

# **Abstract**

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## **The effect of the input energy on the SOA gain with non-uniform biasing**

This paper investigates the effect of input optical pulse energy on the total gain of the semiconductor optical amplifier (SOA) injected with a non-uniform bias current. For ultra-high data rate applications it is essential that the SOA has a fast gain recovery response, thus resulting in maximum SOA gain and reduced gain standard deviation. SOA with higher gain standard deviation will reduce the overall gain of the output optical pulses. Therefore in this paper, non-uniform biasing techniques are adopted in order to accelerate the gain recovery while minimizing the gain standard deviation for highspeed optical applications. The theoretical SOA operation principle is demonstrated using segmented model with the complete rate and propagation equations. The gain responses of the SOA due to uniform and non-uniform biasing techniques are analyzed. Different recovery rates are investigated using the non-uniform biasing to optimize the gain. This paper will present the effect of the input pulse energy on the output gain and the gain standard deviation employing different bias current techniques at speed up to 40 Gbps.