



Test Report

Product Name	Voice Commander
Model No.	VC01
FCC ID	WEA-VC02

Applicant	The Navvo Group,LLC
Address	6553 City West Pkwy Eden Prairie, MN 55344 USA

Date of Receipt	June. 05, 2008
Issued Date	June. 16, 2008
Report No.	086175R-RFUSP05V01
Version	V1.0

The test results relate only to the samples tested.

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Test Report Certification

Issued Date: June. 16, 2008

Report No.: 086175R-RFUSP05V01



Accredited by NIST (NVLAP)

NVLAP Lab Code: 200533-0

Product Name	Voice Commander
Applicant	The Navvo Group, LLC
Address	6553 City West Pkwy Eden Prairie, MN 55344 USA
Manufacturer	Lite-On TECHNOLOGY CORP.
Model No.	VC01
Rated Voltage	AC 120V/60Hz
Working Voltage	DC 5V
Trade Name	VOCO
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2007 ANSI C63.4: 2003
Test Result	Complied

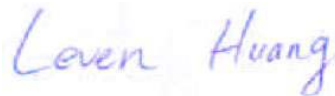


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Documented By :



(Adm. Specialist / Leven Huang)



Tested By :



(Engineer / Tim Sung)

Approved By :



(Deputy Manager / Vincent Lin)



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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Voice Commander
Trade Name	VOCO
Model No.	VC01
FCC ID	WEA-VC02
Frequency Range	802.11b/g: 2412-2462MHz
Channel Number	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	802.11b:DSSS DBPSK, DQPSK, CCK 802.11g: OFDM BPSK, QPSK, 16QAM, 64QAM
Antenna Type	Chip
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto
Power Adapter	MFR: GRE, M/N: SPS-01C5-0.5-US Input: AC 100-240V,50/60Hz,0.3A Output: DC 5V, 0.5A Cable Out: Non-Shielded,2.1m, with one ferrite core bonded.

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	ACX	AT3216-B2R7HAAT	0.5dBi in 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 an Voice Commander 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 1Mbps and 802.11g is 6Mbps)
4. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247 for direct sequence spread spectrum devices.

1.2. Operational Description

The EUT is a Voice Commander with 11 channels. This device provides four kinds of transmitting speed 1, 2, 5.5 and 11Mbps. The modulation of device is BPSK, QPSK and CCK (IEEE 802.11b) and eight kinds of transmitting speed 6, 9, 12, 18, 24, 36, 48 and 54Mbps are provided. The technology of this device used is OFDM (IEEE 802.11g).

The device adapts direct sequence spread spectrum modulation. The antenna provides diversity function to improve the receiving function.

This Voice Commander, compliant with IEEE 802.11b and IEEE 802.11g, is a high-efficiency Wireless LAN adapter. It allows your computer to connect to a wireless network and to share resources, such as files or printers without being bound to the network wires. Operation in 2.4GHz Direct Sequence Spread Spectrum (DSSS) radio transmission, the Voice Commander Wired Equivalent Protection (WEP) algorithm is used. In addition, its standard compliance ensures that it can communicate with any IEEE 802.11b and IEEE 802.11g network.

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

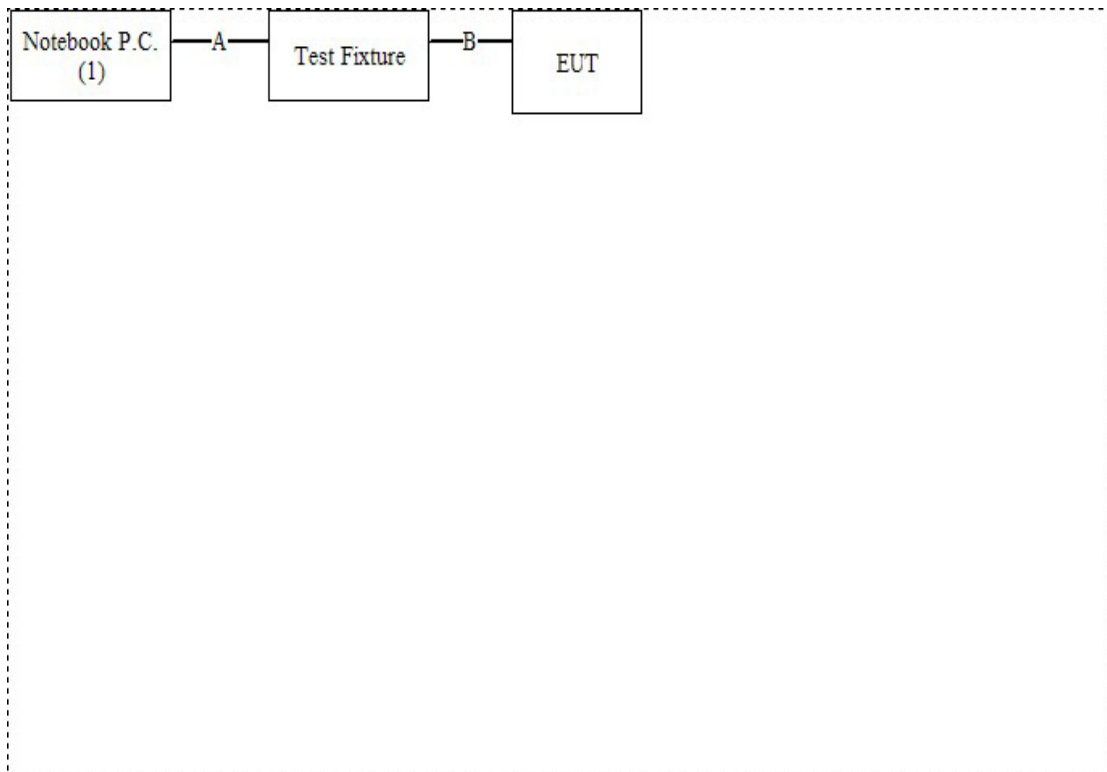
1.3. Tested System Details

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	PP18L	42649348672	DoC	Non-Shielded, 0.8m

	Signal Cable Type	Signal cable Description
A.	RS-232 Cable	Shielded,1.5m
B.	Controller Cable	Non-Shielded,0.3m

1.4. Configuration of Test System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) Execute “Radioscope V5.0” on the EUT.
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Press “OK” to start the continuous Transmit.
- (5) Verify that the EUT works properly.

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
Registration Number: 92195



Accreditation on NVLAP
NVLAP Lab Code: 200533-0



Site Name: Quietek Corporation

Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,
Lin-Kou Shiang, Taipei,
Taiwan, R.O.C.
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com

FCC Accreditation Number: TW1014



2. Conducted Emission

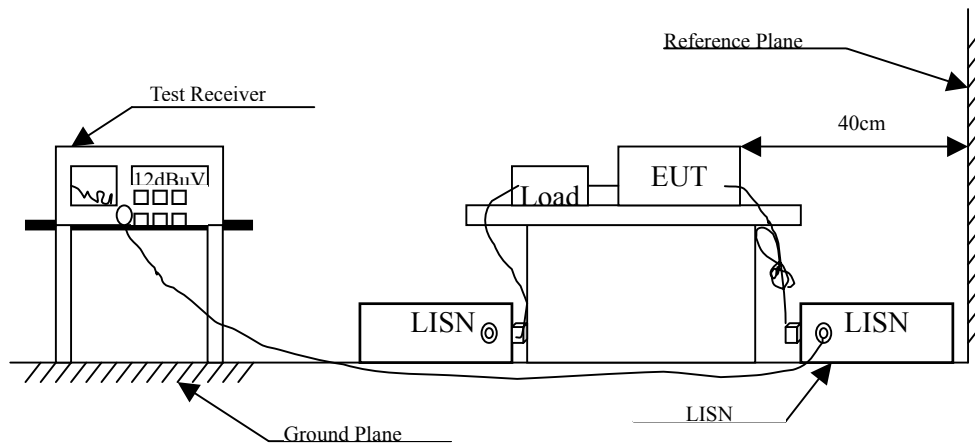
2.1. Test Equipment

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, 2008	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2008	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2008	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2008	
5	No.1 Shielded Room			N/A	

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	uV	dBuV
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 was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs.)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

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 : Voice Commander
 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					
0.166	0.556	46.740	47.296	-18.247	65.543
0.408	0.300	44.560	44.860	-13.769	58.629
1.357	0.324	48.000	48.324	-7.676	56.000
2.884	0.370	36.490	36.860	-19.140	56.000
5.404	0.450	34.910	35.360	-24.640	60.000
10.767	0.630	20.490	21.120	-38.880	60.000
Average					
0.166	0.556	34.690	35.246	-20.297	55.543
0.408	0.300	33.990	34.290	-14.339	48.629
1.357	0.324	31.510	31.834	-14.166	46.000
2.884	0.370	23.970	24.340	-21.660	46.000
5.404	0.450	23.500	23.950	-26.050	50.000
10.767	0.630	12.080	12.710	-37.290	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 : Voice Commander
 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					
0.158	0.300	46.920	47.220	-18.551	65.771
0.322	0.300	40.060	40.360	-20.726	61.086
0.447	0.310	40.690	41.000	-16.514	57.514
0.619	0.310	41.220	41.530	-14.470	56.000
1.330	0.330	43.100	43.430	-12.570	56.000
5.263	0.420	35.640	36.060	-23.940	60.000
Average					
0.158	0.300	32.870	33.170	-22.601	55.771
0.322	0.300	28.480	28.780	-22.306	51.086
0.447	0.310	29.330	29.640	-17.874	47.514
0.619	0.310	29.990	30.300	-15.700	46.000
1.330	0.330	25.950	26.280	-19.720	46.000
5.263	0.420	23.000	23.420	-26.580	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 : Voice Commander
 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					
0.166	0.556	50.520	51.076	-14.467	65.543
0.220	0.505	44.460	44.965	-19.035	64.000
0.431	0.300	43.370	43.670	-14.301	57.971
1.396	0.330	41.910	42.240	-13.760	56.000
2.193	0.350	35.880	36.230	-19.770	56.000
5.279	0.440	34.100	34.540	-25.460	60.000
Average					
0.166	0.556	37.360	37.916	-17.627	55.543
0.220	0.505	31.890	32.395	-21.605	54.000
0.431	0.300	32.120	32.420	-15.551	47.971
1.396	0.330	27.570	27.900	-18.100	46.000
2.193	0.350	25.140	25.490	-20.510	46.000
5.279	0.440	22.900	23.340	-26.660	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 : Voice Commander
 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					
0.150	0.300	50.490	50.790	-15.210	66.000
0.314	0.300	46.190	46.490	-14.824	61.314
0.771	0.320	35.160	35.480	-20.520	56.000
1.365	0.330	43.730	44.060	-11.940	56.000
3.580	0.390	34.020	34.410	-21.590	56.000
6.439	0.440	38.210	38.650	-21.350	60.000
Average					
0.150	0.300	34.040	34.340	-21.660	56.000
0.314	0.300	38.050	38.350	-12.964	51.314
0.771	0.320	22.720	23.040	-22.960	46.000
1.365	0.330	27.790	28.120	-17.880	46.000
3.580	0.390	20.560	20.950	-25.050	46.000
6.439	0.440	25.170	25.610	-24.390	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

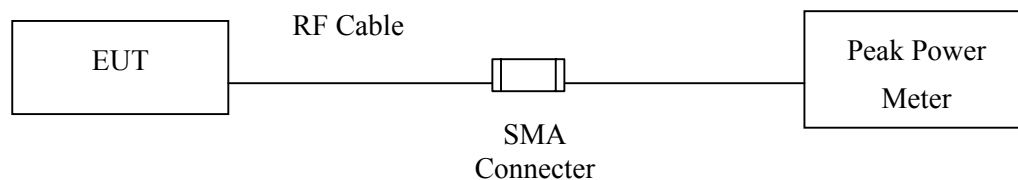
The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2008
X	Power Sensor	Anritsu	MA2491A/034457	May, 2008

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

3.2. Test Setup

Conducted Measurement



3.3. Test procedures

The EUT was tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

3.4. Limits

The maximum peak power shall be less 1 Watt.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

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

Cable loss=0.5dB		Peak Power Output Value (dBm)				
Channel No.	Frequency (MHz)	Data Rate				Required Limit
		1 Mbps	2Mbps	5.5Mbps	11Mbps	
1	2412.00	19.05	--	--	--	1Watt= 30 dBm
6	2437.00	19.03	18.95	18.93	18.84	1Watt= 30 dBm
11	2462.00	19.01	--	--	--	1Watt= 30 dBm

Note: Peak Power Output Value =Reading value on peak power meter + cable loss

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

Cable loss=0.5dB		Peak Power Output Value (dBm)								
Channel No.	Frequency (MHz)	Data Rate (Mbps)								Required Limit
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps	
1	2412.00	21.85	--	--	--	--	--	--	--	1 Watt= 30 dBm
6	2437.00	21.72	21.63	21.6	21.55	21.59	21.58	21.47	21.46	1 Watt= 30 dBm
11	2462.00	21.69	--	--	--	--	--	--	--	1 Watt= 30 dBm

Note: Peak Power Output Value =Reading value on peak power meter + cable loss

4. Radiated Emission

4.1. Test Equipment

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

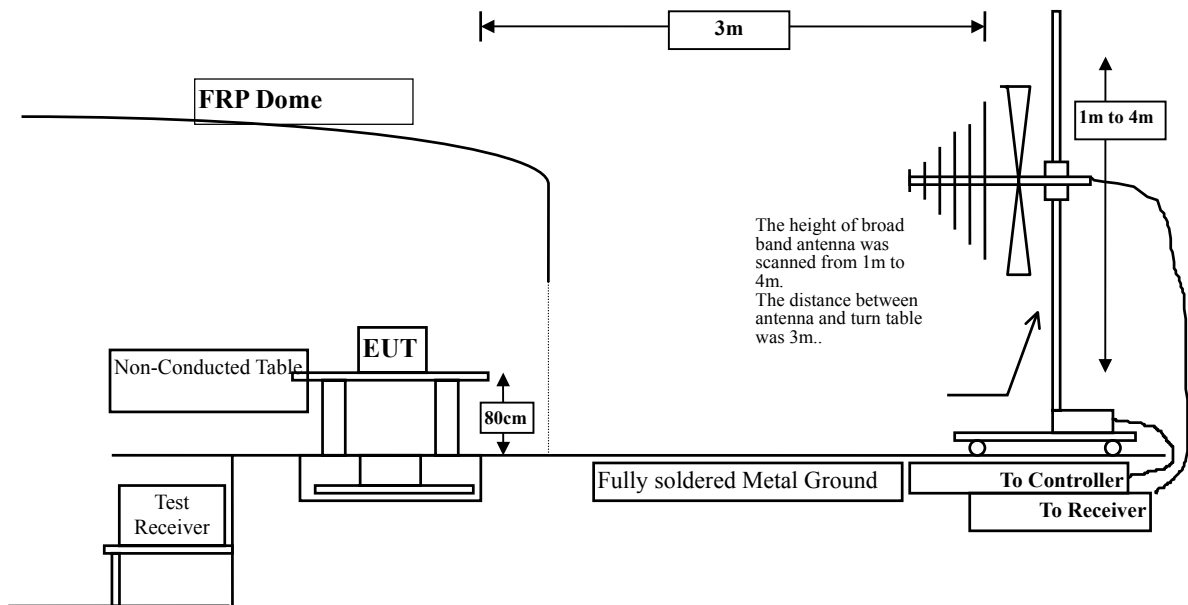
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 1		Test Receiver	R & S	ESCS 30 / 825442/14	May, 2008
		Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2008
		Pre-Amplifier	HP	8447D/3307A01812	May, 2008
		Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2007
		Horn Antenna	EM	EM6917 / 103325	May, 2008
Site # 2		Test Receiver	R & S	ESCS 30 / 825442/17	May, 2008
		Spectrum Analyzer	Advantest	R3261C / 71720609	May, 2008
		Pre-Amplifier	HP	8447D/3307A01814	May, 2008
		Bilog Antenna	Chase	CBL6112B / 2455	Sep., 2007
		Horn Antenna	EM	EM6917 / 103325	May, 2008
Site # 3	X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2008
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2008
	X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2008
	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, 2008
	X	Pre-Amplifier	HP	8449B / 3008A01123	July, 2007

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

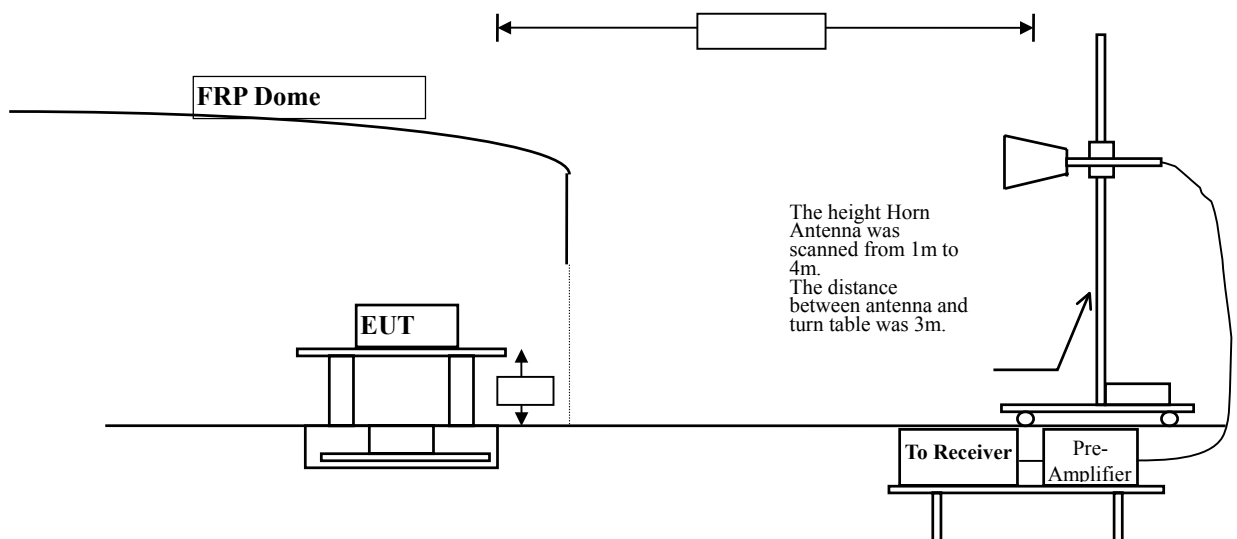
2. The test instruments marked with "X" are used to measure the final test results.

4.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



4.3. 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: E field strength (dBuV/m) = 20 log E field strength (uV/m)

4.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 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 is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.

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

Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB beamwidth of the antenna.

The worst radiated emission is measured on the Final Measurement.

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

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4824.000	5.362	43.880	49.241	-24.759	74.000
7236.000	11.867	41.940	53.807	-20.193	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4824.000	5.362	43.350	48.711	-25.289	74.000
7236.000	11.867	41.270	53.137	-20.863	74.000
Average					
Detector:					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Voice Commander
 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
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4874.000	5.465	43.690	49.156	-24.844	74.000
7311.000	12.030	41.290	53.320	-20.680	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4874.000	5.465	43.590	49.056	-24.944	74.000
7311.000	12.030	40.770	52.800	-21.200	74.000
Average					
Detector:					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Voice Commander
 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

Horizontal

Peak Detector:

4924.000	5.578	43.340	48.917	-25.083	74.000
7386.000	12.211	41.220	53.432	-20.568	74.000

Average

Detector:

--

Vertical

Peak Detector:

4924.000	5.578	43.020	48.597	-25.403	74.000
7386.000	12.211	41.010	53.222	-20.778	74.000

Average

Detector:

--

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Voice Commander
 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:

4824.000	5.362	43.550	48.911	-25.089	74.000
7236.000	11.867	41.310	53.177	-20.823	74.000

Average

Detector:

--

Vertical

Peak Detector:

4824.000	5.362	43.680	49.041	-24.959	74.000
7236.000	11.867	41.030	52.897	-21.103	74.000

Average

Detector:

--

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Voice Commander
 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	43.110	48.576	-25.424	74.000
7311.000	12.030	41.070	53.100	-20.900	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4874.000	5.465	43.560	49.026	-24.974	74.000
7311.000	12.030	40.860	52.890	-21.110	74.000
Average					
Detector:					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Voice Commander
 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:

4924.000	5.578	43.200	48.777	-25.223	74.000
7386.000	12.211	41.120	53.332	-20.668	74.000

Average

Detector:

--

Vertical

Peak Detector:

4924.000	5.578	42.120	47.697	-26.303	74.000
7386.000	12.211	40.580	52.792	-21.208	74.000

Average

Detector:

--

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Voice Commander
 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					
228.277	-9.796	43.367	33.571	-12.429	46.000
304.088	-7.546	43.736	36.190	-9.810	46.000
432.385	-1.085	31.219	30.134	-15.866	46.000
506.253	-0.257	36.884	36.627	-9.373	46.000
632.605	4.096	26.677	30.774	-15.226	46.000
912.525	4.317	29.363	33.681	-12.319	46.000
Vertical					
304.088	-8.800	43.707	34.907	-11.093	46.000
432.385	-2.005	33.509	31.504	-14.496	46.000
506.253	-1.646	36.182	34.535	-11.465	46.000
632.605	1.281	23.695	24.976	-21.024	46.000
751.182	1.998	27.584	29.582	-16.418	46.000
1000.000	6.120	35.015	41.135	-12.865	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Voice Commander
 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					
304.088	-7.546	41.149	33.603	-12.397	46.000
432.385	-1.085	32.181	31.096	-14.904	46.000
506.253	-0.257	38.394	38.137	-7.863	46.000
632.605	4.096	29.263	33.360	-12.640	46.000
749.238	3.752	23.497	27.248	-18.752	46.000
912.525	4.317	31.536	35.854	-10.146	46.000
Vertical					
304.088	-8.800	43.809	35.009	-10.991	46.000
432.385	-2.005	33.715	31.710	-14.290	46.000
506.253	-1.646	37.373	35.726	-10.274	46.000
630.661	1.254	26.884	28.139	-17.861	46.000
751.182	1.998	32.021	34.019	-11.981	46.000
912.525	5.399	26.340	31.740	-14.260	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

5. RF antenna conducted test

5.1. Test Equipment

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

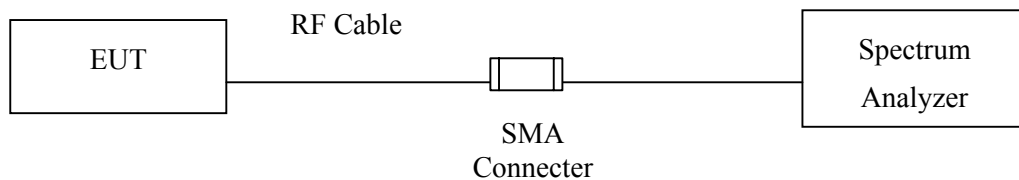
Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2008
X Spectrum Analyzer	Agilent	N9010A / MY48030495	April, 2008

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

2. The test instruments marked with “X” are used to measure the final test results.

5.2. Test Setup

RF antenna Conducted 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 was tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

5.5. Uncertainty

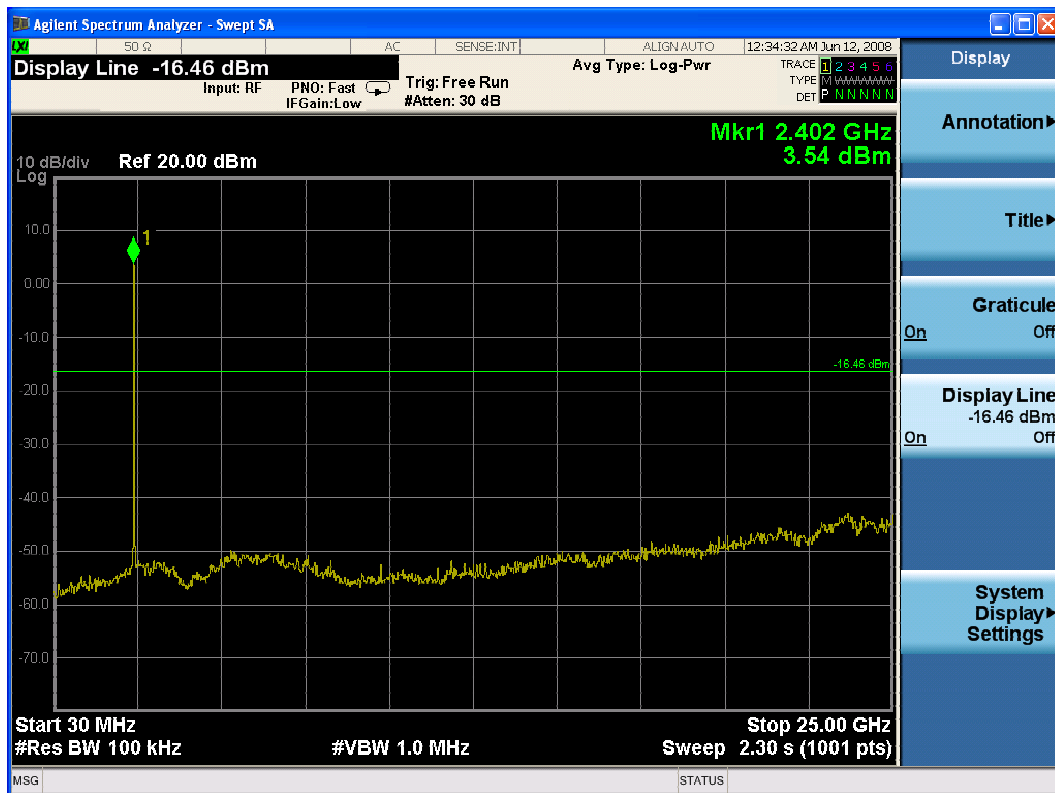
The measurement uncertainty

Conducted is defined as $\pm 1.27\text{dB}$

5.6. Test Result of RF antenna conducted test

Product : Voice Commander
 Test Item : RF antenna conducted test
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

Channel 01 (2412MHz)



Channel 06 (2437MHz)



Channel 11 (2462MHz)



Product : Voice Commander
 Test Item : RF Antenna Conducted Spurious
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

Channel 01 (2412MHz)



Channel 06 (2437MHz)



Channel 11 (2462MHz)



6. Radiated Emission Band Edge

6.1. Test Equipment

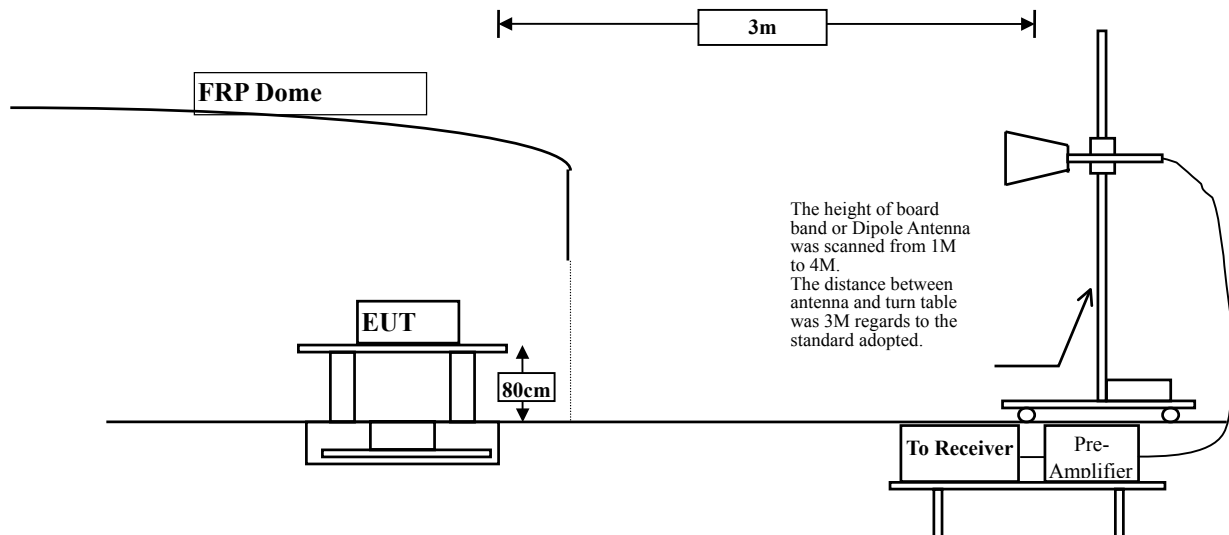
The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2008
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2008
X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2008
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, 2008
X	Pre-Amplifier	HP	8449B / 3008A01123	July, 2007

- Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with "X" are used to measure the final test results.

6.2. Test Setup

RF Radiated Measurement:



6.3. 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.

6.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 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 is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.

6.5. Uncertainty

± 3.9 dB above 1GHz

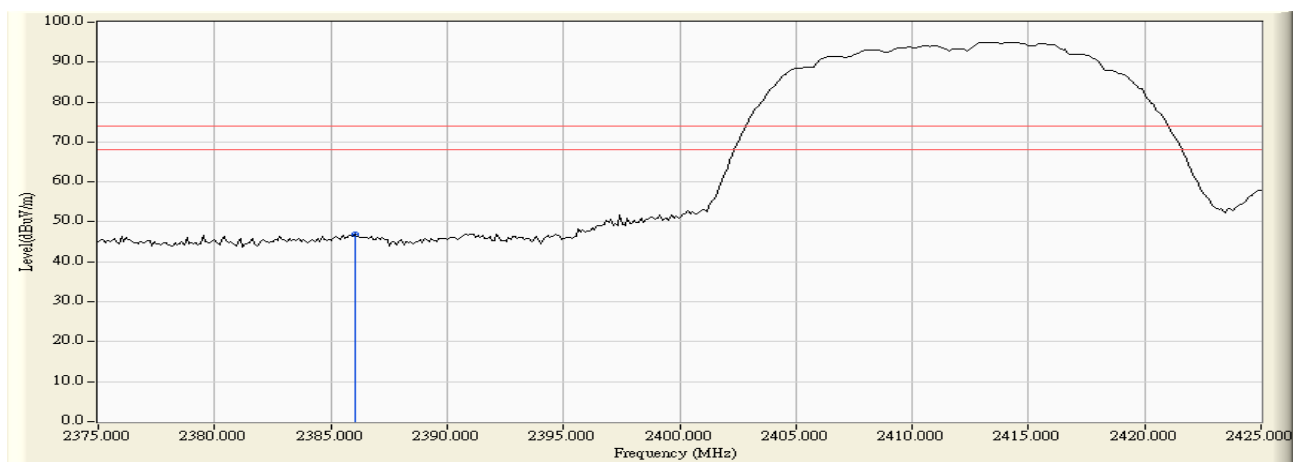
6.6. Test Result of Band Edge

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

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)	2386.022	-2.055	49.028	46.973	74.00	54.00	Pass

Figure Channel 1: Horizontal (Peak)



Note:

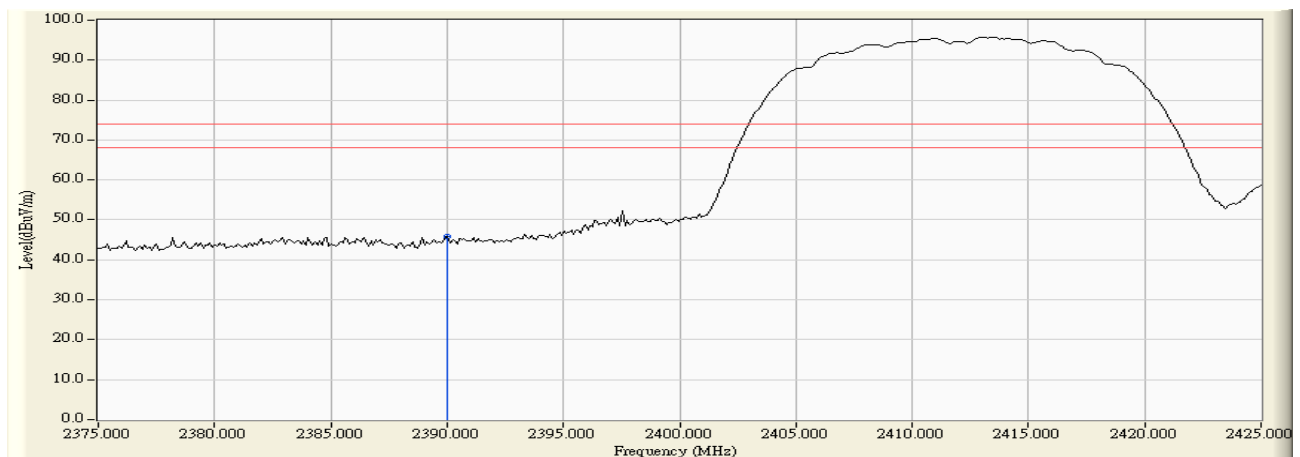
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

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

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)	2390.000	-2.039	47.779	45.740	74.00	54.00	Pass

Figure Channel 1: Vertical (Peak)



Note:

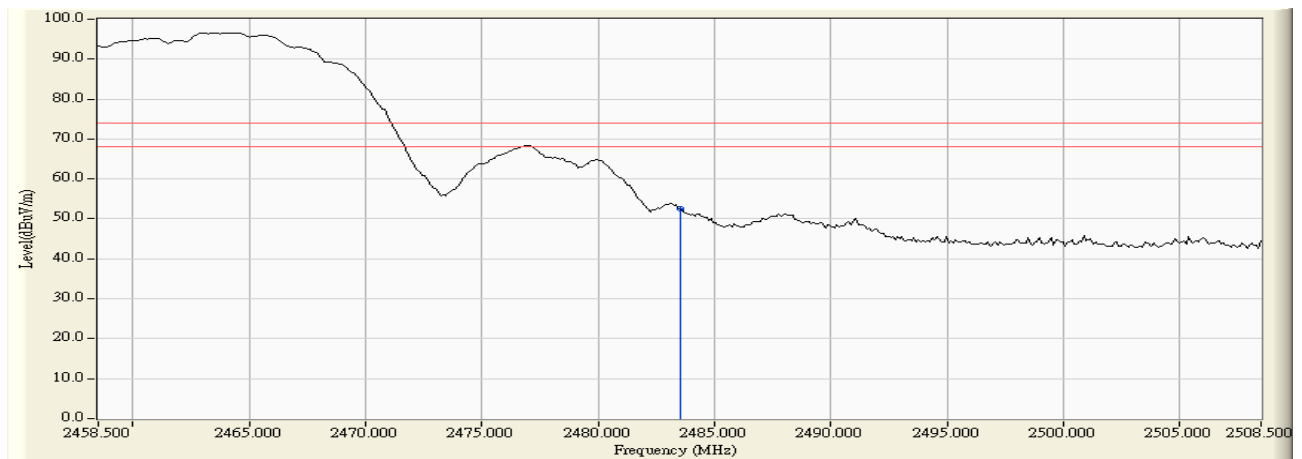
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

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

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)	2483.500	-1.612	54.143	52.530	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

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

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)	2483.500	-1.612	56.176	54.563	74.00	54.00	Pass
11(Average)	2483.500	-1.612	49.109	47.496	74.00	54.00	Pass

Figure Channel 11: Vertical (Peak)

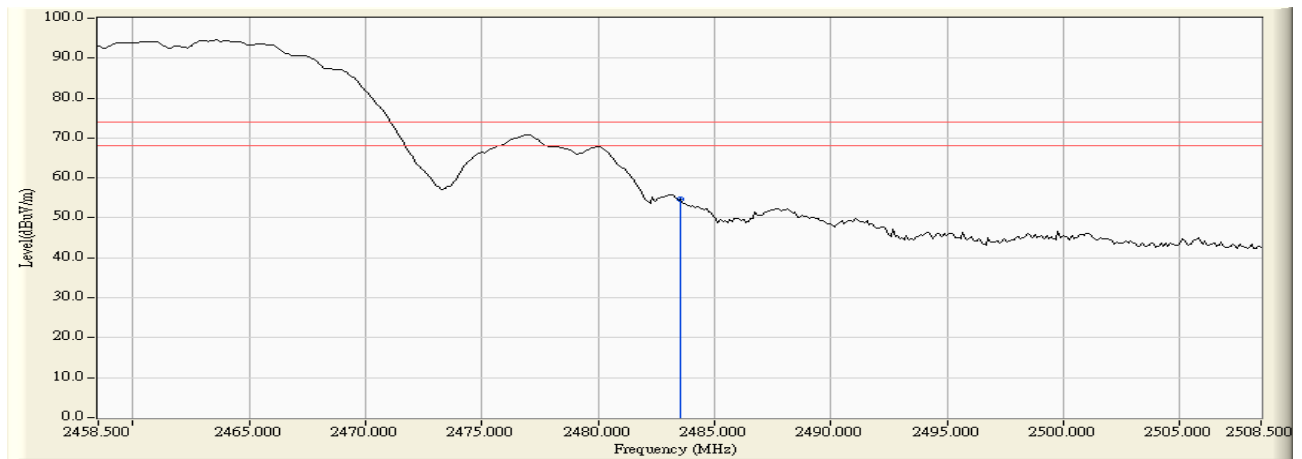


Figure Channel 11: Vertical (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

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

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)	2389.729	-2.039	68.947	66.907	74.00	54.00	Pass
1 (Average)	2389.729	-2.039	42.391	40.351	74.00	54.00	Pass

Figure Channel 1: Horizontal (Peak)

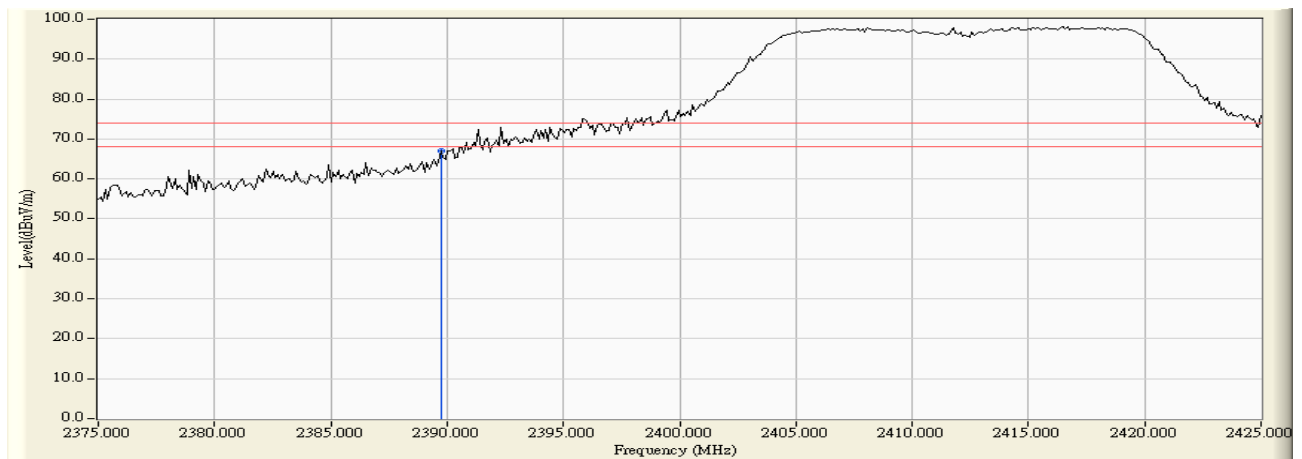
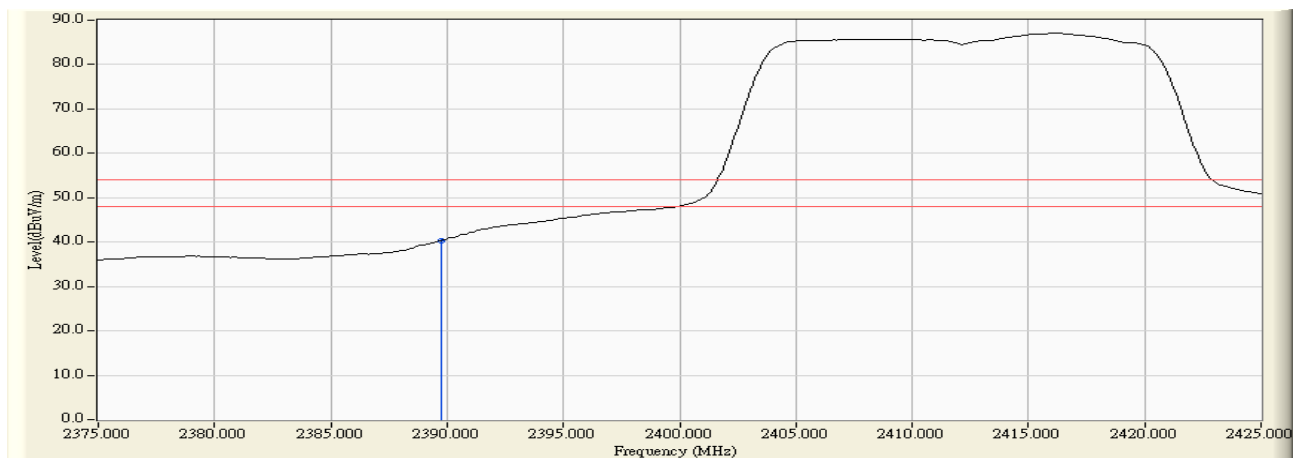


Figure Channel 1: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

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

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)	2389.028	-2.043	63.528	61.486	74.00	54.00	Pass
1 (Average)	2389.028	-2.043	38.590	36.548	74.00	54.00	Pass

Figure Channel 1: Vertical (Peak)

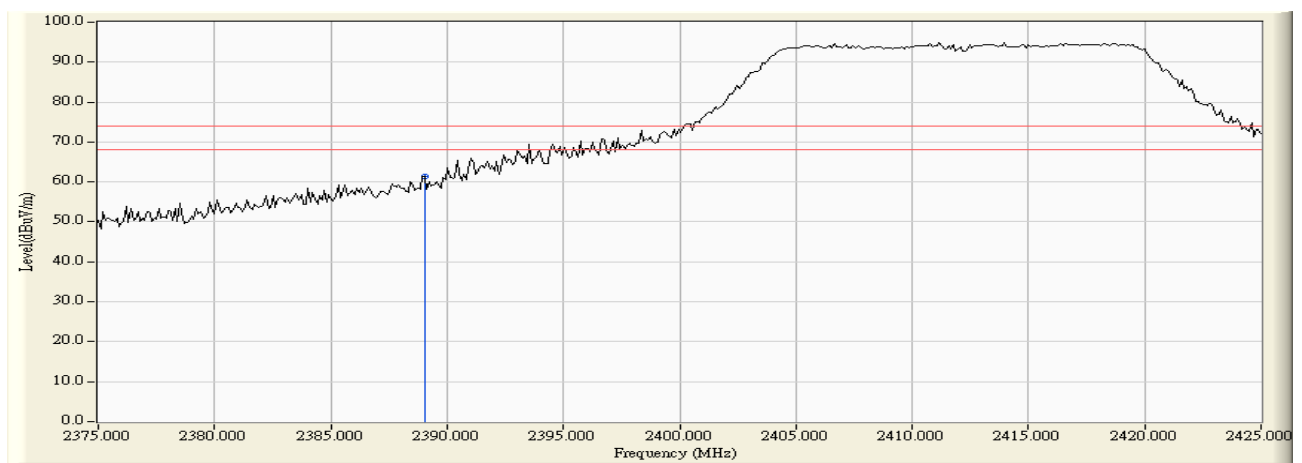
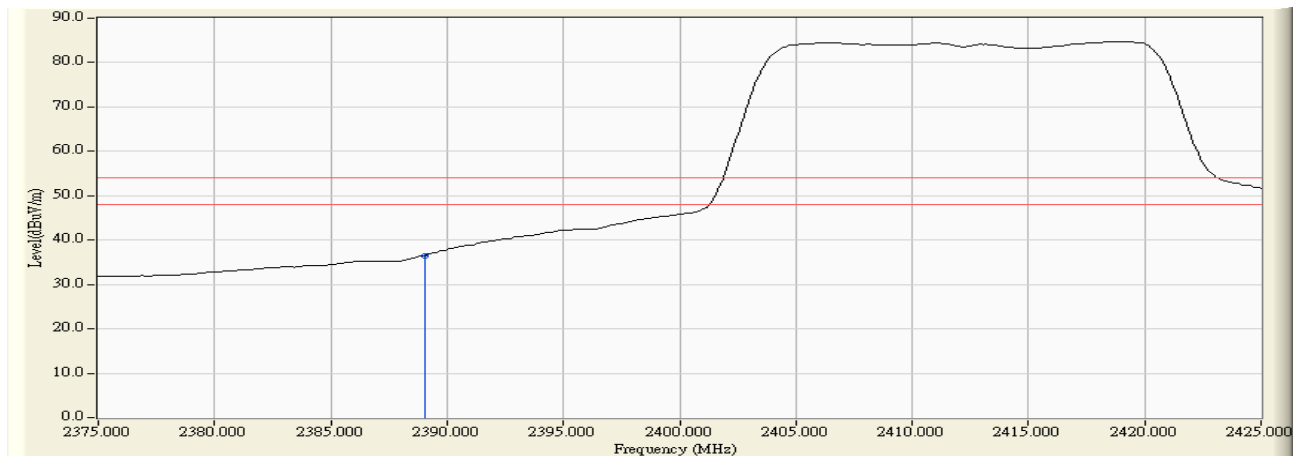


Figure Channel 1: Vertical (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

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

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)	2483.500	-1.612	69.777	68.164	74.00	54.00	Pass
11(Average)	2483.500	-1.612	47.437	45.824	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

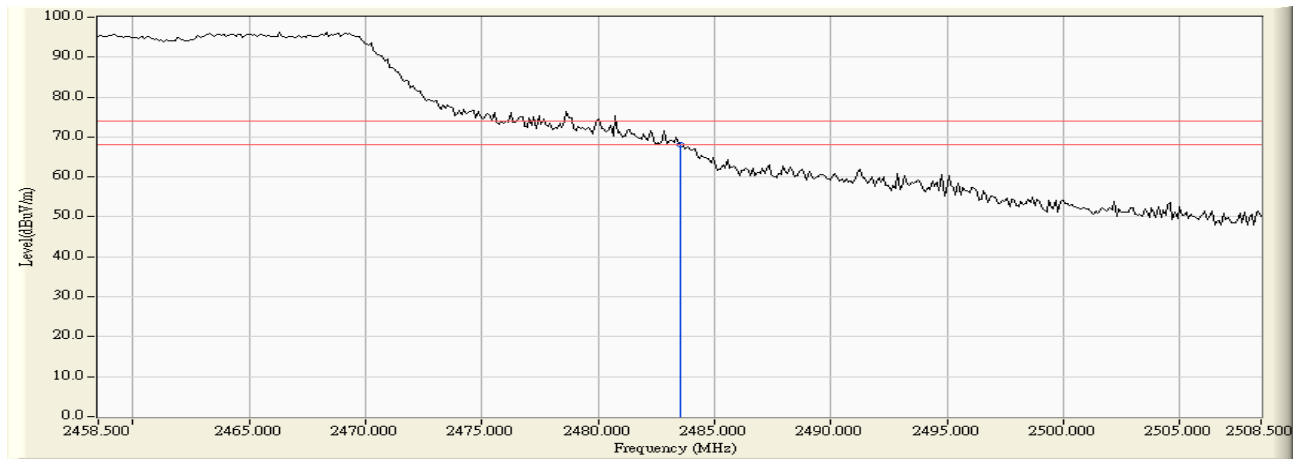
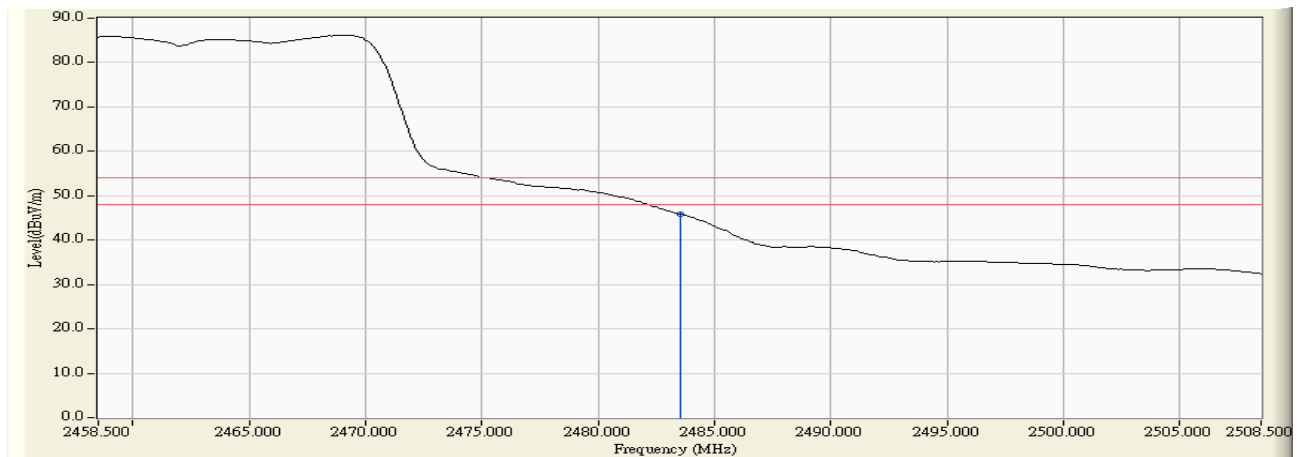


Figure Channel 11: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

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

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)	2483.500	-1.612	68.329	66.716	74.00	54.00	Pass
11(Average)	2483.500	-1.612	45.306	43.693	74.00	54.00	Pass

Figure Channel 11: Vertical (Peak)

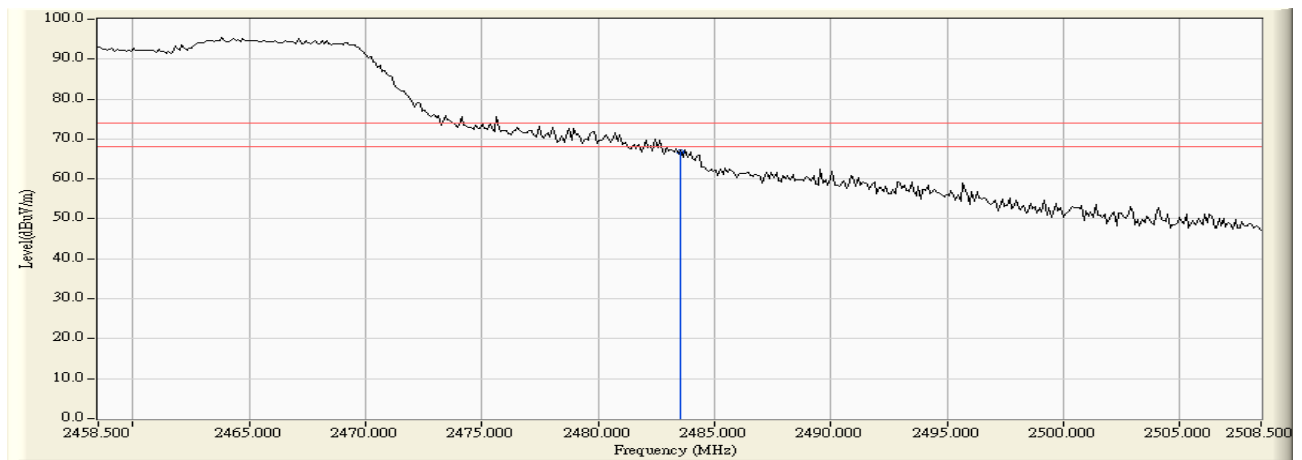
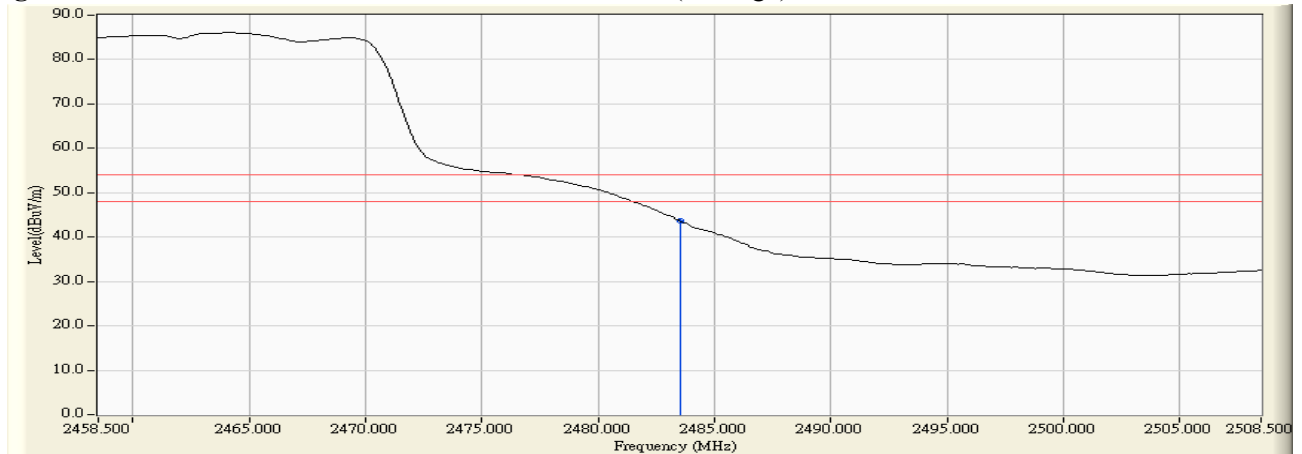


Figure Channel 11: Vertical (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

7. Occupied Bandwidth

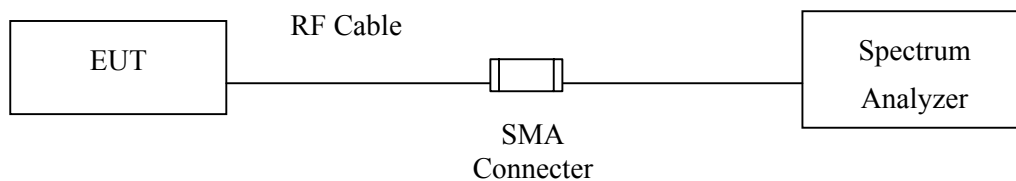
7.1. Test Equipment

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

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2008
Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2008
X Spectrum Analyzer	Agilent	N9010A / MY48030495	April, 2008

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “X” are used to measure the final test results.

7.2. Test Setup



7.3. Test Procedures

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Span greater than RBW.

7.4. Limits

The 6 dB bandwidth must be greater than 500 kHz.

7.5. Uncertainty

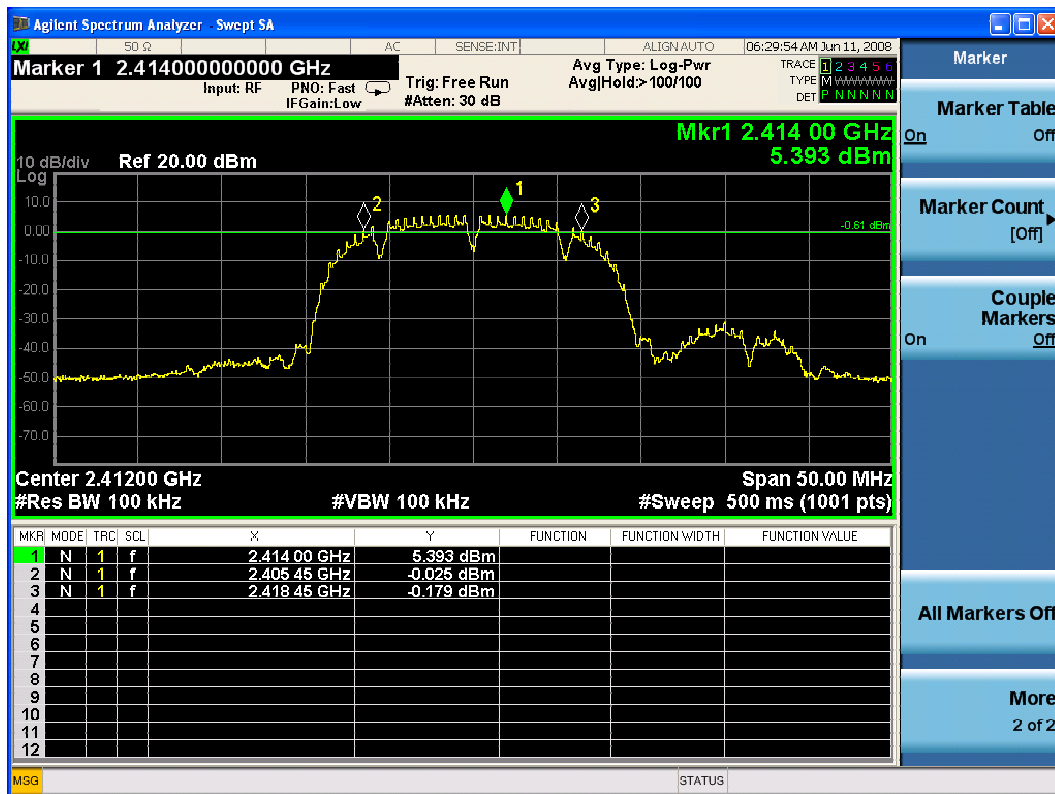
± 150Hz

7.6. Test Result of Occupied Bandwidth

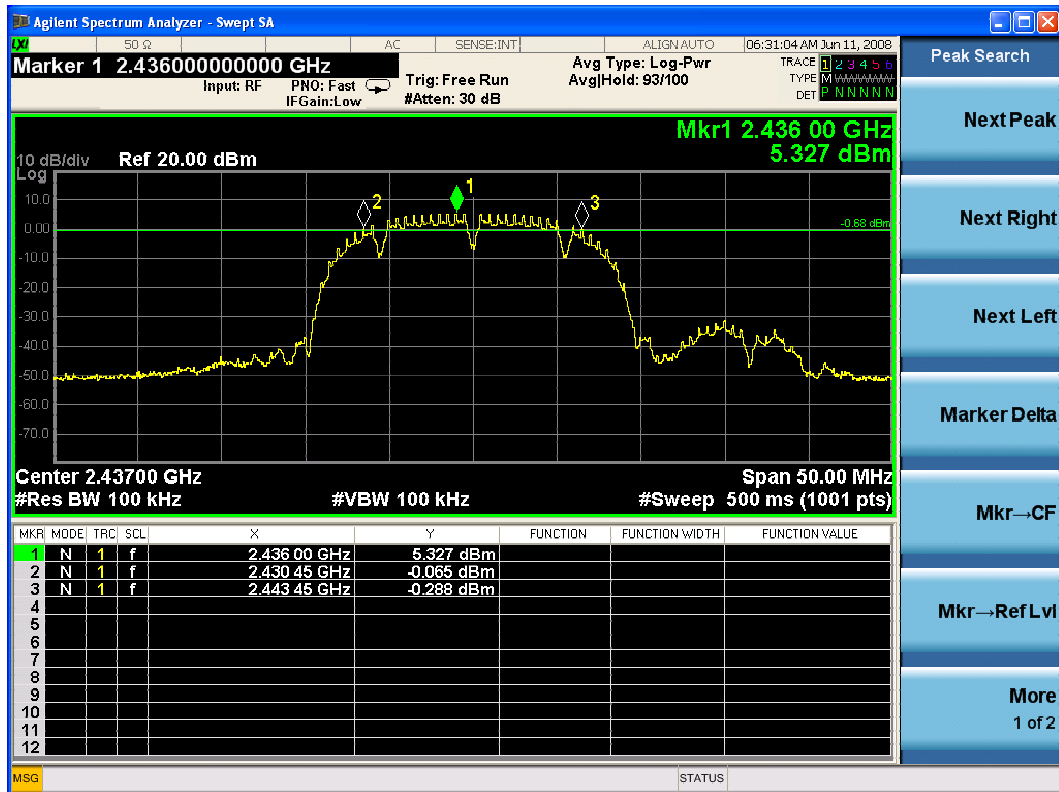
Product : Voice Commander
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1 (1Mbps)	2412.00	13000	>500	Pass
6 (1Mbps)	2437.00	13000	>500	Pass
11 (1Mbps)	2462.00	13000	>500	Pass

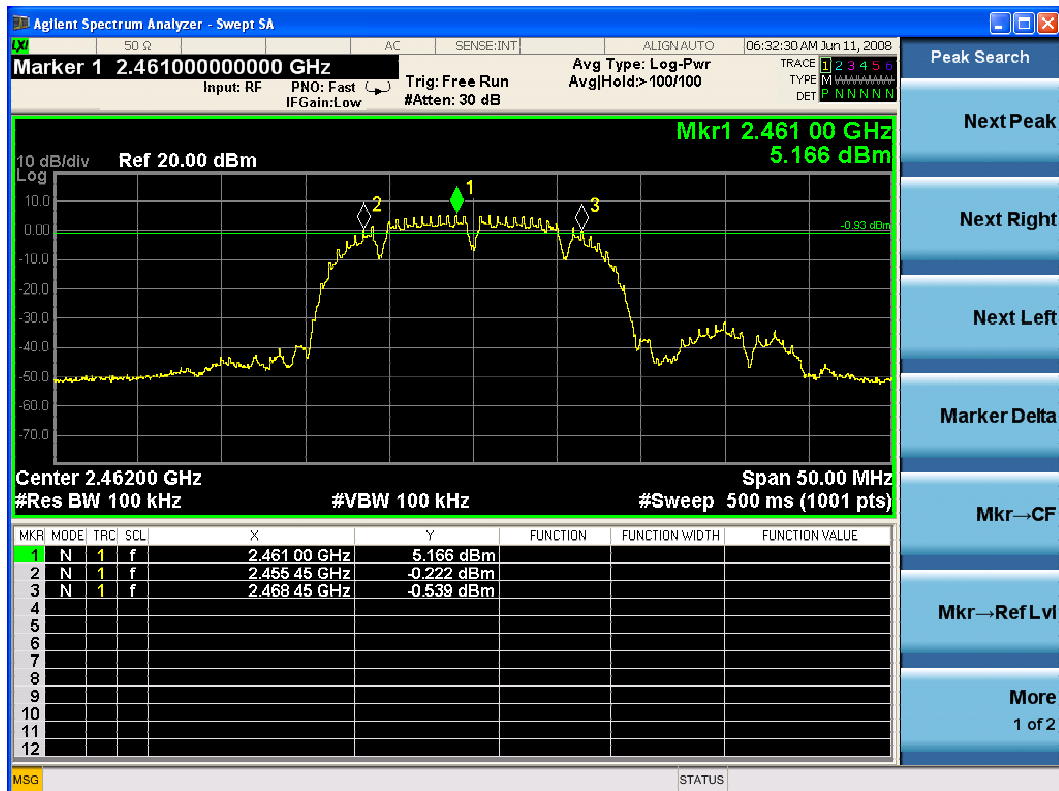
Channel 1:



Channel 6:



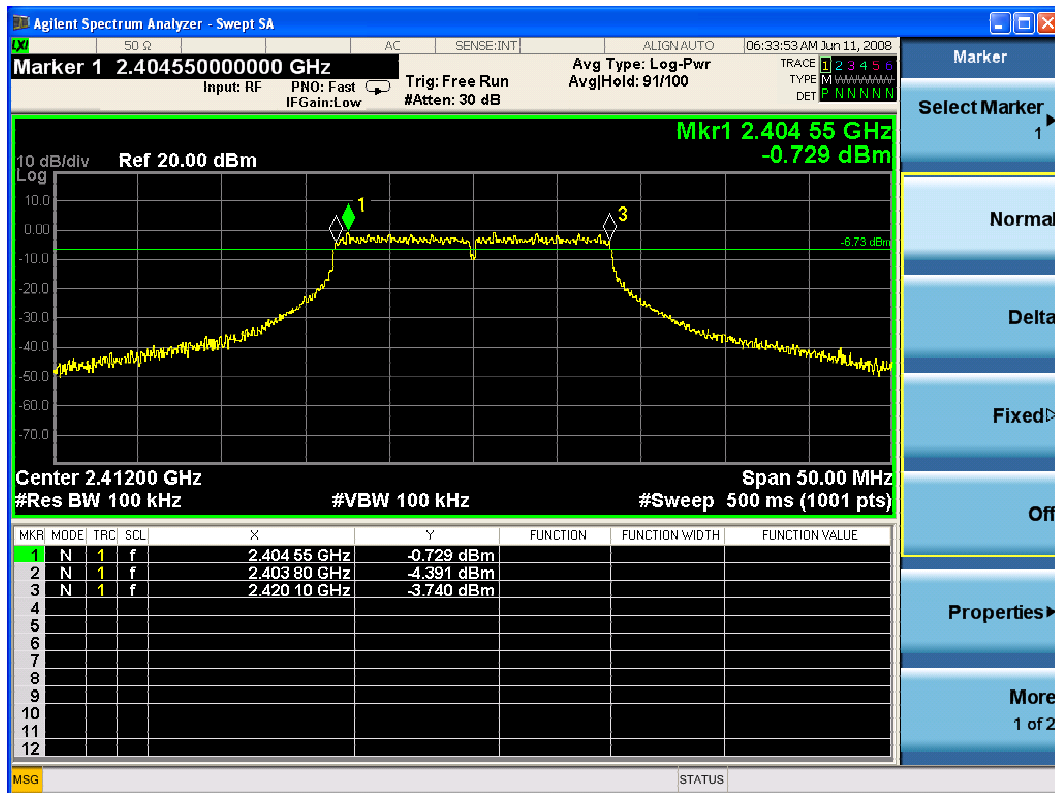
Channel 11:



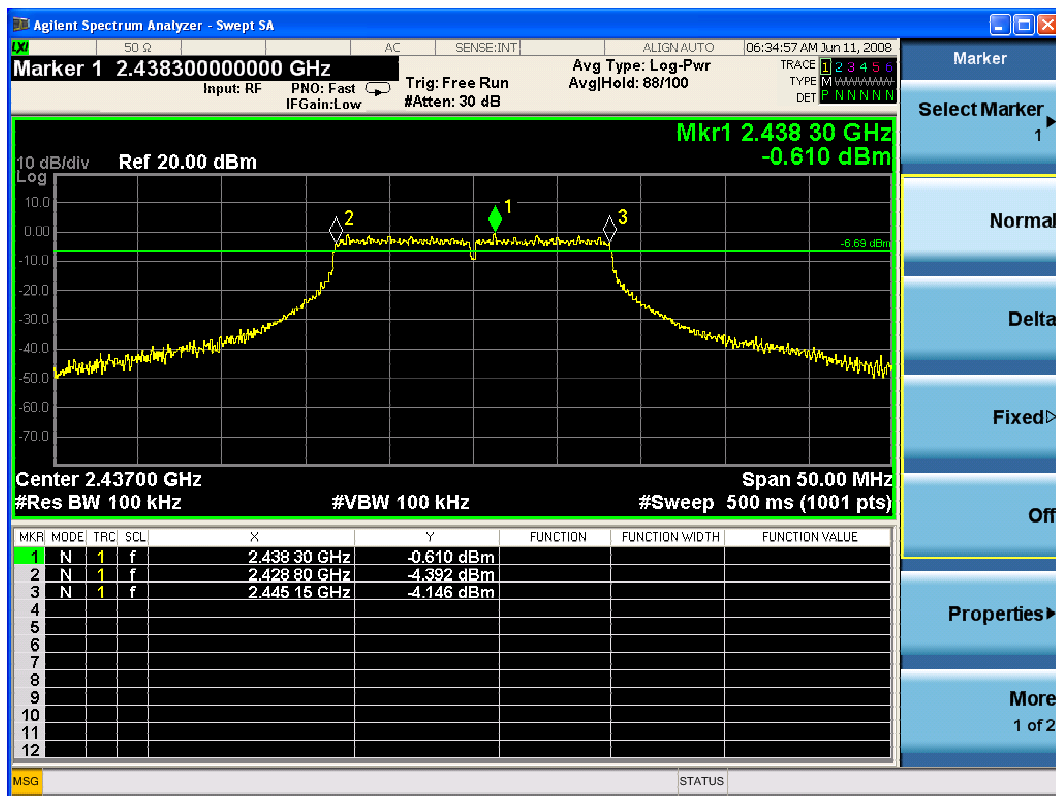
Product : Voice Commander
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1 (6Mbps)	2412.00	16300	>500	Pass
6 (6Mbps)	2437.00	16350	>500	Pass
11 (6Mbps)	2462.00	16300	>500	Pass

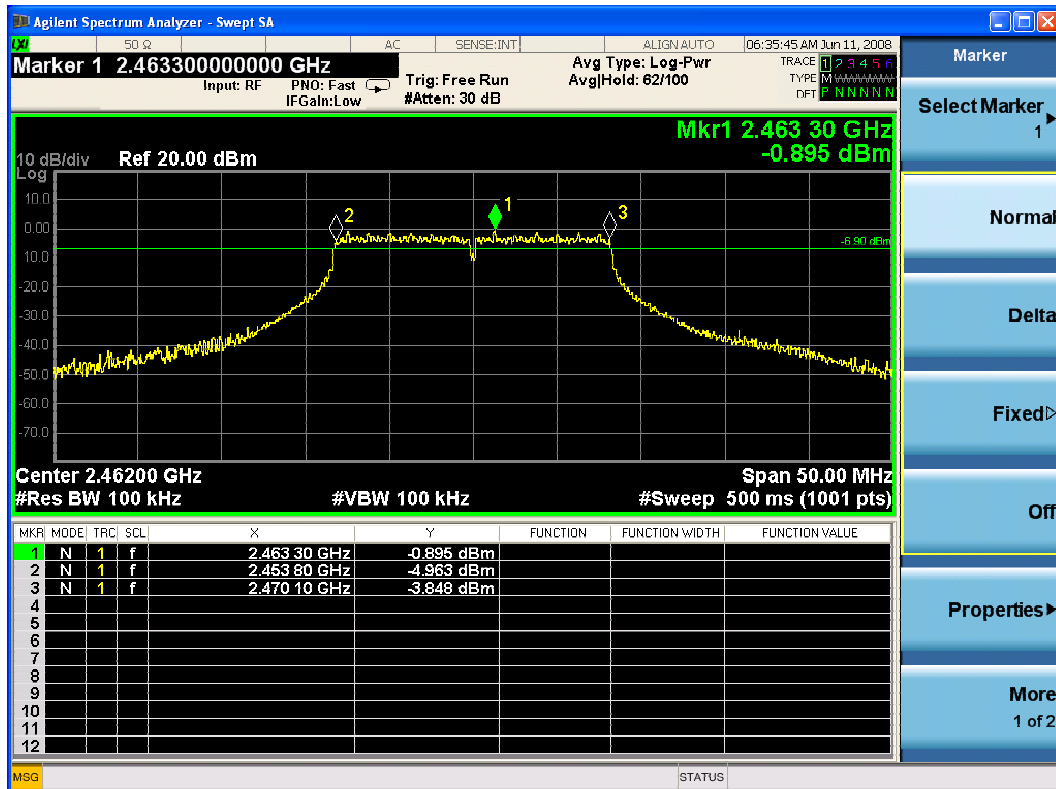
Channel 1:



Channel 6:



Channel 11:



8. Power Density

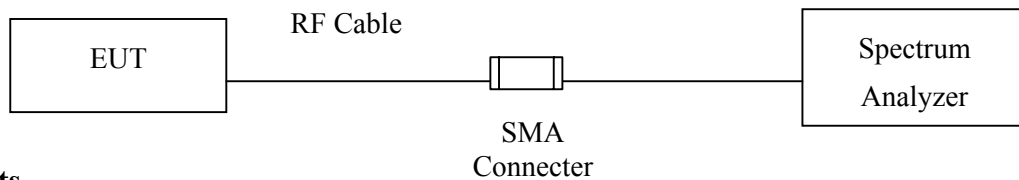
8.1. Test Equipment

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

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2008
Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2008
X Spectrum Analyzer	Agilent	N9010A / MY48030495	April, 2008

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “X” are used to measure the final test results.

8.2. Test Setup



8.3. Limits

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

8.4. Test Procedures

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW= 3 kHz, VBW=10KHz, Sweep time=(SPAN/3KHz), detector=Peak detector

8.5. Uncertainty

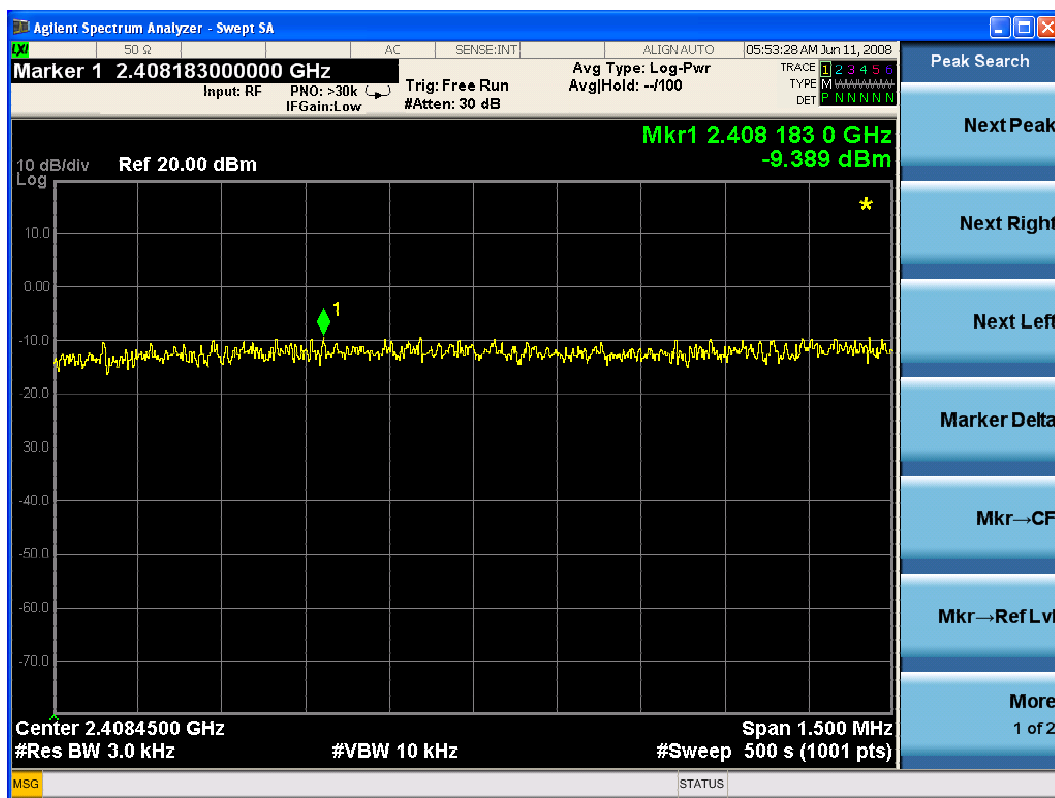
± 1.27 dB

8.6. Test Result of Power Density

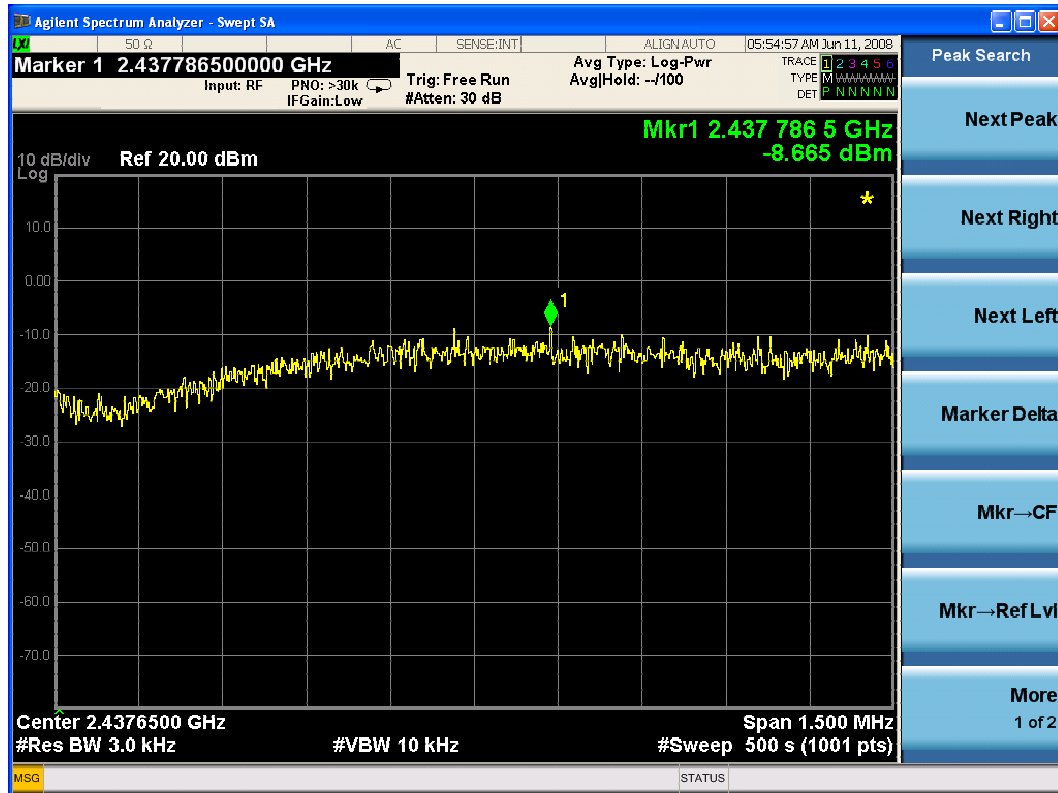
Product : Voice Commander
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
1 (1Mbps)	2412.00	-9.39	< 10dBm	Pass
6 (1Mbps)	2437.00	-8.67	< 10dBm	Pass
11 (1Mbps)	2462.00	-8.74	< 10dBm	Pass

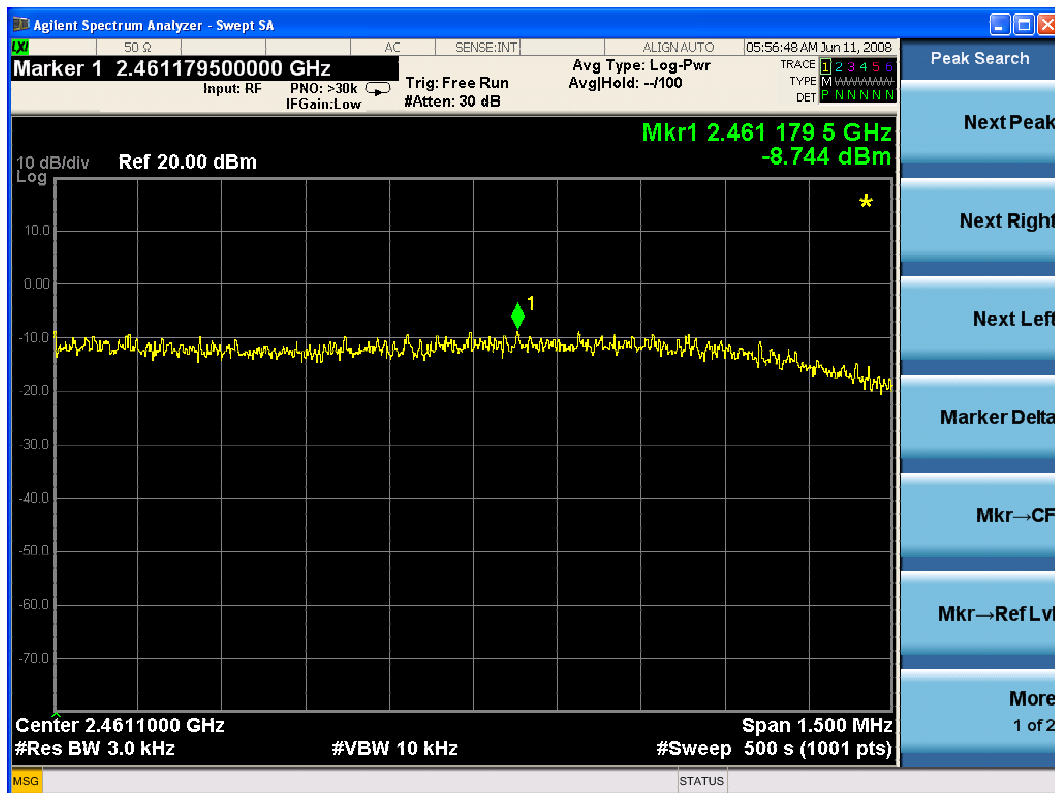
Channel 1:



Channel 6:



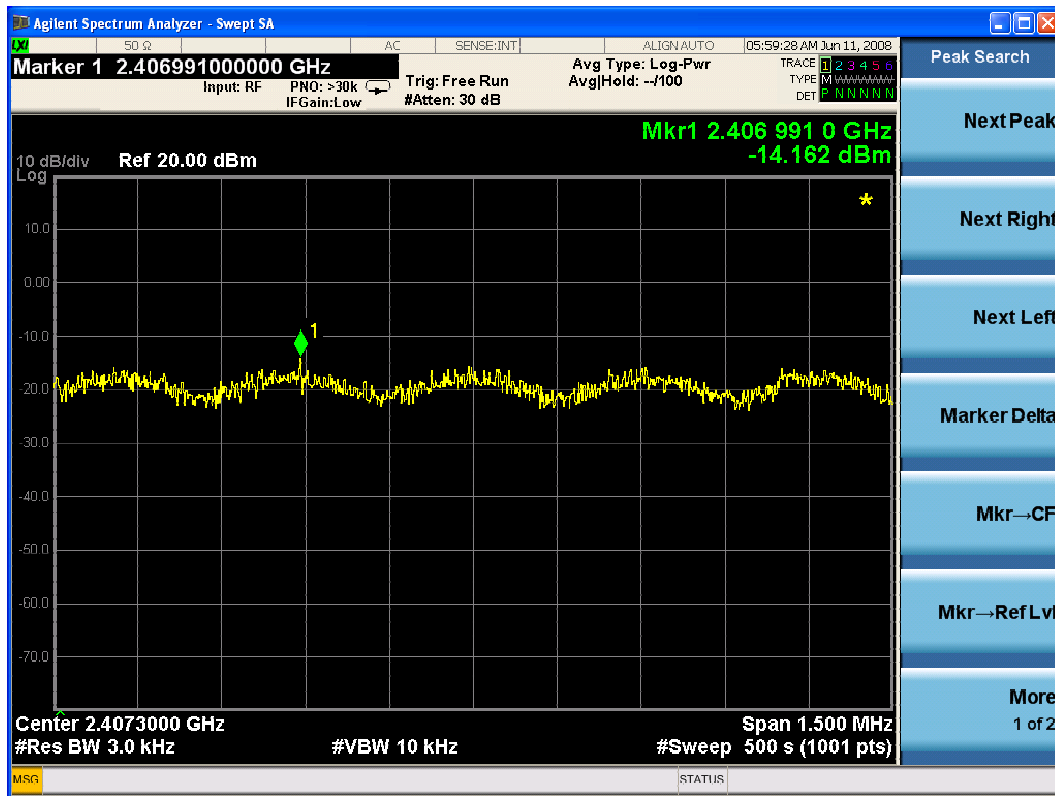
Channel 11:



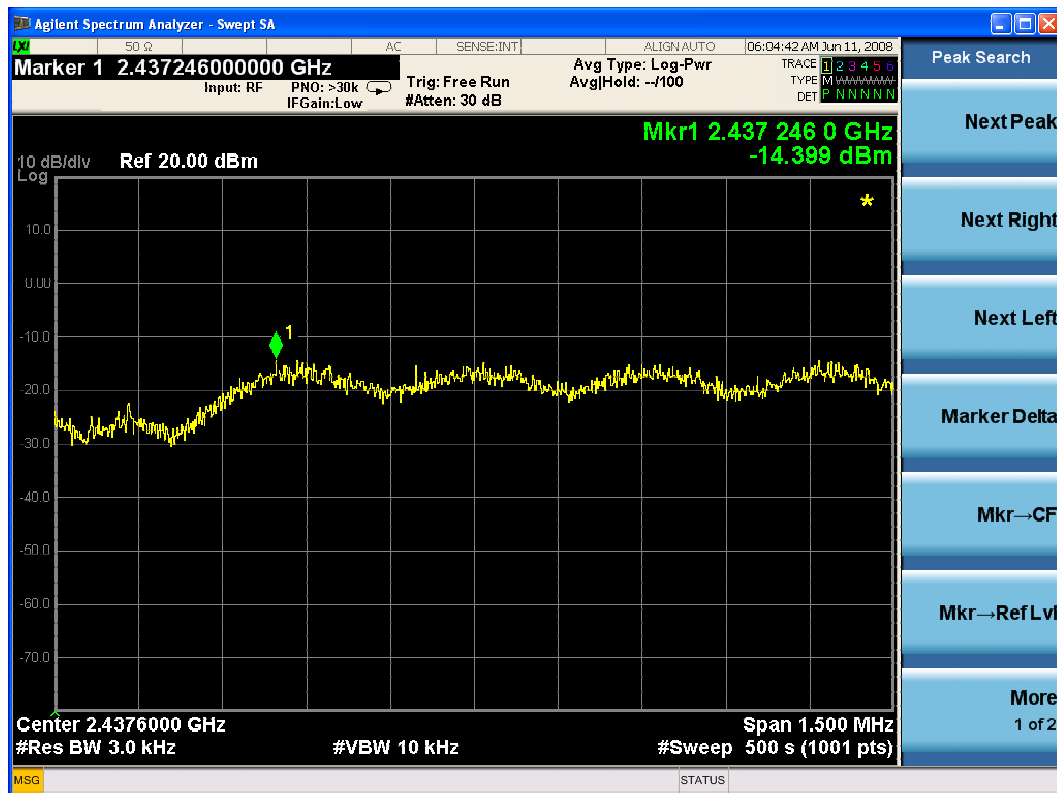
Product : Voice Commander
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
1 (6Mbps)	2412.00	-14.16	< 10dBm	Pass
6 (6Mbps)	2437.00	-14.40	< 10dBm	Pass
11 (6Mbps)	2462.00	-13.90	< 10dBm	Pass

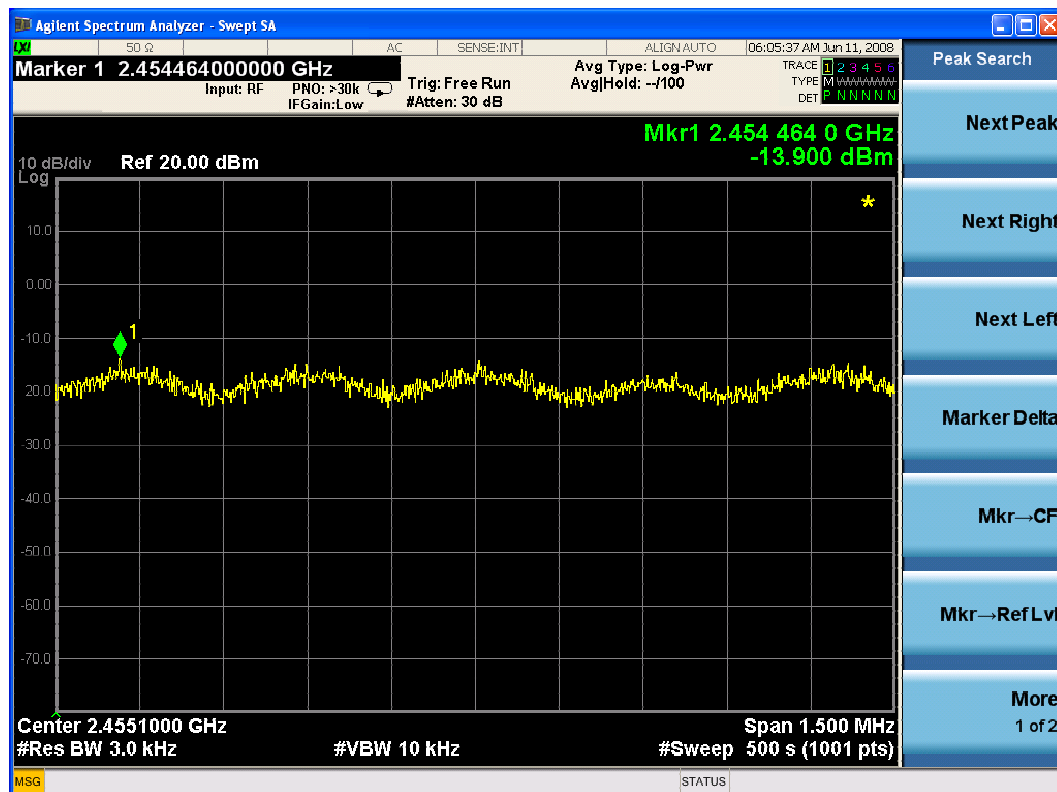
Channel 1:



Channel 6:



Channel 11:



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.