

# RF to DC Converter

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# Agenda

- Problem Background
- Constraints
- Possible Solutions
- Subsystem Block Diagram
- Work Accomplished
- Work Remaining
- Adjustments
- Conclusion

# Problem Background

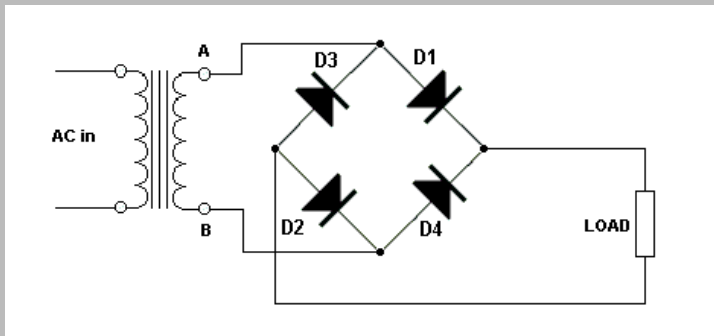
- Continuation of 2014 Bradley University project
- Wireless Power Transfer System
- Commercial Parts, 915MHz
- Rectenna, 5.8GHz

# Constraints

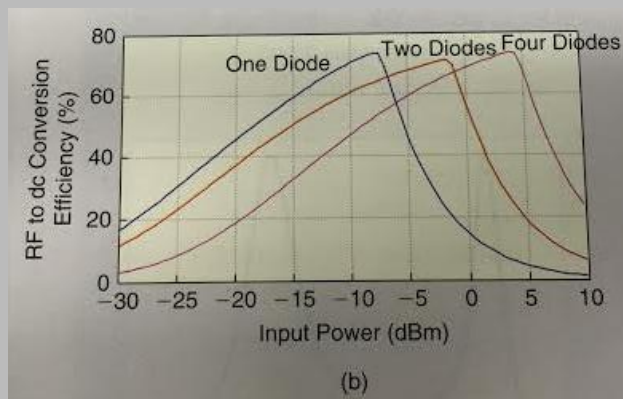
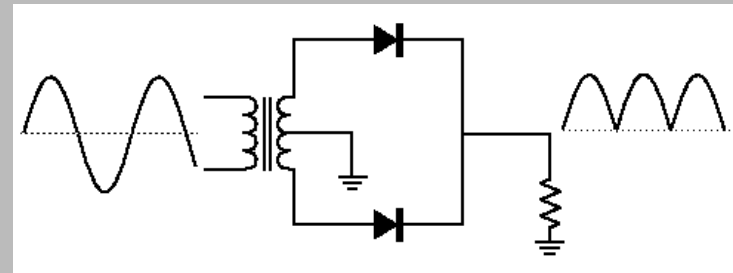
- Output DC:  $\pm 2\%$  ripple
- Must function in the frequency range between 5.725GHz and 5.875GHz

# Possible Solutions

## ■ 4 Diode



## ■ 2 Diode

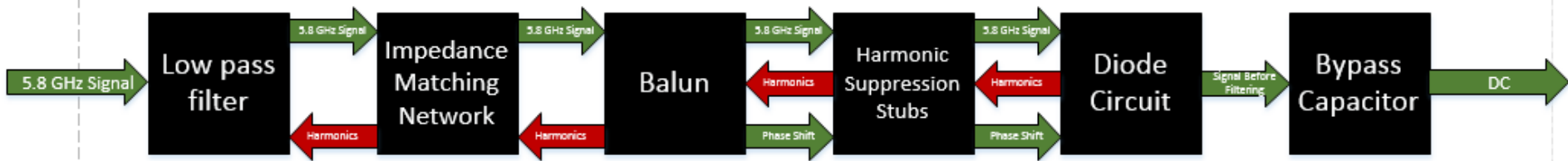


Efficiency Chart

$$P_r = P_t + G_t + G_r + 20 \log_{10} \left( \frac{\lambda}{4\pi R} \right)$$

Friis Transmission Formula

# Subsystem Block Diagram



# Gantt Chart

ID	Task Name	Start	Finish	Duration	Spring 2015 - Spring 2016
1	Research	Spring 2015	Spring 2016	40 Weeks	
2	Diode Selection	Fall 2015	Fall 2015	1 Week	
3	Diode Configuration	Fall 2015	Mid Fall 2015	6 Weeks	
4	Filter Design	Mid Fall 2015	Mid Fall 2015	6 Weeks	
5	Impedance Matching	Mid Fall 2015	End Fall 2015	6 Weeks	
6	Purchase Parts	End Fall 2016	End Fall 2015	1 Day	
7	Circuit Implementation	Beginning Spring 2016	Mid Spring 2016	12 Weeks	
8	Contact Manufacturer	Mid Spring 2016	End Spring 2016	1 Week	
9	Test Product	End Spring 2016	End Spring 2016	3 Weeks	

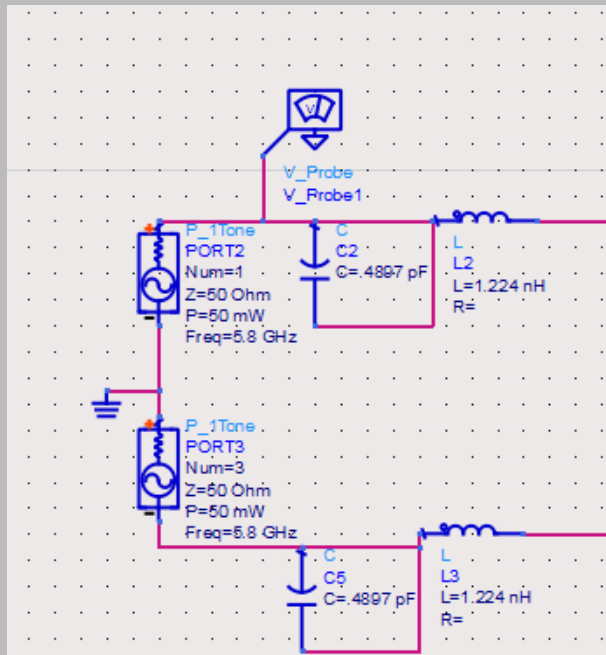
Gantt chart as of proposal presentation

# Work Accomplished

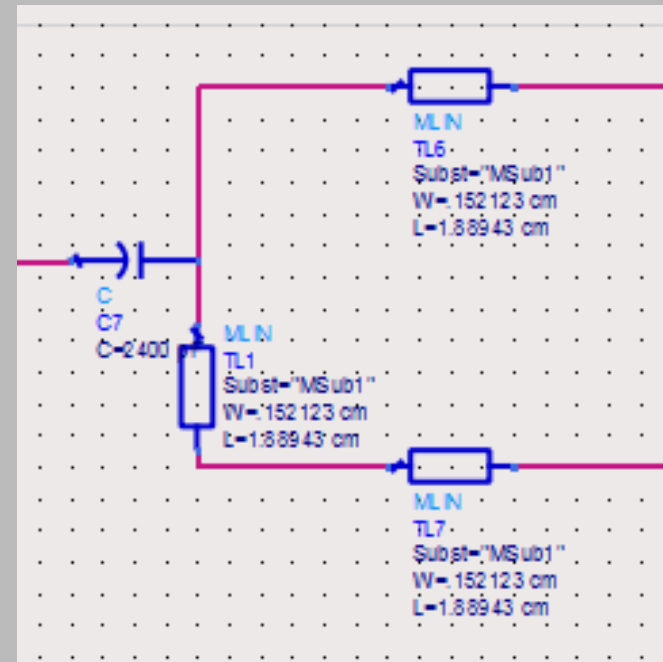
- Balun
- Substrate Selection RT/duroid 5880
- Filter Progress
- Inductor and Capacitor Companies
- Antenna Needs



# Balun



ADS Phase Shift Technique



Balun Phase Shift Technique

# Gantt Chart Updated

ID	Task Name	Start	Finish	Duration	Spring 2015 - Spring 2016
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Gantt chart as of 11/24/15

# Work Remaining

- Impedance Matching
- Parts Ordering
- Final Layout Design
- Send to Manufacturer
- Potential Amplifier Selection

# Adjustments

- Alternate Design
- Filter Alterations
- Harmonic Stub Omission

# Conclusion

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# Questions?



# References

- [1] Boaventura, Alirio, et al. "Optimum Behavior." *IEEE Microwave Magazine* Mar.-Apr. 2013: 26-35. Print.
- [2] Flynn, Brian W., and Kyriaki Fotopoulou. "Rectifying Loose Coils." *IEEE Microwave Magazine* Mar.-Apr. 2013: 48-54. Print.
- [3] Lin, James C. "Wireless Power Transfer for Cell Phones or Other Mobile Communication Devices and Biological Implications." *IEEE Microwave Magazine* July-Aug. 2013: 18-22. Print.
- [4] Scheeler, Robert, Sean Korhummel, and Zoya Popovic. "A Dual-Frequency Ultralow-Power Efficient 0.5-g Rectenna." *IEEE Microwave Magazine* Jan.-Feb. 2014: 109-14. Print.
- [5] Shinohara, Naoki. *Wireless Power Transfer via Radiowaves*. Hoboken: ISTE, 2014. Print.
- [6] *Wireless Power Transfer System* (2014). Print.