Single and Dual Band-Notch Ultra-Wideband Antenna
For WLAN (5.25 GHz and 5.75 GHz) Band

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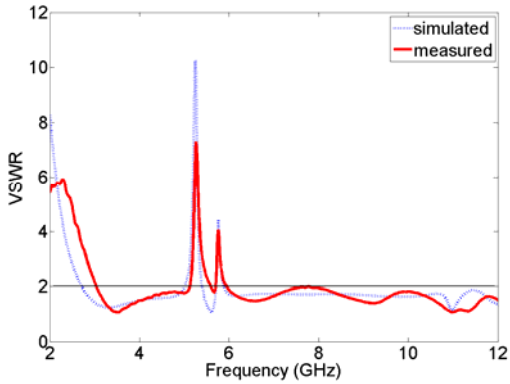
Ultra-wideband (UWB) communication systems attract great attention in the wireless world because of their advantages, including high speed data rate, extremely low spectral power density, high precision ranging, precision, low cost, and low complexity since the Federal Communication Commission (FCC) allowed 3.1-10.6GHz unlicensed band for UWB communication. However, the antenna design for UWB applications faces many challenges. Interference is a serious problem for UWB application systems. There are two bands for the existing wireless local area network (WLAN) technologies such as IEEE 802.11a in the USA (5.15-5.35 GHz, 5.725 -5.825 GHz). It would be cheaper and efficient to make the UWB antenna reject these two bands. Therefore, to prevent interference problems due to existing nearby communication systems within an Ultra-wideband operating frequency, the band-notches are realized by adding independent controllable strips in terms of the notch frequency and the width of the band-notches to the fork shape of the UWB antenna. The size of the flat type band-notched UWB antenna is etched on 24x36 mm^2 substrate. Two novel antennas are presented. One antenna is designed for one band-notch with single separated strip to cover the 5.15-5.825 GHz band. In the mean time, parametric studies are performed and the effect of the strip parameters on the location and the width of the band-notch are performed. However, the limitation of the single band-notch UWB antenna in terms of the efficient frequency motivates the design of dual band-notch UWB antenna. The parametric studies of the single band-notch helped in the design of the second antenna, which is designed for dual band-notches using two separated strips to cover the 5.15-5.35 GHz band and 5.725-5.825 GHz band. Both antennas are built and tested. The simulation and measurement show that the proposed antenna achieves a wide bandwidth from 3 to 12 GHz with perfect band-notches for lower and upper WLAN band as it can be seen from the VSWR versus frequency shown below.