Abstracts

Packaged semiconductor laser optical phase-locked loop (OPLL) for photonic generation, processing and transmission of microwave signals

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In this paper, we present the first fully packaged semiconductor laser optical phase-locked loop (OPLL) microwave photonic transmitter. The transmitter is based on semiconductor lasers that are directly phase locked without the use of any other phase noise-reduction mechanisms. In this transmitter, the lasers have a free-running summed linewidth of 6 MHz and the OPLL has a feedback bandwidth of 70 MHz. A state-of-the-art performance is obtained, with a total phase-error variance of 0.05 rad/sup 2/ (1-GHz bandwidth) and a carrier phase-error variance of 7/spl times/10/sup -4/ rad/sup 2/ in a 15-MHz bandwidth. Carriers are generated in the range of 7-14 GHz. The OPLL transmitter has been fully packaged for practical use in field trials. This is the first time this type of transmitter has been fabricated in a packaged state which is a significant advance on the route to practical application.

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