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FCC RADIO TEST REPORT

Applicant's company	**SparkLAN Communications, Inc.**
Applicant Address	3F, No. 246, Sec. 1, Nei-Hu Rd., 114 Nei-Hu, Taipei, Taiwan
FCC ID	**RYK-WUBZ100**
Manufacturer's company	**SparkLAN Communications, Inc.**
Manufacturer Address	3F, No. 246, Sec. 1, Nei-Hu Rd., 114 Nei-Hu, Taipei, Taiwan

Product Name	WLAN 802.11g+Bluetooth 2-in-1 USB Dongle
Brand Name	SparkLAN
Model Name	WUBZ 100
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz
Receive Date	June 30, 2004
Test Date	Nov. 23, 2004
Submission Type	Original Equipment

Statement

Test result included is only for the 802.11b/g part 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.

Table of Contents

History of This Test Report

Original Issue Date: Dec. 17, 2005

Report No.: FR483129-35

■ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

1. CERTIFICATE OF COMPLIANCE

Product Name	:	**WLAN 802.11g+Bluetooth 2-in-1 USB Dongle**
Brand Name	:	**SparkLAN**
Model Name	:	**WUBZ 100**
Applicant	:	**SparkLAN Communications, Inc.**
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 June 30, 2004 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.

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	21.06 dB
4.2	15.247(b)(3)	Maximum Peak Conducted Output Power	Complies	17.70 dB
4.3	15.247(e)	Power Spectral Density	Complies	-16.22 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	0.01 dB
4.6	15.247(d)	Band Edge Emissions	Complies	1.87 dB
4.7	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.26dB	Confidence levels of 95%
Maximum Peak Conducted Output Power	±0.5dB	Confidence levels of 95%
Power Spectral Density	±0.71dB	Confidence levels of 95%
6dB Spectrum Bandwidth	±6.25X10-7	Confidence levels of 95%
Radiated Emissions/ Band Edge Emissions	±3.72dB	Confidence levels of 95%

3. GENERAL INFORMATION

3.1. Product Details

EUT IS a multi-function wireless notebook with IEEE 802.11b/g, Bluetooth. Only the radio detail of WLAN is shown in the table below. For more detailed features description, please refer to the manufacturer's specifications or user's manual.

Items	Description
Product Type	WLAN
Radio Type	Intentional Transceiver
Power Type	Power Adapter from host
Interface Type	USB
Modulation	DSSS for IEEE 802.11b ; OFDM for IEEE 802.11g
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
Channel Number	11
Channel Band Width (99%)	11b: 15.32 MHz ; 11g: 16.56 MHz
Conducted Output Power	11b: 12.30 dBm ; 11g: 12.17 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

3.2. Accessories

No accessory is provided.

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	-	-	Printed Antenna	NA	1

3.4. Table for Carrier Frequencies

Freqeuncy 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		

3.5. Table for Test Modes

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	11 Mbps	6	1
Maximum Peak Conducted Output Power	11b/CCK	11 Mbps	1/6/11	NA
Power Spectral Density	11g/BPSK	6 Mbps	1/6/11	NA
6dB Spectrum Bandwidth	11g/BPSK Turbo	12 Mbps	6	NA
Radiated Emissions 9kHz~1GHz	11g/BPSK	6 Mbps	6	1
Radiated Emissions 1GHz~10th Harmonic	11b/CCK	11 Mbps	1/6/11	1
Band Edge Emissions	11g/BPSK	6 Mbps	1/6/11	1
	11g/BPSK Turbo	12 Mbps	6	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	101377	IC 4088	-
TH01-HY	OVEN Room	Hwa Ya	-	-	-

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

3.7. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Notebook	DELL	PP01L	DoC
Printer	EPSON	Stylus Color 680	DoC
Modem	ACEEX	-	DoC

3.8. Table for Parameters of Test Software Setting

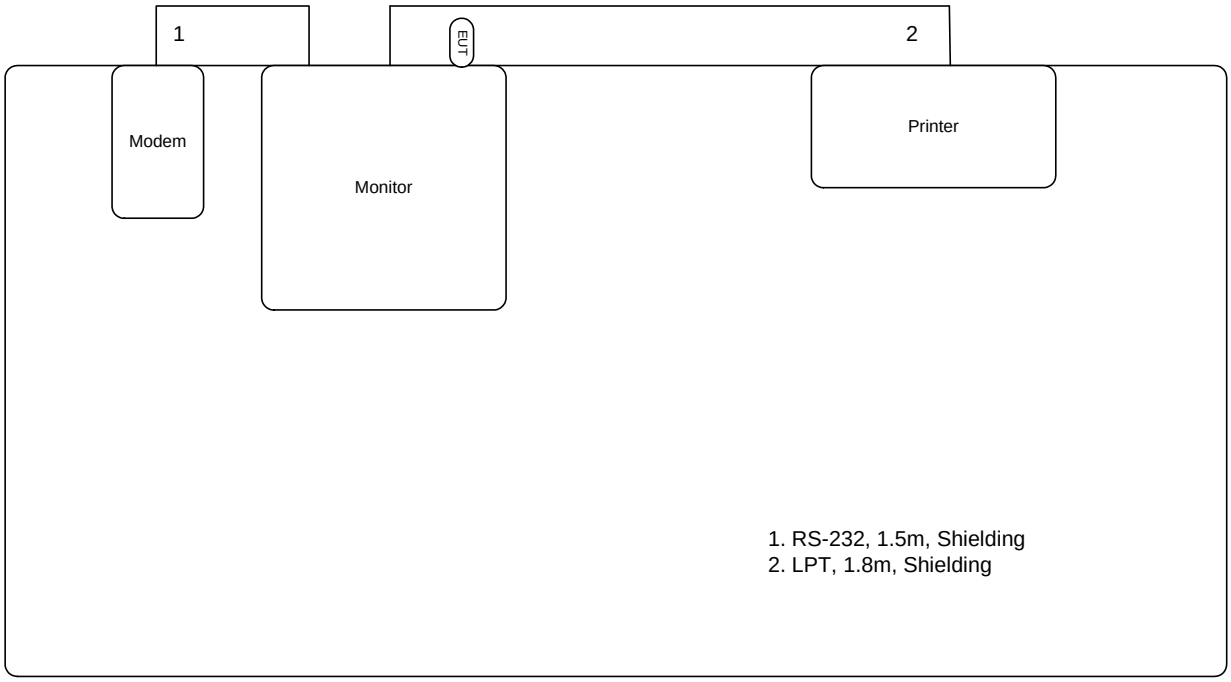
During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final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

Power Parameters of IEEE 802.11b/g

Test Software Version	ART		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	12	12	12
IEEE 802.11g	12	12	12

3.9. Test Configurations

3.9.1. Connection Diagram of Test System



4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For a Low-power Radio-frequency Device 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

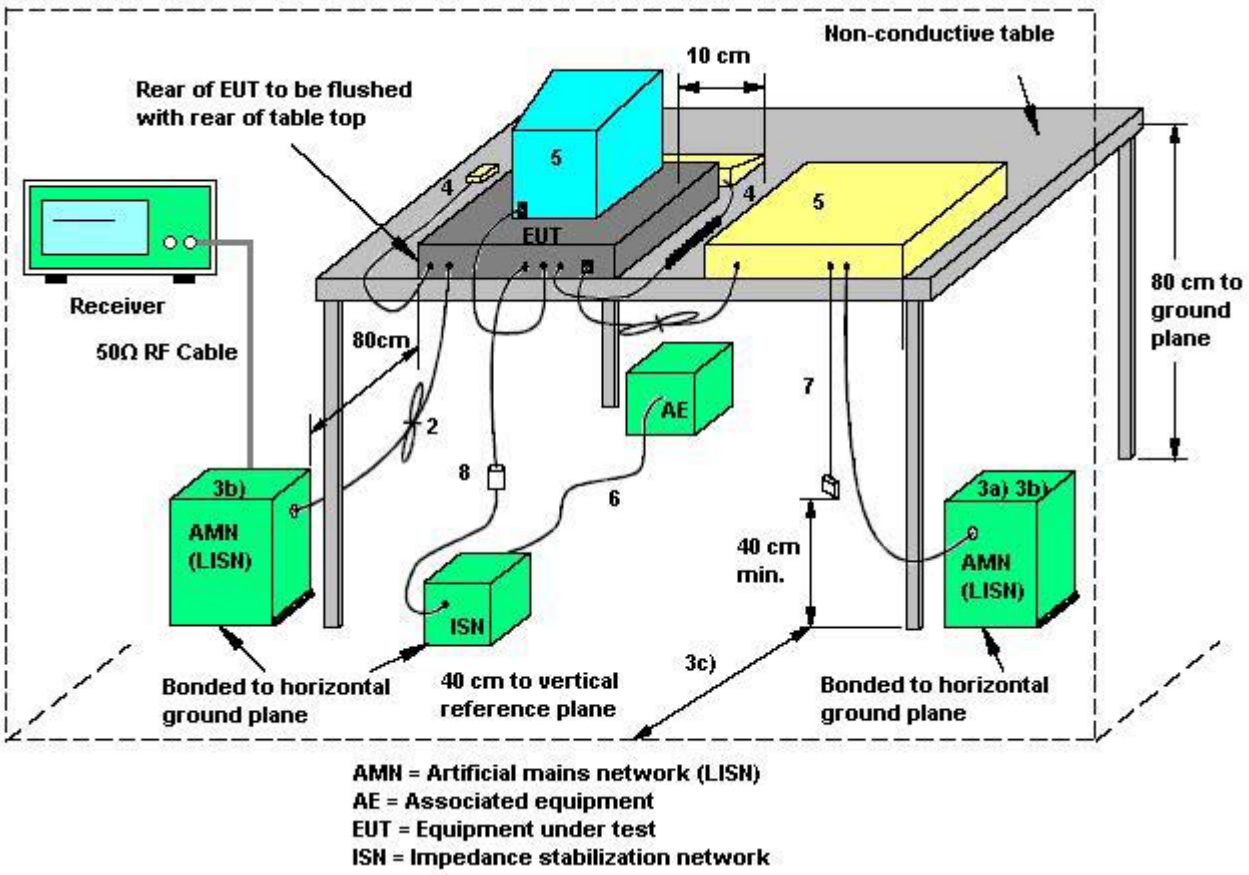
Please refer to section 5 in this report. The following table is the setting of the receiver.

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



1. If cables, which hang closer than 40 cm to the horizontal metal groundplane, cannot be shortened to appropriate length, the excess shall be folded back and forth forming a bundle 30 cm to 40 cm long.
2. Excess mains cord shall be bundled in the centre or shortened to appropriate length.
3. EUT is connected to one artificial mains network (AMN). All AMNs and ISNs may alternatively be connected to a vertical reference plane or metal wall.
4. All other units of a system are powered from a second AMN. A multiple outlet strip can be used for multiple mains cords.
5. AMN and ISN are 80 cm from the EUT and at least 80 cm from other units and other metal planes.
6. Mains cords and signal cables shall be positioned for their entire lengths, as far as possible, at 40 cm from the vertical reference plane.
7. Cables of hand operated devices, such as keyboards, mouses, etc. shall be placed as for normal usage.
8. Peripherals shall be placed at a distance of 10 cm from each other and from the controller, except for the monitor which, if this is an acceptable installation practice, shall be placed directly on the top of the controller.
9. I/O signal cable intended for external connection.
10. The end of the I/O signal cables which are not connected to an AE may be terminated, if required, using correct terminating impedance.
11. If used, the current probe shall be placed at 0,1 m from the ISN.

4.1.5. Test Deviation

There is no deviations 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	24℃	Humidity	50%
Test Engineer	Sky Wu	Phase	Line
Configuration	RF Link		

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Read Level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Remark
0.15	36.25	-29.45	65	35.85	0.1	0.3	QP
0.15	22.83	-32.87	55	22.43	0.1	0.3	Average
0.22	35.59	-26.98	62	35.45	0.1	0.04	QP
0.22	21.37	-31.20	52	21.23	0.1	0.04	Average
0.34	32.93	-26.25	59	32.73	0.1	0.10	QP
0.34	27.15	-22.03	49	26.95	0.1	0.10	Average
1.87	25.19	-30.81	56	25.03	0.1	0.06	QP
1.87	14.40	-31.6	46	14.24	0.1	0.06	Average
3.90	21.96	-34.04	56	21.66	0.2	0.10	QP
3.90	15.66	-30.34	46	15.36	0.2	0.10	Average
10.23	32.41	-27.59	60	31.81	0.2	0.40	QP
10.23	26.61	-23.39	50	26.01	0.2	0.40	Average

Temperature	24°C	Humidity	50%
Test Engineer	Sky Wu	Phase	Neutral
Configuration	RF Link		

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Read Level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Remark
0.151	44.85	-21.06	65	44.42	0.1	0.33	QP
0.15	24.88	-31.03	55	24.45	0.1	0.33	Average
0.22	40.76	-22.03	62	40.63	0.1	0.03	QP
0.22	25.53	-27.26	52	25.40	0.1	0.03	Average
0.34	33.48	-25.52	59	33.28	0.1	0.10	QP
0.34	19.24	-29.76	49	19.04	0.1	0.10	Average
1.82	28.02	-27.98	56	27.84	0.1	0.08	QP
1.82	18.19	-27.81	46	18.01	0.1	0.08	Average
4.38	23.96	-32.04	56	23.76	0.1	0.09	QP
4.38	15.6	-30.4	46	15.40	0.1	0.09	Average
10.34	33.68	-26.32	60	33.06	0.2	0.42	QP
10.34	28.01	-21.99	50	27.39	0.2	0.42	Average

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. Maximum Peak 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.

4.2.2. Measuring Instruments and Setting

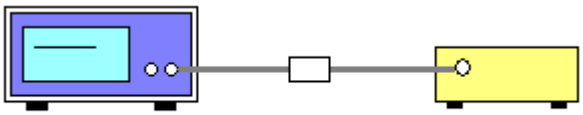
Please refer to section 5 in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Filter No.	Auto
Measurement time	0.135 s ~ 26 s
Used Peak Sensor	NRV-Z32 (model 04)

4.2.3. Test Procedures

1. The transmitter output (antenna port) was connected to the power meter.
2. Turn on the EUT and power meter and then record the peak power value.
3. Repeat above procedures on all channels needed to be tested.

4.2.4. Test Setup Layout



4.2.5. Test Deviation

There are 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 Peak Output Power

Temperature	23℃	Humidity	50%
Test Engineer	Sam Lee	Configurations	802.11b/g

Configuration IEEE 802.11b

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	12.30	30.00	**Complies**
6	2437 MHz	12.28	30.00	**Complies**
11	2462 MHz	12.30	30.00	**Complies**

Configuration IEEE 802.11g

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	11.99	30.00	**Complies**
6	2437 MHz	12.17	30.00	**Complies**
11	2462 MHz	12.04	30.00	**Complies**

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 8 dBm in any 3 kHz band during any time interval of continuous transmission.

4.3.2. Measuring Instruments and Setting

Please refer to section 5 in this report. The following table is the setting of 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 are 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	23℃	Humidity	50%
Test Engineer	Sam Lee	Configurations	802.11b/g

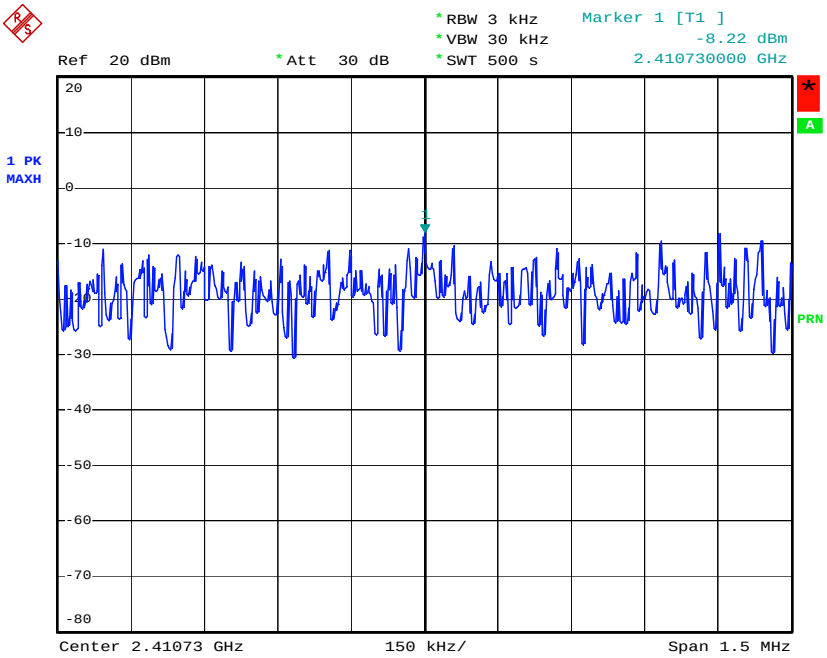
Configuration IEEE 802.11b

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-8.22	8.00	**Complies**
6	2437 MHz	-8.69	8.00	**Complies**
11	2462 MHz	-8.64	8.00	**Complies**

Configuration IEEE 802.11g

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-16.84	8.00	**Complies**
6	2437 MHz	-16.68	8.00	**Complies**
11	2462 MHz	-16.36	8.00	**Complies**

Power Density Plot on Configuration IEEE 802.11b / 2412 MHz



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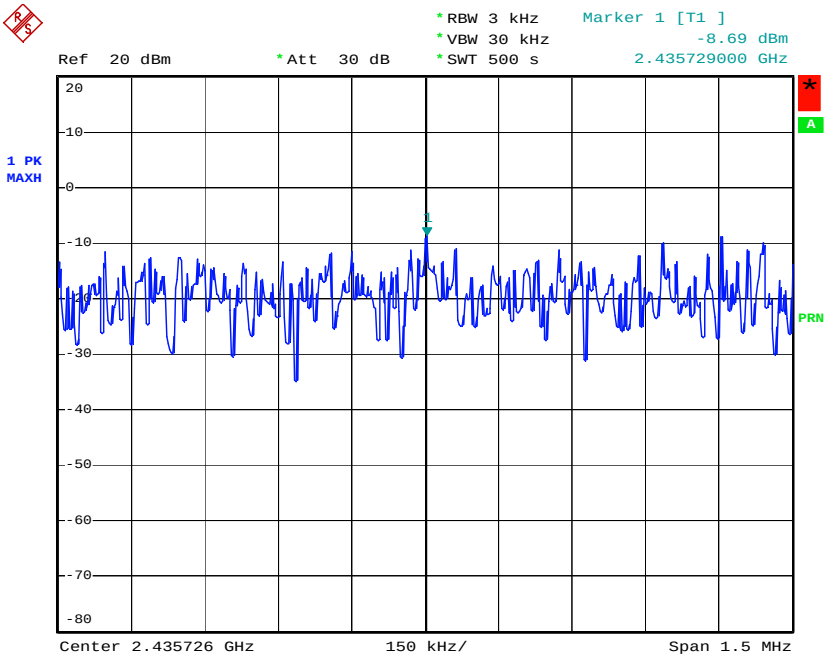
Power Density Plot on Configuration IEEE 802.11b / 2437 MHz



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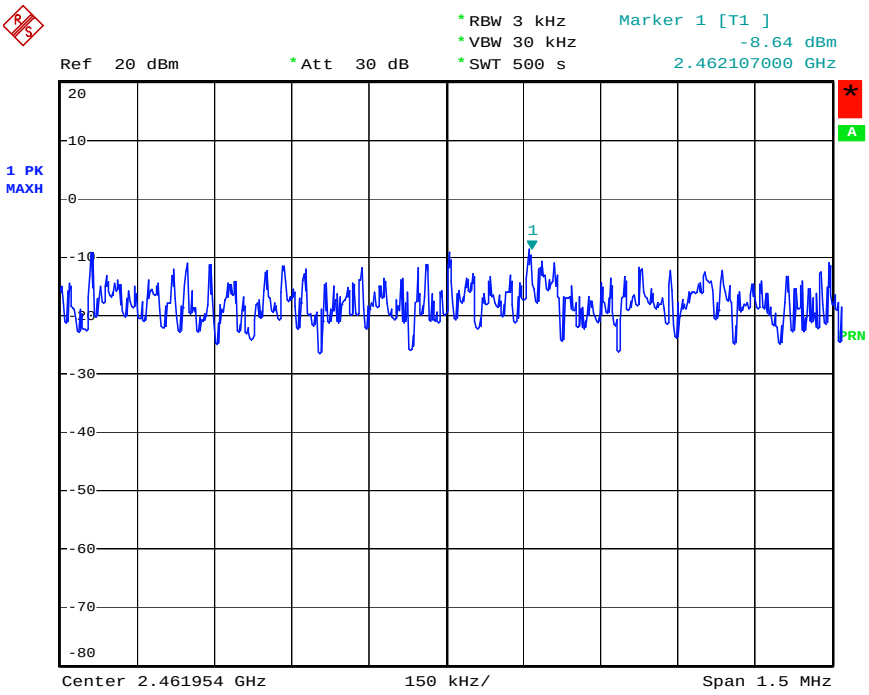
Power Density Plot on Configuration IEEE 802.11b / 2462 MHz



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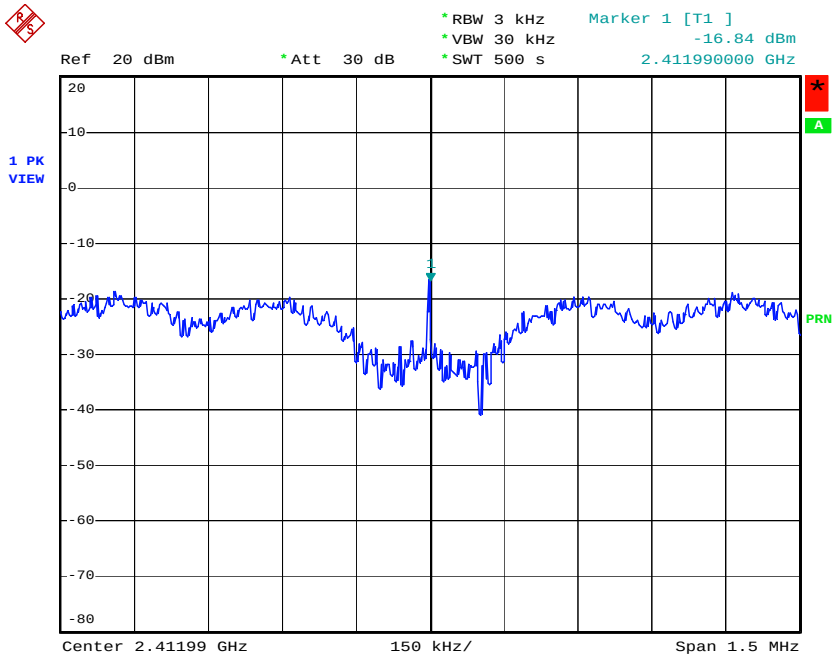
Power Density Plot on Configuration IEEE 802.11g / 2412 MHz



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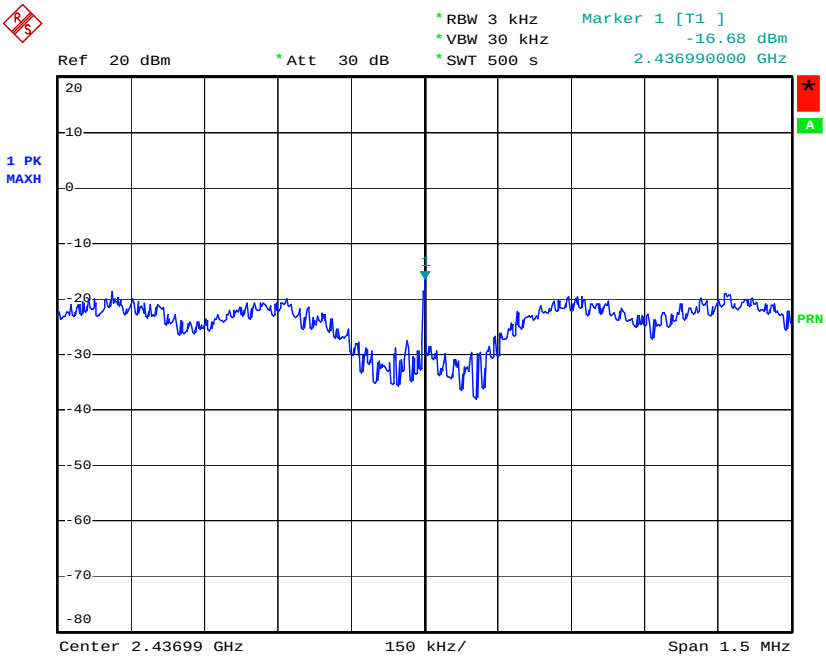
Power Density Plot on Configuration IEEE 802.11g / 2437 MHz



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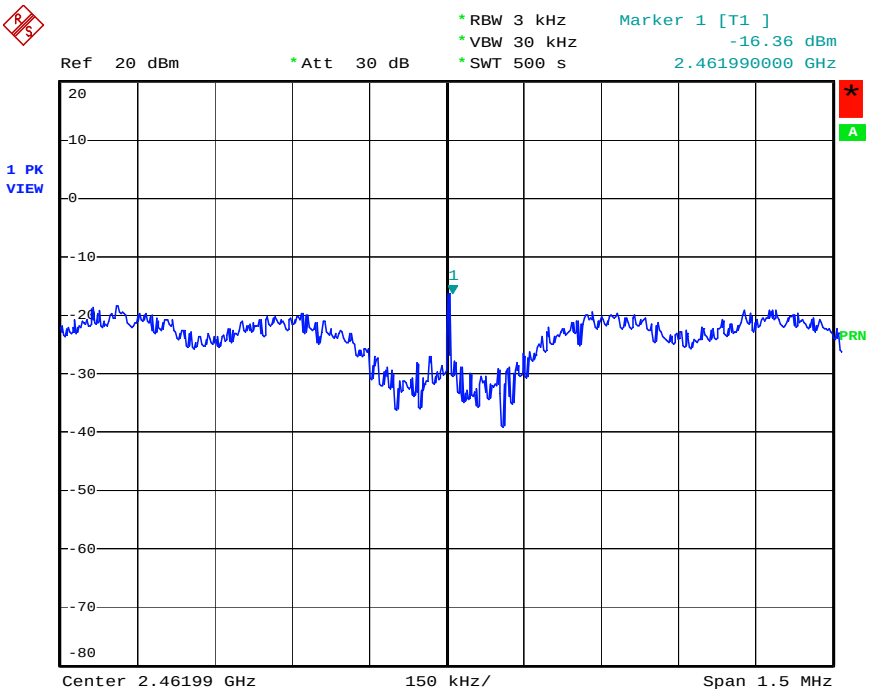
Power Density Plot on Configuration IEEE 802.11g / 2462 MHz



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4.4. 6dB Spectrum Bandwidth Measurement

4.4.1. Limit

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

4.4.2. Measuring Instruments and Setting

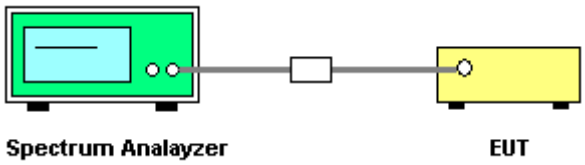
Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

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 deviations 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	23°C	Humidity	50%
Test Engineer	Sam Lee	Configurations	802.11b/g

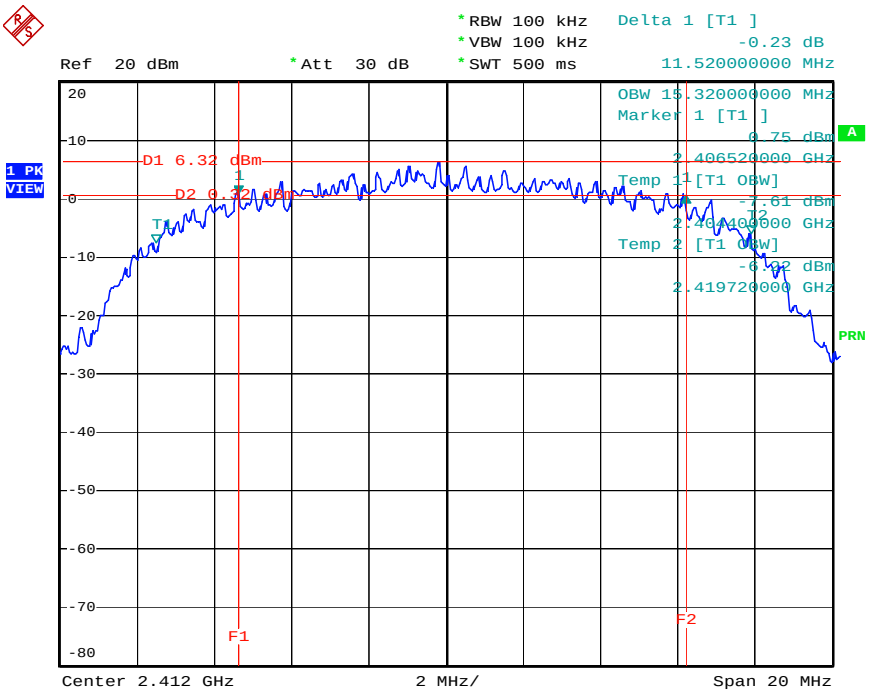
Configuration IEEE 802.11b

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	11.52	15.32	500	Complies
6	2437 MHz	11.52	15.28	500	Complies
11	2462 MHz	11.52	15.32	500	Complies

Configuration IEEE 802.11g

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	16.44	16.48	500	Complies
6	2437 MHz	16.44	16.56	500	Complies
11	2462 MHz	16.44	16.52	500	Complies

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



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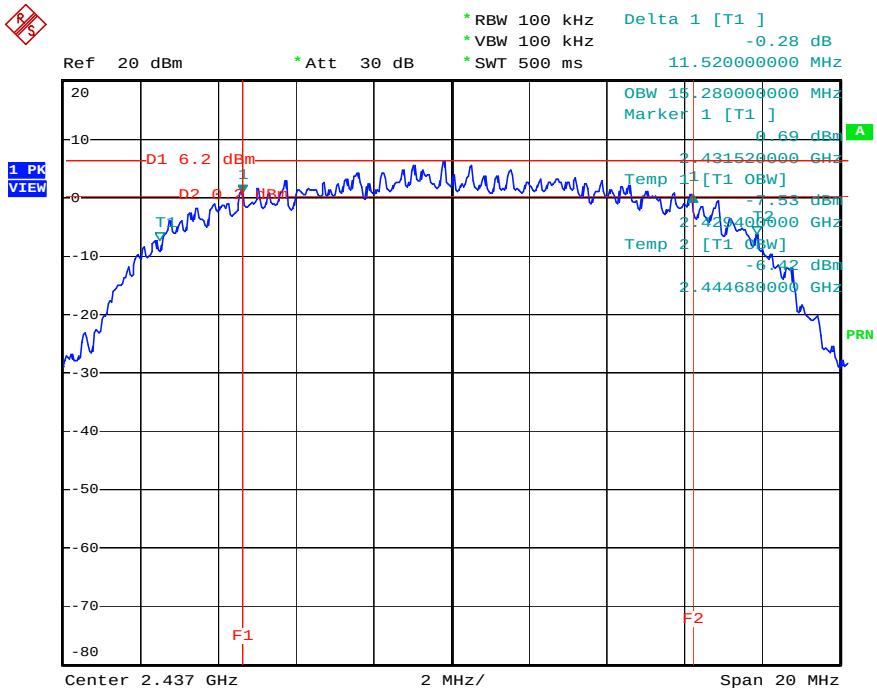
6 dB Bandwidth Plot on Configuration IEEE 802.11b / 2437 MHz



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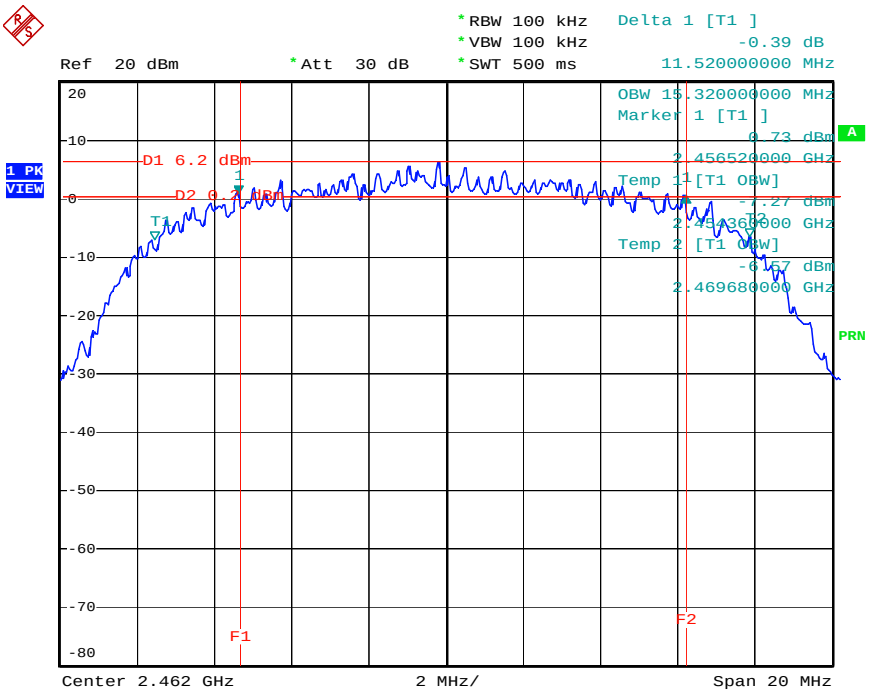
6 dB Bandwidth Plot on Configuration IEEE 802.11b / 2462 MHz



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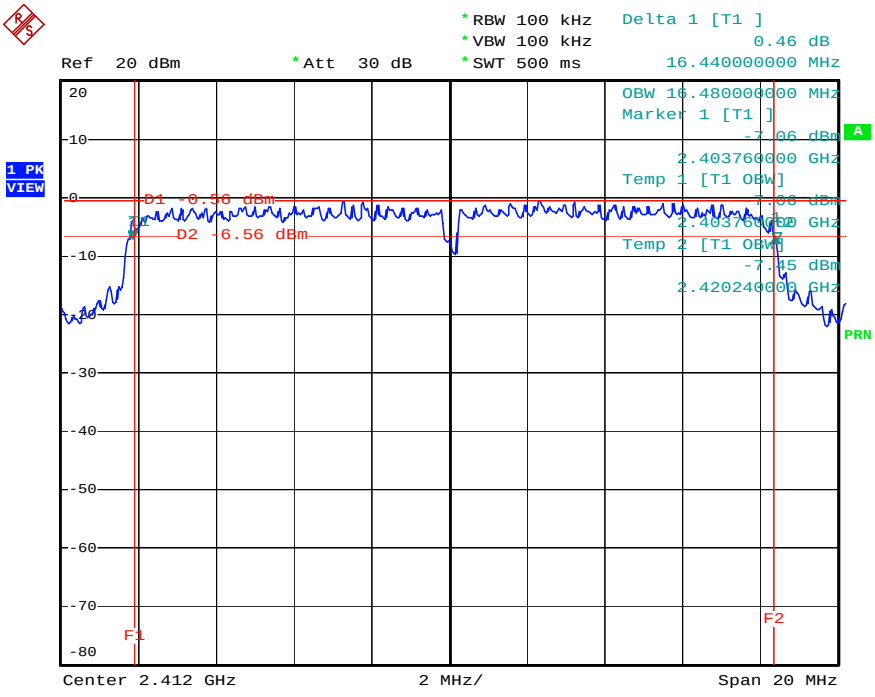
6 dB Bandwidth Plot on Configuration IEEE 802.11g / 2412 MHz



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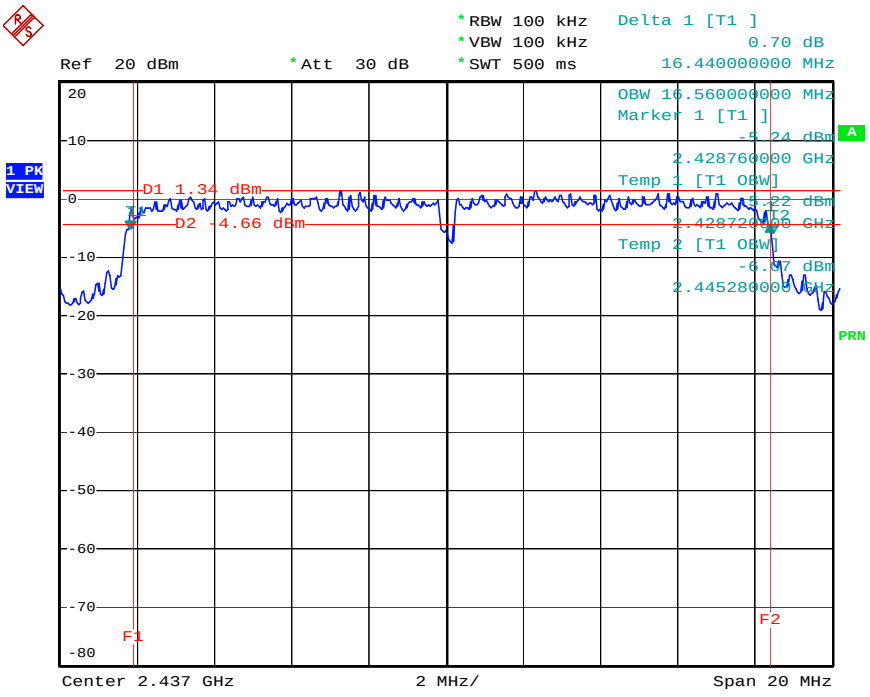
6 dB Bandwidth Plot on Configuration IEEE 802.11g / 2437 MHz



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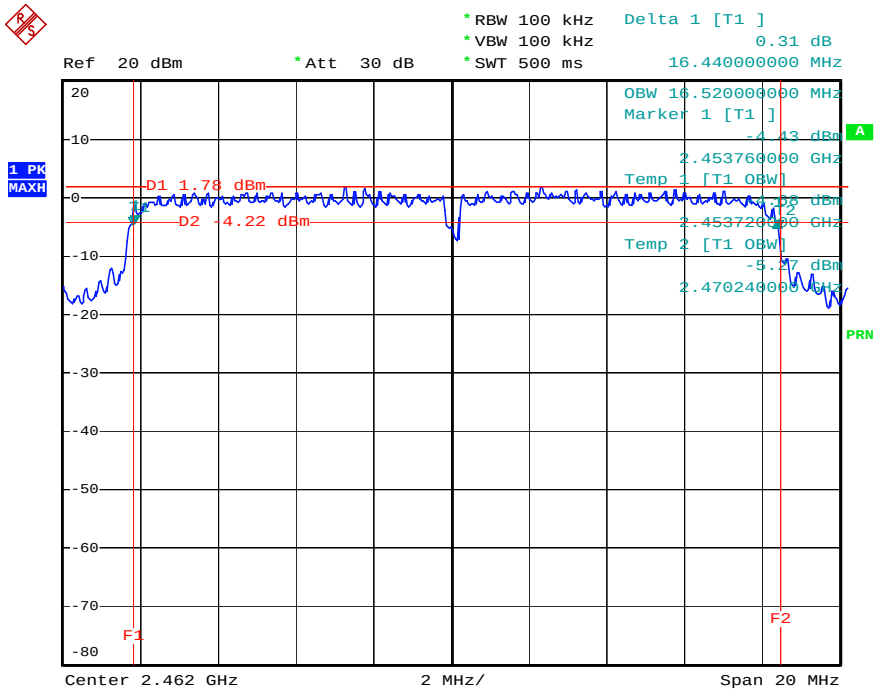
6 dB Bandwidth Plot on Configuration IEEE 802.11g / 2462 MHz



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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 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 (other emission)	100KHz / 100KHz for peak

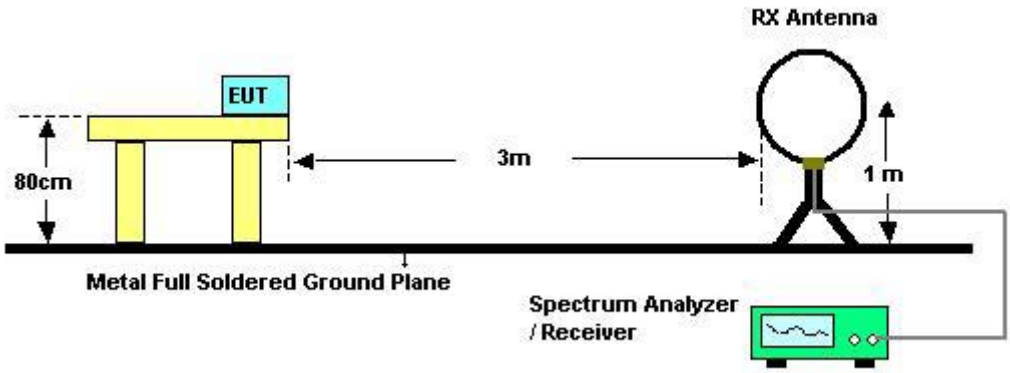
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.5.3. Test Procedures

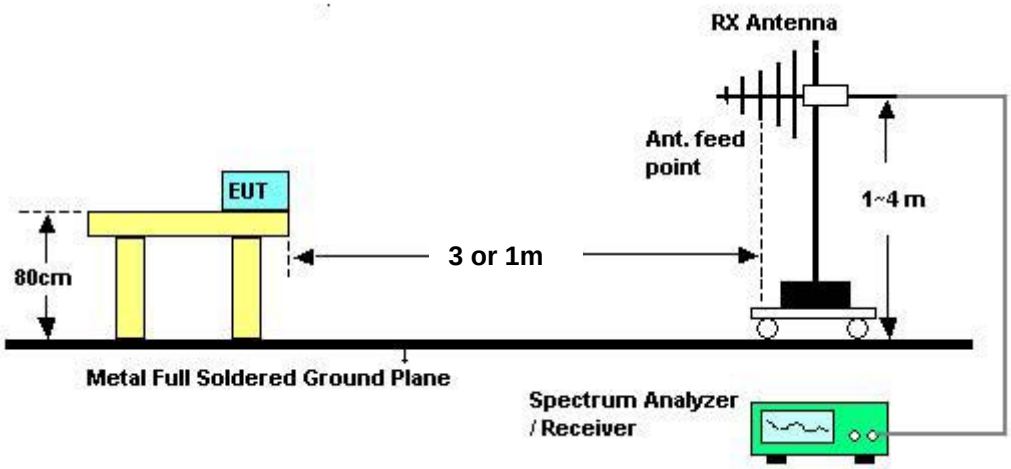
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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 1m.

Distance extrapolation factor = 20 log (specific distanc [3m] / test distance [1m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

4.5.5. Test Deviation

There is no deviations 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	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11g channel 6

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

Note:

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

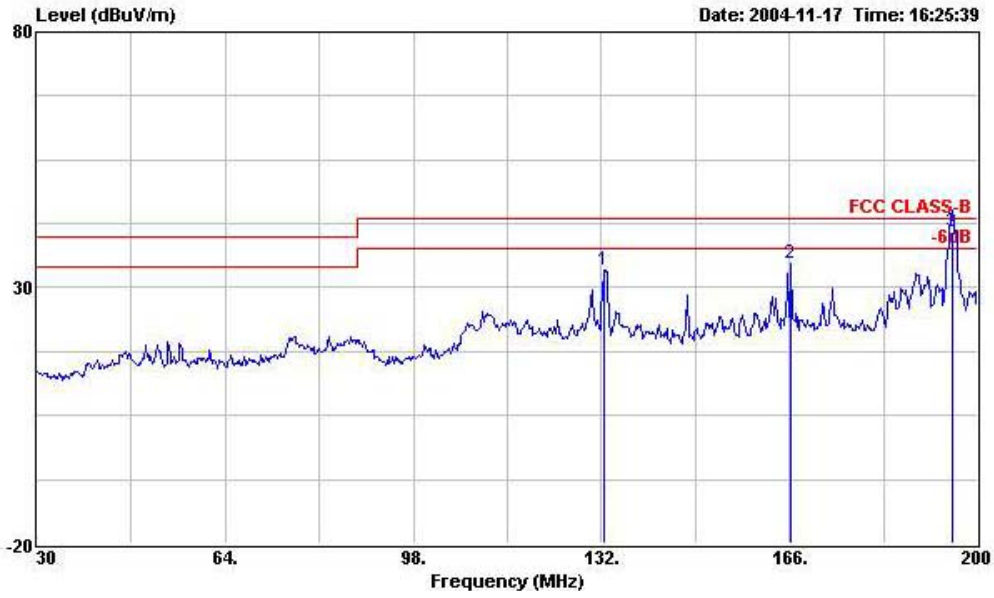
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

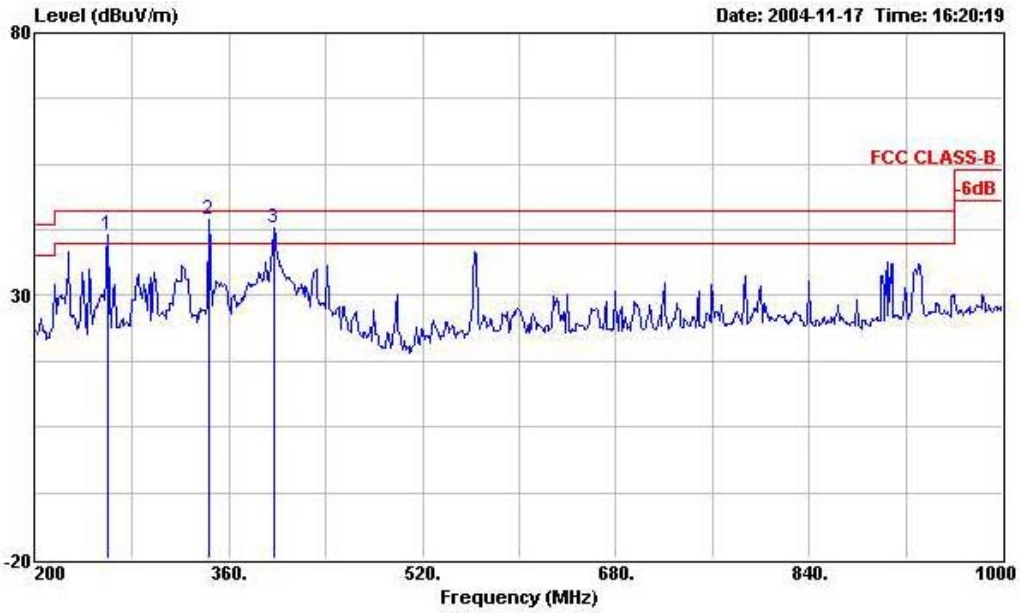
4.5.8. Results of Radiated Emissions (30MHz~1GHz)

Temperature	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11g channel 6

HORIZONTAL



	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	132.340	33.57	-9.93	43.50	46.96	12.39	2.05	27.83	QP	---	---
2	166.340	34.76	-8.74	43.50	46.91	13.29	2.33	27.77	QP	---	---
3 !	195.580	40.99	-2.51	43.50	50.73	15.45	2.52	27.71	QP	---	---



	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 !	259.200	41.42	-4.58	46.00	53.39	12.60	2.89	27.46	QP	---	---
2 !	343.200	44.35	-1.65	46.00	53.55	15.10	3.21	27.51	QP	127	181
3 !	397.600	42.77	-3.23	46.00	50.37	16.73	3.46	27.79	QP	---	---

Note:

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

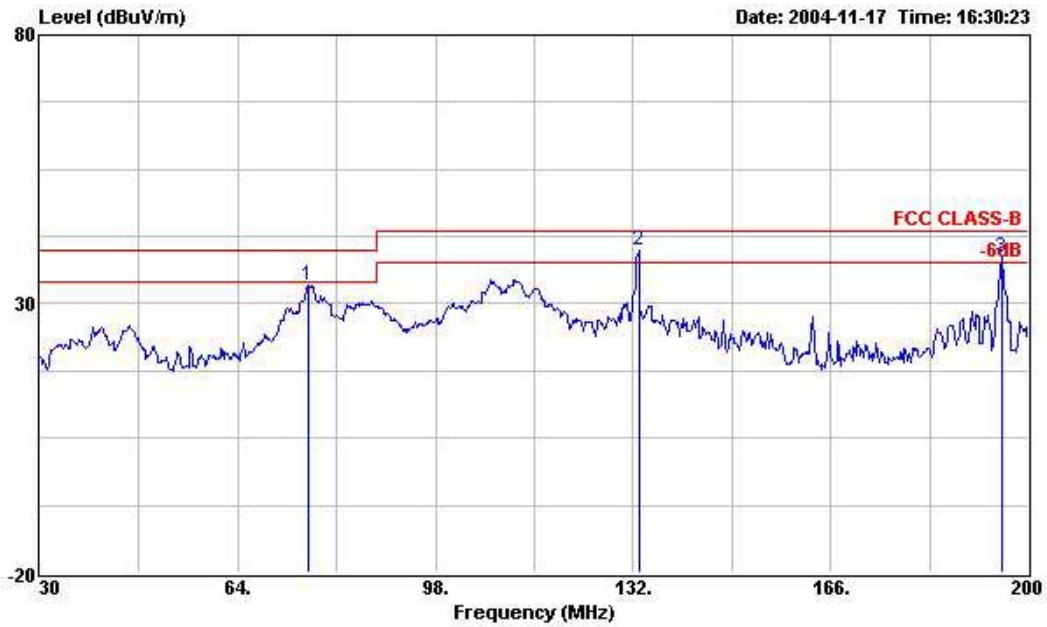
Emission level (dBuV/m) = 20 log Emission level (uV/m).

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

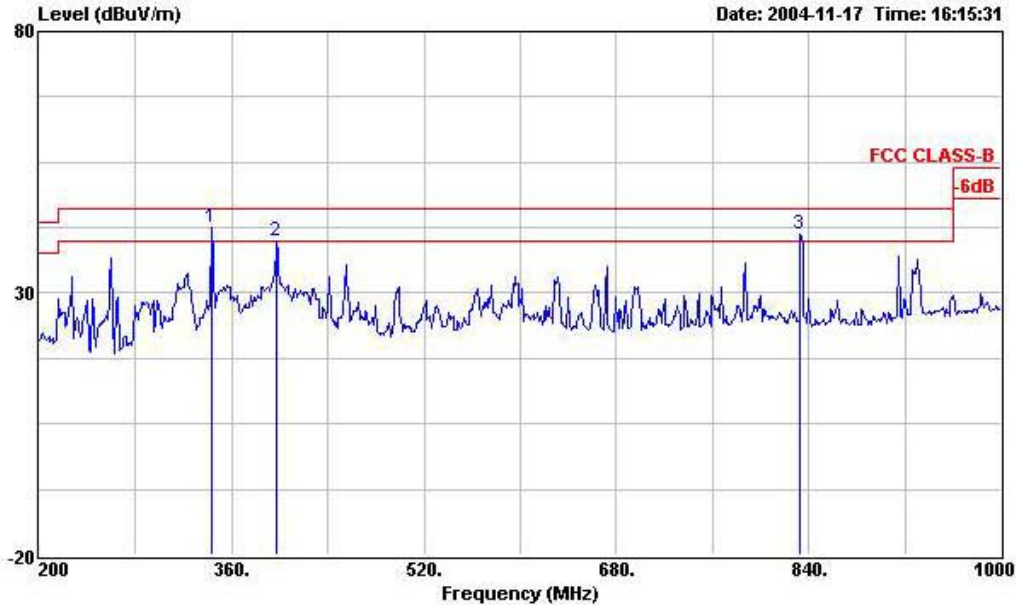
Pol. : V is Vertical Polarization ; H is Horizontal Polarization.

Temperature	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11g channel 6

VERTICAL



	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	76.070	33.52	-6.48	40.00	50.37	9.62	1.48	27.95	QP	---	---
2 !	133.020	39.85	-3.65	43.50	53.24	12.41	2.03	27.83	QP	---	---
3 !	195.580	38.56	-4.94	43.50	48.30	15.45	2.52	27.71	QP	---	---



	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 !	343.200	42.69	-3.31	46.00	51.89	15.10	3.21	27.51	QP	---	---
2	397.600	39.90	-6.10	46.00	47.50	16.73	3.46	27.79	QP	---	---
3 !	832.800	41.25	-4.75	46.00	42.82	21.83	5.23	28.63	QP	---	---

Note:

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

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

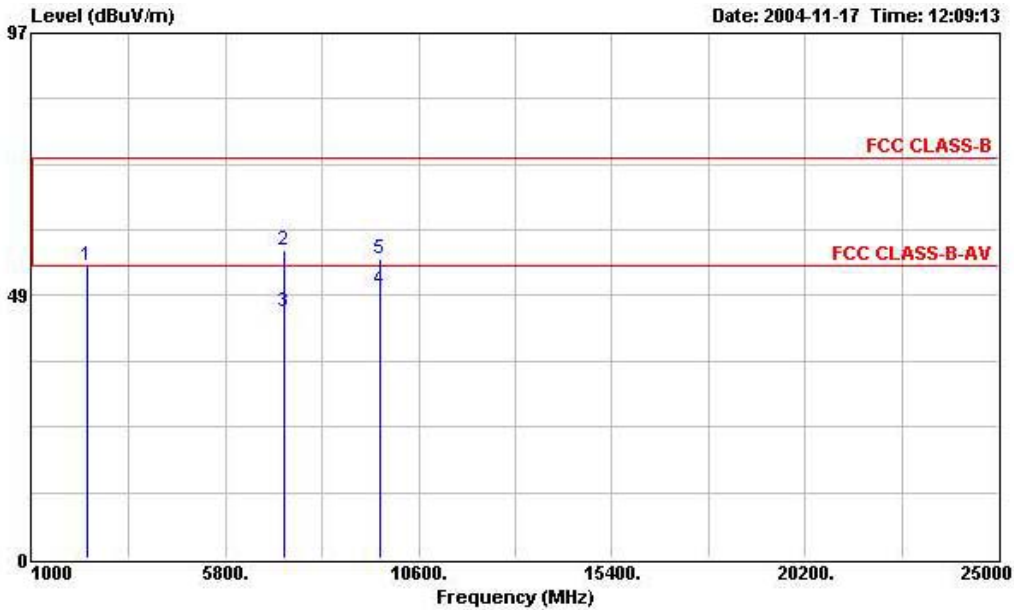
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Pol. : V is Vertical Polarization ; H is Horizontal Polarization.

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

Temperature	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11b channel 1

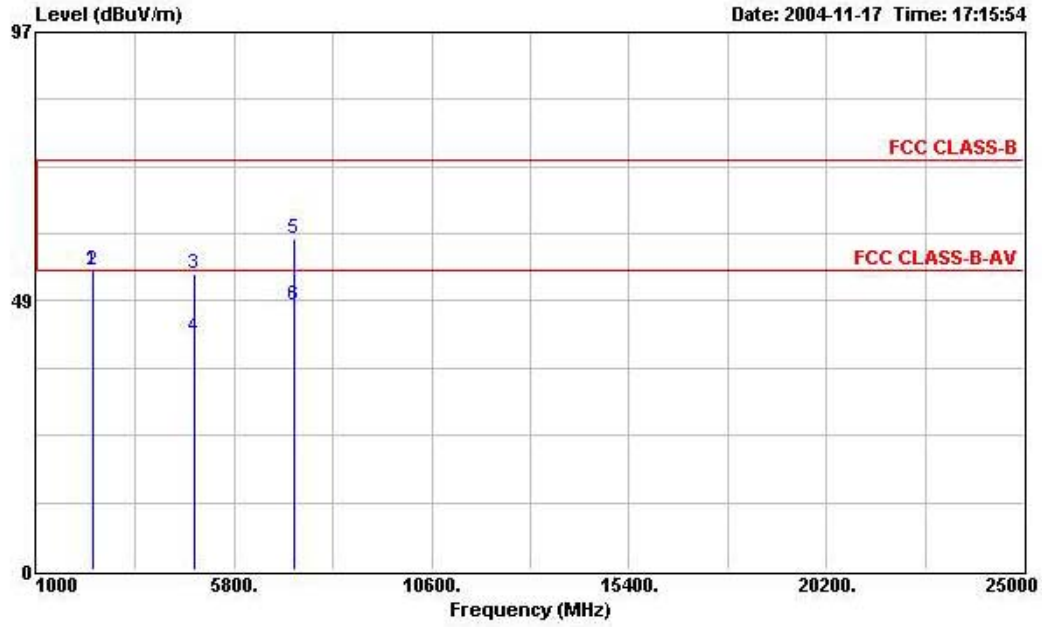
HORIZONTAL



	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	2372.000	53.99	-20.01	74.00	63.65	28.24	1.70	39.60	Peak	---	---
2	7236.000	56.77	-17.23	74.00	57.48	35.84	2.92	39.47	Peak	---	---
3	7236.000	45.37	-8.63	54.00	46.08	35.84	2.92	39.47	Average	---	---
4	9646.000	49.48	-4.52	54.00	46.24	38.28	3.70	38.74	Average	---	---
5	9646.000	55.19	-18.81	74.00	51.95	38.28	3.70	38.74	Peak	---	---

Temperature	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11b channel 1

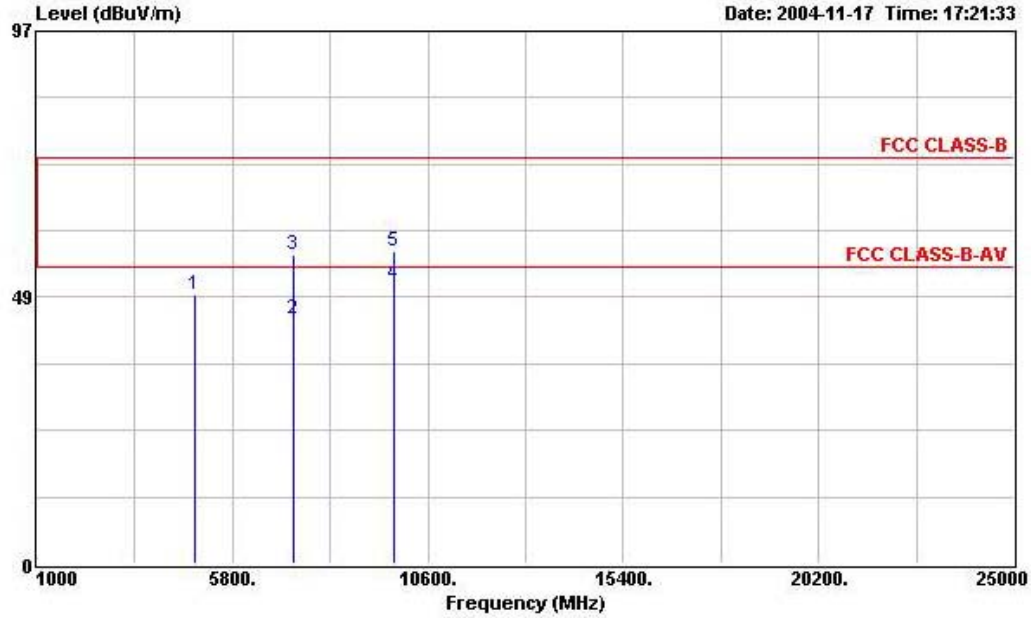
VERTICAL



	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	2372.000	53.99	-20.01	74.00	63.65	28.24	1.70	39.60	Peak	---	---
2	2372.000	53.99	-0.01	54.00	63.65	28.24	1.70	39.60	Average	---	---
3	4822.000	53.32	-20.68	74.00	57.99	33.00	2.47	40.14	Peak	---	---
4	4822.000	42.04	-11.96	54.00	46.71	33.00	2.47	40.14	Average	---	---
5	7236.000	59.78	-14.22	74.00	60.49	35.84	2.92	39.47	Peak	---	---
6	7236.000	47.86	-6.14	54.00	48.57	35.84	2.92	39.47	Average	---	---

Temperature	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11b channel 6

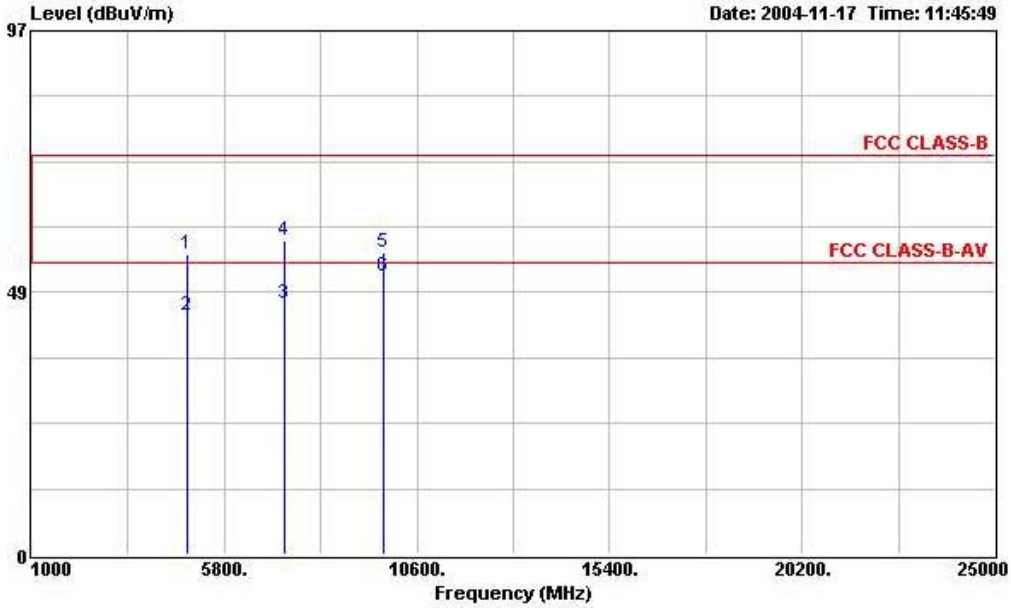
HORIZONTAL



	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	4880.000	49.13	-24.87	74.00	53.65	33.10	2.52	40.14	Peak	---	---
2	7310.000	44.51	-9.49	54.00	44.77	36.06	3.13	39.45	Average	---	---
3	7310.000	56.38	-17.62	74.00	56.64	36.06	3.13	39.45	Peak	---	---
4	9748.000	50.74	-3.26	54.00	47.27	38.47	3.71	38.71	Average	---	---
5	9748.000	56.75	-17.25	74.00	53.28	38.47	3.71	38.71	Peak	---	---

Temperature	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11b channel 6

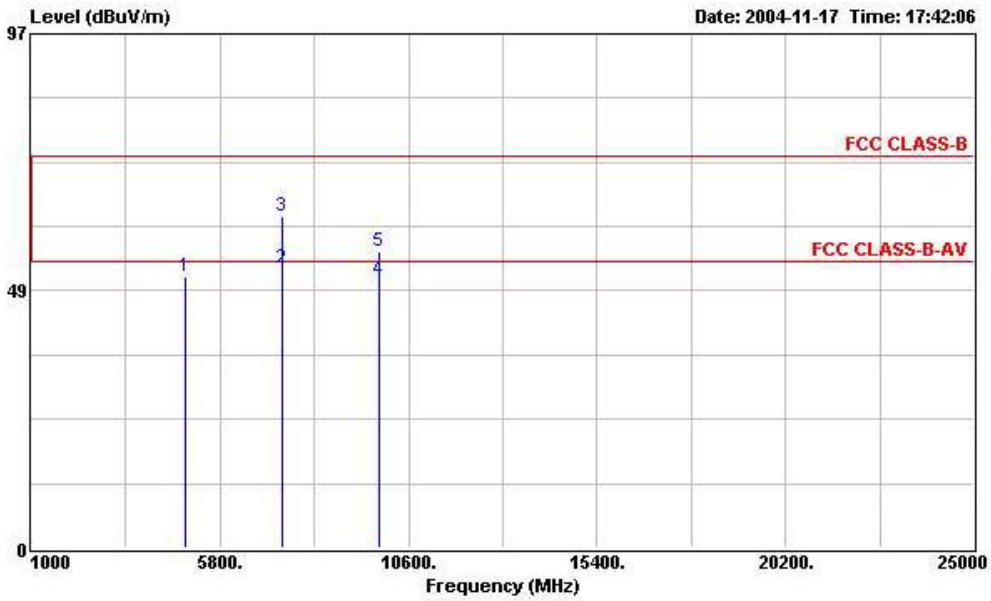
VERTICAL



	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	4876.000	55.71	-18.29	74.00	60.23	33.10	2.52	40.14	Peak	---	---
2	4876.000	44.13	-9.87	54.00	48.65	33.10	2.52	40.14	Average	---	---
3	7310.000	46.49	-7.51	54.00	46.75	36.06	3.13	39.45	Average	---	---
4	7310.000	57.99	-16.01	74.00	58.25	36.06	3.13	39.45	Peak	---	---
5	9748.000	55.81	-18.19	74.00	52.34	38.47	3.71	38.71	Peak	---	---
6	9748.000	51.42	-2.58	54.00	47.95	38.47	3.71	38.71	Average	---	---

Temperature	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11b channel 11

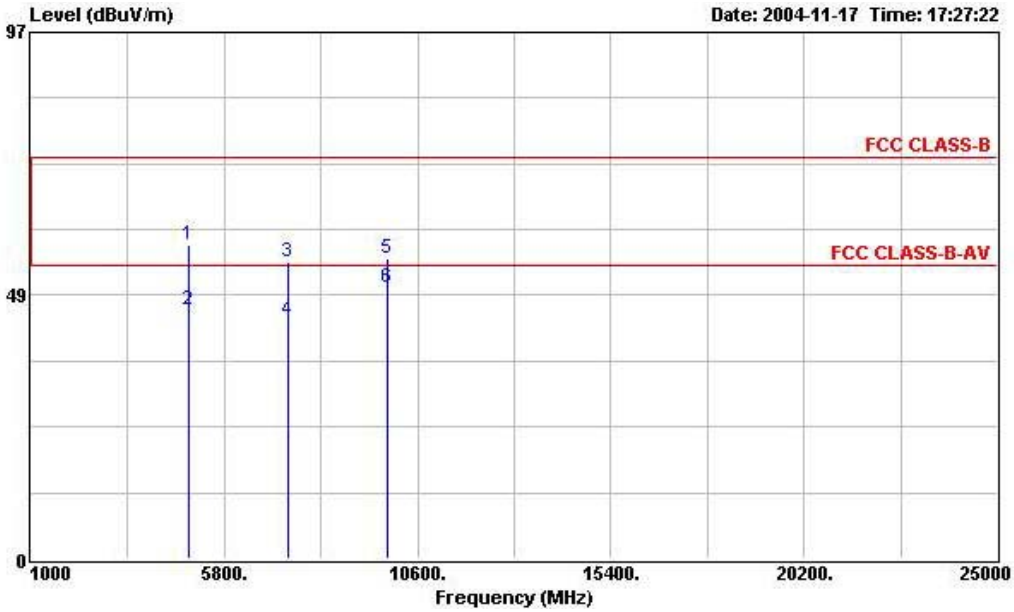
HORIZONTAL



	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	4930.000	51.33	-22.67	74.00	55.83	33.19	2.46	40.15	Peak	---	---
2	7382.000	52.80	-1.20	54.00	53.16	36.28	2.79	39.43	Average	---	---
3	7382.000	62.68	-11.32	74.00	63.04	36.28	2.79	39.43	Peak	---	---
4	9846.000	50.48	-3.52	54.00	46.57	38.64	3.95	38.68	Average	---	---
5	9846.000	55.80	-18.20	74.00	51.89	38.64	3.95	38.68	Peak	---	---

Temperature	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11b channel 11

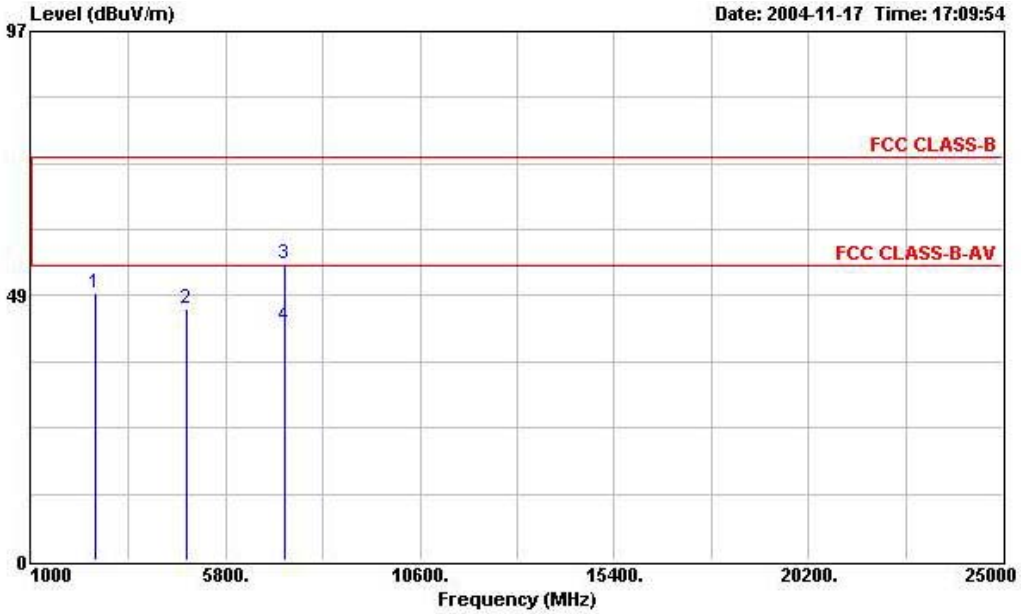
VERTICAL



	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	4924.000	57.77	-16.23	74.00	62.27	33.18	2.47	40.15	Peak	---	---
2	4924.000	45.86	-8.14	54.00	50.36	33.18	2.47	40.15	Average	---	---
3	7388.000	54.80	-19.20	74.00	55.12	36.30	2.81	39.43	Peak	---	---
4	7388.000	43.80	-10.20	54.00	44.12	36.30	2.81	39.43	Average	---	---
5	9846.000	55.24	-18.76	74.00	51.33	38.64	3.95	38.68	Peak	---	---
6	9846.000	50.07	-3.93	54.00	46.16	38.64	3.95	38.68	Average	---	---

Temperature	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11g channel 1

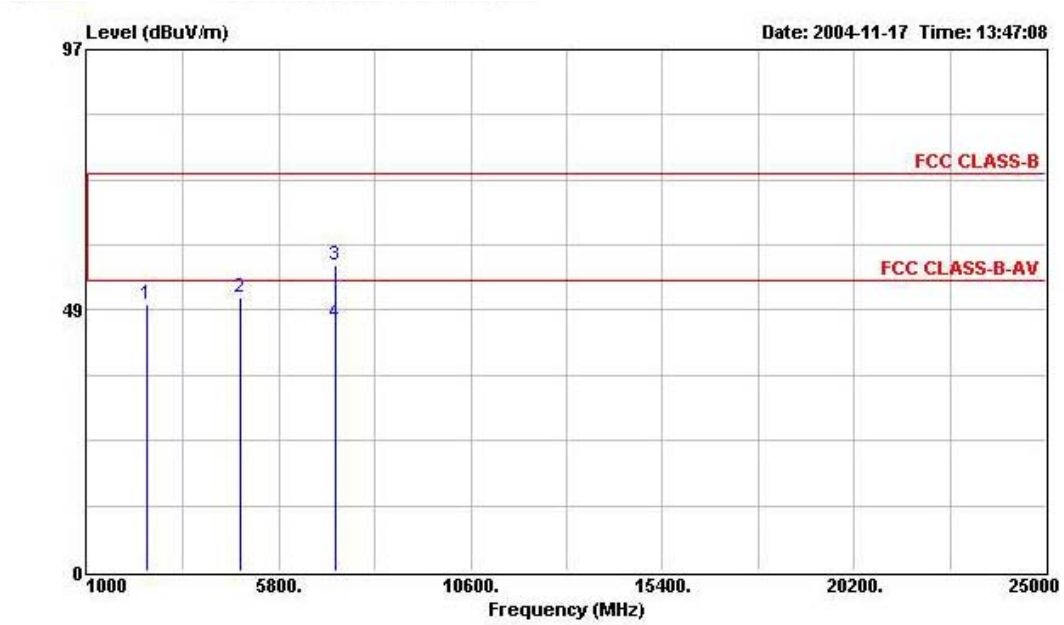
HORIZONTAL



	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	2580.000	48.92	-25.08	74.00	57.80	28.77	1.90	39.55	Peak	---	---
2	4840.000	46.26	-27.74	74.00	50.87	33.02	2.51	40.14	Peak	---	---
3	7244.000	54.29	-19.71	74.00	54.93	35.86	2.97	39.47	Peak	---	---
4	7244.000	43.03	-10.97	54.00	43.67	35.86	2.97	39.47	Average	---	---

Temperature	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11g channel 1

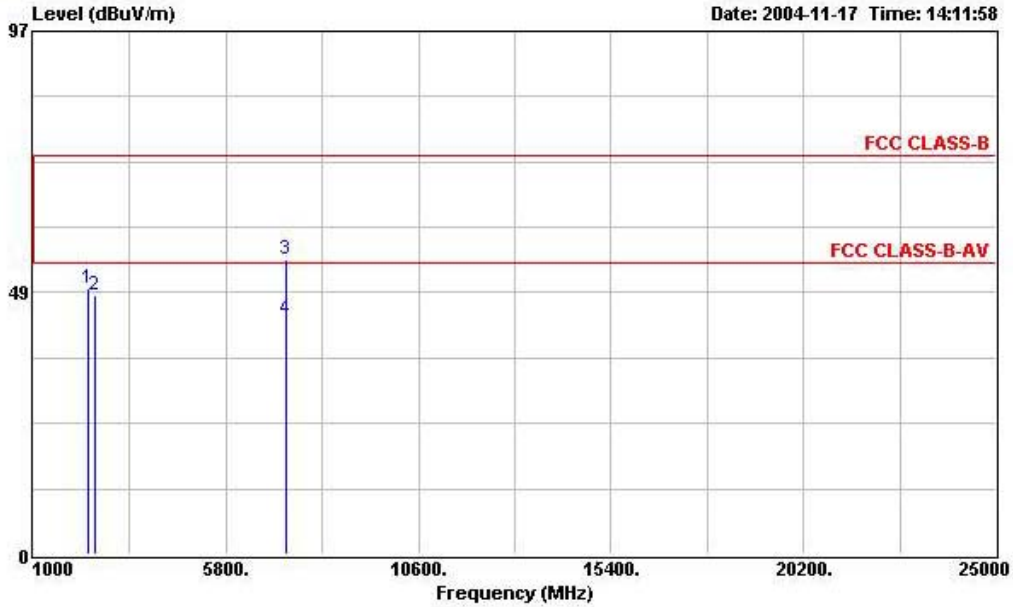
VERTICAL



	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	2510.000	49.59	-24.41	74.00	58.77	28.55	1.85	39.58	Peak	---	---
2	4830.000	50.74	-23.26	74.00	55.40	33.01	2.47	40.14	Peak	---	---
3	7230.000	56.91	-17.09	74.00	57.67	35.82	2.89	39.47	Peak	---	---
4	7230.000	46.04	-7.96	54.00	46.80	35.82	2.89	39.47	Average	---	---

Temperature	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11g channel 6

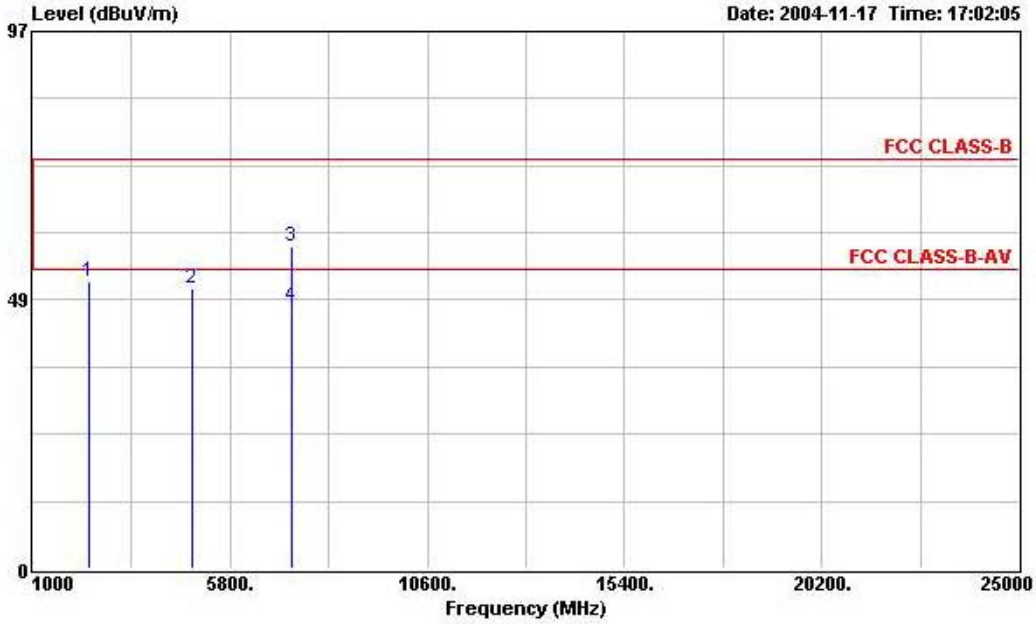
HORIZONTAL



	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	2360.000	49.35	-24.65	74.00	59.07	28.20	1.69	39.61	Peak	---	---
2	2550.000	47.87	-26.13	74.00	56.86	28.69	1.88	39.56	Peak	---	---
3	7308.000	54.52	-19.48	74.00	54.75	36.06	3.16	39.45	Peak	---	---
4	7308.000	43.48	-10.52	54.00	43.71	36.06	3.16	39.45	Average	---	---

Temperature	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11g channel 6

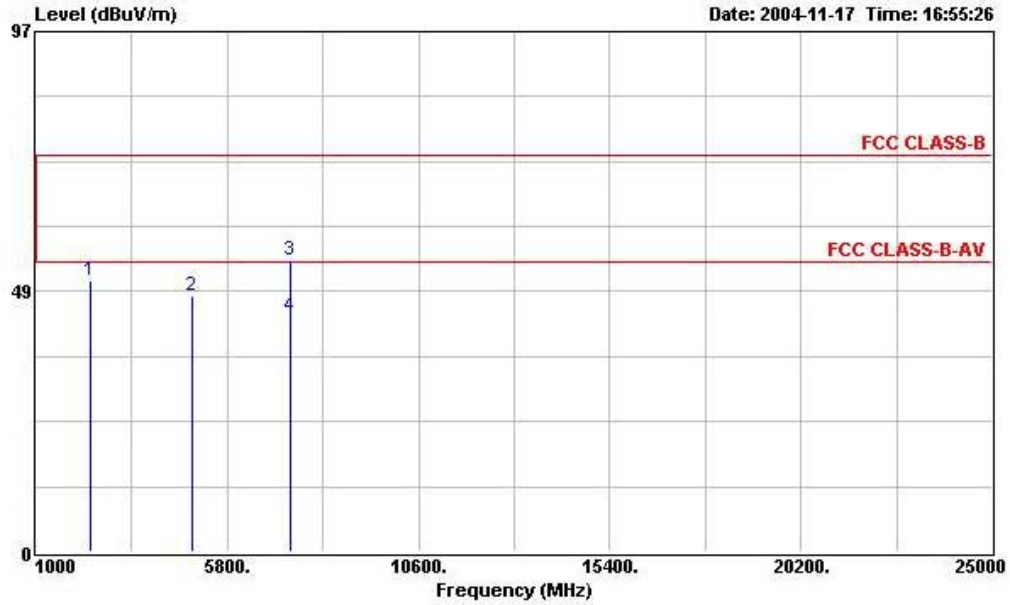
VERTICAL



	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	2370.000	51.89	-22.11	74.00	61.56	28.23	1.70	39.60	Peak	---	---
2	4880.000	50.56	-23.44	74.00	55.08	33.10	2.52	40.14	Peak	---	---
3	7318.000	58.24	-15.76	74.00	58.61	36.09	2.99	39.45	Peak	---	---
4	7318.000	47.31	-6.69	54.00	47.68	36.09	2.99	39.45	Average	---	---

Temperature	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11g channel 11

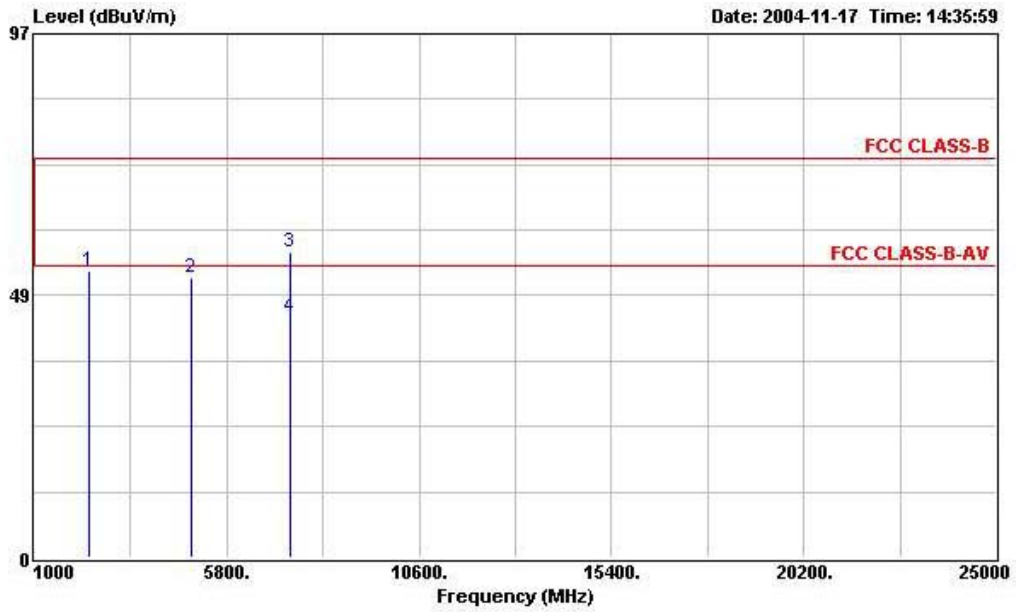
HORIZONTAL



	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	2360.000	50.56	-23.44	74.00	60.28	28.20	1.69	39.61	Peak	---	---
2	4930.000	47.70	-26.30	74.00	52.20	33.19	2.46	40.15	Peak	---	---
3	7396.000	54.33	-19.67	74.00	54.60	36.32	2.83	39.42	Peak	---	---
4	7396.000	43.78	-10.22	54.00	44.05	36.32	2.83	39.42	Average	---	---

Temperature	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11g channel 11

VERTICAL



	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	2370.000	52.93	-21.07	74.00	62.60	28.23	1.70	39.60	Peak	---	---
2	4930.000	51.96	-22.04	74.00	56.46	33.19	2.46	40.15	Peak	---	---
3	7396.000	56.49	-17.51	74.00	56.76	36.32	2.83	39.42	Peak	---	---
4	7396.000	44.42	-9.58	54.00	44.69	36.32	2.83	39.42	Average	---	---

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB 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.

Pol. : V is Vertical Polarization ; H is Horizontal Polarization.

4.6. Band Edge Emissions Measurement

4.6.1. 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

4.6.2. Measuring Instruments and Setting

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

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (other emission)	100 KHz /100 KHz for Peak

4.6.3. Test Procedures

1. The test procedure is the same as section 4.5.3, only the freqeuncy range investigated is limited to 100MHz around bandedges.
2. In case the emission is fail due to the used RB/VB is too wide, marker-delta method of FCC Public Notice DA00-705 will be followed.

4.6.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.5.4.

4.6.5. Test Deviation

There is no deviation with the original standard.

4.6.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.6.7. Test Result of Band Edge Emissions

For Emission in Restricted Band

Temperature	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11b channel 1, 11

Modulation Type	Test Channel	Freq. (MHz)	Level* (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Trace (PK/AV)
CCK	01	2371.370	58.53	-15.47	74	PK
CCK	01	2371.370	52.13	-1.87	54	AV
CCK	11	2488.220	57.82	-16.18	74	PK
CCK	11	2488.220	51.65	-2.35	54	AV

Temperature	23℃	Humidity	50%
Test Engineer	Ted Chiu	Configurations	802.11g channel 1, 11

Modulation Type	Test Channel	Freq. (MHz)	Level* (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Trace (PK/AV)
64QAM	01	2374.410	58.60	-15.40	74	PK
64QAM	01	2374.410	50.30	-3.70	54	AV
64QAM	11	2492.970	57.12	-16.88	74	PK
64QAM	11	2492.970	51.34	-2.66	54	AV

Note:

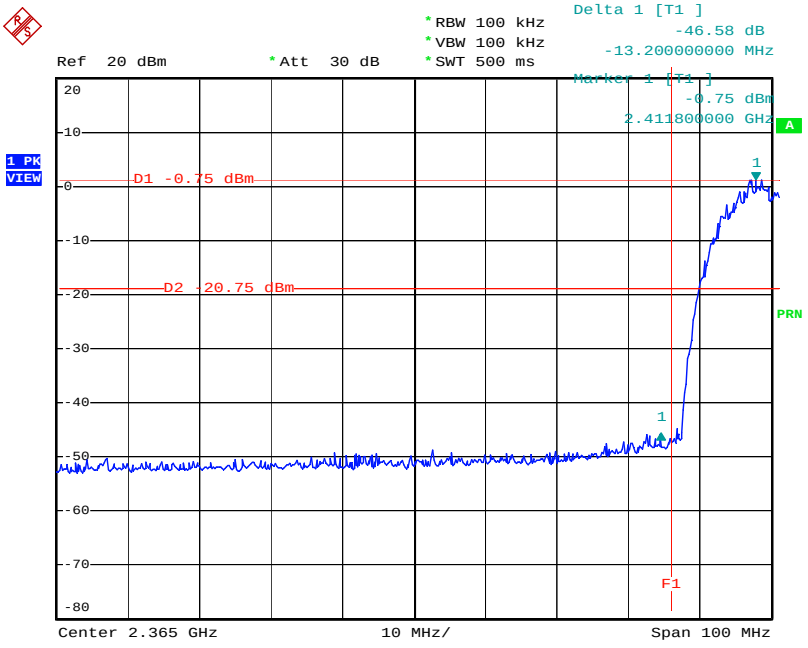
Emission level (dBuV/m) = 20 log Emission level (uV/m).

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

Receiving maximum band edge emissions are Vertical Polarization /Horizontal Polarization.

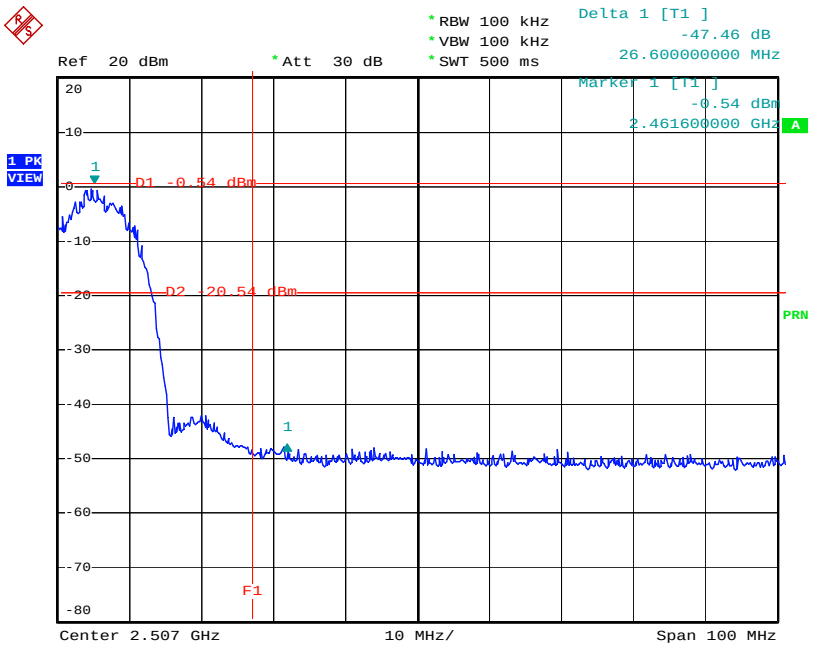
For Emission not in Restricted Band

Low Band Edge Plot on Configuration IEEE 802.11b / 2412 MHz



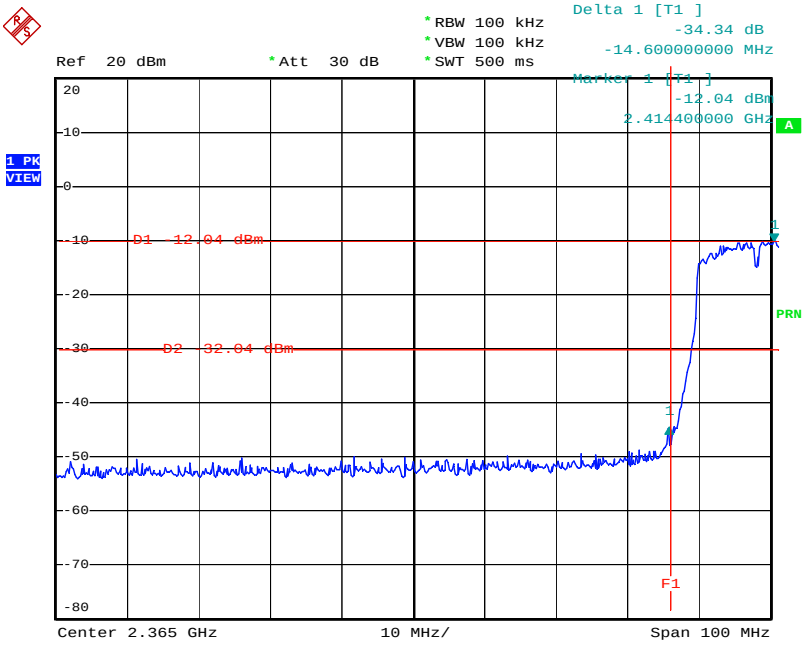
Date: 7.DEC.2004 12:15:53

High Band Edge Plot on Configuration IEEE 802.11b / 2462 MHz



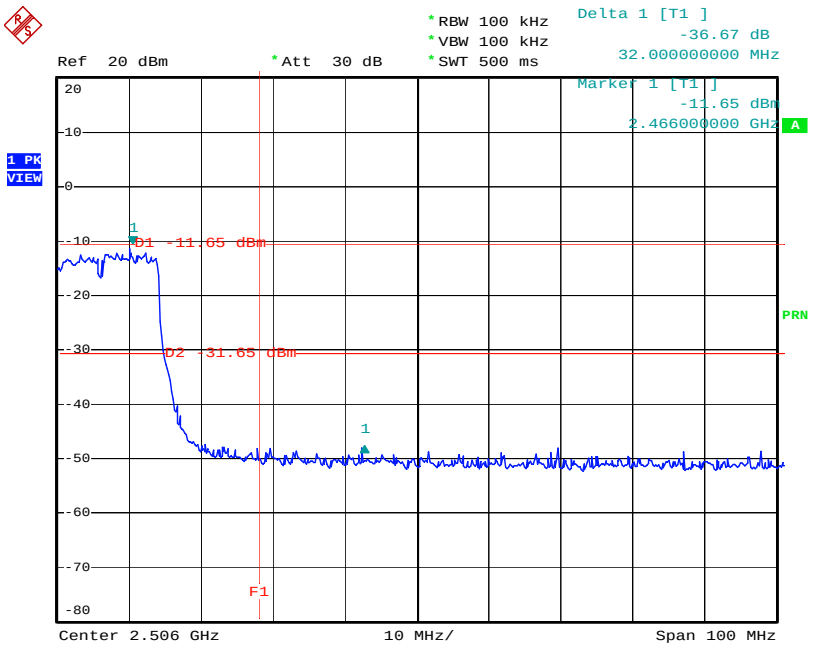
Date: 7.DEC.2004 12:14:11

Low Band Edge Plot on Configuration IEEE 802.11g / 2412 MHz



Date: 7.DEC.2004 12:24:13

High Band Edge Plot on Configuration IEEE 802.11g / 2462 MHz



Date: 7.DEC.2004 12:25:50

4.7. Antenna Requirements

4.7.1. Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

4.7.2. Antenna Connector Construction

Please refer to section 3.3 in this test report, all antenna connectors comply with the requirements.

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9 KHz – 2.75 GHz	Feb. 16, 2004	Conduction (CO04-HY)
LISN	MessTec	NNB-2/16Z	2001/004	9 KHz – 30 MHz	Jun. 09, 2004	Conduction (CO04-HY)
LISN (Support Unit)	MessTec	NNB-2/16Z	99041	9 KHz – 30 MHz	Apr. 27, 2004	Conduction (CO04-HY)
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)
RF Cable-CON	UTIFLEX	3102-26886-4	CB044	9KHz~30MHz	Apr. 21, 2004	Conduction (CO04-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 21, 2004	Radiation (03CH03-HY)
Spectrum analyzer	R&S	FSP40	100004	9KHZ~40GHz	Aug. 22, 2004	Radiation (03CH03-HY)
Amplifier	HP	8447D	2944A09072	100KHz – 1.3GHz	Nov. 04, 2004	Radiation (03CH03-HY)
Biconical Antenna	SCHWARZBECK	VHBB 9124	301	30MHz –200MHz	Jul. 28, 2004	Radiation (03CH03-HY)
Log Antenna	SCHWARZBECK	VUSLP 9111	221	200MHz -1GHz	Jul. 28, 2004	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz~1GHz	Dec. 03, 2003	Radiation (03CH03-HY)
Amplifier	MITEQ	AFS44	849984	100MHz~26.5GHz	Mar. 26, 2004	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6821	1GHz – 18GHz	Sep. 11, 2004	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)
Horn Antenna	Schwarzbeck	BBHA9170	154	15GHz~40GHz	Jun. 09, 2004	Radiation (03CH03-HY)
RF Cable-HIGH	Jye Bao	RG142	CB030-HIGH	1GHz~29.5GHz	Dec. 05, 2003	Radiation (03CH03-HY)
Spectrum analyzer	R&S	FSP7	838858/014	9KHZ~7GHZ	Sep. 02, 2004	Conducted (TH01-HY)
Power meter	R&S	NRVS	100967	DC~40GHz	Mar. 02, 2004	Conducted (TH01-HY)
Power sensor	R&S	NRV-Z51	100666	DC~40GHz	Mar 18, 2004	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z32	836953/060	30MHz-6GHz	Mar. 11, 2004	Conducted (TH01-HY)
AC power source	G.W.	GPC-6030D	C671845	DC 1V~60V	Nov. 05, 2004	Conducted (TH01-HY)
Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Sep. 30, 2004	Conducted (TH01-HY)
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz~7GHz	Jan. 01, 2004	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz~1GHz	Jan. 01, 2004	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is one year.

6. SPORTON COMPANY PROFILE

SPORTON Lab. was established in 1986 with one shielded room: the first private EMI test facility, offering local manufacturers an alternative EMI test familial apart from ERSO. In 1988, one 3M and 10M/3M open area test site were setup and also obtained official accreditation from FCC, VCCI and NEMKO. In 1993, a Safety laboratory was founded and obtained accreditation from UL of USA, CSA of Canada and TUV (Rhineland & PS) of Germany. In 1995, one EMC lab, including EMI and EMS test facilities was setup. In 1997, SPORTON Group has provided financial expense to relocate the headquarter to Orient Scientific Park in Taipei Hsien to offer more comprehensive, more qualified and better service to local suppliers and manufactures. In 1999, Safety Group and Component Group were setup. In 2001, SPORTON has established 3M/10M chamber in Hwa Ya Technology Park.

6.1. Test Location

SHIJR	ADD	:	6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C.
	TEL	:	02-2696-2468
	FAX	:	02-2696-2255
HWA YA	ADD	:	No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
	TEL	:	03-327-3456
	FAX	:	03-318-0055
LINKOU	ADD	:	No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C
	TEL	:	02-2601-1640
	FAX	:	02-2601-1695
DUNGHU	ADD	:	No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C.
	TEL	:	02-2631-4739
	FAX	:	02-2631-9740
JUNGHE	ADD	:	7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C.
	TEL	:	02-8227-2020
	FAX	:	02-8227-2626
NEIHU	ADD	:	4Fl., No. 339, Hsin Hu 2nd Rd., Taipei 114, Taiwan, R.O.C.
	TEL	:	02-2794-8886
	FAX	:	02-2794-9777
JHUBEI	ADD	:	No.8, Lane 728, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.
	TEL	:	03-656-9065
	FAX	:	03-656-9085

Appendix C. Maximum Permissible Exposure

1. Maximum Permissible Exposure

1.1. Applicable Standard

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 20 cm normally can be maintained between the user and the device.

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|², |H|² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|², |H|² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

1.2. MPE Calculation Method

$$E\ (V/m) = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density:} \quad Pd\ (mW/cm^2) = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Peak RF output power (mW)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (cm)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=20cm, as well as the gain of the used antenna, the RF power density can be obtained.

1.3. Calculated Result and Limit

Antenna Type : Printed Antenna

Max Conducted Power for IEEE 802.11b: 20dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
1.00	1.26	12.30	16.98	0.0043	1	Complies

Antenna Type : Printed Antenna

Max Conducted Power for IEEE 802.11g : 20dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
1.00	1.26	12.17	16.48	0.0041	1	Complies