mikromedia™

for PSoC® 5LP

Compact development system rich with on-board peripherals for all-round multimedia development on CY8C5868AXI-LP035 device.

MikroElektronika
DEVELOPMENT TOOLS | COMPILERS | BOOKS

PSoC

TO OUR VALUED CUSTOMERS

I want to express my thanks to you for being interested in our products and for having confidence in MikroElektronika.

The primary aim of our company is to design and produce high quality electronic products and to constantly improve the performance thereof in order to better suit your needs.

Nebojsa Matic
General Manager

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Introduction to mikromedia for PSoC® 5LP

The **mikromedia for PSoC® 5LP** is a compact development system with lots of on-board peripherals which allow development of devices with multimedia content. The central part of the system is a 32-bit **CY8C5868AXI-LP035** microcontroller. The mikromedia for PSoC® 5LP features integrated modules such as stereo MP3 codec, **320x240 TFT touch screen** display, accelerometer, USB connector, audio connector, MMC/SD card slot, 2Mbit FRAM, two 1x26 connection pads and other. It comes pre-programmed with a **USB HID PSoC® bootloader**, but can also be programmed with external programmers, such as mikroProg™ for PSoC® 5LP or other external programmers. Mikromedia is compact and slim which makes it a convenient platform for mobile devices.

Package Contains

01 Damage resistant protective box

02 mikromedia for PSoC® 5LP development board

03 Two 1x26 male headers and one 2x5 male headers

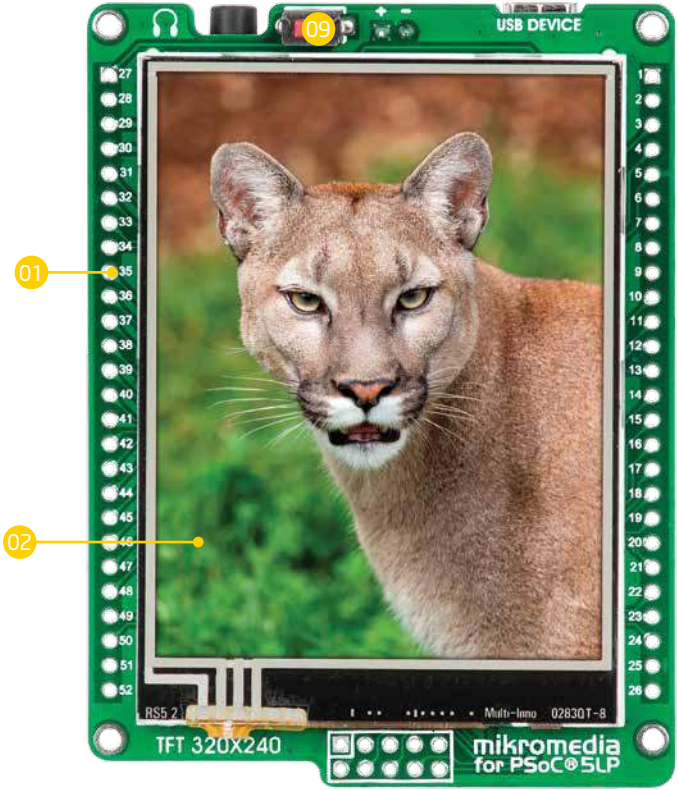
04 mikromedia for PSoC® 5LP user's guide

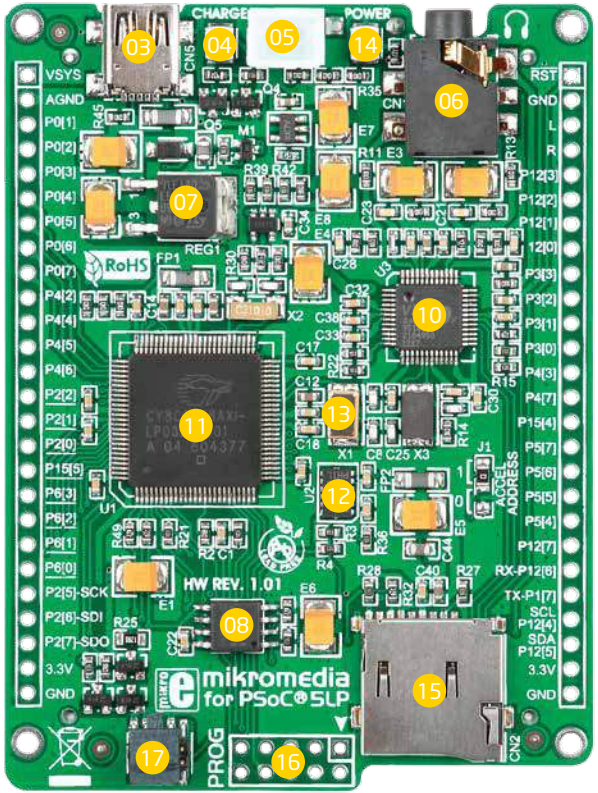
05 mikromedia™ for PSoC® 5LP schematics and pinout

06 USB cable

Key Features

01 Connection Pads
02 TFT display 320x240px
03 USB MINI-B connector
04 CHARGE indicator LED
05 Li-Polymer battery connector
06 3.5mm headphone connector
07 Power supply regulator
08 FRAM
09 RESET button
10 VS1053 Stereo mp3 coder/decoder
11 CY8C5868AXI-LP035 microcontroller
12 Accelerometer
13 Crystal oscillator
14 Power indication LED
15 microSD Card Slot
16 mikroProg connector
17 Cortex Debug connector





System Specification

power supply
Via USB cable (5V DC)

power consumption
46 mA with erased MCU
(when on-board modules are inactive)

board dimensions
81.2 x 60.5 mm (3.19 x 2.38 inch)

weight
~50g (0.11lbs)

1. Power supply

Figure 1-1: Connecting USB power supply

USB power supply

You can power the board using the **MINI-B USB** cable which comes in the package. 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 a **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 the battery is charging. Charging current is ~250mA and charging voltage is 4.2V DC.

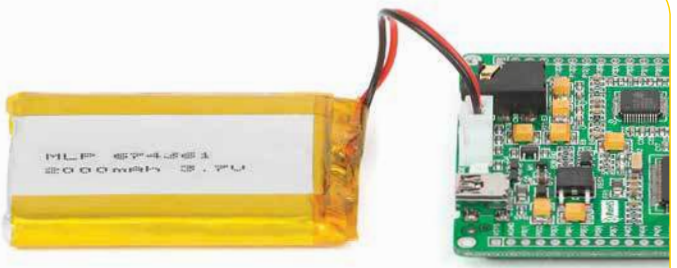


Figure 1-2: Connecting Li-Polymer battery

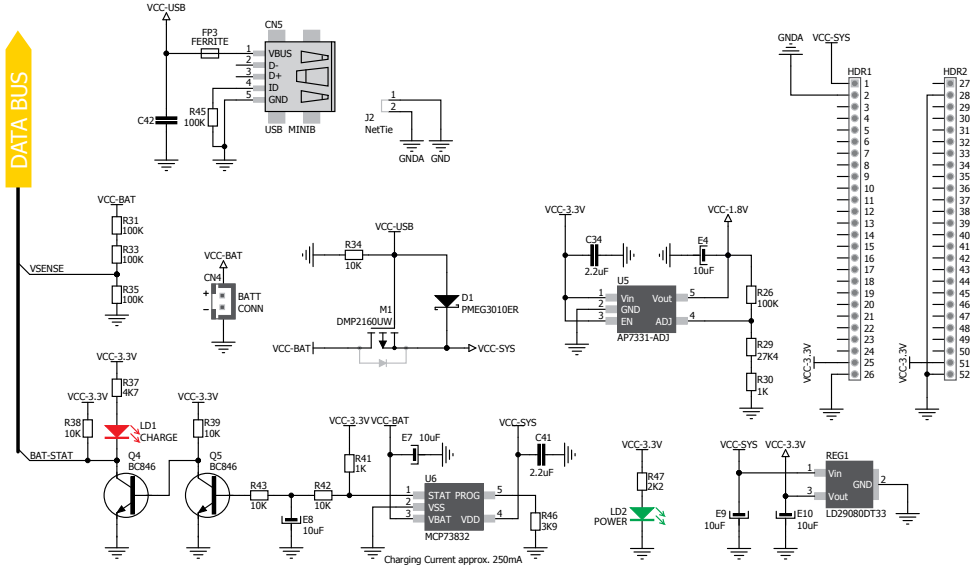
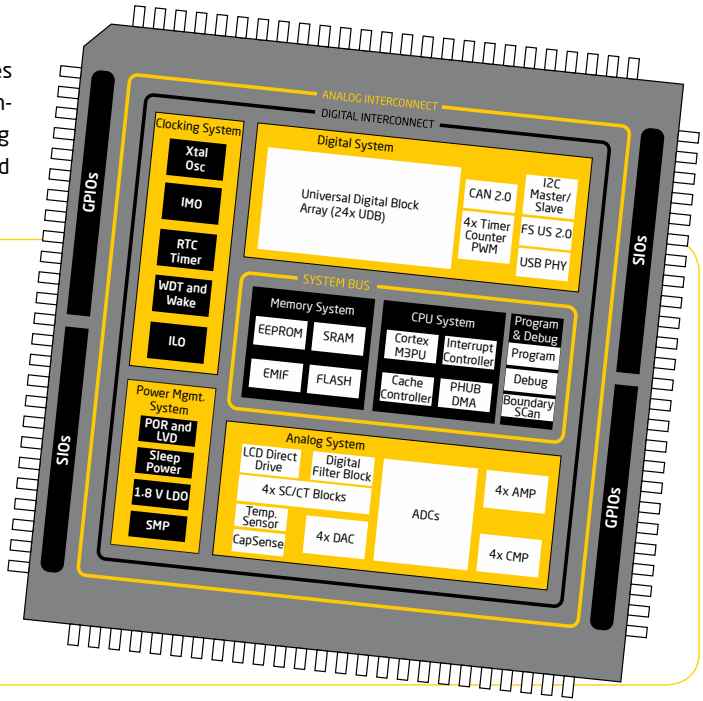


Figure 1-3: Power supply schematics

2. CY8C5868AXI-LP035 microcontroller

The **mikromedia for PSoC® 5LP** development system comes with the **CY8C5868AXI-LP035** microcontroller. This high-performance 32-bit microcontroller with its integrated analog and digital modules and in combination with other on-board modules is ideal for multimedia applications.



Key microcontroller features

- 64 MHz, 32-bit ARM® Cortex™-M3 Core;
- 256 KB Flash; 64 KB SRAM;
- 4 dedicated comparators
- 62 I/O pins;
- SPI, I2C, UART, CAN, USB, ADC, DAC;
- Timers, counters, PWMs;
- Internal Oscillators;
- RTCC; etc.

3. Programming the microcontroller

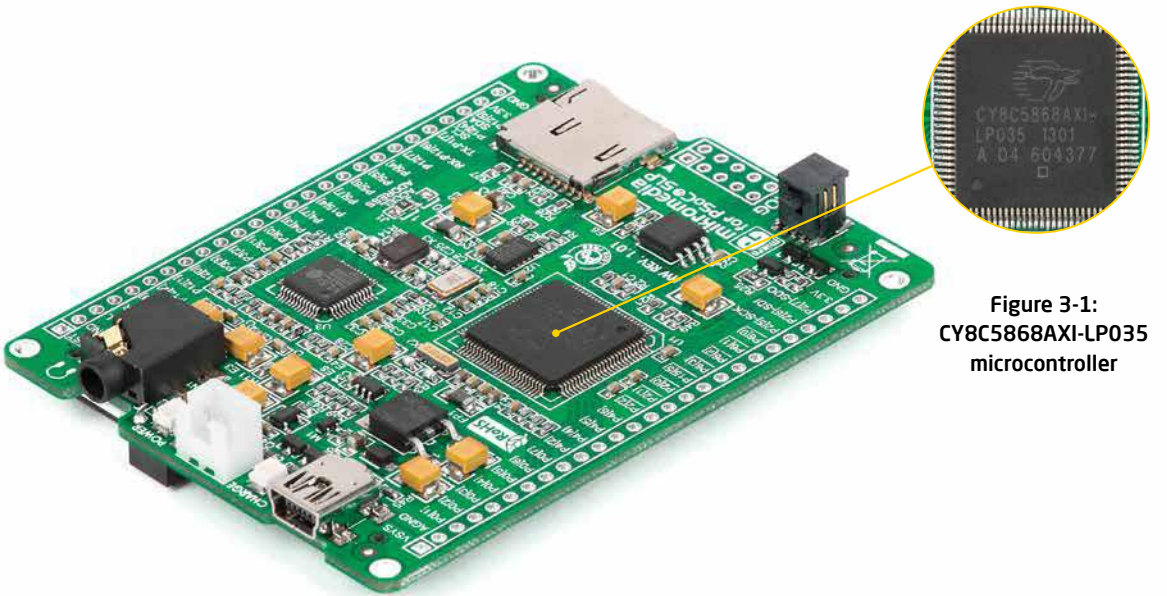


Figure 3-1:
CY8C5868AXI-LP035 microcontroller

The microcontroller can be programmed in two ways:

01 Over USB HID PSoC® bootloader

02 Using mikroProg™ for PSoC® 5LP or other external programmers.

Programming with PSoC® Bootloader

You can program the microcontroller with the bootloader which is preprogrammed into the device by default. To transfer the bootloader file from PC to MCU you need **PSoC® Programmer™** and **PSoC® Creator™**. Appropriate software packages can be found on the links bellow. Before downloading software you need to register on Cypress' website.

http://www.cypress.com/?rID=38050

PSoCProgrammerSetup_3.20.0.1823
.exe
Win32 Cabinet Self-Extractor

http://www.cypress.com/psoccreator/

PSoCCreatorSetup.exe
Win32 Cabinet Self-Extractor
Microsoft Corporation

Upon download, double click each setup file to begin installation of the PSoC® Programmer and PSoC® Creator™.

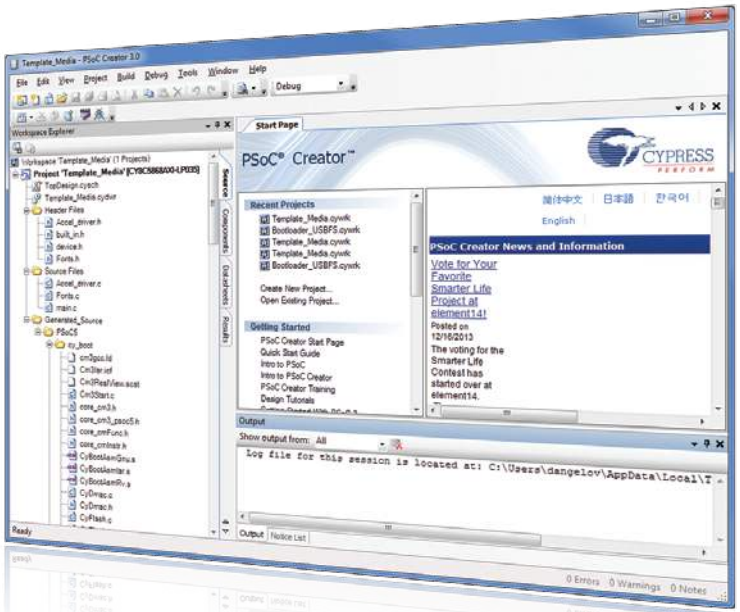
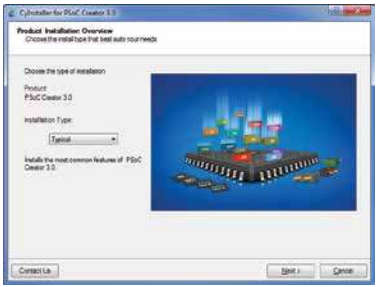


Figure 3-2: Main Window of PSoC® Creator™ software

PSoC® Creator™ Installation Wizard

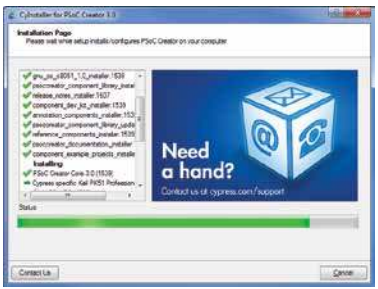
01 Start Installation



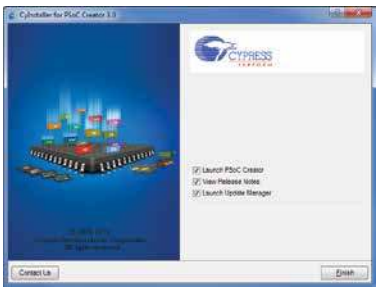
02 Installation type

03 Accept license agreement

04 Accept license agreement



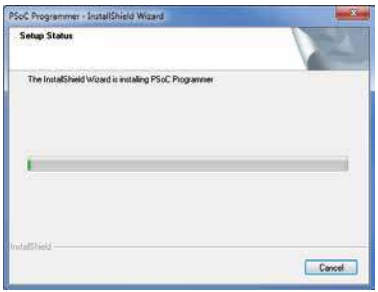
05 Installation in progress



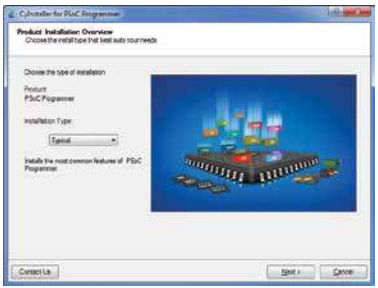
06 Finish installation

PSoC® Programmer™ Installation wizard

01 Start Installation



02 Setup



03 Installation type

04 Accept license agreement

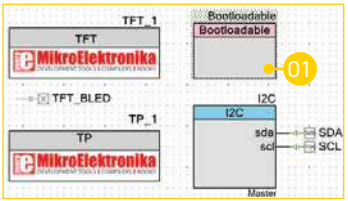
05 Installation in progress

06 Finish installation

PSoC® bootloader quick guide

NOTE: Prior to use, bootloader .HEX file needs to be programmed into the mikromedia for PSoC® 5LP's MCU.

Start PSoC® Creator™ and open the appropriate Workspace File for PSoC® Creator™ (.cywrk file):



01 Double click the **Bootloadable** component and the **Configure window** will appear.

02 Click the **Dependencies** tab to find a reference to the associated bootloader .HEX and .ELF files.

03 Click the **Browse** button and choose the **Bootloader_USBFS.HEX** file from the pop-up window. The file can be find in the bootloader example folder. Click the **OK button**.

Open PSoC® Creator™ Bootloader Host window (**Tools > Bootloader Host**):

04 Click the **blue folder icon** and choose the .CYACD file which will be uploaded to MCU memory from the pop-up window.

05 Connect the USB cable, or if already connected press the **Reset** button on your mikromedia board. **USB Human Interface Device** will appear in the **Ports** section of the window.

06 Click the **blue arrow icon** within 10s to program the MCU memory, otherwise the existing microcontroller program will execute.

07 If everything is done properly the board will automatically reset and your new program will execute.

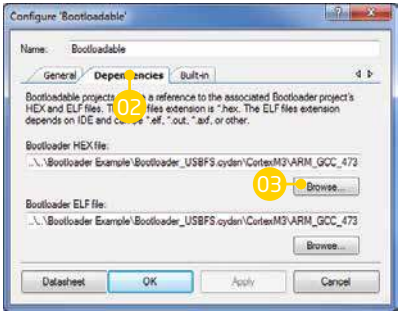


Figure 3-3: PSoC® bootloader host

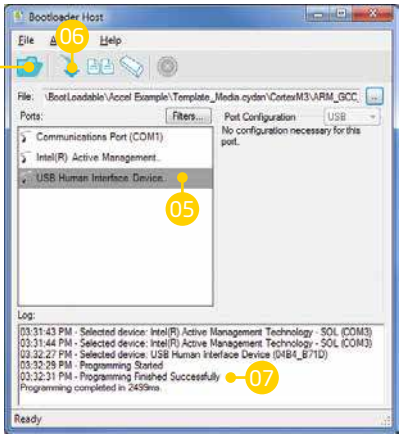


Figure 3-4: PSoC® bootloader host

Programming with mikroProg™ programmer

The microcontroller can be programmed with the **mikroProg™ for PSoC® 5LP** programmer, **PSoC® programmer™** software and **PSoC® Creator™** software. The mikroProg™ is connected to the development board via the **CN6** connector, **Figure 3-5**. The board also contains a **Cortex Debug connector (CN3)** which can be used with other external programmers.

Figure 3-5:
Connecting mikroProg™ to mikromedia™

mikroProg™ for PSoC® 5LP is a fast programmer and hardware debugger. It's a great tool for programming the Cypress® PSoC® 5LP microcontroller family. Outstanding performance, easy operation, elegant design and affordable price are its top features.

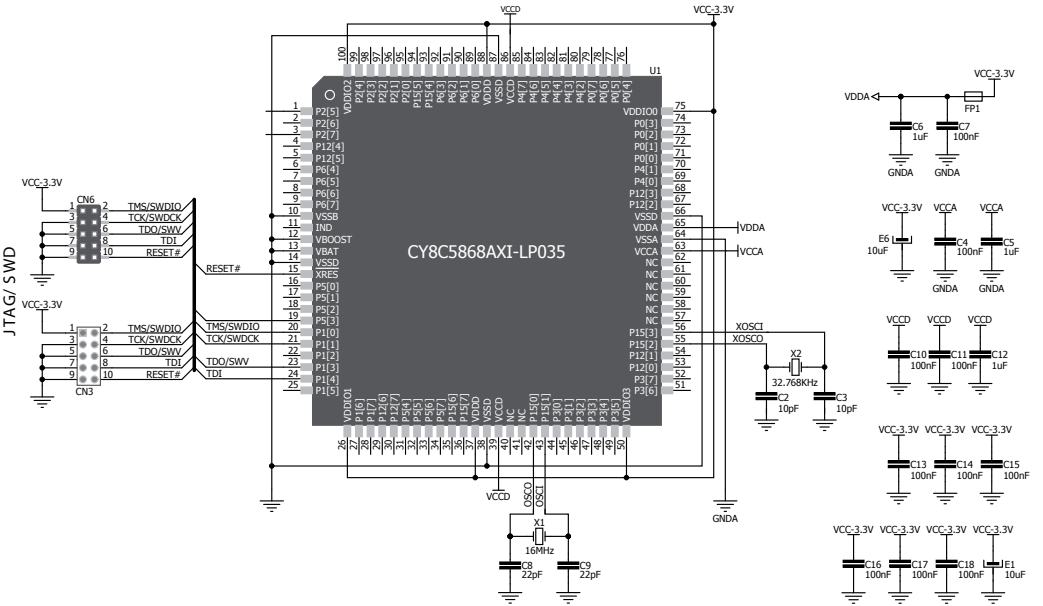


Figure 3-6: mikroProg™ connection schematic

4. Reset Button

Figure 4-1: Reset button

Board is equipped with reset button, which is located at the top of the front side (**Figure 4-1**). Press it to reset the circuit. It will generate a low voltage level on the microcontroller reset pin (input). In addition, a reset signal can also be sent through **pin 27** on side headers (**Figure 4-2**).

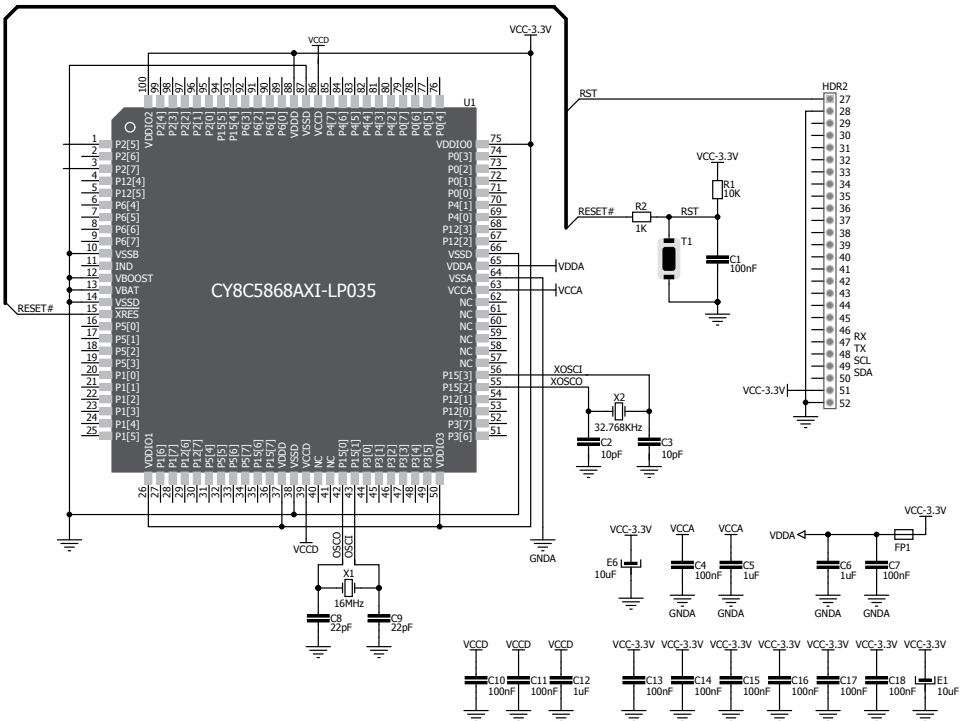


Figure 4-2: Reset circuit schematic

5. Crystal oscillator

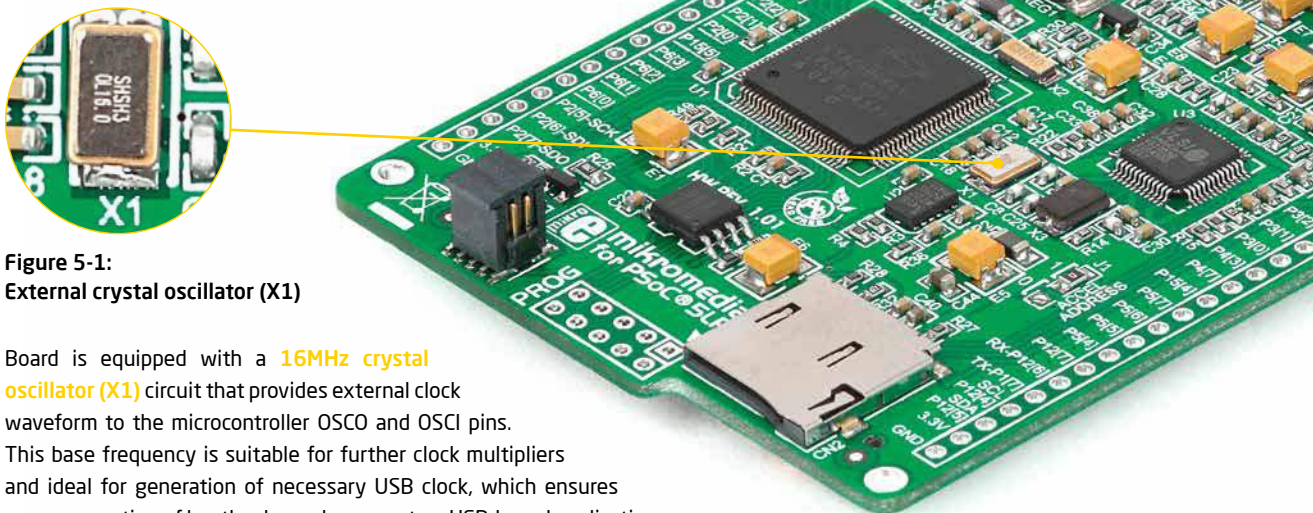


Figure 5-1:
External crystal oscillator (X1)

Board is equipped with a **16MHz crystal oscillator (X1)** circuit that provides external clock waveform to the microcontroller OSCO and OSCI pins. This base frequency is suitable for further clock multipliers and ideal for generation of necessary USB clock, which ensures proper operation of bootloader and your custom USB-based applications. The board also contains a **32.768kHz Crystal oscillator (X2)** which provides external clock for internal **RTCC** module.

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

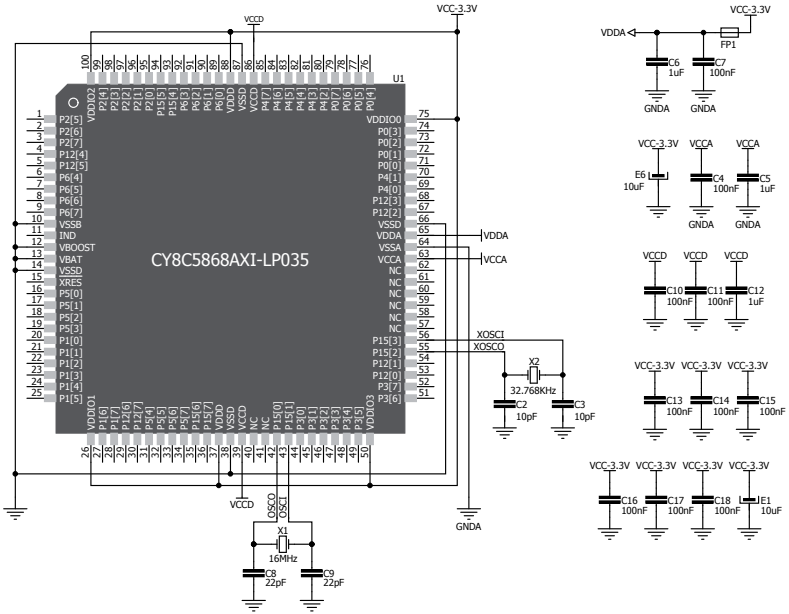


Figure 5-2: Crystal oscillator schematic

6. microSD Card Slot

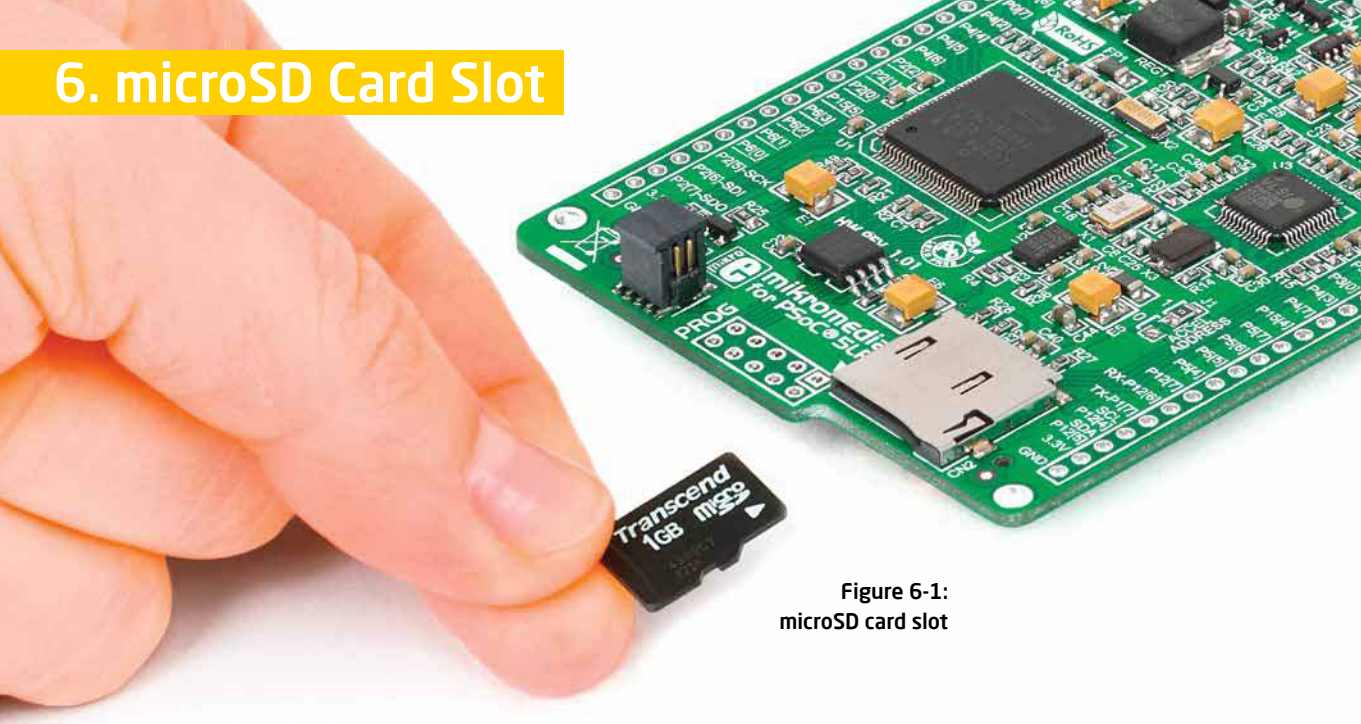


Figure 6-1:
microSD card slot

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's memory. microSD cards use Serial Peripheral Interface (**SPI**) for communication with the microcontroller.

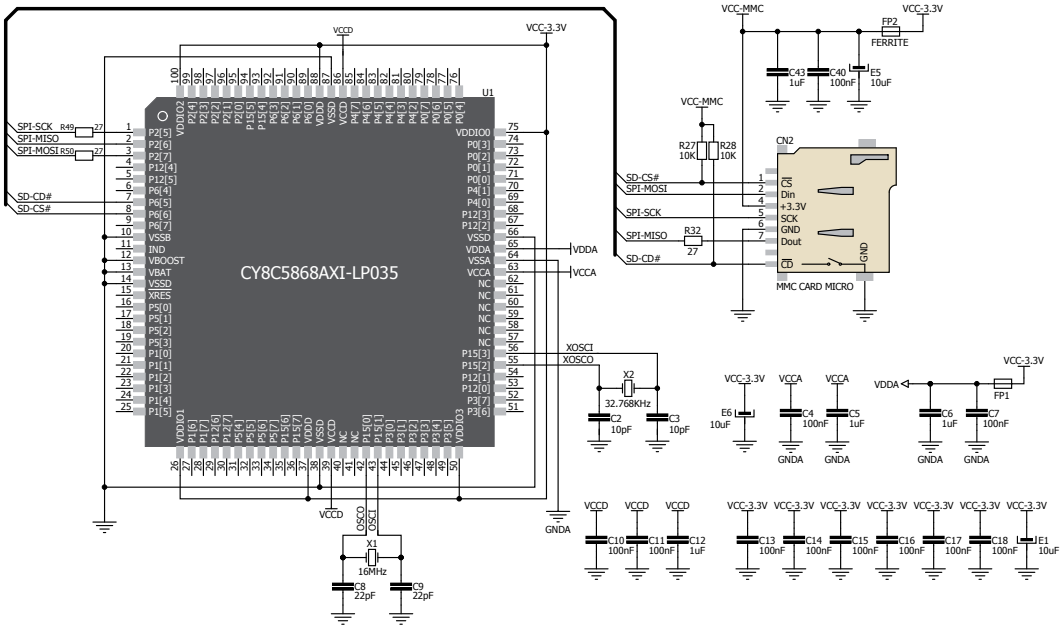


Figure 6-2: microSD card slot module connection schematic

7. Touch Screen

The development system features a TFT 320x240 display (MI0283QT-9A) covered with a resistive touch panel. Together they form a functional touch screen unit. 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.

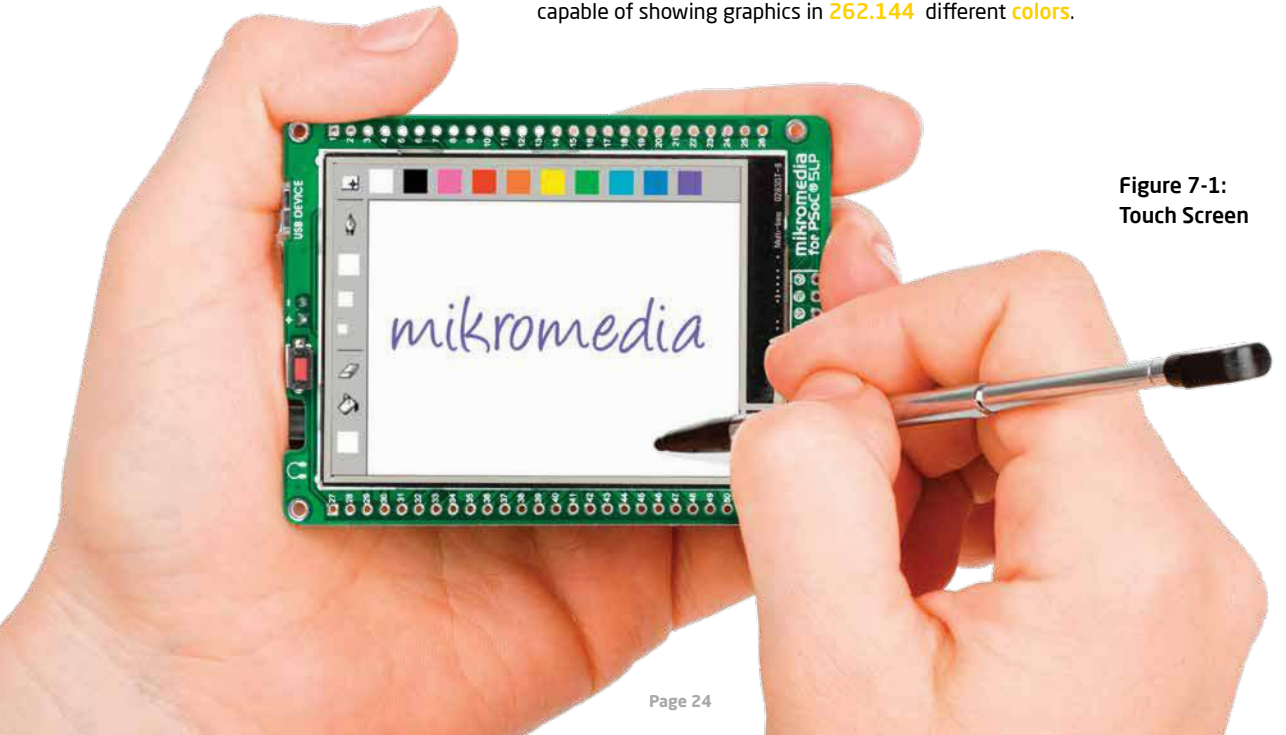


Figure 7-1: Touch Screen

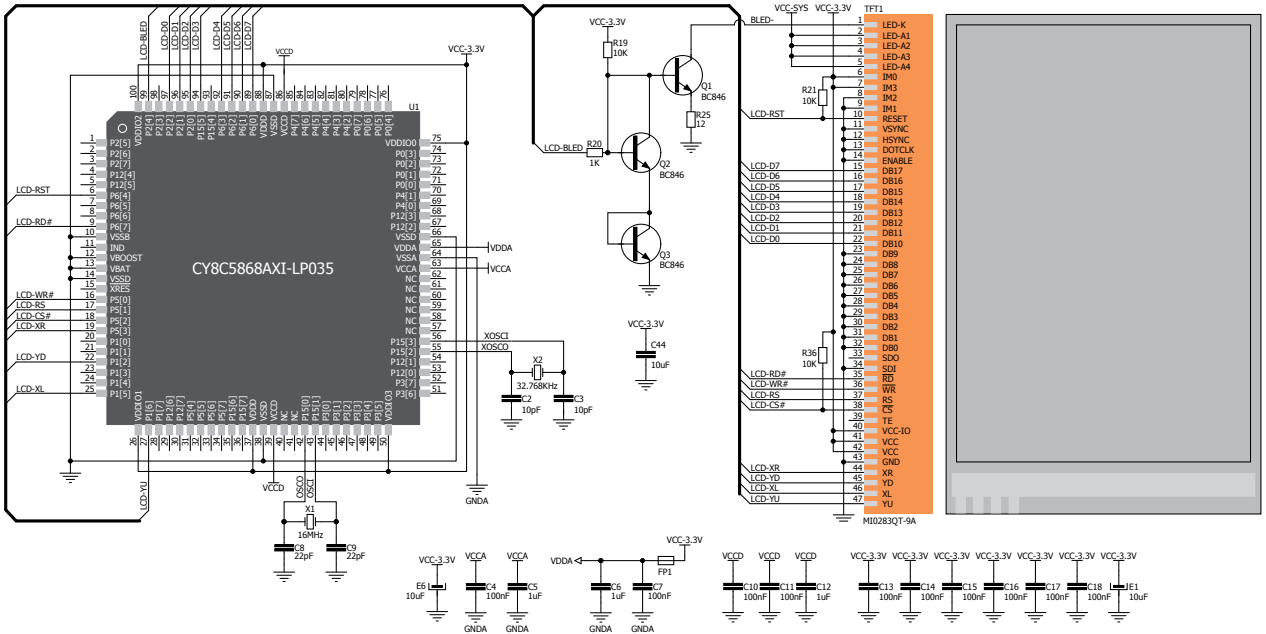


Figure 7-2: Touch Screen connection schematic

8. Audio Module

Figure 8-1:
On-board VS1053
MP3 codec

The mikromedia for PSoC® 5LP features stereo audio codec VS1053. This module enables audio reproduction through stereo headphones connected to the system via a 3.5mm connector **CN1**. All functions of this module are controlled by the microcontroller over Serial Peripheral Interface (SPI).

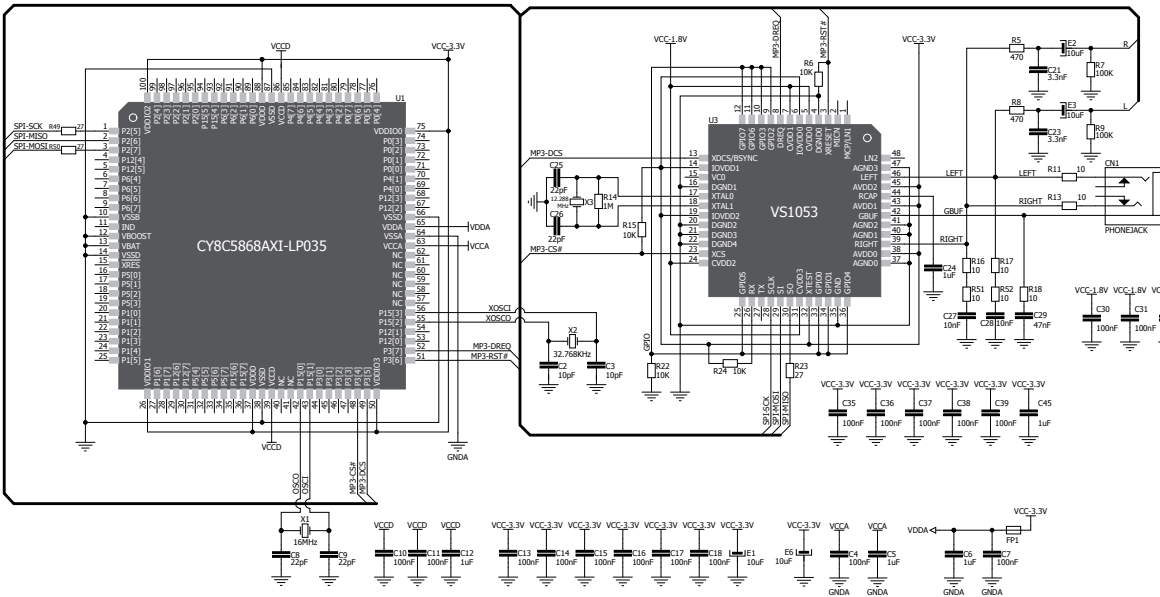


Figure 8-2: Audio module connection schematic

9. USB connection

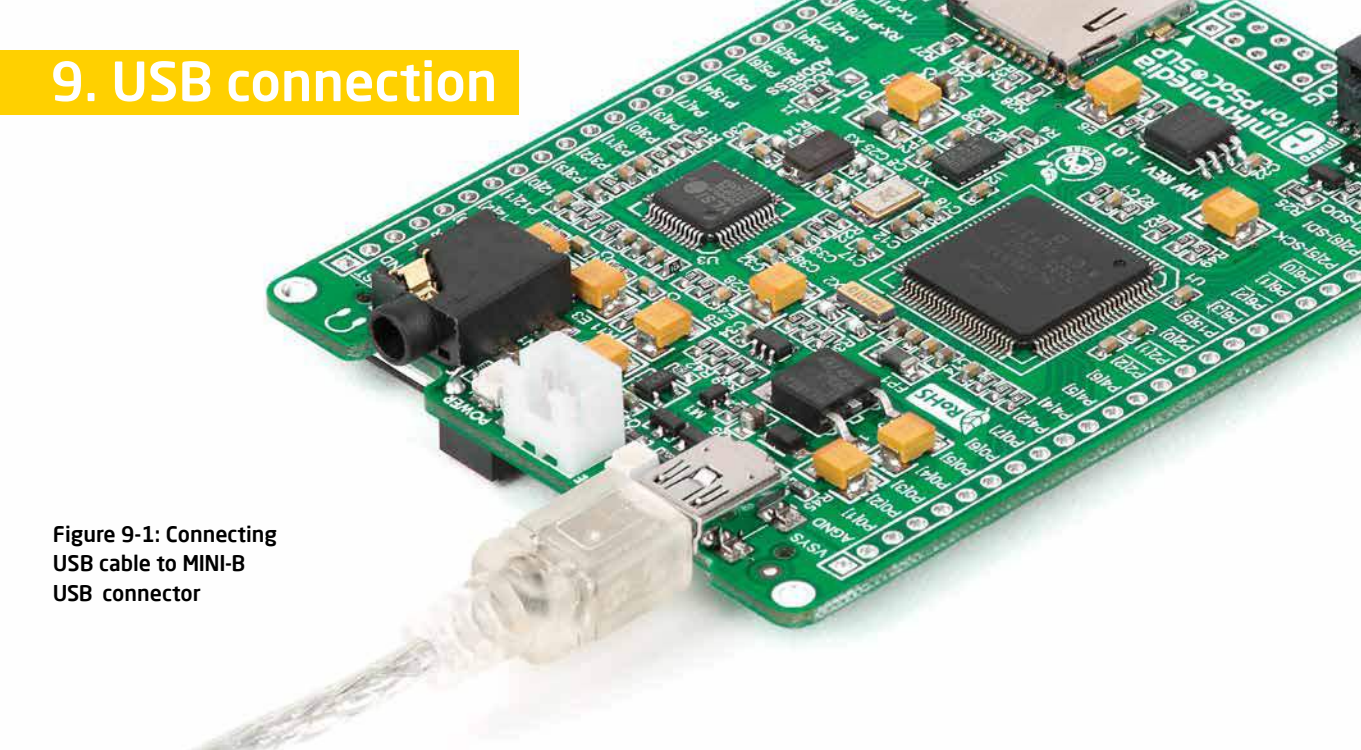


Figure 9-1: Connecting USB cable to MINI-B USB connector

CY8C5868AXI-LP035 microcontroller has an integrated USB module connected to a MINI-B USB connector on your mikromedia. It can be used to connect the target USB host device, such as a PC, to your board.

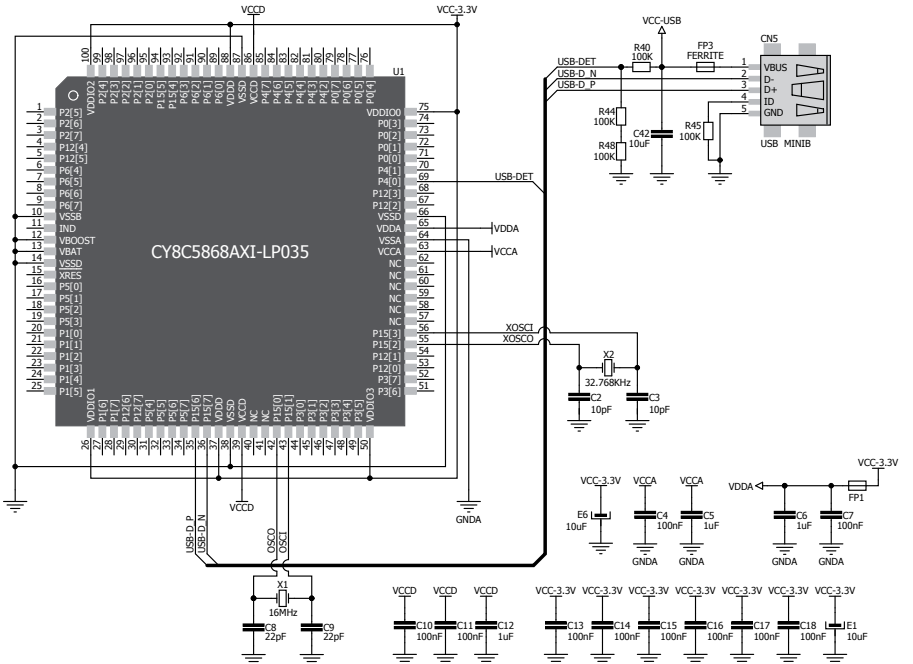


Figure 9-2: USB module connection schematic

10. Accelerometer

Figure 10-1:
Accelerometer module

On-board **ADXL345** accelerometer measures acceleration in three axis: x, y and z. Most common use is to determine screen orientation, but there are many other fields of usage. Communication between the accelerometer and the microcontroller is established through **I²C** interface.

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 soldered to position 1 by default.

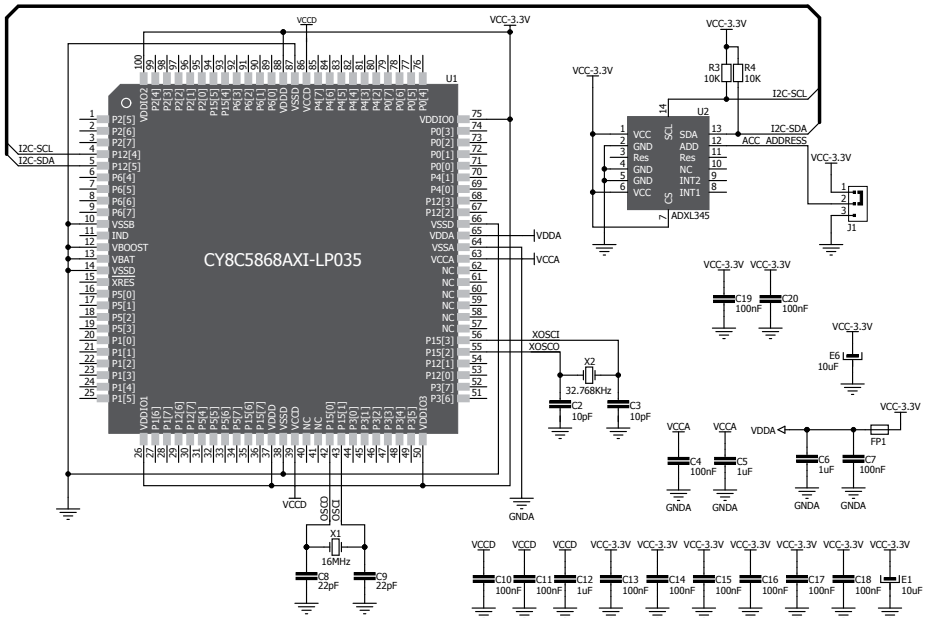


Figure 10-2: Accelerometer connection schematic

11. FRAM

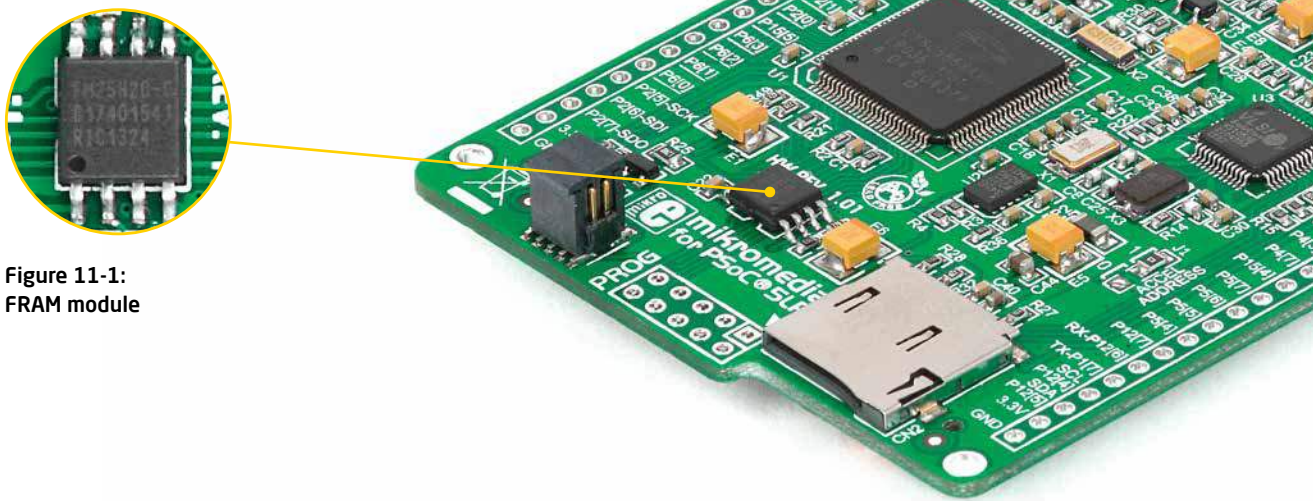


Figure 11-1:
FRAM module

Since multimedia applications are getting increasingly demanding, it is necessary to provide additional memory space for storing more data. The FRAM module enables the microcontroller to use additional 2Mbit ferroelectric non-volatile memory. It is connected to the microcontroller via the Serial Peripheral Interface (SPI).

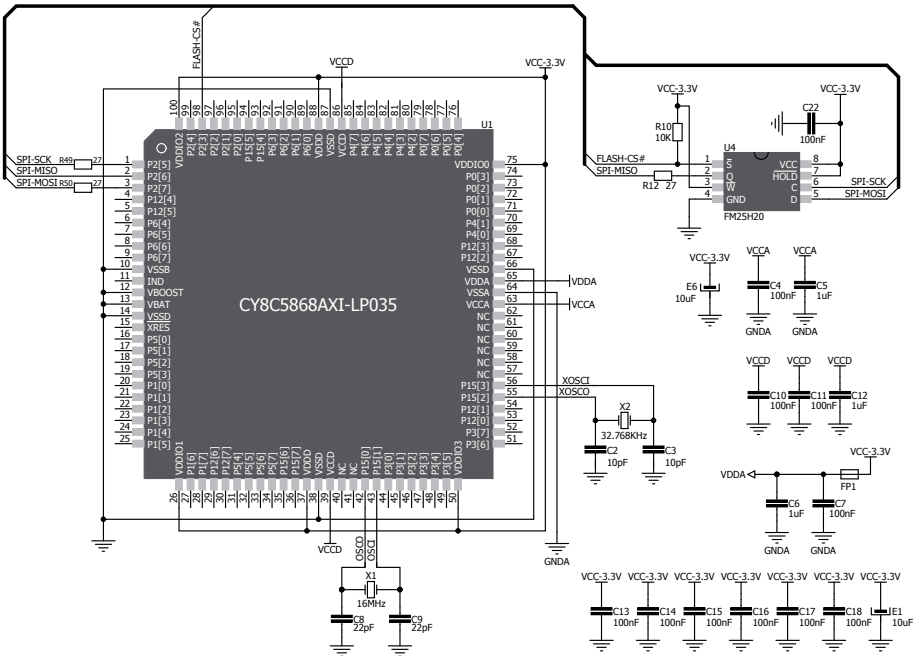


Figure 11-2: FRAM module connection schematic

12. Pads

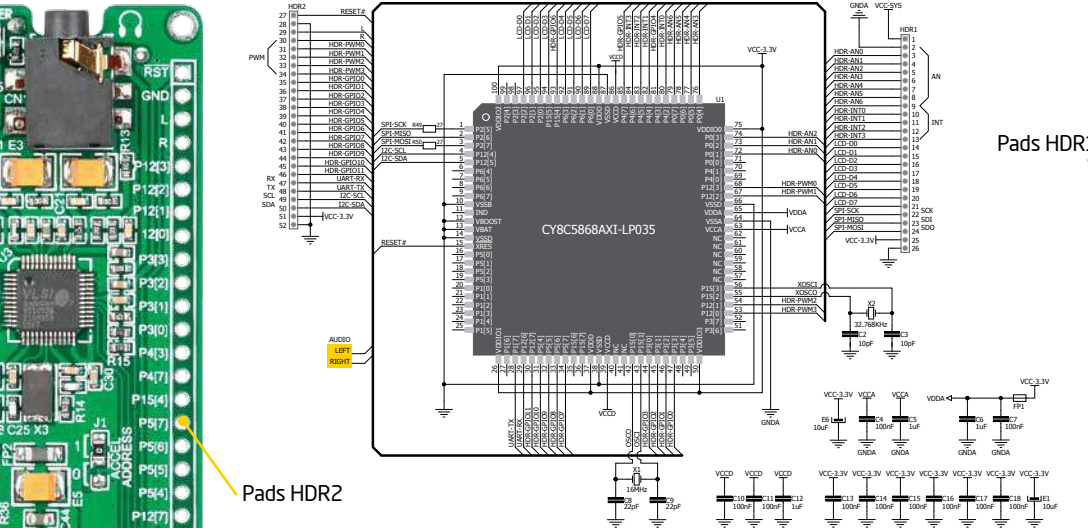
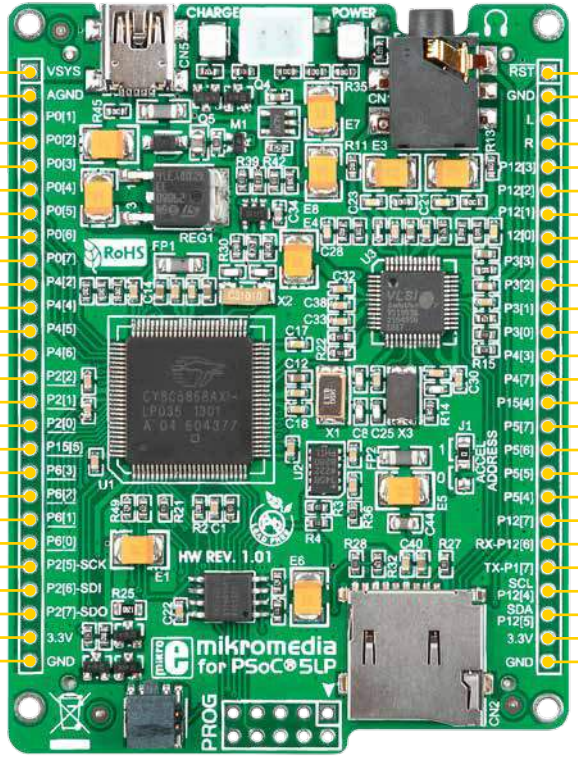


Figure 12-1: Connection pads schematic

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 the Battery Boost, Gaming, PROTO shields and others.

13. Pinout



Pin functions

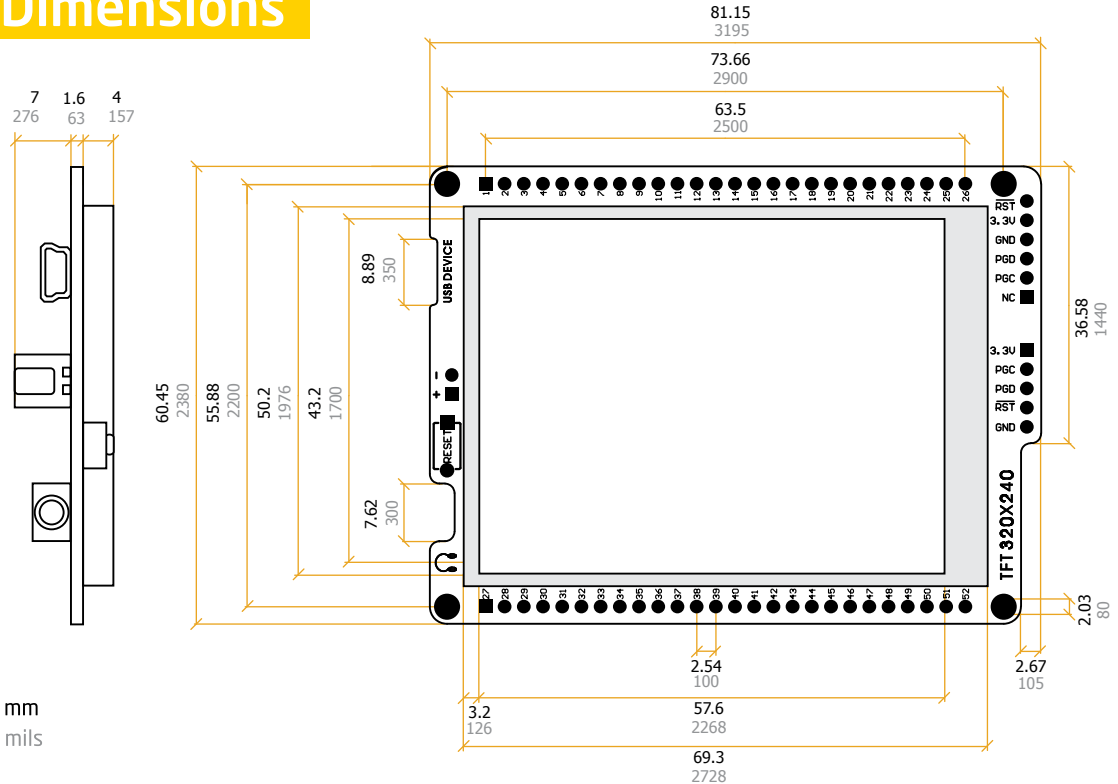
- 5V power supply — VSYS
- GND
- Analog Lines — P0[1], P0[2], P0[3], P0[4], P0[5], P0[6], P0[7]
- Interrupt Lines — P4[2], P4[4], P4[5], P4[6]
- Digital I/O lines — P2[2], P2[1], P2[0], P15[5], P6[3], P6[2], P6[1], P6[0]
- SPI — SCK P2[5], SDI P2[6], SDO P2[7]
- 3.3V power supply — 3.3V
- Reference Ground — GND

Pin functions

- RST — Reset pin
- GND — Reference Ground
- L — left ch.
- R — right ch. — audio out
- PWM lines — P12[3], P12[2], P12[1], P12[0]
- Digital I/O lines — P3[3], P3[2], P3[1], P3[0], P4[3], P4[7], P15[4], P5[7], P5[6], P5[5], P5[4], P12[7]
- UART — P12[6] RX, P1[7] TX
- I²C — P12[4] SCL, P12[5] SDA
- 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



Legend

mm

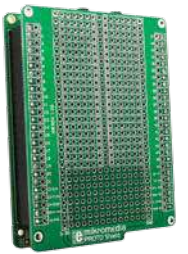
mils

15. mikromedia accessories

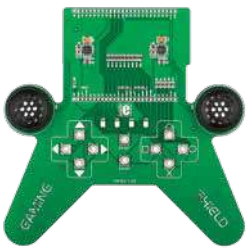
We have prepared a set of extension boards pin-compatible with your mikromedia, which enable you to easily expand your board basic functionality. We call them mikromedia shields. But we also offer other accessories, such as Li-polymer battery, stacking headers, wire jumpers and more.

01 Connect shield

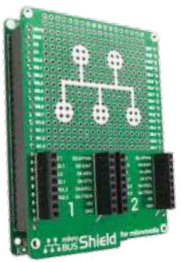
02 BatteryBoost shield



03 PROTO shield



04 Gaming shield



05 mikroBUS shield

06 Li-Polymer battery

07 Wire Jumpers

Notes:

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