

623-374/386

## **PRELIMINARY ENGINEERING SPECIFICATIONS**

16 X 2 DOT MATRIX LCD MODULE

3v VERSION

LED Backlight version available

# **MDLS 16265SS-XLV(3v VERSION) 16 CHARACTERS X 2 LINES**

Specification may be changed without notice in order to improve performance and quality

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**VARITRONIX LIMITED**

**Preliminary Specification  
of  
LCD Module Type  
MDLS16265SS-XLV**

**1. General Description**

- 16 characters x 2 lines STN XLV Positive Green Yellow Dot Matrix LCD module
- Viewing Angle: 6 O'clock direction
- Driving duty: 1/16 Duty, 1/3 bias
- 'SAMSUNG' KS0070B die form LCD Controller & Driver.
- Optional LED01G / LED04G backlight available.

**2. Mechanical Specifications**

The mechanical detail is shown in Fig. 1A and summarized in Table 1 below.

Table 1

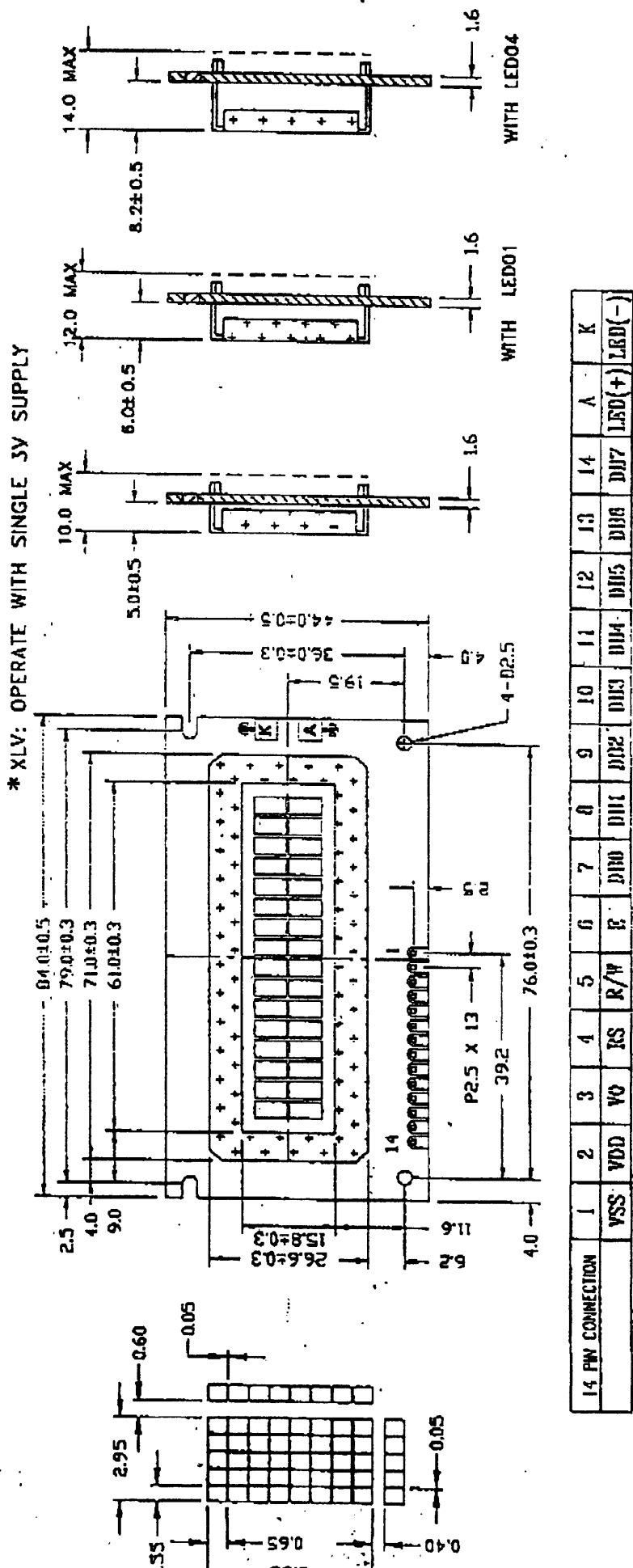
| Parameter              | Specifications  | Unit |
|------------------------|---|------|
| Outline dimensions     | 84.0(W) x 44.0(H) x 10.0 MAX.(D) (see Note 1)<br>84.0(W) x 44.0(H) x 12.0 MAX.(D) (see Note 2)<br>84.0(W) x 44.0(H) x 14.0 MAX.(D) (see Note 3) | m.m. |
| Effective viewing area | 61.0(W) x 15.8(H)   | m.m. |
| Display format         | 16 characters x 2 lines   | -    |
| Character size         | 2.95(W) x 5.55(H) (5 x 8 dots)  | m.m. |
| Character spacing      | 0.60(W) x 0.40(H)   | m.m. |
| Character pitch        | 3.55(W) x 5.95(H)   | m.m. |
| Dot size               | 0.55(W) x 0.65(H)   | m.m. |
| Dot spacing            | 0.05(W) x 0.05(H)   | m.m. |
| Dot pitch              | 0.60(W) x 0.70(H)   | m.m. |
| Weight:                | without LED04 backlight approx. 30.5<br>with LED04 backlight approx. 39.0<br>with LED01 backlight TBD   | gram |

Note 1: Without LED04 backlight.(see Fig. 1A).

Note 2: With LED01 backlight.(see Fig. 1A)

Note 3: With LED04 backlight.(see Fig. 1A).

FIGURE 1A: MDLS16265SS-XLY Module.



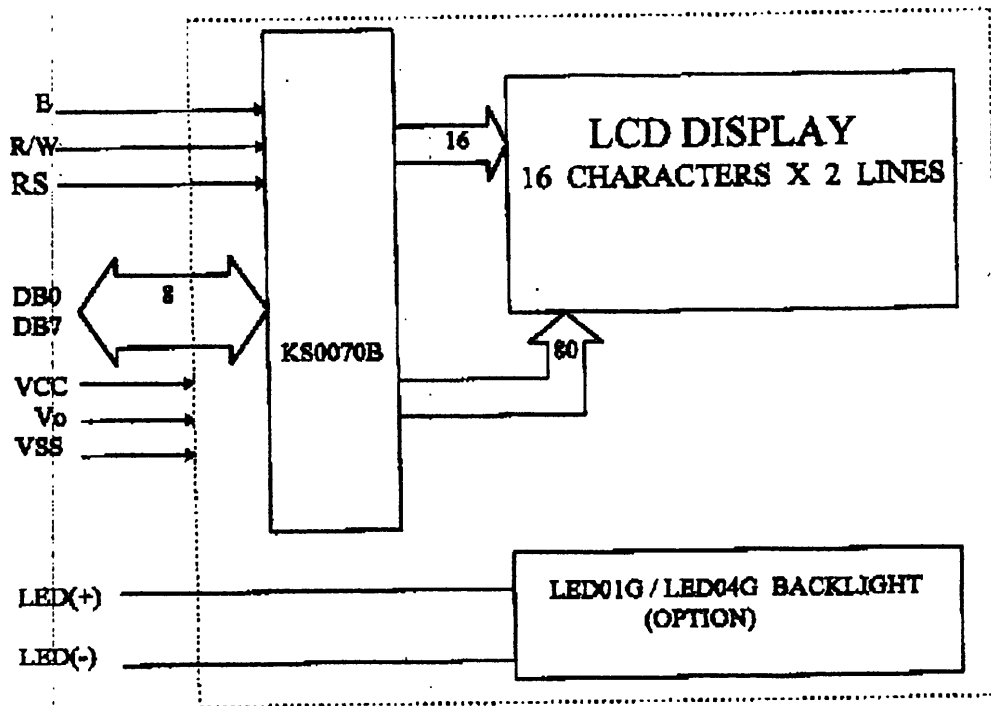


FIGURE 1B: A block diagram of MDLS16265SS-XLV Module.

**3. Absolute Maximum Ratings**

**3.1 Electrical Maximum Ratings (Ta = 25 °C)**

**Table 2**

| Parameter                        | Symbol                           | Min. | Max.            | Unit |
|----------------------------------|----------------------------------|------|-----------------|------|
| Power Supply voltage (Logic)     | V <sub>DD</sub> - GND            | 0    | 7.0             | V    |
| Power Supply voltage (LCD drive) | V <sub>DD</sub> - V <sub>O</sub> | 0    | 11.5            | V    |
| Input voltage                    | V <sub>in</sub>                  | 0    | V <sub>DD</sub> | V    |

**3.2 Environmental Condition**

**Table 3**

| Item                | Operating Temperature (Topr) |       | Storage Temperature (Tstg) |       | Remark          |
|---------------------|------------------------------|-------|----------------------------|-------|-----------------|
|                     | Min.                         | Max.  | Min.                       | Max.  |                 |
| Ambient Temperature | 0°C                          | +50°C | -10°C                      | +60°C |                 |
| Humidity            | Note1                        |       | Note1                      |       | no condensation |
| Vibration           | Note2                        |       | Note2                      |       | 3 directions    |
| Shock               | Note3                        |       | Note3                      |       | 3 directions    |

Note 1: 95% max. RH for Ta ≤ 40°C  
< 95% RH for Ta > 40°C

Note 2: Frequency: 10 ~ 55 Hz  
Amplitude: 1.5 m.m.  
Duration: 10 Hz ~ 55 Hz ~ 10 Hz (in 1 min.) for 6 hours  
(2 hours in each direction).

Note 3: 3 shocks in 3 mutually perpendicular directions.  
Direction normal to surface of LCD glass :  
acceleration 80G , half-sine pulse of duration 11 ms.  
Other 2 directions : acceleration 100G with same waveform.

## 4. Electrical Specifications

### 4.1 Interface signals

Table 4

| Pin No. | Symbol          | Description   |
|---------|-----------------|---|
| 1       | V <sub>SS</sub> | Ground  |
| 2       | V <sub>DD</sub> | Power supply for logic (+3V)  |
| 3       | V <sub>O</sub>  | Power supply for LCD driver   |
| 4       | RS              | Register Select Input:<br>'High' for Data register (for read and write)<br>'Low' for Instruction register (for write),<br>Busy flag; address counter (for read) |
| 5       | R/W             | Read/Write signal: 'High' for Read mode.<br>'Low' for Write mode.   |
| 6       | E               | Enable. To read and write the data.   |
| 7       | DB0             | Data input/output (LSB)   |
| 8       | DB0             | Data input/output   |
| 9       | DB2             | Data input/output   |
| 10      | DB3             | Data input/output   |
| 11      | DB4             | Data input/output   |
| 12      | DB5             | Data input/output   |
| 13      | DB6             | Data input/output   |
| 14      | DB7             | Data input/output (MSB)   |
| 15      | LED(+)          | Anode of backlight  |
| 16      | LED(-)          | Cathode of backlight  |

### 4.2 Electrical characteristics at T<sub>a</sub> = 25 °C, V<sub>DD</sub> = 3.0V, V<sub>SS</sub> = 0V

Table 5

| Parameter   | Symbol  | Conditions            | Min.               | Typ. | Max.               | Unit | Remarks  |
|---|---|-----------------------|--------------------|------|--------------------|------|----------|
| Supply voltage (Logic+LCD)                        | V <sub>DD</sub> -V <sub>SS</sub>                  |                       | -                  | 3.0  | -                  | V    |          |
| Supply voltage (LCD)                              | V <sub>LCD</sub> =V <sub>DD</sub> -V <sub>O</sub> | V <sub>DD</sub> =3.0V | 2.5                | 2.7  | 3.0                | V    | Note (1) |
| Input signal voltage 1<br>for E, DB0-DB7, R/W, RS | V <sub>IHI</sub>                                  | "H" level             | 1.9                | -    | V <sub>DD</sub>    | V    |          |
|   | V <sub>IL1</sub>                                  | "L" level             | -0.3               | -    | 0.4                | V    |          |
| Input signal voltage 2<br>for OSC1                | V <sub>IH2</sub>                                  | "H" level             | 0.7V <sub>DD</sub> | -    | V <sub>DD</sub>    | V    |          |
|   | V <sub>IL2</sub>                                  | "L" level             | 0                  | -    | 0.2V <sub>DD</sub> | V    |          |
| Supply Current (Logic+LCD)                        | I <sub>DD</sub>                                   |                       | 0.50               | 0.52 | 0.55               | mA   |          |
| Supply Current (LCD)                              | I <sub>b</sub>                                    | Note (1)              | 0.18               | 0.20 | 0.23               | mA   |          |
| Supply Voltage (LED01)                            | V <sub>LED01</sub>                                | Note(2)               | -                  | 2.1  | -                  | V    | Option   |
| Supply Current (LED01)                            | I <sub>LED01</sub>                                | Note(2)               | -                  | 40   | -                  | mA   | Option   |
| Supply Voltage (LED04)                            | V <sub>LED04</sub>                                | Note(3)               | 4.0                | 4.1  | 4.2                | V    | Option   |
| Supply Current (LED04)                            | I <sub>LED04</sub>                                | Note(3)               | 65                 | 90   | 140                | mA   | Option   |

Note (1): Driving scheme: 1/16 duty, 1/3 bias.

Note (2): Number of LED chips for LED01 = 4 LED chips.

Note (3): Number of LED chips for LED04 = 18 LED chips.

### 4.3 Timing Specifications at $T_a = -25 \sim +75^\circ\text{C}$ , $V_{DD} = 3V \pm 10\%$ , $V_{SS} = 0V$

Refer to Fig. 2, the bus timing diagram for write mode of KS0070B.

Table 6

| Parameter                 | Symbol    | Min. | Max. | Unit | Test pin |
|---------------------------|-----------|------|------|------|----------|
| E cycle time              | $t_c$     | 1400 | -    | ns   | E        |
| E rise time               | $t_r$     | -    | 25   | ns   | E        |
| E fall time               | $t_f$     | -    | 25   | ns   | E        |
| E pulse width (High, Low) | $t_w$     | 500  | -    | ns   | E        |
| R/W and RS set-up time    | $t_{su}$  | 60   | -    | ns   | R/W, RS  |
| R/W and RS hold time      | $t_h$     | 20   | -    | ns   | R/W, RS  |
| Data set-up time          | $t_{su2}$ | 140  | -    | ns   | DB0-DB7  |
| Data hold time            | $t_{h2}$  | 10   | -    | ns   | DB0-DB7  |

Refer to Fig. 3, the bus timing diagram for read mode of KS0070B.

Table 7

| Parameter              | Symbol   | Min. | Max. | Unit | Test pin |
|------------------------|----------|------|------|------|----------|
| E cycle time           | $t_c$    | 1400 | -    | ns   | E        |
| E rise time            | $t_r$    | -    | 25   | ns   | E        |
| E fall time            | $t_f$    | -    | 25   | ns   | E        |
| E pulse width          | $t_w$    | 500  | -    | ns   | E        |
| R/W and RS set-up time | $t_{su}$ | 60   | -    | ns   | R/W, RS  |
| R/W and RS hold time   | $t_h$    | 20   | -    | ns   | R/W, RS  |
| Data output delay time | $t_d$    | -    | 360  | ns   | DB0-DB7  |
| Data hold time         | $t_{dH}$ | 5    | -    | ns   | DB0-DB7  |



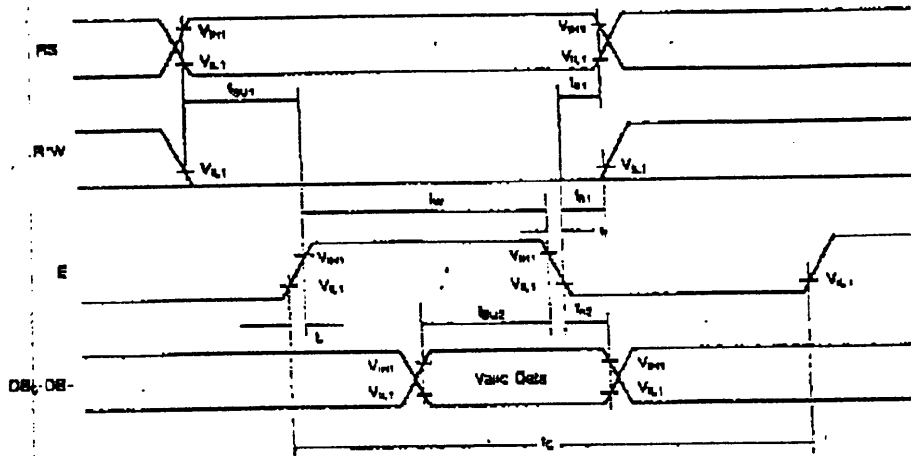


Fig. 2 , The bus timing diagram for write mode of KS0070B  
(Writing data from Micom to KS0070B).

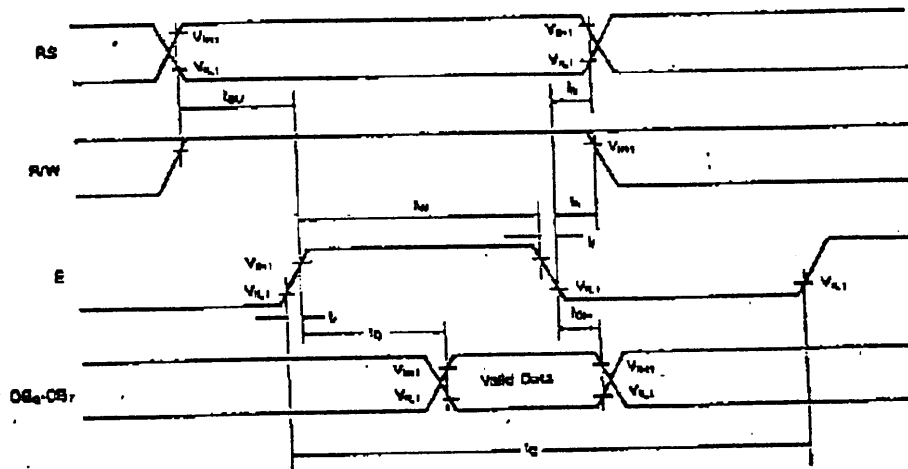


Fig. 3 , The bus timing diagram for read mode of KS0070B.  
(Reading data from KS0070B)

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