



## Silicon Carbide Power Electronics

### NAME AND AFFILIATION OF THE AUTHORS

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### SCOPE AND BENEFITS

The tutorial provides a description of SiC devices, gate drivers for different devices, examples of converter designs employing SiC devices, and an overview of potential applications. The main benefit of the tutorial is *knowledge of how to design high-efficiency converters* using SiC power transistors of different types. Another benefit of the tutorial is insight how SiC can make a difference in various applications and at what maturity level SiC power electronics is today. High-temperature applications are NOT treated in depth.

### CONTENTS AND SCHEDULE

#### Monday, September 2<sup>nd</sup> - Tutorial day (Location: University of Lille)

09:30 - 11:00	Devices Gate Drivers for JFETs, BJTs, and MOSFETs Parallel connection of JFETs, BJTs, and MOSFETs
11:00 - 11:30	Coffee break
11:30 - 13:00	Modules: Overview, half-bridge JFET, two MOSFET modules Main circuits: 40 kW JFET inverter, 6 kW BJT boost converter Applications and outlook

### WHO SHOULD ATTEND

Design engineers, PhD students, and professors who want to design high-efficiency converters using SiC transistors. Technical managers, engineers in general, PhD students, and professors who want to get an overview of SiC power electronics.

**Technical Level:** beginners to specialists



## ABOUT THE INSTRUCTORS



**Hans-Peter Nee** was born in May 1963 in Västerås, Sweden. He studied electrical engineering at KTH and received his Master's, Lic. Tech., and Doctor's degrees in 1987, 1992, and 1996 respectively. In 1999 he was awarded a chair in Power Electronics - "Systems and Semiconductor Components". His interests are:

- power electronic converters for FACTS, HVDC, windpower, variable-speed drives, and soft-switching converters for various applications
- control of power electronic converters and systems
- power semiconductor components, especially new components such as JFETs and BJTs in SiC, but also new designs of high-voltage IGBTs and diodes
- gate- and base drives for emerging semiconductor components
- new valve concepts for high-voltage converters



Jacek Rabkowski received the M.Sc. and Ph.D. degrees in electrical engineering from the Warsaw University of Technology, Warsaw, Poland, in 2000 and 2005, respectively.

He joined the Institute of Control and Industrial Electronics, Warsaw University of Technology, as an Assistant Professor in 2005. Since 2010 he has been with Electrical Energy Conversion Lab (E2C), KTH Royal Institute of Technology, in Sweden, as a Researcher. His research interests include novel topologies of power converters, PWM techniques, drive units, and converters with SiC devices.



**Dimosthenis Pefitsis** was born in Kavala, Greece, in 1985. He received the Diploma in Electrical and Computer Engineering from Democritus University of Thrace, in Xanthi, Greece in 2008. In 2008 he worked on his diploma thesis at ABB Corporate Research in Västerås, Sweden for six months. Since 2008 he has been working towards his PhD degree at the department of electrical energy conversion, at KTH Royal Institute of Technology, in Stockholm, Sweden. His research interests are gate and base driver design for SiC JFETs and BJTs, as well as protection circuits for normally-ON SiC JFETs.