Abstracts

Demonstration of photonically controlled GaAs digital/MMIC for RF optical links

I.W. Smith, R.C. Sharp, J.A. Ruiz, M. O'Connell, A. Kelsey, S.E. Davis, S.-L.G. Chu, A. Brunel and K. Tabatabaie-Alavi. "Demonstration of photonically controlled GaAs digital/MMIC for RF optical links." 1997 Transactions on Microwave Theory and Techniques 45.1 (Jan. 1997 [T-MTT]): 15-22.

We report design, fabrication, and test of a monolithic GaAs optoelectronic integrated circuit (OEIC) implementing a broad-band optically driven digital/analog radio frequency (RF) interface. The integrated circuit (IC) was fabricated using a foundry-compatible enhancement/depletion metal-semiconductor field-effect transistor (MESFET) process with no added lithography steps. A single optical fiber carries externally amplitude modulated 0.85-/spl mu/m light to the on-chip GaAs metal-semiconductor-metal interdigitated photodetector. RF as well as simultaneous digital information encoded at up to 10 Mb/s using a novel waveform set is transmitted over the fiber. The serial digital data is self-clocked into on-chip registers to control the RF signal chain, which includes a three-bit digital attenuator. The circuit operates in an asynchronous mode to detect digital and RF on the single optical-fiber input, control RF level, and transmit the 2-8-GHz RF to the IC's electrical output. Measurements characterizing the RF and digital performance of the IC as well as a demonstration of the full optoelectronic mixed-mode functioning of the IC are presented.

❑ Return to main document.