Abstracts

Hybrid integration technology of planar circuits and NRD-guide for cost-effective microwave and millimeter-wave applications

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An architecture called the hybrid planar/non-radiative-dielectric (NRD) waveguide integrated technology is proposed as a building block for constructing microwave and millimeter-wave circuits. This hybrid approach of integration offers a unique possibility of exploiting inherent complementary advantages of planar structures and NRD waveguides for low-cost wireless applications while eliminating the potential drawbacks associated with both dissimilar structures. Compared to the existing NRD-guide related technology, the proposed framework consists of relocated planar structures on the top and/or the bottom plates of an NRD-guide, sharing the common ground planes. Such a hybrid scheme is particularly suitable for millimeter-wave systems in which active devices can be made with the planar-line technique while passive components can be made with the NRD-guide technique. The two subsets of a complete functional system are interconnected through a class of aperture-based transitions which can be designed to have wide-band performance. In addition, the multichip module (MCM) technique is readily achieved under this proposed scheme. Experimental prototypes, including passive-component and active-device, based on the new hybrid technology presented in this paper, show that the novel hybrid technology promises to be useful in the design of future microwave and millimeter-wave circuits and systems.

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