

Project 3: 5.8 GHz RF Energy Harvester



ECE 6361: Microwave Design Lab

Objective

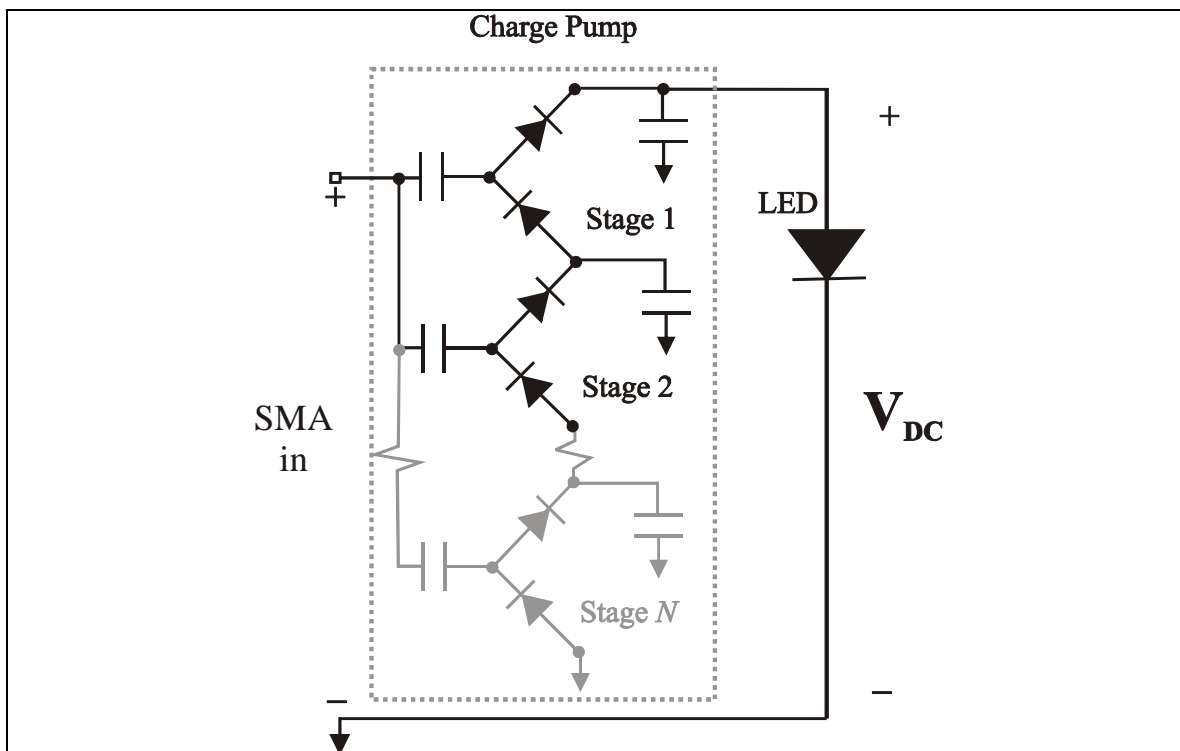
The student team will produce a microwave charge pump that converts a 5.8 GHz continuous wave signal to a DC power supply to drive a low-powered light-emitting diode (LED). Diodes are the only discrete components allowed in this particular project. *No capacitors, resistors, or other surface-mount components are allowed on this project.*

Design Specifications

Each student team is expected to design and build a rectifying RF energy harvesting device, capable of operating in the 5.725- 5.850 GHz ISM band. The device must, using only passive components, convert the microwave power into a DC voltage. The key design targets for the device are

- Interfaces with a 50Ω SMA line input
- Lights up the provided light-emitting diode with a 10 dBm continuous wave 5.8 GHz input

An example of a generic charge pump for microwave-to-DC conversion is shown below:



There is a list of supplies online for building this project. All projects must use the specified light-emitting diode (provided by the instructor) for the charge pump load.

Printed circuit boards for this design must use the in-house circuit fabrication facilities at Georgia Tech. *Schedule in advance.*

Grading

Grading for the student teams is based on three parts:

1. **Written Report** – The base score of this project will be based on the written documentation of the group’s project design and implementation. Key grading points for good design documentation:
 - a. Technical Correctness
 - b. Thorough Design Methodology
 - c. Clear, *Concise* Writing
 - d. Professional Content
 - e. References

Design documentation should strive for succinct repeatability.

2. **Compliance Test** – Each team must demonstrate to the course instructor that their final device complies with the project specifications. Various project score deductions will be assessed to a team depending on how far “out-of-spec” a final device performs. Compliance may only occur immediately after a scheduled lecture.
3. **Peer Evaluation Forms** – Download the peer evaluation forms from the course site and fill them out for each team member. Various project score adjustments may be assessed to a team depending on peer-assessment of individual team member effort. Form feedback is kept confidential.