

# Theoretical bounds for the bit error rate for SAC OCDMA balanced detectors with multiple photodiodes

## **Abstract**

In this paper, we derive the theoretical lower and upper bounds for bit error rate (BER) for spectral amplitude coding OCDMA balanced detector (BD) employing multiple photodiodes. The purpose of this study is to find the maximum performance improvement that can be achieved when a multi-photodiode structure is used to reduce the intensity noise. Results show that when the split signals are independent, the lower bound for the BER is much lower than it is for the conventional BD. To further validate our study, Monte Carlo simulation and software simulation using Optisystem were performed.

## **Keywords**

Balanced detector; Multi-photodiode balanced detector; Optical code division multiple access (OCDMA); Spectral amplitude coding (SAC) OCDMA