

Design of 4bit flash type analog to digital converter

P.D.Divya sree, Rajiv Gandhi University of knowledge and technologies,(AP IIIT nuzvid)

Abstract

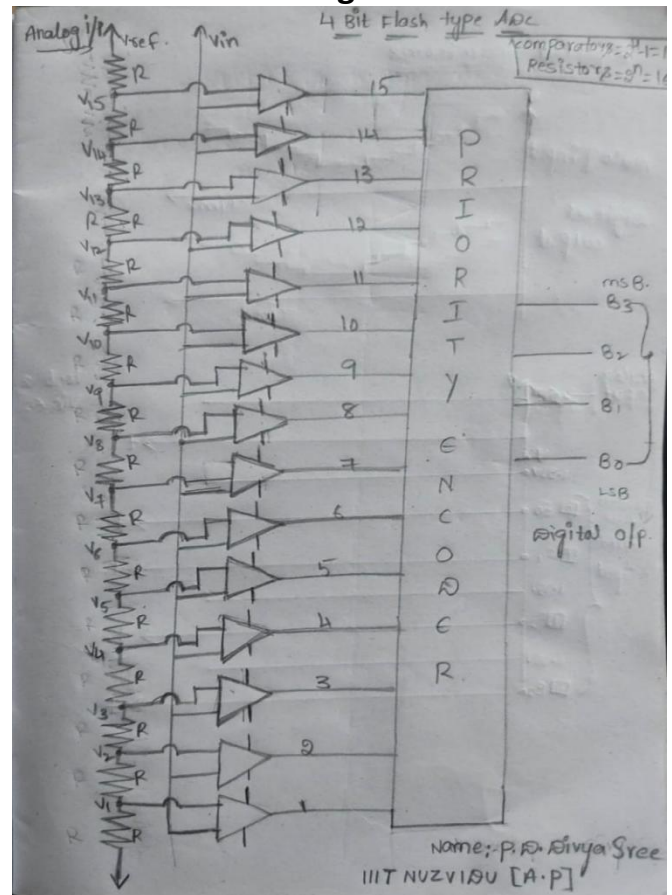
Flash type ADC is the fastest among all ADC's. It requires only one clock cycle for conversion. It is also called as parallel or simultaneous type ADC. It contains comparators connected in serially where each comparator compares the vref at each and every node with the given input voltage. The comparators are connected to the priority encoder circuit, which then results in a binary output.

Keywords: Priority encoder, comparator.

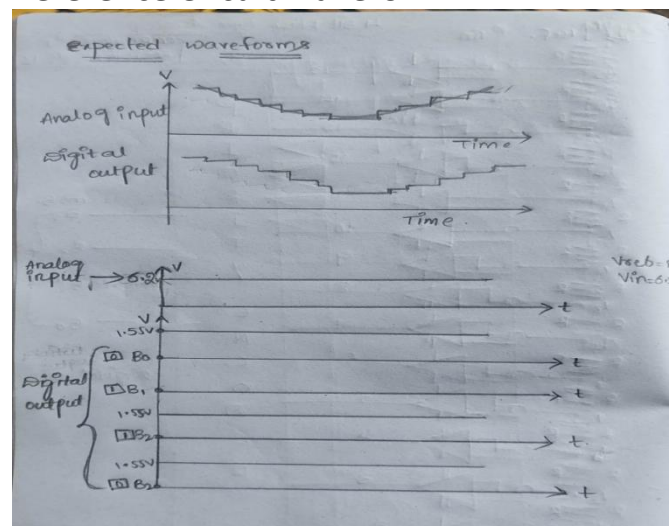
Reference circuit details

4bit flash type ADC consists $(2^n - 1)$ 15 comparators, (2^n) resistors and one priority encoder. V_{ref} is applied to total network with respect to ground. Voltage drop across each resistor with respect to ground will be integer multiplies of V_{R16} . V_{in} is applied to the non-inverting terminal of comparator. 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 V_i is greater than the voltage drop present at the corresponding other input terminal. Similarly, the output at the comparator end will be '0', when, V_i 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 output 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 V_i .

Reference Circuit Diagram



Reference Circuit waveform



Reference papers

K.Gurubaran, Madras Institute of technology campus, Chennai, Implementation of flash type Analog to Digital Converter.

<https://ieeexplore.ieee.org/document/6949880>