



# Test Report

Product Name	Notebook built-in 802.11b/g Module
Model No.	15XXXXXXXXXXXXXX (X=0~9,A~Z)
FCC ID	FKGF11Y

Applicant	Twinhead International Corp.
Address	10F, 550 Rueiguang Road Neihu, Taipei, Taiwan 114, R.O.C.

Date of Receipt	Mar. 27, 2007
Issued Date	Apr. 12, 2007
Report No.	074L013-RFUSP05V01

The test results relate only to the samples tested.  
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 This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

# Test Report Certification

Issued Date: Apr. 12, 2007

Report No.: 074L013-RFUSP05V01



Accredited by NIST (NVLAP)  
NVLAP Lab Code: 200533-0

Product Name	Notebook built-in 802.11b/g Module
Applicant	Twinhead International Corp.
Address	10F, 550 Rueiguang Road Neihu, Taipei, Taiwan 114, R.O.C.
Manufacturer	Twinhead International Corp.
Model No.	15XXXXXXXXXXXXX (X=0~9,A~Z)
Rated Voltage	AC 120V/60Hz
Working Voltage	DC 3.3V
Trade Name	Averatec
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2006 ANSI C63.4: 2003
Test Result	Complied



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0914

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- Attachment 1: EUT Test Photographs  
 Attachment 2: EUT Detailed Photographs

## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	Notebook built-in 802.11b/g Module
Trade Name	Averatec
Model No.	15XXXXXXXXXXXXX (X=0~9,A~Z)
FCC ID.	FKGF11Y
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	PIFA
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto
Power Adapter (1)	MFR: LI-SHIN, M/N: 0335C2065 Cable Out: Non-Shielded, 1.8m with one ferrite core bonded. Power Cord: Shielded, 1.8m
Power Adapter (2)	MFR: LITE-ON, M/N: PA-1650-01 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	wgt	F11Y	1.91dBi 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 built-in 802.11b/g Module 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 built-in 802.11b/g Module 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

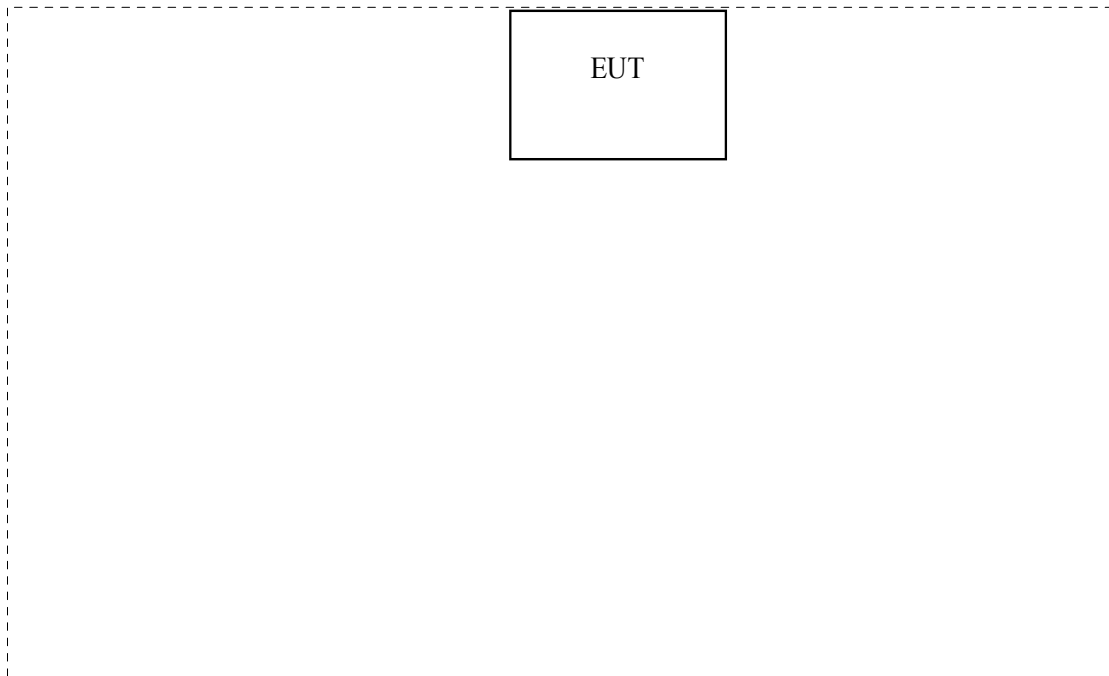
### 1.3. Tested System Details

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 1.3.
- (2) Turn on the power of all equipment.
- (3) Data will be transmitting and receiving through EUT.
- (4) The transmitted and receive status will be shown on the monitor.
- (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  
 Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,  
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 E-Mail : [service@quietek.com](mailto:service@quietek.com)





## 2. Conducted Emission

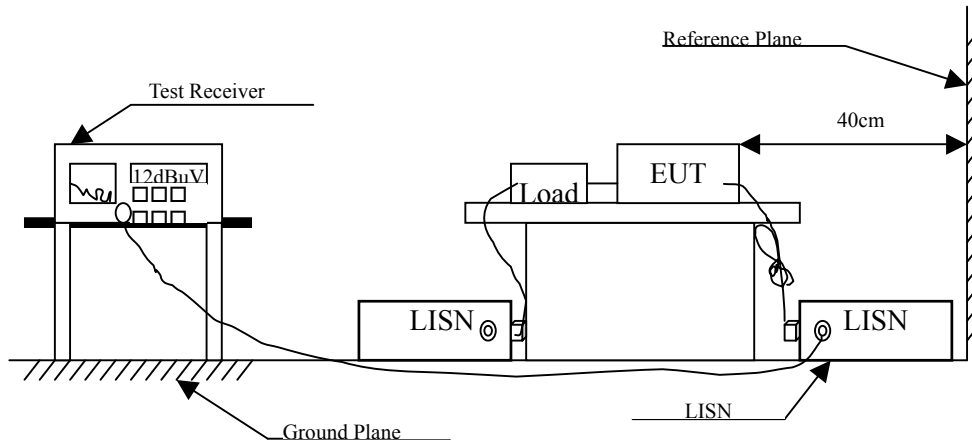
### 2.1. Test Equipment

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 <sup>(註)</sup>	56-46 <sup>(註)</sup>
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 built-in 802.11b/g Module  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
0.201	0.202	53.910	54.112	-10.431	64.543
0.260	0.207	40.420	40.627	-22.230	62.857
0.330	0.214	39.190	39.404	-21.453	60.857
0.400	0.215	37.370	37.585	-21.272	58.857
0.460	0.216	31.240	31.456	-25.687	57.143
0.530	0.217	28.150	28.367	-27.633	56.000
<b>Average</b>					
0.201	0.202	44.290	44.492	-10.051	54.543
0.260	0.207	31.050	31.257	-21.600	52.857
0.330	0.214	29.580	29.794	-21.063	50.857
0.400	0.215	30.480	30.695	-18.162	48.857
0.460	0.216	21.620	21.836	-25.307	47.143
0.530	0.217	20.300	20.517	-25.483	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 built-in 802.11b/g Module  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 2</b>					
<b>Quasi-Peak</b>					
0.197	0.202	52.900	53.102	-11.555	64.657
0.267	0.209	43.760	43.969	-18.688	62.657
0.327	0.214	33.870	34.084	-26.859	60.943
0.397	0.215	37.210	37.425	-21.518	58.943
0.467	0.216	31.990	32.206	-24.737	56.943
0.527	0.217	26.820	27.037	-28.963	56.000
<b>Average</b>					
0.197	0.202	43.340	43.542	-11.115	54.657
0.267	0.209	34.210	34.419	-18.238	52.657
0.327	0.214	26.020	26.234	-24.709	50.943
0.397	0.215	30.550	30.765	-18.178	48.943
0.467	0.216	21.010	21.226	-25.717	46.943
0.527	0.217	18.360	18.577	-27.423	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 built-in 802.11b/g Module  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
0.197	0.202	52.170	52.372	-12.285	64.657
0.267	0.209	42.930	43.139	-19.518	62.657
0.327	0.214	33.370	33.584	-27.359	60.943
0.397	0.215	36.830	37.045	-21.898	58.943
0.457	0.216	26.860	27.076	-30.153	57.229
0.527	0.217	25.780	25.997	-30.003	56.000
<b>Average</b>					
0.197	0.202	42.480	42.682	-11.975	54.657
0.267	0.209	33.540	33.749	-18.908	52.657
0.327	0.214	25.790	26.004	-24.939	50.943
0.397	0.215	29.970	30.185	-18.758	48.943
0.457	0.216	18.560	18.776	-28.453	47.229
0.527	0.217	16.930	17.147	-28.853	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 built-in 802.11b/g Module  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 2</b>					
<b>Quasi-Peak</b>					
0.199	0.202	52.350	52.552	-12.048	64.600
0.259	0.203	42.390	42.593	-20.293	62.886
0.329	0.214	34.770	34.984	-25.902	60.886
0.399	0.215	36.160	36.375	-22.511	58.886
0.529	0.217	24.890	25.107	-30.893	56.000
0.589	0.218	27.890	28.108	-27.892	56.000
<b>Average</b>					
0.199	0.202	41.620	41.822	-12.778	54.600
0.259	0.203	30.920	31.123	-21.763	52.886
0.329	0.214	27.010	27.224	-23.662	50.886
0.399	0.215	27.920	28.135	-20.751	48.886
0.529	0.217	16.530	16.747	-29.253	46.000
0.589	0.218	17.940	18.158	-27.842	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

### 3. Peak Power Output

#### 3.1. Test Equipment

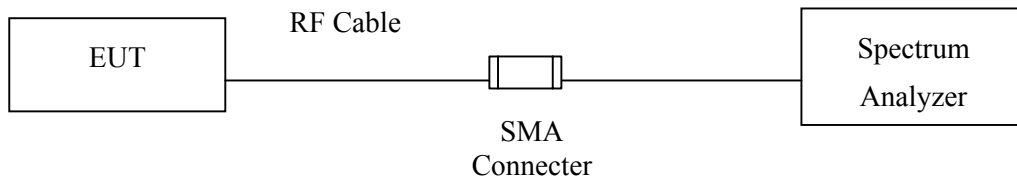
The following test equipments are used during the radiated emission tests:

	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

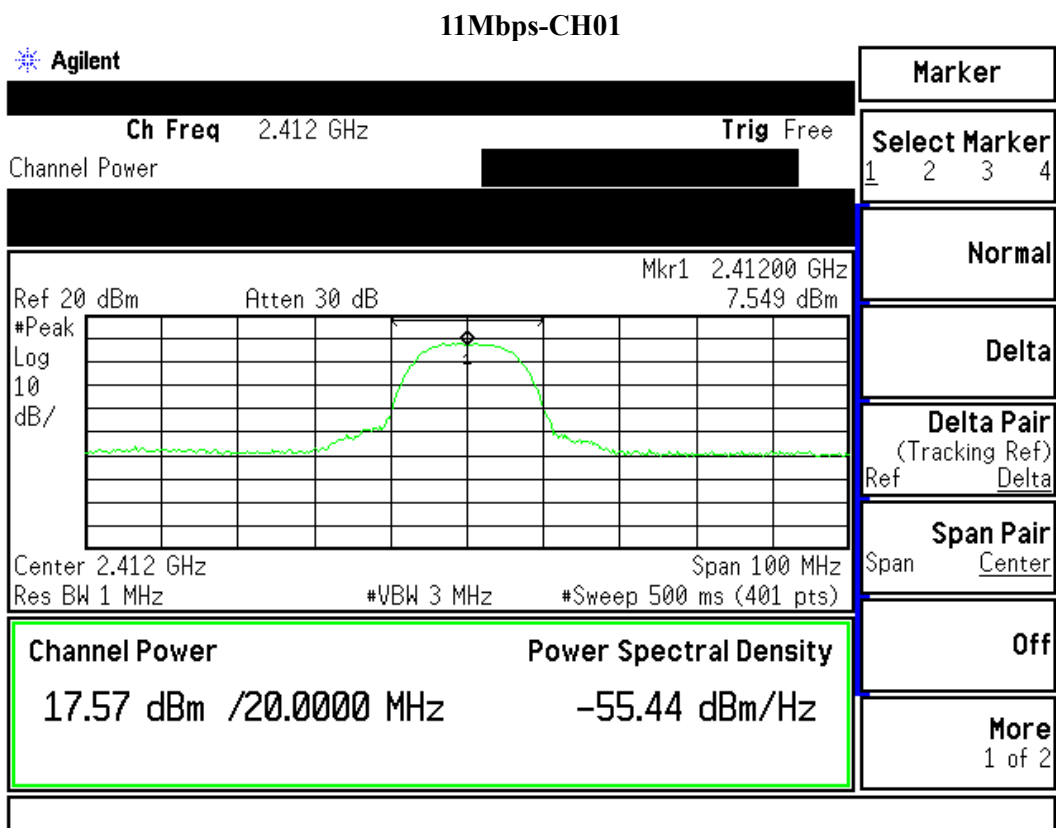
$\pm 1.27$  dB

### 3.5. Test Result of Peak Power Output

Product : Notebook built-in 802.11b/g Module  
 Test Item : Peak Power Output Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b

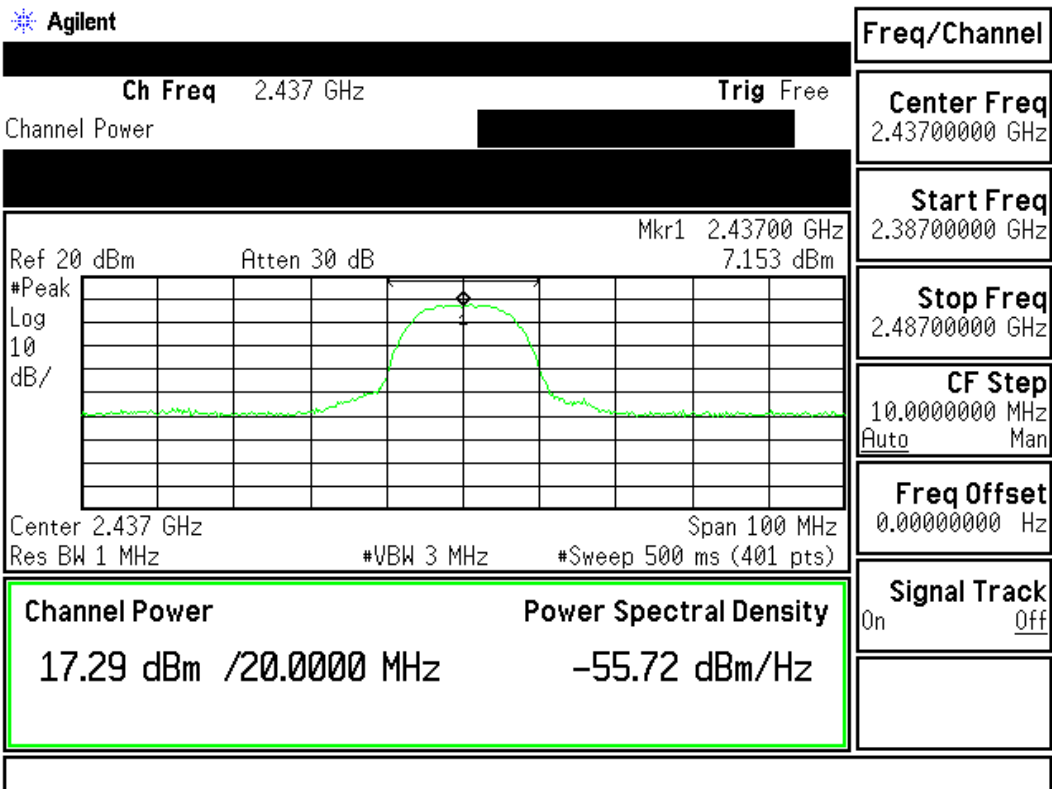
**Data Speed: 11Mbps**

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
1	2412.00	17.57dBm	1 Watt= 30 dBm	Pass
6	2437.00	17.29dBm	1 Watt= 30 dBm	Pass
11	2462.00	17.01dBm	1 Watt= 30 dBm	Pass

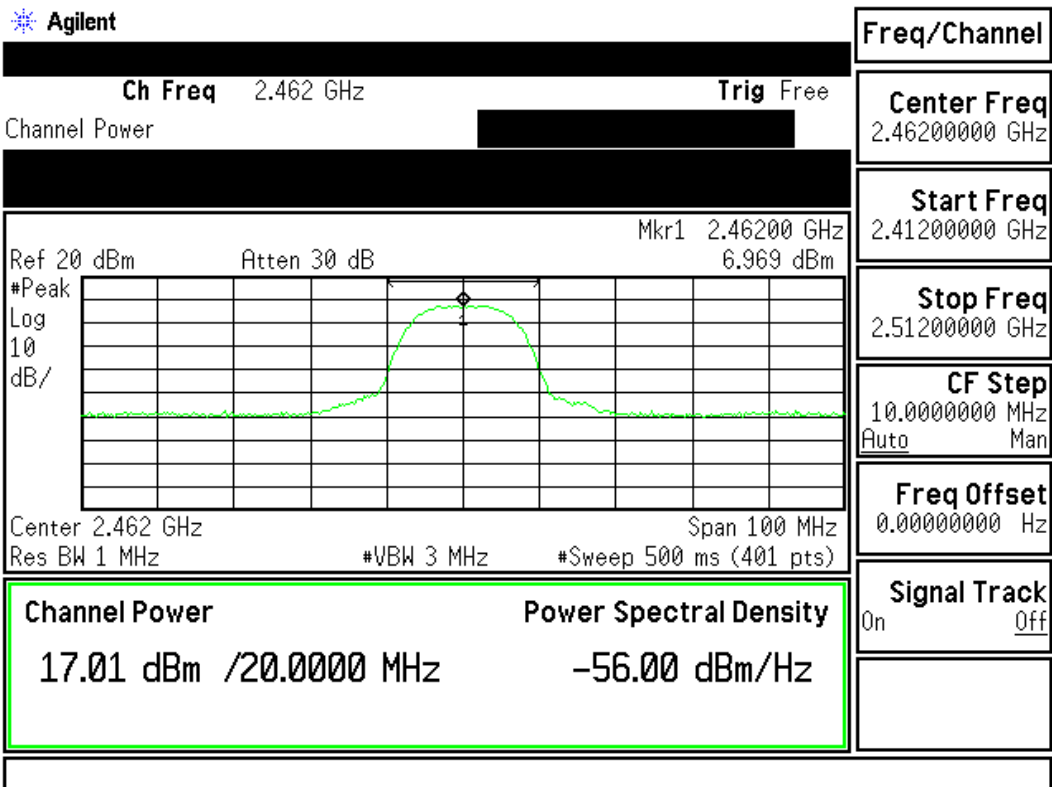




### 11Mbps-CH06



### 11Mbps-CH11

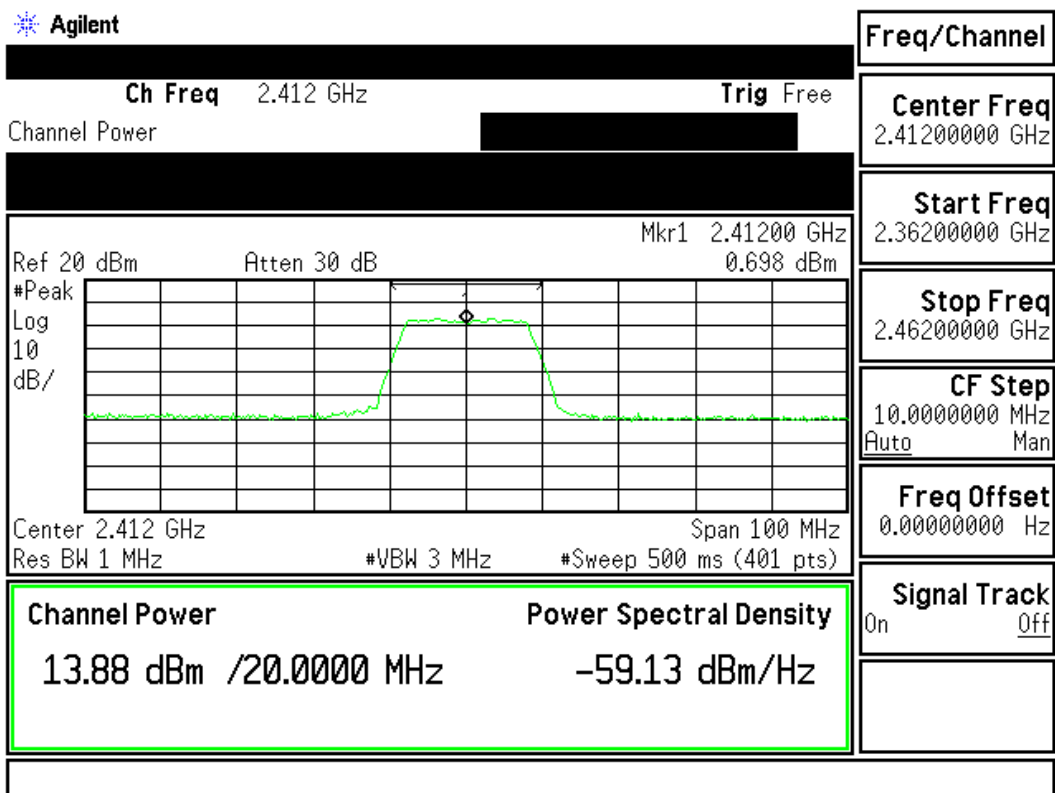


Product : Notebook built-in 802.11b/g Module  
 Test Item : Peak Power Output Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g

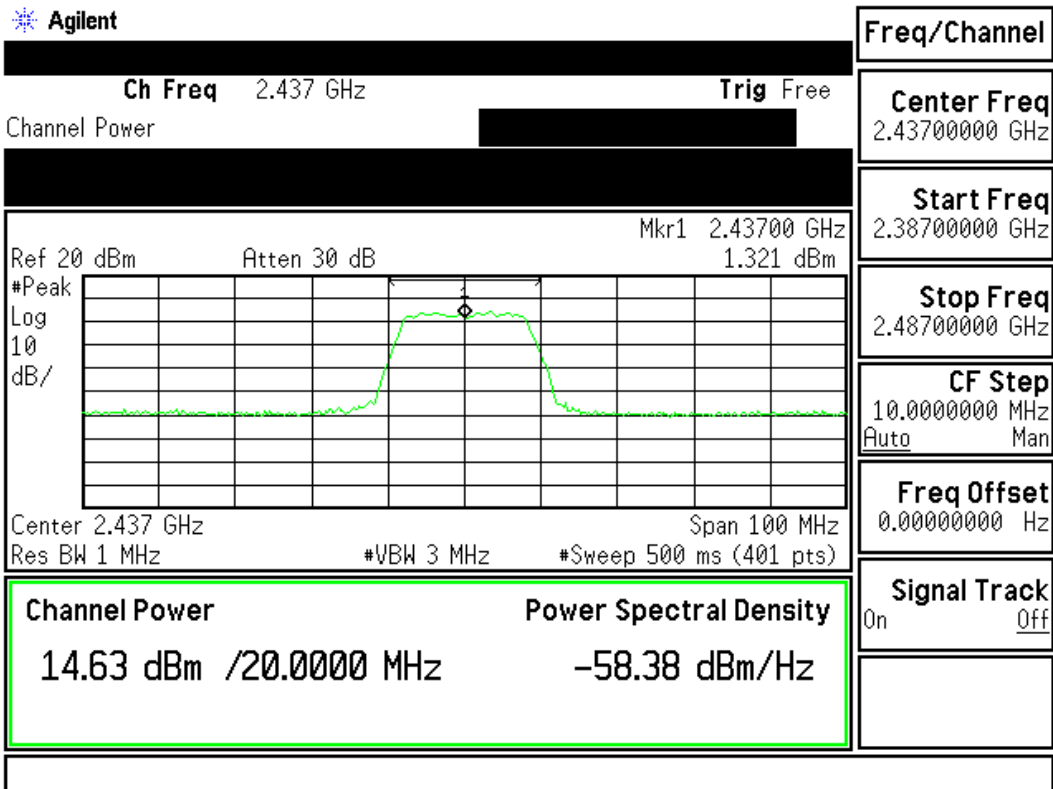
**Data Speed: 11Mbps**

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
1	2412.00	13.88dBm	1 Watt= 30 dBm	Pass
6	2437.00	14.63dBm	1 Watt= 30 dBm	Pass
11	2462.00	14.95dBm	1 Watt= 30 dBm	Pass

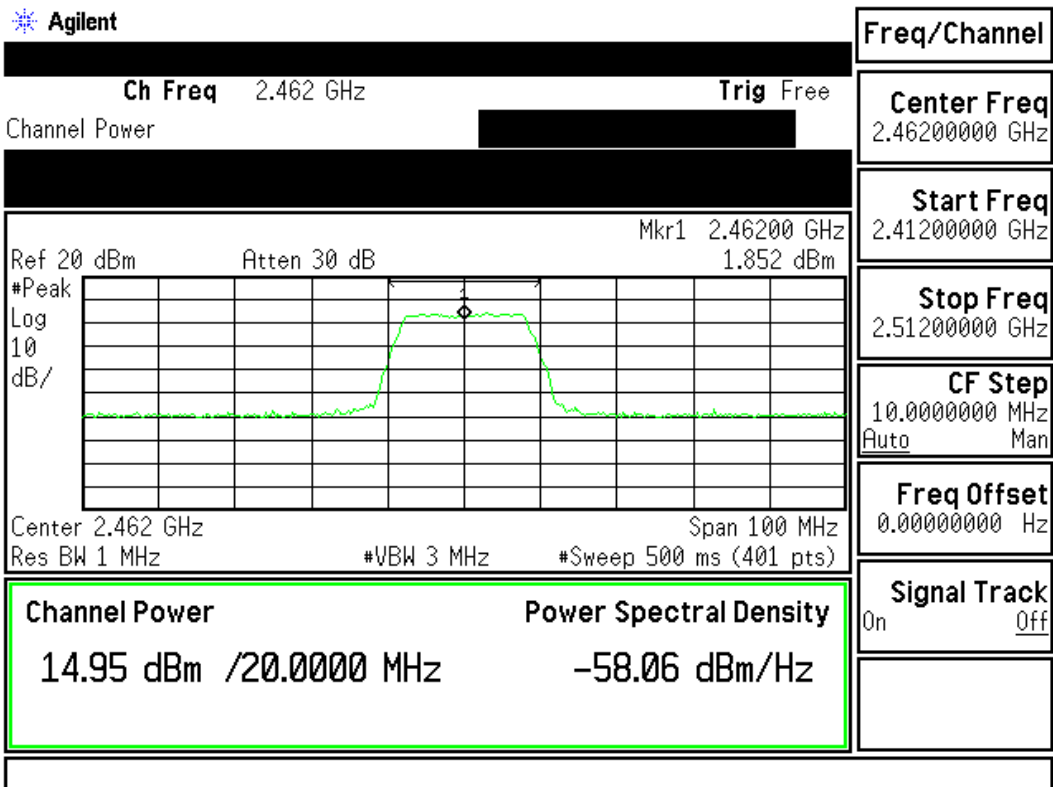
**54Mbps-CH01**



### 54Mbps-CH06



### 54Mbps-CH11



## 4. Radiated Emission

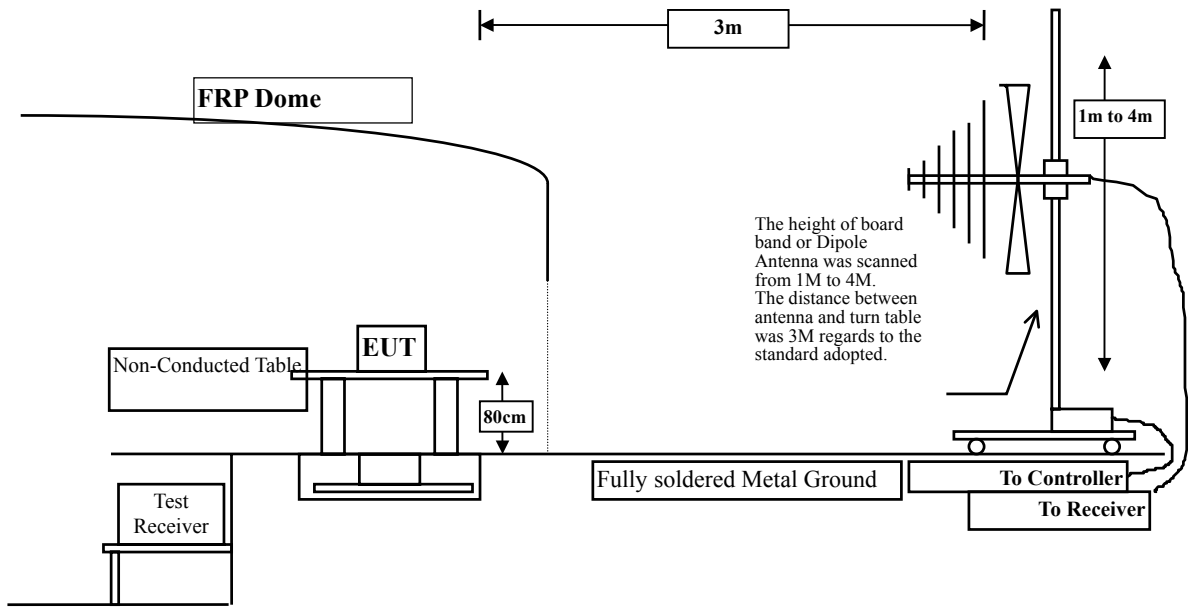
### 4.1. Test Equipment

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 built-in 802.11b/g Module  
 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
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4824.000	3.723	40.484	44.207	-29.793	74.000
7236.000	9.439	34.519	43.957	-30.043	74.000
9648.000	11.829	34.556	46.385	-27.615	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4824.000	3.723	44.617	48.340	-25.660	74.000
7236.000	9.439	35.461	44.899	-29.101	74.000
9648.000	11.829	34.939	46.768	-27.232	74.000
<b>Average Detector:</b>					
--					

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 built-in 802.11b/g Module  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4874.000	3.893	40.698	44.590	-29.410	74.000
7311.000	9.624	34.621	44.245	-29.755	74.000
9748.000	11.805	35.409	47.215	-26.785	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4874.000	3.893	45.978	49.870	-24.130	74.000
7311.000	9.624	34.947	44.571	-29.429	74.000
9748.000	11.805	35.258	47.064	-26.936	74.000
<b>Average Detector:</b>					
--					

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 built-in 802.11b/g Module  
 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/m
	dB	dBuV	dBuV/m		
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4924.000	4.075	41.155	45.230	-28.770	74.000
7386.000	9.812	34.967	44.779	-29.221	74.000
9848.000	11.819	34.675	46.494	-27.506	74.000
<b>Average</b>					
<b>Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4924.000	4.075	45.575	49.650	-24.350	74.000
7386.000	9.812	35.506	45.318	-28.682	74.000
9848.000	11.819	34.562	46.381	-27.619	74.000
<b>Average</b>					
<b>Detector:</b>					
--					

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 built-in 802.11b/g Module  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g (2412MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4824.000	3.723	38.532	42.255	-31.745	74.000
7236.000	9.439	36.107	45.545	-28.455	74.000
9648.000	11.829	35.132	46.961	-27.039	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4824.000	3.723	37.333	41.056	-32.944	74.000
7236.000	9.439	35.006	44.444	-29.556	74.000
9648.000	11.829	36.365	48.194	-25.806	74.000
<b>Average Detector:</b>					
--					

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 built-in 802.11b/g Module  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4874.000	3.893	35.761	39.653	-34.347	74.000
7311.000	9.624	35.574	45.198	-28.802	74.000
9748.000	11.805	36.073	47.879	-26.121	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4874.000	3.893	35.644	39.536	-34.464	74.000
7311.000	9.624	35.780	45.404	-28.596	74.000
9748.000	11.805	35.300	47.106	-26.894	74.000
<b>Average Detector:</b>					
--					

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 built-in 802.11b/g Module  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g (2462 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4924.000	4.075	35.836	39.910	-34.090	74.000
7386.000	9.812	36.256	46.068	-27.932	74.000
9848.000	11.819	35.312	47.131	-26.869	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4924.000	4.075	35.814	39.888	-34.112	74.000
7386.000	9.812	36.087	45.899	-28.101	74.000
9848.000	11.819	34.655	46.474	-27.526	74.000
<b>Average Detector:</b>					
--					

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 built-in 802.11b/g Module  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
85.775	9.781	25.864	35.645	-4.355	40.000
105.175	12.655	26.471	39.126	-4.374	43.500
151.250	11.593	21.666	33.259	-10.241	43.500
209.450	9.804	23.876	33.680	-9.820	43.500
233.700	11.142	28.521	39.663	-6.337	46.000
388.900	15.913	17.633	33.546	-12.454	46.000
<b>Vertical</b>					
85.775	8.909	26.358	35.267	-4.733	40.000
105.175	11.138	28.408	39.546	-3.954	43.500
233.700	11.442	22.878	34.320	-11.680	46.000
388.900	17.260	17.003	34.263	-11.737	46.000
772.050	22.493	13.375	35.868	-10.132	46.000
815.700	21.536	12.635	34.171	-11.829	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 built-in 802.11b/g Module  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
85.775	9.781	25.668	35.449	-4.551	40.000
105.175	12.655	26.802	39.457	-4.043	43.500
151.250	11.593	21.847	33.440	-10.060	43.500
202.175	9.862	24.224	34.086	-9.414	43.500
231.275	10.997	27.536	38.533	-7.467	46.000
466.500	18.593	14.402	32.995	-13.005	46.000
<b>Vertical</b>					
85.775	8.909	26.078	34.987	-5.013	40.000
105.175	11.138	27.490	38.628	-4.872	43.500
156.100	10.170	28.887	39.057	-4.443	43.500
202.175	9.852	27.689	37.541	-5.959	43.500
388.900	17.260	18.722	35.982	-10.018	46.000
772.050	22.493	13.592	36.085	-9.915	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

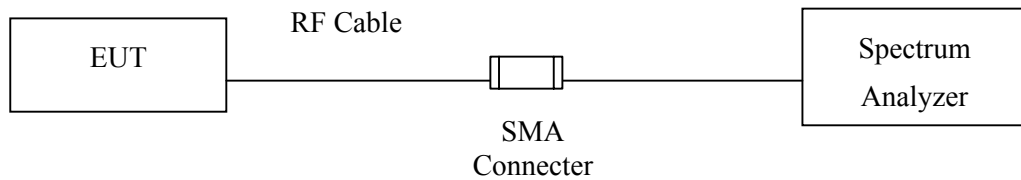
The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2006
X	Spectrum Analyzer	Agilent	E4408E/MY45102743	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

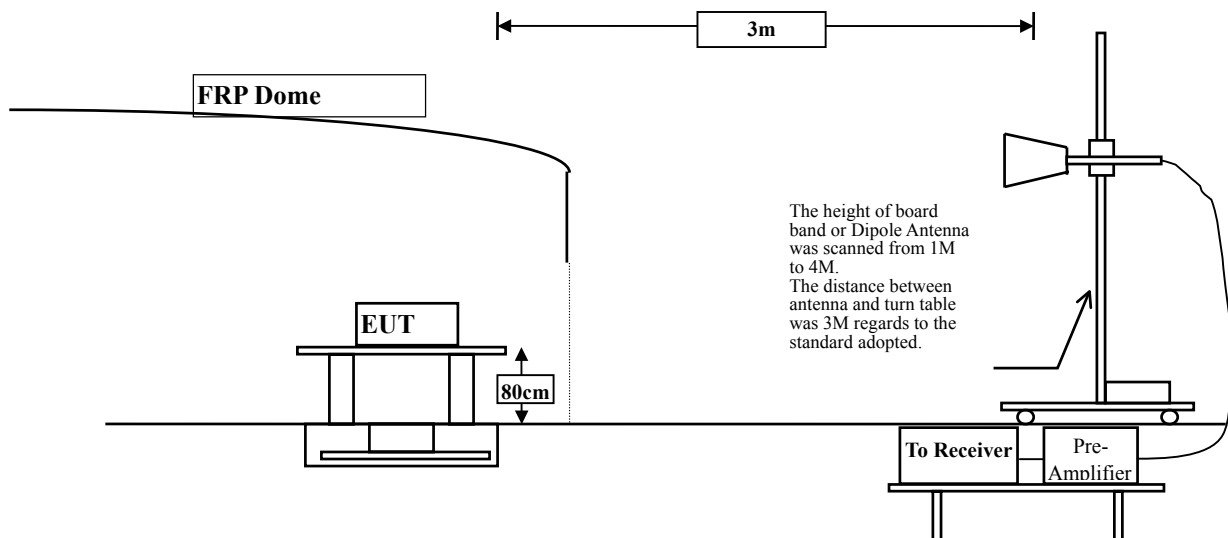
- Note:
1. All instruments are calibrated every one year.
  2. The test instruments marked by "X" are used to measure the final test results.

### 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 built-in 802.11b/g Module  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b

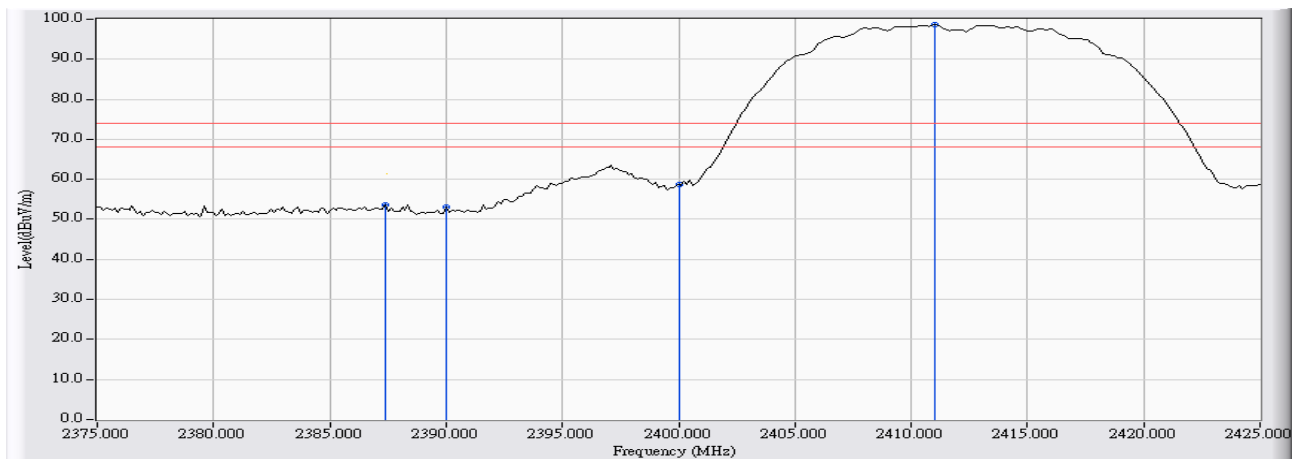
**RF Radiated Measurement:**

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)	2387.375	-2.390	55.947	53.557	74.00	54.00	Pass
1 (Average)	--	--	--	--	74.00	54.00	Pass

**Figure Channel 1: Horizontal (Peak)**



Note:

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

Product : Notebook built-in 802.11b/g Module  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b

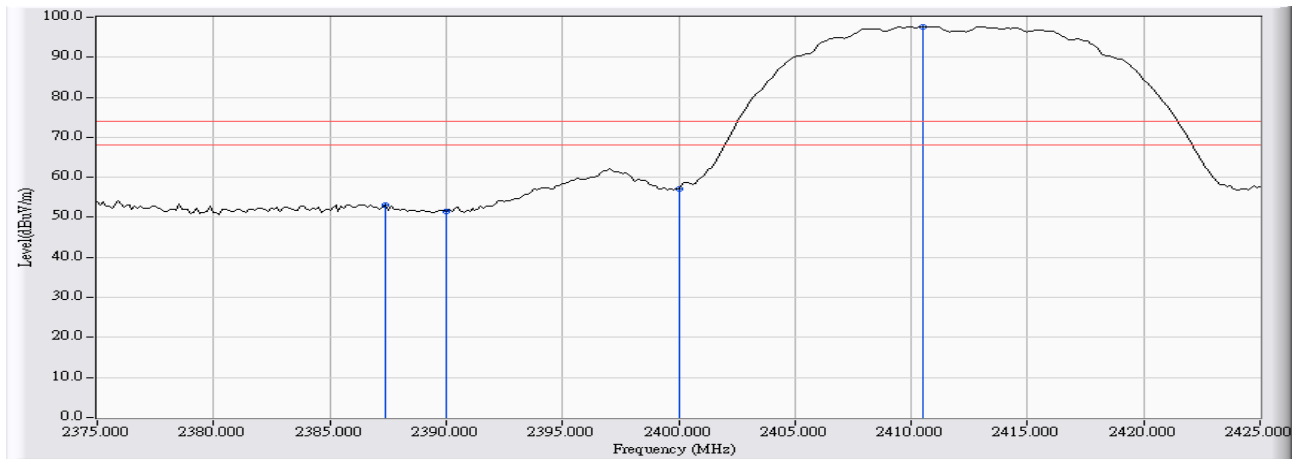
**RF Radiated Measurement:**

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

**RF Radiated Measurement (Vertical):**

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
1 (Peak)	2387.375	-2.390	55.476	53.086	74.00	54.00	Pass
1 (Average)	--	--	--	--	74.00	54.00	Pass

**Figure Channel 1: Vertical (Peak)**



Note:

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

Product : Notebook built-in 802.11b/g Module  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b

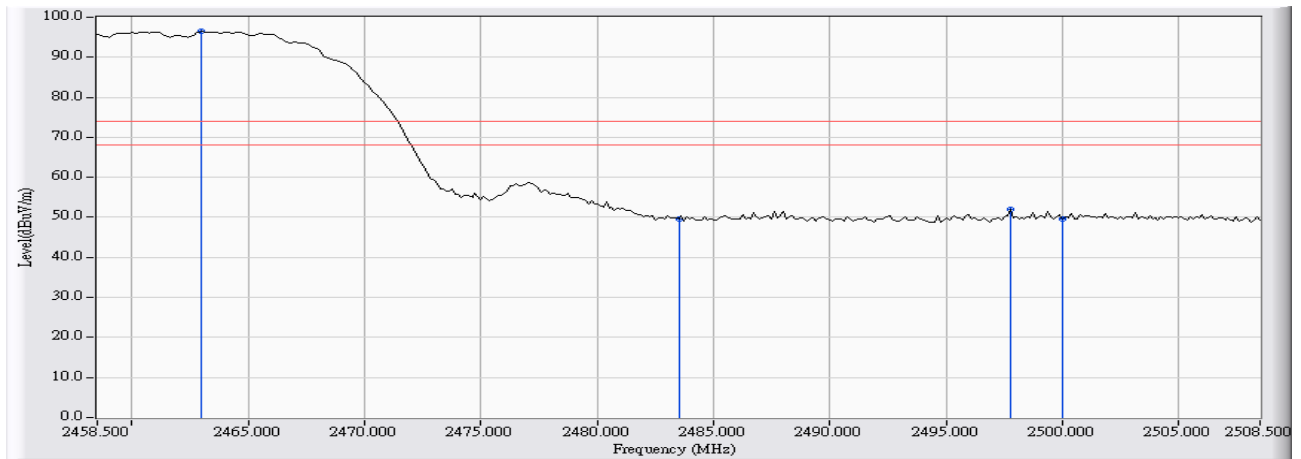
**RF Radiated Measurement:**

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)	2497.750	-1.894	53.969	52.076	74.00	54.00	Pass
11(Average)	--	--	--	--	74.00	54.00	Pass

**Figure Channel 11: Horizontal (Peak)**



Note:

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

Product : Notebook built-in 802.11b/g Module  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b

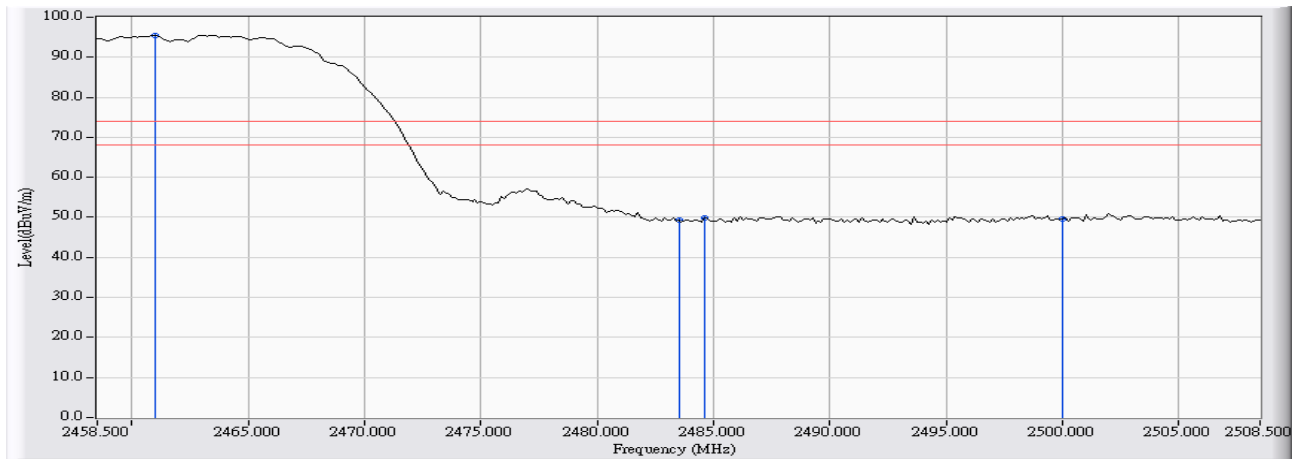
**RF Radiated Measurement:**

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)	2484.625	-1.934	51.773	49.840	74.00	54.00	Pass
11(Average)	--	--	--	--	74.00	54.00	Pass

**Figure Channel 11: (Vertical) (Peak)**



Note:

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

Product : Notebook built-in 802.11b/g Module  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g

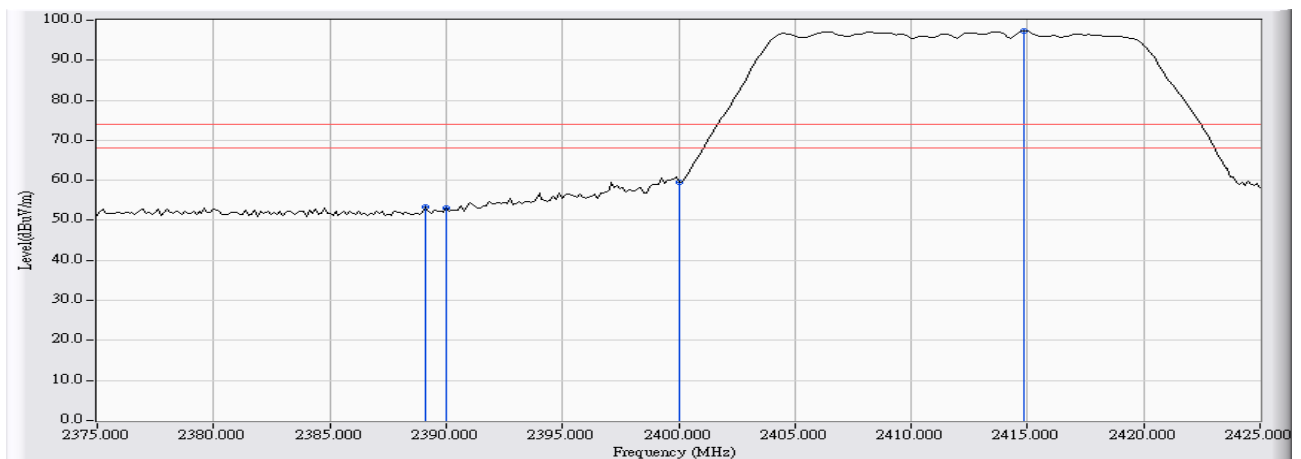
**RF Radiated Measurement:**

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)	2389.125	-2.382	55.727	53.346	74.00	54.00	Pass
1 (Average)	--	--	--	--	74.00	54.00	Pass

**Figure Channel 1: Horizontal (Peak)**



Note:

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

Product : Notebook built-in 802.11b/g Module  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g

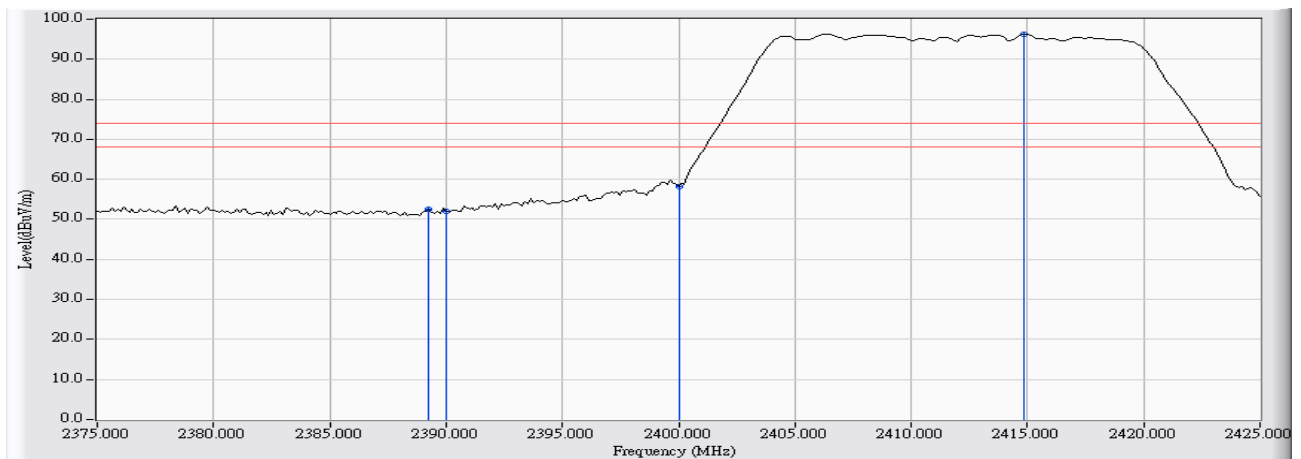
**RF Radiated Measurement:**

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)	2389.250	-2.381	55.043	52.662	74.00	54.00	Pass
1 (Average)	--	--	--	--	74.00	54.00	Pass

**Figure Channel 1: Vertical (Peak)**



Note:

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

Product : Notebook built-in 802.11b/g Module  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g

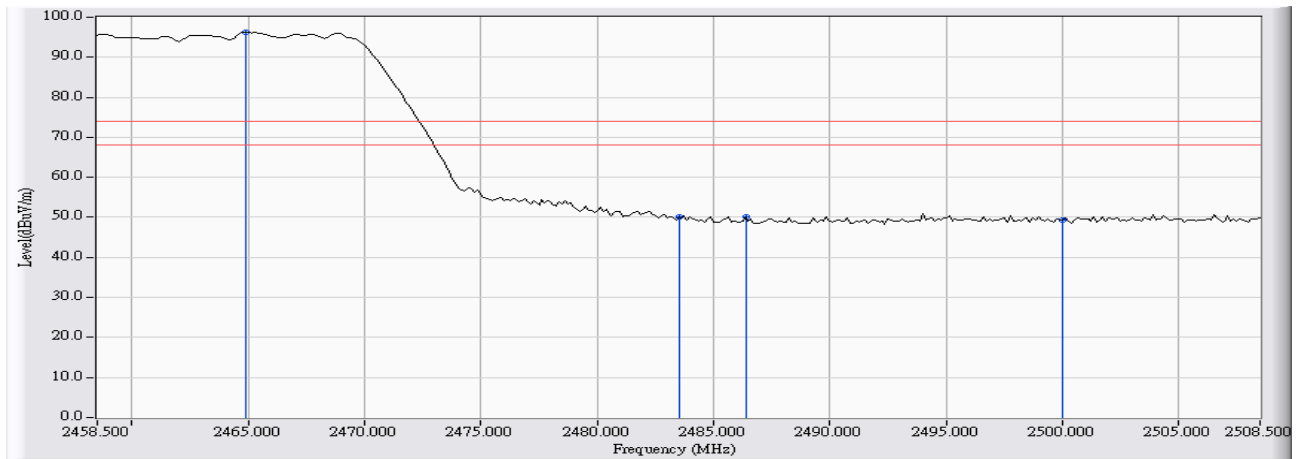
**RF Radiated Measurement:**

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)	2486.375	-1.928	52.159	50.231	74.00	54.00	Pass
11(Average)	--	--	--	--	74.00	54.00	Pass

**Figure Channel 11: Horizontal (Peak)**



Note:

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

Product : Notebook built-in 802.11b/g Module  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g

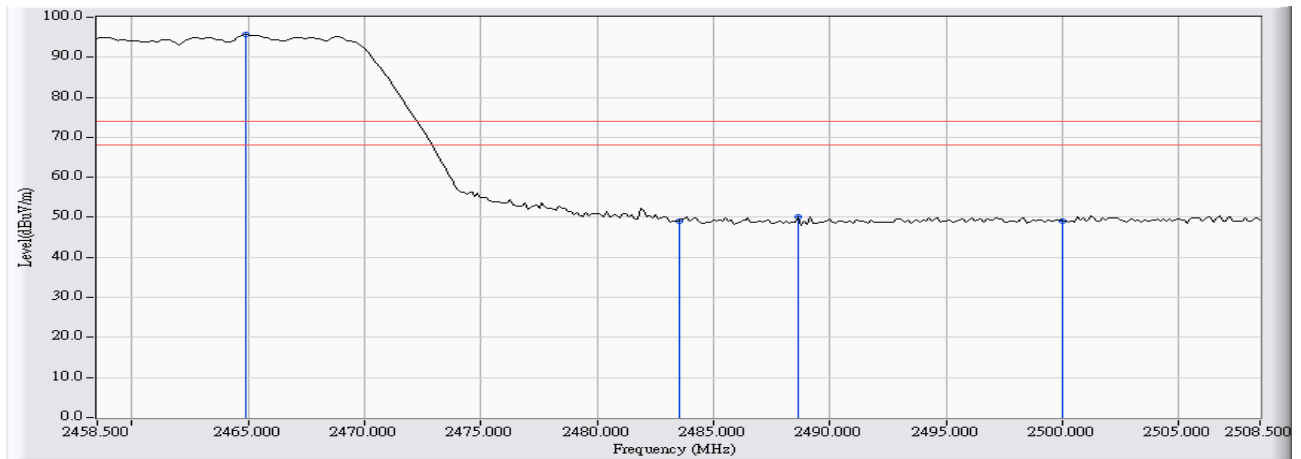
**RF Radiated Measurement:**

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)	2488.625	-1.921	51.996	50.075	74.00	54.00	Pass
11(Average)	--	--	--	--	74.00	54.00	Pass

**Figure Channel 11: (Vertical) (Peak)**



Note:

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



## 6. Occupied Bandwidth

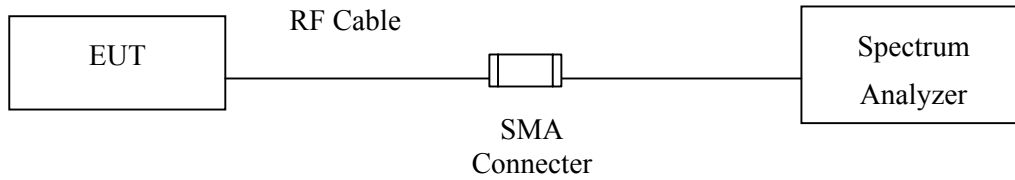
### 6.1. Test Equipment

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

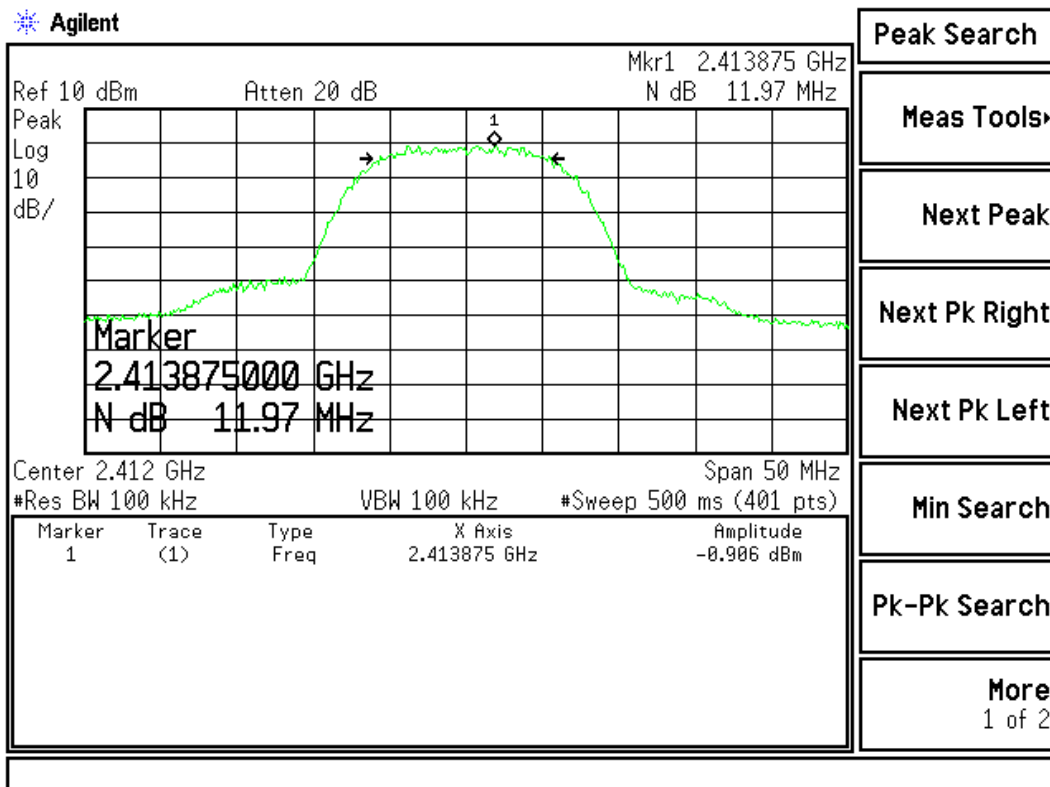
± 150Hz

### 6.5. Test Result of Occupied Bandwidth

Product : Notebook built-in 802.11b/g Module  
 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

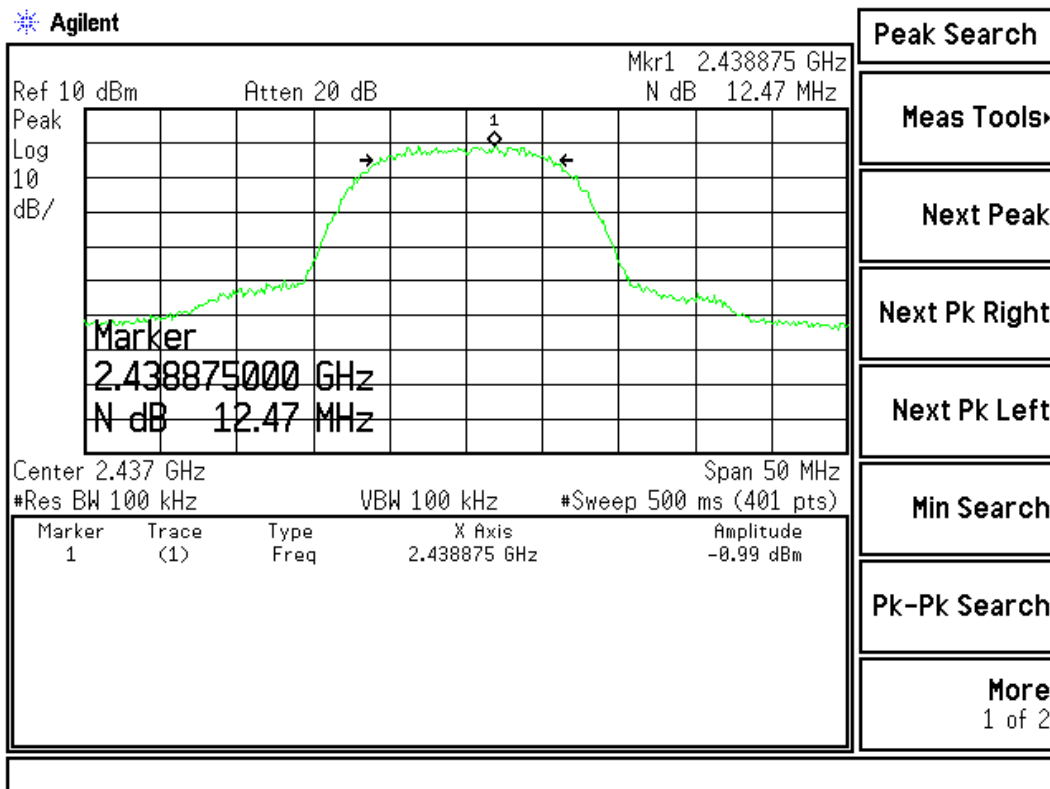
**Figure Channel 1: 11Mbps**



Product : Notebook built-in 802.11b/g Module  
 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	12470	>500	Pass

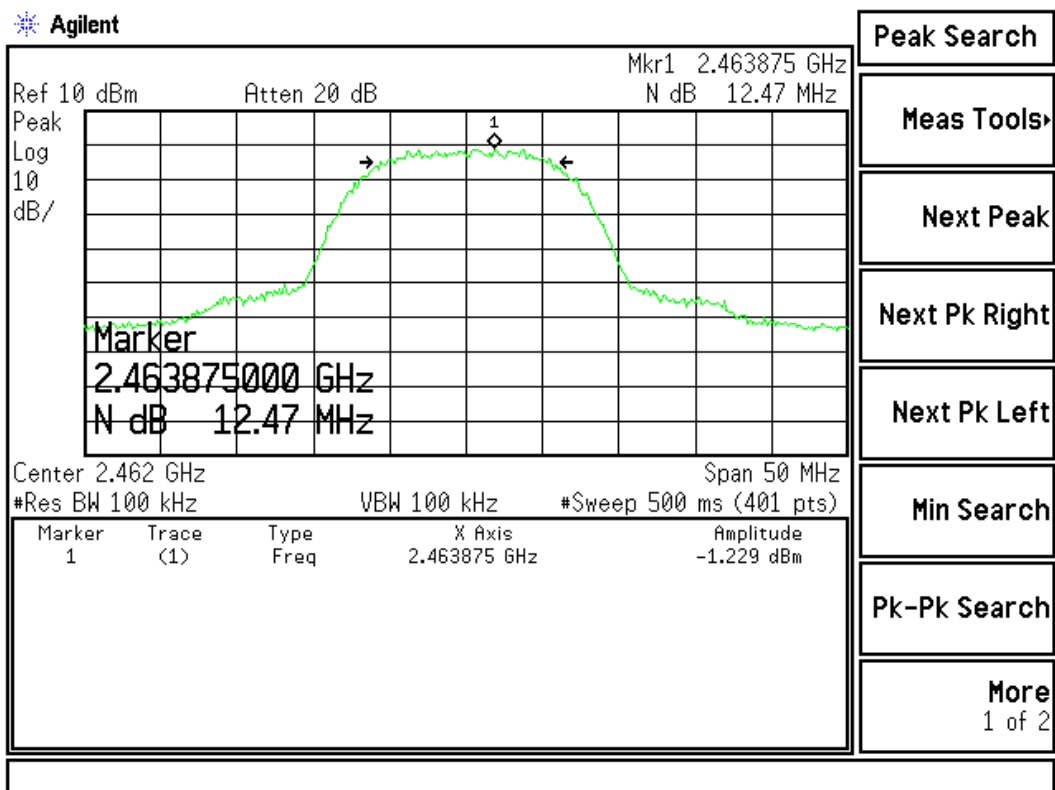
**Figure Channel 6: 11Mbps**



Product : Notebook built-in 802.11b/g Module  
 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	12470	>500	Pass

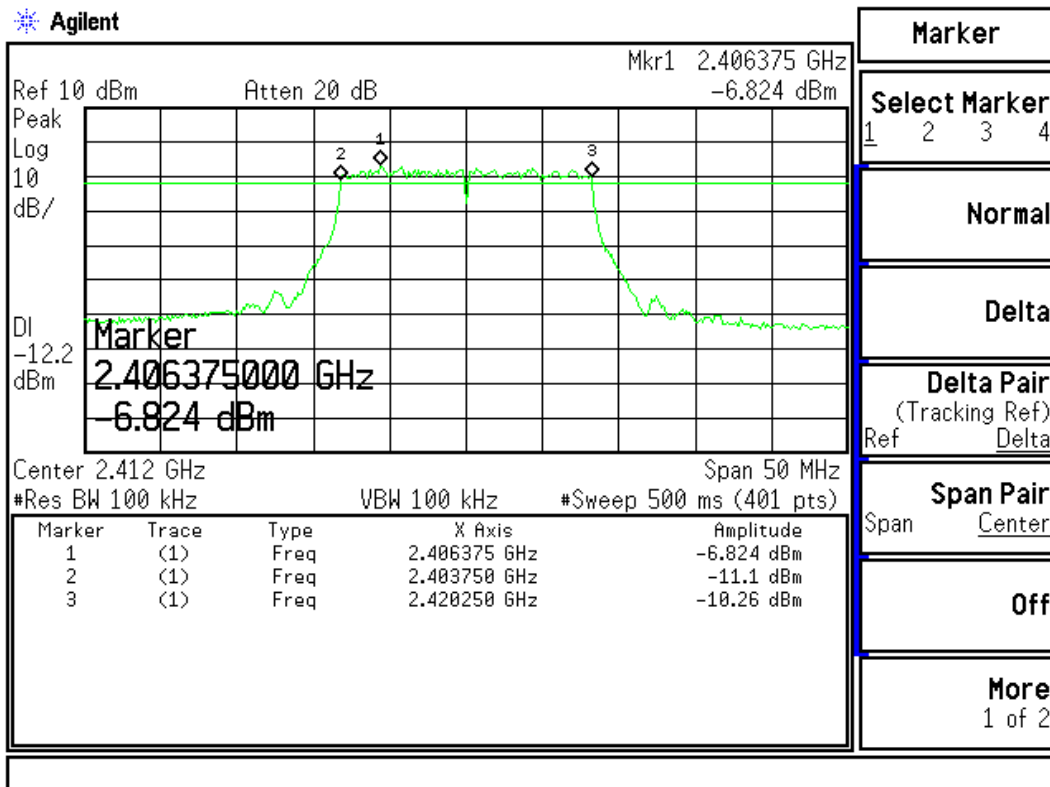
**Figure Channel 11: 11Mbps**



Product : Notebook built-in 802.11b/g Module  
 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

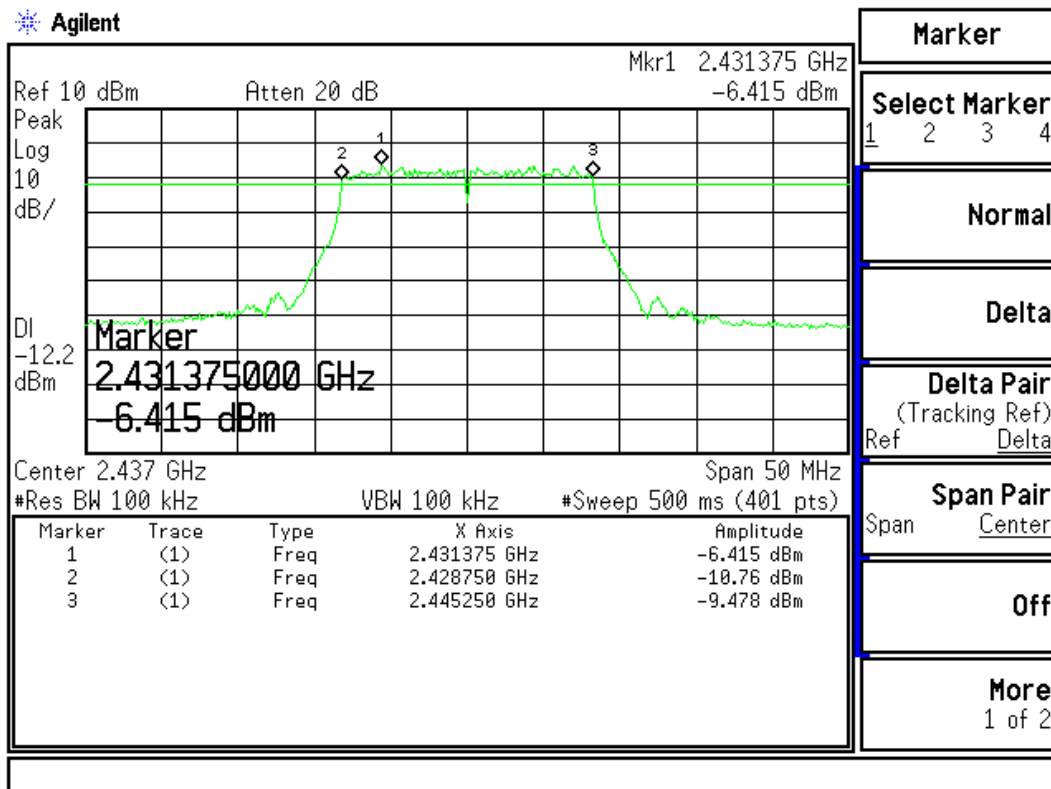
**Figure Channel 1:**



Product : Notebook built-in 802.11b/g Module  
 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

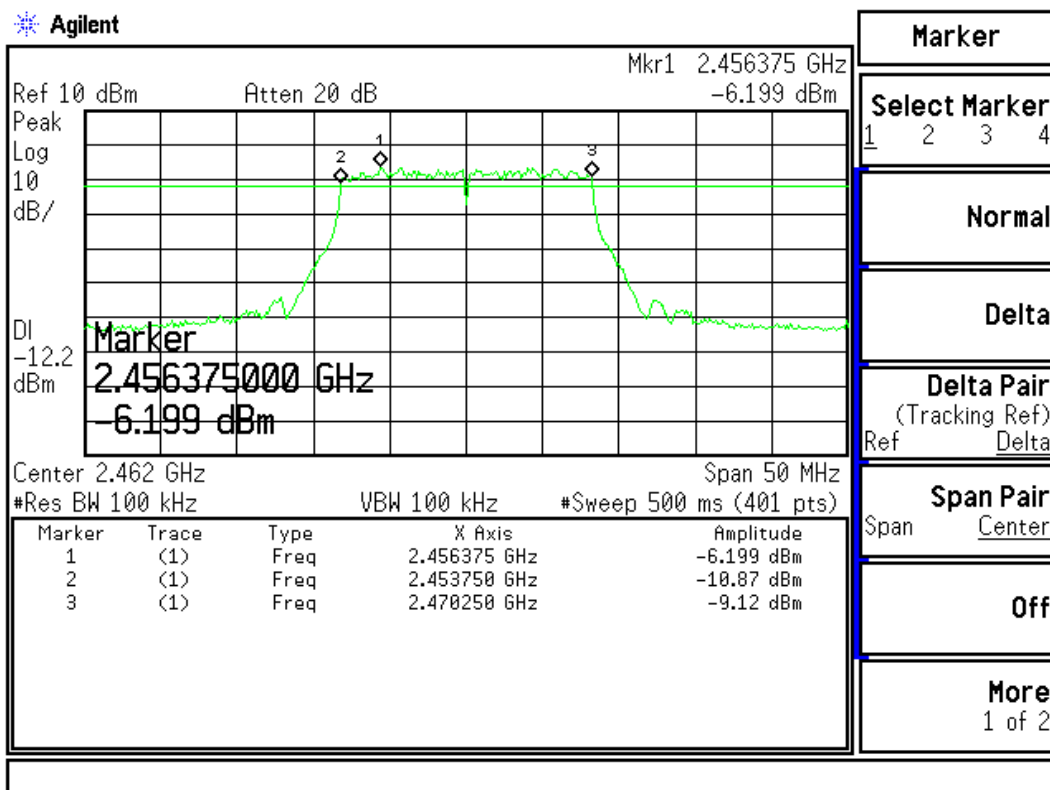
**Figure Channel 6:**



Product : Notebook built-in 802.11b/g Module  
 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

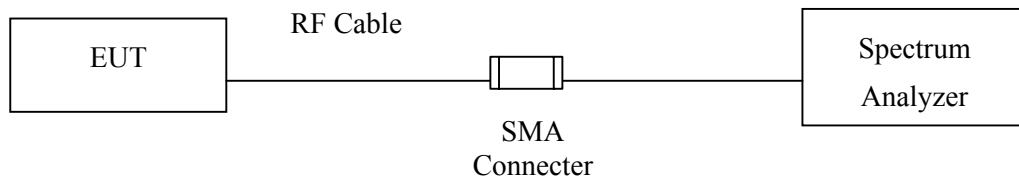
### 7.1. Test Equipment

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

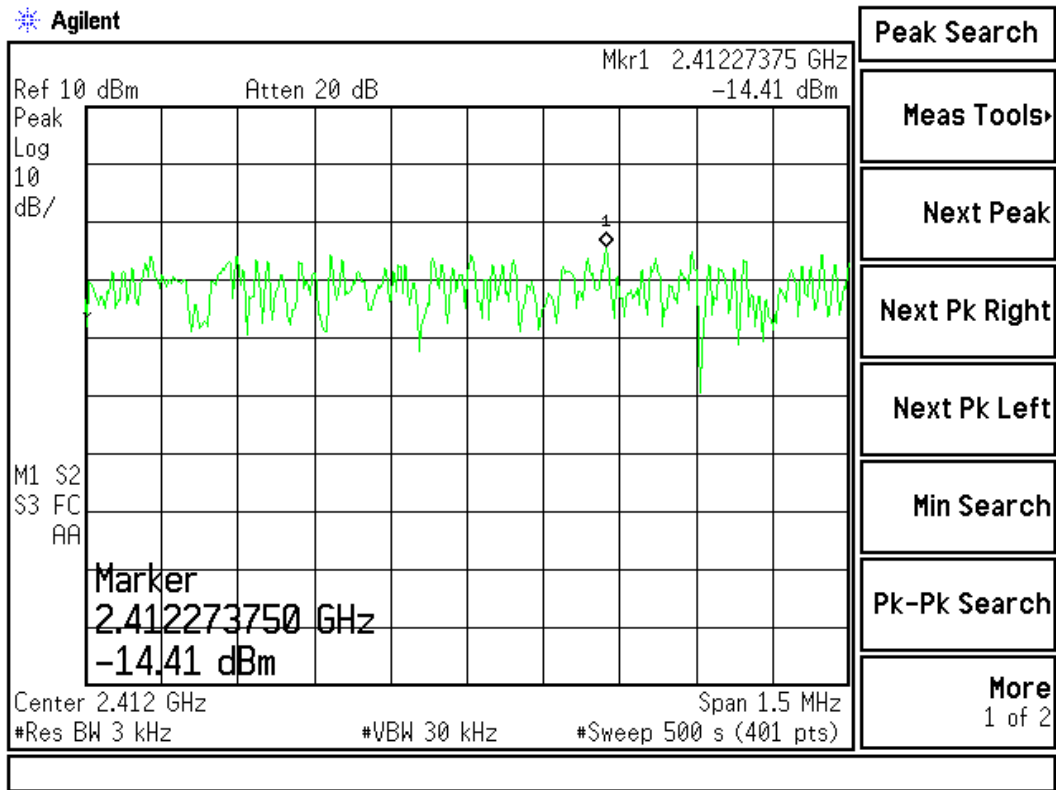


**7.5. Test Result of Power Density**

Product : Notebook built-in 802.11b/g Module  
 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	-14.41	< 10dBm	Pass

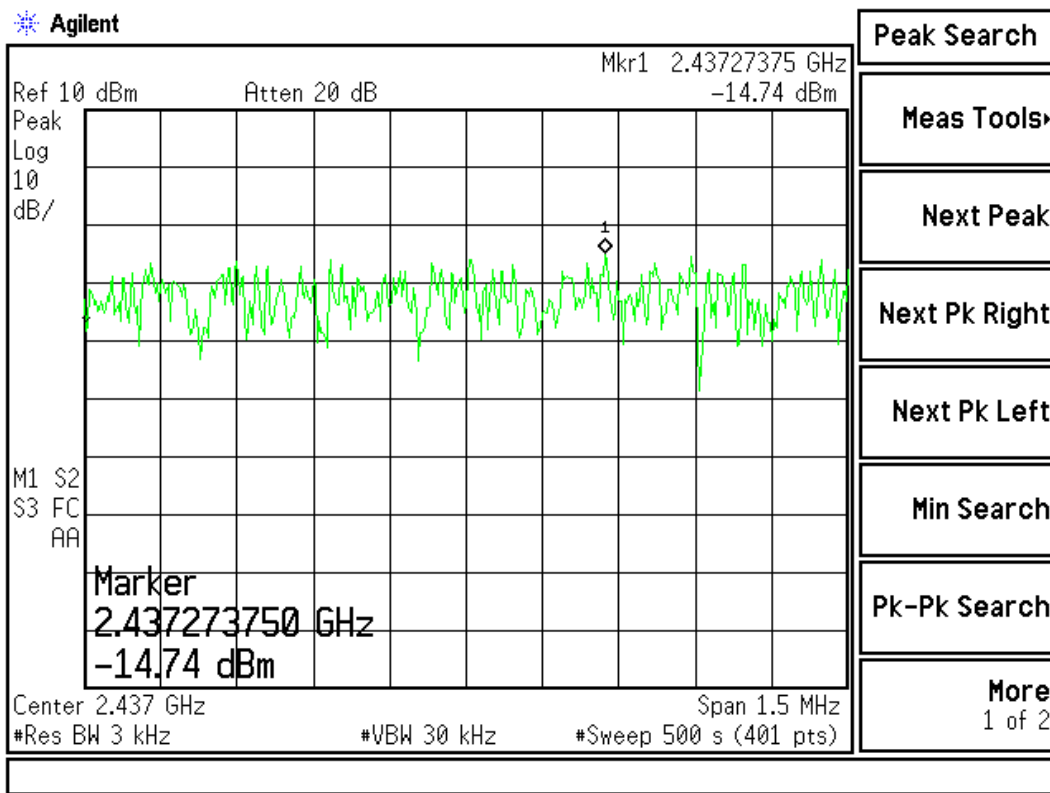
**Figure Channel 1: 11Mbps**



Product : Notebook built-in 802.11b/g Module  
 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	-14.74	< 10dBm	Pass

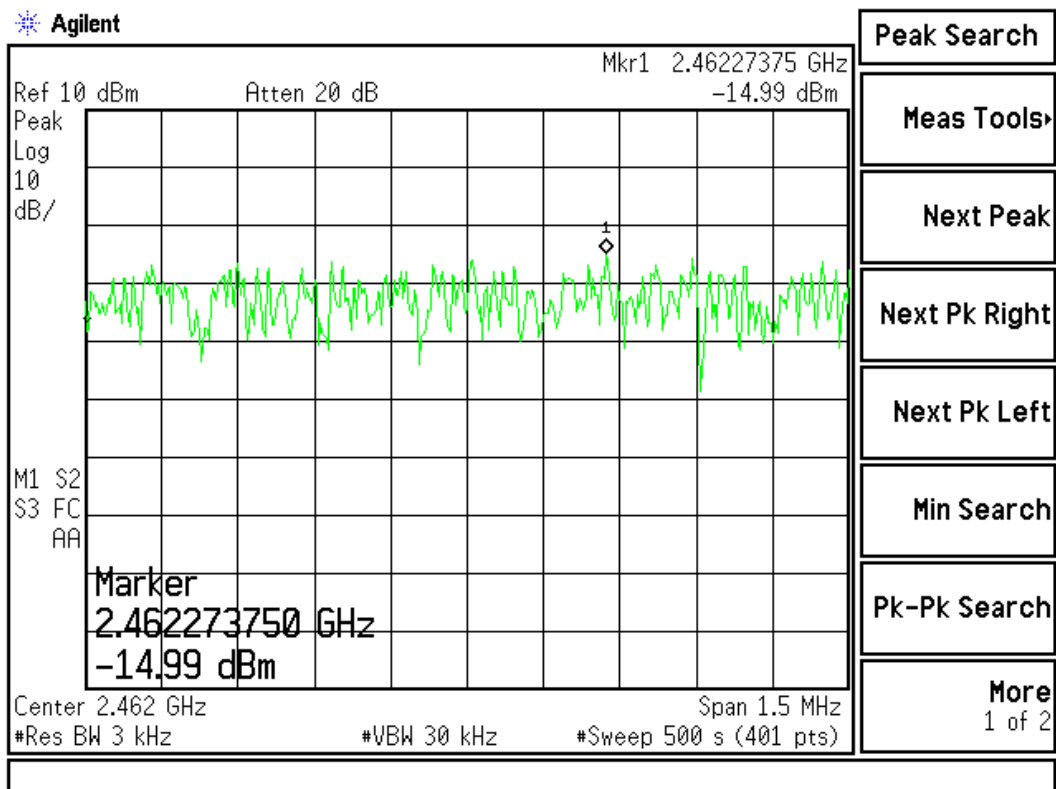
**Figure Channel 6: 11Mbps**



Product : Notebook built-in 802.11b/g Module  
 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	-14.99	< 10dBm	Pass

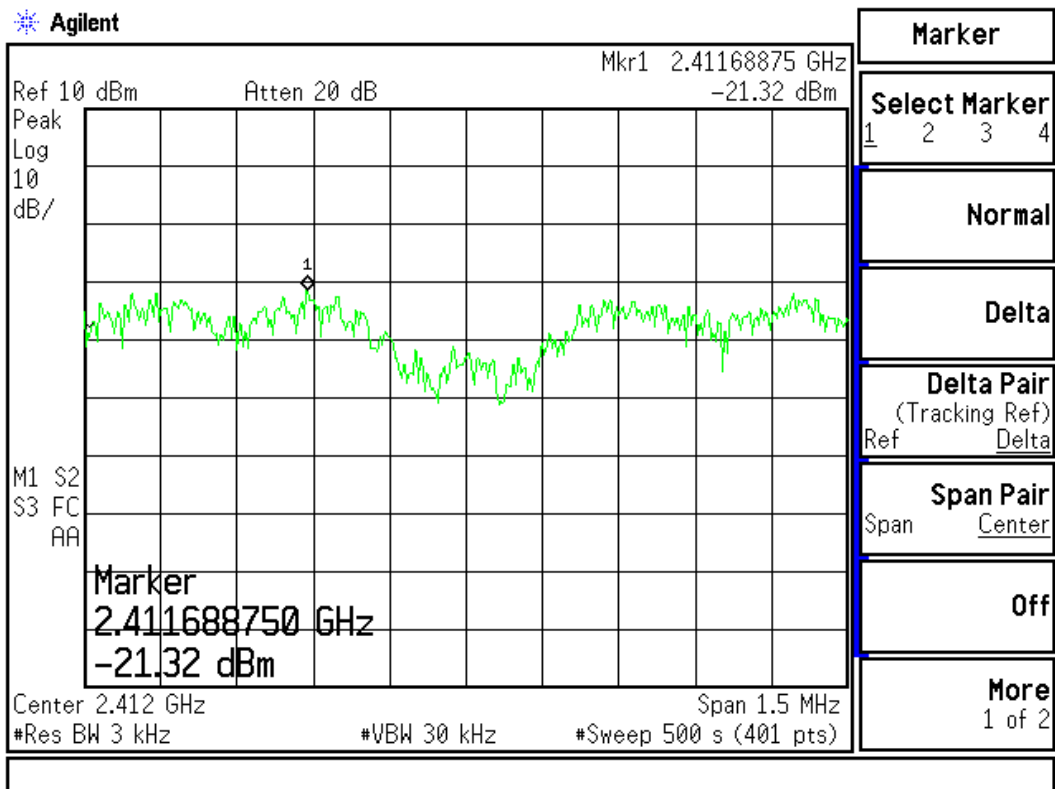
**Figure Channel 11: 11Mbps**



Product : Notebook built-in 802.11b/g Module  
 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	-21.32	< 10dBm	Pass

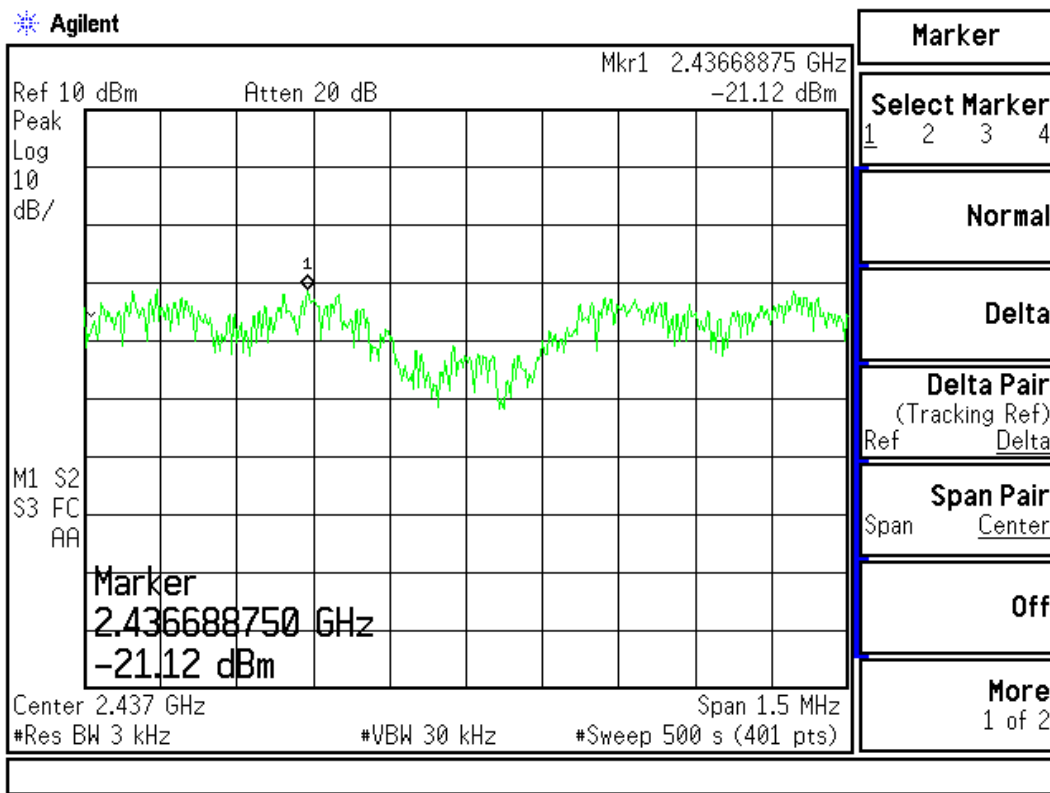
**Figure Channel 1:**



Product : Notebook built-in 802.11b/g Module  
 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	-21.12	< 10dBm	Pass

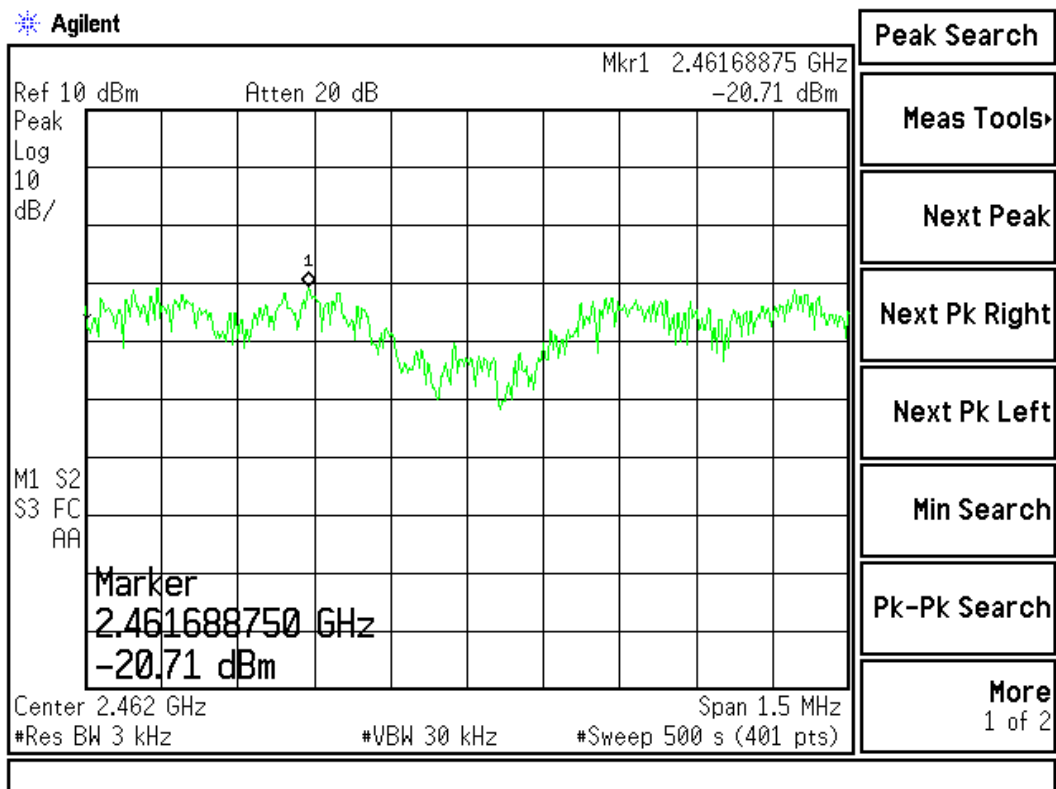
**Figure Channel 6:**



Product : Notebook built-in 802.11b/g Module  
 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	-20.71	< 10dBm	Pass

**Figure Channel 11:**



## 8. EMI Reduction Method During Compliance Testing

No modification was made during testing.