

user's guide to

SmartGLCD

240x128

Smart GLCD 240x128
represents development tool
and final product specially
designed for graphical
applications which use PIC
microcontroller PIC18F8722



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A handwritten signature in white ink, appearing to read 'N. Matic', is positioned on the right side of the page. The signature is fluid and cursive, with a large initial 'N' and 'M'.

Nebojsa Matic
General Manager

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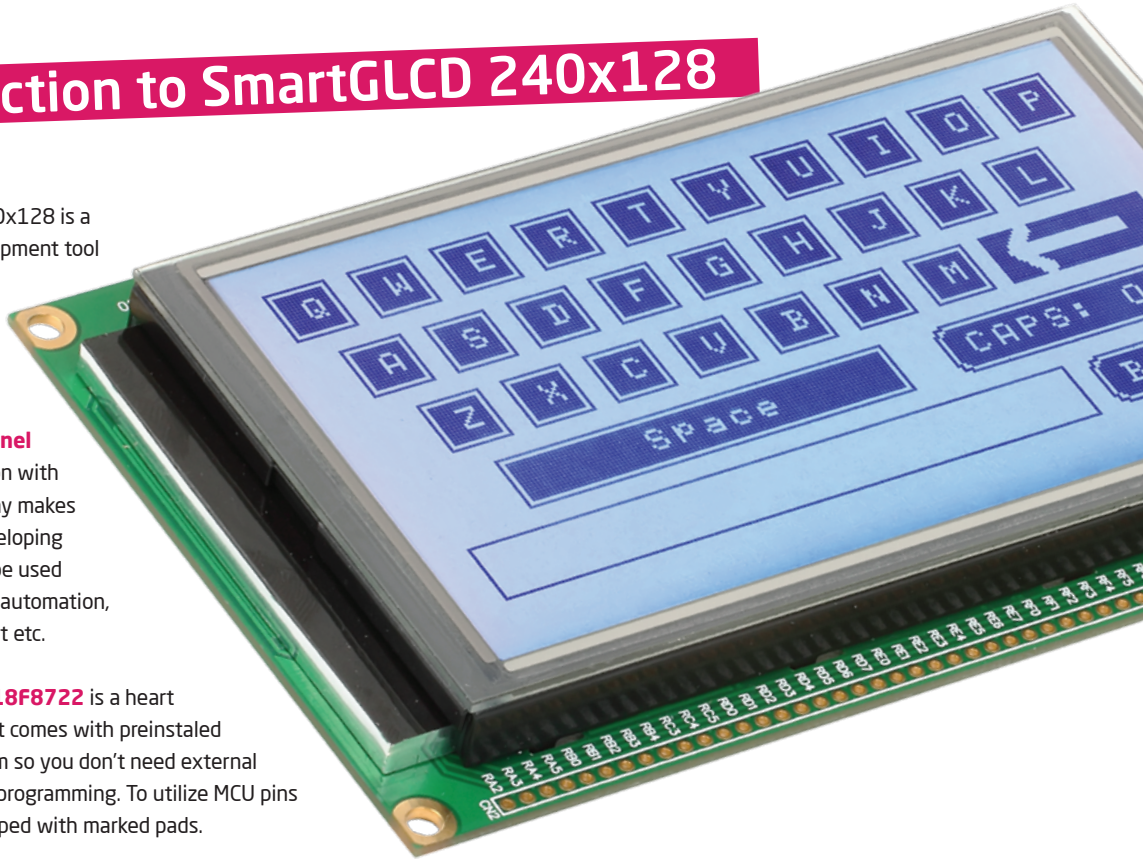
Introduction to SmartGLCD 240x128

The SmartGLCD 240x128 is a full-featured development tool for experimenting with **Graphical LCD** display.

Main advantage of SmartGLCD is **resistive Touch Panel**

which in combination with Graphical LCD display makes perfect tool for developing devices which can be used as control for home automation, industrial equipment etc.

Microcontroller **PIC18F8722** is a heart of the SmartGLCD. It comes with preinstaled **bootloader** program so you don't need external programmer for MCU programming. To utilize MCU pins SmartGLCD is equipped with marked pads.



Package contains



- 01 Damage resistant protective box



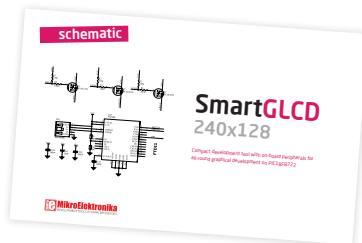
- 02 SmartGLCD 240x128 development tool



- 03 CD with documentation and examples



- 05 SmartGLCD 240x128 user's guide



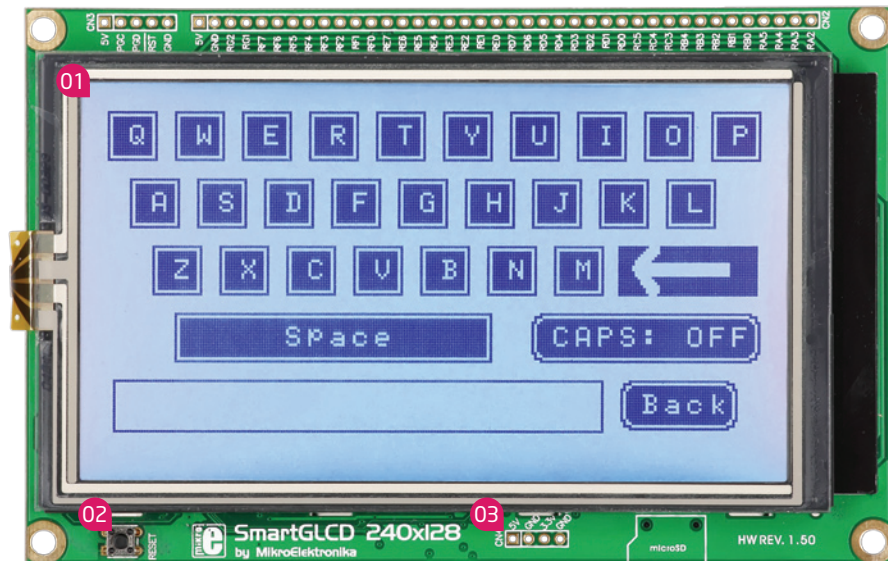
- 05 SmartGLCD 240x128 schematic



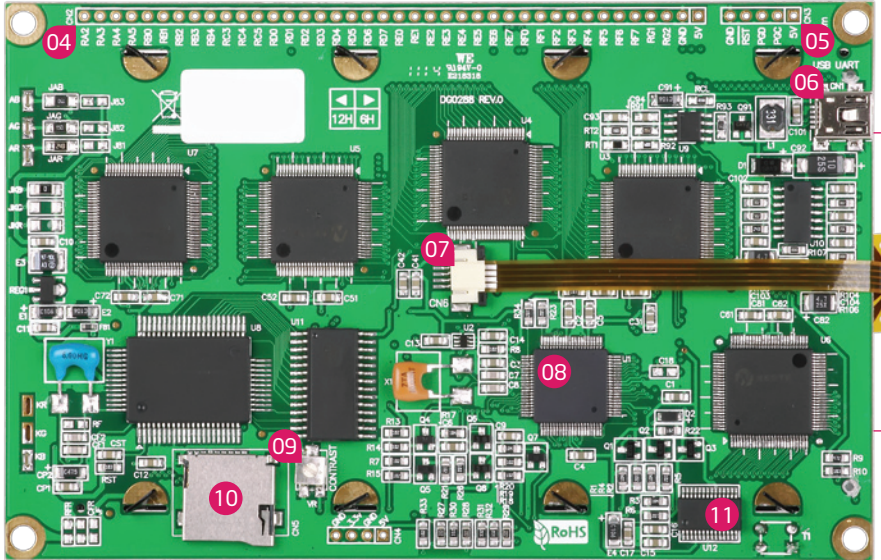
- 06 USB cable

Key Features

- 01 GLCD 240x128 display
- 02 RESET button
- 03 Power supply pads
- 04 I/O pads
- 05 Pads for mikroProg programmer
- 06 USB connector
- 07 Touch panel connector
- 08 Microcontroller PIC18F8722
- 09 Contrast potentiometer
- 10 microSD card slot
- 11 USB UART module



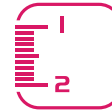
System Specification



power supply
Over a USB cable (5V DC)



power consumption
~350mA in idle state
(backlight is ON)



board dimensions
140x90cm (5.51x3.24")



weight
~200g (0.11 lbs)

1. Connecting power supply

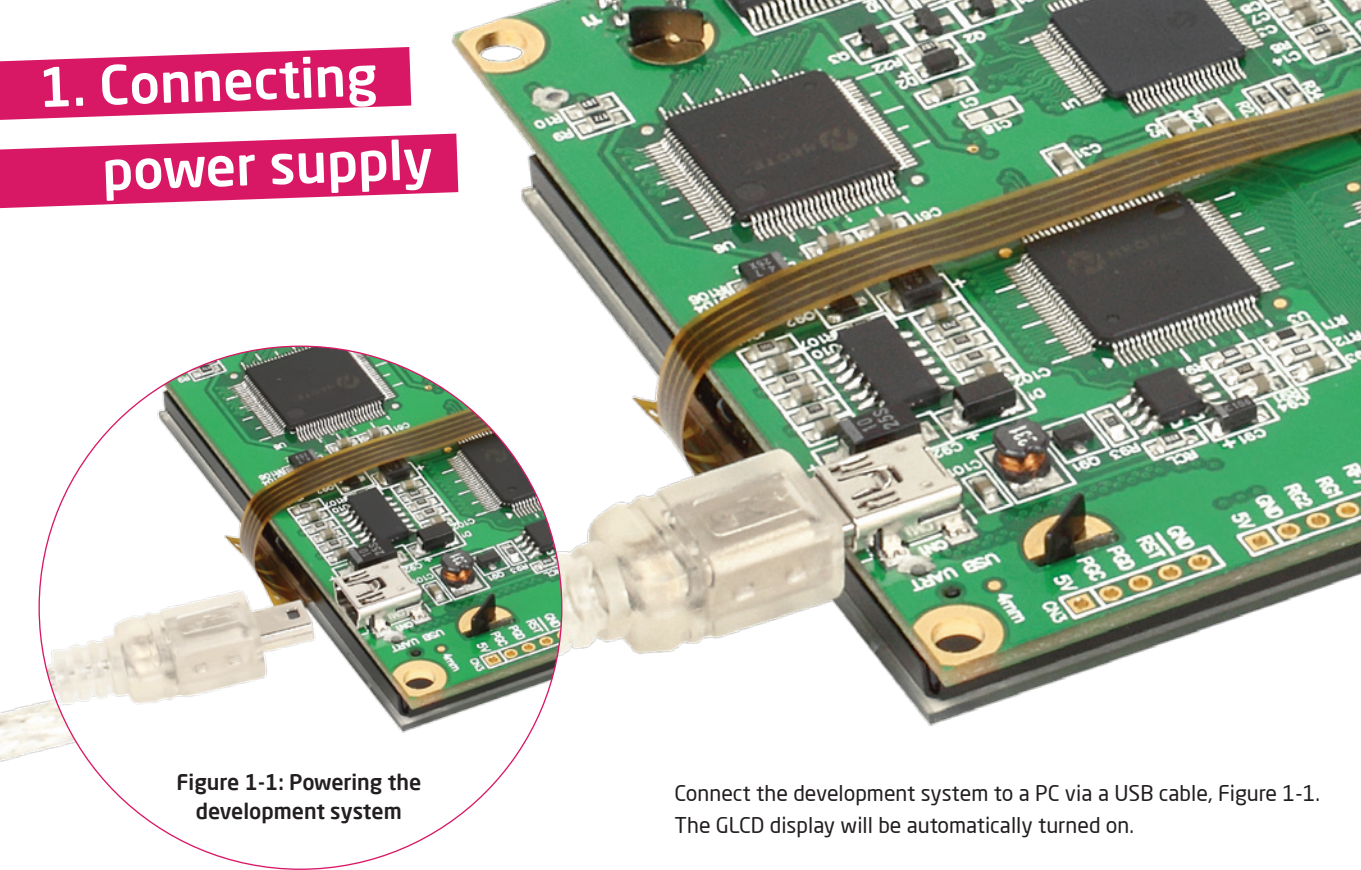


Figure 1-1: Powering the development system

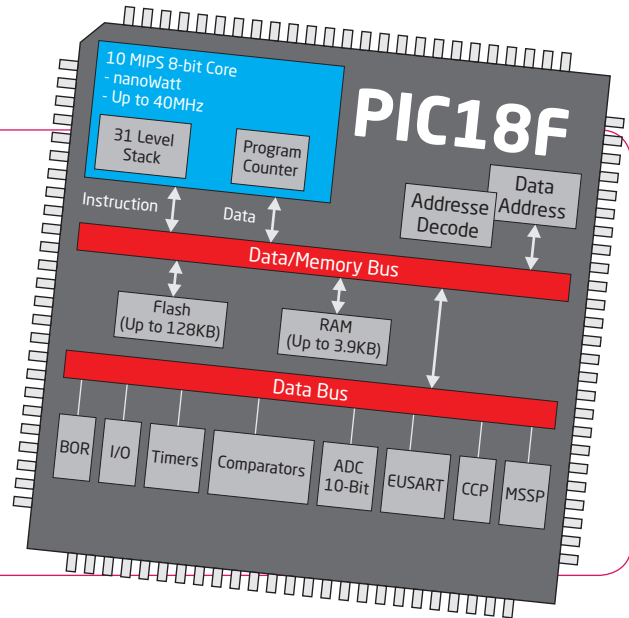
Connect the development system to a PC via a USB cable, Figure 1-1. The GLCD display will be automatically turned on.

2. PIC18F8722 Microcontroller

The **SmartGLCD** development tool comes with the **PIC18F8722** microcontroller. This 8-bit microcontroller with its integrated modules and in combination with other on-board modules is ideal for creating graphical applications..

Key microcontroller features

- Up to **10 MIPS** Operation;
- 8-bit architecture;
- 128KB of Flash memory;
- 3,936 bytes of RAM memory;
- 1024 bytes of EEPROM
- 80 pin TQFP;
- 16 ch, 10-bit ADC;
- UART, SPI, ; etc.



3. Programming with bootloader

For programming, microcontroller use bootloader program which is preinstalled 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/443/smartglcd-240x128-board/>

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

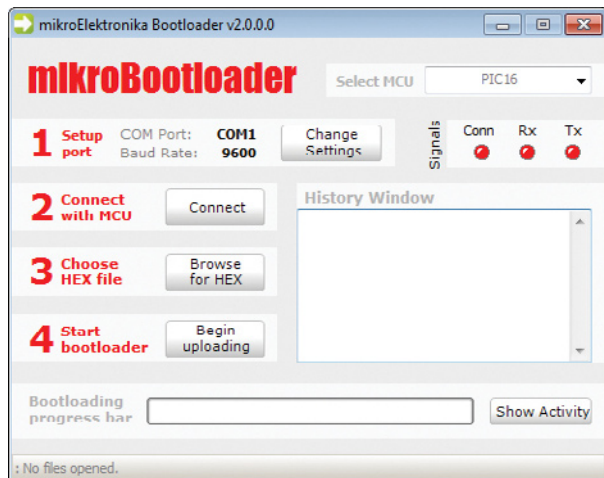
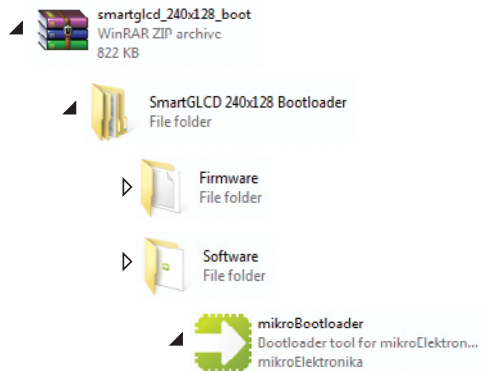


Figure 3-1: mikroBootloader software

note

Connect SmartGLCD with a PC before starting mikroBootloader software

Identifying device COM port

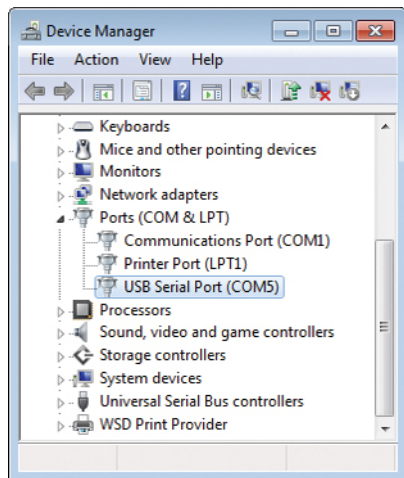


Figure 3-2: Identifying COM port

note

In Device Manager you can see which COM port is assigned to mikromedia (in this case COM5)

step 1 - Choosing COM port



Figure 3-3: Selecting COM port

- 01 Click on Change Settings button
- 02 Select USB COM port (in this case COM5)
- 03 Set Baud rate to 115200
- 04 Click OK button

step 2 - Connecting with a PC



Figure 3-4: Connecting mikromedia with mikroBootloader

- 01 From drop down list Select MCU chose PIC18
- 02 Reset SmartGLCD and within 5s click on Connect button

step 3 - Browse for .hex file



Figure 3-5: Browsing for .hex file

- 01 Click on Browse for HEX and from pop-up window (figure 3-6) select .hex file which will be uploaded to MCU memory

step 4 - Select .hex file

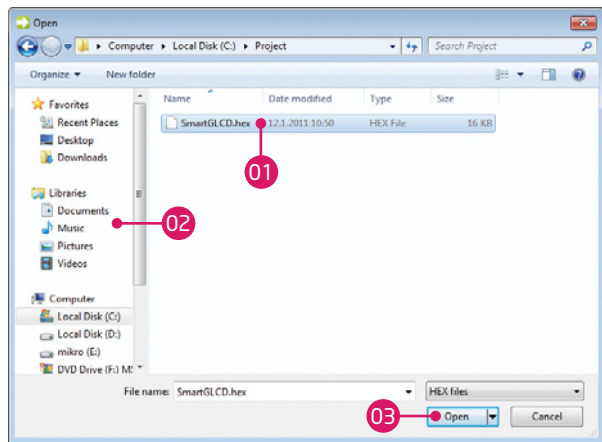


Figure 3-6: Selecting .hex file

- 01 Select desired .hex file
- 02 Folder list
- 03 Click on Open button

step 5 - Uploading .hex file



Figure 3-7: Begin uploading

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

step 6 - Progress bar

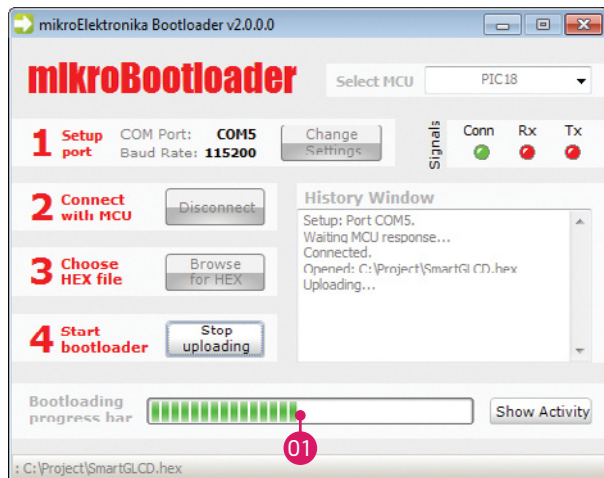


Figure 3-8: Bootloading progress bar

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

step 7 - Reset MCU

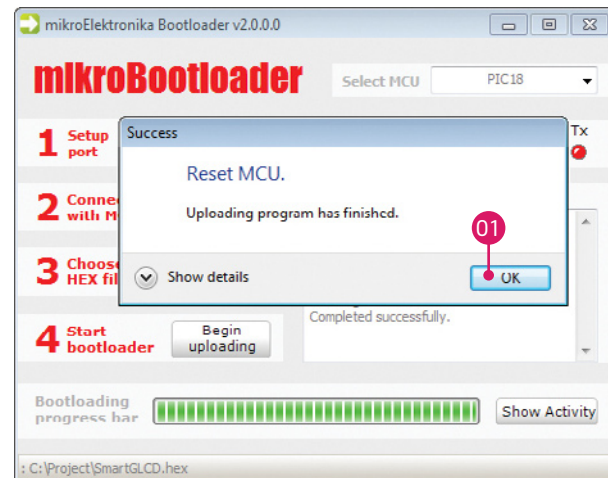
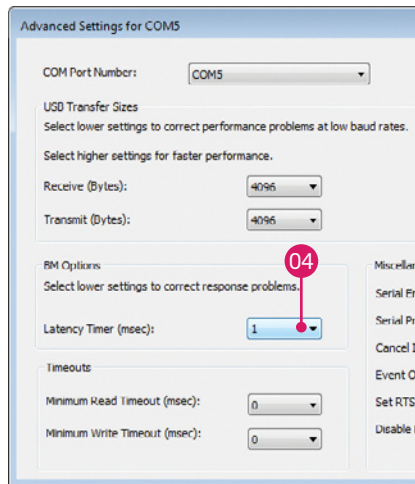
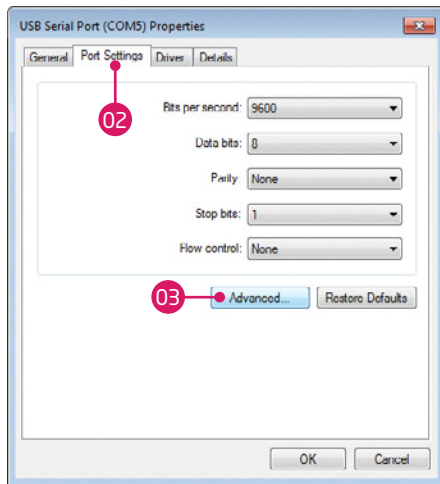
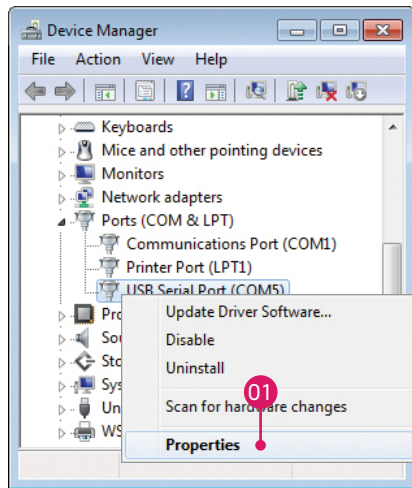


Figure 3-9: Uploading is finished

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

Tips and Tricks: Speed-up UART data transfer



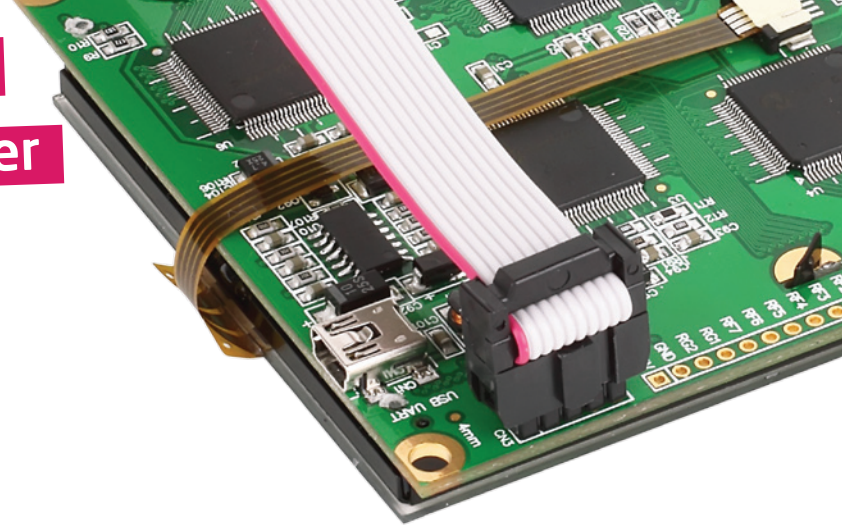
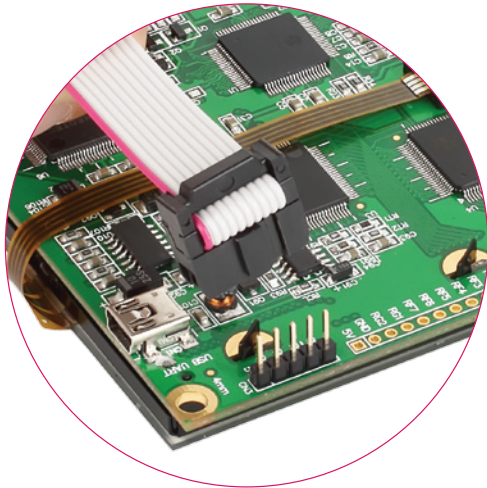
note

If .hex file transfer from your PC to MCU is too slow you can try to speed-up data transfer by setting latency time of COM port to 1. To change latency time go to Device manager:

- 01 Right click on USB Serial Port (COM5) and click on Properties
- 02 In USB Serial Port (COM5) Properties select Port Settings tab
- 03 Click on Advanced... button
- 04 Set latency Timer to 1 (or chose another value) and click on OK button

4. Programming with external programmer

Figure 4-1: Connecting external programmer

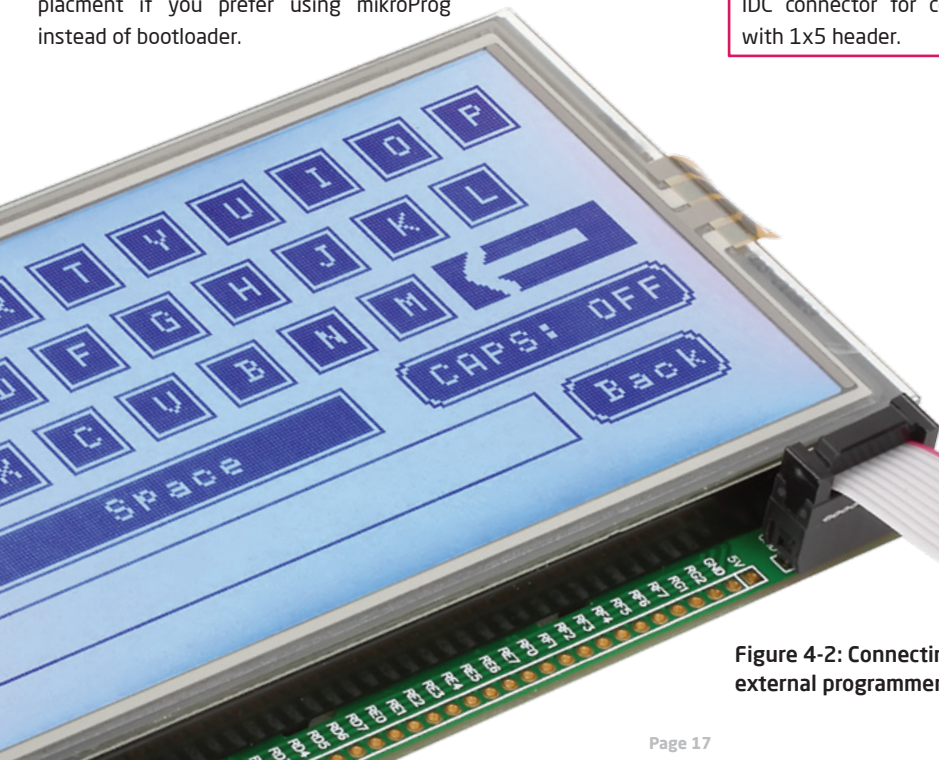


The microcontroller can be programmed with external programmer **mikroProg**. The external programmer is connected to the development system via marked pads CN3, Figure 4-1.

In order to connect the external programmer to the development system, it is necessary to provide a 1x5 header that should be soldered to pads CN3.

If bootloader program is accidentally erased you can upload it again via mikroProg programmer. Program **Bootloader18F8722.hex** can be found under Firmware folder (page 10).

mikroProg programmer can be also attached on the front side of the SmartGLCD. Just solder 1x5 header to pads CN3. This is ideal placement if you prefer using mikroProg instead of bootloader.



Always use side with a knob of IDC connector for connecting with 1x5 header.

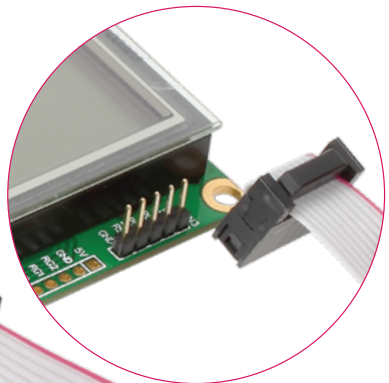
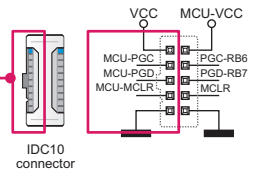


Figure 4-2: Connecting external programmer (GLCD side)

5. Touch Screen

The development system features a **Graphical LCD 240x128 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.

Resistive touch panel is suitable for use with a plastic pen which have rounded tip. Finger press is always available but bare in mind that you use touch panel and there's no need for too much pressing force.

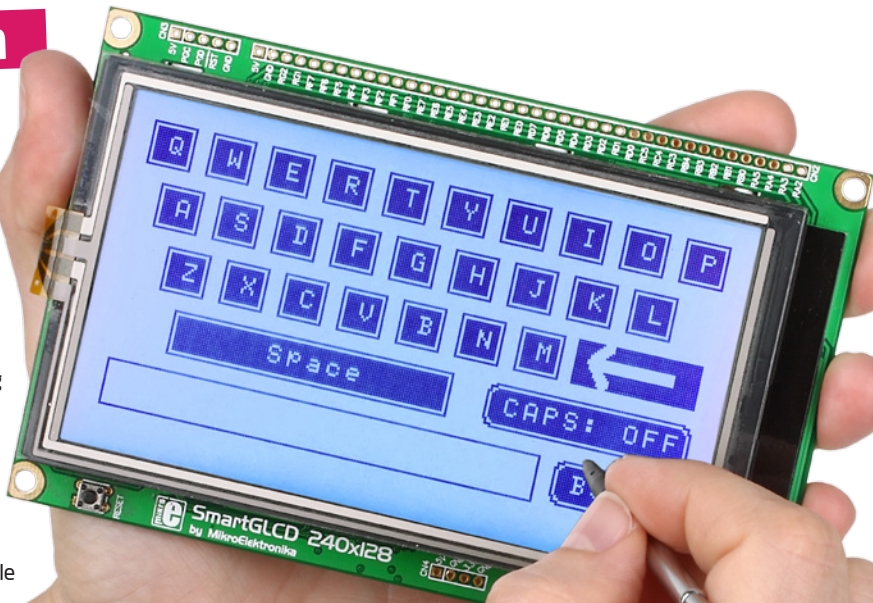


Figure 5-1:
Touch Screen

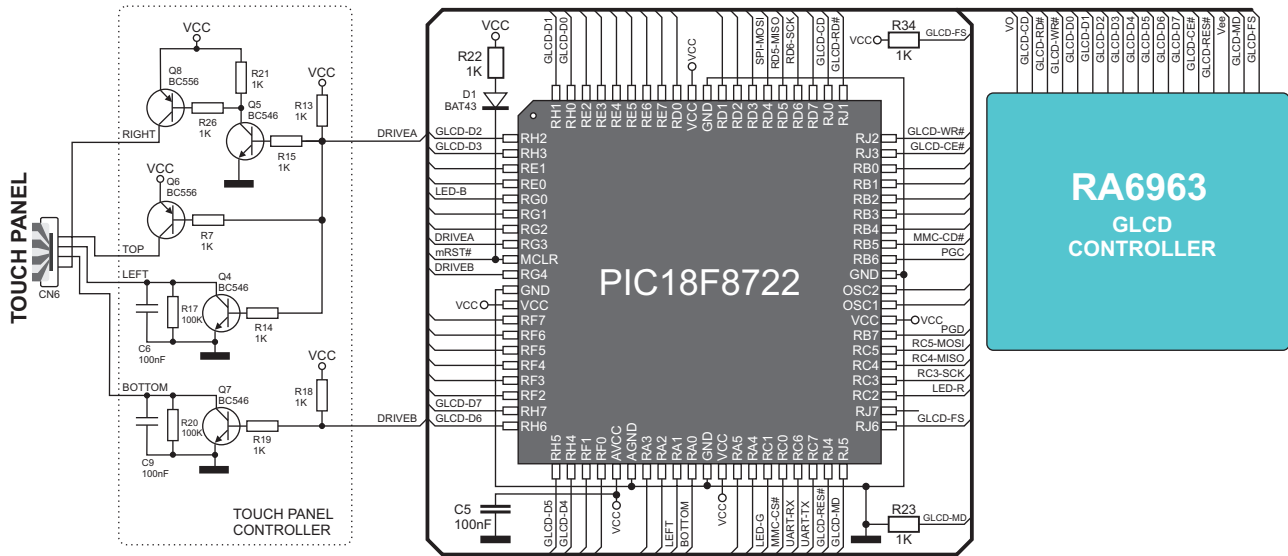


Figure 5-2: Touch screen connection schematic

6. microSD Card Slot

Figure 6-1: microSD card inserted in SmartGLCD

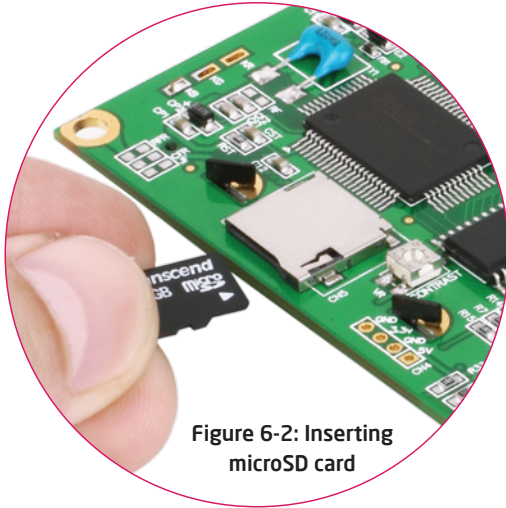
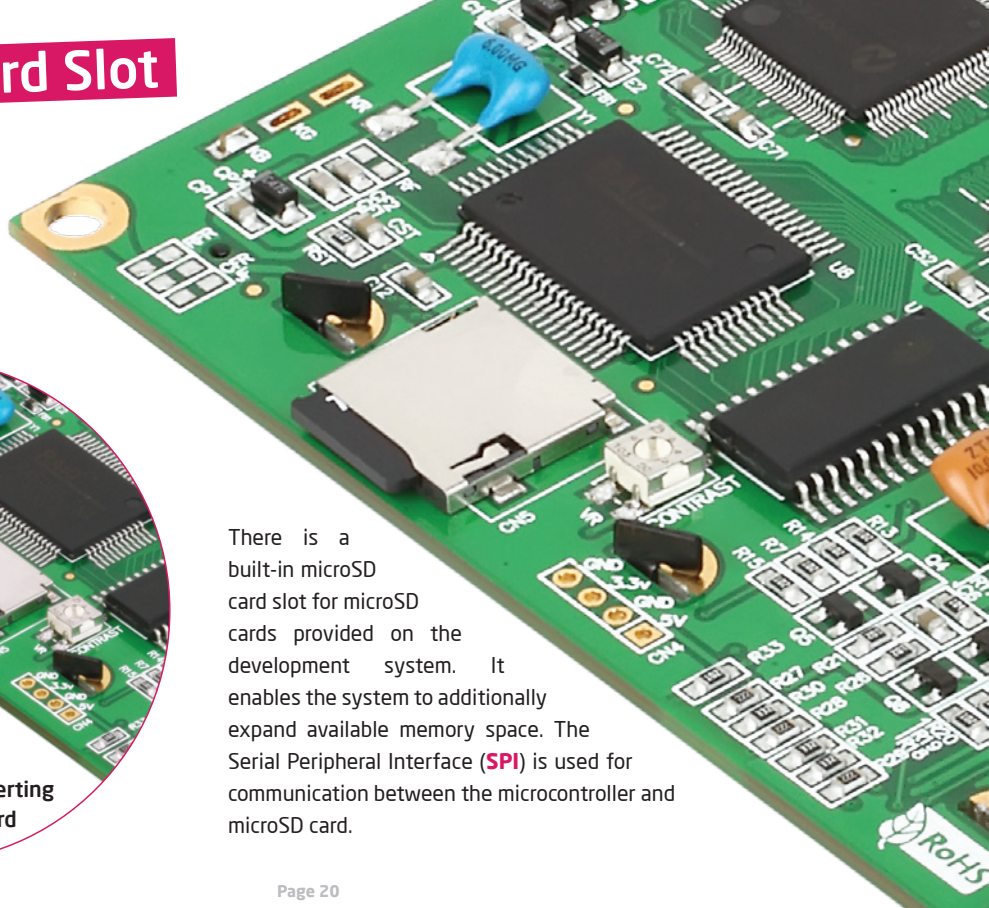


Figure 6-2: Inserting microSD card

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.

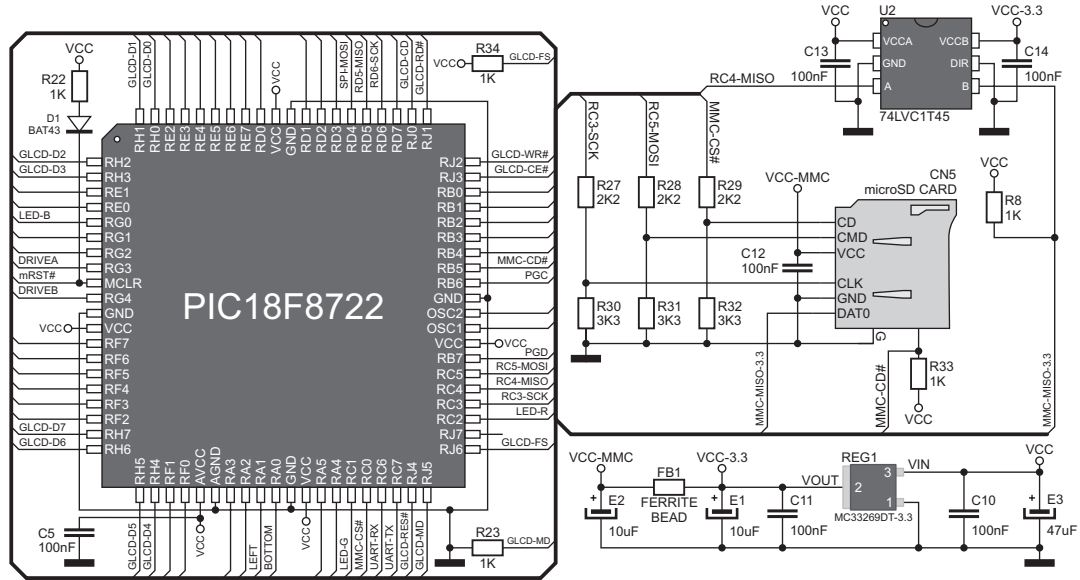


Figure 6-3: microSD card slot connecting schematic

7. 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.

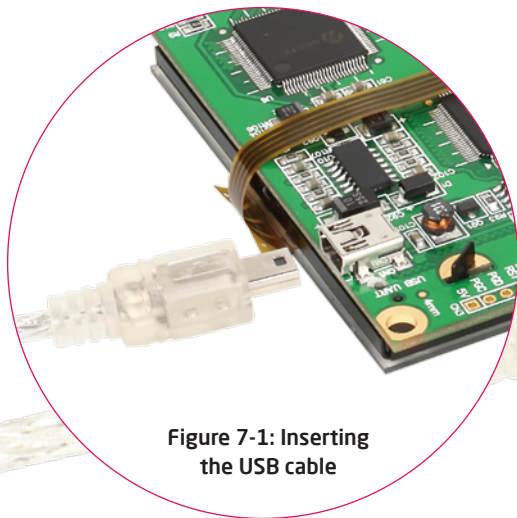


Figure 7-1: Inserting the USB cable

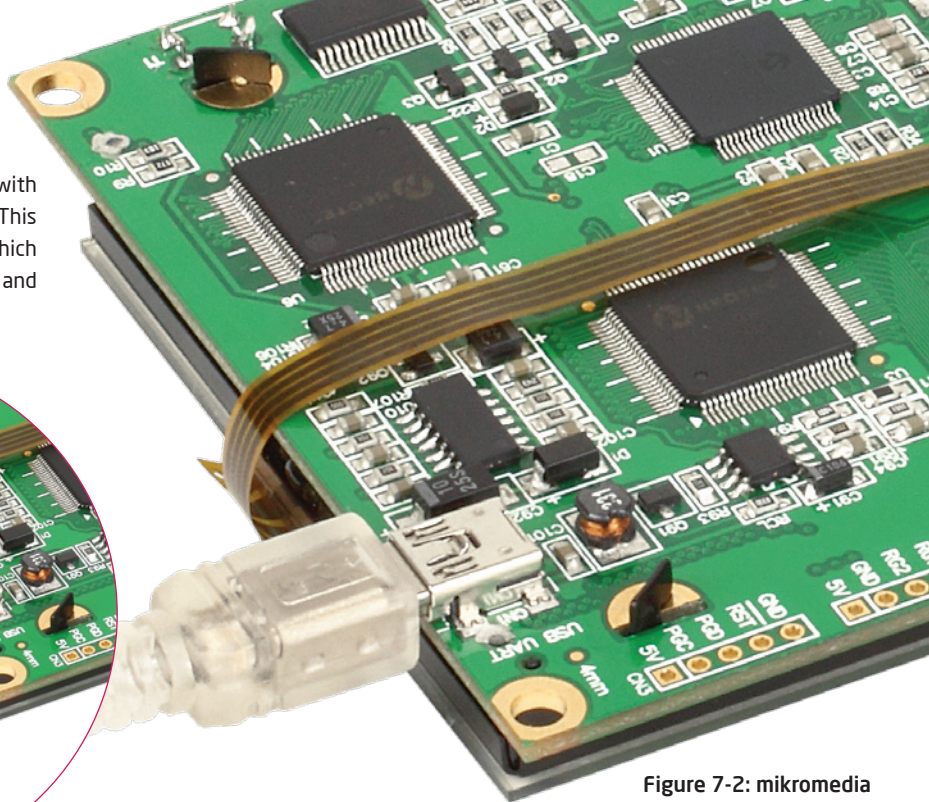


Figure 7-2: mikromedia connected with PC via USB cable

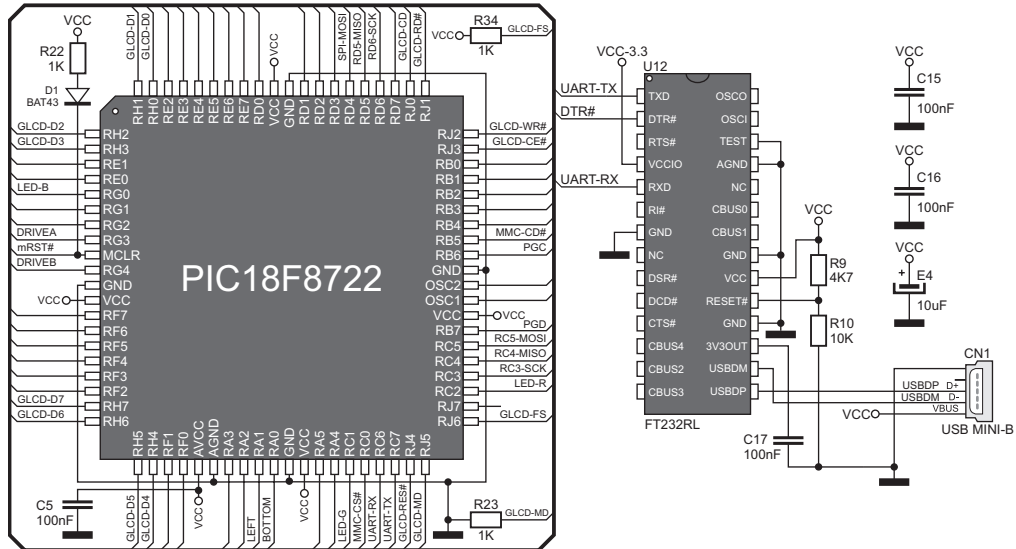
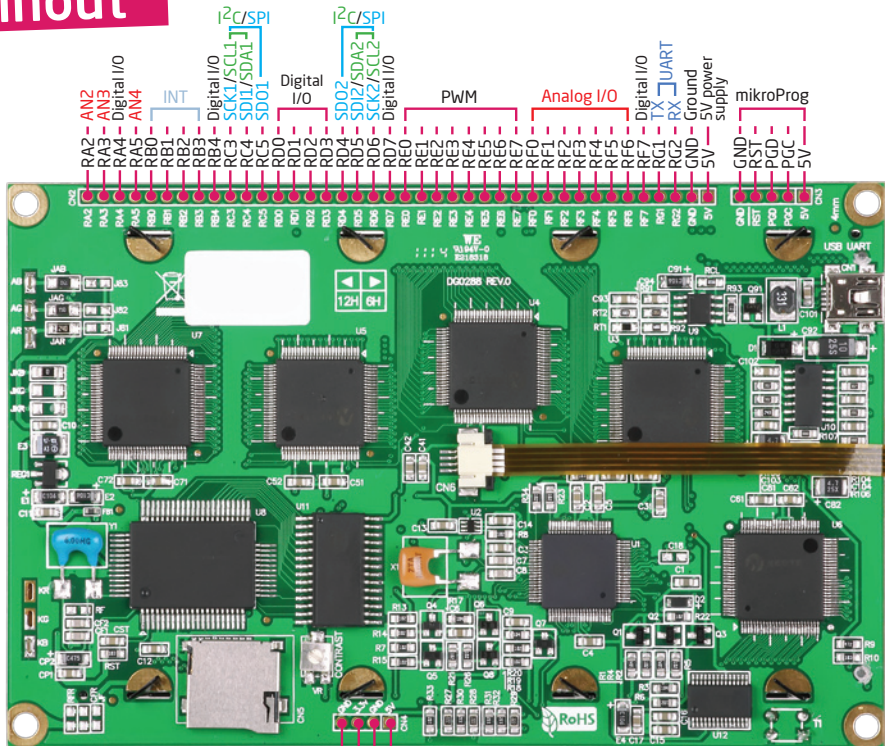


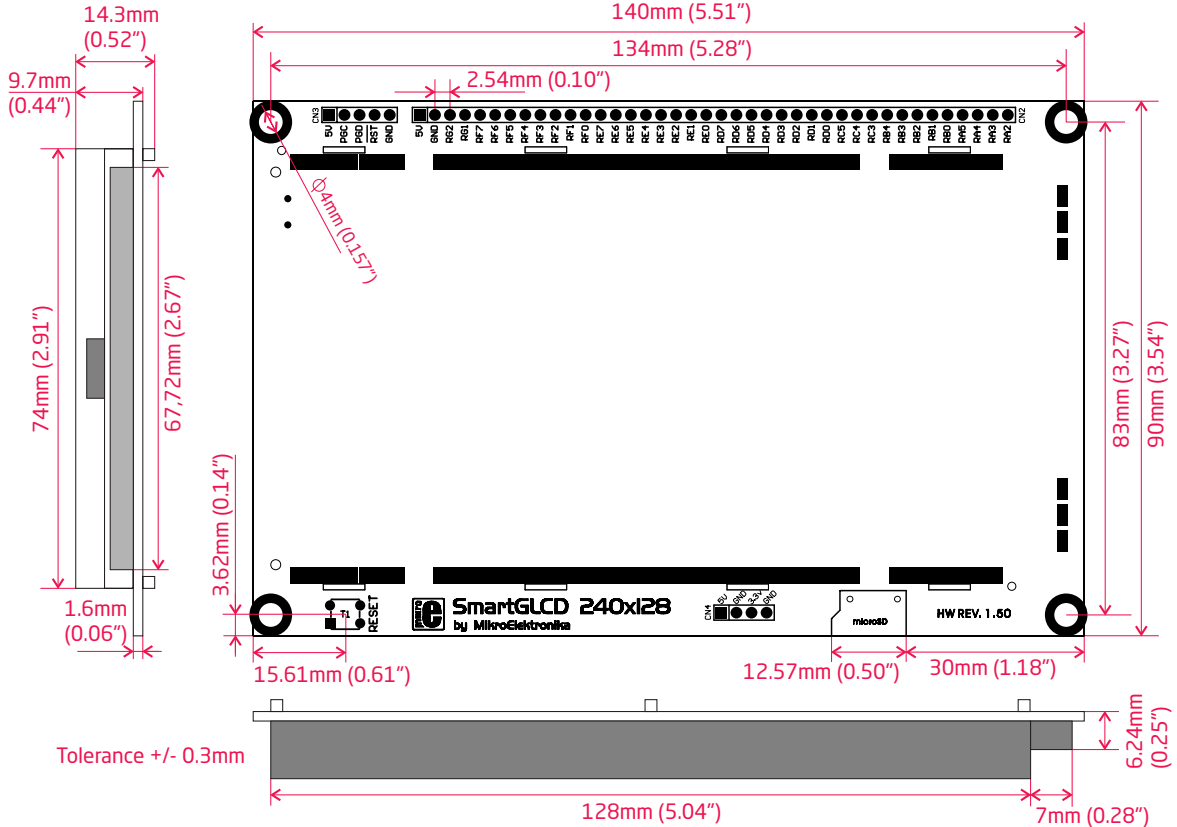
Figure 7-3: USB UART connecting schematic

8. Pinout



- Analog Lines
- Interrupt Lines
- SPI Lines
- I2C Lines
- UART lines

Ground
3.3V power supply output
5V power supply
Ground



Notes:

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SmartGLCD

240x128

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