

## **Novel compact “via-less” ultra-wide band filter utilizing capacitive microstrip patch**

### **ABSTRACT**

This paper presents a novel compact “via-less” UWB filter derived from a quarter-wavelength short-circuited stubs model. In this compact “via-less” UWB filter, there is no connecting vias as short circuit elements. Unlike its previous model that has 5 short-circuited stubs, this novel shape consists of two pairs of stubs which are joint together to share on the same microstrip patch and thus reduces total size of the UWB filter itself making it more compact in nature. With proper width optimization, the microstrip patch is able to decouple and provides low impedance to the ground in the UWB frequencies range. The filter delivers 3.85GHz to 10.44 GHz frequency range with 92.23% of fractional bandwidth. The magnitude of insertion loss is below than 0.53 dB and the return loss is lower than  $-14.8$ dB in the passband frequencies. The  $-3$  dB bandwidth is from 3.85 GHz to 10.44 GHz with 92.23% of fractional bandwidth. The group delay only varied by 0.47 ns in the passband, which makes it suitable for radio communication systems.

**Keyword:** Filter; Compact; Via-less; Microstrip patch