Abstracts

Analytical and Experimental Considerations on the Resonant Frequency and the Quality Factor of Dielectric Resonators

M. Tsuji, H. Shigesawa, H. Aoki and K. Takiyama. "Analytical and Experimental Considerations on the Resonant Frequency and the Quality Factor of Dielectric Resonators." 1982 Transactions on Microwave Theory and Techniques 30.11 (Nov. 1982 [T-MTT]): 1952-1958.

A dielectric pillbox resonator placed on a dielectric substrate is analyzed by a new method, the approximate mode matching method, in which the cross section of such a resonator is subdivided into several sub-sections having a simple geometry of the boundaries, i.e., dielectric slab radial waveguides, and the continuity condition of fields between subsections is treated in the least-squares sense. The resonant frequencies and the intrinsic Q values due to the leakage loss through the dielectric substrate calculated by this method are presented together with experimental results obtained in the 50-GHz region. As a result, it is found that the experimental results for both the resonant frequencies and the Q values agree better with our calculated ones than with the results by other approximate method, and so it will be concluded that the analytical method presented here is almost enough to discuss precisely the resonant characteristics of a dielectric pillbox resonator.

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