NOVEL VERSION OF THE DOUBLE-Y BALUN: MICROSTRIP TO COPLANAR STRIP TRANSITION

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The double-Y balun has been investigated in the past for use with balanced mixers and pulsed antennas. Various versions of the balun have been reported in technical literature, among them: (1) microstrip to slotline, (2) coplanar waveguide (CPW) to slotline, (3) CPW to coplanar strip (CPS), and CPW to parallel microstrip. The double-Y balun transitioning from a CPW to a CPS line has been shown to offer maximum bandwidth when compared to the other versions of the double-Y balun described above. However, parasitic resonances caused by the CPW section of the balun degrade the passband performance of the balun. In addition, the inductance of CPW bridges (required for proper operation of the balun) cause a shift in the /8 resonance of the balun, further limiting the performance of the balun. The requirement for CPW bridges also increases manufacturing complexity of the balun. In this work, a novel version of the double-Y balun is designed for feeding a complementary spiral. The balun transitions from an unbalanced microstrip line to a balanced CPS line. The use of a microstrip line with finite ground plane improves the passband performance of the balun by avoiding parasitic resonances caused by CPW lines. In addition, the new version of the double-Y balun described in this work does not require the use of bridges at the junction, hence avoiding the shift in the /8 resonance of the balun and reducing manufacturing complexity as well. The new version of the double-Y balun, transitioning from a microstrip line to a CPS line is analyzed numerically using Momentum (Agilents 2.5-D Method of Moments Code), and numerical results are compared with preliminary experimental results consisting of VSWR and insertion loss measurements.

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