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®

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. 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 a convenient platform for mobile devices.

Package contains

01 Damage resistant protective box

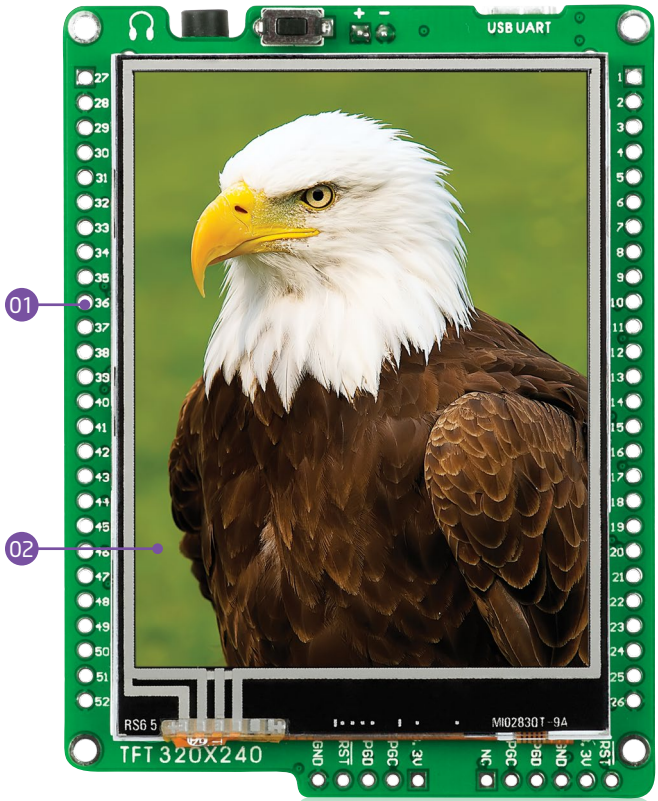
02 mikromedia for dsPIC33® development system

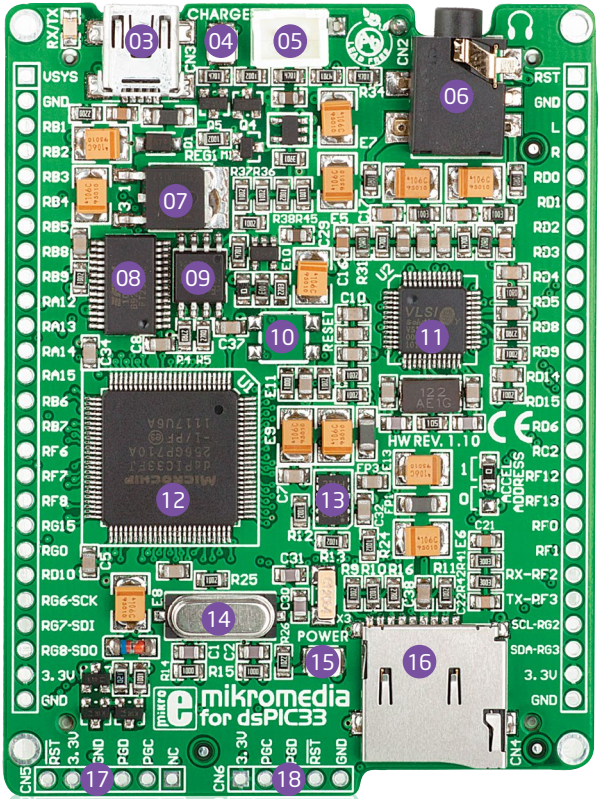
03 User's guide, schematic and pinout

04 USB cable, two 1x26, one 1x6 and one 1x5 male headers

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





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 60.5 mm (3.19 x 2.38 inch)

weight
~50g (0.11lbs)

class B product
Product complies with the Class B limit of EN 55022 and can be used in the domestic, residential, commercial and industrial environments.

CAUTION: Electrostatic sensitive device
Permanent damage may occur on devices subjected to high energy electrostatic discharges which readily accumulate on the human body or test equipment and can discharge without detection.

1. Power supply

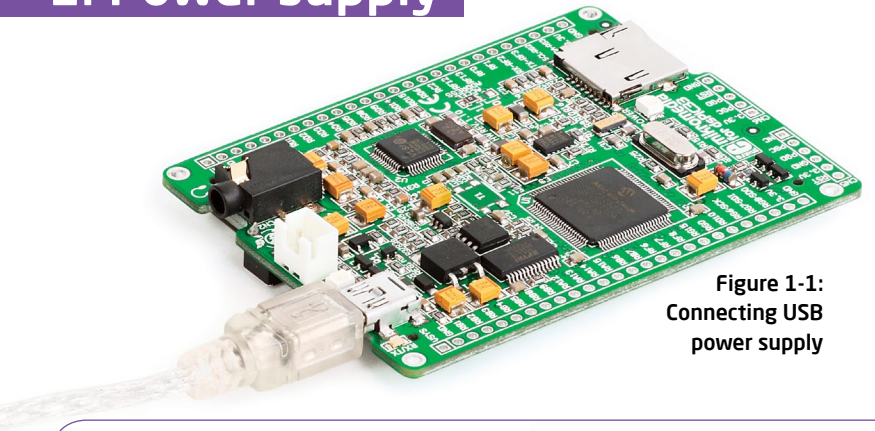


Figure 1-1: Connecting USB power supply

USB power supply

You can apply power supply to the board using **MINI-B USB** cable provided in the package. 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 a Li-Polymer battery, via on-board battery connector. On-board battery charger circuit MCP73832 enables you to charge the battery over a USB connection. LED diode (RED) will indicate when the battery is charging. Charging current is ~250mA and charging voltage is 4.2V DC.

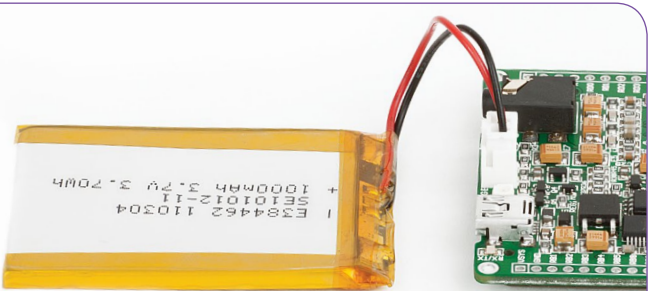


Figure 1-2: Connecting Li-Polymer battery

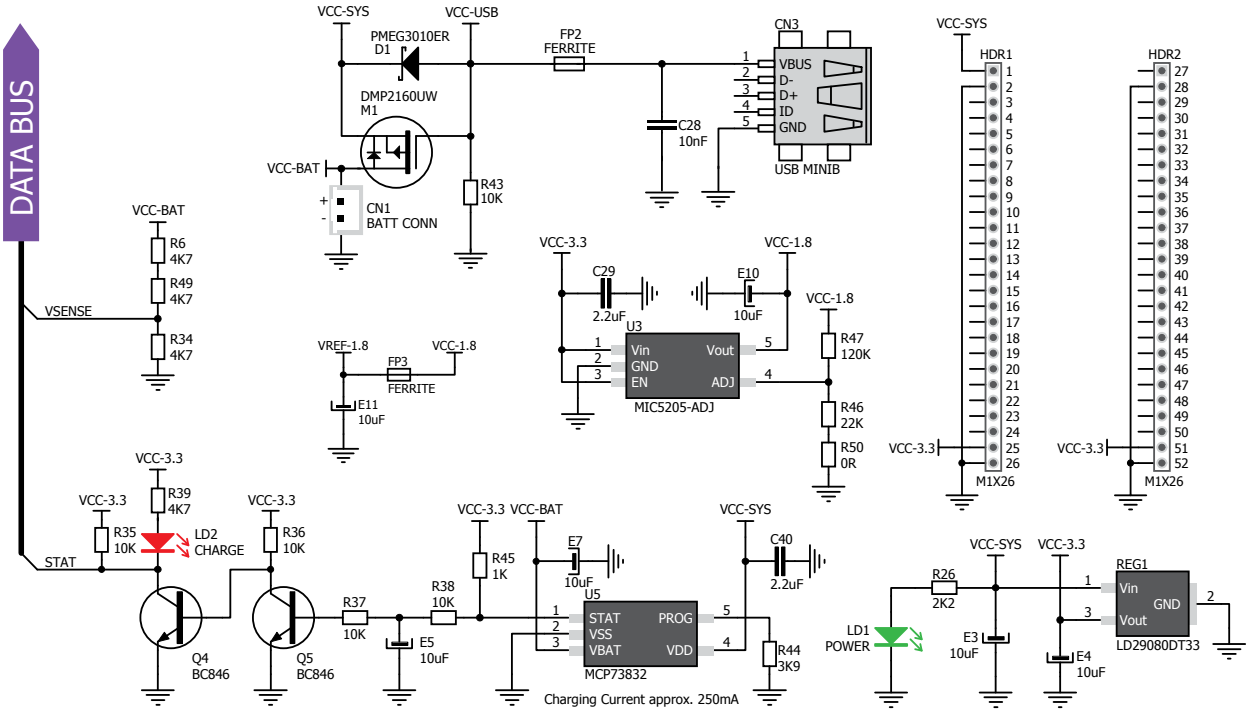


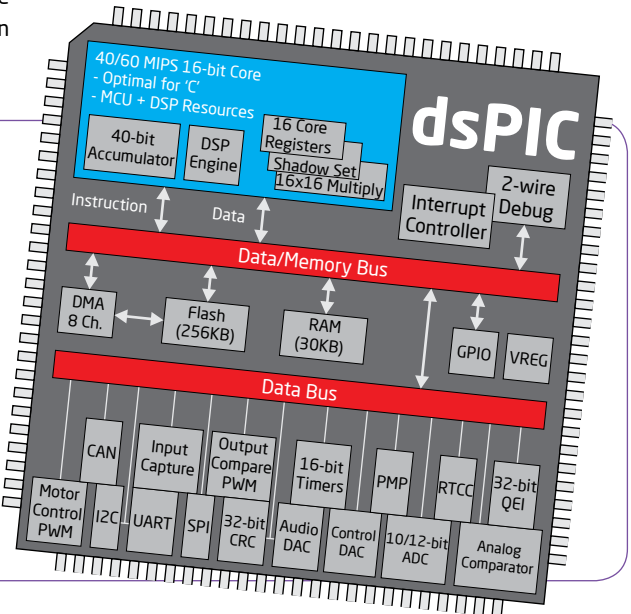
Figure 1-3: Power supply schematics

2. dsPIC33FJ256GP710A microcontroller

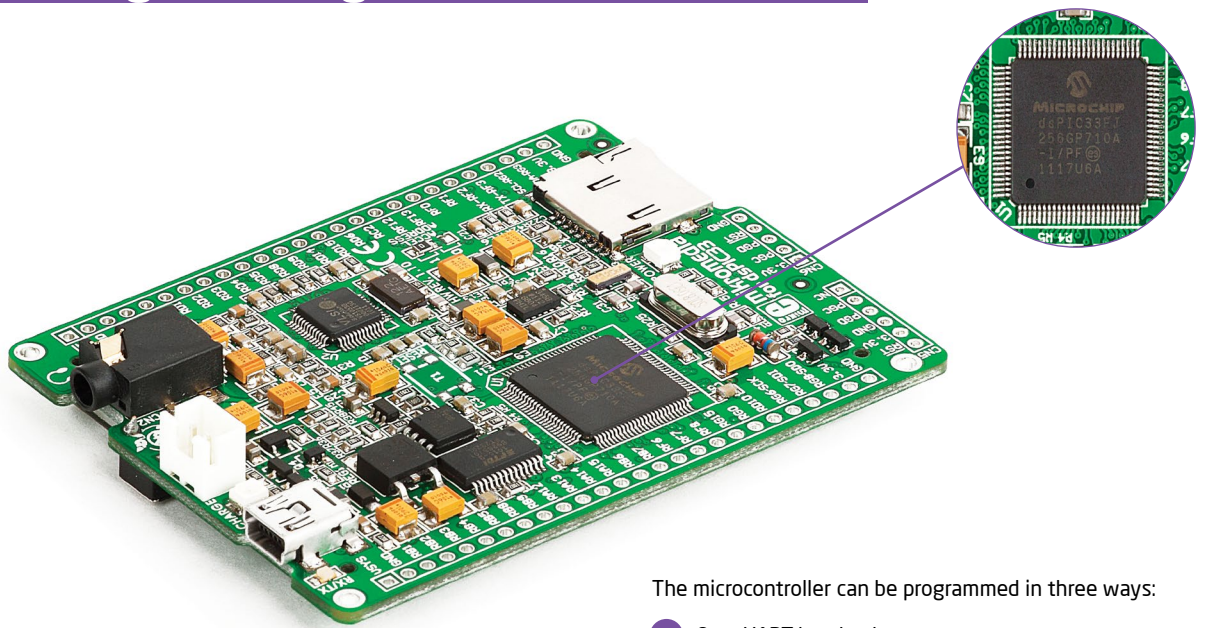
mikromedia for dsPIC33® development system comes with the **dsPIC33FJ256GP710A** microcontroller. This high-performance 16-bit microcontroller with its integrated modules and in combination with other on-board modules is ideal for multimedia applications.

Key microcontroller features

- Up to **40 MIPS** Operation;
- 16-bit architecture;
- 256KB of program memory;
- 30.720 Bytes of RAM;
- 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

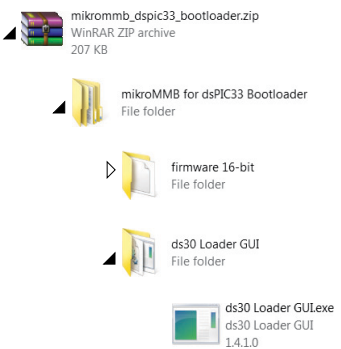
03 Using ICD2/3 external programmer

Programming with mikroBootloader

You can program the microcontroller with the bootloader which is preprogrammed 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:

www.mikroe.com/eng/downloads/get/1493/mikrommb_dspic33_bootloader.zip

Upon download, unzip the file to the desired location and start ds30 Loader software.



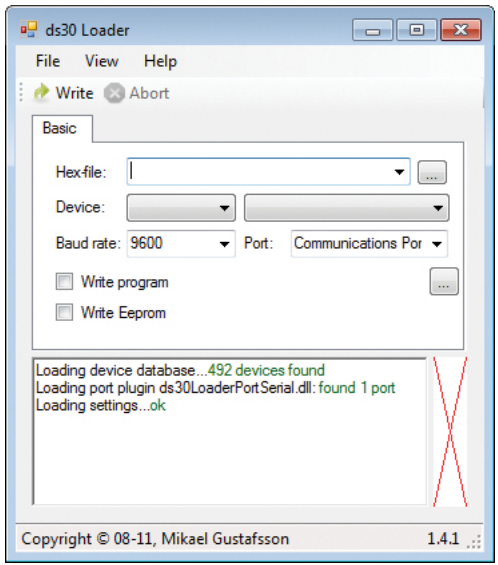


Figure 3-1: ds30 Loader open-source software

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

Identifying device COM port

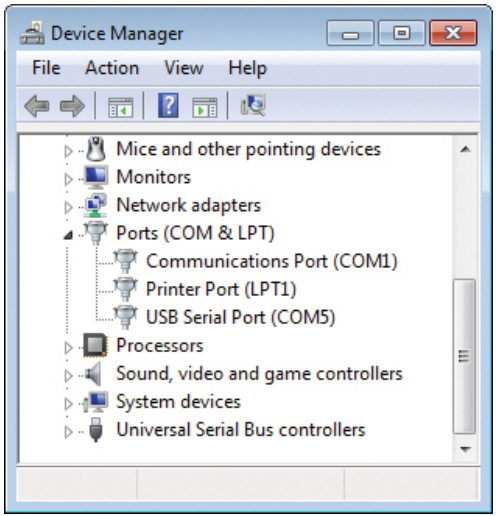


Figure 3-2: Identifying COM port

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

step 1 - Choosing COM port

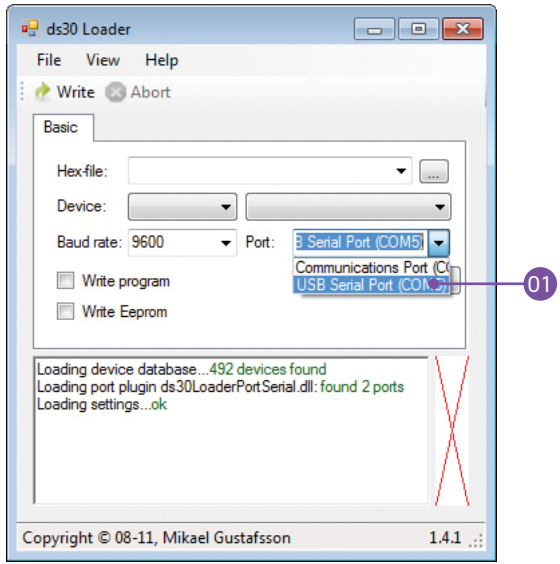


Figure 3-3: Selecting COM port

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

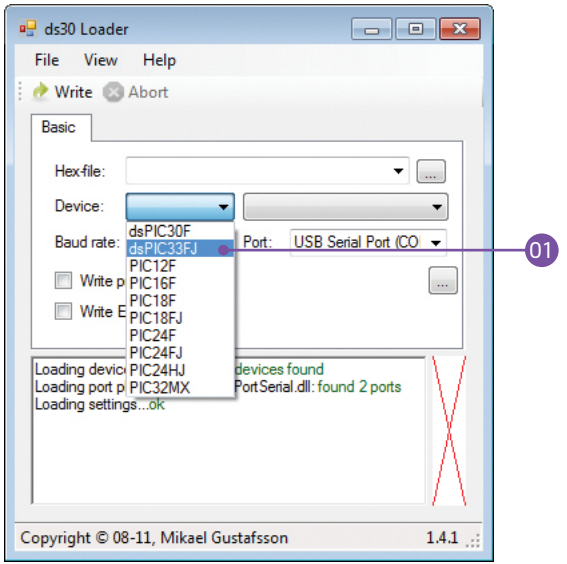


Figure 3-4: Selecting MCU family

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

step 3 - Choosing device

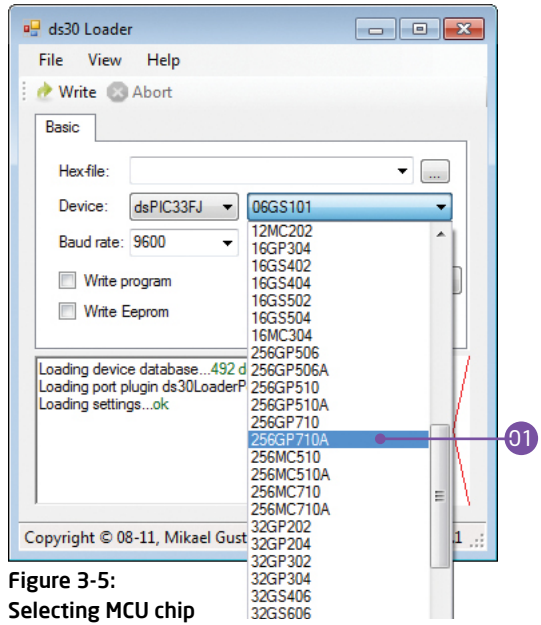


Figure 3-5: Selecting MCU chip

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

step 4 - Browse for .HEX file

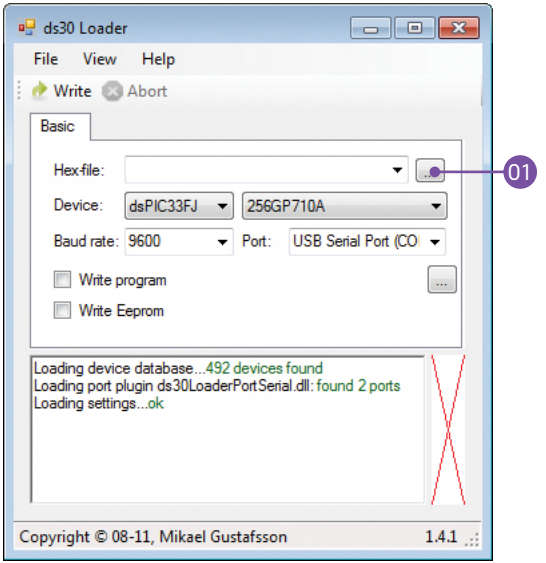


Figure 3-6: Browse for .HEX file

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

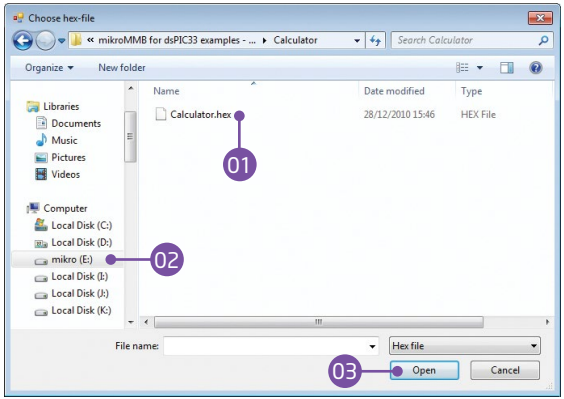


Figure 3-7: Pop-up window for .HEX file choosing

01 Select desired .HEX file

02 Folder list

03 Click on Open button

step 5 - Set Baud rate

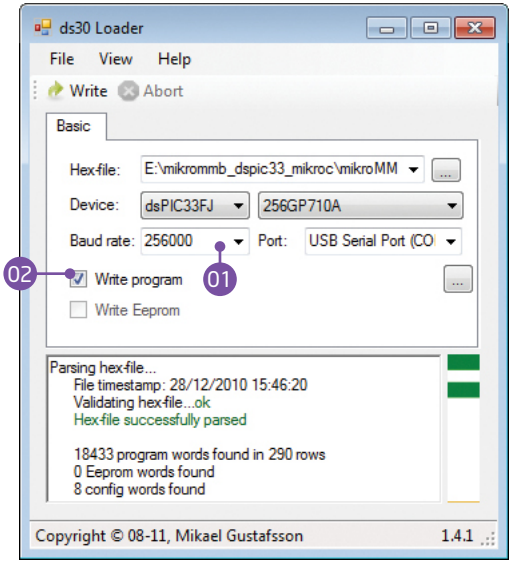


Figure 3-8: Seting baud rate

01 From drop down list set baud rate value to 256000

02 Check **Write program** check box

step 6 - Uploading .HEX file

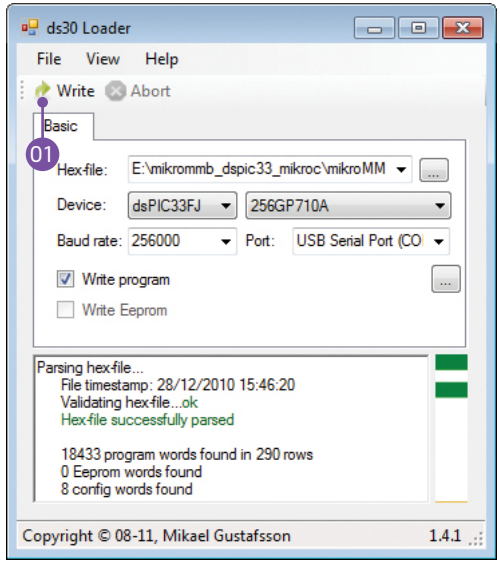


Figure 3-9: Write program

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

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

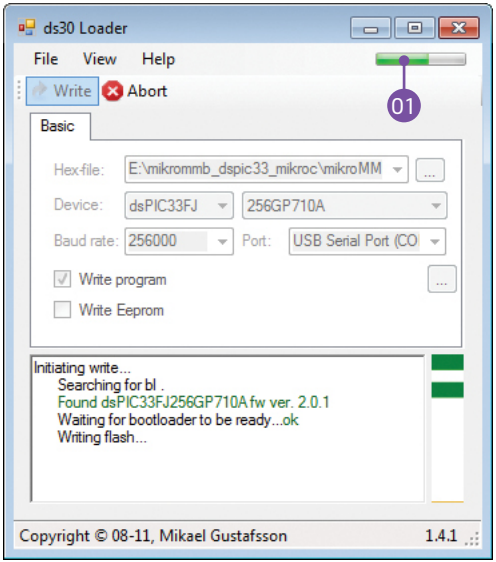


Figure 3-10: Program uploading

01 Progress bar indicates .HEX file upload process

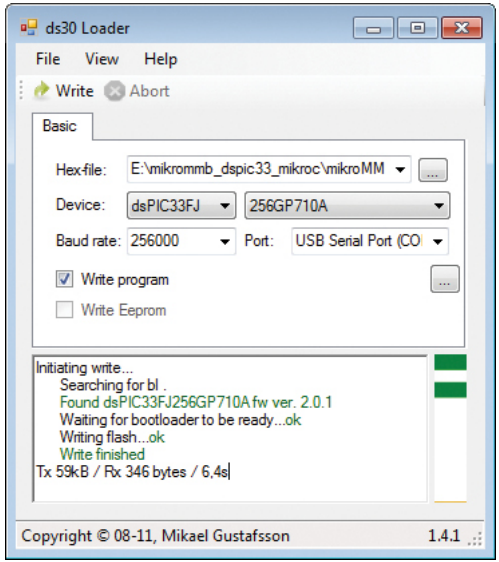


Figure 3-11: Uploading is finished

01 After uploading is finished you will get a 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 3-12.

Figure 3-12:
Connecting mikroProg™ to mikromedia™

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 it's key features.

mikroProg Suite™ for PIC® software

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

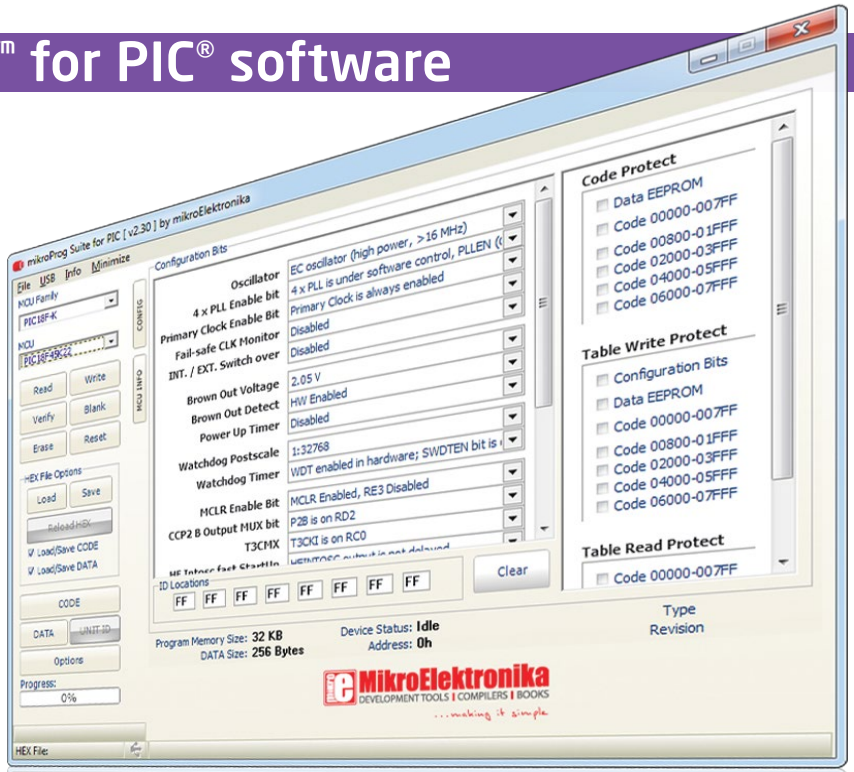


Figure 3-13: Main Window of mikroProg Suite™ for PIC® programming software

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.**

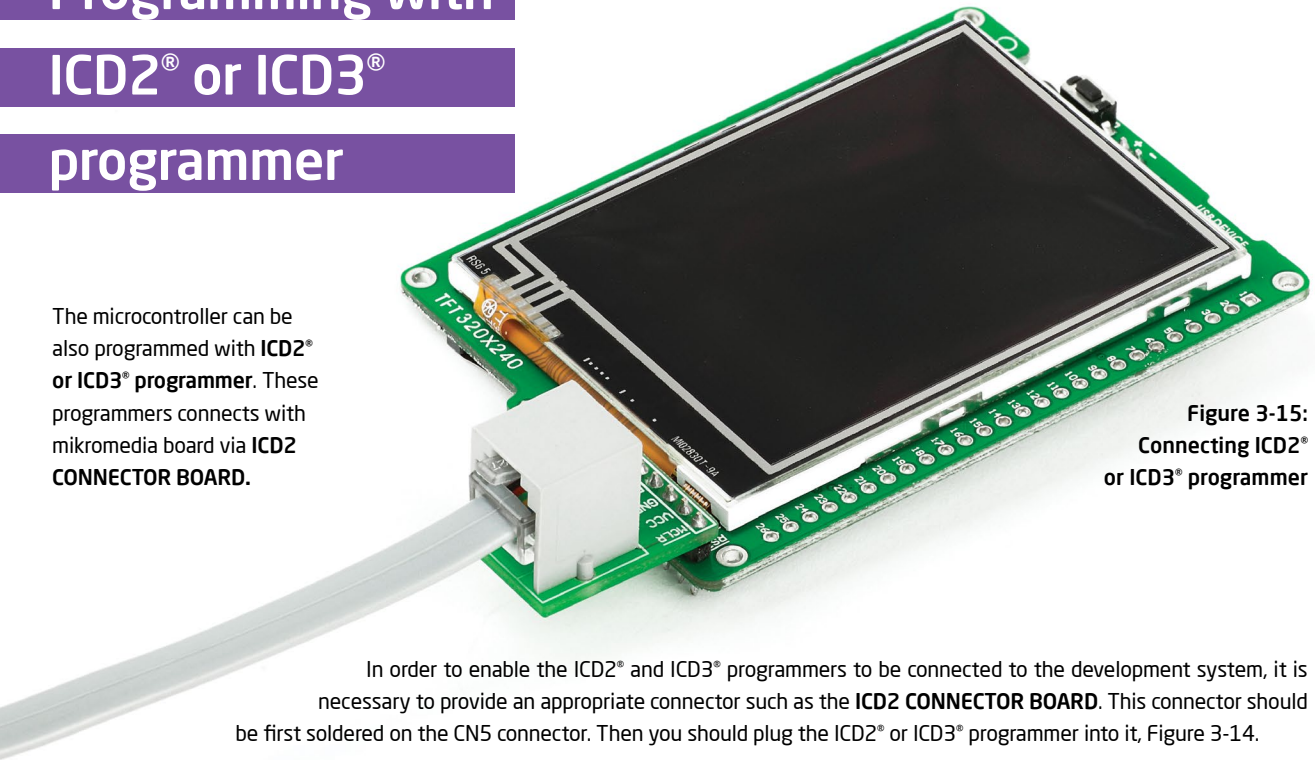


Figure 3-15: Connecting ICD2® or ICD3® programmer

In order to enable the ICD2® and ICD3® programmers to be connected to the development system, it is necessary to provide an 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.

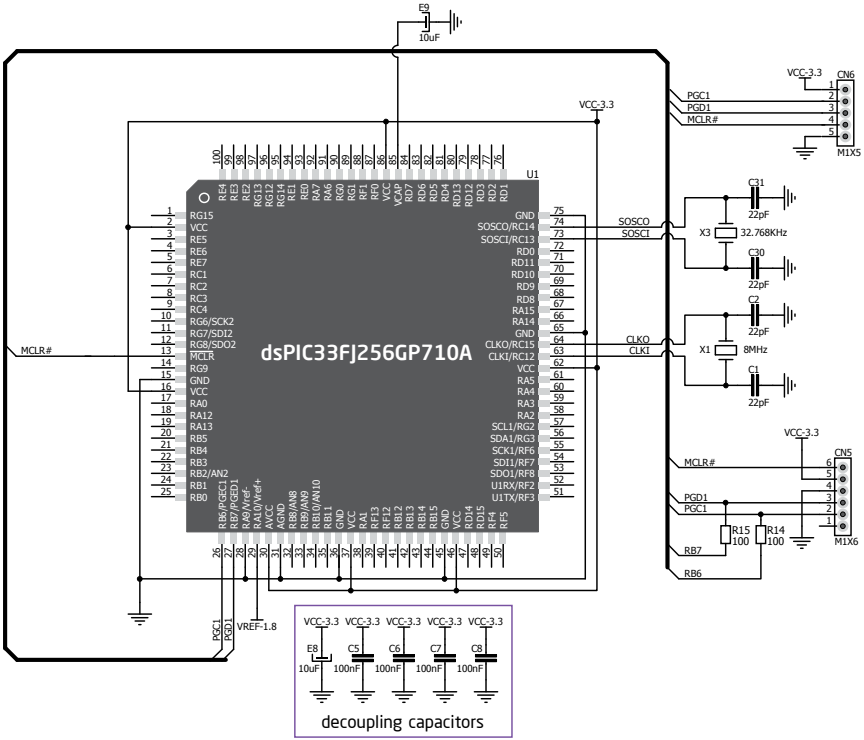
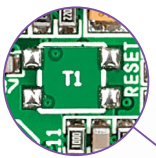


Figure 3-16: ICD2 / ICD3 & mikroProg™ programmer connection schematics

4. Reset buttons

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



note *You can also solder an additional reset button on the appropriate place at the back side of the board,* **Figure 4-1**.

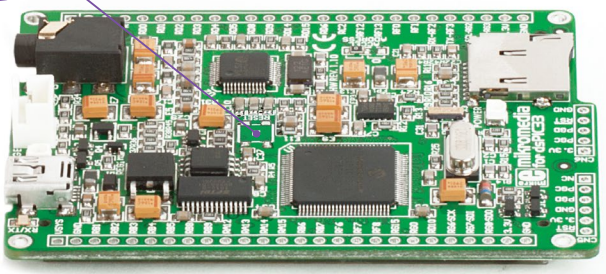


Figure 4-1: Reset button located at the backside of the board

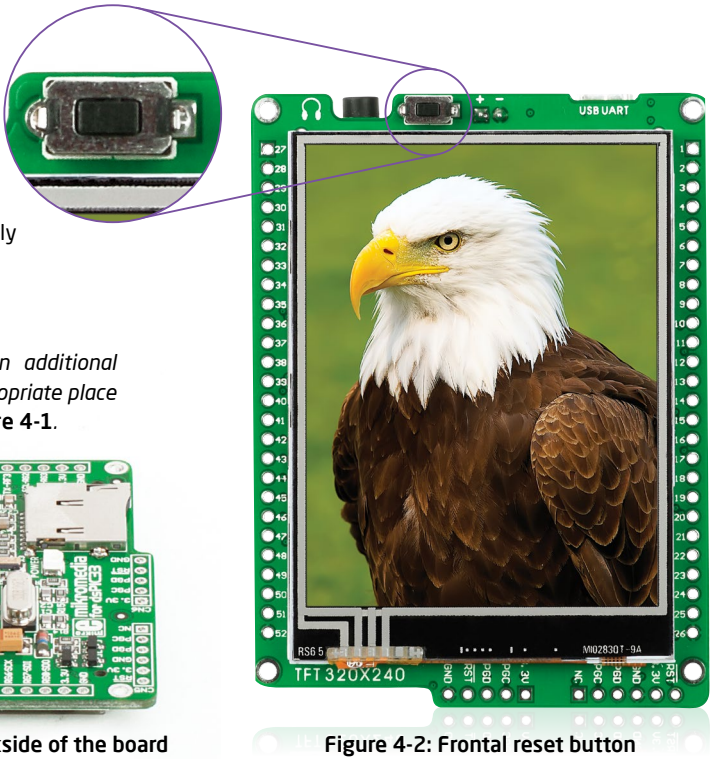


Figure 4-2: Frontal reset button

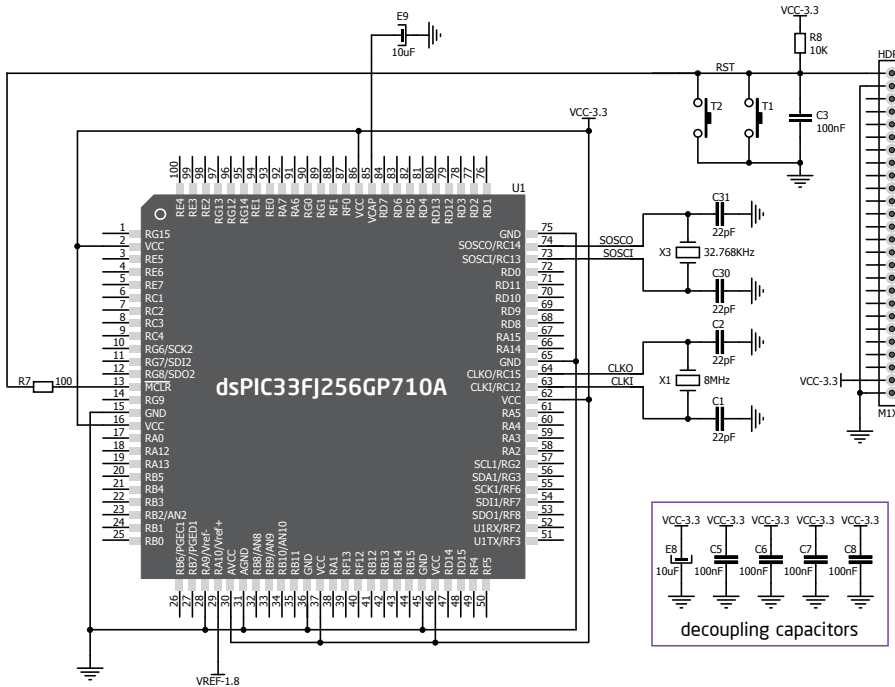


Figure 4-3: Reset circuit schematics

5. Crystal oscillator

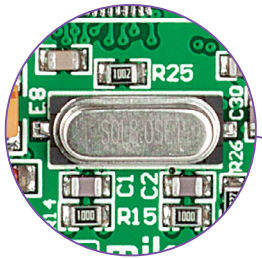


Figure 5-1: Crystal oscillator module (X1)

Board is equipped with an **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 the 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 the internal **RTCC** module.

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

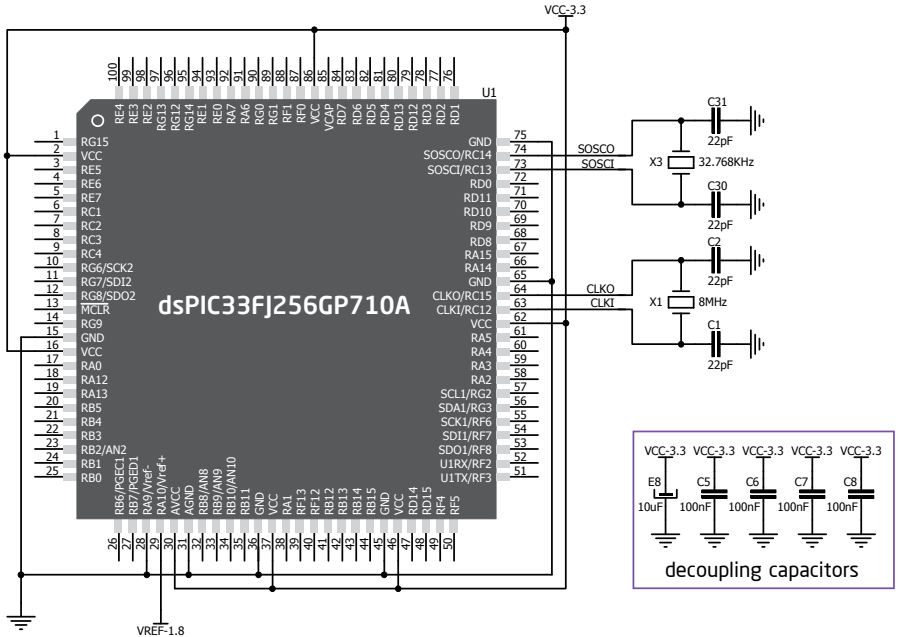


Figure 5-2: Crystal oscillator schematics

6. microSD card slot

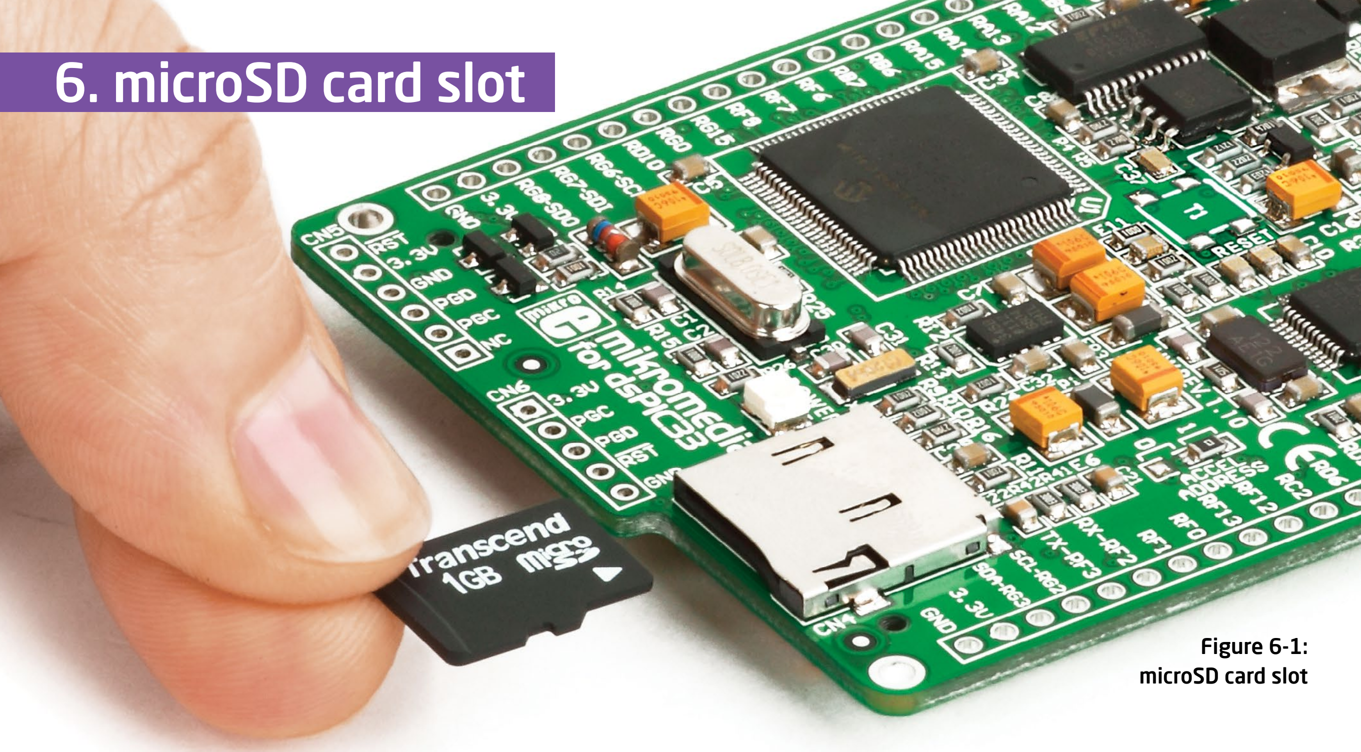


Figure 6-1:
microSD card slot

Board contains a **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.

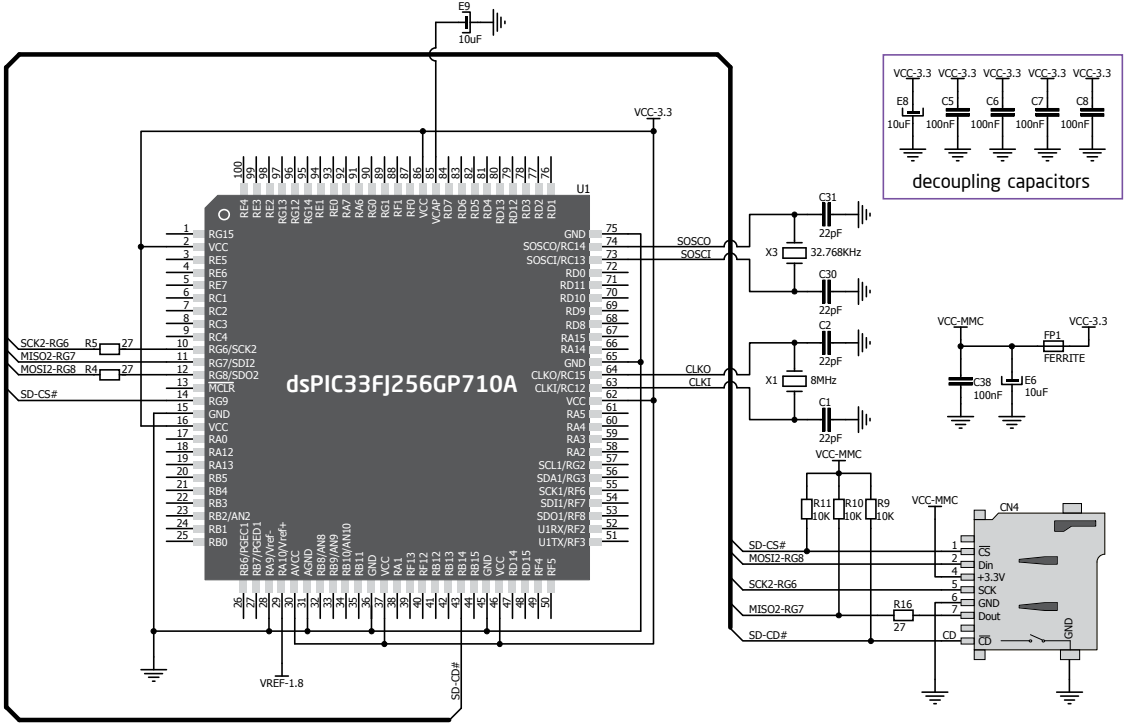


Figure 6-2: microSD Card Slot module connection schematics

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

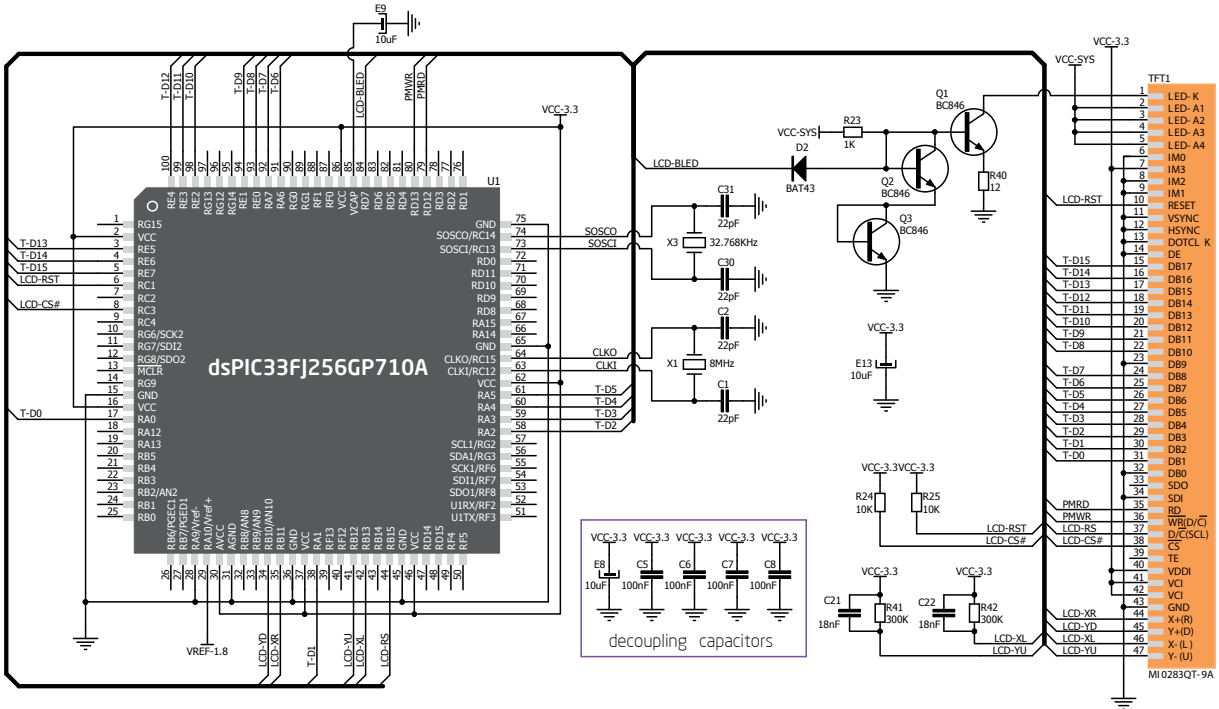


Figure 7-2: Touch Screen connection schematics

8. Audio module

Figure 8-1: On-board VS1053 MP3 codec

mikromedia for dsPIC33 features a 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 8-2: 3.5mm headphones jack

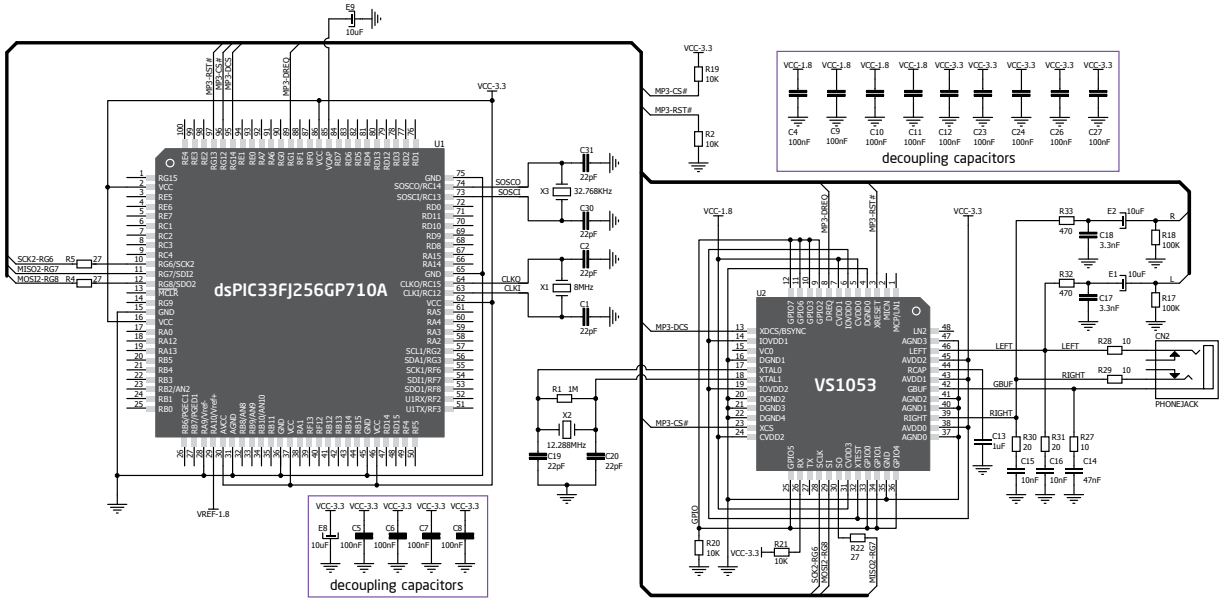


Figure 8-3: Audio module connection schematic

9. USB-UART connection

Mikromedia contains a 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.

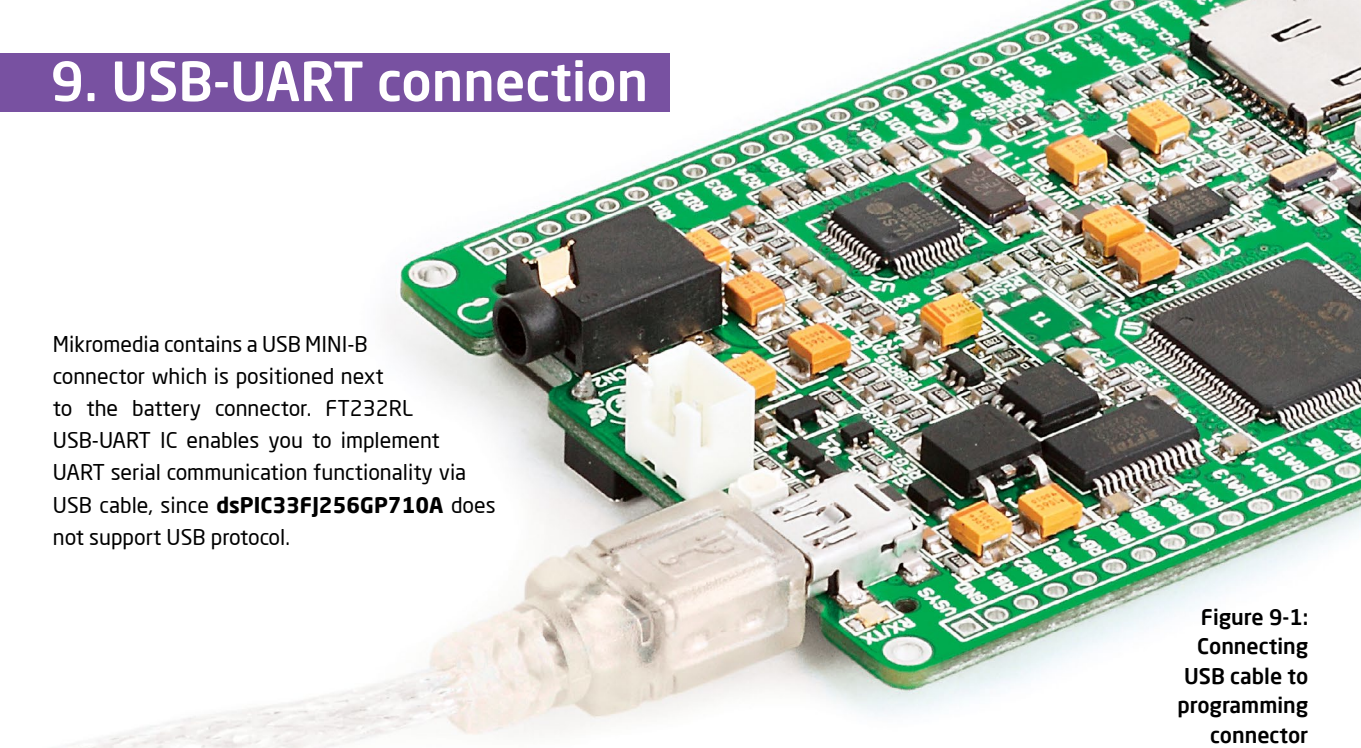


Figure 9-1: Connecting USB cable to programming connector

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.*

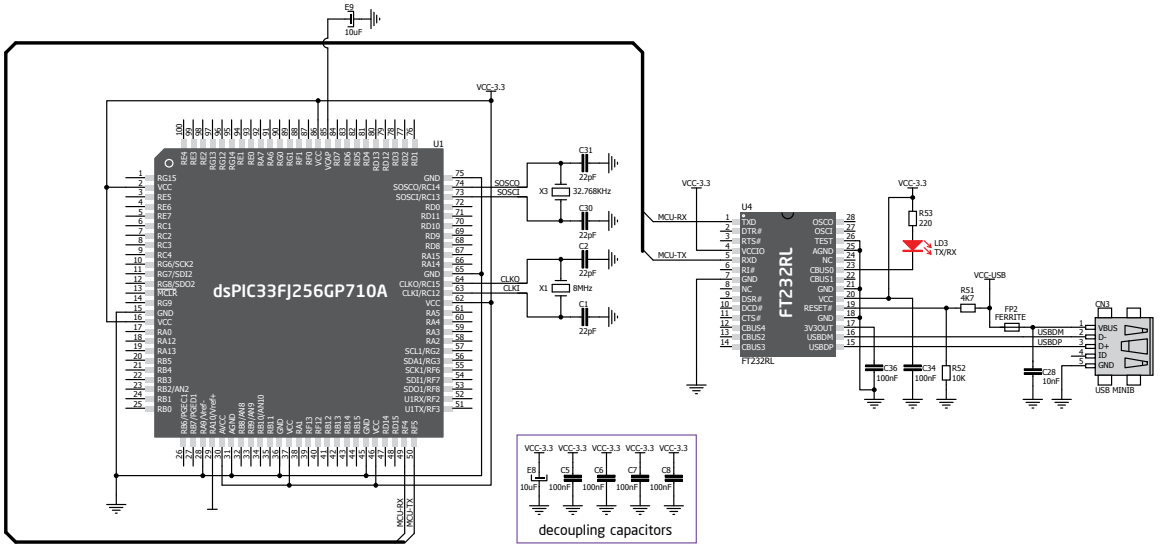


Figure 9-2: USB module connection schematics

10. Accelerometer

Figure 10-1: Accelerometer module

On board **ADXL345** accelerometer is used to measure acceleration in three axes: 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.

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.

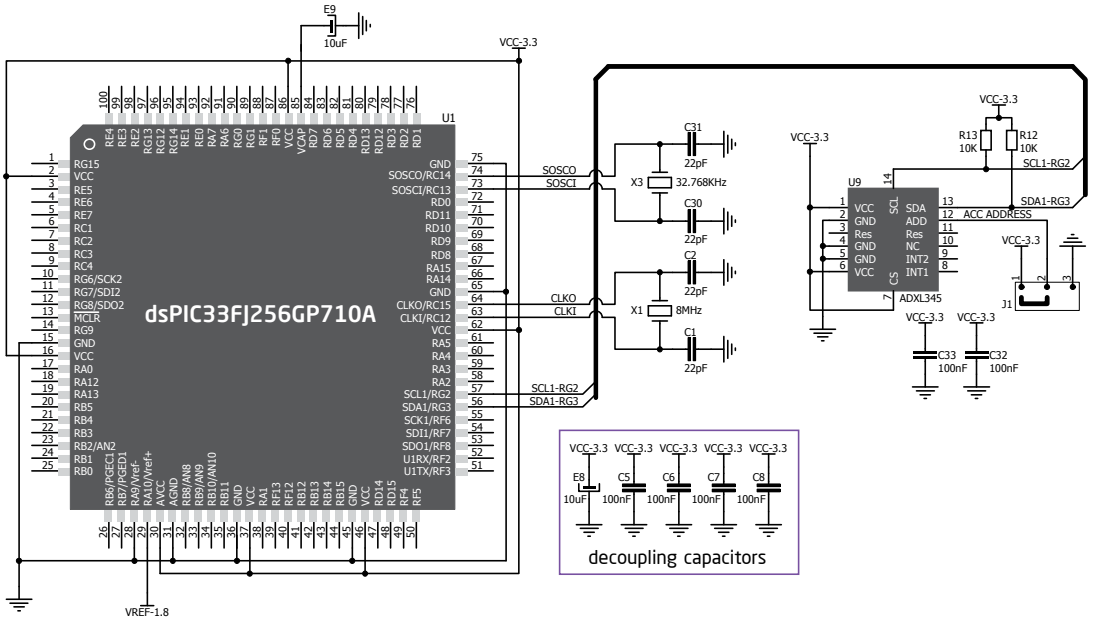


Figure 10-2: Accelerometer connection schematic

11. Flash memory

Figure 11-1:
Flash memory module

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**).

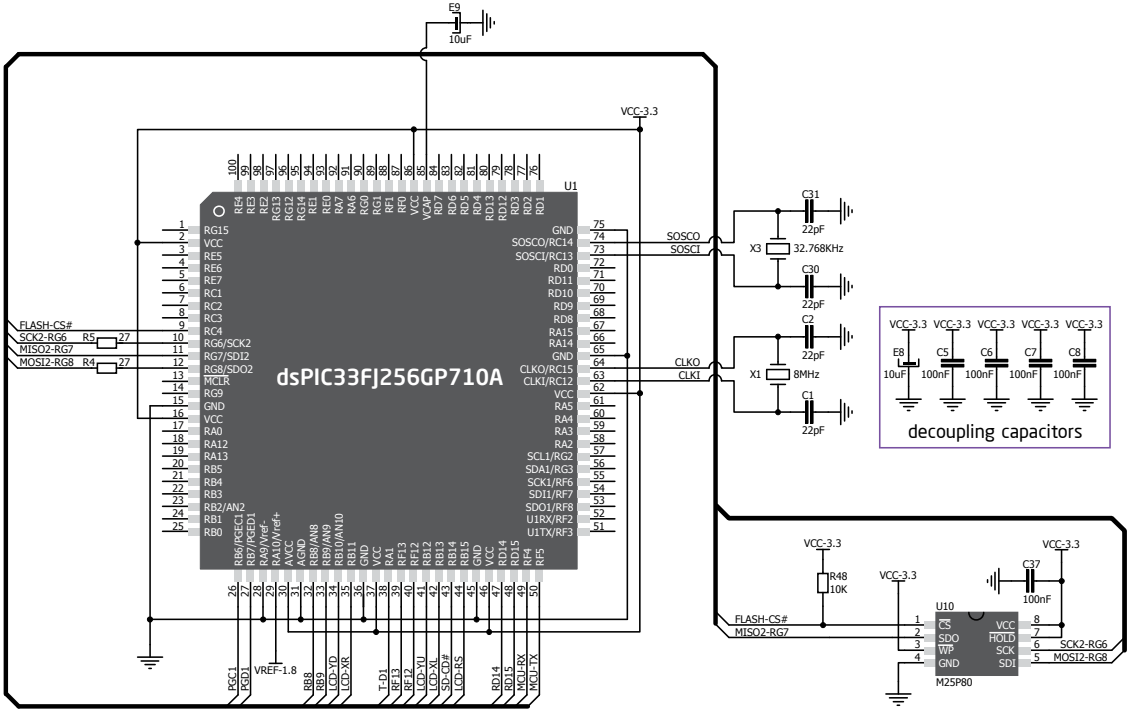


Figure 11-2: Flash memory module connection schematic

12. Pads

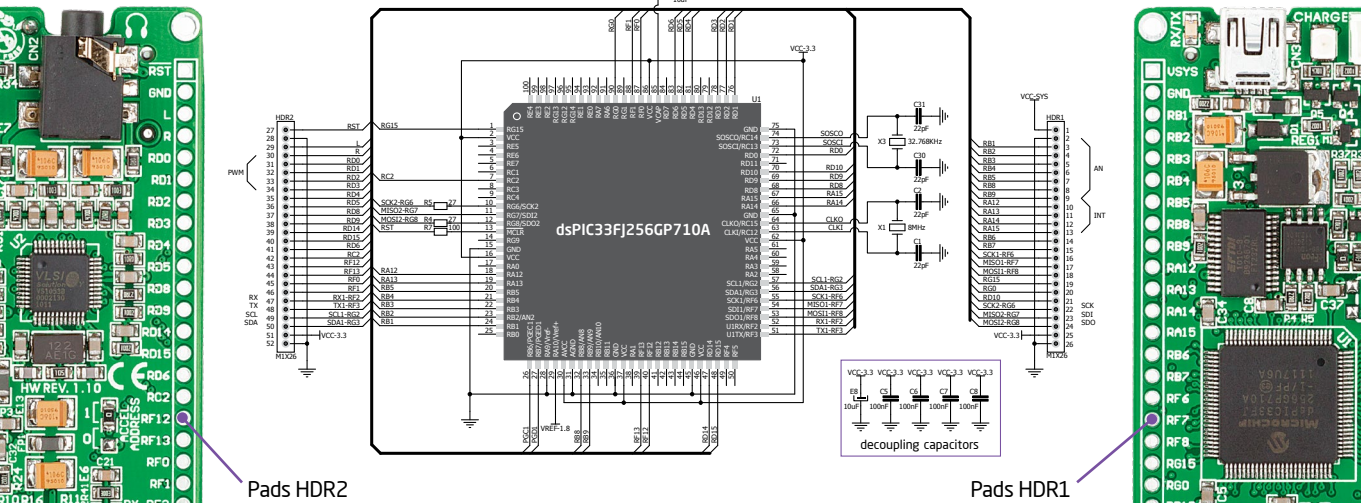
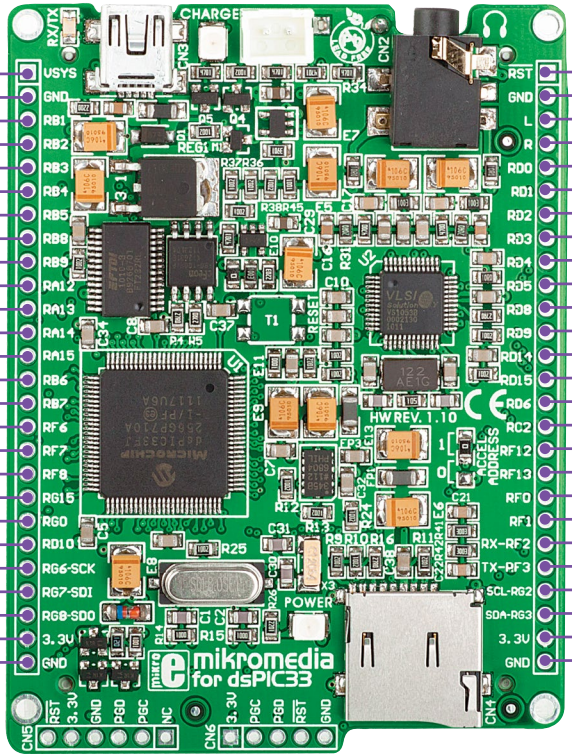


Figure 12-1: Pads connecting schematic

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



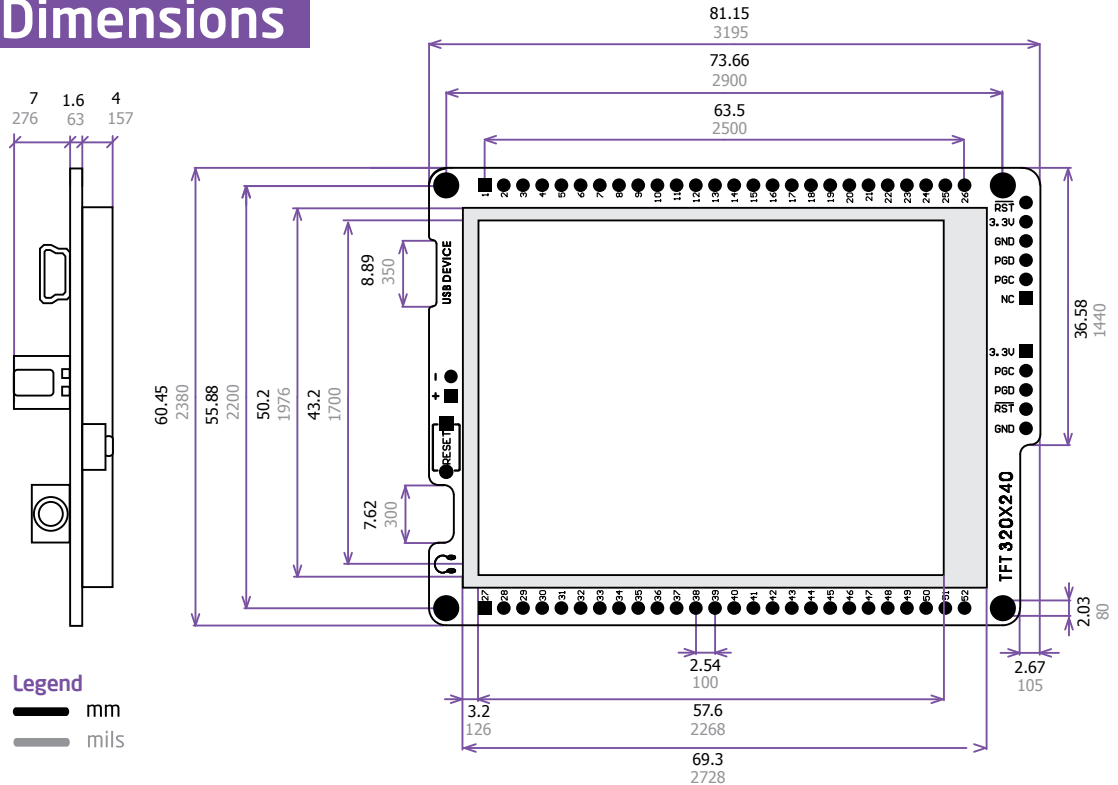
5V power supply	5V	RST	Reset pin
Reference Ground	GND	GND	Reference Ground
AN10	RB1	L	left ch.] audio out
AN2/SS1/CN4	RB2	R	right ch.] audio out
AN3/CN5	RB3	RD0	OC1
AN4/CN6	RB4	RD1	OC2
AN5/CN7	RB5	RD2	OC3
AN8	RB8	RD3	OC4
AN9	RB9	RD4	OC5/CN13
AN20/INT1	RA12	RD5	OC6/CN14
AN21/INT2	RA13	RD8	IC1
INT3	RA14	RD9	IC2
INT4	RA15	RD14	IC7/U1CTS/CN20
PGEC1/AN6/OCFA	RB6	RD15	IC8/U1RTS/CN21
PGED1/AN7	RB7	RD6	OC7/CN15
SPI1 SCK1/INT0	RF6	RC2	AN17/T3CK/T6CK
SPI1 SDI1	RF7	RF12	U2CTS
SPI1 SDO1	RF8	RF13	U2RTS
COFS	RG15	RF0	C1RX] CAN
C2RX	RG0	RF1	C1TX] CAN
IC3	RD10	RF2	U1RX] UART
SPI2 SCK2/CN8	RG6	RF3	U1TX] UART
SPI2 SDI2/CN9	RG7	RG2	SCL1] I²C
SPI2 SDO2/CN10	RG8	RG3	SDA1] I²C
3.3V power supply	3.3V	3.3V	3.3V power supply
Reference Ground	GND	GND	Reference Ground

Pin functions

Pin functions

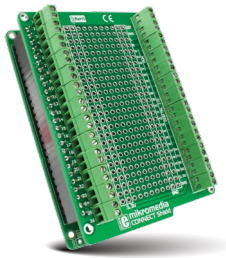
Programming lines | Analog Lines | Interrupt Lines | SPI Lines | I2C Lines | UART lines | PWM lines | Comparator lines

14. Dimensions



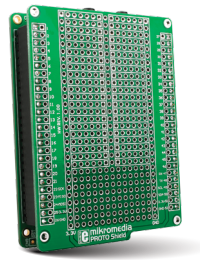
15. mikromedia accessories

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

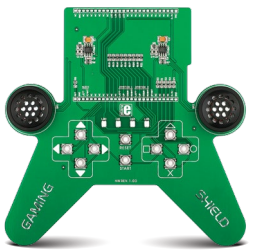


01 Connect shield

02 BatteryBoost shield

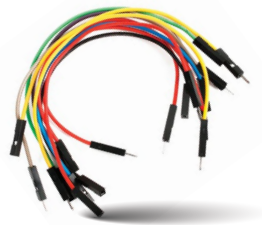


03 PROTO shield

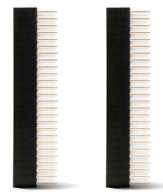


04 Gaming shield

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 its 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. Find useful projects and tutorials on the Libstock website (**www.libstock.com**). Join our Forum (**www.mikroe.com/forum**) and get help from a large ecosystem of users.

Compiler

You still don't have an appropriate compiler? Locate dsPIC® compiler that suits you best on our site:

http://www.mikroe.com/dspic/compilers/

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

Visual TFT

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** enables you to quickly create your GUI. It will automatically generate code compatible with MikroElektronika compilers. Visual TFT is rich with examples, which are an excellent starting point for your future projects. Download it from the link bellow:

http://www.mikroe.com/visualtft/

If you want to learn more about our products, please visit our website at www.mikroe.com
If you are experiencing some problems with any of our products or just need additional information, please place your ticket at www.mikroe.com/support
If you have any questions, comments or business proposals, do not hesitate to contact us at office@mikroe.com

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