user's guide to

mikromedia
board for XMEGA

Compact development system rich with on-board peripherals for all-round multimedia development on ATXMEGA128A1

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DEVELOPMENT TOOLS | COMPILERS | BOOKS

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Nebojsa Matic
General Manager

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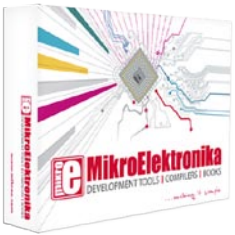
Introduction to mikromedia for XMEGA

The **mikromedia for XMEGA** is a compact development system which provides a convenient platform for development of devices with multimedia contents. The central part of the system is a 16-bit microcontroller **ATXMEGA128A1** which is programed with bootloader software. The mikromedia for XMEGA features integrated modules such as audio module, **TFT 320x240 touch screen** display, USB connector for communication with the microcontroller, accelerometer and microSD card connector.

Package contains

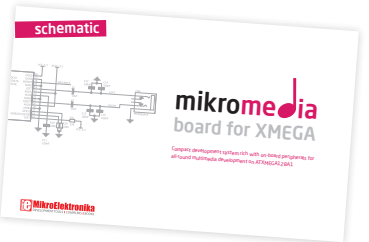


01 Damage resistant protective box

02 mikromedia for XMEGA development system

03 CD with documentation and examples

05 mikromedia for XMEGA user's guide

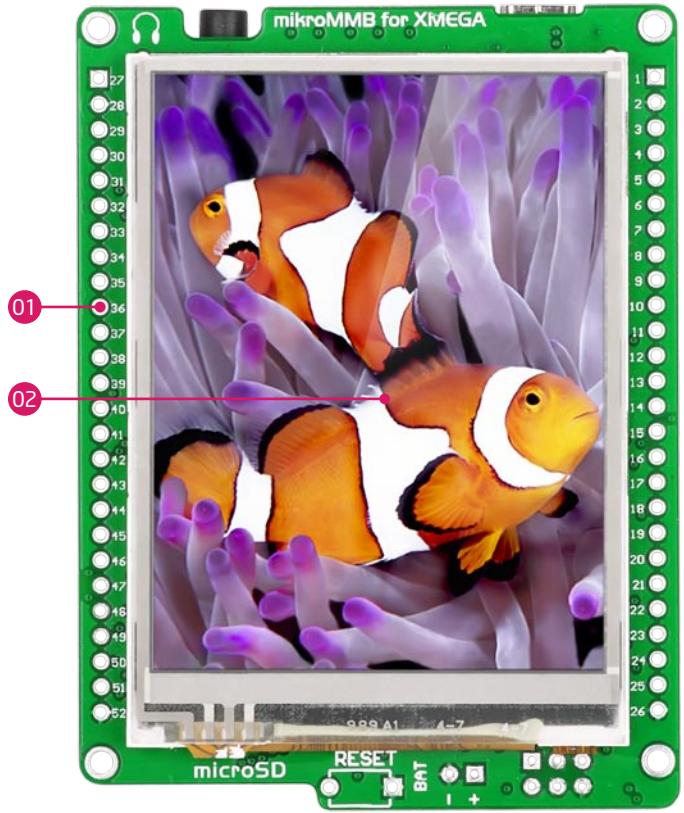


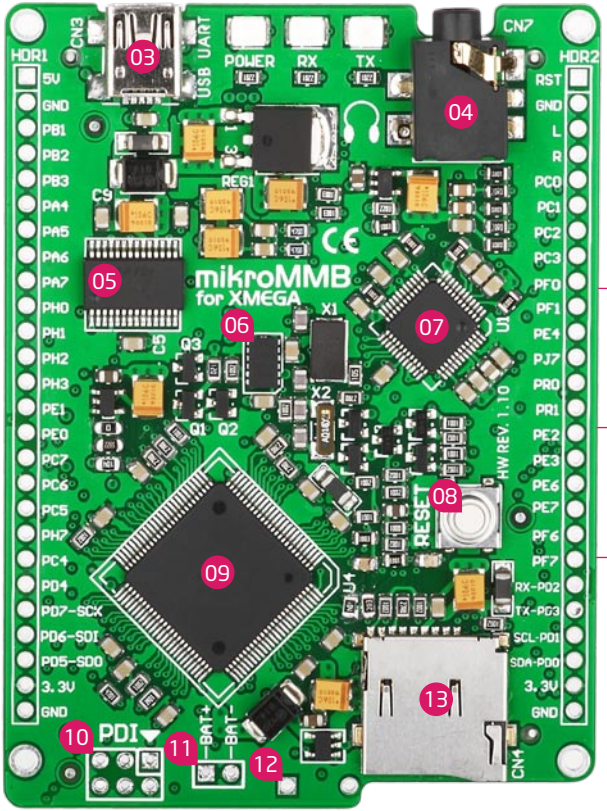
05 mikromedia for XMEGA schematic

06 USB cable

Key Features

01 Pads
02 TFT 320x240 display
03 USB MINI-B connector
04 3.5mm headphone connector
05 USB UART module
06 Accelerometer
07 Audio module
08 RESET button
09 ATXMEGA128A1
10 Pads for external PDI programmer
11 LI-Polymer battery connector
12 Additional RESET taster pads
13 MicroSD Card Slot





System Specification

power supply

Over a USB cable (5V DC)

power consumption

50mA in idle state

(when on-board modules are off)

board dimensions

8 x 6cm (3.14 x 2.36 inch)

weight

~50g (0.11 lbs)

1. Connecting power supply

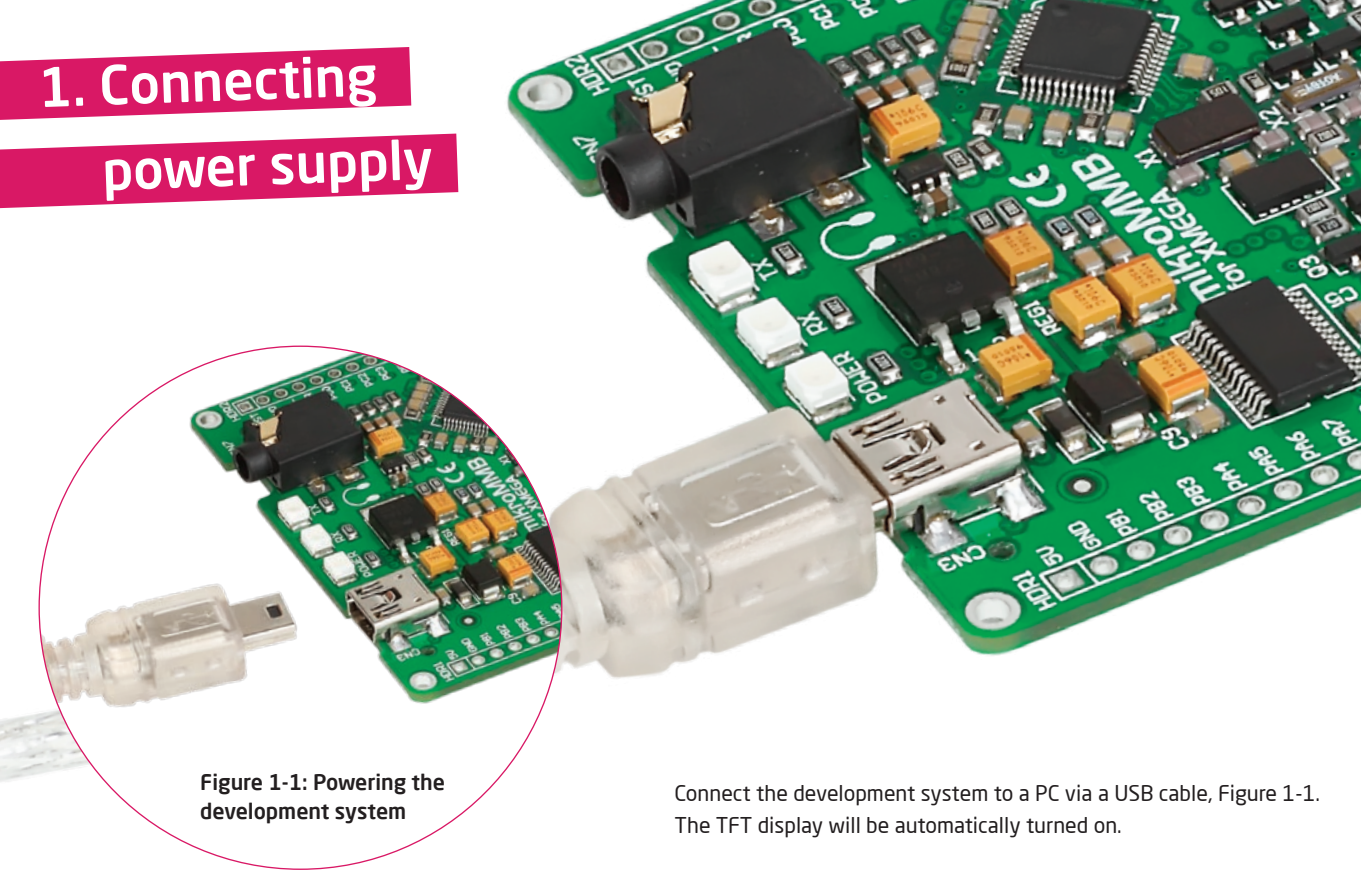


Figure 1-1: Powering the development system

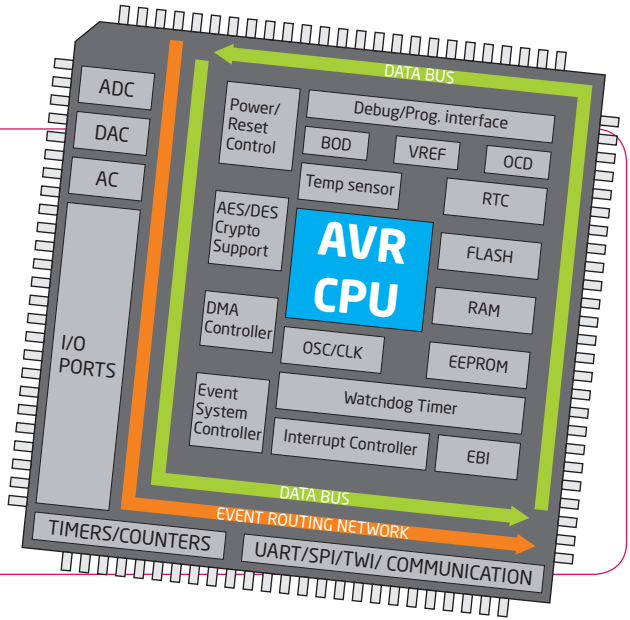
Connect the development system to a PC via a USB cable, Figure 1-1. The TFT display will be automatically turned on.

2. ATXMEGA128A Microcontroller

The **mikromedia for XMEGA** development system comes with the **ATXMEGA128A1** microcontroller. This high-performance 8/16-bit microcontroller with its integrated modules and in combination with other on-board modules is ideal for multimedia applications.

Key microcontroller features

- Up to **32 MIPS** Operation;
- 8/16-bit architecture;
- 128KB of Flash memory;
- 8KB of SRAM memory;
- 2048Bytes of EEPROM
- 78 I/O pins;
- 32kHz RTC;
- UART, SPI, ADC; etc.

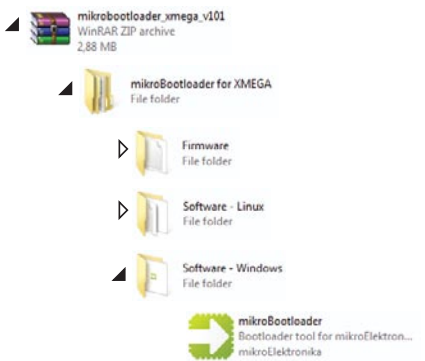


3. Programming with bootloader

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

http://www.mikroe.com/eng/products/view/688/mikrommb-for-xmega-board/

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



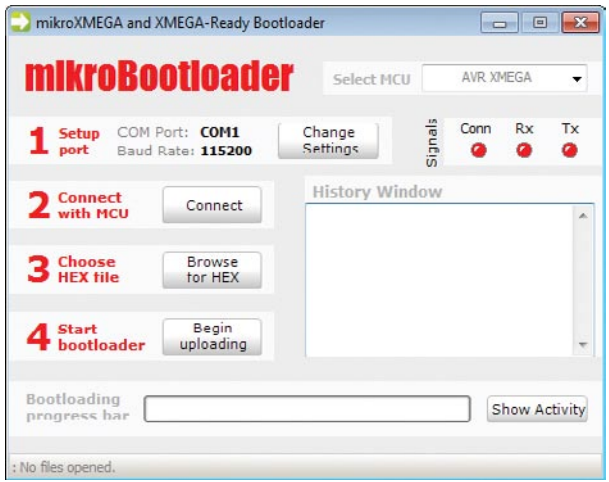


Figure 3-1: mikroBootloader software

note *Connect mikromedia for XMEGA with a PC before starting mikroBootloader software*

Identifying device COM port

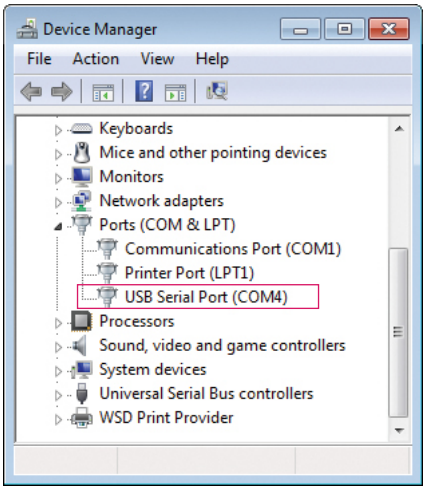


Figure 3-2: Identifying COM port

note *In Device Manager you can see which COM port is assigned to mikromedia (in this case COM4)*

step 1 - Choosing COM port

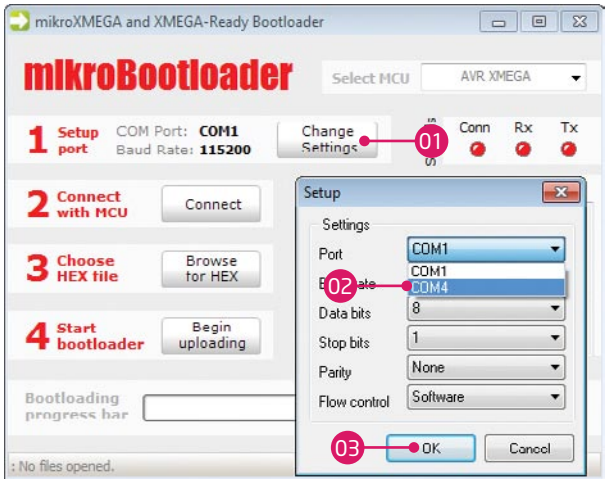


Figure 3-2: Selecting COM port

01 Click on Change Settings button

02 From drop down list select USB COM port which is used for communication with a PC (in this case COM4)

03 Click OK button

step 2 - Connecting with a PC

Figure 3-3: Connecting mikromedia with mikroBootloader

01 Reset mikromedia board and within 5s click on Connect button

note *Baud Rate is set to 115200 by default*

step 3 - Browse for .hex file

Figure 3-4: Browsing for .hex file

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

step 4 - Select .hex file

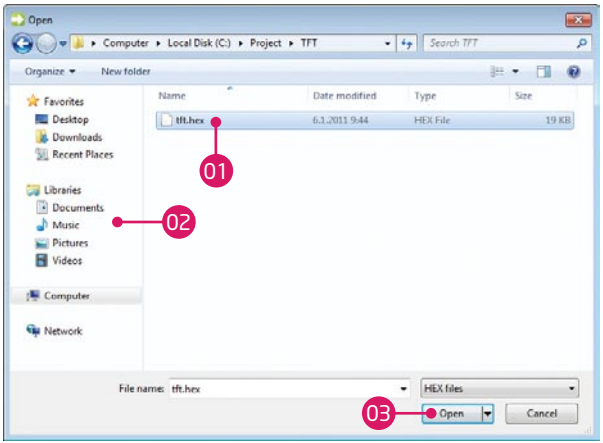


Figure 3-5: Selecting .hex file

01 Select desired .hex file

02 Folder list

03 Click on Open button

step 5 - Uploading .hex file

Figure 3-6: Begin uploading

01 Click on Begin uploading button to start .hex file transfer from a PC to microcontroler

step 6 - Progress bar

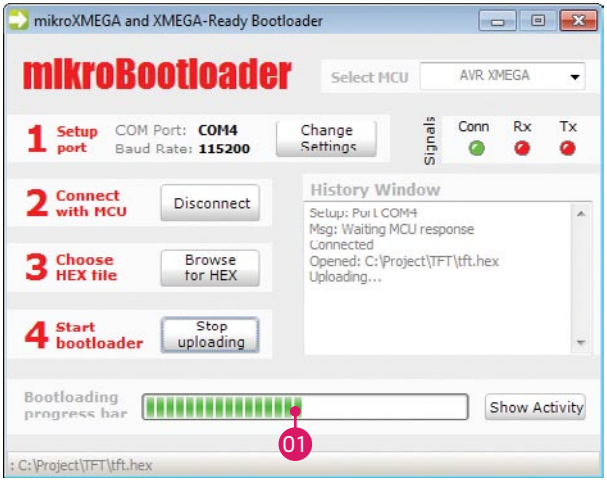


Figure 3-7: Bootloading progress bar

01 Via progress bar you can monitor .hex file uploading process

step 7 - Reset MCU

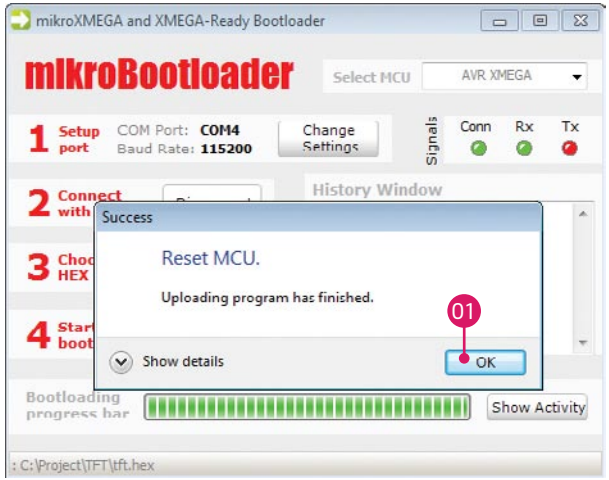


Figure 3-8: Uploading is finished

01 Click on OK button after uploading is finished. Reset MCU and you can see product of your work

4. Programing with external programmer

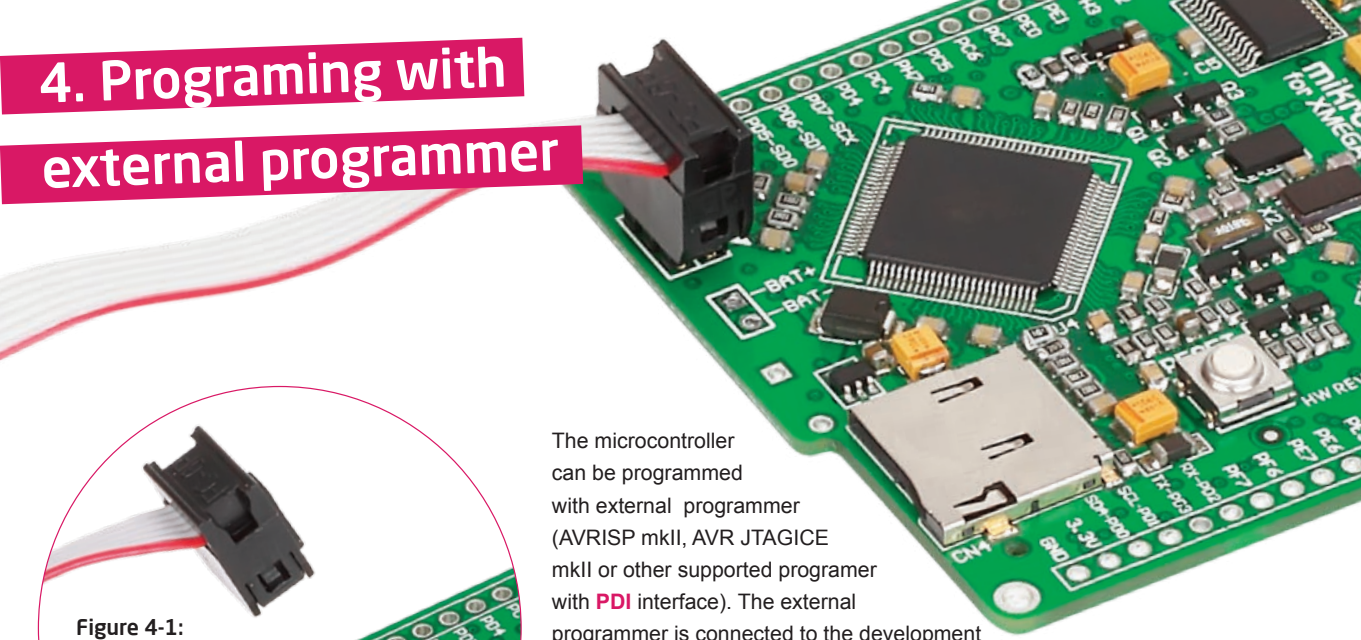


Figure 4-1: Connecting external programmer

The microcontroller can be programmed with external programmer (AVRISP mkII, AVR JTAGICE mkII or other supported programer with **PDI** interface). The external programmer is connected to the development system via pads marked with **PDI**, Figure 4-1.

In order to connect the external programmer to the development system, it is necessary to provide a 2x3 connector that should be soldered to **PDI** pads.

If bootloader program is accidently erased you can upload it again via AVR JTAGICE mkII programmer. Program **xmega_bootloader_firmware.hex** can be found under Firmware folder (page 10).

5. 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 way of entering and displaying data depends on the program loaded into the microcontroller. The TFT display is capable of showing data in **262.000** different **colors**.

Figure 5-1:
Touch Screen

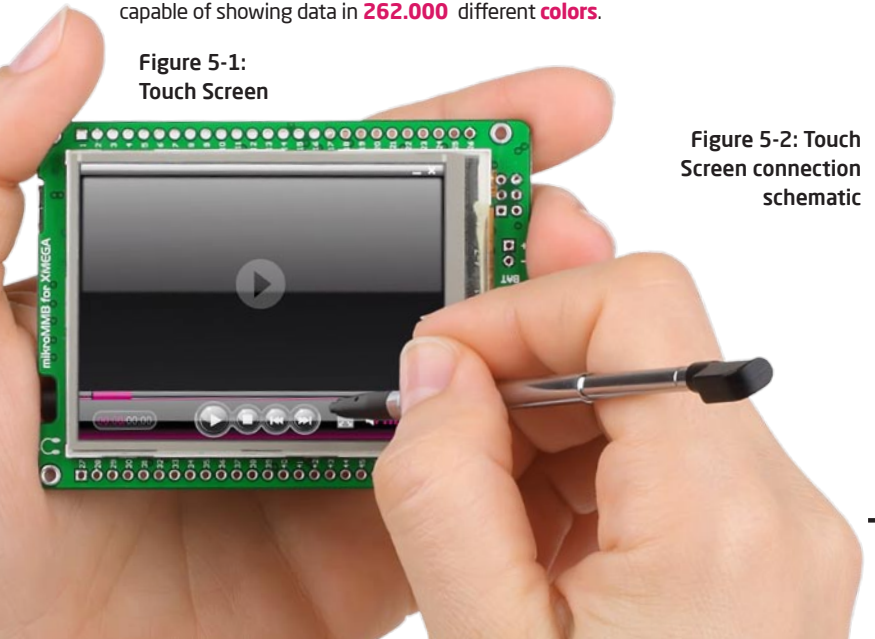
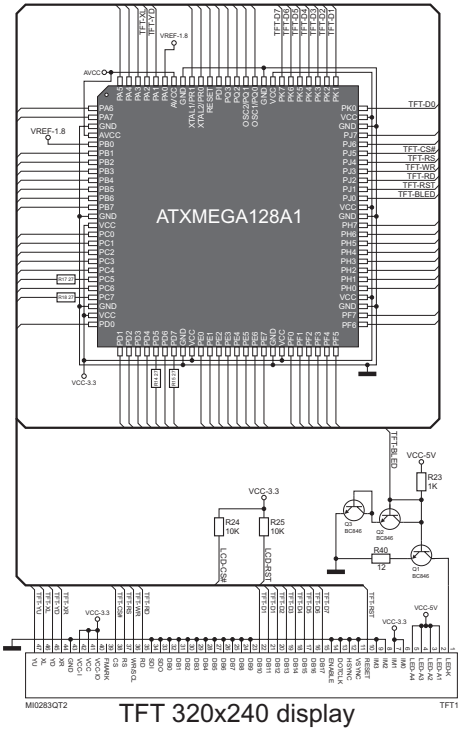


Figure 5-2: Touch Screen connection schematic



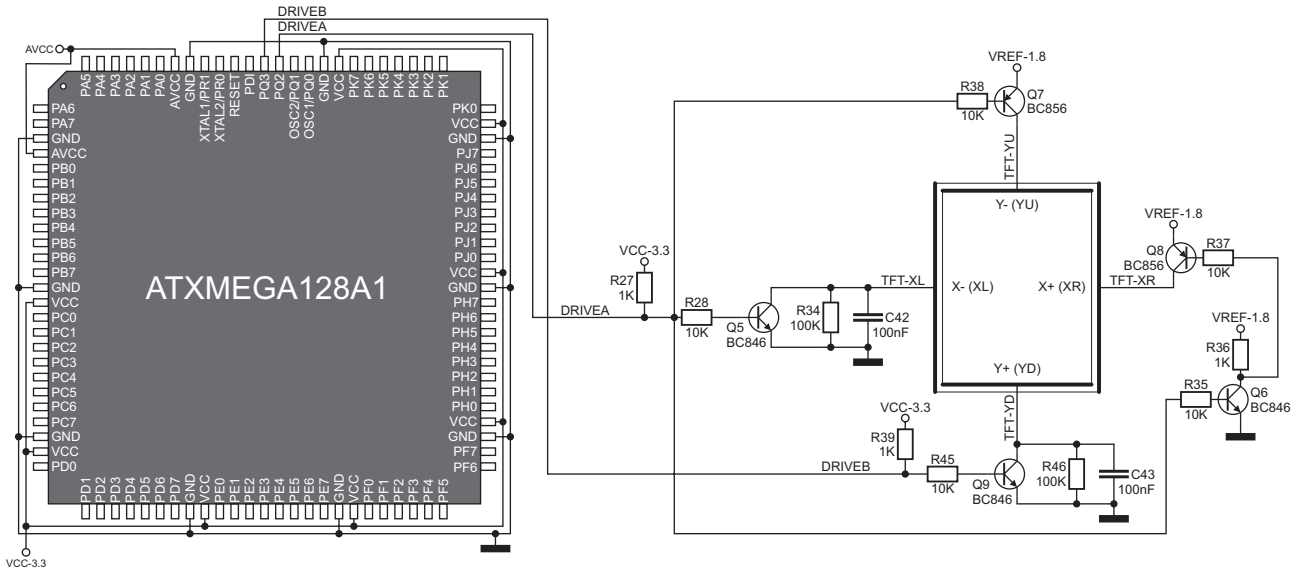


Figure 5-3: Resistive touch panel driver connection schematic

6. microSD Card Slot

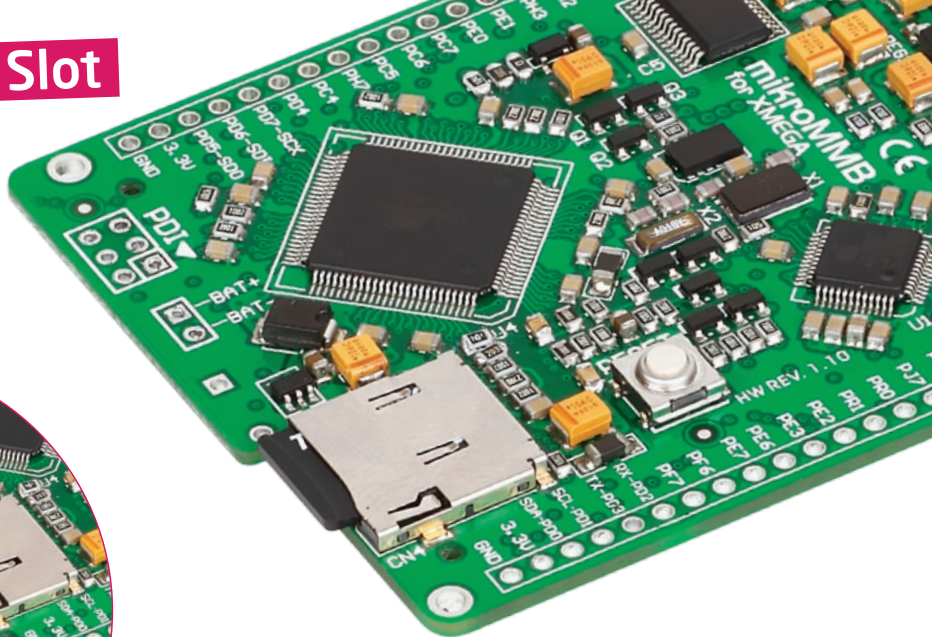


Figure 6-2:
microSD card

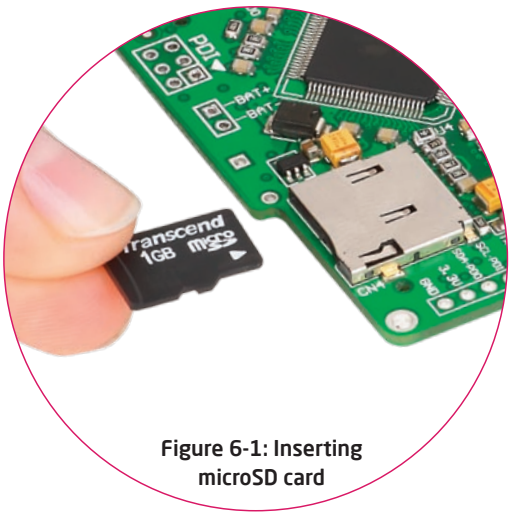


Figure 6-1: Inserting
microSD card

There is a built-in microSD card slot for microSD cards provided on the development system. It enables the system to additionally expand available memory space. The Serial Peripheral Interface (**SPI**) is used for communication between the microcontroller and microSD card.

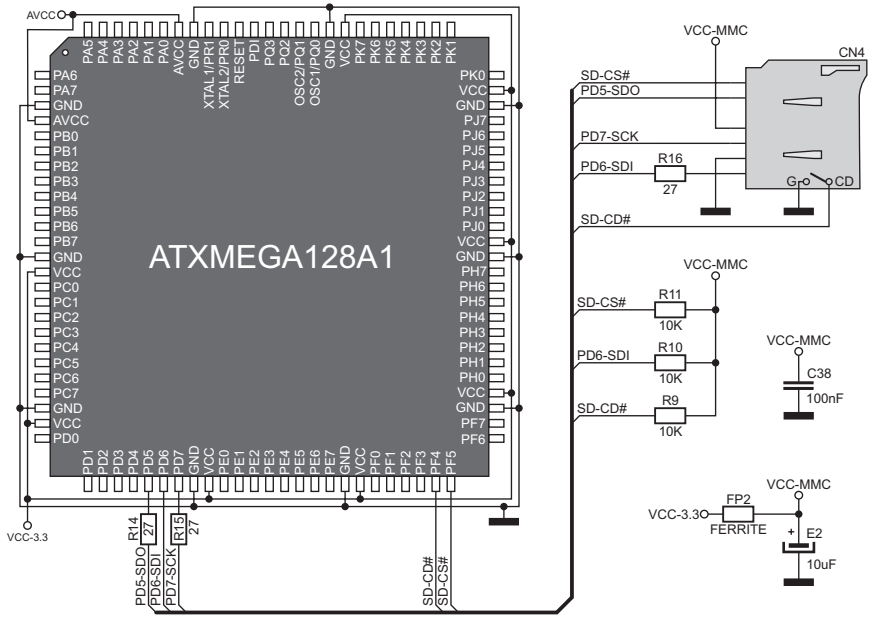


Figure 6-3: microSD card slot connecting schematic

7. Audio Module

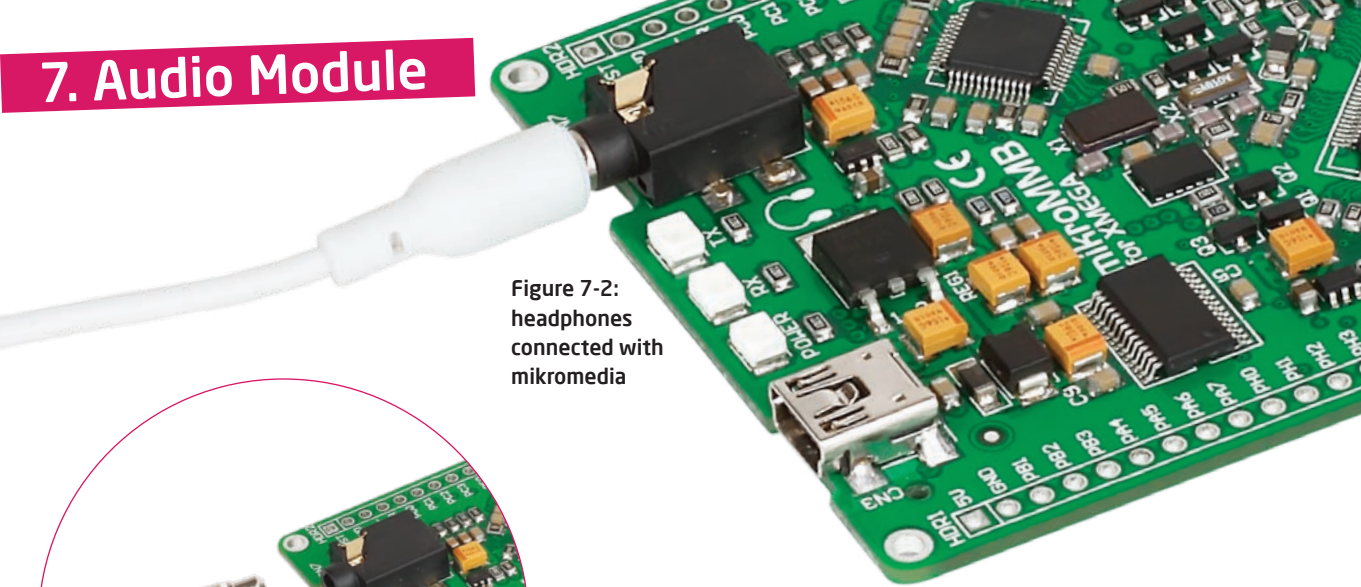


Figure 7-2: headphones connected with mikromedia

Figure 7-1: Inserting 3.5mm headphones jack

The mikromedia for XMEGA features an audio module providing an interface for stereo headphones. This module enables audio reproduction by using stereo headphones connected to the system via a **3.5mm** connector CN7. Volume as well as other functions of this module are controlled by the microcontroller from within the software using the Serial Peripheral Interface (**SPI**). Communication between the audio module and the microcontroller is performed via the Serial Peripheral Interface (SPI).

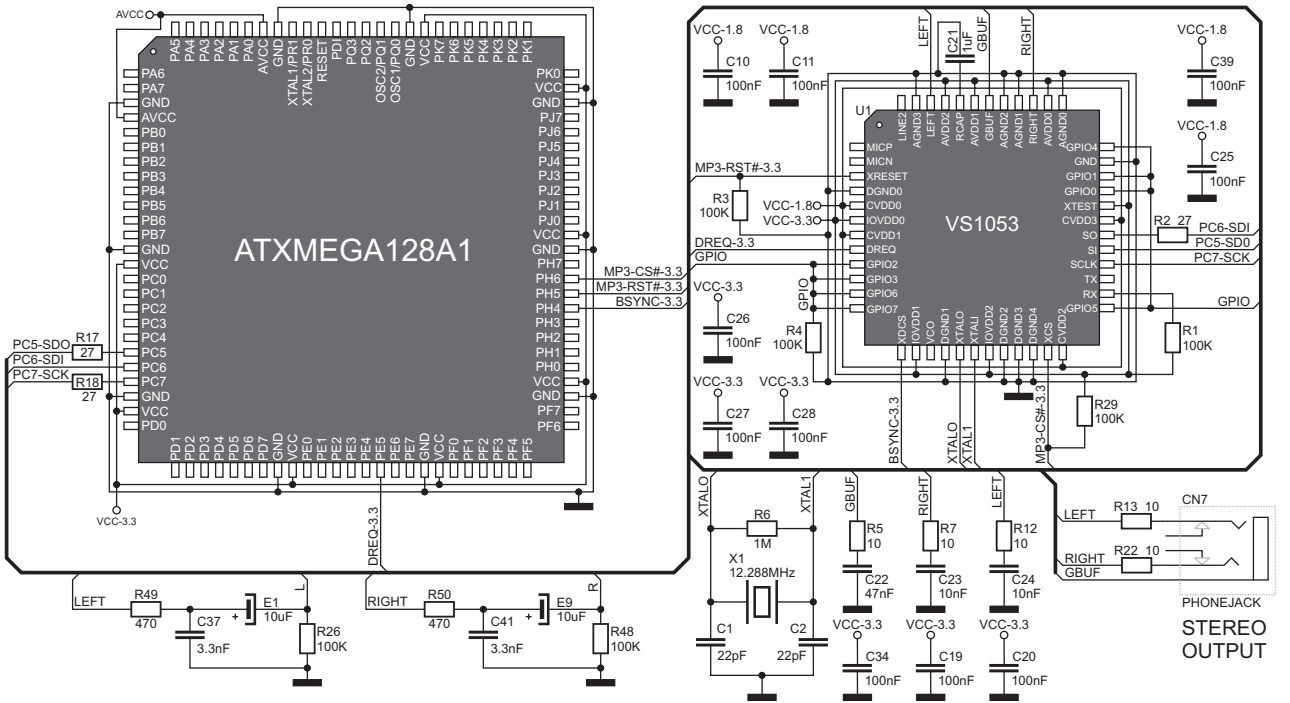


Figure 7-3: Audio module connecting schematic

8. USB UART

Development system can communicate with USB devices via USB UART module. This module comes in form of **FT232RL** chip which is interface between serial UART on MCU and USB device.

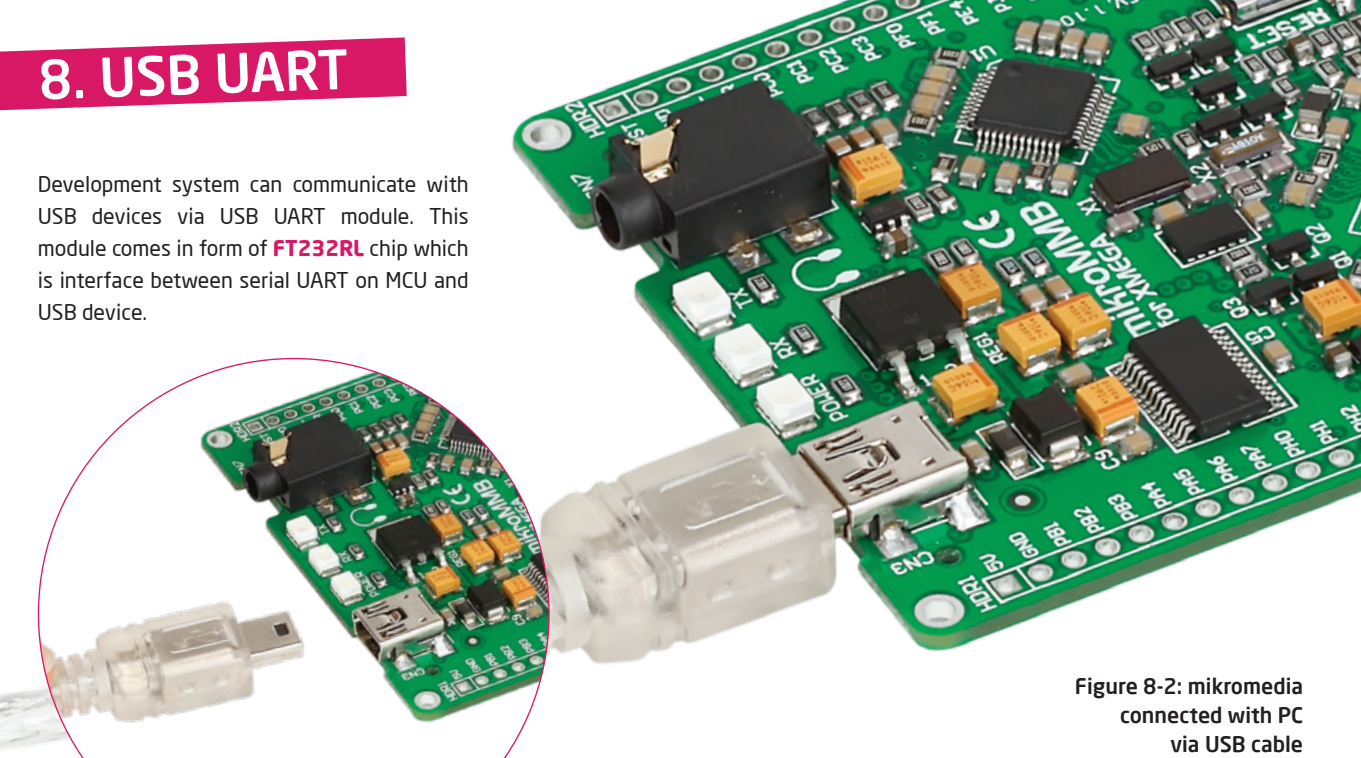


Figure 8-1: Inserting the USB cable

Figure 8-2: mikromedia connected with PC via USB cable

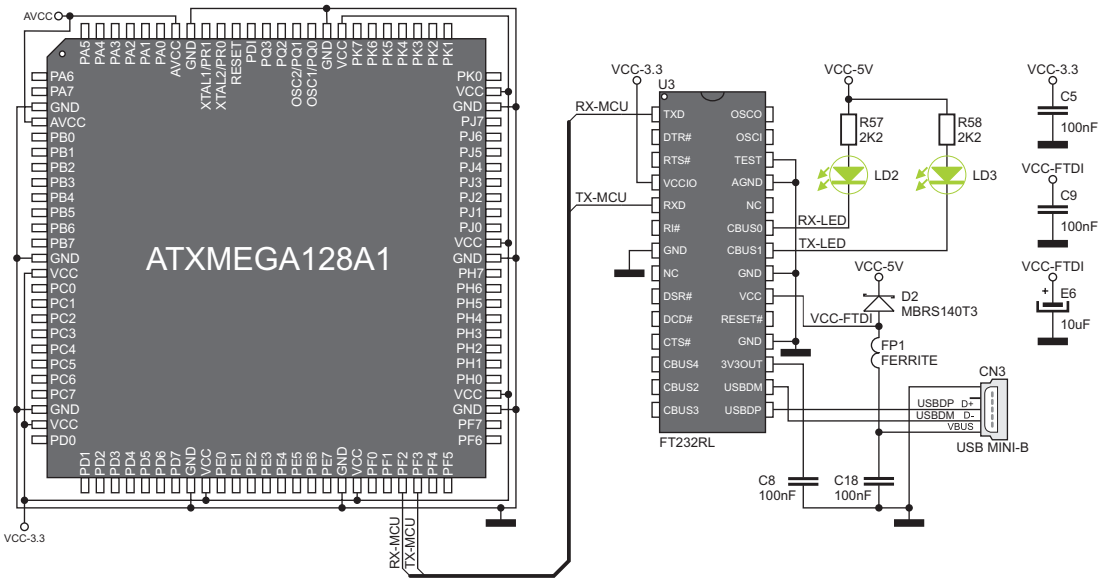


Figure 8-3: USB UART connecting schematic

9. Accelerometer

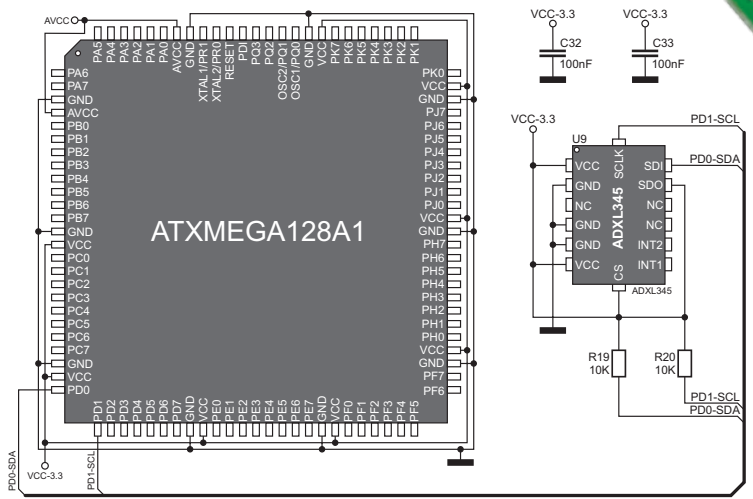


Figure 9-1: Accelerometer connecting schematic

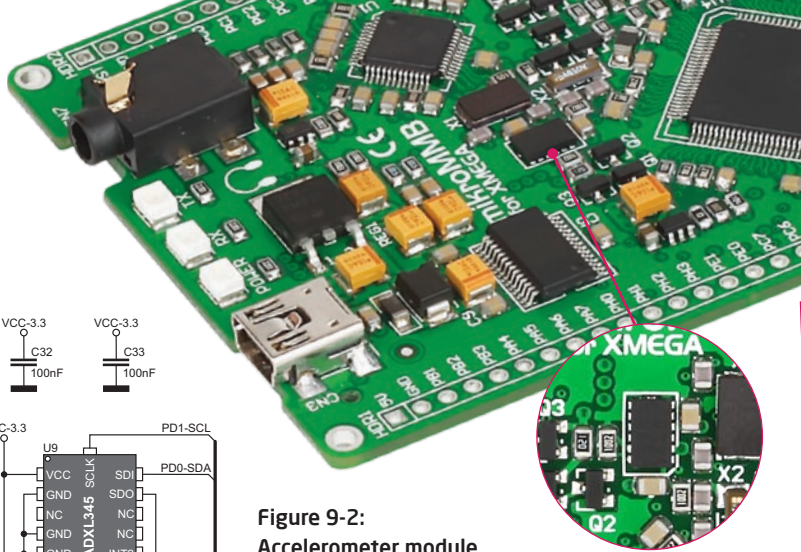
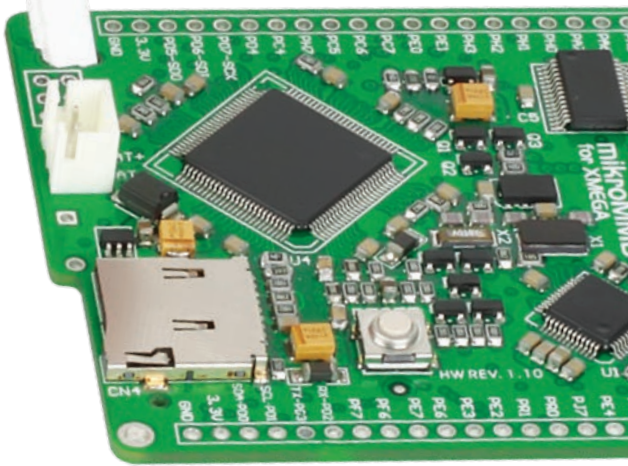


Figure 9-2:
Accelerometer module

The accelerometer is used to measure acceleration, orientation, gravity, etc. 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.

10. Battery charger

Figure 10-2: Li-Polymer battery connected to mikromedia



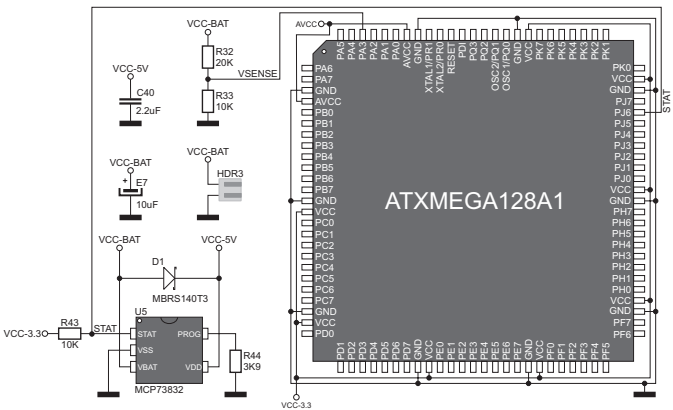
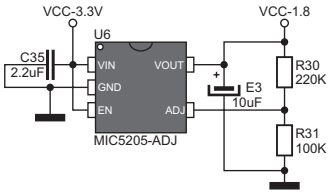
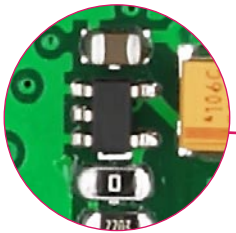


Figure 10-1: Battery charger connecting schematic

Development system can be supplied with power via **Li-Polymer** battery. To connect battery use connector marked with **BATTERY**. While battery is still connected attach mikromedia with a PC via USB cable. On-board battery charger will start to charge battery. Charging current value is ~250mA and charging voltage is 4.2V DC.

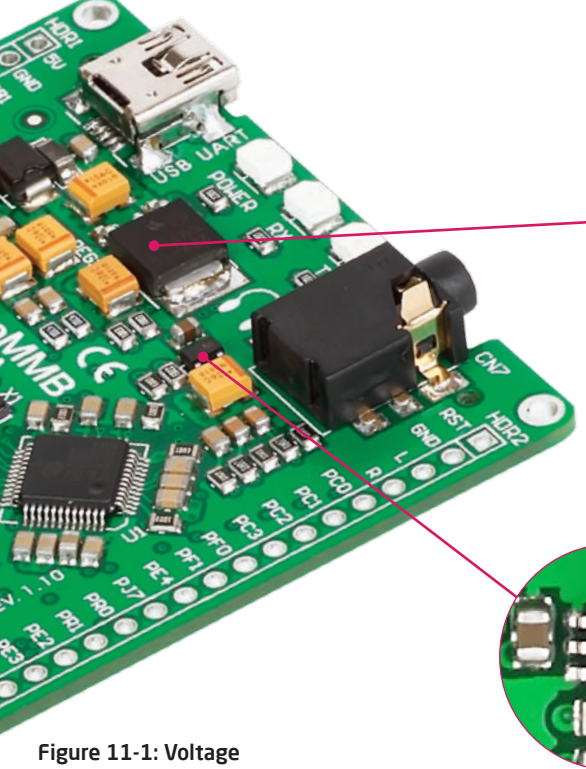
11. Voltage regulators

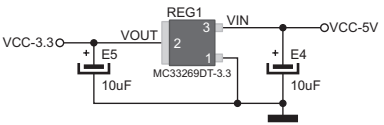




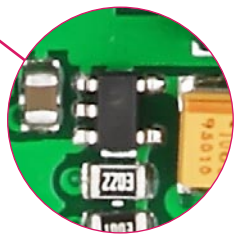
3 Voltage regulator U6 steps down 3.3V to VCC-1.8 voltage (1.8V).

Input power supply (VCC-5V) is to high for supplying on-board modules. To lower power supply voltage mikromedia board is equipped with voltage regulators. Primary voltage of 5V (3.6V Li-Polymer battery) is stepped down to 3.3V via regulator REG1. 3.3V is distributed to regulators U3 (VREF-1.8) and U6 (VCC-1.8) which step down 3.3V to 1.8V and 1.8V.





1 Voltage regulator REG1 steps down input power supply voltage to 3.3V.



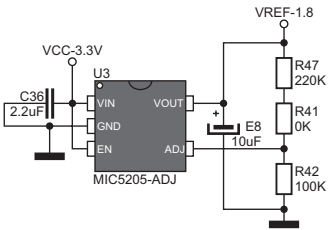
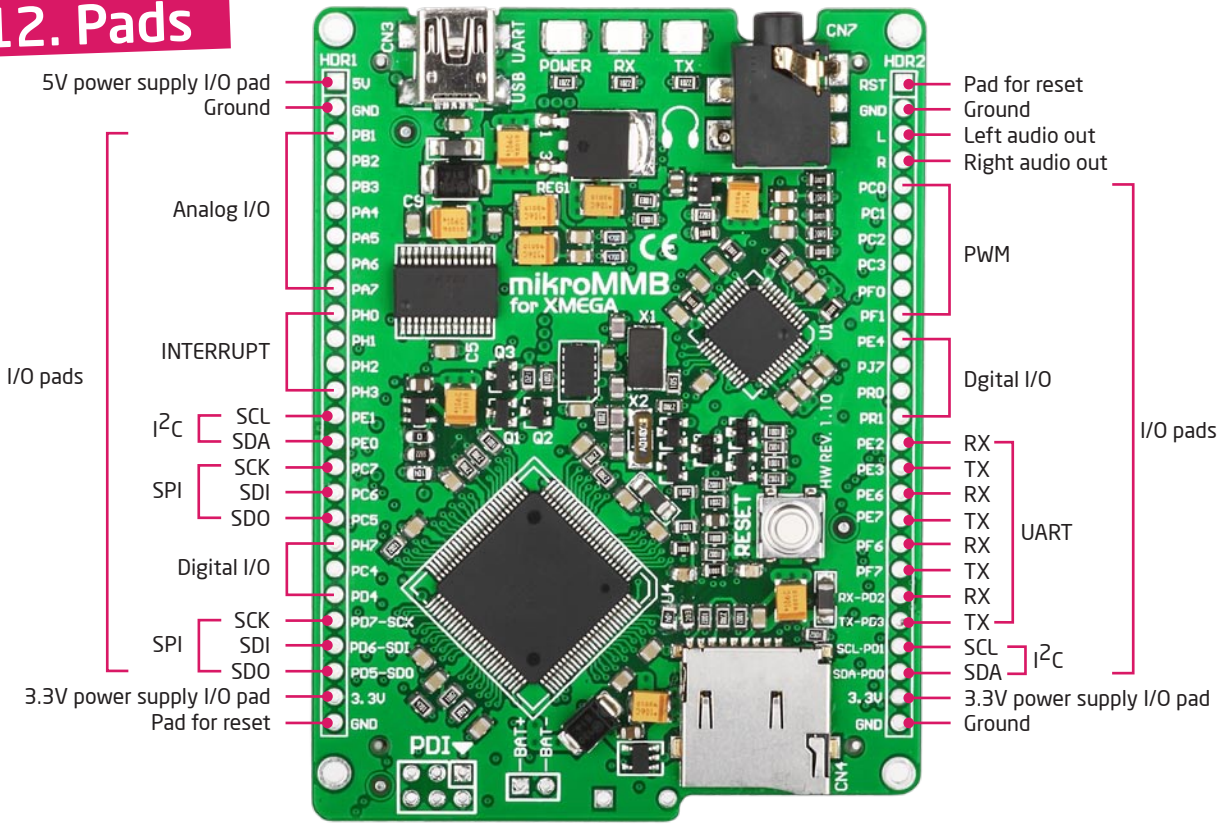


Figure 11-1: Voltage regulators

2 Voltage regulator U3 steps down 3.3V to VREF-1.8 voltage (1.8V).

12. Pads


5V power supply I/O pad
Ground
Analog I/O
INTERRUPT
I/O pads
I2C
SCL
SDA
SPI
SCK
SDI
SDO
Digital I/O
SPI
SCK
SDI
SDO
3.3V power supply I/O pad
Pad for reset
Pad for reset
Ground
Left audio out
Right audio out
PWM
Dgital I/O
I/O pads
RX
TX
RX
TX
RX
TX
RX
TX
UART
SCL
SDA
I2C
3.3V power supply I/O pad
Ground
I/O pads
HDR1
HDR2
CN3
CN7
CN4
USB UART
POWER
RX
TX
REG1
mikroMMB
for XMEGA
RESET
HW REV. 1.10
PDI
BAT+
BAT-

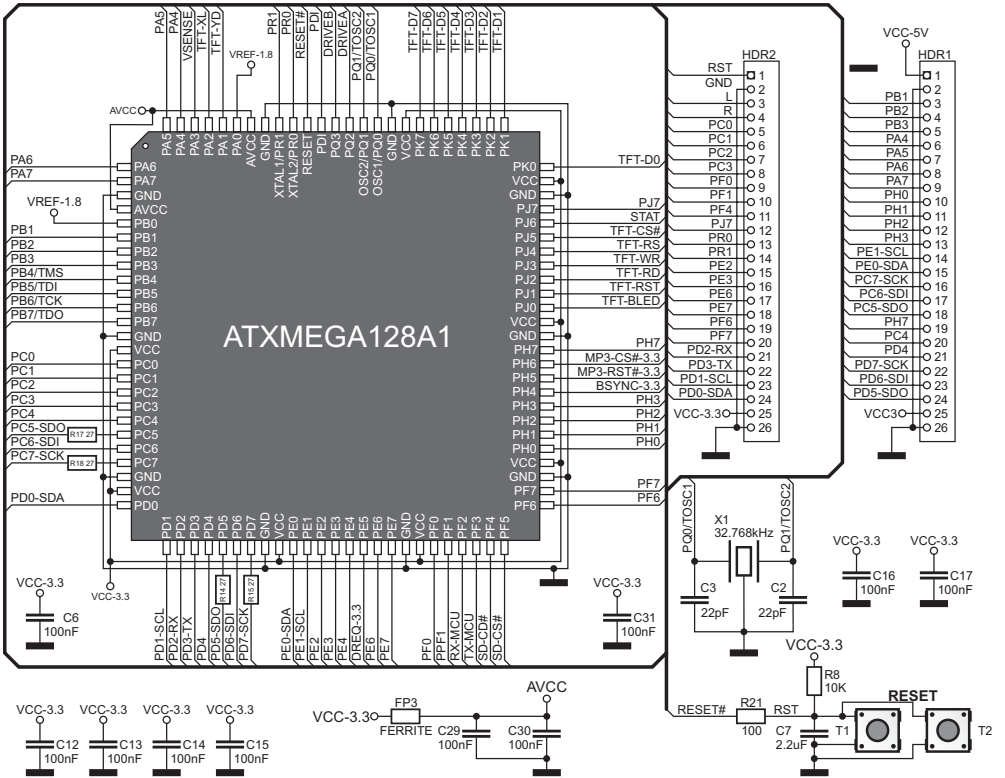
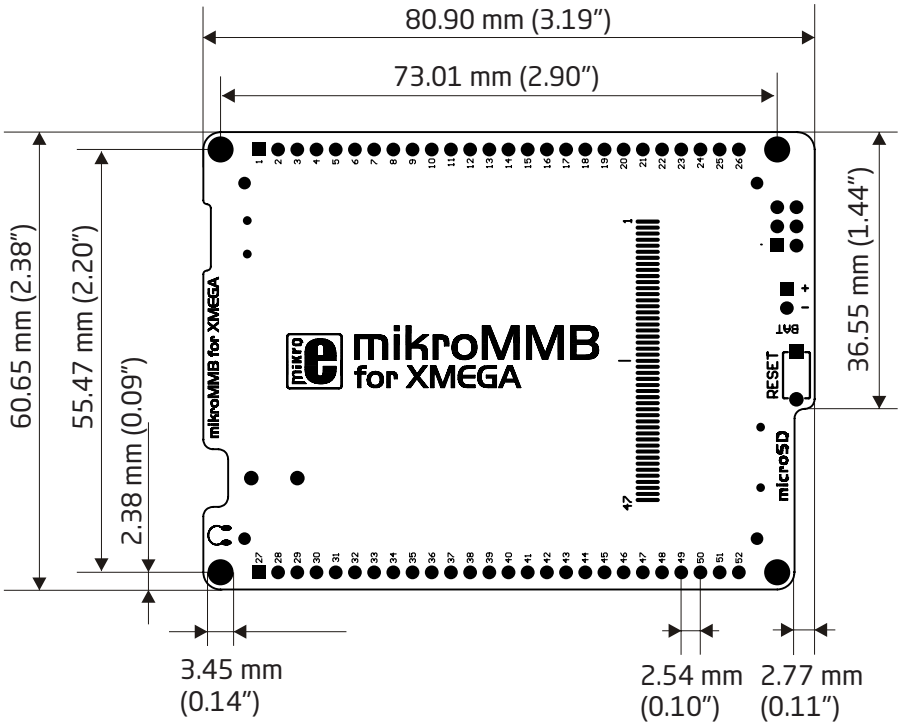


Figure 12-1: Pads connecting schematic

13. Dimensions



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