

Tutorial Sunday 3:30 – 5:00 PM

EOS, ESD, Transient, AMR, EIPD, Robustness, Aging - Do All of These Pieces go to the Same Puzzle?

Instructor: Hans Kunz, Texas Instruments

Electrical Over-Stress (EOS) continues to be one of the largest categories of Customer Returns of Integrated Circuits (ICs). In recent years, there has been resurgence in interest in EOS, including recent attempts by the Industry to better define terms and concepts related to EOS, in hopes of helping suppliers and customers better address the issues. This presentation will examine EOS in relationship to Absolute Maximum Ratings (AMR) and the newly defined term Electrically Induced Physical Damage (EIPD), with an ultimate goal of continuing a conversation about the state of EOS trouble-shooting and how more precise terms and concepts can be harnessed in the process of root-cause analysis. The presentation will also explore relationships between EOS and ESD and contemplate whether combining or separating these categories is ultimately helpful in addressing the EOS problem. Similarly, the relationship between EOS and device Aging will be explored. The complexity of specifying limits for transient events and the complexity of attempting to define or measure EOS robustness will also be discussed.



Hans Kunz joined Texas Instruments as an ESD specialist in 2003, after nine years at Dallas Semiconductor/Maxim. He was elected Distinguished Member of Technical Staff at Texas Instruments in 2017. His past responsibilities include the design, development, and implementation of ESD protection circuits for analog CMOS and high-voltage BiCMOS technologies; he is currently focused on the development of ESD verification tools and methodologies. Hans has been active in the workshop process at both the EOS/ESD Symposium and IEW, serving as both panelist and moderator at various workshops and serving as the EOS/ESD Symposium Workshop Chair in 2010. He has been a frequent member of the EOS/ESD Symposium technical program committee, served as the IEW TPC chair in 2016, and the IEW Management Committee chair in 2017. Hans has also been active in the educational tutorial process of the EOS/ESD Symposium, serving as an instructor since 2007. Hans is co-author of multiple publications related to ESD and received the *Best Presentation Award* for the 2006 EOS/ESD Symposium. He holds 13 patents in the area of ESD protection. Hans received his BS degree in physics from *The University of the South* and his BS in electrical engineering from *The Georgia Institute of Technology*.