Abstracts

Broad-Band Uniplanar Hybrid-Ring and Branch-Line Couplers

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Novel uniplanar 180° and 90° hybrids suitable for MIC and MMIC are described. The new uniplanar crossover hybrid-ring magic-T coupler using a coplanar waveguide (CPW) and slotline provides substantially improved amplitude and phase characteristics over a broad bandwidth compared to conventional microstrip hybrid-ring couplers. Experimental results show that the uniplanar crossover hybrid-ring coupler has a bandwidth of more than one octave from 2 to 4 GHz with ±0.4 dB power dividing balance and ±1° phase balance. A uniplanar two-branch directional coupler using a coupled rectangular slotline ring has also been developed that has over 20 dB isolation over a bandwidth of more than 40% centered at 3 GHz with ±1 dB power dividing balance. To fully utilize the advantages of uniplanar structures, transitions from CPW to slotline and coplanar strip (CPS) using uniform and non-uniform CPWs, slotlines, or CPSs are discussed. These transitions are uniplanar and simple to fabricate. No via holes are needed for ground connections, and integration with solid-state devices is easy. A pair of broad-band transitions using CPW shorts and slotline radial stubs is demonstrated with a 1 dB bandwidth of more than 5.2:1. The CPW-CPS transition shows a 1 dB bandwidth of more than two octaves.

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