筠鼎科技股份有限公司

YUNDING TECH CO., LTD.

PRODUCT SPECIFICATION

7” 800RGB x 480 TFT

MODEL NUMBER: YD070L04NM01

Rev: 0

PENGLEI	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE			
DATE			

CUSTOMER APPROVAL	SIGNATURE	DATE

Revision History

Revision	Date	Originator	Detail	Remarks
1	2012-05-21		First Release	

Table of Contents

1. General Description

This display module is a transmissive type color active matrix TFT(Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This module is composed of a TFT LCD module, a driver circuit, and a back-light unit.
The resolution of a 7” contains 800（RGB)X480 dots and can display up to 16M colors.

2. Module Parameter

Features	Details	Unit
Display Size(Diagonal)	7”	-
LCD type	α-Si TFT	-
Display Mode	TN/ Normally white	-
Resolution	800 RGB x480	-
View Direction	6 O’clock	Best image
Grayscale Inversion Direction	12 O’clock	-
Module Outline	164.9(W) ×100(H)×3.5 (T)	mm
TP Outline	N/A	mm
TP Viewing Area	N/A	mm
TP Active Area	N/A	mm
Active Area	154.08 (W)×85.92(H)	mm
Viewing Area	N/A	mm
Pixel Size	0.0642 (W) x0.179 (H)	mm
Pixel Arrangement	Stripe	-
Display Mode	Normally White，Transmissive	-
Interface	SPI&RGB	-
Operating Temperature	-20～70	ºC
Storage Temperature	-30～80	ºC
Weight	TBD	g

3. Absolute Maximum Ratings

V_{SS}=0V, Ta=25ºC

Item	Symbol	Values		Unit
		Min.	Max	
Power	DVDD	-0.3	5.0	V
	AVDD	6.5	13.5	V
	VGH	-0.3	40	V
	VGL	-20	0.3	V
	VGH-VGL	-	40	V
Operation Temperature	T_{op}	-20	+70	ºC
Storage Temoerature	H_{stg}	-30	80	ºC

Note 1:The absolute maximum rating values of this product are not allowed to be exceeded at any tine. Should a module be use 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 Characteristics

4.1 DC Characteristics

Item		Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	Power supply	VCC	2.5	2.8	3.3	V
	Analog	VCI	2.5	2.8	3.3	V
	IO	IOVCC	1.65	2.8	3.3	V
Logic Low input voltage		V_{IL}	0.0	-	0.2*IOVCC	V
Logic High input voltage		V_{IH}	0.7*IOVCC	-	IOVCC	V
Logic Low output voltage		V_{OL}	-	-	0.2*IOVCC	V
Logic High output voltage		V_{OH}	0.8*IOVCC	-	IOVCC	V
Current Consumption	Normal display	Ivdd	-	-	-	mA
	Standby mode	Ivdd-	-	-	-	uA
Frame Frequency		f_{FR}	-	TBD	-	Hz

.4.2 Typical Operation Conditions

ITEM	Symbol	Values			Unit	Remark
		MIN	TYP	MAX		
Power voltage	Dvdd	3.0	3.3	3.6	V	Note 2
	Avdd	10.2	10.4	10.6	V	
	VGH	15.3	16	16.7	V	
	VGL	-7.7	-7.0	-6.3	V	
Input signal voltage	VCOM	3.6	3.8	4.0	V	
Input logic high voltage	VIH	0.7Dvdd	-	Dvdd	V	Note 3
Input logic low voltage	VIL	0	-	0.3Dvdd	V	

Note 1:Be sure to apply Dvdd and Vgl to the LCD first,and then apply Vgh.

Note 2:Dvdd setting should match the signals output voltage(refer to Note 3)of customer's system board

Note 3:DCLK, HS, VS, RESET, U/D, L/R, DE, R0～R7, G0～G7, B0～B7, MODE,DITHB

5 Backlight Characteristics

5.1.Backlight Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage	V_f	Ta=25 ºC,I_F=160mA	9.0	9.8	10.6	V/LED
Forward Current	I_f	Ta=25 ºC, V_F=9.8V	-	160	-	mA
Luminance	L_V	-	5900	6500	-	cd/m^2
Uniformity	Avg	-	80	-	-	%
CIE	X	-	0.26	-	0.32	-
	Y	-	0.26	-	0.32	-
Power dissipation	P_d	-	-	-	-	mW
Backlight Driving Voltage	V_{AK}	-	-	9.8	-	V
Drive method	Constant current					
LED Configuration	24 White LEDs in parallel					

Note: Test condition I_f =160mA, Ta=25ºC.

6.Optical Characteristics

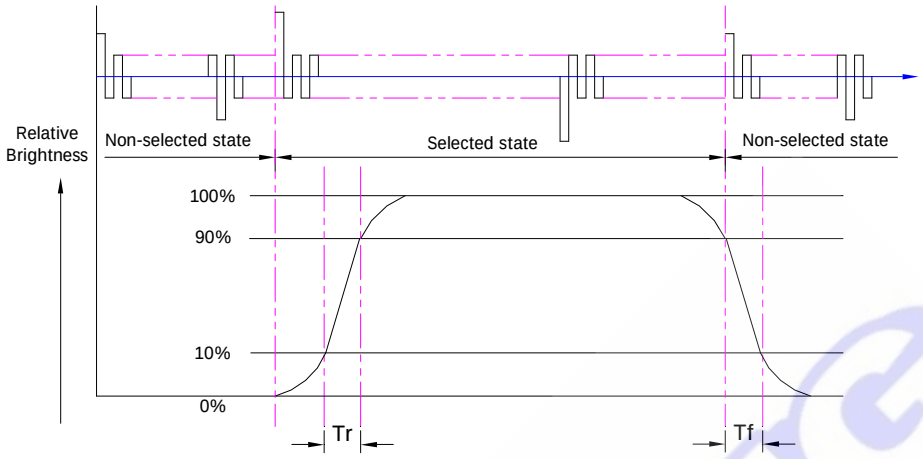
6.1.Optical Characteristics

Ta=25ºC, VDD=2.8V, TN LC+ Polarizer

	Item		Symbol	Condition	Specification			Unit
					Min.	Typ.	Max.	
Backlight On (Transmissive Mode)	Luminance surface(I_f 160mA)		*Lv*	Normally viewing angle $\theta_X = \theta_Y$ =0º	-	320	-	cd/m²
	Contrast ratio(See 6.3)		*CR*		400	500	-	-
	Response time (See 6.2)		*TR+TF*		25	50		ms
	Chromaticity Transmissive (See 6.5)	Red	*XR*	-	-	TBD	-	-
			YR		-	TBD	-	-
		Green	*XG*		-	TBD	-	-
			YG		-	TBD	-	-
		Blue	*XB*		-	TBD	-	-
			YB		-	TBD	-	-
		White	*XW*		-	TBD	-	-
			YW		-	TBD	-	-
	Viewing Angle (See 6.4)	Horizontal	Θ	Center CR≥10	120	140		Deg.
		Vertical	Θ		100	120		
	NTSC Ratio(Gamut)		-	-	-	TBD	-	%

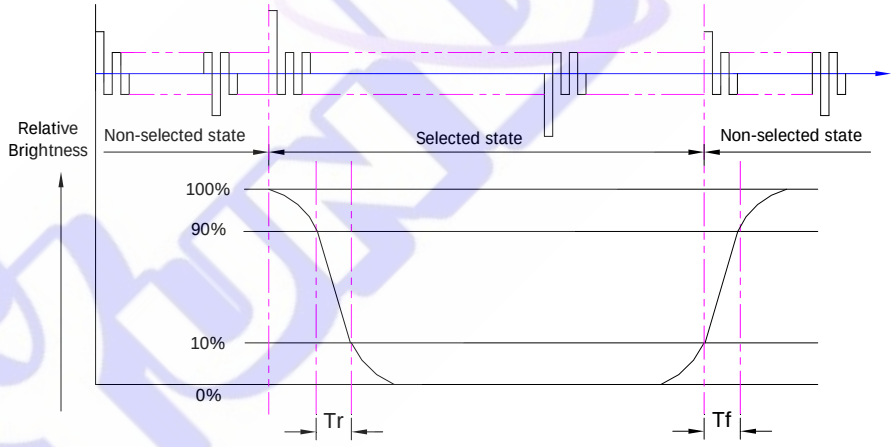
6.2 Definition of Response Time

6.2.1 Normally Black Type (Negative)



Tr is the time it takes to change form non-selected state with relative luminance 10% to selected state with relative luminance 90%;
Tf is the time it takes to change from selected state with relative luminance 90% to non-selected state with relative luminance 10%.

6.2.2 Normally White Type (Positive)



Tr is the time it takes to change form non-selected state with relative luminance 90% to selected state with relative luminance 10%;
Tf is the time it takes to change from selected state with relative luminance 10% to non-selected state with relative luminance 90%;

6.3 Definition of Contrast Ratio

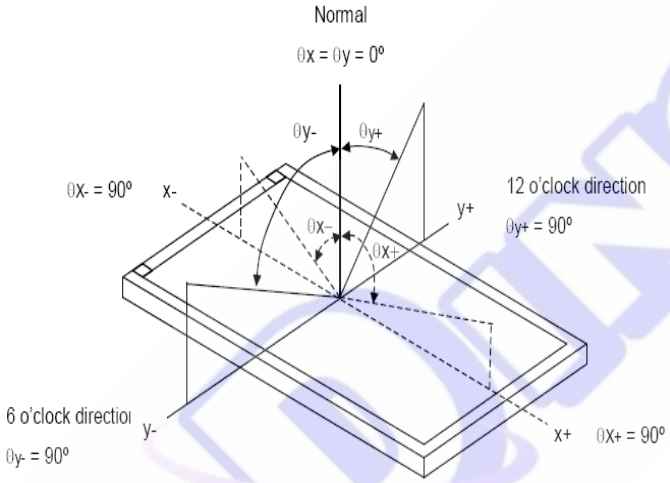
Contrast is measured perpendicular to display surface in reflective and transmissive mode.

The measurement condition is:

Measuring Equipment	BM-7 or EQUI
Measuring Point Diameter	3mm//1mm
Measuring Point Location	Active Area centre point
Test pattern	A: All Pixels white
	B: All Pixel black
Contrast setting	Maximum

Definitions: CR (Contrast) = Luminance of White Pixel / Luminance of Black Pixel

6.4 Definition of Viewing Angles



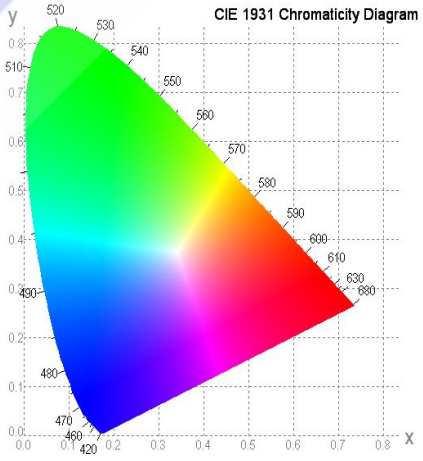
Measuring machine: LCD-5100 or EQUI

6.5 Definition of Color Appearance

R,G,B and W are defined by (x, y) on the IE chromaticity diagram

NTSC=area of RGB triangle/area of NTSC triangleX100%

Measuring picture: Red, Green, Blue and White (Measuring machine: BM-7)



6.6 Definition of Surface Luminance, Uniformity and Transmittance

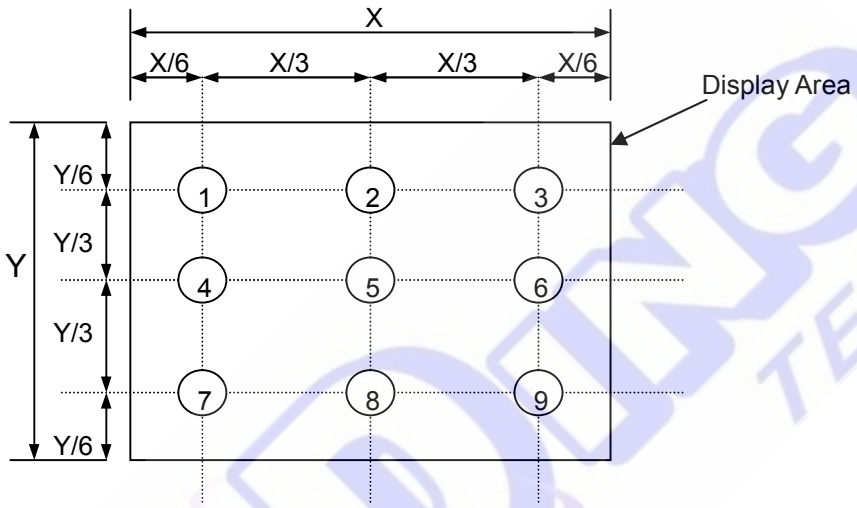
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

6.6.1 Surface Luminance: L_V = average (L_{P1}:L_{P9})

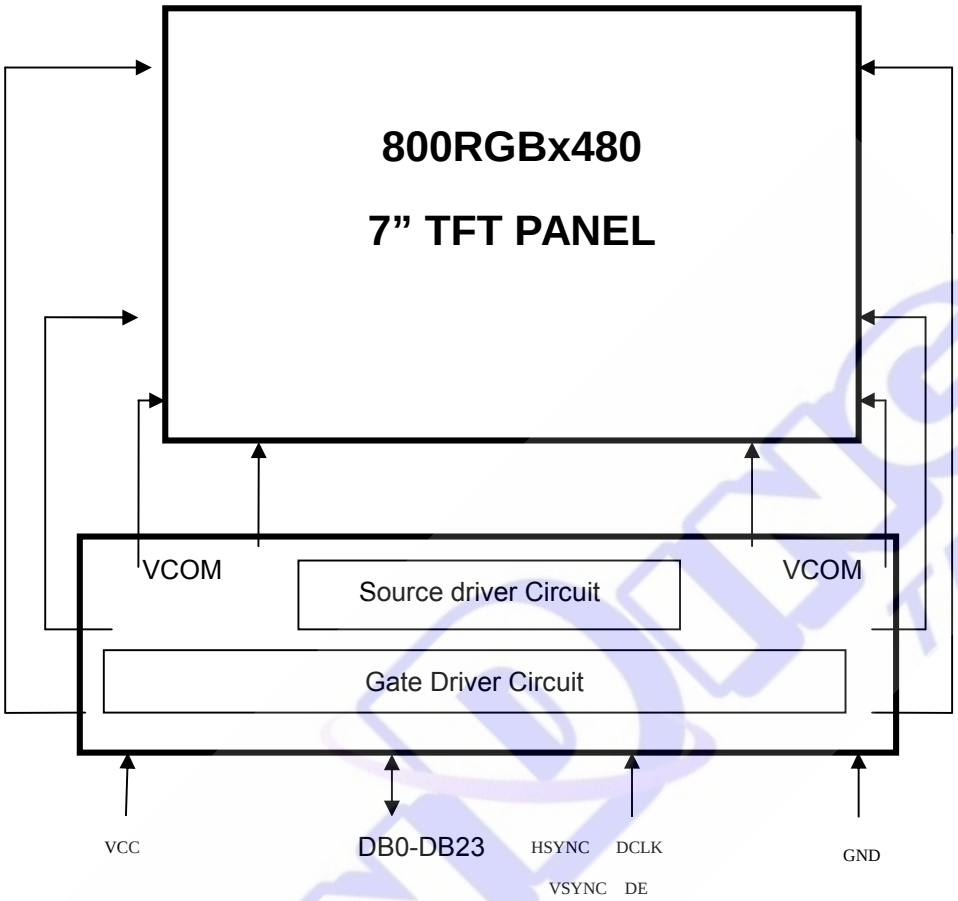
6.6.2 Uniformity = Minimal (L_{P1}:L_{P9}) / Maximal (L_{P1}:L_{P9}) * 100%

6.6.3 Transmittance = L_V on LCD / L_V on Backlight * 100%

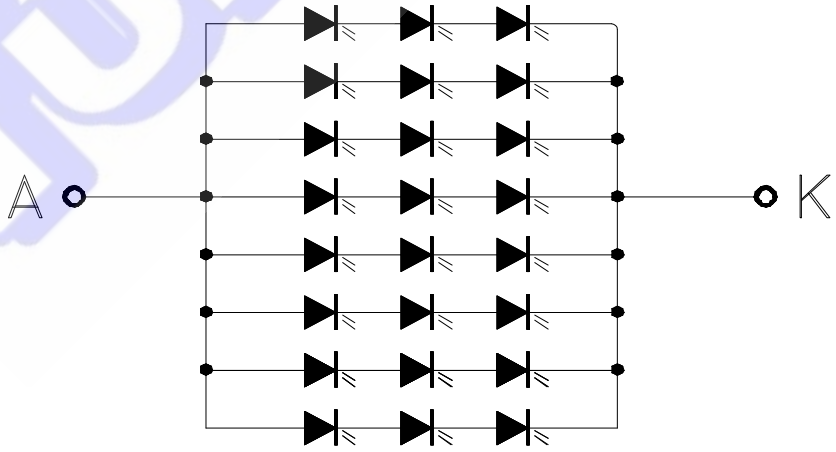
Note : Measuring machine: BM-7



7 Block Diagram and Power Supply



`



IF=160ma VLED=9.8V

8 Interface Pins Definition

8.2 Module interface

PIN No.	Symbol	FUNCTION	NOTE
1	LEDA	Back-light LED Anode	
2	LEDA	Back-light LED Anode	
3	LEDK	Back-light LED Cathode	
4	LEDK	Back-light LED Cathode	
5	GND	Ground	
6	VCOM	Common Voltage	
7	VCC	Power for Digital Circuit	
8	MODE3	De/SYNC mode select	
9	DE	Data inout enable	
10	VS	Vertical Sync Input	
11	HS	Horizontal sync input	
12~19	B7~B0	Data Bus	
20~27	G7~G0	Data Bus	
28~35	R7~R0	Data Bus	
36	GND	Ground	
37	DLCK	Sampel Clock	
38	GND	Ground	
39	SHLR	Source Right or Left select	
40	UPDN	Gate up or down select	
41	VGH	Power supply for Gate on output	
42	VGL	Power supply for Gate on output	
43	AVDD	Power for Analog Circuit	
44	RESET	Glodal reset PIN	
45	NC	No Connection	
46	VCOM	Common Voltage	
47	DITH	Dithering function enable control	
48	GND	Ground	
49	NC	No Connection	
50	NC	No Connection	

9 AC Characteristics

9.1 Reset timing

Please refer to IC datasheet.

9.2 interface timing

9.2.1 SPI&RGB interface timing requirement 1

Please refer to IC datasheet

10 Command Table

Please refer to IC datasheet.

11 Recommended Setting and Initialization Flow for Reference.

TBD.

12. Quality Assurance

12.1. Purpose

This standard for Quality Assurance assures the quality of LCD module products supplied to customer by Penglei display.

12.2. Agreement Items

Penglei and customer shall negotiate if the following situation occurs:

12.4.1 Discrepancies between Penglei's QA standards and customer's QA standards.

12.4.2 Additional requirement to be added in product specification.

12.4.3 Any other special problem.

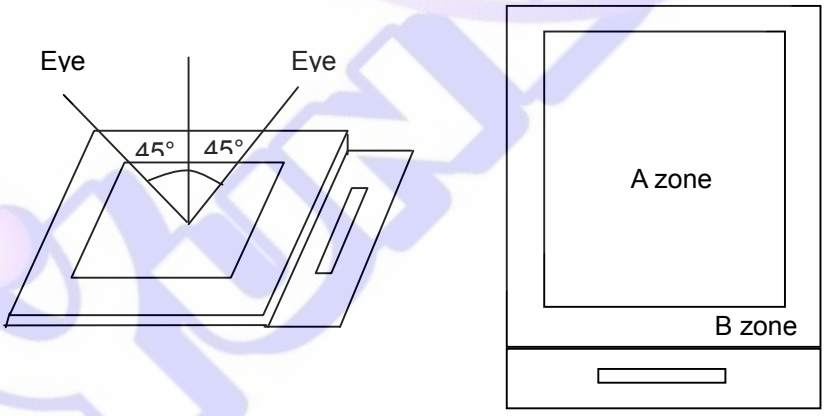
12.3. Standard of the Product Visual Inspection

12.3.1 Appearance inspection:

12.3.1.1 The inspection must be under illumination about 1000 – 1500 lx, and the distance of view must be at 30cm ± 2cm.

12.3.1.2 The viewing angle should be 45° from the vertical line without reflection light or follows customer's viewing angle specifications.

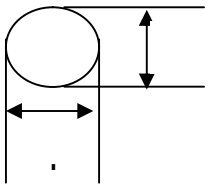
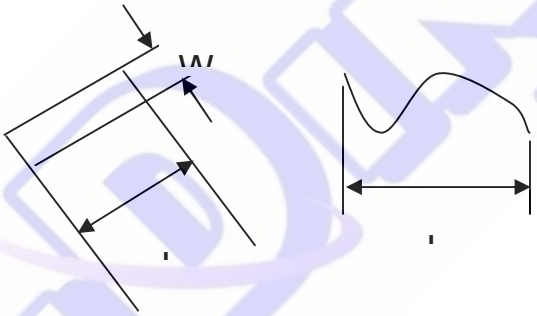
12.3.1.3 Definition of area: A Zone: Active Area, B Zone: Viewing Area,

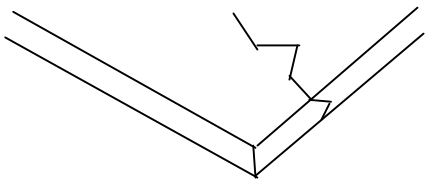


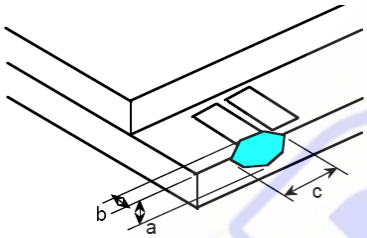
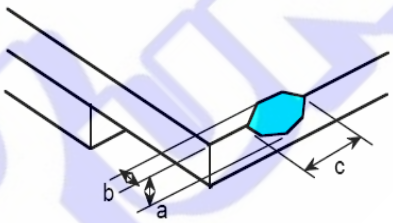
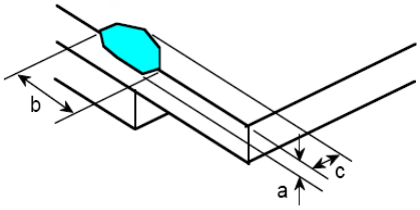
12.3.2 Basic principle:

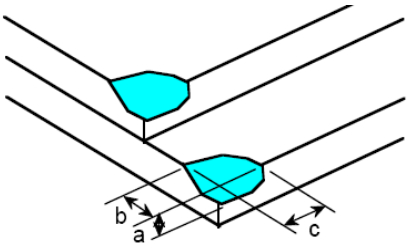
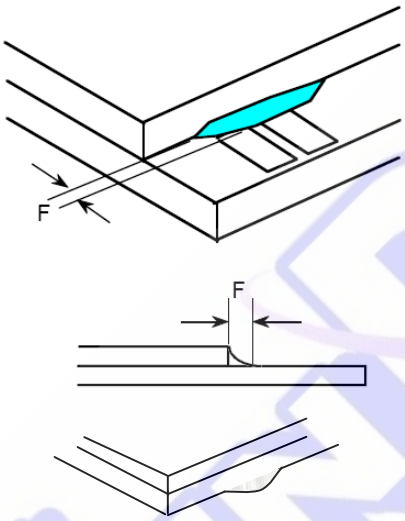
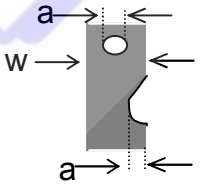
12.3.2.1 A set of sample to indicate the limit of acceptable quality level must be discussed by both Penglei and customer when there is any dispute happened.

12.4. Inspection Specification

<table>
<tr><th>No.</th><th>Item</th><th>Criteria (Unit: mm)</th></tr>
<tr><td>01</td><td>Black / White spot
Foreign material
(Round type)
Pinholes
Stain
Particles inside cell.
(Minor defect)</td><td>

<table>
<tr><th>Area / Size</th><th>Acc. Qty</th></tr>
<tr><td>φ≤0.10</td><td>Ignore</td></tr>
<tr><td>0.10<φ≤0.20</td><td>2</td></tr>
<tr><td>0.20<φ≤0.25</td><td>1</td></tr>
<tr><td>0.25<φ</td><td>0</td></tr>
<tr><td>Total</td><td>2 no include φ≤ 0.10</td></tr>
</table>
φ= (a + b) /2
Distance between 2 defects should more than 3mm apart.
</td></tr>
<tr><td>02</td><td>Black and White line
Scratch
Foreign material
(Line type)
(Minor defect)</td><td>

<table>
<tr><th>Length</th><th>Width</th><th>Acc. Qty</th></tr>
<tr><td>/</td><td>W ≦ 0.03</td><td>Ignore</td></tr>
<tr><td>L ≦ 2</td><td>0.03 ＜ W ≦ 0.05</td><td>1</td></tr>
<tr><td>/</td><td>0.05 ＜ W</td><td>0</td></tr>
<tr><td colspan="2">Total</td><td>1</td></tr>
</table>
Distance between 2 defects should more than 3mm apart. Scratches not viewable through the back of the display are acceptable.
</td></tr>
</table>

03	Glass Crack (Minor defect)	 LCD with extensible crack line is unacceptable(When press the cracked LCD area, the line will expand, we define it is extensible crack line)

04	Glass Chipping Pad Area: (Minor defect)  	<table><tr><td>Length and Width</td><td>Acc. Qty</td></tr><tr><td>c ＜ 5.0, b< 0.4</td><td>Ignore</td></tr><tr><td colspan="2">a<Glass Thickness</td></tr></table>
05	Glass Chipping Rear of Pad Area: (Minor defect)  	<table><tr><td>Length and Width</td><td>Acc. Qty</td></tr><tr><td>c > 3.0, b< 1.0</td><td>1</td></tr><tr><td>c< 3.0, b< 1.0</td><td>2</td></tr><tr><td>c< 3.0, b< 0.5</td><td>4</td></tr><tr><td colspan="2">a<Glass Thickness</td></tr></table>
06	Glass Chipping Except Pad Area: (Minor defect)  	<table><tr><td>Length and Width</td><td>Acc. Qty</td></tr><tr><td>c ≤0.6, b< 5.0</td><td>Ignore</td></tr><tr><td colspan="2">a<Glass Thickness</td></tr></table>

<table>
<tr>
<td>07</td>
<td>Glass Corner Chipping:
(Minor defect)
 
</td>
<td><table>
<tr><th>Length and Width</th><th>Acc. Qty</th></tr>
<tr><td>c < 2.0, b< 1.5</td><td>Ignore</td></tr>
<tr><td>c < 1.5, b< 2</td><td>Ignore</td></tr>
<tr><td colspan="2">a<Glass Thickness</td></tr>
</table></td>
</tr>
<tr>
<td>08</td>
<td>Glass Burr:
(Minor defect)
 
</td>
<td><table>
<tr><th>Length</th><th>Acc. Qty</th></tr>
<tr><td>F < 0.5</td><td>Ignore</td></tr>
</table>
Glass burr don’t affect assemble and module dimension.</td>
</tr>
<tr>
<td>09</td>
<td>FPC Defect:
(Minor defect)
 
</td>
<td>9.1 Dent, pinhole width a<w/3.
(w: circuitry width.)
9.2 Open circuit is unacceptable.
9.3 No oxidation, contamination and distortion.</td>
</tr>
</table>

<table>
<tr><td>10</td><td>Bubble on Polarizer
(Minor defect)</td><td><table><tr><td>Diameter</td><td>Acc. Qty</td></tr><tr><td>φ≤0.20</td><td>Ignore</td></tr><tr><td>0.20 <φ≤0.30</td><td>2</td></tr><tr><td>0.30 < φ</td><td>None</td></tr></table></td></tr>
<tr><td>11</td><td>Dent on Polarizer
(Minor defect)</td><td><table><tr><td>Diameter</td><td>Acc. Qty</td></tr><tr><td>φ≤0.20</td><td>Ignore</td></tr><tr><td>0.20 <φ≤0.30</td><td>2</td></tr><tr><td>0.30 < φ</td><td>None</td></tr></table></td></tr>
<tr><td>12</td><td>Bezel</td><td>12.1 No rust, distortion on the Bezel.
12.2 No visible fingerprints, stains or other contamination.</td></tr>
<tr><td>13</td><td>Touch Panel</td><td>D: Diameter W: width L: length
13.1 Spot: D≤0.20 is acceptable
0.20<D≤0.3, acceptable QTY, 3
2dots are acceptable and the distance between defects should more than 10 mm.
D>0.3 is unacceptable
13.2 Dent: D>0.30 is unacceptable
13.3 Scratch: W≤0.03, L≤10 is acceptable,
0.03<W≤0.10, L≤10 ,acceptable QTY, 3
Distance between 2 defects should more than 10 mm.
W>0.10 is unacceptable.</td></tr>
<tr><td>14</td><td>PCB</td><td>14.1 No distortion or contamination on PCB terminals.
14.2 All components on PCB must same as documented on the BOM/component layout.
14.3 Follow IPC-A-600F.</td></tr>
<tr><td>15</td><td>Soldering</td><td>Follow IPC-A-610C standard</td></tr>
<tr><td>16</td><td>Electrical Defect
(Major defect)</td><td>The below defects must be rejected.
16.1 Missing vertical / horizontal segment,
16.2 Abnormal Display.
16.3 No function or no display.
16.4 Current exceeds product specifications.
16.5 LCD viewing angle defect.
16.6 No Backlight.</td></tr>
</table>

		16.7 Dark Backlight. 16.8 Touch Panel no function. 16.9 Dark Dot –one Allowed. 16.10 Bright Dot – one Allowed. Remark: 1. A pixel defect is acceptable if one color is none functional and causes a bright dot. The display may have one case where one color is out and cause a dark dot. 2. Bright dot caused by scratch and foreign object accords to item 1.

Remark: Visual and cosmetic defects are rejectable only if these fall within the LCD viewing area.

12.5. Classification of Defects

12.5.1 Visual defects (Except no / wrong label) are treated as minor defect and electrical defect is major.

12.5.2 Two minor defects are equal to one major in lot sampling inspection.

12.6. Identification/marking criteria

Any unit with illegible / wrong /double or no marking/ label shall be rejected.

12.7. Packing

12.7.1 There should be no damage of the outside carton box, each packaging box should has label in the correct location per packing drawing requirement.

12.7.2 All direct package materials shall offer ESD protection.

13. Reliability Specification

Item	Condition	Cycle Time	Quantity	Remark
Constant Temp. and Constant Humidity Operation Test	+40 ± 3ºC,90 ± 3%RH	120hrs	--	*1
High Temp. Operation Test	+70 ± 3ºC	120hrs	--	
Low Temp. Operation Test	-20 ± 3ºC	120hrs	--	
Thermal Shock Test	-20 ± 3ºC (30min) +70 ± 3ºC (30min)	10cycles	--	
ESD Test(end product)	150pF, 330Ω, ±2KV, Contact	10times	--	*2, *3
	150pF, 330Ω, ±6KV, Air			
Vibration Test (for packaging)	Frequency: 10Hz to 55Hz to 10Hz, Swing:1.5mm,time：X,Y,Z each 2H.	6hrs	One inner carton	*4

Note 1. For humidity test, DI water should be used.
Inspection Standard: Inspect after 1-2hrs storage at room temperature, the sample shall be free from the following defects:

- Air bubble in the LCD
- Seal Leakage
- Non-display
- Missing Segment
- Glass Crack
- IDD is greater than twice initial value.
- Others as per QA Inspection Criteria

Note 2. No defect is allowed after testing
The End Product ESD value is only indicative and depends on customer ESD protection design for the whole system

Note 3. ESD should be applied to LCD glass panel, not other areas (such as on IC and so on)
IDD should be within twice initial value.
In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

Note 4. Only upon request.

14. Precautions and Warranty

14.1. Safety

14.1.1 The liquid crystal in the LCD is poisonous. Do not put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.

14.1.2 Since the liquid crystal cells are made of glass, do not apply strong impact on them. Handle with care.

14.2. Handling

14.2.1 Reverse and use within ratings in order to keep performance and prevent damage.

14.2.2 Do not wipe the polarizer with dry cloth, as it might cause scratch. If the surface of the LCD needs to be cleaned, wipe it swiftly with cotton or other soft cloth soaked with petroleum IPA, do not use other chemicals.

14.3. Operation

14.3.1 Do not drive LCD with DC voltage

14.3.2 Response time will increase below lower temperature

14.3.3 Display may change color with different temperature

14.3.4 Mechanical disturbance during operation, such as pressing on the display area, may cause the segments to appear “fractured”.

14.4. Static Electricity

14.4.1 CMOS LSIs are equipped in this unit, so care must be taken to avoid the electro-static charge, by ground human body, etc.

14.4.2 The normal static prevention measures should be observed for work clothes and benches.

14.4.3 The module should be kept into anti-static bags or other containers resistant to static for storage.

14.5. Limited Warranty

14.5.1 Unless otherwise agreed between Penglei and customer, Penglei will replace or repair any of its LCD and LCM which Penglei found to be defective electrically and visually when inspected in accordance with Penglei Quality Standards, for a period of one year from date of shipment.

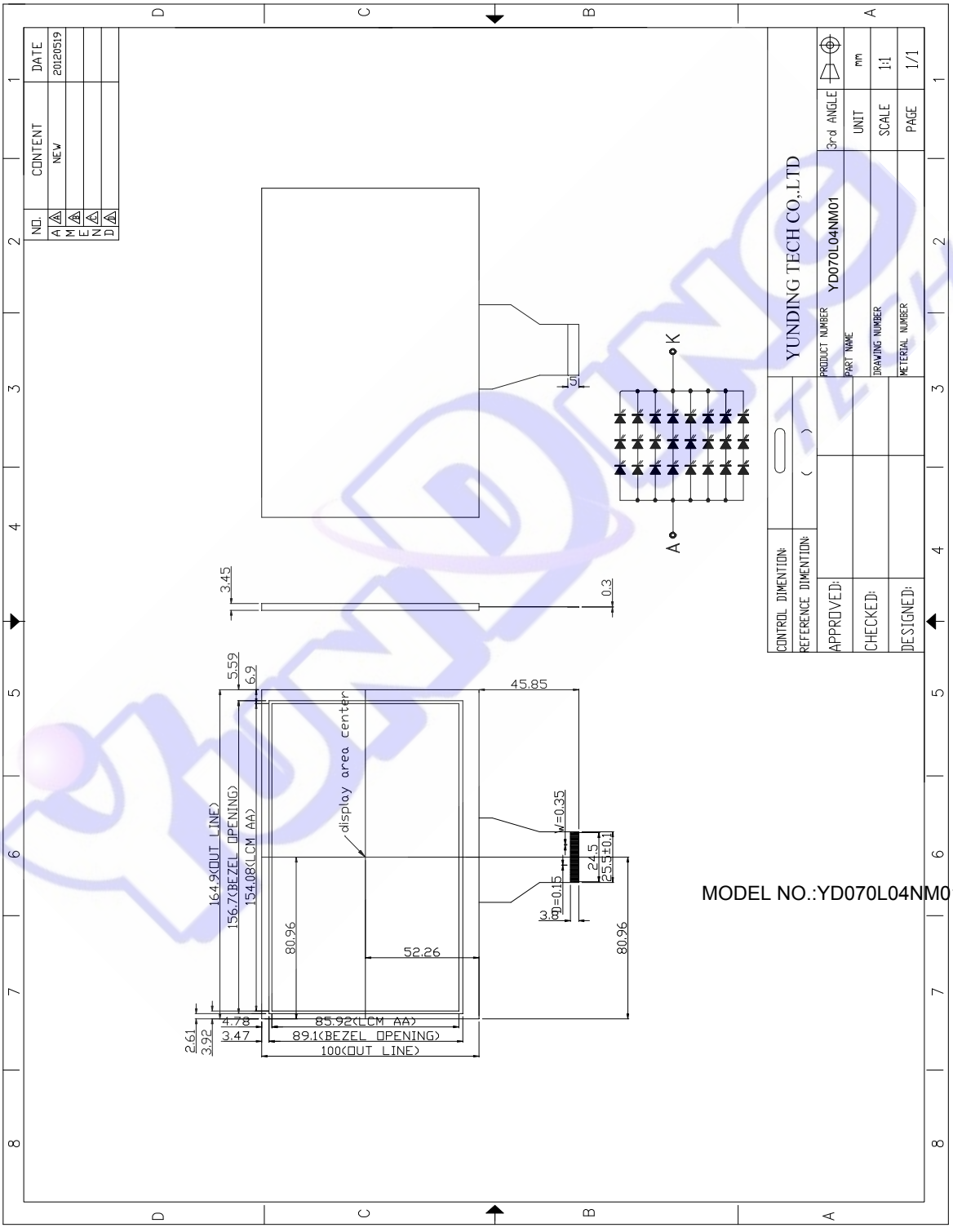
14.5.2 The warranty liability of Penglei is limited to repair and/or replacement. Penglei will not be responsible for any consequential loss.

14.5.3 If possible, we suggest you use up all modules in six months. If the module storage time over twelve months, we suggest that recheck it before the module be used.

15. Packaging

TBD.

16.Assembly Drawing



Reference

Item	Description	Revision
	IC Data sheet	V01
YD070L04NM01	LCM assembly drawing	RO