

# Abstracts

## Novel Unilateral Circuits for MMIC Circulators

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*S. Hara, T. Tokumitsu and M. Aikawa. "Novel Unilateral Circuits for MMIC Circulators." 1990 Transactions on Microwave Theory and Techniques 38.10 (Oct. 1990 [T-MTT]): 1399-1406.*

Novel three-port unilateral circuit modules, which have elemental functions required in a circulator, are proposed. The proposed modules are composed of an active out-of-phase divider and an active in-phase combiner or of an active in-phase divider and an active out-of-phase combiner. The modules have many variations and all are very small and operate over a very wide frequency range. These modules can be used in MMIC's as circulators and are key components for very high frequency signal processing.

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