

We investigate the design of an edge-coupled band-pass filter having a passband of 20 MHz (center frequency- 1.57542 GHz in the L1 frequency band).

The filter used is a 5th order Chebyshev band-pass filter. The design consists of seven sections of microstrip lines terminated in impedances of 50 ohms.

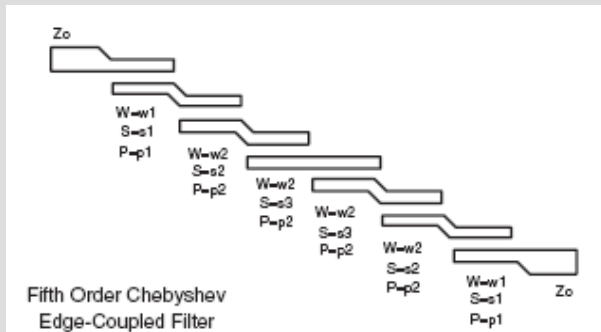


Fig. 3 Edge-Coupled BPF structure using microstrips [1]

Design was analyzed using Agilent Technologies' ADS software.

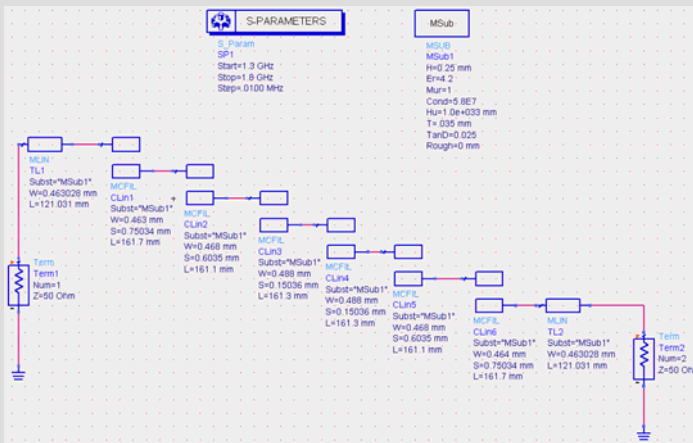


Fig. 4 Layout of the design in ADS

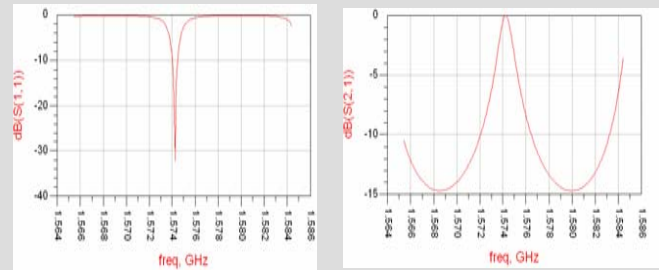


Fig. 5 Frequency response using air as the dielectric

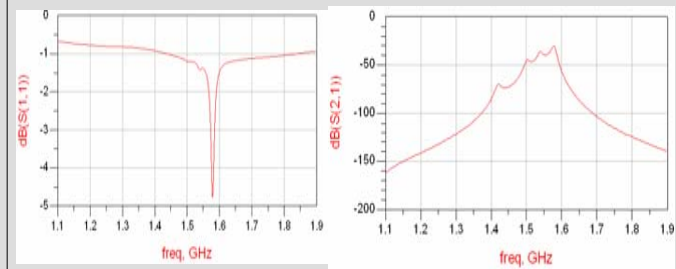


Fig. 6 Frequency response using air as the dielectric and thickness of conductor=0.035 mm.

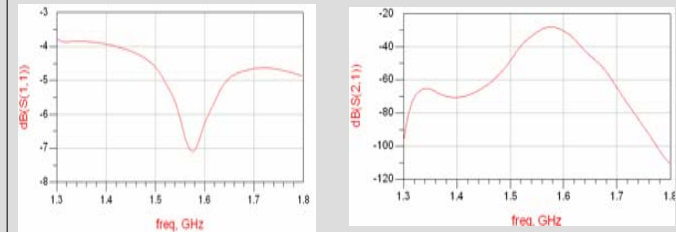


Fig. 7 Frequency response using FR-4 as the dielectric; Er=4.2 and thickness of conductor=0.035 mm.

Future research:

- Investigate the effect of the dielectric constant on the frequency response of the filter.
- Use active components to make the receiver compatible at other bands of frequencies (L1, L2 and L5).

References:

[1] "A 0.25um CMOS RF Front-End with a Low Cost Patch Antenna for GPS Receivers"-Mohammad S. Sharawi and Daniel N. Aloï.
 [2] RF and Microwave Coupled-Line Circuits- Mongia, Bahl, Bhartia.
 [3] Microwave Engineering-David M. Pozar.
 [4] An Introduction to Guided waves and microwave Circuits- R.S. Elliot.

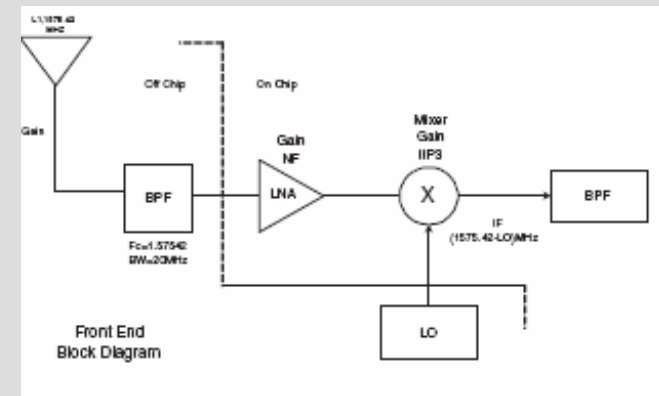


Fig. 1 Front-End block diagram of the GPS receiver [1]

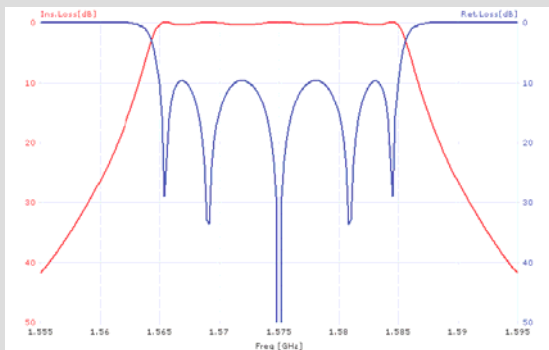


Fig. 2 Desired Frequency response [1]