ESD in Newport

January 28th and 29th, 2009

Day I
ESD: Design & Troubleshooting
At the System & PWB Level

Day 2
ESD: Factory Issues & Equipment, Standards, Safeguards, Packaging & Materials, Test Methods, Counterfeiting Threats & Medical Device Hazards

A Fun and Educational ESD Seminar!

This seminar is unique in the ESD world. Characteristics of ESD, equipment design principles and design troubleshooting techniques are covered. Demonstrations are used to illustrate most of the concepts being taught unlike most seminars which are taught through the use of visuals as the main medium. A large portion of class time is spent in demonstrations. Complicated math is avoided. This format makes the seminar more interesting to the students and helps them to achieve a deeper understanding of the material covered.

Emphasis is placed upon delivering practical knowledge to design engineers, including systems, quality and manufacturing engineers and technicians that can be used immediately on the job. Learning is further enhanced by making the 'dry' subject of ESD actually *fun*. This may be the only SD seminar to make the students laugh!

Day One Description: This seminar describes, in depth, ESD design, measurement and troubleshooting principles. High frequency measurement techniques are used to reinforce these principles and to improve equipment ESD performance and improve the *overall reliability* of electronic systems.

Day 2 Description: In a very *interactive format*, the course study will cover Factory Issues and ESD/ESA Auditing & Validation Techniques, ESD/ESA Practices in the semiconductor, medical device, pharmaceutical delivery, defense, disk drive industry and consumer/retail level issues arising from a microprocessor driven marketplace. Monitoring, Ionization, Machine-Validation Considerations for ESD/ESA Safety, ESD/ESA Materials & Packaging both inside and outside the ANSI/ESD S20.20-2007 ESD/ESA Protective Area (EPA), including Materials Qualification Sequence to protect against counterfeit ESD Materials & Packaging for use in the factory, cleanrooms, outgoing shipments and field repairs will be discussed. One will gain a basic understanding of ESD materials, plus coverage of ESD design and packaging fundamentals, along with material protocols and the NEW ESD Packaging Test Methods per ANSI/ESD S541-2003 with on-site demonstrations and experiments. You will observe how

Charges and ESD events occur with materials in the shielding, conductive, static dissipative and insulative ranges, plus protective measures to employ.

Objectives and Benefits:

- Understand principles of system level ESD including new and important forms of ESD that are not covered in any standard yet are significant sources of system level upset.
- Learn characteristics of ESD that have direct and practical application to system level design.
- Learn principles of circuit and system design that enhance ESD immunity in electronic systems.
- Understand and apply high frequency measurement techniques to troubleshoot design problems.
- Relate ESD immunity to EMC system level performance and reliability.
- Learn construction techniques for useful laboratory apparatus that is useful for troubleshooting system level ESD problems.
- Learn what kinds of problems have occurred in the past and how they were fixed. See how ESD can cause system problems that mimic other types of problems.
- Learn the critical relationship between materials and equipment and see how ESD events and fields affect performance.
- Learn the importance of Supplier Specification Sheets and why current testing and validation is critical to your ESD Program.
- Learn how to inspect, validate and measure a suspect ESD counterfeit material, package or component.
- Learn the difference between Antistatic and Static Dissipative Materials and its correct placement in the cleanroom or field.
- Learn why ionization continues to be a problem and how proper placement and validation of Unit is critical before purchase.
- Learn why an ongoing Materials Qualification List is critical to your program and to your product in the marketplace.

Who should attend: All circuit designers, manufacturing engineers, system engineers, mechanical engineers, quality engineers, design supervisors, EMC/ESD personnel.

Prerequisites: College level course on circuit analysis is desirable although the seminar will be useful to those with two-year technical degrees.

Instructional Mode: Lecture/Laboratory. About 50% of class time is devoted to experiments and demonstrations on both days.

Day 1 Major Topics:

Properties of ESD
- _ High Frequency content of ESD
- _ Hand Metal vs. skin discharge
- _ Contact vs. air discharge
- _ Unusual forms of ESD

Hardware design for ESD
- _ Enclosure design issues
- _ Mechanical design issues
- _ Electrical design issues

Software design for ESD
- _ Processor issues
- _ I/O issues
- _ Memory issues

Troubleshooting Techniques
- _ Voltage Measurements
- _ Current Measurements
- _ Noise injection
- _ Useful home-built test apparatus
- _ Case histories

Day 2 Major Topics:

Characteristics of ESD
- _ Triboelectrification-Charge Separation
- _ Humidity Effect on Charge Generation and Surface Resistance
- _ Triboelectric Series Relationship with Materials

ESD Roadmap of Device Sensitivity

Damage Model Relationship
- _ HBM (Human Body Model)
- _ MM (Machine Model)
- _ CDM-FIM (Charge Device Model – Field Induced Model)

ESD Control in the Workplace for ANSI/ESD S20.20-2007 & ANSI/ESD S541-2003
- _ Storage Considerations
- _ Transport Design Considerations

ESD/ESA Advanced Monitoring Systems in the Workplace

Anti-counterfeiting Measures for Packaging, Materials & Components

Ionization

Material Qualification Sequence: How to Qualify Material from Suppliers?

Engineered ESD Polymers (ICPs, IDPs, CNT)

ESD Testing Methods for Material and Packaging Design Structures

Review of current standards activities

Course Length: 2 Days

Cost: $1200.00

Class is very small and limited to six (6) persons only. The seminar is located in lovely Newport Beach, California. The small size affords an opportunity for personal instruction and the ability of the people attending to run the experiments themselves if they wish. Experiments and demonstrations make up a significant fraction of the class time.

Instructors

Doug Smith

To book dates, please email Doug Smith at doug@emcesd.com or call Doug at 408.858-4528

Mr. Smith held an FCC First Class Radiotelephone license by age 16 and a General Class amateur radio license at age 12. He received a B.E.E.E. degree from Vanderbilt University in 1969 and an M.S.E.E. degree from the California Institute of Technology in 1970. In 1970, he joined AT&T Bell Laboratories as a Member of Technical Staff. He retired in 1996 as a Distinguished Member of Technical Staff. From February 1996 to April 2000 he was Manager of EMC Development and Test at Auspex Systems in Santa Clara, CA. Mr. Smith currently is an independent consultant specializing in high frequency measurements, circuit/system design and verification, switching power supply noise and specifications, EMC, and immunity to transient noise. He is a Senior Member of the IEEE and a former member of the IEEE EMC Society Board of Directors.

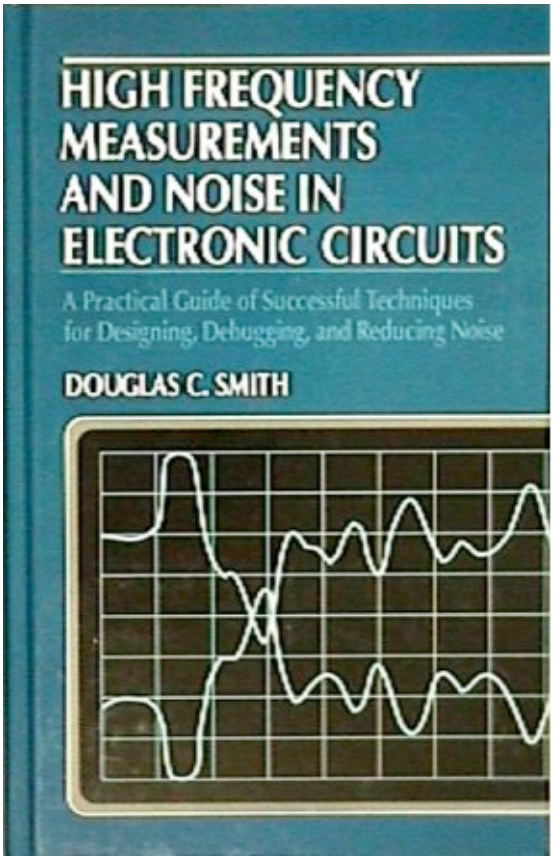
His technical interests include high frequency effects in electronic circuits, including topics such as Electromagnetic Compatibility (EMC), Electrostatic Discharge (ESD), Electrical Fast Transients (EFT), and other forms of pulsed electromagnetic interference. He also has been involved with FCC Part 68 testing and design, telephone system analog and digital design, IC design, and computer simulation of circuits. He has been granted over 15 patents, several on measurement apparatus.

Mr. Smith has lectured at Oxford University, University of California Berkeley, University of California Santa Barbara, Vanderbilt University, AT&T Bell Labs, and at many public and private seminars on high frequency measurements, circuit design, ESD, and EMC. He is author of the book High Frequency Measurements and Noise in Electronic Circuits. His very popular website, http://emcesd.com (www.dsmith.org), draws many thousands of visitors each month to see over 140 technical articles as well as other features.

Mr. Smith's consulting activities focus on design verification and problems at the system, circuit, and device level as well as EMC and immunity (including ESD) problems. By applying specialized knowledge and measurement technology that Doug Smith has developed over the years. Systems and design work Doug has been involved with include:

- Semiconductor processing equipment
- Semiconductor device design and verification
- Lightwave transmission equipment
- Wireless equipment including:
  - Cellular phones and base station equipment
  - Cordless phones
- Information Technology Equipment
- Telephone switching systems
- Shielded and Unshielded data transmission systems
- Medical equipment
- Air traffic control equipment
- Industrial control equipment

- Network file servers
- Automotive
- Consumer Appliance



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Bob Vermillion
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Bob Vermillion has developed advanced ESD technologies with issuance of a U.S. Patent and several patents pending. In addition, one of Bob's ESD technologies has been qualified for a NASA Mars Mission.

In 2002, Bob was recipient of the Institute of Packaging Professional's AmeriStar Award for the electronics category. On 16 May 2007, Bob was inducted into the College of Fellows by the Institute of Packaging Professionals. Newsletter -The IoPP Newsletter Vol. 5, Issue 11 (21 May 2007). Most recently, Bob is Founder and Chair of the ESD Task Force, IOPP Medical Device Packaging Committee (https://www.iopp.org/pages/index.cfm?pageid=1539).

During the International 25th Anniversary for the 2003 ESD Symposium, Bob was recognized for his contributions in workshops, technical program committees, plus involvement in ESD/ESA standards activities. In addition, the IBM Volunteer Recognition Chair commended Bob for his outreach efforts in the local ESD community. From 1996 to 2003, Bob served on the Board of Directors of the Silicon Valley EOS/ESD Society. In October 2005, Bob was asked to join the Advisory Board of Controlled Environments Magazine.

Vermillion works with major corporations in the ESD/ESA materials and packaging qualification process, Certificate of Compliance procedures for supplier products, specification writing, ESD/ESA training, on-site testing (validation) and troubleshooting. In addition, Bob writes material and packaging qualification procedures for electronic organizations, fiber optics, medical and defense related companies.

Having published extensively in the field of Electrostatics, Bob's most recent articles can be found in the February 2008 issue of (*Pharmaceutical & Medical Packaging News (www.pmpnews.com),* *Controlled Environments* (*www.cemag.us*) and *Conformity* (*www.conformity.com*) magazines. Copies of these articles can be downloaded free off the respective websites.

As a Guest Instructor for San Jose State University, California State Polytechnic University (1 May 2008: *www.polypack.calpoly.edu*) and Clemson University, Bob also conducts ESD Seminars for the defense, medical, electronics, disk media and automotive industries. Other engagements include *ESDiscovery 2000-2003* in the USA, Malaysia and Singapore. In addition, Bob has presented for the past few years before the scientific community for the International Conference on Inherently Conductive Polymers. In Mexico's Silicon Valley, Bob conducts ESD Materials Seminars for the engineering community, including contract manufacturing, procurement and management for firms.

RMV Technology Group, LLC is a Member of the American Council of Independent Labs (ACIL), a certified as an ESD Journal Approved Laboratory, IEEE and ESDA Standards Committee. Bob is an *iNARTE* Certified ESD and Product Safety Engineer. A Certified Lifetime Packaging Professional and a member of the College of Fellows with the Institute of Packaging Professionals, Bob is on the board of the IOPP Consultants Council and recently elected the Board of Directors for iNARTE.