



RF and mm-Wave Power Generation in Silicon

Edited by **Hua Wang**
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RF and mm-Wave Power Generation in Silicon

Biography

Hua Wang received his BS degree from Tsinghua University, Beijing, China, in 2003, and MS and PhD degrees in electrical engineering from the California Institute of Technology, Pasadena, in 2007 and 2009, respectively.

He was with Guidant Corporation during the summer of 2004, working on accelerometer-based posture monitoring systems for implantable biomedical devices. In 2010, he joined Intel Corporation, where he worked on the next-generation energy-efficient mm-wave communication link and broadband CMOS Front-End-Module for Wi-Fi systems. In 2011, he joined Skyworks Solutions. His work at Skyworks included the development of SAW-less integrated filter solutions for low-cost cellular-standard Front-End-Module. In 2012, he joined the School of Electrical and Computer Engineering at Georgia Institute of Technology as an assistant professor. He currently holds the Demetrius T. Paris Junior Professorship of the School of Electrical and Computer Engineering. He is generally interested in innovating mixed-signal, RF, and mm-wave integrated circuits and systems for communication, radar, and bioelectronics applications.

Dr Wang received the National Science Foundation (NSF) CAREER Award in 2015, Roger P. Webb ECE Outstanding Junior Faculty Member Award in 2015, and Lockheed Martin Dean's Excellence in Teaching Award in 2015. He was the award recipient of the 46th IEEE DAC/ISSCC Student Design Contest Winner in 2009 based on his work of "An Ultrasensitive CMOS Magnetic Biosensor Array for Point-Of-Care (POC) Microarray Application." He was also a co-recipient of the IEEE Radio Frequency Integrated Circuits Symposium (RFIC) Best Student Paper Award (1st Place) as the students' PhD advisor in 2014.

Dr Wang is an Associate Editor of the IEEE Microwave and Wireless Components Letters (MWCL). He is currently a Technical Program Committee (TPC) Member for IEEE Radio Frequency Integrated Circuits Symposium (RFIC), IEEE Custom Integrated Circuits Conference (CICC), IEEE Biopolar/BiCMOS Circuits and Technology Meeting (BCTM), and IEEE/CAS-EMB Biomedical Circuits and Systems Conference (BioCAS). He serves as the Chair of the Atlanta's IEEE CAS/SSCS joint chapter, which won the IEEE SSCS Outstanding Chapter Award in 2014.

Kaushik Sengupta received the B.Tech. and M.Tech. degrees in electronics and electrical communication engineering from the Indian Institute of Technology (IIT), Kharagpur, India, both in 2007, and the MS and PhD degrees in electrical engineering from the California Institute of Technology, Pasadena, CA, USA, in 2008 and 2012, respectively. In February 2013, he joined the faculty of the Department of Electrical Engineering, Princeton University, Princeton, NJ, USA.

During his undergraduate studies, in the summers of 2005 and 2006, he performed research at the University of Southern California and the Massachusetts

Institute of Technology (MIT), where he was involved with nonlinear integrated systems for high-purity signal generation and low-power RF identification (RFID) tags, respectively. His research interests are in the areas of high-frequency integrated circuits (ICs), electromagnetics, optics for various applications in sensing, imaging, and high-speed communication.

Dr Sengupta was the recipient of the IBM PhD fellowship (2011–2012), the IEEE Solid-State Circuits Society Predoctoral Achievement Award (2012), the IEEE Microwave Theory and Techniques Graduate Fellowship (2012), and the Analog Devices Outstanding Student Designer Award (2011). He was the recipient of the Charles Wilts Prize in 2013 from Electrical Engineering, Caltech, for outstanding independent research in electrical engineering leading to a PhD. He was also the recipient of the Prime Minister Gold Medal Award of IIT (2007), the Caltech Institute Fellowship, the Most Innovative Student Project Award of the Indian National Academy of Engineering (2007), and the IEEE Microwave Theory and Techniques Undergraduate Fellowship (2006).

He serves on the Technical Program Committee of the European Solid-State Circuits Conference (ESSCIRC). He was selected in “Princeton Engineering Commendation List for Outstanding Teaching” in 2014. He was the co-recipient of the IEEE RFIC Symposium Best Student Paper Award in 2012 and 2015 IEEE Microwave Theory and Techniques Society (IEEE MTT-S) Microwave Prize.

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This book is the result of collaborative efforts and dedicated contributions from many people.

First and foremost, we thank all the participating authors for their invaluable contributions to this book. These high-quality technical chapters explain the power amplifier circuit design methodologies, present various implementation examples, and bring the state-of-the-art technologies to the readers.

Much of our knowledge on RF/mm-wave/THz power generation using silicon platforms comes from our close interactions with our colleagues and friends in the field. Although many of them may not have participated directly in writing of this book, the initiation and completion of this book have greatly benefited from our interactions with these technical experts. Therefore, we want to take this opportunity to thank those who have supported and inspired us. Our deep gratitude goes to Professor Ali Hajimiri (Caltech), our PhD advisor, for his kind-hearted advice and generous mentorship. We also thank Professor Hossein Hashemi (USC), Professor Jim Buckwalter (UC Santa Barbara), Professor Sanggeun Jeon (Korea University), Dr. Ichiro Aoki (AyDeeKay LLC), Professor Ehsan Afshari (Cornell University), Professor Ali Niknejad (UC Berkeley), Dr. Scott Kee (AyDeeKay LLC), Dr. Yanjie Wang (Intel Corporation), Dr. Christopher Hull (Intel Corporation), Dr. Shmuel Ravi (Intel Corporation), Dr. Reza Kasnavi (Skyworks Solutions), Dr. Ying Shi (Skyworks Solutions), Dr. Nick Cheng (Skyworks Solutions), Dr. Ali Afsahi (Broadcom Corporation), Dr. Debopriyo Chowdhury (Broadcom Corporation), Dr. Kevin Kobayashi (Qorvo), Dr. Peter Zampardi (Qorvo), Dr. Shouhei Kousai (Toshiba Corporation), Dr. Kohei Onizuka (Toshiba Corporation), Professor Peter Asbeck (UC San Diego), Professor Leo de Vreede (Delft University of Technology), Professor R. Bogdan Staszewski (University College Dublin), Professor Jan Rabaey (UC Berkeley), Professor Ranjit Gharpurey (UT Austin), Professor David Rutledge (Caltech), Professor Azita Emami (Caltech), Dr. Sandy Weinreb (Caltech), Dr. Peter Siegel (Caltech) and many others who have supported us.

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