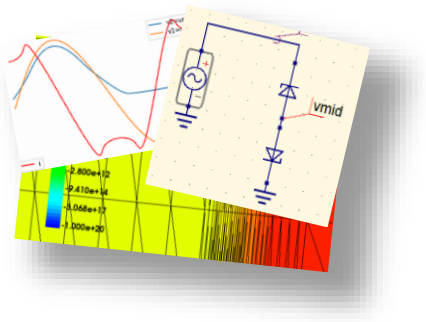
Graz University of Technology
Institute of Electronics

Master's thesis

Simulate and model harmonic generation of TVS diodes



Motivation

To increase data rate, cell phones transmit and receive at multiple frequencies at the same time. This can lead to disturbances: for example, 800 MHz couples into 2400 MHz due to harmonic distortion. In general, we call this challenge "co-existence".

Signal co-existence has become an ever-growing concern in the mobile device industry, more frequencies, more simultaneous usage of transmitters and receivers, more antennas etc. drive this. Failure to properly handle signal co-existence will result in weak receiver performance and poor signal quality. Harmonic generation is one of the major concerns in signal co-existence. ESD protection, such as TVS (Transient Voltage Suppressor) diodes in the RF signal path generate harmonics. The objective of this research is to understand, simulate and model the harmonic generation on TVS diodes.

Research topic

A SPICE like or mathematical model shall be developed to describe the harmonic levels generated by TVS diodes. As reference, the diode can be modeled and simulated in TCAD and/or measured data can be used. Ideally, a deeper understanding of the underlying processes which cause the harmonics and how to influence them by design is desired. Here, we like to better understand the effect of asymmetry, amplitude of the RF signal, and short-term effects during turn on.

Experience with circuit simulation, FEM simulation and scripting languages (Scheme, TCL, Python, Linux Command Line) are an advantage.

This is a **novel approach** to a known problem and **will certainly give you the chance to be author on a scientific publication for example in the EMC Europe conference and/or the IEEE Transactions on EMC**.

Organizational matters

- Start: as soon as possible
- Workplace: at the institute

Contact/Supervision

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