Design of Flash type Analog to Digital Converter

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Abstract

Flash type ADC is the fastest among all ADC's. It requires only one clock cycle for conversion.This type of A/D converter is called parallel type ADC. It consists of a series of comparators, each of them compares the input signal to a reference voltage V_{ref}. The comparator outputs connect to the inputs of a priority encoder circuit, which then results in a binary output.

Keywords: Prioity encoder, comparator

Reference circuit details

3-bit flash type ADC consists of a network of voltage divider with 8 equal resistors. A reference voltage Vref is applied to the complete network which is with respect to the ground. From bottom to top, the voltage drop across each resistor with respect to ground will be integer multiples of V_{R8}. The external input voltage Vi is applied to the comparator's non-inverting terminal. The same voltage drop found across each resistor from bottom to top is applied to the comparator's inverting terminal from bottom to top. Simultaneously, all the comparators compare the input external voltage to the voltage drops present at the corresponding input terminal, which means, the operation of comparison takes place by parallelly. The output at the comparator end will be '1' till long as Vi is greater than the voltage drop present at the corresponding other input terminal. Similarly, the output at the comparator end will be '0', when, Vi becomes less than or equal to the voltage drop present at the corresponding input terminal. Outputs of all the comparators are connected as the inputs of priority encoder. This priority encoder yields digital outpur in the form of binary code,which relates to the high priority input which has 1.Hence, the output of priority encoder is the binary equivalent of analog external input voltage Vi. The components of Flash type ADC are high speed comparator (2^n-1), Voltage divider resistive network (2^n), Priority encoder (1).

Circuit Design
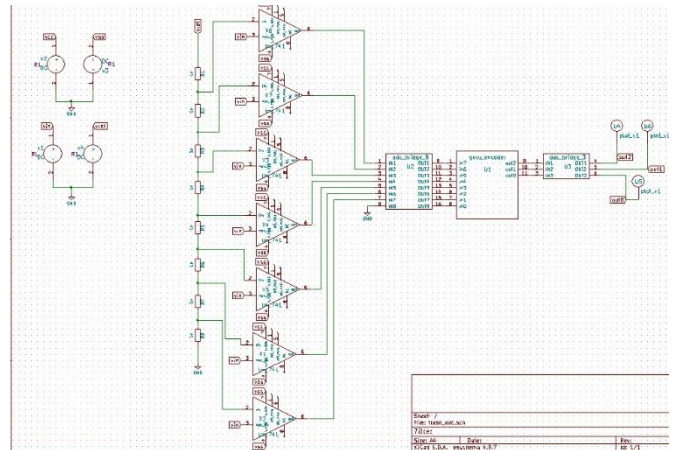
Circuit waveform
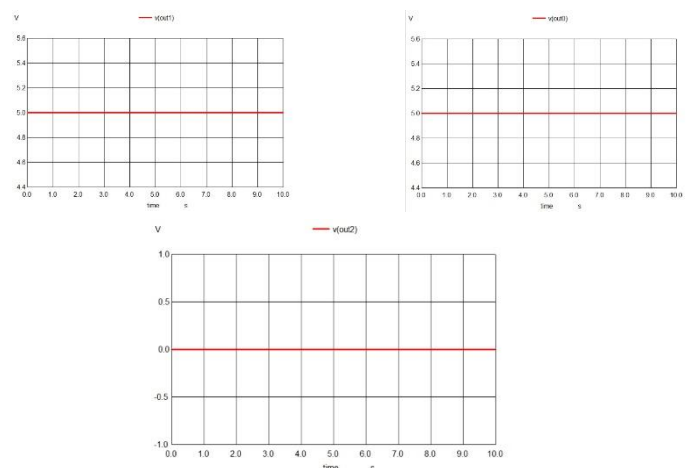
Reference papers

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