



Receivers for Spread Spectrum Wireless Power Transfer

TECHNOLOGY NUMBER: 7598



OVERVIEW

Spread-spectrum wireless power transfer with advanced receiver topologies and algorithms

- Maximizes power capture and efficiency; secure and interference-free transfer
- Wireless charging, IoT devices, medical implants, secure power transfer

BACKGROUND

Wireless power transfer has garnered significant attention due to the increasing demand for untethered devices, from consumer electronics to medical implants. Traditional wireless power systems, typically using inductive or resonant coupling, face challenges such as limited range, inefficient power capture, and susceptibility to interference. These systems often struggle to deliver consistent power across varying distances and environments, impeding their widespread adoption. Historical approaches have focused on optimizing transmitter and receiver designs within narrow frequency bands, which limits the scope of improvements. There's a pressing need for a more efficient method that not only maximizes power capture but also ensures secure, interference-free transfer to enhance the reliability and efficiency of wireless power systems.

INNOVATION

Technology ID

7598

Category

Hardware
Engineering & Physical Sciences
Semiconductors, MEMS, and
Electronics

Inventor

Al-Thaddeus Avestruz
Akshay Sarin

Further information

Joohee Kim
jooheek@umich.edu

Innovation Partnerships Tech
Marketing Team
IPInventions@umich.edu

[View online](#)



This innovative technology introduces advanced receiver topologies and algorithms for spread-spectrum wireless power transfer. The transmitter employs a modified inverse class D topology—a switched-mode resonant converter that uses zero voltage switching for efficient transmission of modulated half sine waves. The proposed receiver, a switched parallel resonant circuit, utilizes a greedy algorithm to extract the maximum power from the spectrum, achieving high efficiency by minimizing switching losses and employing ground-referenced semiconductor switches to bypass the limitations of high side gate drivers at radio frequencies. By spreading the power across a wide frequency band using direct sequence spread spectrum, the system ensures secure power transfer to specific receivers while minimizing interference. Potential applications include wireless charging for consumer electronics, Internet of Things (IoT) devices, medical implants, and secure power transfer for specialized equipment, offering a transformative approach to efficient and reliable wireless energy distribution.

ADDITIONAL INFORMATION

REFERENCES

A. Sarin, X. Cui and A. -T. Avestruz, "Comparison of switched receivers for direct-sequence spread-spectrum wireless power transfer," 2017 IEEE 18th Workshop on Control and Modeling for Power Electronics (COMPEL), Stanford, CA, USA, 2017, pp. 1-8, doi:

[10.1109/COMPEL.2017.8013359](https://doi.org/10.1109/COMPEL.2017.8013359)

INTELLECTUAL PROPERTY

[US10734844](https://patents.google.com/patent/US10734844) "Switched receiver for wireless power transfer"