

**Aufgabe der Abschlussarbeit im
ISE Bachelorstudiengang**

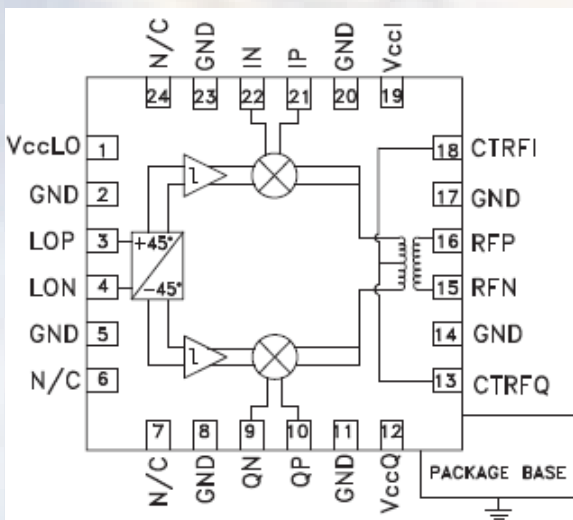
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Thema: 300 MHz IQ-Demodulator for 7-Tesla MRI Smart Amplifier

Beschreibung:

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 a commercial I/Q-demodulator IC from Hittite Microwave Corporation (model HMC597LP4E). A modification in the bias network has to be implemented to allow In-Phase (I) and Quadrature-Phase (Q) output down to dc. The I/Q-output signals have to be amplified by high speed differential amplifiers with dc level shift (AD8132). The complete circuit provides various features which have to be tested and investigated with respect to the critical requirements of an amplifier control loop.

**Thesis Task:**

The thesis task is to design a printed circuit for the I/Q-demodulator circuit 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 a complete circuit schematic of the demodulator with I/Q differential amplifiers, based on the circuits proposed in the data sheets of the IC manufacturers,
- 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-port common mode rejection, RF-to-baseband gain, quadrature accuracy, linearity, baseband bandwidth, variation with LO power, shift of output common mode dc levels.

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