

## Seminar 13      Monday June 18, 2001

### POWER ELECTRONIC SYSTEMS: SMPS AND MOTORDRIVES - HOW TO SELECT THE RIGHT $\mu$ -ELECTRONIC COMPONENTS AND POWER SEMICONDUCTORS 9:00am – 6:00pm

**Instructor: Dr. Leo Lorenz, Michael Herfurth, Infineon Technologies, Germany**

#### **ABOUT THE INSTRUCTORS**

Dr. Leo Lorenz is currently the Director, System Engineering Industrial Electronics at Infineon Technologies Munich. Following his studies in Electrical Engineering and Power Electronics at the Technical University of Berlin, he gained his doctorate in Munich with a thesis on the subject of power electronics. Dr. Leo Lorenz has 5 years of R&D experience in electronic drive engineering, and 18 years experience in the development of power semiconductors, power ICs and SMART Power ICs. He is a leading member of all the main conferences in the field of power electronics, is author of over 150 publications in the fields of power electronics, power semiconductors and power ICs, and the owner of numerous patents in these fields.

Dipl.-Ing. Michael Herfurth is Senior Specialist for Power ICs and Power Supplies System Design. He received a Dipl. Degree in Electrical Engineering from the University of Stuttgart. He joined Siemens Semiconductor division almost 20 years ago. All the time he has been in the R&D for Power Semiconductors, Power ICs and System Engineering for power electronics. He is an author of many papers at international conferences and owner of many patents in power electronics.

#### **COURSE OBJECTIVE**

Participants will be familiarized with the current status and the future of modern power semiconductor components and power ICs together with their application areas. They will be in a position to select and assess the appropriate components (power semiconductor components and power ICs) for the application concerned. They will understand the parasitic effects with fast-switching semiconductors in a system with  $\mu$ -electronic components, and their implications.

#### **COURSE CONTENT**

##### **Power semiconductor components**

- The physics, structures and future development of power semiconductor components for power MOSFETs (low voltage, high voltage), IGBTs and diodes (low power, high power)
- Switching characteristics, maximum load characteristics, thermal characteristics
- Control and protection concepts
- Parallel switching
- Overcoming parasitic effects
- Simulation models
- Selection criteria for different application fields, such as motor control, power supply
- New power semiconductors in SiC technology

##### **Power ICs**

- Semiconductor structures and future development of power ICs for AC/DC and DC/DC
- Functionality of the different ICs
- Electrical evaluation and comparison of different technologies and ICs
- Application areas and selection criteria

##### **Overall system considerations for SMPSs**

- Control principles for clocked converters
- Design criteria for SMPSs and criteria for selecting suitable semiconductor elements (power semiconductors, power ICs)
- Application example and System considerations for motor controllers
- Selection criteria for power semiconductors, control unit and  $\mu$ -controller, using as an example a low-power drive
- Design concepts in the low- and medium-power ranges

#### **WHO SHOULD ATTEND**

- Developers of circuits for power electronic applications, e.g. industrial controllers, electric drives, power supplies: AC/DC and DC/DC, signaling electronics, automotive electronics
- Development engineers working on the preliminary development of power electronic systems, who have to evaluate and select power semiconductor components, power ICs or SMART Power ICs
- Project managers, decision makers, marketing specialists, who want to obtain an overview of the latest developments in power semiconductors and power ICs to familiarize themselves with design concepts, and who have to make decisions for the future
- Scientists who wish to acquire an understanding of physical operations using semiconductor technology and of parasitic effects