

FL1B

Antenna Report

Quanta Antenna Design Center

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No. 211, Wen Hua 2nd Rd., Kuei Shan Hsiang,
Tao Yuan Shien, Taiwan, R. O. C.
+886-3-327-2345 Ext. 16216
Jason-Cheng@quantatw.com

Author: Jason Cheng

Check: Tim Wang

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1 Introduction

The purpose of this report is to judge the transmitting and receiving capability of the antennas inside the notebook PC. For this reason, we may need to know the impedance bandwidth (VSWR) and radiation pattern (2D/3D). In this report, we will systematically show all the values mentioned above, and summary will be drawn in the end.

2 General description

FL1B is a 10.1" wide screen notebook PC platform which support WWAN and WLAN, etc wireless functions all in one. Base on the customer's requirement specification for notebook computer antennas, which needs to cover WWAN band and WLAN (802.11 b/g) frequency bands.

Antenna placement



Fig. 1 Antenna Placement

3 Antenna characteristics

3.1 WWAN & WLAN antenna

3.1.1 Main & Aux antenna

3.1.1.1 Description

The antennas are made by metal sheet and PCB. WWAN Main and WWAN Aux antenna were allocated in the upper left side and upper right side of LCD screen, WLAN Main and WLAN Aux antenna were in the left side and right side of bottom case, respectively.

WWAN main cover GSM 850,EGSM 900,DCS 1800,PCS 1900,IMT-2000 Tx and Rx band. WWAN aux cover GSM 850,EGSM 900,DCS 1800,PCS 1900,IMT-2000 Rx band and GPS frequency. The volume of WWAN Main is 67*10*3mm(L*W*T), Aux is 65*10*3mm(L*W*T). The WWAN Main and Aux antenna were soldered with 392mm and 634mm 50Ohm RF coaxial cable which cable O.D is 1.37mm. The antenna dimensions are illustrated in Figure 2.

Both two WLAN antennas cover IEEE 802.11 a/ b/g frequency bands, the volume of Main is 18*12.9*7.5mm(L*W*H), Aux is 21.5*8.8*10.0mm(L*W*H). The WLAN Main and Aux antenna were soldered with 70mm and 335mm 50Ohm RF coaxial cable which cable O.D is 1.13mm. WLAN antennas cover IEEE 802.11 a/ b/g frequency bands. The antenna dimensions are illustrated in Figure 3.

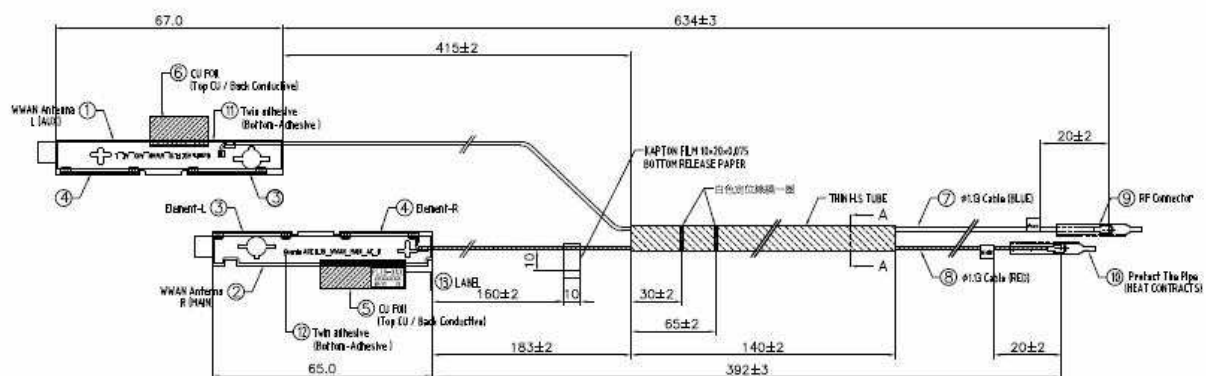


Figure 2 WWAN Antenna Dimensions

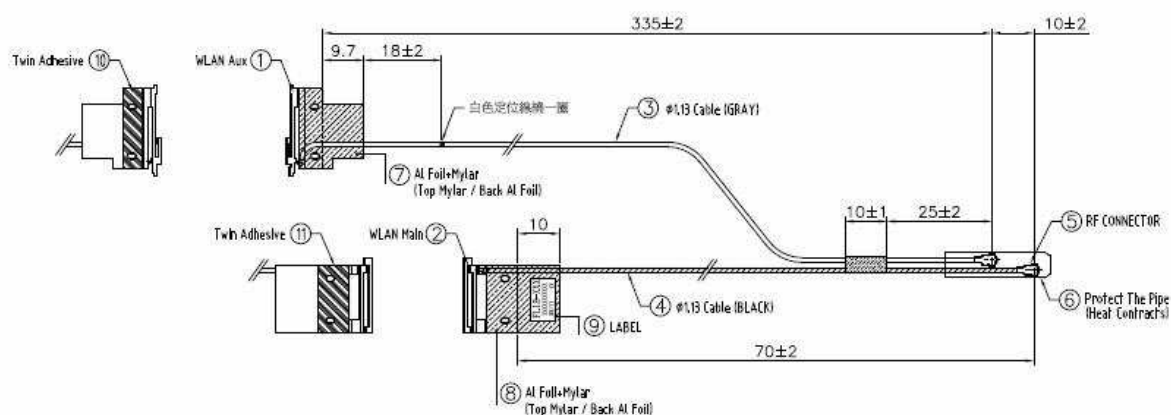
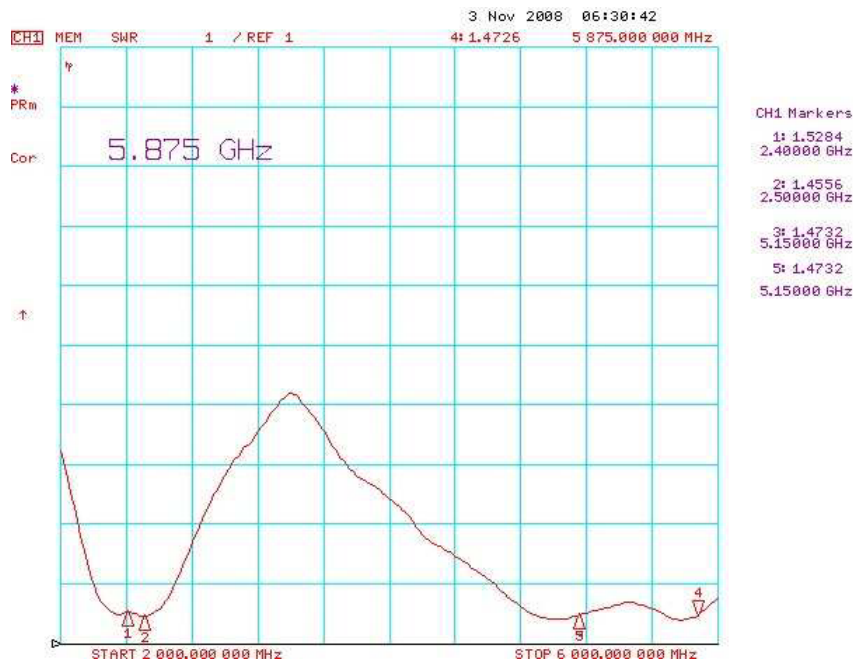


Figure 3 WLAN Antenna Dimensions

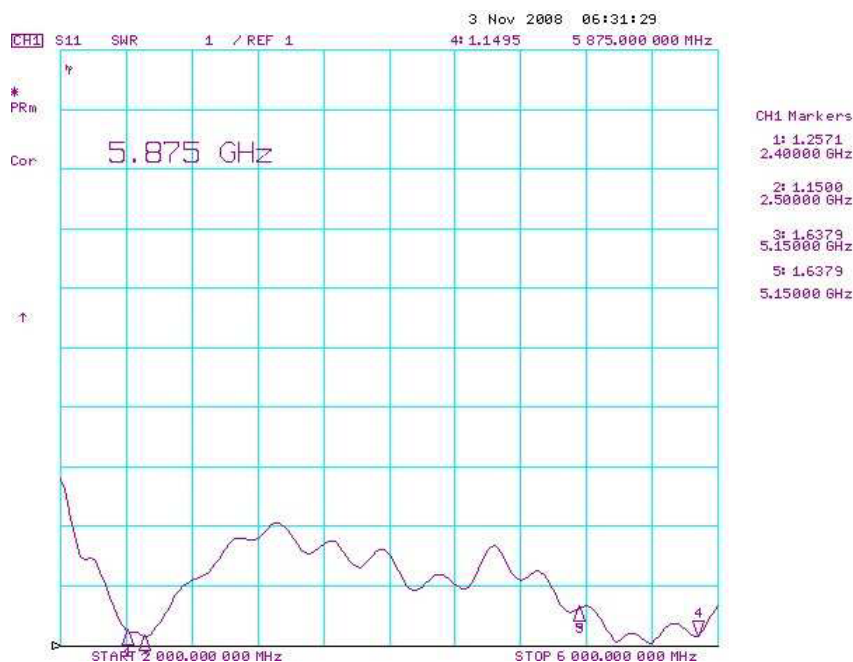
3.1.1.2 VSWR

For better impedance matching, we need to be sure that the antenna is totally in-band and shows a wide enough bandwidth. With return loss (or VSWR), we can easily tell if the design meets the basic requirement. To measure the return loss, we need to cut the connection between antenna feed-in and RF car-kit, and attach a coaxial cable at the feed-in point. Then, by click the coaxial cable onto a network analyzer (such as Agilent 8753ES), we can measure the return loss without difficulties.

WLAN Main antenna



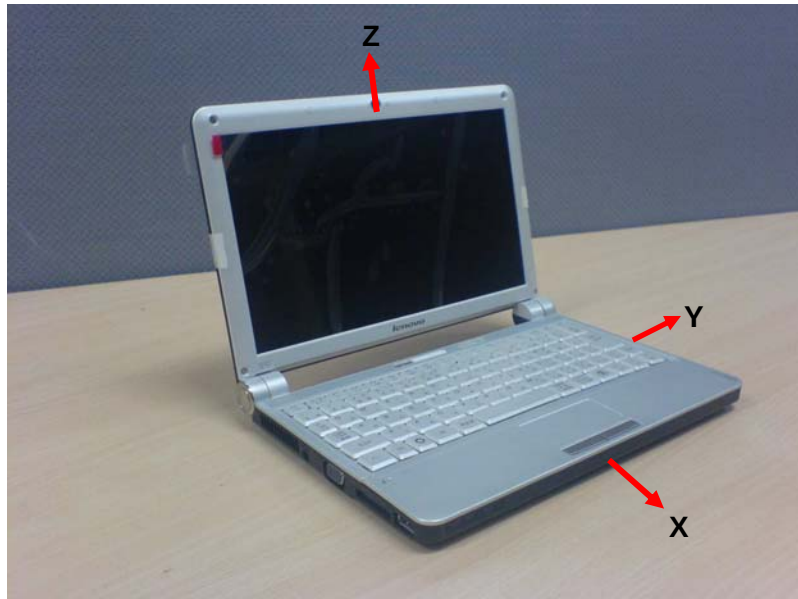
WLAN Aux antenna



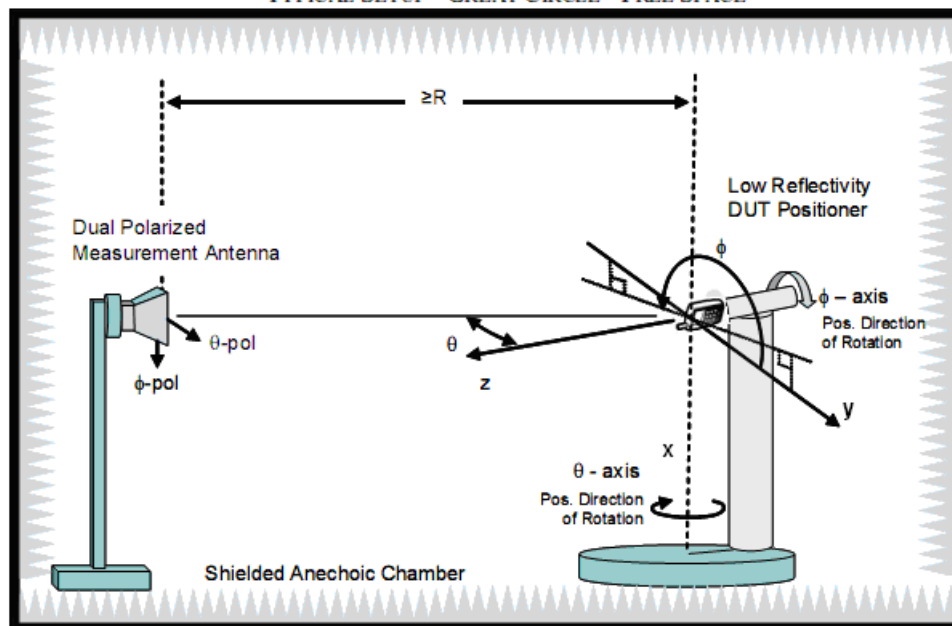
3.1.1.3 Passive

The antenna gain measurement we made here thoroughly follows **CTIA Test Plan for Mobile Station Over The Air Performance ver 2.2**. In the test plan, CTIA defines the total radiated power (TRP) and total isotropic sensitivity (TIS) measurements / specs in different modes (“free space”, “talk mode”, and “dial mode”) and different bands. The term TRP is, in fact, the spherical effective isotropic radiated power, which CTIA claims to be a better indication of mobile performance comparing to traditional peak effective isotropic radiated power (EIRP) in additional spatial coverage concern. Yet the term TIS is the spherical effective radiated receiver sensitivity. Just like TRP, TIS also includes the coverage concern. Following are the configurations for both “free space” and “talk mode” measurements.

Free Space Configuration



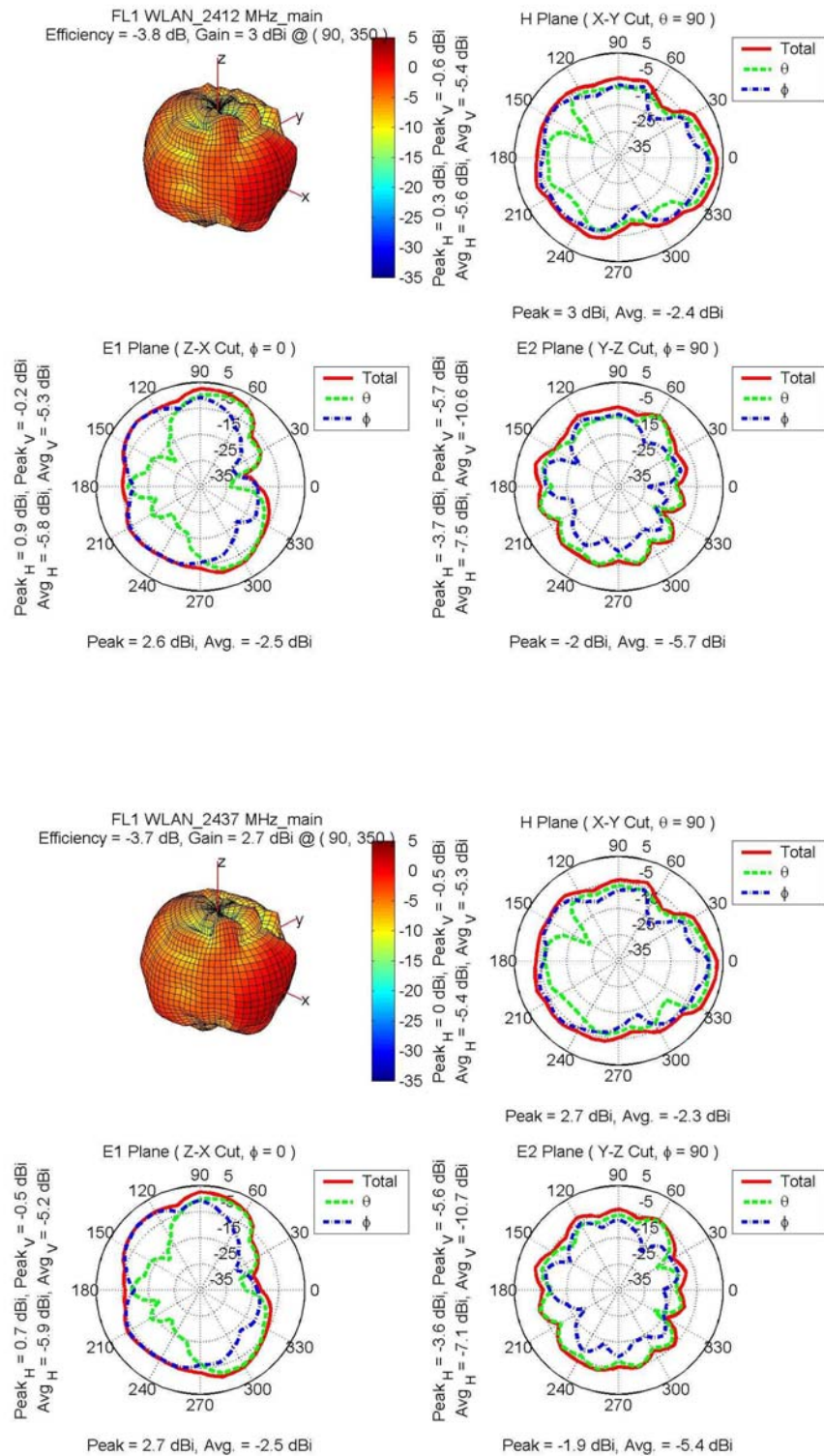
TYPICAL SETUP - GREAT CIRCLE - FREE SPACE

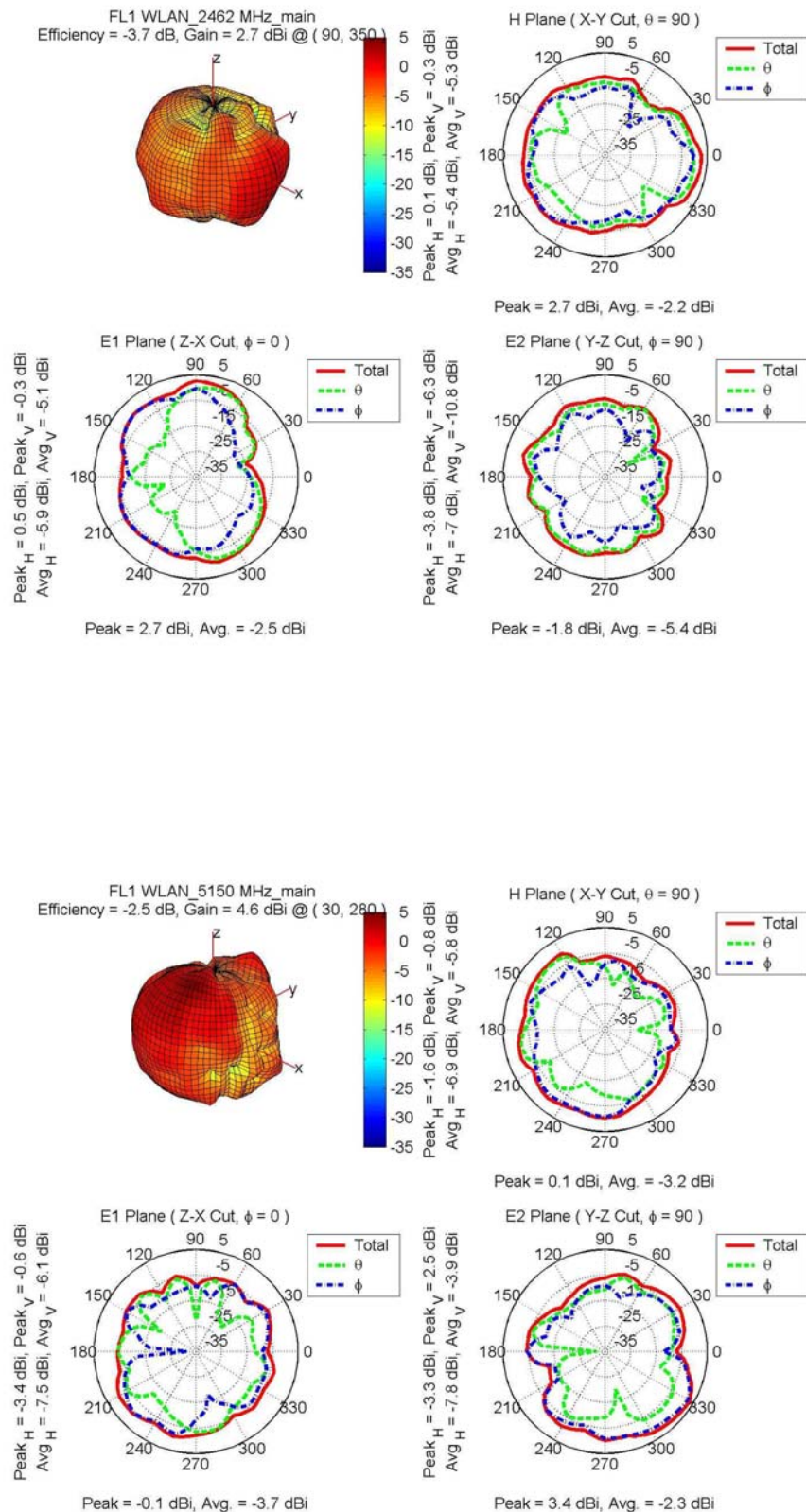


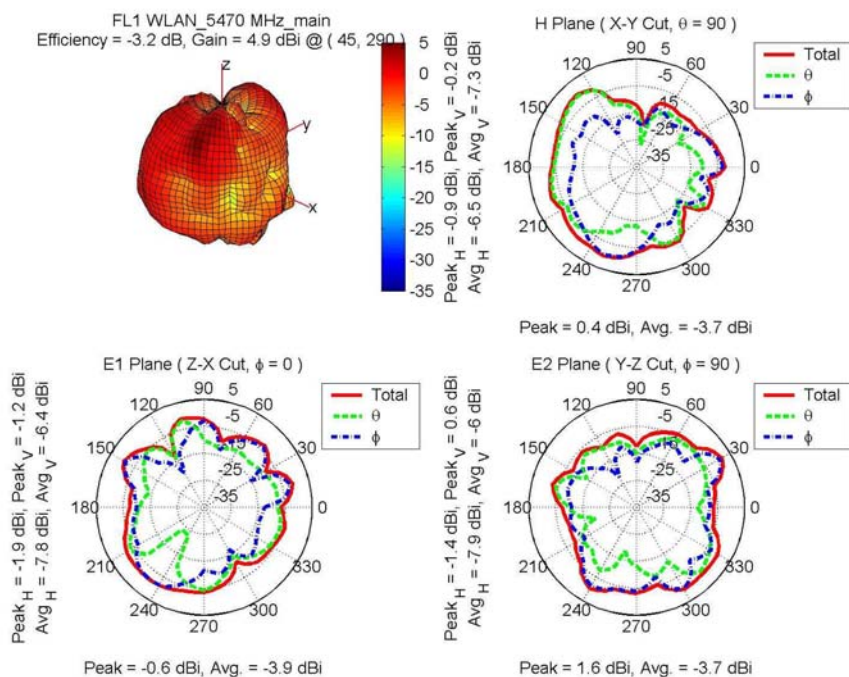
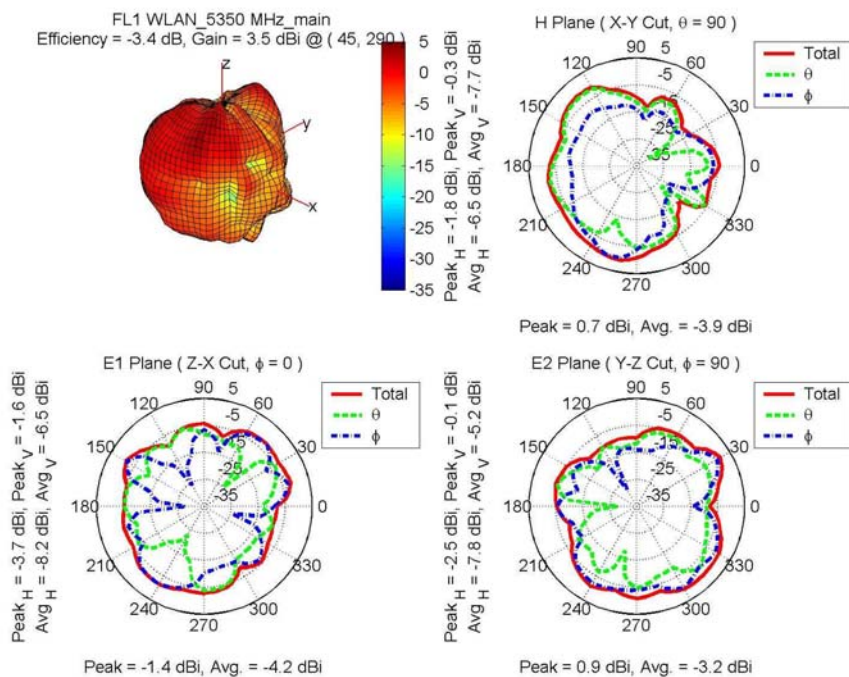
Following passive free space patterns are measured in the first and last frequency point for low and high frequency band, respectively. Each graph contains 3D pattern, 2D (H, E1, E2) patterns, efficiency, and peak gain.

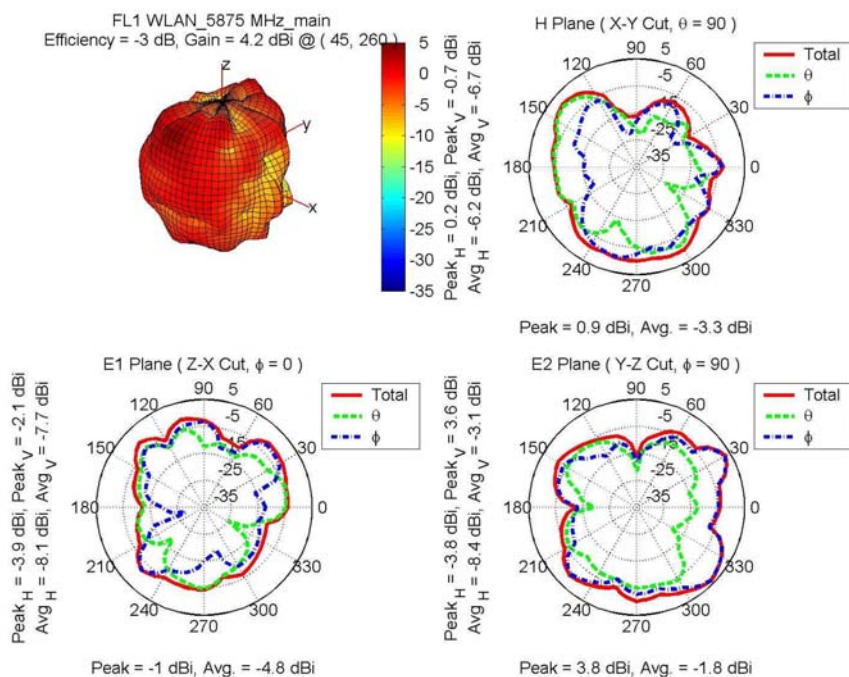
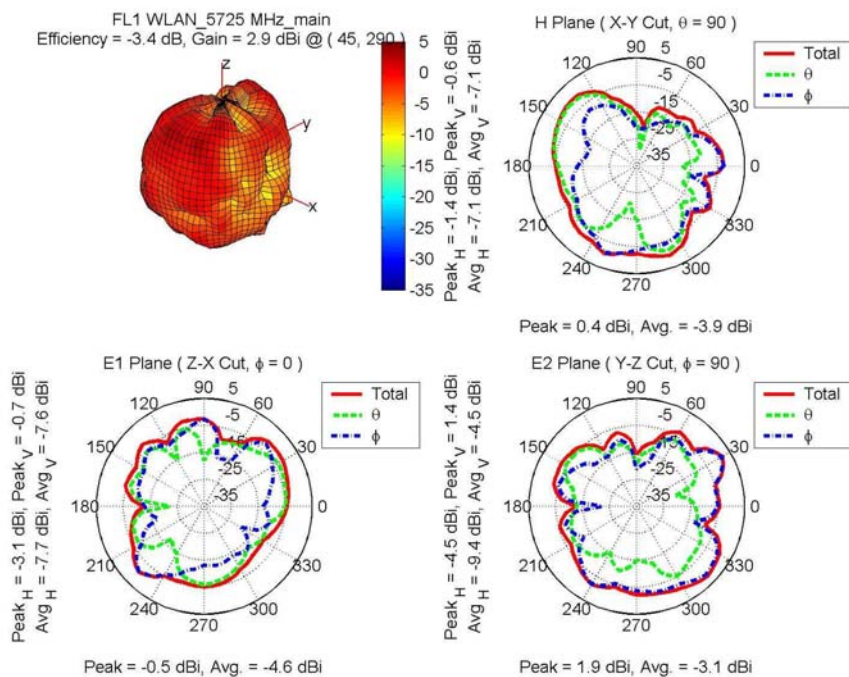
3D/2D patterns

WLAN Main antenna

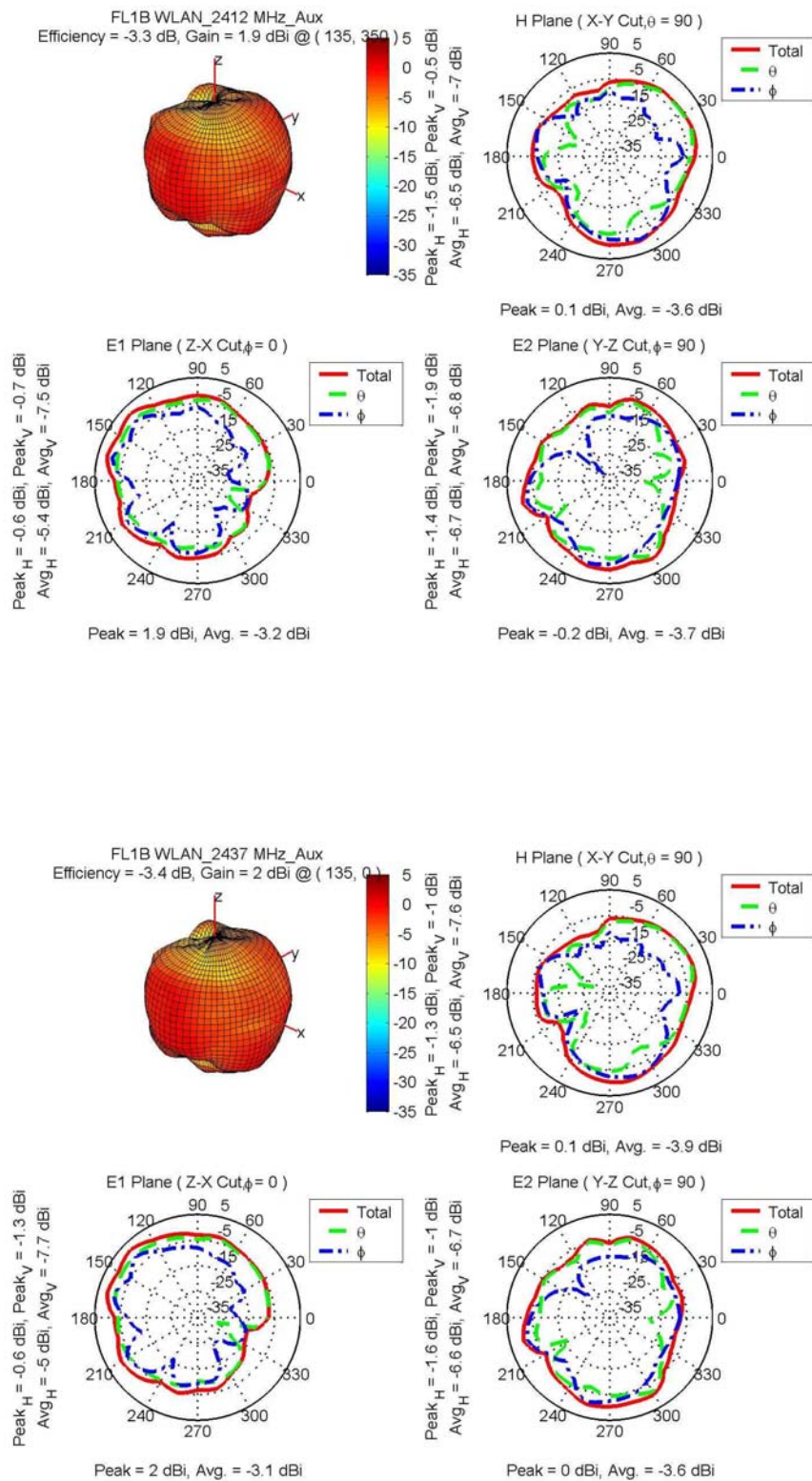


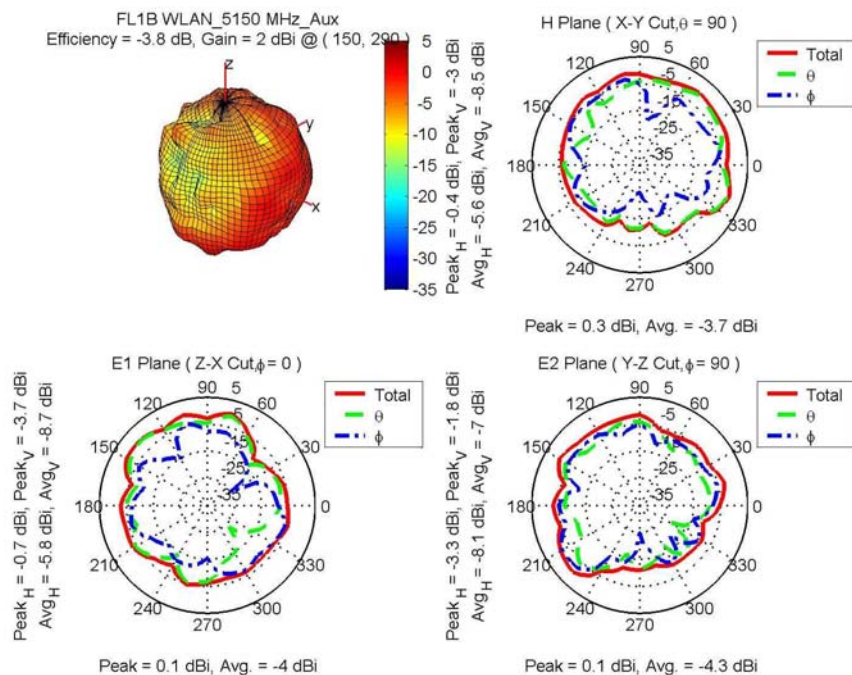
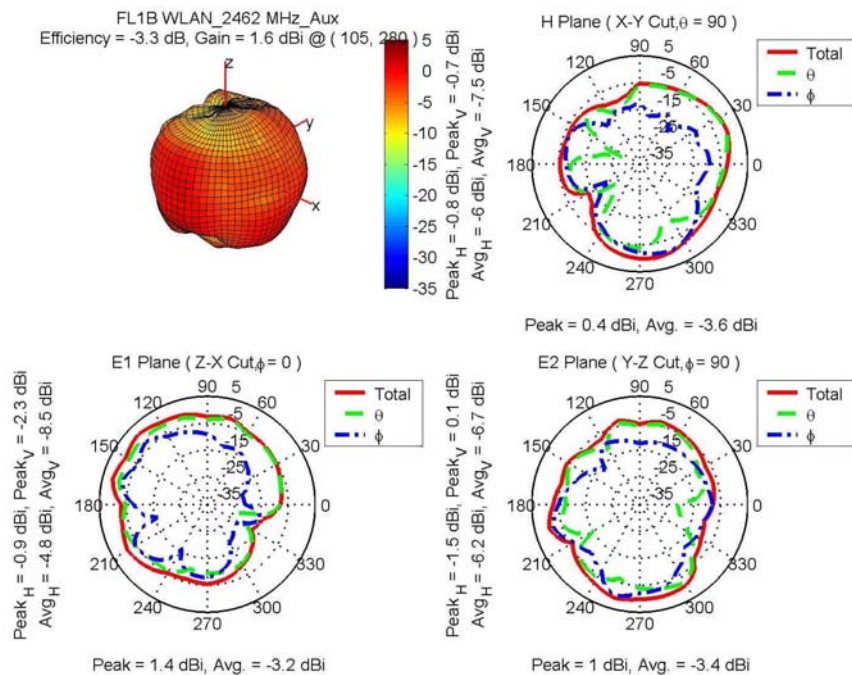


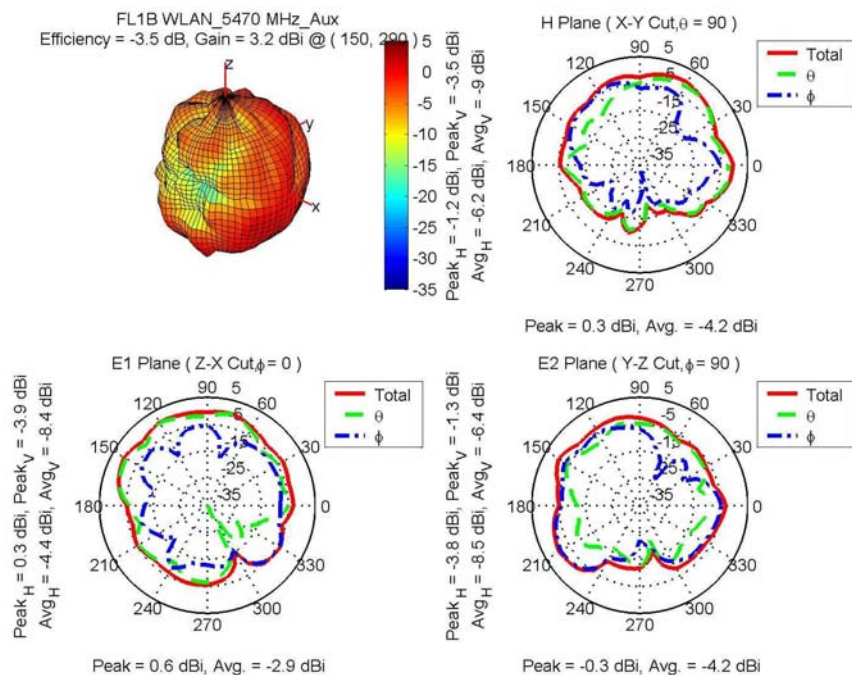
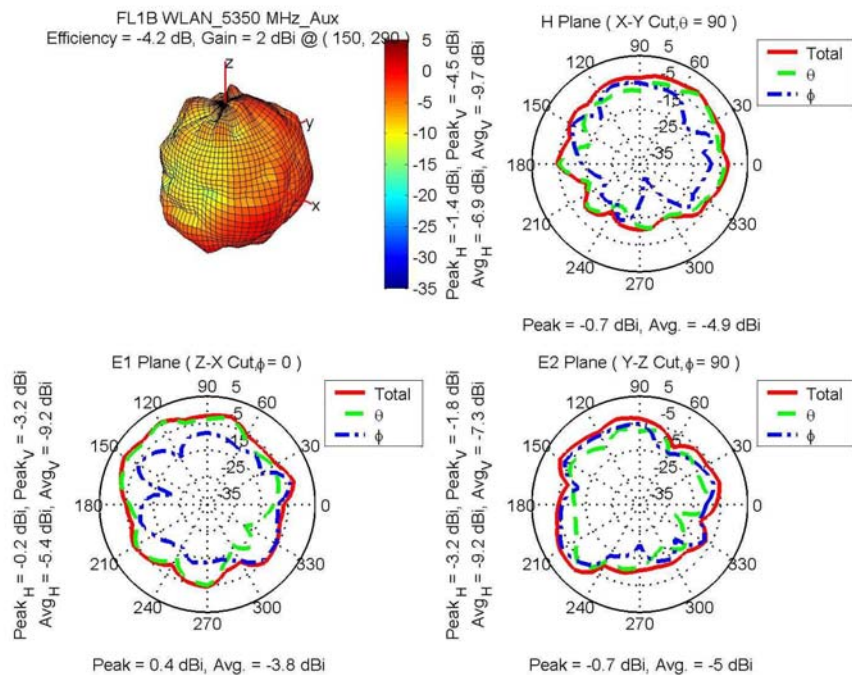


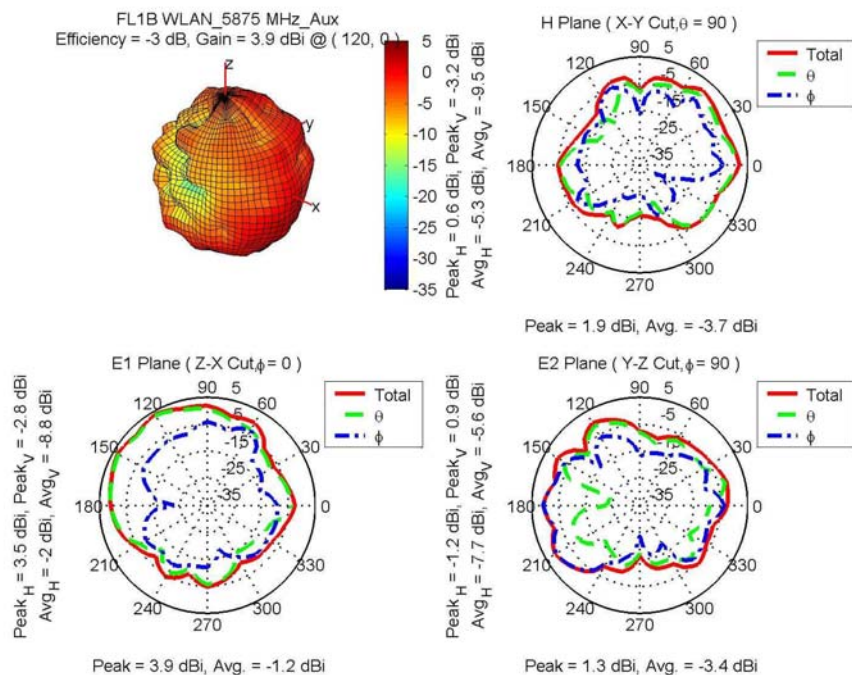
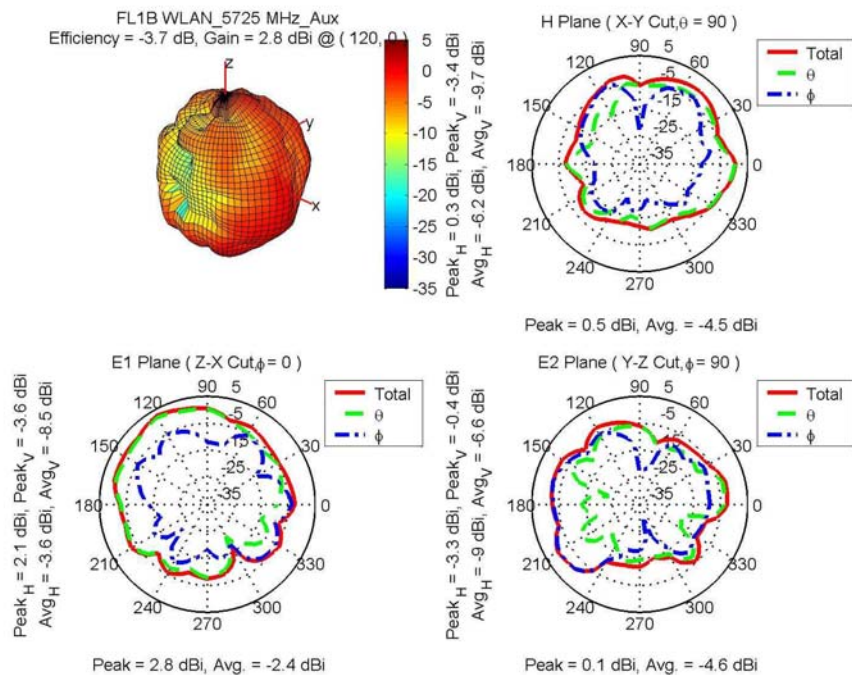


WLAN Aux antenna









4 Summary

WLAN antenna H-plane gain

Peak Gain Table

Frequency	2412MHz	2437MHz	2462MHz	5150MHz	5350MHz	5470MHz	5725MHz	5875MHz
Main	3.0	2.7	2.7	0.1	0.7	0.4	0.4	0.9
Aux	0.1	0.1	0.4	0.3	-0.7	0.3	0.5	1.9

Unit:dBi

Average Gain Table

Frequency	2412MHz	2437MHz	2462MHz	5150MHz	5350MHz	5470MHz	5725MHz	5875MHz
Main	-2.4	-2.3	-2.2	-3.2	-3.9	-3.7	-3.9	-3.3
Aux	-3.6	-3.9	-3.6	-3.7	-4.9	-4.2	-4.5	-3.7

Unit:dBi

In this antenna test report, all the antenna test condition is following to customer requirements. Two antennas were embedded in the top of the LCD which is 10.1-inch wide notebook PC. And the antennas were soldered with 392mm, 634mm, 70mm, 335mm, respectively; The four antennas 50Ohm RF coaxial cable with O.D is 1.13mm and 1.37mm. The WWAN and WLAN antenna measurement shows satisfying performance under present condition (antenna size / location / surrounding). The antenna impedance bandwidth and the 3D efficiency are beyond the specifications. The peak of each frequency point doesn't exceed the maximum gain limitation, also. The patterns show great spatial coverage, which reveals a robust communication capability for end-user in various use environments.