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

MikroElektronika
DEVELOPMENT TOOLS | COMPILERS | BOOKS

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Nebojsa Matic
General Manager

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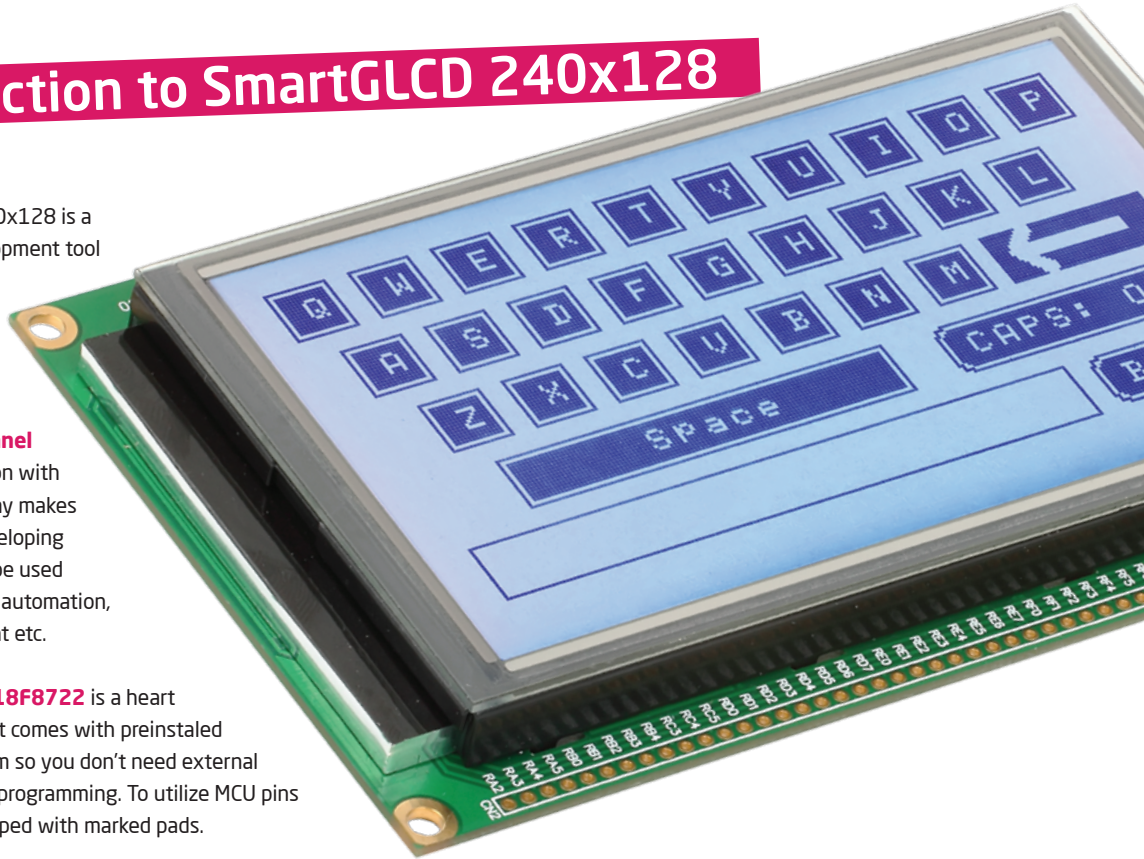
Table of Contents

Introduction to SmartGLCD 240x128 4
Package contains 5
Key Features 6
System Specification 7
1. Connecting power supply 8
2. PIC18F8722 Microcontroller 9
Key microcontroller features 9
3. Programming with bootloader 10
Identifying device COM port 11
step 1 - Choosing COM port 11
step 2 - Connecting with a PC 12
step 3 - Browse for .hex file 12
step 4 - Select .hex file 13
step 5 - Uploading .hex file 13
step 6 - Progress bar 14
step 7 - Reset MCU 14
Tips and Tricks: Speed-up UART data transfer 15
4. Programing with external programmer 16
5. Touch Screen 18
6. microSD Card Slot 20
7. USB UART 22
8. Pinout 24
Dimensions 25

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 programer for MCU programming. To utilize MCU pins SmartGLCD is equipped with marked pads.



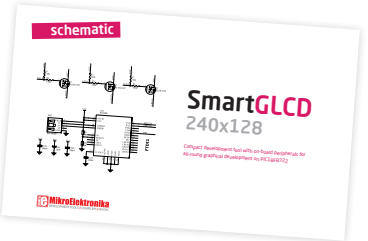
Package contains

01 Damage resistant protective box

02 SmartGLCD 240x128 development tool

03 CD with documentation and examples

05 SmartGLCD 240x128 user's guide

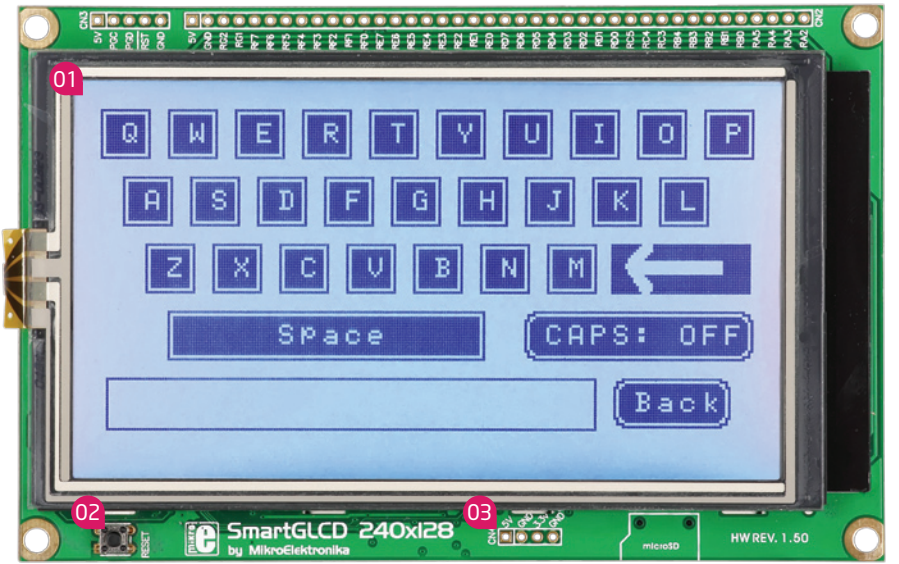


05 SmartGLCD 240x128 schematic

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 Microcontroler PIC18F8722
09 Contrast potentiometer
10 mcroSD card slot
11 USB UART module

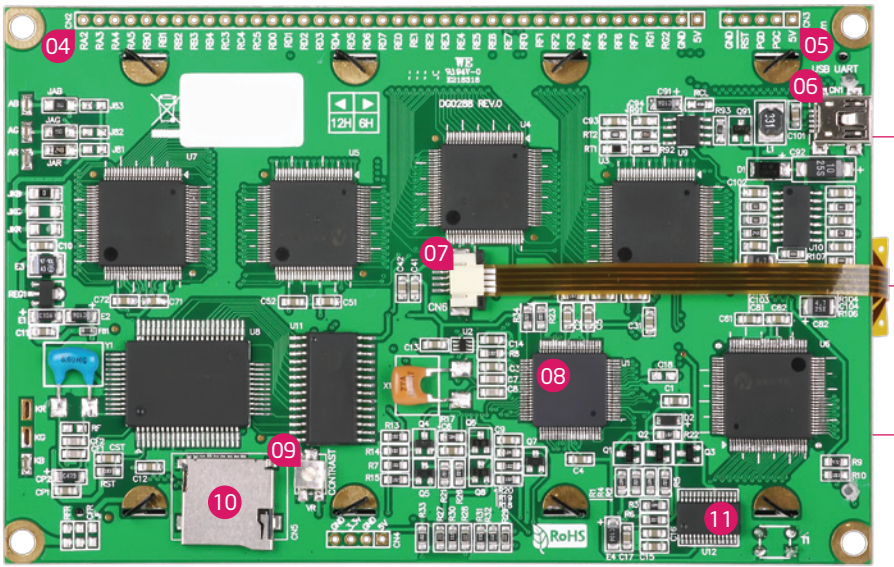


BOOTLOADER

TOUCH SCREEN RESISTIVE

MMC/SD STORAGE

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

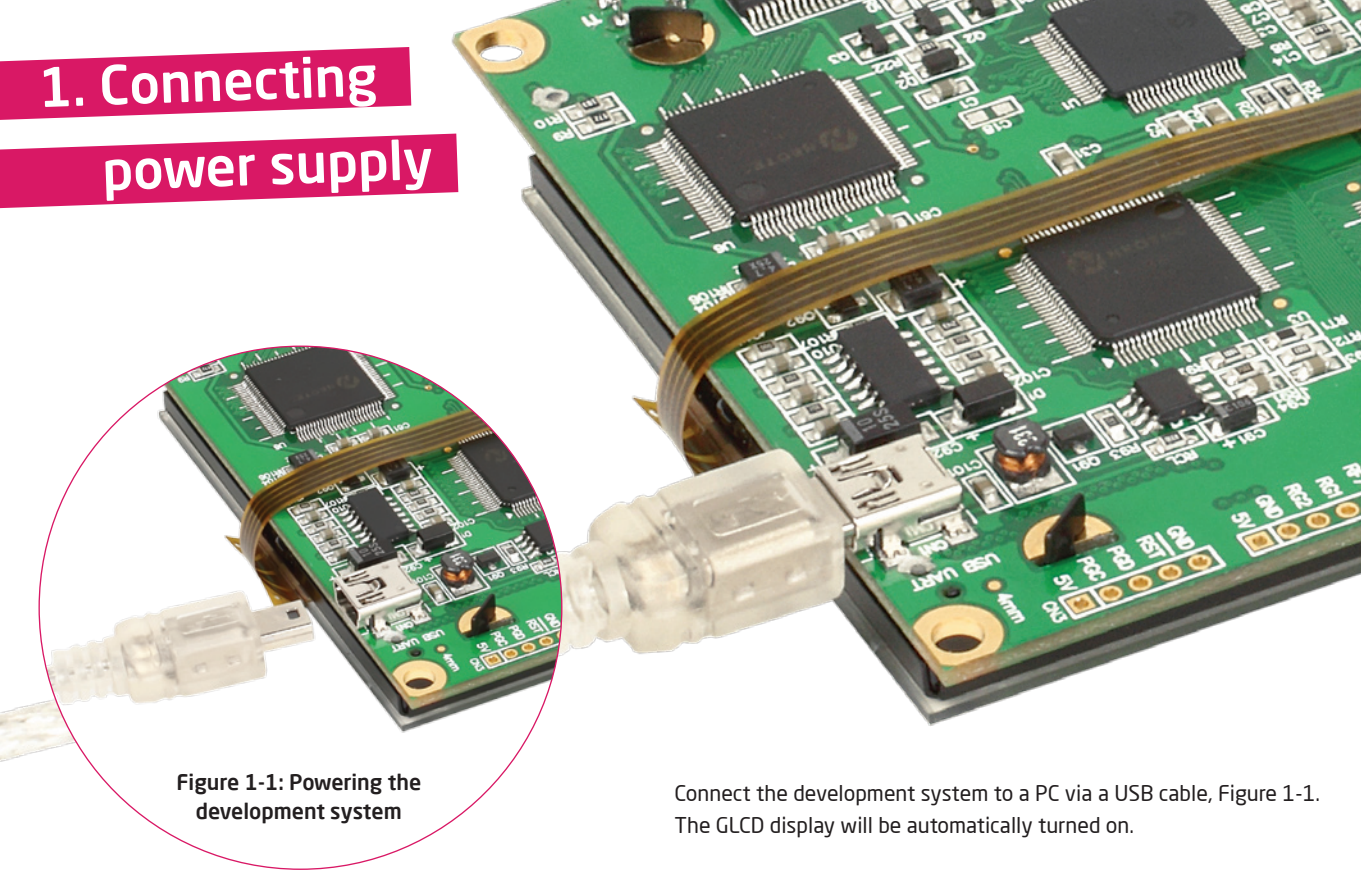


Figure 1-1: Powering the development system

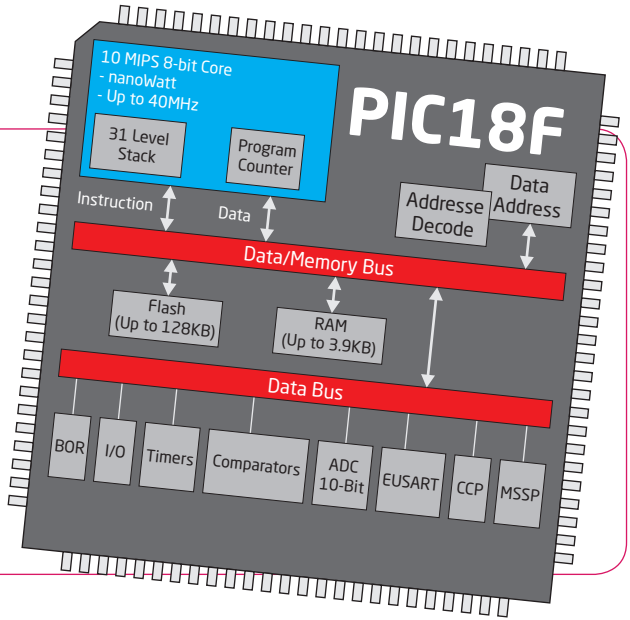
Connect the development system to a PC via a USB cable, Figure 1-1. The GLCD display will be automatically turned on.

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.

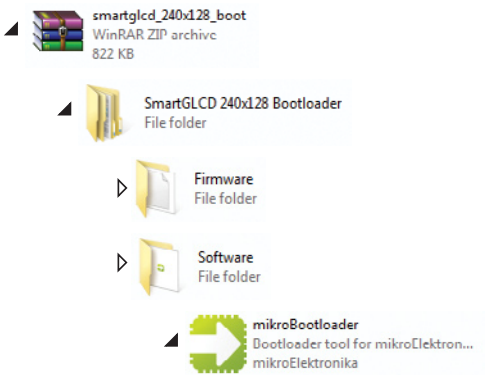


3. Programming with bootloader

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

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



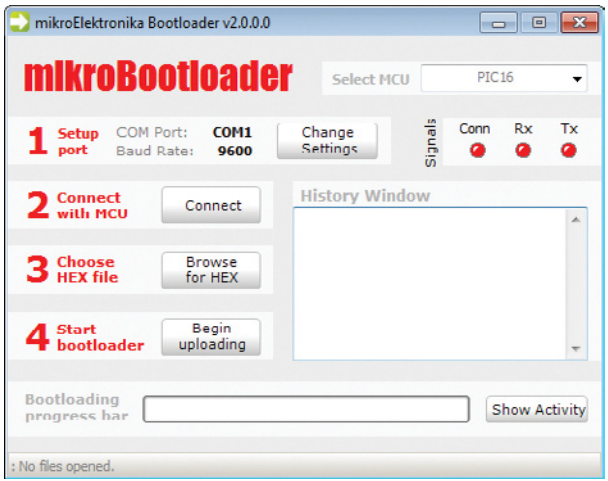


Figure 3-1: mikroBootloader software

note *Connect SmartGLCD with a PC before starting mikroBootloader software*

Identifying device COM port

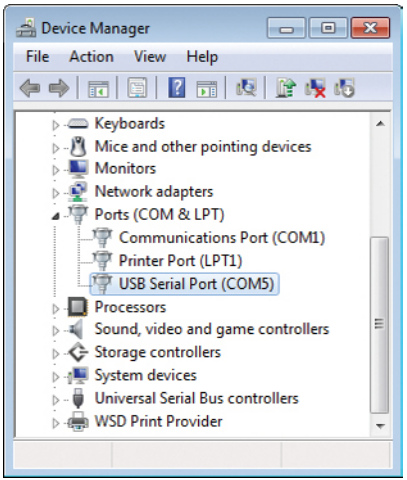


Figure 3-2: Identifying COM port

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

step 1 - Choosing COM port

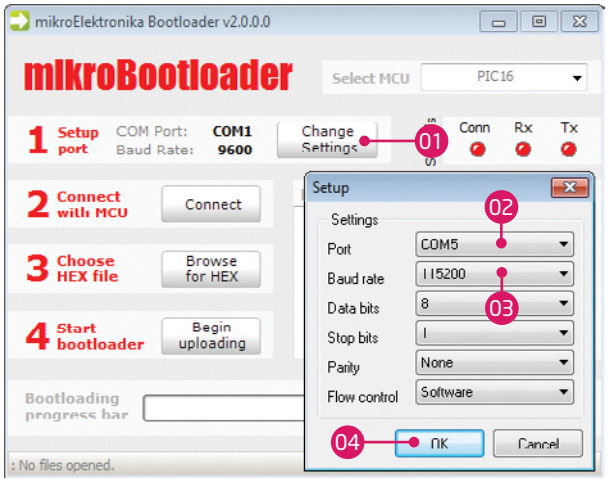


Figure 3-3: Selecting COM port

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

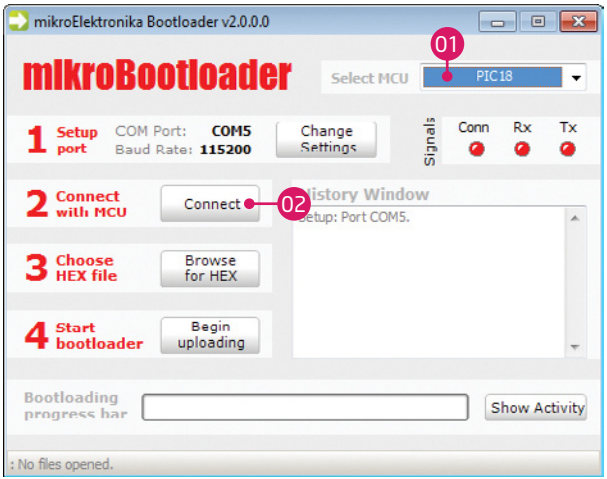


Figure 3-4: Connecting mikromedia with mikroBootloader

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

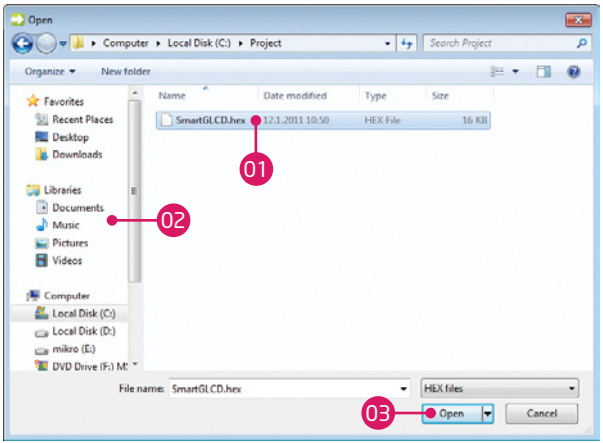


Figure 3-6: Selecting .hex file

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 microcontroler

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

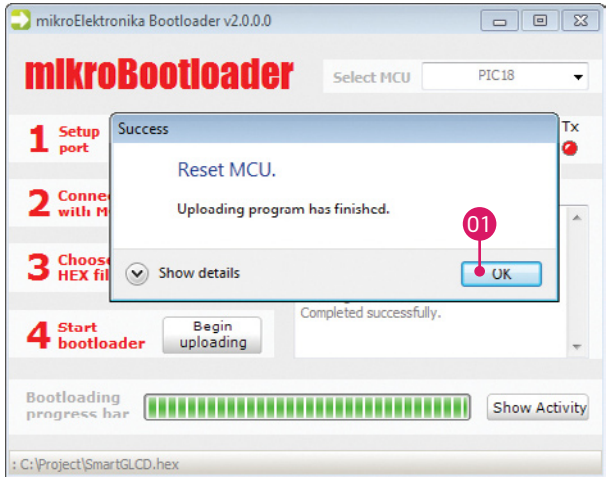
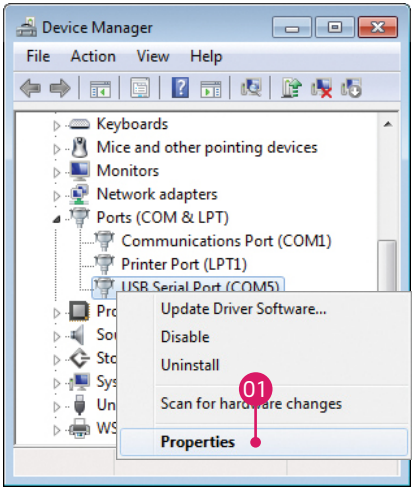
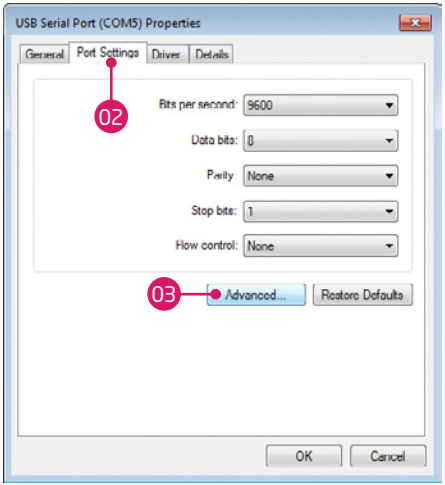


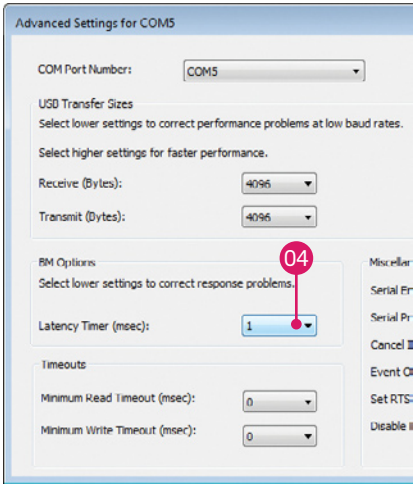
Figure 3-9: Uploading is finished

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 to slow you can try to speed-up data transfer by seting 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. Programing with external programmer

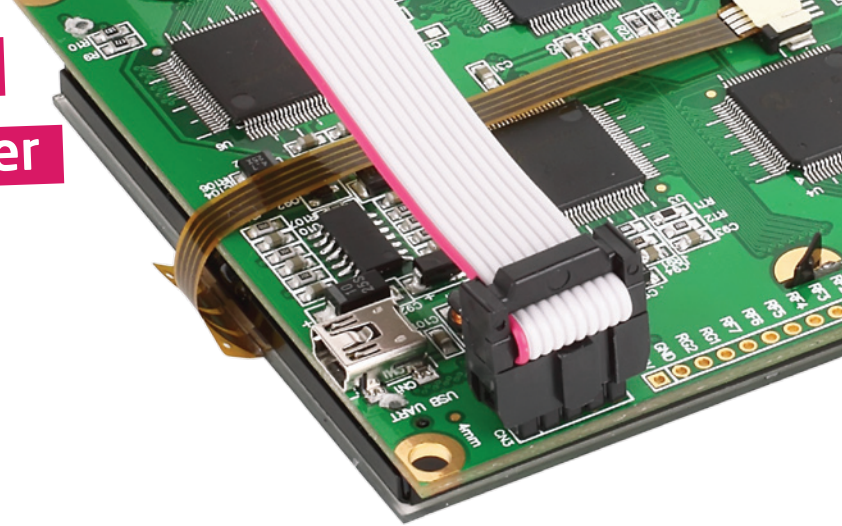
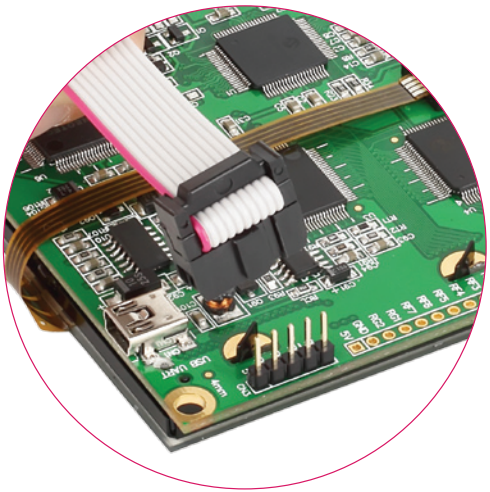


Figure 4-1: Connecting external programmer



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 accidently 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 placment if you prefer using mikroProg instead of bootloader.

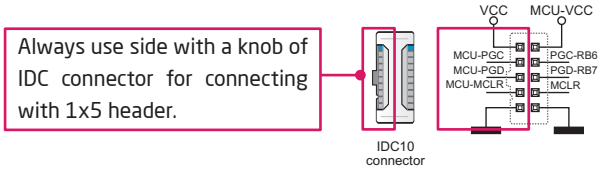


Figure 4-2: Connecting external programmer (GLCD side)

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 usage 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.

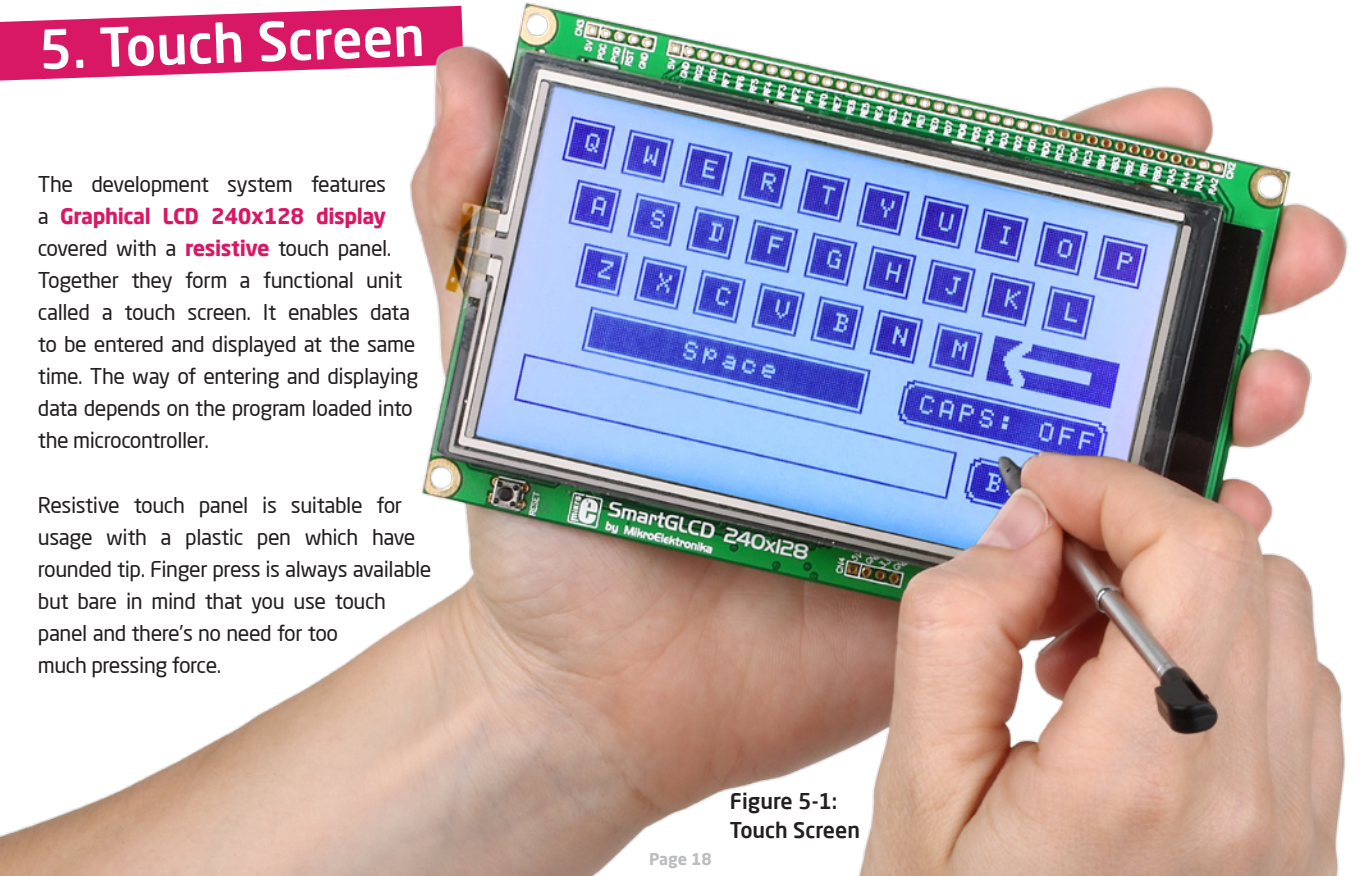


Figure 5-1: Touch Screen

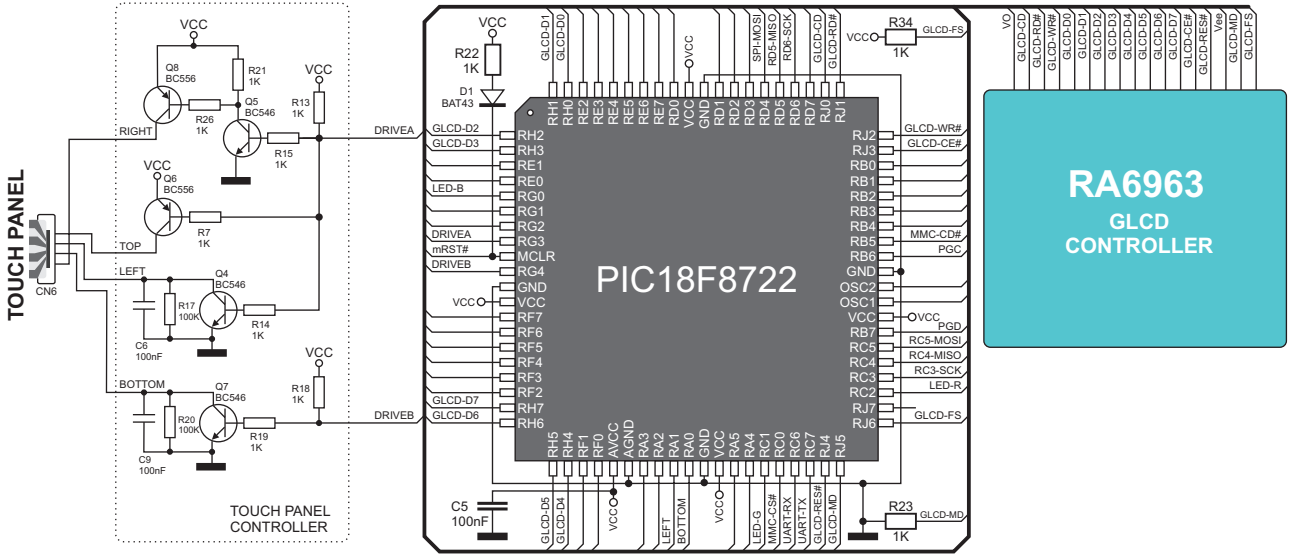


Figure 5-2-: Touch screen connection schematic

6. microSD Card Slot

Figure 6-1: microSD card inserted in SmartGLCD

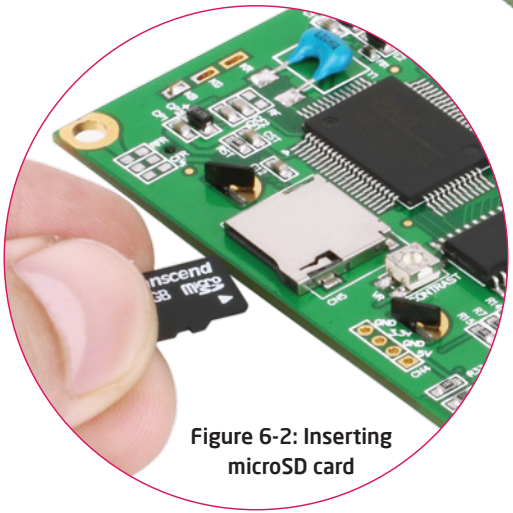


Figure 6-2: Inserting microSD card

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.

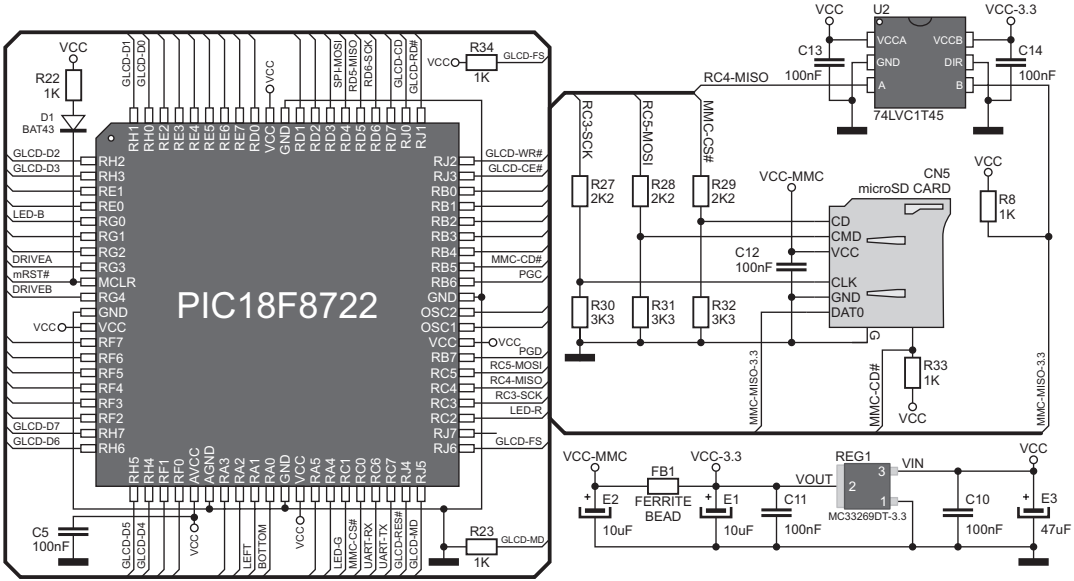


Figure 6-3: microSD card slot connecting schematic

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.

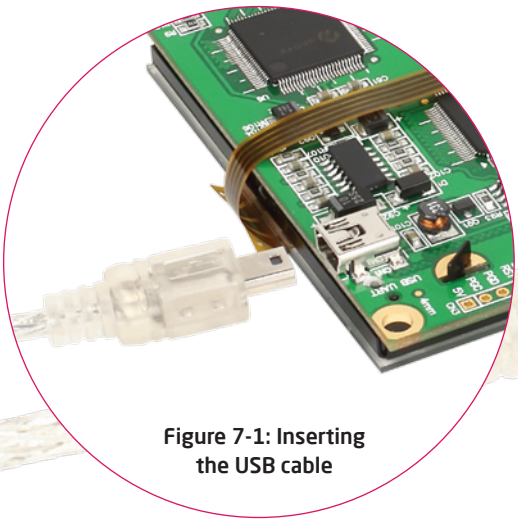


Figure 7-1: Inserting the USB cable

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

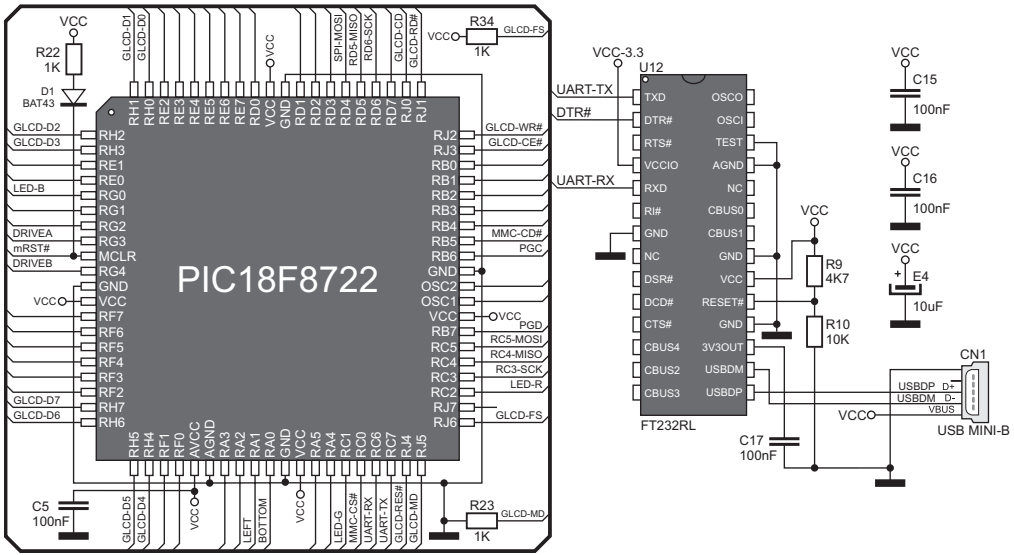
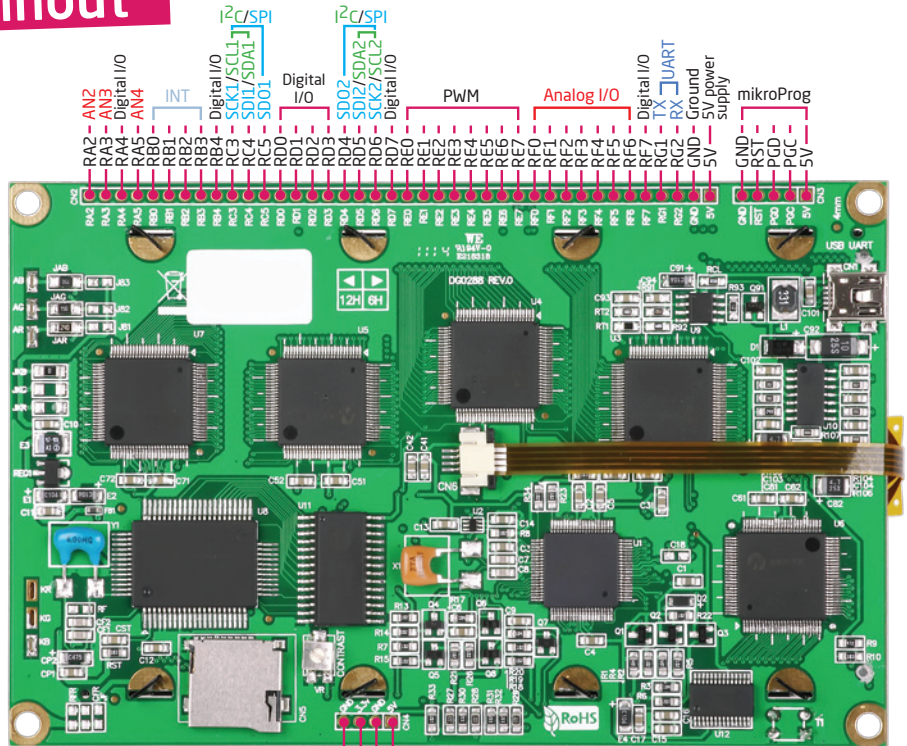
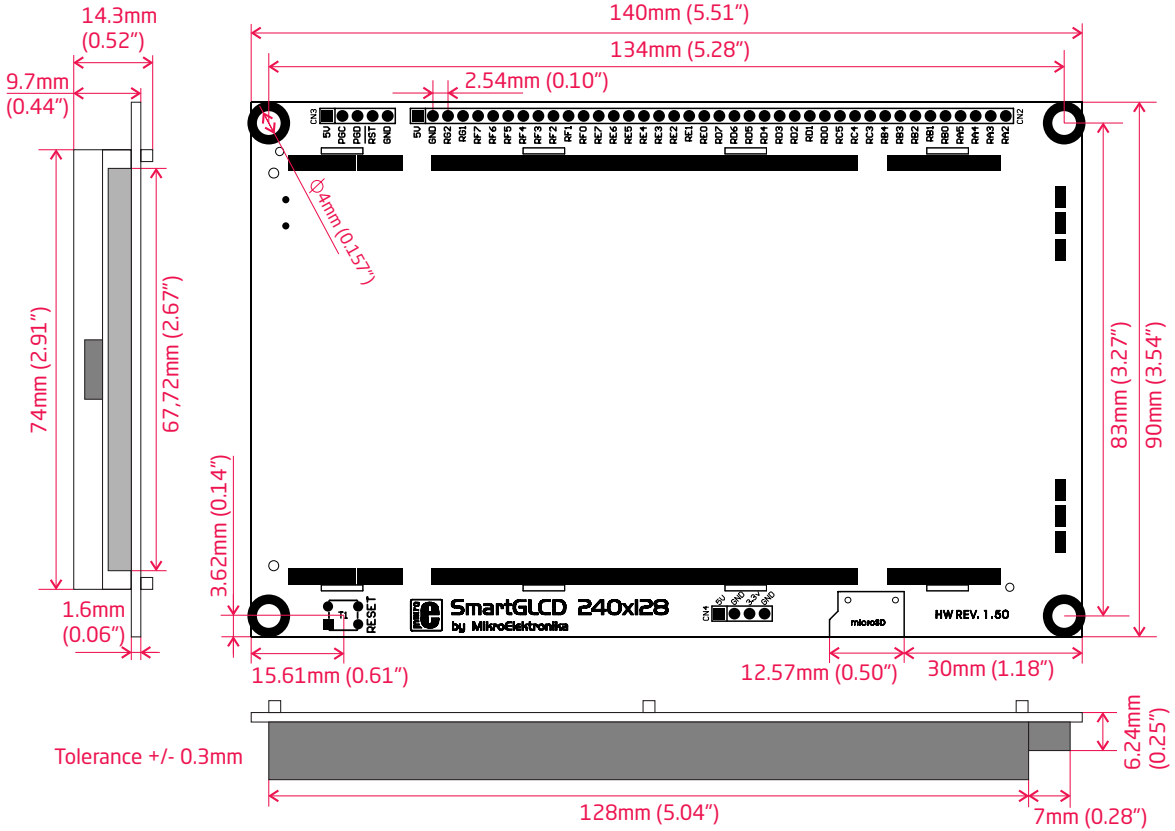


Figure 7-3: USB UART connecting schematic

8. Pinout



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


14.3mm
(0.52")
9.7mm
(0.44")
74mm (2.91")
67.72mm (2.67")
1.6mm
(0.06")
140mm (5.51")
134mm (5.28")
2.54mm (0.10")
Φ4mm (0.157")
3.62mm (0.14")
83mm (3.27")
90mm (3.54")
SmartGLCD 240x128
by MikroElektronika
RESET
HW REV. 1.50
15.61mm (0.61")
12.57mm (0.50")
30mm (1.18")
Tolerance +/- 0.3mm
6.24mm
(0.25")
128mm (5.04")
7mm (0.28")

Notes:

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SmartGLCD
240x128

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