



# Integrated Power Devices and TCAD Simulation (Devices, Circuits, and Systems)

By Yue Fu, Zhanming Li, Wai Tung Ng, Johnny K.O. Sin

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From power electronics to power integrated circuits (PICs), smart power technologies, devices, and beyond, **Integrated Power Devices and TCAD Simulation** provides a complete picture of the power management and semiconductor industry. An essential reference for power device engineering students and professionals, the book not only describes the physics inside integrated power semiconductor devices such lateral double-diffused metal oxide semiconductor field-effect transistors (LDMOSFETs), lateral insulated-gate bipolar transistors (LIGBTs), and super junction LDMOSFETs but also delivers a simple introduction to power management systems.

Instead of abstract theoretical treatments and daunting equations, the text uses technology computer-aided design (TCAD) simulation examples to explain the design of integrated power semiconductor devices. It also explores next generation power devices such as gallium nitride power high electron mobility transistors (GaN power HEMTs).

Including a virtual process flow for smart PIC technology as well as a hard-to-find technology development organization chart, **Integrated Power Devices and TCAD Simulation** gives students and junior engineers a head start in the field of power semiconductor devices while helping to fill the gap between power device engineering and power management systems.

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### Editorial Review

#### Review

"Semiconductor engineering has advanced to the point where the devices?in 3D with layout, thermal, and other effects thrown in?can themselves be computer modeled, along with the processes underlying the devices. This book provides a readable engineering overview of the pre-circuit considerations."

*?Dennis Feucht, Innovatia Laboratories, Cayo, Belize in H2Power Today, August 2014*

#### About the Author

**Yue Fu** obtained his Ph.D from the University of Central Florida, Orlando, USA and his BS from Zhejiang University, China. He is currently the vice president of Crosslight Software, Inc., Vancouver, British Columbia, Canada. Dr. Fu is a senior member of IEEE and has more than ten years of industry and academic experience in power semiconductor devices and power electronics. He holds multiple US patents and has authored or co-authored numerous peer-reviewed papers.

Zhanming (Simon) Li obtained his Ph.D from the University of British Columbia, Vancouver, Canada in 1988. He was with the National Research Council of Canada (NRCC) from 1988 to 1995, where he developed semiconductor device simulation software. In 1995, he founded Crosslight Software, Inc., Vancouver, British Columbia, Canada with simulation technology transferred from the NRCC. Since then, Dr. Li has been the chief designer of many semiconductor process and device simulation software packages. He has been actively involved in research of TCAD simulation technology and authored or coauthored over 70 research papers.

Wai Tung Ng received his BAS, MAS, and Ph.D in electrical engineering from the University of Toronto, Ontario, Canada in 1983, 1985, and 1990, respectively. He was a member of technical staff at Texas Instruments, Dallas, USA from 1990 to 1991. He started his academic career at the University of Hong Kong in 1992. Dr. Ng returned to the University of Toronto as a faculty member in 1993 and is currently a full professor. His research is focused on the areas of power management integrated circuits, integrated DC-DC converters, smart power integrated circuits, power semiconductor devices, and fabrication processes.

Johnny Kin-On Sin obtained his BAS, MAS, and Ph.D in electrical engineering from the University of Toronto, Ontario, Canada in 1981, 1983, and 1988, respectively. He was a senior member of the research staff of Philips Research North America, Briarcliff Manor, New York, USA from 1988 to 1991. He joined the Department of Electronic and Computer Engineering at the Hong Kong University of Science and Technology in 1991 and is currently a full professor. An IEEE fellow, Dr. Sin is the holder of 13 patents and author of over 280 technical papers. His research interests include novel power semiconductor devices and power system-on-chip technologies.

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