

TMS570_CPU



File: tms570_cpu.kicad_sch

BUS_IO_Interface



File: BUS_IO_Interface.kicad_sch

Memory



File: memorg.kicad_sch

Power



File: power.kicad_sch

RF_Power_AMP_FET



File: Power_Amp.kicad_sch

TX_ax5043



File: TX_ax5043.kicad_sch

RX_1_ax5044



File: RX_1_ax5043.kicad_sch

RX_2_ax5045



File: RX_2_ax5043.kicad_sch

RX_3_ax5045



File: RX_3_ax5043.kicad_sch

RX_4_ax5045



File: RX_4_ax5043.kicad_sch

Rx_Power_Divider



File: Power_Divider.kicad_sch

Clocks



File: Clocks.kicad_sch

SPL_CTL

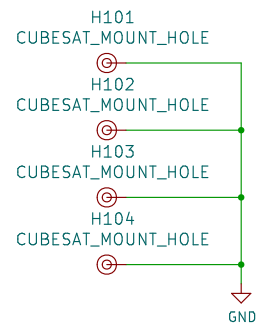


File: SPLCTL.kicad_sch

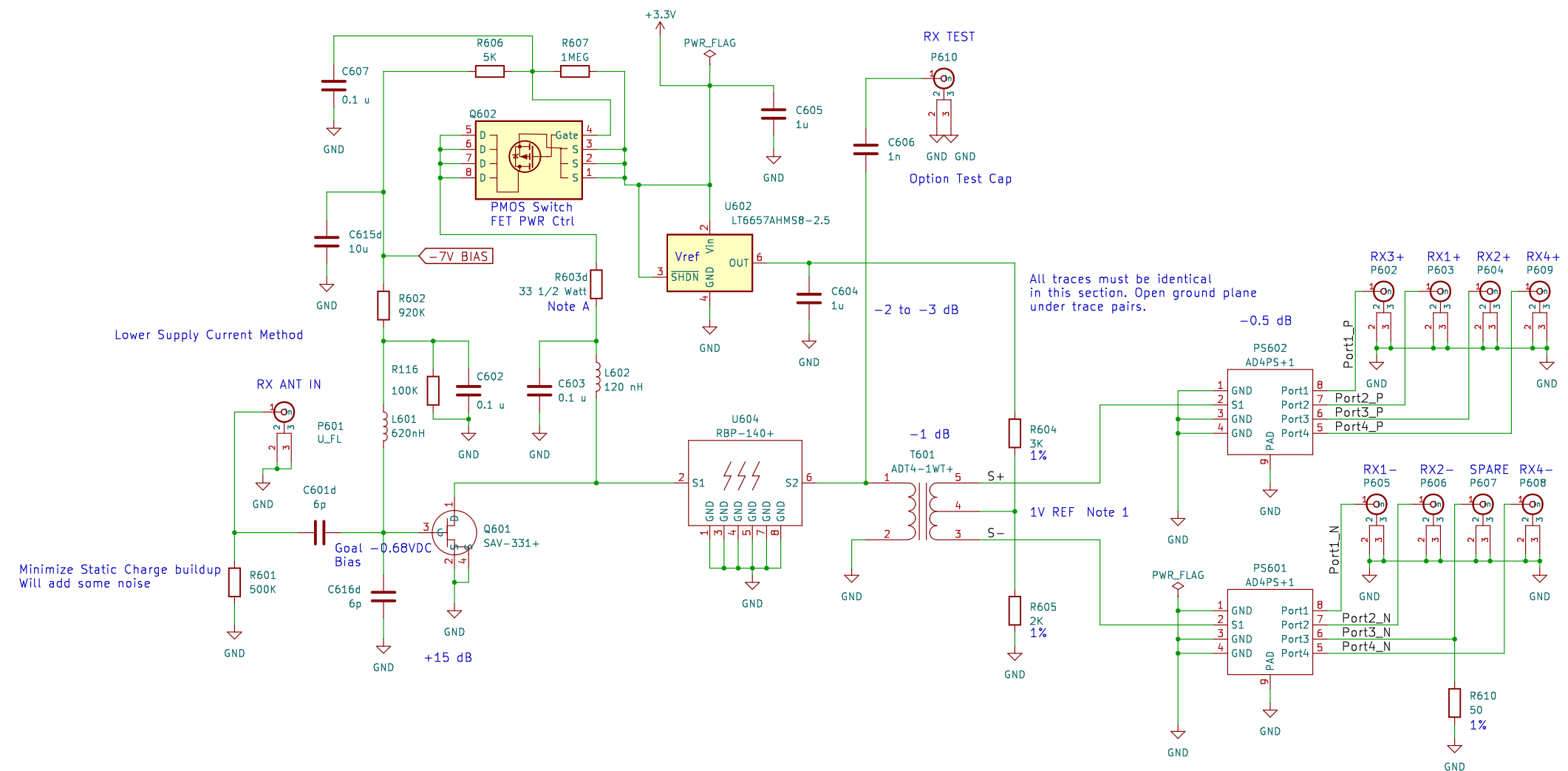
PC104_IO



File: PC104_io_conn.kicad_sch



NSBRG		
AMSAT-NA		
Sheet: /		
File: PacSat_Dev_RevD_231018.kicad_sch		
Title: Radiation Tolerant Internal Housekeeping Unit (IHU)		
Size: USLedger	Date: 2022-12-27	Rev: 1.2
KiCad E.D.A. kicad 7.0.10-7.0.10-ubuntu22.04.1		Id: 1/15



Lower Supply Current Method

Minimize Static Charge buildup
Will add some noise

All traces must be identical
in this section. Open ground plane
under trace pairs.

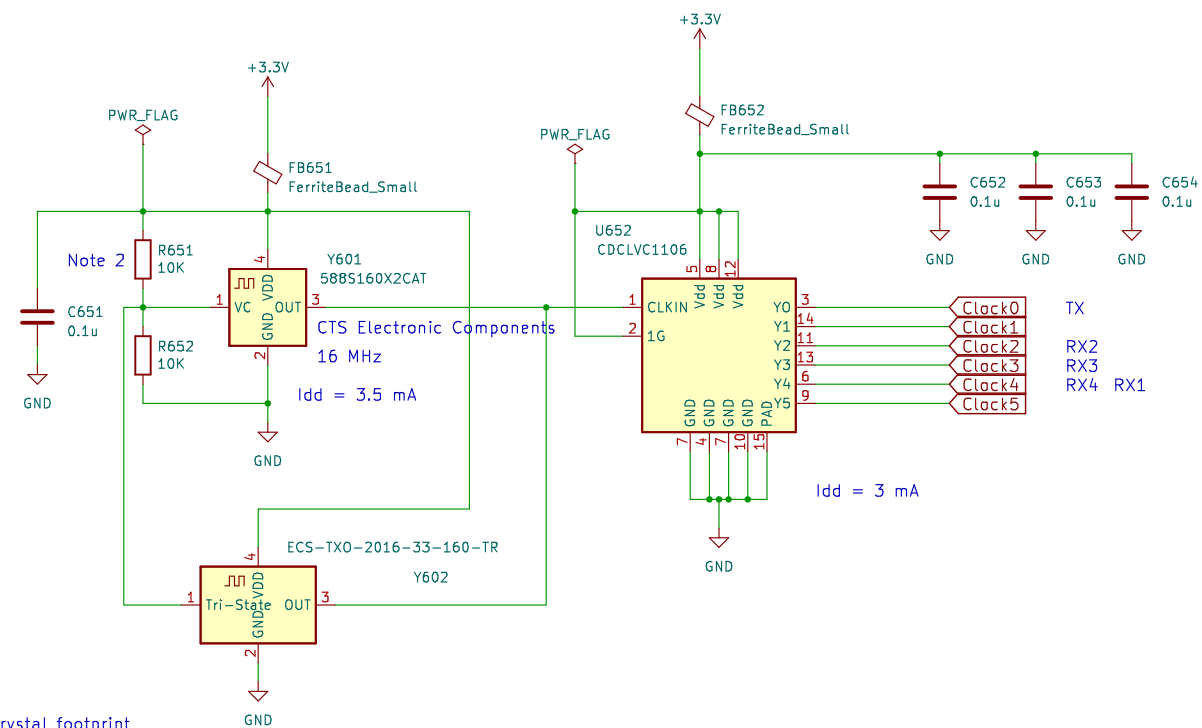
Inductors Ref Murata LQW18AN_00 series

Note A:
Tune resistor for best gain and lowest current.
May replace the FET bia with an active
bias network.

Note 1
Test performance at different offset bias levels and ground.
One AX5043 note suggested 1.0 volts for best results.

Symbol Numbers 600 up

RX INPUT POWER DIVIDER		
N5BRG		
AMSAT-NA		
Sheet: /Rx_Power_Divider/		
File: Power_Divider.kicad_sch		
Title: Radiation Tolerant PacSat Communication		
Size: USLdger	Date: 2023-06-17	Rev: A
KiCad E.D.A. kicad 7.0.10-7.0.10-ubuntu22.04.1		Id: 2/15



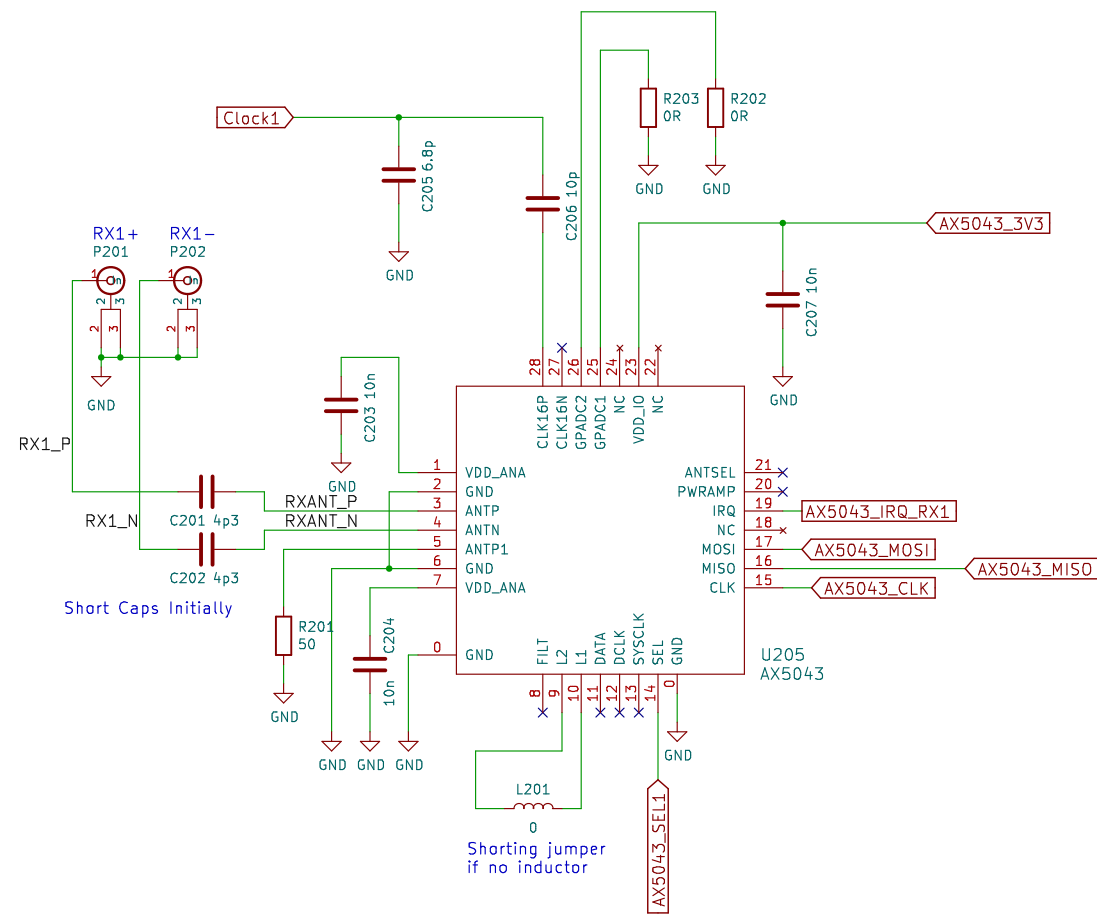
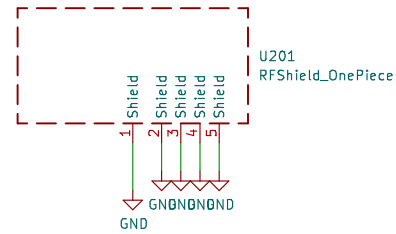
Review crystal footprint
 May have to change due to availability
 When ECS crystal is used leave off R652.

Note:

1. Review FILT voltage node and adjust current if needed per ap note AND9315-D.PDF
2. Seletec best resitor values after assembly and use one percent resistors to put frequency at 16 MHz.

Symbol Numbers 650 up

N5BRG		CLOCK	
AMSAT-NA			
Sheet: /Clocks/			
File: Clocks.kicad_sch			
Title: Radiation Tolerant PacSat Communication			
Size: USLedger	Date: 2023-06-17	Rev: A	
KiCad E.D.A. kicad 7.0.10-7.0.10-ubuntu22.04.1		Id: 4/15	



Symbol Numbers 200 up

RECEIVER 1

N5BRG
AMSAT-NA

Sheet: /RX_1_ax5044/
File: RX_1_ax5043.kicad_sch

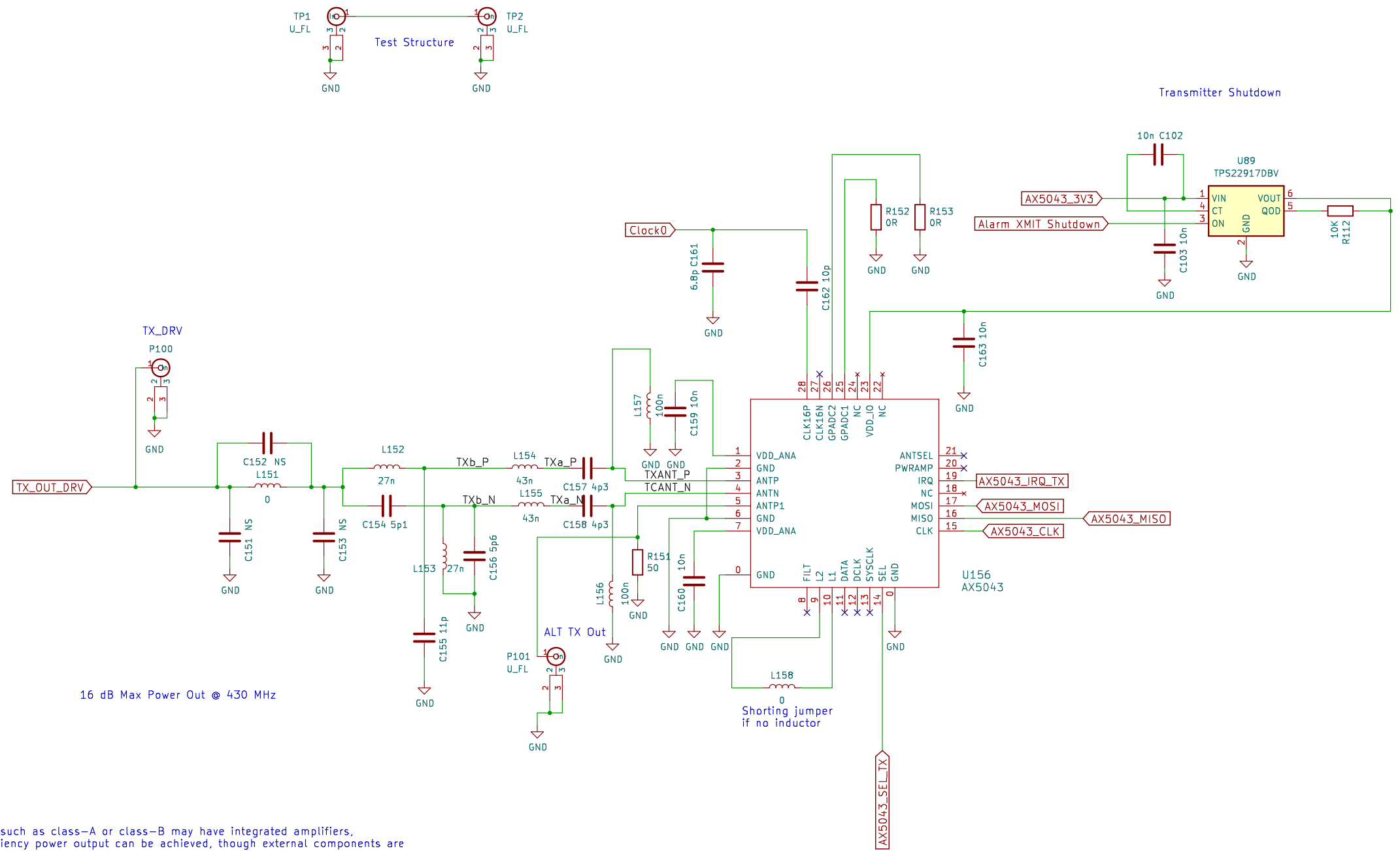
Title: Radiation Tolerant PacSat Communication

Size: USLedger | Date: 2023-06-17

KiCad E.D.A. kicad 7.0.10-7.0.10-ubuntu22.04.1

Rev: A

Id: 5/15



16 dB Max Power Out @ 430 MHz

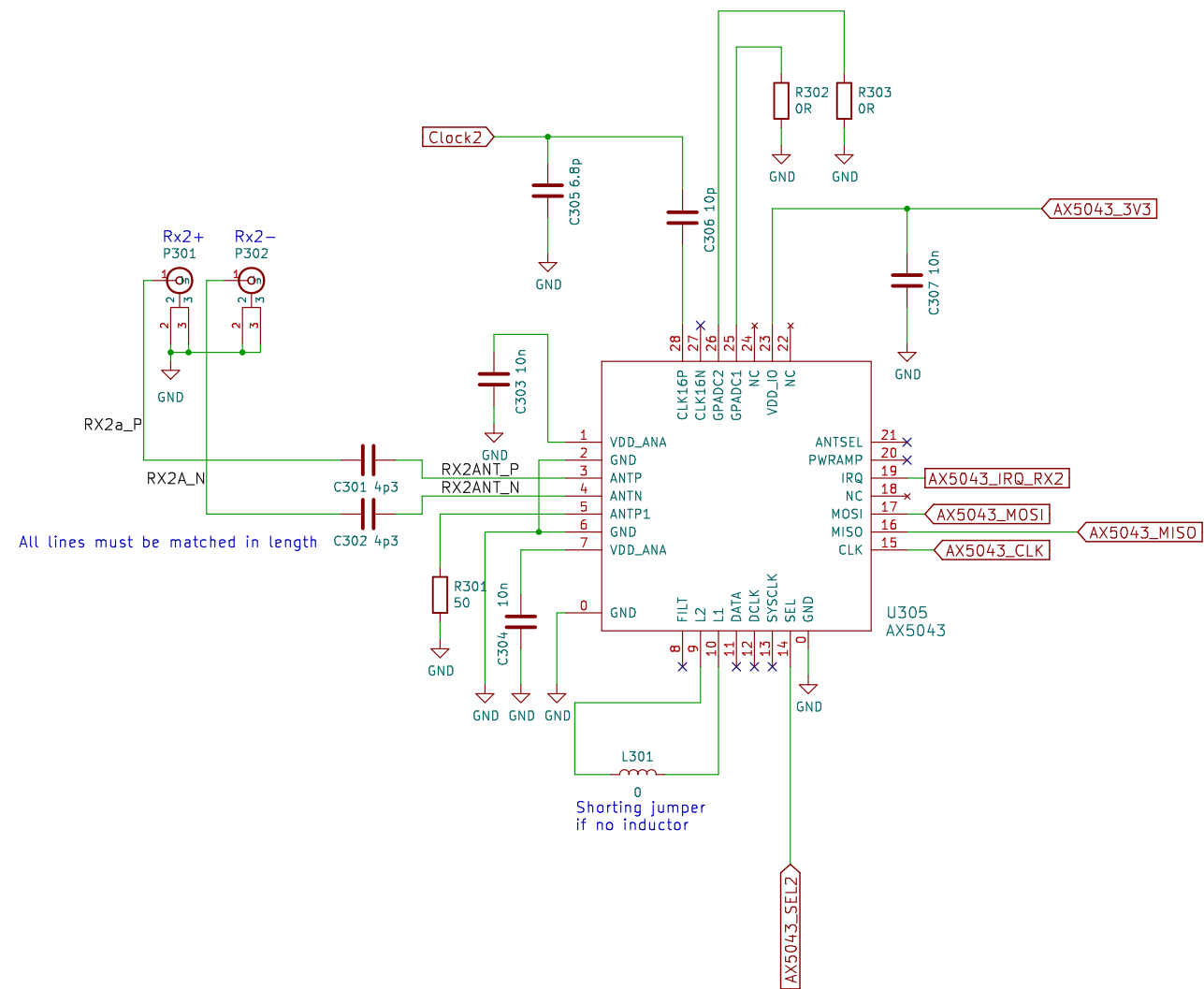
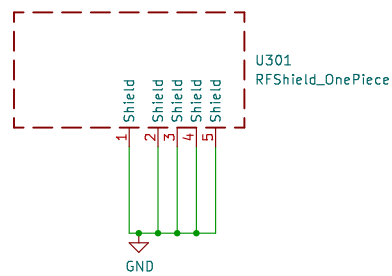
While radio transceivers using power amplifiers with topologies such as class-A or class-B may have integrated amplifiers, AX5043 utilizes a class-E amplifier. Because of this, high efficiency power output can be achieved, though external components are required.

AX5043 pins ANTP, ANTN, and ANTP1 are not the PA output; rather, they are the transition between the internal switching transistor and the external resonant components. In the various AX5043 reference designs, LC, CC, CT, LT, and CM actually form the amplifier. For this reason, the output impedance of the ANT pins is not relevant to antenna matching. When the class-E power amplifier has been properly designed, the output impedance will be found at the balun (LB, CB) components, and will be 100 ohms differential, and 50 ohms after the balun. Between the balun and the antenna (or SMA port), filtering and Antenna matching networks can be inserted in series with the RF path.

Another important point is that the output impedance of the internal PA transistor also depends on the output power setting.

Symbol Numbers 150 up

<h1>TRANSMITTER</h1>		
N5BRG		
AMSAT-NA		
Sheet: /TX_ax5043/		
File: TX_ax5043.kicad_sch		
Title: Radiation Tolerant PacSat Communication		
Size: USLedger	Date: 2023-06-17	Rev: A
KiCad E.D.A. kicad 7.0.10-7.0.10-ubuntu22.04.1		Id: 6/15



Inductors Ref Murata LQW18AN_00 series

Symbol Numbers 300 up

RECEIVER 2

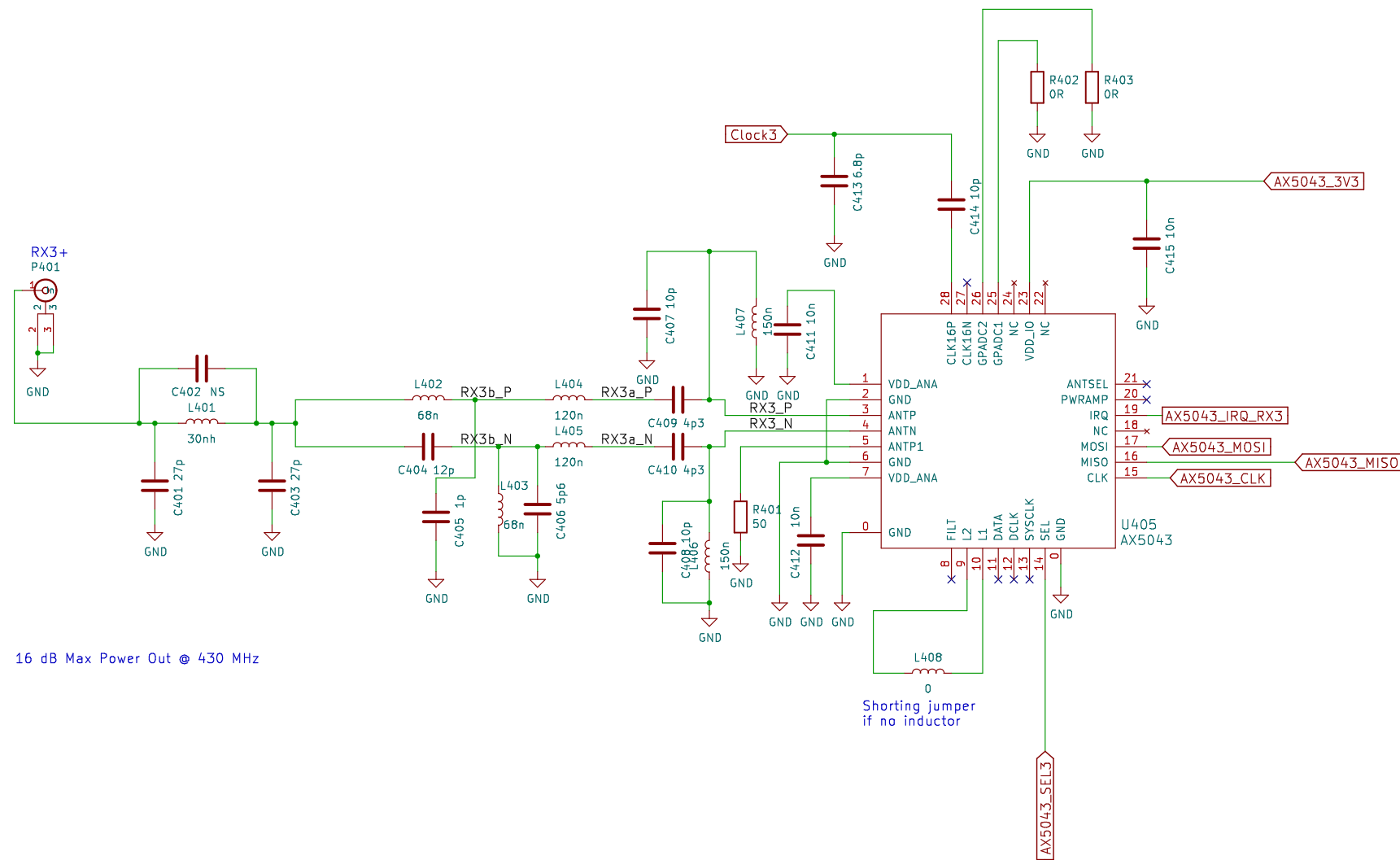
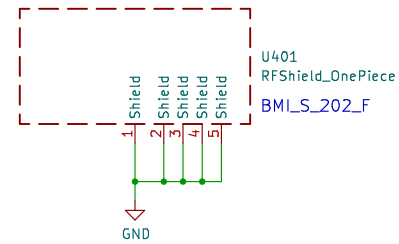
N5BRG
AMSAT-NA

Sheet: /RX_2_ax5045/
File: RX_2_ax5043.kicad_sch

Title: Radiation Tolerant PacSat Communication

Size: USLedger | Date: 2023-06-17
KiCad E.D.A. kicad 7.0.10-7.0.10-ubuntu22.04.1

Rev: A
Id: 7/15



Inductors Ref Murata LQW1BAN_00 series

Symbol Numbers 400 up

RECEIVER 3

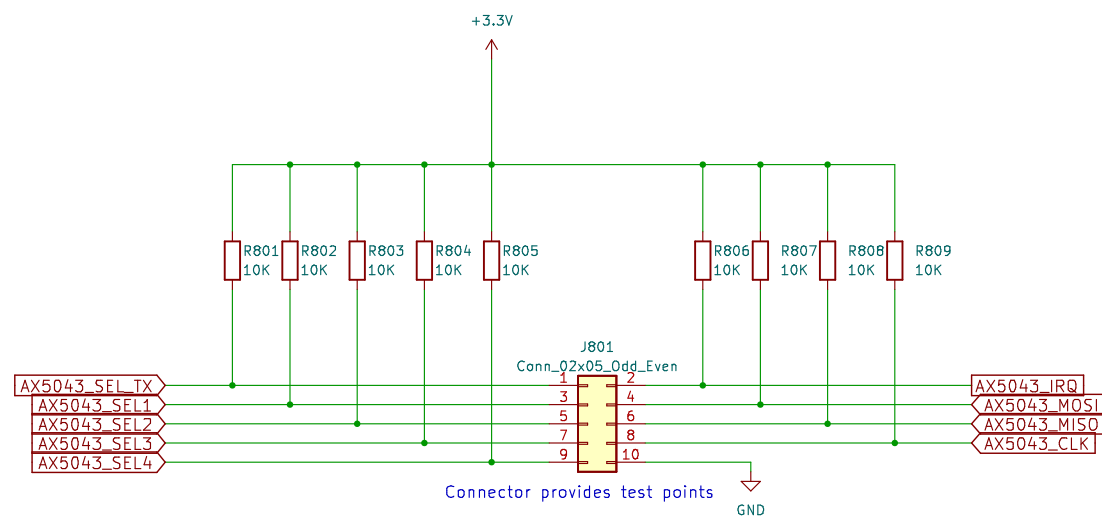
N5BRG
AMSAT-NA

Sheet: /RX_3_ax5045/
File: RX_3_ax5043.kicad_sch

Title: Radiation Tolerant PacSat Communication

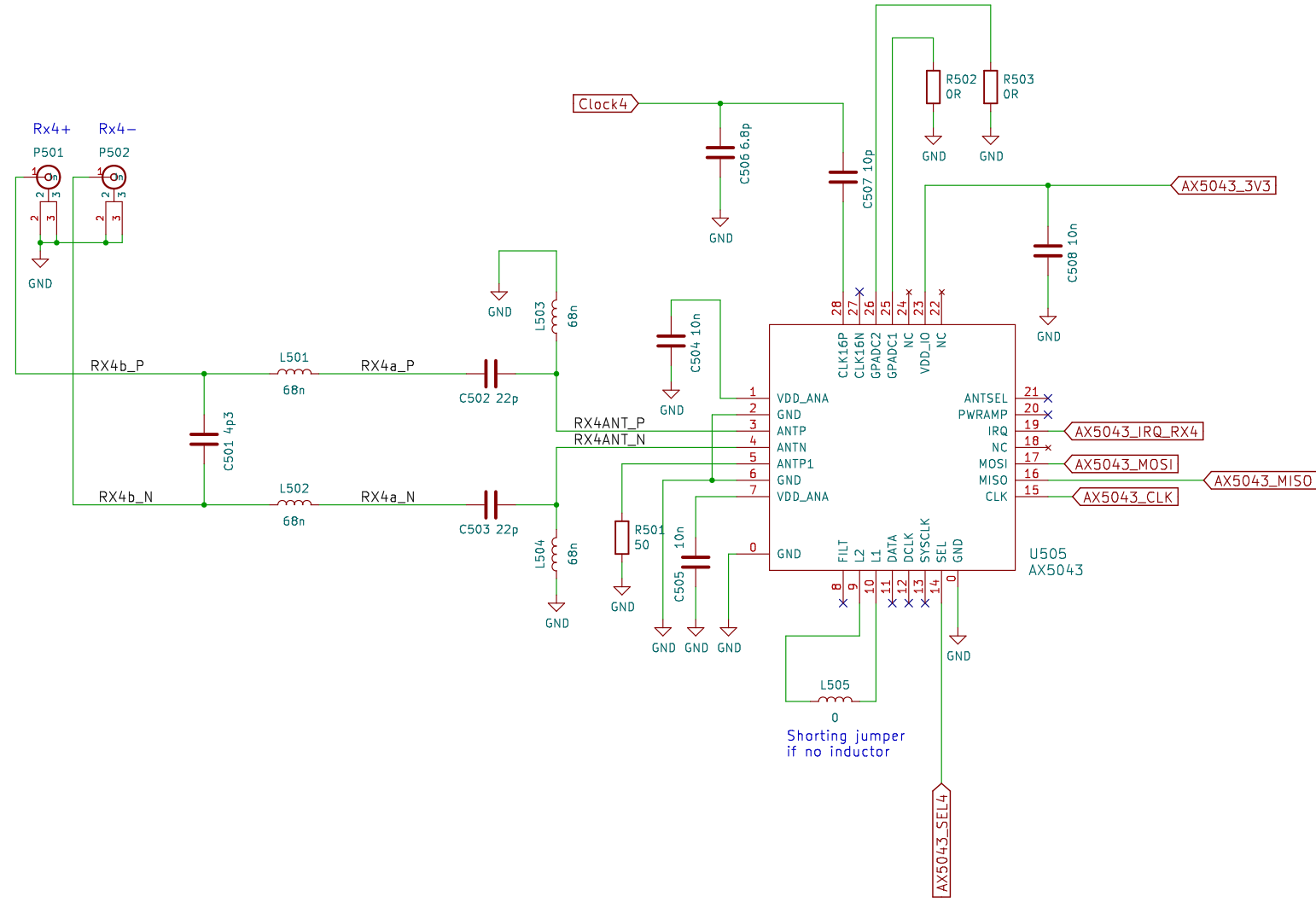
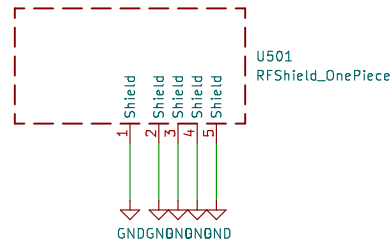
Size: USLedger | Date: 2023-06-17
KiCad E.D.A. kicad 7.0.10-7.0.10-ubuntu22.04.1

Rev: A
Id: 9/15



Symbol Numbers 800 up

N5BRG		COPNTOL LINES	
AMSAT-NA			
Sheet: /SPI_CTL/			
File: SPI_CTL.kicad_sch			
Title: Radiation Tolerant PacSat Communication			
Size: USLedger	Date: 2023-06-17	Rev: A	
KiCad E.D.A. kicad 7.0.10-7.0.10-ubuntu22.04.1		Id: 10/15	



Inductors Ref Murata LQW18AN_00 series

Symbol Numbers 500 up

RECEIVER 4

N5BRG
AMSAT-NA

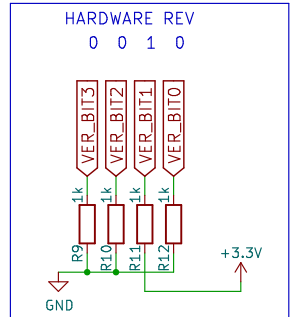
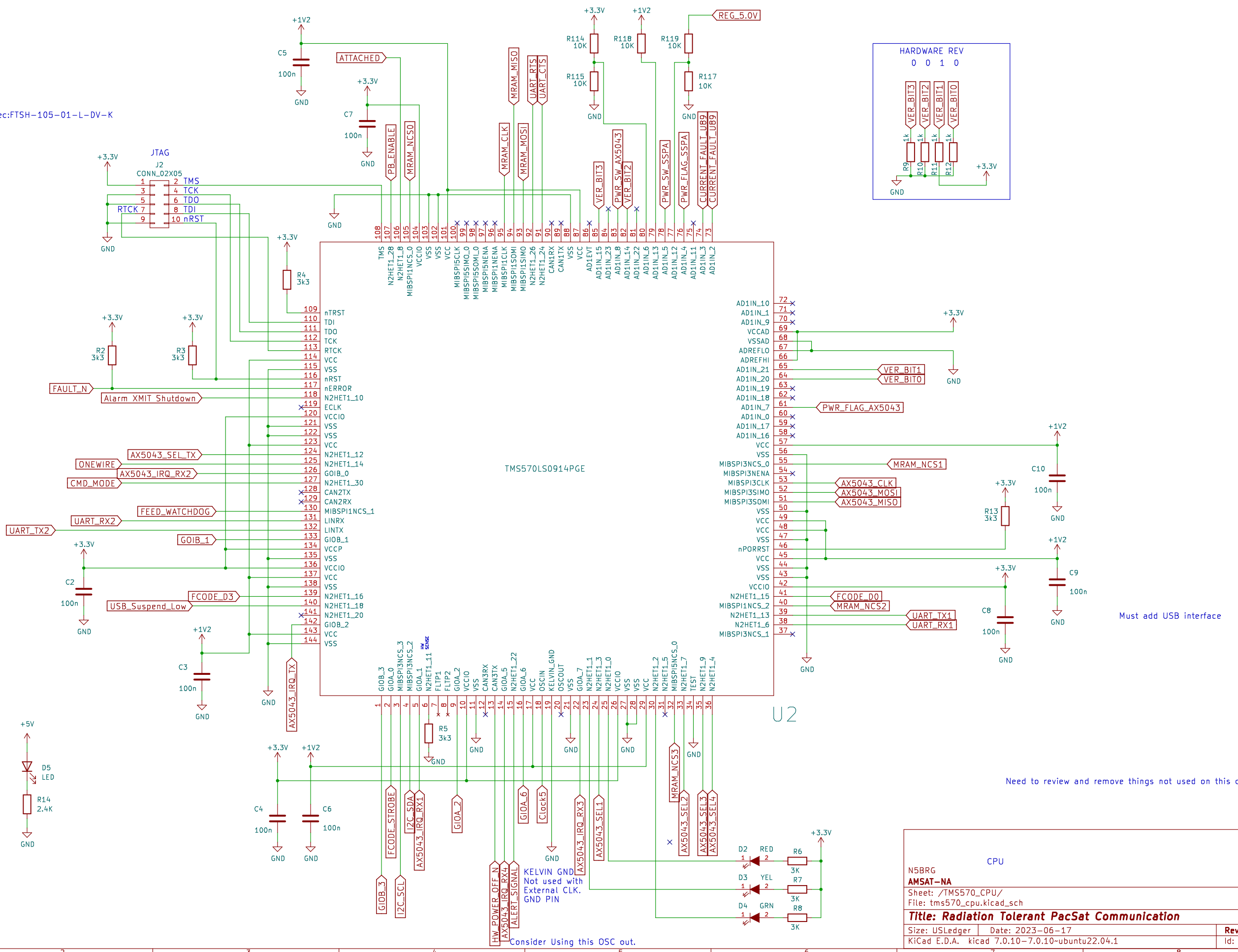
Sheet: /RX_4_ax5045/
File: RX_4_ax5043.kicad_sch

Title: Radiation Tolerant PacSat Communication

Size: USLedger | Date: 2023-06-17
KiCad E.D.A. kicad 7.0.10-7.0.10-ubuntu22.04.1

Rev: A
Id: 11/15

PacSatDev_samtec:FTSH-105-01-L-DV-K

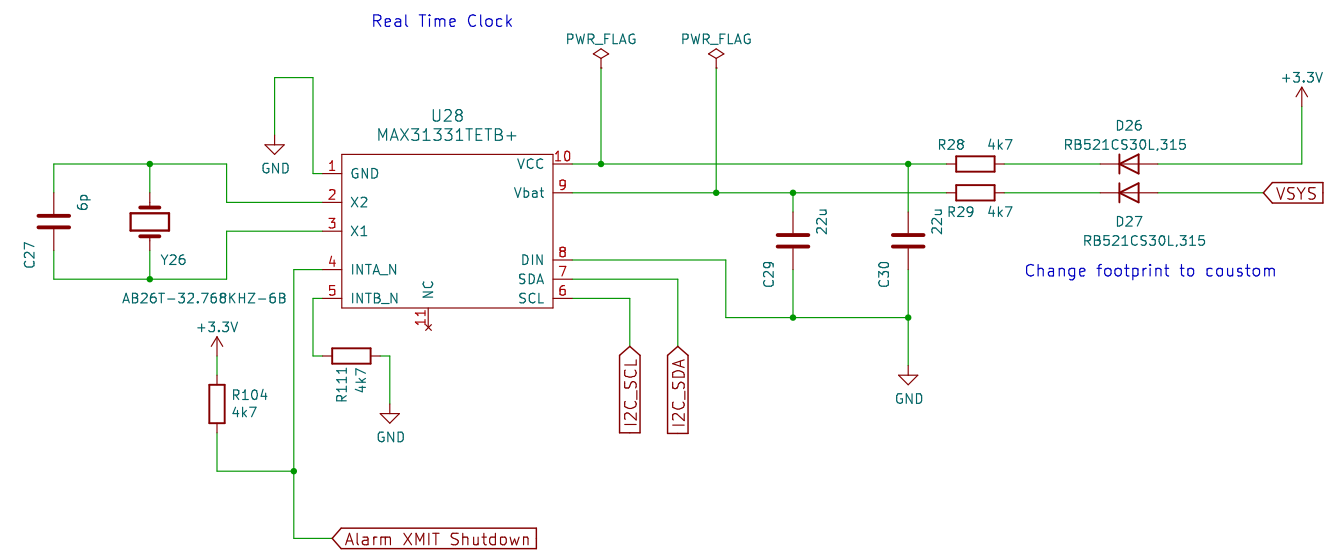
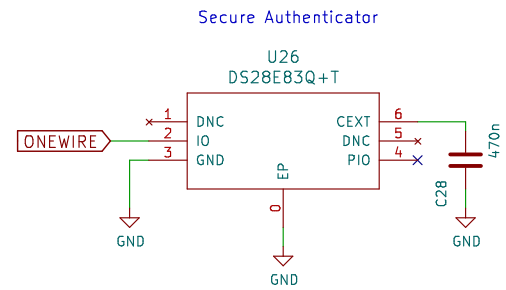


N5BRG		CPU	
AMSAT-NA			
Sheet: /TMS570_CPU/			
File: tms570_cpu.kicad_sch			
Title: Radiation Tolerant PacSat Communication			
Size: USLedger	Date: 2023-06-17	Rev: 1.1	
KiCad E.D.A.	kicad 7.0.10-7.0.10-ubuntu22.04.1	Id: 12/15	

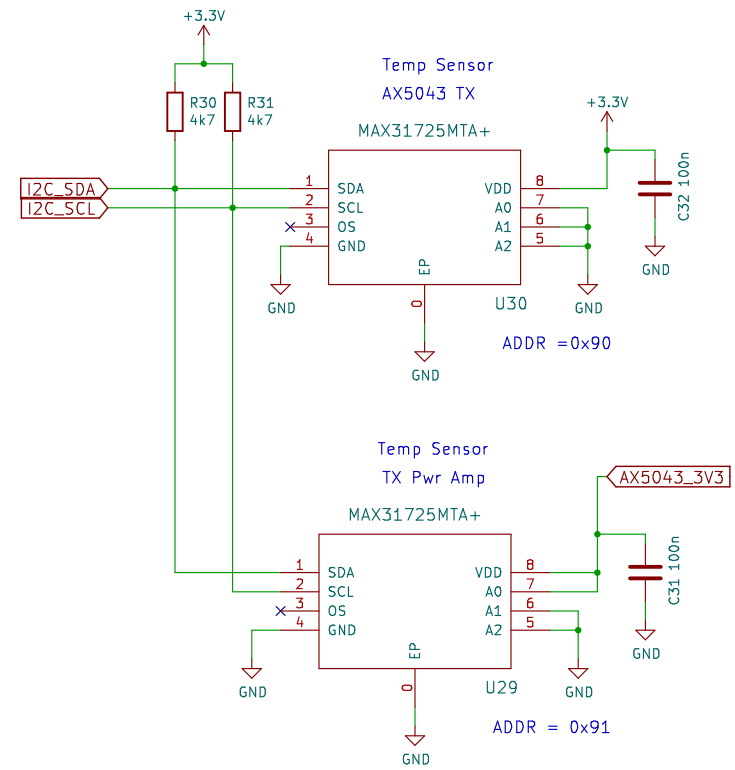
Start with 1

Consider Using this OSC out.

Need to review and remove things not used on this design.

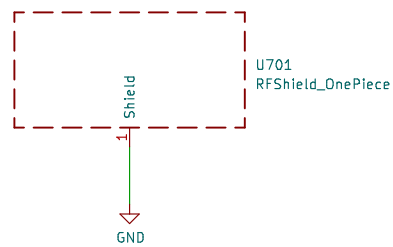


Idd 2.5 uA/600 uA

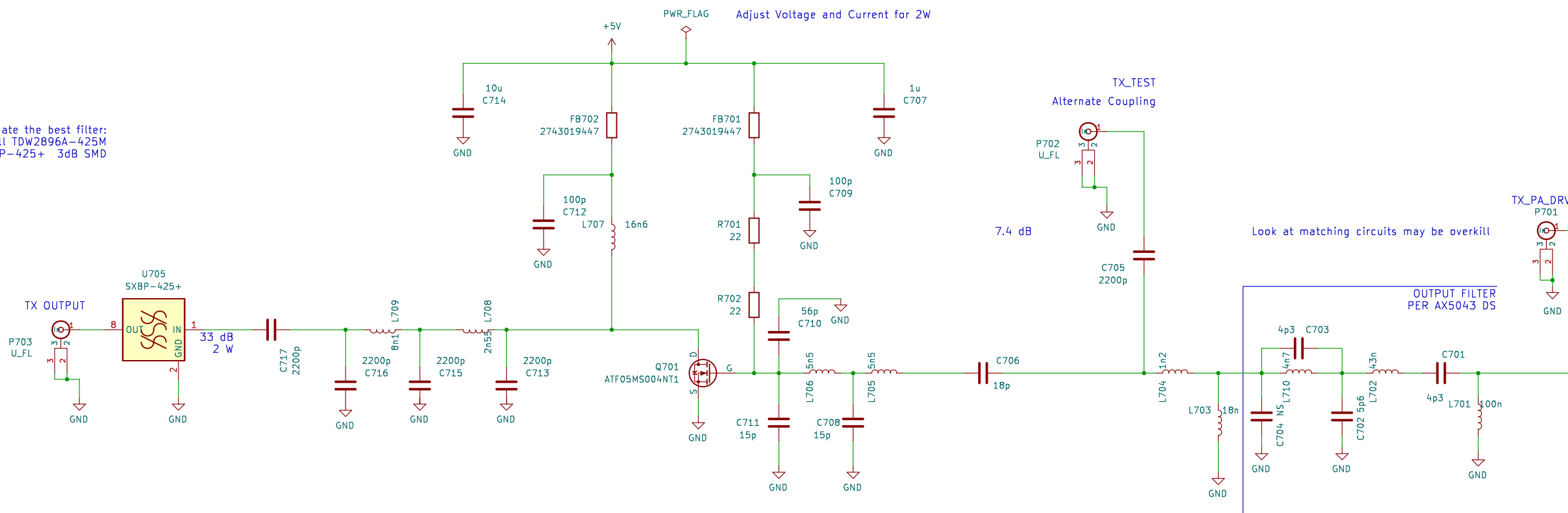


Start with 25

BUS IO		
N5BRG		
AMSAT-NA		
Sheet: /BUS_IO_Interface/		
File: BUS_IO_Interface.kicad_sch		
Title: Radiation Tolerant PacSat Communication		
Size: USLedger	Date: 2023-06-17	Rev: 1.1
KiCad E.D.A. kicad 7.0.10-7.0.10-ubuntu22.04.1		Id: 13/15



Locate the best filter:
Temwell TDW2896A-425M
MiniCircuits SXBP-425+ 3dB SMD



RF Shield over these parts.

Class AB

Use Hi Q Caps in all matching circuits (Ultra low ESR at 435 MHz)

Symbol Numbers 700 up

RF POWER AMP

N5BRG

AMSAT-NA

Sheet: /RF_Power_Amp_FET/

File: Power_Amp.kicad_sch

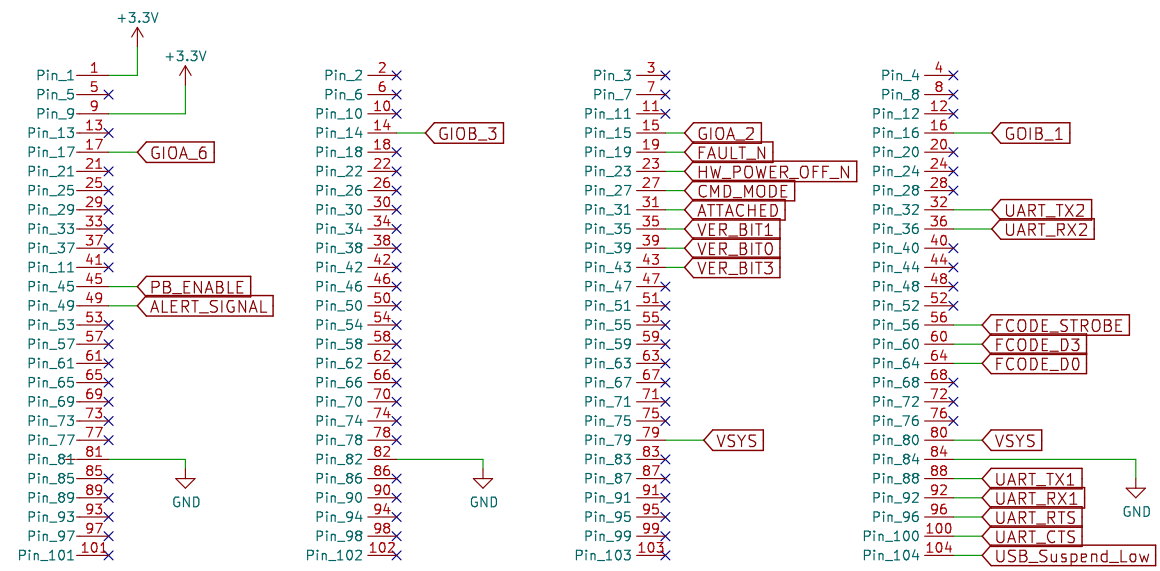
Title: Radiation Tolerant PacSat Communication

Size: USLdger Date: 2023-06-17

KiCad E.D.A. kicad 7.0.10-7.0.10-ubuntu22.04.1

Rev: A

Id: 14/15



PacSat_Dev_CONN_04X26
Conn_04x26_Pin
P651

Timer Signals

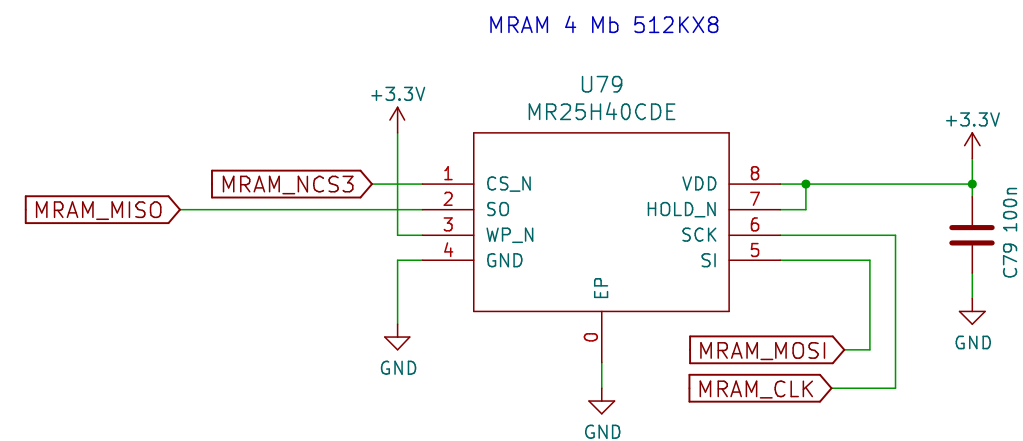
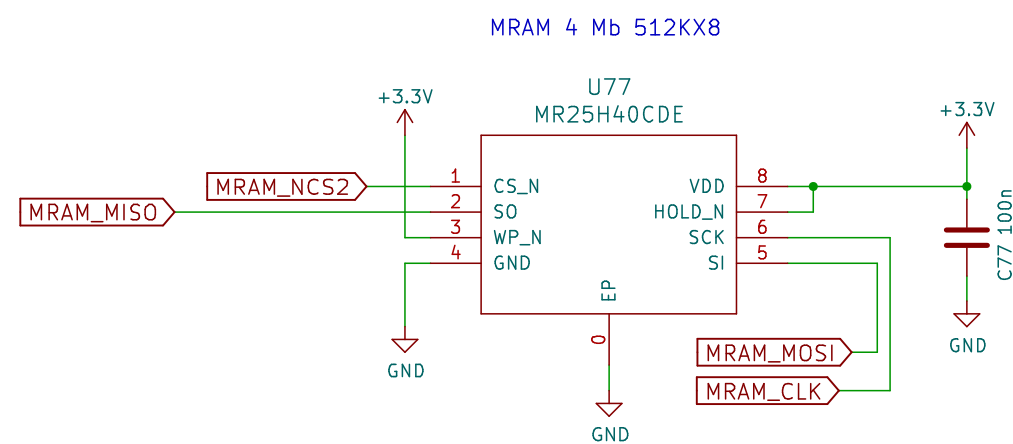
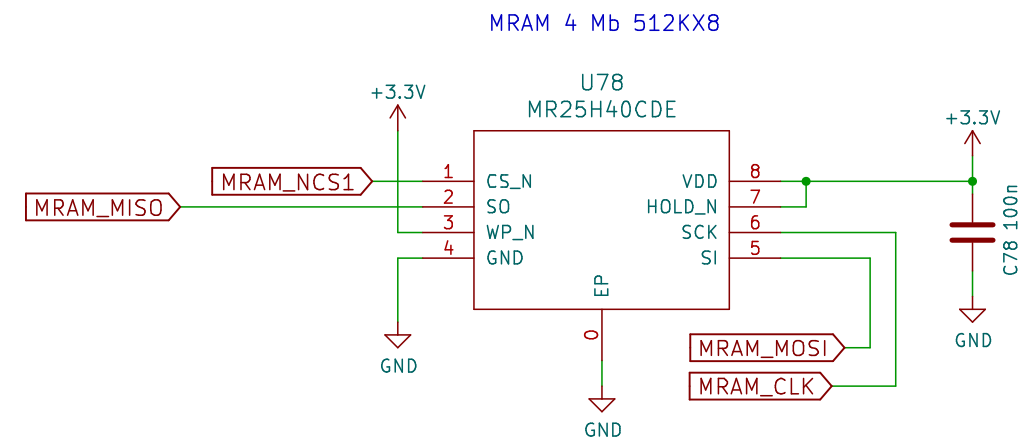
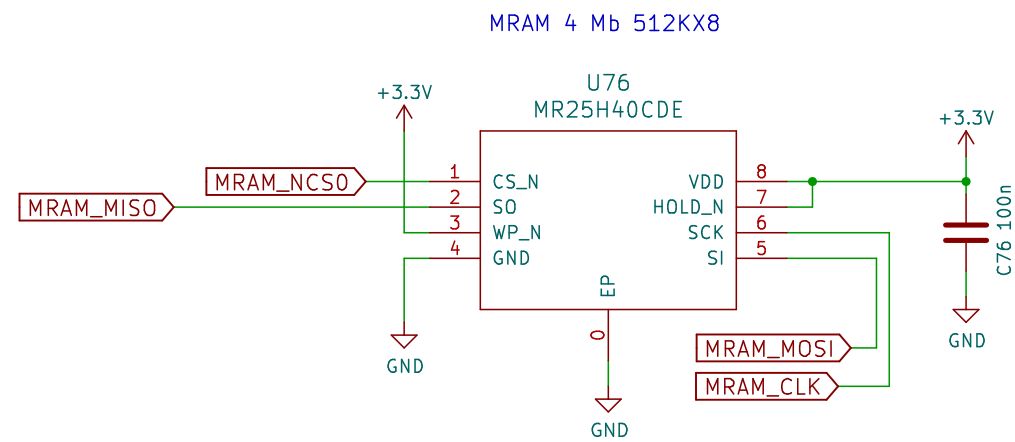
EXTERNAL
USB Interface

Needs a lot of work to define all IO and put the connections on proper pins.

Samtec Q Series Connectors
QSS mates with QTS
This connector accomidates stacking PCBs

Symbol Numbers 925 up

PACSAT BOARD ID		
N5BRG		
AMSAT-NA		
Sheet: /PC104_IO/		
File: PC104_io_conn.kicad_sch		
Title: Radiation Tolerant PacSat Communication		
Size: USLedger	Date: 2023-06-17	Rev: A
KiCad E.D.A. kicad 7.0.10-7.0.10-ubuntu22.04.1		Id: 15/15



Memory Chips
400 uA standby
11 to 18.5 mA active

Start with 75

Memory

N5BRG
AMSAT-NA

Sheet: /Memory/
File: memorg.kicad_sch

Title: Radiation Tolerant PacSat Communication

Size: A4 Date: 2023-06-17

Rev: A

KiCad E.D.A. kicad 7.0.10-7.0.10~ubuntu22.04.1

Id: 17/15