

## Manufacturing Progress for InP-based 500 Gbps Photonic Integrated Circuits

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The status and progress of InP optoelectronic integration is reviewed. Infinera has previously reported on the manufacturing of 100 Gbps InP-based large-scale photonic integrated circuits (LS-PICs)<sup>1</sup>. These PICs, based on electro-absorption modulators (EAMs) and with more than 50 discrete devices per chip, have now reached a high level of manufacturing maturity, and have furthermore redefined reliability standards for InP components, having achieved more than 860 million field hours without a single failure as of this writing.

In this paper, we will describe manufacturing status for the 3<sup>rd</sup> generation of Infinera's LS-PICs<sup>2</sup>, which feature 500 Gbps capacity using phase modulation on the transmit (TX) chip, and coherent detection on the RX chip, and which are now the heart of Infinera's 100G DTN-X transport system, released in mid-2012. The new PICs require an order-of-magnitude increase in chip complexity (based on raw device count), and a commensurate increase in fabrication complexity from III-V epitaxy through photo, etch, deposition and metallization. The architecture and performance of Infinera's PICs will be described, along with relevant yield and production metrics that demonstrate this platform is at once manufacturable and scalable.

<sup>1</sup> J. L. Pleumeekers, et al., "Status and Progress in InP Optoelectronic Processing: Towards Higher Levels of Integration", *Proc. CS-Mantech* (2006).

<sup>2</sup> F. Kish, et al., "Current Status of Large-Scale InP Photonic Integrated Circuits", *IEEE J. Sel. Top. Quantum Electron.* **17**, 1470 (2011).