Abstracts

A Miniature High-Q Bandpass Filter Employing Dielectric Resonators

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The miniaturization of high-Q resonant microwave structures is of great importance. This must he done to keep pace with the size reduction of other related components. The need has led to an investigation into the feasibility of using dielectric materials as microwave resonators. This paper deals with the application of the TiO/sub 2/ dielectric resonator in a narrowband bandpass filter operating in the 2200 to 2300 MHz telemetry band. The study confirms the theory that a bandpass filter employing dielectric resonators is practical to build, is compact, and will approach the performance of an equivalent waveguide filter. The design employed five resonators mounted in a cylindrical tube that was 1.4 inches in diameter by 4.3 inches long and weighed 4.6 ounces. An equivalent waveguide filter would be approximately 2.3x4.5x16 inches long and would weigh approximately 64 ounces (WR-430). The thermal sensitivity of the dielectric resonator employing TiO/sub 2/ is an inherent problem and oven regulation for narrowband applications will be required. Small, inexpensive thermal jackets are available that will control the filter stability to a value equal to, or better than, that obtained with a filter utilizing aluminum cavities operating in a typical uncontrolled temperature environment.

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