Power Conversion Using Analytical Model of Cockcroft-Walton Voltage Multiplier Rectenna

A voltage multiplier rectenna is a combination of a voltage multiplier rectifier and an antenna used for the conversion of AC to DC. It is an essential part of the system of RF energy harvesting. Conventional rectennas are characterized by low conversion efficiency. This study presents an analytical novel mode designed for RF energy harvesting systems to study the voltage and current output of rectifier stages for efficiency optimization. The design contains a voltage multiplier rectification circuit with seven stages. The Schottky diode HSMS 285-C was selected for the circuit modeling voltage multiplier circuit. Advanced Design System (ADS) simulation was used to validate the equations of the theoretical model solved with MATLAB code. The fabricated system was tested for an input power range of 10 μW to 100 mW; the maximum output power is 0.2577 mW with maximum efficiency of 29.85%.

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