Abstracts

Design and realization of a millimeter-wave Si/SiGe HBT frequency multiplier

S.P.O. Bruce, A. Rydberg, M. Kim, F.J. Beißwanger, J.-F. Luy, H. Schumacher, U. Erben, M. Willander and M. Karlsteen. "Design and realization of a millimeter-wave Si/SiGe HBT frequency multiplier." 1998 Transactions on Microwave Theory and Techniques 46.5 (May 1998, Part II [T-MTT] (Special Issue on Microwave Circuits on Silicon Substrates)): 695-700.

In this paper, the design of an active millimeter-wave frequency doubler using an Si/SiGe heterojunction bipolar transistor (HBT) as the active device is studied. Simulations are made using a developed physics-based large-signal model for Si/SiGe HBT's, which includes thermal dependence. Despite the high-output operating frequency of the fabricated doubler being close to f/sub max/ 67 GHz for the Si/SiGe HBT, the conversion efficiency in a not completely optimized circuit is found to be better than -12 dB. The 3-dB bandwidth for the doubler is approximately 7.4%. These results are found to be comparable to a heterojunction field-effect transistor (HFET) doubler operating equally close to its f/sub max/. Simulated results of the doubler performance with varied terminating impedances for the HBT are presented as design aids.

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