TMS570_CPU

1

File: tms570_cpu.kicad_sch

BUS_IO_Interface

25

File: BUS_IO_Interface.kicad_sch

Memory

75

File: memorg.kicad_sch

Power

85

File: power.kicad_sch

RF_Power_AMP_FET

700

File: Power_Amp.kicad_sch

TX_ax5043

150

File: TX_ax5043.kicad_sch

RX_1_ax5044

200

File: RX_1_ax5043.kicad_sch

RX_2_ax5045

300

File: RX_2_ax5043.kicad_sch

RX_3_ax5045

400

File: RX_3_ax5043.kicad_sch

RX_4_ax5045

500

File: RX_4_ax5043.kicad_sch

Need to verify the MISO on AX5042
is a Tri State output or open collector.
Data Sheet just says output.

Rx_Power_Divider

600

File: Power_Divider.kicad_sch

Clocks

650

File: Clocks.kicad_sch

SPI_CTL

800

File: SPI_CTL.kicad_sch

PC104_IO

925

File: PC104_io_conn.kicad_sch

TODO: ANALOG SIGNAL CONDITIONING ON ALL I/O
Check clock generaators
Assign clock frequencies
develope frequency plan
check settings for PSK modulation
Check Power supplies

Need to verify the MISO on MRAM
is a Tri State output or open collector.
Data Sheet just says output. If it is not
we need to add IPO buffers for each memory
chip. Tested on Launch Pad Test Board and
working. 5/24/23

H101
CUBESAT_MOUNT_HOLE

H102
CUBESAT_MOUNT_HOLE

H103
CUBESAT_MOUNT_HOLE

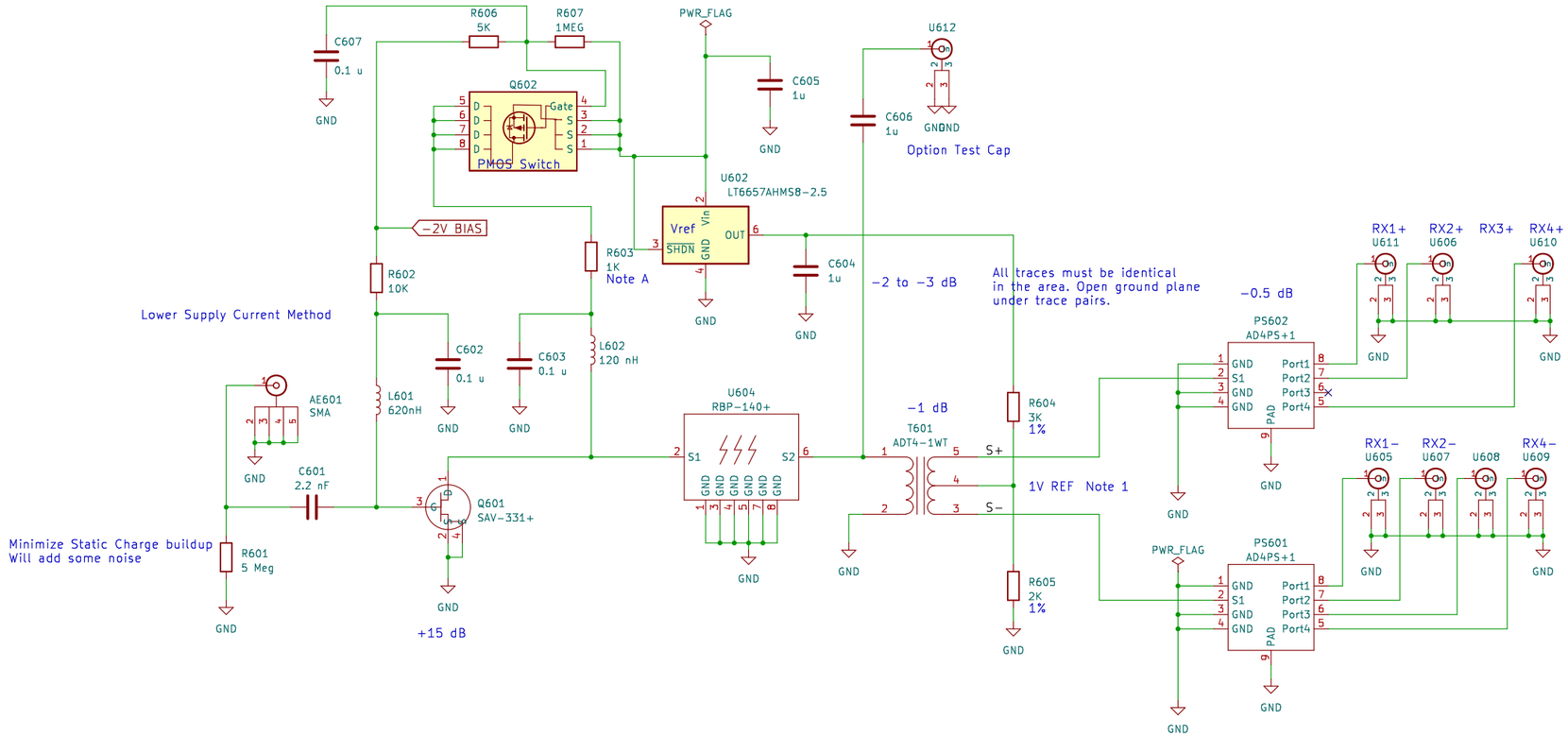
H104
CUBESAT_MOUNT_HOLE

GND

N5BRG
AMSAT-NA
Sheet: /
File: PacSat_Dev_RevC_230824.kicad_sch

Title: Radiation Tolerant Internal Housekeeping Unit (IHU)

Size: USLedger	Date: 2022-12-27	**Rev: 1.2**
KiCad E.D.A. kicad 7.0.6-7.0.6~ubuntu22.04.1		Id: 1/15



Inductors Ref Murata LQW18AN_00 series

Note A:
Tune resistor for best gain and lowest current.

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

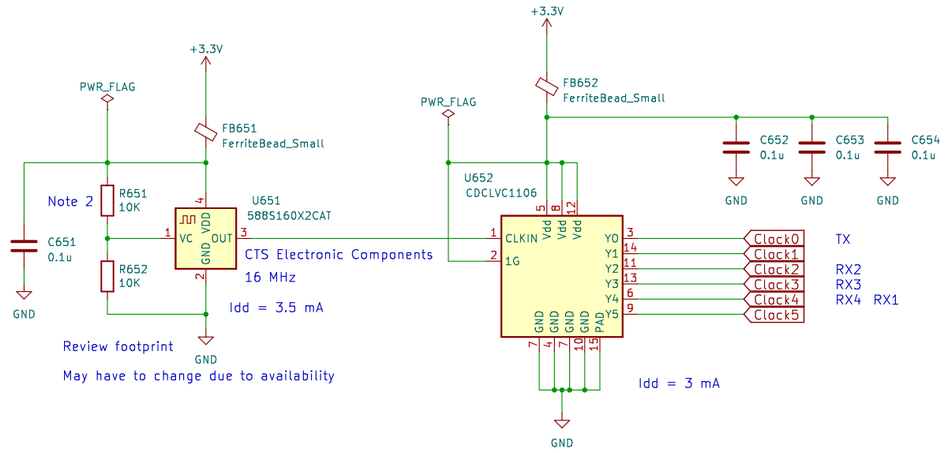
AMSAT−NA

Sheet: /Rx_Power_Divider/

File: Power_Divider.kicad_sch

Title: Radiation Tolerant PacSat Communication

Size: USLedger	Date: 2023−06−17	**Rev: A**
KiCad E.D.A. kicad 7.0.6−7.0.6-ubuntu22.04.1		Id: 2/15



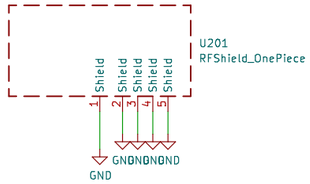
Note:

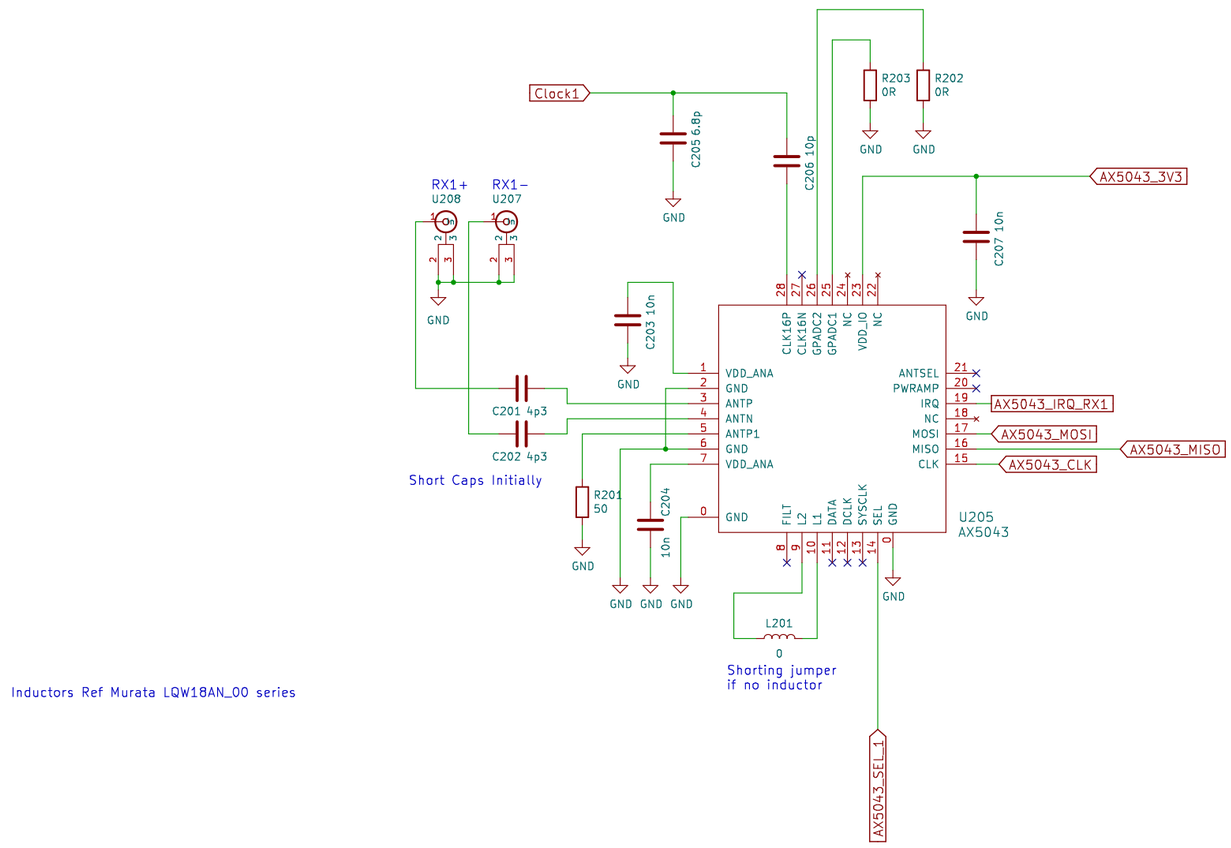
1. Review FILT voltage node and adjust current if needed per ap note AND9315-D.PDF

2. Seletec best resitor values after assembly and use one percent resistors to put frequeny 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 7.0.6-7.0.6~ubuntu22.04.1	Id: 4/15





Inductors Ref Murata LQW18AN_00 series

Symbol Numbers 200 up

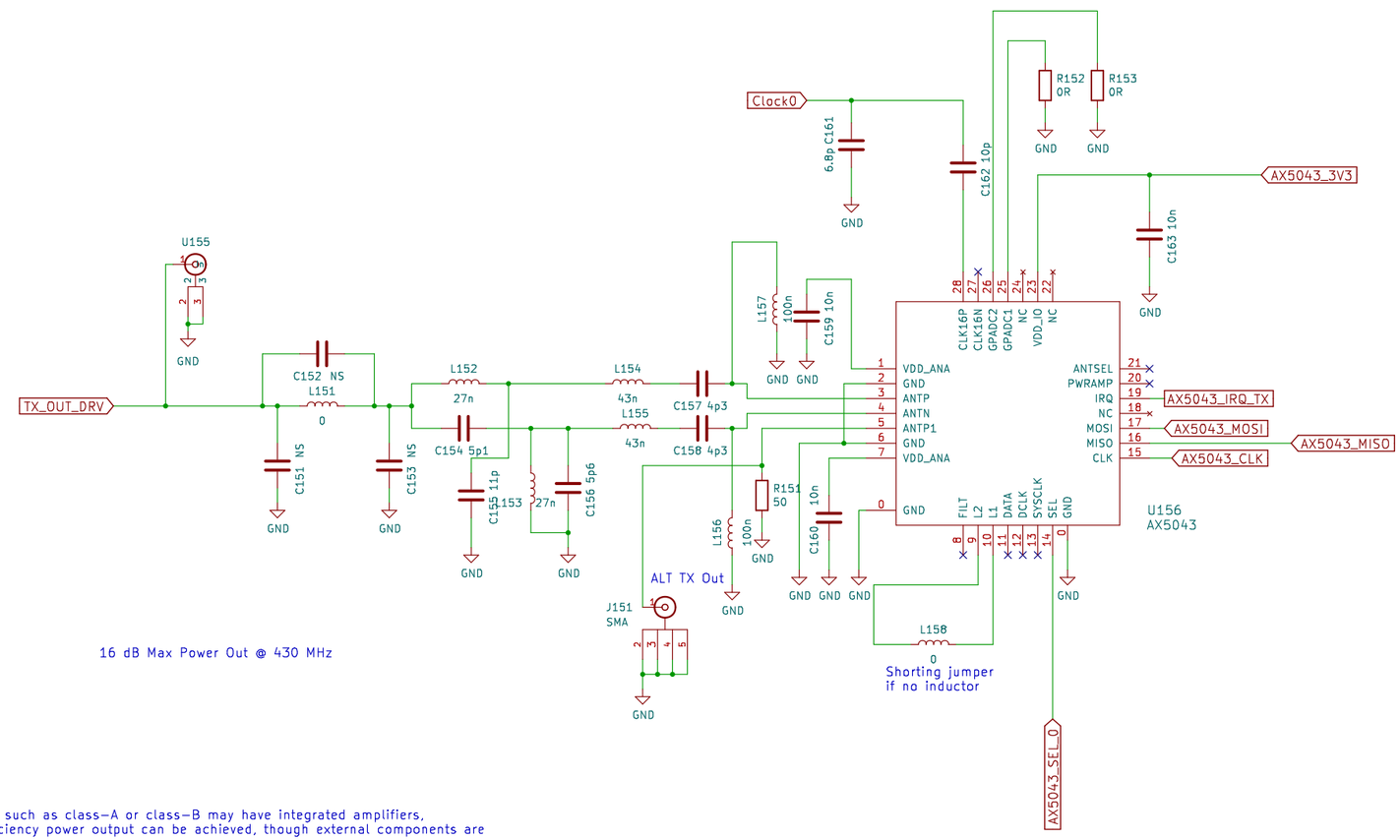
RECEIVER 1

N5BRG
AMSAT-NA

Sheet: /RX_1_ax5044/
File: RX_1_ax5043.kicad_sch

Title: Radiation Tolerant PacSat Communication

Size: USLedger	Date: 2023-06-17	**Rev: A**
KiCad E.D.A. kicad 7.0.6-7.0.6~ubuntu22.04.1		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 outputj; 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

TRANSMITTER

N5BRG

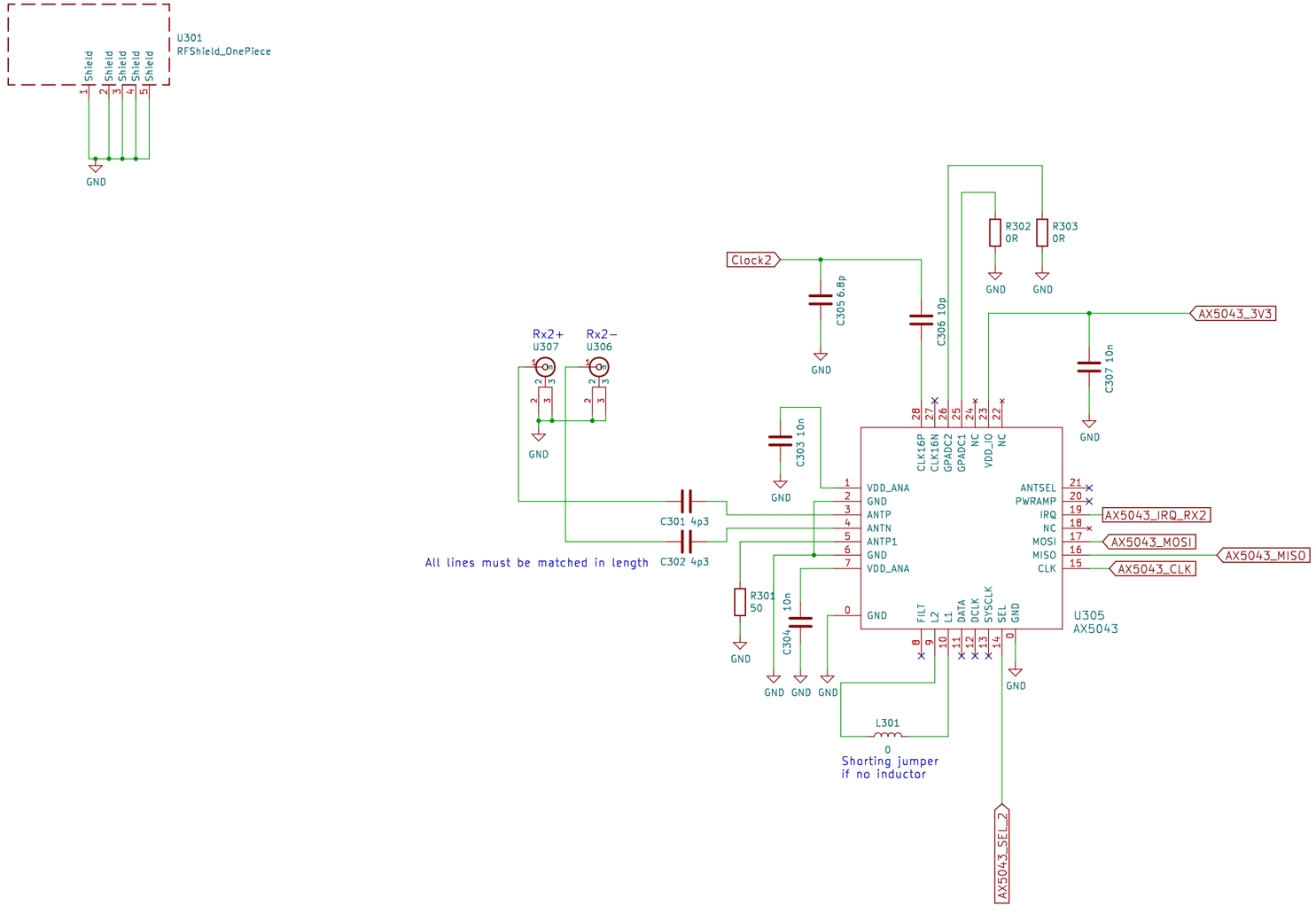
AMSAT−NA

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 7.0.6−7.0.6~ubuntu22.04.1		Id: 6/15



Inductors Ref Murata LQW18AN_00 series

Symbol Numbers 300 up

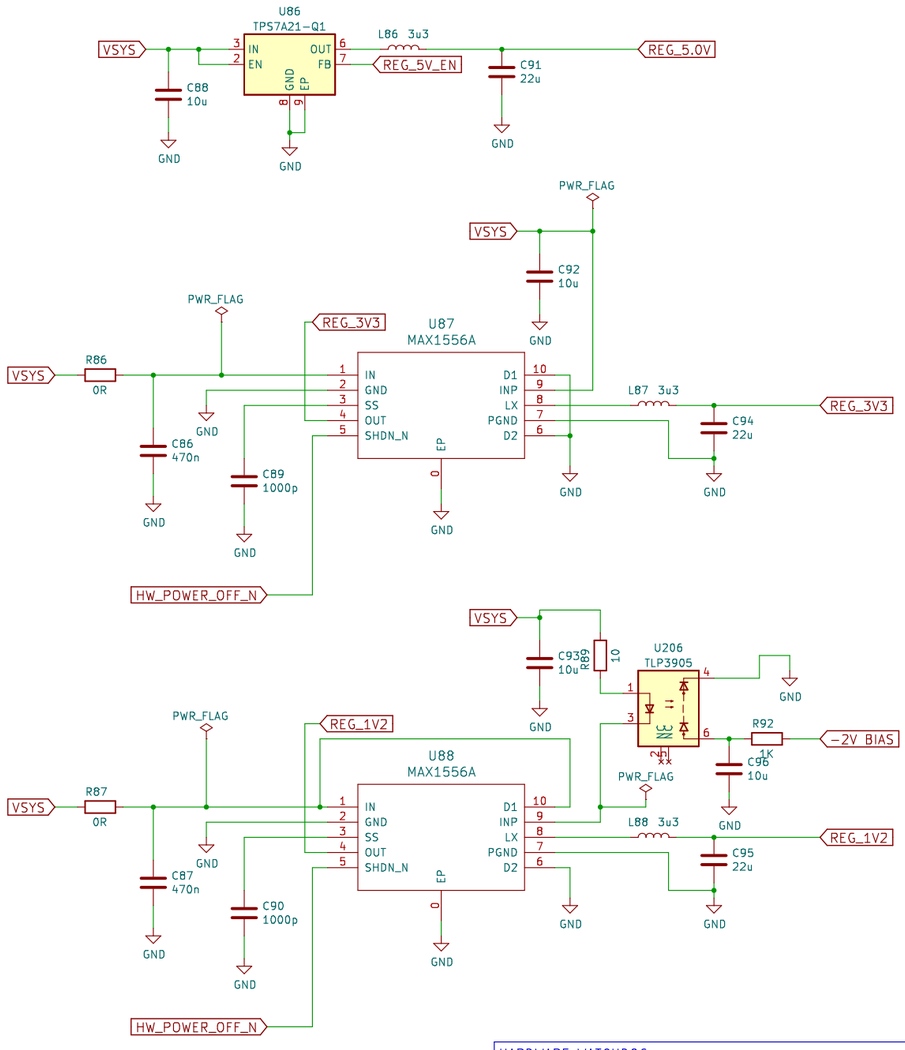
RECEIVER 2

N5BRG
AMSAT-NA

Sheet: /RX_2_ax5045/
File: RX_2_ax5043.kicad_sch

Title: Radiation Tolerant PacSat Communication

Size: USLedger	Date: 2023-06-17	**Rev: A**
KiCad E.D.A. kicad 7.0.6-7.0.6~ubuntu22.04.1		Id: 7/15



POWER

N5BRG

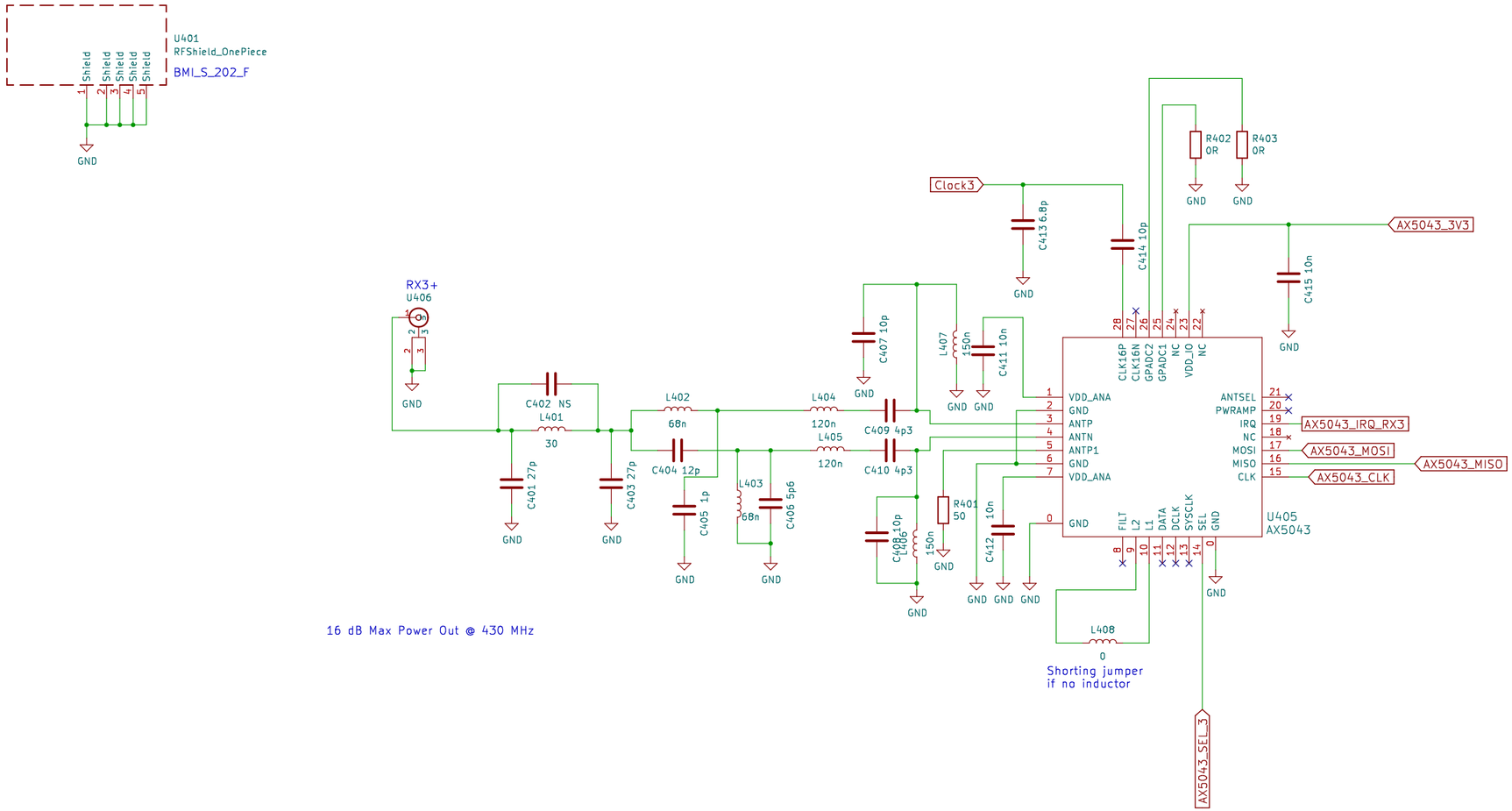
AMSAT-NA

Sheet: /Power/

File: power.kicad_sch

Title: Radiation Tolerant PacSat Communication

Size: USLedger	Date: 2023-06-17	**Rev: A**
KiCad E.D.A. kicad 7.0.6-7.0.6~ubuntu22.04.1		Id: 8/15



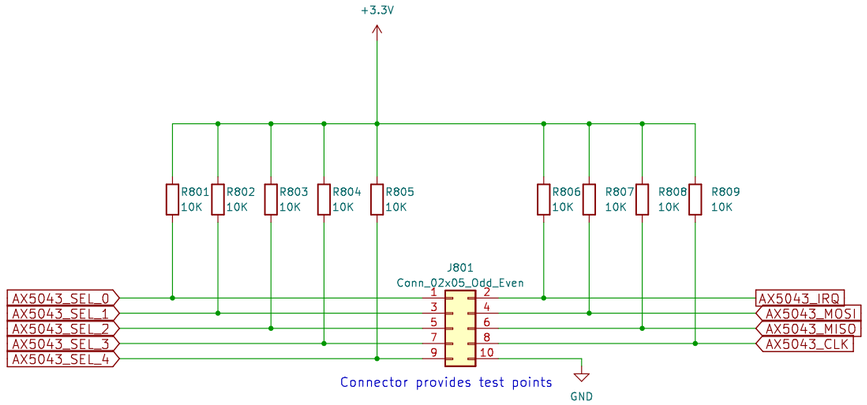
RECEIVER 3

N5BRG
AMSAT-NA

Sheet: /RX_3_ax5045/
File: RX_3_ax5043.kicad_sch

Title: Radiation Tolerant PacSat Communication

Size: USLedger	Date: 2023-06-17	**Rev: A**
KiCad E.D.A. kicad 7.0.6-7.0.6~ubuntu22.04.1		Id: 9/15



Symbol Numbers 800 up

COPNTOL LINES

N5BRG

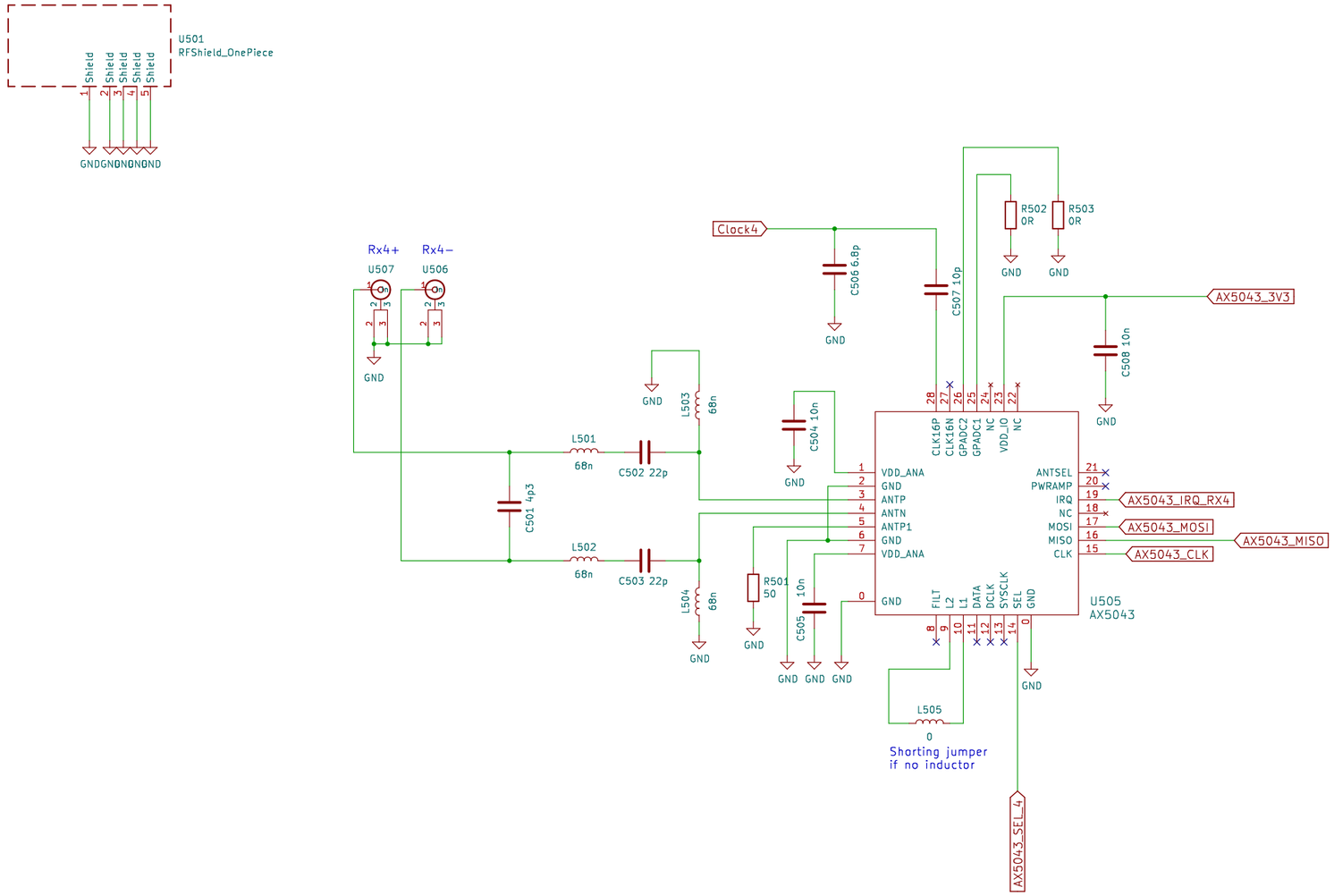
AMSAT-NA

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 7.0.6-7.0.6~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	**Rev: A**
KiCad E.D.A. kicad 7.0.6-7.0.6~ubuntu22.04.1		Id: 11/15

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

JTAG

J2
CONN_02X05

TMS570LS0914PGE

U2

HARDWARE REV
0 0 0 1

Must add USB interface

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

Start with 1

KELVIN GND
Address in
Layout

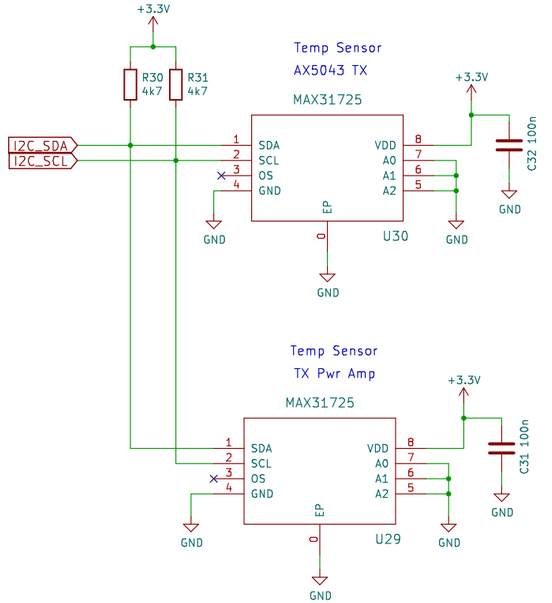
Consider Using this OSC out.

CPU
N5BRG
AMSAT-NA
Sheet: /TMS570_CPU/
File: tms570_cpu.kicad_sch

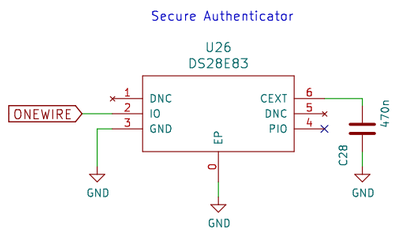
Title: Radiation Tolerant PacSat Communication

Size: USLedger | Date: 2023-06-17 | **Rev: 1.1**
KiCad E.D.A. kicad 7.0.6-7.0.6~ubuntu22.04.1 | Id: 12/15

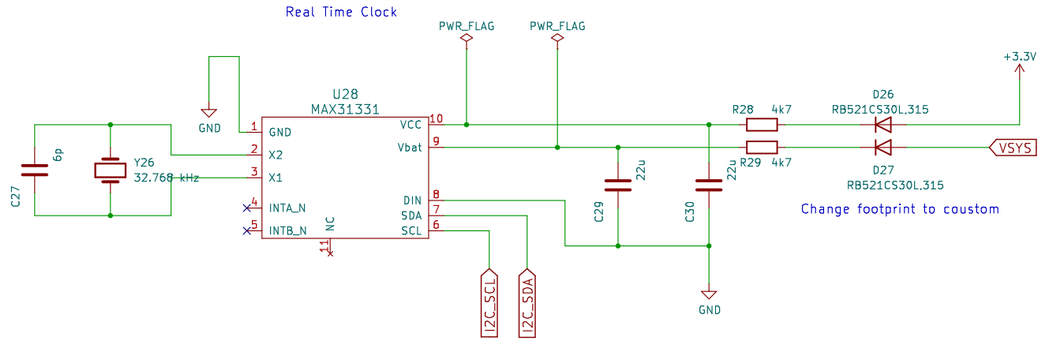
Idd 2.5 uA/600 uA



Secure Authenticator



Real Time Clock



Start with 25

BUS IO

N5BRG

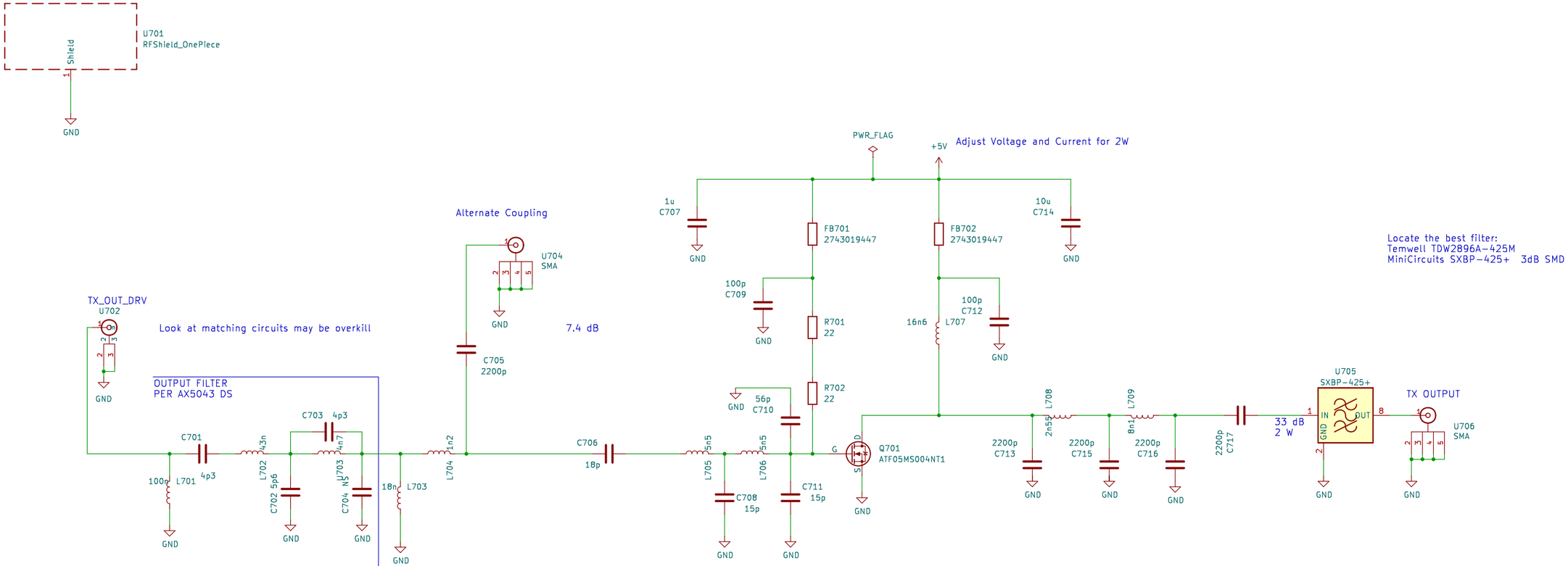
AMSAT-NA

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 7.0.6-7.0.6~ubuntu22.04.1		Id: 13/15



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

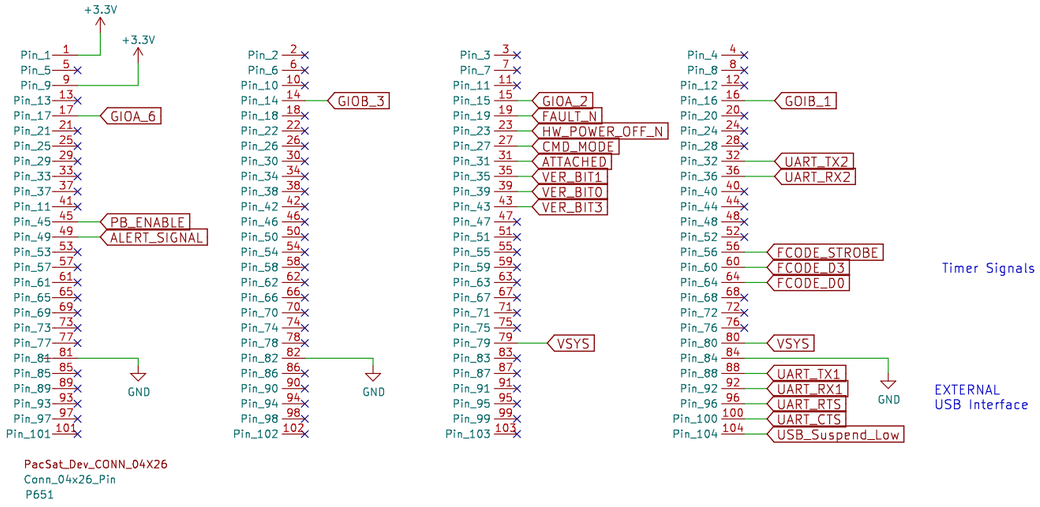
AMSAT-NA

Sheet: /RF_Power_AMP_FET/

File: Power_Amp.kicad_sch

Title: Radiation Tolerant PacSat Communication

Size: USLedger	Date: 2023-06-17	**Rev: A**
KiCad E.D.A. kicad 7.0.6-7.0.6-ubuntu22.04.1		Id: 14/15



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 cinnector accomidates stacking PCBs

Symbol Numbers 925 up

PACSAT BOARD IO

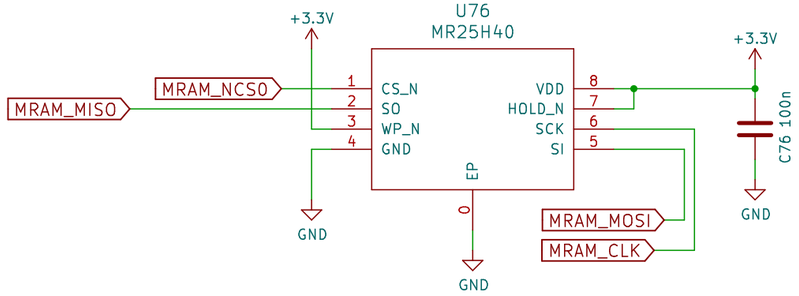
N5BRG
AMSAT-NA

Sheet: /PC104_IO/
File: PC104_io_conn.kicad_sch

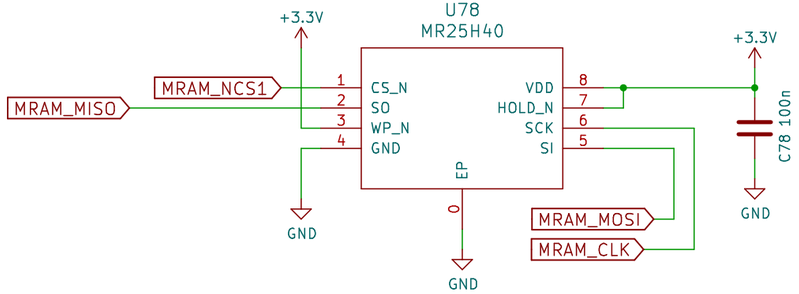
Title: Radiation Tolerant PacSat Communication

Size: USLedger	Date: 2023-06-17	**Rev: A**
KiCad E.D.A. kicad 7.0.6-7.0.6~ubuntu22.04.1		Id: 15/15

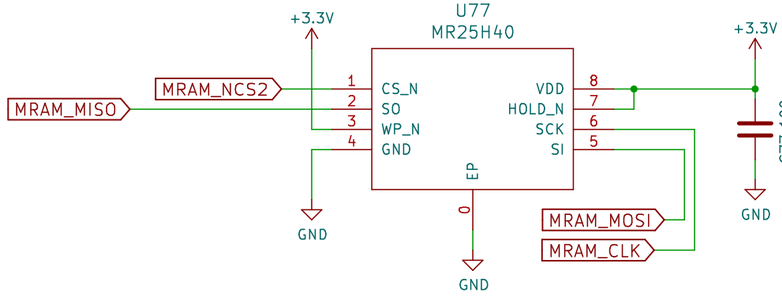
MRAM 4 Mb 512KX8



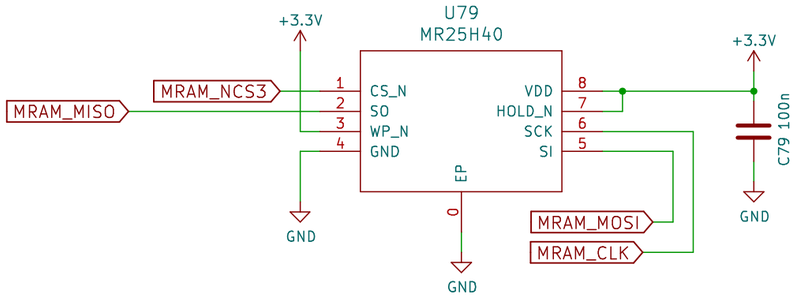
MRAM 4 Mb 512KX8



MRAM 4 Mb 512KX8



MRAM 4 Mb 512KX8



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 7.0.6-7.0.6~ubuntu22.04.1		Id: 17/15