SPORTON International Inc.
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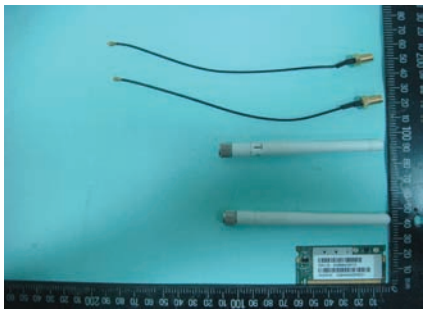
FCC RADIO TEST REPORT

Applicant's company	**Wistron NeWeb Corporation**
Applicant Address	No.10-1,Li-hsin Road I,Hsinchu Science Park,Hsinchu 300,Taiwan, R.O.C.
FCC ID	**NKR-DCMA81**
Manufacturer's company	**Wistron Neweb Corporation**
Manufacturer Address	No. 10-1, Li-Hsin Rd. 1, Science-Based Industrial Park, Hsinchu 300, Taiwan R.O.C

Product Name	WLAN 802.11ABG MINIPCI
Brand Name	WNC
Model Name	DCMA-81
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Received Date	Jun. 11, 2008
Final Test Date	Jun. 19, 2008
Submission Type	Original Equipment



Statement

Test result included is only for the 802.11b/g part and 802.11a (5725 ~ 5850MHz) of the product.
The test result in this report refers exclusively to the presented test model / sample.
Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.
The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.4-2003** and **47 CFR FCC Part 15 Subpart C**.
The test equipment used to perform the test is calibrated and traceable to NML/ROC.

TAF
Testing Laboratory
1190

Table of Contents

History of This Test Report

Original Issue Date: Jun. 25, 2008

Report No.: FR861112AB

■ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

Certificate No.: CB9706094

1. CERTIFICATE OF COMPLIANCE

Product Name	:	WLAN 802.11ABG MINIPCI
Brand Name	:	WNC
Model Name	:	DCMA-81
Applicant	:	Wistron NeWeb Corporation
Test Rule Part(s)	:	47 CFR FCC Part 15 Subpart C § 15.247

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Jun. 11, 2008 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

Wayne Hsu

SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
4.1	15.207	AC Power Line Conducted Emissions	Complies	10.99 dB
4.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	9.98 dB
4.3	15.247(e)	Power Spectral Density	Complies	16.12 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	0.54 dB
4.6	15.247(d)	Band Edge Emissions	Complies	0.38 dB
4.7	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Conducted Output Power	±0.8dB	Confidence levels of 95%
Power Spectral Density	±0.5dB	Confidence levels of 95%
6dB Spectrum Bandwidth	$\pm 8.5 \times 10^{-8}$	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±1.9dB	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	±1.9dB	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7℃	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Power Type	From Host System (Notebook)
Modulation	DSSS for IEEE 802.11b ; OFDM for IEEE 802.11a/g
Data Modulation	DSSS (BPSK / QPSK / CCK) ; OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	DSSS (1/ 2/ 5.5/11) ; OFDM (6/9/12/18/24/36/48/54)
Frequency Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Channel Number	11b/g: 11 ; 11a: 5
Channel Band Width (99%)	11b: 15.52 MHz ; 11g: 16.64 MHz ; 11a: 16.56 MHz
Conducted Output Power	11b: 14.80 dBm ; 11g: 20.02 dBm ; 11a: 16.06 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

3.2. Accessories

N/A

3.3. Table for Filed Antenna

For 2.4GHz Band

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Lct	F1B-294405-52	Dipole Antenna	NA	1.82

For 5GHz Band

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Lct	F1B-294405-52	Dipole Antenna	NA	4.28

3.4. Table for Carrier Frequencies

Frequency Allocation for 802.11b/g

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400~2483.5MHz	1	2412 MHz	7	2442 MHz
	2	2417 MHz	8	2447 MHz
	3	2422 MHz	9	2452 MHz
	4	2427 MHz	10	2457 MHz
	5	2432 MHz	11	2462 MHz
	6	2437 MHz		

Frequency Allocation for 802.11a

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5725~5850 MHz	149	5745 MHz	161	5805 MHz
	153	5765 MHz	165	5825 MHz
	157	5785 MHz		

3.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Line Conducted Emissions	Normal Link	Auto	-	-
Max. Peak Conducted Output Power	11b/CCK	1 Mbps	1/6/11	NA
Power Spectral Density	11g/BPSK	6 Mbps	1/6/11	NA
6dB Spectrum Bandwidth	11a/BPSK	6 Mbps	149/157/165	NA
Radiated Emissions Below 1GHz	Normal Link	Auto	-	-
Radiated Emissions Above 1GHz	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
	11a/BPSK	6 Mbps	149/157/165	1
Band Edge Emissions	11b/CCK	1 Mbps	1/11	1
	11g/BPSK	6 Mbps	1/11	1
	11a/BPSK	6 Mbps	149/165	1

3.6. Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.	VCCI Reg. No
03CH03-HY	SAC	Hwa Ya	101377	IC 4088	-
CO04-HY	Conduction	Hwa Ya	-	-	-
TH01-HY	OVEN Room	Hwa Ya	-	-	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC); Fully Anechoic Chamber (FAC).

Please refer section 6 for Test Site Address.

3.7. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Modem	ACEEX	DM1414	IFAXDM1414
Mouse	QSKY	Lx-619B	DoC
Notebook	DELL	D400	E2K24GBRL
Printer	EPSON	LQ-300+	N/A
Wireless AP	Planex	GW-AP54SGX	N/A

3.8. Table for Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Power Parameters of IEEE 802.11b/g

Test Software Version	ART		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	15	16	15.5
IEEE 802.11g	13.5	19.5	14

Power Parameters of IEEE 802.11a

Test Software Version	ART		
Frequency	5745 MHz	5785 MHz	5825 MHz
IEEE 802.11a	19.5	18.5	17

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. The programs were executed as follows :

b. Turn on the power of all equipment.

c. The NB sends " H" messages to the panel, and the panel displays " H " patterns on the screen.

d. The NB sends " H " messages to the printer, then the printer prints them on the paper.

e. The NB sends " H " messages to the modem.

f. Repeat the steps from b to e.

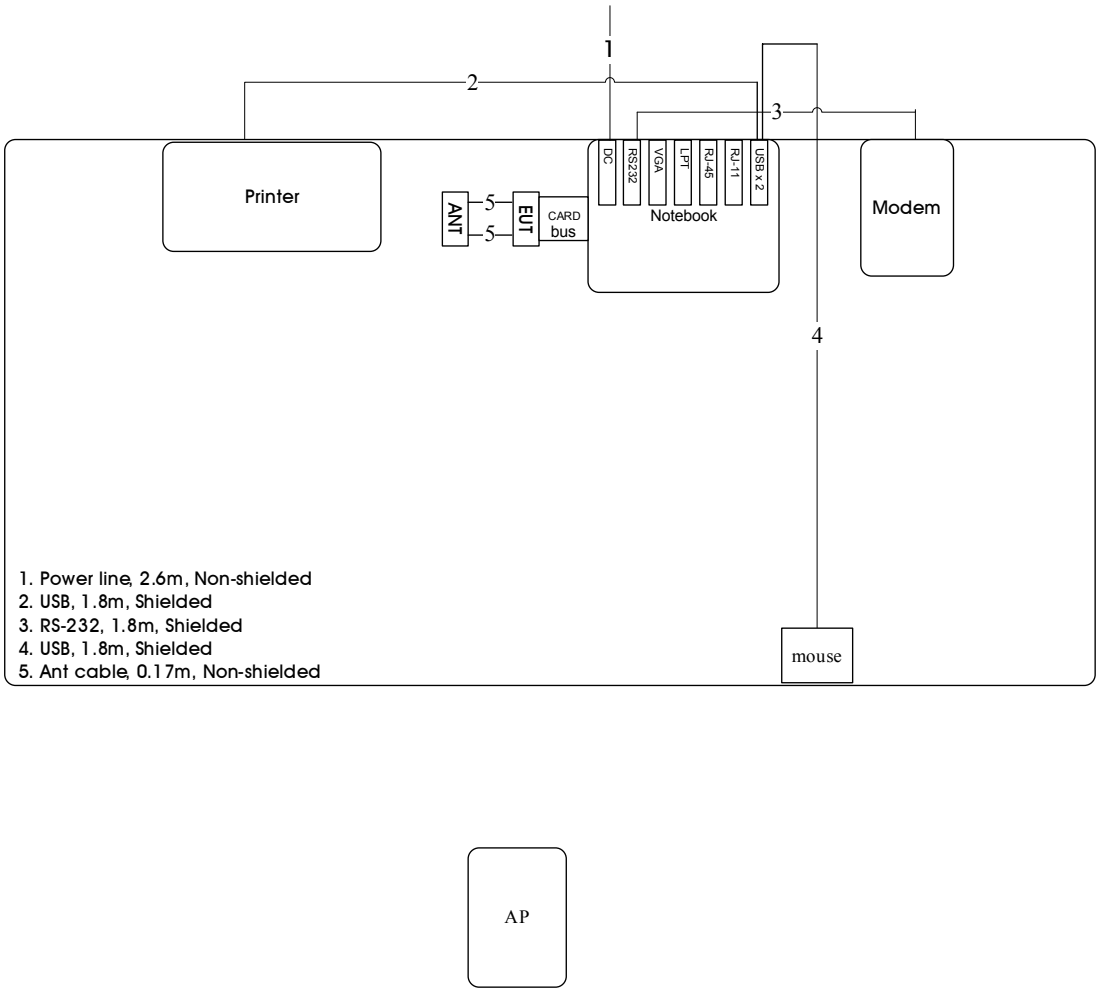
Executed "ping.exe" to link with the remote workstation to receive and transmit signal by LAN and WLAN.

Executed "ART" to control the EUT continuously transmit RF signal.

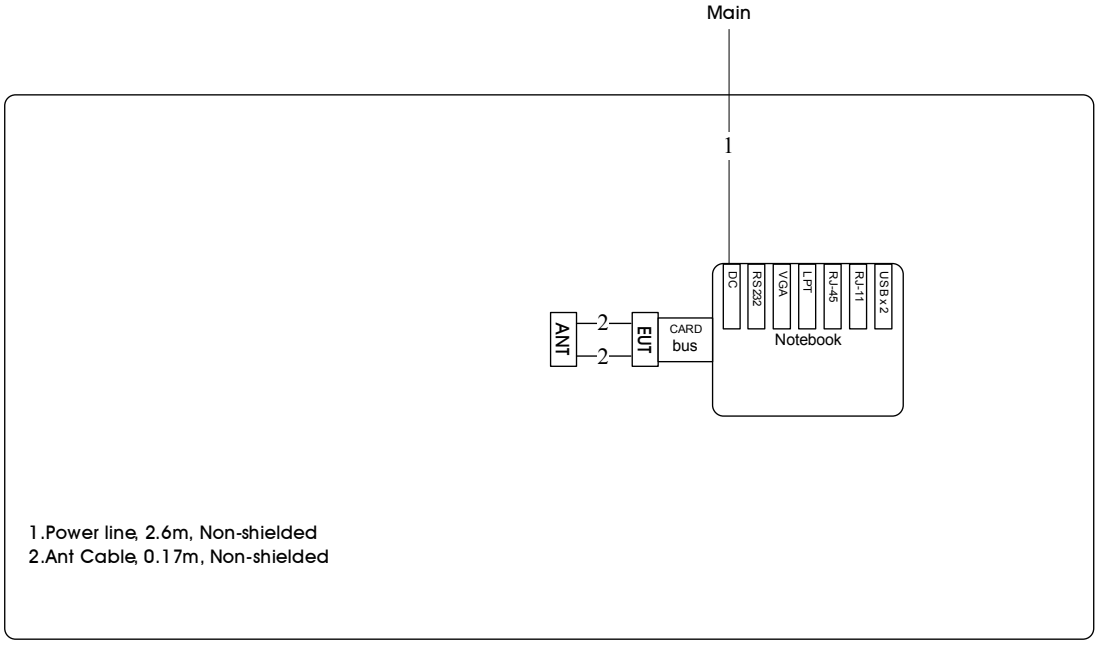
3.9. Test Configurations

3.9.1. Radiation Emissions Test Configuration

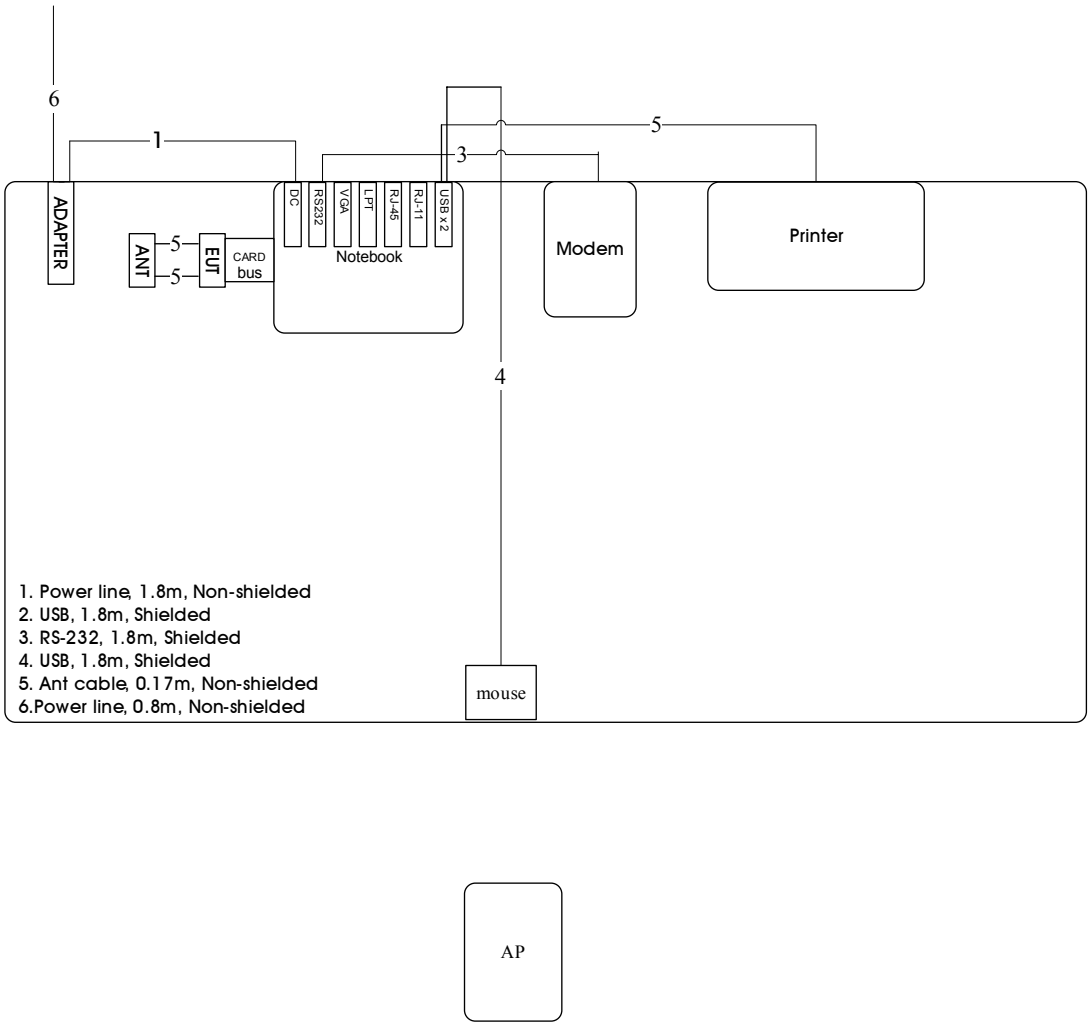
9kHz~1GHz



Above 1GHz


Main
1
DC
RS232
VGA
LPT
RJ-45
RJ-11
USBx2
Notebook
ANT
2
2
EUT
CARD
bus
1.Power line, 2.6m, Non-shielded
2.Ant Cable, 0.17m, Non-shielded

3.9.2. AC Power Line Conduction Emissions Test Configuration



4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For this product which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

4.1.2. Measuring Instruments and Setting

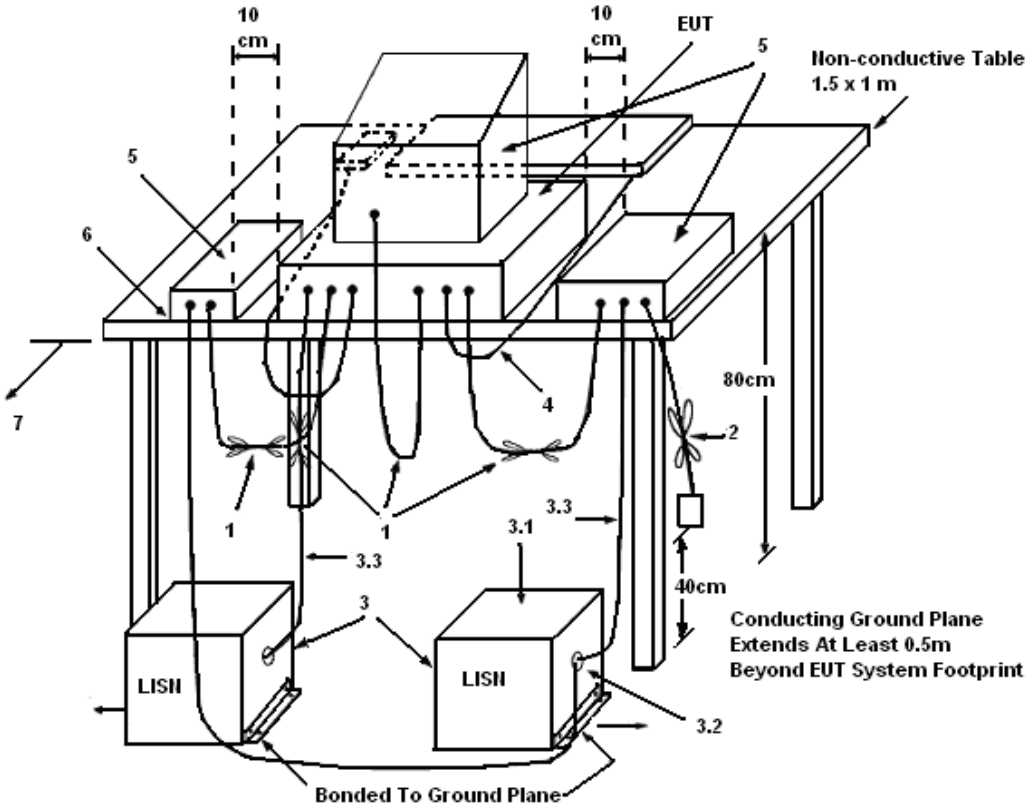
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

4.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.4. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 KHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

4.1.4. Test Setup Layout



LEGEND:

(1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

(2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

(3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.

(3.1) All other equipment powered from additional LISN(s).

(3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

(3.3) LISN at least 80 cm from nearest part of EUT chassis.

(4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

(5) Non-EUT components of EUT system being tested.

(6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

(7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

4.1.5. Test Deviation

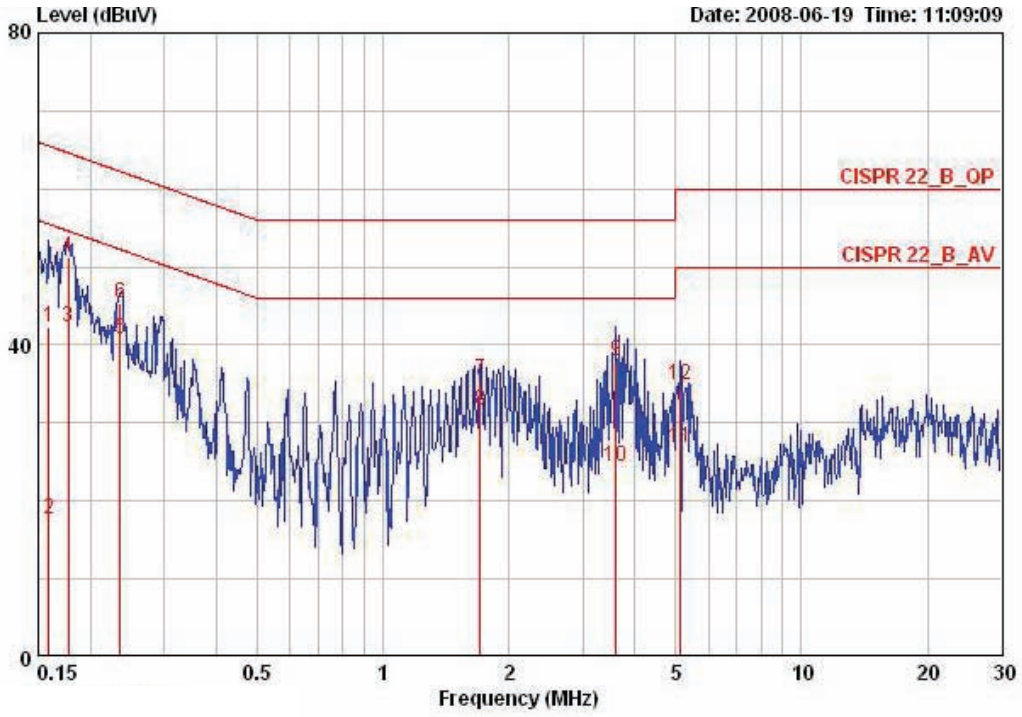
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

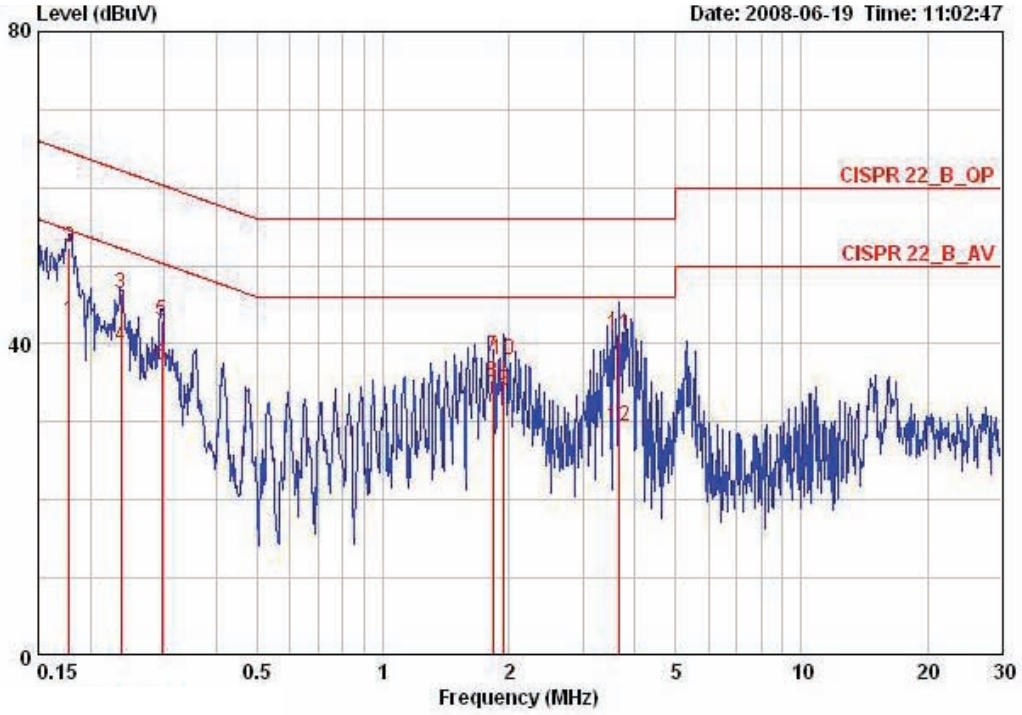
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	23℃	Humidity	54%
Test Engineer	Rex Chiu	Phase	Line
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.15900	42.30	-23.22	65.52	41.80	0.30	0.20	QP
2	0.15900	17.68	-37.84	55.52	17.18	0.30	0.20	AVERAGE
3	0.17744	42.33	-12.27	54.60	41.88	0.25	0.20	AVERAGE
4	0.17744	51.20	-13.40	64.60	50.75	0.25	0.20	QP
5 @	0.23578	40.85	-11.39	52.24	40.47	0.18	0.20	AVERAGE
6	0.23578	45.37	-16.87	62.24	44.99	0.18	0.20	QP
7	1.710	35.56	-20.44	56.00	35.32	0.10	0.14	QP
8	1.710	31.55	-14.45	46.00	31.31	0.10	0.14	AVERAGE
9	3.599	37.84	-18.16	56.00	37.44	0.10	0.30	QP
10	3.599	24.51	-21.49	46.00	24.11	0.10	0.30	AVERAGE
11	5.132	26.83	-23.17	50.00	26.43	0.10	0.30	AVERAGE
12	5.132	34.84	-25.16	60.00	34.44	0.10	0.30	QP

Temperature	23℃	Humidity	54%
Test Engineer	Rex Chiu	Phase	Neutral
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.17816	42.84	-11.73	54.57	42.49	0.15	0.20	AVERAGE
2	0.17816	52.22	-12.35	64.57	51.87	0.15	0.20	QP
3	0.23653	46.42	-15.80	62.22	46.12	0.10	0.20	QP
4	0.23653	39.76	-12.46	52.22	39.46	0.10	0.20	AVERAGE
5	0.29558	43.04	-17.33	60.37	42.74	0.10	0.20	QP
6	0.29558	37.29	-13.08	50.37	36.99	0.10	0.20	AVERAGE
7	1.831	38.29	-17.71	56.00	38.12	0.00	0.17	QP
8 @	1.831	35.01	-10.99	46.00	34.84	0.00	0.17	AVERAGE
9	1.950	33.99	-12.01	46.00	33.80	0.00	0.19	AVERAGE
10	1.950	37.83	-18.17	56.00	37.64	0.00	0.19	QP
11	3.664	41.17	-14.83	56.00	40.87	0.00	0.30	QP
12	3.664	29.35	-16.65	46.00	29.05	0.00	0.30	AVERAGE

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. Maximum Conducted Output Power Measurement

4.2.1. Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. The limited has to be reduced by the amount in dB that the gain of the antenna exceed 6dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi. Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted output power.

4.2.2. Measuring Instruments and Setting

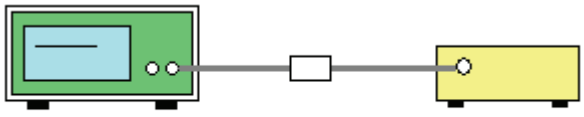
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RB	1000 kHz
VB	3000 kHz
Detector	rms
Trace	Max Hold
Sweep Time	500ms

4.2.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Test was performed in accordance with Measurement of Digital Transmission Systems Operating under Section 15.247 March 23, 2005.

4.2.4. Test Setup Layout



4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of Maximum Conducted Output Power

Temperature	22℃	Humidity	60%
Test Engineer	Jacky Ho	Configurations	802.11a/b/g

Configuration IEEE 802.11b

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	14.63	30.00	Complies
6	2437 MHz	14.80	30.00	Complies
11	2462 MHz	14.11	30.00	Complies

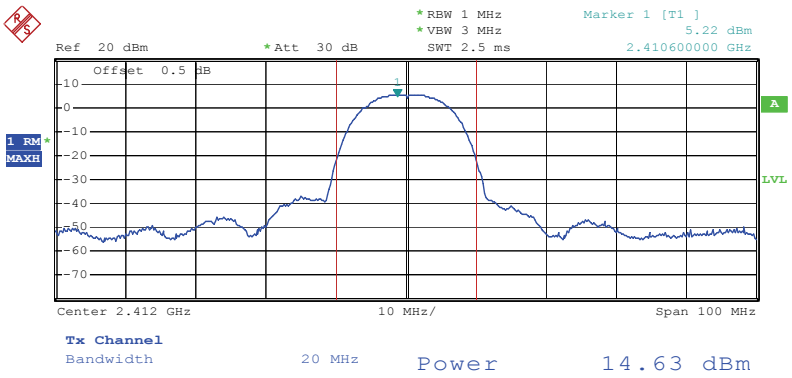
Configuration IEEE 802.11g

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	14.85	30.00	Complies
6	2437 MHz	20.02	30.00	Complies
11	2462 MHz	14.75	30.00	Complies

Configuration IEEE 802.11a

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	16.06	30.00	Complies
157	5785 MHz	15.65	30.00	Complies
165	5825 MHz	14.11	30.00	Complies

Conducted Output Power Plot on Configuration IEEE 802.11b / 2412 MHz



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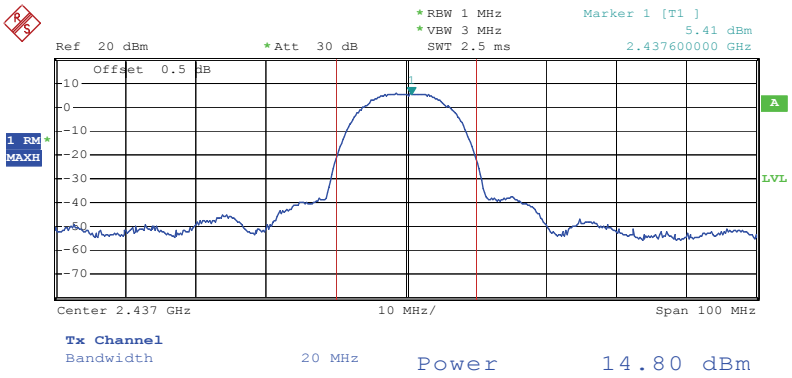
Conducted Output Power Plot on Configuration IEEE 802.11b / 2437 MHz



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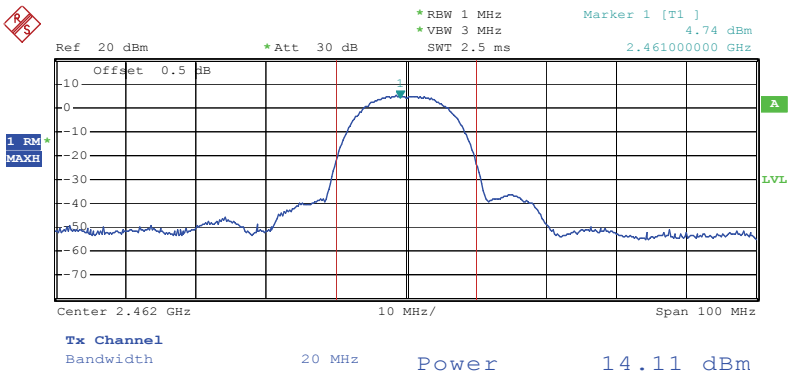
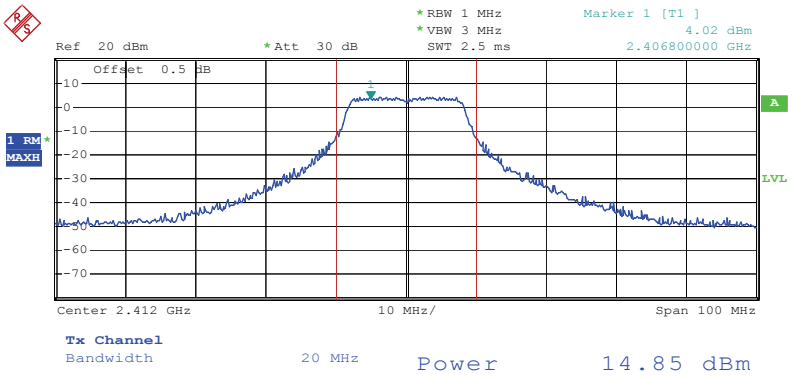
Conducted Output Power Plot on Configuration IEEE 802.11b / 2462 MHz



Date: 16.JUN.2008 17:19:42

Conducted Output Power Plot on Configuration IEEE 802.11g / 2412 MHz



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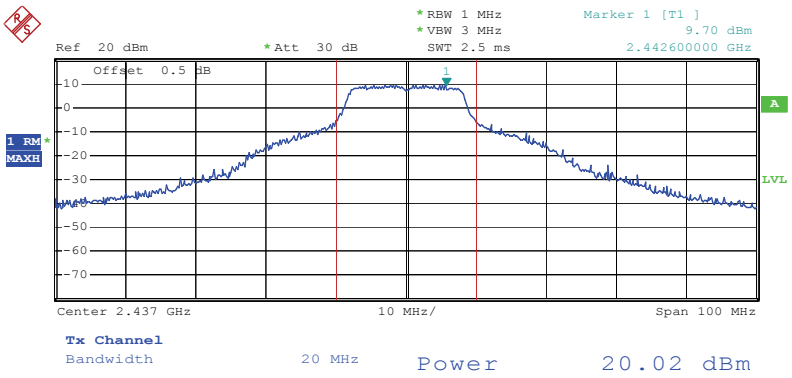
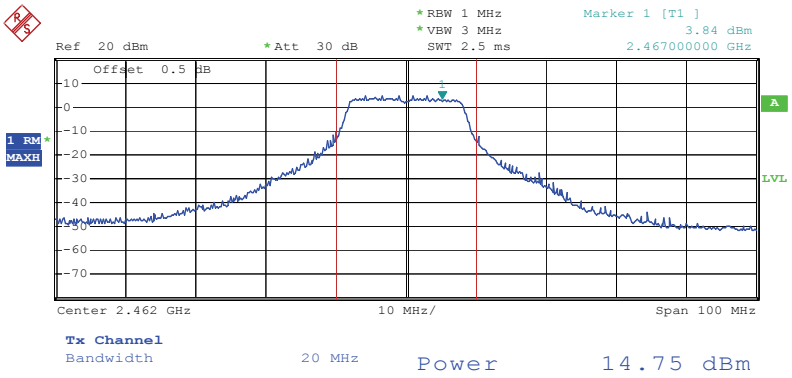
Conducted Output Power Plot on Configuration IEEE 802.11g / 2437 MHz



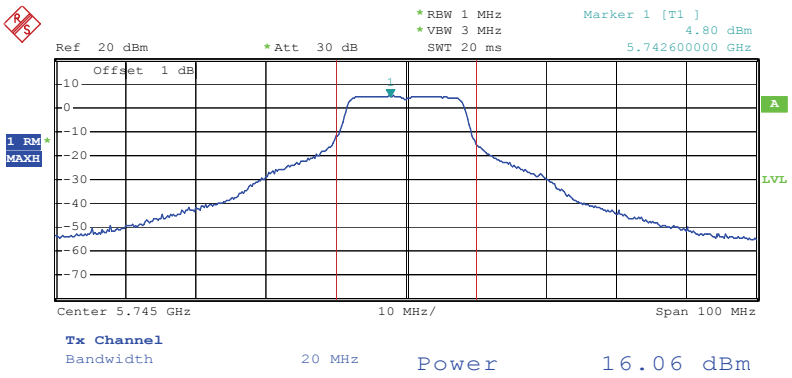
Date: 16.JUN.2008 17:21:18

Conducted Output Power Plot on Configuration IEEE 802.11g / 2462 MHz



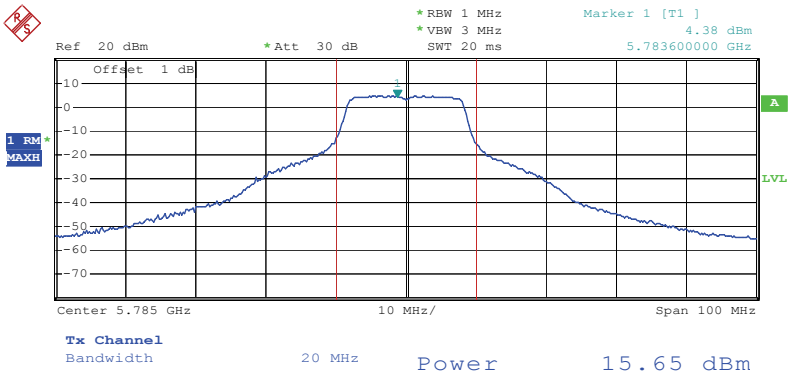
Date: 16.JUN.2008 17:20:21

Conducted Output Power Plot on Configuration IEEE 802.11a / 5745 MHz



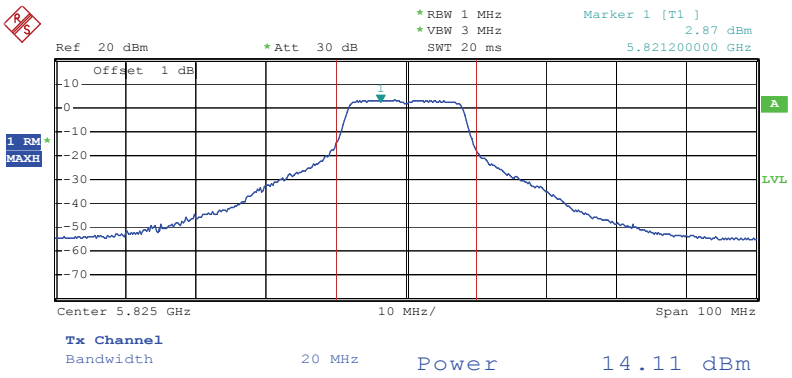
Date: 16.JUN.2008 17:44:32

Conducted Output Power Plot on Configuration IEEE 802.11a / 5785 MHz



Date: 16.JUN.2008 17:45:21

Conducted Output Power Plot on Configuration IEEE 802.11a / 5825 MHz



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4.3. Power Spectral Density Measurement

4.3.1. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

4.3.2. Measuring Instruments and Setting

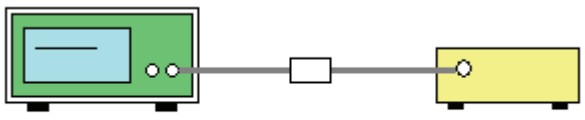
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	1.5MHz
RB	3 kHz
VB	30 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	500s

4.3.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser.
2. Set RBW of spectrum analyzer to 3kHz and VBW to 30kHz. Set Detector to Peak, Trace to Max Hold.
3. Mark the frequency with maximum peak power as the center of the display of the spectrum.
4. Set the span to 1.5MHz and the sweep time to 500s and record the maximum peak value.

4.3.4. Test Setup Layout



4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.7. Test Result of Power Spectral Density

Temperature	22℃	Humidity	60%
Test Engineer	Jacky Ho	Configurations	802.11a/b/g

Configuration IEEE 802.11b

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-8.91	8.00	Complies
6	2437 MHz	-10.49	8.00	Complies
11	2462 MHz	-10.50	8.00	Complies

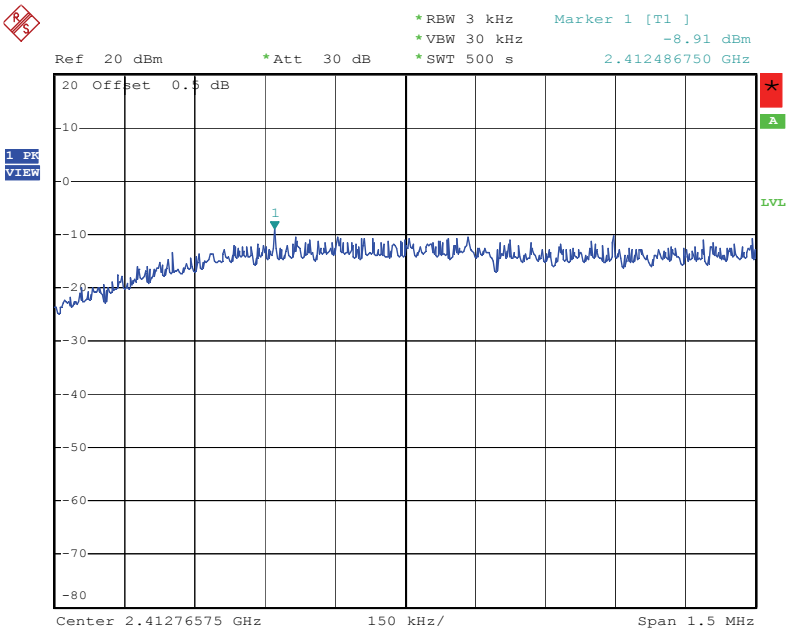
Configuration IEEE 802.11g

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-12.03	8.00	Complies
6	2437 MHz	-8.12	8.00	Complies
11	2462 MHz	-12.19	8.00	Complies

Configuration IEEE 802.11a

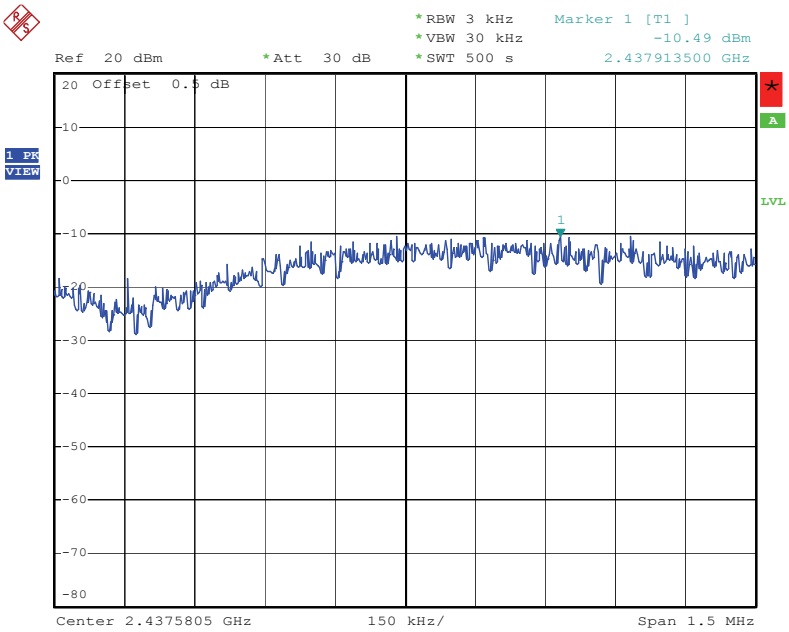
Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	-9.59	8.00	Complies
157	5785 MHz	-10.33	8.00	Complies
165	5825 MHz	-11.33	8.00	Complies

Power Density Plot on Configuration IEEE 802.11b / 2412 MHz



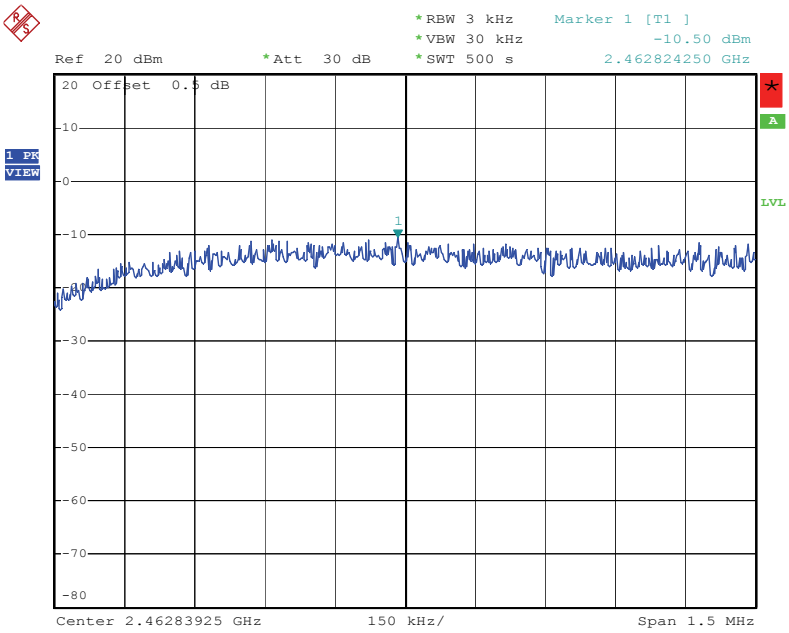
Date: 18.JUN.2008 17:33:17

Power Density Plot on Configuration IEEE 802.11b / 2437 MHz



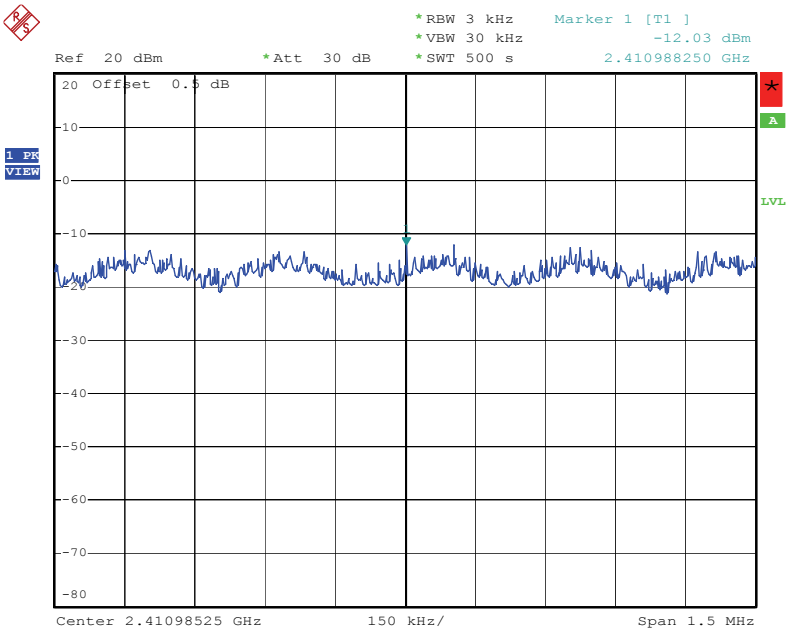
Date: 18.JUN.2008 17:34:10

Power Density Plot on Configuration IEEE 802.11b / 2462 MHz



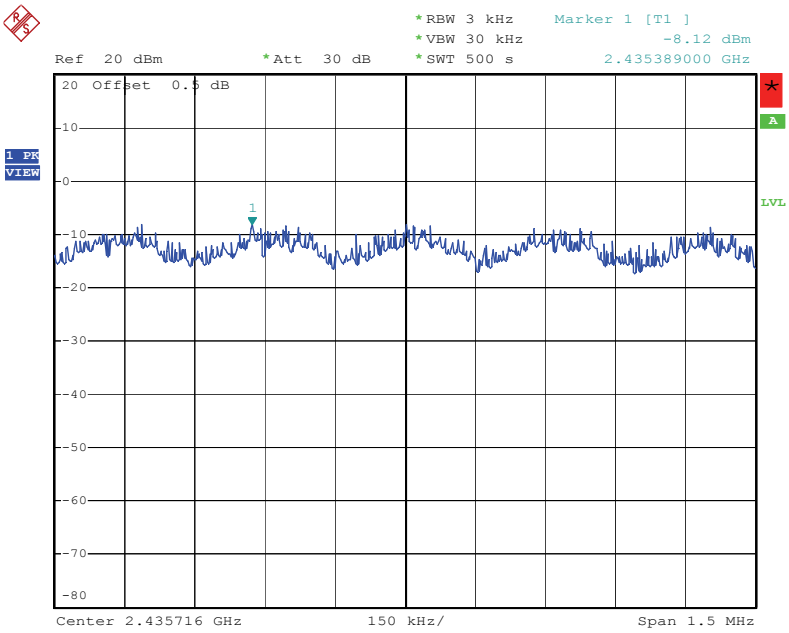
Date: 18.JUN.2008 17:34:51

Power Density Plot on Configuration IEEE 802.11g / 2412 MHz



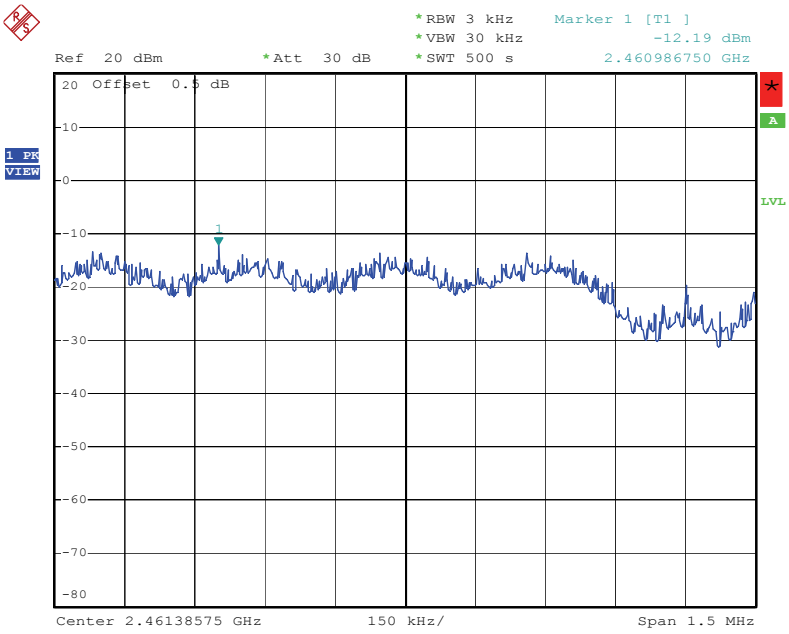
Date: 18.JUN.2008 17:37:40

Power Density Plot on Configuration IEEE 802.11g / 2437 MHz



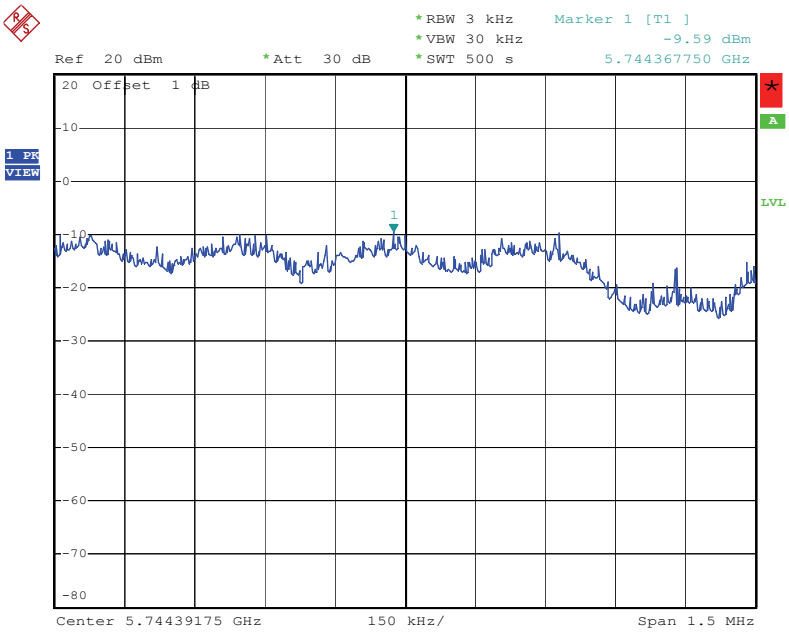
Date: 18.JUN.2008 17:36:45

Power Density Plot on Configuration IEEE 802.11g / 2462 MHz



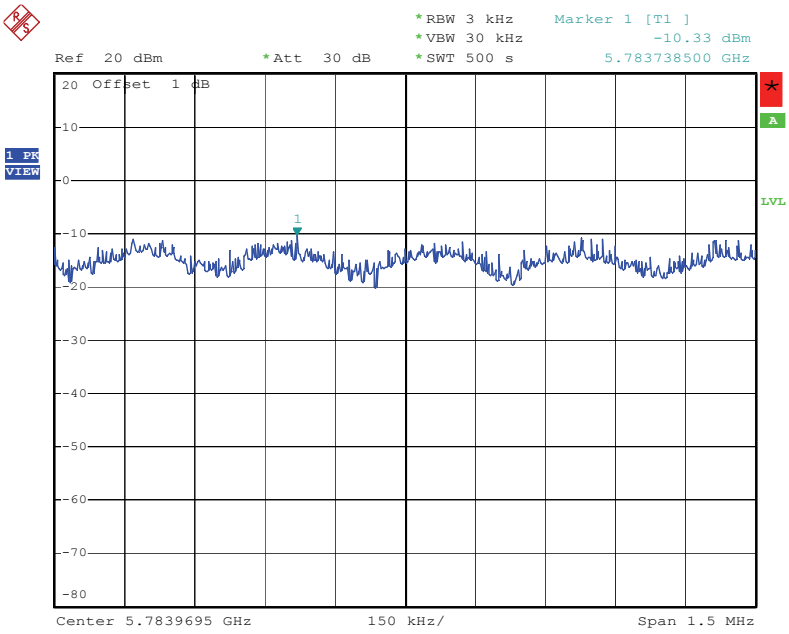
Date: 18.JUN.2008 17:35:51

Power Density Plot on Configuration IEEE 802.11a / 5745 MHz



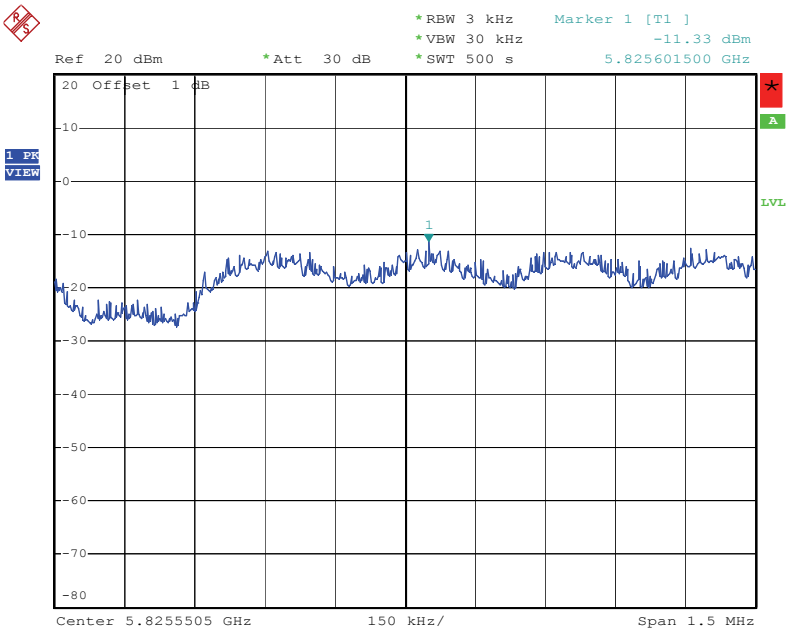
Date: 18.JUN.2008 17:43:01

Power Density Plot on Configuration IEEE 802.11a / 5785 MHz



Date: 18.JUN.2008 17:44:06

Power Density Plot on Configuration IEEE 802.11a / 5825 MHz



Date: 18.JUN.2008 17:44:59

4.4. 6dB Spectrum Bandwidth Measurement

4.4.1. Limit

For digital modulation systems, the minimum 6dB bandwidth shall be at least 500 kHz.

4.4.2. Measuring Instruments and Setting

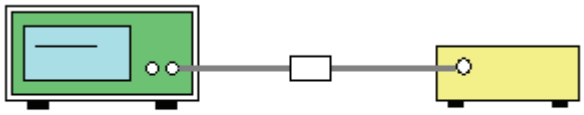
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RB	100 kHz
VB	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were used.
3. Measured the spectrum width with power higher than 6dB below carrier.

4.4.4. Test Setup Layout



4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.7. Test Result of 6dB Spectrum Bandwidth

Temperature	22℃	Humidity	60%
Test Engineer	Jacky Ho	Configurations	802.11a/b/g

Configuration IEEE 802.11b

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	10.08	15.52	500	Complies
6	2437 MHz	12.04	15.48	500	Complies
11	2462 MHz	11.08	15.52	500	Complies

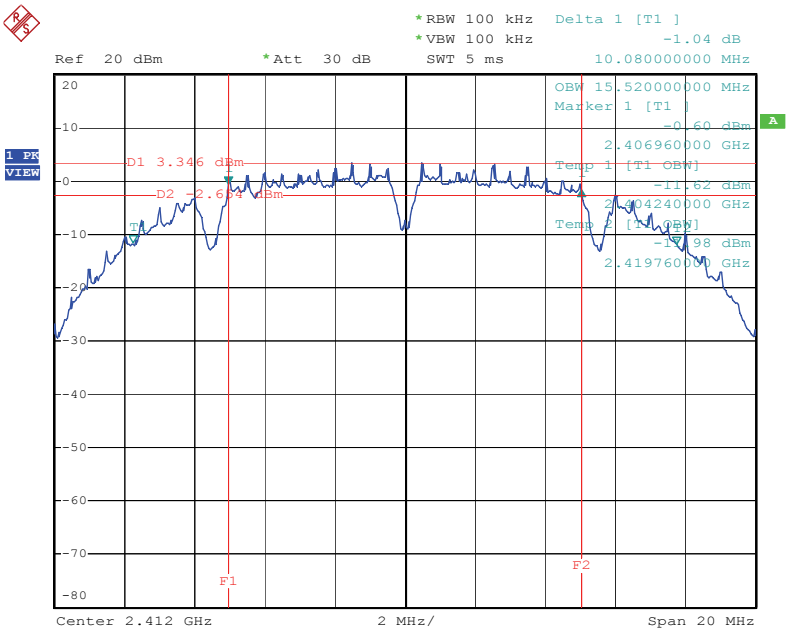
Configuration IEEE 802.11g

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	16.40	16.52	500	Complies
6	2437 MHz	16.32	16.64	500	Complies
11	2462 MHz	16.40	16.52	500	Complies

Configuration IEEE 802.11a

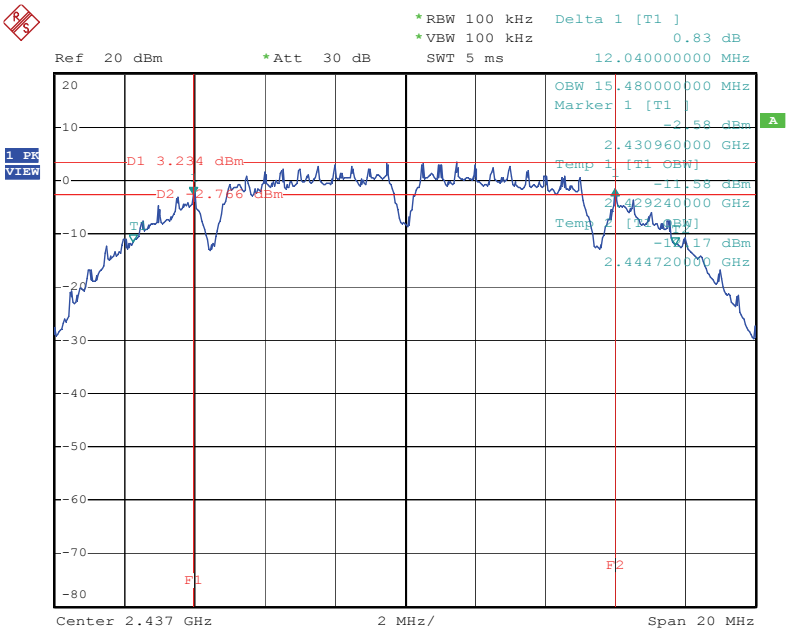
Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	16.36	16.56	500	Complies
157	5785 MHz	16.36	16.56	500	Complies
165	5825 MHz	16.36	16.56	500	Complies

6 dB Bandwidth Plot on Configuration IEEE 802.11b / 2412 MHz



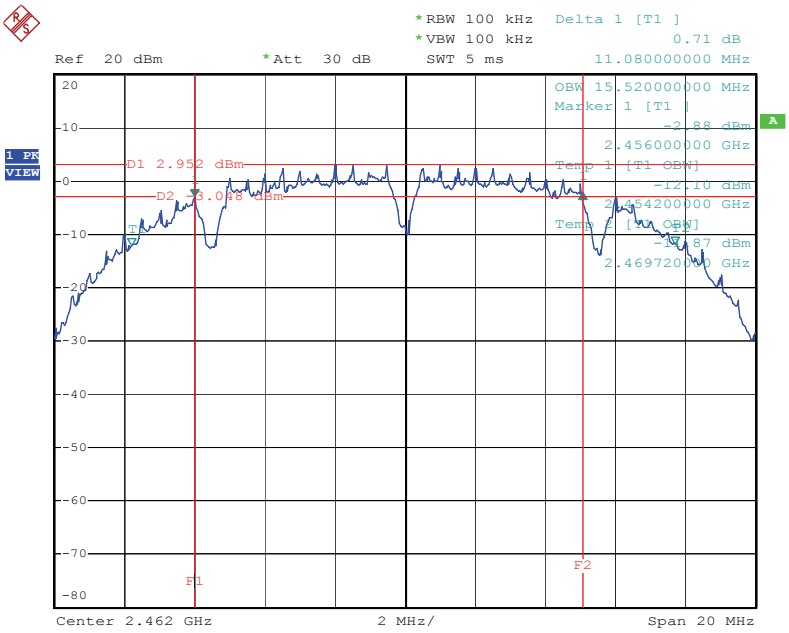
Date: 18.JUN.2008 17:32:52

6 dB Bandwidth Plot on Configuration IEEE 802.11b / 2437 MHz



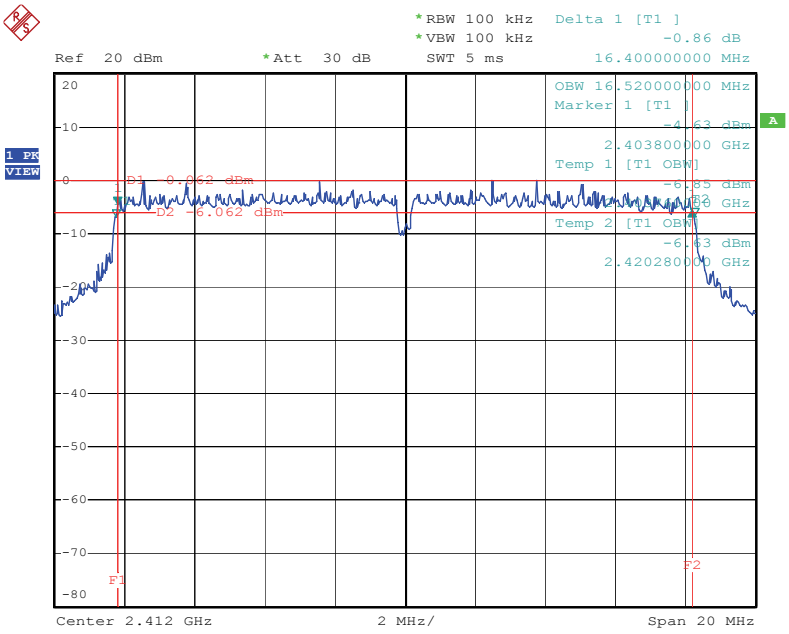
Date: 18.JUN.2008 17:33:54

6 dB Bandwidth Plot on Configuration IEEE 802.11b / 2462 MHz



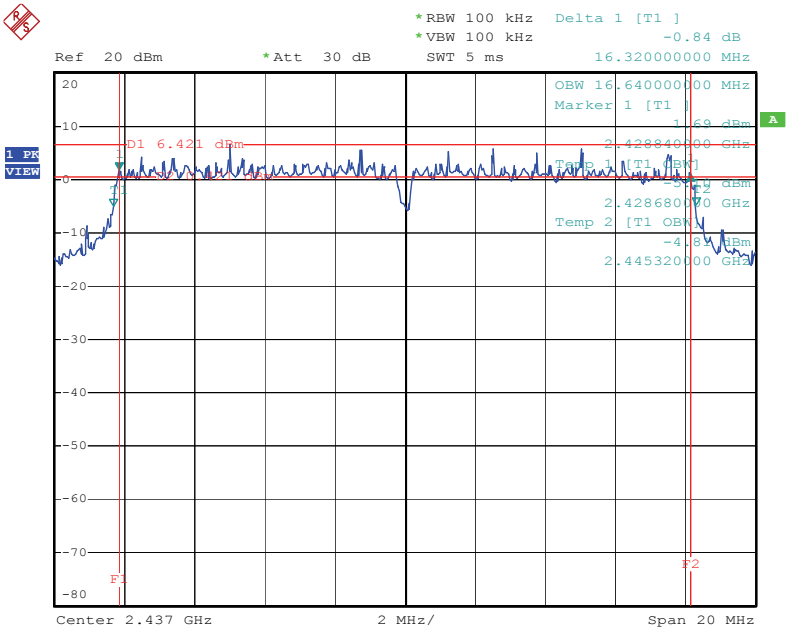
Date: 18.JUN.2008 17:34:35

6 dB Bandwidth Plot on Configuration IEEE 802.11g / 2412 MHz



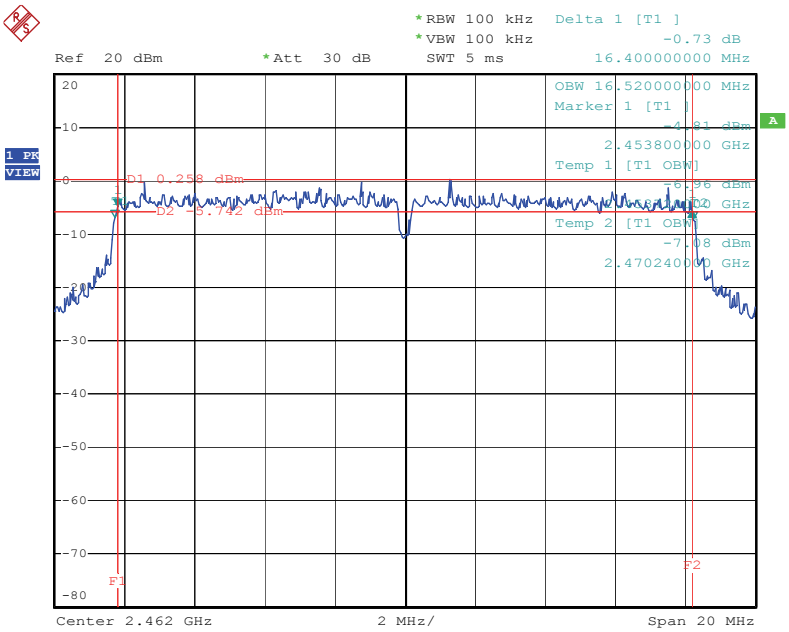
Date: 18.JUN.2008 17:37:14

6 dB Bandwidth Plot on Configuration IEEE 802.11g / 2437 MHz



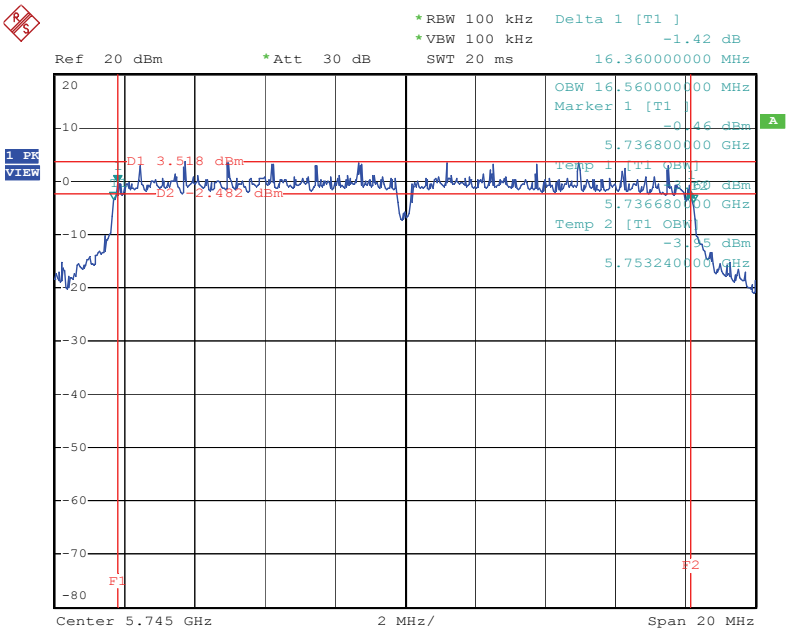
Date: 18.JUN.2008 17:36:28

6 dB Bandwidth Plot on Configuration IEEE 802.11g / 2462 MHz



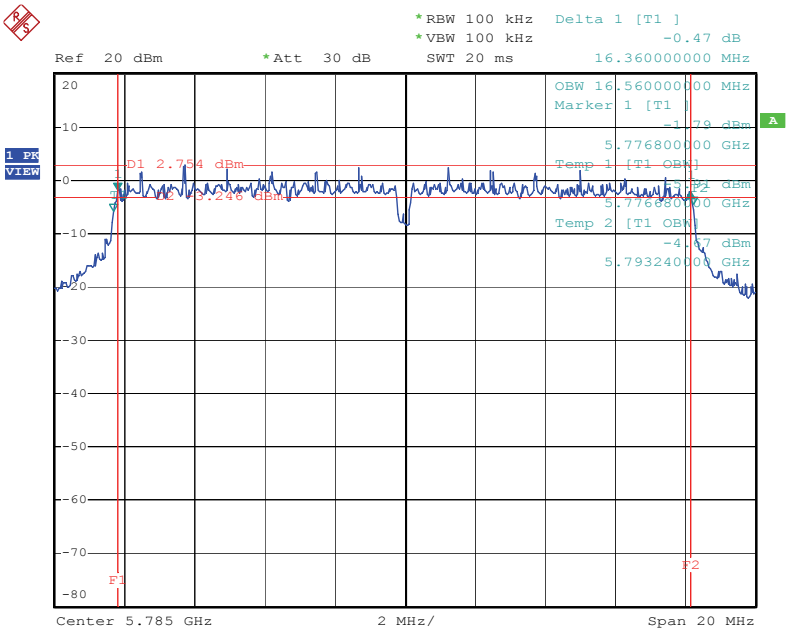
Date: 18.JUN.2008 17:35:36

6 dB Bandwidth Plot on Configuration IEEE 802.11a / 5745 MHz



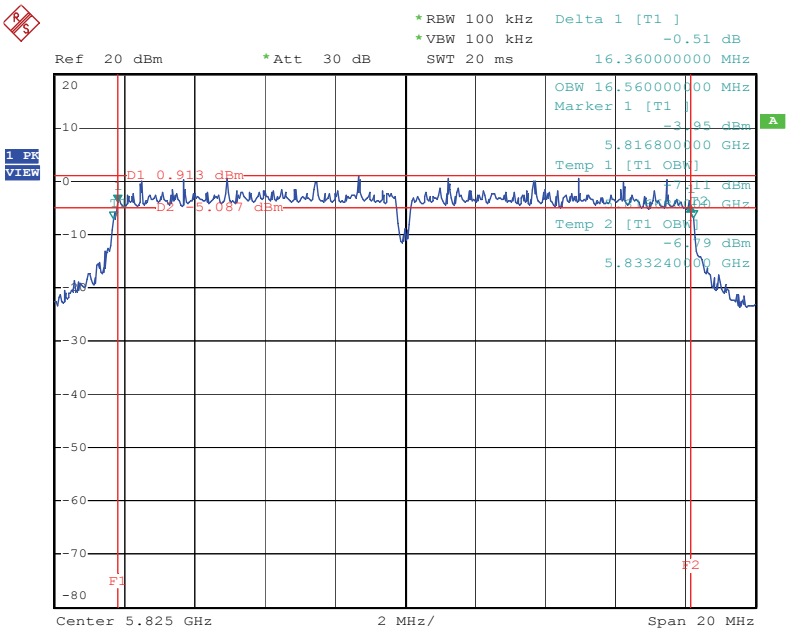
Date: 18.JUN.2008 17:42:36

6 dB Bandwidth Plot on Configuration IEEE 802.11a / 5785 MHz



Date: 18.JUN.2008 17:43:41

6 dB Bandwidth Plot on Configuration IEEE 802.11a / 5825 MHz



Date: 18.JUN.2008 17:44:34

4.5. Radiated Emissions Measurement

4.5.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.5.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	100KHz / 100KHz for peak

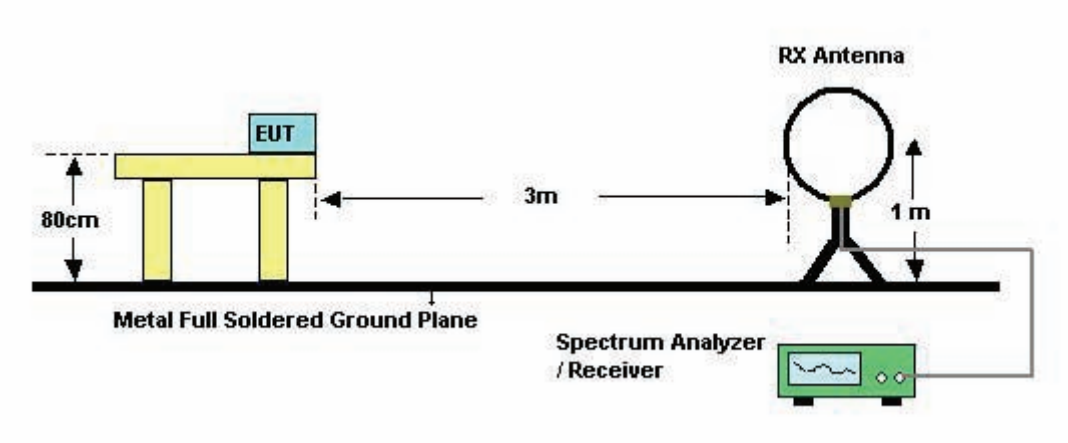
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.5.3. Test Procedures

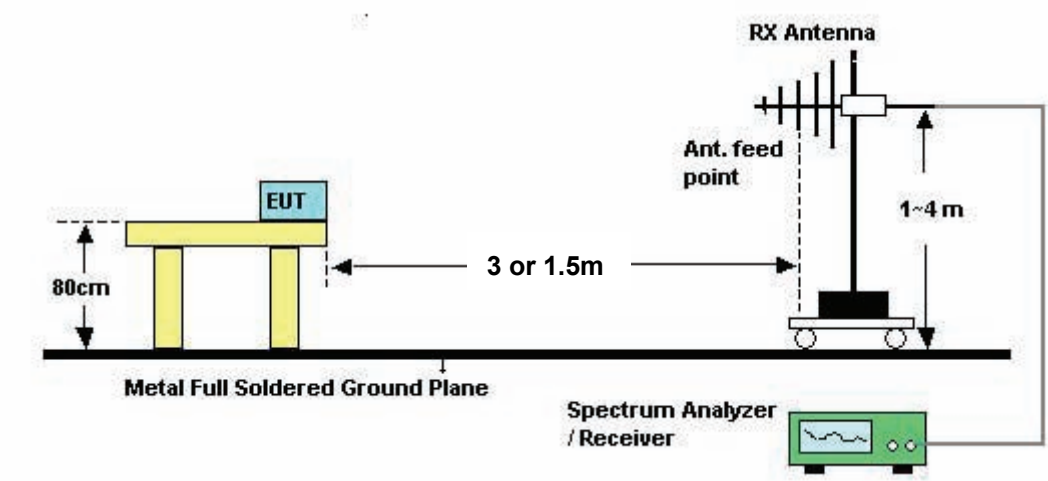
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average 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 for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions 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.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.5.4. Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1.5m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1.5m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.5.7. Results of Radiated Emissions (9kHz~30MHz)

Temperature	24.3℃	Humidity	62%
Test Engineer	Roy Huang		

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

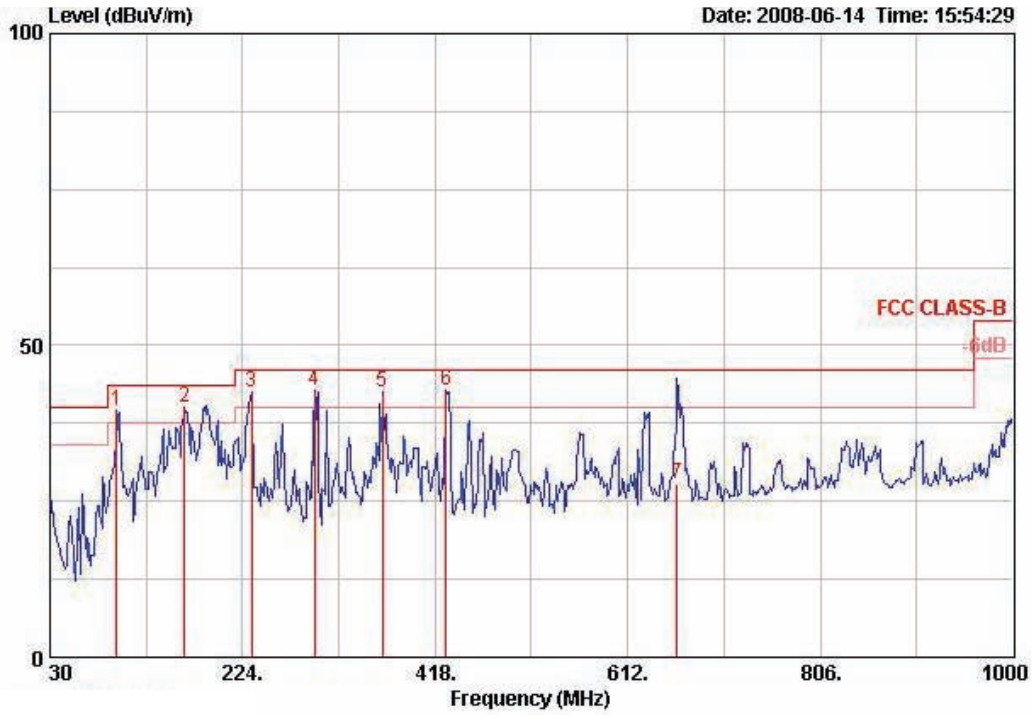
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

4.5.8. Results of Radiated Emissions (30MHz~1GHz)

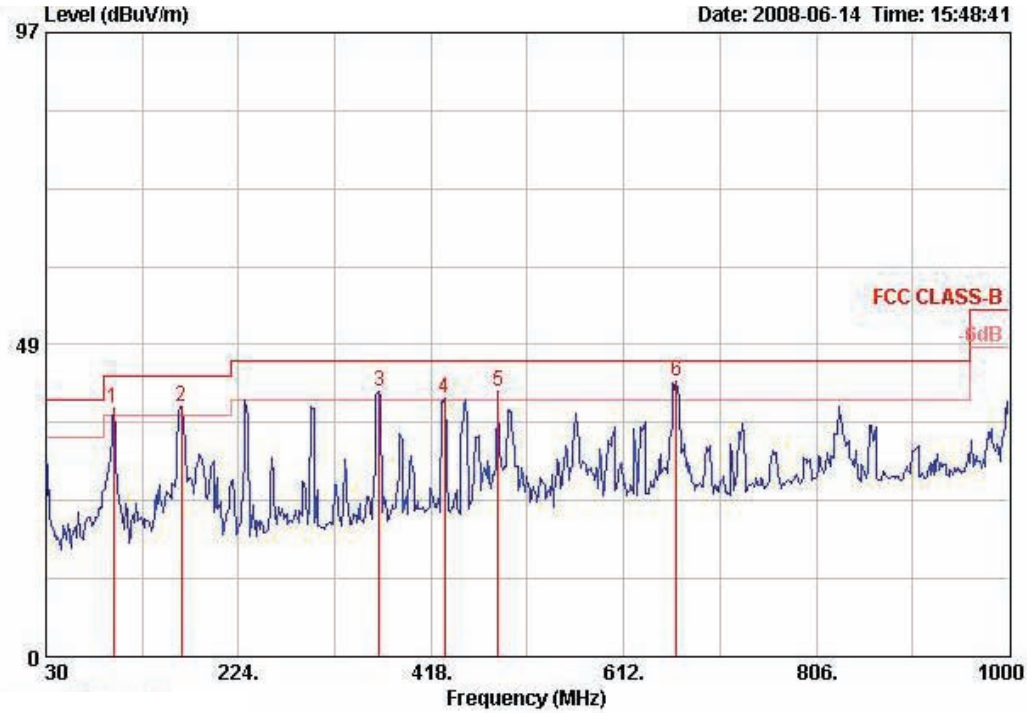
Temperature	24.3℃	Humidity	62%
Test Engineer	Roy Huang	Configurations	802.11a Ch 64

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 !	96.930	39.56	-3.94	43.50	54.72	10.39	0.49	26.03	Peak	100	0	HORIZONTAL
2 !	165.800	40.04	-3.46	43.50	52.50	12.47	0.72	25.64	Peak	100	0	HORIZONTAL
3 !	232.730	42.42	-3.58	46.00	55.29	11.48	1.08	25.43	Peak	100	0	HORIZONTAL
4 !	296.750	42.74	-3.26	46.00	53.24	13.33	1.14	24.97	Peak	100	0	HORIZONTAL
5 !	364.650	42.58	-3.42	46.00	51.32	15.12	1.29	25.15	Peak	100	0	HORIZONTAL
6 @	428.670	42.78	-3.22	46.00	50.54	16.51	1.50	25.77	Peak	100	0	HORIZONTAL
7	661.470	27.87	-18.13	46.00	32.90	18.97	2.15	26.14	QP	122	52	HORIZONTAL

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 !	97.900	38.49	-5.01	43.50	53.48	10.59	0.42	26.00	Peak	400	0	VERTICAL
2 !	166.770	38.89	-4.61	43.50	51.26	12.54	0.71	25.62	Peak	400	0	VERTICAL
3 !	365.620	41.28	-4.72	46.00	50.00	15.14	1.30	25.16	Peak	400	0	VERTICAL
4 !	431.580	40.20	-5.80	46.00	47.94	16.56	1.49	25.79	Peak	400	0	VERTICAL
5 !	485.900	41.31	-4.69	46.00	48.44	17.40	1.70	26.23	Peak	400	0	VERTICAL
6 !	665.350	42.78	-3.22	46.00	47.78	18.98	2.14	26.12	Peak	400	0	VERTICAL

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

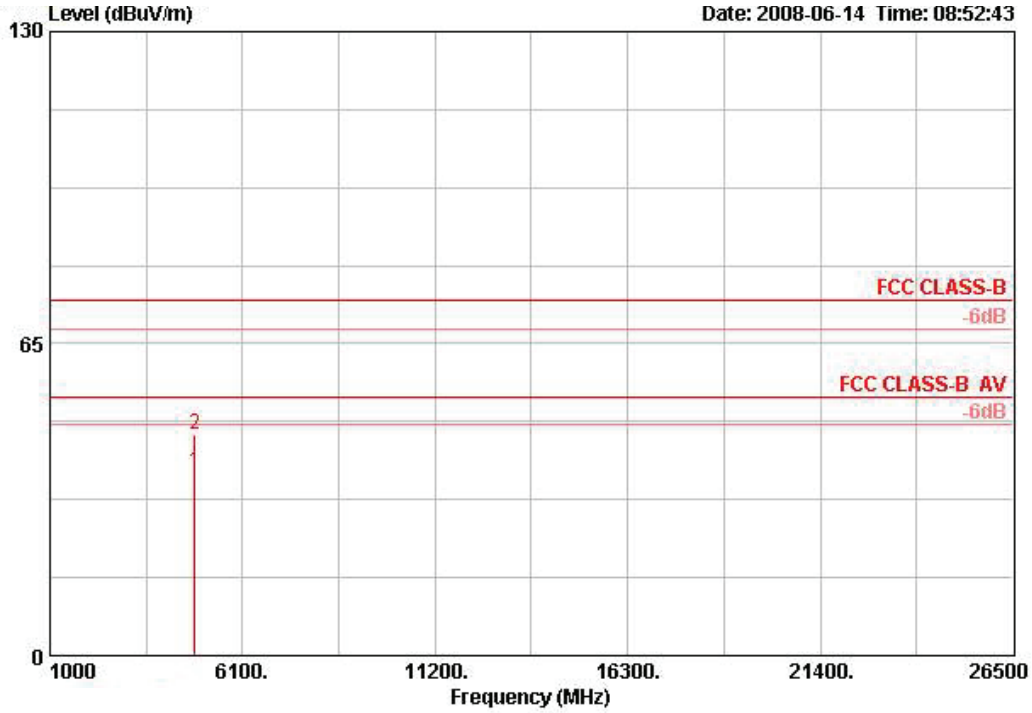
Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.5.9. Results for Radiated Emissions (1GHz~10th Harmonic)

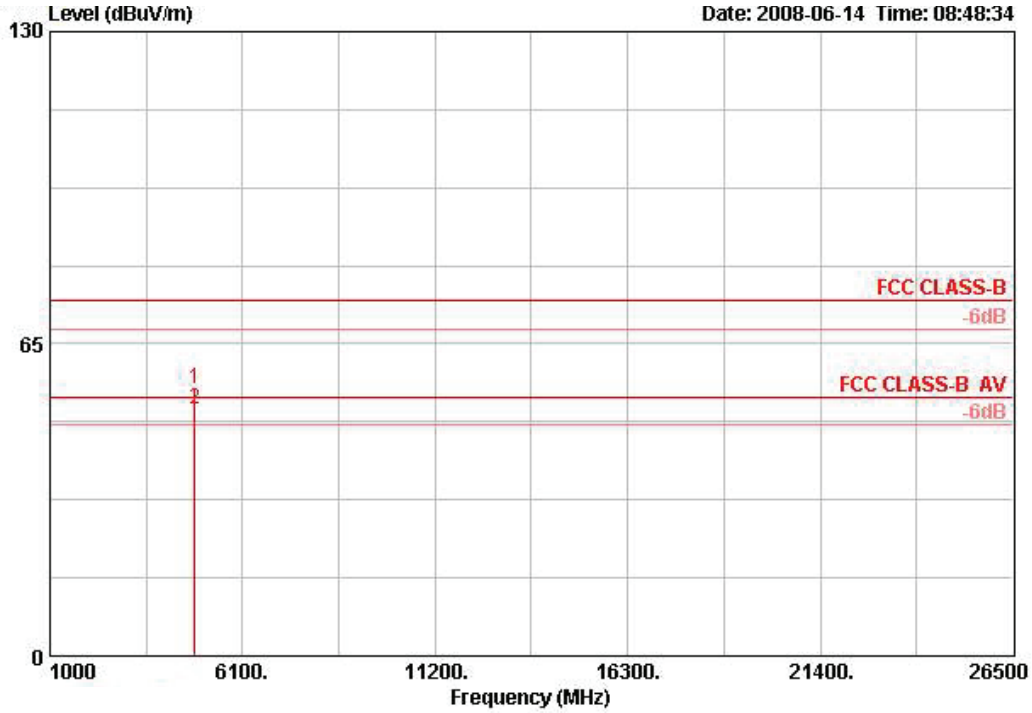
Temperature	24.3℃	Humidity	62%
Test Engineer	Roy Huang	Configurations	802.11b CH 1

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	4823.910	38.19	-15.81	54.00	36.68	33.39	3.37	35.25	AVERAGE	100	243	HORIZONTAL
2	4824.200	46.09	-27.91	74.00	44.58	33.39	3.37	35.25	PEAK	100	243	HORIZONTAL

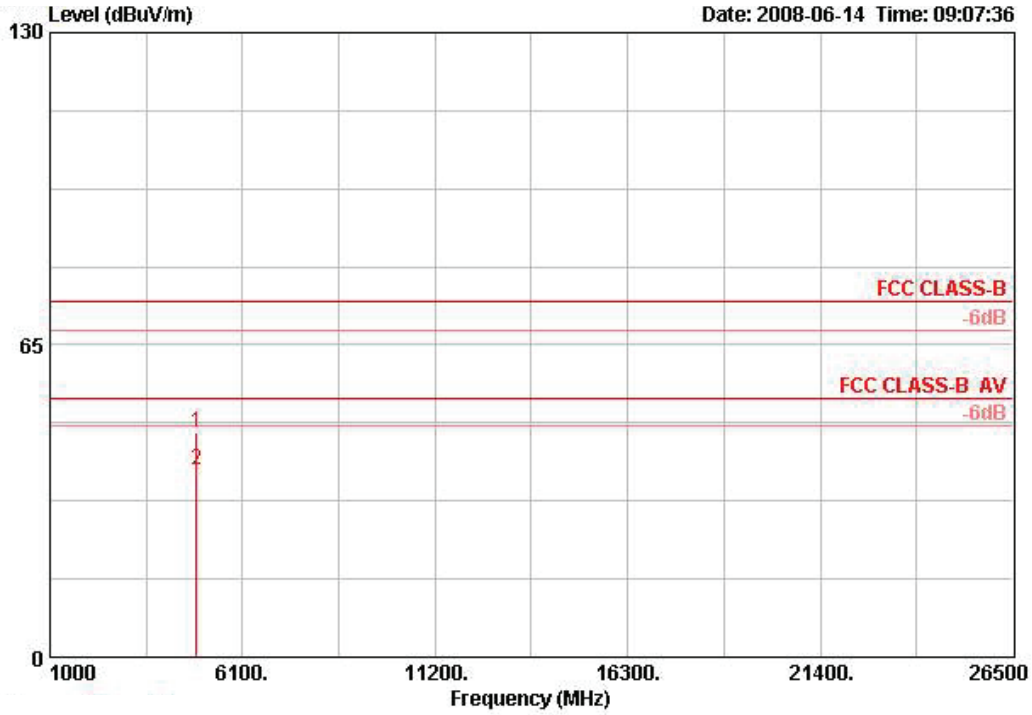
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	4823.720	55.48	-18.52	74.00	53.97	33.39	3.37	35.25	PEAK	119	279	VERTICAL
2 @	4823.910	51.53	-2.47	54.00	50.02	33.39	3.37	35.25	AVERAGE	119	279	VERTICAL

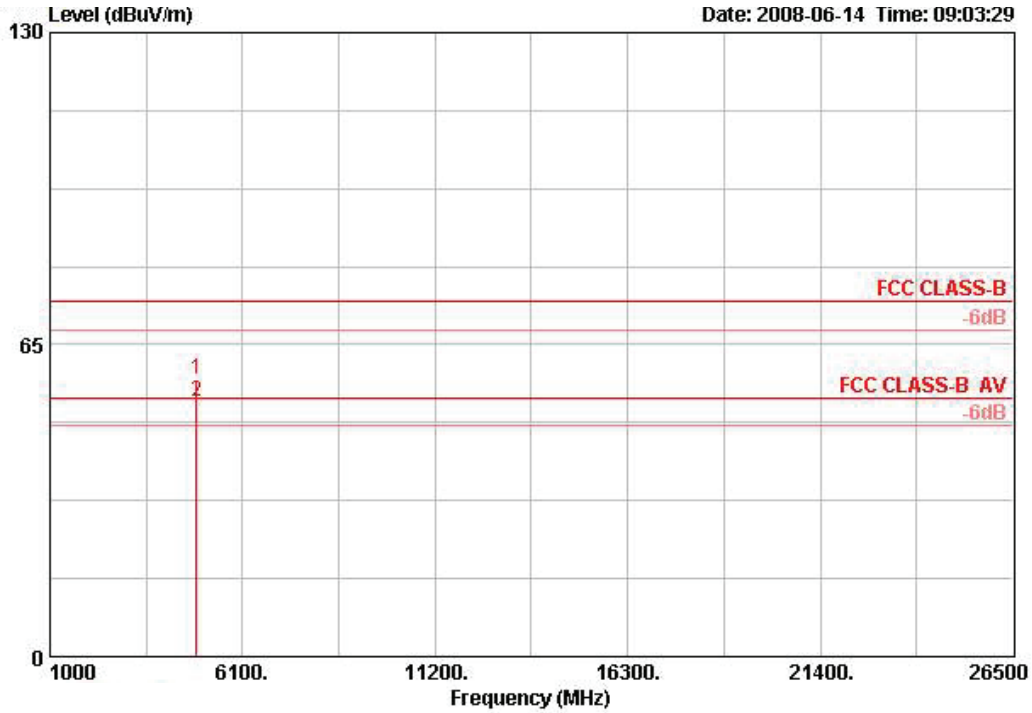
Temperature	24.3℃	Humidity	62%
Test Engineer	Roy Huang	Configurations	802.11b CH 6

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	4873.900	46.90	-27.10	74.00	45.28	33.48	3.38	35.25	PEAK	100	243	HORIZONTAL
2	4873.990	39.03	-14.97	54.00	37.41	33.48	3.38	35.25	AVERAGE	100	243	HORIZONTAL

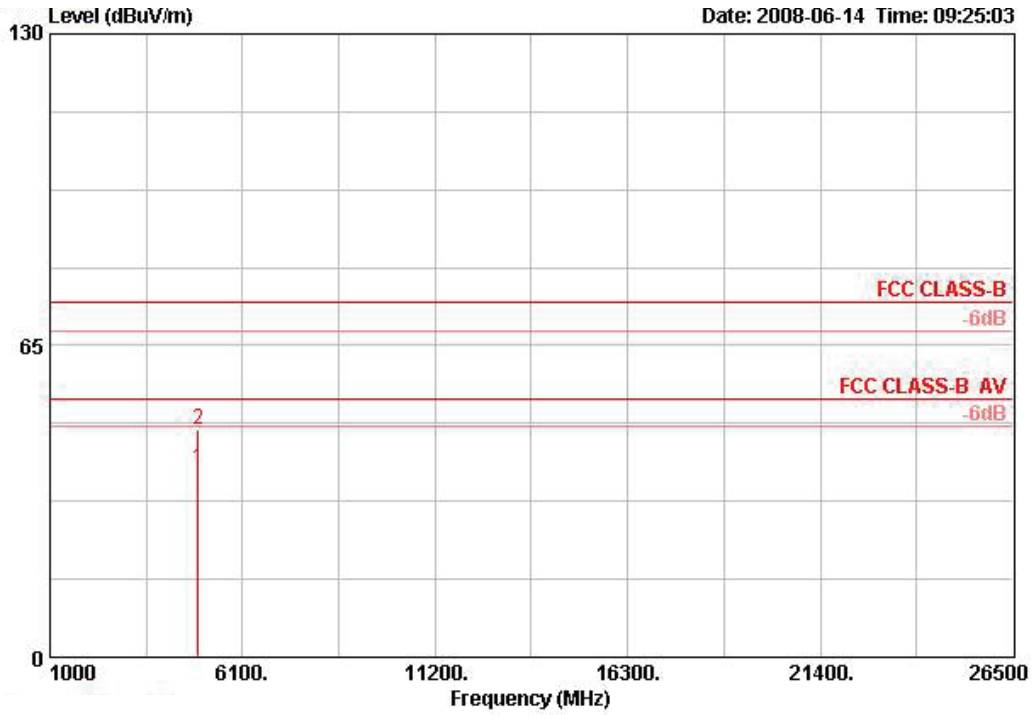
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	4873.860	57.85	-16.15	74.00	56.23	33.48	3.38	35.25	PEAK	133	279	VERTICAL
2 @	4874.070	53.16	-0.84	54.00	51.54	33.48	3.38	35.25	AVERAGE	133	279	VERTICAL

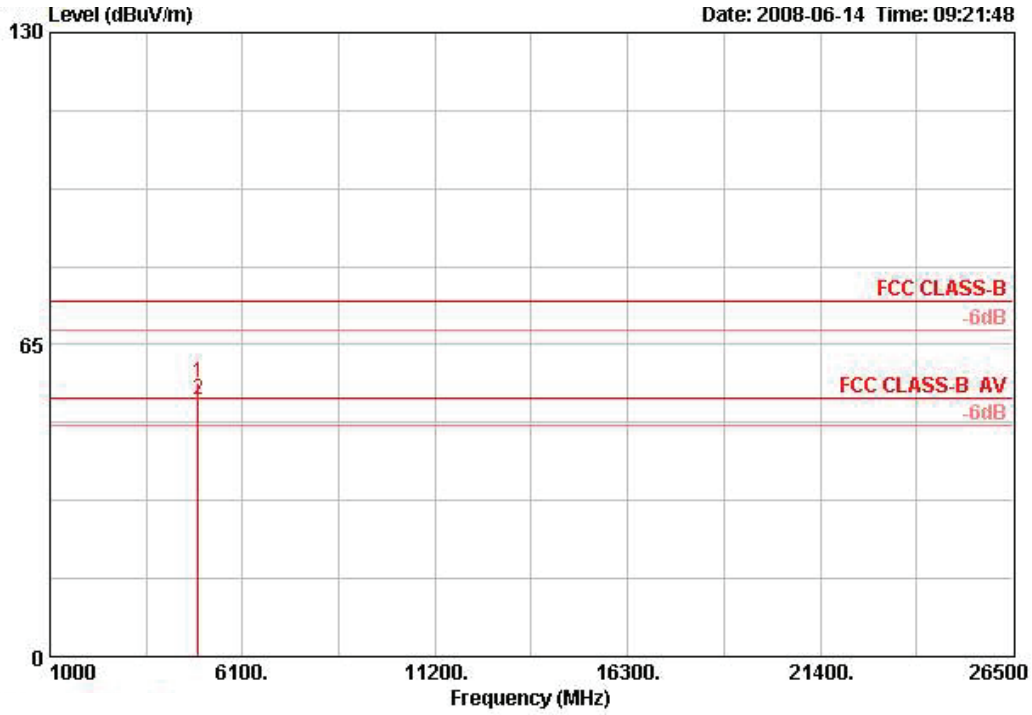
Temperature	24.3℃	Humidity	62%
Test Engineer	Roy Huang	Configurations	802.11b CH 11

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	4923.830	39.16	-14.84	54.00	37.43	33.58	3.40	35.24	AVERAGE	100	240	HORIZONTAL
2	4923.910	47.33	-26.67	74.00	45.60	33.58	3.40	35.24	PEAK	100	240	HORIZONTAL

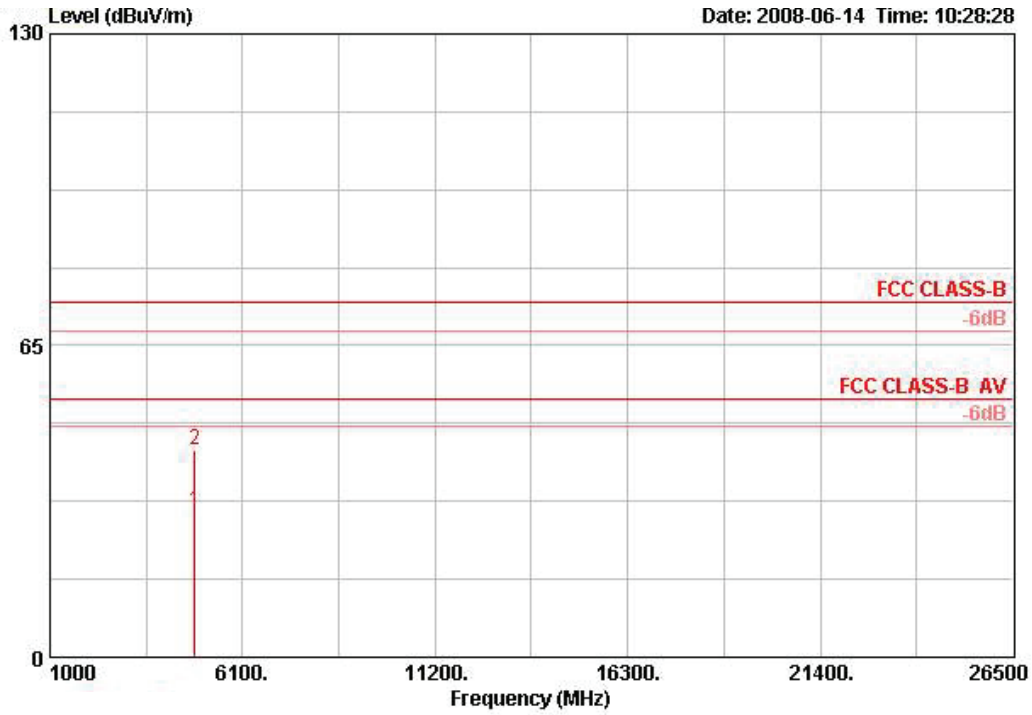
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	4923.670	56.90	-17.10	74.00	55.17	33.58	3.40	35.24	PEAK	148	284	VERTICAL
2 @	4924.050	53.35	-0.65	54.00	51.61	33.58	3.40	35.24	AVERAGE	148	284	VERTICAL

Temperature	24.3℃	Humidity	62%
Test Engineer	Roy Huang	Configurations	802.11g CH 1

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	4823.510	30.51	-23.49	54.00	29.00	33.39	3.37	35.25	AVERAGE	100	360	HORIZONTAL
2	4825.270	43.33	-30.67	74.00	41.82	33.39	3.37	35.25	PEAK	100	360	HORIZONTAL