Abstracts

Computer-Aided Design and Improved Performance of Tunable Ferrite-Loaded E-Plane Integrated Circuit Filters for Millimeter-Wave Applications

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The modal scattering matrix method is applied for the rigorous computer-aided design of low-insertion-loss magnetically tunable E -plane metal insert filters with improved characteristic, where only the resonator sections are loaded with ferrite slabs, and large-gap finline filters on a ferrite substrate of moderate width, for millimeter wave applications. The design method is based on field expansion in suitably normalized eigenmodes which yields directly the modal scattering matrix of key building block discontinuities, which are then appropriately combined for modeling the complete filter structure. The theory includes both the higher order mode interaction of all discontinuities involved and the finite thickness of the metal inserts, or metallization, respectively. Optimized data are given for magnetically tunable Ku-band (12- 18 GHz), Ka-band (26-40 GHz), and V-band (50-75 GHz) metal insert and finline filter examples. The theory is verified by measurements of Ku-band metal insert and finline filters, utilizing ferrite TTI-2800 and TTVG 1200 materials.

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