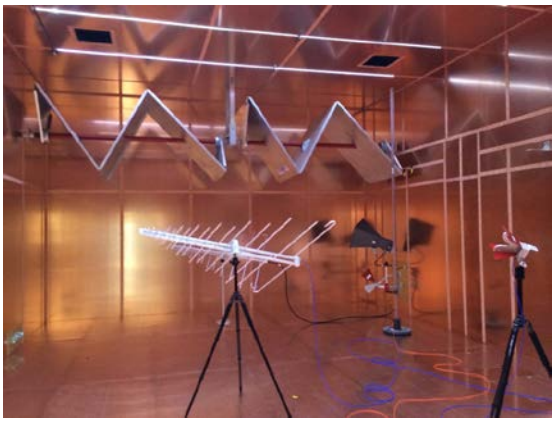
CASE STUDY EMC JAPAN CORPORATION – JAPAN

EMC JAPAN CORPORATION SMART™ 100 EMC Reverberation Chamber Test System with Copper Interior



This photo is for illustrated purpose only. Not actual installed chamber.

When EMC Japan Corporation, Japan, was ready to expand their EMC test lab capabilities, they contacted the experts at ETS Lindgren. A partner in the original R&D conducted on reverberation chamber test methodologies with the National Institute of Standards and Technology (NIST) as well as the US Naval Surface Warfare Center, ETS-Lindgren was at the forefront of this test technology when it was first developed. Now, with decades of experience in the design and installation of reverberation chambers, EMC Japan knew ETS-Lindgren would provide a high quality chamber that allowed great flexibility in full and pre-compliance testing to the industry standards including MIL-STD-461F/G, RTCA DO-160F/G, IEC 61000-4-21, SAE J1113/27, and FORD FMC1278. The chamber can also be used for HERO testing.

SMART 100 Overview

ETS-Lindgren SMART (Statistical Mode Averaging Reverberation Test-Site) chambers feature the latest developments in proven reverberation technology to create a superb electromagnetic environment (EME) for immunity testing. Compared with other test methods, SMART chambers are lower cost, have higher field-to-input power ratios, and can accept large test systems. These chambers are used for evaluating the emissions and immunity of electronic devices from 100 MHz to 18 GHz.

Reverberation Chamber Performance

The nominal chamber dimensions are 9.50m x 6.10m x 4.0m equipped with dual tuner (one is horizontal, and another is vertical), and provide a lowest usable frequency of approximately 100 MHz. The chamber provides frequency dependent performance in the range of 23 to 60 V/m per watt transmit antennas within the normalized field per RTCA DO-160F. Performance meets or exceeds the shield verification test in accordance with the test methods of MIL-STD-285 / IEEE-299 at 1 GHz plane wave field as well as the reverberation chamber validation requirements of RTCA DO-160F at 100 MHz to 18 GHz (based upon an empty chamber).

RF Shielding

ETS-Lindgren's expertise in RF shielding is the result of a time-proven design based upon over 10,000 installations worldwide. The shielded enclosure consists of shielded modular panel sections that are assembled with a clamping system into a self-supported enclosure. Sheets of 28-gauge galvanized steel are laminated to the exterior of a high-density particle and/or plywood board core. The interior shield for this application is copper for optimal field strength. Panels are joined together with an extruded "hat" and "flat" and "cove" clamping system to provide uniform and consistent pressure contact against the shielded panel mating surfaces. These structural clamping sections are zinc plated to resist corrosion with the following performance:

- Electric Field: 100 dB from 150 kHz – 50 MHz
- Plane Wave: 100 dB from 50 MHz – 1 GHz
- Microwave: 100 dB @ 10 GHz

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Model 4848 Z-Fold Tuner

ETS-Lindgren's tuners are made of large aluminum reflecting sheets supported on either a rigid box (truss) frame or a single spine, and are designed to provide the efficient reflecting surfaces necessary for use in the RF reverberation chamber. The tuners can be computer controlled using a positioning controller, providing a digital display of the angular position that can be used to control the speed and position of the tuner. Benefits include:

- Robust, lightweight construction
- Short Settling Time
- Efficient RF Scattering
- Sized to Match Chamber Size
- Cross Section Based on Operating Frequency
- Suitable for Tuned and Stirred Mode Operation

EMCenter™ Modular RF Platform

The chamber test system includes ETS-Lindgren's EMCenter, a flexible measurement platform consisting of an integrated microcontroller, modular chassis, and application-specific plug-in modules. The EMCenter's compact footprint provides centralized control and accessibility. Its 3U form factor accepts up to seven optional instrument card modules, each a miniaturized instrument optimized for RF measurement.

Primary Reverberation Chamber Components

- Log-Periodic Dipole Array Antenna: Model 3145B Log Periodic Antenna measures 100 MHz to 2 GHz in one sweep, eliminating the need for antenna changes at band breaks.
- Ridged Wave Guide Horn Antenna: Model 3117 Double-Ridged Wave Guide Horn Antenna performs from 1 GHz to 18 GHz, with power handling capabilities to 300W.
- Model 4-TR Antenna Tripod: Constructed of non-metallic, non-reflective materials that will not distort measurement data. The 4-TR tripod has easy to use controls for precise height adjustments. Maximum height is 2.0 m (80 in); minimum height is 94.0 cm (37 in). It can hold up to 11.8 kg (26.0 lbs.).
- TILE!™ Software: ETS-Lindgren's TILE! (Total Integrated Lab Environment) software's unique visual interface offers the necessary environment to create automated EMC test profiles, eliminating the need for additional programming. TILE! is designed to perform EMC measurements in any test environment, from an OATS, semi- or fully anechoic chamber, reverberation chamber, GTEM or any suitable test enclosure.

About EMC Japan Corporation

Established in 1989, EMC Japan Corporation is the leading test service company in Japanese EMC industry. EMC Japan Corporation has been playing crucial role assuring reliability for electric/electronics equipment in an electromagnetic environment by providing not only testing/measuring service, but also providing up-to-date information, advice, and consulting as one-stop service provider.

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