mikroBoard for ARM 144-pin™

User manual

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Development system

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Nebojsa Matic
General Manager

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1. General information

MikroBoard for ARM 144-pin is primarily intended to be connected to the EasyARM v6 development system but can also be used as a stand-alone device. The board features the LPC2214 microcontroller, flash module, USB connector, microSD connector, JTAG connector, USB UART, voltage regulator and connectors that enable connection with the development system.

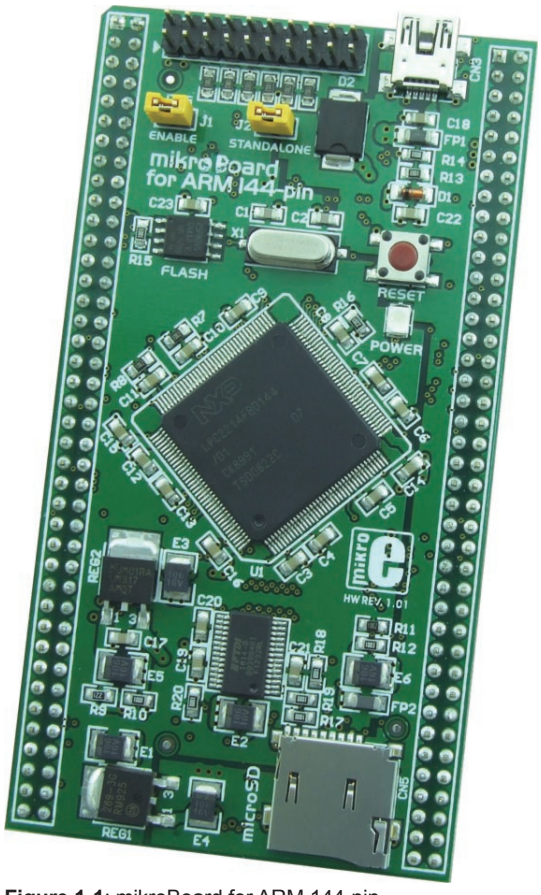

Figure 1-1: mikroBoard for ARM 144-pin

2. LPC2214 microcontroller

The LPC2214 microcontroller in 144-pin LQFP package is soldered on the mikroBoard for ARM 144-pin. Some of its key features are:

- 16/32-bit ARM7TDMI-S microcontroller in a LQFP144 package
- 16 kB on-chip static RAM and 256 kB on-chip flash program memory. 128-bit wide interface/ accelerator enables high speed 60 MHz operation.
- In-System Programming (ISP) and In-Application Programming (IAP) via on-chip bootloader software.

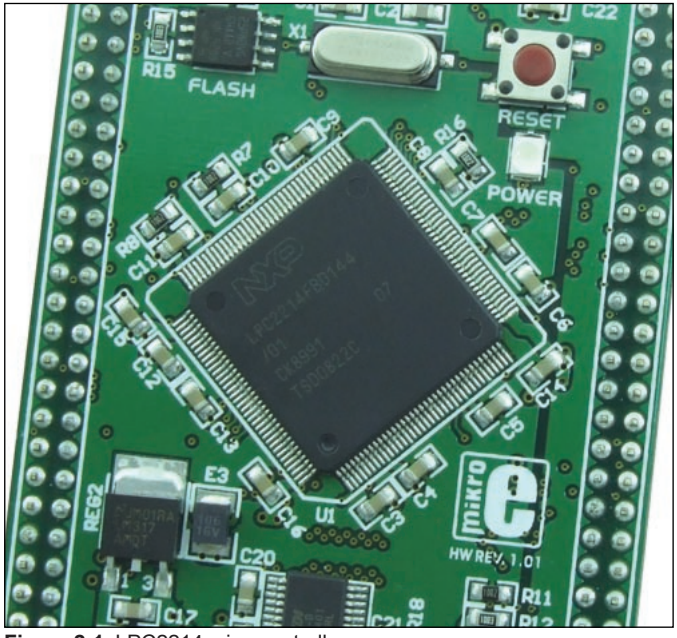

Figure 2-1: LPC2214 microcontroller

LPC2214 is connected to on board modules via pins which are also connected to CN1 and CN2 connectors. These two connectors enable the board to be connected to the EasyARM v6 development system or some other device.

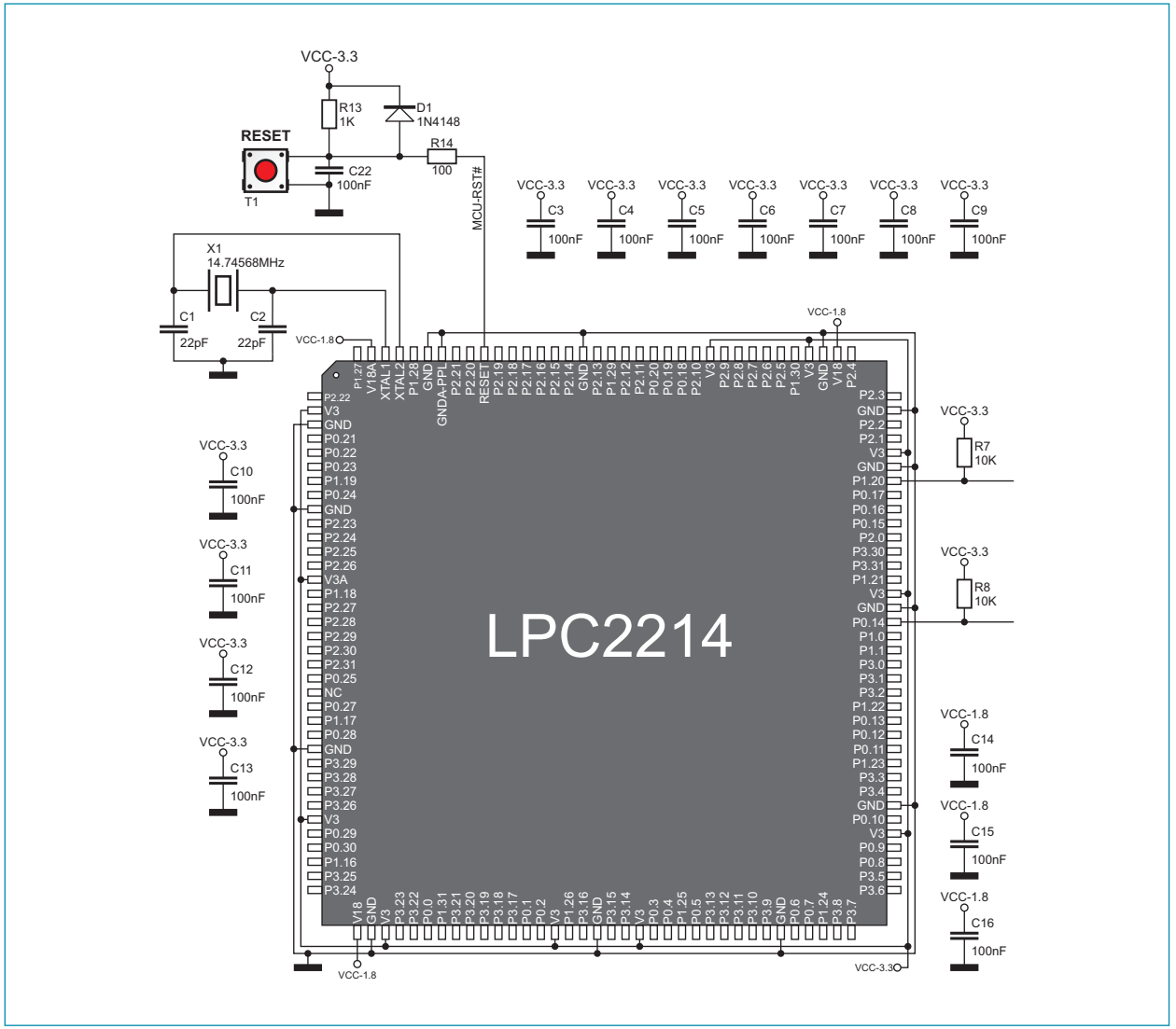

Figure 2-2: LPC2214 microcontroller with oscillators connection schematic

The LPC2214 microcontroller is connected to the X1 oscillator. The X1 oscillator generates a clock used for the operation of the microcontroller. The microcontroller can be cleared by feeding the reset pin with a logic 0, i.e. by pressing the RESET button.

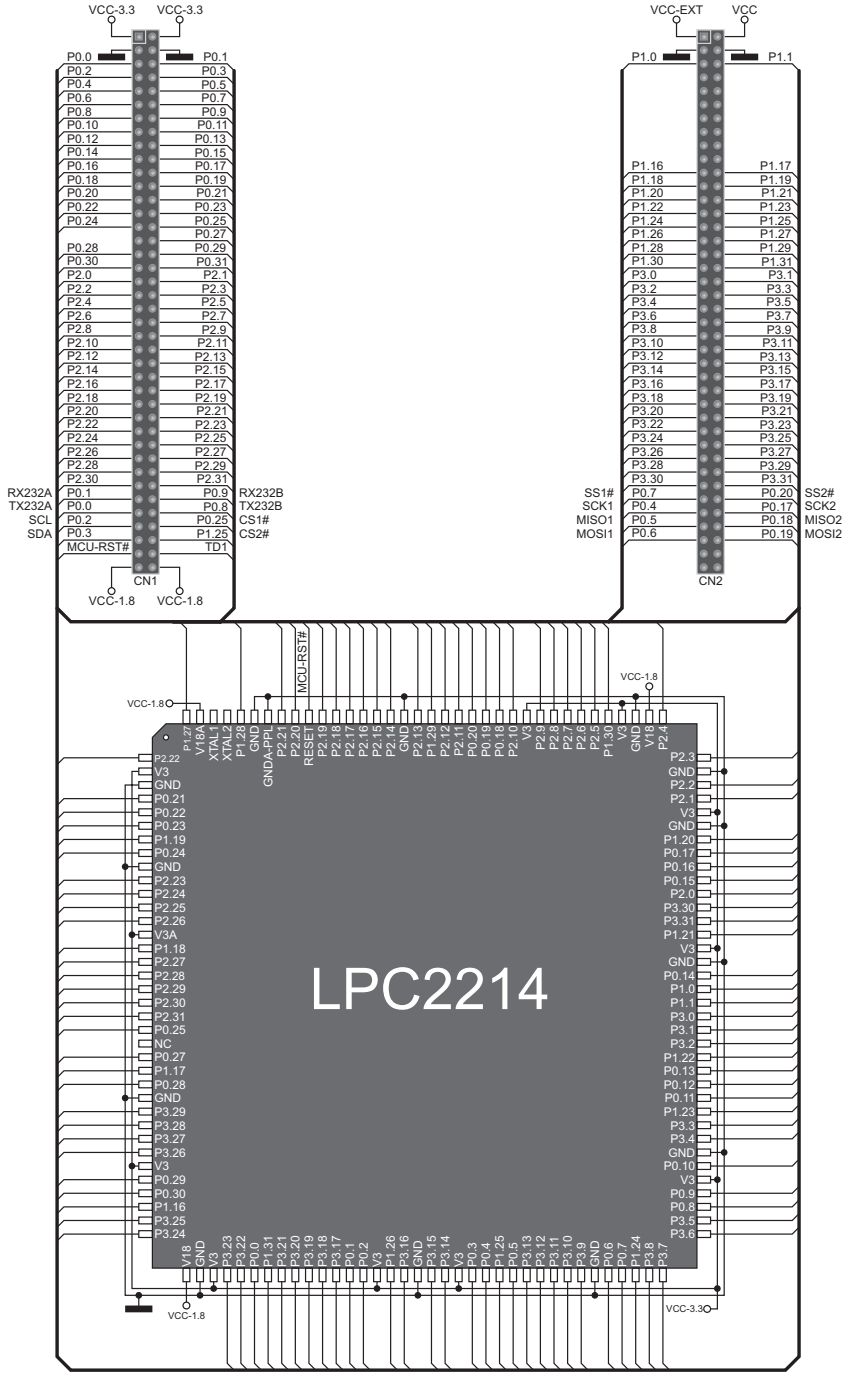

Figure 2-3: LPC2214 microcontroller with connectors connection schematic

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3. Programming the microcontroller

The microcontroller can be programmed with a bootloader or the JTAG programmer. The use of bootloader is enabled due to the bootloader code that is loaded into the microcontroller. In order to program the microcontroller with the bootloader, it is necessary to connect the board to a PC via the CN3 connector and USB cable, Figure 3-1. A .hex code is transferred from the PC to the microcontroller by using some of the bootloader programs, such as Flash Magic.

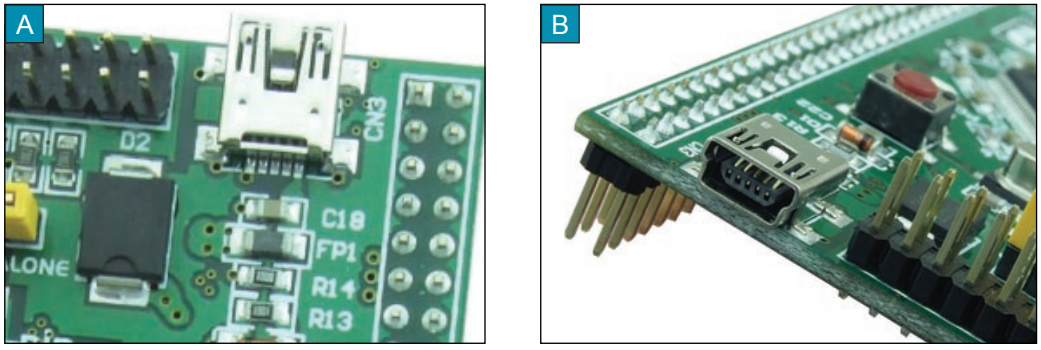


Figure 3-1: USB connector for programming

The CN3 USB connector is connected to the UART module built into the microcontroller via FTDI module (FT232RL).

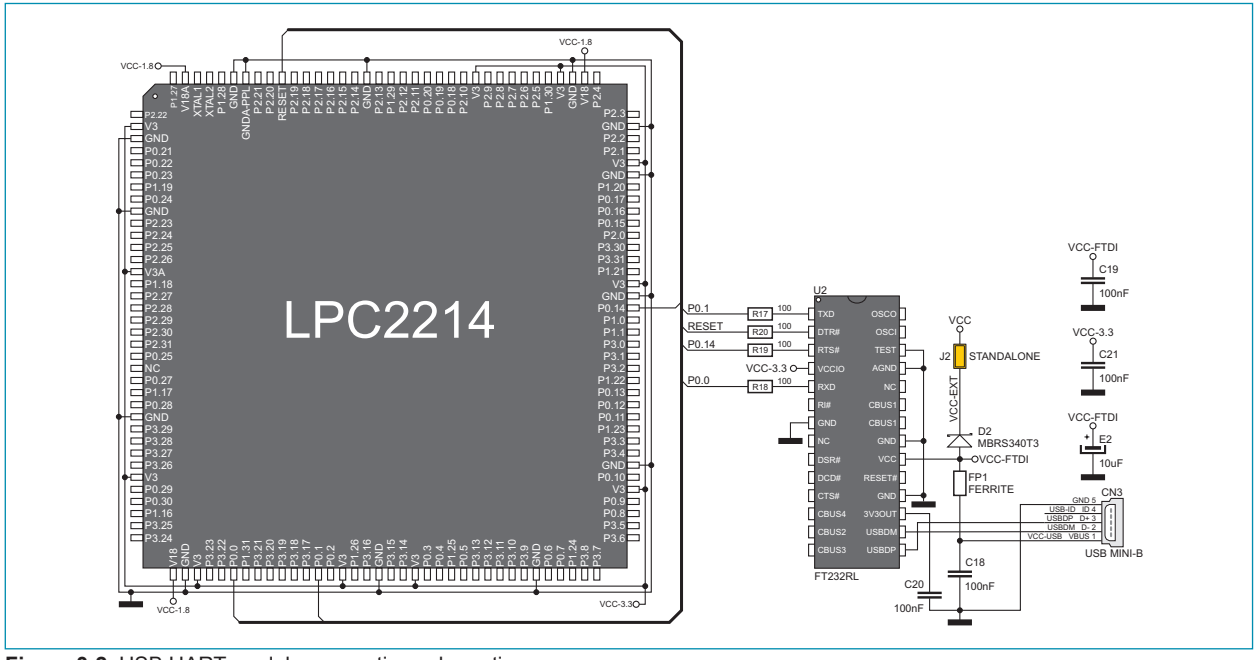
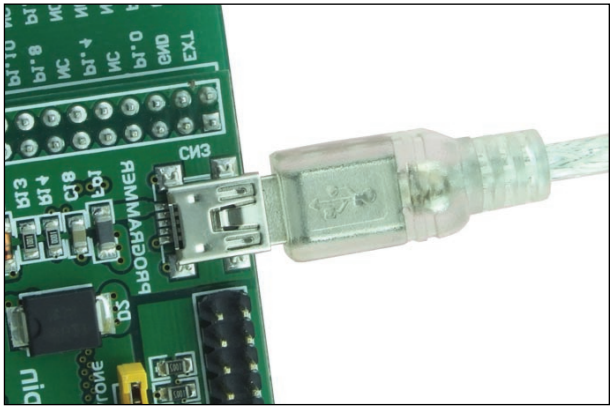


Figure 3-2: USB UART module connection schematic

When the mikroBoard for ARM 144-pin operates as a stand-alone device, it is necessary to place jumper J2 on the board. If the board is connected to the EasyARM v6 development system, jumper J2 should be removed.

In next few steps is explained how to program microcontroller with bootloader via Flash Magic application.

STEP 1: Connect the system to a PC



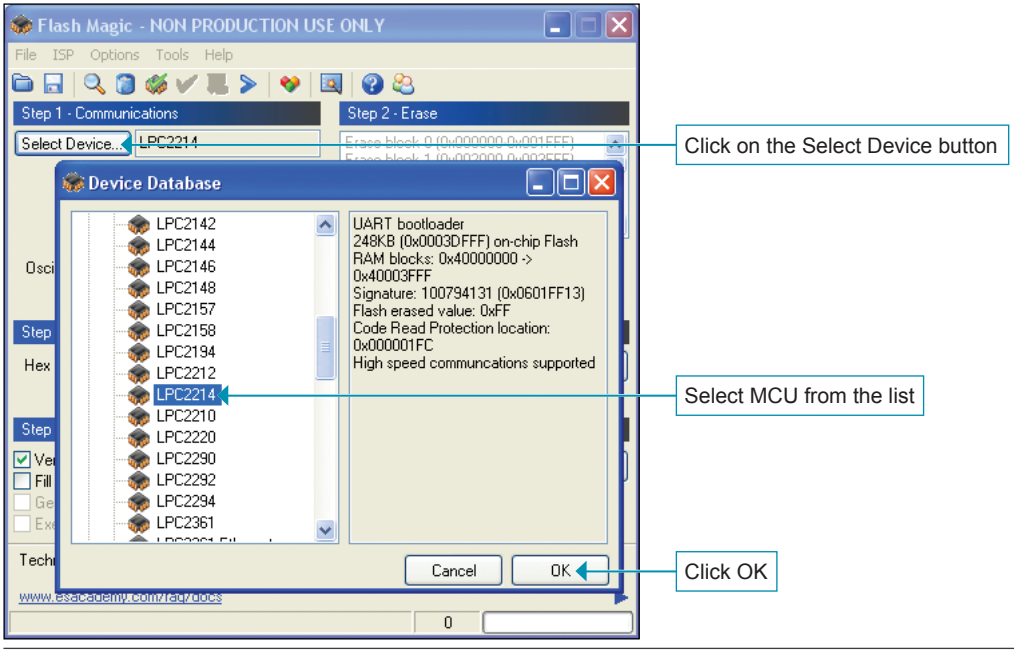
Connect the mikroBoard for ARM 144-pin to available USB port on your PC.

STEP 2: Start Flash Magic

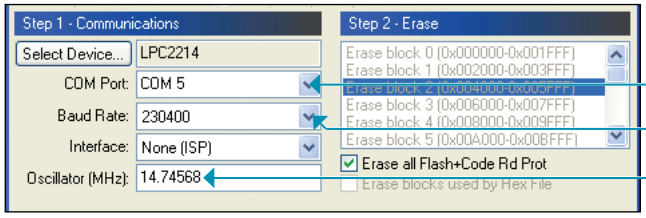
Download the Flash Magic application from http://www.flashmagictool.com/download.html&d=FlashMagic.exe and install it on your PC

When the installation is finished double click on the Flash Magic icon 

STEP 3: Select MCU



STEP 4: Settings

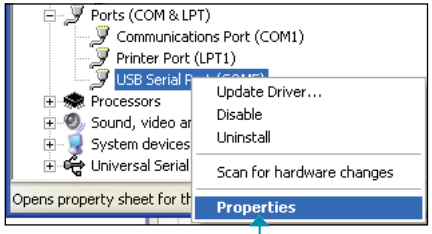


From drop-down menu select the COM port on your PC

Set Baud Rate to 230400

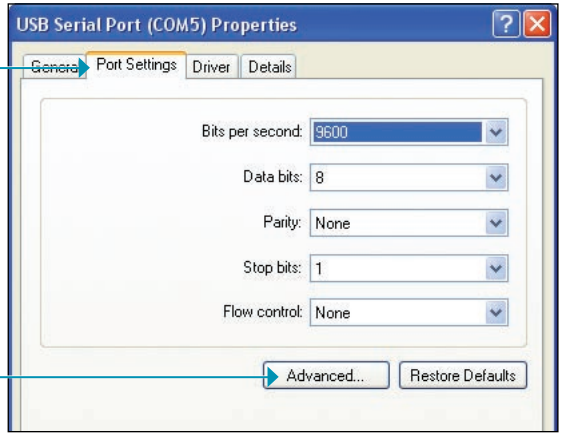
Enter 14.74568 (if you use different oscillator set the appropriate value in MHz)

Device Manager on your PC contains information on which COM port is used for USB communication with the mikroBoard for ARM 144-pin development system. In this case the COM5 port is used.

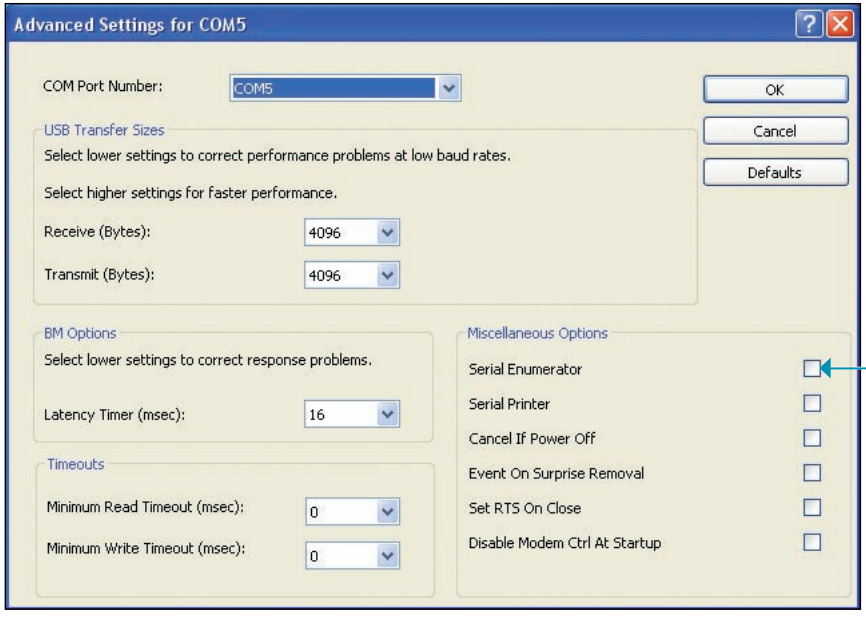


Right click on USB port, then on Properties

From pop-up window select the Port Settings tab

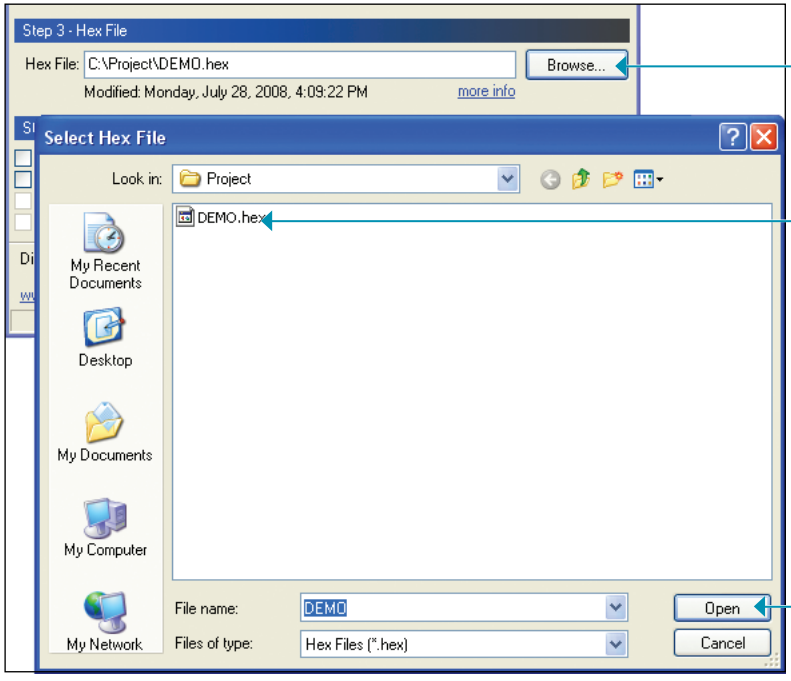


Click on the Advanced... button

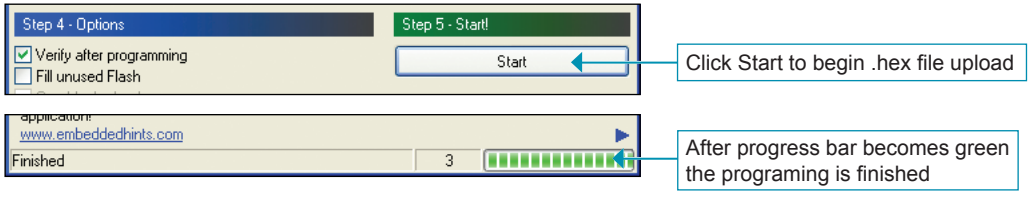


In pop-up window uncheck the Serial Enumeration option and click OK

STEP 5: Browse for .hex file



STEP 6: Upload .hex file



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The microcontroller can also be programmed with the JTAG programmer, Figure 3-3. In addition, this programmer can also be used to test the operation of the microcontroller.

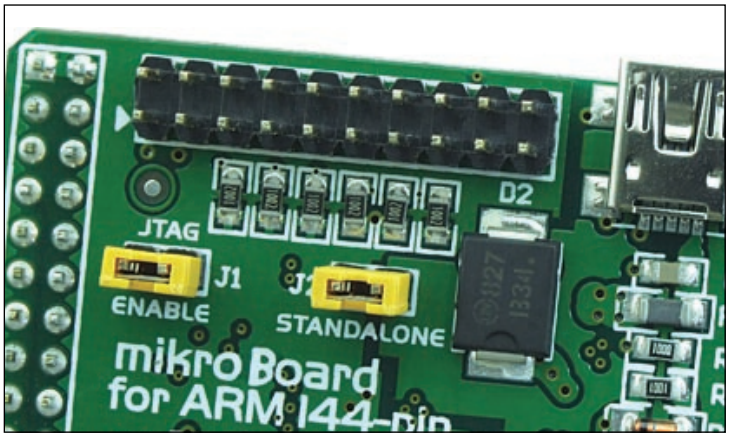

Figure 3-3: JTAG connector

In order to enable the JTAG programmer to be used, it is necessary to place jumper J1 in the ENABLE position, Figure 3-5. If the JTAG programmer is not used for programming, jumper J1 should be removed from the board, Figure 3-6.

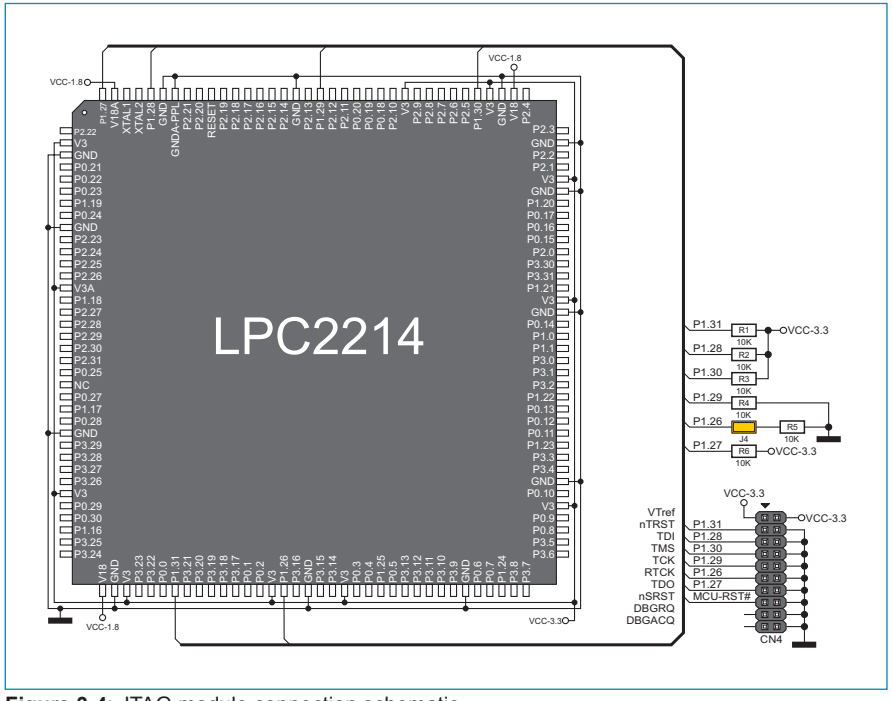

Figure 3-4: JTAG module connection schematic

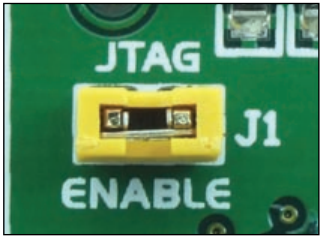

Figure 3-5: JTAG is enabled

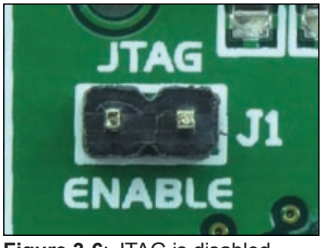

Figure 3-6: JTAG is disabled

4. Voltage regulator

The microcontroller require dual power supply: 1.8V for CPU and 3.3V for I/O. The board is powered with the 5V power supply voltage via the CN3 USB connector supplied on the board.

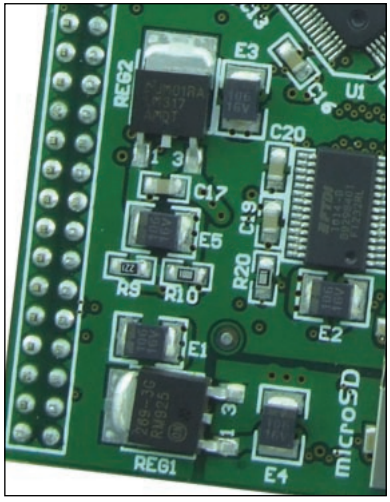

Figure 4-1: Voltage regulator

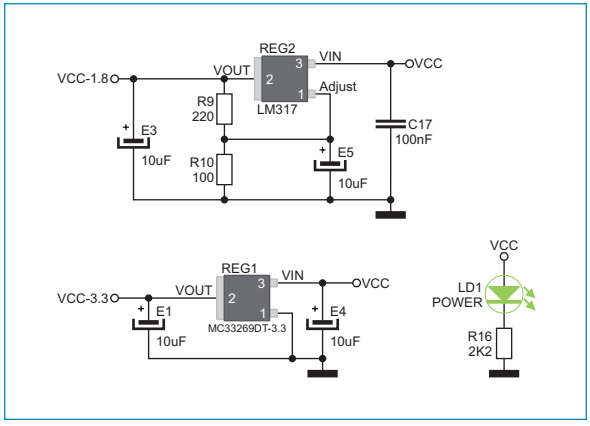

Figure 4-2: Voltage regulator connection schematic

If the board is powered by the development system (EasyARM v6), the function of the voltage regulator remains the same. In this case, it is necessary to remove jumper J2 (STANDALONE), Figure 4-3.

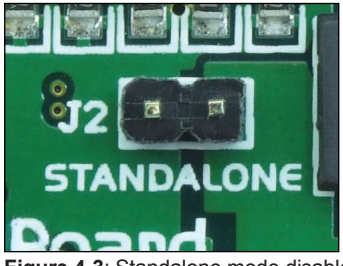

Figure 4-3: Standalone mode disabled

Figure 4-4: Standalone mode enabled

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5. MicroSD connector

There is a connector CN5 provided on the board that enables the use of microSD card. When inserted, the microSD card provides additional memory space that the microcontroller can use to store data. Communication between the microSD card and the microcontroller is performed via the Serial Peripheral Interface (SPI).

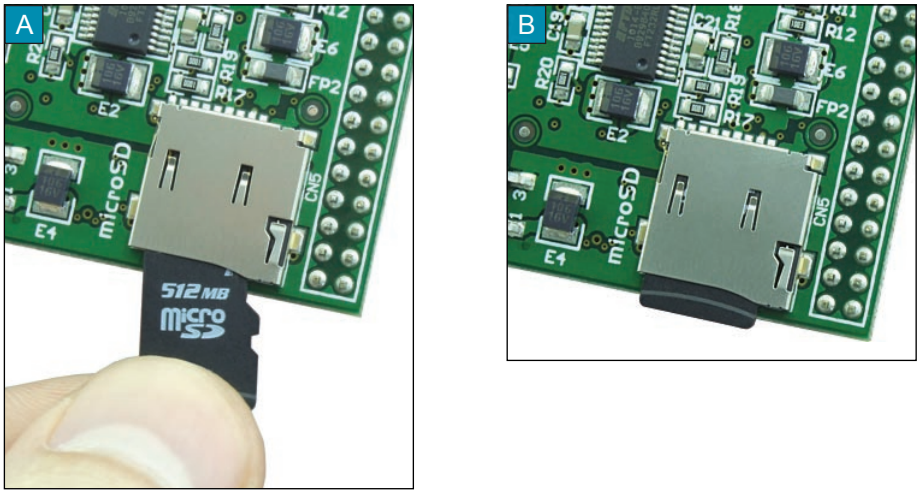

Figure 5-1: MicroSD connector

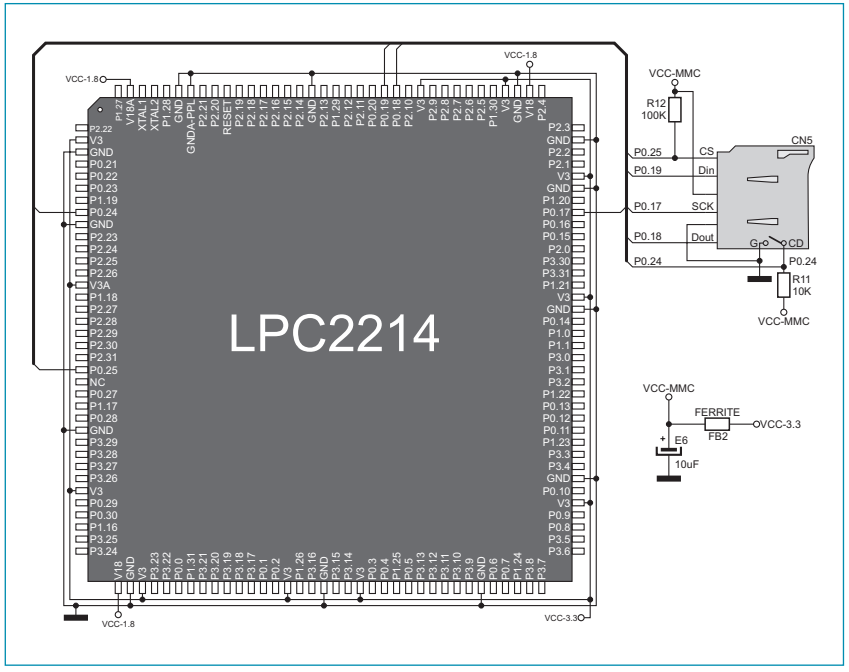

Figure 5-2: microSD connector connection schematic

The pins' designations have the following meaning:

CS - Chip Select
Din - Master Out/Slave In (MOSI)
SCK - Clock
Dout - Master In/Slave Out (MISO)

6. Flash module

Flash module provides additional 8Mbit of flash memory that the microcontroller can use via the Serial Peripheral Interface (SPI).

Figure 6-1: Flash memory

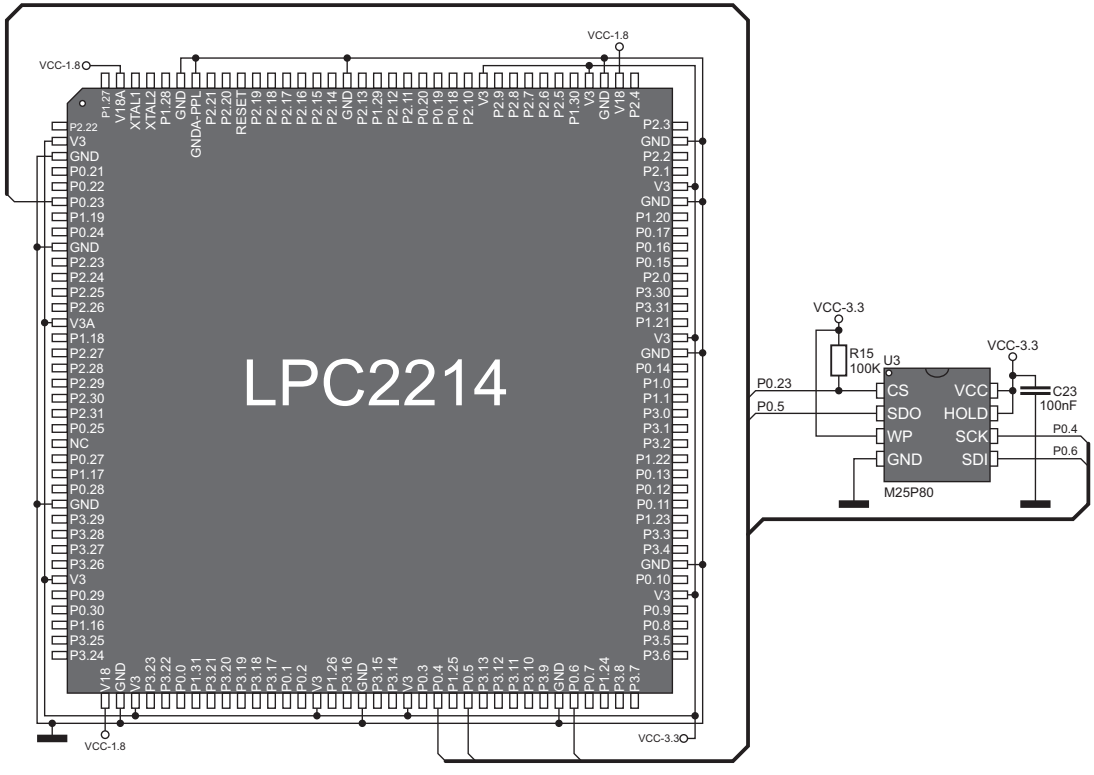

Figure 6-2: Flash module connection schematic

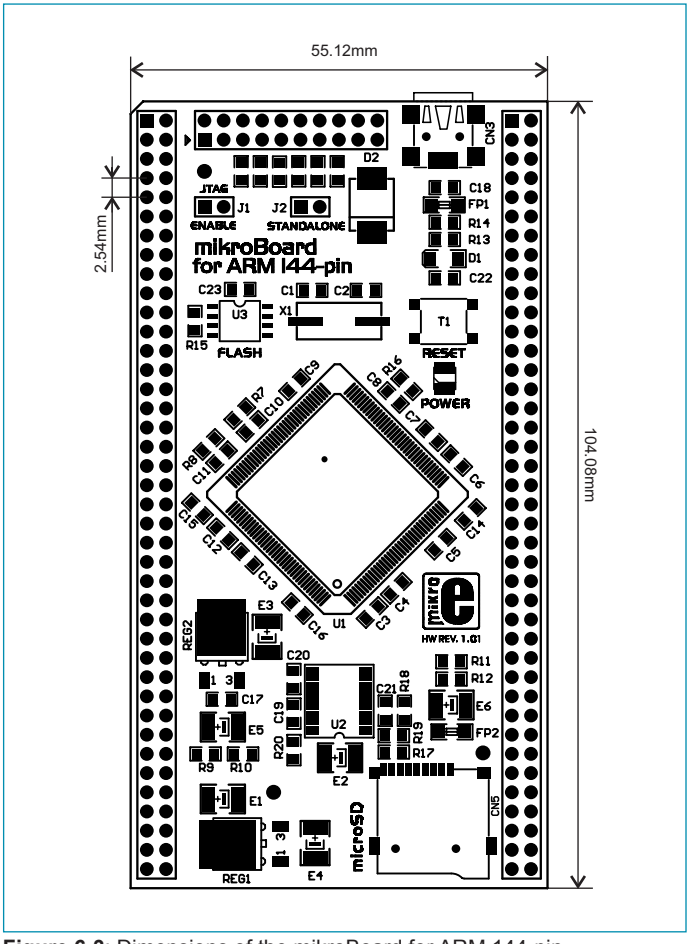

Figure 6-3: Dimensions of the mikroBoard for ARM 144-pin

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