

FCC TEST REPORT

for

47 CFR, Part 15, Subpart C

Equipment : WLAN USB2.0 Pen-Type Adapter

Model No. : ZPlus-G250

FCC ID : RIW-ZWX-G250

Filing Type : Certification

Applicant : **ZINWELL CORPARATION**
2, Wen-Hua Road, Hsinchu Industrial Park, Hsinchu
Hsien 303, Taiwan, R.O.C.

- The test result refers exclusively to the test presented test model / sample.
- Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.
- **Certificate or Test Report must not be used by the applicant to claim the product in this test report endorsement by NVLAP or any agency of U.S. government.**

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

Table of Contents

History of this test report	ii
CERTIFICATE OF COMPLIANCE.....	1
1. General Description of Equipment under Test.....	2
1.1. Applicant.....	2
1.2 Manufacturer	2
1.3 Basic Description of Equipment under Test	2
1.4 Feature of Equipment under Test	3
2 Test Configuration of Equipment under Test.....	5
2.1 Test Manner	5
2.2 Description of Test System	5
2.3 Connection Diagram of Test System	7
3 Operation of Equipment under Test	8
4 General Information of Test.....	9
4.1 Test Voltage	9
4.2 Standard for Methods of Measurement.....	9
4.3 Test in Compliance with	9
4.4 Frequency Range Investigated	9
4.5 Test Distance	9
5 Report of Measurements and Examinations	10
5.1 List of Measurements and Examinations	10
5.2 6dB Bandwidth	11
5.3 Peak Output Power	12
5.4 Power Spectral Density	13
5.6 Test of Conducted Emission	14
5.7 Test of Radiated Emission	23
5.8 Band Edges Measurement.....	41
5.9 Antenna Requirements	43
6 Antenna Factor & Cable Loss	44
7 List of Measuring Equipments Used	45
8 Uncertainty of Test Site	46
Appendix A. Photographs of EUT.....	A1 ~ A7
Appendix B. Test pattern	B1 ~ B16

History of this test report

Original Report Issue Date: Nov. 07, 2003

☒ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

for

47 CFR, Part 15, Subpart C

Equipment : WLAN USB2.0 Pen-Type Adapter

Model No. : ZPlus-G250

FCC ID : RIW-ZWX-G250

Filing Type : Certification

Applicant : ZINWELL CORPORATION

2, Wen-Hua Road, Hsinchu Industrial Park, Hsinchu
Hsien 303, Taiwan, R.O.C.

I **HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 - 2001** and the equipment under test was **passed** all test items required in FCC Part 15 subpart C, relative to the equipment under test. Testing was carried out on Nov. 03, 2003 at **SPORTON International Inc. LAB.**



Joe Yang

Director

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

SPORTON International Inc.

TEL : 886-2-2696-2468

FAX : 886-2-2696-2255

FCC ID : RIW-ZWX-G250

Page No. : 1 of 46

Issued Date : Nov. 07, 2003

1. General Description of Equipment under Test

1.1. Applicant

ZINWELL CORPORATION

2, Wen-Hua Road, Hsinchu Industrial Park, Hsinchu Hsien 303, Taiwan, R.O.C.

1.2 Manufacturer

Same as 1.1

1.3 Basic Description of Equipment under Test

Equipment	: WLAN USB2.0 Pen-Type Adapter
Model No.	: ZPlus-G250
FCC ID.	: RIW-ZWX-G250
Trade Name	: ZINWELL
Power Supply Type	: From system
AC Power Input	: N/A

1.4 Feature of Equipment under Test

Product Feature & Specification				
1. Host/Radio Interface	USB 2.0 Type A			
2. Type of Modulation	802.11g OFDM (BPSK, QPSK, 16-QAM, 64-QAM) 802.11b DSSS (BPSK, QPSK, CCK)			
3. Number of Channels	USA/Canada: 11	V	European: 13	
	Japan: 13, 14		Other:	
4. Frequency Band	2400 MHz ~ 2483.5 MHz			
5. Carrier Frequency of each channel	2412 MHz + 5*N (N= 0~12)			
6. Bandwidth of each channel	802.11g: 20MHz 802.11b: 22MHz			
7. Maximum Output Power to Antenna	802.11g: 15.4 dBm 802.11b: 15.3 dBm			
8. IF & L.O. frequency	ZERO IF			
9. Type of Antenna Connector (Ex: SMA, TNC, MCX, MMCX, UFC.....etc)	IPEX			
10. Antenna Type / Class and Gain	-3 dBi External Antenna			
11. Function Type	Transmitter		Transceiver	V
12. Power Rating (DC/AC , Voltage)	5VDC ($\pm$ 0.5V), 500mA			
13. Duty Cycle	100 %			
14. Basic function of product	WLAN			

15. Temperature Range (Operating)	0°~55°C
16. Humidity	10% to 90%

2 Test Configuration of Equipment under Test

2.1 Test Manner

- a. The EUT has been associated with notebook and peripherals pursuant to ANSI C63.4-2001 and configuration operated in a manner, which tended to maximize its emission characteristics in a typical application.
- b. The complete test system included DELL NOTEBOOK, VIEWSONIC Monitor, LOGITECH USB Mouse, EPSON Printer and EUT for EMI test.
- c. The EUT can operate on eleven channels from 2412.0MHz to 2472.0MHz. (as listed in section 1.4). According to 15.31(m), three channels (one near top, one near middle and one near bottom) were performed as following:
- d. The following test modes were pretested for conduction test:
 - Mode 1: 802. 11b CH01 (2412MHz)
 - Mode 2: 802. 11b CH06 (2437MHz)
 - Mode 3: 802. 11b CH11 (2462MHz)
 - Mode 4: 802. 11g CH01 (2412MHz)
 - Mode 5: 802. 11g CH06 (2437MHz)
 - Mode 6: 802. 11g CH11 (2462MHz)
- f. The following test modes were pretested for radiation test:
 - Mode 1: 802. 11b CH01 (2412MHz)
 - Mode 2: 802. 11b CH06 (2437MHz)
 - Mode 3: 802. 11b CH11 (2462MHz)
 - Mode 4: 802. 11g CH01 (2412MHz)
 - Mode 5: 802. 11g CH06 (2437MHz)
 - Mode 6: 802. 11g CH11 (2462MHz)
- g. Frequency range investigated: conduction 150 KHz to 30 MHz, radiation 30 MHz to 24835MHz.

2.2 Description of Test System

Support Unit 1. – Notebook (Dell)

FCC ID	: QD5-BRCM1005-D
Model No.	: PP05L
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0037

Support Unit 2. -- Monitor (VIEWSONIC)

FCC ID : N/A
Model No. : VCDTS21553-3P
Power Supply Type : Switching
Power Cord : Non-Shielded
Serial No. : SP0052
Data Cable : Shielded, 1.7m
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

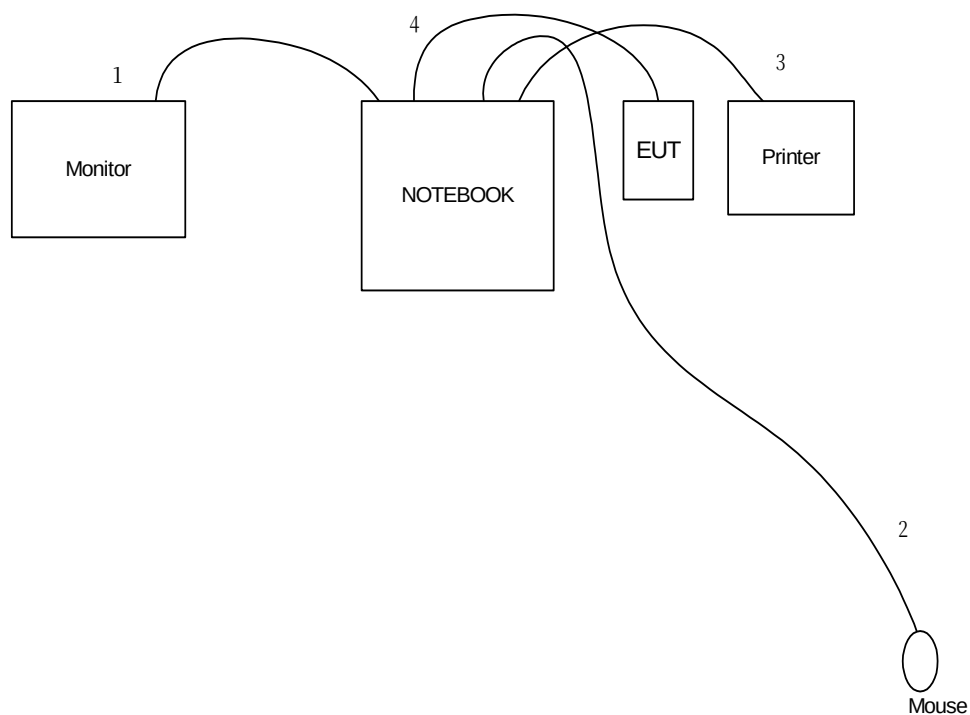
Support Unit 3. -- USB Mouse (LOGITECH)

FCC ID : N/A
Model No. : M-BE58
Serial No. : SP0041
Data Cable : Shielded, 1.7m
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 4. -- Printer (EPSON)

FCC ID : N/A
Model No. : STYLUS COLOR 680
Power Supply Type : Linear
Power Cord : Non-Shielded
Serial No. : SP0048
Data Cable : Shielded, 1.35m
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

2.3 Connection Diagram of Test System



1. The I/O cable is connected from NOTEBOOK to the support unit 2.
2. The I/O cable is connected from NOTEBOOK to the support unit 3.
3. The I/O cable is connected from NOTEBOOK to the support unit 4
4. The I/O cable is connected from NOTEBOOK to the EUT

3 Operation of Equipment under Test

An executive program, EMCTEST.EXE under WIN XP, which generates a complete line of continuously repeating "H" pattern was used as the test software.

The program was executed as follows:

- a. Turn on the power of all equipment.
- b. The PC reads the test program from the hard disk drive and runs it.
- c. The PC sends "H" messages to the monitor, and the monitor displays "H" patterns on the screen.
- d. The PC sends "H" messages to the printer, then the printer prints them on the paper.
- e. The PC sends "H" messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
- f. Repeat the steps from c to e.

At the same time, the following programs were executed:

RF Test Utility and one self test program to keep sending signals.

4 General Information of Test

Test Site Location : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park,
Kwei-Shan Hsiag, Tao Yuan Hsien, Taiwan, R.O.C.
TEL : 886-3-327-3456
FAX : 886-3-318-0055
Test Site No : CO01-HY, 03CH03-HY

4.1 Test Voltage

110V/ 60Hz

4.2 Standard for Methods of Measurement

ANSI C63.4-2001 for conducted power line test and radiated emission test,
"Guidance on Measurements for Direct Sequence Spread Spectrum Systems" for test of 6dB Bandwidth
"Guidance on Measurements for Direct Sequence Spread Spectrum Systems" for test of Maximum Peak Output Power
"Guidance on Measurements for Direct Sequence Spread Spectrum Systems" for test of 100kHz Bandwidth of Frequency Band Edges
"Guidance on Measurements for Direct Sequence Spread Spectrum Systems" for test of Power Spectral Density

4.3 Test in Compliance with

FCC Part 15, Subpart C

4.4 Frequency Range Investigated

- a. Conduction: from 150 kHz to 30 MHz
- b. Radiation: from 30 MHz to 24835MHz

4.5 Test Distance

The test distance of radiated emission from antenna to EUT is 3 M.

5 Report of Measurements and Examinations

5.1 List of Measurements and Examinations

FCC Rule	Description of Test	Result
15.207	Conducted Emission	Pass
<u>15.247(a)(2)</u>	6dB Bandwidth	Pass
<u>15.247(b)</u>	Maximum Peak Output Power	Pass
15.209	Radiated Emission	Pass
<u>15.247(c)</u>	100kHz Bandwidth of Frequency Band Edges	Pass
<u>15.247(d)</u>	Power Spectral Density	Pass
<u>15.203</u>	Antenna Requirement	Pass
1.1307 1.1310 2.1091 2.1093	RF Exposure Compliance	Pass

5.2 6dB Bandwidth

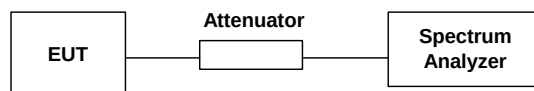
5.2.1 Measuring Instruments :

As described in chapter 7 of this test report.

5.2.2 Test Procedure :

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 100KHz and VBW to 100KHz.
3. The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.

5.2.3 Test Setup Layout :



5.2.4 Test Result : The spectrum analyzer plots are attached as below

- Temperature : 24 °C
- Relative Humidity : 72%

- **Mode 1~3 (802.11b)**

Channel	Frequency (MHz)	6dB Emission bandwidth (MHz)	Limits (MHz)	Plot Ref. No.
01	2412	11.44	0.5	1
06	2437	11.2	0.5	2
11	2462	11.44	0.5	3

- **Mode4~6 (802.11g)**

Channel	Frequency (MHz)	6dB Emission bandwidth (MHz)	Limits (MHz)	Plot Ref. No.
01	2412	16.64	0.5	4
06	2437	17.3	0.5	5
11	2462	16.6	0.5	6

5.3 Peak Output Power

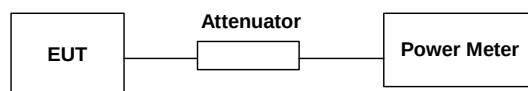
5.3.1 Measuring Instruments :

As described in chapter 7 of this test report.

5.3.2 Test Procedure :

The antenna port (RF output) of the EUT was connected to the input (RF input) of a power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

5.3.3 Test Setup Layout :



5.3.4 Test Result : See spectrum analyzer plots below

- Temperature : 24°C
- Relative Humidity : 72 %
- Antenna Gain: 0 dBi

- **Mode 1~3 (802.11b)**

Channel	Frequency (MHz)	Measured Output Power (mWatt)	Measured Output Power (dBm)	Limits (Watt/dBm)
01	2412	32.58	15.13	1W/30 dBm
06	2437	33.88	15.3	1W/30 dBm
11	2462	33.88	15.3	1W/30 dBm

- **Mode 4~6 (802.11g)**

Channel	Frequency (MHz)	Measured Output Power (mWatt)	Measured Output Power (dBm)	Limits (Watt/dBm)
01	2412	33.11	15.22	1W/30 dBm
06	2437	34.67	15.4	1W/30 dBm
11	2462	34.67	15.4	1W/30 dBm

- Comments : Maximum Peak Output Power < 30dBm (1Watt)

5.4 Power Spectral Density

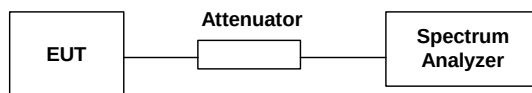
5.4.1 Measuring Instruments :

As described in chapter 7 of this test report.

5.4.2 Test Procedure :

1. The transmitter output was connected to spectrum analyzer through an attenuator.
2. The spectrum analyzer's resolution bandwidth were set at 3KHz RBW and 30KHz VBW as that of the fundamental frequency. Set the sweep time=span/3KHz.
3. The power spectral density was measured and recorded.
4. The sweep time is allowed to be longer than span/3KHz for a full response of the mixer in the spectrum analyzer.

5.4.3 Test Setup Layout :



5.4.4 Test Result : See spectrum analyzer plots below

- Mode 1~3: 802.11b . Temperature : 24°C, Relative Humidity : 72%

Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limits (dBm)	Plot Ref. No.
01	2412	-2.43	8	7
06	2437	-0.13	8	8
11	2462	0.24	8	9

- Mode 4~6: 802.11g. Temperature : 24°C, Relative Humidity : 72%

Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limits (dBm)	Plot Ref. No.
01	2412	-13.56	8	10
06	2437	-13.60	8	11
11	2462	-13.48	8	12

5.6 Test of Conducted Emission

Conducted Emissions were measured from 150 KHz to 30 MHz with a bandwidth of 9 KHz and return leads of the EUT according to the methods defined in ANSI C63.4-2001 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

5.6.5 Major Measuring Instruments :

● Test Receiver	(R&S ESCS 30)
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

5.6.6 Test Procedures :

- a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. All the support units are connect to the other LISN.
- d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- e. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- f. Both sides of AC line were checked for maximum conducted interference.
- g. The frequency range from 150 KHz to 30 MHz was searched.
- h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.6.7 Test Result of Conducted Emission :

Frequency Range of Test : from 150KHz to 30 MHz. 6dB Bandwidth : 9KHz

- Test Mode : Mode 1
- Temperature : 24°C
- Relative Humidity : 53 %

■ The test was passed at the minimum margin that marked by the frame in the following table

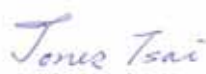
Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 NEUTRAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 Model : ZPlus-G250
 Memo : WLAN 802.11b TX Ch01

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.152	50.29	-15.60	65.89	50.14	0.10	0.05	QP
2	0.152	30.42	-25.47	55.89	30.27	0.10	0.05	Average
3	0.161	48.50	-16.91	65.41	48.35	0.10	0.05	QP
4	0.161	29.50	-25.91	55.41	29.35	0.10	0.05	Average
5	0.168	47.48	-17.58	65.06	47.33	0.10	0.05	QP
6	0.168	29.08	-25.98	55.06	28.93	0.10	0.05	Average
7	0.179	47.45	-17.08	64.53	47.30	0.10	0.05	QP
8	0.179	29.48	-25.05	54.53	29.33	0.10	0.05	Average
9	0.209	44.20	-19.04	63.24	44.04	0.10	0.06	QP
10	0.209	24.99	-28.25	53.24	24.83	0.10	0.06	Average
11	0.221	42.02	-20.76	62.78	41.85	0.10	0.07	QP
12	0.221	8.18	-44.60	52.78	8.01	0.10	0.07	Average

Condition : CNS/VCCI/CISPR-B 2003 2001/008 LINE
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 Model : ZPlus-G250
 Memo : WLAN 802.11b TX Ch01

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.154	52.82	-12.96	65.78	52.67	0.10	0.05	QP
2	0.154	33.95	-21.83	55.78	33.80	0.10	0.05	Average
3	0.154	52.60	-13.18	65.78	52.45	0.10	0.05	QP
4	0.154	33.71	-22.07	55.78	33.56	0.10	0.05	Average
5	0.167	50.40	-14.71	65.11	50.25	0.10	0.05	QP
6	0.167	30.55	-24.56	55.11	30.40	0.10	0.05	Average
7	0.176	50.82	-13.85	64.67	50.67	0.10	0.05	QP
8	0.176	34.24	-20.43	54.67	34.09	0.10	0.05	Average
9	0.201	48.02	-15.55	63.57	47.87	0.10	0.05	QP
10	0.201	27.05	-26.52	53.57	26.90	0.10	0.05	Average
11	0.207	47.49	-15.83	63.32	47.33	0.10	0.06	QP
12	0.207	28.67	-24.65	53.32	28.51	0.10	0.06	Average

Test Engineer :



Jones Tsai

5.6.8 Test Result of Conducted Emission :

- Frequency Range of Test : from 150KHz to 30 MHz. 6dB Bandwidth : 9KHz
- Test Mode : Mode 2
- Temperature : 24°C
- Relative Humidity :53 %

■ The test was passed at the minimum margin that marked by the frame in the following table

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 LINE
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 Model : ZPlus-G250
 Memo : WLAN 802.11b TX Ch06

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.152	48.42	-17.47	65.89	48.27	0.10	0.05	QP
2	0.152	28.66	-27.23	55.89	28.51	0.10	0.05	Average
3	0.159	46.93	-18.59	65.52	46.78	0.10	0.05	QP
4	0.159	28.66	-26.86	55.52	28.51	0.10	0.05	Average
5	0.176	46.50	-18.17	64.67	46.35	0.10	0.05	QP
6	0.176	30.10	-24.57	54.67	29.95	0.10	0.05	Average
7	0.207	43.46	-19.86	63.32	43.30	0.10	0.06	QP
8	0.207	24.78	-28.54	53.32	24.62	0.10	0.06	Average
9	0.213	41.98	-21.11	63.09	41.82	0.10	0.06	QP
10	0.213	22.07	-31.02	53.09	21.91	0.10	0.06	Average
11	0.230	39.94	-22.51	62.45	39.77	0.10	0.07	QP
12	0.230	22.47	-29.98	52.45	22.30	0.10	0.07	Average
13	0.243	34.61	-27.38	61.99	34.43	0.10	0.08	QP
14	0.243	14.66	-37.33	51.99	14.48	0.10	0.08	Average

Condition : CNS/VCCI/CISPR-B 2003 2001/008 NEUTRAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 Model : ZPlus-G250
 Memo : WLAN 802.11b TX Ch06

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.154	47.42	-18.36	65.78	47.27	0.10	0.05	QP
2	0.154	29.26	-26.52	55.78	29.11	0.10	0.05	Average
3	0.156	46.87	-18.80	65.67	46.72	0.10	0.05	QP
4	0.156	29.34	-26.33	55.67	29.19	0.10	0.05	Average
5	0.169	45.25	-19.76	65.01	45.10	0.10	0.05	QP
6	0.169	27.18	-27.83	55.01	27.03	0.10	0.05	Average
7	0.174	45.49	-19.28	64.77	45.34	0.10	0.05	QP
8	0.174	29.72	-25.05	54.77	29.57	0.10	0.05	Average
9	0.180	44.82	-19.67	64.49	44.67	0.10	0.05	QP
10	0.180	26.47	-28.02	54.49	26.32	0.10	0.05	Average
11	0.202	43.33	-20.20	63.53	43.18	0.10	0.05	QP
12	0.202	22.92	-30.61	53.53	22.77	0.10	0.05	Average

Test Engineer : 

Jones Tsai

SPORTON International Inc.

TEL : 886-2-2696-2468

FAX : 886-2-2696-2255

FCC ID : RIW-ZWX-G250

Page No. : 16 of 46

Issued Date : Nov. 07, 2003

5.6.9 Test Result of Conducted Emission :

- Frequency Range of Test : from 150KHz to 30 MHz. 6dB Bandwidth : 9KHz
- Test Mode : Mode 3
- Temperature : 24°C
- Relative Humidity : 53 %

■ The test was passed at the minimum margin that marked by the frame in the following table

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 LINE
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 Model : ZPlus-G250
 Memo : WLAN 802.11b TX Ch11

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.159	27.25	-28.27	55.52	27.10	0.10	0.05	Average
2	0.159	45.07	-20.45	65.52	44.92	0.10	0.05	QP
3	0.162	44.58	-20.78	65.36	44.43	0.10	0.05	QP
4	0.162	26.33	-29.03	55.36	26.18	0.10	0.05	Average
5	0.177	44.78	-19.85	64.63	44.63	0.10	0.05	QP
6	0.177	28.09	-26.54	54.63	27.94	0.10	0.05	Average
7	0.203	22.31	-31.18	53.49	22.16	0.10	0.05	Average
8	0.203	42.52	-20.97	63.49	42.37	0.10	0.05	QP
9	0.216	39.89	-23.08	62.97	39.73	0.10	0.06	QP
10	0.216	20.17	-32.80	52.97	20.01	0.10	0.06	Average
11	0.232	38.87	-23.51	62.38	38.70	0.10	0.07	QP
12	0.232	22.15	-30.23	52.38	21.98	0.10	0.07	Average

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 NEUTRAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 Model : ZPlus-G250
 Memo : WLAN 802.11b TX Ch11

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.153	46.40	-19.44	65.84	46.25	0.10	0.05	QP
2	0.153	27.84	-28.00	55.84	27.69	0.10	0.05	Average
3	0.161	44.86	-20.55	65.41	44.71	0.10	0.05	QP
4	0.161	26.33	-29.08	55.41	26.18	0.10	0.05	Average
5	0.172	44.22	-20.64	64.86	44.07	0.10	0.05	QP
6	0.172	27.77	-27.09	54.86	27.62	0.10	0.05	Average
7	0.203	42.46	-21.03	63.49	42.31	0.10	0.05	QP
8	0.203	22.48	-31.01	53.49	22.33	0.10	0.05	Average
9	0.220	39.31	-23.51	62.82	39.15	0.10	0.06	QP
10	0.220	18.34	-34.48	52.82	18.18	0.10	0.06	Average
11	0.243	32.99	-29.00	61.99	32.81	0.10	0.08	QP
12	0.243	13.06	-38.93	51.99	12.88	0.10	0.08	Average

Test Engineer :

Jones Tsai

Jones Tsai

5.6.10 Test Result of Conducted Emission :

Frequency Range of Test : from 150KHz to 30 MHz. 6dB Bandwidth : 9KHz

- Test Mode : Mode 4
- Temperature : 24°C
- Relative Humidity : 53 %

■ The test was passed at the minimum margin that marked by the frame in the following table

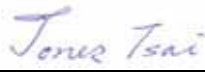
Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 LINE
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 Model : ZPlus-G250
 Memo : WLAN 802.11g TX Ch01

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.177	46.60	-18.03	64.63	46.45	0.10	0.05	QP
2	0.177	28.63	-26.00	54.63	28.48	0.10	0.05	Average
3	0.187	45.79	-18.38	64.17	45.64	0.10	0.05	QP
4	0.187	28.89	-25.28	54.17	28.74	0.10	0.05	Average
5	0.209	37.03	-26.21	63.24	36.87	0.10	0.06	QP
6	0.209	15.02	-38.22	53.24	14.86	0.10	0.06	Average
7	0.239	34.21	-27.92	62.13	34.03	0.10	0.08	QP
8	0.239	11.86	-40.27	52.13	11.68	0.10	0.08	Average
9	0.266	33.49	-27.75	61.24	33.30	0.10	0.09	QP
10	0.266	21.86	-29.38	51.24	21.67	0.10	0.09	Average
11	1.440	31.24	-24.76	56.00	31.07	0.10	0.07	QP
12	1.440	18.48	-27.52	46.00	18.31	0.10	0.07	Average

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 NEUTRAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 Model : ZPlus-G250
 Memo : WLAN 802.11g TX Ch01

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.185	45.65	-18.61	64.26	45.50	0.10	0.05	QP
2	0.185	34.23	-20.03	54.26	34.08	0.10	0.05	Average
3	0.185	45.65	-18.61	64.26	45.50	0.10	0.05	QP
4	0.185	29.93	-24.33	54.26	29.78	0.10	0.05	Average
5	0.200	37.54	-26.07	63.61	37.39	0.10	0.05	QP
6	0.200	14.83	-38.78	53.61	14.68	0.10	0.05	Average
7	0.226	34.03	-28.57	62.60	33.86	0.10	0.07	QP
8	0.226	12.68	-39.92	52.60	12.51	0.10	0.07	Average
9	0.259	33.52	-27.94	61.46	33.33	0.10	0.09	QP
10	0.259	14.94	-36.52	51.46	14.75	0.10	0.09	Average
11	0.285	32.30	-28.37	60.67	32.10	0.10	0.10	QP
12	0.285	18.33	-32.34	50.67	18.13	0.10	0.10	Average

Test Engineer :



Jones Tsai

5.6.11 Test Result of Conducted Emission :

- Frequency Range of Test : from 150KHz to 30 MHz. 6dB Bandwidth : 9KHz
- Test Mode : Mode 5
- Temperature : 24°C
- Relative Humidity : 53 %

■ The test was passed at the minimum margin that marked by the frame in the following table

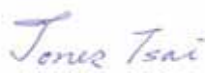
Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 LINE
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 Model : ZPlus-G250
 Memo : WLAN 802.11g TX Ch06

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.165	18.67	-36.54	55.21	18.52	0.10	0.05	Average
2	0.165	40.54	-24.67	65.21	40.39	0.10	0.05	QP
3	0.185	29.70	-24.56	54.26	29.55	0.10	0.05	Average
4	0.185	45.82	-18.44	64.26	45.67	0.10	0.05	QP
5	0.185	45.73	-18.53	64.26	45.58	0.10	0.05	QP
6	0.185	30.00	-24.26	54.26	29.85	0.10	0.05	Average
7	0.227	34.63	-27.93	62.56	34.46	0.10	0.07	QP
8	0.227	12.43	-40.13	52.56	12.26	0.10	0.07	Average
9	0.260	30.69	-30.74	61.43	30.50	0.10	0.09	QP
10	0.260	10.92	-40.51	51.43	10.73	0.10	0.09	Average
11	1.440	31.20	-24.80	56.00	31.03	0.10	0.07	QP
12	1.440	19.45	-26.55	46.00	19.28	0.10	0.07	Average

Condition : CNS/VCCI/CISPR-B 2003 2001/008 NEUTRAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 Model : ZPlus-G250
 Memo : WLAN 802.11gTX Ch06

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.154	41.61	-24.17	65.78	41.46	0.10	0.05	QP
2	0.154	19.78	-36.00	55.78	19.63	0.10	0.05	Average
3	0.164	18.96	-36.30	55.26	18.81	0.10	0.05	Average
4	0.164	40.26	-25.00	65.26	40.11	0.10	0.05	QP
5	0.182	46.03	-18.36	64.39	45.88	0.10	0.05	QP
6	0.182	30.10	-24.29	54.39	29.95	0.10	0.05	Average
7	0.187	45.88	-18.29	64.17	45.73	0.10	0.05	QP
8	0.187	29.06	-25.11	54.17	28.91	0.10	0.05	Average
9	0.237	34.38	-27.82	62.20	34.21	0.10	0.07	QP
10	0.237	12.05	-40.15	52.20	11.88	0.10	0.07	Average
11	0.266	32.97	-28.27	61.24	32.78	0.10	0.09	QP
12	0.266	16.91	-34.33	51.24	16.72	0.10	0.09	Average
13	1.560	29.67	-26.33	56.00	29.51	0.10	0.06	QP
14	1.560	18.35	-27.65	46.00	18.19	0.10	0.06	Average

Test Engineer :



Jones Tsai

5.6.12 Test Result of Conducted Emission :

- Frequency Range of Test : from 150KHz to 30 MHz. 6dB Bandwidth : 9KHz
- Test Mode : Mode 6
- Temperature : 24°C
- Relative Humidity : 53 %

■ The test was passed at the minimum margin that marked by the frame in the following table

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 LINE
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 Model : ZPlus-G250
 Memo : WLAN 802.11g TX Ch11

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.172	42.70	-22.16	64.86	42.55	0.10	0.05	QP
2	0.172	23.62	-31.24	54.86	23.47	0.10	0.05	Average
3	0.185	45.77	-18.49	64.26	45.62	0.10	0.05	QP
4	0.185	29.85	-24.41	54.26	29.70	0.10	0.05	Average
5	0.212	36.63	-26.50	63.13	36.47	0.10	0.06	QP
6	0.212	13.53	-39.60	53.13	13.37	0.10	0.06	Average
7	0.280	33.31	-27.51	60.82	33.11	0.10	0.10	QP
8	0.280	20.28	-30.54	50.82	20.08	0.10	0.10	Average
9	0.320	24.35	-35.36	59.71	24.13	0.10	0.12	QP
10	0.320	6.99	-42.72	49.71	6.77	0.10	0.12	Average
11	1.640	30.71	-25.29	56.00	30.56	0.10	0.05	QP
12	1.640	20.80	-25.20	46.00	20.65	0.10	0.05	Average

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 NEUTRAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 Model : ZPlus-G250
 Memo : WLAN 802.11g TX Ch11

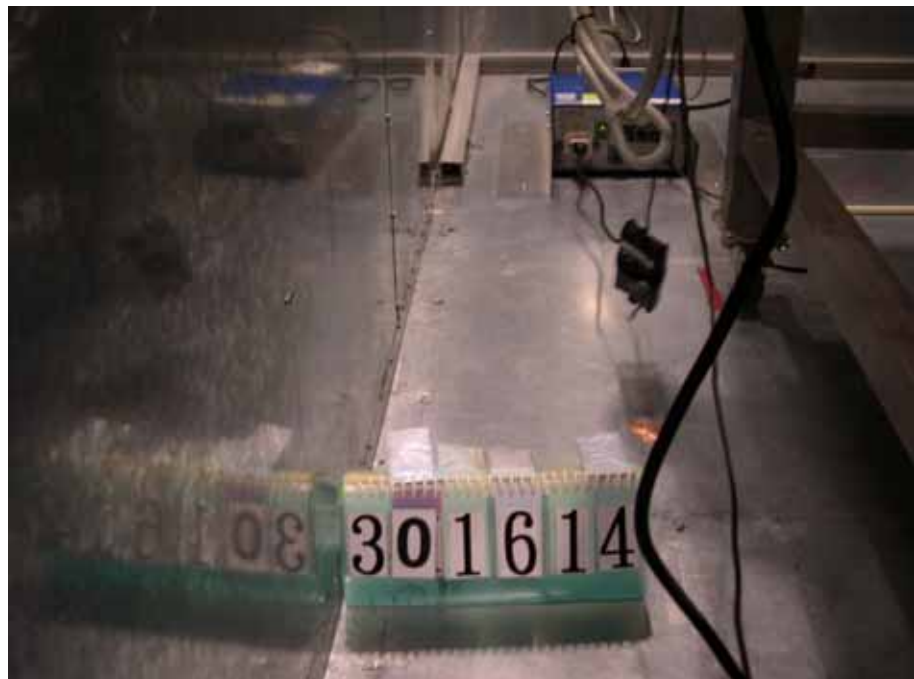
	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.165	39.96	-25.25	65.21	39.81	0.10	0.05	QP
2	0.165	19.45	-35.76	55.21	19.30	0.10	0.05	Average
3	0.176	46.94	-17.73	64.67	46.79	0.10	0.05	QP
4	0.176	28.00	-26.67	54.67	27.85	0.10	0.05	Average
5	0.191	45.15	-18.84	63.99	45.00	0.10	0.05	QP
6	0.191	26.35	-27.64	53.99	26.20	0.10	0.05	Average
7	0.217	35.42	-27.51	62.93	35.26	0.10	0.06	QP
8	0.217	13.57	-39.36	52.93	13.41	0.10	0.06	Average
9	0.223	34.50	-28.21	62.71	34.33	0.10	0.07	QP
10	0.223	12.63	-40.08	52.71	12.46	0.10	0.07	Average
11	1.230	28.58	-27.42	56.00	28.39	0.10	0.09	QP
12	1.230	16.58	-29.42	46.00	16.39	0.10	0.09	Average

Test Engineer : 

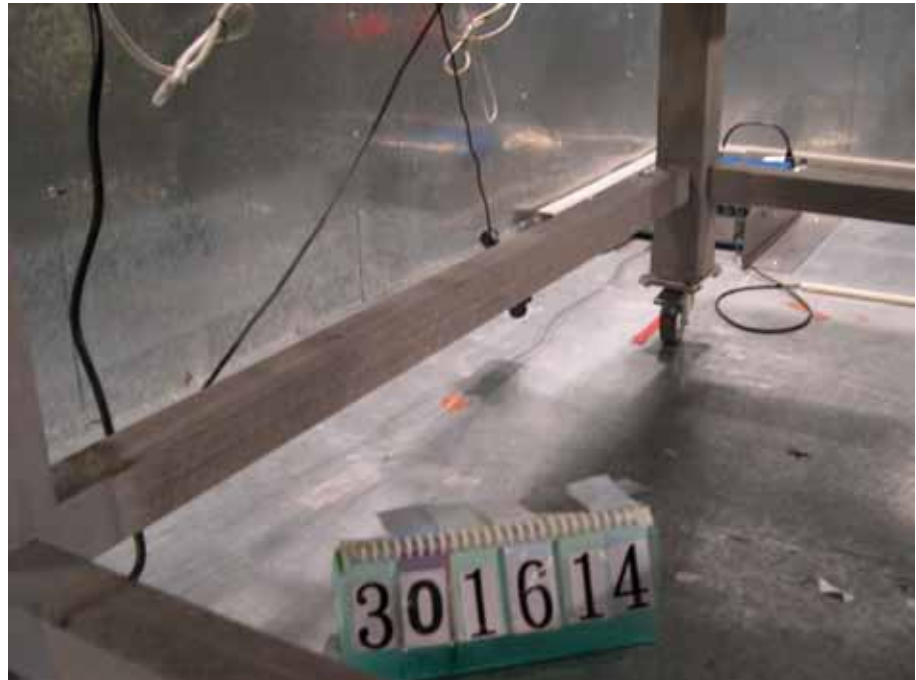
Jones Tsai

5.6.13 Photographs of Conducted Emission Test Configuration

- The photographs show the configuration that generates the maximum emission.

FRONT VIEW**REAR VIEW**

SIDE VIEW



5.7 Test of Radiated Emission

Radiated emissions from 30 MHz to 24.835 GHz were measured according to the methods defines in ANSI C63.4-2001. The EUT was placed, 0.8 meter above the ground plane, as shown in section 5.6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions

5.7.5 Major Measuring Instruments

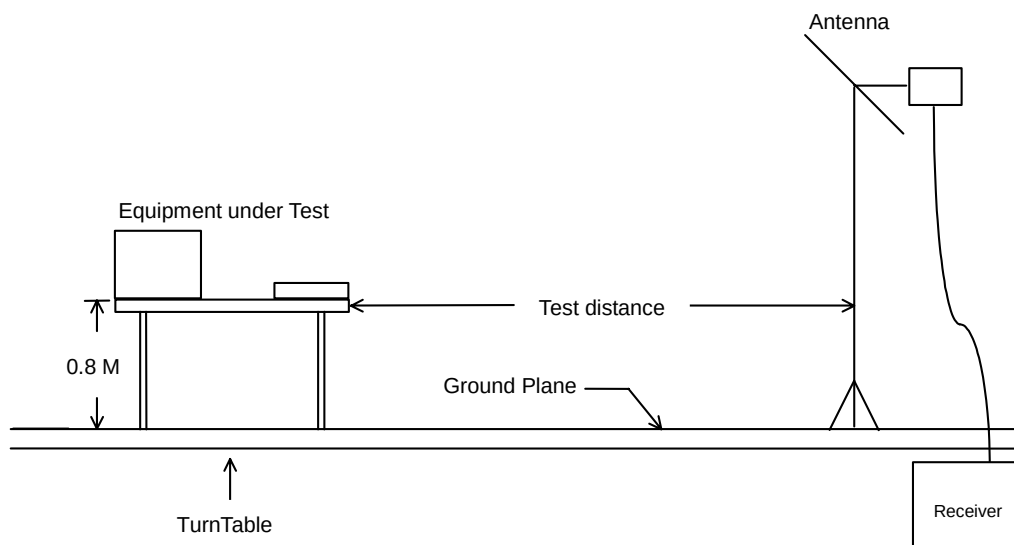
- Amplifier (MITEQ AFS44)
 - RF Gain 40 dB
 - Signal Input 100 MHz to 26.5 GHz

- Spectrum analyzer (R&S FSP40)
 - Attenuation 10 dB
 - Start Frequency 1 GHz
 - Stop Frequency 25 GHz
 - Resolution Bandwidth 1 MHz
 - Video Bandwidth 1 MHz
 - Signal Input 9 KHz to 40 GHz

5.7.6 Test Procedures

- A. The EUT was placed on a rotatable table top 0.8 meter above ground.
- B. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- C. The table was rotated 360 degrees to determine the position of the highest radiation.
- D. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- E. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- F. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- G. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
- H. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

5.7.7 Typical Test Setup Layout of Radiated Emission



5.7.8 Test Result of Radiated Emission

- Test Mode: Mode 1 (2412MHz)
- Test Distance : 3 M
- Temperature : 24 °C
- Relative Humidity :53 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

■ The test was passed at the minimum margin that marked by the frame in the following table

■ Spurious Emission

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 MODEL : ZPlus-G250
 MEMO : WLAN 11b Tx CH1 2412MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	44.850	38.68	-1.32	40.00	55.84	8.68	1.26	27.10	Peak	100	175
2	44.850	28.85	-11.15	40.00	46.01	8.68	1.26	27.10	QP	---	---

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 MODEL : ZPlus-G250
 MEMO : WLAN 11b Tx CH1 2412MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	176.610	39.01	-4.49	43.50	56.03	7.55	2.12	26.69	Peak	100	192
2	176.880	35.31	-8.19	43.50	52.32	7.56	2.12	26.69	Peak	---	---

➤ For 177MHz ~ 24.835GHz

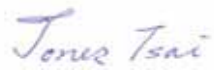
Remark: Frequency from 177MHz to 24835MHz, the emission emitted by the EUT is too low to be measured

■ Field strength of fundamental and harmonics

Frequency	Antenna	Cable	Reading	Limits	Emission	Level	Margin	Detect		
Polarity	Factor	Loss								
(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)	(dB)	Mode	
2412.000	V	28.24	6.02	59.50	-	-	93.76	48752.85	-	Peak
2412.000	V	28.24	6.02	53.77	-	-	88.03	25205.77	-	AV
2414.000	H	28.25	6.02	55.84	-	-	90.11	32025.80	-	Peak
2414.000	H	28.25	6.02	53.77	-	-	88.04	25234.81	-	AV
4822.000	V/H									AV/Peak
7236.000	V/H						-			AV/Peak
9648.000	V/H						-			AV/Peak
12060.000	V/H						-			AV/Peak
14472.000	V/H						-			AV/Peak
16884.000	V/H						-			AV/Peak
19296.000	V/H						-			AV/Peak
21708.000	V/H						-			AV/Peak
24120.000	V/H						-			AV/Peak

Remark: The emission emitted by the EUT is too low to be measured except the emission listed above,

Test Engineer :



Jones Tsai

5.7.9 Test Result of Radiated Emission

- Test Mode: Mode 2 (2437 MHz)
- Test Distance : 3 M
- Temperature : 24 °C
- Relative Humidity : 53 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

■ The test was passed at the minimum margin that marked by the frame in the following table

■ Spurious Emission

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 MODEL : ZPlus-G250
 MEMO : WLAN 11b Tx CH6 2437MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	32.700	33.93	-6.07	40.00	46.06	13.94	1.03	27.10	Peak	---	---
2 !	34.860	34.05	-5.95	40.00	47.09	13.02	1.04	27.10	Peak	---	---
3 !	53.220	34.18	-5.82	40.00	53.82	6.05	1.40	27.09	Peak	---	---
4	240.060	31.56	-14.44	46.00	44.69	10.92	2.55	26.60	Peak	---	---
1	478.500	35.56	-10.44	46.00	43.71	15.74	3.70	27.59	Peak	---	---

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 MODEL : ZPlus-G250
 MEMO : WLAN 11b Tx CH6 2437MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	240.060	41.24	-4.76	46.00	54.37	10.92	2.55	26.60	Peak	---	---
2	240.060	18.51	-27.49	46.00	31.64	10.92	2.55	26.60	QP	---	---
1 !	478.500	42.39	-3.61	46.00	50.54	15.74	3.70	27.59	Peak	103	170
2	478.500	28.46	-17.54	46.00	36.61	15.74	3.70	27.59	QP	---	---

➤ For 479MHz ~ 24.850GHz

Remark: Frequency from 479MHz to 24850MHz, the emission emitted by the EUT is too low to be measured

FCC TEST REPORT

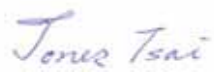
Report No. : F301614

■ Field strength of fundamental and harmonics

Frequency	Antenna	Cable	Reading	Limits	Emission	Level	Margin	Detect		
Polarity	Factor	Loss								
(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)	(dB)	Mode	
2436.000	V	28.29	6.05	66.33	-	-	100.67	108018.96	-	Peak
2436.000	V	28.29	6.05	56.35	-	-	90.69	34237.34	-	AV
2438.000	H	28.30	6.05	55.81	-	-	90.16	32210.69	-	Peak
2438.000	H	28.30	6.05	47.90	-	-	82.25	12956.87	-	AV
4876.000	V/H									AV/Peak
7311.000	V/H					-				AV/Peak
9748.000	V/H					-				AV/Peak
12185.000	V/H					-				AV/Peak
14622.000	V/H					-				AV/Peak
17059.000	V/H					-				AV/Peak
19496.000	V/H					-				AV/Peak
21933.000	V/H					-				AV/Peak
24370.000	V/H					-				AV/Peak

Remark: The emission emitted by the EUT is too low to be measured except the emission listed above,

Test Engineer :



Jones Tsai

5.7.10 Test Result of Radiated Emission

- Test Mode: Mode 3 (2462 MHz)
- Test Distance : 3 M
- Temperature : 24 °C
- Relative Humidity : 53 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

■ The test was passed at the minimum margin that marked by the frame in the following table

■ Spurious Emission

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 MODEL : ZPlus-G250
 MEMO : WLAN 11b Tx CH11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	34.860	34.91	-5.09	40.00	47.95	13.02	1.04	27.10	Peak	---	---
2	34.860	27.29	-12.71	40.00	40.33	13.02	1.04	27.10	QP	---	---
3 !	53.220	35.09	-4.91	40.00	54.73	6.05	1.40	27.09	Peak	---	---
4	53.220	28.50	-11.50	40.00	48.14	6.05	1.40	27.09	QP	---	---
5	64.290	33.88	-6.12	40.00	54.69	4.84	1.42	27.07	Peak	---	---

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 MODEL : ZPlus-G250
 MEMO : WLAN 11b Tx CH11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg

1 !	240.060	41.24	-4.76	46.00	54.37	10.92	2.55	26.60	Peak	---	---
-----	---------	-------	-------	-------	-------	-------	------	-------	------	-----	-----

1 !	478.500	40.76	-5.24	46.00	48.91	15.74	3.70	27.59	Peak	105	167
2	478.500	16.32	-29.68	46.00	24.47	15.74	3.70	27.59	QP	---	---
1	1438.000	46.59	-27.41	74.00	59.16	25.19	4.58	42.34	Peak	---	---

➤ For 1.439GHz ~ 24.850GHz

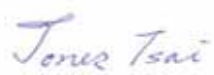
Remark: Frequency from 1439MHz to 24850MHz, the emission emitted by the EUT is too low to be measured

■ Field strength of fundamental and harmonics

Frequency	Antenna	Cable	Reading	Limits	Emission	Level	Margin	Detect	
Polarity	Factor	Loss							
(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)	(dB)	
								Mode	
2462.000	H	28.35	6.29	73.65	-	-	108.29	259716.77	Peak
2462.000	H	28.35	6.29	69.74	-	-	104.38	165577.00	AV
2462.000	V	28.35	6.29	69.25	-	-	103.89	156494.83	Peak
2462.000	V	28.35	6.29	66.78	-	-	101.42	117760.60	AV
4926.000	V/H						-		AV/ Peak
7386.000	V/H						-		AV/ Peak
9848.000	V/H						-		AV/ Peak
12310.000	V/H						-		AV/ Peak
14772.000	V/H						-		AV/ Peak
17234.000	V/H						-		AV/ Peak
19696.000	V/H						-		AV/ Peak
22158.000	V/H						-		AV/ Peak
24620.000	V/H						-		AV/ Peak

Remark: The emission emitted by the EUT is too low to be measured except the emission listed above,

Test Engineer :



Jones Tsai

5.7.11 Test Result of Radiated Emission

- Test Mode: Mode 4 (2412MHz)
- Test Distance : 3 M
- Temperature : 24 °C
- Relative Humidity : 53 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

■ The test was passed at the minimum margin that marked by the frame in the following table

■ Spurious Emission

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 MODEL : ZPlus-G250
 MEMO : WLAN 11g Tx Ch1 2412MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	47.010	37.05	-2.95	40.00	55.07	7.74	1.34	27.10	Peak	100	13
2	47.010	28.97	-11.03	40.00	46.99	7.74	1.34	27.10	QP	---	---
3	55.380	33.95	-6.05	40.00	53.87	5.76	1.41	27.09	QP	---	---
4 !	55.380	37.82	-2.18	40.00	57.74	5.76	1.41	27.09	Peak	---	---
5	240.060	38.17	-7.83	46.00	51.30	10.92	2.55	26.60	Peak	---	---
1	335.000	26.81	-19.19	46.00	37.81	12.52	3.29	26.81	Peak	---	---
2	363.000	27.98	-18.02	46.00	38.04	13.43	3.49	26.98	Peak	---	---
3	450.500	28.56	-17.44	46.00	37.11	15.34	3.56	27.45	Peak	---	---
4	478.500	33.77	-12.23	46.00	41.92	15.74	3.70	27.59	Peak	---	---
5	797.700	32.04	-13.96	46.00	36.22	18.77	5.05	28.00	Peak	---	---
6	906.900	29.64	-16.36	46.00	32.51	19.44	5.47	27.78	Peak	---	---

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 MODEL : ZPlus-G250
 MEMO : WLAN 11g Tx Ch1 2412MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	58.620	37.02	-2.98	40.00	57.21	5.34	1.55	27.08	Peak	---	---
2	58.620	28.81	-11.19	40.00	49.00	5.34	1.55	27.08	QP	---	---
3	114.780	31.41	-12.09	43.50	46.78	9.81	1.76	26.94	Peak	---	---
4	226.290	31.53	-14.47	46.00	45.96	9.71	2.46	26.60	Peak	---	---
5 !	240.060	41.88	-4.12	46.00	55.01	10.92	2.55	26.60	Peak	---	---
1 !	478.500	41.21	-4.79	46.00	49.36	15.74	3.70	27.59	Peak	---	---
2	906.200	37.65	-8.35	46.00	40.52	19.44	5.47	27.78	Peak	---	---
3	960.100	36.46	-17.54	54.00	38.62	19.62	5.84	27.62	Peak	---	---

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 VERTICAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 MODEL : ZPlus-G250
 MEMO : WLAN 11g Tx Ch1 2412MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1438.000	50.47	-23.53	74.00	57.29	25.19	4.58	36.59	Peak	---	---
2	1438.000	35.04	-18.96	54.00	41.86	25.19	4.58	36.59	Average	---	---

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 HORIZONTAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 MODEL : ZPlus-G250
 MEMO : WLAN 11g Tx Ch1 2412MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1438.000	51.06	-22.94	74.00	57.88	25.19	4.58	36.59	Peak	---	---
2	1438.000	35.24	-18.76	54.00	42.06	25.19	4.58	36.59	Average	---	---
3	1588.000	46.68	-27.32	74.00	52.68	25.72	4.81	36.53	Peak	---	---

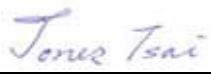
➤ For 1.589GHz ~ 24.835GHz

Remark: Frequency from 1589MHz to 24835MHz, the emission emitted by the EUT is too low to be measured

■ Field strength of fundamental and harmonics

Frequency	Antenna	Cable	Reading	Limits	Emission	Level	Margin	Detect		
Polarity	Factor	Loss								
(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)	(dB)	Mode	
2414.000	V	28.25	6.02	72.85	-	-	107.12	226986.49	-	Peak
2414.000	V	28.25	6.02	62.77	-	-	97.04	71121.35	-	AV
2412.000	H	28.24	6.02	70.60	-	-	104.86	174984.67	-	Peak
2412.000	H	28.24	6.02	60.17	-	-	94.43	52662.32	-	AV
4822.000	V/H									AV/Peak
7236.000	V/H						-			AV/Peak
9648.000	V/H						-			AV/Peak
12060.000	V/H						-			AV/Peak
14472.000	V/H						-			AV/Peak
16884.000	V/H						-			AV/Peak
19296.000	V/H						-			AV/Peak
21708.000	V/H						-			AV/Peak
24120.000	V/H						-			AV/Peak

Remark: The emission emitted by the EUT is too low to be measured except the emission listed above,

Test Engineer : 
Jones Tsai

5.7.12 Test Result of Radiated Emission

- Test Mode: Mode 5 (2437 MHz)
- Test Distance : 3 M
- Temperature : 24 °C
- Relative Humidity : 53 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

■ The test was passed at the minimum margin that marked by the frame in the following table

■ Spurious Emission

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 MODEL : ZPlus-G250
 MEMO : WLAN 11g Tx Ch6 2437MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	55.380	37.46	-2.54	40.00	57.38	5.76	1.41	27.09	Peak	---	---
2	55.380	33.99	-6.01	40.00	53.91	5.76	1.41	27.09	QP	---	---
3	80.490	30.06	-9.94	40.00	49.35	6.19	1.56	27.04	Peak	---	---
4	128.820	26.70	-16.80	43.50	41.20	10.47	1.91	26.88	Peak	---	---
5	227.100	27.02	-18.98	46.00	41.36	9.79	2.47	26.60	Peak	---	---
6	240.060	37.28	-8.72	46.00	50.41	10.92	2.55	26.60	Peak	---	---
7	264.900	24.79	-21.21	46.00	37.01	11.70	2.68	26.60	Peak	---	---
1	323.800	26.19	-19.81	46.00	37.62	12.16	3.15	26.74	Peak	---	---
2	335.000	26.98	-19.02	46.00	37.98	12.52	3.29	26.81	Peak	---	---
3	363.000	29.10	-16.90	46.00	39.16	13.43	3.49	26.98	Peak	---	---
4	430.900	28.31	-17.69	46.00	37.05	15.07	3.54	27.35	Peak	---	---
5	478.500	33.77	-12.23	46.00	41.92	15.74	3.70	27.59	Peak	---	---
6	799.100	29.55	-16.45	46.00	33.71	18.78	5.06	28.00	Peak	---	---

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 MODEL : ZPlus-G250
 MEMO : WLAN 11g Tx Ch6 2437MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	62.130	39.26	-0.74	40.00	59.84	5.00	1.50	27.08	Peak	100	25
2	62.130	23.78	-16.22	40.00	44.36	5.00	1.50	27.08	QP	---	---
3	116.130	31.34	-12.16	43.50	46.65	9.86	1.77	26.94	Peak	---	---
4 !	240.060	42.12	-3.88	46.00	55.25	10.92	2.55	26.60	Peak	---	---
1 !	478.500	41.40	-4.60	46.00	49.55	15.74	3.70	27.59	Peak	---	---
2	960.100	33.97	-20.03	54.00	36.13	19.62	5.84	27.62	Peak	---	---

FCC TEST REPORT

Report No. : F301614

Site : 03CH03-HY
Condition : 3m HORN-ANT-6741 VERTICAL
EUT : WLAN USB 2.0 Pen-Type Adapter
Power : 110V/60Hz
MODEL : ZPlus-G250
MEMO : WLAN 11g Tx Ch6 2437MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1438.000	49.53	-24.47	74.00	56.35	25.19	4.58	36.59	Peak	---	---
2	1750.000	56.75	-17.25	74.00	61.74	26.39	5.05	36.43	Peak	---	---
3	1750.000	32.22	-21.78	54.00	37.21	26.39	5.05	36.43	Average	---	---

Site : 03CH03-HY
Condition : 3m HORN-ANT-6741 HORIZONTAL
EUT : WLAN USB 2.0 Pen-Type Adapter
Power : 110V/60Hz
MODEL : ZPlus-G250
MEMO : WLAN 11g Tx Ch6 2437MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1438.000	50.60	-23.40	74.00	57.42	25.19	4.58	36.59	Peak	---	---
2	1590.000	48.10	-25.90	74.00	54.09	25.73	4.81	36.53	Peak	---	---

➤ For 1.751GHz ~ 24.850GHz

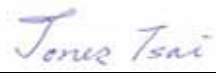
Remark: Frequency from 1751MHz to 24850MHz, the emission emitted by the EUT is too low to be measured

■ Field strength of fundamental and harmonics

Frequency	Antenna	Cable	Reading	Limits	Emission	Level	Margin	Detect		
Polarity	Factor	Loss								
(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)	(dB)	Mode	
2438.000	V	28.30	6.05	63.19	-	-	97.54	75335.56	-	AV
2438.000	V	28.30	6.05	73.62	-	-	107.97	250322.56	-	Peak
2444.000	H	28.10	6.06	60.55	-	-	94.71	54387.61	-	AV
2444.000	H	28.31	6.06	70.55	-	-	104.92	176197.60	-	Peak
4876.000	V/H									AV/Peak
7311.000	V/H					-				AV/Peak
9748.000	V/H					-				AV/Peak
12185.000	V/H					-				AV/Peak
14622.000	V/H					-				AV/Peak
17059.000	V/H					-				AV/Peak
19496.000	V/H					-				AV/Peak
21933.000	V/H					-				AV/Peak
24370.000	V/H					-				AV/Peak

Remark: The emission emitted by the EUT is too low to be measured except the emission listed above,

Test Engineer :



Jones Tsai

5.7.13 Test Result of Radiated Emission

- Test Mode: Mode 6 (2462 MHz)
- Test Distance : 3 M
- Temperature : 24 °C
- Relative Humidity : 53 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

■ The test was passed at the minimum margin that marked by the frame in the following table

■ Spurious Emission

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 MODEL : ZPlus-G250
 MEMO : WLAN 11g Tx Ch11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	42.690	39.99	-0.01	40.00	56.26	9.63	1.20	27.10	Peak	103	343
2	42.690	30.15	-9.85	40.00	46.42	9.63	1.20	27.10	QP	---	---
3 !	55.650	37.20	-2.80	40.00	57.14	5.73	1.42	27.09	Peak	---	---
4 !	55.650	34.04	-5.96	40.00	53.98	5.73	1.42	27.09	QP	---	---
5 !	61.860	36.58	-3.42	40.00	57.12	5.03	1.51	27.08	Peak	---	---
6	161.490	24.03	-19.47	43.50	40.69	7.97	2.12	26.75	Peak	---	---
7	240.060	37.79	-8.21	46.00	50.92	10.92	2.55	26.60	Peak	---	---

1 478.500 35.50 -10.50 46.00 43.65 15.74 3.70 27.59 Peak --- ---

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : WLAN USB 2.0 Pen-Type Adapter
 Power : 110V/60Hz
 MODEL : ZPlus-G250
 MEMO : WLAN 11g Tx Ch11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	240.060	42.39	-3.61	46.00	55.52	10.92	2.55	26.60	Peak	---	---
1 !	478.500	40.72	-5.28	46.00	48.87	15.74	3.70	27.59	Peak	---	---
2	858.600	37.22	-8.78	46.00	40.72	19.16	5.22	27.88	Peak	---	---
3	960.100	37.63	-16.37	54.00	39.79	19.62	5.84	27.62	Peak	---	---

FCC TEST REPORT

Report No. : F301614

Site : 03CH03-HY
Condition : 3m HORN-ANT-6741 VERTICAL
EUT : WLAN USB 2.0 Pen-Type Adapter
Power : 110V/60Hz
MODEL : ZPlus-G250
MEMO : WLAN 11g Tx Ch11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1440.000	47.94	-26.06	74.00	54.75	25.19	4.59	36.59	Peak	---	---

Site : 03CH03-HY
Condition : 3m HORN-ANT-6741 HORIZONTAL
EUT : WLAN USB 2.0 Pen-Type Adapter
Power : 110V/60Hz
MODEL : ZPlus-G250
MEMO : WLAN 11g Tx Ch11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1438.000	50.76	-23.24	74.00	57.58	25.19	4.58	36.59	Peak	---	---
2	1590.000	48.75	-25.25	74.00	54.74	25.73	4.81	36.53	Peak	---	---

➤ For 1.591GHz ~ 24.850GHz

Remark: Frequency from 3283MHz to 24850MHz, the emission emitted by the EUT is too low to be measured

Test Engineer :



Jones Tsai

■ Field strength of fundamental and harmonics

Frequency	Antenna	Cable	Reading	Limits	Emission	Level	Margin	Detect		
Polarity	Factor	Loss								
(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)	(dB)	Mode	
2468.000	V	28.36	6.10	62.84	-	-	97.30	73282.45	-	AV
2468.000	V	28.36	6.10	73.18	-	-	107.64	240990.54	-	Peak
2462.000	H	28.35	6.09	59.77	-	-	94.21	51345.22	-	AV
2462.000	H	28.35	6.09	70.72	-	-	105.16	181134.01	-	Peak
4926.000	V/H						-			AV/ Peak
7386.000	V/H						-			AV/ Peak
9848.000	V/H						-			AV/ Peak
12310.000	V/H						-			AV/ Peak
14772.000	V/H						-			AV/ Peak
17234.000	V/H						-			AV/ Peak
19696.000	V/H						-			AV/ Peak
22158.000	V/H						-			AV/ Peak
24620.000	V/H						-			AV/ Peak

Remark: The emission emitted by the EUT is too low to be measured except the emission listed above,

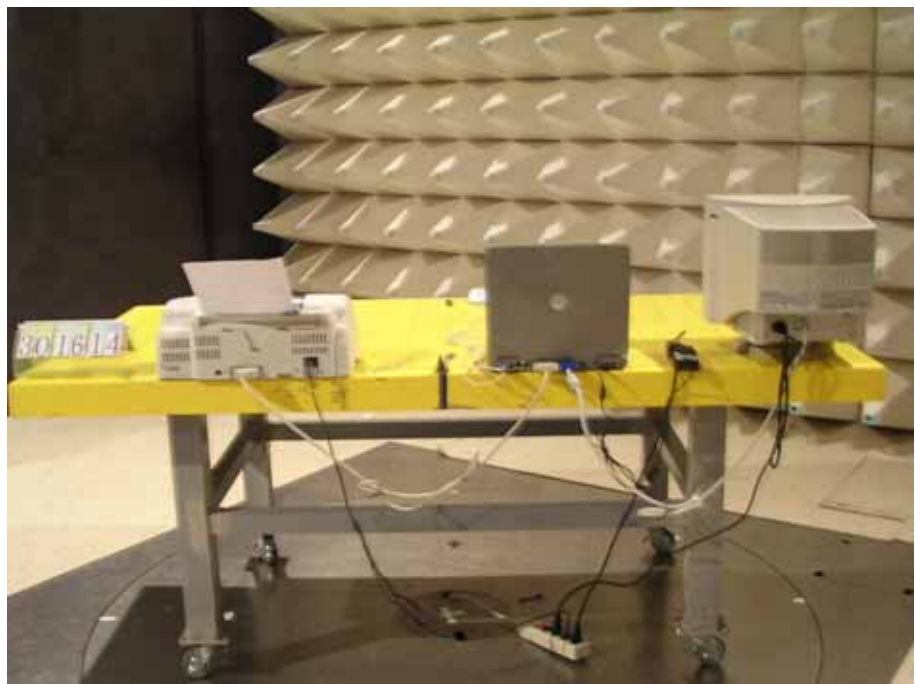
Test Engineer :

Jones Tsai

Jones Tsai

5.7.14 Photographs of Radiated Emission Test Configuration

- The photographs show the configuration that generates the maximum emission.

FRONT VIEW**REAR VIEW**

5.8 Band Edges Measurement

5.8.5 Measuring Instruments :

As described in chapter 7 of this test report.

5.8.6 Test Procedure :

1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set both RBW and VBW of spectrum analyzer to 100KHz with convenient frequency span including 100 KHz bandwidth from band edge.
3. The band edges was measured and recorded.

5.8.7 Test Result :

- Test Result in lower band (Channel 1) : PASS
- Test Result in higher band(Channel 11) : PASS

5.8.8 Note on Band edge Emission

The band edge emission plot on appendix B page B13. shows 51.47 dB delta between carrier maximum power and local maximum emission in the restricted band (2.390GHz).

The band edge emission plot on appendix B page B14. shows 51.08 dB delta between carrier maximum power and local maximum emission in the restricted band (2.4835GHz).

Mode 1~3 (802.11b)

Channel	Polarity	The emission of carrier power strength	The maximum field strength in restrict band	Limit	Margin	Result
		(dB μ V/m)	(dB μ V/m)	(dB μ V/m)	(dB)	
CH1	V	93.76	42.29	74	-31.71	Peak
	V	88.03	36.56	54	-17.44	Average
	H	90.11	38.64	74	-35.36	Peak
	H	88.04	36.57	54	-17.43	Average
Ch11	V	103.89	52.81	74	-21.19	Peak
	V	101.42	50.34	54	-3.66	Average
	H	108.29	57.21	74	-16.79	Peak
	H	104.38	53.3	54	-0.7	Average

The band edge emission plot on appendix B page B15. shows 44.41 dB delta between carrier maximum power and local maximum emission in the restricted band (2.390GHz).

The band edge emission plot on appendix B page B16. shows 45.83dB delta between carrier maximum power and local maximum emission in the restricted band (2.4835GHz).

Mode 4~6 (802.11g)

Channel	Polarity	The emission of carrier power strength	The maximum field strength in restrict band	Limit	Margin	Result
		(dB μ V/m)	(dB μ V/m)	(dB μ V/m)	(dB)	
CH1	V	107.12	62.71	74	-11.29	Peak
	V	97.04	52.63	54	-1.37	Average
	H	104.86	60.45	74	-13.55	Peak
	H	94.43	50.02	54	-3.98	Average
Ch11	V	107.64	61.81	74	-12.19	Peak
	V	97.3	51.47	54	-2.53	Average
	H	105.16	59.33	74	-14.67	Peak
	H	94.21	48.38	54	-5.62	Average

*The maximum field strength in restricted band is the emission of carrier power strength subtract to the delta between carrier maximum power and local maximum emission in the restricted band.

5.9 Antenna Requirements

The EUT use a fixed antenna without external connector. It is considered meet antenna requirement of FCC.

5.9.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

5.9.2 Antenna Connected Construction

The maximum Gain antenna used in this product is chip antenna. No antenna connector.

6 Antenna Factor & Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)	Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	15.35	0.92	30	15.35	0.92
35	13.63	1.05	35	13.63	1.05
40	11.11	1.08	40	11.11	1.08
45	10.59	1.15	45	10.59	1.15
50	6.47	1.29	50	6.47	1.29
55	5.83	1.63	55	5.83	1.63
60	5.18	1.30	60	5.18	1.30
65	4.81	1.36	65	4.81	1.36
70	4.43	1.43	70	4.43	1.43
75	5.10	1.48	75	5.10	1.48
80	5.91	1.53	80	5.91	1.53
85	7.33	1.61	85	7.33	1.61
90	8.74	1.69	90	8.74	1.69
95	9.05	1.67	95	9.05	1.67
100	9.36	1.76	100	9.36	1.76
110	9.65	1.80	110	9.65	1.80
120	9.97	1.90	120	9.97	1.90
130	10.51	1.61	130	10.51	1.61
140	10.32	2.14	140	10.32	2.14
150	9.42	2.16	150	9.42	2.16
160	8.09	2.16	160	8.09	2.16
170	7.43	1.99	170	7.43	1.99
180	7.60	2.39	180	7.60	2.39
190	7.43	2.38	190	7.43	2.38
200	7.26	2.46	200	7.26	2.46
220	9.11	2.59	220	9.11	2.59
240	10.88	2.68	240	10.88	2.68
260	11.75	2.91	260	11.75	2.91
280	11.55	2.92	280	11.55	2.92
300	11.36	2.99	300	11.36	2.99
320	12.03	3.03	320	12.03	3.03
340	12.69	3.22	340	12.69	3.22
360	13.33	3.28	360	13.33	3.28
380	14.00	3.80	380	14.00	3.80
400	14.63	3.80	400	14.63	3.80
450	15.33	3.69	450	15.33	3.69
500	16.03	3.93	500	16.03	3.93
550	16.65	3.56	550	16.65	3.56
600	17.29	4.15	600	17.29	4.15
650	17.64	4.58	650	17.64	4.58
700	18.00	4.73	700	18.00	4.73
750	18.39	4.71	750	18.39	4.71
800	18.79	4.99	800	18.79	4.99
850	19.10	5.24	850	19.10	5.24
900	19.42	5.38	900	19.42	5.38
950	19.58	5.57	950	19.58	5.57
1000	19.75	5.62	1000	19.75	5.62

7 List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100132	9 KHz – 2.75 GHz	Jun. 12, 2003	Conduction (CO01-HY)
LISN	MessTec	NNB-2/16Z	2001-008	9 KHz – 30 MHz	Apr. 29, 2003	Conduction (CO01-HY)
LISN (Support Unit)	MessTec	NNB-2/16Z	2001-009	9 KHz – 30 MHz	Apr. 29, 2003	Conduction (CO01-HY)
EMI Filter	LINDGREN	LRE-2060	1004	< 450 Hz	N/A	Conduction (CO01-HY)
EMI Filter	LINDGREN	N6006	201052	0 ~ 60 Hz	N/A	Conduction (CO01-HY)
RF Cable-CON	Suhner Switzerland	RG223/U	CB029	9KHz~30MHz	Jan. 07, 2003	Conduction (CO01-HY)
50 ohm BNC type Terminal	NOBLE	50ohm	TM009	50 ohm	Apr. 24, 2003	Conduction (CO01-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 21, 2003	Radiation (03CH03-HY)
Spectrum analyzer	R&S	FSP40	100004	9KHz~40GHz	Aug. 07, 2003	Radiation (03CH03-HY)
Amplifier	MITEQ	AFS44	879981	100MHz~26.5GHz	Jul. 23, 2003	Radiation (03CH03-HY)
Horn Antenna	COM-POWER	AH-118	10094	1GHz – 18GHz	Apr. 10, 2003	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
RF Cable-HIGH	Jye Bao	RG142	CB030-HIGH	1GHz~29.5GHz	Mar. 14, 2003	Radiation (03CH03-HY)

※ Calibration Interval of instruments listed above is one year, except for Horn Antenna, BBHA9170.

8 Uncertainty of Test Site

Uncertainty of Radiated Emission Measurement

Contribution	Probability Distribution	3m
Antenna factor calibration	normal(k=2)	±1
cable loss calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2
Antenna Directivity	rectangular	±3
Antenna Factor V.S. Height	rectangular	±2
Antenna Factor Interpolation for Frequency	rectangular	±0.25
site imperfection	rectangular	±2
Mismatch Receiver VSWR $\Gamma_1=0.09$ Antenna VSWR $\Gamma_2=0.67$ Uncertainty= $20\log(1-\Gamma_1\Gamma_2)$	U-shaped	±0.54
combined standard uncertainty $U_e(y)$	normal	±2.7
Measuring uncertainty for a level of confidence of 95% $U=2U_e(y)$	normal (k=2)	±5.4

$$U = \sqrt{\{(1/2)^2 + (0.3/2)^2 + (2^2 + 0.5^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\}} = 2.2 \quad \text{for 10m test distance}$$

$$U = \sqrt{\{(1/2)^2 + (0.3/2)^2 + (2^2 + 3^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\}} = 2.7 \quad \text{for 3m test distance}$$

Uncertainty of Conducted Emission Measurement

Contribution	Probability Distribution	150KHz – 30MHz
Cable and I/P attenuator calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2
LISN coupling specification	rectangular	±1.5
Transducer factor frequency interpolation	rectangular	±0.2
Mismatch Receiver VSWR $\Gamma_1=0.09$ LISN VSWR $\Gamma_2=0.33$ Uncertainty= $20\log(1-\Gamma_1\Gamma_2)$	U-shaped	0.2
combined standard uncertainty $U_e(y)$	normal	±1.66
Measuring uncertainty for a level of confidence of 95% $U=2U_e(y)$	normal (k=2)	±3.32

$$U = \sqrt{\{(0.3/2)^2 + (2^2 + 1.5^2 + 0.2^2)/3 + (0.2)^2/2\}} = 1.66$$