



DOCUMENT NUMBER AND REVISION

FS-8815P02042 REV. E
(SFGL2WHES-12-RA-HDC)

DOCUMENT TITLE:
SPECIFICATION
OF
LCD MODULE TYPE

CUSTOMER	
MODEL NUMBER	8815P02042
CUSTOMER APPROVAL	
DATE	

DEPARTMENT	NAME	SIGNATURE	DATE
PREPARED BY	LIANG YUN		
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DOCUMENT REVISION HISTORY 1:

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Specification of LCD Module Type Item No.: 8815P02042

1. General Description

- 240 x 128 Dots STN grey Positive Transflective Dot Matrix LCD Module.
- Viewing Angle: 12 O'clock direction.
- Driving duty: 1/128 Duty, 1/12 bias.
- RA6963C LCD Controller or equivalent. (SMT)
- SDN8080G Driver or equivalent. (COB)
- Power Supply: +5.0V.
- DC-DC IC built in temperature compensation circuit.
- White backlight. (Side LED)

2. Mechanical Specifications

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Table 1

Parameter	Specifications	Unit
Outline dimensions	144.0(L) x 104.0(W) x 14.3MAX(H)	mm
Viewing area	114.0 (L) x 64.0(W)	mm
Display format	240 x 128	dots
Dot size	0.43(L) x 0.43(W)	mm
Dot spacing	0.02(L) x 0.02(W)	mm
Dot pitch	0.45(L) x 0.45(W)	mm

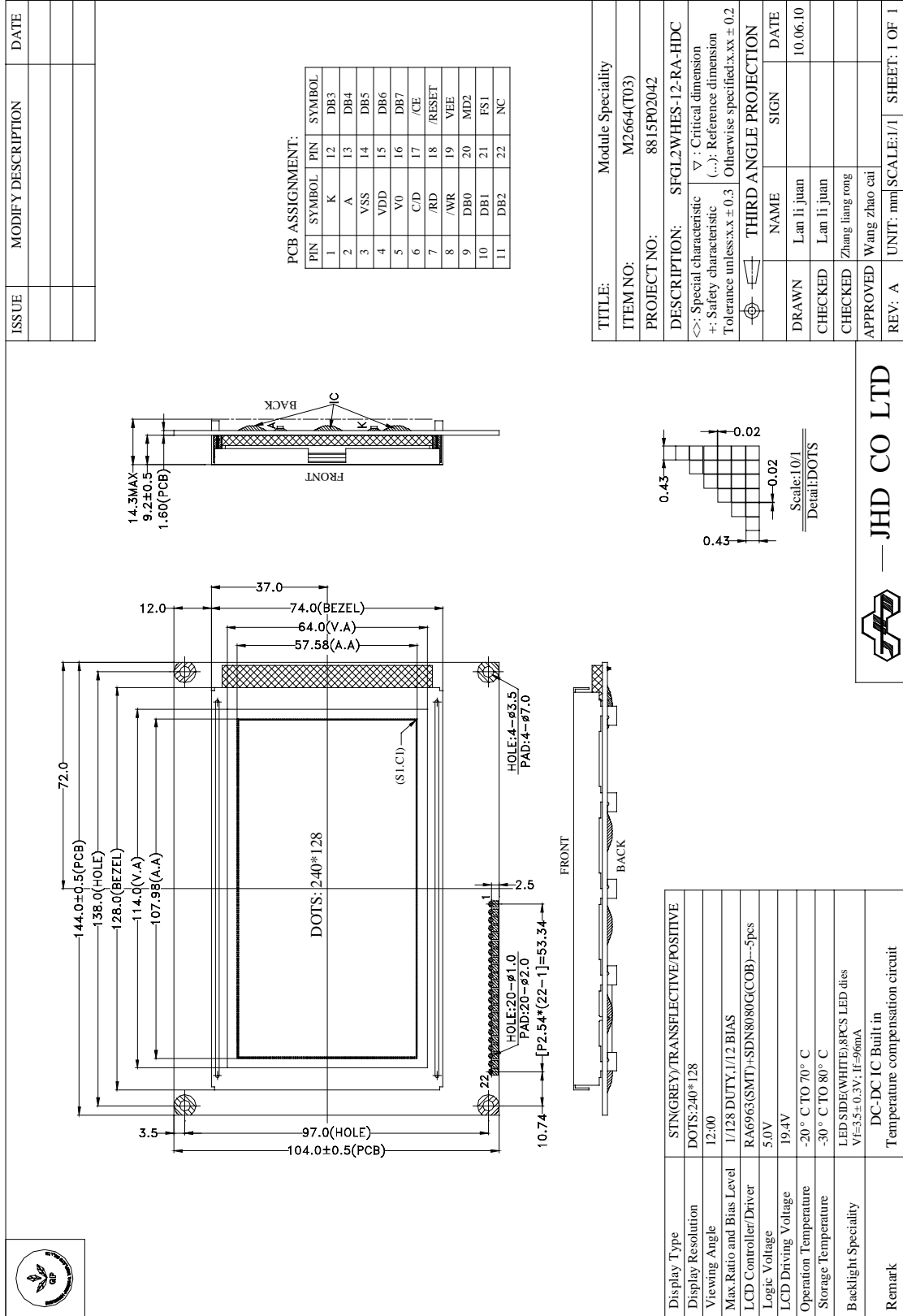


Figure 1: Module Specification



3. Interface signals

Table 2

Pin No.	Symbol	Description															
1	K	Cathode of the backlight.															
2	A	Anode of the backlight.															
3	VSS	Ground. (0V)															
4	VDD	Power supply for logic.															
5	V0	External bias voltage for LCD driver.															
6	C/D	Command/Data Select or Register Select This is a Data or Command select signal.															
		<table border="1"> <tr> <td>C/\bar{D}</td> <td>$\bar{WR} = \text{Low}$</td> <td>$\bar{RD} = \text{Low}$</td> </tr> <tr> <td>High</td> <td>Command Write</td> <td>Status Read</td> </tr> <tr> <td>Low</td> <td>Data Write</td> <td>Data Read</td> </tr> </table>	C/\bar{D}	$\bar{WR} = \text{Low}$	$\bar{RD} = \text{Low}$	High	Command Write	Status Read	Low	Data Write	Data Read						
		C/\bar{D}	$\bar{WR} = \text{Low}$	$\bar{RD} = \text{Low}$													
High	Command Write	Status Read															
Low	Data Write	Data Read															
7	/RD	Read Control RD is a data read signal. When Low, MPU read data from RA6963.															
8	/WR	Write Control WR is a data write signal. When Low, MPU write data into RA6963.															
9	DB0	Data bus.															
10	DB1	Data bus.															
11	DB2	Data bus.															
12	DB3	Data bus.															
13	DB4	Data bus.															
14	DB5	Data bus.															
15	DB6	Data bus.															
16	DB7	Data bus.															
17	/CE	Chip Enable This is chip enable of RA6963. When MPU communicate with RA6963, this pin must be Low.															
18	/RESET	Reset pin. There is a RC reset circuit inside.															
19	VEE	Power supply.															
20	MD2	Columns Selection (MD3 = High, inside)															
		<table border="1"> <tr> <td>MD2</td> <td>H</td> <td>L</td> <td>H</td> <td>L</td> </tr> <tr> <td>MD3</td> <td>H</td> <td>H</td> <td>L</td> <td>L</td> </tr> <tr> <td>Columns</td> <td>32</td> <td>40</td> <td>64</td> <td>80</td> </tr> </table>	MD2	H	L	H	L	MD3	H	H	L	L	Columns	32	40	64	80
		MD2	H	L	H	L											
MD3	H	H	L	L													
Columns	32	40	64	80													
21	FS1	Font Selection (FS0 = Low, inside)															
		<table border="1"> <tr> <td>FS0</td> <td>H</td> <td>L</td> <td>H</td> <td>L</td> </tr> <tr> <td>FS1</td> <td>H</td> <td>H</td> <td>L</td> <td>L</td> </tr> <tr> <td>Font</td> <td>5 X 8</td> <td>6 X 8</td> <td>7 X 8</td> <td>8 X 8</td> </tr> </table>	FS0	H	L	H	L	FS1	H	H	L	L	Font	5 X 8	6 X 8	7 X 8	8 X 8
		FS0	H	L	H	L											
FS1	H	H	L	L													
Font	5 X 8	6 X 8	7 X 8	8 X 8													
22	NC	No connection.															



4. Absolute Maximum Ratings

4.1 Electrical Maximum Ratings (Ta = 25 °C)

Table 3

Parameter	Symbol	Min.	Max.	Unit
Power Supply voltage (Logic)	V _{DD} (Note)	-0.3	+7.0	V
Input Voltage	V _{IN} (Note)	-0.3	V _{DD} +0.3	V

Note:

Referenced to V_{SS}=0V.

4.2 Environmental Condition

Table 4

Item	Operating Temperature (T _{opr})		Storage Temperature (T _{stg})		Remark
	Min.	Max.	Min.	Max.	
Ambient Temperature	-20°C	+70°C	-30°C	+80°C	Dry



5. Electrical Specifications

5.1 Typical Electrical Characteristics

At $T_a = 25\text{ }^\circ\text{C}$, $V_{DD} = 5.0 \pm 0.2\text{V}$, $V_{SS} = 0\text{V}$.

Table 5

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (Logic)	$V_{DD}-V_{SS}$		4.8	5.0	5.2	V
Supply voltage (LCD)	$V_{LCD}=V_{EE}-V_{SS}$	$V_{DD} = +5.0\text{V}$, Note 1	19.1	19.4	19.7	V
Input signal voltage	V_{IH}	“H” level	$V_{DD}-2.2$	-	V_{DD}	V
	V_{IL}	“L” level	0	-	0.8	V
Output voltage	V_{OH}	“H” level	$V_{DD}-0.3$	-	V_{DD}	V
	V_{OL}	“L” level	0	-	0.3	V
Supply Current (Logic)	I_{DD}	Note 1	-	23.0	34.5	mA
Supply voltage for Backlight	V_{LED}	Forward current=96mA $L_v \geq 400\text{cd/m}^2$	3.2	3.5	3.8	V

Note 1: There is tolerance in optimum LCD driving voltage during production and it will be within the specified range.



5.2 Timing Specifications

At $T_a = -20\text{ }^{\circ}\text{C}$ To $+70\text{ }^{\circ}\text{C}$, $V_{DD} = 5.0\pm 0.2\text{V}$, $V_{SS} = 0\text{V}$.

Refer to Fig. 2, the bus-timing diagram for MPU Interface Timing

Table 6

Item	Symbol	Test Conditions	Min.	Max.	Unit
$\overline{\text{C/D}}$ Set Up Time	t_{CDS}	--	100	--	ns
$\overline{\text{C/D}}$ Hold Time	t_{CDH}	--	10	--	ns
$\overline{\text{CE}}$, $\overline{\text{RD}}$, $\overline{\text{WR}}$ Pulse Width	t_{CE} , t_{RD} , t_{WR}	--	80	--	ns
Data Set Up Time	t_{DS}	--	80	--	ns
Data Hold Time	t_{DH}	--	40	--	ns
Access Time	t_{ACC}	--	--	150	ns
Output Hold Time	t_{OH}	--	10	50	ns

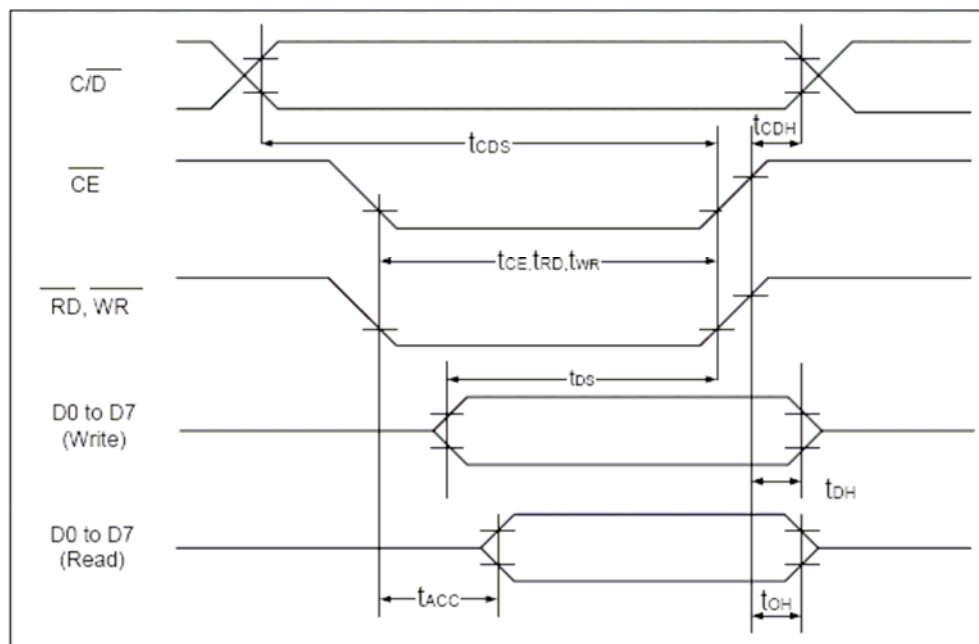


Figure 2: MPU Interface Timing



At $T_a = 0\text{ }^{\circ}\text{C}$ To $+50\text{ }^{\circ}\text{C}$, $V_{DD} = 5.0\text{V} \pm 0.2\text{V}$, $V_{SS} = 0\text{V}$.

Refer to Fig. 3, the bus-timing diagram for Driver Interface Timing.

Table 7

Item	Symbol	Test Conditions	Min.	Max.	Unit
Operating Frequency	f_{SCP}	$T_a = -20\sim 70\text{ }^{\circ}\text{C}$	--	9	MHz
SCP Pulse Width	t_{CWH}, t_{CWL}	--	150	--	ns
SCP Rise/Fall Time	t_r, t_f	--	--	30	ns
LP Setup Time	t_{LSU}	--	150	290	ns
LP Hold Time	t_{LHD}	--	5	40	ns
Data Setup Time	t_{DSU}	--	170	--	ns
Data Hold Time	t_{DHD}	--	80	--	ns
FR Delay Time	t_d	--	0	90	ns
CDATA Setup Time	t_{CSU}	--	450	850	ns
CDATA Hold Time	t_{CHD}	--	450	950	ns

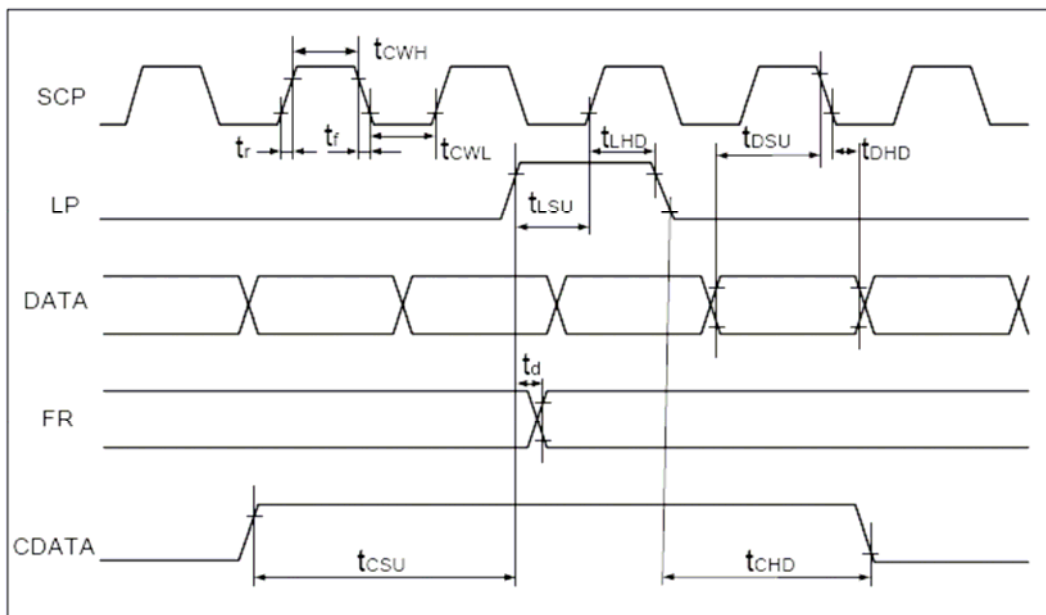


Figure 3: Driver Interface Timing



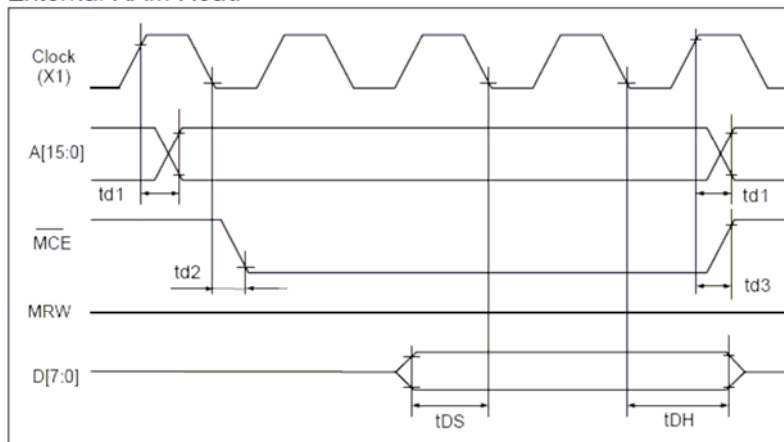
At $T_a = 0\text{ }^{\circ}\text{C}$ To $+50\text{ }^{\circ}\text{C}$, $V_{DD} = 5.0\text{V} \pm 0.2\text{V}$, $V_{SS} = 0\text{V}$.

Refer to Fig. 4 the bus timing diagram for External Memory Interface.

Table 8

Item	Symbol	Test Conditions	Min.	Max.	Unit
Address Delay Time	t_{d1}	--	--	250	ns
MCE Fall Delay Time(Read)	t_{d2}	--	--	180	ns
MCE Rise Delay Time(Read)	t_{d3}	--	--	180	ns
Data Setup Time	t_{DS}	--	--	--	ns
Data Hold Time	t_{DH}	--	--	--	ns
MCE Fall Delay Time(Write)	t_{d4}	--	--	200	ns
MCE Rise Delay Time(Write)	t_{d5}	--	--	200	ns
MRW Fall Delay Time	t_{d6}	--	--	180	ns
MRW Rise Delay Time	t_{d7}	--	--	180	ns
Data Stable Time	t_{d8}	--	--	450	ns
Data Hold Time	t_{d9}	--	--	200	ns

External RAM Read



External RAM Write

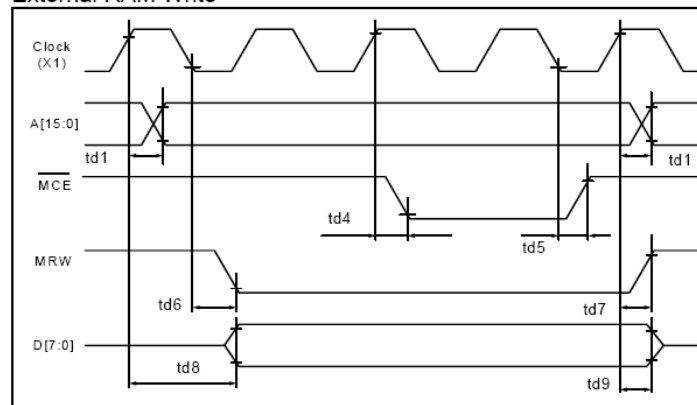


Figure 4: External Memory Interface

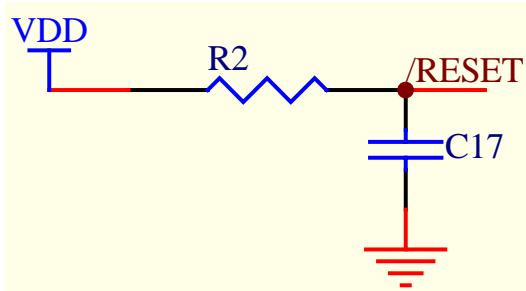


At $T_a = 0\text{ }^{\circ}\text{C}$ To $+50\text{ }^{\circ}\text{C}$, $V_{DD} = 5.0\text{V} \pm 0.2\text{V}$, $V_{SS} = 0\text{V}$.

Refer to Fig. 5 the bus timing diagram for reset timing.

Table 9

Item	Symbol	Max.	Typ.	Min.	Unit
Treset	Reset active time	20	-	1	ms
POR (Power-on reset)	There is a RC circuit inside: $R2=10\text{K } \Omega$, $C17=1\mu\text{F}$ (Note 1)	-	-	-	-



Note 1: RC circuit:

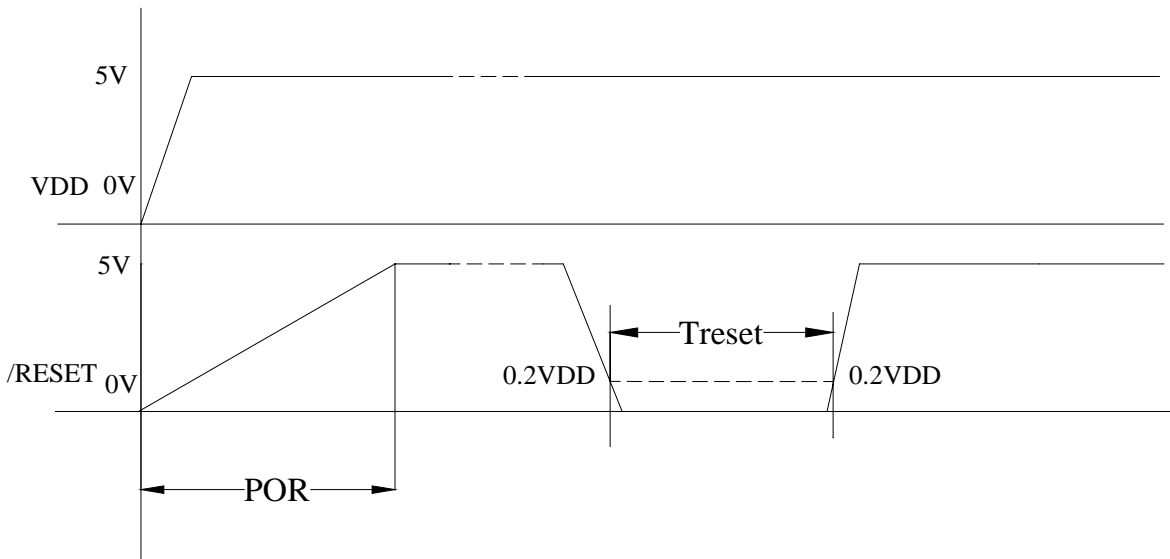


Figure 5: reset timing



6. Quality Units

6.1.0 Purpose

This standard for quality assurance should define the quality of LCD module products to customer by JINGHUA DISPLAYS LTD.

6.2.0 Scope

This document defines general provisions as well as inspection standards for LCD module supplied by JINGHUA DISPLAYS LTD, except for those with special requirements from customer.

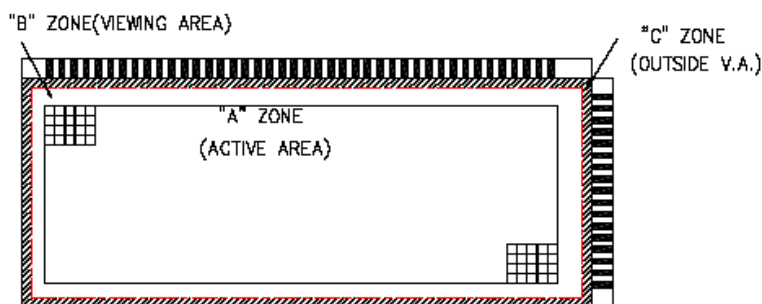
6.3.0 Definition

6.3.1 Definition of area

A Zone: Active area.

B Zone: Viewing area.

C Zone: Outside viewing area.



6.3.2 Definition of size

Large size(L): 1~6 pcs LCD screens are cut out of from each 14 " ×16 " mother glass.

Middle size(L): 7~50 pcs LCD screens are cut out of from each 14 " ×16 " unit mother glass.

Small size(S): more than 50 pcs LCD screens are cut out of from each 14 " ×16 " unit mother glass.



6.4.0 Quality Specification

6.4.1 Conditions of Cosmetic Inspection

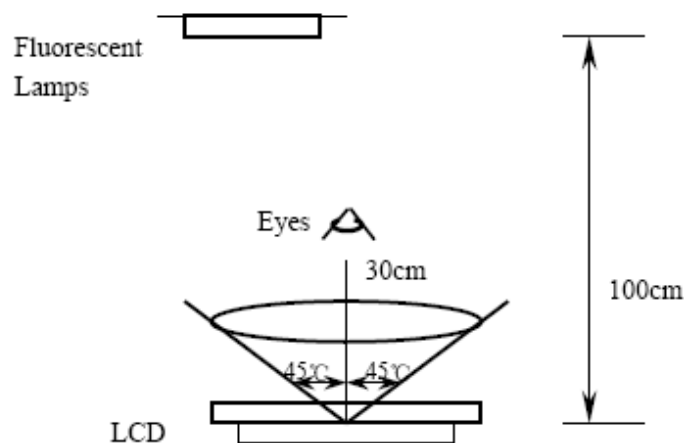
6.4.1.1 Tests should be conducted under the following conditions:

Ambient temperature: $22 \pm 5^{\circ}\text{C}$.

Ambient humidity: $65 \pm 20\%RH$.

Ambient Luminance: 40-watt fluorescent lamp.





An appearance test should be conducted by human sight at approximately 30 cm distance from the LCD module under fluorescent light. Distance between LCD and fluorescent lamps should be 100 cm or more. Viewing direction for inspection is 45° from vertical against LCD.



6.4.1.2 When test the model of transmissive product must add the reflective plate.

6.4.2 Sampling plan

Unless otherwise agreed in writing, the sampling inspection shall be applied to the incoming inspection of customer.

-  Lot size: Quantity of shipment lot per model.
-  Sampling type: Normal inspection, single sampling.
-  Sampling Level: Level II.
-  Sampling table: GB/T2828.1. (GB-national standard of China.)



6.4.3 Classification of defects and Acceptable quality level

Defects and classified as either a major or minor defect defined as bellows:

- 📖 Major defect: It is a defect that is likely to result in failure or to reduce materially the usability of the product for the intended function.
- 📖 Minor defect: It is a defect that will not result in functioning problem with deviation classified.

The AQL for major and minor defects is defined as follows:

Partition	Definition	AQL
Major defect	Functional defective as product.	0.4
Minor defect	Satisfy all functions as product but not satisfy cosmetic standard.	1.0

6.4.4 Applicable instrument

- 📖 LCD module tester.
- 📖 Multimeter.
- 📖 Caliper.
- 📖 Defect size filming standard.



6.4.5 Inspection quality criterion

6.4.5.1 LCD panel part.

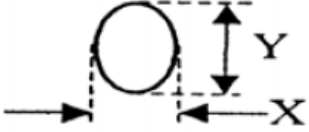
The inspection specification as following list:

Classify	Item	Description of defects	Inspection criterion	Drawing specification	
Major defect	1. Non-display.	Product no function.	Not accept.		
	2. LCD with wrong view direction.	Difference in Spec.	Not accept.		
	3. Segment missing.	Part or all pattern do not light up.	Not accept.		
	4. Occur high current.	Current exceed designed value.	Not accept.		
	5. LC leakage.	LC does not fulfill the glass cell.	Not accept.		
	6. Deviation from drawing.	LCM Dimension difference from drawing and over tolerance	According to dimensions noted in the specification.		
	7. Wrong type applied.	Wrong polarizer attachment.		Not accept.	
		Pin attached wrong type applied.		Not accept.	
8. Incorrect pins quantity	Pin attached wrong quantity applied.		Not accept.		



<p>Minor defect</p>	<p>9. Pattern deformation</p>	<p>Segment fatter or smaller.</p>	<p>Accept if c or $d \leq 1/4 - 1/5W$, or refer to the defect specimen. W = Segment width</p> <p>Accept if $a-b \leq 1/4a$, or refer to the defect specimen. a = Segment width</p>																					
<p>Minor defect</p>	<p>10. Pinholes</p>	<p>black spot/ white spot at activated state.</p>	<p>1. Large size LCD Accept if can't be found at 1m distance and will not enlarge under electronic test.</p> <p>2. Middle size LCD</p> <table border="1" data-bbox="630 1086 981 1276"> <thead> <tr> <th>Diameter (mm)</th> <th>Accept QTY</th> </tr> </thead> <tbody> <tr> <td>$\varnothing \leq 0.15$</td> <td>Not count</td> </tr> <tr> <td>$0.15 < \varnothing \leq 0.25$</td> <td>3</td> </tr> <tr> <td>$0.25 < \varnothing \leq 0.35$</td> <td>1</td> </tr> <tr> <td>$\varnothing > 0.35$</td> <td>0</td> </tr> </tbody> </table> <p>3. Small size LCD</p> <table border="1" data-bbox="630 1366 981 1556"> <thead> <tr> <th>Diameter (mm)</th> <th>Accept QTY</th> </tr> </thead> <tbody> <tr> <td>$\varnothing \leq 0.15$</td> <td>Not count</td> </tr> <tr> <td>$0.15 < \varnothing \leq 0.25$</td> <td>2</td> </tr> <tr> <td>$0.25 < \varnothing \leq 0.30$</td> <td>1</td> </tr> <tr> <td>$\varnothing > 0.30$</td> <td>0</td> </tr> </tbody> </table> <p>4. For the dot pattern: accept if the area of defect is less than or equal to half of one lattice's.</p> <p>5. Only allow one defect in one segment.</p> <p>6. The nearest distance allowed between two pinholes is 20mm.</p>	Diameter (mm)	Accept QTY	$\varnothing \leq 0.15$	Not count	$0.15 < \varnothing \leq 0.25$	3	$0.25 < \varnothing \leq 0.35$	1	$\varnothing > 0.35$	0	Diameter (mm)	Accept QTY	$\varnothing \leq 0.15$	Not count	$0.15 < \varnothing \leq 0.25$	2	$0.25 < \varnothing \leq 0.30$	1	$\varnothing > 0.30$	0	
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<p>Minor defect</p>	<p>11. Blemishes and foreign matters.</p>	<p>Black spot/ dust on LCD. (non-display)</p>	<p>Positive panel:</p> <p>1. A zone.</p> <p>(1) Large size LCD Accept if can't find at 1m distance and will not enlarge under electronic test.</p> <p>(2) Middle size LCD</p> <table border="0"> <tr> <td>Diameter (mm)</td> <td>Accept QTY</td> </tr> <tr> <td>$\varnothing \leq 0.15$</td> <td>Not count</td> </tr> <tr> <td>$0.15 < \varnothing \leq 0.25$</td> <td>3</td> </tr> <tr> <td>$0.25 < \varnothing \leq 0.35$</td> <td>1</td> </tr> <tr> <td>$\varnothing > 0.35$</td> <td>0</td> </tr> </table> <p>(3) Small size LCD</p> <table border="0"> <tr> <td>Diameter (mm)</td> <td>Accept QTY</td> </tr> <tr> <td>$\varnothing \leq 0.15$</td> <td>Not count</td> </tr> <tr> <td>$0.15 < \varnothing \leq 0.25$</td> <td>2</td> </tr> <tr> <td>$0.25 < \varnothing \leq 0.30$</td> <td>1</td> </tr> <tr> <td>$\varnothing > 0.30$</td> <td>0</td> </tr> </table> <p>2. B zone. 1.5 times of acceptable largest diameter size of Zone A.</p> <p>3. C area Not count.</p> <p>Negative panel:</p> <p>1. A zone.</p> <p>(1) Large size LCD</p> <table border="0"> <tr> <td>Diameter (mm)</td> <td>Accept QTY</td> </tr> <tr> <td>$\varnothing \leq 0.15$</td> <td>Not count</td> </tr> <tr> <td>$0.15 < \varnothing \leq 0.30$</td> <td>4</td> </tr> <tr> <td>$0.30 < \varnothing \leq 0.50$</td> <td>1</td> </tr> <tr> <td>$\varnothing > 0.50$</td> <td>0</td> </tr> </table> <p>(2) Middle and small size LCD</p> <table border="0"> <tr> <td>Diameter (mm)</td> <td>Accept QTY</td> </tr> <tr> <td>$\varnothing \leq 0.15$</td> <td>Not count</td> </tr> <tr> <td>$0.15 < \varnothing \leq 0.25$</td> <td>3</td> </tr> <tr> <td>$\varnothing > 0.25$</td> <td>0</td> </tr> </table> <p>2. B zone. 1.5 times of acceptable largest diameter size of Zone A.</p> <p>3. C area Not count.</p> <p>The nearest distance allowed between two black spot is 20mm.</p>	Diameter (mm)	Accept QTY	$\varnothing \leq 0.15$	Not count	$0.15 < \varnothing \leq 0.25$	3	$0.25 < \varnothing \leq 0.35$	1	$\varnothing > 0.35$	0	Diameter (mm)	Accept QTY	$\varnothing \leq 0.15$	Not count	$0.15 < \varnothing \leq 0.25$	2	$0.25 < \varnothing \leq 0.30$	1	$\varnothing > 0.30$	0	Diameter (mm)	Accept QTY	$\varnothing \leq 0.15$	Not count	$0.15 < \varnothing \leq 0.30$	4	$0.30 < \varnothing \leq 0.50$	1	$\varnothing > 0.50$	0	Diameter (mm)	Accept QTY	$\varnothing \leq 0.15$	Not count	$0.15 < \varnothing \leq 0.25$	3	$\varnothing > 0.25$	0	 <p>$\varnothing = (X + Y) / 2$</p>
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<p>Minor defect</p>	<p>12.Black lines and scratches.</p>	<p>Scratch on glass or polarizer surface. And foreign linear matters in LCD.</p>	<p>Positive panel:</p> <p>1. A zone.</p> <p>(1) Large size LCD Accept if can't be found at 1m distance and will not enlarge under electronic test.</p> <p>(2) Middle size LCD</p> <table border="0"> <thead> <tr> <th>Diameter (mm)</th> <th>Accept QTY</th> </tr> </thead> <tbody> <tr> <td>$W \leq 0.02$</td> <td>Not count</td> </tr> <tr> <td>$0.02 < W \leq 0.03, L \leq 4$</td> <td>2</td> </tr> <tr> <td>$0.03 < W \leq 0.05, L \leq 3$</td> <td>2</td> </tr> <tr> <td>$0.02 < W \leq 0.03, L > 4$</td> <td>0</td> </tr> <tr> <td>$0.03 < W \leq 0.05, L > 3$</td> <td>0</td> </tr> </tbody> </table> <p>$W > 0.05$ As the spot criteria.</p> <p>(3)small size LCD</p> <table border="0"> <thead> <tr> <th>Diameter (mm)</th> <th>Accept QTY</th> </tr> </thead> <tbody> <tr> <td>$W \leq 0.02$</td> <td>Not count</td> </tr> <tr> <td>$0.02 < W \leq 0.03, L \leq 4$</td> <td>2</td> </tr> <tr> <td>$0.03 < W \leq 0.05, L \leq 2$</td> <td>1</td> </tr> <tr> <td>$0.02 < W \leq 0.03, L > 4$</td> <td>0</td> </tr> <tr> <td>$0.03 < W \leq 0.05, L > 2$</td> <td>0</td> </tr> </tbody> </table> <p>$W > 0.05$ As the spot criteria.</p> <p>2. B zone. 1.5 times of acceptable largest diameter size of Zone A.</p> <p>3. C zone Not count.</p> <p>Negative panel:</p> <p>1. A zone.</p> <p>(1) Large size LCD</p> <table border="0"> <thead> <tr> <th>Diameter (mm)</th> <th>Accept QTY</th> </tr> </thead> <tbody> <tr> <td>$W \leq 0.02$</td> <td>Not count</td> </tr> <tr> <td>$0.02 < W \leq 0.03, L \leq 5$</td> <td>3</td> </tr> <tr> <td>$0.03 < W \leq 0.05, L \leq 4$</td> <td>2</td> </tr> <tr> <td>$0.02 < W \leq 0.03, L > 5$</td> <td>0</td> </tr> <tr> <td>$0.03 < W \leq 0.05, L > 4$</td> <td>0</td> </tr> </tbody> </table> <p>$W > 0.05$ As the spot criteria.</p> <p>(2) Middle size LCD</p> <table border="0"> <thead> <tr> <th>Diameter (mm)</th> <th>Accept QTY</th> </tr> </thead> <tbody> <tr> <td>$W \leq 0.02$</td> <td>Not count</td> </tr> <tr> <td>$0.02 < W \leq 0.03, L \leq 4$</td> <td>2</td> </tr> <tr> <td>$0.03 < W \leq 0.05, L \leq 2$</td> <td>2</td> </tr> <tr> <td>$0.02 < W \leq 0.03, L > 3$</td> <td>0</td> </tr> <tr> <td>$0.03 < W \leq 0.05, L > 2$</td> <td>0</td> </tr> </tbody> </table> <p>$W > 0.05$ As the spot criteria.</p>	Diameter (mm)	Accept QTY	$W \leq 0.02$	Not count	$0.02 < W \leq 0.03, L \leq 4$	2	$0.03 < W \leq 0.05, L \leq 3$	2	$0.02 < W \leq 0.03, L > 4$	0	$0.03 < W \leq 0.05, L > 3$	0	Diameter (mm)	Accept QTY	$W \leq 0.02$	Not count	$0.02 < W \leq 0.03, L \leq 4$	2	$0.03 < W \leq 0.05, L \leq 2$	1	$0.02 < W \leq 0.03, L > 4$	0	$0.03 < W \leq 0.05, L > 2$	0	Diameter (mm)	Accept QTY	$W \leq 0.02$	Not count	$0.02 < W \leq 0.03, L \leq 5$	3	$0.03 < W \leq 0.05, L \leq 4$	2	$0.02 < W \leq 0.03, L > 5$	0	$0.03 < W \leq 0.05, L > 4$	0	Diameter (mm)	Accept QTY	$W \leq 0.02$	Not count	$0.02 < W \leq 0.03, L \leq 4$	2	$0.03 < W \leq 0.05, L \leq 2$	2	$0.02 < W \leq 0.03, L > 3$	0	$0.03 < W \leq 0.05, L > 2$	0	
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Minor defect	Black lines and scratches.	Scratch on glass or polarizer surface. And foreign linear matters in LCD.	$0.02 < W \leq 0.03, L > 4$ 0 $0.03 < W \leq 0.05, L > 2$ 0 (3) Small size LCD Diameter (mm) Accept QTY $W \leq 0.02$ Not count $0.02 < W \leq 0.03, L \leq 3$ 2 $0.03 < W \leq 0.05, L \leq 2$ 1 $0.03 < W \leq 0.03, L > 3$ 0 $0.02 < W \leq 0.05, L > 2$ 0 2. B zone. 1.5 times of acceptable largest diameter size of Zone A. 3. C zone Not count. The nearest distance allowed between two defects is 20mm.	
Minor defect	13. Scratch on PI coating.	PI coating scratched.	The visible scratch of A zone can not be accepted at 30cm view distance.	
Minor defect	14. Rainbow	Arches, circular or parallel colorful spread.	According to the limit specimen.	
Minor defect	15. Bubbles or wrinkles in polarizer	Bubbles or wrinkles between polarizer and glass.	A zone : The visible defect can not be accepted at 30cm view distance. B zone : Not count.	
Minor defect	16. Position of polarizer attachment	16. Wrong polarizer attachment in position or dimension.	Polarizer protruding from edge of glass and exceeding/ within the maximum external dimension of LCD.	
Minor defect	17. Ink printing defect	17.1 Ink line/ pattern broken	Not accept.	
		17.2 Ink pattern/ line jagged.	Accept if the thick or thin part is less than or equal to 25% segment width ,or according to the limit specimen.	



Minor defect	16. Position of polarizer attachment	16.1 Wrong polarizer attachment in position or dimension.	Polarizer protruding from edge of glass and exceeding/ within the maximum external dimension of LCD.	
Minor defect	17. Ink printing defect	17.1 Ink line/pattern broken	Not accept.	
		17.2 Ink pattern/line jagged.	Accept if the thick or thin part is less than or equal to 25% segment width or according to the limit specimen.	
		17.3 Light leakage	When activated with current white light appears in the position of pinhole or scratch due to ink printing misalignment. According to the pinhole specification.	
Minor defect		17.4 Ink printing pattern/line uneven	Reject if the thick or thin is more than 1/2W. Reject when $W1 - W2 \leq 1/3W$.	
Minor defect	18. Pin defect.	18.1 Corrosion or foreign material on terminal legs.	Pin incoming defect: oxidized, damage (including pins plating damaged), excess epoxy on bottom glass or terminal legs. Not accept.	
Minor defect		18.2 Pin deviation over tolerance	According to the specification.	



Minor defect	19. Chipped glass on comer	19.1 Chip in lead contact area.	a	b	c	Accept QTY			
			$a \leq 3\text{mm}$ ($L \geq 5\text{mm}$)	$b \leq 1/2W$	$c \leq T$	2			
		19.2 Others	$a < 1/2L$ ($L < 5\text{mm}$)	$b \leq 1/2W$	$c \leq T$	2			
			a	b	c	Accept QTY			
			not exceed 1/2 width of seal		$c \leq T$	2			
Minor defect	20. Glass chip on edge		a	b	c	Accept QTY			
			$a \leq 3\text{mm}$	not exceed 1/2 width of seal	$c \leq 3/4T$	2			
Minor defect	21. Chipped electrode pad	21.1 Glass chip on ITO edge	COG and TAB product.		a	b	c	Accept QTY	
					$a \leq 2\text{mm}$ (and not exceed 3 ITO terminal)	$b \leq W/5$	$T > 0.7\text{mm}$ $c \leq 1/2T$ $T \leq 0.7\text{mm}$ $c \leq T$	2	
Minor defect			Others		a	b	c	Accept QTY	
			$a \leq 3\text{mm}$ (and not exceed 4 ITO terminal)	$b \leq W/4$	$c \leq T$	2			



Minor defect	21.2 Glass chip on ITO back	COG and TAB product.	a	b	c	Accept QTY	
			$a \leq 3\text{mm}$	$b \leq W/4$	$T > 0.7\text{mm}$ $c \leq 1/2T$ $T \leq 0.7\text{mm}$ $c \leq T$	2	
		Others	a	b	c	Accept QTY	
			$a \leq 5\text{mm}$	$b \leq W/4$	$c \leq T$	2	
Minor defect	22. Mechanical damage.	Extended crack inspector shall attempt to remove the chip with tweezers, re-evaluate if the remaining defect is still a crack or a chip.	B	Accept QTY			
Minor defect	23. Glass cracks		Not accept				

Remark;

The minimum space between any 2 defects (spot, dirt) should more than 20mm, and Max. allowed defect QTY in total:

Large size LCD : Zone A: $\leq 5/\text{unit}$, Zone B $\leq 5/\text{unit}$;

Middle size LCD : Zone A: $\leq 3/\text{unit}$, Zone B $\leq 3/\text{unit}$;

Small size LCD: Zone A: $\leq 2/\text{unit}$, Zone B $\leq 2/\text{unit}$.



6.4.5.2 Other part

The inspection specification as following list:

NO	Items	Criterion of defects	AQL
1	Backlight	1.Lumination source flickers. 2.Using spot, lines and contamination standard of LCD to judge the spots or scratches defect on backlight. 3.Not allow unlighted on backlight. 4.Colour and luminance of backlight should correspond its specification.	Major Minor Major Major
2	PCB, COB	1.COB seal may not have pinholes larger than 0.2mm or contamination. 2.COB seal surface may not have pinholes through to the IC. 3.The height of the COB should not exceed the height indicated in the assembly diagram. 4.Beyond 2mm of the seal area, there may not have sealant on the PCB. 5.No oxidation or contamination on PCB connector. 6.Parts on PCB should correspond the characteristic, and not allow wrong parts, missing parts or additional parts. 7.The jumper on the PCB should correspond to the characteristic. 8.The solder which gets on bezel, LED pad, zebra pad or screw hole pad should be smoothed down.	Minor Minor Major Minor Minor Major Minor Major
3	Soldering	1.No unmelted solder pastes on the PCB. 2.No cold solder joints, solder connection missing, oxidation of solder. 3.No short circuits in components on PCB.	Minor Minor Minor
4	General Appearance	1.No oxidation, contamination, curves ,cracks or bends on interface Pin of TCP. 2.No solder residue or solder balls on product. 3.The IC on the TCP may not be damaged. 4.The residual rosin or tin oil of soldering (component or chip component) is not turned into brown or black color. 5.Packing method correspond the specification. 6.Dimension and structure correspond the specification sheet. 7.No dirt and break on the heat seal.	Minor Minor Major Minor Major Major Major



6.5.0 Reliability

The LCD module should not fail the following reliability test.

ITEM	Condition		Criterion
High temperature operation	+70°C 8h		1.Total current consumption should be below double of initial value. 2.Cosmetic defects should not be happened.
Low temperature operation	-20°C 8h		
Humidity	Storage	40°C 93%RH 24h	
	Operation	40°C 93%RH 8h	
High temperature storage	+80°C 10h		
Low temperature storage	-30°C 10h		
Thermal shock storage	-20°C → +70°C 60min → 60min 5 cycle		
Vibration (Package state)	50Hz 0.7mm 30min in each direction (X, Y, Z).		
Falling test (Packaged state)	Weight ≥ 15kg; Falling height: 80cm. Weight < 15kg; Falling height: 100cm.		



6.6. Quality Assurance

6.6.1 JINGHUA DISPLAYS will only replace or repair any of its LCD which is found defective electrically or visually when inspected in accordance with the LCM specification, for a period of one year from the date of shipment. Confirmation of such date shall be based on freight documents.

No warranty can be granted if any of the precautions stated in handling LCD and LCD Modules above have been disregarded.

6.6.2 In returning the LCD and LCD Modules, they must be properly packaged and there should be detailed description of the failures or defects. Broken glass, scratches on polarizers, mechanical damages as well as defects that are caused by accelerated environmental tests are excluded from warranty.

6.7. Precautions in Use of LCM

1. Handling of LCM

1.1 Don't give external shock.

1.2 Liquid crystal is chemical hazardous substance. Once the liquid crystal inside it leaks out, be sure not to get any in your mouth. If the liquid is adhered your skin or clothes etc, wash it off using soap and water thoroughly and immediately.

1.3 Don't apply excessive force on the display surface.

1.4 Don't scratch and dirty polarizer of covering the display surface of the LCD module.

1.5 In order to prevent static electricity from destructing, be sure to wear gauntlet that is tested up to grade.

2. Storage

2.1 Store in dark places and do not expose to sunlight or fluorescent light. Keep the temperature between 0°C and 40°C and the humidity lower than 60%RH. Please consult JINGHUA DISPLAYS LTD. for other storage requirements.

2.2 Storage in a clean environment, free-dust and well ventilated.

2.3 Storage in anti-static electricity container.

3. Soldering

3.1 The soldering temperature is 260±5°C and soldering Time should be less than 3 sec, and soldering iron power should be less than 30w.

3.2 Re-soldering: no more than 3 times.

3.3 The soldering point should be further than 1.6 mm from body.

“Shenzhen Jinghua Displays CO.,LTD. reserves the right to change this specification”