Abstracts

Dielectric Resonators for Microwave Applications (Correspondence)

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The purpose of this communication is to report certain test results recently obtained with resonators made of single crystal rutile. Since rutile has a very high dielectric constant and a very low loss factor, microwave resonators made of rutile have several desirable characteristics. Compared to metallic resonators it is possible to reduce the size of the rutile resonator, which is especially useful at lower microwave frequencies. The Q factor of rutile resonators is very high and at room temperature may be of the order of several thousand, while at liquid helium temperature it may even reach 10/sup 5/. It can be shown that the ratio of electric and magnetic field strengths of dielectric cavity to metallic cavity is proportional to (E)/sup 1/4/ and (E)/sup 3/4/, respectively. Therefore, with the same availablе power, an increase in field intensity can be obtained. Furthermore, these fields are not confined to the inside of the rutile resonator but extend beyond the dielectric surface into free space. Because of these characteristics rutile resonators are finding useful applications in traveling-wave masers, in harmonic generators (in conjunction with varactor diodes), in novel RF Hall-effect-devices, and in experiments with parametric superconducting devices.

❑ Return to main document.