

ME DISPLAYS

SPECIFICATIONS

FOR

LCD MODULE

CCM4020

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- FEATURES**

| | |
|-----------------------------|-----------------------------------|
| <i>Number of Characters</i> | <i>40 characters x 2 lines</i> |
| <i>Display Font</i> | <i>5 x 8 dots</i> |
| <i>Built-in Controller</i> | <i>HD44780 or Comp</i> |
| <i>Input Data</i> | <i>4 Bits or 8-Bits Interface</i> |
| <i>Power Supply</i> | <i>+5 V Single Power</i> |
| <i>Duty Cycle</i> | <i>1/16 Duty</i> |
| <i>Options</i> | <i>EL/LED Backlight, TN/STN</i> |

- MECHANICAL PARAMETERS**

| | |
|--------------------------|---------------------------------|
| <i>Module Size</i> | <i>182.0W x 33.5H x 9.5T mm</i> |
| <i>Viewing Area Size</i> | <i>152.5W x 15.5H mm</i> |
| <i>Dot Size</i> | <i>0.60 x 0.65 mm</i> |
| <i>Dot Pitch</i> | <i>0.65 x 0.70 mm</i> |

- ABSOLUTE MAXIMUM**

| Item | Symbol | Min. | Max | Unit |
|----------------------------|--------|------|------|------|
| Power Supply for Logic | Vdd | 0 | +7.0 | V |
| Power Supply for LCD Drive | Vlcd | 0 | 13.5 | V |
| Input Voltage | Vi | Vss | Vdd | V |
| Operating Temperature | Ta | 0 | +50 | C |
| Storage Temperature | Tstg | -20 | +70 | C |

- ELECTRICAL CHARACTERISTICS**

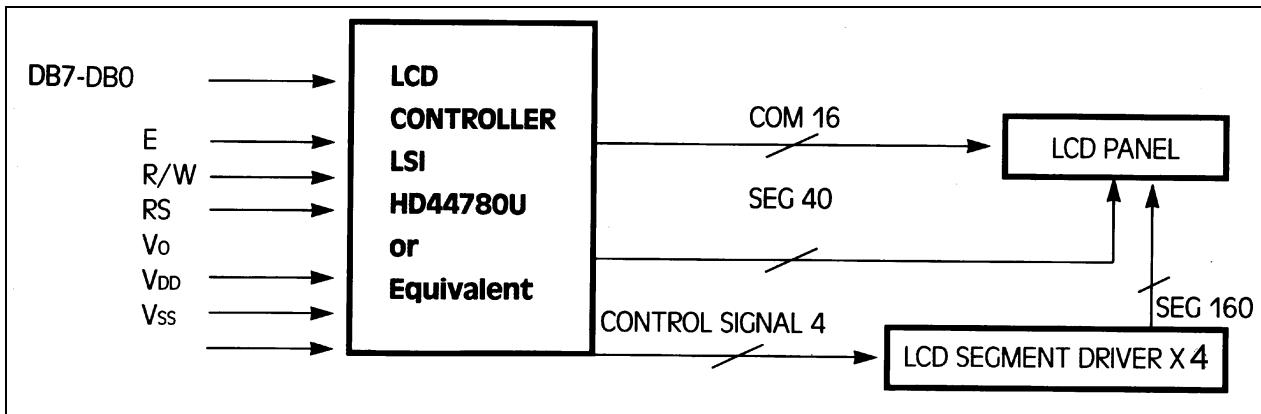
(Vdd=5.0V ± 5%, Ta=25C)

| 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 | -- | 1.0 | 3.0 | mA |

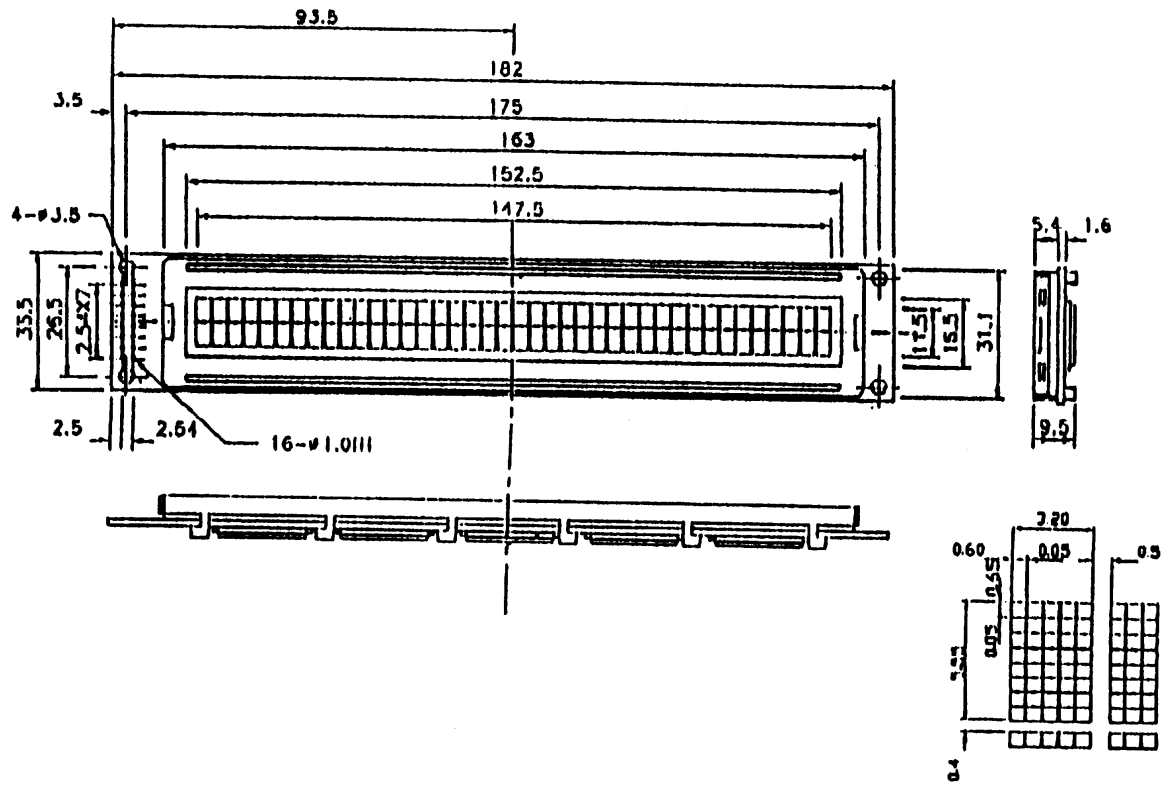
• **PIN ASSIGNMENT**

| 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 | -- | Backlight | Power Supply for Backlight |
| 16 | K | -- | Backlight | Power Supply for Backlight |

• **BLOCK DIAGRAM**



• DIAGRAM CCM4020



- 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 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 | Ø2-Ø1 | K=1.4 | 20 | -- | -- | Deg |
| Contrast Ratio | K | Ø=25° θ=0° | -- | 3 | -- | -- |
| Response Time (Rise) | tr | Ø=25° θ=0° | -- | 200 | 250 | ms |
| Response Time (Fall) | tf | Ø=25° θ=0° | -- | 200 | 300 | ms |

STN TYPE

| Item | Symbol | Condition | Min | Typ | Max | Unit |
|----------------------|--------|---------------|-----|-----|-----|------|
| Viewing Angle | Ø2-Ø1 | K=1.4 | 40 | -- | -- | Deg |
| Contrast Ratio | K | Ø=25° θ=0° | 3 | -- | -- | -- |
| Response Time (Rise) | tr | Ø=25° θ=0° | -- | 200 | 300 | ms |
| Response Time (Fall) | tf | Ø=25° θ=0° | -- | 250 | 350 | ms |

- **BACKLIGHT CHARASTERISTICS**

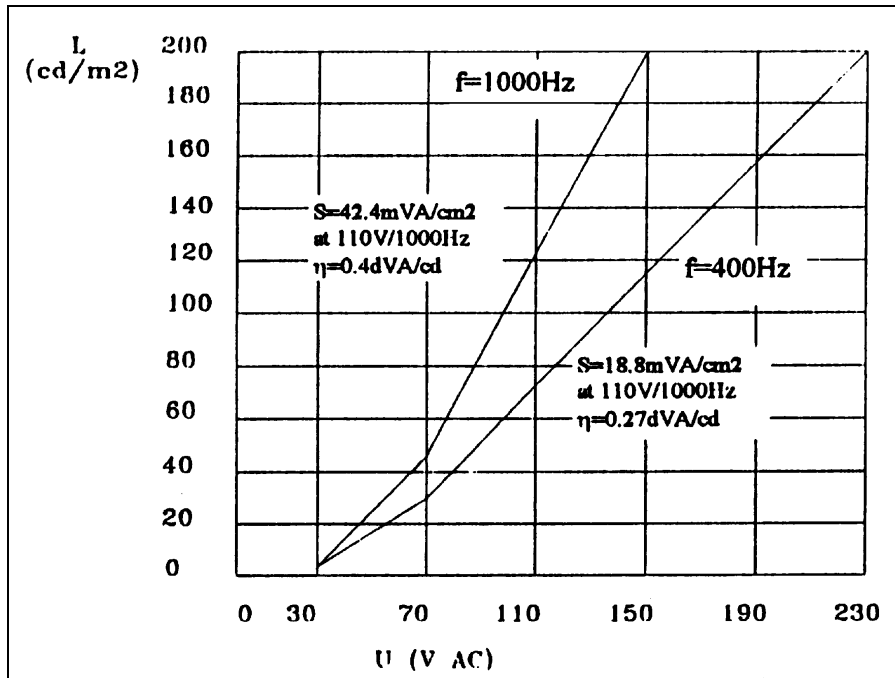
EL BACKLIGHT

Electrical Data

| Parameter | Description |
|-------------------|-------------------------|
| Power Supply | Up to max. 230 RMS |
| Wave Shape | Sinusoidal |
| Frequency | Up to max. 3 KHz |
| Efficiency η | (dvA/cd) |
| Capacity | 0.50 nF/cm ² |
| Operating Current | 160mA |

Optical Data

| Parameter | Description |
|---|--|
| Power Supply | 110v 400Hz sinusoidal |
| Luminous Intensity | 69.3 cd/m ² resp 20.4fl |
| Emission | Color Green/Blue 500nm x=0.173, y=0.407 |
| Homogeneity | $\pm 5\%$ |
| Useful Life | Unlimited |
| Brightness Uniformity (Relative Humidity <80%) | 1000h approx. 80% 5000h approx. 50% |



LED BACKLIGHT

Characterisitcs

Low Voltage Driving (DC) is available without invertor

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 |

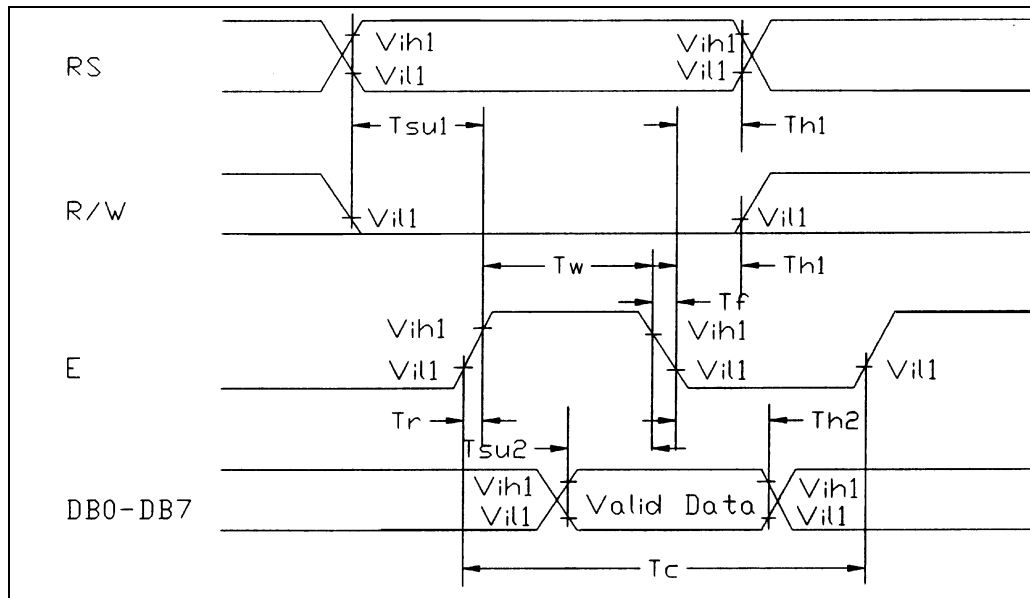
• AC CHARACTERISTICS

(Vdd=5V ± 10%, Vss=0V, Ta=25°C)

Write Mode (Writing data from Micom to KS070B)

| Item | Symbol | Min | Max | Unit |
|--------------------------|-----------------------------------|-----|-----|------|
| Enable Cycle Time | T _{CYCE} | 500 | -- | ns |
| Enable Pulse Width | PW _{EH} | 220 | -- | ns |
| Enable Rise/Fall Time | t _{Er} , t _{Ef} | -- | 25 | ns |
| Address Set-up Time | t _{AS} | 40 | -- | ns |
| Address Hold Time | t _{AH} | 10 | -- | ns |
| Data Set-up Time | t _{DSW} | 60 | -- | ns |
| Data Hold Time (Writing) | t _H | 10 | -- | ns |
| Data Hold Time (Reading) | t _{DHR} | 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 H-Increase L-Decrease SH: Specifies Shift of Display H-Display is Shifted L-Display is Not Shifted |
| Display On/Off | L | L | L | L | L | L | H | D | C | B | D: Display (H-on, L-off) C: Cursor (H-on, L-off) 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) 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) N: (H-2 Line Display, L-1 Line Display) 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) -- Reads BF: Indicates Internal Operation is Being Performed. -- 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 | | | |