Abstracts

On the use of vias in conductor-backed coplanar circuits

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Ground planes of conductor-backed coplanar waveguides (CBCPWs) behave like overmoded patch antennas supporting parallel-plate modes and show numerous resonances. For typical monolithic-microwave integrated-circuit chip sizes, these unwanted resonance frequencies lie within the microwave and millimeter-wave frequency region. Due to this feedback mechanism, today's coplanar millimeter-wave amplifiers operating up to 250 GHz require special packaging techniques for stable operation. The use of vias is one method of suppressing parallel-plate modes. The effect of via-holes within a ground plane and the effect of an open or a shorted ground-plane periphery on the parallel-plate modes of CBCPWs were investigated in depth up to 200 GHz for quartz and GaAs substrates. It is shown that the placement of the vias within the coplanar-waveguide structure is crucial for the suppression of parallel-plate modes. If properly placed, vias are an effective means to suppress these unwanted modes over a chosen frequency range.

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