

A Rectenna System With Power Combining Topology for Improved Power Handling Capabilities

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Abstract:

This article proposes a new rectenna system that is based on a radio frequency (RF) rectifying circuit with enhanced power handling capabilities. The rectenna consists of an antenna that receives the RF signal and a rectifying circuit that converts it into a direct current (dc) output. The rectifier's power handling capability is improved by delaying the breakdown effect of a Schottky diode, resulting in higher maximum dc output power. The power handling capability enhancement is attained by splitting the received RF signal and directing it to feed multiple rectifying branches. The dc outputs from all branches are then combined across an optimized load. This topology results in a single-input single-output rectifier. The designed rectenna is fabricated and tested. The results indicate a 1.9 times increase in input power at which breakdown occurs. The rectenna system is proposed for use in wireless energy transfer applications, where dedicated power is transmitted towards the rectifier. This rectifier can be integrated into nodes of a wireless sensor network, where the enhanced power handling capabilities contribute to enhance the breakdown characteristics.