

AMS Lab exercise 10

Touch screen driver

HH, March 14, 2018

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Purpose

To understand how to interface a typical resistive touch panel from a microcontroller.
A driver has to be implemented.

Literature

- “ITDB02 Arduino Mega shield” data sheet.
- “ITDB02 Arduino Mega shield” schematic.
- “XPT2046 Touch Screen Controller” data sheet.

Material

- Arduino Mega2560 board.
- ITDB02 Arduino Mega shield.
- ITDB02 TFT display module (version 2). We will use the SD card interface.

The relevant documents are available at AMS Blackboard.

Exercise

The ITDB02 display module (that we used in LAB3a) has a resistive touch film glued to its front surface. It is connected to an onboard touch screen controller (XPT2046).

In this exercise, we will write and test a C driver to interface the touch screen.
Study the data sheet for the touch screen controller (available at AMS Blackboard).

Start by mounting the Arduino Mega shield and the Display module on the Mega2560 Arduino.

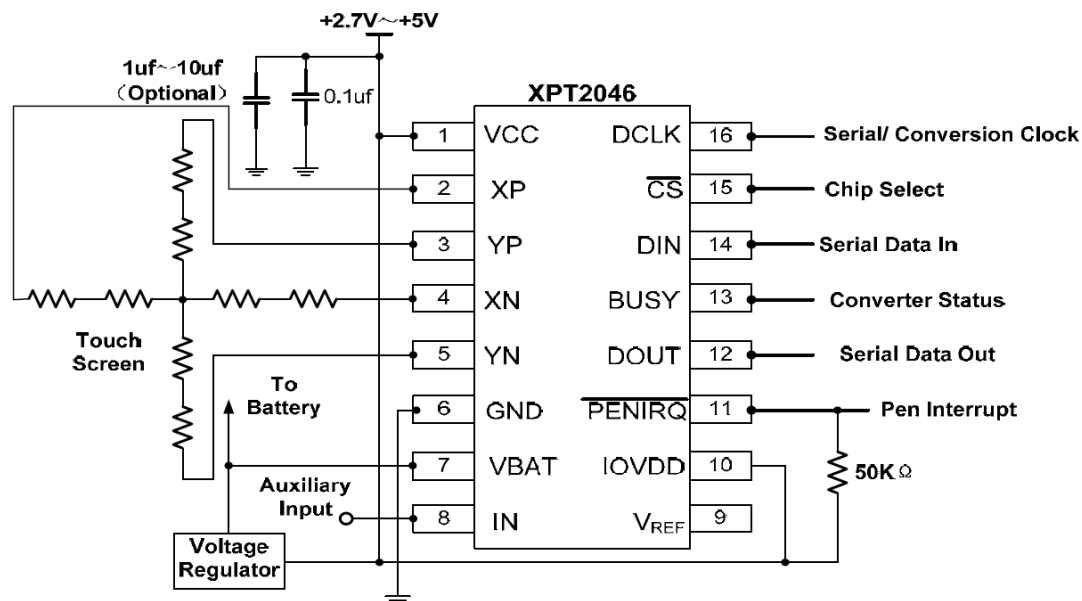
*Notice: Do not mount on top of the “Arduino Mega2560 I/O Shield” (PR5824).
Some signals will then interfere.*



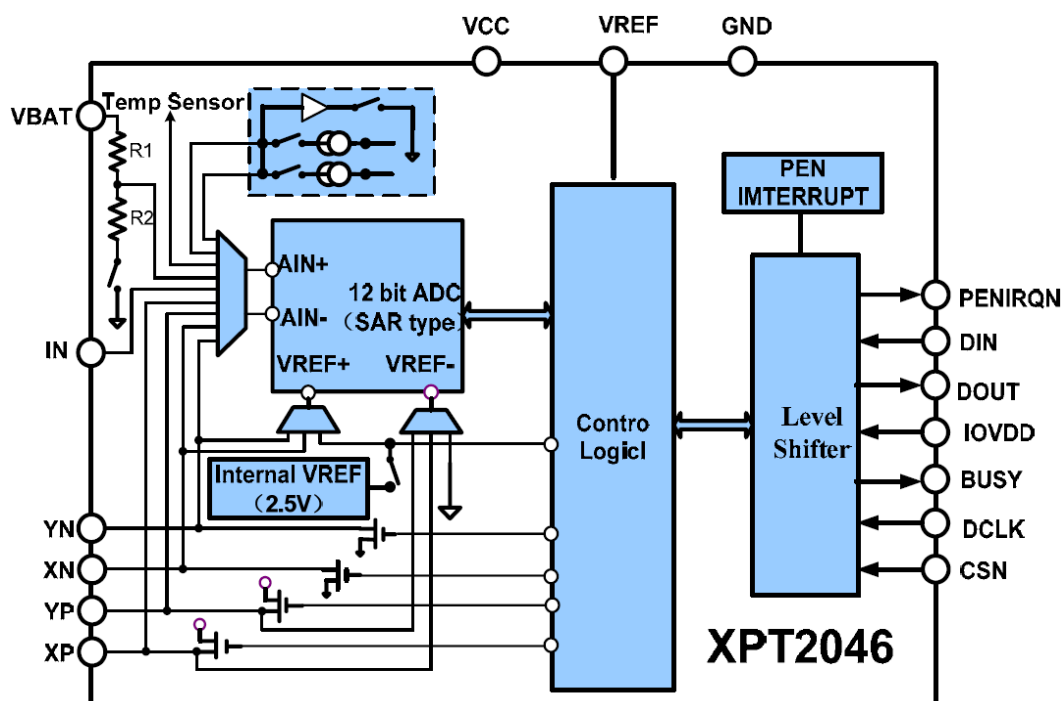
To avoid damaging the hardware (by shortcircuitings), remember to place some nonconduction material (eg. plastic foam) between the display module and the Arduino shield!

The position of the power switch (3,3 volt / 5 volt) does not matter.

Basic Operation of the XPT2046



This is the block diagram for the controller:



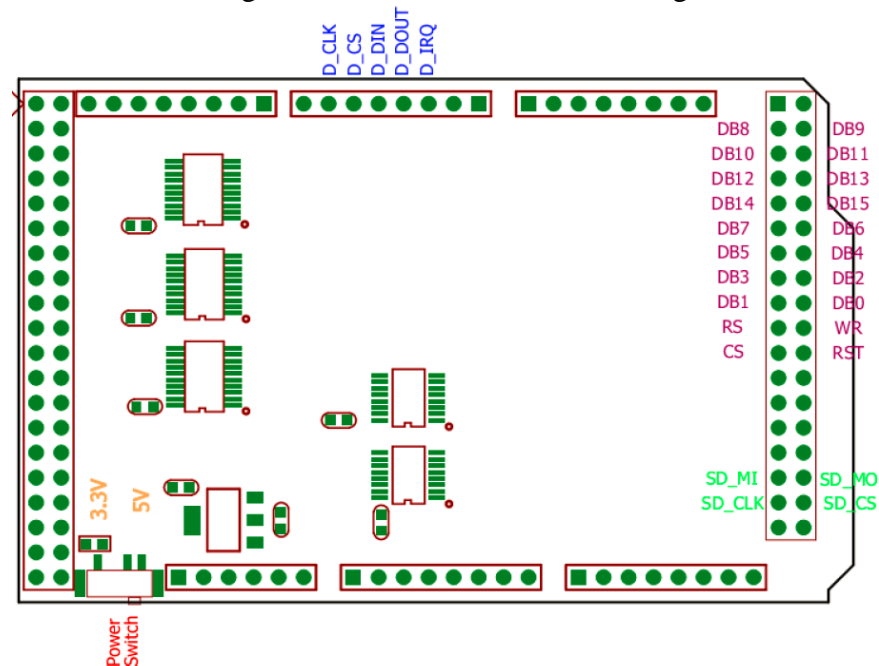
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The controller uses 4 wires for serial communication (consult the data sheet for timing).
Seen from the Mega2560 board it uses the “blue” signals:



This table shows the connections between the Mega2560 and the SD card:

| Mega2560 pin | Controller signal |
|----------------|-------------------|
| PH3 | CLK |
| PE3 | CS |
| PG5 | DIN |
| PE5 | DOUT |
| PE4 (= INT 4) | IRQ |

The touch controller runs at 3,3 volt and the signal levels are 3,3 volts.
Conversion between 5 volt (Mega2560 supply voltage) and 3,3 volt are done at the ITDB02 shield.

Write and test a driver for the touch panel with relevant functions.
As a minimum is must have a function to return the actual position of a pen touch.