Abstracts

A 50-MHz-55-GHz multidecade InP-based HBT distributed amplifier

K.W. Kobayashi, J. Cowles, L.T. Tran, A. Gutierrez-Aitken, T.R. Block, A.K. Oki and D.C. Streit. "A 50-MHz-55-GHz multidecade InP-based HBT distributed amplifier." 1997 Microwave and Guided Wave Letters 7.10 (Oct. 1997 [MGWL]): 353-355.

The authors report on a 50-MHz-55-GHz multidecade bandwidth InP-based heterojunction bipolar transistor (HBT) MMIC distributed amplifier (DA) which achieves the widest bandwidth and highest frequency of operation so far demonstrated for a bipolar amplifier. The HBT MMIC DA was fabricated using a high-speed 1-/spl mu/m InAlAs-InGaAs-InP HBT base-undercut technology with peak f/sub T/'s and f/sub max/'s of 80 and 200 GHz, respectively, in order to obtain broad-band gain. Key to this work is the successful employment of HBT active load terminations used on both the input and output DA transmission lines in order to extend the low-frequency gain performance down to baseband. With only 82 mW of DC power consumption, the amplifier obtains measured gains of 7.6 dB at 50 MHz, 5.7 dB at 30 GHz, 5.8 dB at 50 GHz, and 3.1 dB at 55 GHz. Simulations of a monolithically integrated InGaAs p-i-n photodetector predicts a baseband 47-GHz photoreceiver response with an effective transimpedance of 38-dB/spl Omega/. The baseband millimeter-wave capability of the InP-based HBT DA and its compatibility with InGaAs photodetectors makes this technology attractive for future generation (>40 Gb/s) high-data-rate light-wave applications.

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