Abstracts

A uniplanar compact photonic-bandgap (UC-PBG) structure and its applications for microwave circuit

Fei-Ran Yang, Kuang-Ping Ma, Yongxi Qian and T. Itoh. "A uniplanar compact photonic-bandgap (UC-PBG) structure and its applications for microwave circuit." 1999 Transactions on Microwave Theory and Techniques 47.8 (Aug. 1999 [T-MTT] (Mini-Special Issue on Low-Power/Low-Noise Technologies for Mobile Wireless Communications)): 1509-1514.

This paper presents a novel photonic bandgap (PBG) structure for microwave integrated circuits. This new PBG structure is a two-dimensional square lattice with each element consisting of a metal pad and four connecting branches. Experimental results of a microstrip on a substrate with the PEG ground plane displays a broad stopband, as predicted by finite-difference time-domain simulations. Due to the slow-wave effect generated by this unique structure, the period of the PBG lattice is only 0.1/spl lambda//sub 0/ at the cutoff frequency, resulting in the most compact PEG lattice ever achieved. In the passband, the measured slow-wave factor (/spl beta//k/sub 0/) is 1.2-2.4 times higher and insertion loss is at the same level compared to a conventional 50-/spl Omega/ line. This uniplanar compact PBG (UC-PBG) structure can be built using standard planar fabrication techniques without any modification. Several application examples have also been demonstrated, including a nonleaky conductor-backed coplanar waveguide and a compact spurious-free bandpass filter. This UC-PBG structure should find wide applications for high-performance and compact circuit components in microwave and millimeter-wave integrated circuits.

❑ Return to main document.