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Title

InP HBT IC Technology for Terahertz Frequencies: Fundamental Oscillators Up to 0.57 THz

Source

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Abstract

We report on the development of a 0.25-m InP HBT IC technology for lower end of the THz frequency band (0.3-3 THz). Transistors demonstrate an extrapolated f_{max} of >800 GHz while maintaining a common-emitter breakdown voltage (BVCEO) >4 V. The transistors have been integrated in a full IC process that includes three-levels of interconnects, and backside processing. The technology has been utilized for key circuit building blocks (amplifiers, oscillators, frequency dividers, PLL, etc), all operating at >=300 GHz. Next, we report a series of fundamental oscillators operating up to 0.57 THz fabricated in a 0.25-m InP HBT technology. Oscillator designs are based on a differential series-tuned topology followed by a common-base buffer, in a fixed-frequency or varactor-tuned scheme. For >=400 GHz designs, a subharmonic down-conversion mixer is integrated to facilitate spectrum measurement. At optimum bias, the measured output power was -6.2, -5.6, and -19.2 dBm, for 310.2-, 412.9-, and 573.1-GHz designs, respectively, with P_{DC} <= 115 mW. Varactor-tuned designs demonstrated 10.6-12.3 GHz of tuning bandwidth up to 300 GHz. (31 References).