Aufgabe der Abschlussarbeit im
ISE Bachelorstudiengang

für:               Frau Su Kian Thian

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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.