

# **Abstract**

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## **Characterization of the Semiconductor Optical Amplifier for Amplification and Optical Switching Employing the Segmentation Model**

This paper characterizes the gain and the carrier density responses of a semiconductor optical amplifier (SOA). In order to achieve the switching functions in SOA-based optical switches, such as Symmetric Mach-Zehnder (SMZ), the effect of the input signal on the total gain response of the SOA is investigated. The theoretical operation principle is demonstrated using a segmentation model that employs the complete rate equation with third order gain coefficients. Results obtained show the input boundaries and requirements in which the SOA can be efficiently used as an amplifier and as a switch.