

Designing for EMC & Signal Integrity (2 Days)
Grounding, Shielding, Power, Emissions, ESD, RFI & More

Includes over 35 Practical Design EMC Fixes

Date and Time

March 15-16, 2010

8 a.m. – 4 p.m.

Location

Location: Washington Laboratories
7560 Lindbergh Drive
Gaithersburg, MD 20879
301-216-1500

Teacher

Daryl Gerke, P.E.

Daryl is a partner in Kimmel Gerke Associates, a professional engineering firm that specializes in EMI/EMC issues. The firm is an independent engineering and training company. Daryl and his business partner, Bill Kimmel, share over 80 years of practical EMC experience, as well as several thousand hours of technical training.

Course Description

This course presents practical design-oriented methods for maintain signal integrity on complex and high speed circuit board and methods of designing electronics systems for Electromagnetic Compatibility. Signal Integrity and EMC: We consider Signal Integrity (SI) as a special case of EMC. First, while the design techniques are often the same, the levels can be vastly different. SI deals with millivolt/milliamp levels, while EMC often deals with emicovol/microamp levels. Also, while SI focuses primarily on the printed circuit boards (PCBs), EMC often deals with the whole system: the design of the grounding, shielding, power and cabling. Our PCS class deals with both of these important issues at the same time.

Objectives

After this course, you will be able to:

understand and implement high speed signal design for the densely-packed confines of printed circuit boards so that the product will pass compliance and performance requirements.

- Discover component selection criteria to enhance Signal Integrity
- Speed your product's time to market
- Reduce the time and cost of EMC testing and measurements
- Improve test results and reliability

Who Should Attend:

- Electronics, mechanical and systems engineers and technicians, EMC personnel and technical managers could all benefit.
- No prior EMC knowledge is needed - just a desire to learn more about these problems and how to deal with them.

Course Outline

- **Introduction**
 - Interference Sources, Paths, and Receptors
 - Key Threats in EMC and SI
 - EMI Regulations & Impact on Design
 - Signal Integrity and EMC
 - Looking for "Hidden Transmitters" and "Hidden Antennas"
- **Physics of EMI**
 - Frequency, Time, and Dimensions
 - Dealing with "Hidden Schematics"
 - Transmission Lines and "Hidden Antennas"
 - Common Mode & Differential Mode
- **Components**
 - Passive Components and Their Limitations
 - EMC Effects in Active Components
 - Simple EMC Filters and How to Design Them
 - Clock and Reset Circuits
 - On-Board Power Regulators
 - Clock Dithering
- **General PCB Issues**
 - Identifying Critical Circuits
 - Component Placement
 - PCB Stack-up Recommendations
 - Isolated or "Split" Planes
 - I/O Treatments
 - Circuit Board Grounding
 - Power Decoupling
 - Buried Capacitance
 - Trace Routing and Terminations
 - Crosstalk
 - Component Shielding
- **Power Supplies**
 - Power Quality and EMI
 - Filters & Transient Protection
 - Switch Mode Power Supply Design for EMC
- **Grounding**
 - Function of a Ground
 - Safety and EMI
 - Single Point, Multi Point, and Hybrid Grounds
 - Ground Loops
 - Signal Grounds
 - Analog Grounds
 - Grounding Guidelines
- **Shielding**
 - Materials & Limitations
 - Dealing with Openings and Penetrations
 - Magnetic Field Shielding Issues
 - Cable Grounding
 - Cable Shielding & Connectors
 - Cable Crosstalk
 - Shielding Design Guidelines

Fee/Registration

Fee is US\$995 per student. Payment in advance via check, VISA or MasterCard, preferred credit cards or bank transfer (ask for transfer details).

For registration and payment received one month prior to course, deduct \$100. For three or more participants from an organization and payment received one month prior to course, deduct \$200 each.

COST: Design for EMC/SI (2 days) - \$995

Four or more from same company -- 10% discount.

HOW TO ENROLL: <http://www.emiguru.com/tekgaith10.htm>, or 1-800-763-3133

INFO: Contact Daryl Gerke at Kimmel Gerke Associates

480-755-0080 (Arizona Office Direct)

888-EMI-GURU (Toll Free Voice Mail Box)

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