Abstracts

Comparison of High-Temperature-Superconductor and Metal-Based Resonators

M.R. Namordi, A. Mogro-Campero, L.G. Turner and D.W. Hogue. "Comparison of High-Temperature-Superconductor and Metal-Based Resonators." 1991 Transactions on Microwave Theory and Techniques 39.9 (Sep. 1991 [T-MTT] (Special Issue on Microwave Applications of Superconductivity)): 1468-1474.

A 50 Omega coplanar waveguide (CPW) resonator designed for a fundamental frequency of about 4.75 GHz was fabricated on LaAlO/sub 3/. Two versions were fabricated the first using 1.9- µm-thick gold and the second using a high-temperature superconductor (HTS), YBa/sub 2/Cu/sub 3/O/sub 7/, 0.6 µm thick. The devices were identically packaged and tested at 77 K. It was found that the HTS resonator had a surface resistance, R/sub s/, about six to nine times lower than the Au one. At 45 K, the R/sub s/, of the HTS resonator decreases by another factor of 4 compared with its 77 K value. For the HTS resonator, (i) R/sub s/ varies as f² and (ii) R/sub s/, degrades with resonator power density as the RF current density, J/sub c/, approaches typical dc measured values. Five identical HTS resonators were fabricated. At 77 K, mean and standard deviations on R/sub s/, were µ = 1.42 and sigma = 0.46 m Omega /sq., respectively. The measured sigma/µ ratio of 0.3% on the fundamental suggests that narrow passband filters can readily be implemented.

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