

Design of a Compact Tunable Microstrip Rectenna at 2.45 GHz

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Extended Abstract

Microwave wireless power transmission (MWPT) is an important direction in the microwave engineering applications. As the core of the MWPT system, how to miniaturize the rectenna size and improve its efficiency is the goal of rectenna design. So far, there are a lot of progress in rectenna research. For example, a dipole antenna is fed with a direct integrated rectifier to reduce the rectenna size ^[1]. Method of improving efficiency of the rectenna is based on the harmonic recycling theory ^[2].

This paper utilizes an air layer to improve the bandwidth of a patch antenna, and designs a rectifier in the air layer to realize the miniaturization of the rectenna. Moreover, a slider is introduced to tune the impedance matching between the antenna and rectifying circuit. The proposed rectenna is designed and fabricated. The structure of the proposed rectenna and the measurement results are shown in Figure 1.

From measurement results, it can be known that the highest measured rectifying efficiency reaches 72.4 % when the input power is 20 dBm. Compared with the work in reference [3], the rectenna size is reduced and the rectifying efficiency is improved. Compared with reference [4], the overall size of the rectenna has been increased, however the rectifying efficiency has been improved by 3.1%. Compared with the reference [5], the highest rectifying efficiency is close, while the size is decreased by 11%. The novel rectenna has a compact size with the dimension of 70 mm × 70 mm × 1mm, which can be well integrated to the microwave wireless power transmission engineering systems.

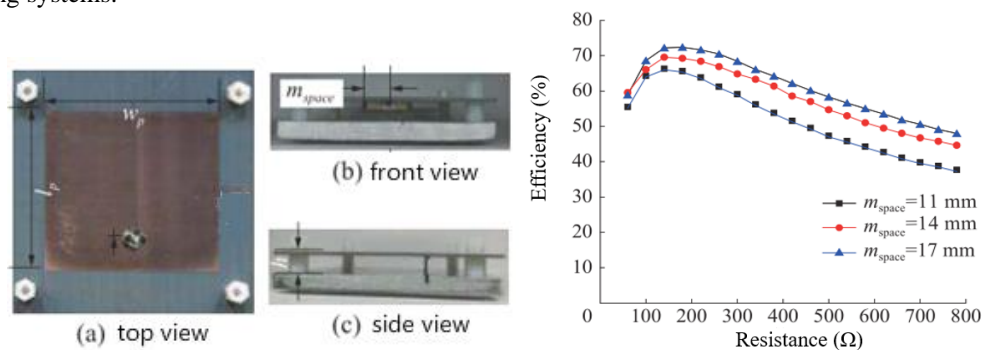


Figure 1. The structure of the rectenna and the efficiency vs the resistance.

Reference comparison	Dimension/mm	diode	The input power/dBm	Efficiency/%
Reference [3]	100×60×5	HSMS-2860	11	47.3
Reference [4]	70×70×2	SMSA3823-011LF	20	69.3
Reference [5]	135×150×22	HSMS-2862	11	72.5
This paper	70×70×10	HSMS-282C	20	72.4

References

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