



DOCUMENT NUMBER AND REVISION

FS-JCG12864A32-12 REV. A
(STBL2WHEG-12-ST-NSC)

DOCUMENT TITLE:
SPECIFICATION
OF
LCD MODULE TYPE

CUSTOMER	
MODEL NUMBER	JCG12864A32-12
CUSTOMER APPROVAL	
DATE	

DEPARTMENT	NAME	SIGNATURE	DATE
PREPARED BY	LIANG YUN		2008.11.27
CHECKED BY	YI NA		2008.11.28
APPROVED BY	WANG ZHAO CAI		08.11.28

SHENZHEN JINGHUA DISPLAYS CO., LTD.

No.511 Bldg.6.7/F., Bagualing Ind. District, Shenzhen, Guangdong Province, China

Fax: 86-755-82262610

URL: www.china-lcd.com



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Specification of LCD Module Type Item No.: JCG12864A32-12

1. General Description

- 128 x 64 Dots STN Negative Transmissive Dot Matrix LCD Graphic Module.
- Viewing Angle: 12 O'clock direction.
- Driving duty: 1/65 Duty, 1/9 bias.
- ST7565R LCD Controller & Driver or equivalent.
- Chip-On-Glass (COG).
- Serial and 6800 series.
- Power Supply: +3.3V.
- Interface type: FPC.
- 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	67.15(L) x 63.08(W) x 5.3MAX. (H)	mm
Viewing area	61.00MIN(L) x 31.40MIN(W)	mm
Display format	128 x 64	dots
Dot size	0.42(W) x 0.42 (H)	mm
Dot spacing	0.03(W) x 0.03(H)	mm
Dot pitch	0.45(W) x 0.45(H)	mm
Weight:	TBD	grams

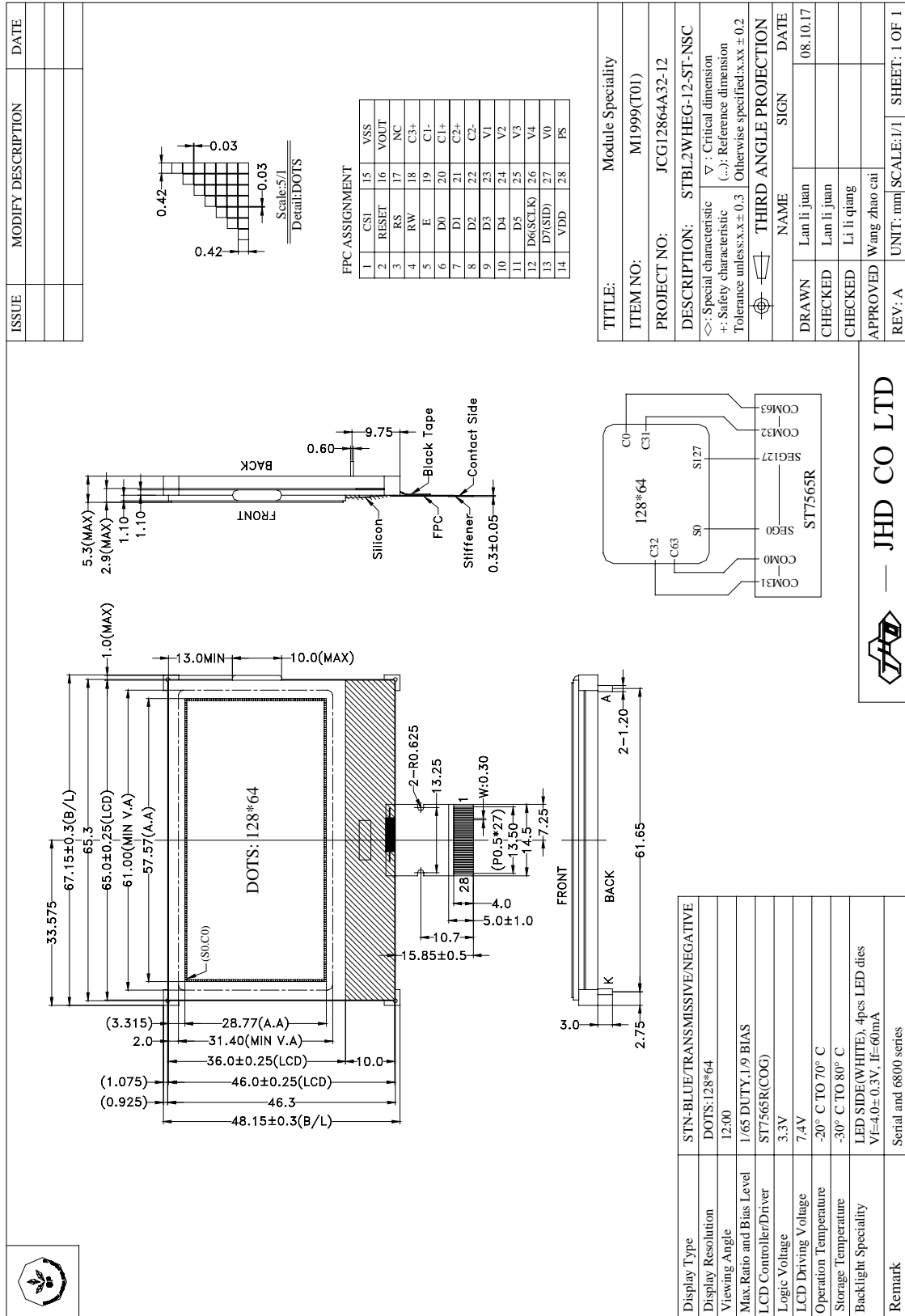


Figure 1: Module Specification

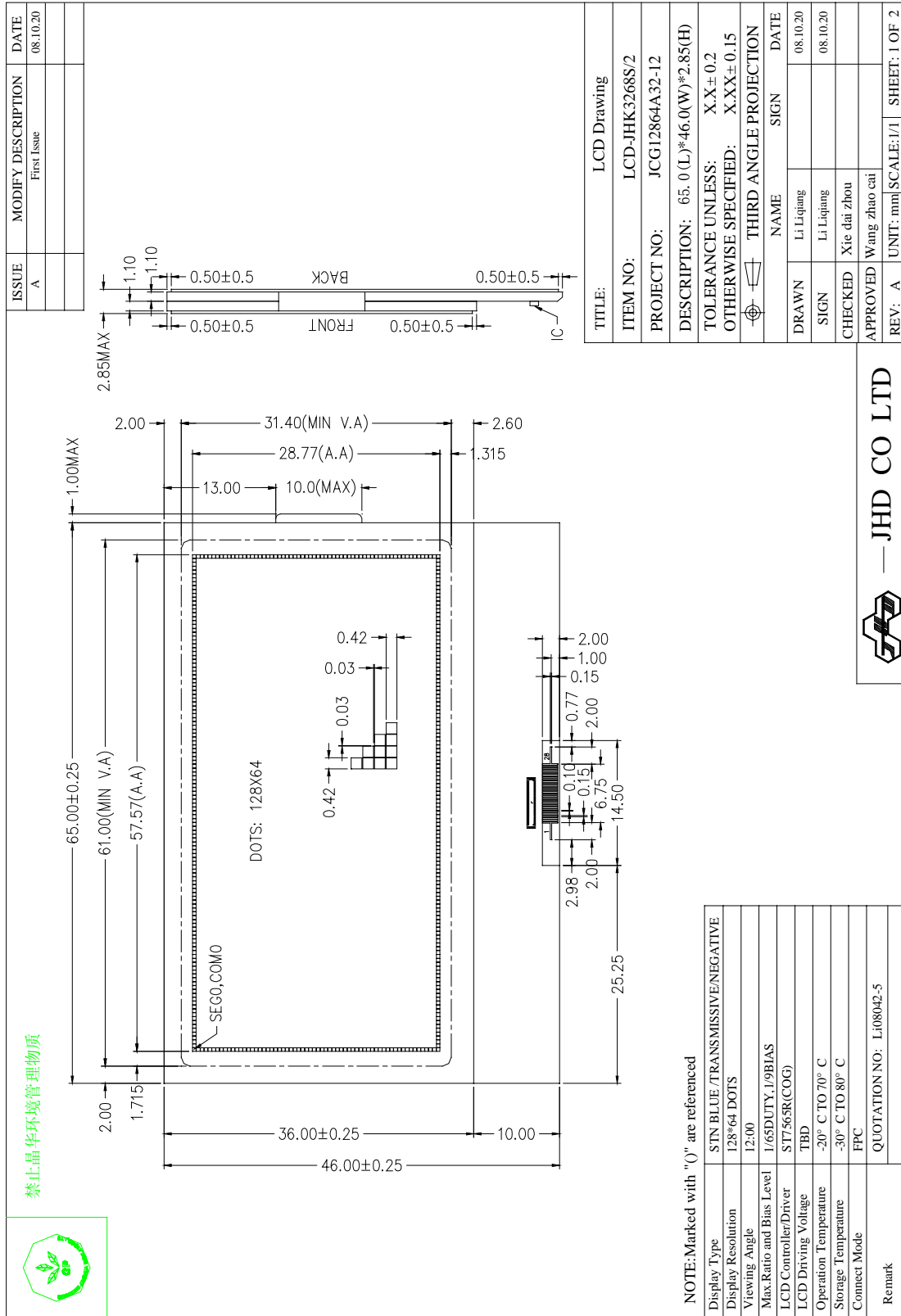


Figure 2a: LCD Specification 1



ISSUE	MODIFY DESCRIPTION	DATE
A	First Issue	08.10.20

禁止晶华环境管理物质



- 晶华公司的环保标志:
JHD Environment Sign (green shading) :



- 晶华所执行的标准如下:
JHD perform Environment Standard as follows :

有害物质六种含量 (ppm) --- ICP 测试方式			
Six Injurant Contents (ppm)	--- ICP	Test Style	
镉及镉化合物 Cadmium and Cadmium compounds	100	1000	1000
铅及铅化合物 Lead and lead compounds	1000	1000	1000
汞及汞化合物 Mercury and mercury compounds	1000	1000	1000
六价铬化合物 Hexavalent chromium compounds	1000	1000	1000
多溴联苯 Polybrominated biphenyls (PBB)	1000	1000	1000
多溴二苯醚 Polybrominated diphenylethers (PBDE)	1000	1000	1000

NOTE: Marked with "()" are referenced

Display Type	STN BLUE /TRANSMISSIVE/NEGATIVE
Display Resolution	128*64 DOTS
Viewing Angle	1200
Max.Ratio and Bias Level	1/65DUTY,19BIAS
LCD Controller/Driver	ST7565R(COG)
LCD Driving Voltage	TBD
Operation Temperature	-20° C TO 70° C
Storage Temperature	-30° C TO 80° C
Connect Mode	FPC
Remark	QUOTATION NO: L108042-5

TITLE:	LCD Drawing
ITEM NO:	LCD-JHK3268S/2
PROJECT NO:	JCG12864A32-12
DESCRIPTION:	65.0(L)*46.0(W)*2.85(H)
TOLERANCE UNLESS:	X.X±0.2
OTHERWISE SPECIFIED:	X.XX±0.15
THIRD ANGLE PROJECTION	
NAME SIGN DATE	
DRAWN	Li Liqiang 08.10.20
SIGN	Li Liqiang 08.10.20
CHECKED	Xie dai zhou
APPROVED	Wang zhao cai
REV: A	UNIT: mm SCALE: 1/1 SHEET: 2 OF 2



Figure 2b: LCD Specification 2

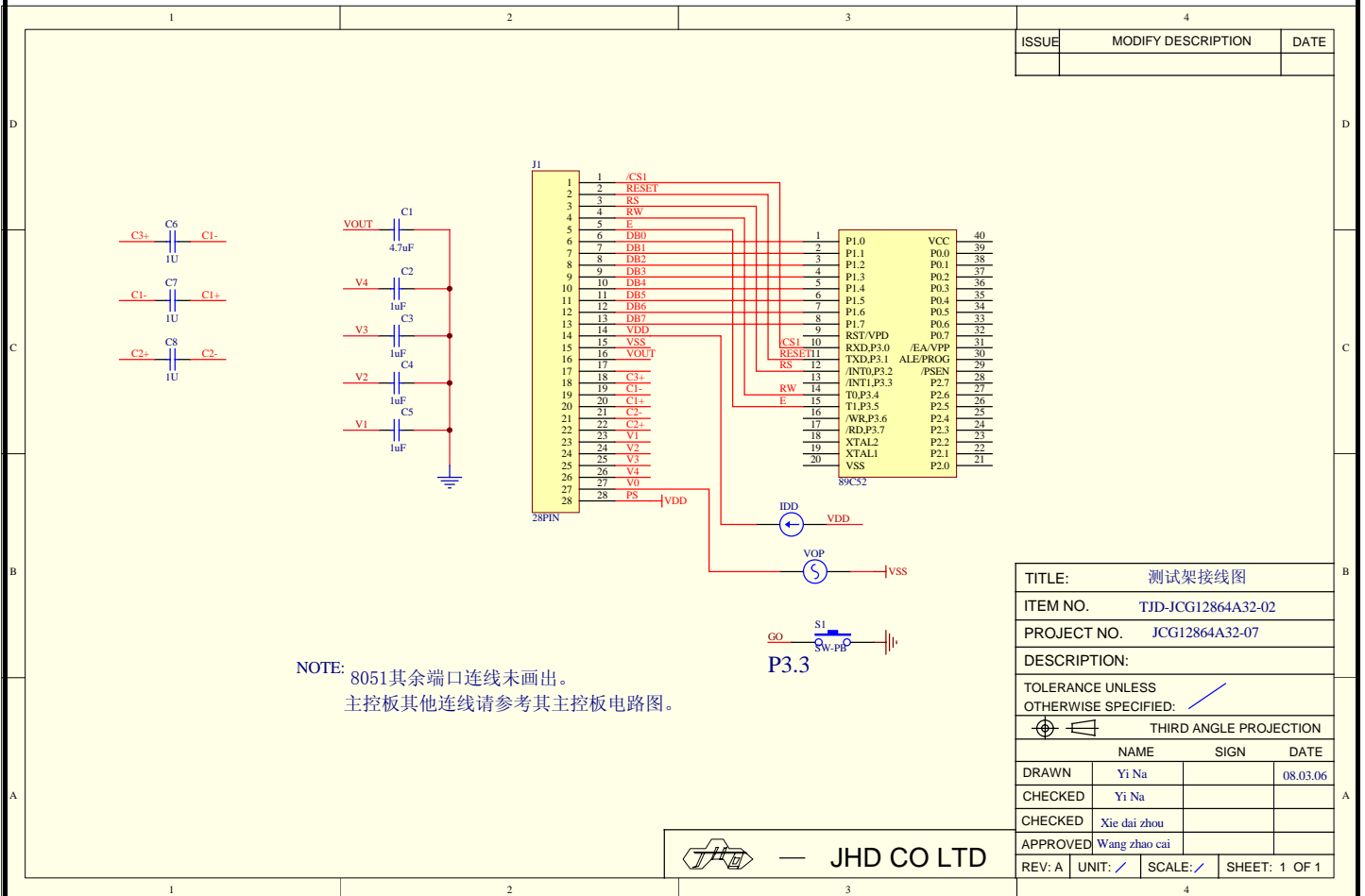


Figure 3: Recommend the power supply for circuit



3. Interface signals

Table 2(a)

Pin No.	Symbol	Description	
1	CS1	This is the chip select signal. When /CS1 = "L" and CS2 = "H", then the chip select becomes active, and data/command I/O is enabled.	
2	RESET	When /RES is set to "L", the register settings are initialized (cleared). The reset operation is performed by the /RES signal level.	
3	RS	Register select input pin 1. RS = "H": DB0 to DB7 are display data - RS = "L": DB0 to DB7 are control data	
4	RW	<ul style="list-style-type: none"> When connected to 8080 series MPU, this pin is treated as the "/WR" signal of the 8080 MPU and is LOW active. The signals on the data bus are latched at the rising edge of the /WR signal. When connected to 6800 series MPU, this pin is treated as the "R/W" signal of the 6800 MPU and decides the access type: When R/W = "H": Read. When R/W = "L": Write 	
5	E	<ul style="list-style-type: none"> When connected to 8080 series MPU, this pin is treated as the "/RD" signal of the 8080 MPU and is LOW active. The data bus is in an output status when this signal is "L". When connected to 6800 series MPU, this pin is treated as the "E" signal of the 6800 MPU and is HIGH active. This is the enable clock input terminal of the 6800 Series MPU.	
6	D0	This is an 8-bit bi-directional data bus that connects to an 8-bit or 16-bit standard MPU data bus. When the serial interface (SPI-4) is selected (P/S = "L"): D7: serial data input (SI); D6: the serial clock input (SCL). D0 to D5 should be connected to VDD or floating. When the chip select is not active, D0 to D7 are set to high impedance.	
7	D1		
8	D2		
9	D3		
10	D4		
11	D5		
12	D6 (SCLK)		
13	D7 (SID)		
14	VDD		Power supply for logic (+3.3V).
15	VSS		Ground (0V).
16	VOUT		DC/DC voltage converter. Connect a capacitor between this terminal and VSS or VDD
17	NC		No connection.
18	C3+		Capacitor 3 positive connection pin for voltage converter.
19	C1-	Capacitor 1 negative connection pin for voltage converter.	
20	C1+	Capacitor 1 positive connection pin for voltage converter.	
21	C2+	Capacitor 2 positive connection pin for voltage converter.	
22	C2-	Capacitor 2 negative connection pin for voltage converter.	
23	V1	LCD driver supply voltages The voltage determined by LCD pixel is impedance-converted by an operational amplifier for application. Voltages should have the following relationship; $V0 \ V1 \ V2 \ V3 \ V4 \ VSS$ When the internal power circuit is active, these voltages are generated as following table according to the state of LCD bias. $V1=(8/9) V0, V2=(7/9) V0, V3=(2/9) V0, V4=(1/9) V0$	
24	V2		
25	V3		
26	V4		
27	V0		
28	PS	Parallel / Serial data input select input.	



4. Absolute Maximum Ratings

4.1 Electrical Maximum Ratings (Ta = 25 °C)

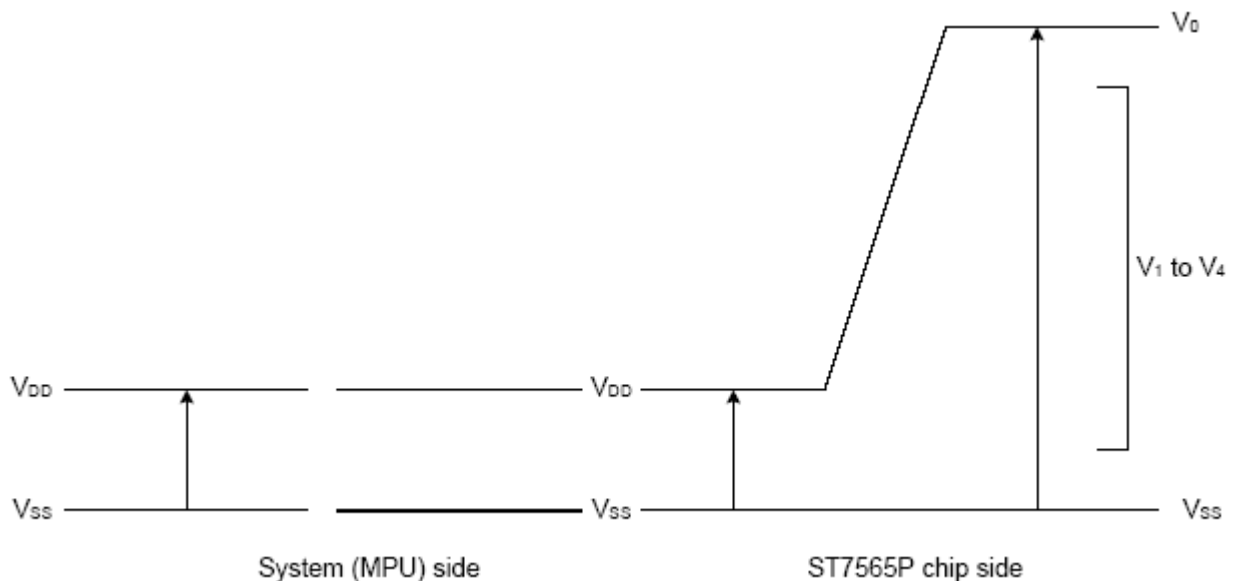
Table 3

Parameter	Symbol	Min.	Max.	Unit
Power Supply voltage	V_{DD}	-0.3	+3.6	V
Power Supply voltage (VDD standard)	V_{DD2}	-0.3	+3.6	V
Power Supply voltage (VDD standard)	V_0, V_{OUT}	-0.3	+14.5	V
Power Supply voltage (VDD standard)	V_1, V_2, V_3, V_4	-0.3	$V_0+0.3$	V
Input voltage range	V_{IN}	-0.3	$V_{DD}+0.3$	V
Input voltage range	V_O	-0.3	$V_{DD}+0.3$	V

Notes and Cautions

1. The voltages are relative to $V_{SS} = 0V$ unless otherwise specified.
2. The ranges listed in this section are stress only. It is recommended that the normal operating condition of this device should be in the ranges listed in “DC Characteristics” (the next section).
3. Stress over the listed ranges in “Absolute Maximum Ratings” may cause permanent damage to this device.
4. If this device is operated out of these conditions and ranges, it may not only result in malfunctions, but may have a negative impact on the reliability as well.
5. Insure that the voltage levels of $V_1, V_2, V_3,$ and V_4 are always such that

$$V_{OUT} > V_0 > V_1 > V_2 > V_3 > V_4.$$





4.2 Environmental Condition

Table 4

Item	Operating Temperature (Topr)		Storage Temperature (Tstg)		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 Ta = 25 °C, V_{DD} = 3.3V±0.1V, V_{SS}=0V.

Table 5

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (Logic)	V _{DD} -V _{SS}		3.2	3.3	3.4	V
Supply voltage (LCD)	V _{LCD} = V _O -V _{SS}	V _{DD} =+3.3V, Note 1	7.20	7.40	7.60	V
Input signal voltage	V _{IH}	“H” level	0.8V _{DD}	-	V _{DD}	V
	V _{IL}	“L” level	V _{SS}	-	0.2V _{DD}	V
Supply Current (Logic & LCD)	I _{DD}	Note 1	-	0.6	0.9	mA
Supply voltage for White Backlight (Side LED)	V _{LED}	Forward current =60mA	3.7	4.0	4.3	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 $T_a = -20^{\circ}\text{C}$ To $+70^{\circ}\text{C}$, $V_{DD} = +3.3\text{V} \pm 0.1\text{V}$, $V_{SS} = 0\text{V}$.

Refer to Fig. 4, the bus-timing diagram for the 6800 Series MPU.

Table 6

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	t_{AH6}		0	—	ns
Address setup time		t_{AW6}		0	—	
System cycle time		t_{CYC6}		240	—	
Enable L pulse width (WRITE)	E	t_{EWLW}		80	—	
Enable H pulse width (WRITE)		t_{EHWLW}		80	—	
Enable L pulse width (READ)		t_{EWLR}		80	—	
Enable H pulse width (READ)		t_{EWHR}		140	—	
WRITE Data setup time	D0 to D7	t_{DS6}		40	—	
WRITE Address hold time		t_{DH6}		0	—	
READ access time		t_{ACC6}	$CL = 100 \text{ pF}$	—	70	
READ Output disable time		t_{OH6}	$CL = 100 \text{ pF}$	5	50	

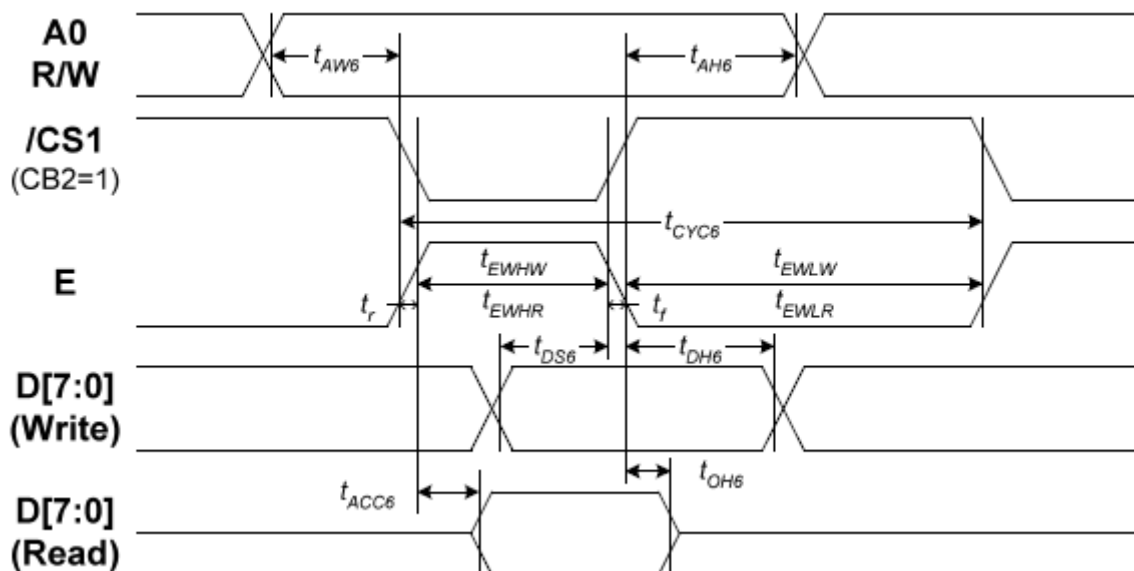


Figure 4: System Bus Read/Write Characteristics 2 (For the 6800 Series MPU)



At $T_a = -20^{\circ}\text{C}$ To $+70^{\circ}\text{C}$, $V_{DD} = +3.3\text{V} \pm 0.1\text{V}$, $V_{SS} = 0\text{V}$.

Refer to Fig. 5, the bus-timing diagram for the Serial Interface.

Table 7

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period	SCL	t_{SCYC}		50	—	ns
SCL "H" pulse width		t_{SHW}		25	—	
SCL "L" pulse width		t_{SLW}		25	—	
Address setup time	A0	t_{SAS}		20	—	
Address hold time		t_{SAH}		10	—	
Data setup time	SI	t_{SDS}		20	—	
Data hold time		t_{SDH}		10	—	
CS-SCL time	CS	t_{CSS}		20	—	
CS-SCL time		t_{CSH}		40	—	

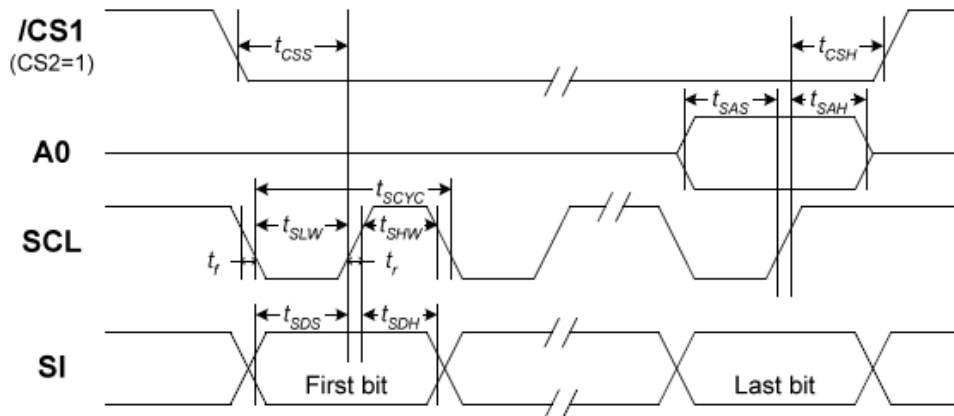


Figure 5: The Serial Interface

At $T_a = -20^{\circ}\text{C}$ To $+70^{\circ}\text{C}$, $V_{DD} = +3.3\text{V} \pm 0.1\text{V}$, $V_{SS} = 0\text{V}$.

Refer to Fig. 6, the bus-timing diagram for reset timing.

Table 8

Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
Reset time	/RES	t_R		—	—	1.0	μs
Reset "L" pulse width		t_{RW}		1.0	—	—	μs

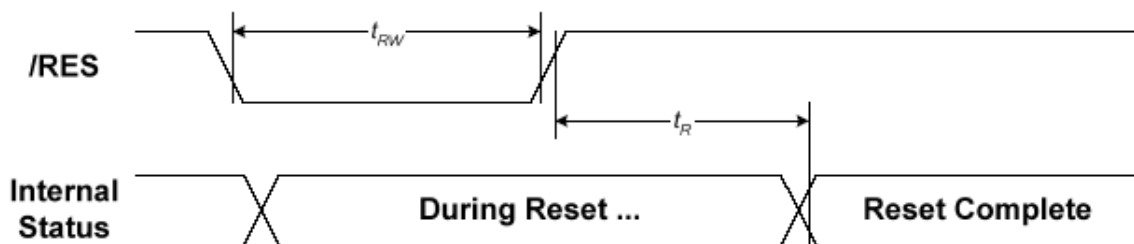


Figure 6: Reset Timing



5.3 Initialization Code (Reference only)

```
RW      EQU      P3.4
E       EQU      P3.5
RS      EQU      P3.2
RESETB EQU      P3.1
cs1     equ      p3.0
ADJV    EQU      P3.6;;ADJUST VOLTAGE
GO      EQU      P3.3
;*****
ORG     0000H
LJMP    INIT
INIT:   clr      cs1
        SETB     RESETB
LCALL   T2
CLR     RESETB
LCALL   T2
SETB    RESETB
LCALL   T2
;SETB   MI;SET TO 6800 SERIES
MOV     P1,#0A0H;;;SET ADC=0
LCALL   WRCOM
MOV     P1,#0A6H;;;SET REVERSE DISPLAY=normal
LCALL   WRCOM
MOV     P1,#0C8H;SET SHL=0
LCALL   WRCOM
MOV     P1,#0A3H;SET BIAS=1
LCALL   WRCOM
MOV     P1,#2CH;SET POWER CONTROL VC=1
LCALL   WRCOM
LCALL   T2
MOV     P1,#2EH;SET POWER CONTROL VC=1,VR=1,VF=0
LCALL   WRCOM
LCALL   T2
MOV     P1,#2FH;SET POWER CONTROL VC=1,VR=1,VF=1
LCALL   WRCOM
```



```
LCALL  T2;;;;;T2>50MS

MOV    P1,#20H;set 1+Rb/Rb=4.35(P1<=#25H)  LCALL  WRCOM
LCALL  TT1
MOV    P1,#81H;;SET REFERENCE VOLTAGE
LCALL  WRCOM
LCALL  T2;;;;;T2>50MS
MOV    P1,#0Fh;SET SV5-SV0=32
LCALL  WRCOM
LCALL  T2;;;;;T2>50MS
MOV    P1,#0ADH;SET STATIC INDICATOR MODE=ON
LCALL  WRCOM
MOV    P1,#03H;SET S1,S0=1,1
LCALL  WRCOM

MOV    P1,#40H;;SET INITIAL DISPLAY LINE IS 0
LCALL  WRCOM
MOV    P1,#0B0H;;SET PAGE ADDRESS IS 0
LCALL  WRCOM
MOV    P1,#10H;;SET COLUMN ADDRESS IS 0000H
LCALL  WRCOM
MOV    P1,#00H
LCALL  WRCOM

MOV    P1,#0AFH;DISPLAY ON
LCALL  WRCOM

MOV    A,#0FFH;ENTIRE DIPLAY,EVERY DOT IS ON
LCALL  WR128
```



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.

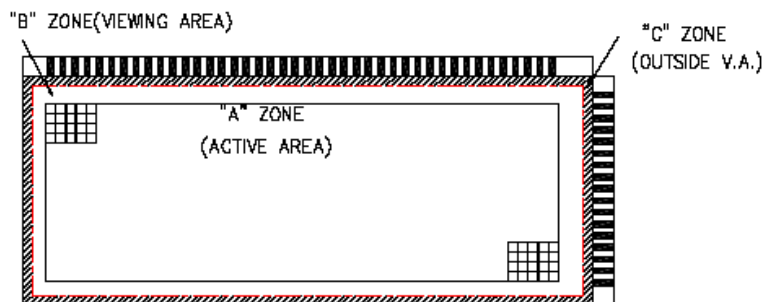
6.3.0 Definition

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

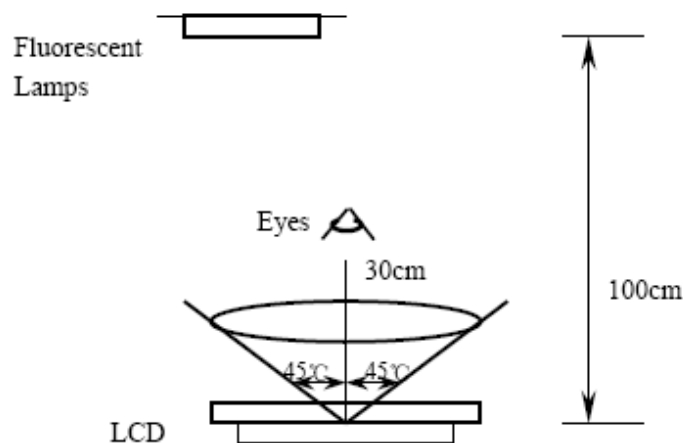
6.4.1.1 Tests should be conducted under the following conditions:

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.

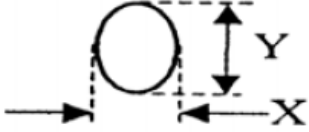
The inspection specification as following list:

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="628 1084 986 1279"> <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="628 1368 963 1563"> <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.	



		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		18.1 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. Pin defect.	18.2 Pin deviation over tolerance	According to the specification.				
Minor defect	19. Chipped glass on corner		a	b	c	Accept QTY	
			$a \leq 5\text{mm}$ ($L \geq 5\text{mm}$)	$b \leq W$	$c \leq T$	3	
		19.1 Chip in lead contact area.	$a < L$ ($L < 5\text{mm}$)	$b \leq W$	$c \leq T$	3	



			19.2 Others	a	b	c	Accept QTY	
				not exceed 1/2 width of seal		$c \leq T$	3	
Minor defect	20. Glass chip on edge			a	b	c	Accept QTY	
				$a \leq 5\text{mm}$	not exceed 1/2 width of seal	$c \leq T$	3	
Minor defect	21. Chipped electrode pad	21.1 Glass chip on ITO edge	21.1.1 COG and TAB product.	a	b	c	Accept QTY	
				$a \leq 3\text{mm}$ (and not exceed 4 ITO terminal)	$b \leq W/5$	$T > 0.7\text{mm}$ $c \leq 1/2T$ $T \leq 0.7\text{mm}$ $c \leq T$	3	
Minor defect	21. Chipped electrode pad	21.1 Glass chip on ITO edge	21.1.2 Others	a	b	c	Accept QTY	
				$a \leq 4\text{mm}$ (and not exceed 4 ITO terminal)	$b \leq W/4$	$c \leq T$	3	
Minor defect	21.2 Glass chip on ITO back	21.2.1 COG and TAB product.	21.2.1 COG and TAB product.	a	b	c	Accept QTY	
				$a \leq 3\text{mm}$	$b \leq W/4$	$T > 0.7\text{mm}$ $c \leq 3/4T$ $T \leq 0.7\text{mm}$ $c \leq T$	3	



			a	b	c	Accept QTY	
		21.2.2 Others	$a \leq 5\text{mm}$	$b \leq W/3$	$c \leq T$	3	
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	
				$b \leq 1/4W$		2	
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 shall not fail the following reliability test.

ITEM	Condition		Criterion
High temperature operation	+70 8h		1.Total current consumption should be below double of initial value. 2.Cosmetic defects should not be happened.
Low temperature operation	-20 8h		
Humidity	Storage	40 93%RH 24h	
	Operation	40 93%RH 8h	
High temperature storage	+80 10h		
Low temperature storage	-30 10h		
Thermal shock storage	-20 +70 60min 60min 5 cycles		
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.”