Abstracts

Nonsquarelaw Behavior of Diode Detectors Analyzed by the Ritz-Galerkin Method

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It is widely believed that diode detectors exhibit true square-law behavior at low power levels, and that at higher power levels there is a gradual change to a linear (peak-detecting) law. This paper demonstrates that this idea is correct only under restrictive conditions, and that slopes corresponding to eighth and higher-order laws can easily be encountered in practical situations. It is shown that these high-order slopes are inherent in conventional diode detector circuits and that the behavior can be predicted by a closed-form solution involving both exponential and modified Bessel functions. The nonlinear theory, which does not depend on a truncated power-series approximation to the diode I-V characteristic, is confirmed by measured data.

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