

Ph.D Thesis no.1: Investigations on Bridgeless – PFC States

For bridgeless PFC stages with

- 90V to 250V AC input- voltage (50Hz or 60Hz)
- 2kW output power
- approx. 400V output voltage

the following investigations have to be made:

- New measuring systems without current sensing
- Digital control algorithms for operation in different modes (CCM, DCM) under different load conditions (light load, half load, full load)
- Optimization of the EMI input filter
- Reducing the numbers of components including the construction of new magnetic components like a PFC choke with included air gap
- Increasing the efficiency better than 98%
- Analyze the influence of new semiconductors (e.g. SiC)
- Comparison of different switching modes (hard or resonant switching)
- Reducing the costs

Ph.D Thesis No.2: Single Stage Converter

To increase the efficiency of switch mode power supplies a single stage converter can be an alternative to the today's topologies. The operating data are:

- 90V to 250V AC- input- Voltage (50Hz or 60Hz)
- 2kW output power
- 24 V or 48V output voltage

Following investigations have to be made:

- Explore digital control algorithms for operation in different modes under all kind of load conditions
- Creating an EMI input filter with a minimum of passive components
- Reducing the numbers of the system components
- Construction of new magnetic components like transformers including air gaps
- Increasing the efficiency better than 98% by using new semiconductors (e.g. SiC or GaAs) and optimized resonant switching modes.
- Reducing the system costs.

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