

# 深圳市正晶浩电子有限公司

SHEN ZHEN ZHENG JING HAO ELECTRONICS CO.,LTD.

网址: [www.zjhlcd.com](http://www.zjhlcd.com) 电话: 0755-29355801, 133-9284-8764

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## 4.0 inch LCD TFT

(4.0 英寸真彩色液晶显示屏)

## 320RGBx480 Resolution and 65K color

(320x480 分辨率, 6万5千种色)

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## 1. General Description 基本描述

MODEL NO 产品型号	Z400IT005
Display Mode 显示模式	Transmissive 全透
Display Format 显示格式	Graphic 320RGB*480 Dot-matrix 320xRGBx480 图形点阵
Input Data 显示屏接口类型	3 Line-SPI/4 Line-SPI/8bit/16bit interface 3线-SPI 串口/4线-SPI 串口/ 8位并口/16位并口
Viewing Direction 视角方向	12 o'clock 12点钟
Drive 显示屏驱动芯片	<b>ILI9488</b>

## 2. Mechanical Specification 机械规格

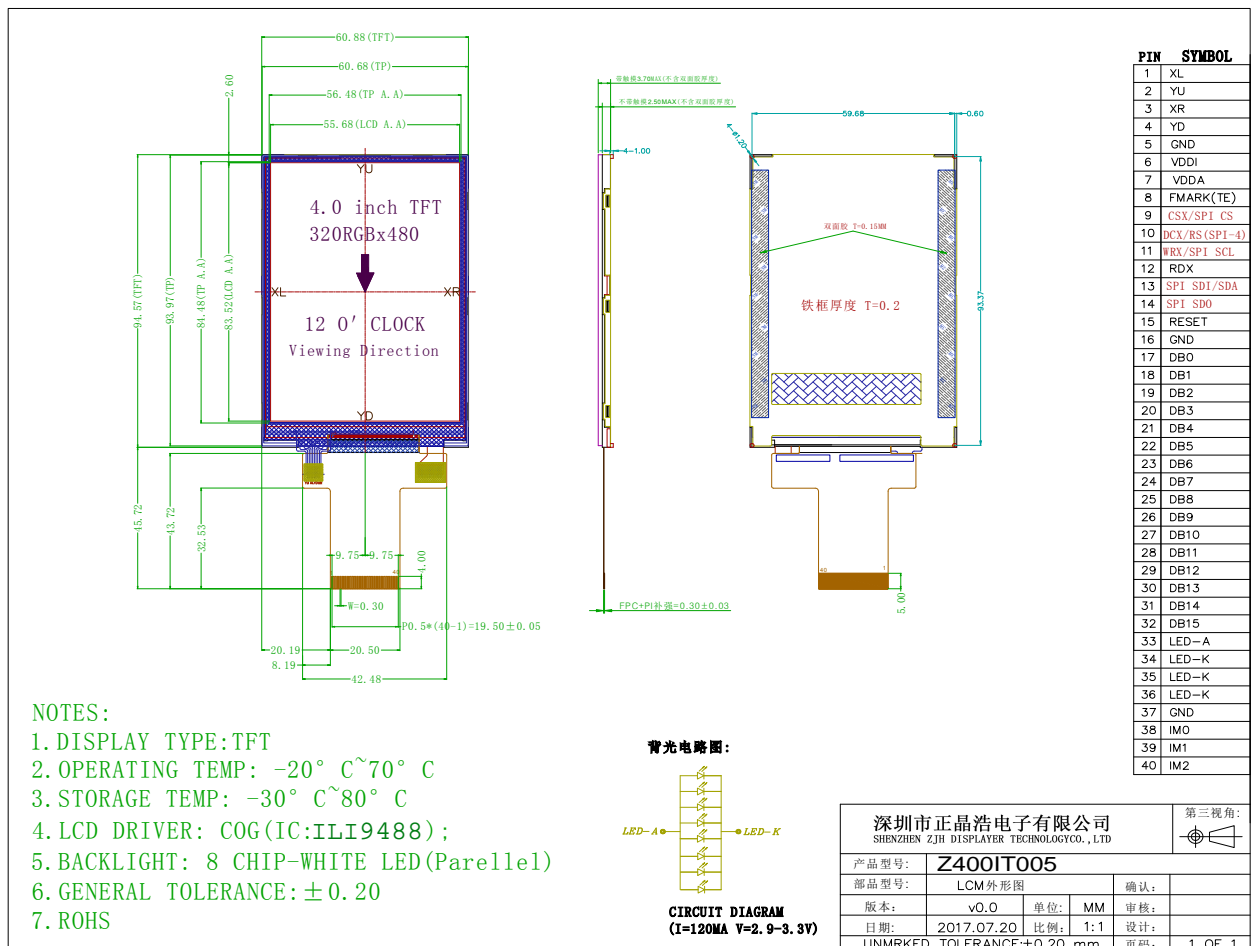
Item	Specifications	Unit
Dimensional outline 显示屏外围尺寸	60.88(W)*94.57(H)*2.50(T) (不带触摸) 60.88(W)*94.57(H)*3.70(T) (带触摸) (FPC not include)	mm
Resolution 分辨率	320RGB*480	dots
LCD Active area 显示尺寸	55.68(W)*83.52 (H)	mm
Pixel size 像素尺寸	0.174(W)*0.174(H)	mm

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## 3.Mechanical Dimension 机械尺寸图



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## 4. Electrical Maximum Ratings 电气极限

Item 项目	Symbol 符号	Min 最小值	Max 最大值	Unit 单位	Note 备注
Supply voltage (VDDI) 工作电压(VDDI)	V	1.8	3.3	V	-
Supply voltage (VDDA) 工作电压(VDD)	V	2.8	3.3	V	-
Operating temperature 工 作温度范围	T <sub>OPR</sub>	-20	70	℃	-
Storage temperature 存储温度范围	T <sub>STR</sub>	-30	80	℃	-

※NOTE: VDDI 和 VDDA 可以直接连一起, 共用一组 (2.8V~3.3V) 电压供电。

## 5. Brightness characteristic&Power dissipation 亮度特性&功耗

Item 项目	Symbol 符号	Min 最小值	Typical 典型值	Max 最大值	Unit
LED module Forward voltage LED 背光源正向电压	V <sub>LED</sub>	2.9	3.1	3.3	V
LED module current LED 背光源电流	I <sub>LED</sub>	-	108	-	mA
LCD Surface Luminance 显示屏表面亮度	L <sub>S</sub>	280	300	-	Cd/m <sup>2</sup>
LCM Surface brightness uniform LED 背光源均匀度	L <sub>D</sub>	80	-	-	%
LCD power dissipation 显示屏总功耗	P <sub>LCD</sub>	-	0.45	-	W

※NOTE:  $P_{LCD} = VDD * (I_{LED} + I_{LCD})$

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## 6. Module Function Description 显示屏脚位定义

PIN No. 引脚序号	Symbol 引脚名称	Description 作用描述	Notes 备注
1	<b>XL</b>	Touch panel Logical foot (四线电阻触摸屏逻辑脚)	-
2	<b>YU</b>	Touch panel Logical foot (四线电阻触摸屏逻辑脚)	-
3	<b>XR</b>	Touch panel Logical foot (四线电阻触摸屏逻辑脚)	-
4	<b>YD</b>	Touch panel Logical foot (四线电阻触摸屏逻辑脚)	-
5	<b>GND</b>	Ground (接地脚)	-
6	<b>VDDI</b>	Power Supply for I/O System. (显示屏 I/O 口电源供电脚 1.8-3.3V)	-
7	<b>VDDA</b>	Power Supply for Analog, Digital System and Booster Circuit. (显示屏主电源供电脚 2.8-3.3V)	-
8	<b>FMARK(TE)</b>	Tearing effect signal is used to synchronize MCU to frame memory(帧同步调节, 一般用于摄像头同步调节, 不用时悬空)	-
9	<b>CSX/SPI CS</b>	-Chip selection pin Low enable. High disable. (显示屏驱动芯片选脚, 低电平使能)	-
10	<b>DCX/RS(SPI-4)</b>	-Display data/command selection pin in MCU interface. (MCU 接口的数据/指令选择选择脚) DCX=' 1' : display data or parameter. (DCX=1:选择显示数据或参数寄存器) DCX=' 0' : command data (DCX=0:选择指令寄存器)	-
11	<b>WRX/SPI SCL</b>	- Write enable in MCU parallel interface. (在并口模式下, 用作并口的写使能信号) - In SPI mode, this pin is used as SCL. (在串口模式下, 用作 SPI 的时钟脚)	<b>复用脚</b>

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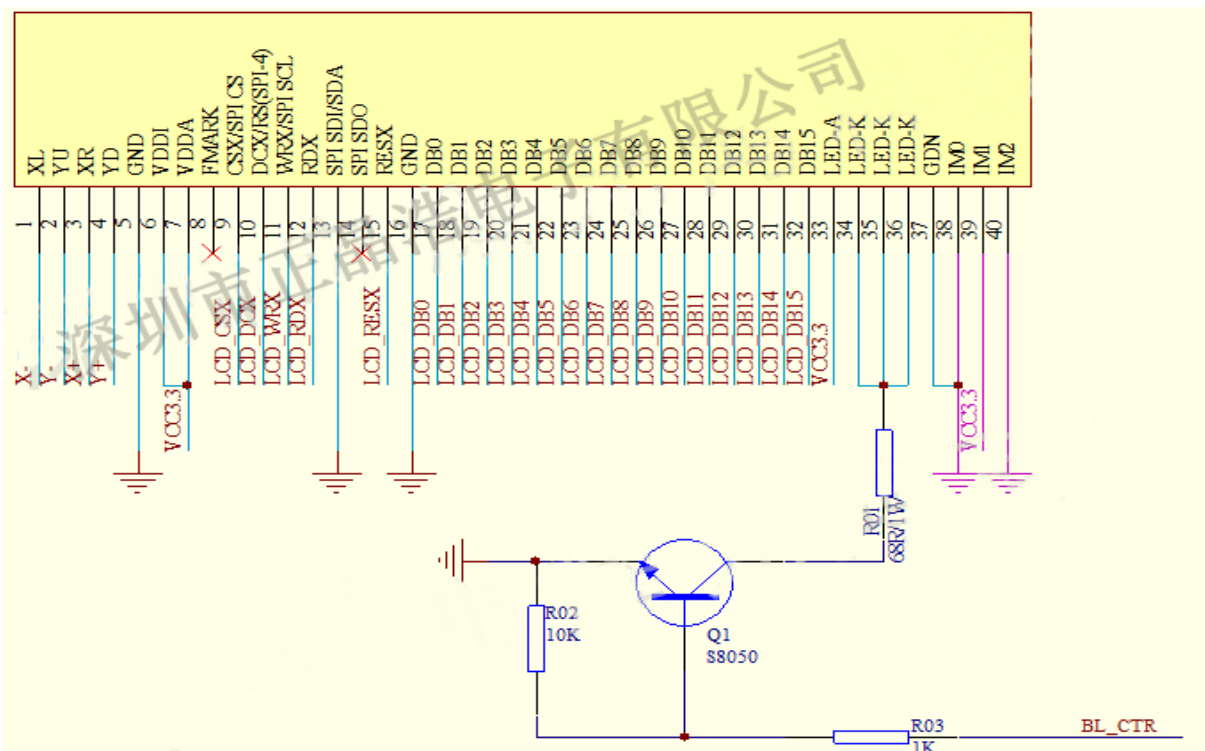
12	<b>RDX</b>	-Read enable in 8080 MCU parallel interface. -If not used, please fix this pin at VDDI or GND. (并口的读使能信号, 不需要用时接 VDDI 或 GND)	-																									
13	<b>SPI SDI/SDA</b>	- SPI interface input pin. - The data is latched on the rising edge of the SCL signal. - If not used, please fix this pin at VDDI or DGND level. (SPI 数据输入, 不用时接 VDDI 或 GND)	-																									
14	<b>SPI SDO</b>	-SPI interface output pin. -The data is output on the falling edge of the SCL signal. -If not used, let this pin open. (SPI 数据输出, 不用时悬空)	-																									
15	<b>RESET</b>	-This signal will reset the device and it must be applied to properly initialize the chip. -Signal is active low. (显示屏复位脚, 低电平有效)	-																									
16	<b>GND</b>	Ground (接地脚)	-																									
17-24	<b>DB0-DB7</b>	MCU parallel interface data bus. (MCU 低 8 位并联接口数据线)	-																									
25-32	<b>DB8-DB15</b>	MCU parallel interface data bus. (MCU 高 8 位并联接口数据线)	-																									
33	<b>LED-A</b>	Anode of Backlight (2.9V-3.3V Typical:3.1V) (背光正极供电脚, 电压范围:2.9-3.3V, 典型值:3.1V)	-																									
34-36	<b>LED-K</b>	Cathode of Backlight (背光负极供电脚)	-																									
37	<b>GND</b>	Ground (接地脚)	-																									
38	<b>IM0</b>	-The MCU interface mode select. (MCU 接口模式选择脚)	-																									
39	<b>IM1</b>	<table border="1"> <thead> <tr> <th>IM2</th> <th>IM1</th> <th>IM0</th> <th>MCU interfac Mode</th> <th>Data pin</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1</td> <td>0</td> <td>80-16bit parallel I/F</td> <td>DB15-DB0</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>80-8bit parallel I/F</td> <td>DB7-DB0</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>3-line 9bit serial I/F</td> <td>SDA:in SDO:out</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>4-line 8bit serial I/F</td> <td>SDA:in SDO:out</td> </tr> </tbody> </table>	IM2	IM1	IM0	MCU interfac Mode	Data pin	0	1	0	80-16bit parallel I/F	DB15-DB0	0	1	1	80-8bit parallel I/F	DB7-DB0	1	0	1	3-line 9bit serial I/F	SDA:in SDO:out	1	1	1	4-line 8bit serial I/F	SDA:in SDO:out	-
IM2	IM1	IM0	MCU interfac Mode	Data pin																								
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40	<b>IM2</b>		-																									

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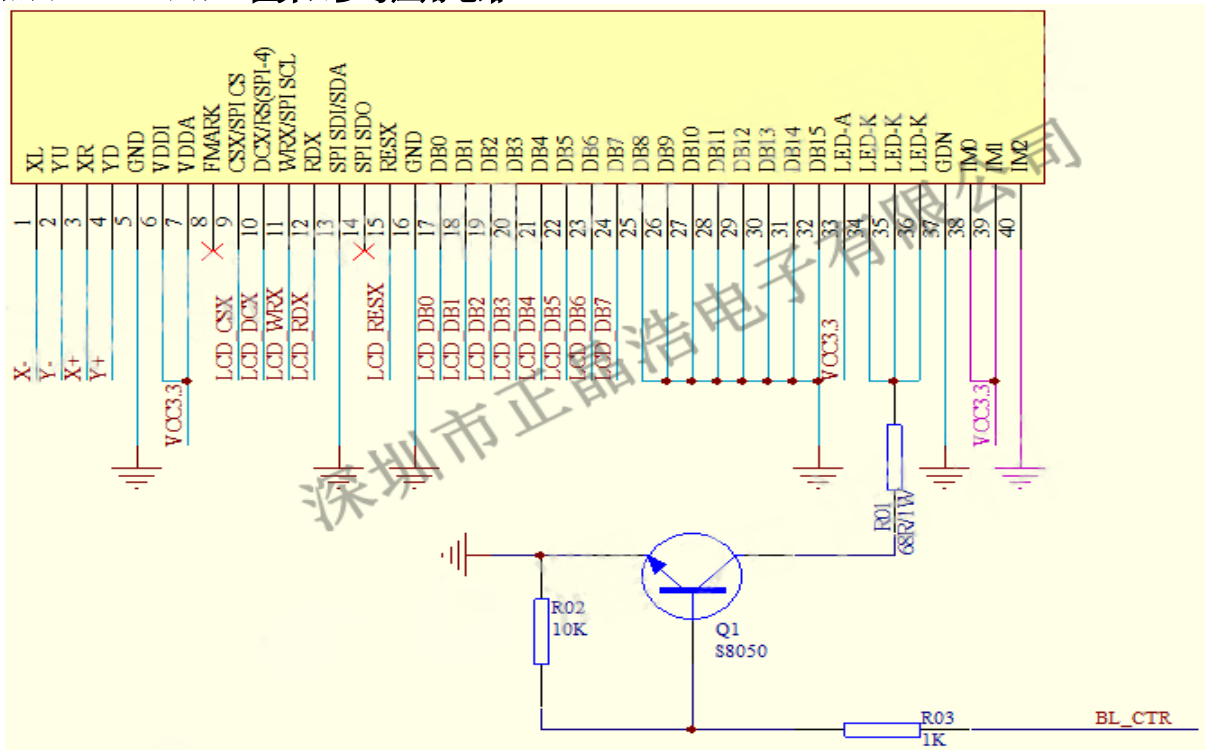
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附图 6-1: 显示屏 16 位并口参考应用电路



附图 6-2: 显示屏 8 位并口参考应用电路



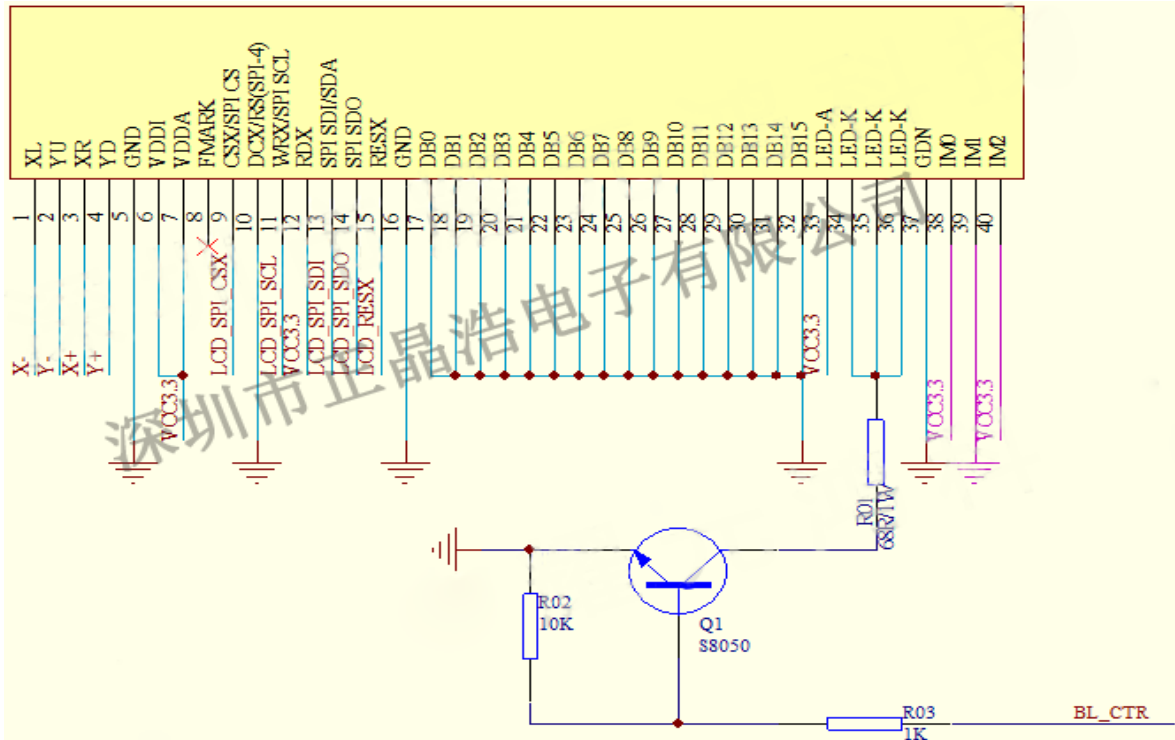


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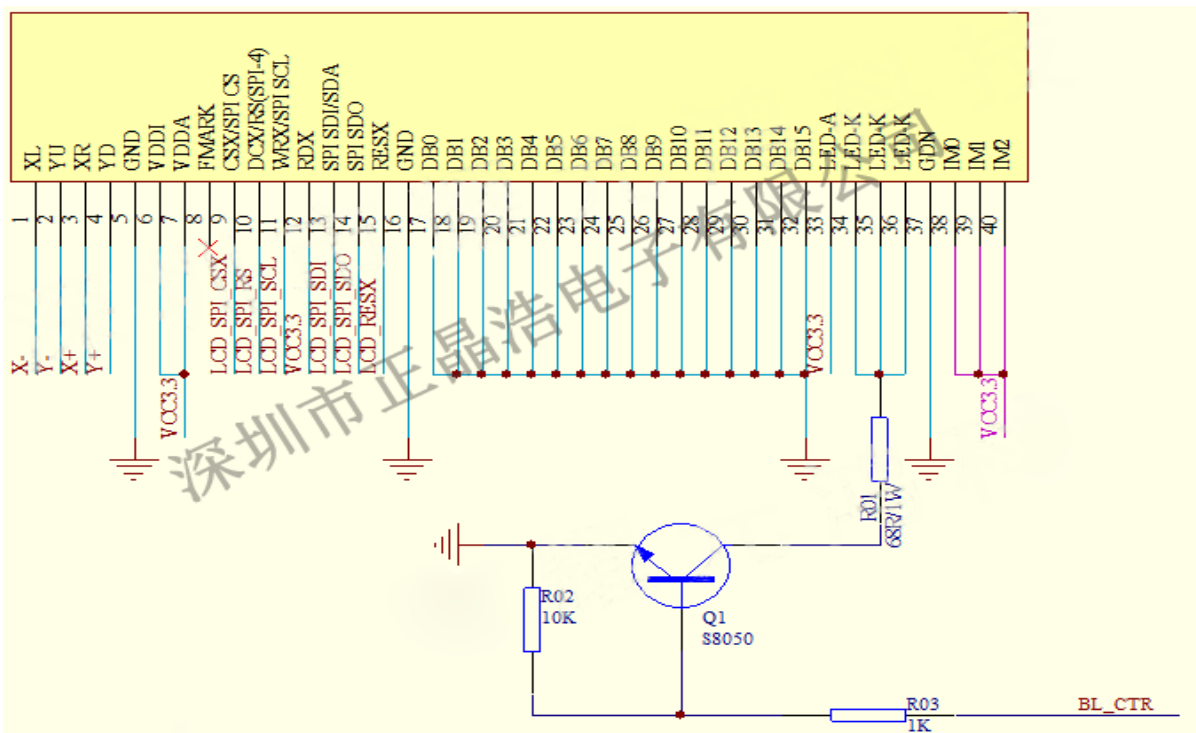
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附图 6-3: 显示屏 3 线-SPI 串口参考应用电路



附图 6-4: 显示屏 4 线-SPI 串口参考应用电路

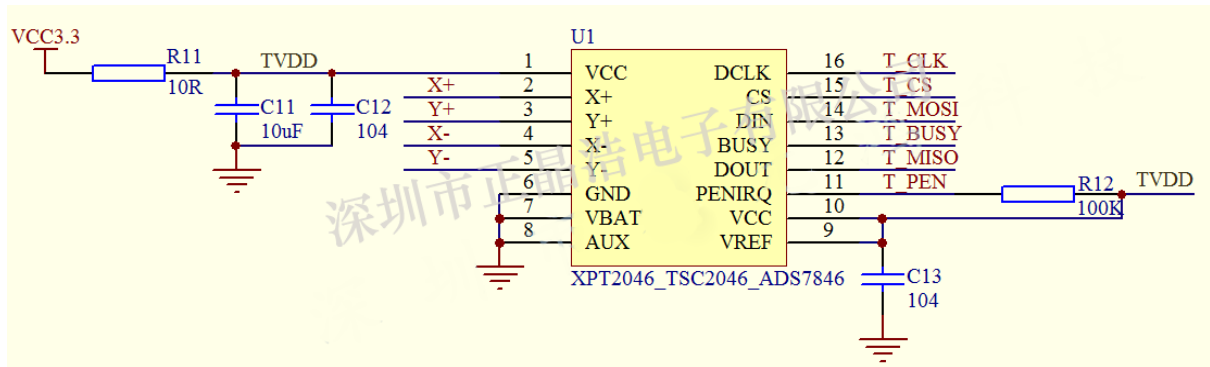


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附图 6-5: 触摸屏参考应用电路



※NOTE:

- 1.若为不带触摸版本, 参考附图 6-1、附图 6-2、附图 6-3 或附图 6-4 连接电路, 把显示屏的 XL、YU、XR、YD 四个触摸脚悬空即可。
- 2.若为带触摸版本, 参考附图 6-5 触摸应用连接电路。

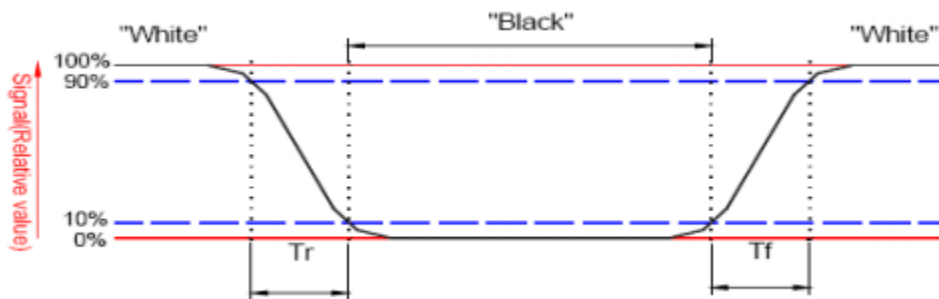
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## 7.Response time&Contrast ratio 响应时间与对比度

Item 项目	Symbol 符号	Condition 条件	Remark			Unit 单位
			Min. 最小值	Typ. 典型值	Max. 最大值	
Response time 响应时间	Tr+Tf	$\theta = 0^\circ$	-	20	40	ms
Contrast ratio 对比度	CR	$\theta = 0^\circ$	-	500	-	-



响应时间图示

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "white" state}}{\text{Brightness on the "black" state}}$$

对比度计算公式

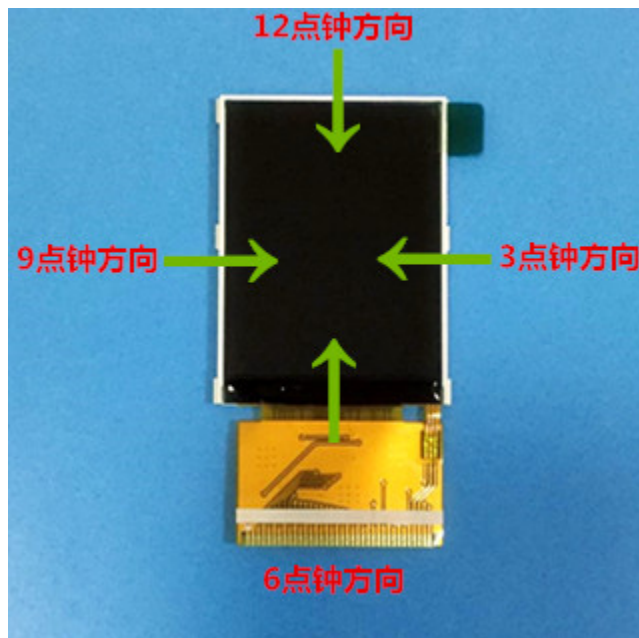
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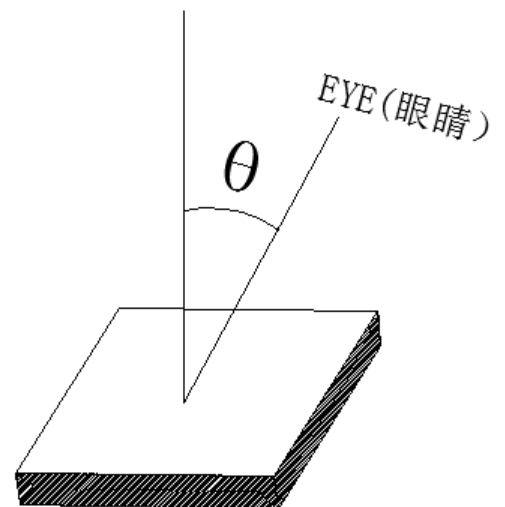
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## 8.Viewing Angle 视角宽度

Item 项目	Symbol 符号	Condition 条件	Remark			Unit 单位
			Min. 最小值	Typ. 典型值	Max. 最大值	
Viewing angle 视角宽度	Top 12点钟方向	$CR \geq 10$ 对比度大于等于 10	50	60	-	Deg. 度
	Bottom 6点钟方向	$CR \geq 10$ 对比度大于等于 10	50	60	-	
	Left 9点钟方向	$CR \geq 10$ 对比度大于等于 10	60	70	-	
	Right 3点钟方向	$CR \geq 10$ 对比度大于等于 10	60	70	-	



垂直于屏表面



NOTE:3点,6点,9点,12点方向视角的大小指的是垂直于屏表面的线眼睛视线之间的夹角。

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## 9. Reliability Trial 可靠性实验

NO. 序号	ITEM 实验项目	CONDITION 实验环境	CRITERION 实验规范
1	High Temperature Non-Operating Test 高温存储实验	80°C*120Hrs	No Defect Of Operational Function In Room Temperature Are Allowable 室温运行功能无缺陷
2	Low Temperature Non-Operating Test 低温存储实验	-30°C*120Hrs	
3	High Temperature/Humidity Non Operating Test 高温高湿实验	60°C*90%RH*120Hrs	
4	High Temperature Operating Test 高温工作实验	70°C*72Hrs	
5	Low Temperature Operating Test 低温工作实验	-20°C*72Hrs	
6	Thermal Shock Test 热冲实验	-20 °C (30Min) v 70 °C (30Min) *10CYCLES	

## 10. Inspection standards 检验标准

### 10.1 Glass defect

NO	Defect item	Criteria	Remark
1	Dimension Unconformity (Major defect)	By Engineering Drawing	
2	Cracks (Major defect)	1. Linear cracks panel 【Reject】 2. Nonlinear crack contrast by limited sample	
3	Glass extrude the conductive area (minor defect)	a: disregards and no influence assemblage. 1) $b \leq 1/3$ Pin width (non bonding area) 【Accept】 2) bonding area $\leq 0.5$ mm 【Accept】	A: Length, b: Width
4	Pin-side ,conductive area damaged (minor defect)	(a c: disregards) $b \leq 1/3$ of effective length for bonding electrode 【Accept】	a: length, b: Width, c: Thickness
5	Pin-side, non-conductive area damaged	1) Damage area don't touch the ITO (Including contraposition mark,	a: Length, b: Width c: Thickness

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	(minor defect)	except scribing mark) <p style="text-align: right;">【Accept】</p> 2)C<T b ≅ BM1/3of width <p style="text-align: right;">【Accept】</p> 3)c=T b not touch the seal glue <p style="text-align: right;">【Accept】</p> 4)a disregards	
6	Non-pin-side damage (minor defect)	c<T 1)b exceeds 1/3Bm <p style="text-align: right;">【Reject】</p> c=T b not touch the seal glue <p style="text-align: right;">【Reject】</p>	c: Thickness b: width of  damage

## 10.2LCD appearance defect(View area)

NO	Defect item	Criteria		Remark
		Specification	Allowable	
1	Fiber、 glass cratch、 polarizer scratch/folded (minor defect)	$W \leq 0.03\text{mm}$	disregard	note1:L: Length, W: Width note2: disregard if out of AA
		$0.03\text{mm} < W \leq 0.05\text{mm};$ $L \leq 3.0\text{mm}$	2	
		$0.05\text{mm} < W \leq 0.1\text{mm};$ $L \leq 3.0\text{mm}$	1	
		$W > 0.1\text{mm}; L > 3.0\text{mm}$	0	
2	Polarizer bubble、 concave and convex (minor defect)	$\phi \leq 0.2\text{mm}$	disregard	note1: $\phi = (L+W)/2$ , L:Length, W :Width note2:disregard if out of AA
		$0.2\text{mm} < \phi \leq 0.3\text{mm}$	2	
		$0.3\text{mm} < \phi \leq 0.5\text{mm}$	1	
		$0.5\text{mm} < \phi$	0	
3	Black dots、 dirty dots、 impurities、 eye winker (minor defect)	$\phi \leq 0.15\text{mm}$	disregard	note2:disregard if out of AA
		$0.15\text{mm} < \phi \leq 0.25\text{mm}$	2	
		$0.25\text{mm} < \phi \leq 0.3\text{mm}$	1	
		$0.3\text{mm} < \phi$	0	
4	Polarizer prick (minor defect)	$\phi \leq 0.1\text{mm}$	disregard	note1: $\phi = (L+W)/2$ , L=Length, W=Width note2:the distance between two dots>5mm
		$0.1\text{mm} < \phi \leq 0.25\text{mm}$	3	
		$\phi > 0.25\text{mm}$	0	

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## 11.Package Method 包装方法

显示屏出货包装示意图:

