Abstracts

Design of radiating K-band HEMT oscillators by means of moment-method approach

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This paper discusses the design of radiating K-band oscillators with high electron-mobility transistors (HEMTs) as active devices. In order to allow monolithic integration, the design Is based on a uniplanar microstrip configuration, i.e., all terminals of the passive microstrip circuit are located on top of the substrate and no via-holes are needed. In this configuration, feeding of the microstrip lines is incompatible to the fundamental quasi-TEM microstrip mode. Moreover, the radiation losses of these so-called active antennas significantly influence the oscillation condition. Thus, modeling of the passive circuit by means of a full-wave analysis is mandatory. In this paper, we show how a full-wave analysis of the passive circuit can be combined with well-known network-based oscillator design methods using commercially available design tools. By using a moment-method approach for the passive structure and small signal model for the active device, all relevant electromagnetic effects like losses, coupling and radiation, are included, allowing a very precise prediction of the operation frequency.

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