

Full wave Bridge rectifier using CMOS

Siddharth Hande, Dr. D. Y. Patil Institute of Technology

July 21, 2021

Abstract

A Full Wave Rectifier is a circuit arrangement which makes use of both half cycles of input alternating current (AC) and converts them to direct current (DC). Thus a full wave rectifier is much more efficient than a half wave rectifier. This process of converting both half cycles of the input supply which is in alternating current to direct current is termed as full wave rectification. More efficient full wave bridge rectifier is that with a minimum distortion. This can be achieved using efficient and exploratory combinations of CMOS logic. This can not only utilized to design full wave rectifier, but also as pass transistors configurations at the input.

2 Implemented Circuit

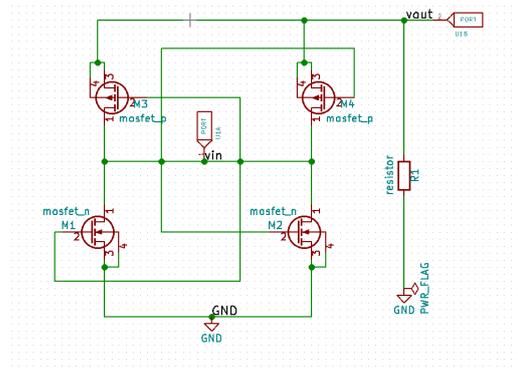


Figure 1: Implemented circuit diagram.

3 Implemented Waveforms

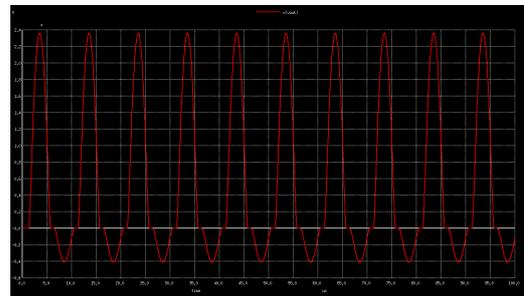


Figure 2: Implemented waveform.

1 Circuit Details

The full wave rectifier circuit used with the combination of full wave rectifier to form a bridge is known as bridge rectifier. A CMOS based rectifier is designed using the MOS transistors which consist of filter and load. For the proper pulsating DC power output supply waveform. A MOS is introduced in the full wave bridge rectifier which act as diodes in the process of rectification. Four MOS are used PM1, PM2, NM1, and NM2 which regulated the power supply current to generate the required output DC supply wave form. When one of the terminal becomes negative, then the other becomes more positive than the other. This means the NM1, assuming the upper part, is turn OFF and PM1 is ON then current is flowing through the PM1 to NM2 to Load and getting pulsating DC output convert sustained output. Similar happens vice versa. Since CMOS has low static power consumption, high noise immunity and very low static power consumption is becomes much more efficient than their counterpart pn junctions diode. For each case the direction of the current is the same, so we have uni-directional current flow, which is DC voltage. The output of this circuit is the rectified signal and a full wave signal. The proposed rectifier circuit has been compared with its conventional rectifier circuit. It explains the efficiency of the proposed circuit which is much improved and increased than its conventional circuit.

References

- [1] P. K. T. P. J. S. Akashe. Design of low leakage cmos based full wave bridge rectifier. <https://ieeexplore.ieee.org/document/7507483>.
- [2] P.-A. H. F. S. J.-P. R. D. B. D. Flandre. Automated layout-integrated sizing of a 2.45 ghz differential-drive rectifier in 28 nm fdsoi cmos. <https://ieeexplore.ieee.org/document/79>.