



University of Stuttgart

Institute of Robust Power
Semiconductor Systems

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Bachelor,
Research or
Master thesis

RF

Design of a broadband SIW to RWG transition

Motivation:

The integration of high-frequency circuits requires efficient transitions between different waveguide systems. While rectangular waveguides offer excellent performance, they are bulky and expensive, making them primarily suitable for measurement equipment. On the other hand, planar structures enable high integration density and cost efficiency. Substrate-integrated waveguides (SIW) present a promising solution by combining the advantages of planar transmission lines with the high efficiency of rectangular waveguides. Therefore, SIW structures provide an attractive option for hetero-integration of various system components. The transition from rectangular waveguides to SIW is crucial for low-loss and broadband signal transmission, especially in frequency ranges extending into the sub-THz domain.

Goal:

The goal of this thesis is to develop and optimize a broadband transition from a rectangular waveguide to a substrate-integrated waveguide.

Tasks:

- Literature review of existing approaches
- Design and 3D FEM simulation of the transition with geometry optimization
- Fabrication and characterization of a prototype (optional)

Knowledge:

- of RF engineering and electromagnetic field propagation.
- Initial experience with 3D FEM simulation tools (e.g. CST, Rfpro) are advantageous.

The thesis can be conducted as a bachelor's, research, or master's thesis. The exact scope of the work will be adjusted accordingly at the beginning of the project in collaboration with the student.

