Abstracts

A Numerical Analysis Frequency of the Tunnel-Diode Converter

The theory of tunnel-diode mixer operation is briefly reviewed. It is shown how the available gain, minimum noise figure and output conductance can be expressed in terms of the bias and local oscillator voltages. A numerical analysis is then carried out for a large number of pairs of these voltages. The results show that there are two modes of low noise operation, both using approximately the same bias voltage which gives minimum noise when the diode is used as an amplifier. The minimum noise figure of one mode approaches that of the amplifier and is accompanied by very high gain, critical adjustment, and a vanishingly small local oscillator voltage. The more practical second mode on the other hand, uses a local oscillator power of about -7 dBm and gives a conversion loss lower than that obtainable from the best L-band varistor mixers, but with a slightly poorer noise figure. The analysis could be applied equally well to optimize backward diode converters using megacycle intermediate frequencies in which only the second mode occurs.

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