

PRODUCT SPECIFICATION **FOR LCD MODULE**

Revision: 1.0

Model No: LSLI03501VGA-RV1

Module Type: COG+FPC+B/L+LENS

APPROVED SIGNATURE

- Approved Product Specification only
- Approved Product Specification and Samples

<u>Prepared By</u>	<u>Checked By</u>	<u>Approved By</u>

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1. General Description

LSLI03501VGA-RV1 is a transmissive type a-Si TFT-LCD (amorphous silicon thin film transistor liquid crystal display) module, which is composed of a TFT-LCD panel, a driver circuit and a backlight unit. The panel size is 3.5 inch and the resolution is 480(RGB)*480, the panel can display up to 16.7M colors.

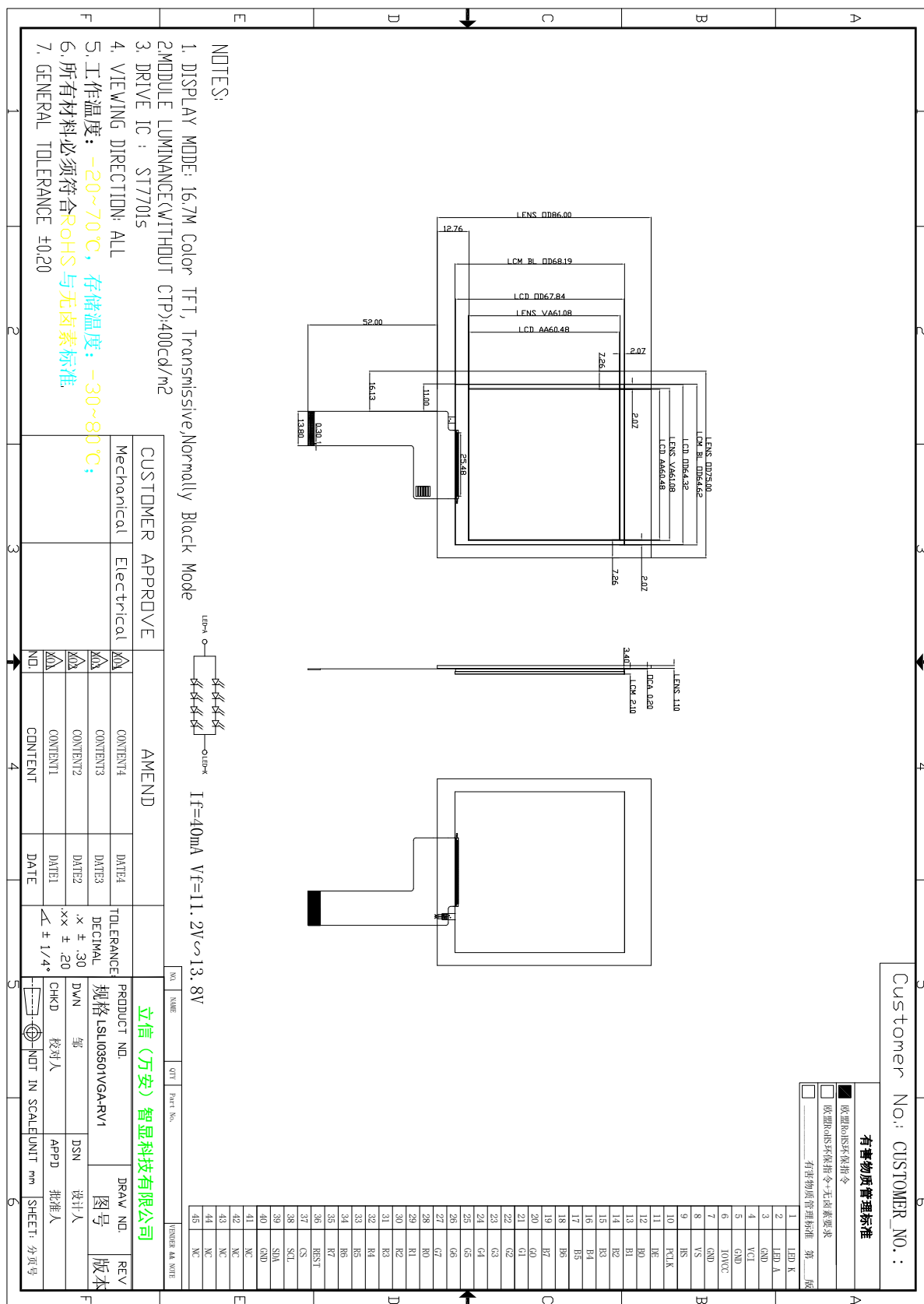
2. Physical Features

Display Mode	TFT-LCD Module
	Active matrix TFT, Transmissive type
Display Format	Graphic 480(RGB)×480 Dot-matrix
Input Data	24 bit RGB
Viewing Direction (Grayscale Inversion)	Free (IPS)
Display Mode	Normally black

3. Mechanical Specification

Item	Contents	Unit
Module size (H×V×D)	64.32 ×67.84 ×0.8	mm
Number of dots	480(RGB) ×480	pixel
Active area (H×V)	60.48×60.48	mm

4. Outline Dimension



5. Absolute Maximum Ratings

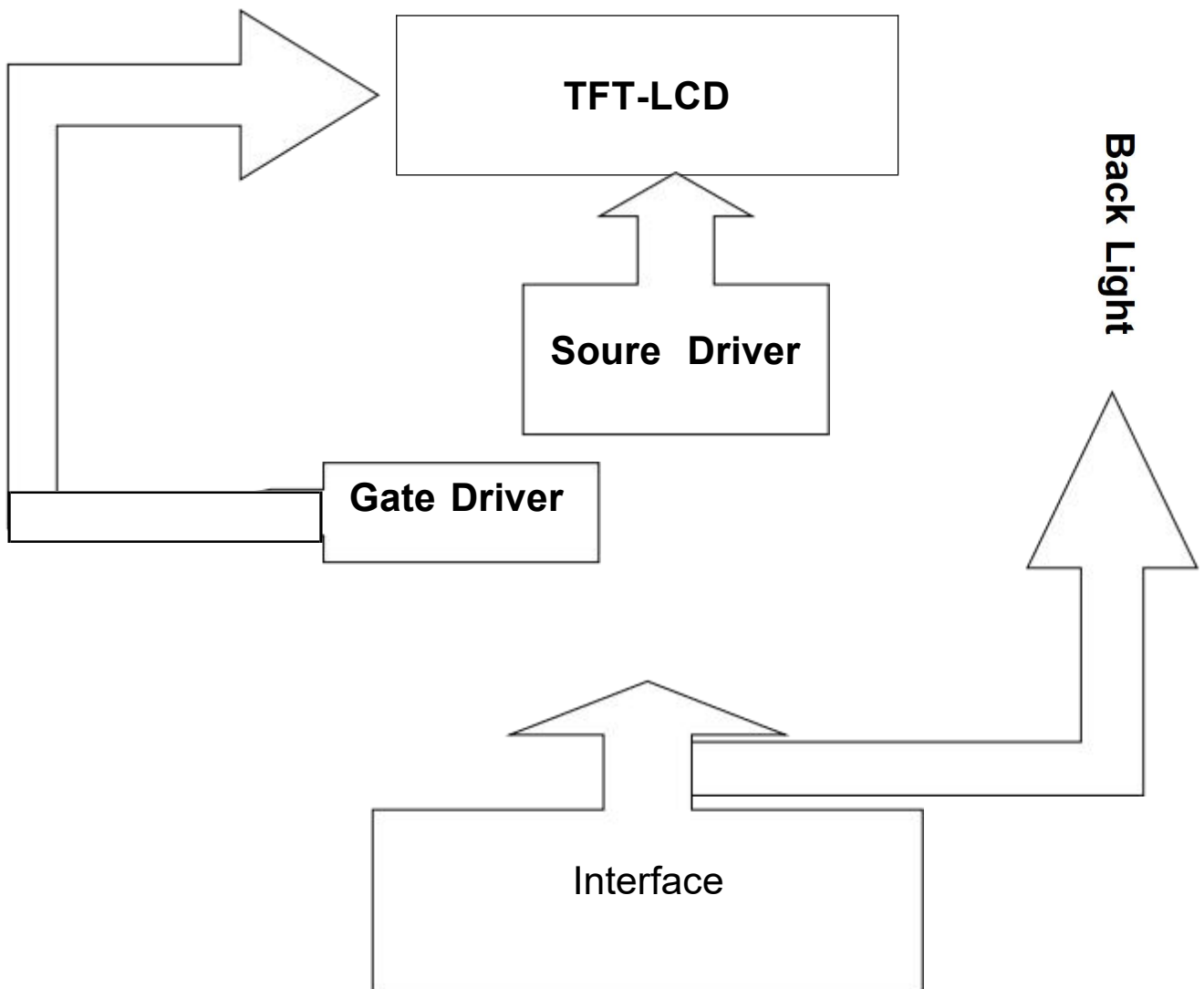
Item	Symbol	Min	Max	Unit	Remark
Supply voltage	VCC	-0.3	3.6	V	Note1 Note2
Supply voltage	IOVCC	-0.3	3.3	V	
Operating temperature	TOPR	-20	70	°C	
Storage temperature	TSTR	-30	80	°C	
Humidity	---	---	90	%RH	---

6. Electrical Characteristics

Item		Symbol	Rating			Unit	Remark
			Min	Typ	Max		
Supply voltage		VCC	2.5	2.8	3.3	V	Note1
Supply voltage		IOVCC	1.65	1.8	3.3	V	
Input Voltage	L level	VIL	0	---	0.3*VCC	V	
	H level	VIH	0.7*VCC	---	VCC	V	
LCD Drive Power current		ILCD		TBD		mA	

7. Module Function Description

7-1. Block Diagram Of LCM



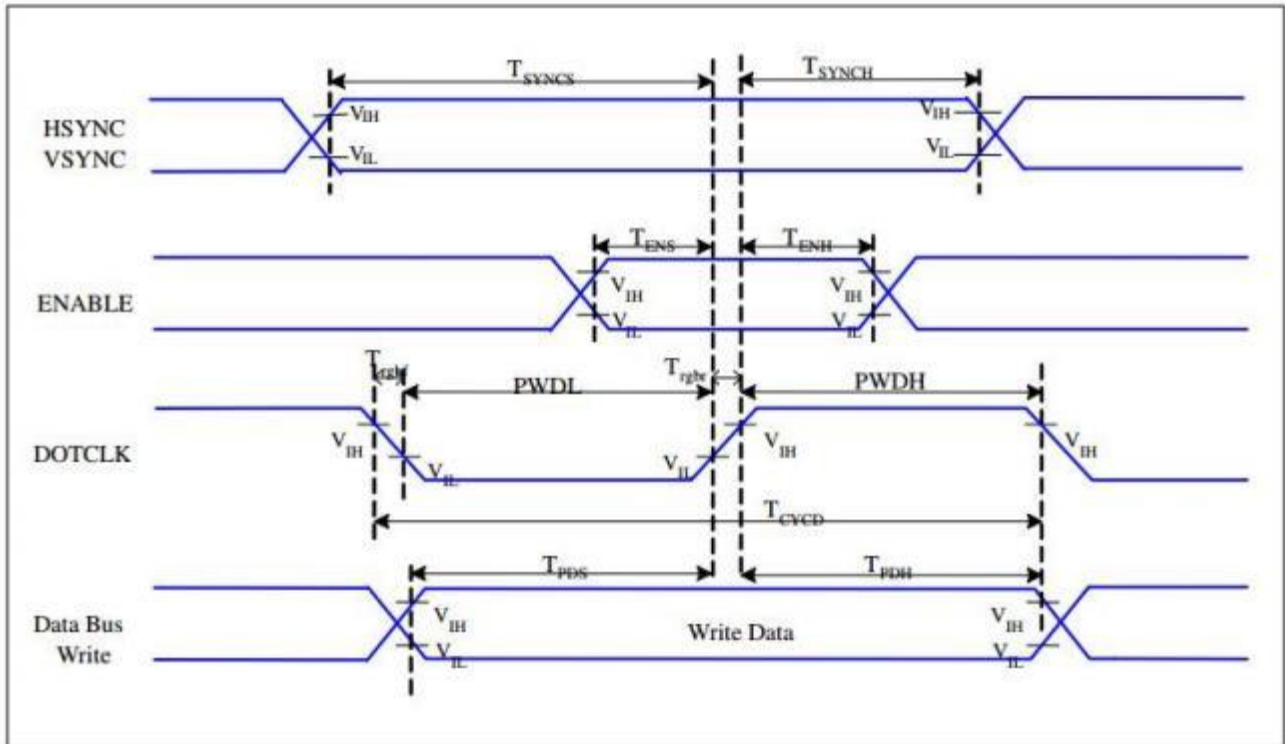
7-2. Pin Description

7.2.1 24 BIT RGB Description

PIN NO.	Symbol	I/O	Description
1	LEDK	P	Power for LED backlight cathode
2	LEDA	P	Power for LED backlight anode
3	GND	GND	Power ground
4	VCI	P	Power voltage
5	GND	GND	Power ground
6	IOVCC	P	Power voltage
7	GND	GND	Power ground
8	VS	I	Vertical sync signal
9	HS	I	Horizontal sync signal
10	PCLK	I	Pixel clock
11	DE	I	Data enable
12-19	B0-B7	I	Blue data
20-27	G0-G7	I	Green data
28-35	R0-R7	I	Red data
36	GND	GND	Power ground
37	REST	I	Reset signal pin
38	CS	I	chip select signal
39	SCL	I	Serial clock input
40	SDA	I	Serial data input
41	GND	GND	Power ground
42	NC		
43	NC		
44	NC		
45	NC		

7-3. Timing Characteristics

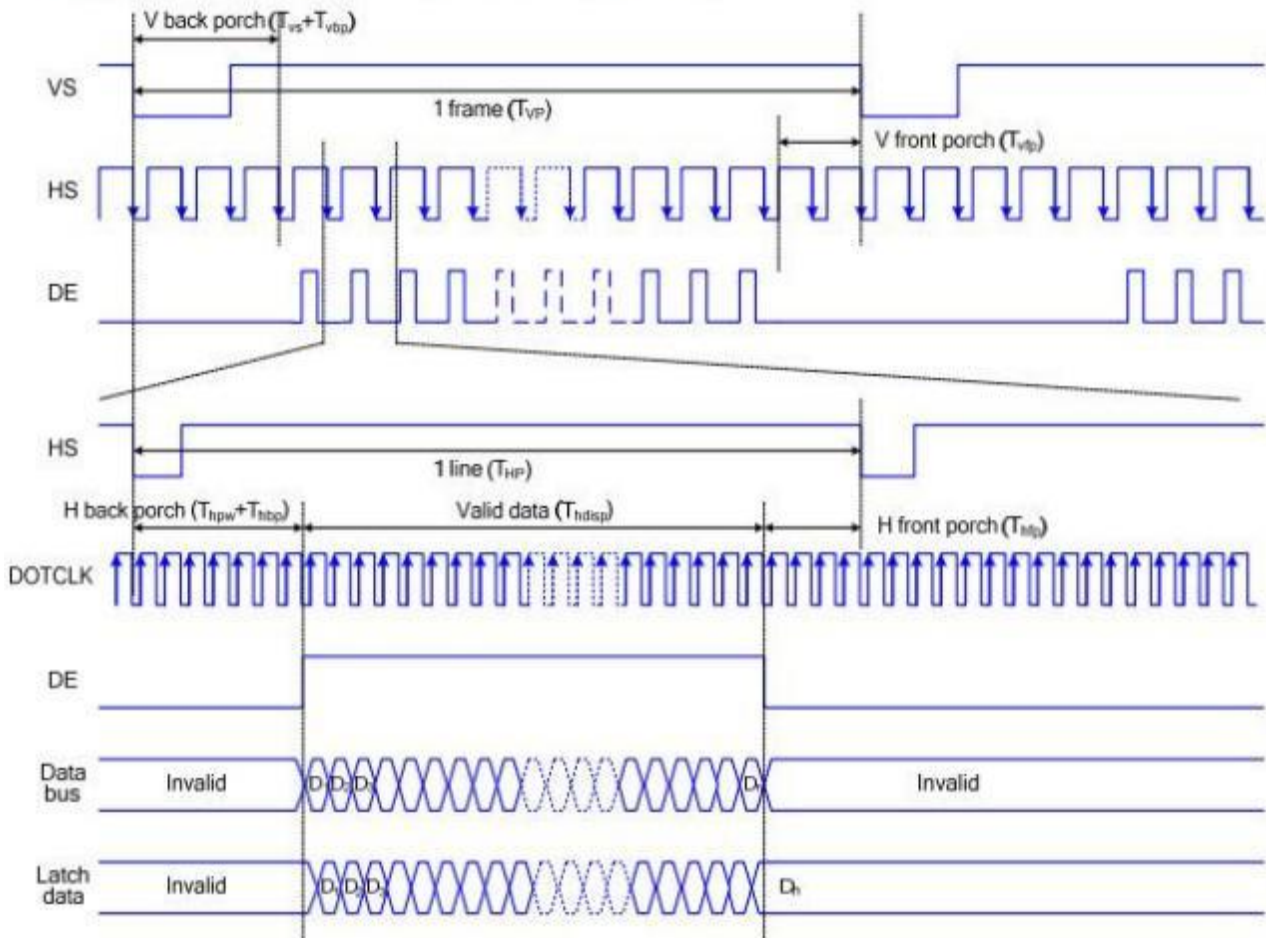
7.3.1 RGB Interface Characteristics



Signal	Symbol	Parameter	MIN	MAX	Unit	Description
HSYNC, VSYNC	T_{SYNCS}	VSYSN, HSYNCS Setup Time	5	-	ns	
ENABLE	T_{ENS}	Enable Setup Time	5	-	ns	
	T_{ENH}	Enable Hold Time	5	-	ns	
DOTCLK	$PWDH$	DOTCLK High-level Pulse Width	15	-	ns	
	$PWDL$	DOTCLK Low-level Pulse Width	15	-	ns	
	T_{CYCD}	DOTCLK Cycle Time	33	-	ns	
	T_{rghr}, T_{rghf}	DOTCLK Rise/Fall time	-	15	ns	
DB	T_{PDS}	PD Data Setup Time	5	-	ns	
	T_{PDH}	PD Data Hold Time	5	-	ns	

7.3.2 RGB Interface Timing

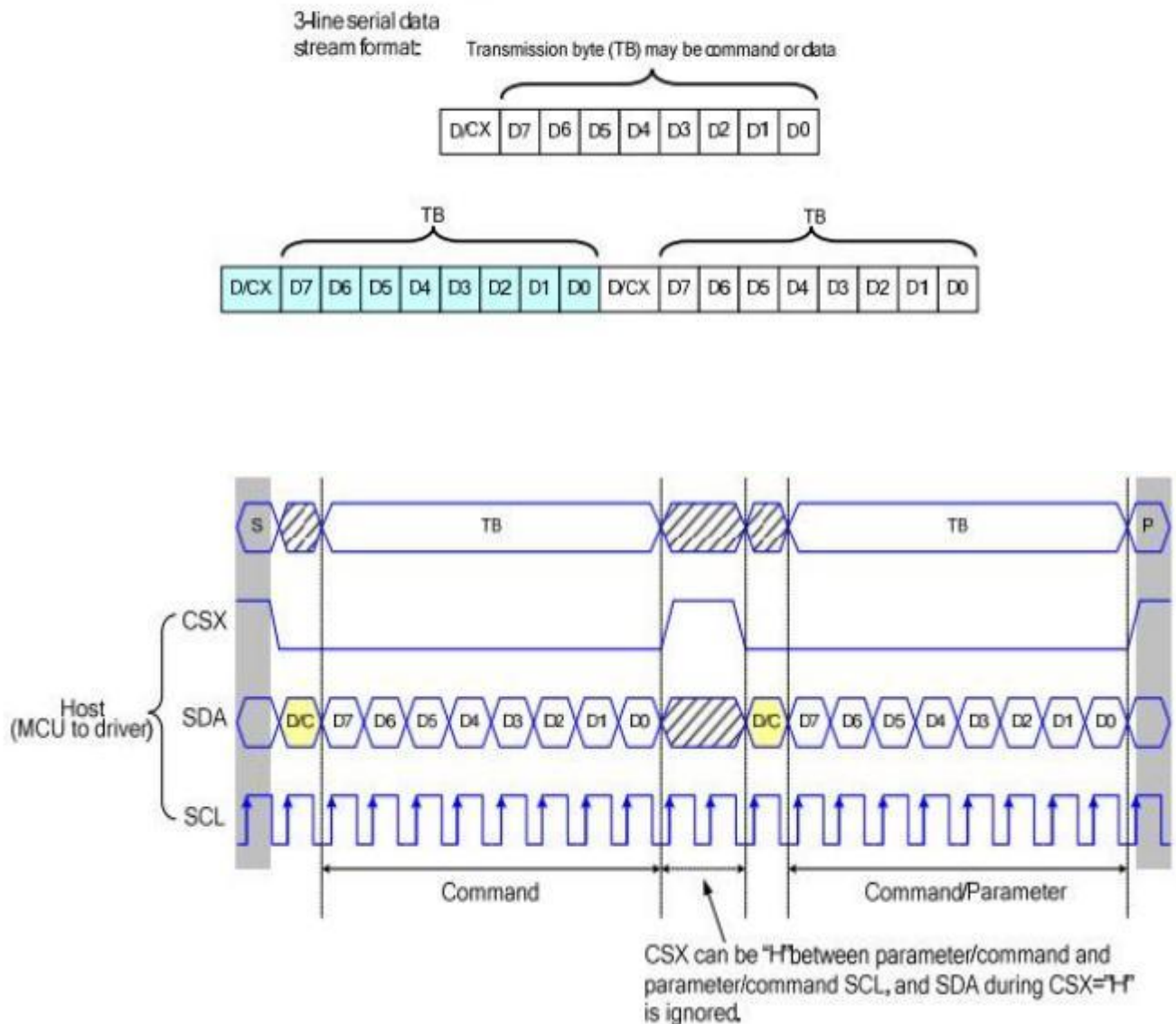
The timing chart of RGB interface DE mode is shown as follows.



7.3.3 SPI Interface Timing

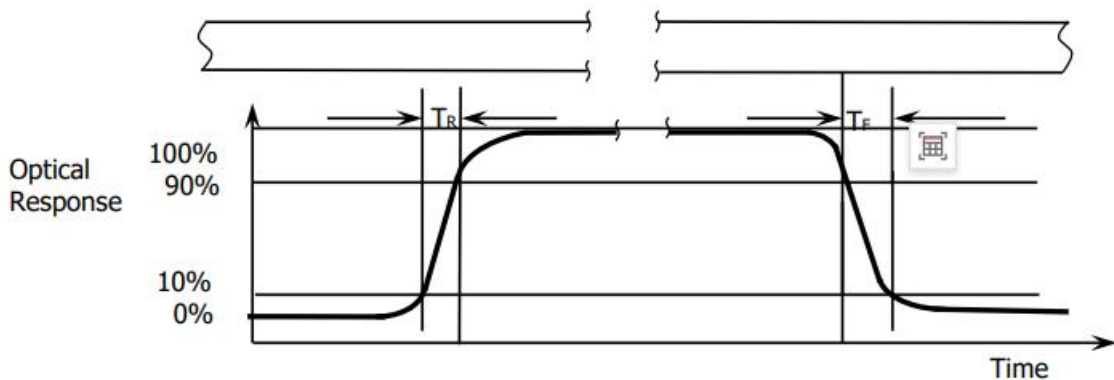
The write mode of the interface means the micro controller writes commands and data to the LCD driver. 3-lines serial data packet contains a control bit D/CX and a transmission byte. In 4-lines serial interface, data packet contains just transmission byte and control bit D/CX is transferred by the D/CX pin. If D/CX is "low", the transmission byte is interpreted as a command byte. If D/CX is "high", the transmission byte is command register as parameter.

Any instruction can be sent in any order to the driver. The MSB is transmitted first. The serial interface is initialized when CSX is high. In this state, SCL clock pulse or SDA data have no effect. A falling edge on CSX enables the serial interface and indicates the start of data transmission.



8. Electro-Optical Characteristics

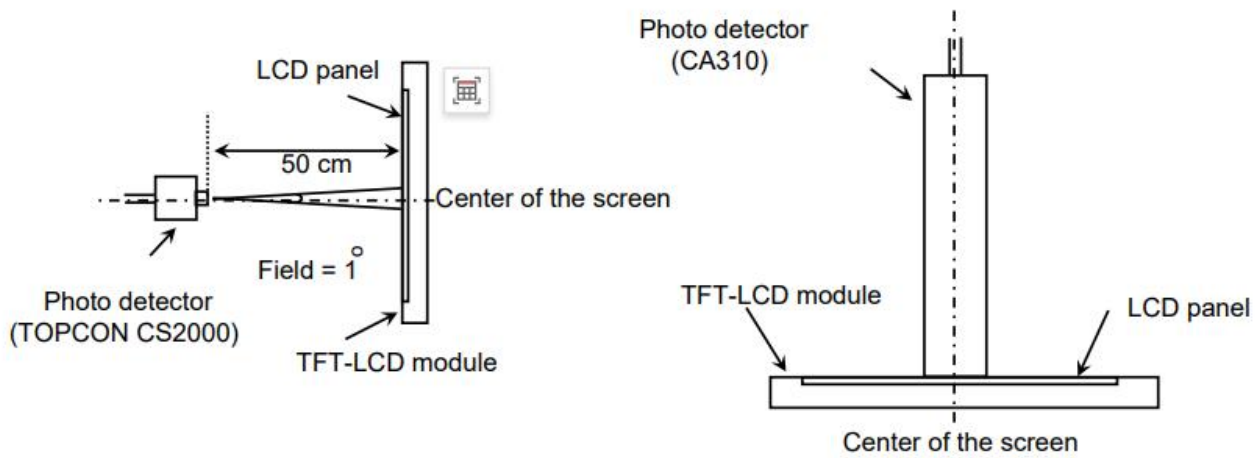
Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	75	85	-	Deg.	Note 1
		Θ_9		75	85	-	Deg.	
	Vertical	Θ_{12}		75	85	-	Deg.	
		Θ_6		75	85	-	Deg.	
Contrast ratio		CR	$\Theta = 0^\circ$	800	1000	-	-	Note 2
Transmittance		Tr		4.5	5.3	-	%	Note 3
Color Gamut	NTSC	CIE1931	$\Theta = 0^\circ$	67	72	-	%	Note 4 C Light
Reproduction of color	White	Wx	$\Theta = 0^\circ$	Typ -0.03	0.301	Typ +0.03	-	
		Wy			0.330		-	
Response Time		Tr+Td	Ta= 25° C $\Theta = 0^\circ$	-	30	35	ms	Note 5



The electro-optical response time measurements shall be made as shown in FIGURE 2. The times needed for the luminance to change from 10% to 90% is Tr and 90% to 10% is Tf.

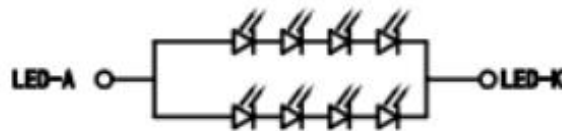
$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

Note (3) Definition of Viewing Angle:



Note(4) Backlight circuit

- a. Test Instrument: BM-7 (Distance: 500mm; Field=1°)
- b. Light Source: LED*8 (White)



$$I_f = 40\text{mA} \quad V_f = 11.2\text{V} \sim 13.8\text{V}$$

9. Specification of Quality Assurance

1 目的

在生产过程中，统一而明确产品质量判定标准，确保产品质量能满足或超越客户的需求

2 适用范围

适用于1.0~4寸显示屏的检验。

3 职责

生产部：依照此对产品功能、外观进行全检

品质部：依照此标准进行判定，批退处理

工程部：实验验证的参考。

4 定义

4.1 缺点等级：缺点分为主要缺点及次要缺点。

4.1.1 主要缺点（MA）：

指缺陷会降低产品的应用程序的可用性，包括所有的功能缺陷（如不显示，显示异常，缺划，短路，缺件），外形尺寸超出图纸，渐进式的缺陷和可靠性异常。

4.1.2 次要缺点（MI）：

指缺陷没有降低产品的应用与其运行的有效使用几乎无关，如黑色斑，白斑，亮点，黑线，白线，对比度变化，玻璃缺陷，偏光片瑕疵等。

4.2 名词定义

4.2.1 N：亮点/微亮点/暗点/异物/脏污/刮伤等不良的数目。

4.2.2 DS：亮点/微亮点/暗点等不良的相互距离。

4.2.3 D：点状脏污/异物/刮伤等不良的直径 $D = (L+W)/2$ 。

4.2.4 L：不规则点状，线状异物/刮伤等不良的长度。

4.2.5 W：不规则点状，线状异物/刮伤等不良的宽度。

5 检测要求

5.1 检验设备：游标卡尺、菲林卡尺、测试治具、电源箱、开离子风机、放大镜、台灯等

5.2 检验环境：温度：23±2℃、湿度：50±10%RH

5.3 距离：肉眼与被测物距离30cm；

5.4 照明：功能检验照度300~500 Lux，外观检验照度500~800 Lux；

5.5 角度：被测物与目测方向呈90度，再以上下左右各30度再检测一次。；

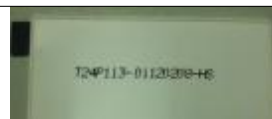
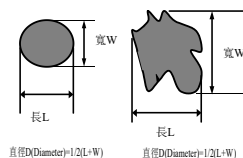
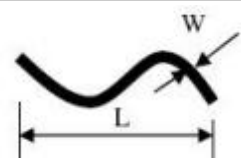
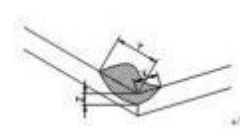
5.6 抽样计划

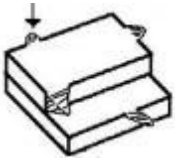
检验项目	抽样计划
外观、电测	GB/T2828-2003一般水平II进行
	主缺AQL=0.65，次缺AQL=1.5
尺寸	5PCS/批

6. 显示屏

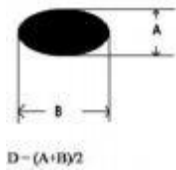
6.1 外观检验规格:

0.1 外观检验规格:

不良现象	不良描述	检查规格	图例说明	分类			
				次缺	主缺		
型号	与采购型号不符	与采购单以及BOM相符。			✓		
数量	实物与订单数量不符	不能少数或多数			✓		
尺寸	尺寸不符	尺寸参照承认书规格要求。			✓		
保护膜	脏污，翘起，脱落等	1. 无保护膜或保护膜脱落不合格 2. 保护膜破损、划伤表面模糊为不良 3. 保护膜不易分离为不良		✓			
喷码	喷码不良	1. MARK 位置错误，双重 MARK 不良 2. 喷印内容错误 3. 喷码内容外残留墨迹时不良		✓			
点状陷缺	刺伤、异物、凹痕、缺膜、气泡、白点、脏点	大小D（mm）	允许数量		✓		
		D≤0.0mm	不计				
		0.0<D≤0.25	N≤2 DS≥10mm				
		0.25<D	0				
线状缺陷	磨伤、划伤、毛屑、纤维等	长(L)mm	宽(W)mm	允许个数		✓	
		不计	W≤0.03	不计			
		L≤5.0	W≤0.05	N≤2 DS≥10mm			
		L>5.0	W>0.05	0			
气泡、凹印	显示区	大小D（mm）	允许数量				
		D≤0.00mm	不计				
		0.00≤D≤0.25	N≤2 DS≥10mm				
		0.25<D	0				
脏污	可视区	ITO表面不能有手指印；可视区不可有残胶、油墨等脏污		✓			
崩边/崩角	崩边	(X)mm	(Y)mm	Z	容许个数		✓
		X≤2	Y≤1	Z<LCD厚度	N≤3		
		X>2	Y>1	Z≥LCD厚度	0		
		密封胶不可能出现破损					
	崩角	(X)mm	(Y)mm	Z	容许个数		✓
		X≤2	Y≤1	Z<LCD厚度	N≤3		
		X>2	Y>1	Z≥LCD厚度	0		
		密封胶不可能出现破损					
裂纹	延伸性裂纹不允许				✓		

	披峰	影响组装有则NG		✓	
FPC检验	FPC缺陷	FPC折痕未死折, 不影响功能 判OK		✓	
		FPC双面胶离型纸未撕、未粘帖固定 判NG			✓
		FPC 补强板变形、脱落、翘起、弯曲 判NG			
		补强板双面胶褶皱、翘起、离型纸脱落 判NG			
		金手指脏污、压伤、裂纹、脱落、变形、氧化判NG			
		绝缘纸脱落导致元件外漏 判NG			
		FPC少元件、断裂、撕裂、绑定偏位 判NG			
		连接器压伤损坏 判NG			
牛顿环	在既定检验条件下, 牛顿环在整个屏检查区域目视不明显, 则OK; 若目视较明显或影响清晰度和透光率, 则NG; (如有限度样已限度样为准)			✓	

6.2 功能性检查规格: (根据原厂要求所有不良品需降到常温下判定)

不良 现象	不良描述	检查规格		图例说明	分类		
					次缺	主缺	
线缺陷	缺划	任何暗线，断线，压力线，静电线，淡线，亮线等均不可接受。				✓	
显示异常	显示不良	画面显示异常不可接受				✓	
不显示	无显示	出现不显示现象不可接受				✓	
屏闪	屏抖动	出现画面抖动现象，有即不良				✓	
功 能 点 (亮点、暗点、异物点、脏点等)	功能点缺陷	显示区			✓		
		大小D（mm）	允许数量				
		D≤0.0mm	不计				
		0.0<D≤0.25	N≤2 DS≥10mm				
		0.25<D	0				
功能线异物不良判定	功能线异物、划伤缺陷	显示区			✓		
		长(L)mm	宽（W）mm				允许个数
		L≤5.0	W≤0.05				N≤2 DS ≥15mm
		L>5.0	W>0.05				0
微亮点	玻璃细碎点	5%ND不可视忽略不计			✓		

10.Records Of Version

Version	Revise Date	Page	Content