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|--|---|---------------------|
| EXAMINED BY :<br><br><i>Vincent Wh</i>       | <b>EMERGING DISPLAY</b><br><br>TECHNOLOGIES CORPORATION | FILE NO . CAS-10387 |
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|  |   | VERSION : 1         |

|          |            |                |
|----------|------------|----------------|
| CUSTOMER | ACCEPTANCE | SPECIFICATIONS |
|----------|------------|----------------|

MODEL NO. :

32FY0(LED TYPES)

FOR MESSRS :

\_\_\_\_\_

CUSTOMER'S APPROVAL

DATE : \_\_\_\_\_

BY : \_\_\_\_\_

EMERGING DISPLAY  
TECHNOLOGIES CORPORATION

|                                |              |             |
|--------------------------------|--------------|-------------|
| MODEL NO .<br>32FY0(LED TYPES) | VERSION<br>1 | PAGE<br>0-1 |
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| RECORDS OF REVISION | DOC . FIRST ISSUE<br>DEC.21,2004 |
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| DATE | REVISED<br>PAGE<br>NO. | SUMMARY |
|------|------------------------|---------|
|      |                        |         |

NUMBERING SYSTEM

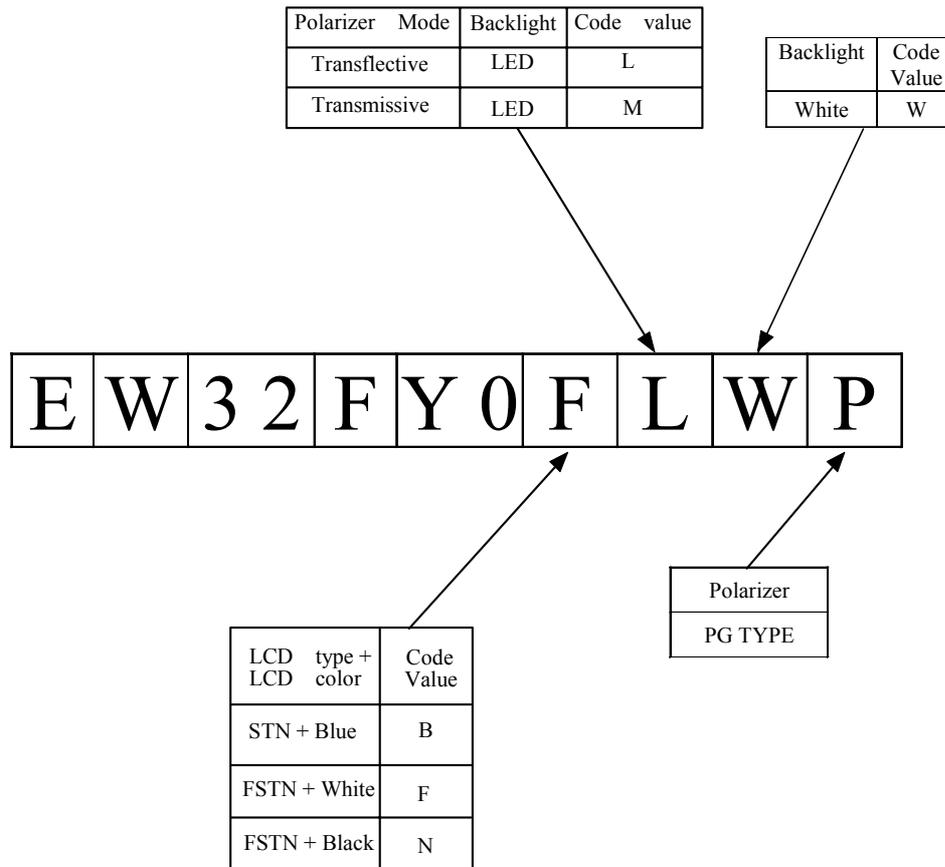


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## 1. GENERAL SPECIFICATIONS

### 1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

EU-002A

### 1.2 APPLICATION NOTES FOR CONTROLLER / DRIVER :

PLEASE REFER TO :

EPSON S1D13700

1.3 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL SPECIFICATIONS .

## 2. MECHANICAL SPECIFICATIONS

- |                        |       |  |
|------------------------|-------|--|
| (1) NUMBER OF DOTS     | ----- | 320W * 240H DOTS   |
| (2) MODULE SIZE        | ----- | 96.3W * 66.6H * 8.5D (max.)mm<br>( NOT INCLUDED FFC LENGTH ) |
| (3) EFFECTIVE AREA     | ----- | 78.8W * 59.6H mm   |
| (4) ACTIVE AREA        | ----- | 76.79W * 57.59H mm   |
| (5) DOT SIZE           | ----- | 0.23W * 0.23H mm   |
| (6) DOT PITCH          | ----- | 0.24W * 0.24H mm   |
| (7) LCD TYPE *         |       |  |
| (8) DRIVING METHOD     | ----- | 1 / 242 DUTY MULTIPLEX DRIVE                                 |
| (9) BACKLIGHT*         |       |  |
| (10) VIEWING DIRECTION | ----- | 6 O'CLOCK  |

\* PLEASE REFER TO NUMBERING SYSTEM .

### 3. ABSOLUTE MAXIMUM RATINGS

#### 3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS .

| PARAMETER                    | SYMBOL      | MIN . | MAX . | UNIT | REMARK   |
|------------------------------|-------------|-------|-------|------|----------|
| POWER SUPPLY FOR LOGIC       | VDD - VSS   | 0     | 7.0   | V    |          |
| POWER SUPPLY FOR LCD DRIVING | VEE - VSS   | 0     | 2.7   | V    |          |
| INPUT VOLTAGE                | VI          | VSS   | VDD   | V    |          |
| STATIC ELECTRICITY           | —           | —     | 100   | V    | NOTE (1) |
| POWER SUPPLY FOR LED         | VLED - VLSS | —     | 5     | V    |          |

NOTE (1) : TEST METHOD AND CONDITIONS :  
AFTER CHARGING UP 200 PF CAPACITOR BY STATED VOLTAGE ,  
THE CAPACITOR IS CONNECTED WITH INTERFACE PINS OF THE  
MODULE .

#### 3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS .

| I T E M             | OPERATING      |                                   | STORAGE        |                                   | REMARK  |
|---------------------|----------------|-----------------------------------|----------------|-----------------------------------|---|
|                     | MIN .          | MAX .                             | MIN .          | MAX .                             |   |
| AMBIENT TEMPERATURE | -20 °C         | 70 °C                             | -20 °C         | 70 °C                             | NOTE (2) , (3)                                  |
| HUMIDITY            | —              | 85 % RH                           | —              | 85 % RH                           | WITHOUT<br>CONDENSATION<br>NOTE (4)             |
| VIBRATION           | —              | 2.45 m/s <sup>2</sup><br>(0.25 G) | —              | 11.76 m/s <sup>2</sup><br>(1.2 G) | 10~100 HZ XYZ<br>DIRECTIONS<br>1 Hr. EACH       |
| SHOCK               | —              | 29.4 m/s <sup>2</sup><br>(3 G)    | —              | 490.0 m/s <sup>2</sup><br>(50 G)  | 10 mSECONDS<br>XYZ<br>DIRECTIONS<br>1 TIME EACH |
| CORROSIVE GAS       | NOT ACCEPTABLE |                                   | NOT ACCEPTABLE |                                   |   |

NOTE (2) : Ta AT -20°C : 48HR MAX.  
70°C : 168HR MAX.

NOTE (3) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT  
TEMPERATURE THIS PHENOMENON IS REVERSIBLE .

NOTE (4) : Ta AT 40°C(85% RH) : 96HR MAX .

4. ELECTRICAL CHARACTERISTICS

Ta = 25 °C

VDD-VSS = 5.0 V

| PARAMETER                                  | SYMBOL                                      | CONDITION                               | MIN .   | TYP. | MAX .   | UNIT |
|--|---|---|---------|------|---------|------|
| POWER SUPPLY VOLTAGE FOR LOGIC             | VDD - VSS                                   | —                                       | 3.3     | —    | 5.5     | V    |
| POWER SUPPLY VOLTAGE FOR LCD DRIVE         | VEE - VSS                                   | —                                       | +15     | —    | +27     | V    |
| INPUT VOLTAGE<br>NOTE (1)                  | VIH   | H LEVEL                                 | 0.5*VDD | —    | —       | V    |
|  | VIL   | L LEVEL                                 | —       | —    | 0.2*VDD | V    |
| OUTPUT VOLTAGE<br>NOTE (1)                 | VOH   | H LEVEL                                 | 2.4     | —    | —       | V    |
|  | VOL   | L LEVEL                                 | —       | —    | VSS+0.4 | V    |
| POWER SUPPLY CURRENT FOR LOGIC NOTE(2)     | IDD   | VDD - VSS = 5.0 V<br>VEE - VSS = 21.7 V | —       | 16.0 | 23.0    | mA   |
| POWER SUPPLY CURRENT FOR LCD DRIVE NOTE(2) | IEE   | VDD - VSS = 5.0 V<br>VEE - VSS = 21.7 V | —       | 6.0  | 9.0     | mA   |
| RECOMMENDED LCD DRIVING VOLTAGE            | VEE - VSS<br>∅ = 10° θ = 0°<br>DUTY = 1/240 | Ta = -20 °C<br>NOTE(3)                  | 21.5    | 22.5 | 23.5    | V    |
|  |   | Ta = 25 °C<br>NOTE(4)                   | 20.7    | 21.7 | 22.7    | V    |
|  |   | Ta = 70 °C<br>NOTE(4)                   | 19.9    | 20.9 | 21.9    | V    |
| CLOCK OSCILLATION FREQUENCY                | f OSC                                       | —                                       | —       | 8    | —       | MHz  |
| POWER SUPPLY FOR LED                       | VLED - VLSS                                 | IF = 100 mA                             | —       | 5    | —       | V    |

NOTE (1): APPLIED TO TERMINALS D0 TO D7 , A0 ,  $\overline{CS}$ ,  $\overline{RD}(E)$ ,  $\overline{WR}(R/\overline{W})$ .

NOTE (2): THIS DISPLAY PATTERN IS ALL "OFF" / "ON" .

NOTE (3): THIS DISPLAY PATTERN IS BAR (ONLY , Ta=-20°C)

NOTE (4): THIS DISPLAY PATTERN IS ALL "Q".

5. OPTICAL CHARACTERISTICS

Ta = 25 °C

VDD = 5.0 V

| I T E M                  |             | SYMBOL            | CONDITION                      | MIN .                          | TYP . | MAX. | UNIT                | NOTE |      |   |
|--------------------------|-------------|-------------------|--------------------------------|--------------------------------|-------|------|---------------------|------|------|---|
| VIEWING ANGLE            | STN         | ∅ 2 - ∅ 1         | K ≥ 2.0                        | —                              | 40    | —    | deg.                | 1    |      |   |
|                          | FSTN        |                   |                                | 50                             | —     | —    | deg.                | 1    |      |   |
| CONTRAST RATIO           | STN         | K                 | ∅ = 10°<br>θ = 0°              | 1.5                            | 3.0   | —    | —                   | 1    |      |   |
|                          | FSTN        |                   |                                | 1.5                            | 3.1   | —    | —                   | 1    |      |   |
| RESPONSE TIME            | tr ( rise ) | ∅ = 10°<br>θ = 0° | TA=-20°C<br>TA=25°C<br>TA=70°C | —                              | 4700  | 7400 | ms                  | 1    |      |   |
|                          |             |                   |                                |                                | 310   | 620  |                     |      |      |   |
|                          |             |                   |                                |                                | 80    | 160  |                     |      |      |   |
|                          | tf ( fall ) |                   |                                | TA=-20°C<br>TA=25°C<br>TA=70°C | —     | 3000 |                     |      | 6000 |   |
|                          |             |                   |                                |                                |       | 190  |                     |      | 380  |   |
|                          |             |                   |                                |                                |       | 90   |                     |      | 180  |   |
| THE BRIGHTNESS OF MODULE | L           | VLED-VSS=5.0V     |                                | 8                              | 10    | —    | cd / m <sup>2</sup> | 1, 3 |      |   |
|                          |             |                   |                                | 12                             | 15    | —    |                     | 1, 4 |      |   |
|                          |             |                   |                                | 6.4                            | 8.0   | —    |                     | 1, 5 |      |   |
| THE UNIFORMITY OF MODULE | —           |                   |                                |                                |       | —    | —                   | 30   | %    | 2 |

NOTE (1) : PLEASE REFER TO :  
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS. (EU - 002A)

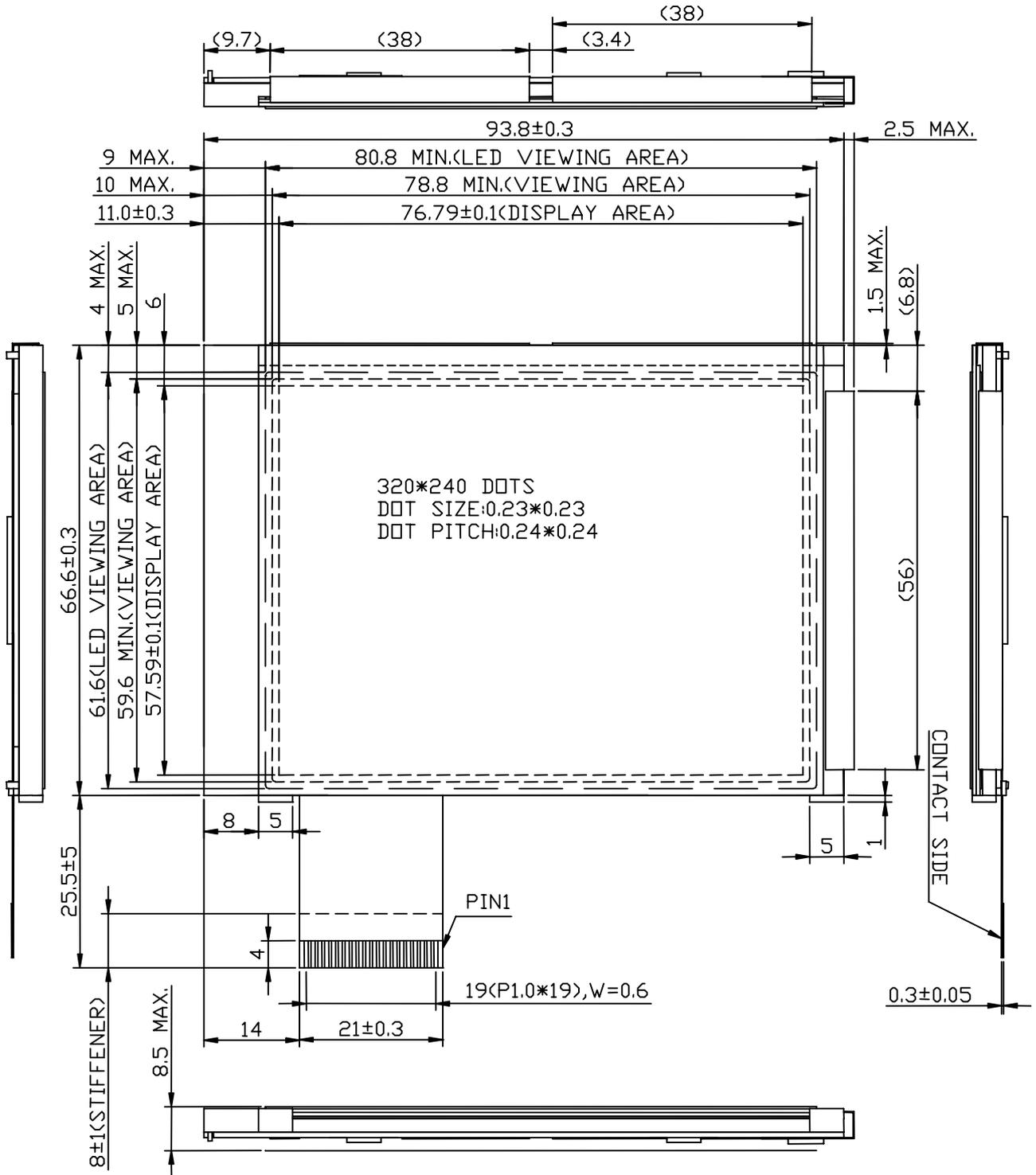
NOTE (2) : BRIGHTNESS AT GLASS SURFACE( NEGATIVE GLASS DISPLAY ALL “ON”  
POSITIVE GLASS DISPLAY ALL “OFF” )

NOTE (3) : POLARIZER IS TRANSFLECTIVE TYPE.

NOTE (4) : POLARIZER IS TRANSMISSIVE TYPE.

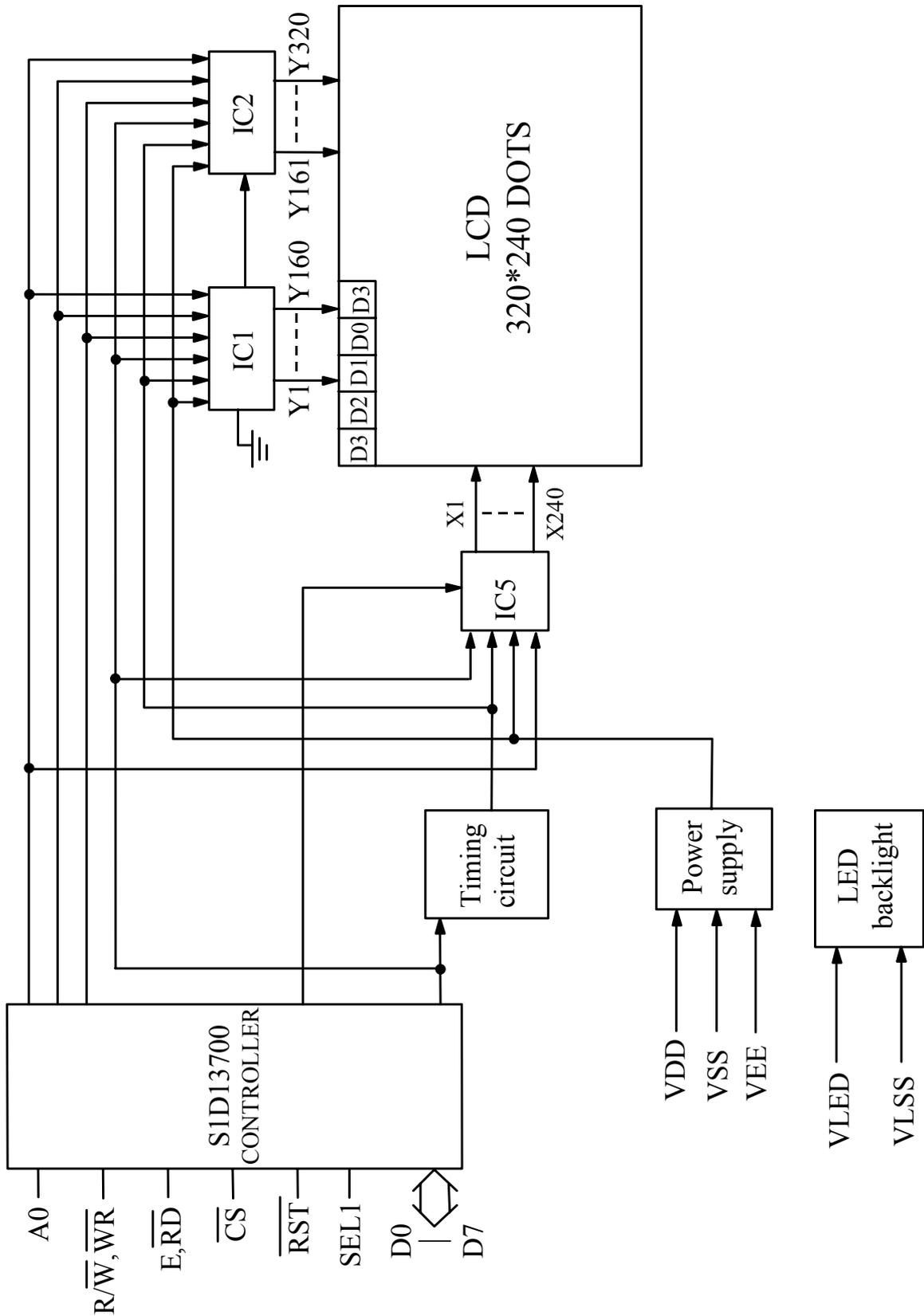
NOTE (5) : POLARIZER IS PG TYPE.

6. OUTLINE DIMENSIONS

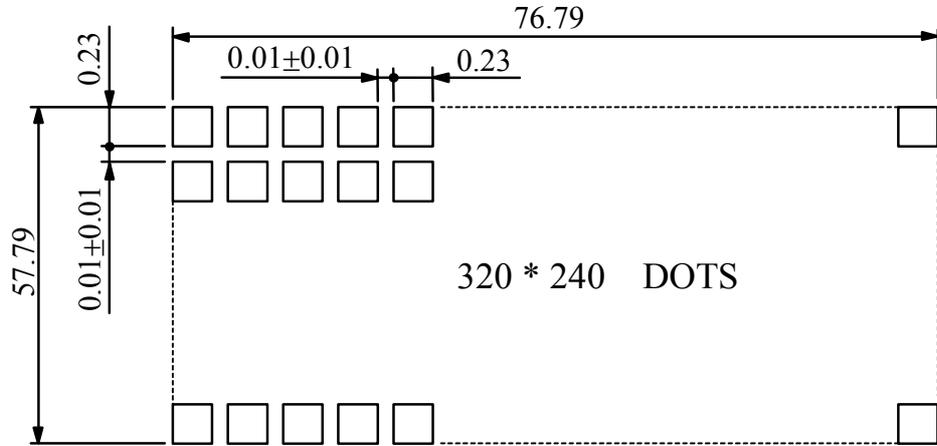


UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS  $\pm 0.5$

7. BLOCK DIAGRAM



8. DETAIL DRAWING OF DOT MATRIX



320 \* 240 DOTS

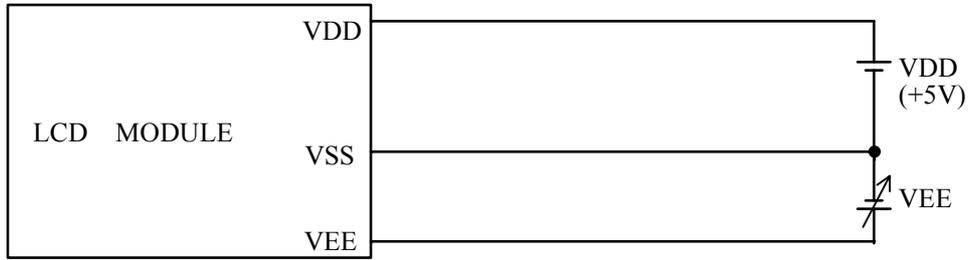
UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS ± 0.1

9. INTERFACE SIGNALS

| PIN NO       | SYMBOL                            | LEVEL | FUNCTION  |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
|--------------|-----------------------------------|-------|---|--------------------|--------------------|--------------------------------------|----------|---|---|---|------------------|---|---|---|--------------------------------------|---|---|---|----------------------------------|---|---|---|---------------|
| 1            | VSS                               | —     | GROUND  |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
| 2            | VDD                               | —     | POWER SUPPLY FOR LOGIC CIRCUIT  |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
| 3            | N.C                               | —     | N.C.  |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
| 4            | A0                                | —     | 8080 FAMILY INTERFACE   |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
|              |                                   |       | <table border="1"> <thead> <tr> <th>AO</th> <th><math>\overline{RD}</math></th> <th><math>\overline{WR}</math></th> <th>FUNCTION</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>1</td> <td>STATUS FLAG READ</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>DISPLAY DATA AND CURSOR ADDRESS READ</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>DISPLAY DATA AND PARAMETER WRITE</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>COMMAND WRITE</td> </tr> </tbody> </table> | AO                 | $\overline{RD}$    | $\overline{WR}$                      | FUNCTION | 0 | 0 | 1 | STATUS FLAG READ | 1 | 0 | 1 | DISPLAY DATA AND CURSOR ADDRESS READ | 0 | 1 | 0 | DISPLAY DATA AND PARAMETER WRITE | 1 | 1 | 0 | COMMAND WRITE |
|              |                                   |       | AO  | $\overline{RD}$    | $\overline{WR}$    | FUNCTION                             |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
|              |                                   |       | 0   | 0                  | 1                  | STATUS FLAG READ                     |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
|              |                                   |       | 1   | 0                  | 1                  | DISPLAY DATA AND CURSOR ADDRESS READ |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
|              |                                   |       | 0   | 1                  | 0                  | DISPLAY DATA AND PARAMETER WRITE     |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
|              |                                   |       | 1   | 1                  | 0                  | COMMAND WRITE                        |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
|              |                                   |       | 6800 FAMILY INTERFACE   |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
|              |                                   |       | <table border="1"> <thead> <tr> <th>AO</th> <th>R / <math>\overline{W}</math></th> <th>E</th> <th>FUNCTION</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1</td> <td>1</td> <td>STATUS FLAG READ</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>DISPLAY DATA AND CURSOR ADDRESS READ</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>DISPLAY DATA AND PARAMETER WRITE</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>COMMAND WRITE</td> </tr> </tbody> </table>                       | AO                 | R / $\overline{W}$ | E                                    | FUNCTION | 0 | 1 | 1 | STATUS FLAG READ | 1 | 1 | 1 | DISPLAY DATA AND CURSOR ADDRESS READ | 0 | 0 | 1 | DISPLAY DATA AND PARAMETER WRITE | 1 | 0 | 1 | COMMAND WRITE |
|              |                                   |       | AO  | R / $\overline{W}$ | E                  | FUNCTION                             |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
| 0            | 1                                 | 1     | STATUS FLAG READ  |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
| 1            | 1                                 | 1     | DISPLAY DATA AND CURSOR ADDRESS READ  |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
| 0            | 0                                 | 1     | DISPLAY DATA AND PARAMETER WRITE  |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
| 1            | 0                                 | 1     | COMMAND WRITE   |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
| 5            | $\overline{WR}, R / \overline{W}$ | H/L   | 8080 FAMILY INTERFACE ACTS AS THE ACTIVE-LOW WRITE STROBE .<br>6800 FAMILY INTERFACE ACTS AS THE READ/ WRITE CONTROL SIGNAL .   |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
| 6            | $\overline{RD}, E$                | H/L   | 8080 FAMILY INTERFACE ACTS AS THE ACTIVE-LOW READ STROBE .<br>6800 FAMILY INTERFACE ACTS AS THE ACTIVE-HIGH ENABLE CLOCK .  |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
| 7<br> <br>14 | D0<br> <br>D7                     | H/L   | DISPLAY DATA  |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
| 15           | $\overline{CS}$                   | H/L   | CHIP SELECT   |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
| 16           | $\overline{RST}$                  | H/L   | RESET   |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
| 17           | VEE                               | —     | POWER SUPPLY FOR LCD DRIVING  |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
| 18           | SEL1                              | H/L   | 8080 OR 6800 FAMILY INTERFACE SELECT , H:6800 , L:8080  |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
| 19           | VLED                              | —     | POWER SUPPLY FOR LED B.L  |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |
| 20           | VLSS                              | —     | POWER SUPPLY FOR LED B.L  |                    |                    |                                      |          |   |   |   |                  |   |   |   |                                      |   |   |   |                                  |   |   |   |               |

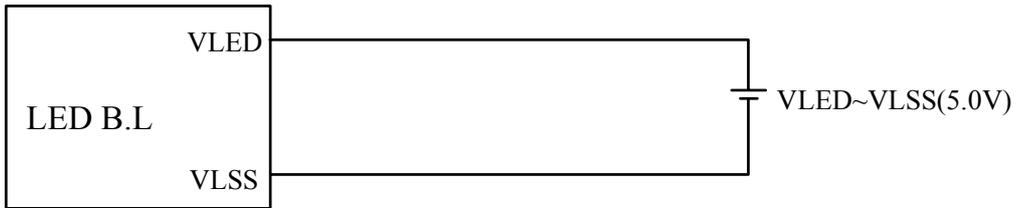
10. POWER SUPPLY

10.1 POWER SUPPLY FOR LCM



VEE – VSS : LCD DRIVING VOLTAGE

10.2 POWER SUPPLY FOR LED BACK - LIGHT



10.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

