Design of 3-bit Flash Type ADC

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Abstract

This paper is about designing of a 3-bit Flash Type Analog-to-Digital Converter (ADC). Comparators and voltage divider circuits are used which are to be modelled using Ngspice and Priority encoder is designed using Verilog HDL. This is an example of mixed-signal electronic circuit simulation. Here, we will be using eSim open-source EDA tool for the circuit design and simulation.

1. Reference Circuit Details

Analog to Digital Converter (ADC) is an electronic integrated circuit used to convert the analog signals such as voltages to digital or binary form consisting of 1s and 0s. Most of the ADCs take a voltage input as 0 to 10V, -5V to +5V, etc., and correspondingly produces digital output as some sort of a binary number.

Also called the parallel A/D converter, this circuit is the simplest to understand. It is formed of a series of comparators, each one comparing the input signal to a unique reference voltage. The outputs from the comparator connect to the inputs of a priority encoder circuit, which then produces a binary output.

2. Reference Circuit
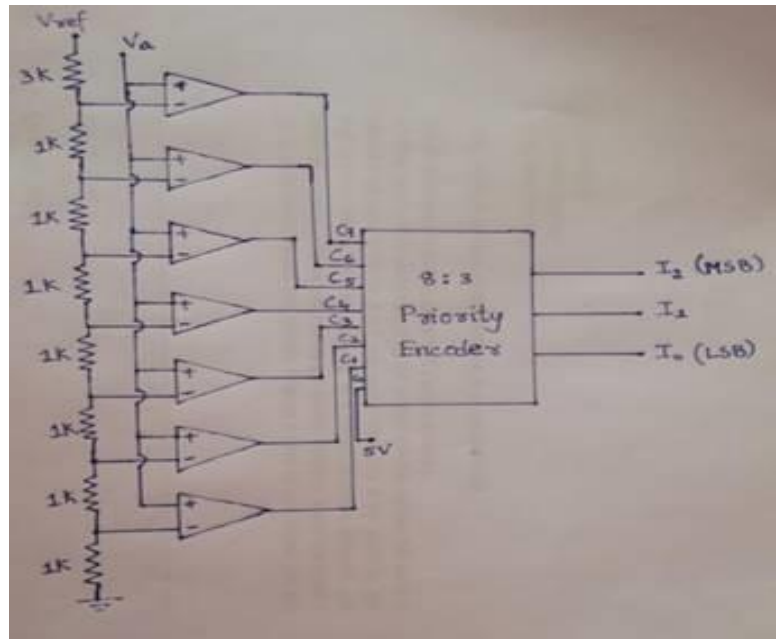
3. Reference Circuit Waveforms
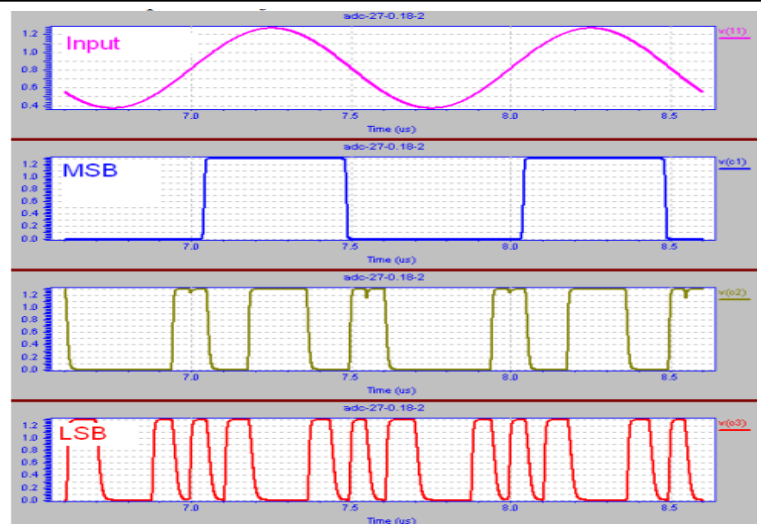
References:
[1] www.allaboutcircuits.com
[2] CMOS Analog Circuit Design Phillip E. Allen and Douglas R. Holberg.
[3] Verilog HDL: A Guide to Digital Design and Synthesis by Samir Palnitkar.