



Efficiency measurement of 5.8 GHz Magnetron Wireless Power Transmission System

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In 1975, W.C Brown developed a 2.45 GHz microwave power transmission system. The transmission efficiency (dc-dc) of the system achieved $54 \pm 1\%$ at two meters' distance [1] which is the highest transmission efficiency in the world even now.

We have built a 5.8 GHz microwave wireless power transmission system. The microwave was generated by a 5.8 GHz magnetron (Panasonic M5801J, 5.784 GHz). As shown in Figure 1, at 5.6 meters in front of the antennas, the receiver is a 5.8 GHz rectenna array system (IHI, 2014) which is constructed by 2304 pieces rectenna. The DC power input of this wireless power transmitter was 1125 W when the anode current and voltage of the magnetron generated 724 W microwave, whose efficiency was 60.7%. The rectenna array system output a DC power of 109.4 W through rectification. The DC-DC efficiency of this wireless power transmission system was 9.73%. The highest efficiency of the rectenna array system was 50% when the received power of each rectenna maintained at a scope of 200mW~800mW. In the next step, we will focus on the DC-DC efficiency enhancement of the microwave wireless power transmission system.

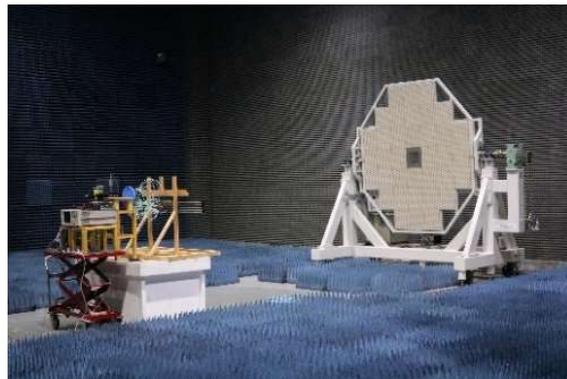


Figure 1. 5.8 GHz microwave wireless power transmission system. (9.73% DC-DC efficiency at 5.6 m distance)

The transmission efficiency and the power loss part of this system are precisely measured. In the next step, we will focus on the DC-DC efficiency enhancement of the microwave wireless power transmission system.

1. Brown. W. C," Free-space microwave power transmission study, phase 3", NASA-CR-144151, PT-4601, September 10, 1975