Abstracts

Excitation of a parallel-plate dielectric waveguide using a coaxial probe-basic characteristics and experiments

G.K.C. Kwan and N.K. Das. "Excitation of a parallel-plate dielectric waveguide using a coaxial probe-basic characteristics and experiments." 2002 Transactions on Microwave Theory and Techniques 50.6 (Jun. 2002 [T-MTT]): 1609-1620.

In this paper, we study the basic characteristics of a probe excitation to a parallel-plate dielectric waveguide (PPDW), and present design data and experimental results. A coaxial probe has been used in microstrip lines and rectangular waveguides. The present study shows that it is also an effective method to excite/couple a PPDW, thus facilitating the introduction of a new class of PPDW technology in microwave/millimeter-wave integrated circuits. We use here a spectral-domain analysis for analytical modeling of the probe transition, where the probe is approximated by a current strip of an equivalent width. Applying the method of image, the structure is transformed to an infinite-long thin strip inside a dielectric slab, which reduces the transition analysis into a simpler planar geometry. Basic characteristics of the probe excitation, and a complete design data for the radiation loss, excitation efficiency, and input impedance for various transition parameters are computed. Prototype design experiments were conducted, which show that quite efficient excitation can be achieved using; the probe, with insertion loss as low as 0.1 dB. This is contrary to some misconceptions that a probe transition to the fundamental PPDW mode is quite inefficient due to parallel-plate mode radiation.

❑ Return to main document.