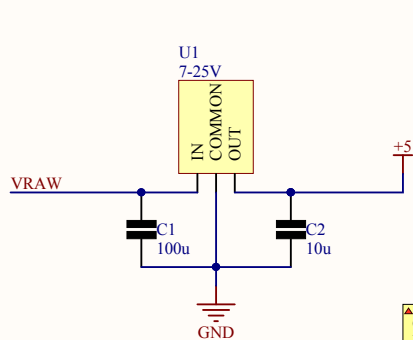


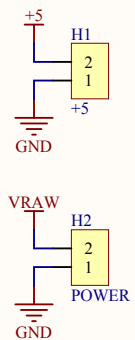
▲ Pulling Signal Select 1 low enables the receiver.
Pulling Signal Select 2 low enables the transmitter.

▲ Power supply is connected using Net labels

Description: Top level overview		
Sheet name: 01 Overview.SchDoc		
Drawn by: L.P. Klaver	Project: SDVN test1	
Delft University of Technology	Sheet 1 of 12	Rev.:14-3-2014

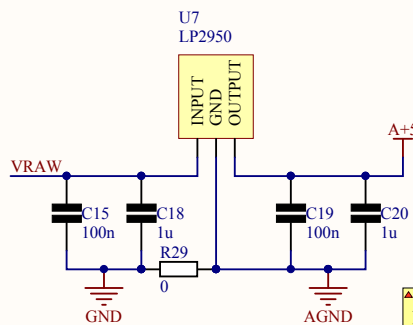


▲ General +5 Volt power supply.
Max. 1.5A.



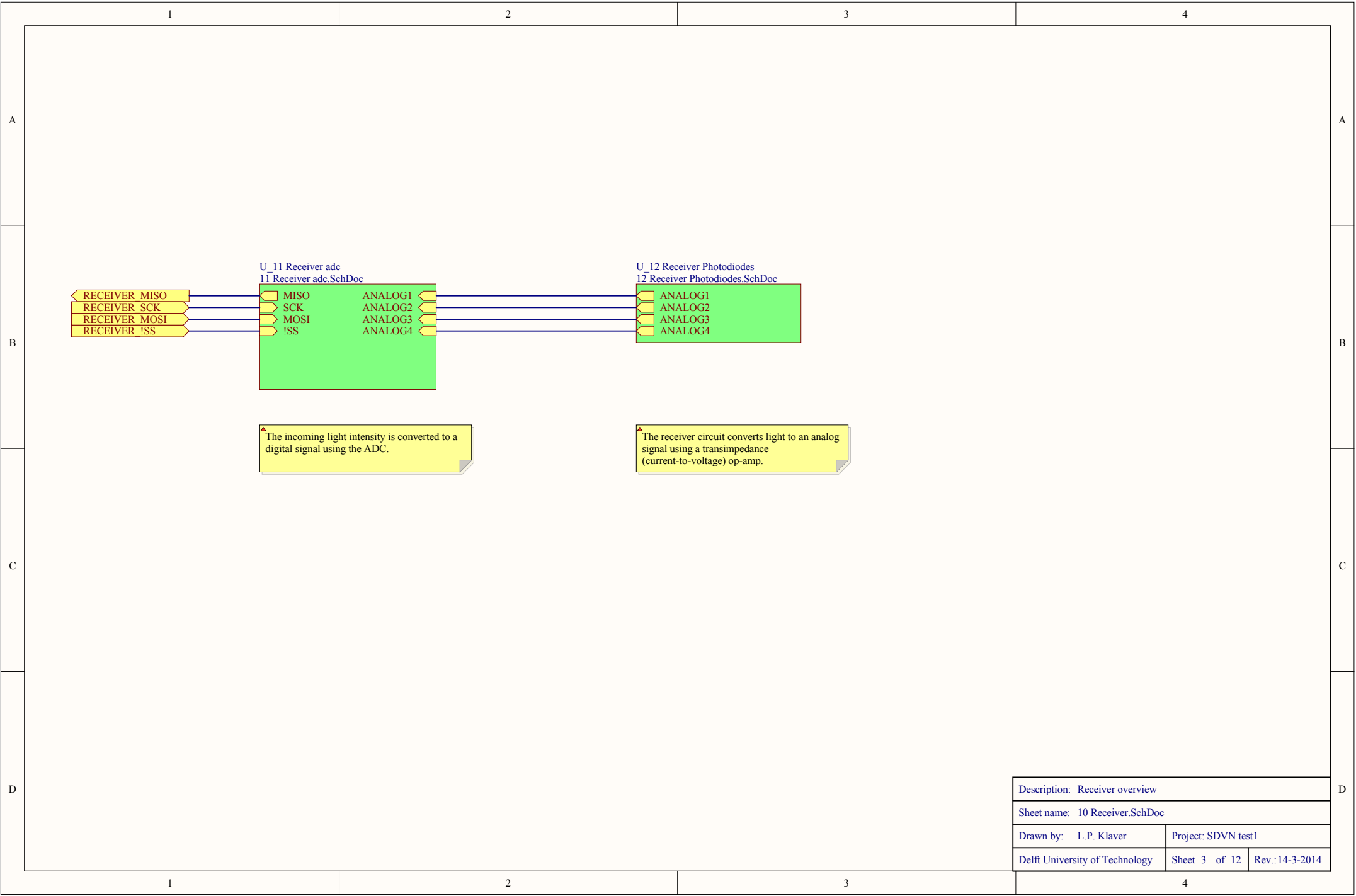
▲ +5 header for external powering circuits.

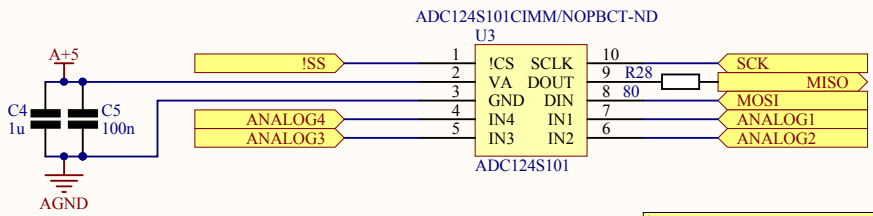
▲ Header for power input source.



▲ ADC power supply for stable power. The 0 Ohm resistor can be replaced by an inductor to decouple analog ground from the digital ground.

Description: Power supply		
Sheet name: 02 Power.SchDoc		
Drawn by: L.P. Klaver	Project: SDVN test1	
Delft University of Technology	Sheet 2 of 12	Rev.:14-3-2014

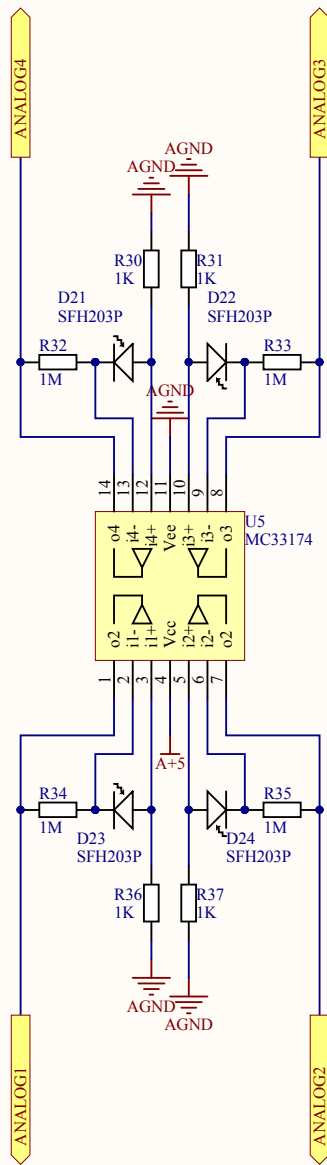
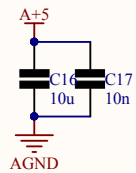




▲ Resistor in SPI lines offer a place to match the trace impedance. If any reflections in the line create overshoot issues then a resistor can be soldered in the line to dampen it. Trace impedance is 79.9 Ohm.

▲ The ADC makes the analog light intensity signals available for digital processing. The ADC takes a sample when its signal select signal is pulled low. After taking the sample the value can be read out using SPI. Max. sampling frequency is 1Mhz. The SPI clock frequency must be between 50KHz and 16Mhz.

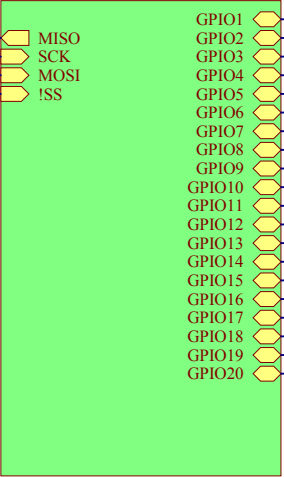
Description: ADC circuit		
Sheet name: 11 Receiver adc.SchDoc		
Drawn by: L.P. Klaver	Project: SDVN test1	
Delft University of Technology	Sheet 4 of 12	Rev.:14-3-2014



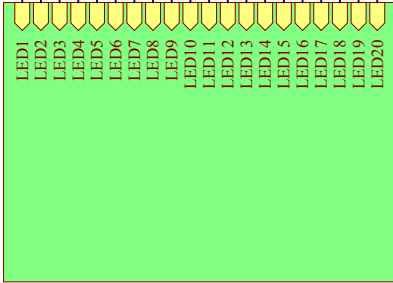
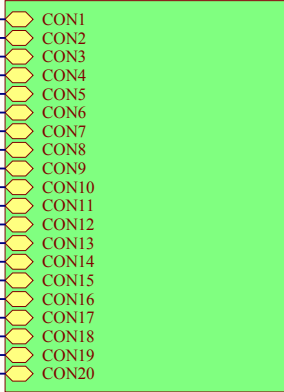
Description: Photodiode and op-amp circuit		
Sheet name: 12 Receiver Photodiodes.SchDoc		
Drawn by: L.P. Klaver	Project: SDVN test1	
Delft University of Technology	Sheet 5 of 12	Rev.:14-3-2014



U_21 Transmitter GPIO module
21 Transmitter GPIO module.SchDoc



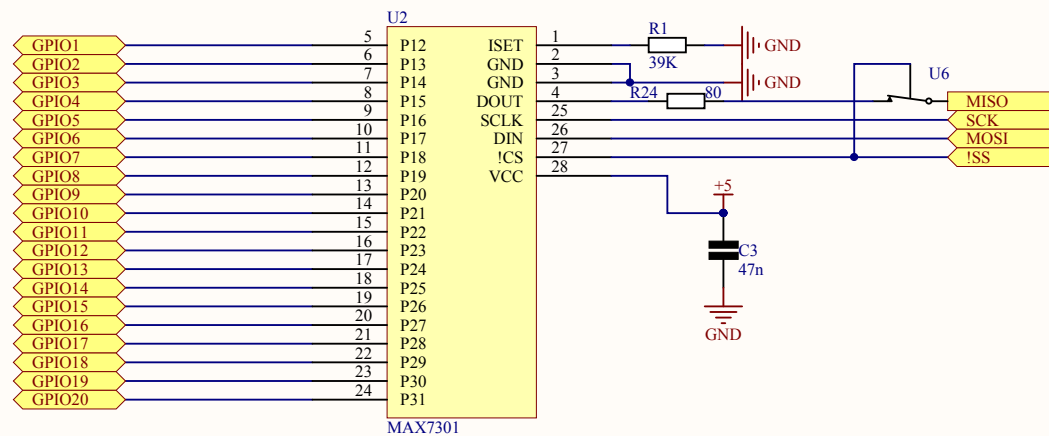
U_22 Transmitter Connectors
22 Transmitter Connectors.SchDoc



U_23 Transmitter LEDs
23 Transmitter LEDs.SchDoc

▲ The transmitter connectors provide a control interface for the LED driver transistors. The user can control the LEDs directly. Pull the signals low to enable the LED.

Description: Transmitter overview		
Sheet name: 20 Transmitter.SchDoc		
Drawn by: L.P. Klaver	Project: SDVN test1	
Delft University of Technology	Sheet 6 of 12	Rev.:14-3-2014



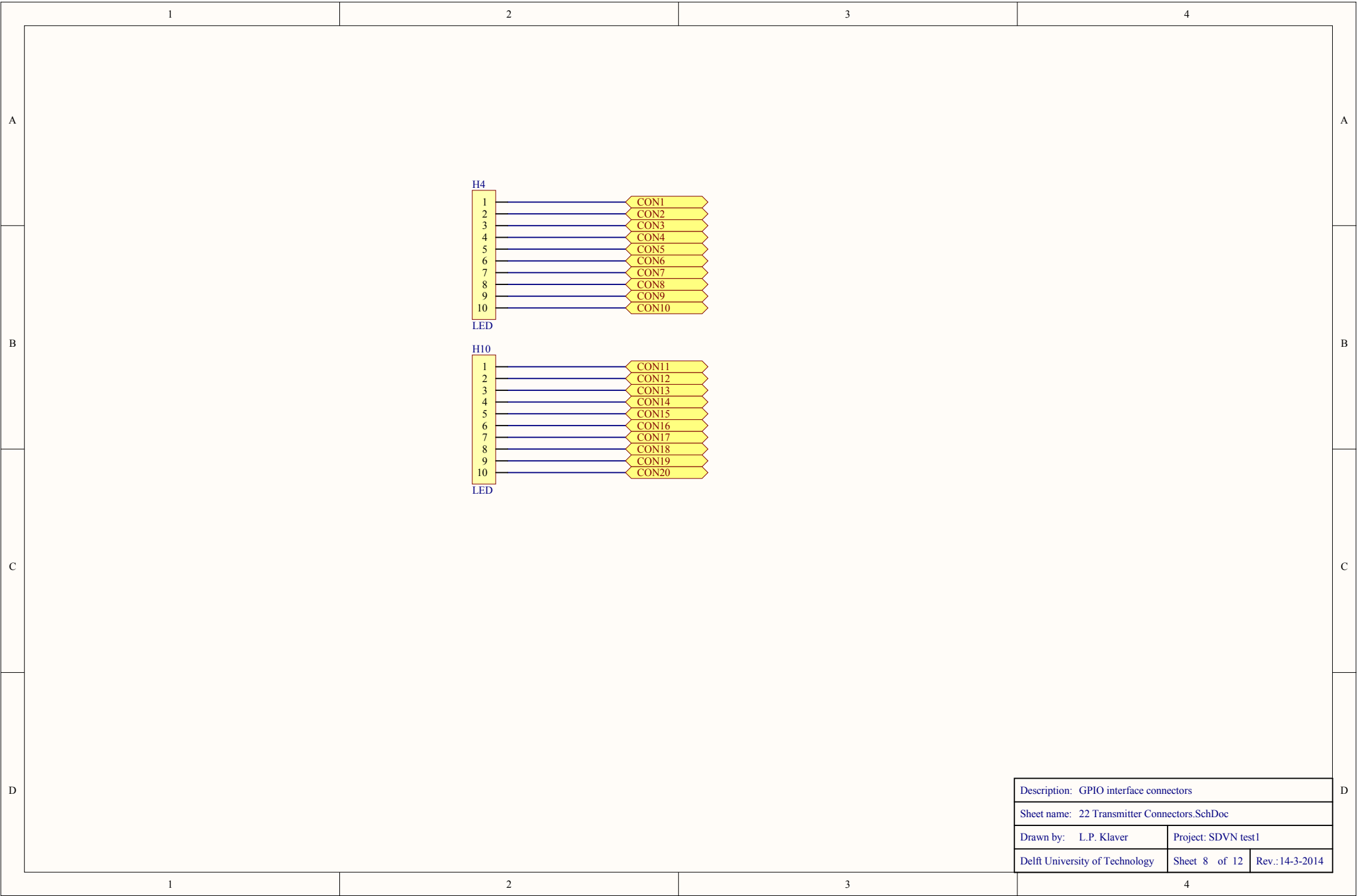
▲ Resistor in SPI lines offer a place to match the trace impedance. If any reflections in the line create overshoot issues then a resistor can be soldered in the line to dampen it. Trace impedance is 79.9 Ohm.

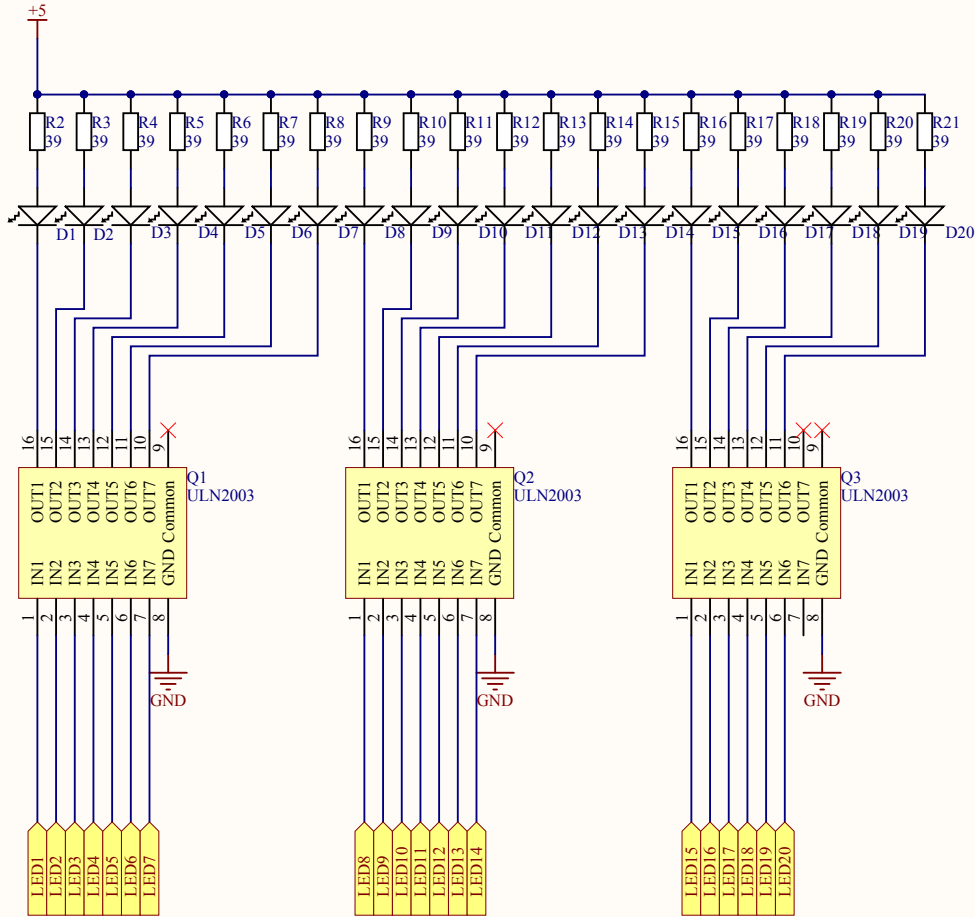
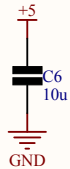
▲ MAX7301 needs a gate to make its output high impedance. High impedance behaviour is required when there are multiple slaves on the SPI bus. The switch is controlled by signal select: closed when ss is low (chip enabled) and opened when ss is high (chip disabled).

▲ The eight unused ports should be configured as outputs on power-up by writing 0x55 to registers 0x09 and 0x0A. If this is not done, the eight unused ports remain as floating inputs and quiescent supply current rises, although there is no damage to the part.

▲ The GPIO expander makes it possible to use the board with processors or microcontrollers with limited pins. Only an SPI interface is required. The module has a max. speed of 50MHz, with 8 bits for controlling all the pins. For the selected microcontroller this means a max. GPIO speed of 1Mhz. The data propagation delay is 21ns.

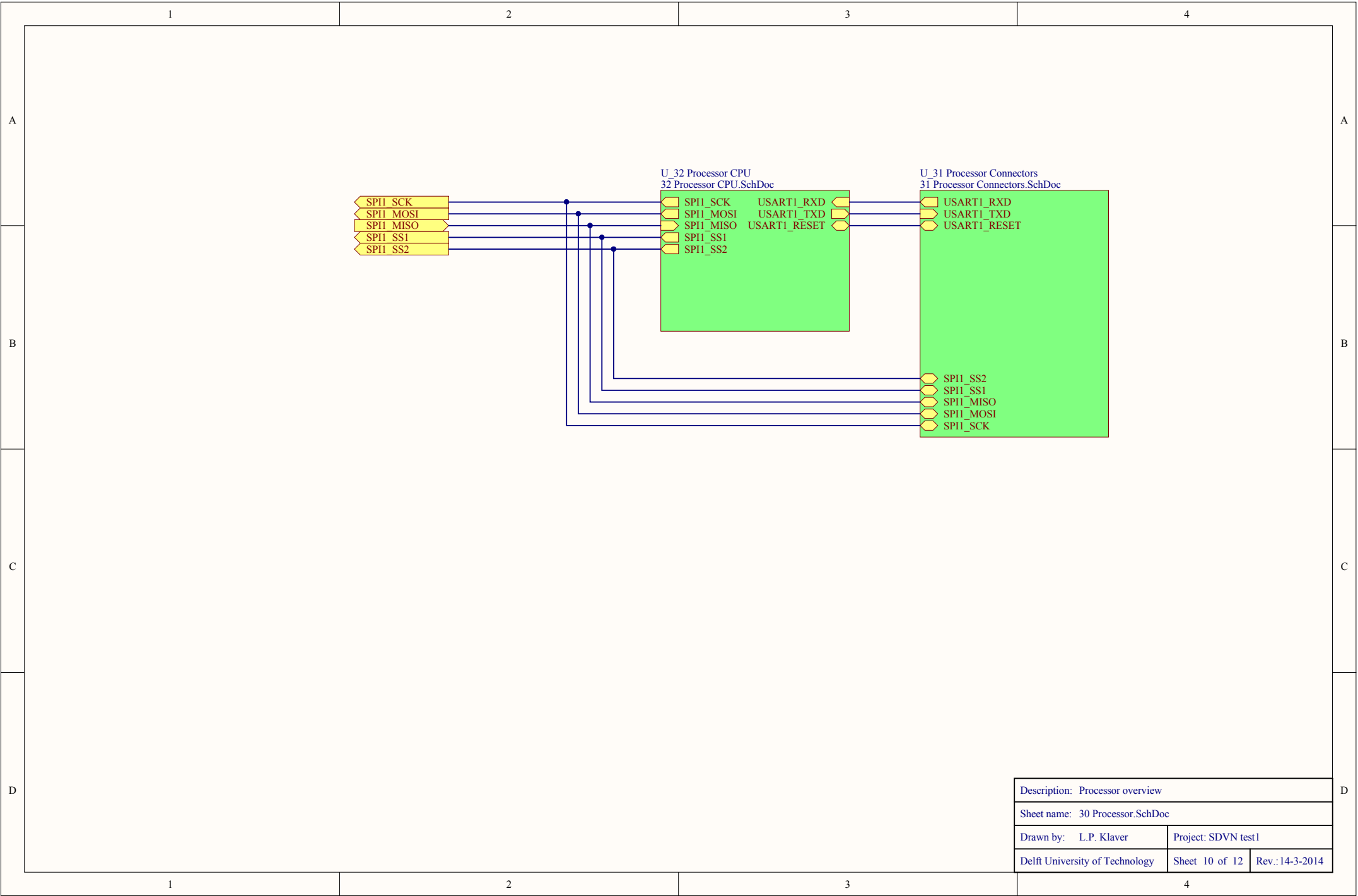
Description: GPIO Expander module		
Sheet name: 21 Transmitter GPIO module.SchDoc		
Drawn by: L.P. Klaver	Project: SDVN test1	
Delft University of Technology	Sheet 7 of 12	Rev.:14-3-2014

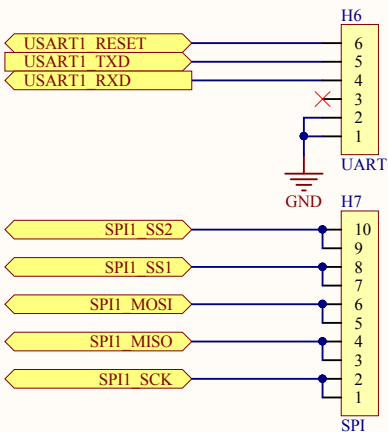




▲ The transmitter leds are controlled by the board circuits or external user input. The leds are ON when the input is pulled LOW, and OFF when pulled HIGH.

Description: Transmitter LED circuit		
Sheet name: 23 Transmitter LEDs.SchDoc		
Drawn by: L.P. Klaver	Project: SDVN test1	
Delft University of Technology	Sheet 9 of 12	Rev.:14-3-2014

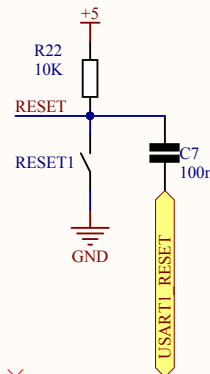
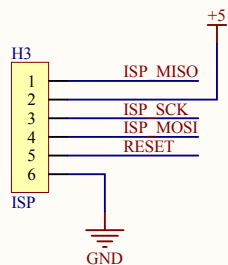




FTDI		Arduino
DTR	-----	Reset
TXO	-----	RXI
RXI	-----	TXO
+5V	-----	n.c.
CTS	-----	GND (pull low)
GND	-----	GND

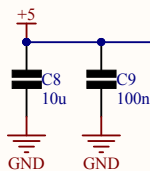
Traces between pads of the SPI header can be cut to disconnect the SPI components from the processor. This gives the user direct and undisturbed control over SPI. To reconnect after cutting the traces, use a 2.54mm jumper header.

Description: Processor interface connectors		
Sheet name: 31 Processor Connectors.SchDoc		
Drawn by: L.P. Klaver	Project: SDVN test1	
Delft University of Technology	Sheet 11 of 12	Rev.:14-3-2014

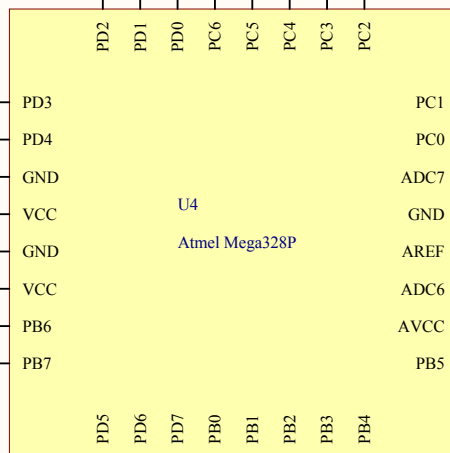


Capacitor in UART reset line for auto resetting purposes if the board is connected to a FTDI serial to usb converter module with Arduino bootloader.

Decoupling capacitors to offer fast current supply and high frequency noise filtering.

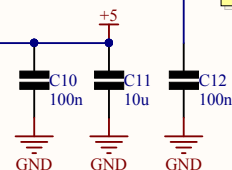


20pF load capacitors for crystal. See datasheet crystal.

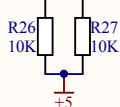


Capacitor on Aref is for external noise decoupling. Do not connect to any net because of internal shortening when selecting GND as reference. Datasheet 24.5.2.

Decoupling capacitors to offer fast current supply and high frequency noise filtering.



SS pull-up resistors to keep SPI slaves disabled during programming when the Mega328P pins are in tri-state.



Resistor in SPI lines offer a place to match the trace impedance. If any reflections in the line create overshoot issues then a resistor can be soldered in the line to dampen it. Trace impedance is 79.9 Ohm.

Description: Processor circuit

Sheet name: 32 Processor CPU.SchDoc

Drawn by: L.P. Klaver

Project: SDVN test1

Delft University of Technology

Sheet 12 of 12

Rev.: 14-3-2014

