

Rev	Description	Date	Author
0.1	- Initial release	01-Apr-2021	Andre M. P. Mattos

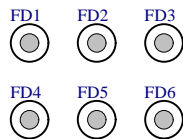
Revision History

PCB

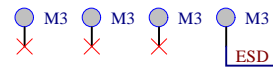
1_interface.schdoc



FIDUTIALS



MECHANICAL HOLES

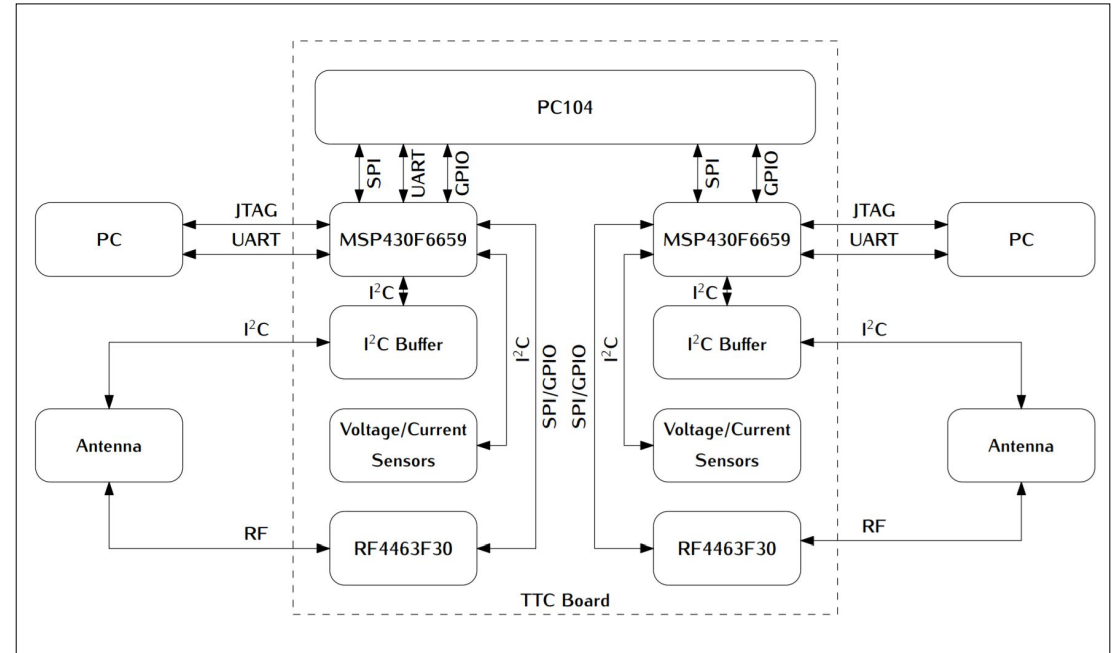


PCB Elements

TTC2 Hardware:

- Drawn by: André M. P. Mattos
- Reviewers: Yan C. Azeredo
- Based on FloripaSat-I TTC designed by: Sara V. Martinez
- Support: Gabriel M. Marcelino

Project Contributions



Block Diagram

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TTC2 Hardware
Based on the FloripaSat-I TTC

This work is licensed under under CERN Open Hardware License, version 2.
To view a copy of this license, visit
<https://github.com/spacelab-ufsc/ttc2/blob/master/hardware/LICENSE>

Github repository: <https://github.com/spacelab-ufsc/ttc2>

More info about SpaceLab: <https://spacelab.ufsc.br/>

Project Information

SpaceLab - Federal University of Santa Catarina

Project: *ttc2_project.prjpcb* / [No Variations]

Title: *Hardware Architecture*

Designed by: *André M. P. Mattos*

Date: 6/15/2021

Revision: *v0.1*

Sheet 0 of 6

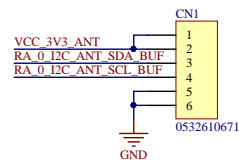


Project Code: *TTC2*

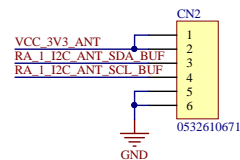
Size: *A4*

A

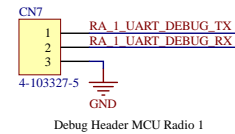
ANTENNA DEPLOYER INTERFACE (RADIO_0)



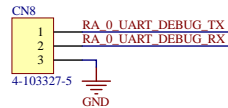
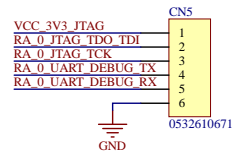
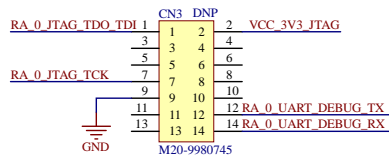
ANTENNA DEPLOYER INTERFACE (RADIO_1)



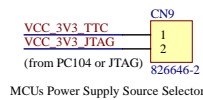
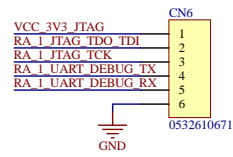
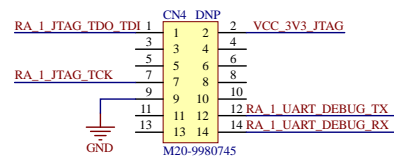
DEBUG HEADERS



Debug Header MCU Radio 1

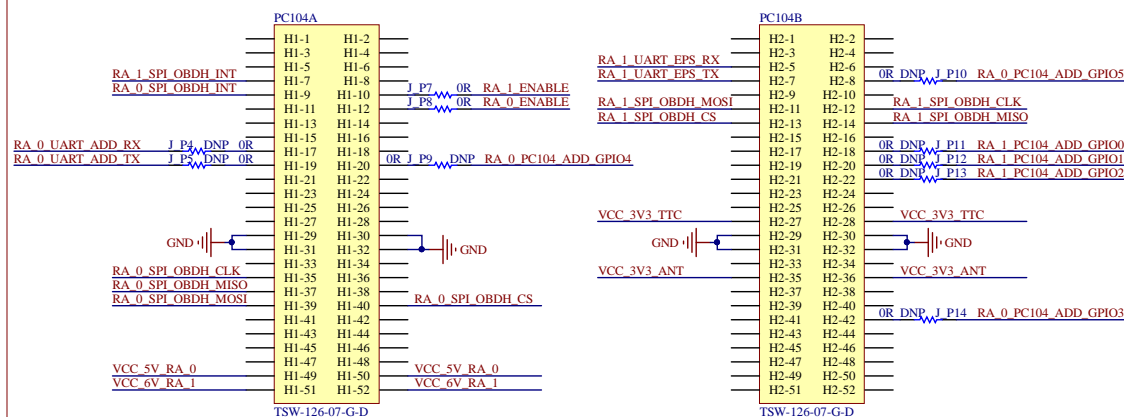
PROGRAMMING HEADERS MCU RADIO 0
(JTAG Spy Bi-Wire)

Debug Header MCU Radio 0

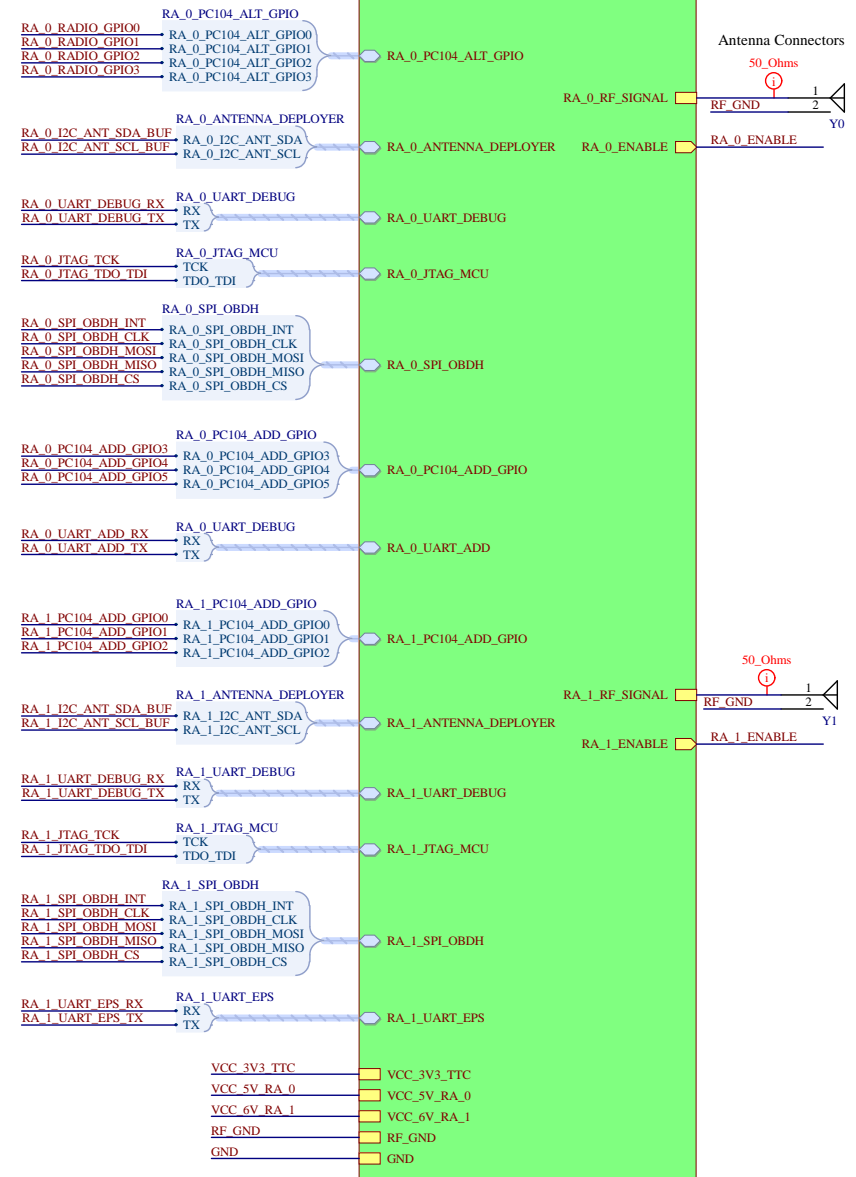
PROGRAMMING HEADERS MCU RADIO 1
(JTAG Spy Bi-Wire)

MCUs Power Supply Source Selector

PC104 INTERFACE



D

INTERFACE
2_topology.schdoc

GROUNDING



SpaceLab - Federal University of Santa Catarina

Project: *nc2_project.pjpcb* / [No Variations]Title: *Interface*Engineer: *André M. P. Mattos*

Date: 6/15/2021

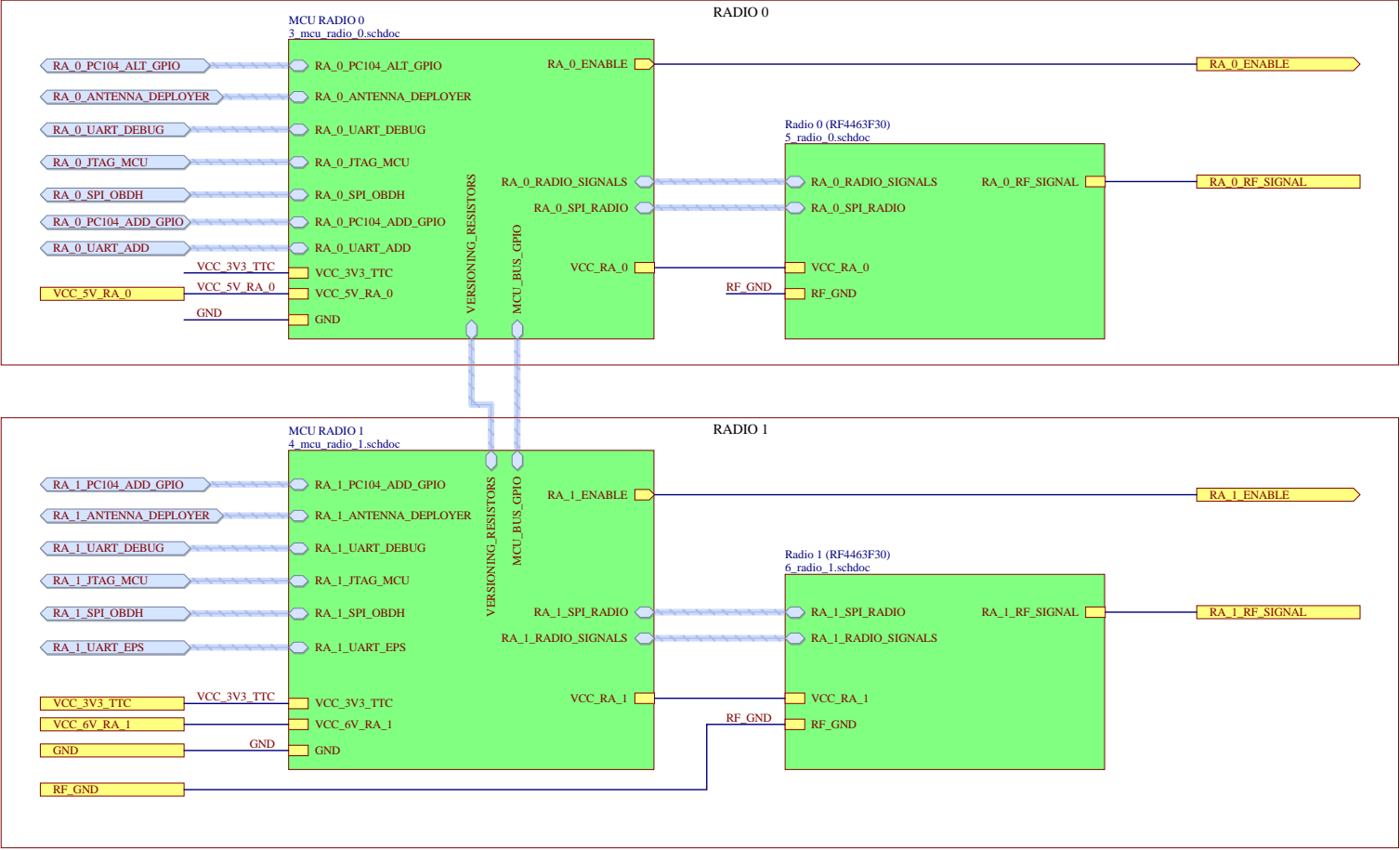
Revision: *v0.1*Sheet *1* of *6*Project Code: *TTC2*Size: *A3*

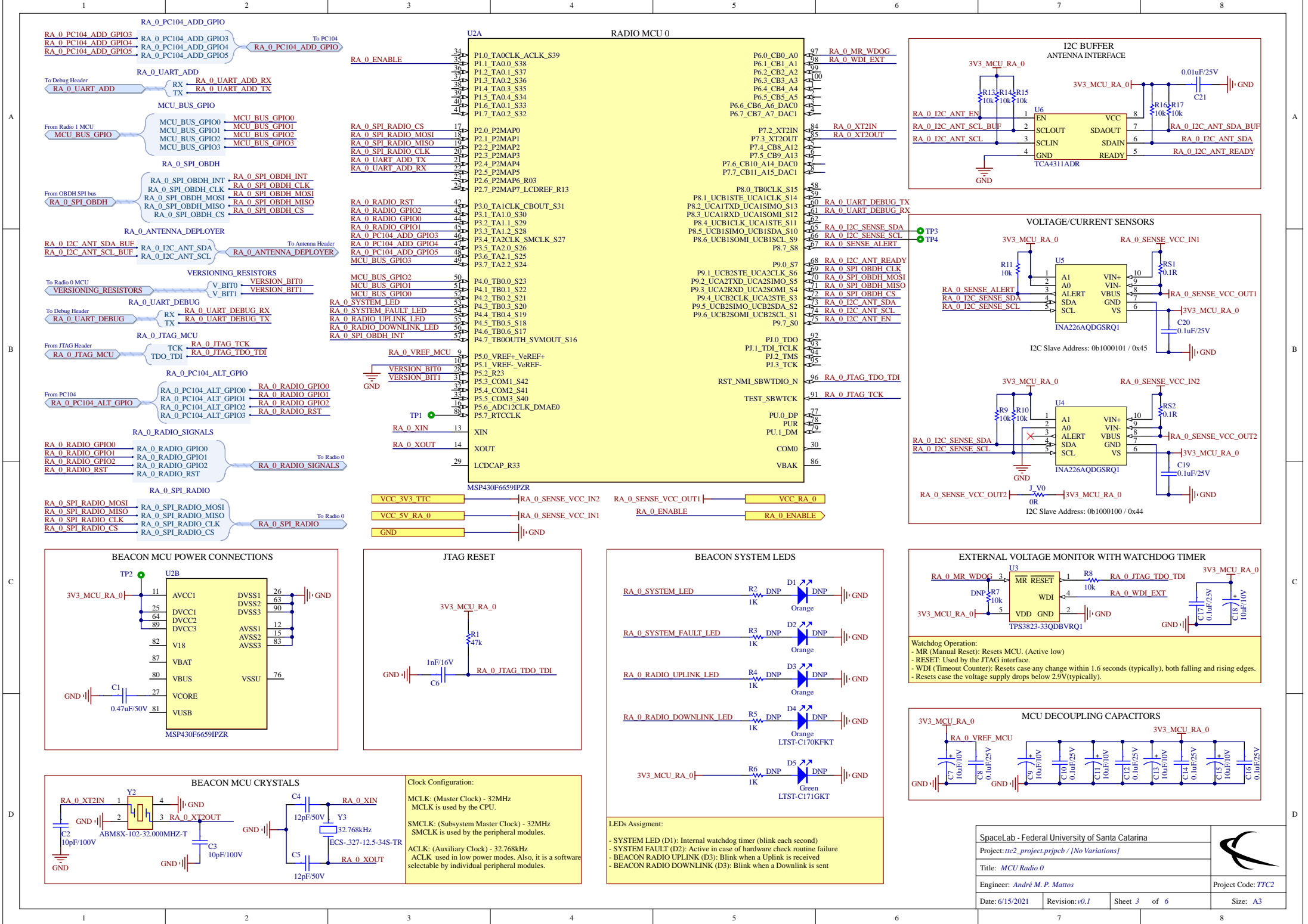
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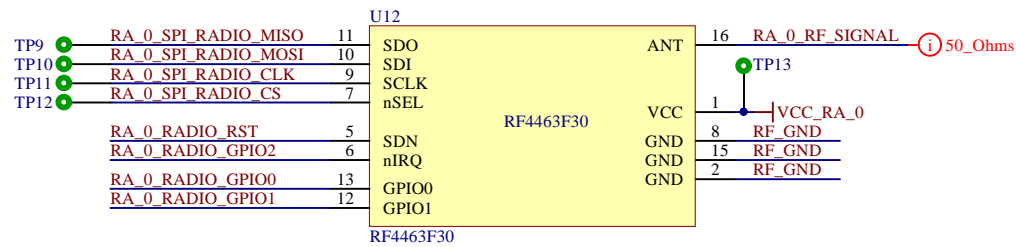
D





RADIO 0 (TRANSCIVER)

Notes:
nIRQ - Interrupt output
GPIO0/1 - Si4463 GPIOs
SDN - Power down control
(SDN=1, power down)



NiceRF RF4463F30 transceiver module:

- Based on the Si4463/61/60-C transceiver
- Antenna matching network and two-way switch control
- 3.3-6.5 V Power supply
- Receiving current: 15mA
- Transmitting current: 500mA (at VCC=5V and TX=30dBm)
- Typical output power: +30dBm (at 433MHz and VCC=5V)
- Sensitivity up to -126 dBm (at 433MHz and Data rate=600bps)
- Operating Temperature Range: -40 + 85 °C
- Frequency Range: 315/433/490/868/915 (Customizable 142-1050MHz)
- Modulation: (G)FSK,4(G)FSK,(G)MSK,OOK and ASK
- Data transfer rate: 0.1-1000Kbps
- TX/RX FIFO: 64/128Byte data register

FloripaSat-1 Configuration:

Customization:

- Center Frequency: 433Mhz

Operating parameters:

- Sensitivity up to -126dBm
- Data transfer rate: 2.4Kbps
- Input voltage: 5V
- Maximum output power: +30dBm
- Transmitting current: 500mA
- Receiving current (always on): 15mA
- Modulation: GFSK

FloripaSat-2 Configuration:

Customization:

- Center Frequency: 450Mhz

Operating parameters:

- Sensitivity up to -126dBm
- Data transfer rate: 4.8Kbps
- Input voltage: 5V
- Maximum output power: +30dBm
- Transmitting current: 500mA
- Receiving current (always on): 15mA
- Modulation: GMSK

RA_0_RADIO_SIGNALS

From MCU Radio 0

RA_0_RADIO_SIGNALS

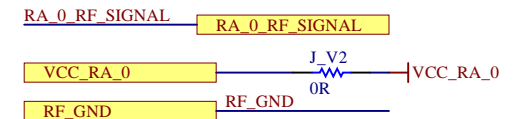
RA_0_RADIO_GPIO0	RA_0_RADIO_GPIO0
RA_0_RADIO_GPIO1	RA_0_RADIO_GPIO1
RA_0_RADIO_GPIO2	RA_0_RADIO_GPIO2
RA_0_RADIO_RST	RA_0_RADIO_RST

RA_0_SPI_RADIO

From MCU Radio 0

RA_0_SPI_RADIO

RA_0_SPI_RADIO_MOSI	RA_0_SPI_RADIO_MOSI
RA_0_SPI_RADIO_MISO	RA_0_SPI_RADIO_MISO
RA_0_SPI_RADIO_CLK	RA_0_SPI_RADIO_CLK
RA_0_SPI_RADIO_CS	RA_0_SPI_RADIO_CS



SpaceLab - Federal University of Santa Catarina

Project: *ttc2_project.prjpcb* / [No Variations]Title: *Radio 0*Designed by: *André M. P. Mattos*

Date: 6/15/2021

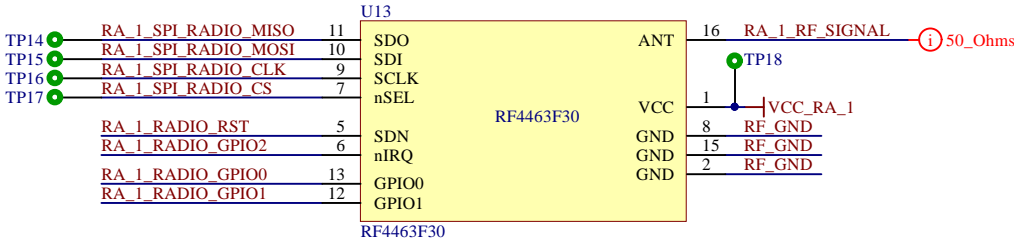
Revision: *v0.1*

Sheet 5 of 6

Project Code: *TTC2*Size: *A4*

RADIO 1 (TRANSCIVER)

Notes:
nIRQ - Interrupt output
GPIO0/1 - Si4463 GPIOs
SDN - Power down control
(SDN=1, power down)



NiceRF RF4463F30 transceiver module:

- Based on the Si4463/61/60-C transceiver
- Antenna matching network and two-way switch control
- 3.3-6.5 V Power supply
- Receiving current: 15mA
- Transmitting current: 500mA (at VCC=5V and TX=30dBm)
- Typical output power: +30dBm (at 433MHz and VCC=5V)
- Sensitivity up to -126 dBm (at 433MHz and Data rate=600bps)
- Operating Temperature Range: -40 + 85 °C
- Frequency Range: 315/433/490/868/915 (Customizable 142-1050MHz)
- Modulation: (G)FSK,4(G)FSK,(G)MSK,OOK and ASK
- Data transfer rate: 0.1-1000Kbps
- TX/RX FIFO: 64/128Byte data register

FloripaSat-1 Configuration:
Customization:
- Center Frequency: 160Mhz

Operating parameters:

- Sensitivity up to -126dBm
- Data transfer rate: 1.2Kbps
- Input voltage: 5V
- Output power: +28.6dBm
- Transmitting current: 500mA
- Receiving current (always on): 15mA
- Modulation: GFSK

FloripaSat-2 Configuration:
Customization:
- Center Frequency: 160Mhz

Operating parameters:

- Sensitivity up to -126dBm
- Data transfer rate: 1.2Kbps
- Input voltage: 6V
- Maximum output power: +30dBm
- Transmitting current: 550mA
- Receiving current (always on): 15mA
- Modulation: GMSK

