

Bachelors/Master thesis

Modelling gallium nitride devices for EMC simulations

Motivation

Today, modern switched power electronic systems can be found in a variety of applications such as AC adapters, solar inverters and battery chargers which include advanced power semiconductor switches. The development of gallium nitride (GaN) devices has been driven by the increasing demand for power electronic devices with new specifications such as high frequencies, voltages, temperatures, and high current densities. GaN is the technology of choice for fast switching frequencies, offering the highest efficiency and power density at an optimized total cost for power applications. However, fast switching comes at the price of higher electromagnetic emissions: a factor of 10 faster rise time results in about 20 dB higher emissions at high frequencies. The number of redesigns should be kept to a minimum as they are time-consuming and costly. Therefore, circuit simulations are used, supplemented by parasitic elements to account for the electromagnetic properties of the electromechanical setup of the test system. In simulations, it is becoming increasingly important to better represent the high-frequency behavior of the GaN switches. For accurate SPICE simulations in power electronics, accurate models of power transistors are therefore essential.

Key Facts:

- Developing a universal model for GaN devices for EMC simulation.
- Some research has been done on this topic and there is already some hardware developed for the possible measurements that will help to resume the project easily.
- Collaborate closely with the world-leading companies through regular online meetings.

Your Profile

- Eager to Learn
- Prior knowledge and experience in electronics is needed

Organizational matters

- Start: as soon as possible
- Workplace: Institute of Electronics

Contact/Supervision

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