Abstracts

Full-wave design and optimization of mm-wave diode-based circuits in finline technique (Dec. 1999 [T-MTT])

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This paper presents a full-wave design and optimization of a quasi-planar frequency doubler and a balanced subharmonic mixer in finline technique by applying the extended finite-difference time-domain (FDTD) method. The structures are based on the junction of a coplanar waveguide and a finline using two Schottky diodes mounted across this junction. The diodes are represented by their large-signal device circuit model. The specific problem of embedding the lumped elements in the FDTD mesh at millimeter-wave frequencies is discussed. A new method for the inclusion of the device into the grid is developed, avoiding nonphysical reactances. The frequency doubler is designed for optimal conversion loss at 0-dBm input power in a frequency band from 20 to 25 and 40 to 50 GHz, respectively. With the subharmonic mixer, matching structures at both the local-oscillator (LO) port and the radio-frequency (RF) port have been employed so that a conversion loss of 14.8 dB could be achieved with only 5-dBm LO power. The operation frequencies are 18 GHz for the LO and 56 GHz for the RF. The simulation results are validated by measurements.

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