Abstracts

Noise in IMPATT Diode Amplifiers and Oscillators

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The results of experimental and theoretical investigations of the noise characteristics of lMPATT diode amplifiers and oscillators are presented. The oscillator noise is shown to consist of three different contributions: modulation noise, selectively amplified primary noise, and conversion noise. The influence of the active device nonlinearity and load circuit parameters is discussed in detail. The experimental results are in good agreement with the theoretical predictions. It is especially pointed out that the large correlation between AM and FM fluctuations, usually measured in IMPATT oscillators, indicates nonoptimum AM noise performance. Experimental techniques for achieving optimum AM noise performance are demonstrated (orthogonal noise tuning). By a simple extension of the model, the noise behavior of an injection phase-locked oscillator can be described. The calculated AM and FM noise power spectra for the synchronized oscillator are also shown to be in good agreement with experimental results. Finally the signal-to-noise ratio for current modulated IMPATT oscillators is investigated and optimization is demonstrated.

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