Abstracts

Size-reduction and band-broadening design technique of uniplanar hybrid ring coupler using phase inverter for M(H)MIC's

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The hybrid coupler is one of the most fundamental building blocks in microwave and millimeter-wave systems. Ring topology can be often found in the hybrid microwave integrated-circuit design of narrow and broad-band integrated couplers and mixers. In this paper, we propose a new design theory using a phase inverter for systematic size reduction and band broadening of a uniplanar hybrid ring coupler. The features and design criteria of broad-band reverse-phase hybrid ring couplers are presented. Effective bandwidth of a new reverse-phase hybrid ring coupler can be increased by 28% with a return loss of 20 dB. In addition, we present a class of uniplanar phase inverters and discuss their technical aspects. Experimental results show that the bandwidth of the proposed phase inverter is greater than 1.9 octaves with insertion loss below 1 dB and phase shift error of less than /spl plusmn/20/spl deg/. Measurements confirm that the new uniplanar hybrid ring coupler provides attractive features. Its isolation is better than 20 dB over a 1.8-octave bandwidth attributed to the phase inverter providing almost a frequency-independent phase shift.

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