



Test Report

Product Name	Notebook
Model No.	MS-1024X, MS-1412, MS-1412X, S420X, MS-1325, VR320, S420
FCC ID	I4L-MS6855C

Applicant	MICRO-STAR INTL Co., LTD.
Address	No. 69, Li-De St., Jung-He City, Taipei Hsien, Taiwan, R.O.C.

Date of Receipt	Feb. 05, 2007
Issued Date	March 28, 2007
Report No.	072L051-RFUSP05V01

The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.

This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Test Report Certification

Issued Date: March 28, 2007

Report No.: 072L051-RFUSP05V01



Accredited by NIST (NVLAP)

NVLAP Lab Code: 200533-0

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Applicant	MICRO-STAR INTL Co., LTD.
Address	No. 69, Li-De St., Jung-He City, Taipei Hsien, Taiwan, R.O.C.
Manufacturer	MICRO-STAR INTL Co., LTD.
Model No.	MS-1024X, MS-1412, MS-1412X, S420X, MS-1325, VR320, S420
Rated Voltage	AC 120V/60Hz
Working Voltage	DC 3.3V
Trade Name	MSI
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2006 ANSI C63.4: 2003
Test Result	Complied



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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Notebook
Trade Name	MSI
Model No.	MS-1024X, MS-1412, MS-1412X, S420X, MS-1325, VR320, S420
FCC ID.	I4L-MS6855C
Frequency Range	2412 – 2462MHz
Number of Channels	11
Data Speed	IEEE 802.11b – 1, 2, 5.5, 11Mbps IEEE 802.11g – 6, 9, 12, 18, 24, 36 48, 54Mbps
Type of Modulation	DSSS/ OFDM
Antenna Type	Connector
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto
Power Adapter	MFR: LITE-ON, M/N: PA-1900-04 Cable Out: Non-Shielded, 1.8m with one ferrite core bonded. Power Cord: Shielded, 1.8m

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	HIGH-TEK	S79-1800260-H39 (Main) S79-1800270-H39 (Aux)	-0.87dBi for 2.4 GHz
2	YAGEO	CAN4313582022501B (Main) CAN4313582012501B (Aux)	-0.98dBi for 2.4 GHz
3	VOS	S79-1800360-V03 (R) S79-1800370-V03 (L)	-0.95dBi for 2.4 GHz
4	HIGH-TEK	S79-1800240-H39 (Main) S79-1800230-H39 (Aux)	0.17dBi for 2.4 GHz
5	HIGH-TEK	S79-1800300-H39 (Main) S79-1800310-H39 (Aux)	1.18dBi for 2.4 GHz

Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 1:	2412 MHz	Channel 5:	2432 MHz	Channel 9:	2452 MHz
Channel 2:	2417 MHz	Channel 6:	2437 MHz	Channel 10:	2457 MHz
Channel 3:	2422 MHz	Channel 7:	2442 MHz	Channel 11:	2462 MHz
Channel 4:	2427 MHz	Channel 8:	2447 MHz		

Note:

1. The EUT is a Notebook with a built-in 2.4GHz WLAN transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11b is 11Mbps and 802.11g is 54Mbps)
4. These tests are conducted on a sample for the purpose of demonstrating compliance of 802.11b/g transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices
5. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

1.2. Operational Description

The EUT is a Notebook with a built-in 2.4GHz transceiver. There are 11 channels in 2412 – 2462MHz. The channels are separated by 5MHz. This device supports the data rates of 1, 2, 5.5, 11Mbps in 802.11b mode and 6, 9, 12, 18, 24, 36, 48, 54Mbps in 802.11g mode. The signals are modulated by DSSS in 802.11b mode and OFDM in 802.11g mode. The antenna type is PIFA.

Test Mode	Mode 1: Transmitter 802.11b
	Mode 2: Transmitter 802.11g

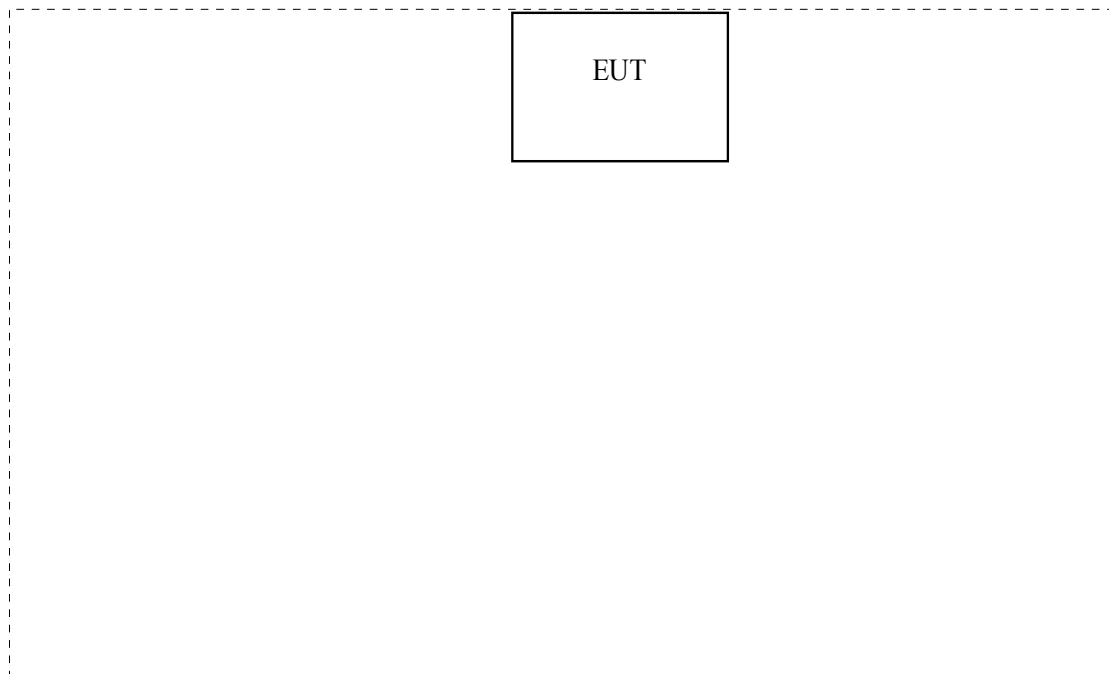
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1.	N/A	N/A	N/A	N/A	N/A	N/A

	Signal Cable Type	Signal cable Description
A.	N/A	N/A

1.4. Configuration of Test System



1.5. EUT Exercise Software

- 1 Setup the EUT and simulators as shown on 1.4.
- 2 Turn on the power of all equipment.
- 3 Messages will be transmitted and received through EUT.
- 4 Test is based on the mandatory continuous transmitter.
- 5 Repeat the above procedure (3) to (4).

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

Site Description: File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Reference 31040/SIT1300F2



Accreditation on NVLAP
NVLAP Lab Code: 200533-0



Site Name: Quietek Corporation
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TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com



2. Conducted Emission

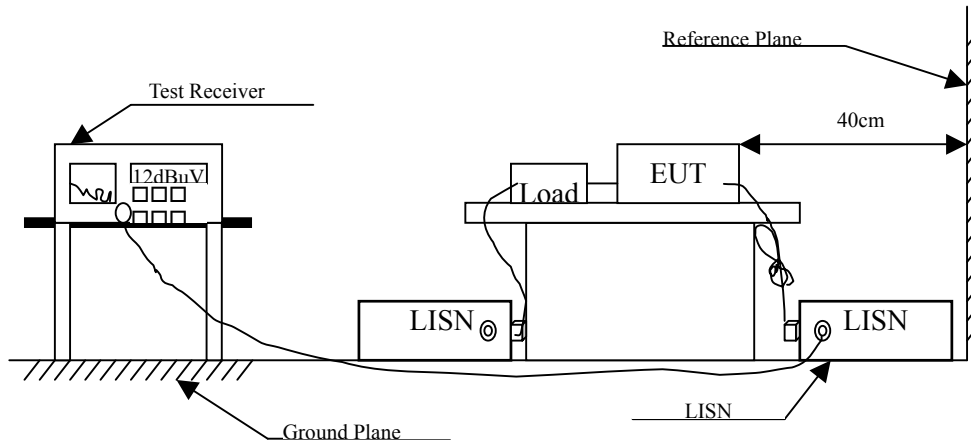
2.1. Test Equipment

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 2006	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2006	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2006	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2006	
5	No.1 Shielded Room			N/A	

Note: All instruments are calibrated every one year.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AVG
0.15 - 0.50	66-56 _(註)	56-46 _(註)
0.50-5.0	56	46
5.0 - 30	60	50

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Product : Notebook
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.177	0.202	40.910	41.112	-24.117	65.229
0.338	0.214	29.460	29.674	-30.955	60.629
0.505	0.216	28.260	28.476	-27.524	56.000
1.166	0.245	27.730	27.975	-28.025	56.000
1.611	0.261	27.570	27.831	-28.169	56.000
6.455	0.466	25.390	25.856	-34.144	60.000
Average					
0.177	0.202	27.270	27.472	-27.757	55.229
0.338	0.214	24.030	24.244	-26.385	50.629
0.505	0.216	21.170	21.386	-24.614	46.000
1.166	0.245	18.520	18.765	-27.235	46.000
1.611	0.261	19.240	19.501	-26.499	46.000
6.455	0.466	18.880	19.346	-30.654	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Notebook
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
LINE 2					
Quasi-Peak					
0.189	0.202	38.800	39.002	-25.884	64.886
0.216	0.202	31.320	31.522	-32.592	64.114
0.334	0.214	29.380	29.594	-31.149	60.743
1.416	0.248	28.020	28.268	-27.732	56.000
3.896	0.352	23.780	24.132	-31.868	56.000
15.576	0.797	27.400	28.197	-31.803	60.000
Average					
0.189	0.202	22.750	22.952	-31.934	54.886
0.216	0.202	18.600	18.802	-35.312	54.114
0.334	0.214	24.180	24.394	-26.349	50.743
1.416	0.248	19.170	19.418	-26.582	46.000
3.896	0.352	17.520	17.872	-28.128	46.000
15.576	0.797	21.910	22.707	-27.293	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Notebook
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.158	0.202	45.080	45.282	-20.489	65.771
0.177	0.202	40.770	40.972	-24.257	65.229
0.201	0.202	36.330	36.532	-28.011	64.543
0.603	0.218	28.060	28.278	-27.722	56.000
1.818	0.264	28.990	29.254	-26.746	56.000
4.826	0.394	27.180	27.574	-28.426	56.000
Average					
0.158	0.202	25.360	25.562	-30.209	55.771
0.177	0.202	27.160	27.362	-27.867	55.229
0.201	0.202	23.090	23.292	-31.251	54.543
0.603	0.218	18.010	18.228	-27.772	46.000
1.818	0.264	19.870	20.134	-25.866	46.000
4.826	0.394	18.080	18.474	-27.526	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Notebook
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
LINE 2					
Quasi-Peak					
0.170	0.202	42.480	42.682	-22.747	65.429
0.189	0.202	38.840	39.042	-25.844	64.886
0.220	0.202	30.830	31.032	-32.968	64.000
0.279	0.203	28.260	28.463	-33.851	62.314
4.627	0.371	24.170	24.541	-31.459	56.000
15.099	0.801	26.810	27.611	-32.389	60.000
Average					
0.170	0.202	30.150	30.352	-25.077	55.429
0.189	0.202	22.540	22.742	-32.144	54.886
0.220	0.202	24.030	24.232	-29.768	54.000
0.279	0.203	24.070	24.273	-28.041	52.314
4.627	0.371	16.730	17.101	-28.899	46.000
15.099	0.801	21.320	22.121	-27.879	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

3. Peak Power Output

3.1. Test Equipment

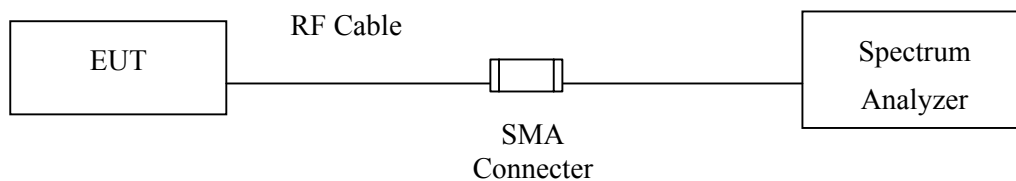
The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2006
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

Note: 1. All instruments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

3.2. Test Setup

Conducted Measurement



3.3. Limits

The maximum peak power shall be less 1 Watt.

3.4. Uncertainty

± 1.27 dB

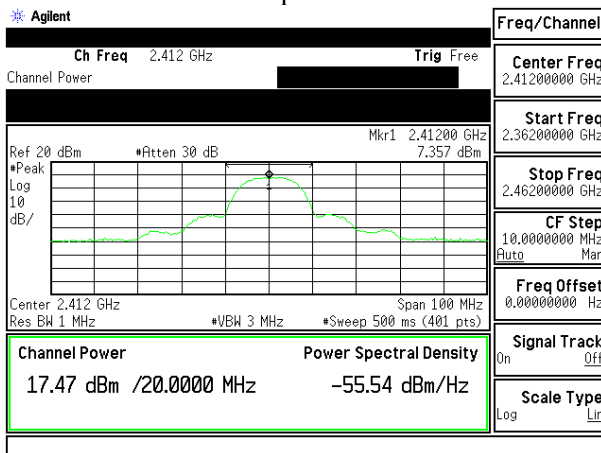
3.5. Test Result of Peak Power Output

Product : Notebook
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

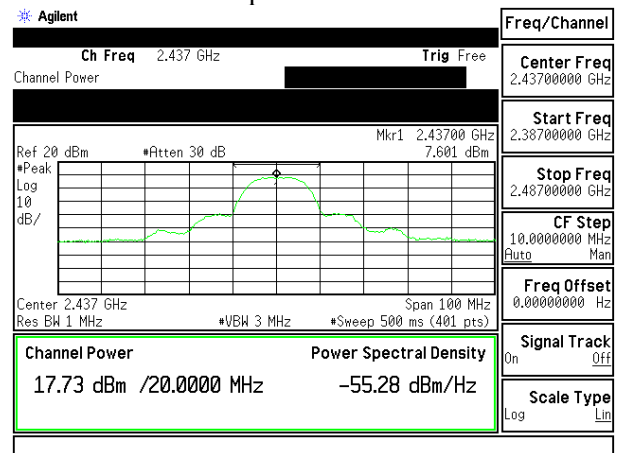
Data Speed: 11Mbps

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
1	2412.00	17.47dBm	1 Watt= 30 dBm	Pass
6	2437.00	17.73dBm	1 Watt= 30 dBm	Pass
11	2462.00	17.49dBm	1 Watt= 30 dBm	Pass

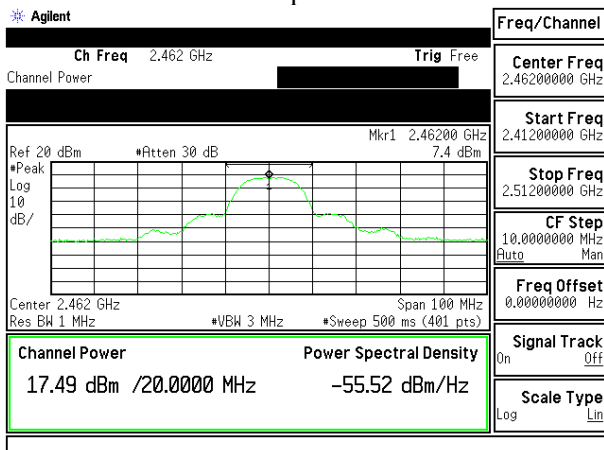
11Mbps-CH01



11Mbps-CH06



11Mbps-CH11

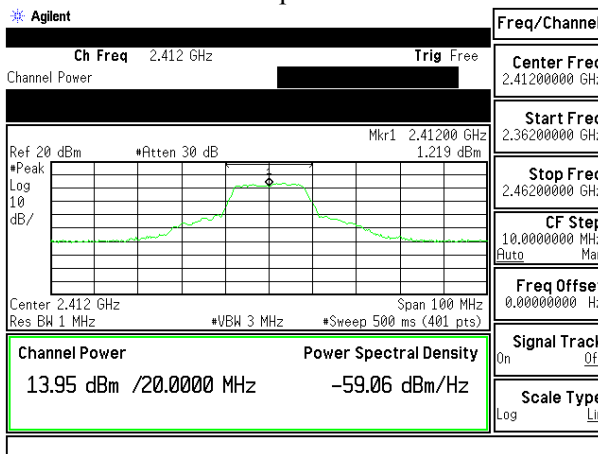


Product : Notebook
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

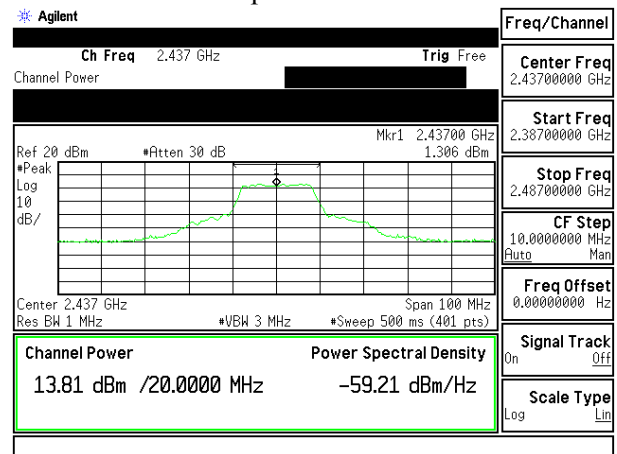
Data Speed: 54Mbps

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
1	2412.00	13.95dBm	1 Watt= 30 dBm	Pass
6	2437.00	13.81dBm	1 Watt= 30 dBm	Pass
11	2462.00	13.39dBm	1 Watt= 30 dBm	Pass

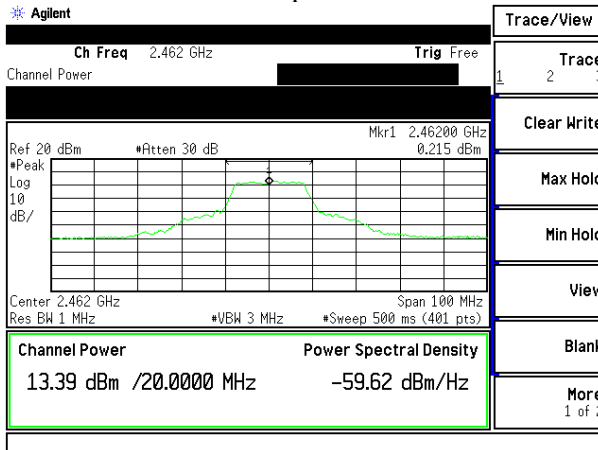
54Mbps-CH01



54Mbps-CH06



54Mbps-CH11



4. Radiated Emission

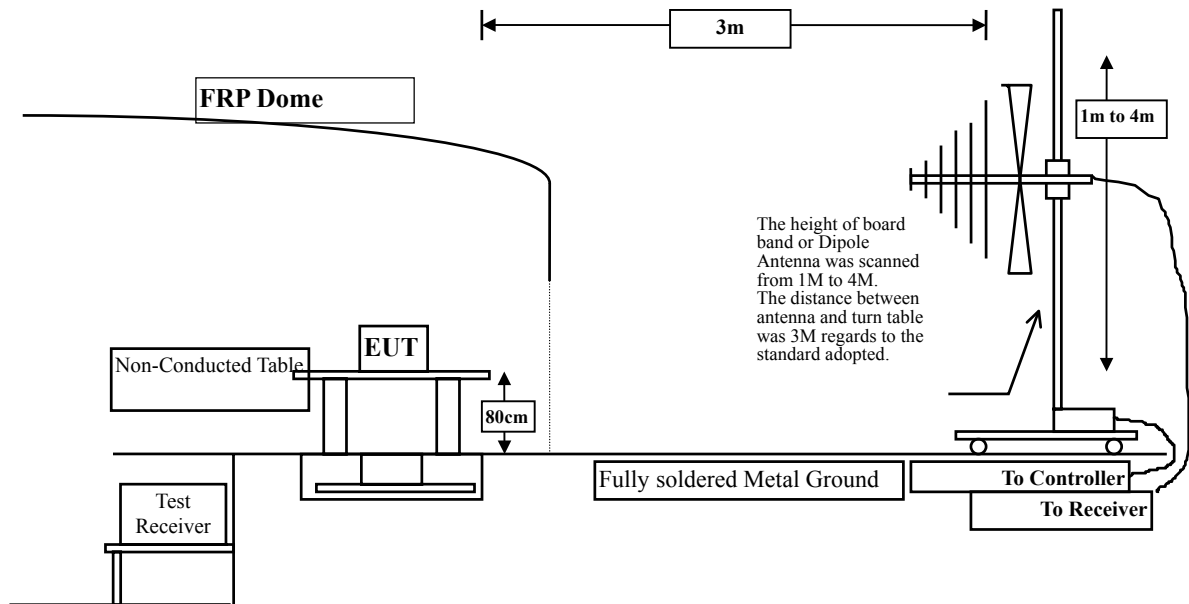
4.1. Test Equipment

The following test equipment are used during the radiated emission test:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 1	Test Receiver	R & S	ESCS 30 / 825442/14	May, 2006
	Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2006
	Pre-Amplifier	HP	8447D/3307A01812	May, 2006
	Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2006
	Horn Antenna	EM	EM6917 / 103325	May, 2006
Site # 2	Test Receiver	R & S	ESCS 30 / 825442/17	May, 2006
	Spectrum Analyzer	Advantest	R3261C / 71720609	May, 2006
	Pre-Amplifier	HP	8447D/3307A01814	May, 2006
	Bilog Antenna	Chase	CBL6112B / 2455	Sep., 2006
	Horn Antenna	EM	EM6917 / 103325	May, 2006
Site # 3	X Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2006
	X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006
	X Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2006
	X Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2006
	X Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2006
	X Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2006
	X Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2006
	X Pre-Amplifier	HP	8449B / 3008A01123	July, 2006

- Note:
1. All instruments are calibrated every one year.
 2. The test instruments marked by "X" are used to measure the final test results.

4.2. Test Setup



4.3. Limits

➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

- Remarks :
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
 2. In the Above Table, the tighter limit applies at the band edges.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated measurement.

The additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field strength of harmonics measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz.

The frequency range from 30MHz to 10th harmonics is checked.

4.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

4.6. Test Result of Radiated Emission

Product : Notebook
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b (2412MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4824.050	5.362	53.350	58.712	-15.288	74.000
7236.000	11.867	40.490	52.357	-21.643	74.000
Average Detector:					
4824.050	5.362	39.280	44.642	-9.358	54.000
Vertical					
Peak Detector:					
4824.890	5.363	54.120	59.483	-14.517	74.000
7236.000	11.867	40.510	52.377	-21.623	74.000
Average Detector:					
4823.890	5.362	39.190	44.551	-9.449	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2437 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4874.050	5.466	53.820	59.286	-14.714	74.000
7311.000	12.030	41.600	53.630	-20.370	74.000
Average					
Detector:					
4874.050	5.466	39.740	45.206	-8.794	54.000
Vertical					
Peak Detector:					
4873.940	5.465	54.470	59.935	-14.065	74.000
7311.000	12.030	41.550	53.580	-20.420	74.000
Average					
Detector:					
4873.940	5.465	40.010	45.475	-8.525	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2462 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4923.980	5.578	54.210	59.787	-14.213	74.000
7386.000	12.211	41.530	53.742	-20.258	74.000
Average					
Detector:					
4923.980	5.578	39.440	45.017	-8.983	54.000
Vertical					
Peak Detector:					
4924.050	5.578	53.980	59.557	-14.443	74.000
7386.000	12.211	41.460	53.672	-20.328	74.000
Average					
Detector:					
4924.050	5.578	39.870	45.447	-8.553	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2412MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

Peak Detector:

4824.300	5.362	46.130	51.492	-22.508	74.000
7236.000	11.867	42.130	53.997	-20.003	74.000

Average

Detector:

--

Vertical

Peak Detector:

4822.490	5.359	47.350	52.709	-21.291	74.000
7236.000	11.867	42.050	53.917	-20.083	74.000

Average

Detector:

--

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Notebook
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2437 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

Peak Detector:

4874.000	5.465	46.894	52.360	-21.640	74.000
7311.000	12.030	41.240	53.270	-20.730	74.000

Average

Detector:

--

Vertical

Peak Detector:

4874.320	5.466	47.714	53.180	-20.820	74.000
7311.000	12.030	41.650	53.680	-20.320	74.000

Average

Detector:

--

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Notebook
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter 802.11g (2462 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

Peak Detector:

4924.530	5.578	47.082	52.660	-21.340	74.000
7386.000	12.211	41.498	53.710	-20.290	74.000

Average

Detector:

--

Vertical

Peak Detector:

4924.480	5.578	47.072	52.650	-21.350	74.000
7386.000	12.211	40.768	52.980	-21.020	74.000

Average

Detector:

--

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Notebook
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2437 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
240.975	12.077	21.343	33.420	-12.580	46.000
371.925	15.919	16.728	32.647	-13.353	46.000
434.975	17.646	17.327	34.973	-11.027	46.000
636.250	20.889	15.891	36.780	-9.220	46.000
769.625	21.929	15.385	37.314	-8.686	46.000
961.200	22.909	11.633	34.542	-19.458	54.000
Vertical					
141.550	11.211	21.187	32.398	-11.102	43.500
401.025	18.298	15.885	34.183	-11.817	46.000
527.125	18.888	12.354	31.242	-14.758	46.000
636.250	20.713	14.730	35.443	-10.557	46.000
769.625	22.679	14.844	37.523	-8.477	46.000
900.575	23.649	9.132	32.781	-13.219	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The radiated emissions below 1GHz of the lowest, middle, highest frequency are pretested. Only the worst case is shown on the report.

Product : Notebook
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2437 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
371.925	15.919	16.728	32.647	-13.353	46.000
568.350	19.178	15.864	35.042	-10.958	46.000
599.875	19.999	15.307	35.306	-10.694	46.000
665.350	20.693	11.490	32.183	-13.817	46.000
801.150	21.771	14.999	36.770	-9.230	46.000
912.700	22.319	12.947	35.266	-10.734	46.000
Vertical					
502.875	18.472	19.219	37.691	-8.309	46.000
568.350	21.217	9.257	30.474	-15.526	46.000
599.875	21.898	12.387	34.285	-11.715	46.000
704.150	20.810	10.437	31.247	-14.753	46.000
900.575	23.649	9.135	32.784	-13.216	46.000
934.525	24.106	9.391	33.498	-12.502	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The radiated emissions below 1GHz of the lowest, middle, highest frequency are pretested. Only the worst case is shown on the report.

5. Band Edge

5.1. Test Equipment

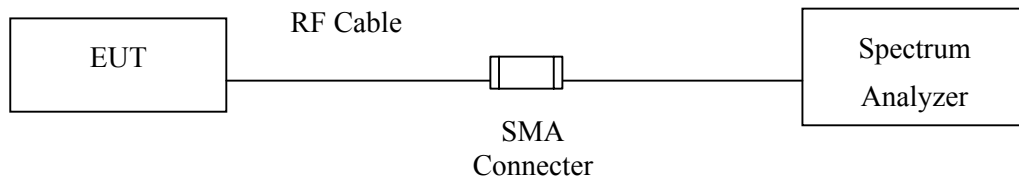
The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2006
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006
X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2006
X	Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2006
X	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2006
X	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2006
X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2006
X	Pre-Amplifier	HP	8449B / 3008A01123	July, 2006

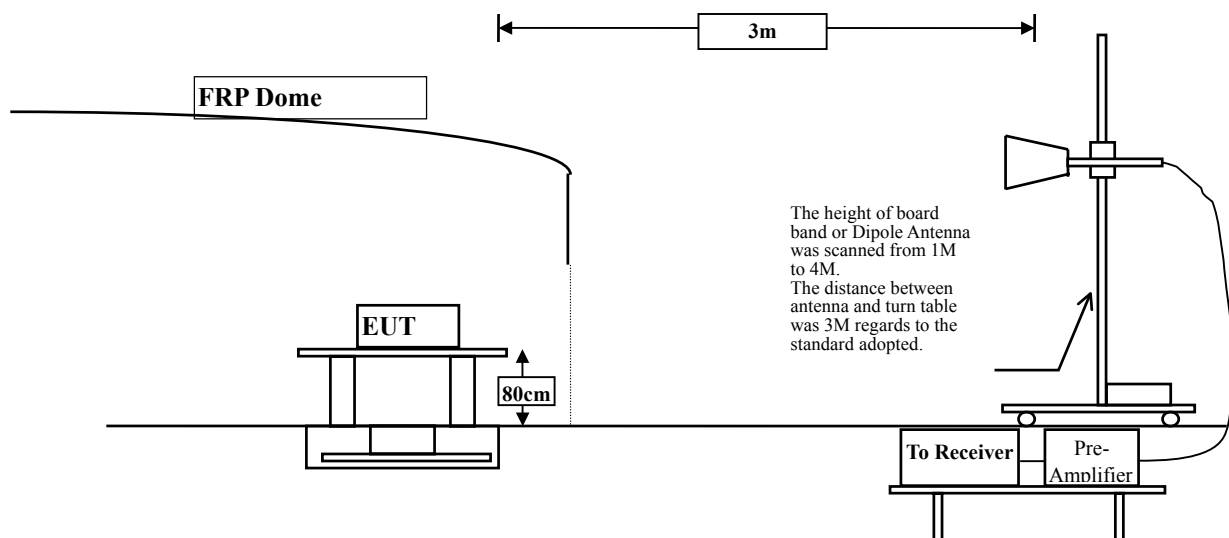
- Note:
1. All instruments are calibrated every one year.
 2. The test instruments marked by "X" are used to measure the final test results.

5.2. Test Setup

RF Conducted Measurement:



RF Radiated Measurement:



5.3. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

5.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz.

5.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

5.6. Test Result of Band Edge

Product : Notebook
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

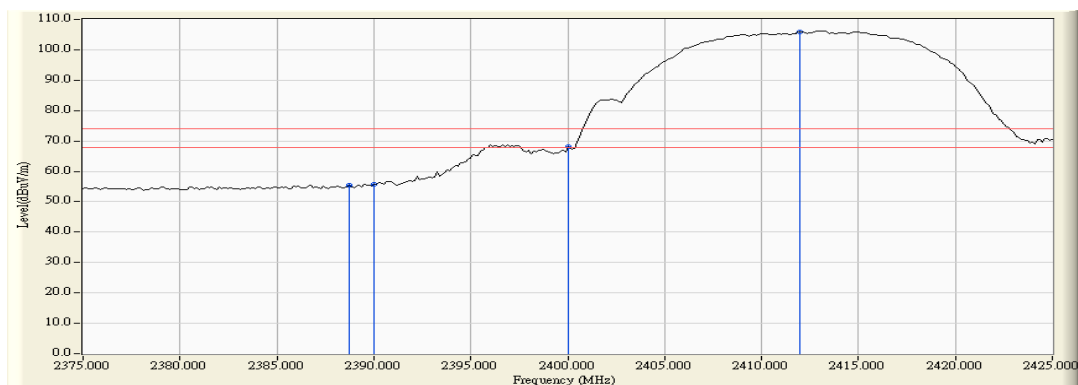
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
1 (Horizontal)	<2400	>20	Pass

RF Radiated Measurement (Horizontal):

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
1 (Peak)	2388.750	-2.383	57.752	55.369	74.00	54.00	Pass
1 (Average)	2388.750	-2.383	44.916	42.533	74.00	54.00	Pass

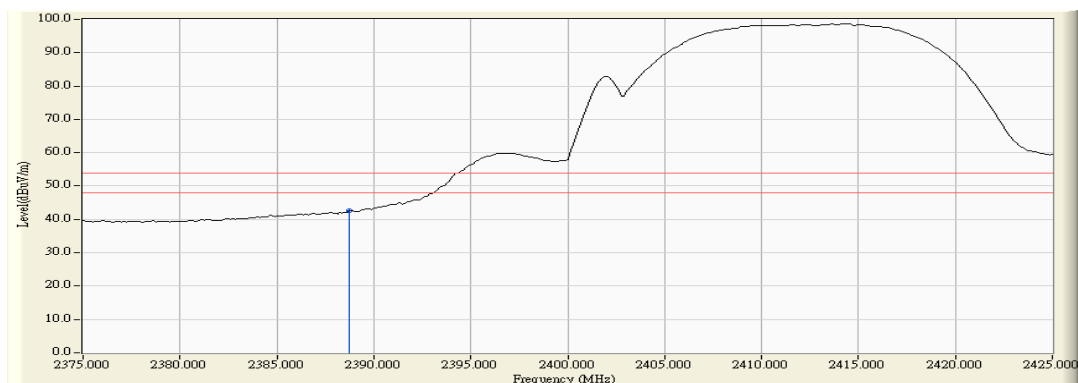
Figure Channel 1: Horizontal (Peak)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Figure Channel 1: Horizontal (Average)



Note:

RBW=1MHz, VBW=300Hz, Sweep Time=500ms

Product : Notebook
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

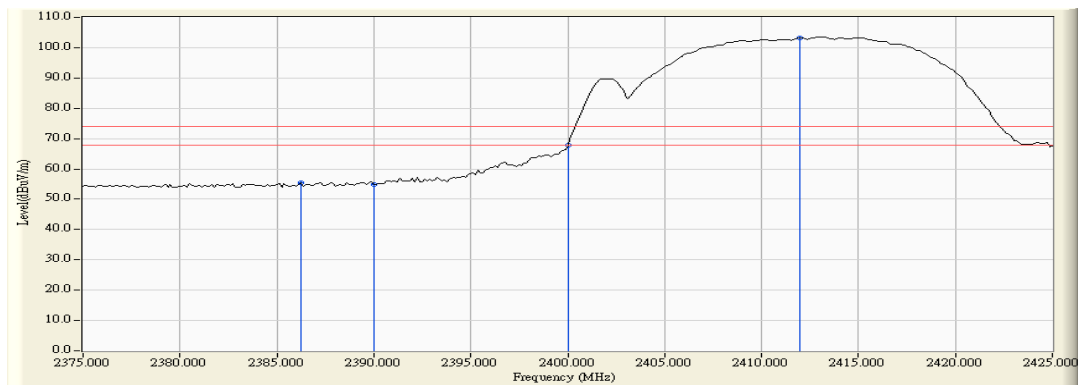
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
1 (Vertical)	<2400	>20	Pass

RF Radiated Measurement (Vertical):

Channel	Frequency (MHz)	Correct Fcator (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
1 (Peak)	2386.250	-2.395	57.697	55.301	74.00	54.00	Pass
1 (Average)	2386.250	-2.395	42.137	39.741	74.00	54.00	Pass

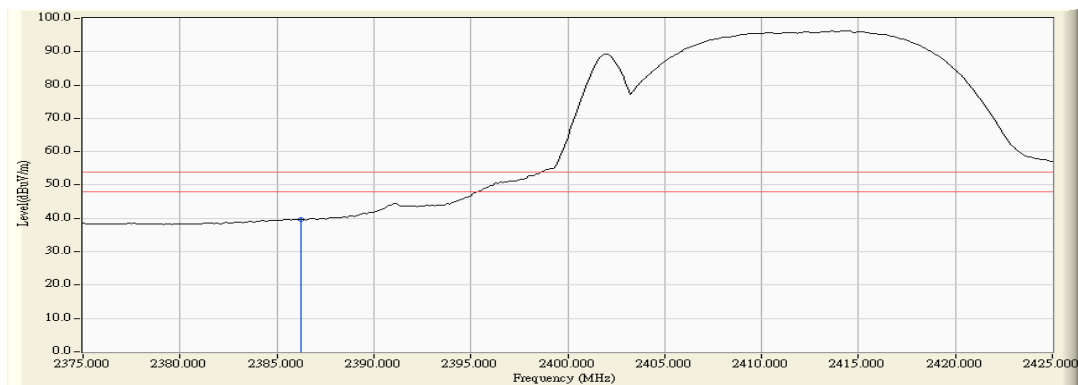
Figure Channel 1: Vertical (Peak)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Figure Channel 1: Vertical (Average)



Note:

RBW=1MHz, VBW=300Hz, Sweep Time=500ms

Product : Notebook
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

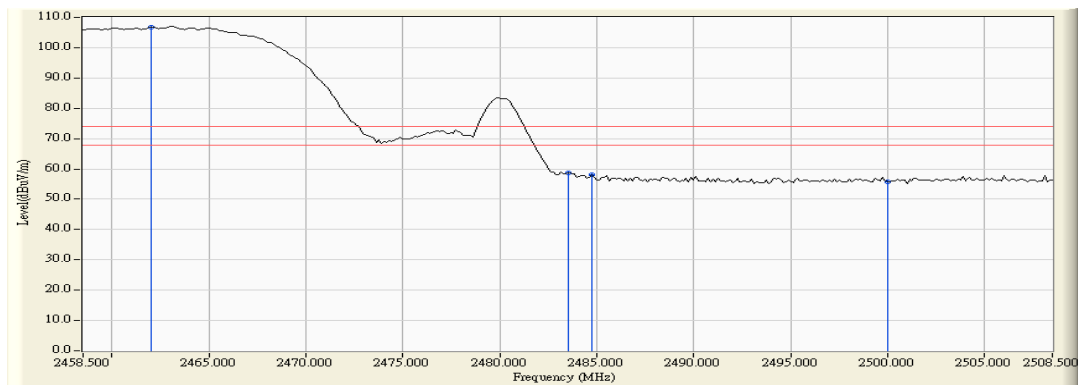
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
11 (Horizontal)	>2483.5	>20	Pass

RF Radiated Measurement (Horizontal):

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11(Peak)	2484.750	-1.934	59.977	58.044	74.00	54.00	Pass
11(Average)	2484.750	-1.934	47.867	45.934	74.00	54.00	Pass

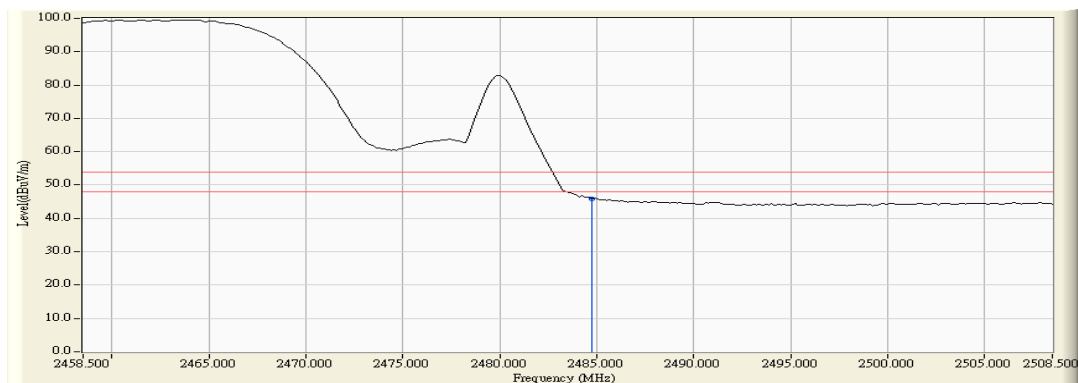
Figure Channel 11: Horizontal (Peak)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms

Figure Channel 11: Horizontal (Average)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms

Product : Notebook
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

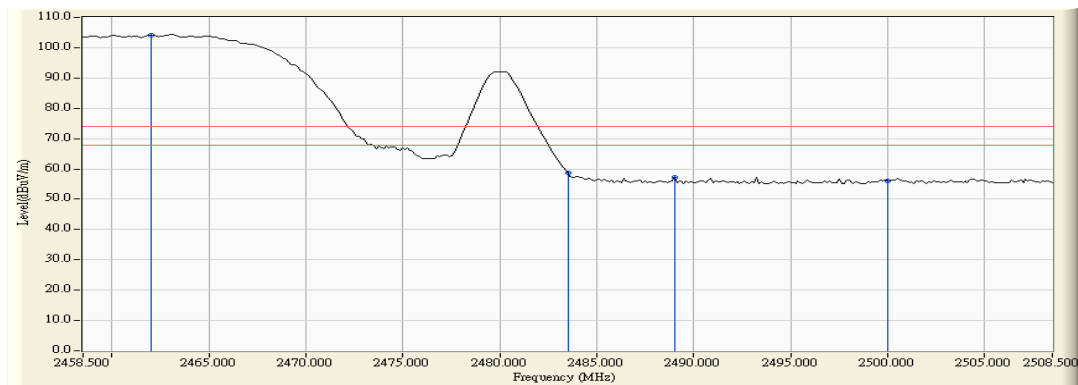
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
11 (Vertical)	>2483.5	>20	Pass

RF Radiated Measurement (Vertical):

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11(Peak)	2489.000	-1.920	59.093	57.173	74.00	54.00	Pass
11(Average)	2489.000	-1.920	44.258	42.338	74.00	54.00	Pass

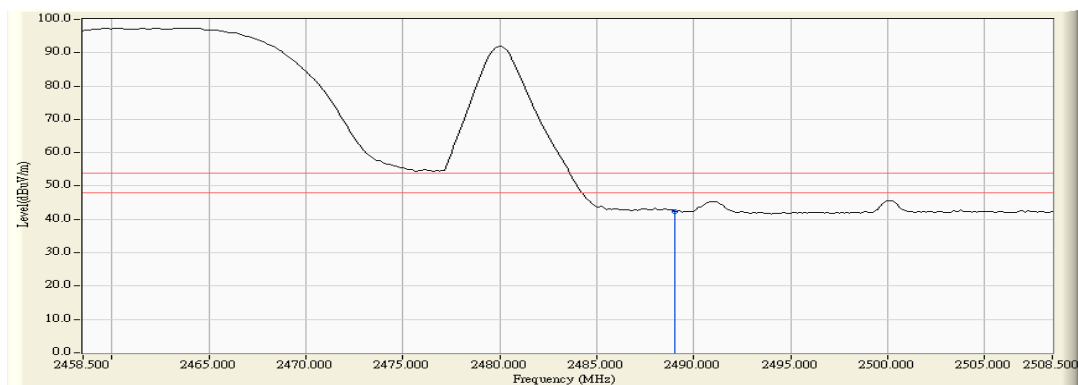
Figure Channel 11: (Vertical) (Peak)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Figure Channel 11: (Vertical) (Average)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Product : Notebook
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

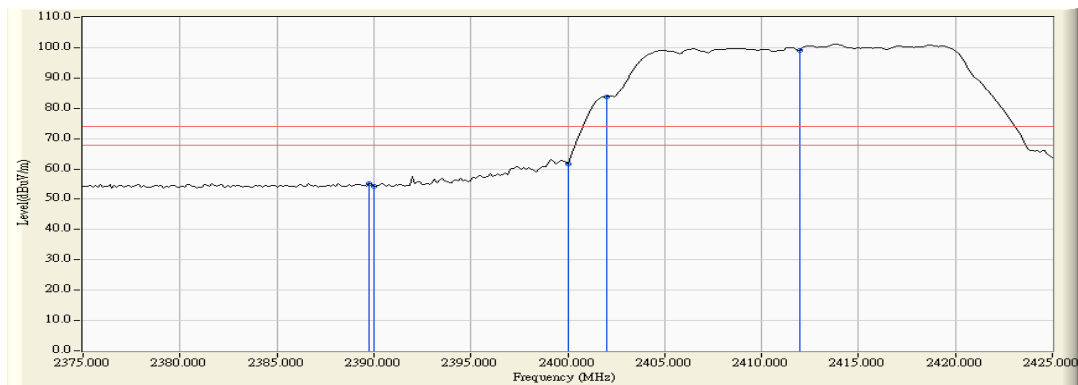
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
1 (Horizontal)	<2400	>20	Pass

RF Radiated Measurement (Horizontal):

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
1 (Peak)	2389.750	-2.378	57.624	55.246	74.00	54.00	Pass
1 (Average)	2389.750	-2.378	42.518	40.140	74.00	54.00	Pass

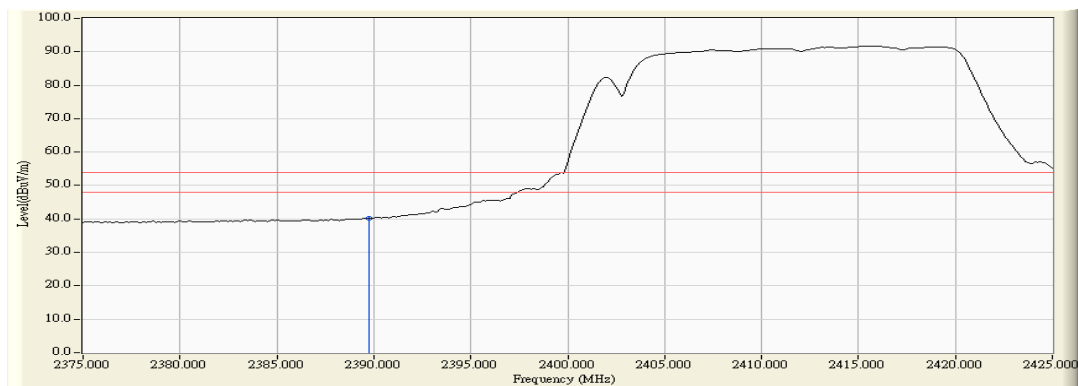
Figure Channel 1: Horizontal (Peak)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Figure Channel 1: Horizontal (Average)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Product : Notebook
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

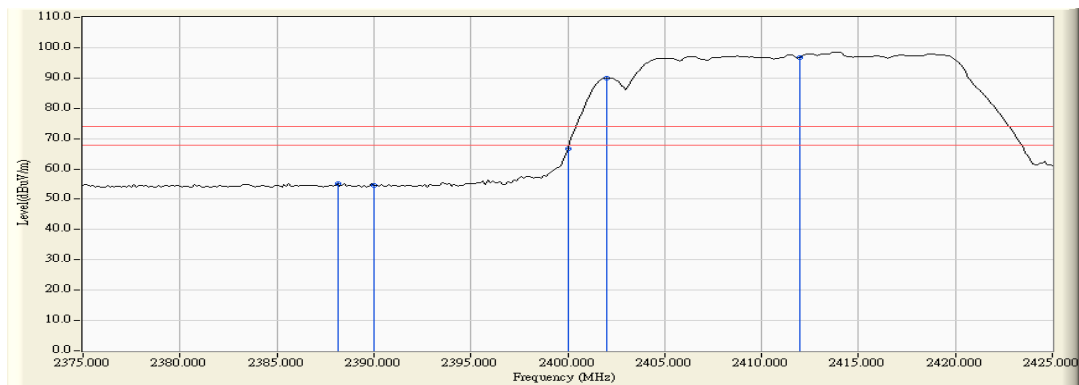
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
1 (Vertical)	<2400	>20	Pass

RF Radiated Measurement (Vertical):

Channel	Frequency (MHz)	Correct Fcator (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
1 (Peak)	2388.125	-2.386	57.559	55.173	74.00	54.00	Pass
1 (Average)	2388.125	-2.386	40.950	38.564	74.00	54.00	Pass

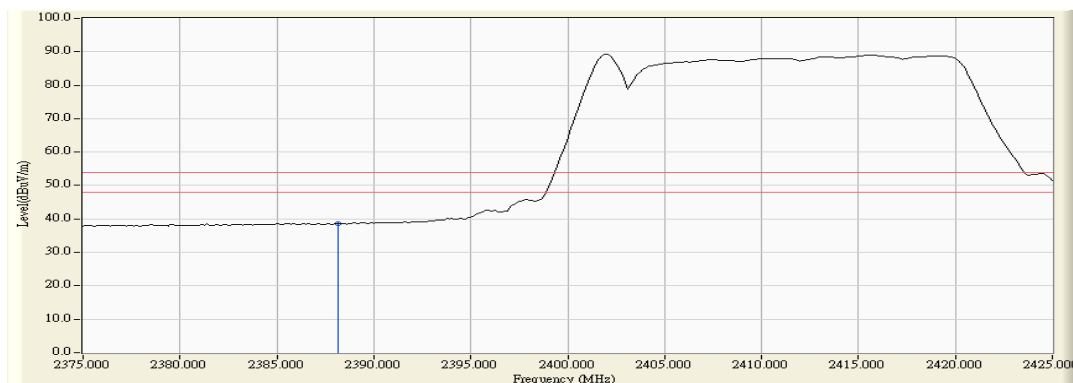
Figure Channel 1: Vertical (Peak)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Figure Channel 1: Vertical (Average)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Product : Notebook
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

RF Radiated Measurement:

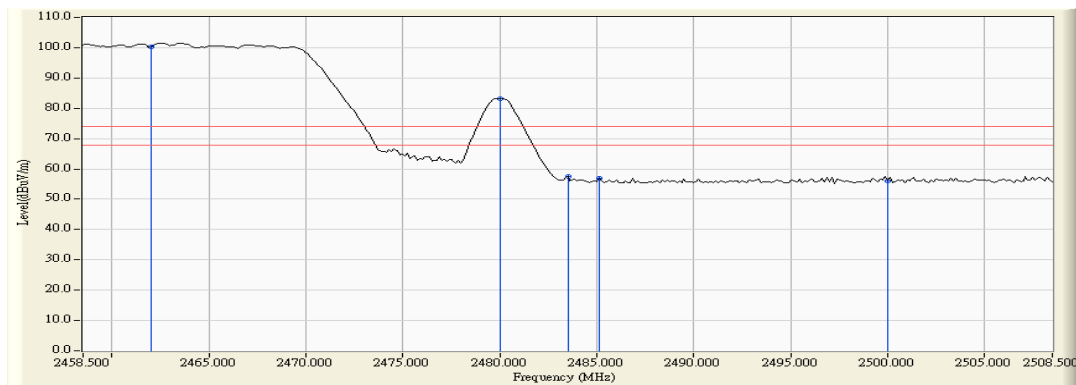
Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
11 (Horizontal)	>2483.5	>20	Pass

RF Radiated Measurement (Horizontal):

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11(Peak)	2485.125	-1.933	58.863	56.931	74.00	54.00	Pass
11(Average)	2485.125	-1.933	45.711	43.779	74.00	54.00	Pass

Figure Channel 11:

Horizontal (Peak)

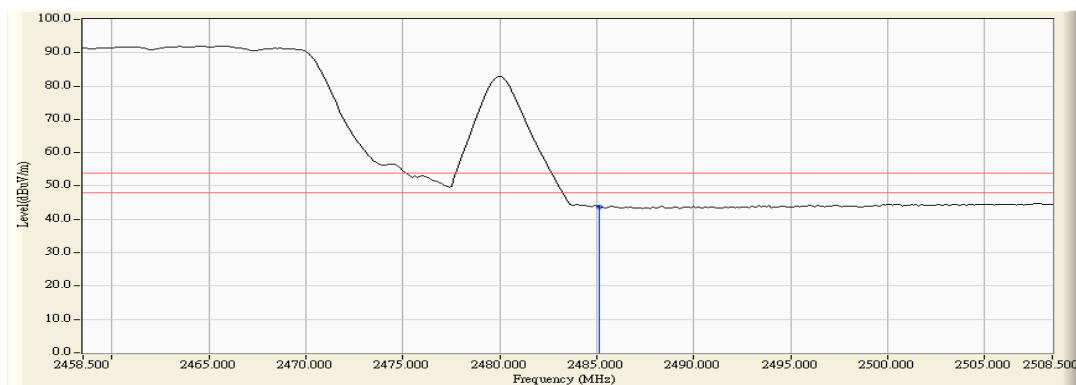


Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms

Figure Channel 11:

Horizontal (Average)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms

Product : Notebook
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

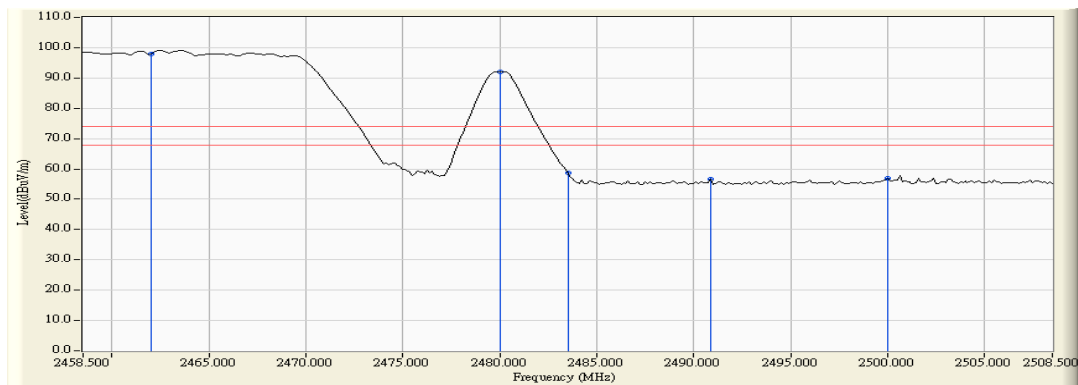
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
11 (Vertical)	>2483.5	>20	Pass

RF Radiated Measurement (Vertical):

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11(Peak)	2490.875	-1.914	58.537	56.623	74.00	54.00	Pass
11(Average)	2490.875	-1.914	43.373	41.459	74.00	54.00	Pass

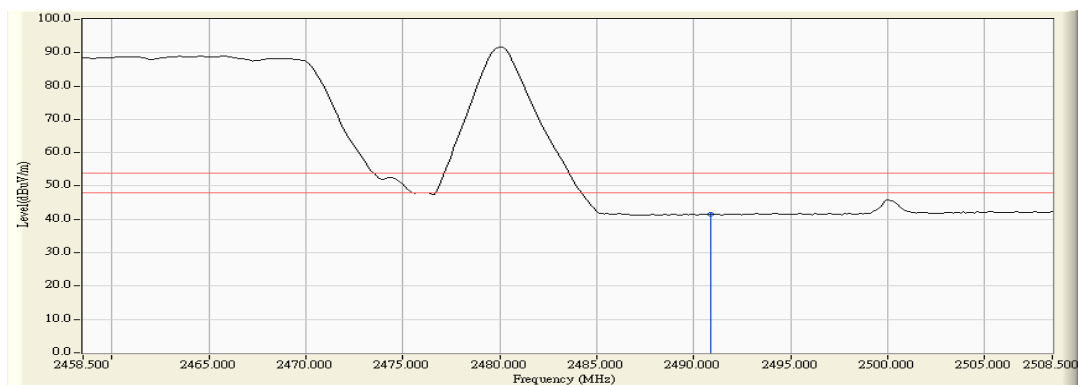
Figure Channel 11: (Vertical) (Peak)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Figure Channel 11: (Vertical) (Average)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

6. Occupied Bandwidth

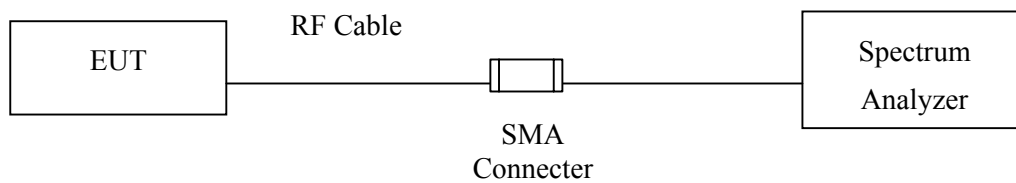
6.1. Test Equipment

The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2006
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

Note: 1. All instruments are calibrated every one year.
2. The test instruments marked by “X” are used to measure the final test results.

6.2. Test Setup



6.3. Limits

The minimum bandwidth shall be at least 500kHz.

6.4. Uncertainty

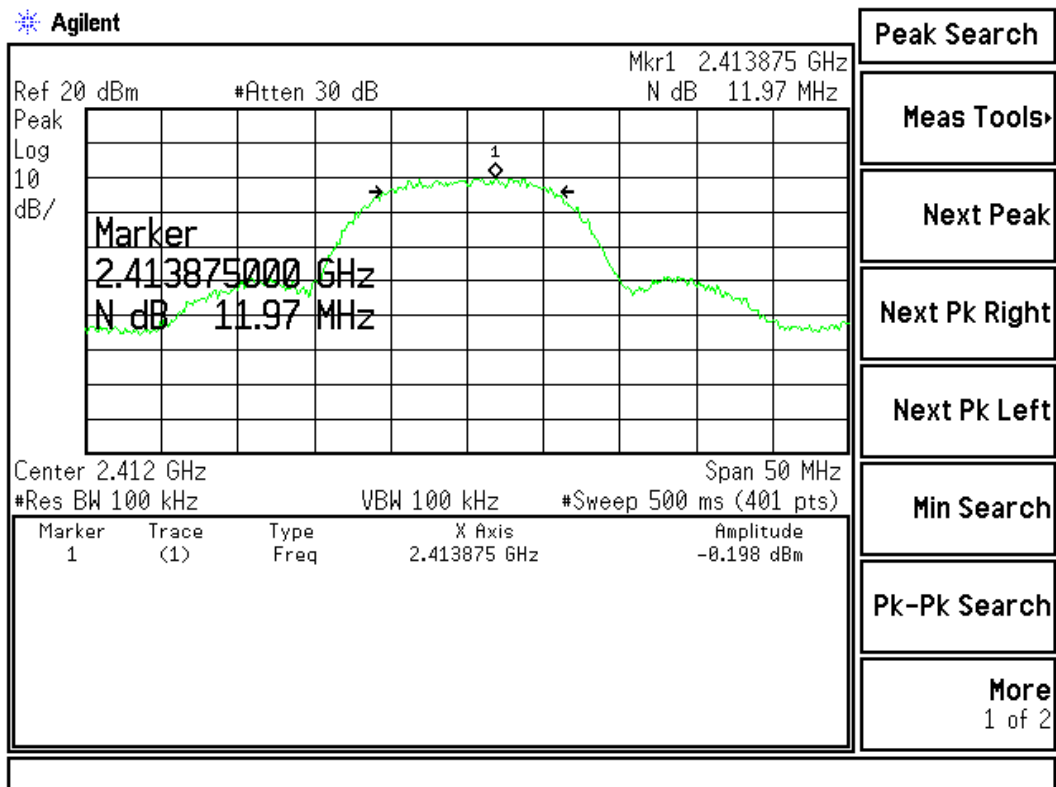
$\pm 150\text{Hz}$

6.5. Test Result of Occupied Bandwidth

Product : Notebook
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2412MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1 (11Mbps)	2412.00	11970	>500	Pass

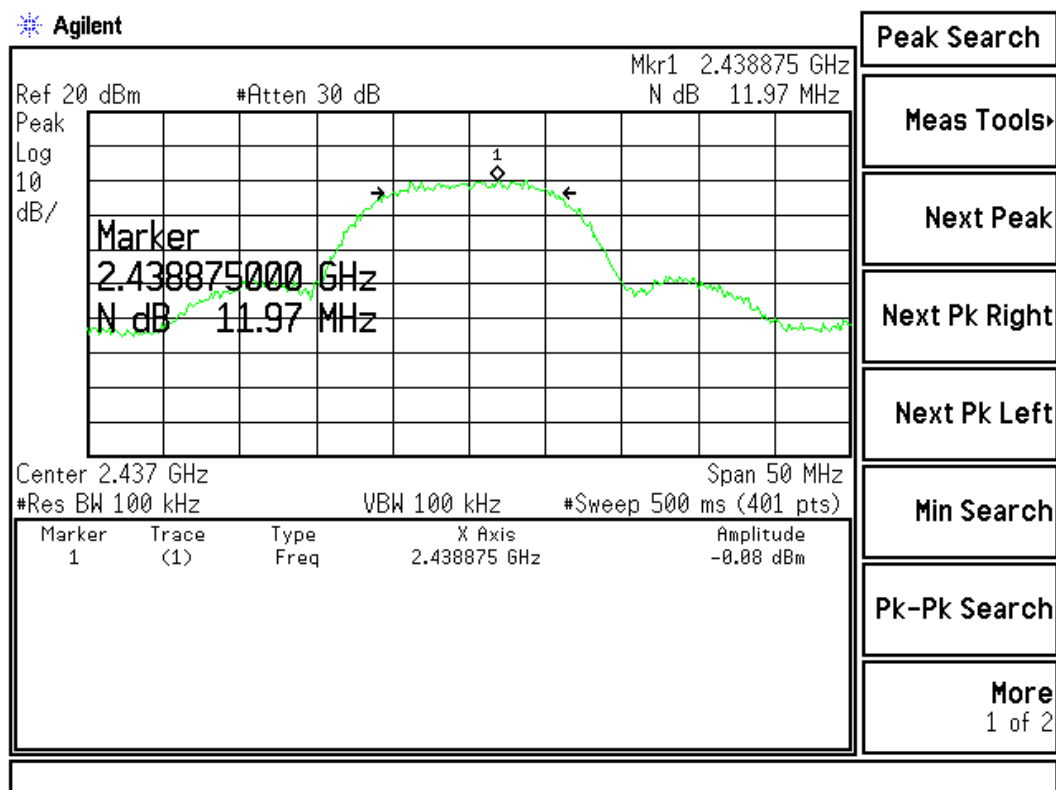
Figure Channel 1: 11Mbps



Product : Notebook
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6 (11Mbps)	2437.00	11970	>500	Pass

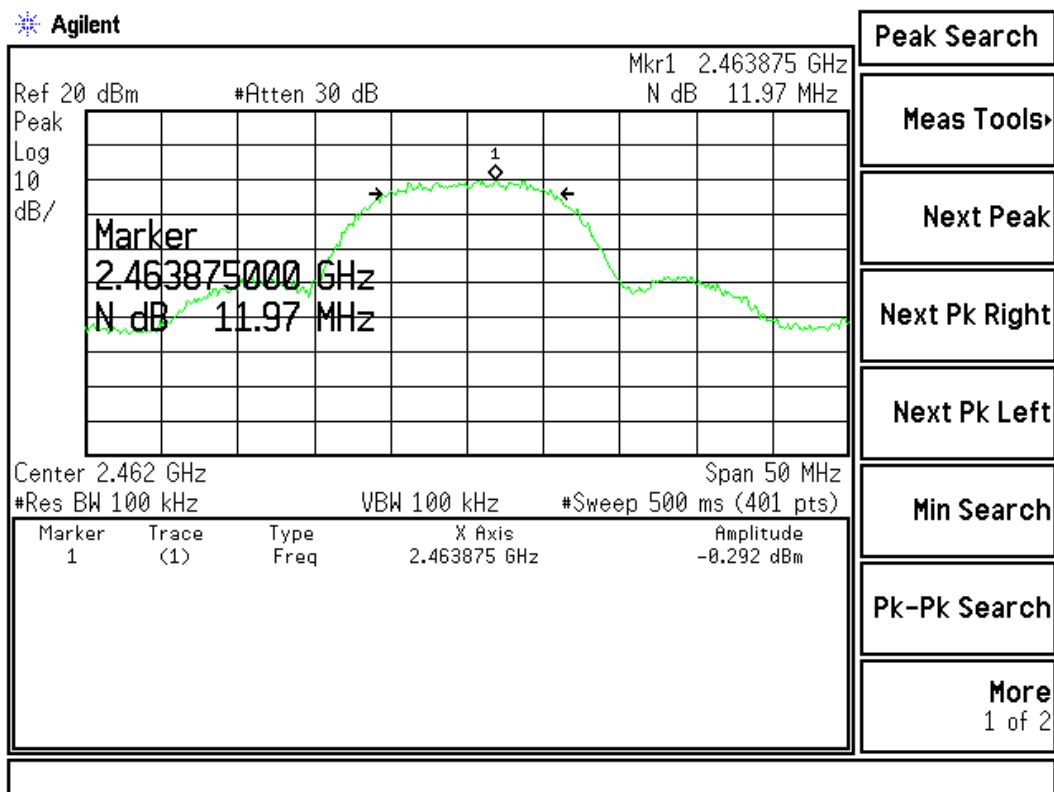
Figure Channel 6: 11Mbps



Product : Notebook
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
11 (11Mbps)	2462.00	11970	>500	Pass

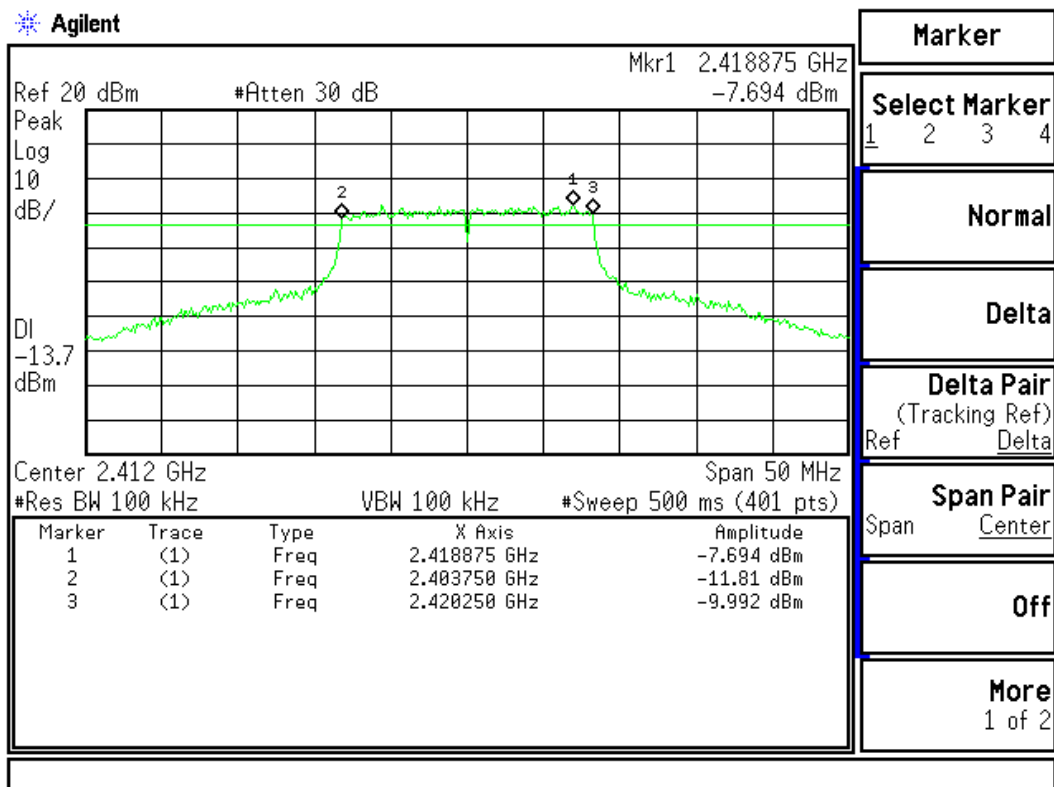
Figure Channel 11: 11Mbps



Product : Notebook
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2412MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1 (54Mbps)	2412.00	16500	>500	Pass

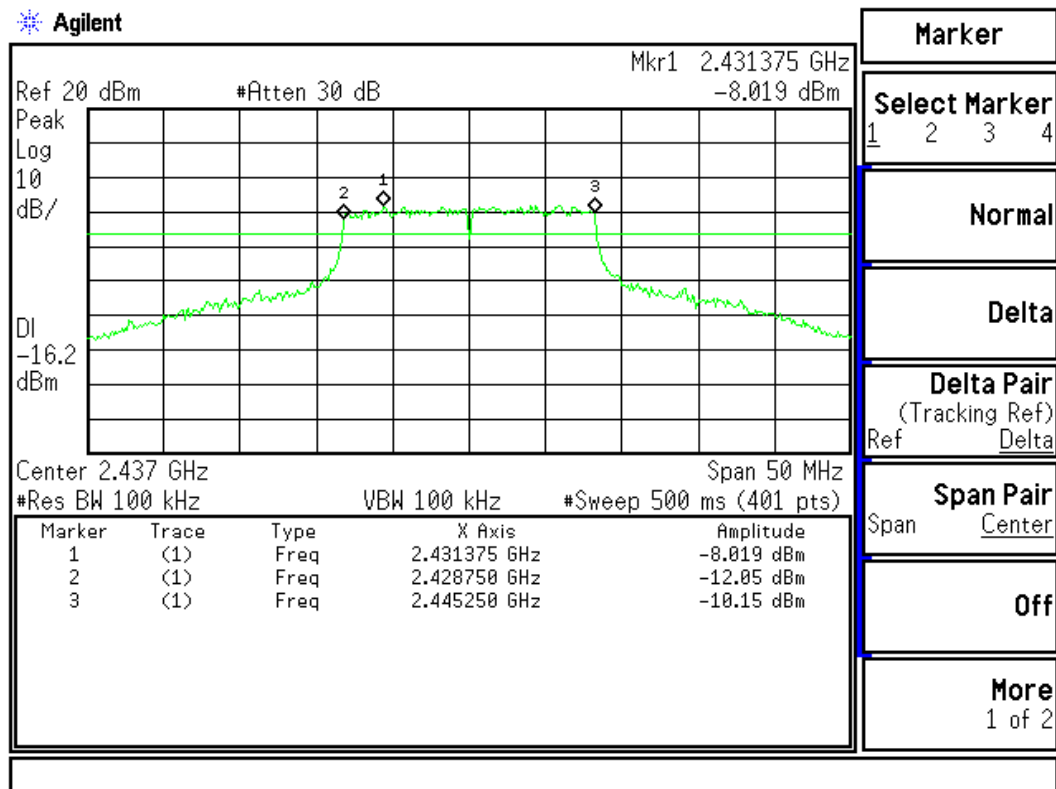
Figure Channel 1:



Product : Notebook
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6 (54Mbps)	2437.00	16500	>500	Pass

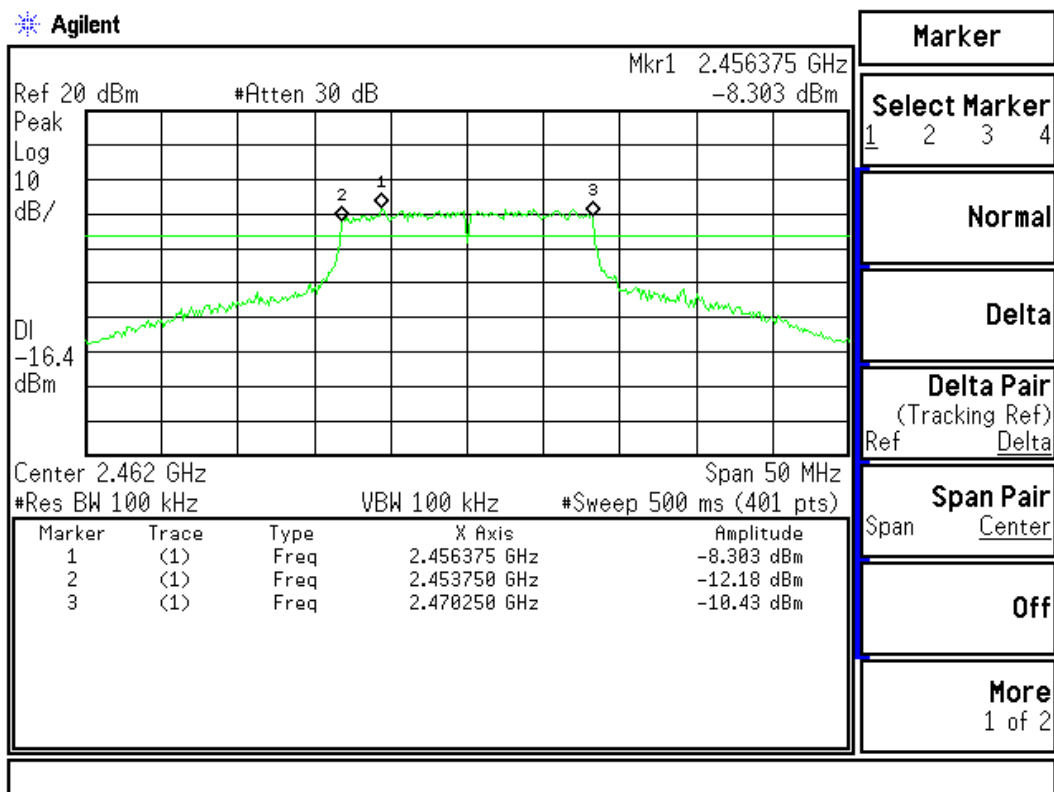
Figure Channel 6:



Product : Notebook
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
11 (54Mbps)	2462.00	16500	>500	Pass

Figure Channel 11:



7. Power Density

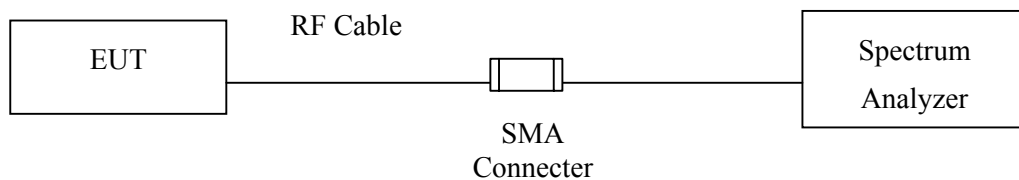
7.1. Test Equipment

The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2006
X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

Note: 1. All equipments are calibrated every one year.
2. The test instruments marked by “X” are used to measure the final test results.

7.2. Test Setup



7.3. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

7.4. Uncertainty

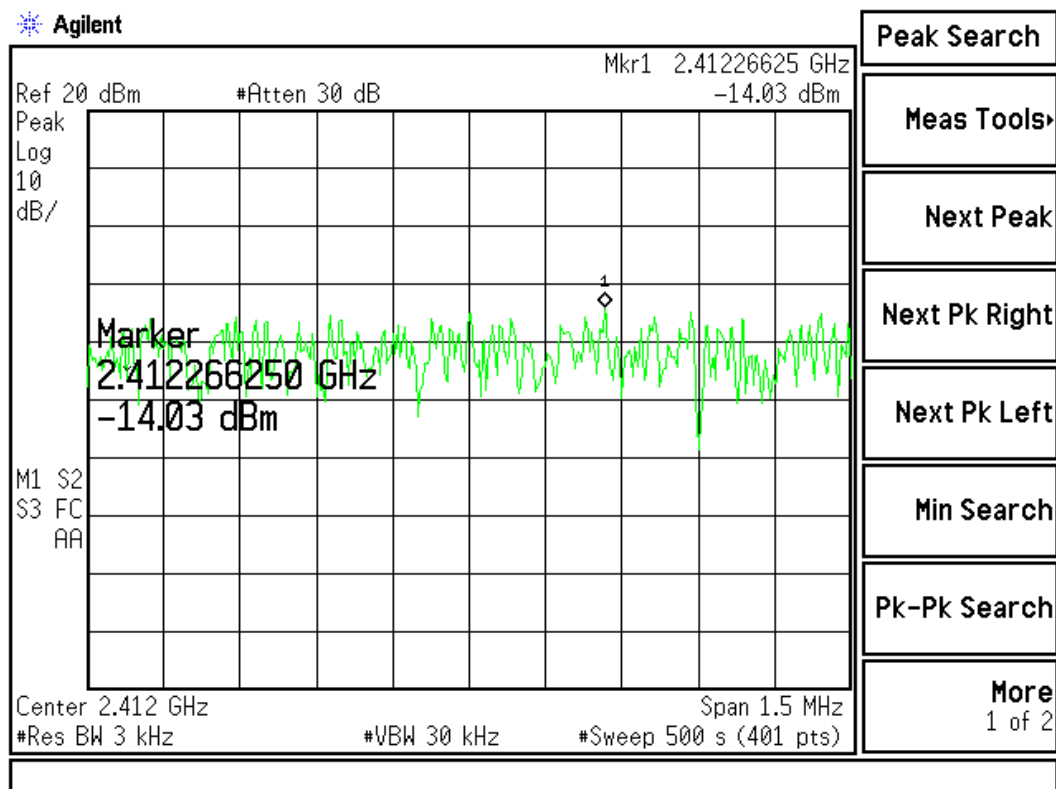
± 1.27 dB

7.5. Test Result of Power Density

Product : Notebook
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2412MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1 (11Mbps)	2412.00	-14.03	< 10dBm	Pass

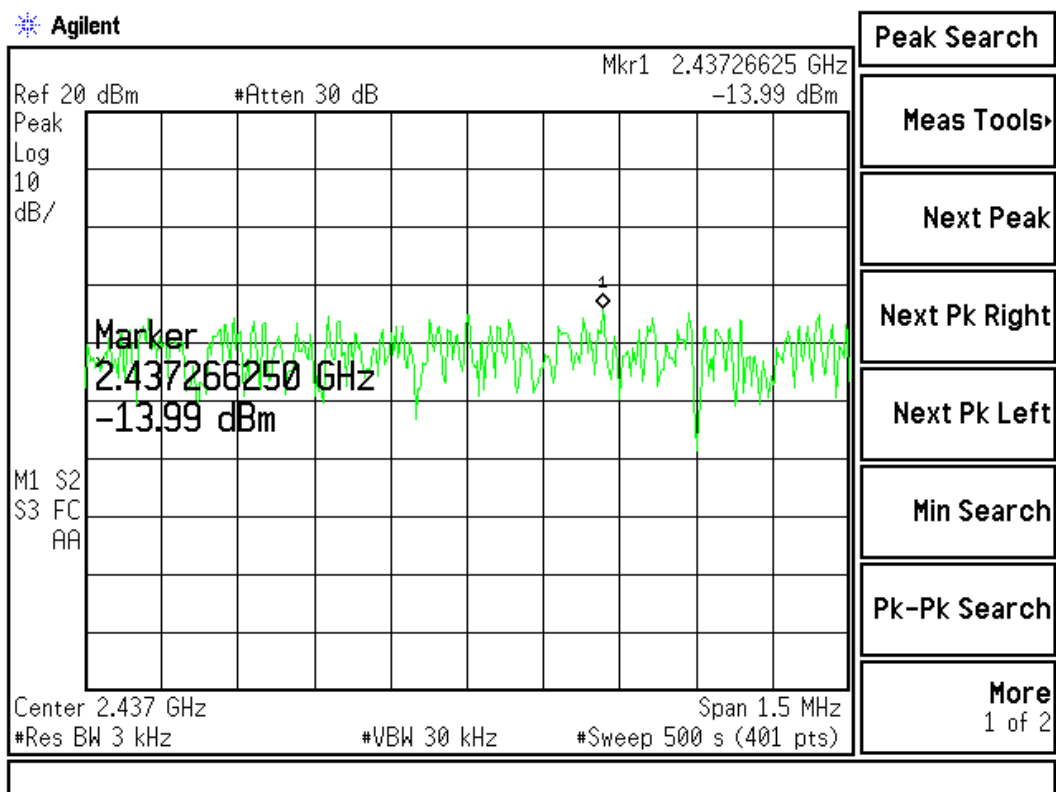
Figure Channel 1: 11Mbps



Product : Notebook
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
6 (11Mbps)	2437.000	-13.99	< 10dBm	Pass

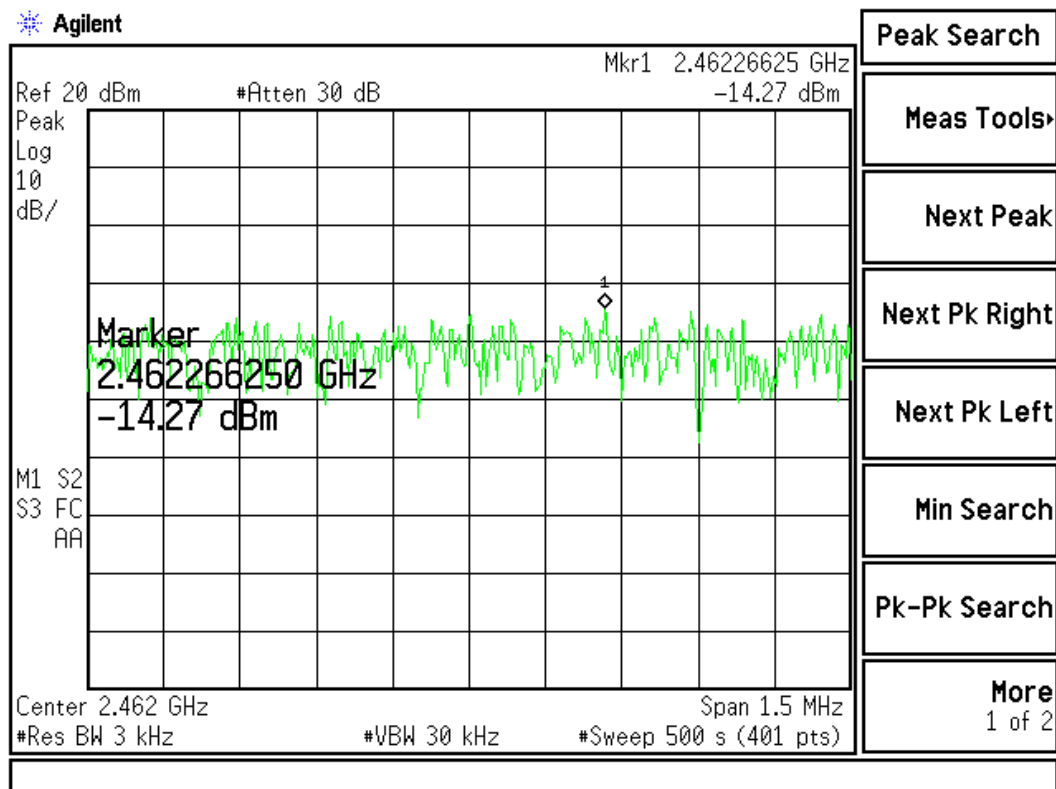
Figure Channel 6: 11Mbps



Product : Notebook
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
11 (11Mbps)	2462.00	-14.27	< 10dBm	Pass

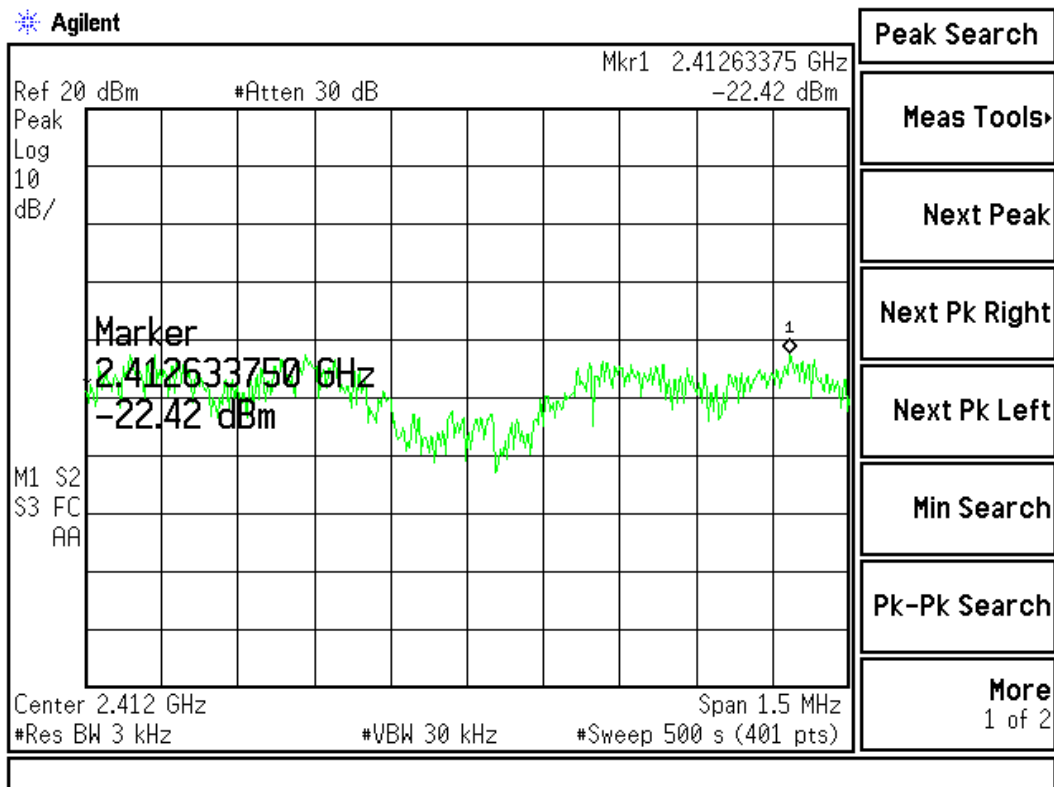
Figure Channel 11: 11Mbps



Product : Notebook
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2412MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1 (54Mbps)	2412.00	-22.42	< 10dBm	Pass

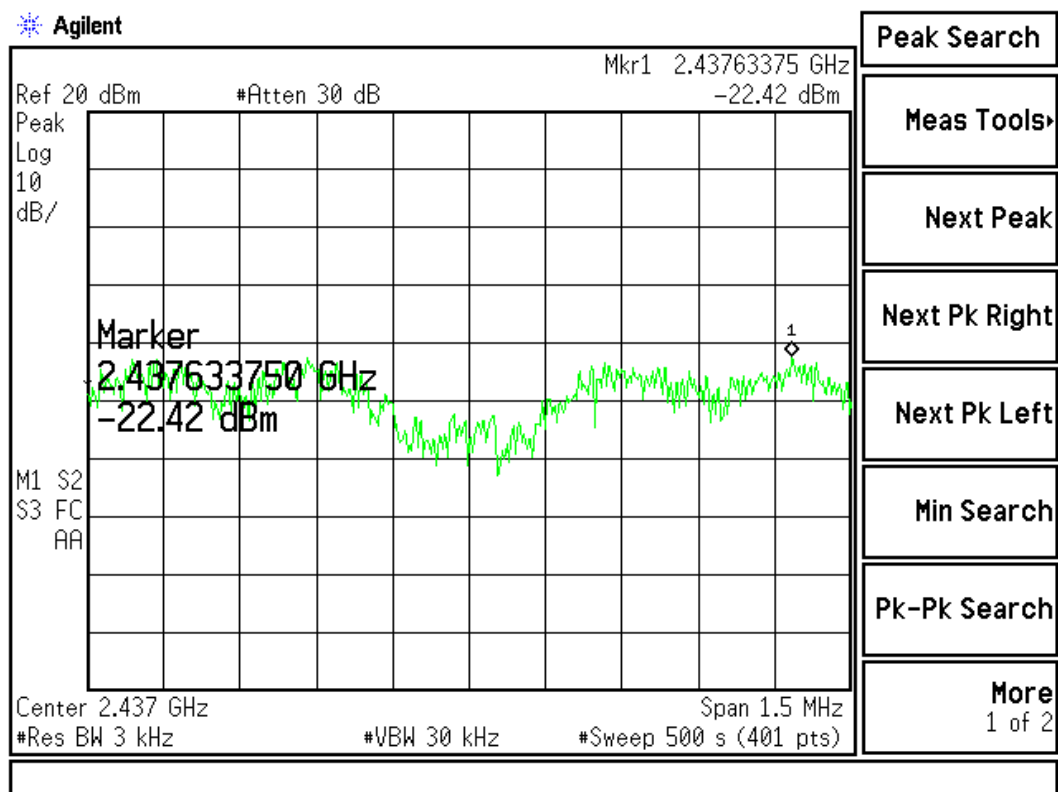
Figure Channel 1:



Product : Notebook
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
6 (54Mbps)	2437.000	-22.42	< 10dBm	Pass

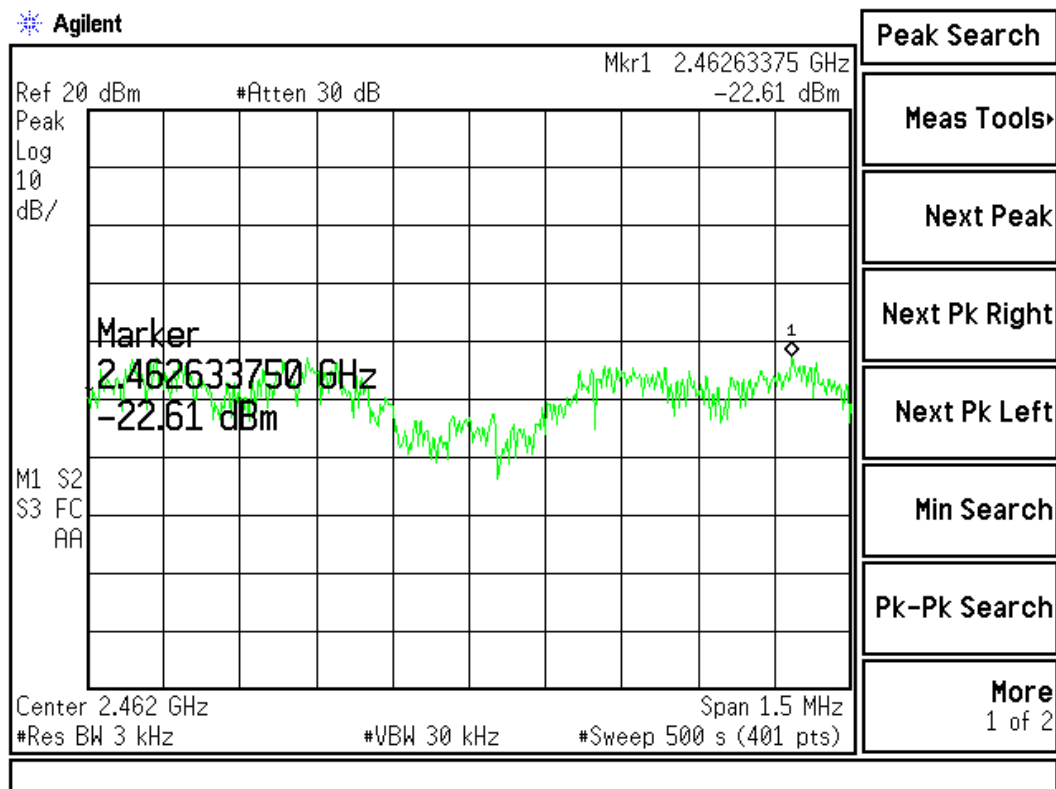
Figure Channel 6:



Product : Notebook
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
11 (54Mbps)	2462.00	-22.61	< 10dBm	Pass

Figure Channel 11:



8. EMI Reduction Method During Compliance Testing

No modification was made during testing.