

An RF energy harvester system using UHF micropower CMOS rectifier based on a diode connected CMOS transistor

Abstract

This paper presents a new type diode connected MOS transistor to improve CMOS conventional rectifier's performance in RF energy harvester systems for wireless sensor networks in which the circuits are designed in 0.18 μm TSMC CMOS technology. The proposed diode connected MOS transistor uses a new bulk connection which leads to reduction in the threshold voltage and leakage current; therefore, it contributes to increment of the rectifier's output voltage, output current, and efficiency when it is well important in the conventional CMOS rectifiers. The design technique for the rectifiers is explained and a matching network has been proposed to increase the sensitivity of the proposed rectifier. Five-stage rectifier with a matching network is proposed based on the optimization. The simulation results shows 18.2% improvement in the efficiency of the rectifier circuit and increase in sensitivity of RF energy harvester circuit. All circuits are designed in 0.18 μm TSMC CMOS technology.

Keyword: RF energy harvester system; CMOS rectifier; Diode connected