

规格书

产品：TFT 模块

型号：H40008T-A

| 客户 | | | 老友记电子 | | |
|----|----|----|-------|----|----|
| 批准 | 审核 | 检查 | 批准 | 审核 | 拟制 |
| | | | | | |

用于承认规格书

用于承认规格书和样品

| | | | | | |
|------|-------|----|-----------|----|---|
| 标准文本 | 产品规格书 | 型号 | H40008T-A | 页数 | 1 |
|------|-------|----|-----------|----|---|

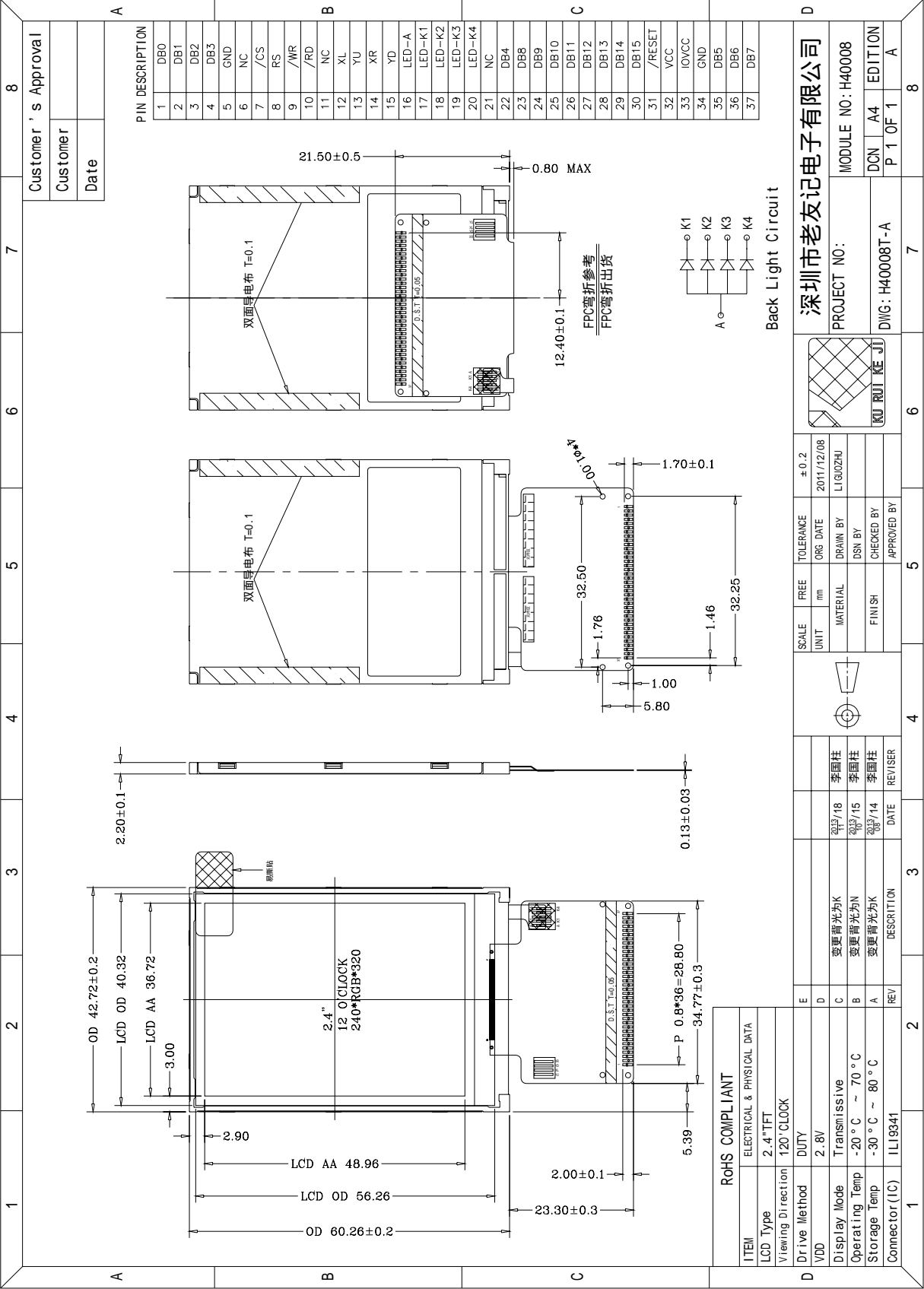
修改记录

| 日期 | 版本 | 修改内容 | 拟制 | 检查 | 核准 |
|------------|----|------|---------|----|----|
| 2014-10-22 | 01 | 初版发行 | Gilbert | | |
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| 深圳市老友记电子有限公司 | | | | | |

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|---|----------------------|-----|-----------|----|---|----|----|----|------|------------------|----|------|-------------|----|------|-----------------|-----|------|------------|-----|------|----------------------|---|
| <div>1. 概述</div> <div>1-1 范围: 此份规格书涵盖了LCM从老友记电子到客户的运输过程中应该注意的所有要求。</div> <div>1-2 产品: LCD 模块 (LCM)</div> <div>1-3 型号: H40008T-A</div> <div>2. 产品特征</div> <div>transmissive</div> <div>(1) 显示类型: Transmissive (全透式), 2.4” QVGA TFT , COG ;</div> <div>(2) 显示色彩:262K ;</div> <div>(3) 驱动 IC: ILI9341</div> <div>(4) 视角 : 12 点</div> <div>(5) 点阵 : 240 (RGB) (W) ×320H) Pixels ;</div> <div>3. 机械规格</div> <table><tr><th>项目</th><th>规格</th><th>单位</th></tr><tr><td>外形尺寸</td><td>42.72*60.26*2.20</td><td>mm</td></tr><tr><td>可视区域</td><td>36.72*48.96</td><td>mm</td></tr><tr><td>显示内容</td><td>240RGB *320Dots</td><td>---</td></tr><tr><td>结构类型</td><td>COG+FPC+BL</td><td>---</td></tr><tr><td>背光类型</td><td>4-WHITE LED PARALLEL</td><td>-</td></tr></table> | | | | | | 项目 | 规格 | 单位 | 外形尺寸 | 42.72*60.26*2.20 | mm | 可视区域 | 36.72*48.96 | mm | 显示内容 | 240RGB *320Dots | --- | 结构类型 | COG+FPC+BL | --- | 背光类型 | 4-WHITE LED PARALLEL | - |
| 项目 | 规格 | 单位 | | | | | | | | | | | | | | | | | | | | | |
| 外形尺寸 | 42.72*60.26*2.20 | mm | | | | | | | | | | | | | | | | | | | | | |
| 可视区域 | 36.72*48.96 | mm | | | | | | | | | | | | | | | | | | | | | |
| 显示内容 | 240RGB *320Dots | --- | | | | | | | | | | | | | | | | | | | | | |
| 结构类型 | COG+FPC+BL | --- | | | | | | | | | | | | | | | | | | | | | |
| 背光类型 | 4-WHITE LED PARALLEL | - | | | | | | | | | | | | | | | | | | | | | |
| 深圳市老友记电子有限公司 | | | | | | | | | | | | | | | | | | | | | | | |

4. 外形尺寸



| | | | | | |
|------|-------|----|-----------|----|---|
| 标准文本 | 产品规格书 | 型号 | H40008T-A | 页数 | 5 |
|------|-------|----|-----------|----|---|

5.接口定义：

| 编号 | 接口定义 | 引脚功能说明 | I/O |
|-------|-----------|--|-----|
| 1~4 | DB0~DB3 | Data bus | I/O |
| 5 | GND | Ground | P |
| 6 | NC | No Connection | |
| 7 | /CS | Chip select input pin | I |
| 8 | RS | Instruction /data select input Pin | I |
| 9 | /WR | Write execution control Pin | I |
| 10 | /RD | Read execution control pin | I |
| 11 | NC | No Connection | |
| 12 | XL | Touch panel coordinate in the LEFT side of envisage drawing | I/O |
| 13 | YU | Touch panel coordinate in the UP side of envisage drawing | I/O |
| 14 | XR | Touch panel coordinate in the RIGHT side of envisage drawing | I/O |
| 15 | YD | Touch panel coordinate in the DOWN side of envisage drawing | I/O |
| 16 | LED-A | LED backlight + | I |
| 17~20 | LED-K1~K4 | LED backlight - | I |
| 21 | NC | No Connection | |
| 22 | DB4 | Data bus | I/O |
| 23~30 | DB8~DB15 | Data bus | I/O |
| 31 | /RESET | Reset Signal Input Pin | I |
| 32 | VCC | Power supply voltage(2.8V) | P |
| 33 | IOVCC | Power supply voltage(1.8/2.8V) | P |
| 34 | GND | Ground | P |
| 35~37 | DB5~DB7 | Data bus | I/O |

6. 极限技术参数

| Item | Symbol | Unit | Value | Note |
|-------------------------|--------------|------|--------------------|------|
| Power Supply Voltage 1 | VCC, IOVCC | V | -0.3 ~ +4.6 | 1, 2 |
| Power Supply Voltage 2 | VCI – AGND | V | -0.3 ~ +4.6 | 1, 3 |
| Power Supply Voltage 3 | DDVDH – AGND | V | -0.3 ~ +6.5 | 1, 4 |
| Power Supply Voltage 4 | AGND – VCL | V | -0.3 ~ +4.6 | 1 |
| Power Supply Voltage 5 | DDVDH – VCL | V | -0.3 ~ +9.0 | 1, 5 |
| Power Supply Voltage 7 | AGND – VGL | V | -0.3 ~ +13.0 | 1, 6 |
| Power Supply Voltage 8 | VGH– VGL | V | -0.3 ~ +30.0 | 1 |
| Power Supply Voltage 9 | VPP1 | V | -0.3 ~ +10.0 | 1 |
| Power Supply Voltage 10 | VPP2 | V | -0.3 ~ +10.0 | 1 |
| Power Supply Voltage 11 | VPP3A | V | -10.0 ~ +0.3 | 1 |
| Input Voltage | Vt | V | -0.3 ~ IOVCC + 0.3 | 1 |
| Operating Temperature | Topr | ℃ | -40 ~ +85 | 1, 7 |
| NVM Write Temperature | Twep | ℃ | +20 ~ +30 | 1 |
| NVM Erase Temperature | Teep | ℃ | +20 ~ +30 | 1 |
| Storage Temperature | Tstg | ℃ | -55 ~ +110 | 1 |

7. 电气参数

| Parameter | Symbol | Value | | | Unit | Notes |
|------------------------------|------------------|-------|------|------|------|-------|
| | | Min. | Typ. | Max. | | |
| TFT Gate ON Voltage | VGH *1) | 13 | 15 | 17 | V | *3) |
| TFT Gate OFF Voltage | VGL *2) | -11.7 | -9.7 | -7.7 | V | |
| TFT Common Electrode Voltage | VcomH | - | 4.25 | - | V | |
| | VcomL | - | -0.7 | - | V | |
| TFT Kick-Back Voltage Max. | ΔV_p Max | 0.6 | - | 1.8 | V | |
| TFT Kick-Back Voltage Min. | ΔV_p Min | | | | | |

Notes:

- *1) VGH is TFT Gate Operating Voltage.
- *2) VGL is TFT Gate Operating Voltage
The low voltage level of VGL signal must be fluctuated with same phase as Vcom,
in case of Cadd (Storage on Gate) structure.
The storage capacitance structure of LH240Q36-SH01 is Cst (Storage on Common)
- *3) Vcom must be adjusted to optimize display quality: Cross-talk, Contrast Ratio and etc.

8. 背光参数

12-1 背光供电方式

12-2LED 白背光特性指标

| 项目 | | 符号 | 条件 | 最小值 | 典型值 | 最大值 | 单位 |
|----------|---------|-----|--------------------|-----|-----|-----|-------------------|
| 正向电压 | | Vf | IF=60mA | 2.8 | 3.2 | 3.3 | V |
| 反向电压 | | Vr | | - | - | - | |
| 正向 电流 | Normal | Ipn | 4-chip parallel | | 90 | - | mA |
| | Dimming | Ipd | | | | 5 | |
| 反向电流 | | Ir | Vr=5V | - | - | - | uA |
| 均匀性 | | | IF=60mA | - | 80 | - | % |
| 亮度（覆屏） | 主屏 | | IF=60mA | - | 150 | - | cd/m ² |
| 背光颜色 | | | | 白色 | | | |

9 极限环境参数

| ITEM | SYMBOL | CONDITIONS | CRITERION |
|-----------------------|--------|------------|--|
| OPERATING TEMPERATURE | TOPR | -20 ~ +70 | NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION |
| STORAGE TEMPERATURE | TSTG | -30 ~ +80 | NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION |
| HUMIDITY | - | See Note | WITHOUT CONDENSATION |

*NOTE: TEST CONDITION

(1)TEMPERATURE AND HUMIDITY: IF NO SPECIFICATION, TEMP. SET AT 25±2℃, HUMIDITY SET AT 60±5%RH

(2) OPERATING STATE: SAMPLES SUBJECT TO THE TESTS SHALL BE IN " OPERATING" CONDITION

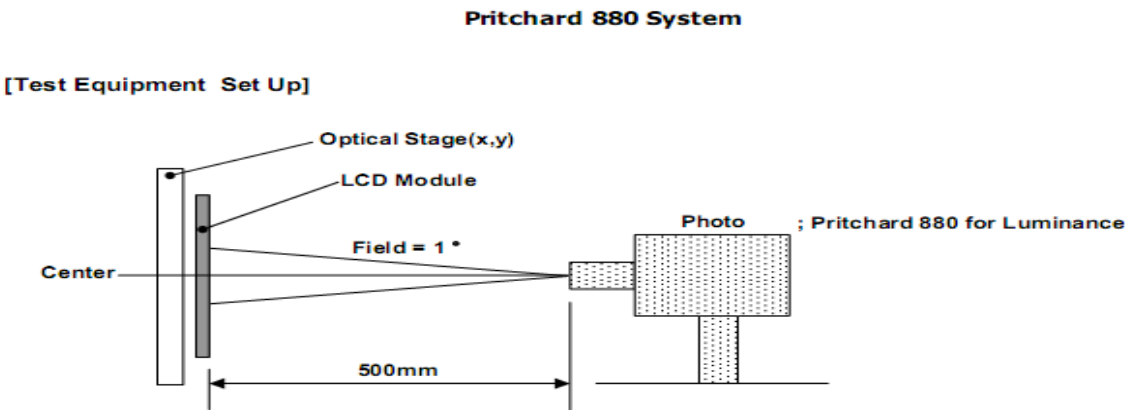
10. 光电参数

| Parameter | Symbol | Values | | | Unit | Notes |
|--------------------------|--------|--------|-------|-------|--------|-----------------|
| | | Min | Typ | Max | | |
| *1) Threshold Voltage | Vsat | 4.2 | 4.3 | 4.4 | V | Fig.2 |
| | Vth | 2.0 | 2.1 | 2.2 | V | |
| *1) Transmittance | T(%) | - | 4.7 | - | % | Fig.1 |
| *1) Contrast Ratio | C/R | - | 500 | - | | |
| *1) Response Time | Tr+Tf | - | 35 | 50 | msec | Fig.3, Fig.5 |
| *2) CIE Color Coordinate | Rx | 0.637 | 0.657 | 0.677 | | |
| | Ry | 0.300 | 0.320 | 0.340 | | |
| | Gx | 0.267 | 0.287 | 0.307 | | |
| | Gy | 0.571 | 0.591 | 0.611 | | |
| | Bx | 0.120 | 0.140 | 0.160 | | |
| | By | 0.060 | 0.080 | 0.100 | | |
| | Wx | 0.290 | 0.310 | 0.330 | | |
| | Wy | 0.307 | 0.327 | 0.347 | | |
| *1) Viewing Angle | Θl | - | 80 | - | Degree | C/R>10 Fig.4 |
| | Θr | - | 80 | - | | |
| | Θu | - | 80 | - | | |
| | Θd | - | 80 | - | | |

- Notes :
1. Contrast Ratio(CR) is defined mathematically as :

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$
 2. Surface luminance is the center point across the TFT-LCD surface 500 mm from the surface with all pixels displaying white. For more information see FIG 1.
 3. Response time is the time required for the display to transition from white to black(Rise Time, Tr) and from black to white(Falling Time, Tf). For additional information see FIG 3.
 4. 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 TFT-LCD surface. For more information see FIG 4.
 5. Optimum contrast is obtained by adjusting the TFT-LCD Threshold voltage(Vth & Vsat)

FIG. 1 Optical Characteristic Measurement Equipment and Method



- Measuring Condition ;
 - Measuring surroundings : Dark Room
 - Measuring temperature : T_a=25℃
 - Adjust operating voltage to get optimum contrast at the center of the display.
 - Measured value at the center point of LCD panel after more than 30 minutes while backlight turning on.

FIG. 2 The definition of V_{th} and V_{sat}

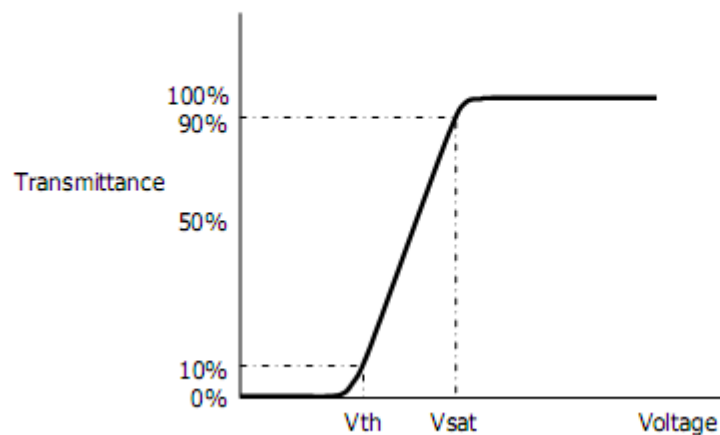
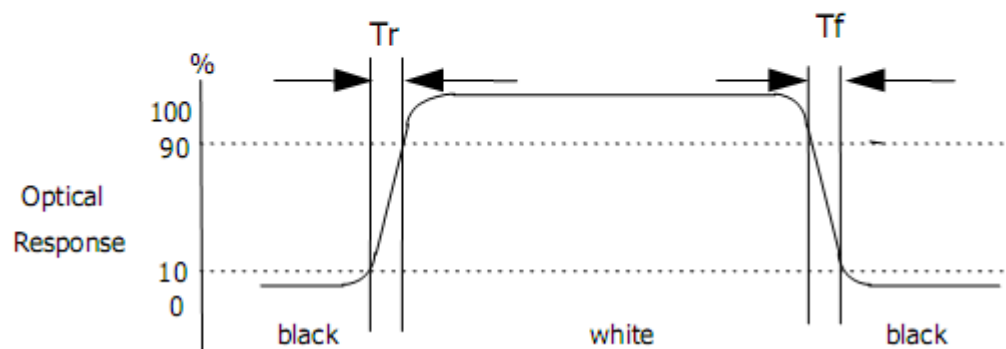


FIG. 3 The definition of Response Time

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".



* Voltage conditions for Response time

Vgate : 22V DC
Vdata : 0V~4.5V DC
Vcom : 0V (Ground)

FIG. 4 The definition of viewing angle
 <dimension of viewing angle range>

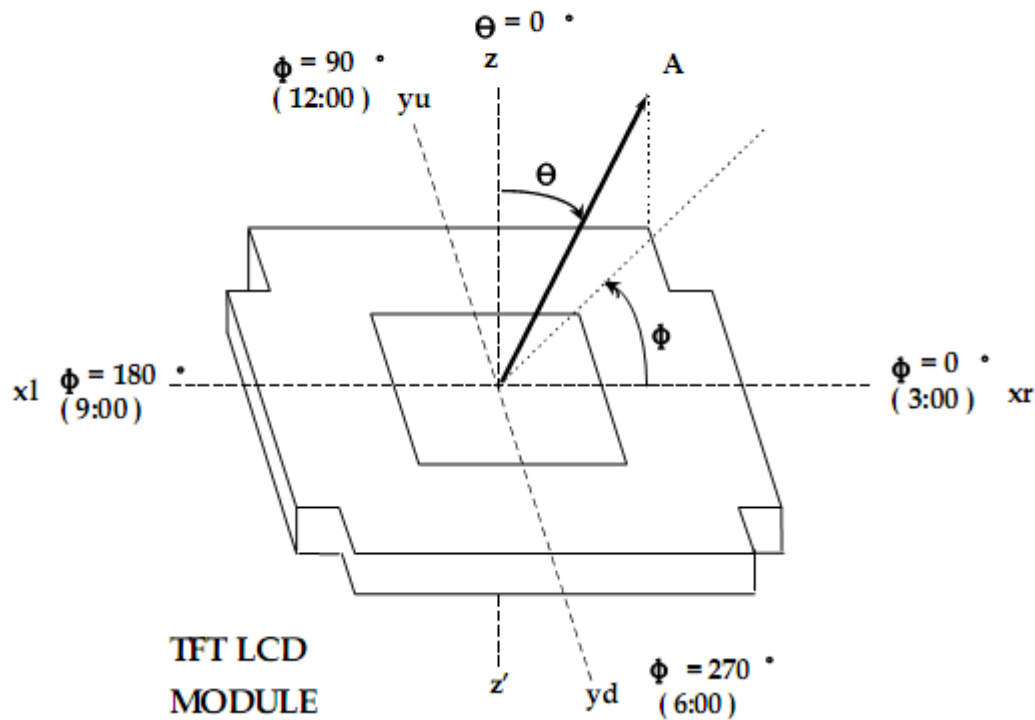
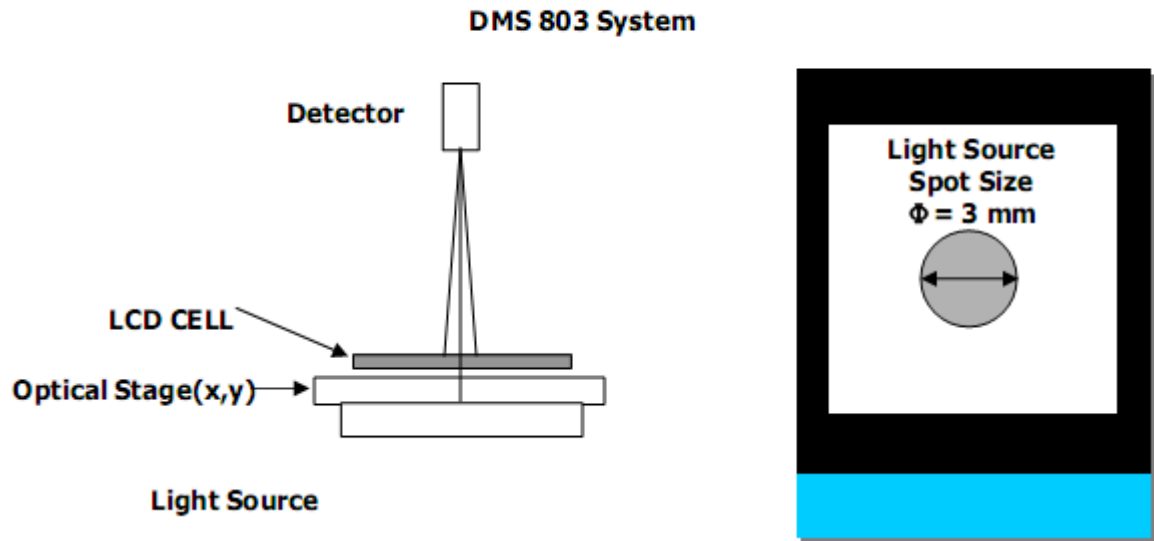


FIG. 5 Response Time Measurement Equipment and Method



| | | | | | |
|------|-------|----|-----------|----|----|
| 标准文本 | 产品规格书 | 型号 | H40008T-A | 页数 | 11 |
|------|-------|----|-----------|----|----|

11. 可靠性测试

Absolute Maximum Conditions

| No. | Parameter | Condition |
|-----|-----------------------|-----------|
| 1 | Operating Temperature | -20 ~ 70℃ |
| 2 | Storage Temperature | -30 ~ 80℃ |

Reliability test conditions (Polarizer characteristics null)

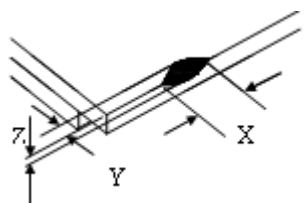
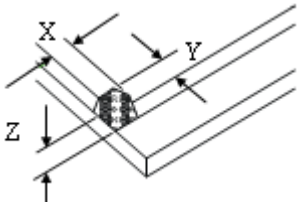
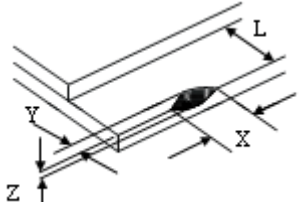
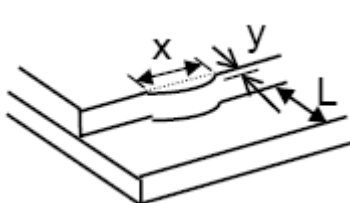
| No. | Test Items | Test Condition | |
|-----|---|---|--------------------------------------|
| 1 | High Temperature Storage | T = 80℃ 240hr | Module (Without Contamination) |
| 2 | Low Temperature Storage | T = -30℃ for 240hr | |
| 3 | High Temperature Operating | T = 70℃ for 240hr | |
| 4 | Low Temperature Operating | T = -20℃ for 240hr (But no condensation of dew) | |
| 5 | High Temp. and High Humidity Operating | T = 60℃ /90% for 240hr (But no condensation dew) | |
| 6 | Thermal Shock | -30 ~ 80℃, 100cycle | |
| 7 | Packing Shock | 1 corner, 3 edge, 6 face / 76cm Drop | Packing |
| 8 | Packing Vibration | Random Truck 0.57Grms Z direction 1hr. | |

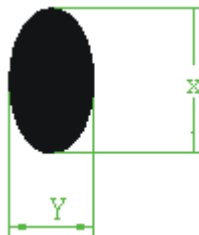
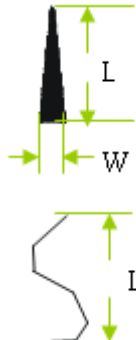
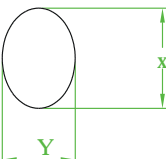
※ 1) No.1~ No.6 : No guarantee for panel, only for module with the above test conditions.

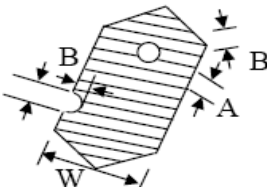
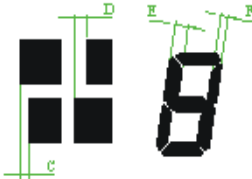
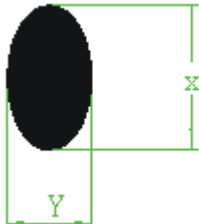
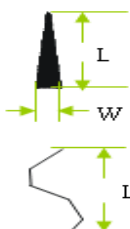
2) No.7~ No.8 : Refer to 7-1) Packing Ass'y on page 14.

12 . LCM 检验标准

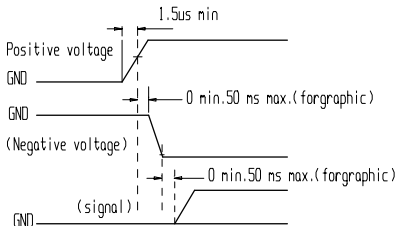
(1) 外观检验项目及标准 (非工作状态)

| 次序 | 项目 | 判断标准 | AQL | | | | | | | | |
|--|---|--|---|--|-----|-----|-----|-----|---------|----|------|
| 1 | 尺寸状况 | 尺寸超出产品规格 | 1 | | | | | | | | |
| 2 | 缺口 | 1、一般缺口 |  | <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>K/8</td><td>不进入 A 区</td><td>T</td></tr></table> | X | Y | Z | K/8 | 不进入 A 区 | T | 2.50 |
| | | X | Y | Z | | | | | | | |
| | | K/8 | 不进入 A 区 | T | | | | | | | |
| | | 2、角缺 |  | <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>K/8</td><td>不进入 A 区</td><td>不计</td></tr></table> | X | Y | Z | K/8 | 不进入 A 区 | 不计 | |
| | | X | Y | Z | | | | | | | |
| K/8 | 不进入 A 区 | 不计 | | | | | | | | | |
| 3、引脚部位缺口 |  | <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>K/8</td><td>L/3</td><td>不计</td></tr></table> | X | Y | Z | K/8 | L/3 | 不计 | | | |
| X | Y | Z | | | | | | | | | |
| K/8 | L/3 | 不计 | | | | | | | | | |
| 4、边缘突起 |  | <table><tr><td>X</td><td>Y</td></tr><tr><td>K/8</td><td>L/3</td></tr></table> | X | Y | K/8 | L/3 | | | | | |
| X | Y | | | | | | | | | | |
| K/8 | L/3 | | | | | | | | | | |
| 缺口伤及线路斑马纸产品 Y L/5 ; 导电胶条产品 Y L/3 ; 装脚产品 Y 0.3mm 判断 | | | | | | | | | | | |

| 标准文本 | 产品规格书 | 型号 | H40008T-A | | 页数 | 13 | | | | | | | | | | | | | | | | |
|-----------------------|-----------------|--|-----------|-------|-------|-------|-------|--------------|----|---------------|-----------------------|-----|-----------------------|---------------|-----------|--------------|---------------|---|------------|---------|--|------|
| 3 | 点状缺陷 | <div><p>X:长径 Y:短径 D:平均直径 $D=(X+Y)/2$</p></div> <table><tr><th rowspan="2">D</th><th colspan="2">允许缺陷数</th></tr><tr><th>A/B 区</th><th>C 区</th></tr><tr><td>$D < 0.2$</td><td>不限</td><td rowspan="4">不限</td></tr><tr><td>$0.2 \leq D < 0.3$</td><td>2</td></tr><tr><td>$0.3 \leq D \leq 0.5$</td><td>1</td></tr><tr><td>$D > 0.5$</td><td>0</td></tr></table> | D | 允许缺陷数 | | A/B 区 | C 区 | $D < 0.2$ | 不限 | 不限 | $0.2 \leq D < 0.3$ | 2 | $0.3 \leq D \leq 0.5$ | 1 | $D > 0.5$ | 0 | 2.50 | | | | | |
| D | 允许缺陷数 | | | | | | | | | | | | | | | | | | | | | |
| | A/B 区 | C 区 | | | | | | | | | | | | | | | | | | | | |
| $D < 0.2$ | 不限 | 不限 | | | | | | | | | | | | | | | | | | | | |
| $0.2 \leq D < 0.3$ | 2 | | | | | | | | | | | | | | | | | | | | | |
| $0.3 \leq D \leq 0.5$ | 1 | | | | | | | | | | | | | | | | | | | | | |
| $D > 0.5$ | 0 | | | | | | | | | | | | | | | | | | | | | |
| 4 | 线状缺陷 | <div><p>L:长度 W:宽度 对偏光片（刮伤、污点、压痕）有限度样本则以限度样本判断</p></div> <table><tr><th rowspan="2">长度</th><th rowspan="2">宽度</th><th colspan="2">允许缺陷数</th></tr><tr><th>A/B 区</th><th>C 区</th></tr><tr><td>不计</td><td>$W \leq 0.02$</td><td>不计</td><td rowspan="3">不限</td></tr><tr><td>$L \leq 3$</td><td>$W \leq 0.05$</td><td>2</td></tr><tr><td rowspan="2">$L \leq 2.5$</td><td>$W \leq 0.05$</td><td>2</td></tr><tr><td>$W > 0.05$</td><td colspan="2">按点状缺陷判定</td></tr></table> | 长度 | 宽度 | 允许缺陷数 | | A/B 区 | C 区 | 不计 | $W \leq 0.02$ | 不计 | 不限 | $L \leq 3$ | $W \leq 0.05$ | 2 | $L \leq 2.5$ | $W \leq 0.05$ | 2 | $W > 0.05$ | 按点状缺陷判定 | | 2.50 |
| 长度 | 宽度 | 允许缺陷数 | | | | | | | | | | | | | | | | | | | | |
| | | A/B 区 | C 区 | | | | | | | | | | | | | | | | | | | |
| 不计 | $W \leq 0.02$ | 不计 | 不限 | | | | | | | | | | | | | | | | | | | |
| $L \leq 3$ | $W \leq 0.05$ | 2 | | | | | | | | | | | | | | | | | | | | |
| $L \leq 2.5$ | $W \leq 0.05$ | 2 | | | | | | | | | | | | | | | | | | | | |
| | $W > 0.05$ | 按点状缺陷判定 | | | | | | | | | | | | | | | | | | | | |
| 5 | 偏光片 气泡/水纹/皱纹 | <div></div> <table><tr><th rowspan="2">D</th><th colspan="2">允许缺陷数</th></tr><tr><th>A/B 区</th><th>C 区</th></tr><tr><td>$D \leq 0.2$</td><td>不限</td><td rowspan="4">不限</td></tr><tr><td>$0.2 \leq D \leq 0.5$</td><td>3 个</td></tr><tr><td>$0.5 \leq D \leq 1.0$</td><td>2 个</td></tr><tr><td>$D > 1.0$</td><td>0 个</td></tr></table> | D | 允许缺陷数 | | A/B 区 | C 区 | $D \leq 0.2$ | 不限 | 不限 | $0.2 \leq D \leq 0.5$ | 3 个 | $0.5 \leq D \leq 1.0$ | 2 个 | $D > 1.0$ | 0 个 | 2.50 | | | | | |
| D | 允许缺陷数 | | | | | | | | | | | | | | | | | | | | | |
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| $0.5 \leq D \leq 1.0$ | 2 个 | | | | | | | | | | | | | | | | | | | | | |
| $D > 1.0$ | 0 个 | | | | | | | | | | | | | | | | | | | | | |
| 6 | 外丝印 | 1、丝印变形、针孔：按照字符变形针孔规格判断。 2、丝印宽度：丝印宽度 $\geq 1/2$ 标准宽度，可判 OK。 | 2.50 | | | | | | | | | | | | | | | | | | | |
| 7 | 打胶（硅胶） | 打胶面积必须盖住 ITO 引线 | 2.50 | | | | | | | | | | | | | | | | | | | |
| 8 | PCB 板不良 | 1、PCB 板烧焦、版本不符、线路剥离、裂痕、导电过孔堵不允许 2、PCB 板金手指不可有氧化、腐蚀、胶状物、断裂现象 | 2.50 | | | | | | | | | | | | | | | | | | | |
| 9 | 贴片元件 | 1、元件装配上下、左右偏位 $\leq 1/3$ 元件本体宽度 2、焊锡点尽可能光滑圆润 3、元件受损、破裂、少件、多件、元件装配反向、漏焊不允许 | 2.50 | | | | | | | | | | | | | | | | | | | |
| 10 | 铁框 | 破裂、变形不允许 外形尺寸参照产品规格书 | 2.50 | | | | | | | | | | | | | | | | | | | |
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| 标准文本 | 产品规格书 | 型号 | H40008T-A | | 页数 | 14 | | | | | | | | | | | | | | | | | | | | |
|------------------------|-----------------|--|--|-----|----|-------|---------|----------------|-------|-----------------|------|--------|-------------|----|------------|--------|--------|-------|---------------|------|--|----------|---------|--|------|--|
| (2) 显示功能检验项目及标准 (工作状态) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 电性能缺陷 | | 断路 | 不允许 | | 1.0 | | | | | | | | | | | | | | | | | | | | |
| | | | 短路/大电流 | 不允许 | | | | | | | | | | | | | | | | | | | | | | |
| | | | 视角错误 | 不允许 | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 字划 凸起/缺口 | 1、针孔缺口  | <table><tr><th>宽度</th><th>接收规格</th></tr><tr><td>W < 0.4</td><td>D 0.2 & D 1/2W</td></tr><tr><td>W 0.4</td><td>D 0.25 & D 1/3W</td></tr></table> *D=(A+B)/2 D 0.1 则忽略不计 | | 宽度 | 接收规格 | W < 0.4 | D 0.2 & D 1/2W | W 0.4 | D 0.25 & D 1/3W | 2.50 | | | | | | | | | | | | | | | |
| 宽度 | 接收规格 | | | | | | | | | | | | | | | | | | | | | | | | | |
| W < 0.4 | D 0.2 & D 1/2W | | | | | | | | | | | | | | | | | | | | | | | | | |
| W 0.4 | D 0.25 & D 1/3W | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 字划/图案 粗细 |  | <table><tr><th>宽度</th><th>接收规格</th></tr><tr><td>W < 0.4</td><td>C、D、G 1/2W</td></tr><tr><td>W 0.4</td><td>C、D、G 0.2</td></tr></table> W : 图案设计尺寸 C、D : 差异尺寸 G= E-F | | 宽度 | 接收规格 | W < 0.4 | C、D、G 1/2W | W 0.4 | C、D、G 0.2 | 1.0 | | | | | | | | | | | | | | | |
| 宽度 | 接收规格 | | | | | | | | | | | | | | | | | | | | | | | | | |
| W < 0.4 | C、D、G 1/2W | | | | | | | | | | | | | | | | | | | | | | | | | |
| W 0.4 | C、D、G 0.2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 点状缺陷 |  X:长径 Y:短径 D:平均直径 D=(X+Y)/2 如黑点、污迹在字段区,按“笔段缺陷”判定 | <table><tr><th rowspan="2">D</th><th colspan="2">允许缺陷数</th></tr><tr><th>A/B 区</th><th>C 区</th></tr><tr><td>D < 0.1</td><td>不限</td><td rowspan="3">不限</td></tr><tr><td>0.1 D < 0.2</td><td>2</td></tr><tr><td>0.2 D 0.25</td><td>1</td></tr><tr><td>D>0.25</td><td>0</td><td></td></tr></table> | | D | 允许缺陷数 | | A/B 区 | C 区 | D < 0.1 | 不限 | 不限 | 0.1 D < 0.2 | 2 | 0.2 D 0.25 | 1 | D>0.25 | 0 | | 2.50 | | | | | | |
| D | 允许缺陷数 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | A/B 区 | C 区 | | | | | | | | | | | | | | | | | | | | | | | | |
| D < 0.1 | 不限 | 不限 | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.1 D < 0.2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.2 D 0.25 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| D>0.25 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 线状缺陷 |  L: 长度 W: 宽度 | <table><tr><th rowspan="2">长度</th><th rowspan="2">宽度</th><th colspan="2">允许缺陷数</th></tr><tr><th>A/B 区</th><th>C 区</th></tr><tr><td>不计</td><td>W 0.02</td><td>不计</td><td rowspan="3">不限</td></tr><tr><td>L 3</td><td>W 0.03</td><td>2</td></tr><tr><td>L 2.5</td><td>0.03 < W 0.05</td><td>2</td></tr><tr><td></td><td>W > 0.05</td><td colspan="2">按点状缺陷判定</td></tr></table> | | 长度 | 宽度 | 允许缺陷数 | | A/B 区 | C 区 | 不计 | W 0.02 | 不计 | 不限 | L 3 | W 0.03 | 2 | L 2.5 | 0.03 < W 0.05 | 2 | | W > 0.05 | 按点状缺陷判定 | | 2.50 | |
| 长度 | 宽度 | 允许缺陷数 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | A/B 区 | C 区 | | | | | | | | | | | | | | | | | | | | | | | |
| 不计 | W 0.02 | 不计 | 不限 | | | | | | | | | | | | | | | | | | | | | | | |
| L 3 | W 0.03 | 2 | | | | | | | | | | | | | | | | | | | | | | | | |
| L 2.5 | 0.03 < W 0.05 | 2 | | | | | | | | | | | | | | | | | | | | | | | | |
| | W > 0.05 | 按点状缺陷判定 | | | | | | | | | | | | | | | | | | | | | | | | |
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| 标准文本 | 产品规格书 | 型号 | H40008T-A | 页数 | 15 |
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| <p>13. LCM 的使用</p> <p>16-1 晶显示模块</p> <p>LCD 是由玻璃和偏光片组成，在搬运过程中，请注意以下事项：</p> <ul style="list-style-type: none">(1) 请保证使用和存储是在规定的温度范围之内。高温高湿会导致偏光性能降级，产生气泡或者偏光片剥落。(2) LCM 表面的偏光片质软容易划伤,不要用硬度大于 HB 铅笔芯的任何物品（玻璃，镊子等）接触，挤压或者摩擦外露的偏光片(3) 用来粘合底/面偏光片和反射片的有机粘合剂会被一些化学物质，如丙酮，甲苯，乙醇和异链烷烃破坏，建议用 N-己烷进行清洁。(4) 显示屏表面有脏污，请吹拂同时用干的软布擦拭表面。如果脏污比较严重，建议用脱脂棉或者其他的柔软材料，如擦拭用软皮，浸湿异丙醇或酒精之后进行擦拭其表面。不要用力擦洗以避免损伤显示屏表面。(5) 不可使用以下溶剂：水，酮，芳香烃。其溶剂可能损坏偏光片。(6) 避免与油和脂肪接触。(7) 因低温而产生的表面浓缩和端子的连接，会损坏，染污或者弄脏偏光片。产品在低温测试之后，需要先在容器之内烘干之后才可以与室温接触。(8) 不要放置或贴附任何东西在屏幕上，以免留下痕迹。(9) 不要裸手触摸显示器。这样会染污显示区域，并且降低接线端子之间的绝缘性（对于偏光片一些化妆品是确定的）(10) 采取措施尽量减小电极的腐蚀。水滴，凝结的潮气或者高湿环境下的电流会加速电极的腐蚀。(11) 因为玻璃是易碎的，搬运过程中容易产生缺口（特别是边缘）。请避免跌落或震动。 <p>16-2 组装 LCM 的注意事项</p> <p>因为 LCM 是高精密度的组装和调试，请避免因过度的撞击，或者进行任何的变更或者修改。</p> <ul style="list-style-type: none">(1) 不要更改或者改变金属框架的突起形状。(2) 不要在线路印刷板上另外钻孔，修改形状或者改变其上的元器件的位置。(3) 不要损坏或者修改线路印刷板上的图案。(4) 绝对不要更改斑马条（导电橡胶）或者热压连接器。(5) 除了焊接接口，不要用烙铁进行任何的修改或者变更。(6) 不要跌落，弯曲或者扭转 LCM。特别注意不可用力拉或者扭转 I/O 口或背光的排线。(7) 为了防止 FPC 破裂，请特别注意 FPC 的可弯曲部分，覆盖层的边缘，镀金区域的表面，焊接区域或者通孔区域。 <p>16-3 静电放电控制</p> <p>因为模块使用 CMOS LSI,像平常的 CMOS IC 一样需要注意静电的防护。</p> <ul style="list-style-type: none">(1) 手持 LCM 时，请确保身体是接地的。为了尽量减少因静电而产生的 LCM 功能降级，在运输模块时小心操作避免接触到：印刷电路板的外露区域，元件的电极。(2) 从包装袋中取出 LCM 或者与其他装置装配时，请确保模块与你的身体的电势一致。(3) 焊接 LCM 的接线端时，请确保烙铁的交流电源没有漏电。(4) 使用电动螺丝批装配 LCM 时，电动螺丝批须接地以尽可能减小马达换向器产生火花而引起的电磁波辐射(5) 尽量使你的工衣，工作台达到地电位。(6) 为了减少静电产生需要注意工作环境的空气不可太干燥。建议相对湿度为 50%-60%。 | | | | | |
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| <p>16-4 操作注意事项：</p> <ul style="list-style-type: none">(1) 液晶的视角会随着驱动电压（VO）的变化而变化，调节 VO 使之显示为最好的对比度。(2) 极限值以上的驱动电压会缩短 LCD 的使用寿命。(3) 如果 LCM 长时间的显示一个图案，图案可能残存（似鬼影）或者其暗影不规则的显示。隔段时间后使用即可恢复正常。请注意这种现象不会影响显示。(4) 在低于操作温度范围的温度下工作会造成响应时间延长。但是，这并不意味着 LCD 不能工作。它会在温度恢复至规定范围后恢复正常。(5) 如果在工作过程中显示区域被猛烈的挤压，显示会异常。但是，关电后重新启动后会恢复正常。(6) 端子的凝结水汽会导致电化学反应，破坏线路的接线端。所以，必须在低于 40℃，50% RH 环境条件下中使用。(7) 电源打开，在正极/负极电压稳定之后，输入信号。 <div></div> <p>16-5 储存</p> <p>如果 LCD 需储存几年，以下的预防事项是必要的。</p> <ul style="list-style-type: none">(1) 保存于密封的聚乙烯袋内。适当的密封就不需要干燥剂。(2) 存储于黑暗的环境中。不要暴露于日光或者荧光灯的直射下，保持温度在 0℃ 到 35℃ 之间。(3) 偏光片的表面不可与其他物体接触。（建议存于运输用的容器中）(4) 环境条件<ul style="list-style-type: none">- 不要在 70℃ 的环境中放置超过 160 小时。- 不要在 -20℃ 的环境中放置超过 48 小时。 <p>16-6 安全</p> <ul style="list-style-type: none">(1) 建议将损坏的或者不要的 LCD 压成碎片，用溶剂，如丙酮，乙醇清洗后烧毁。(2) 如果从破损的玻璃中泄漏的液晶不慎粘到手，请用肥皂，清水彻底清洗。 <p>16-7 权利限制</p> <p>除非经过上线科技公司和客户的认可，在交货之日起一年之内，上线科技公司会按照自己承诺的检验标准对 LCD 功能性的缺陷进行修改。外观上缺陷的产品必须在交货之日起 30 天之内退回上线科技公司。以上日期依运输文件为准。上线科技公司的权力范围仅限于对以上项目的修复和/或者替换。上线科技公司不会对由此引起的或者并发的其他事件负责。</p> <p>16-8 权利范围之内的退货</p> <p>如有违反以上所提到的预防注意事项而造成的不良将不予以保证。典型例子如下：</p> <ul style="list-style-type: none">- 破坏 LCD 玻璃。- 任何形式的线路修改，包括增加电器元件。 <p>模块的修改必须基于客户相互的文件协议。模块退回时，必须要有详细的不良描述。客户安装的连接器或者排线必须完全地取掉，不能损坏 LCM 的 PCB 孔，连接器和接线端。</p> <p>规格书技术资料备注：由于液晶产品技术不断改进，本规格书有未能把所有技术资料体现，请客户务必在确定产品时，以样品质量和结构为准，以免造成生产批量出现不必要的损失，谢谢支持和配合！</p> | | | | | |
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