

High-Baudrate Silicon Photonics Ring Resonator and Mach-Zehnder Modulators for Short-Reach Applications

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ABSTRACT

Silicon photonics (SiP) is a key enabling technology for high-baudrate communication. It is a key technology for future 800 Gbps and 1.6 Tbps solutions to meet the ever-increasing demands. The 800G pluggable multi-source agreement (MSA) suggests that intensity-modulated direct-detection (IM/DD) is the most sustainable way forward [1]. The high operational bandwidth of each transceiver component is essential. An ultra-compact SiP slow light modulator with record-high bandwidth of 110 GHz shows the potential [2]. Therefore, both multilevel pulse amplitude modulation (PAM) and on-off keying (OOK) should be considered. SiP offers excellent production yield and has a substantial role in optical interconnects. SiP ring resonator modulators (RRM) have unique advantages like a small footprint, simple driver configuration, low power consumption, and suitability for multichannel applications. On the other hand, the SiP Mach-Zehnder modulator (MZM) offers differential drive benefits.

In this paper, we demonstrate SiP MZM/RRM-based transmitters to achieve highest-baudrate OOK and PAM4 signals below 6.7% overhead (OH) hard-decision forward error correction (HD-FEC) threshold of 4.5×10^{-3} . These are characterized with [3]. We also managed to achieve high baudrate OOK, PAM4, and PAM6 signal transmission with SiP MZM and RRM over 100 meters single mode fiber (SMF).

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