Abstracts

Ultrahigh-speed InP/InGaAs DHPTs for OEMMICs

H. Kamitsuna, Y. Matsuoka, S. Yamahata and N. Shigekawa. "Ultrahigh-speed InP/InGaAs DHPTs for OEMMICs." 2001 Transactions on Microwave Theory and Techniques 49.10 (Oct. 2001, Part II [T-MTT] (Special Issue on Microwave and Millimeter-Wave Photonics)): 1921-1925.

This paper presents an ultrahigh-speed InP/InGaAs double-heterostructure phototransistor (DHPT) with a record optical gain cutoff frequency of 82 GHz. This excellent performance originates from the double-heterostructure's compatibility with high-performance double-heterostructure bipolar transistor (DHBT) and a new self-aligned process. To demonstrate the excellent performance of the DHPT, two kinds of optoelectronic MMICs (OEMMICs) were designed and fabricated. One is a 40-GHz-band DHPT/DHBT photoreceiver that shows the DHPT's ability to be simultaneously integrated with a high-performance DHBT. The 40 GHz operation frequency is also the highest reported for monolithically integrated HPT/HBT photoreceivers. The other is a direct optical injection-locked oscillator that can extract an electrical clock signal from optical data streams. The OEMMICs are promising for compact and low-power-consumption optical receivers on an InP platform for millimeter-wave photonics and ultrahigh-speed optical communication systems.

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