10 Channel, 45.6 Gb/s per channel, polarization-multiplexed DQPSK, InP receiver photonic integrated circuit

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Abstract

We demonstrate a 10 wavelength, 200 GHz spaced, monolithically integrated, polarization-multiplexed, InP differential quadrature phase shift keying receiver operating at 45.6 Gb/s per wavelength. The receiver is based on a novel technique for polarization demodulation and phase tracking that does not require any external components.

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Single channel time division multiplexed (TDM) systems (black filled squares), and WDM systems (red filled circles). Figure 1.2. Evolution of bit rate-distance product for single wavelength (diamonds, open symbols for optical TDM), WDM (triangles), single and multi-band orthogonal frequency division multiplexing (OFDM) (filled circles) and coherent detection (open circles). Schematic of the GSCS Tb/s super-channel transmitter and coherent receiver. Insets show the optical spectra measured using a 0.01 nm resolution bandwidth. The presented constellation diagrams are obtained using an ECL as a carrier, and serve as reference measurements. Fig. 1. Historical trend and timeline for complexity in monolithic, photonic integration on InP (Refs next to the devices are from Ref [1]). The vertical scale is linear, and the red filled circles start at 1 and go to 240. The trend shows an exponential growth in PIC complexity in recent years.2. DQPSK PIC Architecture and Performance. Fig. 2(a) shows the layout of the 10 channel DQPSK receiver PIC that we reported in [4]. The polarization processing block at the input is common to all 10 channels. The input 10 Channel, 45.6 Gb/s per Channel, Polarization-Multiplexed DQPSK, InP Receiver. Photonic Integrated Circuit. Radhakrishnan Nagarajan, Fellow, IEEE, Jeffrey Rahn, Member, IEEE, Masaki Kato, Member, IEEE, Jacco Pleumeekers, Damien Lambert, Vikrant Lal, Member, IEEE, Huan-Shang Tsai, Alan Nilsson, Member, IEEE, Andrew Dentali, Fellow, IEEE, Matthias Kuntz, Roman Maleendevich, Jie Tang, Jiaming Zhang, Timothy Butrie. In this paper, we report a 10 channel, 45.6 Gb/s per channel, PM DQPSK InP receiver PIC. This PIC is based on a novel de-modulation technique for PM DQPSK signals that uses multiple combinations of the optical input signal to decode the receiver [13], [14].