Abstracts

A Temperature-Stabilized Broad-Band Lumped-Element Circulator

I. Ikushima and M. Maeda. "A Temperature-Stabilized Broad-Band Lumped-Element Circulator." 1974 Transactions on Microwave Theory and Techniques 22.12 (Dec. 1974, Part II [T-MTT] (1974 Symposium Issue)): 1220-1225.

An equivalent circuit including the stray reactance of a microstrip-type lumped-element circulator is derived to establish the design procedure, and it is shown theoretically that a broad-band circulator with a 30-percent bandwidth can be realized. Additionally, to obtain the broad-band characteristics over a wide range of temperatures, the necessary temperature coefficients of ferrite materials and magnets are calculated. A new ferrite material with a low temperature coefficient as well as a new fabrication process for thin-film crossovers have been developed. The experiments indicate that a radial magnetizing field improves the circulator characteristics in both bandwidth and loss. An experimental circulator exhibits the following characteristics over a wide temperature range from -10 to 60°C: VSWR < 1.2, loss < 1.0 dB, and isolation >20 dB over a bandwidth of 450 MHz centered at 1.7 GHz.

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