mikromedia™
for dsPIC33®

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

MikroElektronika
DEVELOPMENT TOOLS | COMPILERS | BOOKS

dsPIC

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.

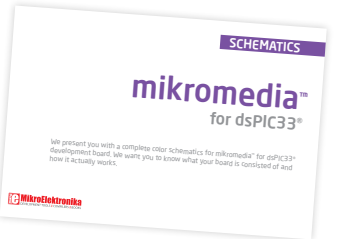
Package Contains

01 Damage resistant protective box

02 mikromedia for dsPIC33® development system

03 DVD with documentation and examples

04 mikromedia for dsPIC33® user's guide

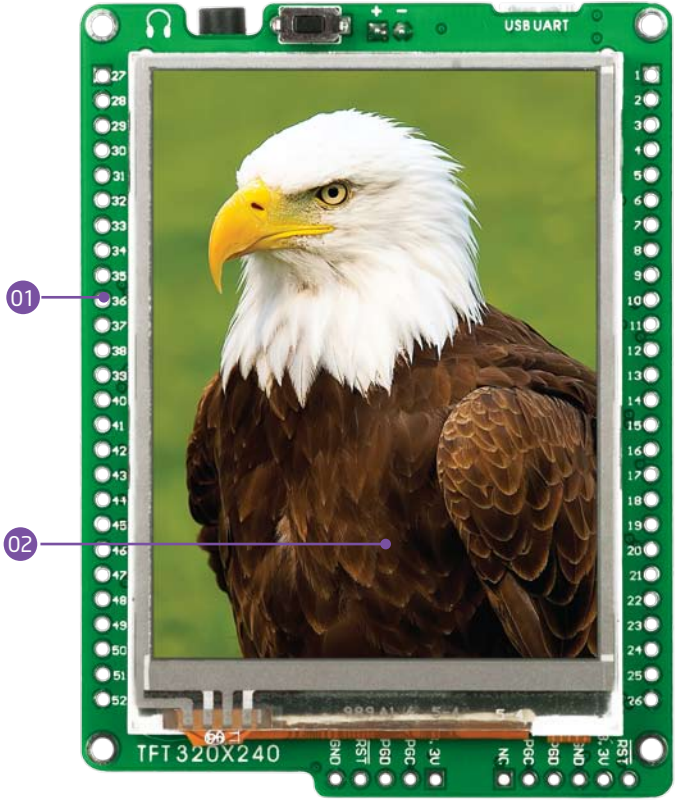


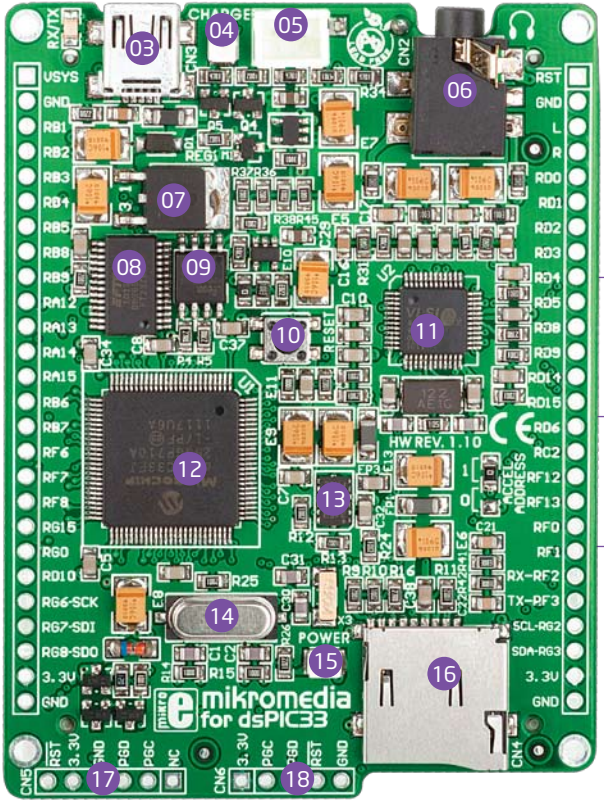
05 mikromedia for dsPIC33® schematics

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





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

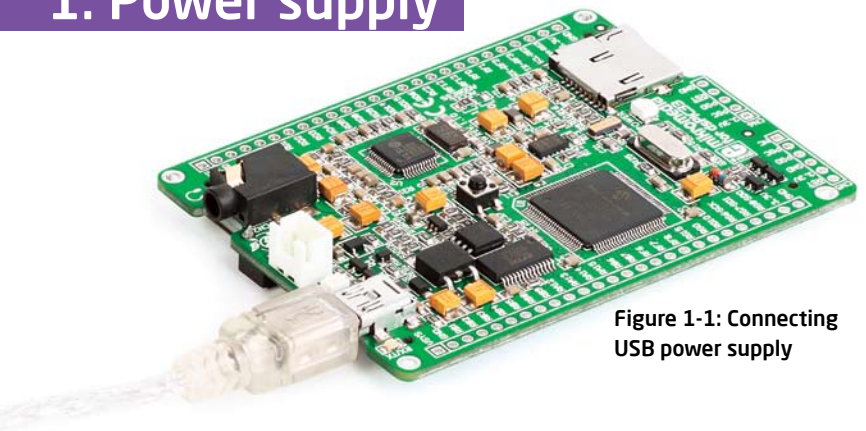


Figure 1-1: Connecting USB power supply

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.

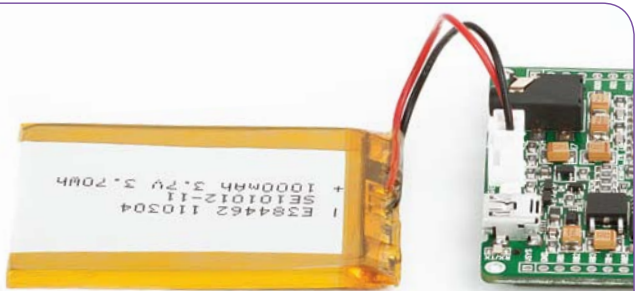


Figure 1-2: Connecting Li-Polymer battery

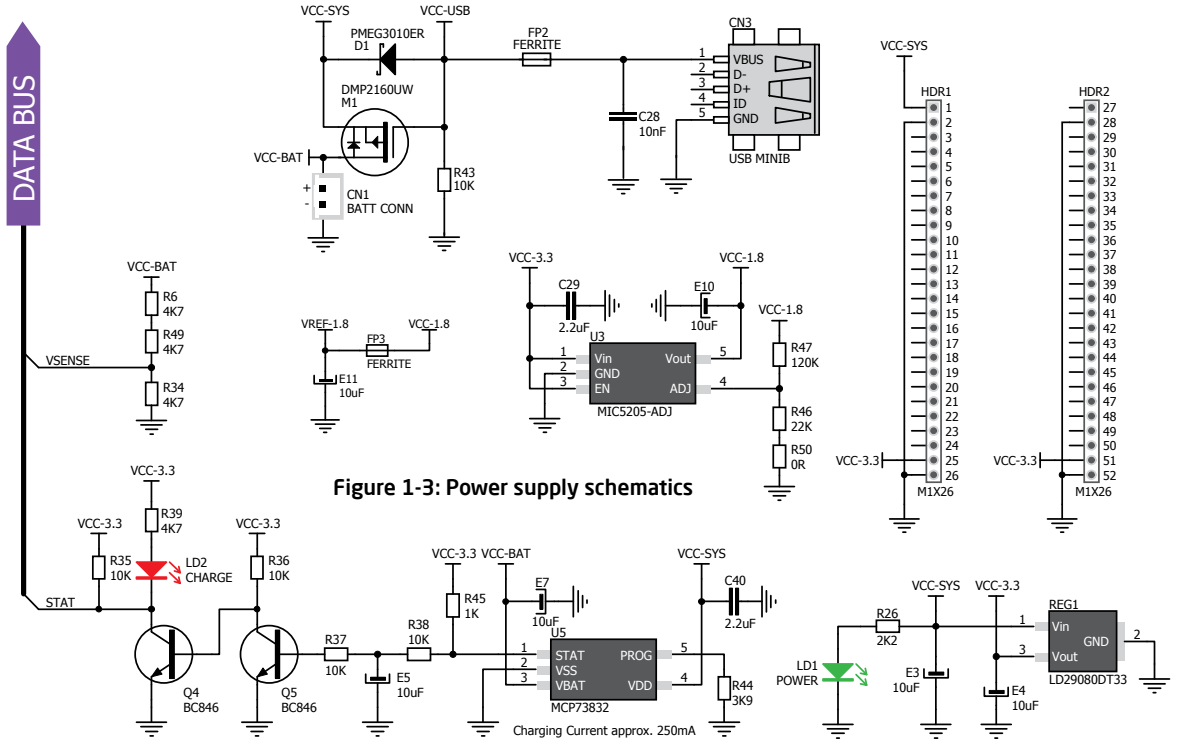


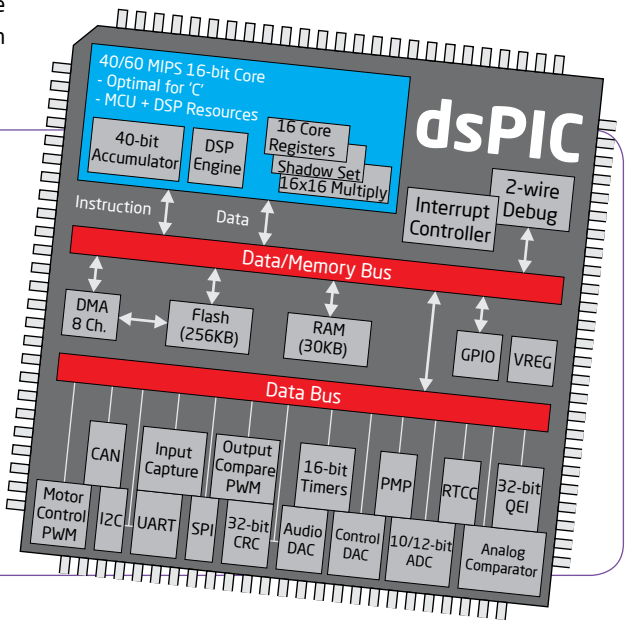
Figure 1-3: Power supply schematics

2. dsPIC33FJ256GP710A microcontroller

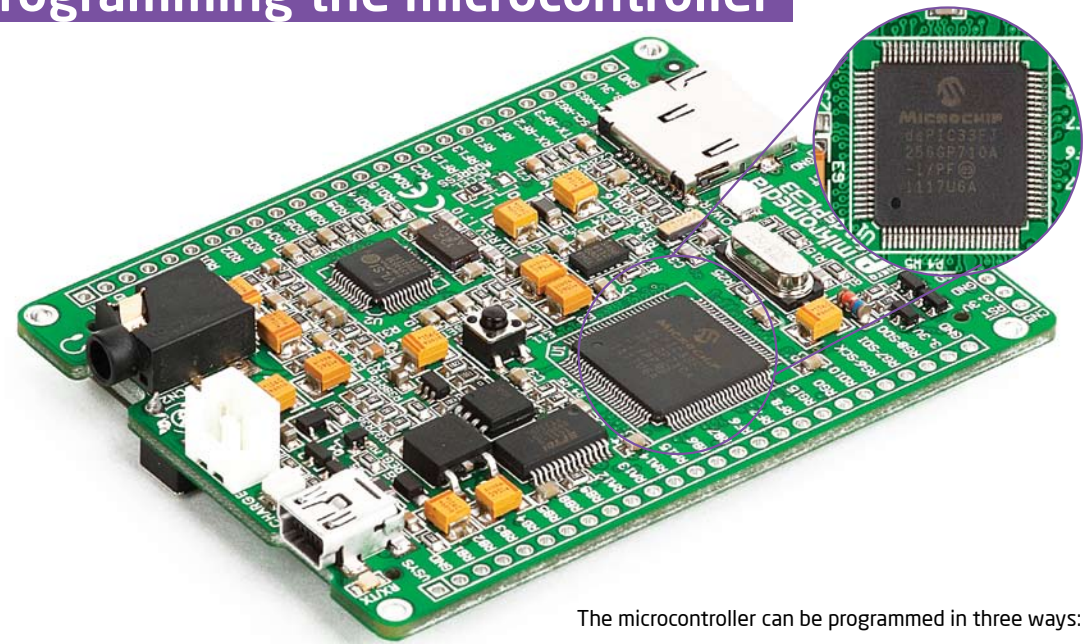
The **mikromedia for dsPIC33®** development system comes with the **dsPIC33FJ256GP710A** microcontroller. This high-performance 16-bit microcontroller with its integrated modules and in combination with other on-board modules is ideal for multimedia applications.

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

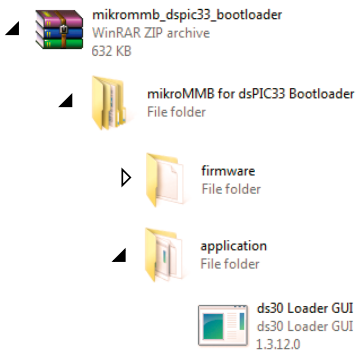
03 Using ICD2/3 external programmer

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.



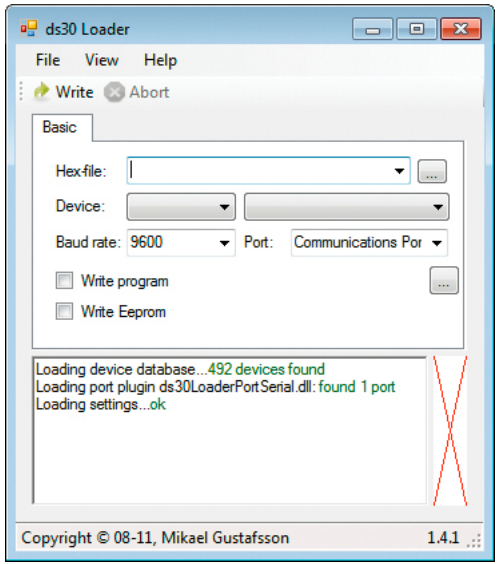


Figure 3-1: ds30 Loader open-source software

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

Identifying device COM port

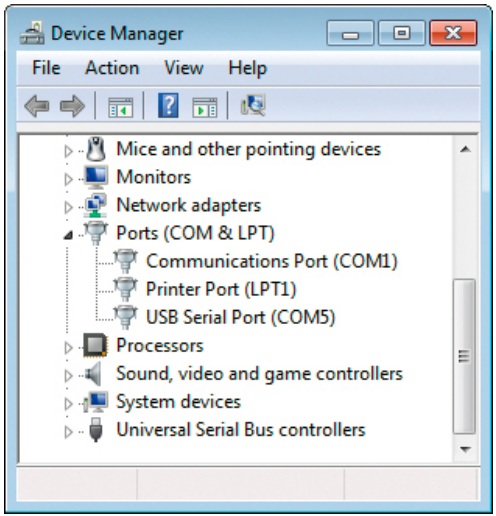


Figure 3-2: Identifying COM port

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

step 1 - Choosing COM port

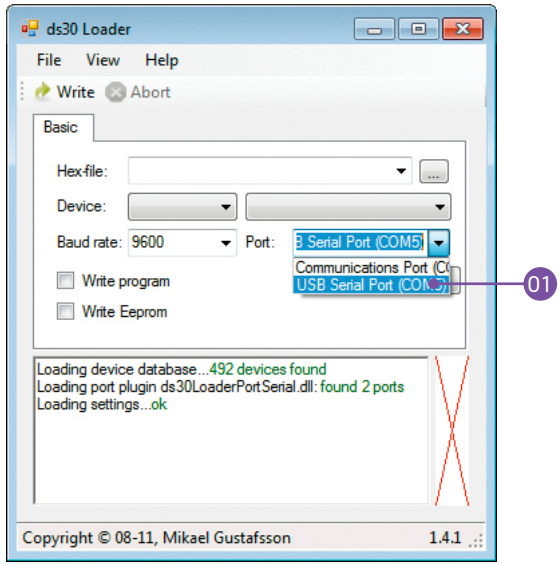


Figure 3-3: Selecting COM port

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

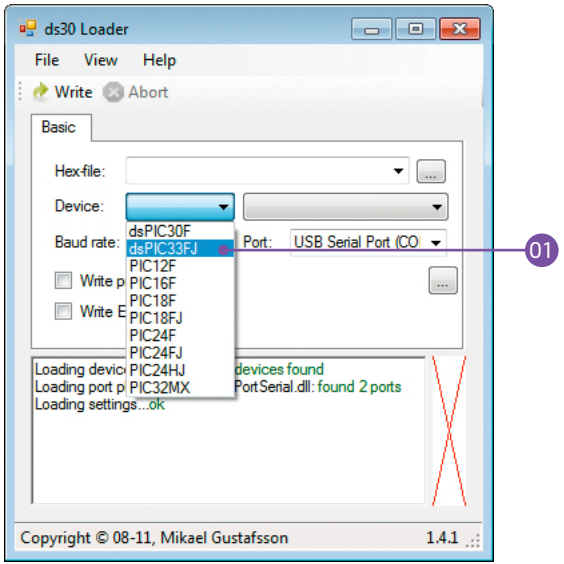


Figure 3-4: Selecting MCU family

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

step 3 - Choosing device

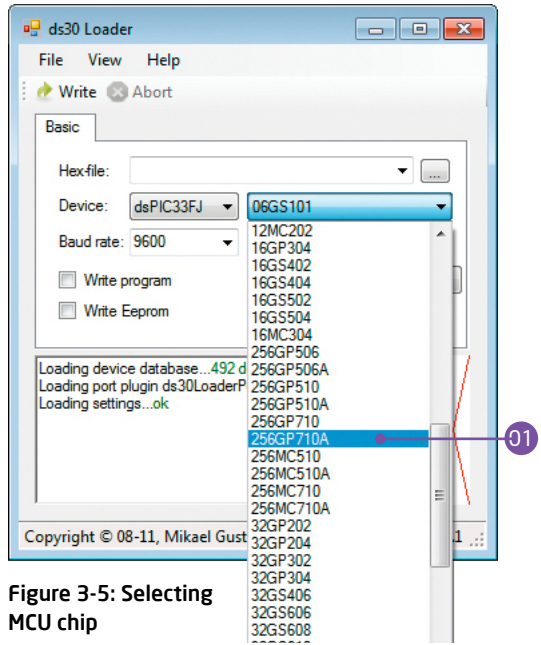


Figure 3-5: Selecting MCU chip

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

step 4 - Browse for .HEX file

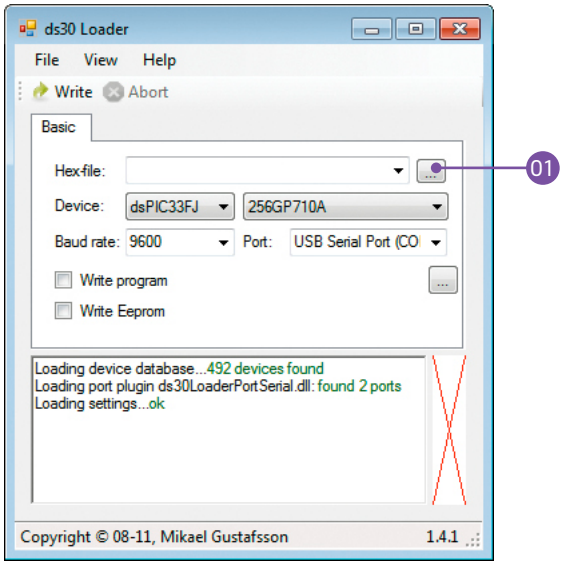


Figure 3-6: Browse for .HEX file

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

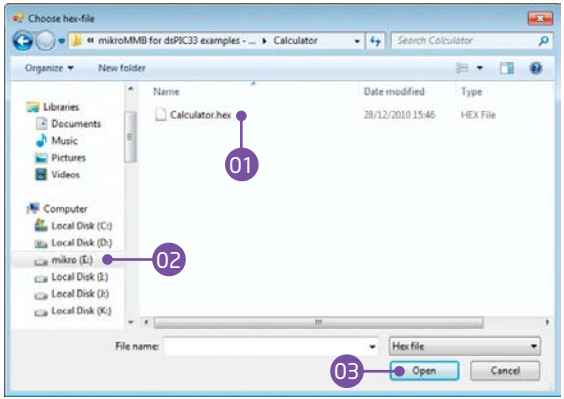


Figure 3-7: Pop-up window for .HEX file choosing

01 Select desired .HEX file

02 Folder list

03 Click on Open button

step 5 - Set Baud rate

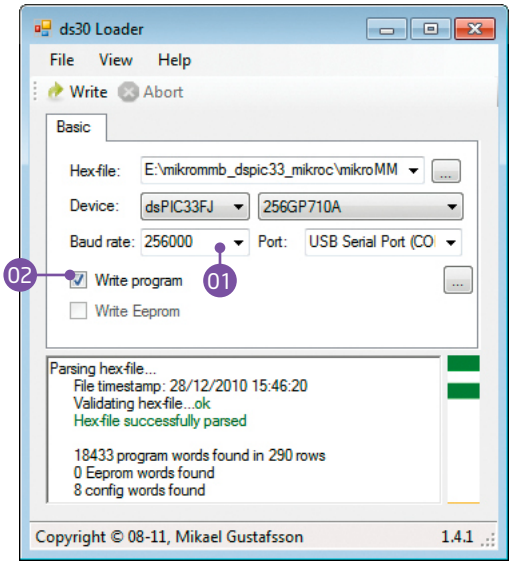


Figure 3-8: Seting baud rate

01 From drop down list set baud rate value to 256000

02 Check **Write program** check box

step 6 - Uploading .HEX file

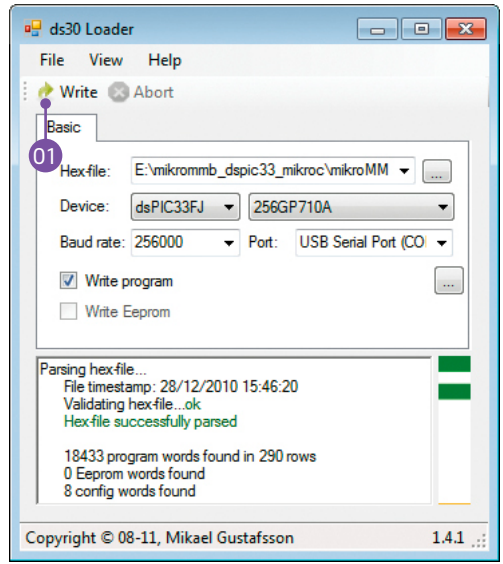


Figure 3-9: Write program

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.

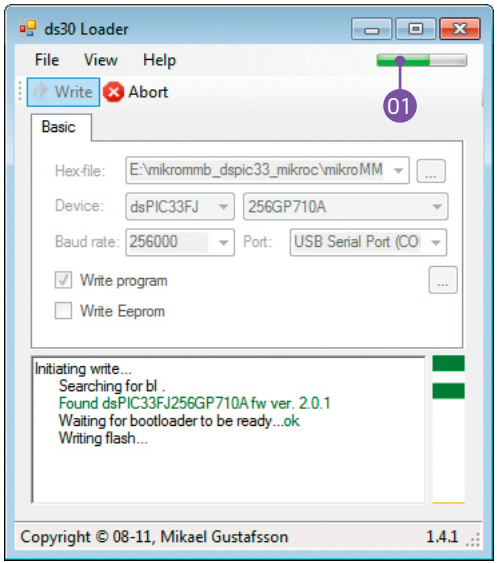


Figure 3-10: Program uploading

01 Progress bar indicates .HEX file upload process

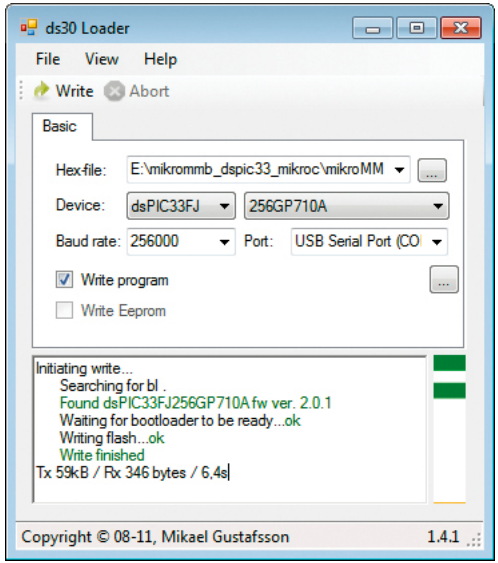
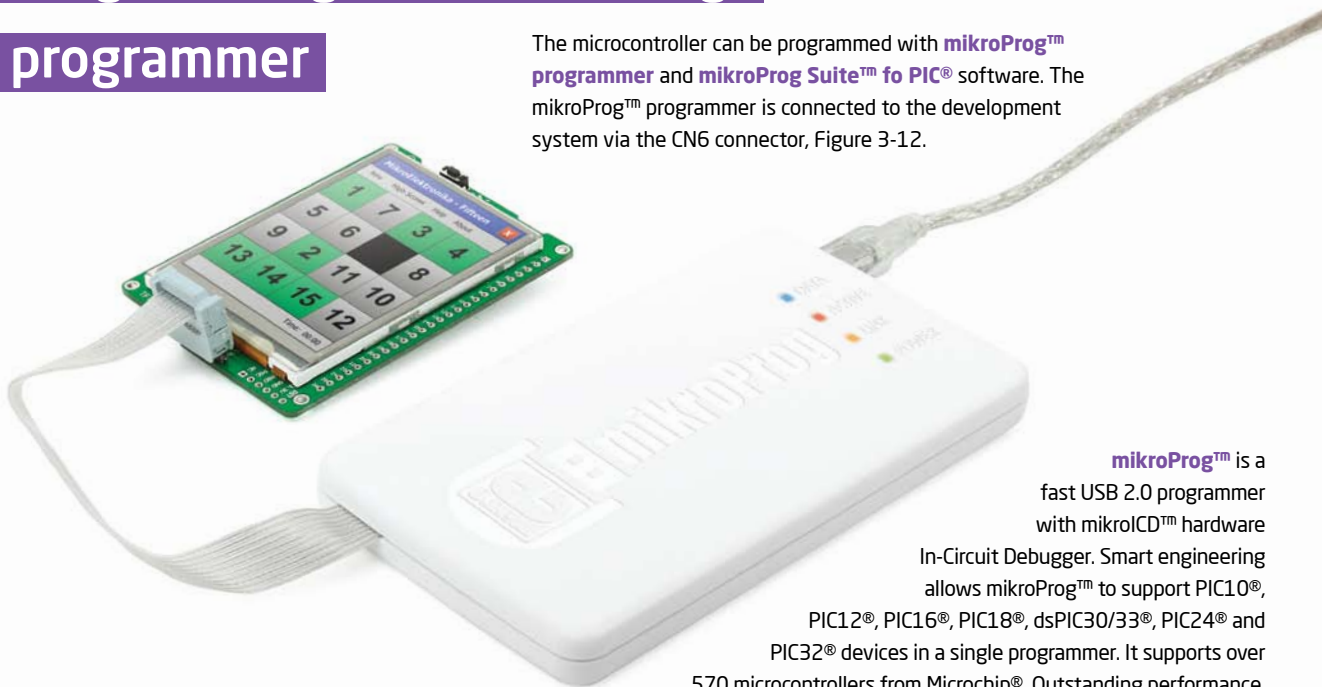


Figure 3-11: Uploading is finished

01 After uploading is finished you will get 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.



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.

Figure 3-12:
Connecting mikroProg™ to mikromedia™

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.

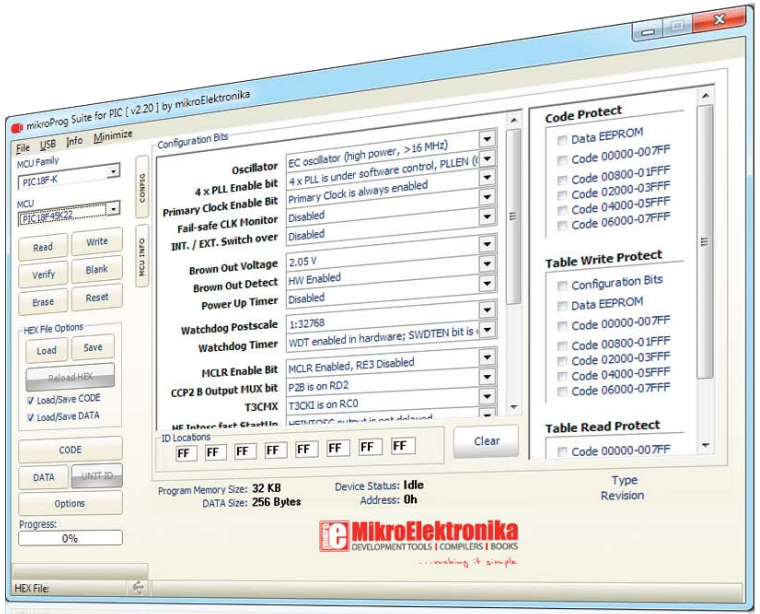


Figure 3-13: Main Window of mikroProg Suite™ for PIC® programming software

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.**

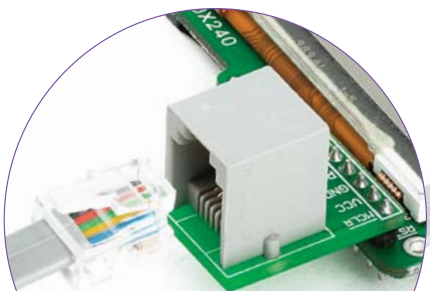


Figure 3-14: Placing ICD2® connector

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.

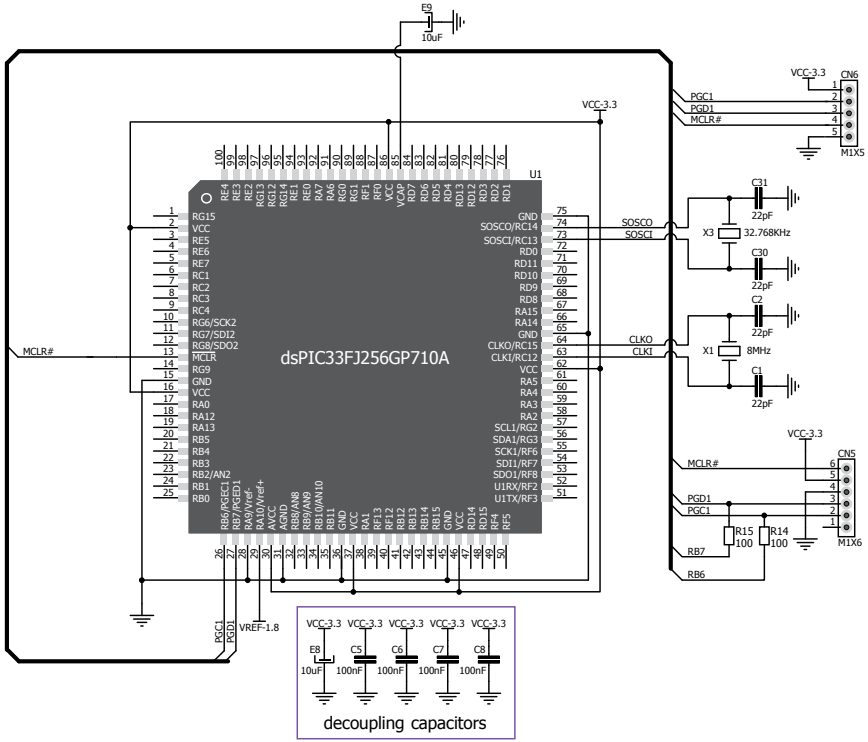


Figure 3-16: ICD2 / ICD3 & mikroProg™ programmer connection schematics

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**).

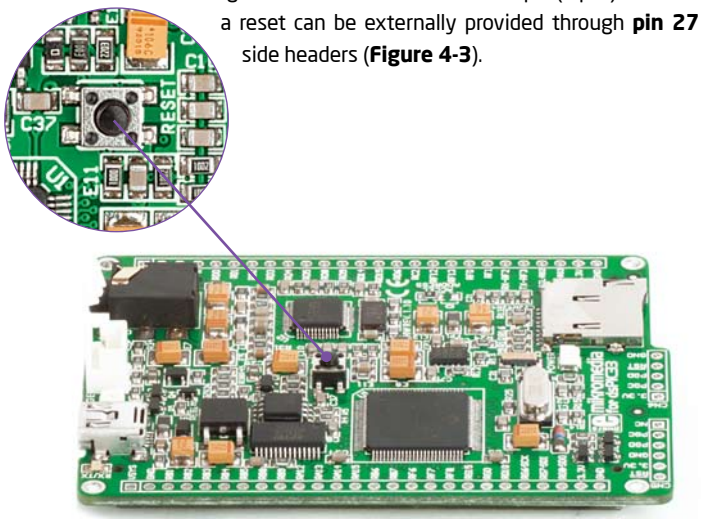


Figure 4-1: Reset button located at the backside of the board

Figure 4-2: Frontal reset button

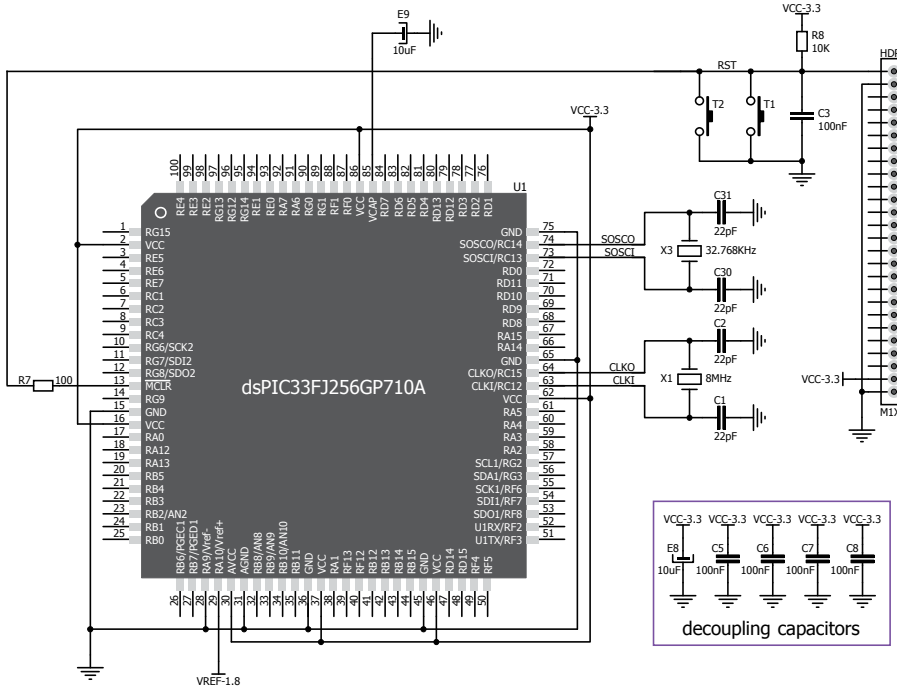


Figure 4-3: Reset circuit schematics

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 **RTCC** module.

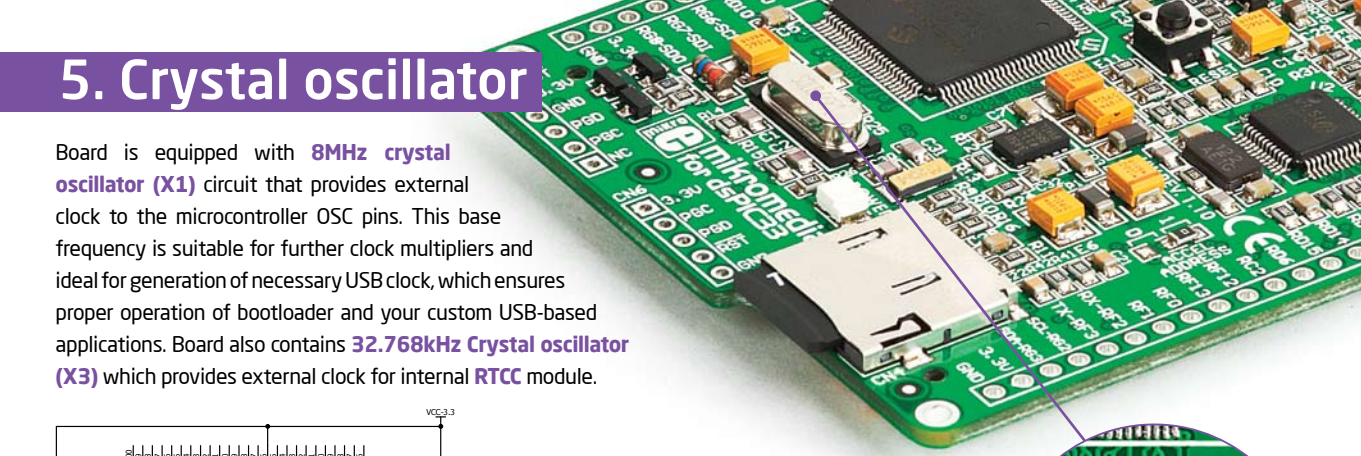


Figure 5-1: Crystal oscillator module (X1)

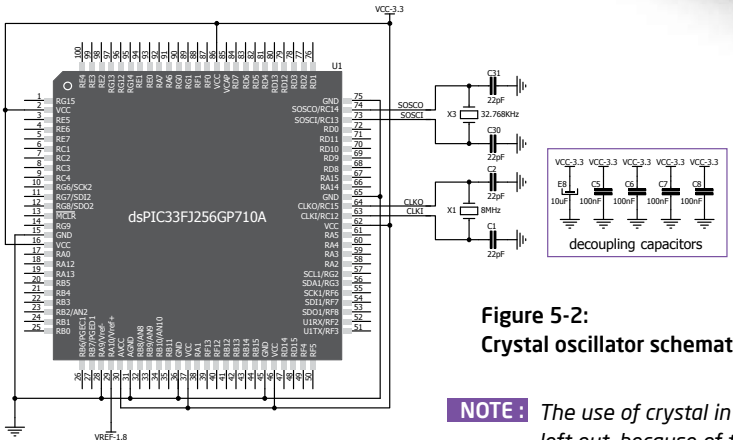


Figure 5-2: Crystal oscillator schematics

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.

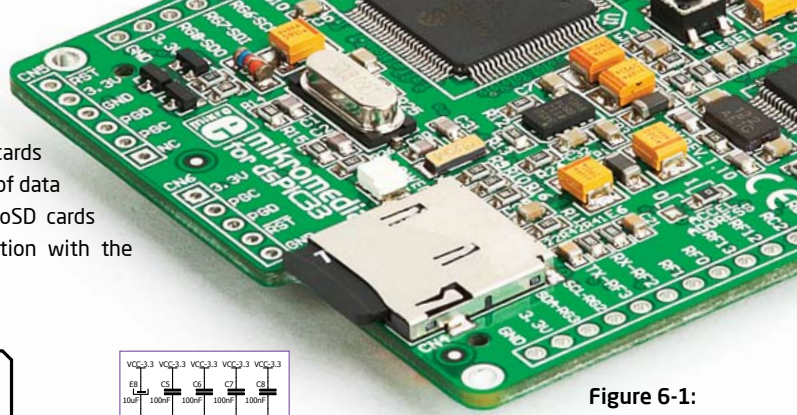


Figure 6-1:
microSD card slot

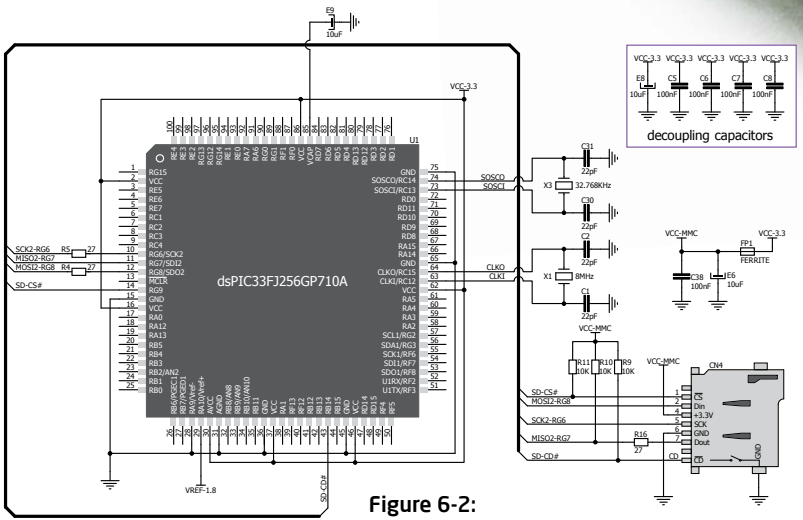


Figure 6-2:
microSD Card Slot module connection schematics

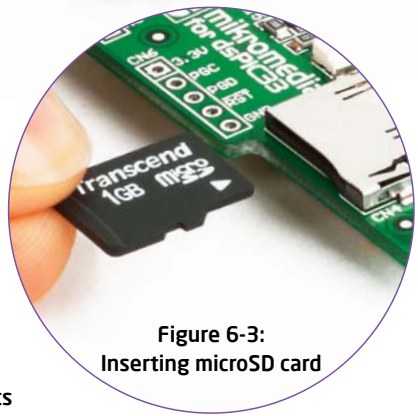


Figure 6-3:
Inserting microSD card

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**.

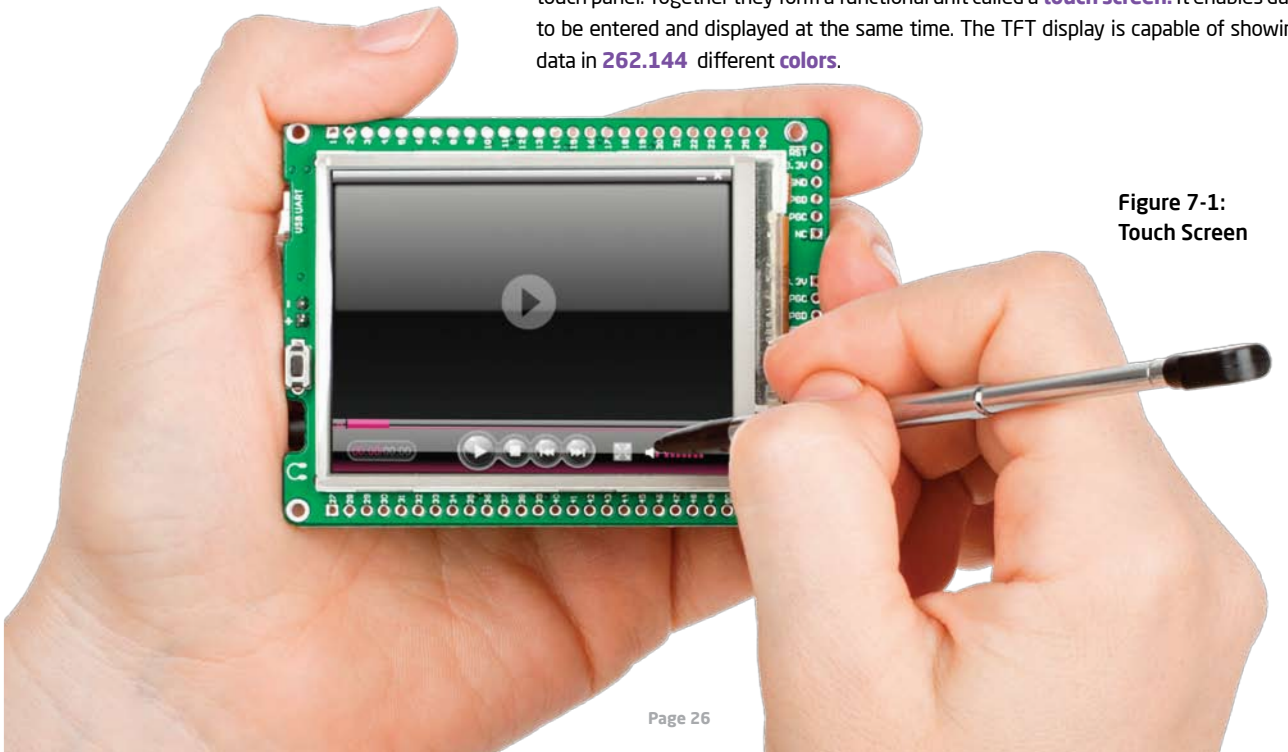


Figure 7-1: Touch Screen

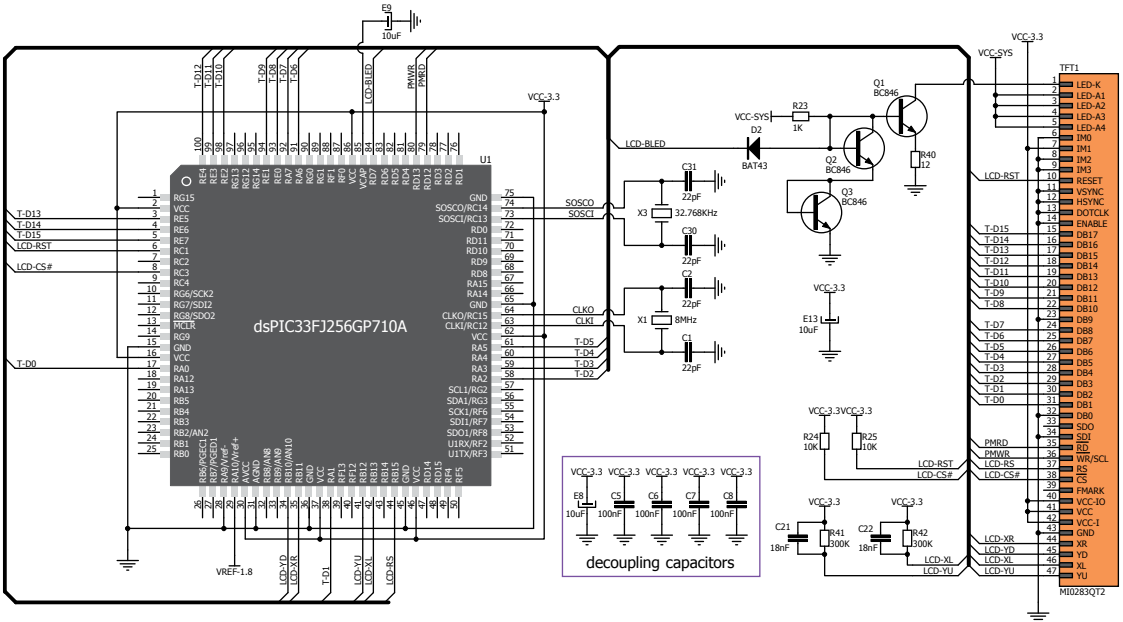


Figure 7-2: Touch Screen connection schematics

8. Audio Module

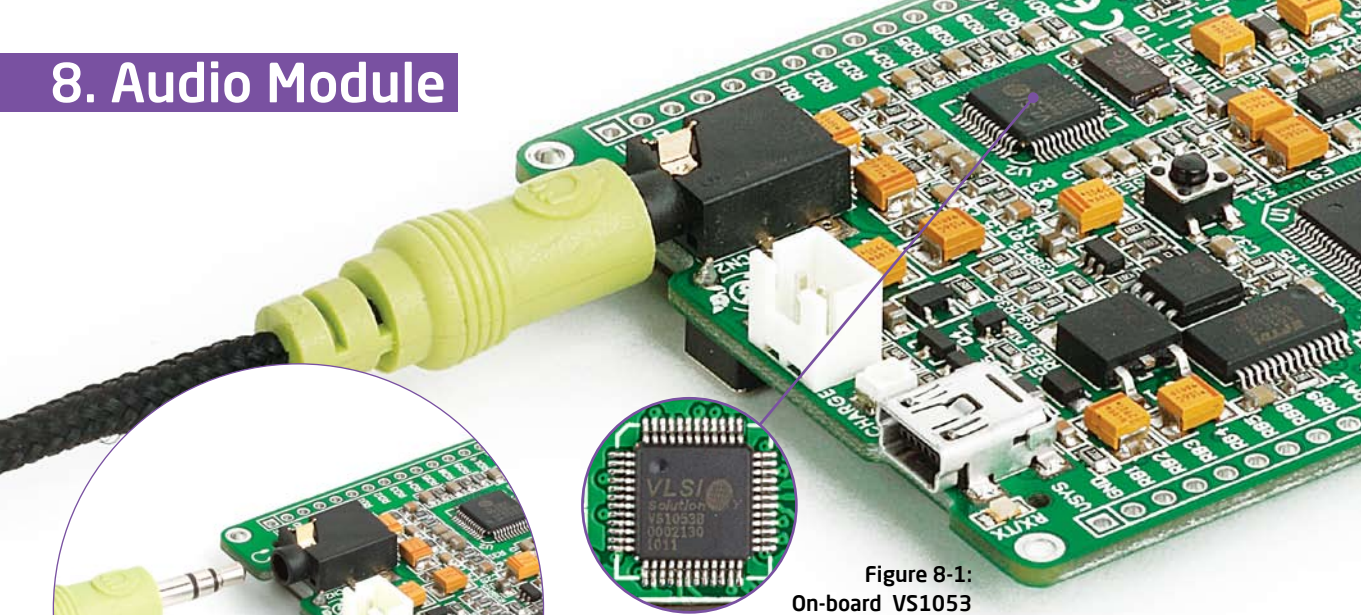


Figure 8-1: On-board VS1053 MP3 codec

Figure 8-2: Inserting 3.5mm headphones jack

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**).

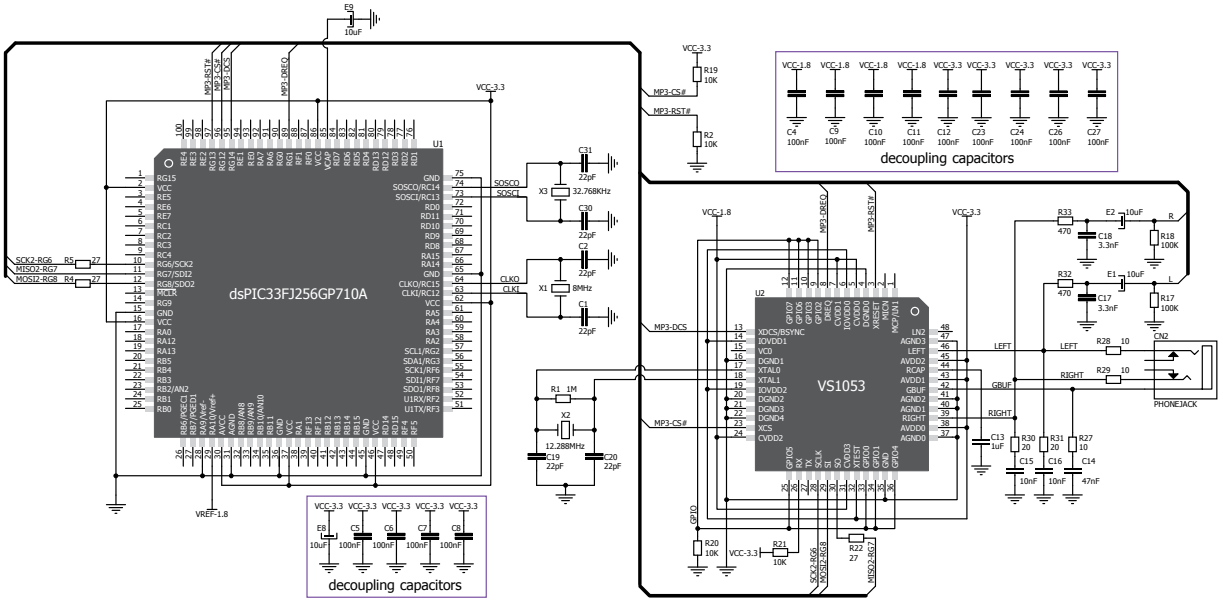


Figure 8-3: Audio module connection schematics

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.

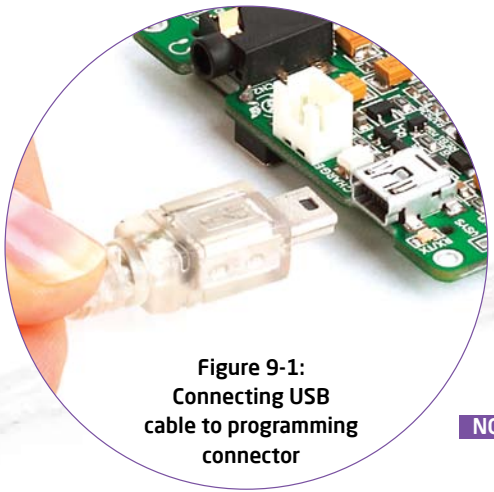


Figure 9-1: Connecting USB cable to programming connector

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.*

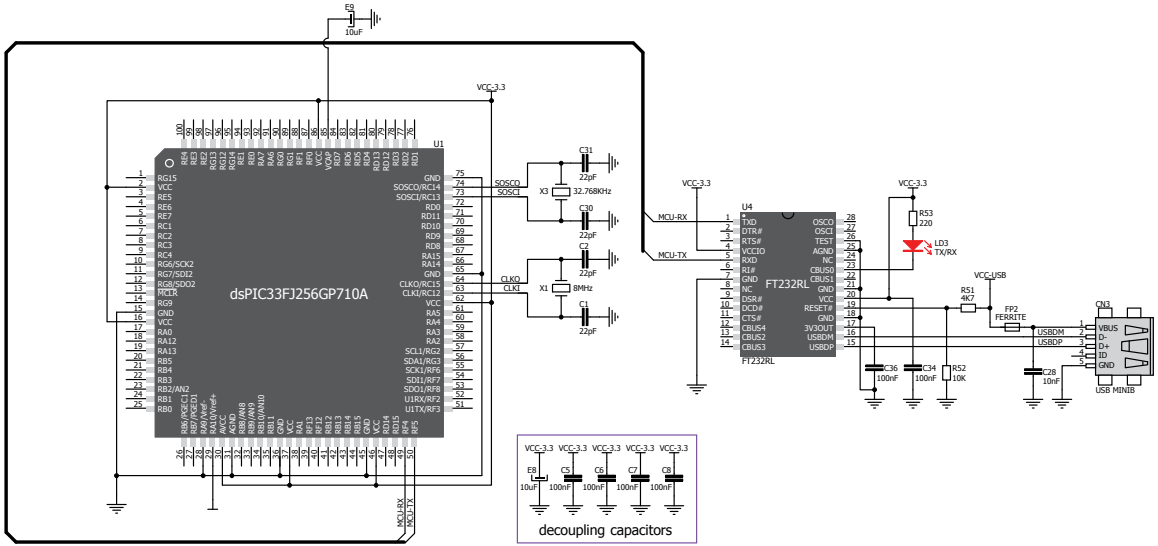


Figure 9-2: USB module connection schematics

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.

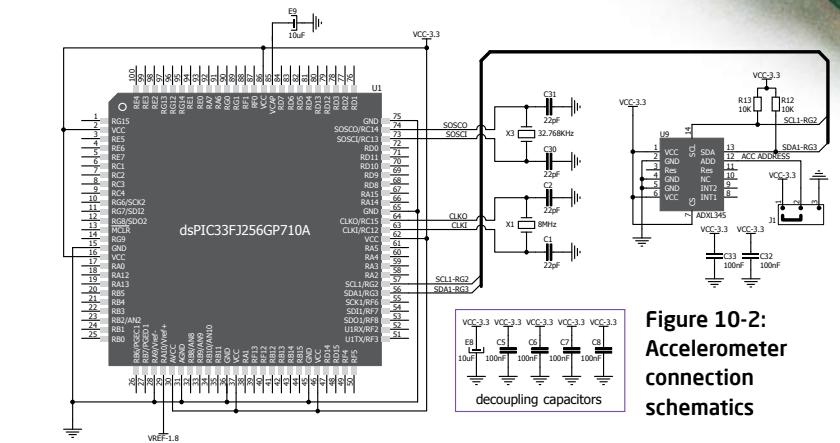


Figure 10-2: Accelerometer connection schematics

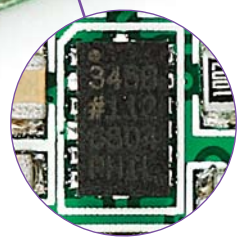


Figure 10-1: Accelerometer module

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

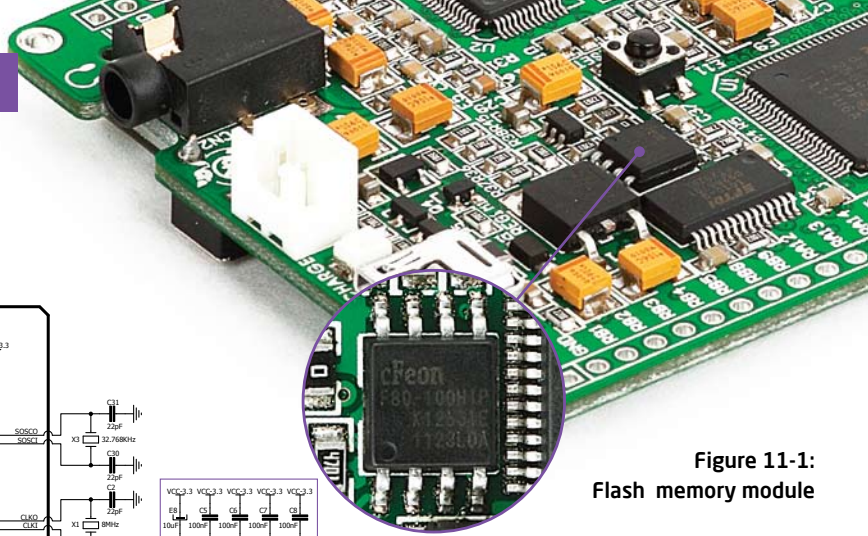


Figure 11-1:
Flash memory module

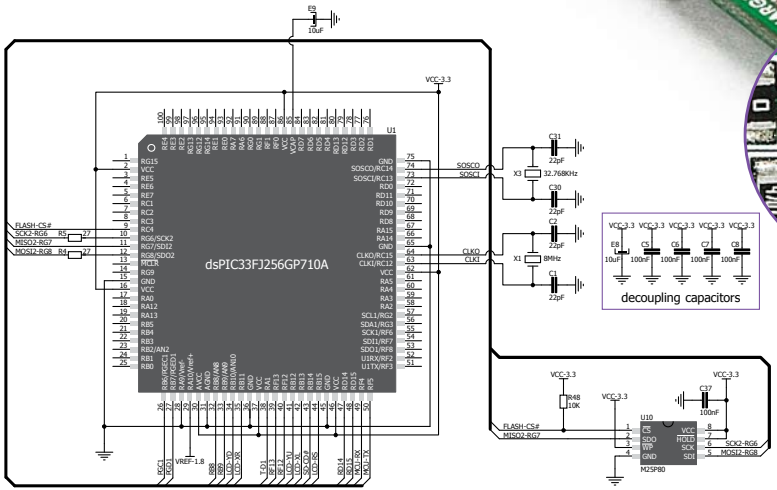
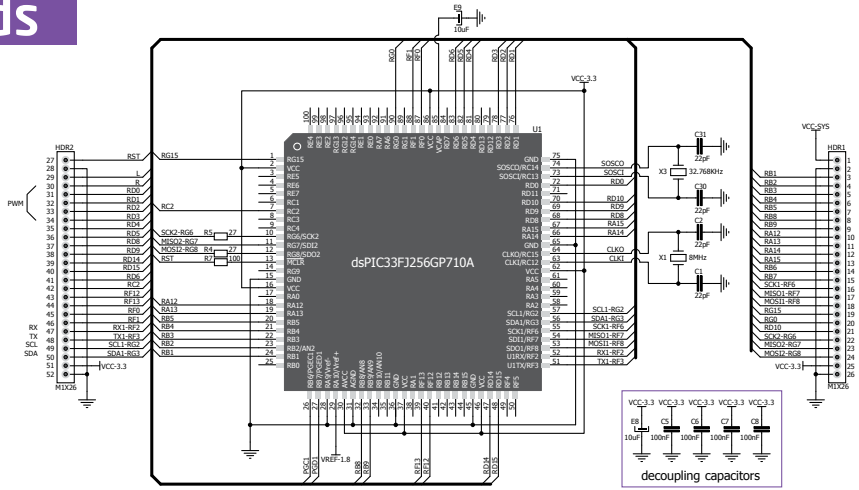


Figure 11-2:
Flash memory module connection schematics

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

Pin functions

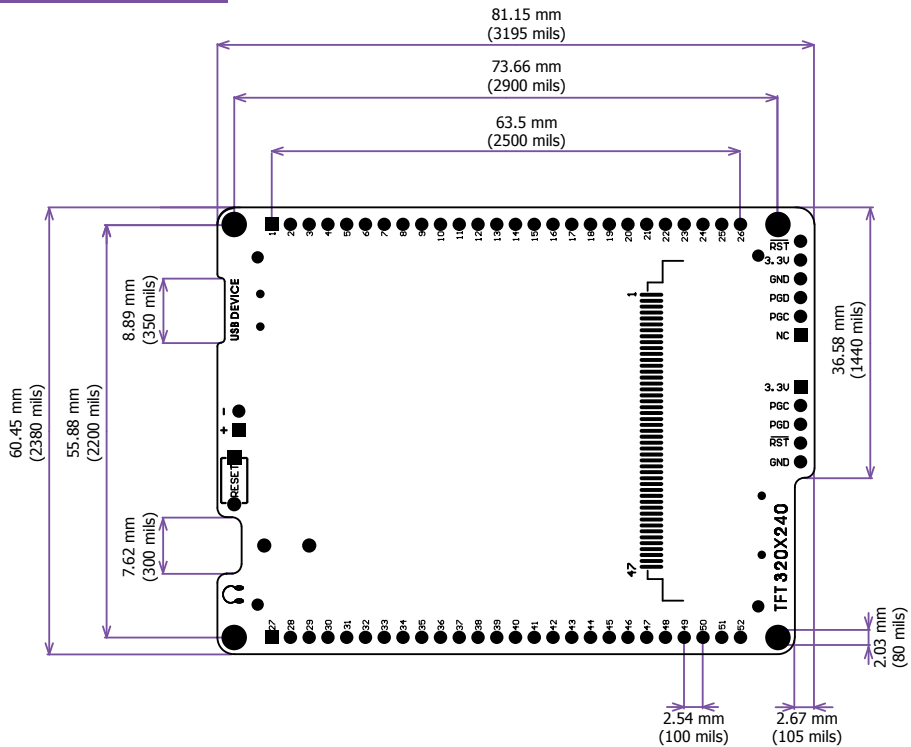
5V power supply	5V	
Reference Ground	GND	
AN10	RB1	
AN2/SS1/CN4	RB2	
AN3/CN5	RB3	
AN4/CN6	RB4	
AN5/CN7	RB5	
AN8	RB8	
AN9	RB9	
AN20/INT1	RA12	
AN21/INT2	RA13	
INT3	RA14	
INT4	RA15	
PGEC1/AN6/OCFA	RB6	
PGED1/AN7	RB7	
SPI1	SCK1/INT0	RF6
SPI1	SDI1	RF7
SPI1	SDO1	RF8
COFS	RG15	
C2RX	RG0	
IC3	RD10	
SPI2	SCK2/CN8	RG6
SPI2	SDI2/CN9	RG7
SPI2	SDO2/CN10	RG8
3.3V power supply	3.3V	
Reference Ground	GND	

RST	Reset pin	
GND	Reference Ground	
L	left ch.	audio out
R	right ch.	audio out
RD0	OC1	
RD1	OC2	
RD2	OC3	
RD3	OC4	
RD4	OC5/CN13	
RD5	OC6/CN14	
RD8	IC1	
RD9	IC2	
RD14	IC7/U1CTS/CN20	
RD15	IC8/U1RTS/CN21	
RD6	OC7/CN15	
RC2	AN17/T3CK/T6CK	
RF12	U2CTS	
RF13	U2RTS	
RF0	C1RX	CAN
RF1	C1TX	CAN
RF2	U1RX	UART
RF3	U1TX	UART
RG2	SCL1	I²C
RG3	SDA1	I²C
3.3V	3.3V power supply	
GND	Reference Ground	

Pin functions

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

14. Dimensions

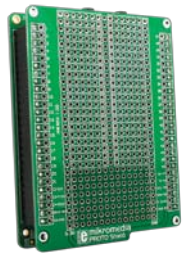


15. mikromedia accessories

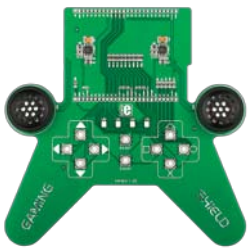
We have prepared a set of extension boards pin-compatible with your mikromedia, which enable you to easily expand your board basic functionality. We call them mikromedia shields. But we also offer other accessories, such as Li-polymer battery, stacking headers, wire jumpers and more.

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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