

Low Voltage Low Power Amplifier based on MOSFET Darlington Configuration

MANGALAPALLY NAVEEN KUMAR, VNR Vignana Jyothi Institute of Engineering & Technology

July 21, 2021

Abstract

This paper shows that the Amplifier is based on the MOSFET Darlington pair Configuration. These circuits mainly show that the low voltage (VDD) and low power consumption (PC) characteristics using N-MOS or P-MOS amplifier with Darlington pair Configuration. By analyzing the BJT Darlington pair Amplifier, we came to know that the power consumption is more. Here, to reduce the power consumption (PC) we can use MOS transistors over BJT transistors. And, the frequency response parameters like bandwidth, the logarithmic gain will improve by using MOS transistors. By using this circuit, the bandwidth will be improved. The circuit is designed and implemented in the eSim EDA tool and will be done using Sky Water's 130nm PDK.

1 Circuit Details

The Amplifier which we proposed to be taken is based on MOSFET Darlington pair configuration can be done by using both NMOS transistors or PMOS transistors. The Circuit is designed by using two NMOS or PMOS transistors, DC biasing voltage, Resistors, Capacitors, Input AC voltage source. Here, MOS transistors Q1, Q2 can be used as per requirement. And by considering the value of low dc voltage applied consumption of power is very important to be low while the output power is also low. By giving AC source voltage as V_{in} . The source voltage will have a phase value, we should give the input frequency and the Amplitude value of voltage taken. Resistors used are Input Resistor (R1), Source Resistor 1 (RS1), Source Resistor 2 (RS2), Drain Resistor (RD), LOAD Resistor (RL). Capacitors used are Input Capacitor CC1, Output Capacitor CC2, Source Capacitor CS. DC biasing voltage (VDD) is the supply dc voltage to the circuit. And the value of dc voltage is low so the output power will be low so by reducing the power consumption (PC) we can get the maximum output power. Now the two MOS transistors are connected through the wire with some resistors and capacitors are connected. And, the DC biasing voltage can be connected to the drain resistor and Q1 transistor through the wire. And then the dc analysis of the circuit can be done (applying dc voltage or current). By performing dc analysis, we come to know that what is the behavior of the circuit which we are taken. Here, in this circuit output is taken across the LOAD resistor (RL).

2 Implemented Circuit

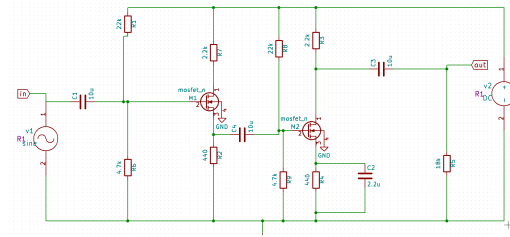


Figure 1: Implemented circuit diagram.

3 Implemented Waveforms

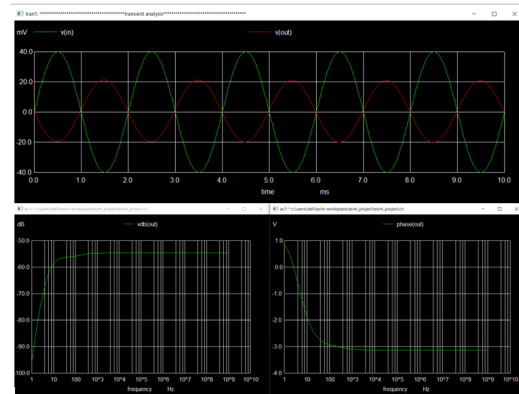


Figure 2: Implemented waveform.

References

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