

Shenzhen Leadtek Electronics Co.,Ltd

PRODUCT SPECIFICATION

TFT-LCD MODULE

Module No: LTK021SQBLM14-V0

☒ Preliminary Specification

☐ Approval Specification

Designed by	Checked by	Approved by
<i>jona</i>	<i>tom</i>	<i>lan</i>

Final Approval by Customer

Approved by	Comment

※The specification of "TBD" should refer to the measured value of sample . If there is difference between the design specification and measured value, we naturally shall negotiate and agree to solution with customer.



1.Document Revision History

Version	Contents	Date	Note
V0	Original	2023.06.15	



2.GENERAL INFORMATION

Item	Specification	Unit
LCD size	2.1	inch
Display Mode	Normally Black	--
Resolution	480(RGB)x480	Pixel
Pixel pitch	0.111(H) x 0.111(V)	mm
Pixel Arrangement	RGB Vertical Stripe	
Viewing direction	Free	-
Module outline dimension	56.18 (H)*59.71 (V)*2.2(D)	mm
LCD AA	53.28 (H)* 53.28 (V)	mm
TP VA	--	mm
Colors	16.7M	-
Weight	-	g
Driver IC	ST7701S	-
Driver IC RAM Sise	—	-
Interface	RGB	--
Backlight	White LED	--
Touch IC	--	--
Surface hardness	--	--
Support points	--	--
Touch structure	--	--
Cover lens	--	--
Colors	--	--
Operating Temperature	-20℃~ +60℃	--
Storage Temperature	-30℃~ +70℃	--

3.ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit	Note
Power Supply voltage 1	VCI~GND	-0.3	+4.6	V	
Power Supply voltage 2	IOVCC~GND	-0.3	+4.6	V	
Logic Input Voltage Range	V _{IN}	-0.3	IOVCC+0.5	V	
Logic Output Voltage Range	V _O	-0.3	IOVCC+0.5	V	
Operating temperature	Topr	-20	+60	°C	
Storage temperature	Tstg	-30	+70	°C	

* The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

4.DC ELECTRICAL CHARACTERISTICS

4.1 Driving TFT LCD Panel

AGND = GND = 0V, Ta = 25°C

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage for analog circuit	VCI	2.5	2.8	3.6	V
Supply voltage for logic circuit	IOVCC	1.65	1.8	3.3	V
Input voltage 'H'level	V _{IH}	0.7*IOVCC	—	IOVCC	V
Input voltage 'L'level	V _{IL}	GND	—	0.3*IOVCC	V
Output voltage 'H'level	V _{OH}	0.8*IOVCC	—	IOVCC	V
Output voltage 'L'level	V _{OL}	GND	—	0.2*IOVCC	V

4.2 Backlight Characteristics

Ta = 25°C

Item	Symbol	Min	Typ	Max	Unit	Condition
Forward voltage	V _f	2.8	3	3.2	V	If=80mA
Luminance	LV	6000	-	—	cd/m ²	
Number of LED	-	1X4			Piece	-
Connection mode	S/P	1Serial/4Parallel			-	-

Using condition: constant current driving method If= 4×20mA (+/-10%)

5.TIMING CHARACTERISTICS

5.1 Serial Interface Characteristics(3-line serial)

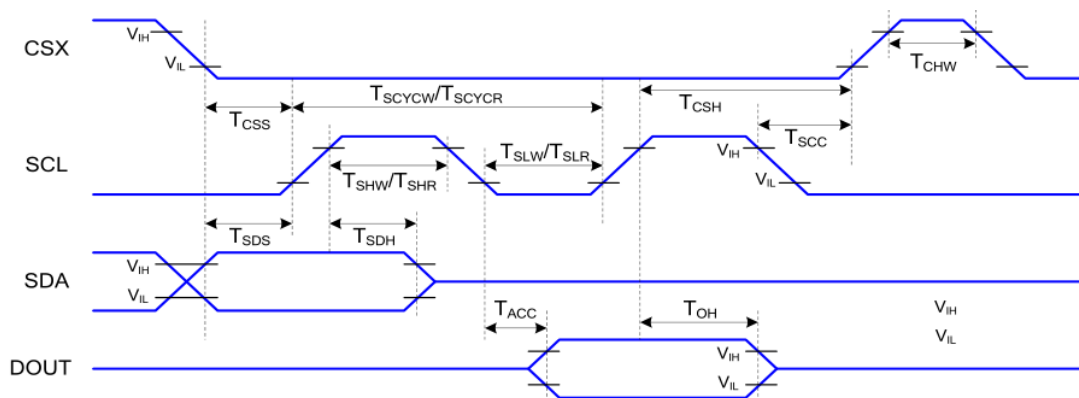


Figure 5.1 3-line serial Interface Timing Characteristics

Ta=25°C, IOVCC=1.65~3.7V, VCC=2.5~3.7V

Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	T _{CS} S	Chip select setup time(write)	15	-	ns	
	T _{CS} H	Chip select hold time(write)	15	-	ns	
	T _{CS} S	Chip select setup time(read)	60	-	ns	
	T _{SC} C	Chip Select hold time(read)	60	-	ns	
	T _{CH} W	Chip Select 'H' pulse width	40	-	ns	
SCL	T _{SC} YCW	Serial clock cycle(write)	66	-	ns	Write Command & Data Ram
	T _{SH} W	SCL 'H' pulse width(write)	15	-	ns	
	T _{SL} W	SCL 'L' pulse width(write)	15	-	ns	
	T _{SC} YCR	Serial clock cycle(read)	150	-	ns	Read Command & Data Ram
	T _{SH} R	SCL 'H' pulse width(read)	60	-	ns	
	T _{SL} R	SCL 'L' pulse width(read)	60	-	ns	
SDA (DIN)	T _{SD} S	Data setup time	10	-	ns	
	T _{SD} H	Data hold time	10	-	ns	

Note : The rising time and falling time (Tr, Tf) of input signal are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of IOVCCfor Input signals.

Table 5.1 3-line Serial Interface Characteristics

5.2 RGB Interface Characteristics

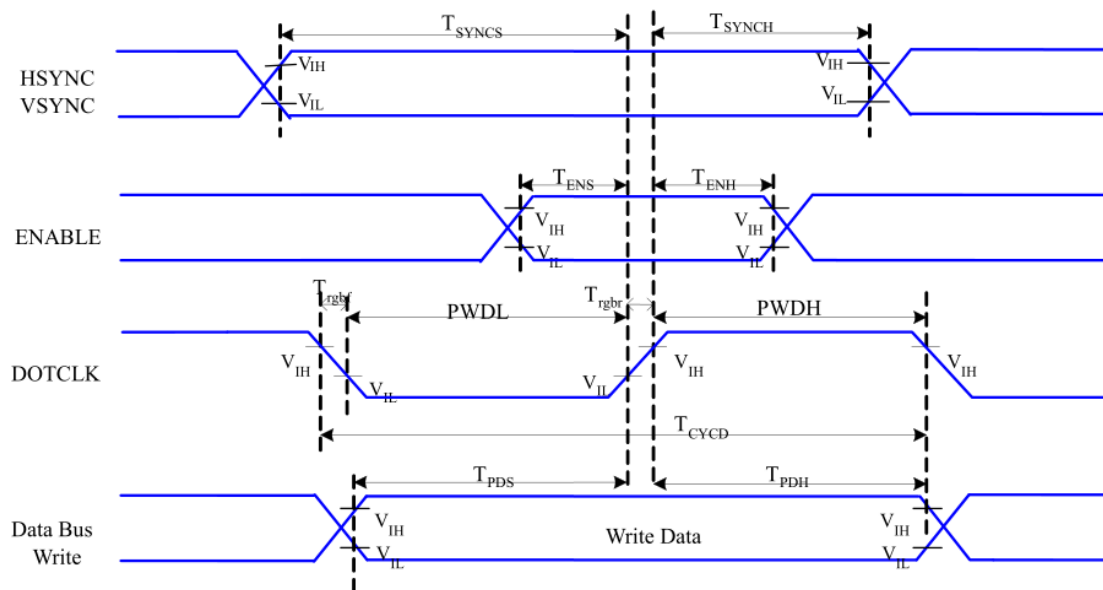


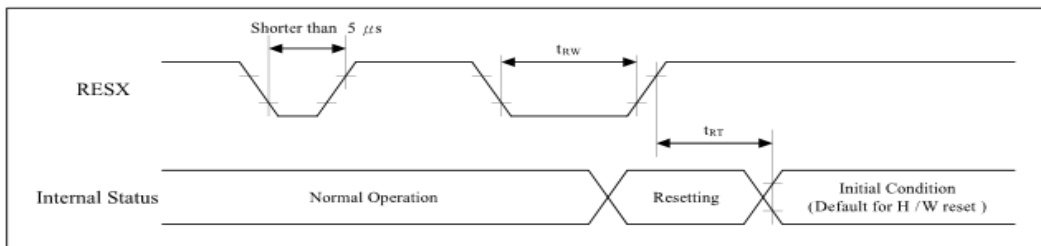
Figure 5.2.1 RGB Interface Timing Characteristics

$T_a=25^{\circ}\text{C}$, $\text{IOVCC}=1.8\text{V}$, $\text{VCC}=2.8\text{V}$

Signal	Symbol	Parameter	Min	Max	Unit	Description
HSYNC, VSYNC	T_{SYNCS}	VSYNC,HSYNV Setup Time	5	-	ns	
ENABLE	T_{ENS}	Enable setup time	5	-	ns	
	T_{ENH}	Enable hold time	5	-	ns	
DOTCLK	PWDH	DOTCLK High-level Pulse Width	15	-	ns	
	PWDL	DOTCLK Low-level Pulse Width	15	-	ns	
	T_{CYCD}	DOTCLK Cycle Time	33	-	ns	
	T_{rghr} , T_{rghf}	DOTCLK Rise/Fall time.	-	15	ns	
DB	T_{PDS}	PD Data Setup Time	5	-	ns	
	T_{PDH}	PD Data Hold Time	5	-	ns	

Table 5.2.2 18/16 Bits RGB Interface Timing Characteristics

6. Reset Timing



Signal	Symbol	Parameter	Min.	Max.	Unit
RESX	t_{RW}	Reset pulse duration	10(Note)	-	us
	t_{RT}	Reset cancel	-	10(Note)	ms
			-	120(Note)	ms

Notes:

- The reset cancel also includes required time for loading ID bytes, VCOM setting and other settings from EEPROM (or similar device) to registers.

This loading is done every time when there is HW reset cancel time (t_{RT}) within 10 ms after a rising edge of RESX.

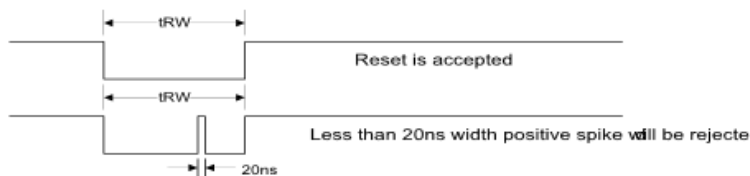
- Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below :

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9us	Reset starts

- During the Resetting period, the display will be blanked(The display is entering blanking sequence, which maximum time is 120 ms, when Reset

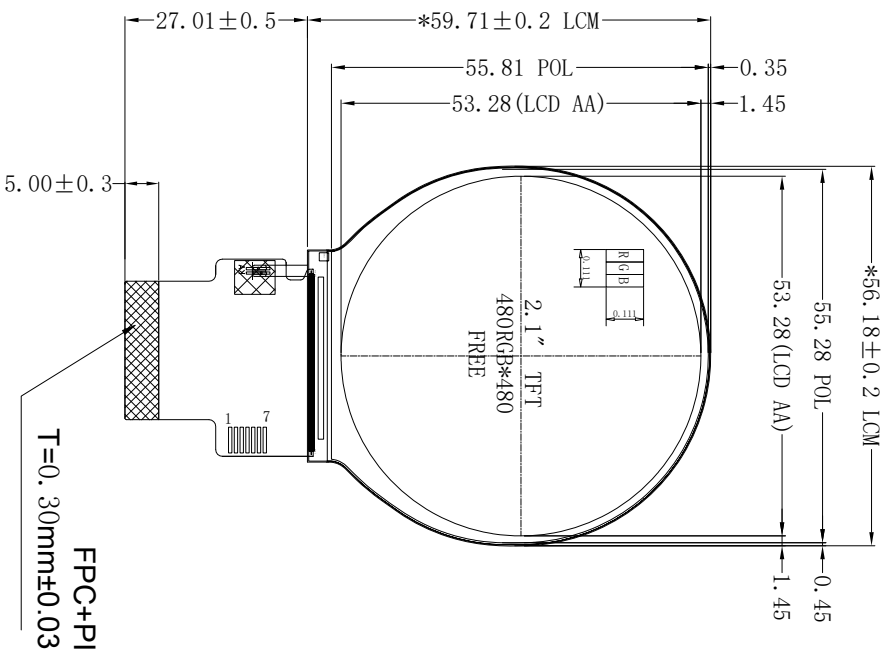
Starts at Sleep-Out status. The display remains the blank state in Sleep-In mode). Then return to Default condition for Hardware Reset

- Spike Rejection also applies during a valid reset pulse as shown below :

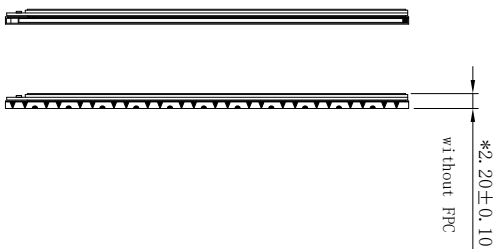


- When Reset applied during Sleep-In Mode.
- When Reset applied during Sleep-Out Mode
- It is necessary to wait 10ms after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120 ms.

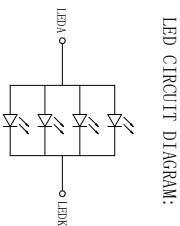
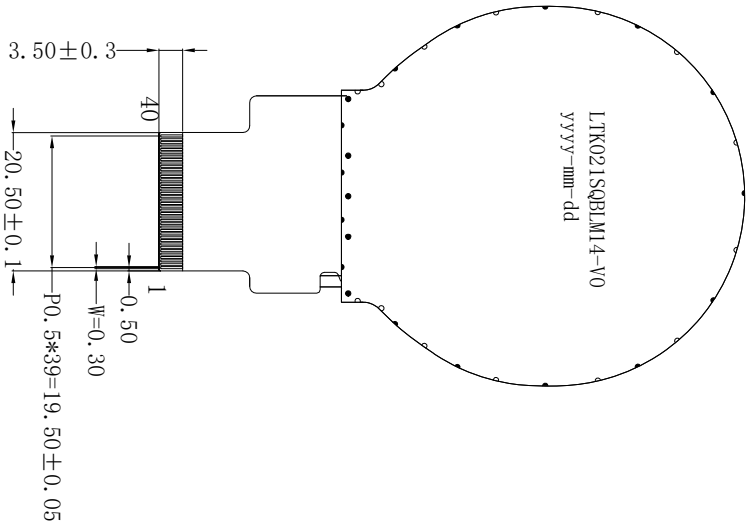
Front View



Side View



Back View



If=80mA, Vf=3.0V (Typ)

3

2

1

REV

NEW

DESCRIPTION

3

2

1



LEADTEK COMPANY LIMITED

LEADTEK DISPLAY

SCALE: 1/1	UNIT: mm	PAGE: 1/1	APPROVE	CHECK	DRAWN
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PART NO:	LTK021SQBLM14	VER: V0			
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CUSTOMER NO:					IAN
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PIN	SYMBOL
1	LED1
2	LED1
3	LED1
4	GND
5	VCI
6	RESET
7	IOVCC
8	GND
9	SDA
10	SCK
11	CS
12	PCLK
13	DE
14	VSYNC
15	HSYNC
16	DB0
17	DB1
18	DB2
19	DB3
20	DB4
21	DB5
22	DB6
23	DB7
24	DB8
25	DB9
26	DB10
27	DB11
28	DB12
29	DB13
30	DB14
31	DB15
32	DB16
33	DB17
34	GND
35	TP_INT
36	TP_SDA
37	TP_SCL
38	TP_RESET
39	TP_VCI
40	GND

- Notes:
1. Display : 2.1", TFT
 2. Resolution: 480xRGBx480
 3. LCD Viewing Direction: ALL
 4. Drive IC: ST7701S
 5. Display Mode: Normally Black/Transmissive
 6. LCM Brightness: 360cd/m² (Typ), uniformity ≥80%
 7. unmark Tolerance: ±0.2
 8. OPERATING TEMP: -20° C ~ +60° C
 9. STORAGE TEMP: -30° C ~ +70° C
 10. Requirements on Environmental Protection: ROHS

8.INTERFACE SIGNAL

Pin No.	Symbol	Description
1	LED A	LED backlight anode
2	LED K1	LED backlight cathode
3	LED K2	LED backlight cathode
4	GND	Power ground
5	VCI	Analog power supply
6	RESET	Reset signal(low active)
7	IOVCC	Power supply for the logic power and I/O circuit.
8	GND	Power ground
9	SDA	Serial data input pin in serial bus system interface
10	SCK	Pixel clock signal input pin
11	CS	Chip select
12	PCLK	Pixel clock signal in RGB interface
13	DE	Data enable signal in RGB I/F mode
14	VS YNC	Vertical synchronizing signal input pin
15	HS YNC	Horizontal synchronizing signal input pin
16-33	DB0-DB17	Data bus
34	GND	Power ground
35	TP_INT	INT pin for CTP
36	TP_SDA	SDA pin for CTP
37	TP_SCL	SCL pin for CTP
38	TP_RESET	Reset pin for CTP
39	TP_VCI	Power supply for CTP
40	GND	Power ground

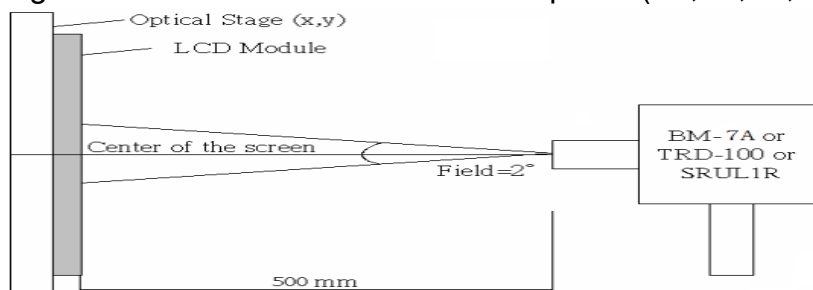
9.ELECTRO-OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Transmittance (w/o polarizer)	T%	$\theta=0^\circ$ $T_a=25^\circ\text{C}$	-	4	-	%	1
Contrast ratio	Cr		800	1000	-	-	3
Response time	Ton+Toff		-	30	35	ms	4
Surface Luminance	LV		--	360	-	cd/m ²	2
Viewing angle range	H or V er	Θ_{x+}	-	85	-	deg	5
		Θ_{x-}	-	85	-	deg	
		Θ_{y+}	-	85	-	deg	
		Θ_{y-}	-	85	-	deg	
CIE(x,y) chromaticity	Red	x	0.591	0.621	0.651	-	6
		y	0.320	0.350	0.380	-	
	Green	x	0.294	0.324	0.354	-	
		y	0.609	0.639	0.669	-	
	Blue	x	0.114	0.144	0.174	-	
		y	0.034	0.064	0.094	-	
	White	x	0.250	0.280	0.310	-	
		y	0.295	0.325	0.355	-	

Note 1.Ambient condition: $25^\circ\text{C}\pm 2^\circ\text{C}$, $60\pm 10\%\text{RH}$, under 10 Lux in the darkroom。

Note 2.Measure device: BM-7A (TOPCON), viewing cone= 2°

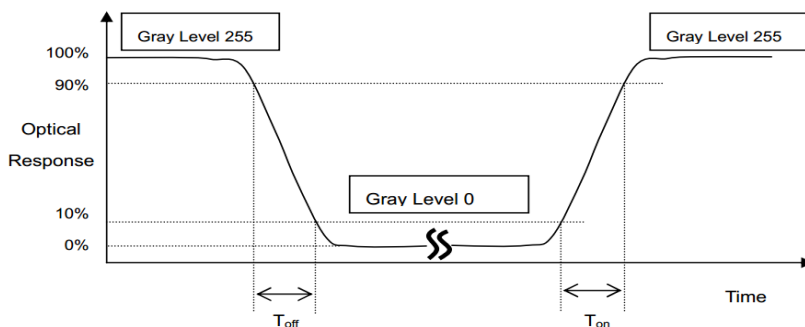
Lv = Average Surface Luminance with all white pixels (P1,P2,P3,P4,P5)



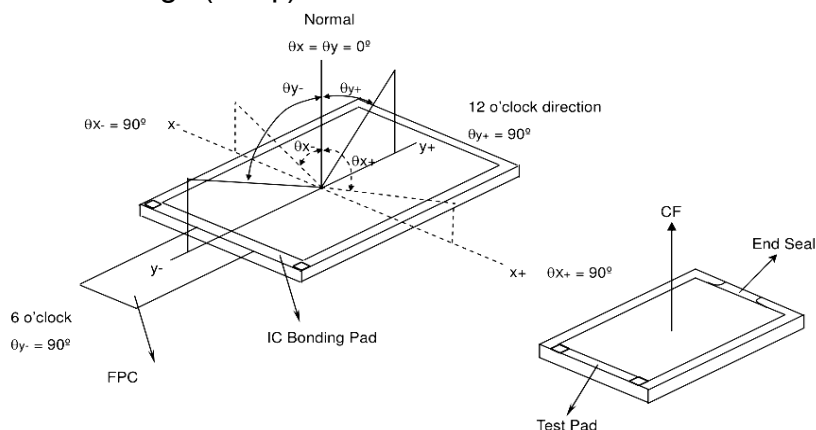
Note 3. Definition of Contrast Ratio:

$$CR = \frac{\text{Average Surface Luminance with all black pixels (P1,P2,P3,P4,P5)}}{\text{Average Surface Luminance with all white pixels (P1,P2,P3,P4,P5)}}$$

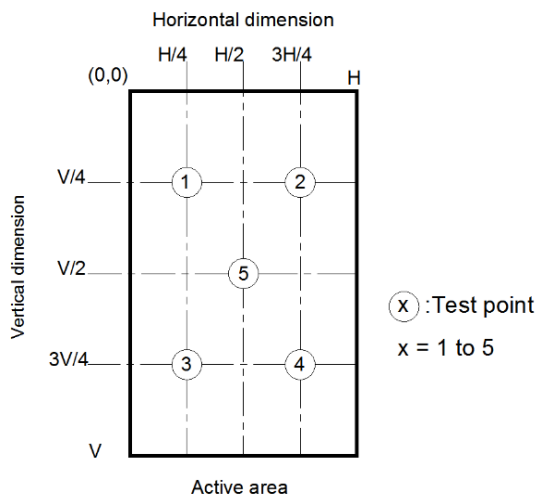
Note 4. Definition of Response Time (Ton, Toff), The response time is defined as the time interval between the 10% and 90% amplitudes.



Note 5. Definition of view angle(θ , ψ):



Note 6. The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE(x,y) chromaticity.



Light spot size $\varnothing = 7\text{mm}$, 500mm distance from the LCD surface to detector lens measurement instrument is TOPCON's luminance meter BM-7

10.RELIABILITY TEST

Reliability test conditions (Polarizer characteristics null)

No.	Items	Condition	Inspection after test
1	High Temperature Storage	T = 70℃ ± 2℃ for 48 hr	Inspection after 4 hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD 2.Sealleak; 3.Non-display; 4.missing segments; 5.Glass crack; 6.Current Idd is twice higher than initial value.
2	Low Temperature Storage	T = -30℃ ± 2℃ for 48 hr	
3	High Temperature Operating	T = 60℃ ± 2℃ for 48 hr	
4	Low Temperature Operating	T = -20℃ ± 2℃ for 48 hr (But no condensation of dew)	
5	High Temp. and High Humidity Operating	T = 60℃ ± 5℃ /90% for 48 hr (But no condensation dew)	
6	Thermal Shock	-20±2℃~25~70±2℃×10cycles (30min.) (5min.) (30min.)	
7	Dropping test (non-operation)	Drop to the ground from 76cm height, one time, every side of carton. (Packing condition)	
8	Packing Vibration (non-operation)	Frequency: 10Hz~55Hz~10Hz Amplitude: 1.0mm, X, Y, Z direction for total 3hours (Packing condition)	
9	ESD	Voltage:±6KV R: 330Ω C: 150pF Air discharge, 10time	

Note:

- (1)The test samples should be applied to only one test item.
- (2)Sample size for each test item is 5~10pcs.
- (3)In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.
Using ionizer(an antistatic blower) is recommended at working area in order to reduce electro-static voltage.
When removing protection film from LCM panel, peel off the tag slowly (recommended more than one second) while blowing with ionizer toward the peeling face to minimize ESD which may damage electrical circuit.
- (4) Please use automatic switch testing mode when test operating mode.

11. PRECAUTIONS FOR USE OF LCD MODULES

1. Handling Precautions

- (1) The display panel is made of glass and polarizer. As glass is fragile. It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock by dropping it or impact.
- (2) If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.
- (3) Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary. Do not touch the display with bare hands. This will stain the display area and degraded insulation between terminals (some cosmetics are determined to the polarizer).
- (4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizer. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.
- (5) If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents
 - Isopropyl alcohol
 - Ethyl alcoholDo not scrub hard to avoid damaging the display surface.
- (6) Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.
 - Water
 - Ketone
 - Aromatic solventsWipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading. Avoid contacting oil and fats.
- (7) Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.
- (8) Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.
- (9) Do not attempt to disassemble or process the LCD module.
- (10) NC terminal should be open. Do not connect anything.
- (11) If the logic circuit power is off, do not apply the input signals.
- (12) Electro-Static Discharge Control, Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC. To prevent destruction of

the elements by static electricity, be careful to maintain an optimum work environment.

- Before remove LCM from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential. Be sure to ground the body when handling the LCD modules.
- Tools required for assembling, such as soldering irons, must be properly grounded. Make certain the AC power source for the soldering iron does not leak. When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.
- To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions. To reduce the generation of static electricity be careful that the air in the work is not too dried. A relative humidity of 50%-60% is recommended. As far as possible make the electric potential of your work clothes and that of the work bench the ground potential
- The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated

(13) Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.

- Do not alter, modify or change the shape of the tab on the metal frame.
- Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
- Do not damage or modify the pattern writing on the printed circuit board.
- Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.
- Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
- Do not drop, bend or twist LCM.

2. Storage precautions

2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0℃ ~ 40℃ Relatively humidity: ≤80%

2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

2.4 The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.



深圳市丽台电子有限公司

Shenzhen Leadtek Electronics Co.,Ltd

Quality Inspection Standards

品质允收标准

Model No. / 产品型号: Applies 0.95~5.0 Inch Touch Display Screen

Updated Date / 生效日期: 2022-05-20

Version / 版本: A0

Customer confirmation : _____

Record of Revision / 修订履历

Version / 版本	Revision Record / 修订内容	Reviser / 修订人	Revision Date / 修订日期
V0	首发 / Starting	Green	2022.05.20

1.Scope of application /适用范围.

This document shall be applied to 0.95~5.0 inch touch display screen.

本文件适用于0.95~5.0 寸触摸显示屏.

2.Inspection conditions and environment /检验条件与环境.

2.1 Inspection Conditions /检验条件:

(1) Inspection Distance /检测距离: 35cm ±5cm.

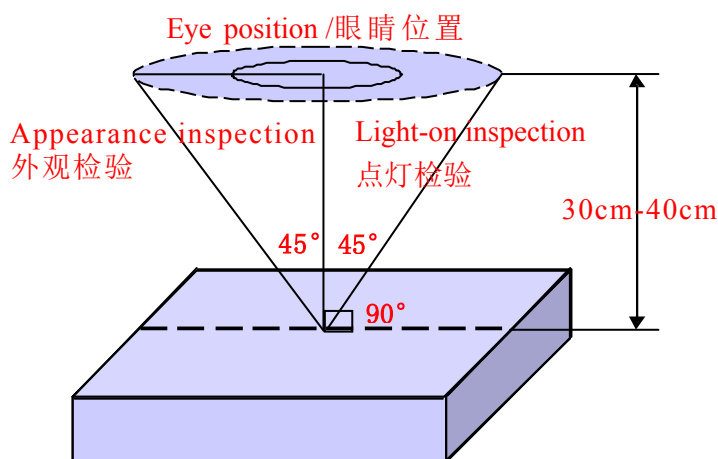
(2) Check time /检验时间:

Displays performance test /功能测试: 2~3S /Image, Cosmetic Inspection /外观检验:10~12S.

(3) Check the viewing angle /检验视角:

Light-on Inspection Angle /点灯检验角度: ±45°.

Cosmetic Inspection Angle /外观检验角度: ±45°.



(Perpendicular to LCD panel surface /垂直于LCD表面)

2.2 Inspection environment /检验环境:

Ambient Temperature 温度		25°C±5°C
Ambient Humidity 湿度		55±5%RH
Ambient Illumination 亮度	Cosmetic Inspection 外观检验	800-1000 Lux
	Functional Inspection 点灯检验	200~300Lux

2.3 Sampling Conditions /抽样条件:

(1) Quantity to be inspected /批量: Quantity of shipment lot per model /单次运送单一型号数量.

(2) Sampling method /抽样方法:

Sampling Plan /抽样计划		GB/T 2828.1- 2003
		Normal Inspection , Single Sampling 正常检验、单次抽样
		General inspection level: II 一般检验水平: 二级
AQL	Major Defect /主要缺陷	0.65
	Minor Defect /次要缺陷	1.0

(3) The classification of Major(MA) and Minor(MI) defects is shown as “3.1 Classification of defects” .
主缺 (MA) 及次缺 (MI) 定义于”3.1缺陷分类”.

3.Terms And Definitions /术语和定义

3.1 Classification of defects / 缺陷分类 :

(1) Major defects /主要缺陷:

A major defect is a defect that is likely to result in failure, or to reduce materially the usability of the product for its intended purpose .

可导致产品功能失效或减少产品可用性的缺陷.

(2) Minor defects /次要缺陷:

It will not cause the product to fail and reduce the defects in the effective use and operation of the product.

不会导致产品功能失效和减少产品的有效使用与操作的缺陷.

3.2 Point defects /点状缺陷:

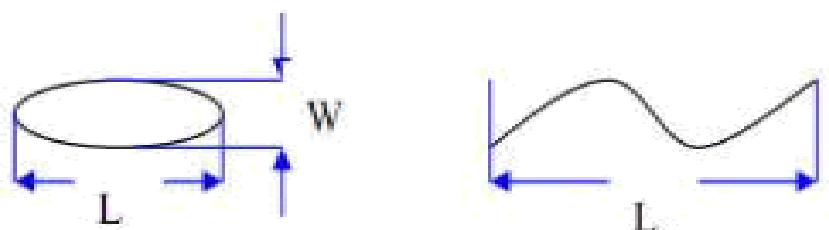
The size of the point defect is defined by the diameter D, and the average diameter of the defect is $D=1/2 (W+L)$.

点状缺陷的大小是由直径 D 定义的, 缺陷的平均直径 $D=1/2(W+L)$.

3.3 Linear defects /线状缺陷:

When defect size $L \geq 2W$, the defect count as liner type defect. Size of linear defect is defined by length (L) and the maximum width (W).

当缺陷尺寸 $L \geq 2W$ 时, 被视为线状缺陷, 线状缺陷是由长度 (L) 和最大宽度 (W) 定义的.



3.4 LCD sub-pixel dot /LCD子像素点

(1) Definition /定义 : The point defect area is greater than 50% of the LCD sub-pixel area, and is visible through ND5% filter masking .

子像素点缺陷面积大于 50% LCD子像素面积, 且透过 ND5%遮盖是可见的.

(2) The drawing of 1/2 area sub-pixel definition / 1/2 面积的子像素定义绘图:

The 1/2 area sub-pixel can be defined as below one or more of specific shapes

1/2 面积的子像素可以定义为如下一个或多个特定形状图:



3.5 Small bright dot /细碎亮点 :

Point defects smaller than "LCD sub-pixels" /小于“LCD子像素点”的点缺陷.

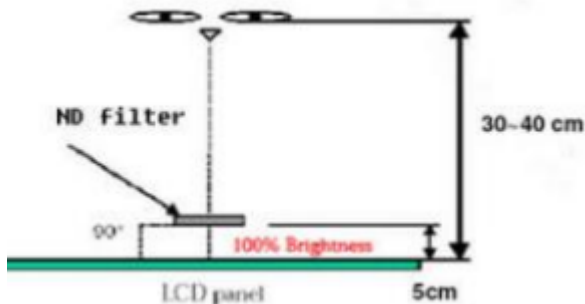
(Ratio of Zone I to Zone O /I 区与 O 区比例: 1: 2: 1)



3.6 ND filter inspection method /ND卡的检验方法:

Hold the ND filter about 5cm above the display area, with your eyes 30-40cm away from the panel, and observe for 2~3 seconds.

在显示区域上方大约 5cm 处握住 ND 卡, 眼睛距离面板 30-40cm, 观察2~3 秒.



3.7 Any FPC surface problems that do not leak copper on the surface and do not cause functional failure are acceptable.

任何 FPC 表面问题, 表面未露铜和不造成功能失效是可以接受的.

3.8 Extraneous substances that can be wiped out , like Finger point,Particles are not considered as a defect .

可以被擦拭干净的表面物质不视为缺陷 (如手指印, 尘粒) .

3.9 Defects that are covered by the material and are not visible to the eye and do not affect the function and use are not considered defects.

会被物料覆盖目视不可见，且不影响功能与使用的缺陷不视为缺陷。

3.10 Panel damage /面板损伤:

Glass damage outside the AA display area that does not affect the effective wiring is acceptable.

AA 显示区域以外的玻璃损伤，不影响有效线路是可以接受的。

3.11 Issues not specified or defined in this acceptance standard shall be handled through friendly negotiation between the two parties.

本允收标准中未规定或定义的问题，双方友好协商处理。

4. Inspection standards /检验标准

4.1 Structural Dimensions /结构尺寸规格

Serial Number 序号	Measurement items /测量项目		Specification /规格	Remark /备注
	名称 /Name	Unit /单位	Tolerance /公差	
1	Outside dimension: Length 尺寸: 长	mm /毫米	0.10mm~0.20mm	Please refer to the product specification for detailed dimensions and tolerances 详细的尺寸规格和公差请参考产品规格书
2	Outside dimension: Width 尺寸: 宽	mm /毫米	0.10mm~0.2mm	
3	Outside dimension: Thickness 尺寸: 厚	mm /毫米	0.20mm~0.30mm	

4.2 Appearance Inspection Specification /外观检验规格

(D : diameter, W : width, L : length, N : quantity, DS : spacing)

Inspection area 检验区域	Inspection items 检验项目	Inspection specifications 检验规格	Defect category 缺陷类别	
Glass 玻璃	Wire(on Array) 线路	Can't be damaged 不能损伤	MA	
	Chipping/corner breaking 崩边/破角	Can't affect the effective lines and functions 不能影响有效线路和功能	MA	
	Edge 边缘	There must be no extensional cracks 不可有延伸性裂纹	MA	
Silicone 硅胶	Silicone coating 硅胶涂布	The height must not exceed the LCD CF surface 高度不能超过LCD CF面		MI
	Glue overflow 溢胶	Can't cover FPC, POL, etc 不能覆盖到FPC、POL等		MI

Inspection area 检验区域	Inspection items 检验项目	Inspection specifications 检验规格	Defect category 缺陷类别	
PCBA FPC Connector 连接器	Appearance 外观	Scratches or injuries are not allowed to cause copper exposure 划伤或损伤不允许表面出现露铜		MI
	Component 元器件	Can't be damaged and lack 不能损伤和缺少	MA	
	Gold finger oxidation 金手指氧化	Not allowed 不允许		MI
	Connection status 连接状况	The connection must be accurate and stable 必须准确稳定连接	MA	
	Break 破裂	Not allowed 不允许	MA	
	Soldering, false soldering/tinning/tin beads 假焊/连锡/锡珠	Not allowed 不允许	MA	
POL 偏光片	Scratches 划伤	1. $W \leq 0.05\text{mm}$; $L \leq 5\text{mm}$, Ignore (忽略) 2. $0.05\text{mm} < W \leq 0.10\text{mm}$; $L \leq 5\text{mm}$; $N \leq 3$; $DS \geq 10\text{mm}$ 3. $0.10\text{mm} < W$; $5\text{mm} < L$, Not allowable (不允许)		MI
	Dent 凹凸印	1. $D \leq 0.15\text{mm}$, Ignore (忽略) 2. $0.15\text{mm} < D \leq 0.30\text{mm}$; $N \leq 3$; $DS \geq 10\text{mm}$ 3. $0.30\text{mm} < D$, Not allowable (不允许)		MI
	Bubbles 气泡	1. $D \leq 0.15\text{mm}$, Ignore (忽略) 2. $0.15\text{mm} < D \leq 0.30\text{mm}$; $N \leq 3$; $DS \geq 10\text{mm}$ 3. $0.30\text{mm} < D$, Not allowable (不允许)		MI
	Point defects 点状不良	1. $D \leq 0.15\text{mm}$, Ignore (忽略) 2. $0.15\text{mm} < D \leq 0.30\text{mm}$; $N \leq 3$; $DS \geq 10\text{mm}$ 3. $0.30\text{mm} < D$, Not allowable (不允许)		MI
	Edge bubbles 边缘气泡	1. Within 1/2BM of the display area, it is not allowed 显示区往外 1/2BM 区域内, 不允许 2. The display area is 1/2 outside the BM area, and it is not controlled 显示区往外1/2BM区域以外, 不管控		MI
	Dirty/watermarked 脏污/水印	No dirt/water lines/finger marks are allowed, and must be wiped clean 不允许有脏污/水印/手指印, 须擦拭干净方可		MI
	Warping 起翘	Not allowed 不允许		MI
	Attaching offset 贴偏	It is necessary to completely cover the display area outward, within the 1/2BM area, or without leaking POL edges after TP is attached 需完整覆盖显示区往外、1/2BM区以内或贴合TP后不会出现漏偏光片边缘		MI
	Mixture 混料	Mixing different types of POL or not using POL as required by the BOM, not allowed 不允许混贴不同型号的POL或未按BOM要求使用POL	MA	

Inspection area 检验区域	Inspection items 检验项目	Inspection specifications 检验规格	Defect category 缺陷类别	
TP&CG	Point defects 点状不良	1. $D \leq 0.15\text{mm}$, Ignore (忽略) 2. $0.15\text{mm} < D \leq 0.30\text{mm}$; $N \leq 3$; $DS \geq 10\text{mm}$ 3. $0.30\text{mm} < D$, Not allowable (不允许)		MI
	Scratches 划伤	1. $W \leq 0.05\text{mm}$; $L \leq 5\text{mm}$, Ignore (忽略) 2. $0.05\text{mm} < W \leq 0.10\text{mm}$; $L \leq 5\text{mm}$; $N \leq 3$; $DS \geq 10\text{mm}$ 3. $0.10\text{mm} < W$; $5\text{mm} < L$, Not allowable (不允许) 4. There is a feeling scratch, Not allowable 有感划伤, 不允许		MI
	Edges and corners cracked 崩角/崩边	1. Product front / 产品正面: Edge and corner chipping is not allowed 崩角、崩边不允许 2. Product back / 产品背面: $X \leq 0.5$, $Y \leq 0.5$, $Z \leq 1/2T$; $N \leq 3$; $DS \geq 10\text{mm}$		MI
	Silk screen 丝印	The silk screen is clear, complete and correct 丝印清晰、完整、内容正确		MI
	Dirty 脏污	Non-wipeable dirt, not allowed 不可擦拭的脏污, 不允许		MI
	Broken 破损	Not allowable 不允许	MA	
	Ink color aberration 油墨色差	$\Delta E > 1$, Not allowable (不允许)		MI
	Cover pinholes 针孔	1. $D \leq 0.10\text{mm}$, $N \leq 3$, $DS \geq 10\text{mm}$, allowable 2. $D > 0.10\text{mm}$, intensive pinholes (密集型针孔), Not allowable (不允许)		MI
	IR holes IR孔	Dirt, deviation, color difference, etc. are not allowed 不允许脏污、偏位、色差等		MI
BL 背光	Backlight separation 背光分离	Not allowable 不允许		MI
	Deformation of rubber iron and rubber frame 胶铁、胶框变形	Use the plug gauge 0.3mm on the flat surface and can snap in and judge NG 在平面上使用塞规0.3mm卡翘曲位置, 能卡进判定NG		MI
	The iron frame is oxidized and not tightened 铁框氧化、卡不紧	Not allowable 不允许		MI
	Backlight sticky solder beads, glue, etc 背面粘锡珠、残胶等	Not allowable 不允许		MI
	Lnkjet coding , Barcode , QR code 喷码/条码/二维码	The lmkjet coding is clear and complete, the barcode and QR code can be scanned normally, and the content and format match 喷码清晰完整、条码和二维码可正常扫描, 内容和格式相符		MI
	Accessories (protective film, double-sided tape, insulating adhesive, etc.) 辅料 (保护膜、双面 胶、绝缘胶等)	Defects such as missing pastes, sticking deviations, defects, and fractures are not allowed 不允许有漏贴、贴偏、残缺、断裂等缺陷		MI

4.3 Electrical test specifications /电性检查规格

(D : diameter, W : width, L : length, N : quantity, DS : spacing)

Inspection items 检验项目	Inspection specifications 检验规格	Defect category 缺陷类别	
Glass bright spots/dark spots 玻璃亮点/暗点	1. $D \leq 0.15\text{mm}$, Ignore (忽略) 2. $0.15\text{mm} < D \leq 0.30\text{mm}$; $N \leq 3$; $DS \geq 10\text{mm}$ 3. $0.30\text{mm} < D$, Not allowable (不允许)		MI
Mura	Use ND5% filter masking, visual invisibility is OK, 200~300Lux 使用ND5%遮盖, 目视不可见即为OK, 200~300Lux		MI
Small bright dot 细碎亮点	Use ND5% filter masking, visual invisibility is OK 使用ND5%遮盖, 目视不可见即为OK		MI
Light leakage 漏光	1. Use ND5% filter masking, visual invisibility is OK 使用ND5%遮盖, 目视不可见即为OK 2. If necessary, sign off on the sample 必要时, 签限定样		MI
Backlight black/white dots 背光黑点/白点	1. $D \leq 0.15\text{mm}$, Ignore (忽略) 2. $0.15\text{mm} < D \leq 0.30\text{mm}$; $N \leq 3$; $DS \geq 10\text{mm}$ 3. $0.30\text{mm} < D$, Not allowable (不允许)		MI
Linear foreign bodies 线状异物 (异物毛丝等)	1. $W \leq 0.05\text{mm}$; $L \leq 5\text{mm}$, Ignore (忽略) 2. $0.05\text{mm} < W \leq 0.10\text{mm}$; $L \leq 5\text{mm}$; $N \leq 3$; $DS \geq 10\text{mm}$ 3. $0.10\text{mm} < W$; $5\text{mm} < L$, Not allowable (不允许)		MI
Black/White Print 黑印/白印	Use ND5% filter masking, visual invisibility is OK 使用ND5%遮盖, 目视不可见即为OK		MI
The display is uneven 显示不均匀	Use ND5% filter masking, visual invisibility is OK 使用ND5%遮盖, 目视不可见即为OK		MI
The brightness is uneven 亮度不均匀	Brightness uniformity $< 85.0\%$, Not allowable 亮度均匀性 $< 85.0\%$, 不允许		MI
Displacement of the membrane 膜材移位	Not allowable 不允许		MI
Interference pattern/Newtonian pattern 干涉纹/牛顿纹	Not allowable 不允许		MI
Display abnormal 显示异常	Not allowable 不允许	MA	
No display 无显示	Not allowable 不允许	MA	
Line/Missing Drawing 线条/缺画	Not allowable 不允许	MA	
Splash screen 闪屏	Not allowable 不允许	MA	
LCD grid LCD网格	Not allowable 不允许	MA	
Afterimage 残影	Not allowable 不允许	MA	
Wrong viewing angle 视角错误	Not allowable 不允许	MA	
No touch 无触摸	Not allowable 不允许	MA	
Touch the jump point 触摸跳点	Not allowable 不允许	MA	
Not sensitive 触摸不灵敏	Not allowable 不允许	MA	