

|                          |                              |
|--------------------------|------------------------------|
| <b>PRODUCT</b><br>产品名称   | TFT LCD MODULE<br>TFT 液晶显示模块 |
| <b>MODEL NO.</b><br>模块型号 | FT39731JPY-39P               |
| <b>SUPPLIER</b><br>供应商   | 东莞方胜电子有限公司                   |
| <b>DATE</b><br>日期        | 2019-8-7                     |

# SPECIFICATION

## 产品规格书

Version: V0

版本: V0

This module uses ROHS material  
模块用环保材料

**CUSTOMER (客户):**

| Customer Approval(客户核准) |
|-------------------------|
|                         |

Dongguan FangSheng Electronic Co., Ltd:

| Technical Department 工程部 |                  | Quality Department<br>品质部 | Approved by<br>核准 |
|--------------------------|------------------|---------------------------|-------------------|
| PREPARED BY<br>制定        | CHECKED BY<br>审核 |                           |                   |
|                          |                  |                           |                   |





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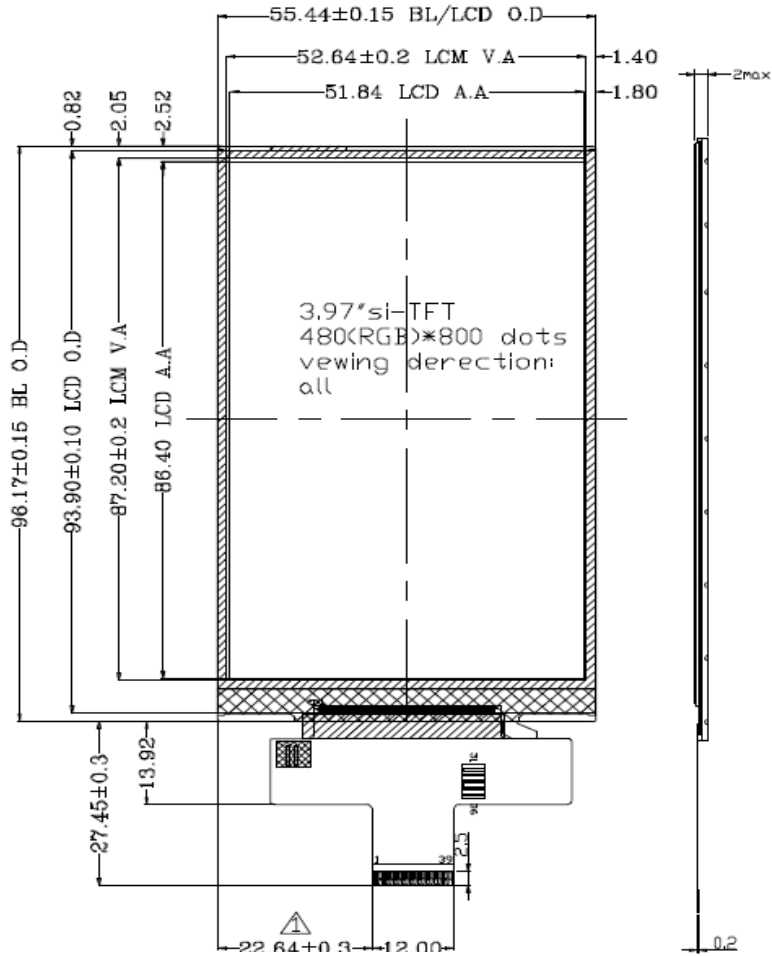
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## 1. GENERAL INFORMATION 主要特征描述

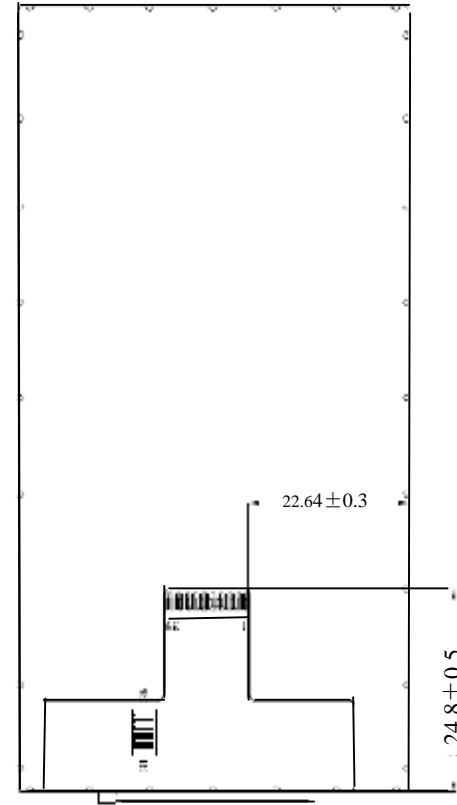
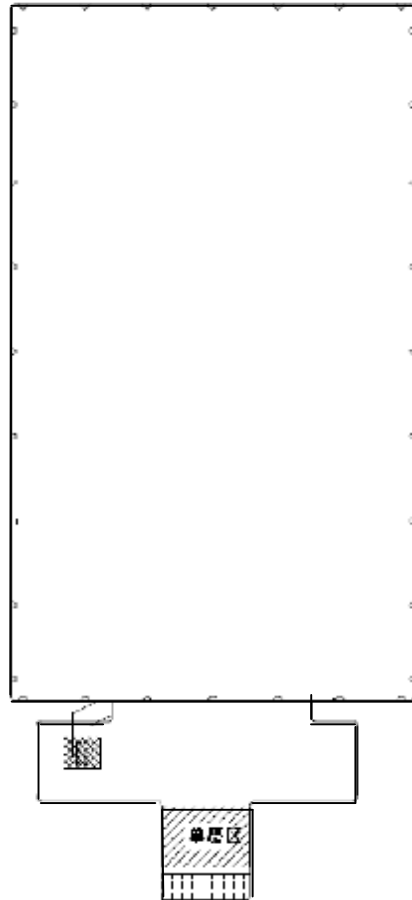
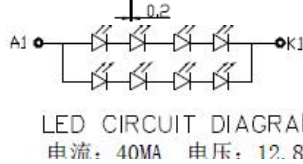
| Item of general information<br>项目         | Contents<br>内容            | Unit<br>单位 |
|---|---------------------------|------------|
| LCD Type 液晶显示类型                           | TFT/16.7M COLOR           | /          |
| Recommended Viewing Direction<br>模块推荐使用方向 | ALL O'Clock               |            |
| Module area (W × H×T)<br>模块外围尺寸 (宽× 高×厚)  | 55.44 (W)x96.17(H)x2.0(T) | mm         |
| Number of Dots 点阵                         | 480RGB*800 DOT            | dots       |
| Pixel pitch (W × H)<br>像素大小(宽× 高)         | 0.108 (H) x 0.108 (V)     | mm         |
| Driver IC 驱动 IC                           | ST7701S                   | /          |
| Interface Type 接口类型                       | RGB-16bit interface       | /          |
| Backlight Type 背光类型                       | 8 LEDs White LED          | /          |

2. EXTERNAL DIMENSIONS 外形尺寸



NOTES:

1. DISPLAY TYPE: TFT(16.7M COLOR)
2. VIEWING DIRECTION: 80/80/80/80 DEG
3. POLARIZER MODE: TRANSMISSIVE/NORMALLY BLACK
4. DRIVER IC: ST7701S
5. BACK LIGHT: 12 CHIP-WHITE LED; 40MA,12.8V
6. OPERATING TEMP.: -10° C-60° C
7. STORAGE TEMP.: -20° C-70° C
8. UNMARKED TOLERANCE: ± 0.2
9. 建议机壳可视区比 LCD V.A 区单边小 0.3MM 以上
- 10.LCM Luminance: 300 cd/m2(TYP)



| PIN | Symbol     |
|-----|------------|
| 1   | GND        |
| 2   | SDI        |
| 3   | SCC        |
| 4   | CS         |
| 5   | RESET      |
| 6   | GND        |
| 7   | R4         |
| 8   | R3         |
| 9   | R2         |
| 10  | R1         |
| 11  | R0         |
| 12  | G5         |
| 13  | G4         |
| 14  | G3         |
| 15  | G2         |
| 16  | G1         |
| 17  | G0         |
| 18  | B4         |
| 19  | B3         |
| 20  | B2         |
| 21  | B1         |
| 22  | B0         |
| 23  | PE         |
| 24  | PCLK       |
| 25  | HS         |
| 26  | VS         |
| 27  | VCI        |
| 28  | LEDA       |
| 29  | LEDK       |
| 30  | GND        |
| 31  | TP_SCL     |
| 32  | TP_SDA     |
| 33  | TP_INT/2.8 |
| 34  | TP_RST/2.8 |
| 35  | TP_VDD/2.8 |
| 36  | TP_GND     |
| 37  | NC         |
| 38  | NC         |
| 39  | NC         |

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|                                   |          |      |             |                |            |          |             |
|-----------------------------------|----------|------|-------------|----------------|------------|----------|-------------|
| FPC 插口向中间移 1.85mm 由原来的 20.79MM 改为 | 2019.8.9 |      | UNIT:MM     |                | DRWAING BY | CHECK BY | APPROVAL BY |
| 改用无边框背光                           | 2019.8.7 |      | DESCRIPTION | TFT LCM MODULE |            |          |             |
| 1ST                               | 2019.8.3 |      | PART NO     | FT39731JPY-39P |            |          |             |
| REVISE DSCRIPTION                 | DATE     | NAME | DWG NO      |                |            |          |             |



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### 3. ABSOLUTE MAXIMUM RATINGS 极限参数

| Parameter of absolute maximum ratings 参数 | Symbol 符号       | Min 最小值 | Max 最大值 | Unit 单位 |
|--|-----------------|---------|---------|---------|
| Operating temperature 操作温度               | T <sub>OP</sub> | -10     | 60      | °C      |
| Storage temperature 储存温度                 | T <sub>ST</sub> | -20     | 70      | °C      |

### 4. ELECTRICAL CHARACTERISTICS 模块电气特性

#### 4.1. DC Characteristics 直流特性

| Parameter of DC characteristics 参数 | Symbol 符号                           | Min 最小值              | Typ 典型值 | Max 最大值              | Unit 单位 |
|------------------------------------|-------------------------------------|----------------------|---------|----------------------|---------|
| Supply voltage for logic 逻辑电压      | V <sub>CI</sub>                     | 2.5                  | 2.8     | 3.6                  | V       |
| I/O power supply 接口电压              | V <sub>DDI</sub> (V <sub>CI</sub> ) | 1.65                 | 2.8     | 3.3                  | V       |
| Input voltage 'H' level 输入高电平      | V <sub>IH</sub>                     | 0.8*V <sub>DDI</sub> |         | V <sub>DDI</sub>     | V       |
| Input voltage 'L' level 输入低电平      | V <sub>IL</sub>                     | 0.0                  |         | 0.2*V <sub>DDI</sub> | V       |
| Output voltage 'H' level 输出高电平     | V <sub>OH</sub>                     | 0.8*V <sub>DDI</sub> |         | V <sub>DDI</sub>     | V       |
| Output voltage 'L' level 输出低电平     | V <sub>OL</sub>                     | 0.0                  |         | 0.2*V <sub>DDI</sub> | V       |

#### 4.2. Backlight Characteristics 背光电气特性

| Item of backlight characteristics 项目 | Symbol         | Min. | Typ. | Max. | Unit | Condition |
|--------------------------------------|----------------|------|------|------|------|-----------|
| Forward voltage 正向电压                 | V <sub>f</sub> |      | 12   |      | v    |           |
| Number of LED LED 数量                 | 8LEDs          |      |      |      |      |           |

Using condition: constant current driving method I<sub>f</sub>=40mA(+/-10%).



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## 5. INTERFACE DESCRIPTION 接口定义描述

| Pin No. | Symbol      | Function                                       |
|---------|-------------|--|
| 1       | GND         | System Ground                                  |
| 2       | SDI         | Serial data input/output bidirectional pin for |
| 3       | SCL         | Serial clock input for SPI interface           |
| 4       | CS          | A chip select signal                           |
| 5       | RST         | Chip reset pin                                 |
| 6       | GND         | System Ground                                  |
| 7-11    | R4-R0       | Parallel data bus for RGB Interface.           |
| 12-17   | G5-G0       | Parallel data bus for RGB Interface.           |
| 18-22   | B4-B0       | Parallel data bus for RGB Interface.           |
| 23      | DE          | Data enable signal for RGB interface operation |
| 24      | PCLK        | Dot clock signal for RGB interface operation   |
| 25      | HS          | Line synchronizing signal for RGB interface    |
| 26      | VS          | Frame synchronizing signal for RGB interface   |
| 27      | VCI         | Power supply, Type 2.8V                        |
| 28      | LEDA        | LED back light (Anode)                         |
| 29      | LEDK        | LED back light (Cathode)                       |
| 30      | GND         | System Ground                                  |
| 31      | TP_SCL/2.8V |  |
| 32      | TP_SDA/2.8V |  |
| 33      | TP_INT/2.8V |  |
| 34      | TP_RST/2.8V |  |
| 35      | TP_VDD/2.8V |  |
| 36      | TP_GND      |  |
| 37      | NC          |  |
| 38      | NC          |  |
| 39      | NC          |  |

Note:

The voltage power of the interface logic pin depend on "VDD" and "GND", Such as  $DB_n$ ,  $IM_n$  and function pins 备注: 逻辑接口 PIN 电压取决于"VDD"和"GND", 如  $DB_n$ ,  $IM_n$  和功能 PIN



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## 6. ELECTRO-OPTICAL CHARACTERISTICS 光电参数

| Item of electro-optical characteristics<br>项目 | Symbol<br>符号            | Condition<br>条件  | Min<br>最小值 | Typ<br>典型值 | Max<br>最大值 | Unit<br>单位        | Remark<br>注释 |
|---|-------------------------|--|------------|------------|------------|-------------------|--------------|
| Contrast ratio 对比度                            | CR                      | $\theta=\psi=0^{\circ}$<br>$\theta=25^{\circ}$<br>$I_f=40mA$ | 1000       | 1500       | -          | -                 | Note 1       |
| Surface Luminance<br>表面亮度                     | Lv                      |  | 260        | 300        | -          | Cd/m <sup>2</sup> | Note 2       |
| Luminance uniformity<br>均匀度                   | $\delta$<br>WHITE       |  | 80         | -          | -          | %                 | Note 3       |
| Response time<br>响应时间                         | Tr+Tf                   |  | -          | 25         | -          | ms                | Note 4       |
| Viewing angle range<br>视角范围                   | $\theta$ (CR $\geq$ 10) | 3o'clock   | 80         | 85         | -          | degree            | Note 5       |
|   |                         | 12o'clock  | 80         | 85         | -          |                   |              |
|   |                         | 9o'clock   | 80         | 85         | -          |                   |              |
|   |                         | 6o'clock   | 80         | 85         | -          |                   |              |
| Module Chromaticity<br>CIE (x, y)             | White                   | x  | -          | 0.308      | -          | -                 | Note6        |
|   |                         | y  | -          | 0.328      | -          |                   |              |
|   | Red                     | x  | -          | 0.608      | -          |                   |              |
|   |                         | y  | -          | 0.330      | -          |                   |              |
|   | Green                   | x  | -          | 0.302      | -          |                   |              |
|   |                         | y  | -          | 0.565      | -          |                   |              |
|   | Blue                    | x  | -          | 0.144      | -          |                   |              |
|   |                         | y  | -          | 0.111      | -          |                   |              |
| NTSC Ratio                                    | S                       | -  | -          | 55.6%      | -          | -                 | Note7        |

Note1. Contrast Ratio (CR) is defined mathematically by the following formula. For more information see FIG 1.:

$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Average Surface Luminance with all black pixels (P1, P2, P3, P4, P5)}}$$

备注 1. 对比度是由以下公式计算所得。详见 FIG 1.。

$$\text{对比度} = \frac{\text{显示白色画面时平均表面亮度(P1,P2,P3,P4,P5)}}{\text{显示黑色画面时平均表面亮度(P1,P2,P3,P4, P5)}}$$

Note2. Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see FIG 1.

$$L_v = \text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}$$

备注 2. 表面亮度是在显示白色画面时，测试的亮度值，详见 FIG 1.。

$$L_v = \text{平均的表面亮度(P1, P2, P3, P4, P5)}$$





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Note3. The uniformity in surface luminance ( $\delta$  WHITE) is determined by measuring luminance at each test position 1 through 5, and then dividing the maximum luminance of 5 points luminance by minimum luminance of 5 points luminance. For more information see FIG 1.

$$\delta \text{ WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P1, P2, P3,P4,P5)}}{\text{Maximum Surface Luminance with all white pixels (P1, P2, P3,P4,P5)}}$$

备注 3. 均匀度是在显示白色画面时，测试 P1 到 P5 的亮度，然后再用 5 个点亮度的最小值除以最大值。

详见 FIG 1. 。

$$\text{均匀度} = \frac{\text{表面亮度最小值(P1, P2, P 3,P4, P5)}}{\text{表面亮度最大值(P1, P2, P 3,P4, P5)}}$$

Note4. Response time is the time required for the display to transition from White to black(Rise Time, Tr) and from black to white(Decay Time, Tf). For additional information see FIG 2..

备注 4. 响应时间是 Tr(上升时间)与 Tf(下降时间)的和; Tr 指显示黑色画面转为显示白色画面需要时间, Tf 指显示白色画面转为显示黑色画面需要时间。详见 FIG 2. 。

Note5. CIE (x, y) chromaticity ,The x,y value is determined by screen active area position 5. For more information see FIG 1.

备注 5. CIE(x,y) 色坐标测试点为显示屏中心点 P5。详见 FIG 1.

Note6. Viewing angle is the angle at which the contrast ratio is greater than 2. For TFT module 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. For more information see FIG 3.

备注 6. 视角指对比度大于等于 2 时的可视范围，对 TFT 屏，则是对比度大于等于 10 的可视范围。视角由横轴（x 轴），竖轴（y 轴）同 Z 轴(垂直于 LCD 表面)之间的夹角来定义。详见 FIG 3.

Note7: NTSC ratio: For more information see FIG 4.

$$\text{NTSC ratio} = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}}$$

备注 7. 色域比： 详见 FIG 4

$$\text{NTSC ratio} = \frac{\text{RGB 三色三角形面积}}{\frac{\text{标准 NTSC 三角形面积}}{\text{三角形面积}}}$$

Note8. For Viewing angle and response time testing, the testing data is base on Autronic-Melchers's ConoScope. Series Instruments. For contrast ratio, Surface Luminance, Luminance uniformity and CIE, the testing data is base on BM-7 photo detector.

备注 8. 视角和响应时间， 测试数据基于 Autronic-Melchers's ConoScope. 系列。而对比度， 表面亮度， 均匀度， CIE 坐标, 测试数据基于 BM-7 photo detector.

Note9. For TFT transmissive module, Gray scale reverse occurs in the direction of panel viewing angle 备注 9. TFT 全透产品,在视角方向会发生灰度反转



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FIG.1. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x,y) chromaticity 对比度, 表面亮度, 均匀度, CIE 坐标测试方法

A : 5 mm

B : 5 mm

H,V : Active Area

Light spot size=5mm, 500mm distance from the LCD surface to detector lens

measurement instrument is luminance meter BM-7

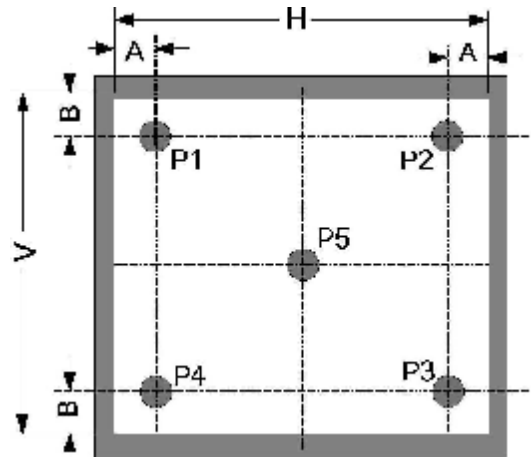


FIG.2. The definition of Response Time 响应时间定义

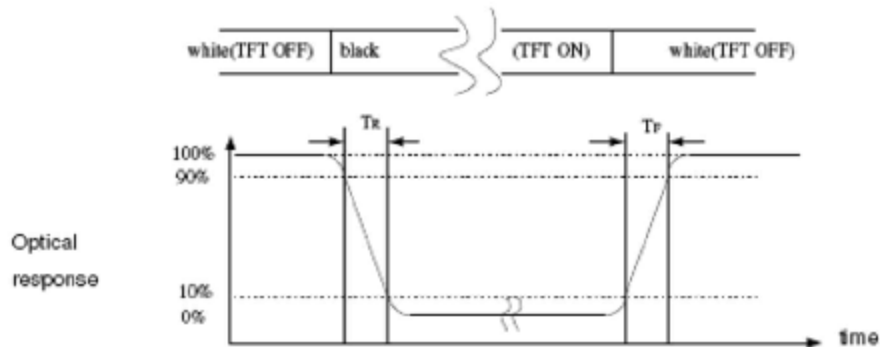


FIG.3. The definition of viewing angle 视角定义

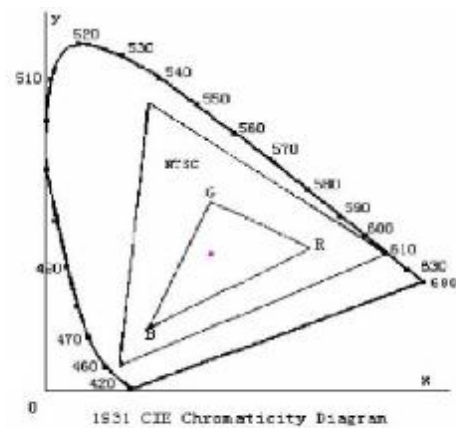
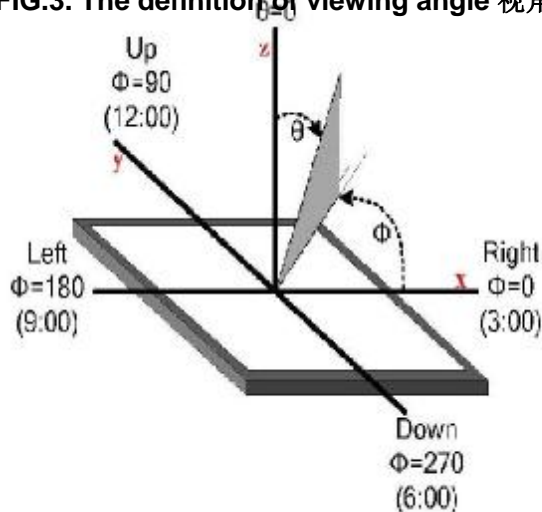


Fig.4. 1931 CIE chromaticity diagram



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### 7. RELIABILITY TEST CONDITIONS 可靠性试验条件

| No. 序号 | Test Item 试验项目                     | Test Condition 试验条件  | Inspection after test 判断标准  |
|--------|------------------------------------|--|---|
| 1      | High Temperature Storage<br>高温存放   | 70±2°C/48 hours  | Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 试验结束后, 已测试的 LCD 样品必须在室内正常温湿度环境下放置 2~4 个小时以上才能进行功能和外观检查, 样品不允许有以下缺陷:<br>1.Air bubble in the LCD; 模块中有气泡;<br>2.Sealleak; 封口松脱;<br>3.Non-display; 不显示;<br>4.missing segments; 漏笔<br>5.Glass crack; 玻璃破碎;<br>6.Current Idd is twice higher than initial value. 电流 Idd 大于初时值的 2 倍<br>7, the surface shall be free from damage. 表面无损伤.<br>8. The <b>electrical characteristics</b> requirements shall be satisfied. 需要满足模块电气性能。 |
| 2      | Low Temperature Storage<br>低温存放    | -20±2°C/48 hours   |   |
| 3      | High Temperature Operating<br>高温操作 | 60±2°C/48hours   |   |
| 4      | Low Temperature Operating<br>低温操作  | -10±2°C/48 hours   |   |
| 5      | Temperature Cycle 冷热循环             | -10±2°C (30min.) ~25(5min.)~60(30min.)<br>± °C × 2 cycles<br>2 ~25(5min.)                            |   |
| 6      | Damp Proof Test 防潮试验               | 50°C±5°C×90%RH/48 hours  |   |
| 7      | Vibration Test 振荡试验                | Frequency: 10Hz~55Hz~10Hz Amplitude: 1.5mm, X, Y, Z direction for total 0.5hours (Packing condition) |   |
| 8      | Dropping test 跌落试验                 | Drop to the ground from 1.0m height, one time, every side of carton. (Packing condition)             |   |
| 9      | ESD test 静电试验                      | Voltage:±4KV R: 330Ω C: 150pF Air discharge, 10time  |   |

Remark: 注意:

- The test samples should be applied to only one test item. 每个被测试的模块只能用于其中的一个测试项目。
- Sample size for each test item is 5~10pcs. 每个测试项目的样品数量为 5~10 片。
- For Damp Proof Test, Pure water(Resistance>10MΩ) should be used. 对于防潮试验, 试验箱的用水必须是电阻大于 10M 欧姆的纯水。
- In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part. 如果由静电引起产品故障,当放置一段时间后能够恢复正常, 则不视为产品缺陷。
- EL evaluation should be excepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has. 带 EL 片的可靠性测试在高温高湿条件下, 荧光粉会发生自然化学反应而产生黑点或瑕疵, 因此不在高温高湿条件测试范围内。
- Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic. 故障判断标准:基本规格,电气特性,机械特性,光电特性