Abstracts

High-isolation CPW MEMS shunt switches. 1. Modeling

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This paper, the first of two parts, presents an electromagnetic model for membrane microelectromechanical systems (MEMS) shunt switches for microwave/millimeter-wave applications. The up-state capacitance can be accurately modeled using three-dimensional static solvers, and full-wave solvers are used to predict the current distribution and inductance of the switch. The loss in the up-state position is equivalent to the coplanar waveguide line loss and is 0.01-0.02 dB at 10-30 GHz for a 2-/spl mu/m-thick Au MEMS shunt switch. It is seen that the capacitance, inductance, and series resistance can be accurately extracted from DC-40 GHz S-parameter measurements. It is also shown that dramatic increase in the down-state isolation (20/sup +/ dB) can be achieved with the choice of the correct LC series resonant frequency of the switch. In part 2 of this paper, the equivalent capacitor-inductor-resistor model is used in the design of tuned high isolation switches at 10 and 30 GHz.

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