Abstracts

A rectangular tem waveguide with photonic crystal walls for excitation of quasi-optical amplifiers

M. Kim, J.B. Hacker, A.L. Sailer, S. Kim, D. Sievenpiper and J.A. Higgins. "A rectangular tem waveguide with photonic crystal walls for excitation of quasi-optical amplifiers." 1999 MTT-S International Microwave Symposium Digest 99.2 (1999 Vol. II [MWSYM]): 543-546.

Thin photonic crystal substrates are used to produce a TEM mode in a rectangular waveguide. Hexagonal pads arranged in honeycomb lattice and connected to the ground plane by substrate vias form the photonic crystal waveguide walls. Measurements on a Ku-band waveguide with two photonic crystal sidewalls showed a Field Flatness Efficiency (FFE) of better that 80 percent between 14.9 and 15.4 GHz, a substantial increase compared to the 50 percent of conventional rectangular waveguide. Simulations of a striped photonic crystal show similar behavior with additional property that it is also possible to use the crystal on top and bottom walls. Such a waveguide could support sual cross-polarized TEM modes by preventing only the longitudinal magnetic field at the crystal surface.

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