

Voltage Divider

Jayantha Nayak, Jayantha Nayak

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Abstract

Voltage divider is the circuit in which the voltage of the source is distributed in circuit elements in series depending on the impedance of elements. This works on Kirchhoff's current rule which states that the total current entering a node is equal sum of currents leaving it. The applications are in sensor measurement, voltage controlling, logic level shifting. It is used to control voltage when the voltage of circuit exceeds the limit which has been set. So we majorly use this circuit with sensors and actuators. The voltage divider is a simple series impedance circuit where output voltage is the fraction of input voltage.

2 Implemented Circuit

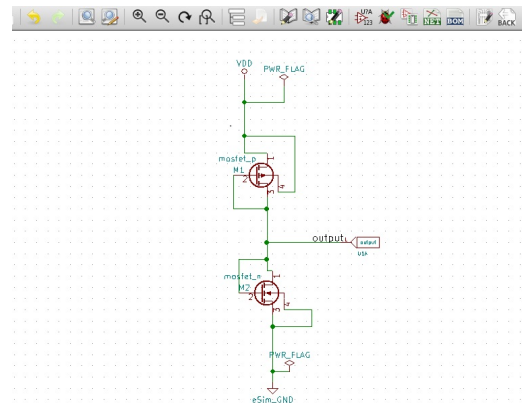


Figure 1: Implemented circuit diagram.

3 Implemented Waveforms

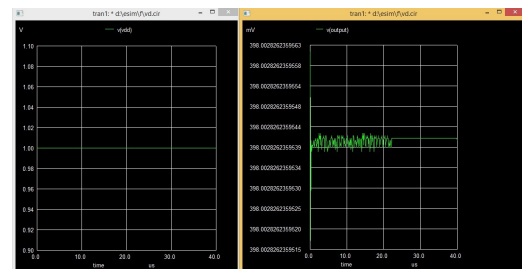


Figure 2: Implemented waveform.

1 Circuit Details

The voltage divider is a simple series impedance circuit where output voltage is the fraction of input voltage. The circuit consists of 2 mosfets, one pmos and another nmos which is used to produce impedance. From a fixed dc voltage source input Vdd is given. The output is measured using a voltmeter or port in case of e sim software. In the given circuit the gate voltage and emitter voltage will be supplied by the source of mosfet element. For different input values of voltage the output voltage will vary. The dc source will be reduced in the circuit and output voltage will change proportional with the input voltage. The reference circuit gives the relation between input and output voltage in changing time. For different input voltage, the output voltage increases directly. This linear circuit has power consumption and wastage of power issues as another part is unutilized. The voltage divider rule for two impedance circuit is given as output voltage is equal to input voltage multiplied with second impedance and divided by sum of impedances in series. So we can say fraction of input across second impedance is the output tat is needed to us. This rule is another form of Kirchhoff current rule. Here the connection is done as shown in figure. Here a voltage of 1V is supplied and output of 398mV is obtained .i.e. the voltage is divided in 0.6 and 0.4V over both component of circuit.

References

- [1] V. Thrivikrammaru. Cmos voltage divider based current mirror. <https://ieeexplore.ieee.org/document/6141260>.