Abstracts

Folded U-Shaped Microwire Technology for Ultra-Compact Three-Dimensional MMIC's

K. Onodera, M. Hirano, M. Tokumitsu, I. Toyoda, K. Nishikawa and T. Tokumitsu. "Folded U-Shaped Microwire Technology for Ultra-Compact Three-Dimensional MMIC's." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2347-2353.

A microwire technique has been developed for fabricating three-dimensional (3-D) structures for use in ultra-compact GOAS monolithic microwave/millimeter wave integrated circuits (MMIC). By folding metal into a U-shaped wall and burying it in a relatively thick polyimide insulator, vertical microwires can be made with greatly reduced process complexity. This technique also offers process compatibility with multilevel interconnects. In this paper, the fundamental characteristics of the proposed U-shaped microwire are discussed and its applications to 3-D passive elements and circuits are demonstrated. The characteristics of the U-shaped microwires are almost the same as those of I-shaped microwires and can be accurately estimated and designed by using numerical analysis. The fabricated and designed transmission lines are one-half to one-third the size of conventional lines with the same transmission loss, and if the microwire is also used as a shielding wall, the occupied area can be made much smaller. Miniature inductors made of vertical U-shaped microwires exhibit a self-resonance frequency as high as that of conventional inductors, with one-half the size and offer a great advantage in L- or S-band applications. A fabricated miniature wideband 3-D balun had an insertion loss of 1.5 + 1 dB at frequencies from 10 to 30 GHz, and an amplitude and phase balance of 2 dB and 5°, respectively.

❑ Return to main document.