

**COMPARATIVE STUDY ON TELESCOPIC DIFFERENTIAL
AMPLIFIER AND MULTISTAGE AMPLIFIER DESIGN USING 50nm
BSIM4 TECHNOLOGY**

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UNIVERSITI TEKNOLOGI MARA (UiTM)



MOHD AZRIE BIN ABU BAKAR

FACULTY OF ELECTRICAL ENGINEERING

UNIVERSITY TEKNOLOGI MARA (UiTM)

40450 SHAH ALAM, SELANGOR

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With the name of ALLAH Most Gracious Most Merciful

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“May Allah bless and reward them for their generosity”

ABSTRACT

The operational amplifier is one of the most useful and prominent components of analog electronics. It is a voltage controlled voltage source with very high gain. The operational amplifier is also an essential block of many mixed-mode systems and it is widely used in modern electronics. This thesis presents the comparison between telescopic differential amplifier and multistage amplifier design using 50nm BSIM4 technology. The objective of this project is to compare the gain and power dissipation among these two design models. The execution has been done in 50nm BSIM4 technology, for a 1.0V voltage supply using LTSpice simulation tools. LTSpice is a high performance SPICE simulator, waveform viewer and schematic capture with improvements and models for easing the simulation of switching regulators. From the simulation, the telescopic differential amplifier obtained 60.49dB gain and consumes 24.68uW power dissipation. The multistage amplifier obtained 71.32dB gain and consumes 62.47uW power dissipation.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

This project is to compare parameters between two design models which are Telescopic Differential Amplifier and Multistage Amplifier. The parameters to be compared are gain and power dissipation. Design model that has high gain and lower power dissipation is considered as the better design model. Both amplifiers are designed in 50 nm BSIM technology by using LTSpice and then characterized the parameters by comparing these two design models with each other.

1.2 BACKGROUND OF STUDY

Operational amplifiers (Op-amps) are one of prominent components of any kind of signal processing task ranging from simple amplification of weak signals to complex audio and video processing applications in mixed-signal domain. The designing of operational amplifiers put new challenges in low power application with reduces channel length devices. Operational amplifiers with negative feedback allow highly versatile realizations, in particular highly stabilized gain amplifiers. In fact, today's amplifiers are mostly utilized with feedback. The differential amplifier is used on the output of an amplifier to allow input voltages to move around so that biasing of the gain stages isn't affected [1]. With the advance in technologies, multistage amplifier is greatly needed due to the fact that for low voltage design, single-stage cascode amplifier is no longer suitable [2].