



SPORTON International Inc.

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FCC RADIO TEST REPORT

Applicant's company	Z-Com, Inc.
Applicant Address	7F-2, No. 9. Prosperity RD.I Science-Based Industrial, Park Hsinchu, 300 Taiwan
FCC ID	M4Y-XN620V04
Manufacturer's company	Z-Com, Inc.
Manufacturer Address	7F-2, No. 9. Prosperity RD.I Science-Based Industrial, Park Hsinchu, 300 Taiwan

Product Name	Draft 802.11n Wireless Mini-PCI Card
Brand Name	ZCOM
Model Name	XN-620
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz
Received Date	Jun. 06, 2007
Final Test Date	Oct. 31, 2007
Submission Type	Original Equipment
Multiple Listing	Please refer to section 3.7



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

1. CERTIFICATE OF COMPLIANCE	1
2. SUMMARY OF THE TEST RESULT	2
3. GENERAL INFORMATION	3
3.1. Product Details.....	3
3.2. Accessories.....	3
3.3. Table for Filed Antenna.....	4
3.4. Table for Carrier Frequencies	4
3.5. Table for Test Modes.....	5
3.6. Table for Testing Locations.....	5
3.7. Table for Multiple Listing & Class II Change	5
3.8. Table for Supporting Units	5
3.9. Table for Parameters of Test Software Setting	6
3.10. Test Configurations	7
4. TEST RESULT	8
4.1. Radiated Emissions Measurement	8
4.2. Band Edge Emissions Measurement	26
4.3. Antenna Requirements	29
5. LIST OF MEASURING EQUIPMENTS	30
6. TEST LOCATION.....	32
7. TAF CERTIFICATE OF ACCREDITATION	33
APPENDIX A. PHOTOGRAPHS OF EUT.....	A1 ~ A9
APPENDIX B. TEST PHOTOS.....	B1 ~ B8
APPENDIX C. MAXIMUM PERMISSIBLE EXPOSURE.....	C1 ~C3



History of This Test Report

Original Issue Date: Nov. 15, 2007

Report No.: FR760609-02AB

No additional attachment.

Additional attachment were issued as following record:

Attachment No.	Issue Date	Description



1. CERTIFICATE OF COMPLIANCE

Product Name : Draft 802.11n Wireless Mini-PCI Card
Brand Name : ZCOM
Model Name : XN-620
Applicant : Z-Com, 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 Jun. 06, 2007 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.

A handwritten signature in blue ink that reads "Wayne Hsu 16.11.07". The signature is written over a horizontal line.

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	-	-
4.2	15.247(b)(3)	Maximum Peak Conducted Output Power	-	-
4.3	15.247(e)	Power Spectral Density	-	-
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	-	-
4.5	15.247(d)	Radiated Emissions	Complies	1.07 dB
4.6	15.247(d)	Band Edge Emissions	Complies	0.50 dB
4.7	15.203	Antenna Requirements	-	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Peak Conducted Output Power	±0.8dB	Confidence levels of 95%
Power Spectral Density	±0.5dB	Confidence levels of 95%
6dB Spectrum Bandwidth	±8.5×10 ⁻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°C	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
Product Type	WLAN (3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From Host System
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
Conducted Output Power	11b: 18.46 dBm ; 11g: 22.22 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

Antenna	Single (TX)		Three (TX)	
	20 MHz	40 MHz	20 MHz	40 MHz
Band width Mode				
802.11b	X	X	V	X
802.11g	X	X	V	X
Draft n	X	X	V	V

3.2. Accessories

Others
Antenna Cable

Through an antenna cable, the antenna connector is transferred from R-SMA to UFL.

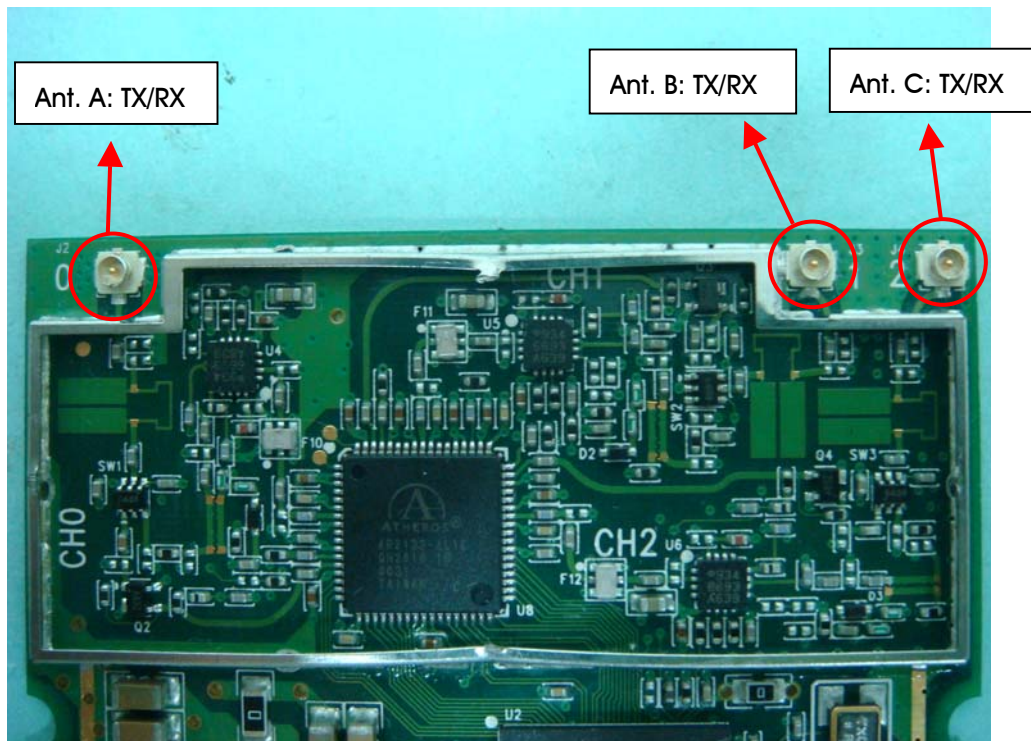
3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Cable Loss (dBi)	Remark
A	ZyXEL	ANT1106	Dipole Antenna	Reversed-SMA	6	2.4	TX / RX Ant.
B	ZyXEL	ANT1106	Dipole Antenna	Reversed-SMA	6	2.4	TX / RX Ant.
C	ZyXEL	ANT1106	Dipole Antenna	Reversed-SMA	6	2.4	TX / RX Ant.

The EUT has three antennas, and all of the antennas have both TX/RX function.

All of the antennas must be used for transmitting simultaneously.

All of the antennas must be used for receiving simultaneously.



3.4. Table for Carrier Frequencies

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		

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
Radiated Emissions 9kHz~1GHz	Normal Link	Auto	6	A+B+C
Radiated Emissions 1GHz~10 th Harmonic	11b/BPSK	11 Mbps	1/6/11	A+B+C
	11g/BPSK	6 Mbps	1/6/11	A+B+C
Band Edge Emissions	11b/BPSK	11 Mbps	1/11	A+B+C
	11g/BPSK	6 Mbps	1/11	A+B+C

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	-

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 Multiple Listing & Class II Change

This product is an extension of original one reported under Sporton project number: 760609

Below is the table for the change of the product with respect to the original one.

Modifications	Description	Performance Checking
Additional three antennas	Dipole Antenna: ANT1106	Radiated Emissions

3.8. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Modem	ACEEX	DM1414	IFAXDM1414
Mouse	QSKY	Lx-619B	DoC
Notebook	DELL	D520	E2KWM3945ABG
Printer	EPSON	LQ-300+	N/A
Wireless AP	Planex	GW-AP54SGX	N/A

3.9. 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.

Test Software Version	ART		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	13	13	13
IEEE 802.11g	12	12	12

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

The program was executed as follows:

- a. Turn on the power of all equipment.
- b. The NB sends " H " messages to the panel, and the panel displays " H " patterns on the screen.
- c. The NB sends " H " messages to the printer, then the printer prints them on the paper.
- d. The NB sends " H " messages to the modem.
- e. Repeat the steps from b to d.

At the same time, the following programs were executed:

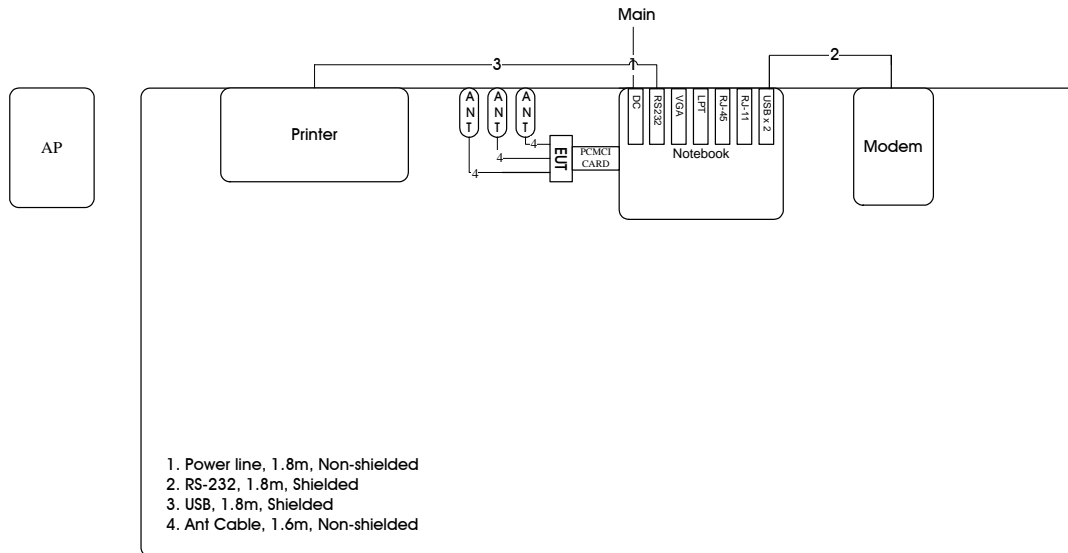
Executed "ping.exe" to link with the remote workstation to receive and transmit signal by LAN and WLAN.

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

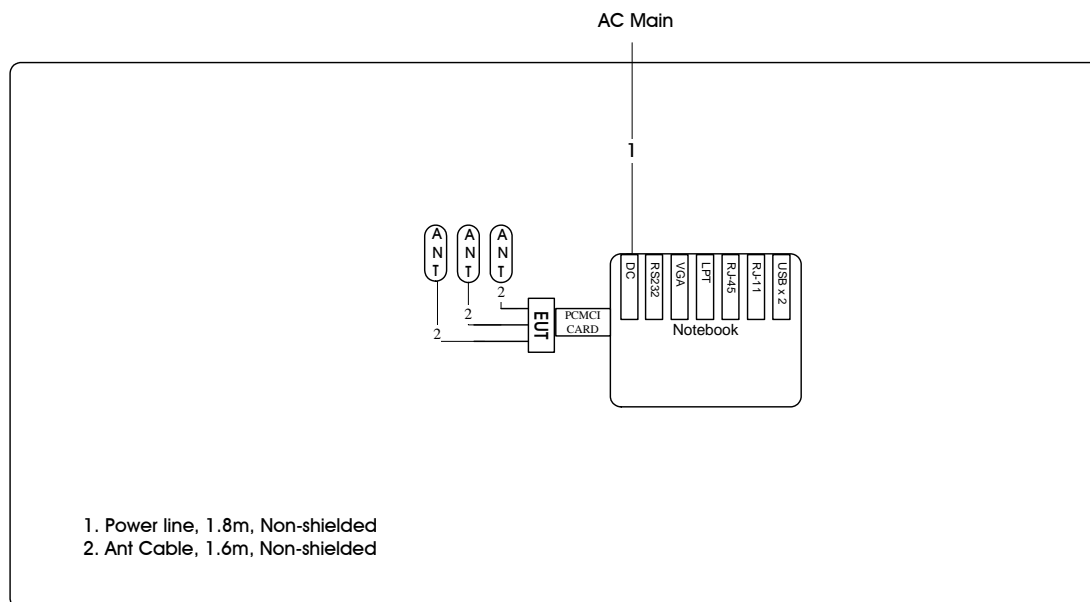
3.10. Test Configurations

3.10.1. Radiation Emissions Test Configuration

Test Configuration: 9KHz~1GHz



Test Configuration: Above 1GHz



4. TEST RESULT

4.1. Radiated Emissions Measurement

4.1.1. 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

4.1.2. 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

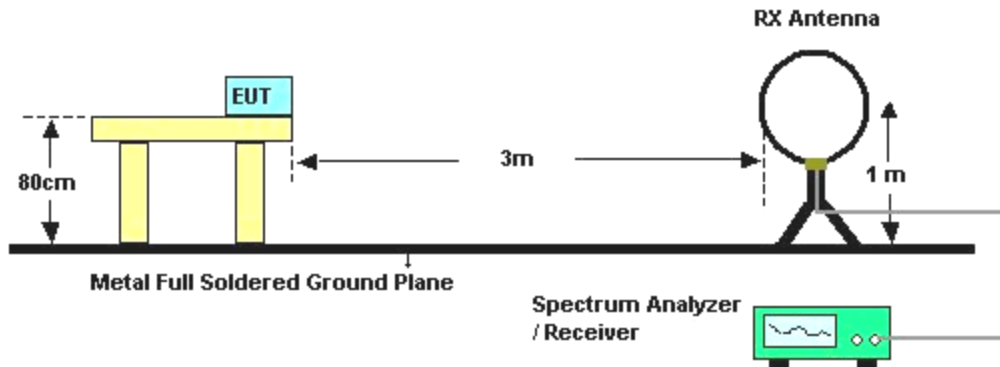
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.1.3. Test Procedures

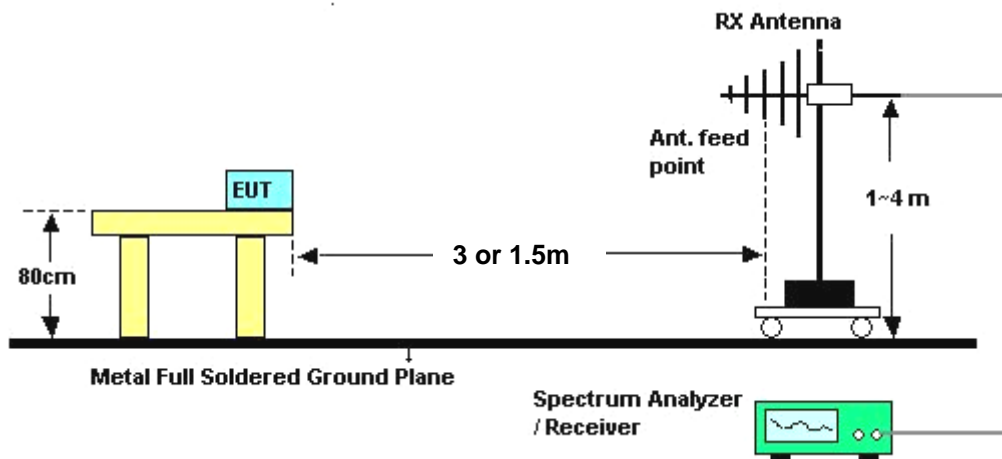
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

4.1.4. 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 from 3m to 1.5m.

Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1.5m]})$ (dB);

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

4.1.5. Test Deviation

There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

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

Temperature	23°C	Humidity	62%
Test Engineer	Jacky Ho	Configurations	802.11g CH 6 Ant. A + Ant. B + Ant. C

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.

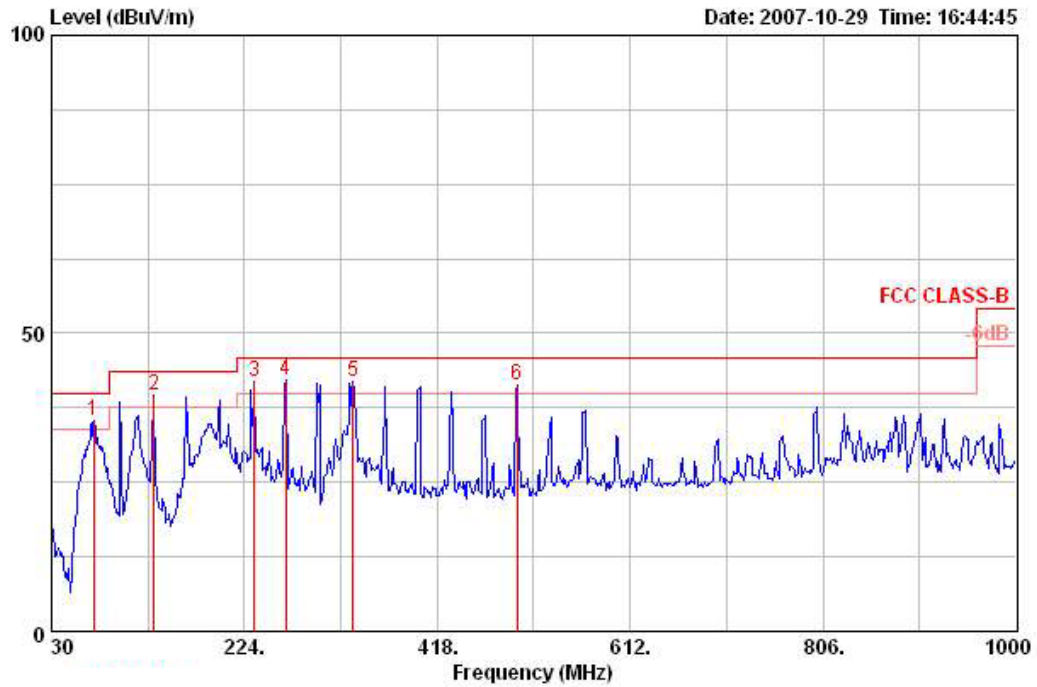
Distance extrapolation factor = $40 \log(\text{specific distance} / \text{test distance})$ (dB);

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

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

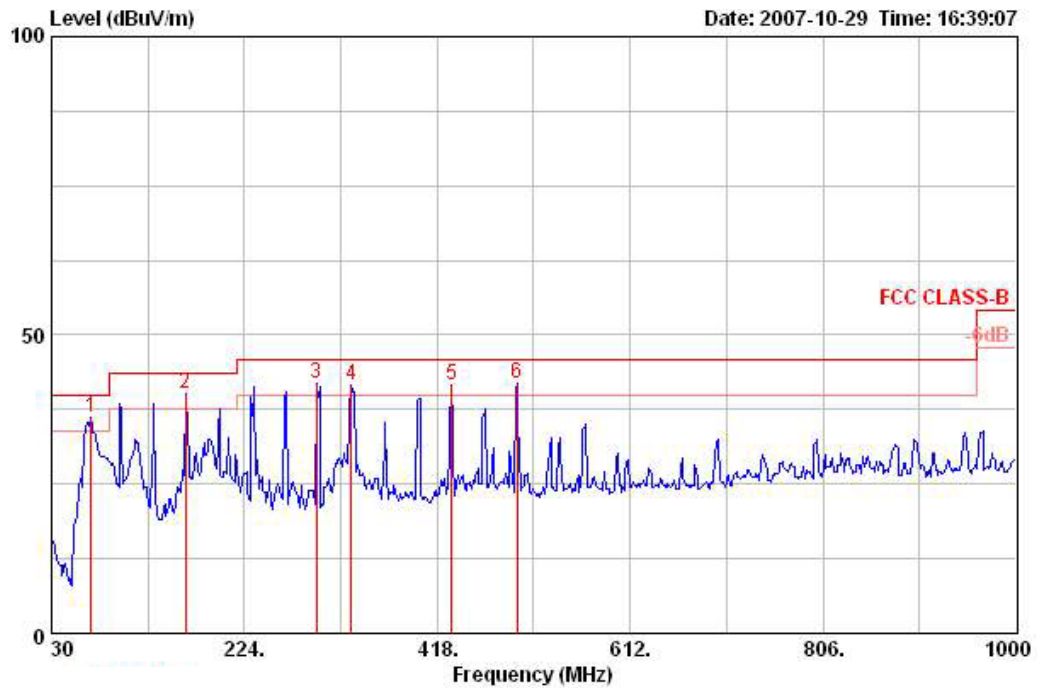
Temperature	23°C	Humidity	62%
Test Engineer	Jacky Ho	Configurations	802.11g CH 6 Ant. A + Ant. B + Ant. C

Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna	Preamp	Cable	Table	Ant
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	deg	cm
1 @	72.680	35.40	-4.60	40.00	56.68	5.45	27.69	0.96	100
2 @	132.820	39.55	-3.95	43.50	54.24	11.37	27.26	1.20	100
3 @	233.700	41.90	-4.10	46.00	56.80	10.04	26.52	1.58	100
4 @	265.710	42.22	-3.78	46.00	54.44	12.45	26.48	1.81	100
5 @	333.610	41.84	-4.16	46.00	52.62	13.95	26.64	1.91	100
6 @	498.510	41.32	-4.68	46.00	49.30	17.24	27.70	2.48	100

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1	69.770	36.20	-3.80	40.00	57.74	5.25	27.74	0.95	Peak	0	400	VERTICAL
2	164.830	40.04	-3.46	43.50	56.85	8.85	27.05	1.39	Peak	258	105	VERTICAL
3	296.750	41.94	-4.06	46.00	53.76	12.84	26.10	1.45	Peak	0	400	VERTICAL
4	331.670	41.65	-4.35	46.00	52.43	13.93	26.64	1.94	Peak	0	400	VERTICAL
5	432.550	41.50	-4.50	46.00	50.45	16.37	27.56	2.23	Peak	0	400	VERTICAL
6	498.510	41.76	-4.24	46.00	49.74	17.24	27.70	2.48	Peak	0	400	VERTICAL

Note:

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

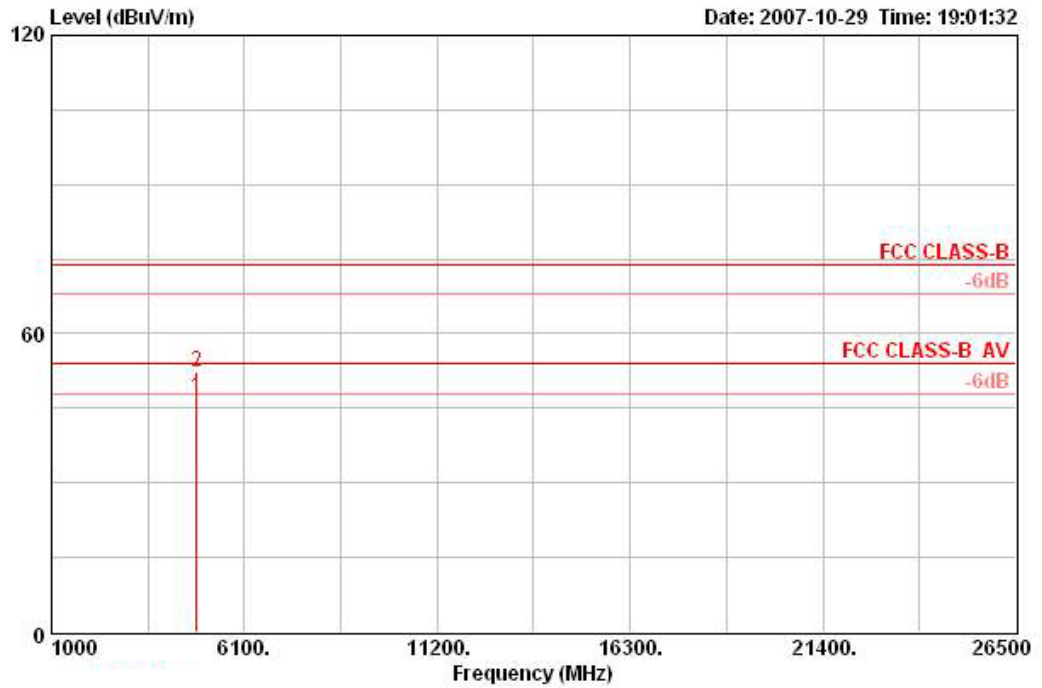
Emission level (dBuV/m) = 20 log Emission level (uV/m).

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

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

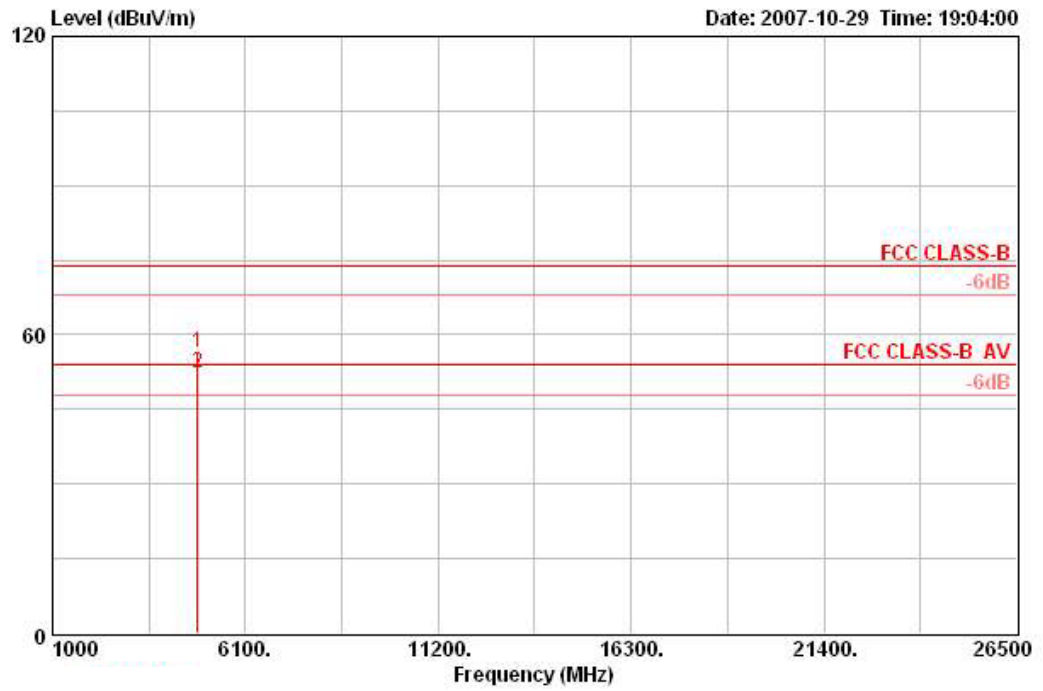
Temperature	23°C	Humidity	62%
Test Engineer	Jacky Ho	Configurations	802.11b CH 1 Ant. A + Ant. B + Ant. C

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1	4823.860	47.28	-6.72	54.00	41.86	34.29	35.26	6.39	AVERAGE	190	100	HORIZONTAL
2	4823.920	52.30	-21.70	74.00	46.88	34.29	35.26	6.39	PEAK	190	100	HORIZONTAL

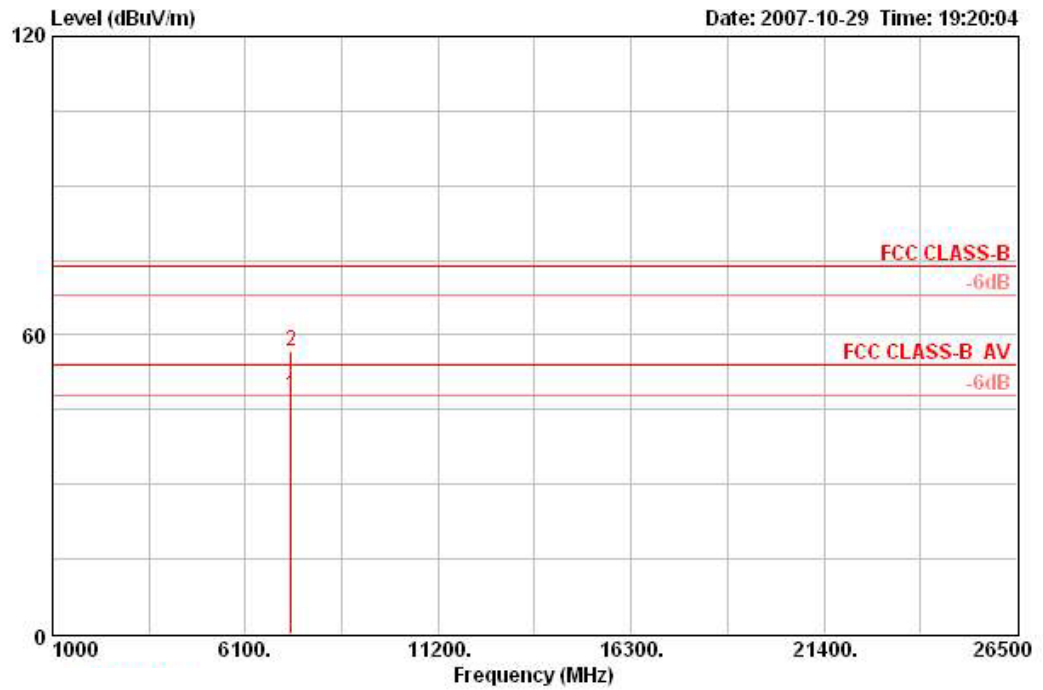
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		deg	cm	
1	4823.820	56.36	-17.64	74.00	50.95	34.29	35.26	6.39	PEAK	193	100	VERTICAL
2	4823.900	52.20	-1.80	54.00	46.79	34.29	35.26	6.39	AVERAGE	193	100	VERTICAL

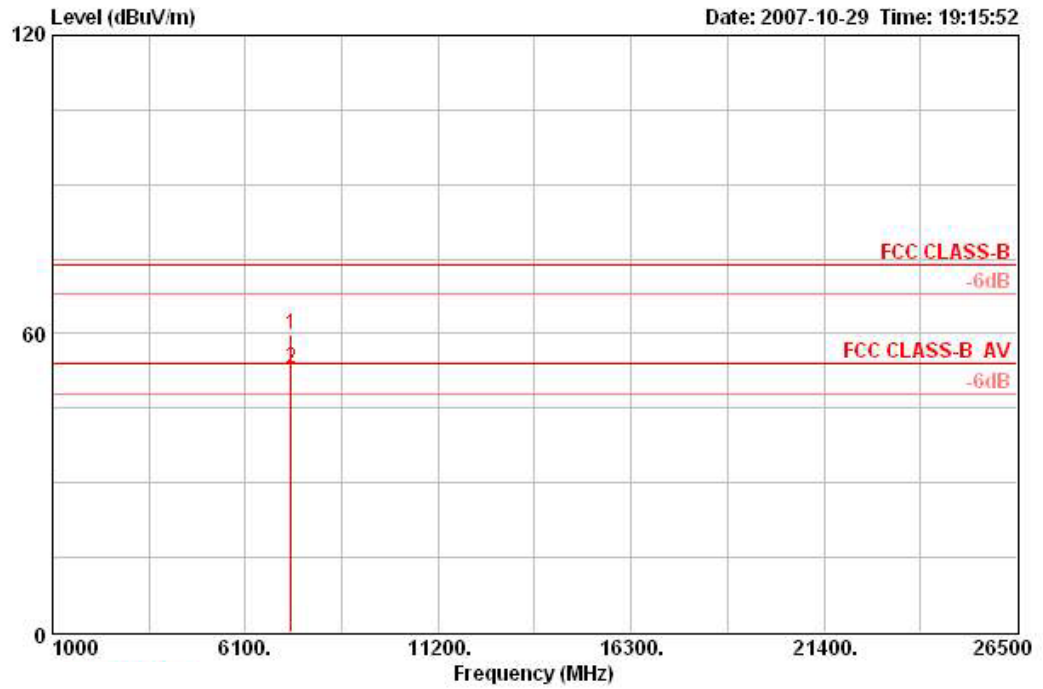
Temperature	23°C	Humidity	62%
Test Engineer	Jacky Ho	Configurations	802.11b CH 6 Ant. A + Ant. B + Ant. C

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1	7308.560	47.90	-6.10	54.00	36.50	38.35	34.94	7.99	AVERAGE	238	189	HORIZONTAL
2	7312.480	56.69	-17.31	74.00	45.26	38.35	34.93	8.01	PEAK	238	189	HORIZONTAL

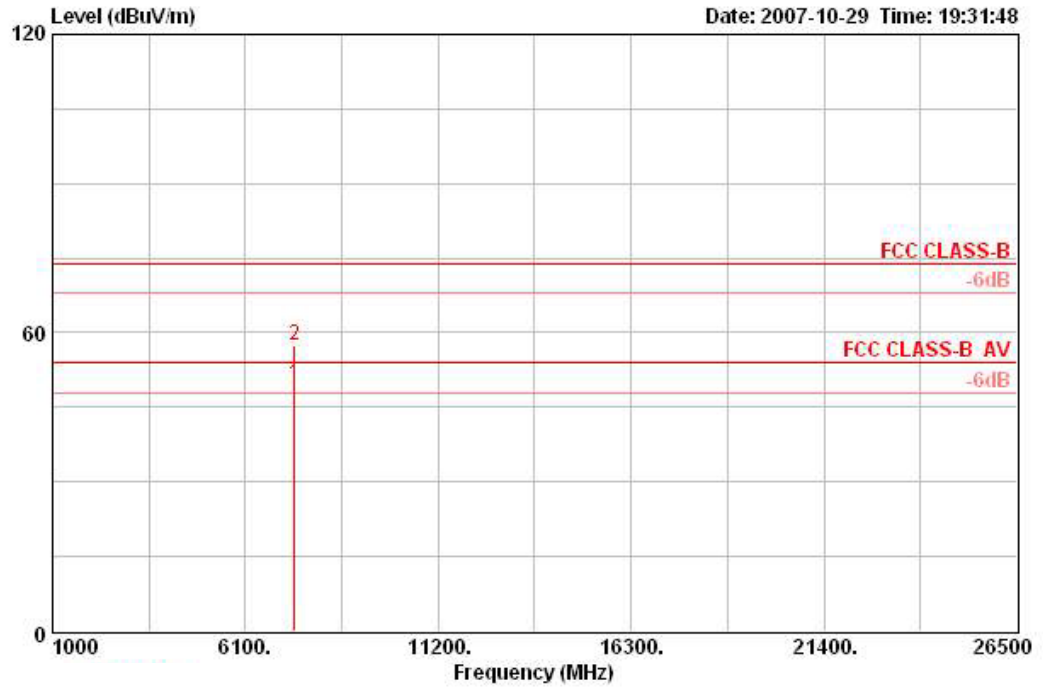
Vertical



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Preamp Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Ant Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1	7308.840	59.89	-14.11	74.00	48.49	38.35	34.94	7.99	PEAK	198	100	VERTICAL
2	7310.080	52.93	-1.07	54.00	41.52	38.35	34.94	7.99	AVERAGE	198	100	VERTICAL

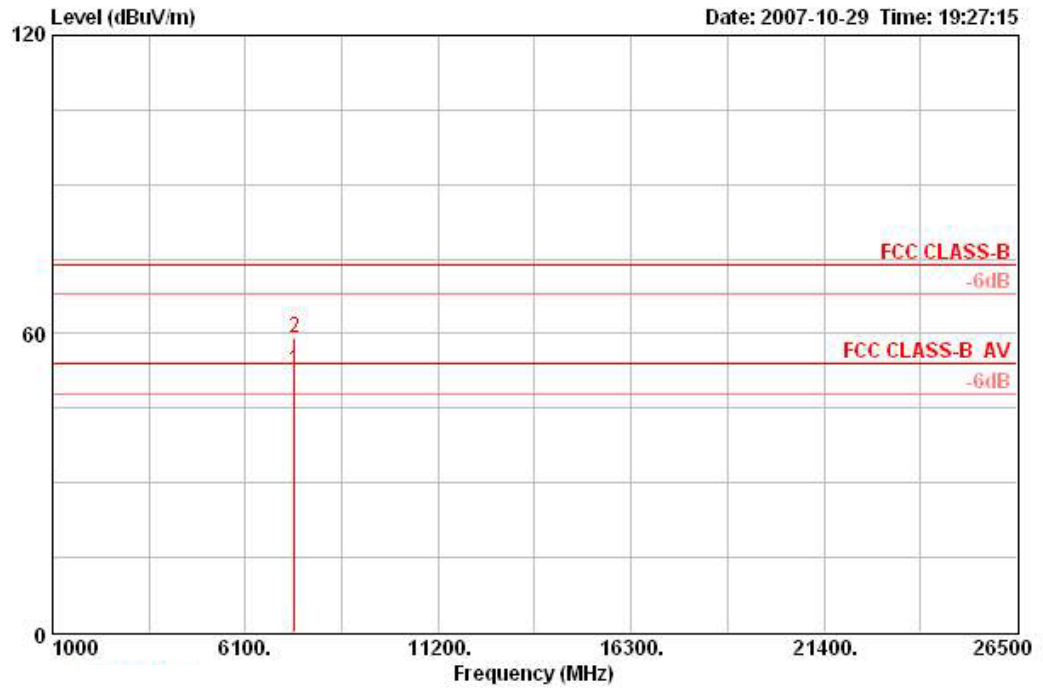
Temperature	23°C	Humidity	62%
Test Engineer	Jacky Ho	Configurations	802.11b CH 11 Ant. A + Ant. B + Ant. C

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		deg	cm	
1	7386.840	49.45	-4.55	54.00	37.89	38.42	34.90	8.05	AVERAGE	216	174	HORIZONTAL
2	7387.080	57.46	-16.54	74.00	45.90	38.42	34.90	8.05	PEAK	216	174	HORIZONTAL

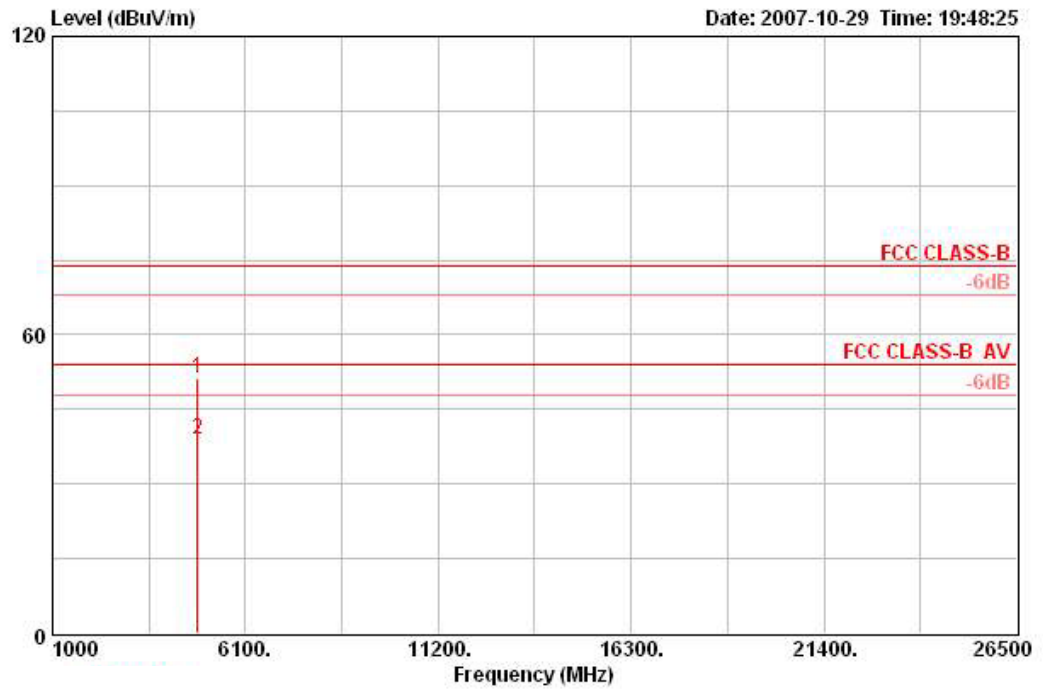
Vertical



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Ant Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1	7388.560	52.54	-1.46	54.00	40.96	38.42	34.89	8.06	AVERAGE	202	165	VERTICAL
2	7388.720	59.23	-14.77	74.00	47.64	38.42	34.89	8.06	PEAK	202	165	VERTICAL

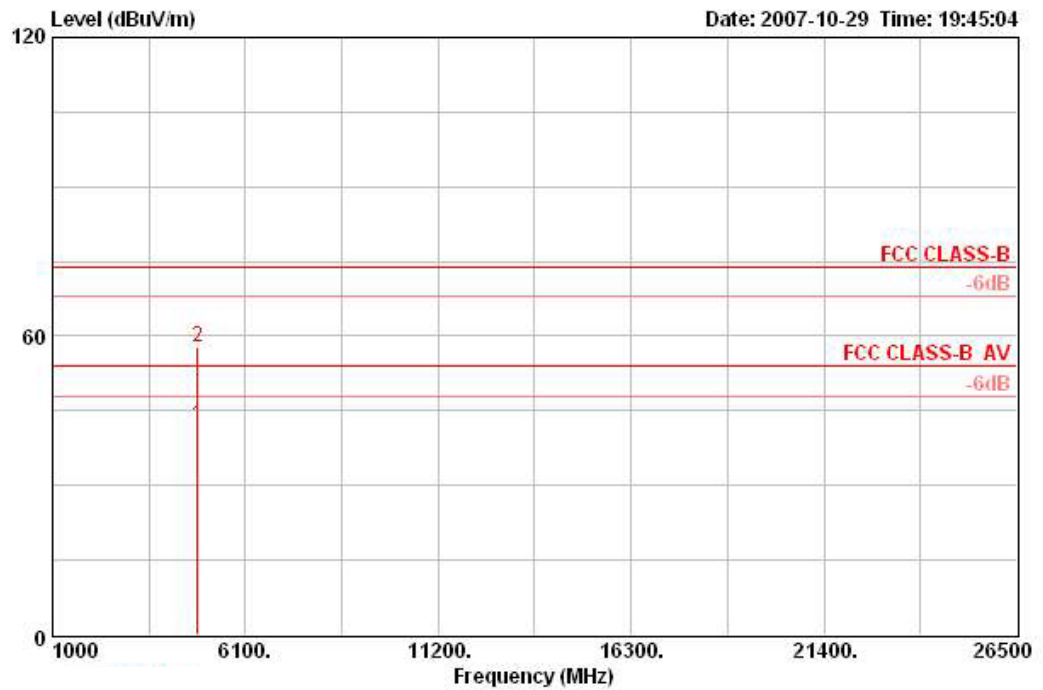
Temperature	23°C	Humidity	62%
Test Engineer	Jacky Ho	Configurations	802.11g CH 1 Ant. A + Ant. B + Ant. C

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1	4827.300	51.27	-22.73	74.00	45.86	34.29	35.26	6.39	PEAK	240	129	HORIZONTAL
2	4827.500	39.05	-14.95	54.00	33.63	34.29	35.26	6.39	AVERAGE	240	129	HORIZONTAL

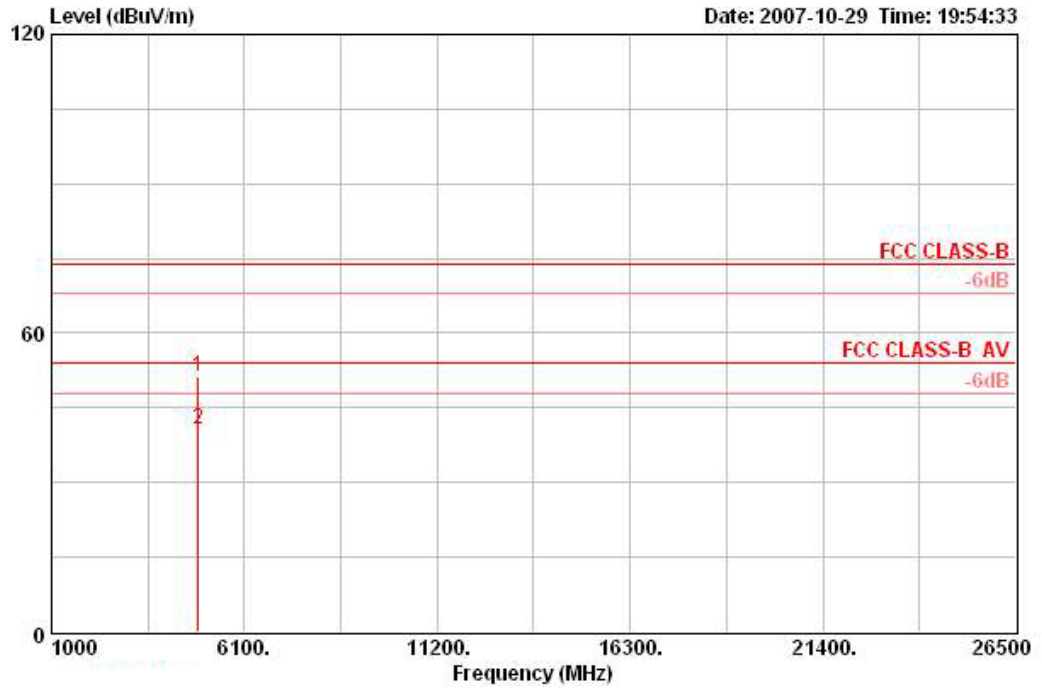
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Ant Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1	4827.500	42.11	-11.89	54.00	36.69	34.29	35.26	6.39	AVERAGE	210	100	VERTICAL
2	4828.400	57.73	-16.27	74.00	52.31	34.29	35.26	6.39	PEAK	210	100	VERTICAL

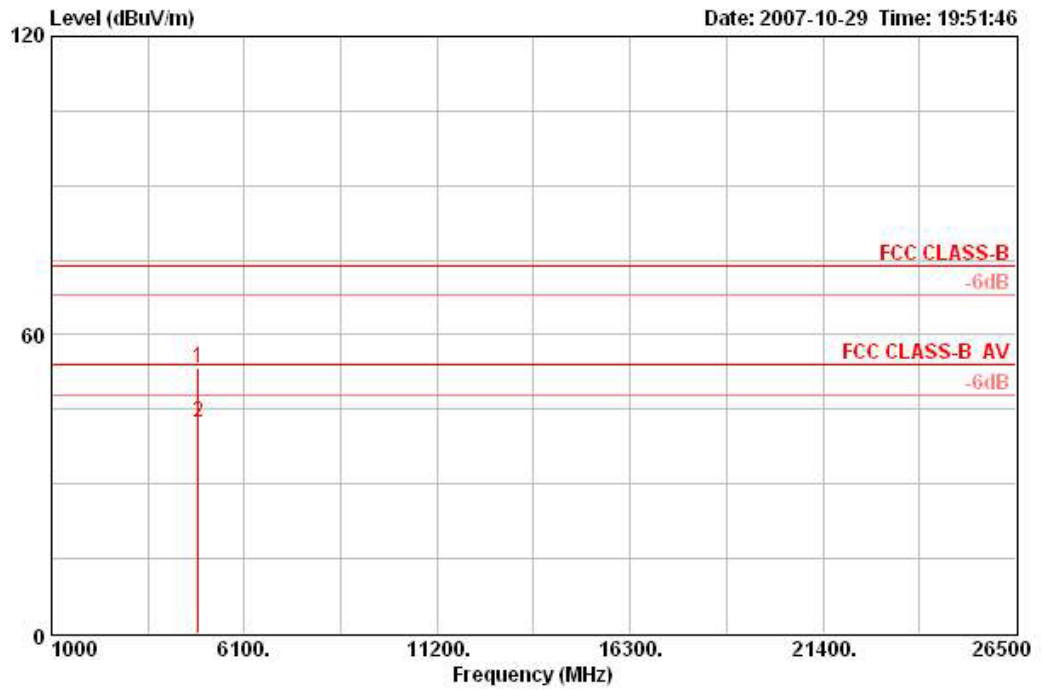
Temperature	23°C	Humidity	62%
Test Engineer	Jacky Ho	Configurations	802.11g CH 6 Ant. A + Ant. B + Ant. C

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		deg	cm	
1	4867.940	51.36	-22.64	74.00	45.54	34.41	35.15	6.56	PEAK	240	130	HORIZONTAL
2	4877.220	40.65	-13.35	54.00	34.82	34.41	35.15	6.56	AVERAGE	240	130	HORIZONTAL

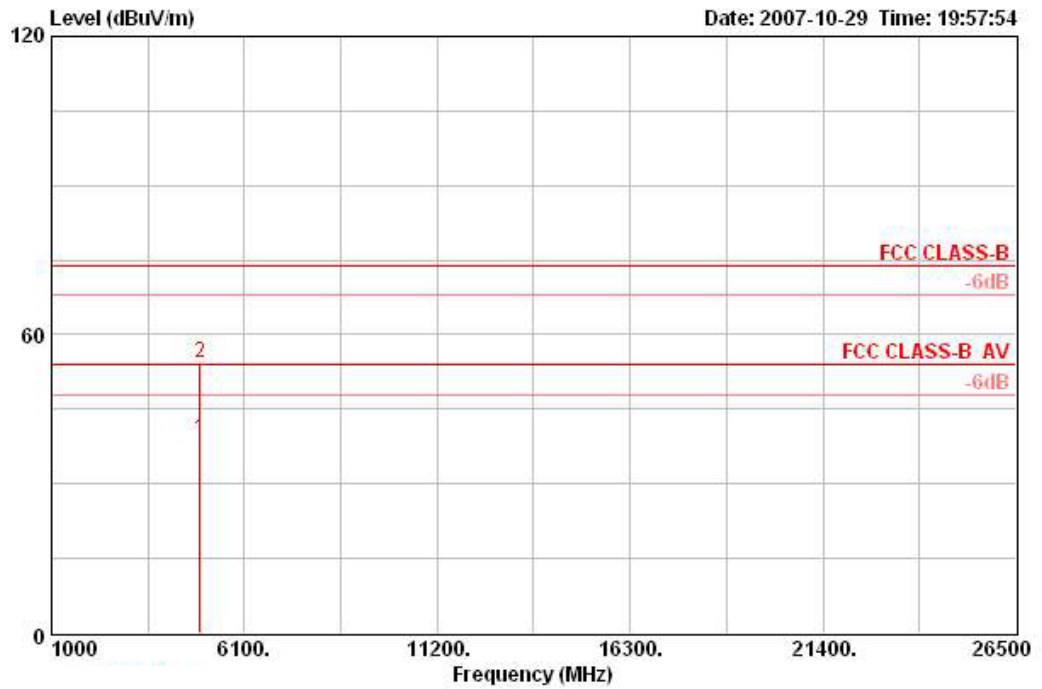
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Ant Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1	4876.580	53.22	-20.78	74.00	47.40	34.41	35.15	6.56	PEAK	172	100	VERTICAL
2	4877.900	42.55	-11.45	54.00	36.73	34.41	35.15	6.56	AVERAGE	172	100	VERTICAL

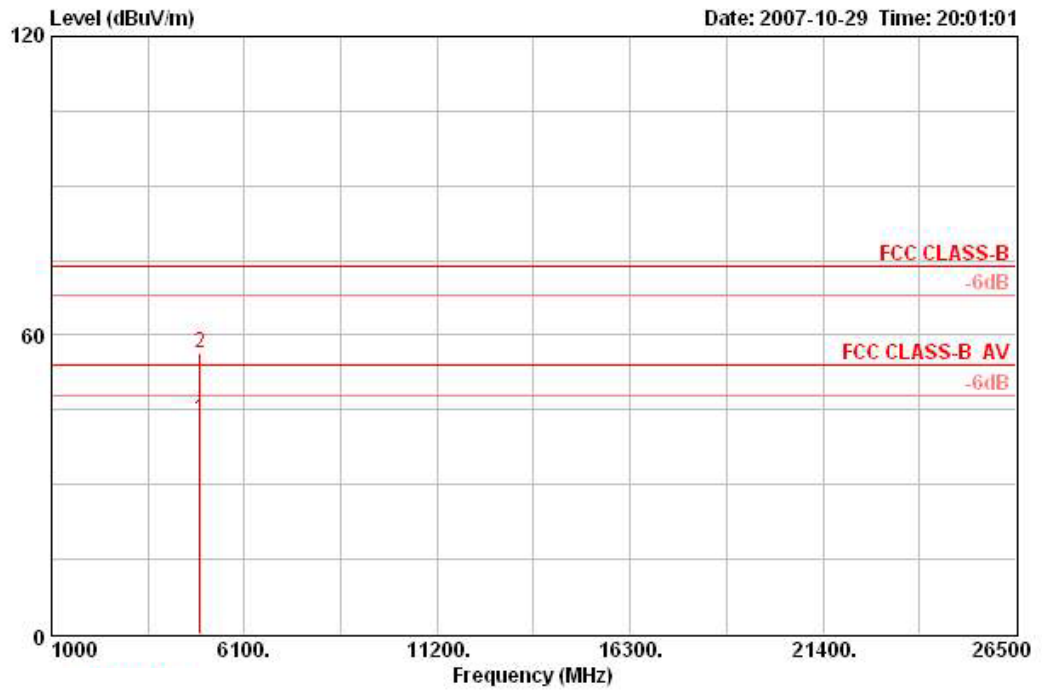
Temperature	23°C	Humidity	62%
Test Engineer	Jacky Ho	Configurations	802.11g CH 11 Ant. A + Ant. B + Ant. C

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		deg	cm	
1	4927.545	39.06	-14.94	54.00	32.83	34.53	35.03	6.73	AVERAGE	240	128	HORIZONTAL
2	4928.565	54.44	-19.56	74.00	48.20	34.53	35.03	6.73	PEAK	240	128	HORIZONTAL

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1	4927.405	43.23	-10.77	54.00	36.99	34.53	35.03	6.73	AVERAGE	164	100	VERTICAL
2	4927.685	56.35	-17.65	74.00	50.11	34.53	35.03	6.73	PEAK	164	100	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.

4.2. Band Edge Emissions Measurement

4.2.1. 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 (micovolts/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

4.2.2. 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	100 MHz
RB / VB (Emission in restricted band)	1 MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	100 KHz /100 KHz for Peak

4.2.3. Test Procedures

1. The test procedure is the same as section 4.5.3, only the frequency 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.

4.2.4. Test Setup Layout

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

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 Band Edge and Fundamental Emissions

Temperature	23°C	Humidity	62%
Test Engineer	Jacky Ho	Configurations	802.11b CH 1, 6, 11 Ant. A + Ant. B + Ant. C

Channel 1

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1 ☒	2386.000	61.81	-12.19	74.00	29.67	29.28	0.00	2.86	PEAK	26	100	VERTICAL
2 ☒	2386.200	52.76	-1.24	54.00	20.61	29.28	0.00	2.86	AVERAGE	26	100	VERTICAL
3 ☒	2411.000	114.64			82.49	29.27	0.00	2.88	PEAK	26	100	VERTICAL
4 ☒	2411.200	110.03			77.88	29.27	0.00	2.88	AVERAGE	26	100	VERTICAL

Item 3, 4 are the fundamental frequency at 2412 MHz.

Channel 6

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1 ☒	2436.000	116.50			84.37	29.24	0.00	2.90	PEAK	196	100	VERTICAL
2 ☒	2437.800	111.60			79.46	29.24	0.00	2.90	AVERAGE	196	100	VERTICAL

Item 1, 2 are the fundamental frequency at 2437MHz.

Channel 11

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1 ☒	2462.600	110.70			78.56	29.23	0.00	2.91	AVERAGE	15	100	VERTICAL
2 ☒	2463.000	115.34			83.21	29.23	0.00	2.91	PEAK	15	100	VERTICAL
3 ☒	2487.100	53.50	-0.50	54.00	21.38	29.20	0.00	2.93	AVERAGE	15	100	VERTICAL
4 ☒	2487.400	61.81	-12.19	74.00	29.68	29.20	0.00	2.93	PEAK	15	100	VERTICAL

Item 1, 2 are the fundamental frequency at 2462 MHz.

Temperature	23°C	Humidity	62%
Test Engineer	Jacky Ho	Configurations	802.11g CH 1, 6, 11 Ant. A + Ant. B + Ant. C

Channel 1

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1 ☺	2389.600	70.26	-3.74	74.00	38.11	29.28	0.00	2.86	PEAK	88	100	VERTICAL
2 ☺	2390.000	53.48	-0.52	54.00	21.32	29.28	0.00	2.88	AVERAGE	88	100	VERTICAL
3 ☺	2407.400	102.80			70.65	29.27	0.00	2.88	AVERAGE	88	100	VERTICAL
4 ☺	2410.200	114.65			82.50	29.27	0.00	2.88	PEAK	88	100	VERTICAL

Item 3, 4 are the fundamental frequency at 2412 MHz.

Channel 6

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1 ☺	2390.000	50.49	-3.51	54.00	18.33	29.28	0.00	2.88	AVERAGE	189	103	VERTICAL
2 ☺	2390.000	62.47	-11.53	74.00	30.30	29.28	0.00	2.88	PEAK	189	103	VERTICAL
3 ☺	2434.600	102.14			70.00	29.24	0.00	2.90	AVERAGE	189	103	VERTICAL
4 ☺	2435.800	114.17			82.03	29.24	0.00	2.90	PEAK	189	103	VERTICAL

Item 3, 4 are the fundamental frequency at 2437 MHz.

Channel 11

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1 ☺	2463.000	104.66			72.52	29.23	0.00	2.91	AVERAGE	333	126	VERTICAL
2 ☺	2463.800	108.21			76.08	29.23	0.00	2.91	PEAK	333	126	VERTICAL
3 ☺	2483.500	53.42	-0.58	54.00	21.28	29.21	0.00	2.93	AVERAGE	333	126	VERTICAL
4 ☺	2483.500	69.02	-4.98	74.00	36.88	29.21	0.00	2.93	PEAK	333	126	VERTICAL

Item 1, 2 are the fundamental frequency at 2462 MHz.

Note:

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

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

4.3. Antenna Requirements

4.3.1. 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. Further, this requirement does not apply to intentional radiators that must be professionally installed.

4.3.2. Antenna Connector Construction

Please refer to section 3.3 in this test report; antenna connector complied with the requirements.

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100359	9kHz – 2.75GHz	Mar. 01, 2007	Conduction (CO04-HY)
LISN	MessTec	NNB-2/16Z	99079	9kHz – 30MHz	Mar. 31, 2007	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9kHz – 30MHz	Mar. 22, 2007	Conduction (CO04-HY)
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9kHz – 30MHz	Apr. 20, 2007	Conduction (CO04-HY)
ISN	SCHAFFNER	ISN T400	21653	9kHz –30MHz	May 09, 2007	Conduction (CO04-HY)
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)
Isolation Transformer	Erika Fiedler OHG	D-65396 Walluf	58	45MHz-2.15GHz	N/A	Conduction (CO04-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30 MHz - 1 GHz 3m	Jun. 14, 2007	Radiation (03CH03-HY)
Amplifier	SCHAFFNER	CPA9231A	1886	9 kHz - 2 GHz	Jan. 22, 2007	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1 GHz - 26.5 GHz	Jun. 07, 2007	Radiation (03CH03-HY)
Amplifier	MITEQ	AMF-6F-260400	923364	26.5 GHz - 40 GHz	Jan. 22, 2007*	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP40	100305	9 kHz - 40 GHz	Dec. 15, 2006	Radiation (03CH03-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	May 23, 2006*	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30 MHz – 1 GHz	Jul. 21, 2007	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	May 04, 2007	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15 GHz - 40 GHz	NCR	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz - 1 GHz	Dec. 02, 2006	Radiation (03CH03-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1 GHz - 40 GHz	Dec. 02, 2006	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)
Spectrum Analyzer	R&S	FSP30	100023	9kHz ~ 30GHz	Dec. 17, 2006	Conducted (TH01-HY)
Power Meter	R&S	NRVS	100444	DC ~ 40GHz	Jun. 27, 2007	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z51	100458	DC ~ 30GHz	Jun. 27, 2007	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z32	100057	30MHz ~ 6GHz	Jun. 27, 2007	Conducted (TH01-HY)
AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	May 04, 2007*	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Mar. 03, 2007	Conducted (TH01-HY)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 01, 2007	Conducted (TH01-HY)
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Dec. 01, 2006	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Dec. 01, 2006	Conducted (TH01-HY)
Vector Signal Generator	R&S	SMU200A	102098	100kHz ~ 6GHz	Nov. 14, 2006	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Mar. 07, 2007	Conducted (TH01-HY)

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

* Calibration Interval of instruments listed above is two year.

NCR means Non-Calibration required.

6. TEST LOCATION

SHIJR	ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. TEL : 886-2-2696-2468 FAX : 886-2-2696-2255
HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055
LINKOU	ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C TEL : 886-2-2601-1640 FAX : 886-2-2601-1695
DUNGHU	ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C. TEL : 886-2-2631-4739 FAX : 886-2-2631-9740
JUNGHE	ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C. TEL : 886-2-8227-2020 FAX : 886-2-8227-2626
NEIHU	ADD : 4Fl., No. 339, Hsin Hu 2 nd Rd., Taipei 114, Taiwan, R.O.C. TEL : 886-2-2794-8886 FAX : 886-2-2794-9777
JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085

7. TAF CERTIFICATE OF ACCREDITATION



Certificate No. : L1190-070110

財團法人全國認證基金會
Taiwan Accreditation Foundation

Certificate of Accreditation

This is to certify that

Sporton International Inc.
EMC & Wireless Communications Laboratory
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien,
Taiwan, R.O.C.

is accredited in respect of laboratory

Accreditation Criteria : ISO/IEC 17025:2005
Accreditation Number : 1190
Originally Accredited : December 15, 2003
Effective Period : January 10, 2007 to January 09, 2010
Accredited Scope : Testing Field, see described in the Appendix
Specific Accreditation Program : Accreditation Program for Designated Testing Laboratory
for Commodities Inspection
: Accreditation Program for Telecommunication Equipment
Testing Laboratory



Jay-San Chen
President, Taiwan Accreditation Foundation
Date : January 10, 2007

P1, total 9 pages

The Appendix forms an integral part of this Certificate, which shall be invalid when used without the Appendix.