

Advanced Electrostatic Discharge (ESD) Protection for Digital, Analog, and RF Integrated Circuits

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Electrostatic discharge (ESD) is a process in which a finite amount of charge is transferred from one object (i.e., human body) to the other (i.e., microchip). This process can result in a very high current passing through the microchip within a very short period of time, and more than 35% of chip damages can be attributed to such an event. As such, designing robust on-chip ESD structures to protect microchips against ESD stress is a high priority in the semiconductor industry. An overview on the ESD sources, models, and protection schemes will first be given in this talk. This is followed by the examples of robust ESD solutions for protecting data communication transceivers, high voltage IC, gas-sensor microchips, and low voltage RF IC.

Biography of Juin J. Liou

Juin J. Liou received the B.S. (honors), M.S., and Ph.D. degrees in electrical engineering from the University of Florida, Gainesville, in 1982, 1983, and 1987, respectively. In 1987, he joined the Department of Electrical and Computer Engineering at the University of Central Florida, Orlando, Florida where he is now a Professor. His current research interests are Micro/nanoelectronics computer-aided design, RF device modeling and simulation, and electrostatic discharge (ESD) protection design and simulation.

Dr. Liou has been awarded 3 U.S. patents, and has published 8 books, more than 210 journal papers (including 14 invited articles), and more than 160 papers (including 58 keynote or invited papers) in international and national conference proceedings. He has been awarded more than \$7.0 million of research contracts and grants from federal agencies (i.e., NSF, DARPA, Navy, Air Force, NIST), state government, and industry (i.e., Semiconductor Research Corp., Intel Corp., Intersil Corp., Lucent Technologies, Alcatel Space, Conexant Systems, Texas Instruments, Fairchild Semiconductor, Analog Devices, RF Micro Device, Lockheed Martin), and has held consulting positions with research laboratories and companies in the United States, China, Japan, Taiwan, and Singapore. In addition, Dr. Liou serves as a technical reviewer for various journals and publishers, general chair or technical program chair for a large number of international conferences, and regional editor (in USA, Canada and South America) for the *Microelectronics Reliability* journal.

Dr. Liou received ten different awards on excellence in teaching and research from the University of Central Florida (UCF) and six different awards from the IEEE Electron Device Society. Among them, he was awarded the UCF Distinguished Researcher Award three times (1992, 1998, 2002), UCF Research Incentive Award two times (2000, 2005), UCF Trustee Chair Professor (2002), and IEEE Joseph M. Biedenbach Outstanding Engineering Educator Award in 2004 for his exemplary teaching, research, and international collaboration. His other honors include Fellow of the Institute of Electronic Engineers (IEE), IEEE Electron Device Society (EDS) Distinguished Lecturer, National Science Council Distinguished Lecturer, Yangtze River Scholar Endowed Chair Professor – the highest honorary professorship in China, Cao Guang-Biao Endowed Professor of Zhejiang University, China, Consultant Professor of Huazhong University of Science and Technology, Wuhan, China, and Courtesy Professor of Shanghai Jiao Tong University, Shanghai, China. Dr Liou was a recipient of U.S. Air Force Fellowship Award and National University Singapore Fellowship Award.

Dr. Liou served as the IEEE EDS Vice-President for Regions/Chapters, IEEE EDS Treasurer, IEEE EDS Finance Committee Chair, IEEE EDS Administrative Committee Elected Member, and IEEE EDS Educational Activities Committee Member.