OCRA - Open Source Console for Realtime Acquisitions

OCRA Tabletop MRI System and its RF components

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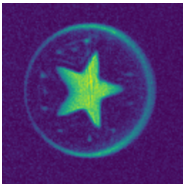
Table of contents

OCRA Tabletop MRI System

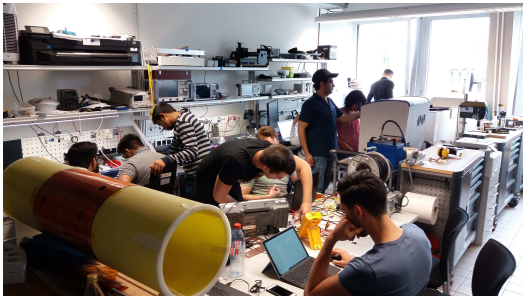
Magnet, console and gradient amplifier

Human MRI vs. Tabletop MRI

www.siemens-healthineers.com



Teaching on real MR Hard- and Software



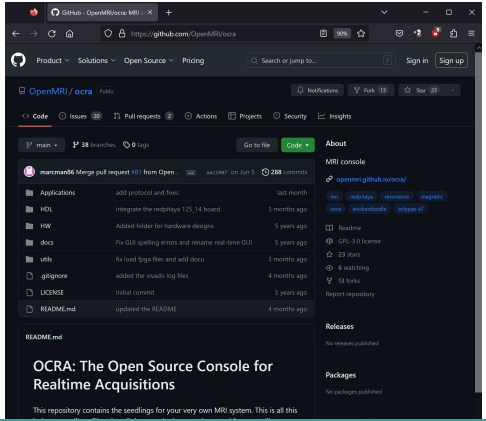
MR System Engineering 2019

Teaching on real MR Hard- and Software

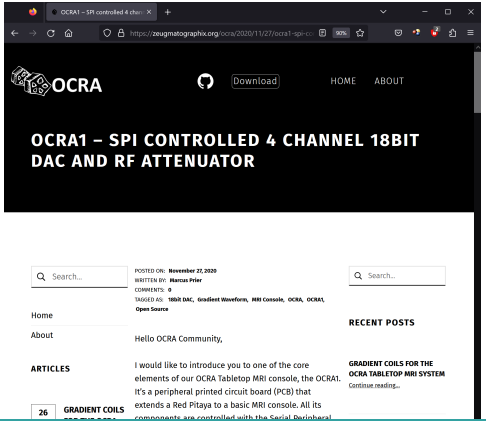
MRSE (Siemens Healthineers) 2023

Open-Source Hard- and Software

github.com/OpenMRI/ocra

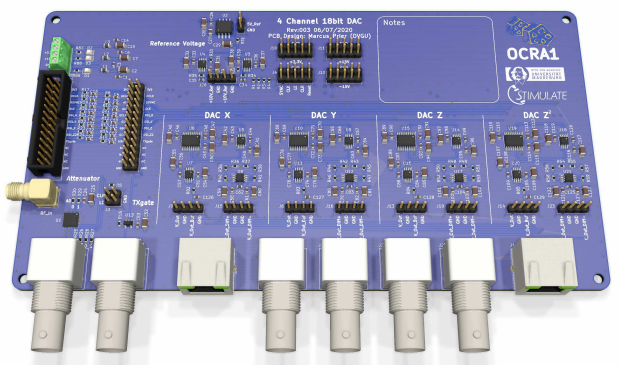


zeugmatographix.org/ocra/



OCRA Console Main Components

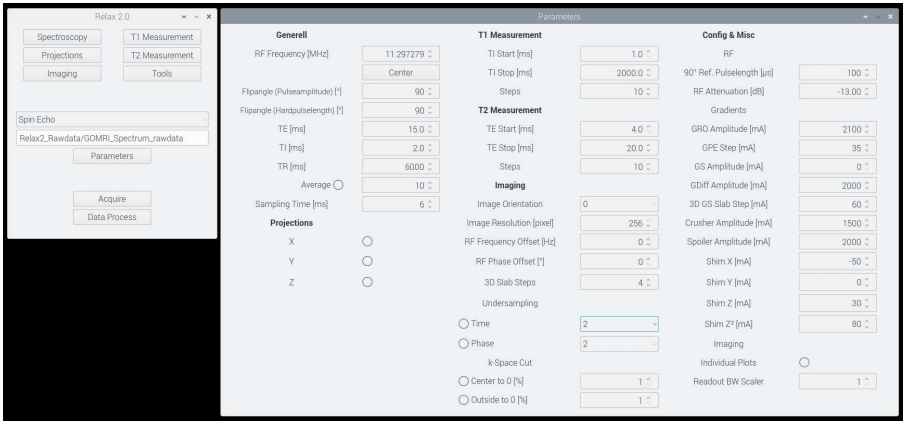
Red Pitaya



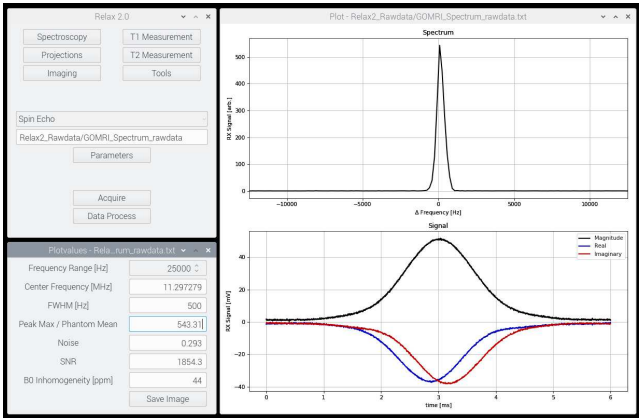
OCRA1

OCRA Console

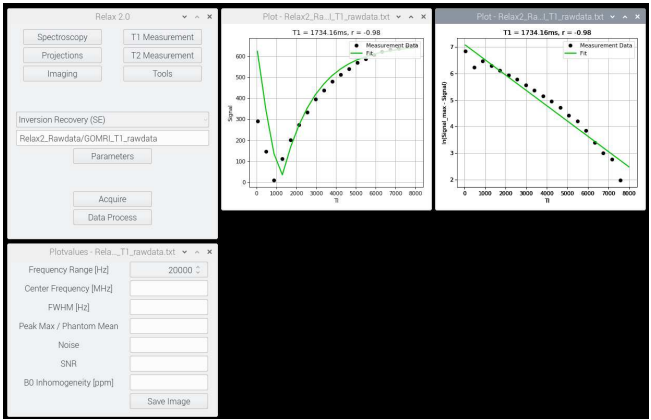
GUI - Main Window and Global Parameters



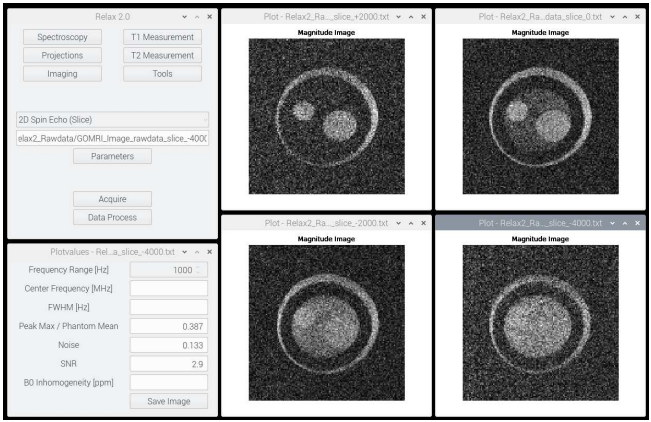
GUI - MR Spectrum (Spin Echo)

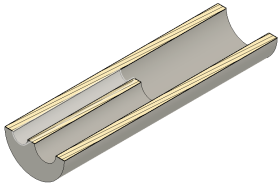


GUI - MR Material Parameters (T1)

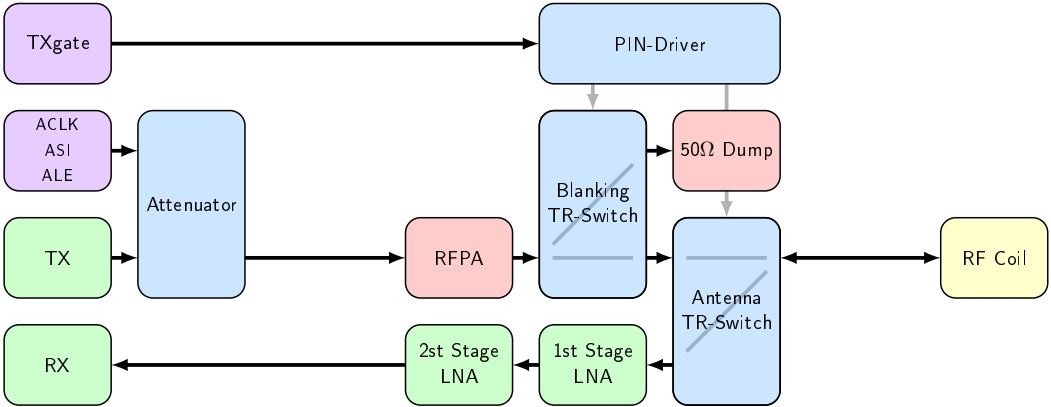


GUI - MR Imaging (Spin Echo Slice Select)

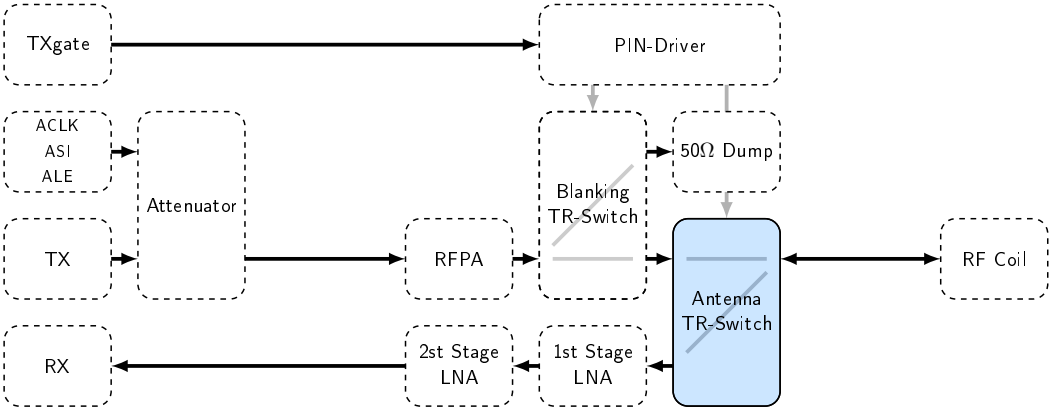




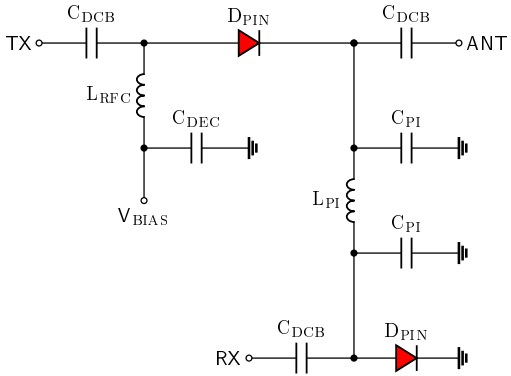
OCRA Tabletop RF System Overview



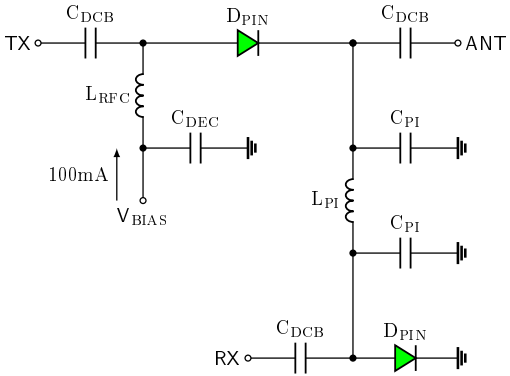
TR-Switch


TXgate
PIN-Driver
ACLK
ASI
ALE
Attenuator
50Ω Dump
Blanking
TR-Switch
TX
RFPA
RF Coil
Antenna
TR-Switch
RX
2st Stage
LNA
1st Stage
LNA

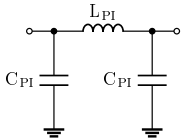
TR-Switch - Principle Schematic



TR-Switch - Principle Schematic



Tabletop TR-Switch - Pi-Element



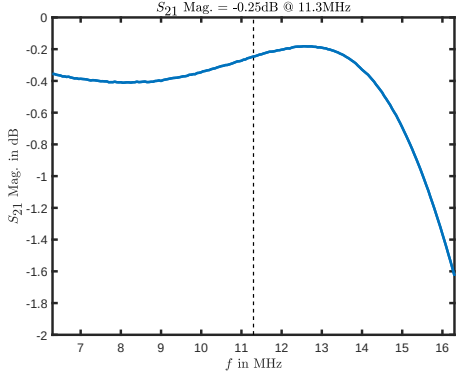
$$C_{PI} = \frac{1}{2\pi f_L Z_0} \qquad L_{PI} = \frac{Z_0}{2\pi f_L}$$

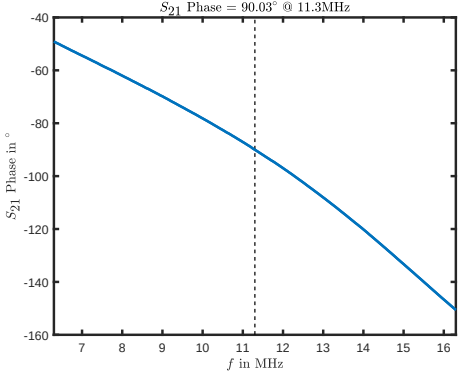
$$Z_0 = 50\Omega \quad f_L = 11.3\text{MHz}$$

$$\Longrightarrow \quad C_{PI} = 282\text{pF} \quad L_{PI} = 704\text{nH}$$

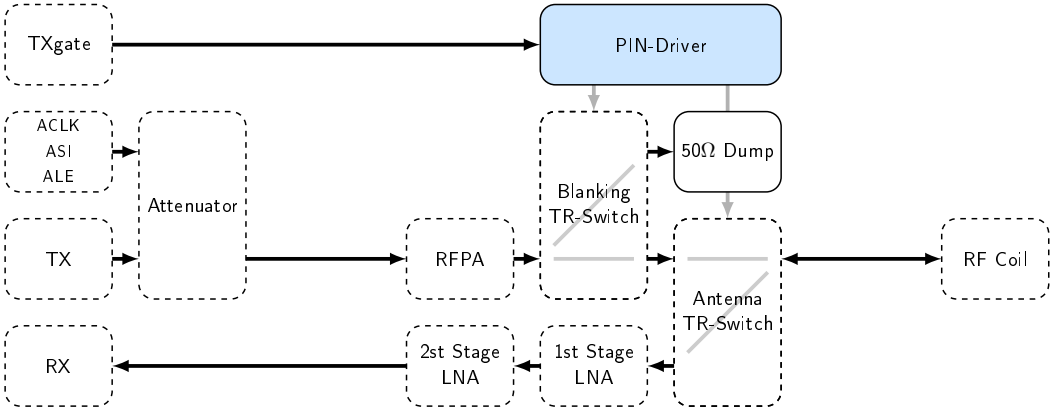
(Equivalent to 4.38m of RG-58 coaxial cable)

Tabletop TR-Switch - Pi-Element





PIN-Driver


TXgate
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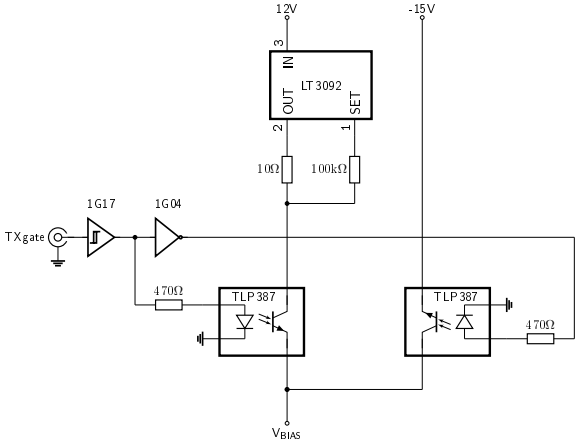
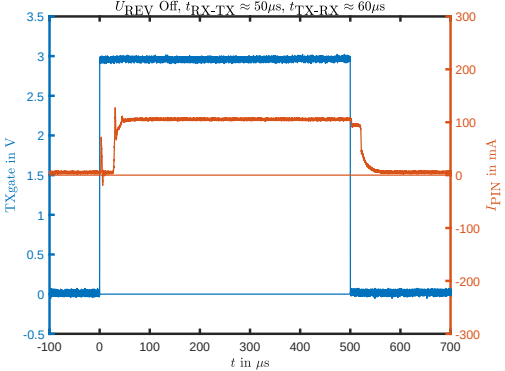
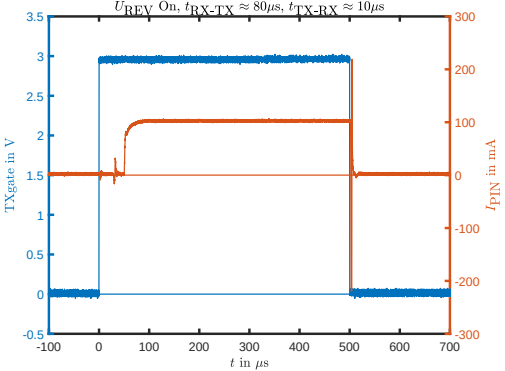
2st Stage
LNA
1st Stage
LNA

PIN-Driver - Schematic

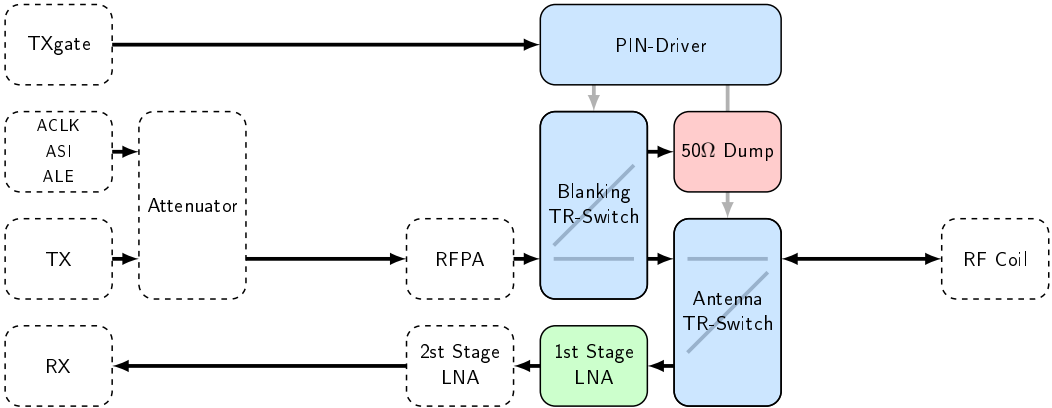


Tabletop TR-Switch - PIN-Driver

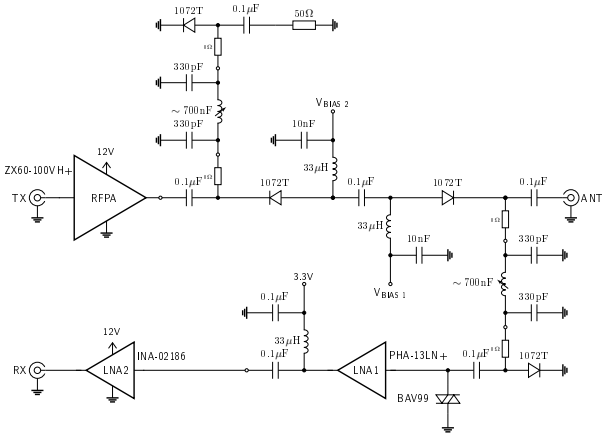




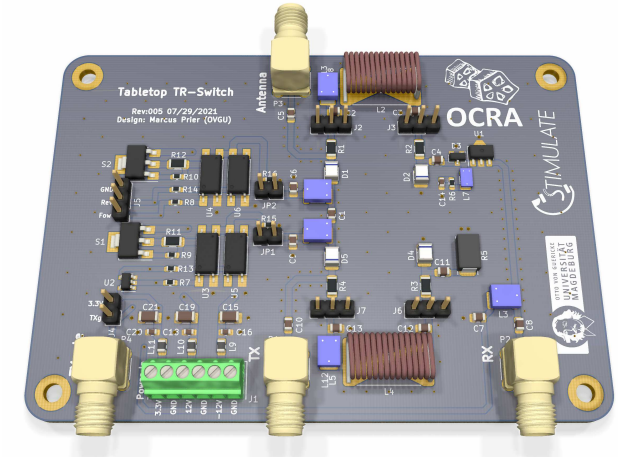
Tabletop TR-Switch



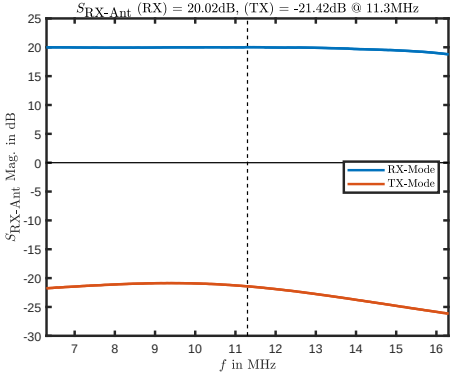
Tabletop TR-Switch* - Schematic

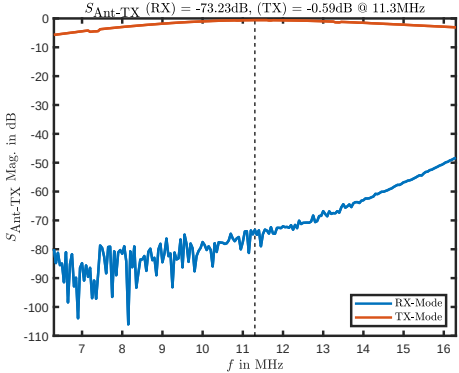


Tabletop TR-Switch - PCB

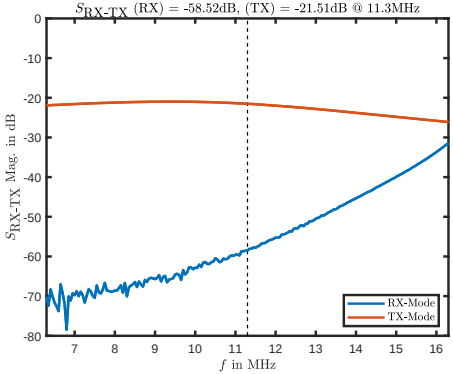


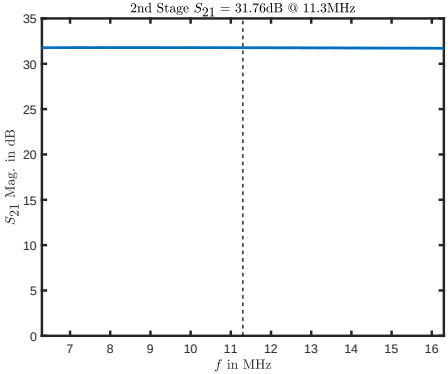
Tabletop TR-Switch - S-Parameter





Tabletop TR-Switch - S-Parameter





Summary

- ORCA Tabletop MRI System offers an open-source hard- and software platform
- Working RF components in the Tabletop System
- Easy to adapt for Halbach MRI System
- Additional components can be build (RF-Attenuator and SAR-Monitor)

Thank you for your attention!

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