

California State University,
Northridge

College of Engineering &
Computer Science

Electrical and Computer
Engineering Department

ECE 443L Digital Electronics
Laboratory Report 8

CMOS Based DAC Circuit



By Evan Thomas, Haroutun Haroutunian

Abstract: After constructing the Digital-to-Analog Converter, students examine the Pulse Voltage supplies to alter input frequencies. Input frequencies alter the pulse, as seen in the output figures in Procedure.

Keywords: DAC, MSB, LSB, non-inverting

8.1 Introduction

Experiment 8 introduces students to Digital-to-Analog Circuits. DACs are found in every electronic device, eg. Smartphones to convert volume on speakers, etc. The circuit consists of simple resistors, OpAmp, Voltage supplies to create inputs, and PMOS and NMOS transistors.

8.2 Simulation and Experimental Set-up

As seen in figure 8.1, the circuit is set up with common source and gate transistors. The circuit is set up where the Left-most is the Most Significant Bit, and the Right-most is the Least Significant Bit.

8.3 Simulation and Experimental Results

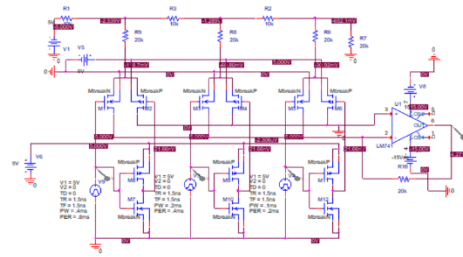


Figure 8.1 Case 1 Evan DAC circuit running at 5kHz, 2.5kHz, and 1.25kHz

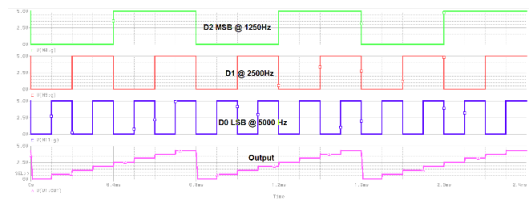


Figure 8.2 Case 1 Evan output of DAC circuit

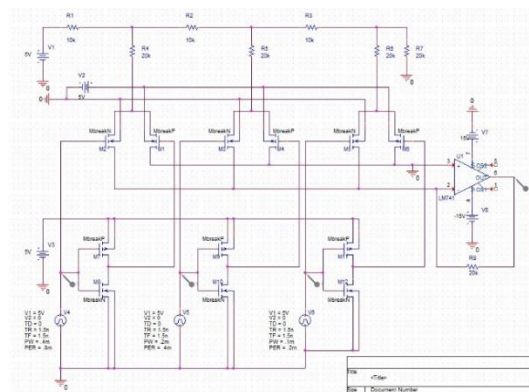


Figure 8.3 Case 2 Haroutun DAC circuit running @ LSB 5kHz, 2.5kHz and MSB 1.25kHz

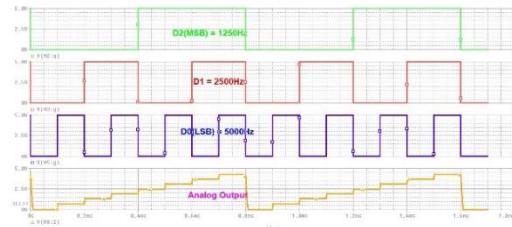


Figure 8.4 Case 2 Haroutun
DAC circuit output @ LSB
5kHz, 2.5kHz and MSB 1.25kHz

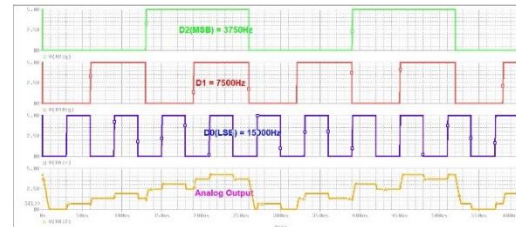


Figure 8.8 Case 2 Haroutun
DAC circuit output @ LSB
15kHz, 7.5kHz and MSB 3.75kHz

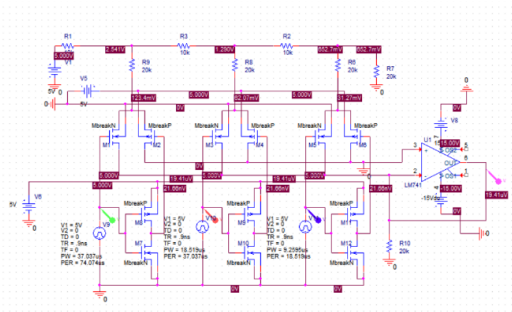


Figure 8.5 Case 3 Evan non
inverting DAC circuit
running at 3375 Hz, 6750 Hz,
and 13500 Hz

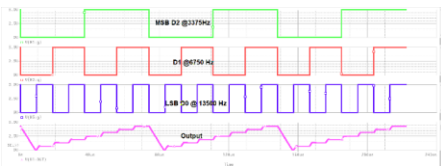


Figure 8.6 Case 3 Evan DAC
output of DAC circuit

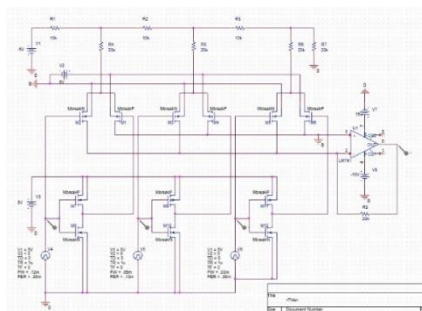


Figure 8.7 Case 4 Haroutun
DAC circuit running @ LSB
15kHz, 7.5kHz and MSB 3.75kHz

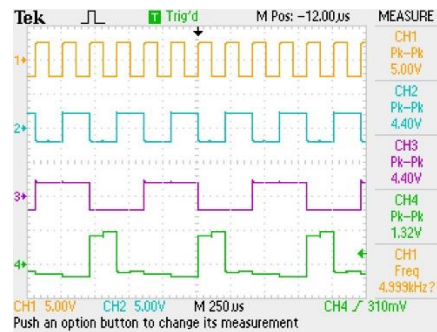


Figure 8.9 Case 3
Experimental output of DAC
Circuit

8.4 Discussion and Conclusion

In experiment 8, students were exposed to the set-up and uses of DAC circuits. DAC is utilized in everyday electronic devices so real-world inputs can be read by the electronic device and output easy-to-read waveforms. The music industry is surrounded by DAC circuits since frequencies are input in analog or digital and converted.