MODEL NO.   :   LX395A4003CTP01

ISSUED DATE:   2020-03-27

VERSION   :   Ver 1.0

☐**Preliminary Specification**
■**Final Product Specification**

CUSTOMER:_____

| Approved by | Notes |
|---|---|
|  |  |

LIANXUN:

| PREPARED | CHECKED | APPROVED |
|---|---|---|
|  |  |  |

## REVISION RECORD

| Rev. NO. | Rev. Date | Description | Remarks |
|---|---|---|---|
| 1.0 | 2020-03-27 | First Release | |
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# 深圳联讯光电有限公司
## SHENZHEN LIANXUN OPTRONICS CO.,LTD

## 1. General Specifications

    **LX395A4003CTP01**   is a color active matrix LCD module incorporating amorphous silicon **TFT** (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver IC, FPC， and a back light unit. The module display area contains **480x 480**pixels. This product accords with RoHS environmental criterion.

| Item | Display Panel | Remark |
|---|---|---|
| Size | 3.95 inch | / |
| Display Mode | Normally Black, Transmissive LCD | / |
| Viewing Direction | Free View | / |
| Module area(W x H x T) | 83.00 x 83.00 x 3.41 | mm |
| Active Area(W x H) | 71.856 x 70.176 | mm |
| Number of Dots | 480RGB x 480 | / |
| Pixel Pitch(W x H) | 0.149 x 0.146 | mm |
| Colors | 16.7M | / |
| Drive IC | ST7701S | / |
| Backlight Type | 4 Serial*2 LED | / |
| Interface Type | 3 SPI 9b(rise) + RGB | / |
| Input voltage | 3.3 | V |

## 2. ABSOLUTE MAXIMUM RATINGS

| Parameter | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Logic Supply Voltage | IOVCC | -0.3 | 4.6 | **V** |
| Analog Supply Voltage | VCC | -0.3 | 4.6 | **V** |
| Operating temperature | Top | -20 | 70 | ℃ |
| Storage temperature | Tst | -30 | 80 | ℃ |
| Humidity | RH | -- | 90%(Max60C) | RH |

## 3. ELECTRICAL CHARACTERISTICS

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Logic Supply Voltage | IOVCC | - | - | - | V |
| Analog Supply Voltage | VCC | 2.6 | 3.3 | 3.6 | |
| Input Current | Idd | - | 30 | - | mA |

## 4. BACKLIGHT CHARACTERISTICS

| Item | Symbol | Min | Typ | Max | Unit | Condition |
|---|---|---|---|---|---|---|
| Forward Voltage | Vf | -- | 12.4 | -- | V | -- |
| Forward Current | If | -- | 40 | - | mA | -- |
| Operating Life Time | -- | -- | 30000 | -- | Hrs | |

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃

Note 2: Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data..

## 5. DIMENSIONAL DRAWING

| No. | PIN NAME |
|-----|----------|
| 1 | LEDK |
| 2 | LEDA |
| 3 | GND |
| 4 | VCC |
| 5 | R0 |
| 6 | R1 |
| 7 | R2 |
| 8 | R3 |
| 9 | R4 |
| 10 | R5 |
| 11 | R6 |
| 12 | R7 |
| 13 | G0 |
| 14 | G1 |
| 15 | G2 |
| 16 | G3 |
| 17 | G4 |
| 18 | G5 |
| 19 | G6 |
| 20 | G7 |
| 21 | B0 |
| 22 | B1 |
| 23 | B2 |
| 24 | B3 |
| 25 | B4 |
| 26 | B5 |
| 27 | B6 |
| 28 | B7 |
| 29 | GND |
| 30 | CLK |
| 31 | DISPN(C) |
| 32 | VSYNC |
| 33 | HSYNC |
| 34 | DEN |
| 35 | NC |
| 36 | GND |
| 37 | RESET |
| 38 | SDI |
| 39 | SCI |
| 40 | CS |

必须使用SPI接口初始化

Circuit Diagram

LED A

IF=20*2mA=40mA

LED K

4.0" TFT
480*RGB*480dots

Free Viewing Direction

背面丝印黑色

IC Area

83.00±0.1(LENS)
79.03±0.2(SENSOR)
78.98±0.15(BL)
76.18±0.1(LCD)
71.23(CTP V.A)
70.176(LCD A/A)

42.29±0.5
30.42±0.5
3.70±0.3
3.50±0.3

1.30
1.97
3.10
3.80
4.30

83.00
79.03
78.98
5.00±0.3

NOTES:
1. 结构: G+F+F
2. IC型号:GT911 12(RX)*12(TX)
3. 盖板材质: 玻璃子(soda lime); 表面硬度6H
4. 透光率:83%以上
5. 工作温度湿度范围:-20℃~70℃, 10%90%RH
   存储温度湿度范围:-20℃~70℃, 40%65%RH
6. 符合ROHS标准
7. 未标公差: ±0.2mm

| No | PIN | |
|----|-----|---|
| 1 | GND | |
| 2 | VCP(3.3V) | |
| 3 | SDA(3.3V) | |
| 4 | SCL(3.3V) | |
| 5 | INT(3.3V) | |
| 6 | RST(3.3V) | |

| | | |
|---|---|---|
| 1.DISPLAY TYPE | 3.95" TFT, TRANSMISIVE | |
| 2.VIEWING DIRECTION | FREE VIEW | |
| 3.DRIVER IC | ST7701S | |
| 4.BACKLIGHT | 4Serial *2 Chip-White LED | |
| 5.OPERATIVE VOLTAGE | 3.3V | |
| 6.OPERATIVE TEMP | -10°C TO 60°C | |
| 7.STORAGE TEMP. | -20°C TO 70°C | |
| 8.CONNECTOR | FPC | |

| | |
|---|---|
| Checked | |
| Drawn | |
| Approved | |

| Unmarked Tolerance | ±0.2 |
|---|---|
| Unit | mm |
| Scale | A.0 |
| Date | 2020/03/27 |
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SHENZHEN LIANXUN OPTRONICS CO.,LTD

| LCM.No | LX395A4003CTP01 |
|---|---|

| 版本 | 变更日期 | 变更内容 | 核准 |
|---|---|---|---|

## 6. INTERFACE PIN CONNECTIONS

| Pin.No | Symbol | Function |
|--------|--------|----------|
| 1 | LEDK | back light power supply negative |
| 2 | LEDA | back light power supply positive |
| 3 | GND | Ground |
| 4 | VCC | Power supply |
| 5-12 | R0-R7 | Red Data |
| 13-20 | G0-G7 | Green Data |
| 21-28 | B0-B7 | Blue Data |
| 29 | GND | Ground |
| 30 | DCLK | Clock signal |
| 31 | DISP(NC) | NC |
| 32 | HSYNC | Horizontal sync input in RGB mode(short to GND if not used) |
| 33 | VSYNC | Vertical sync input in RGB mode(short to GND if not used) |
| 34 | DE | Data enable. |
| 35 | NC | No Connection |
| 36 | GND | Ground |
| 37 | RESET | - The external reset input |
| 38 | SDI | Serial data input/output bidirectional pin for SPI Interface. |
| 39 | SCL | Serial clock input for SPI interface. |
| 40 | CS | A chip select signal |

NOTE : Interface Mode for SPI: 3-Line    9b SPI(rise)

IM3=1, IM2=0, IM1=1, IM0=0

## 7. BLOCK DIAGRAM OF LCM

1          40

I/F

ST7701S

480

480X480

480
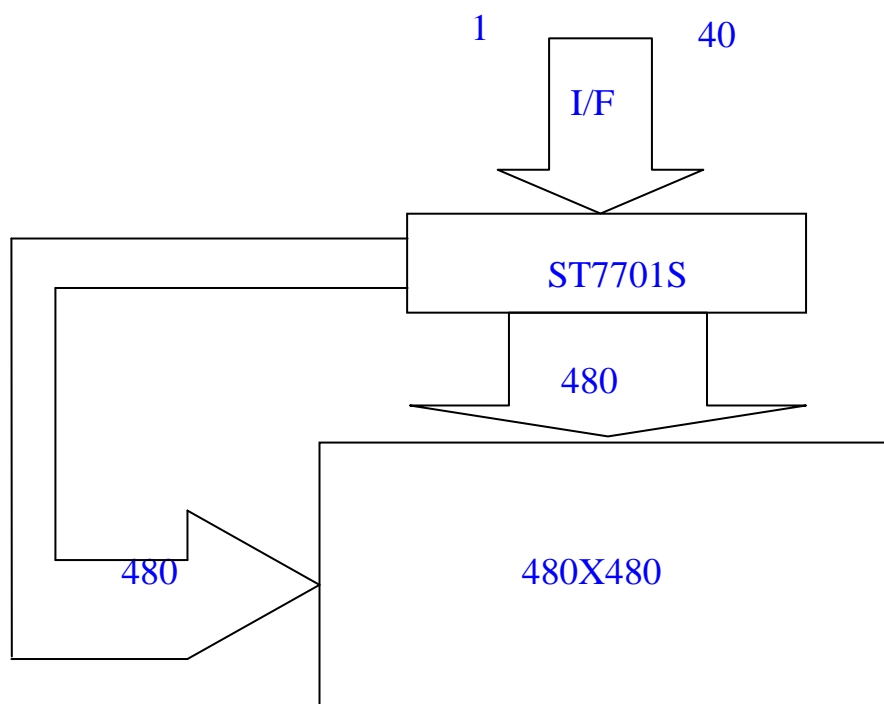
## 8. ELECTRO-OPTICAL CHARACTERISTICS

Optical characteristics are determined after the unit has been on and stable for approximately 30 minutes dark environment at 25℃.the value specified are at an approximate distance 500mm from the LCD surface at a viewing angle and θ equal to 0

### 8.1 LCD Optical Characteristics

| Parameter | | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| **Viewing Angle** | Φ=3 O'clock | θ | Cr > 10 | - | 80 | - | deg | Note 1 |
| | Φ=9 O'clock | | | - | 80 | - | | |
| | Φ= 6 O'clock | | | - | 80 | - | | |
| | Φ=12 O'clock | | | - | 80 | - | | |
| **Response time** | | Tr+Tf | θ=0 | - | 25 | 35 | ms | Note 2 |
| **Contrast ratio** | | Cr | Φ=0 | 640 | 800 | - | | Note 3 |
| **CIE(x,y) chromaticty** | RED | X | θ=0 Φ=0 | - | TBD | - | - | Note 4 |
| | | Y | | - | TBD | - | | |
| | GREEN | X | | - | TBD | - | | |
| | | Y | | - | TBD | - | | |
| | BLUE | X | | - | TBD | - | | |
| | | Y | | - | TBD | - | | |
| | WHITE | X | | - | TBD | - | | |
| | | Y | | - | TBD | - | | |
| **Uniformity(%)** | | | | 80 | - | - | - | Note 5 |
| **Luminance** | | L | | - | 380 | - | - | Note 6 |

### Note 1. LCD Viewing Angle
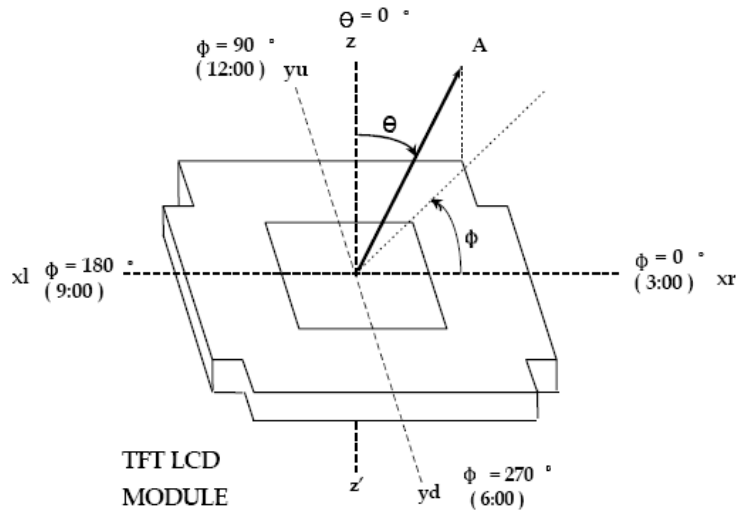


Viewing angle is the angle at which the contrast ratio is greater than 10.the angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface.

### Note 2. Response time
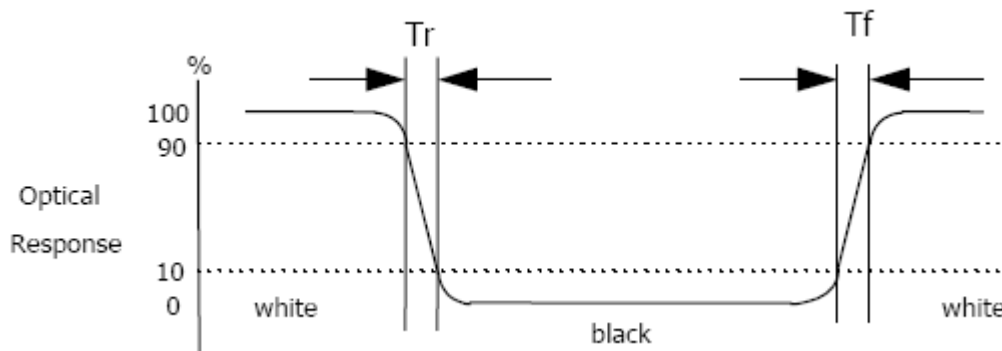


Response time is the time required for the display to transition from white to black (Rising time, Tr) and from black to white (Falling time, Tf).for additional information

### Note 3.   Contrast Ratio(CR)

Contrast Ratio(CR) is defined mathematically as:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

Surface luminance is the center point across the lcd surface 500mm from the surface with all pixels

displaying white.

**Note 4.   Definition of optical measurement setup**
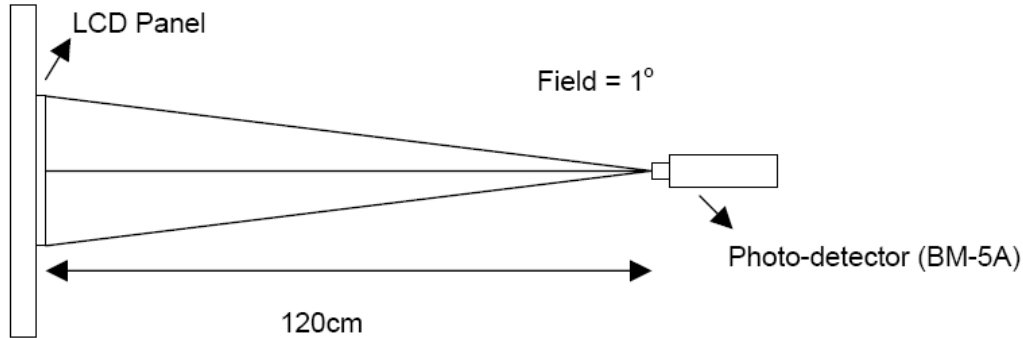


**Note 5.   Definition of luminance uniformity**

Active area is divided into 9 measuring areas . Every measuring point is placed at the center of each measuring area.

Luminance Uniformity(U) = Lmin/ Lmax

L-------Active area length W----- Active area width
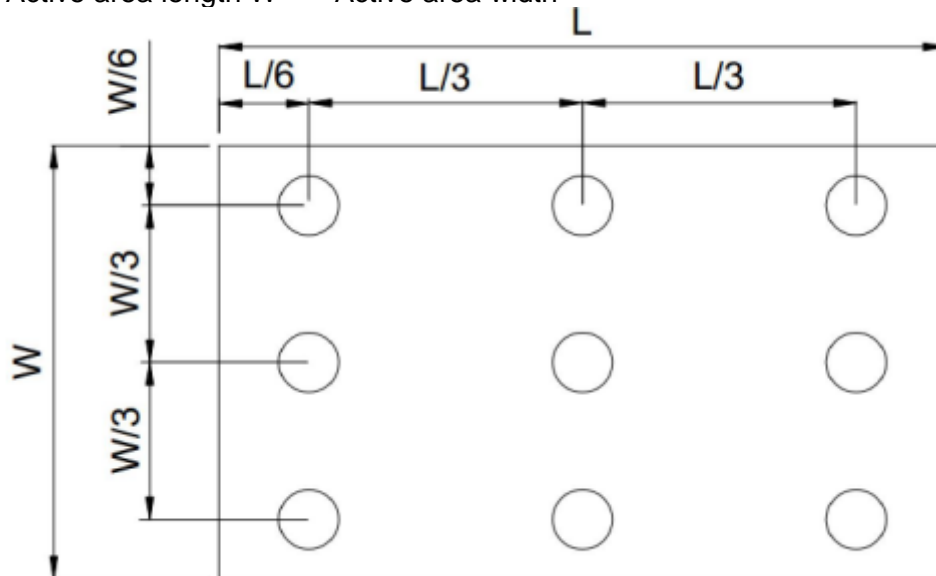


Lmax: The measured maximum luminance of all measurement position.

Lmin: The measured minimum luminance of all measurement position.

**Note 6.   Definition of luminance:**

Measure the luminance of white state at center point.

# 9. TOUCH PANEL SPECIFICATION
## 9.1 General Specification

| Item | Display Panel | Remark |
|---|---|---|
| Size | 3.95 inch | / |
| Outline Dimension | 83.00 x 83.00 x 2.15 | mm |
| View Area | 72.86 x 71.23 | mm |
| Touch Panel Structure | G+F+F | / |
| Surface Hardness | ≧6H | / |
| Controller IC | GT911 | / |
| Interface Type | I2C | / |

## 9.2 FPC PIN Assignment

| Pin.No | Symbol | Function |
|---|---|---|
| 1 | GND | Ground |
| 2 | VDD(3.3V) | Power supply 3.3V |
| 3 | SDA(3.3V) | IIC_SDA |
| 4 | SCL(3.3V) | IIC_SCK |
| 5 | INT(3.3V) | IIC_INT |
| 6 | RST(3.3V) | IIC_RESET |

## 10.0  INSPECTION CRITERIA

### 10.1   Inspection Conditions

#### 10.1.1   Environmental conditions

The environmental conditions for inspection shall be as follows

Room temperature: 20±3°C

Humidity: 65±20%RH

#### 10.1.2   Environmental conditions

With a single 20-watt fluorescent lamp as the light source, the inspection was in the distance of 30cm or more from the LCD to the inspector's eyes.

### 10.2   Light Method
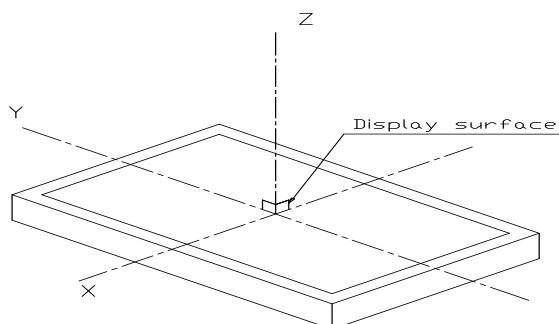


Fluorescent lamp perpendicular to the display surface



Inspection distance and angle
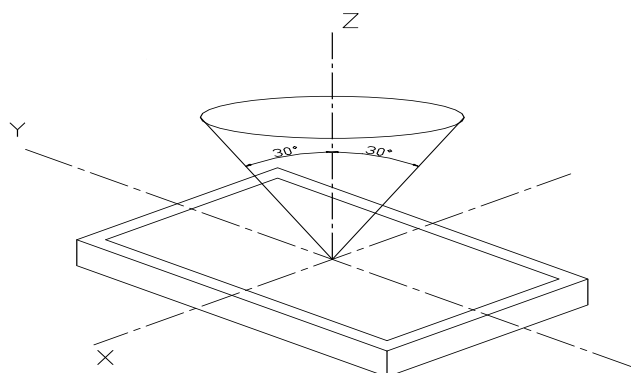
Inspection should be performed within angleφ (φ is usually 30°) from Z axis to each X and Y.

Inspection distance in any direction within φ must be kept 30±5cm from the display surface.
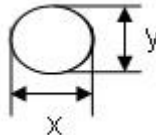
## 10.3 Classification of defects

### 10.3.1 Major defect

| No. | Item | Inspection Standard | Classification of defects |
|---|---|---|---|
| 1 | All functional defects | 1) No display<br>2) Display abnormally<br>3) Open or missing segment<br>4) Short circuit<br>5) Excess power consumption<br>6) Backlight no lighting, flickering and abnormal lighting | Major |
| 2 | Missing | Missing component | Major |
| 3 | Outline dimension | Overall outline dimension beyond the drawing is not allowed | Major |

### 10.3.2 Cosmetic Defect
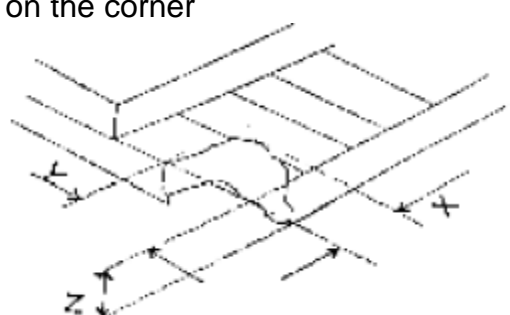
| No. | Item | Inspection Standard | | Classification of defects |
|---|---|---|---|---|
| 1 | (spot defect) Black and White spot pinhole | For dark/white spot, size Φ is defined as Φ=(x+y)/2 |  | Minor |
| | | Size Φ (mm) | Acceptable Quantity | |
| | | Φ≤0.1 | Ignore | |
| | | 0.10≤Φ≤0.15 | 2 | |
| | | 0.15≤Φ≤0.2 | 1 | |
| | | 0.2<Φ | 0 | |
| 2 | (line defect) Black and White line | Define: Width W, Length L | | Minor |

|  | Polarizer scratch | Width(mm) | Length(mm);Acceptable Qty |  |
|---|---|---|---|---|
|  |  | Φ≤0.03 L≤1.0 | Ignore |  |
|  |  | 0.03<W≤0.05 | L≤3.0; N≤2 |  |
|  |  | 0.05<W or L>3.0 | Define as spot defect |  |
| 3 | Polarizer defect | Dent or bubble(between the polarizer and glass) | | Minor |
|  |  | Size Φ(mm) | Acceptable Qty |  |
|  |  | Φ≤0.10 | Ignor |  |
|  |  | 0.10<Φ≤0.15 | 2 |  |
|  |  | 0.15<Φ≤0.20 | 1 |  |
|  |  | 0.20<Φ | 0 |  |
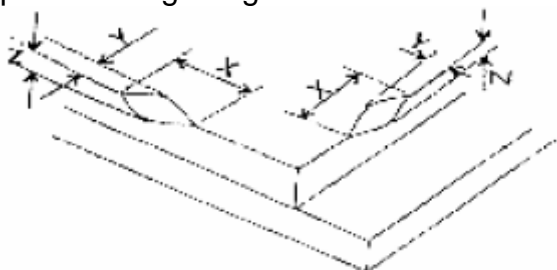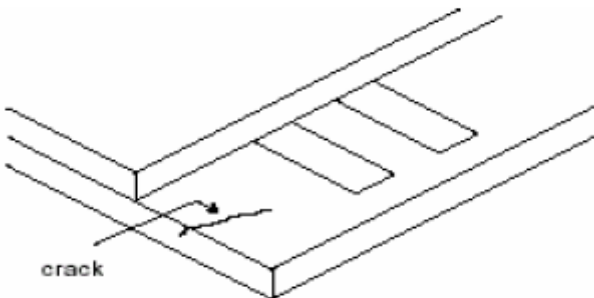
### 10.3.3 Cosmetic Defect

| No. | Item | Inspection Standard | Classification of defects |
|---|---|---|---|
| 1 | Glass defect | 1) Chip on the corner<br><br><br><br>Remark: S=contact pad length;<br>T=the thickness of glass<br>Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal. Acceptable Quantity N≤2. | Minor |

Table inside Glass defect cell:

| X | Y | Z |
|---|---|---|
| ≤3.0 | ≤S | ≤T |

2) Chip on the edge of glass

| X | Y | Z |
|---|---|---|
| Ignore | ≤0.5 | ≤T |

Acceptable Quantity: N≤2

Minor

3) Creak

Creaks tend to break are not allowed.

crack

Minor

## 11.0 RELIABILITY AND INSPECTION STANDARD

| NO. | Test Item | Test condition | Criterion |
|---|---|---|---|
| 1 | High Temperature Storage | 80℃±2℃ 96H<br>Restore 2H at 25℃<br>Power off | After testing, cosmetic and electrical defects should not happen. |
| 2 | Low Temperature Storage | -30℃±2℃ 96H<br>Restore 2H at 25℃<br>Power off | |
| 3 | High Temperature Operation | 70℃±2℃ 96H<br>Restore 2H at 25℃<br>Power on | |
| 4 | Low Temperature Operation | -20℃±2℃ 96H<br>Restore 2H at 25℃<br>Power on | |
| 5 | High Temperature & Humidity Storage | 60℃±2℃ 90%RH 96H<br>Power off | |
| 6 | Temperature Cycle | --30℃←→25℃←→80℃<br>30min   5min   30min<br>after 10cycle, Restore 2H at 25℃ Power off | |
| 7 | Vibration Test | 10Hz~150Hz, 100m/s2, 120min | |
| 8 | Shock Test | Half-sinewave,300m/s2,11ms | |
| 9 | Drop Test(package state) | 600mm,   concrete floor,1corner,<br>3edges, 6 sides each time | 1.After testing, cosmetic and electrical defects should not happen.<br>2.The product should remain at initial place.<br>3.Product uncovered or package broken is not permitted. |

## 12.0 PRECAUTIONS FOR USING LCD MODULE

### 12.1 Handing Precautions

(1) The display panel is made of glass and polarizer. As glass is fragile, it tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock by dropping it or impact.

(2) If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.

(3) Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary. Do not touch the display with bare hands. This will stain the display area and degraded insulation between terminals (some cosmetics are determined to the polarizer).

(4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizer. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.

(5) If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents
   - Isopropyl alcohol
   - Ethyl alcohol
   Do not scrub hard to avoid damaging the display surface.

(6) Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.
   - Water
   - Ketone
   - Aromatic solvents
   Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading. Avoid contacting oil and fats.

(7) Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.

(8) Install the LCD Module by using the mounting holes. When mounting the LCD module make

sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.

(9) Do not attempt to disassemble or process the LCD module.

(10) NC terminal should be open. Do not connect anything.

(11) If the logic circuit power is off, do not apply the input signals.

(12) Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.
 - Do not alter, modify or change the shape of the tab on the metal frame.
 - Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
 - Do not damage or modify the pattern writing on the printed circuit board.
 - Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.
 - Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
 - Do not drop, bend or twist LCM.


## 12.2 Storage Precautions

When storing the LCD modules, the following precaution is necessary.

(1) Store them in a sealed polyethylene bag. If properly sealed, there is no need for the dessicant.

(2) Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C.

(3) The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped).


## 12.3 Others

Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.

If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.