视智美科技（深圳）有限公司

Shizhimei Technology (Shenzhen) Co.,Ltd

PRODUCT
产品名称　模组

MODEL NO.
模块型号　SZMJL-0316IVO-SV1-R

DATE
日期　2019-12-01

SPECIFICATION
产品规格书

Version: A0.0
版本：A0.0
This module uses ROHS material
模块用环保材料

CUSTOMER（客户）：

Customer Approval(客户核准)

SUPPLIER(供应商):

PREPARED BY 制定	**CHECKED BY** 审核	**Approved by** 核准

REVISION RECORD 修改记录

REV NO. 版本	REV DATE 日期	CONTENTS 内容	REMARKS 备注
A0	2019.12.01	First version初始版本	

CONTENTS 目录

1.1 LCM General Specification 模组规格

Item of general information 项目	**Contents** 内容	**Unit** 单位
LCD Type 液晶显示类型	TFT	/
Recommended Viewing Direction 模块推荐使用方向	ALL	O' Clock
Display mode 显示模式	Normal Black	/
Module area (W × H×T) 模块外围尺寸 (宽× 高×厚)	76.6*31.2*2.4	mm
Active area (W×H) 有效区域 (宽× 高)	65.65*26.4	mm
Number of Dots 点阵	820*RGB*320	/
Pixel pitch (W × H) 像素大小(宽× 高)	0.0825*0.0285	mm
Driver IC 驱动 IC	ST7701S	/
Interface Type 接口类型	RGB	/
Colors 色彩	16.7M	/
Backlight Type 背光类型	LED	/

2. Electrical Characteristics 电气参数

2.1 LCM Electrical Characteristics 模组电气参数

2.1.1. 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
Operating temperature 操作温度	T_{op}	-20	70	°C
Storage temperature 储存温度	T_{st}	-30	80	°C
Humidity 湿度	RH	-	90%(Max60 °C)	RH

2.1.2. ELECTRICAL CHARACTERISTICS 模块电气特性

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	VCI	2.8	3.3	3.6	V
I/O power supply 接口电压	IOVCC	1.65	1.8	3.3	V
Input Current 输入电流	I_{dd}	-	40	-	mA
Input voltage 'H' level输入高电平	V_{IH}	0.7IOVCC	-	IOVCC	V
Input voltage 'L' level 输入低电平	V_{IL}	-0.3	-	0.3IOVCC	V
Output voltage 'H' level 输出高电平	V_{OH}	0.8IOVCC	-	IOVCC	V
Output voltage 'L' level 输出低电平	V_{OL}	0	-	0.2IOVCC	V

2.1.3. Backlight Characteristics 背光电气特性(祥见成品图)

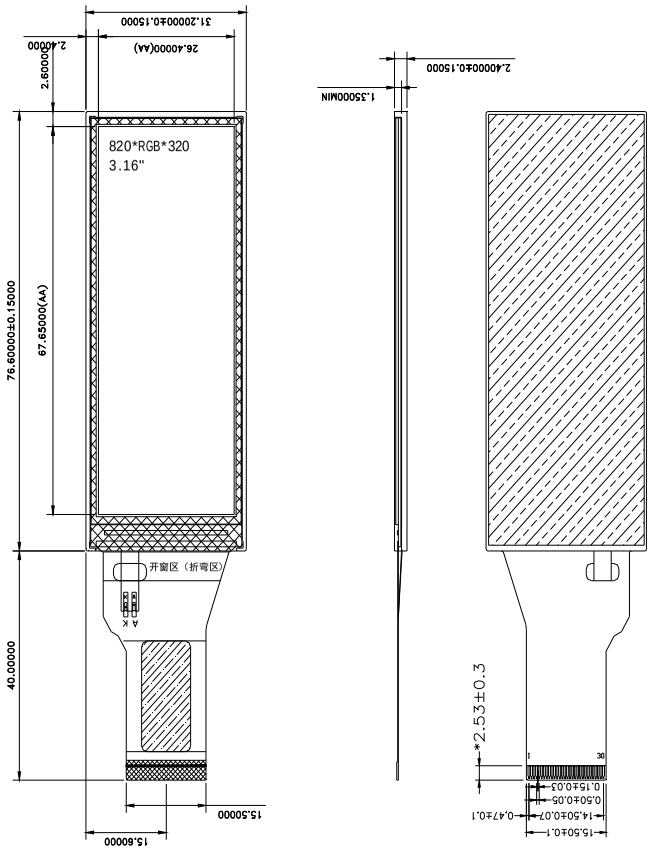
Item of backlight characteristics 项目	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**	**Condition**
Forward voltage 正向电压	Vf				V	If=--mA
Number of LED LED数量	-	-	10	-	Piece	-
Connection mode 连接类型	-	-		-	-	-

Using condition: constant current driving method I_f=40mA(+/-10%).
使用条件：恒流的驱动方式I_f=40mA(+/-10%).

3. EXTERNAL DIMENSIONS AND INTERFACE DESCRIPTION

外形及接口定义描述

3.1 External Dimensions 外形尺寸



1	LEDA
2	LEDK
3	GND
4	RESET
5	VSYNC
6	HSYNC
7	CLK
8	DEN
9	GND
10	R4
11	R3
12	R2
13	R1
14	R0
15	G5
16	G4
17	G3
18	G2
19	G1
20	G0
21	B4
22	B3
23	B2
24	B1
25	B0
26	IOVCC
27	SDI
28	SCL
29	CS
30	VCI

Notes:

1.RoHS must be complied.

2.⚠Modification rev. number

3.Draft angle 1.0° :

4." * " ICON MEAN IMPORTANT DIM.

5.All radii without dimension R0.3,Unspecified Tolerances is: ±0.3

6.Driver IC:7701S

7.Circuit Diagram: 1X4=4

A ⊣▷◁▷◁▷◁▷⊢ K

LED Circuit Drawing

	Item	Symbol	Min.	Typ.	Max.	Unit	Condition
LCM	Luminance	Lv	500	550	600	cd/m²	If= -- mA (测PET检测)
	Uniformity	Avg	80	85		%	Measure tolerance:
	Colour Coordinate	X	0.26	0.32	0.38		Luminance:±5%
		Y	0.26	0.32	0.38		Colour coordinate:±0.008
Forward Voltage		Vf	12.0	13.0	14.0	V	Voltage:±0.1V
Forward Current		IV	20	25	30	mA	

●Operating Temperature: -20~+70° C ●Storage Temperature: -30~+80° C

●Storage condition Recommended: temperature (25° C±5° C) and humidity (65%RH±20%RH)

●ESD Contact=+/-4KV Air=+/-8KV

ISSUE	AMENDMENT	DATE
0	NEW ISSUE	2019.12.01

MODEL NO.:	0316IV0-SV1-R
REV:	V00
CUSTOMER'S NO.:	IVO 3.16"
REV:	0
SHEET	1 of 1
SCALE	1 : 1
THE THIRD ANGLE PROJECTION	
UNIT:	mm
DESIGN:	
CHECKED:	
COUNTERSIGN:	
APPROVED:	

Ver：A0

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3.16寸RGB接口 30PIN模组

3.2 LCM interface description LCM接口功能描述

Pin No.	Symbol	Functional
1	LED-A	LED Negative
2	LED-K	LED Positive
3	GND	Ground
4	RESET	Reset pin
5	VSYNC	Vertical sync.signal in RGB interface mode
6	HSYNC	Horizontal sync. Signal in RGB interface mode
7	CLK	Pixel clock signal RGB interface mode
8	DEN	Data enable signal in RGB interface mode
9	GND	Ground
10	R4	Red Data
11	R3	Red Data
12	R2	Red Data
13	R1	Red Data
14	R0	Red Data
15	G5	Green Data
16	G4	Green Data
17	G3	Green Data
18	G2	Green Data
19	G1	Green Data
20	G0	Green Data
21	B4	Blue Data
22	B3	Blue Data
23	B2	Blue Data
24	B1	Blue Data
25	B0	Blue Data
26	IOPVCC	Power supply (1.8V)
27	SDI	Serial data output pin in serial interface operation.
28	SCL	Serial data input pin in serial interface operation.
29	CS	Chip select input pin
30	VCI	Power supply (3.3V)

4. ELECTRO-OPTICAL CHARACTERISTICS 光电参数

4.1 LCM ELECTRO_Optical Characteristics LCM光电参数

Item of electro-optical 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
Contrast ratio 对比度	CR		θ =0° ψ =0° If=20mA /LED	1000	1500	-	-	Note 1
SurfaceLuminance 表面亮度	Lv			-	550	-	Cd/m^2	Note 2
Luminance uniformity 均匀度	δ WHITE			80	-	-	%	Note 3
Response time 响应时间	Tr+Tf			-	30	35	ms	Note 4
Viewing angle range 视角范围	θ （CR≥10）		CR>10	-	80	-	degree	Note 5
				-	80	-		
				-	80	-		
				-	80	-		
Module Chromaticity CIE (x, y) 色坐标	White	x	θ =0° ψ =0° Ta=25℃	0.296	0.288	0.288	-	Note6
		y		0.340	0.377	0.377		
		x		0.294	0.287	0.287		
		y		0.338	0.329	0.329		
		x		0.285	0.263	0.263		
		y		0.331	0.292	0.292		
NTSC Ratio 色域	S		-	-	60	-	%	Note7

Note1. Contrast Ratio (CR) is defined mathematically by the following formula. For more information see FIG 1.:

$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all white pixels (P1, P2, P 3, P4, P5,P6,P7,P8,P9)}}{\text{Average Surface Luminance with all black pixels (P1, P2, P 3, P4, P5,P6,P7,P8,P9)}}$$

备注1. 对比度是由以下公式计算所得。详见FIG 1. 。

$$\text{对比度} = \frac{\text{显示白色画面时平均表面亮度(P1,P2,P3,P4,P5,P6,P7,P8,P9)}}{\text{显示黑色画面时平均表面亮度(P1,P2,P3,P4, P5,P6,P7,P8,P9)}}$$

Note2. Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see FIG 1.

Lv = Average Surface Luminance with all white pixels (P1, P2, P 3,P4, P5,P6,P7,P8,P9)

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 1. 。

Lv = 平均的表面亮度(P1, P2, P 3,P4, P5,P6,P7,P8,P9)

Note3. The uniformity in surface luminance（ δ WHITE）is determined by measuring luminance at each test position 1 through 5, and then dividing the maximum luminance of 5 points luminance by minimum luminance of 5 points luminance. For more information see FIG 1.

$$\delta\,\text{WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P1, P2, P3,P4,P5,P6,P7,P8,P9)}}{\text{Maxi mum Surface Luminance with all white pixels (P1, P2, P3,P4,P5,P6,P7,P8,P9)}}$$

备注3. 均匀度是在显示白色画面时，测试P1到P5的亮度，然后再用5个点亮度的最小值除以最大值。详见FIG 1. 。

$$\text{均匀度} = \frac{\text{表面亮度最小值(P1, P2, P 3,P4, P5,P6,P7,P8,P9)}}{\text{表面高度最大值(P1, P2, P 3,P4, P5,P6,P7,P8,P9)}}$$

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 2..

备注4. 响应时间是Tr(上升时间)与Tf(下降时间)的和; Tr 指显示黑色画面转为显示白色画面需要时间, Tf 指显示白色画面转为显示黑色画面需要时间。详见FIG 2. 。

Note5. Viewing angle is the angle at which the contrast ratio is greater than 2. For TFT module 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. For more information see FIG 3.

备注5. 视角指对比度大于等于2时的可视范围，对TFT 屏，则是对比度大于等于10 的可视范围。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.

Note6. CIE (x, y) chromaticity ,The x,y value is determined by screen active area position 5. For more information see FIG 1.

备注6. CIE(x,y) 色坐标测试点为显示屏中心点P5。详见FIG 1.

Note7: NTSC ratio：For more information see FIG 4.

$$\text{NTSC ratio} = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}}$$

备注7. 色域比： 详见FIG 4

$$\text{NTSC ratio} = \frac{\text{RGB三色三角形面积}}{\text{标准NTSC三角形面积}}$$

Note8. 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 BM-7 photo detector.

备注8. 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BM-7 photo detector.

Note9. For TFT transmissive module, Gray scale reverse occurs in the direction of panel viewing angle

备注9. TFT 全透产品,在视角方向会发生灰度反转

FIG.1. 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

A : 5 mm

B : 5 mm

H,V : Active Area

Light spot size =5mm, 500mm distance from the

LCD surface to detector lens

measurement instrument is luminance meter BM-7

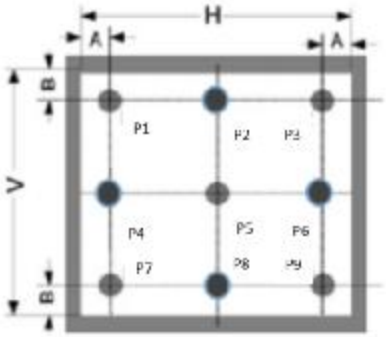


FIG.2. The definition of Response Time 响应时间定义

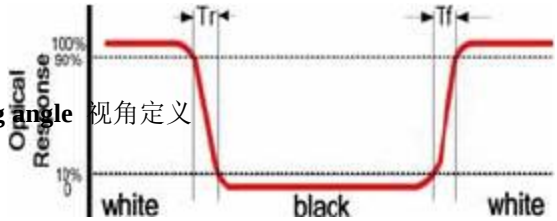
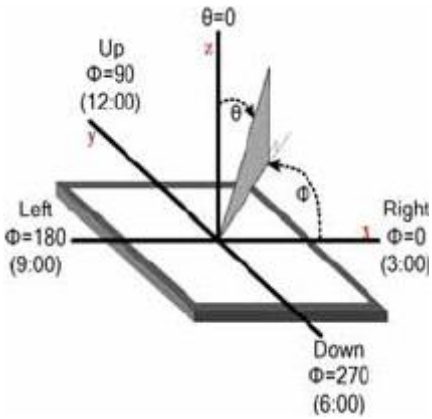


FIG.3. The definition of viewing angle 视角定义



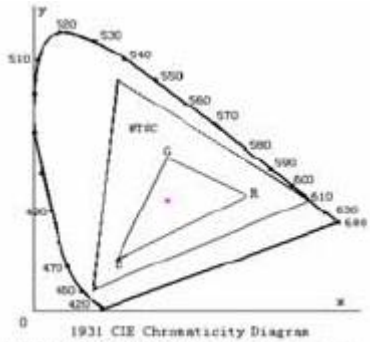


Fig.4. 1931 CIE chromaticity diagram

5. 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	70±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 7, the surface shall be free from damage..表面无损伤. 8. The electrical characteristics requirements shall be satisfied. 需要满足模块电气性能。
2	Low Temperature Storage 低温存放	-30±2℃/96 hours	
3	High Temperature Operating 高温操作	80±2℃/96 hours	
4	Low Temperature Operating 低温操作	-20±2℃/48 hours	
5	Temperature Cycle 冷热循环	-30±2℃(30min.) ~70(30min.)±2℃×48 cycles	
6	High temperature and high humidity 高温高湿	70℃±5℃×90%RH/48 hours	
7	Vibration Test 振荡试验	Frequency：10Hz~55Hz~10Hz Amplitude：1.5mm, X，Y，Z direction for total 0.5hours (Packing condition)	
8	Dropping test 跌落试验	Drop to the ground from 1.0m height, one time, every side of carton. (Packing condition)	

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 5~10pcs. 每个测试项目的样品数量为5～10 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

6. PRIOR CONSULT MATTER 提前商议事项

1 For standard products, we keep the right to change material, process ... for improving the product property without prior notice to our customer.
对于标准产品，我们保留在不通知客户的情况下,为提高产品性能而改变原材料及加工方法等的权利。

2 For OEM products, if any changes are needed which may affect the product property, we will consult with our customer in advance.
对于OEM产品，如果需要做任何会影响到产品性能的改变，我们会提前和客户商议。

3 If you have special requirement about reliability condition, please let us know before you start the design on our samples.
如对可靠性条件有特殊要求，请在模块设计开发前通知我们。