

Development of Cockcroft-Walton voltage multiplier for RF energy harvesting applications

The Cockcroft-Walton voltage multiplier circuit is designed from a series of rectifiers to obtain high DC voltage. In the presented model, the DC voltage, which is generated in the present stage, contributes to a higher value in the next stage. Every stage produces a higher DC output voltage. The proposed signaling scheme enables the use of the rectified DC voltage in a classical way along with the involvement of instantaneous RF input voltage. In this paper, a seven-stage Cockcroft-Walton voltage multiplier is used. The design was optimized via simulation based on Schottky diode HSMS 285C. It was enhanced utilizing Advanced Design System (ADS) 2009, while the prototype was fabricated on RT/Duroid 5880 (RO5880) printed circuit board (PCB) substrate with dielectric constant and loss tangent of 2.2 and 0.0009 respectively. Experimentally, the output voltage is found to be 6.47 V harvested from the operating frequency of 900 MHz within board dimensions of (45x19x1.57) mm in addition to sufficient DC current level. Hence, this is suitable for battery charging applications.

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