



冀雅（廊坊）电子有限公司

JIYA (LANGFANG) ELECTRONICS CO., LTD

模块产品规格书 SPECIFICATION FOR LCD MODULE

| | |
|----------------|------------------------------|
| 客户 COSTOMER | |
| 产品型号 MODEL | JYG-12864G8G-FS6N2-VA |

| | | |
|---------------------|--------------------|---------------------|
| 设 计 ORGANIZED BY | 审 核 CHECKED BY | 批 准 APPROVED BY |
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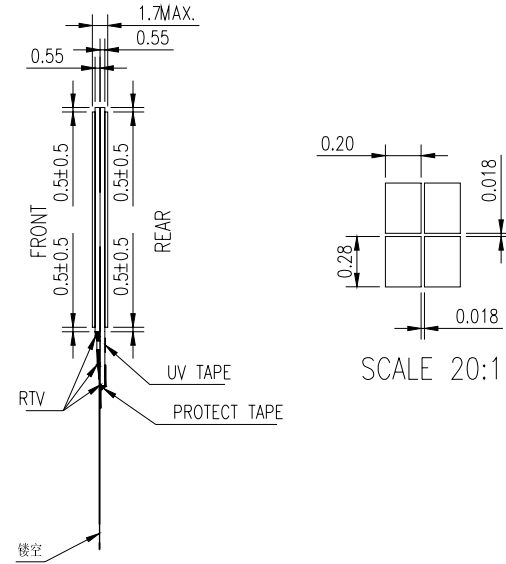
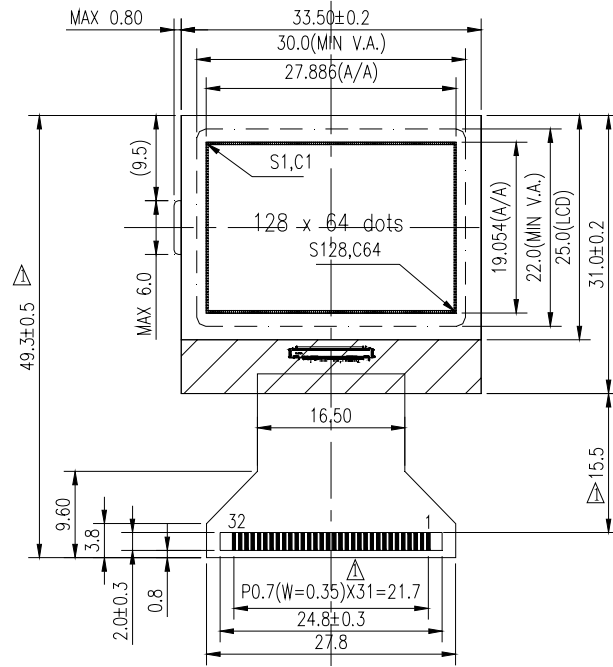
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1.LCM DRWING



SCALE 20:1

- NOTE:
1. FSTN, POSITIVE,HIGH-TRANSFLECTIVE
 2. 1/64 DUTY CYCLE, 1/9 BIAS,Vop.=9.0V,VDD=3.0V
 3. VIEWING DIRECTION: 6:00 O'CLOCK
 4. DRIVER IC: ST-7565P
 5. Top.: -20 TO +70 DEGREE C
 6. Tst.: -30 TO +80 DEGREE C
 7. LCD DRAWING NO.:JY05A02
 8. IRS&P/S CONNECT TO VDD

| | | | | | | | | |
|--------|-----|------|----|------|-----|-----|-----|-----|
| PIN | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| SYMBOL | NC | /CS1 | NC | /RES | A0 | WR | RD | D0 |
| PIN | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| SYMBOL | D1 | D2 | D3 | D4 | D5 | D6 | D7 | VDD |
| PIN | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| SYMBOL | VSS | VOUT | NC | CSP | C1N | CTP | C2P | C2N |
| PIN | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |
| SYMBOL | V4 | V3 | V2 | V1 | V0 | VR | C86 | NC |

| | |
|---------|-------------|
| LCD PIN | IC PIN |
| C1-C64 | COM63-COM0 |
| S1-S128 | SEGO-SEG127 |

| 更改记录 | | | | | 设计 | 审核 | 工艺 | 标准化 | 批准 | 产品型号 | JYG-12864G8G-FS6N2-VA |
|------|-----------|-------------------|-----|----|----|------|------------|-----|----|------------|-----------------------|
| 更改标记 | 日期 | 更改内容 | 设计 | 审核 | 批准 | 签名 | 宫毓娟 | | | 文件编号 | G12864G8G-WX |
| △ | 05. 3. 14 | 更改FPC的尺寸,增加NOTE 8 | 宫毓娟 | | | 日期 | 04. 12. 31 | | | 分文件号 | 4 |
| | | | | | | 页数 | 1-1 | 单位 | mm | 河北冀雅电子有限公司 | |
| | | | | | | 未注公差 | ±0.2 | | | | |

2. GENERAL DESCRIPTION

| | |
|------------------------|------------------------------------|
| MAIN TECHNICS: | COG |
| DISPLAY CONTENT: | 128*64DOTS |
| DISPLAY TYPE: | FSTN, POSITIVE,HIGH-TRANSFLECTIVE |
| DRIVER METHOD: | 1/64 DUTY , 1/9 BIAS |
| VIEWING DIRECTION: | 6:00 |
| CONTROLLER: | ST-7565P |
| BACKLIGHT: | --- |
| OPERATING TEMPERATURE: | -20°C-+70°C |
| STORAGE TEMPERATURE: | -30°C-+80°C |
| REFERENCE DOCUMENTS : | ST-7565P datasheet |

3. MECHANICAL SPECIFICATIONS

| ITEM | CONTENT | UNIT |
|------------------|----------------------------|------|
| DOTS NUMBER | 128x64 | DOTS |
| MODULE DIMENSION | 33.5(w)*49.3(h)*1.7(t) Max | mm |
| ACTIVE AREA | 27.886(w)*19.05(h) | mm |
| DOT SIZE | 0.20(w)*0.28(h) | mm |
| DOT SPACE | 0.018 (w)*0.018(h) | mm |

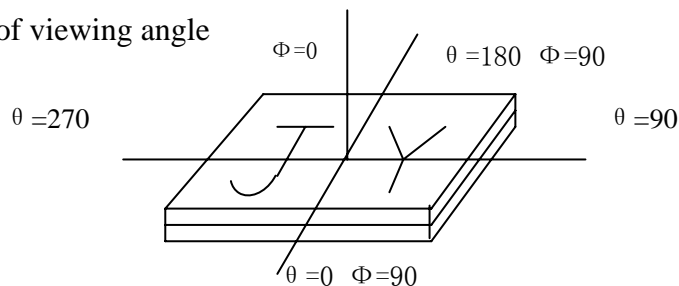
4. ELECTRO-OPTICAL CHARACTERISTICS

| ITEM | SYMBOL | CONDITIO N | MIN. | TYP. | MAX | UNIT |
|-----------------------|--------|---------------|------|------|-----|------|
| LCD OPERATING VOLTAGE | Vop. | 25°C | 8.8 | 9.0 | 9.2 | V |
| RESPONSE TIME | Ton | 25°C | - | 27 | 400 | Ms |
| | Toff | 25°C | - | 220 | 400 | Ms |
| CONTRAST RATIO | CR | 25°C | - | 14 | - | - |
| VIEWING RANGE | | 25°C | - | 88 | - | DEG |
| CROSSTALK | | 25°C | - | 1.2 | - | - |

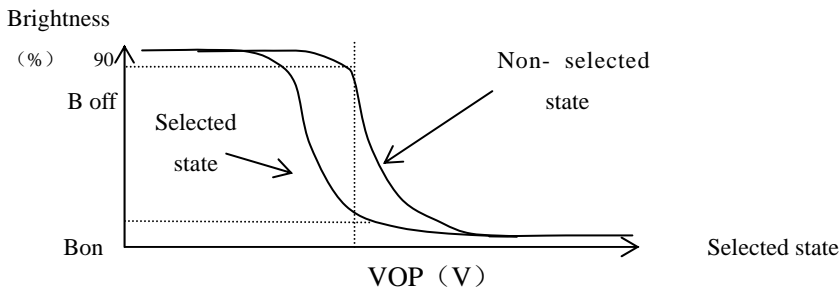
Note1: Definition of viewing angle

$(0 \leq \Phi \leq 90$

$0 \leq \theta \leq 360)$



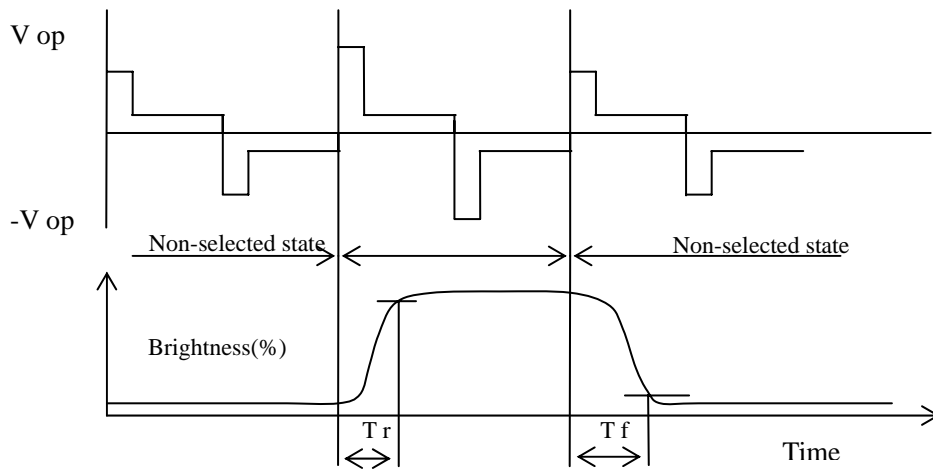
Note 2: Definition of contrast ratio



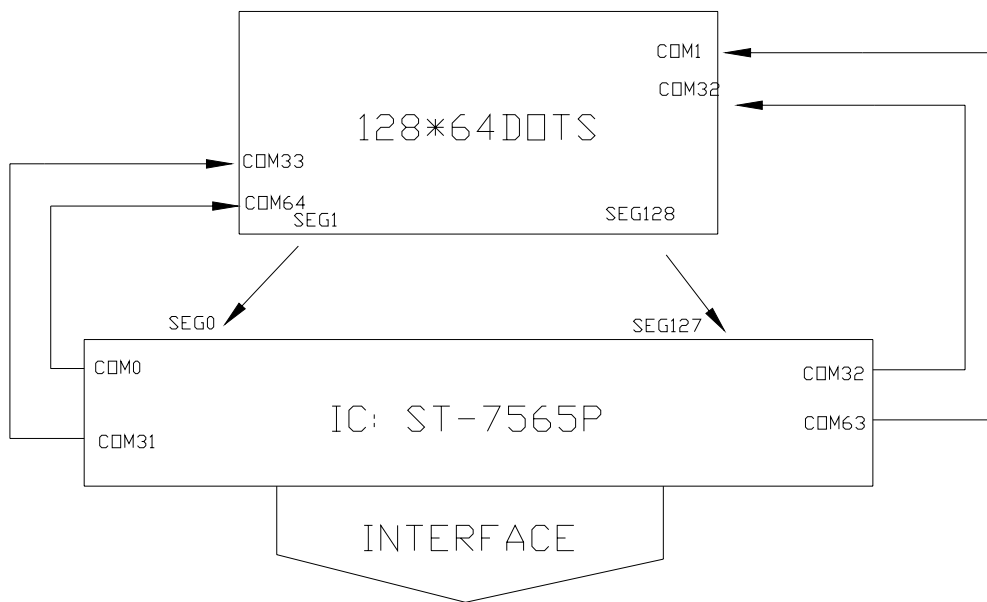
$$\text{Contrast ratio} = \frac{\text{Brightness under non-selected state}}{\text{Brightness under selected state}}$$

$$\text{Cross talk} = \frac{\text{Brightness under non-selected state}}{\text{Brightness under off state}}$$

Note 3: Definition of response time



5.BLOCK DIAGRAM



6. ELECTRONIC CHARACTERISTICS

6.1 MAXIMUM VALUES

| ITEM | SYMBOL | STANDARD VALUE | | UNIT |
|-----------------------|------------------|----------------|-------|------|
| | | MIN | MAX | |
| Logic supply voltage | V _{DD1} | 0.3 | +5.0 | V |
| LCD supply voltage | V _{LCD} | 0.3 | +18.0 | V |
| Operating Temperature | Top | -20 | +70 | °C |
| Storage Temperature | Tst | -30 | +80 | °C |

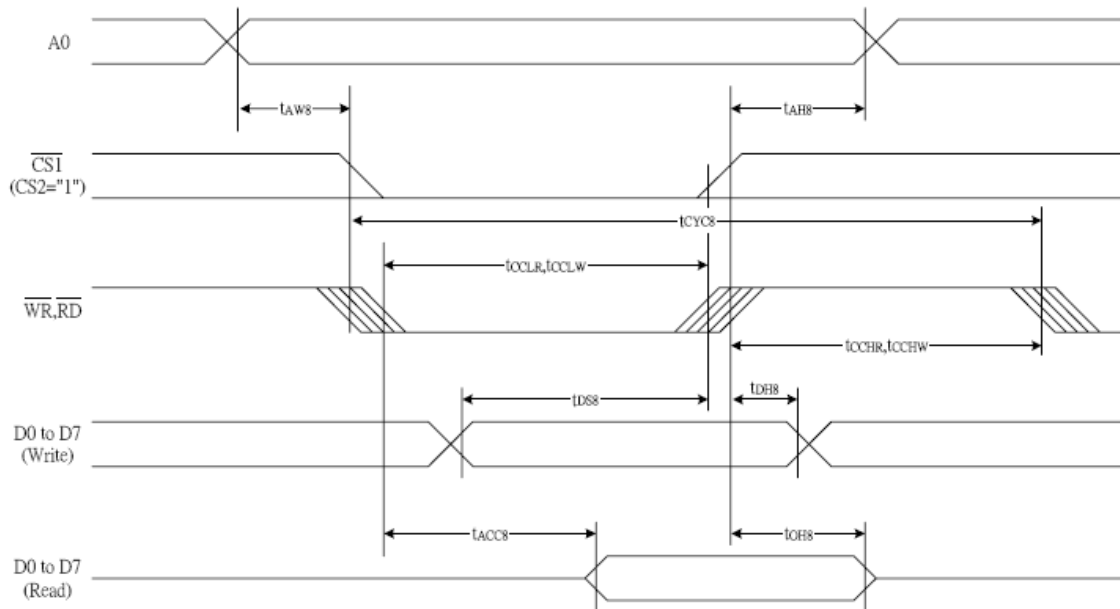
6.2. DC CHARACTERISTICS

| Item | Symbol | Condition | Rating | | | Units | Applicable Pin | | |
|-------------------------------------|---------------------|--|-------------------------------------|-----------------------|-----------------------|-------|---|-----|----|
| | | | Min. | Typ. | Max. | | | | |
| Operating Voltage (1) | V _{DD} | | 1.8 | — | 3.3 | V | V _{SS} *1 | | |
| Operating Voltage (2) | V _{DD2} | (Relative to V _{SS}) | 2.4 | — | 3.3 | V | V _{SS} | | |
| High-level Input Voltage | V _{IHC} | | 0.8 x V _{DD} | — | V _{DD} | V | *3 | | |
| Low-level Input Voltage | V _{ILC} | | V _{SS} | — | 0.2 x V _{DD} | V | *3 | | |
| High-level Output Voltage | V _{OHC} | I _{OH} = -0.5 mA | 0.8 x V _{DD} | — | V _{DD} | V | *4 | | |
| Low-level Output Voltage | V _{OLC} | I _{OL} = 0.5 mA | V _{SS} | — | 0.2 x V _{DD} | V | *4 | | |
| Input leakage current | I _{LI} | V _{IN} = V _{DD} or V _{SS} | -1.0 | — | 1.0 | μA | *5 | | |
| Output leakage current | I _{LO} | V _{IN} = V _{DD} or V _{SS} | -3.0 | — | 3.0 | μA | *6 | | |
| Liquid Crystal Driver ON Resistance | R _{ON} | T _a = 25°C V _O = 13.0 V | — | 2.0 | 3.5 | KΩ | SE _{Gn} CO _{Mn} *7 | | |
| | | (Relative To V _{DD}) V _O = 8.0 V | — | 3.2 | 5.4 | | | | |
| Static Consumption Current | I _{SSQ} | V _O = 13.0 V (Relative To V _{DD}) | — | 0.01 | 2 | μA | V _{DD} , V _{DD2} | | |
| Output Leakage Current | I _{5Q} | | — | 0.01 | 10 | μA | V _O | | |
| Input Terminal Capacitance | C _{IN} | T _a = 25°C, f = 1 MHz | — | 5.0 | 8.0 | pF | | | |
| Oscillator Frequency | Internal Oscillator | f _{OSC} | 1/65 duty 1/33 duty | T _a = 25°C | 17 | 20 | 24 | kHz | *8 |
| | External Input | f _{CL} | | | 17 | 20 | 24 | kHz | CL |
| | Internal Oscillator | f _{OSC} | 1/49 duty 1/53 duty 1/55 duty | T _a = 25°C | 25 | 30 | 35 | kHz | *8 |
| | External Input | f _{CL} | | | 25 | 30 | 35 | kHz | CL |

| Item | Symbol | Condition | Rating | | | Units | Applicable Pin |
|----------------|---|------------------------|---|------|------|-------|----------------|
| | | | Min. | Typ. | Max. | | |
| Internal Power | Input voltage | VDD2 (Relative To Vss) | 2.4 | — | 3.3 | V | Vss |
| | Supply Step-up output voltage Circuit | VOUT (Relative To Vss) | — | — | 16.0 | V | VOUT |
| | Voltage regulator Circuit Operating Voltage | VOUT (Relative To Vss) | 6.0 | — | 16.0 | V | VOUT |
| | Voltage Follower Circuit Operating Voltage | V0 (Relative To Vss) | 4.0 | — | 13.0 | V | V0 * 9 |
| | Base Voltage | VR | Ta = 25°C, (Relative To Vss) -0.01%/°C | 2.07 | 2.10 | 2.13 | V |

6.3 . TIMING CHARACTERISTICS

System Bus Read/Write Characteristics 1 (For the 8080 Series MPU)

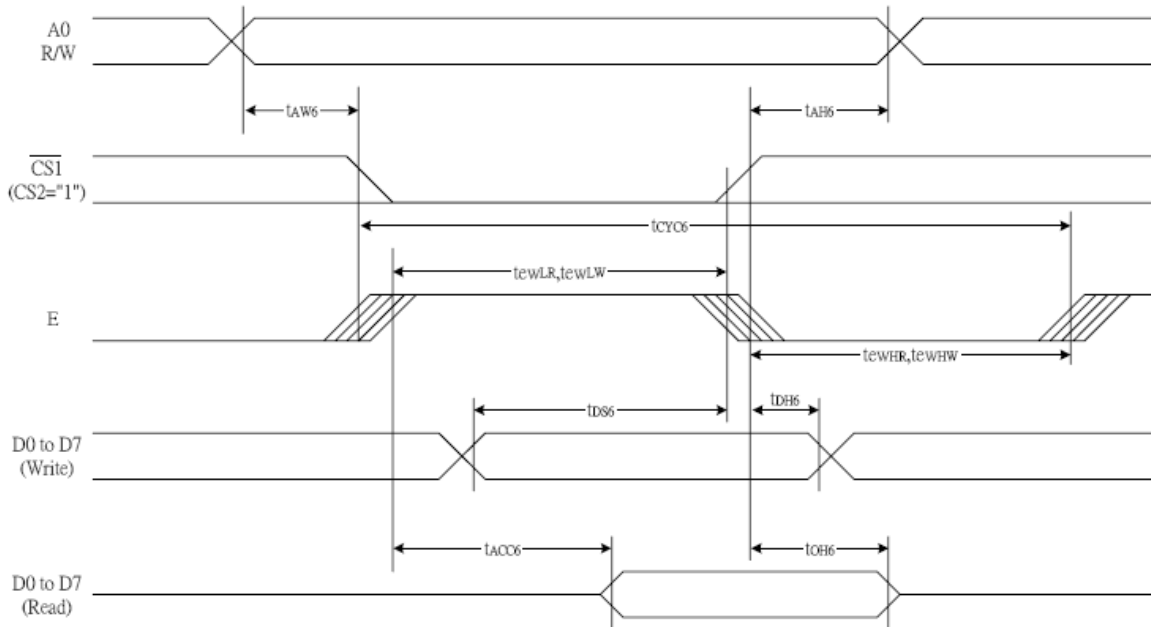


(VDD = 3.3V, Ta = 25°C)

| Item | Signal | Symbol | Condition | Rating | | Units |
|------------------------------|----------|--------|-------------|--------|------|-------|
| | | | | Min. | Max. | |
| Address hold time | A0 | tAH8 | | 0 | — | Ns |
| Address setup time | | tAW8 | | 0 | — | |
| System cycle time | | tCYCS | | 240 | — | |
| Enable L pulse width (WRITE) | WR | tCCLW | | 80 | — | |
| Enable H pulse width (WRITE) | | tCCHW | | 80 | — | |
| Enable L pulse width (READ) | RD | tCCLR | | 140 | — | |
| Enable H pulse width (READ) | | tCCHR | | 80 | — | |
| WRITE Data setup time | D0 to D7 | tDS8 | | 40 | — | |
| WRITE Address hold time | | tDH8 | | 0 | — | |
| READ access time | | tACC8 | CL = 100 pF | — | 70 | |
| READ Output disable time | | tOH8 | CL = 100 pF | 5 | 50 | |

(VDD = 2.7 V, Ta = 25°C)

| Item | Signal | Symbol | Condition | Rating | | Units |
|------------------------------|----------|-------------------|-------------|--------|------|-------|
| | | | | Min. | Max. | |
| Address hold time | A0 | t _{AH8} | | 0 | — | ns |
| Address setup time | | t _{AW8} | | 0 | — | |
| System cycle time | | t _{CYC8} | | 400 | — | |
| Enable L pulse width (WRITE) | WR | t _{CCLW} | | 220 | — | |
| Enable H pulse width (WRITE) | | t _{CCHW} | | 180 | — | |
| Enable L pulse width (READ) | RD | t _{CCLR} | | 220 | — | |
| Enable H pulse width (READ) | | t _{CCHR} | | 180 | — | |
| WRITE Data setup time | D0 to D7 | t _{DS8} | | 40 | — | |
| WRITE Address hold time | | t _{DH8} | | 0 | — | |
| READ access time | | t _{ACC8} | CL = 100 pF | — | 140 | |
| READ Output disable time | | t _{OH8} | CL = 100 pF | 10 | 100 | |



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

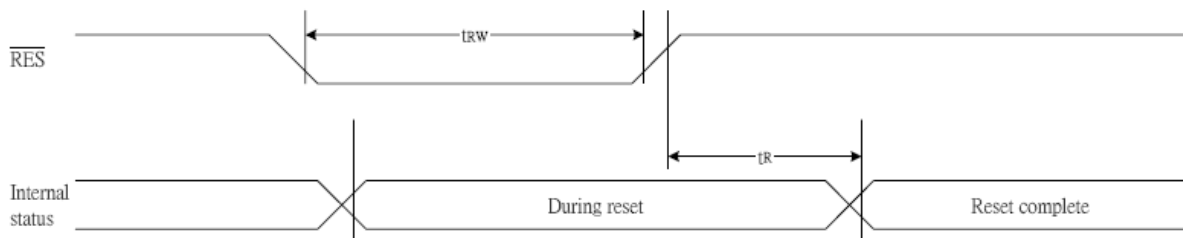
(VDD = 3.3 V , Ta = 25°C)

| 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) | WR | t _{EWLW} | | 80 | — | |
| Enable H pulse width (WRITE) | | t _{EWHW} | | 80 | — | |
| Enable L pulse width (READ) | RD | 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 pF | — | 70 | |
| READ Output disable time | | t _{OH6} | CL = 100 pF | 5 | 50 | |

(VDD = 2.7V , Ta =25°C)

| 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} | | 400 | — | |
| Enable L pulse width (WRITE) | WR | t _{EWLW} | | 220 | — | |
| Enable H pulse width (WRITE) | | t _{EWHW} | | 180 | — | |
| Enable L pulse width (READ) | RD | t _{EWLR} | | 220 | — | |
| Enable H pulse width (READ) | | t _{EWHR} | | 180 | — | |
| WRITE Data setup time | D0 to D7 | t _{DS6} | | 40 | — | |
| WRITE Address hold time | | t _{DH6} | | 0 | — | |
| READ access time | | t _{ACC6} | CL = 100 pF | — | 140 | |
| READ Output disable time | | t _{OH6} | CL = 100 pF | 10 | 100 | |

Reset Timing



(VDD = 3.3V , Ta = -40 to 85°C)

| Item | Signal | Symbol | Condition | Rating | | | Units |
|-----------------------|--------|-----------------|-----------|--------|------|------|-------|
| | | | | Min. | Typ. | Max. | |
| Reset time | | t _R | | — | — | 1.0 | us |
| Reset "L" pulse width | /RES | t _{RW} | | 1.0 | — | — | us |

(VDD = 2.7V , Ta = -40 to 85°C)

| Item | Signal | Symbol | Condition | Rating | | | Units |
|-----------------------|--------|-----------------|-----------|--------|------|------|-------|
| | | | | Min. | Typ. | Max. | |
| Reset time | | t _R | | — | — | 2.0 | us |
| Reset "L" pulse width | /RES | t _{RW} | | 2.0 | — | — | us |

7. PINS DESCRIPTION

| Pin no. | SIGNAL | CAPACITOR CONNECTIONS |
|---------|--------|--|
| 1 | NC | ---- |
| 2 | /CS1 | L: Chip select H: Chip unselected |
| 3 | NC | ---- |
| 4 | /RES | Reset L: Enable; H: Disable |
| 5 | A0 | H: display data; L: command; |
| 6 | WR | Write L: Enable H: Disable(8080INTERFACE) L:Write H:Read(68INTERFACE) |
| 7 | RD | Read L: Enable H: Disable(8080INTERFACE) H: Enable(68INTERFACE) |
| 8 | D0 | DATA BUS |
| 9 | D1 | DATA BUS |
| 10 | D2 | DATA BUS |
| 11 | D3 | DATA BUS |
| 12 | D4 | DATA BUS |
| 13 | D5 | DATA BUS |
| 14 | D6 | DATA BUS |
| 15 | D7 | DATA BUS |
| 16 | VDD | Power supply(+3.0V) |
| 17 | VSS | Ground |
| 18 | VOUT | Connect to 1.0uF→VSS |
| 19 | NC | ---- |
| 20 | C3P | Connect to 1.0uF→CAP1- |
| 21 | C1N | Connect to 1.0uF→CAP1+ |
| 22 | C1P | Connect to 1.0uF→CAP1- |
| 23 | C2P | Connect to 1.0uF→CAP2- |
| 24 | C2N | Connect to 1.0uF→CAP2+ |
| 25 | V4 | Connect to 1.0uF→VSS |
| 26 | V3 | Connect to 1.0uF→VSS |
| 27 | V2 | Connect to 1.0uF→VSS |
| 28 | V1 | Connect to 1.0uF→VSS |
| 29 | V0 | Connect to 1.0uF→VSS |
| 30 | VR | |
| 31 | C86 | H: 6800 series selected; L: 8080 series selected. |
| 32 | NC | ---- |

8. INSTRUCTION DESCRIPTION

| Command | Command Code | | | | | | | | | Function | | | |
|---|--------------|-----|-----|------------|----|-------------------------|----|----------------------------------|----------------|----------|----|--|---|
| | A0 | /RD | /WR | D7 | D6 | D5 | D4 | D3 | D2 | | D1 | D0 | |
| (1) Display ON/OFF | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | LCD display ON/OFF 0: OFF, 1: ON |
| (2) Display start line set | 0 | 1 | 0 | 0 | 1 | Display start address | | | | | | Sets the display RAM display start line address | |
| (3) Page address set | 0 | 1 | 0 | 1 | 0 | 1 | 1 | Page address | | | | Sets the display RAM page address | |
| (4) Column address set upper bit | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Most significant column address | | | | Sets the most significant 4 bits of the display RAM column address. | |
| Column address set lower bit | 0 | 1 | 0 | 0 | 0 | 0 | 0 | Least significant column address | | | | Sets the least significant 4 bits of the display RAM column address. | |
| (5) Status read | 0 | 0 | 1 | Status | | | | 0 | 0 | 0 | 0 | 0 | Reads the status data |
| (6) Display data write | 1 | 1 | 0 | Write data | | | | | | | | Writes to the display RAM | |
| (7) Display data read | 1 | 0 | 1 | Read data | | | | | | | | Reads from the display RAM | |
| (8) ADC select | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Sets the display RAM address SEG output correspondence 0: normal, 1: reverse |
| (9) Display normal/reverse | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | Sets the LCD display normal/reverse 0: normal, 1: reverse |
| (10) Display all points ON/OFF | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | Display all points 0: normal display 1: all points ON |
| (11) LCD bias set | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | Sets the LCD drive voltage bias ratio 0: 1/9 bias, 1: 1/7 bias (ST7565P) |
| (12) Read/modify/write | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Column address increment At write: +1 At read: 0 |
| (13) End | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | Clear read/modify/write |
| (14) Reset | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Internal reset |
| (15) Common output mode select | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | * | * | * | Select COM output scan direction 0: normal direction 1: reverse direction |
| (16) Power control set | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | Operating mode | | | Select internal power supply operating mode | |
| (17) Vo voltage regulator internal resistor ratio set | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Resistor ratio | | | Select internal resistor ratio(Rb/Ra) mode | |
| (18) Electronic volume mode set | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Set the Vo output voltage electronic volume register |
| Electronic volume register set | | | | 0 | 0 | Electronic volume value | | | | | | | |
| (19) Static indicator ON/OFF | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0: OFF, 1: ON |
| Static indicator register set | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Mode |
| (20) Booster ratio set | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | select booster ratio 00: 2x,3x,4x 01: 5x 11: 6x |
| (21) Power saver | | | | | | | | | | | | | Display OFF and display all points ON compound command |
| (22) NOP | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | Command for non-operation |
| (23) Test | 0 | 1 | 0 | 1 | 1 | 1 | 1 | * | * | * | * | * | Command for IC test. Do not use this command |

9. BACKLIGHT PARAMETERS

NO

10. Product Quality & Reliability

10.1 Standard for Quality Test

10.1.1 Inspection :

Before delivering, the supplier should take the following tests, and affirm the quality of product.

10.1.2 Electro-Optical Characteristics:

According to the individual specification to test the product.

10.1.3 Test of Appearance Characteristics:

According to the individual specification to test the product.

10.1.4 Test of Reliability Characteristics:

According to the definition of reliability on the specification for testing products.

10.1.5 Delivery Test:

Before delivering, the supplier should take the delivery test.

A. Test method: According to MIL-STD-105E, General Inspection Level II take a single time.

B. The defects classify of AQL as following:

Major defect: AQL=0.65

Minor defect: AQL=2.5

Total defects: AQL=2.5

10.2 Standard for inspection

10.2.1 Manner of appearance test:

a. The test must be under a 40W fluorescent light, and the distance of view must be at 30 cm.

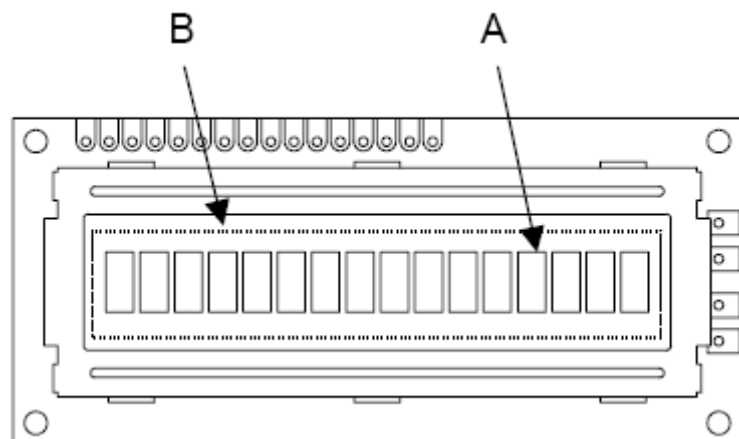
b. When test the model of transmissive product must add the reflective plate.

c. The test direction is base on about around 45° of vertical line.

10.2.2 Definition of area: B A

A Area : Viewing area.

B Area : Out of viewing area.(Outside viewing area)

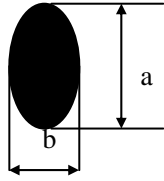


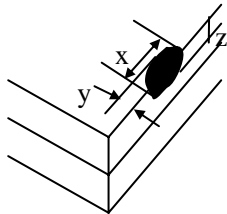
10.2.3 Basic principle:

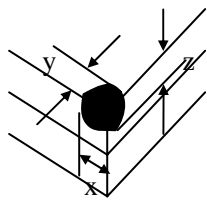
- A. In principle the defect out of Area A should be acceptable if the defect does not affect assemblage and the quality of productions.
- B. If defects that can not describe clearly, acceptable samples will be the standard.
- C. The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.
- D. Must add new item on time when it is necessary.

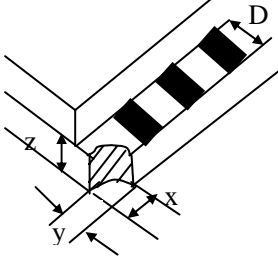
10.2.4 Standard of inspection

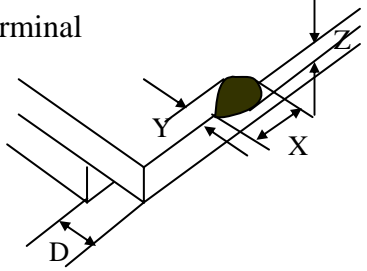
| Defect | Inspect item | Criteria |
|------------|--|--|
| 1 Minor | Scratch and fold on polarizer. Scratch on glass. Glass fiber etc. (by bare eyes, defect outside viewing area is acceptable) | length ignore width $\leq 0.03\text{mm}$ acceptable |

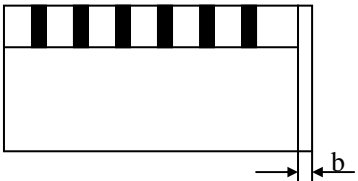
| Defect | Inspect item | Criteria |
|------------|---|---|
| 2 Minor | Chip on glass(round type) Chip on polarizer(round type) Air bubble between polarizer and glass <div style="text-align: center;">  </div> $\Phi = (a + b) / 2$ | $\Phi \leq 0.5\text{mm}$ acceptable $0.5 < \Phi \leq 0.7\text{mm}$ two are acceptable $\Phi > 0.7\text{mm}$ reject 1.The distance between any two dots should be more than 5mm. 2.Defect outside viewing area is acceptable. 3.If the air bubble is black, it can be judged as black spot. |

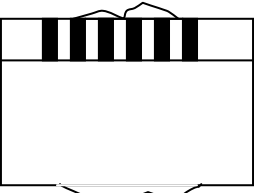
| Defect | Inspect item | Criteria |
|------------|--|---|
| 3 Minor | <p>Chip out</p>  <p>a: LCD length x: length y: width z: thickness</p> | <p>$a \geq 80\text{mm}, x \geq 7\text{mm}$ reject</p> <p>$a < 80\text{mm}, x \geq 5\text{mm}$ reject</p> <p>$z < 2/3t, y \geq s$ reject</p> <p>$z \geq 2/3t, y \geq 1/3s$ reject</p> <p>t: glass thickness. S: distance between glass edge and inside of edge sealing</p> |

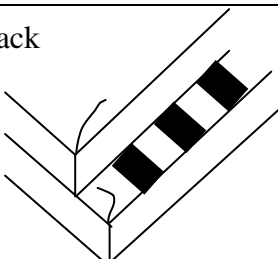
| Defect | Inspect item | Criteria |
|------------|---|--|
| 4 Minor | <p>Chip on corner of neat edge</p>  <p>X: length Y: width S: width of edge sealing</p> | <p>$a \geq 80\text{mm}, x \geq 7\text{mm}$ reject</p> <p>$a < 80\text{mm}, x \geq 5\text{mm}$ reject</p> <p>$x > S * 2/3, x > S * 2/3$ reject</p> <p>z: ignore</p> <p>any chip exposes the silver dot reject</p> |

| Defect | Inspect item | Criteria |
|------------|--|---|
| 5 Minor | <p>Chip on corner of terminal edge</p>  <p>D: terminal length</p> | <p>$a \geq 80\text{mm}, x \geq 7\text{mm}$ reject</p> <p>$a < 80\text{mm}, x \geq 5\text{mm}$ reject</p> <p>y, z: ignore</p> |

| Defect | Inspect item | Criteria |
|------------|--|--|
| 6 Minor | Chip on opposite side of terminal  | $a \geq 80\text{mm}, x \geq 7\text{mm}$ reject $a < 80\text{mm}, x > 5\text{mm}$ reject $y > 1/2D$ reject $z > 1/2t, y > 1/4D$ reject D: terminal length |

| Defect | Inspect item | Criteria |
|------------|--|--|
| 7 Minor | Cutting/breaking defect (flare)  | Dimension not meet the drawing specification reject $b \geq 0.3\text{mm}$ reject |

| Defect | Inspect item | Criteria |
|------------|--|---------------------------------------|
| 8 Major | Cutting/breaking defect (flare)  | According to the dimension of drawing |

| Defect | Inspect item | Criteria |
|------------|--|---------------------------------------|
| 9 Major | Crack  | Any crack trend to extend reject |

| Defect | Inspect item | Criteria |
|-------------|--|---|
| 16 Minor | The soldering tin of pinouts is not enough | A. The height of soldering tin in though-holes is 1/2 less than the height of PCB looked down from the component side reject B. The width of soldering tin on pads around the though-hole is 2/3 less than the width of pad reject |

| Defect | Inspect item | Criteria |
|-------------|--|---|
| 17 Minor | The soldering tin of pinouts overflows | The distance between pieces of soldering tin is less than 0.2 mm reject |

| Defect | Inspect item | Criteria |
|-------------|--|---|
| 18 Minor | The soldering tin of SMT is not enough | The height that soldering tin covers the bump of SMT component is 1/2 less than the height of bump reject |

| Defect | Inspect item | Criteria |
|-------------|------------------------------------|--|
| 19 Minor | The soldering tin of SMT overflows | The soldering tin covers whole bump reject |

| Defect | Inspect item | Criteria |
|-------------|-------------------------|----------|
| 20 Minor | The component is broken | reject |

| Defect | Inspect item | Criteria |
|-------------|---|------------------------------------|
| 21 Minor | The shape of pinouts is not the same as that in the criterion | It makes the LCM work badly reject |

| Defect | Inspect item | Criteria |
|------------|----------------------|----------|
| 22 Mjor | The pinout is broken | reject |

| Defect | Inspect item | Criteria |
|-------------|---|---|
| 23 Minor | The paint falls off the frame or the frame is damaged | $\Phi > 1.0\text{mm}$ reject $\phi = (\text{length} + \text{width}) / 2$ |

| Defect | Inspect item | Criteria |
|-------------|--------------------------------|---|
| 24 Minor | The frame is scratched visibly | Length ignore Width $\leq 0.5\text{mm}$ reject |

| Defect | Inspect item | Criteria |
|-------------|------------------------------------|---|
| 25 Minor | The frame is rusted (accumulation) | When the shape is as dot, reference to defect 23 When the shape is as line, reference to defect 24 |

| Defect | Inspect item | Criteria |
|-------------|---|----------|
| 26 Major | The foot of frame is broken or can not be fixed | reject |

| Defect | Inspect item | Criteria |
|-------------|------------------------------|--------------------------------------|
| 27 Minor | The copper on PCB is damaged | A. the track or pad is broken reject |

| Defect | Inspect item | Criteria |
|-------------|-----------------------|---|
| 28 Minor | Paste layer falls off | When the shape is as dot, reference to defect 23 When the shape is as line, reference to defect 24 |

| Defect | Inspect item | Criteria |
|-------------|--------------------|----------|
| 29 Major | The bolt is missed | reject |

| Defect | Inspect item | Criteria |
|-------------|-------------------------|----------|
| 30 Minor | The bolt is not hard up | reject |

| Defect | Inspect item | Criteria |
|-------------|--------------|----------|
| 31 Major | No function | reject |

| Defect | Inspect item | Criteria |
|-------------|------------------------------|----------|
| 32 Major | Some row or column is absent | reject |

| Defect | Inspect item | Criteria |
|-------------|---------------------|----------|
| 33 Major | The frame is absent | reject |

| Defect | Inspect item | Criteria |
|-------------|------------------------------------|----------|
| 34 Major | The LCM can not follow the program | reject |

| Defect | Inspect item | Criteria |
|-------------|---|-------------------------|
| 35 Minor | Some row or column displays more heavily or lightly than others in the same frame | Reference to the sample |

| Defect | Inspect item | Criteria |
|-------------|-----------------------------|-------------------------|
| 36 Minor | The display is not equality | Reference to the sample |

| Defect | Inspect item | Criteria |
|-------------|--|----------|
| 37 Major | Pattern not meet the drawing specification | reject |

| Defect | Inspect item | Criteria |
|-------------|--------------|----------|
| 38 Major | Deformation | reject |

| Defect | Inspect item | Criteria |
|-------------|--|--------------------------------------|
| 39 Minor | Black dots or white dots in viewing area | reference to defect 23 or the sample |

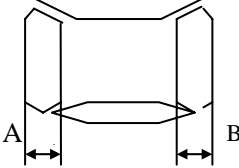
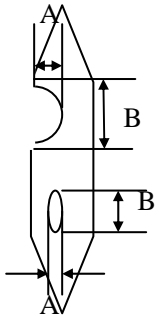
| Defect | Inspect item | Criteria |
|-------------|--|-----------------------|
| 40 Minor | Black lines or white lines in viewing area | reference to defect 1 |

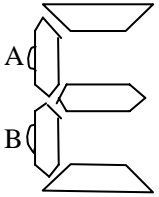
| Defect | Inspect item | Criteria |
|-------------|-------------------------|----------|
| 41 Major | Wrong viewing direction | reject |

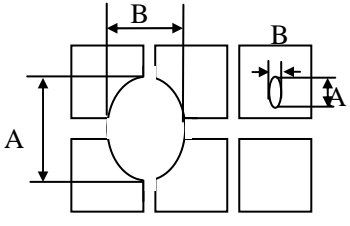
| Defect | Inspect item | Criteria |
|-------------|---|----------|
| 42 Major | Operating current upper the specification | reject |

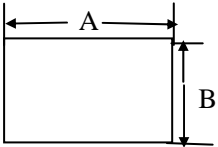
| Defect | Inspect item | Criteria |
|-------------|-----------------------------|----------|
| 43 Major | The backlight can not light | reject |

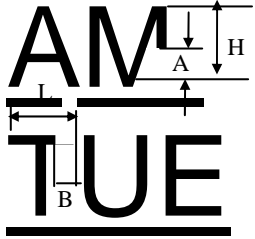
| Defect | Inspect item | Criteria |
|-------------|------------------------------|-------------------------|
| 44 Minor | The backlihg is not equality | Reference to the sample |

| Defect | Inspect item | Criteria |
|-------------|--|---|
| 45 Minor | Shape of pattern  W: width of pattern | $ A-B > 1/3W$ reject $ A-W > 1/3W$ reject $ A-B > 0.25mm$ reject |
| 46 Minor | pinhole  W: width of character | $\phi < 0.2mm$ acceptable $0.2mm < \phi \leq 0.25mm$ three are acceptable (distance between two spots should be more than 20mm) $\phi > 0.25mm$ or $\phi > 1/3W$ reject |

| Defect | Inspect item | Criteria |
|-------------|---|----------------------------------|
| 47 Minor | Concave  $\Phi = 1/2 (\text{length} + \text{width})$ | $\Phi > 0.25mm$ or $1/3W$ reject |

| Defect | Inspect item | Criteria |
|-------------|--|------------------------|
| 48 Minor | Pinhole in pixels  $\Phi = (A+B) / 2$ | Reference to defect 10 |

| Defect | Inspect item | Criteria |
|-------------|--|--|
| 49 Minor | Pixel deformation  | A: Quantity of deformation > 25% reject B: Quantity of deformation > 25% reject |

| Defect | Inspect item | Criteria |
|-------------|---|--|
| 50 Minor | Pinhole in character  | Vertical: $A > 1/4H$ reject Horizontal: $B > 1/3L$ reject |

10.3RELIABILITY

| ITEM | CONDITION |
|----------------------------|---|
| High temperature operation | 70 °C, 96 hrs |
| Low temperature operation | -20 °C, 96 hrs |
| Moisture storage | 60 °C, 90%RH, 96 hrs |
| High temperature storage | 80 °C, 96 hrs |
| Low temperature storage | -30 °C, 96 hrs |
| Thermal shock | -30 °C (30 minute) 25 °C (5 minute) 80 °C (30 minute) CYCLES: 10 |
| LIFE TIME | 50,000 hours, 25±10°C, 45±20% RH |

11.PRECAUTIONS IN USING

11.1 Liquid crystal display (LCD)

The LCD panel is made up of glass, organic fluid and polarizer. When handling, please pay attention to the following items:

- 1) Keep the operation and storage temperature of the LCD within the range specified in the LCD specification. Otherwise, excessive temperature and humidity would cause polarization degradation, bubble generation or polarizer peel-off.
- 2) Prevent it from mechanical shock by dropping it from a high place, etc.
- 3) Don't contact, push or rub the exposed polarizers with anything harder than

HB pencil lead.

- 4) Avoid using chemicals such as acetone, toluene, ethanol and isoropyl alcohol to clean the front/rear polarizers and reflectors, which will cause damage to them.
- 5) Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause deformation or color fading. The LCM is assembled and adjusted with a high degree of precision.
- 6) Do not put or attach anything on the display area. Avoid touching the display area with bare hand.

11.2 Precaution for handling LCD modules

The LCM is assembled and adjusted with a high degree of precision, do not applying excessive shocks to it or making any alterations or modifications to it, the following precautions should be taken when handing.

- 1) Do not drop, bend or twist the module.
- 2) Do not alter or making any modification on the shape of the metal frame.
- 3) Do not change the shape, the pattern wiring or add any extra hole on the PCB.
- 4) Do not modify or touch the zebra rubber strip(conductive rubber) with another object.
- 5) Do not change the positions of components on the PCB.

11.3 Eletro-static discharge control

Careful attention should be paid to control the electrostatic discharge of the modules, since the modules contain no. of CMOS LSI.

- 1) Make sure you are grounded properly when remove the module from its antistatic bag. Be sure that the module and have the same electric potential.
- 2) Only properly grounded soldering iron should be used.
- 3) Modules should be stored in antistatic bag or other containers resistant to static after remove from its original package.
- 4) When using the electric screw-driver is used, make sure the screw driver had been ground potentiality to minimize the transmission of EM wave produced by commutator sparks.
- 5) In order to reduce the generation of static electricity, a relative humidity of 50-60% is recommended.

11.4 Precaution for soldering

- 1) Soldering should apply to I/O terminals only.
- 2) Soldering temperature is 280°C+(-)10°C.
- 3) Soldering time 3-4 seconds.
- 4) Eutectic solder (rosin flux filled) should be used.
- 5) If soldering flux is used, be sure to remove any remaining flux after finishing the soldering operation and LCD surface should be covered during soldering to prevent any damage to flux spatters.
- 6) When remove the lead wires from the I/O terminals, use proper de-soldering methods, e.g. suction type de-soldering irons. Do not repeat wiring by soldering more than three times at the pads and plated though

holes may be damaged.

11.5 Precaution for operation

- 1) Adjust liquid crystal driving voltage (V_0) to varies viewing angle and obtain the contrast.
- 2) V_0 should be kept in proper range stated in the specification. Excess voltage will shorten the LCD life.
- 3) Response time is greatly delayed at low temperature. It will recover when go back to normal temperature.
- 4) Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore it should be used under the relative condition of 50% RH.

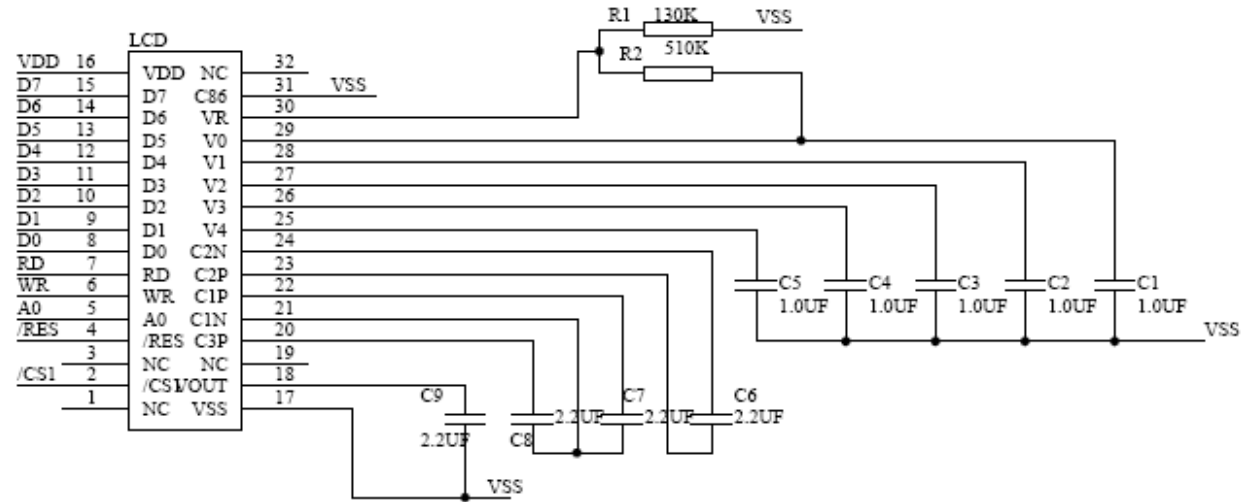
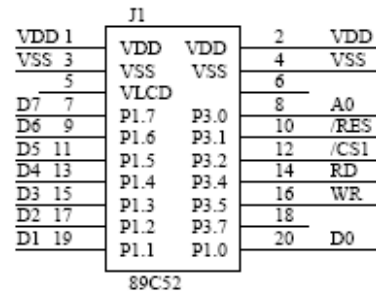
11.6 Storage

When long term storage is required, following precautions are necessary:

- 1) Storage them in a sealed polyethylene bag (antistatic), seal the opening, and store it where it is not subjected to direct sunshine, or to the light of fluorescent lamp. If properly sealed, there is no need for desiccant.
- 2) Store them in the temperature range of $-30^{\circ}\text{C}\sim 80^{\circ}\text{C}$ and at low humidity is recommended.

12. APPLICATION

12.1 REFERENCE CIRCUIT



12.2 APPENDIX

INITIALIZATION FOR REFERENCE (MPU: AT89C52):

BINITIAL: mov time1,#40

lcall Delay

mov a,#0a0h

lcall bwrctrl

MOV A,#0C0H

LCALL BWRCTRL

mov a,#0f8h

lcall bwrctrl

mov a,#00h

lcall bwrctrl

mov a,#0a2h

lcall bwrctrl

MOV TIME1,#20

LCALL DELAY

mov a,#2Ch

lcall Bwrctrl

MOV TIME1,#40

LCALL DELAY

mov a,#2Eh

lcall Bwrctrl

MOV TIME1,#40

LCALL DELAY

mov a,#2fh

lcall Bwrctrl

MOV TIME1,#40

LCALL DELAY

MOV A,#25H

LCALL BWRCTRL

MOV TIME1,#20

LCALL DELAY

MOV A,#81H

LCALL BWRCTRL

MOV A,#28 ;vop=9.0V

LCALL BWRCTRL

```
MOV TIME1,#20
LCALL DELAY
mov a,#0afh
lcall bwrctrl ;display on
```

.....**TO YOUR CODE**

REVISIONS

| No. | DATE | DESCRIPTION | ORGANIZED BY | CHECKED BY | APPROVED BY |
|-----|------|-------------|-----------------|---------------|----------------|
| 1 | | | | | |
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