Perspective of loss mechanisms in silicon and wide bandgap power devices

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Abstract

This short course will discuss switching losses for power semiconductor devices from a physical device point of view. The focus will be laid on power MOSFETs based on Superjunction technology and GaN high electron mobility transistors as two prominent examples of the silicon and the wide bandgap world. We will give a perspective of loss mechanisms in the light of recent developments of the two fundamental device concepts.

Based on these loss mechanisms appropriate circuits and control methods are discussed yielding best efficiency for both device concepts respectively.

The short course addresses researchers interested in a deep understanding of the device properties as well as users of modern power semiconductor devices seeking best matching between topology, control and power device.

Biography

Dr. Gerald Deboy received the M.S. and Ph.D. degree in physics from the Technical University Munich in 1991 and 1996 respectively. He joined Siemens Corporate Research and Development in 1992 and the Semiconductor Division of Siemens in 1995, which became Infineon Technologies later on. His research interests were focused on the development of new device concepts for power electronics, especially the revolutionary COOLMOS™ technology. From 2004 onward he was heading the Application engineering department for power semiconductors and ICs within Infineon Technologies Austria AG. Since 2009 he is leading a business development group specializing on new fields for power electronics. He is a Sr. member of IEEE (IEEE Member since 1998) and has served as a member of the Technical Committee for Power Devices and Integrated Circuits within the Electron Device Society. He has authored and coauthored more than 70 papers in national and international journals including contributions to three student text books. He holds more than 60 granted international patents and has more applications pending.