

# A SELF-CONTAINED, PORTABLE ANTENNA MEASUREMENT SYSTEM



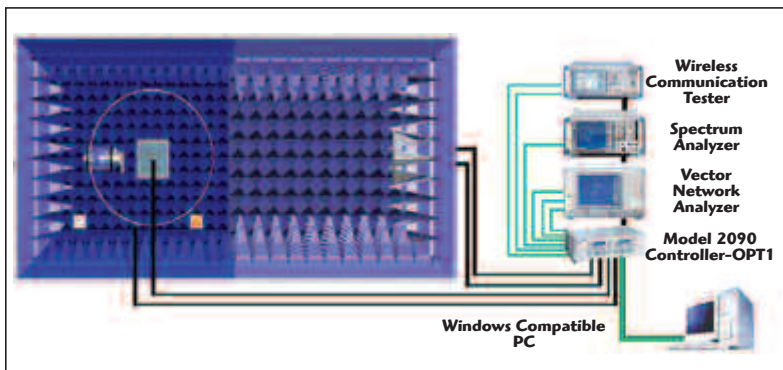
**E**TS-Lindgren pioneered the over-the-air (OTA) performance testing market, designing and building the first CTIA Authorized Test Lab (CATL) for mobile station over-the-air antenna performance testing. Since then, the company has designed and built test chambers that have performed tests at some of the largest and best-known manufacturers of mobile wireless products. ETS-Lindgren's efficient and accurate test systems have contributed to the successful determination of transmit and receive characteristics under controlled conditions. This, in turn, has supported device makers in their quest to bring their products to market quickly and reliably.

For a wireless technology to be successful in the marketplace, it must provide the end user

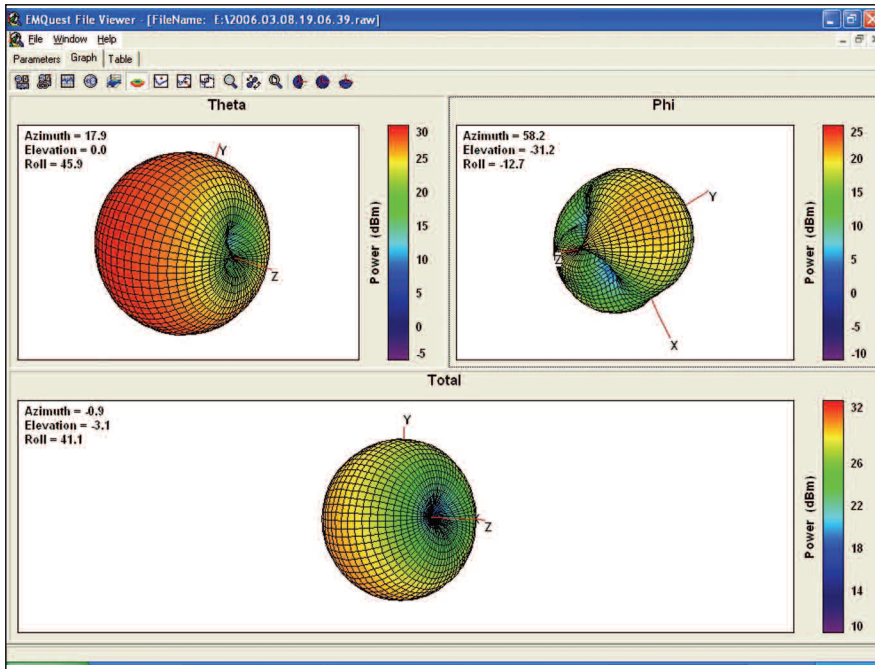
with an acceptable and reliable level of performance. The physical functionality of the wireless device is key to the device's ability to "talk" to a network and vice versa. If the devices at either end of the link cannot "hear" each other, then communication breaks down. The now famous quantitative test "can you hear me now?" is an inefficient way to determine OTA performance of wireless devices. Network operators and designers, wireless device makers and antenna makers need more effective tools to qualify devices earlier in design sequence.

To address the needs of the pre-compliance wireless device OTA performance test market, ETS-Lindgren recently introduced the new AMS-8050 Antenna Measurement System. The AMS-8050 is a practical solution when building space is a limitation as it is a self-contained test lab for making efficient, over-the-air performance measurements of small wireless devices and mobile handsets. This lab is built on a movable chassis so the entire system may be transported between different test stations. The ability to transport the system and store all components within the cart makes it an ideal solution for multiple research and development groups. **Figure 1** shows the AMS-8050 system's configuration.

*Fig. 1 The AMS-8050 wireless performance system (top cut view).* ▼



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▲ Fig. 2 Example of a 3D spherical antenna pattern from EMQuest EMQ-100 software.

Early experience by engineers using the AMS-8050 shows that when research and development or product development schedules are highly compressed, it is highly beneficial to have a dedicated, cost-effective, portable testing platform to more quickly assess the impact of design decisions and speed their design concept through the stage gates. Using a pre-compliance wireless performance test and measurement system in the design center yields higher confidence in initial designs to meet the accelerating schedule demands of the marketplace. Today's fast-paced wireless markets require device makers to know about their product's performance much earlier in the design process. Correcting designs on the fly has resulted in higher success rates at the time that full certification is required near the end of a design cycle (for example, higher first pass rates).

The AMS-8050 is small in size but big on operational throughput. It lets the user make fully automated 2D (polar) and 3D (spherical) antenna pattern measurements following measurement protocols that are consistent with the type used for compliance testing, yet in a compact, portable range. These pre-compliance data are analyzed and the measurement quantities such as total radiated power (TRP), effective isotropic radiated power (EIRP), total isotropic sensitiv-

ity (TIS), effective isotropic sensitivity (EIS), near-horizon partial radiated power (NHPRP) and near-horizon partial isotropic sensitivity (NHPIS) are generated by ETS-Lindgren's EMQuest™ EMQ-100 software. This premiere data acquisition and analysis software is the most widely used in CATL labs worldwide.

Wireless device manufacturers and network operators are interested in the total radiated power since this over-the-air test result is the only way to qualify the entire signal path of the wireless device. TRP data (shown graphically in **Figure 2**) provide key measures to wireless carriers that demonstrate that a wireless device meets its required performance criteria. In a manufacturing quality program TRP can be used to detect and reject manufacturing defects as well as to test mobile equipment for proper operation in repair centers. Similarly, the AMS-8050 can collect the data needed to calculate total isotropic sensitivity. TIS is an indicator of the lowest signal strength when a device is in receive mode (the ability of the device to "listen" to the network, for example). The use of TRP and TIS are needed to plan the layout of a network for efficient and cost-effective geographical coverage.

Since the AMS-8050 is a pre-compliance measurement tool principally used in R&D and design labs, it is

important to know how well the system performs when compared to a full-size CTIA Authorized Test Lab chamber. The key reported benefit of the AMS-8050 is to provide the engineer with the confidence his or her design will fare well in compliance tests. In a comparison study of total isotropic sensitivity and total radiated power measurements taken in a full-size compliance test environment and the AMS-8050 compact antenna lab, the results show a very high degree of agreement between the two systems. The comparison data supports the choice of the AMS-8050 for pre-compliance over-the-air performance testing of mobile handsets and small portable wireless devices. The data validates its importance as a key tool for:

- Design Validation
- Performance Measurement
- Pre-certification Testing
- Production Testing

## CONCLUSION

A new portable self-contained antenna measurement system has been presented. Current owners of the AMS-8050 have found the measurement system ideal for wireless device pre-compliance performance testing, and have reported achieving faster time to market for their wireless handsets, reductions in product development cycle time, and savings in time and resources. They also enjoy the benefit of making it convenient for engineers to test performance without occupying a full compliance lab. As projects and priorities change, the AMS-8050 is a re-locatable measurement system without the encumbrance of a parent building installation. Additional information on the system and its advantages may be obtained by visiting [www.ets-lindgren.com/8050](http://www.ets-lindgren.com/8050).

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