Abstracts

An integrated heterojunction bipolar transistor cascode opto-electronic mixer

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An integrated electrically pumped opto-electronic mixer consisting of two InP-GaInAs heterojunction bipolar transistors in a cascode configuration is demonstrated. Intrinsic down-conversion gains of 18.2 and 8.9 dB at RF optical modulation frequencies of 3 and 9.5 GHz were obtained. The performance of the cascode mixer and a single heterojunction bipolar transistor (HBT) opto-electronic mixer are compared. The performance of the cascode mixer was superior to the single HBT mixer, mainly at high frequencies. Up and down mixing conversion gains were measured and found comparable. A simulation was carried out by solving the nonlinear differential equations that correspond to the large-signal equivalent circuit. The results of the simulation enabled us to identify the principal nonlinear components in the equivalent circuit.

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