Abstracts

A Low-Loss Bandpass Filter Using Electrically Coupled High-Q TM/sub 01delta/ Dielectric Rod Resonators

Y. Kobayashi and M. Minegishi. "A Low-Loss Bandpass Filter Using Electrically Coupled High-Q TM/sub 01delta/ Dielectric Rod Resonators." 1988 Transactions on Microwave Theory and Techniques 36.12 (Dec. 1988 [T-MTT] (1988 Symposium Issue)): 1727-1732.

For a TM/sub 01delta/ mode dielectric rod resonator placed coaxially in a TM/sub 01/ cutoff circular waveguide, the resonant characteristics such as the resonant frequency, its temperature coefficient, the unloaded Q, and the other resonances, are discussed on the basis of results calculated accurately by the mode-matching method. The results show that this resonator compares favorably to a conventional TE/sub 01delta/ mode dielectric resonator, particularly for realization of a high unloaded Q. Analytical results also verify that interresonator coupling between these two resonators can be expressed equivalently by a capacitively coupled LC resonant circuit. A four-stage Chebyshev filter having a ripple of 0.035 dB and an equiripple bandwidth of 27 MHz at a center frequency of 11.958 GHz is fabricated using these resonators. Low loss and good spurious characteristics are realized for this filter; i.e., the insertion loss is 0.5 dB, which corresponds to an unloaded Q of 17000, and no spurious response appears in the frequency range below 17 GHz.

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