

**Th2D-3**

# Fully Passive Modulation Technique for SWIPT Scenarios

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# Outline

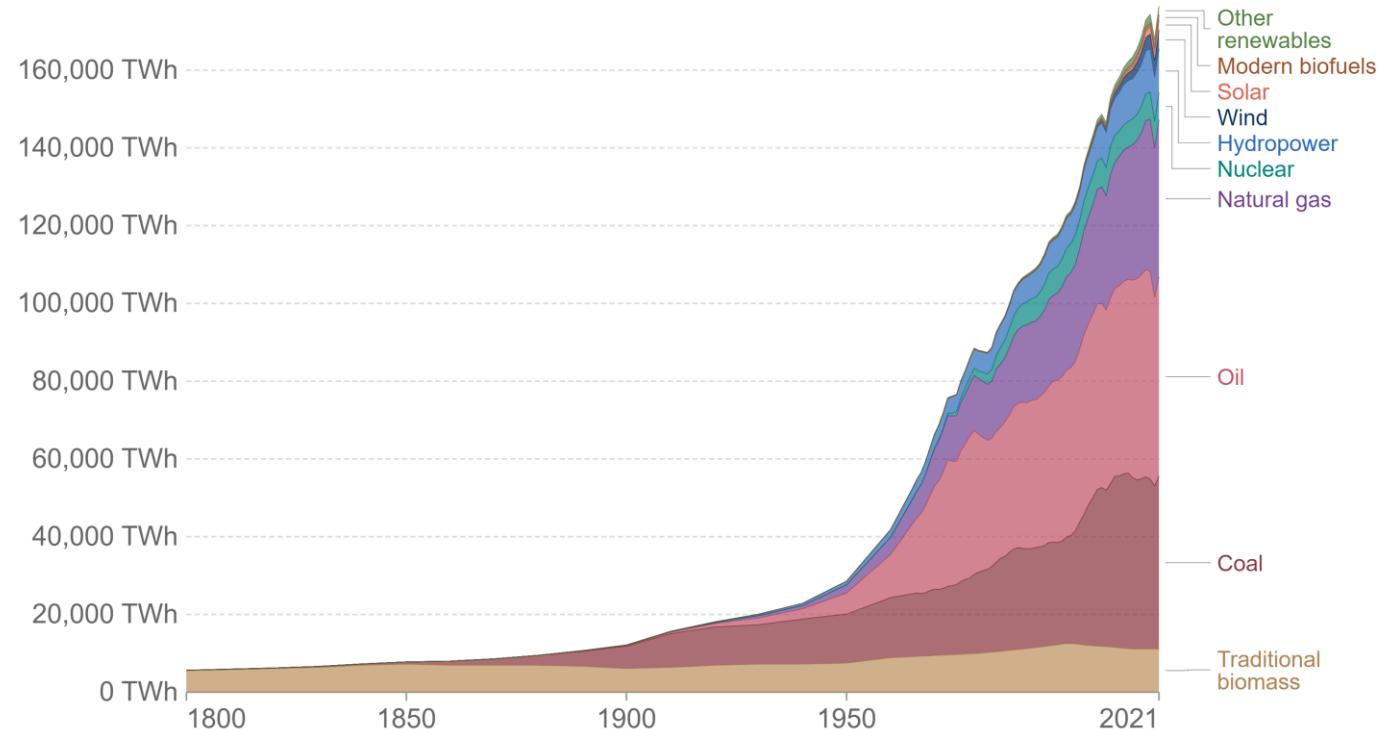
- Motivation
- Our Challenge
- Our Solution
- Work Plan
- Results
- Conclusions
- Future Work

# Motivation

## Global primary energy consumption by source

 Our World  
in Data

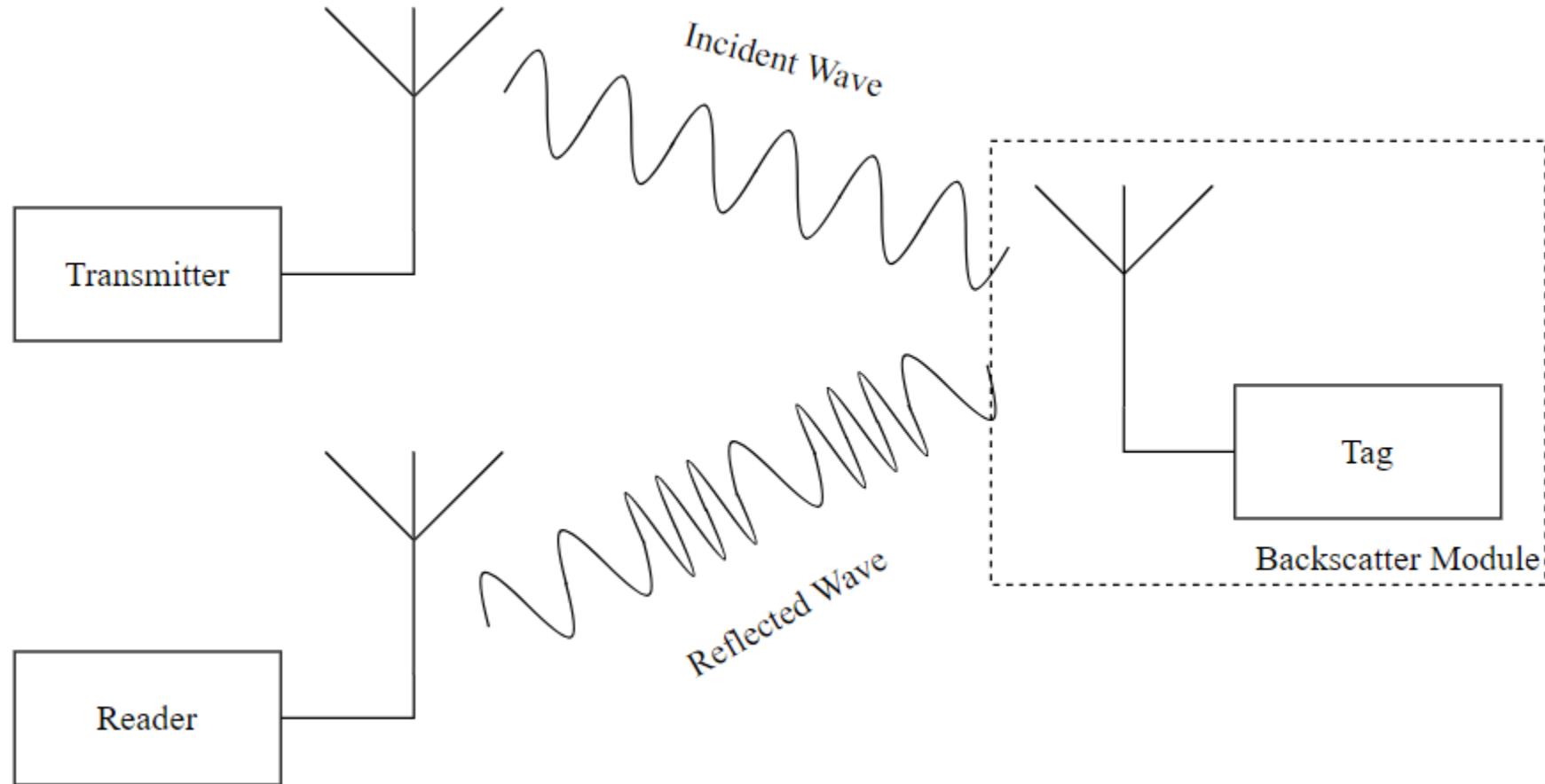
Primary energy is calculated based on the 'substitution method' which takes account of the inefficiencies in fossil fuel production by converting non-fossil energy into the energy inputs required if they had the same conversion losses as fossil fuels.



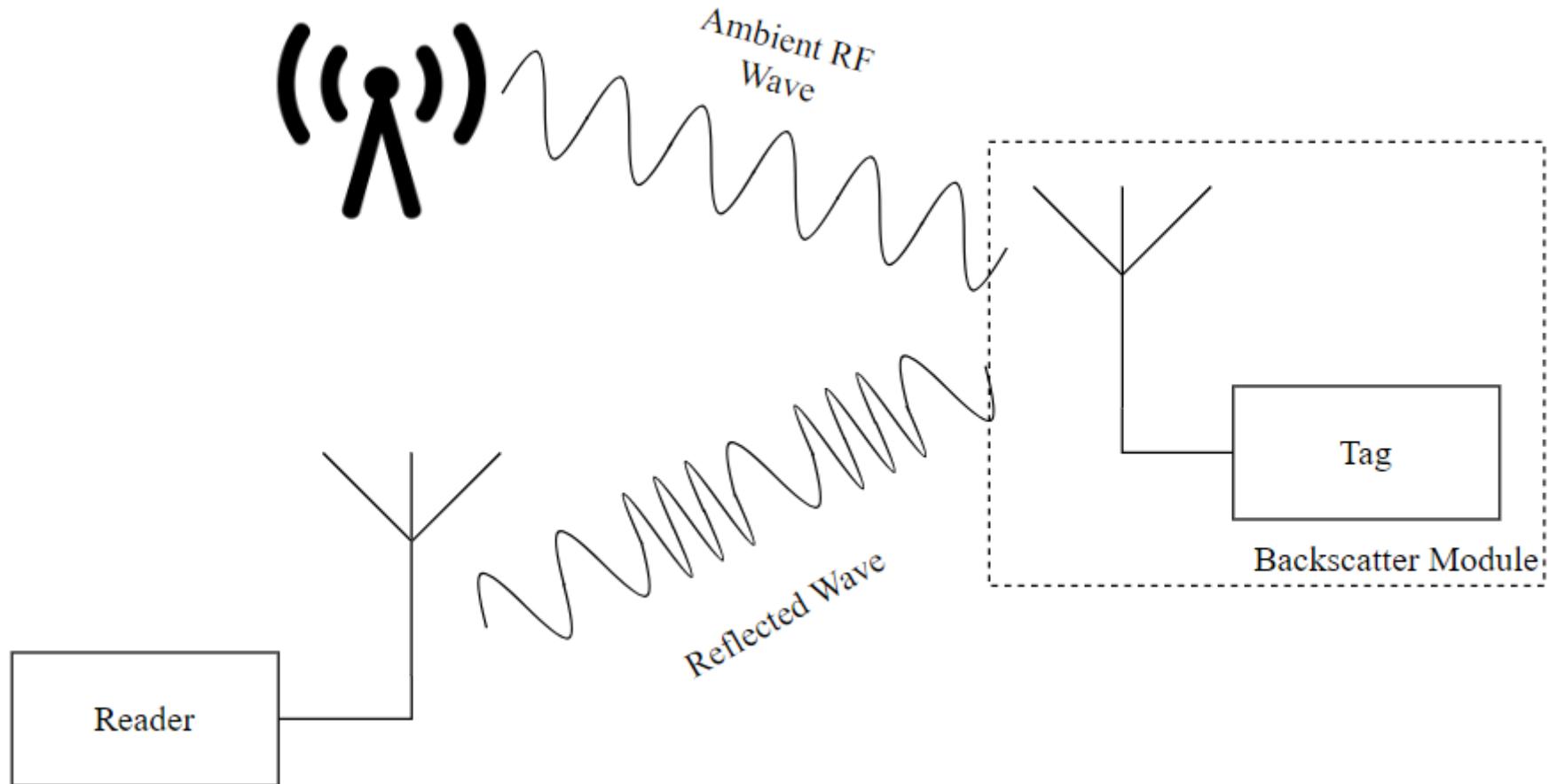
Source: Our World in Data based on Vaclav Smil (2017) and BP Statistical Review of World Energy

[OurWorldInData.org/energy](http://OurWorldInData.org/energy) • CC BY

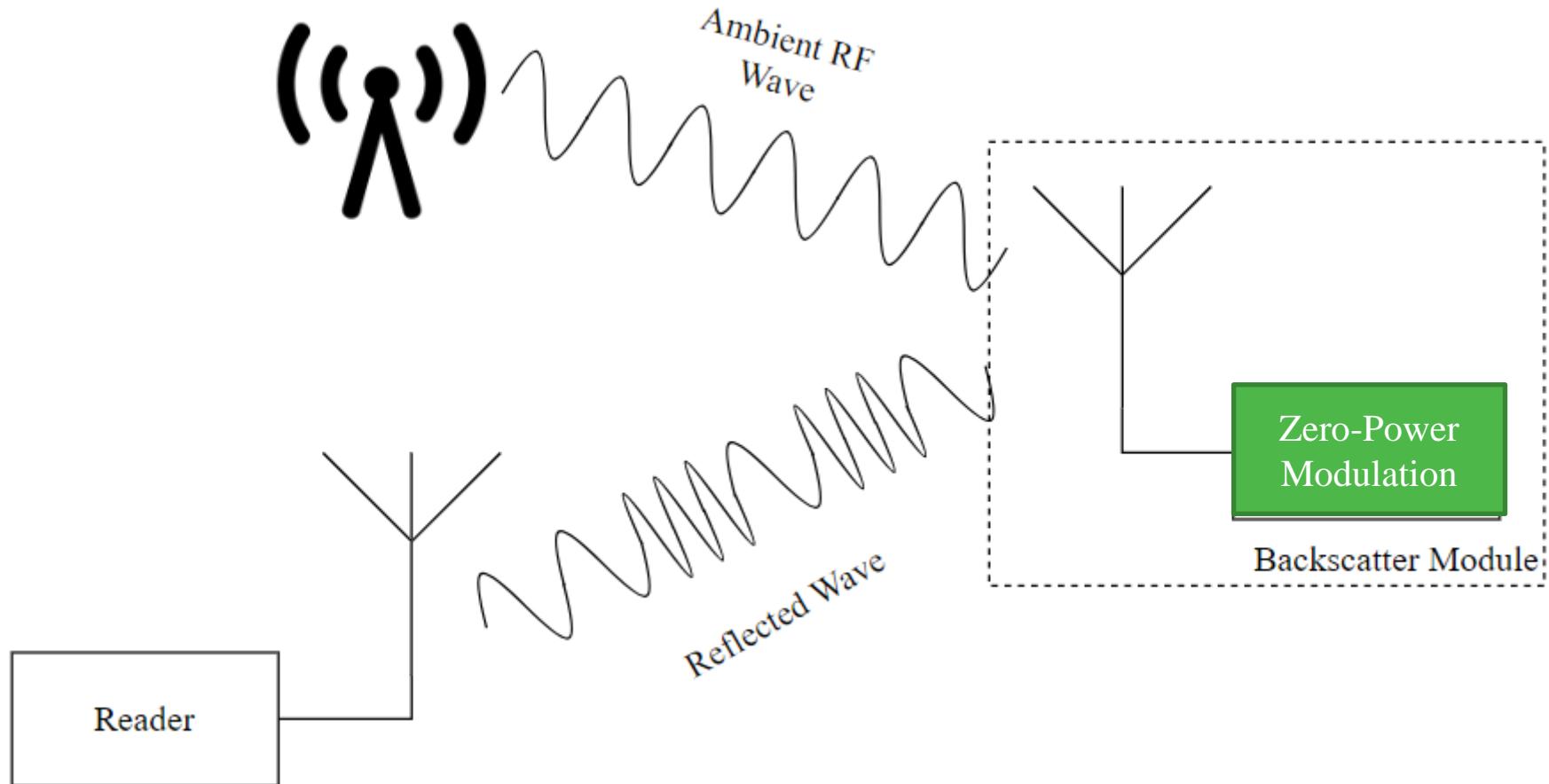
# Motivation



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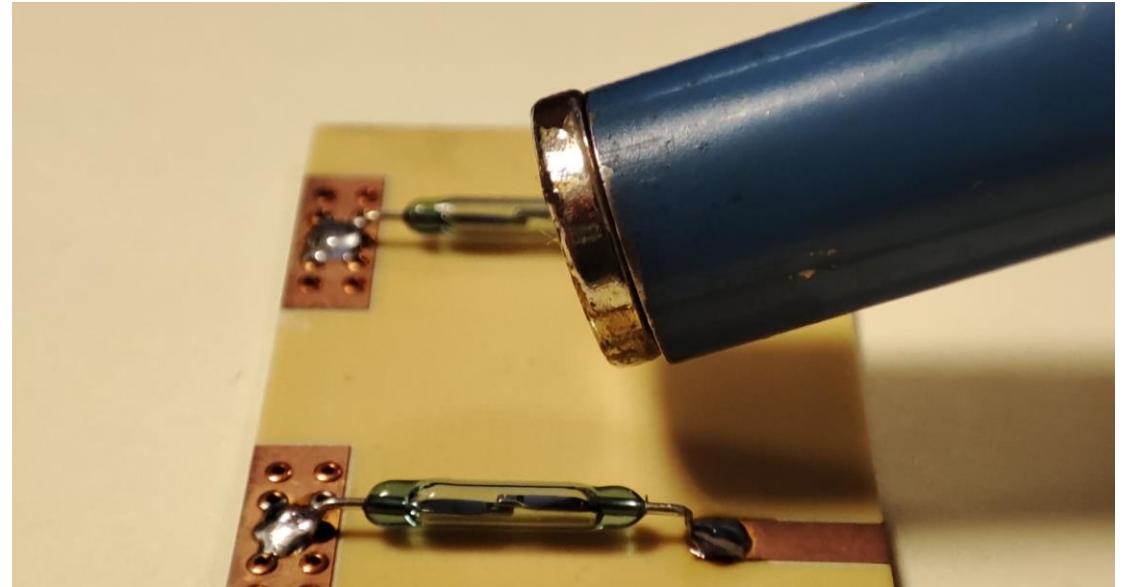


# Our Challenge

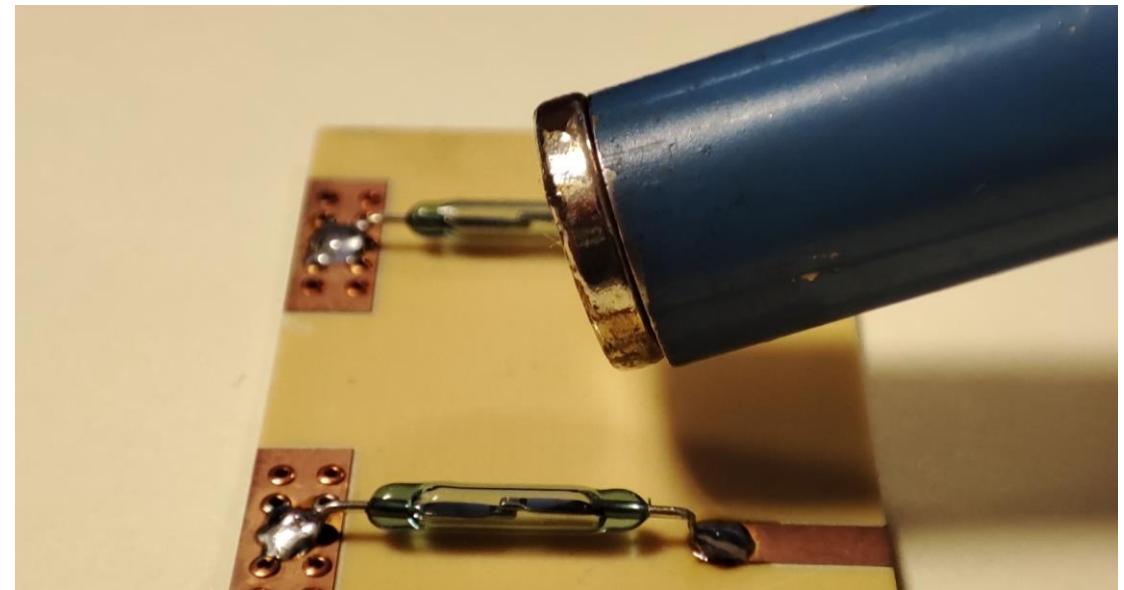
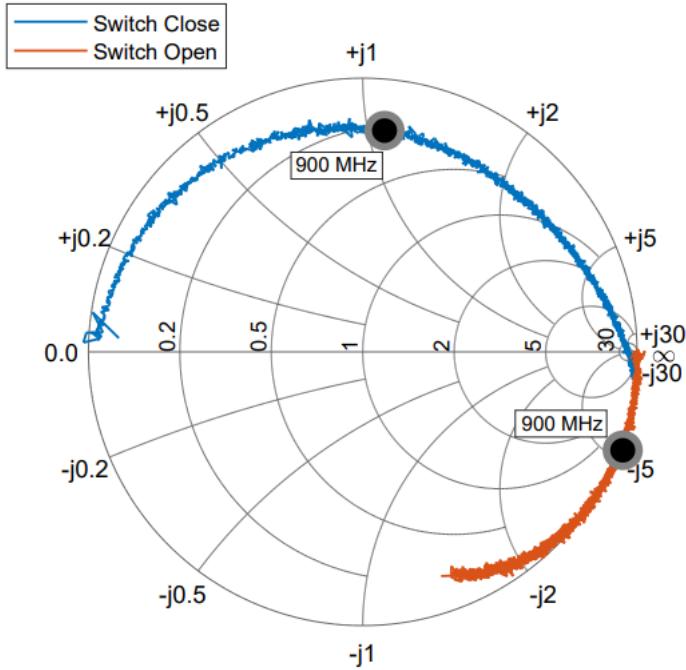
- Have a SWIPT system to measure the velocity of a motor
- Use switches as the backscatter modulator
- Switches need DC supply and waste energy
- Have a passive backscatter modulator in the SWIPT system
- Use ambient waves to perform the modulation

# Our solution – The Reed Switch

- Mechanical switch activated with the magnetic field
- Littelfuse MDSM-10R-20-25
- Amper-turn range: [10; 25] AT

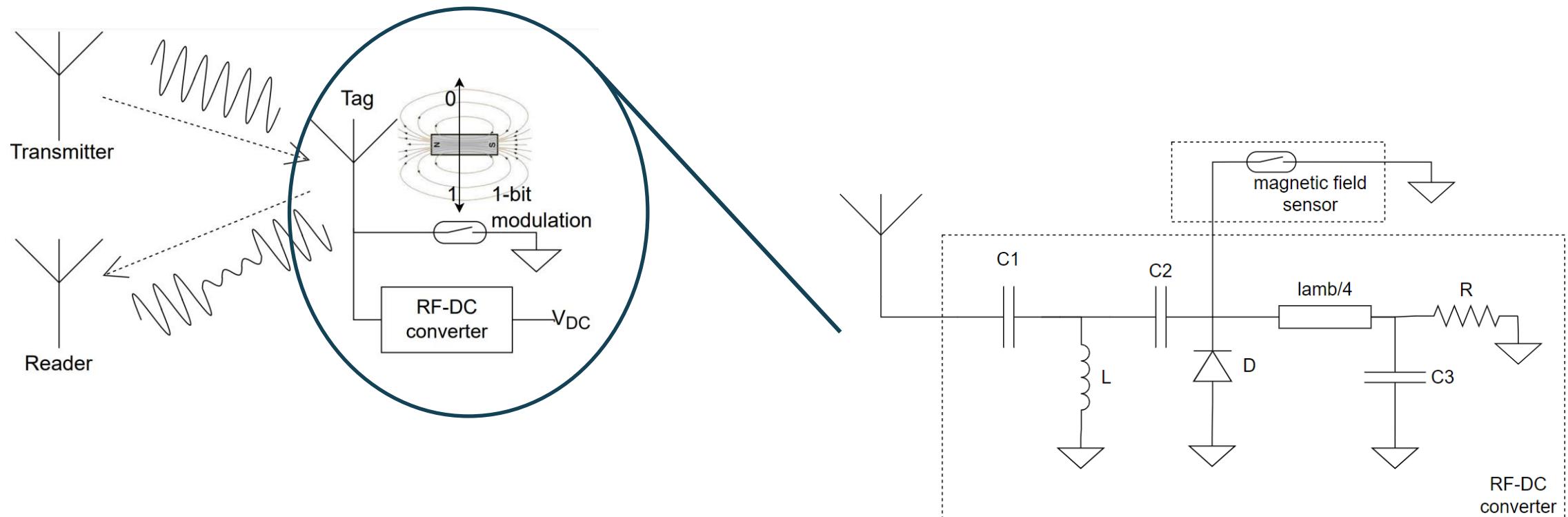


# Our solution – The Reed Switch

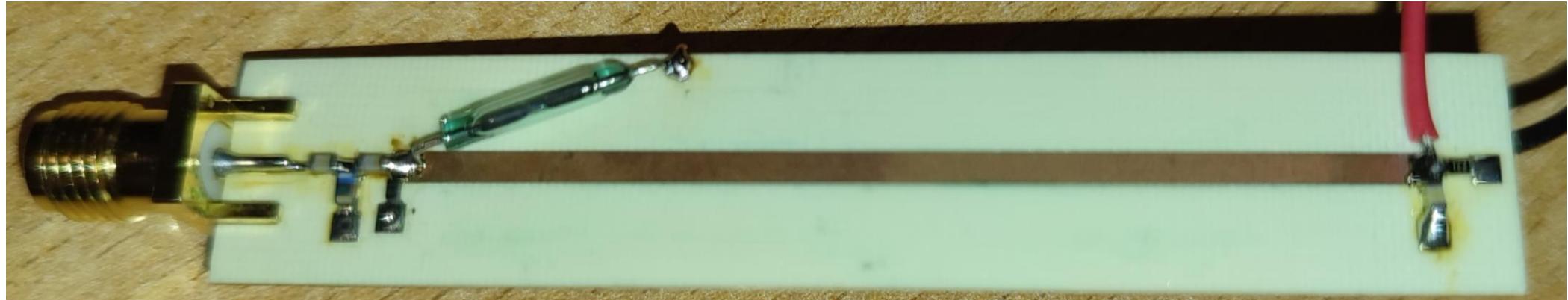


# Work plan

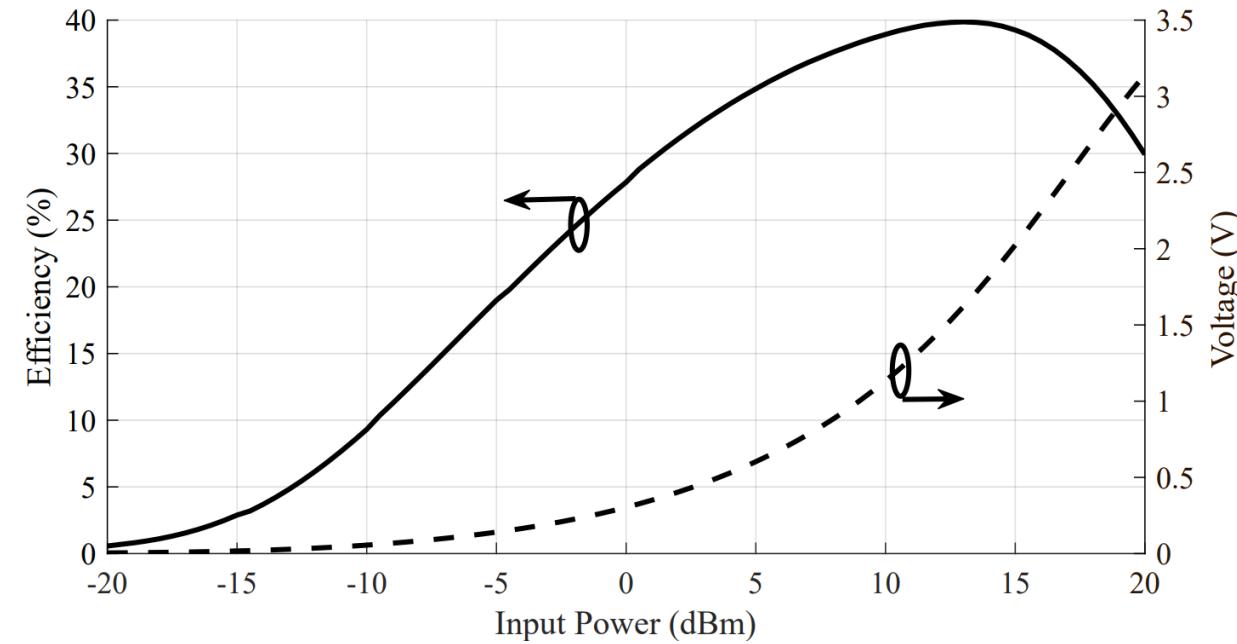
- Design a SWIPT backscatter



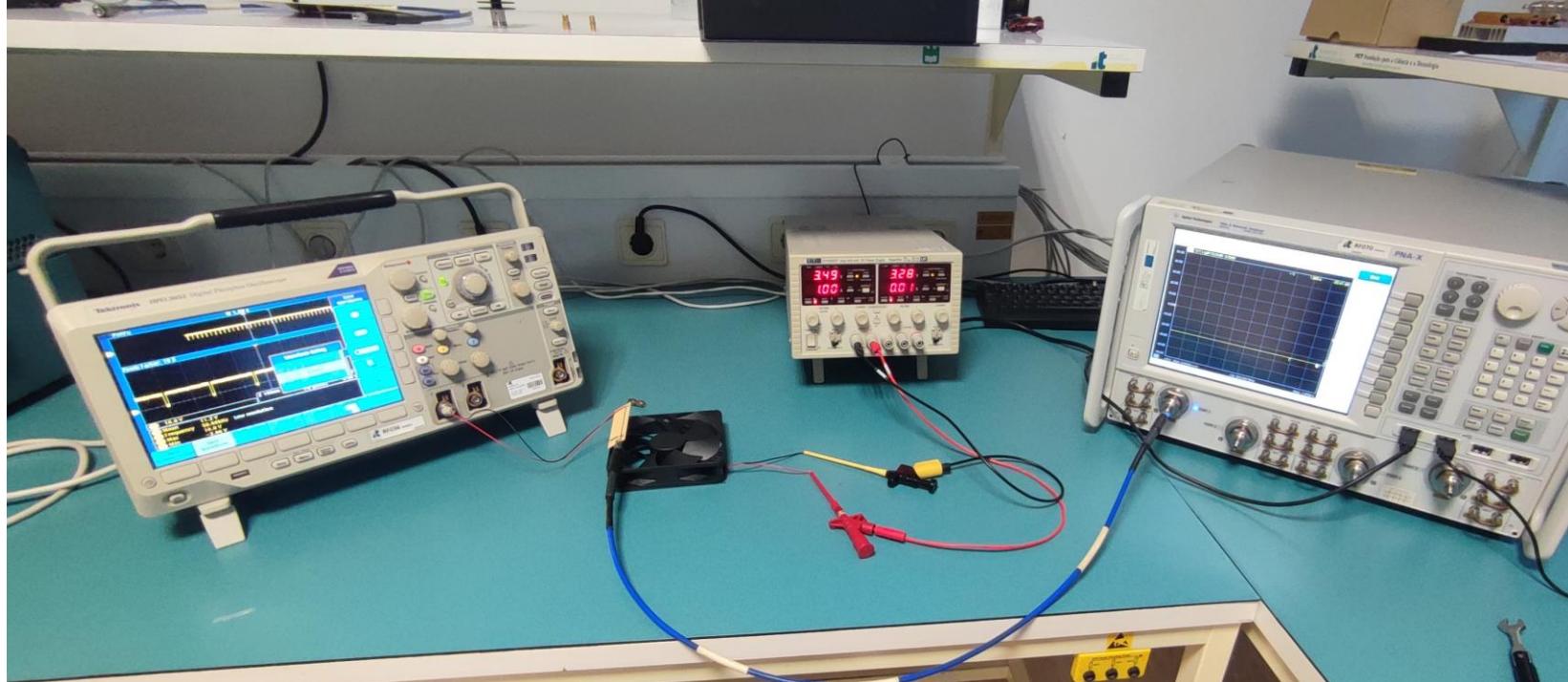
# Work plan



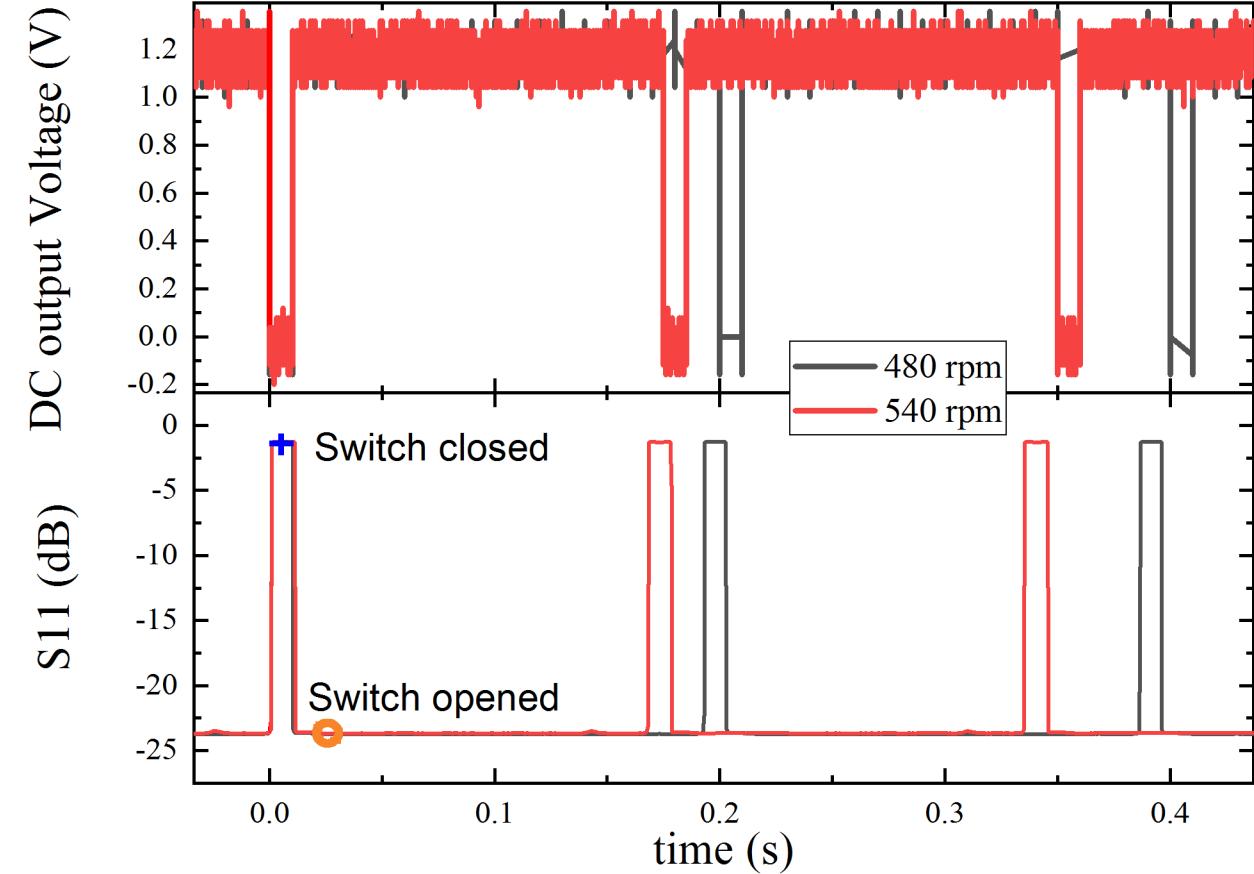
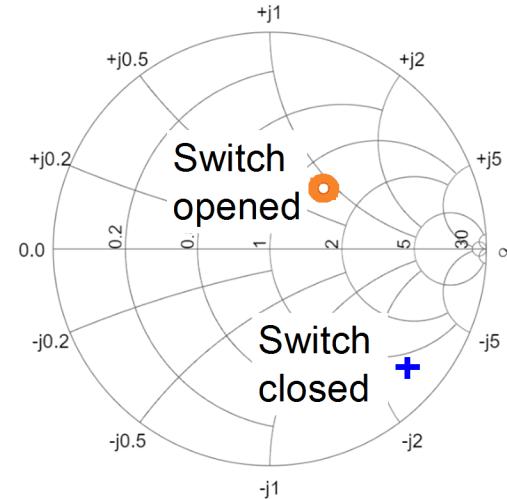
# Results



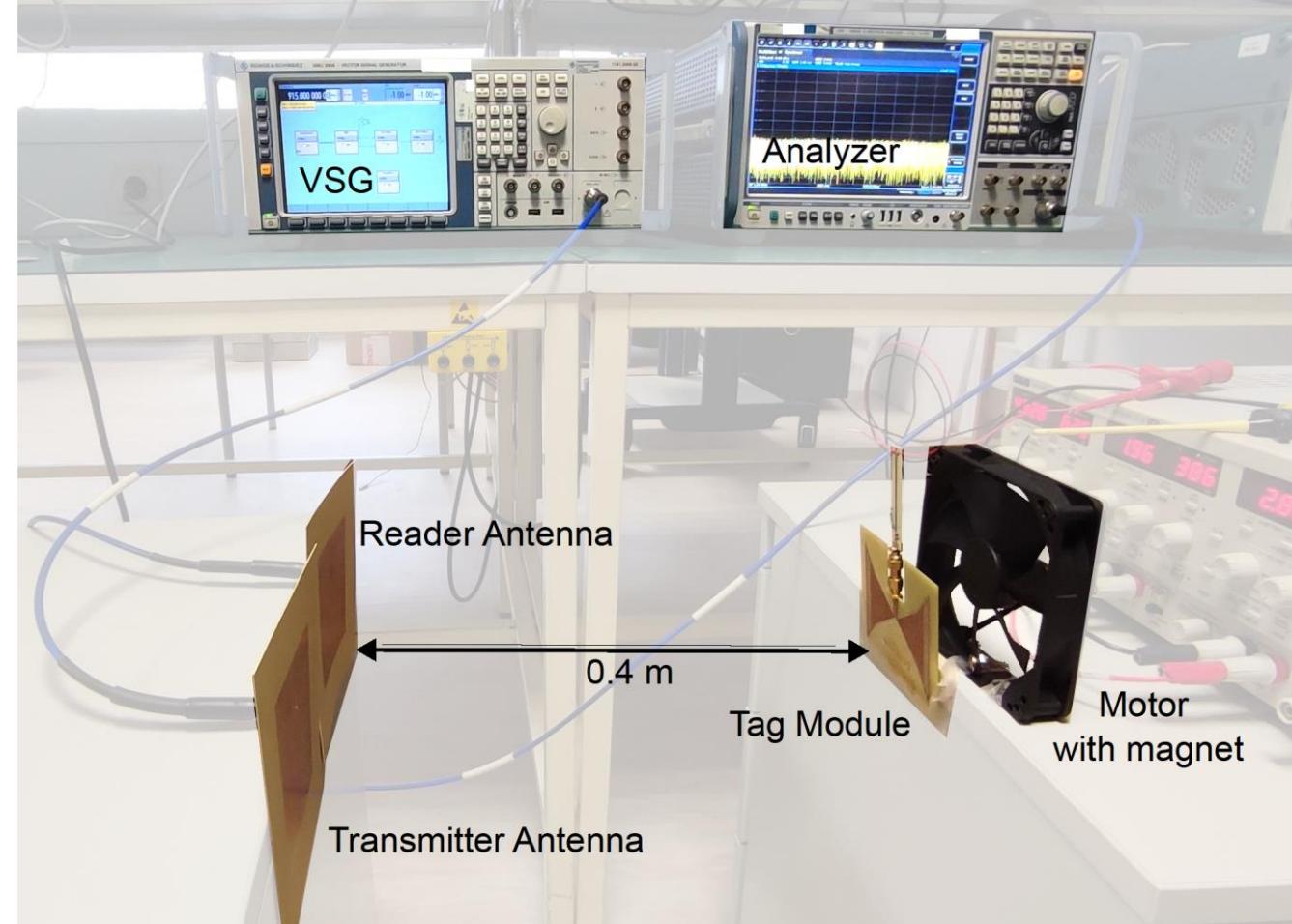
# Results



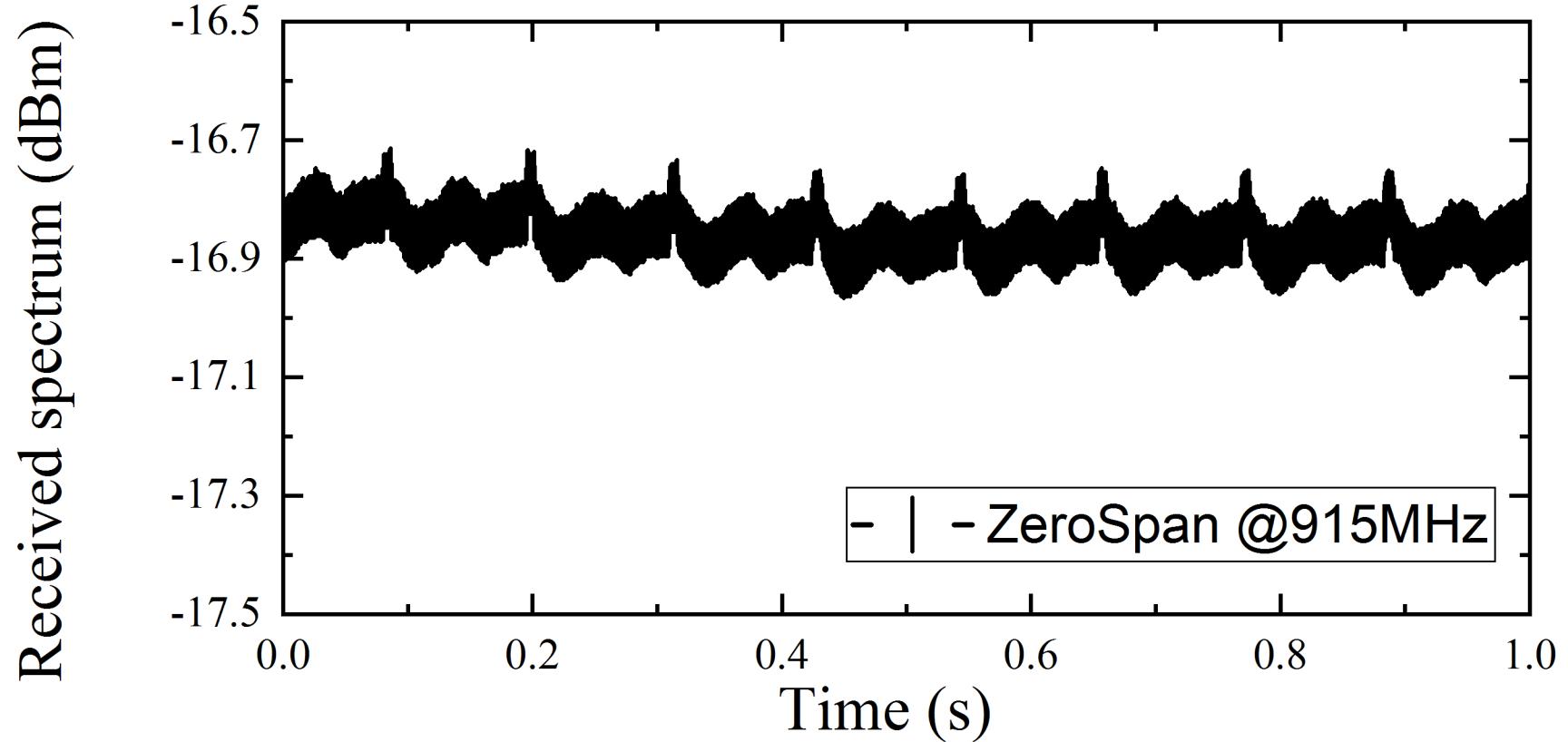
# Results



# Results



# Results



# Conclusion

- Zero-power passive SWIPT system
- Zero-power modulator using the magnetic field
- Very high switching velocity (6800 transitions per second)

# References

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# Thank You!

Questions?