

# Abstracts

## Ring Circulator Theory, Design, and Performance

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*S.D. Ewing, Jr. and J.A. Weiss. "Ring Circulator Theory, Design, and Performance." 1967 Transactions on Microwave Theory and Techniques 15.11 (Nov. 1967 [T-MTT]): 623-628.*

A compact, symmetrical, three-port S-band circulator composed of reciprocal T junctions and nonreciprocal phase shifters is investigated theoretically, and its experimental performance results are presented. The comparison of these results demonstrates that 1) circulators can be designed and their experimental performance described from a network model and 2) there is no theoretical limitation on the minimum amount of total differential phase shift necessary for perfect circulation. Bandwidth is investigated and techniques are discussed, including the introduction of a "backward wave" phase shifter, for achieving larger bandwidths. The stripline nonreciprocal comb-filter phase shifter used in the ring circulator is described and performance results are given.

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