Abstracts

New Uniplanar Coplanar Waveguide Hybrid-Ring Couplers and Magic-T's

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The uniplanar coplanar waveguide (CPW) and slotline on a dielectric substrate have many applications to MIC and MMIC designs. A new reverse-phase CPW hybrid-ring coupler and a uniplanar CPW magic-T were developed. Experimental results showed that the hybrid-ring coupler has a 60% bandwidth centered at 3 GHz and the magic-T has a bandwidth of one octave from 2 to 4 GHz with 0.4 dB amplitude imbalance and 3.5° phase imbalance. Also, this paper presents theoretical analyses of CPW-slotline transitions using the transmission line models. Accurate modeling of nonuniform CPW and slotline radial stubs was developed using tandem connected uniform lines. Measured results of various CPW-slotline transitions agree very well with calculation. Design curves of the transitions are given for practical applications. To fully use the advantages of uniplanar structures, a 180° reverse-phase CPW-slotline back-to-back balun and a tee junction are described. Both circuits provide good amplitude and phase characteristic over a broad bandwidth due to the phase change of the circuits being independent of frequency.

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