Abstracts

Broadband Theoretical Gyroelectric Junction Circulator Tracking Behavior at 77 K

R. Sloan, C.K. Yong and L.E. Davis. "Broadband Theoretical Gyroelectric Junction Circulator Tracking Behavior at 77 K." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2655-2660.

The perfect circulation conditions for the gyroelectric circulator are given for a gyroelectric ratio with magnitude in the range zero to two. Values of this ratio above unity given in the paper correspond to the frequency regions where the effective permittivity is negative. The subsequent Green's function analysis employs the modified Bessel function. In accordance with the Drude model of semiconductors, a theoretical low-loss GRAS design is presented with a 20 dB isolation bandwidth of approximately 90% at an operating temperature of 77 K. The theoretical broadband circulation tracking behavior of this design is demonstrated for gyroelectric ratios which may exceed a magnitude of unity. The operating frequency range for this particular circulator design is below the extraordinary wave resonance frequency. In order to measure the microwave properties of the magnetised semiconductor disk, a two port analysis is performed based upon the Drude model of semiconductors.

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