user's guide to

mikromedia
board for ATmega

Compact development system rich with on-board peripherals for all-round multimedia development on ATmega1280 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

Table of Contents

Introduction to mikromedia for ATmega 4
Package Contains 5
Key Features 6
System Specification 7
1. Power supply 8
2. ATmega1280 microcontroller 10
Key microcontroller features 10
3. Programming the microcontroller 11
Programming with mikroBootloader 12
Identifying COM port 14
step 1 – Choosing COM port 14
step 2 – Establishing connection 15
step 3 – Browse for .hex file 15
step 4 – Select .hex file 16
step 4 – Uploading .hex file 16
step 6 – Progress bar 17
step 5 – Finish upload 17
Programing with exernal programmer 16
4. Reset buttons 20
5. Crystal oscillator 22
6. microSD Card Slot 23
7. Touch Screen 24
8. Audio Module 26
9. USB UART communication 28
10. Accelerometer 30
11. Flash Memory 31
12. Pads 32
13. Pinout 33
14. Dimensions 34
15. Mikromedia accessories 35
What's next 36

Introduction to mikromedia for ATmega

The **mikromedia for ATmega** 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 the 8-bit **ATmega1280** microcontroller. The mikromedia for ATmega 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 USB-UART bootloader, but can also be programmed with external **AVR JTAGICE mkII**. 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 ATmega development system

03 DVD with documentation and examples

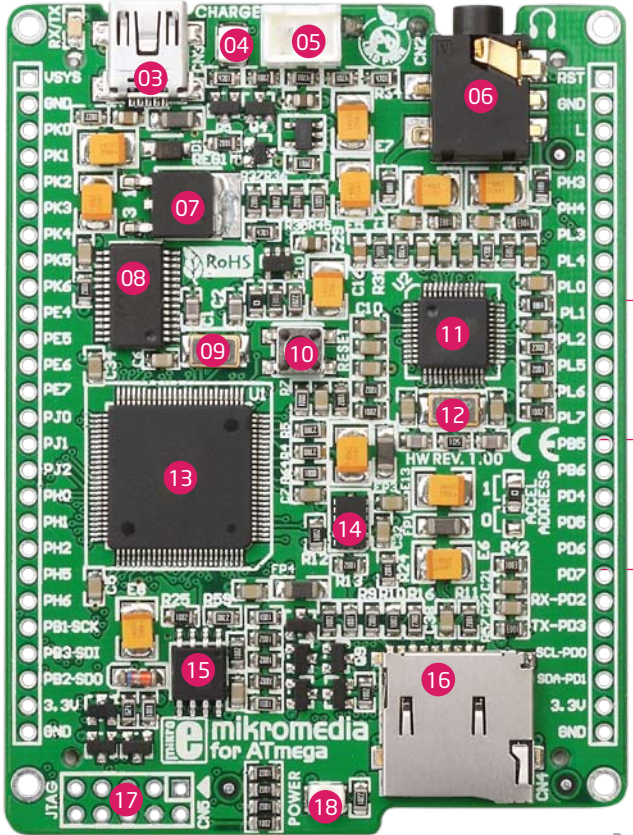
04 mikromedia for ATmega user's guide

05 mikromedia for ATmega schematic

06 USB cable

Key Features

01 Connection Pads
02 TFT 320x240 display
03 USB MINI-B connector
04 CHARGE indication LED (RED)
05 Li-Polymer battery connector
06 3.5mm headphone connector
07 Power supply regulator
08 USB-UART IC
09 8MHz crystal oscillator
10 RESET button
11 VS1053 stereo audio codec
12 12.288MHz crystal oscillator
13 Atmel AVR ATmega 1280 device
14 Accelerometer
15 Serial 8Mbit Flash memory
16 microSD Card Slot
17 JTAG programmer connector
18 Power indication LED (GREEN)



System Specification

power supply

Over a USB cable (5V DC)

power consumption

68 mA with erased MCU

(when on-board modules are inactive)

board dimensions

8 x 6 cm (3.14 x 2.36 inch)

weight

~46 g (0.10 lbs)

1. Power supply

Figure 1-1: Connecting USB power supply

1. USB power supply

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

2. 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. **CHARGE LED (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

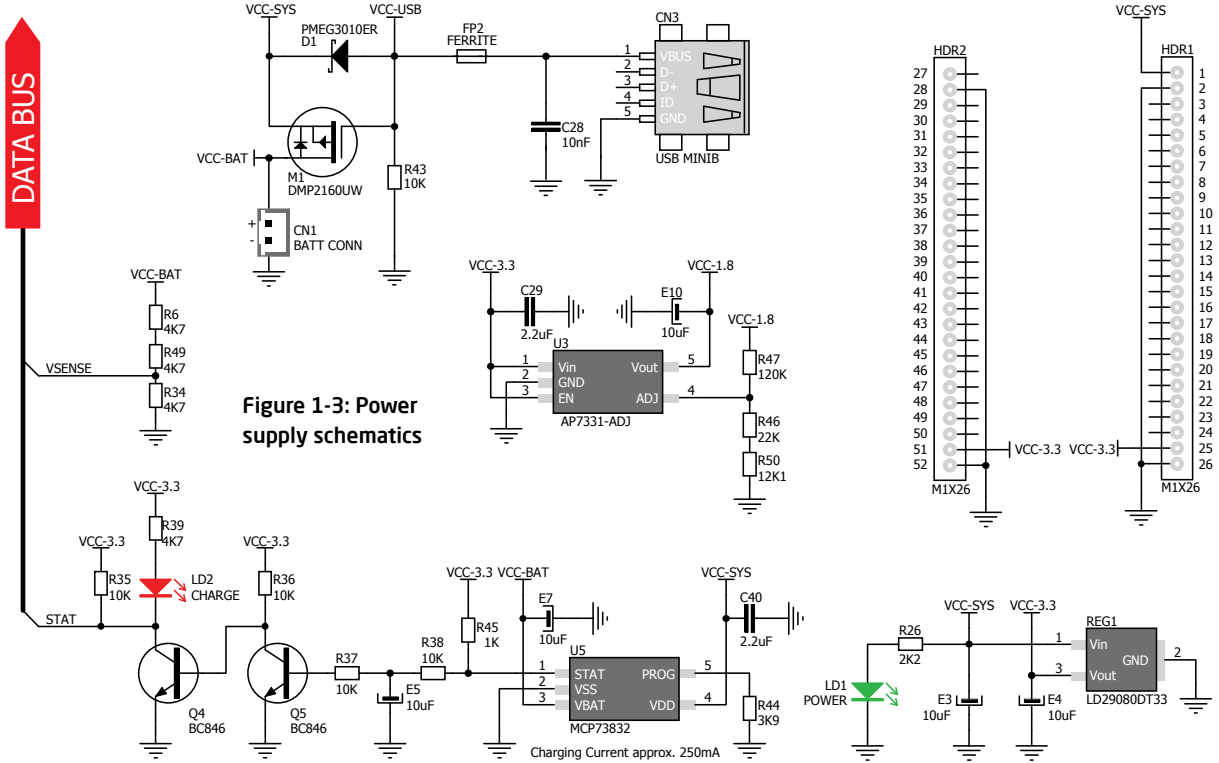


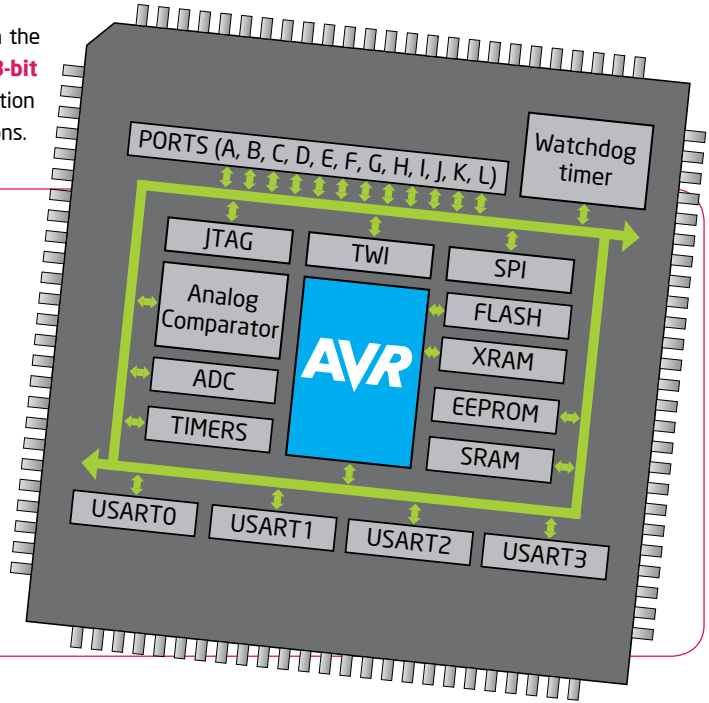
Figure 1-3: Power supply schematics

2. ATmega1280 microcontroller

The mikromedia for ATmega development board comes with the **AVR ATmega1280** microcontroller. This high-performance **8-bit** microcontroller with its integrated modules and in combination with other on-board modules is ideal for multimedia applications.

Key microcontroller features

- Up to **16 MIPS** Operation;
- 8-bit architecture;
- 128KB of Flash memory;
- 8KB of SRAM memory;
- 4KB of EEPROM
- 86 I/O pins;
- UART, SPI, TWI;
- ADC, Analog Comparator;
- JTAG programming interface, etc.



3. Programming the microcontroller

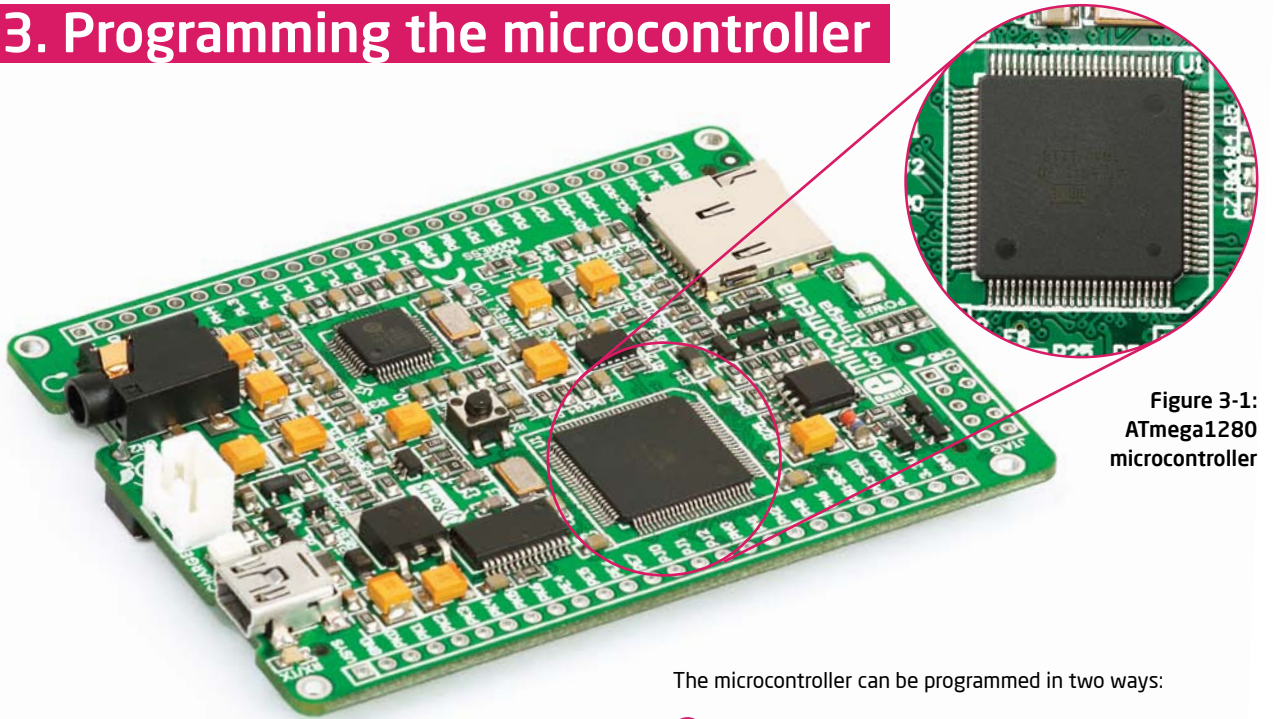


Figure 3-1: ATmega1280 microcontroller

The microcontroller can be programmed in two ways:

01 Via USB-UART mikroBootloader

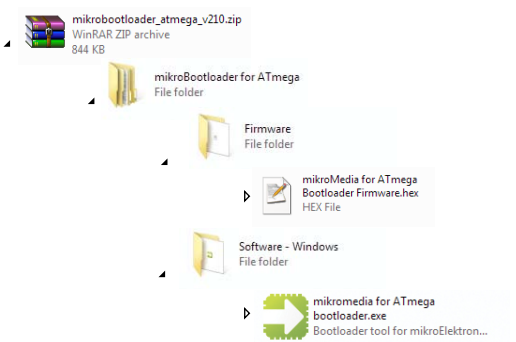
02 Using external **AVR JTAGICE mkII** programmer

Programming with mikroBootloader

You can program the microcontroller with UART bootloader which is preprogrammed into the device by default. To transfer .hex file from a PC to MCU you need bootloader software (**mikroBootloader**) which can be downloaded from:

http://www.mikroe.com/eng/downloads/get/1822/mikrobootloader_atmega1280_v210.zip

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



mikroBootloader software

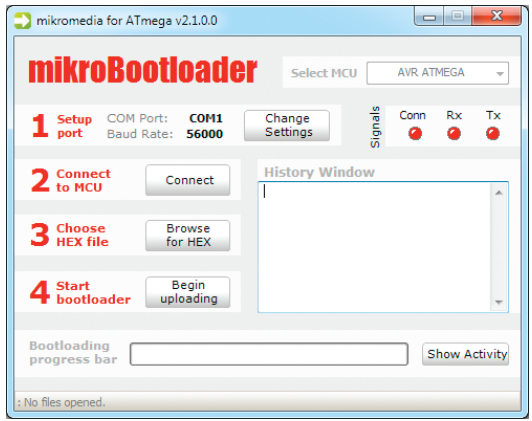
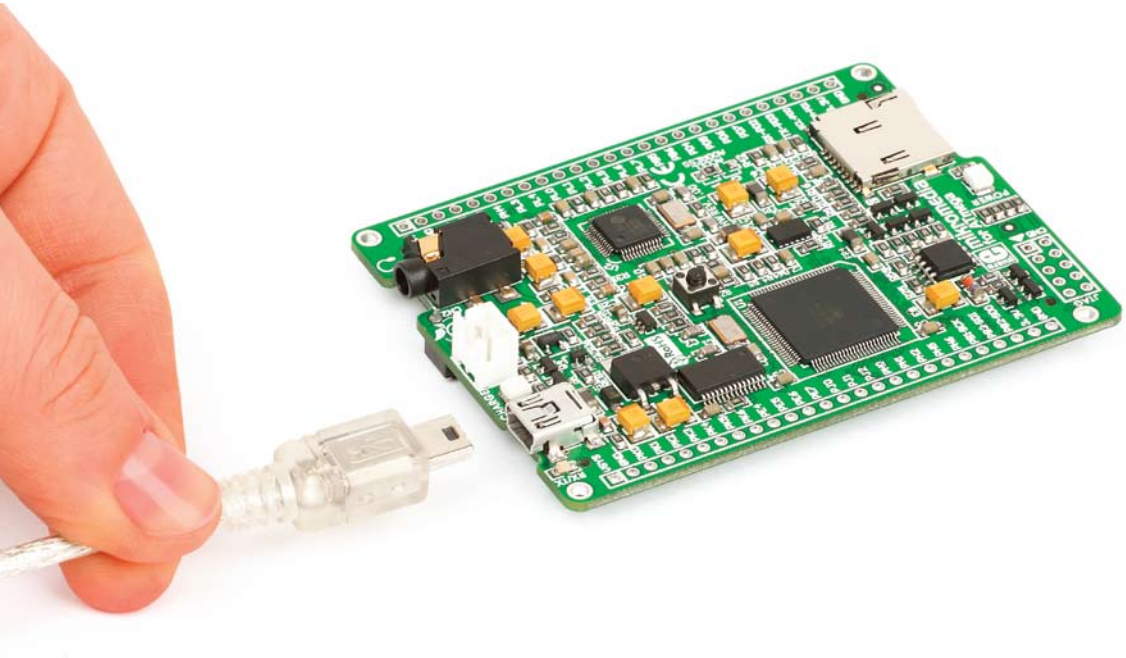


Figure 3-2: mikroBootloader window

01 When you start mikroBootloader software, a window shown on **Figure 3-2** should appear.



NOTE: *Connect mikromedia for ATmega with a PC before starting mikroBootloader software*

Identifying device COM port

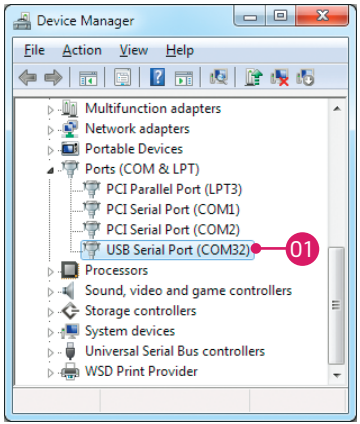


Figure 3-3: Identifying COM port

01 In Device Manager you can see which COM port is assigned to mikromedia (in this case COM32)

step 1 – Choosing COM port

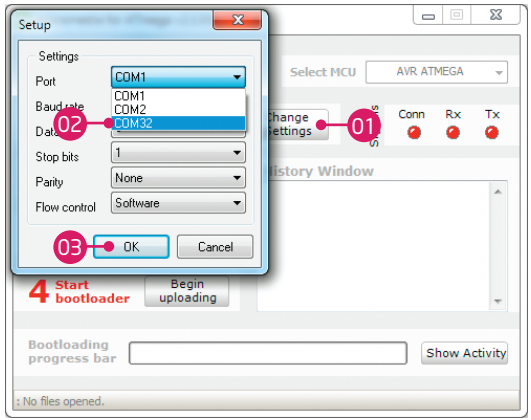


Figure 3-4: Selecting COM port

01 Click the **Change Settings** button

02 From drop down list **select COM port** which is used for communication with a PC (in this case COM32)

03 Click **OK** button

step 2 - Establishing connection

Figure 3-5: Connecting mikromedia with mikroBootloader

01 Reset mikromedia board and within 5s click the **Connect button.** If connected, caption on a button will be changed to "Disconnect".

NOTE: *Baud Rate is set to 56000bps by default*

step 3 - Browse for .hex file

Figure 3-6: Browsing for .hex file

01 Click the **Browse for HEX** button and from pop-up window (figure 3-5) select .hex file which will be uploaded to MCU memory

step 4 - Select .hex file

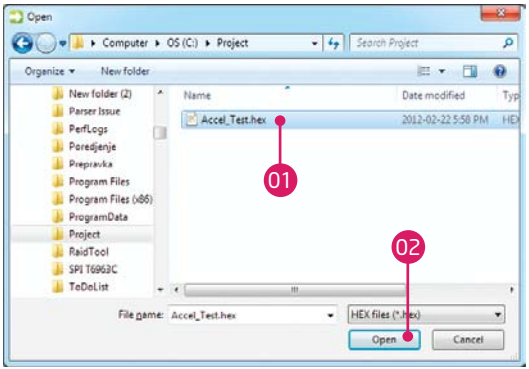


Figure 3-7: Selecting HEX

01 Select a .hex file via open dialog window

02 Click the **Open button**

step 5 - Uploading .hex file

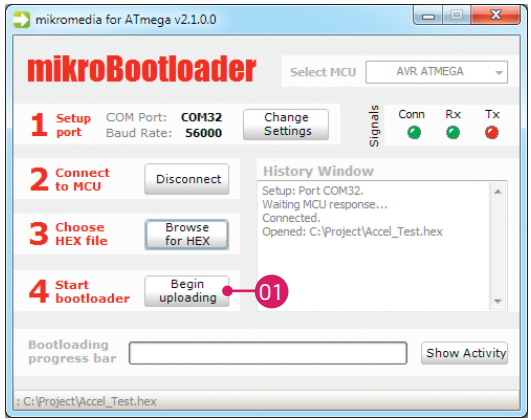


Figure 3-8: Begin uploading

01 To start .hex file uploading click the **Begin uploading button**

step 6 - Progress bar

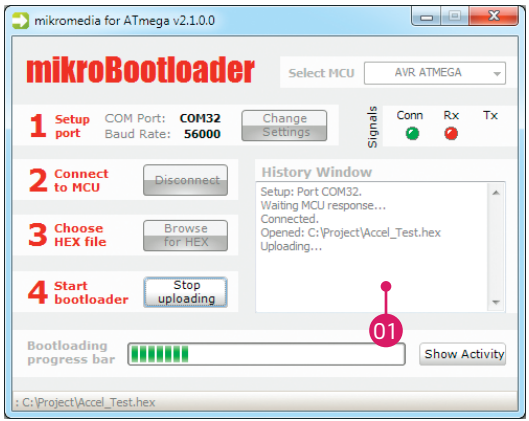


Figure 3-9: Progress bar

01 You can monitor .hex file uploading via progress bar

step 7 - Finish upload

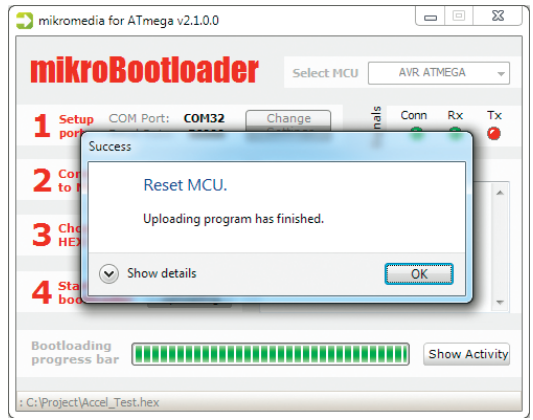


Figure 3-10: Restarting MCU

01 Click the **OK** button after uploading is finished. **Reset MCU** and your mikromedia will start with new firmware.

Programing with external programmer

The microcontroller can be programmed with an external programmer (AVR JTAGICE mkII or other supported programer with **JTAG** interface). The external programmer is connected to the development system via pads marked with **JTAG**, **Figure 3-11**. In order to connect the external programmer to the development system, it is necessary to solder the 2x5 male headers provided with the product to **JTAG** pads

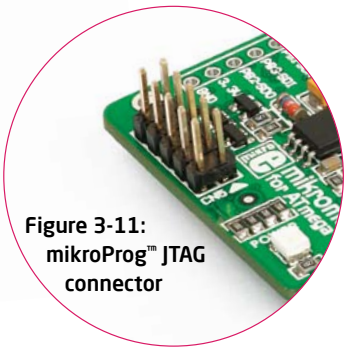


Figure 3-11: mikroProg™ JTAG connector

NOTE: *If bootloader program is accidently erased you can upload it again via AVR JTAGICE mkII programmer. Program mikroMedia for ATmega Bootloader Firmware.hex can be found under Firmware folder (page 12)*

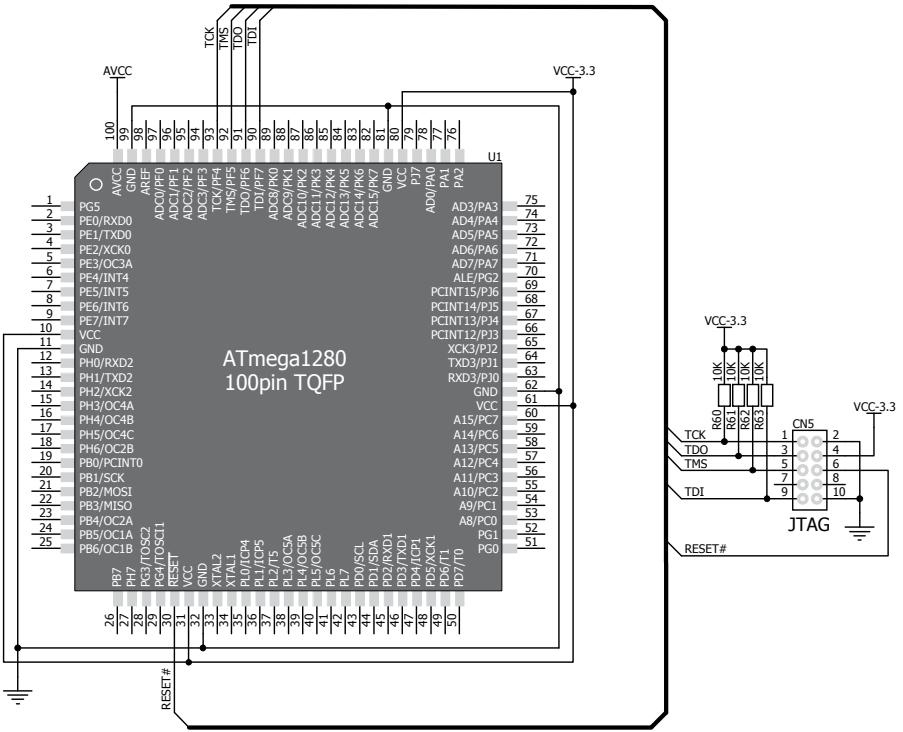


Figure 3-12: JTAG programmer connection schematics

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 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**).

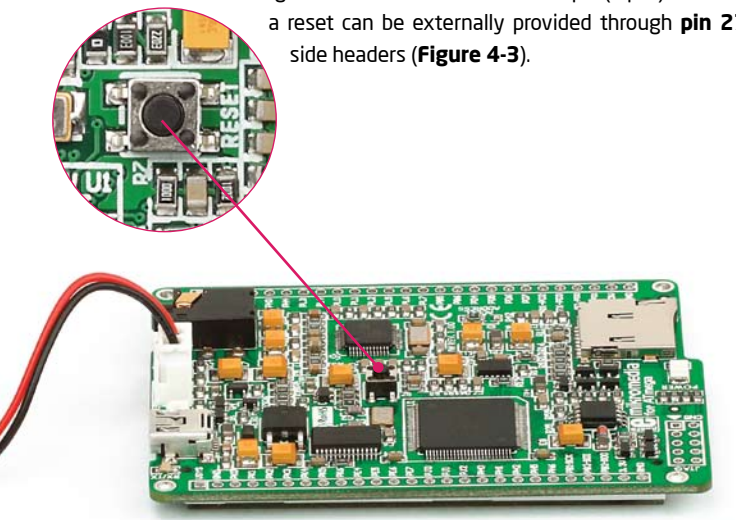


Figure 4-1: Reset button located at the backside of the board

Figure 4-2: Frontal reset button

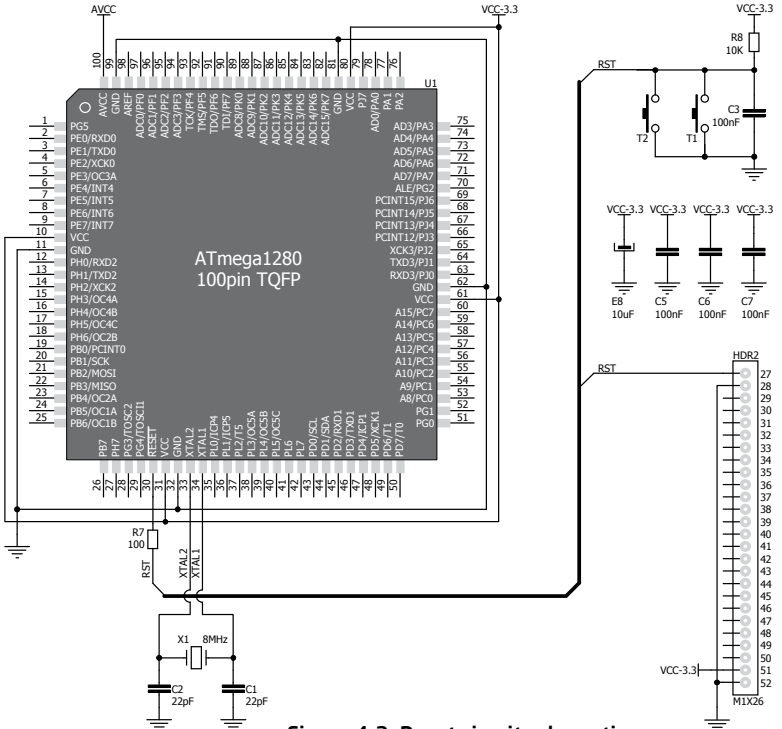


Figure 4-3: Reset circuit schematics

5. Crystal oscillator

ATmega1280 is equipped with internal 128kHz RC oscillator that can provide base frequency. Board also contains 8MHz crystal oscillator (**X1**), which is the most optimal because chip is powered by 3.3V supply. Since chip does not have integrated PLL, maximum operating frequency is also 8MHz, which is just enough for your multimedia applications.

Figure 5-1:
8MHz crystal oscillator

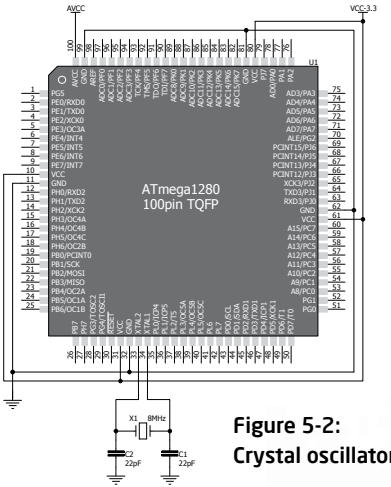


Figure 5-2:
Crystal oscillator schematics

6. microSD Card Slot

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

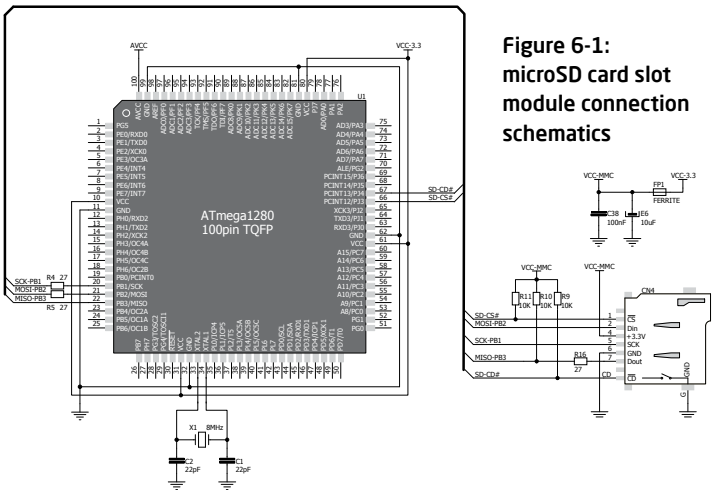


Figure 6-1: microSD card slot module connection schematics

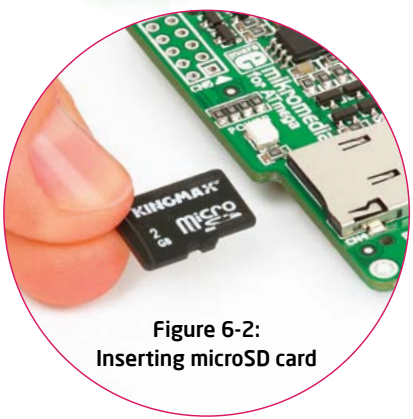
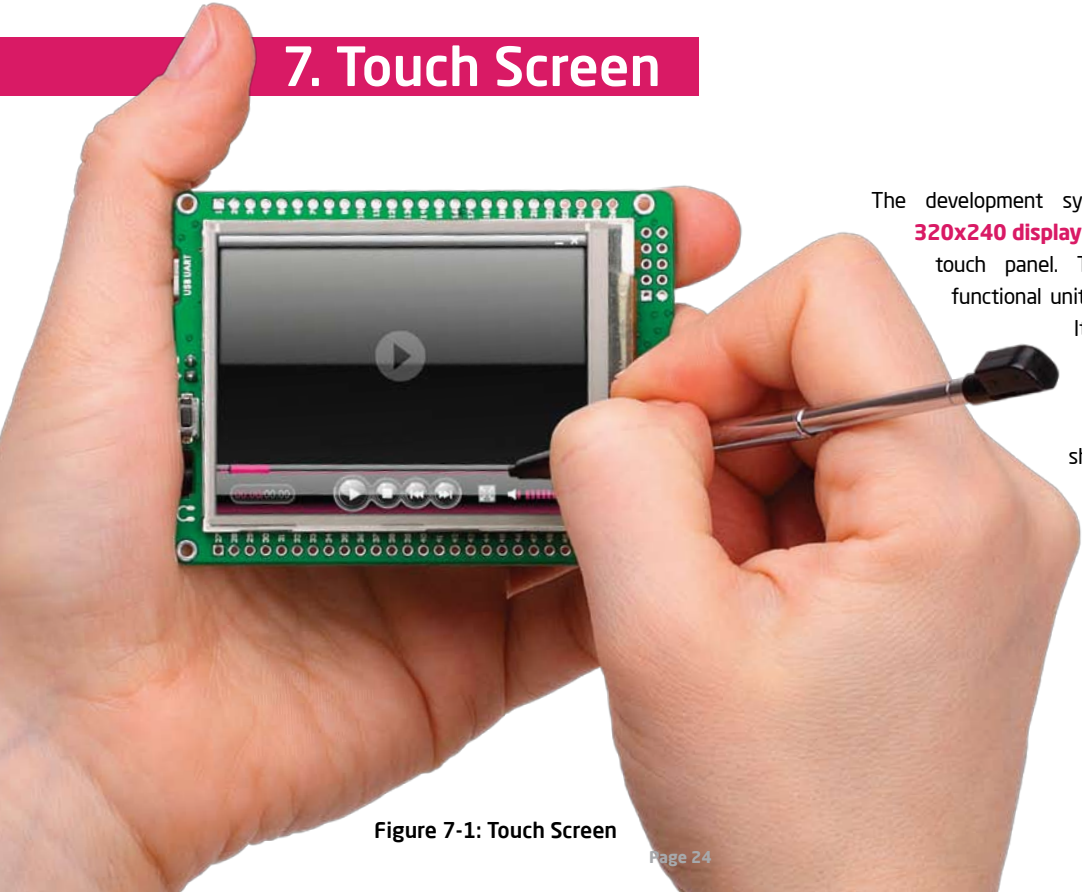


Figure 6-2: Inserting microSD card

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

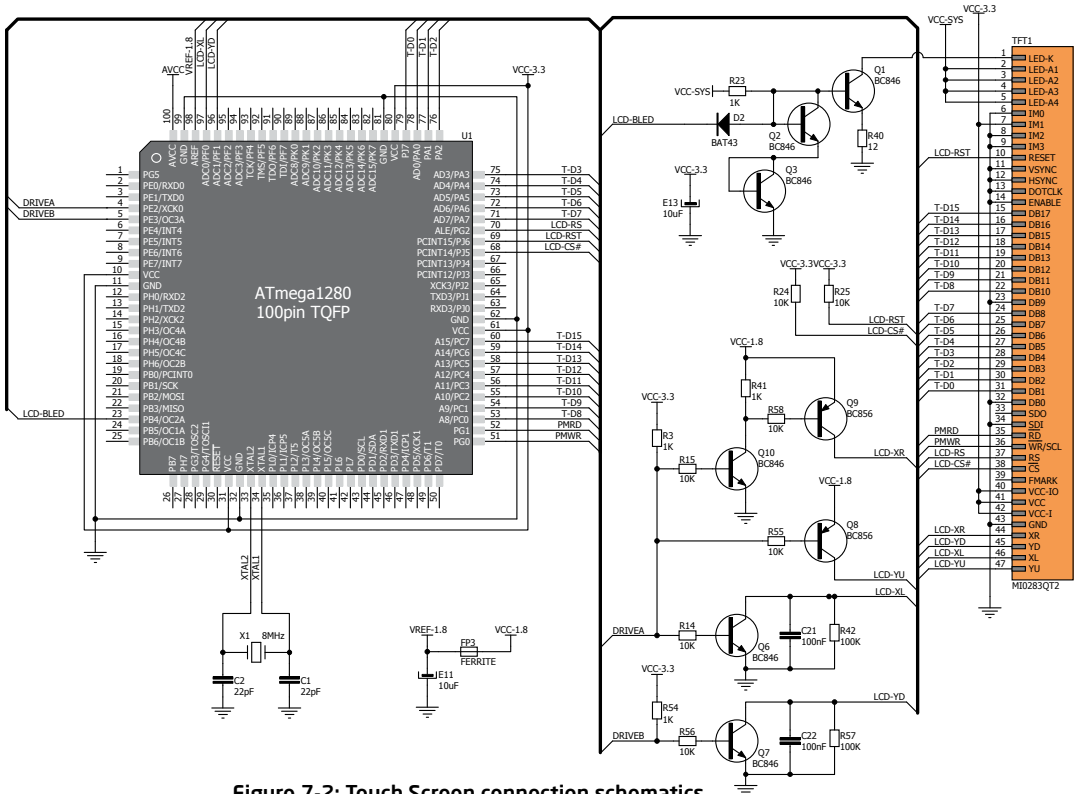


Figure 7-2: Touch Screen connection schematics

8. Audio Module

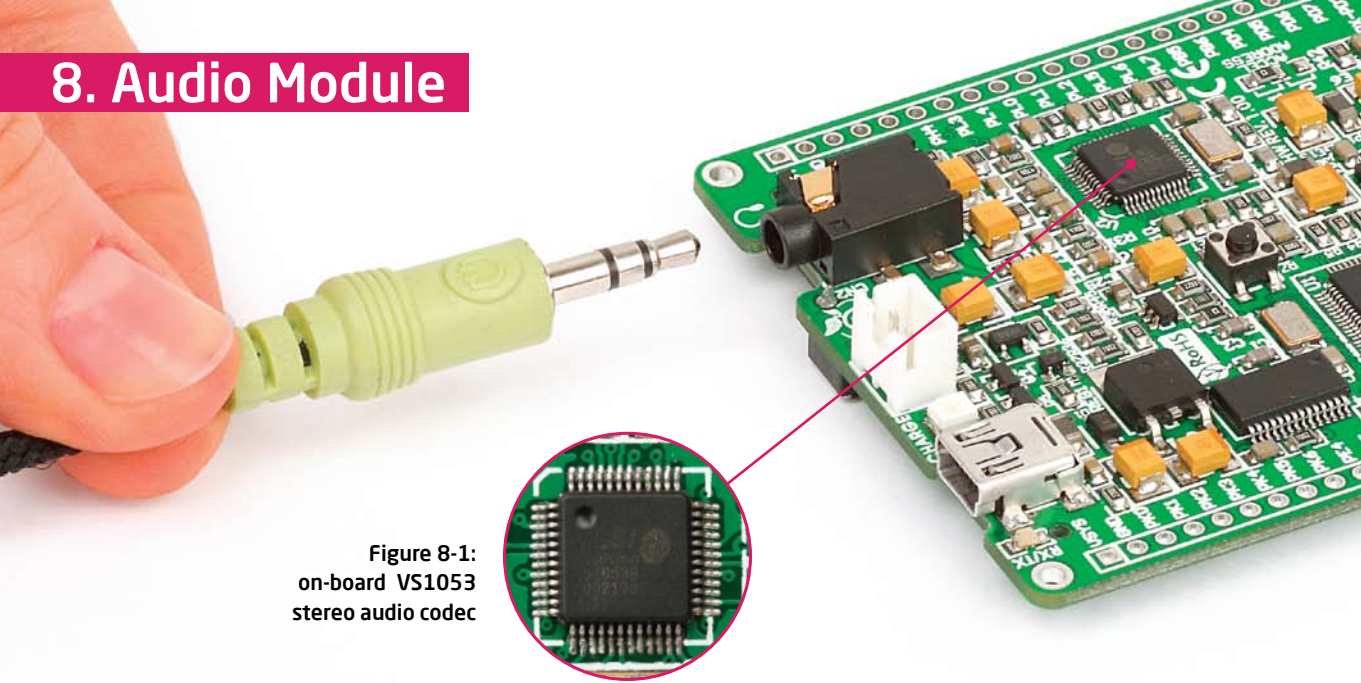


Figure 8-1:
on-board VS1053
stereo audio codec

mikromedia for ATmega 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 via Serial Peripheral Interface (**SPI**).

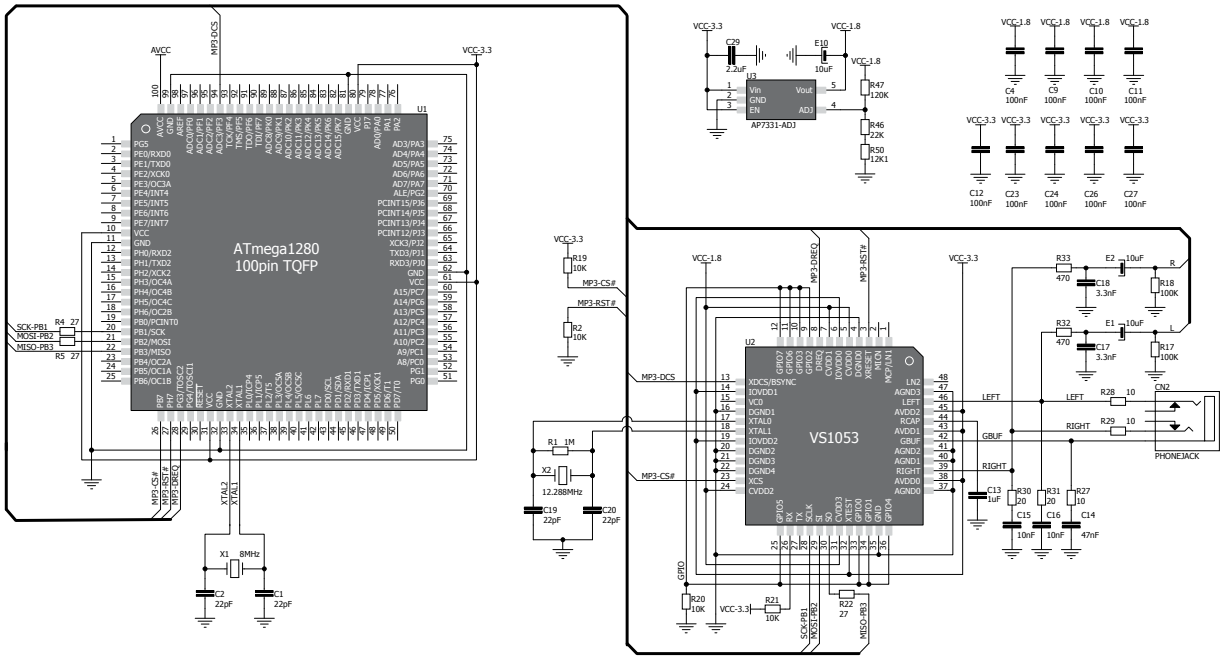


Figure 8-2: Audio module connection schematics

9. USB-UART communication

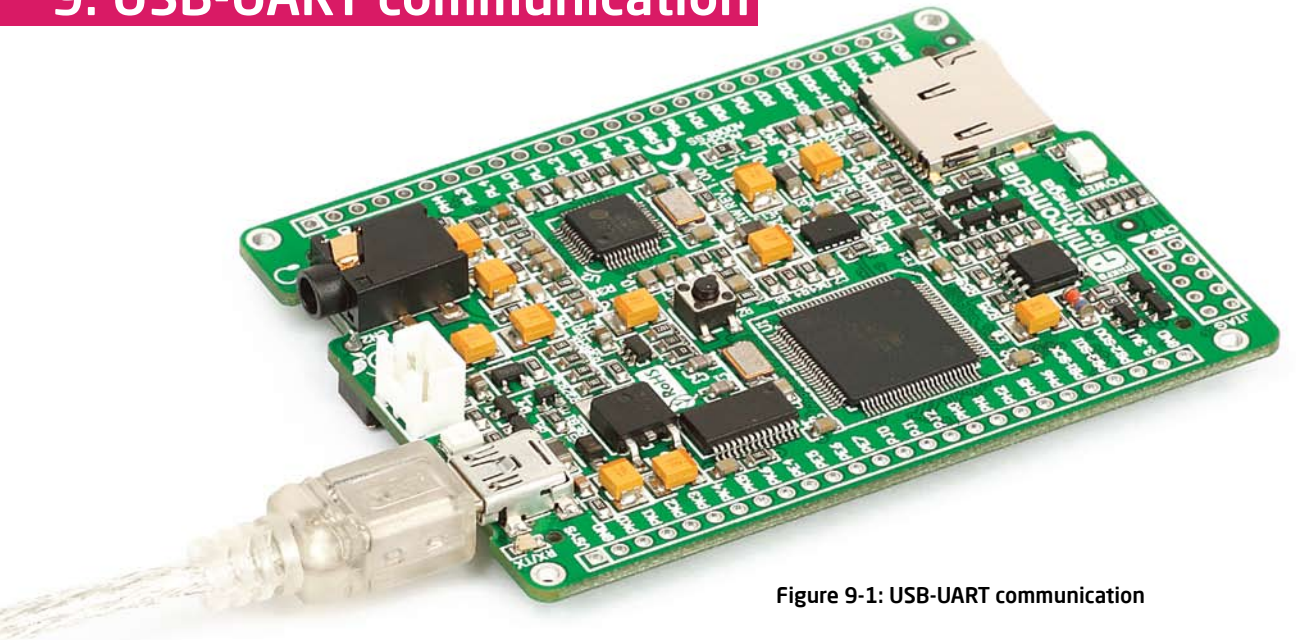


Figure 9-1: USB-UART communication

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 **ATmega1280** does not support USB protocol. Before connecting the board, make sure that you have FTDI drivers installed on your computer. Rx/Tx LED flashes when USB and controller communicate.

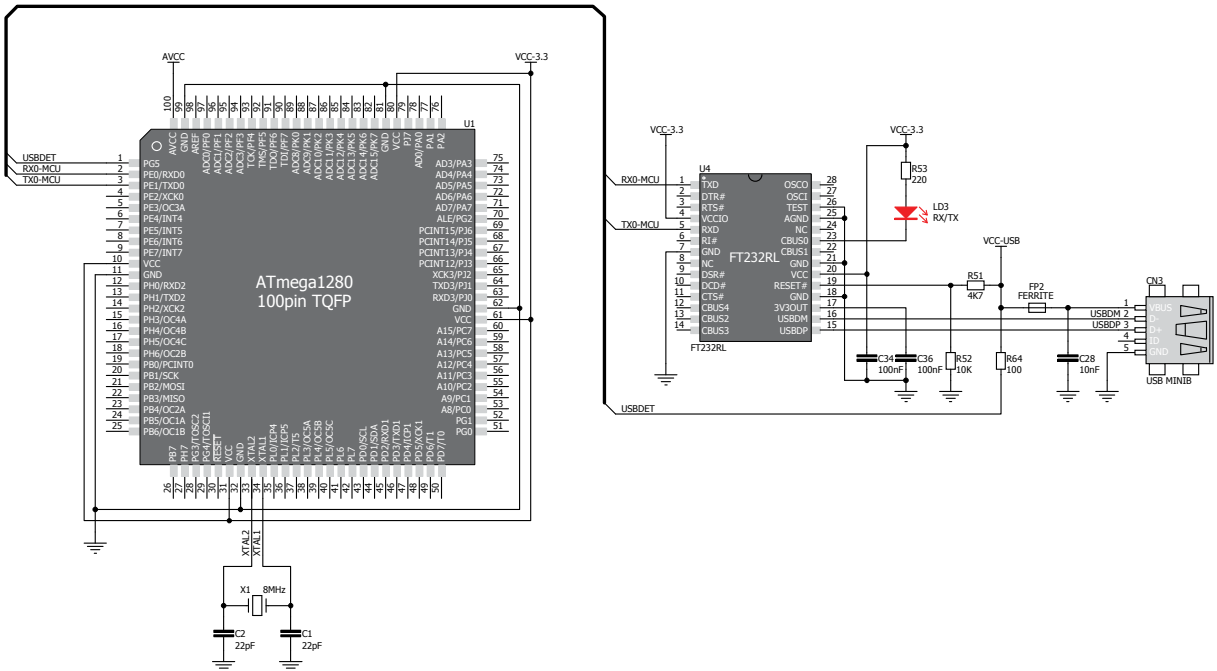


Figure 9-2: USB-UART connection schematics

10. Accelerometer

On board **ADXL345** accelerometer, among other features, can be used to measure acceleration in three axis: **x**, **y**, and **z**. The accelerometer 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.

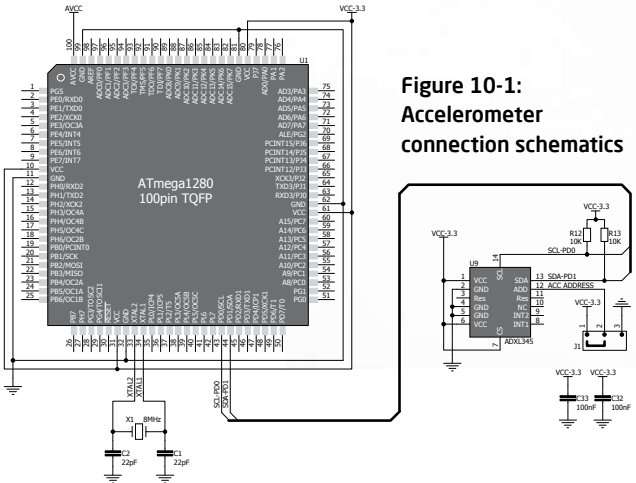


Figure 10-1: Accelerometer connection schematics

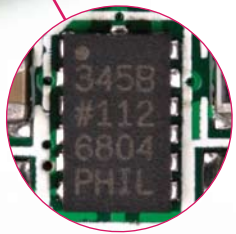


Figure 10-2: Accelerometer module

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

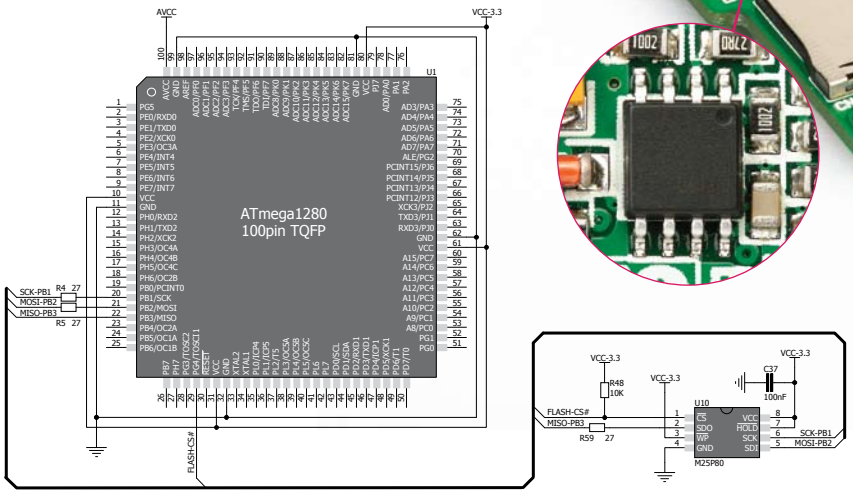


Figure 11-1: Flash memory module connection schematics

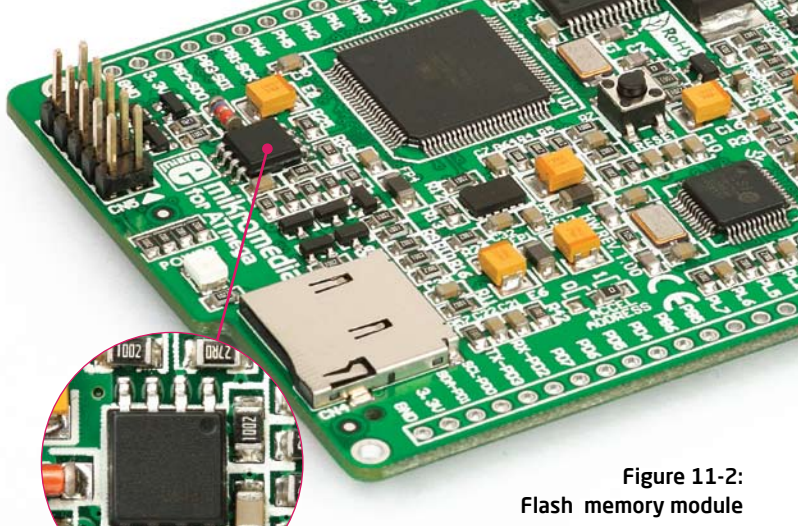
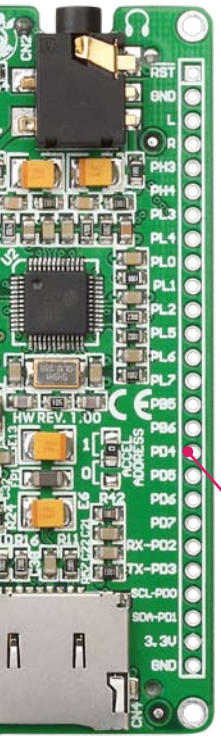


Figure 11-2:
Flash memory module

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**).

12. Pads



Pads HDR2

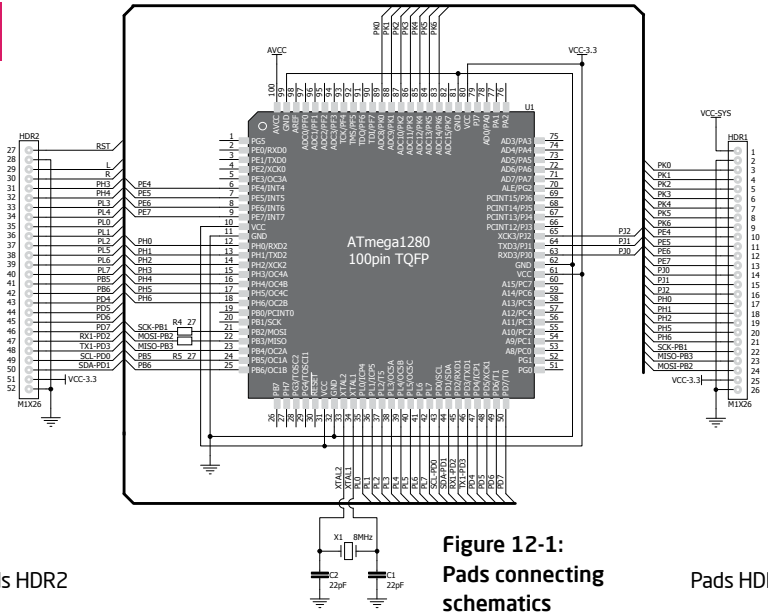
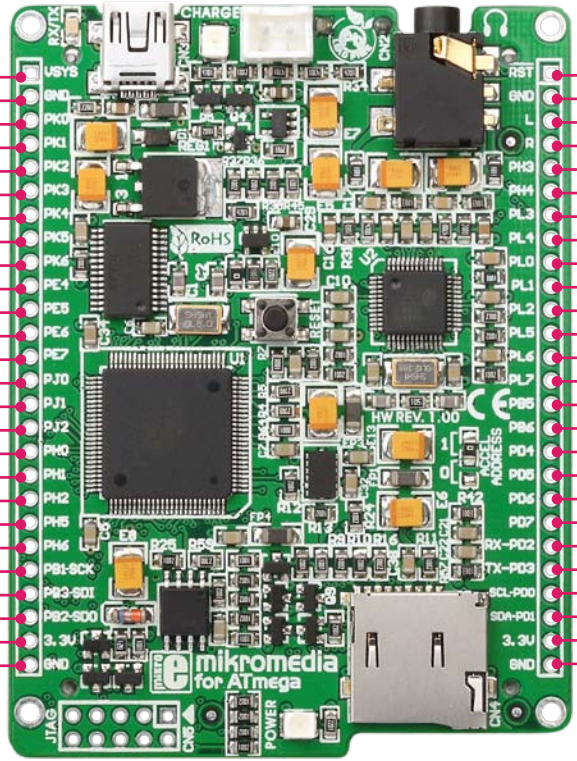


Figure 12-1: Pads connecting schematics

Pads HDR1

Most microcontroller pins are available for further connectivity via two 1x26 rows of connection pads on both sides of the mikromedia board. They are designed to match additional shields, such as Battery Boost shield, Gaming, PROTO shield and others. Pads with underlined silkscreen markings have multiple functions (see the complete schematics for more information).

13. Pinout



Pin functions

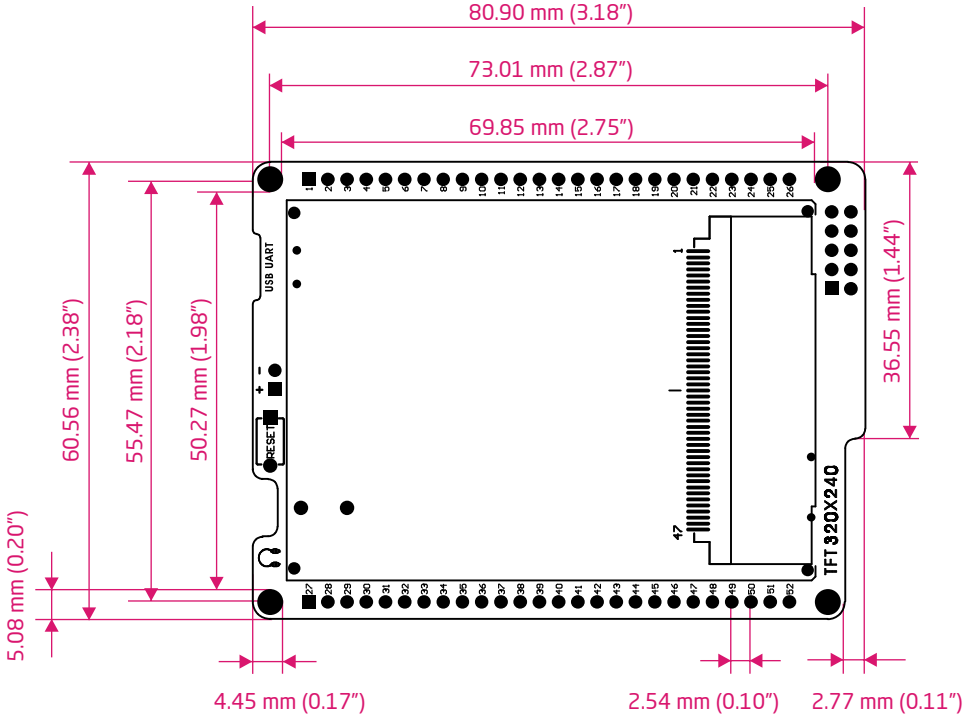
- System power supply — VSYS
- Reference Ground — GND
- Analog Lines — PK0, PK1, PK2, PK3, PK4, PK5, PK6
- Interrupt Lines — PE4, PE5, PE6, PE7
- Digital I/O lines — PJ0, PJ1, PJ2, PH0, PH1, PH2, PH5, PH6
- SPI Lines — SCK (PB1), SDI (PB3), SDO (PB2)
- 3.3V power supply — 3.3V
- Reference Ground — GND

Pin functions

- RST — Reset pin
- GND — Reference Ground
- L — left ch.
- R — right ch.
- audio out
- PH3, PH4, PL3, PL4 — PWM lines
- PL0, PL1, PL2, PL5, PL6, PL7, PB5, PB6, PD4, PD5, PD6, PD7 — Digital I/O lines
- PD2 — RX
- PD3 — TX
- UART Lines
- PD0 — SCL2
- PD1 — SDA2
- I²C Lines
- 3.3V — 3.3V power supply
- GND — Reference Ground

Digital lines | Analog Lines | Interrupt Lines | SPI Lines | I2C Lines | UART lines | PWM lines

14. Dimensions

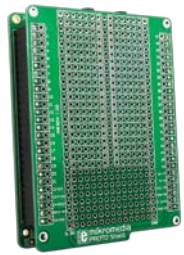


15. mikromedia accessories

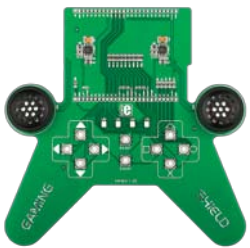
We have prepared a set of extension boards pin-compatible with your mikromedia, which enable you to easily expand your board basic functionality. We call them mikromedia shields. But we also offer other accessories, such as Li-polymer battery, stacking headers, wire jumpers and more.

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?

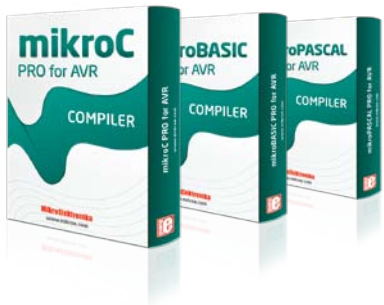
You have now completed the journey through each and every feature of mikromedia for ATmega board. You got to know it's modules and organization. Now you are ready to start using your new board. We are suggesting several steps which are probably the best way to begin. We invite you to join the users of 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 AVR® 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.

Notes:

Notes:

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