Abstracts

Broad-Band Cavity-Type Parametric Amplifier Design

K.M. Johnson. "Broad-Band Cavity-Type Parametric Amplifier Design." 1961 Transactions on Microwave Theory and Techniques 9.2 (Mar. 1961 [T-MTT]): 187-194.

This paper tells how maximum bandwidth can be obtained from a nondegenerate parametric amplifier which utilizes a circulator. Expressions are derived for the gain bandwidth product and maximum possible gain bandwidth product. It is then shown how the Q of the cavities used for the signal and idler circuits may be kept at a minimum without degrading the noise performance of the amplifier. It is shown that best performance results when the TEM mode is used in coax, or, if waveguide is used, when the operating frequency is far away from the waveguide cutoff frequency. The diode used should have as high a self-resonant frequency as possible and the line admittance should be approximately the diode susceptance. Using a diode with a self-resonant frequency at the idler frequency will be seen to give optimum performance. This paper also discusses double tuning the signal circuit to achieve broader bandwidths. In this case, the addition of the second tuned circuit will be seen to give much broader bandwidths than one would expect from conventional filter theory. Two sample amplifiers are considered and their bandwidths calculated. The effect of double tuning one of the amplifiers is then considered.

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