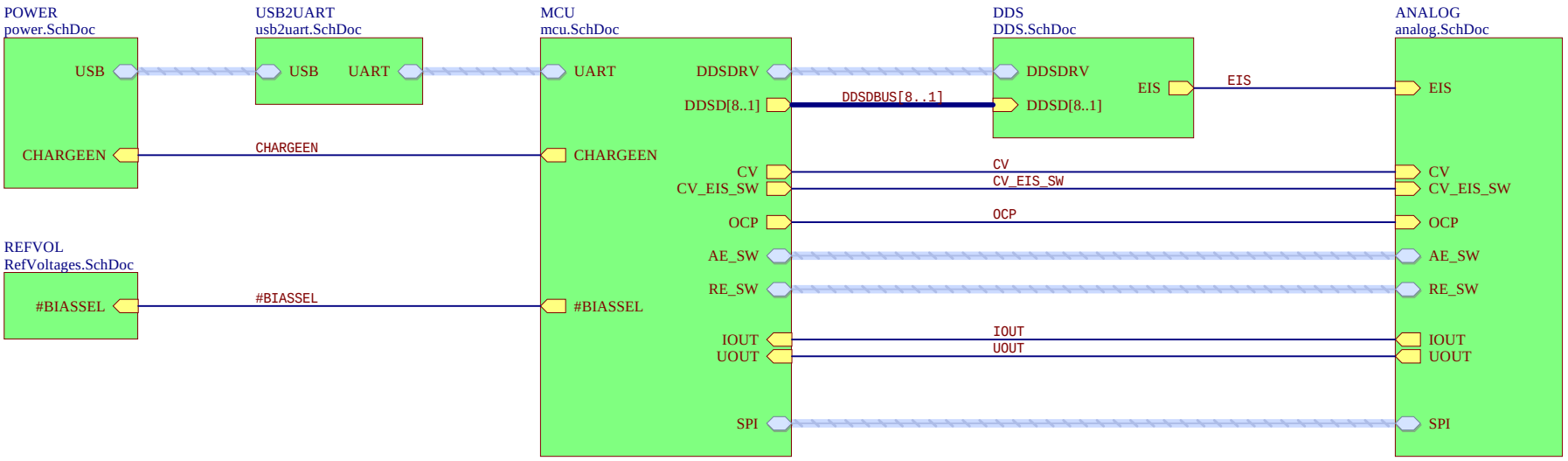


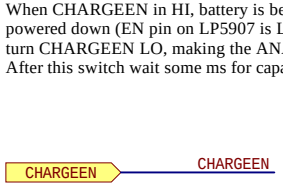
FID1 FID2 FID3 FID4

H Hole1 H Hole2 H Hole3 H Hole4 H Hole5

Title	***GrunMasterBox.SchDoc***		*Zachodniopomorski Uniwersytet Technologiczny w Szczecinie Wydział Elektryczny*
Size: A4	Author: *Łukasz Przeniosło*		
Date: 2016-04-10	Time: 20:59:57	Sheet 0 of 0	
File: M:\Github\altium-projects\GruntMasterBox\GrunMasterBox.SchDoc			

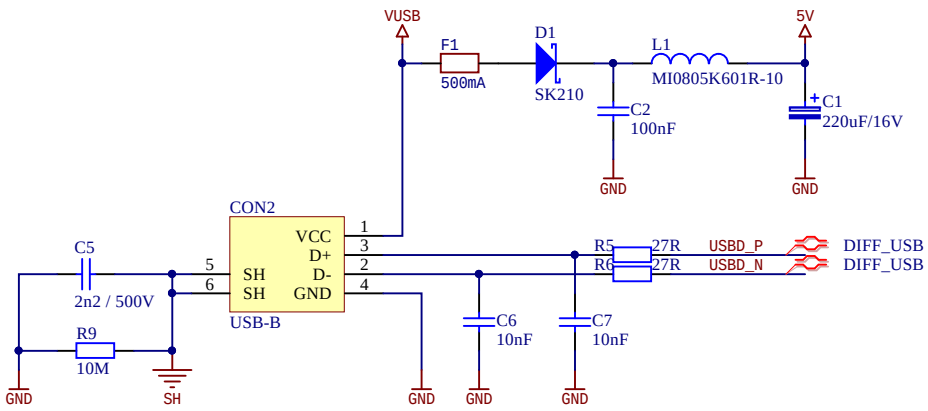
Wydział Elektryczny

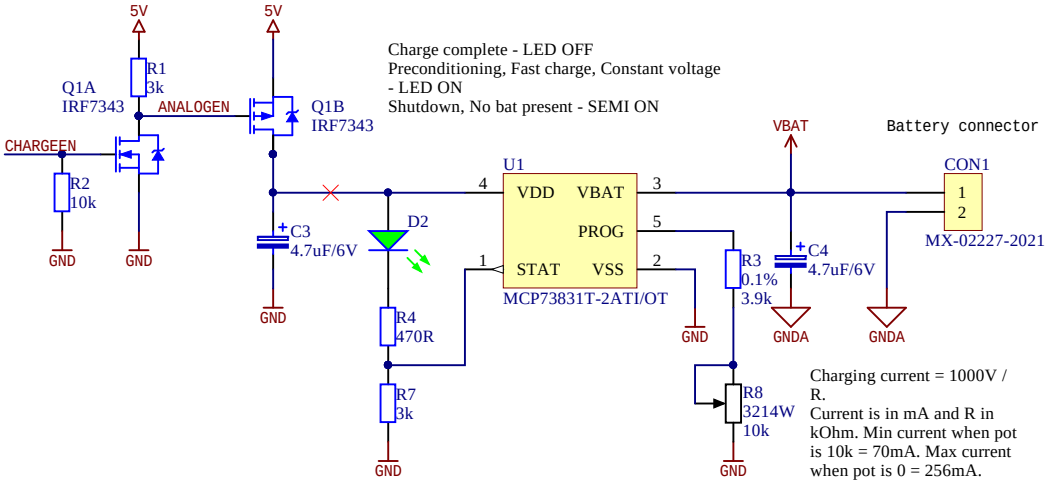
When CHARGEEN in HI, battery is being charged and analog circuitry is powered down (EN pin on LP5907 is LO). Before taking measurement, turn CHARGEEN LO, making the ANALOGEN HI at the same time. After this switch wait some ms for capacitors to charge.



Overcurrent and wrong input voltage polarisation protection

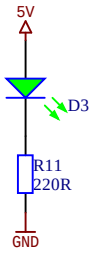
- v drop on D1



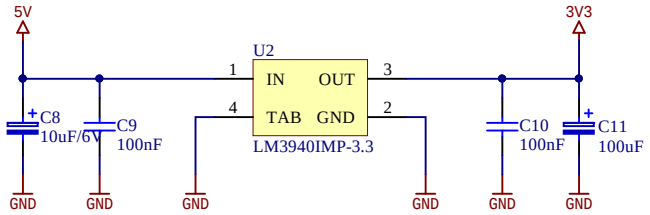


Charge complete - LED OFF
Preconditioning, Fast charge, Constant voltage - LED ON
Shutdown, No bat present - SEMI ON

Charging current = 1000V / R.
Current is in mA and R in kOhm. Min current when pot is 10k = 70mA. Max current when pot is 0 = 256mA.

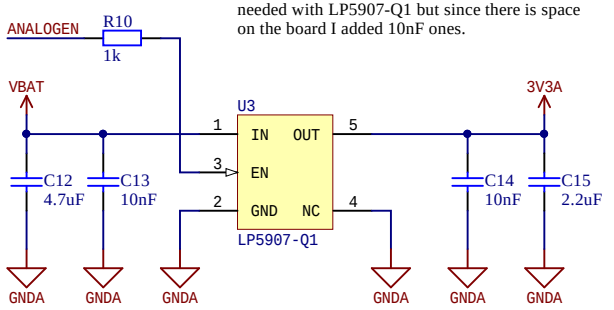


Power indication Green 5mm LED on a 14mm spacer, so it reaches out the casing.

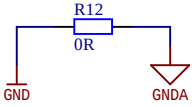


ANALOGEN is driven by MCU. When turned LOW, LP5907-Q1 is turned off, cutting all power from analog circuitry. It should be turned on only to make a measurement and turned off after it is done.

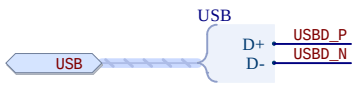
Analog circuitry doesnt draw much current so only 4.7uF input and 2.2uF output caps are used (ceramic for low ESR). No bypass capacitors are needed with LP5907-Q1 but since there is space on the board I added 10nF ones.

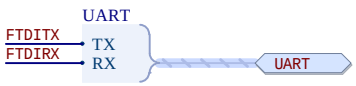


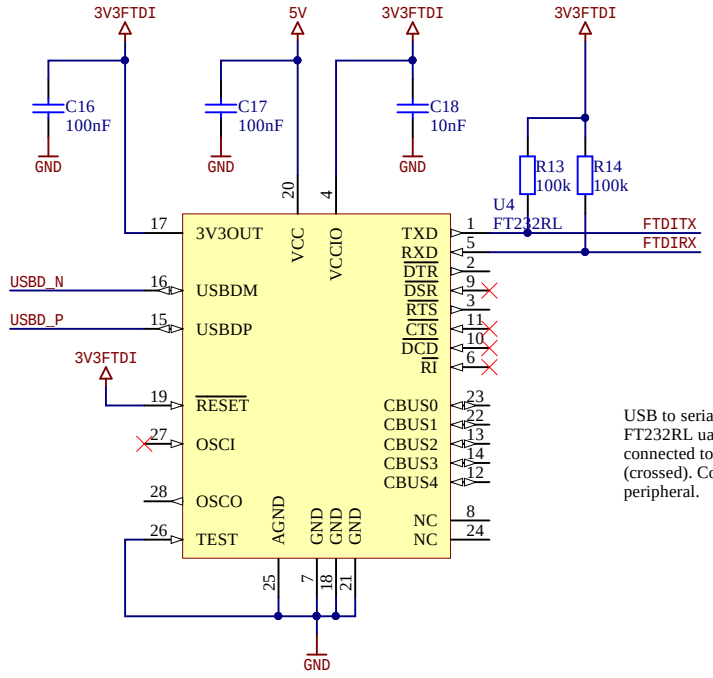
Single point analog and digital ground connection.



Title	***power.SchDoc***		*Zachodniopomorski Uniwersytet Technologiczny w Szczecinie*
Size: A4	Author: *Łukasz Przeniosło*		*Wydział Elektryczny*
Date: 2016-04-10	Time: 20:59:56	Sheet 0 of 0	Wydział Elektryczny
File: M:\Github\altium-projects\GruntMasterBox\power.SchDoc			

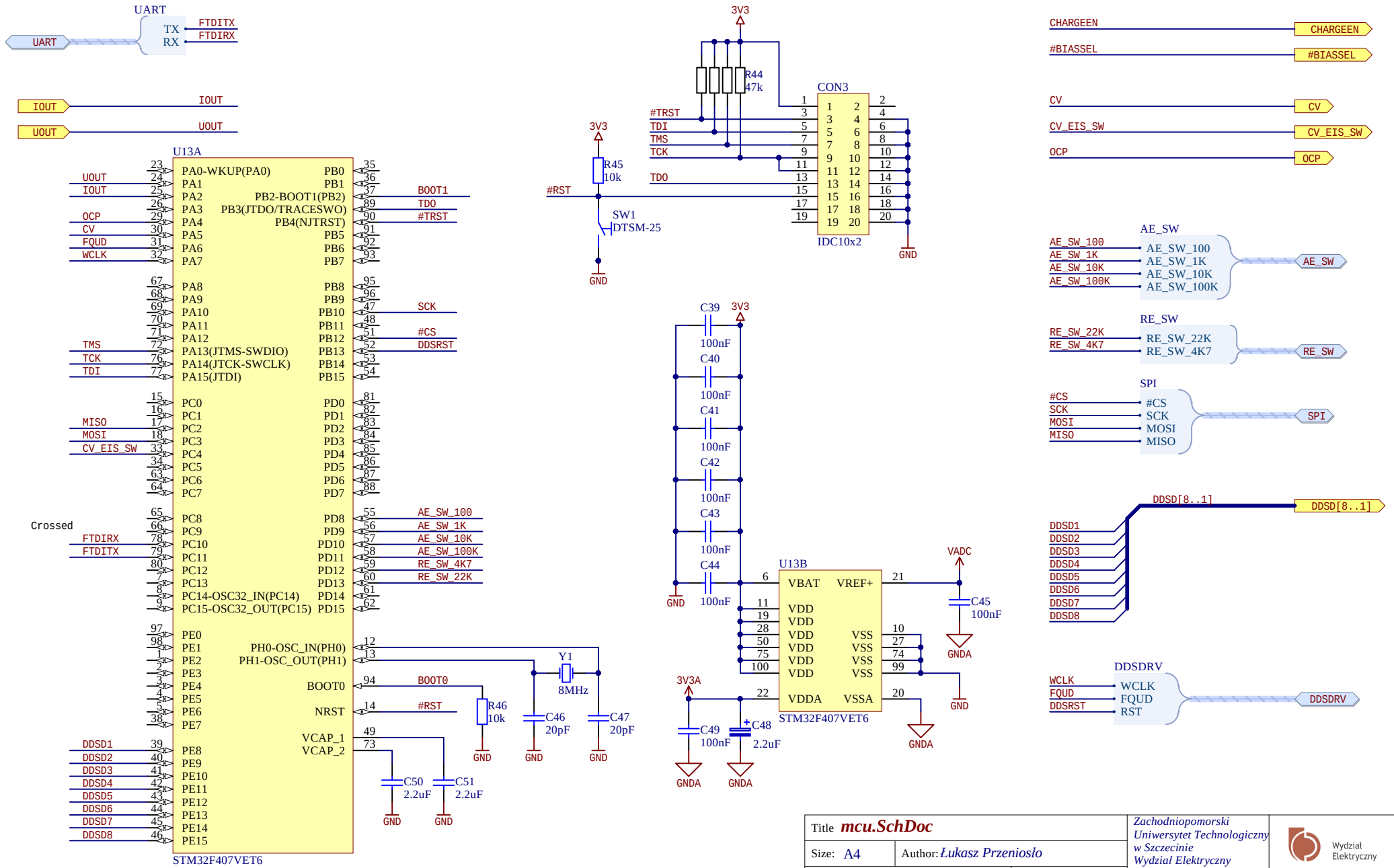






USB to serial port converter.
FT232RL uart lines (3.3V level) connected to MCU uart lines (crossed). Consider using MCU USB peripheral.

Title	***usb2uart.SchDoc***	*Zachodniopomorski Uniwersytet Technologiczny w Szczecinie Wydział Elektryczny*	Wydział Elektryczny
Size: A4	Author: *Łukasz Przeniosło*		
Date: 2016-04-10	Time: 20:59:56	Sheet 0 of 0	
File: M:\Github\altium-projects\GruntMasterBox\usb2uart.SchDoc			



Title	**mcu.SchDoc**		
Size: A4	Author: *Łukasz Przeniosło*		
Date: 2016-04-10	Time: 20:59:56	Sheet 0 of 0	
File: M:\Github\altium-projects\GruntMasterBox\mcu.SchDoc			

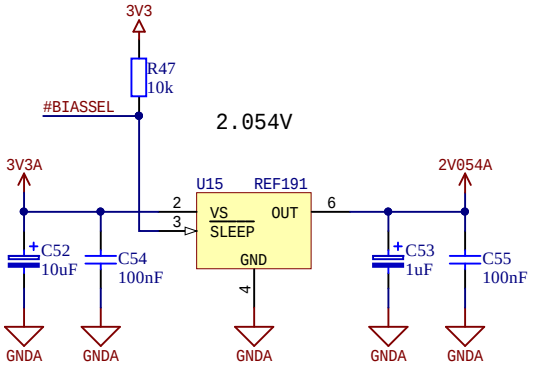
Zachodniopomorski Uniwersytet Technologiczny w Szczecinie
Wydział Elektryczny

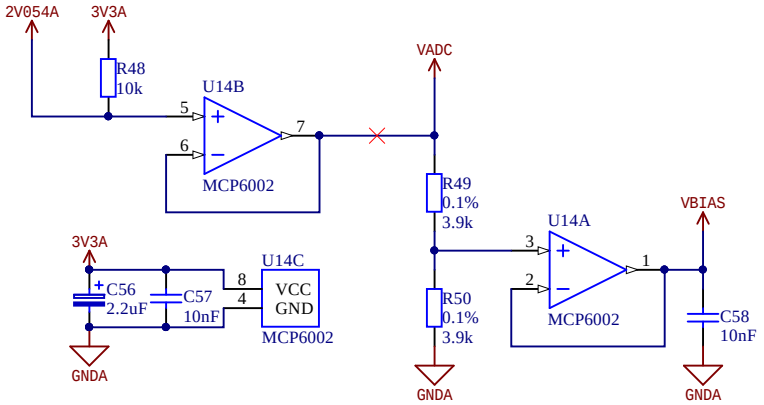
Wydział Elektryczny

#BIASSEL #BIASSEL

#BIASSEL selects voltages values for MCU ADC VREF and BIAS voltage for analog circuitry. When #BIASSEL is LOW, 2.054V output is high impedance, allowing 3.3V to enter the voltage follower.

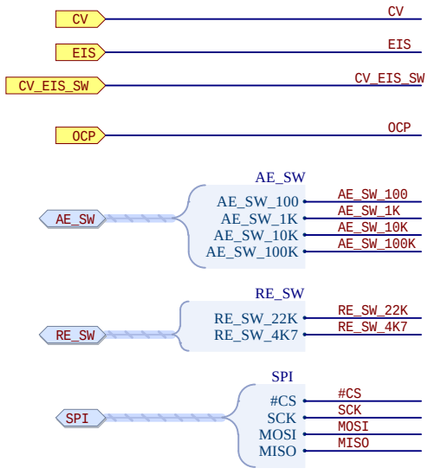
#BIASSEL LO -> VREF = 3.3V and VBIAS = 1.65V
#BIASSEL HI -> VREF = 2.054V and VBIAS = 1,027V

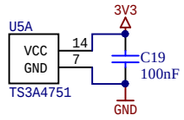


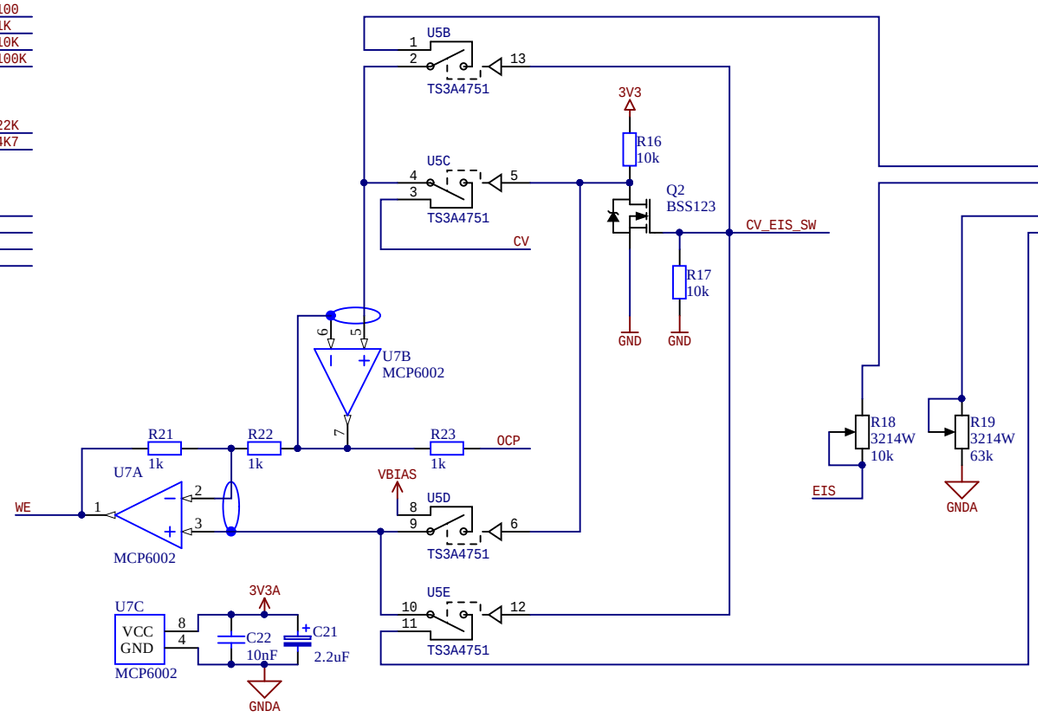


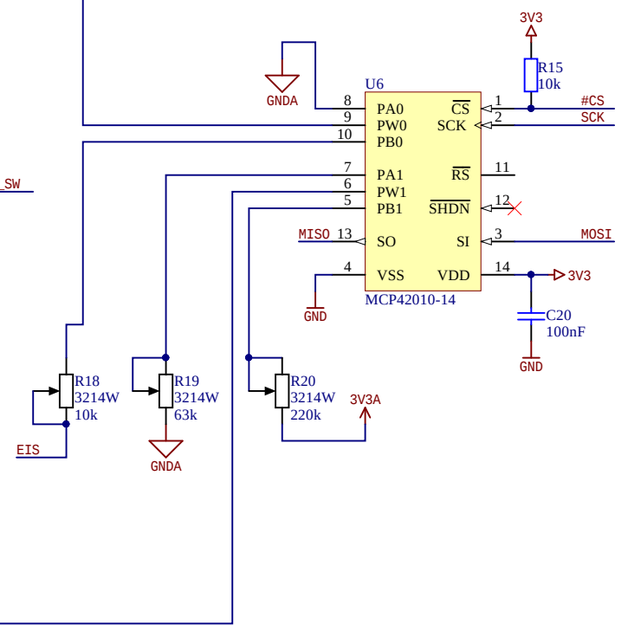
Title	***RefVoltages.SchDoc***		*Zachodniopomorski Uniwersytet Technologiczny w Szczecinie Wydział Elektryczny*
Size: A4	Author: *Łukasz Przeniosło*		
Date: 2016-04-10	Time: 20:59:56	Sheet 0 of 0	
File: M:\Github\altium-projects\GruntMasterBox\RefVoltages.SchDoc			

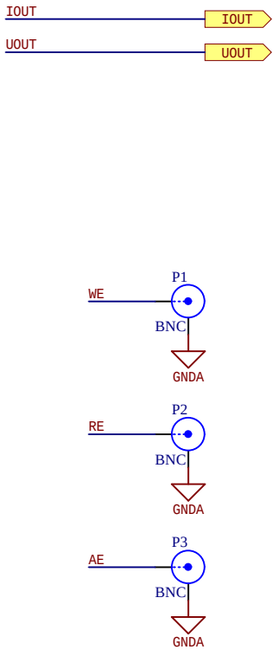
Wydział Elektryczny

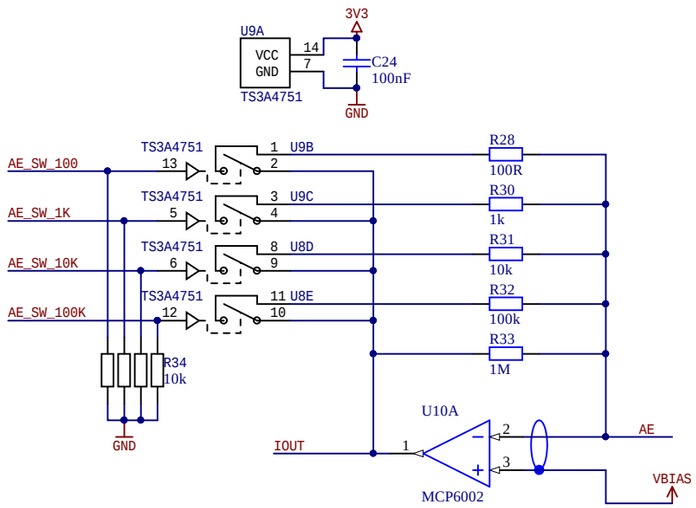






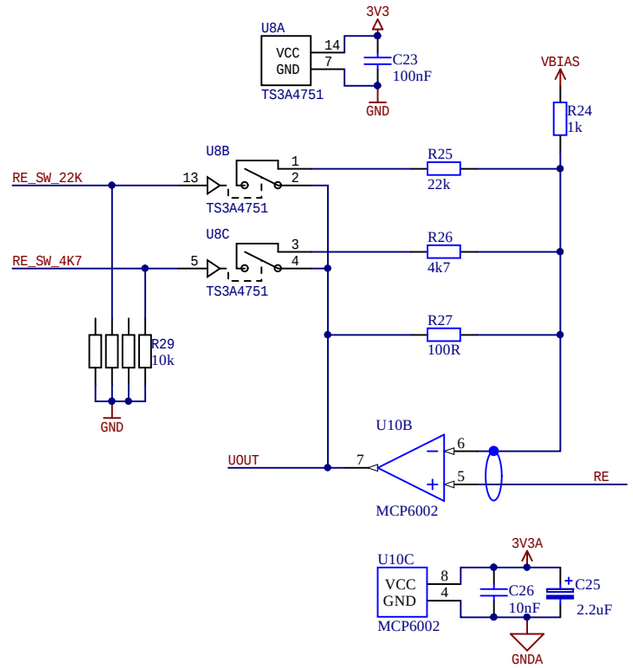




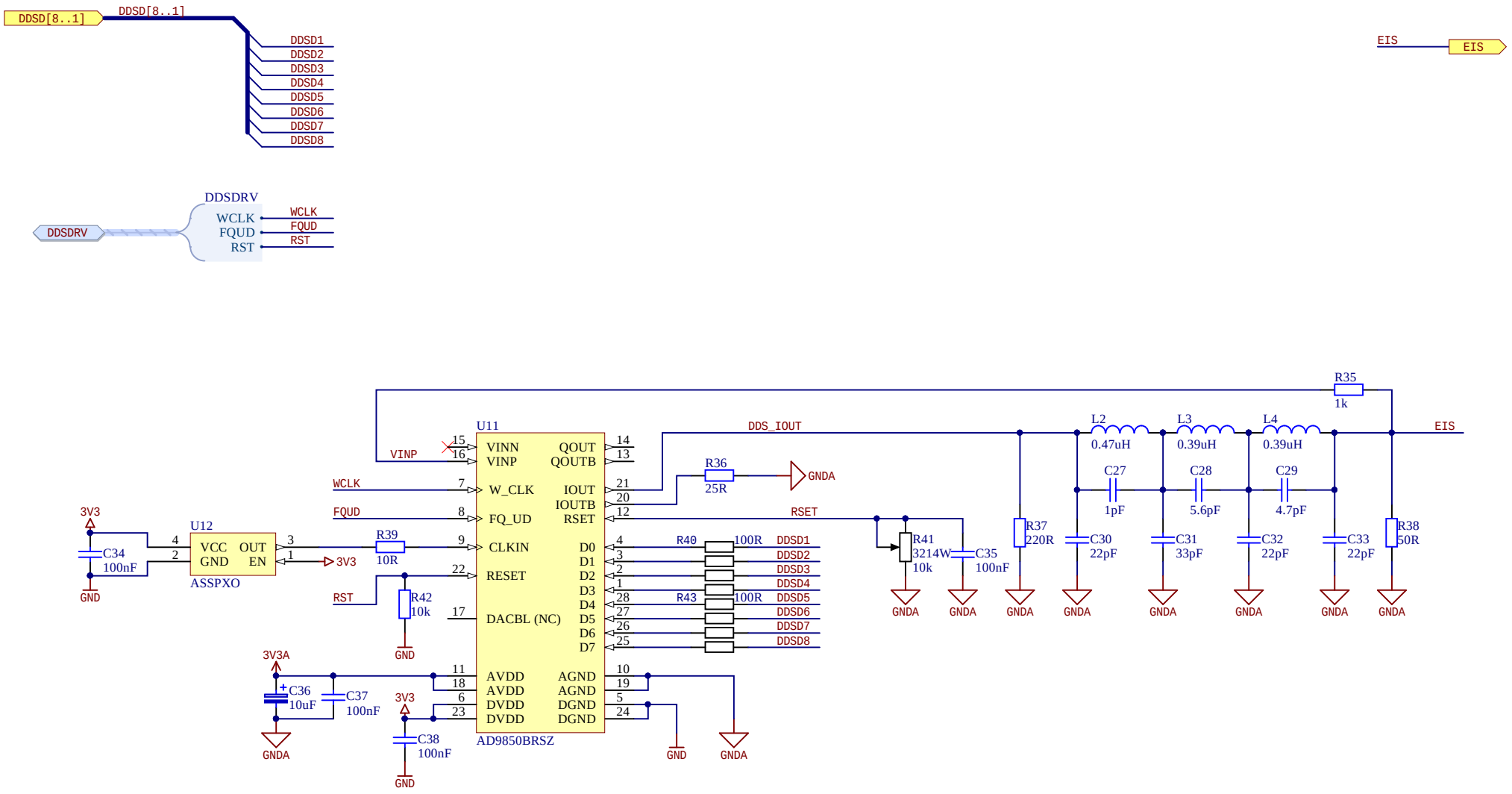


WE, RE, AE- Electrodes inputs
#CS, SCK, MOSI- STM32 SPI signals
U_OUT, I_OUT- STM32 ADC inputs
CV, OCP- STM32 DAC outputs
EIS- DDS chip output
RE_SW_100K, RE_SW_22K, CW/EIS_SW, AE_SW_100, AE_SW_1K, AE_SW_10K, AE_SW_100K- STM32 outputs

Guard rings. Dot indicates junction point.



Title	*analog.SchDoc*		*Zachodniopomorski Uniwersytet Technologiczny w Szczecinie Wydział Elektryczny*
Size: A4	Author: *Łukasz Przeniosło*		Wydział Elektryczny
Date: 2016-04-10	Time: 20:59:56	Sheet 0 of 0	
File: M:\Github\altium-projects\GruntMasterBox\analog.SchDoc			



Title	***DDS.SchDoc***		*Zachodniopomorski Uniwersytet Technologiczny w Szczecinie*
Size: A4	Author: *Łukasz Przeniosło*		*Wydział Elektryczny*
Date: 2016-04-10	Time: 20:59:56	Sheet 0 of 0	Wydział Elektryczny
File: M:\Github\altium-projects\GruntMasterBox\DDS.SchDoc			