

RF PERFORMANCE AND MODELLING OF OPTICALLY CONTROLLED MOSFET

GAYATRI PHADE¹ & B K MISHRA²

¹PhD Student, SNDT University, Mumbai, India

²Thakur Engineering College, Mumbai, India

ABSTRACT

Normally off devices like Metal Oxide Semiconductor Transistors (MOSFET) are sensitive to light and can be controlled optically. These devices have high package density, low power consumption and dynamic operating range. In this paper modelling and simulation of MOSFET devices is carried out in 1GHz to 10GHz frequency band. Devices are controlled optically by varying optical power of incident radiations from 0.25 mW to 25mW at constant gate voltage and drain voltage. Wavelength of incident radiation is 800nm and device length is 0.35 μ m. Radiations are made to incident perpendicular to the device surface. RF performance is observed by means of Drain current, transconductance, Y parameters and S parameters. Illumination of device gives rise to electron hole pairs thereby increasing inversion level in the channel. Drain current and transconductance of MOSFET increases due this optical absorption.

S parameter is the proper tool to characterize the two-port network description of RF devices. MOSFET can be viewed as two port network with two controlling ports, Gate and Drain with common grounded Source terminal. Optical control provides third controlling port to this two-port network. Result shows that all performance parameters can be controlled optically. Device can be used as OEIC due integrity of optical and RF characteristics.

KEYWORDS: MOSFET, Y Parameters, S Parameters, RF, Optical