



# mikromedia™

for XMEGA®

Compact multimedia development system rich with on-board peripherals for all-round development on [ATxmega128A1](#) device



# 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.

A stylized, handwritten signature in white ink, consisting of several overlapping loops and a long horizontal stroke extending to the right.

Nebojsa Matic  
General Manager

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# Introduction to mikromedia for XMEGA®

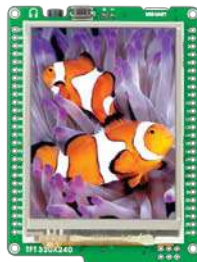
The **mikromedia for XMEGA®** is a compact development system with lots of on-board peripherals which allow development of devices with multimedia contents. The central part of the system is a 8-bit **ATxmega128A1** microcontroller. The mikromedia for XMEGA® features integrated modules such as stereo MP3 codec, **TFT 320x240** touch screen display, accelerometer, MMC/SD card slot, 8 Mbit flash memory, battery charger. The board also contains MINI-B USB connector, two 1x26 connection pads and other. It comes pre programmed with UART bootloader, but can also be programmed with external PDI programmers. Mikromedia is compact and slim, and perfectly fits in the palm of your hand, which makes it convenient platform for mobile devices.



# Package Contains



- 01 Damage resistant protective box



- 02 mikromedia for XMEGA® development system



- 03 DVD with documentation and examples



- 04 mikromedia for XMEGA® user's guide



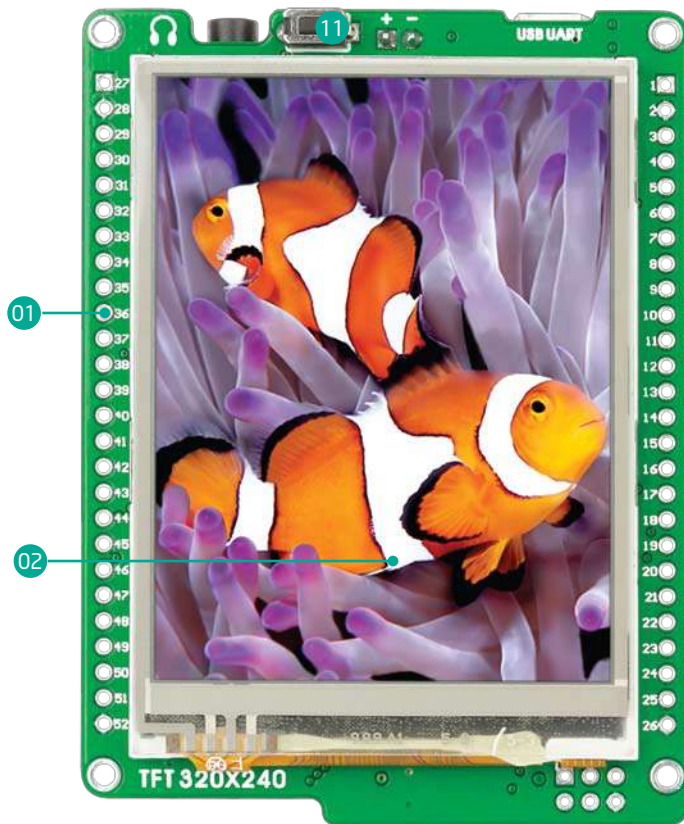
- 05 mikromedia for XMEGA® schematic

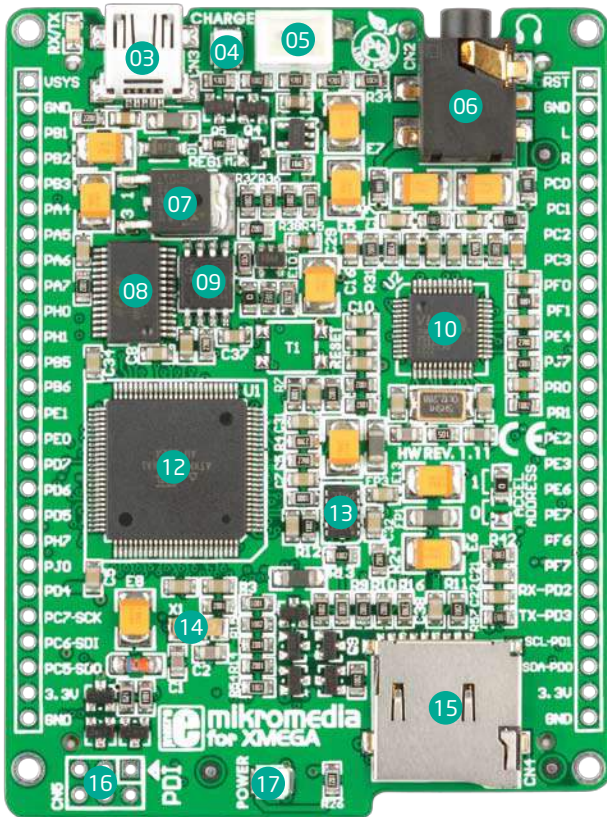


- 06 USB cable

# 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 USB UART
- 09 Serial Flash memory
- 10 VS1053 Stereo mp3 coder/decoder
- 11 RESET button
- 12 ATxmega128A1 microcontroller
- 13 Accelerometer
- 14 Crystal oscillator
- 15 microSD Card Slot
- 16 PDI connector
- 17 Power indicator LED





## System Specification



### power supply

Over a USB cable (5V DC)



### power consumption

87 mA with erased MCU  
(when back-light is ON)



### board dimensions

81.2 x 60.5 mm (3.19 x 2.38 inch)



### weight

~45 g (0.10 lbs)

# 1. Power supply

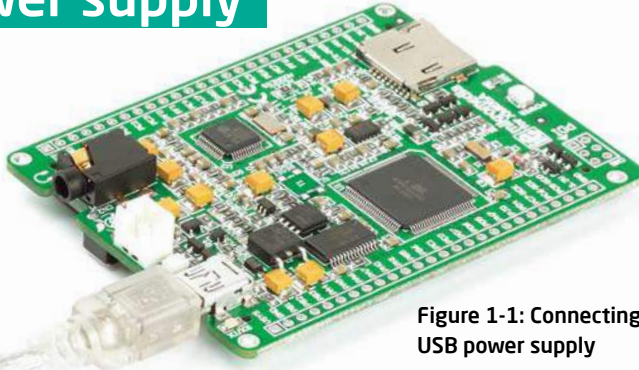


Figure 1-1: Connecting USB power supply

## 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 on the board. **Power LED (GREEN)** will indicate the presence of power supply.

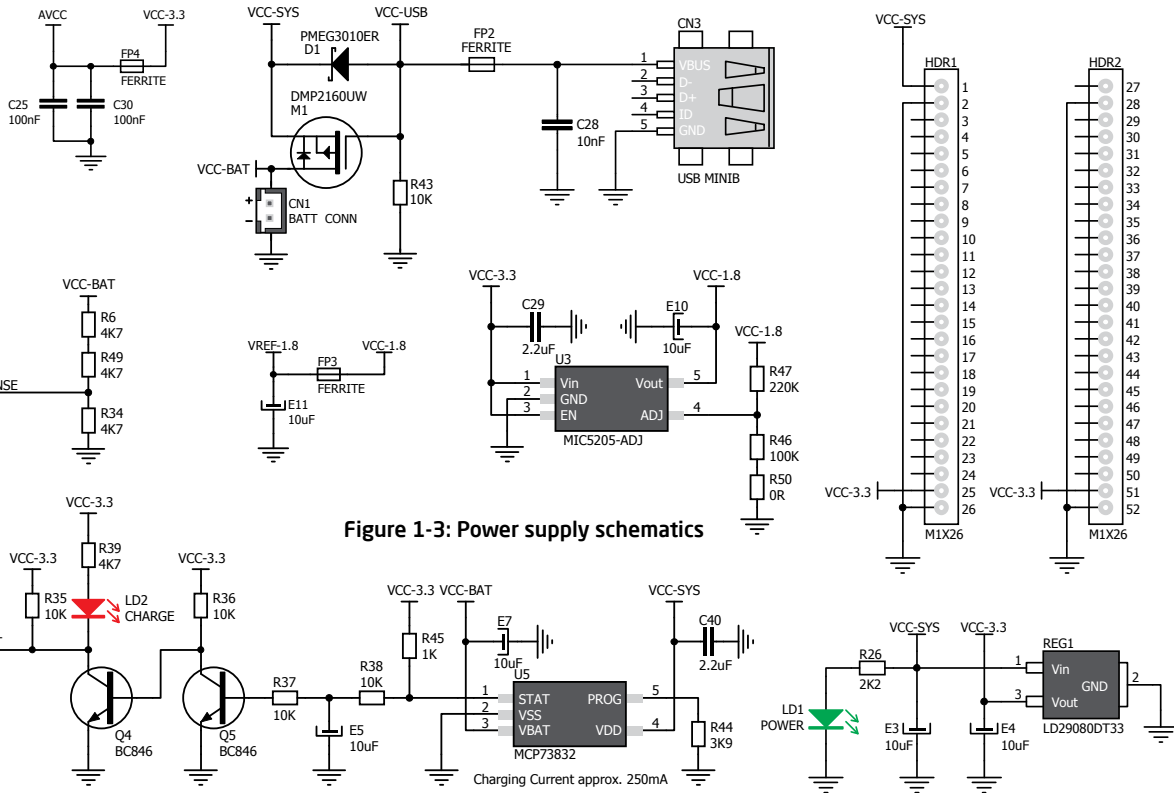
## Battery power supply

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 when battery is charging. Charging current is ~250mA and charging voltage is 4.2V DC.



Figure 1-2: Connecting Li-Polymer battery





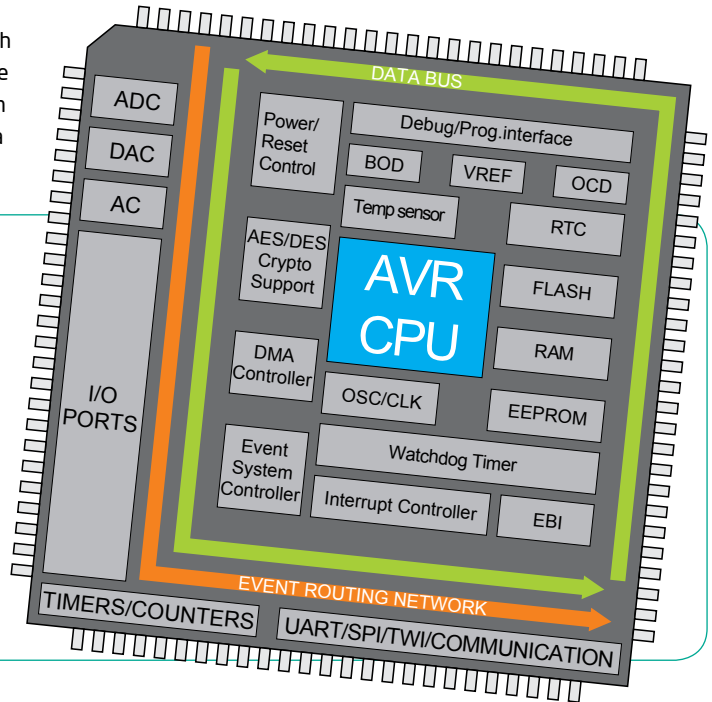
**Figure 1-3: Power supply schematics**

## 2. ATxmega128A1 microcontroller

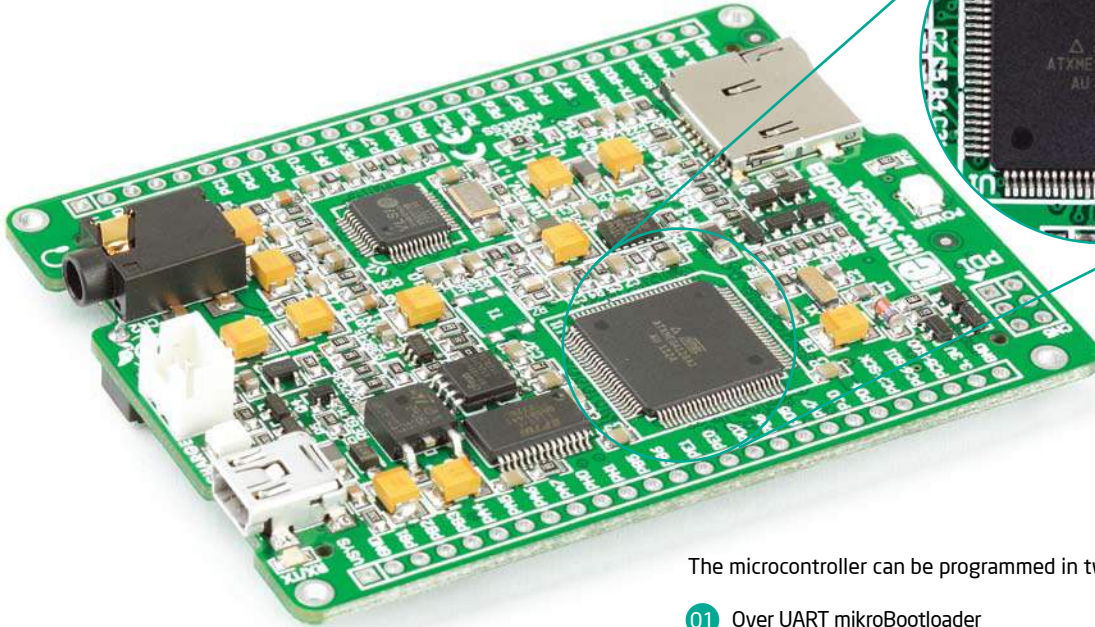
The mikromedia for XMEGA® development system comes with the **ATxmega128A1** microcontroller. This high-performance **8-bit** microcontroller with its integrated modules and in combination with other on-board modules is ideal for multimedia applications.

### Key microcontroller features

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



# 3. Programming the microcontroller



**Figure 3-1:**  
**ATxmega128A1**  
**Microcontroller**

The microcontroller can be programmed in two ways:

- 01 Over UART mikroBootloader
- 02 Using external PDI programmer

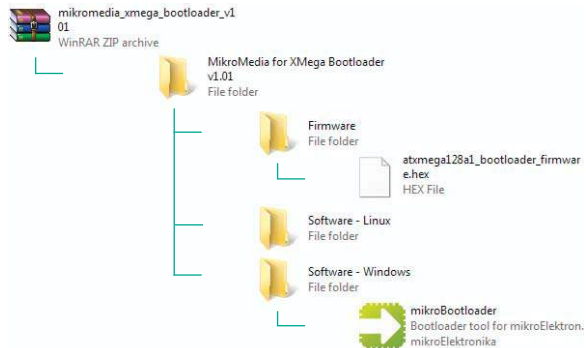
# Programming with mikroBootloader

You can program the microcontroller with UART bootloader which is pre programmed 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/downloads/get/1669/mikromedia\\_xmega\\_bootloader\\_v101.zip](http://www.mikroe.com/downloads/get/1669/mikromedia_xmega_bootloader_v101.zip)

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

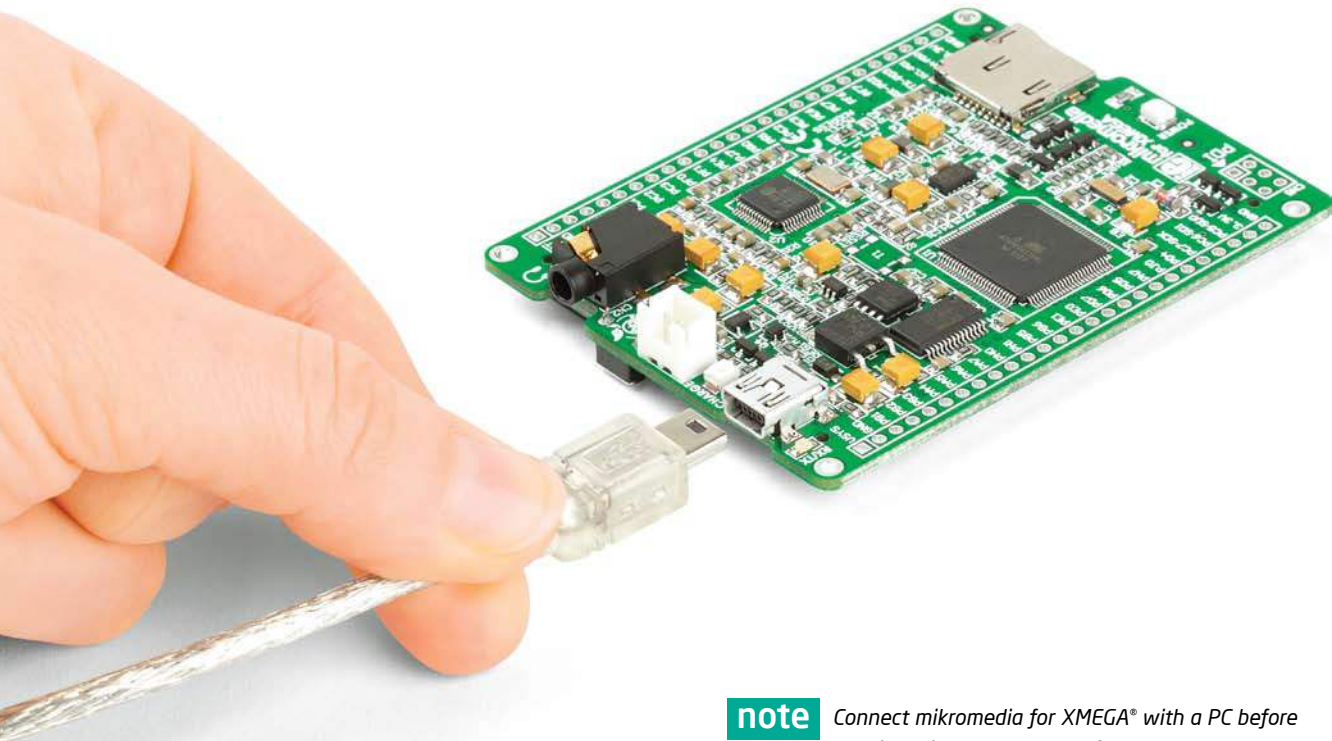


## mikroBootloader software



Figure 3-2: mikroBootloader window

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



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

## Identifying device COM port

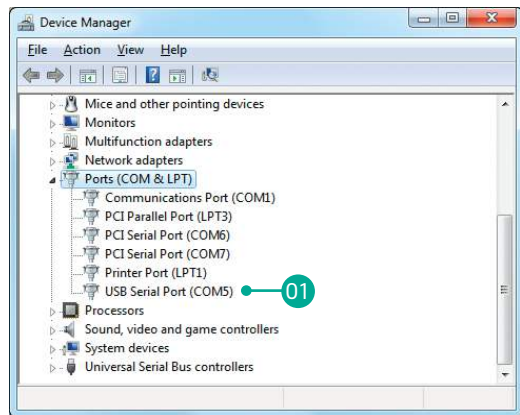


Figure 3-3: Identifying COM port

- 01 Open **Device Manager** window and expand **Ports section** to see which COM port is assigned to Ready for XMEGA® board (in this case it is COM5)

## step 1 - Choosing COM port

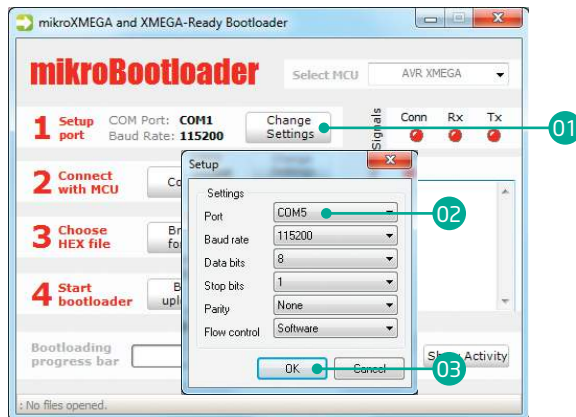


Figure 3-4: Choosing COM port

- 01 Click the **Change Settings** button
- 02 From the drop down list, select appropriate **COM port** (in this case it is COM5)
- 03 Click **OK**

## step 2 - Establishing Connection



Figure 3-5: Connecting with mikroBootloader

- 01 Press the **Reset** button on Ready for XMEGA® board and click the **Connect** button within 5s, otherwise the existing microcontroller program will run. If connected, the button's caption will be changed to **Disconnect**

## step 3 - Browsing for .HEX file

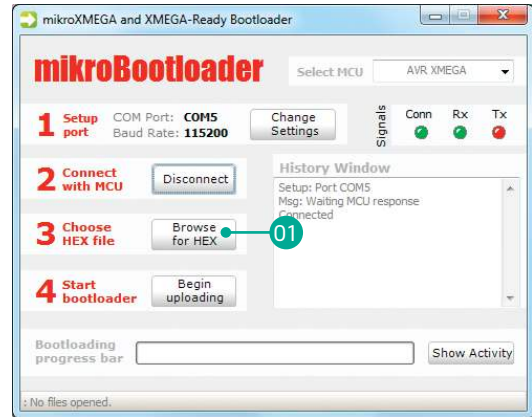


Figure 3-6: Browse for HEX

- 01 Click the **Browse for HEX** button and from a pop-up window (Figure 3-7) choose a .HEX file to be uploaded to MCU memory

## step 4 - Selecting .HEX file

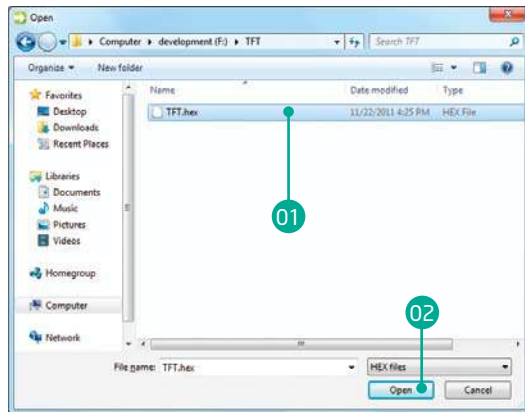


Figure 3-7: Locating and selecting .hex file

- 01 Select .HEX file using open dialog window.
- 02 Click the **Open** button

## step 5 - Uploading .HEX file

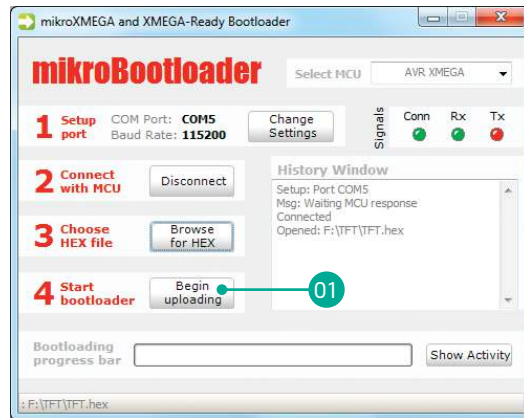


Figure 3-8: Begin uploading

- 01 To start .HEX file bootloading click the **Begin uploading** button



## step 6 - Progress bar



Figure 3-9: Progress bar

- 01 Progress bar enables you to monitor .HEX file uploading

## step 7 - Finishing upload



Figure 3-10: Restarting MCU

- 01 Click **OK** button after the uploading process is finished
- 02 Press **Reset** button on Ready for XMEGA® board and wait for 5 seconds. Your program will run automatically

# Programming with external programmer

The microcontroller can be programmed with external programmer (AVRISP mkII, AVR JTAGICE mkII or other supported programmer with PDI interface). The external programmer is connected to the development system via pads marked with **PDI (CN5)**, Figure 3-11. In order to connect the external programmer to the development system, it is necessary to solder a 2x3 male header on the pad (**CN5**). If bootloader program is accidentally erased you can upload it again via external PDI programmer. Program [atxmega128a1\\_bootloader\\_firmware.hex](#) can be found under Firmware folder (page 12).



Figure 3-11:  
connecting PDI  
programmer

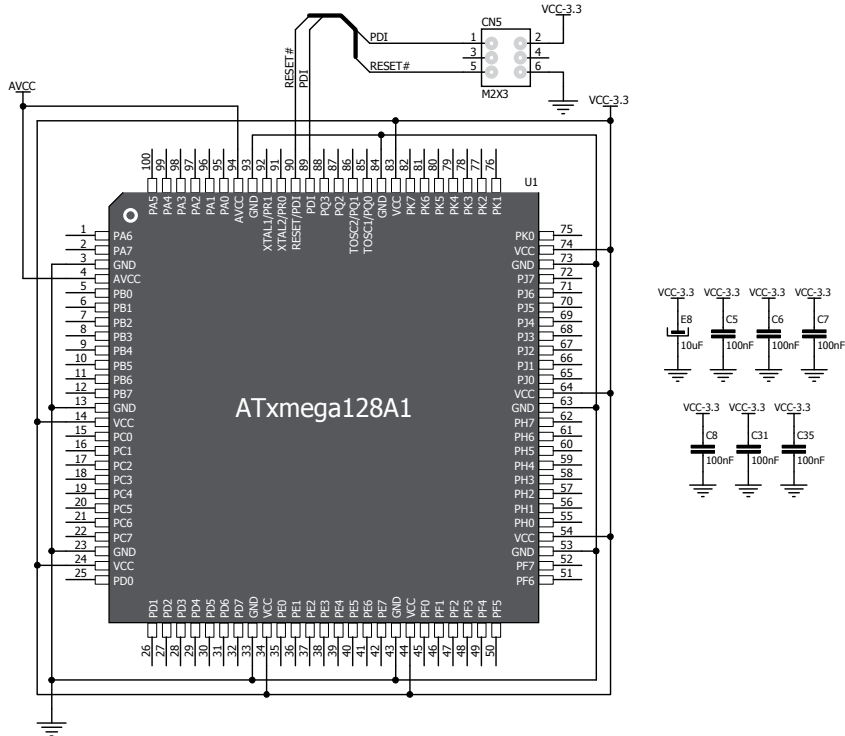
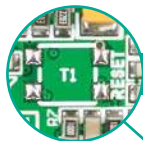


Figure 3-12: PDI programmer connection schematic

## 4. Reset Button

Board is equipped with 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 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**).



### NOTE

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

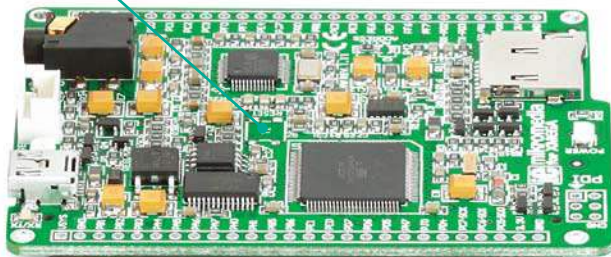


Figure 4-1: Location of additional reset button

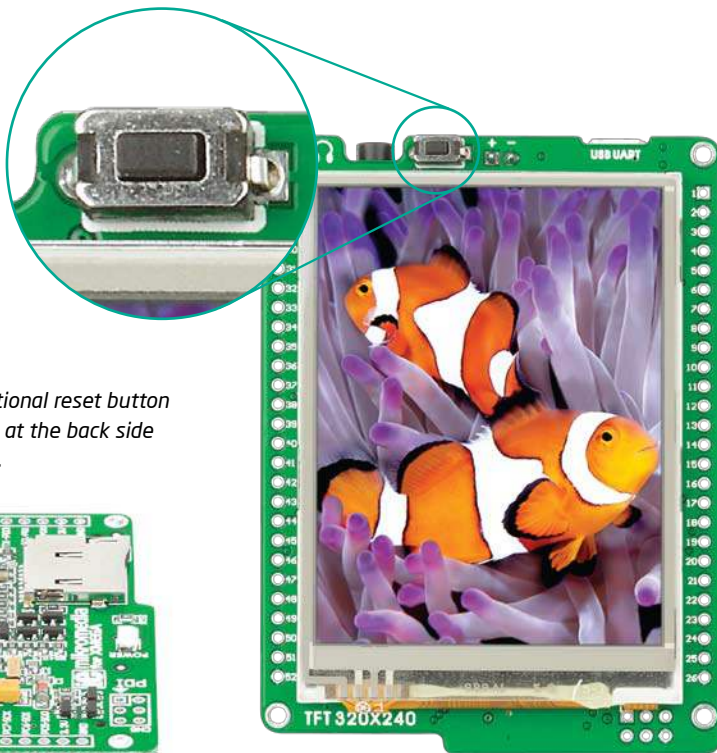


Figure 4-2: Frontal reset button

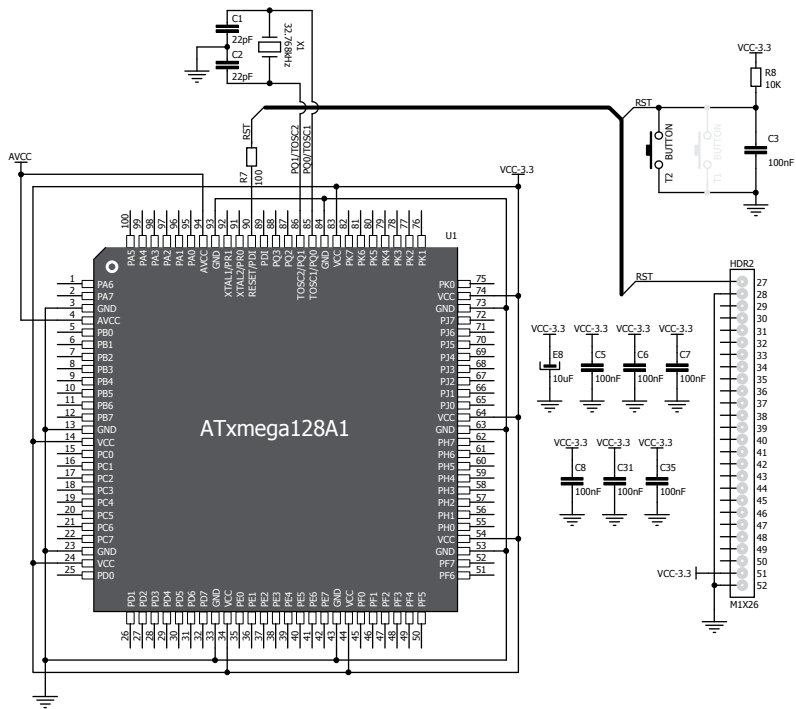


Figure 4-3: Reset circuit schematic

# 5. Crystal oscillators

**ATxmega128A1** uses internal 2MHz and 32MHz oscillators that provide the necessary clock frequency. In combination with prescalers and multipliers it gives you a wide range of output frequencies, which ensures proper operation of bootloader and your custom applications. Board contains **32.768kHz Crystal oscillator (X1)** which provides external clock for internal **RTCC** module.

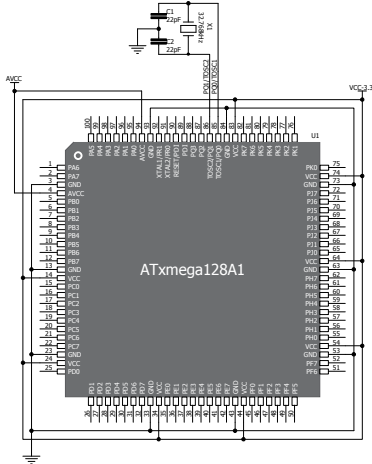
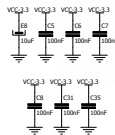


Figure 5-2:  
Crystal oscillator  
schematic



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

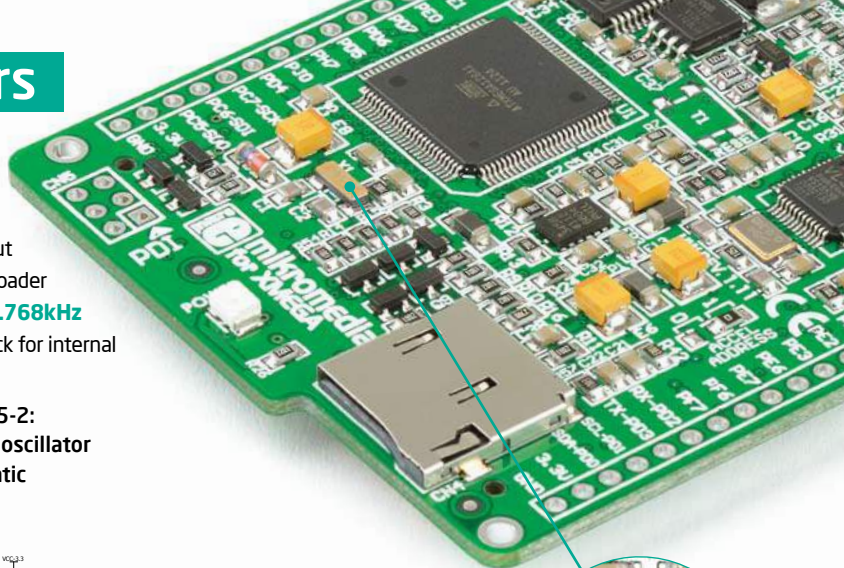
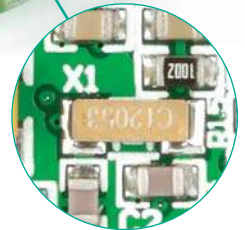


Figure 5-1:  
32.768kHz crystal oscillator  
connected to RTCC module (X1)



# 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.

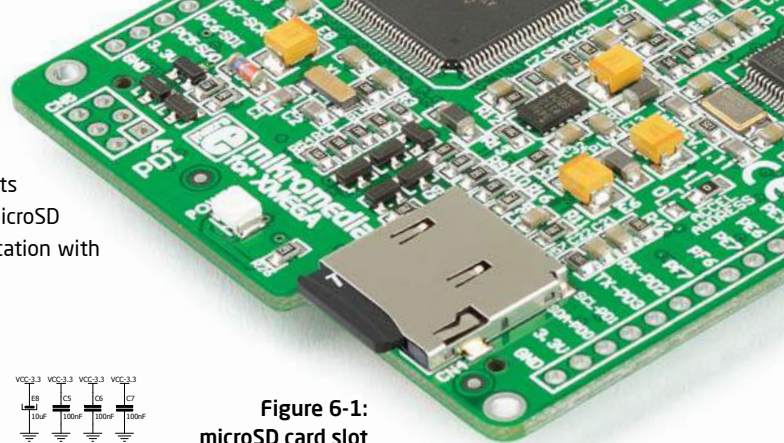


Figure 6-1:  
microSD card slot

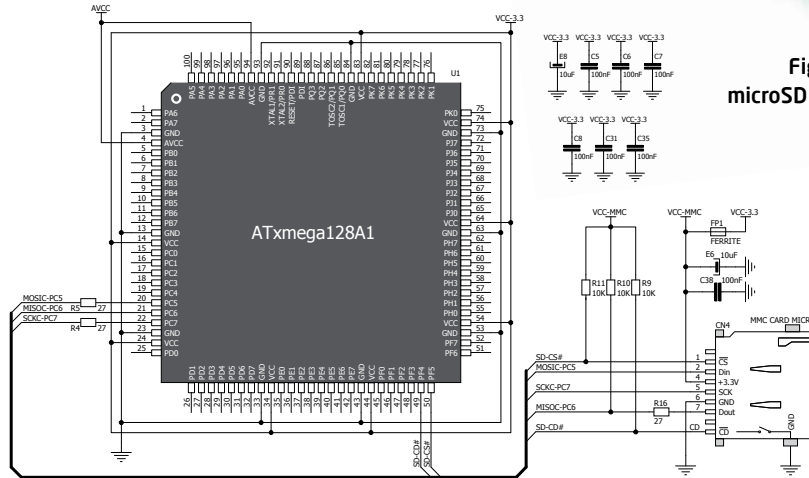


Figure 6-2: microSD Card Slot module connection schematic

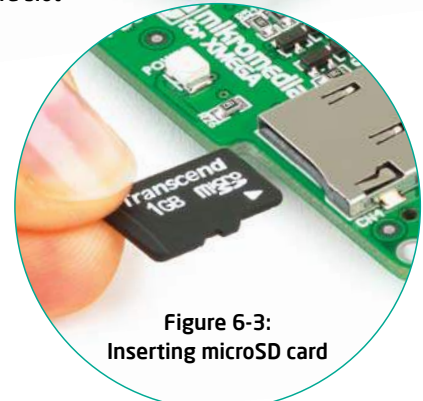


Figure 6-3:  
Inserting microSD card

## 7. Touch Screen

Figure 7-1:  
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 graphics in **262.144** different **colors**.



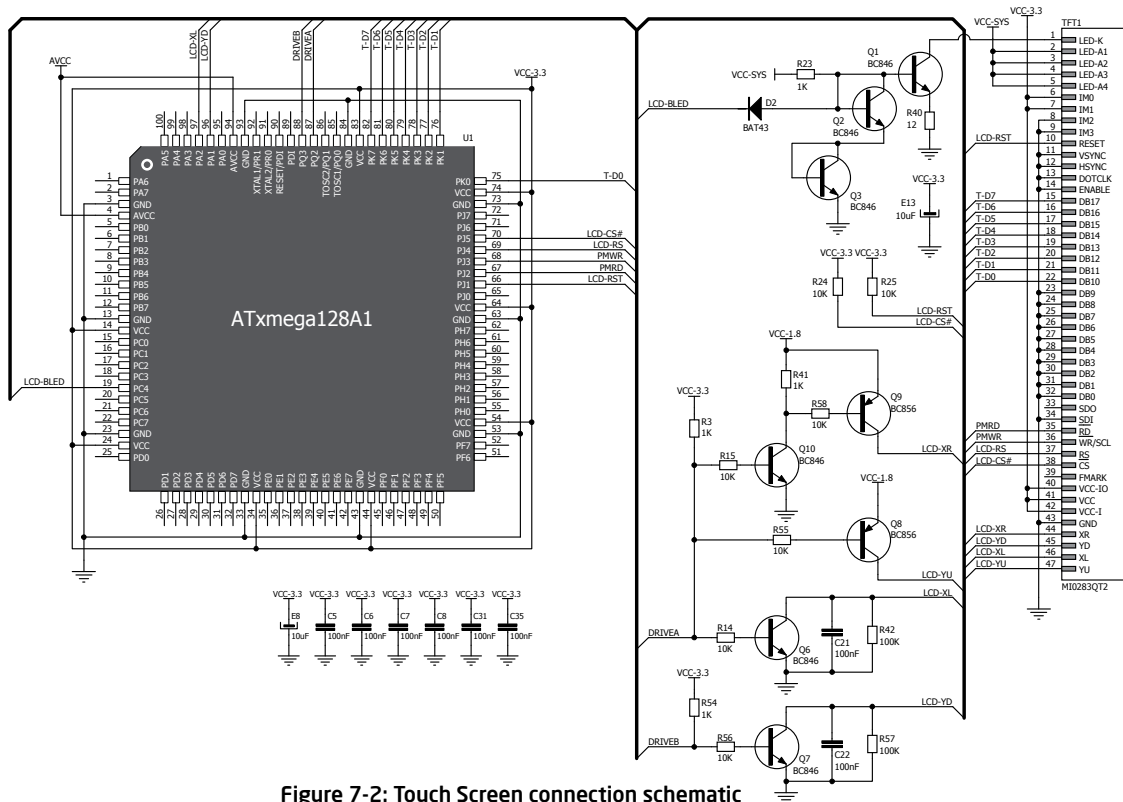
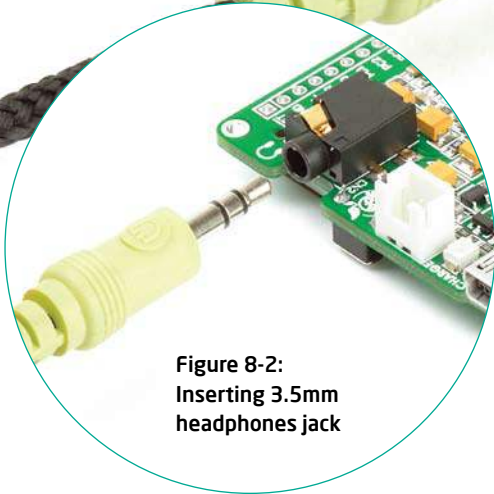
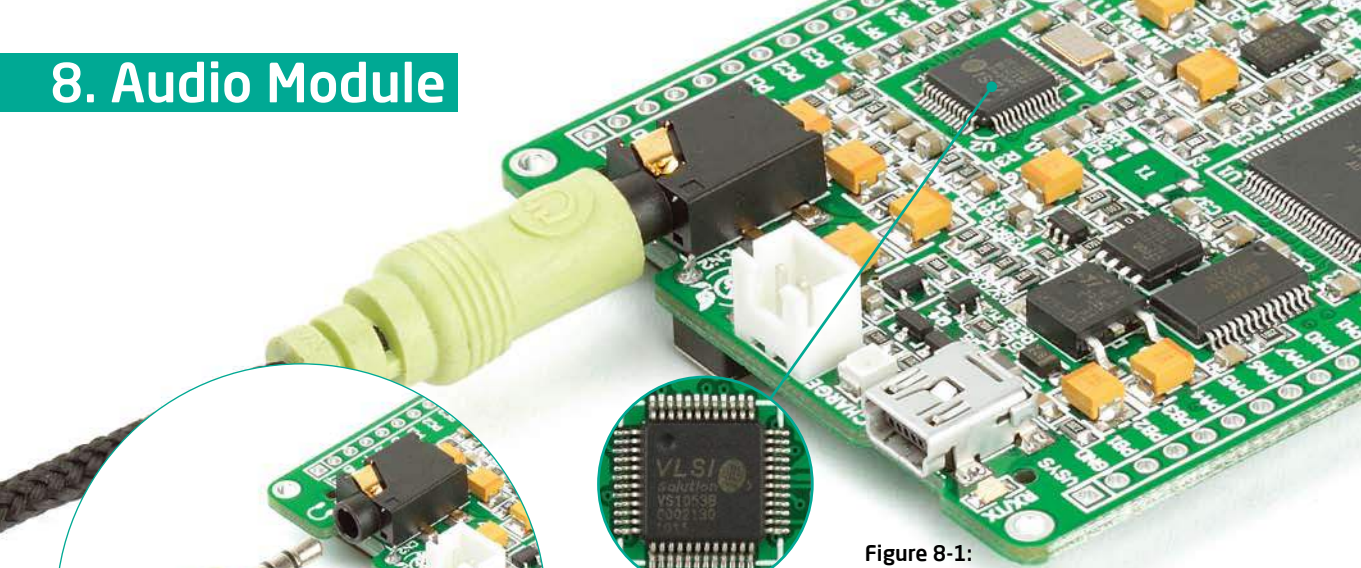


Figure 7-2: Touch Screen connection schematic

## 8. Audio Module



**Figure 8-2:**  
Inserting 3.5mm  
headphones jack



**Figure 8-1:**  
On-board VS1053  
MP3 codec

The mikromedia for XMEGA® 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**).

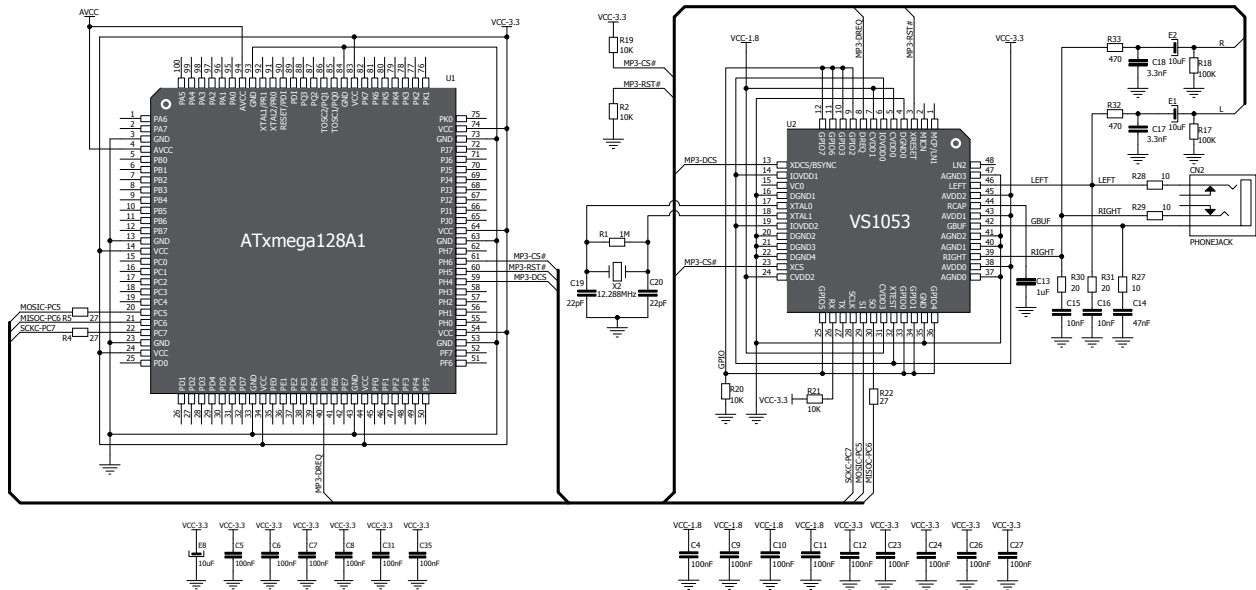


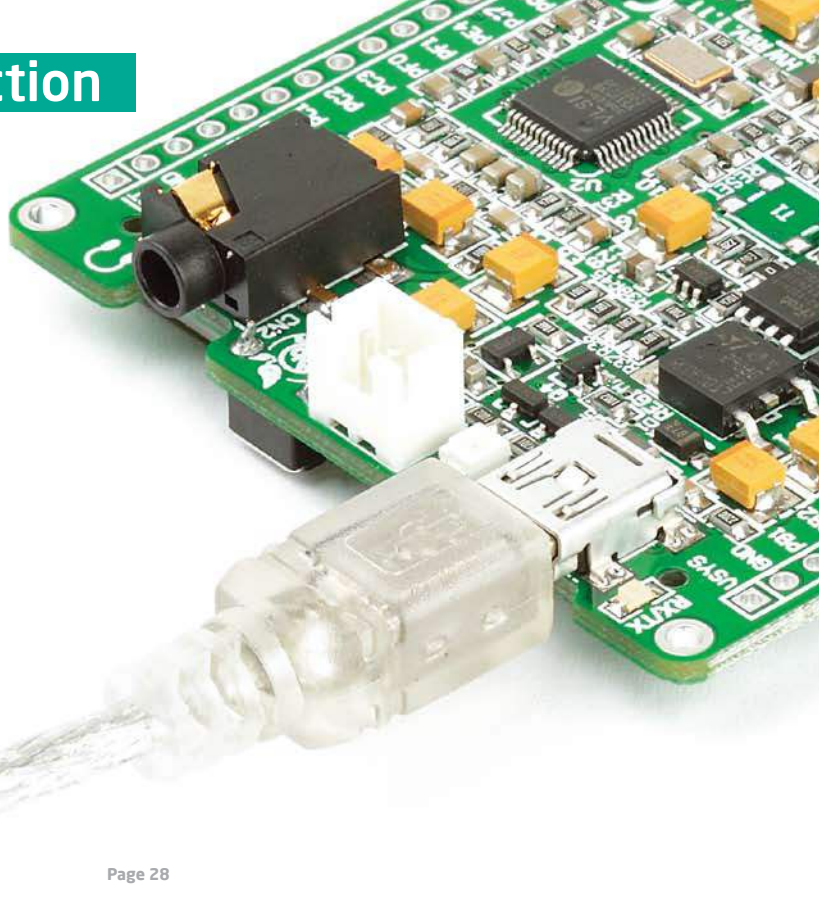
Figure 8-3: Audio module connection schematic

## 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 [ATxmega128A1](#) does not support USB protocol.



**Figure 9-1: Connecting USB cable to MINI-B USB connector**



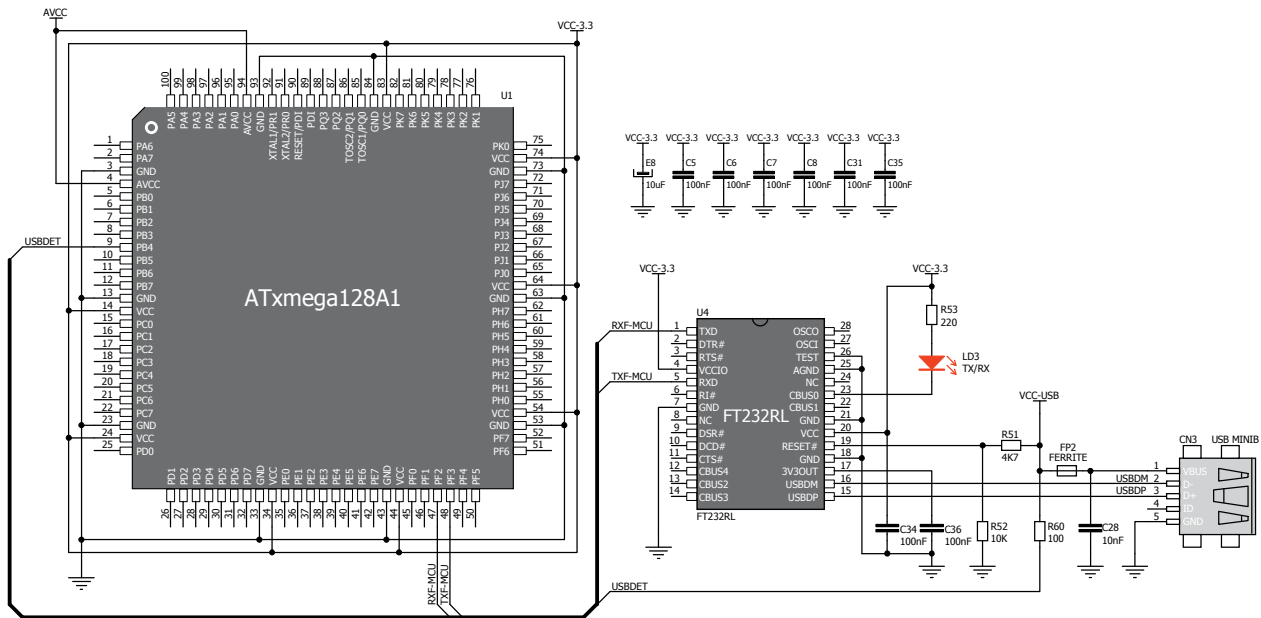
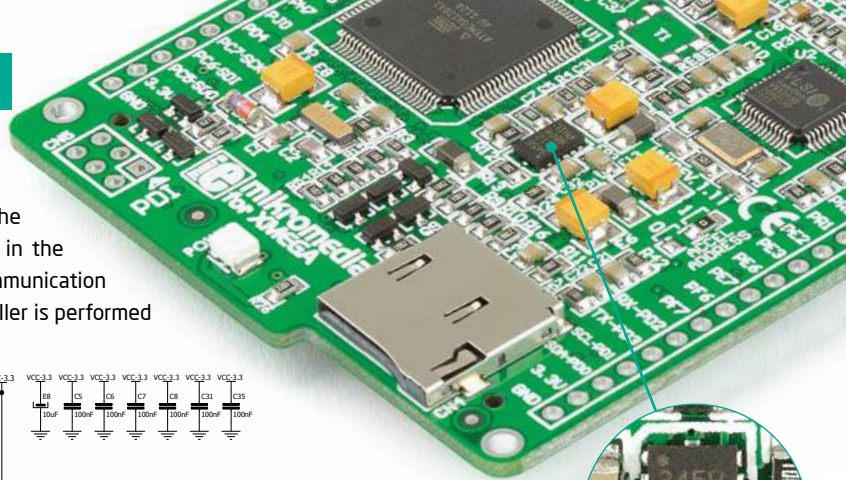


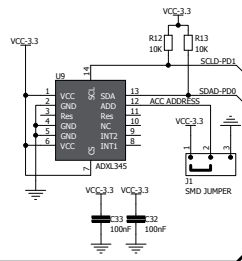
Figure 9-2: USB module connection schematic

# 10. Accelerometer

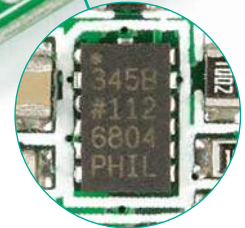
On board **ADXL345** accelerometer is used to measure acceleration in three axis: x, y and z. The accelerometer function is defined by the user in the program loaded into the microcontroller. Communication between the accelerometer and the microcontroller is performed via the **I<sup>2</sup>C** interface.



**Figure 10-2:**  
Accelerometer connection schematic



**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

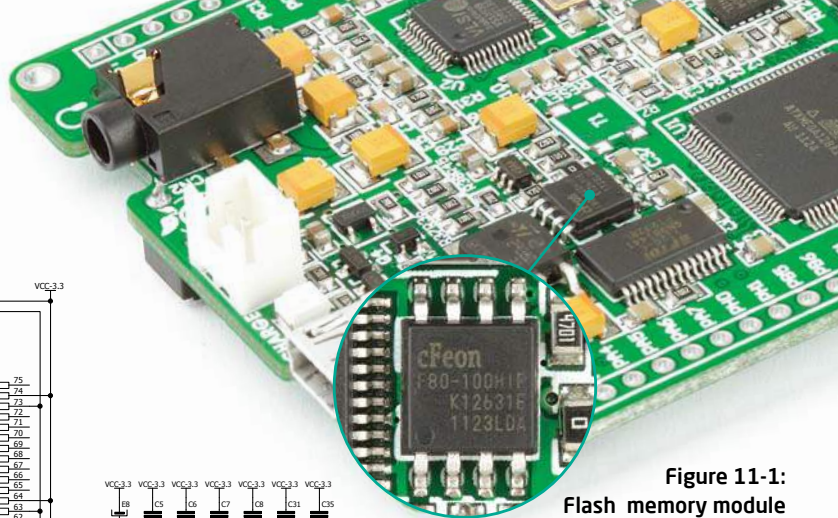


Figure 11-1:  
Flash memory module

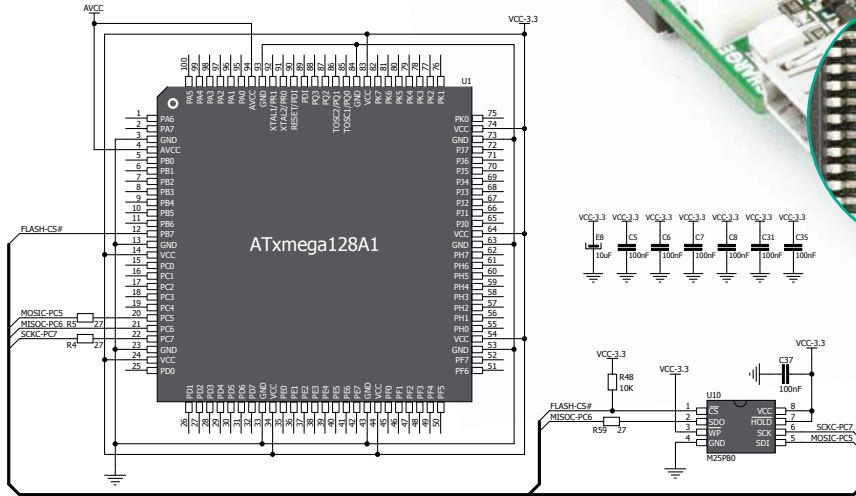


Figure 11-2:  
Flash memory module connection schematic

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

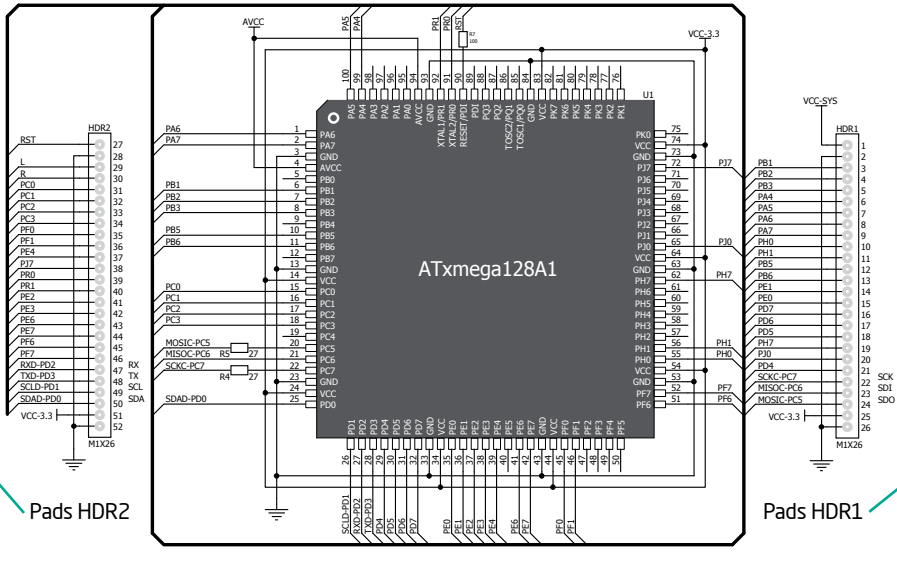
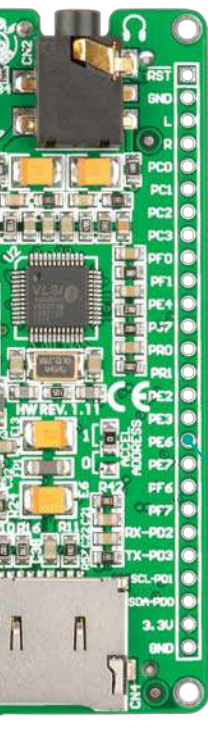
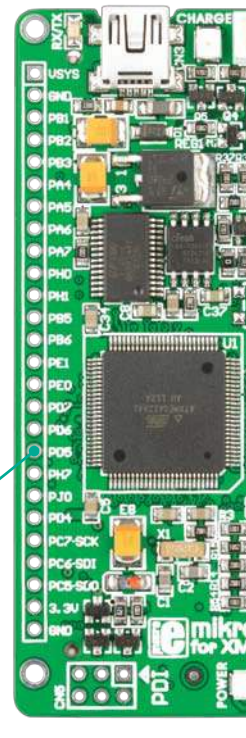


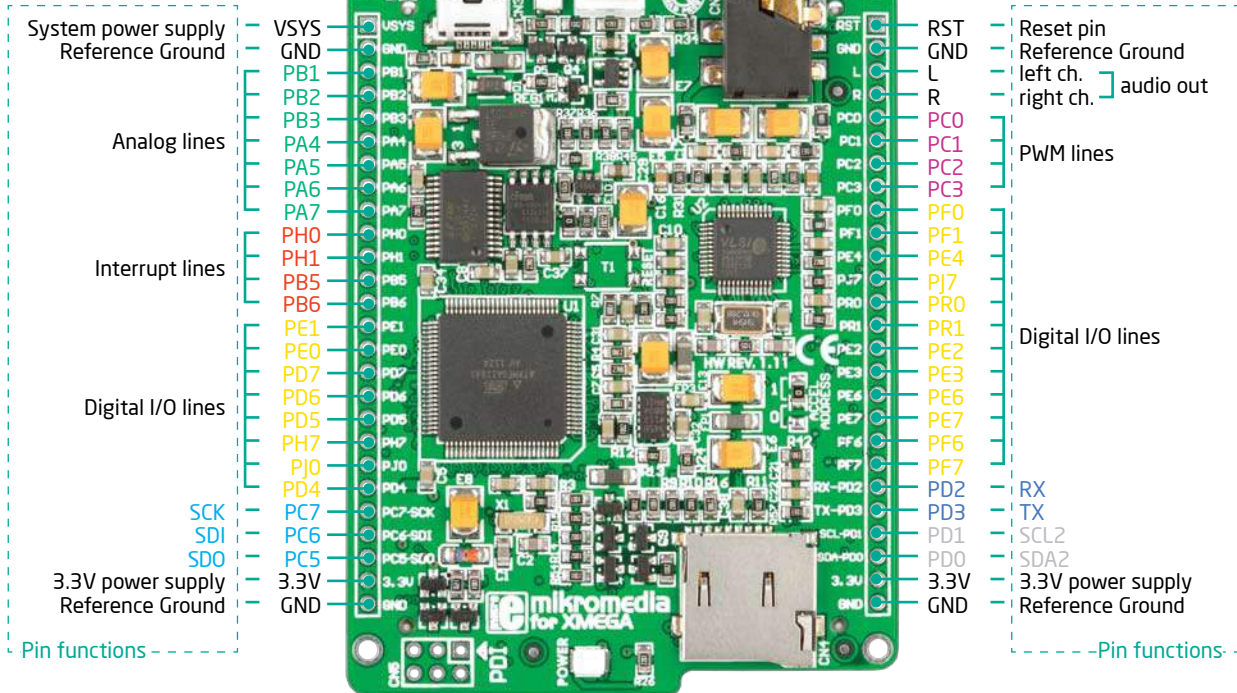
Figure 12-1: connecting pads schematic

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.

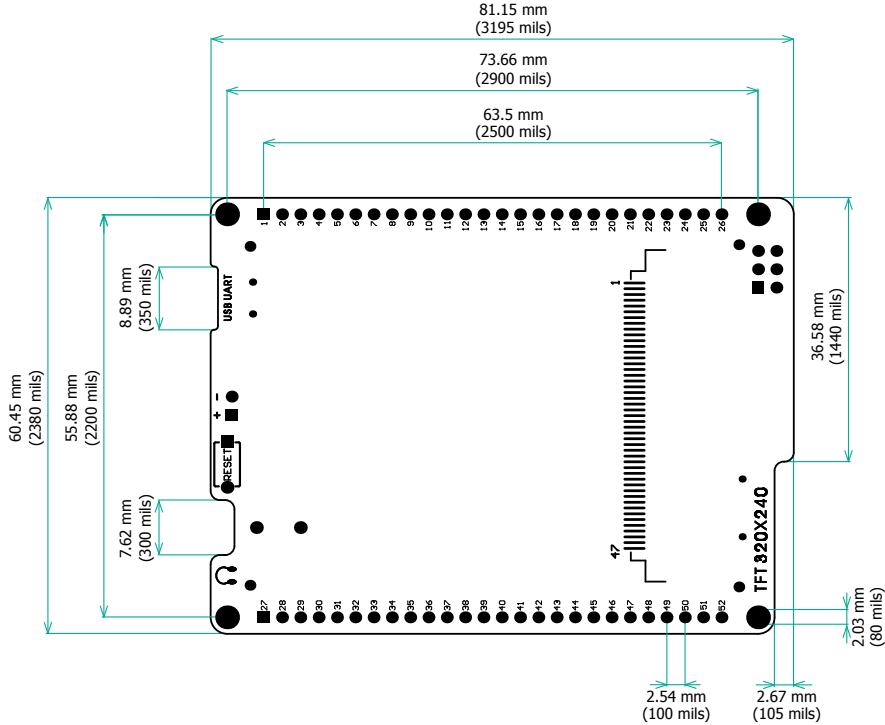




# 13. Pinout



# 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.



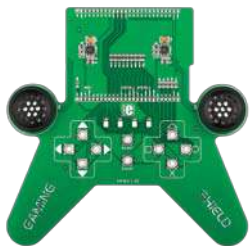
01 Connect shield



02 BatteryBoost shield



03 PROTO shield



04 Gaming shield



05 mikroBUS shield



06 Li-Polymer battery



07 Wire Jumpers

# What's next?

You have now completed the journey through each and every feature of mikromedia for XMEGA® 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:

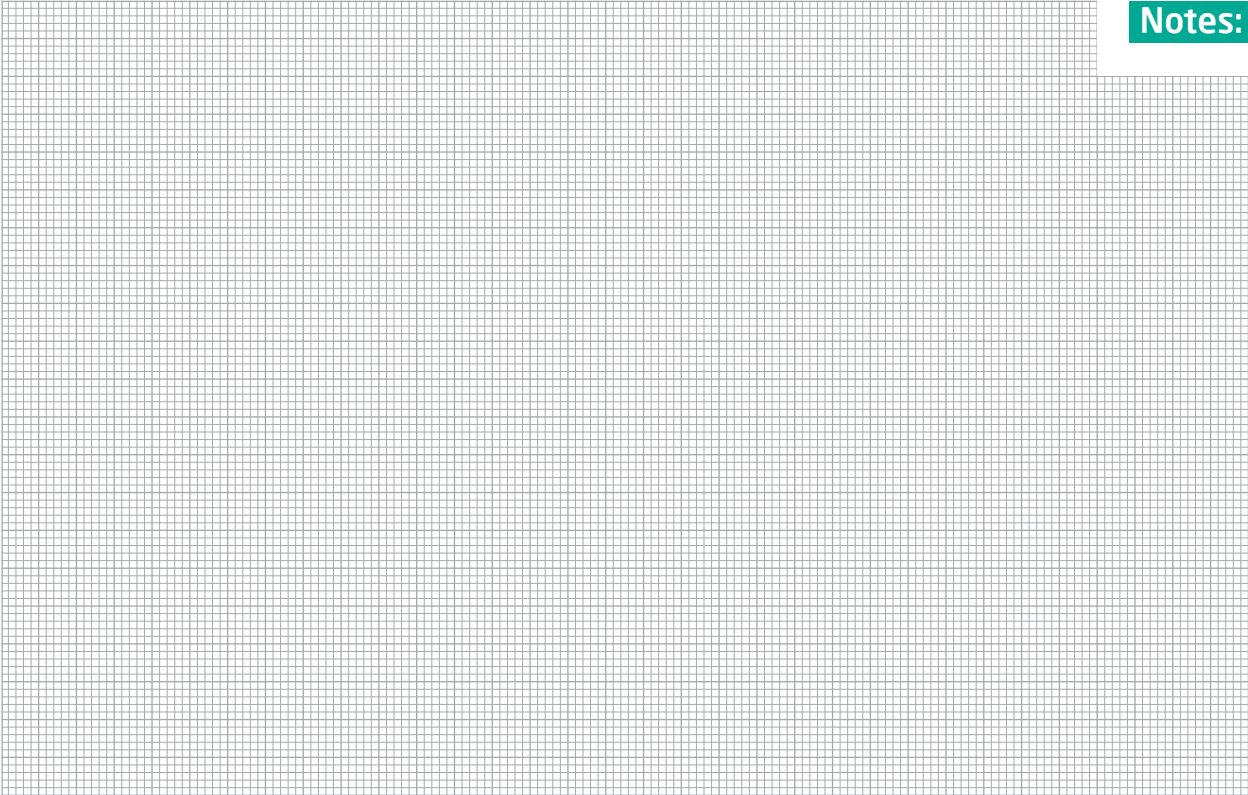
*DVD://download/eng/software/compilers/*

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:

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If you have any questions, comments or business proposals,  
do not hesitate to contact us at [office@mikroe.com](mailto:office@mikroe.com)

mikromedia for XMEGA Manual  
ver. 1.11



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