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The USDS is Multi-Use!

Compare ***Different*** Test Sites!
Quick Shielding Effectiveness Testing!
Quasi-Peak Detector Check!
Insure your test site is making ***ACCURATE*** measurements ***Daily!***

FIGURE 1 – USDS and Tripod Yoke Mounting Assembly

Applied Electromagnetic Technology, LLC (AET) provides the Universal Spherical Dipole Source (USDS); a unique electromagnetically-isolated, broadband Electric field Comb Generator RF source with Quasi-Peak (QP) detector test functionality packaged inside a spherical dipole antenna. *The USDS design is traceable to our Precision Spherical Dipole Source (PSDS) design, which was originally developed by NIST as a precise spherical dipole antenna RF source.*

The Universal Spherical Dipole System (USDS) was designed to provide real-world RF laboratory and field measurement teams a versatile broad-band electric field source! The USDS is a unique product, a radiated E-field source that addresses many requirements in both the research and test community. This RF signal is internally generated by a stable Comb Generator (CG) and amplified to create a highly repeatable RF source. The fundamental frequency of the CG can be selected by the operator to any of 4 fundamental frequency settings (10, 64, 100 and 133 MHz), with custom frequencies available.

The USDS is ideally suited for:

1. RF Emission Site Comparisons
2. Shielding Measurements for RF Laboratory or Complex Enclosures
3. Quasi-Peak Detector Verification
4. Verification of RF Laboratory Equipment, Emission Quality and Turn-table Integrity

Application #1 - RF Emission Site Comparisons

The USDS is often used to compare different measurement sites, whether they are the same type of site of different types of site (such as comparing an open area test site (OATS) to a GTEM or semi-anechoic room). Differences between the sites can be determined to allow better prediction before eventual certification testing. For example, some customers use the USDS to compare their GTEM cell (where it is convenient to test their products) with the commercial OATS (located in a different state and where they must pay by the hour for test time). The customer performs their preliminary testing in the GTEM and uses the predetermined difference between GTEM and OATS to determine if they are likely to pass the certification at the OATS or if more engineering work is needed before traveling to the OATS, thus saving time and money.

Application #2- Shielding Measurements for RF Laboratory or Complex Enclosures

The USDS is a small radiating element (10cm. in diameter) and battery operated, which makes it ideal to be placed inside small (or large) shielded enclosures for quick-look shielding effectiveness measurements of the enclosure. The USDS can be positioned either horizontally or vertically polarized to insure that slots and other openings in either orientation are tested.

Application #3 - Quasi-Peak Detector Verification

Commercial EMC test requirements have limits based on a quasi-peak detector. Another unique feature allows users of the USDS to also check their quasi-peak detectors in their receivers. It is well known that a sine wave (or constant comb harmonics) should measure the same level whether the receiver is in peak mode of quasi-peak mode. However, if the signal that is being measured is impulsive, the quasi-peak detector will measure a lower level than the peak detector, often resulting in passing results where the peak detector would have measured too high to pass the limits. The USDS allows the users to pulse the comb on/off at about a 5 Hz rate. This means that a receiver with an properly operating quasi-peak detector will measure the radiated levels at about 3-4 dB less than the peak detector would report. Making sure the quasi-peak detector is operating properly could make the difference between a product passing or failing radiated emissions testing. This is a fast and inexpensive way to check quasi-peak detectors!

Application #4 - Verification of RF Laboratory Equipment

Antennas/Baluns/Cable/Receivers can all develop problems that may go unnoticed, requiring expensive and time consuming re-testing. The USDS is ideal as a stable and repeatable RF source for daily emission measurement equipment checks. The USDS is ***easy-to-use*** and battery isolated, with the actual antenna being an integral part of the system. Users can test in either horizontal or vertical polarization as well as test Quasi-Peak detectors and Peak detectors separately.

The comb generator is a self contained source, requiring no external cables, power supplies etc. The fundamental frequency of the comb can be selected from a range of four frequencies[1] depending on how high in frequency the user desires to test as well as how densely packed the harmonics desired. Lower fundamental frequencies will provide closely spaced harmonics while higher fundamental frequencies will have wider spacing between the harmonics.

[1] Standard fundamental frequencies are 10 MHz, 64 MHz, 100 MHz and 133 MHz. Custom fundamental frequencies are available.

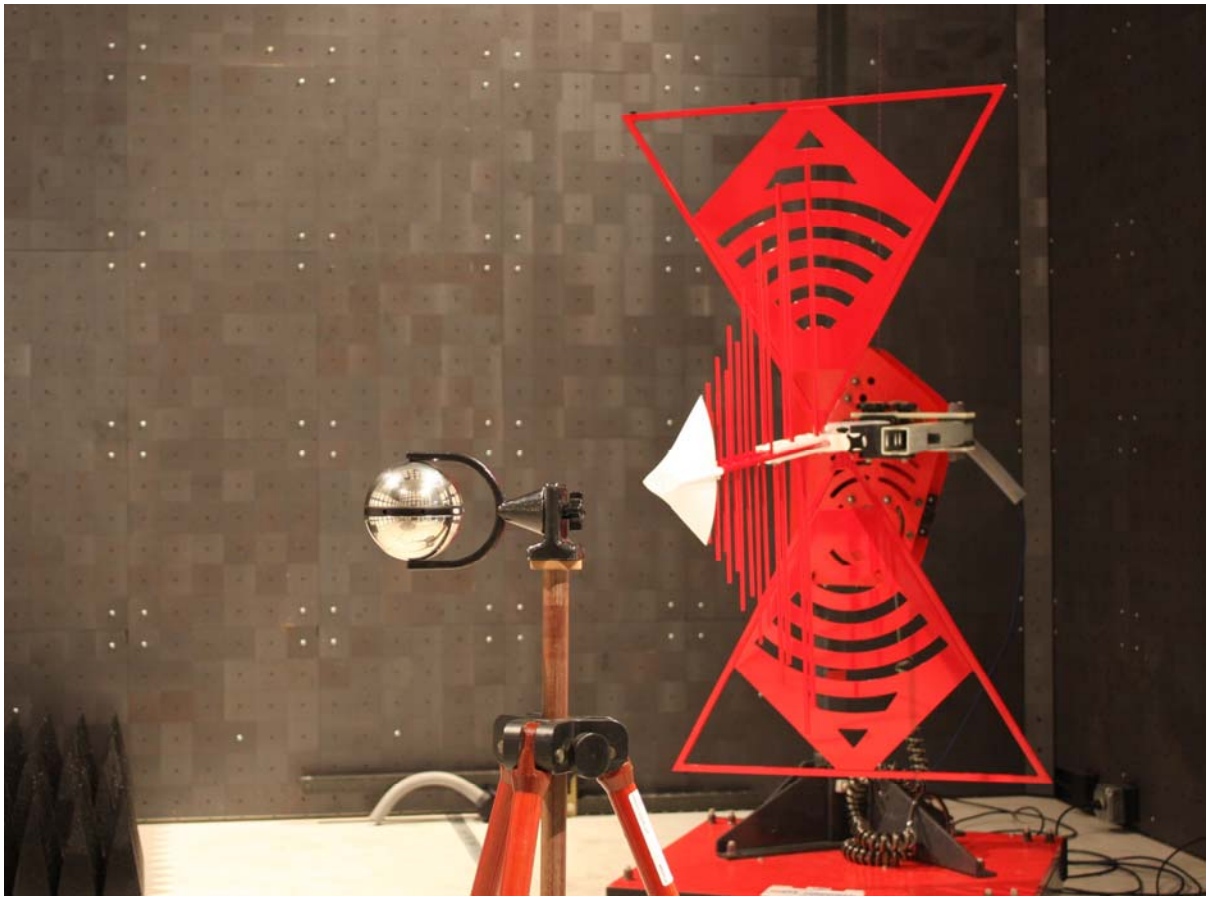

FIGURE 2 – USDS is Easily Used to Quickly Check Systems End-to-End on a Daily Basis

While the test standards have very detailed procedures to characterize an EMC test environment's accuracy, these procedure are time consuming and often require a day or more to complete. Using the USDS comb generator, users can quickly insure the measurement system is operating as expected, with no unexpected changes. Since test standards require both horizontal and vertical polarization to be tested from products, it only make sense to check the test environment for both polarizations as well. Here, the USDS shines head and shoulders above simple monopole sources, since monopole sources require electrically large[2] ground-reference planes, eliminating them from being used (accurately) in the horizontal polarization. The USDS is a (spherical) dipole, with the same antenna pattern as the classical dipole and may accurately be used in either horizontal or vertical polarization, without the need of electrical large ground-reference planes.

[2] Electrical large means that the reference plane must be approximately a full wavelength or more at the frequency of use. The wavelength (in air) at 30 MHz is 10 meters!

The USDS features include:

- Radiating Spherical Dipole Frequency Range from 10 MHz to 12 GHz
- Selectable Fundamental Frequencies of 10 MHz, 64 MHz, 100 MHz and 133 MHz[3]
- Low Frequency Pulsed RF for Quasi-peak Testing
- Useable harmonics at least 10 dB above noise floor to at least 10 GHz[4]
- Output Above 35 dBuv/m at 1 m
- Internal SMB RF Connector Useful for Direct RF Measurements
- Electrically Isolated Battery-Powered Dipole Antenna
- Choice of 1 or 2 AAA Battery Boards Inside the Sphere
- Choice of rechargeable Ni-MH batteries or replaceable Alkaline batteries (not chargeable).
- Designed to Provide 6-8 Hours of Operating Time on fresh well charged batteries[5]
- Easy In-Sphere & External Charging for Real-World Applications

The USDS's Spherical Dipole antenna provides:

- Highly Uniform Radiation Pattern
- Spherical Dipole Shape Easy to Use
- Spherical Dipole Emission Pattern Highly Predictable
- Small, 10 cm, Size Enables Shielding Effectiveness Tests in Small Enclosures
- Tripod Mountable With Yoke Assembly

For more information please see the USDS data sheet; www.appliedemtech.com/usdsmain.html.

[3] Custom fundamental frequencies are available.
[4] Spectrum analyzer resolution bandwidth = 10 KHz.
[5] 6-8 hours with two battery boards. If only one battery board is used, the operating time is 3-4 hours.