XINNOA(HK) Display Technology Co.,Limited

Date: 2022/03/22

Specifications for Approval

Model name : XNY1602Y-SDYTSY-3FSWA REV:A

ENG	QA	APPROVAL
Andy	Leo	Duke

Customer Approval	☐ **Accept** ☐ **Reject** **Comment:** **Approved by:**

REVISION RECORD

Revision	Revision Date	Page	Contents
A	2022/03/22		Initial Release and Issue Full Specification

CONTENTS

1. FEATURES

The features of LCD are as follows

* Display mode : STN(Y/G),POSITIVE,TRANSMISSIVE
* Color : Display dot : BLACK
  Background: YELLOW-GREEN
* Display Format : 16(characters) ×2(line)
* IC : 31068 31065
* Interface Input Data : SPI 3wire IIC
* Driving Method : 1/16 Duty, 1/5 Bias
* Viewing Direction : 6 O'clock
* Backlight : LED (YELLOW-GREEN)

2. MECHANICAL SPECIFICATIONS

Item	Specification	Unit
Module Size	80.00(W) X36.00(H) X12.0(T)	mm
Viewing Area	64.00(W) X 16.00(H)	mm
Effective Display Area	55.02(W) X 11.00(H)	mm
Number of Dots	16(characters) ×2(line)	-
Dot Size	0.55(W) X 0.60(H)	mm
Dot Pitch	0.61(W) X0.66(H)	mm

3. ELECTRICAL SPECIFICATIONS

3-1. Absolute Maximum Ratings (Vss=0V)

Item	Symbol	Standard Value			Unit
		Min.	Typ.	Max.	
Supply Voltage For Logic	V_{DD}	-0.3	-	3.3	V
Supply Voltage For LCD Drive	V_0, V_{OUT}	-0.3	-	14.5	V
Operating Temp.	T_{OP}	-20	-	+70	°C
Storage Temp.	T_{ST}	-30	-	+80	°C
Static Electricity	Be sue that you are ground when handing LCM				

3. ELECTRICAL SPECIFICATIONS

3-2-1.Electrical Characteristics

Item		Symbol	Test Condition	Min.	Typ.	Max.	Unit
Supply Voltage For Logic		$V_{DD} - V_{SS}$	Ta=25℃	3.1	3.3	3.5	V
Supply Voltage For LCD		$V_{DD} - V_0$	Ta=25℃	4.1	4.3	4.5	V
Input Voltage	"H" Level	V_{IH}	Ta=25℃	0.8V_{DD}	-	V_{DD}	V
	"L" Level	V_{IL}		V_{SS}	-	0.2V_{DD}	V
Output Voltage	"H" Level	V_{OH}	I_{OUT}= -0.5mA	0.8V_{DD}	-	V_{DD}	V
	"L" Level	V_{OL}	I_{OUT}= 0.5mA	V_{SS}	-	0.2V_{DD}	V
Current Consumption		I_{DD}	V_{IN} = V_{DD}	-	-	1.0	mA

NOTE: 1) Duty ratio=1/65, Bias=1/9

2) Measured in Dots ON-state

3-3. BACKLIGHT

3-3-1. Absolute Maximum Ratings

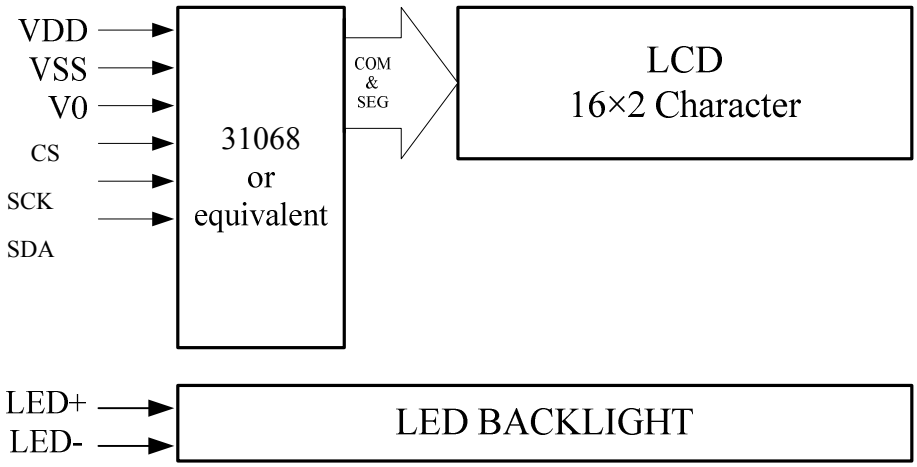
Item	Symbol	Condition	Min.	Typ.	Max	Unit
Forward Current	IF	Ta= 25℃	-	-	20	mA
Reverse Voltage	VR		-	-	5	V
Power Dissipation	PD	Ta= 25℃	-	-	100	mW

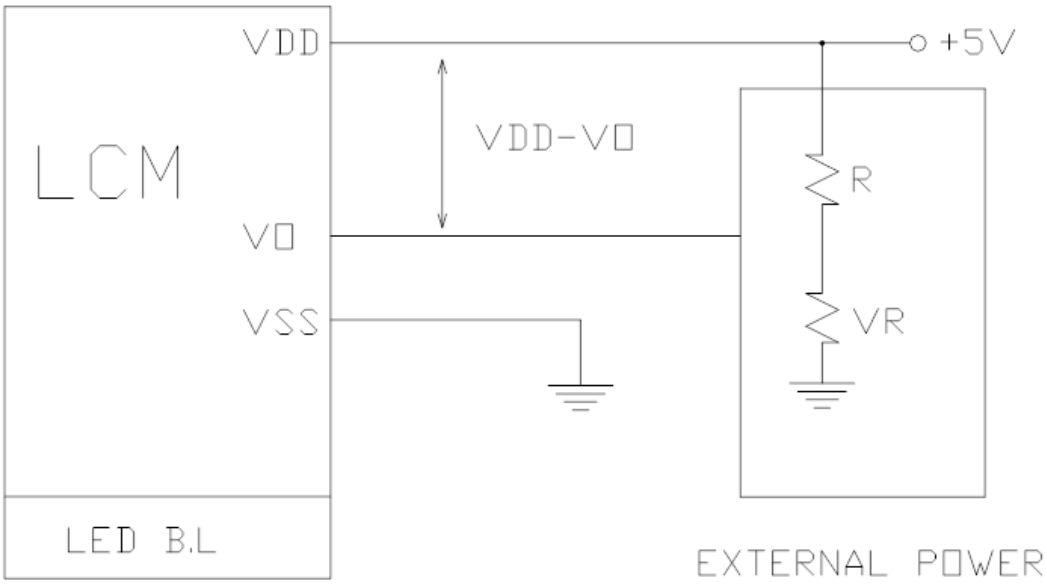
3-3-2. Opto-electronic Characteristics

Item	Symbol	Condition	Min.	Typ.	Max	Unit
Forward Voltage	VF	Ta= 25℃ IF= 32mA	3.1	3.3	3.5	V
Luminous	-		100	150	-	cd/m²

* The brightness is measured without LCD panel

4. schematic diagram





VDD-V0:LCD DRIVING VOLTAGE
VR: 10K ~ 20K
IF VOP(LCD) > 5.0V,THE EXERNAL POWER MUST BE USED

5. Interface Pin Function

Pin No.	Pin Out	Description
1	GND	GND (0V)
2	VDD	Logic supply voltage (3.3V)
3	VO	Power supply for LCD
4	CS	Three-wire communication chip selection signal; Two wire communication not in use, suspended.
5	SCK	Serial communication clock port
6	SDA	Serial communication data port
7	BLA	LED Backlight +.
8	BLK	LED Backlight -.

6. COMMAND LIST

指令	RS	D7	D6	D5	D4	D3	D2	D1	D0	执行时间 fosc=270KHz	描述
清除显示	0	0	0	0	0	0	0	0	1	1.53ms	将 20H 写入 DDRAM，将地址计数器中的地址 00H 设置为 DDRAM 地址
返回	0	0	0	0	0	0	0	1	-	1.53ms	将地址计数器中的地址 00H 设置为 DDRAM 地址，并将光标恢复至初始位置，DDRAM 的内容保持不变。
输入模式设置	0	0	0	0	0	0	1	I/D	SH	39us	设置光标移方向，并允许整个显示移动
显示开/关	0	0	0	0	0	1	D	C	B	39us	设置显示、光标，光标的闪烁控制位。
移位	0	0	0	0	1	S/C	R/L	-	-	39us	设置光标移动，显示移动方向的控制位，DDRAM 数据保持不变。
功能设置	0	0	0	1	-	N	F	-	-	39us	设置显示行数(N：2 行/1 行)，显示字体（F：5×11 点阵/5×8 点阵）
设置 CGRAM 地址	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	39us	在地址计数器内设置 CGRAM 地址
设置 DDRAM 地址	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0	39us	在地址计数器内设置 DDRAM 地址
写数据	1	D7	D6	D5	D4	D3	D2	D1	D0	43us	写数据至内部 RAM（DDRAM/CGRAM）

7.TIMING CHARACTERISTICS (Continued)

SPI 3 wire

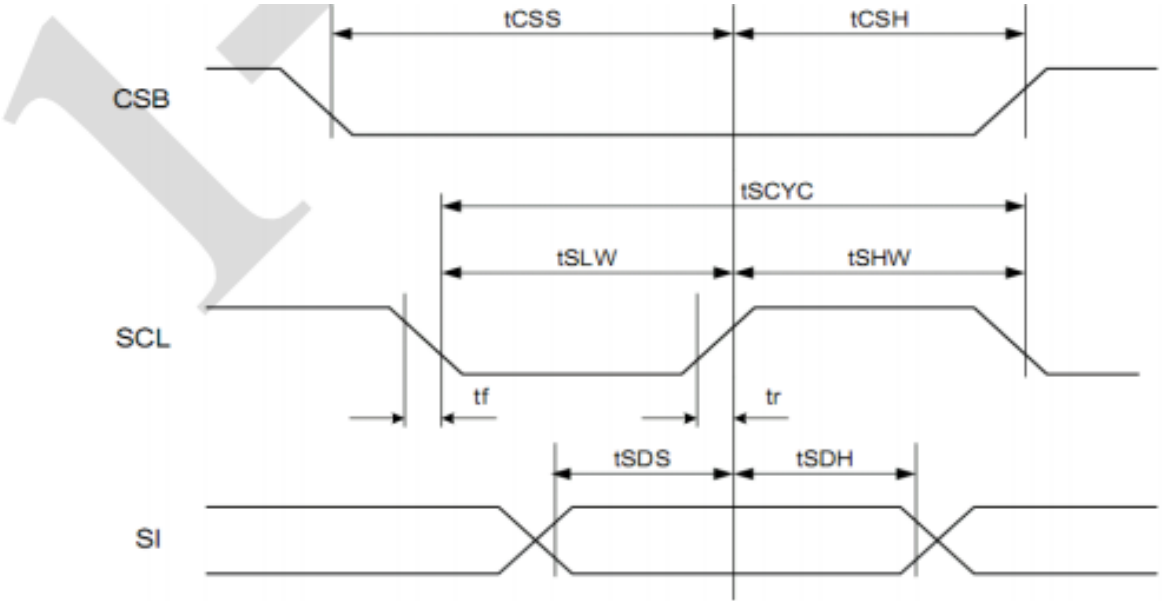


图 3、三线通讯时序图

IIC 2wire

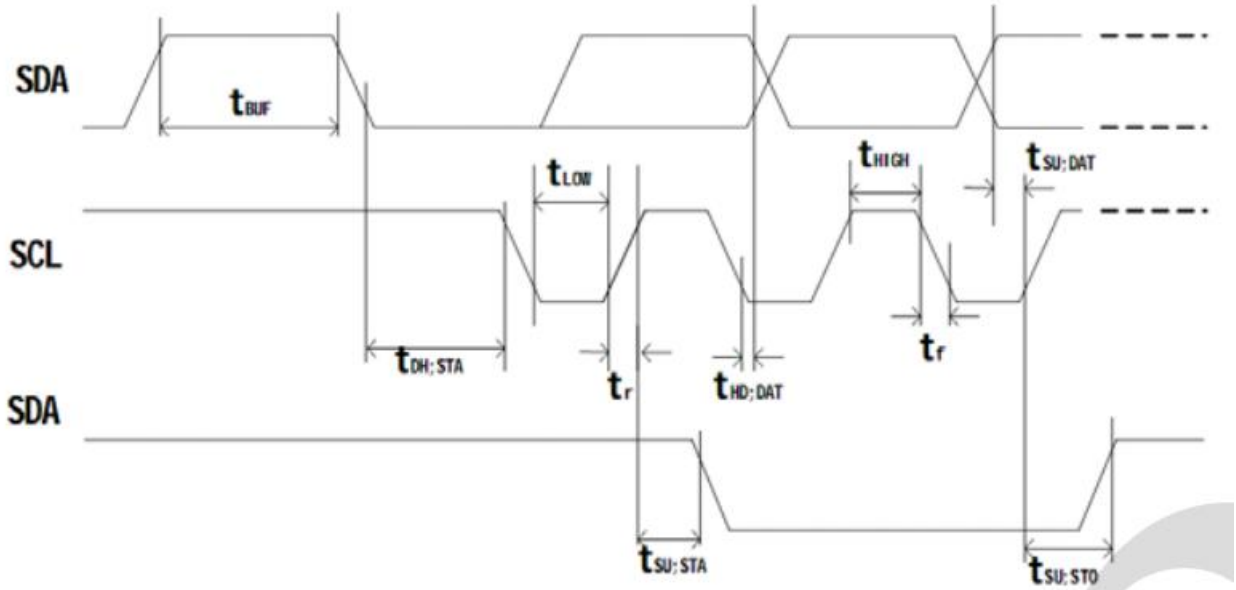
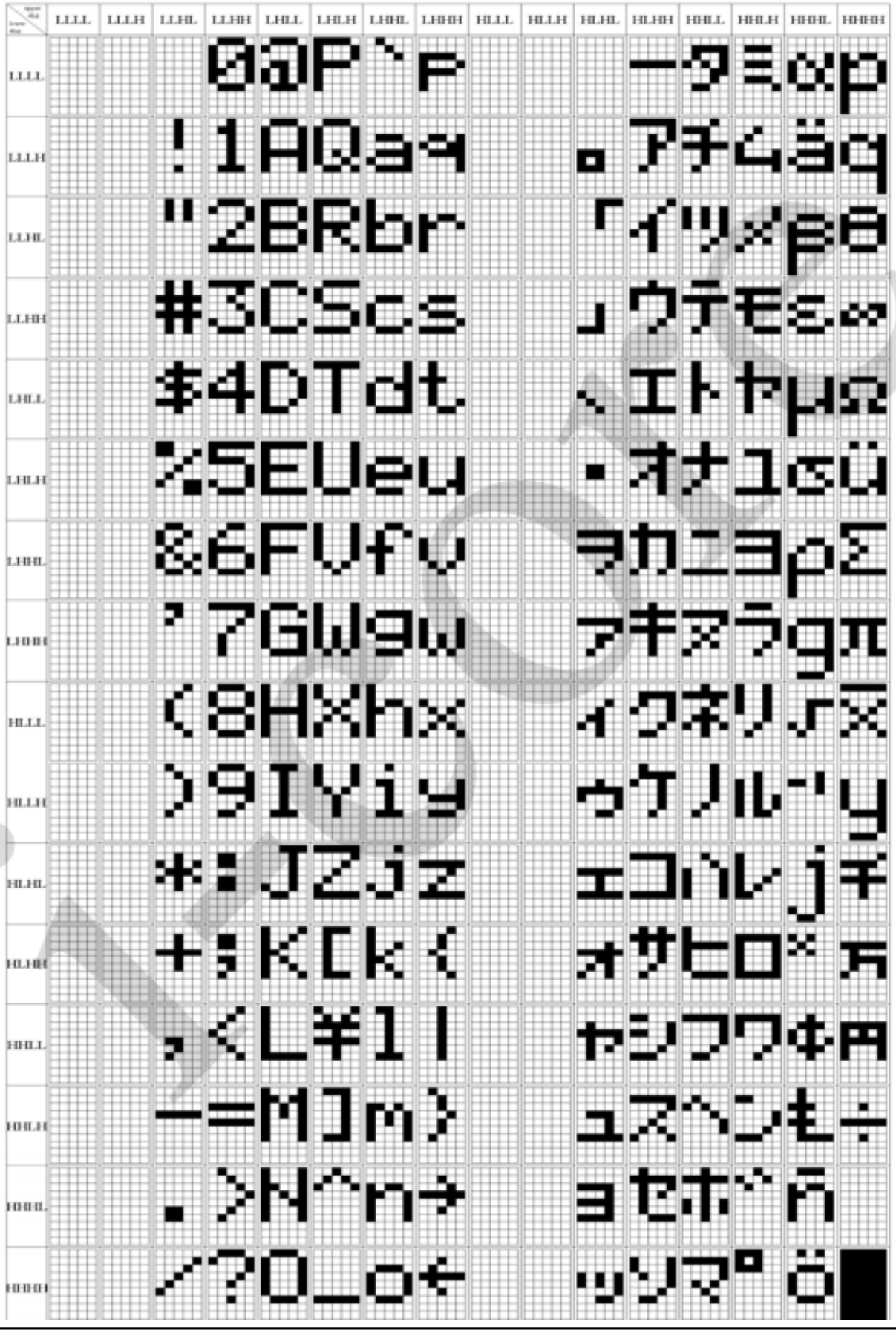


图 4、两线通讯时序图

AiP31068-001 字库



8. QUALITY SPECIFICATION (Continued)

8-3. Sampling Plan and Acceptance

1. Sampling Plan

MIL - STD - 105E (||) ordinary single inspection is used.

2. Acceptance

Major defect: AQL = 0.25%

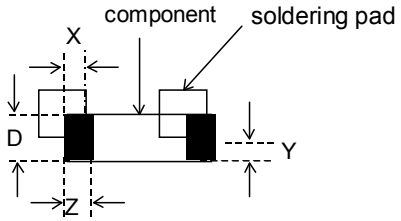
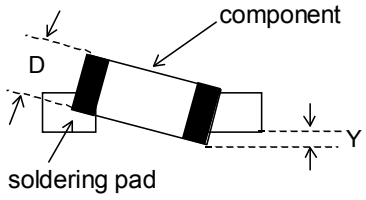
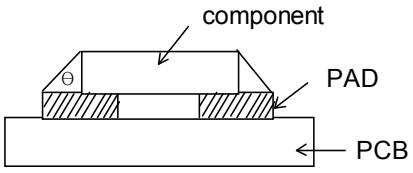
Minor defect: AQL = 0.65%

8-4. Criteria

1. COB

Defect	Inspection Item	Inspection Standards	
Major	PCB copper flakes peeling off	Any copper flake in viewing Area should be greater than 1.0mm^2	Reject
Major	Height of coating epoxy	Exceed the dimension of drawing	Reject
Major	Void or hole of coating epoxy	Expose bonding wire or IC	Reject
Major	PCB cutting defect	Exceed the dimension of drawing	Reject

2. SMT

Defect	Inspection Item	Inspection Standards	
Minor	Component marking not readable		Reject
Minor	Component height	Exceed the dimension Of drawing	Reject
Major	Component solder defect (missing , extra, wrong component or wrong orientation		Reject
Minor	Component position shift 	X < 3/4Z Y > 1/3D	Reject Reject
Minor	Component tilt 	Y > 1/3D	Reject
Minor	Insufficient solder 	$\theta \leq 20^{\circ}$	Reject

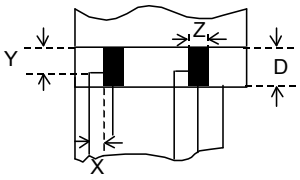
8. QUALITY SECIFICATION (Continued)

8-4. Criteria (Continued)

3. Metal (Plastic) Frame

Defect	Inspection Item	Inspection Standards		
Major	Crack / breakage	Anywhere		Reject
Minor	Frame Scratch	W	L	Acceptable of Scratch
		w<0.03mm	Any	Ignore
		0.03mm≤w<0.05mm	L≤5.0mm	2
		0.05mm≤w<0.1mm	L≤3.0mm	1
		w≥0.1mm	Any	0
		Note: 1. Above criteria applicable to scratch lines with distance greater than 5mm. 2. Scratch on the back side of frame (not visible) can be ignored.		
Minor	Frame Dent, Prick $\Phi = \frac{L + W}{2}$			Acceptable of Dents / Pricks
		$\Phi \leq 1.0$mm		2
		$1.0 < \Phi \leq 1.5$mm		1
		$1.5\text{mm} > \Phi$		0
		Note: 1. Above criteria applicable to any two dents / pricks with distance greater than 5mm 2. Dent / prick on the back side of frame (not visible) can be ignored		
Minor	Frame Deformation	Exceed the dimension of drawing		
Minor	Metal Frame Oxidation	Any rust		

4. Flexible Film Connector (FFC)

Defect	Inspection Item		Inspection Standards	
Minor	Tilted soldering		Within the angle ±3°	Acceptable
Minor	Uneven solder joint /bump			Reject
Minor	Hole	$\Phi = \frac{L + W}{2}$	Expose the conductive line	Reject
			Φ > 1.0mm	Reject
Minor	Position shift 		Y > 1/3D	Reject
			X > 1/2Z	Reject

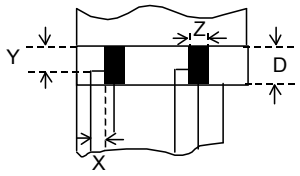
8. QUALITY SPECIFICATION (Continued)

8-4. Criteria (Continued)

5. Screw

Defect	Inspection Item	Inspection Standards	
Major	Screw missing/loosen		Reject
Minor	Screw oxidation	Any rust	Reject
Minor	Screw deformation	Difficult to accept screw driver	Reject

6. Heat seal 、TCP 、FPC

Defect	Inspection Item	Inspection Standards	
Major	Scratch expose conductive layer		Reject
Minor	HS Hole $\Phi = \frac{L + W}{2}$	Φ> 0.2mm	Reject
Major	Adhesion strength	Less than the specification	Reject
Minor	Position shift 	Y > 1/3D	Reject
		X > 1/2Z	Reject
Major	Conductive line break		Reject

7. LED Backing Protective Film and Others

Defect	Inspection Item	Inspection Standards	
Minor	LED dirty, prick	Acceptable number of units	
		$\Phi \leq$0.10mm	Ignore
		0.10< $\Phi \leq$0.15mm	2
		0.15< $\Phi \leq$0.2mm	1
		Φ>0.2mm	0
		The distance between any two spots should be $\geq$10mm Any spot/dot/void outside of viewing area is acceptable	
Minor	Protective film tilt	Not fully cover LCD	Reject
Major	COG coating	Not fully cover ITO circuit	Reject

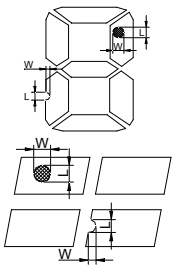
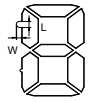
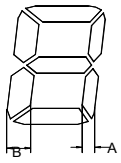
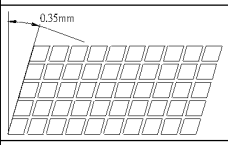
8. Electric Inspection

Defect	Inspection Item	Inspection Standards	
Major	Short		Reject
Major	Open		Reject

8. QUALITY SPECIFICATION (Continued)

8-4. Criteria (Continued)

9. Inspection Specification of LCD

<table>
<tr><th>Defect</th><th colspan="2">Inspect Item</th><th colspan="6">Inspection Standards</th></tr>
<tr><td rowspan="4">Minor</td><td rowspan="4">Linear Defect</td><td rowspan="4">∗ Glass Scratch
∗ Polarizer Scratch
∗ Fiber and Linear material</td><td>W</td><td colspan="2">W≤0.03</td><td colspan="2">0.03<W≤0.05</td><td>W>0.05</td></tr>
<tr><td>L</td><td colspan="2">L<5</td><td colspan="2">L<3</td><td>Any</td></tr>
<tr><td>ACC. NO.</td><td colspan="2">1</td><td colspan="2">1</td><td>Reject</td></tr>
<tr><td>Note</td><td colspan="5">L is the length and W is the width of the defect</td></tr>
<tr><td rowspan="3">Minor</td><td rowspan="3">Black Spot and Polarizer Pricked</td><td rowspan="3">∗ Foreign material between glass and polarizer or glass and glass
∗ Polarizer hole or protuberance by external force</td><td>Φ</td><td>Φ≤0.1</td><td>0.1<Φ≤0.15</td><td>0.15<Φ≤0.2</td><td>Φ>0.2</td></tr>
<tr><td>ACC. NO.</td><td>3EA /1PC</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td>Note</td><td colspan="4">Φ is the average diameter of the defect.
Distance between two defects > 10mm.</td></tr>
<tr><td rowspan="3">Minor</td><td rowspan="3">White Spot and Bubble in polarizer</td><td rowspan="3">∗ Unobvious transparant foreign material between glass and glass or glass and polarizer
∗ Air protuberance between polarizer and glass</td><td>Φ</td><td>Φ≤0.1</td><td>0.1<Φ≤0.15</td><td>0.15<Φ≤0.2</td><td>Φ>0.2</td></tr>
<tr><td>ACC. NO.</td><td>3EA / 1PC</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td>Note</td><td colspan="4">Φ is the average diameter of the defect.
Distance between two defects > 10mm.</td></tr>
<tr><td rowspan="3">Minor</td><td rowspan="3">Segment Defect</td><td rowspan="3"></td><td>Φ</td><td>Φ≤0.10</td><td colspan="2">0.10<Φ≤0.20</td><td>Φ>0.2</td></tr>
<tr><td>ACC. NO.</td><td>3EA /1PC</td><td colspan="2">2</td><td>0</td></tr>
<tr><td>Note</td><td colspan="3">W is more than 1/2 segment width</td><td>Reject</td></tr>
<tr><td rowspan="3">Minor</td><td rowspan="3">Protuberant Segment</td><td rowspan="3">
Φ = (L + W) / 2</td><td>Φ</td><td>Φ≤0.10</td><td colspan="2">0.10<Φ≤0.20</td><td>Φ>0.2</td></tr>
<tr><td>W</td><td>Glue</td><td colspan="2">W≤1/2 Seg , W≤0.2</td><td>Ignore</td></tr>
<tr><td>ACC. NO.</td><td>3EA /1PC</td><td colspan="2">2</td><td>0</td></tr>
<tr><td rowspan="5">Minor</td><td rowspan="5">Assembly Mis-alignment</td><td rowspan="3"></td><td colspan="5">1. Segment</td></tr>
<tr><td>B</td><td>B≤0.4mm</td><td>0.4<B≤1.0mm</td><td>B>1.0mm</td></tr>
<tr><td>B-A</td><td>B-A<1/2B</td><td>B-A<0.2</td><td>B-A<0.25</td></tr>
<tr><td rowspan="2"></td><td colspan="5">2. Dot Matrix</td></tr>
<tr><td colspan="4">Deformation>0.35mm</td><td>Reject</td></tr>
<tr><td>Minor</td><td>Stain on LCD Panel Surface</td><td></td><td colspan="5">Accept when stains can be wiped lightly with a soft cloth or a similar one. Otherwise, judged according to the above items: “Black spot” and “White Spot”</td></tr>
</table>

9. RELIABILITY

NO.	Item	Condition	Criterion
1	High Temperature Operating	70℃, 96Hrs	No defect in cosmetic and operational function allowable. Total current Consumption should be below double of initial value.
2	Low Temperature Operating	-20℃, 96Hrs	
3	High Humidity	40℃, 90%RH, 96Hrs	
4	High Temperature Storage	80℃, 96Hrs	
5	Low Temperature Storage	-30℃, 96Hrs	
6	Vibration	Random wave 10 ~ 100Hz Acceleration: 2g 2 Hrs per direction(X,Y,Z)	
7	Thermal Shock	-10℃ to 25℃ to 60℃ (60Min) (5Min) (60Min) 16Cycles	
8	ESD Testing	Contract Discharge Voltage: +1 ~ 5kV and –1 ~ –5kV	There will be discharged ten times at every discharging voltage cycle. The voltage gap is 1kV.
		Air Discharge Voltage: +1 ~ 8kV and –1 ~ -8kV	

Note: 1) Above conditions are suitable for xinnuoya standard products.

2) For restrict products, the test conditions listed as above must be revised.

10. HANDLING PRECAUTION

(1) Mounting Method

The panel of the LCD Module consists of two thin glass plates with polarizers which easily get damaged since the Module is fixed by utilizing fitting holes in the printed circuit board. Extreme care should be taken when handling the LCD Modules.

(2) Caution of LCD handling & cleaning

When cleaning the display surface, use soft cloth with solvent (recommended below) and wipe lightly.

- Isopropyl alcohol
- Ethyl alcohol
- Trichlorotrifloroethane

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Ketone
- Aromatics

(3) Caution against static charge

The LCD Module use C-MOS LSI drivers, so we recommend that you connect any unused input terminal to VDD or VSS, do not input any signals before power is turned on. And ground your body, Work/assembly table. And assembly equipment to protect against static electricity.

(4) Packaging

- Modules use LCD elements, and must be treated as such. Avoid intense shock and falls from a height.
- To prevent modules from degradation. Do not operate or store them exposed directly to sunshine or high temperature/humidity.

(5) Caution for operation

- It is indispensable to drive LCD's within the specified voltage limit since the higher voltage than the limit shorten LCD life. An electrochemical reaction due to direct current causes LCD deterioration, Avoid the use of direct current drive.

10. HANDLING PRECAUTION (Continued)

- Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show dark color in them.

However those phenomena do not mean malfunction or out of order with LCD's. Which will come back in the specified operating temperature range.

- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the relative condition of 60 C, 90%RH or less is required.

(6) Storage

In the case of storing for a long period of time (for instance ,for years) for the purpose or replacement use, The following ways are recommended.

- Storage in a polyethylene bag with sealed so as not to enter fresh air outside in it, And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light is. Keeping temperature in the specified storage temperature range.
- Storing with no touch on polarizer surface by the anything else. (It is recommended to store them as they have been contained in the inner container at the time of delivery)

(7) Safety

- It is recommendable to crash damaged or unnecessary LCD into pieces and wash off liquid crystal by using solvents such as acetone and ethanol.

Which should be burned up later.

- When any liquid crystal leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water.

11. OUTLINE DIMENTION

