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A Dual Polarized Multiband Rectenna for RF Energy Harvesting

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Abstract: The paper presents a multiband dual polarized rectenna for RF energy harvesting in C-band application range. The receiving antenna of the designed rectenna is consisting of a truncated corner square patch loaded with several circular slots, L-slots and U-slot. A proximity coupled feeding arrangement is used for obtaining a wide impedance bandwidth so that the complete C-band from 4–8 GHz can be covered. The proposed antenna has the advantage of compact size and dual polarization since circular polarization is realized at three bands (5.42 GHz, 6.9 GHz and 7.61 GHz) in the -10 dB impedance bandwidth range. For efficient RF to DC conversion a two-stage voltage doubler rectifier is used considering that it provides a higher voltage multiplication with a small threshold voltage at its primary stage. For ensuring maximum RF to DC conversion efficiency; a matching network has been designed and is connected in between receiving antenna and the rectifier circuitry in order to match the antenna and load in different frequency bands. It is observed that a maximum conversion efficiency of 84% is achieved at 5.76 GHz. The proposed rectenna has been fabricated and it is found that measured results are in good match with the simulated results.

Keywords: Circular polarization; energy harvesting; multiband; rectenna

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