

Robust Electrostatic Discharge (ESD) Protection in CMOS Technology

Juin J. Liou

Professor, Dept. of Electrical and Computer Engineering
Director, Solid State Electronics Lab and Device Characterization Lab
University of Central Florida, Orlando, Florida, USA

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 examples of a recent development of robust ESD solutions for protecting data communication transceivers and gas-sensor microchips.



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 semiconductor manufacturing and reliability.

Dr. Liou has filed 3 patents, and has published 6 textbooks (another in progress), more than 210 journal papers (including 13 invited articles), and more than 155 papers (including 50 keynote or invited papers) in international and national conference proceedings. He has been awarded more than \$6.5 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, 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 many international conferences, and regional editor (in USA, Canada and South America) for the journal *Microelectronics Reliability*.

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 (EDS). Among them, he was awarded the UCF Distinguished Researcher Award three times (1992, 1998, 2002), UCF Research Incentive Award two times (2000, 2005), and IEEE Joseph M. Biedenbach Outstanding Educator Award in 2004 for his exemplary teaching, research, and international collaboration. His other honors include Fellow of the IEE, Trustee Chair Professor of UCF, Cao Guang-Biao Endowed Professor of Zhejiang University, China, Consultant Professor of Huazhong University of Science and Technology, Wuhan, China, Courtesy

Professor of Shanghai Jiao Tong University, Shanghai, China, IEEE EDS Distinguished Lecturer, and National Science Council Distinguished Lecturer.

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