European Conference on Antennas and Propagation 2011, 11-15 April 2011, Rome

UWB Printed Slot Antenna with Added Band and Notches

M. M. Samadi Taheri[1], H. R. Hassani[2]and S. Mohammad Ali Nezhad[3]
Electrical & Electronic Eng. Dept., Shahed University, Tehran, IRAN
[1]msamadi@shahed.ac.ir, [2]hassani@shahed.ac.ir,and [3]alinezhad@shahed.ac.ir

Abstract:A novel technique for adding simultaneouslyextra band and notchesto a compact Ultrawideband (UWB) printed slot antenna is proposed. The UWB slot antenna is in the shape of a pentagon. The notched bands are centered at 5.8GHz WLANand 3.5GHz WiMAX bands and the extra band is located at 2.4GHz Bluetooth band.The proposed antenna has a compact size, 23 x 28 mm^2, stable radiation pattern and return loss of better than 10 dB over the whole of the mentioned frequency bands.

Introduction: Therapiddevelopmentofwirelesscommunicatio nurgestheneedofUWB,dual-bandormultibandantennas.The printed planar slot antennas are good candidates for UWB systemsbecause of their wide bandwidth, high gain, low profile, ease of fabrication and integration with active devices. To prevent interference between UWB systems and existing wireless systems, creating notches in the UWB is necessary. Some UWB printed slot antennas have been reported such as printed inverted cone [1]. In the literature a few techniques have been reported to design printed slot antennas with band notch behavior. This includes: a C shaped parasitic strip combined with a circular slot antenna [2]; parasitic strip and slit in the slot antenna [3]; use of variable length on-ground slits in the open slot antenna [4];using square ring resonator to improve the frequency notch behavior of the UWB slot antenna[5] anda dual band notch UWB slot antenna can be obtained by cutting a rectangular and L shaped slits in the ground plane [6].

Adding an extra band which covers the 2.4GHz Bluetooth band to the UWB antenna is also popular. Few works have been reported to add an extra band to the UWB antenna, such as integrating the Bluetooth band to the UWB antenna, [7].

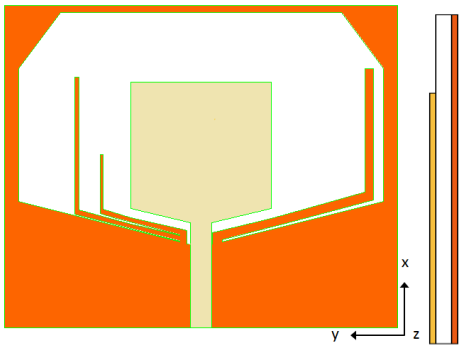
In this paper a small size, low profile and easy to fabricate Bluetooth and UWB slot antenna with notches at WLAN and WiMAX band is presented. Simulation results are carried out using commercially available software package HFSS.

Antenna design: The configuration of the UWB printed slot antenna with capability of adding and rejecting bands is shown in Fig. 1.The antenna uses a 0.8mm thick Roger 4003 substrate with ε_r= 3.38 and loss tangent of 0.0027. The dimension of the antenna is 23 x 28 mm^2.

Notched bands at 5.8GHz (WLAN band) and at 3.5 GHz (WiMAX band), are created by placing two stubs of quarter-wavelength eachand appropriate width attachedto the ground plane near the feed line. The extra band, located at 2.4GHz (Bluetooth band), is created by placing a stub similar to that of the notch but away from the feeding patch.

The return loss and radiation patterns are shown in Figure 2 and 3,respectively.

From results obtained it is seen that the VSWR values at notch frequencies are very high and the patterns are good omnidirectional.



(a) (b)

Fig.1. Configuration of pentagonal printed UWB slot antenna with stubs for adding extra band and notches. (a)Top and bottom layer (b)side view.

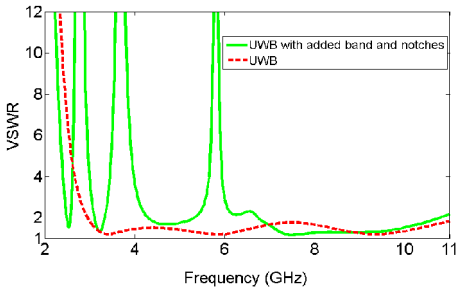
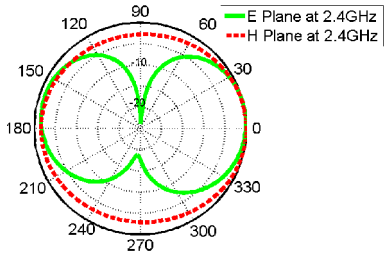
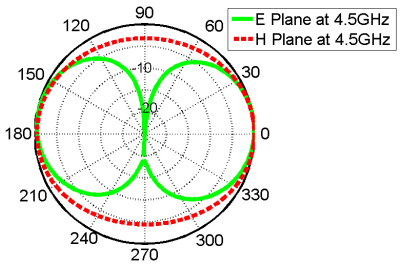


Fig. 2. Simulated VSWR of UWB pentagonal slot with stubs and without stub.



(a)



(b)

Fig. 3. Simulated Radiation pattern of UWB pentagonal slot antenna with stubs (a) atfrequency 2.4 GHz. (b) at frequency 4.5GHz.

REFERENCES

[1] S. Cheng,P. Hallbjorner,and A. Rydberg,"Printed Slot Planar Inverted Cone Antenna for Ultrawideband Applications," IEEE Antennas And Wireless Propag. lett, VOL.7,pp.18-21, 2008.

[2] C.-Y. Huang, S.-A. Huang, and C. -F. Yang,"Band-notchedultra-widebandcircularslotantennawithinvertedC-shapedparasiticstrip," Electron. lett., Vol. 45., No. 25., Dec. 2009.

[3] L.-H.YeandQ.-X.Chu,"Improved band-notched UWB slot antenna,"Electron. lett., Vol. 44., No. 15., Jul. 2008.

[4] N. Farrokh-Heshmat, J. Nourinia, and C. Ghobadi,"Band notchd ultra-wideband printedopen-slot antenna usingvariable on-ground slits,"Electron.lett.,Vol. 45., No. 21., Oct. 2008.

[5] Wen-junLui,Chong-huCheng,andHong-boZhu,"Improved Frequency Notched Ultrawideband Slot Antenna Using Square Ring Resonator,"IEEE Trans on Antennas and Propagation., vol. 55, no. 9, pp. 2445–2450, Sep. 2007.

[6] L. - H. Ye, and Q. - X. Chu," 3.5/5.5GHzdualband-notchultra-widebandslotantennawithcompactsize," Electron. lett., Vol. 45., No. 25, Mar. 2010.

[7] B. S. Yildirim, B. A. Cetiner, G. Roqueta, andLuis Jofre,"Integrated Bluetooth and UWB antenna,"IEEE Antennas And Wireless Propag. lett, VOL. 8, pp.149-152, 2009.