

Introduction to EMC – Fundamental Concepts **(One Day Seminar)**

INTRODUCTION

- Why is this Course Necessary
- Uniqueness of EMC Engineering
- Definition of EMC Terms
- Basis Forms of EMC
- Elements of the EMC Environment
- Basic Aspects of EMC
- Electrical Dimensions
- Logic Families

SIGNAL SPECTRA AND WAVEFORMS

- Signal Spectra - Bandwidth
- Digital vs. Analog Waveforms

BASIC ELECTROMAGNETIC THEORY

- How Circuits Create EMI
- Right Hand Rule
- Maxwell Equations Made Simple
- Electric and Magnetic Field Impedance
- Magnetic and Electric Field Representation
- Closed Loop Circuit
- Common-Mode and Differential-Mode Currents
- What Makes an Efficient Antenna
- Loop Area Between Components

ELECTROSTATIC FIELDS (a.k.a. ESD)

- Description of an ESD Event
- ESD Waveforms and Triboelectric Series
- Failure Modes

GROUNDING AND 0V-REFERENCING

- Inductance – What is It?
- Path of Least Impedance
- Self Inductance
- Current Return Paths
- Defining Ground
- Grounding Methodologies
- Ground Loop Control
- Breaking up Ground Loops

COMMON IMPEDANCE COUPLING

- Methods of Coupling
- Common Impedance Coupling

NON-IDEAL BEHAVIOR OF COMPONENTS

- Component Characteristics at RF Frequencies
- Non-Ideal Behavior of Components
- Circuit Analysis
- Passive Component Analysis
- Hidden Characteristics of Digital Components

FUNDAMENTALS OF SIGNAL INTEGRITY

- Defining Signal Integrity
- Lossy and Lossless Transmission Lines
- Transmission Line Systems
- Identification of Signal Distortion
- Relative Permittivity
- Crosstalk

PRINTED CIRCUIT BOARD BASICS

- Stackup Configurations
- RF Field Distribution
- RF Current Density Distribution
- RF Return Path Configuration
- Image Plane and Moat Violations
- Functional Partitioning
- PCB Layout Guidelines

SIMPLE TEST FACILITIES

- Open Area Test Sites (OATS)
- Chambers
- Screen/Shield Rooms
- LISNs/CDNs
- Shielding