Abstract

Measurements of material properties such as loss tangent and surface resistance at microwave frequencies require the accurate determination of the quality factor $Q$ of the resonating structure in which the sample is incorporated. We review various techniques used so far to determine the loaded quality factor $Q_L$ of microwave resonators. We also present a method developed to accurately obtain $Q_L$ from measurements of complex transmission coefficients $S_{21}$ close to the resonant frequency using fractional linear curve-fitting. Verification of the technique was done using a sapphire rod resonator with YBa$_2$Cu$_3$O$_7$ end-plates.

References