Abstracts

Impedance Characterization of GaAs FET Switches

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The FET switch is a very complicated device to analyze all characteristics at the same time because of the existence of nonlinearity, three-dimensional electrodes, passivation layers, and depletion regions. Since the GaAs FET switch can be regarded as a linear small-signal device in the on- and off-state, a linear analysis is carried out in this paper only of the two states but by taking into account the geometry of electrodes, passivation layers, and depletion regions. The rectangular boundary division method is applied to solve Laplace's equation for the impedance characterization of GaAs FET switches. Equivalent electrical circuits composed of capacitors and resistors are defined for the on-state and off-state of a FET switch. The capacitances and resistances in the equivalent circuits are estimated and compared with experimentally measured values at 10 GHz. The quality factor of the FET switch, which can be used for estimating insertion loss, is calculated by using the two equivalent series impedances of the FET switch corresponding to the two states.

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