Abstracts

Noise Analysis of Nonlinear Feedback Oscillator with AM-PM Conversion Coefficient

A. Takaoka and K. Ura. "Noise Analysis of Nonlinear Feedback Oscillator with AM-PM Conversion Coefficient." 1980 Transactions on Microwave Theory and Techniques 28.6 (Jun. 1980 [T-MTT]): 654-662.

The noise of a microwave nonlinear feedback oscillator with AM-PM conversion coefficient is analyzed. The oscillation wave is divided into a carrier and noise sidebands. It is assumed that the noise sideband is the first-order perturbation to the carrier wave and can be superposed with each other. The amplitude and frequency of the carrier are graphically determined by the "device-load line" method, considering the nonlinearity of the amplifier. In order to take the AM-PM conversion effect of a nonlinear amplifier into account, the "transfer matrix" for the small AM and PM sideband components which has amplitude-dependent diagonal and off-diagonal terms is introduced as an extension of the incremental describing function. The spectra of the oscillator noise and their dependence on operating conditions can be easily calculated by using these transfer matrices. The AM and PM noise spectra are measured when a traveling-wave tube is used as an amplifier. The measured values well agree with the calculated ones.

❑ Return to main document.