LCD Module SPECIFICATION

液晶显示模组规格书

Customer Name 客户名称	
Customer Model 客户机型	**摩托车仪表专用**
Project Name 机种名	**TFT036B003-HW**
Date 日期	**2022-04-13**
Version 版本	**V0**

■ Preliminary Specification

□ Final Specification

Customer’s Acceptance 客户承认：

This module uses RoHS material. 模块使用环保材料.

Comment 承认意见	Approved by 承认人

Written by 撰写	Checked by 审核	Approved by 批准
研发部	**研发部**	**研发中心**

Revision Record

修改记录

Rev No 版本号	Date 时间	Description 内容
V0	2022/04/13	First release

CONTENTS 目录

1. General Specifications 基本规格

No.	Item 项目	Specification 规格	Unit 单位	Remark
1	LCD Size 液晶面板尺寸	3.6”	inch	-
2	Panel Type 面板类型	IPS	-	-
3	Resolution 分辨率	544xRGBx506	Pixel	-
4	Display Mode 显示模式	Normally Black	-	-
5	Number of Colors 颜色数量	16.7M	-	-
6	Viewing Direction 使用视角	ALL	-	Note1
7	NTSC 色彩饱和度	60%	-	Typ.
8	Contrast Ratio 对比度	1200	-	
9	Luminance 亮度	1000	cd/m2	Typ.
10	Module Size 模组尺寸	98.88(H)x94.12(V)x7.7(D)	mm	Note1
11	Panel Active Area 可视区域	89.76X83.49	mm	Note1
12	Pixel Pitch 像素尺寸	0.055x0.165	mm	-
13	Pixel Arrangement 像素排列	RGB-stripe		-
14	Weight 重量	TBD	g	-
15	Driver IC 驱动芯片	ST72566	-	-
17	Light Source 背光源	20 LED light	-	-
18	Interface 接口方式	RGB 24BIT	-	-
19	Operating Temperature 工作温度	-35~+85	℃	-
20	Storage Temperature 存储温度	-35~+85	℃	-

Note 1: Please refer to the mechanical drawing； 注 1：请参照模组图；

2. Pin Assignments 接口定义

Pin No. Pin 序号	Symbol 符号	Function 功能描述
1	LEDK	Backlight cathode 背光负极输入端。
2	LEDA	Backlight anode 背光正极输入端
3	GND	Ground 接地
4	VCC	Analog Power Supply for LCM（2.8V） 系统输入电压 2.8V。
5-12	R0-R7	Data bus
13-20	G0-G7	Data bus
21-28	B0-B7	Data bus
29	GND	Ground 接地
30	CLK	Pixel clock signal in RGB I/F
31	DISP	Display
32	HSYNC	Horizontal sync . Signal in RGB I/F
33	VSYNC	Vertical sync . Signal in RGB I/F
34	DEN	Data enable signal in RGB I/F DE mode
35	NC	NC
36	GND	Ground 接地
37	NC(XR)	NC
38	NC(YD)	NC
39	NC(XL)	NC
40	NC(YU)	NC

3. Electrical Specification 电气特性

3.1 Absolute Maximum Ratings 极限参数

Item 项目	Symbol	Value	Unit	Remark
Analog Power Supply Voltage 模拟供电电压	VDD	-0.3~+4.6	V	-
Logic Input Voltage Range	VIN	-0.3~VDDI+0.3	V	-
Logic Output Voltage Range	VO	-0.3~VDDI+0.3	V	-

3.2 Typical Operation Conditions 典型工作条件

Item 项目	Symbol	Min.最小	Typ.典型	Max.最大	Unit
Supply Voltage 供电电压	VDD	3.0	3.3	3.6	V
NVM Supply Voltage	VPP	7.4	7.5	7.6	V
Input High Voltage 输入高电平	V_{IH}	0.7*VDD	-	VDD	V
Input Low Voltage 输入低电平	V_{IL}	DGND	-	0.3*VDD	V
Output High Voltage 输出高电平	V_{OH}	VDD-0.4	-	VDD	V
Output Low Voltage 输出低电平	V_{OL}	DGND	-	DGND+0.4	V

3.3 Backlight Circuit Characteristics 背光功耗

Item	Symbol	Min.	Typ.	Max.	Unit
LED Current 背光电流	I_B	-	180	-	mA
LED Voltage 背光电压	Vf	-	15	-	V
Power Consumption 功耗	P_{BL}	-	-	-	mW

3.4 LCD Current Consumption 液晶面板功耗

Item	Symbol	Typ.	Max.	Unit
Full Mode 正常模式	VCI	-	-	mW
测试条件：VCI=3.3V； Interface 驱动类型：行翻转或者列翻转； TN Type=>All Black Pattern. TN型液晶面板=>黑色画面； IPS Type=>All White Pattern. IPS型液晶面板=>白色画面； Temperature：25℃；温度：室温25摄氏度；				
Sleep Mode 休眠模式	VCI	-	-	mW
测试条件：VCI=3.3V； DC/DC converter is enabled. Internal oscillator is started and panel scanning is started. 除IC内部晶振和面板扫描外，其他功能都暂停工作； Temperature：25℃；温度：室温25摄氏度；				

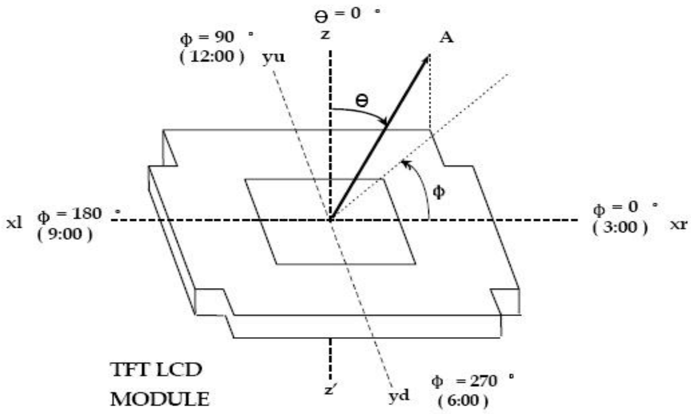
4. Optical Specification 光学参数

4.1 LCM Optical Characteristics 液晶模组光学特性

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle Range 视角	Left	θ_L	CR≧10	80	85	-	degree
	Right	θ_R		80	85	-	
	Top	θ_T		80	85	-	
	Bottom	θ_B		80	85	-	
Response Time 响应时间		Ton+Toff	$\theta=\Phi=0^\circ$	-		40	ms
Contrast Ratio 对比度		CR	$\theta=\Phi=0^\circ$	1000	1200	-	-
Luminance 亮度		L	$\theta=\Phi=0^\circ$	-	1000	-	cd/m^2
Color Chromaticity (CIE1931) 色坐标	White	W_x	Normal $\theta=\Phi=0^\circ$		0.293		-
		W_y			0.336		
	Red	R_x			0.653		
		R_y			0.323		
	Green	G_x			0.281		
		G_y			0.563		
	Blue	B_x			0.136		
		B_y			0.143		
Uniformity 均匀度		U_L	$\theta=\Phi=0^\circ$	-	80	-	%
Flicker 闪烁		-	-	No Visible			-

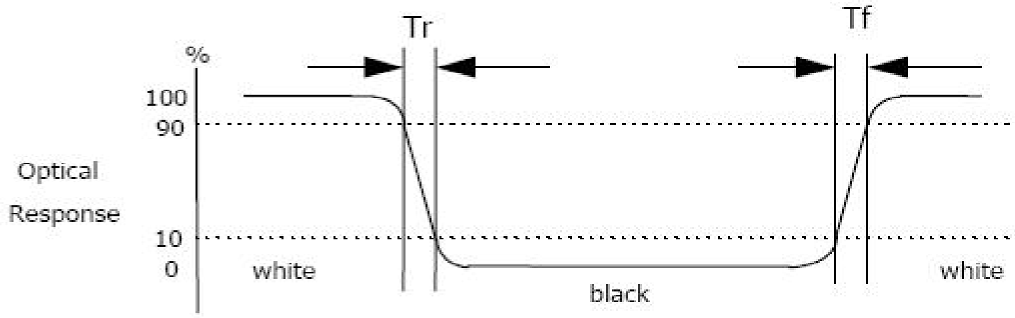
4.2 Measurement system 测量系统

4.2.1 LCM Viewing Angle



Viewing angle is the angle at which the contrast ratio is greater than 10.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.

4.2.2 Response time



Response time is the time required for the display to transition from white to black (Rising time, Tr) and from black to white (Falling time, Tf) for additional information.

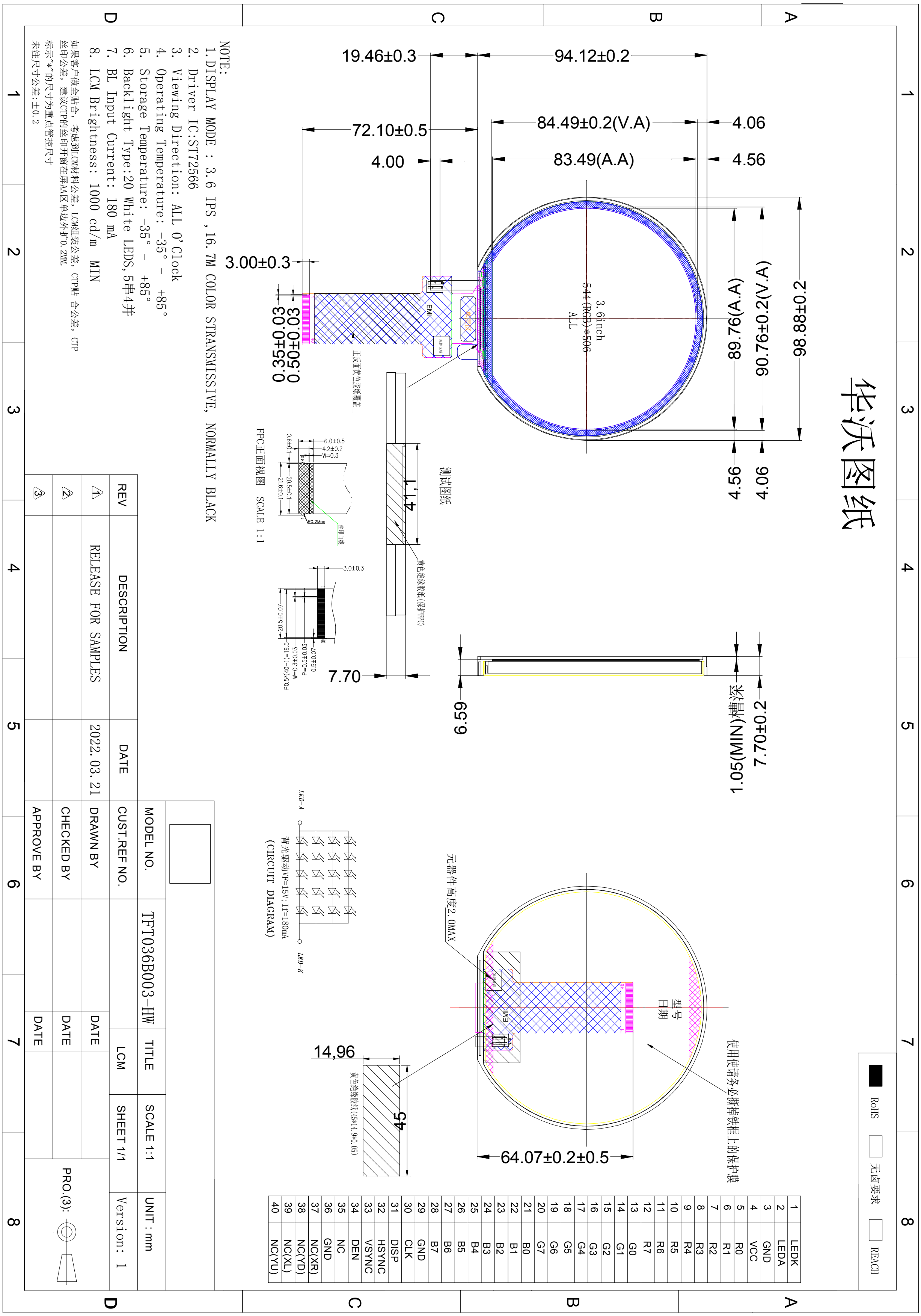
4.2.3 Contrast Ratio (CR)

Contrast Ratio (CR) is defined mathematically as:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

Surface luminance is the center point across the LCD surface 500mm from the surface with all pixels displaying white.

5. Mechanical Drawing 模组图

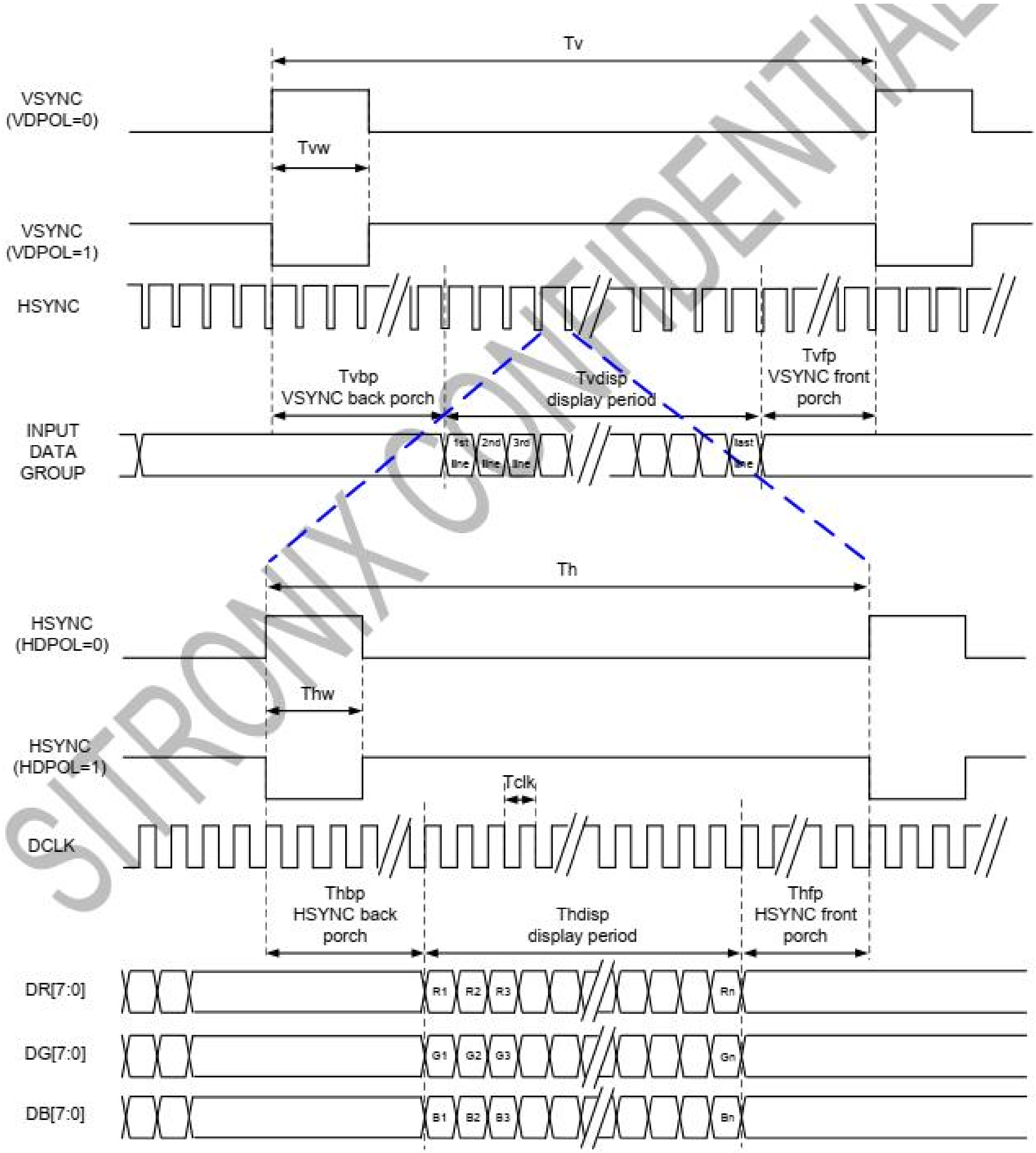


6. RGB Interface RGB 模式

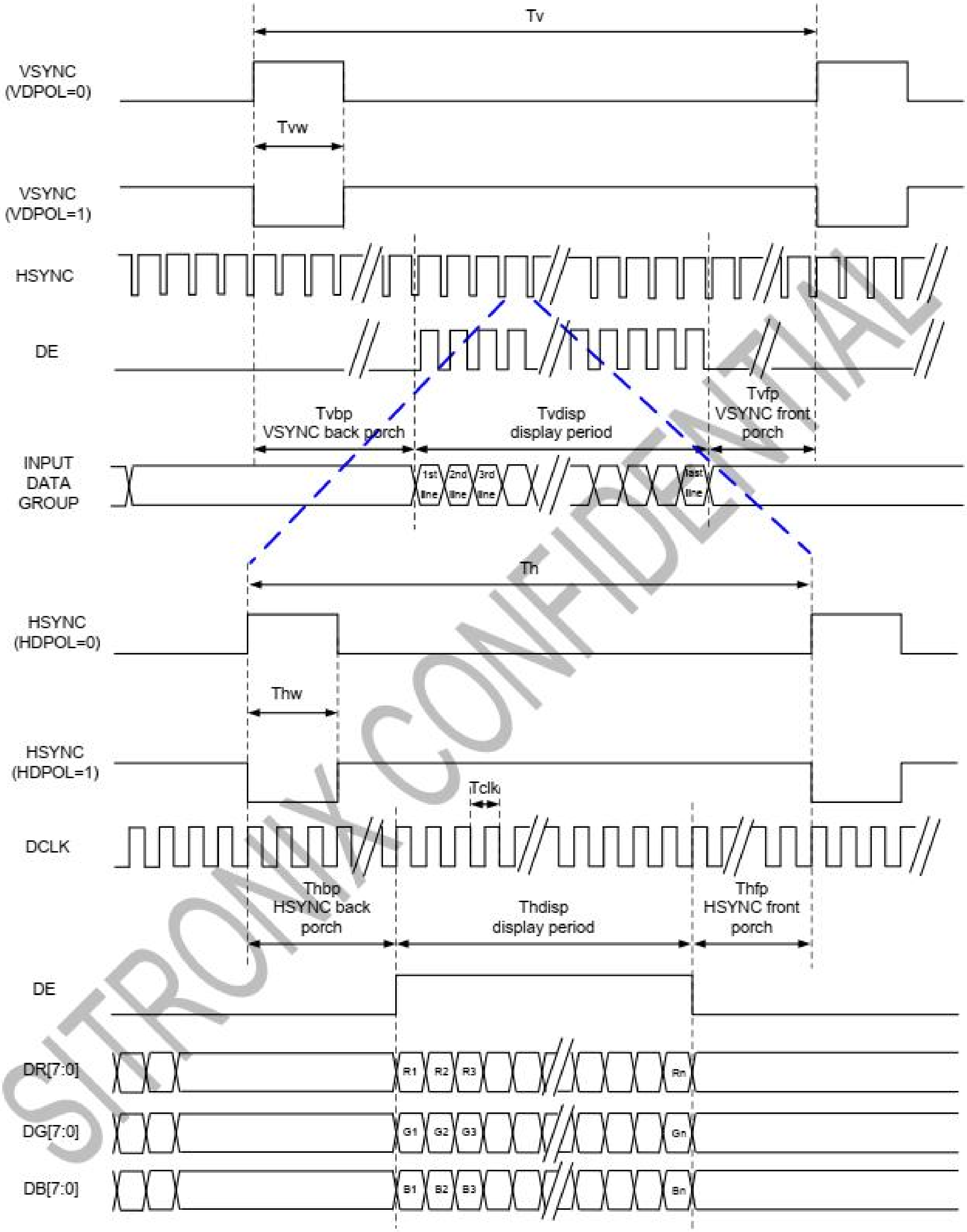
RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC - DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

Note: "Input" means these signals are driven by host side

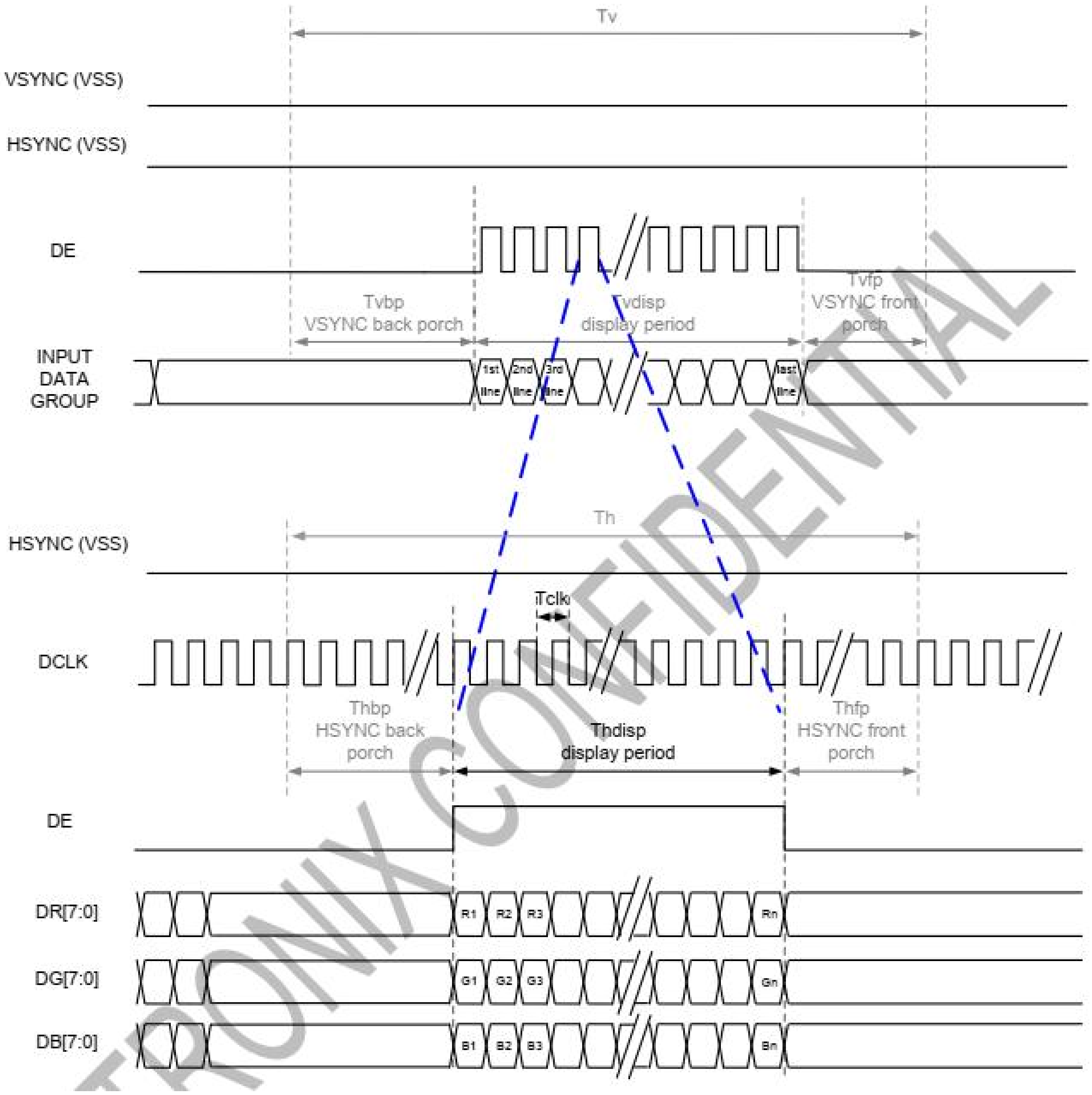
6.1 SYNC Mode



6.2 SYNC-DE Mode



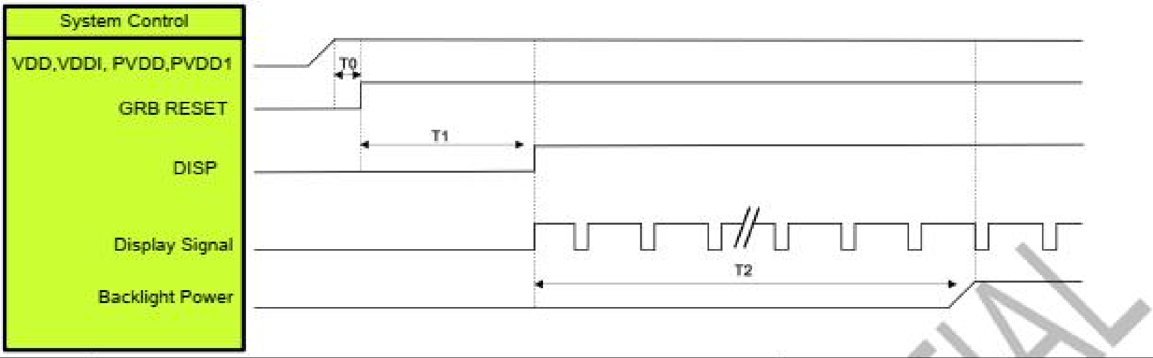
6.3 DE Mode



Tv
VSYNC (VSS)
HSYNC (VSS)
DE
Tvbp
VSYNC back porch
Tvdisp
display period
Tvfp
VSYNC front
porch
INPUT
DATA
GROUP
1st
line
2nd
line
3rd
line
last
line
Th
HSYNC (VSS)
Tclk
DCLK
Thbp
HSYNC back
porch
Thdisp
display period
Thfp
HSYNC front
porch
DE
DR[7:0]
R1
R2
R3
Rn
DG[7:0]
G1
G2
G3
Gn
DB[7:0]
B1
B2
B3
Bn

7.POWER ON/OFF SEQUENCE 上电时序

7.1 Power On Sequence



Symbol	Description	Min. Time	Unit
T0	System power stability to GRB RESET signal	0	ms
T1	GRB RESET= "High" to DISP="High"	10	ms
T2	Display Signal output to Backlight Power on	250	ms

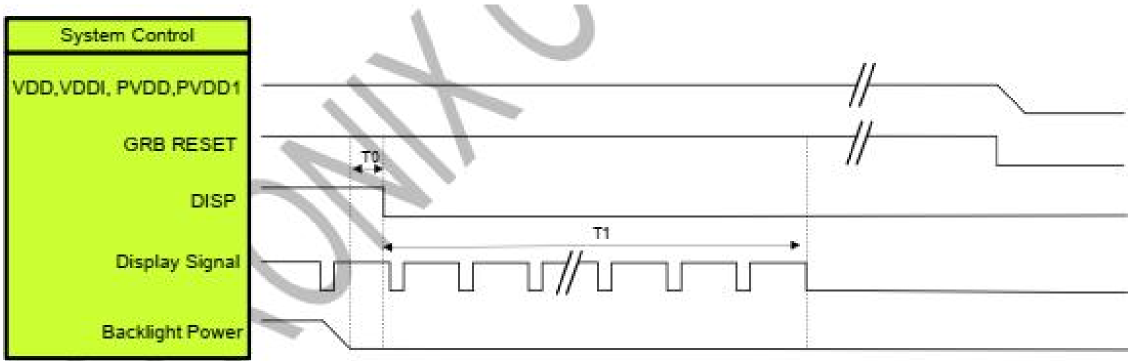
Note :

1. When DISP pull "H" or "L", IC will execute the internal power on or power off procedures .Please be careful about the timing of DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.

2. RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]

3: LVDS interface Display signal: DCLK P/N; RX[3:0] P/N

7.2 Power Off Sequence



Symbol	Description	Min. Time	Unit
T0	Backlight Power off to DISP="Low"	5	ms
T1	DISP="Low" to IC internal voltage discharge complete	100	ms

Note :

1. When DISP pull "H" or "L", IC will execute the internal power on or power off procedures .Please be careful about the timing of DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.

2. RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]

3: LVDS interface Display signal: DCLK P/N; RX[3:0] P/N

8. Reliability Test Items 可靠性测试项目

<table>
<tr><th>Test Item 测试项目</th><th>Test Condition 测试条件</th><th>Test result
determinant gist
实验结果判定</th></tr>
<tr><td>High temperature storage
高温存储</td><td>85±3℃，240H；</td><td rowspan="8">Inspection after 2~4hours storage at room temperature,
the sample shall be free from defects:
试验结束后,已测试的LCD样品必须在室内正常温湿度环境下放置2~4个小时以上才能进行功能和外观检查，样品不允许有以下缺陷：
1.Air bubble in the LCD;
模块中有气泡；
2.Non-display; 不显示；
3.Glass crack; 玻璃破碎；
4. The electrical characteristics requirements shall be satisfied.
需要满足模块电气性能。</td></tr>
<tr><td>Low temperature storage
低温存储</td><td>-35±3℃，240H；</td></tr>
<tr><td>High temperature operation
高温运行测试</td><td>85±3℃，240H；</td></tr>
<tr><td>Low temperature operation
低温运行测试</td><td>-35±3℃，240H；</td></tr>
<tr><td>High temperature /humidity 高温高湿</td><td>60℃±3℃,90%±3%RH，240H；</td></tr>
<tr><td>Thermal Shock
冷热冲击</td><td>-35℃/0.5h~+85℃/0.5h for a total 24 cycles；</td></tr>
<tr><td>Vibration Test
振动测试</td><td>Frequency 10Hz~55Hz~10Hz Amplitude：1.5mm, X，Y，Z direction for total 1H；(Packing condition)</td></tr>
<tr><td>ESD test
静电测试</td><td>±2KV, Human Body Mode, 150pF/330Ω；
±8KV, Air Mode, 150pF/330Ω；</td></tr>
</table>

Remark: 注意：

1. The test samples should be applied to only one test item.

每个被测试的模块只能用于其中的一个测试项目。

2. Sample size for each test item is 2pcs.

每个测试项目的样品数量为2片。

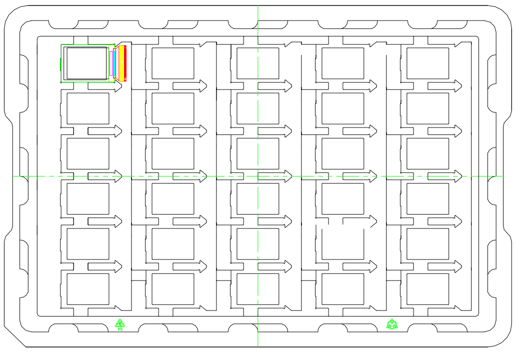
3. Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

故障判断标准:基本规格,电气特性,机械特性,光电特性。

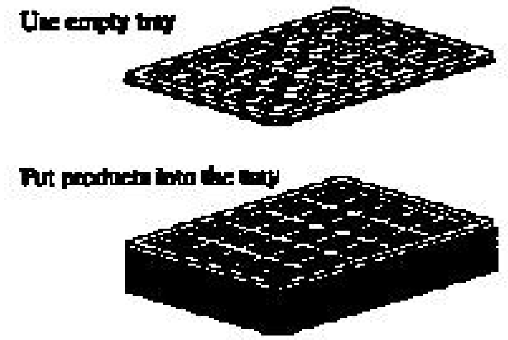
9.Packing and Storage Specification(Reference Only)包装存储

9.1 Packing Method 包装方法

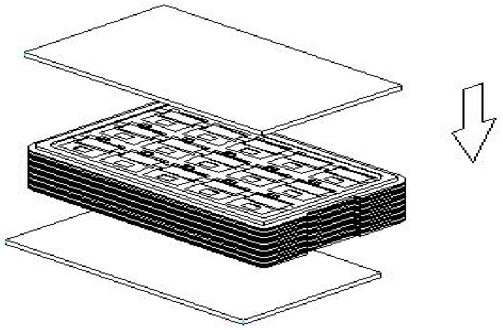
(1)



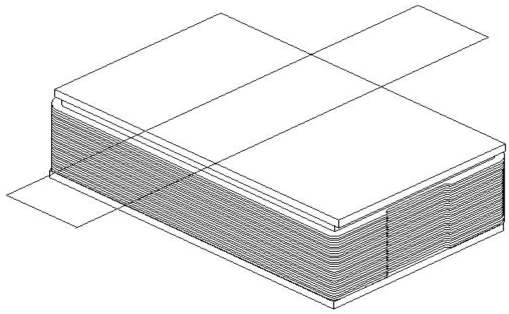
(2)



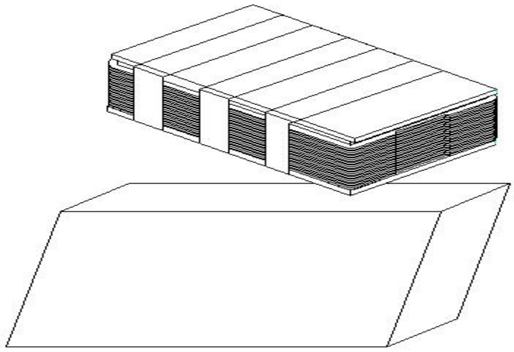
(3)



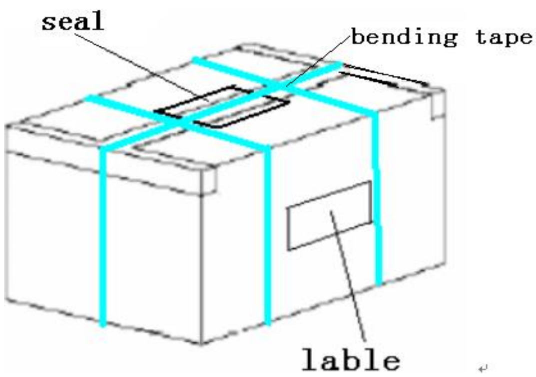
(4)



(5)



(6)



1. Put module into tray cavity. 把模块放进托盘.

2. Tray stacking. 托盘叠装.

3. Put 1 foam under the tray stack and 1 foam above. 在托盘上下放卡板.

4. Fix the cardboard to the tray stack with adhesive tape. 绑胶带.

5. Put the tray stack into carton. 把邦好的托盘放进纸箱.

6. Carton sealing with adhesive tape. 封纸箱.

9.2 Storage Method 存储方法

1.Store in an ambient temperature of 23°C±5°C, and in a relative humidity of 55%±15%. Don't exceed 12 months and expose to sunlight or fluorescent light.

存储环境温度为 23±5°C，相对湿度为 55%±15%，存储不能超过 12 个月，不要长时间暴晒。

2. Store in a clean environment, free from dust, active gas, and solvent.

存储在一个干净的环境，不受灰尘，活性气体和溶剂污染。

3. Store in antistatic container.

存储在防静电环境。

10.Announcements 注意事项

1.Do not attempt to disassemble or process the LCD module.

请勿拆卸液晶显示模块。

2.Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached。

不要在印制电路板上钻额外的孔，修改形状或更改印制线路板上元件的位置。

3.Except for soldering the interface, do not make any alterations or modifications with a soldering iron; Ensure welding temperature at 320 ° C to 350 ° C, the welding time control within the 10 s, welding note don't stay too long in the same place to avoid scald FPC.

除焊接接口外，不要用烙铁做任何更改；焊接温度保证在 320°C-350°C，焊接时间控制在 10S 以内，焊接时注意不要在同一处停留时间太久以免烫伤 FPC。

4. Other matters in not clear before use, please contact our staff to guide.

其他事项在不清楚使用之前，请联系我司人员指导进行。

-END-