

# A Simple wave-traps MIMO antenna design for WLAN Application

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**Abstract** - A simple wave-traps multi-input multi-output (MIMO) antenna design is presented for wireless local area network (WLAN) operation. The measured -10 dB bandwidths for return loss are covering the WLAN2.4 and Wlan5.2/5.8 bands. The antenna structure is uncomplicated; it's composition by two symmetrically antennas and places on the clear-area which is at upper substrate. The proposed MIMO antenna system also has the good performances on isolation characteristic, which value are all under -15 dB at the required bandwidth.

**Index Terms** — Antennas, propagation, MIMO, WLAN, Wave-traps.

## 1. Introduction

Most of the WLAN products have adopted multiple-input multiple-output (MIMO) technology, in which antennas are used to increase data throughput without additional spectrum. The dual-antenna formed by integrating two similar or same antennas into a compact configuration [1–6] is attractive for the diversity in the mobile communication device. It can use of multi-path propagation to improve signal quality and reliability. Dual to today's electronic products are the pursuit of small size, lightweight and cost down, The antenna design evolved clearance area is gradually reduced, the distance between the antennas are too close, resulting in destructive interference between the signals, resulting in isolation degree (Isolation) over poor antenna efficiency decreases, the transmission speed decreases.

## 2. Antenna design

The configuration of the proposed MIMO antenna system is shown in Fig.1. The MIMO antenna includes two radiating antenna elements which are on the clear-area upper the ground plane. Its overall dimension is 12 x 60 mm<sup>2</sup> and the ground plane size is 108 x 60 mm<sup>2</sup>, which is also a typical ground size of handset. Fig.2 shows the detailed views and dimensions for two antenna elements. Each antenna elements are fed by SMA cables and consist of rectangle coupled patch and U shape shorting line. Ant.1 and Ant.2 is same size mirror each other.

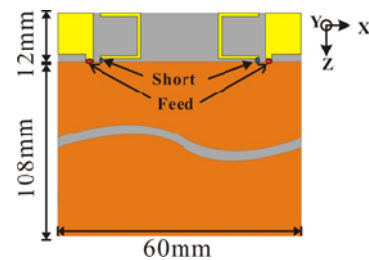


Fig.1 the configuration of the MIMO antenna

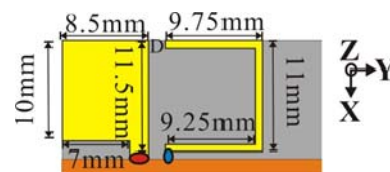


Fig.2 detailed views and dimensions for antenna elements.

## 3. EXPERIMENTAL RESULTS

Results of the measured S-parameters of the proposed antenna are shown in Fig. 3. The measured results obtained using the Agilent/HP 8753 is seen. Both of the low and high band, which can cover the WLAN2.4 and WLAN5.2/5.8 operating bands. The measured  $S_{21}$  and  $S_{12}$  are all less than about 14 dB over the operating band.

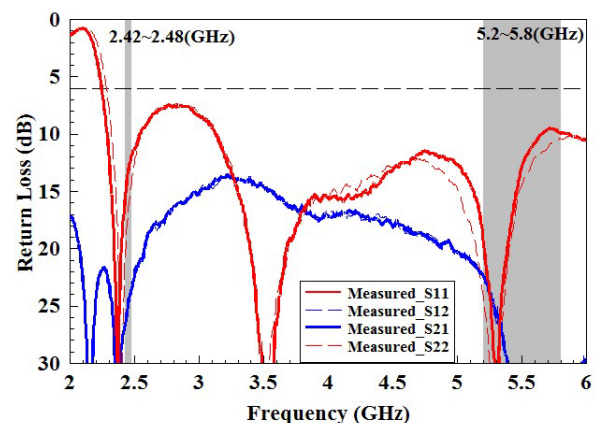
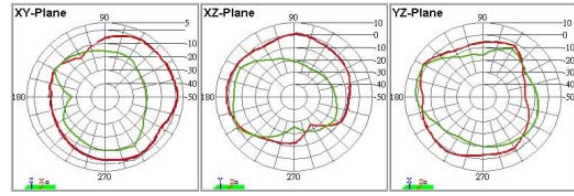
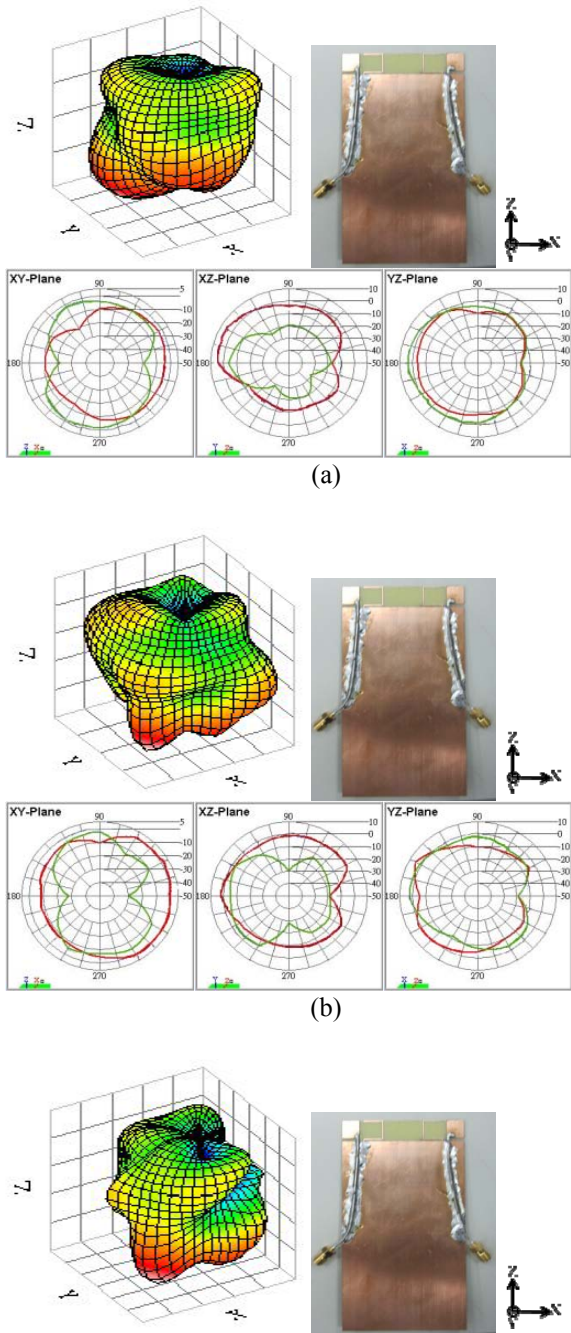


Fig. 3 Measured and S parameters of the fabricated dual antenna.

Fig 4 shows the measured radiation patterns of the proposed antenna (a) 2400 MHz (b)5150 MHz (c)5725 MHz. The measured antenna patterns include 3D, XY-Plane, XZ-Plane and YZ-plane dimensional radiation patterns.



(c)

Fig. 4 Measured and simulated radiation patterns of the proposed antenna. (a) 2400 MHz (b)5150 MHz (c)5725 MHz.

#### 4. Conclusion

A Simple wave-traps MIMO antenna design for WLAN application have been proposed and verified. By adjusting the u-type ground path and feeding path position which can cover WLAN2.4 and WLAN5.2/5.8 bands successfully. The antenna design is suitable for the handset, so the proposed antenna design is very practical.

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