Abstracts

Analysis of Image Recovery Down Converter Made by Planar Circuit Mounted in a Waveguide

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This paper presents an analysis of a superhigh frequency (SHF) down converter using a Schottky-barrier mixer diode and a planar circuit mounted in a waveguide. The analysis assumes that the mixer diode consists of a nonlinear conductance g, a junction capacitance C/sub j/, an ohmic spreading resistance R/sub s/, and several parasitic susceptances. The frequency performance of the impedance of external circuits at the signal, image, and intermediate frequency bands is considered. This analysis also includes consideration of the mismatching effect between the converter and the IF amplifier, and the optimum design procedure for the down converter. Using this theoretical method, a SHF down converter was designed and constructed. Its application is low noise receivers for satellite broadcasting. The design used the optimum image condition (the image impedance takes a low value, i.e., nearly a short). The RF band is 11.7 - 12.2 GHz, the IF band is 0.96 - 1.46 GHz, and the total noise figure is 3.3 - 3.7 dB. The noise figure is in good agreement with the (3.2 - 3.6 dB) obtained from this analysis.

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