Abstracts

Some Aspects of the Design of Wide-Band Up-Converters and Nondegenerate Parametric Amplifiers

W.J. Getsinger and G.L. Matthaei. "Some Aspects of the Design of Wide-Band Up-Converters and Nondegenerate Parametric Amplifiers." 1964 Transactions on Microwave Theory and Techniques 12.1 (Jan. 1964 [T-MTT]): 77-87.

Proper design of the diode-resonating circuit is seen to be extremely important if large bandwidth is desired in a varactor-diode parametric amplifier. Cases where there is one resonance of the diode-resonating circuit at a frequency between the frequencies of the signal-input and the sideband resonances are examined in some detail. It is shown that the frequency of this intermediate resonance can greatly influence the bandwidth capabilities of an amplifier design, and the optimum frequency for such a resonance is given for upper-sideband up-converters. The optimum frequency of such a resonance is greatly different if the diode is resonated in series than it is if the diode is resonated in shunt. It is believed that the same results would also apply for lower-sideband up-converters and nondegenerate parametric amplifiers. Some upper-sideband up-converter designs were worked out and their computed responses are given including the effects of all of the parasitic elements of the diode. Bandwidths of the order of an octave are obtained. A systematic sign procedure is given for wide-band nondegenerate parametric amplifiers which use the diode parasitic resistance as the idler termination. Some designs of this type were also worked out and their computed responses (includlng effects of all diode parasitic parameters) are presented. Bandwidths as large as 33 per cent are obtained depending on the peak gain and operating frequency range.

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