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| EXAMINED BY : <i>Jony Chen</i> | MITSUTECH INTERNATIONAL CORPORATION | FILE NO . CAS-10070 |
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| | | |
|----------|------------|----------------|
| CUSTOMER | ACCEPTANCE | SPECIFICATIONS |
|----------|------------|----------------|

MODEL NO. :

32F40(CCFL TYPES)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

NUMBERING SYSTEM

| Polarizer Mode | Backlight | Code value |
|----------------|-----------|------------|
| Transflective | CCFL | D |
| Transmissive | CCFL | C |

| | | | | | | | |
|---|---|----|---|----|---|---|---|
| E | W | 32 | F | 40 | B | C | W |
|---|---|----|---|----|---|---|---|

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

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1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - 0 0 1 A

1.2 APPLICATION NOTES FOR CONTROLLER / DRIVER :

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - S E D 1 3 3 5

1.3 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

- (1) NUMBER OF DOTS ----- 320W * 240H DOTS
- (2) MODULE SIZE ----- 167.1W * 109.0H * 11.0D mm
- (3) EFFECTIVE AREA ----- 120.0W * 90.0H mm
- (4) ACTIVE AREA ----- 115.17W * 86.37H mm
- (5) DOT SIZE ----- 0.33W * 0.33H mm
- (6) DOT PITCH ----- 0.36W * 0.36H mm
- (7) LCD TYPE *
- (8) DRIVING METHOD ----- 1 / 240 DUTY MULTIPLEX DRIVE
- (9) BACKLIGHT ----- CCFL , 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 | 0 | 7.0 | V | |
| POWER SUPPLY FOR LCD DRIVING | VDD - VEE | 0 | 30.0 | V | |
| INPUT VOLTAGE | VI | VSS | VDD | V | |
| STATIC ELECTRICITY | — | — | 100 | V | NOTE (1) |

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 .

NOTE (4) : CCFL BACKLIGHT IS NOT AVAILABCE TO FUNCTION BELOW 0°C

4 . ELECTRICAL CHARACTERISTICS

Ta = 25 °C

VDD-VSS = 5 . 0 V

VEE-VSS = -22.0

| PARAMETER | SYMBOL | CONDITION | MIN . | TYP. | MAX . | UNIT |
|---|--|---|---------|-------|---------|------|
| POWER SUPPLY VOLTAGE FOR LOGIC | VDD - VSS | — | 4.5 | 5.0 | 5.5 | V |
| POWER SUPPLY VOLTAGE FOR LCD DRIVE | VEE - VSS | — | -21.5 | -22.0 | -22.5 | 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 VDD - VEE = 22 . 0 V | — | 40.0 | — | mA |
| POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2) | IEE | VDD - VSS = 5 . 0 V VDD - VEE = 22 . 0 V | — | 2.5 | — | mA |
| RECOMMENDED LCD DRIVING VOLTAGE NOTE (3) | VDD - VO ∅ = 10° θ = 0° DUTY = 1/240 | Ta = -10 °C | — | 26.0 | — | V |
| | | Ta = 25 °C | — | 23.0 | — | V |
| | | Ta = 60 °C | — | 20.0 | — | V |
| CLOCK OSCILLATION FREQUENCY | f OSC | — | — | 8 | — | MHZ |
| POWER SUPPLY FOR CCFL | VOLTAGE | VCCFL | — | 300 | — | Vrms |
| | FREQUENCY | f CCFL | — | 30K | — | HZ |
| | CURRENT | IL | — | 5 | — | mA |

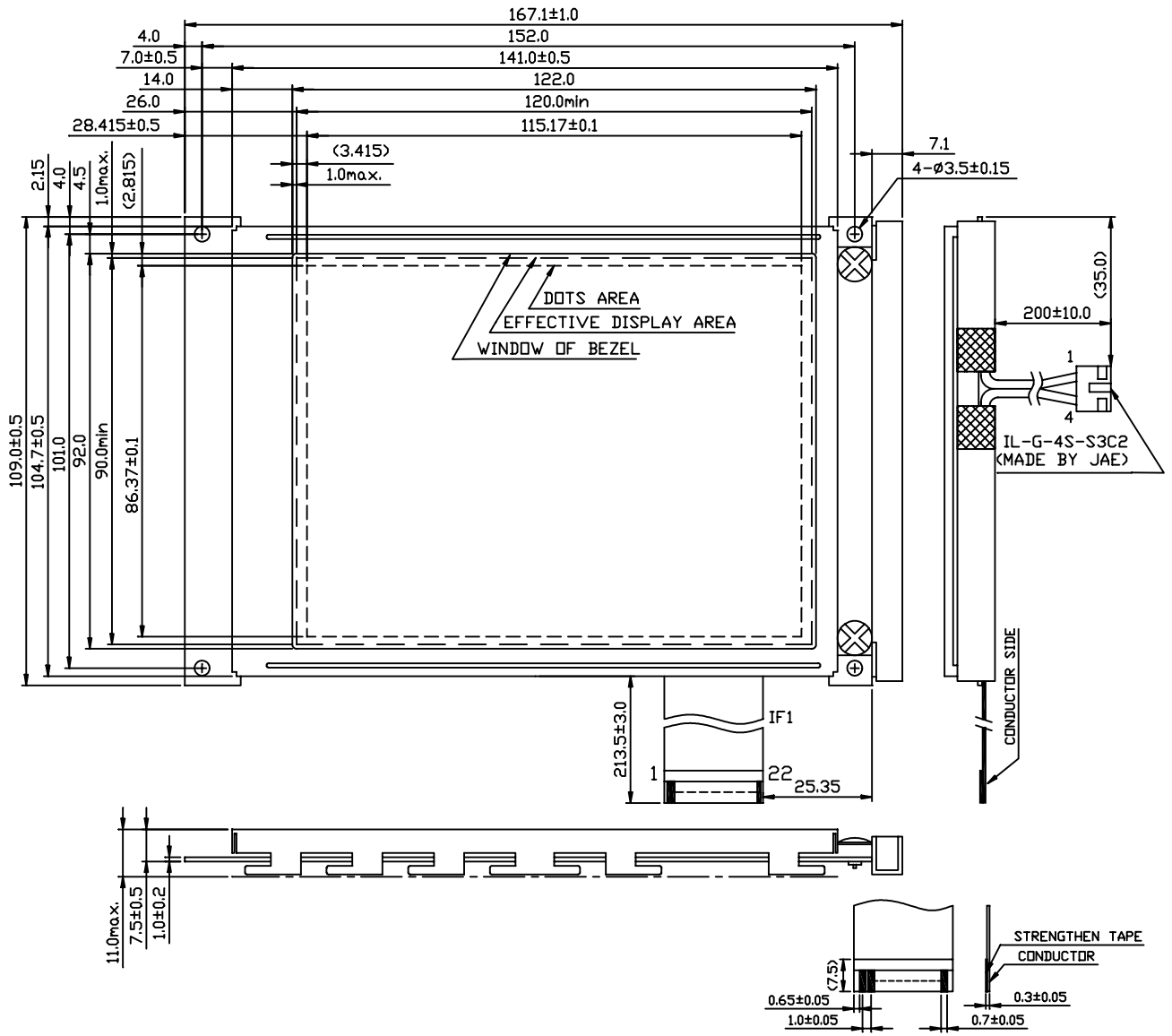
NOTE (1) : APPLIED TO TERMINALS D0 TO D7 , A0 , \overline{CS} , \overline{RD} , \overline{WR} .

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

NOTE (3) : RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT $\pm 1.0V$ BY EACH MODULE .

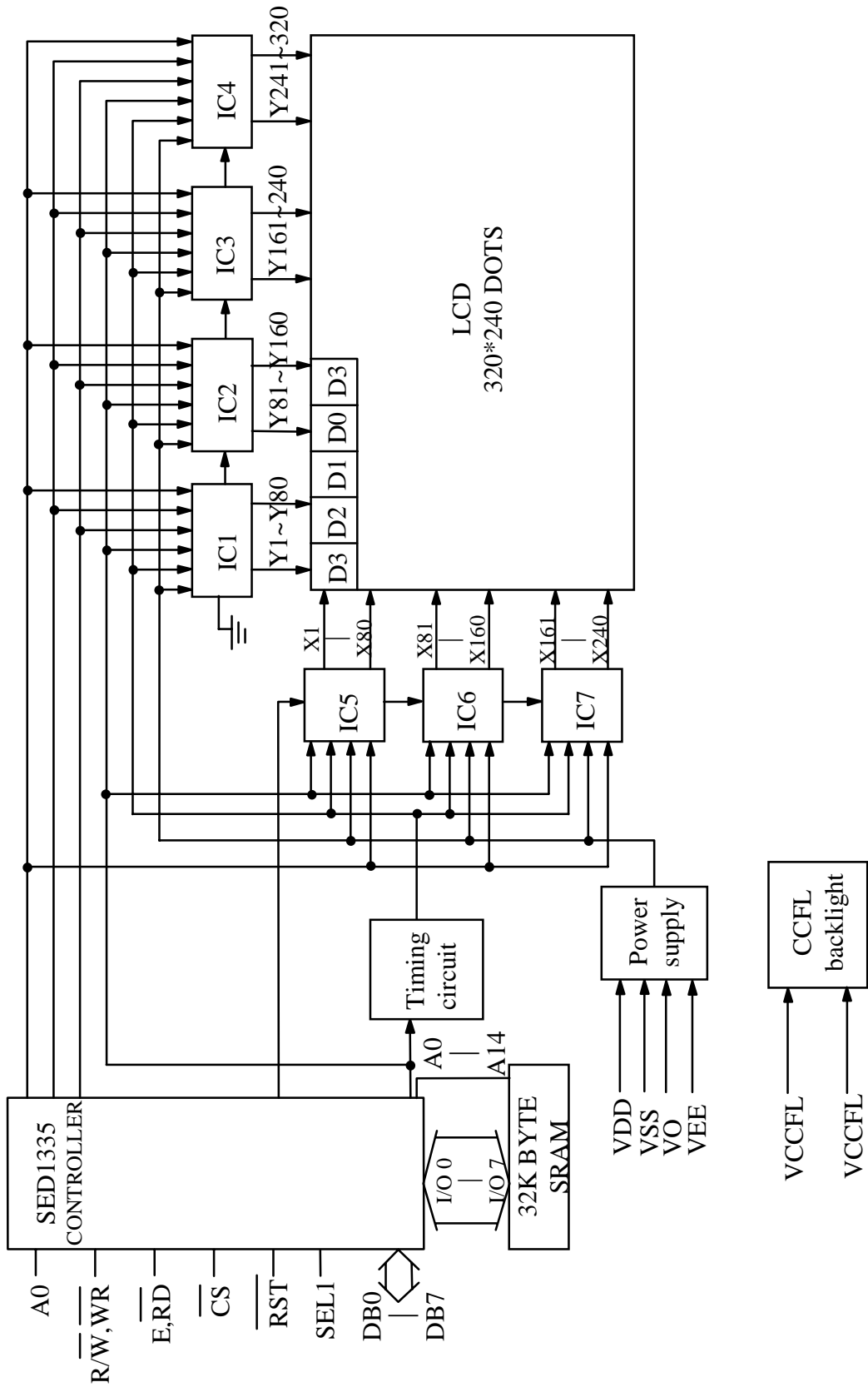
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6. OUTLINE DIMENSION

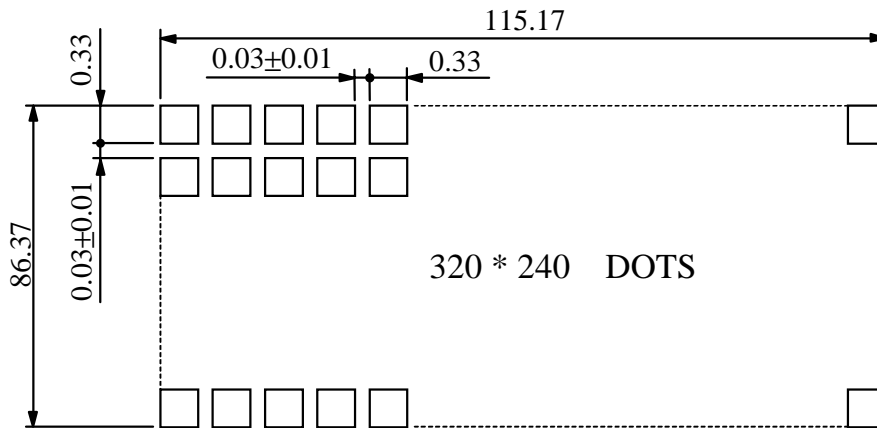


UNIT : mm
 SCALE : NTS
 NOT SPECIFIED TOLERANCE IS ± 0.5

7. BLOCK DIAGRAM



8. DETAIL DRAWING OF DOT MATRIX



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 | VO | — | OPERATING VOLTAGE FOR LCD DRIVING | | | | | | | | | | | | | | | | | | | | |
| 4 | A0 | — | 8080 FAMILY INTERFACE | | | | | | | | | | | | | | | | | | | | |
| | | | <table border="1"> <thead> <tr> <th>AO</th> <th>RD</th> <th>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 | RD | 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 | RD | 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/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 | 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 | 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 | $\overline{\text{WR,R/W}}$ | H/L | 8080 FAMILY INTERFACE ACTS AS THE ACTIVE-LOW WRITE STROBE . 6800 FAMILY INTERFACE ACTS AS THE READ/ WRITE CONTROL SIGNAL . | | | | | | | | | | | | | | | | | | | | |
| 6 | $\overline{\text{RD,E}}$ | H/L | 8080 FAMILY INTERFACE ACTS AS THE ACTIVE-LOW READ STROBE . 6800 FAMILY INTERFACE ACTS AS THE ACTIVE-HIGH ENABLE CLOCK . | | | | | | | | | | | | | | | | | | | | |
| 7 ∩ 14 | D0 ∩ D7 | H/L | DISPLAY DATA | | | | | | | | | | | | | | | | | | | | |
| 15 | $\overline{\text{CS}}$ | H/L | CHIP SELECT | | | | | | | | | | | | | | | | | | | | |
| 16 | $\overline{\text{RST}}$ | 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 ∩ 22 | NC | — | NOT USE | | | | | | | | | | | | | | | | | | | | |

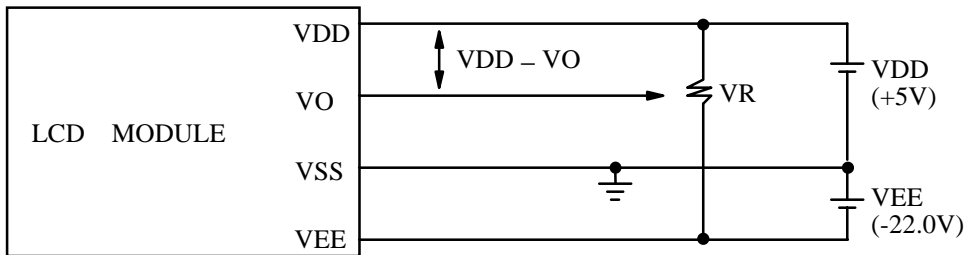
9. INTERFACE SIGNALS

IF2 :

| INTERFACE | PIN | SIGNAL | LEVEL | FUNCTION |
|-----------|-----|--------|-------|-------------------------------|
| CCFL | 1 | VCCFL | — | POWER SUPPLY FOR CCFL DRIVING |
| | 2~3 | NC | — | NO CONNECTION |
| | 4 | VCCFL | — | POWER SUPPLY FOR CCFL DRIVING |

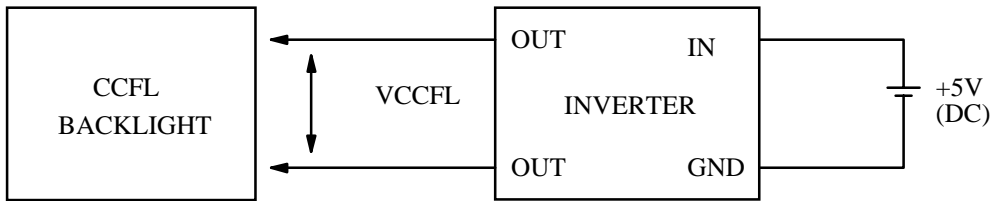
10. POWER SUPPLY

10.1 POWER SUPPLY FOR LCM



VDD - VO : LCD DRIVING VOLTAGE
 VR: 20KΩ

10.2 POWER SUPPLY FOR CCFL BACK - LIGHT



RECOMMENDED INVERTER : IA-EM02A

10.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

