Abstracts

A Novel Baseband-1.5 GHz Monolithic HBT Variable Gain Amplifier with PIN Diode Gain Control (1995 Vol. I [MWSYM])

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This paper reports on a GaAs HBT Variable Gain Amplifier (VGA) which monolithically integrates a GaAs PIN diode as a variable resistor to achieve wide gain control. The PIN diode is made from the intrinsic MBE layers of the HBT collector-base junction which consists of a 7000A angstrom thick i-region. The novel VGA topology employs active feedback and output buffering to obtain high IP3 performance and is the first PIN-HBT VGA reported of its kind. The VGA obtains 10 dB gain and over 25 dB of gain control range at 1 GHz. The output IP3 is 15.1 dBm and the noise figure is 9.3 dB at maximum gain. The corresponding input IP3 is +5.1 dBm and remains constant over gain control which is an attractive feature of the HBT-PIN VGA. The PIN diode VGA design is realized in a miniature 0.8x0.4 mm^2 area. Integrated with a previously developed HBT LNA, the resultant low noise VGA MMIC demonstrates 2.1 dB noise figure, >35 dB gain, +13.5 dBm OIP3, and over 25 dB of gain control at 1 GHz.

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