ShenZhen WOLCD Technology Co.,Ltd
深 圳 市 沃 乐 康 科 技 有 限 公 司

PRODUCT　　　TFT-LCD Modulewith CTP Touch Panel
产品名称：　TFT 液晶显示模块带电容触摸屏
MODELNO
模块型号：W280BF036I-24C-CTP
SUPPLIER　　　WOLCD
供应商：沃乐康科技
PROJECT
适用项目：　DM100
DAT
日期：　2020.7.9

SPECIFICATION FOR

TFT LCD MODULE
TFT 液 晶 模 块 规 格 书

Version　版本号：V0
This module uses ROHS material

WOLCD(沃乐康科技)		Customer(客户)
PREPARED BY 制定		☐**OK** ☐**NG，Problem survey:**
CHECKED BY 审核		
Quality Department 品质		
Approved By 批准		**Approved By**:___

1.If there is no special request from customer, WOLCD Will not reserve the tooling of the product under the following conditions:

1.1　There is no response from customer in Three months after WOLCD Submit the samples;

1.2　There is no order in one year after the latest mass production.

2.　All correlated data (include WOLCD record) will be reserved one year more after tooling was discarded.

3.　If there is no special request from customer, The product of WOLCD Will repair only one year

沃乐康科技专注行业液晶应用　　　　　0755-32882855　　　*WLK_LCD@163.COM*

RECORDS OF REVISION 修改记录

Date 日期	Sheet 页码	Revise No. 版本	SUMMARY 摘要	REMARK 备注
2020/7/09	ALL 所有新	A0	FIRST ISSUE 初始版本	

Contents 目录

1. Introduction 概述介绍

The **W280BF036I-24C-CTP**model is a Color TFT LCD supplied by WOLCD Technology co.,ltd
This Module has a **2.83** inch diagonally measured active display area with **480(RGB)×640** resolution.
Each pixel is divided into Red, Green and Blue sub-pixels and dots which are arranged in vertical stripes.
LCD color is determined with 1600,000 colors signal for each pixel.
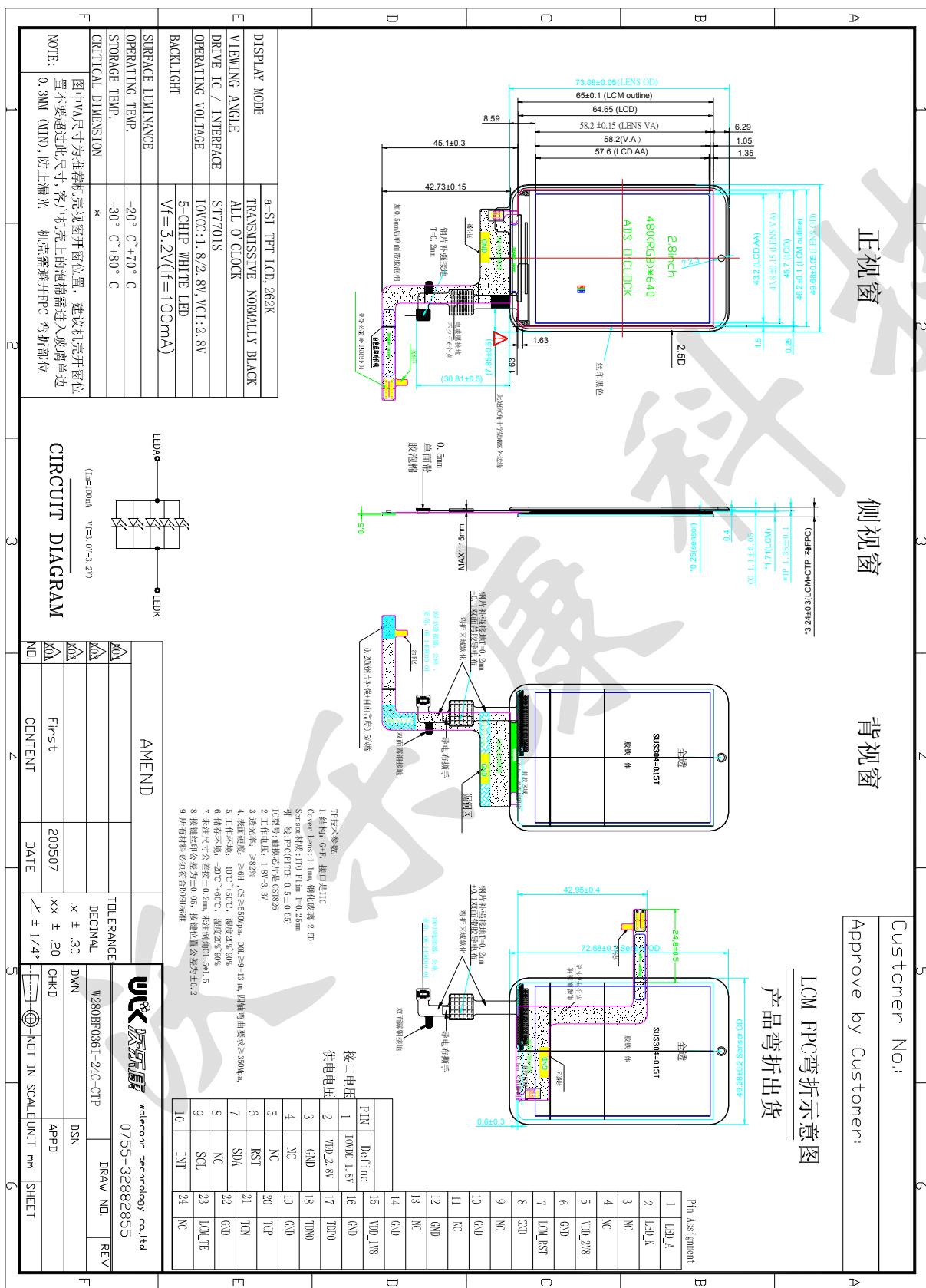
The **W280BF036I-24C-CTP**has been designed to apply the interface method that enables low power, high speed, and high contrast.

The**W280BF036I-24C-CTP** is intended to support applications where thin thickness, wide viewing angle and low power are critical factors and graphic displays are important.

2. General specification 通用规格

ITEM 项目	Standard value 标准值	UNIT 单位
LCD Type 液晶显示类型	TFT NegativeTransmissive Normally black	———
Driver element 驱动元素	a−Si TFT Active matrix	
Number of Dots 点阵数	480*(RGB)*640	Dots
Pixel Arrangement 像素排列	RGB Vertical stripe	
Dot Pitch (W*H)点距	0.03*0.09	mm
Active Area 显示区域	43.2(H) × 57.6(V)	mm
Glass Area (W*H)液晶玻璃尺寸	45.7(H)× 64.65 (V)	mm
Viewing Direction 视角方向	ADS ALL O'clock	
LCM Control IC 液晶模块 IC	ST7701S	
LCM Size(W*H*T)液晶模块尺寸	46.2(W)*65(H)*1.75(T)	mm
Approx.Weight 重量	TBD	g
Back Light 背光源	5 chipWhite LEDin parallel	
Interface ModeLCM 接口模式	MIPI 1LANE	
Touch Panel IC& Interface 触摸屏 IC 和接口类型	Hynitron CST826 IIC interface	
Cover lens&sensor Features 盖板功能片特点	1.1MM GLASS 6H 2.5D0.25MM single film sensor	
Touch Display Assembly Size 触控显示总成尺寸	49.68(W)*73.08(H)*3.3(T)mm	
Fitting method 贴合方式	OCA 全贴合	

3. Mechanical drawing 外形机构图

4. ABSOLUTE MAXIMUM RATINGS 极限参数

Parameter	Symbol	Min	Max	Unit
Supply voltage for I/O logic	IOVCC	−0.3	4.6	V
Analog Voltage	V_{CI}	−0.3	4.6	V
Supply current(One LED)	I_{LED}		20	mA
Operating temperature	T_{OP}	−10	+50	°C
Storage temperature	T_{ST}	−20	+60	°C

5.ELECTRICAL CHARACTERISTICS 电气参数
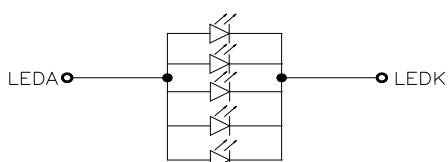
Properties		Sym.	Min	Typ.	Max	Unit	Note
Power for Circuit Driving		VCI	2.5	2.8	3.6	V	Note
Interface Voltage		IOVcc	1.65	1.8	3.3	V	Note
Power for Circuit Logic		Vt	2.6	2.8	3.0	V	Note
BLU Driving Logic		Vbat	-	3.3	-	V	
Logic Input Voltage	Low Voltage	VIL	VSS	-	0.2Iovcc	V	
	High Voltage	VIH	0.8xIovcc	-	IOVCC	V	
Logic Output Voltage	Low Voltage	VOL	0	-	0.2Vcc	V	
	High Voltage	VOH	0.8Iovcc	-	IOVCC	V	
Power Consumption	White	P_w	T.B.D	T.B.D	T.B.D	mW	
	Black	P_b	T.B.D	T.B.D	T.B.D	mW	
	Vertical Stripe	P_v	T.B.D	T.B.D	T.B.D	mW	

Note

The recommended operating conditions refer to a range in which operation of this product is
guaranteed. Should this range is exceeded, the operation cannot be guaranteed even if the
values may be without the absolute maximum ratings.

Accordingly, please make sure that the module is used within this range. And these current values are
measured under the condition that all devices are stopped, each component is stable and logic
signal is input.

6.Backlight Charasterics 背光源参数

LEDA o─────●─────[diodes]─────●─────o LEDK
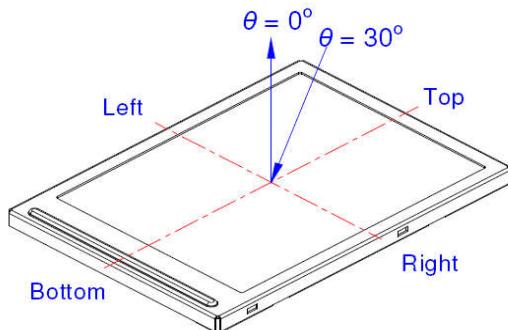
(1m=100mA   VT=3.0V-3.2V)

CIRCUIT DIAGRAM

Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition	Note
Supply Voltage	Vf	3.0	3.1	3.3	V	If=20 mA	-
Supply Current	If	-	20	-	mA	-	单 LED-
Reverse Voltage	Vr	-	-	5	V	10uA	
Power dissipation	Pd	-	140	-	mW	-	
Luminous Intensity for LCM			200		Cd/m^2	If=15mA	
Uniformity for LCM	-	80	-	-	%	If=15 mA	
Life Time	-	50000	-	-	Hr	If=15 mA	-
Backlight Color	White						

7. OPTICAL CHARACTERISTICS 光学特性
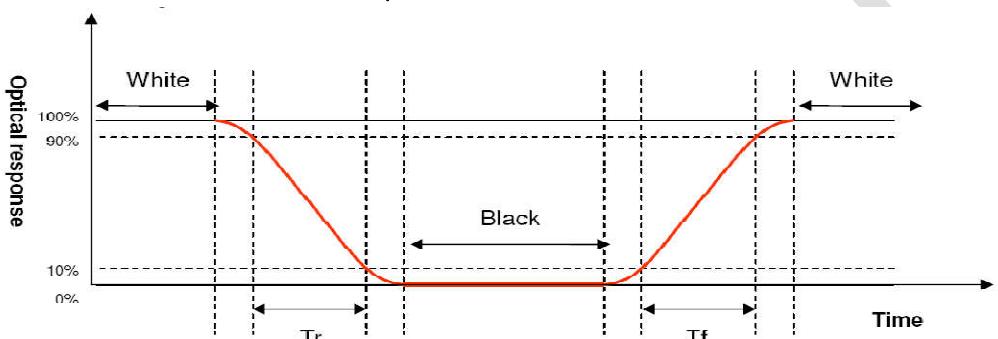
Spec	Parameter	Sym.	Values			Unit	Note
			Min.	Typ.	Max.		
With Back light LED ON	*1)Contrast Ratio	C/R	800	1200			Note
	*1)Threshold Voltage	Vsat				V	FIG.2
		Vth				V	
	*2)Transmittance	T%	3.57	4.2		%	FIG.1
	*1)Response Time	Tr+ Tf		30	35	Mses	FIG.4
	*1)Viewing Angle	θl	75	80	-	Degree	FIG.5
		θr	75	80	-		
		θu	75	80	-		
		θd	75	80	-		
	*3)CIE Color Coordinate	Wx		0.294			
		Wy		0.313			
		Rx		0.658			
		Ry		0.318			
		Gx		0.250			
		Gy		0.570			
		Bx		0.139			
		By		0.087			
Color Gamut		S(%)	66	71	-	%	FIG.3

$\theta = 0^{\circ}$ $\theta = 30^{\circ}$

Left   Top

Right

Bottom
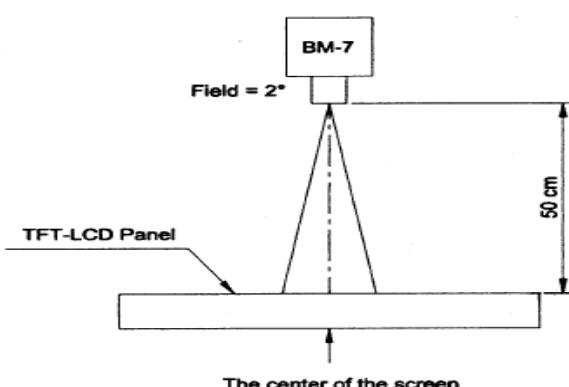
Note 2: Definition of contrast ratio CR:

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black}}$$
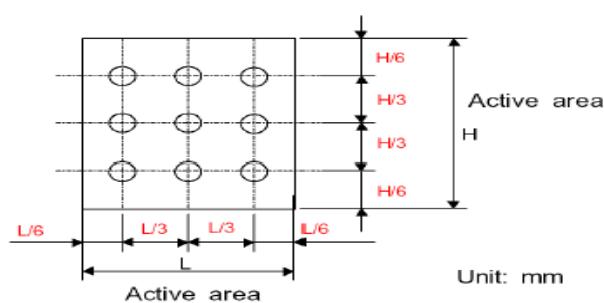
Note 3: Definition of response time (T$_R$,T$_F$)

Optical response

White   White

100%
90%

Black

10%
0%

Tr   Tf   Time

: The brightness test equipment setup
20mA   Field=2° (As measuring "black" image, field=2° is the best testing condition)

BM-7

Field = 2°

50 cm

TFT-LCD Panel

The center of the screen

Note 4 :

H/6
H/3
H/3
H/6

Active area

H

L/6   L/3   L/3   L/6

L

Active area

Unit: mm

8. Pin Assignment 接口引脚定义

8.1 LCMInterface Pin Function 液晶模块引脚接口功能

Input Signal and Power(24 Pins FPC B2B connector OK-14GM024-04)
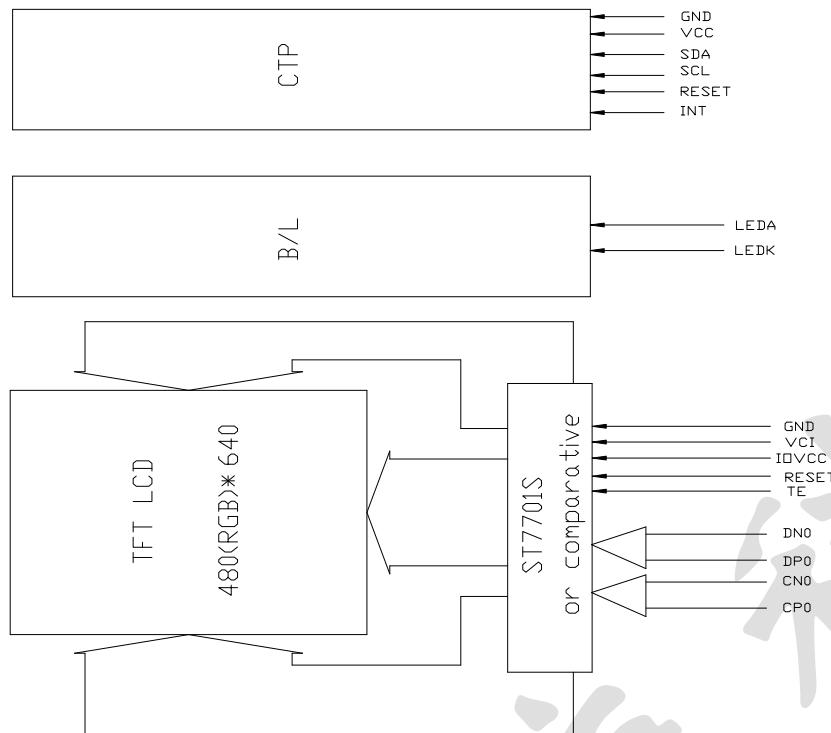
Pin NO.	Symbol 定义	I/O	Description 描述
1	LEDA	P	Power supply for LED backlight Anode input
2	LEDK	P	Power supply for LED backlight Cathode input
3-4	NC	-	NO CONNECTION
5	VCI	P	Power supply for analog(2.8V)
6	GND	P	Power Ground
7	LCM-RST	I	The external reset input Initializes the chip with a low input. Be sure to execute a power-on reset after supplying power
8	GND	P	Power Ground
9	NC	-	NO CONNECTION
10	GND	P	Power Ground
11	NC	-	NO CONNECTION
12	GND	P	Power Ground Chip Select pin
13	NC	-	NO CONNECTION
14	GND	P	Power Ground
15	IOVCC	P	Power supply for logic(2.8V/1.8V)
16	GND	P	Power Ground
17	DP0	I/O	MIPI DSI differential data0 pairpostive
18	DN0	I/O	MIPI DSI differential data0 pairnegtive
19	GND	P	Power Ground
20	CLKP	I/O	MIPI DSI differential clock pairpostive
21	CLKN	I/O	MIPI DSI differential clock pairnegtive
22	GND	P	Power Ground
23	LCM-TE	O	NOT USE
24	NC	-	NO CONNECTION

8.2CTPInterface Pin Function 电容触摸屏引脚接口功能

Input Signal and Power(10 Pins FPC B2B connector OK-14GM010-04)
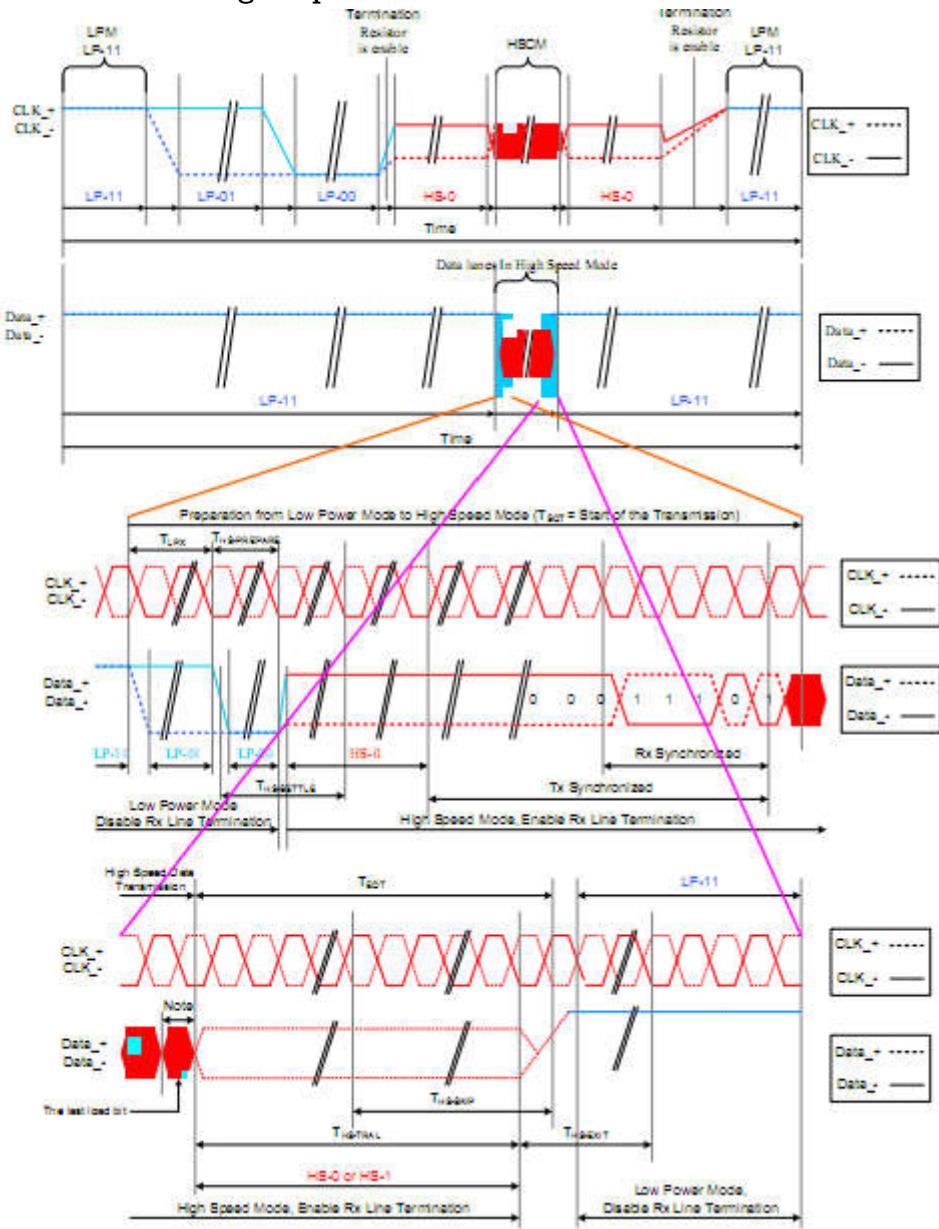
Pin NO.	Symbol	Description	Remark
1	NC	-	NC
2	VDD	P	Power supply for analog(2.8V)
3	GND	GND	Power Ground
4-5	NC	-	NO CONNECTION
6	RESET	I	Reset Pin
7	SDA	I/O	IICdata pin
8	NC	-	NO CONNECTION
9	SCL	-	IIC synchronous clock pin
10	INT	I/O	Interrupt pin

9. BLOCK DIAGRAM 方框图

CTP

GND
VCC
SDA
SCL
RESET
INT

B/L

LEDA
LEDK

TFT LCD
480(RGB)*640

ST7701S
or comparative

GND
VCI
IOVCC
RESET
TE

DN0
DP0
CN0
CP0

10.TIMING CHARACTERISTICS 时序特性

10.1 MIPI High Speed Clock Burs

10.2. 频率 前后肩

CLK Lane Speed	330.00	Mbps		Data Lane Num	2
bit time	1.52	ns			
Pixel Format	24.00	bit			
Pixel Clk	27.50	Mhz			
Horizontal Syn Width	10			Vertical Syn Width	8
Horizontal front porch	80			Vertical front porch	20
Horizontal back porch	80			Vertical back porch	20
Horizontal	480			Vertical	640
	650.00				688
frame rate	61.5	Hz			
Line Time	23.6	us			

11.LCM Quality Criteria

11.1 VISUAL & FUNCTION INSPECTION STANDARD

11.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.
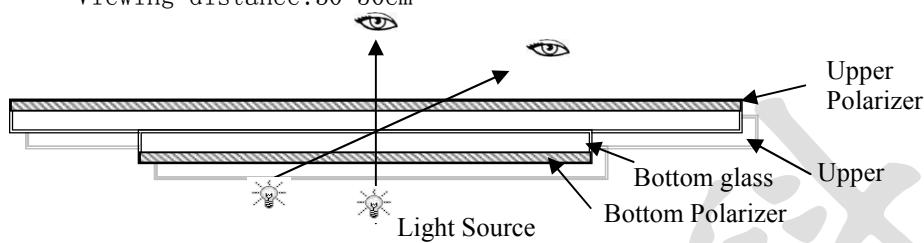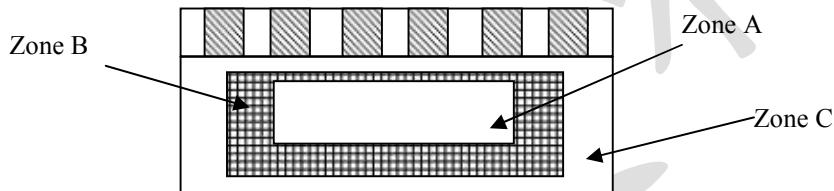
Temperature : 25±5℃
Humidity :   65%±10%RH
Viewing Angle : Normal viewing Angle.
Illumination: Single fluorescent lamp (300 to 700Lux)
Viewing distance:30-50cm

Upper Polarizer
Bottom glass
Upper
Bottom Polarizer
Light Source

11.1.2 Definition

Zone B
Zone A
Zone C

Zone A : Effective Viewing Area(Character or Digit can be seen)
Zone B : Viewing Area except Zone A
Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)
Note:
As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function
 or appearance after assembly by customer.

11.1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class Ⅱ
AQL:
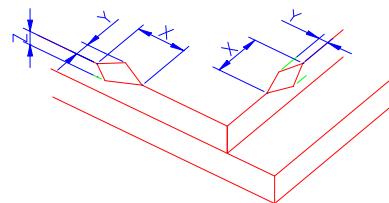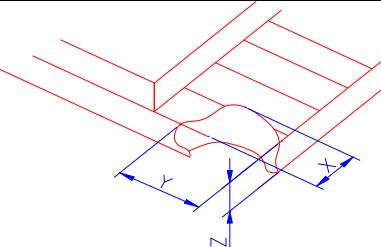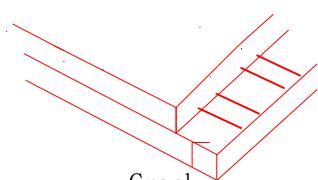
Major defect	Minor defect
0.65	1.5

LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module
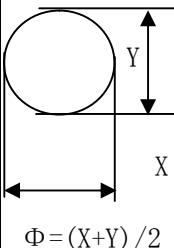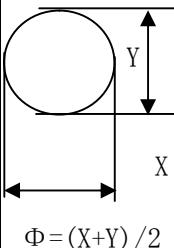
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
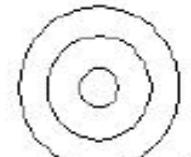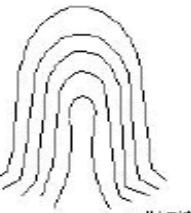
5	Soldering appearance	Good soldering , Peeling off is not allowed.	
6	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	
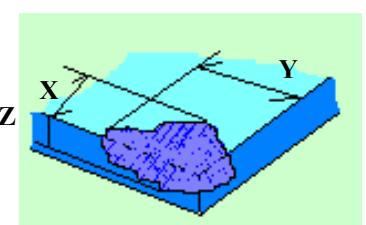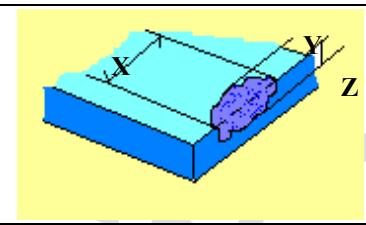
11.1.4 Criteria (Visual)

Number	Items	Criteria(mm)
1.0 LCD Crack/Broken NOTE: X: Length Y: Width Z: Height L: Length of ITO, T: Height of LCD	(1) The edge of LCD broken	 | X	Y	Z | |---|---|---|
≤3.0mm	<Inner border line of the seal	≤T	
	(2)LCD corner broken	 | X	Y	Z | |---|---|---|
≤3.0mm	≤L	≤T	
	(3) LCD crack	 Crack Not allowed

Number	Items	Criteria (mm)

2.0	Spot defect	① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain)

$\Phi=(X+Y)/2$

① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain)

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.10	Ignore		Ignore
0.10<Φ≤0.15	3(distance≧10mm)		
0.15<Φ≤0.2	1		
0.2<Φ	0		

② Dim spot (LCD/TP/Polarizer dim dot, light leakage、dark spot)

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.1	Ignore		Ignore
0.1<Φ≤0.2	2(distance≧10mm)		
0.2<Φ≤0.3	1		
Φ>0.3	0		

③ Polarizer accidented spot

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		Ignore
0.2<Φ≤0.5	2(distance≧10mm)		
Φ>0.5	0		

Line defect (LCD/TP /Polarizer black/white line, scratch, stain)

Width(mm)	Length(mm)	Acceptable Qty		
		A	B	C
Φ≤0.03	Ignore	Ignore		Ignore
0.03<W≤0.05	L≤3.0	N≤2		
0.05<W≤0.08	L≤2.0	N≤2		
0.08<W	Define as spot defect			

3.0	Polarizer Bubble	Zone Size (mm)	Acceptable Qty		
			A	B	C
		Φ≤0.2	Ignore		Ignore
		0.2<Φ≤0.4	2(distance≧10mm)		
		0.4<Φ≤0.6	1		
		0.6<Φ	0		

4.0	SMT	According to IPC-A-610C class Ⅱ standard . Function defect and missing part are major defect ,the others are minor defect.

5.0	TP Related	TP bubble/ accidented spot	Size Φ(mm)	Acceptable Qty		
				A	B	C
			Φ≤0.1	Ignore		Ignore
			0.1<Φ≤0.2	2 (distance≧10mm)		
			0.2<Φ≤0.3	1		
			0.3<Φ	0		
		Assembly deflection	beyond the edge of backlight ≤0.15mm			
		Newton Ring	Newton Ring area>1/3 TP area NG Newton Ring area≤1/3 TP area OK			

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TP corner broken X: length Y: width Z: height	X	Y	Z	
	X≤3.0mm	Y≤3.0mm	Z<LCD thickness	
* Circuitry broken is not allowed.				

TP edge broken X: length Y: width Z: height	X	Y	Z	
	X≤6.0mm	Y≤2.0mm	Z<LCD thickness	
* Circuitry broken is not allowed.				

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	TP no function	Not allowed

11.2 RELIABILITY TEST

NO	ITEM	CONDTTION	STANDARD
1	High Temp. Storage	70℃, 12 hours	1. Functional test is OK. Missing Segment, short, unclear segment, non-display, display abnormally and liquid crystal leak are un-allowed. 2. No low temperature bubbles, end seal loose and fall, frame rainbow.
2	Low Temp. Storage	-20℃, 12 hours	
3	High Temp. Operation	60℃, 12 hours	
4	Low Temp. Operation	-20℃, 12 hours	
5	High temperature and high Humidity storage	40℃,90%RH ,12 hours	
6	Thermal and cold shock	Static state, −20℃（30 Min）~70℃（30 Min）~−20℃（30Min），packaging, 10 cycles	
7	Vibration test	Packaging, Frequency : 10-55Hz Amplitude : 1.0mm, Each direction on X,Y axe 0.5 houre, circle 2 hours	1. Function test is OK. 2. No glass crack, chipped glass, end seal loose and fall, epoxy frame crack and so on. 3. No structure loose and fall.
8	Dropping test	Pack products into the carton box. Drop it from 80cm height to ground. Once for each side of the carton	

NOTE：

    10.2.1 The reliability items will be fully performed in new sample qualification,

    11.2.2 The reliability status will be tested as monitor during mass production. Individual reliability test shall be

        performed by lot , Moreover, the individual reliability item shall be decided according to reliability plan.

    11.2.3 All samples are inspected after keeping in the room with normal temperature and humidity for 2 hours or above.

    11.2.4 Vibration test: It is not necessary to test for those products without assembly frame , back light ,PCB and so on.

    11.2.5 Dropping test : It is necessary for affirming new package.

    11.2.6 For the high temperature and high humidity test, pure water of over 10 MΩ.cm should be used.

    11.2.7 Each test item applies for test LCM only once .Then tested LCM cannot be used again in any other test item.

    11.2.8 The quantity of LCM examination for each test item is 5pcs to 10pcs.

11.3Safetv instructions

    11.3.1 If the LCD panel breaks, be careful not to get any liquid crystal substance in your mouth.

    11.3.2 If the liquid crystal substance touches your skin or clothes, please wash it off immediately by using soap and water.

11.4 Handling Precautions

    11.4.1 Avoid static electricity damaging the LSI.

    11.4.2 Do not remove the panel or frame from the module .

    11.4.3 The polarizing plate of the display is very fragile . So, please handle it very carefully.

    11.4.4 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of the plate.

    11.4.5 The color tone of display and background of LCM has the possibility to be changed in the storage temperature range.

    11.4.6 Pay attention to the working environment, as the element may be destroyed by static electricity.

       --Be sure to ground human body and electric appliance during work.

       --Avoid working in a dry environment to minimize the generations of static electricity.

       --Static electricity may be generated when the protective film is fast peeled off.

    11.4.7 When soldering the terminal of LCM, make certain the AC power source of soldering iron does not leak.

    11.4.8 If the display surface becomes contaminated ,breathe on the surface and gently wipe it with a soft-dry-clean cloth .If it is heavily contaminated ,moisten cloth with the following solvent(ex:Ethyl alcohol).Solvents other than those above-mentioned may damage the polarizer(Especially , do not use them .ex: Warter / Ketone)

11.5 Operation instructions

    11.5.1 It is recommended to drive the LCD within the specified voltage limits, try to adjust the operating voltage for the optimal contrast, the color and contrast of LCD panel will varies at different temperature.

    11.5.2 Response time is greatly delayed at low operating temperature range. However, this does not mean the LCD will be out of the order, It will recover when it returns to the specified temperature range.

    11.5.3 If the display area is pushed hard during operation, the display will become abnormal.

    11.5.4 Do not operate the LCD at the environments over the specified conditions, this may cause damage on the LCD and shorten the lifetime.

11.6 Storage instructions:

11.6.1 Store LCDs in a sealed polyethylene bag.

11.6.2 Store LCDs in a dark place, Do not expose to sunlight or fluorescent light. Keep the temperature between 0℃and 35℃.

11.6.3 Avoid the polarizer touch any other object, (It is recommended to store them in the container in which they were shipped.)

11.7 Limited Warranty

11.7.1 LEAD will replace or repair any of its LCD modules, which are found to be defective, when inspected in accordance with LEAD LCM acceptance standards (copies available upon request) for a period of 12 months from ink- print date on product

11.7.2 Any defects must be returned to LEAD within 60 days since ship-out. Confirmation of such date shall be based on freight documents. The warranty liability of LEAD limited to repair and/or replacement on defects above (7.1, 7.2)

11.7.3 No warranty can be granted if the precautions stated above have been disregarded. The typical samples are as below:

-- LCD glass crack/break

--PCB outlet is damaged or modified.

--PCB conductors damaged.

--Circuit modified with by grinding, engraving or painting varnish.

--FPC crack

11.7.4 Modules must be returned with sufficient description of the failures of defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB outlet, conductors and terminals. Modules must be packed with the container in which they were shipped.

10.Packing method

------TBD-------