*D≤0.10,忽略不计,但密集型不允许*	MI	OK
				0.1<D≤0.15，ds≥10		N≤2
				0.15<D≤0.2，ds≥10		N≤1
				LCD 亮点：0.15<D		N≤1
				D>0.2		NG
			判定（D 区）	同背面丝印油墨区杂质判定标准		
			注：1）D 区的点状缺陷需在不影响 CTP 功能、客户组装及整机的外观的情况下，判定 OK		MI	
2	线状缺陷（磨伤、无感划伤、毛屑、纤维等）		判定（A/B/C 区）	*W≤0.03mm，L≤3mmm，ds≥10*	MI	N≤2
				0.03mm<W≤0.05mm，L≤3mm，ds≥10		N≤1
				W>0.05mm 或 L>3mm		NG

中尺寸点、线判定标准：（6.2~8 寸以内）

1	点状缺陷（磨伤、异物、针孔、凹痕、缺膜、气泡，白点、彩点、脏点）		判定（A/B/C 区）	*D≤0.10，忽略不计，但密集型不允许*	MI	OK
				0.15<D≤0.25，ds≥10		N≤2
				0.25<D≤3，ds≥10		N≤1
				LCD 亮点：0.2<D		N≤1
				D>0.3		NG
			判定（D 区）	同背面丝印油墨区杂质判定标准		
			注：1）D 区的点状缺陷需在不影响 CTP 功能、客户组装及整机的外观的情况下，判定 OK		MI	
2	线状缺陷（磨伤、无感划伤、毛屑、纤维等）		判定（A/B/C 区）	*W≤0.03mm，L≤3mmm，ds≥10*	MI	N≤2
				0.03mm<W≤0.05mm，L≤3mm，ds≥10		N≤1
				W>0.05mm 或 L>3mm		NG

大尺寸点、线判定标准：（8.1~13.3 寸以内）

1	点状缺陷（磨伤、异物、针孔、凹痕、缺膜、气泡，白点、彩点、脏点）		判定（A/B/C 区）	*D≤0.1，忽略不计，但密集型不允许*	MI	OK
				0.15<D≤0.3，ds≥10		N≤2
				0.3<D≤0.35，ds≥10		N≤1
				LCD 亮点：0.25<D		N≤1
				D>0.35		NG
			判定（D 区）	同背面丝印油墨区杂质判定标准		
			注：1）D 区的点状缺陷需在不影响 CTP 功能、客户组装及整机的外观的情况下，判定 OK		MI	
2	线状缺陷（磨伤、无感划伤、毛屑、纤维等）		判定（A/B/C 区）	*W≤0.05mm，L≤5mmm，ds≥10*	MI	N≤2
				0.05mm<W≤0.07mm，L≤5mm，ds≥10		N≤1
				W>0.07mm 或 L>5mm		NG

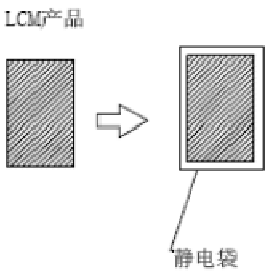
9. PACKAGE DRAWING

LCM产品(刀卡类)包装流程图

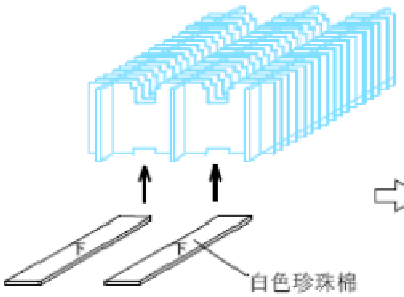
1.0包装材料清单：

见受控BOM

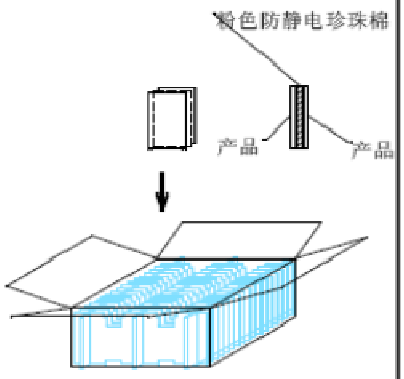
2.0包装方法说明：



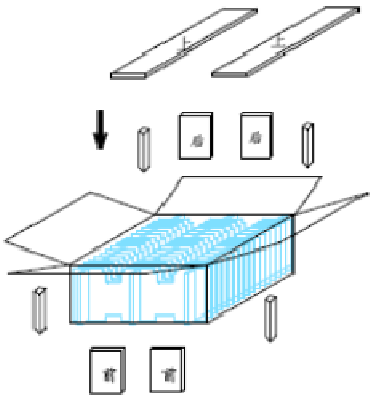
第一步：
LCM产品装入静电袋



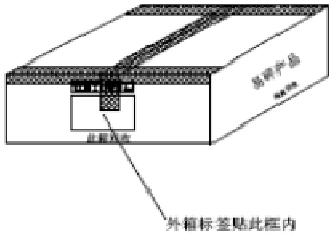
第二步：
把长卡，短卡组成卡阵（短卡朝向一致）
形状和数量按照 BOM 实际物料
卡阵底部放对应的白色珍珠棉后装箱



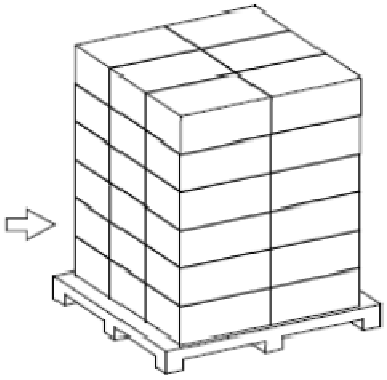
第三步：
放产品，每个卡槽内放两片产品；
2PCS产品显示面相对，
中间加粉色珍珠棉一起放入卡槽内。



第四步：
装箱后，按照BOM实际物料在纸箱内侧与卡阵避空位置放白色泡棉；



第五步：
最后胶带封箱，贴外箱标签



第六步：
将每箱整齐摆放在栈板上并包裹
最高可堆叠6层