mikromedia™
for XMEGA®

Compact multimedia development system rich with on-board peripherals for all-round development on ATxmega128A1 device

MikroElektronika
DEVELOPMENT TOOLS | COMPILERS | BOOKS

AVR

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

The XMEGA® and Windows® logos and product names are trademarks of ATMEL® and Microsoft® in the U.S.A. and other countries.

Table of Contents

Introduction to mikromedia for XMEGA® 4
Package Contains 5
Key Features 6
System Specification 7
1. Power supply 8
USB power supply 8
Battery power supply 8
2. ATxmega128A1 microcontroller 10
Key microcontroller features 10
3. Programming the microcontroller 11
Programming with mikroBootloader 12
mikroBootloader software 12
Identifying device COM port 14
step 1 – Choosing COM port 14
step 2 – Establishing connection 15
step 3 – Browsing for .HEX file 15
step 4 – Selecting .HEX file 16
step 5 – Uploading .HEX file 16
step 6 – Progress bar 17
step 7 – Finishing upload 17
Programming with external programmer 18
4. Reset Button 20
5. Crystal Oscillators 22
6. MicroSD Card Slot 23
7. Touch Screen 24
8. Audio Module 26
9. USB UART connection 28
10. Accelerometer 30
11. Flash Memory 31
12. Pads 32
13. Pinout 33
14. Dimensions 34
15. Mikromedia Accessories 35
16. What's Next 36

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

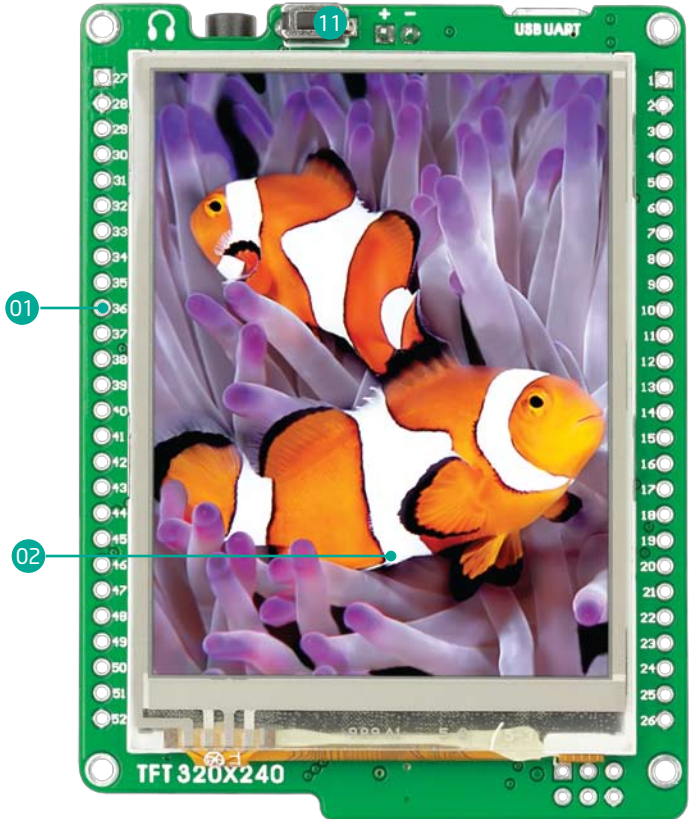
04 mikromedia for XMEGA® user's guide

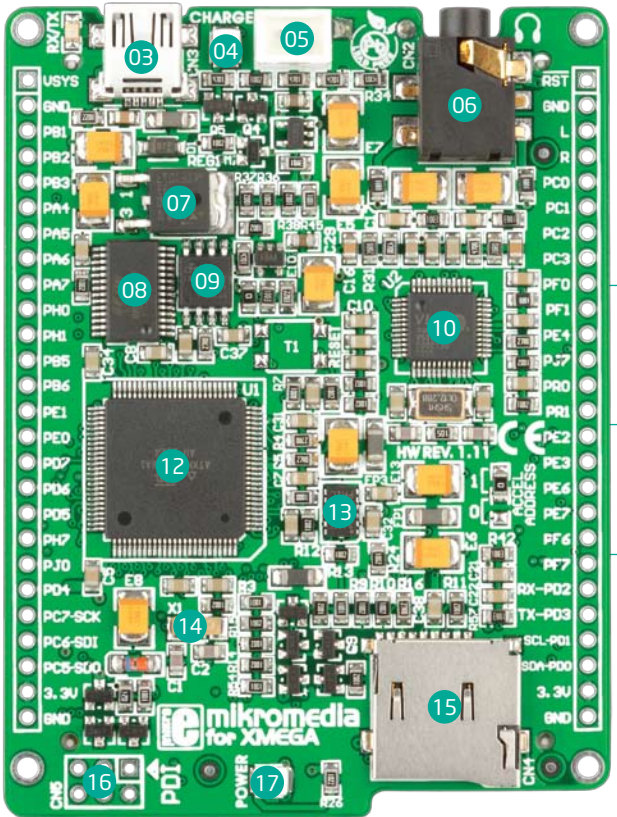
05 mikromedia for XMEGA® schematic

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

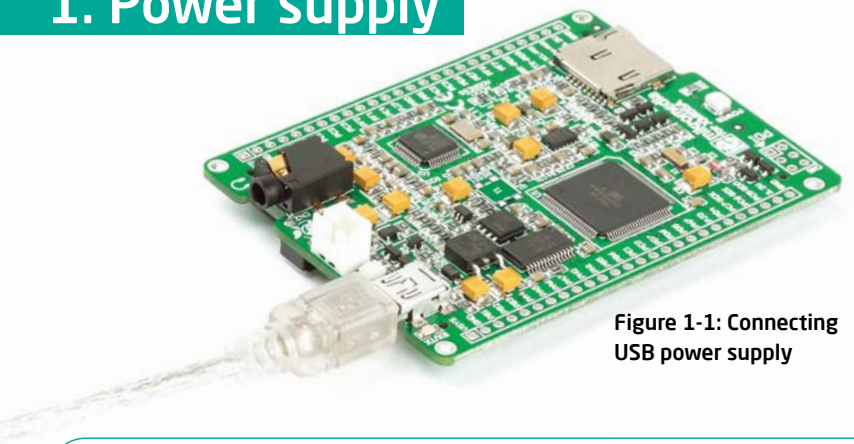


Figure 1-1: Connecting USB power supply

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.

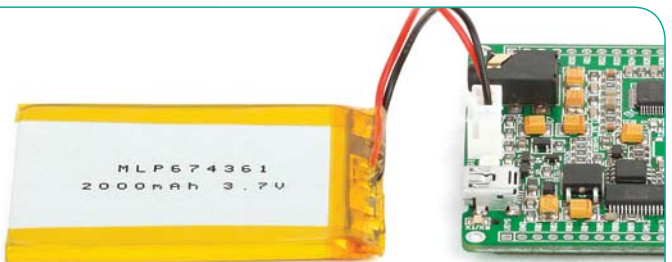


Figure 1-2: Connecting Li-Polymer battery

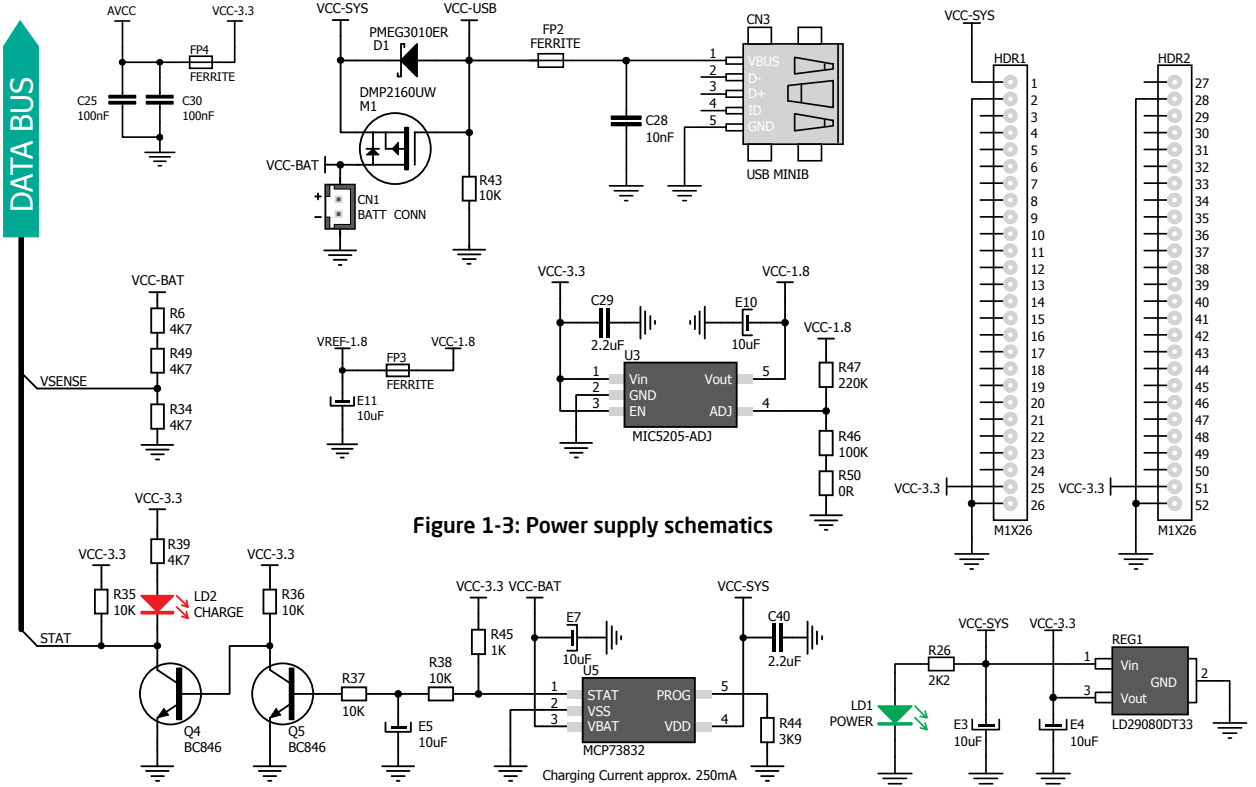


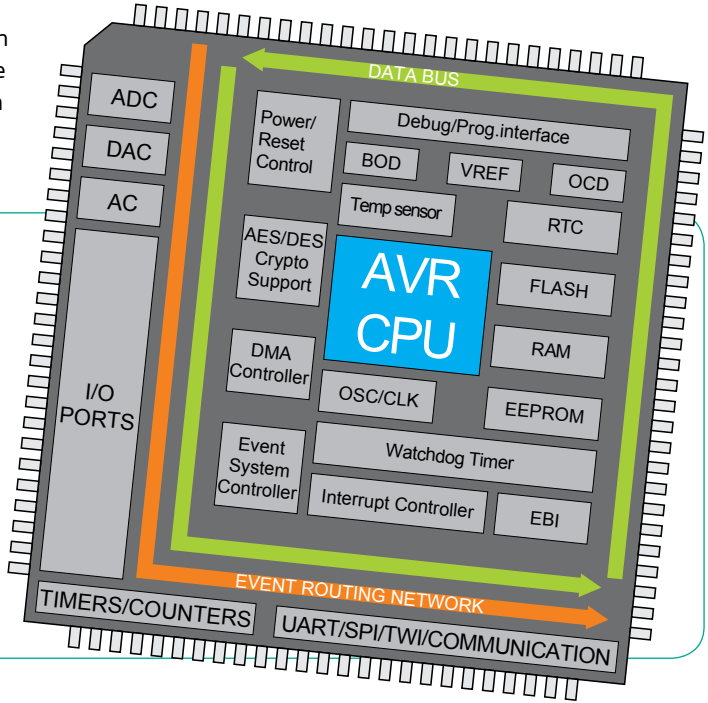
Figure 1-3: Power supply schematics

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

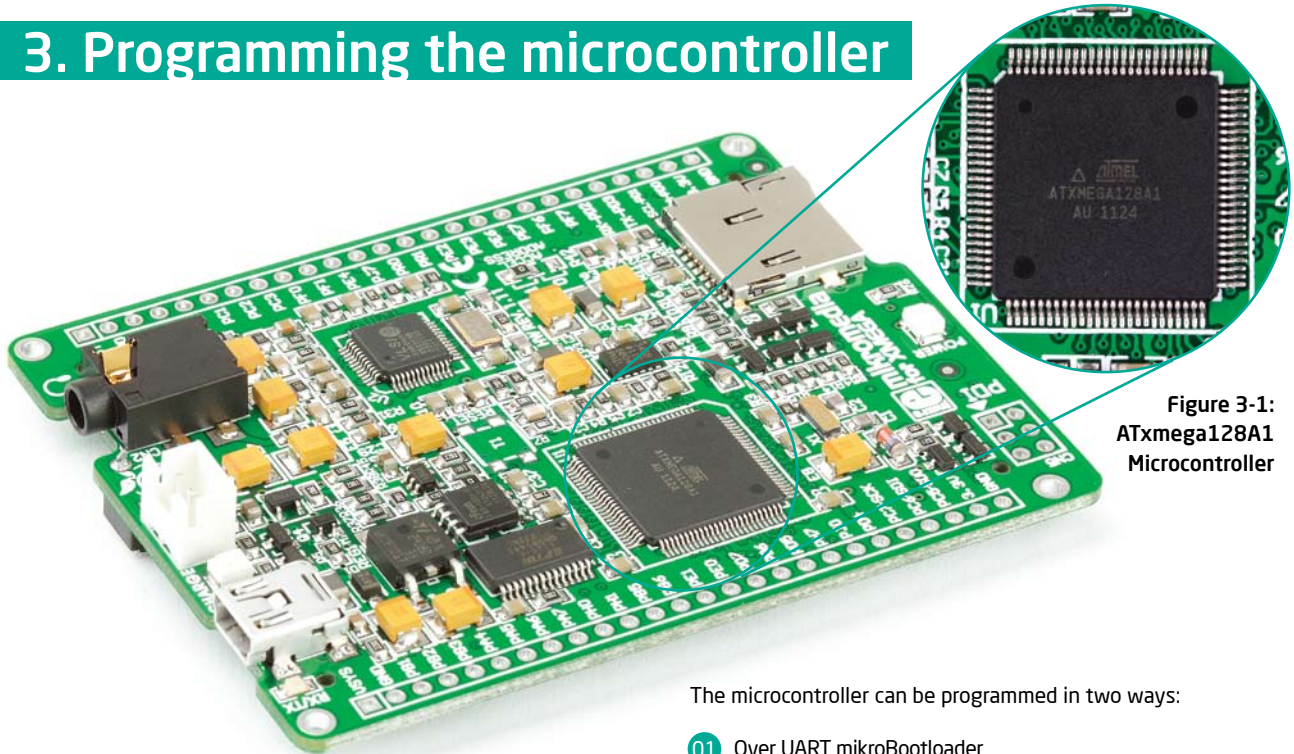


Figure 3-1: ATxmega128A1 Microcontroller

The microcontroller can be programmed in two ways:

01 Over UART mikroBootloader

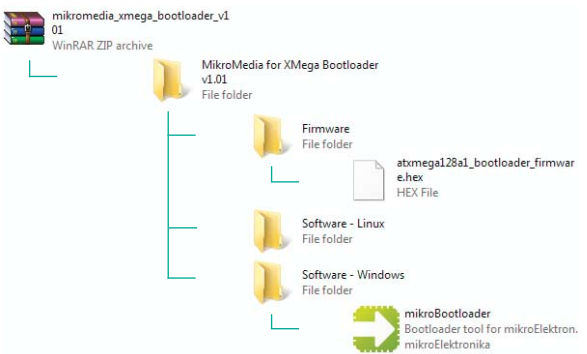
02 Using external PDI programmer

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

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



mikroBootloader software

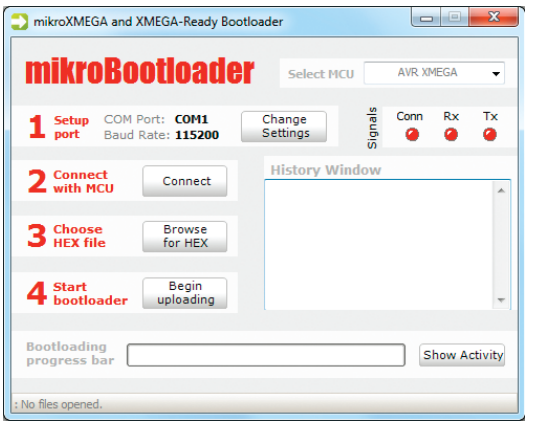
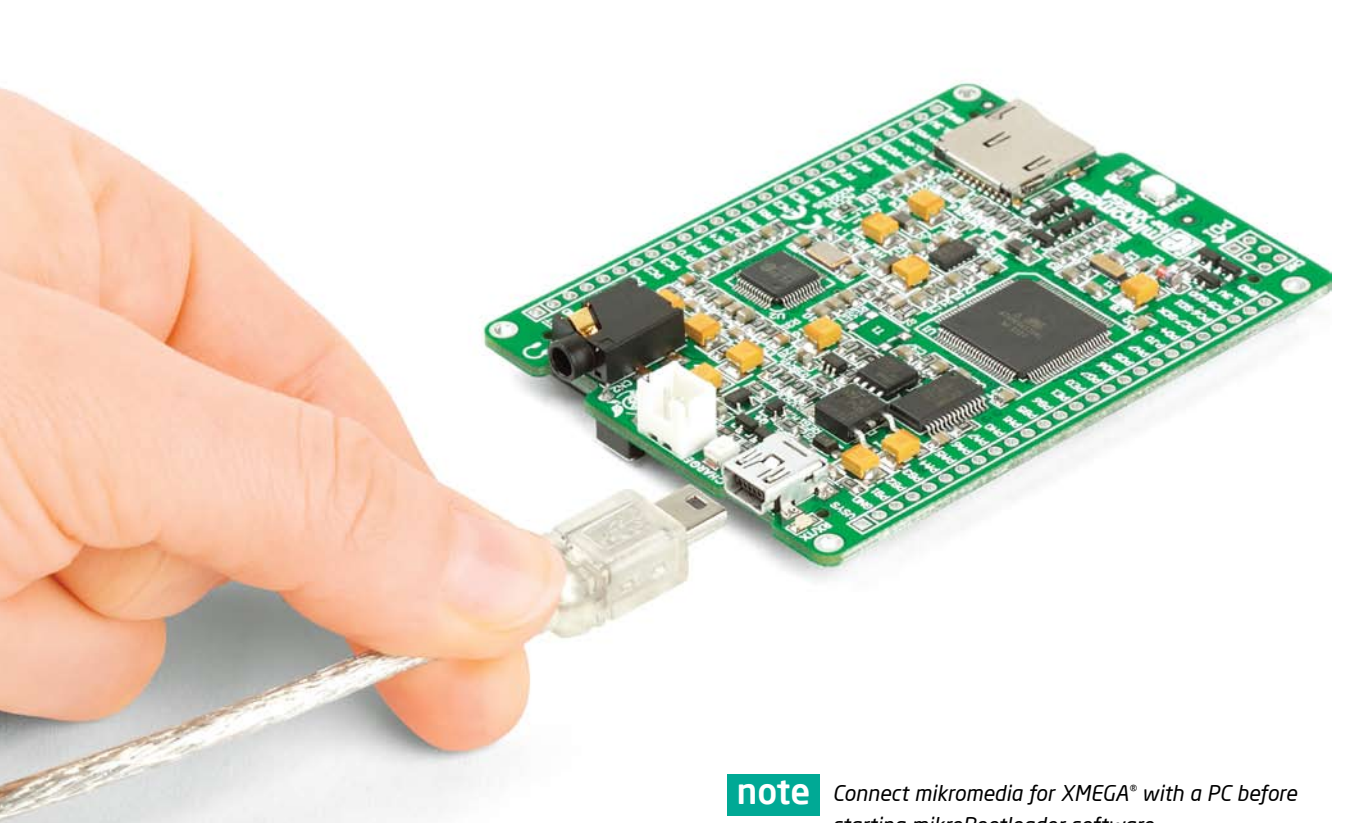


Figure 3-2: mikroBootloader window

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

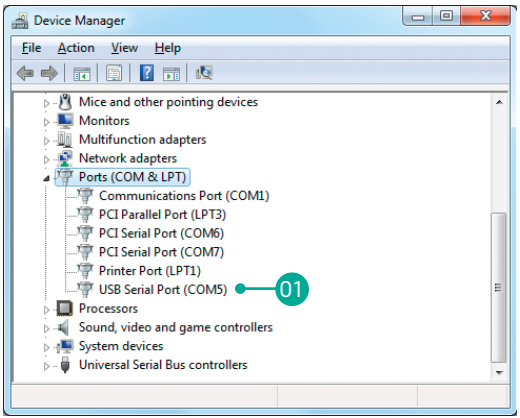


Figure 3-3: Identifying COM port

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

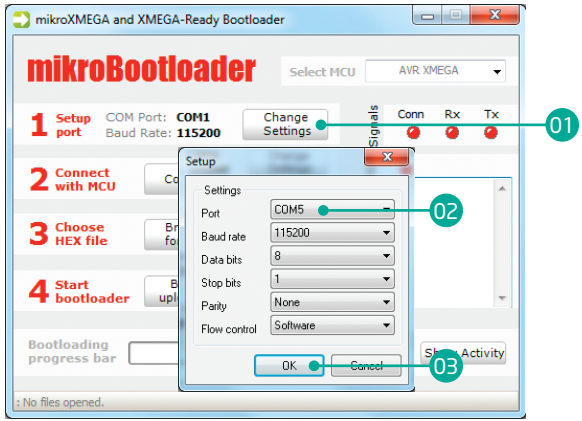


Figure 3-4: Choosing COM port

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

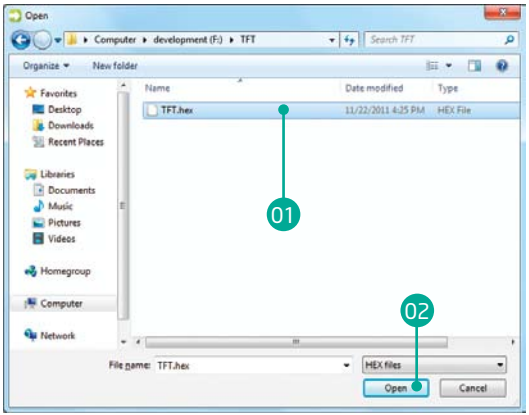


Figure 3-7: Locating and selecting .hex file

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 bootloding click the **Begin uploading** button

step 6 - Progress bar

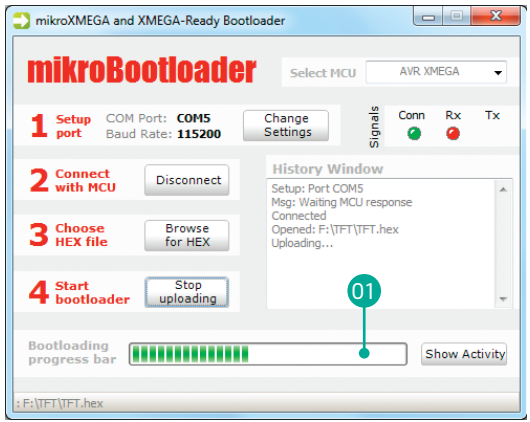


Figure 3-9: Progress bar

01 Progress bar enables you to monitor .HEX file uploading

step 7 - Finishing upload

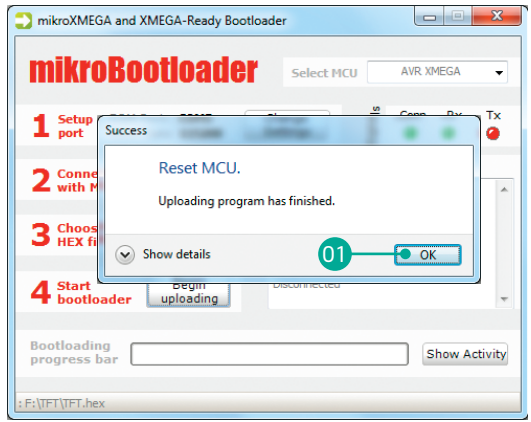


Figure 3-10: Restarting MCU

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 programer 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 accidently 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

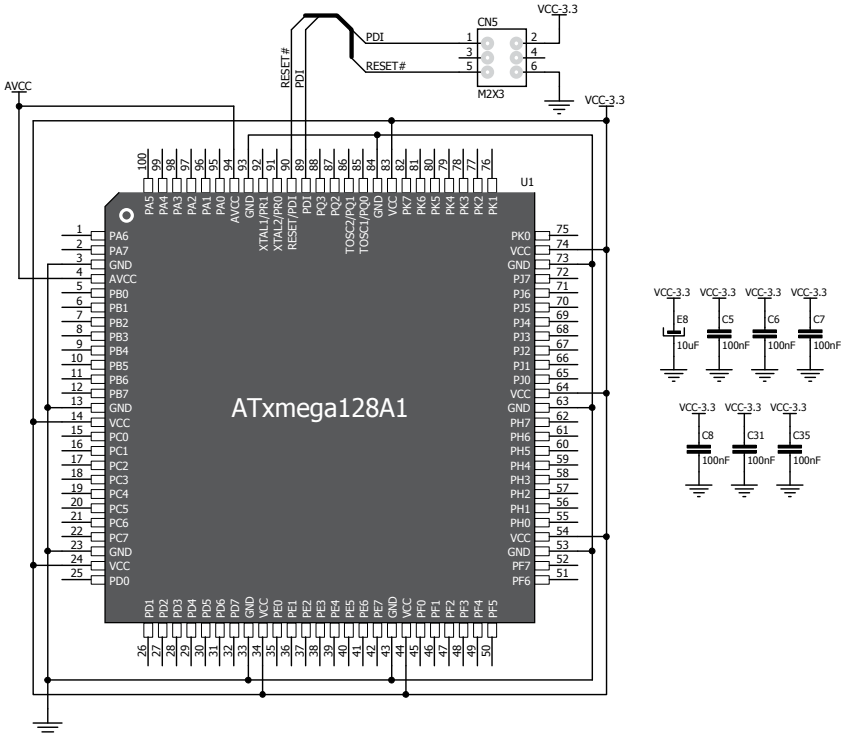
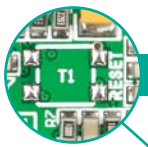


Figure 3-12: PDI programmer connection schematic

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**.

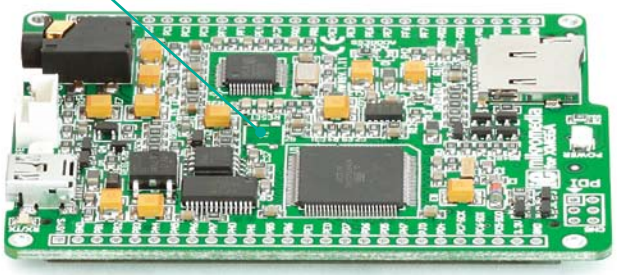


Figure 4-1: Location of additional reset button

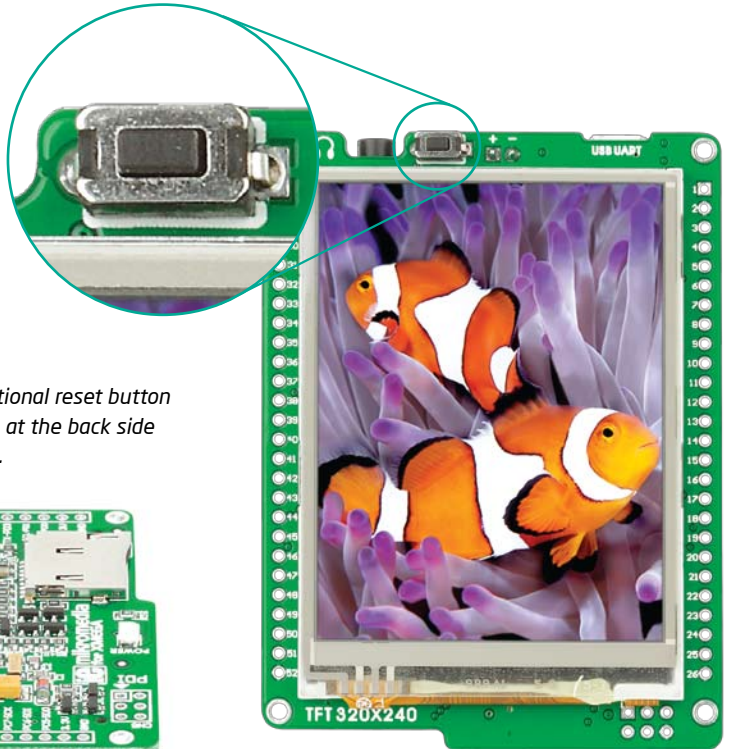


Figure 4-2: Frontal reset button

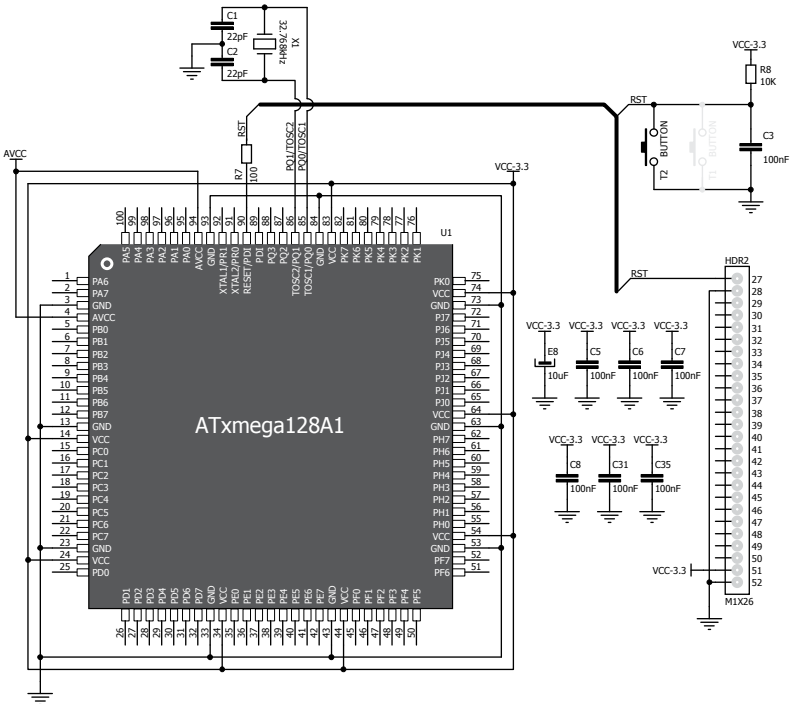


Figure 4-3: Reset circuit schematic

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.

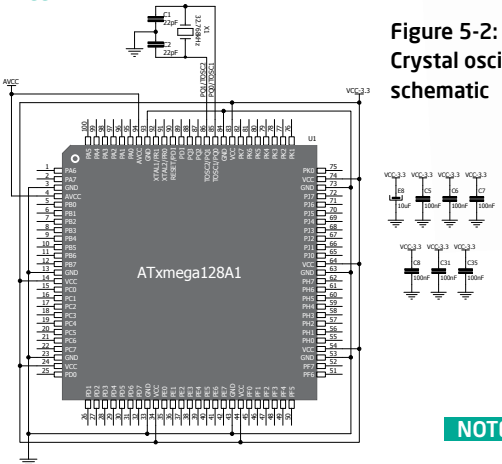


Figure 5-2: Crystal oscillator schematic

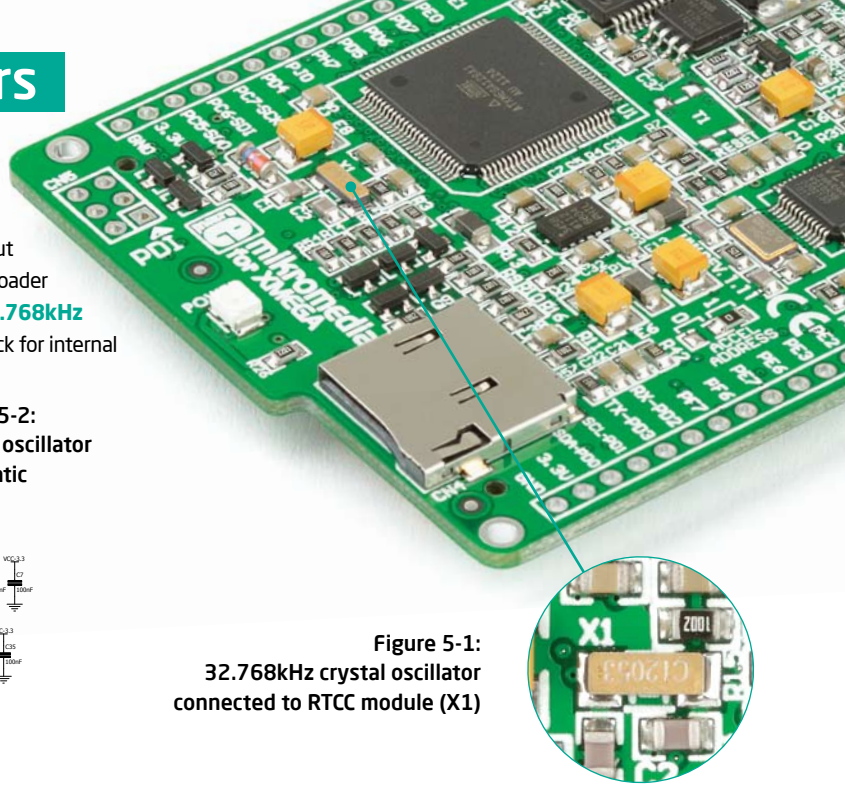


Figure 5-1: 32.768kHz crystal oscillator connected to RTCC module (X1)

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

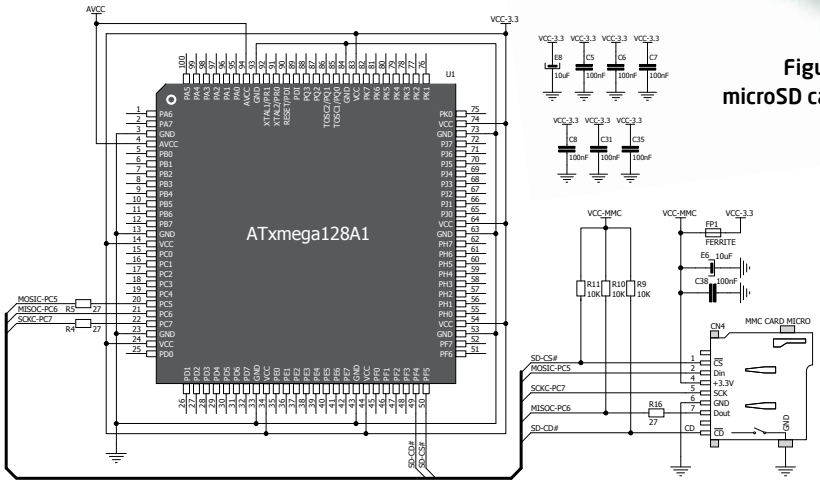


Figure 6-2: microSD Card Slot module connection schematic

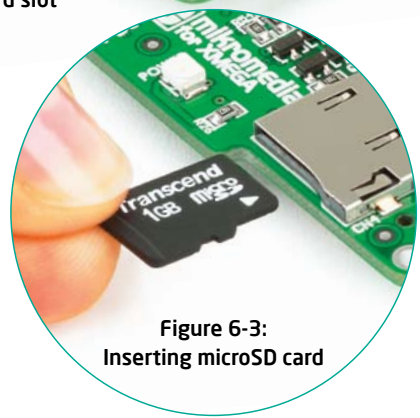


Figure 6-3: Inserting microSD card

7. Touch Screen

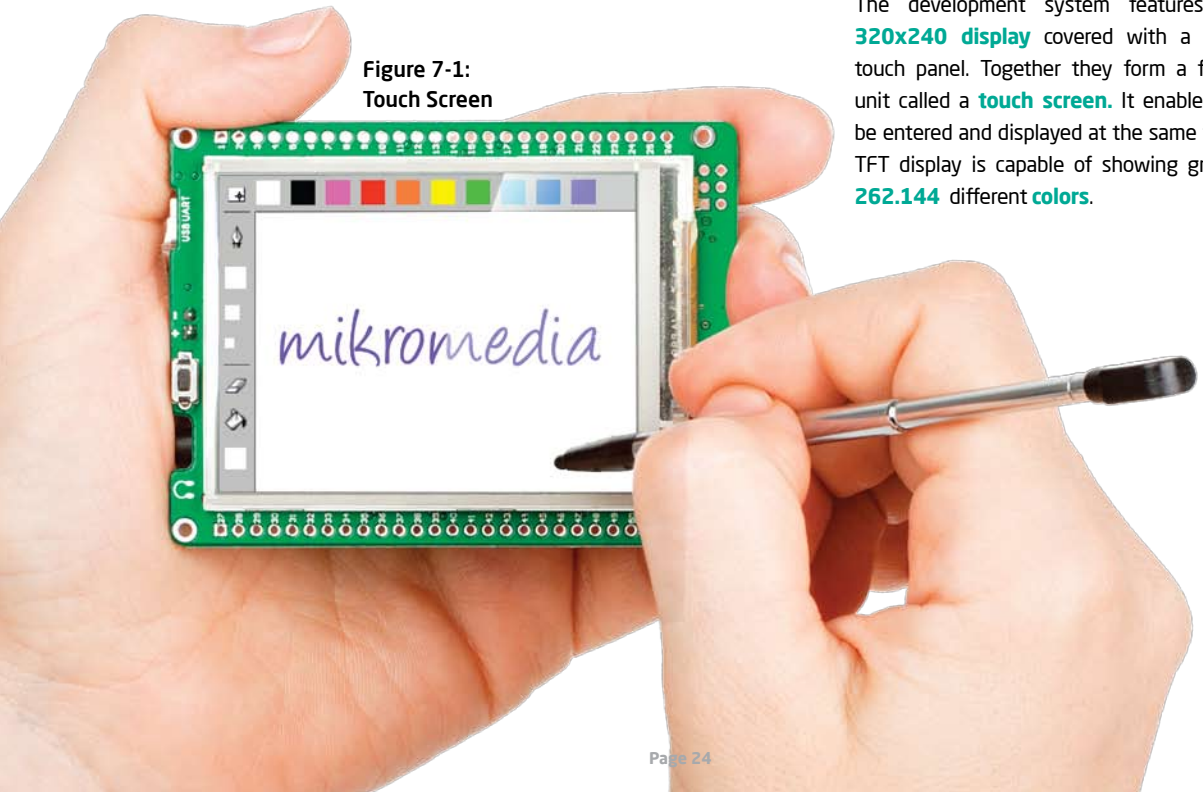


Figure 7-1:
Touch Screen

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**.

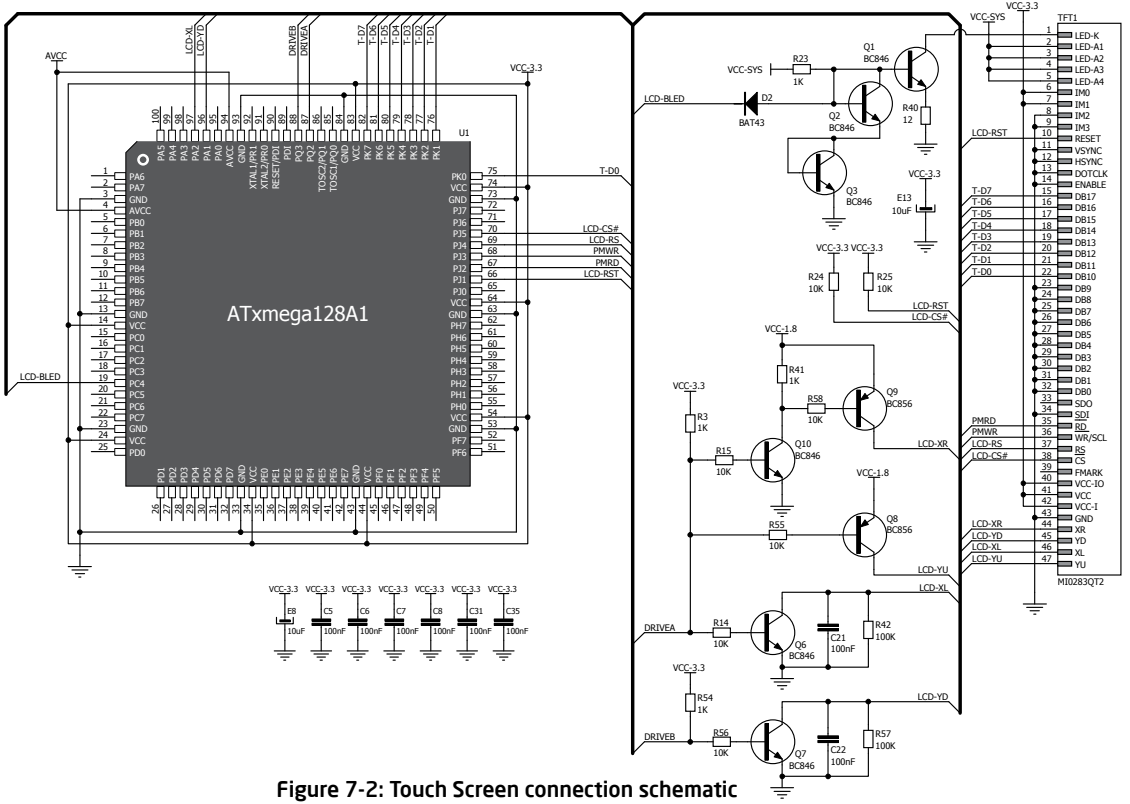


Figure 7-2: Touch Screen connection schematic

8. Audio Module

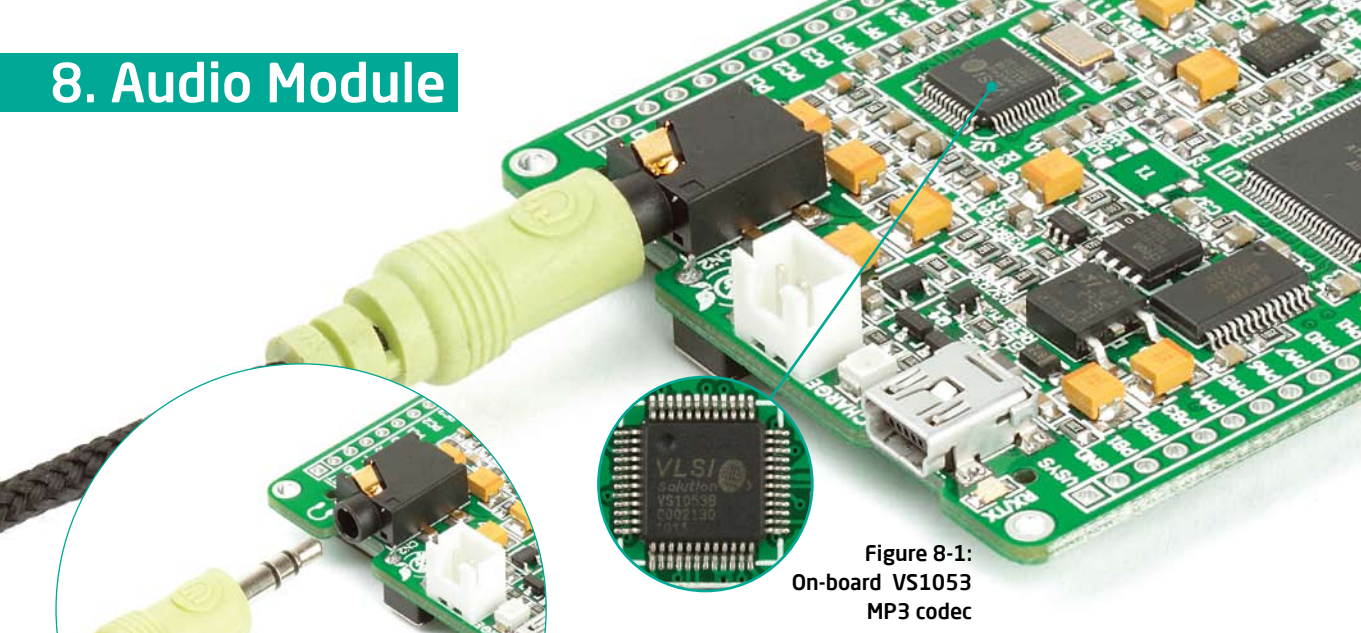


Figure 8-1:
On-board VS1053
MP3 codec

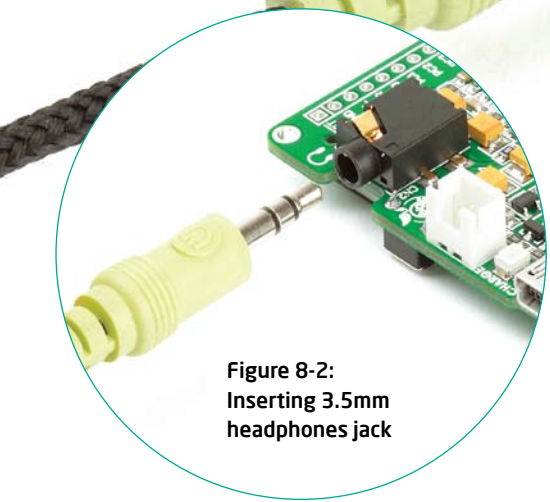


Figure 8-2:
Inserting 3.5mm
headphones jack

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**).

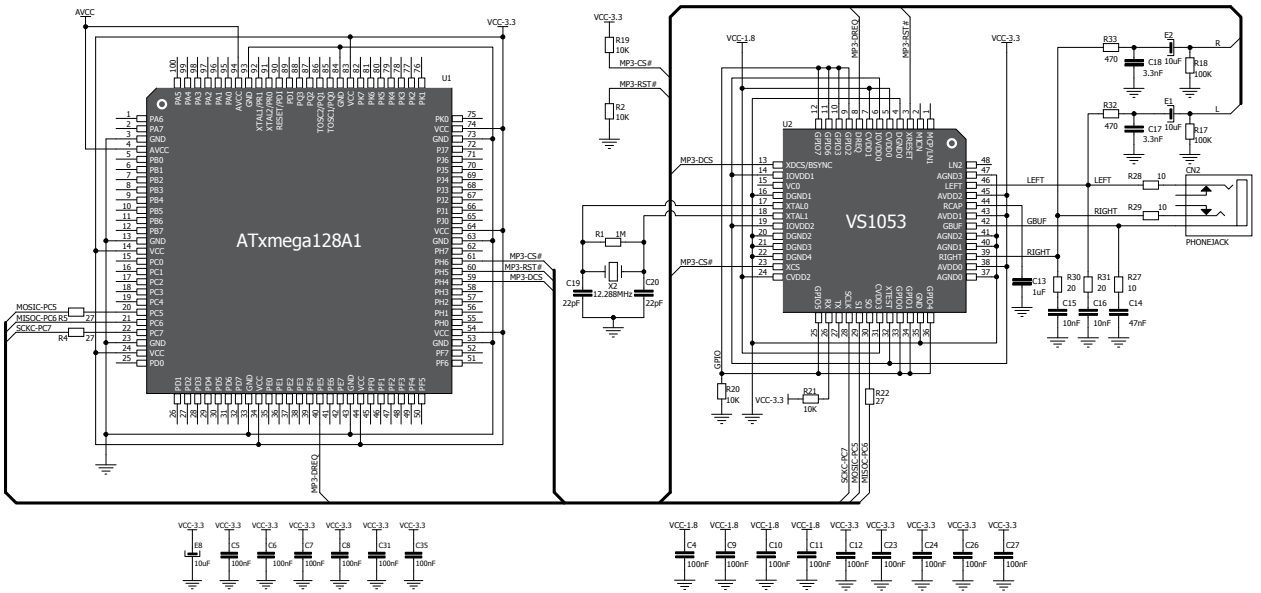


Figure 8-3: Audio module connection schematic

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.

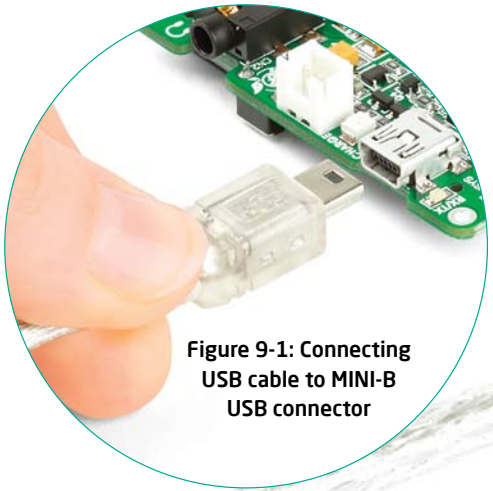


Figure 9-1: Connecting USB cable to MINI-B USB connector

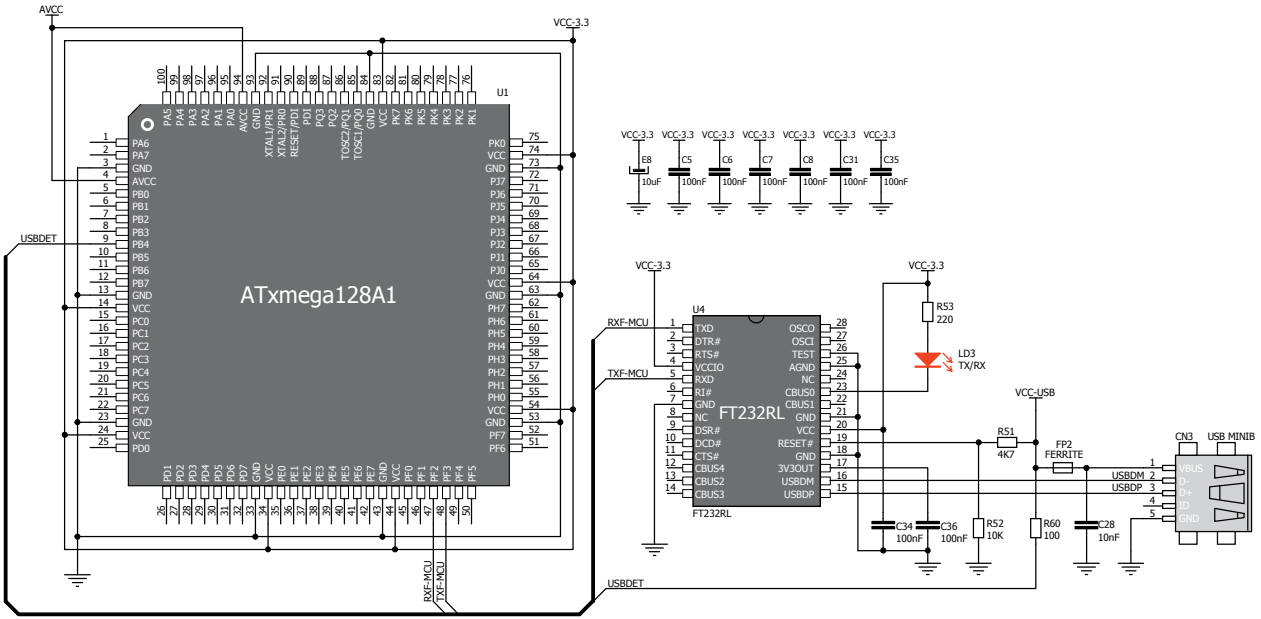
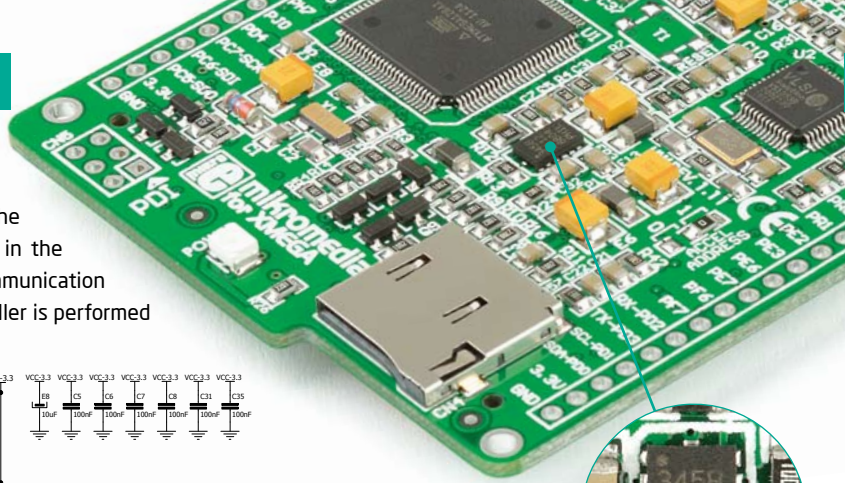


Figure 9-2: USB module connection schematic

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 **I²C** interface.



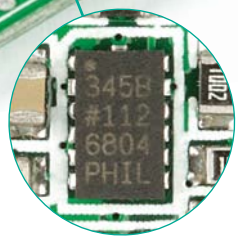


Figure 10-1: Accelerometer module

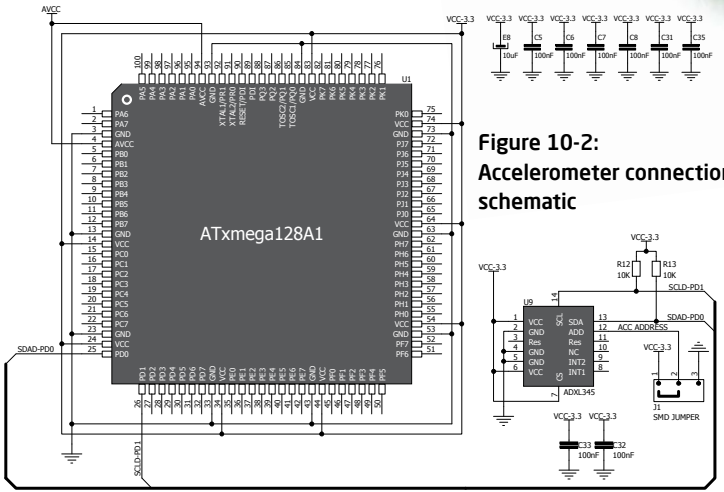


Figure 10-2: Accelerometer connection schematic

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

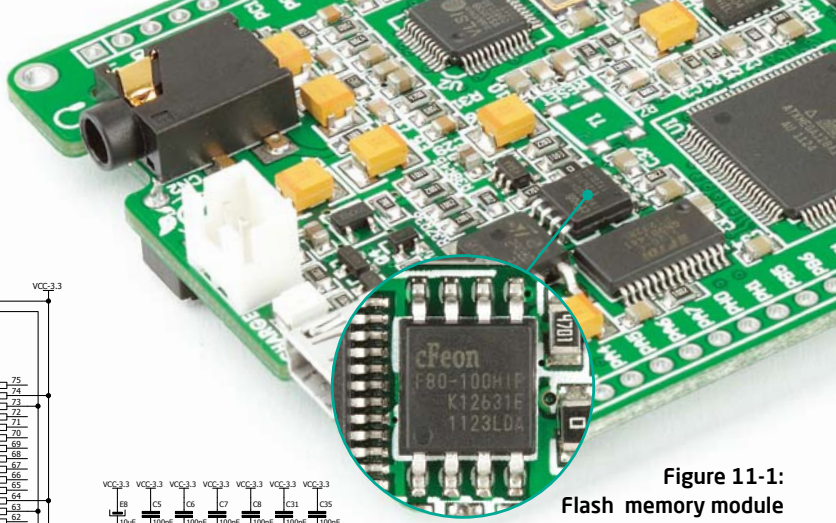


Figure 11-1:
Flash memory module

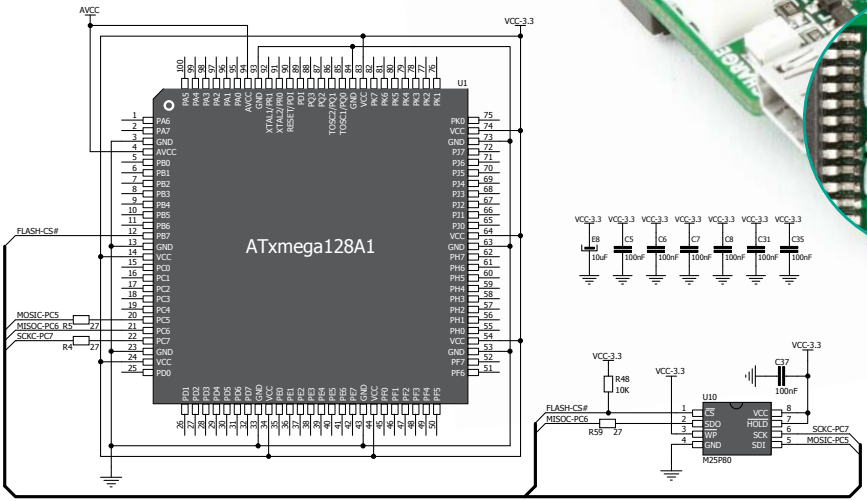


Figure 11-2:
Flash memory module connection schematic

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

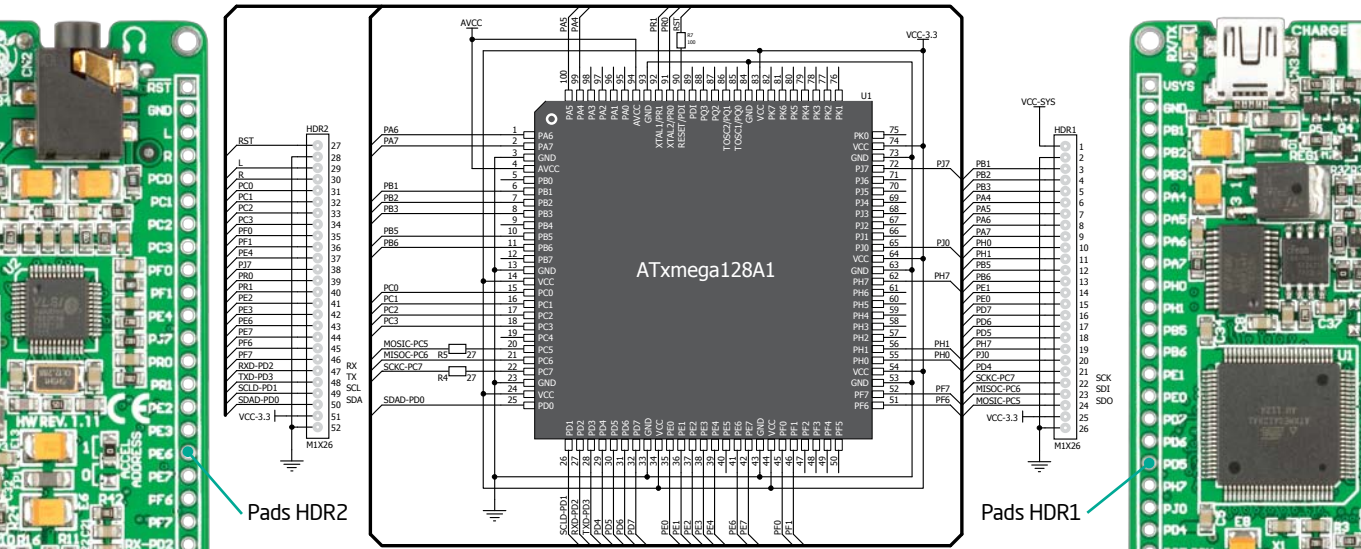
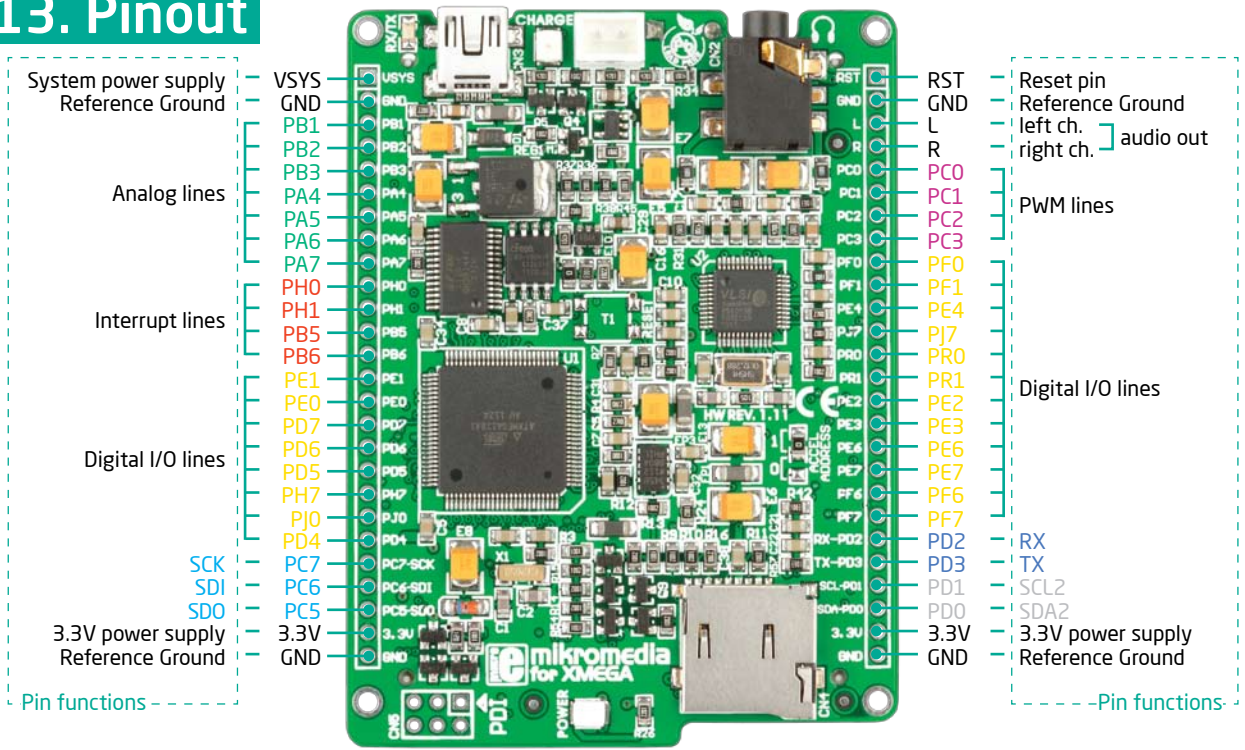


Figure 12-1: connecting pads schematic

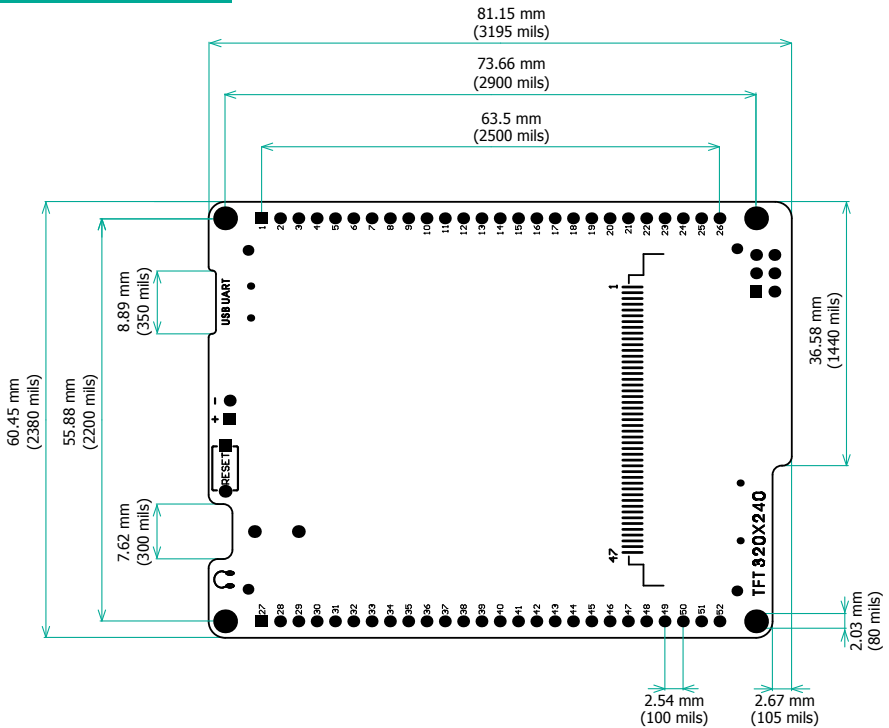
Most microcontroller pins are available for further connectivity via two 1x26 rows of connection pads on both sides of the mikromedia board. They are designed to match additional shields, such as Battery Boost shield, Gaming, PROTO shield and others.

13. Pinout



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

14. Dimensions



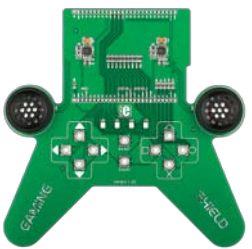
15. mikromedia accessories

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.

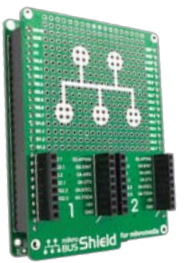
01 Connect shield

02 BatteryBoost shield

03 PROTO shield



04 Gaming shield



05 mikroBUS shield

06 Li-Polimer 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:

Notes:

DISCLAIMER

All the products owned by MikroElektronika are protected by copyright law and international copyright treaty. Therefore, this manual is to be treated as any other copyright material. No part of this manual, including product and software described herein, may be reproduced, stored in a retrieval system, translated or transmitted in any form or by any means, without the prior written permission of MikroElektronika. The manual PDF edition can be printed for private or local use, but not for distribution. Any modification of this manual is prohibited.

MikroElektronika provides this manual 'as is' without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties or conditions of merchantability or fitness for a particular purpose.

MikroElektronika shall assume no responsibility or liability for any errors, omissions and inaccuracies that may appear in this manual. In no event shall MikroElektronika, its directors, officers, employees or distributors be liable for any indirect, specific, incidental or consequential damages (including damages for loss of business profits and business information, business interruption or any other pecuniary loss) arising out of the use of this manual or product, even if MikroElektronika has been advised of the possibility of such damages. MikroElektronika reserves the right to change information contained in this manual at any time without prior notice, if necessary.

HIGH RISK ACTIVITIES

The products of MikroElektronika are not fault - tolerant nor designed, manufactured or intended for use or resale as on - line control equipment in hazardous environments requiring fail - safe performance, such as in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life support machines or weapons systems in which the failure of Software could lead directly to death, personal injury or severe physical or environmental damage ('High Risk Activities'). MikroElektronika and its suppliers specifically disclaim any expressed or implied warranty of fitness for High Risk Activities.

TRADEMARKS

The MikroElektronika name and logo, the MikroElektronika logo, mikroC™, mikroBasic™, mikroPascal™, mikroProg™, EasyAVR™, mikroBUS™, Click Boards™ and mikromedia™ are trademarks of MikroElektronika. All other trademarks mentioned herein are property of their respective companies.
All other product and corporate names appearing in this manual may or may not be registered trademarks or copyrights of their respective companies, and are only used for identification or explanation and to the owners' benefit, with no intent to infringe.

Copyright © MikroElektronika, 2012, All Rights Reserved.

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/esupport
If you have any questions, comments or business proposals, do not hesitate to contact us at office@mikroe.com

mikromedia for XMEGA Manual
ver. 1.11