Abstracts

Precise measurements of the Q factor of dielectric resonators in the transmission mode-accounting for noise, crosstalk, delay of uncalibrated lines, coupling loss, and coupling reactance

K. Leong and J. Mazierska. "Precise measurements of the Q factor of dielectric resonators in the transmission mode-accounting for noise, crosstalk, delay of uncalibrated lines, coupling loss, and coupling reactance." 2002 Transactions on Microwave Theory and Techniques 50.9 (Sep. 2002 [T-MTT]): 2115-2127.

Accurate measurements of the unloaded Q/sub 0/ factor of microwave resonators are necessary in many microwave applications. The most accurate values of Q/sub 0/ can be obtained by Q-circle fits from multifrequency S-parameter data. Practical measurement systems cause S-parameters of the resonators to be distorted from the circular ideal shape, rotated, and shifted from the origin resulting in errors in the Q-factor values. A novel Q-factor measurement method has been developed based on equations derived for resonators working in the transmission mode and fractional linear circle-fitting techniques. The transmission-mode Q-factor (TMQF) technique removes measurement effects of noise, noncalibrated measurement cables, connectors, coupling structures, crosstalk between the coupling loops, and impedance mismatch from the measurement data. The TMQF is especially useful in cryogenic measurements of high-temperature superconducting thin films and dielectrics since these measurements are typically done in the transmission mode and contain cables and connectors that are difficult to calibrate. The accuracy of the TMQF is better than 1% for practical measurement ranges and the method is applicable to a wide range of coupling. The range of Q factors measurable is from 10/sup 3/ up to 10/sup 7/.

❑ Return to main document.