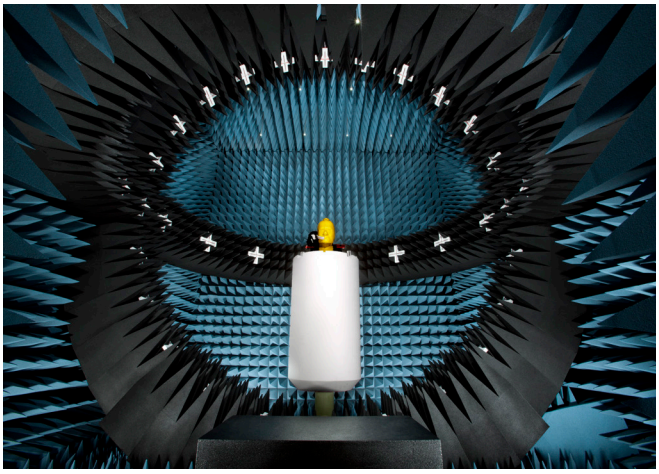
CASE STUDY ELECTRO MAGNETIC TEST, INC. – MOUNTIAN VIEW, CALIFORNIA



When EMT Labs (Electro Magnetic Test, Inc.), an independent testing and consulting firm in Mountain View, California wanted to expand their test capabilities to offer wireless over-the-air (OTA) performance verification, they enlisted the help of ETS-Lindgren. Since EMT Labs services many important, as well as demanding, high tech companies located in the Silicon Valley, they knew a CTIA Authorized Test Lab (CATL) distinction was critical to document their new wireless test capabilities. ETS-Lindgren provided an Antenna Measurement System, Model AMS-8923-150. This system is designed for fully-compliant radiated wireless antenna measurements over the frequency range from 690 MHz to 6 GHz with a 1.5-meter path length. The chamber package provided includes test capabilities for cellular, Wi-Fi, A-GPS (2G/3G/4G), and LTE-SISO.

In addition, ETS-Lindgren assisted EMT Labs by providing on-site installation, on-site integration, on-site training, and CATL certification system assistance. EMT Labs knew they could rely on ETS-Lindgren to be successful with their test lab expansion. After all, ETS-Lindgren is the first company to have received the CATL distinction in 2002. Today, more than 75% of the CTIA Authorized Test Labs (CATLs) utilize ETS-Lindgren's solutions for over-the-air radiated performance testing. Now, with Model AMS-8923-150, EMT Labs offers CTIA testing of mobile handsets and antenna devices, with or without a simulated human head. The system performs both Total Radiated Power (TRP) and Total Isotropic Sensitivity (TIS) measurements according to CTIA specifications. It includes a multi-antenna array wherein the ring houses 23 dual-polarized measurement antennas spaced every 15° with anechoic absorber material between. An integrated laser alignment system aids Device Under Test (DUT) positioning. An integrated high-speed switch controller system provides fast switching between antennas for accelerated testing.

It also has a horizontal 16 antenna ring so that MIMO capabilities can easily be added at a later time. In addition, the EMQuest™ Antenna Measurement Software provided offers a wide range of fully parameterized test methods for measuring basic antenna performance metrics as well as testing both radiated and conducted performance of various wireless devices. The flexibility of EMQuest enables EMT Labs to test per a wide variety of the industry standard OTA radiated performance test requirements. EMT Labs is now well positioned to meet their customers' current and future wireless test requirements

Cellular Test Package

The components of this package support testing in accordance with the CTIA OTA Test Plan for cellular devices. ETS-Lindgren provided Ripple Testing to evaluate the chamber and positioner system as specified in the CTIA OTA Test Plan. ETS-Lindgren also performed range calibration with included dipoles to allow for TRP and TIS testing. The DUT transmits via the internal RF source and a subsequent communication link is established between the communication tester and DUT via communication antennas.

Wi-Fi (SISO) Test Package

The components of this package support Wi-Fi OTA testing per the Wi-Fi Alliance® Test Plan for RF Performance Evaluation of Wi-Fi Mobile Converged Devices or of stand-alone Wi-Fi devices. The system utilizes methods to derive basic parameters for transmitter performance and receiver sensitivity performance evaluation: the test plan evaluates Receive Sensitivity of Wi-Fi with cellular active (in-call) and Receive Sensitivity of the cellular radio(s) with Wi-Fi active (also known as de-sensitivity).

Features:

- The Wi-Fi Converged Wireless Group (CWG) Test Plan requires the anechoic chamber to be tested at 2450 MHz and 500 MHz for quiet zone ripple accuracy. (The Test Plan does not enforce 5500 MHz ripple testing so a 5500 MHz loop was not included.)
- Precision sleeve dipoles and center-fed loop antennas fulfill the symmetry requirement.

A-GPS (2G/3G/4G) Test Package

The Antenna Measurement System components of this package support 2G/3G Assisted GPS and 4G LTE testing in accordance with the CTIA OTA Test Plan.

Features:

- ETS-Lindgren performed quiet zone uncertainty testing for A-GPS test frequency of 1575.42 MHz.
- ETS-Lindgren performed test system range calibration with dipoles provided.
- EMQuest EMQ-100 software derives 2G/3G A-GPS test parameters (GPS TIS, Upper Hemisphere Isotropic Sensitivity, Partial Isotropic GPS Sensitivity) and LTE parameters using SUPL 2.0 and C/N0 Averaging vs. Median to minimize non-monotonic behavior.

LTE Test Package

ETS-Lindgren provided EMQuest EMQ-100 and the EMQ-109 Test Package to support all LTE SISO Frequency Division Duplex and Time Division Duplex bands currently supported by instrumentation vendors. LTE implementation utilizes Multiple Input Multiple Output (MIMO) technology, i.e. multiple antennas on the receiver and transmitter utilize multi-path effects that transmit additional data rather than causing interference.

ETSI

A complete ETSI measurement setup was provided, including antennas and tripods for testing in accordance with the new ETSI EN 300 328 v1.8.1 and ETSI EN 301 893 v1.7.1 standards for wideband data transmission systems, including IEEE 802.11™, Bluetooth® and Zigbee™. ETS-Lindgren's Total Integrated Lab Environment (TILE!™) EMC application software was tailored for ETSI applications with message prompts that guide the operator through the test process.

Series 81 Shielding Enclosure

ETS-Lindgren's Series 81 Shielding boasts over 10,000 installations worldwide. Modular panel sections are assembled with a zinc-plated clamping system into a self-supported, corrosion resistant enclosure. Sheets of 28-gauge galvanized steel are laminated to high-density particle and/or plywood board core. Dielectric vapor barrier and underlayment are placed beneath the shielded floor panels to maintain electrical isolation. The Series 81 enclosure can be converted into a ferrite-lined and/or conventional absorber-lined anechoic chamber.

Polyurethane Absorber

Utilizing a two-step impregnation process, ETS-Lindgren maximizes carbon distribution uniformity to achieve higher performance consistency and better fire resistance. ETS-Lindgren utilizes a non-hygroscopic, moisture-resistant substrate and FlexSorb™ coating creates durable absorber tips that resist breakage. ETS-Lindgren is the only absorber manufacturer that tests all absorber manufactured for key quality indicators such as RF Reflectivity.

About EMT Labs

EMT Labs (Electro Magnetic Test, Inc) is an independent testing and consulting firm ideally located in the San Francisco Bay Area (Mountain View, California) and central to Silicon Valley, which is one of the largest engineering development regions in the USA. EMT Labs provides testing, approvals, and homologation certifications desired and required to make a company's product an international success. As an ISO 17025 accredited testing and consulting firm, services offered provide an engineering focus across all areas of Electromagnetic Compatibility, Wireless, Wireline Telecom, and Safety certifications for a wide range of products for many different commercial and military environments. EMT Labs facilities include a state-of-the-art wireless test chamber, a 5 meter semi-anechoic chamber, several RF shielded enclosures and an open area test site (OATS). For more information, see emtlabs.com.

About ETS-Lindgren

ETS-Lindgren is an international manufacturer of components and systems that measure, shield, and control electromagnetic and acoustic energy. The company's products are used for electromagnetic compatibility (EMC), microwave and wireless testing, electromagnetic field (EMF) measurement, radio frequency (RF) personal safety monitoring, magnetic resonance imaging (MRI), and control of acoustic environments.

Headquartered in Cedar Park, Texas, ETS-Lindgren has manufacturing facilities in North America, Europe, and Asia. Additional information about ETS-Lindgren is available at www.ets-lindgren.com. Additional information about ETS-Lindgren's parent company ESCO and its subsidiaries is available at www.escotechnologies.com.

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