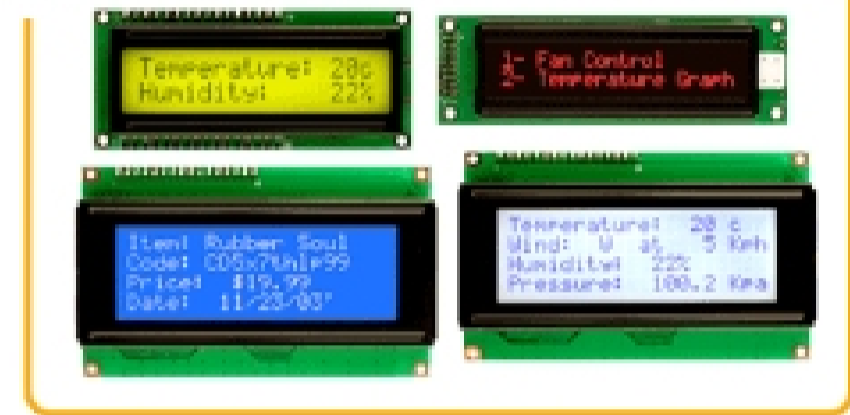


Alphanumeric LCD Displays

55:036
Embedded Systems and Systems
Software

Alphanumeric LCDs

CHARACTER LCD Screens



The HD44780 LCD Controller

- Most low cost Character-based LCD modules use the Hitachi HD44780 controller chip
 - Typically 8, 16, 20, 24 or 40 characters/line
 - 1, 2, or 4 lines
 - Handles up to $2^7 = 128$ total characters/display
- Standard 14-pin interface

LCD Pinouts

Pin number	Symbol	Level	I/O	Function
1	Vss	-	-	Power supply (GND)
2	Vcc	-	-	Power supply (+5V)
3	Vee	-	-	Contrast adjust
4	RS	0/1	I	0 = Instruction input 1 = Data input
5	RW	0/1	I	0 = Write to LCD module 1 = Read from LCD module
6	E	1, 1→0	I	Enable signal
7	DB0	0/1	I/O	Data bus line 0 (LSB)
8	DB1	0/1	I/O	Data bus line 1
9	DB2	0/1	I/O	Data bus line 2
10	DB3	0/1	I/O	Data bus line 3
11	DB4	0/1	I/O	Data bus line 4
12	DB5	0/1	I/O	Data bus line 5
13	DB6	0/1	I/O	Data bus line 6
14	DB7	0/1	I/O	Data bus line 7 (MSB)

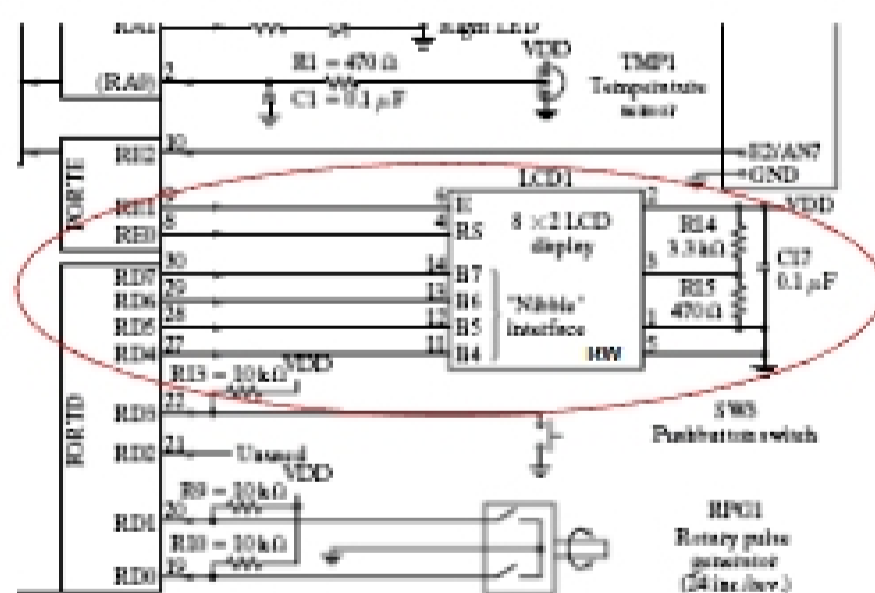
LCD Interface Modes

- 8 bit mode
 - Uses all 8 data lines DB0-DB7
 - Data transferred to LCD in byte units
 - Interface requires 10 (sometimes 11) I/O pins of microcontroller (DB0-DB7, RS, E) (sometimes R/W)
- 4-bit mode
 - 4-bit (nibble) data transfer
 - Doesn't use DB0-DB3
 - Each byte transfer is done in two steps: high order nibble, then low order nibble
 - Interface requires only 8 (sometimes 7) I/O pins of microcontroller (DB4-DB7, RS, E) (sometimes R/W)

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- QwikFlash uses 4-bit interface mode

QwikFlash LCD Configuration



LCD Control: RS, E, R/W

- RS (Register Select)
 - When low: data transferred to (from) device is treated as commands (status)
 - When high: data transferred to/from device is characters.
- R/W (Read/Write)
 - Controls data transfer direction
 - low to write to LCD
 - high to read from LCD
 - On the QwikFlash, this pin is wired to ground—i.e. can't read from LCD
- E (Enable) Input
 - Initiates data transfer
 - For write, data transferred to LCD on high to low transition
 - For read, data available following low to high transition

