TUNABLE HIGH SPEED PULSE GENERATOR FOR PHASE CHANGE MEMORY (PCM) USING 0.13μm TECHNOLOGY

MUNIRAH BINTI RASIN

FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITY TECHNOLOGY MARA
MALAYSIA

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ABSTRACT

This project presents a tunable high speed pulse generator for Phase Change Memory (PCM) using 0.13μm technology. The promising candidates for the next generation memory device is PCM with high speed, high performance and low production cost which are the major issues in the semiconductor industry. A pulse generator is needed to induce pulses into PCM to give enough supply for it to change state from amorphous to crystalline. The conventional pulse generator has a large internal resistance that limits the accuracy of the generated pulse. To overcome this problem, an integrated tunable high speed pulse generator is needed. In this project, a tunable high speed pulse generator will be design by varying the RC delay circuit to have adjustable pulse width. The proposed tunable high speed pulse generator circuit composed of a timer circuit and RC delay circuit. The width of the generated pulse can be tuned by varying resistor value in the RC delay circuit. The tunable high speed pulse generator will be design using 0.13 μm technology. The proposed design is purposely designed for Phase Change Memory to change state from amorphous to crystalline that required pulse width input ranging of 100μs – 100ns.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

This chapter discusses about the project which is introduction of overview for pulse generators with phase change memory (PCM) in the semiconductor industry. It includes the problem statement, objectives and scope of work and also the thesis organization part.

1.2 INTRODUCTION

A pulse generator circuit is used in many electronic device applications. A pulse generator is either an electronic circuit or a piece of electronic test equipment used to generate rectangular pulses. For example, a pulse generator circuit may be designed to generate a pulse of predetermined time duration at the rising edge of an input pulse. Alternatively, the circuit may be designed to generate a pulse at the falling edge of an input pulse [1].

In a number of semiconductor integrated circuit devices to control time delays between operations or to control the length of an operation or a phase of that operation, a pulse generator is needed. The timing of operations within a memory device will be regulated by a timing pulse or other control signal generated by a pulse generator [1]. Countless digital electronic systems employ signal pulses to trigger/control various circuit elements.