

PART NO. : DC2004B1

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## ***2. General specifications***

### ***2.1 General specifications***

*We are opened to customer specifics*

## ***3. Mechanical data***

- (1) NUMBER OF DOTS ----- 20 Character \* 4 LINE
- (2) MODULE SIZE ----- 146 W \* 62.5 H \* 15.5 T (max) mm
- (3) EFFECTIVE AREA ----- 123 W(min) \* 43 H mm
- (4) ACTIVE AREA ----- 118.85 W \* 38.1 H mm
- (5) DOT SIZE----- 0.93 W \* 1.1 H mm
- (6) DOT PITCH ----- 0.98 W \* 1.15 H mm
- (7) VIEWING DIRECTION----- 6 O'CLOCK
- (8) LCD TYPE----- STN/ Yellow Green
- (9)BACKLIGHT COLOR ----- Yellow Green / White available

#### 4. Absolute maximum ratings

##### 4.1 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 <sub>DD</sub> -V <sub>SS</sub> | 4.5             | 5.0             | 5.5              | -----          |
| INPUT VOLTAGE                  | V <sub>I</sub>                   | V <sub>SS</sub> | V <sub>DD</sub> | V                | -----          |
| STATIC ELECTRICITY             | -----                            | -----           | -----           | V                | NOTE (1)       |
| POWER SUPPLY FOR BACKLIGHT     | V <sub>S</sub>                   | -----           | 4.2             | V <sub>rms</sub> | -----          |
|                                | f <sub>FL</sub>                  | -----           | -----           | KHz              | -----          |
| STARTING VOLTAGE FOR BACKLIGHT | -----                            | -----           | -----           | V <sub>rms</sub> | -----          |
|                                | -----                            | -----           | -----           | V <sub>rms</sub> | -----          |
| POWER SUPPLY FOR LCD           | V <sub>DD</sub> -V <sub>EE</sub> | -----           | 4.5             | V                | -----          |

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

##### 4.2 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              | 70          | -30            | 80          | -----                                       |
| HUMIDITY              | NOTE (2)         |             | NOTE (2)       |             | NO CONDENSATION                             |
| VIBRATION<br>NOTE (3) | -----            | 0.5G        | -----          | 2G          | 10~300Hz<br>XYZ<br>DIRECTIONS<br>1 Hr EACH  |
| SHOCK<br>NOTE (3)     | -----            | 3G          | -----          | 50G         | 10 msec<br>XYZ<br>DIRECTIONS<br>1 TIME EACH |
| CORROSIVE GAS         | NOT ACCEPTABLE   |             | NOT ACCEPTABLE |             | -----                                       |

NOTE (2): T<sub>a</sub> 70 : 75% RH MAX.

T<sub>a</sub> > 70 : ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 75% RH AT 70 .

NOTE (3): 1G = 9.8 m/s<sup>2</sup>

### 5. Electrical characteristics

Ta = 25? VDD = 5.0 ± 0.25 V

| <i>I T E M</i>                            | <i>SYMBOL</i>                                    | <i>CONDITION</i>                        | <i>MIN.</i>        | <i>TYP.</i> | <i>MAX.</i>        | <i>UNIT</i> |
|---|--|---|--------------------|-------------|--------------------|-------------|
| Power supply voltage for circuit          | VDD-VSS  | -----                                   | 4.75               | 5.0         | 5.25               | V           |
| Power supply voltage for LCD drive        | VEE-VSS  | -----                                   | -----              | 4.7         | -----              | V           |
| Input voltage,<br>NOTE (1)                | V <sub>IH</sub>                                  | H LEVEL                                 | 0.8V <sub>DD</sub> | -----       | V <sub>DD</sub>    | V           |
|   | V <sub>IL</sub>                                  | L LEVEL                                 | V <sub>SS</sub>    | -----       | 0.2V <sub>DD</sub> | V           |
| Power supply current,<br>NOTE (2)         | I <sub>DD</sub>                                  | V <sub>DD</sub> -V <sub>SS</sub> = 5.0V | -----              | 1.44        | ---                | mA          |
| LCD display duty ratio                    | DUTY   | -----                                   | -----              | 1/16        | -----              | -----       |
| Recommended LCD driving voltage, NOTE (3) | V <sub>DD</sub> -V <sub>O</sub><br>= 10°<br>= 0° | Ta = 70                                 | -----              |             | -----              | V           |
|   |  | Ta = 25                                 | -----              | 4.7         | -----              | V           |
|   |  | Ta = -20                                | -----              |             | -----              | V           |
| LED BACKLIGHT                             | Ifp  | I mse0 plus 10%<br>Dutg cycle           |                    | 2400        |                    | mA          |
|   |  | Operating voltage                       | -----              | 4.2         | -----              | V           |
|   |  | Forward current                         |                    | 400         |                    | mA          |
| LED Lifetime                              | -----  | -----                                   | -----              | 100,000     | -----              | Hr          |
| Power supply LCD current                  | I <sub>EE</sub>                                  | -----                                   | -----              | 0.44        |                    | mA          |

NOTE (1): APPLIED TO TERMINALS D0~D3, LOAD, CP, DISP OFF

NOTE (2): THE DISPLAY PATTERN IS ALL "ON", OR ALL "OFF"

NOTE (3): RECOMMENDED LCD DIRVING VOLTGE MAY FLUCTUATE ABOUT ± 0.5V BY EACH MODULE.

### 6. Optical characteristics

Ta = 25

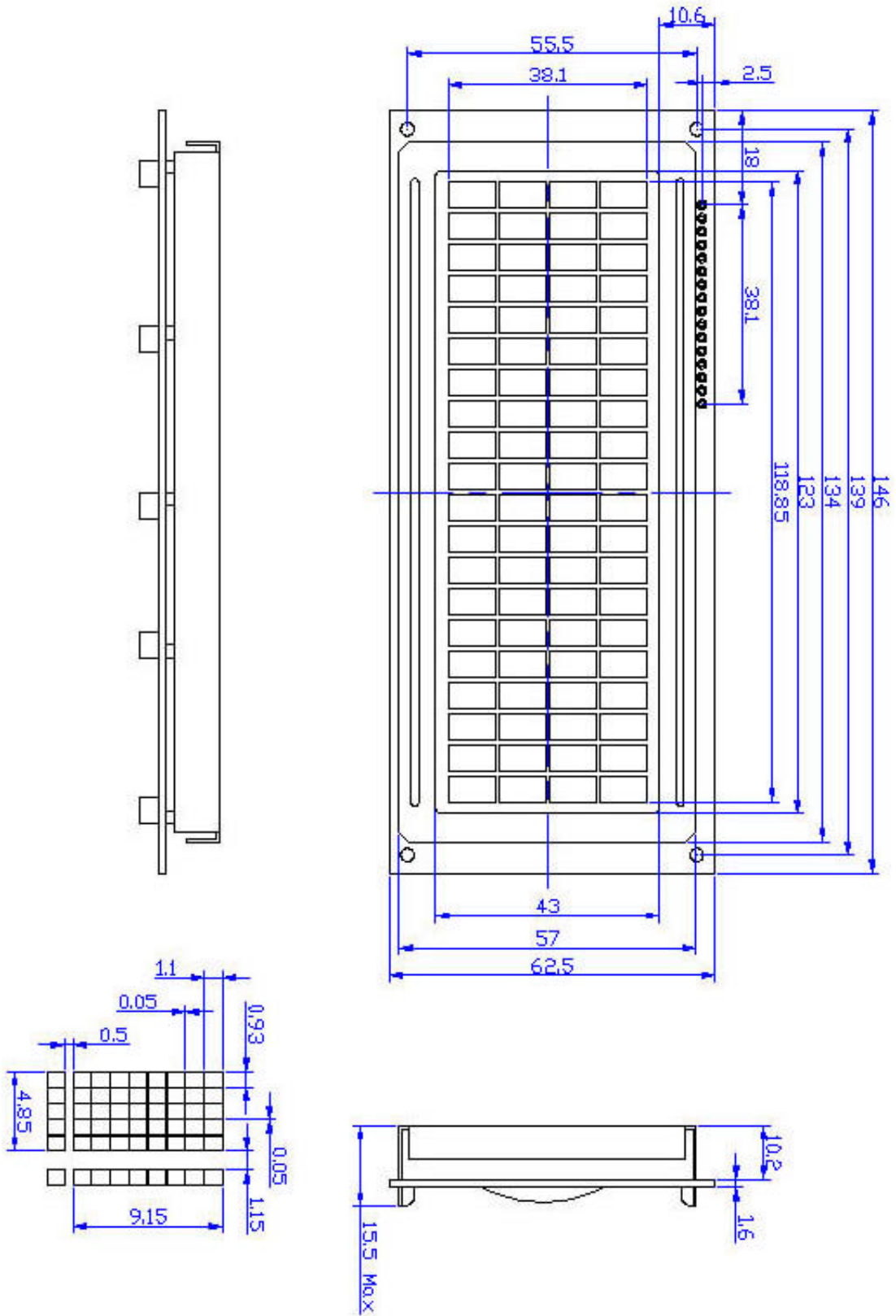
V<sub>DD</sub>-V<sub>O</sub> = 22.3V

| <i>I T E M</i>                           | <i>SYMBOL</i> | <i>CONDITION</i>                        | <i>MIN.</i> | <i>TYP.</i> | <i>MAX.</i> | <i>UNIT</i>       | <i>NOTE</i> |
|--|---------------|---|-------------|-------------|-------------|-------------------|-------------|
| Viewing angle                            | 2- 1          | K 2.0                                   | 40          | 50          | -----       | deg.              | 1           |
| Contrast ratio                           | K             | = 10°<br>= 0°                           | 5.0         | 6.0         | -----       | -----             | 1           |
| Response time<br>(at 25 )                | tr (rise)     | = 10°<br>= 0°                           | -----       | 215         | -----       | ms                | 1           |
|  | tf (fall)     | = 10°<br>= 0°                           | -----       | 150         | -----       | ms                | 1           |
| The brightness<br>of backlighting source | B             | DOTS ALL ON<br>VFL=270Vrms<br>fFL=35KHZ | -----       | 160         | -----       | cd/m <sup>2</sup> | 2           |

NOTE (1): SEE CUSTOMER ACCEPTANCE STANDARD SPECIFICATION FOR DEFINITION OF OPTICAL CHARACTERISTICS

NOTE (2): UNDER NORMAL TEMPERATURE AND HUMIDITY IN A DARK ROOM

**7. Outline dimension**



UNIT:mm

**7.1 Interface**

**Pin Assignment**

| <i>PIN NO.</i> | <i>SYMBOL</i> | <i>FUNCTION</i>                            |
|----------------|---------------|--|
| 1              | VSS           | GROUND                                     |
| 2              | VDD           | POWER SUPPLY FOR LOGIC AND LCD(+)          |
| 3              | V0            | POWER SUPPLY FOR LCD(-)                    |
| 4              | RS            | SELECTS REGISTERS (H: DATA L: INSTRUCTION) |
| 5              | R/W           | SELECTS READ OR WRITE                      |
| 6              | E             | STARTS DATA READ/WRITE                     |
| 7              | DB0           | DISPLAY DATA                               |
| 8              | DB1           | DISPLAY DATA                               |
| 9              | DB2           | DISPLAY DATA                               |
| 10             | DB3           | DISPLAY DATA                               |
| 11             | DB4           | DISPLAY DATA                               |
| 12             | DB5           | DISPLAY DATA                               |
| 13             | DB6           | DISPLAY DATA                               |
| 14             | DB7           | DISPLAY DATA                               |
| 15             | A             | POWER SUPPLY FOR LED(+)                    |
| 16             | K             | POWER SUPPLY FOR LED(-)                    |

**8. Block diagram**

