2009 Wireless & EMC Seminar Program: Technology and Methods for FCC, EU and International Compliance

Click HERE to register.

Session 1: Focus on Regulations: December 7-8, 2009 ($895)
Procedures and processes for Radio Certification in the US, Canada and Europe.

Session 2: Focus on Testing: December 9-11 ($1295)
Laboratory Measurement Methods for Wireless and EMC Requirements

Session 1 and 2 Together: $1995

Location

Elliott Laboratories/NTS
684 W. Maude Avenue
Sunnyvale, CA 94085

The Seminar

Join the experts with ATCB, NTS and Washington Laboratories for a comprehensive overview of methods and requirements of EMC and Radio Regulations. This seminar will cover methods of testing, evaluation and certification requirements for commercial equipment with demands for EMC compliance. With specific focus on radio regulations compliance for products bound for global markets. Included is an update on the recent TCB Council and FCC Training. Learn the specific requirements of the FCC Rules and Regulations including recent interpretations and policies and the impact of the new edition of ANSI C63.4 and the newly-issued ANSI C63.10.

The seminar will be provided in two modules. The first module is a two-day comprehensive presentation on FCC, IC and EU requirements for Radio Certification. The second module is a three-day intensive presentation on laboratory methods to meet EMC requirements.

Updates from the FCC/TCB Council Training. The training will feature critical technical updates on regulations and policies from the FCC/TCB Council training in October 2009.

Demonstrations. Observe laboratory demonstrations of key concepts, compliance measurements, power, frequency, bandwidth, spurious emissions.

Who Should Attend

Design, development and test engineers and technicians will benefit from receiving the latest in critical updates on test methodology from practicing experts Dennis Ward and Werner Schaefer.

As the technologies evolve, measurement and certification of devices are constantly evolving and creating challenges for the electronics industry. Keeping abreast of these changes and the nuances of the regulations is critical for speeding electronics products' time-to-market. Fierce competition from rival developers creates additional pressure to design the devices for compliance with the regulatory requirements and "getting it right the first time."

New spectrum and services are being allocated in the US and abroad as the demand for higher speed and multi-point access to information pushes developers to create highly integrated products. Exotic, broadband modulation techniques cram more bits-per-hertz into the allocated spectrum. As it is not uncommon to find multiple-transmitter devices, the challenge to certify these devices creates issues dealing with radiation hazards, electromagnetic compatibility (EMC) and certification strategies.

Our Lecturers have a wealth of experience and information in the field of product testing and certification and will share their perspective and insight on EMC regulations and evolving requirements for radio frequency systems. This goal of this seminar is to present the latest information on these evolving

requirements and to give attendees better understanding of the processes and procedures for approving equipment.

Seminar Overview

Specific topics include:

- Explanation of new technologies (3G, LTE, WiMAX and UWB)
- Updates from TCB Council workshop in Baltimore, October 2009 and the latest requirements and changes from FCC, IC and Europe
- Practical testing techniques
- Testing methodologies for electronic devices, with a focus on radio transmitter devices
- Measurement methods using spectrum analyzers including proper methods of determining power, averaging techniques, ACP measurements (and implemented algorithms), bandwidth and spurious emissions
- Measurement system sensitivity and overload considerations for linear measurements
- Dynamic range considerations
- Sweep time considerations (probability of intercept for broadband signals)
- Extending the frequency range beyond the coax medium (external mixing)
- Test accreditation, including calibration, uncertainties and engineer proficiency

Seminar Format: The Instruction You Need.

This training opportunity is split into two different topic areas that have been developed to complement each other. The first two days will focus on regulatory matters and the approval of wireless devices. The focus will be on consumer products and systems and the impact of FCC, IC Industry Canada and Europe. The third through fifth day will focus on laboratory techniques, operations, accreditation and QA processes. Attendees can choose to take one or both of these courses.

Expert Instruction

Dennis Ward is senior applications examiner for **AmericanTCB**. He has been involved in many aspects of EMC, wireless and product conformance for many years. He has worked as a EMC test engineer and Director of Laboratories for CKC Laboratories. He has consulted on numerous products for world-wide approval, including cellular, 3G, Wi-Fi, Spread Spectrum, Digital Transmission Systems, Wireless Access Points, and numerous licensed and unlicensed products. He has performed certification review for conformance with Specific Absorption Rate (SAR) requirements and radiation hazards.

Mr. Ward has been directly responsible for accreditation issues and activities supporting Telecommunications Certification Bodies, accreditation to ISO Guide 65 and ISO Guide 17025. Mr. Ward is a EMC and ESD NARTE-Accredited Test Laboratory Engineer.

Werner Schaefer is the principal engineer and owner of **Schaefer Associates**, a training and consulting company. He is currently employed as a technical leader for EMC and RF & Microwave Calibrations as well as a quality manager of accredited test laboratories in the high tech industry. Mr. Schaefer has an MSEE and MBA and 19 years of experience in the field of RF and Microwave measurement technology, in particular in the areas of spectrum analysis, network analysis, phase noise measurements, RF power measurements and signal generation/simulation. This also includes extensive experience in the determination of measurement

uncertainty estimates. He serves on many national and international EMC and quality standards committees in leading roles. In addition is a NARTE certified EMC engineer, a RABQSA certified quality system lead auditor, a member of the BoD of the IEEE EMC Society as well as a lead auditor for domestic accreditation bodies in the technical fields of EMC, Radio, SAR, and RF & Microwave Calibration.

Mark Briggs is senior engineer at **Elliott Laboratories/NTS**. He has over 15 years of experience in the testing and evaluation industry and has performed and overseen numerous product evaluations for EMC and radio frequency devices. He developed testing methodology for Dynamic Frequency Selection (DFS) measurements for UNII devices. He has extensive experience in R&TTE Directive and international approvals for electronics systems.

Course Outline

Days 1 & 2: FCC, IC and EU Regulations
Requirements for Radio Transmitters: Procedures and processes for Radio Certification

Instructors: Dennis Ward and Mark Briggs

8:00 AM Registration

8:30 AM Introduction and overview of course

9:00 AM Licensed verses unlicensed devices

9:30 AM TCB Applications–TCB approval processes and confidence-building
Problem applications – common mistakes

11:00 AM Break

11:15 AM RF Exposure, Maximum Permissible Exposure (MPE)

12:00 Lunch

1:00 PM RF Exposure, Specific Absorption Rate (SAR)

2:00 PM Break

2:30 PM FCC Submissions from a Laboratory Perspective

3:30 PM RF hazards considerations: Portable vs Mobile RF hazards considerations:
Measurement vs predicted for single vs multiple transmitters and antenna(s)

4:30 PM Questions and Answers

5:00 PM End

Tuesday, December 8, 2009

8:30 AM US/FCC Radio Regulations overview

9:30 AM FCC Technical Rules

10:00 AM Break

10:15 AM Updates from TCBC Training: Permit But Ask Procedure, KDBs

11:30 AM Modular approvals and permissive changes

12:00 PM Lunch

1:00 PM 802.16, 802.11, WiMAX, LTE

2:00 PM HSUPA, KDB

2:30 PM CE Marking for the R&TTE Directive

3:00 PM Break

3:30 PM RTTED Approval for European market

4:30 PM Certification requirements for Industry Canada

5::00 PM End

Days 3-5: Laboratory Measurement Methods for Wireless and EMC Requirements: Practical testing techniques, laboratory operations and measurement methods

Instructor: Werner Schaefer

Wednesday December 9, 2009

9:00 AM Spectrum Analyzer Fundamentals

- Theory of operation
- Block Diagram
- Understanding Specifications – Part 1

10:30 AM Break

10:45 AM Spectrum Analyzer Fundamentals

- Understanding Specifications and Instrument Settings – Part 2
- Time Domain, FFT

12:15 PM Lunch

1:00 PM Spectrum Analyzer Sample Measurements

- Time Domain
- FFT
- Noise Measurements

2:00 PM Measurement Accuracy Considerations

- Parameters that can impact the measurement uncertainty
- Uncertainty calculation approach

2:45 PM Break

3:00 PM Narrowband and Broadband Measurements with Spectrum Analyzers

- Signal discrimination
- Preselection considerations
- Signal to noise ratio considerations
- Effect of various detectors on different signal types
- Impulse bandwidth considerations

4:30 PM Questions and Answers

5:00 PM End

Thursday December 10, 2009

9:00 AM Role of Detectors in Digital Modulation Measurements

- Introduction
- Detectors - History and recent technology
- Detector example measurements

10:30 AM Break

10:45 AM Importance of Averaging for Digital Modulation Measurements

- Averaging—History and recent technology
- Averaging example measurements
- Automatic couplings and detector/averaging selections

12:15 PM Lunch

1:00 PM Power Measurements on Digitally Modulated Signals with a Spectrum Analyzer

- Adjacent Channel Power (ACP) Measurement Problem
- ACP algorithm
- Impact of video averaging
- Integration and resolution bandwidth methods

2:15 PM Measurement of Power Spectral Density (PSD) with a Spectrum Analyzer

- Importance of “Noise Marker” function
- Performing a PSD measurement and interpreting the result

3:00 PM Break

3:15 PM The Use of Preamplifiers with Spectrum Analyzers

- Instrumentation sensitivity
- Impact of input attenuation and resolution bandwidth settings
- Use of a preamplifier in the system
- Noise figure considerations
- Concept for selection of preamplifiers

4:30 PM Questions and Answers

5:00 PM End

Friday December 11, 2009

9:00 AM Accreditation of an EMC/Radio Test Lab in the US

- Meaning and purpose of laboratory accreditation
- Prerequisites for accreditation
- Accreditation process details

10:30 AM Break

10:45 AM Specific Topics Related to Accreditation

- Test equipment calibration requirements
- Internal calibrations
- Measurement uncertainty requirements
- Test equipment and test environment suitability

12:15 PM Lunch

1:00 PM Maintaining Accreditation

- Annual submissions and activities
- Best laboratory practices (e.g, confidence checks, audits, proficiency testing)
- Updates of scopes of accreditation

2:30 PM Questions and Answers

3:00 PM End

Support material

A complete lecture notebook

Copy of new standard

Fee/Registration

Session 1: Focus on Regulations: December 7-8, 2009: $895
Requirements for Radio Transmitters: Procedures and processes for Radio Certification in the US, Canada and Europe. Two days of training.

Session 2: Focus on Testing: December 9-11: $1295
Laboratory Measurement Methods for Wireless and EMC Requirements: Practical testing techniques, laboratory operations, direct measurement methods and demonstrations over the course of three days.

Session 1 and 2 Together: $1995

Discounts! Second student from same company: 10% discount for second enrollment.

Fee Includes:

Lecture notebook, copy of the standard, lunch, breaks, and completion certificate.

Payment in advance via check, VISA or MasterCard preferred credit cards or bank transfer (ask for transfer details.)

Click HERE to register.

Suggestions for Accommodation

Arrangements are the responsibility of the attendee. Map and hotel information are references provided courtesy of Elliott Labs website: http://www.elliottlabs.com/contact_us.htm