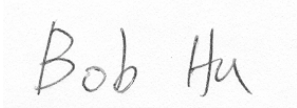



| | | |
|--|---|---------------------|
| EXAMINED BY :  | EMERGING DISPLAY TECHNOLOGIES CORPORATION | FILE NO . CAS-10241 |
| APPROVED BY:  | | ISSUE : JUN.03,2002 |
| | | TOTAL PAGE : 11 |
| | | VERSION : 4 |

CUSTOMER

ACCEPTANCE

SPECIFICATIONS

MODEL NO. :

32FA3(LED TYPES)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

EMERGING DISPLAY
TECHNOLOGIES CORPORATION

| | |
|-------------------------------|--------------|
| MODEL NO. 32FA3(LED TYPES) | VERSION 4 |
|-------------------------------|--------------|

| | |
|---------------------|----------------------------------|
| RECORDS OF REVISION | DOC . FIRST ISSUE MAR.19,2001 |
|---------------------|----------------------------------|

| DATE | REVISED PAGE NO. | SUMMARY |
|-------------|------------------|---|
| OCT.04,2001 | 1 | 2. MECHANICAL SPECIFICATIONS (2) MODULE SIZE : 116.7W * 99.8H * 9.3 D (max.) mm → 126.2W * 99.8H * 9.3 D (max.) mm |
| | 3 | 4. ELECTRICAL CHARACTERISTICS VR7 - VSS : Ta = -20 °C , 25.2 → 24.2 V , Ta = 25 °C , 22.7 → 21.7 V IDD = 34.6 → 60 mA |
| | 6 | 7. BLOCK DIAGRAM ADDITION DC/DC |
| | 8 | 10. POWER SUPPLY 10.1 POWER SUPPLY FOR LCM : VEE IS OUTPUT |
| APR.09,2002 | 2 | 3. ABSOLUTE MAXIMUM RATINGS VR7 - VSS → VEE - VSS DELETE : NOTE (2) |
| | 3 | 4. ELECTRICAL CHARACTERISTICS VR7 - VSS → VLCD - VSS DELETE : NOTE (2) (VR7 : THE VOLTAGE OF R7) |
| JUN.03,2002 | 3 | 4. ELECTRICAL CHARACTERISTICS VEE - VSS : - 20 °C ~ 60 °C → - 10 °C ~ 60 °C |
| | | |

NUMBERING SYSTEM

| Polarizer Mode | Backlight | Code value |
|----------------|-----------|------------|
| Transflective | LED | L |
| Transmissive | LED | M |

E W 3 2 F A 3 F L W

| LCD type + LCD color | Code Value |
|----------------------|------------|
| FSTN + White | F |
| STN + Blue | B |
| FSTN + Black | N |

| Backlight | Code value |
|-----------|------------|
| WHITE | W |

TABLE OF CONTENTS

| NO. | ITEM | PAGE |
|-----|-------------------------------------|--------|
| 1. | GENERAL SPECIFICATIONS ----- | 1 |
| 2. | MECHANICAL SPECIFICATIONS ----- | 1 |
| 3. | ABSOLUTE MAXIMUM RATINGS ----- | 2 |
| 4. | ELECTRICAL CHARACTERISTICS ----- | 3 |
| 5. | OPTICAL CHARACTERISTICS ----- | 4 |
| 6. | OUTLINE DIMENSION ----- | 5 |
| 7. | BLOCK DIAGRAM ----- | 6 |
| 8. | DETAIL DRAWING OF DOT MATRIX ----- | 7 |
| 9. | INTERFACE SIGNALS ----- | 7~8 |
| 10. | SPECIFICATIONS OF TOUCH PANEL ----- | 9 , 10 |
| 11. | POWER SUPPLY ----- | 11 |

1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - 0 0 2 A

1.2 THIS INDIVIDUAL SPECIFICATIONS IS PRIOR TO GENERAL SPECIFICATIONS .

1.3 TOUCH PANEL SPECIFICATIONS PLEASE REFER TO :

E U - S E D 1 3 3 5

2. MECHANICAL SPECIFICATIONS

| | | |
|-------------------------|-------|----------------------------------|
| (1) NUMBER OF DOTS | ----- | 320W * 240H DOTS |
| (2) MODULE SIZE | ----- | 126.2W * 99.8H * 9.3 D (max.) mm |
| (3) VIEWING AREA | ----- | 77.79W * 58.59H 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 / 240 DUTY MULTIPLEX DRIVE |
| (9) VIEWING DIRECTION | ----- | 6 O'CLOCK |
| (10) BACK LIGHT | ----- | LED;COLOR : WHITE |

* 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 | 2.7 | 5.5 | V | |
| POWER SUPPLY FOR LCD DRIVING | VEE – VSS | — | 27V | 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 | - 10 °C | 60 °C | - 20 °C | 70 °C | NOTE (2), (3) |
| HUMIDITY | — | 85 % RH | — | 85 % RH | WITHOUT CONDENSATION |
| VIBRATION | — | 2.45 m/s ² (0.25 G) | — | 11.76 m/s ² (1.2 G) | 10~100 HZ XYZ DIRECTIONS 1 Hr. EACH |
| SHOCK | — | 29.4 m/s ² (3 G) | — | 490.0 m/s ² (50 G) | 10 mSECONDS XYZ DIRECTIONS 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 .

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 | — | 2.7 | — | 5.0 | V |
| INPUT VOLTAGE NOTE (1) | VIH | H LEVEL | 0.5*VDD | — | — | V |
| | VIL | L LEVEL | — | — | 0.2*VDD | V |
| OUTPUT VOLTAGE 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 VLCD - VSS = 21.7 V | — | 60 | 80 | mA |
| RECOMMENDED LCD DRIVING VOLTAGE | VLCD - VSS ∅ = 10° θ = 0° DUTY = 1/240 | Ta = -10 °C | 23.2 | 24.2 | 25.2 | V |
| | | Ta = 25 °C | 20.7 | 21.7 | 22.7 | V |
| | | Ta = 60 °C | 17.2 | 18.2 | 19.2 | 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} , $\overline{WR}(R/\overline{W})$, $\overline{RD}(E)$, SEL1.

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

5. OPTICAL CHARACTERISTICS

Ta = 25 °C

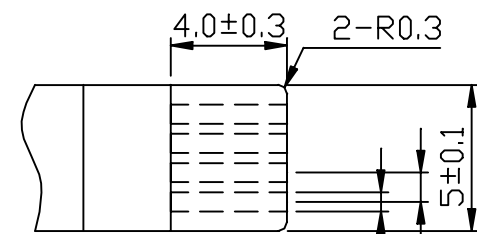
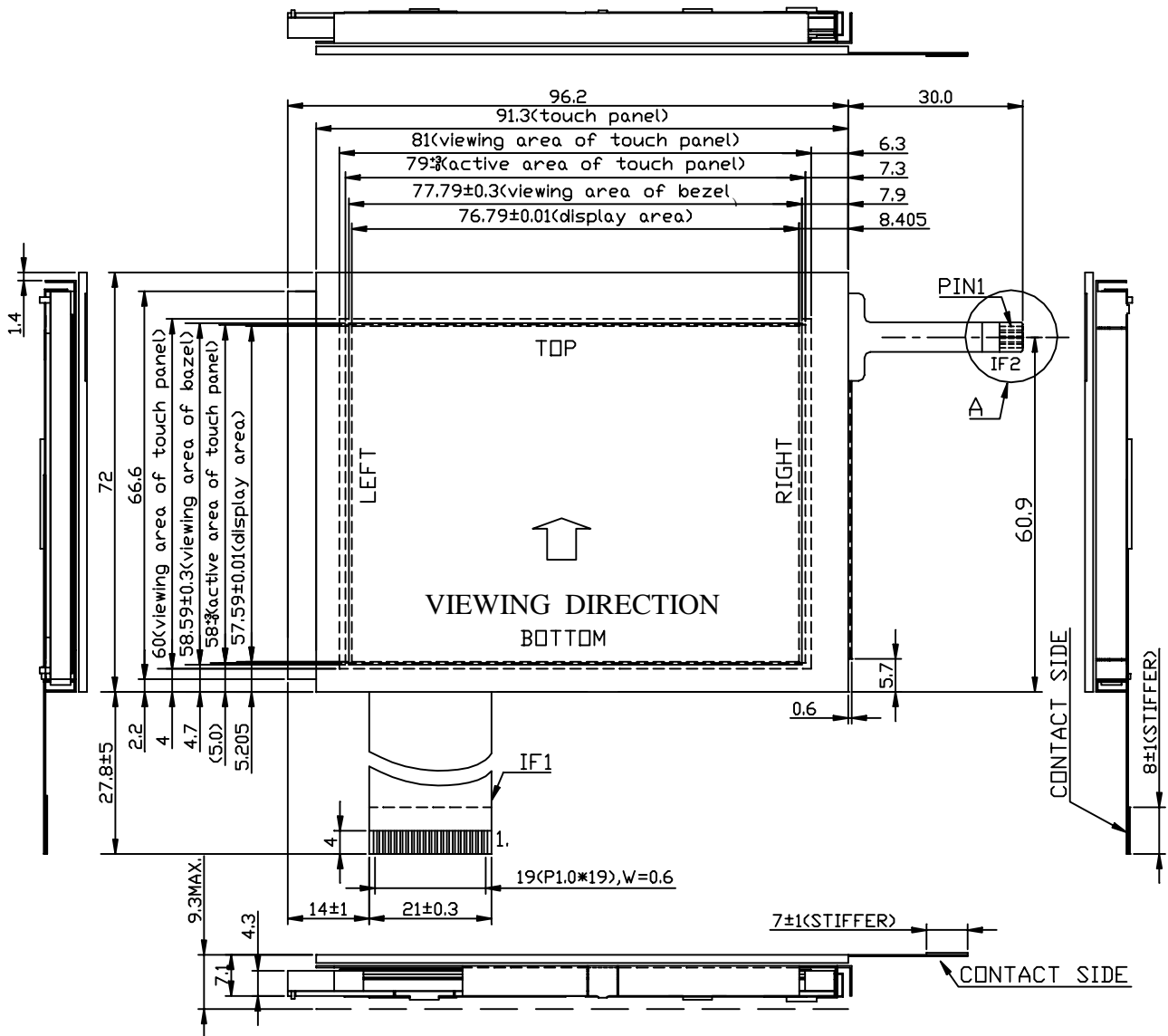
| I T E M | | SYMBOL | CONDITION | MIN . | TYP . | MAX. | UNIT | NOTE |
|------------------------------|------|---------------------------------|--|-------|---------|------|-------------------|-------|
| VIEWING AREA | STN | $\varnothing 2 - \varnothing 1$ | $K \geq 2.0$ | — | 40 | — | deg. | 1 |
| | FSTN | | | 50 | — | — | deg. | 1 |
| CONTRAST RATIO | STN | K | $\varnothing = 10^\circ$ | 3 | — | — | — | 1 |
| | FSTN | | | 5 | — | — | — | 1 |
| RESPONSE TIME | | t r (rise) | $\varnothing = 10^\circ$ $\theta = 0^\circ$ | — | (330) | — | msec | 1 |
| | | t f (fall) | $\varnothing = 10^\circ$ $\theta = 0^\circ$ | — | (330) | — | msec | 1 |
| THE BRIGHTNESS OF BACK-LIGHT | | B | $\varnothing = 10^\circ$ $\theta = 0^\circ$ | 10 | — | — | cd/m ² | 1 , 2 |
| | | | | 13 | — | — | | 1 , 3 |

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

NOTE (2) : POLARIZER IS TRANSFLECTIVE TYPE .

NOTE (3) : POLARIZER IS TRANSMISSIVE TYPE .

6. OUTLINE DIMENSION

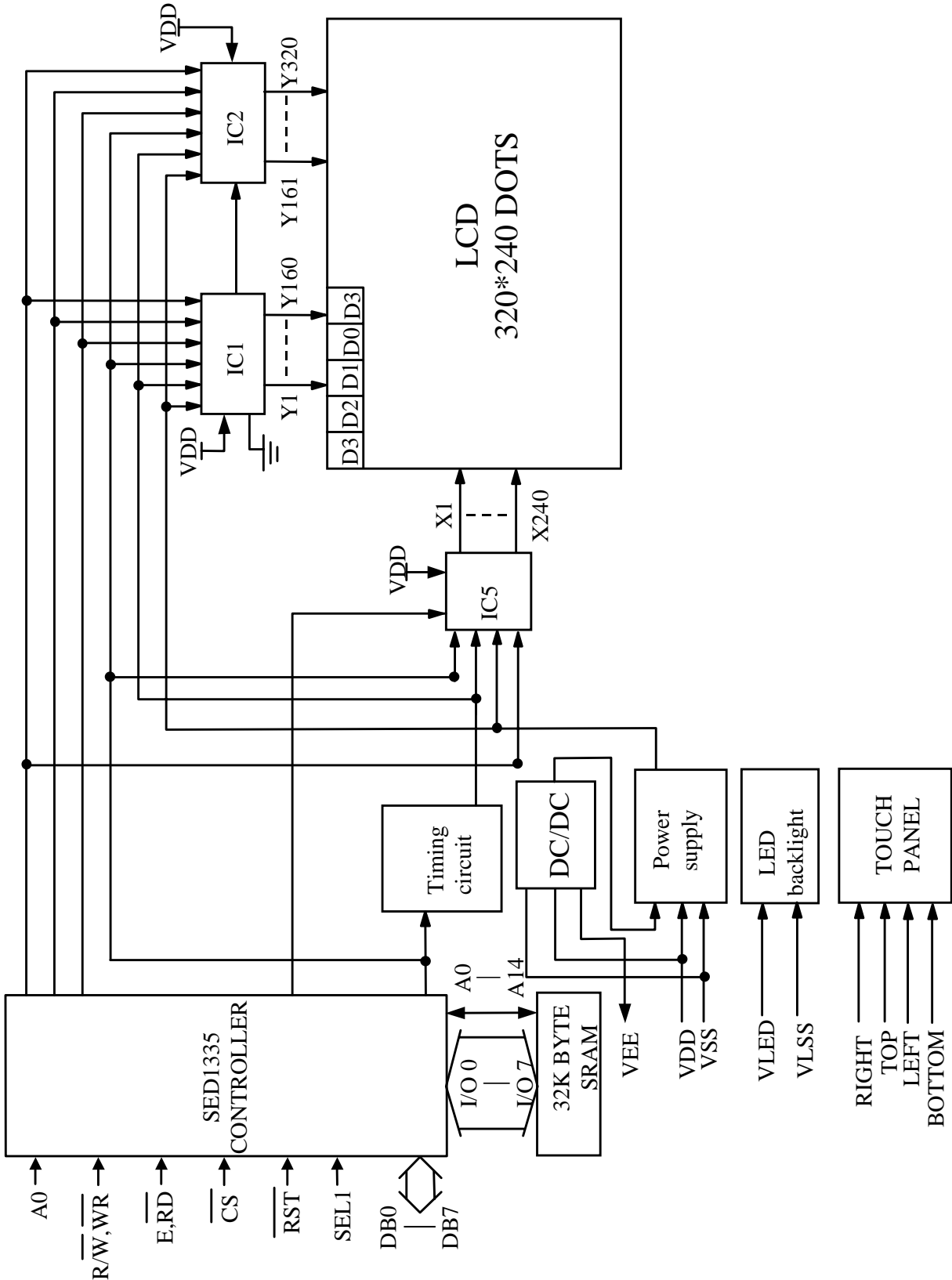


A
DETAIL

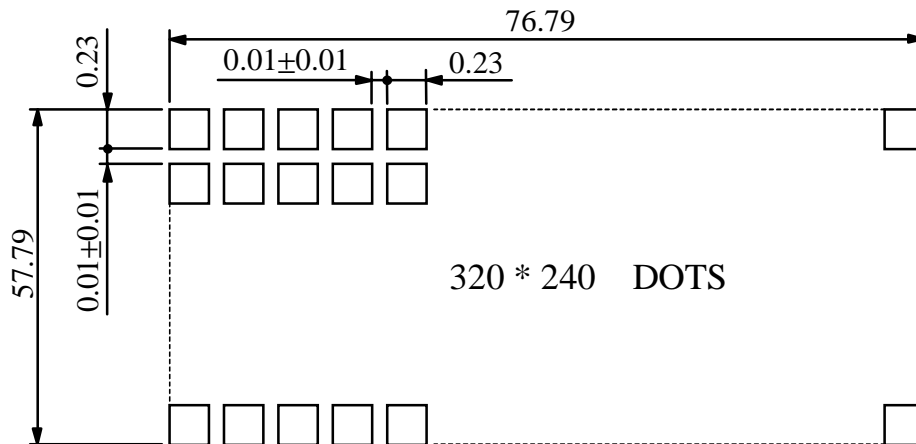
→ FEMALE CONNECTOR OF MOLEX P/N.
52271-0491 IS RECOMMENDED

UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 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

IF1:

| 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>\overline{RD}</th> <th>\overline{WR}</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>$\overline{R/W}$</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 | $\overline{R/W}$ | 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 | $\overline{R/W}$ | 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 . 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 . 6800 FAMILY INTERFACE ACTS AS THE ACTIVE-HIGH ENABLE CLOCK | | | | | | | | | | | | | | | | | | | | |

| | | | |
|----|-------------------------|-----|--|
| 7 | D0 | | H/L DISPLAY DATA |
| 14 | D7 | | |
| 15 | $\overline{\text{CS}}$ | H/L | CHIP SELECT |
| 16 | $\overline{\text{RST}}$ | H/L | RESET |
| 17 | VEE | — | CONNECTION RESISTER TO GND (FOR CONTRST ADJUST) |
| 18 | SEL1 | H/L | 8080 OR 6800 FAMILY INTERFACE SELECT , NC OR H:6800 , L:8080 |
| 19 | VLED | — | POWER SUPPLY FOR LED B.L |
| 20 | VLSS | — | POWER SUPPLY FOR LED B.L |

IF2:

| PIN NO | SYMBOL | LEVEL | FUNCTION |
|--------|--------|-------|------------|
| 1 | LEFT | — | LEFT SIDE |
| 2 | TOP | — | TOP |
| 3 | RIGHT | — | RIGHT SIDE |
| 4 | BOTTOM | — | BOTTOM |

1 0 . SPECIFICATIONS FOR TOUCH PANEL

1 0.1 INPUT METHOD AND ACTIVATION FORCE

| Input Method | Average Activation Force |
|--------------|--------------------------|
| Stylus | > 30 grams |
| Finger | > 80 grams |

1 0.2 TYPICAL OPTICAL CHARACTERISTICS

10.2.1 Visible Light Transmission: > 80 % @ 550nm

10.2.2 Haze: 5 % ± 2 % through hard coated PET only

1 0.3 ELECTRICAL SPECIFICATIONS

10.3.1 Operating Voltage: 5.5V or less

10.3.2 Contact current: 20mA (maximum)

10.3.3 Circuit close resistance : X : 400 ~ 900 Ω

Y : 200 ~ 600Ω

10.3.4 Circuit open resistance: > 20MΩ at 25VDC

10.3.5 Contact bounce: < 15ms

10.3.6 Linear Test : ± 1.5 % or Less

1 0.4 LINEARITY

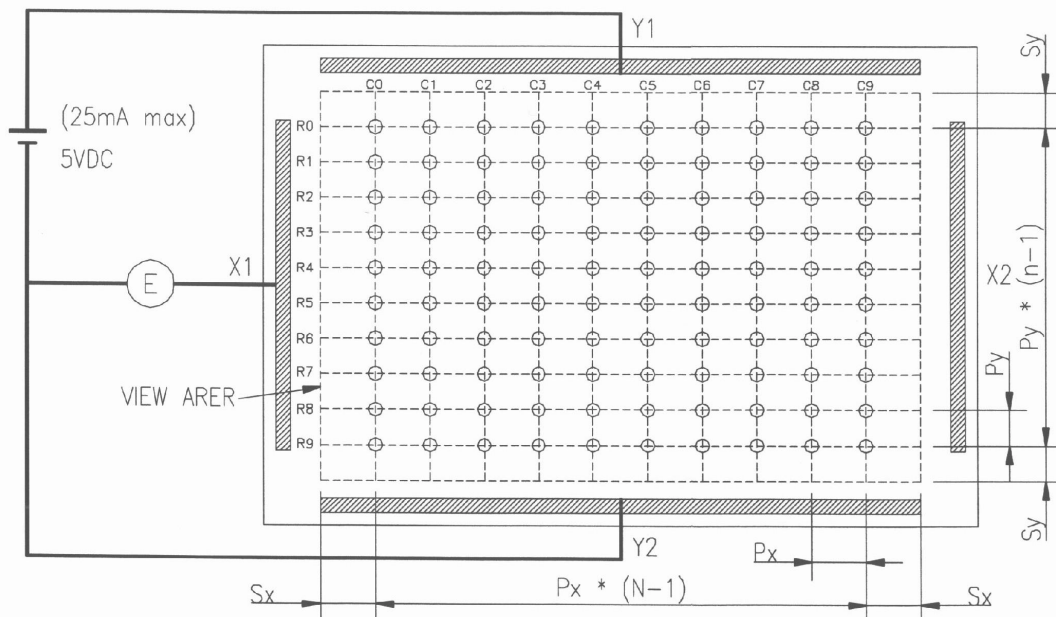
10.4.1 Linear Test Specification

Direction X: ± 1.5 % or less

Direction Y: ± 1.5 % or less

10.4.2 Line Test Circuit for Y Coordinate

Add 5V between Y1 and Y2 touch the point C0R0 to C9R9 separately, and measure the voltage from X1 as the following drawing.



10.4.3 Calculate Linearity : For the First Row0

$$R0avg = (VC0 + VC1 + VC2 + \dots + VC9) \div 10$$

R0max = The maximum voltage in Row 0

R0min = The minimum voltage in Row 0

$$R0 \text{ linear1} = \left| R0 \text{ max} - R0 \text{ avg.} \right| \div R0 \text{ avg.} * 100 \%$$

$$R0 \text{ linear2} = \left| R0 \text{ min} - R0 \text{ avg.} \right| \div R0 \text{ avg.} * 100 \%$$

$$R0 \text{ linear} = \max (R0 \text{ linear1}, R0 \text{ linear2})$$

10.4.4 For X Coordinate Test

Add 5 voltage between X1 and X2 touch the point C0R0 to C9R9 separately and measure the voltage from Y1 as the above drawing

10.4.5 Calculate Linearity : For the First Column0

$$C0avg = (VR0 + VR1 + VR2 + \dots + VR9) \div 10$$

C0max = The maximum voltage in Column 0

C0min = The minimum voltage in Column 0

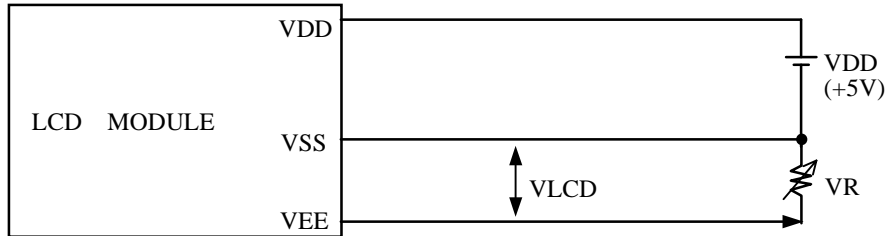
$$C0 \text{ linear1} = \left| C0 \text{ max} - C0 \text{ avg.} \right| \div C0 \text{ avg.} * 100 \%$$

$$C0 \text{ linear2} = \left| C0 \text{ min} - C0 \text{ avg.} \right| \div C0 \text{ avg.} * 100 \%$$

$$C0 \text{ linear} = \max (C0 \text{ linear1} , C0 \text{ linear2})$$

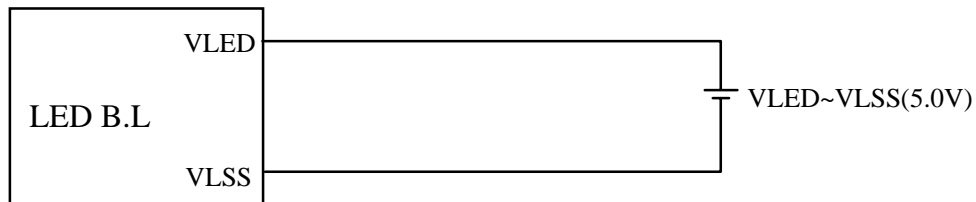
1 1 . POWER SUPPLY

1 1 . 1 POWER SUPPLY FOR LCM



VR: 20K Ω

1 1 . 2 POWER SUPPLY FOR LED BACK - LIGHT



1 1 . 3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

