EMI Causes, Measurement, and Reduction Techniques for Switch-Mode Power Converters

This seminar provides a comprehensive introduction for engineers desiring a fundamental understanding of electromagnetic interference (EMI) issues associated with switch-mode power converters, and also for experienced engineers eager for a detailed understanding of EMI noise creation mechanisms and design fixes for power converters.

The seminar begins with an introduction to the fundamental EMI coupling mechanisms and their electrical properties. The concept of impedance mismatch is presented as a basis to understand filtering theory. Differential-mode (DM) and common-mode (CM) separation and filtering approaches are derived, with measurement and separation techniques presented. DM & CM measurement and reduction techniques are presented using an experimental flyback converter example. Converter layout techniques and principles are derived, and experimentally confirmed. The seminar presents how DM and CM currents are created in power converters, with layout and construction techniques to minimize the need for costly filtering. Several practical EMI reduction techniques and construction methods are provided throughout the seminar.