

user's guide to

# mikromedia

## board for dsPIC33

Compact development system rich with on-board peripherals for  
all-round multimedia development on dsPIC33FJ256GP710A



# 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 above the name and title. The signature is fluid and cursive.

Nebojsa Matic  
General Manager

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# Introduction to mikromedia for dsPIC33

The **mikromedia for dsPIC33** 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 16-bit **dsPIC33FJ256GP710A** microcontroller. The mikromedia for dsPIC33 features integrated modules such as stereo MP3 codec, **TFT 320x240 touch screen** display, accelerometer, USB connector, MMC/SD card slot and other. It comes preprogrammed with UART bootloader, but can also be programmed with external programmers, such as mikroProg or ICD2/3. Mikromedia is compact and slim, and perfectly fits in the palm of the hand, which makes it convenient platform for mobile devices.

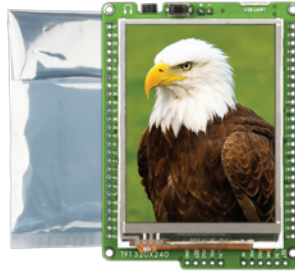




# Package contains



- 01 Damage resistant protective box



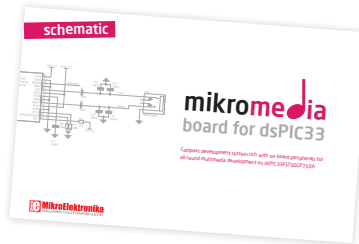
- 02 mikromedia for dsPIC33 development system



- 03 CD with documentation and examples



- 04 mikromedia for dsPIC33 user's guide



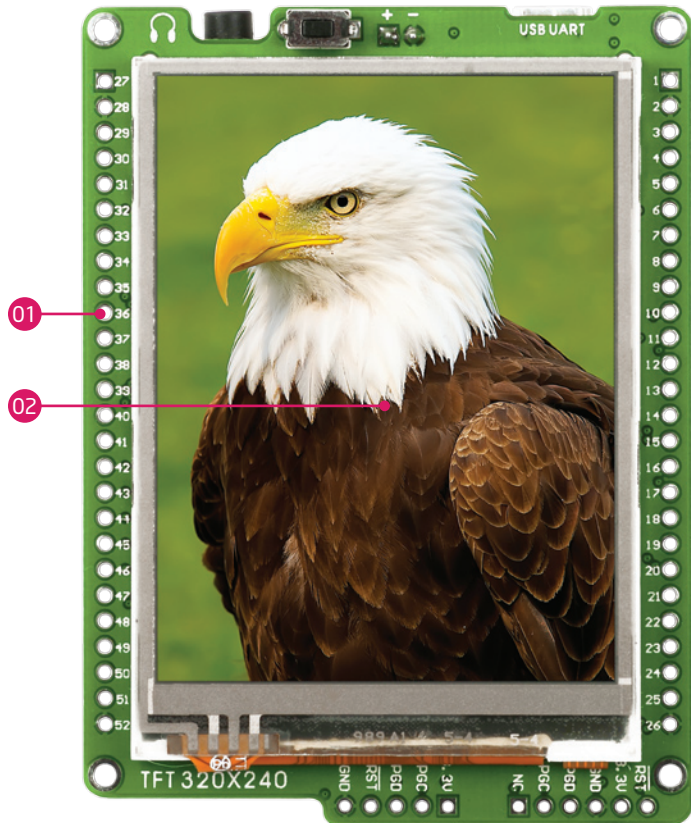
- 05 mikromedia for dsPIC33 schematic

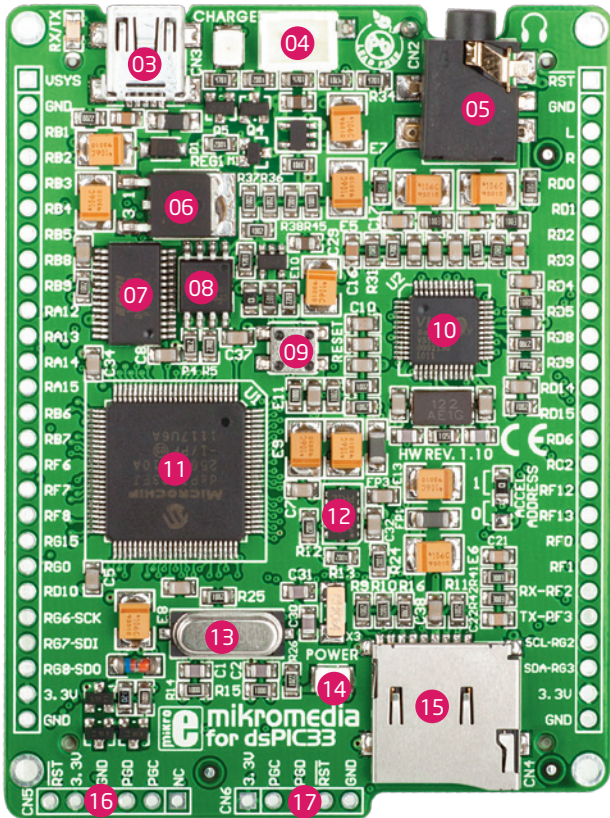


- 06 USB cable

# Key Features

- 01 Connection Pads
- 02 TFT 320x240 display
- 03 USB MINI-B connector
- 04 LI-Polymer battery connector
- 05 3.5mm headphone connector
- 06 Power supply regulator
- 07 FTDI chip
- 08 Serial Flash memory
- 09 RESET button
- 10 VS1053 Stereo mp3 coder/decoder
- 11 dsPIC33FJ256GP710A microcontroller
- 12 Accelerometer
- 13 Crystal oscillator
- 14 Power indicator LED
- 15 microSD Card Slot
- 16 ICD2/3 connector
- 17 mikroProg 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

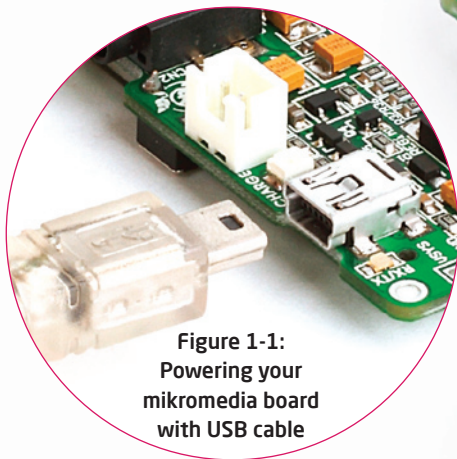
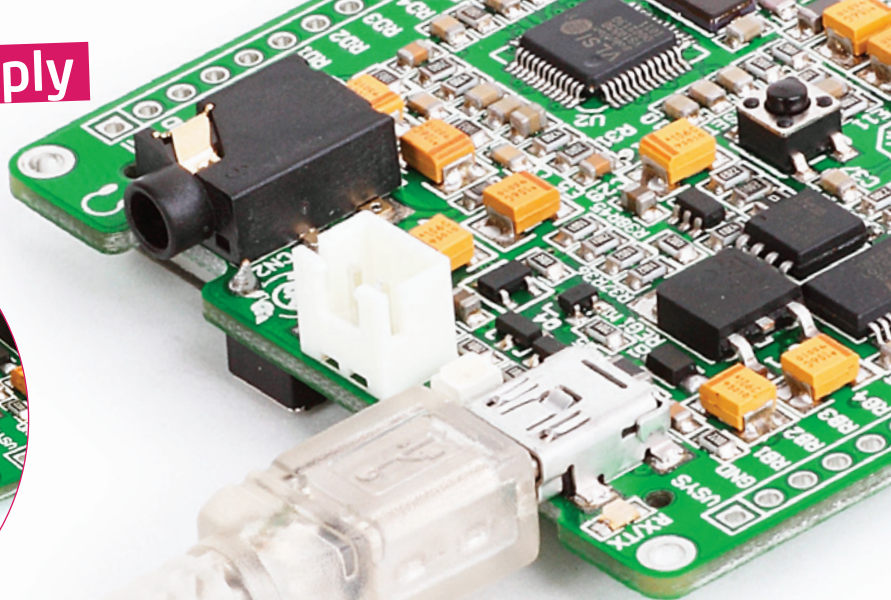


Figure 1-1:  
Powering your  
mikromedia board  
with USB cable



You can provide power supply to the board using provided **miniUSB connector**. 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.

## 2. Battery power supply



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

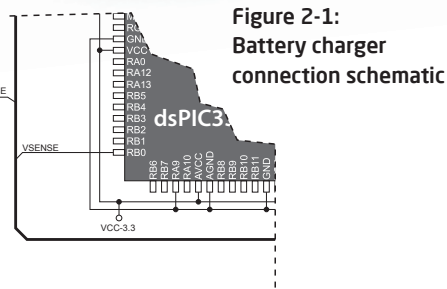
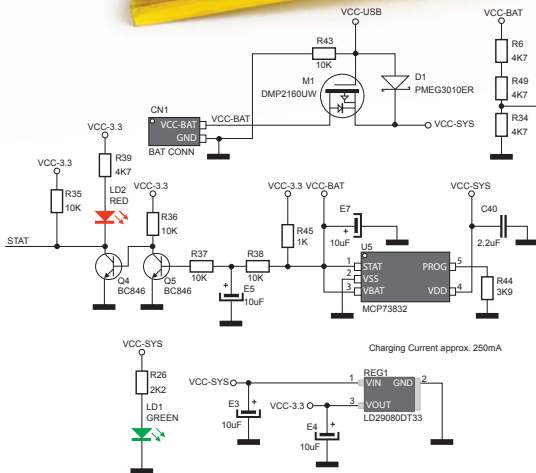
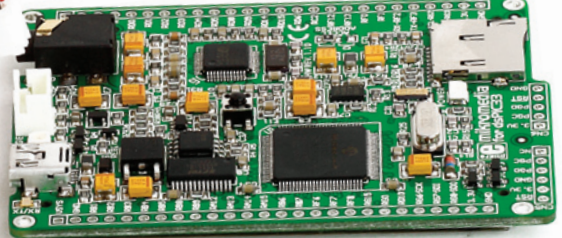


Figure 2-1:  
Battery charger  
connection schematic

You can also power the board using **Li-Polymer** battery, via on-board battery connector. On-board battery charger circuit **MCP73832** enables you to charge the battery over USB connection. Charging current is ~250mA and charging voltage is 4.2V DC.

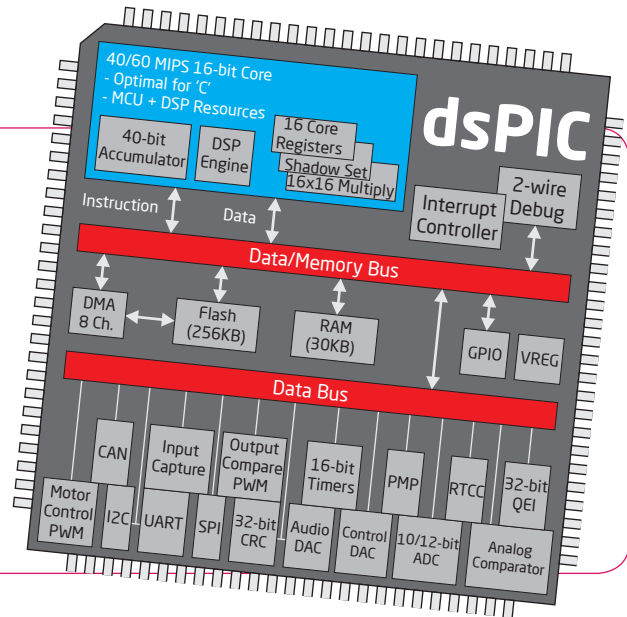


# 3. dsPIC33FJ256GP710A Microcontroller

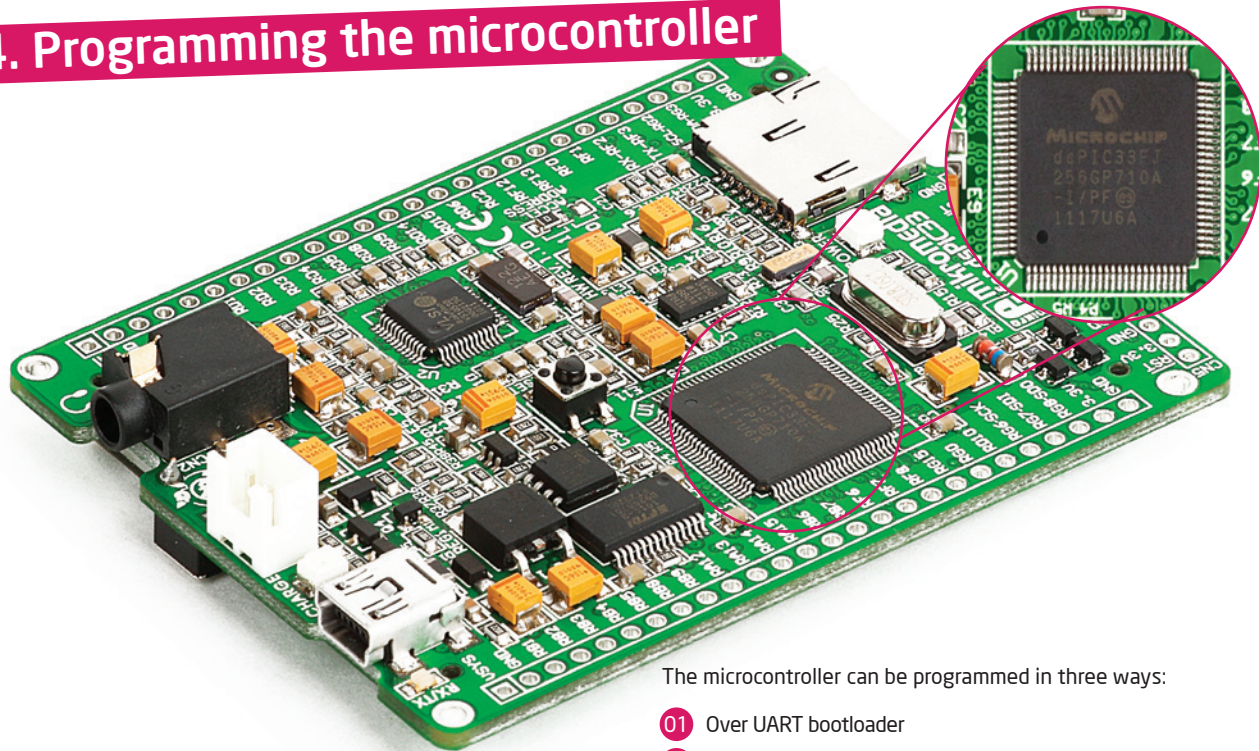
The **mikromedia for PIC33** development system comes with the **dsPIC33FJ256GP710A** microcontroller. This high-performance 16-bit microcontroller with its integrated modules and in combination with other on-board modules is ideal for multimedia applications.

## Key microcontroller features

- Up to **40 MIPS** Operation;
- 16-bit architecture;
- 256KB of program memory;
- 30.720 Bytes of RAM memory;
- 85 I/O pins;
- Internal Oscillator 7.37 MHz, 512kHz;
- nanoWatt features: Fast Wake/Fast Control;
- 2-UART, 2-SPI, 2-I2C; etc.



## 4. Programming the microcontroller



The microcontroller can be programmed in three ways:

- 01 Over UART bootloader
- 02 Using mikroProg external programmer
- 03 Using ICD2/3 external programmer

# Programming with bootloader

For programming, microcontroller use bootloader program which is preinstalled in to MCU memory. To transfer .hex file from a PC to MCU you need bootloader software (**ds30 Loader**) which can be downloaded from:



<http://www.mikroe.com/eng/products/view/586/mikrommb-for-dspic33-board/>

After software is downloaded unzip it to desired location and start ds30 Loader software.

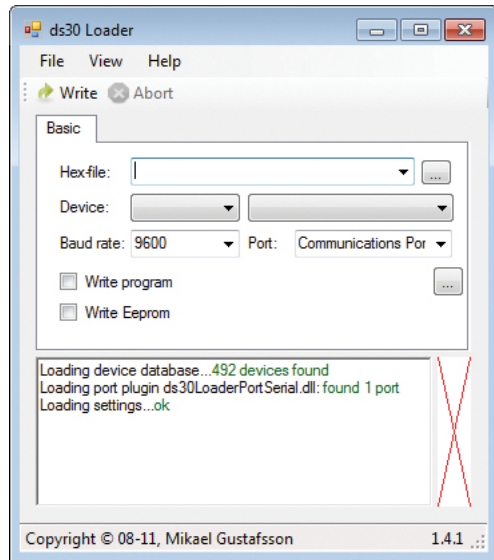
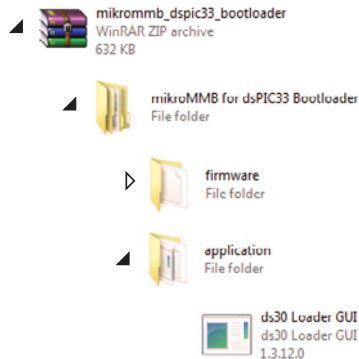


Figure 4-1: ds30 Loader open-source software

**note**

Connect mikromedia for dsPIC33 with a PC before starting ds30 Loader software



## Identifying device COM port

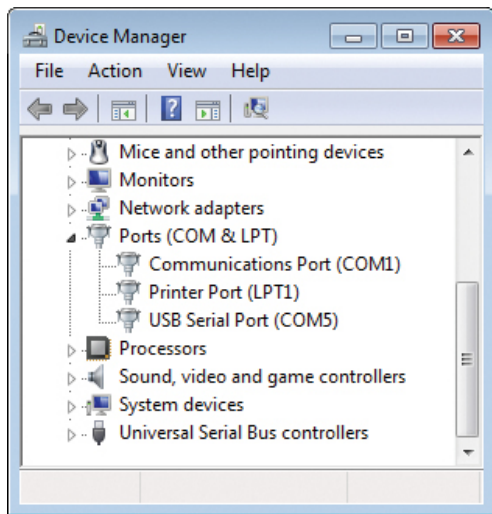


Figure 4-2: Identifying COM port

### note

*In Device Manager you can see which COM port is assigned to mikromedia (in this case COM5)*

## step 1 - Choosing COM port

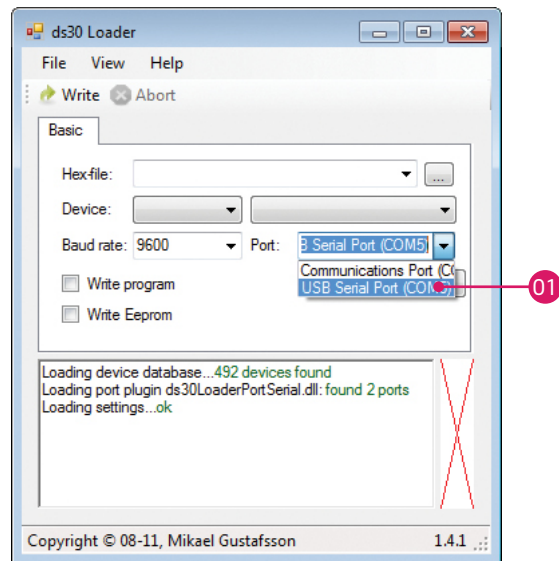


Figure 4-3: Selecting COM port

- 01** From drop down list select USB COM port which is used for communication with a PC (in this case COM5)

## step 2 - Choosing device family

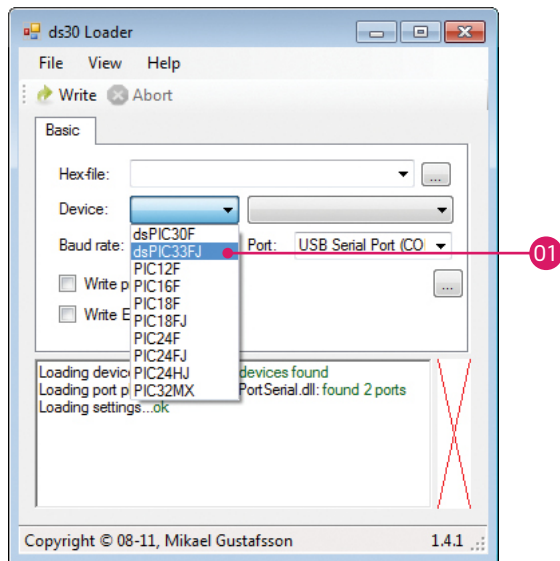


Figure 4-4: Selecting MCU family

01 From drop down list select MCU family (**dsPIC33FJ**)

## step 3 - Choosing device

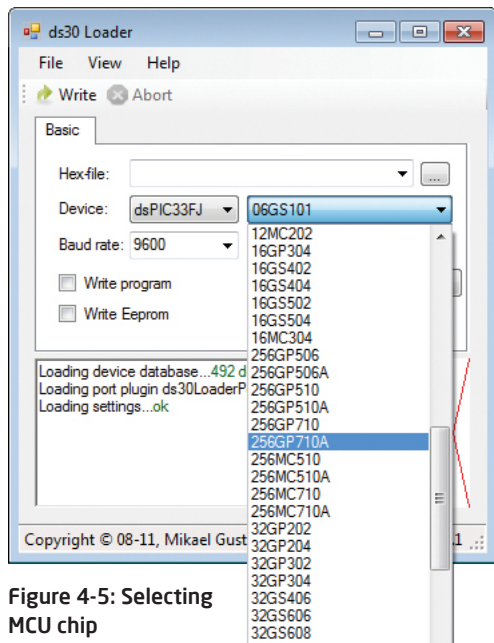


Figure 4-5: Selecting MCU chip

01 From drop down list select MCU chip (**256GP710A**)

## step 4 - Browse for .hex file

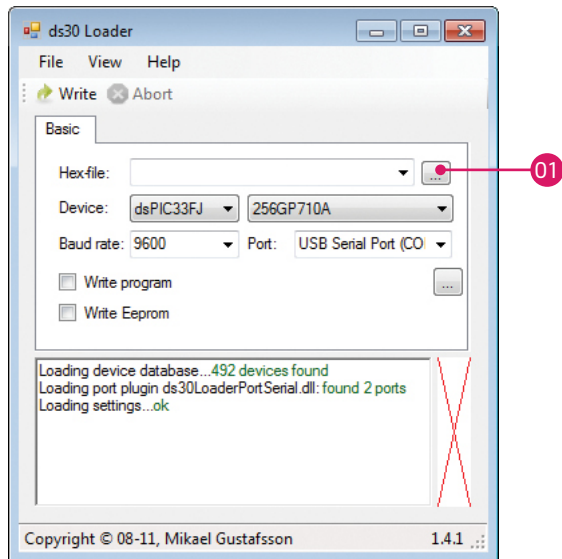


Figure 4-6: Browse for .hex file

- 01 Click on **Browse button** and from pop-up window (figure 3-6) select .hex file which will be uploaded to MCU memory

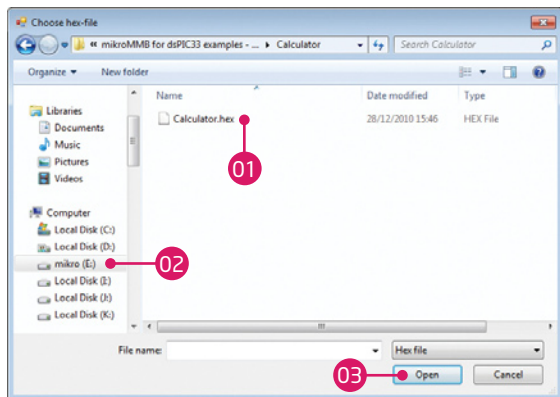


Figure 4-7: Pop-up window for .hex file choosing

- 01 Select desired .hex file  
02 Folder list  
03 Click on Open button

## step 5 - Set Baud rate

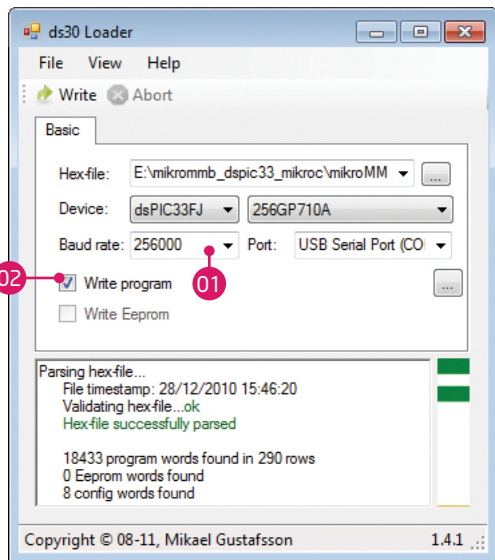


Figure 4-8: Setting baud rate

- 01 From drop down list set baud rate value to 256000
- 02 Check **Write program** check box

## step 6 - Uploading .hex file

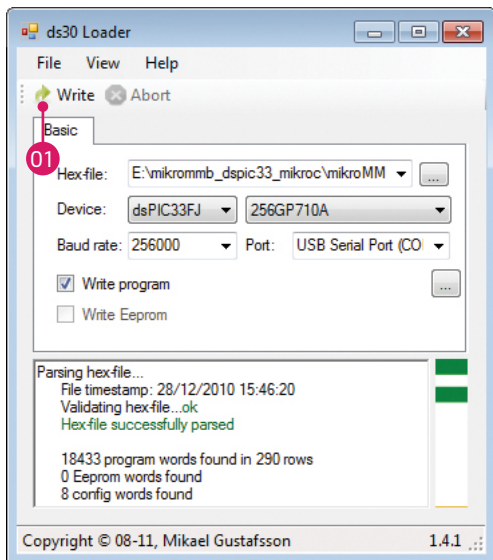


Figure 4-9: Write program

- 01 First RESET mikromedia and then, within 5s click on **Write button**

**note**

If you accidentally erase bootloader program from MCU memory it is possible to load it again with external programmer. mikromedia for dsPIC33 bootloader firmware.hex file is located in Firmware subfolder, Page 12.

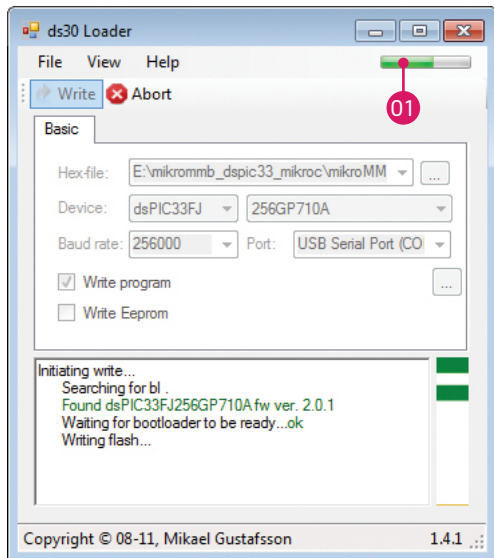


Figure 4-10: Program uploading

01 Progress bar indicates .hex file upload process

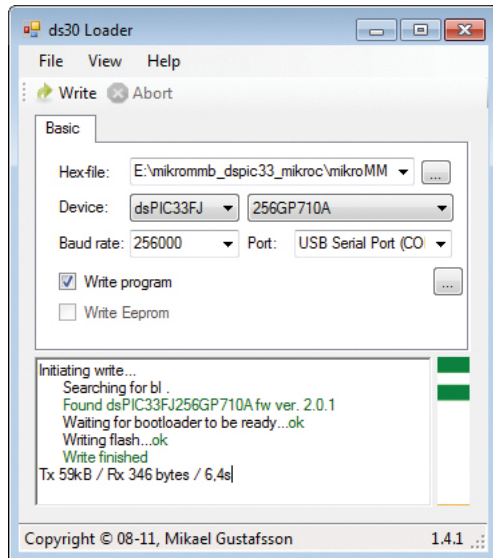


Figure 4-11: Uploading is finished

01 After uploading is finished you will get notice in ds30 Loader history window

# Programming with mikroProg™

## programmer

The microcontroller can be programmed with **mikroProg programmer** and **mikroProg Suite fo PIC** software. The mikroProg programmer is connected to the development system via the CN6 connector, Figure 4-12.



### **mikroProg™**

is a fast USB 2.0 programmer with mikroICD hardware In-Circuit Debugger.

Smart engineering allows mikroProg to support PIC10, PIC12, PIC16, PIC18, dsPIC30/33, PIC24 and PIC32 devices in a single programmer. It supports over 570 microcontrollers from Microchip. Outstanding performance, easy operation and elegant design are its key features.

**Figure 4-12:**  
connecting mikroProg

# mikroProg Suite™ for PIC Software



mikroProg™ programmer requires special programming software called mikroProg Suite™ for PIC®. This software is used for programming ALL of Microchip® microcontroller families, including PIC10, PIC12, PIC16, PIC18, dsPIC30/33, PIC24 and PIC32. Software has intuitive interface and SingleClick™ programming technology. Just by downloading the latest version of mikroProg Suite™ your programmer is ready to program new devices. mikroProg Suite™ is updated regularly, at least four times a year, so your programmer will be more and more powerful with each new release.

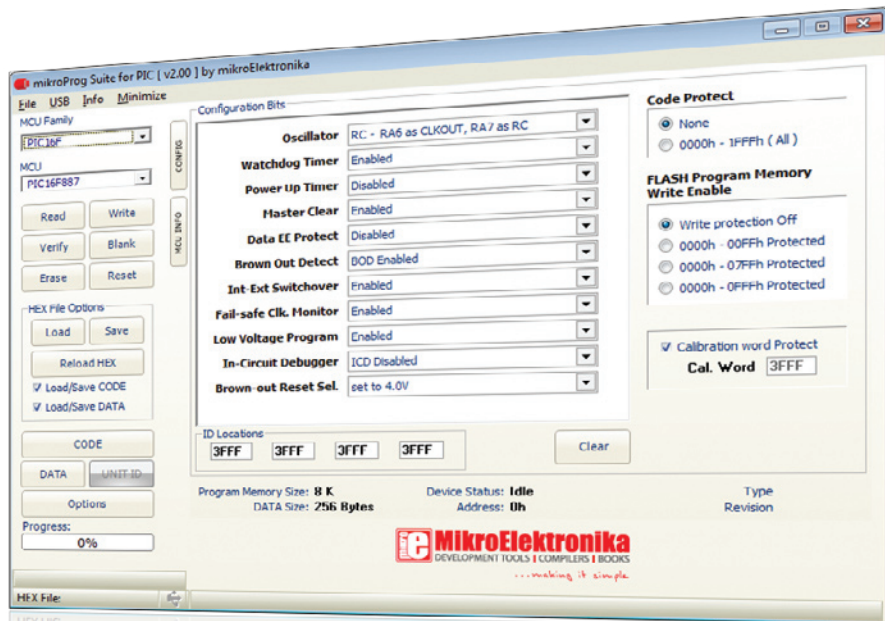


Figure 4-13: Main Window of mikroProg Suite for PIC programming software

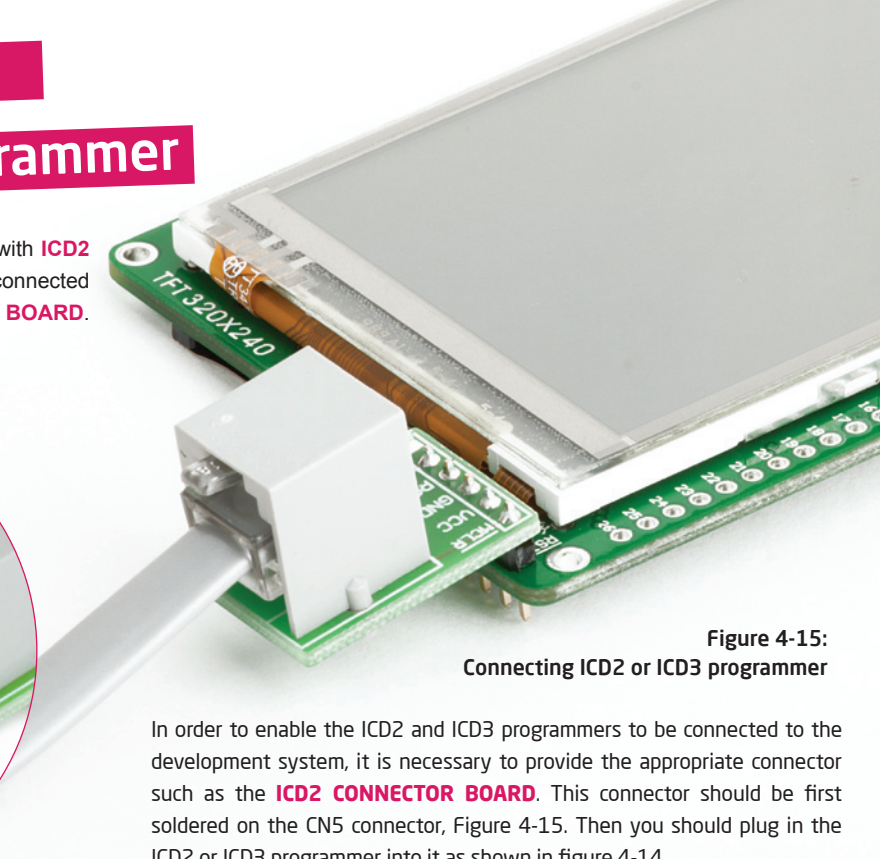


# Programming with ICD2 or ICD3 programmer

The microcontroller can be also programmed with **ICD2** or **ICD3** programmer. These programmer is connected with mikromedia board via **ICD2 CONNECTOR BOARD**.



**Figure 4-14:**  
Placing ICD2 connector



**Figure 4-15:**  
Connecting ICD2 or ICD3 programmer

In order to enable the ICD2 and ICD3 programmers to be connected to the development system, it is necessary to provide the appropriate connector such as the **ICD2 CONNECTOR BOARD**. This connector should be first soldered on the CN5 connector, Figure 4-15. Then you should plug in the ICD2 or ICD3 programmer into it as shown in figure 4-14.



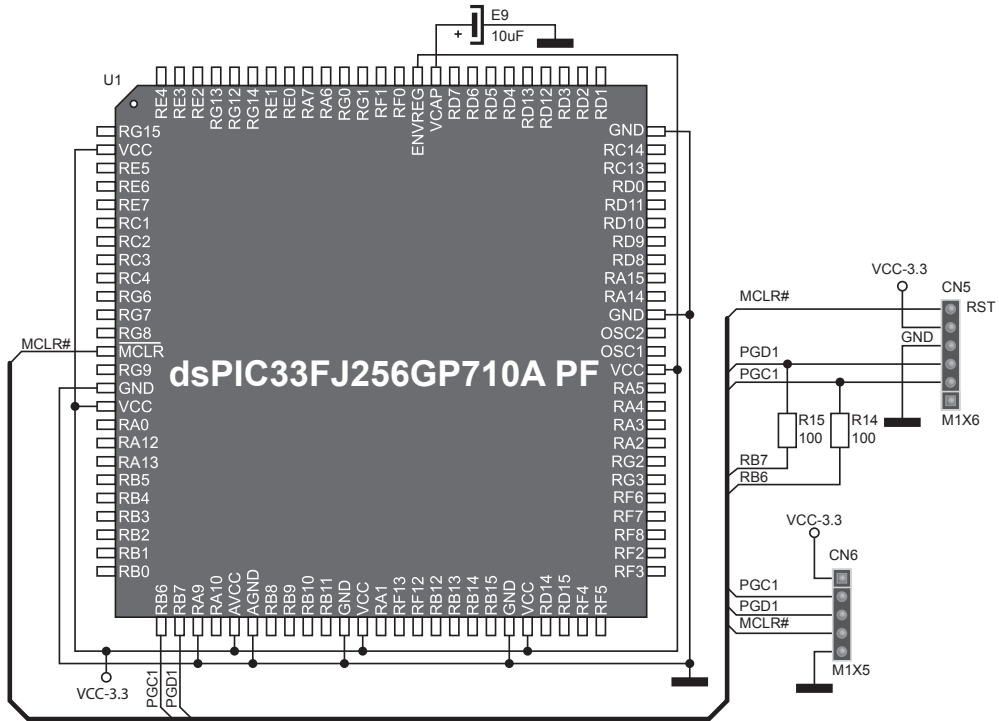


Figure 4-16: ICD2 / ICD3 & mikroProg programmer connection schematic

# 5. 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.

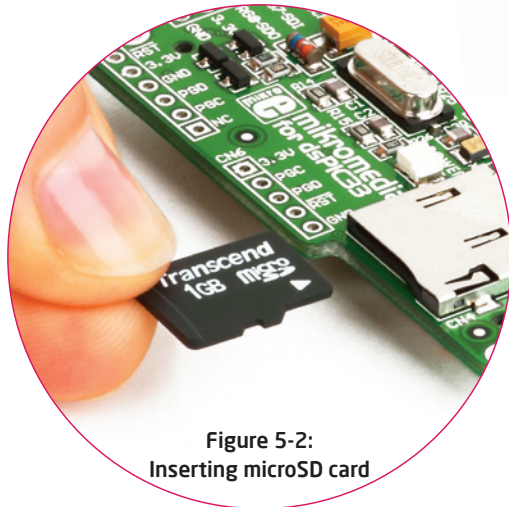


Figure 5-2:  
Inserting microSD card

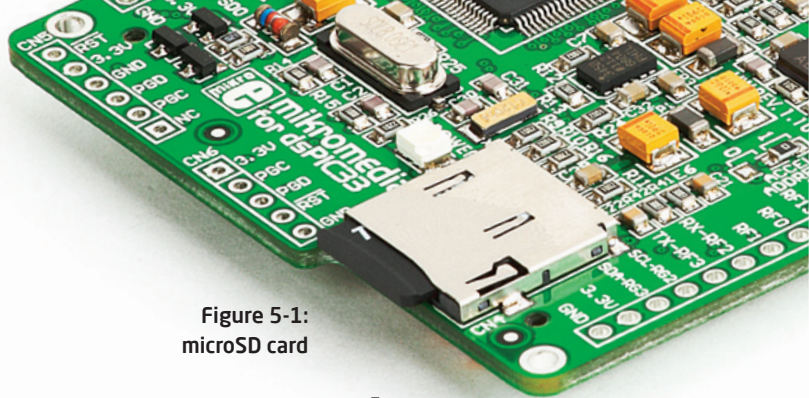


Figure 5-1:  
microSD card

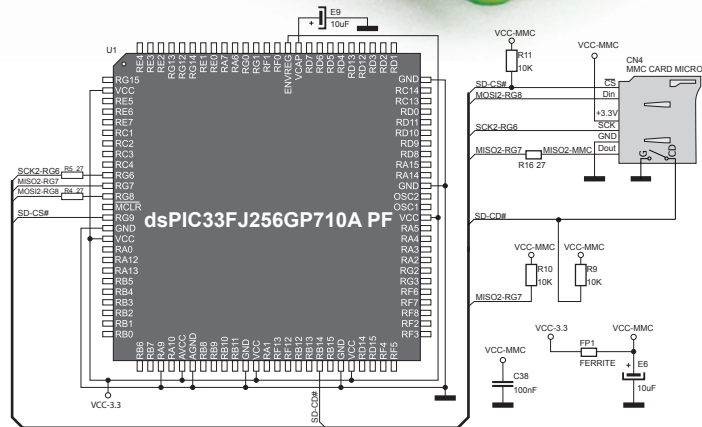


Figure 5-3: microSD slot connection schematic

# 6. Flash Memory

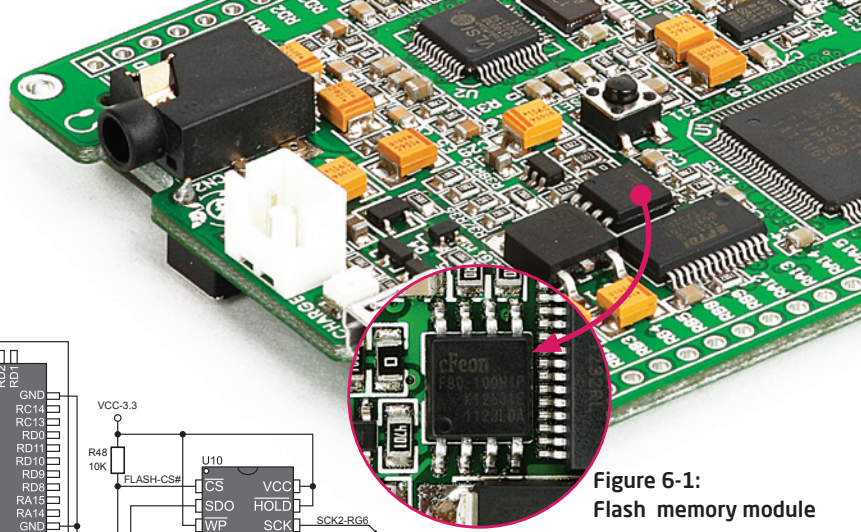


Figure 6-1:  
Flash memory module

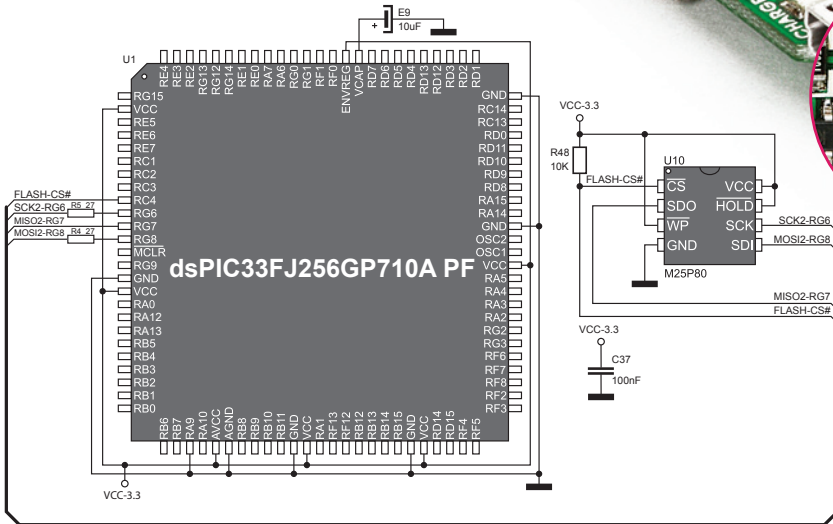
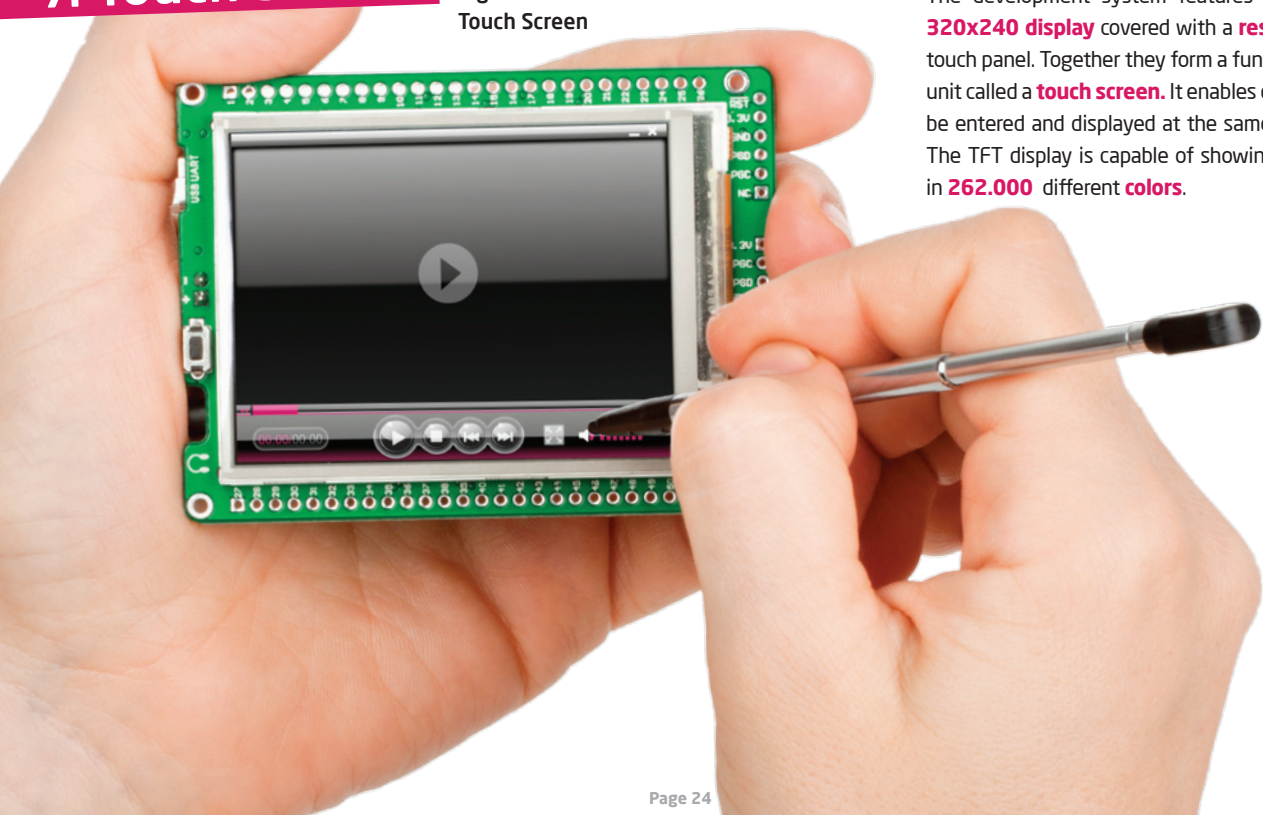


Figure 6-2: Flash memory module connection schematic

Since multimedia applications are getting increasingly demanding, it is necessary to provide additional memory space to be used for storing more data. The flash memory module enables the microcontroller to use additional **8Mbit** flash memory. It is connected to the microcontroller via the Serial Peripheral Interface (**SPI**).

## 7. Touch Screen

Figure 7-1:  
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**.

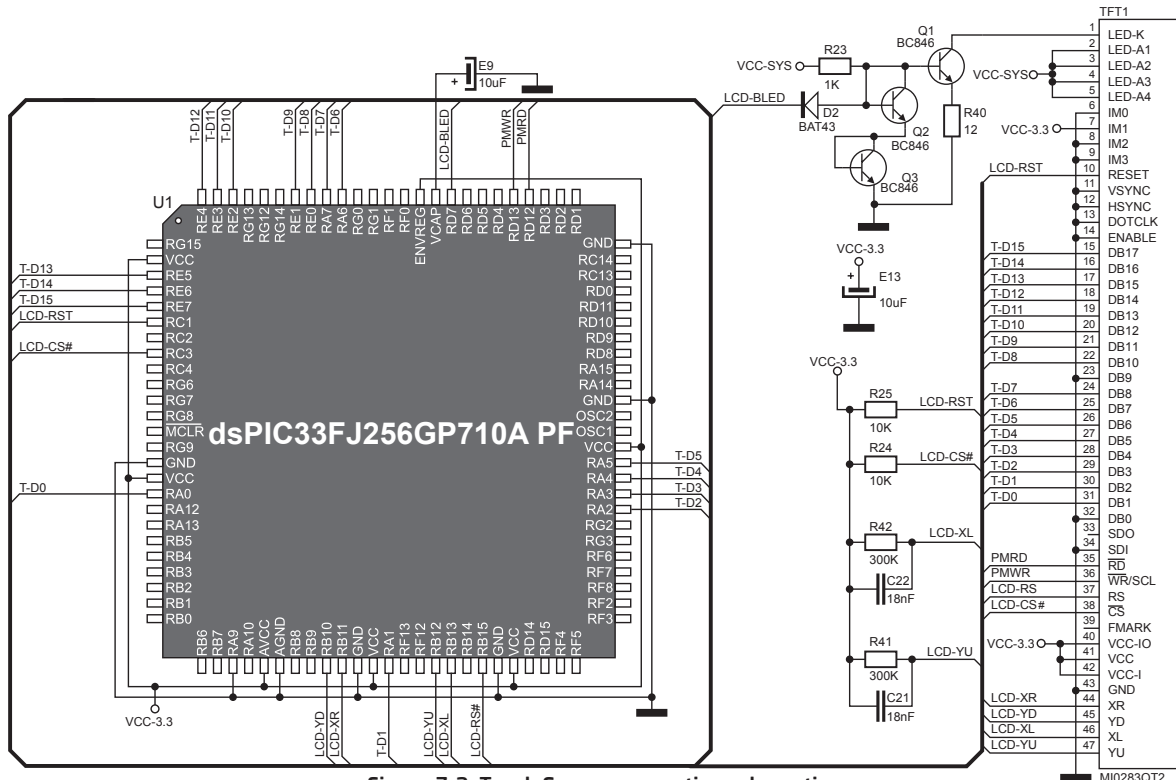


Figure 7-2: Touch Screen connection schematic



## 8. Audio Module

Figure 8-1:  
headphones connected  
with mikromedia

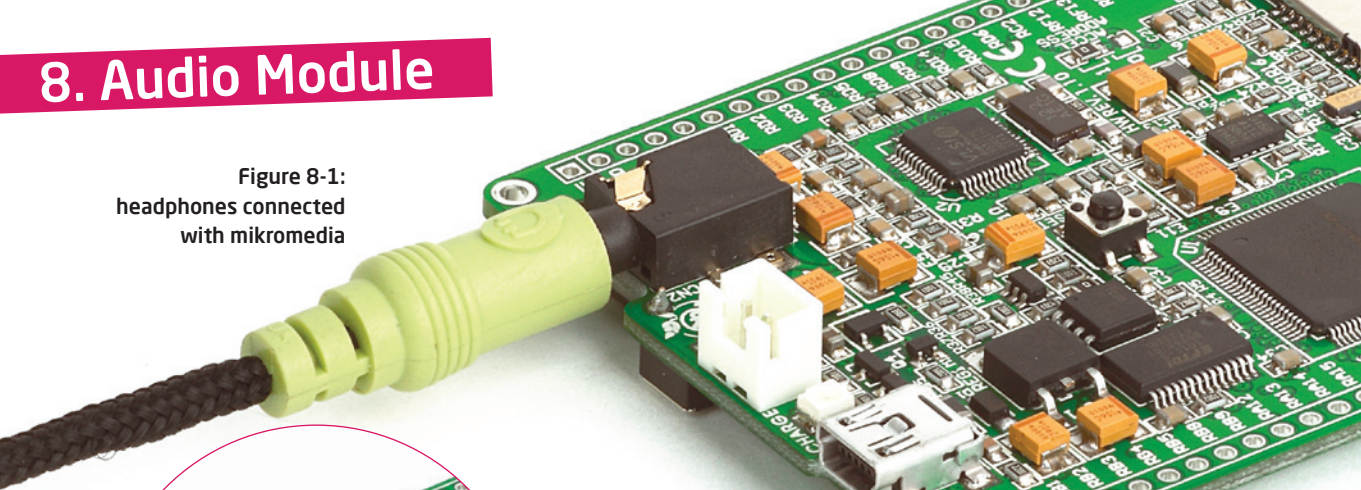


Figure 8-2:  
Inserting 3.5mm  
headphones jack

The mikromedia for dsPIC33 features MP3 codec audio controller **VS1053**. This module enables audio reproduction by using stereo headphones connected to the system via a **3.5mm** connector CN2. All functions of this module are controlled by the microcontroller over Serial Peripheral Interface (**SPI**).



## 9. USB-UART connection

On-board **FTDI chip** enables you to exploit UART functionality of your mikromedia for dsPIC33 board over USB connection enabled through miniUSB connector which is positioned next to the battery connector. Before connecting the board, make sure that you have **FTDI drivers** installed on your computer.

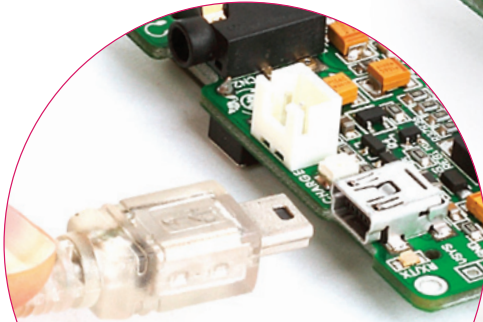
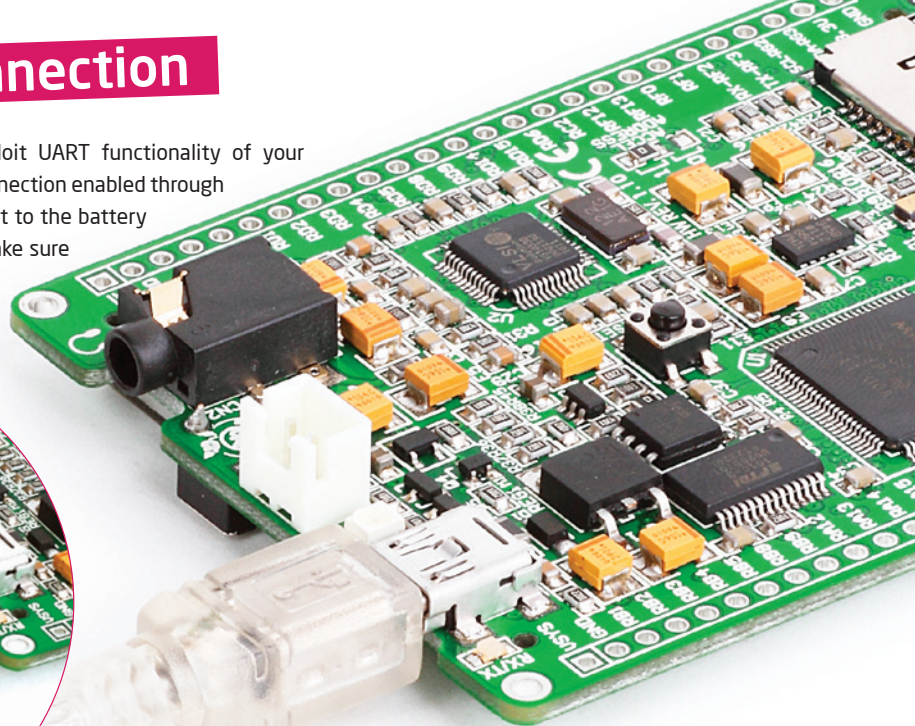


Figure 9-1:  
Connecting USB  
cable to programming  
connector









# 11. Crystal oscillator

Figure 11-1:  
Oscillators connected to MCU

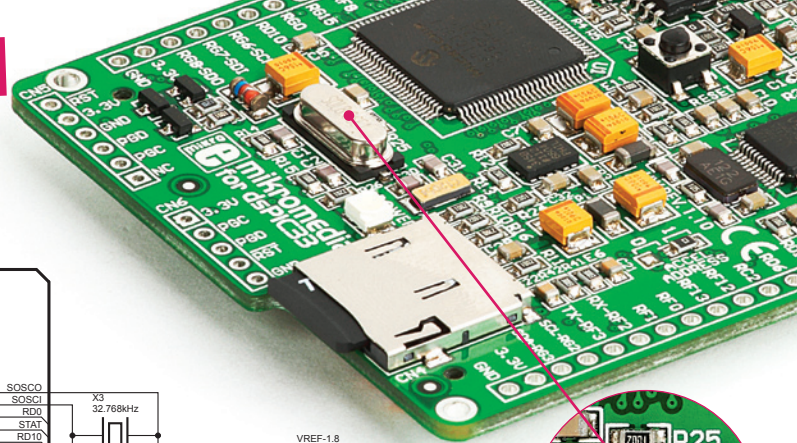
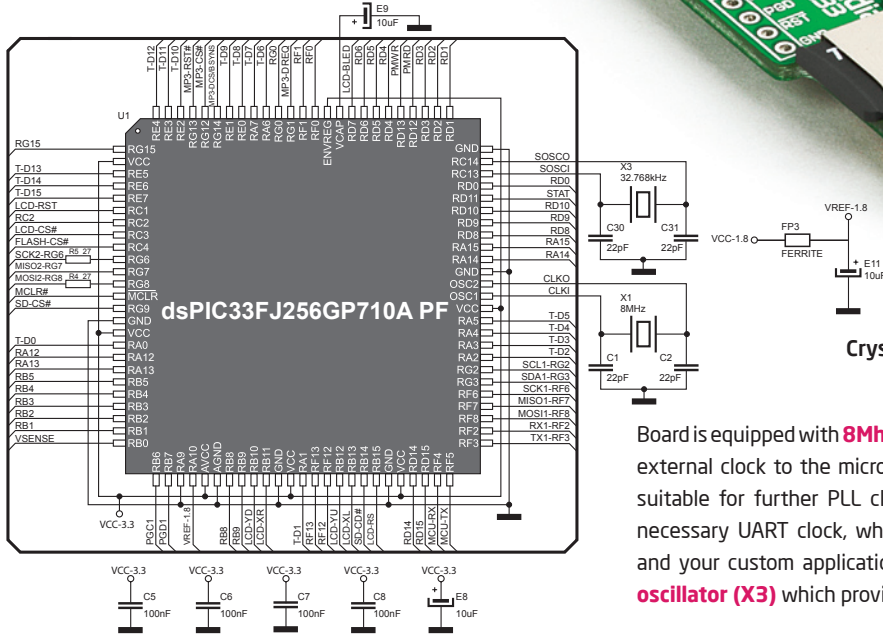


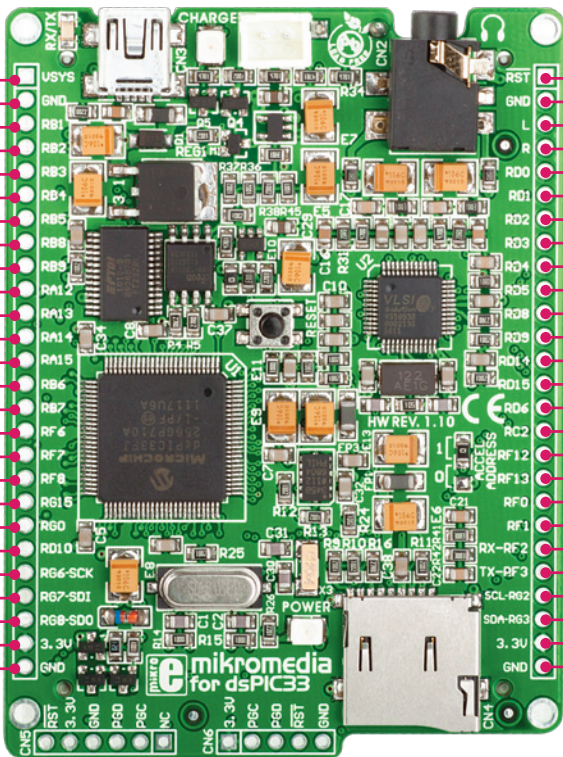
Figure 11-2:  
Crystal oscillator (X1)

Board is equipped with **8Mhz crystal oscillator (X1)** circuit that provides external clock to the microcontroller **OSC** pins. This base frequency is suitable for further PLL clock multipliers and ideal for generation of necessary UART clock, which ensures proper operation of bootloader and your custom applications. Board also contains **32.768kHz SOSC oscillator (X3)** which provides external clock for internal **RTCC** module.



# 13. Pinout

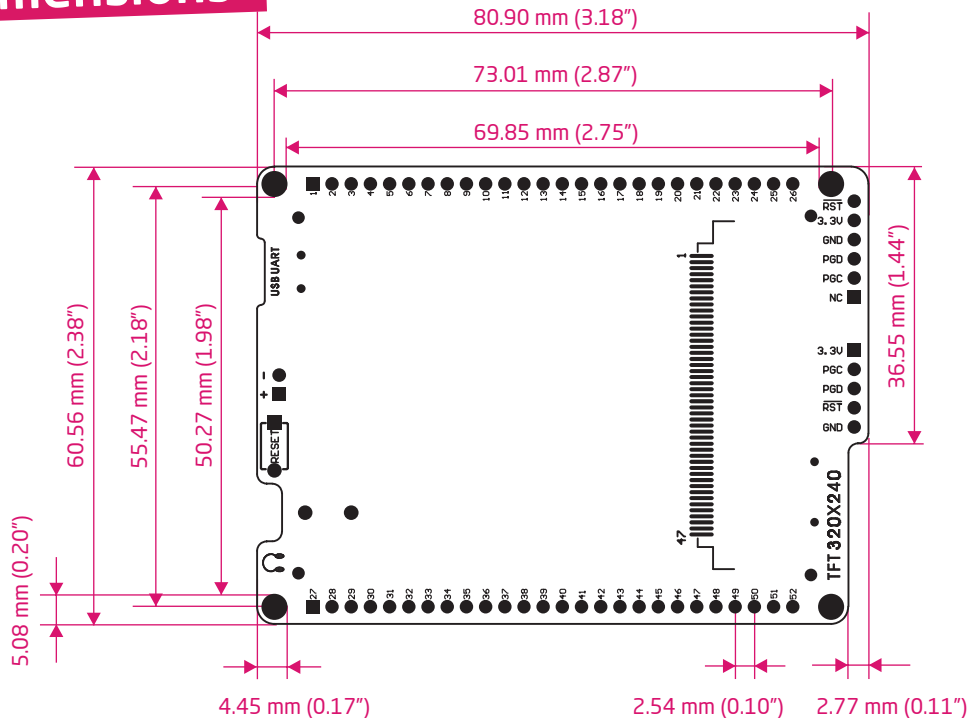
- 5V power supply
  - Reference Ground
  - AN10
  - AN2/SS1/CN4
  - AN3/CN5
  - AN4/CN6
  - AN5/CN7
  - AN8
  - AN9
  - AN20/INT1
  - AN21/INT2
  - INT3
  - INT4
  - PGEC1/AN6/OCFA
  - PGED1/AN7
  - SCK1/INT0
  - SDI1
  - SDO1
  - COFS
  - C2RX
  - IC3
  - SCK2/CN8
  - SDI2/CN9
  - SDO2/CN10
  - 3.3V power supply
  - Reference Ground
- Pin functions



- RST
  - GND
  - L
  - R
  - RD0
  - RD1
  - RD2
  - RD3
  - RD4
  - RD5
  - RD8
  - RD9
  - RD14
  - RD15
  - RD6
  - RC2
  - RF12
  - RF13
  - RF0
  - RF1
  - RF2
  - RF3
  - RG2
  - RG3
  - 3.3V
  - GND
- Reset pin
  - Reference Ground
  - left ch.
  - right ch. } audio out
  - OC1
  - OC2
  - OC3
  - OC4
  - OC5/CN13
  - OC6/CN14
  - IC1
  - IC2
  - IC7/U1CTS/CN20
  - IC8/U1RTS/CN21
  - OC7/CN15
  - AN17/T3CK/T6CK
  - U2CTS
  - U2RTS
  - C1RX
  - C1TX } CAN
  - U1RX
  - U1TX } UART
  - SCL1
  - SDA1 } I<sup>2</sup>C
  - 3.3V power supply
  - Reference Ground
- Pin functions

■ Programing lines  
 ■ Analog Lines  
 ■ Interrupt Lines  
 ■ SPI Lines  
 ■ I2C Lines  
 ■ UART lines  
 ■ PWM lines  
 ■ Comparator lines

# 14. Dimensions





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