

Monolithic Ultra-Broadband Transimpedance Amplifiers Using AlGaAs/GaAs Heterojunction Bipolar Transistors

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Monolithic ultra-broadband transimpedance amplifiers are developed using AlGaAs/GaAs HBT's. To realize good amplifier performances, two factors are mentioned, those are an affordable HBT fabrication process using self-aligned method and an optimized circuit design considering large signal operations. The developed HBT fabrication process achieves excellent uniformity in DC characteristics. And an effect on amplifier microwave performances, derived from the discrete device uniformity, is estimated. Amplifier circuit configurations are designed by harmonic balance simulation using the extracted large signal device parameters. The fabricated amplifier exhibits a DC to 13.4-GHz bandwidth with an 18.1-dB gain. Fairly good uniformity is also achieved for the amplifier microwave performances. An optical receiver module is constructed mounting the developed HBT amplifier and InGaAs p-i-n photodiode chips. The optical receiver module provides a 9.4-GHz bandwidth and an optical receiver sensitivity of -15.7 dBm at 10-Gb/s data rate.

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