

**Aufgabe der Abschlussarbeit im  
ISE Bachelorstudiengang**

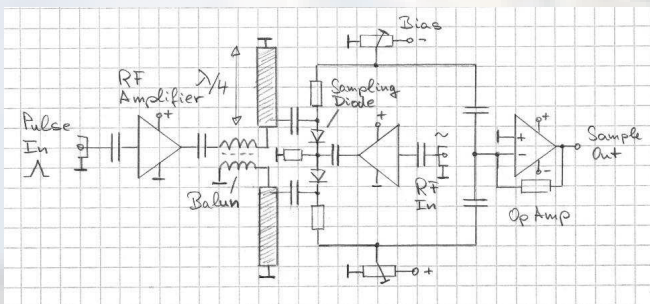
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**Thema:** **Sampler Circuit for Microwave In-Room Communications**

**Beschreibung:**

In a new project, the communication using a large number of harmonically related microwave signals inside an office room is investigated. At the receive side, the microwave signals are sampled (or harmonically mixed) down to base band. The sampler circuit employs diodes which act as switches to connect the amplified antenna signal to the baseband amplifier during short pulses from a sampling pulse generator. For a proof-of-concept, the project requires one sampler circuit suitable for the low microwave frequency range up to a few GHz which can be realized based on the concept of a bridge circuit as used in microwave test equipment (described in the paper: "Sampling for Oscilloscopes and Other RF Systems: Dc through X-band").

Thesis Task:

The thesis task is to design, build and test a sampler circuit for the frequency range of 1 to 4 GHz. The sampler is to use a pair of Schottky diodes in a bridge configuration employing a balanced injection of the sampling pulse and an unbalanced RF signal injection, realized as a printed circuit board (PCB). The sampler is to include a biasing

circuit for balancing the switching characteristic of the diodes, amplifiers for the pulse and the RF signal (commercially available "drop-in" component), a balun for the creation of a balanced pulse signal and a base band signal extraction and amplification (Op Amp) circuit. All components are to be integrated into the circuit as surface mount devices (SMD).

The task entails the following steps:

1. Selection of components and design of the detailed sampler circuit.
2. Layout of the printed circuit using the "EAGLE" CAD program.
3. Assembly of the circuit (on manufactured PCB) and functional test.
4. Quantitative investigation of the circuit transfer function, i.e., sampling (conversion) loss and phase shift vs. frequency.

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