Abstracts

A useful new class of miniature CPW shunt stubs and its impact on millimeter-wave integrated circuits

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This paper proposes a new concept for the generation of millimeter-wave coplanar waveguide (CPW) shunt stubs printed within the center conductor, as opposed to those printed in the ground plane. Several new designs are presented for CPW open- and short-end shunt stubs patterned inside the center conductor. Unlike conventional stubs, which are patterned inside the ground plane, several advantages are derived from the use of the proposed framework: additional degrees of freedom, lower radiation loss, high compactness, and a reduction of the number of air bridges that are potentially expensive to build. The way to achieve high-quality circuits is detailed and confirmed by experimental results over the large frequency band from 1 to 50 GHz. Good agreement between experimental and theoretical results, obtained using two different full-wave techniques, validates the design procedure. In an effort to explore the advantages offered by the proposed CPW shunt stubs, in terms of their flexibility and potential for innovation, a possibility of the usage of such stubs in the area of filters is investigated. Thus, three novel variants of miniature filters are designed and measured, demonstrating that the proposed shunt stubs are entirely responsible for major reduction of size and better performance. The designs presented here show a new powerful way of achieving size, weight, and cost reduction. They are suitable for use as building blocks for the growing commercial radio-frequency/millimeter-waves wireless communications circuits and systems.

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