Abstracts

Direct optical injection locking of InP/InGaAs HPT oscillator ICs for microwave photonics and 40-Gbit/s-class, optoelectronic clock recovery

H. Kamitsuna, T. Shibata, K. Kurishima and M. Ida. "Direct optical injection locking of InP/InGaAs HPT oscillator ICs for microwave photonics and 40-Gbit/s-class, optoelectronic clock recovery." 2002 Transactions on Microwave Theory and Techniques 50.12 (Dec. 2002 [T-MTT] (Special Issue on 2002 International Microwave Symposium)): 3002-3008.

Presents fully monolithically integrated 10- and 39-GHz-band InP/InGaAs heterojunction phototransistor (HPT) oscillators that can be optically injection locked by directly illuminating the HPT. When optical signals are modulated by fundamental frequencies around free-running oscillations, the 10-GHz-band HPT oscillator integrated circuit (IC) achieves an ultra-wide locking range of 1401 MHz (relative bandwidth of 13.6%), and the 39-GHz-band HPT oscillator IC achieves a wide locking range of 768 MHz, which are records among the indirect and/or direct optical injection-locked oscillators reported to date. The 10-GHz-band HPT oscillator IC also achieves very wide locking ranges of 618 and 160 MHz for third and fifth subharmonic modulated optical signal injection, respectively, which is very useful for microwave photonics applications. Optoelectronic clock recovery for optical transmission systems was tested by using the 39-GHz-band HPT oscillator IC and a planar lightwave circuit Mach-Zehnder interferometer. A 38.8-GHz electrical clock signal was successfully extracted from 38.8-Gbit/s nonreturn-to-zero optical data streams.

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