Abstracts

Modeling of Noise Parameters of MESFET's and MODFET's and Their Frequency and Temperature Dependence (Sep. 1989 [T-MTT])

A simple noise model of a microwave MESFET (MODFET, HEMT, etc.) is described and verified at room and cryogenic temperatures. Closed-form expressions for T_{min}, the minimum noise temperature, $Z_{g\,opt}$, the optimum generator impedance, g_n, the noise conductance, and $Z^M_{g\,opt}$, the generator impedance minimizing noise measure, are given in terms of the frequency, the elements of a FET equivalent circuit, and the equivalent temperatures of intrinsic gate resistance and drain conductance to be determined from noise measurement. These equivalent temperatures are demonstrated in the example of a Fujitsu FHR01FH MODFET to be independent of frequency in the frequency range in which 1/f noise is negligible. Thus, the model allows prediction of noise parameters for a broad frequency range from a single-frequency noise parameters measurement. The relations between this approach and other relevant studies are established.

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