

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 :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :  
EU - KS0066

1.3 THIS INDIVIDUAL SPECIFICATIONS IS PRIOR TO GENERAL  
SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

- (1) NUMBER OF CHARACTER ----- 24 CH \* 2 LINES
- (2) MODULE SIZE ----- 118.0W \* 36.0H \* 14.0D (max.) mm
- (3) EFFECTIVE AREA ----- 94.5W \* 17.8H mm
- (4) CHARACTER FONT ----- 5 \* 7 DOTS + CURSOR
- (5) CHARACTER SIZE ----- 3.20W \* 5.55H mm
- (6) CHARACTER PITCH ----- 3.70W \* 5.95H mm
- (7) DOT SIZE ----- 0.60W \* 0.65H mm
- (8) DOT PITCH ----- 0.65W \* 0.70H mm
- (9) LCD TYPE \*
- (10) DRIVING METHOD ----- 1 / 16 DUTY MULTIPLEX DRIVE
- (11) BACK-LIGHT \*

\* PLEASE REFER TO NUMBERING SYSTEM

#### 4. ELECTRICAL CHARACTERISTICS

Ta = 25°C

VDD = 5.0 ± 0.25 V

| PARAMETER                       | SYMBOL                                    | CONDITION     | MIN . | TYP . | MAX . | UNIT |
|---------------------------------|---|---------------|-------|-------|-------|------|
| H LEVEL INPUT VOLTAGE           | VIH                                       | —             | 2.2   | —     | —     | V    |
| L LEVEL INPUT VOLTAGE           | VIL                                       | —             | —     | —     | 0.6   | V    |
| H LEVEL OUTPUT VOLTAGE          | VOH                                       | -IOH = 0.2 mA | 2.4   | —     | —     | V    |
| L LEVEL OUTPUT VOLTAGE          | VOL                                       | IOL = 1.2 mA  | —     | —     | 0.4   | V    |
| POWER SUPPLY CURRENT (LOGIC)    | IDD                                       | VDD = 5.0 V   | —     | 2.0   | 5.0   | mA   |
| RECOMMENDED LCD DRIVING VOLTAGE | VDD - VO<br>∅ = 10°, θ = 0°<br>DUTY= 1/16 | Ta = -20 °C   | —     | 4.4   | —     | V    |
|                                 |   | Ta = 25 °C    | —     | 4.4   | —     | V    |
|                                 |   | Ta = 70 °C    | —     | 4.4   | —     | V    |
| CLOCK OSCILLATION FREQUENCY     | FOSC                                      | Ta = 25°C     | —     | 270   | —     | KHZ  |
| LED FORWARD VOLTAGE             | VF  | IF = 150 mA   | —     | 4.2   | 4.6   | V    |
| LED FORWARD CURRENT             | IF  | —             | —     | 150   | —     | mA   |
| LED REVERSE CURRENT             | IR  | VR = 8 V      | —     | —     | 150   | uA   |

#### 5. OPTICAL CHARACTERISTICS .

Ta = 25 °C

VDD = 5.0 V

| ITEM                         | SYMBOL      | CONDITION         | MIN .      | TYP . | MAX . | UNIT              | NOTE |   |
|------------------------------|-------------|-------------------|------------|-------|-------|-------------------|------|---|
| VIEWING AREA                 | ∅ 2 - ∅ 1   | K ≥ 1.4           | 30         | —     | —     | deg.              | 1    |   |
| CONTRAST RATIO               | K           | ∅ = 10°, θ = 0°   | 5          | —     | —     | —                 | 1    |   |
| RESPONSE TIME                | tr ( rise ) | ∅ = 10°<br>θ = 0° | Ta = -20°C | —     | 5538  | —                 | ms   | 1 |
|                              |             |                   | Ta = 25°C  | —     | 228   | —                 |      |   |
|                              |             |                   | Ta = 70°C  | —     | 104   | —                 |      |   |
|                              | tf ( fall ) |                   | Ta = -20°C | —     | 2316  | —                 |      |   |
|                              |             |                   | Ta = 25°C  | —     | 174   | —                 |      |   |
|                              |             |                   | Ta = 70°C  | —     | 85    | —                 |      |   |
| THE BRIGHTNESS OF BACK-LIGHT | L           | VDD = 5.0 V       | —          | 12    | —     | cd/m <sup>2</sup> | 1, 2 |   |
|                              |             |                   | —          | 36    | —     |                   | 1, 3 |   |
| PEAK EMISSION WAVELENGTH     | λ P         | VDD = 5.0 V       | —          | 572   | —     | nm                | 1    |   |

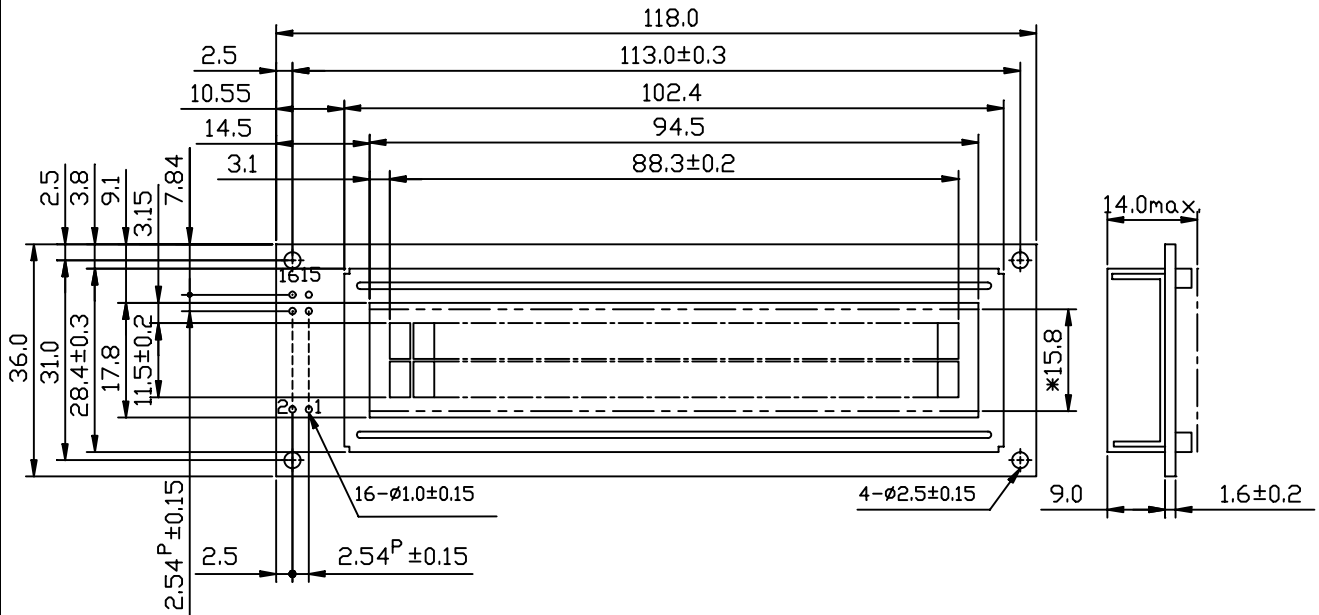
NOTE (1) : PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATION : EU-002A

NOTE (2) : POLARIZER MODE : TRANSFLECTIVE

NOTE (3) : POLARIZER MODE : TRANSMISSIVE

6. OUTLINE DIMENSION



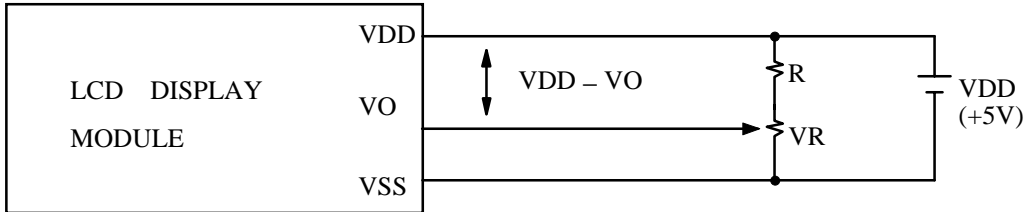
\*LIGHTING AREA WHEN LED B/L IS ON  
UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS ± 0.5

9. INTERFACE SIGNALS

| PIN NO.      | SYMBOL           | DESCRIPTION                                | FUNCTION  |
|--------------|------------------|--|---|
| 1            | VSS              | GROUND                                     | 0V (GND)  |
| 2            | VDD              | POWER SUPPLY FOR LOGIC CIRCUIT             | +5V   |
| 3            | VO               | LCD CONTRAST ADJUSTMENT                    |   |
| 4            | RS               | INSTRUCTION/DATA REGISTER SELECTION        | RS = 0 : INSTRUCTION REGISTER<br>RS = 1: DATA REGISTER                        |
| 5            | $\overline{R/W}$ | READ/WRITE SELECTION                       | $\overline{R/W}$ = 0 : REGISTER WRITE<br>$\overline{R/W}$ = 1 : REGISTER READ |
| 6            | E                | ENABLE INPUT                               |   |
| 7<br> <br>14 | DB0<br> <br>DB7  | DATA INPUT/OUTPUT LINES                    | 4 BIT/ 8 BIT SELECTABLE<br>4 BIT:DB4-DB7<br>8 BIT:DB0-DB7                     |
| 15           | VLED             | POWER SUPPLY FOR LED BACKLIGHT ( ANODE )   |   |
| 16           | VLSS             | POWER SUPPLY FOR LED BACKLIGHT ( CATHODE ) | 0V (GND)  |

## 10. POWER SUPPLY

### 10.1 POWER SUPPLY FOR LCD MODULE

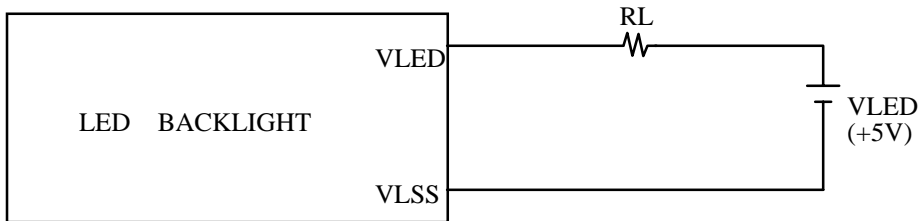


VDD - VO : LCD DRIVING VOLTAGE

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

RECOMMENDED RESISTOR R : VDD - VO  $\geq$  1.5 V

### 10.2 POWER SUPPLY FOR LED BACK-LIGHT



RECOMMENDED RESISTOR RL : 5 . 3 $\Omega$ , 1 / 4 WATT( CONTROLLED BY USER )

\* THE BRIGHTNESS WOULD BE ALTERED SUBJECT TO DIFFERENT VALUES OF RL

## 11. DISPLAY DATA RAM ADDRESS

|           |    |    |    |    |    |    |    |    |    |    |    |    |
|-----------|----|----|----|----|----|----|----|----|----|----|----|----|
| CHARACTER | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 |
| LINE 1    | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 8A | 8B |
| LINE 2    | C0 | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | CA | CB |
| CHARACTER | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| LINE 1    | 8C | 8D | 8E | 8F | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 |
| LINE 2    | CC | CD | CE | CF | D0 | D1 | D2 | D3 | D4 | D5 | D6 | D7 |