

Seminar 6 Monday June 18, 2001

HIGH-EFFICIENCY- HIGH DENSITY POWER CONVERSION TECHNOLOGIES

9:00am – 6:00pm

Instructor: Ionel Dan Jitaru, Rompower Inc., Tucson, Arizona, USA

ABOUT THE INSTRUCTOR: SEE SEMINAR 5

CONTENTS

The seminar will present a comprehensive overview of available topologies, magnetic and packaging technologies for increasing the efficiency and power density in power converters. A full section is dedicated to the synchronized rectification a major step forward in the quest for higher efficiency. Another key chapter is dedicated to high efficiency rectification wherein the limiting factor is the reverse recovery of the rectifiers. There will be presented packaging technologies for low and high power Converters for thermal and electrical optimization. The focus will be on the three-dimensional packaging technology as a merge between electric-magnetic-thermal designs. The presentation will be highlighted with design guidance, worked-out design example and experimental results from telecommunications, industrial and automotive applications. Experimental hardware realizations including very high efficiency above 92% for 3.3V output voltage, power densities above 120 W/inc³, and power level ranging from 10W to 3KW.

Topologies

- Power loss mechanisms in power converters
- Losses in different topologies based on the latest development in components
- The search for the more suitable topology in a given application
- The key advantages and limitations of the hard switching and soft switching topologies
- New topologies for specific applications

High Efficiency Rectification for low output voltage applications

- The overview will focus the synchronized rectification
- Self-driven Synchronized rectification
- Driven Synchronized rectification
- Timing challenges to avoid the cross conduction and body diode conduction
- How to prevent the back flow of power
- Synchronized rectification in different topologies

High Efficiency Rectification for high output voltage applications

- Loss mechanism due to reverse recovery of the rectifiers
- Optimization of RC snubbers and magnetic snubbers
- Loss less snubbers techniques
- Circuit techniques to reduce the reverse recovery loss
- Soft switching across the output rectifiers
- Application of these circuit techniques for PFC and higher output voltage converters

Packaging

- Overview of packaging technologies for higher power density
- Three-dimensional packaging concept for electrical-magnetic-thermal optimization

WHO SHOULD ATTEND

This course is designed for power conversion engineers and technical managers who are involved in state-of-art power conversion. The participants will get familiar with the latest advancement in power conversion technologies aimed to increase the performance and reduce the total cost.