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DAFTAR ISI

ALAT PENGUKUR JARAK DENGAN OUTPUT SUARA

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Abstract

Distance measurement instrument with sound can be used not only by normal human being but also disabilities that have seeing trouble. This instrument possible using by them because it has LCD display and sound output. Measurement instrument with sound can measure distance in 10-79 cm range. Output analog voltage of sensor SHARP GP2D12 depend on the distance, the longer distance produce smaller voltage. The result show for 10 cm distance the analog voltage is 2,4 volt and 79 cm have voltage 0,4 volt. The instrument after some experiments have error 0,5 cm.

Keywords : Sharp sensor, Pengukur jarak, Suara, LCD, Microcontroller

COMPACT UWB BAND NOTCHED WITH C-SLOT ANTENNA

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Abstract

An UWB communication employs tremendously narrow carrier less RF pulses and stimulates the research activities in various designs of UWB antennas. A compact UWB rectangular monopole antenna with C-slot for rejecting unwanted band and having radiation pattern which consistently omnidirectional for all range of UWB frequency band is presented. The C-shape slot can be easily used to adjust the frequency rejection of antenna. Both numerical and experimental results show that the proposed antenna has consistent radiation pattern from 3.2 to 5 GHz.

Keywords : Antenna, UWB, C-slot

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Compact UWB Band Notched with C-Slot Antenna

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Abstract— An UWB communication employs tremendously narrow carrier less RF pulses and stimulates the research activities in various designs of UWB antennas. A compact UWB rectangular monopole antenna with C-slot for rejecting unwanted band and having radiation pattern which consistently omnidirectional for all range of UWB frequency band is presented. The C-shape slot can be easily used to adjust the frequency rejection of antenna. Both numerical and experimental results show that the proposed antenna has consistent radiation pattern from 3.2 to 5 GHz.

Keywords— **Antenna, UWB, C-slot.**

I. Introduction

Recently, there are many significant developments of Ultra Wide Band (UWB) technologies. UWB communications is fundamentally different from all other communication techniques because it employs tremendously narrow carrier less RF pulses (pico second to nanosecond) to communicate between transmitters and receivers [1]. According to Federal Communication Commission, the frequency band of UWB is detemined from 3.1 to 10.6 GHz for commercial application. This opportunity stimulates the research activities in various designs of UWB antennas.

Several UWB antennas have been proposed in literature. One common way is to use patch antenna with partial ground plane as found in [2], [3] and [4]. Nevertheless, the frequency range for UWB systems will interference the existing WLAN and WiMAX networks which operating in 5.15–5.825 and 3.3–3.7 GHz, respectively. To solve this problem, many approaches have been proposed to avoid interfering signals by using open loop resonator as [5] and [6], embedding stub in two trapezoid slots on [7], by mean of electromagnetic band gap structure [8], cutting slots on patch or radiator area [9], embedding stub in radiator patch and slot in feeding line [10], integrated band rejected elements in the feed line [11]. Furthermore, several antenna are designed by applying dielectric resonator antenna (DRA) to overcome the interference problems as [12] and [13].

The antenna which having consistent radiation pattern for all frequency band also a challenge in design UWB antenna to avoid undesirable distortions of the radiated and received signals. In this paper, we proposed the new design of slot that can reject unwanted band and have radiation pattern which consistently omnidirectional for all range of UWB frequency band .

II. Antenna Design

The geometry of the proposed UWB printed antenna structure is shown in Fig. 1. The antenna consists of a rectangular patch with a C-slot and a partial ground plane with 30×30 mm overall size . The material is using FR4 substrate with a dielectric constant of 4.3 and 1.6- mm thickness. The tapered patch is excited by a 50 ohm feed line. The antenna parameters are shown Fig. 1 where a = 15 mm, b =11 mm, c = 7 mm, d =4.5 mm, e = 8.5 mm, f = 12.5 mm, g = 2 mm, h= 2 mm, i =11.5 mm, k =3 mm, l =1.6 mm. m= 30 mm

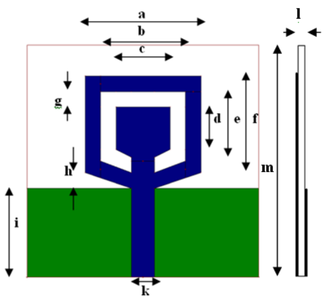

Fig. 1 UWB Antenna geometry

III. Result and Discussion

A. Parametric study

The parametric study have been done to know the effect of some changes in antenna geometry to the performance of the antenna. Initially the frequency response and the band rejection studied as Fig. 2 and Fig. 3. The s11 of the antenna meet the UWB operating frequency range i.e. 3.2 GHz to more than 10.6 GHz. Changing of *g*, shifts the rejection band to higher frequency with wider bandwith (Fig. 2). The same effect also occurs when varying *d* but with less frequency

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shifting than *g*. Meanwhile changing the *d* shifts small frequency but the bandwidth remain constant. Therefore changing on these 3 dimensions will influence the frequency tuning of the antenna, in this case *g* and *d* for tuning the band rejection and *d* for fine tuning the frequency response.

Fig. 2 and Fig.3 also indicate that the rejection band is below 6 GHz. In order to have higher rejection band then *n* can be varied as Fig. 5.

The radiation pattern of the antenna for the frequency of 3.2, 5, 8 and 10 GHz are shown on Fig. 6a to Fig. 6d which consist of H-plane (solid line) and E-plane (dash line). The radiation patterns for frequency of 3.2 GHz and 5 GHz are omnidirectional. Fig. 6a and Fig. 6b show that the H-plane forms a circle pattern (omnidirectional) while the E-plane forms a bi-directional pattern (doughnut pattern). The UWB communication systems require the antenna with omnidirectional radiation pattern for all frequencies. At 8 GHz (Fig. 6c) the radiation pattern reach maximum on 45° and -45° direction which mean that the UWB signals have maximum radiation on those directions and have lower quality of the signal on other directions.

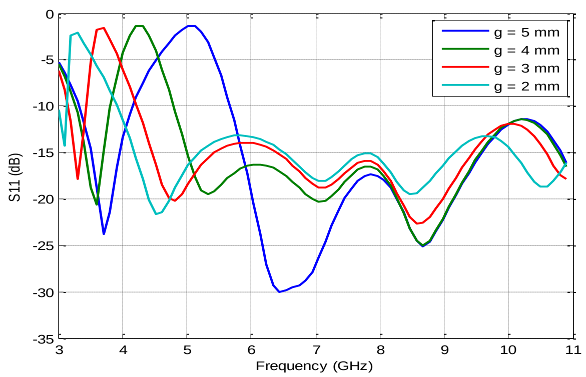

Fig. 2 simulated S11for different g length

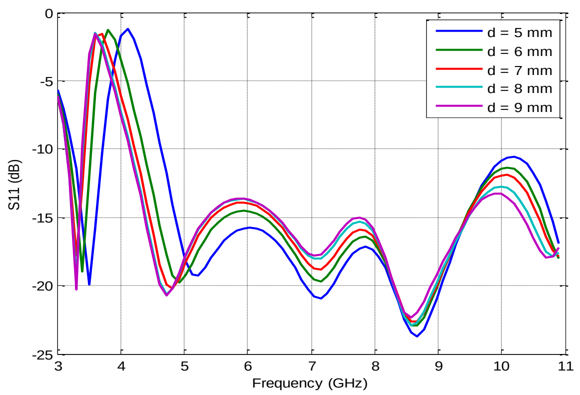

Fig. 3 simulated s11for various *c* length

At 10 GHz the radiation pattern forms bi-directional where the maximum radiation are on 90 and 270° meanwhile the minimum radiaton are around the directions of 0° and 180°.

B. *Measurement*

After completing the simulation then the initial fabrication was carried out to validate the results. Fig. 8 shows the antenna after the fabrication. Futhermore Fig. 9 displays the s11 of the antenna for both simulation and measurement by using design at Fig. 1. We can see that there is only small discrepancy between fabrication and simulation results for 3 – 6 GHz. On the other hand, by using FR4 on higher frequency application cause some differences between measurement and simulation results especially on the magnitude of the s11 when the frequency is higher than 6 GHz. It is due to instability of FR4 substrate for higher frequencies. The radiation pattern of the antenna after measurement are shown on Fig. 7 where the antenna has good omnidirectional pattern at 3.5 and 5 GHz.

IV. Conclusions

A compact UWB antenna with C-slot has been presented. Antenna is easy to tune to the desired frequency by varying slot dimension. The antenna have consistent omnidirectional radiation pattern for all UWB frequency of 3GHz to 10 GHz.

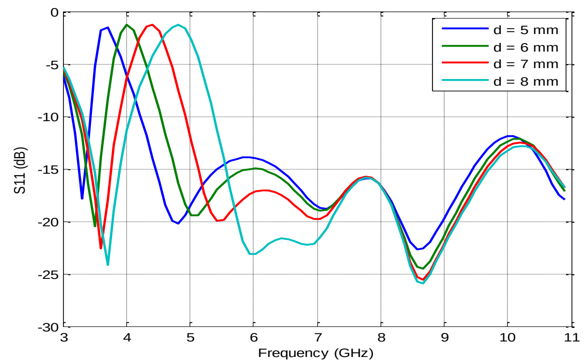

Fig. 4 simulated S11for different d length

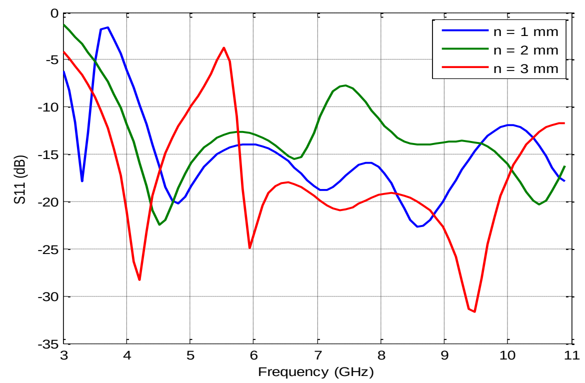

Fig. 5 Simulated S11 for different n length

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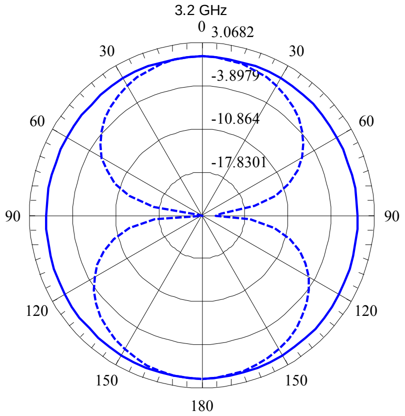
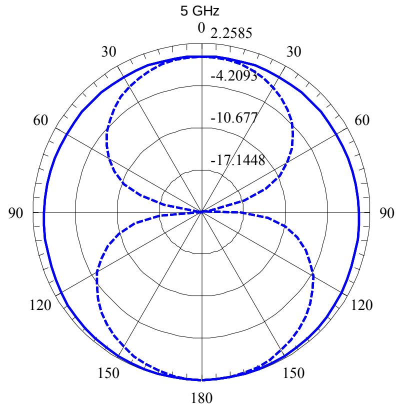
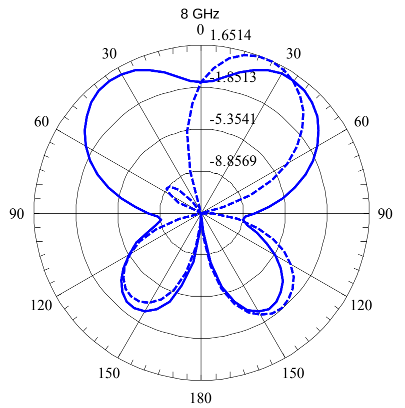






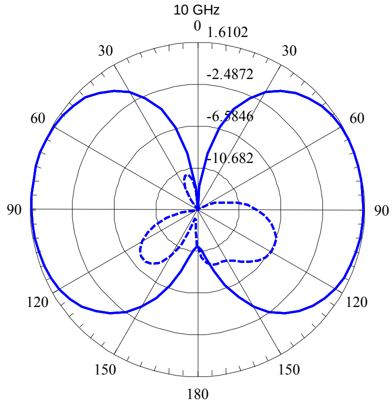
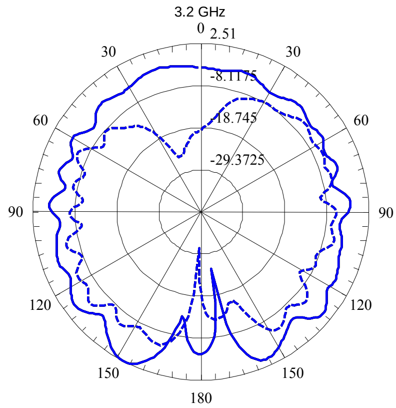
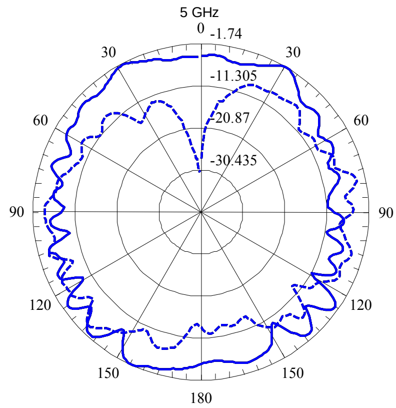


Fig. 6 Radiation Pattern for 3.2, 5, 8, 10 GHz





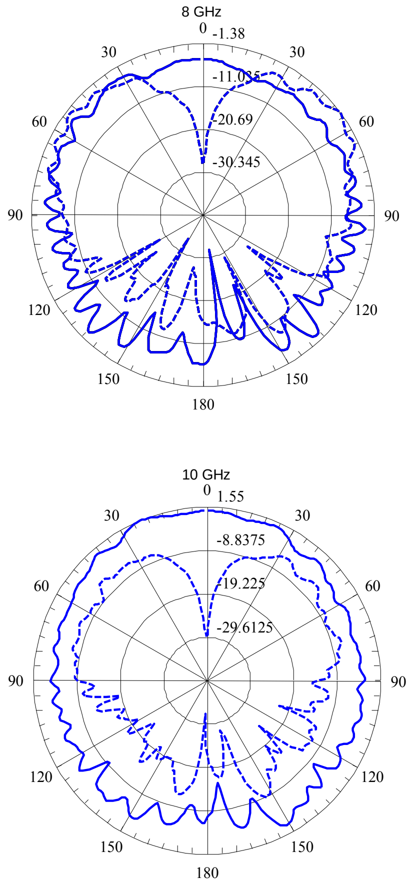


Fig. 7 Radiation pattern measurement for 3.2, 5, 8, 10 GHz, solid line = E-plane and dash line = H-plane.

Fig. 8 Prorotype of the antenna

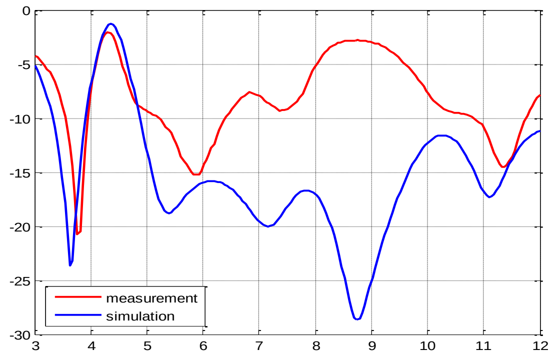


Fig. 9 The S11 results of antenna for both simulation and measuremenr at x=5

FUTURE WORK

After these simulated results and initial fabrication of the antenna, further optimization and correction on fabrication will be conducted for improving the return loss on antenna measurement. The antenna geometry need to be optimized to have more than one band rejection. For future development, try to avoid on using FR4 on higher frequencies in order to have good accuracy on measurements

ACKNOWLEDGMENT

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