SEMINAR

Seminar 15 Monday June 18, 2001

APPLICATION OF MOSFET AND IGBT POWER MODULES

9:00am – 6:00pm

Instructor: Dr. Tobias Reimann, Technical University of Ilmenau, ISLE, Ilmenau, Germany

ABOUT THE INSTRUCTOR

Dr. Tobias Reimann received 1994 his PhD from the Technical University of Ilmenau in the field of power semiconductor applications for hard and soft switching converters. He works as scientific assistant in the Department of Power Electronics of the TUI. His special fields are power electronic circuits and power semiconductor applications. In 1994 he was one of the founders of the ISLE company which is engaged in system development for power electronics and electrical drives.

CONTENTS

1 Basic Principles of Power Electronics

Switching – Commutation – Switching Modes

2 Power Components: MOSFET, IGBT, Freewheeling Diode

Basic Structure – Principle of Operation – Device Characteristics – State of the Art – New Developments

3 Power Module Packaging

Mechanical Construction – Isolation – Thermal Resistance and Impedance – Materials – Modules with and without Baseplate – Reliability – Power Cycling Capability

4 Reading Data Sheets

Standard Diagram Set – Static and Dynamic Parameters – Nominal and Max. Ratings

5 Power Losses and Junction Temperature

Power Loss Calculation – Simplified Estimation of the Junction Temperature – DC/DC-Converters, DC/AC-Converters, Load Cycles – Cooling

6 Drive and Protection

Basic Principles – Technical Realisations – Failure Modes – Failure Detection – Protection (Overvoltage, Overcurrent, Short Circuit, Overtemperature)

7 Paralleling and Series Connection of Power Modules

Drive – Protection - Layout

8 Special Effects in Soft-Switching-Modes (ZVS, ZCS)

Basics – Typical Waveforms – Power Loss Reduction

9 Parasitic Switch Environment

Effects of Parasitic Inductors and Capacitors

WHO SHOULD ATTEND

Development engineers designing converters with IGBT- and MOSFET power modules, to actualise their knowledge; engineers starting to work in this area