Abstracts

A Graphic Design Method for Matched Low-Noise Amplifiers

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This paper presents a graphic design method for matched low-noise amplifiers where all necessary design information is presented in the load plane. It is possible to work exclusively in the load plane, as the input matching requirement makes the source admittance dependent on the load admittance. As a consequence of the bilinear transformation involved, all parameters may be presented by circles. Analytic equations giving the centers and the radii of the circles in the load plane are presented. The method is particularly useful for feedback amplifiers. For a given feedback situation, a trade-off between different design parameters can be evaluated by inspection of the graph. The analytic equations make the calculations very fast, and the result of changes in the feedback element values can be viewed directly. Two kinds of amplifier configurations are considered. First, a single-stage amplifier with an input match requirement is described. Secondly, a two-stage cascade amplifier is considered. The latter is required to have an output match and noise-optimized second stage, in addition to an input match. For the single stage case the noise figure, the power gain, the stability, and the input network are treated. In the cascade design, the total noise figure, the interstate network, and the available gain are treated as well. A design example for lossless feedback is presented.

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