



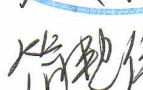
SPECIFICATION

产品说明书

Revision;2.0

版本: 2.0

Model/型号: JR6009A

中山市锦润电子有限公司	CUSTOMER/客户:
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审核 (REV.): 	审核 (REV.):
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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	2023-11-01	First release	/
2.0	2023-12-22	增加偏光片型号及 UV 光照测试参数	/

CONTENTS

内容

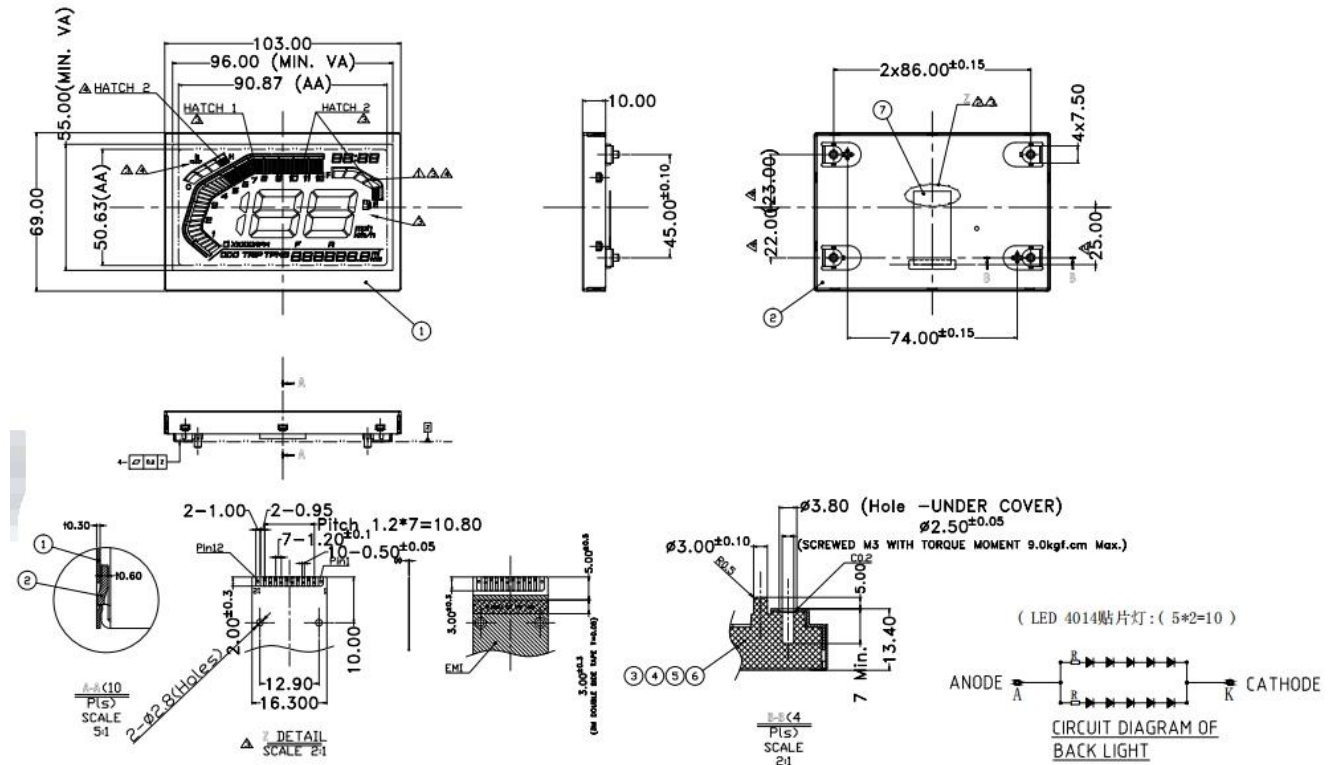
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■ GENERAL INFORMATION

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	BTN/NEGATIVE	/
Recommended Viewing Direction 模块推荐使用方向	6:00	0’ Clock
Module area (W*H*T) 模块外围尺寸 (宽*高*厚)	103×69×15.9	mm
Viewing area (W*H) 可视区域 (宽*高)	96×55	mm
Active area (W*H) 有效区域 (宽*高)	90.87×50.63	mm
Number of Dots 点阵	笔段式	/
Pixel pitch (W*H) 像素间隙 (宽*高)	—	/
Driver IC 驱动集成电路	SC5037-G4-1	/
Interface Type 接口类型	SPI-4W	/
Input voltage 输入电压	3.3V	V
Module Power consumption 模块功耗	TBD	mW
Backlight Type 背光类型	LED white	/

外形尺寸



PIN	SEG6	SEG62	SEG63	SEG64	SEG65	SEG66	SEG67	SEG68	SEG69	SEG70	SEG71	SEG72	SEG73	SEG74	SEG75	SEG76	SEG77	SEG78	SEG79	SEG80	SEG81	SEG82	SEG83	SEG84	SEG85	SEG86	SEG87
COMO	6C	6B	6A	6F	6G	6E	6D	5C	5B	5A	5F	5G	5E	5D	P1	S9	T51	P85	P86	P87	P91	P90	P89	P88	T77	T52	T53
PIN	SEG88	SEG89	SEG90	SEG91	SEG92	SEG93	SEG94	SEG95	SEG96	SEG97	SEG98	SEG99	SEG100	SEG101	SEG102	SEG103	SEG104	SEG105	SEG106	SEG107	SEG108	SEG109	SEG110	SEG111	SEG112	SEG113	SEG114
COMO	T54	T55	T56	T57	T58	T59	T60	T61	T76	T62	T63	T64	T65	T66	T67	T75	T74	T73	T72	T71	T70	T69	T68	T3	T4	T5	T6
PIN	SEG115	SEG116	SEG117	SEG118	SEG119	SEG120	SEG121	SEG122	SEG123	SEG124	SEG125	SEG126	SEG127	SEG128	SEG129	SEG130	SEG131	SEG132	SEG133	SEG134	SEG135	SEG136	SEG137	SEG138	SEG139	SEG140	SEG141
COMO	T7	T8	T9	T10	T1	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	S17	S15	S16	S14	S13	S12	S11	S10	T2	T21	T22	T23
PIN	SEG142	SEG143	SEG144	SEG145	SEG146	SEG147	SEG148	SEG149	SEG150	SEG151	SEG152	SEG153	SEG154	SEG155	SEG156	SEG157	SEG158	SEG159	SEG160	SEG161	SEG162	SEG163	SEG164	SEG165	SEG166	SEG167	SEG168
COMO	T24	T25	T26	T27	T28	T29	T30	T31	T32	T33	T34	T35	T36	T78	P83	P82	P81	P80	P9	P8	P7	P10	P79	P4	P5	P6	P11
PIN	SEG169	SEG170	SEG171	SEG172	SEG173	SEG174	SEG175	SEG176	SEG177	SEG178	SEG179	SEG180	SEG181	SEG182	SEG183	SEG184	SEG185	SEG186	SEG187	SEG188	SEG189	SEG190	SEG191	SEG192	SEG193	SEG194	SEG195
COMO	7A	7F	7G	7E	7D	7C	7B	8A	8F	8G	8E	8D	8C	8B	9A	9F	9G	9E	9D	9C	9B	10A	10F	10G	10E	10D	10C
PIN	SEG196	SEG197	SEG198	SEG199	SEG200	SEG201	SEG202	SEG203	SEG204	SEG205	SEG206	SEG207	SEG208	SEG209	SEG210	SEG211	SEG212	SEG213	SEG214	SEG215	SEG216	SEG217	SEG218	SEG219	SEG220	SEG221	SEG222
COMO	10B	11A	11F	11G	11E	11D	11C	11B	12A	12F	12G	12E	12D	12C	12B	P12	13A	13F	13G	13E	13D	13C	13B	P14	P13	P3	P2
PIN	SEG223	SEG224	SEG225	SEG226	SEG227	SEG228	SEG229	SEG230	SEG231	SEG232	SEG233	SEG234	SEG235	SEG236	SEG237	SEG238	SEG239	SEG240	SEG241	SEG242	SEG243	SEG244	SEG245	SEG246	SEG247	SEG248	SEG249
COMO	1F	1E	1D	1C	1G	1B	1A	2A	2F	2G	2E	2D	2C	2B	P16	P15	P84	T37	T38	T39	T40	T41	T42	T43	T44	T45	T46
PIN	SEG250	SEG251	SEG252	SEG253	SEG254	SEG255	SEG256	SEG257	SEG258	SEG259	SEG260	SEG261	SEG262	SEG263	SEG264	SEG265	SEG266	SEG267	SEG268	SEG269	SEG270	SEG271	SEG272	SEG273	SEG274	SEG275	
COMO	T47	T48	T49	T50	S1	S2	S8	S7	S6	S5	S4	S3	3F	3G	3E	3D	3C	3B	3A	4A	4F	4G	4E	4D	4C	4B	

注：LCD 偏光片使用如下型号：

面偏光片: JYD7311AGV

底偏光片: JYD7311AGV/JYD7311T

■ INTERFACE DESCRIPTION

接口定义描述

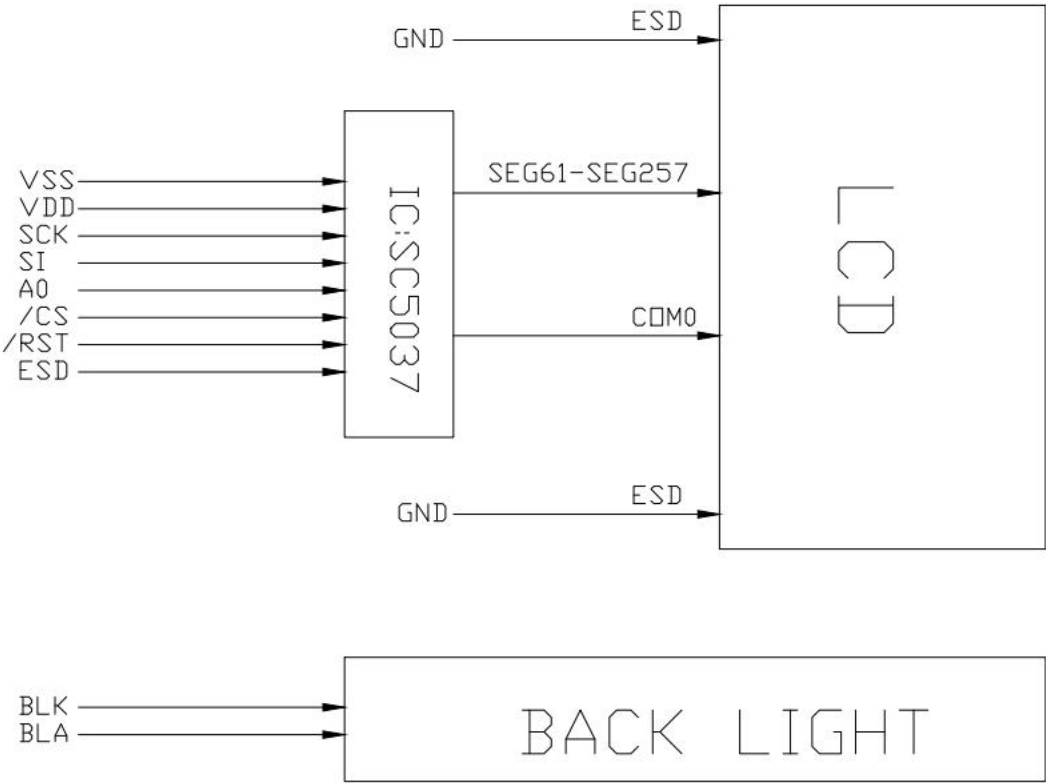
Interface NO. 接口序号	Symbol 符号	I/O or connect to 输入/出或连接到	Description 描述
1	ESD	–	Anti static pin, connect to GND
2	VLCD	P	LCD POWER SUPPLY
3	VSS	P	GND
4	VDD	P	POWER SUPPLY +3.3V
5	SCK	I	SPI-SCK PIN
6	SI	I	SPI-SI PIN
7	A0	I	SPI-A0 PIN
8	/CS	I	SPI-CS PIN
9	/RST	I	LCD DRIVER IC RST PIN
10	ESD	–	Anti static pin, connect to GND
11	BLK	P	BACK LIGHT POWER SUPPLY
12	BLA	P	BACK LIGHT POWER SUPPLY

■ REFERENCE APPLICATION CIRCUIT

参考应用电路

1、BLOCK DIAGRAM

模块框图



TIMING CHARACTERISTICS

时序特征

(2) 4SPI (8-bit) serial interface
When entering data (parameters): A0= HIGH at the rising edge of the 8th SCK.

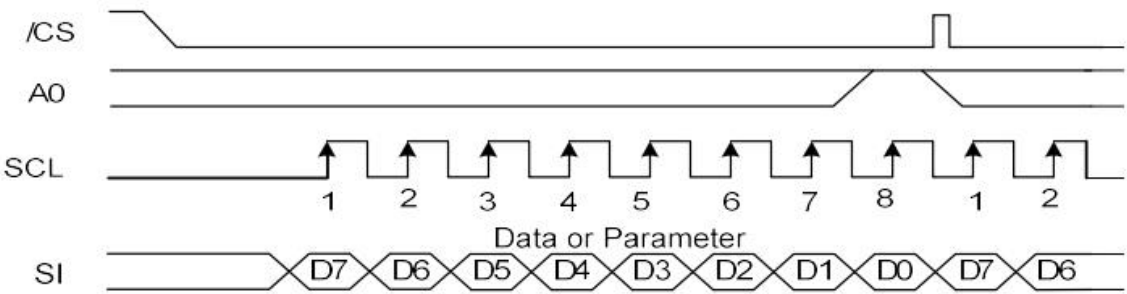


Figure 5

When entering command: A0= LOW at the rising edge of the 8th SCK

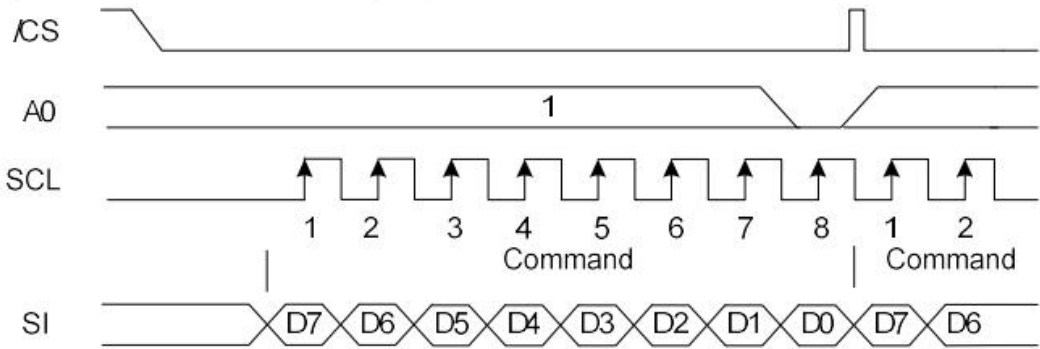


Figure 6

Please refer SC5037-G4-1 DATASHEES
具体请详细参考 SC5037-G4-1 规格书

COMMAND DESCRIPTION

命令描述

COMMAND	CODE										DESCRIPTION
	HEX	A0	D7	D6	D5	D4	D3	D2	D1	D0	
NOP	00	0	0	0	0	0	0	0	0	0	No Operation
Software reset	01	0	0	0	0	0	0	0	0	1	Software reset
Sleep in	10	0	0	0	0	1	0	0	0	0	Sleep in mode
Sleep out	11	0	0	0	0	1	0	0	0	1	Sleep out mode
Inverse display off	20	0	0	0	1	0	0	0	0	0	Display Inversion off
Inverse display on	21	0	0	0	1	0	0	0	0	1	Display Inversion on
Exit all point on	22	0	0	0	1	0	0	0	1	0	Exit all point on
Enter all point on	23	0	0	0	1	0	0	0	1	1	Enter all point on
Display off	28	0	0	0	1	0	1	0	0	0	Display off
Display on	29	0	0	0	1	0	1	0	0	1	Display on
Column address set	2A	0	0	0	1	0	1	0	1	0	Column address set
	-	1	CS7	CS6	CS5	CS4	CS3	CS2	CS1	CS0	Column start address
	-	1	CE7	CE6	CE5	CE4	CE3	CE2	CE1	CE0	Column end address
Row address set	2B	0	0	0	1	0	1	0	1	1	Row address set
	-	1	0	0	0	0	0	0	RS1	RS0	Row start address
	-	1	0	0	0	0	0	0	RE1	RE0	Row end address
Memory write	2C	0	0	0	1	0	1	1	0	0	Write data to memory
Memory read	2E	0	0	0	1	0	1	1	1	0	Read data from memory
Duty set	B0	0	1	0	1	1	0	0	0	0	Duty set
	-	1	0	0	0	0	0	0	DT1	DT0	Range 1 to 4 duty
Frame Frequency	B2	0	1	0	1	1	0	0	1	0	Frame Frequency
	-	1	0	0	0	1	FR3	FR2	FR1	FR0	
Gray level set	B4	0	1	0	1	1	0	1	0	0	Gray level set
	-	1	BK7	BK6	BK5	BK4	BK3	BK2	BK1	BK0	
	-	1	DG7	DG6	DG5	DG4	DG3	DG2	DG1	DG0	
	-	1	LG7	LG6	LG5	LG4	LG3	LG2	LG1	LG0	
LCD scan set	B7	0	1	0	1	1	0	1	1	1	LCD scan set
	-	1	MY	MX	0	0	MS	0	0	0	Master/Slave enable
Enter Read modify	B8	0	1	0	1	1	1	0	0	0	Enter Read modify
Exit Read modify	B9	0	1	0	1	1	1	0	0	1	Exit Read modify
Vop set	C0	0	1	1	0	0	0	0	0	0	Vop set Range 3V to 10.8V
	-	1	Vop7	Vop6	Vop5	Vop4	Vop3	Vop2	Vop1	Vop0	
	-	1	0	0	0	0	0	0	0	Vop8	
Bias selection	C3	0	1	1	0	0	0	0	0	1	Bias selection
	-	1	0	0	0	0	0	0	0	BS	
Power Control	D2	0	1	1	0	1	0	0	1	0	Power Control
	-	1	0	0	0	OSC	BST	FOL	V0	VREF	

Please refer SC5037-G4-1 DATASHEES

具体请详细参考 SC5037-G4-1 规格书

■ MAXIMUM ABSOLUTE 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	-0.3	4.0	V
Supply Voltage for LCD LCD 电压	VLCD	-0.3	12	V
Input Voltage 输入电压	Vin	-0.3	4.0	V
Supply Current for Backlight 背光电流	If (Ta=25° C)	-	80	mA
Operating temperature 操作温度	TOP	-35	85	° C
Storage temperature 储存温度	TST	-40	90	° C

Note: Absolute maximum ratings means the product can withstand short-term, NOT more than 500 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 500 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	2.8	3.3	3.3	V
Supply Voltage for LCD LCD 电压	VLCD	4.3	4.5	4.7	V
Input voltage 'H' level 输入高电平	VIH	0.7VDD	-	VDD	V
Input voltage 'L' level 输入低电平	VIL	0	-	0.3VDD	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 目(White Backlight)	Symbol 符号	Min. 最小值	Typ. 典型值	Max. 最大值	Unit 单位	Condition 条件
Forward current 正向电流	If	—	50	80	mA	Vf=15V
Number of LED 灯数	—	—	5*2	—	Piece	—
Backlight Colour 背光颜色	—	—	White	—	—	—

■ 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	θ=0° φ=0° Ta=25°C	—	80	160	ms	FIG 1	4
	Tf		—	85	170			
Contrast ratio 对比度	Cr		—	800	—	—	FIG 2	1
Luminance uniformity 均匀度	δ WHITE		75	—	—	%		3
Surface Luminance 表面亮度 (BL)	Lv		2000	2400	—	cd/m2		2
Viewing angle range 视角范围	θ	φ = 90°	—	35	—	deg	FIG 3	6
		φ = 270°	—	60	—	deg		
		φ = 0°	—	50	—	deg		
		φ = 180°	—	50	—	deg		

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

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

备注 1. 对比度是由以下公式计算所得。详见 FIG 2.

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

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, \dots)

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, \dots)

Note3. The uniformity in surface luminance (δ WHITE) 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.

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

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.

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

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

备注 4. 响应时间是 T_r (上升时间) 与 T_f (下降时间) 的和; T_r 指显示白色画面转为显示黑色画面需要时间, T_f 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 contrast ratio is 10; For monochrome and color stn module, the specific value of contrast 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

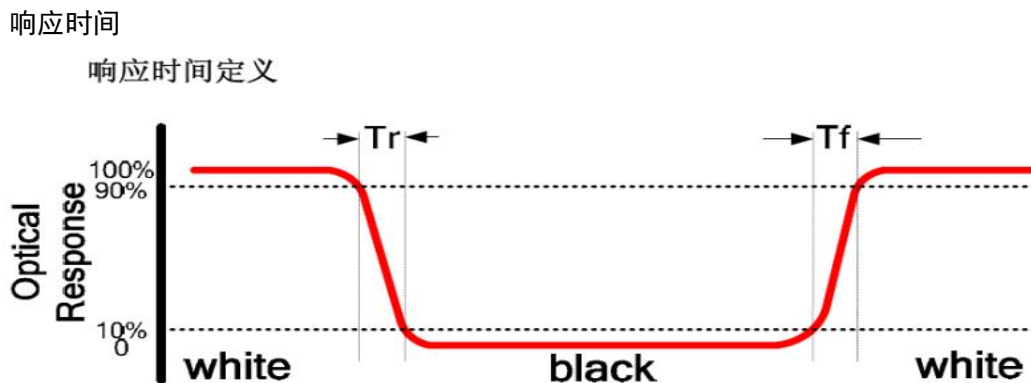


FIG 2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE(x, y) chromaticity.

对比度、表面亮度、均匀度、CIE 坐标测试方法

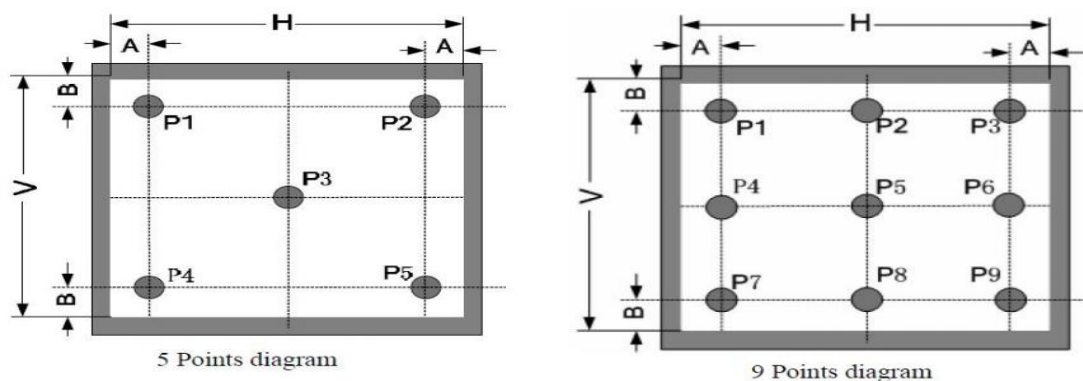


Fig2 Note1: For TFT Module Test point: 9 points (as 9 Points diagram)

A : $H/6$ B : $V/6$

H, V : Active Area (AA) size

Measurement instrument: CS-2000; Light spot size $\phi=5\text{mm}$, 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 $\phi=5\text{mm}$, 350mm distance from the LCD surface to detector lens.
- 2.4 Measurement instrument : ConoScope will be selected to measure If CS-2000 cannot meet the measurement requirement. Light spot size $\phi=0.2-2.0\text{mm}$. 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.

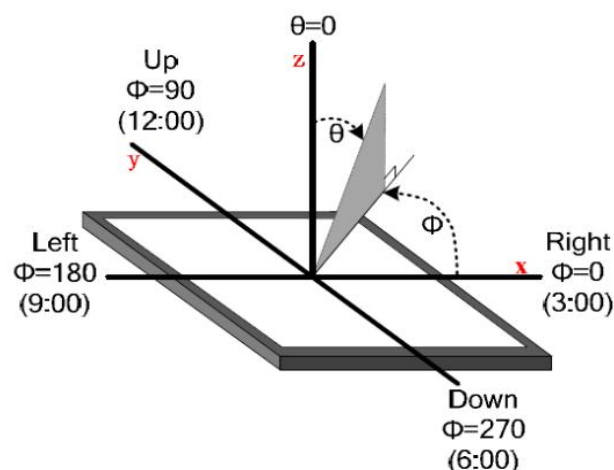
Fig2 Note3: For non-TFT Module and non-Dot-Matrix type Module

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 $\phi=5\text{mm}$, 350mm distance from the LCD surface to detector lens.
- 3.2 Measurement instrument : ConoScope will be selected to measure If CS-2000 cannot meet the measurement requirement. Light spot size $\phi=0.2-2.0\text{mm}$. 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	90 ±2°C/500 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 7. After UV illumination test; The color change of LCM should not exceed ± 10% before testing, and no structural component should have cracks. All functions must comply with the design specifications. UV 照射测试后, LCM 色度变化量不可大于测试前± 10%, 且任一结构件不可有龟裂, 所有功能需符合设计规范值
2	Low Temperature Storage 低温存放	-40 ±2°C/500 hours	
3	High Temperature Operating 高温操作	85±2°C/500 hours	
4	Low Temperature Operating 低温操作	-35±2°C/500 hours	
5	Temperature Cycle storage 冷热循环存放	-35±2°C~ 85±2°C×100cycles (60min.) (60min.) transfer time <30sec	
6	Damp proof Test operating 防潮试验操作	60°C±5°C×90%RH/500 hours	
7	Vibration Test 振荡试验	Frequency & Amplitude: 30Hz~100Hz:0.5mm amplitude 100Hz~500Hz:98m/s ² Sweep rate: Log sweep 15 minute/reciprocation Direction to vibrate:X+Y+Z Indication:Full display Duration:20 hours for each direction	
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:±4KV R: 330Ω C: 150pF Air discharge, 10time	
10	UV illumination test UV 光照射耐久试验	40±3°C & 1.12kW/m ² 8 hours test×16 hours rest Circulate 360 hours. (Refer to IEC60068-2-5)	

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 3~5pcs.

每个测试项目的样品数量为 3~5 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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