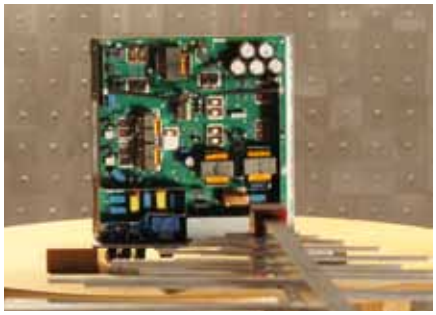
FRIEDRICH-ALEXANDER-UNIVERSITÄT ERLANGEN-NÜRNBERG

Research at LEMF

The chair of Electromagnetic Fields is lead by Prof. Dr.-Ing. Manfred Albach. In addition to fundamental problems of technical electrodynamics, the core research areas include electromagnetic compatibility, power electronics and the design of magnetic components.



Shielded chamber for EMC testing

Power Electronics

This research area focuses on conversion circuits for small and medium power levels. Such converters can be found in consumer electronics, communication and information technology, lighting, telecommunications, automotive and medical technologies.

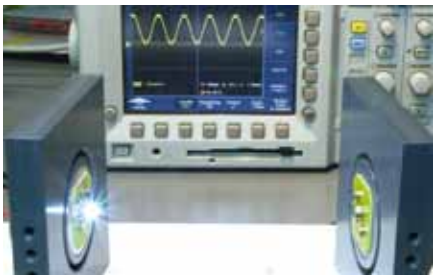
- Resonant as well as soft-switching pulse width modulated topologies for the optimization (efficiency, volume and weight) of power supplies
- Electronic ballasts for lighting applications
- Optimization of power supply systems under industrial constraints
- Digital control techniques of switched mode power supplies for the improvement of their stationary and transient behaviour, e. g. for medical applications
- Examination of critical components, such as switching behaviour of MOSFETs and diodes, large signal properties of magnetics, driver circuits
- Software aided design of switched mode power supplies with respect to specification requirements – multi-level simulation

Electromagnetic Compatibility

… is the ability of an electrical device or system to operate satisfactorily in its electromagnetic environment without causing interferences for surrounding equipment and without being influenced by external interferences.

- EMC of electronic modules and components
- Mains current distortion (power factor correction circuits)
- Conducted and radiated interferences
- Susceptibility of electronic modules and components

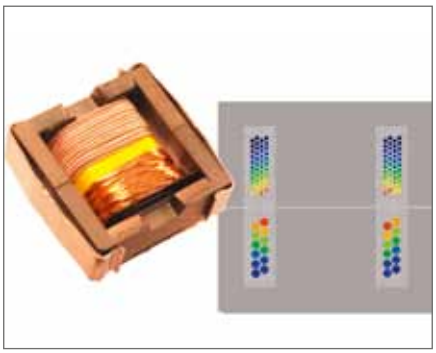
In addition to theoretical examinations, also EMC measurements are performed within the laboratories of the chair.



Characterisation set-up for LED drivers

Design of Inductive Components

Main emphasis is placed on analytical methods for the calculation of loss mechanisms within the core and the winding as well as on the derivation of equivalent circuit models for high frequency and large signal operation.



Simulated loss distribution in magnetic components

Maxwell's Theory

The whole spectrum of electromagnetic field theory is covered, beginning from stationary field problems up to high frequencies:

- Fundamental problems of technical electrodynamics
- Calculation of electromagnetic fields

Industrial Cooperation, Research and Technology Transfer

- Optimization of switched mode power supplies
- EMC analyses and measurements
- Dimensioning of magnetics for power electronics
- Calculation of electromagnetic fields