



Test Report

Product Name	VoIP Wireless Router
Model No.	DVG-G5402SP
FCC ID	KA2DVGG5402SP

Applicant	D-Link Corp.
Address	17595 Mt. Herrmann, Fountain Vally, California, United States.

Date of Receipt	Aug. 29, 2007
Issued Date	Nov. 15, 2007
Report No.	07B129R-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: Nov. 15, 2007

Report No.: 07B129R-RFUSP05V01



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

Product Name	VoIP Wireless Router
Applicant	D-Link Corp.
Address	17595 Mt. Herrmann, Fountain Vally, California, United States.
Manufacturer	Octtel Communication Co., Ltd.
Model No.	DVG-G5402SP
Rated Voltage	AC 120V/60Hz
Working Voltage	DC 12V
Trade Name	D-Link
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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TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION	5
1.1. EUT Description.....	5
1.2. Operational Description	7
1.3. Tested System Details.....	8
1.4. Configuration of Test System.....	8
1.5. EUT Exercise Software	8
1.6. Test Facility	9
2. Conducted Emission.....	10
2.1. Test Equipment.....	10
2.2. Test Setup	10
2.3. Limits	10
2.4. Test Procedure	11
2.5. Uncertainty	11
2.6. Test Result of Conducted Emission.....	12
3. Peak Power Output	16
3.1. Test Equipment.....	16
3.2. Test Setup	16
3.3. Limits	16
3.4. Test Procedure	16
3.5. Uncertainty	16
3.6. Test Result of Peak Power Output.....	17
4. Radiated Emission.....	19
4.1. Test Equipment.....	19
4.2. Test Setup	20
4.3. Limits	21
4.4. Test Procedure	22
4.5. Uncertainty	22
4.6. Test Result of Radiated Emission.....	23
5. Band Edge	31
5.1. Test Equipment.....	31
5.2. Test Setup	31
5.3. Limits	31
5.4. Test Procedure	32
5.5. Uncertainty	32
5.6. Test Result of Band Edge	33
6. Occupied Bandwidth.....	41
6.1. Test Equipment.....	41
6.2. Test Setup	41
6.3. Limits	41
6.4. Uncertainty	41
6.5. Test Result of Occupied Bandwidth	42
7. Power Density	48

7.1.	Test Equipment.....	48
7.2.	Test Setup	48
7.3.	Limits	48
7.4.	Uncertainty	48
7.5.	Test Result of Power Density	49
8.	EMI Reduction Method During Compliance Testing	55

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

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	VoIP Wireless Router
Trade Name	D-Link
Model No.	DVG-G5402SP
FCC ID.	KA2DVGG5402SP
Frequency Range	802.11b/g: 2412-2462MHz
Number of Channels	802.11b/g: 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	Dipole
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto
Power Adapter	MFR: L.T.E., M/N: LTE12W-S2 Input: AC 100-240V, 47-63Hz, 1A Output: DC 12V, 1A Cable Out: Non-Shielded, 1.75m

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	Wha Yu	C916-510008-A	2 dBi

Frequency of Each Channel (802.11b/g):

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 VoIP Wireless Router 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 stand-alone OR SERIES carries both voice and facsimile over the IP network. It supports SIP industry standard call control protocol to be compatible with free registration services or VoIP service providers' systems. As a standard user agent, it is compatible to all well-known Soft Switches and VSP(Voice Service Provider)/ SIP proxy servers.

OR SERIES can be seamlessly integrated to existing network by connecting to a phone set, fax machine or PSTN line. With only a broadband connection such as ADSL bridge/router, Cable Modem or leased line router, it allows you to gain access to voice and FAX services over the IP in order to get the convenient of VoIP and reduce the cost of international and long distance calls.

In addition, the in-built router supports comprehensive Internet gateway functions to accommodate other PCs or IP devices to share the same broadband stream. QoS function allows voice and data traffic to flow through where voice traffic is transmitted in the highest priority. With TOS bit enabled, it guarantees voice packets to have first priority to pass through a TOS enabled router.

With the support of DDNS, it makes OR SERIES reachable by its domain name where the ISP dynamically assigns the IP address.

The EUT is a VoIP Wireless Router 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 Dipole.

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

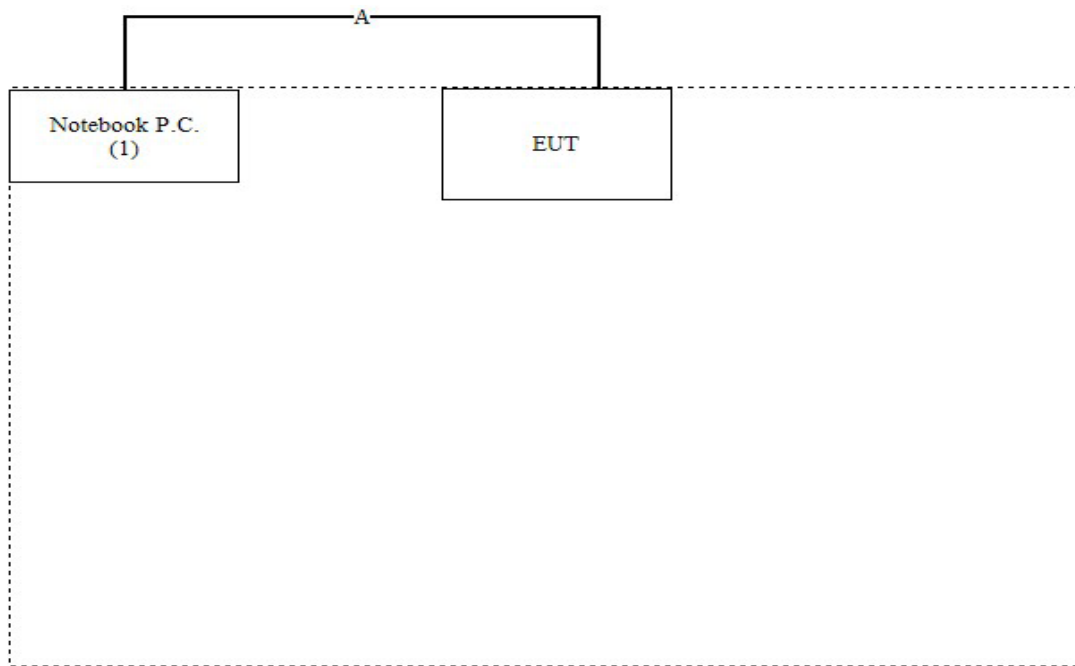
1.3. Tested System Details

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) Notebook P.C.	DELL	PP04X	2D2ZM1S	DoC	Non-Shielded, 0.8m

Signal Cable Type	Signal cable Description
A. LAN Cable	Non-Shielded, 1.5m

1.4. Configuration of Test System



1.5. EUT Exercise Software

- 1 Setup the EUT as shown in section 1.4
- 2 Execute the MP_150 program (the continuous transmission program) on the Notebook PC.
- 3 Setup the test mode, the test channel, and the data rate.
- 4 Press OK to start the transmission.
- 5 Verify that the EUT works correctly.

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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FCC Accreditation Number: TW1014

2. Conducted Emission

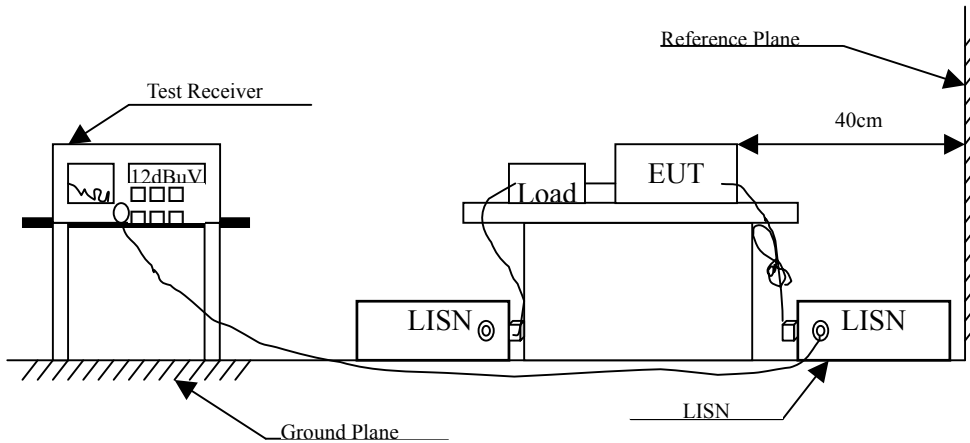
2.1. Test Equipment

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, 2007	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2007	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2007	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2007	
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 : VoIP Wireless Router
 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
LINE 1					
Quasi-Peak					
0.173	0.685	49.950	50.635	-14.708	65.343
0.228	0.450	40.880	41.330	-22.441	63.771
0.345	0.300	38.430	38.730	-21.699	60.429
0.822	0.310	33.940	34.250	-21.750	56.000
3.662	0.390	28.700	29.090	-26.910	56.000
12.216	0.787	29.760	30.547	-29.453	60.000
Average					
0.173	0.685	39.670	40.355	-14.988	55.343
0.228	0.450	29.390	29.840	-23.931	53.771
0.345	0.300	30.730	31.030	-19.399	50.429
0.822	0.310	26.100	26.410	-19.590	46.000
3.662	0.390	14.260	14.650	-31.350	46.000
12.216	0.787	20.200	20.987	-29.013	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 : VoIP Wireless Router
 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
LINE 2					
Quasi-Peak					
0.170	0.300	47.810	48.110	-17.319	65.429
0.240	0.300	39.080	39.380	-24.049	63.429
0.591	0.310	36.860	37.170	-18.830	56.000
1.720	0.340	32.070	32.410	-23.590	56.000
16.228	0.900	33.490	34.390	-25.610	60.000
28.689	1.030	32.140	33.170	-26.830	60.000
Average					
0.170	0.300	34.460	34.760	-20.669	55.429
0.240	0.300	28.200	28.500	-24.929	53.429
0.591	0.310	30.070	30.380	-15.620	46.000
1.720	0.340	20.610	20.950	-25.050	46.000
16.228	0.900	28.960	29.860	-20.140	50.000
28.689	1.030	28.050	29.080	-20.920	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 : VoIP Wireless Router
 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
LINE 1					
Quasi-Peak					
0.177	0.749	48.720	49.469	-15.760	65.229
0.232	0.423	42.330	42.753	-20.904	63.657
0.349	0.300	38.760	39.060	-21.254	60.314
1.005	0.317	32.880	33.197	-22.803	56.000
1.283	0.320	31.240	31.560	-24.440	56.000
12.197	0.785	30.710	31.495	-28.505	60.000
Average					
0.177	0.749	38.570	39.319	-15.910	55.229
0.232	0.423	33.670	34.093	-19.564	53.657
0.349	0.300	36.130	36.430	-13.884	50.314
1.005	0.317	23.450	23.767	-22.233	46.000
1.283	0.320	20.290	20.610	-25.390	46.000
12.197	0.785	24.090	24.875	-25.125	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 : VoIP Wireless Router
 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
LINE 2					
Quasi-Peak					
0.177	0.300	48.500	48.800	-16.429	65.229
0.345	0.305	39.720	40.025	-20.404	60.429
0.588	0.310	37.000	37.310	-18.690	56.000
1.291	0.330	34.940	35.270	-20.730	56.000
4.423	0.410	31.150	31.560	-24.440	56.000
27.341	1.050	29.320	30.370	-29.630	60.000
Average					
0.177	0.300	37.860	38.160	-17.069	55.229
0.345	0.305	33.860	34.165	-16.264	50.429
0.588	0.310	31.210	31.520	-14.480	46.000
1.291	0.330	24.410	24.740	-21.260	46.000
4.423	0.410	20.480	20.890	-25.110	46.000
27.341	1.050	26.250	27.300	-22.700	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

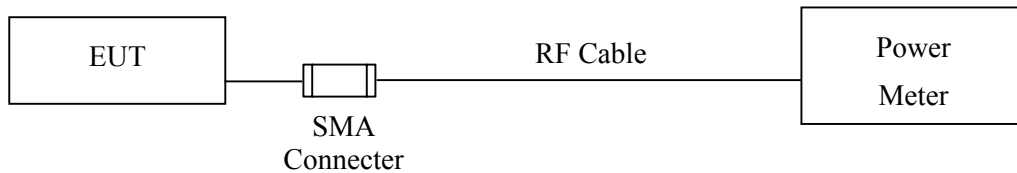
The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Power Meter	Anritsu	ML2495A/6K00003357	May, 2007
X Power Sensor	Anritsu	MA2491A/034457	May, 2007

- 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

Conduction Power Measurement



3.3. Limits

The maximum peak power shall be less 1 Watt.

3.4. Test Procedure

- (1) The transmitter output was connected the Power Meter.
- (2) Select the middle channel of the operation band, and measure the peak output power value of each data rate.
- (3) Find out the worst-case data rate of previous procedure, and dependence on which data rate to measure the high and the low channel.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

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

Peak Power Output						
Channel No.	Frequency (MHz)	Data Rate				Required Limit
		1	2	5.5	11	
1	2412.00				17.33	1Watt= 30 dBm
6	2437.00	16.58	16.68	16.85	17.03	1Watt= 30 dBm
11	2462.00				16.49	1Watt= 30 dBm

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

Peak Power Output										
Channel No.	Frequency (MHz)	Data Rate								Required Limit
		6	9	12	18	24	36	48	54	
1	2412.00								19.76	1Watt= 30 dBm
6	2437.00	18.52	18.61	18.77	18.82	19.02	19.19	19.22	19.54	1Watt= 30 dBm
11	2462.00								18.87	1Watt= 30 dBm

4. Radiated Emission

4.1. Test Equipment

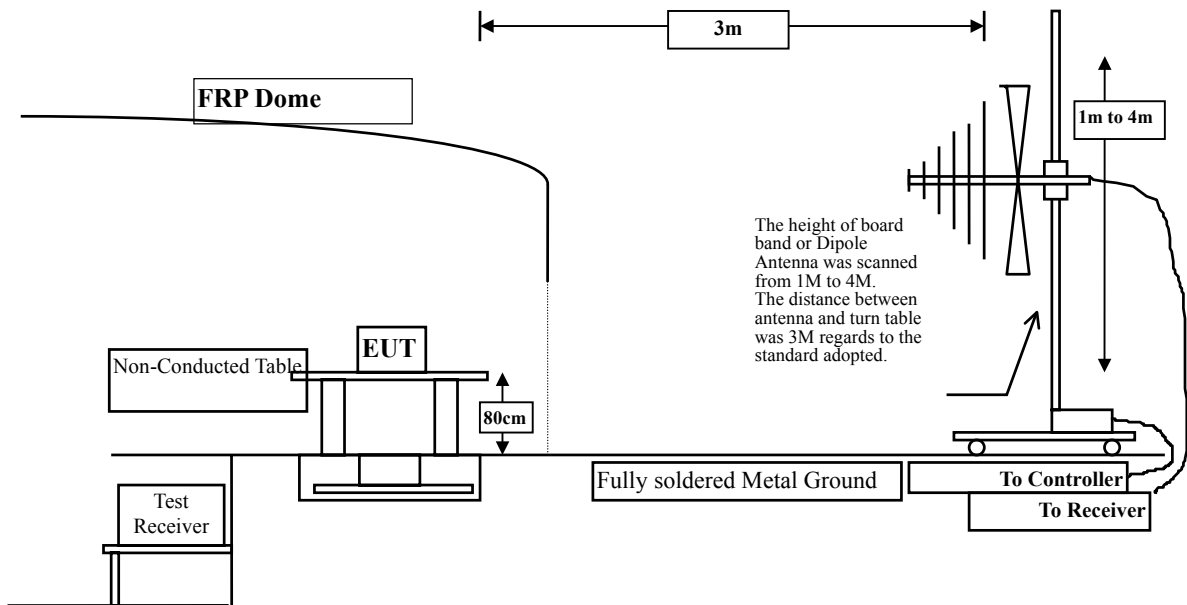
The following test equipment are used during the radiated emission test:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 1	Test Receiver	R & S	ESCS 30 / 825442/14	May, 2007
	Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2007
	Pre-Amplifier	HP	8447D/3307A01812	May, 2007
	Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2007
	Horn Antenna	EM	EM6917 / 103325	May, 2007
Site # 2	Test Receiver	R & S	ESCS 30 / 825442/17	May, 2007
	Spectrum Analyzer	Advantest	R3261C / 71720609	May, 2007
	Pre-Amplifier	HP	8447D/3307A01814	May, 2007
	Bilog Antenna	Chase	CBL6112B / 2455	Sep., 2007
	Horn Antenna	EM	EM6917 / 103325	May, 2007
Site # 3	X Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2007
	X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007
	X Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
	X Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2007
	X Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2007
	X Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2007
	X Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2007
X Pre-Amplifier	HP	8449B / 3008A01123	July, 2007	

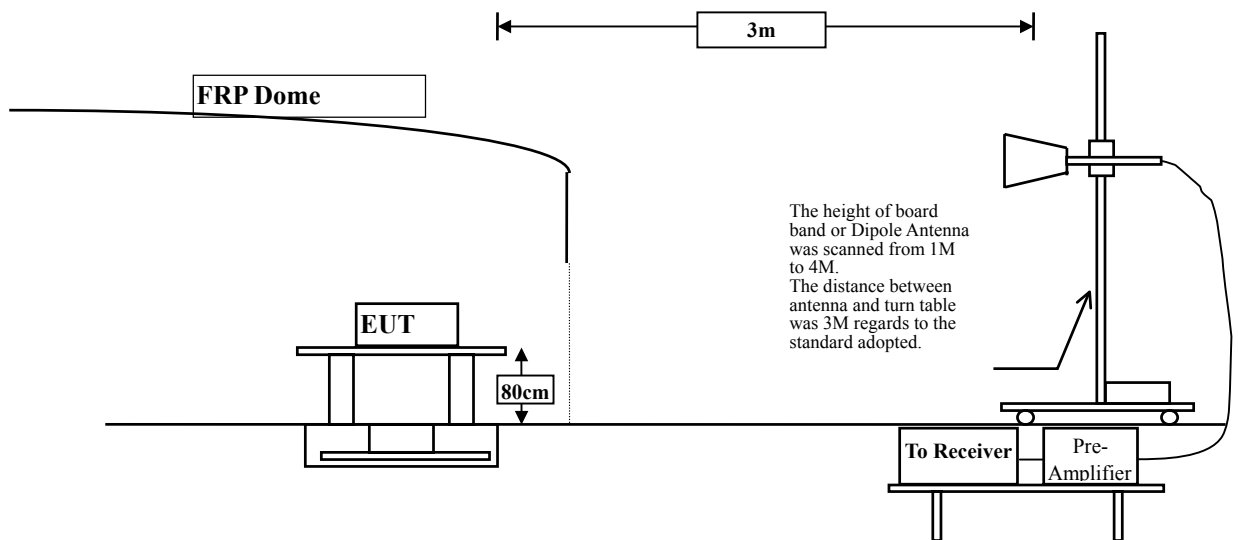
- Note:
1. All instruments are calibrated every one year.
 2. The test instruments marked by "X" are used to measure the final test results.

4.2. Test Setup

Below 1GHz



Above 1GHz



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 : VoIP Wireless Router
 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
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Horizontal

Peak Detector:

4824.000	2.927	39.230	42.157	-31.843	74.000
7236.000	9.472	36.810	46.282	-27.718	74.000
9648.000	10.512	38.240	48.752	-25.248	74.000

Average Detector:

--

Vertical

Peak Detector:

4824.000	2.927	42.240	45.167	-28.833	74.000
7236.000	9.472	36.050	45.522	-28.478	74.000
9648.000	10.512	37.070	47.582	-26.418	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 : VoIP Wireless Router
 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
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Horizontal
Peak Detector:

4874.000	3.037	39.120	42.157	-31.843	74.000
7311.000	9.557	36.210	45.768	-28.232	74.000
9748.000	10.600	37.120	47.720	-26.280	74.000

Average Detector:

--

Vertical
Peak Detector:

4874.000	3.037	42.040	45.077	-28.923	74.000
7311.000	9.557	36.460	46.018	-27.982	74.000
9748.000	10.600	37.320	47.920	-26.080	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 : VoIP Wireless Router
 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		

Horizontal
Peak Detector:

4924.000	3.154	40.240	43.394	-30.606	74.000
7386.000	9.627	36.290	45.917	-28.083	74.000
9848.000	10.686	36.550	47.236	-26.764	74.000

Average Detector:

--

Vertical
Peak Detector:

4924.000	3.154	40.950	44.104	-29.896	74.000
7386.000	9.627	35.260	44.887	-29.113	74.000
9848.000	10.686	36.910	47.596	-26.404	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 : VoIP Wireless Router
 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/m
	dB	dBuV	dBuV/m		

Horizontal
Peak Detector:

4824.000	2.927	39.510	42.437	-31.563	74.000
7236.000	9.472	35.830	45.302	-28.698	74.000
9648.000	10.512	37.650	48.162	-25.838	74.000

Average Detector:

--

Vertical
Peak Detector:

4824.000	2.927	38.730	41.657	-32.343	74.000
7236.000	9.472	35.120	44.592	-29.408	74.000
9648.000	10.512	37.870	48.382	-25.618	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 : VoIP Wireless Router
 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
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Horizontal
Peak Detector:

4874.000	3.037	39.040	42.077	-31.923	74.000
7311.000	9.557	36.550	46.108	-27.892	74.000
9748.000	10.600	36.670	47.270	-26.730	74.000

Average Detector:

--

Vertical
Peak Detector:

4874.000	3.037	39.140	42.177	-31.823	74.000
7311.000	9.557	36.420	45.978	-28.022	74.000
9748.000	10.600	37.850	48.450	-25.550	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 : VoIP Wireless Router
 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
Horizontal					
Peak Detector:					
4924.000	3.154	37.220	40.374	-33.626	74.000
7386.000	9.627	35.280	44.907	-29.093	74.000
9848.000	10.686	36.560	47.246	-26.754	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4924.000	3.154	38.090	41.244	-32.756	74.000
7386.000	9.627	36.050	45.677	-28.323	74.000
9848.000	10.686	36.780	47.466	-26.534	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 : VoIP Wireless Router
 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
Horizontal					
178.200	8.822	18.832	27.654	-15.846	43.500
250.018	12.264	20.760	33.024	-12.976	46.000
360.442	14.249	19.804	34.054	-11.946	46.000
500.035	16.980	13.644	30.624	-15.376	46.000
745.460	19.253	11.995	31.248	-14.752	46.000
843.765	20.667	11.660	32.327	-13.673	46.000
Vertical					
54.300	6.125	18.101	24.226	-15.774	40.000
162.600	8.859	18.730	27.589	-15.911	43.500
250.000	12.300	22.011	34.311	-11.689	46.000
393.207	16.339	14.901	31.241	-14.759	46.000
499.702	17.093	16.301	33.394	-12.606	46.000
745.460	21.653	12.655	34.308	-11.692	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 : VoIP Wireless Router
 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
Horizontal					
64.620	5.971	14.050	20.021	-19.979	40.000
179.200	8.797	18.530	27.327	-16.173	43.500
250.015	12.264	20.882	33.146	-12.854	46.000
360.000	14.158	19.090	33.248	-12.752	46.000
499.700	16.938	14.692	31.629	-14.371	46.000
679.923	19.434	9.265	28.699	-17.301	46.000
Vertical					
174.400	8.889	18.629	27.518	-15.982	43.500
250.000	12.300	20.914	33.214	-12.786	46.000
360.440	14.932	16.096	31.029	-14.971	46.000
499.700	17.094	14.154	31.247	-14.753	46.000
680.000	18.648	13.406	32.054	-13.946	46.000
999.742	20.962	12.185	33.148	-20.852	54.000

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.
5. Measurement Level = Reading Level + Correct Factor.
6. 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

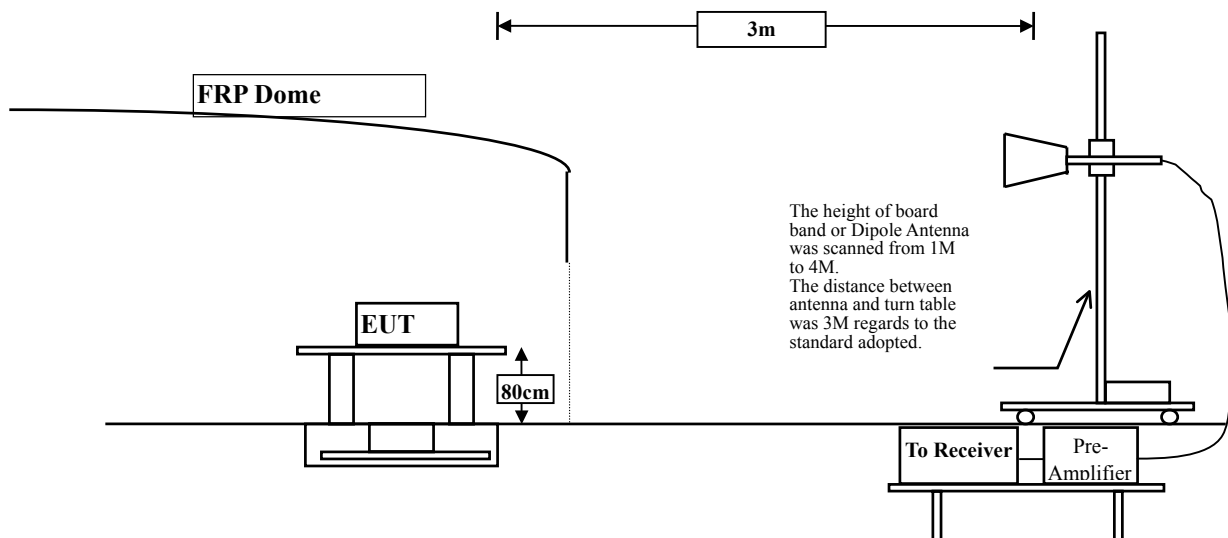
The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2007
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007
X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
X	Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2007
X	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2007
X	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2007
X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2007
X	Pre-Amplifier	HP	8449B / 3008A01123	July, 2007

- 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 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 : VoIP Wireless Router
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

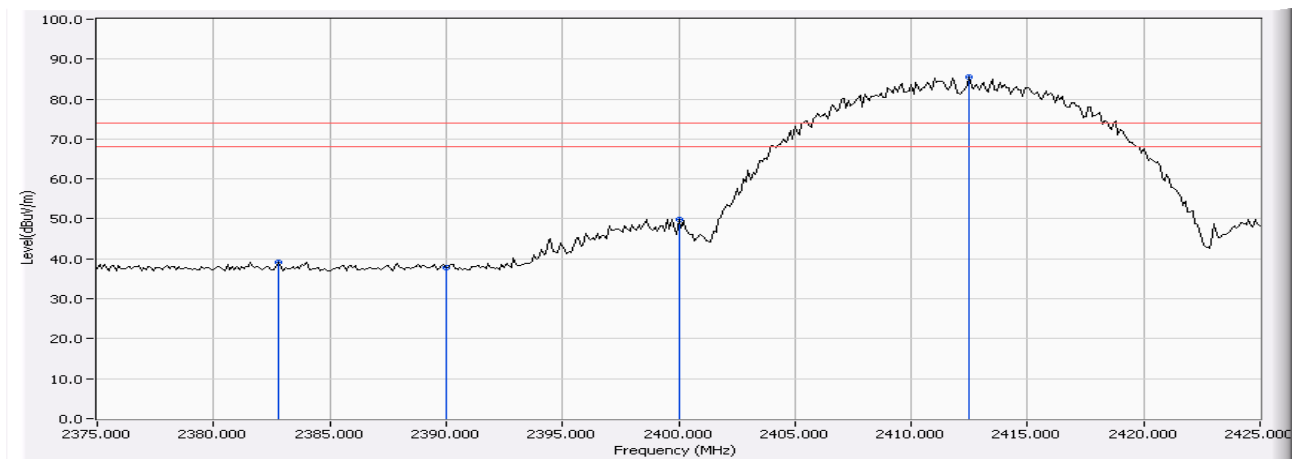
RF Radiated Measurement:

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)	2382.800	-1.429	40.681	39.253	74.00	54.00	Pass
1 (Peak)	2390.000	-1.407	39.339	37.932	74.00	54.00	Pass
1 (Peak)	2400.000	-1.363	51.175	49.812	74.00	54.00	Pass
1 (Peak)	2412.000	-1.312	86.793	85.480	74.00	54.00	Pass

Figure Channel 1: Horizontal



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

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

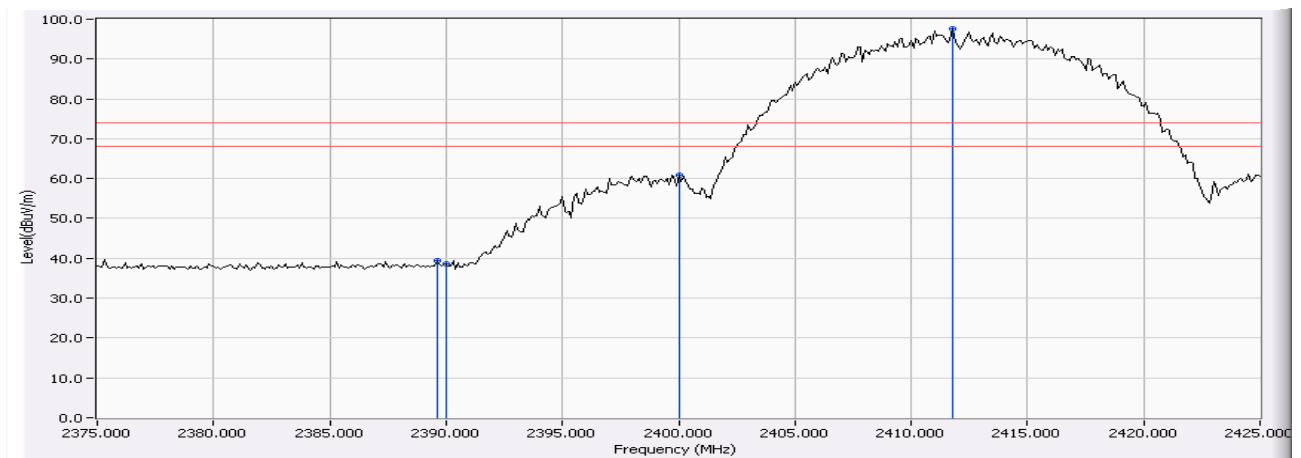
RF Radiated Measurement:

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)	2389.600	-1.408	40.859	39.451	74.00	54.00	Pass
1 (Peak)	2390.000	-1.407	39.896	38.489	74.00	54.00	Pass
1 (Peak)	2400.000	-1.363	62.309	60.946	74.00	54.00	Pass
1 (Peak)	2412.000	-1.315	98.957	97.641	74.00	54.00	Pass

Figure Channel 1: Vertical



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

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

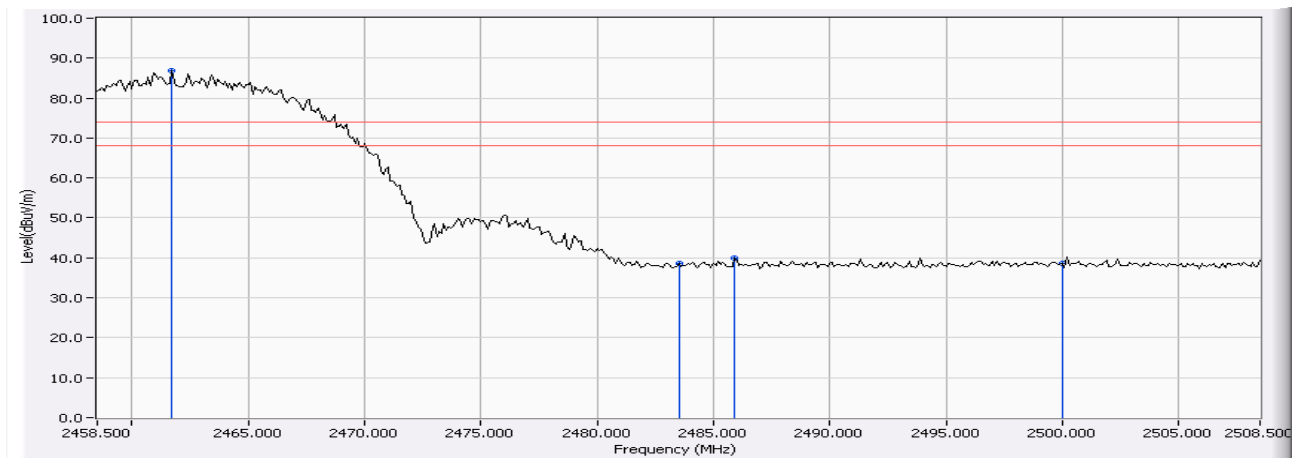
RF Radiated Measurement:

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)	2462.000	-1.120	87.903	86.783	74.00	54.00	Pass
11(Peak)	2483.500	-1.037	39.555	38.518	74.00	54.00	Pass
11(Peak)	2485.900	-1.031	41.004	39.973	74.00	54.00	Pass
11(Peak)	2500.000	-0.988	39.576	38.588	74.00	54.00	Pass

Figure Channel 11: Horizontal



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

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

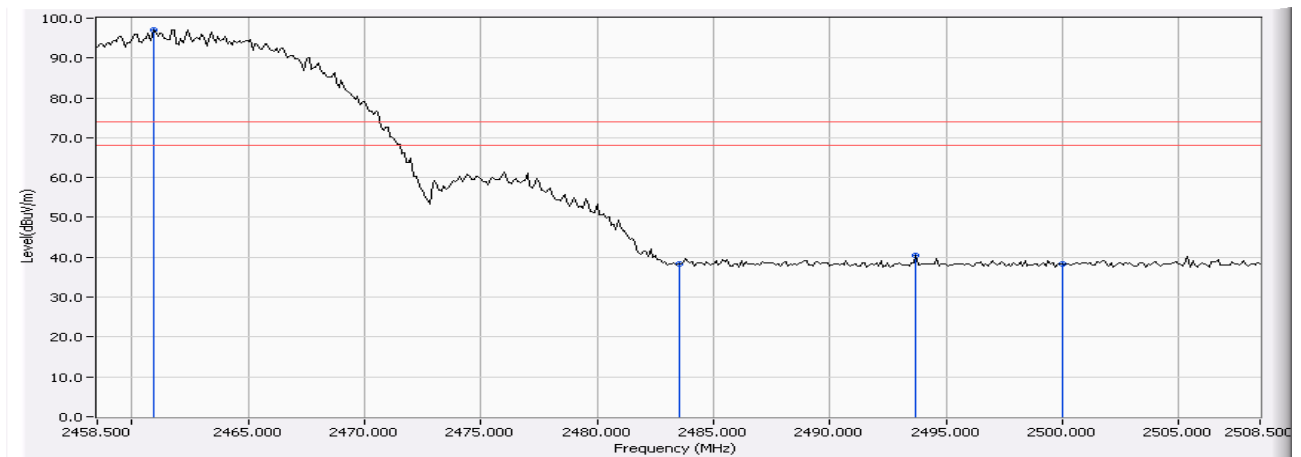
RF Radiated Measurement:

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)	2462.000	-1.125	98.305	97.180	74.00	54.00	Pass
11(Peak)	2483.500	-1.037	39.450	38.413	74.00	54.00	Pass
11(Peak)	2493.700	-1.008	41.497	40.489	74.00	54.00	Pass
11(Peak)	2500.000	-0.988	39.254	38.266	74.00	54.00	Pass

Figure Channel 11: Vertical



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

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

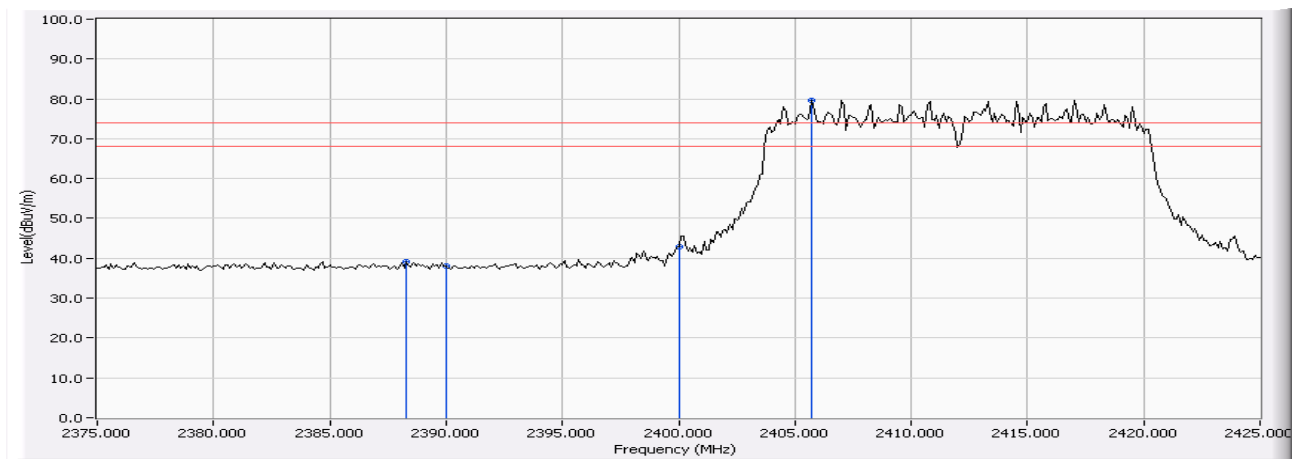
RF Radiated Measurement:

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)	2388.300	-1.412	40.438	39.026	74.00	54.00	Pass
1 (Peak)	2390.000	-1.407	39.533	38.126	74.00	54.00	Pass
1 (Peak)	2400.000	-1.363	44.236	42.873	74.00	54.00	Pass
1 (Peak)	2412.000	-1.344	80.975	79.631	74.00	54.00	Pass

Figure Channel 1: Horizontal



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

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

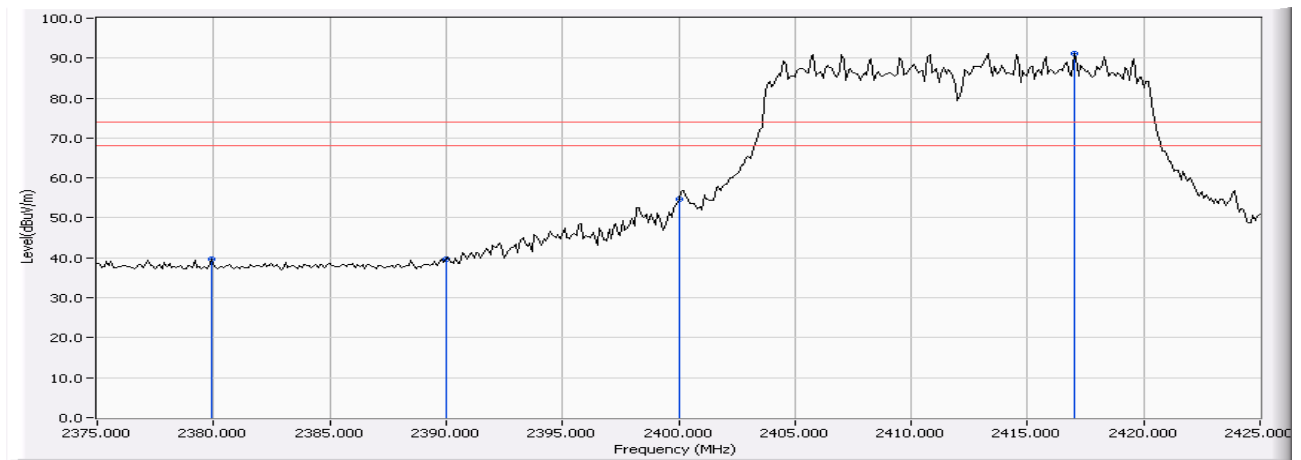
RF Radiated Measurement:

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)	2379.900	-1.436	41.222	39.785	74.00	54.00	Pass
1 (Peak)	2390.000	-1.407	41.136	39.729	74.00	54.00	Pass
1 (Peak)	2400.000	-1.363	56.112	54.749	74.00	54.00	Pass
1 (Peak)	2412.000	-1.299	92.510	91.211	74.00	54.00	Pass

Figure Channel 1: Vertical



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

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

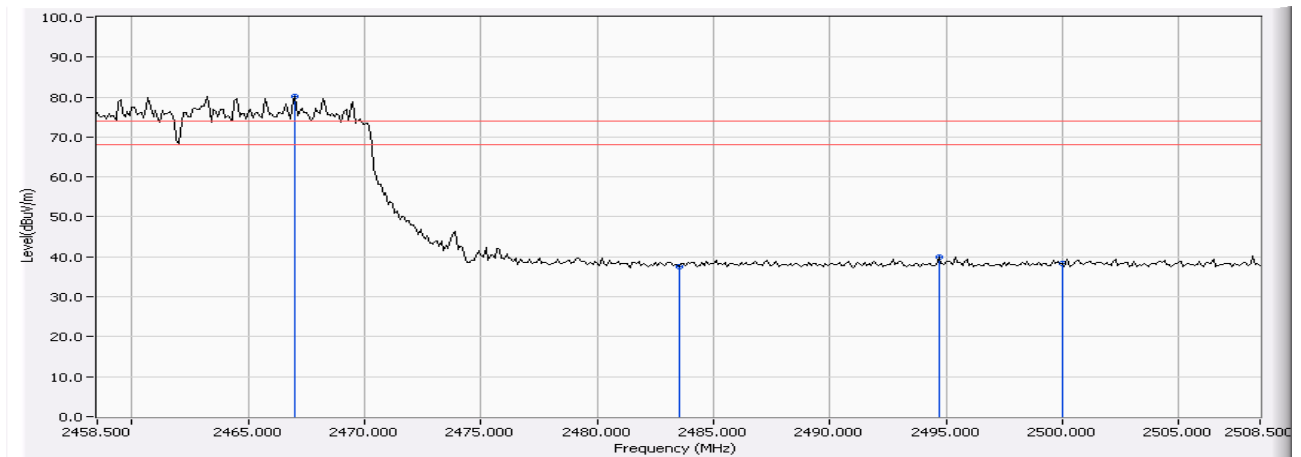
RF Radiated Measurement:

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)	2462.000	-1.100	81.340	80.240	74.00	54.00	Pass
11(Peak)	2483.500	-1.037	38.596	37.559	74.00	54.00	Pass
11(Peak)	2494.700	-1.002	41.004	40.002	74.00	54.00	Pass
11(Peak)	2500.000	-0.988	39.427	38.439	74.00	54.00	Pass

Figure Channel 11: Horizontal



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

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

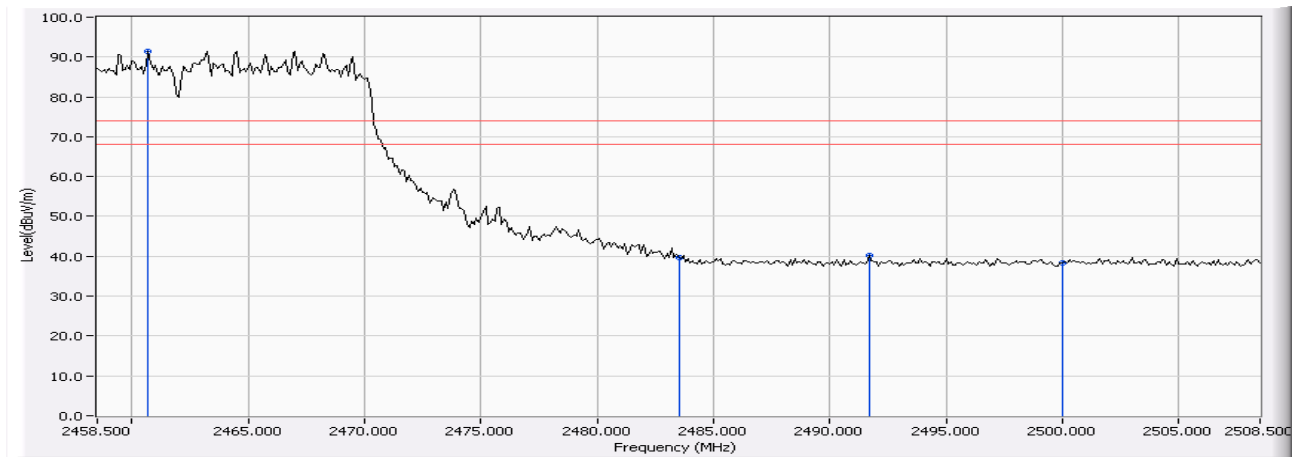
RF Radiated Measurement:

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)	2462.000	-1.127	92.584	91.457	74.00	54.00	Pass
11(Peak)	2483.500	-1.037	40.811	39.774	74.00	54.00	Pass
11(Peak)	2491.700	-1.018	41.336	40.318	74.00	54.00	Pass
11(Peak)	2500.000	-0.988	39.339	38.351	74.00	54.00	Pass

Figure Channel 11: Vertical



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

Note: 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.

6. Occupied Bandwidth

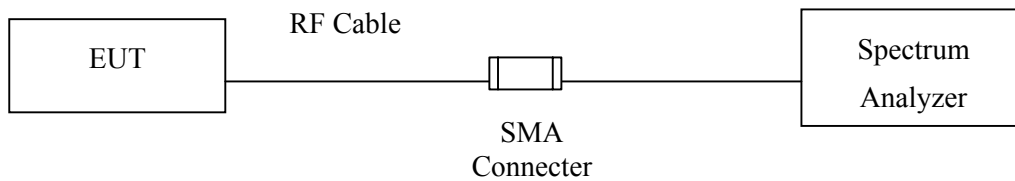
6.1. Test Equipment

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

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007

- 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

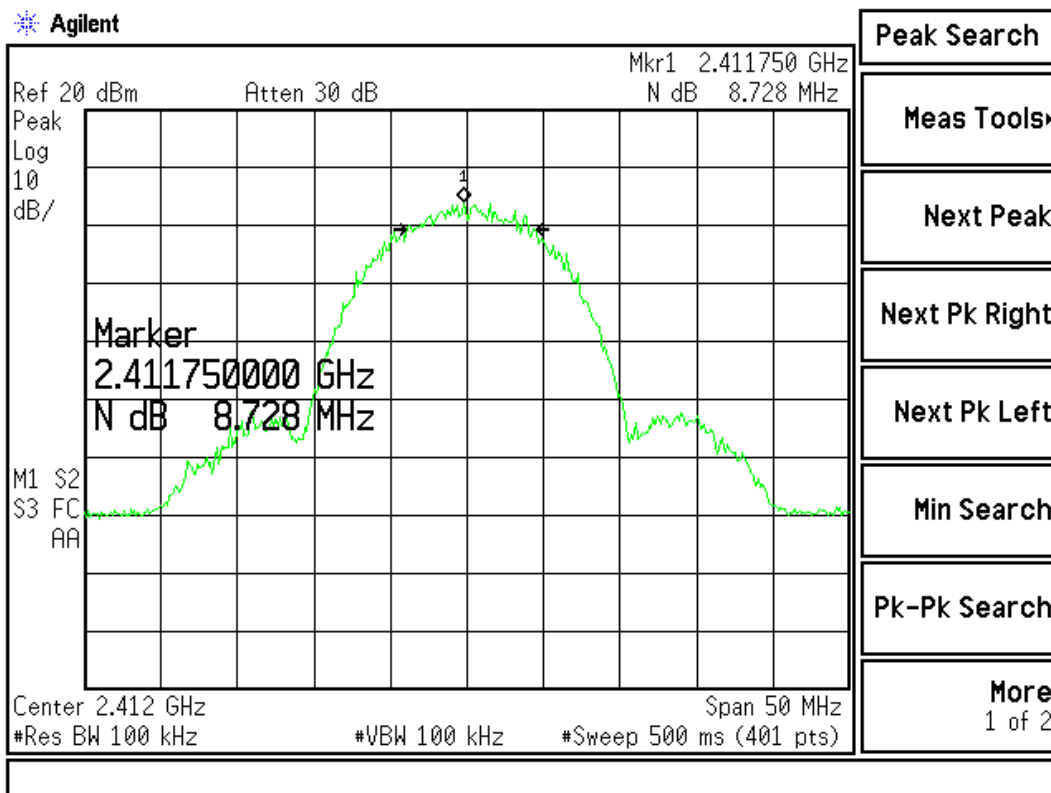
± 150Hz

6.5. Test Result of Occupied Bandwidth

Product : VoIP Wireless Router
 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	8728	>500	Pass

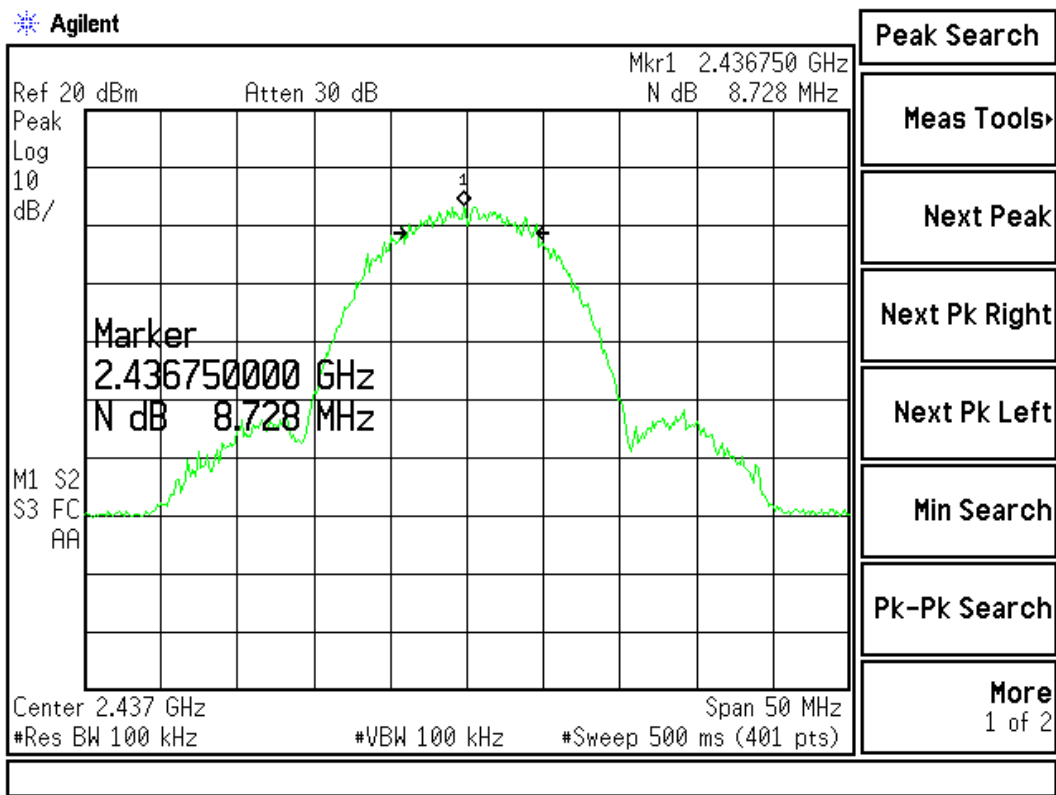
Figure Channel 1:



Product : VoIP Wireless Router
 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	8728	>500	Pass

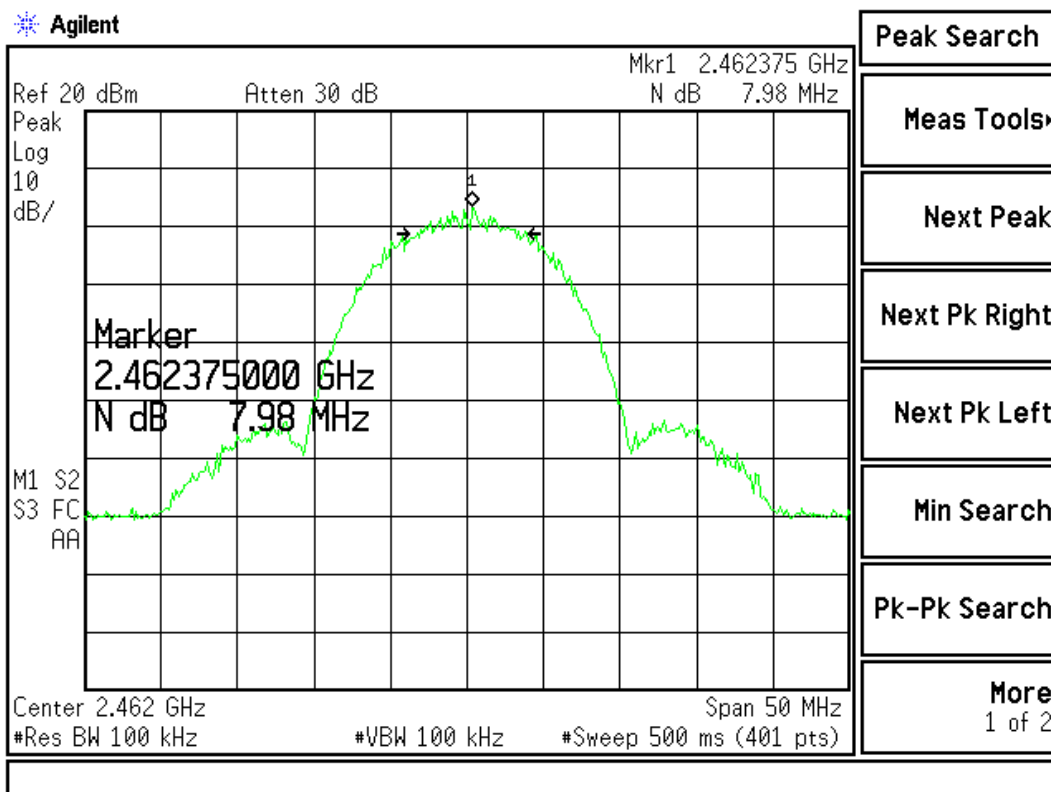
Figure Channel 6:



Product : VoIP Wireless Router
 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	7980	>500	Pass

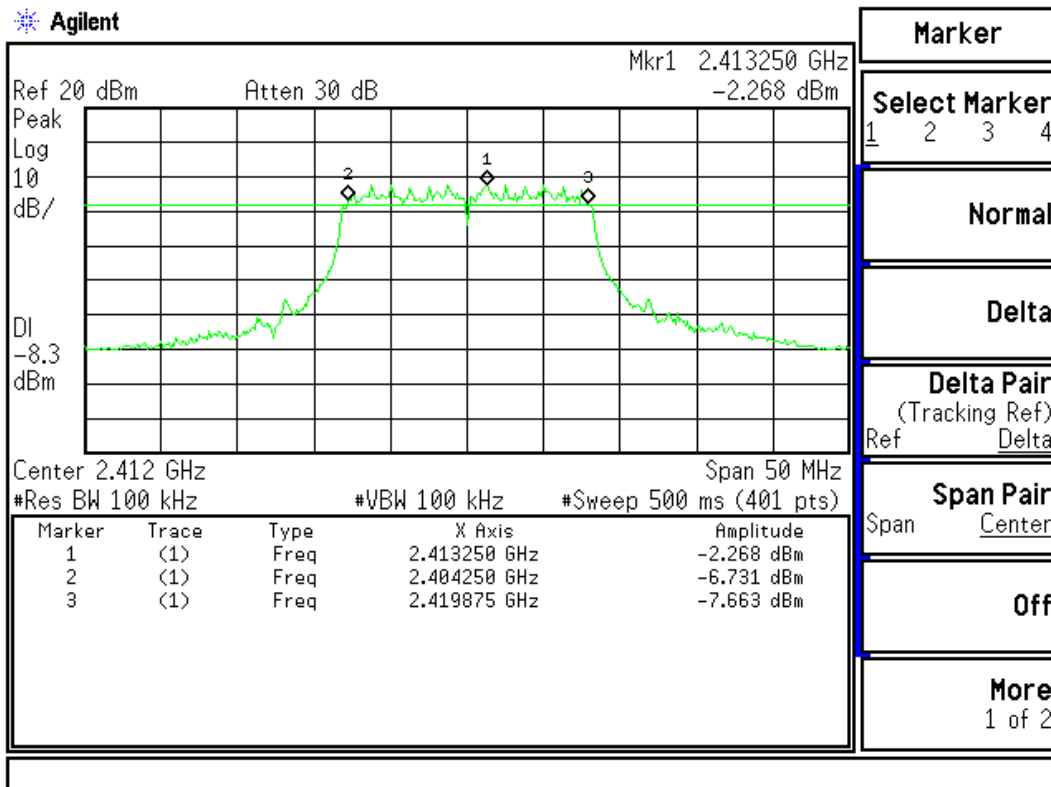
Figure Channel 11:



Product : VoIP Wireless Router
 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	15625	>500	Pass

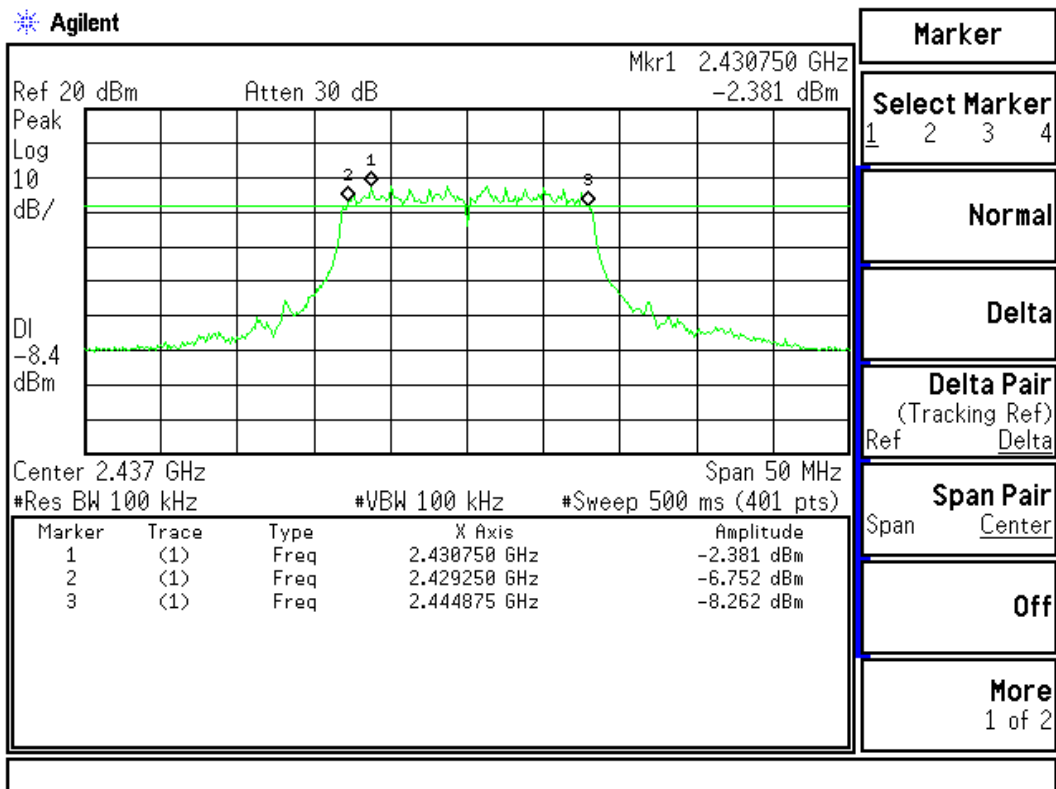
Figure Channel 1:



Product : VoIP Wireless Router
 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	15625	>500	Pass

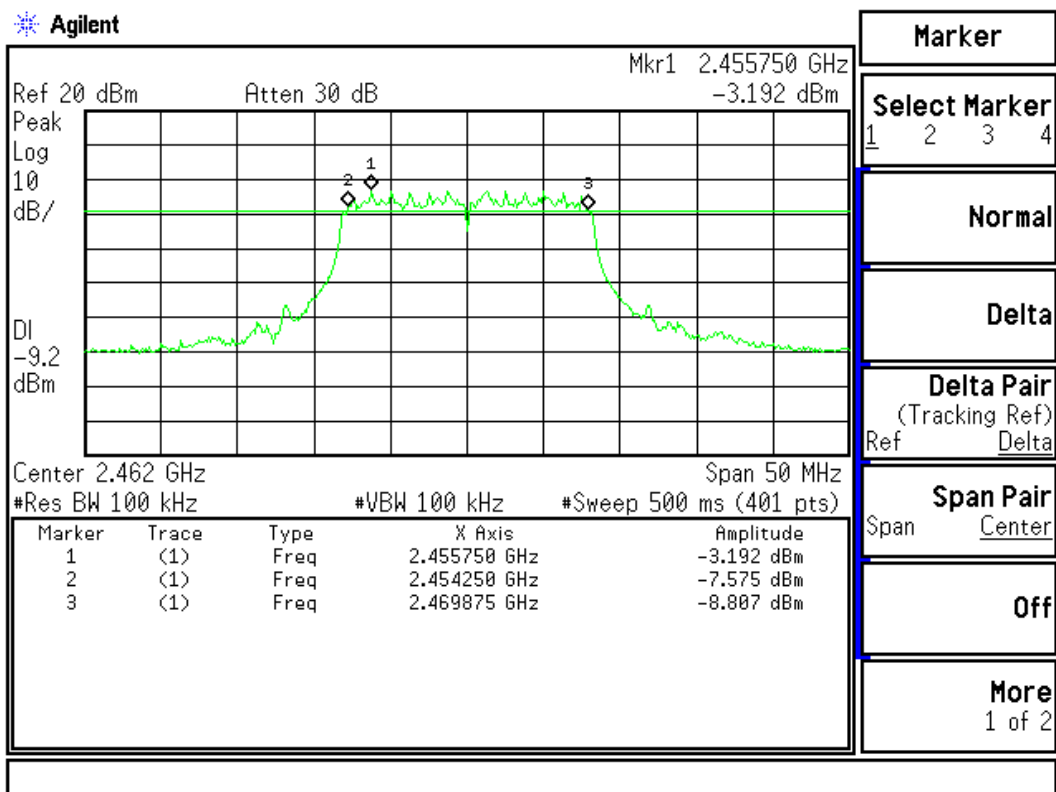
Figure Channel 6:



Product : VoIP Wireless Router
 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	15625	>500	Pass

Figure Channel 11:



7. Power Density

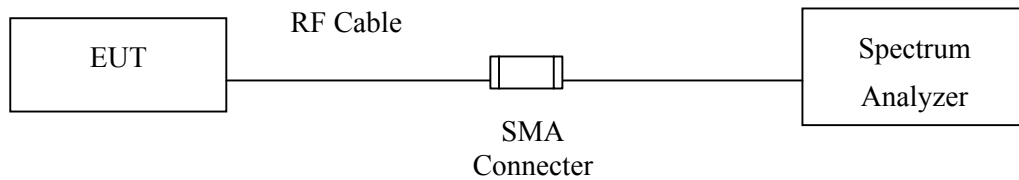
7.1. Test Equipment

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

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007

- 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

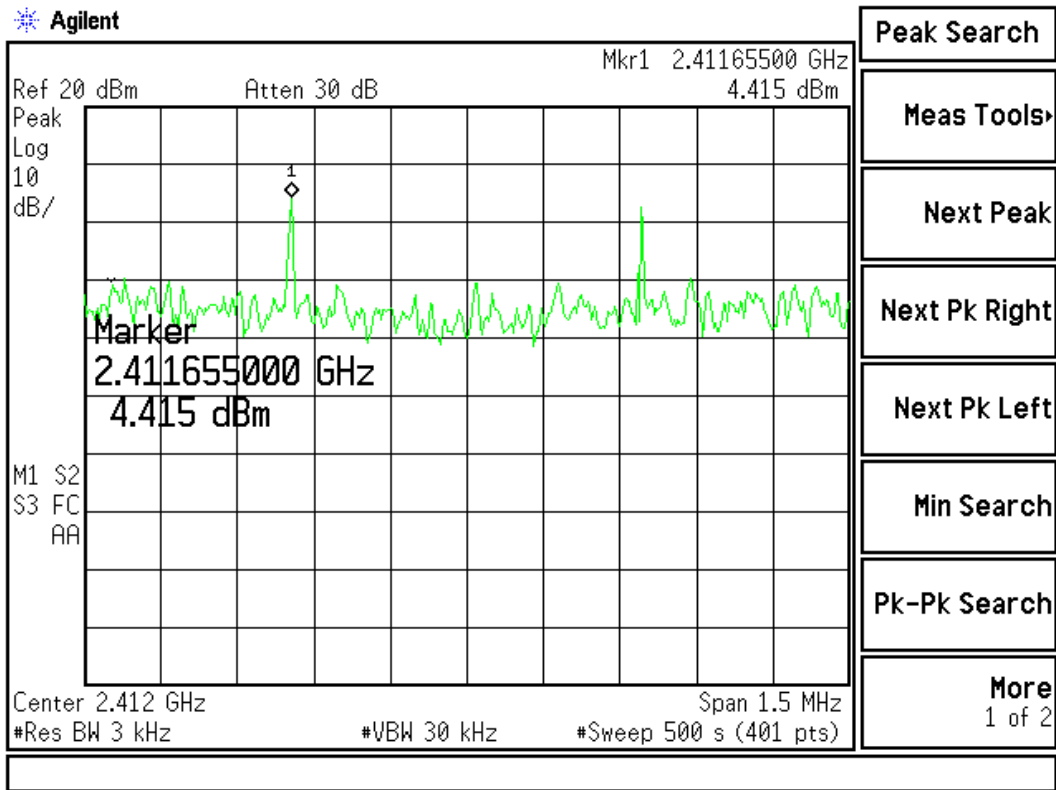
± 1.27 dB

7.5. Test Result of Power Density

Product : VoIP Wireless Router
 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	4.415	< 8dBm	Pass

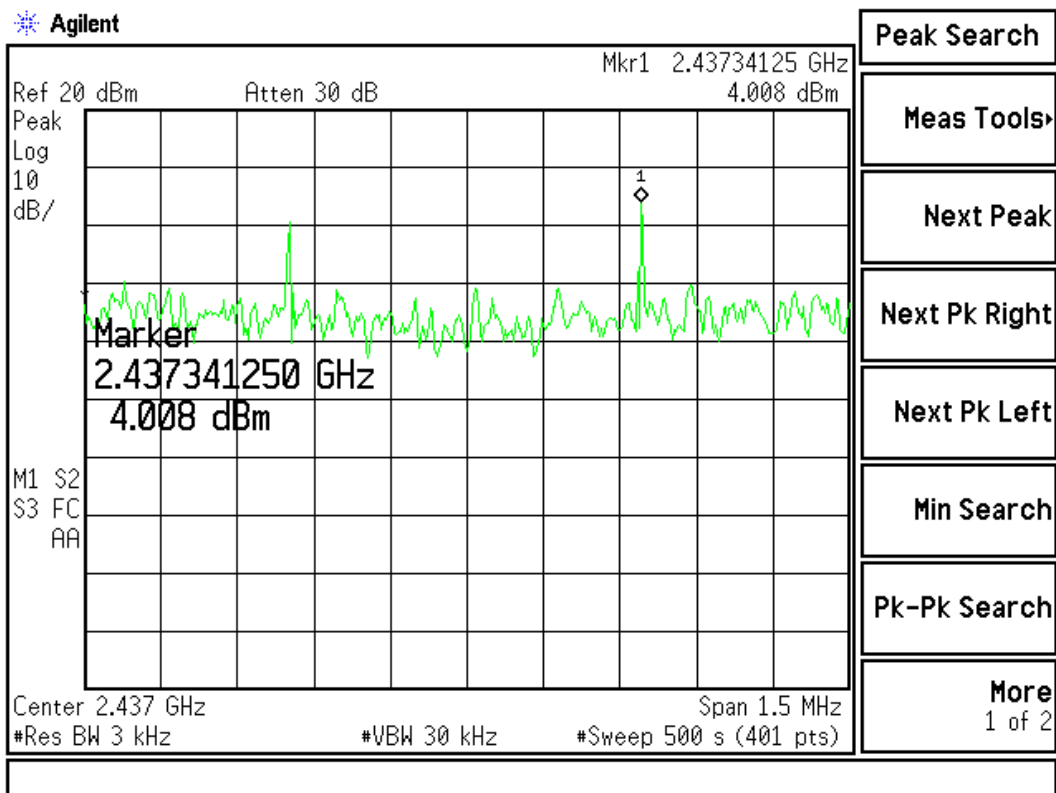
Figure Channel 1: 11Mbps



Product : VoIP Wireless Router
 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	4.008	< 8dBm	Pass

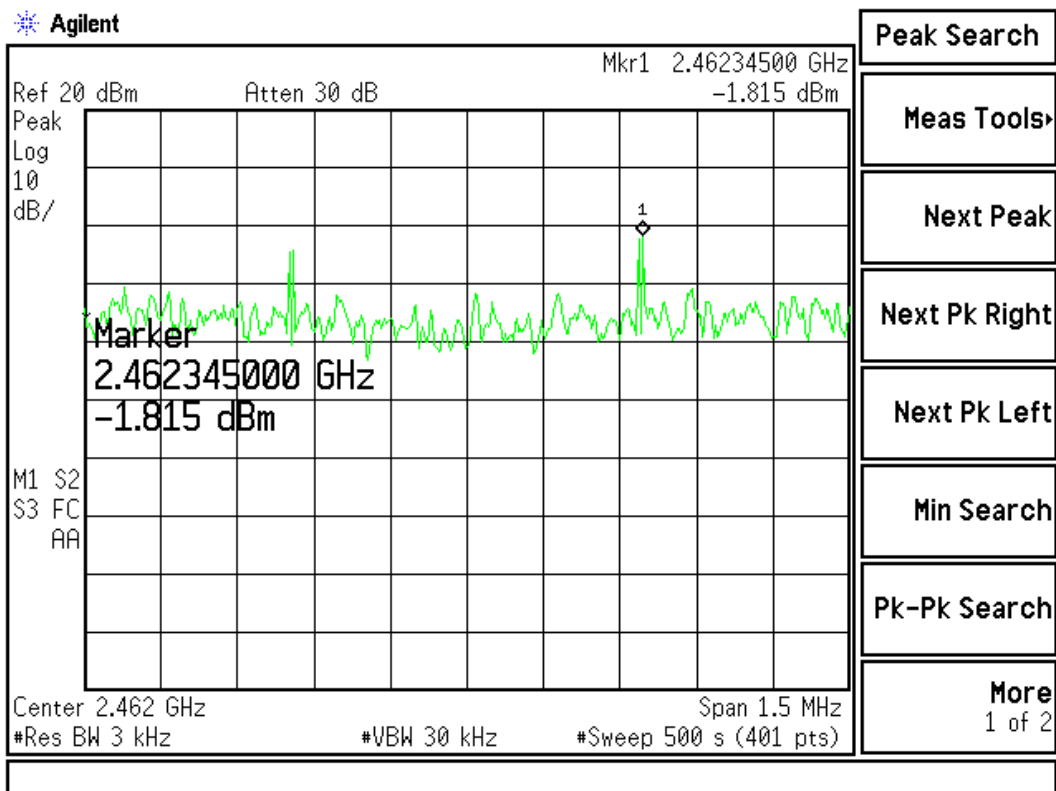
Figure Channel 6: 11Mbps



Product : VoIP Wireless Router
 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	-1.815	< 8dBm	Pass

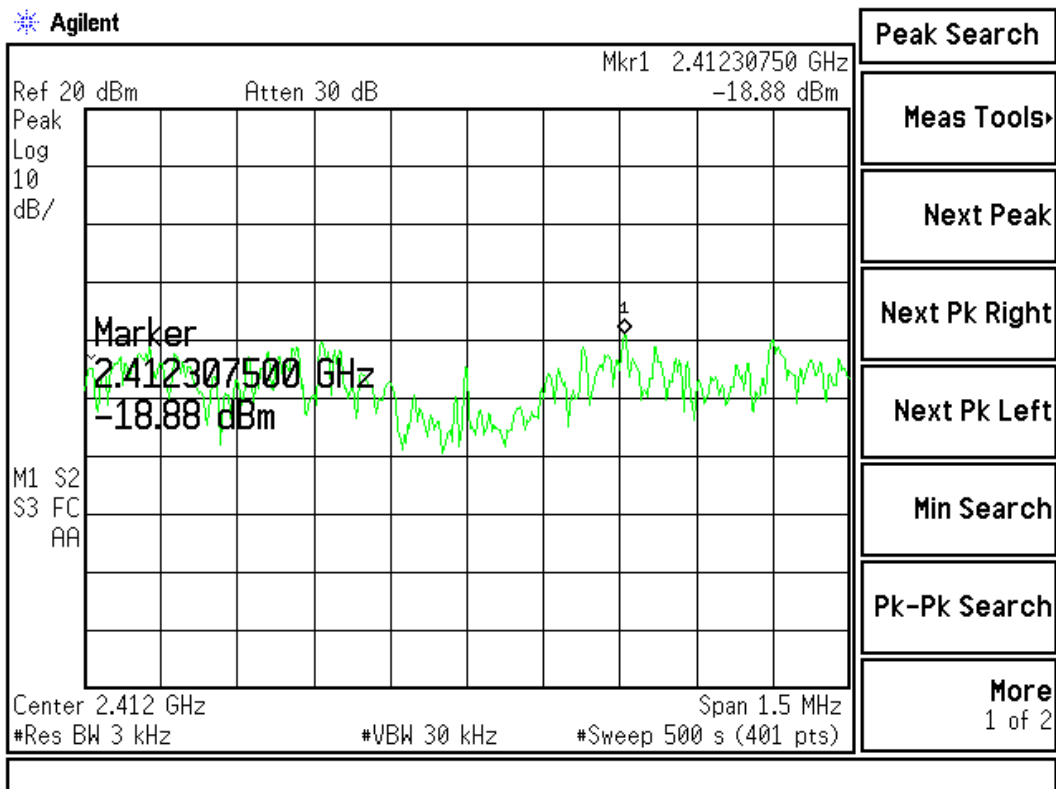
Figure Channel 11: 11Mbps



Product : VoIP Wireless Router
 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	-18.88	< 8dBm	Pass

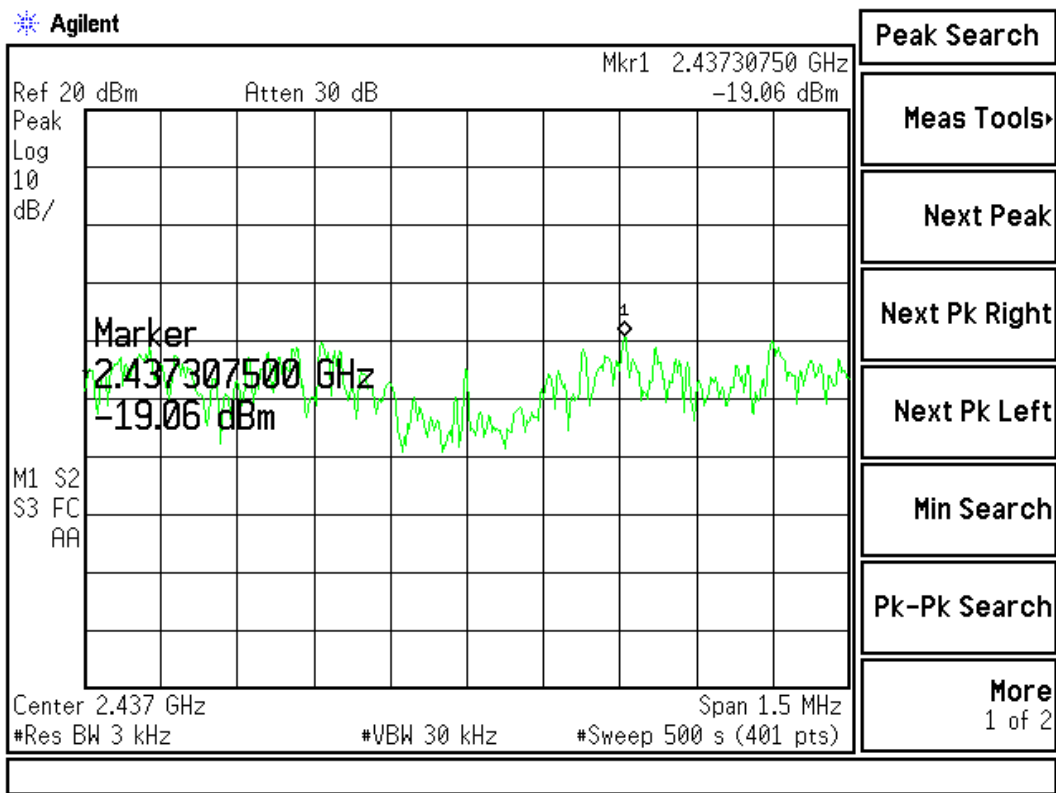
Figure Channel 1:



Product : VoIP Wireless Router
 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	-19.06	< 8dBm	Pass

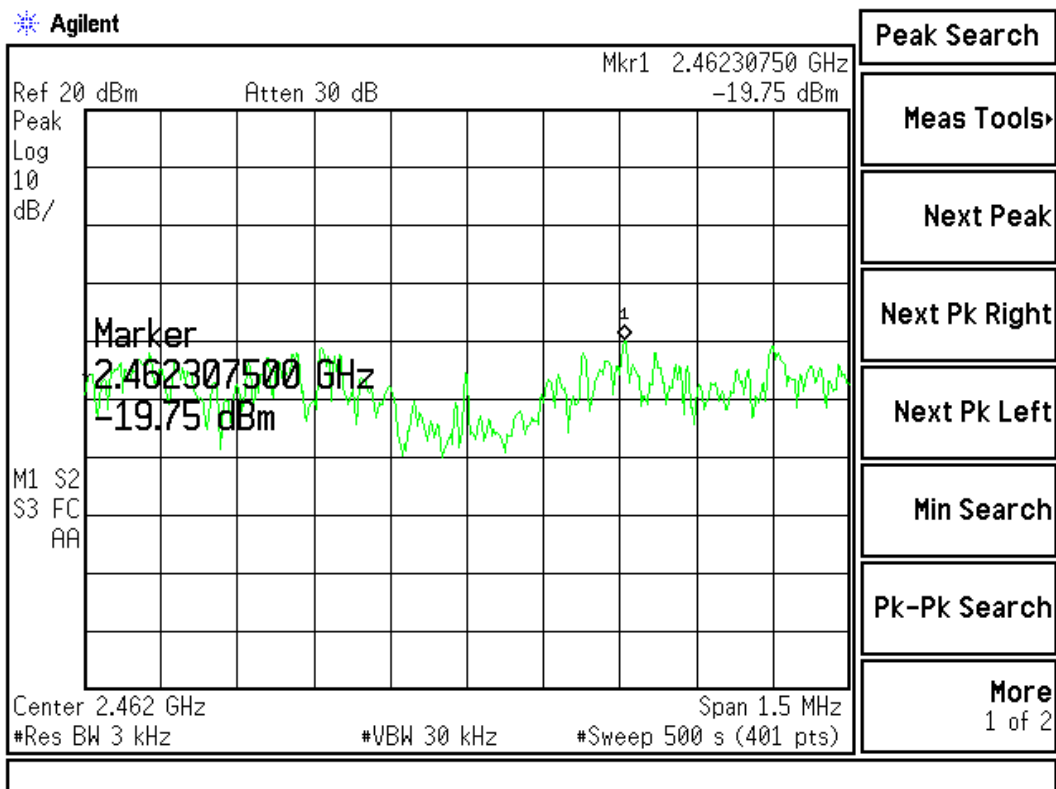
Figure Channel 6:



Product : VoIP Wireless Router
 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	-19.75	< 8dBm	Pass

Figure Channel 11:



8. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs