

Abstract Submitted
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Bandwidth broadening of waveguide circulator for industrial dual-band magnetrons¹ KAVIYA ARANGANADIN, Department of Electrical and Biomedical Engineering, Hanyang University, Seoul 04763, South Korea, HUA-YI HSU, Department of Mechanical Engineering, National Taipei University of Technology, Taipei 10608, Taiwan, MING-CHIEH LIN, Department of Electrical and Biomedical Engineering, Hanyang University, Seoul 04763, South Korea — An RF waveguide circulator is a ferromagnetic passive device with three or four ports which is used to protect other RF components from excessive signal reflection. This paper focuses on the design and development of a partial height ferrite circulator with wider operating bandwidth of minimum 100 MHz with the frequency centered at 2.45 GHz to replace the present industrial waveguide circulator which has 50 MHz bandwidth because the circulator with bandwidth broadening from 50 to 100 MHz can serve as a low-cost but high-efficiency protection device for two magnetrons operating concurrently at different frequencies of 2430 and 2480 MHz. Hence, increasing the bandwidth of a circulator reduces the number of units used from two to one for the dual frequency magnetrons. The validation of the design is performed using the finite element method simulations. A preliminary optimization using a small signal approximation of ferrite tensor shows that the overall operation ranges from 2340 to 2550 MHz with the insertion loss less than 0.24 dB, reflection, and isolation better than 20 dB can be achieved. The detailed design, simulation, optimization, and manufacturing plan will be discussed.

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