SPECIFICATION

产品说明书

Revision;2.0

版本：2.0

Model/型号：JR9115A

中山市锦润电子有限公司 制作(PRO.)：罗俊明 审核(REV.)：麦宇宏 批准(APP.)：简慧伟	CUSTOMER/客户: 确认(PRO.)： 审核(REV.)： 批准(APP.)：

REVISION RECORD

修改记录

REV NO. 版本号	REV DATE 修改日期	CONTENTS 内容	REMARKS 注释
1.0	2023-03-30	First release	/
2.0	2024-11-09	VLCD 驱动电压由 5V 修改到 3.3V	玻璃 VLCD 驱动电压由 5V 修改为 3.3V

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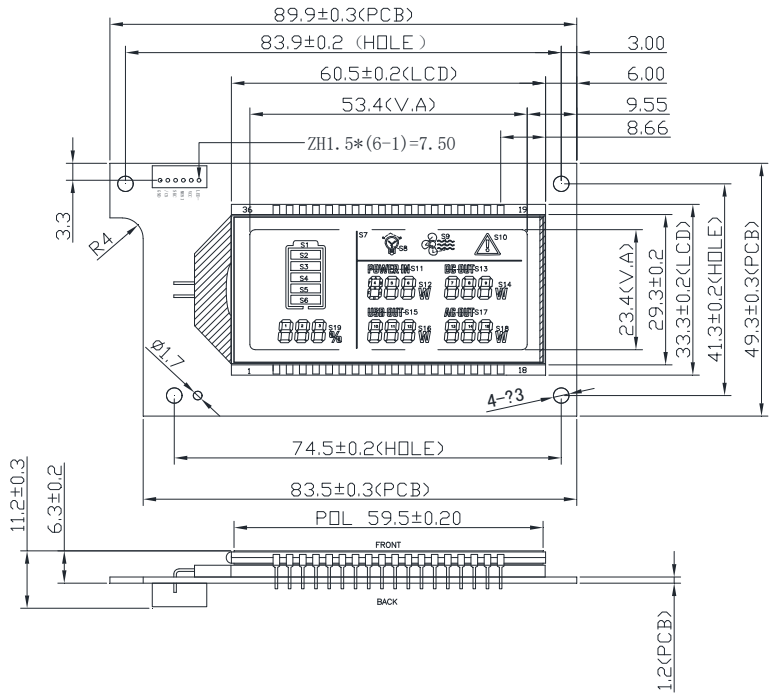
■ GENERAL INFORMATION

主要特征描述

ITEM OF GRNERAL INFORMATION 项目	CONTENTS 内容	UNIT 单位
LCD Type 液晶显示类型	TN/POSITIVE/TRANSMISSIVE	/
Recommended Viewing Direction 模块推荐使用方向	12:00	O’ Clock
Module area (W*H*T) 模块外围尺寸（宽*高*厚）	89.90×49.30×11.20（含插座）	mm
Viewing area (W*H) 可视区域（宽*高）	53.40×23.40	mm
Active area (W*H) 有效区域（宽*高）	-	mm
Number of Dots 点阵	笔段式	/
Pixel pitch (W*H) 像素间隙(宽*高)	/	mm
Driver IC 驱动集成电路	HT1621B	/
Interface Type 接口类型	串行	/
Input voltage 输入电压	5.0V	V
Module Power consumption 模块功耗	TBD	mW
Backlight Type 背光类型	LED	/

■ EXTERANL DIMENSIONS

外形尺寸



NO.	SYMBLE
1	GND
2	/CS
3	SKC
4	MOSI
5	VCC
6	LED-

■ INTERFACE DESCRIPTION

接口定义描述

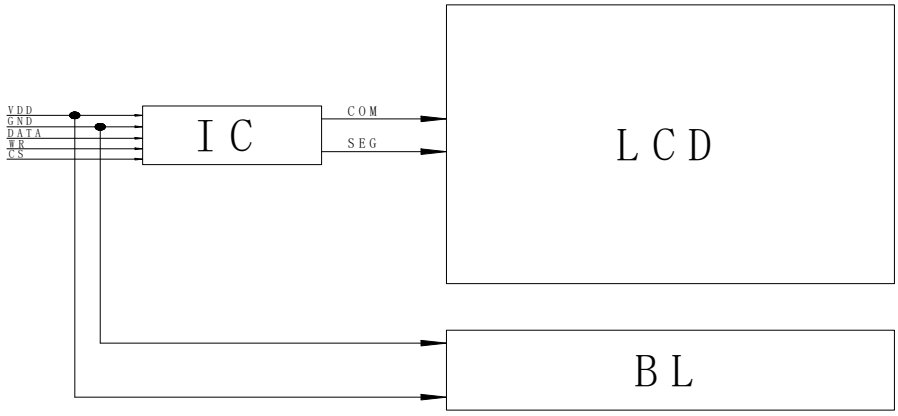
Interface NO. 接口序号	Symbol 符号	I/O or connect to 输入/出或连接到	Description 描述
1	GND	P	电源地
2	/CS	I	芯片片选接口
3	SKC	I	芯片时序写时序接口
4	MOSI	I/O	芯片时序数据接口
5	VCC	P	电源正极
6	LED-	P	背光负极

■ REFERENCE APPLICATION CIRCUIT

参考应用电路

1、 BLOCK DIAGRAM

模块框图



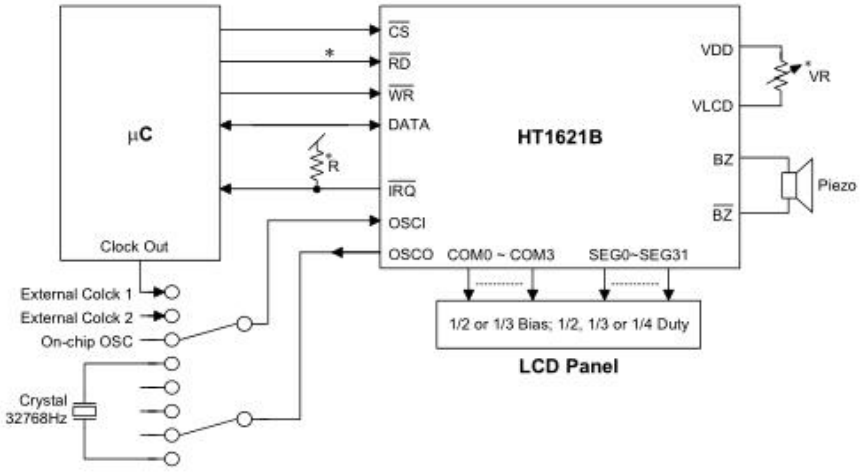
2、 APPLICATION CIRCUIT

应用电路

AppLICATION Circuit

Application Circuits

Host controller with an HT1621 display system

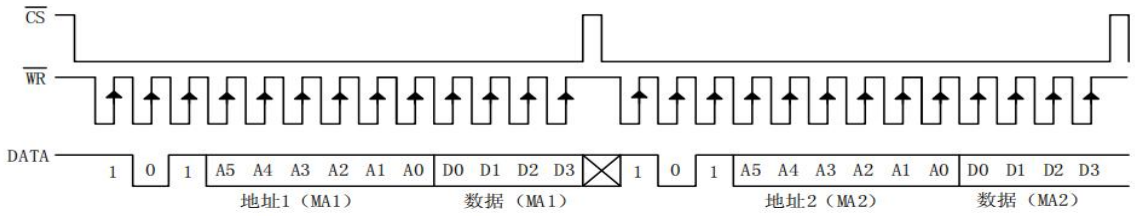


Note: The connection of $\overline{IRQ}$ and $\overline{RD}$ pin can be selected depending on the requirement of the μC.
The voltage applied to V_{LCD} pin must be lower than V_{DD}.
Adjust VR to fit LCD display, at V_{DD}=5V, V_{LCD}=4V, VR=15kΩ±20%.
Adjust R (external pull-high resistance) to fit user s time base clock.

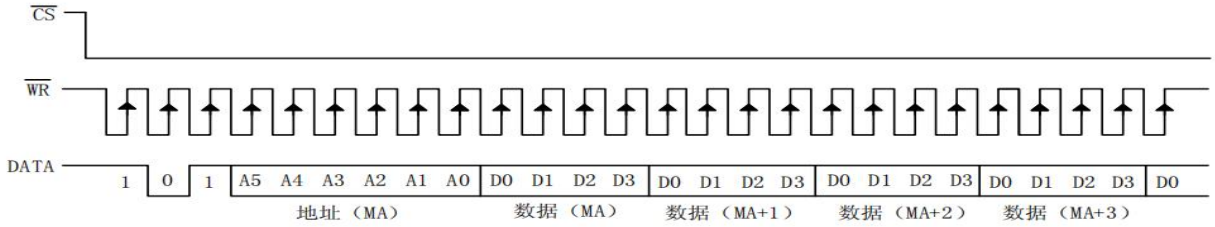
■ TIMING CHARACTERISTICS

时序特征

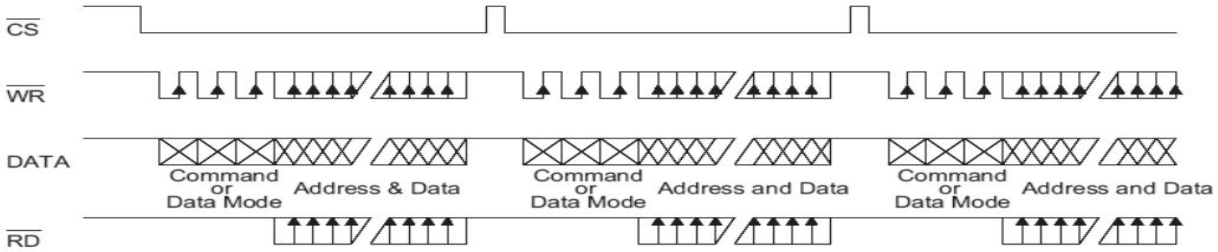
c. WRITE 模式（指令码：101）



d. WRITE 模式（连续地址写）

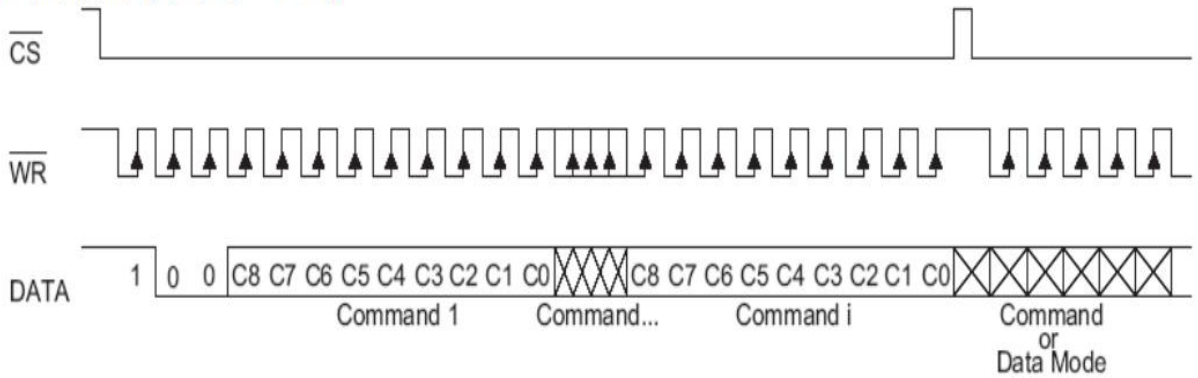


h. 模式 (数据及命令模式)



注释：推荐主控制器应在 $\overline{RD}$ 上升沿与下一周期 $\overline{RD}$ 下降沿之间从DATA端读取数据。

g. 命令模式 (命令码：100)



Please refer to HT1621 OR EQU IC detailed specifications

具体请详细参考 HT1621 或兼容芯片规格书

■ COMMAND DESCRIPTION

命令描述

名称	ID	命令代码	D/C	功 能	开启预置复位
READ	110	A5A4A3A2A1A0D0D1D2D3	D	读 RAM 中数据	
WRITE	101	A5A4A3A2A1A0D0D1D2D3	D	写数据到 RAM 中	
READ-MODIFY-WRITE	101	A5A4A3A2A1A0D0D1D2D3	D	读写 RAM	
SYS DIS	100	0000-0000-X	C	同时关闭系统振荡器和 LCD 偏置发生器	Yes
SYS EN	100	0000-0001-X	C	开启系统振荡器	
LCD OFF	100	0000-0010-X	C	关闭 LCD 偏置发生器	Yes
LCD ON	100	0000-0011-X	C	开启 LCD 偏置发生器	
TIMER DIS	100	0000-0100-X	C	禁止时间基准输出	
WDT DIS	100	0000-0101-X	C	禁止 WDT 暂停标志输出	
TIMER EN	100	0000-0110-X	C	允许时间基准输出	
WDT EN	100	0000-0111-X	C	允许 WDT 暂停标志输出	
TONE OFF	100	0000-1000-X	C	关闭蜂鸣输出	Yes
TONE ON	100	0000-1001-X	C	开启蜂鸣输出	
CLR TIMER	100	0000-10XX-X	C	清除时基发生器的内容	
CLR WDT	100	0000-111X-X	C	清除 WDT 内容	
XTAL 32K	100	0001-01XX-X	C	系统时钟为晶体振荡器	
RC 256K	100	0001-10XX-X	C	系统时钟为片内RC振荡器	Yes
EXT 256K	100	0001-11XX-X	C	系统时钟为外部时钟LCD1/2	
BIAS 1/2	100	0010-abX0-X	C	LCD 1/2 偏置状态 ab=00:2COM 端 ab=01:3COM 端 ab=10:4COM 端	
BIAS 1/3	100	0010-abX1-X	C	LCD 1/3 偏置状态 ab=00:2COM 端 ab=01:3COM 端 ab=10:4COM 端	
TONE 2K	100	011X-XXXX-X	C	蜂鸣频率:2KHz	
TONE 4K	100	010X-XXXX-X	C	蜂鸣频率:4KHz	
$\overline{IRQ}$ DIS	100	100X-0XXX-X	C	禁止 $\overline{IRQ}$ 输出	Yes
$\overline{IRQ}$ EN	100	100X-1XXX-X	C	允许 $\overline{IRQ}$ 输出	

名 称	ID	命令代码	D/C	功 能	开启预置复位
F1	100	101X-X000-X	C	时基/WDT 时钟输出：1Hz WDT 暂停标志延时：4s	
F2	100	101X-X001-X	C	时基/WDT 时钟输出：2Hz WDT 暂停标志延时：2s	
F4	100	101X-X010-X	C	时基/WDT 时钟输出：4Hz WDT 暂停标志延时：1s	
F8	100	101X-X011-X	C	时基/WDT 时钟输出：8Hz WDT 暂停标志延时：1/2s	
F16	100	101X-X100-X	C	时基/WDT 时钟输出：16Hz WDT 暂停标志延时：1/4s	
F32	100	101X-X101-X	C	时基/WDT 时钟输出：32Hz WDT 暂停标志延时：1/8s	
F64	100	101X-X110-X	C	时基/WDT 时钟输出：64Hz WDT 暂停标志延时：1/16s	
F128	100	101X-X111-X	C	时基/WDT 时钟输出：128Hz WDT 暂停标志延时：1/32s	Yes
TOPT	100	1110-0000-X	C	测试模式	
TNORMAL	100	1110-0011-X	C	标准模式	Yes

Please refer to HT1621 OR EQU IC detailed specifications

具体请详细参考 HT1621 或兼容芯片规格书

■ ABSOLUTE MAXIMUM RATINGS

极限参数

Parameter of absolute maximum ratings 参数	Symbol 符号	Min 最小值	Max 最大值	Unit 单位
Supply voltage for logic 逻辑电压	VDD	2.4	5.2	V
Input voltag 输入电压	VIN	0	VDD	V
Operating temperature 操作温度	TOP	-20	70	° C
Storage temperature 储存温度	TST	-30	80	° C
Humidity 湿度	RH	-	90%(Max60° C)	RH

Note: Absolute maximum ratings means the product can withstand short-term, NOT more than 96 hours. If the product is a long time to withstand these conditions, the life time would be shorter.

备注:极限条件仅指产品能短暂承受的范围,不可超过 96 小时。如果产品长时间在极限条件,将有损产品的使用寿命。

■ ELECTRICAL CHARACTERISTICS

模块电气特性

DC CHARACTERISTICS

直流特性

Parameter of DC characteristics 参数	Symbol 符号	Min 最小值	Typ 典型值	Max 最大值	Unit 单位
Supply voltage for logic 逻辑电压	VDD	4.8	5.0	5.2	V
Supply Voltage for LCD LCD 电压	VO	2.8	3.3	3.5	V
Input voltage 'H' level 输入高电平	VIH	0.8VDD	-	VDD	V
Input voltage 'L' level 输入低电平	VIL	0	-	0.2VDD	V
Output voltage 'H' level 输出高电平	VOH	0.8VDD	-	VDD	V
Output voltage 'L' level 输出低电平	VOL	0	-	0.2VDD	V
Supply Current 模块电流	Idd	-	TBD	-	mA

■ BACKLIGHT CHARACTERISTICS

背光电气特性

Item of backlight characteristics 项目	Symbol 符号	Min. 最小值	Typ. 典型值	Max. 最大值	Unit 单位	Condition 条件
Forward voltage 正向电压	Vf	2.7	2.9	3.2	V	If=15mA
Number of LED 灯数	-	-	1	-	Piece	-
Blacklight Colour 背光颜色	-	-	WHITE	-	-	-

Using condition: constant current driving method If=1*15(+/-10%)(WHITE)

使用条件：恒流的驱动方式是 If=1*15mA(+/-10%)/(白色)

■ ELECTRO-OPTICAL CHARACTERISTICS

光电参数

Item of backlight characteristics 项目	Symbol 符号	Condition 条件	Min. 最小值	Typ. 典型值	Max. 最大值	Unit 单位	Remark 注释	Note 备注
Response time 响应时间	Tr+ Tf	θ=0° ø=0° Ta=25℃	-	435	655	ms	FIG 1	4
Contrast ratio 对比度	Cr		3	5	-	-	FIG 2	1
Luminance uniformity 均匀度	δ BLUE		70	-	-	%		3
Surface Luminance 表面亮度	Lv		-	-	-	cd/m2		2
Viewing angle range 视角范围	θ	ø = 90°	-	-	-	deg	FIG 3	6
		ø = 270°	-	-	-	deg		

		ø = 0°	–	–	–	deg		
		ø = 180°	–	–	–	deg		

Note1. Contrast Ratio(CR) is defined mathematically by the following formula. For more information see FIG 2.

$$\text{Contrast Ratio(CR)} = \frac{\text{Average Surface Luminance with all white pixels (P1, P2, ……)}}{\text{Average Surface Luminance with all black pixels (P1, P2, ……)}}$$

备注 1. 对比度是由以下公式计算所得。详见 FIG 2.

$$\text{对比度} = \frac{\text{显示白色画面时平均表面亮度(P1,P2,…)}}{\text{显示黑色画面时平均表面亮度(P1,P2,…)}}$$

Note2. Surface luminance is the LCD surface luminance with all white pixels. For more information see FIG 2.

Lv = Average Surface Luminance with all white pixels(P1, P2,……)

备注 2. 表面亮度是在显示白色画面时，测试的亮度值，详见 FIG 2.

Lv = 平均的表面亮度(P1, P2,……)

Note3. The uniformity in surface luminance(δWHITE) is determined by measuring luminance at each test position, and then dividing the maximum luminance of all white pixels by minimum luminance of all white pixels. For more information see FIG 2.

$$\delta\text{WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels(P1, P2,……)}}{\text{Maximum Surface Luminance with all white pixels(P1, P2,……)}}$$

备注 3. 均匀度是在显示白色画面时，测试 P1 到 P9 的亮度，然后再用 9 个点亮度的最小值除以最大值。详见 FIG 2.

$$\text{均匀度} = \frac{\text{白色画面下表面亮度最小值 (P1, P2,……)}}{\text{白色画面下表面高度最大值 (P1,P2,……)}}$$

Note4. Response time is the time required for the display to transition from White to black(Rise Time, Tr) and from black to white(Decay Time, Tf). For additional information see FIG 1.

备注 4. 响应时间是 Tr（上升时间）与 Tf（下降时间）的和；Tr 指显示白色画面转为显示黑色画面需要时间，Tf 指显示黑色画面转为显示白色画面需要时间。详见 FIG 1.

Note5. CIE(x, y)chromaticity is the Center point value. For more information see FIG 2.

备注 5. 选择中心点分别测试 x，y 值。详见 FIG 2.

Note6. Viewing angle is the angle at which the contrast ratio is greater than a specific value. For TFT module, the specific value of conrast ratio is 10; For monochrome and color stn module, the specific value of conrast ratio is 2. 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. For more information see FIG 3.

备注 6. 视角指对比度大于等于一个特定值时的可视范围，对 TFT 屏，对比度特定值为 10，对黑白屏，CSTN 屏，对比度特定值为 2。视角由横轴（x 轴），竖轴（y 轴）同 Z 轴（垂直于 LCD 表面）之间的夹角来定义。详见 FIG 3.

Note7. For Viewing angle and response time testing, the testing data is base on Autronic-Melchers’s ConoScope. Series Instruments. For contrast ratio, Surface Luminance, Luminance uniformity and CIE, the testing data is base on CS-2000 photo detector.

备注 7. 视角和响应时间，测试数据基于 Autronic-Melchers’s ConoScope. 系列。而对比度，表面亮度，均匀度，CIE 坐标，测试数据基于 CS-2000 photo detector。

Note8. For TN type TFT transmissive module, Gray scale reverse occurs in the direction of panel viewing angle

备注 8. TN 型 TFT 全透产品，在视角方向会发生灰度反转。

FIG 1. The definition of Response Time
响应时间

响应时间定义

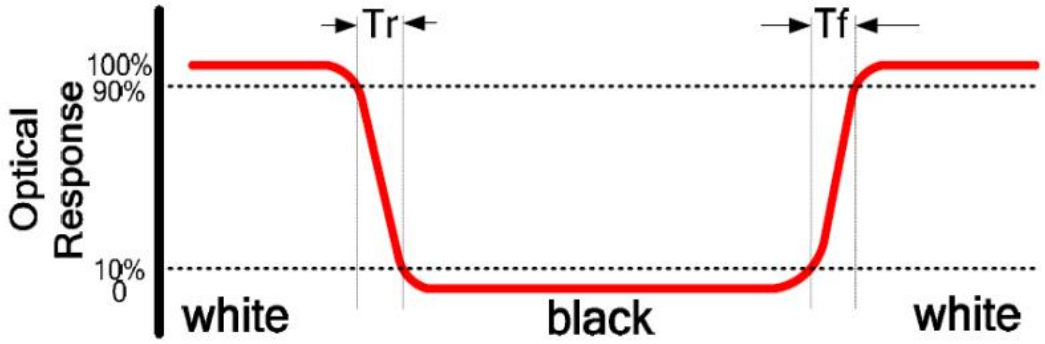


FIG 2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE(x, y) chromaticity.
对比度、表面亮度、均匀度、CIE 坐标测试方法

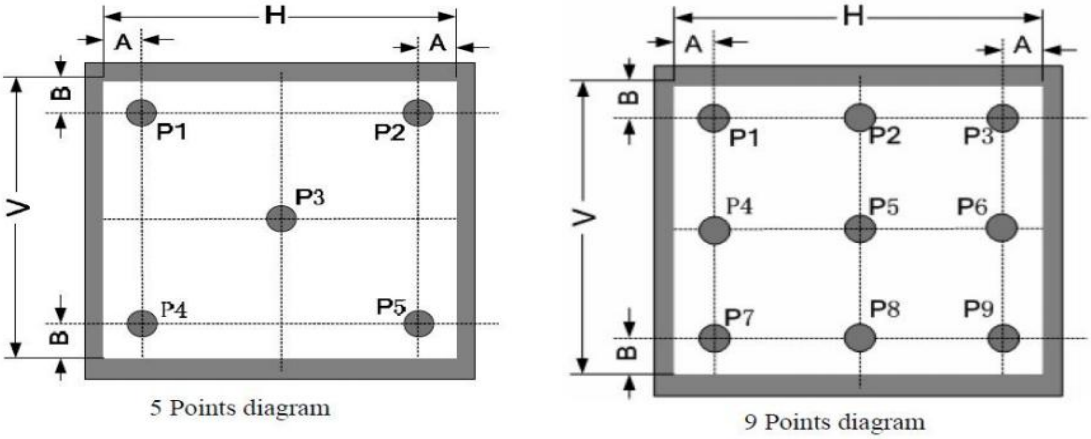


Fig2 Note1: For TFT Module Test point:9 points(as 9 Points diagram)
A : H/6 B : V/6
H,V : Active Area(AA) size
Measurement instrument:CS-2000;Light spot size ø=5mm,350mm distance from the LCD surface to detector lens.

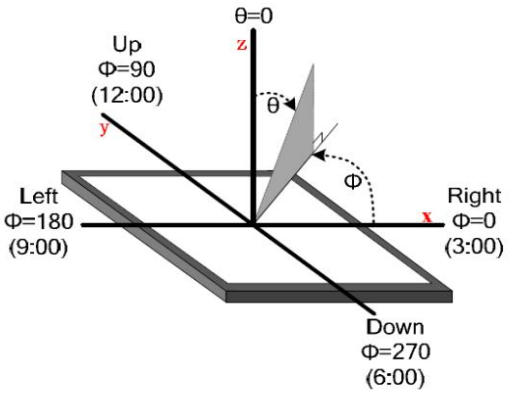
Fig2 Note2: For non-TFT Module and Dot-Matrix type Module
2.1 If the minimum side size is bigger than 20 mm,the testing method is the same as TFT module.
2.2 If the minimum side size is less than 20 mm,then testing 5 point datas (as 5 Points diagram),Both A and B are 5 mm.
2.3 Measurement instrument: CS-2000 is priority selected to measure.Light spot size ø=5mm, 350mm distance from the LCD surface to detector lens.
2.4 Measurement instrument : ConoScope will be selelected to measure If CS-2000 cannot meet the measurement requirement. Light spot size ø =0.2-2.0mm.About 2-3mm distance from the LCD surface to detector lens,but suggest to confirm the best distance on focusing the picture to be clearest when actually measuring.

Fig2 Note3: For non-TFT Module and non-Dot-Matrix type Module
The test point is defined by the fact size and shape of module,but the center point and four edges should be selected.
3.1 Measurement instrument: CS-2000 is priority selected to measure.Light spot

size Æ=5mm, 350mm distance from the LCD surface to detector lens.

3.2 Measurement instrument : ConoScope will be selelected to measure If CS-2000 cannot meet the measurement requirement. Light spot size Æ=0.2-2.0mm. About 2-3mm distance from the LCD surface to detector lens,but suggest to confirm the best distance on focusing the picture to be clearest when actually measuring.

FIG.3. The definition of viewing angle
视角定义



■ RELIABILITY TEST CONDITIONS
可靠性试验条件

No. 序号	Test Item 试验项目	Test Condition 试验条件	Inspection after test 判断标准
1	High Temperature Storage 高温存放	80 ±2℃/96 hours	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.Sealleak; 封口松脱； 3.Non-display;不显示； 4.missing segments; 漏笔 5.Glass crack;玻璃破碎； 6.Current Idd is twice higher than initial value.电流 Idd 大于初时值的 2 倍
2	Low Temperature Storage 低温存放	-30 ±2℃/96 hours	
3	High Temperature Operating 高温操作	70±2℃/96 hours	
4	Low Temperature Operating 低温操作	-20±2℃/96 hours	
5	Temperature Cycle storage 冷热循环存放	-20±2℃~25~70±2℃×10cycles (30min.) (5min.) (30min.)	
6	Damp proof Test operating 防潮试验操作	60℃±5℃×90%RH/96 hours	
7	Vibration Test 振荡试验	Frequency: 10Hz~55Hz~10Hz Amplitude: 1.5mm, X, Y, Z direction for total 3hours (Packing condition)	
8	Dropping test 跌落试验	Drop to the ground from 1m height, one time,every side of carton.(Packing condition)	
9	ESD test 静电试验	Voltage:- R: 330Ω C: 150pF Air discharge, 10time	

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 2~5pcs.
   每个测试项目的样品数量为 2~5 片.
3. For Damp Proof Test, Pure water(Resistance＞10MΩ) should be used.
   对于防潮试验，试验箱的用水必须是电阻大于 10M 欧姆的纯水。
4. In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting,it would be judged as a good part.
   如果由静电引起产品故障,当放置一段时间后能够恢复正常, 则不视为产品缺陷。
5. EL evaluation should be excepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
   带EL片的可靠性测试在高温高湿条件下,荧光粉会发生自然化学反应而产生黑点或瑕疵,因此不在高温高湿条件测试范围内.
6. 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

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