



mikromedia™

for dsPIC33®

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

MikroElektronika
DEVELOPMENT TOOLS | COMPILERS | BOOKS



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.



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, audio connector, MMC/SD card slot, 8 Mbit flash memory, 2x26 connection pads and other. It comes pre-programmed 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.

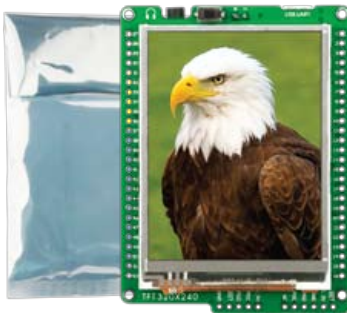


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Package Contains



01 Damage resistant protective box



02 mikromedia for dsPIC33[®] development system



03 DVD with documentation and examples



04 mikromedia for dsPIC33[®] user's guide



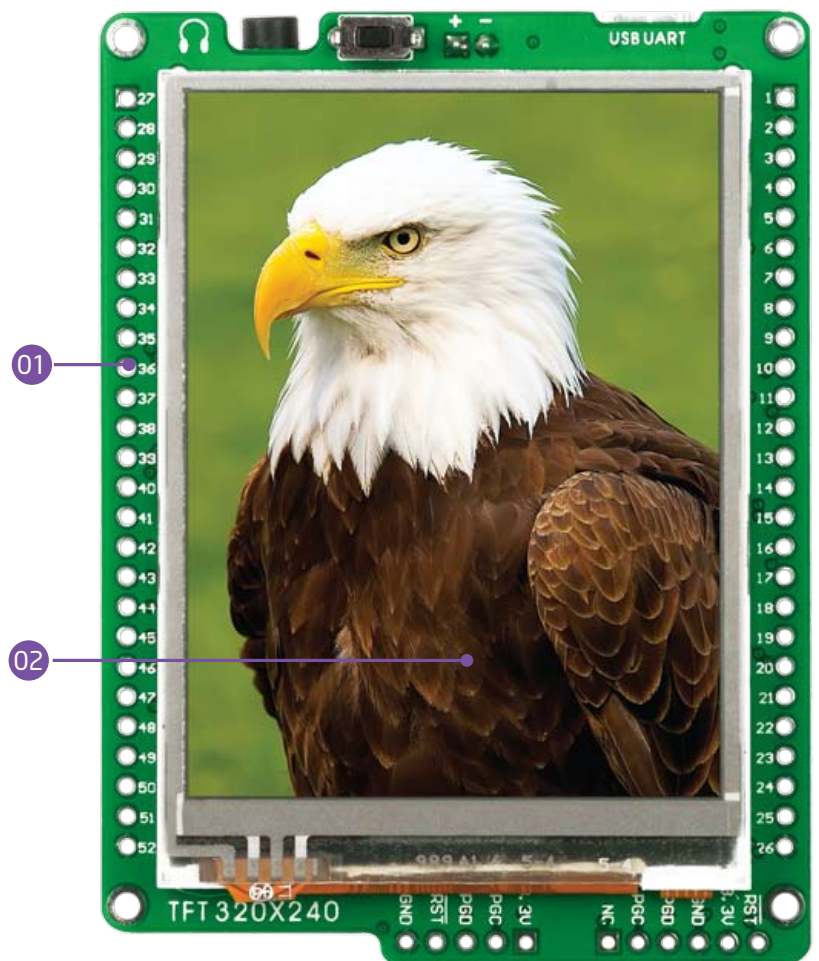
05 mikromedia for dsPIC33[®] schematics



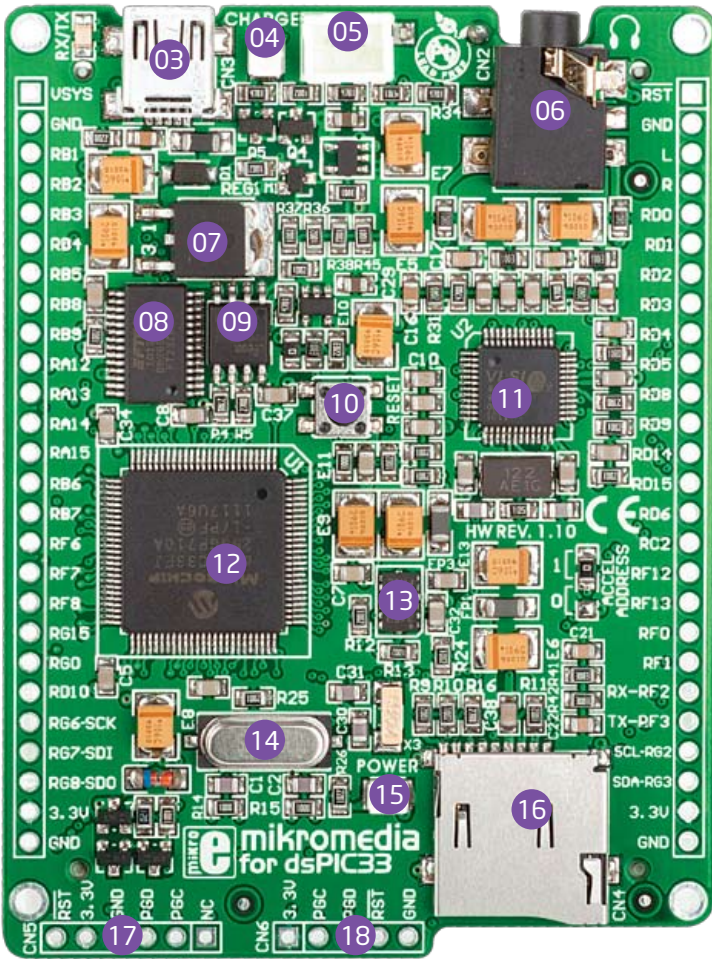
06 USB cable

Key Features

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



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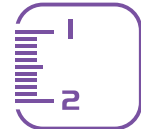
System Specification



power supply
Via USB cable (5V DC)



power consumption
77 mA with erased MCU
(when on-board modules are inactive)



board dimensions
81.2 x 60.5cm (3.19 x 2.38 inch)



weight
~50 g (0.11 lbs)

1. Power supply

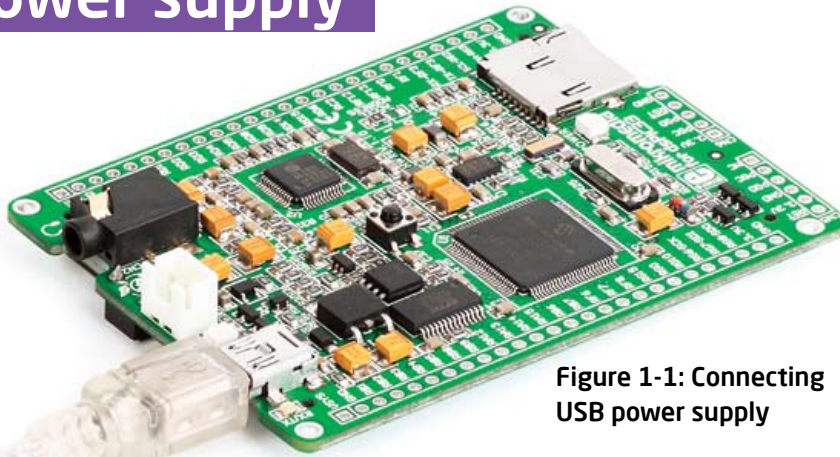


Figure 1-1: Connecting USB power supply

USB power supply

You can apply power supply to the board using **MINI-B USB** cable provided with the board. On-board voltage regulators provide the appropriate voltage levels to each component of the board. **Power LED (GREEN)** will indicate the presence of power supply.

Battery power supply

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. **LED diode (RED)** will indicate battery charging. Led is off when battery is full. Charging current is ~250mA and charging voltage is 4.2V DC.

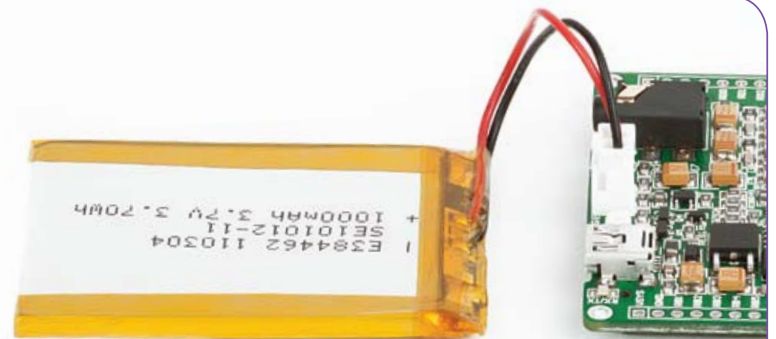


Figure 1-2: Connecting Li-Polymer battery

DATA BUS

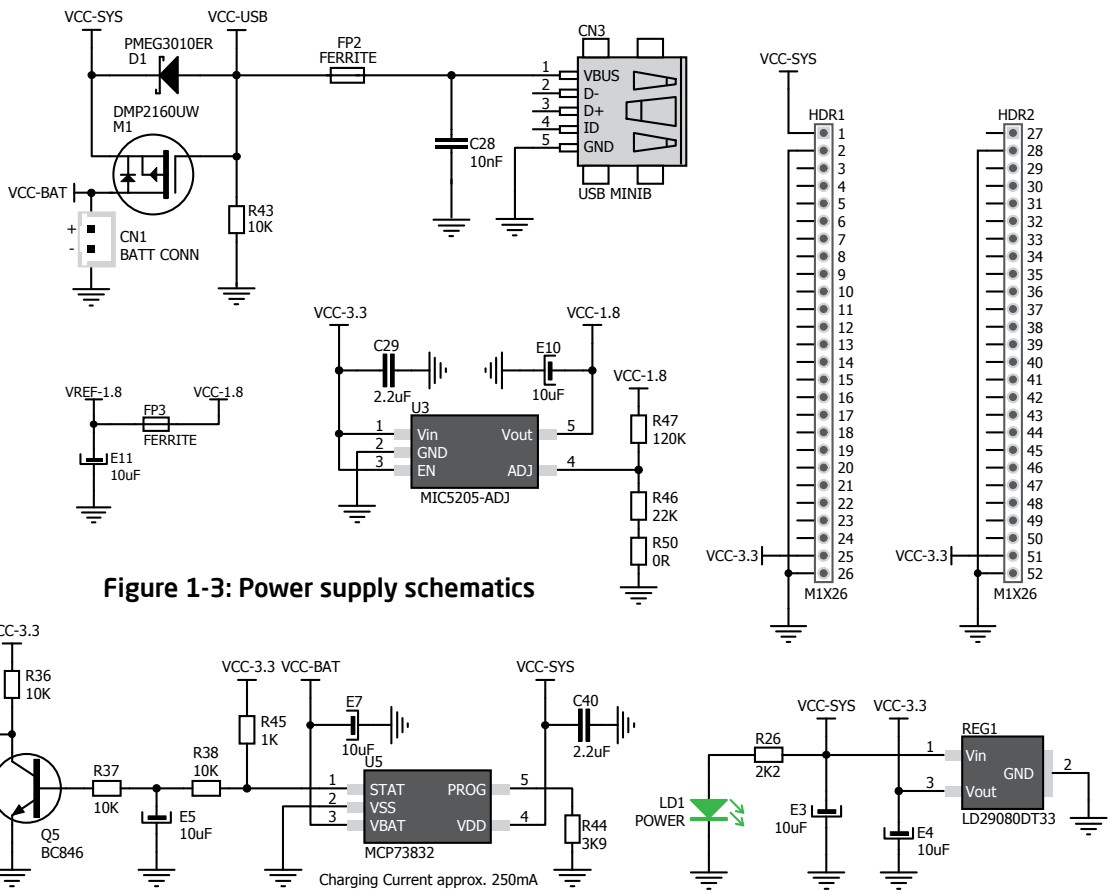


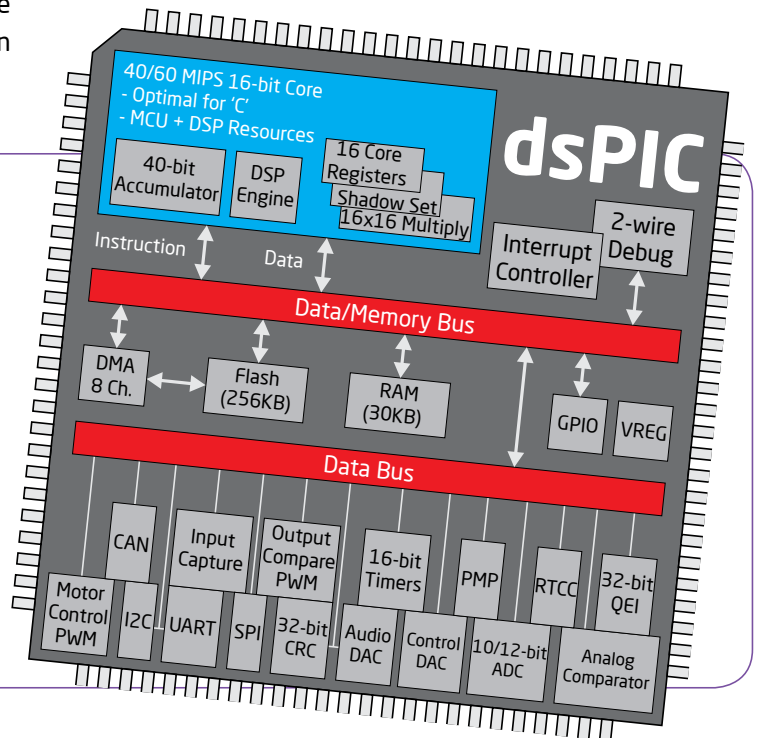
Figure 1-3: Power supply schematics

2. dsPIC33FJ256GP710A microcontroller

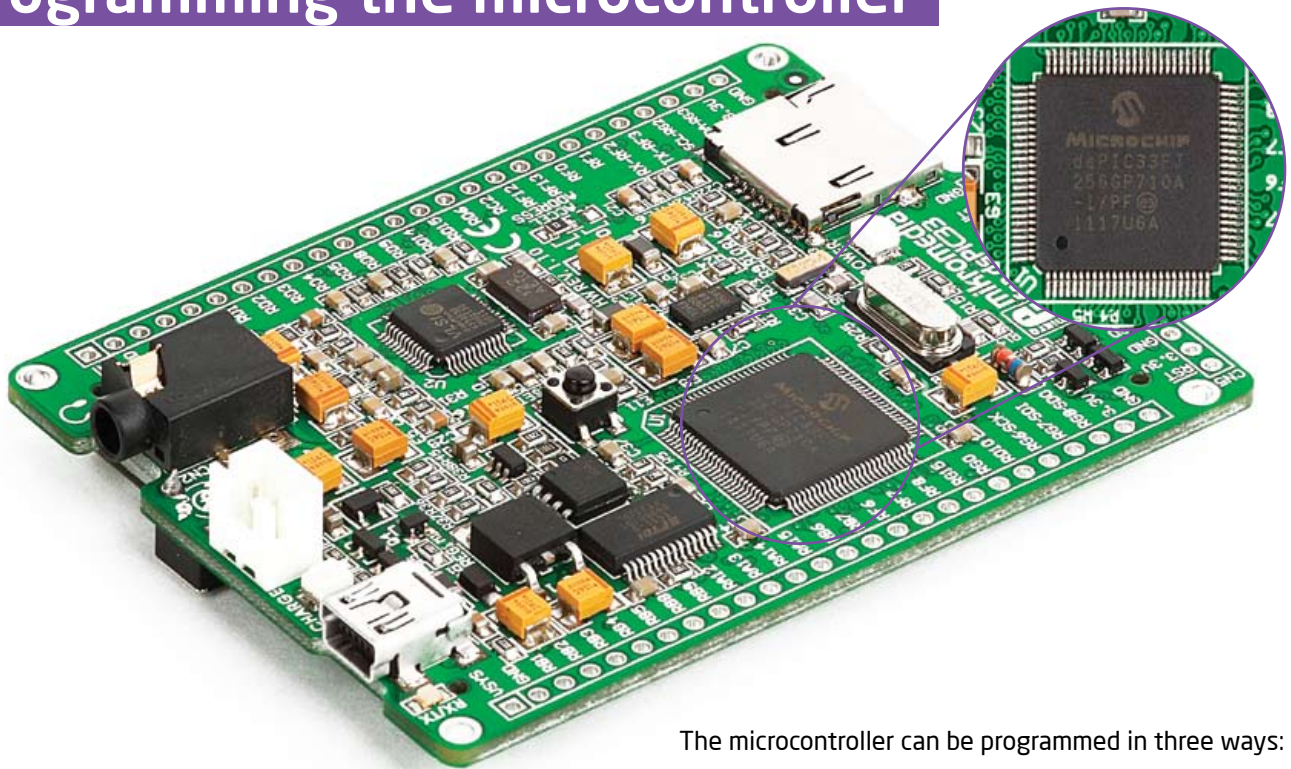
The **mikromedia** for **dsPIC33®** development system comes with the **dsPIC33FJ256GP710A** microcontroller. This high-performance 16-bit microcontroller with its integrated modules and in combination with other on-board modules is ideal for multimedia applications.

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, 2-CAN;
- DAC, ADC, etc.



3. 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 mikroBootloader

You can program the microcontroller with bootloader which is pre-programmed into the device by default. 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.

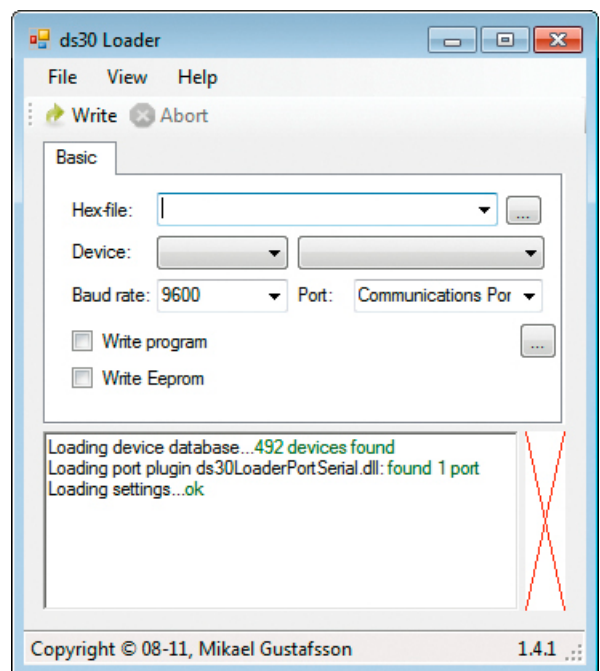
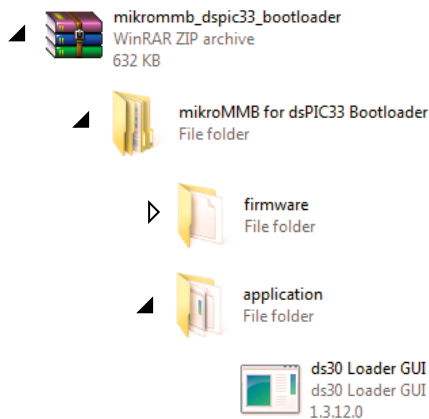


Figure 3-1: ds30 Loader open-source software

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

Identifying device COM port

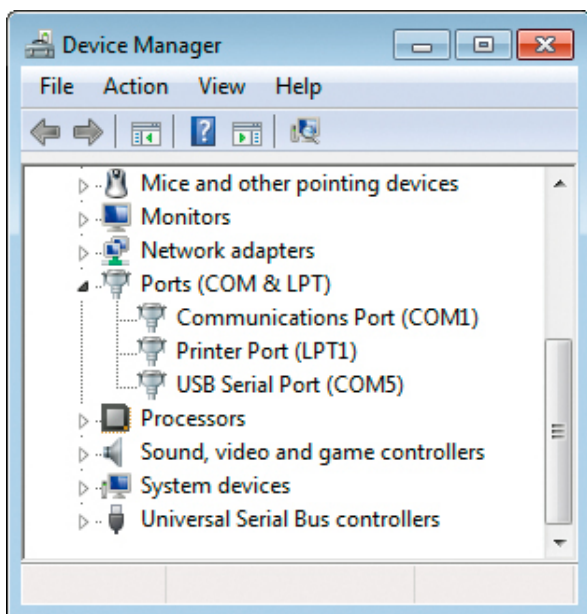


Figure 3-2: Identifying COM port

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

step 1 - Choosing COM port

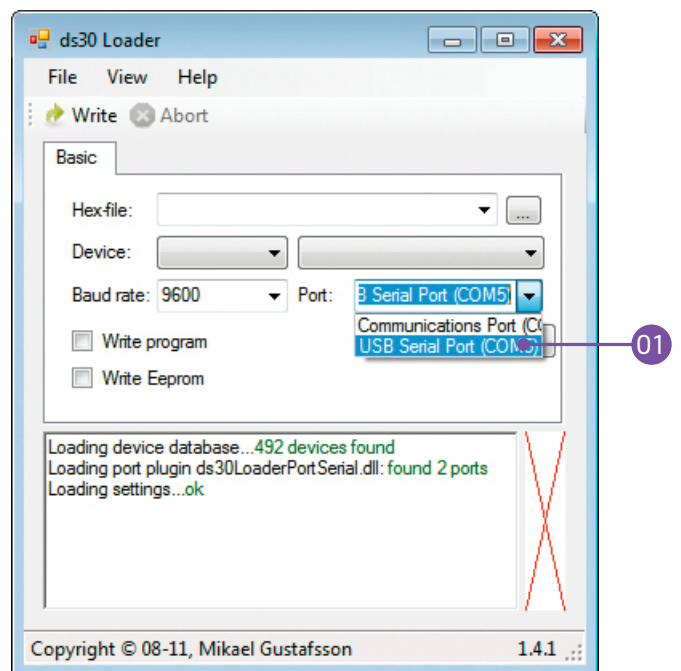


Figure 3-3: Selecting COM port

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

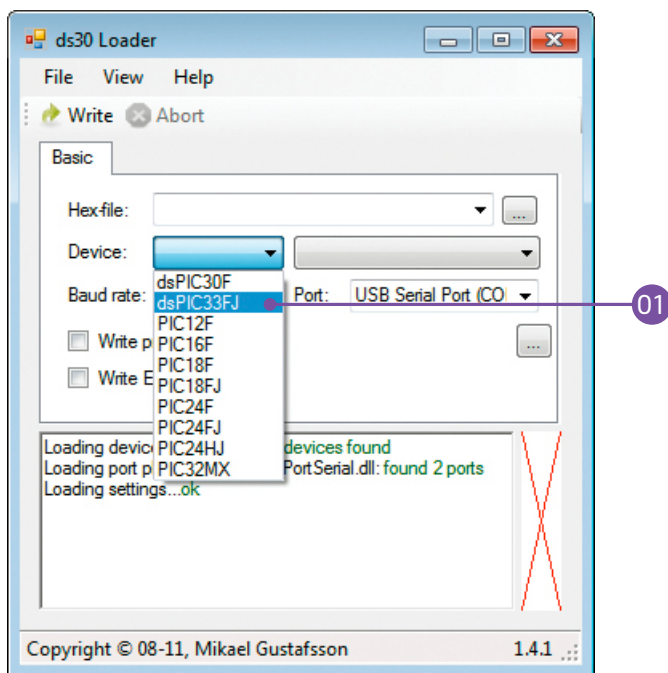


Figure 3-4: Selecting MCU family

01 From drop down list select MCU family (dsPIC33FJ)

step 3 - Choosing device

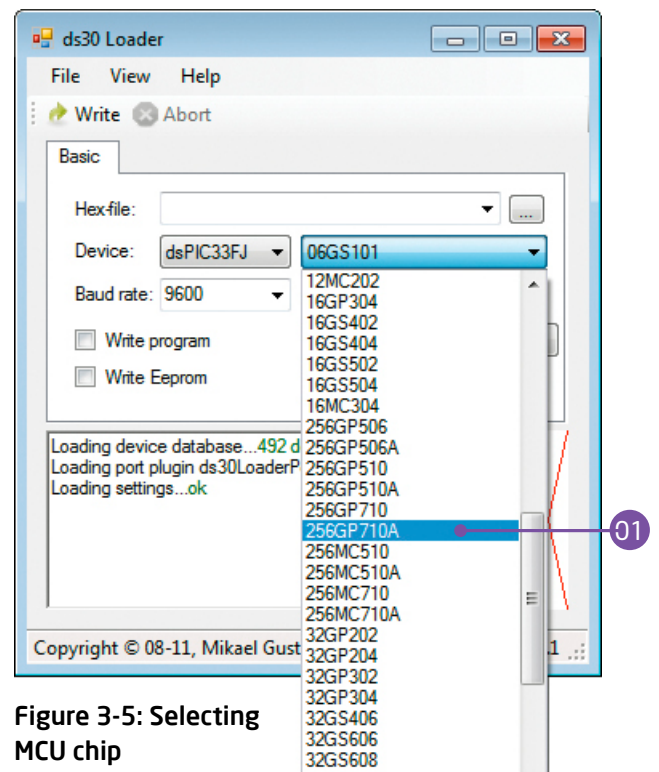


Figure 3-5: Selecting MCU chip

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

step 4 - Browse for .HEX file

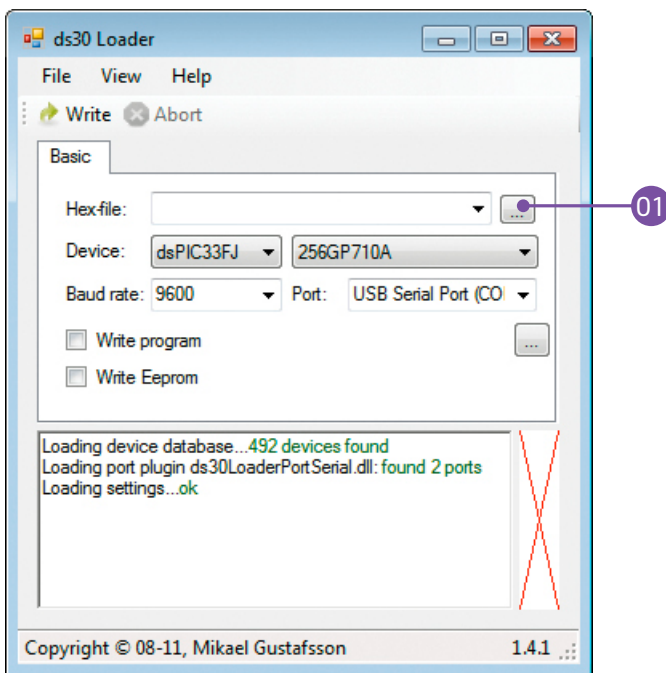


Figure 3-6: Browse for .HEX file

- 01 Click on **Browse button** and from pop-up window (figure 3-7) select .HEX file which will be uploaded to MCU memory

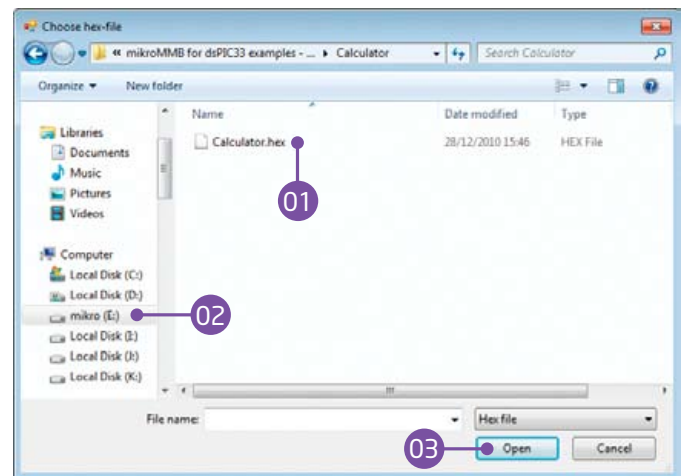


Figure 3-7: Pop-up window for .HEX file choosing

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

step 5 - Set Baud rate

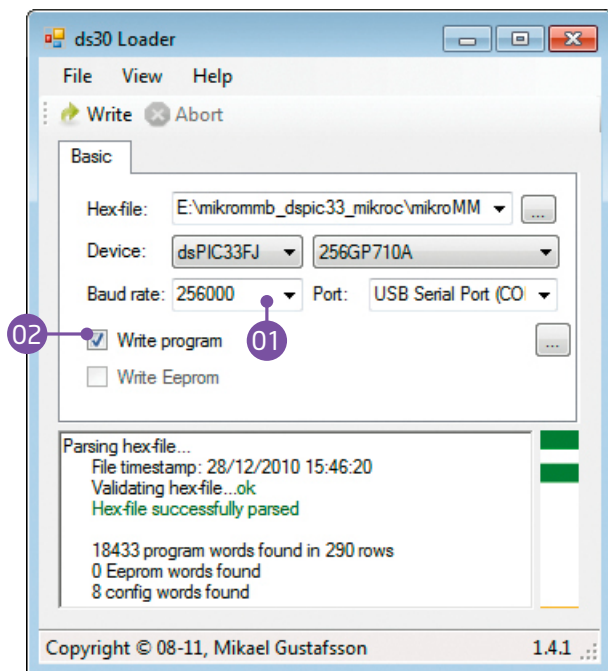


Figure 3-8: Setting baud rate

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

step 6 - Uploading .HEX file

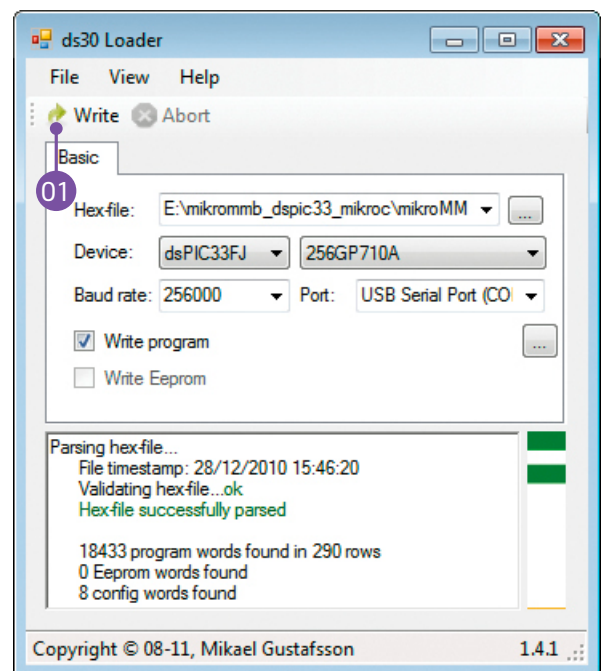


Figure 3-9: Write program

- 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 program.hex file is located in Firmware subfolder, Page 12.

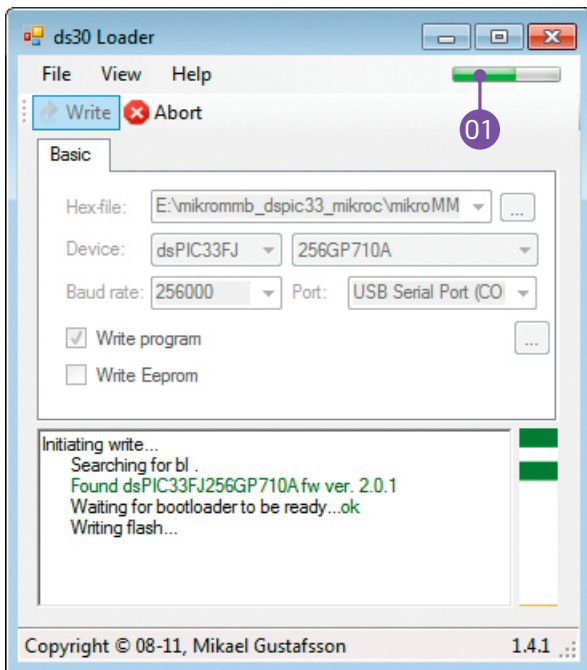


Figure 3-10: Program uploading

01 Progress bar indicates .HEX file upload process

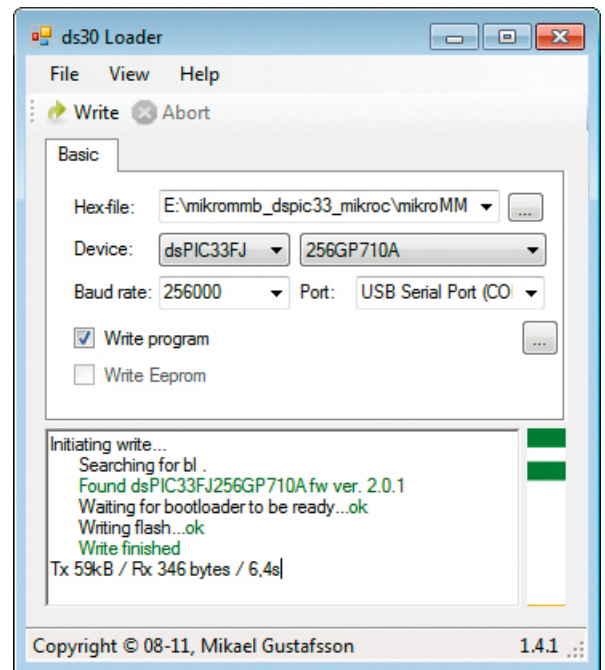


Figure 3-11: Uploading is finished

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™ for PIC®** software. The mikroProg™ programmer is connected to the development system via the CN6 connector, Figure 3-12.



Figure 3-12:
Connecting mikroProg™ to mikromedia™

mikroProg™ is a fast USB 2.0 programmer with mikroCD™ 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.

mikroProg Suite™ for PIC® Software



mikroProg™ programmer requires special programming software called **mikroProg Suite™ for PIC®**. This software is used for programming of ALL 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.

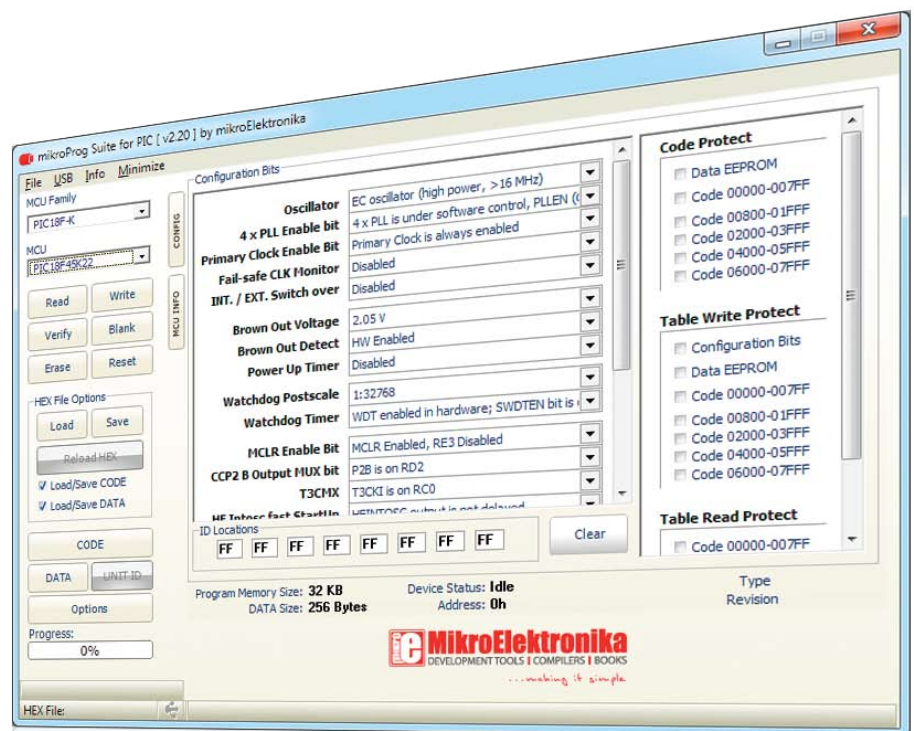


Figure 3-13: Main Window of mikroProg Suite™ for PIC® programming software

Programming with ICD2® or ICD3® programmer

The microcontroller can be also programmed with **ICD2® or ICD3® programmer**. These programmers connects with mikromedia board via **ICD2 CONNECTOR BOARD**.

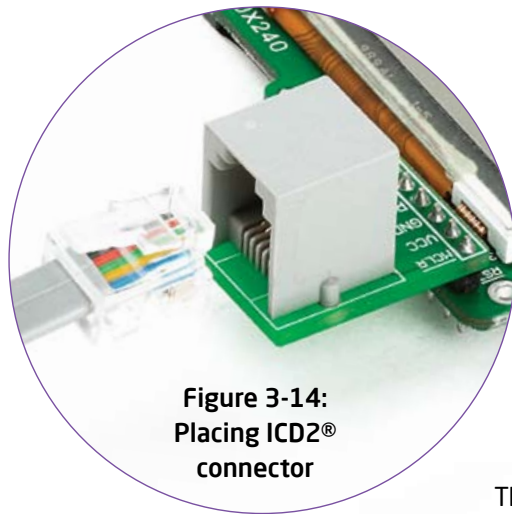


Figure 3-14:
Placing ICD2®
connector

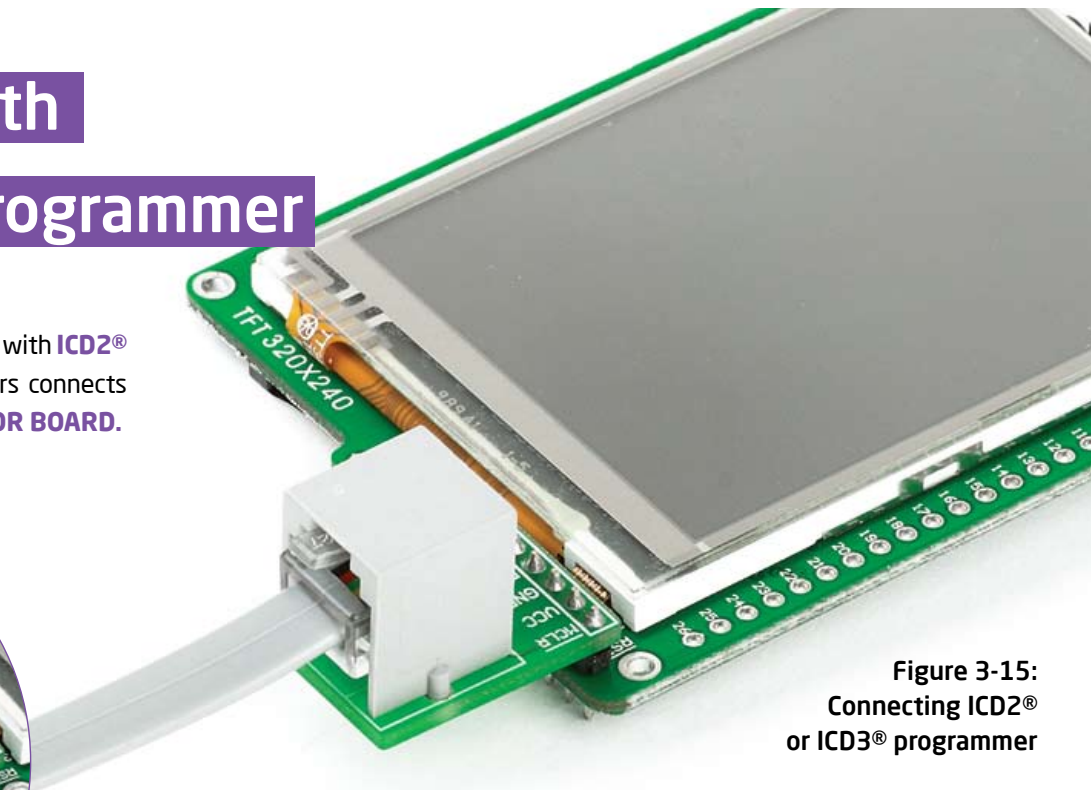


Figure 3-15:
Connecting ICD2®
or ICD3® programmer

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. Then you should plug the ICD2® or ICD3® programmer into it, Figure 3-14.

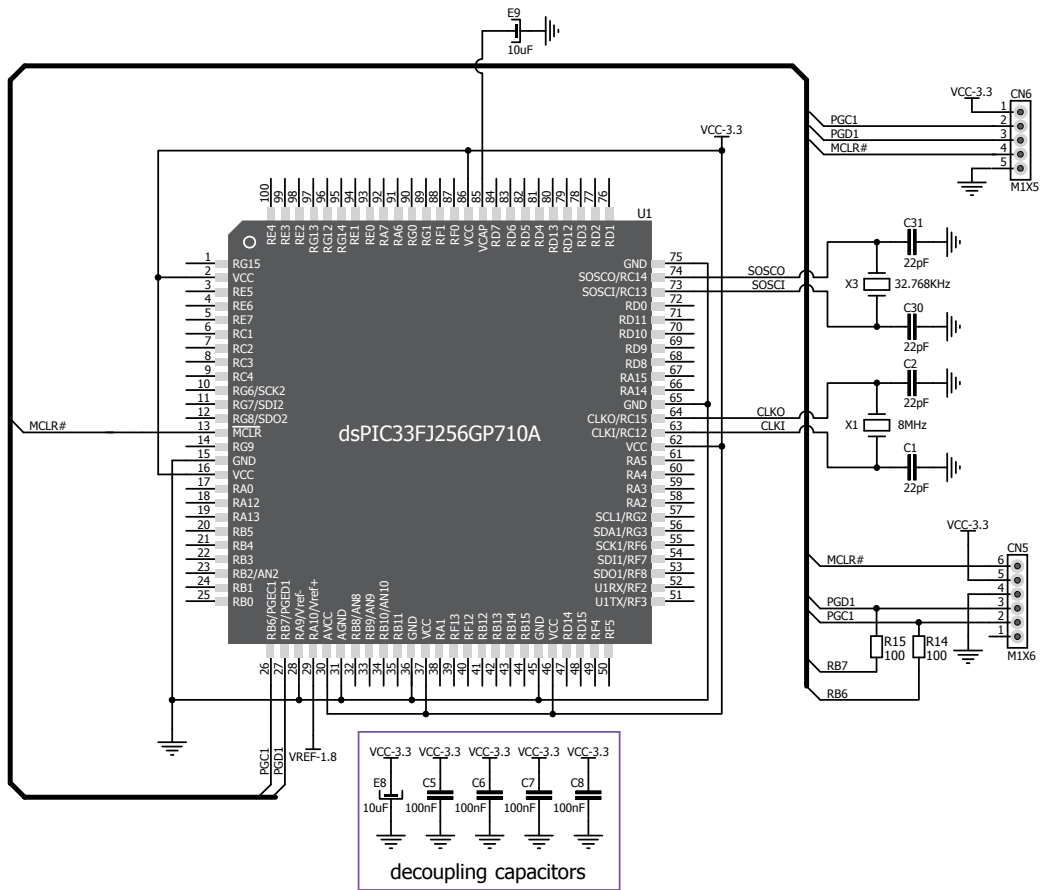


Figure 3-16: ICD2 / ICD3 & mikroProg™ programmer connection schematics

4. Reset Buttons

Board is equipped with two reset buttons. First is located at the back side of the board (**Figure 4-1**), and second one is at the top of the front side (**Figure 4-2**). If you want to reset the circuit, press either of two buttons. It will generate low voltage level on microcontroller reset pin (input). In addition, a reset can be externally provided through **pin 27** on side headers (**Figure 4-3**).

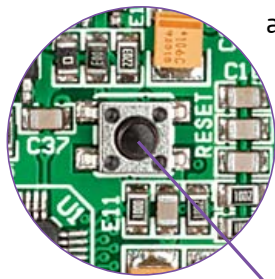


Figure 4-1: Reset button located at the backside of the board

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Figure 4-2: Frontal reset button

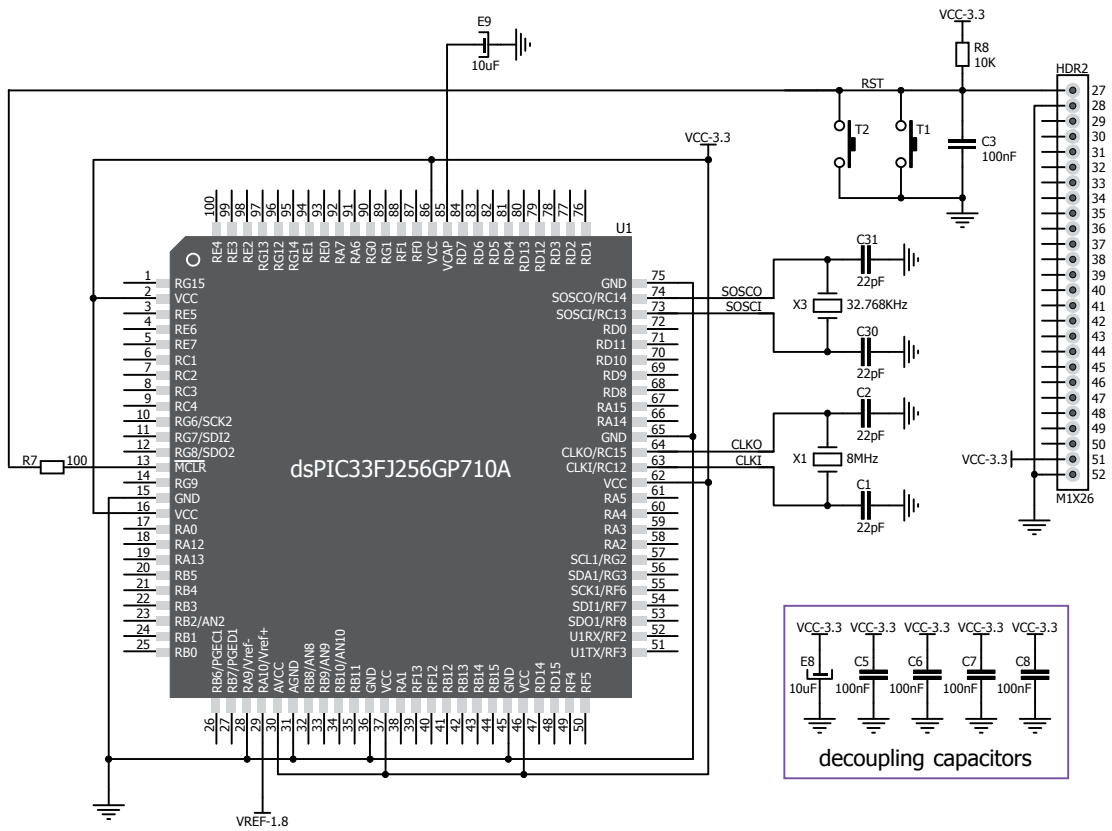


Figure 4-3: Reset circuit schematics

5. Crystal oscillator

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 clock multipliers and ideal for generation of necessary USB clock, which ensures proper operation of bootloader and your custom USB-based applications. Board also contains **32.768kHz Crystal oscillator (X3)** which provides external clock for internal **RTC** module.

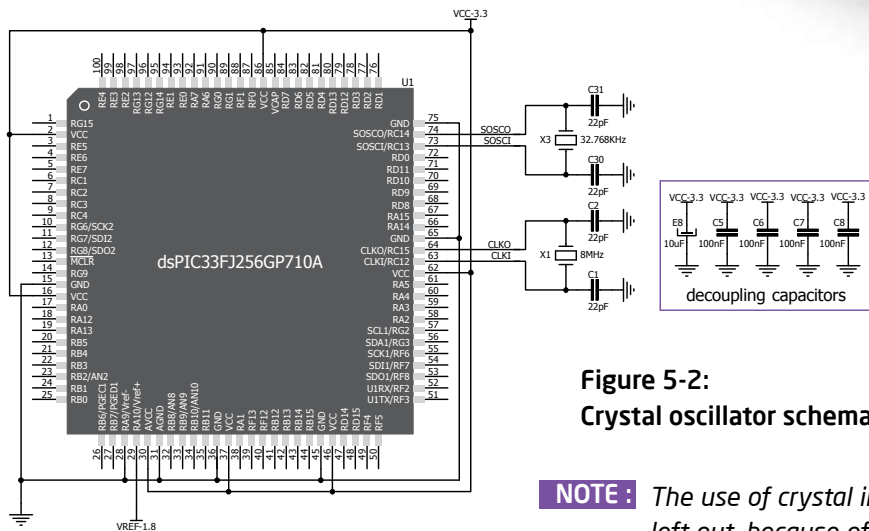
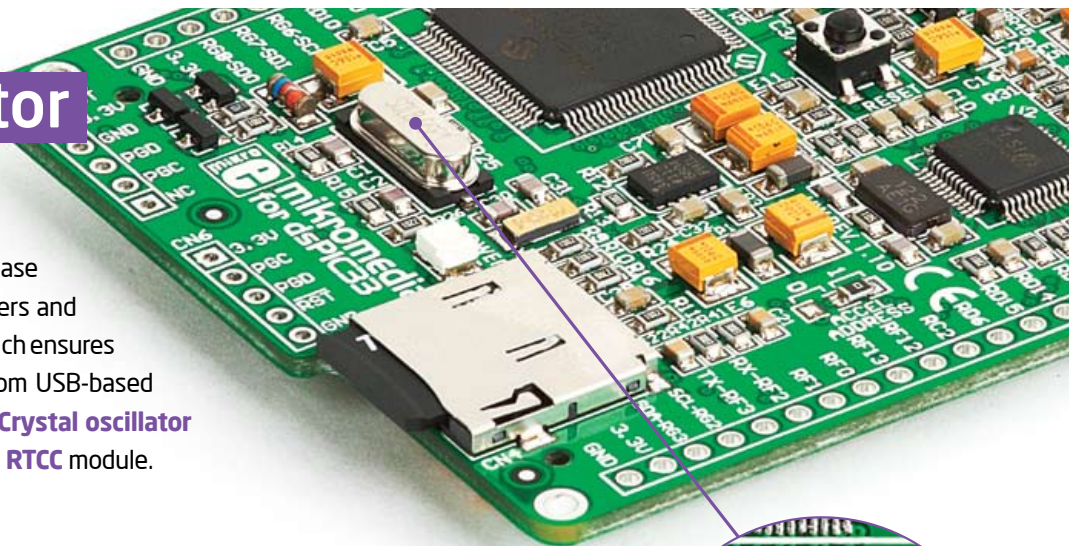


Figure 5-1: Crystal oscillator module (X1)



Figure 5-2: Crystal oscillator schematics

NOTE : The use of crystal in all other schematics is implied even if it is purposely left out, because of the schematics clarity.

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.

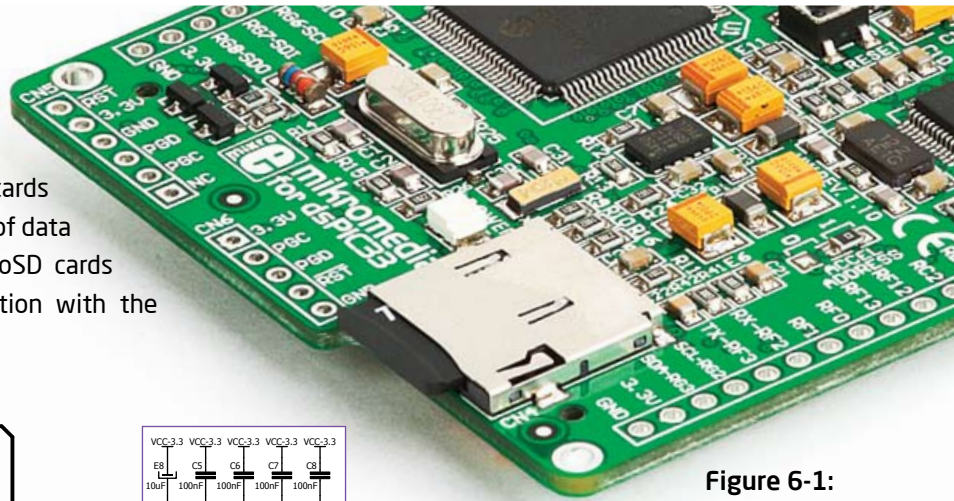


Figure 6-1:
microSD card slot

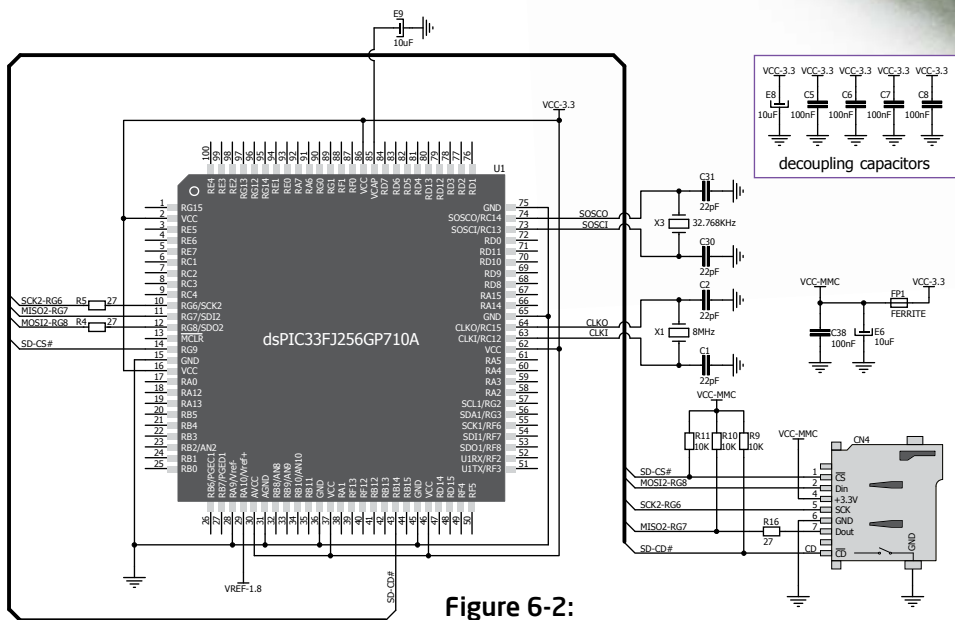


Figure 6-2:
microSD Card Slot module connection schematics

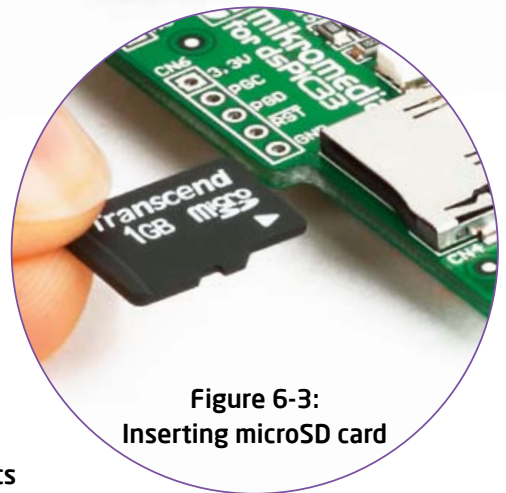


Figure 6-3:
Inserting microSD card

7. 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 **262.144** different **colors**.

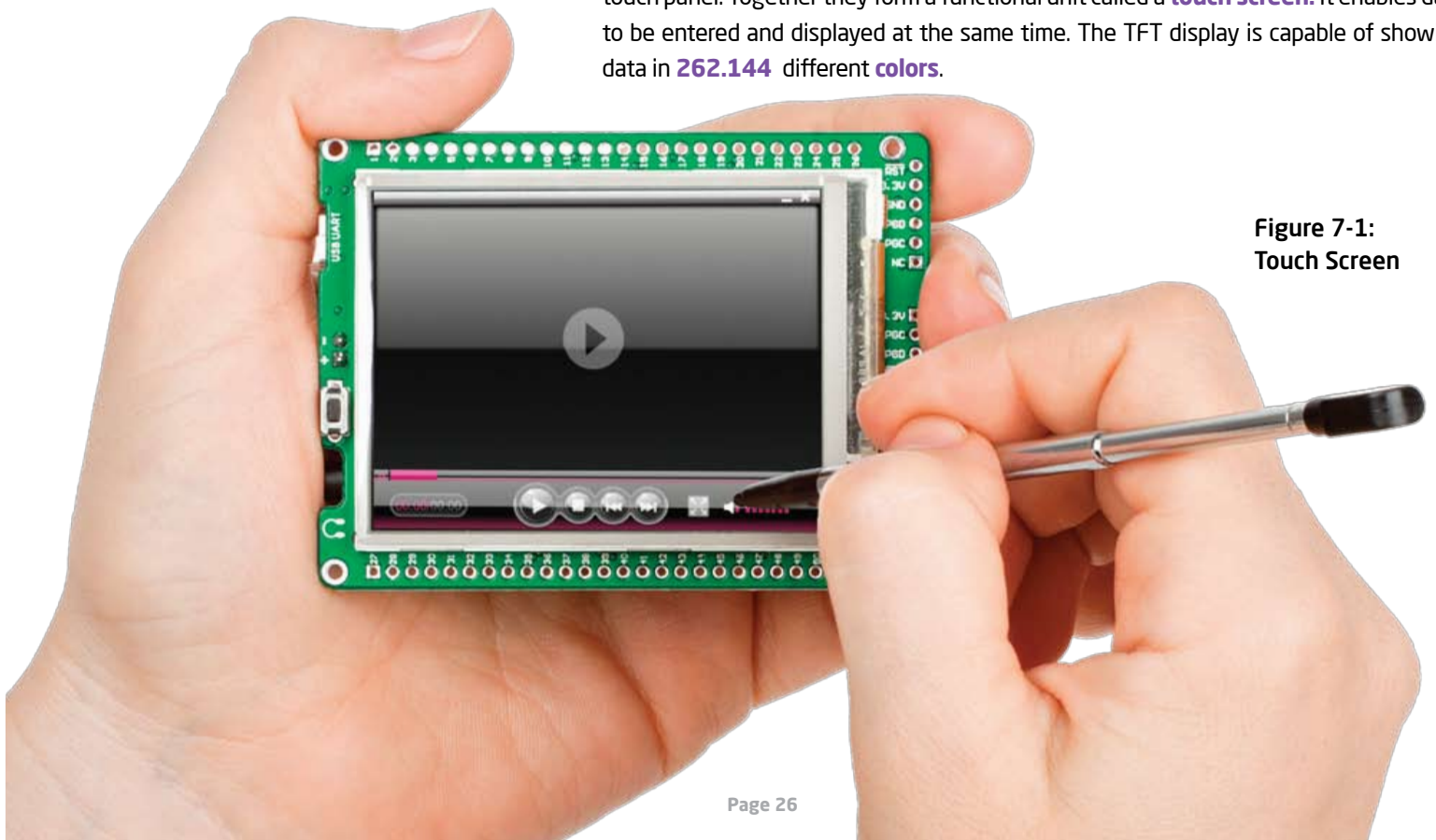


Figure 7-1:
Touch Screen

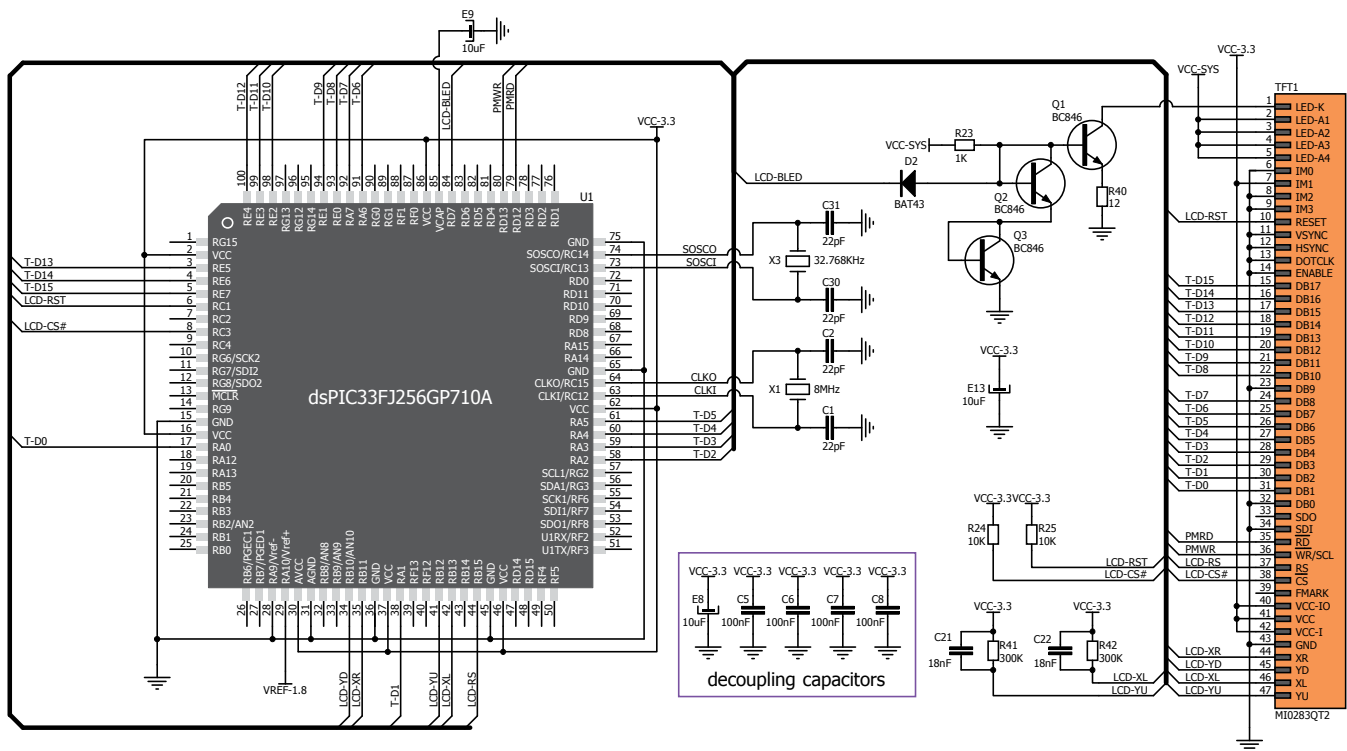


Figure 7-2: Touch Screen connection schematics

8. Audio Module

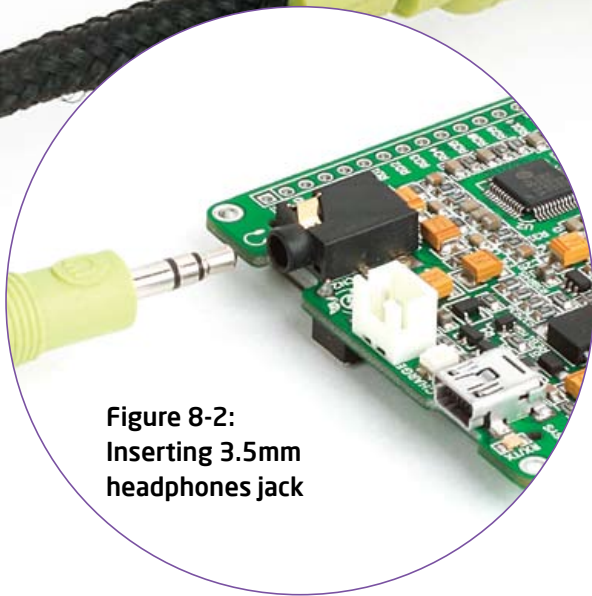
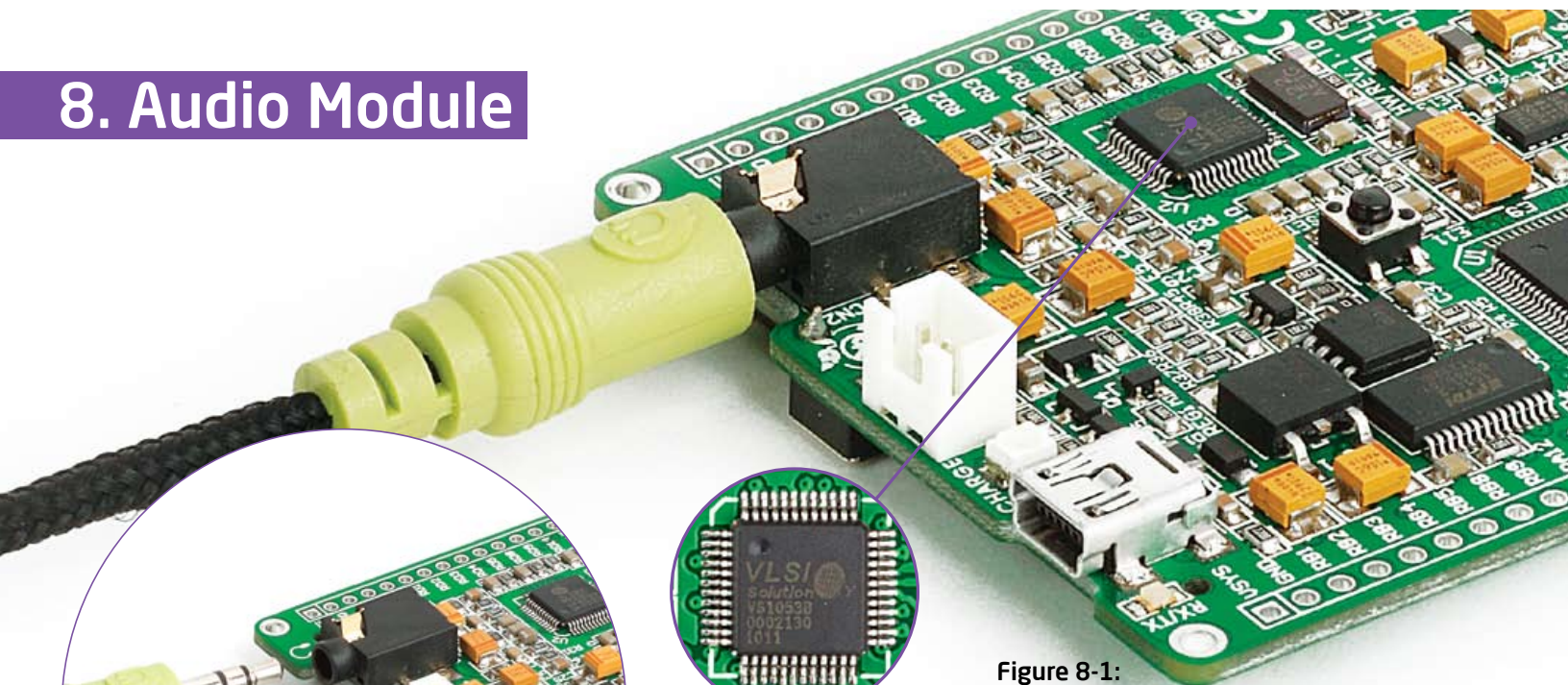


Figure 8-2:
Inserting 3.5mm
headphones jack



Figure 8-1:
On-board VS1053
MP3 codec

The mikromedia for dsPIC33 features stereo audio codec **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**).

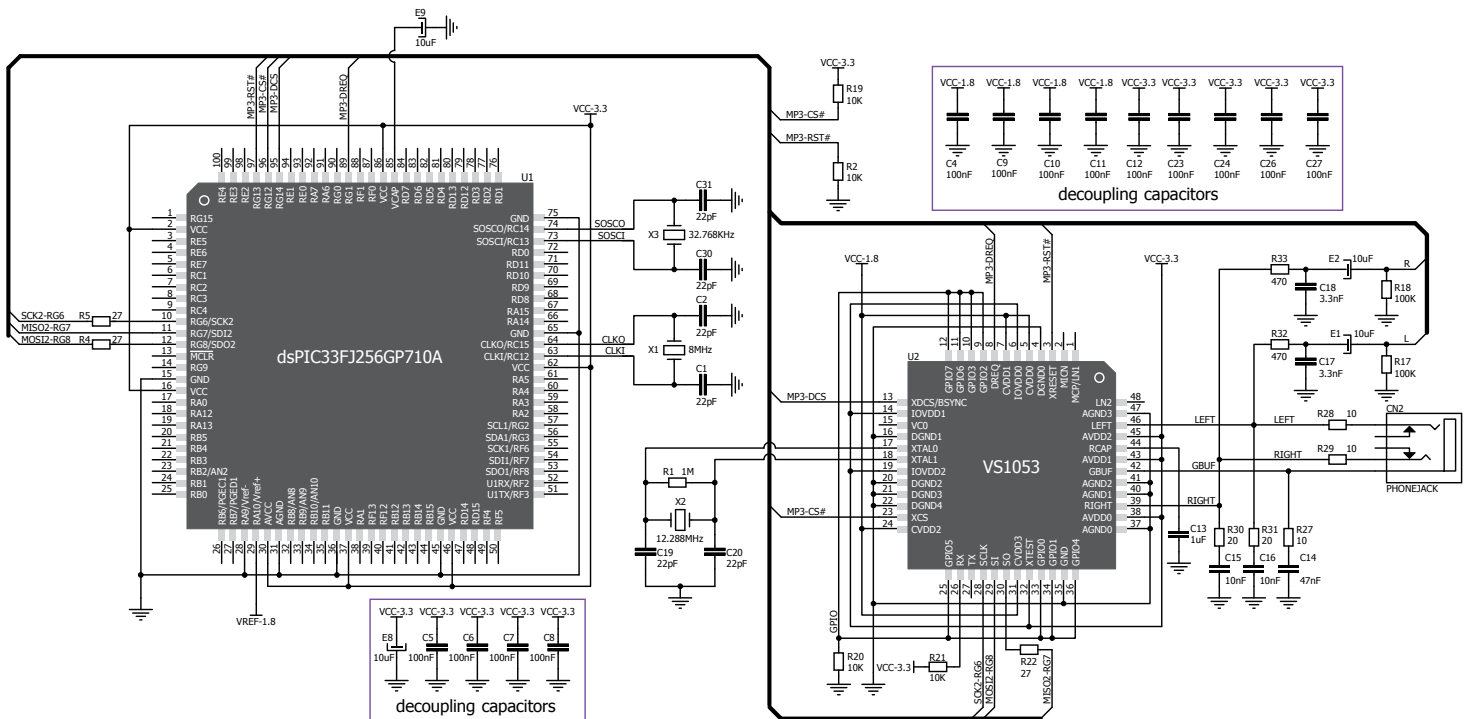


Figure 8-3: Audio module connection schematics

9. USB-UART connection

Mikromedia contains USB MINI-B connector which is positioned next to the battery connector. FT232RL USB-UART IC enables you to implement UART serial communication functionality via USB cable, since **dsPIC33FJ256GP710A** does not support USB protocol.

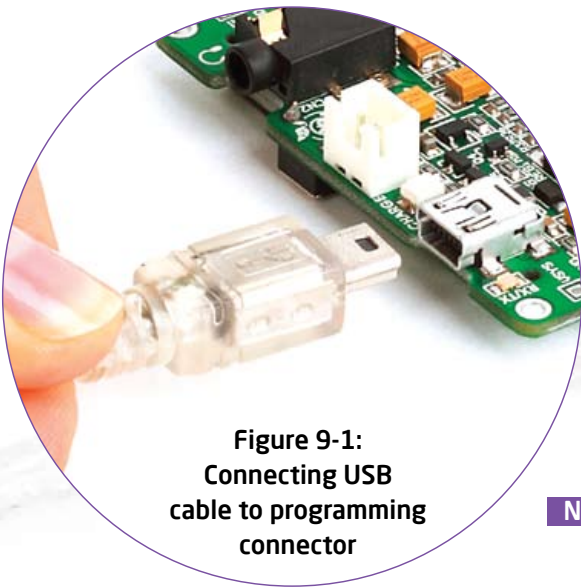


Figure 9-1:
Connecting USB
cable to programming
connector

NOTE: Before connecting the board, make sure that you have FTDI drivers installed on your computer. Tx/Rx LED flashes when USB and controller communicate.

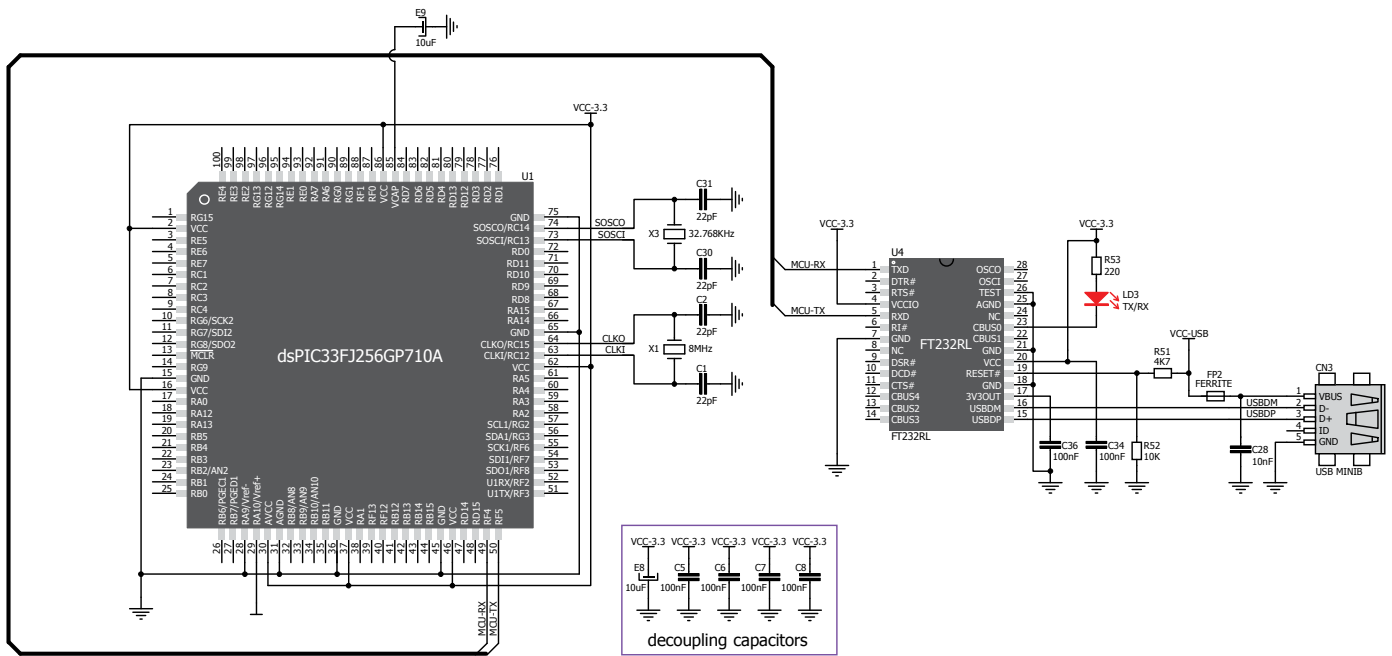


Figure 9-2: USB module connection schematics

10. Accelerometer

On board **ADXL345** 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 via the **I²C** interface.

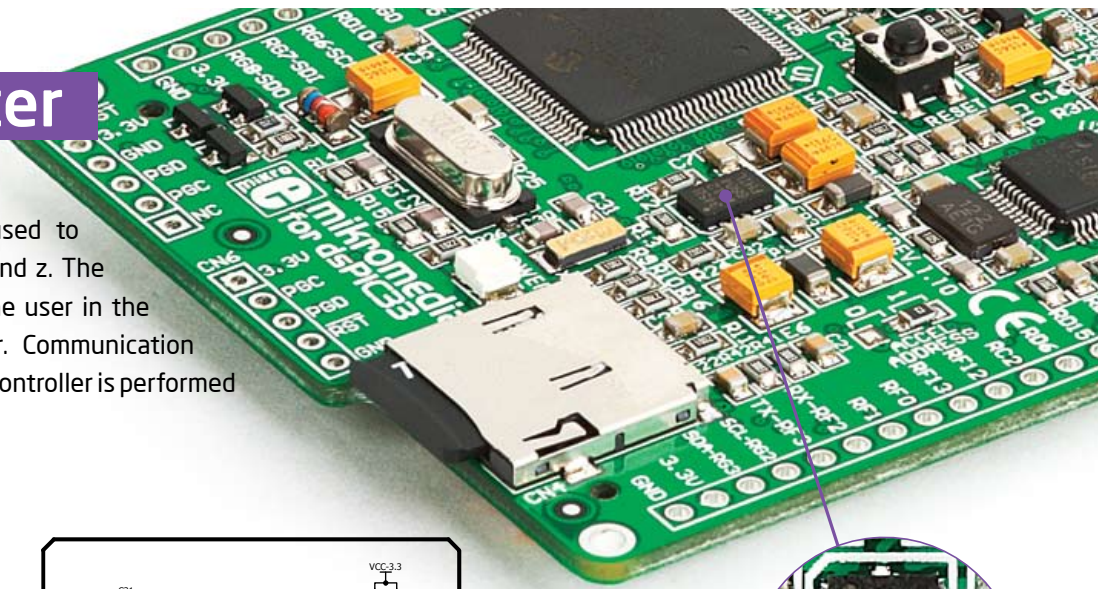
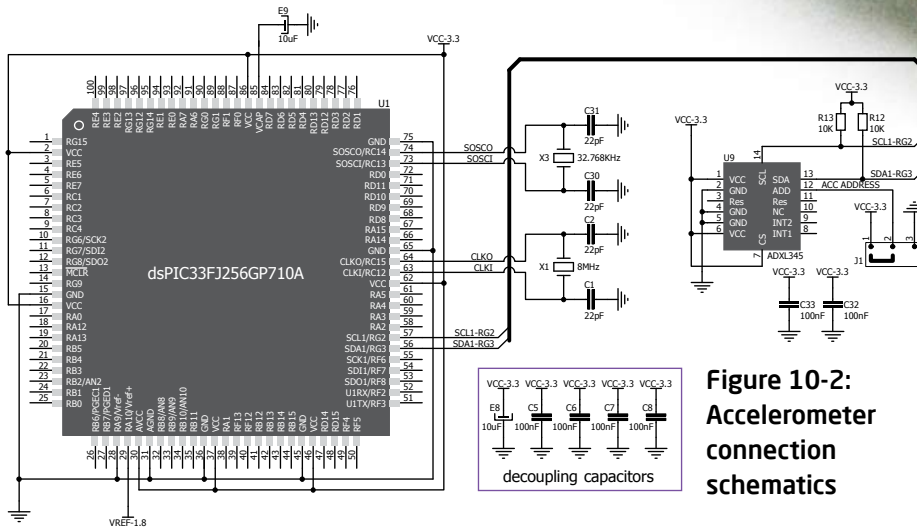


Figure 10-1:
Accelerometer module



You can set the accelerometer address to 0 or 1 by re-soldering the SMD jumper (zero-ohm resistor) to the appropriate position. Jumper is placed in address 1 position by default.

11. Flash Memory

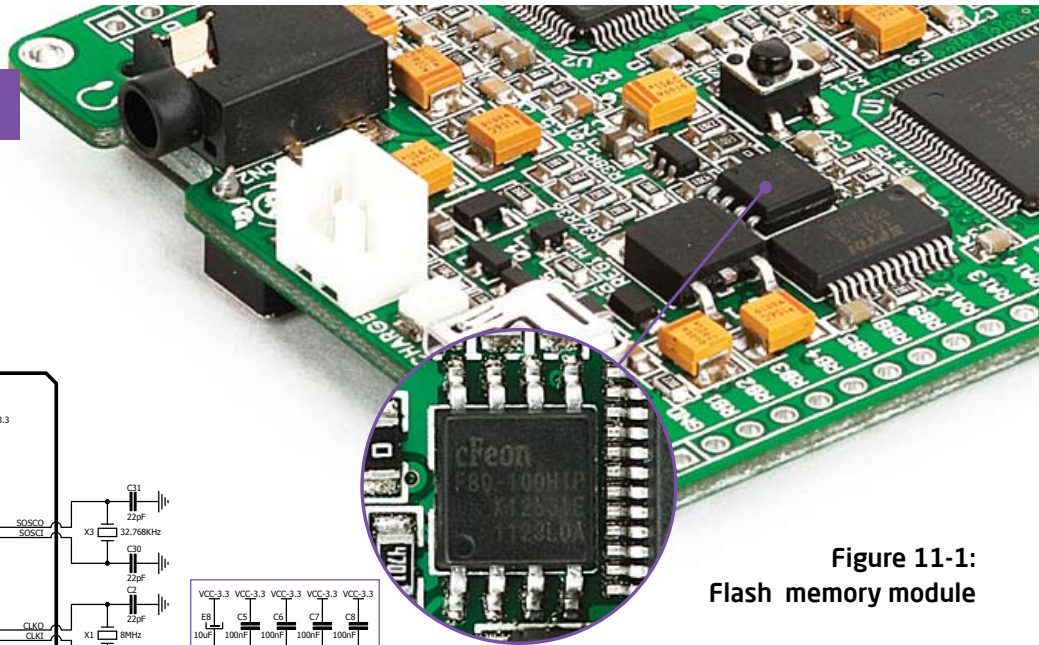


Figure 11-1:
Flash memory module

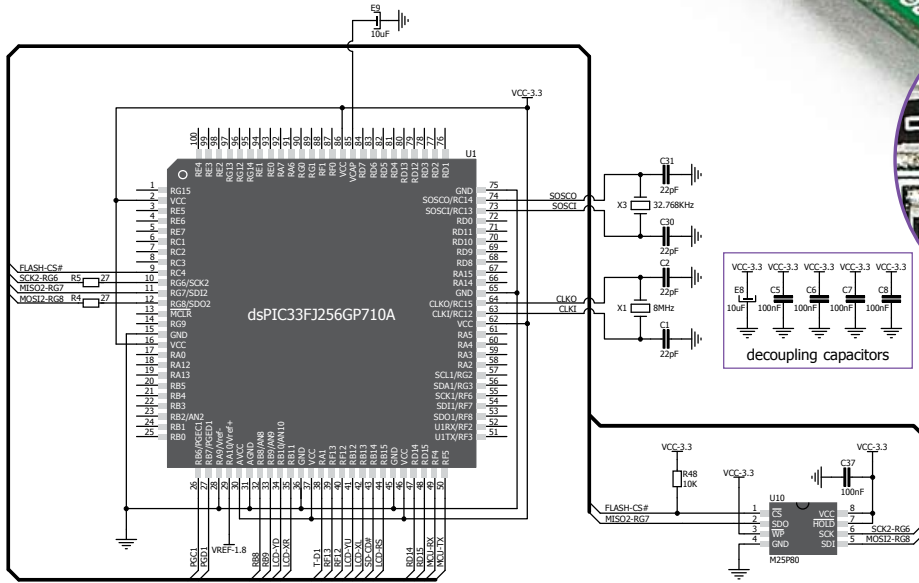
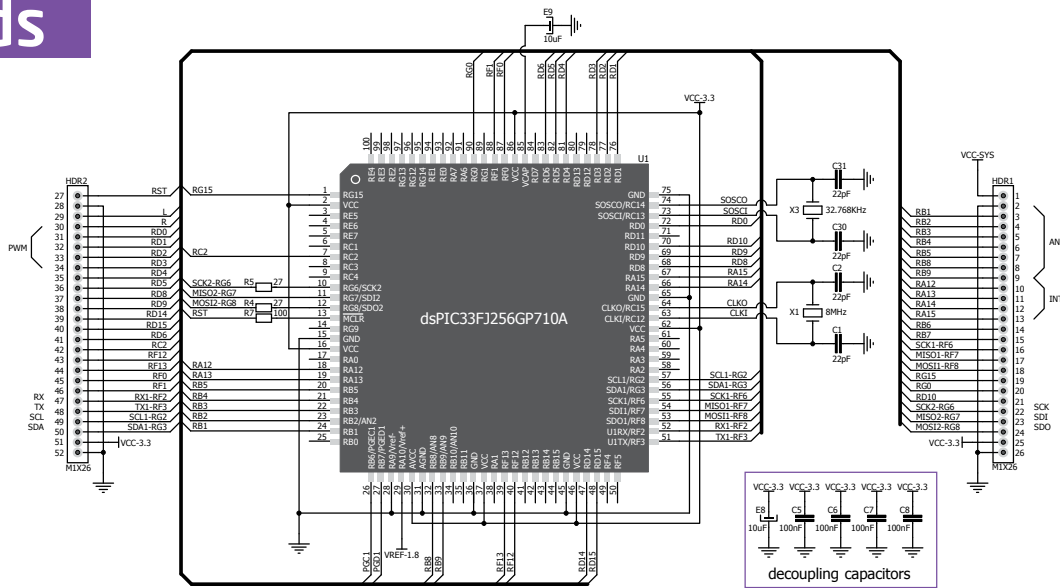


Figure 11-2:
Flash memory module connection schematics

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**).

12. Pads



Pads HDR2

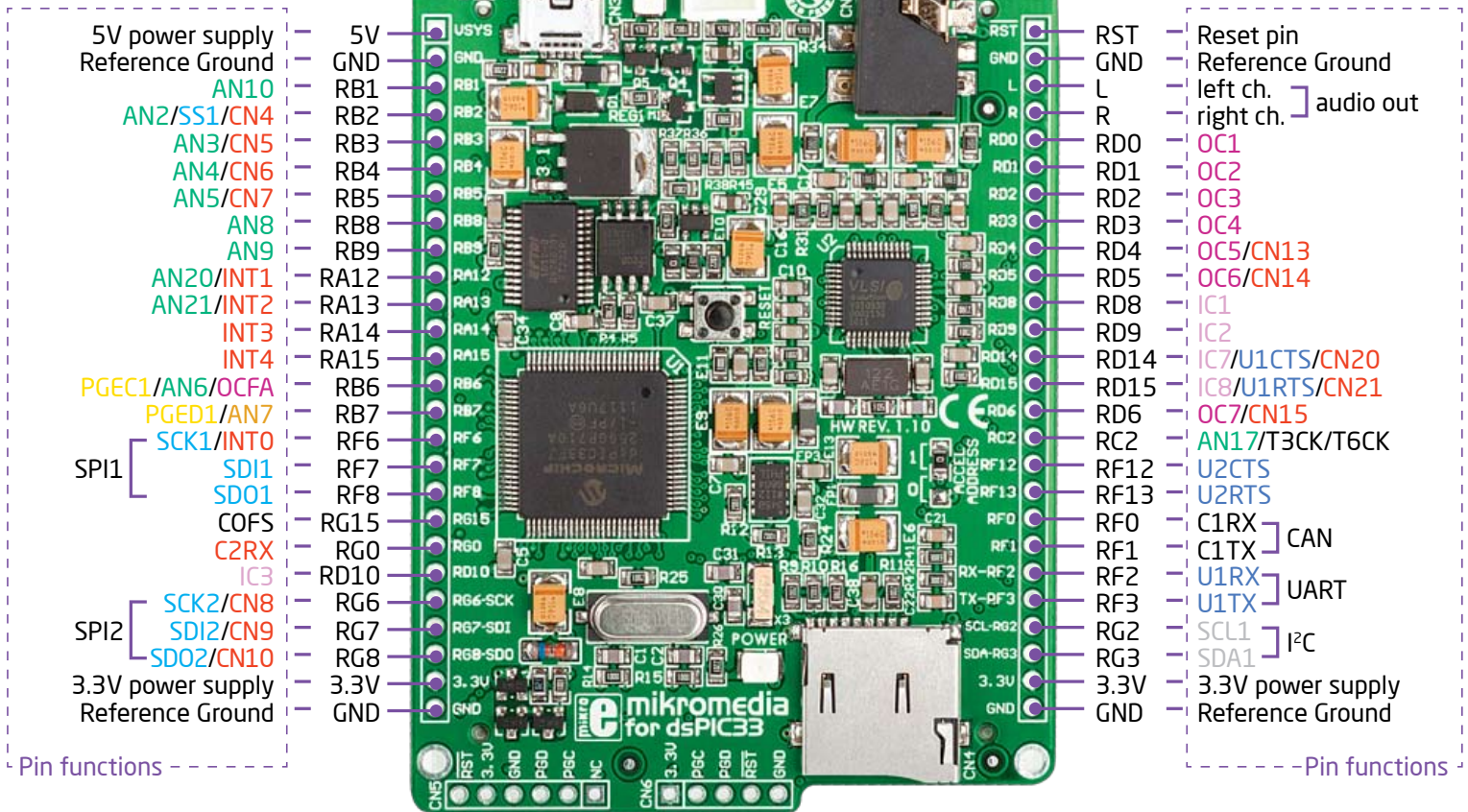
Pads HDR1

Figure 12-1: Pads connecting schematics

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 match additional shields, such as Battery Boost shield, Gaming, PROTO shield and others.

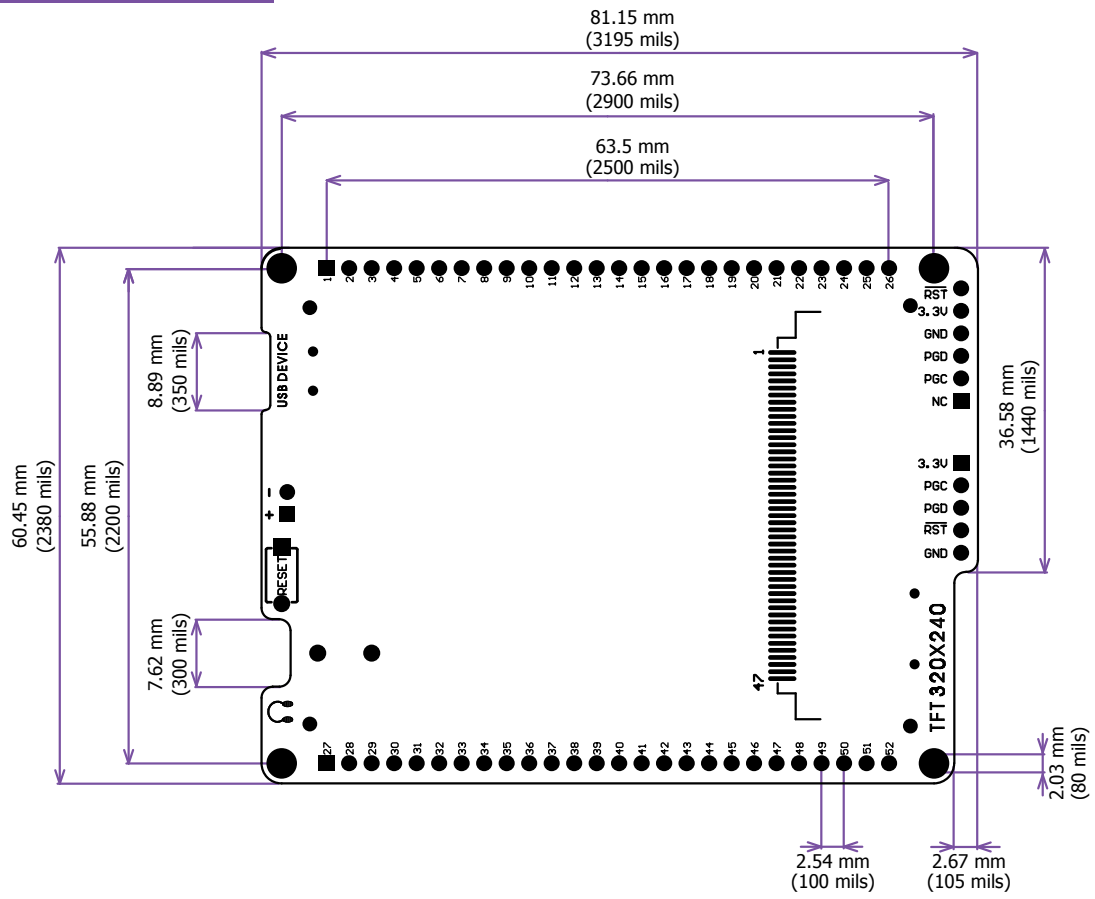


13. Pinout



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

14. Dimensions



15. mikromedia accessories

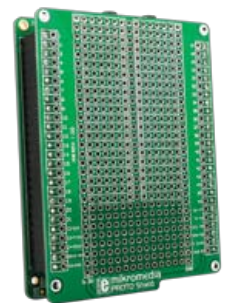
We have prepared a set of extension boards pin-compatible with your mikromedia, which enable you to easily expand your board basic functionality. We call them mikromedia shields. But we also offer other accessories, such as Li-polymer battery, stacking headers, wire jumpers and more.



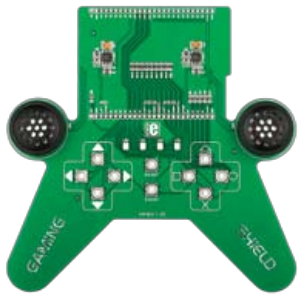
01 Connect shield



02 BatteryBoost shield



03 PROTO shield



04 Gaming shield



05 Li-Polimer battery



06 Wire Jumpers



07 Stacking headers

What's next?

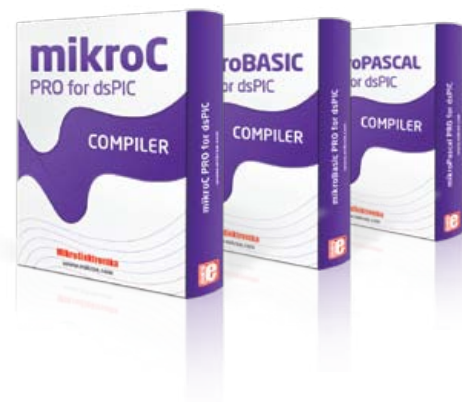
You have now completed the journey through each and every feature of mikromedia for dsPIC33 board. You got to know it's modules and organization. Now you are ready to start using your new board. We are suggesting several steps which are probably the best way to begin. We invite you to join the users of mikromedia™ brand. You will find very useful projects and tutorials and can get help from a large ecosystem of users. Welcome!

Compiler

You still don't have an appropriate compiler? Locate dsPIC® compiler that suits you best on the Product DVD provided with the package:

DVD://download/eng/software/compilers/

Choose between mikroC™, mikroBasic™ and mikroPascal™ and download fully functional demo version, so you can begin building your first applications.



Projects

Once you have chosen your compiler, and since you already got the board, you are ready to start writing your first projects. **Visual TFT software** for rapid development of graphical user interfaces enables you to quickly create your GUI. It will automatically create necessary code which is compatible with mikroElektronika compilers. Visual TFT is rich with examples, which are an excellent starting point for your future projects. Just load the example, read well commented code, and see how it works on hardware. Visual TFT is also available on the Product DVD.

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