

Abstract

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SAC-A Simple Approach to Extract the Small Signal Model Circuit Elements for RTD

Most of Resonant Tunneling Diode (RTD) small signal model equivalent circuit elements extraction approaches are based on fitting the equivalent circuit model with measured S-parameter data over the frequency at certain bias points in the three regions of RTD current – voltage characteristics. In this paper, we propose a simple approach to extract widely employed RTD small signal model equivalent circuit elements. This approach is based on fitting the RTD DC analytical model with the measurement of the current – voltage characteristics of a given resonant tunneling diode in the entire bias range using a MATLAB routine. Then, the equivalent circuit elements (the quantum capacitance, quantum inductance and the conductance) are expressed as set of related analytical mathematical expressions as a function of the applied voltage. Simulation results show that the calculated equivalent circuit elements using the proposed approach exhibit a good agreement with measured data taken by another researcher for the same RTD structure in the entire bias range. In addition to, the proposed approach is easily incorporated into SPICE program to simulate the circuits containing RTD.