



ALL SHORE INDUSTRIES, INC.

SPECIFICATION FOR LIQUID CRYSTAL DISPLAY MODULE

MODULE # : ASI-C-32024AS-GF-_WS/W

| | |
|--------------------------|-------------------------------------|
| (1) NUMBER OF DOTS ----- | 320 W * 240 H DOTS |
| (2) MODULE SIZE ----- | 167.5 W * 109.0 H * 13.0 T (max) mm |
| (3) EFFECTIVE AREA ----- | 120.5 * 92.0 W(min) H mm |
| (4) ACTIVE AREA----- | 115.17 W * 86.37 H mm |
| (5) DOT SIZE ----- | 0.33 W * 0.33 H mm |
| (6) DOT PITCH----- | 0.36 W * 0.36 H mm |



MODEL NO : ASI-C-32024A_-GF-_WS/W

RECORD OF REVISION

| DATE | PAGE | SUMMARY |
|------|------|---------|
| | | |



MODEL NO : ASI-C-32024A_-GF-_WS/W

3. General specifications

3.1 General specifications

PLEASE REFER TO:

“CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (MS-10-10000)”.

3.2 This individual specification is prior to general specifications

4. Mechanical data

- (1) NUMBER OF DOTS ----- 320 W * 240 H DOTS
- (2) MODULE SIZE ----- 167.5 W * 109.0 H * 13.5 T (max) mm
- (3) EFFECTIVE AREA ----- 122.0 W * 92.0 H mm
- (4) ACTIVE AREA----- 115.17 W * 86.37 H mm
- (5) DOT SIZE ----- 0.33 W * 0.33 H mm
- (6) DOT PITCH----- 0.36 W * 0.36 H mm
- (7) VIEWING DIRECTION ----- 6 OR 12 O’CLOCK
- (8) LCD TYPE ----- STN BLUE NEGATIVE
- (9) LED BACKLIGHT COLOR----- WHITE



MODEL NO : ASI-C-32024A_-GF-_WS/W

5. Absolute maximum ratings

5.1 Electrical absolute maximum ratings

| <i>I T E M</i> | <i>SYMBOL</i> | <i>MIN.</i> | <i>MAX.</i> | <i>UNIT</i> | <i>COMMENT</i> |
|-------------------------------------|---------------------|-----------------|-----------------|------------------|----------------|
| POWER SUPPLY FOR LOGIC | V _{DD-VSS} | 0 | 5.5 | V | ----- |
| INPUT VOLTAGE | V _I | V _{SS} | V _{DD} | V | ----- |
| STATIC ELECTRICITY | ----- | ----- | 100 | V | NOTE (1) |
| POWER SUPPLY FOR CCFL BACKLIGHT | V _S | ----- | AC1000 | V _{rms} | ----- |
| | f _{FL} | ----- | 55.0 | KHz | ----- |
| STARTING VOLTAGE FOR CCFL BACKLIGHT | V _{start1} | AC550 | ----- | V _{rms} | Ta = 25°C |
| | V _{start2} | AC700 | ----- | V _{rms} | Ta = 25°C |
| POWER SUPPLY FOR LED | V _{LED} | ----- | 5.0 | V | ----- |

NOTE (1): ELECTRO-STATIC DISCHARGE RESISTANCE IS TESTED BY CHARGING A 200PF CAPACITOR AND DISCHARGING IT BY CONTACT WITH A INTERFACE CONNECTOR PIN.

5.2 Environmental absolute maximum ratings

| <i>I T E M</i> | <i>OPERATING</i> | | <i>STORAGE</i> | | <i>COMMENT</i> |
|-----------------------|------------------|-------------|----------------|-------------|---|
| | <i>MIN.</i> | <i>MAX.</i> | <i>MIN.</i> | <i>MAX.</i> | |
| AMBIENT TEMPERATURE | -20°C | 70°C | -20°C | 70°C | ----- |
| HUMIDITY | NOTE (2) | | NOTE (2) | | NO CONDENSATION |
| VIBRATION NOTE (3) | ----- | 0.5G | ----- | 2G | 10~300HZ XYZ DIRECTIONS 1 Hr EACH |
| SHOCK NOTE (3) | ----- | 3G | ----- | 50G | 10 msec XYZ DIRECTIONS 1 TIME EACH |
| CORROSIVE GAS | NOT ACCEPTABLE | | NOT ACCEPTABLE | | ----- |

NOTE (2): Ta ≤ 70°C: 75% RH MAX.

Ta > 70°C: ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 75% RH AT 70°C.

NOTE (3): 1G = 9.8 m/s²



MODEL NO : ASI-C-32024A_-GF_-WS/W

6. Electrical characteristics

$$T_a = 25^\circ \text{ V}_{DD} = 5.0 \pm 0.25 \text{ V}$$

| ITEM | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT | |
|--|-----------------|---|-------------------------|--------|-------------|-----------|---|
| POWER SUPPLY VOLTAGE FOR CIRCUIT | $V_{DD}-V_{SS}$ | ----- | 4.75 | 5.0 | 5.25 | V | |
| INPUT VOLTAGE | V_{IH} | H LEVEL | $0.8V_{DD}$ | ----- | V_{DD} | V | |
| | V_{IL} | L LEVEL | V_{SS} | ----- | $0.2V_{DD}$ | V | |
| POWER SUPPLY CURRENT, NOTE (1) | I_{DD} | $V_{DD}-V_{SS} = 5.0V$ | ----- | 70.0 | 80.0 | mA | |
| RECOMMENDED LCD DRIVING VOLTAGE, NOTE(2) NOTE(3)-A | V_O-V_{SS} | DUTY =1/240 $\Phi=10^\circ$ NOTE(4) | $T_a=-20^\circ\text{C}$ | ----- | 24.3 | ----- | V |
| | | | $T_a=25^\circ\text{C}$ | ----- | 22.9 | ----- | V |
| | | | $T_a=70^\circ\text{C}$ | ----- | 21.1 | ----- | V |
| RECOMMENDED LCD DRIVING VOLTAGE, NOTE(2) NOTE(3)-B | V_O-V_{SS} | DUTY =1/240 $\Phi=10^\circ$ NOTE(4) | $T_a=-20^\circ\text{C}$ | ----- | 24.9 | ----- | V |
| | | | $T_a=25^\circ\text{C}$ | ----- | 23.5 | ----- | V |
| | | | $T_a=70^\circ\text{C}$ | ----- | 21.7 | ----- | V |
| CCFL LAMP | V_{FL} | $f_{FL} = 35\text{KHz}$ | ----- | 270 | ----- | V_{rms} | |
| | I_{FL} | $V_{FL} = 270 V_{rms}$ $f_{FL} = 35 \text{ KHz}$ | ----- | 5.0 | ----- | $mArms$ | |
| CCFL LIFETIME | ----- | $V_{FL} = 270 V_{rms}$ $f_{FL} = 35 \text{ KHz}$ | ----- | 30,000 | ----- | hr | |
| FLM FREQUENCY | f_{FLM} | ----- | 70 | 75 | 80 | Hz | |
| POWER SUPPLY CURRENT FOR LED BACKLIGHT | I_{LED} | $V_{LED} = +4.0 \text{ V}$ | ----- | 120.0 | 160.0 | mA | |

NOTE (1): THE DISPLAY PATTERN IS ALL "ON", OR ALL "OFF"

(2): RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT $\pm 0.5V$ BY EACH MODULE.

(3): RECOMMENDED LCD DRIVING VOLTAGE FOR DIFFERENT LCD TYPE

| | LCD TYPE | LCD COLOR |
|---|----------|--------------------------------------|
| A | FSTN | BLACK(NEGATIVE) |
| B | FSTN | WHITE(POSITIVE) |
| | STN | GRAY / YELLOW-GREEN / BLUE(NEGATIVE) |

(4): $\theta = 0^\circ$: VIEWING ANGLE AT 6 O'CLOCK

$\theta = 180^\circ$: VIEWING ANGLE AT 12 O'CLOCK



MODEL NO : ASI-C-32024A_-GF-_WS/W

7. Optical characteristics

 $T_a = 25^{\circ}$ $V_{DD} = 5.0V$

STN TYPE LCD

 $T_a = 25^{\circ}C$

| ITEM | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT | NOTE |
|----------------|-------------------|--------------------------------|------|------|------|------|---------|
| VIEWING ANGLE | $\Phi 2 - \Phi 1$ | K = 2.0 NOTE(1) | 30 | 40 | ---- | deg. | NOTE(2) |
| CONTRAST RATIO | K | $\Phi = 10^{\circ}$ NOTE(1) | 3.0 | 4.0 | ---- | ---- | NOTE(2) |
| RESPONSE TIME | tr (rise) | $\Phi = 10^{\circ}$ NOTE(1) | ---- | 200 | 350 | ms | NOTE(2) |
| | tf (fall) | $\Phi = 10^{\circ}$ NOTE(1) | ---- | 300 | 400 | ms | NOTE(2) |

FSTN TYPE LCD

 $T_a = 25^{\circ}C$

| ITEM | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT | NOTE |
|----------------|-------------------|--------------------------------|------|------|------|------|---------|
| VIEWING ANGLE | $\Phi 2 - \Phi 1$ | K = 2.0 NOTE(1) | 30 | 40 | ---- | deg. | NOTE(2) |
| CONTRAST RATIO | K | $\Phi = 10^{\circ}$ NOTE(1) | 4.0 | 5.0 | ---- | ---- | NOTE(2) |
| RESPONSE TIME | tr (rise) | $\Phi = 10^{\circ}$ NOTE(1) | ---- | 200 | 350 | ms | NOTE(2) |
| | tf (fall) | $\Phi = 10^{\circ}$ NOTE(1) | ---- | 300 | 400 | ms | NOTE(2) |

Brightness for backlight

| Symbol | Condition | MIN. | TYP. | MAX. | UNIT | Backlight Type | Note | |
|--------|---|--------------|-------|------|-------|-------------------|-------------|---------|
| B | $V_{FL}=270V_{rms}$ $f_{FL}=35KHz$ STN/FSTN POSITIVE | Dots all on | ----- | 5 | ----- | cd/m ² | CCFL | |
| | | Dots all off | ----- | 60 | ----- | | | |
| | $V_{FL}=270V_{rms}$ $f_{FL}=35KHz$ STN/FSTN NEGATIVE | Dots all on | ----- | 160 | ----- | | | |
| | | Dots all off | ----- | 60 | ----- | | | |
| | $\Phi = 0^{\circ}$ $\theta = 0^{\circ}$ STN/FSTN POSITIVE | Dots all on | ----- | 5 | ----- | | LED (WHITE) | Note(2) |
| | | Dots all off | ----- | 160 | ----- | | | |
| | $\Phi = 0^{\circ}$ $\theta = 0^{\circ}$ STN/FSTN NEGATIVE | Dots all on | ----- | 160 | ----- | | | |
| | | Dots all off | ----- | 5 | ----- | | | |

Note (1): $\theta = 0^{\circ}$ WHEN VIEWING ANGLE AT 6 O'CLOCK
 $\theta = 180^{\circ}$ WHEN VIEWING ANGLE AT 12 O'CLOCK

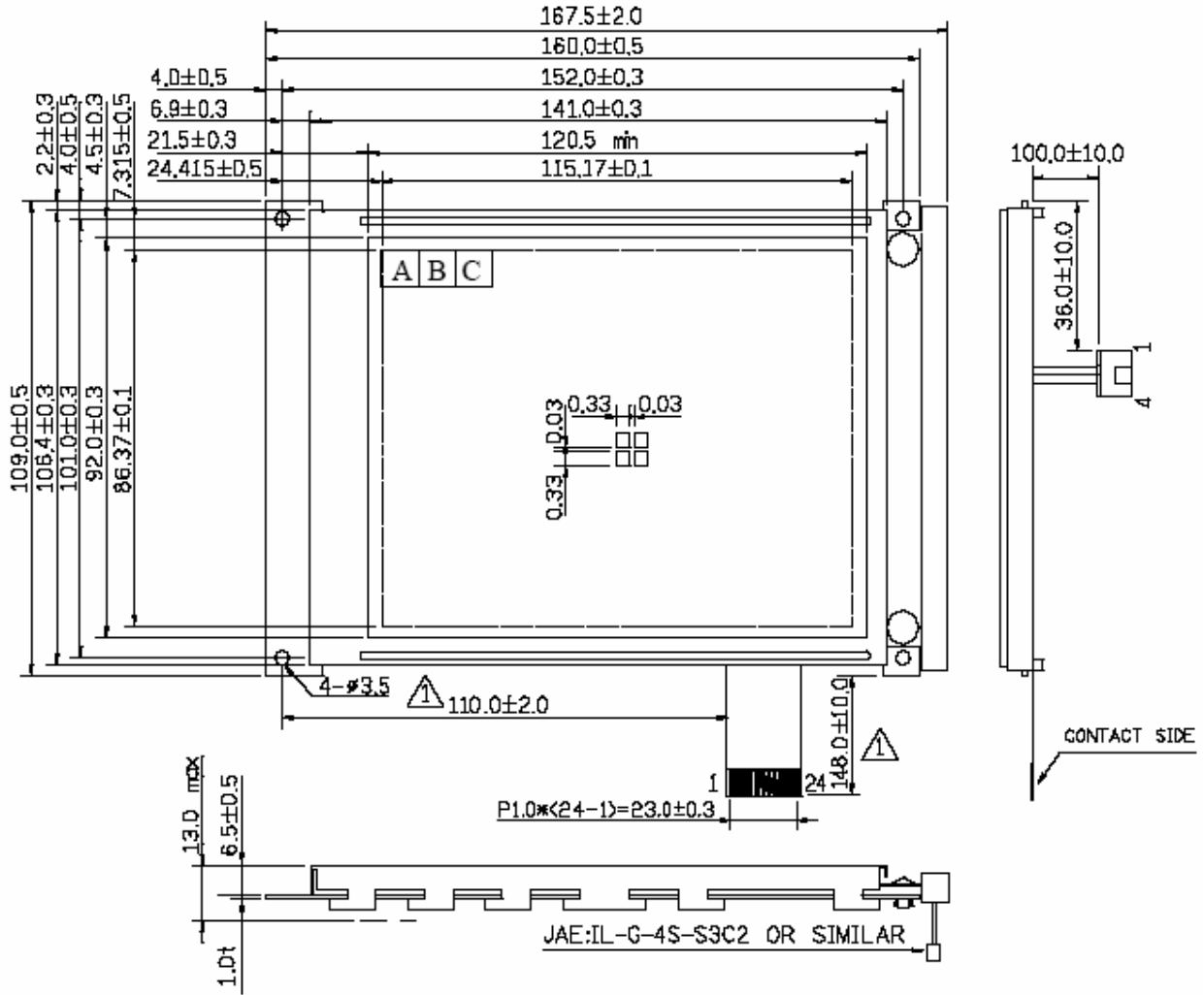
(2): SEE CUSTOMER ACCEPTANCE STANDARD SPECIFICATION FOR DEFINITION OF OPTICAL CHARACTERISTICS.

(3): UNDER NORMAL TEMPERATURE AND HUMIDITY IN A DARK ROOM.



MODEL NO : ASI-C-32024A_-GF-_WS/W

8. Outline dimension



NOTE :
 1.UNIT : mm
 2.SCALE : NTS



MODEL NO : ASI-C-32024A_-GF-_WS/W

7.1 Interface

(a) Pin Assignment

| PIN NO. | SYMBOL | FUNCTION |
|---------|---------------------------------|---|
| 1 | V _{SS} | POWER SUPPLY (GND) |
| 2 | V _{DD} | POWER SUPPLY |
| 3 | V _o | OPERATING VOLTAGE FOR LCD DRIVING |
| 4 | A _o | DATA TYPE SELECTION |
| 5 | $\overline{WR}(R/\overline{W})$ | (When 8080-series) : \overline{WR} IS (L) (When 6800-series) : Read mode : R/ \overline{W} IS (H) Write mode : R/ \overline{W} IS (L) |
| 6 | \overline{RD}/E | \overline{RD} : (When to 8080-series) E : (When to 6800-series) |
| 7 | D0 | DATA INPUT/OUTPUT |
| 8 | D1 | DATA INPUT/OUTPUT |
| 9 | D2 | DATA INPUT/OUTPUT |
| 10 | D3 | DATA INPUT/OUTPUT |
| 11 | D4 | DATA INPUT/OUTPUT |
| 12 | D5 | DATA INPUT/OUTPUT |
| 13 | D6 | DATA INPUT/OUTPUT |
| 14 | D7 | DATA INPUT/OUTPUT |
| 15 | \overline{CS} | L:CHIP SELECTION |
| 16 | \overline{RES} | L: RESET |
| 17 | V _{EE} | POWER SUPPLY FOR LCD DRIVING (OUTPUT) |
| 18 | SEL1 | 8080 OR 6800 FAMILY INTERFACE SELECT L:80 SERIES , H:68 SERIES |
| 19 | F.G | FRAME GROUND |
| 20 | N.C | NO CONNECTION |
| 21 | N.C | NO CONNECTION |
| 22 | N.C | NO CONNECTION |
| 23 | N.C | NO CONNECTION |
| 24 | N.C | NO CONNECTION |

(b) CCFL Connector

| PIN NO. | SYMBOL | FUNCTION |
|---------|-------------------|-------------------------------|
| 1 | V _{CCFL} | POWER SUPPLY VOLTAGE FOR CCFL |
| 2 | N.C | NO CONNECTION |
| 3 | N.C | NO CONNECTION |
| 4 | V _{CCFL} | POWER SUPPLY VOLTAGE FOR CCFL |

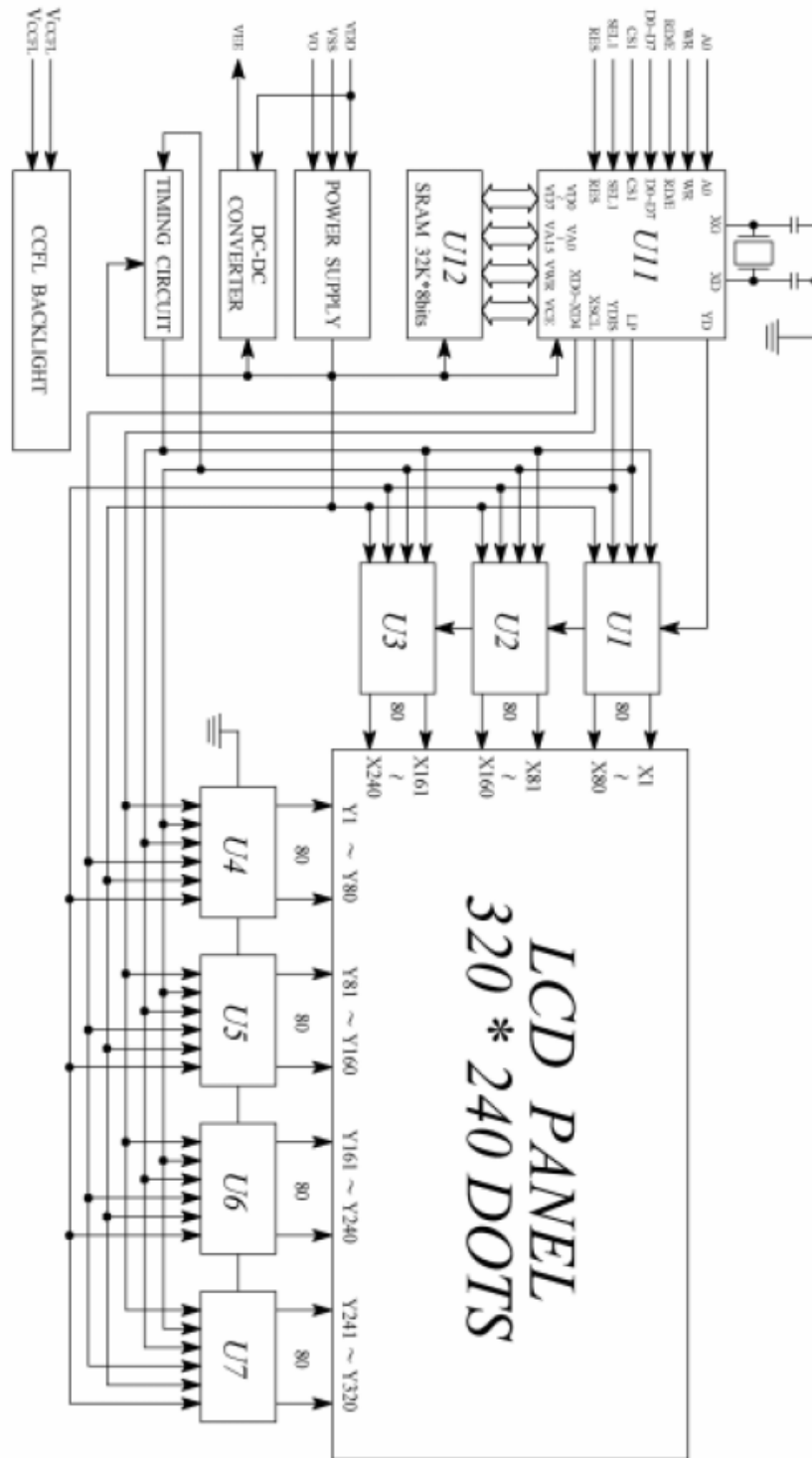
(c) LED Connector

| PIN NO. | SYMBOL | FUNCTION |
|---------|--------|---------------------------------|
| 1 | A | POWER SUPPLY VOLTAGE FOR LED(+) |
| 2 | N.C | NO CONNECTED |
| 3 | N.C | NO CONNECTED |
| 4 | K | POWER SUPPLY VOLTAGE FOR LED(-) |



MODEL NO : ASI-C-32024A_-GF-_WS/W

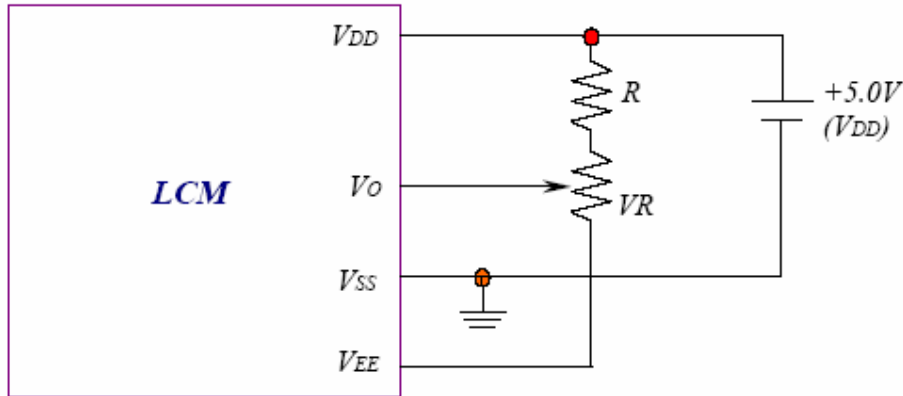
8.2 Block diagram





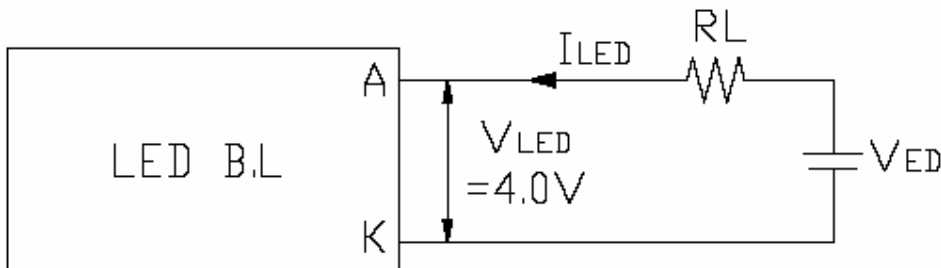
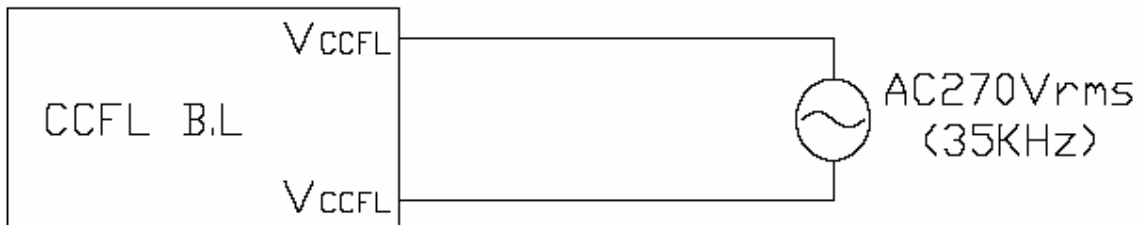
MODEL NO : ASI-C-32024A_-GF-_WS/W

10 Power supply for LCM



$V_o - V_{SS}$: LCD DRIVING VOLTAGE
 RECOMMEND RESISTOR R: $V_{DD} - V_o \geq 1.5V$
 V_R : 200K Ω

10.1 Power supply for backlight



$R_L \geq (V_{ED} - V_{LED}) / I_{LED}$, $I_{LED} \leq 160.0 \text{ mA (max)}$