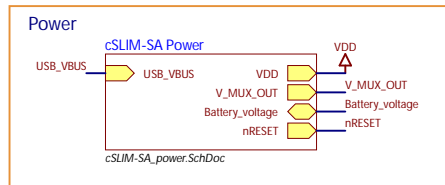


cSLIM-SA (Stand Alone buoy-controller)

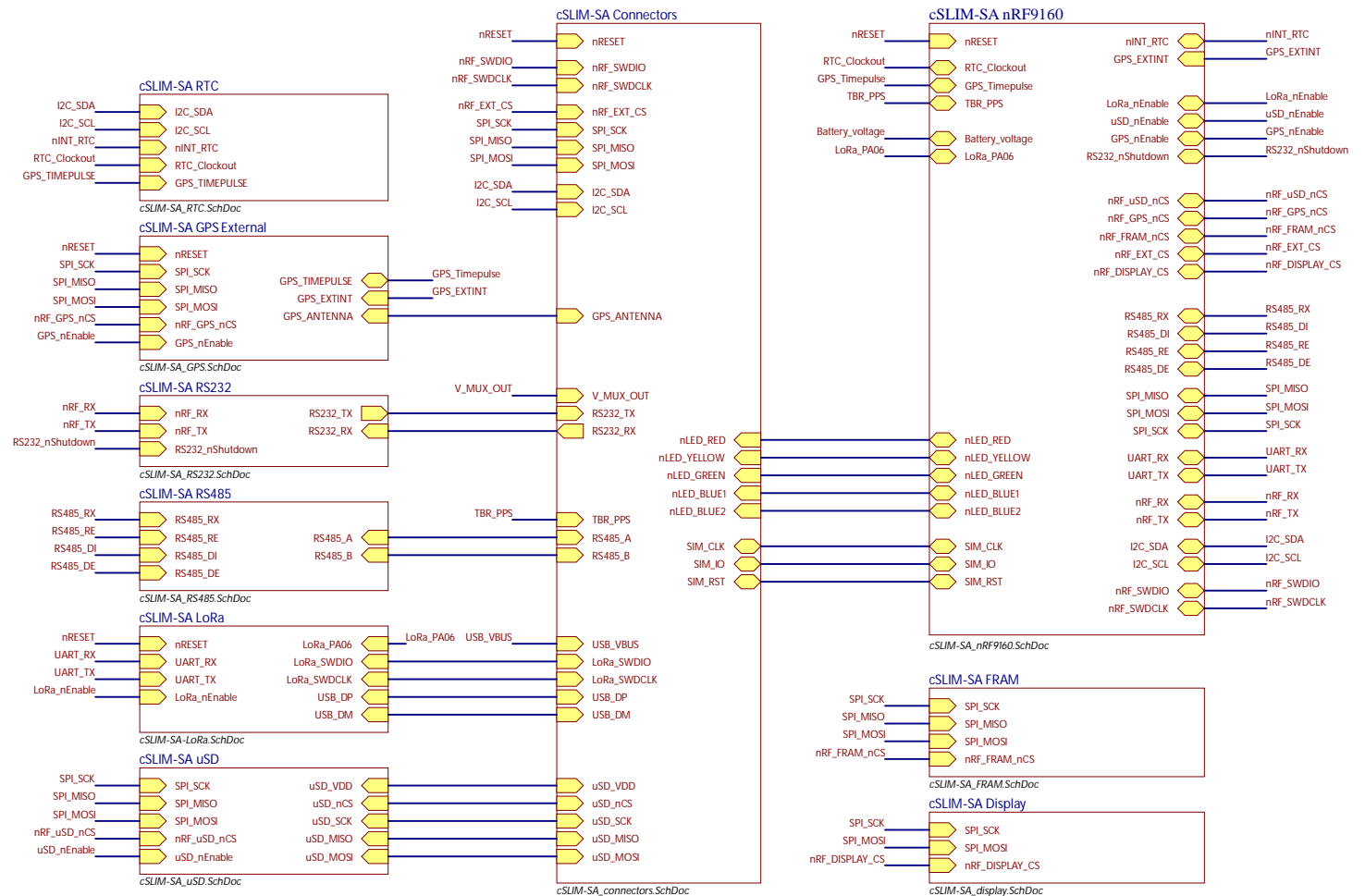
Project 2021 NTNU

Vetle Berg Abrahamsen

Sheet 1: Connections
Sheet 2: LoRa Module
Sheet 3: RS485
Sheet 4: RS232
Sheet 5: Connectors
Sheet 6: Power
Sheet 7: uSD
Sheet 8: Display
Sheet 9: GNSS
Sheet 10: FRAM
Sheet 11: RTC
Sheet 12: nRF9160



Use LoRa PB03 or nRF to control Blue2 led?



✗ The No ERC object is a design directive.
This directive is placed on a node in the circuit to suppress harmless warnings and/or error violation conditions that are detected when the schematic project is compiled.

Based on framework for the cSLIM-shield done by Eivind Holen Jølgard

See Eyvinds Github for schematics and PCB on this link.

Eivind Jølgard

NTNU

Sheet : /
File: cSLIM-shield.sch

Title: cSLIM Overview

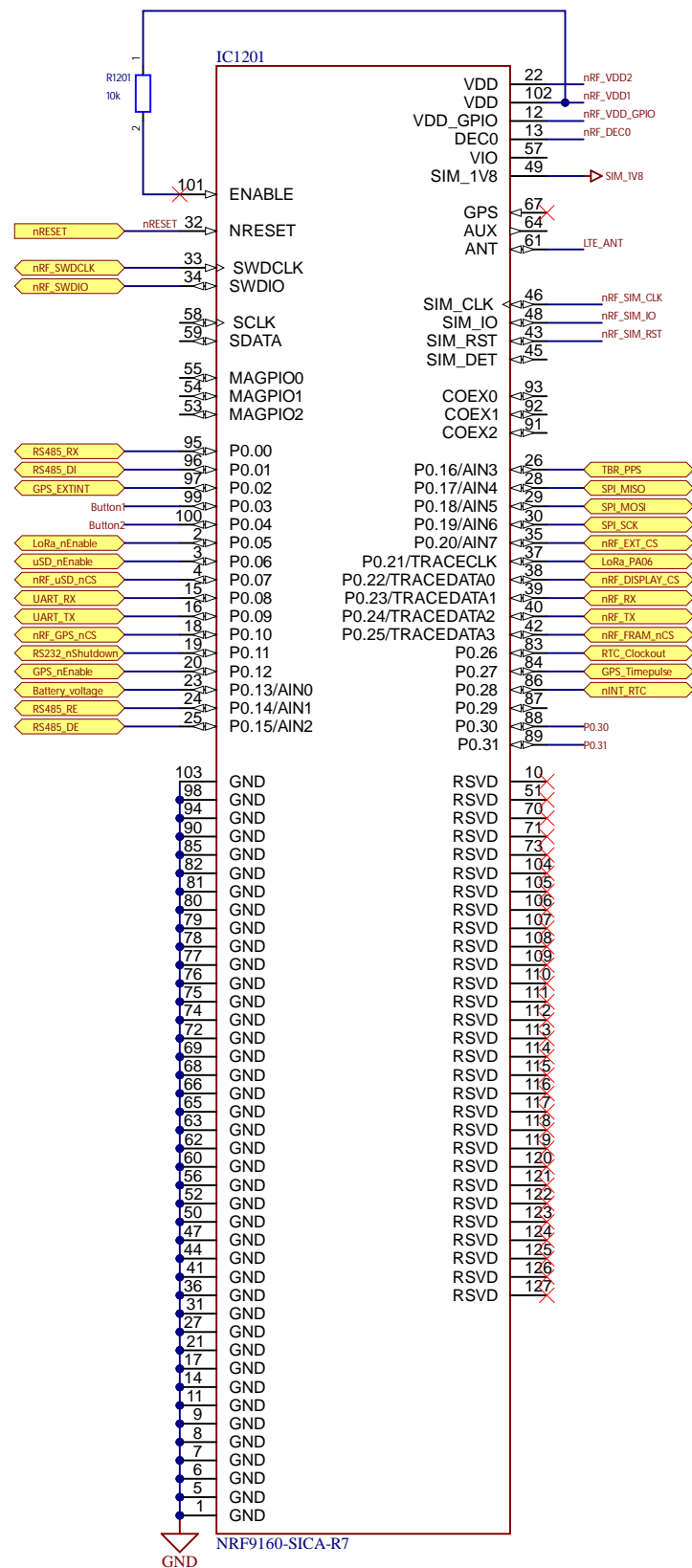
Size: A4 Date: 2021-03-31

KiCad E.D.A. kicad (5.1.4)-1

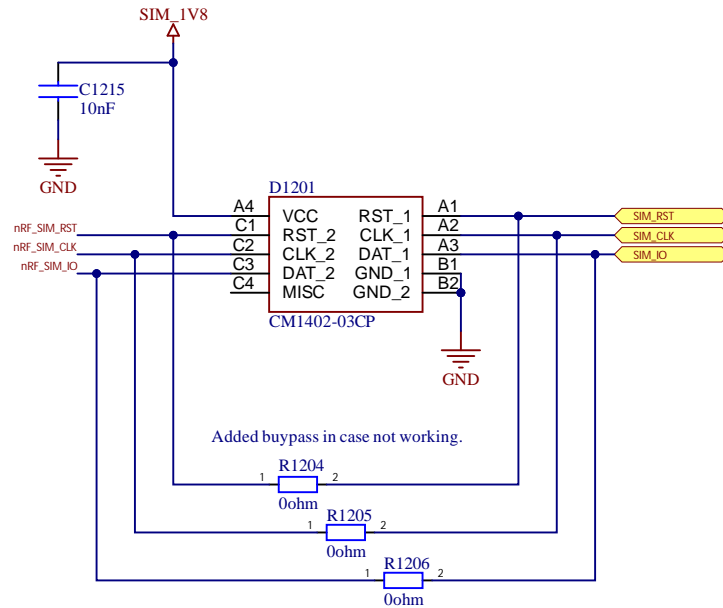
Rev: v1

Id: 1/11

nRF9160 SiP

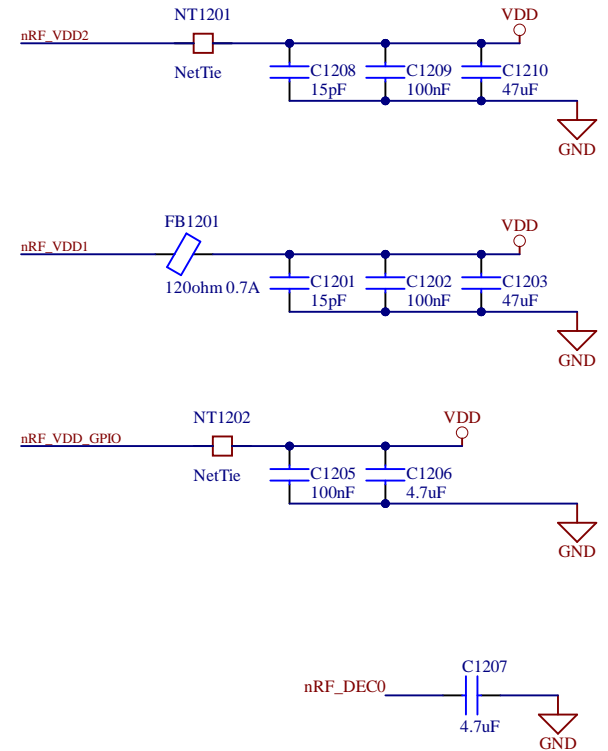


EMI-protection for SIM

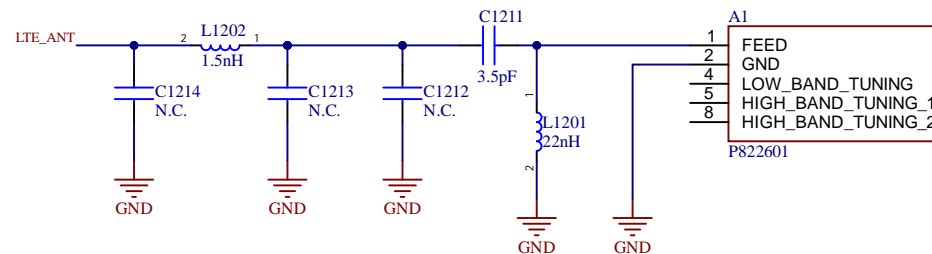


Power to nRF

Using net-tie to connect two different nets without warnings.
Tie VDD_GPIO and VDD together, as long as they power up at the same time, it is okay

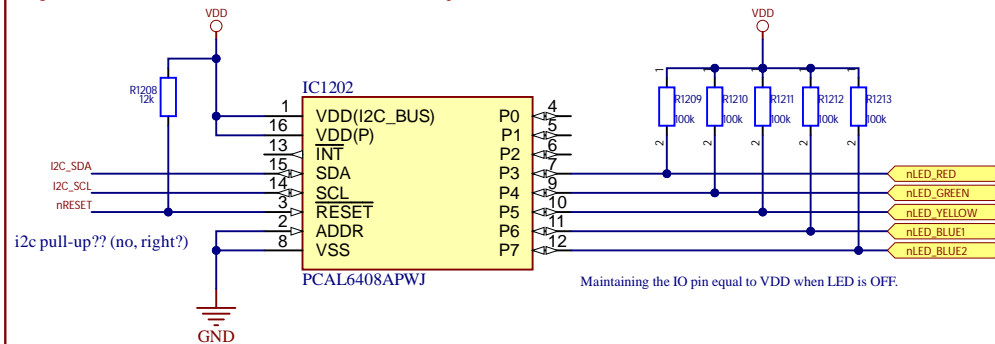


Antenna matching

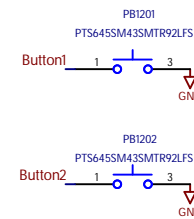


8-bit I2C-bus IO-expander. Used to drive LEDs

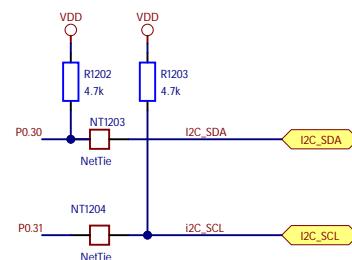
Figure out if we want to drive LED BLUE2 from nRF or keep it at LoRa PB03



Pushbuttons



I2C pullup resistors



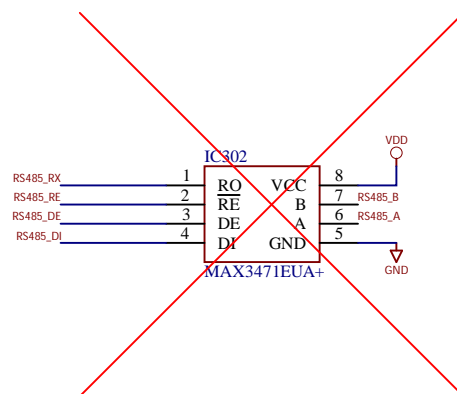
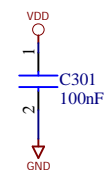
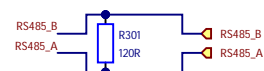
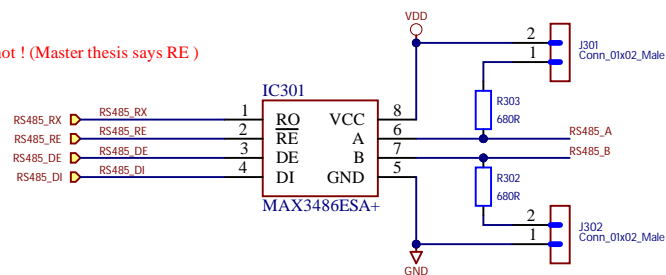
NOTE:
pin 45 (SIM_DET) not used and needs to be left floating.
External pull-up resistor on nRESET not allowed

Title		
Size	Number	Revision
A3		
Date:	11.01.2021	Sheet of
File:	C:\Users\...\cSLIM-SA_nRF9160.SchDoc	Drawn By:

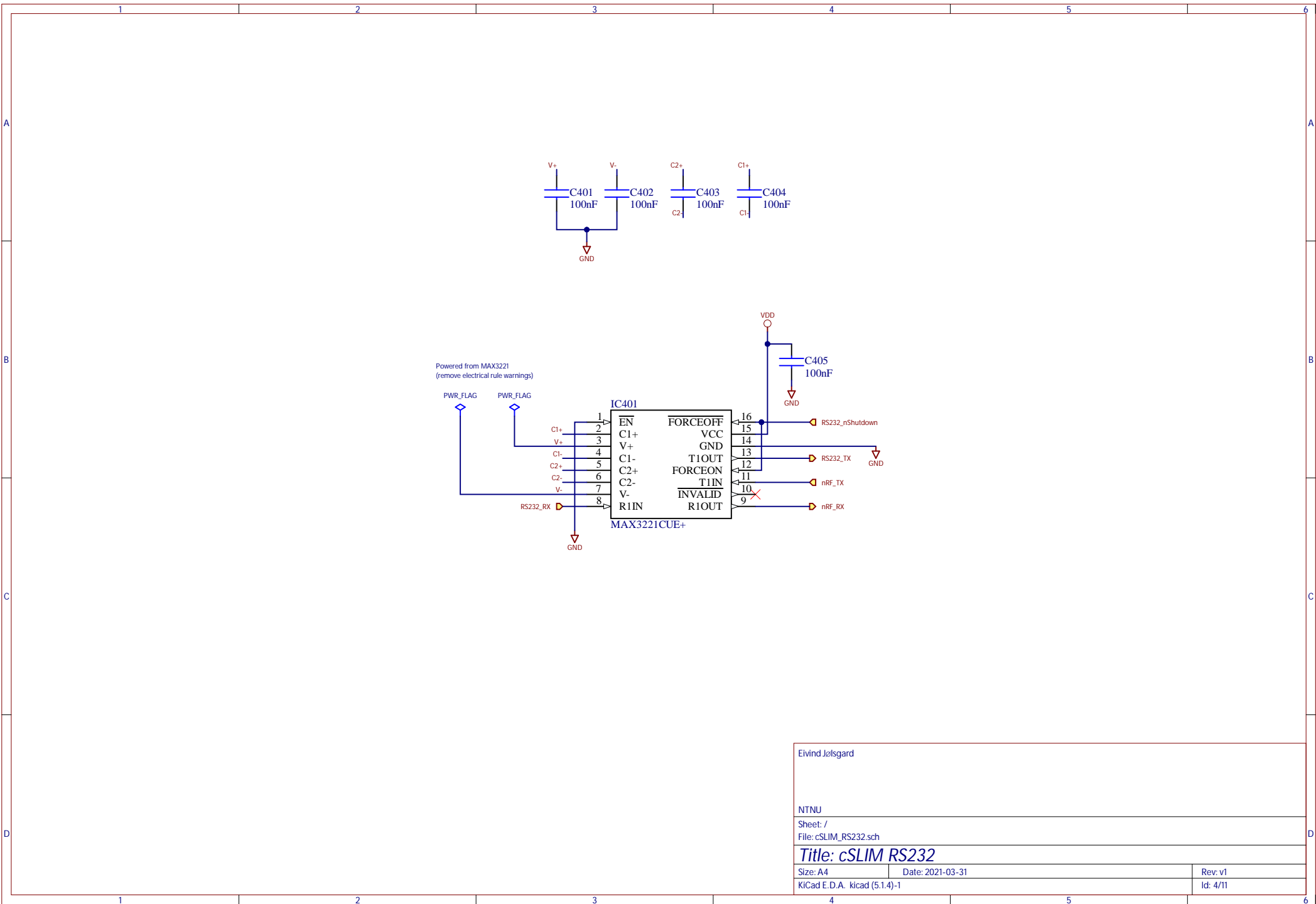
Id: 2/11

Only mount either MAX3486 or MAX3471,
dependent on baudrate of TBR.
Default baudrate of TBR-700 is 115.200kbps.
MAX3471 is more power efficient, however
it has a maximum baud of 64kbps.

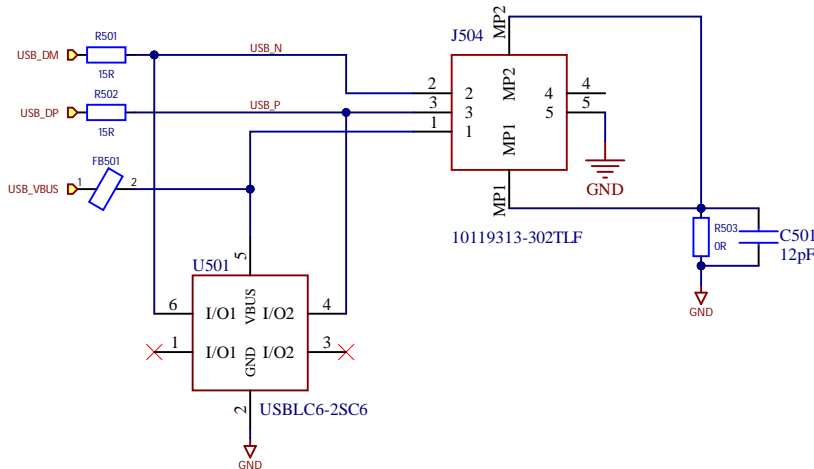
changed from RS485_!RE to _RE (IS IT ! or not ! (Master thesis says RE)



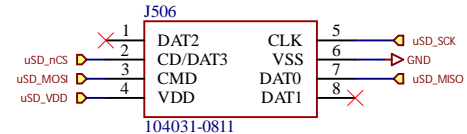
Eivind Jølsgard		
NTNU		
Sheet: /		
File: cSLIM_RS485.sch		
Title: cSLIM RS485		
Size: A4	Date: 2021-06-30	Rev: v1.1
KiCad E.D.A. kicad (5.1.4)-1		Id: 3/11



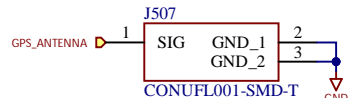
USB Connector



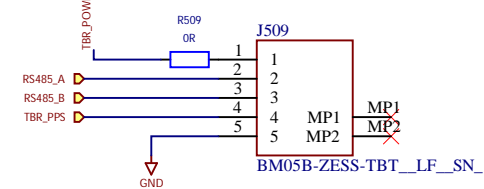
uSD Card reader



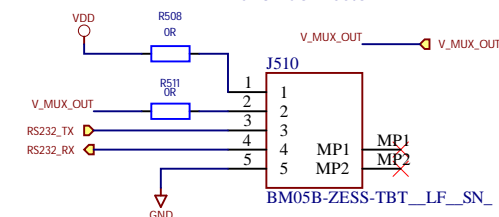
GPS Antenna Connector



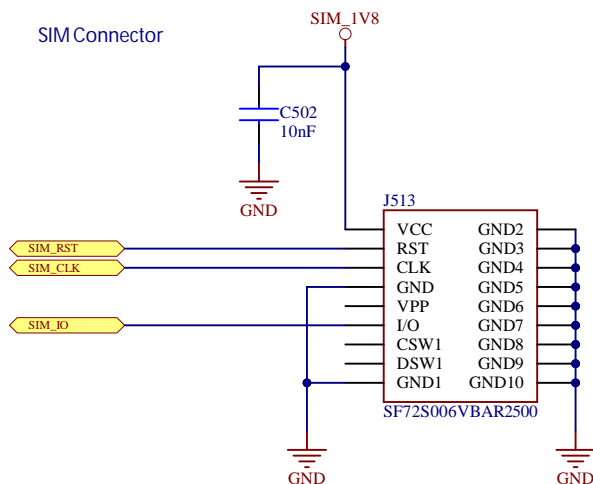
RS485 Connector



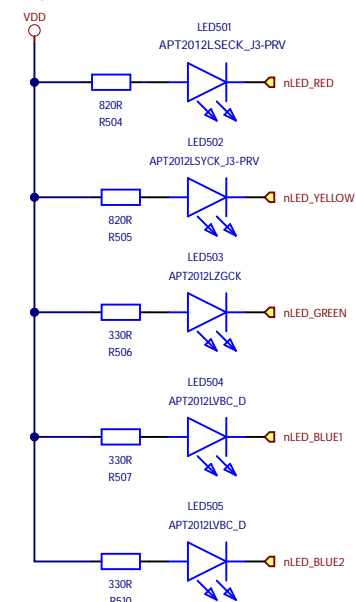
RS232 Connector



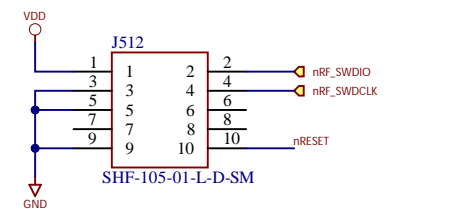
SIM Connector



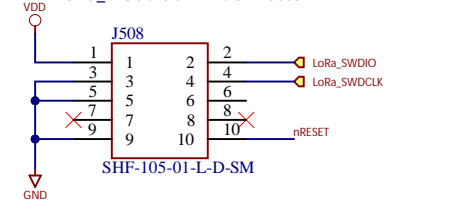
LEDs



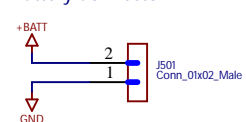
nRF9160 SWD Connector



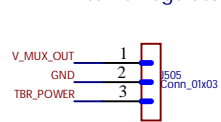
LoRa_module SWD Connector



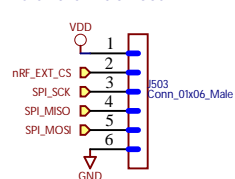
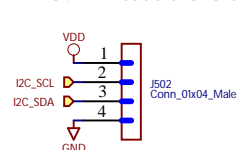
Battery Connector



External regulator



2.54mm headers for external I2C and SPI devices



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Sheet: /
File: cSLIM_connectors.sch

Title: cSLIM Connectors

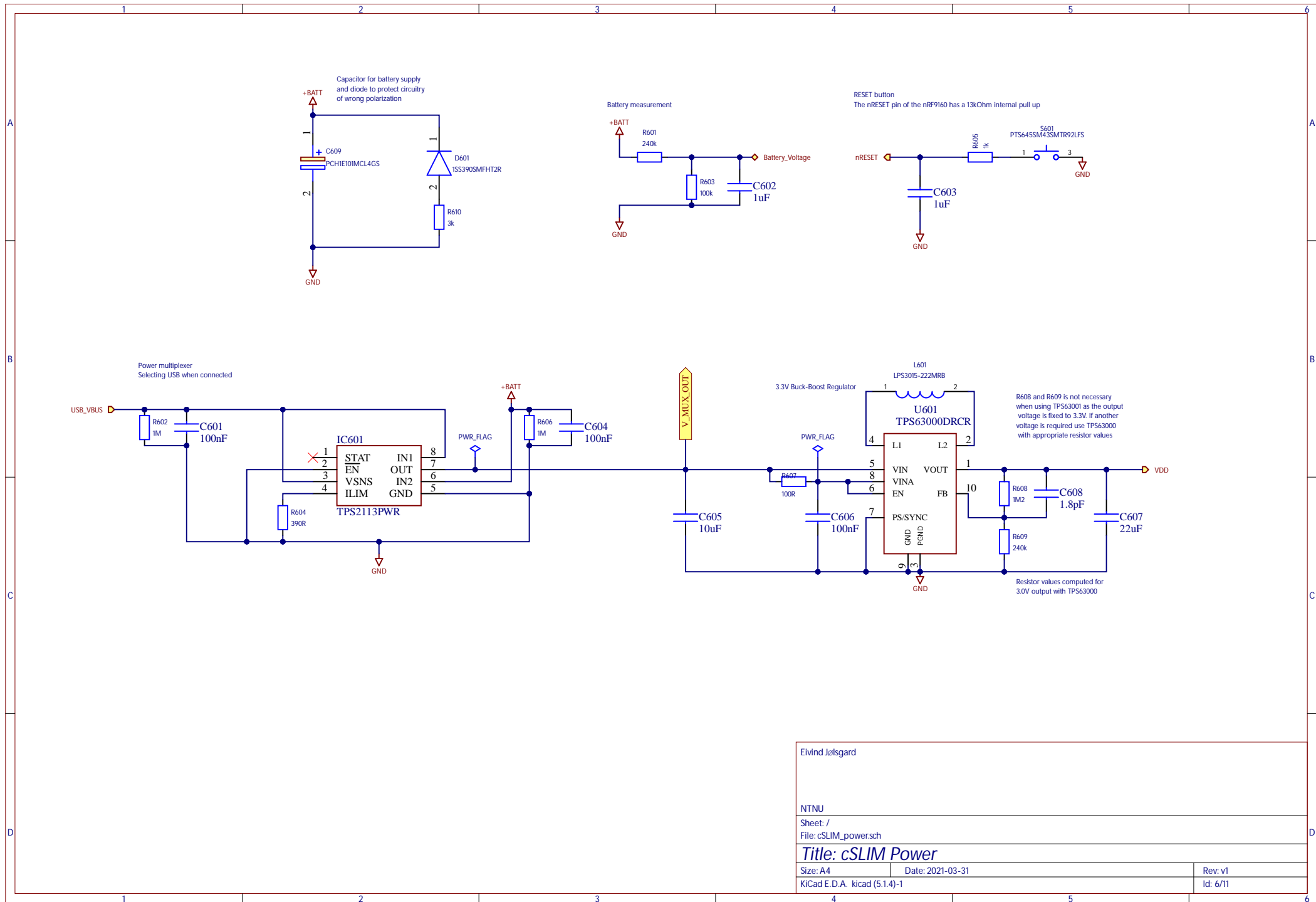
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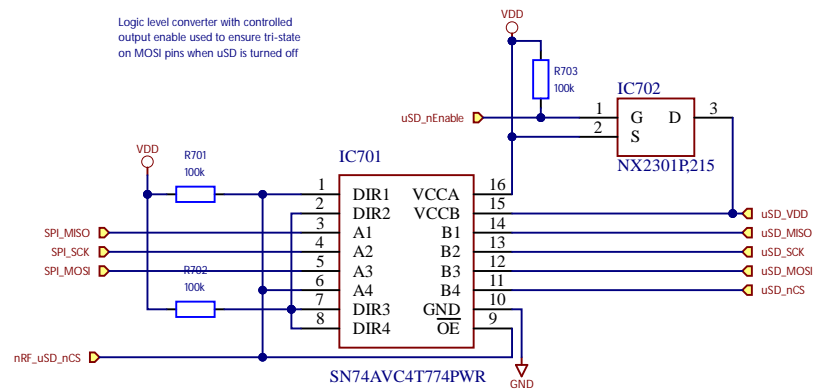
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KiCad E.D.A. kicad (5.1.4)-1

Rev: v1

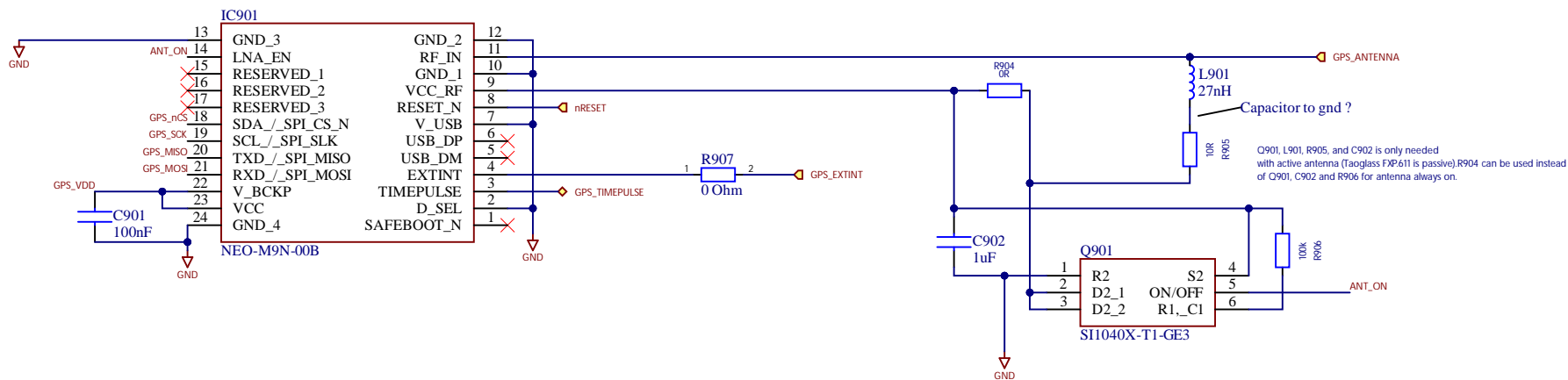
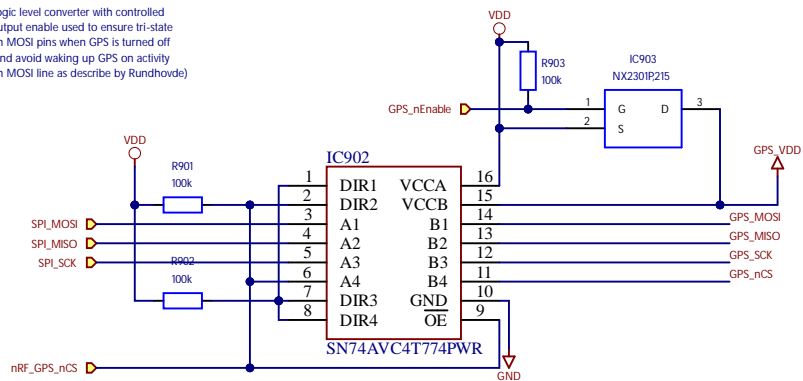
Id: 5/11





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NTNU		
Sheet: /		
File: cSLIM_uSD.sch		
Title: cSLIM uSD		
Size: A4	Date: 2021-03-31	Rev: v1
KiCad E.D.A. kicad (5.1.4)-1		Id: 7/11

Logic level converter with controlled output enable used to ensure tri-state on MOSI pins when GPS is turned off (and avoid waking up GPS on activity on MOSI line as describe by Rundhovde)



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Sheet: /
File: cSLIM_GPS.sch

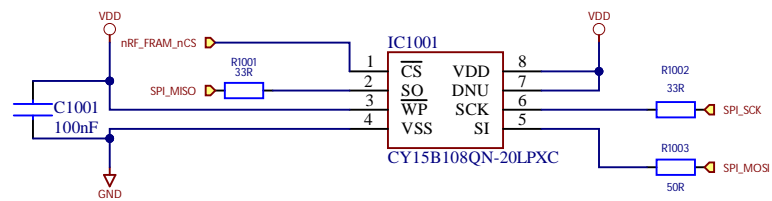
Title: cSLIM External GPS

Size: A4 Date: 2021-03-31

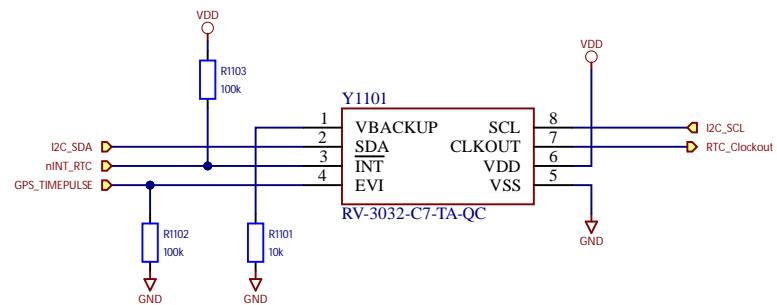
KiCad E.D.A. kicad (5.1.4)-1

Rev: v1

Id: 9/11



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NTNU		
Sheet: /		
File: cSLIM_FRAM.sch		
Title: cSLIM FRAM		
Size: A4	Date: 2021-03-31	Rev: v1
KiCad E.D.A. kicad (5.1.4)-1		Id: 10/11



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NTNU		
Sheet: /		
File: cSLIM_RTC.sch		
Title: cSLIM RTC		
Size: A4	Date: 2021-03-31	Rev: v1
KiCad E.D.A. kicad (5.1.4)-1		Id: 11/11

Comment	Description	Designator	Footprint	LibRef	Quantity
P822601	Antenna	A1	P822601	P822601	1
100nF	Capacitor	C301, C401, C402, C403, C404, C405, C601, C604, C606, C806, C810, C901, C1001, C1202, C1205, C1209	CAPC1608X90N	C	16
12pF	Capacitor	C501	CAPC1608X90N	C	1
10nF	Capacitor	C502, C1215	CAPC1608X90N	C	2
1uF	Capacitor	C602, C603, C902	CAPC1608X90N	C	3
10uF	Capacitor	C605	CAPC1608X90N	C	1
22uF	Capacitor	C607	CAPC1608X90N	C	1
1.8pF	Capacitor	C608	CAPC1608X90N	C	1
PCH1E101MCL4GS	Capacitor Polarised	C609	CAPAE660X840N	PCH1E101MCL4GS	1
1uF/50V	Capacitor	C807	CAPC1608X90N	C	1
15pF	Capacitor	C1201, C1208	CAPC1608X90N	C	2
47uF	Capacitor	C1203, C1210	CAPC1608X90N	C	2
4.7uF	Capacitor	C1206, C1207	CAPC1608X90N	C	2
3.5pF	Capacitor	C1211	CAPC1608X90N	C	1
N.C.	Capacitor	C1212, C1213, C1214	CAPC1608X90N	C	3
1SS390SMFHT2R	Diode	D601	SODFL1608X70N	1SS390SMFHT2R	1
CM1402-03CP	Diode ESD (Uni-directional)	D1201	CM140203CP	CM1402-03CP	1
500mA		FB501	CAPC1608X90N	Ferrite_Bead	1
Ferrite_Bead		FB801, FB802	CAPC1608X90N	Ferrite_Bead	2
120ohm 0.7A		FB1201	CAPC1608X90N	Ferrite_Bead	1
WLR089U0-I_RM	Integrated Circuit	IC201	WLR089U0IRM	WLR089U0-I_RM	1
SN74AVC4T774PWR	Integrated Circuit	IC202, IC701, IC902	SOP65P640X120-16N	SN74AVC4T774PWR	3
NX2301P,215	Integrated Circuit, [NoValue]	IC203, IC702, IC903	SOT95P230X110-3N	NX2301P,215	3
MAX3486ESA+	Integrated Circuit	IC301	SOIC127P600X175-8N	MAX3486ESA+	1
MAX3471EUA+	Integrated Circuit	IC302	SOP65P490X110-8N	MAX3471EUA+	1
MAX3221CUE+	Integrated Circuit	IC401	SOP65P640X110-16N	MAX3221CUE+	1
TPS2113PWR	Integrated Circuit	IC601	SOP65P640X120-8N	TPS2113PWR	1
NEO-M9N-00B	Integrated Circuit	IC901	NEOM9N00B	NEO-M9N-00B	1
CY15B108QN-20LPXC	Integrated Circuit	IC1001	SON65P323X328X55-8N	CY15B108QN-20LPXC	1
NRF9160-SICA-R7	IC RF TxRx + MCU Cellular GPS 700MHz ~ 2.2GHz 161-TFLGA Module	IC1201	XCVR_NRF9160-SICA-R7	NRF9160-SICA-R7	1
PCAL6408APWJ	Integrated Circuit	IC1202	SOP65P640X110-16N	PCAL6408APWJ	1
Conn_01x02_Male	Connector	J301, J302, J501	HDRV2W110P0X254_1X2_508X254X854P	61300211121	3
Conn_01x04_Male	Connector	J502	HDRV4W64P0X254_1X4_1016X250X901P	PH1-04-UA	1
Conn_01x06_Male	Connector	J503	HDRV6W64P0X254_1X6_1524X254X869P	61300611121	1
10119313-302TLF	Connector	J504	10119313302TLF	10119313-302TLF	1
Conn_01x03	Connector	J505	HDRV3W64P0X254_1X3_762X254X869P	61300311121	1
104031-0811	Connector	J506	1040310811	104031-0811	1
CONUFL001-SMD-T	Connector	J507	CONUFL001-SMD	CONUFL001-SMD-T	1
SHF-105-01-L-D-SM	Connector	J508, J512	SHF10501LDSMLCKTR	SHF-105-01-L-D-SM-LC-K-TR	2
BM05B-ZESS-TBT_LF_SN_	Connector	J509, J510	BM05BZESSBTTLFSN	BM05B-ZESS-TBT_LF_SN_	2
SF72S006VBAR2500	Connector	J513	SF72S006VBAR2500	SF72S006VBAR2500	1
52746-1071	Connector	J802	52746-1071	52746-1071	1
LPS3015-222MRB		L601	LPS3015	LPS3015-103MRB	1
27nH		L901	L-1608	L	1
22nH		L1201	L-1608	L	1
1.5nH		L1202	L-1608	L	1
APT2012LSECK_J3-PRV	LED	LED501	LEDC2012X75N	APT2012LSECK_J3-PRV	1
APT2012LSYCK_J3-PRV	LED	LED502	LEDC2012X85N	APT2012LSYCK_J3-PRV	1
APT2012LZGCK	LED	LED503	LEDC2012X85N	APT2012LZGCK	1
APT2012LVBC_D	LED	LED504, LED505	LEDC2012X85N	APT2012LVBC_D	2
NetTie		NT1201, NT1202, NT1203, NT1204	NETTIE_FP	NetTie	4
	Switch 4-pi. used 1-3 (2-4 not in use)	PB1201, PB1202, S601	PTS645(SMT)	PTS645SM43SMTR92LFS	3
SI1040X-T1-GE3	MOSFET (N-Channel)	Q901	SOTFL50P160X60-6N	SI1040X-T1-GE3	1
100k		R201, R202, R203, R603, R701, R702, R703, R801, R804, R901, R902, R903, R906, R1102, R1103, R1209, R1210, R1211, R1212, R1213	RESC1608X55N	R	20
120R		R301	RESC1608X55N	R	1
680R		R302, R303	RESC1608X55N	R	2
15R		R501, R502	RESC1608X55N	R	2
0R		R503, R508, R509, R511, R904	RESC1608X55N	R	5
820R		R504, R505	RESC1608X55N	R	2
330R		R506, R507, R510	RESC1608X55N	R	3
240k		R601, R609	RESC1608X55N	R	2
1M		R602, R606	RESC1608X55N	R	2
390R		R604	RESC1608X55N	R	1
1k		R605	RESC1608X55N	R	1
100R		R607	RESC1608X55N	R	1
1M2		R608	RESC1608X55N	R	1
3k		R610	RESC1608X55N	R	1
10R		R905	RESC1608X55N	R	1
0 Ohm		R907	RESC1608X55N	R	1
33R		R1001, R1002	RESC1608X55N	R	2
50R		R1003	RESC1608X55N	R	1
10k		R1101, R1201	RESC1608X55N	R	2
4.7k		R1202, R1203	RESC1608X55N	R	2
0ohm		R1204, R1205, R1206	RESC1608X55N	R	3
12k		R1208	RESC1608X55N	R	1
97C08ST	Switch	S201	SOIC127P671X170-16N	97C08ST	1
USBLC6-2SC6	Integrated Circuit	U501	SOT95P280X145-6N	USBLC6-2SC6	1
TPS63000DRCR	Integrated Circuit	U601	TPS63002DRCR	TPS63000DRCR	1
RV-3032-C7-TA-QC	Integrated Circuit	Y1101	RV3032C7TAQA	RV-3032-C7-TA-QC	1