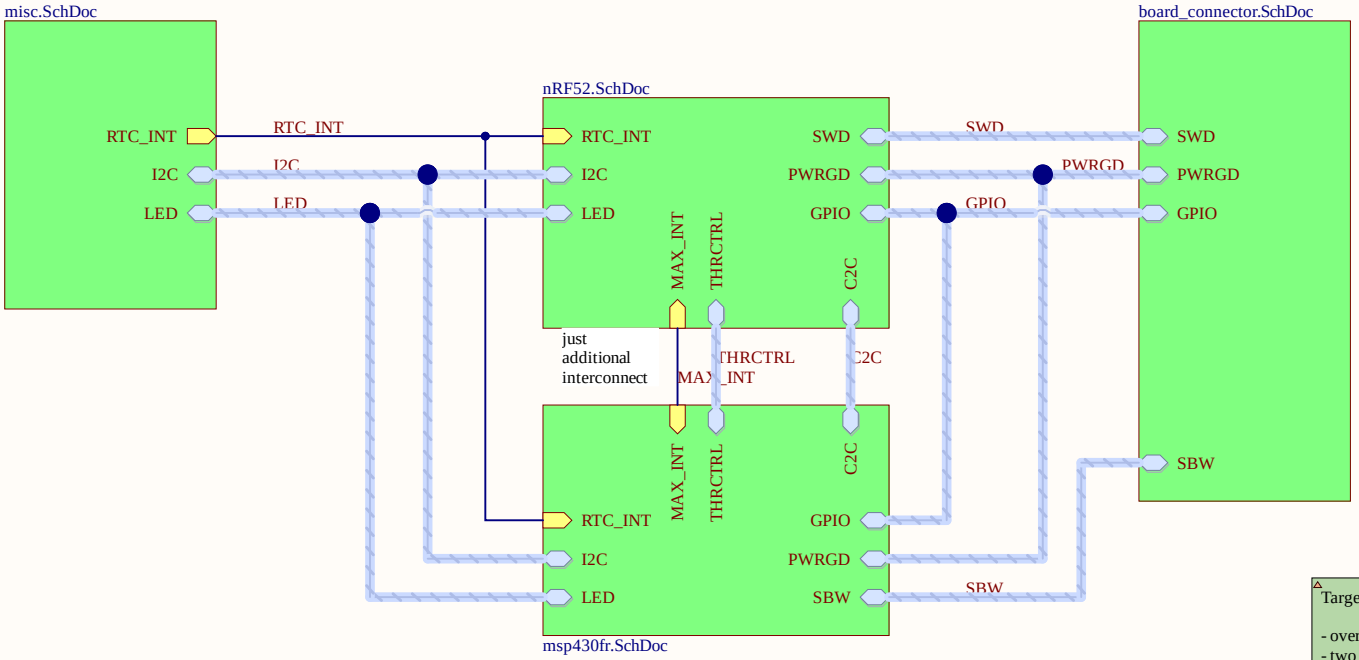


GPIO Current Protection

nRF52
High Drive (>= 2.7 V) -> 6-15 mA sink & drive
Std Drive (>=1.7 V) -> 1-4 mA sink & drive

MSP430FR59x
diode current @ pin max +- 2mA
I_OHmax = -6 mA @ 3V
I_OLmax = 6 mA @ 3V
"8.12.5.3 Typical Characteristics, Digital Outputs" show 0.5 V drop / increase @ 10 mA

74LVC2T45GT
has +- 24 mA drive & sink current

consequence #NAME? limit to 8-10 mA @ 4V with 470 R or 220 R

Target-Features

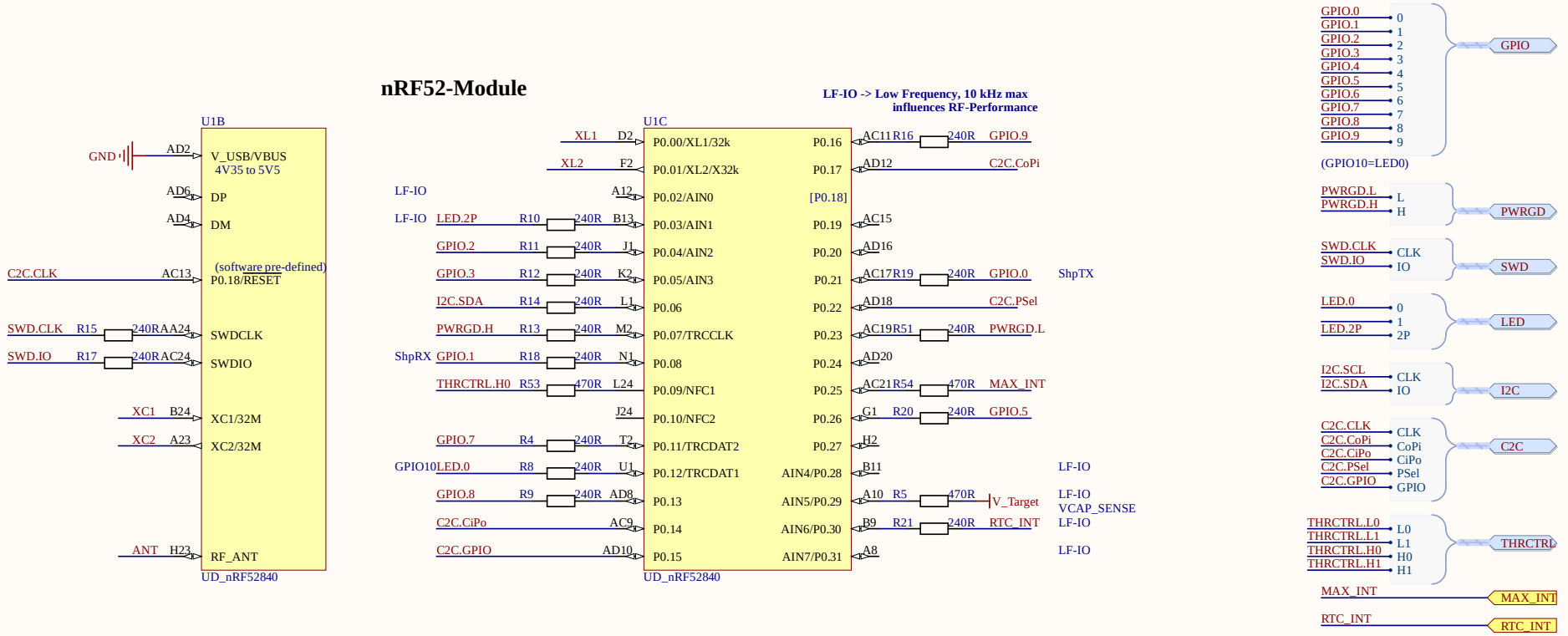
- over-voltage protection for V_LV (max 3.9V)
- two debug LEDs with separate supply
- one self-powered LED to "burn" energy
- io pins not interferring with RF (nRF PS v1.6 page 578)
- LEDs / UART similar to Riotee
- LEDs have minimal impact on pwr-budget

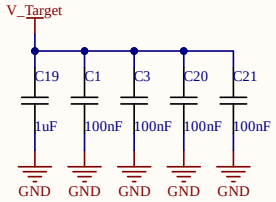
- nRF uses low voltage mode (PSv1.1 page 61)
- 3rd possible way for reset (external), beside jtag and pwr-cycle

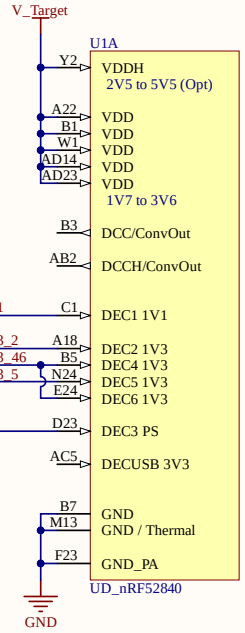
Host-PinHeader-Variants
SSQ-109-02-G-D-RA -> right angled socket (default)
SSQ-109-02-G-D -> straight socket
2x9-header allows to use ribbon-cable to connect to shepherd-cape

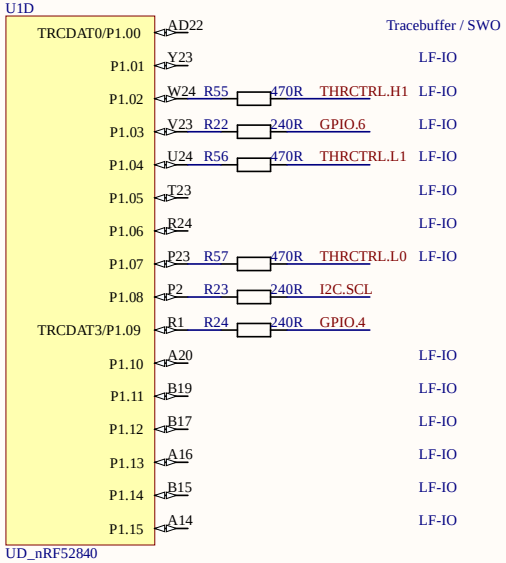
Title	Target-Board Overview NES Lab / TU Dresden		
Size A4	Number		Revision
Date:	3.28.2024	Sheet of	nRF_FRAM_Target.PrjPcb
File:	C:\Users\..\overview.SchDoc	Drawn By:	Ingmar

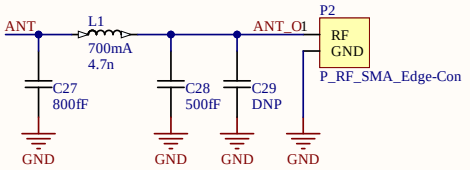
nRF52-Module

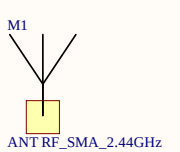


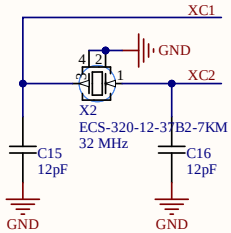


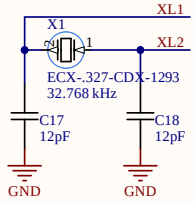






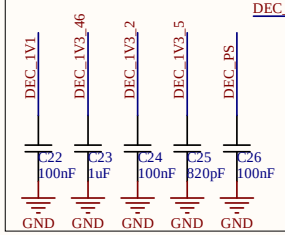




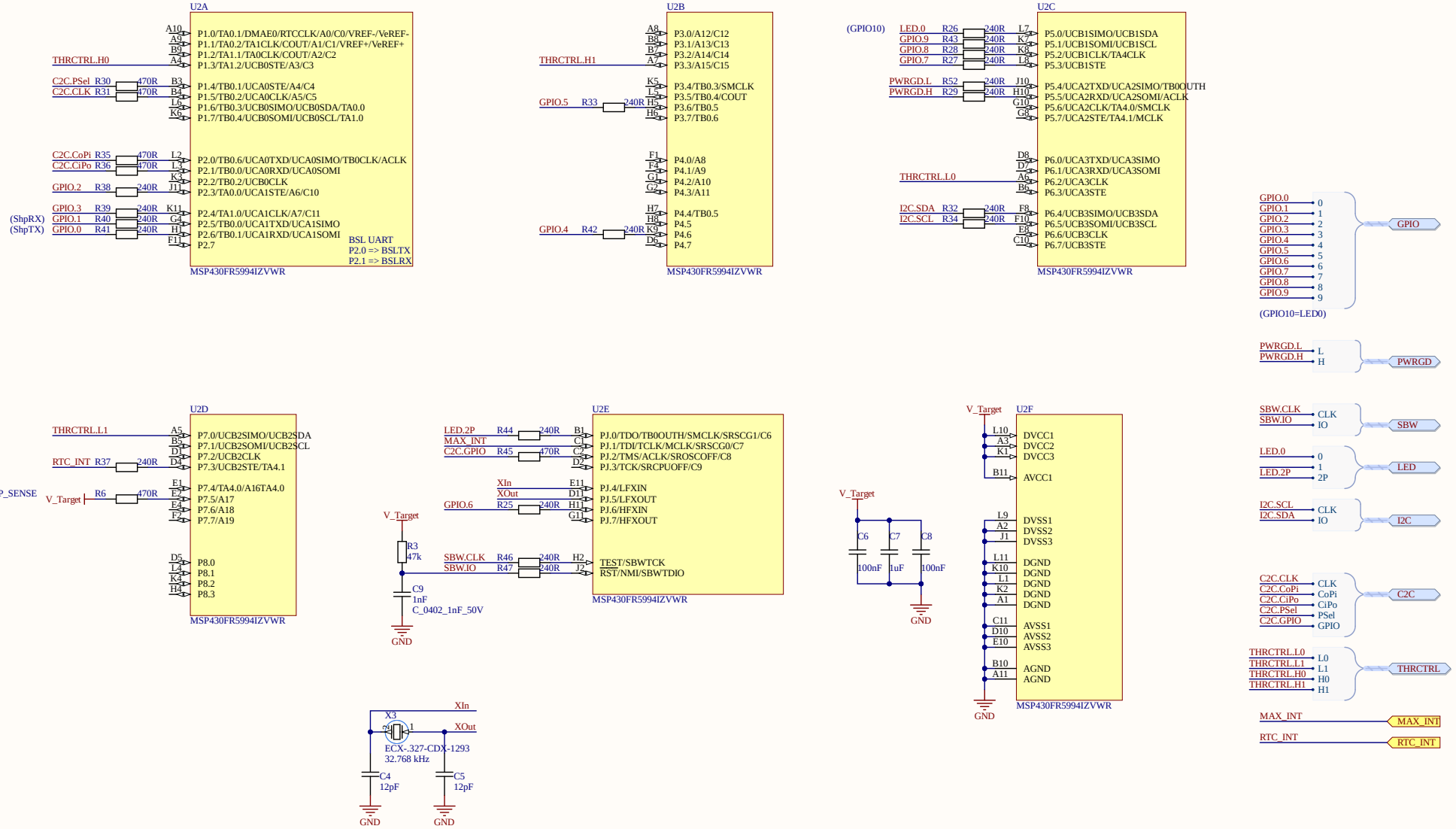


Tune C_F:
- C_pin=1pF (estimate)
- C_pcb=4pF (estimate)
- C_Quarz = 12pF

C_Ext = 2*(C_Quarz - C_pin - C_pcb)
C_Ext = 14pF

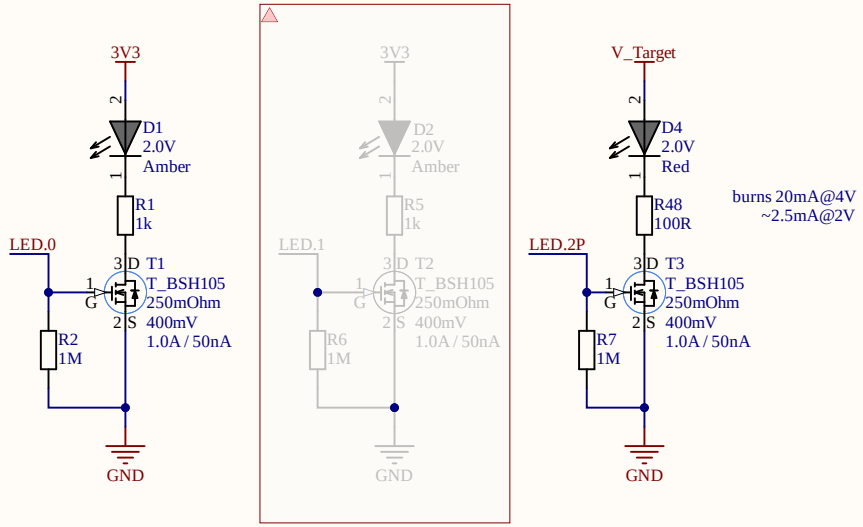


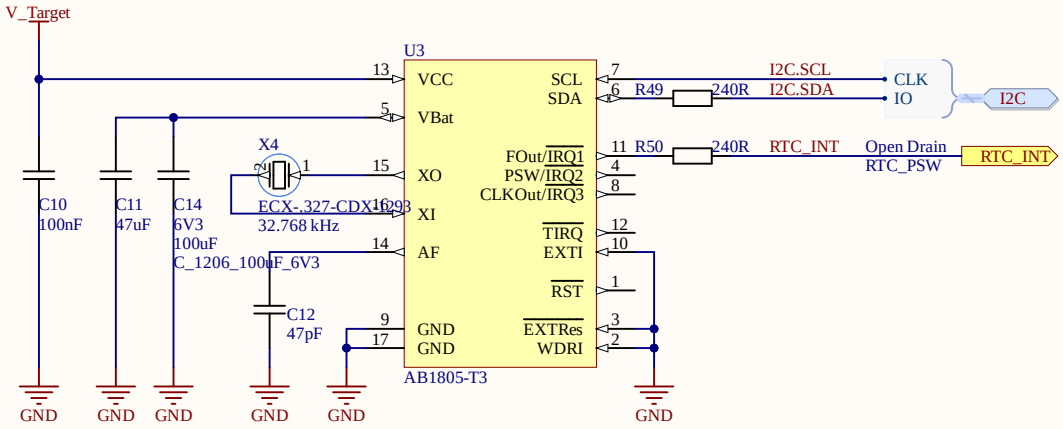
Title	Target nRF52840 NES Lab / TU Dresden		
Size A3	Number		Revision
Date:	3.28.2024	Sheet of	nRF_FRAM_Target.PrjPcb
File:	C:\Users\..\nRF52.SchDoc	Drawn By:	Ingmar



Title	Target MSP430FR NES Lab / TU Dresden	
Size A3	Number	Revision
Date: 3.28.2024	Sheet of nRF_FRAM_Target.PrjPcb	
File: C:\Users\..\msp430fr.SchDoc	Drawn By: Ingmar	

Debug-LEDs



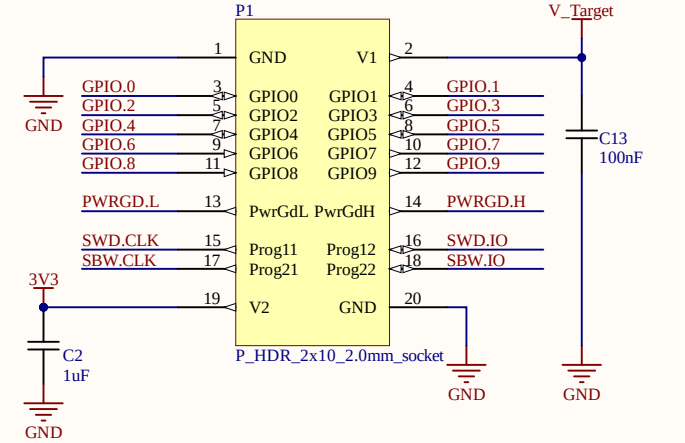


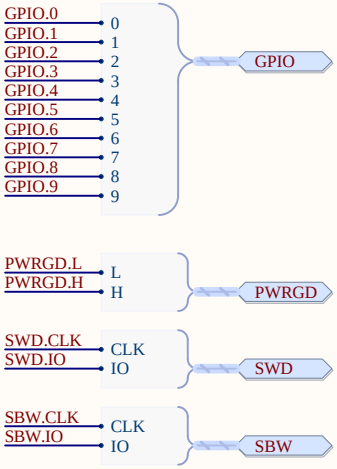
Title	RTC & LEDs NES Lab / TU Dresden		
Size A4	Number	Revision	
Date:	3.28.2024	Sheet of	nRF_FRAM_Target.PrjPcb
File:	C:\Users\..\misc.SchDoc	Drawn By:	Ingmar

Cape-Port

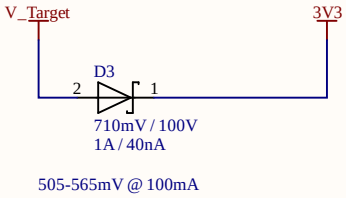
signal-direction is from Host point of view (Target is Guest)

Switchable Directions:
Group A = GPIO 0
Group B = GPIO 1
Group C = GPIO 2:5

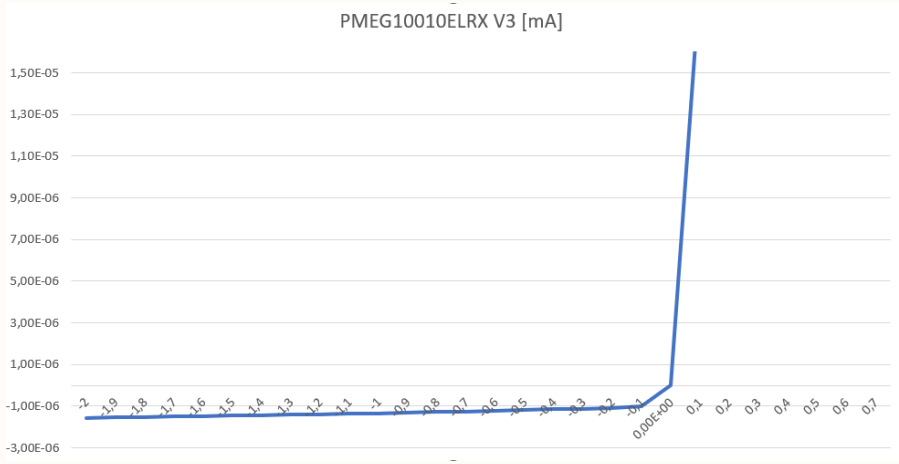




OVP



505-565mV @ 100mA

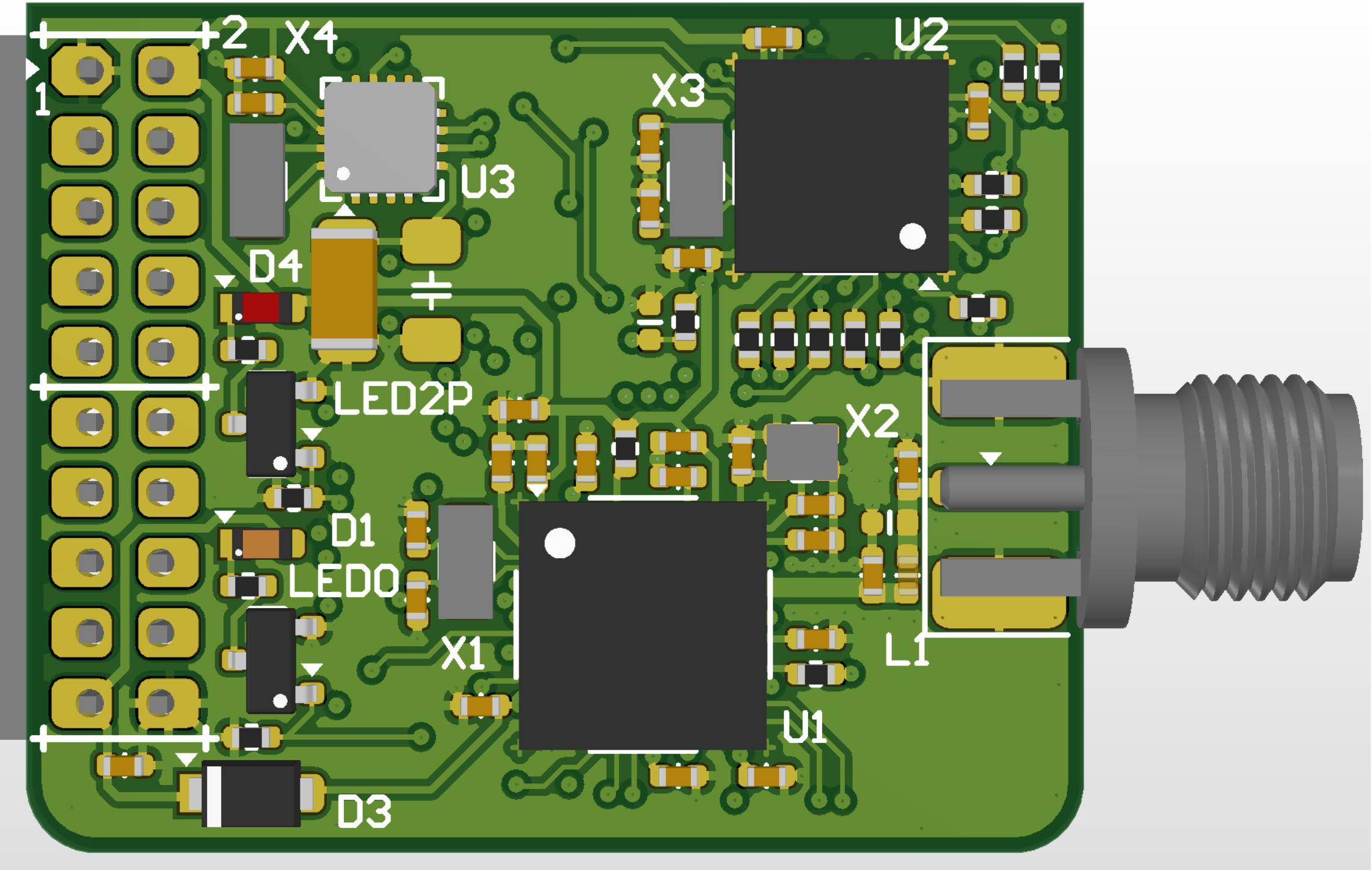


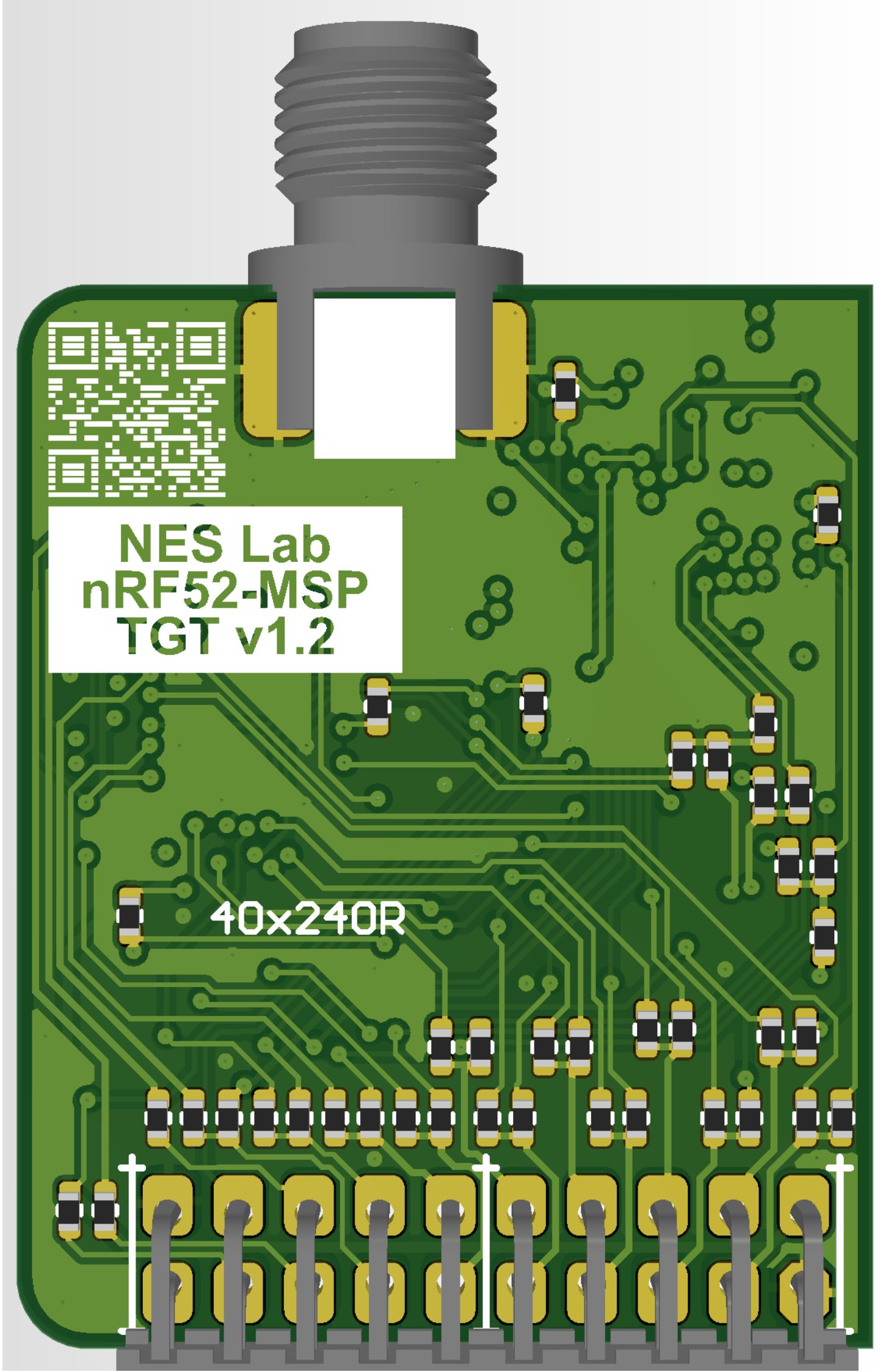
Abs Max Ratings:

nRF52	3.9 V
RTC	3.8 V
MSP430	4.1 V

One Diode:
+ 0.0 V -> 6 pA (noise)
+ 0.1 V -> 47 nA
+ 0.2 V -> 2.3 uA
+ 0.3 V -> 120 uA
+ 0.4 V -> 4.83 mA

Title	Board-Connector NES Lab / TU Dresden		
Size A4	Number	Revision	
Date:	3.28.2024	Sheet of	nRF_FRAM_Target.PrjPcb
File:	C:\Users\..\board_connector.SchDoc	Drawn By:	Ingmar


2
X4
1
X3
U2
U3
D4
LED2P
X2
D1
LED0
X1
L1
U1
D3


NES Lab
nRF52-MSP
TGT v1.2
40x240R