Abstracts

A high-efficiency and low-phase-noise 38-GHz pHEMT MMIC tripler

A. Boudiaf, D. Bachelet and C. Rumelhard. "A high-efficiency and low-phase-noise 38-GHz pHEMT MMIC tripler." 2000 Transactions on Microwave Theory and Techniques 48.12 (Dec. 2000 [T-MTT] (Special Issue on 2000 International Microwave Symposium)): 2546-2553.

Frequency translation circuits are key elements in communication systems. This paper presents a frequency tripler for 38-GHz short-range communication systems, designed using a pseudomorphic high electron-mobility field-effect transistor (pHEMT) technology. The successful first iteration monolithic microwave integrated circuit achieved a state-of-the-art output power of 3.1 dBm and a minimum conversion loss of 3.4 dB. The multiplier exhibits a conversion efficiency of 11% and average phase noise degradation at 10 and 100 kHz offset frequency from carrier of 9/spl plusmn/1 dB. Through a comprehensive study of the frequency multiplier, we demonstrate the optimum performance achieved under a class B mode of operation. To our knowledge, this is the first reported Ka-band single-stage frequency tripler based on pHEMT technology that has been fully characterized for phase noise degradation.

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