INVESTIGATION OF ELECTRICAL CHARACTERISTICS OF PARTIALLY DEPLETED SOI DEVICE

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ABSTRACT

Well constructed models for n-type n-MOSFET using bulk technology and partially depleted (PD) silicon on insulator (SOI) technology had been developed. This paper was investigated and simulated the electrical characteristics of partially-depleted SOI (silicon-on-insulator) n-MOSFET device and also done on bulk-Si n-MOSFET device in order to compare its electrical characteristics. The models were simulated using Silvaco-Athena software to find electrical properties such as threshold voltage, sub-threshold and leakage current. Comparison of electrical properties for both technology and channel length were done accordingly from each result. This paper was focus on investigation of the electrical characteristics of the devices at 0.5 micron and 0.35 micron channel length. Silvaco Athena structure and simulation results using Atlas were presented, that shows PD SOI technology is better than Bulk technology in the small scaling of channel length.

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CHAPTER I

INTRODUCTION

1.1 OVERVIEW

This chapter will elaborate on the background of project and describe on the problem statement that related to the project. This chapter also consists of objectives, significance of project and last part of this chapter will briefly explain the organization of the report.

1.2 BACKGROUND OF PROJECT

International Business Machine (IBM) says that scaling refers to the drive to continue making the transistor smaller and the technology that connects transistors together. As the transistor becomes smaller, it becomes faster and can conduct more electricity. It also consumes less power when it switches on or off or when electricity passes through it. It is mentioning that the critical dimension of a Metal Oxide Semiconductor (MOS), first introduced in the IBM computer 15 year ago, has done down from 10 microns to 0.2 microns and 90 nanometre in researching chips today. In that time, a chip's electrical characterization has also change like the leakage current and threshold voltage [1].