

Abstracts

Properties and Applications of HTS-Shielded Dielectric Resonators: A State-of-the-Art Report

N. Klein, A. Scholen, N. Tellmann, C. Zuccaro and K.W. Urban. "Properties and Applications of HTS-Shielded Dielectric Resonators: A State-of-the-Art Report." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1369-1373.

High temperature superconductor (HTS) shielded dielectric resonators (DR's) have demonstrated to provide quality factors Q between 5×10^5 and several 10^6 at frequencies up to 20 GHz and levels of dissipated rf power in the range of Watts. As dielectric materials, high purity single crystals of sapphire, LaAlO_3 , and rutile exhibit sufficiently low microwave losses. There are two main areas of application which are considered to benefit from HTS-shielded DR's, namely low-phase-noise oscillators for radar systems and digital communication, and high-power filters for satellite communication. Projections for phase noise are -145 dBc/Hz at 1 kHz offset from the carrier frequency, a value of -110 dBc/Hz at 1 kHz was measured recently for an oscillator with a carrier frequency of 5.6 GHz. Modeling of filters based on resonators with Qs in the 10^6 range indicates their ability to reduce the rf power dissipation apparent in the output multiplexers of communication satellite payloads. Presently, schemes for resonator coupling and tuning while maintaining high Qs are under development.

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