Abstracts

Micromechanical tuning elements in a 620-GHz monolithic integrated circuit

V.M. Lubecke, W.R. McGrath, P.A. Stimson and D.B. Rutledge. "Micromechanical tuning elements in a 620-GHz monolithic integrated circuit." 1998 Transactions on Microwave Theory and Techniques 46.12 (Dec. 1998, Part I [T-MTT]): 2098-2103.

While monolithic integrated-circuit technology promises a practical means for realizing reliable reproducible planar millimeter and submillimeter-wave circuits, conventional planar circuits do not allow for critical post-fabrication optimization of performance. A 620-GHz quasi-optical monolithic detector circuit is used here to demonstrate the performance of two integrated micromechanical planar tuning elements. This is the first reported demonstration of integrated micromechanical tuning at submillimeter wavelengths. The tuning elements, called sliding planar backshorts (SPBs), are used to adjust the electrical length of planar transmission-line tuning stubs to vary the power delivered between a substrate-lens coupled planar antenna and a thin-film bismuth detector over a range of nearly 15 dB. The circuit performance agrees with theoretical calculations and microwave measurements of a -0.06-dB reflection coefficient made for a scale model of the integrated tuners. The demonstrated tuning range for the SPB tuners indicates that they can be valuable for characterizing components in developmental circuits and for optimizing the in-use performance of various millimeter and submillimeter-wave integrated circuits.

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