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Measurement Methods for Total Radiated Power from an Antenna

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Abstract

Due to the diversification of operation forms of the wireless devices, the measurement of the radiated power from the devices in the operation status, that is, in all directions of the devices should be required. CTIA (Cellular Telecommunications and Internet Association) recommends the maximum division angle of 15 degree in azimuth and elevation angle, providing 264 sample points. In this paper, we present four methods for measuring total radiated power (TRP) using the pattern measurement in all direction, such as, ordinary equi-angle method, modified equi-angle method, generalized spiral method and partially spherical scanning method. The modified equi-angle method divides sampling interval to keep equal area between sampling points, which is almost equivalent to equi-area method. The generalized spiral method picks up each sample along a spiral line on the sphere. This method provides an easy and smooth probe scanning in the spherical coordinate. The partial scanning method uses a circular reflector base to hide the azimuth rotator to support heavy devices being tested. These methods are discussed to find the minimum number of sampling points by using radiation patterns of antennas built in notebook PC. Reference 3-D radiation patterns are given by the conical-cut method with angular spacing of 5 degree in elevation and 1 degree in azimuth angle. Numerical simulation using these 3-D data result in that the minimum total number of sampling points are 200 for modified equiangle and generalized spiral methods, which reduces the measurement time with high accuracy. In addition to these measurements, this paper also presents a simple approximation method to reduce the measurement time.