Anritsu Advancing beyond

Antenna Quality Control Test for Consumer Electronics

Frequency Selectable mmWave Power Analyzer (MA24507A/MA24510A)

Introduction

The Power Master™ MA24507A is an ultra-portable, USB-based mmWave power analyzer that provides simple, numeric and frequency selective average power RF measurements.

The Power Master MA24507A features two frequency coverage options between 9 kHz to 70 GHz (MA24507A) and 9 kHz to 110 GHz (MA24510A). The Power Master MA24507A provides very broadband power range coverage with a floor as low as –90 dBm.

The Power Master MA24507A was created to minimize cost to the customer by removing expensive and unwarranted features that can drive up the price of a standard mmWave sensor. The design of the Power Master MA24507A was to mitigate long measurement times that can be experienced with other mmWave sensor products that are based on thermal components. The Power Master MA24507A uses a receiver-based architecture that can not only reduce measurement time, but also allows for frequency-selectivity which provides a more accurate power measurement in the desired frequency band. For footprint, the Power Master MA24507A is nearly the size of a smart phone, freeing up workbench space.

Background

Today's consumer electronics are getting more complicated due to multiple radios. For example, a smartphone might contain anywhere between four to ten different antennas. Most of the smartphones have a minimum of four (Transmitter/Receiver) like Wi-Fi, Cellular, GPS, and Bluetooth, etc. The performance of the antenna is critical due to the limited space availability in mobile phones and having multiple antennas result in interference. During the development process, expensive tests verify the total radiated power and total isotropic sensitivity performance of prototypes.

Now for the production line or the manufacturing line, we will need to test the antenna performance for quality control of a completely assembled device to make sure to meet the customer expectations. Since there is no direct access to the antennas after assembly, this test must be done over-the-air (OTA), which can make them prone to interference or crosstalk and greatly decreases the power of the signal at the receiver. By using a Power Master MA24507A power analyzer in the test system, test engineers can narrow in on the signals of interest and see signals at a much lower power level.

Customer Problem

Consumer electronics manufacturers find it difficult to validate the antenna performance of the device-under-test (DUT) after the assembly is completed. Many customers are challenged with finding an affordable power sensor that provides broadband frequency and power level coverage.

Solution

To overcome the challenge, we are providing the solution where the goal is to easily verify that each antenna is on and transmitting at the appropriate frequency. We will do this by simulating the over-the-air (OTA) chamber testing where the manufacturer will test their products after assembly is completed. For simulation, we will be using a Triarchy signal generator to simulate the following signal which will be connected to our Power Master MA24507A.

The Power Master MA24507A is capable of measuring a range of signals never before allowed by a power meter. Furthermore, its unique ability to filter on frequencies makes it an ideal instrument for OTA signal analysis.

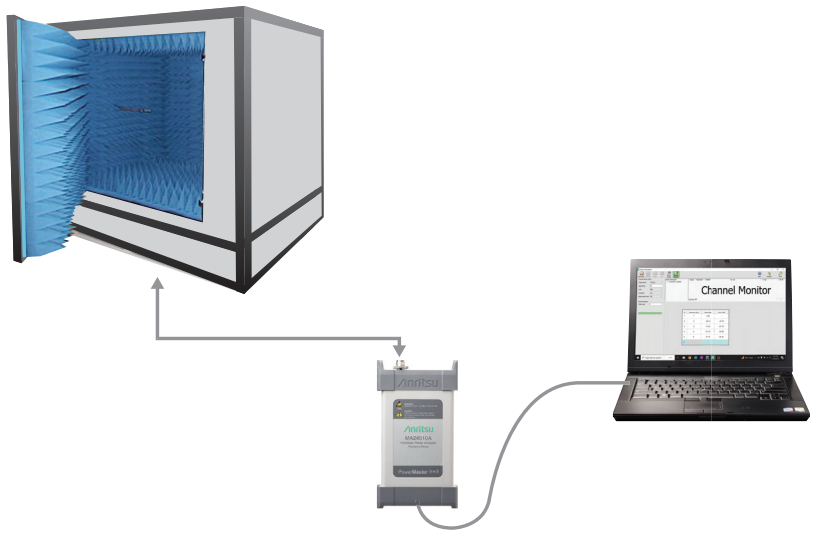

Figure1. RF Chamber Box with Tablet (DUT) Connected to a Power Master MA24507A

Solution 1: Now to validate the different antenna transmitting signals in the chamber, we can use the Channel Monitor mode in PowerXpert software provided for the Power Master MA24507A.

Channel Monitor Mode: It allows users to select up to six frequency channels (up to 20 MHz wide) and monitor their CW amplitude or channel power simultaneously.

In Channel Monitor mode, we have set the span to 20 MHz and set the first five frequencies that we plan to simulate. We will be able to read the power readings for each antenna and validate if our antennas are performing as per the requirement as shown in the below table.

Antenna	Power Range	Frequency
Bluetooth	–8 to –10 dBm	1 GHz
Wi-Fi	–25 to –28 dBm	2 GHz
LTE	–15 to –17 dBm	3 GHz
GSM	–40 to –44 dBm	4 GHz
Wireless HD	–36 to –40 dBm	5 GHz

Solution 2: Power Master can also measure the power of just one of the signals (the 1 GHz signal) and ignore the others.

Power Hunter Mode: User defines a frequency range within which the Power Master MA24507A will identify the six highest CW amplitudes and their corresponding frequency.

In Power Hunter mode, we have set the start frequency to 500 MHz and the stop frequency to 5.5 GHz. You should see the same five signals as you measured in Channel Monitor mode.

Summary

Power Master MA24507A is excellent for OTA testing, especially with mmWave signals that have high propagation loss. It has user settings to control measurement speeds and noise floor.

PowerXpert offers different modes like Channel Monitor mode for monitoring up to six frequency channels at once and Power Hunter mode for searching up to six signals within a frequency range.

For more product information or to request a quote, refer to the product page linked below:
https://www.anritsu.com/en-us/test-measurement/products/ma245xxa

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