Abstracts

A 35-GHz Isolator Using a Coaxial Solid-State Plasma in a Longitudinal Magnetic Field

B.R. McLeod and W.G. May. "A 35-GHz Isolator Using a Coaxial Solid-State Plasma in a Longitudinal Magnetic Field." 1971 Transactions on Microwave Theory and Techniques 19.6 (Jun. 1971 [T-MTT]): 510-516.

The device considered in this study is a semiconductor isolator consisting of a circular waveguide with a cylindrical rod of n-type InSb mounted coaxially in the guide. To achieve nonreciprocal operation, the InSb was cooled to liquid nitrogen temperature, a dc magnetic field was applied parallel to the direction of propagation, and a circularly polarized signal was used to excite the waveguide containing the rod. The pertinent solution of Maxwell's equations was programmed for a digital computer to allow numerical evaluation of the characteristics of the isolator using an InSb rod in which losses were present. Experimental data for various parameters and the corresponding calculated data are presented and compared. Low forward loss is achieved with the present coaxial geometry because of strong power concentration effects within or outside of the InSb rod as a function of the direction of propagation. Two series of calculated mode patterns are presented that demonstrate two types of operation of the isolator in achieving a high loss for one direction of propagation, one depending on field displacement, the other on mode coupling. These data are again compared to the experimental evidence.

❑ Return to main document.