2025 47th Annual EOS/ESD Symposium (EOS/ESD 2025)

Riverside, California, USA
13-18 September 2025

IEEE Catalog Number: CFP25413-POD
ISBN: 979-8-3315-6751-4

Copyright © 2025, EOS/ESD Association, Inc.
All Rights Reserved

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP25413-POD
ISBN (Print-On-Demand):	979-8-3315-6751-4
ISBN (Online):	978-1-5853-7363-5
ISSN:	0739-5159

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings.com

TABLE OF CONTENTS

1A: Emerging Technologies I

1A.1 ESD Considerations for Photonics Products...1
Chloé Troussier, Johan Bourgeat, Alice Pimentel, Sébastien Cremer, STMicroelectronics

1A.2 ESD HBM Failures of Different Cap Layer and Barrier Thinning Effects in GaN-on-Si AlGaN/GaN HEMTs ...11
Wei-Min Wu, H. Yu, A. Sibaja-Hernandez, U. Peralagu, imec; C.-Y. Su, imec, KU Leuven; H.-C. Chen, imec, KU Leuven, National Yang Ming Chiao Tung University; B. Parvais, N. Collaert, imec, National Yang Ming Chiao Tung University; T.-L. Wu, National Yang Ming Chiao Tung University

1B: Device Testing I

1B.1 Discharge Currents of Metallized Silicon Chiplets at Low Pre-Charge Voltages ...18
Ellen Merkel, Heinrich Wolf, Leon Heiland, Fraunhofer EMFT

1B.2 Pulse After Power Down (PAPD) Latch-up Failures ...27
Scott Ward, James McGee, Texas Instruments; Tom Meuse, Thermo Fisher Scientific

2A: Emerging Technologies II

2A.1 Transient Response of Very Fast Transmission Line Pulse: Procedures for Measurement Verification ...35
Leonardo Di Biccari, Andrea Boroni, STMicroelectronics; Robert Ashton, Minotaur Labs (retired); Theo Smedes, NXP Semiconductors; Kathleen Muhonen, Qorvo; Wei Huang, ESDEMC Technology LLC; Henning Lohmeyer, Robert Bosch GmbH; Mirko Scholz, Infineon Technologies AG; Tom Meuse, Thermo Fisher Scientific

2A.2 Statistical Analysis of (VF-)TLP Parameter Variability...44
Theo Smedes, Paul Cappon, Sander Sluiter, NXP Semiconductors; Luca Merlo, Andrea Boroni, Leonardo Di Biccari, STMicroelectronics; Marko Simicic, imec; Mihael Krilcic, imec, Gent University

2A.3 AI-Driven Analysis of VF-TLP and TLP Characteristics via Hierarchical Clustering ...52
Seyed Hossein Hosseini, Mehrdad Nourani, University of Texas at Dallas; Theo Smedes, NXP Semiconductors; Charvaka Duvvury, iT2 Technologies

2B: Emerging Technologies II

2B.1 Novel Floating-p SCR-LDMOS Design for BCD Technology: Improving ESD Protection With High Holding Voltages and Fast Turn-on...59
Giacomo Drudi, Susanna Reggiani, University of Bologna; Rajkumar Sankaralingam, Mariano Dissegna, Gianluca Boselli, Texas Instruments Inc.

2B.2 Protection Window Targeting Using NLDMOS-SCR with Active Gate Control ...66
Vladislav Vashchenko, Analog Devices, Inc; Andrei Shibkov, Angstrom Design Automation

2B.3 High-Speed Interconnects to Enable Chiplet-Based AI Systems (Invited Presentation CICC)...N/A
Walker Turner, NVIDIA (no paper submitted)

3A: EMC & ESD Co-Design I

3A.1 Innovative ESD Protection for RF Circuits: Integrating Diodes into Capacitors in Advanced Technology ...73
Thalis Da C. Guedes, STMicroelectronics SA, Univ. Grenoble Alpes; Johan Bourgeat, Blaise Jacquier, STMicroelectronics SA; Jean-Marc Duchamp, Manuel J. Barragan, Philippe Ferrari, Univ. Grenoble Alpes

3A.2 Low-C ESD Protection Design with Improved BEOL Layout Style for High-Frequency Applications ...82
Chen-Yu Liang, Ming-Dou Ker, National Yang Ming Chiao Tung University

3A.3 CDM Protection of an Antenna Pad in CMOS Technology ...88
Michael Stockinger, NXP Semiconductors

3B: Device Testing III

3B.1 On-Chip Probe for Real-Time Measurement of ESD Transients ...96
Matthew Drallmeier, Elyse Rosenbaum, University of Illinois at Urbana-Champaign

3B.2 On-Chip ESD Detection From Wafer Bulk Substrate Discharge ...106
James Davis, Souvick Mitra, Ken Marr, Greg O'Sullivan, Kevin Werhane, Micron Technology

3B.3 Case Study of a Miscorrelation Between CDM Testing and CC-TLP Characterization of Multi-GHz RF Pins...112
Dolphin Abessolo-Bidzo, NXP Semiconductors; Johannes Weber, Heinrich Wolf, Fraunhofer EMFT

4A: Electrostatics I

4A.1 ESD Air Discharges into Shielded Automotive RF Connectors...121
Martin Pilaski, Steffen Holland, Andreas Hardock, Nima Lotfi, Nexperia Germany GmbH

4A.2 Radial Transmission Line Effects in Charged Device Model Events and Testing...126
Timothy J. Maloney, Center for Analytic Insights

4A.3 Effect of Pulse Duration in Transient Latchup Events ...136
Guido Quax, NXP Semiconductors NV

4A.4 Degradation of PN-Junction Devices Subjected to Multiple Surge Pulses...143
Steffen Holland, Sönke Kahl, Nexperia Germany GmbH

5A: ESD Latch-up & EDA I

5A.1 Metal Electrothermal Model for Circuit Simulation...150
Eugene Worley, Silicon Crossing, LLC

5A.2 Empirical ESD Modeling of ESD Pass Gate Transistors...159
Alona Blum Gez, Ido Nahmany, Avi Parvin, Tower Semiconductor; Efraim Aharoni, Tower Semiconductor, Kinneret College on the Sea of Galilee

5A.3 Corona Discharge to Touchscreen Modeling Using Non-Linear Time-Dependent Corona Streamer Propagation Model in SPICE...169
Zhekun Peng, Daniel Szanto, Daryl Beetner, Missouri University of Science and Technology; Jianchi Zhou, Darryl Kostka, Apple Inc.; David Pommerenke, Graz University of Technology

6A: EMC & ESD Co-Design II

6A.1 ESD Power Clamp Using Variable Clamping Voltage for Enhanced ESD Robustness and Prevention of False Triggering in High Voltage Applications ...177
Kazuki Shimada, Mototsugu Okushima, Renesas Electronics Corporation

6A.2 Area-Efficient and Low-Leakage Design for GaN-on-Si Power-Rail ESD Clamp Circuit With D-Mode HEMT...184
Chao-Yang Ke, Ming-Dou Ker, National Yang Ming Chiao Tung University

7A: ESD Latch-up & EDA II

7A.1 Transient Simulation of CDM Currents in a Multichip Module Based on Measurements and 3D FEM Simulations ...191
Ellen Merkel, Heinrich Wolf, Fraunhofer EMFT; Michael Graf, Guel Dogan, Klaus Kosbi, Robert Bosch GmbH

7A.2 ESD EDA Verification Evolution for Packages and Modules...199
Michael Khazhinsky, Kuo-Hsuan Meng, Vasan Subbiah, Rohinth Ram R V, Sowmya Kndula, Sriram Raparla, Silicon Laboratories, Inc.; Matthew Hogan, Siemens

7A.3 Ultrafast Characterization of Gated and STI Diodes in Bulk FinFET and GAAFET Technologies...208
Emanuele Groppo, Intel Deutschland GmbH, Technische Universität München; Harald Gossner, Intel Deutschland GmbH; Wen-Chieh Chen, Marko Simicic, imec; Ralf Brederlow, Technische Universität München

7A.4 Charge Trapping Mechanism in Thick Oxide of HV LDMOS Under CDM Events ...217
Leonardo Di Biccari, Andrea Boroni, Alessandro Castelnovo, Lucia Zullino, Lorenzo Cerati, STMicroelectronics

M1 & M2: Manufacturing

M1.1 Power and Energy Distribution of Electrostatic Discharge on Material Measurements ...227
Toni Viheriäkoski, Cascade Metrology Oy; Jean-Luc Houalla, Eurostat; Reinhold Gärtner, Infineon Technologies AG; Wolfgang Stadler, Intel Deutschland GmbH; Pasi Tamminen, Danfoss Drives Oy

M1.2 Investigation of Bar Type AC Corona Discharge Ionizer for Suppression of Induced Voltage and Improvement of Static Elimination Capability (RCJ Best Paper)...237
Shinichi Yamaguchi, Shishido Electrostatic Ltd.

M1.3 Reassessing Material Resistance Requirements for the Control of Charged Device Model-Like Discharges...241
Toni Viheriäkoski, Cascade Metrology Oy; Pasi Seppälä, Premix Oy; Wolfgang Stadler, Intel Deutschland GmbH; Friedrich zur Nieden, Lena Zeitlhoefler, Infineon Technologies AG; Pasi Tamminen, Danfoss Drives Oy

M1.4 Measurement and Evaluation of Ionizers ...251
Wolfgang Stadler, Arman Vassighi, Intel; Rainer Pfeifle, Wolfgang Warmbier GmbH & Co. KG

M2.1 Advanced ESD Event Detection System Using M.L. Method ...261
Byung Hoon Moon, Greg O'Sullivan, Bong Andres, Siddhant Sharma, Hugo Chen, Ken Hau Chang, Micron

M2.2 Detection of Fast ESD Events with Antennas ...267
Mohamed Chefai, Lena Zeitlhoefler, Friedrich zur Nieden, Infineon Technologies AG

Workshops

System Level Workshop - Steps Towards the Root Cause ...277
Moderators: *Steffen Holland, Nexperia; Shubhankar Marathe, Amazon*

Emerging Technologies Workshop - ESD Challenges of 2.5D/3D Integration ...278
Moderators: *Benjamin Orr, Intel; Scott Ruth, AMD*

Circuit Design Workshop - ESD Model Standards...279
Moderators: *Michael Stockinger, NXP Semiconductors; Meng Miao, Broadcom*

Manufacturing Workshop - ANSI/ESD S20.20 and TR53 Review: Community Feedback and Discussion...280
Moderators: *Kevin Duncan, Tesla; John Kinnear, EOS/ESD Association, Inc.*