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A Free-Space measurement system for microwave materials at Kuband

Abstract

One of the non-resonant techniques is the free-space measurement technique, which is popular due to its many advantages compared to the other techniques. It allows the transmission and reflection measurements without any physical contact with the sample. This paper discusses the free-space material measurement system in Ku-band which uses the NRW algorithm and Keysight (Formerly Agilent) 85071E software in determining the dielectric properties of materials. The permittivity and permeability of Teflon, FR4, PVC, ABS, Acrylic, polypropylene, polycarbonate, and epoxy were determined using free space measurement setup. For the first, a free-space measurement for Ku-Band is setup. It consists of a vector network analyzer, two horn antennas, sample holder, and Keysight 85071E software. The different role of transmission and reflection measurements on the achievable results is analyzed about experimental uncertainties and different noise scenarios. Results from the two strategies are analyzed and compared. Good agreement between simulation, measurement, and literature was obtained.

Keywords

Dielectric properties; Free-space measurement technique; Magnetic properties; NRW algorithm