

PRODUCT TFT-LCD Module
产品名称: **TFT 液晶显示模块**
MODELNO
模块型号: **W700BH018I-30Z(CTP)**
SUPPLIER WOLCD
供应商: **沃乐康科技**
PROJECT
适用项目:
DATE
日期: **2025.3.24**

SPECIFICATION FOR

TFT LCD MODULE

TFT 液晶模块规格书

Version 版本号: **V1.0**

This module uses ROHS material

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

- 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

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RECORDS OF REVISION 修改记录

Date 日期	Sheet 页码	Revise No. 版本	SUMMARY 摘要	REMARK 备注
2025/3/23	ALL 所有新	A0	FIRST ISSUE 初始版本	

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1. Introduction 概述介绍

The **W700BH018I-30Z** model is a Color TFT LCD supplied by WOLCD Technology co.,Ltd This Module has a **7** inch diagonally measured active display area with **1024(RGB)*600** resolution. Each pixel is divided into Red, Green and Blue sub-pixels and dots which are arranged in vertical stripes.

The **W700BH018I-30Z** has been designed to apply the interface method that enables low power, high speed, and high contrast.

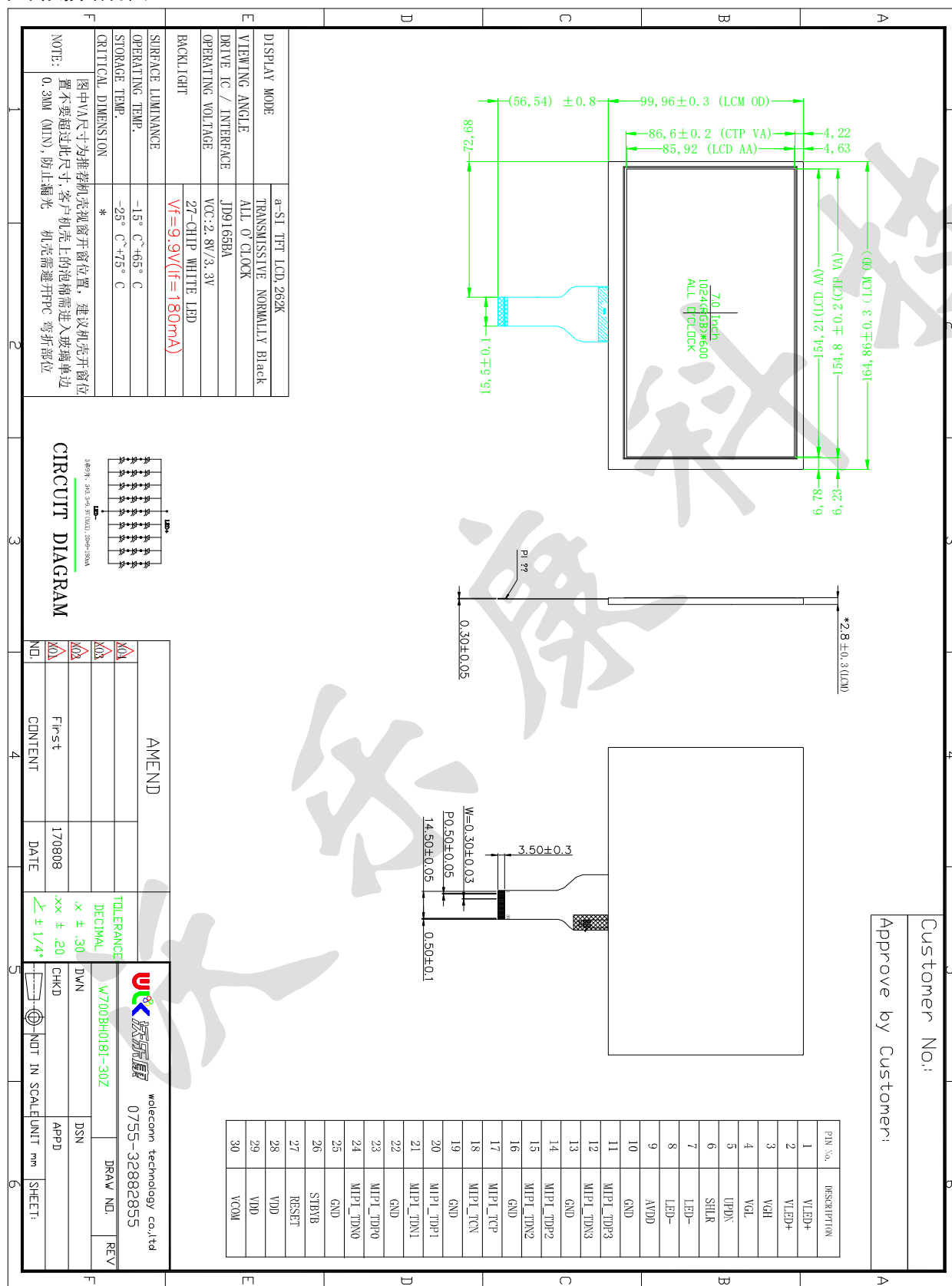
The **W700BH018I-30Z** is intended to support applications where thin thickness, wide viewing angle and low power are critical factors and graphic displays are important.

2. General specification 通用规格

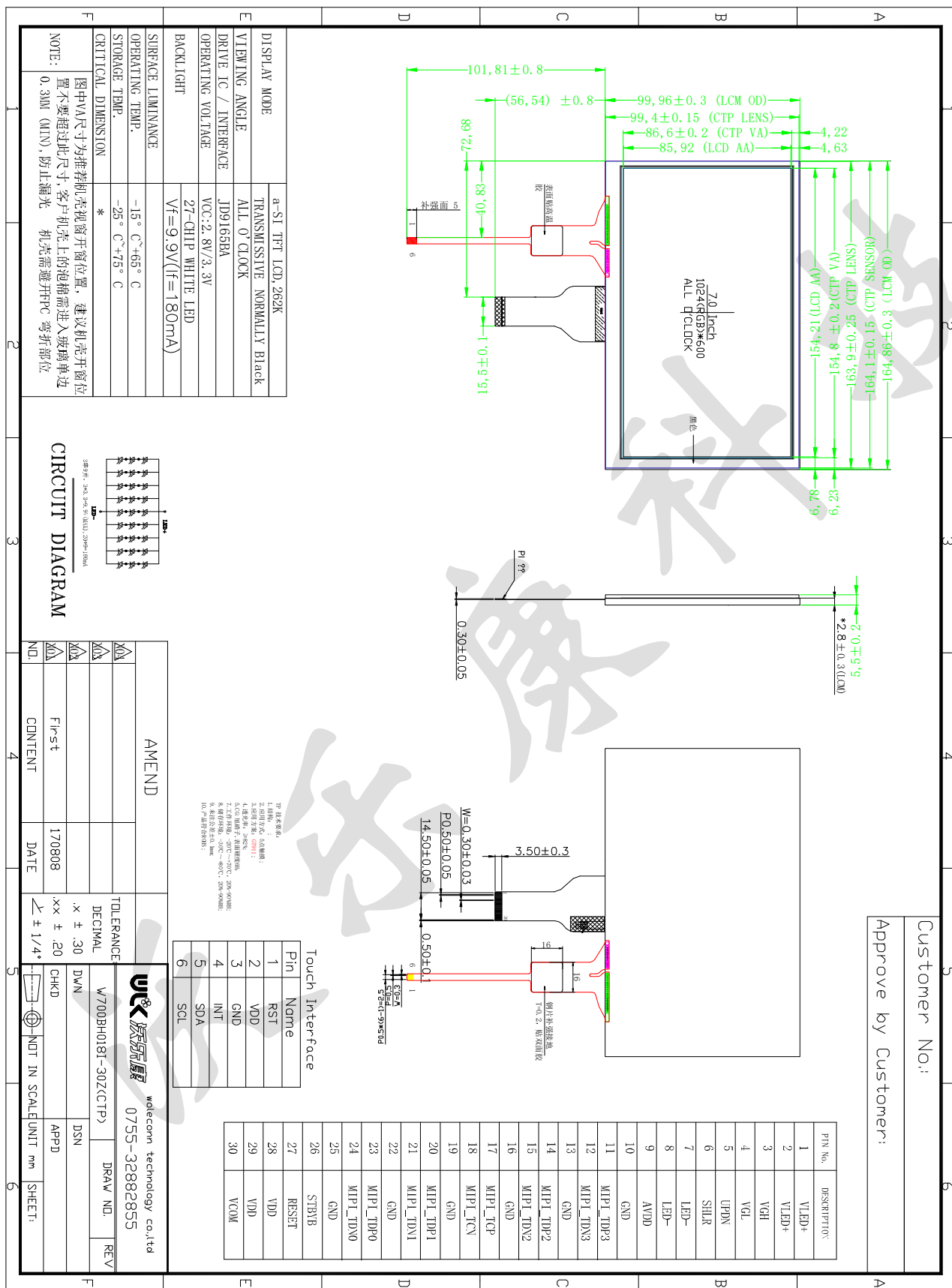
ITEM 项目	Standard value 标准值	UNIT 单位
LCD Type 液晶显示类型	TFT NegativeTransmissive Normally black	---
Driver element 驱动元素	a-Si TFT Active matrix	
Number of Dots 点阵数	1024(RGB)*600	Dots
Pixel Arrangement 像素排列	RGB Vertical stripe	
Dot Pitch (W*H)点距	0.0502*0.1432	mm
Active Area 显示区域	154.2144(H) ×85.92(V) (显示区)	mm
Glass Area (W*H)液晶玻璃尺寸	162.2(H)× 95.7(V)	mm
Viewing Direction 视角方向	ALL O'clock	
LCM Control IC 液晶模块 IC	JD9165BA	
LCM Size(W*H*T)液晶模块尺寸	165(H)X100(V)X2.8(T)	mm
Approx.Weight 重量	TBD	g
Back Light 背光源	3S9P 27 Chip white LED	
Interface ModeLCM 接口模式	MIPI 4lane /2lane	
Touch Panel IC& Interface 触摸屏 IC 和接口类型	GT911 IIC	
Cover lens&sensor Features 盖板功能片特点	P+G	
Touch Display Assembly Size 触控显示总成尺寸	165*100*5.5MM	
Fitting method 贴合方式	框贴	

3. Mechanical drawing 外形机构图

不带触摸结构图



带触摸结构图



4. ABSOLUTE MAXIMUM RATINGS 极限参数

Parameter	Symbol	Min	Max	Unit
Supply voltage for I/O logic	VDD	-0.3	3.6	V
Analog Voltage	V _{CI}	-0.3	3.6	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

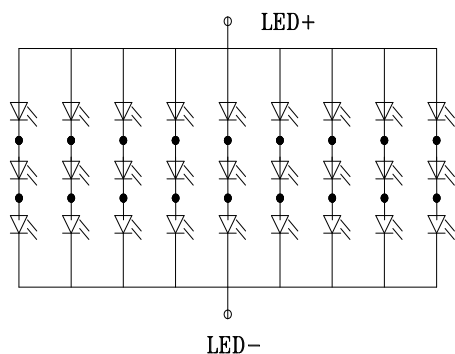
Properties		Sym.	Min	Typ.	Max	Unit	Note
Power for Circuit Driving		VDD	2.5	3.3	3.6	V	Note
Interface Voltage		IOVcc	1.65	1.8	3.6	V	Note
TFT Common Electrode Voltage		VCOM	2.7	3.3	4.94	V	Note
Backligh Voltage		VLED	8.5	9	9.9-	V	
Power For Analog Circuit		AVDD	9	9.8	11	V	
TFT Gate Voltage	Gate ON	VGH	18		20	V	
	Gate OFF	VGL	-8.5		-7.5	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	Without Backlight
	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



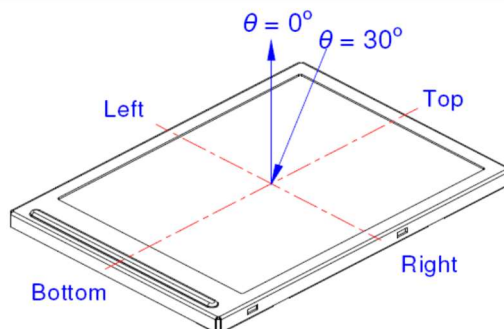
3串9并, 3*3.3=9.9V (MAX), 20*9=180mA

CIRCUIT DIAGRAM

Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition	Note
Supply Voltage	Vf	8.5	9	9.9	V	If=20 mA	-
Supply Current	If	135	180	225	mA	-	
Reverse Voltage	Vr	-	-	5	V	10uA	
Power dissipation	Pd	-	1.62	-	mW	-	
Luminous Intensity for LCM	-	-	300	-	Cd/m ²	If=20mA	
Uniformity for LCM	-	-	78	-	%	If=15 mA	
Life Time	-	-	5000	-	Hr	If=15 mA	-
Backlight Color	White						

7. OPTICAL CHARACTERISTICS 光学特性

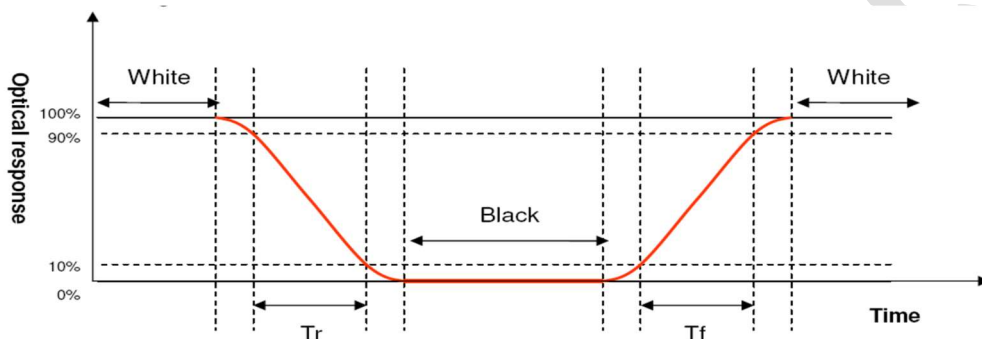
Spec	Parameter	Sym.	Values			Unit	Note
			Min.	Typ.	Max.		
With Back light LED ON	*1)Contrast Ratio	C/R		800			Note
	*1)Threshold Voltage	Vsat				v	FIG.2
		Vth				v	
	*2)Transmittance	T%	4.9	5.45		%	FIG.1
	*1)Response Time	Tr+ Tf		30	40	Mses	FIG.4
	*1)Viewing Angle	θl		85	-	Degree	FIG.5
		θr		85	-		
		θu		85	-		
		θd		85	-		
	*3)CIE Color Coordinate	Wx	-0.03	0.298	+0.03		
		Wy		0.337			
		Rx		0.633			
		Ry		0.341			
		Gx		0.276			
		Gy		0.547			
		Bx		0.144			
		By		0.166			
Color Gamut		S(%)				50	



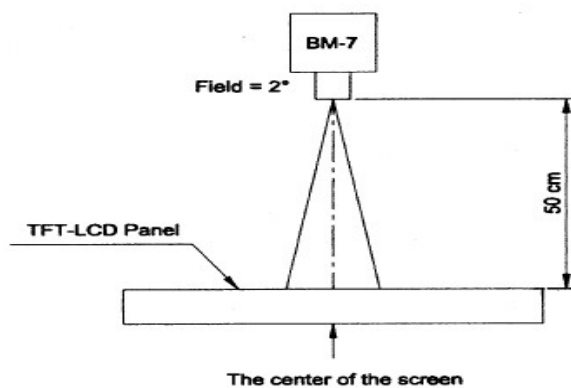
Note 2: Definition of contrast ratio CR:

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

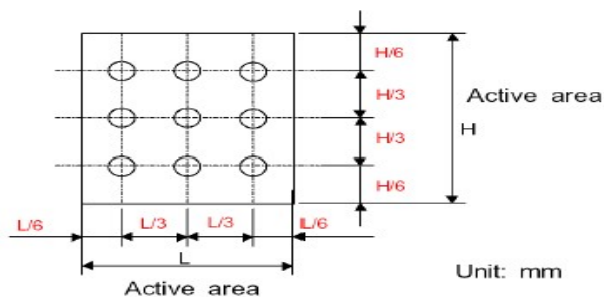
Note 3: Definition of response time (T_R, T_F)



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



Note 4 :



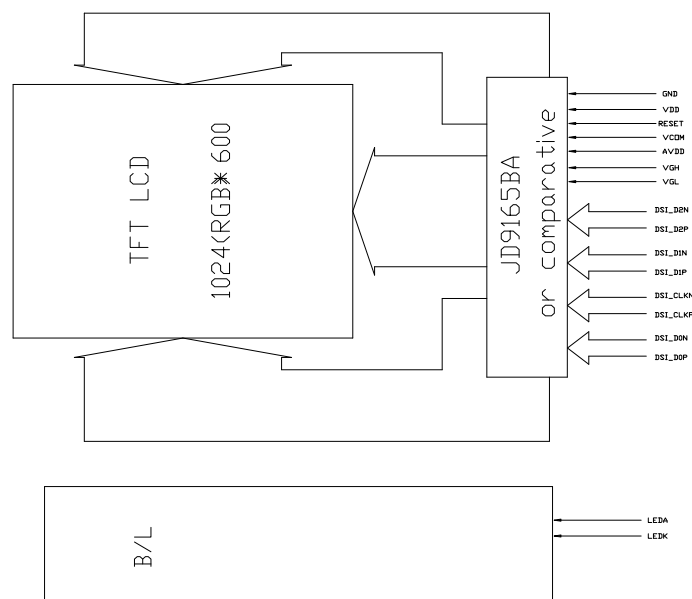
8. Pin Assignment 接口引脚定义

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

Input Signal and Power(0.5MM 30 Pins FPC ZIF)

Pin NO.	Symbol 定义	I/O	Description 描述
1-2	VLED+	P	Power supply for LED backlight Anode input
3	VGH	P	Gate ON Voltage
4	VGL	P	Gate OFF Voltage
5	UPDN	-	Vertical scan direction
6	SHLR	-	Horizontal scan direction
7-8	VLED-	P	Power supply for LED backlight Cathode input
9	AVDD	P	PowerforAnalogCircuit
10	GND	P	Power Ground
11	D3P	I	MIPI-DSI Data differential signal input pins. (Data lane 3)
12	D3N	I	MIPI-DSI Data differential signal input pins. (Data lane 3)
13	GND	P	Power Ground
14	D2P	I	MIPI-DSI Data differential signal input pins. (Data lane 2)
15	D2N	I	MIPI-DSI Data differential signal input pins. (Data lane 2)
16	GND	P	Power Ground
17	CLKP	I	MIPI-DSI CLOCK differential signal input pins
18	CLKN	I	MIPI-DSI CLOCK differential signal input pins
19	GND	P	Power Ground
20	D1P	I	MIPI-DSI Data differential signal input pins. (Data lane 1)
21	D1N	I	MIPI-DSI Data differential signal input pins. (Data lane 1)
22	GND	P	Power Ground
23	D0P	I/O	MIPI-DSI Data differential signal input pins. (Data lane 0)
24	D0N	I/O	MIPI-DSI Data differential signal input pins. (Data lane 0)
25	GND	P	Power Ground
26	STBYB	-	StandbyModeselectpin
27	RESET	I	This signal will reset the device and it must be applied to properly initialize the chip.
28	VDD	P	PowerforDigitalCircuit
29	VDD	P	PowerforDigitalCircuit
30	VCOM	P	TFT Common Electrode Voltage

9. BLOCK DIAGRAM 方框图



9.1 Initialization Code 初始化代码

参考设置:

$hfp=160$ $hbp=136$ $hsync=24$ $hline = 1024$, $vfp = 12$, $vbp = 21$, $vsync = 2$, $vline = 600$

9.2 PRIOR CONSULTMATTER(提前商议事项)

9.2.1 For WOLCD Technology products, we keep the right to change material, process ... for improving the product property without prior notice to our customer. (对于沃乐康的标准模块产品, 非定制类, 我们保留在不通知客户的情况下, 为提高产品性能而改变原材料及加工方法等的权利。)

9.2.2 If you have special requirement about reliability condition, please let us know before you start the design on our samples. (如对可靠性条件有特殊要求, 请在设计开发前通知我们。)

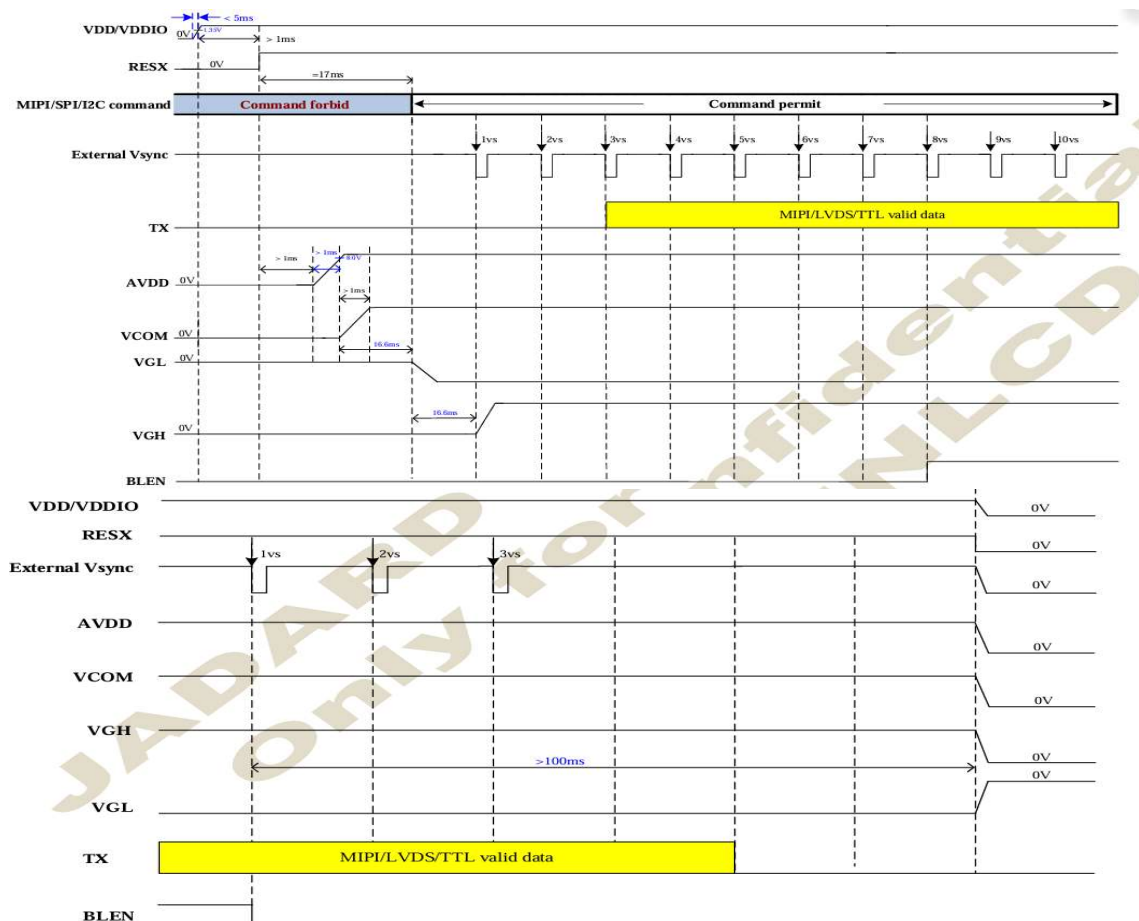
9.2.3 If the Module keeps displaying the same pattern for a long period of time, the image may be "sticked" to the screen. To avoid image sticking, it is recommended to use a screen saver. (由于液晶特性长期固定一个显示页面有造成显示残影的隐患, 建议息屏或加入屏保)

9.2.4 背光 LED 灯比较多, 在满负荷亮度状态下 背光会有一定发热量是正常现象, 设计时请规避此区域。

9.2.5 MIPI 高速信号易受外部干扰, 请确保 FFC 的长度和质量, PCB 差分信号线尽量做阻抗匹配走差分蛇形线

10.TIMING CHARACTERISTICS 时序特性

10.1 Power ON/OFF timings



10.2 Timings for DSI Video mode

Parameter		Symbol	Min.	Typ.	Max.	Unit
Frame Rate		/	-	60	-	Hz
Clock frequency		1/Tclock	100	-	500	Mbps
Horizontal Section	Period	Tht	1114	1344	1400	Tclock
	Active	THDISP1024				
	Blanking	THFP	30	160	216	
		THBP	60	160	160	
		THS	1	24	HBP-1	
Vertical Section	Period	Tvt	610	635	800	Tline
	Active	TVDISP600				
	Blanking	TVFP	2	12	100	
		TVBP	8	23	100	
		Tvs	1	2	VBP-1	

11.LCM Quality Criteria

11.1 VISUAL & FUNCTION INSPECTION STANDARD

11.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

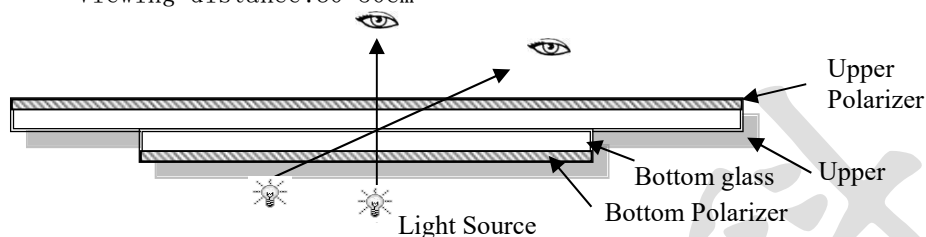
Temperature : $25 \pm 5^{\circ}\text{C}$

Humidity : $65\% \pm 10\% \text{RH}$

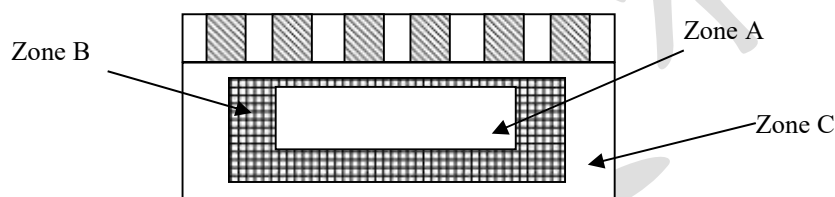
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance: 30-50cm



11.1.2 Definition



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:

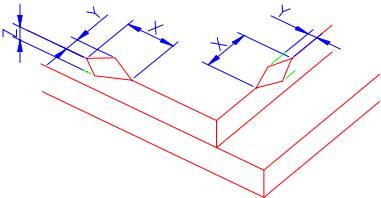
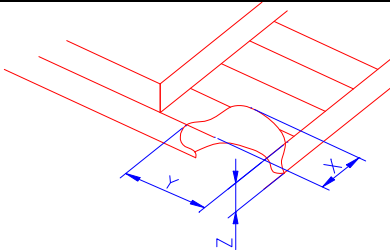
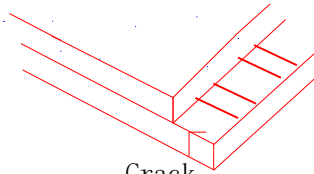
Major defect	Minor defect
0.65	1.5

LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

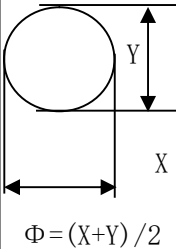
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor

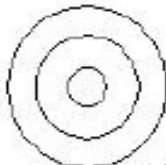
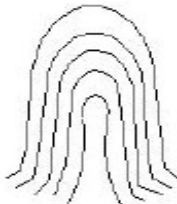
5	Soldering appearance	Good soldering , Peeling off is not allowed.	
6	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	

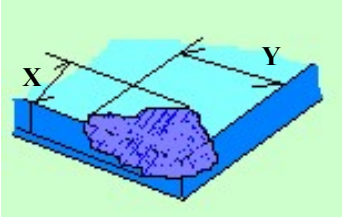
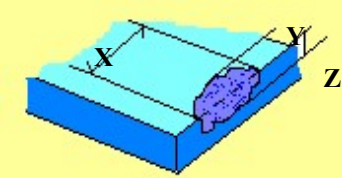
11.1.4 Criteria (Visual)

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	<table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr></table>	X	Y	Z	≤3.0mm	<Inner border line of the seal	≤T
	X	Y	Z					
	≤3.0mm	<Inner border line of the seal	≤T					
(2)LCD corner broken	 <table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr></table>	X	Y	Z	≤3.0mm	≤L	≤T	
X	Y	Z						
≤3.0mm	≤L	≤T						
(3) LCD crack	 Crack Not allowed							

Number	Items	Criteria (mm)
--------	-------	---------------

2.0	Spot defect  $\Phi = (X+Y) / 2$	① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain) <table><tr><th rowspan="2">Zone Size (mm)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>$\Phi \leq 0.15$</td><td colspan="3">Ignore</td></tr><tr><td>$0.10 < \Phi \leq 0.15$</td><td colspan="3">3(distance $\geq 10\text{mm}$)</td></tr><tr><td>$0.15 < \Phi \leq 0.2$</td><td colspan="3">1</td></tr><tr><td>$0.2 < \Phi$</td><td colspan="3">0</td></tr></table> ②Dim spot (LCD/TP/Polarizer dim dot, light leakage, dark spot) <table><tr><th rowspan="2">Zone Size (mm)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>$\Phi \leq 0.1$</td><td colspan="3">Ignore</td></tr><tr><td>$0.1 < \Phi \leq 0.2$</td><td colspan="3">2(distance $\geq 10\text{mm}$)</td></tr><tr><td>$0.2 < \Phi \leq 0.3$</td><td colspan="3">1</td></tr><tr><td>$\Phi > 0.3$</td><td colspan="3">0</td></tr></table> ③ Polarizer accidented spot <table><tr><th rowspan="2">Zone Size (mm)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>$\Phi \leq 0.2$</td><td colspan="3">Ignore</td></tr><tr><td>$0.2 < \Phi \leq 0.5$</td><td colspan="3">2(distance $\geq 10\text{mm}$)</td></tr><tr><td>$\Phi > 0.5$</td><td colspan="3">0</td></tr></table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.15$	Ignore			$0.10 < \Phi \leq 0.15$	3(distance $\geq 10\text{mm}$)			$0.15 < \Phi \leq 0.2$	1			$0.2 < \Phi$	0			Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore			$0.1 < \Phi \leq 0.2$	2(distance $\geq 10\text{mm}$)			$0.2 < \Phi \leq 0.3$	1			$\Phi > 0.3$	0			Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.2$	Ignore			$0.2 < \Phi \leq 0.5$	2(distance $\geq 10\text{mm}$)			$\Phi > 0.5$	0		
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$\Phi > 0.5$	0																																																																		
	Line defect (LCD/TP /Polarizer black/white line, scratch, stain)	<table><tr><th rowspan="2">Width (mm)</th><th rowspan="2">Length (mm)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>$\Phi \leq 0.03$</td><td>Ignore</td><td colspan="3">Ignore</td></tr><tr><td>$0.03 < W \leq 0.05$</td><td>$L \leq 3.0$</td><td colspan="3">$N \leq 2$</td></tr><tr><td>$0.05 < W \leq 0.08$</td><td>$L \leq 2.0$</td><td colspan="3">$N \leq 2$</td></tr><tr><td>$0.08 < W$</td><td colspan="4">Define as spot defect</td></tr></table>	Width (mm)	Length (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.03$	Ignore	Ignore			$0.03 < W \leq 0.05$	$L \leq 3.0$	$N \leq 2$			$0.05 < W \leq 0.08$	$L \leq 2.0$	$N \leq 2$			$0.08 < W$	Define as spot defect																																								
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$0.05 < W \leq 0.08$	$L \leq 2.0$	$N \leq 2$																																																																	
$0.08 < W$	Define as spot defect																																																																		

3.0	Polarizer Bubble	<table><tr><th rowspan="2">Zone Size (mm)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>$\Phi \leq 0.2$</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>$0.2 < \Phi \leq 0.4$</td><td colspan="2">2 (distance $\geq 10\text{mm}$)</td></tr><tr><td>$0.4 < \Phi \leq 0.6$</td><td colspan="2">1</td></tr><tr><td>$0.6 < \Phi$</td><td colspan="2">0</td></tr></table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.2$	Ignore		Ignore	$0.2 < \Phi \leq 0.4$	2 (distance $\geq 10\text{mm}$)		$0.4 < \Phi \leq 0.6$	1		$0.6 < \Phi$	0			
Zone Size (mm)	Acceptable Qty																							
	A	B	C																					
$\Phi \leq 0.2$	Ignore		Ignore																					
$0.2 < \Phi \leq 0.4$	2 (distance $\geq 10\text{mm}$)																							
$0.4 < \Phi \leq 0.6$	1																							
$0.6 < \Phi$	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	<table><tr><th rowspan="2">Size Φ (mm)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>$\Phi \leq 0.1$</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>$0.1 < \Phi \leq 0.2$</td><td colspan="2">2 (distance $\geq 10\text{mm}$)</td></tr><tr><td>$0.2 < \Phi \leq 0.3$</td><td colspan="2">1</td></tr><tr><td>$0.3 < \Phi$</td><td colspan="2">0</td></tr></table>	Size Φ (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore		Ignore	$0.1 < \Phi \leq 0.2$	2 (distance $\geq 10\text{mm}$)		$0.2 < \Phi \leq 0.3$	1		$0.3 < \Phi$	0		
		Size Φ (mm)	Acceptable Qty																					
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$0.1 < \Phi \leq 0.2$	2 (distance $\geq 10\text{mm}$)																							
$0.2 < \Phi \leq 0.3$	1																							
$0.3 < \Phi$	0																							
	Assembly deflection	beyond the edge of backlight $\leq 0.15\text{mm}$																						
		Newton Ring area$>1/3$ TP area NG Newton Ring Newton Ring area$\leq 1/3$ TP area OK	 1 规律性  2 非规律性  似牛顿环																					

			TP corner broken X: length Y: width Z: height	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>$X \leq 3.0\text{mm}$</td><td>$Y \leq 3.0\text{mm}$</td><td>$Z < \text{LCD thickness}$</td></tr></table> * Circuitry broken is not allowed.	X	Y	Z	$X \leq 3.0\text{mm}$	$Y \leq 3.0\text{mm}$	$Z < \text{LCD thickness}$	Z 
X	Y	Z									
$X \leq 3.0\text{mm}$	$Y \leq 3.0\text{mm}$	$Z < \text{LCD thickness}$									
			TP edge broken X: length Y: width Z: height	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>$X \leq 6.0\text{mm}$</td><td>$Y \leq 2.0\text{mm}$</td><td>$Z < \text{LCD thickness}$</td></tr></table> * Circuitry broken is not allowed.	X	Y	Z	$X \leq 6.0\text{mm}$	$Y \leq 2.0\text{mm}$	$Z < \text{LCD thickness}$	
X	Y	Z									
$X \leq 6.0\text{mm}$	$Y \leq 2.0\text{mm}$	$Z < \text{LCD thickness}$									

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	CONDITION	STANDARD
1	High Temp. Storage	65°C, 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	-25°C, 12 hours	
3	High Temp. Operation	60°C, 12 hours	
4	Low Temp. Operation	-20°C, 12 hours	
5	High temperature and high Humidity storage	40°C, 90%RH , 12 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.
6	Thermal and cold shock	Static state, -20°C (30 Min) ~70°C (30 Min) ~-20°C (30Min), packaging, 10 cycles	
7	Vibration test	Packaging, Frequency : 10-55Hz Amplitude : 1.0mm, Each direction on X,Y axe 0.5 heure, circle 2 hours	
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 M Ω .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.

11.3 Safety 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°C and 35°C.
- 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.

12.Packing method

-----TBD-----