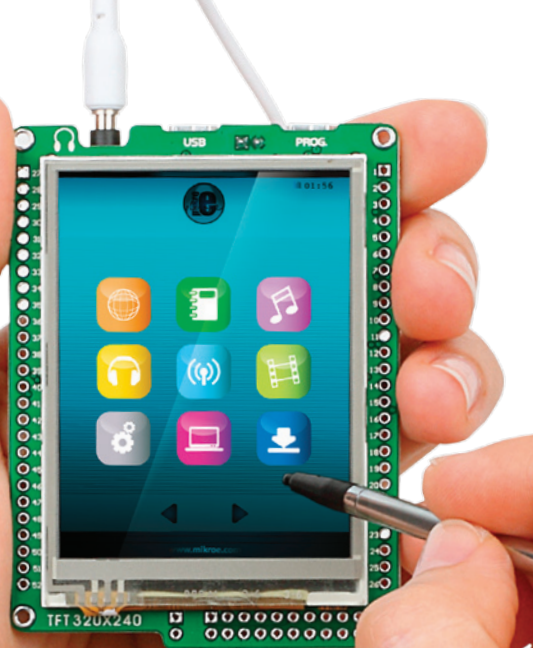


user's guide to

mikromedia board for ARM

Compact development system rich with on-board peripherals for
all-round multimedia development on LPC2148 ARM7 device



TO OUR VALUED CUSTOMERS

I want to express my thanks to you for being interested in our products and for having confidence in Mikroelektronika.

The primary aim of our company is to design and produce high quality electronic products and to constantly improve the performance thereof in order to better suit your needs.

A handwritten signature in white ink, appearing to read 'N. Matic', is positioned in the lower right quadrant of the page. The signature is fluid and cursive, with a large initial 'N' and 'M'.

Nebojsa Matic
General Manager

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Introduction to mikromedia for ARM

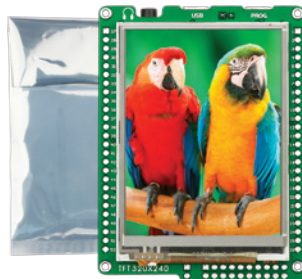
The **mikromedia for ARM** is a compact development system with lots of on-board peripherals which allow development of devices with multimedia contents. The central part of the system is a 32-bit ARM7 microcontroller **LPC2148**. The mikromedia for ARM features integrated modules such as stereo MP3 codec, **TFT 320x240 touch screen** display, accelerometer, two USB connectors: one for communication with the microcontroller one and for ISP programming, MMC/SD card slot and other. Mikromedia is compact and slim, and perfectly fits in the palm of the hand, which makes it convenient platform for mobile devices.



Related material



- 01 Damage resistant protective box



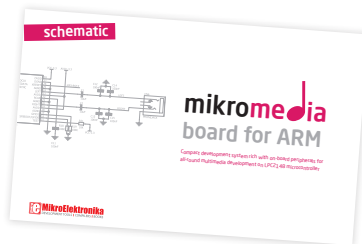
- 02 mikroMedia for ARM development system



- 03 DVD with documentation and examples



- 04 mikroMedia for ARM user's guide



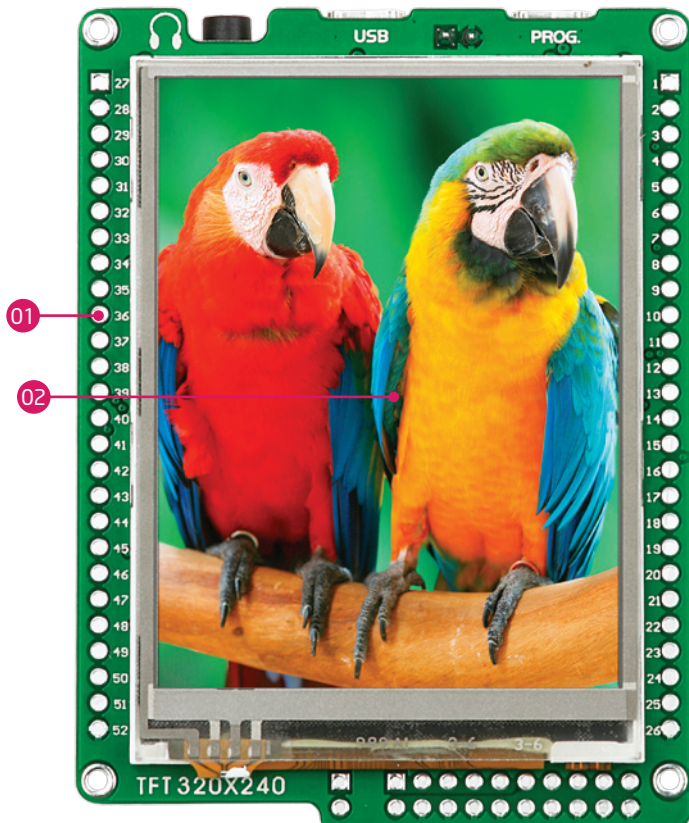
- 05 mikroMedia for ARM schematic

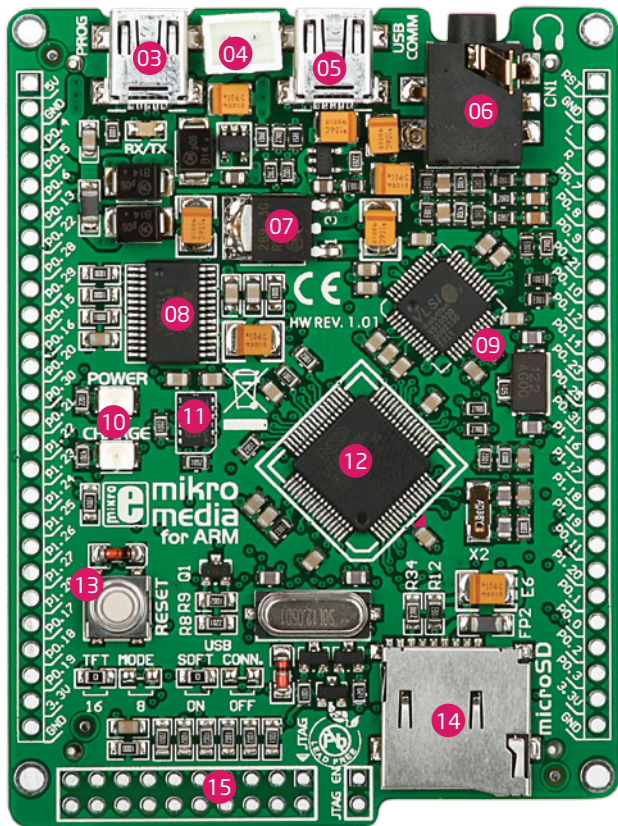


- 06 USB cable

Key Features

- 01 Connection Pads
- 02 TFT 320x240 display
- 03 USB MINI-B programmer connector
- 04 LI-Polymer battery connector
- 05 USB MINI-B device connector
- 06 3.5mm headphone connector
- 07 Power supply regulator
- 08 FTDI USB Uart controller
- 09 VS1053 Stereo mp3 coder/decoder
- 10 Power indicator LEDs
- 11 Accelerometer
- 12 LPC2148 microcontroller
- 13 RESET button
- 14 MicroSD Card Slot
- 15 JTAG connector





System Specification



power supply

Over a USB cable (5V DC)



power consumption

50mA in idle state

(when on-board modules are off)



board dimensions

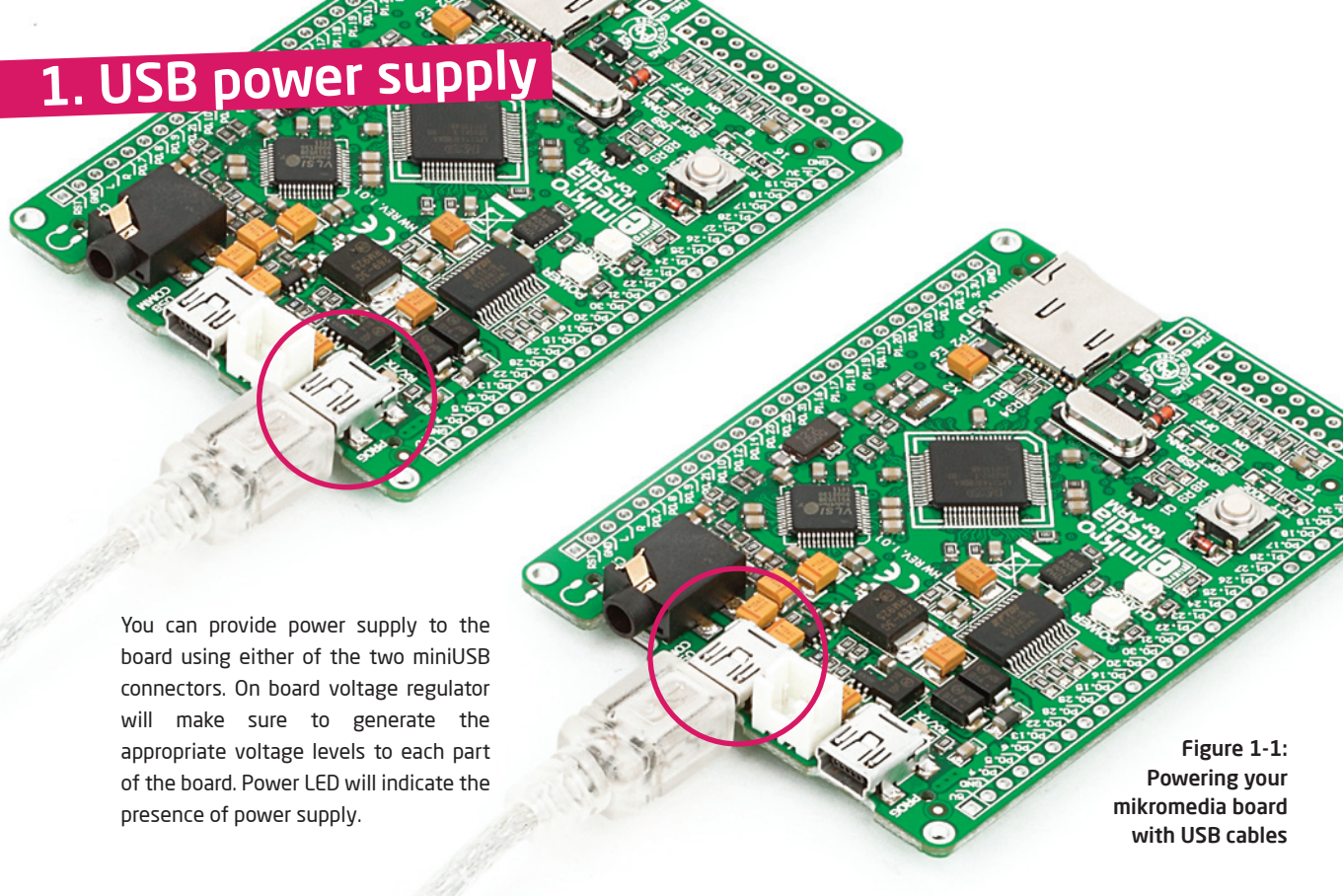
8 x 6cm (3.14 x 2.36 inch)



weight

~50g (0.11 lbs)

1. USB power supply



You can provide power supply to the board using either of the two miniUSB connectors. On board voltage regulator will make sure to generate the appropriate voltage levels to each part of the board. Power LED will indicate the presence of power supply.

Figure 1-1:
Powering your
mikromedia board
with USB cables

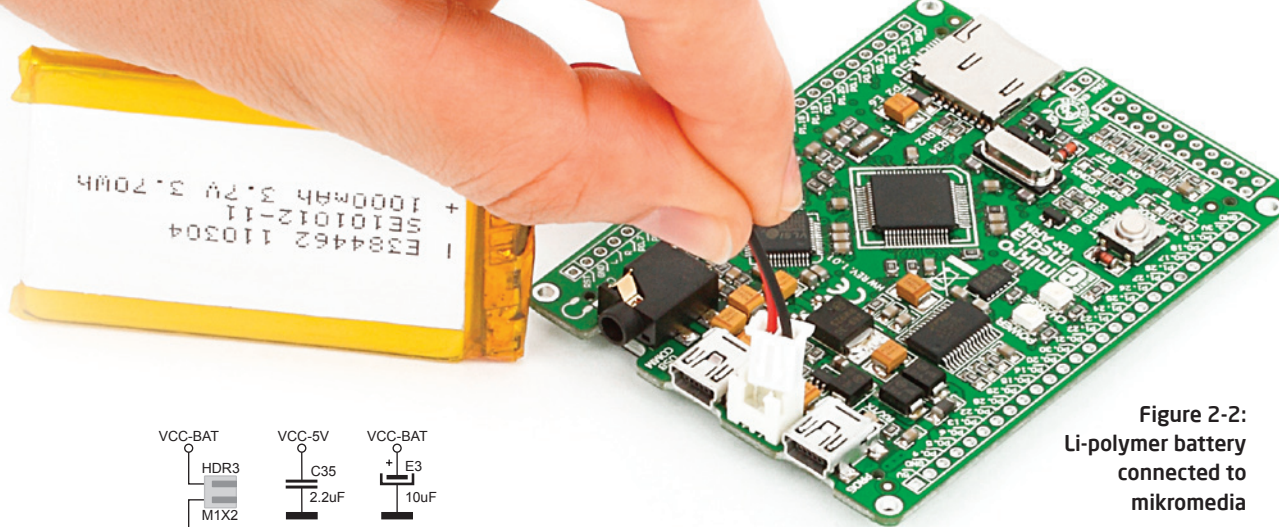


Figure 2-2:
Li-polymer battery
connected to
mikromedia

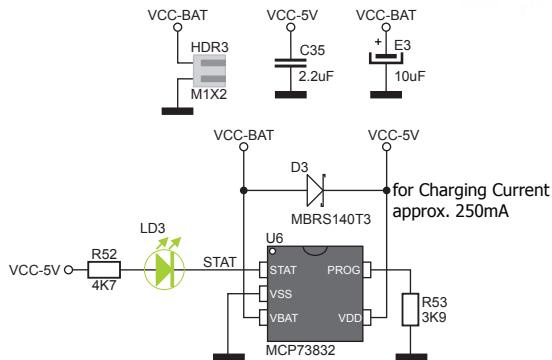


Figure 2-1: Battery charger connecting schematic

2. Battery power supply

Development system can be provided with power supply using **Li-Polymer** battery, via on-board battery connector. On-board battery charger circuit **MCP73832** enables you to charge the battery over USB power supply. Charging current value is ~250mA and charging voltage is 4.2V DC.

3. Programming with In-System Programmer

The microcontroller can be programmed with **In-System Programmer** supported in the hardware itself. Programmer USB connector is connected to the microcontroller through USB-UART connection.

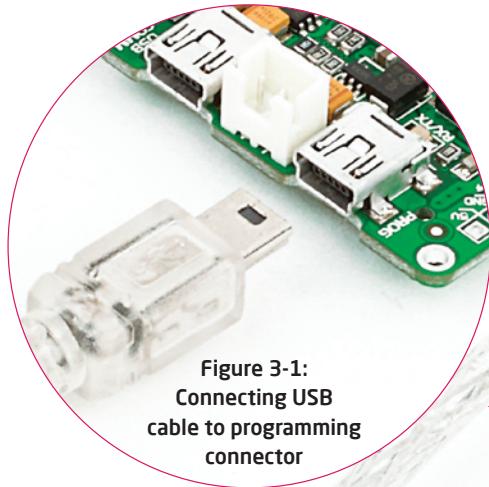


Figure 3-1:
Connecting USB
cable to programming
connector

note

You have to download and install drivers for your USB-UART connection before programming. Drivers can be found on FTDI website: <http://www.ftdichip.com/FTDrivers.htm>

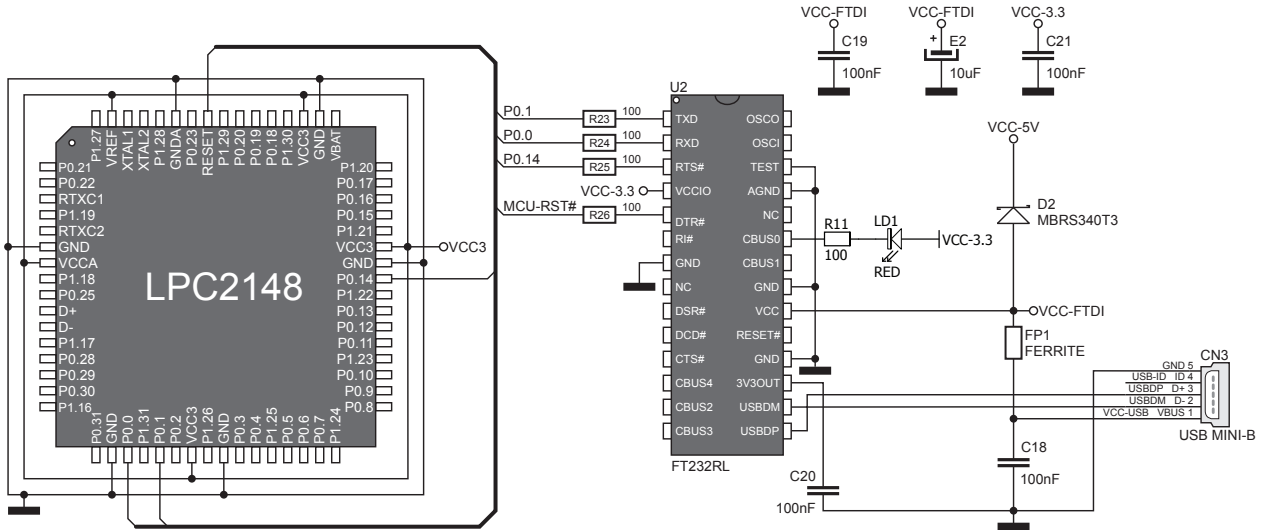
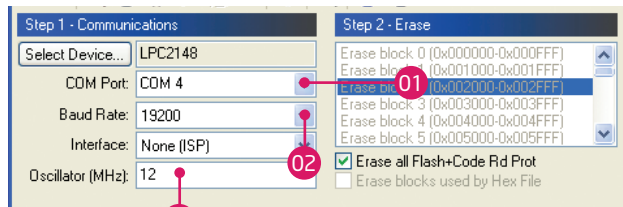


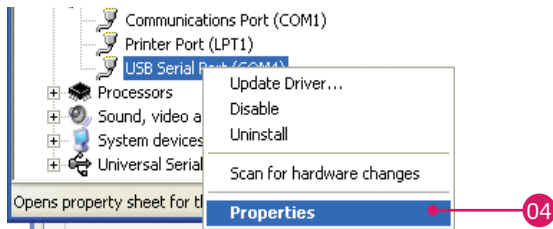
Figure 3-1: ISP programming lines are connected with USB-UART

Settings

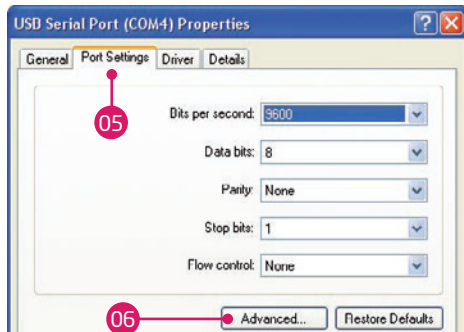
Device Manager on your PC contains informations on which COM port is used for USB communication with the mikromedia board for ARM. In this case the COM4 port is used.



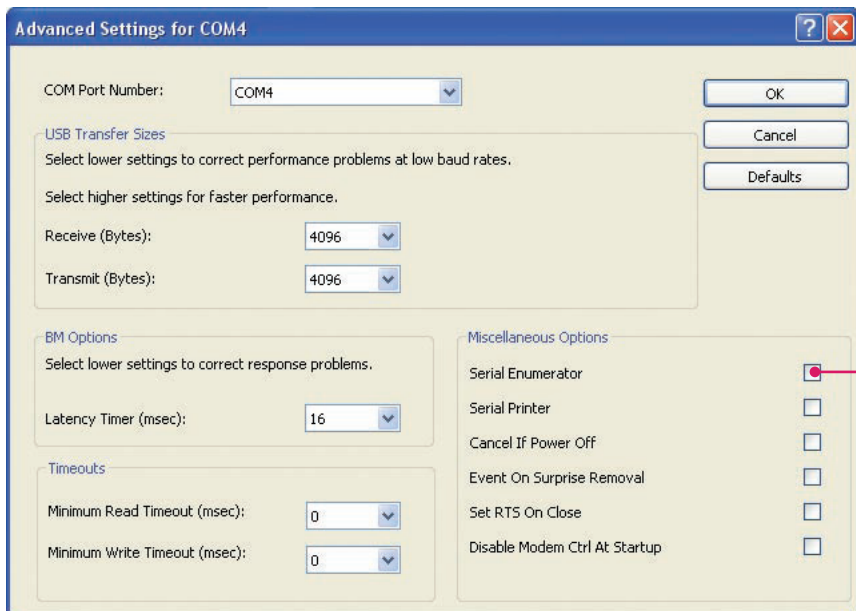
- 01 From the drop menu select COM port on your PC.
- 02 Set Baud Rate to 19200.
- 03 Enter 12 in the Oscillator field (if you use different oscillator enter its value in MHz instead).



- 04 Right click on USB port, then on properties in the drop-down list.



- 05 Select the Port Settings tab from pop-up window.
- 06 Click on the Advanced... button.



07 In pop-up window uncheck the Serial Enumerator option and click OK.

note

Steps 4 - 7 should be adjusted only once.

Flash Magic software

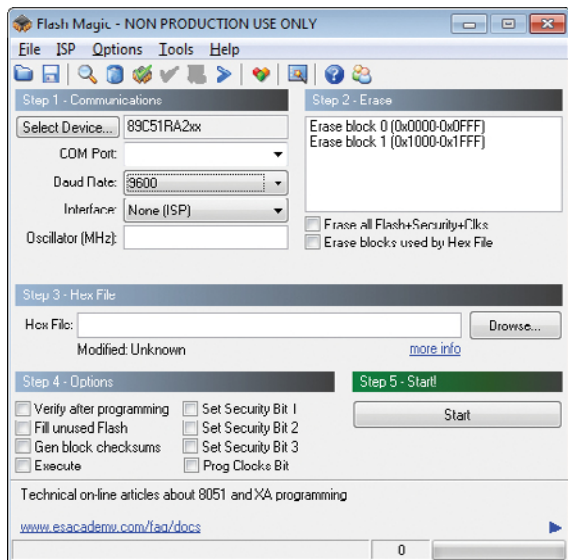


Figure 3-2: Flash Magic window after installation

Programming is done using specialized programming software called **Flash Magic**, which is available for download from the mikromedia for ARM webpage.

step 1 - Choose Device

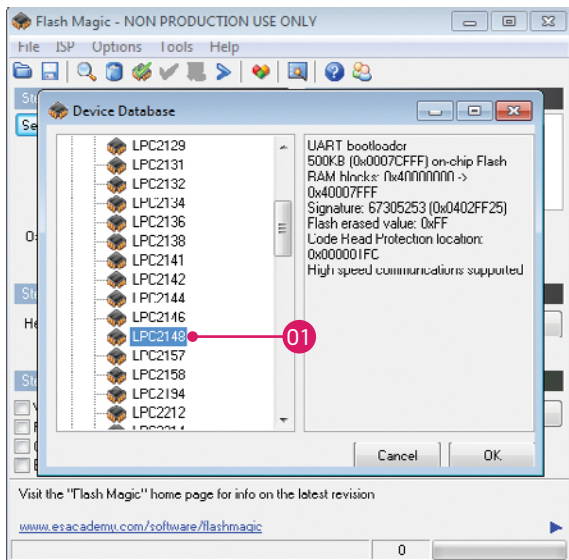


Figure 3-3: Selecting target device

- 01 Click on Select device button and browse for **LPC2148** microcontroller from **ARM7** family of microcontrollers.

step 2 - Choose COM port

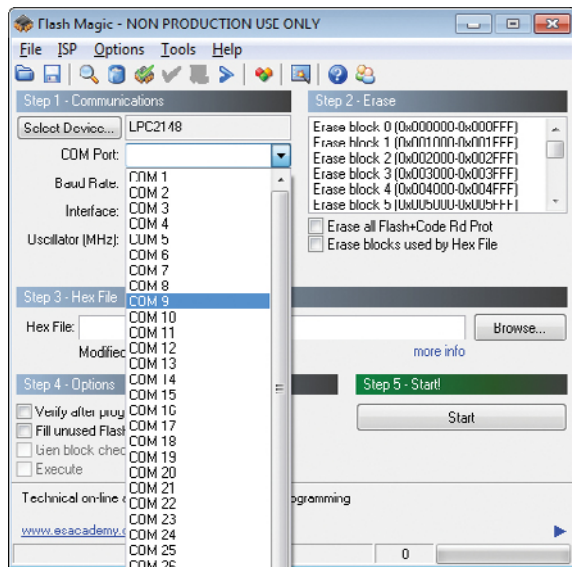


Figure 3-4: Selecting COM Port

- 01 From the dropdown list choose the **COM Port** assigned to your mikromedia board after connecting it to your PC over USB cable.

step 3 - Select baud rate

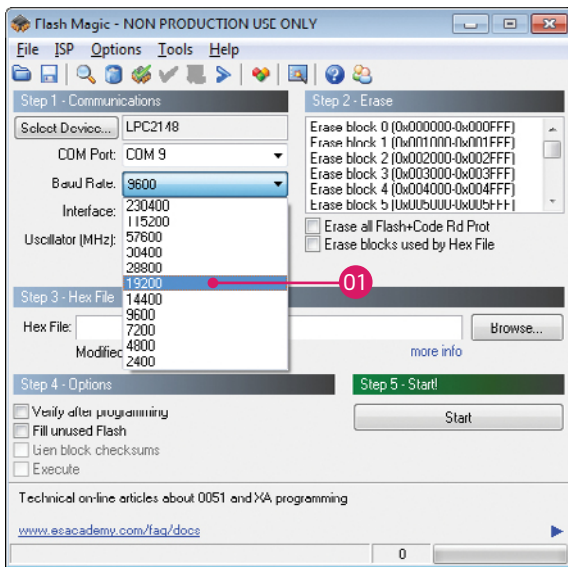


Figure 3-5: Selecting baudrate

- 01 From the dropdown list select **19200 bps** baudrate which is the correct UART communication speed for mikromedia.

step 4 - Specify oscillator freq.

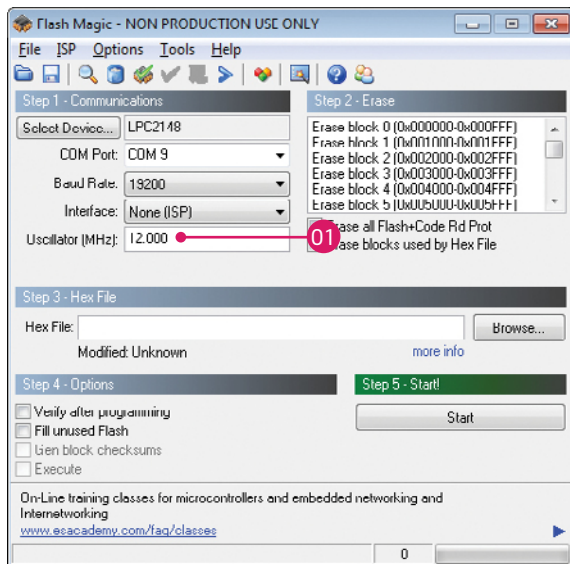


Figure 3-6: Specifying oscillator frequency

- 01 Specify the value of on-board crystal oscillator **12.000 MHz**

step 5 - Browse for .hex file

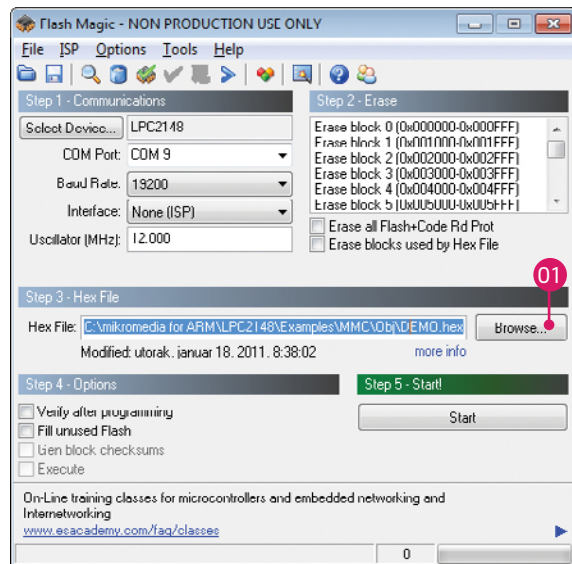


Figure 3-7: Browsing for HEX file

- 01 Click on **Browse** and find the HEX file you want to program your mikromedia with. The path to the target file will be shown in the edit field.

step 6 - Erase Flash

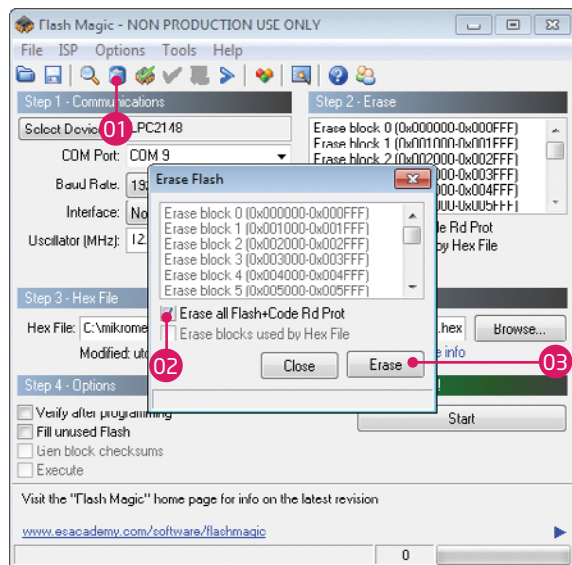


Figure 3-8: Erasing Flash memory before programming

- 01 Click on the **Erase Flash icon** in the main toolbar.
- 02 Tick the **first checkbox** to specify erasing the entire flash.
- 03 Click on **Erase button** to start erasing flash.

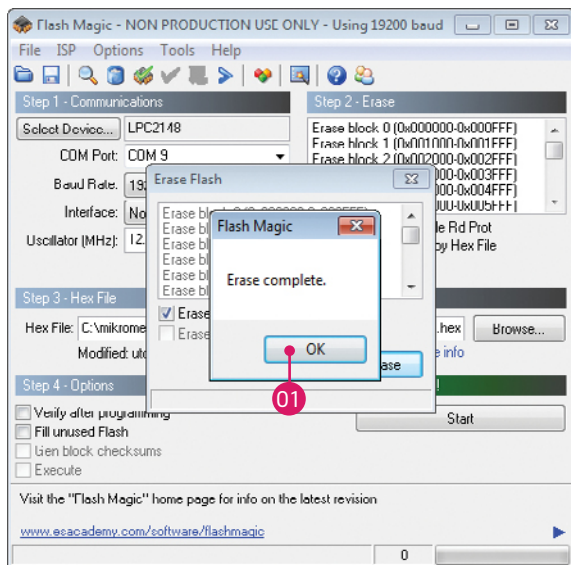


Figure 3-8: Write program

- 01 Click **OK** when Erasing is completed.

step 7 - Start Programming

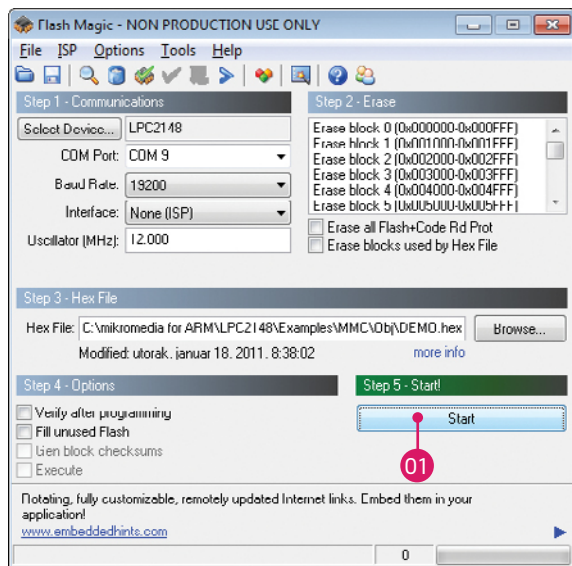


Figure 3-9: Program uploading

- 01 We are now ready to program the microcontroller.
Click on **Start button** to start uploading your program.

step 8 - Finished!

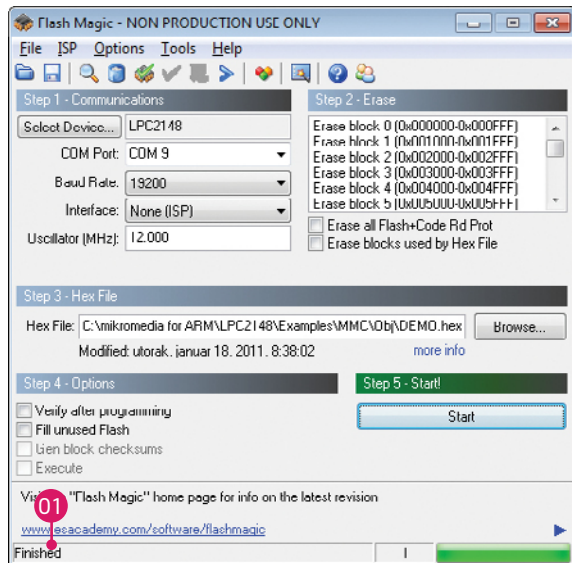


Figure 3-10: Uploading is finished

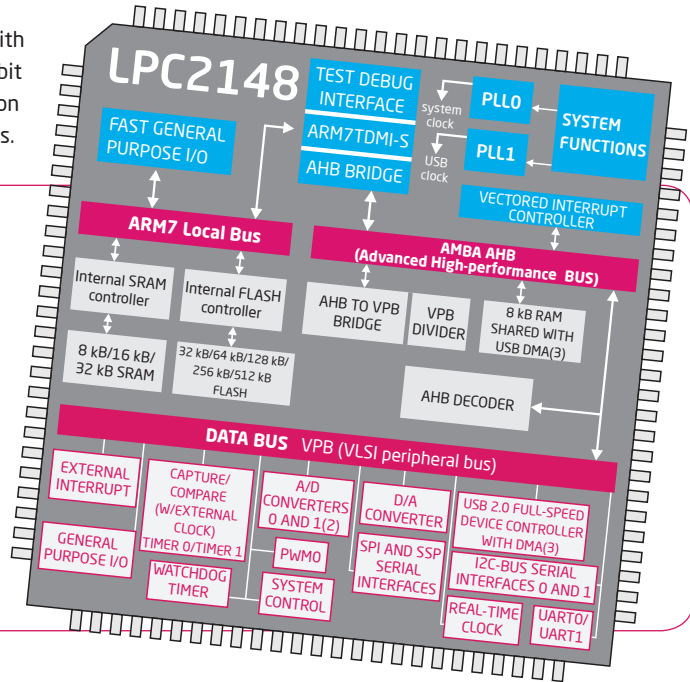
- 01 When everything is completed, you will receive a **message** in the status bar.

4. LPC2148 Microcontroller

The **mikromedia for ARM** development system comes with the **LPC2148** microcontroller. This high-performance 32-bit microcontroller with its integrated modules and in combination with other on-board modules is ideal for multimedia applications.

Key microcontroller features

- 32-bit architecture;
- 512KB of program memory;
- 32KB of RAM memory;
- 64 pins;
- 128 bit wide interface enables high speed 60 MHz operation
- USB 2.0 Full Speed compliant Device
- 2-UART, 2-SPI, 2-I2C; etc.



5. Programming with JTAG programmer/debugger

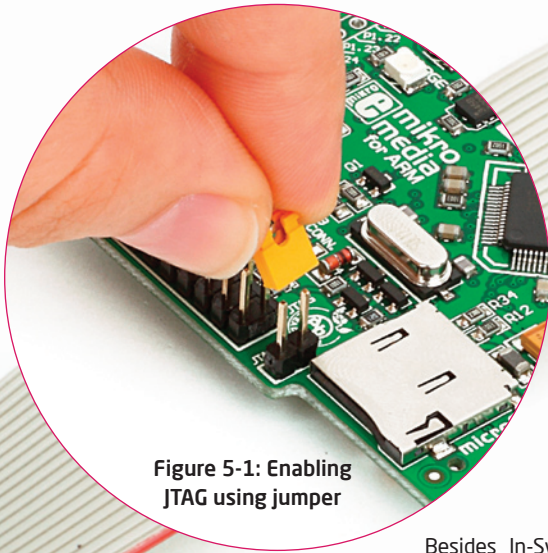


Figure 5-1: Enabling JTAG using jumper

Besides In-System programming mikromedia for ARM supports **JTAG programming** and debugging interface. In order to use it, you have to **solder 2x10 header** to the JTAG connection pads on the back side of your mikromedia board. It is also necessary to solder and set the **JTAG jumper**, located right next to the JTAG connector (Figure 5-1), in order to enable this type of programming.

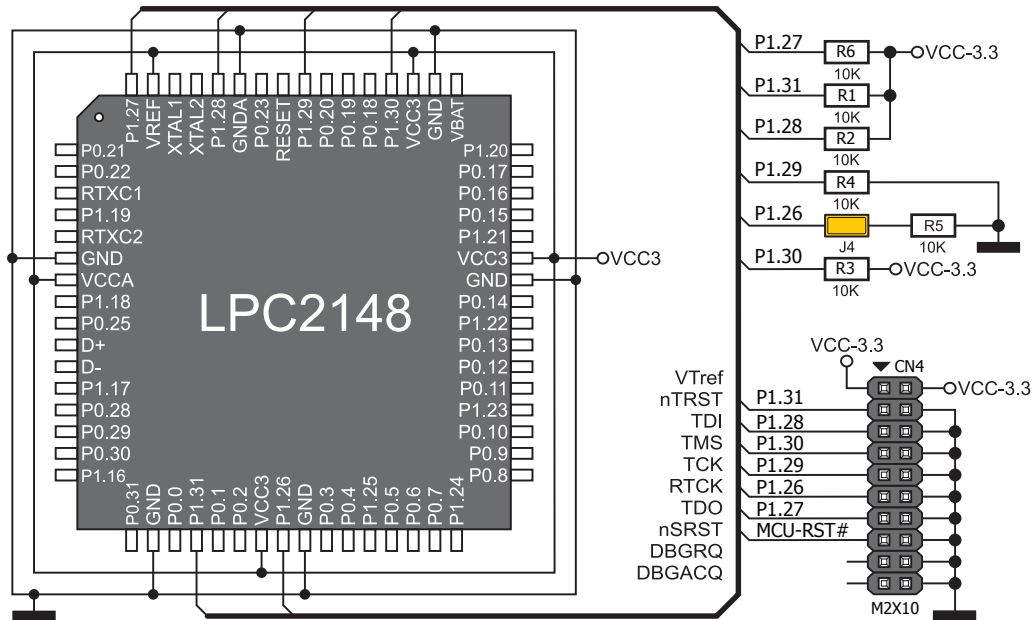


Figure 5-2: JTAG interface schematics

6. microSD Card Slot

Board contains microSD card slot for using microSD cards in your projects. It enables you to store large amounts of data externally, thus saving microcontroller memory. microSD cards use Serial Peripheral Interface (**SPI**) for communication with the microcontroller.



Figure 6-1: Inserting microSD card

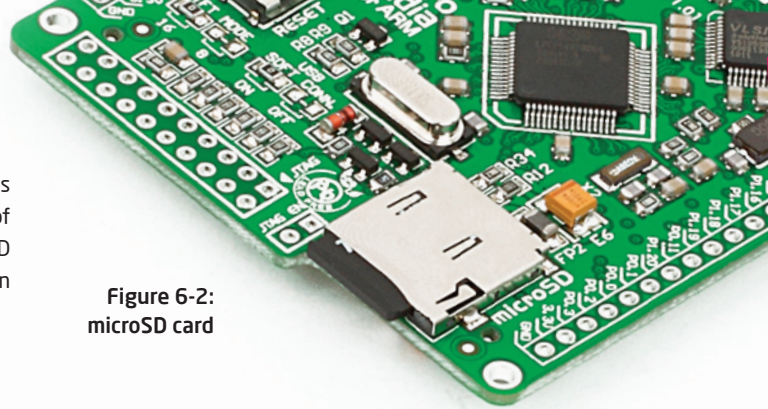
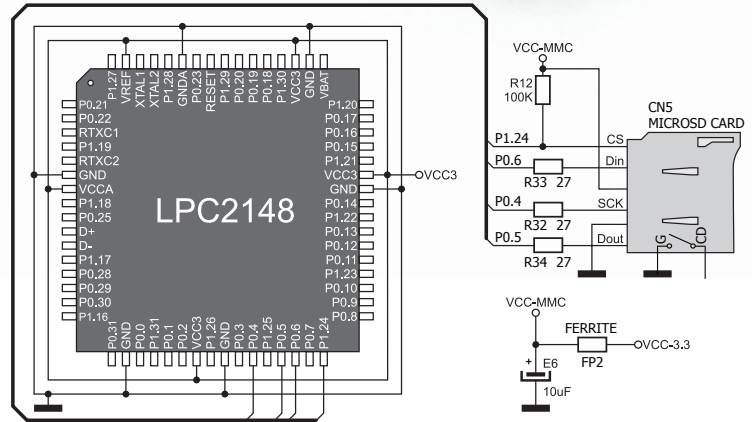


Figure 6-2: microSD card



7. Accelerometer

The accelerometer is used to measure acceleration in three axis: x- y- and z-. The accelerometer's function is defined by the user in the program loaded into the microcontroller. Communication between the accelerometer and the microcontroller is performed over the **I²C** interface.

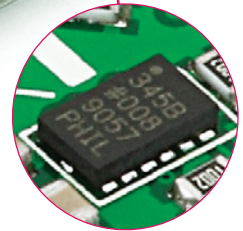
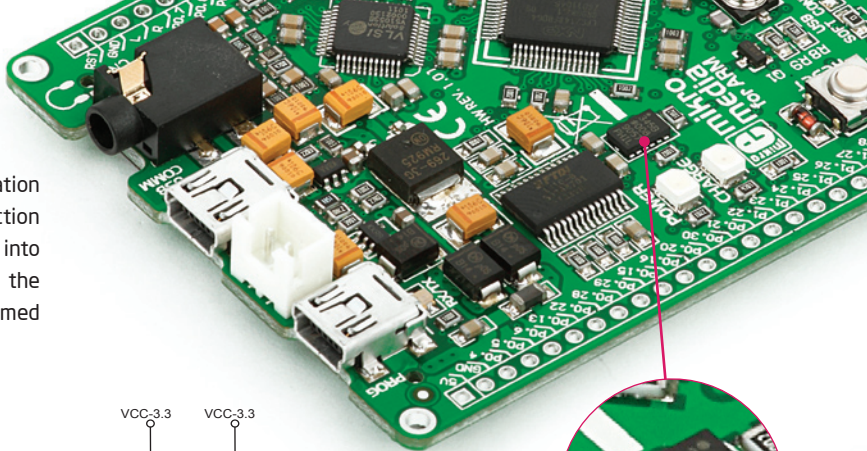


Figure 7-1:
Accelerometer
module

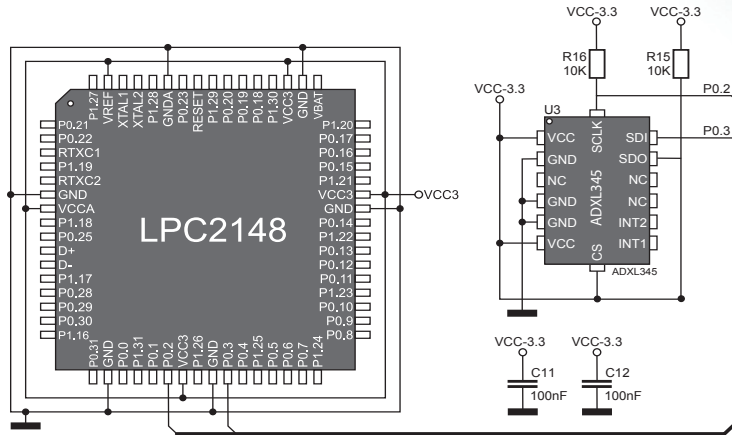


Figure 7-2: Accelerometer
connecting schematic

8. Touch Screen

The development system features a **TFT 320x240 display** covered with a **resistive** touch panel. Together they form a functional unit called a touch screen. It enables data to be entered and displayed at the same time. The TFT display is capable of showing data in **262.000** different **colors**.

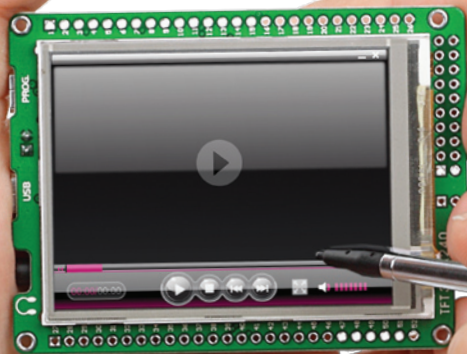
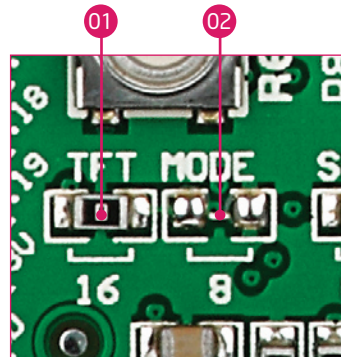


Figure 8-1:
Touch Screen



There are two SMD jumpers, or zero-ohm resistors on board for selection of TFT communication mode. By soldering the resistor in the desired position you can select following TFT operating modes:

- 01 16-bit interface mode
- 02 8-bit interface mode

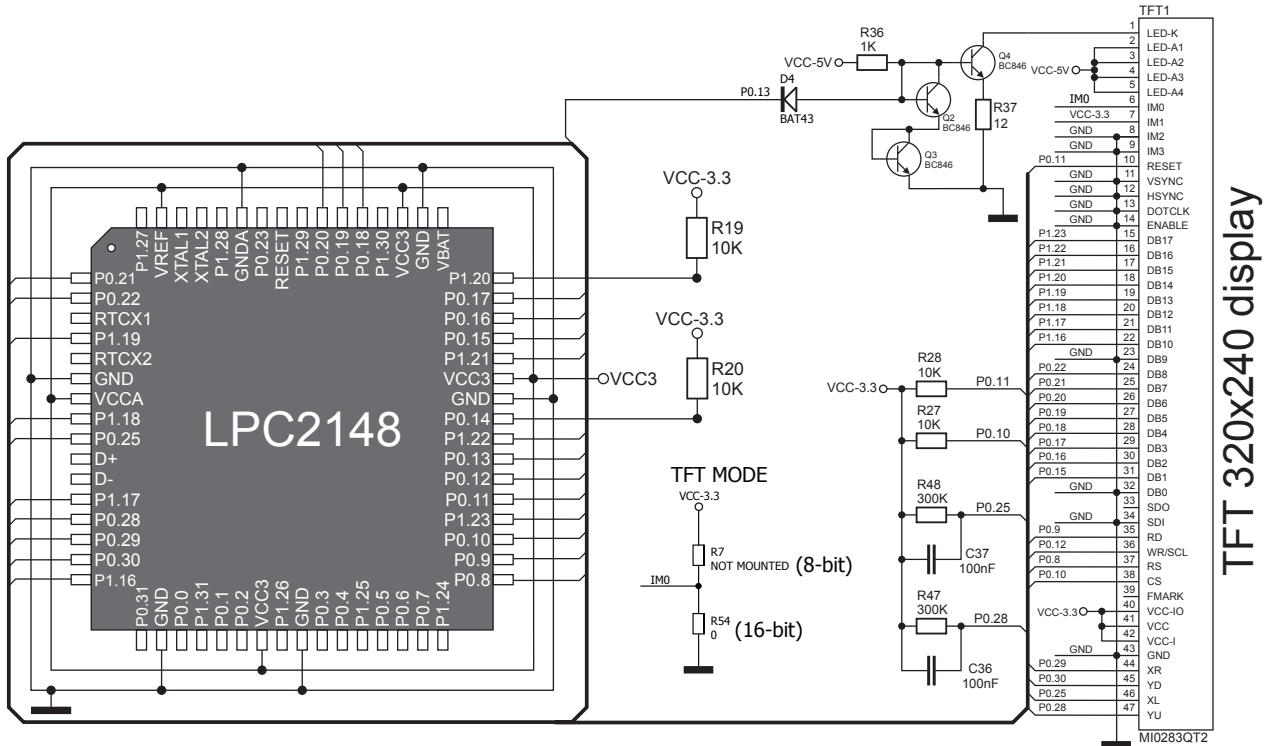


Figure 8-2: Touch Screen connection schematic

9. Audio Module

Figure 9-1:
headphones
connected with
mikromedia

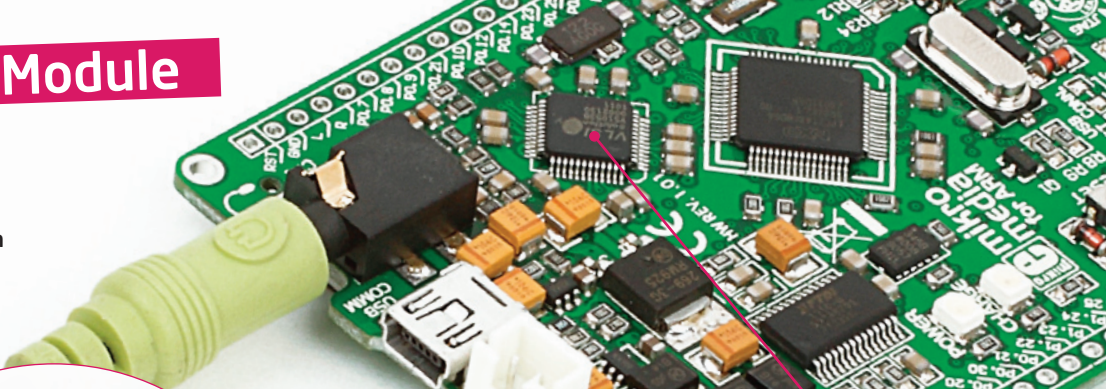
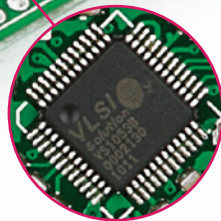


Figure 9-2: Inserting
3.5mm headphones jack



The mikromedia for ARM features MP3 codec audio controller **VS1053**. This module enables audio reproduction by using stereo headphones connected to the system via a **3.5mm** connector CN6. All functions of this module are controlled by the microcontroller over Serial Peripheral Interface (**SPI**).

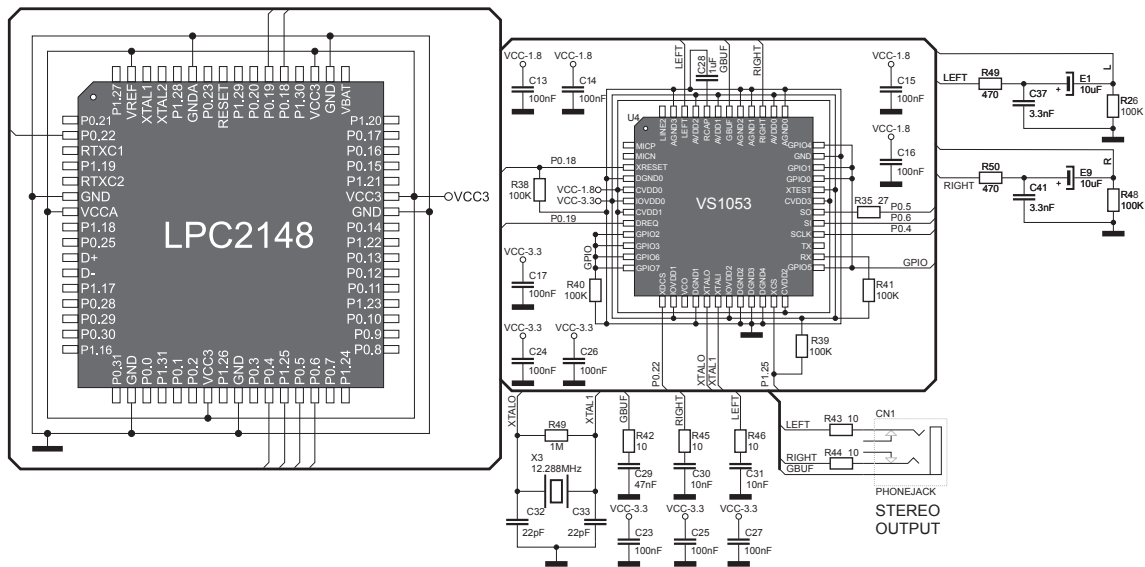


Figure 9-3: Audio module connecting schematic

10. USB connection

LPC2148 microcontroller has integrated USB 2.0 module, which enables you to implement USB communication functionality of your mikromedia board. Connection with target USB host is done over miniUSB connector which is positioned next to the audio jack.

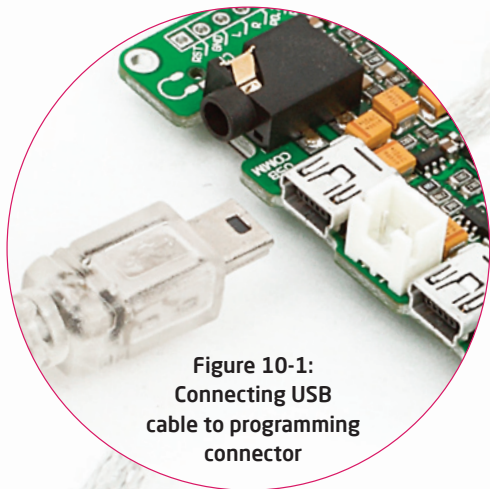
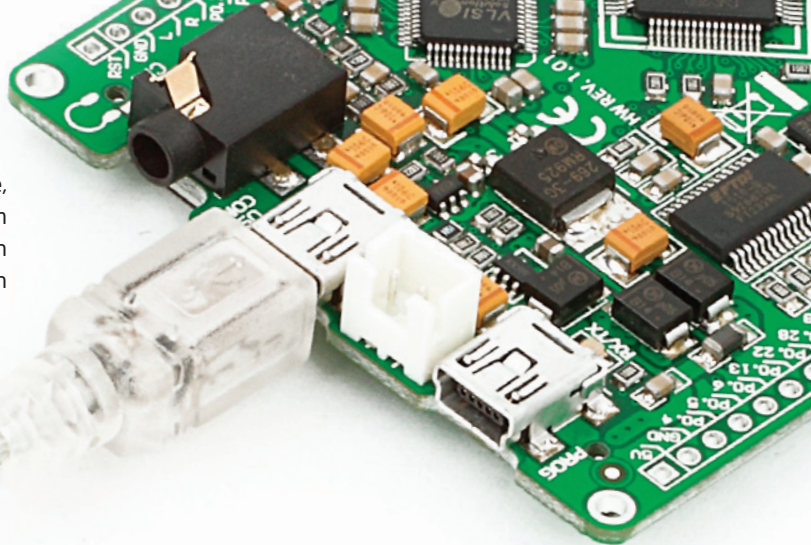


Figure 10-1:
Connecting USB
cable to programming
connector



There are two SMD jumpers, or zero-ohm resistors on board for selection of USB communication mode. By soldering the resistor in the desired position you can select following USB operating modes:

- 01** USB Soft connection OFF
- 02** USB Soft connection ON

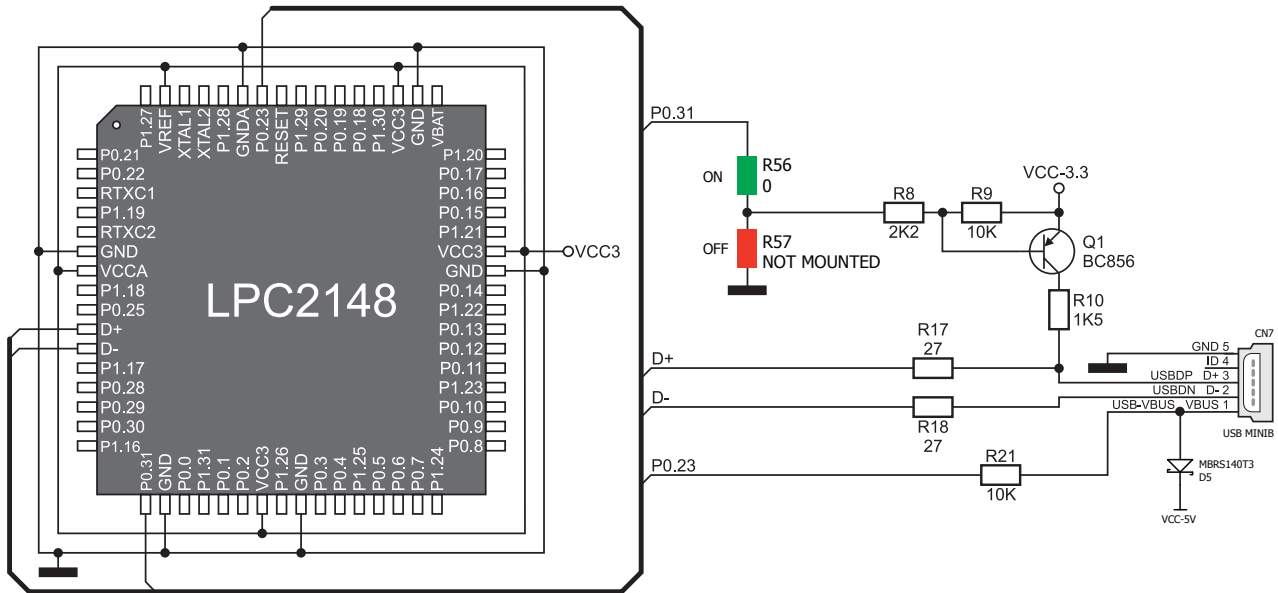
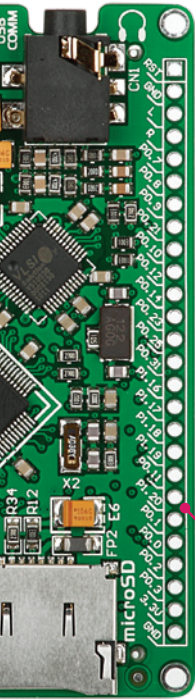


Figure 10-2: USB module connecting schematic

11. Pads



Pads HDR2

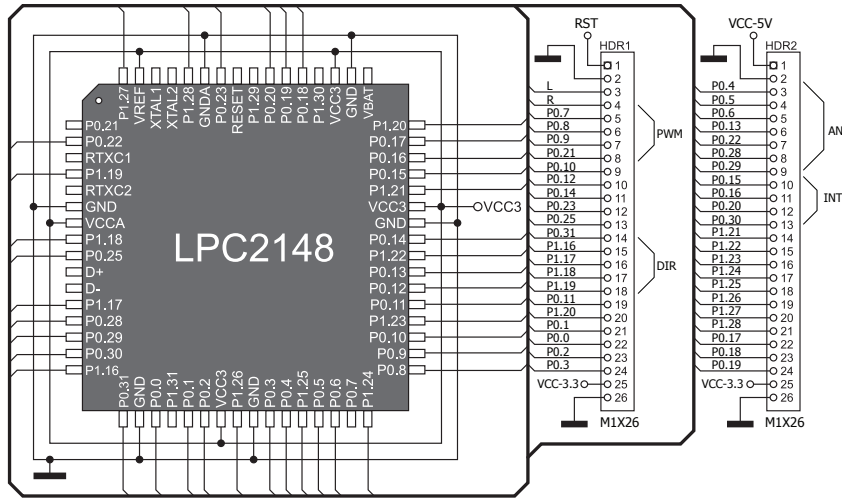
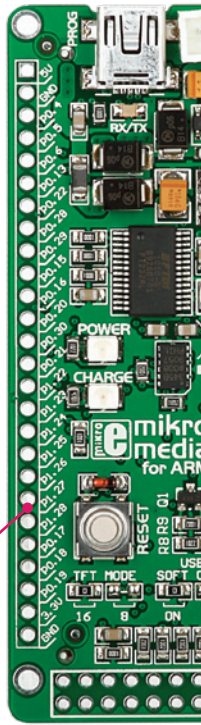


Figure 11-1: Pads connecting schematic



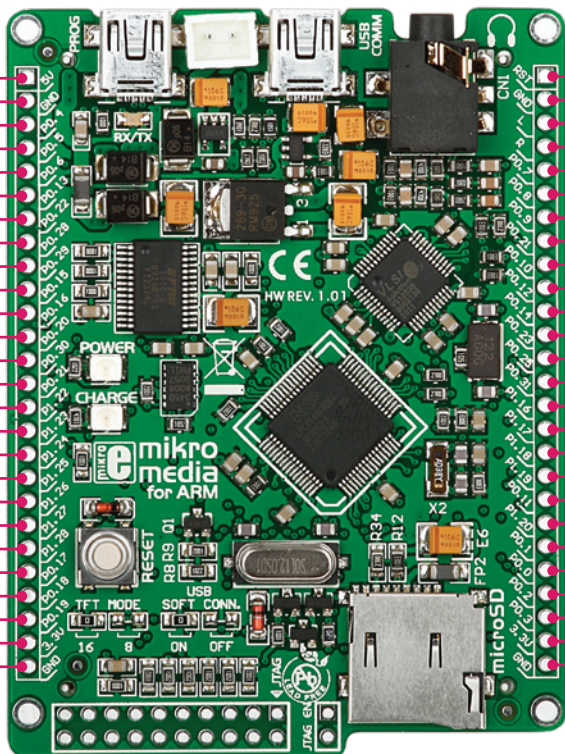
Pads HDR1

Most microcontroller pins are available for further connectivity via two 1x26 rows of connection pads on both sides of the mikromedia board. They are designed to perfectly match additional shields, such as Battery Boost shield, PROTO shield and others.

12. Pinout

5V power supply	5V
Reference Ground	GND
SCK0/CAPO.1/AD0.6	P0.4
MISO0/MATO.1/AD0.7	P0.5
MOSI0/CAPO.2/AD1.0	P0.6
DTR1/MAT1.1/AD1.4	P0.13
AD1.7/CAPO.0/MATO.0	P0.22
AD0.1/CAPO.2/MATO.2	P0.28
AD0.2/CAPO.3/MATO.3	P0.29
RI1/EINT2/AD1.5	P0.15
EINT0/MATO.2/CAPO.2	P0.16
MAT1.3/SSEL1/EINT3	P0.20
AD0.3/EINT3/CAPO.0	P0.30
PWM5/AD1.6/CAP1.3	P0.21
AD1.7/CAPO.0/MATO.0	P1.22
PIPESTAT2	P1.23
TRACECLK	P1.24
EXTINO	P1.25
RTCK	P1.26
TDO	P1.27
TDI	P1.28
CAP1.2/SCK1/MAT1.2	P0.17
CAP1.3/MISO1/MAT1.3	P0.18
MAT1.2/MOSI1/CAP1.2	P0.19
3.3V power supply	3.3V
Reference Ground	GND

Pin functions

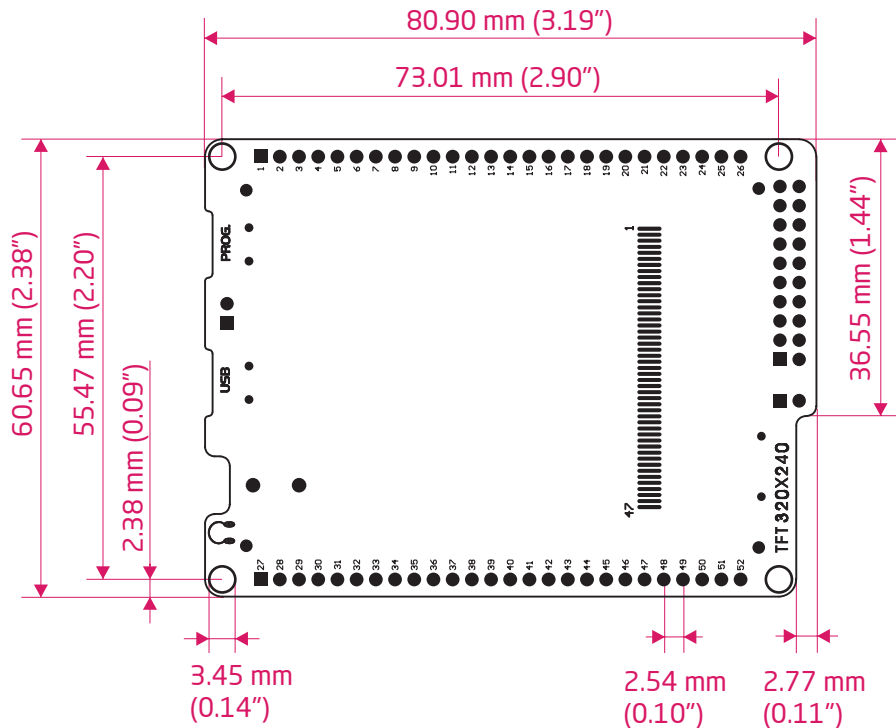


RST	Reset pin
GND	Reference Ground
L	left ch.] audio out
R	right ch.] audio out
P0.7	SSEL0/PWM2/EINT2
P0.8	TXD1/PWM4/AD1.1
P0.9	RXD1/PWM6/EINT3
P0.21	PWM5/AD1.6/CAP1.3
P0.10	RTS1/CAP1.0/AD1.2
P0.12	DSR1/MAT1.0/AD1.3
P0.14	DCD1/EINT1/SDA1
P0.23	VBUS
P0.25	AD0.4/AOUT
P0.31	UP_LED/CONNECT
P1.16	TRACEPKT0
P1.17	TRACEPKT1
P1.18	TRACEPKT2
P1.19	TRACEPKT3
P0.11	CTS1/CAP1.1/SCL1
P1.20	TRACESYNC
P0.1	RXD0/PWM3/EINT0
P0.0	TXD0/PWM1
P0.2	SCL0/CAPO.0
P0.3	SDA0/MATO.0/EINT1
3.3V	3.3V power supply
GND	Reference Ground

Pin functions

■ PWM lines
 ■ Analog Lines
 ■ Interrupt Lines
 ■ SPI Lines
 ■ I2C Lines
 ■ UART lines
 ■ JTAG lines

13. Dimensions



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