Abstracts

60-GHz flip-chip assembled MIC design considering chip-substrate effect

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In this paper, 60-GHz microwave integrated circuits (MIC's) with flip chip assembled 0.1-/spl mu/m-gate GaAs pseudomorphic high electron-mobility transistors (p-HEMT's) are demonstrated. To clarify the millimeter-wave characteristics of the flip-chip assembled structure, the parameters for the assembly equivalent circuit are examined using three-dimensional (3-D) electromagnetic-field analysis. The analytical results indicate that the optimum height of the bump is 30 /spl mu/m to minimize degradation of the millimeter-wave characteristics. A 60-GHz-band MIC two-stage amplifier and 30/60-GHz frequency doubler designed using the results of the field analysis have been fabricated. The amplifier has maximum gain of 12.8 dB at 58.6 GHz, P/sub 1dB/ of 12.9 dBm has been obtained at 60 GHz. A 30/60-GHz frequency doubler has maximum conversion gain of 0.4 dB and fundamental frequency suppression of -23.0 dB at the input frequency of 30.4 GHz. Good agreement between the measured and the simulated results demonstrates the potential of the structure and design method.

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