



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

Coimbatore-35

sns
INSTITUTIONS

DEPARTMENT OF BIOMEDICAL ENGINEERING

19BMB303 & Fundamentals of Microprocessors and Microcontrollers

16x2 LCD Interface

III Year/ VI Sem

**Dr. K. Manoharan,
ASP / BME / SNSCT**



LCD Interface

- LCDs (Liquid Crystal Displays) are used for displaying status or Output in embedded systems.
- LCD used in 4-bit mode or 8-bit mode





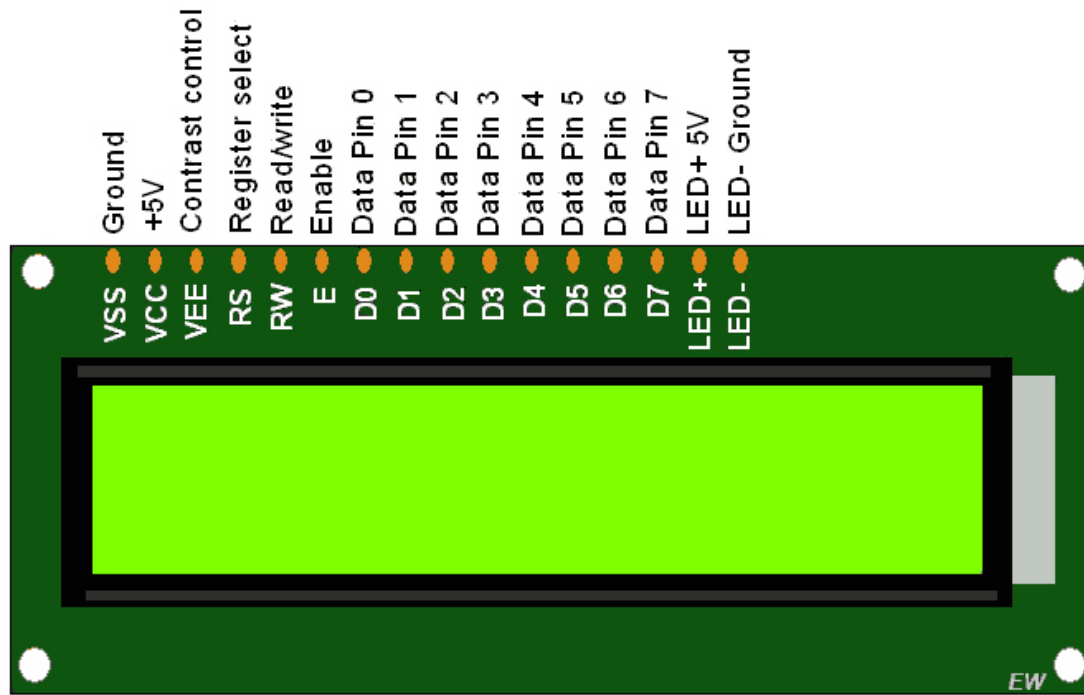
Characters are displayed 5x7 dot matrix

	d4	d3	d2	d1	d0
b0					
b1					
b2					
b3					
b4					
b5					
b6					
b7					

Row 1:	.				.
Row 2:		.	.	.	
Row 3:		.	.	.	
Row 4:					
Row 5:		.	.	.	
Row 6:		.	.	.	
Row 7:		.	.	.	



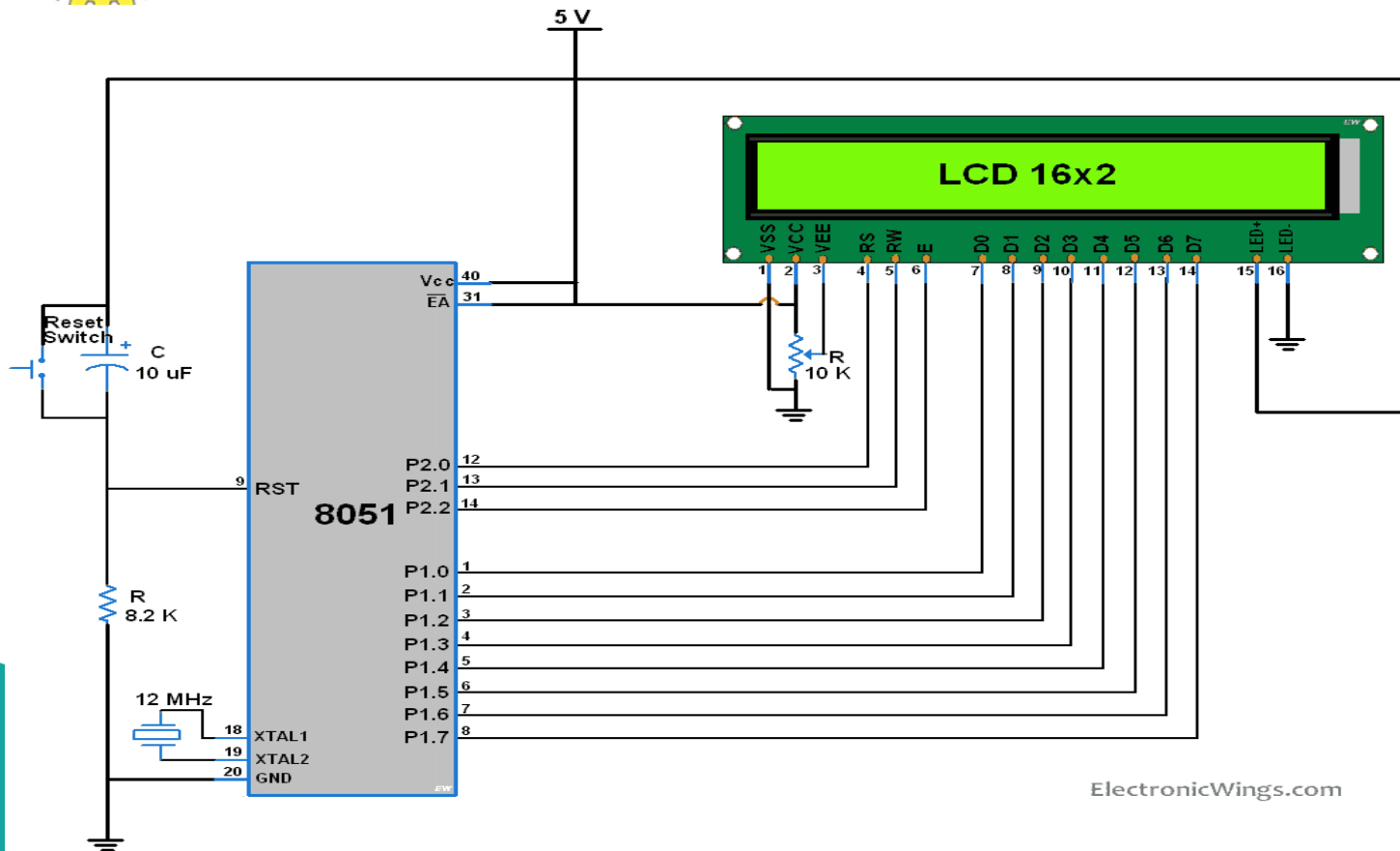
16x2 LCD Interface



- LCD 16x2 is 16 pin device
- 8 data pins (D0-D7)
- 3 control pins (RS, RW, EN).
- 5 pins supply and backlight



16x2 LCD Interface



ElectronicWings.com

LCD Pins	8051 Pins
Data Pins D0-D7	PORT1
RS	PORT2.0
RW	PORT2.1
E	PORT2.2



16x2 LCD Interface

✓ LCD Pins (8-bit mode)

- **D0–D7**: Data pins (8-bit)
- **RS**: Register Select (0 = Command, 1 = Data)
- **RW**: Read/Write (0 = Write, 1 = Read)
- **EN**: Enable (Latching pin)



16x2 LCD Interface

Algorithm to Display Character on LCD:

1. Initialize LCD in 8-bit mode.
2. Send Command to set cursor.
3. Send Data (ASCII of character) to display.
4. Add delay between commands for LCD processing.





Programs

START:

```
ACALL INIT_LCD
MOV A, #'H'      ; Character to display
ACALL LCD_DATA   ; Send to LCD
SJMP $
```

INIT_LCD:

```
MOV A, #38H      ; Function Set
ACALL LCD_CMD
MOV A, #0CH      ; Display ON
ACALL LCD_CMD
MOV A, #06H      ; Entry Mode
ACALL LCD_CMD
MOV A, #01H      ; Clear Display
ACALL LCD_CMD
RET
```

LCD_CMD:

```
CLR P3.0         ; RS = 0 (command)
CLR P3.1         ; RW = 0 (write)
MOV P2, A        ; Send command to data lines
SETB P3.2        ; EN = 1
ACALL DELAY
CLR P3.2         ; EN = 0
ACALL DELAY
RET
```

LCD_DATA:

```
SETB P3.0        ; RS = 1 (data)
CLR P3.1         ; RW = 0 (write)
MOV P2, A        ; Send data
SETB P3.2        ; EN = 1
ACALL DELAY
CLR P3.2         ; EN = 0
ACALL DELAY
RET
```