

2.4 inch LCD TFT

(2.4 英寸真彩色液晶显示屏)

240RGBx320 Resolution and 65K color

(240x320 分辨率, 6 万 5 千种色)

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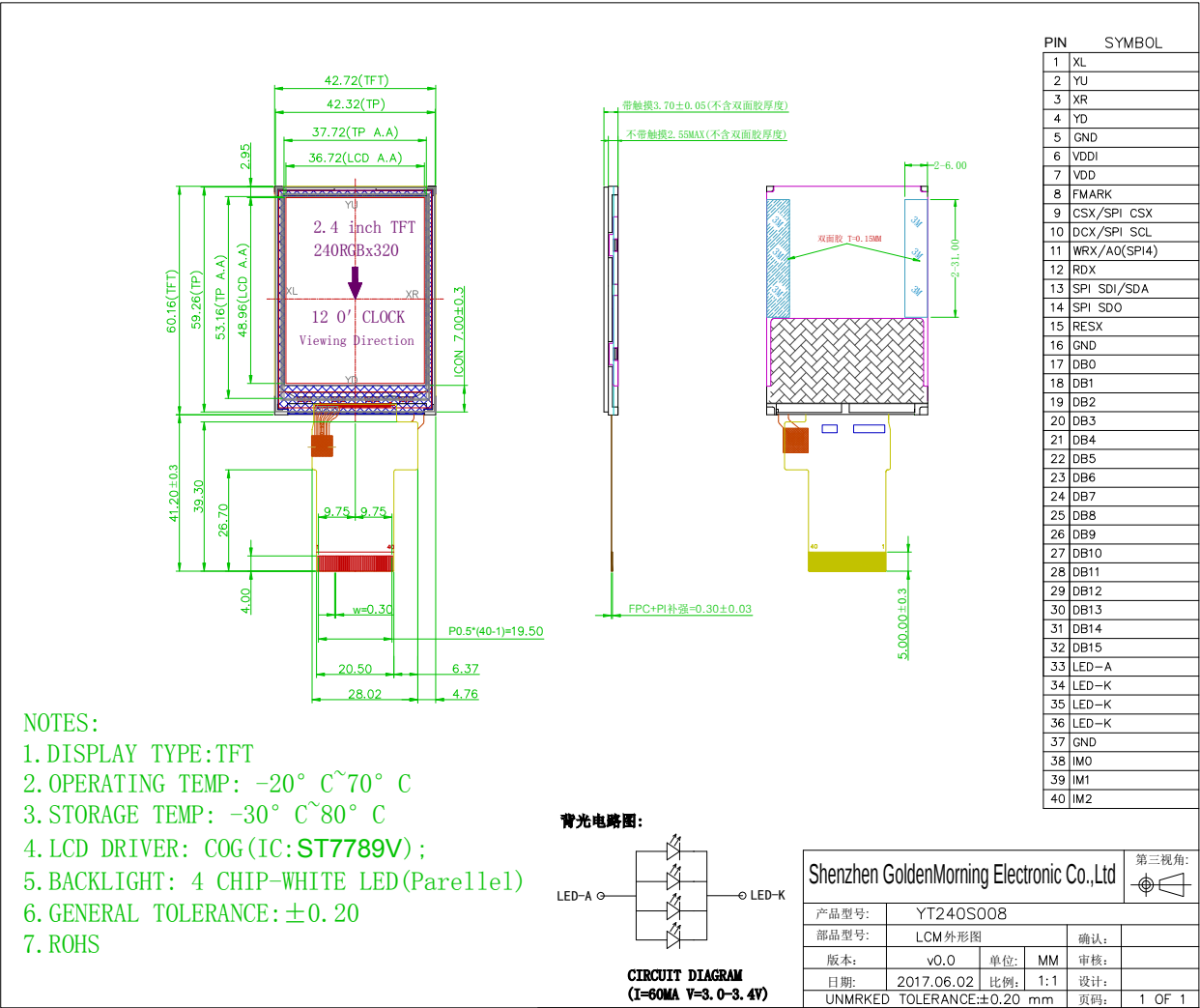
1.General Description 基本描述

MODEL NO 产品型号	GMT024-04T
Display Mode 显示模式	Transmissive 全透
Display Format 显示格式	Graphic 240RGB*320 Dot-matrix 240xRGBx320 图形点阵
Input Data 显示屏接口类型	4 Line-SPI/8bit/16bit interface 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	ST7789V (台湾矽创)

2. Mechanical Specification 机械规格

Item	Specifications	Unit
Dimensional outline 显示屏外围尺寸	42.72(W)*60.16(H)*2.55(T) (不带触摸) 42.72(W)*60.16(H)*3.70(T) (带触摸) (FPC not include)	mm
Resolution 分辨率	240RGB*320	dots
LCD Active area 显示尺寸	36.72(W)*48.96 (H)	mm
Pixel size 像素尺寸	0.153(W)*0.153(H)	mm

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 (VDD) 工作电压(VDD)	V	2.8	3.3	V	-
Operating temperature 工 作温度范围	T _{OPR}	-20	70	℃	-
Storage temperature 存储温度范围	T _{STR}	-30	80	℃	-

※NOTE: VDDI 和 VDD 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 _{LED}	2.9	3.1	3.3	V
LED module current LED 背光源电流	I _{LED}	-	60	-	mA
LCD Surface Luminance 显示屏表面亮度	L _S	250	300	-	Cd/m ²
LCM Surface brightness uniform LED 背光源均匀度	L _D	80	-	-	%
LCD power dissipation 显示屏总功耗	P _{LCD}	-	0.22	-	W

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

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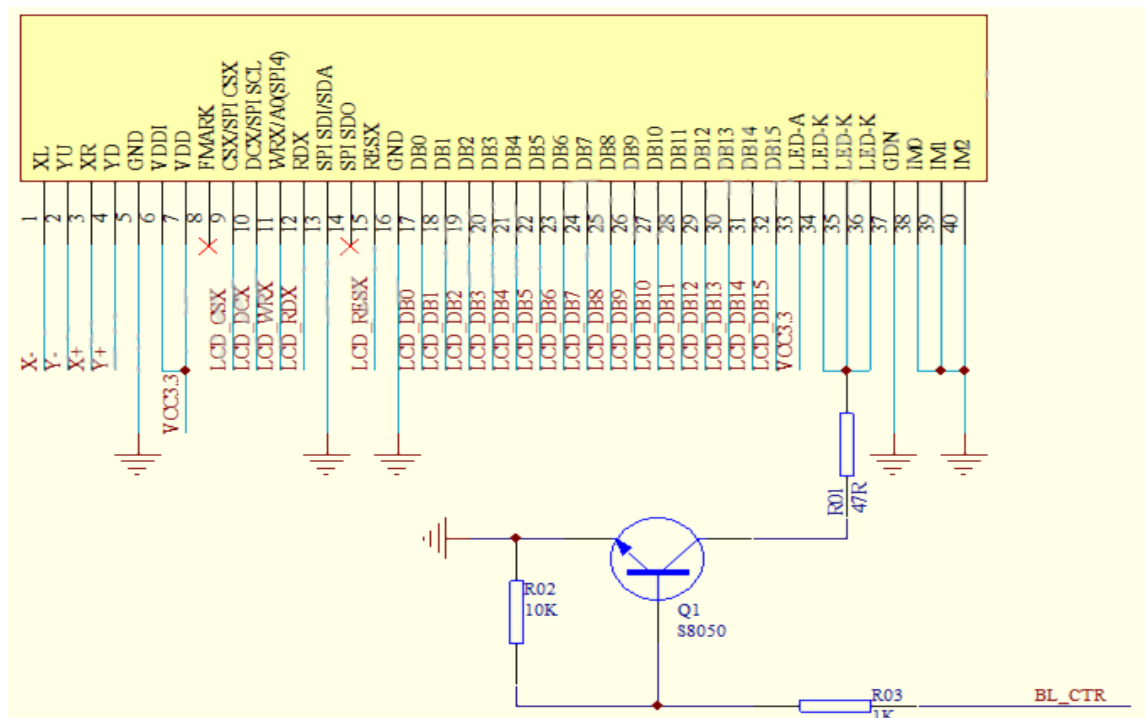
6. Module Function Description 显示屏脚位定义

PIN No. 引脚序号	Symbol 引脚名称	Description 作用描述	Notes 备注
1	XL	Touch panel Logical foot (四线电阻触摸屏逻辑脚)	-
2	YU	Touch panel Logical foot (四线电阻触摸屏逻辑脚)	-
3	XR	Touch panel Logical foot (四线电阻触摸屏逻辑脚)	-
4	YD	Touch panel Logical foot (四线电阻触摸屏逻辑脚)	-
5	GND	Ground (接地脚)	-
6	VDDI	Power Supply for I/O System. (显示屏 I/O 口电源供电脚 1.8-3.3V)	-
7	VDD	Power Supply for Analog, Digital System and Booster Circuit. (显示屏主电源供电脚 2.8-3.3V)	-
8	FMARK	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	CSX/SPI CSX	-Chip selection pin Low enable. High disable. (显示屏驱动芯片选脚, 低电平使能)	-
10	DCX/SPI SCL	-Display data/command selection pin in parallel interface. (在并口模式下, 用作并联接口的数据/指令选择选择脚) -This pin is used to be serial interface clock. (在串口模式下, 用作 4 线-SPI 串口时钟)	复用脚
11	WRX/A0(SPI4)	-Write enable in MCU parallel interface. (在并口模式下, 用作并口的写使能信号) - Display data/command selection pin in 4-line serial interface. (在串口模式下, 用作 4 线-SPI 数据/指令选择选择脚)	复用脚

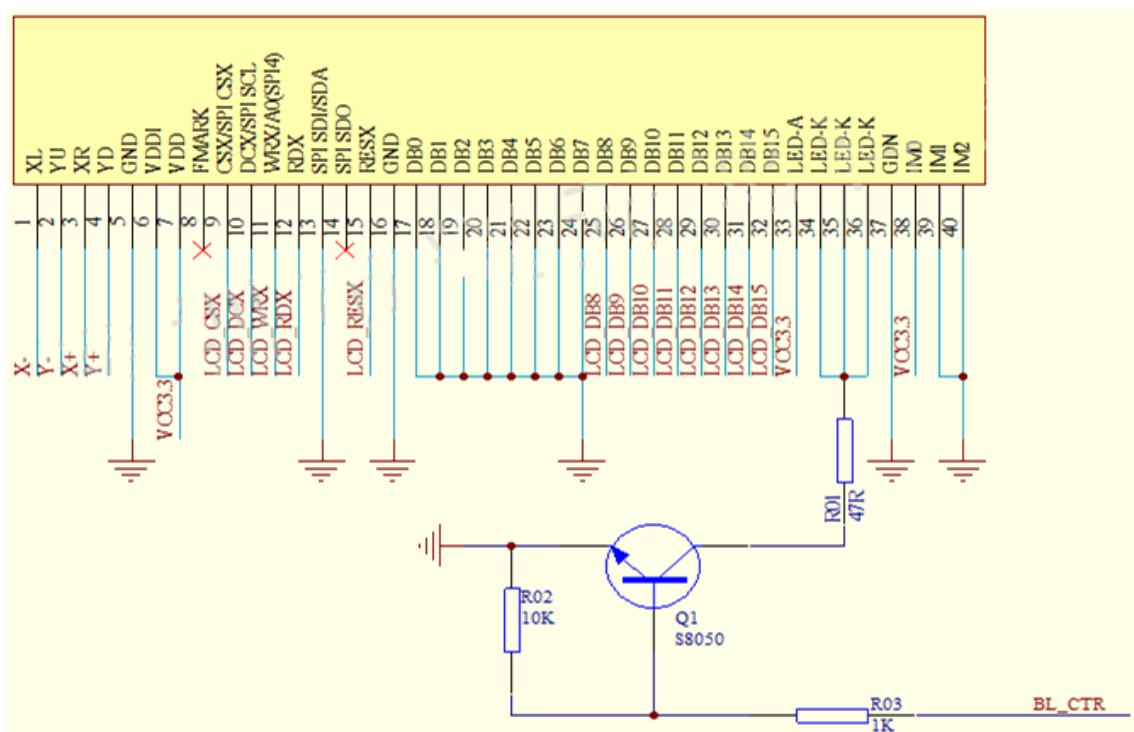
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12	RDX	-Read enable in 8080 MCU parallel interface. -If not used, please fix this pin at VDDI or GND. (并口的读使能信号，不需要用时接 VDDI 或 GND)	-																				
13	SPI SDI/SDA	SPI interface input pin. -The data is latched on the rising edge of the SCL signal. -If not used, please fix this pin at VDDI or DGND level. (4 线-SPI 数据输入，不用时接 VDDI 或 GND)	-																				
14	SPI SDO	-SPI interface output pin. -The data is output on the falling edge of the SCL signal. -If not used, let this pin open. (4 线-SPI 数据输出，不用时悬空)	-																				
15	RESX	-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	GND	Ground (接地脚)	-																				
17-24	DB0-DB7	MCU parallel interface data bus. (MCU 低 8 位并联接口数据线)	-																				
25-32	DB8-DB15	MCU parallel interface data bus. (MCU 高 8 位并联接口数据线)	-																				
33	LED-A	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	LED-K	Cathode of Backlight (背光负极供电脚)	-																				
37	GND	Ground (接地脚)	-																				
38	IM0	-The MCU interface mode select. (MCU 接口模式选择脚)	-																				
39	IM1	<table><tr><td>IM2</td><td>IM1</td><td>IM0</td><td>MCU interfaced Mode</td><td>Data pin</td></tr><tr><td>0</td><td>0</td><td>0</td><td>80-16bit parallel I/F</td><td>DB0-DB15</td></tr><tr><td>0</td><td>0</td><td>1</td><td>80-8bit parallel I/F</td><td>D15-DB8</td></tr><tr><td>1</td><td>1</td><td>0</td><td>4-line 8bit serial I/F</td><td>SDA:in SDO:out</td></tr></table>	IM2	IM1	IM0	MCU interfaced Mode	Data pin	0	0	0	80-16bit parallel I/F	DB0-DB15	0	0	1	80-8bit parallel I/F	D15-DB8	1	1	0	4-line 8bit serial I/F	SDA:in SDO:out	-
IM2	IM1	IM0	MCU interfaced Mode	Data pin																			
0	0	0	80-16bit parallel I/F	DB0-DB15																			
0	0	1	80-8bit parallel I/F	D15-DB8																			
1	1	0	4-line 8bit serial I/F	SDA:in SDO:out																			
40	IM2		-																				

附图 6-1：显示屏 YT240S008_16 位并口参考应用电路

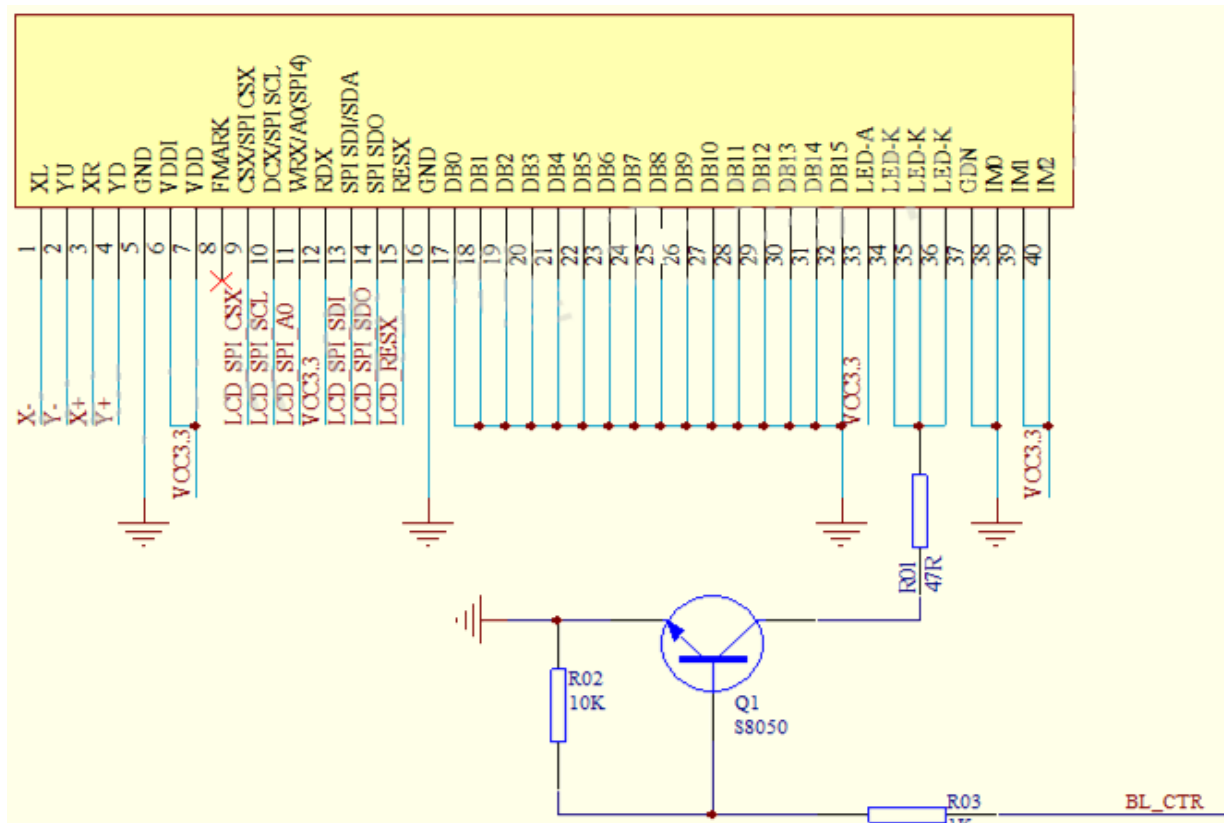


附图 6-2：显示屏 YT240S008_8 位并口参考应用电路

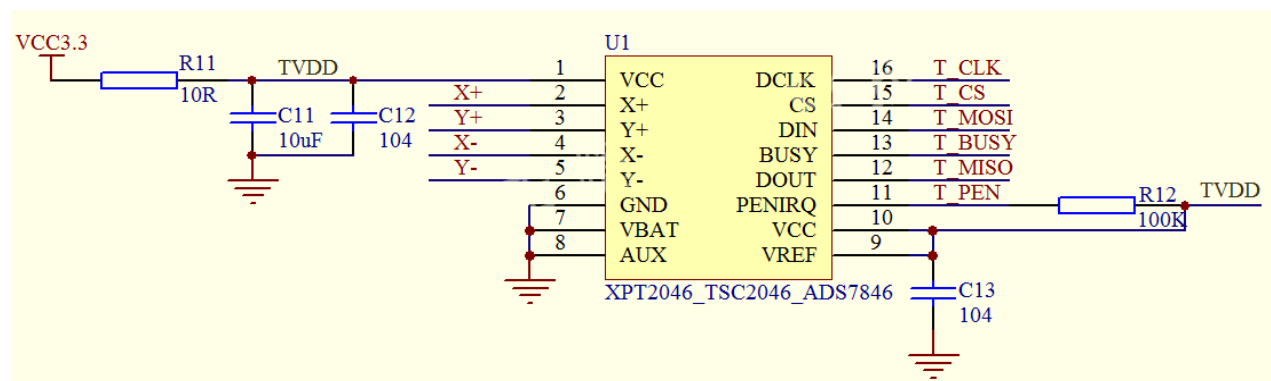


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附图 6-3: 显示屏 YT240S008_4 线-SPI 串口参考应用电路



附图 6-4: 触摸屏参考应用电路 With touch version, please refer to 6-4 application circuit diagram

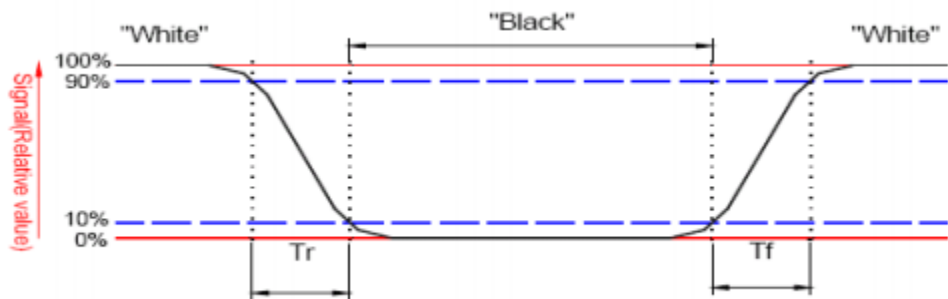


※NOTE:

- 1.若为不带触摸版本，参考附图 6-1、附图 6-2 或附图 6-3 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 6-4 触摸应用连接电路。

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	$\theta = 0^\circ$	-	25	40	ms
Contrast ratio 对比度	CR	$\theta = 0^\circ$	350	500	-	-



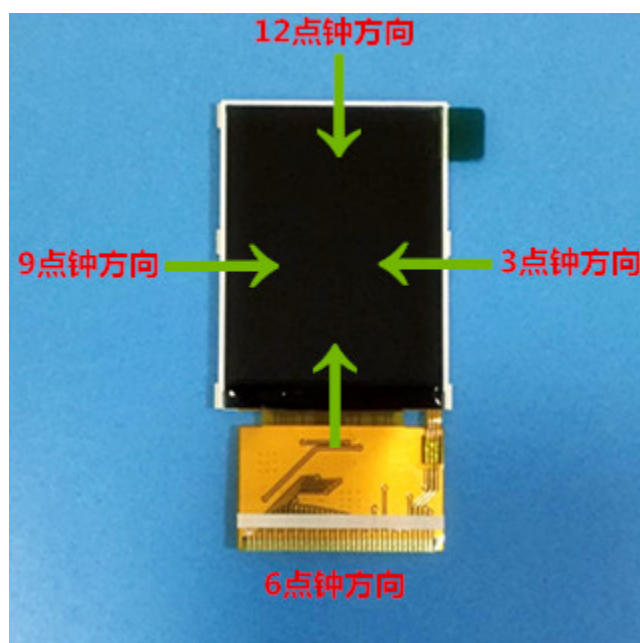
响应时间图示

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

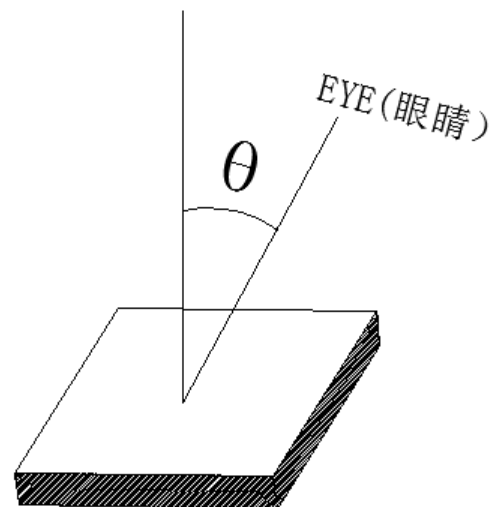
对比度计算公式

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	40	50	-	Deg. 度
	Bottom 6 点方向	$CR \geq 10$ 对比度大于等于 10	55	65	-	
	Left 9 点钟方向	$CR \geq 10$ 对比度大于等于 10	55	65	-	
	Right 3 点钟方向	$CR \geq 10$ 对比度大于等于 10	55	65	-	



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 θ 。

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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℃*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℃*120Hrs	
3	High Temperature/Humidity Non Operating Test 高温高湿实验	60℃*90%RH*120Hrs	
4	High Temperature Operating Test 高温工作实验	70℃*72Hrs	
5	Low Temperature Operating Test 低温工作实验	-20℃*72Hrs	
6	Thermal Shock Test 热冲实验	-20℃ (30Min) v 70℃ (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 ≤ 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 (Inclueing contraposition mark,	a: Length, b: Width c: Thickness

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

10.2LCD appearance defect(View area)

NO	Defect item	Criteria		Remark
1	Fiber、 glass cratch、 polarizer scratch/folded (minor defect)	Specification	Allowable	note1:L: Length, W: Width note2: disregard if out of AA
		$W \leq 0.03\text{mm}$	disregard	
		$0.03\text{mm} < W \leq 0.05\text{mm};$ $L \leq 3.0\text{mm}$	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	

11.Package Method 包装方法

显示屏出货包装示意图：

