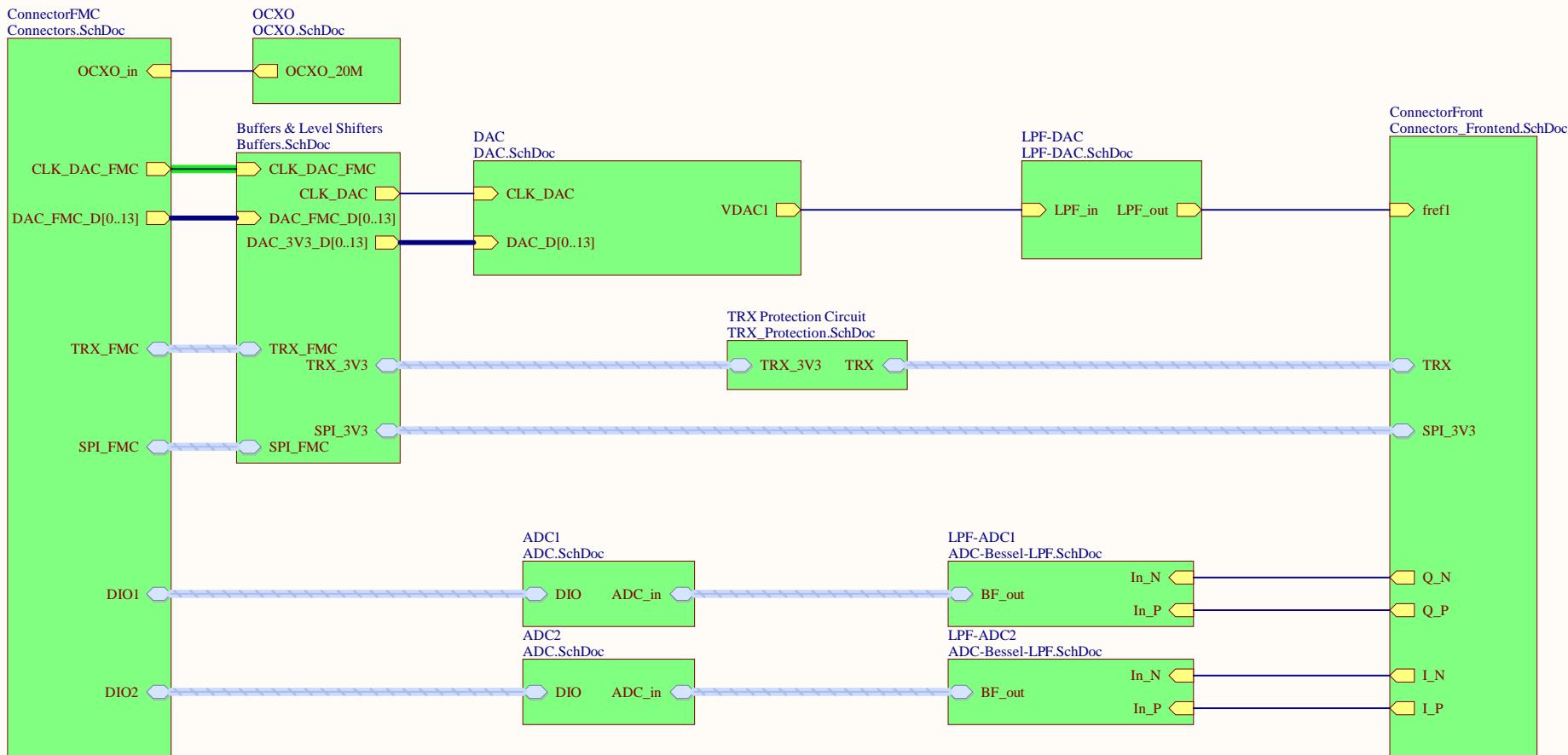
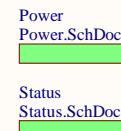


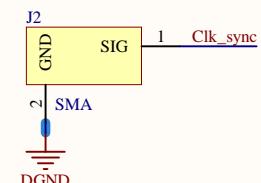
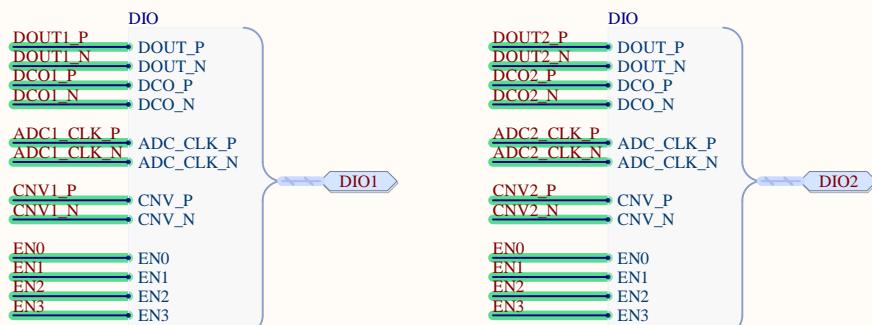
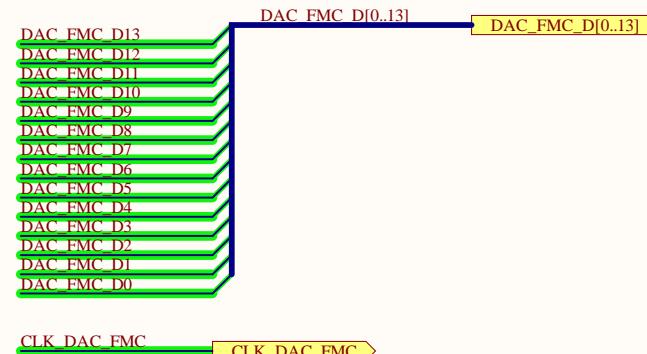
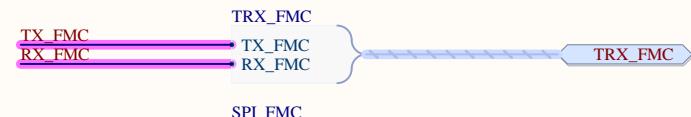
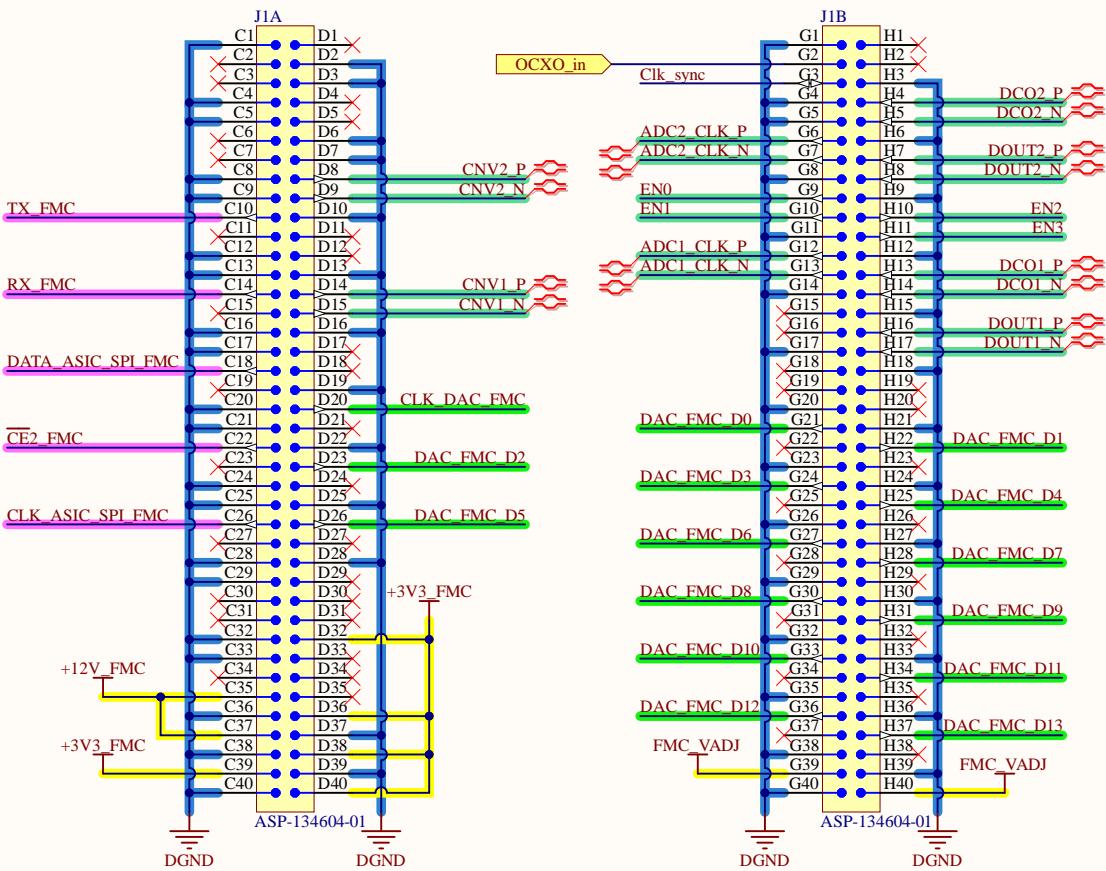
	A	B	C	D	E
Bill Of Materials					
1	Line #	Designator	Name	Quantity	
1	1	C1, C6, C8, C59_ADC1, C59_ADC2, C69, C72, C74, C78, C81, C85, C87, C89, C90, C91, C94, C97, C99, C101, C102, C103	10u	21	
2	2	C2, C44_LPF-ADC1, C44_LPF-ADC2, C49_LPF-ADC1, C49_LPF-ADC2, C66, C67, C68, C70, C71, C75, C77, C79, C80, C82, C84, C86, C95, C96	1u	19	
2	3	C3, C5, C7, C11, C12, C15, C22, C24, C26, C28, C37, C39, C41, C53_LPF-ADC1, C53_LPF-ADC2, C55_LPF-ADC1, C55_LPF-ADC2, C56_LPF-ADC1, C56_LPF-ADC2, C57_LPF-ADC1, C57_LPF-ADC2, C58_ADC1, C58_ADC2, C60_ADC1, C60_ADC2, C61_ADC1, C61_ADC2, C62_ADC1, C62_ADC2, C63_ADC1, C63_ADC2, C64_ADC1, C64_ADC2, C65_ADC1, C65_ADC2, C76, C83, C92, C104, C105, C106, C107	100n	42	
3	4	C4	22p	1	
3	5	C9, C10	22n	2	
3	6	C13, C16, C73, C93, C98	10n	5	
3	7	C14, C17, C52_LPF-ADC1, C52_LPF-ADC2, C54_LPF-ADC1, C54_LPF-ADC2	1n	6	
4	8	C18	3p3	1	
4	9	C19	2p2	1	
4	10	C20	12p	1	
4	11	C21	33p	1	
4	12	C23, C25, C27, C29, C31, C32, C38, C40, C42, C45_LPF-ADC1, C45_LPF-ADC2, C46_LPF-ADC1, C46_LPF-ADC2, C50_LPF-ADC1, C50_LPF-ADC2, C51_LPF-ADC1, C51_LPF-ADC2	100p	17	
4	13	C30	390p	1	
4	14	C33	510p	1	
4	15	C34	39p	1	
4	16	C35, C36	10p	2	
4	17	C47_LPF-ADC1, C47_LPF-ADC2	180p	2	
Bill Of Materials					
	Line #	Designator	Name	Quantity	
	18	C48_LPF-ADC1, C48_LPF-ADC2	430p	2	
	19	C88, C100	22u / 10u	2	
	20	D1	1N4148WS	1	
	21	J1	ASP-134604-01	1	
	22	J2, J3	SMA	2	
	23	J4	1803277	1	
	24	LED1, LED2, LED3, LED4	Green	4	
	25	LED5	Red	1	
	26	LED6	Blue	1	
	27	P1	EPG.1B.314.NLN	1	
	28	R1, R18, R19, R20, R21, R22, R23, R37, R38, R40, R65, R66, R67, R78	0 inf	14	
	29	R2	2K7	1	
	30	R3, R12	741X163471JP	2	
	31	R4, R10	741X163270JP	2	
	32	R5, R6	220R	2	
	33	R7, R8	27R	2	
	34	R9	3k3	1	
	35	R11	180R	1	
	36	R13, R44_LPF-ADC1, R44_LPF-ADC2, R45_LPF-ADC1, R45_LPF-ADC2, R64, R68, R81, R82, R86, R87, R88	10k	12	
	37	R14, R16	8k2	2	
	38	R15, R17	249R	2	
	39	R24, R26, R29	1k43	3	
	40	R25, R28	1k5	2	
	41	R27	1k33	1	
	42	R30	63R4	1	
	43	R31, R32, R33	243R	3	
	44	R34	4k02	1	
	45	R35	178R	1	
	46	R36	5k62	1	
	47	R41	49R9	1	
	48	R46_LPF-ADC1, R46_LPF-ADC2, R57_LPF-ADC1, R57_LPF-ADC2	2k61	4	
	49	R47_LPF-ADC1, R47_LPF-ADC2, R58_LPF-ADC1, R58_LPF-ADC2	1k78	4	
	50	R48_LPF-ADC1, R48_LPF-ADC2, R53_LPF-ADC1, R53_LPF-ADC2	1k18	4	
	51	R49_LPF-ADC1, R49_LPF-ADC2, R54_LPF-ADC1, R54_LPF-ADC2, R69, R71	1k1	6	
	52	R50_LPF-ADC1, R50_LPF-ADC2, R55_LPF-ADC1, R55_LPF-ADC2	787R	4	



Title	
FMC interface to FPGA - Top Level	
Size	Project
A4	AUS - NMR System
Date: 27.09.2023	Revision: V1.1
Sheet 1 of 16	Drawn By: M.Sc. Tobias Wirth



A



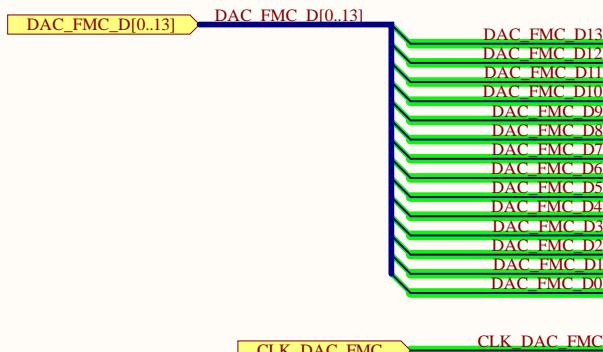
Connectors

Title: AUS - NMR System
Size: A4
Project: AUS - NMR System

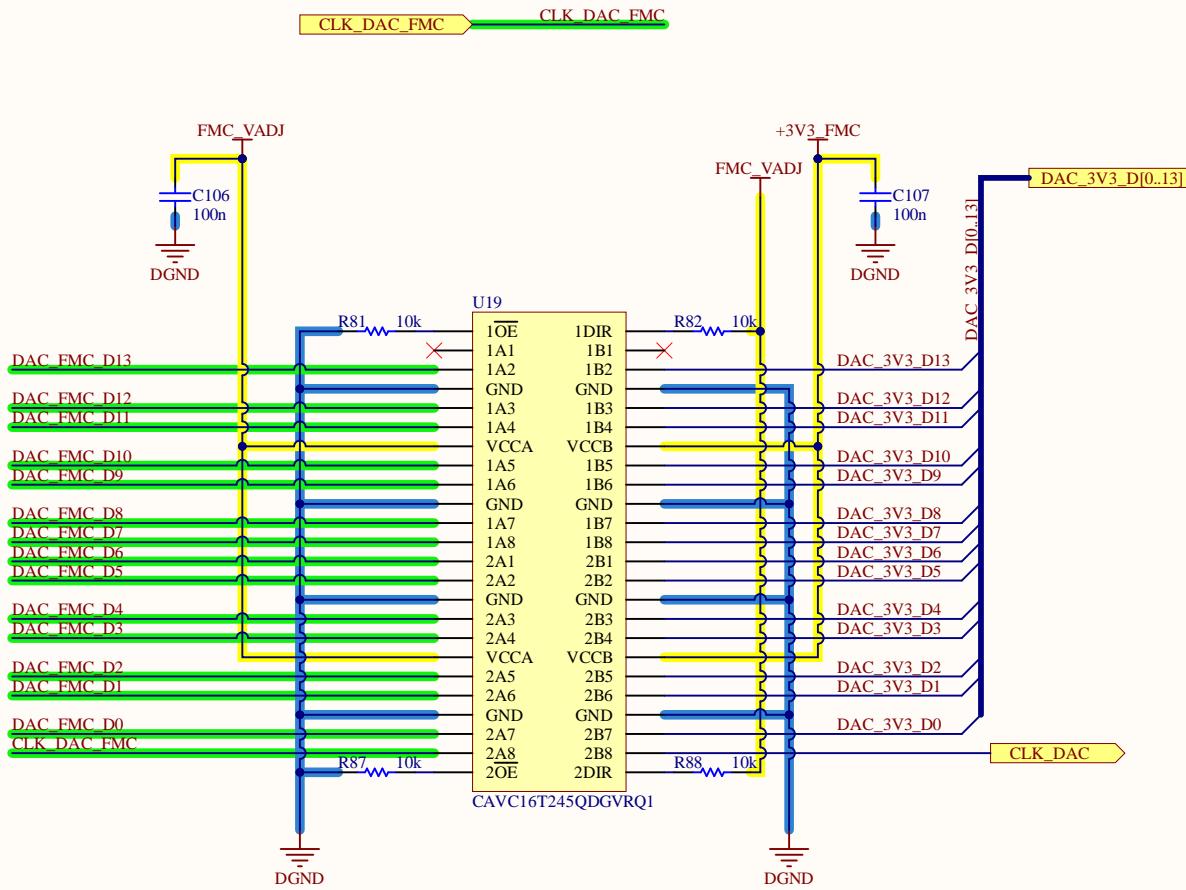
Date: 27.09.2023 Revision: V1.4
Sheet 2 of 16 Drawn By: M.Sc. Tobias Wirth



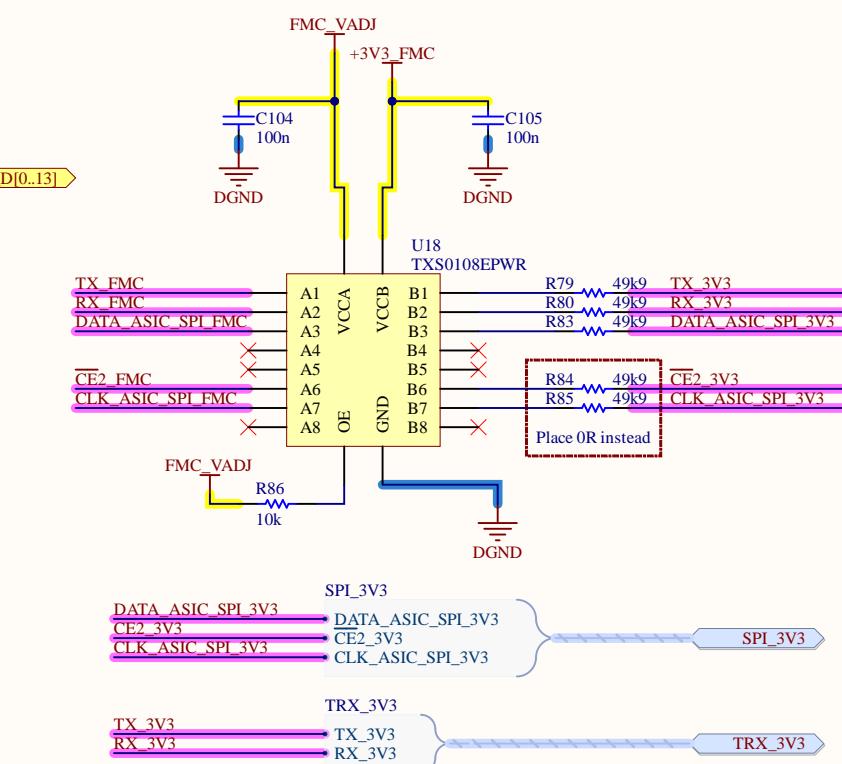
A



B



C



Title Buffers / Level Shifters

Size A4 Project AUS - NMR System

Date: 14.11.2023 Revision: V0.1
Sheet 3 of 16 Drawn By: M.Sc. Tobias Wirth



A

A

B

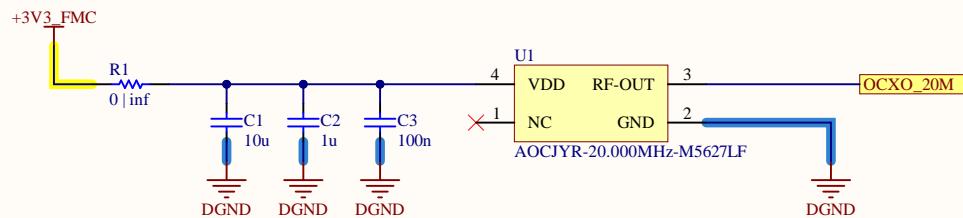
B

C

C

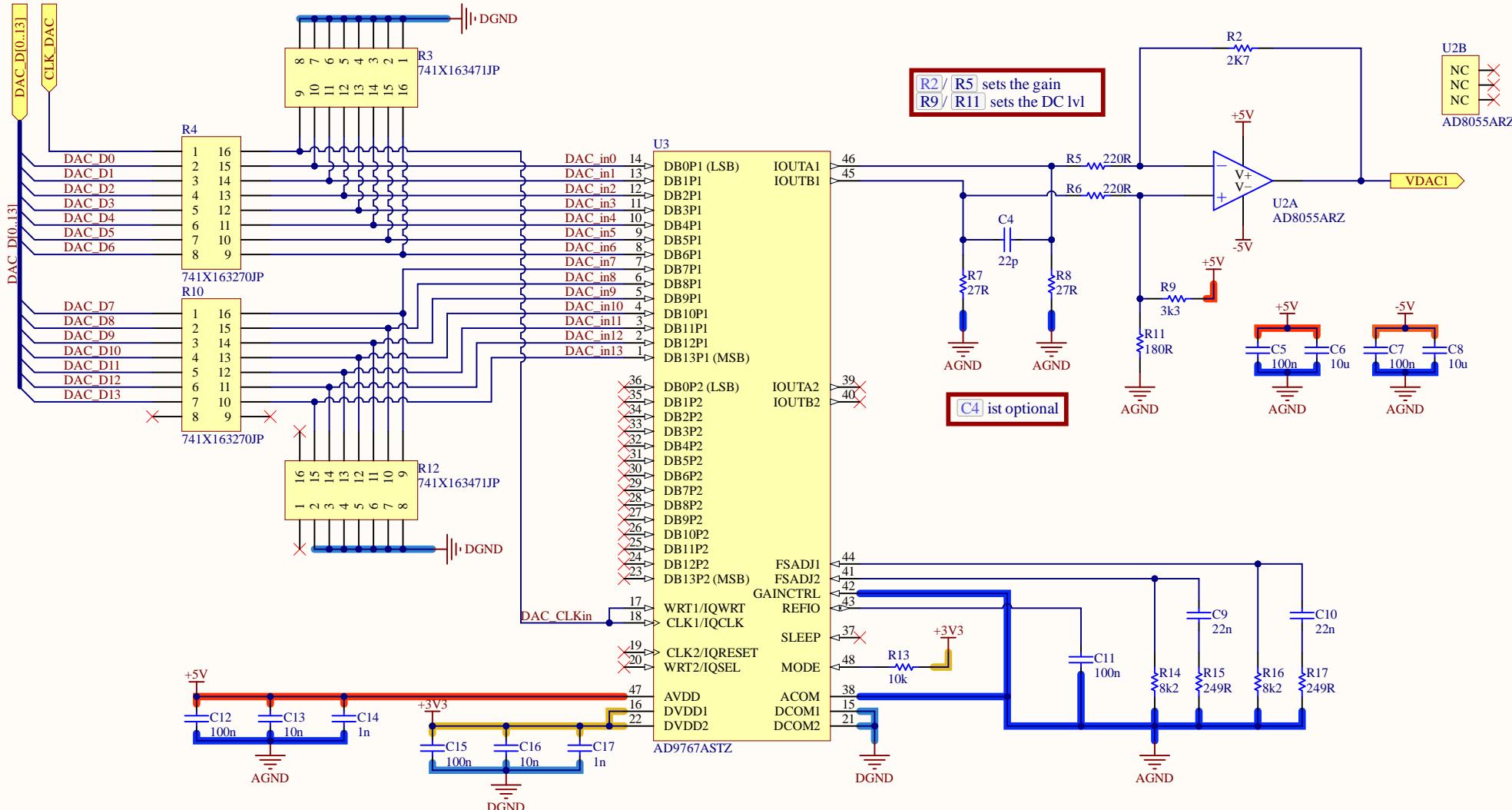
D

D



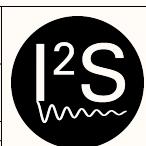
Title	
Oven Controlled Crystal Oscillator	
Size A4	Project AUS - NMR System
Date: 27.09.2023	Revision: V1.1
Sheet 4 of 16	Drawn By: M.Sc. Tobias Wirth





Title: Digital to Analog Converter

Size: A4	Project: AUS - NMR System
Date: 27.09.2023	Revision: V1.5
Sheet 5 of 16 Drawn By: M.Sc. Tobias Wirth	



A

A

B

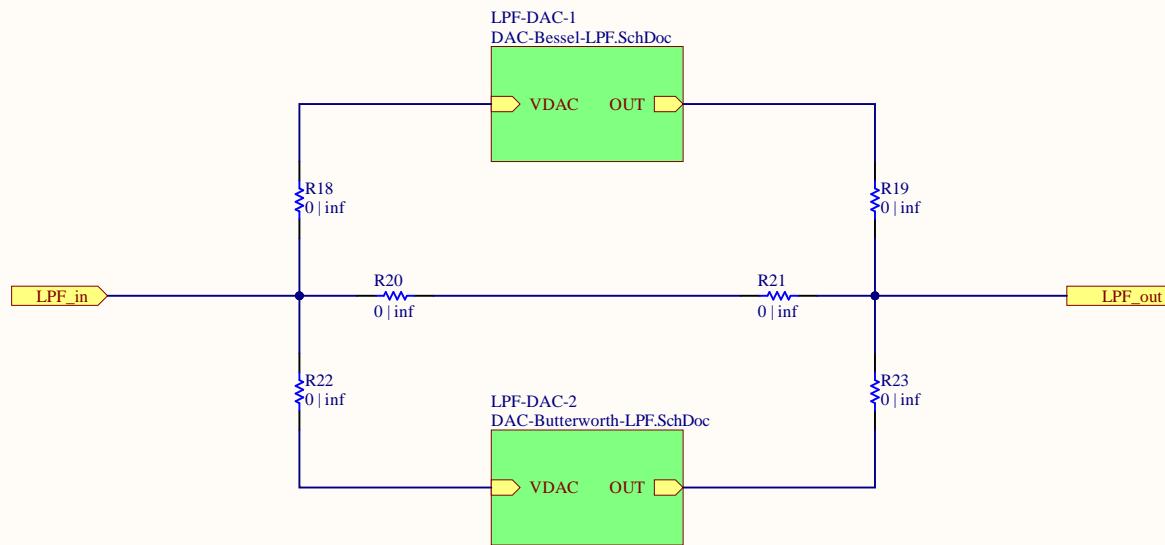
B

C

C

D

D



R22 & R23 = 12MHz LPF
 R18 & R19 = 4MHz LPF
 R20 & R21 = Ommit LPFs

On PCB:
 (...)
 (...)
 (...)

Title	
Low Pass Filters	
Size	Project
A4	AUS - NMR System
Date: 27.09.2023	Revision: V1.1
Sheet 6 of 16	Drawn By: M.Sc. Tobias Wirth



A

A

B

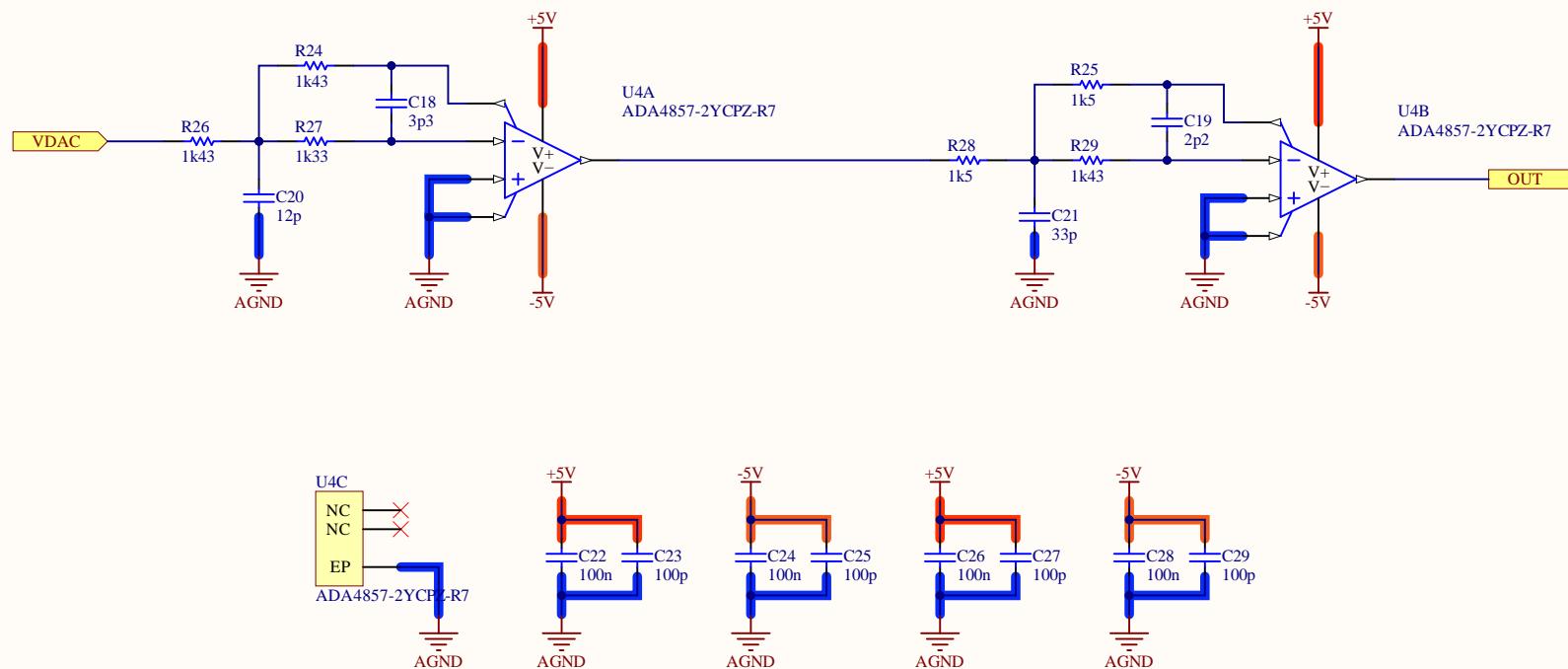
B

C

C

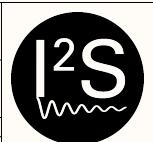
D

D



Active Butterworth Low Pass Filter
12MHz Passband
Gain 0dB

Title	
Butterworth LPF (12MHz / 0dB)	
Size	Project
A4	AUS - NMR System
Date: 27.09.2023	Revision: V0.1
Sheet 7 of 16	Drawn By: M.Sc. Tobias Wirth



A

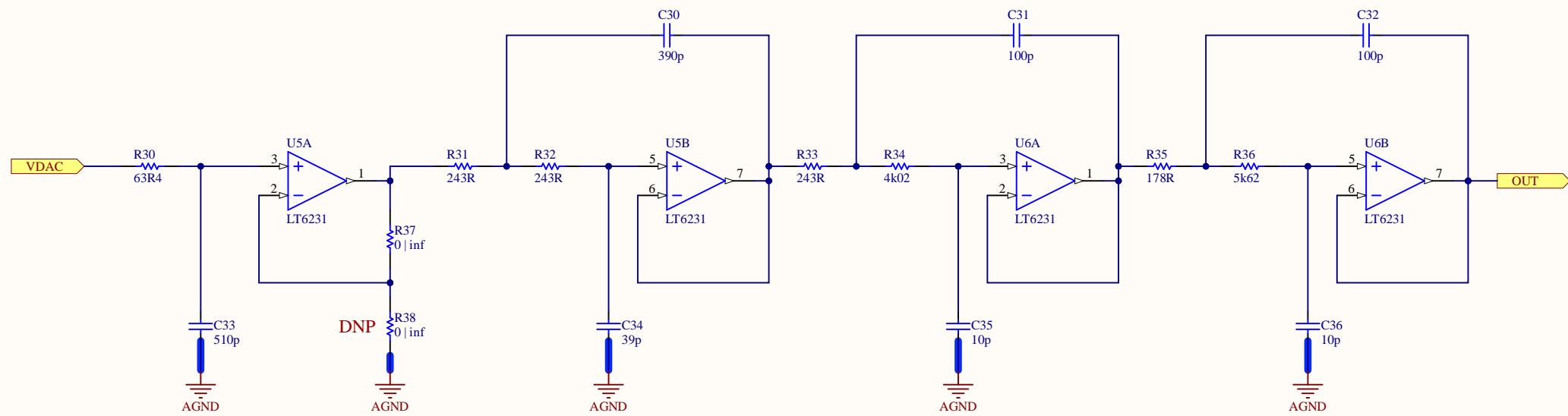
A

U5A
1st stage
Low Pass Buffered RC

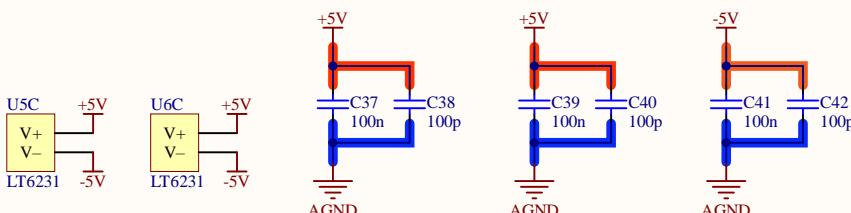
U5B
2nd stage
Low Pass Sallen Key

U6A
2nd stage
Low Pass Sallen Key

U6B
2nd stage
Low Pass Sallen Key



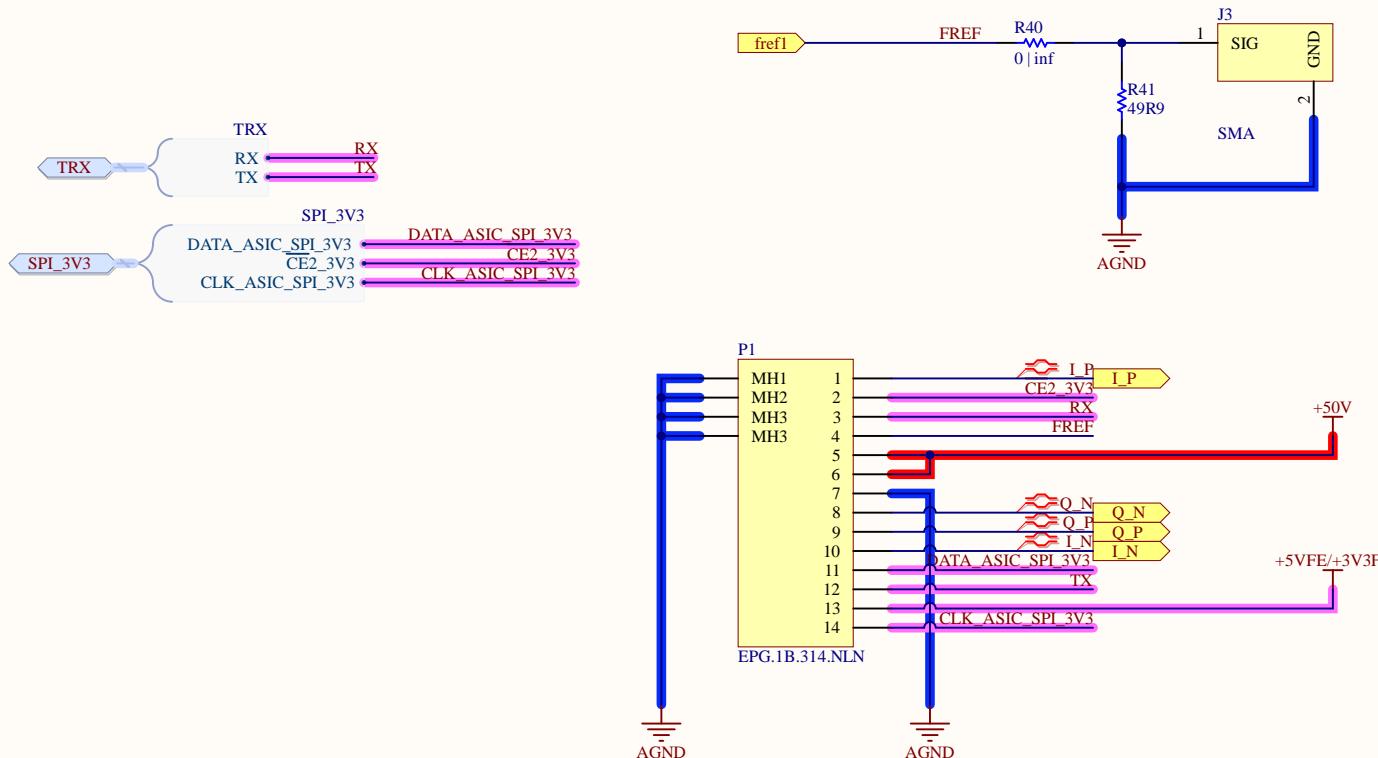
7th Order Active Butterworth Bessel Low Pass Filter
4MHz passband
Gain 0dB



Title	
Bessel LPF (4MHz / 0dB)	
Size	Project
A4	AUS - NMR System
Date: 27.09.2023	Revision: V1.1
Sheet 8 of 16	Drawn By: M.Sc. Tobias Wirth



A



J3 SMA is used for an external reference frequency

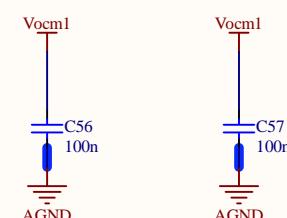
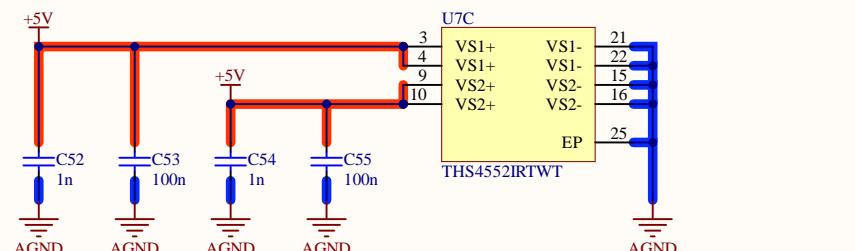
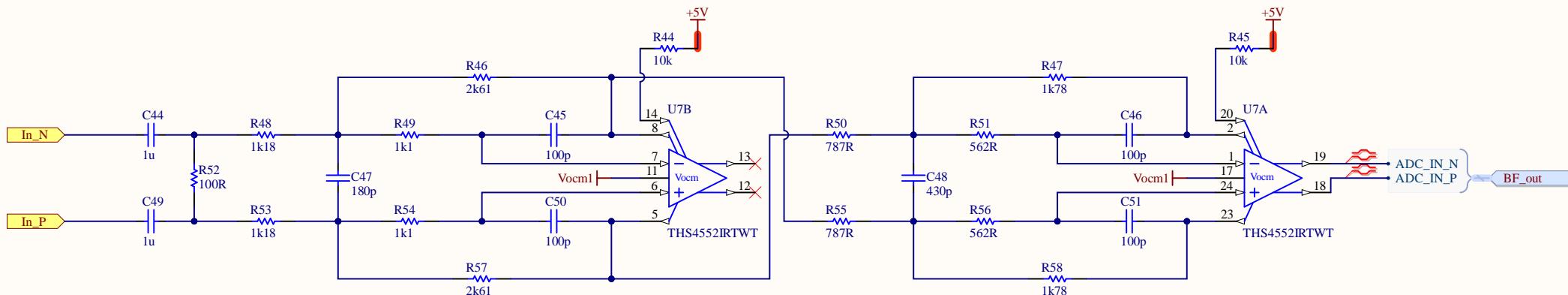
Title	
Connectors - Frontend	
Size	Project
A4	AUS - NMR System
Date: 28.09.2023	Revision: V1.2
Sheet 9 of 16	Drawn By: M.Sc. Tobias Wirth



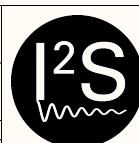
Components [R52], [C44] & [C49] form a HPF with a cutoff frequency of 3.18kHz. This is observable as an additional exponential decay of the DC level in the recorded FID.

To omit the HPF, DNP [R52] and replace [C44] & [C49] with 0Ohm resistors.

Not applicable in combination with LFNMR Gen4 (HB's ASIC) due to its high DC output level. Omitting the AC coupling / DC block will oversaturate the LPF!



Title		Bessel LPF / AAF (350kHz / 14dB)
Size	Project	AUS - NMR System
A4	Date: 06.10.2023	Revision: V1.3
	Sheet 10 of 16	Drawn By: M.Sc. Tobias Wirth



A

A

B

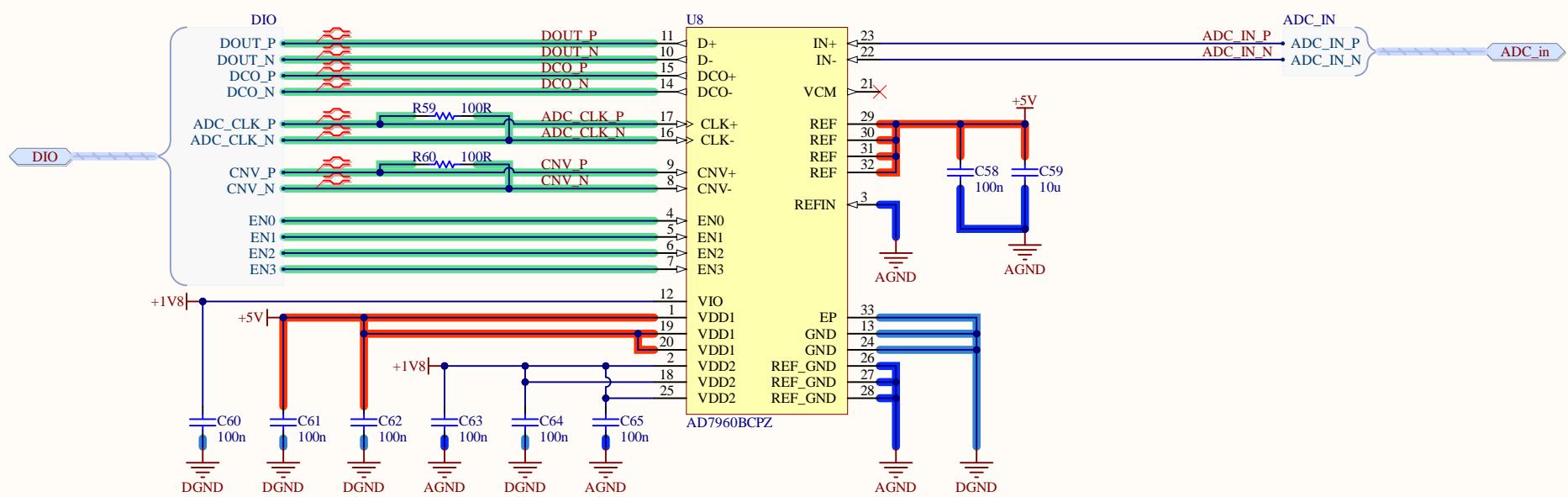
B

C

C

D

D



Title Analog to Digital Converter	
Size A4	Project AUS - NMR System
Date: 06.10.2023	Revision: V1.1
Sheet 11 of 16	Drawn By: M.Sc. Tobias Wirth



A

A

B

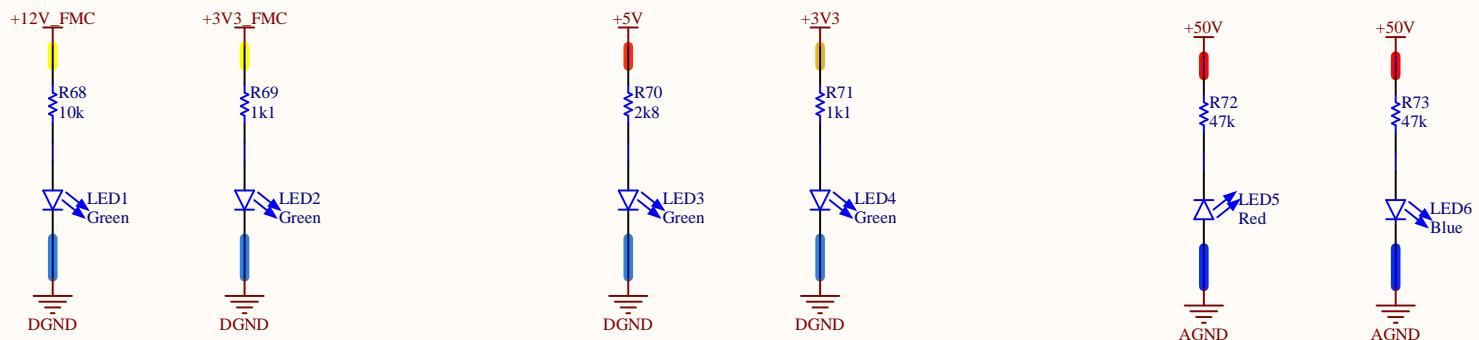
B

C

C

D

D

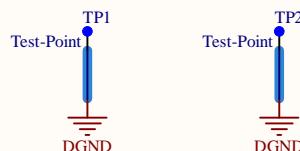


Forward bias voltage:

R: +1V7
Y: +2V
G: +2V2
B: +3V

Current rating:

IDmax = 20mA
IDnom = 1mA



Title: **Status LEDs / Test Points**

Size: **A4** Project: **AUS - NMR System**

Date: 06.10.2023 Revision: V1.2
Sheet 12 of 16 Drawn By: M.Sc. Tobias Wirth



A

A

B

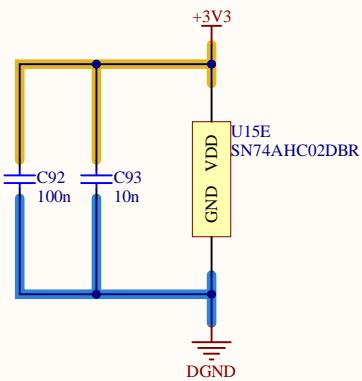
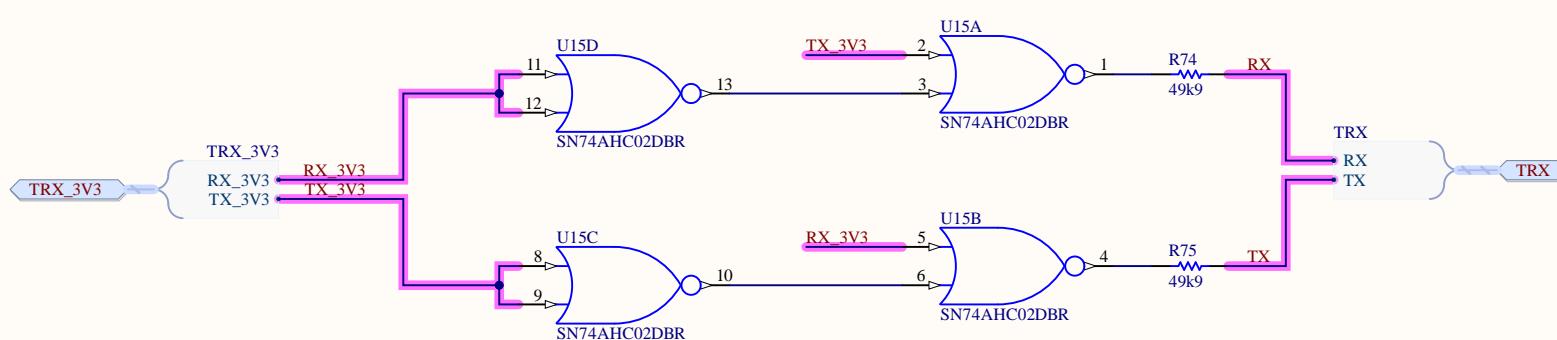
B

C

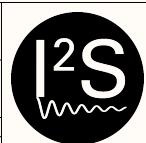
C

D

D



Title	
TRX Protection Circuit	
Size	Project
A4	AUS - NMR System
Date: 07.10.2023	Revision: V1.1
Sheet 13 of 16	Drawn By: M.Sc. Tobias Wirth



A

A

B

B

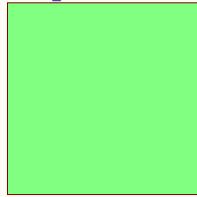
C

C

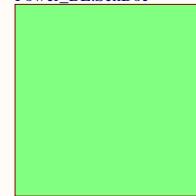
D

D

PDN Frontend
Power_FE.SchDoc



PDN Backend
Power_BE.SchDoc



U10 & U16 are end of life products,
for future revisions switch to TPS7A26

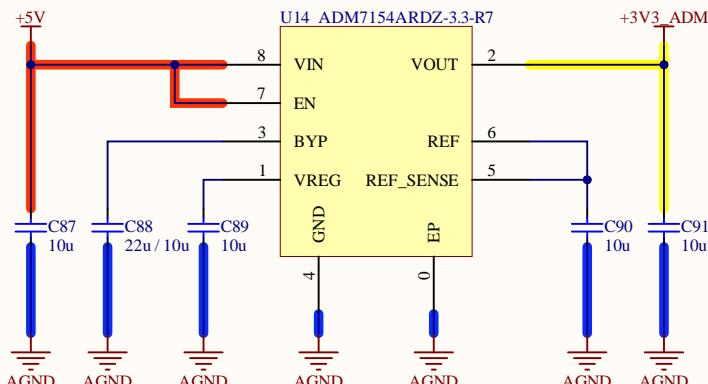
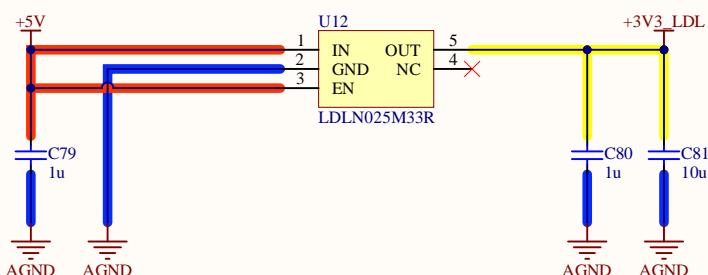
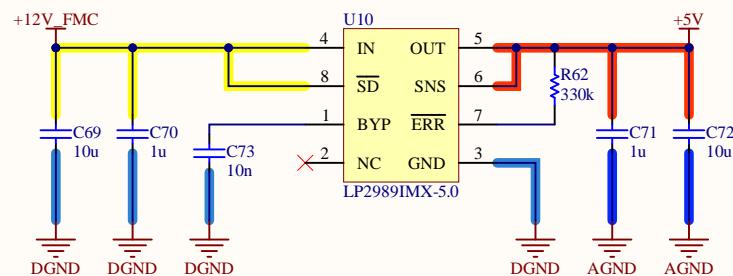
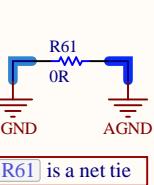
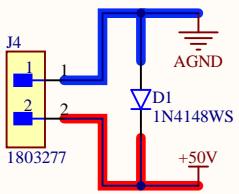
Title
Power Delivery Network

Size A4 Project AUS - NMR System

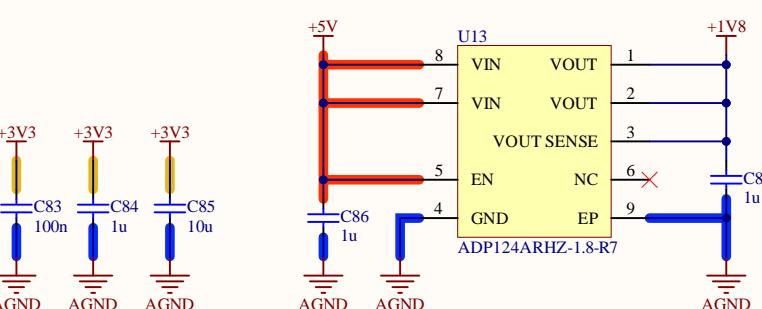
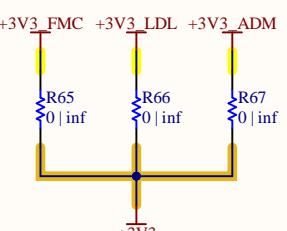
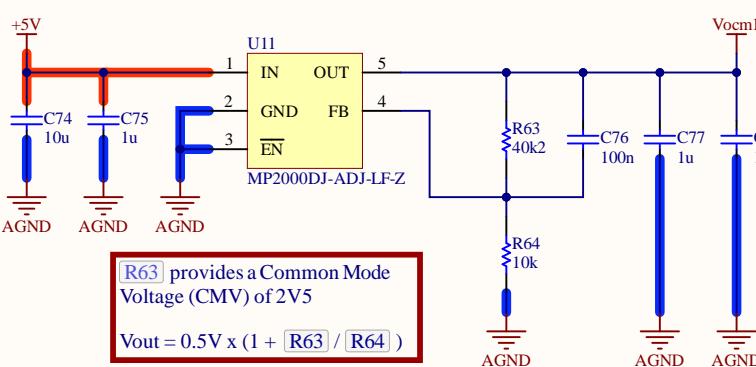
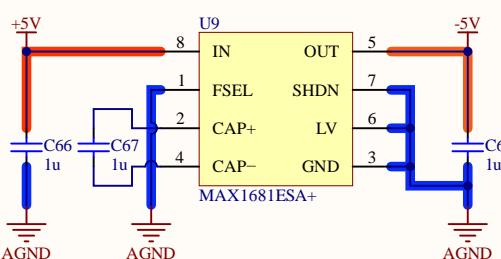
Date: 01.11.2023 Revision: V0.1
Sheet 14 of 16 Drawn By: M.Sc. Tobias Wirth



A



[R65], [R66], and [R67] are used to control the +3V3 VDD of the DAC and TRX protection circuit



Title PDN - Backend

Size

A4

Project

AUS - NMR System

Date:

06.10.2023

Revision:

V1.2

Sheet

15 of

16

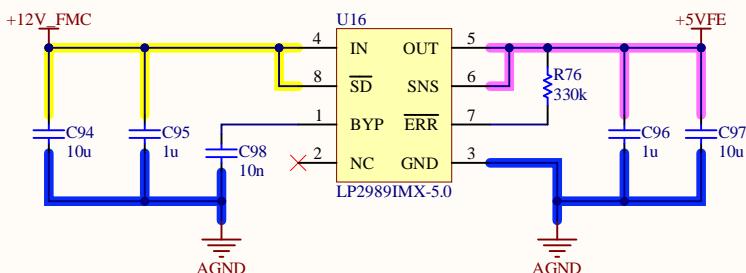
Drawn By:

M.Sc. Tobias Wirth



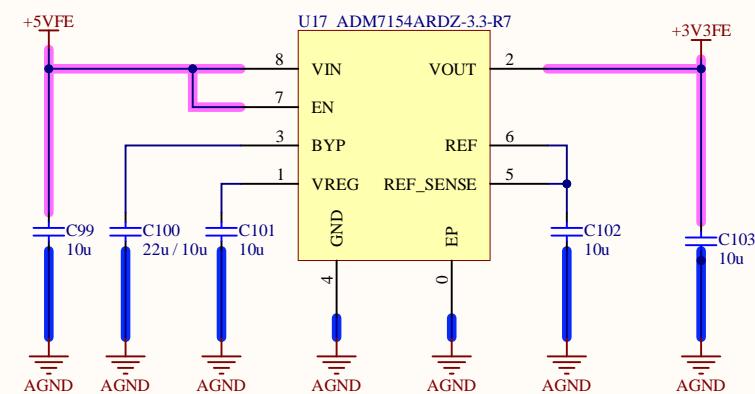
A

A



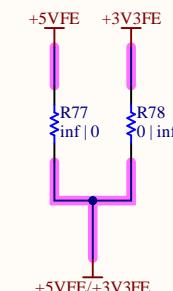
B

B



C

C



U16 is used exclusively for the frontend power supply

U17 is used / placed on backend if temperatures exceed 125°C on the frontend otherwise DNP.
Also choose **R77** & **R78** accordingly.

Title
PDN - Frontend

Size
A4 Project
AUS - NMR System

Date: 06.10.2023 Revision: V0.1
Sheet 16 of 16 Drawn By: M.Sc. Tobias Wirth



