3-Day Practical EMC Control

From Principles, Design Techniques to Conformity Assessment

EMI & EMC

Traditionally, many EMC problems are after the fact and solved through rule-of-thumb. Such approach delays the product time to market and increases the development cost as many rectification cycles are needed. Proper design of a product that can meet the EMC requirements requires a basic understanding of the underlying principles on the potential causes of the EMC emission and susceptibility. This course is specifically designed such that mathematic equations are kept to minimum while emphasizing the focus on the practical aspects. Hands-on sessions are included to enhance the understanding of the important concepts.

Course Outline

Day 1
Introduction to EMC, Definition, Terminology
- Emissions: Conducted & Radiated
- Immunity: Conducted & Radiated

Importance of EMC Design & Measurement
- Shorter product development cycle
- Shorter product time to market (TTM)

EMC Regulations & Standards
- FCC
- CISPR

EMC Conformity Assessment/Measurement
- Conducted Emission
- Radiated Emission (3m, 10m)
- Electrostatic Discharge (ESD)
- Electrical Fast Transient (EFT) or Burst
- Surge

Hands-on Session: Demonstrating EMC issues via measurement

Day 2
Fundamental Concept of EMC/EMI
- Basic propagation model: Source-Path-Receptor(Victim)
- Control emission – Reduce noise source, reduce propagation efficiency
- Control immunity – Increase receptor noise immunity, reduce propagation efficiency

Source Characteristics
- Energy source
- Clock & its harmonics (duty cycle & edge rate)
- Data & its harmonics
- Differential mode
- Common mode

Coupling & Emission Mechanisms
- Conductive coupling – Power distribution, ground return path, interconnecting cables
- Near field coupling – Capacitive crosstalk, inductive crosstalk
- Far field coupling – Cable/antenna
- Transmission line emission – Routing, termination, discontinuity, fringe, radiation loss, heat sink

Hands-on Session: Demonstrating EMC issues via simulation/measurement

Day 3
EMC Control Techniques (PCB)
- Filter
- Suppressor or choke
- Shielding enclosure
- Grounding (isolation)
- Cable/connector
- Device selection/placement

Management Plan
- Design – EMC control & design measures (schematic, layout, device placement review)
- Prototype – Pre-compliance EMC tests
- Production – EMC certification
- Upgrade/modification – EMC re-assessment

Case Study
- Simulation on the test board radiated emission
- Shielding enclosure design
- Cable/Connector design

Hands-on Session: Demonstrating EMC issues via simulation/measurement

Public Training Session

Date: 13-15th October, 2014 (Monday – Wednesday)

Time: 0900 - 1700

Venue: Melia Hotel, Kuala Lumpur
16, Jalan Imbi,
Kuala Lumpur 55100
Malaysia

This public training is HRDF (PSMB) claimable.
Register by 12th September 2014 to enjoy early bird discount.
Certificate will be awarded to participants who complete the training.
Lunch, refreshments and training handout provided and included.
Transportation and accommodation not included.

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About the Instructors

Dr. Koh Boon Ping received his BEng and PhD degrees in Electrical and Electronics Engineering from the University of Bristol, United Kingdom, in 1999 and 2003, respectively. From 2004 to 2010, he worked as an electronic engineer with Motorola Malaysia on projects particularly in the areas of antenna design for portable two-way radios, electromagnetic energy (EME) study especially on the Specific Absorption Rate (SAR) of the communication devices, and electromagnetic compatibility (EMC). Currently with Intel Malaysia, he is actively working on projects related to signal integrity and electromagnetic interference (EMI) studies especially on the System-on-Chip (SoC), package and printed circuit board system level. As a Senior Member of the IEEE, he has published papers in refereed conferences and journals in IEEE and IEE, and he is currently holding three patents.

Mr. Chee Lay Heng graduated with Bachelor of Electrical and Electronics Engineering from University of Tasmania, Australia in 1994. He started his career in manufacturing, working for Clearwater Pty. Ltd. In Melbourne, Australia. He worked for Motorola Penang for 17 years. He successfully built the largest ISO/IEC 17025 accredited electromagnetic test laboratory for Motorola's land mobile radio business worldwide. He served as the Chairman of the Motorola Amateur Radio for many years. In 2004, he successfully led the amateur radio team to work with the Penang General Hospital to design, install, and commission Penang's first Emergency Ambulance Radio Link (PEARL). In 2010, he left Motorola and joined Cisspr Sdn. Bhd. He is now the company director of Cisspr, which specializes in radio frequencies (RF), electromagnetic compatibility (EMC), and electromagnetic safety (EMS) testing. Cisspr performs compliance testing in accordance with local and international RF, EMC, and EMS regulations.

One of the most effective types of radiation absorbent material comprises arrays of pyramid shaped pieces, typically used to house the equipment for performing measurements of EMC.

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