

EMI/EMC and ESD Training

Course Description

In modern electronics, component size continues to decrease and complexity to increase. Electrostatic and magnetic fields and their interactions are becoming increasingly important. As problems have arisen, creative solutions had to be developed. An understanding of the principles and developments in this growing field is essential to many individuals in electronics industries

Level: Connectivity 2

Training Duration: 3 days

Prerequisites:

None

Who Should Attend?

Individuals whose work requires an understanding of the effects of interacting electrostatic and magnetic fields on electronic equipment. It is suitable for circuit designers, electronics packaging specialists; systems engineers, test specialists, etc.

Objectives:

To provide to the participants a review of applicable theory and an explanation of the grounding and shielding concepts and terminology. During the course the participants will get an overview of effective techniques for overcoming problems through the proper use of grounds and shields.

Course Outline

1. Introduction

- Interference Sources, Paths, and Receptors
- Key Threats in EMC
- EMI Regulations & Impact on Design
- Looking for "Hidden Transmitters" and "Hidden Antennas"

2. Physics of EMI

- Frequency, Time, and Dimensions
- Dealing with "Hidden Schematics"
- Transmission Lines and "Hidden Antennas"
- Common Mode & Differential Mode

3. 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

4. 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

5. Grounding

- Function of a Ground
- Safety and EMI
- Single Point, Multi Point, and Hybrid Grounds
- Ground Loops
- Signal Grounds
- Analog Grounds
- Grounding Guidelines

6. Power Electronics

- Power Quality and EMI
- Filters & Transient Protection
- Switch Mode Power Supply Design for EMC

7. Shielding

- Materials & Limitations
- Dealing with Openings and Penetrations
- Magnetic Field Shielding Issues
- Shielding Design Guidelines

8. Cable and Connectors

- Cable Grounding
- Cable Shielding & Connectors
- Cable Crosstalk

9. ESD Introduction

- ESD protection schemes
- ESD related failures

10. ESD and CMOS Technology Review

- Diode ESD protection device
- Resistor ESD protection device
- MOS ESD protection device

11. ESD and Ground/Power Strategies

12. RF/Mixed Signal ESD Protection Schemes

- Parasitic effects of ESD protection structures
- Noise Isolation

13. Whole Chip ESD Protection Schemes

- Input ESD Protection Schemes
- Output ESD Protection Schemes
- Power Clamps
- Multiple domains

14. Summary