

Voltage Rectification: The Energy-Bottleneck for Passive RFID Systems

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Abstract

Efficient voltage rectification is one of the main challenges in passive UHF RFID. When the tag is located several meters from the base station, the amplitude of the UHF signal is critically low. The threshold voltage drop of rectifying diodes is therefore the main limiting factor for the power transfer. This paper presents the design challenges for state of the art rectifier circuits and introduces a novel threshold-voltage cancellation technique to improve the rectifier sensitivity. The proposed circuit is implemented in a standard CMOS technology without additional processing steps. The minimum available input power is only -11.3 dBm for a DC output voltage of 1.5 V and an output current of 5 μ A. In the given technology, these values represent a 26% improvement compared to the conventional circuit.