



# Specification of Display

## Module

Customer Model Name	
Module Name	PV02016Y0840U
Version No.	V02      2022-07-19

**Customer Approval:**

- Approve Specification Only
- Approve Specification and Sample

Approved By	
Data	

Designed By	Checked By	Approved By
LiuPeng	HeJunCheng	LiXingyuan





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## 1. Introduction

This display module is designed by Kingtech Group Co.,Ltd in Shenzhen China.

All materials and processes of this display module are Lead Free.

## 2. General Specification

### 2.1 LCM General Specification

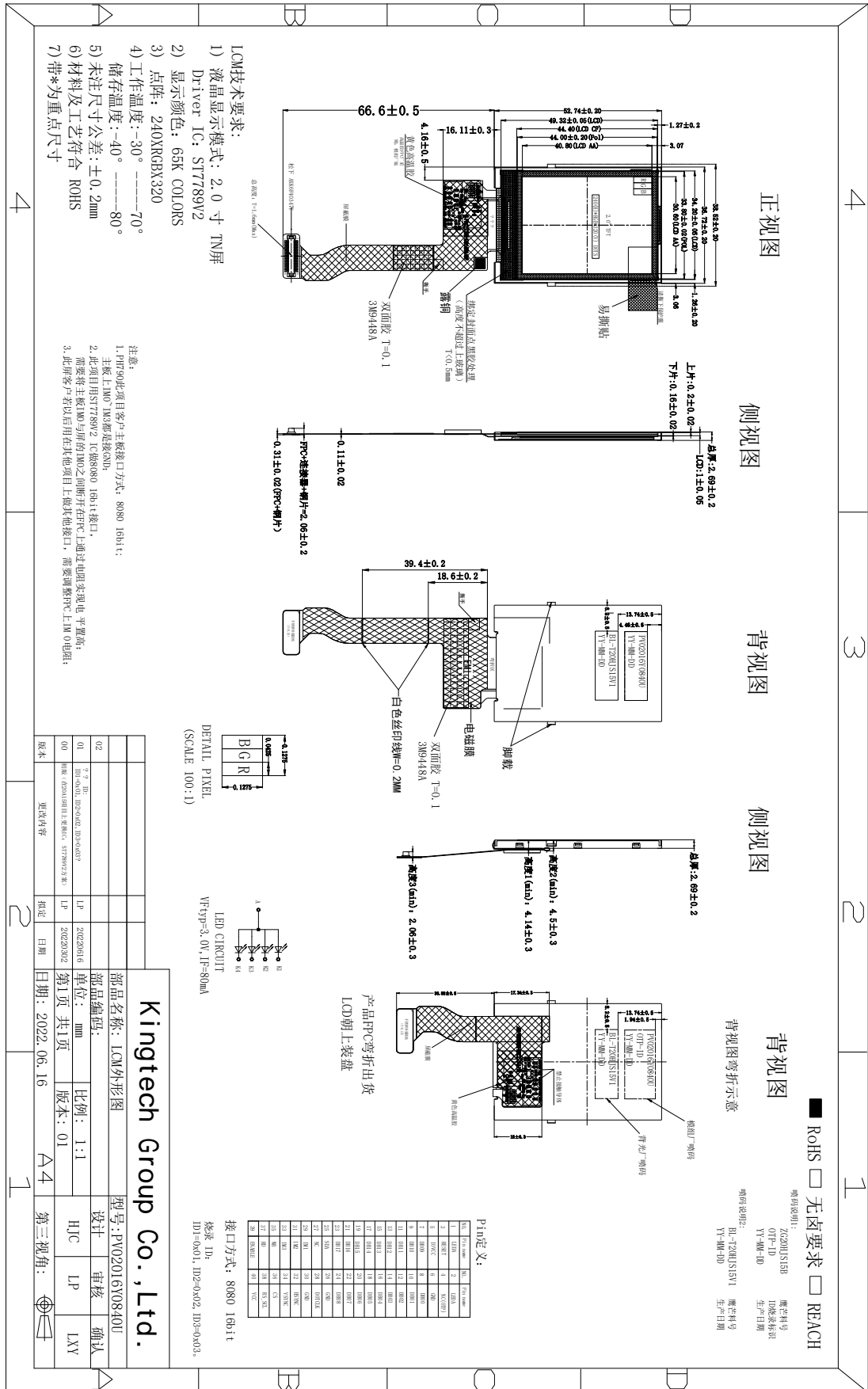
Item	Content	Unit
LCM Size (inch)	2.0	inch
Active Area (W×H)	30.60*40.80	mm
Module Size (W×H×T)	38.52*52.74*2.69	mm
LCD Type	a-Si TFT	/
Recommended Viewing Virection	8:00	/
Number of Dots	240*(RGB)*320	Dots
Pixel Per Inch (PPI)	0.1275*0.1275	/
Driver IC	ST7789V2	/
Interface Type	MCU 、 RGB、 SPI 3len	/
Approx. Weight	TBD	g
Backlight Type	White LED	/
NTSC	25%(Min)	/

### 2.2 TP General Specification

Item	Content	Unit
TP Outline Dimension (W×H×T)	N/D	mm
TP View Area (W×H)	N/D	mm
Lamination Mode with LCM	N/D	/
Touch IC	N/D	/
Interface Type	N/D	/
Touch Structure	N/D	/
Cover Lens Hardness	N/D	/
Lens Surface Treatment	N/D	/



3. Mechanical Drawing





## 4. LCM Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply voltage for logic	IOVCC	1.65	3.3	V
DC/DC converter circuit output	VCC	2.4	3.3	V
Driver Supply Voltage	VGH	14	18	V
Driver Supply Voltage	VGL	-8	-5	V
Input voltage for logic	Vt	1.65	IOVCC +0.3	V
Supply current(LED)	ILED	0	25	mA
Operating temperature	Top	-20	+70	°C
Storage temperature	Tst	-30	+80	°C

## 5. Electrical Characteristics

### 5.1 LCD Electrical Characteristics

Item	Symbol	Min	Typ	Max	Unit
Supply voltage for logic	IOVCC	1.65	1.8	3.3	V
supply voltage for analogic	VCC	2.8	2.8	3.3	V
Input voltage	V <sub>IL</sub>	-0.3	-	0.3 IOVCC	V
	V <sub>IH</sub>	0.8 IOVCC	-	IOVCC	V
Input leakage current	I <sub>LKG</sub>	-	10	15	μA

### 5.2 Backlight Characteristics

Item	symbol	Min.	Typ.	Max	Unit	Condition
Forward voltage	V <sub>f</sub>	2.8	3	3.25	V	If=80mA
Number of LED	-	4			Piece	-
Connection mode	P	4 parallel			-	-



## 6. LCM Optical Characteristics

Item	Symbol	Condition	Specifications			Unit	Remark	
			Min.	Typ.	Max.			
Brightness	Lv	Viewing normal angle $\Theta=0^\circ$	110	140	--	Cd/m2	Note 2	
Contrast Ratio	CR		110	130	--	/	Note 1	
Response Time	Tr+Tf		--	40	50	ms	Note 4	
Chromaticity CIE(x,y)	Red		x	0.460±0.03			/	Note 6
			y	0.291±0.03			/	
	Green		x	0.316±0.03			/	
			y	0.507±0.03			/	
	Blue	x	0.155±0.03			/		
		y	0.128±0.03			/		
	White	x	0.266±0.03			/		
		y	0.286±0.03			/		
Viewing Angle	Hor.	$\theta_{X+}$	25	35	--	Deg.	Note 5	
		$\theta_{X-}$	50	65	--			
	Ver.	$\theta_{Y+}$	15	20	--			
		$\theta_{Y-}$	25	35	--			
Luminance Uniformity	White		80	--	--	%	Note 3	

Remark:

LCM brightness is the test brightness under an external backlit power supply (I=80mA);



Note1. Contrast Ratio (CR) is defined mathematically by the following formula. For more information see FIG 1.:

$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5, P6, P7, P8, P9)}}{\text{Average Surface Luminance with all black pixels (P1, P2, P3, P4, P5, P6, P7, P8, P9)}}$$

Note2. Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see FIG 1.

$$L_v = \text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5, P6, P7, P8, P9)}$$

Note3. The uniformity in surface luminance (δ WHITE) is determined by measuring luminance at each test position 1 through 9, and then dividing the maximum luminance of 9 points luminance by minimum luminance of 9 points luminance. For more information see FIG 1 .

$$\text{WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P1, P2, P3, P4, P5, P6, P7, P8, P9)}}{\text{Maximum Surface Luminance with all white pixels (P1, P2, P3, P4, P5, P6, P7, P8, P9)}}$$

Note4. Response time is the time required for the display to transition from White to black(Rise Time, Tr) and from black to white(Decay Time, Tf). For additional information see FIG 2.

Note5. Viewing angle is the angle at which the contrast ratio is greater than 2. For TFT module the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 3.

Note6. CIE (x, y) chromaticity ,The x,y value is determined by screen active area position 5. For more information see FIG 1.

Note7: NTSC ratio: For more information see FIG 4.

$$\text{NTSC ratio} = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}}$$

Note8. For Viewing angle and response time testing, the testing data is base on Autronic-Melchers's ConoScope. Series Instruments. For contrast ratio, Surface Luminance, Luminance uniformity and CIE, the testing data is base on BM-7 photo detector.

Note9. For TFT transmissive module, Gray scale reverse occurs in the direction of panel viewing Angle

FIG.1. Measuring method for Contrast ratio,surface luminance, Luminance uniformity,CIE (x,y) chromaticity

A :H/6 mm

B : V/6 mm

H,V : Active Area

Light spot size ∅ =5mm, 500mm distance from the LCD surface to detector lens measurement instrument is luminance meter BM-7

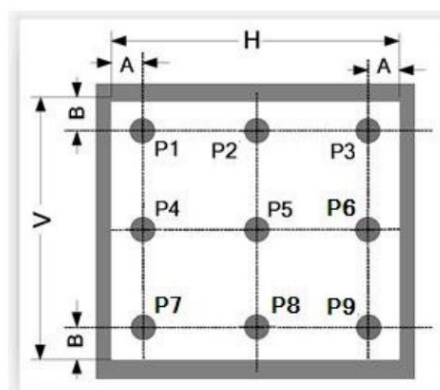






FIG.2. The definition of Response Time 响应时间定义

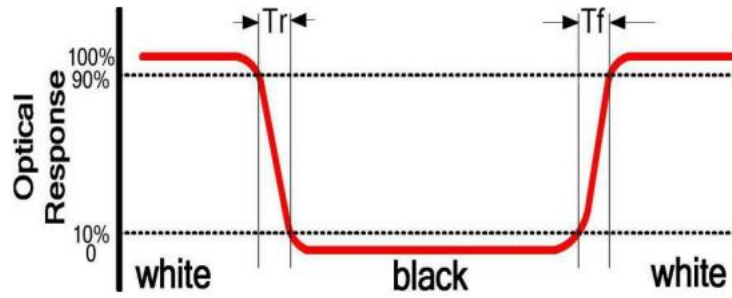
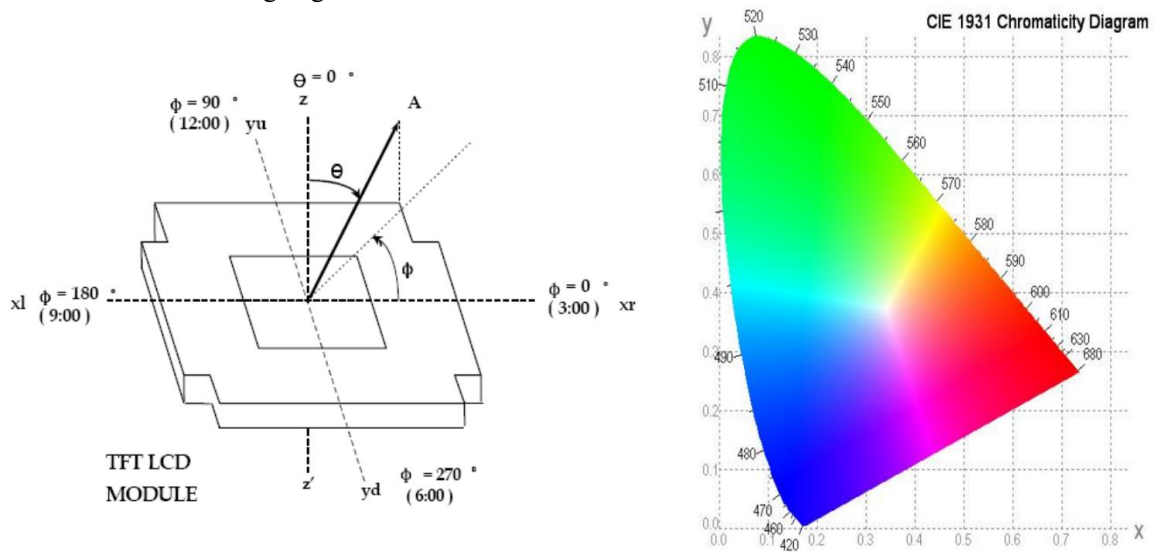


FIG.3. The definition of viewing angle 视角定义



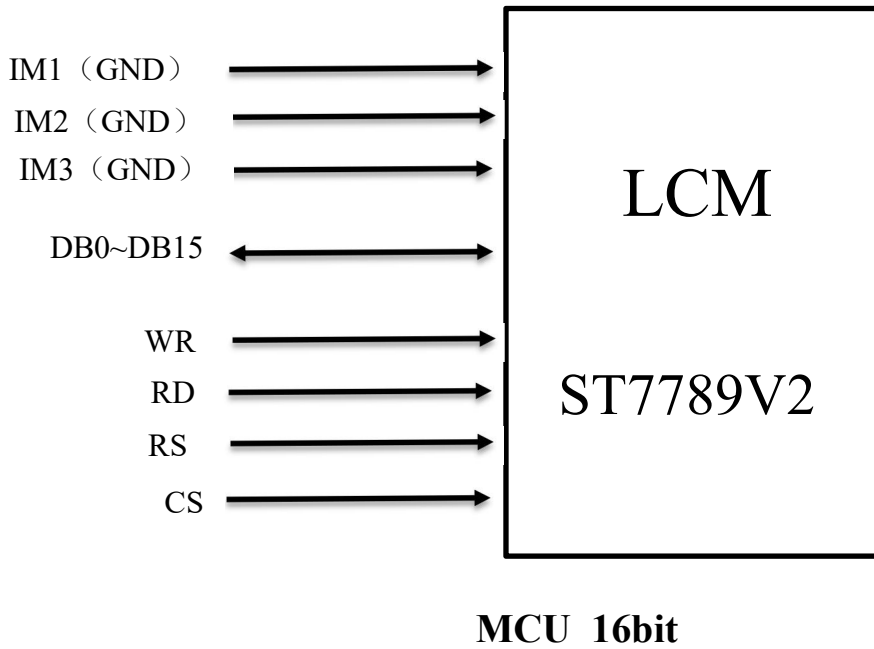


## 7. Display Module Interface Description(Pin Definition)

NO.	SYMBOL	Description	I/O
1	LEDA	LED backlight +	P
2	LEDA	LED backlight +	P
3	RESET	Reset signal.Setting either pin low initializes the LSI	I
4	NC (OTP)	-When programming NVM, it needs external power supply voltage (7.5V); the current of Ivpp must be more than 10mA. -If not used, let this pin open.	-
5	IOVCC	Power Supply for I/O System.	P
6	GND	Ground	P
7	DB09	Data bus	I/O
8	DB00	Data bus	I/O
9	DB10	Data bus	I/O
10	DB01	Data bus	I/O
11	DB11	Data bus	I/O
12	DB02	Data bus	I/O
13	DB12	Data bus	I/O
14	DB03	Data bus	I/O
15	DB13	Data bus	I/O
16	DB04	Data bus	I/O
17	DB14	Data bus	I/O
18	DB05	Data bus	I/O
19	DB15	Data bus	I/O
20	DB06	Data bus	I/O
21	DB16	Data bus	I/O
22	DB07	Data bus	I/O
23	DB17	Data bus	I/O
24	DB08	Data bus	I/O
25	SDA	Serial data input pin and output pin in serial bus system interface.	I/O
26	GND	Ground	P
27	NC	NC	--
28	DOCLK	Dot clock signal in RGB interface.	I
29	IM1	Interface select.	I
30	GND	Ground	P
31	IM2	Interface select.	I
32	HSYNC	Horizontal synchronizing signal in RGB interface	I
33	IM3	Interface select.	I
34	VSYNC	Vertical synchronizing signal in RGB interface.	I
35	WR	-Write enable in MCU parallel interface. - Display data/command selection pin in 4-line serial interface. - Second Data lane in 2 data lane serial interface. -If not used, please fix this pin at VDDI or DGND.	I
36	CS	Chip select signal.	I
37	RD	Read enable pin in 80 parallel bus system interface	I
38	RS_SCL	-Display data/command selection pin in parallel interface. -This pin is used to be serial interface clock.	I
39	ENABLE	Data ENABLE signal in RGB mode	I
40	VCC	Power supply voltage(2.8v~3.3v)	P



## 8.LCM Block Diagram



### 8.1 System interface select.

Note: The voltage power of the interface logic pin depend on “IOVCC” and “GND”, Such as DB<sub>n</sub>, IM<sub>n</sub> and function pins 备注：逻辑接口 PIN 电压取决于 “IOVCC” 和 “GND”，如 DB<sub>n</sub>, IM<sub>n</sub> 和功能 PIN

Name	I/O	IM3	IM2	IM1	IM0	MPU Interface Mode	Data pin	Connect Pin
IM3、IM2 IM1、IM0	I	0	0	0	1	80-16bit parallel I/F	DB[15:0]	DGND/VDDI
		0	0	1	1	80-18bit parallel I/F	DB[17:0]	
		0	1	0	1	3-line 9bit serial I/F	SDA: in/out	
		1	0	0	1	80-8bit parallel I/F II	DB[17:10]	
		1	0	1	1	80-9bit parallel I/F II	DB[17:9]	



## 9. Caution

### 9.1 Handling of Display Module

Be sure to ground the body when handling the LCM.

Don't give external shock.

Don't apply excessive force on the surface.

Liquid in LCD is hazardous substance. Must not lick and swallow.

When the liquid is attach to your hand, skin, cloth etc. Wash it out thoroughly and immediately.

Don't operate it above the absolute maximum rating.

Don't disassemble the LCM.

### 9.2 Storage

Store in an ambient temperature of 5°C to 45°C, and in a relative humidity of 40% to 60%. Don't expose to sunlight or intensive ultraviolet rays.

Storage in a clean environment, free from dust, active gas, and solvent.

Store in anti-static electricity container.

Store without any physical load.



# 10.Display Module Quality Criteria (Visual & Function Inspection Standard)

## 10.1 Inspection Conditions

Inspection performed under the following conditions is recommended.

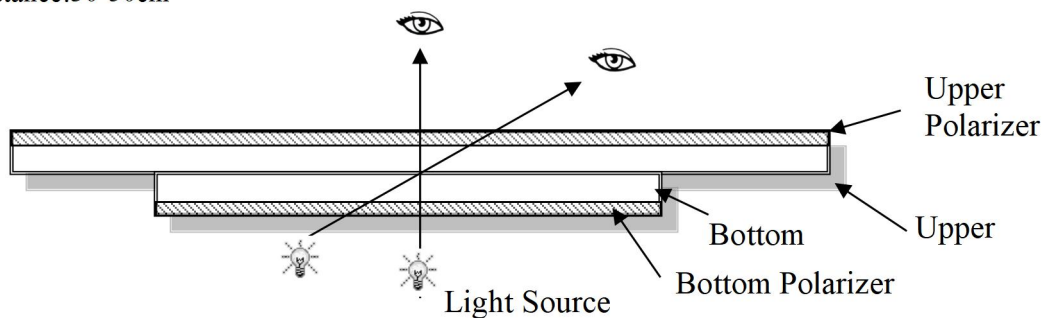
Temperature : 25±5°C

Humidity : 65%±10%RH

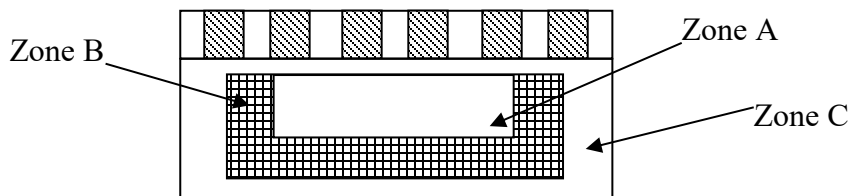
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm



## 10.2 Zone Definition



Zone A : Effective Viewing Area(AA)

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.

## 10.3 Inspection Specification

Sampling plan according to GB/T2828.1-2012/ISO 2859-1: 1999 and ANSI/ASQC

Z1.4-1993,normal level 2 and based on:

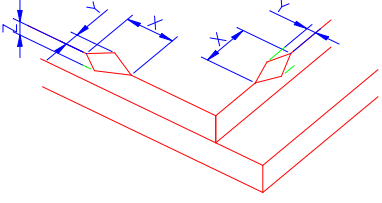
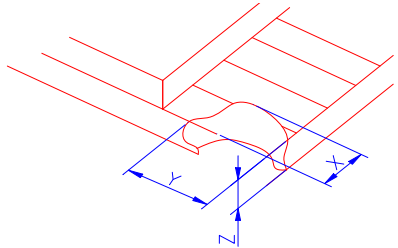
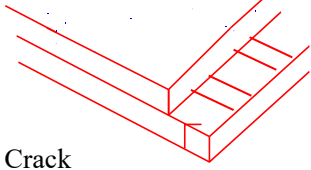
AQL:

Major defect	Minor defect
0.4	1.0



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.	
7	Linearity	No more than 1.5%	

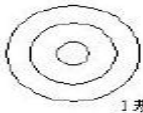
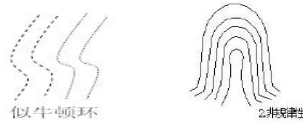
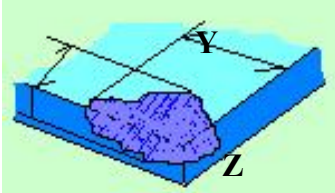
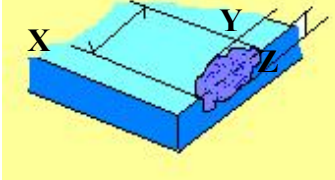
**10.4 Criteria (Visual)**

Number	Items	Criteria(mm)						
1 LCD Crack/Broken	The edge of LCD broken	 <table border="1" data-bbox="699 1232 1241 1361"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>≤3.0mm</td> <td>&lt;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					
LCD corner broken	 <p>No effective function</p> <table border="1" data-bbox="750 1653 1189 1747"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </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						
LCD crack	 <p>Crack Not allowed</p>							



Number	Items	Criteria (mm)																								
2	<p>Clear Spot defect</p> <p><math>\Phi = (X+Y)/2</math></p>	<p>1.light dot ( LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain )</p> <table border="1"> <thead> <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> </thead> <tbody> <tr> <td><math>\Phi \leq 0.1</math></td> <td colspan="2">Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>0.1 &lt; \Phi \leq 0.2</math></td> <td colspan="2">2( distance <math>\geq 5</math>mm)</td> </tr> <tr> <td><math>\Phi &gt; 0.2</math></td> <td colspan="2">0</td> </tr> </tbody> </table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore		Ignore	$0.1 < \Phi \leq 0.2$	2( distance $\geq 5$ mm)		$\Phi > 0.2$	0								
		Zone Size (mm)		Acceptable Qty																						
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		$0.1 < \Phi \leq 0.2$	2( distance $\geq 5$ mm)																							
		$\Phi > 0.2$	0																							
		<p>2.Dim spot ( LCD/TP/Polarizer dim dot, light leakage、dark spot )</p> <table border="1"> <thead> <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> </thead> <tbody> <tr> <td><math>\Phi \leq 0.1</math></td> <td colspan="2">Ignore</td> <td rowspan="4">Ignore</td> </tr> <tr> <td><math>0.1 &lt; \Phi \leq 0.2</math></td> <td colspan="2">2( distance <math>\geq 5</math>mm)</td> </tr> <tr> <td><math>0.2 &lt; \Phi \leq 0.25</math></td> <td colspan="2">1</td> </tr> <tr> <td><math>\Phi &gt; 0.25</math></td> <td colspan="2">0</td> </tr> </tbody> </table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore		Ignore	$0.1 < \Phi \leq 0.2$	2( distance $\geq 5$ mm)		$0.2 < \Phi \leq 0.25$	1		$\Phi > 0.25$	0					
		Zone Size (mm)		Acceptable Qty																						
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<p>3.TP Dirt</p> <table border="1"> <thead> <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> </thead> <tbody> <tr> <td><math>\Phi \leq 0.1</math></td> <td colspan="2">Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>0.1 &lt; \Phi \leq 0.25</math></td> <td colspan="2">2( distance <math>\geq 5</math>mm)</td> </tr> <tr> <td><math>\Phi &gt; 0.25</math></td> <td colspan="2">0</td> </tr> </tbody> </table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore		Ignore	$0.1 < \Phi \leq 0.25$	2( distance $\geq 5$ mm)		$\Phi > 0.25$	0										
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<p>Line defect (LCD/TP /Polarizer black/white line, foreign material on Polarizer scratch, stain)</p> <table border="1"> <thead> <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> </thead> <tbody> <tr> <td><math>\Phi \leq 0.02</math></td> <td>Ignore</td> <td colspan="2">Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>0.02 &lt; W \leq 0.03</math></td> <td><math>L \leq 2.0</math></td> <td colspan="2"><math>N \leq 1</math></td> </tr> <tr> <td><math>0.03 &lt; W \leq 0.05</math></td> <td><math>L \leq 1.0</math></td> <td colspan="2"><math>N \leq 1</math></td> </tr> <tr> <td><math>W &gt; 0.05</math></td> <td colspan="3">Define as spot defect</td> <td></td> </tr> </tbody> </table>	Width(mm)	Length(mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.02$	Ignore	Ignore		Ignore	$0.02 < W \leq 0.03$	$L \leq 2.0$	$N \leq 1$		$0.03 < W \leq 0.05$	$L \leq 1.0$	$N \leq 1$		$W > 0.05$	Define as spot defect			
Width(mm)			Length(mm)	Acceptable Qty																						
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$\Phi \leq 0.02$	Ignore	Ignore		Ignore																						
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$0.1 < \Phi \leq 0.25$	2(distance $\geq 5$ mm)																									
$\Phi > 0.25$	0																									
4	SMT	According to IPC-A-610C class II standard . Function defect and missing part are major defect ,the others are minor defect.																								



5	Newton Ring	Newton Ring area > 1/6 TP area NG Newton Ring area ≤ 1/6 TP area OK	 <p>1 规律性</p>																							
		Rule-less Newton Ring area > 1/4 TP area NG Rule-less Newton Ring area ≤ 1/4 TP area OK	 <p>似牛顿环      2 非规律性</p>																							
	TP corner broken X: length Y: width Z: height	<table border="1"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>X ≤ 2.0mm</td> <td>Y ≤ 2.0mm</td> <td>Z &lt; Lens thickness</td> </tr> </table> <p>*Circuitry broken is not allowed.</p>	X	Y	Z	X ≤ 2.0mm	Y ≤ 2.0mm	Z < Lens thickness																		
	X	Y	Z																							
X ≤ 2.0mm	Y ≤ 2.0mm	Z < Lens thickness																								
TP edge broken X: length Y: width Z: height	<table border="1"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>X ≤ 2.0mm</td> <td>Y ≤ 0.15mm</td> <td>Z &lt; lens thickness</td> </tr> </table> <p>* Circuitry broken is not allowed.</p>	X	Y	Z	X ≤ 2.0mm	Y ≤ 0.15mm	Z < lens thickness																			
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6	TP Dirt	<table border="1"> <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>Φ ≤ 0.1</td> <td colspan="3">Ignore</td> </tr> <tr> <td>0.1 &lt; Φ ≤ 0.2</td> <td colspan="3">2 ( distance ≥ 5mm)</td> </tr> <tr> <td>Φ &gt; 0.2</td> <td colspan="3">0</td> </tr> </table>	Zone Size (mm)	Acceptable Qty			A	B	C	Φ ≤ 0.1	Ignore			0.1 < Φ ≤ 0.2	2 ( distance ≥ 5mm)			Φ > 0.2	0			Ignore				
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9	Pattern font	Pattern fonts are clear and symmetrical, Pattern fonts filter lightly are allowed; the fort line is not allow to thinner or thicker than 1/3 of normal size, and swing is not more than 0.1mm, the line is smooth and not broken																								





## 11. Reliability Test

NO	ITEM	CONDITION	STANDARD
1	High Temp. Storage	80°C, 120 hours	1. Functional test is OK. Missing Segment, short, unclear segment, non-display, display abnormally and liquid crystal leak are not allowed. 2. No low temperature bubbles, end seal loose and fall, frame rainbow.
2	Low Temp. Storage	-40°C, 120 hours	
3	High Temp. Operation	70°C, 120hours	
4	Low Temp. Operation	-30°C, 120 hours	
5	High temperature and high Humidity storage	50°C±5°C,90%RH ,120 hours	
6	Thermal and cold shock	Static state, -20°C (30 Min) ~70°C (30 Min) ~ -20°C (30Min) , packaging, 10 cycles	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.
7	Vibration test	Packaging, Frequency : 10-55Hz Amplitude : 1.0mm, Each direction on X,Y axe 1 hour,	
8	Dropping test	Pack products into the carton box. Drop it from 100cm height to ground. Once for each side of the carton	

**Notes:**

- 11.1 The reliability items will be fully performed in new sample qualification,
- 11.2 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.
- 11.3 All samples are inspected after keeping in the room with normal temperature and humidity for 2 hours or above.
- 11.4 Vibration test: It is not necessary to test for those products without assembly frame , back light ,PCB and so on.
- 11.5 Dropping test : It is necessary for affirming new package.
- 11.6 For the high temperature and high humidity test, pure water of over 10 MΩ.cm should be used.
- 11.7 Each test item applies for test LCM only once .Then tested LCM cannot be used again in any other test item.
- 11.8 The quantity of LCM examination for each test item is 5pcs to 10pcs.

## 12. Precautions for Using Display Modules

### 12.1 Safety instructions

- 12.1.1 If the LCD panel breaks, be careful not to get any liquid crystal substance in your mouth.
- 12.1.2 If the liquid crystal substance touches your skin or clothes, please wash it off immediately by using soap and water.

### 12.2 Handling Precautions

- 12.2.1 Avoid static electricity damaging the LSI.
- 12.2.2 Do not remove the panel or frame from the module .
- 12.2.3 The polarizing plate of the display is very fragile . So, please handle it very carefully.
- 12.2.4 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of the plate.
- 12.2.5 The color tone of display and background of LCM has the possibility to be changed in the storage temperature range.
- 12.2.6 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.
- 12.2.7 When soldering the terminal of LCM, make certain the AC power source of soldering iron does not leak.



12.2.8 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.

### 12.3 Operation Instructions

12.3.1 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.

12.3.2 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.

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

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

### 12.4 Storage Instructions:

12.4.1 Store display module in a sealed polyethylene bag.

12.4.2 Store display module in a dark place, Do not expose to sunlight or fluorescent light. Keep the temperature between 0°C and 35°C.

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

### 12.5 Limited Warranty

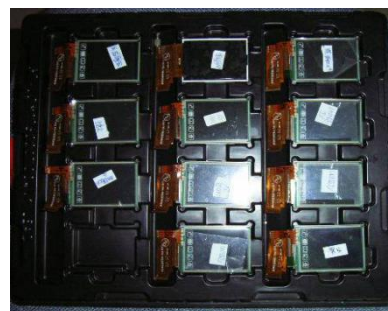
12.5.1 Kingtech will replace or repair any of its LCD modules, which are found to be defective, when inspected in accordance with Kingtech acceptance standards ( copies available upon request ) for a period of 12 months from ink-print date on product

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

12.5.3 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

12.5.4 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.





## 13. Packing Specification

-TBD-