

深圳市风景电子有限公司  
Viewson Elec. Co., Limited

样品规格承认书  
Specification

客户名称(CUSTOMER) :

型号名称(LCM CODE (Ver.)) : VT394WF01

描述(Description) : 3.94' a-Si TFT 液晶显示屏

客户确认:  
CUSTOMER  
APPROVED:

APPROVED BY	CHECK BY	PREPARED BY

## RECORDS OF REVISION

Date	Rev.	Description	Note	Page
2015/04/09	1	First issue.		
2015/04/17	2	Change the interface		

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## 1. SPECIFICATIONS

### 1.1 Features

Item	Standard Value
Display Type	272(R+G+B) * 480 Dots
LCD Type	a-Si TFT, Positive, Transmissive
Viewing Direction	12 O'clock
Backlight	8-LED White Color
Interface	MCU interface (8bit bus)
Controller/driver IC	ST7796S

### 1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	97.2(L) ×57.4(W) ×3.35(T)	mm
Viewing Area	88.3(L) ×53.4(W)	mm
Active Area	87.12 (L) ×49.37(W)	mm
Pixel pitch	0.1815(L) × 0.1815 (W)	mm

Note: For detailed information please refer to LCM drawing

### 1.3 Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Power Supply Voltage	V <sub>CI</sub>	-	-0.3	4.6	V
LCD Driver Supply Voltage	V <sub>GH-VSS</sub>	-	-0.3	18.5	V
Input voltage	V <sub>in</sub>		-0.3	4.6	V
Operating Temperature	T <sub>OP</sub>	-	-20	+70	°C
Storage Temperature.	T <sub>ST</sub>	-	-30	+80	°C
Storage Humidity	H <sub>D</sub>	T <sub>a</sub> < 40 °C	-	90	%RH

## 1.4 DC Electrical Characteristics

$V_{CI} = 2.4 \sim 3.3V$ ,  $V_{SS} = 0V$ ,  $T_a = 25^\circ C$

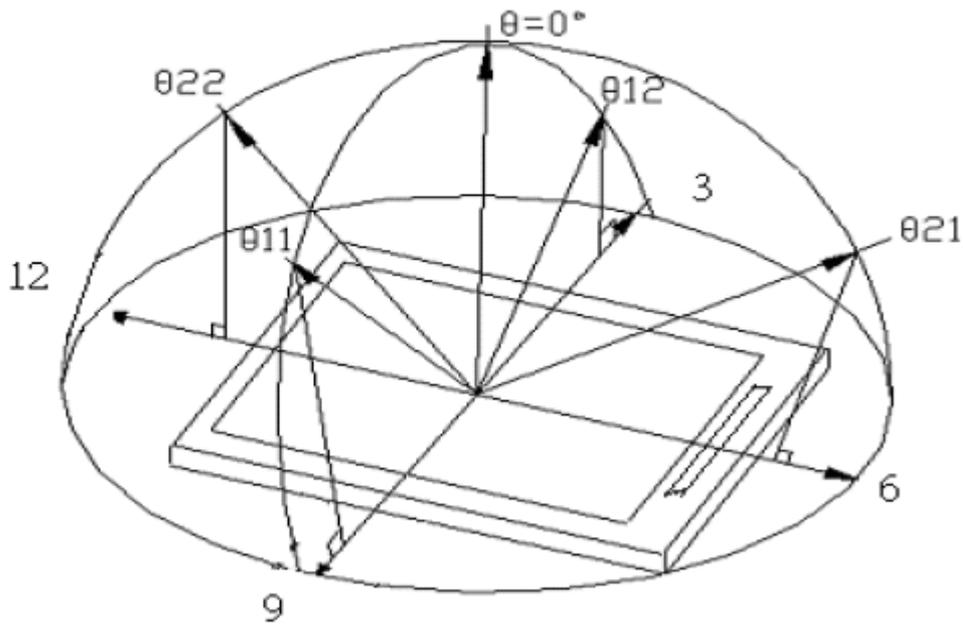
Item	Symbol	Condition	Min.	Type	Max.	Unit
Logic Supply Voltage	$V_{CI}$	-	2.4	2.8	3.3	V
I/O Supply Voltage	IOVCC	-	1.65		3.3	
“H” Input Voltage	$V_{IH}$	-	0.8 $V_{DD}$	-	$V_{DD}$	V
“L” Input Voltage	$V_{IL}$	-	$V_{SS}$	-	0.2 $V_{DD}$	V
“H” Output Voltage	$V_{OH}$	-	0.8 $V_{DD}$	-	$V_{DD}$	V
“L” Output Voltage	$V_{OL}$	-	$V_{SS}$	-	0.2 $V_{DD}$	V
Supply Current	$I_{DD}$	$V_{CI} = 2.8V$	-	4	6	mA

## 1.5 Optical Characteristics

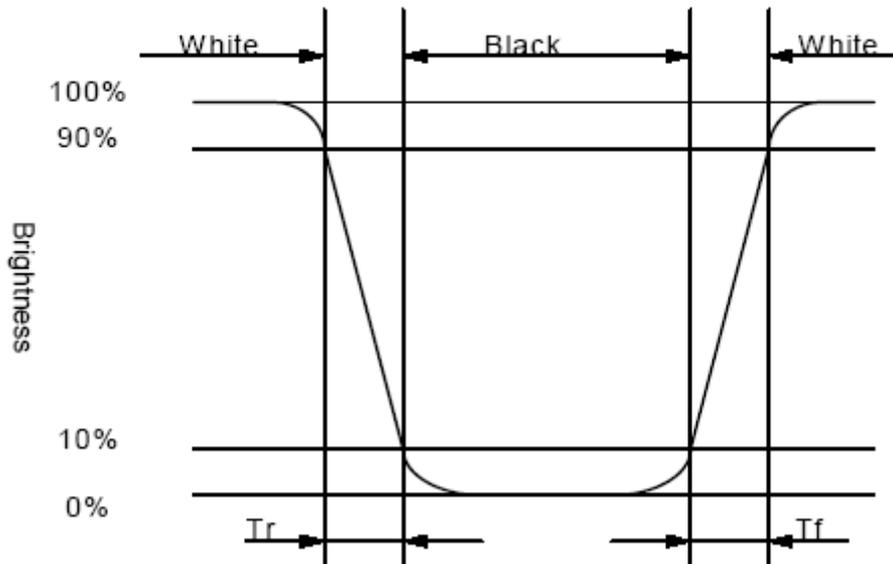
$T_a = 25^\circ C$

Item	Symbol	Conditions	Min.	Typ.	Max.	Reference
View Angle	q11, q12	$C \geq 10^\circ, \text{E} = 0^\circ$	-	45	--	Note6-1
	q21		-	50	--	Note6-1
	q22		-	20	--	Note6-1
Contrast Ratio	C	$q = 0^\circ, \text{E} = 0^\circ$	-	500	-	--
Response Time(rise)	tr	$q = 0^\circ, \text{E} = 0^\circ$	-	4ms	8ms	Note6-3
Response Time(fall)	tf	$q = 0^\circ, \text{E} = 0^\circ$	-	12ms	24ms	Note6-3
Luminance	B	$\theta = 0^\circ \quad \phi = 0^\circ$	-	210	-	cd/m <sup>2</sup>

Note 6-1 : The definitions of viewing angles



Note 6-3 : The definition of response time :



## 1.6 Backlight & LED Characteristics

### Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta =25℃	-	30(8 LED)	mA
Reverse Voltage	VR	Ta =25℃	-	30	V
Power Dissipation	PO	Ta =25℃	-	600	mW
Operating Temperature	T <sub>OP</sub>	-	-20	70	℃
Storage Temperature	T <sub>ST</sub>	-	-30	80	℃
Solder Temp. for 3 Seconds	-	-	-	260	℃

### Electrical / Optical Characteristics

VSS = 0V, Ta =25℃

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	LED-A	IF= 20mA	-	25.6		V
Reverse Current	IR	VR= 30V	-	-	50	uA
Average Brightness (without LCD)	IV	IF= 20mA	3800		-	cd/m <sup>2</sup>
CIE Color Coordinate (without LCD)	X	IF= 20mA	0.250	-	0.310	—
	Y		0.250	-	0.310	
Color	WHITE					

\*1 This value will be changed while mass production.



## 2.2 Interface Pin Description

NO	SYMBOL	FUNCTION
1	GND	GROUND
2	VCI	A supply voltage to the analog circuit. Connect to an external power supply of 2.5 ~ 3.3V.
3	IOVCC	A supply voltage to the digital circuit. Connect to an external power supply of 1.65 ~ 3.3V.
4	LED-K	BACK LIGHT K
5	LED-A	BACK LIGHT A
6	DB15	DATA BUS
7	DB14	DATA BUS
8	DB13	DATA BUS
9	DB12	DATA BUS
10	DB11	DATA BUS
11	DB10	DATA BUS
12	DB9	DATA BUS
13	DB8	DATA BUS
14	DB7	DATA BUS
15	DB6	DATA BUS
16	DB5	DATA BUS
17	DB4	DATA BUS
18	DB3	DATA BUS
19	DB2	DATA BUS
20	DB1	DATA BUS
21	DB0	DATA BUS
22	RESET	RESET PIN (“L” à Active)
23	YD	TouchPanel YD PIN
24	XL	TouchPanel XL PIN
25	YU	TouchPanel YU PIN
26	XR	TouchPanel XR PIN
27	RD	Read signal (“L” à Active)
28	WE	Write signal (“L” à Active)
29	RS	Data / Command select signal(“L”à register index; ”H”à data)
30	CS	A chip select signal. Low: the chip is selected and accessible

## 2.3 Timing Characteristics

Please refer to ST7796S DATASHEET.

## 2.4 Display Command

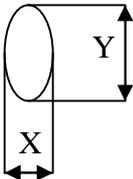
Please refer to ST7796S DATASHEET.

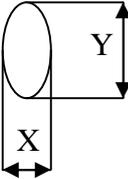
## 2.5 Touchpanel Charactoeistics

NO.	项目 Item	单位	规格尺寸 Value	备注 Note
1	最大电压值 Max voltage	V	DC 5V	
2	线性度 Linearity	%	±1.5	Load 120gf
3	回路阻抗 Terminal resistance	Ω	Film side: 150~500	
			Glass side: 400~800	
4	绝缘阻抗 Insulation resistance	MΩ	≥10	DC25V
5	操作荷重 Operation force	g	40~100	R0.8 TP Pen
6	表面硬度 Hardness	H	≥3	
7	笔划寿命 Pen sliding life	次	≥ 100, 000	100g, 60mm/s, R0.8 POM

### 3. INSPECTION SPECIFICATION

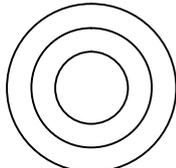
NO.	项目 Item	经验标准 Inspection Standard	判断 Result	备注 Note
1	整体功能 All functional defects	1) 不显示 No display 2) 显示异常 Display abnormally 3) 缺划 (横或竖, 横&竖) Missing vertical, horizontal segment 4) 短路 Short circuit 5) 背光不亮或闪烁 Backlight no lighting, flickering and abnormal lighting.	不允许 Reject	
2	缺失 Missing	少成分 Missing component	不允许 Reject	
3	外观尺寸 Outline dimension	同 CD 图 Overall outline dimension beyond the drawing is not allowed		

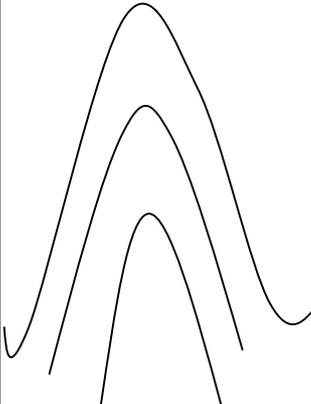
NO.	项目 Item	检验标准 Inspection Standard	备注 Note																			
4	清楚的黑白点 Clear Spots	$\phi = (X+Y) / 2$  <p>A: AA 区 (显示区) B: VA 区 (可视区) C: 可视区以外(Out of VA)</p> <table border="1" style="margin-top: 10px;"> <thead> <tr> <th rowspan="2">区域 Zone 尺寸 Size</th> <th colspan="3">接受个数 Acceptable Quantity</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td><math>\phi \leq 0.1\text{mm}</math></td> <td colspan="3">Ignore</td> </tr> <tr> <td><math>0.1\text{mm} &lt; \phi \leq 0.2\text{mm}</math></td> <td>3</td> <td colspan="2" rowspan="3">Ignore</td> </tr> <tr> <td><math>0.2\text{mm} &lt; \phi \leq 0.25\text{mm}</math></td> <td>2</td> </tr> <tr> <td><math>\phi &gt; 0.25\text{mm}</math></td> <td>0</td> </tr> </tbody> </table>	区域 Zone 尺寸 Size	接受个数 Acceptable Quantity			A	B	C	$\phi \leq 0.1\text{mm}$	Ignore			$0.1\text{mm} < \phi \leq 0.2\text{mm}$	3	Ignore		$0.2\text{mm} < \phi \leq 0.25\text{mm}$	2	$\phi > 0.25\text{mm}$	0	
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$\phi > 0.25\text{mm}$	0																					

NO.	项目 Item	检验标准 Inspection Standard	备注 Note																											
5	不明显的黑白点 Dim Spots	$\phi = (X+Y) / 2$ <div style="display: flex; align-items: center; margin: 10px 0;">  <div style="text-align: left;"> <p>A: AA 区 (显示区)</p> <p>B: VA 区 (可视区)</p> <p>C: 可视区以外(Out of V.A.)</p> </div> </div> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2" style="width: 40%;">区域 Zone 尺寸 Size</th> <th colspan="3">接受个数 Acceptable Quantit</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td><math>\phi \leq 0.3\text{mm}</math></td> <td colspan="2">Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>0.3\text{mm} &lt; \phi \leq 0.6\text{mm}</math></td> <td colspan="2">2</td> </tr> <tr> <td><math>\phi &gt; 0.6\text{mm}</math></td> <td colspan="2">0</td> </tr> </tbody> </table>	区域 Zone 尺寸 Size	接受个数 Acceptable Quantit			A	B	C	$\phi \leq 0.3\text{mm}$	Ignore		Ignore	$0.3\text{mm} < \phi \leq 0.6\text{mm}$	2		$\phi > 0.6\text{mm}$	0												
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6	线不良 Line defect	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="2">尺寸 Size (mm)</th> <th colspan="3">接受个数 Acceptable Quantity</th> </tr> <tr> <th>L (Length)</th> <th>W (width)</th> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>Ignore</td> <td><math>W \leq 0.03</math></td> <td colspan="2">Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>L &lt; 5.0</math></td> <td><math>0.03 &lt; W \leq 0.05</math></td> <td colspan="2">2</td> </tr> <tr> <td></td> <td><math>0.05 &lt; W</math></td> <td colspan="2">以脏污论 Define as spot defect</td> </tr> </tbody> </table>	尺寸 Size (mm)		接受个数 Acceptable Quantity			L (Length)	W (width)	A	B	C	Ignore	$W \leq 0.03$	Ignore		Ignore	$L < 5.0$	$0.03 < W \leq 0.05$	2			$0.05 < W$	以脏污论 Define as spot defect						
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	$0.05 < W$	以脏污论 Define as spot defect																												
7	偏光片刮伤 Polarizer Scratch	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="2">尺寸 Size (mm)</th> <th colspan="3">Acceptable Quantity</th> </tr> <tr> <th>L (Length)</th> <th>W (width)</th> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>Ignore</td> <td><math>W \leq 0.03</math></td> <td colspan="2">Ignore</td> <td rowspan="5">Ignore</td> </tr> <tr> <td><math>L \leq 10</math></td> <td><math>0.03 &lt; W \leq 0.05</math></td> <td colspan="2">2</td> </tr> <tr> <td><math>L &lt; 5.0</math></td> <td><math>0.05 &lt; W \leq 0.08</math></td> <td colspan="2">1</td> </tr> <tr> <td></td> <td><math>0.08 &lt; W</math></td> <td colspan="2">0</td> </tr> </tbody> </table>	尺寸 Size (mm)		Acceptable Quantity			L (Length)	W (width)	A	B	C	Ignore	$W \leq 0.03$	Ignore		Ignore	$L \leq 10$	$0.03 < W \leq 0.05$	2		$L < 5.0$	$0.05 < W \leq 0.08$	1			$0.08 < W$	0		
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$L < 5.0$	$0.05 < W \leq 0.08$	1																												
	$0.08 < W$	0																												

8	偏光片与玻璃间气泡 Polarize Air bubble	区域 Zone 尺寸 Size		接受个数 Acceptable Quantity		
				A	B	C
		$\phi \leq 0.2\text{mm}$		Ignore		Ignore
		$0.2\text{mm} < \phi \leq 0.3\text{mm}$		2		
		$0.3\text{mm} < \phi \leq 0.5\text{mm}$		1		
$\phi > 0.5\text{mm}$		0				

牛顿环/干涉纹 Newton Ring

NO.	项目 Item	检验标准 Inspection Standard	备注 Note
9	规则 Inerratic	<p>1. 在整个触摸屏检查区域内（可视区）超过 1/3 范围, 不可; When Newton ring dimension is more than 1/3 of sample dimension, it is regarded as a defect.</p> <p>2. 直径 <math>\leq 5\text{mm}</math>, 且在整个触摸屏检查区（可视区）域小于 1/3 范围, 不影响透过率及失真; 不计 When Newton ring dimension is less than 1/3 of sample dimension is not affect font effect and line distortion under a ceiling fluorescent light, it is acceptable.</p>	

10	不规则 Atactic	<p>1. 在照明环境下牛顿环有影响清晰度和透过率, 失真; 不可。As long as Newton ring affects font effect and line distortion under a ceiling fluorescent light, it is regarded as a defect.</p> <p>2. 在整个触摸屏检查区域（可视区）内, 超过 1/2, 不可。 <math>\phi \leq 10\text{mm}</math>; 不计。When <math>\phi \leq 10\text{mm}</math>, it is acceptable</p>	
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## **4. PRECAUTION RELATING PRODUCT HANDLING**

### **4.1 SAFETY**

- 4.1.1** If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.
- 4.1.2** If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

### **4.2 HANDLING**

- 4.2.1** Avoid any strong mechanical shock which can break the glass.
- 4.2.2** Avoid static electricity which can damage the CMOS LSI—When working with the module, be sure to ground your body and any electrical equipment you may be using.
- 4.2.3** Do not remove the panel or frame from the module.
- 4.2.4** The polarizing plate of the display is very fragile. So , please handle it very carefully, Do not touch, push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)
- 4.2.5** Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the Surface of plate.
- 4.2.6** Do not touch the display area with bare hands , this will stain the display area.
- 4.2.7** Do not use ketonic solvent & aromatic solvent. Use with a soft cloth soaked with A cleaning naphtha solvent.
- 4.2.8** To control temperature and time of soldering is  $280 \pm 10^{\circ}\text{C}$  and 3-5 sec.
- 4.2.9** To avoid liquid (include organic solvent) stained on LCM.

### **4.3 STORAGE**

- 4.3.1** Store the panel or module in a dark place where the temperature is  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$  and the humidity is below 65% RH.
- 4.3.2** Do not place the module near organics solvents or corrosive gases.
- 4.3.3** Do not crush, shake , or jolt the module.