

STP0240C2-240320 Series TFT LCD PANEL USER MANUAL

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Reference Controller Datasheet

TFT LCD Panel Selection Guide

ST7789V

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1. General Description 基本描述

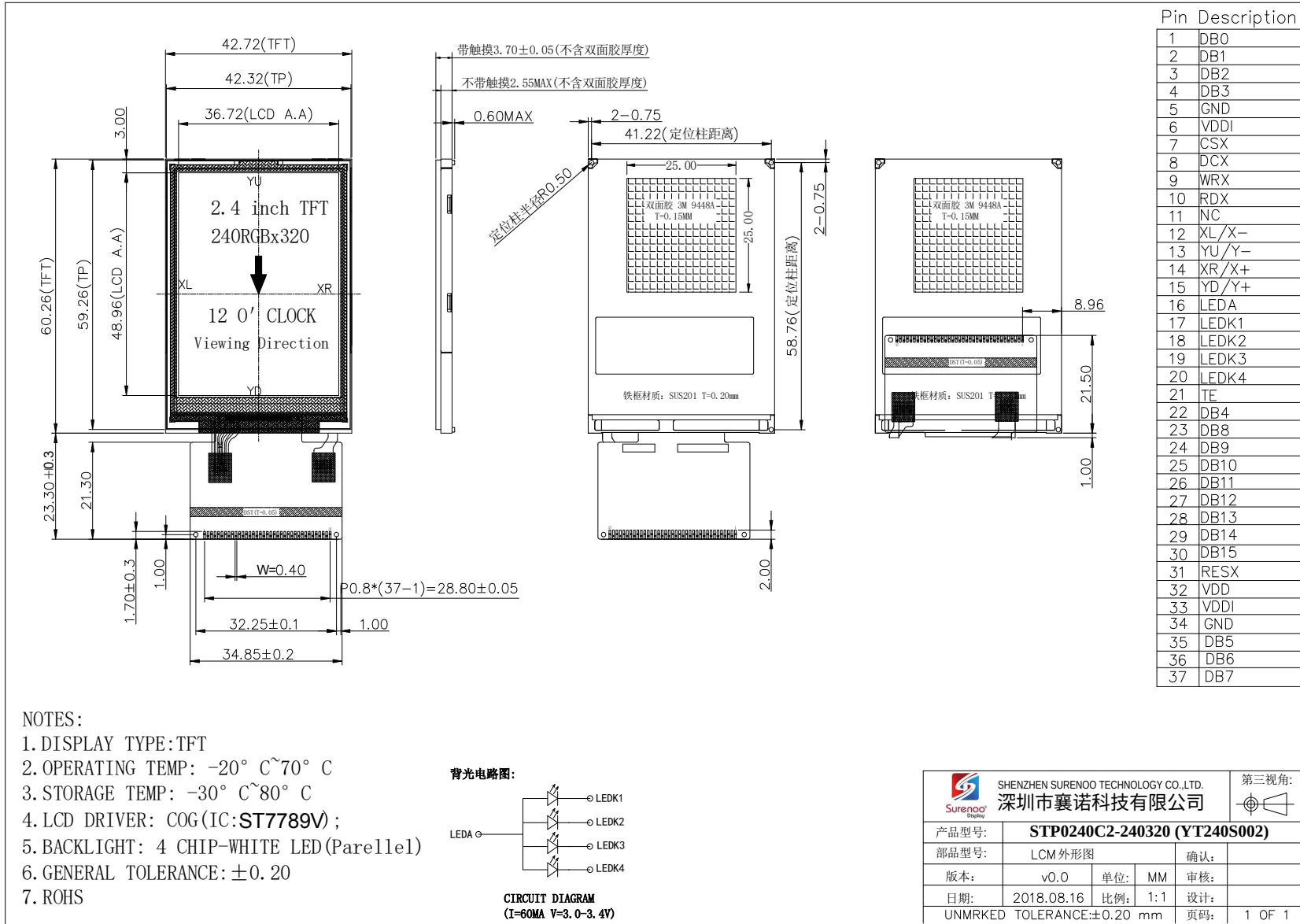
MODEL NO 产品型号	STP0240C2-240320 YT240S002
Display Mode 显示模式	Transmissive 全透
Display Format 显示格式	Graphic 240RGB*320 Dot-matrix 240xRGBx320 图形点阵
Input Data 显示屏接口类型	MCU-8bit/16bit interface MUC 8 位并口/MCU 16 位并口
Viewing Direction 视角方向	12 o'clock 12 点钟
Drive 显示屏驱动芯片	ST7789V (台湾矽创)

2. Mechanical Specification 机械规格

Item	Specifications	Unit
Dimensional outline 显示屏外围尺寸	42.72(W)*60.26(H)*2.55(T) (NTP) 42.72(W)*60.26(H)*3.75(T) (RTP) (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



NOTES:

- 1.DISPLAY TYPE:TFT
- 2.OPERATING TEMP: -20° C~70° C
- 3.STORAGE TEMP: -30° C~80° C
- 4.LCD DRIVER: COG(IC:ST7789V);
- 5.BACKLIGHT: 4 CHIP-WHITE LED(Parellel)
- 6.GENERAL TOLERANCE:±0.20
- 7.ROHS

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



6. Module Function Description 显示屏脚位定义

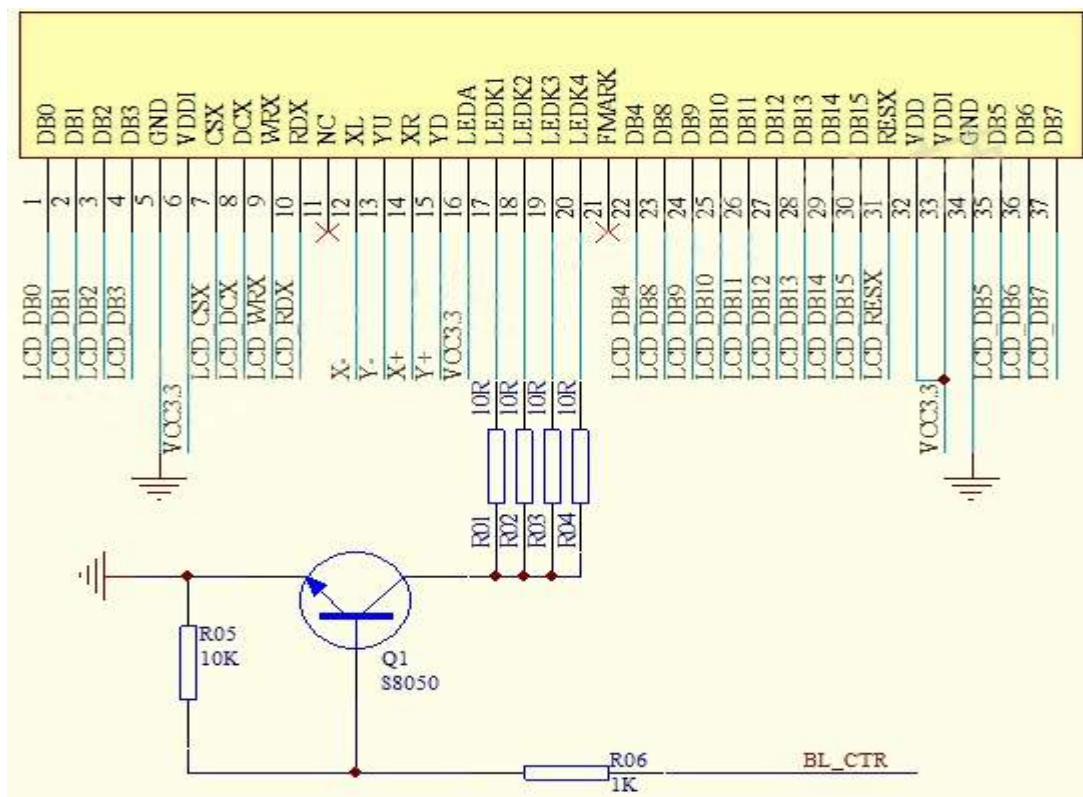
PIN No. 引脚序号	Symbol 引脚名称	Description 作用描述	Notes 备注
1-4	DB0-DB3	MCU parallel interface data bus. (MCU 并联接口数据线)	-
5	GND	Ground (接地脚)	-
6	VDDI	Power Supply for I/O System. (显示屏 I/O 口电源供电脚 1.8-3.3V)	-
7	CSX	-Chip selection pin Low enable. High disable. (显示屏驱动芯片选脚, 低电平使能)	-
8	DCX	-Display data/command selection pin in parallel interface. (并联接口显示数据或显示指令选择脚) 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)	-
9	WRX	-Write enable in MCU parallel interface. (并口的写使能信号)	-
10	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)	-
11	NC	No connection (空脚)	-
12	XL(X-)	Touch panel Logical foot (四线电阻触摸屏逻辑脚)	-
13	YU(Y-)	Touch panel Logical foot (四线电阻触摸屏逻辑脚)	-
14	XR(X+)	Touch panel Logical foot (四线电阻触摸屏逻辑脚)	-
15	YD(Y+)	Touch panel Logical foot (四线电阻触摸屏逻辑脚)	-



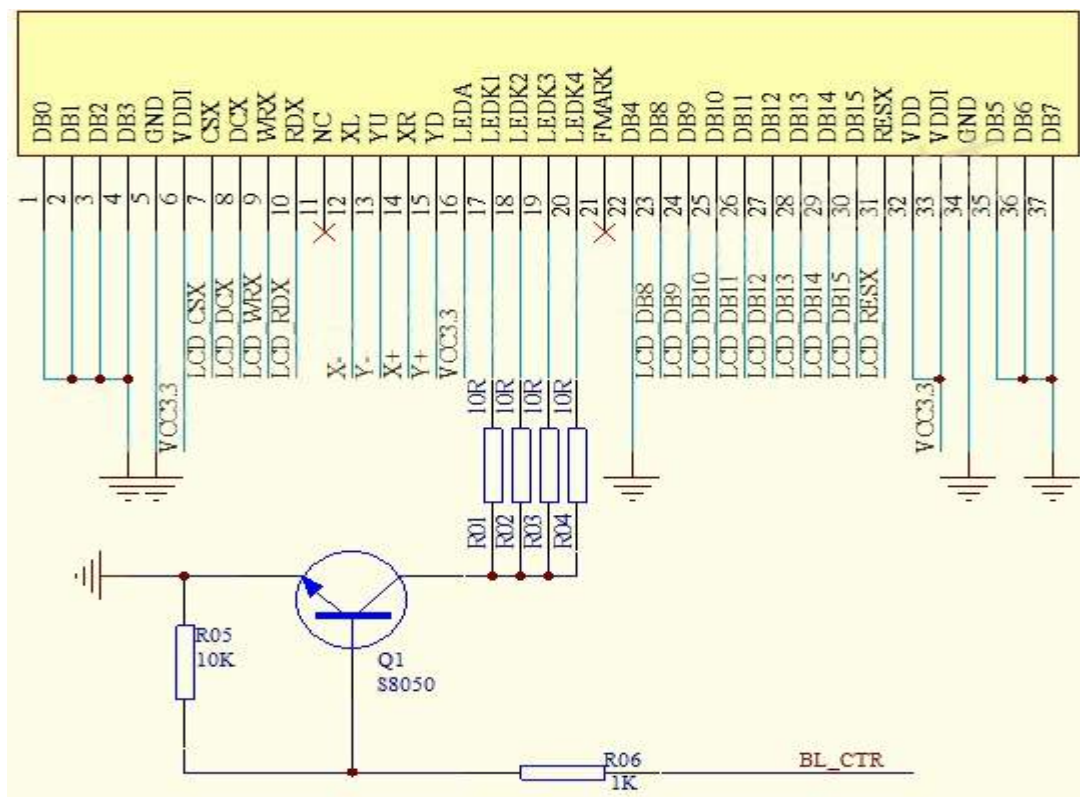
16	LEDA	Anode of Backlight (2.9V-3.3V Typical:3.1V) (背光正极供电脚, 电压范围:2.9-3.3V, 典型值:3.1V)	-
17	LEDK1	Cathode of Backlight (背光负极供电脚)	-
18	LEDK2	Cathode of Backlight (背光负极供电脚)	-
19	LEDK3	Cathode of Backlight (背光负极供电脚)	-
20	LEDK4	Cathode of Backlight (背光负极供电脚)	-
21	TE	Tearing effect signal is used to synchronize 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)	-
22	DB4	MCU parallel interface data bus. (MCU 并联接口数据线)	-
23-30	DB8-DB15	MCU parallel interface data bus. (MCU 并联接口数据线)	-
31	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)	-
32	VDD	Power Supply for Analog, Digital System and Booster Circuit. (显示屏主电源供电脚 2.8-3.3V)	-
33	VDDI	Power Supply for I/O System. (显示屏 I/O 口电源供电脚 1.8-3.3V)	-
34	GND	Ground (接地脚)	-
35-37	DB5-DB7	MCU parallel interface data bus. (MCU 并联接口数据线)	-



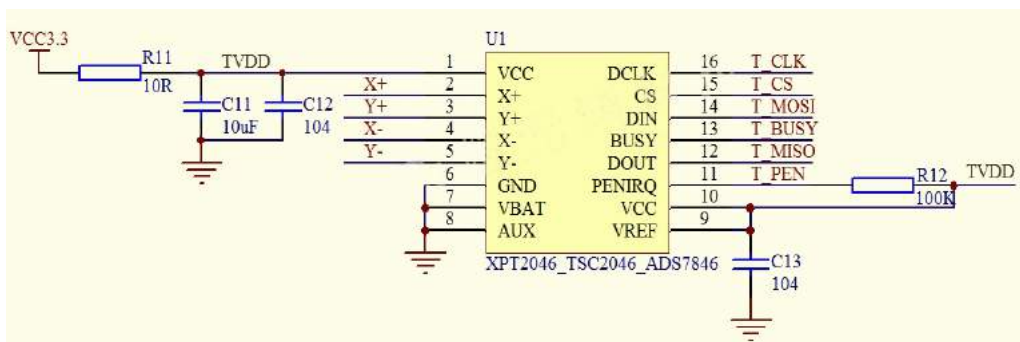
附图 6-1：显示屏 STP0240C2 MCU-8 位并口参考应用电路



附图 6-2: 显示屏 STP0240C2 MCU-8 位并口参考应用电路



附图 6-3: 触摸屏参考应用电路

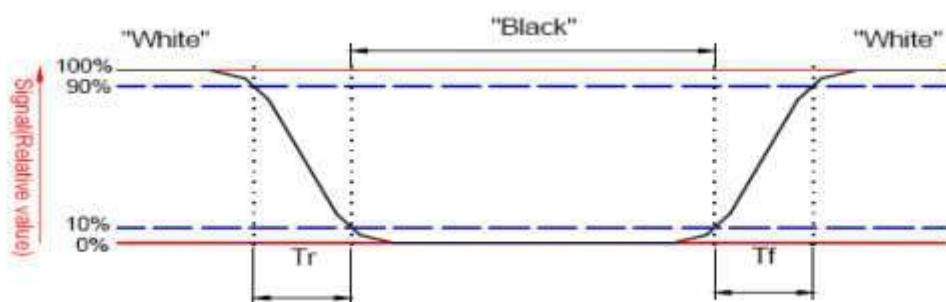


※NOTE:

- 1.若为不带触摸版本，参考附图 6-1 或附图 6-2 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 6-3 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	-	-



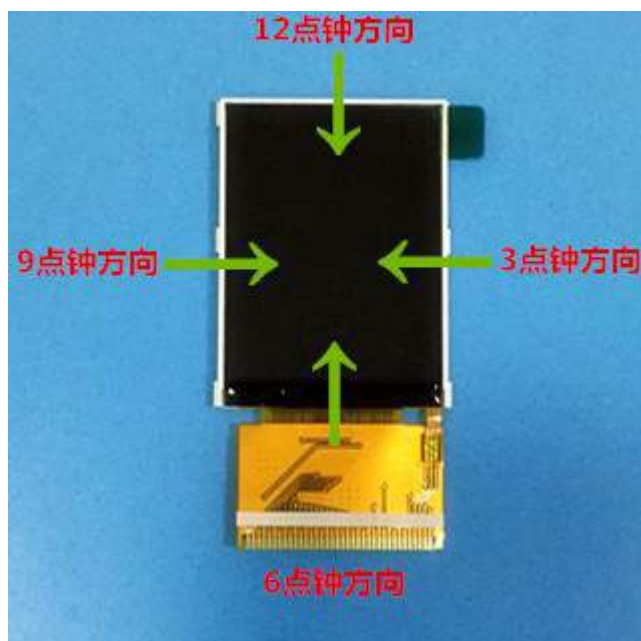
响应时间图示

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

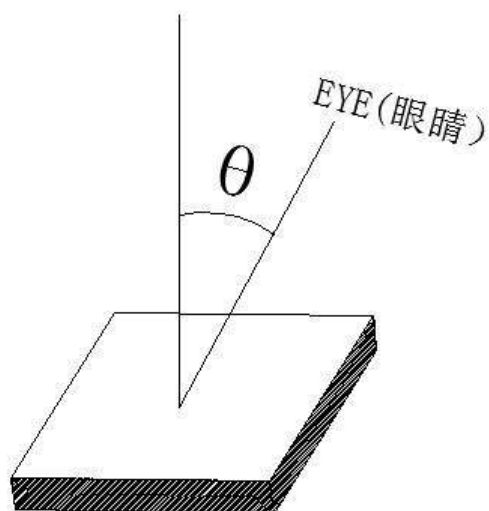
对比度计算公式

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 点钟方向	$CR \geq 10$ 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



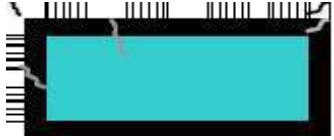
NOTE:3 点, 6 点, 9 点, 12 点方向视角的大小指的是垂直于屏表面的线眼睛视线之间的夹角(θ)。

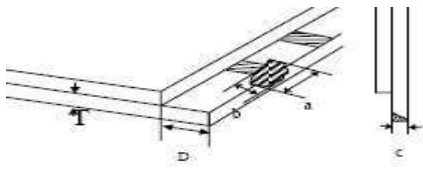
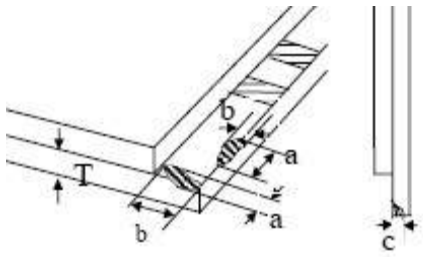
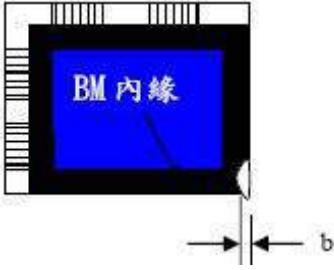
9. Reliability Trial 可靠性实验

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) Q70℃ (30Min) *10CYCLES	

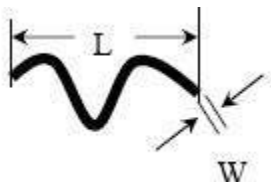
10. Inspection standards 检验标准

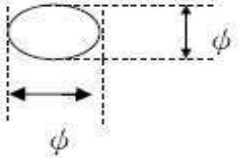
10.1 Glass defect

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 (minor defect)	1)Damage area don't touch the ITO (Inclueing contraposition mark, except scribing mark) 【Accept】 2) $C < T$ $b \leq BM1/3$ of width 【Accept】 3) $c = T$ b not touch the seal glue 【Accept】 4)a disregards	a: Length, b: Width c: Thickness 
6	Non-pin-side damage (minor defect)	$c < T$ 1)b exceeds $1/3 B_m$ 【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、	$\phi \leq 0.15\text{mm}$	disregard	note2:disregard if out of AA

	impurities、eye winker (minor defect)	$0.15\text{mm} < \phi \leq 0.25\text{mm}$	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:

