

Rancang bangun rectifying antenna rectenna untuk pemanenan energi rf = Design of rectifying antenna rectenna for energy harvesting rf

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Abstrak

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Penggunaan energi alternatif untuk saat ini merupakan hal yang sangat penting, dikarenakan makin menipisnya ketersediaan energi di alam. Energi alternatif ini berasal dari potensial-potensial alam yang lain, yang dapat diperbaharui, dapat dihasilkan dalam waktu yang singkat, atau juga berasal dari akibat adanya penggunaan potensi alam yang lain sehingga menimbulkan potensi energi yang tidak kita sadari kehadirannya disekitar kita adalah gelombang frekuensi radio atau yang biasa dikenal dengan gelombang RF.

Pada Tesis ini dibuat rectifier antenna dengan menggunakan antena mikrostrip patch lingkaran yang dapat digunakan untuk memanen energi RF pada frekuensi resonan 2,445 GHz dan mengkonversikannya menjadi energi DC, yang dapat digunakan untuk menghasilkan energi alternatif dari sumber daya yang belum dimanfaatkan.

Dari hasil simulasi, parameter antena hasil perancangan diperoleh VSWR dan return loss paling bagus sebesar 1,1664 dan -22,292 dB pada frekuensi 2,445 GHz, bandwidth sebesar 85 MHz, gain 6,882 dB, dan pola radiasi directional. Kemudian, dengan diberikan nilai $P_{in} = 20$ dBm, $RL = 2$ K Ω , dan jarak 100 cm rectenna mampu menghasilkan nilai $V_{out} = 3,3$ Volt dengan nilai efisiensi maksimal sebesar 82%.

Dari hasil pengukuran, parameter antena hasil perancangan diperoleh VSWR dan return loss paling bagus sebesar 1,12 dan -25,08 dB pada frekuensi resonan 2,445 GHz, bandwidth sebesar 72 MHz, dan gain 7,4 dB, dan pola radiasi directional. Kemudian, dengan diberikan nilai $P_{in} = 20$ dBm, $RL = 2$ K Ω , dan jarak 100 cm rectenna mampu menghasilkan nilai $V_{out} = 0,967$ Volt dengan nilai efisiensi maksimal sebesar 24%

ABSTRACT

Alternative energy becomes a very important issue due to the decrease energy availability in the nature. For example, one potential energy that we didn't realize its presence around us is the Radio Frequency waves or commonly known as RF waves. There is an effort to harvest the RF energy using rectenna technology.

In this thesis a rectifier antenna using circular microstrip patch antenna that can be used to harvest RF energy at frequency 2.445 GHz is designed to convert the RF into DC energy. This design can be used to produce alternative energy from resources that have not been utilized.

From the simulation results, the results of the antenna parameters VSWR and return loss is 1.1664 and -22.292 dB respectively at frequency 2.445 GHz, has a bandwidth of 85 MHz, gain 8.82 dB, and radiation pattern is directional. In addition, with $P_{in} = 20$ dBm, $RL = 2$ K Ω , and distance 100 cm the rectenna is able to give a value of $V_{out} = 3.3$ Volts with maximum efficiency is 82%.

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