Abstracts

Cutoff Frequency of Submillimeter Schottky-Barrier Diodes

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The traditional HF model of a bulk-type (nonepitaxial) Schottky-barrier diode is extended to include the influence of skin effect, carrier inertia, and displacement current. The parasitic cutoff frequency of the extended model is calculated for n-GaAs and n-Si and compared with that predicted by the traditional model. Below the plasma frequency, the two models are found to give similar results for n-Si. For n-GaAs, however, the extended model predicts a value of cutoff frequency only one-sixth that predicted by the traditional model. With both materials, operation near the plasma frequency is impractical since it would require unrealistically small contact dimensions. Above the plasma frequency, however, both materials display a broad frequency range where operation should again be feasible. For n-Si, the extended model predicts that operation above the plasma frequency can actually be achieved with Iarger contacts than is predicted on the basis of the traditional model.

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