Abstracts

Quarter-Wave Coupled Junction Circulators Using Weakly Magnetized Disk Resonators

The simple classic theory of very weakly magnetized junction circulators using disk resonators indicates that the loaded Q-factor of the junction is completely determined by the magnetic variables of the garnet or ferrite resonator. An exact theory using numerical methods suggests that this approximation is nearly met for all values of the coupling angle psi suspended by the striplines at the resonator terminals, provided the ratio of the off-diagonal and diagonal elements K and p of the tensor permeability has an upper bound of about 0.30. The corresponding minimum realizable value of the loaded Q-factor is approximately 2. This value of loaded Q-factor is suitable for the realization of quarter-wave coupled junction circulators with bandwidths of 25 percent at the 20-dB frequencies or 18 percent at the 26-dB frequencies. The improved closed form solution is based on a seven-mode description of this class of circulator is obtained in this paper by adding a correction polynomial to the classic very weakly magnetized formulation.

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