Abstracts

High-Performance GaAs Heterojunction Bipolar Transistor Monolithic Logarithmic IF Amplifiers

A.K. Oki, M.E. Kim, G.M. Gorman and J.B. Camou. "High-Performance GaAs Heterojunction Bipolar Transistor Monolithic Logarithmic IF Amplifiers." 1988 Transactions on Microwave Theory and Techniques 36.12 (Dec. 1988 [T-MTT] (1988 Symposium Issue)): 1958-1965.

The GaAs/AIGaAs heterojunction bipolar transistor (HBT) technology is used to demonstrate high-performance monolithic logarithmic intermediate frequency (IF) amplifiers. These log IF amplifiers, believed to be the first using the HBT technology, implement both "true" and "successive-detection" designs. Monolithically cascaded log gain stages are used to achieve piecewise-approximated logarithmic functions for the compression of wide-dynamic-range signals. An HBT IC fabrication process, based on a 3 µm emitter, self-aligned base ohmic metal transistor employing both molecular-beam epitaxy (MBE) and metal-organic chemical vapor deposition (MOCVD) growth structures, is used to advance the state of the art in monolithic log IF amplifier technology. The true log amp integrates four dual-gain (limiting and unity gain) stages without on-chip video detection. Its performance includes dc-3 GHz IF/video bandwidth, 400 ps rise time, <±1 dB log error over /spl ap/40 dB dynamic range at 3 GHz, and a tangential signal sensitivity (noise) of -60 dBm (test set limited). The successive-detection log amp, designed for lower frequency and dynamic range, employs three limiting gain stages and four detector stages to achieve a 550 MHz bandwidth and <± 0.34 dB log error over a 27 dB dynamic range. It is able to process 13 ns pulses with 5.0 ns and 5.2 ns rise and fall times, respectively.

❑ Return to main document.