



ALL SHORE INDUSTRIES, INC.

SPECIFICATION FOR LIQUID CRYSTAL DISPLAY MODULE

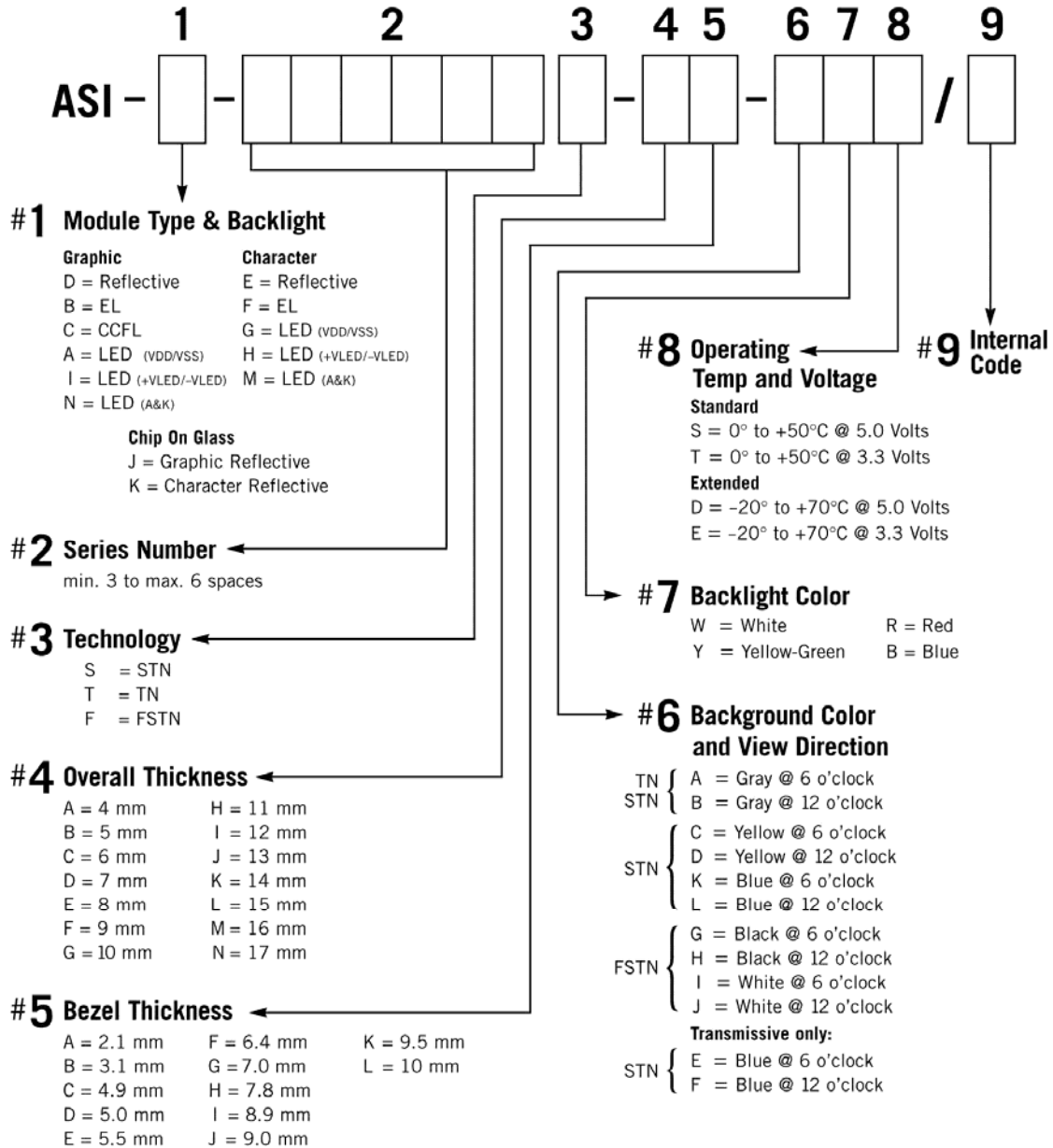
MODULE # : ASI-E-402AS-GC-_S/W

- (1) NUMBER OF CHARACTERS-----40 CH * 2 LINE
- (2) MODULE SIZE -----182.0 W * 33.5 H * 10.0 T (Max) mm
- (3) EFFECTIVE AREA -----154.0 W * 15.3 H mm
- (4) CHARACTER PATTERN -----5 * 7 DOTS + CURSOR
- (5) CHARACTER SIZE-----3.20 W * 4.85 H mm
- (6) CHARACTER PITCH -----3.70 mm
- (7) DOT SIZE-----0.60 W * 0.65 H mm
- (8) DOT PITCH -----0.65 W * 0.70 H mm



MODEL NO : ASI-E-402AS-GC-_S/W

LCD MODULE PART NUMBERING SYSTEM



NOTE: Some options may not be available in specific modules. Please contact your Sales Representative to check availability.



MODEL NO : ASI-E-402AS-GC-_S/W

1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

1.2 APPLICATION NOTES FOR CONTROLLER / DRIVER :

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

1.3 THIS INDIVIDUAL SPECIFICATIONS IS PRIOR TO GENERAL SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

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3. ABSOLUTE MAXIMUM RATINGS

3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS . (AT Ta = 25°C)

| ITEM | SYMBOL | MIN. | MAX. | UNIT | COMMENT |
|------------------------|---------------------|-----------------|-----------------|------|----------|
| POWER SUPPLY FOR LOGIC | V _{DD-VSS} | 0 | 6.0 | V | ----- |
| INPUT VOLTAGE | V _I | V _{SS} | V _{DD} | V | ----- |
| STATIC ELECTRICITY | ----- | ----- | 100 | V | NOTE (1) |
| POWER SUPPLY FOR LED | V _{LED} | ----- | NOTE(2) | V | ----- |

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

NOTE (2):

| SYMBOL | V _{LED} MAX. | LED TYPE |
|------------------|-----------------------|-------------------------------|
| V _{LED} | 5.5V | YELLOW-GREEN,AMBER,ORANGE,RED |
| | 5.0V | BLUE,PURE GREEN,WHITE |

3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATING

| ITEM | CONDITION | OPERATING | | STORAGE | | COMMENT |
|-----------------------|-----------|----------------|------|----------------|------|---|
| | | MIN. | MAX. | MIN. | MAX. | |
| AMBIENT TEMPERATURE | NORMAL | 0°C | 50°C | -20°C | 70°C | ----- |
| | WIDE | -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 ≤ 50°C: 90% RH MAX.

Ta > 50°C: ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 90% RH AT 50°C. (80%RH AT 60°C)

NOTE (3): 1G = 9.8 m/s²

S.

MODEL NO : ASI-E-402AS-GC-_S/W

4. ELECTRICAL CHARACTERISTICS

| <i>I T E M</i> | <i>SYMBOL</i> | <i>CONDITION</i> | <i>MIN.</i> | <i>TYP.</i> | <i>MAX.</i> | <i>UNIT</i> | |
|--|---------------|---|-------------------------|-------------|-------------|-------------|---|
| INPUT VOLTAGE | V_{IH} | ----- | 2.0 | ----- | V_{DD} | V | |
| | V_{IL} | ----- | V_{SS} | ----- | 0.8 | V | |
| OUTPUT VOLTAGE | V_{OH} | $-I_{OH} = 0.2 \text{ mA}$ | 2.4 | ----- | ----- | V | |
| | V_{OL} | $I_{OL} = 1.6 \text{ mA}$ | ----- | ----- | 0.4 | V | |
| POWER SUPPLY CURRENT | I_{DD} | $V_{DD} = 5.0V$ | ----- | 2.0 | 3.0 | mA | |
| RECOMMENDED LCD DRIVING VOLTAGE, NOTE(1) | $V_{DD}-V_O$ | STN/ FSTN DUTY =1/16 $\Phi=10^\circ$ NOTE(2) | $T_a=-20^\circ\text{C}$ | ----- | 4.8 | ----- | V |
| | | | $T_a= 0^\circ\text{C}$ | ----- | 4.7 | ----- | V |
| | | | $T_a= 25^\circ\text{C}$ | ----- | 4.5 | ----- | V |
| | | | $T_a= 50^\circ\text{C}$ | ----- | 4.3 | ----- | V |
| | | | $T_a= 70^\circ\text{C}$ | ----- | 4.2 | ----- | V |
| | | TN DUTY =1/16 $\Phi=25^\circ$ NOTE(2) | $T_a=-20^\circ\text{C}$ | ----- | 4.7 | ----- | V |
| | | | $T_a= 0^\circ\text{C}$ | ----- | 4.6 | ----- | V |
| | | | $T_a= 25^\circ\text{C}$ | ----- | 4.2 | ----- | V |
| | | | $T_a= 50^\circ\text{C}$ | ----- | 3.8 | ----- | V |
| | | | $T_a= 70^\circ\text{C}$ | ----- | 3.7 | ----- | V |
| POWER SUPPLY CURRENT FOR NOTE(3) | I_{LED} | V_{LED} NOTE(3) | ----- | 30 | 40 | mA | |

NOTE (1): RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT $\pm 0.5V$ BY EACH MODULE.

(2): $\theta = 0^\circ$: VIEWING ANGLE AT 6 O'CLOCK
 $\theta = 180^\circ$: VIEWING ANGLE AT 12 O'CLOCK

(3): LED CURRENT OF DIFFERENT LED TYPE

| <i>LED B.L TYPE</i> | V_{LED} | I_{LED} | | | | <i>LED COLOR</i> |
|---------------------|-----------|-------------|-------------|-------------|--------------|-------------------------------|
| | | <i>MIN.</i> | <i>TYP.</i> | <i>MAX.</i> | <i>UNIT.</i> | |
| A | 4.5V | ---- | 30 | 40 | mA | YELLOW-GREEN、AMBER、ORANGE、RED |
| B | 4.0V | ---- | 30 | 40 | mA | BLUE、WHITE、PURE GREEN |

MODEL NO : ASI-E-402AS-GC-_S/W

5. OPTICAL CHARACTERISTICS .

$T_a = 25^{\circ}\text{C}$ $V_{DD} = 5.0\text{ V}$
 $T_a = 25^{\circ}\text{C}$ $V_{DD}-V_O = 4.2\text{ V}$

TN TYPE LCD

| ITEM | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT | NOTE |
|----------------|-----------------|--------------------------------|------|------|------|------|---------|
| VIEWING ANGLE | $\Phi 2-\Phi 1$ | $K = 1.4$ NOTE(1) | 20 | 30 | ---- | deg. | NOTE(2) |
| CONTRAST RATIO | K | $\Phi = 25^{\circ}$ NOTE(1) | 2.0 | 3.0 | ---- | ---- | NOTE(2) |
| RESPONSE TIME | tr (rise) | $\Phi = 25^{\circ}$ NOTE(1) | ---- | 150 | 250 | ms | NOTE(2) |
| | tf (fall) | $\Phi = 25^{\circ}$ NOTE(1) | ---- | 150 | 250 | ms | NOTE(2) |

$T_a = 25^{\circ}\text{C}$ $V_{DD}-V_O = 4.5\text{ V}$

STN TYPE LCD

| 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) |

$T_a = 25^{\circ}\text{C}$ $V_{DD}-V_O = 4.5\text{ V}$

FSTN /STN BLUE TYPE LCD

| 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 LED backlight

| SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT | LED TYPE | NOTE |
|--------|----------------------|------|------|------|-------------------|-------------------------------|---------|
| B | $\Phi = 0^{\circ}$ | 4.0 | ---- | ---- | cd/m ² | YELLOW-GREEN、RED、AMBER、ORANGE | NOTE(2) |
| | $\theta = 0^{\circ}$ | 6.0 | ---- | ---- | | BLUE、PURE GREEN、WHITE | NOTE(3) |

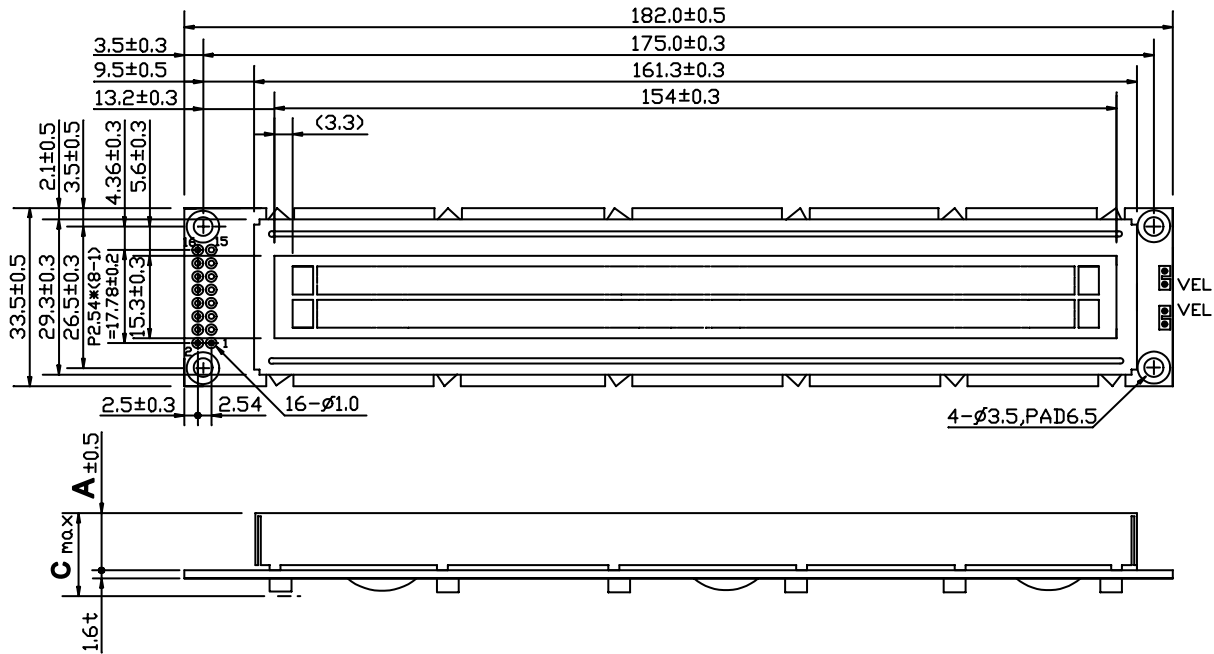
NOTE (1): $\theta = 0^{\circ}$ WHEN VIEWING ANGLE AT 6 O'CLOCK
 $\theta = 180^{\circ}$ WHEN VIEWING ANGLE AT 12 O'CLOCK

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

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

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6. OUTLINE DIMENSION



| TYPE | A | C |
|-------------|-----|------|
| LED B.L | 9.5 | 15.0 |
| EL & NO B.L | 4.9 | 10.0 |

Interface pin connection

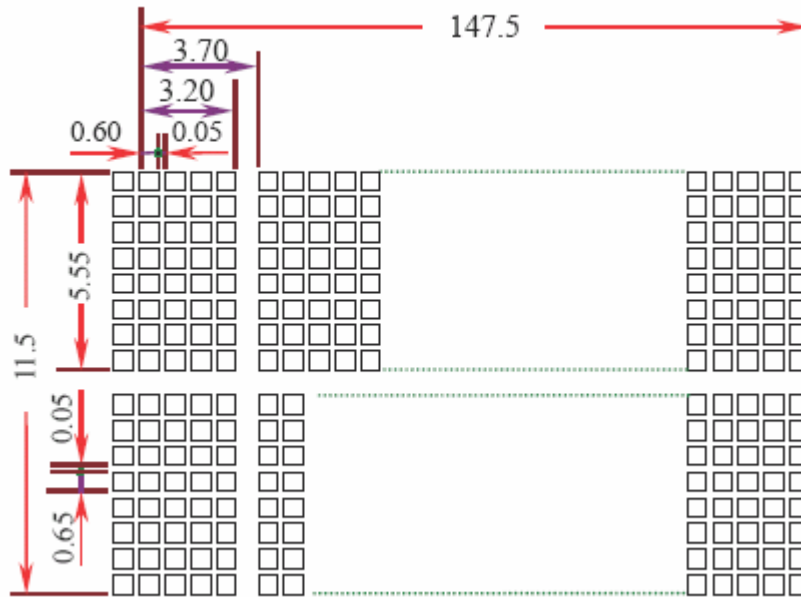
| | | | | | | | |
|----------------|----------|----------|-----------|-----------|-----------|-----------|-----------|
| PIN NO. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| SYMBOL | VSS | VDD | VO | RS | R/W | E | DB0 |
| PIN NO. | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| SYMBOL | DB1 | DB2 | DB3 | DB4 | DB5 | DB6 | DB7 |

Interface pin connection

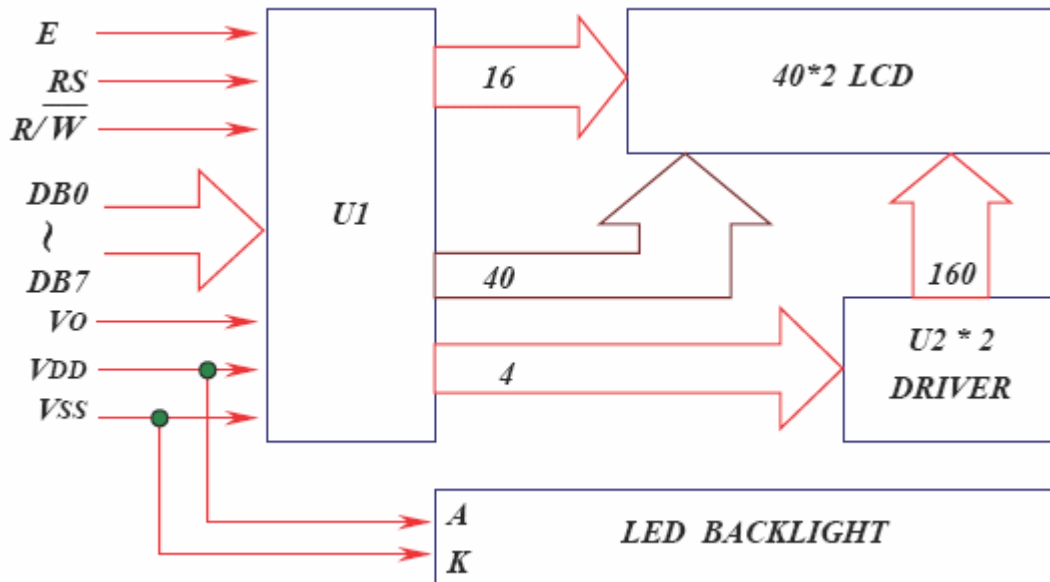
| | | | | | | | | |
|----------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| PIN NO. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| SYMBOL | VSS | VDD | VO | RS | R/W | E | DB0 | DB1 |
| PIN NO. | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| SYMBOL | DB2 | DB3 | DB4 | DB5 | DB6 | DB7 | A(+) | K(-) |

MODEL NO : ASI-E-402AS-GC-_S/W

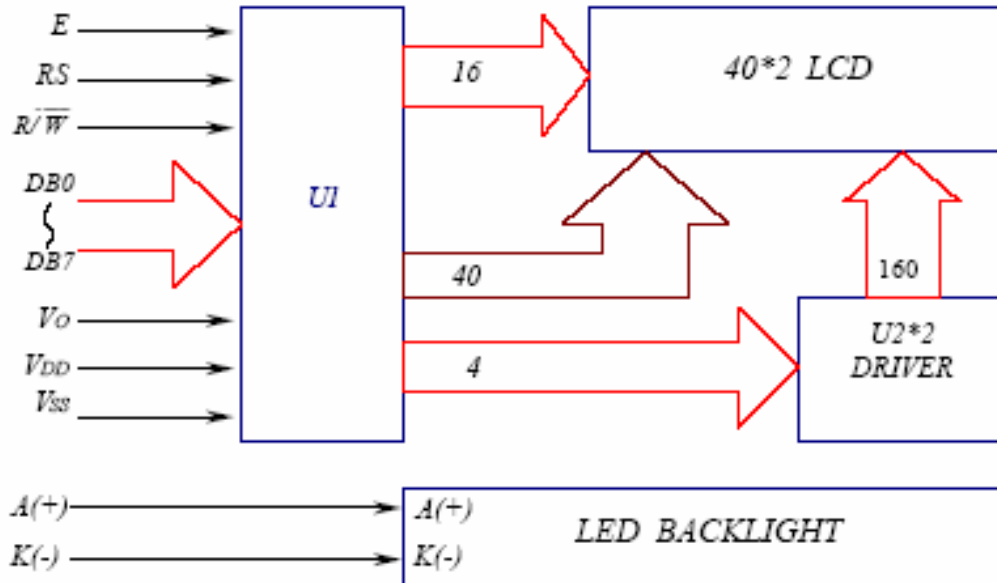
7. DETAIL DRAWING OF DOT MATRIX



8. BLOCK DIAGRAM



MODEL NO : ASI-E-402AS-GC-_S/W

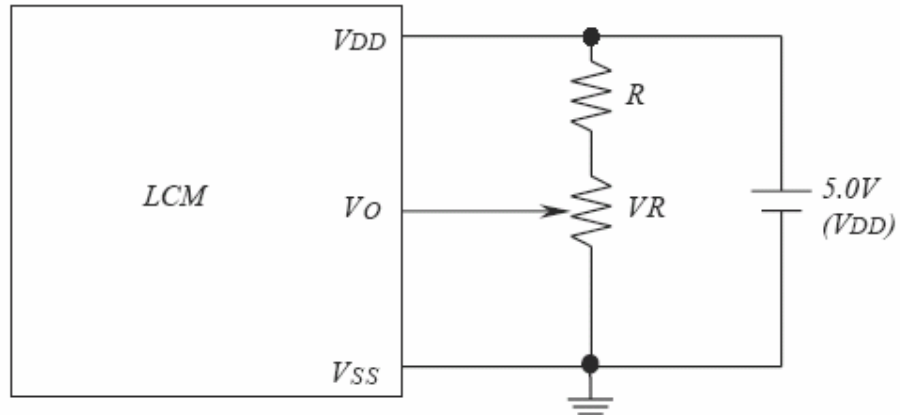


9 DATA DISPLAY ADDRESS CHART

Display data address charts

| Character | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|-----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| LINE 1 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 0A | 0B | 0C | 0D | 0E | 0F | 10 | 11 | 12 | 13 |
| LINE 2 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 4A | 4B | 4C | 4D | 4E | 4F | 50 | 51 | 52 | 53 |

| Character | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
|-----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| LINE 1 | 14 | 15 | 16 | 17 | 18 | 19 | 1A | 1B | 1C | 1D | 1E | 1F | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| LINE 2 | 54 | 55 | 56 | 57 | 58 | 59 | 5A | 5B | 5C | 5D | 5E | 5F | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 |

MODEL NO : ASI-E-402AS-GC-_S/W**1 0 . POWER SUPPLY**

RECOMMENDED RESISTOR R: $V_{DD} - V_O \geq 1.5V$

$V_{DD} - V_O$: LCD DRIVING VOLTAGE

VR: $10K\Omega \sim 20K\Omega$