Abstracts

Three-dimensional silicon MMIC's operating up to K-band

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This paper presents three-dimensional (3-D) Si monolithic microwave integrated circuit (MMIC) technology and Si MMIC operation up to K-band using this technology, and describes X- and K-band mixers with design details and measurements. The 3-D Si MMIC technology isolates passive circuits from the low-resistivity Si substrate. The evaluations use Si bipolar transistors with an emitter size of 0.3 /spl mu/m/spl times/13.4 /spl mu/m/spl times/9 and f/sub max/ of 30 GHz. The mixers are base and collector LO injection types. The mixers, fabricated in an area of 0.76 mm/spl times/0.54 mm for the X-band mixers and in 0.46 mm/spl times/0.42 mm for the K-band mixers, exhibit a frequency conversion loss of 5-12 dB from 3.5 to 10 GHz and from 10 to 25 GHz. This technology is extremely effective for single-chip integration of receivers and transmitters and also for mixed-mode MMIC's up to K-band frequencies.

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