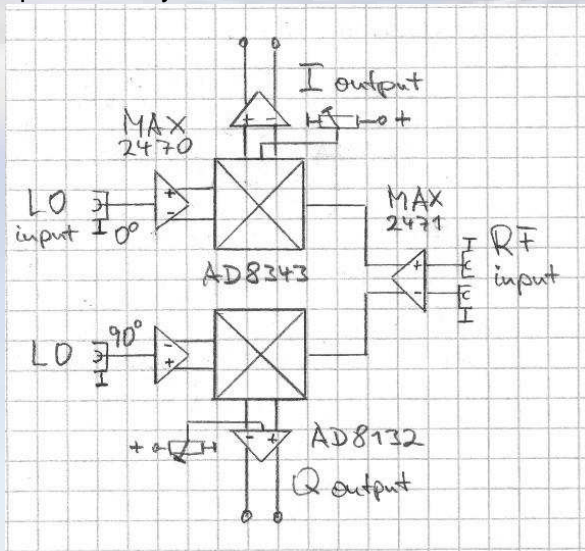


Projektarbeit

Investigation of an I/Q-Demodulator for 7-Tesla MRI Amplifier

Description:

In a research project the department develops a power amplifier for a 7-Tesla Magnetic Resonance Imaging (MRI) system. The power amplifier employs a feedback loop with translation of the RF signal at 300 MHz to baseband (zero frequency) with in-phase and quadrature-phase components (Cartesian feedback). The frequency translation will be provided by an I/Q-demodulator circuit consisting of two frequency mixers clocked by a 0°



and a 90° local oscillator (LO) signal and driven by the RF signal from a differential amplifier. The intermediate frequency output signals at baseband (in-phase and quadrature-phase) will be amplified by a broadband operational amplifier for further processing as feedback signals. The mixer and amplifier components will be commercially available ICs, like the AD8343 mixer circuit, the MAX2470(1) differential RF amplifier and the AD8132 operational amplifier. The circuit provides various features which have to be tested and investigated with respect to the variations with voltages and frequencies.

The thesis task is to design a printed circuit for the I/Q-demodulator using the ICs and other

surface-mount technology (SMD) components and using microstrip line on a dielectric laminate as the printed circuit technology and using SMA coaxial connectors for signal input and output.

In particular the task is to

- design the complete demodulator circuit schematic based on the circuits proposed in the data sheets,
- lay-out the printed circuit and prepare the data files for production of printed circuit boards,
- assemble the circuit,
- test the circuit using laboratory test equipment: Input match, RF-to-baseband gain, quadrature accuracy, linearity, baseband bandwidth, variation with LO power, common mode voltage variation (at I/Q output).

At the end of the work, a public presentation of results is to be given