

Fundamentals of Grounding and Shielding
For System Level Noise Reduction
(One Day Seminar)

WHAT CREATES RF ENERGY

- Signal Spectra (Fourier Analysis)
- How RF Energy is Created
- Right Hand Rule and Maxwell's Equations
- Component Characteristics at RF Frequencies

ELECTRICAL NOISE CONCEPTS

- Digital Components as a Source of EMI
- How Does Current Travel—What Path Does It Take?
- Path of Least Impedance / Typical Wire Configuration
- Concept of Self Inductance
- Common-Mode and Differential-Mode Currents

BASIC GROUNDING CONCEPTS

- Grounding Concepts
- Different Types of Grounds Possible in a System
- Multiple Return Path Possibilities
- Grounding Misconception
- Reasons for Grounding
- Product Safety and Signal Referencing Requirements

GROUNDING METHODOLOGIES

- Floating/Single/Multiple/Hybrid Ground Systems
- Cable Shield Grounding
- Ground Trees

GROUND LOOPS & COMMON IMPEDANCE COUPLING

- Inductance of Wire
- Minimizing Ground Inductance
- Mutual Inductance/Capacitance Between Transmission Lines
- Common Impedance Coupling
- Ground Loop Control – System and Adapter Cards
- Avoiding Ground Loops
- Isolation Techniques
- Common-Mode Rejection

SHIELDING THEORY

- Shielding Effectiveness
- Transmission Line Theory of Shielding Effectiveness
- Skin Depth and Absorption Loss
- Multiple Reflections and Loss in Copper and Thin Shields
- Apertures in Shielding Walls
- Waveguide Below Cutoff

SHIELDING APPLICATIONS AND IMPLEMENTATION

- Gasketing and Conductive Coatings
- Potential Mechanical Problems When Using Gaskets
- Conductive Coatings
- Shielding Integrity Violations