

# Tunable Microwave Filters using Phase Change Material-based Switches

Reconfigurable RF integrated circuits are an attractive feature to sustain the increasing number of standards and functionalities of modern mobile devices. While back-end circuits in a radio transceiver (e.g., baseband analog, IF and digital) can be reconfigured using MOSFET switches, front-end circuits require high performance switches since resonant narrowband circuits require high quality factor inductors and capacitors. Phase-change-materials (PCM)-based RF switches have been proposed as high-performance RF switches due to their excellent transmission properties, small footprint, low power consumption, and non-volatility, which make them great contenders for reconfigurable RF applications.

In this project, a reconfigurable microwave filter controlled by PCM-based RF switches will be designed and evaluated. Multi-band filters are fundamental components in any radio transceiver, and PCM RF switches are great candidates for better energy and area efficiency. The implementation will be done in HFSS and/or ADS.

## Schedule:

- Study of the basics of microwave filters and PCM RF switches.
- Evaluation of different topologies to integrate the PCM switches to tunable filters.
- Design, implementation and evaluation of the filters.

**Prerequisites:** Waves & Distributed systems, Linear circuits     **Recommended:** RFIC

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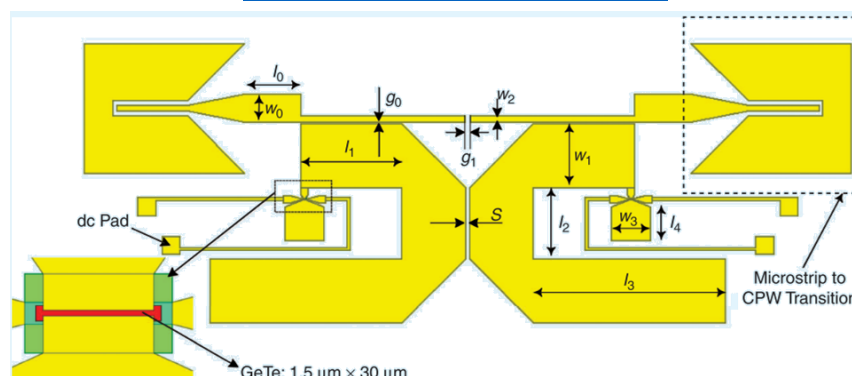


Figure 1- Reconfigurable filter proposed by Wang et al., IEEE Microwave Magazine 2016

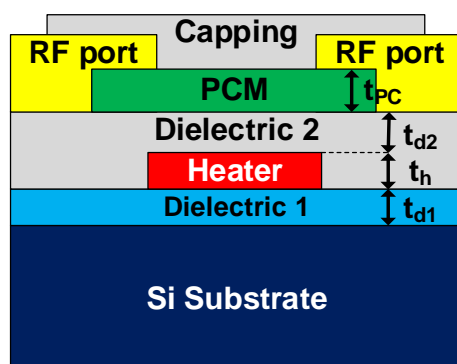


Figure 2 – Cross-section of PCM RF switch

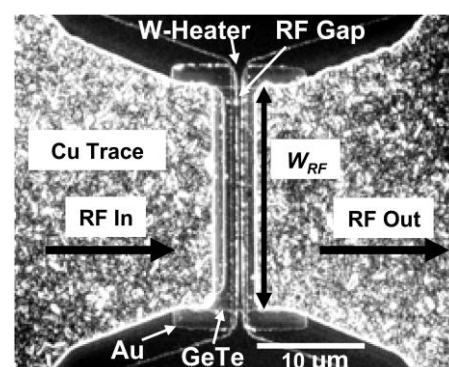


Figure 3 – SEM image of PCM RF switch