Abstracts

Gap Effect in Measurement of Large Permittivities (Correspondence)

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Complex permittivity is frequently determined from measurements of the transmission--or reflection coefficient of the dominant mode of a uniformly-filled waveguide section. Uniformity is difficult to achieve in practice, however, because of unavoidable gaps between the sample and the waveguide walls. The importance of gaps increases with increasing magnitude of the complex permittivity and may cause large errors in measurements of high-permittivity or high-loss (e.g., semiconducting) dielectrics if proper corrections are not made. The purpose of this note is to examine the range of validity of several correction formulas found in the literature by comparing their predictions of measured permittivity with values actually measured with germanium. During these measurements, the true magnitude of the complex relative permittivity of the germanium was varied between 16.4 and 860.0 by varying the sample temperature.

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