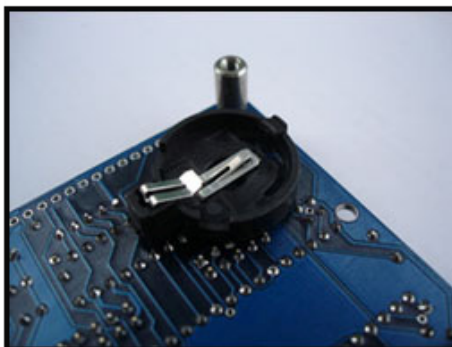
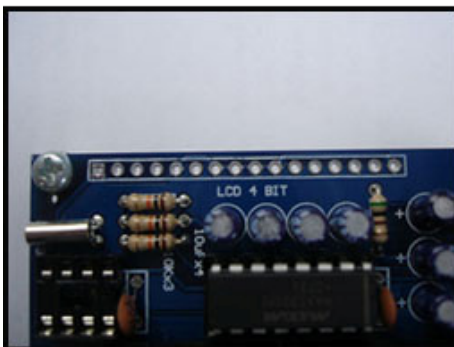
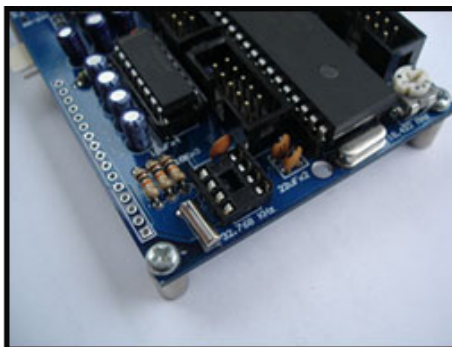
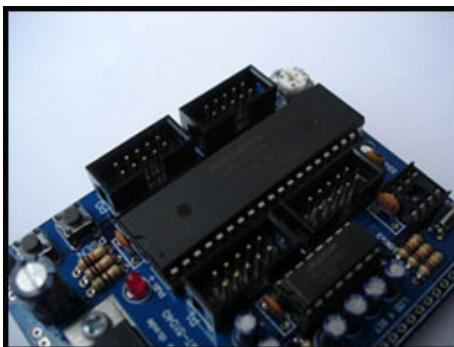
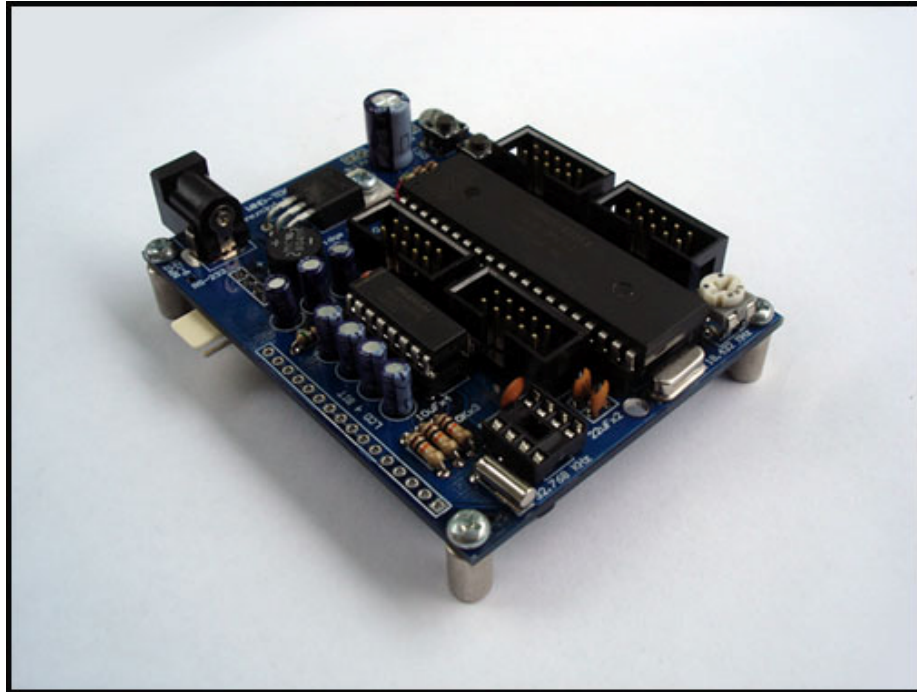


User Manual








MT-51D40



MT-51D40 development board includes the P89V51RD2 NXP microcontroller, which is high performance Flash version of the 80C51 8-bit microcontroller. P89V51RD2 provide huge 64kBytes of internal flash program memory and 1024 Bytes of internal RAM. With In-System Programming, program downloading can be executed easily on normal RS-232 connection with no external programmer required. The P89V51RD2 can run either normal mode (12 clock per machine cycle) or double speed with X2 mode (6 clocks per machine cycle) to achieve twice throughput at the same clock frequency. The P89V51RD2 is also support In-Application Programmable (IAP), allowing the Flash program memory to be reconfigured even while the application is running.

MT-51D40 provide built in power rectifier, user can apply 9-12V DC/AC as power input, 32 I/O available with IDC header connection, RTC and character LCD can be extended easily

Feature

-  Includes NXP P89V51RD2 microcontroller with 64 KBytes internal flash program
-  Running at 18.432 MHz (can be boost up to double speed by operated in X2 mode)
-  Easy program downloading by In-System Programming on RS-232 connection
-  RS232 connection ready with MAX232
-  DS1307 Real Time Clock extendable with external 32.768 kHz crystal
-  Built in power rectifier
-  Easy character LCD extended and contrast adjustable

Technical Data

- Microcontroller: NXP P89V51RD2
- Processor Type: MCS-51
- Main Crystal: 18.432 MHz
- Program Flash Memory (Internal): 64KBytes
- Ram Memory (Internal): 1024Bytes
- I/O Port Available: 32
- Timer: Three 16 bit Timer
- RS-232 Communication Ready
- LCD Connection port Ready
- In Circuit Programming by RS-232 connection
- Real Time Clock: DS1307 Extendable
- Power Input: 9-12V DC/AC, 5V DC

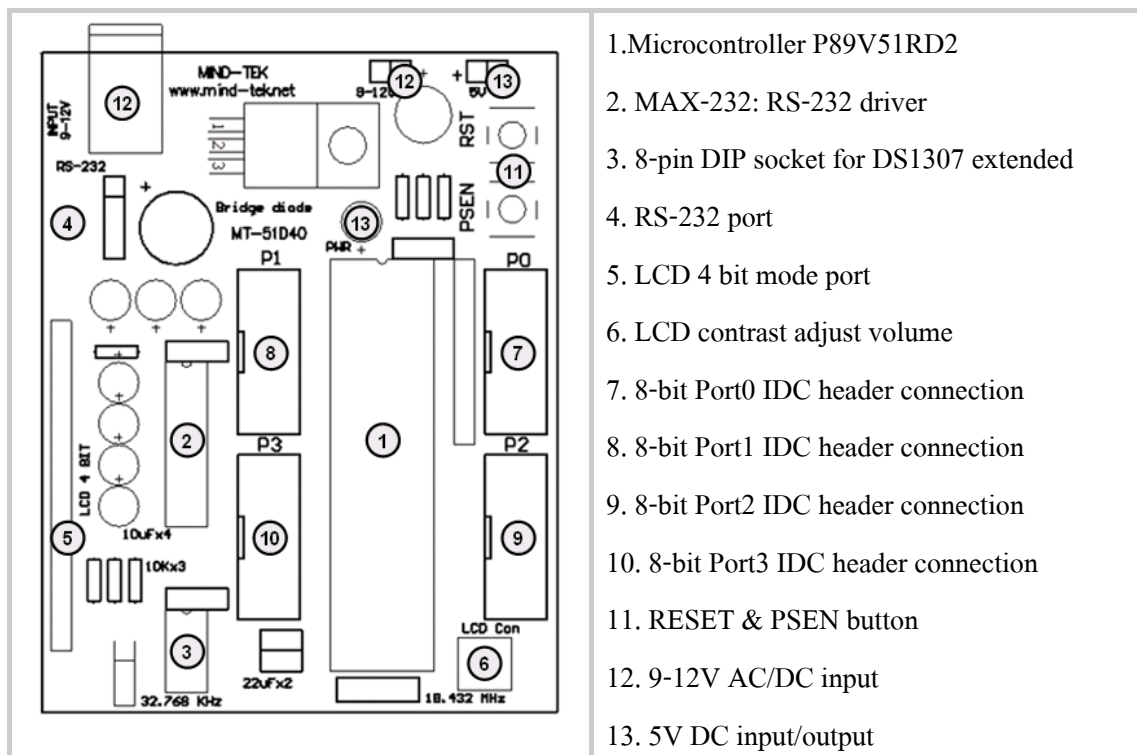


Figure1 MT-51D40 board structure

Port I/O

MT-51D40 provide four 8-bit parallel ports or 32 I/O ports with IDC header connection, pin assignment as shown in figure 2

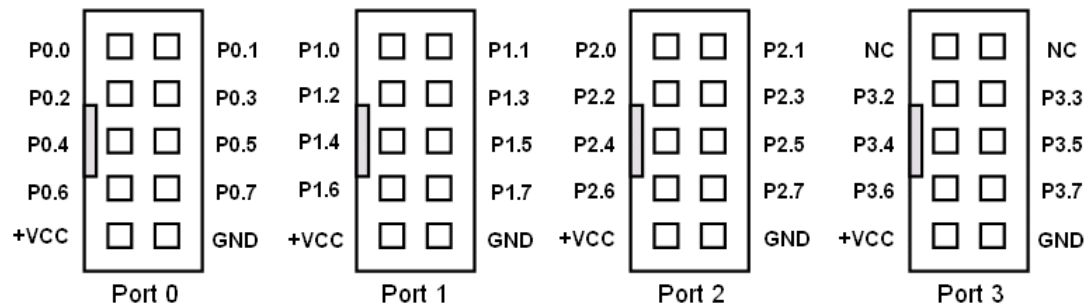


Figure2 I/O Port pin assignment

Port 0.0-0.7 was pull up with 10K Ohm resistor, can be use as input or output port

Port 1.0-1.1 can be use as normal input or output port, also connected to DS1307 and LCD as follow

P1.0: Connected to SCL of DS1307

P1.1: Connected to SDA of DS1307

P1.2: Connected to D4 pin of LCD

P1.3: Connected to D5 pin of LCD

P1.4: Connected to D6 pin of LCD

P1.5: Connected to D7 pin of LCD

P1.6: Connected to EN pin of LCD

P1.7: Connected to RS pin of LCD

Port 2.0-2.7 can be use as input or output port

Port 3.0: RXD of RS-232 communication

Port 3.1: TXD of RS-232 communication

P3.2-P3.7 can be use as normal input or output port, P3.2 also connected to SQW/OUT of DS1307

RS-232 Serial Port

MT-51D40 provides one RS-232 serial port, which can be use for communicate to other device or program downloading. Pin assignment for RS-232 header connection as shown in Figure 3



Figure3 RS-232 pin assignment

Character LCD Port

MT-51D40 has one character LCD port, which operate in 4-bit mode. As shown in Figure 4, LCD port is connected to port 1.2-1.7 of MCU and can be connected to character LCD directly by pin header. In case of pin assignment of character LCD is not match with LCD port, user can wired signal cable from board to LCD module manually. Screen contrast of LCD is adjustable by variable resistor.

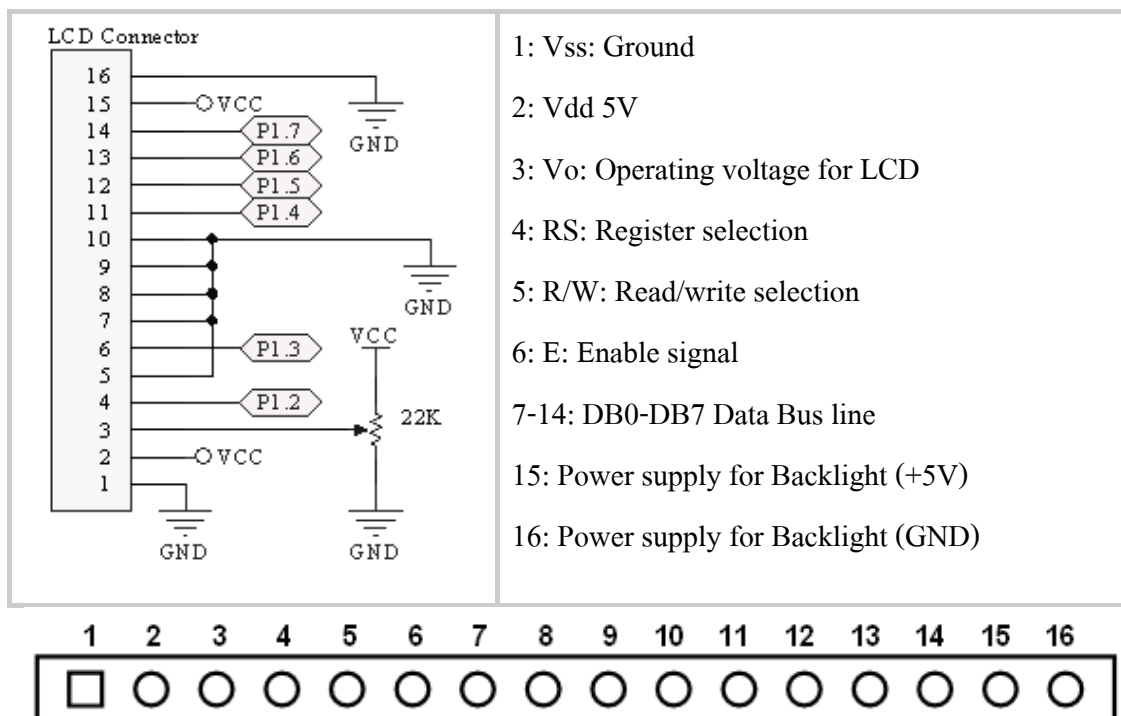


Figure4 LCD 4-bit port pin assignment

RTC (Real Time Clock) Unit

MT-51D40 can be extended RTC unit by using DS1307 and CR2025 battery backup as shown in Figure 5

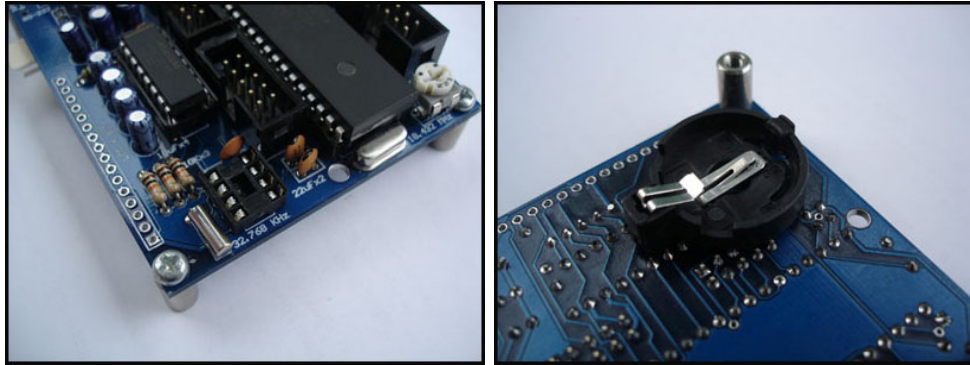


Figure5. DS1307 IC socket and battery back up for RTC extended

P1.0 and P1.1 of P89V51RD2 are operate as I2C bus and connected to SCL (Serial Clock Line) and SDA (Serial Data Line) of DS1307. P3.4 was connected to SQW/OUT of DS1307 and can use to detected interrupted signal from DS1307

Quick Start

Originally, MT-51D40 come with test program inside Flash memory. User can test all function of the board as step below

1. Power on MT-51D40 and connected the board to PC by use RS-232 cable
2. Open serial communication program such as HyperTerminal and set correct com port and connection rate to 9600 bps
3. Reset MT-51D40 by push reset button on the board, Test menu will display as in Figure 6. In case of character LCD is connected with LCD port, LCD will show board testing messages
4. Press number 1-5 from PC to test any functions of the board, In case of press 5 for test RTC unit, DS1307 and CR2025 3V battery are need

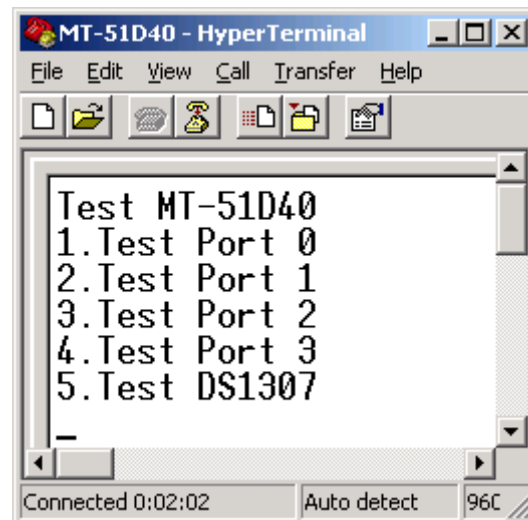


Figure6. Menu of test program

Program downloading

Downloading program to flash memory of P89V51RD2 can be done easily by normal RS-232 connection. Procedure of program downloading as shown in step below

1. Power on MT-51D40 and connect the board to PC by RS-232 Cable
2. Open Flash Magic program, and select COM Port, that's use to connect to the board, select Baud rate and Device to 89V51RD2 as shown in Figure 7

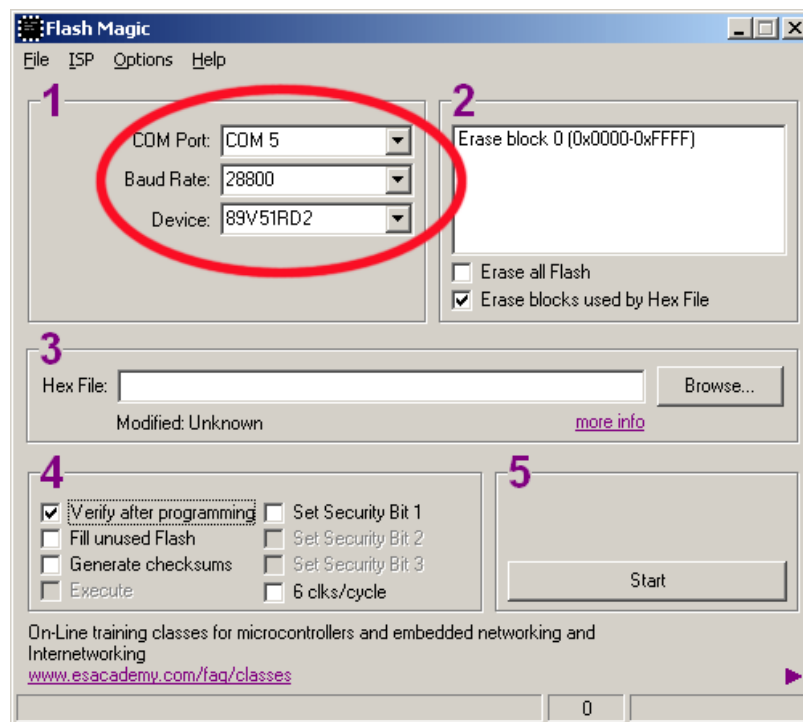


Figure7. Setting RS-232 connection parameter and device

- Chose hex file to download and mark Verify after programming and Erase blocks used by Hex File as shown in Figure 8

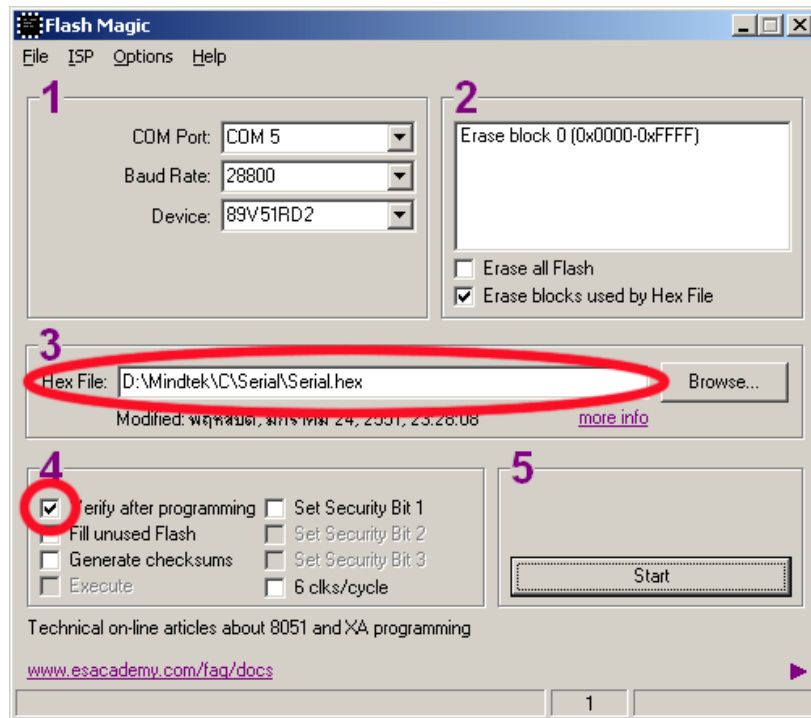


Figure8. Choosing hex file for downloading

- Click Start to start download hex file in to P89V51RD2.
- Flash Magic will prompt to reset board as shown in Figure 9



Figure9. Prompt window from Flash Magic

- Press RESET button on MT-51D40 to change operation mode of P89V51RD2 to ISP mode, Flash Magic will check the connection. If connection is ready, downloading will start

