

# *ME* DISPLAYS

**SPECIFICATIONS  
FOR  
LCD MODULE  
CCM2020**

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**ME DISPLAYS****CCM2020**  
**20 x 2 lines Character****• FEATURES**

|                      |                            |
|----------------------|----------------------------|
| Number of Characters | 20 characters x 2 lines    |
| Display Font         | 5 x 8 dots                 |
| Built-in Controller  | HD44780 or Comp            |
| Input Data           | 4 Bits or 8-Bits Interface |
| Power Supply         | +5 V Single Power          |
| Duty Cycle           | 1/16 Duty                  |
| Options              | EL/LED Backlight, TN/STN   |

**• MECHANICAL PARAMETERS**

|                                |                           |
|--------------------------------|---------------------------|
| Module Size                    | 116.0W x 37.0H x 11.0T mm |
| Module Size with LED Backlight | 116.0W x 37.0H x 24.0T mm |
| Viewing Area Size              | 83.6W x 18.5H mm          |
| Dot Size                       | 0.65 x 0.60 mm            |
| Dot Pitch                      | 0.70 x 0.65 mm            |

**• ABSOLUTE MAXIMUM**

| Item                       | Symbol | Min.     | Max     | Unit |
|----------------------------|--------|----------|---------|------|
| Power Supply for Logic     | Vdd    | -0.3     | +7.0    | V    |
| Power Supply for LCD Drive | Vlcd   | Vdd-13.5 | Vdd+0.3 | V    |
| Input Voltage              | Vi     | -0.3     | Vdd+0.3 | V    |
| Operating Temperature      | Ta     | 0        | +50     | C    |
| Storage Temperature        | Tstg   | -10      | +60     | C    |

**• ELECTRICAL CHARACTERISTICS**(Vdd=5.0V  $\pm$  5%, Ta=25C)

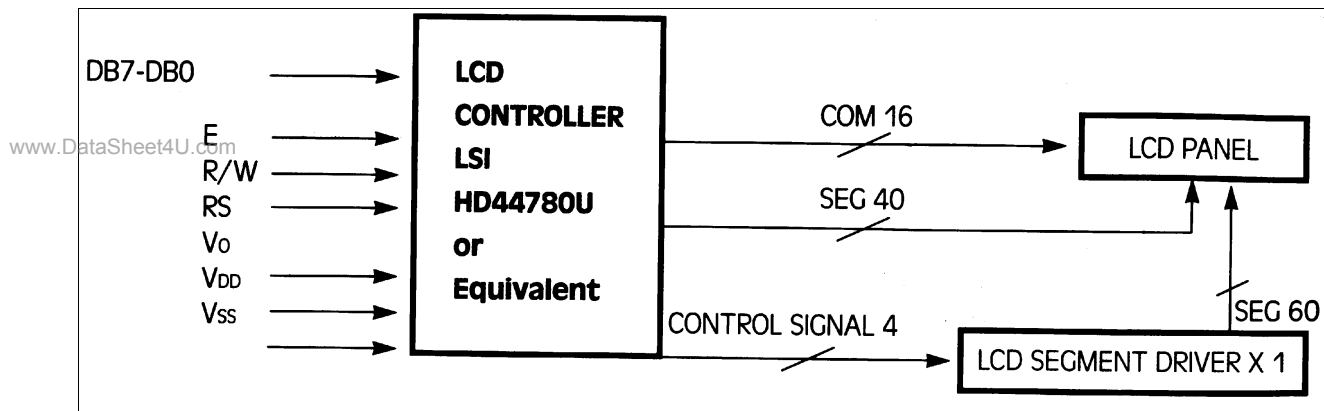
| Item                   | Symbol | Conditions    | Min  | Typ | Max | U  |
|------------------------|--------|---------------|------|-----|-----|----|
| Power Supply for Logic | Vdd    | --            | 4.5  | --  | 5.5 | V  |
| Op. Voltage for LCD    | Vdd-Vo | --            | --   | 5.0 | --  | V  |
| Input "High" Voltage   | Vih    | --            | 2.2  | --  | Vdd | V  |
| Input "Low" Voltage    | Vil    | --            | -0.3 | --  | 0.6 | V  |
| Output "High" Voltage  | Voh    | - Ioh = 0.2mA | 2.4  | --  | --  | V  |
| Output "Low" Voltage   | Vol    | Iol = 1.2mA   | --   | --  | 0.4 | V  |
| Power Supply Current   | Idd    | Vdd = 5.0V    | --   | 0.4 | 0.6 | mA |

**ME DISPLAYS****CCM2020**  
**20 x 2 lines Character**

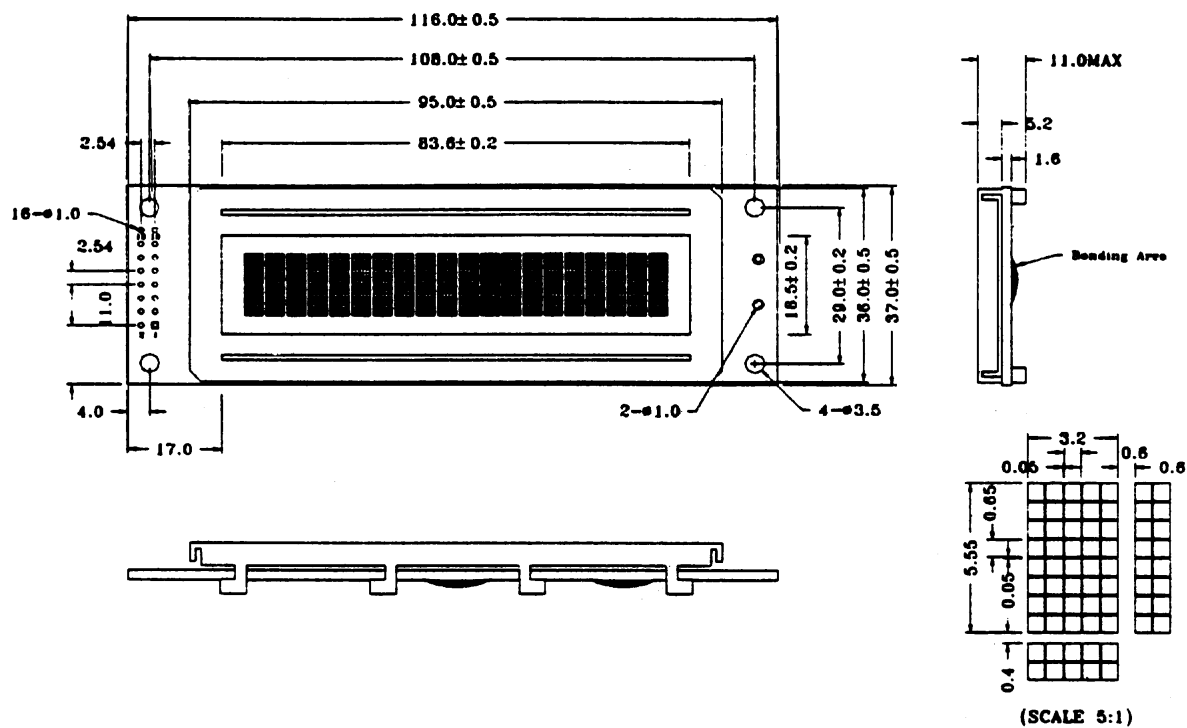
- PIN ASSIGNMENT**

| No. | Symbol | Level  | Pin Description          | Function                     |
|-----|--------|--------|--------------------------|------------------------------|
| 1   | Vss    | --     | Ground                   | 0V                           |
| 2   | Vdd    | --     | Supply Voltage for Logic | 5V                           |
| 3   | Vo     | --     | LCD Contrast Adjust      | By User                      |
| 4   | RS     | H/L    | Register Select          | H: Data, L: Instruction Code |
| 5   | R/W    | H/L    | Read / Write             | H: Data Read, L: Data Write  |
| 6   | E      | H, H→L | Enable                   | Enable Signal                |
| 7   | DB0    | H/L    | Data Bit 0               | 8-Bit Interface              |
| 8   | DB1    | H/L    | Data Bit 1               | 8-Bit Interface              |
| 9   | DB2    | H/L    | Data Bit 2               | 8-Bit Interface              |
| 10  | DB3    | H/L    | Data Bit 3               | 8-Bit Interface              |
| 11  | DB4    | H/L    | Data Bit 4               | 4 or 8-Bit Interface         |
| 12  | DB5    | H/L    | Data Bit 5               | 4 or 8-Bit Interface         |
| 13  | DB6    | H/L    | Data Bit 6               | 4 or 8-Bit Interface         |
| 14  | DB7    | H/L    | Data Bit 7               | 4 or 8-Bit Interface         |
| 15  | A      | --     | LED Backlight            | Power Supply for Backlight   |
| 16  | K      | --     | LED Backlight            | Power Supply for Backlight   |

- BLOCK DIAGRAM**



• DIAGRAM CCM2020



## • ENVIRONMENTAL CONDITIONS

| Item                     | Operating        |      | Non-Operating |      | Remarks                   |
|--------------------------|------------------|------|---------------|------|---------------------------|
|                          | Min              | Max  | Min           | Max  |                           |
| Ambient Temperature (Ta) | 0°C              | 50°C | -20°C         | 70°C | Normal Temperature Type   |
|                          | -20°C            | 70°C | -30°C         | 80°C | Extended Temperature Type |
| Vibration                | --               | 0.5G | --            | 2G   | $G=9.8 \text{ m/s}^2$     |
| Shock                    | --               | 3G   | --            | 50G  | XYZ Directions            |
| Corrosion Gas            | No Corrosion Gas |      |               |      |                           |

## • OPTICAL CHARACTERISTICS

### TN TYPE

| Item                 | Symbol                               | Condition                                  | Min | Typ | Max | Unit |
|----------------------|--------------------------------------|--------------------------------------------|-----|-----|-----|------|
| Viewing Angle        | $\varnothing 2\text{-}\varnothing 1$ | $K=1.4$                                    | 20  | --  | --  | Deg  |
| Contrast Ratio       | K                                    | $\varnothing=25^\circ$<br>$\theta=0^\circ$ | --  | 3   | --  | --   |
| Response Time (Rise) | tr                                   | $\varnothing=25^\circ$<br>$\theta=0^\circ$ | --  | 200 | 250 | ms   |
| Response Time (Fall) | tf                                   | $\varnothing=25^\circ$<br>$\theta=0^\circ$ | --  | 200 | 300 | ms   |

### STN TYPE

| Item                 | Symbol                               | Condition                                  | Min | Typ | Max | Unit |
|----------------------|--------------------------------------|--------------------------------------------|-----|-----|-----|------|
| Viewing Angle        | $\varnothing 2\text{-}\varnothing 1$ | $K=1.4$                                    | 40  | --  | --  | Deg  |
| Contrast Ratio       | K                                    | $\varnothing=25^\circ$<br>$\theta=0^\circ$ | 3   | --  | --  | --   |
| Response Time (Rise) | tr                                   | $\varnothing=25^\circ$<br>$\theta=0^\circ$ | --  | 200 | 300 | ms   |
| Response Time (Fall) | tf                                   | $\varnothing=25^\circ$<br>$\theta=0^\circ$ | --  | 250 | 350 | ms   |

## • BACKLIGHT CHARACTERISTICS

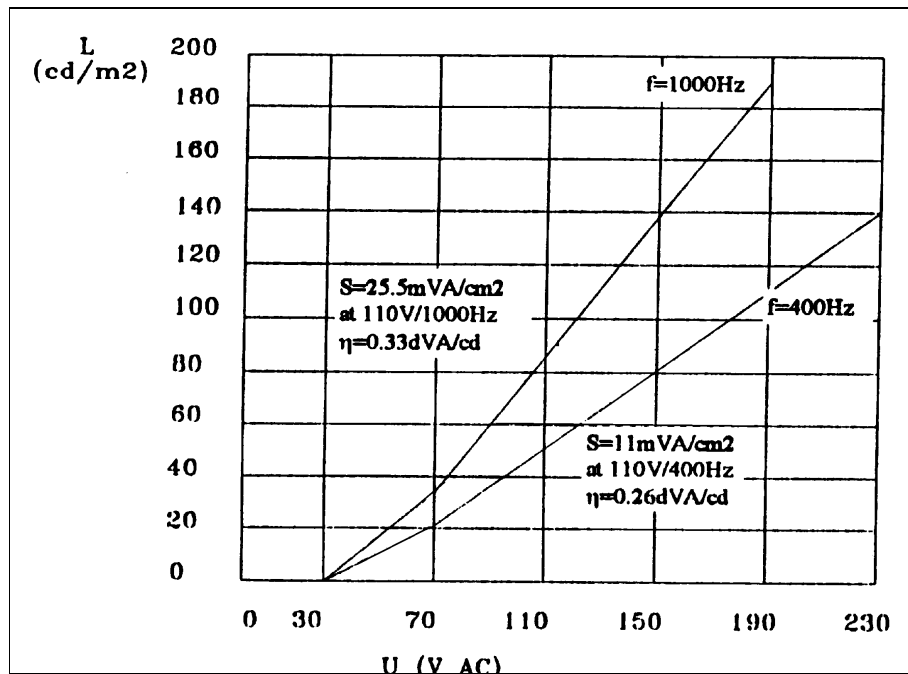
### EL BACKLIGHT

#### Electrical Data

| Parameter         | Description             |
|-------------------|-------------------------|
| Power Supply      | Up to max. 230 RMS      |
| Wave Shape        | Sinusoidal              |
| Frequency         | Up to max. 3 KHz        |
| Efficiency $\eta$ | (dvA/cd)                |
| Capacity          | 0.55 nF/cm <sup>2</sup> |
| Operating Current | 160mA                   |

#### Optical Data

| Parameter                                         | Description                                 |
|---------------------------------------------------|---------------------------------------------|
| Power Supply                                      | 110v 400Hz sinusoidal                       |
| Luminous Intensity                                | 42 cd/m <sup>2</sup> resp 12.4fl            |
| Emission                                          | Color White(Rose) 564nm<br>x=0.293, y=0.365 |
| Homogeneity                                       | $\pm 5\%$                                   |
| Useful Life                                       | Unlimited                                   |
| Brightness Uniformity<br>(Relative Humidity <80%) | 1000h approx. 80%<br>5000h approx. 50%      |



**LED BACKLIGHT****Characterisitcs**

Low Voltage Driving (DC) is available without inverter

No noise occurrence

Life : 20K Hours

| Item                    | Symbol | Conditions | Rating | Unit |
|-------------------------|--------|------------|--------|------|
| Power Dissipation       | Pmax   | --         | 1960   | mW   |
| Forward Voltage         | Vf     | Type       | 4.4    | V    |
| Reverse Voltage         | Vr min | Ir=1400uA  | 10     | V    |
| Average Forward Current | If max | Vf=4.4V    | 350    | mA   |

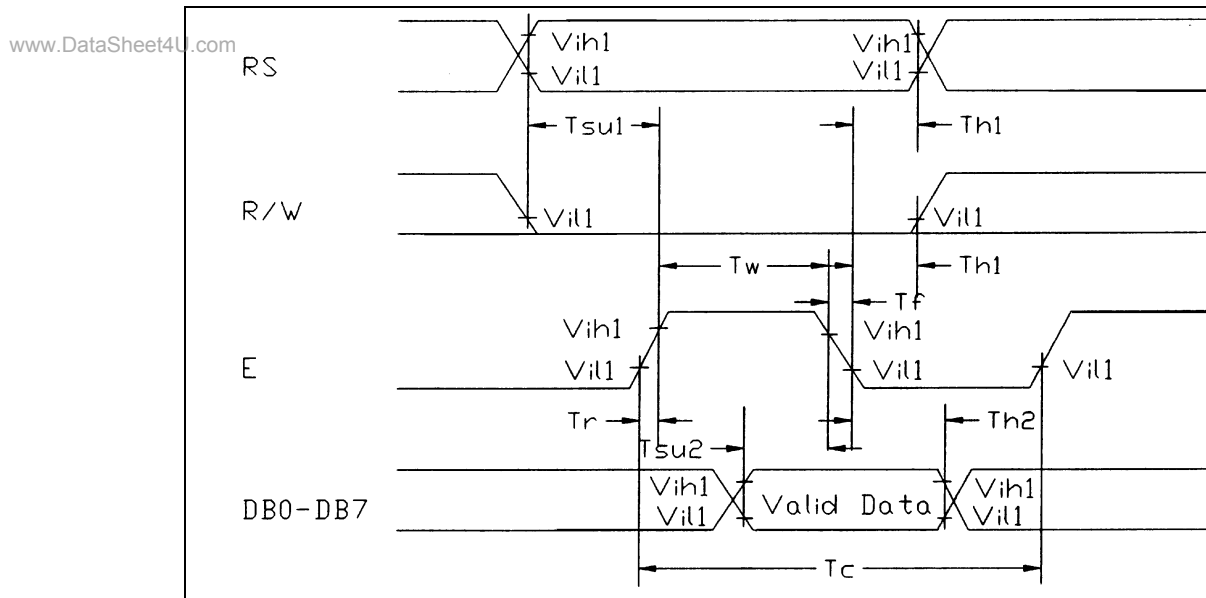
- AC CHARACTERISTICS**

(Vdd=5V  $\pm$  10%, Vss=0V, Ta=25°C)

Write Mode (Writing data from Micom to KS070B)

| Item                     | Symbol                            | Min | Max | Unit |
|--------------------------|-----------------------------------|-----|-----|------|
| Enable Cycle Time        | T <sub>CYCE</sub>                 | 500 | --  | ns   |
| Enable Pulse Width       | PW <sub>EH</sub>                  | 220 | --  | ns   |
| Enable Rise/Fall Time    | t <sub>Er</sub> , t <sub>Ef</sub> | --  | 25  | ns   |
| Address Set-up Time      | t <sub>AS</sub>                   | 40  | --  | ns   |
| Address Hold Time        | t <sub>AH</sub>                   | 10  | --  | ns   |
| Data Set-up Time         | t <sub>DSW</sub>                  | 60  | --  | ns   |
| Data Hold Time (Writing) | t <sub>H</sub>                    | 10  | --  | ns   |
| Data Hold Time (Reading) | t <sub>DHR</sub>                  | 10  | --  | ns   |

- TIMING CHARACTERISTICS**



# • CONTROL AND DISPLAY COMMAND

| Command                  | RS | R/W | DB7        | DB6                                               | DB5                                     | DB4 | DB3 | DB2 | DB1 | DB0 | Remark                                                                                                                                        |  |
|--------------------------|----|-----|------------|---------------------------------------------------|-----------------------------------------|-----|-----|-----|-----|-----|-----------------------------------------------------------------------------------------------------------------------------------------------|--|
| Display Clear            | L  | L   | L          | L                                                 | L                                       | L   | L   | L   | L   | H   |                                                                                                                                               |  |
| Return Home              | L  | L   | L          | L                                                 | L                                       | L   | L   | L   | H   | X   | Cursor Moves to First Digit                                                                                                                   |  |
| Entry Mode Set           | L  | L   | L          | L                                                 | L                                       | L   | L   | H   | I/D | SH  | I/D: Set Cursor Move Direction<br>H-Increase L-Decrease<br>SH: Specifies Shift of Display<br>H-Display is Shifted<br>L-Display is Not Shifted |  |
| Display On/Off           | L  | L   | L          | L                                                 | L                                       | L   | H   | D   | C   | B   | D: Display (H-on, L-off)<br>C: Cursor (H-on, L-off)<br>B: Blinking (H-o, L-off)                                                               |  |
| Shift                    | L  | L   | L          | L                                                 | L                                       | H   | S/C | R/L | X   | X   | SC: (H-Display Shift, L-Cursor Move)<br>R/L: (H-Right Shift, L-Left Shift)                                                                    |  |
| Set Function             | L  | L   | L          | L                                                 | H                                       | DL  | N   | F   | X   | X   | DL: (H-8 Bits Interface, L-4 Bits Interface)<br>N: (H-2 Line Display, L-1 Line Display)<br>F: (H-5 x 10 Dots, L-5 x7 Dots)                    |  |
| Set CG RAM Address       | L  | L   | L          | H                                                 | CG RAM Address (corresponds to address) |     |     |     |     |     | CG RAM Data is Sent and Received After this Setting                                                                                           |  |
| Set DD RAM Address       | L  | L   | H          | DD RAM Address                                    |                                         |     |     |     |     |     | DD RAM Data is Sent and Received After this Setting                                                                                           |  |
| Read Busy Flag & Address | L  | H   | BF         | Address Counter Used for Both DD & CG RAM Address |                                         |     |     |     |     |     | BF: (H-Busy, L-Ready)<br>-- Reads BF: Indicates Internal Operation is Being Performed.<br>-- Read Address Counter Contents                    |  |
| Write Data               | H  | L   | Write Data |                                                   |                                         |     |     |     |     |     | Write Data into DD or CG RAM                                                                                                                  |  |
| Read Data                | H  | H   | Read Data  |                                                   |                                         |     |     |     |     |     | Read Data from DD or CGRAM                                                                                                                    |  |