Abstracts

A 20-GHz Integrated Balanced Mixer

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An integrated balanced mixer for use in the receiver for the quasi-millimeter-wave digital radio transmission system is described. The following aspects of the mixer realization are discussed. 1) The characteristics of gallium arsenide Schottky barrier diodes and three types of diode mount construction are described. The least observed dc incremental conversion loss was about 4 dB in the range of 18-23 GHz. 2) The fabrication of waveguide to microstrip transition, using a ridged waveguide transducer, is described. A transition loss of less than 0.38 dB was obtained in the range of 18-21.75 GHz. 3) The microstrip circuit elements, such as the 3-dB directional coupler and the low-pass filter, are described. The minimum isolation and coupling values of the coupler were about 16 dB and 3-4 dB, respectively. 4) The effect of the undesirable electromagnetic mode propagation on the integrated mixer operations is discussed. 5) The performance of the integrated balanced mixer is presented. This mixer, operated at a signal frequency of 20 ±0.5 GHz and at a local oscillator frequency of 18.3 GHz, showed a single side-band noise figure of 4.8-5.8 dB. 6) The reliability of the mixer is also evaluated with high reliability under vibration and shock testing being exhibited.

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