Abstracts

Design and characterization of multilayer spiral transmission-line baluns

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We discuss the design of coupled spiral transmission-line baluns modeled after the Marchand type. The balun structure consists of a pair of coupled spiral conductors vertically offset across intervening polyimide layers. The baluns are fabricated on various substrates (glass and high- and low-resistivity silicon). The characteristics such as return loss, insertion loss, and output signal imbalance are measured. The center frequencies of 3-dB bandwidths (BWs), primarily determined by their conductor lengths, range from 1.2 to 3.5 GHz. The 3-dB BW normalized by the center frequency is /spl sim/1.48 in all cases. We observe an optimum BW for better performance. Return losses at the center frequencies range from 13 to 18 dB. Amplitude imbalance distributes in the range of 0.3-1.0 dB, depending on the sizes of devices and substrates. The minimum insertion loss is 0.55 dB for the balun on a glass substrate with 100-/spl mu/m-wide conductors. The devices fabricated on glass and high resistivity (>4000 n cm) silicon show remarkably similar behaviors despite the large difference in dielectric constant. This technique is applicable to monolithic microwave integrated circuits.

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