Abstracts

Micromachined microwave transmission lines in CMOS technology

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Coplanar waveguides were designed and fabricated through a commercial CMOS process with post-processing micromachining. The transmission-line layouts were designed with commercial computer-aided design (CAD) tools. Integrated circuits (ICs) were fabricated through the MOSIS service, and subsequently suspended by top-side etching. The absence of the lossy silicon substrate after etching results in significantly improved insertion-loss characteristics, dispersion characteristics, and phase velocity. Two types of layout are presented for different ranges of characteristic impedance. Measurements of the waveguides both before and after micromachining were performed at frequencies from 1 to 40 GHz using a vector network analyzer and de-embedding techniques, showing improvement of loss characteristics of orders of magnitude. For the entire range of frequencies, for the 50-/spl Omega/ layout, losses do not exceed 4 dB/cm. These losses are mainly due to the small width and thickness of the metal strips. Before etching, losses are as high as 38 dB/cm due to currents in the underlying substrate. Phase velocity in the micromachined transmission lines is close to that in free space.

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