

Normally the ST7565 or SSD1306 controller is connected with a 4-wire SPI interface. But with the SSD1306 controller you can also use a I<sup>2</sup>C interface with PD2 as SDA and PD5 as SCL signal. The SDA and SCL signals must be equipped with pull-up resistors of about 4.7k $\Omega$  to 3.3V. A solution for connecting the OLED display shows the figure 2.9. The outputs of the ATmega is only switched to 0V for the I<sup>2</sup>C signals. Before connecting the pull-up resistors to 5V you must check, if your display module can tolerate a 5V signal level. Normally the data inputs of the controller are protected with diodes to 3.3V. You should make shure, that you have loaded a program with the I<sup>2</sup>C support to the ATmega before the Display is connected. If you have loaded a program with another interface, the output are also switched to the 5V side. Because I have determined a influence to the tester results across the VCC connection of a OLED module, a additional decoupling with a serial resistor of 68 $\Omega$  with a additional 10 $\mu$ F blocking capacitor is recommended. Instead of the 68 $\Omega$  resistor you can also use a inductor with about 1mH. Without the additional filter my tester has reported collector residual currents with bipolar transistors and a OLED display. Also you should check the pin sequence of your OLED module, some moduls have a different location of GND and VCC.

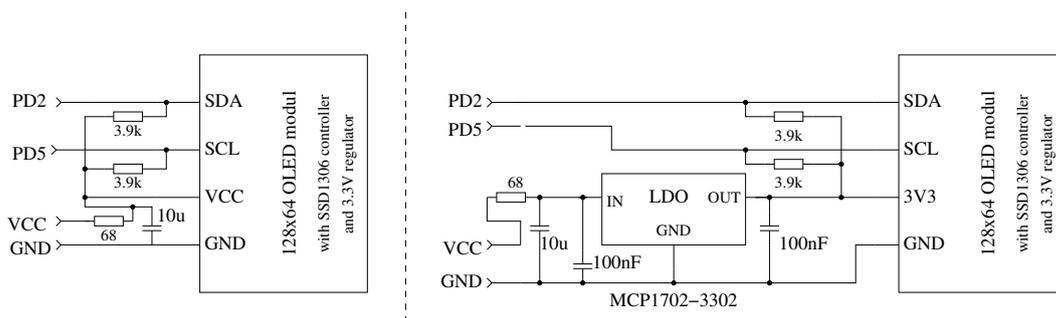


Figure 2.9. Connection of a graphical OLED display with I<sup>2</sup>C interface

For connection to the ATmega644 series of processors the pins PB2 to PB5 instead of PD0 to PD3 are used. The exchange of a text display to a graphical display is possible with a adapter printed board because all required data signals and power signals are available at the LCD connector. A little simpler is the connection of a graphical display with a ST7920 controller because the controller can operate with 5V power voltage. For that the display should offer 128x64 visible pixels. The display module with the ST7920 controller can be connected with the 4-bit parallel interface or with a special serial interface., as shown in figure 2.10.

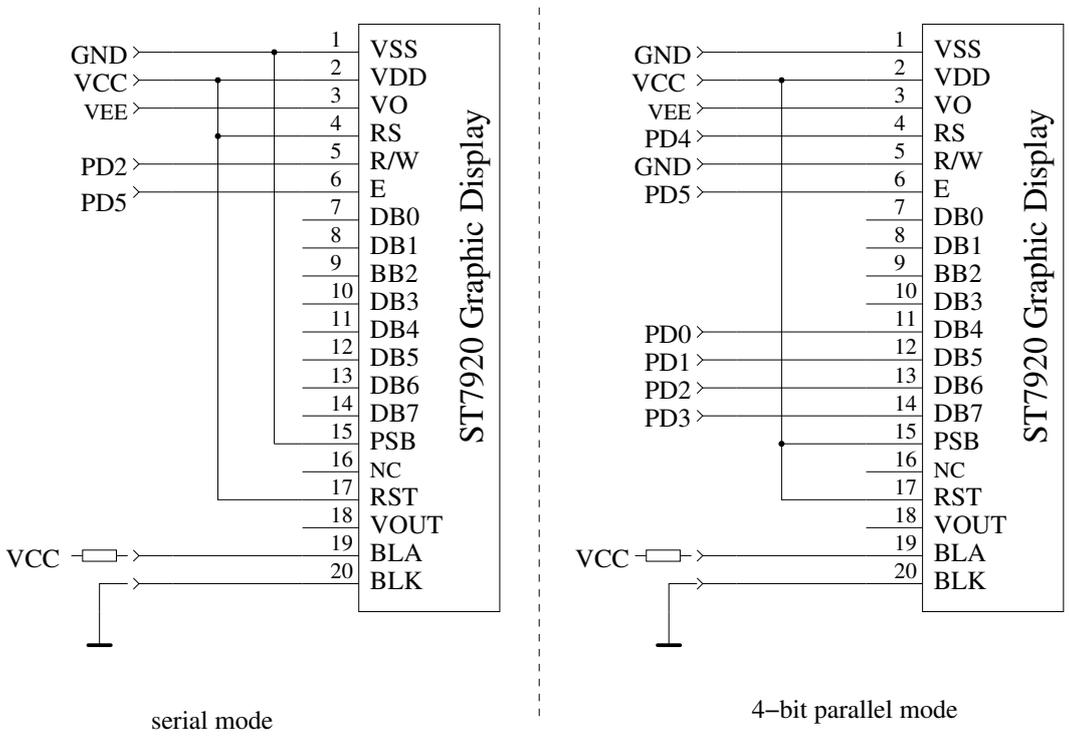


Figure 2.10. Connection of a display with ST7920 controller

For both connection types the software must be configured in a special way. The Makefile option "WITH\_LCD\_ST7565 = 7920" must be set in any case, for the serial connection type you must set also the option "CFLAGS += -DLCD\_INTERFACE\_MODE=5". The orientation of the presentation can be changed with the options LCD\_ST7565\_H\_FLIP and LCD\_ST7565\_V\_FLIP in the same way as with the other graphical displays.

A special case is the connection of displays with a ST7108 controller. Because these displays can only use the 8-bit parallel interface, you must use a serial to parallel converter. The simplest way seems to be the use of a 74HCT164 or a 74HCT595 chip. A suitable suggestion of a connection circuit shows the figure 2.11 .