Abstracts

New miniature broadband CPW-to-slotline transitions

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This paper proposes a novel class of uniplanar coplanar waveguide (CPW)-to-slotline transitions, which is particularly suitable for monolithic millimeter-wave integrated circuits. Instead of using CPW series stub printed in the ground plane, as is the case in classical CPW-to-slotline transition, this paper shows the capability to use a CPW series stub printed in the center conductor of the CPW. Compared to classical CPW-to-slotline transitions, the proposed transitions have the following advantages: additional degrees of freedom, lower radiation loss, larger bandwidth, higher compactness, and a major reduction of the number of air bridges that are potentially expensive to build. One alternative configuration that appears to have some merit involves the use of the slotline ring resonator, which does not suffer from open-end or short-end effects and, therefore, gives more accurate resonance frequency, provides an accurate localized zero or infinite impedance point, and maintains low- or high-input impedance values over a wide frequency range, depending on the feed type. A principle of achieving such high-quality transitions is detailed and also confirmed by experimental and theoretical results, which are in good agreement up to 50 GHz. A maximum fractional bandwidth of 160% is achieved for a 10-dB return loss, and the corresponding insertion loss is less than or equal to 2 dB.

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