

## News bits

### Download Device Testing Standards

The ESD Association continues to offer free downloads of three device testing standards on the ESDA web site:

- ANSI/ESD STM5.1-2001: Electrostatic Discharge Sensitivity Testing—Human Body Model (HBM) Component Level
- ANSI/ESD STM5.2-1999: Electrostatic Discharge Sensitivity Testing—Machine Model (MM) Component Level
- ANSI/ESD STM5.3.1-1999: Charged Device Model (CDM)—Component Level

The documents may be downloaded or viewed at [www.esda.org/standards.html](http://www.esda.org/standards.html). If you would like to purchase a printed copy of any of these documents, please call the ESD Association at 315-339-6937.

### Exhibit Space Available

50 exhibitors have already committed to the 2004 EOS/ESD Symposium. There is still space available—call today to reserve yours. For information on exhibiting, contact Association headquarters by phone: 315-339-6937, fax: 315-339-6793 or e-mail: [info@esda.org](mailto:info@esda.org).

## In this issue

Symposium .....	1-6
Tutorials .....	1-2
Technical sessions .....	2-3
Workshops .....	3
Welcome to Dallas .....	4
Promotion opportunities .....	4
Exhibits .....	5
Professional certification .....	6
Standards activity update .....	7
Sept. meeting schedule .....	7
From the President .....	8
Calendar .....	8
From the Threshold Chair .....	9
And the survey says .....	10
Institutional listings .....	11-12

## 2004 EOS/ESD Symposium

### Join us in Texas!

The 26<sup>th</sup> Annual EOS/ESD Symposium packages research, technology, education, and peer networking into the premier international ESD event September 19-23, 2004, at the Gaylord Texan Resort and Conference Center in Grapevine, Texas (near Dallas/Fort Worth).

The Symposium program is organized in three special interest tracks, and attendees will be able to customize their Symposium experience along specific areas of interest. This year's tracks are: ESD Test, Failure Analysis, and Systems; Factory, Materials, and ESD Control; and Device, Design, and Technology.

### Tutorials

Three days of tutorials provide in-depth training and education. Internationally recognized instructors will present a total of 20 basic, intermediate, and advanced courses. The Symposium officially opens Sunday, September 19 with three full-day tutorials on *ESD Basics for the Program Manager*, *ESD On-Chip Protection in Advanced Technologies*, and *System Level ESD/EMI*.

An additional 17 tutorials will be offered on Monday, September 20, and Thursday, September 23, covering topics such as *Air Ionization: Issues and Answers*; *Packaging Principles for the Program Manager*; *Device Technology and FA Overview*; *Electrostatic Calculations for the ESD Engineer*; and *Cleanroom Considerations for the Program Manager*.

Many of the tutorials earn credit for one of the professional certification programs sponsored by the ESD Association: ESD Certified Professional-Device/Design and ESD Certified Professional-Program Manager. Other tutorials will assist attendees in preparing for the NARTE certification exams for ESD Control Engineer and/or ESD Control Technician, scheduled this

year for Friday, September 24.

For more information about professional certification, see page 6.

Also included in this year's Symposium is the two-day seminar, *ESD Program Development and Assessment (ANSI/ESD S20.20)*, on Sunday, September 19, and Monday, September 20.

Several new or newly expanded tutorials are included in the program this year; they are highlighted below. The complete list of tutorials and abstracts may be viewed in the Symposium program on the ESDA web site at [www.esda.org/symposia.html](http://www.esda.org/symposia.html).

### Tutorial Highlights

#### Tutorial A: ESD Basics for the Program Manager

8:30 AM-4:30 PM, Sunday, September 19  
*Stephen Halperin, SH&A/Prostat Corp.*

This newly developed presentation is a comprehensive introduction to the fundamentals of ESD causes and control. ESD Basics is a full day seminar consisting of three presentation sections. Part 1 includes an overview of ESD impact on industry, detailed explanations of Charge Generation, Field Measurement, the role of Capacitance and Voltage, Charge Measurement and Charge Decay. Part 2 focuses on general explanations and illustrations of Device Failure Mechanisms, including Human Body Model, Charge Device and Field Induction Modes, and explains the Machine Model. Part 3 is concerned with protecting ESD sensitive devices & assemblies, defining the Electrostatic Protected Area (EPA), understanding various ESD control elements and material selection, and includes a brief introduction to ANSI/S20.20 ESD Program Development criteria. Several demonstra-

## Symposium

Continued from page 1**Join us in Texas!**

tions and opportunities for discussion make this an interesting introduction to ESD causes and control. No previous ESD experience is necessary. This tutorial is a required course for the ESD Certified Professional-Program Manager curriculum.

**Tutorial I: Packaging Principles for the Program Manager**

1:00 PM-4:30 PM, Monday, September 20  
*David E. Swenson, Affinity Static Control Consulting, LLC*

Shipping electronic parts within a factory, to another factory, distributor, or to an end-user has always been an area of uncertainty within the manufacturing process. To provide clear-cut information on what type of controlled packaging should be used in any situation, the ESD Association has recently released a comprehensive revision of the obsolete industry standard EIA 541-1988. The new document, ESD S541, is the focus of this inclusive session. It provides information and guidance, as well as material specifications, to assist in the design and implementation of a packaging plan for use within an ANSI/ESD S20.20 based ESD Control Program. Current and newly released test method standards suitable for packaging material evaluation will be described. Course credit applies to the ESD Certified Professional-Program Manager curriculum.

**Tutorial N: ESD Standards Basics for EPA**

8:30 AM-12:00 Noon,  
Thursday, September 23  
*David E. Swenson, Affinity Static Control Consulting, L.L.C.*

The ESD Association's introduction of the ESD Certified Professional-Program Manager curriculum has created a need to modify the Standards Tutorial that has been presented for a number of years, mainly to help individuals prepare for the NARTE Engineering and Technician Ex-

ams. This year and in the future, many of the ESDA Standards and Standard Test Methods will be discussed in-depth during the individual tutorials related to the specific subject matter. This new Standards Tutorial provides an overview of all the Standards, grouped into common test method types, based on measurement probe and test instruments. A common methodology is used in this tutorial to cover the requirements, applications, and specifications for each Standard and Standard Test Method.

**Tutorial P: Device Technology and FA Overview**

8:30 AM-12:00 Noon,  
Thursday, September 23  
*Joseph Bernier, Intersil*

This tutorial is designed to give a broad overview of ESD device technology, the ways Circuit Designers protect against ESD, and the Failure Analysis techniques that are likely to be encountered in reports about ESD failures. This class is NOT intended to turn you into an ESD Protection Designer or a Failure Analysis Engineer. It is meant for Program Managers to give background on what designers and FA engineers actually do, or for those people who want to have a broad, but not deep, understanding of those areas of the ESD world. After completing this tutorial you should be able to understand the basics of device protection design and some of the trade-offs inherent in that process. You should also be familiar with some of the most commonly used failure analysis techniques that can help identify failing circuit components - in other words "what does a semiconductor manufacturer do with the units I return for failure analysis"? The topics covered include: the three most common ESD Models; characteristics of ideal ESD protection; typical ESD protection schemes; key characteristics of ESD protection; Failure analysis flow; Failure analysis tools and their uses.

**Technical Sessions**

This year's Symposium features 51 technical papers presented in 10 sessions featuring the latest technological issues and research on ESD and EOS.

The papers will be offered in parallel sessions to allow attendees to concentrate on those sessions of greatest interest to them. The technical sessions, scheduled for Tuesday, September 21 through Thursday, September 23 are: *MR Heads – Processing; RFIC and Novel Protection Devices; System Level and Other ESD Issues; On-Chip Protection Strategies, Physics and Modeling; Tester – Device Effects; Analysis and Modeling of ESD Design Failures; Factory and Materials; Characterization of On-Chip Protection; Novel TLP Testers; and Magnetic Recording Heads.*

A special plenary session on *The Evolution of Failure Analysis to Keep up with the Semiconductor Industry* will be featured Tuesday morning, September 21.

The technical sessions also feature the award winning invited paper from the 2003 RCJ EOS/ESD Symposium-Japan: *ESD Protection Design Using a Mixed-Mode Simulation for Advanced Devices* by H. Hayashi, S. Kuroda, K. Kato, K. Fukuda, S. Baba, and Y. Fukuda of Oki Electric Industry Co., Ltd.

Detailed descriptions of the technical papers may be found in the Symposium program, available on the ESDA web site at [www.esda.org/symposia.html](http://www.esda.org/symposia.html).

**Technical Session Schedule****Tuesday, September 21**

MR Heads – Processing  
RFIC and Novel Protection Devices  
System Level and Other ESD Issues  
On-Chip Protection Strategies, Physics and Modeling  
Tester – Device Effects  
Analysis and Modeling of ESD Design Failure

Continued on page 3

## Symposium

*Continued from page 2*

### Join us in Texas!

#### Wednesday, September 22

Factory and Materials  
Characterization of On-Chip Protection

#### Thursday, September 23

Novel TLP Testers  
Magnetic Recording Heads

#### Workshops

Eight interactive workshops on Wednesday afternoon, September 22 provide attendees with the opportunity to explore specific topics in depth. The workshops encourage discussion, questions, and audience interaction and participation.

Workshop session topics for this year are: *Silicon Technology Scaling and ESD Reliability – Roadmap and Reality; Common Auditing Issues; ESD in Cleanrooms;*

*Can TLP Go Beyond HBM and CDM?; Ionization Issues; Automated Equipment, ESD and Grounding Issues; ESD in Magnetic Recording, and HBM-TLP Testing Miscorrelation: Experiences, Explanations, Solutions.* Complete workshop details may be found in the Symposium program, available on the ESDA web site at [www.esda.org/symposia.html](http://www.esda.org/symposia.html).

#### Exhibits and Other Events

Attendees also will have the opportunity to visit nearly 100 exhibit booths displaying ESD control products and services. The exhibits are open to anyone interested in EOS and ESD, and Symposium registration is not required to attend the exhibits.

Other events include a Welcome Reception, an Awards Breakfast, a Professional

and Technical Women's Reception, the ESD Association Luncheon and Annual Meeting, and Authors' Corners that provide opportunities to discuss technical papers with the authors.

The Symposium is sponsored by the ESD Association in cooperation with the IEEE. It is technically co-sponsored by the Electron Devices Society. The general chair is John Kinnear, IBM. The technical program chair is Carl Newburg, River's Edge Technical Service/Microstat Labs.

The detailed program is available on the Association's web site: [www.esda.org/symposia.html](http://www.esda.org/symposia.html). For more information, contact the ESD Association, 7900 Turin Road, Building 3, Rome, NY 13440, phone: 315-339-6937, fax: 315-339-6793, e-mail: [info@esda.org](mailto:info@esda.org), web site: [www.esda.org](http://www.esda.org).

## Symposium Registration and Fees

### Save by registering early!

You can save time and money by registering in advance. Advance registration fees are valid only if received no later than **August 6, 2004**. Registrations received after this date will be processed at the on-site fees.

You can save hundreds of dollars by registering early. Attendees who participate in the "Total Symposium Experience" and full-time students will save even more.

To register, use the registration form in the program you will receive in the mail in June, download the form from the ESD Association web site ([www.esda.org](http://www.esda.org)), or contact ESDA headquarters by phone at 315-339-6937, by fax at 315-339-6793, or by e-mail at [info@esda.org](mailto:info@esda.org).

	Advance Fees On or Before August 6, 2004	On-Site Fees After August 6, 2004
<b>Symposium</b>		
ESD Association Members	\$495	\$695
Non-Members	\$595	\$695
<b>Tutorials</b>		
Sunday (Full Day)	\$475	\$550
Monday (Full Day)	\$475	\$550
Thursday (Full Day)	\$475	\$550
Thursday (Half Day, AM or PM)	\$275	\$275
<b>Student Fees</b>		
50% discount for full-time students. Proof of enrollment required. Student fees apply only to Symposium or Tutorial registration and do not apply to Bundled Fees.		
<b>Total Symposium Experience: Save with Bundled Fees.</b>		
(Symposium plus 3 full days of tutorials.)		
ESD Association Members	\$1,725	\$2,110
Non-Members	\$1,815	\$2,110
<b>S20.20 Seminar</b>	\$1,495	\$1,495
(Attendance limited to first 30 registrants.)		
<b>Exhibits Only*</b>	No Charge	No Charge

\*Pre-registration not required for exhibits only.

## Welcome to Dallas

We're not sure exactly what it is, but maybe it's the warm southern welcome offered by Dallas that drew us here for the 2004 EOS/ESD Symposium. Topping the Texas charts for both business and leisure travel, Dallas offers visitors a unique blend of Southwestern warmth, cosmopolitan flair, Old West charm, and modern sophistication.

### Gaylord Texan Resort & Conference Center

The EOS/ESD Symposium will be held at the Gaylord Texan Resort & Conference Center, a new facility that opened in April 2004. Located in Grapevine, Texas, the conference center is just 6 minutes from the Dallas-Fort Worth Airport, 20 minutes from downtown Dallas, and 20 minutes from downtown Fort Worth. Sitting high on

a bluff overlooking Lake Grapevine, this resort welcomes guests to an authentic Texas experience.

### Food and Spirits

According to the Texas Restaurant Association, Dallas has more than 7,000 restaurants (that is more restaurants per person than New York City!) Dallas is regularly included in the list of the nation's top cities for fine dining. Most of the major chains can be found in Dallas, as well as many one-of-a-kind local eateries offering the regional fare Dallas is known for—Mexican food, barbecue, and steaks—and many other ethnic specialties.

### Arts, Culture and Attractions

The Dallas/Fort Worth (DFW) area is home to two major art districts. The 60-

acre Dallas Art District is the largest urban arts district in the country and is home to the Dallas Museum of Art, the Morton H. Meyerson Symphony Center, and the newly completed Nasher Sculpture Garden. The Crow Collection of Asian Art, the only Asian

*Continued on page 5*

## Symposium promotion opportunities

The 26<sup>th</sup> Annual EOS/ESD Symposium offers exhibitors and other companies a number of marketing and promotion opportunities.

### Exhibits directory

The Symposium will again publish a separate exhibits directory containing detailed information on the 3-day exhibits program. In addition to the free company and product listings in the directory, exhibiting companies also may purchase half-page and full-page advertisements to expand awareness of their company, products, and services. Details are in the exhibitor kits mailed to all exhibitors.

### Advertising opportunities

Also this year, companies can support the Symposium and create company awareness at various events such as the tutorial lunches, coffee breaks, the welcome reception, and the opening breakfast. Event signage or on-screen slides will prominently identify and promote companies participating in these opportunities.

Costs, deadlines, and other requirements for each of these programs are included in the exhibitor kit mailed to each exhibiting company.

Additional information may be obtained by contacting ESD Association headquarters by phone: 315-339-6937; fax: 315-339-6793; e-mail: [info@esda.org](mailto:info@esda.org); web site: [www.esda.org](http://www.esda.org).

## EOS/ESD Symposium and Exhibits Program and Schedule Summary

**September 19-23, 2004**

**Gaylord Texan Resort and Conference Center, Grapevine (Dallas), TX**

(Program Subject to Change)

### Sunday, September 19

Registration Opens  
Standards Meetings  
ANSI/ESD S20.20 Seminar, Part 1  
Tutorials

### Monday, September 20

Registration  
ANSI/ESD S20.20 Seminar, Part 2  
Tutorials  
Welcome Reception (Exhibit Hall)  
Exhibits Open (p.m. only)

### Tuesday, September 21

Registration  
Awards Breakfast  
Plenary Session, *The Evolution of Failure Analysis to Keep up with the Semiconductor Industry*  
Exhibits

### Tuesday, September 21 (continued)

Technical Sessions  
Professional and Technical Women's Reception

### Wednesday, September 22

Registration  
Technical Sessions  
Association Luncheon & Annual Meeting  
Exhibits  
Workshops

### Thursday, September 23

Registration  
Technical Sessions  
Tutorials

### Friday, September 24

ESDC Technician Exam  
ESDC Engineer Exam

Symposium

# Exhibits feature products, services, solutions

When you are searching for ESD products and services, where to begin? If you are looking through purchasing directories, checking ads in industry magazines, or walking the floors of major electronics

trade shows, there is an easier way.

The 2004 EOS/ESD Symposium features nearly 100 exhibit spaces displaying ESD products and services from leading companies. All in one place, you will cover

the broad spectrum of static protection, control, testing, and analysis, as well as prominent trade publications. The exhibits are open to the public.



### Exhibit Hours

Monday, September 20  
7:00 PM-10:00 PM

Tuesday, September 21  
9:00 AM-5:00 PM

Wednesday, September 22  
9:00 AM-Noon, 2:00 PM-4:00 PM  
*(Exhibits closed during luncheon,  
from Noon until 2:00 PM)*

*Continued from page 4*

## Welcome to Dallas

Art museum in the Southwest, is also located in downtown Dallas across from the Dallas Museum of Art. The Fort Worth Cultural District claims several of the top museums in the state, including the Kimball, the Amon Carter, and the recently added Museum of Modern Art.

The Dallas World Aquarium & Zoological Garden is home to exotic plants and creatures from around the world. Visitors can explore a South American rainforest, walk through a water tunnel surrounded by reef life from the Continental Shelf, and observe monkeys, stingrays, piranhas, and penguins. The Dallas Zoo, founded in 1888, is the oldest zoo in Texas, and with 95 developed acres, contains the largest land mass of any zoo in Texas. The zoo participates in national Species Survival Plans for 37 species, including gorillas, tigers, chimps, lemurs, okapis, and Bali mynahs. Just a short drive west of downtown Dallas is Six Flags Over Texas, the area's largest family amusement park attractions.

For more information about the Dallas area, visit the ESD Association website at [www.esda.org](http://www.esda.org).

*Information for this article was obtained from The Dallas Convention & Visitors Bureau ([www.dallascvb.com](http://www.dallascvb.com)) and the Greater Dallas Chamber ([www.gdc.org](http://www.gdc.org)).*

## List of Exhibitors

As of May 28, 2004

Exhibitor	Booth #	Exhibitor	Booth #
3M Electronic & Interconnect Solutions Division	310-312	NOVX Corporation	200
Abeba GmbH	306	Oryx Instruments	216
ACL/Staticide, Inc.	305	Prostat Corporation	516
Aesops, Inc.	301	RTP Company	408
Asiatic Fiber Corp.	600	Sarnoff Corp.	411
Associated/ACC International, Ltd.	116	Simco Static Control & Cleanroom Products	306
Barth Electronics, Inc.	514	Static Control Components, Inc.	414
Botron Co., Inc.	117	Static Solutions, Inc.	409
Century Container Corporation	311	Statico	405
CIBA Specialty Chemicals	406	Stephen Halperin & Associates	516
Conductive Containers, Inc.	303	Tech Wear, Inc.	616
Credence Technologies, Inc.	413	Tek Stil Concepts, Inc.	101
Desco	214	Thermo	416
Dou Yee Enterprises	202	Trek, Inc.	316
Electronic Polymers, Inc.	114	Uniglobe Kisco	513
Electro-Tech Systems, Inc.	314	Vidaro Corp.	308
ESD Management and Consultancy Pte. Ltd.	115	Publications	
ESD TLP Consulting & Testing	205	A2C2 Magazine	TBA
Flexco	313	Circuits Assembly	TBA
H.C. Starck, Inc.	401	CleanRooms	TBA
ION Systems, Inc.	508	Evaluation Engineering	TBA
ITW-Richmond Technology, Inc.	304	Printed Circuit Design & Manufacture	TBA
John Wiley & Sons	504	Test & Measurement World	TBA
Kreha Corporation of America	321	Sponsor	
Monroe Electronics, Inc.	302	ESD Association	Foyer
Noveon Static Control	212		

## Certification

### Advance Your Career

# Earn an ESD Association Professional Certification

The ESD Association now offers Professional Certification for ESD Control Program Managers and for Device/Design Technical specialists.

The impact of the ESD Control Program Standard *ANSI/ESD S20.20-1999: Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)* on the global industry has been extraordinary. The ESD Association's Board of Directors recognizes the need to offer a certification program for individuals that are involved in designing, implementing, managing and auditing ESD control programs in their facilities. The ESD Certified Professional-Program Manager certification program was announced in 2003 to serve that purpose. In addition, the needs of the technical community for certification of various technical specialists are apparent. The ESD Association is pleased to now offer an ESD Certified Professional-Device/Design certification program as well.

Requirements for certification will include, as a minimum, attending required prerequisite tutorials, and passing a final exam. Sign up at this year's Symposium and start earning your credits!

Many of the prerequisite courses are available in the 2004 Symposium tutorial program (course list follows) and additional courses are in development.

Please watch the ESD Association web site at [www.esda.org](http://www.esda.org) for announcements regarding these exciting and important new offerings. Details of these Certification Programs also will be available at the EOS/ESD Symposium; please stop by the ESD Association booth for more information.

### Program Manager Certification Seminars and Tutorials

ESD Program Development and Assessment (ANSI/ESD S20.20 Seminar) (Sunday and Monday)

A. ESD Basics for the Program Manager (Sunday)

D. Air Ionization: Issues and Answers (Monday)  
H. How To's of In-Plant ESD Survey and Evaluation Measurements (Monday)  
I. Packaging Principles for the Program Manager (Monday)  
N. ESD Standards Basics for EPA (Thursday)  
P. Device Technology and FA Overview (Thursday)  
Q. Electrostatic Calculations for the ESD Engineer (Thursday)  
T. Cleanrooms Considerations for the Program Manager (Thursday)

### Device/Design Certification Tutorials

B. ESD On-Chip Protection in Advanced Technologies (Sunday)  
C. System Level ESD/EMI (Part 1 & 2) (Sunday)  
E. On-Chip ESD Protection in RF Technologies (Monday)  
F. SPICE-Based ESD Protection Design Utilizing Diodes and Active MOSFET Rail Clamp Circuits (Monday)  
G. EOS/ESD Failure Models and Mechanisms (Monday)  
J. Circuit Modeling and Simulation for On-Chip Protection (Monday)  
K. Latchup Physics and Design (Monday)  
L. Device Testing-Component Level: HBM, CDM, MM, & TLP (Monday)  
O. Troubleshooting On-Chip ESD Failures (Thursday)  
S. Transmission Line Pulse Measurements: Parametric Analyzer for ESD On-Chip Protection (Thursday)

### Earn a NARTE Certification

Change continues to foster growing interest in voluntary professional certification. In static control, you can advance your career by becoming NARTE certified as an ESD Control (ESDC) Engineer or ESD Control (ESDC) Technician.

At the 2004 Symposium, certification examinations for ESDC Engineer and ESDC Technician will be held Friday, September

24. You can prepare for the exams and add to your education by attending the tutorials that have been designated as examination preparation courses.

### Tutorials Preparing for the Technician Exam

A. ESD Basics for the Program Manager (Sunday)  
D. Air Ionization: Issues and Answers (Monday)  
H. How To's of In-Plant ESD Survey and Evaluation Measurements (Monday)  
I. Packaging Principles for the Program Manager (Monday)  
N. ESD Standards Basics for EPA (Thursday)

### Tutorials Preparing for the Engineer Exam

A. ESD Basics for the Program Manager (Sunday)  
D. Air Ionization: Issues and Answers (Monday)  
G. EOS/ESD Failure Models and Mechanisms (Monday)  
H. How To's of In-Plant ESD Survey and Evaluation Measurements (Monday)  
I. Packaging Principles for the Program Manager (Monday)  
L. Device Testing-Component Level: HBM, CDM, MM, & TLP (Monday)  
N. ESD Standards Basics for EPA (Thursday)  
Q. Electrostatic Calculations for the ESD Engineer (Thursday)

To obtain additional information about professional certification or the 2004 EOS/ESD Symposium, please contact the ESD Association by phone: 315-339-6937; fax: 315-339-6793; or e-mail: [info@esda.org](mailto:info@esda.org); web site: [www.esda.org](http://www.esda.org). The complete 2004 Symposium Program is available on the ESDA web site at [www.esda.org/symposia.html](http://www.esda.org/symposia.html). Information about professional certification also will be available at this year's Symposium in the registration area and at the ESD Association booth.

## Update on Standards activity

by  
Tammy Muldoon  
Program Manager



Tammy Muldoon

### June 2004 Standards Meeting Series

The ESD Association Standards Committee (StdCom) and standards working groups (WG) held their June 2004 meeting series at the Gaylord Texan Resort and Conference Center in Grapevine, TX on June 4-7, 2004.

### June 2004 Working Group Activities

**Garments - WG2** received notice that the Technical and Administrative Support Committee (TAS) reviewed the lab test data and provided analysis to the WG2 Chairperson. The WG will discuss the data results prior to September 2004 and determine how to proceed.

**Ionization - WG3** reviewed the Charge Plate Monitor (CPM) study technical paper for the 2004 EOS/ESD Symposium. The WG discussed the CPM test history, additional testing observations found, and test procedure limitations. The group also discussed future testing for the CPM study, to include smaller plates, smaller test patterns, and possibly a new Standard Test Method.

**Human Body Model Device Testing - WG5.1** reviewed the unexpected effects tester parasitics had on floating pins during the HBM tests. The WG is now working on methods for measuring these parasitic loads. The WG also reviewed the new data for the alternate HBM test methods. A

draft document should be available for TAS review by the end of July 2004.

**CDM Device Testing - WG5.3.1** continued discussions on calibration methodology. Decision was made to recollect data associated with the verification of the CDM tester before it is used to test devices. The WG divided into teams and began working on a CDM technical report.

**Socket Discharge Model (SDM) Device Testing - WG5.3.2** published and released the *ANSI/ESD SP5.3.2-2004 – Sensitivity Testing Socketed Device (SDM) Component Level* document in May 2004.

**Transient Latch-up Device Testing - WG5.4** published and released the *ANSI/ESD SP5.4-2004 – Transient Latch-up Testing – Component Level Supply Transient Stimulation* document in May 2004. The WG discussed the new TLU data that was presented showing the differences between stressing IO pins and power pins.

**Transmission Line Pulsing (TLP) - WG5.5** published and released the *ANSI/ESD SP5.5.1-2004 – Electrostatic Discharge Sensitivity Testing – Transmission Line Pulse (TLP) Component Level* document in May 2004. The WG is awaiting feedback on this newly published document. The WG also discussed the very fast TLP draft document, a newly approved activity.

**Grounding - WG6** developed a new outline for work-in-process 6.1 (WIP6.1). The new WIP is planned to be submitted to TAS for review in August 2004.

**Flooring - WG7** reviewed the Flooring technical report and discussed additions and corrections to be made.

**Handlers - WG10** reviewed discharge current waveforms from both a CDM tester and a ground plane test fixture. The WG is working on narrowing the differences and assigned action items to be reported by July 31. Further data collection will be compiled by the September 2004 meeting.

**Packaging - WG11** reviewed initial lab

## Tentative Schedule

September 2004  
ESD Association  
Standards Meeting Series

Gaylord Texan Resort &  
Conference Center

Grapevine (Dallas), TX  
September 16-19, 2004

Thursday  
September 16, 2004  
TAS

Friday  
September 17, 2004  
TAS  
Device Testing WG-5  
Ionization WG-3  
Grounding WG-6  
Handlers WG-10

Saturday  
September 18, 2004  
TAS  
Device Testing WG-5  
Work Stations WG-53  
Cleanrooms WG-55  
Packaging WG-11  
ICE/Steering

Sunday  
September 19, 2004  
Flooring WG-7  
Simulators WG-14  
Gloves WG-15  
ICE  
Standards Committee  
Technical Liaison  
Human Resources  
Board of Directors

*Continued on page 10*

## From the president

# Mid-year meeting series



Ed Weggeland

During the first week in June, the ESD Association held our mid-year meeting series at the Gaylord Texan Resort & Conference Center in Grapevine, Texas, also the site of our 2004 EOS/ESD Symposium.

Some of you might not be too aware of what takes place at this mid-year meeting series, so I thought I would give you a brief summary of the activities.

Approximately 110 volunteers attend this series that starts with the **Standards Development** Group activities. The **Standards Technical & Administrative Support** team (TAS) reviews all actions that have taken place as a result of the February meetings and all documents that have been submitted for technical review. Working Groups meet continuously for 3 full days, preparing work in process, updating standards, and discussing current needs of industry.

The Steering Committee for 2004 **Symposium** meets to finalize all September event plans, logistics and special events. Beginning with event registration on through the final bell – every aspect of the Symposium is reviewed in great detail and no stone is left unturned. The result is a problem-free major industry symposium attended by both ESDA members and professionals from all over the world. Many of the people that work so diligently on the Steering Committee to ensure a successful event work quietly behind the scenes, and attendees never realize the tremendous effort put forth by this dedicated group.

By this time (June) the majority of work by the Symposium **Technical Program Committee** is complete. Final plans for

speakers, moderators, and technical sessions are coordinated.

**ICE** (International Council on Education) meets to finalize their seminar and tutorial programs for September '04 and begins planning for '05.

While all this is going on, other committees are meeting day and night to work toward their goals and future plans for our organization: **Human Resources, Certification, Local Chapters, Volunteer Recognition, Technology Roadmap, International Liaison, Headquarters Operations, and Marketing & Communications**.

The ESD Association **Board of Directors** meets for a full day, following an organized agenda. All activities are reviewed. Presentations and proposals are pre-

sented and discussed. The Directors specifically review performance in activities measured against the prior approved objectives or actions. Financial results covering five months are reviewed, along with actual expenditures versus the Board approved budgets.

It can never be said that the ESDA meeting series is a walk in the park! Every day, from 7 a.m. until late at night, the activity committees are meeting. There is no time for play, and many times, little time for relaxation. But, that is what is needed to get the job done and **serve our industry**.

I'm looking forward to our September Symposium, and anticipate seeing and talking with many of you.

Y'all come back, ya hear!

## Calendar

### July 2004

ESD Northwest Chapter Membership Meeting: July 13, 2004, Vanguard EMS, Beaverton, OR; [www.esdnw.org](http://www.esdnw.org)

Silicon Valley EOS/ESD Society General Membership Meeting: July 20, 2004, Silicon Valley Ramada Inn, 1217 Wildwood Avenue, Sunnyvale, CA; [www.esdsiva.org](http://www.esdsiva.org)

### August 2004

ESD Northwest Chapter Board Meeting: August 10, 2004, Vanguard EMS, Beaverton, OR; [www.esdnw.org](http://www.esdnw.org)

Silicon Valley EOS/ESD Society General Membership Meeting: August 17, 2004, Silicon Valley Ramada Inn, 1217 Wildwood Avenue, Sunnyvale, CA; [www.esdsiva.org](http://www.esdsiva.org)

### September 2004

ESD Northwest Chapter Membership Meeting: September 14, 2004, Vanguard EMS, Beaverton, OR; [www.esdnw.org](http://www.esdnw.org)

ESDA Standards and Committee Meetings: September 16-19, 2004, Gaylord Texan Resort & Conference

Center, Grapevine (Dallas), Texas; [www.esda.org](http://www.esda.org)

EOS/ESD Symposium: September 19-23, 2004, Gaylord Texan Resort and Conference Center, Grapevine (Dallas), Texas; [www.esda.org](http://www.esda.org)

Silicon Valley EOS/ESD Society General Membership Meeting: September 21, 2004, Silicon Valley Ramada Inn, 1217 Wildwood Avenue, Sunnyvale, CA; [www.esdsiva.org](http://www.esdsiva.org)

ESD Certification Exams: September 24, 2004, Gaylord Texan Resort and Conference Center, Grapevine (Dallas), Texas; [www.esda.org](http://www.esda.org)

### October 2004

ESD Northwest Chapter Board Meeting: October 12, 2004, Vanguard EMS, Beaverton, OR; [www.esdnw.org](http://www.esdnw.org)

Silicon Valley EOS/ESD Society General Membership Meeting: October 19, 2004, Silicon Valley Ramada Inn, 1217 Wildwood Avenue, Sunnyvale, CA; [www.esdsiva.org](http://www.esdsiva.org)

NEPCON Texas: October 20-21, 2004, Arlington Convention Center, Arlington (Dallas), TX; [www.nepcontexas.com](http://www.nepcontexas.com)



Leo G. Henry

## Are all CDM ESD Standards created equal?

The Charged Device Model (CDM) ESD event, which causes major electrostatic discharge (ESD) damage to electronics components and magnetic storage devices, has become a major focus of the electronics industry (both semiconductor and storage). This CDM event occurs when an electronic component acquires a charge through some frictional (tribo-electric) or field-induced process, and the charge is then discharged when a grounded conductor, object, or surface comes into direct contact with one of the conductive leads.

In 1974, Speakman<sup>1</sup> published an article first proposing the idea of a device being discharged. In 1980, data on devices from an in-house built CDM tester was published by Bossard et al<sup>2</sup>. Then, in 1993, the ESD Association published the first ever CDM ESD standard<sup>3</sup>.

Since then other associations have published CDM standards<sup>4, 5, 6</sup> which raises the question of which standard best represents the real CDM ESD event. The existing standard documents (developed by Japan and the USA) are not harmonized and, as a result, the industry is left to choose between several documents. How do you choose?

There are several parameters that explicitly define whether or not the CDM ESD document is worth a second look. Parameters like voltage stress levels, incremental voltages, number of zaps, and time between zaps are very good; but these are secondary.

The more important parameter is the fast ESD current pulse that impinges on the devices' conductive leads. Hence, the simulated current pulse from the ESD Simulator must be accurate, reproducible, and repeatable. The ESD current event is very fast (psec risetimes and nsec pulse widths) and is dependent on (or can be developed from) specific parameters associated with the ESD Simulator. Parameters<sup>7, 8, 9</sup> that affect this ESD current waveform include the measurement chain, spark discharge, humidity, ground plane size, charge plate size, pogo pin length, pogo pin width, pogo pin tip radius of curvature, and verification capacitance module.

If we assume that most of the above parameters are fixed and controllable, and also assume that the environment (temperature, humidity, etc.) allows the spark discharge to be repeatable within some allowable/acceptable percent, we can then turn our attention to the module capacitance module. ESDA STM5.3.1 defines this module as a passive capacitor that is made up of a dielectric medium sandwiched between a square conductive backing and a circular conductive disc<sup>3</sup>.

The combination of resistor, pogo pin, and capacitor forms the RLC circuit from which results the fast and ringing CDM waveform. This is meant to simulate the RLC circuit which is inherently part of any device.

So now we get to the real physics:

$$I \cong B \cdot V \cdot (C/L)^{1/2}, \text{ where}$$

$$C = E_0 K A/t \text{ for the dielectric material}$$

$$K = \text{material dielectric constant}$$

$$A = \text{cross sectional area of the circular disk conductor surface}^3 = \pi \cdot D \cdot D, \text{ where } D \text{ is the diameter of the circular disc conductor}$$

$$t = \text{distance between module's conductive plates or dielectric thickness}$$

$$B = \text{constant associated with the equipment discharge circuitry}^{8,9}$$

$$L = \text{circuitry inductance}$$

Assuming all the parameters are constant, then  $I \cong C$  for any specified voltage. The table illustrates specified peak current (Ip) values for two industry standards (at 500V).

You may have noted that there is some discrepancy in the Ip values. How do you check? The expected limited linearity in the Ip values (per the earlier equation) is not evident. Where is the error? Note that the Ip data is defined for both a 1.0 GHz and 3.5 GHz BW oscilloscope. Note also that only one standard specifies Ip values using both the 3.5 GHz and the 1.0 GHz BW. This means that some measure of correlation could be established.

So, what do you check? The test head parameters? The calibration of the equipment? The measurement chain? The capacitance of the module used? Is the Ip measured proportional to the capacitance being used? Does the ground plane (GP) totally cover a large device so that there is adequate capacitive coupling? It is controversial. In a later article, I will look at the issues in more detail. No matter which standard you choose, you must verify the numbers in the standard, you must check the scope (e.g., BW, etc.) being used to provide the data, you must request the equipment calibration data, and you must verify the Ip verification data yourself ... **because all ESD standards are NOT created equal!**

Be Happy

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References:

1. T.S. Speakman, a Model for Failure of Bipolar Silicon Integrated Circuits subjected to Electrostatic Discharge, 12<sup>th</sup> Annual Proceedings, Reliability Physics, pp 60-69, 1974.
2. P.R. Bossard, R.G. Chemelli and B.A. Unger, "ESD Damages from Tribo-electrically Charged IC pins", EOS/ESD Symposium Proceedings, 1980.
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5. EIAJ-ED-4701/300, Test Method 305, CDM ESD, 2001, JEITA, Tokyo, Japan.
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8. L.G. Henry, M. Kelly, Tom Diep, and Jon Barth, "Issues Concerning CDM ESD Verification Modules - The Need to Move to Alumina", EOS/ESD Symposium Proceedings, EOS-21, pp 203-211, 1999.
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Capacitance (C)	Ip (@ 3.5 GHz)	Ip (@ 1.0 GHz)	CDM Standard
4.0 pF	7.50 A	4.50 A	ESDA <sup>3</sup>
6.8 pF	not specified	5.75 A	JEDEC <sup>4</sup>
30.0 pF	18.00 A	14.00 A	ESDA <sup>3</sup>
55.0 pF	not specified	11.50 A	JEDEC <sup>4</sup>

## Association news

# And the survey says...

Beginning with this issue of *Threshold*<sup>TM</sup>, a monthly column will address the many questions and comments expressed by the membership in their response to an e-mailed survey conducted by the ESD Association's (ESDA) Human Resources Business Unit.

Structured in a question and answer format, this column will present questions chosen from the survey responses, and will provide answers to those questions.

The primary goal of the ESDA is to serve our members in any way possible. The survey responses received will serve as an excellent source of direction in our quest to serve the membership.

As many of you know, this survey was distributed by e-mail in August 2003, and members also responded by e-mail. The ESD Association sincerely thanks those members who took the time to send in their comments.

**Survey Question:** *What products or services can the ESD Association provide to help you in your ESD duties?*

**Member Comment:**

*Does the ESD Association offer corporate memberships?*

**ESDA Response:**

The Corporate Sponsorship Program was developed by the ESDA to address requests for corporate memberships. Companies are now able to become Corporate Sponsors and benefit in a number of ways.

The program enables companies to take advantage of ESDA standards and educational programs with substantial discounts of up to \$7,000 per year. Anyone interested in more details may contact the the ESD Association by e-mail at [info@esda.org](mailto:info@esda.org).

**Member Comment:**

*The ESDA is very helpful in advancing ESD and new technologies. I think the ESDA can provide more networking events and more technical workshops through-*

*out the year, not just during the annual conference. It is also great to see that the ESDA is providing tutorials all through the year, many of which are very helpful for educating people about ESD, especially those providing information from the experts about new and emerging technologies.*

**ESDA Response:**

The ESDA recently held a conference in Singapore that was tremendously successful. Stay-tuned for more of these events in the future!

Through our Local Chapters initiative, we are continuously working in locations throughout the world so that those interested in ESD control can involve themselves with others in their area, and gain the knowledge they need.

By joining the ESDA you will have access to the Members section of our website, which contains our membership roster. This is an excellent resource for networking with colleagues in your area.

Also, we typically offer additional training during the spring months. If there are training programs that you are interested in attending, please send an e-mail to us at [info@esda.org](mailto:info@esda.org) and watch the ESDA website for details at [www.esda.org](http://www.esda.org).

**Member Comment:**

*With the shift in ESD Symposium Proceedings from hard copy to CD ROM, you may want to consider offering past ESD Symposium Proceedings (perhaps in 10 year increments) on CD ROM.*

**ESDA Response:**

The EOS/ESD Symposium Proceedings continue to be offered each year for sale in hard copy. The CD ROM is given to Symposium attendees as part of the Symposium package and membership renewal. As the ESDA continues to move forward, we will have CD ROM's available. However, copyright agreements with the authors of past years do not allow the ESDA to place back issues of the Proceedings on CD ROM for sale.

## Standards

*Continued from page 7*

# Update on Standards activity

work for a charge retention test method. Two new initial lab testing methods are planned for September 2004.

**Simulators - WG14** published and released the *ANSI/ESD SP14.1-2004 – System Level Electrostatic Discharge (ESD) Simulator Verification* document in May 2004.

**Gloves - WG15** reviewed the outline of WIP15.1. The WG discussed and recommended that the document be classified as a standard practice.

**Workstations - WG53** has completed 7 sections of the compliance verification document, and is working on 5 sections that require review by the end of August 2004.

**Cleanrooms - WG55** discussed TAS approval of additions and modifications to the existing *TR11-01 - Electrostatic Guidelines and Considerations for Cleanrooms and Clean Manufacturing*. TR11-04 will be finalized and will replace TR11-01 by July 2004.

## Association News

Michele McSwain has been appointed Secretary to the BoD. In her volunteer role, Michele is responsible for recording meeting minutes at all Board and Executive Committee meetings. In this position she will ensure that all meetings, proposals, and resolutions comply with the Constitution and By-laws of the Association and to coordinate all changes proposed to these guidance documents.

Michele has been active in our Association since 1996 and has participated in various working committees. We look forward to the management experience and multinational familiarity Michele brings to the BoD.



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*More institutional listings, previous page*

## Threshold

*Threshold™* is published six times a year by the ESD Association, a not-for-profit corporation. It strives for the advancement of theory and practice of electrical overstress avoidance and of allied arts and sciences and the maintenance of a high professional standing among its members and others.

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### Threshold™ Publication Schedule

Issue	Deadlines
September/October -----	Aug. 1
November/December -----	Oct. 1
January/February -----	Nov. 19
March/April -----	Feb. 1
May/June -----	April 1
July/August -----	June 1



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