

A General Noise De-Embedding Procedure for Packaged Two-Port Linear Active Devices

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A general noise de-embedding procedure is described for packaged two-port linear active devices. The method is based on the noise correlation technique and its applications developed previously. In its most general form, the package, which need not be reciprocal, may consist of an arbitrary interconnection of linear passive elements at thermal equilibrium. Only the terminal admittance properties of the package need be known, not its topology. However, under certain special cases which lead to singular submatrices of the admittance matrix the method is inapplicable as will be pointed out. This situation may occur when elements such as isolators are part of the package. Our objective in this paper is to draw together, in one place, the necessary theoretical foundation and experimental techniques to enable workers, not familiar with the field, to assemble the software and laboratory setup for two-port noise de-embedding. In line with this objective, we have borrowed from the work of earlier authors. In furtherance of our goal to make the paper self-contained, we describe in some detail the automated noise measurement system used for data acquisition and the mathematical basis for it. Last, but not least, we establish the validity of the de-embedding approach with extensive experimental data obtained on three MESFETs and a PsHEMT.

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