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Title:Substrate integrated nonradiative dielectric waveguide structures directly fabricated on printed circuit boards and metallized dielectric layers
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Abstract:A technique concerning the design and implementation of substrate integrated nonradiative dielectric (SINRD) waveguide is proposed in this paper. Different from the current SINRD waveguides, this scheme of making the SINRD guide structures directly out of the conventional printed circuit boards (PCBs) or similar platforms effectively eliminates cover metallic plates. This class of SINRD waveguides can be realized without resorting to a mechanical assembly as usually is done in the case of developing conventional nonradiative dielectric (NRD) guide circuits owing to the following two facts. First, increasing the width of the dielectric strip will decrease surface electric currents more significantly in the area of NRD strip. Second, the fabrication process and practical implementation are based on the concept of the substrate integration technique. In this case, air via-slot or via-hole arrays are created or punched directly on PCBs or metallized dielectric layers in order to fulfill the basic requirements of an SINRD waveguide design. By carefully choosing the SINRD dimensions and the pattern of via-slots or via-holes, potential leakage loss caused by these metallically uncovered via-slots or via-holes can be minimized and reduced to a negligible level. Therefore, the NRD waveguides can be designed and made through various processing techniques in a simple and practical manner for millimeter-wave and terahertz applications. In this paper, simulations and measurements have verified the proposed scheme.
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