



FCC PART 15.247

MEASUREMENT AND TEST REPORT

For

Vigor Sports, Inc. dba ChatterBox

16918 Edwards Rd.
Cerritos, CA 90703, USA

**FCC ID: KA9HJC-X1B
Model: GMRS X1 Bluetooth**

This Report Concerns:	Product Type:
<input checked="" type="checkbox"/> Original Report	22 channel GMRS/FRS Transceiver with Bluetooth
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

This Bay Area Compliance Laboratories Corp. test report has been prepared on behalf of *Vigor Sport, Inc. Chatter Box* and their product, GMRS X1 Bluetooth FM Handheld transceiver/ two way radio (FCCID:KA9HJC-X1B) or the EUT (Equipment Under Test) as referred to in the rest of this report.

The EUT is a *22 channel GMRS/FRS Transceiver with Bluetooth* radio self-contained transceiver unit with integral antenna intended for use as a general communication tool. It is designed to operate on all 22 channels allocated by the FCC. The useable range, while dependent upon terrain and other radio propagation principles, is typically two miles. The X1 Bluetooth uses the maximum transmit power allowed to help ensure the maximum communication range.

Features include: *22 channel GMRS/FRS Transceiver with Bluetooth*, Page and LCD Display. The unit is equipped with an external Headset option connector. DC 4.8V, Ni-MH Rechargeable Pack batteries, that are readily available in retail outlets, supply operating power. An automatic power savings feature allows the typical standby battery life to extend to more than 4 days.

EUT Photo



Additional photos in exhibit C

Mechanical Description

The Vigor Sport, Inc. Chatter Box product, FCCID: KA9HJC-X1B, measures approximately 65 mm (L) x132 mm (W) x 39 mm (H).

** The test data gathered are from typical production sample, serial number: CBXBT00001 assigned by Manufacturer.*

Objective

This type approval report is prepared on behalf of *Vigor Sport, Inc. Chatter Box* in accordance with Part 2, Subpart J, Part 15, Subparts A, B, and C.

Related Submittal(s)/Grant(s)

BACL *Chatter Box* project R0703304-95 for 22- channel GMRS/FRS Transceiver with Bluetooth model: *GMRS X1 Bluetooth*.

Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003.

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the values range from ± 2.0 for Conducted Emissions tests and ± 4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL.

Detailed instrumentation measurement uncertainties can be found in BACL report QAP-018.

Test Facility

The semi-anechoic chambers used by BACL to collect radiated and conducted emissions measurement data is located in the building at it's facility in Sunnyvale, California, USA.

BACL's test sites have been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.4-2003.

The EUT was tested in the engineering operating mode to represent *worst-case* results during the final qualification test.

Special Accessories

As shown in following test block diagram, all interface cables used for compliance testing are shielded.

Equipment Modifications

No modifications were made to the EUT.

Local Support Equipment

Manufacturer	Description	Model	Serial Number
DELL	Laptop	D600	Cn-0g5152-48643-46l-1133
HP	DC Power Supply	6236B	2003A05705

Interface Ports and Cabling

Cable Description	Length (m)	From	To
Audio cable	0.5	Microphone	EUT
Serial Cable	1.0	Laptop	Simulation board going to EUT

SUMMARY OF TEST RESULTS FOR FCC PART 15

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirements	Compliant
§ 15.205	Restricted Bands	Compliant
§15.207 (a)	Conducted Emissions	Compliant
§15.209	Radiated Emissions	Compliant
§15.247 (a) (1)	Hopping Channel Separation	Compliant
§15.247 (a) (1) (i)	Channel Bandwidth	Compliant
§15.247 (a) (1) (iii)	Number of Hopping Frequencies	Compliant
§15.247 (a) (1) (iii)	Dwell Time	Compliant
§15.247 (b) (1)	Maximum Peak Output Power	Compliant
§ 15.247 (c)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§ 15.247 (e)(i) & §2.1093	RF Exposure	Compliant
§ 2.1051	Spurious Emissions at Antenna Port	Compliant

§15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Refer to statement below for compliance.

“The antenna for this device is an integral antenna that the end user cannot access. Furthermore the device is for indoor/outdoor use as detailed in the Users Manual and Operational Description”.

Antenna Connected Construction

The antenna for this device is an integral antenna that the end user cannot access. It is fully enclosed by the EUT chassis and removal/modification would result in irreparable damage to the device.

Compliant

N/A

§15.207 – CONDUCTED EMISSIONS

Applicable Standard

According to FCC §15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency Range (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

**Decreases with the logarithm of the frequency*

Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.4 – 2003 measurement procedure. The specification used was FCC Class B limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The EUT was connected with LISN-1.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2007-03-08
Solar Electronics	LISN	9252-R-24-BNC	511205	2006-07-07

*** Statement of Traceability:** BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

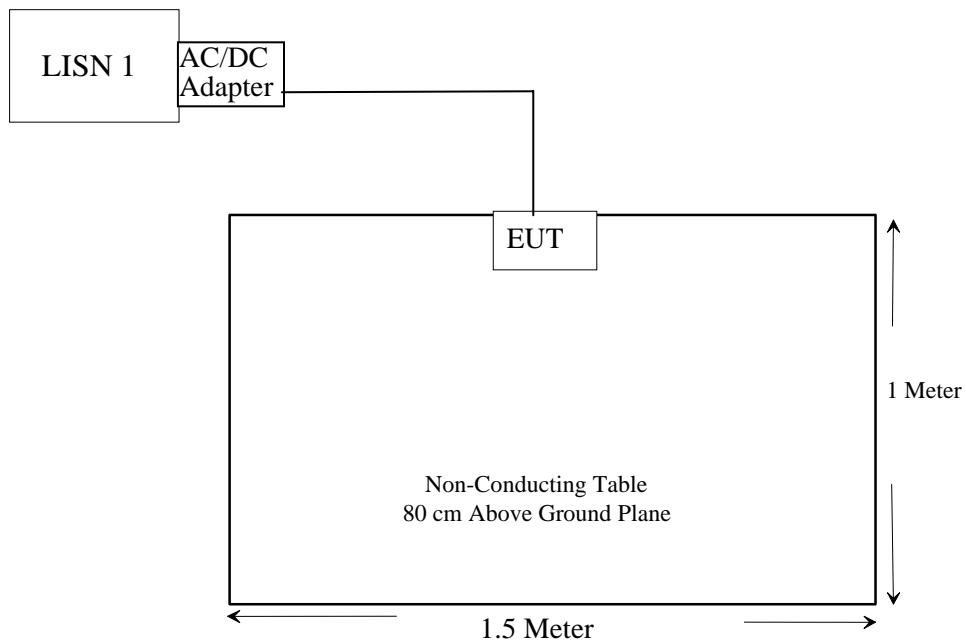
Test Procedure

During the conducted emissions test, the power cord of adaptor was connected to the mains outlet of the LISN-1.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with a "QP". Average readings are distinguished with an "Ave".

Test Setup Diagram



Environmental Conditions

Temperature:	20 °C
Relative Humidity:	59 %
ATM Pressure:	102.0 kPa

* The testing was performed by Dan Corona on 2007-04-20th to 24th

Summary of Test Results

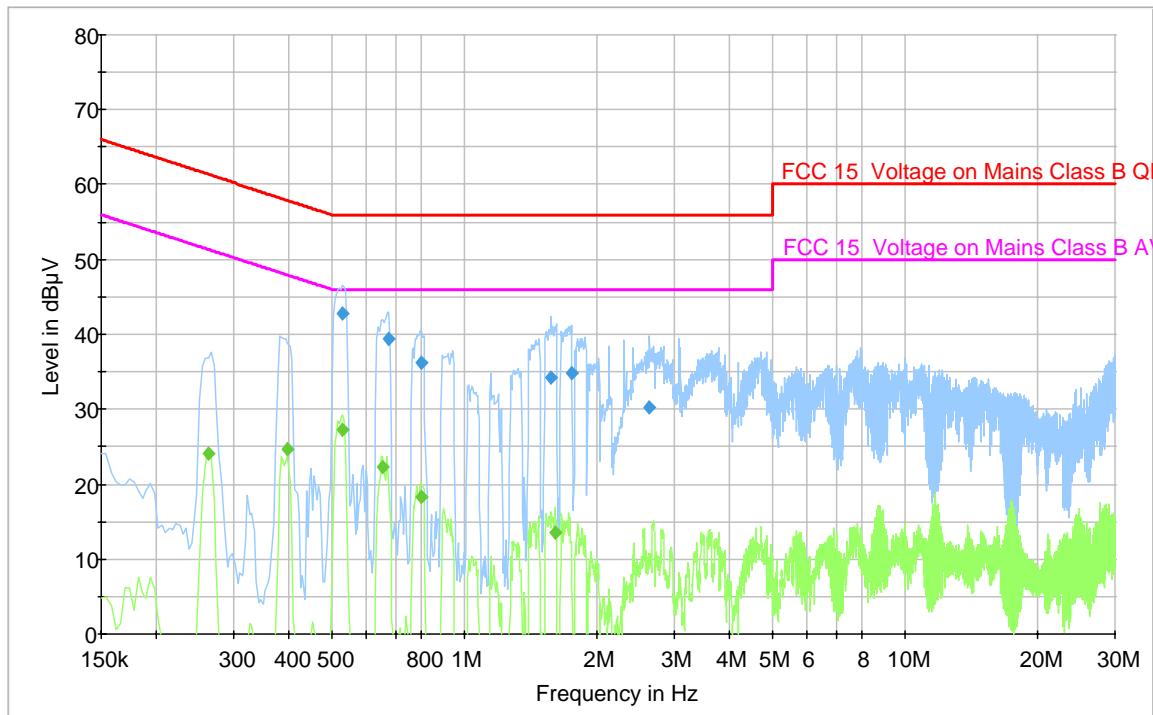
According to the recorded data in following table, the EUT complied with the FCC standard's conducted emissions limits for Class B devices, with the worst margin reading of:

-13.3 dB at 0.53 MHz in the **Neutral Line Conductor** mode

Please refer to the following plots and tables for complete test results

Conducted Emissions Test plot & data

Line Conductor Mode

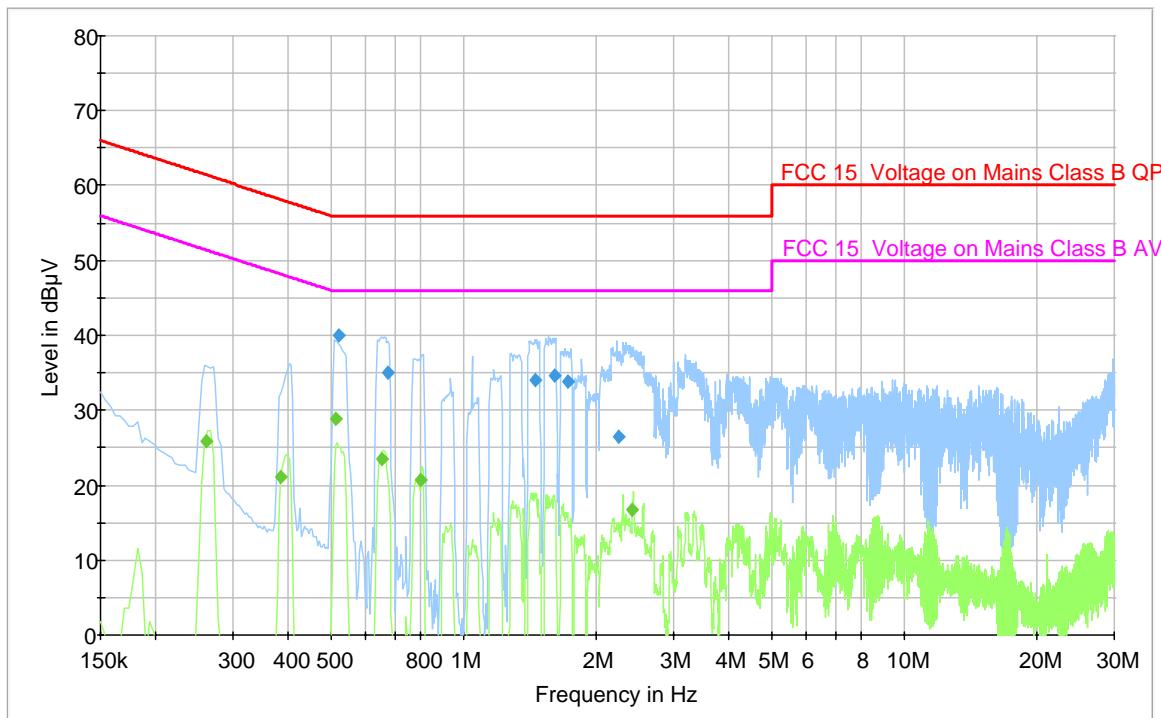


QP Measurements

Frequency (MHz)	Quasi-Peak (dB μ V)	Conductor (L/N)	Correction Factor (dB)	Limit (dB μ V)	Margin (dB)
0.530000	42.7	L1	0.3	56.0	-13.3
0.674000	39.4	L1	0.3	56.0	-16.6
0.802000	36.3	L1	0.3	56.0	-19.7
1.754000	34.8	L1	0.3	56.0	-21.2
1.578000	34.3	L1	0.3	56.0	-21.7
2.634000	30.2	L1	0.2	56.0	-25.8

Average Measurements

Frequency (MHz)	Average (dB μ V)	Line (L/N)	Correction Factor (dB)	Limit (dB μ V)	Margin (dB)
0.530000	27.3	L1	0.3	46.0	-18.7
0.398000	24.8	L1	0.4	47.9	-23.1
0.654000	22.3	L1	0.3	46.0	-23.7
0.262000	24.2	L1	0.2	51.4	-27.2
0.798000	18.4	L1	0.3	46.0	-27.7
1.610000	13.5	L1	0.3	46.0	-32.5

Neutral Line Conductor Mode**QP Measurements**

Frequency (MHz)	Quasi-Peak (dB μ V)	Conductor (L/N)	Correction Factor (dB)	Limit (dB μ V)	Margin (dB)
0.521000	40.0	N	0.3	56.0	-16.0
0.673000	34.9	N	0.3	56.0	-21.1
1.605000	34.6	N	0.3	56.0	-21.4
1.449000	34.0	N	0.2	56.0	-22.0
1.725000	33.8	N	0.3	56.0	-22.3
2.241000	26.5	N	0.3	56.0	-29.5

Average Measurements

Frequency (MHz)	Average (dB μ V)	Line (L/N)	Correction Factor (dB)	Limit (dB μ V)	Margin (dB)
0.513000	28.8	N	0.3	46.0	-17.2
0.653000	23.5	N	0.3	46.0	-22.5
0.797000	20.7	N	0.3	46.0	-25.3
0.261000	25.8	N	0.2	51.4	-25.6
0.385000	21.0	N	0.4	48.2	-27.2
2.413000	16.6	N	0.3	46.0	-29.4

§15.205, §15.209 & §15.247 - RADIATED EMISSIONS

Applicable Standard: FCC §15.205 Restricted bands of operation

(a) Except as shown in 15.205 paragraphs (d), only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	MHz	GHz	GHz
0.090 – 0.110	8.291 – 8.294	16.69475 – 16.69525	156.7 – 156.9	1435 – 1626.5	3.332 – 3.339	10.6 – 12.7
0.495 – 0.505	8.362 – 8.366	25.5 – 25.67	162.0125 – 167.17	1645.5 – 1646.5	3.3458 – 3.358	13.25 – 13.4
2.1735 – 2.1905	8.37625 – 8.38675	37.5 – 38.25	167.72 – 173.2	1660 – 1710	3.600 – 4.400	14.47 – 14.5
4.125 – 4.128	8.41425 – 8.41475	73 – 74.6	240 – 285	1718.8 – 1722.2	4.5 – 5.15	15.35 – 16.2
4.17725 – 4.17775	12.29 – 12.293	74.8 – 75.2	322 – 335.4	2200 – 2300	5.35 – 5.46	17.7 – 21.4
4.20725 – 4.20775	12.51975 – 12.52025	108 – 121.94	399.9 – 410	2310 – 2390	7.25 – 7.75	22.01 – 23.12
6.215 – 6.218	12.57675 – 12.57725	123 – 138	608 – 614	2483.5 – 2500	8.025 – 8.5	23.6 – 24.0
6.26775 – 6.26825	13.36 – 13.41	149.9 – 150.05	960 – 1240	2690 – 2900	9.0 – 9.2	31.2 – 31.8
6.31175 – 6.31225	16.42 – 16.423	156.52475 – 156.52525	1300 – 1427	3260 – 3267	9.3 – 9.5	36.43 – 36.5
Above 38.6						

(b) Except as provided in 15.205 paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

(c) Except as provided in paragraphs (d) and (e), regardless of the field strength limits specified elsewhere in this Subpart, the provisions of this Section apply to emissions from any intentional radiator.

Compliant

N/A

Applicable Standard: FCC §15.209 Radiated emission limits, general requirements.

(a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

(b) In the emission table above, the tighter limit applies at the band edges.

Compliant

N/A

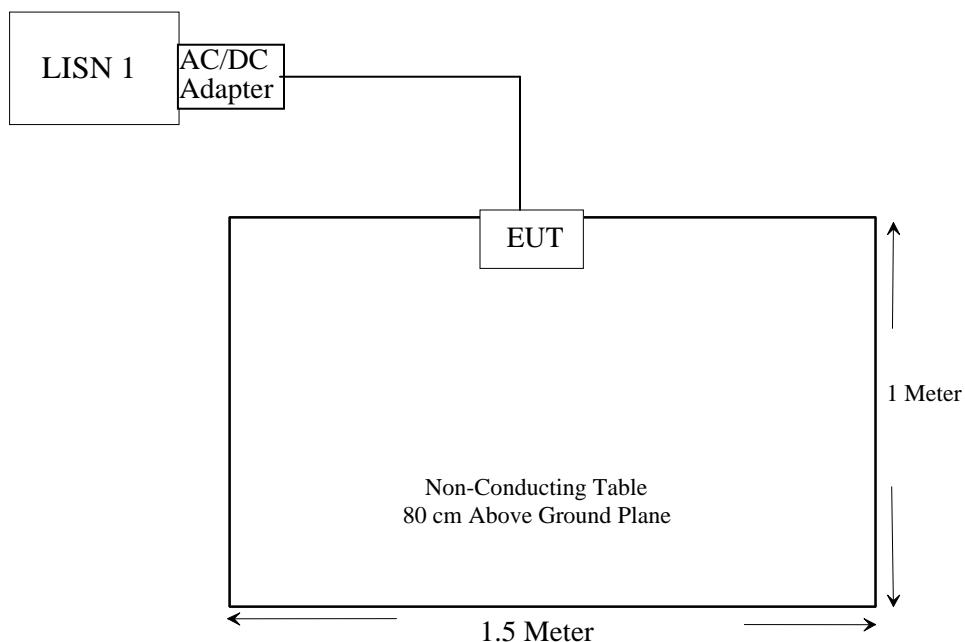
Applicable Standard: FCC §15.247 Radiated emission limits.

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Setup

The radiated emissions tests were performed in the 3-meter semi-anechoic chamber test site, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

Test Setup Diagram



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Sonoma	Amplifier, Pre	317	260406	2007-04-30
Spectrum Analyzer	E4440A	Agilent	MY44303352	2007-02-23
HP	Pre, Amplifier (1 ~ 26.5 GHz)	8449B	3147A00400	2006-08-21
Sunol Sciences	Antenna	JB3	A020106-2 / S009976	2007-04-05
A. R.A	Horn Antenna	DRG-118/A	1132	2005-08-17*

*Two year calibration cycle

* **Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	20 °C
Relative Humidity:	59 %
ATM Pressure:	102.0 kPa

* The testing was performed by Dan Corona on 2007-04-20th to 24th

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

All data were recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limits), and are distinguished with a "QP" in the data table.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Cord. Amp.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Cord. Amp.} - \text{Limit}$$

Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247 standard's radiated emissions limits for class B devices, and had the worst margin of:

- 8.7 dB at 4803.9 MHz** in the **Vertical** polarization at **Low** Channel
- 9.0 dB at 4884.0 MHz** in the **Vertical** polarization at **Middle** Channel
- 8.6 dB at 4958.0 MHz** in the **Vertical** polarization at **High** Channel

Please refer to the following tables for full test results

Radiated Emissions Test Result Data: Measured at 3 meter

Run # 1: Low CH = 2402.0 MHz

Frequency (MHz)	Reading (dBuV)	Azimuth Degrees	Height (m)	Polarization H / V	Antenna Factor (dB/m)	Cable Loss (dB)	Amplifier Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comments
2402.0000	115.6	235	1.0	V	28.7	1.5	37.4	108.4			Fund/Peak
2402.0000	110.8	200	1.0	H	28.7	1.5	37.4	103.6			Fund/Peak
2402.0000	82.8	187	1.0	V	28.7	1.5	37.4	75.6			Ave
2402.0000	84.2	200	1.0	H	28.7	1.5	37.4	76.9			Ave
4803.9000	45.7	255	1.4	V	32.5	1.9	34.8	45.3	54	-8.7	Ave
4803.9000	44.4	163	1.4	H	32.5	1.9	34.8	44.0	54	-10.0	Ave
4803.9000	62.5	163	1.4	H	32.5	1.9	34.8	62.1	74	-11.9	Peak
4803.9000	61.3	255	1.4	V	32.5	1.9	34.8	60.9	74	-13.1	Peak
7205.0000	31.0	163	1.3	H	36.7	4.2	34.9	37.0	56.9	-19.9	Ave
7205.0000	32.0	26	1.4	V	36.7	4.2	34.9	38.0	55.6	-17.6	Ave
7205.0000	45.3	163	1.3	H	36.7	4.2	34.9	51.3	83.6	-32.3	Peak
7205.0000	46.0	26	1.4	V	36.7	4.2	34.9	52.0	88.4	-36.4	Peak

Run # 2: Mid CH = 2442.0 MHz

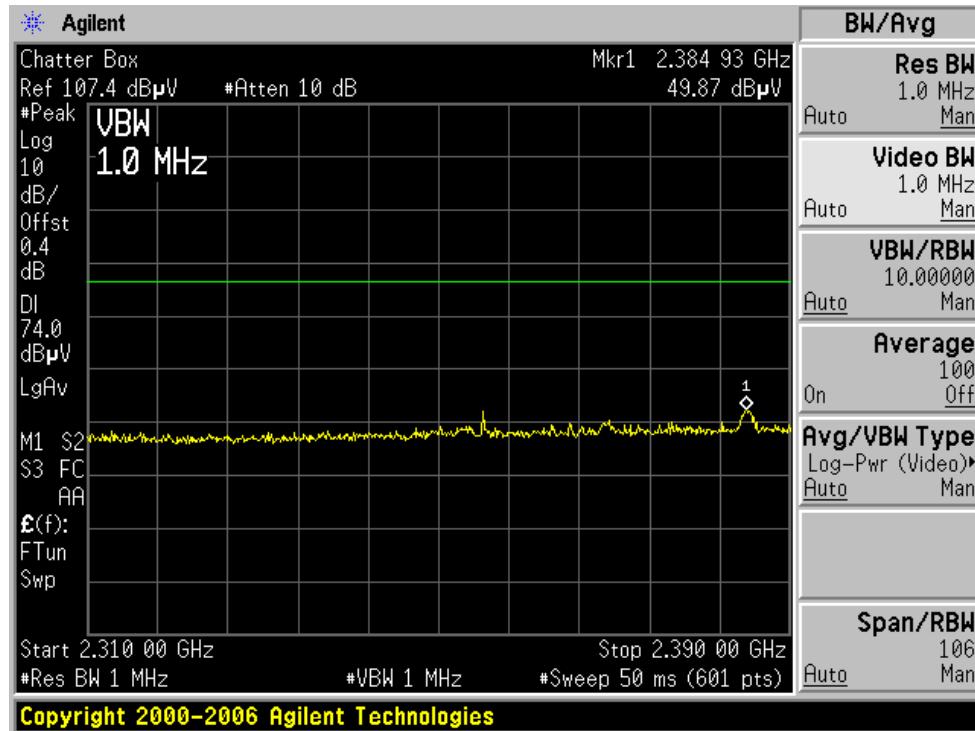
Frequency (MHz)	Reading (dBuV)	Azimuth Degrees	Height (m)	Polarization H / V	Antenna Factor (dB/m)	Cable Loss (dB)	Amplifier Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comments
2442.0000	112.5	7	1.2	V	28.7	1.5	37.0	105.7			Fund/Peak
2442.0000	107.2	199	1.2	H	28.7	1.5	37.0	100.4			Fund/Peak
2442.0000	84.7	7	1.2	V	28.7	1.5	37.0	77.9			Ave
2442.0000	80.2	202	1.2	H	28.7	1.5	37.0	73.4			Ave
4884.0000	45.7	270	2.4	V	32.5	1.9	35.1	45.0	54	-9.0	Ave
7326.0000	37.2	198	1.2	V	36.7	4.2	35.1	43.0	54	-11.0	Ave
4884.0000	43.3	28	1.8	H	32.5	1.9	35.1	42.7	54	-11.3	Ave
7326.0000	36.5	23	1.7	H	36.7	4.2	35.1	42.3	54	-11.7	Ave
7326.0000	55.4	198	1.2	V	36.7	4.2	35.1	61.2	74	-12.8	Peak
7326.0000	55.3	23	1.7	H	36.7	4.2	35.1	61.1	74	-12.9	Peak
4884.0000	61.2	259	1.4	V	32.5	1.9	35.1	60.5	74	-13.5	Peak
4884.0000	59.0	162	2.0	H	32.5	1.9	35.1	58.3	74	-15.7	Peak

Run # 3: High CH = 2480.0 MHz

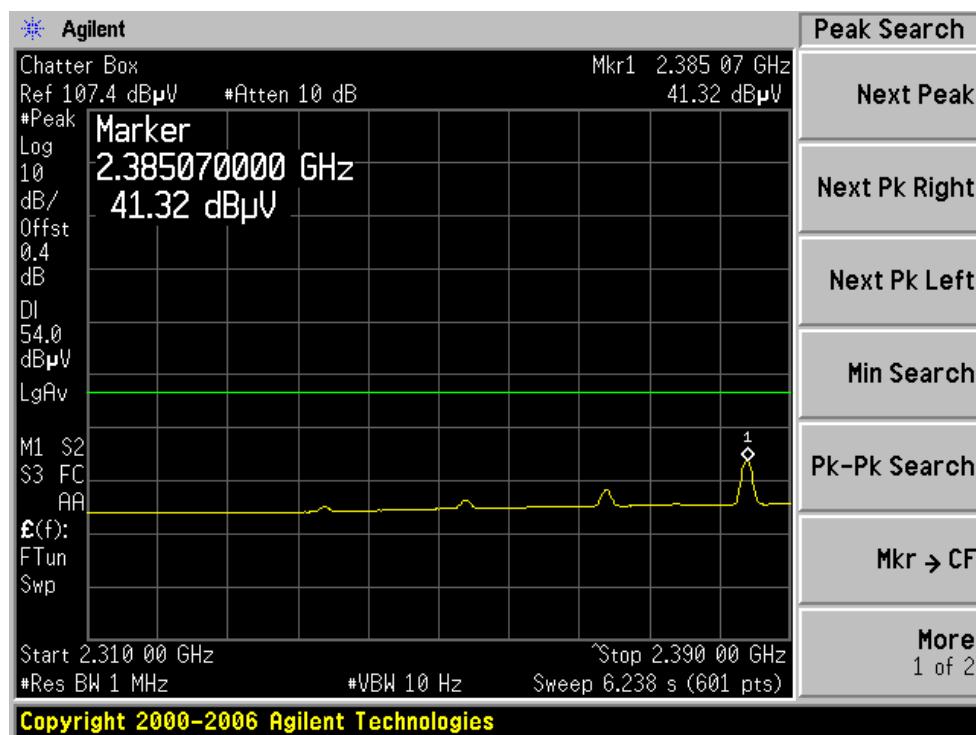
Frequency (MHz)	Reading (dBuV)	Azimuth Degrees	Height (m)	Polarization H / V	Antenna Factor (dB/m)	Cable Loss (dB)	Amplifier Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comments
2480.0000	112.9	292	1.5	V	28.7	1.5	37.2	105.9			Fund/Peak
2480.0000	109.3	255	1.3	H	28.7	1.5	37.2	102.2			Fund/Peak
2480.0000	88.5	180	1.3	V	28.7	1.5	37.2	81.4			Ave
2480.0000	88.4	180	1.2	H	28.7	1.5	37.2	81.4			Ave
4960.0000	45.8	143	1.6	V	32.5	1.9	34.8	45.4	54	-8.6	Ave
4960.0000	44.6	321	1.2	H	32.5	1.9	34.8	44.2	54	-9.8	Ave
7440.0000	33.1	211	1.5	H	36.7	4.2	34.7	39.3	54	-14.7	Ave
4960.0000	58.4	321	1.2	H	32.5	1.9	34.8	58.0	74	-16.0	Peak
4960.0000	57.7	143	1.6	V	32.5	1.9	34.8	57.3	74	-16.7	Peak
9920.0000	30.7	189	1.8	V	36.7	4.2	34.7	36.9	54	-17.1	Ave
9920.0000	45.2	211	1.5	H	36.7	4.2	34.7	51.4	74	-22.6	Peak
7440.0000	43.7	189	1.8	V	36.7	4.2	34.7	49.9	74	-24.1	Peak

Low Channel Band Edges on Restriction Band

Peak

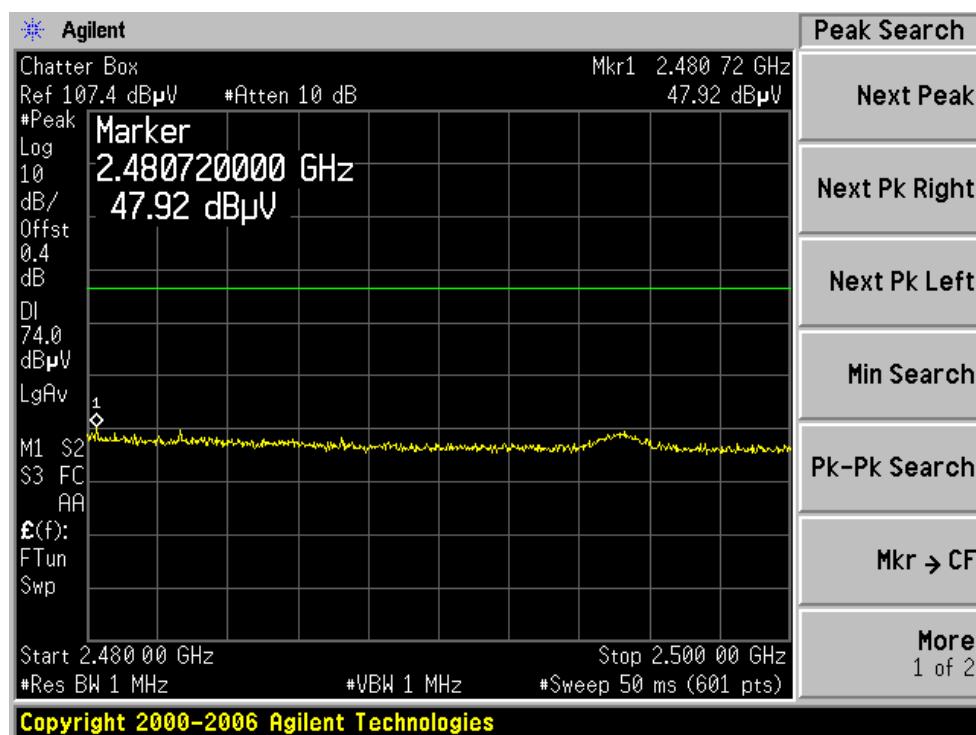


Average

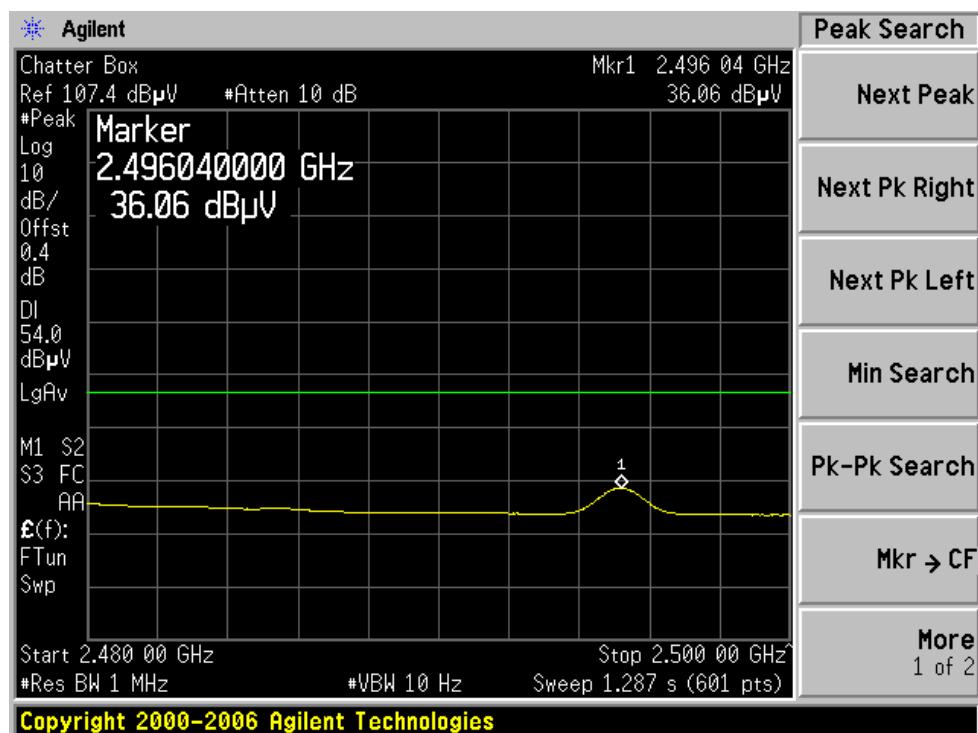


High Channel Band Edges on Restriction Band

Peak



Average



§15.247 (a) (1) - HOPPING CHANNEL SEPARATION

Applicable Standard

According to §15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

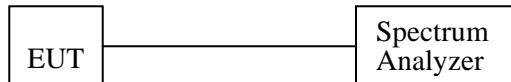
Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on a bench without connection to measurement instrument Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the Max-Hold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function, and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Spectrum Analyzer	E4440A	Agilent	MY44303352	2007-02-23

* **Statement of Traceability:** BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Setup Diagram**Environmental Conditions**

Temperature:	20 ° C
Relative Humidity:	59 %
ATM Pressure:	102.0 kPa

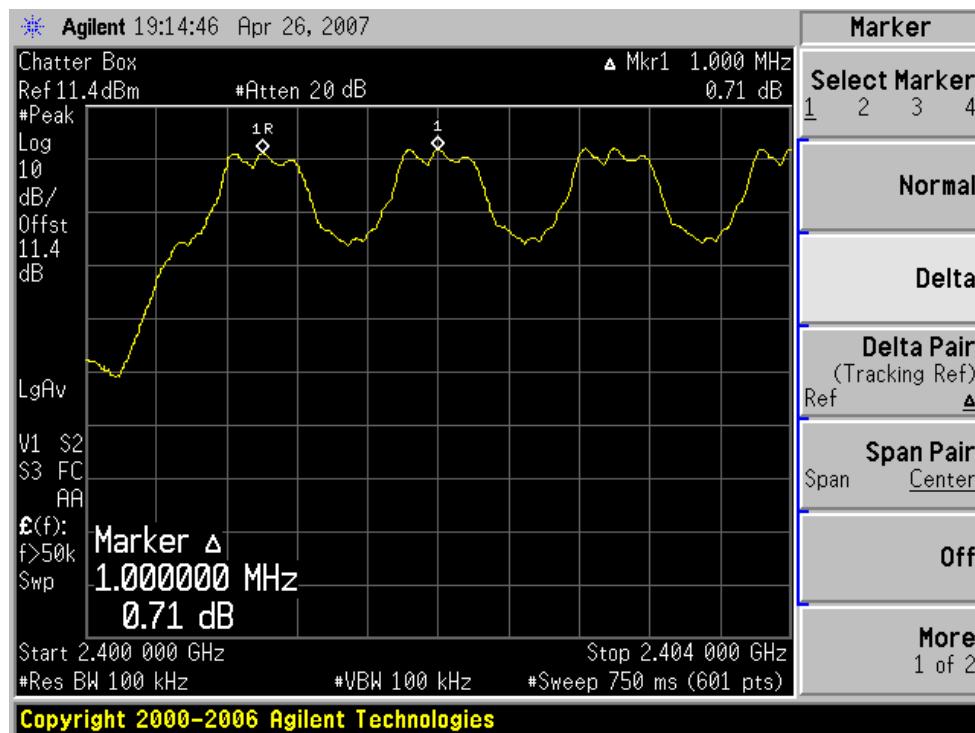
* The testing was performed by Dan Corona on 2007-04-20- 24

Measurement Results

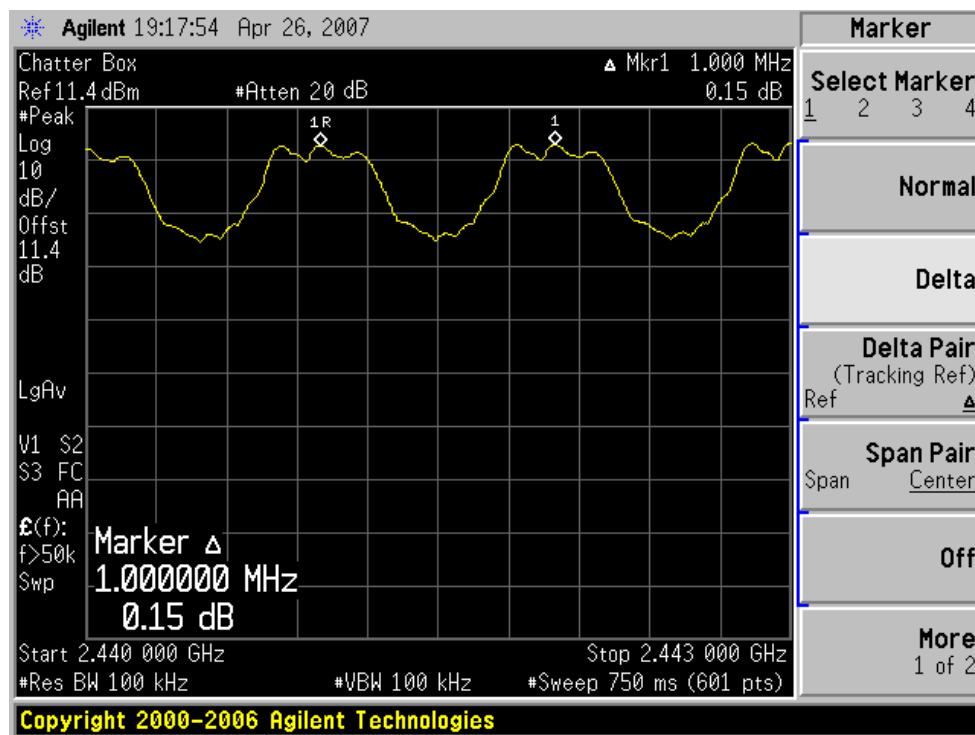
Channel	Frequency (MHz)	Channel Separation (MHz)	Limit >(MHz)
Low	2402.0	1.000	0.471
Mid	2442.0	1.000	0.471
High	2480.0	1.000	0.469

Please refer to the following plots.

Low Channel



Middle Channel



High Channel

§15.247 (a) (1) – HOPPING CHANNEL BANDWIDTH

Applicable Standard

According to §15.247 (a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Measurement Procedure

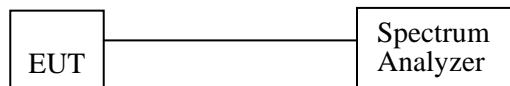
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emissions bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Spectrum Analyzer	E4440A	Agilent	MY44303352	2007-02-23

* **Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Setup Diagram



Environmental Conditions

Temperature:	20 °C
Relative Humidity:	59 %
ATM Pressure:	102.0 kPa

* The testing was performed by Dan Corona on 2007-04-20- 24

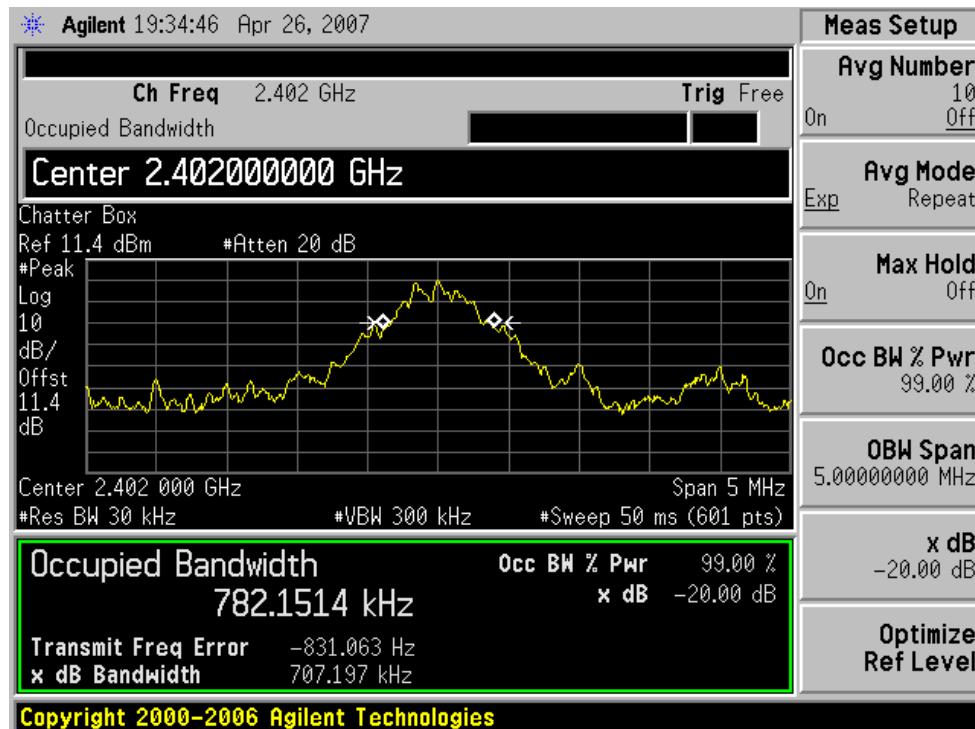
Measurement Results

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
Low	2402.0	707.2
Mid	2442.0	706
High	2480.0	703.6

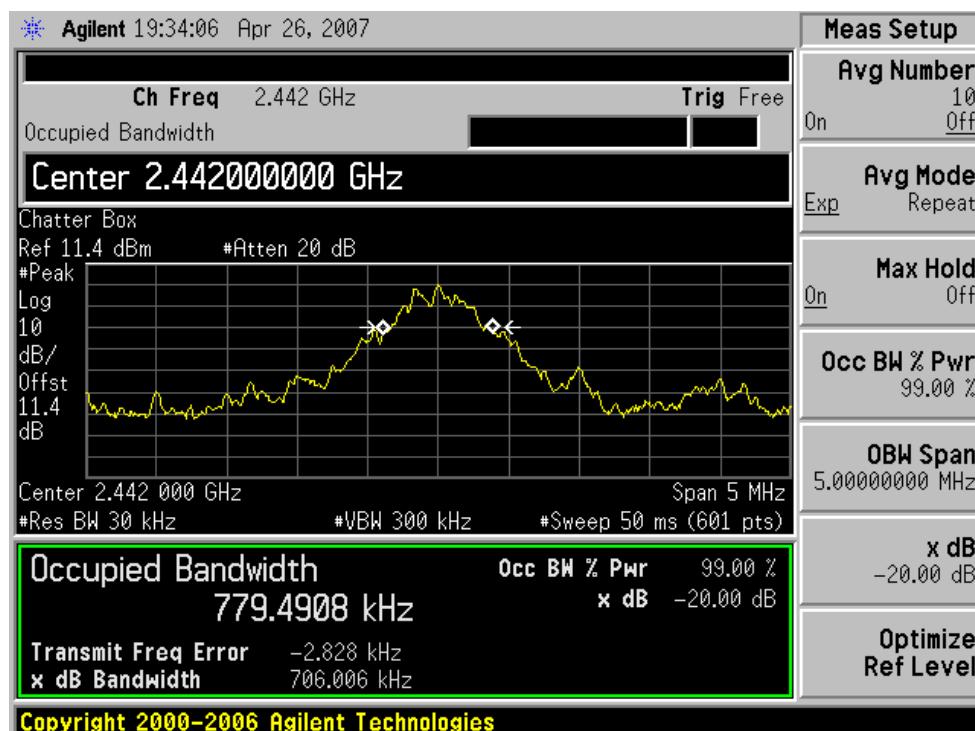
Please refer to the following plots.

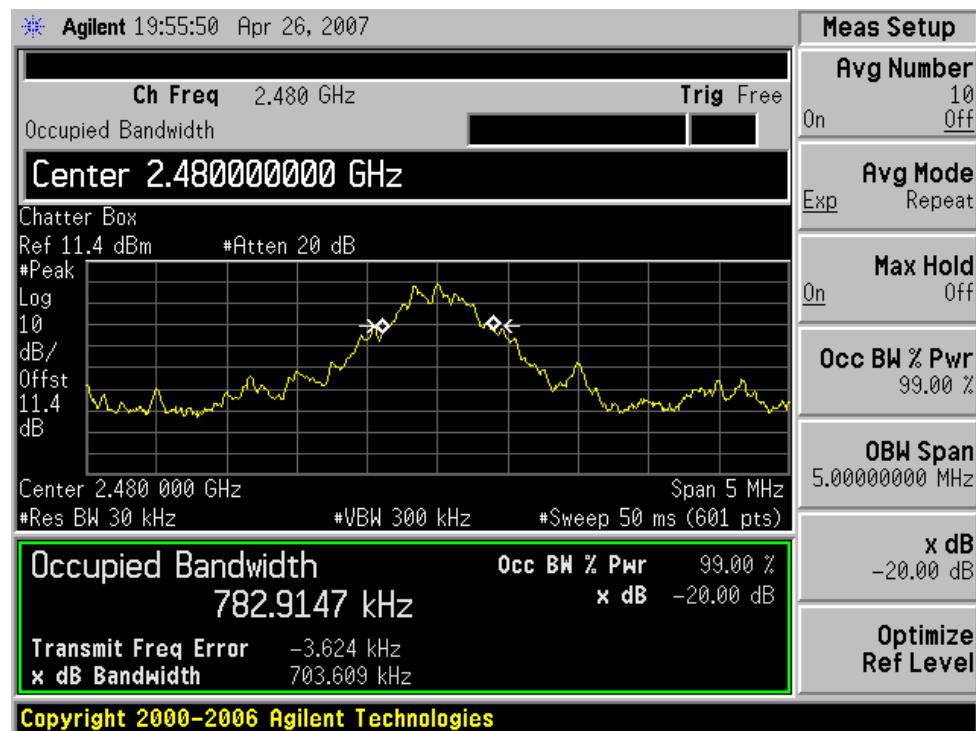
Measurement Result

Low Channel



Middle Channel



High Channel

§15.247 (a) (1) (iii) - NUMBER OF HOPPING FREQUENCIES USED

Applicable Standard

According to §15.247(a)(1)(iii), Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Measurement Procedure

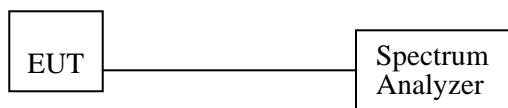
1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the bench without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
HP	Analyzer, Spectrum	8565EC	3946A00131	2007-01-24

* **Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Setup Diagram



Environmental Conditions

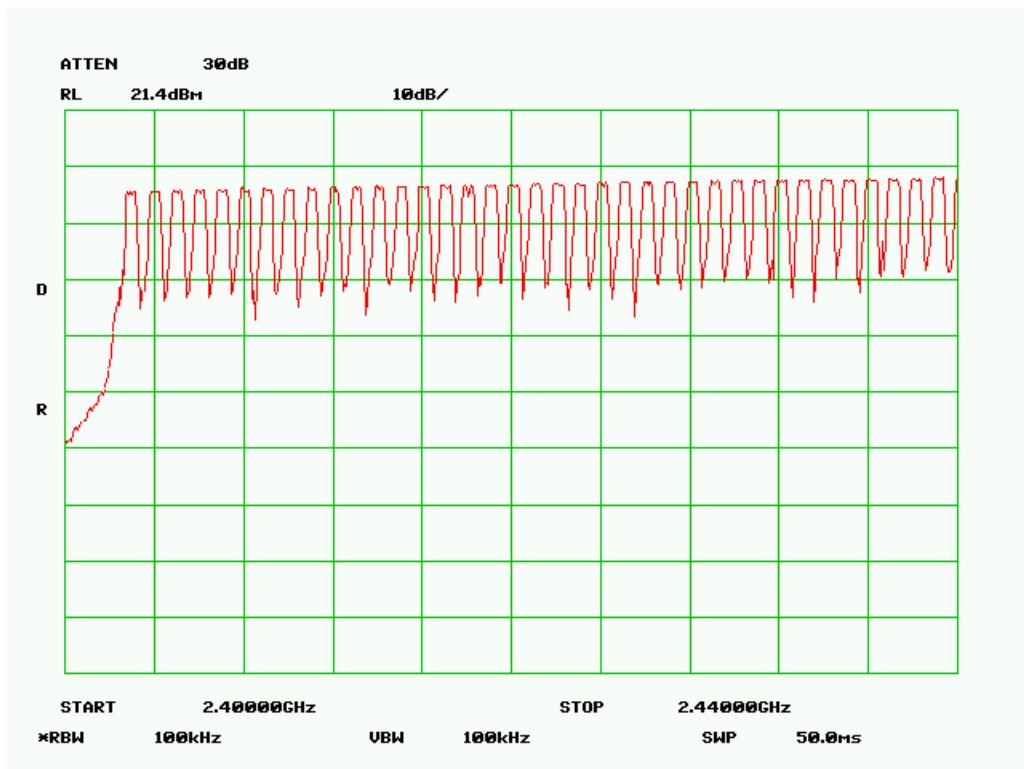
Temperature:	20 °C
Relative Humidity:	59 %
ATM Pressure:	102.0 kPa

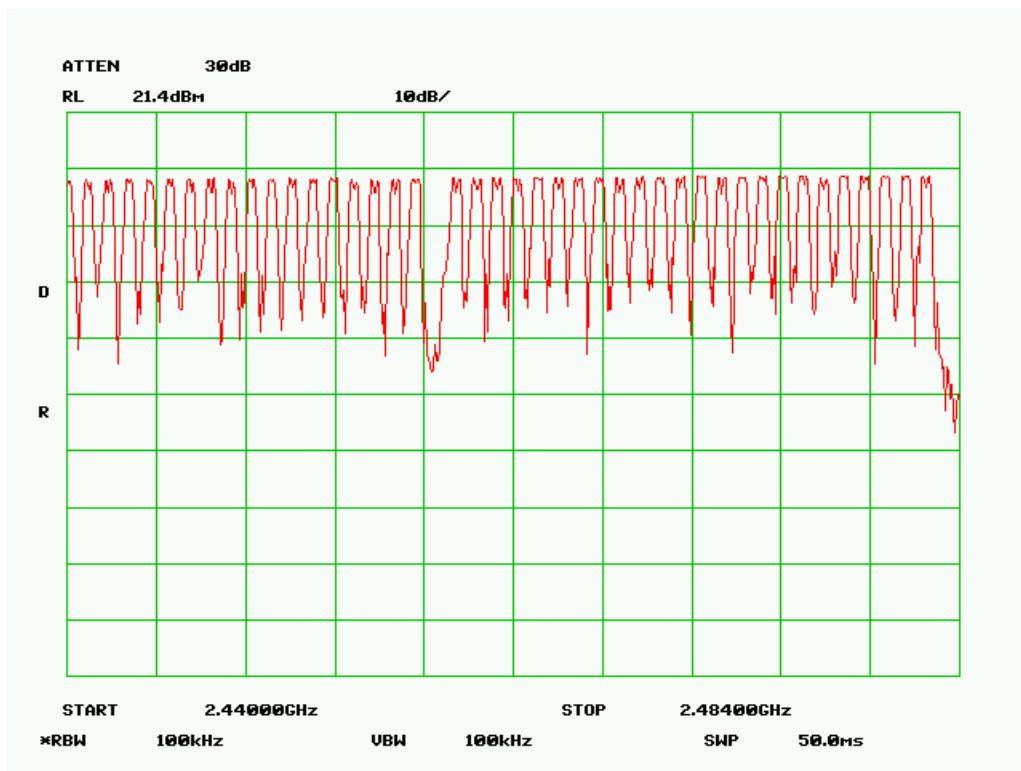
* The testing was performed by Dan Corona on 2007-04-20- 24

Measurement Result: 79 channels

Please refer to the following plots:

First plot of 37 channels



Second plot of 42 channels

§15.247(a) (1) (iii) - DWELL TIME

Applicable Standard

According to §15.247 (a)(1)(iii), According to §15.247(a)(1)(iii), For Frequency hopping systems in the 2400–2483.5 MHz band the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
HP	Analyzer, Spectrum	8565EC	3946A00131	2007-01-24

* **Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Setup Diagram



Environmental Conditions

Temperature:	20 °C
Relative Humidity:	59 %
ATM Pressure:	102.0 kPa

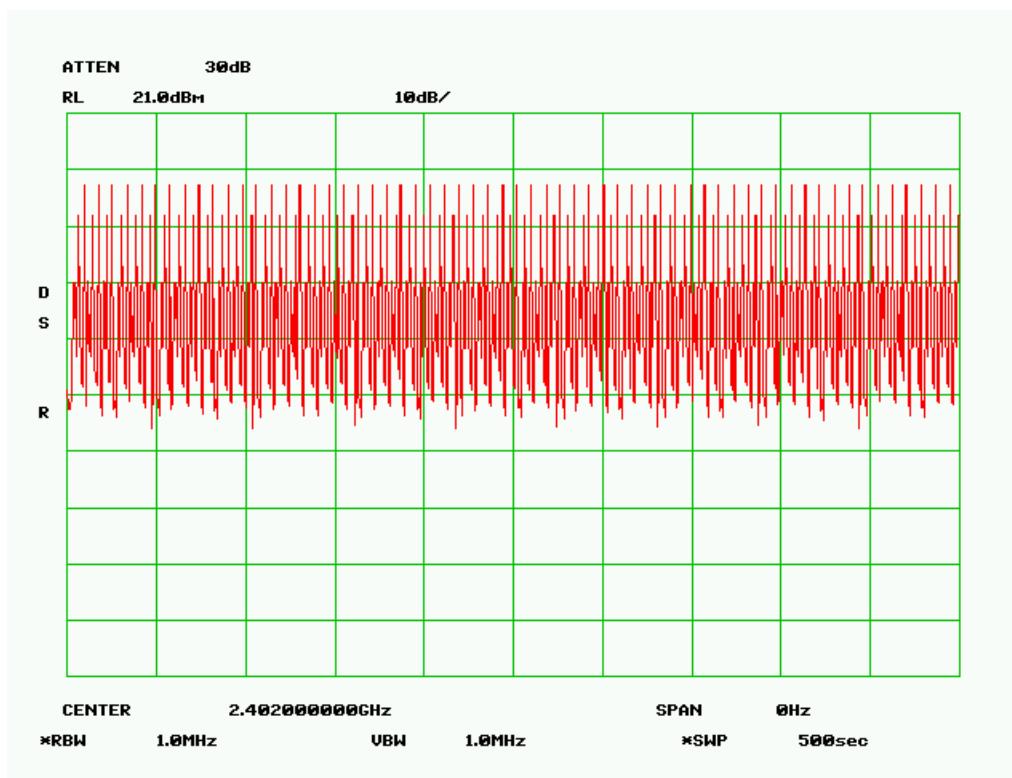
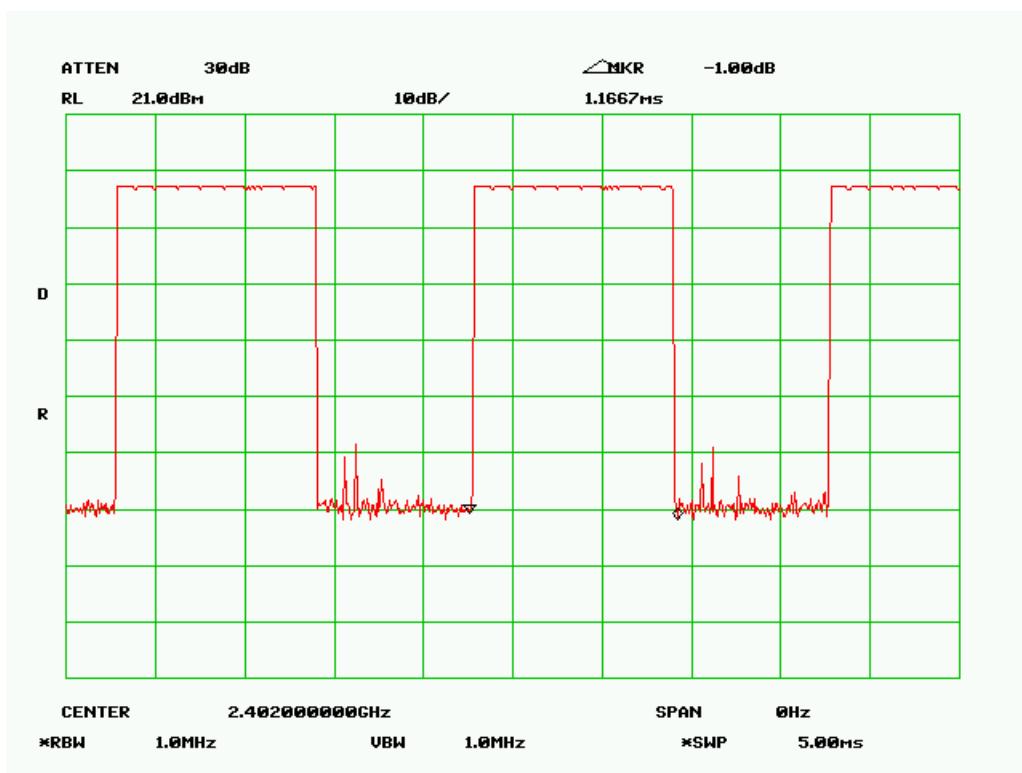
* The testing was performed by Dan Corona on 2007-04-20- 24

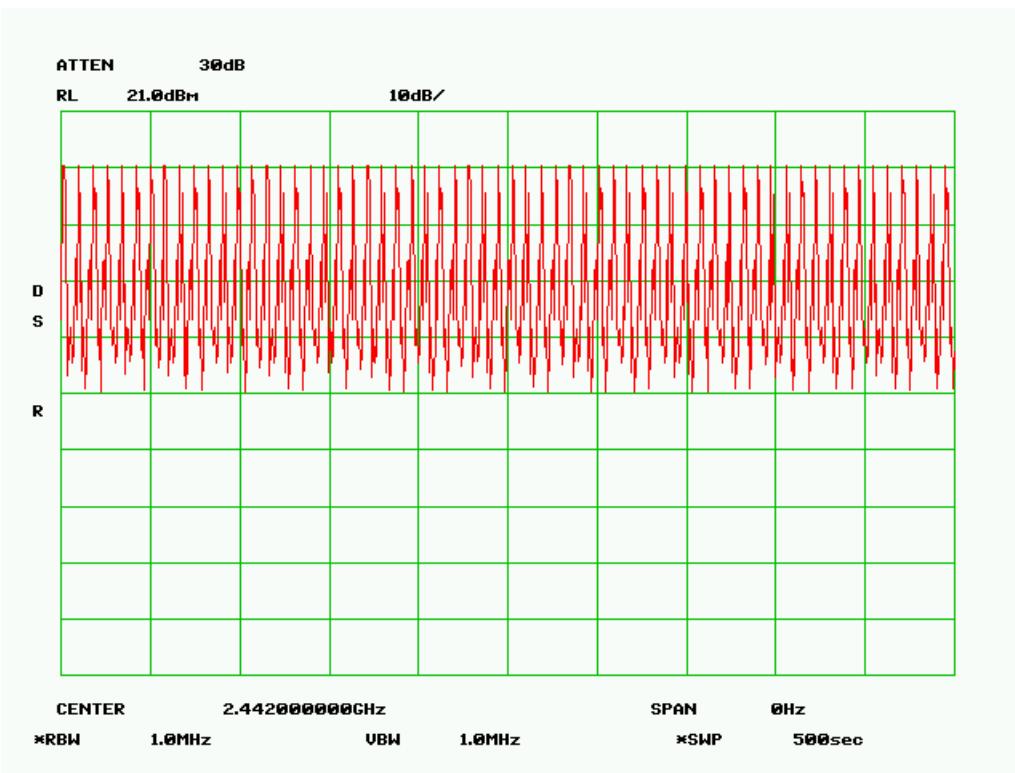
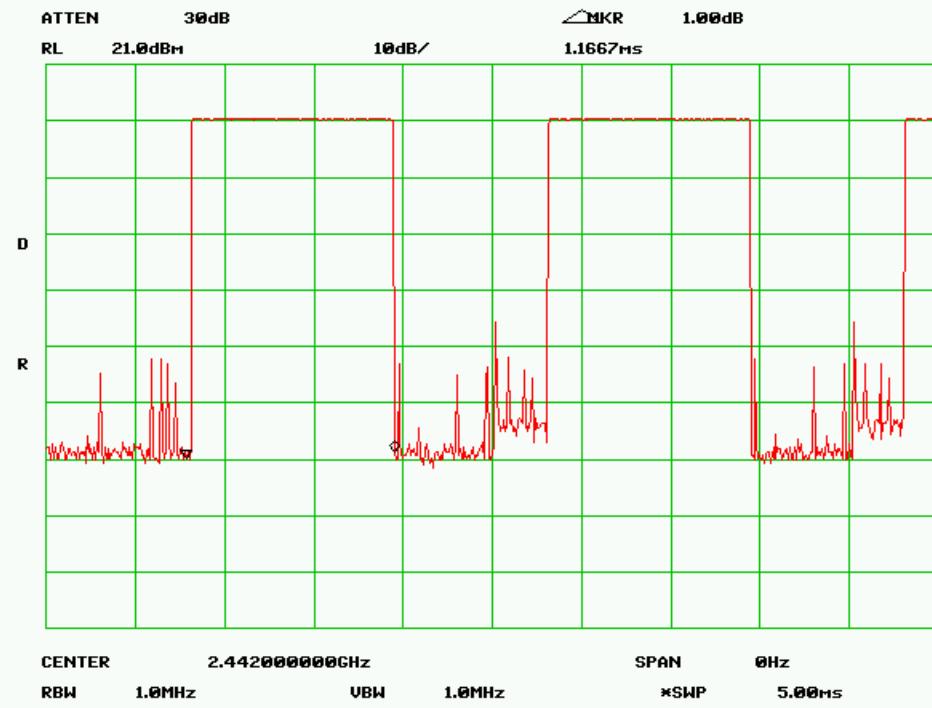
Measurement Results:

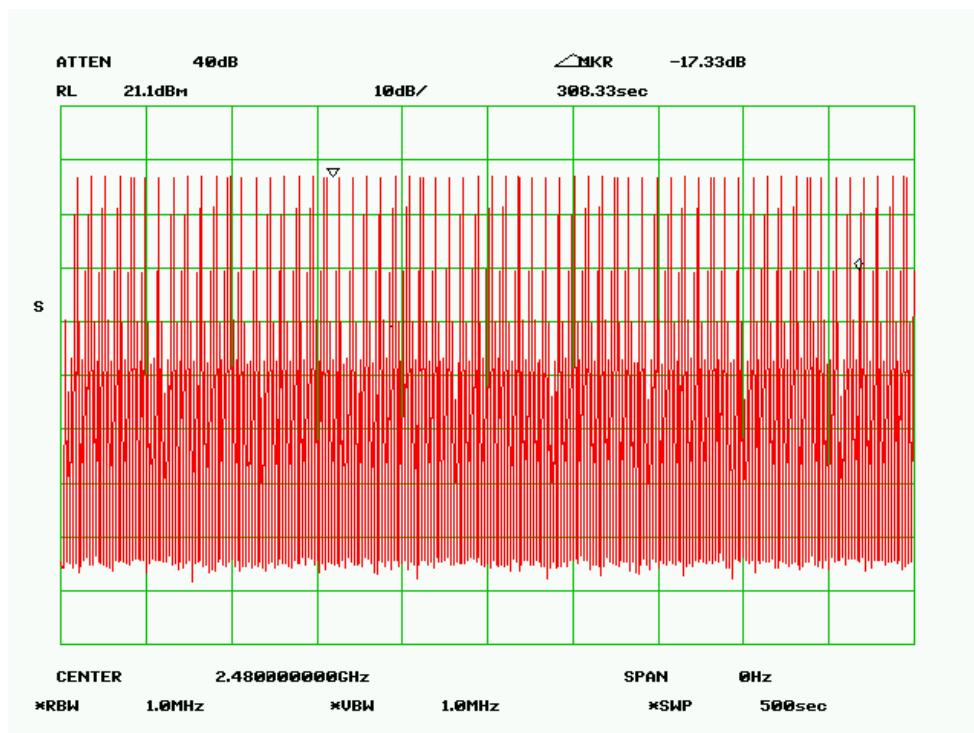
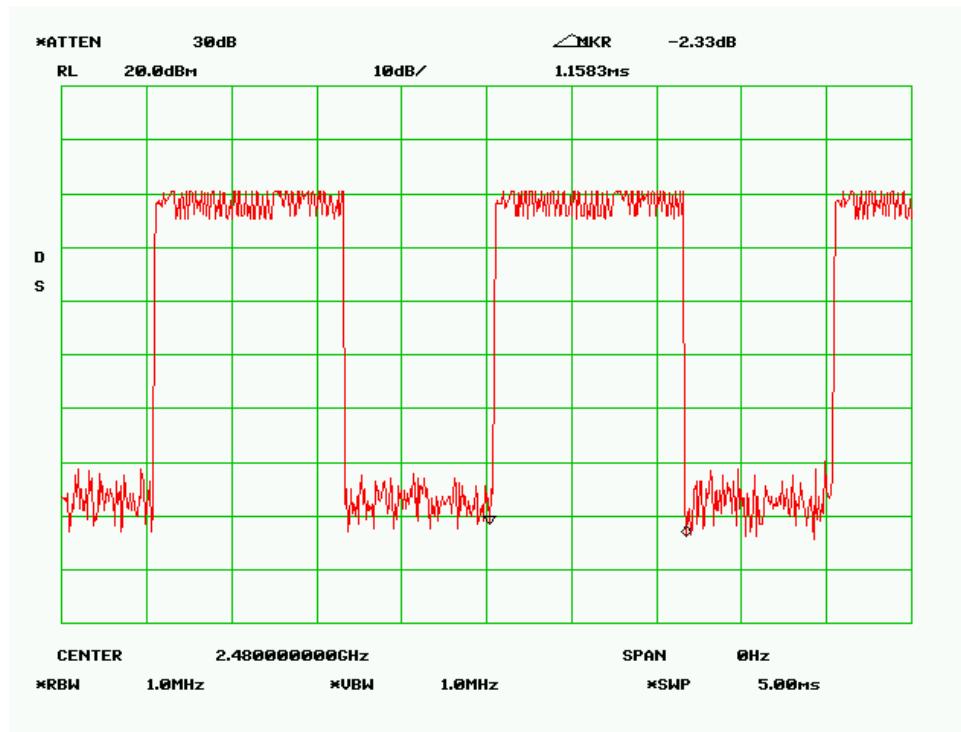
Channel	Frequency (MHz)	Pulse Width (ms)	Occupied Time	Dwell Time (sec.)	Limit (sec.)	Result
Low	2402.0	1.1500	44	0.0506	0.4	Pass
Mid	2442.0	1.1583	44	0.0510	0.4	Pass
High	2480.0	1.1583	61	0.0707	0.4	Pass

Please refer the following plots.

Low Channel



Middle Channel

High Channel

§15.247(B) (1) - MAXIMUM PEAK OUTPUT POWER

Applicable Standard

According to §15.247(b) (1), For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

Measurement Procedure

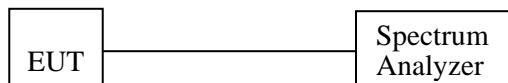
1. Place the EUT on the turntable and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Test Equipment

Manufacturer	Description	Model Number	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4440A	MY44303352	2007-02-23

* **Statement of Traceability:** BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Setup Diagram



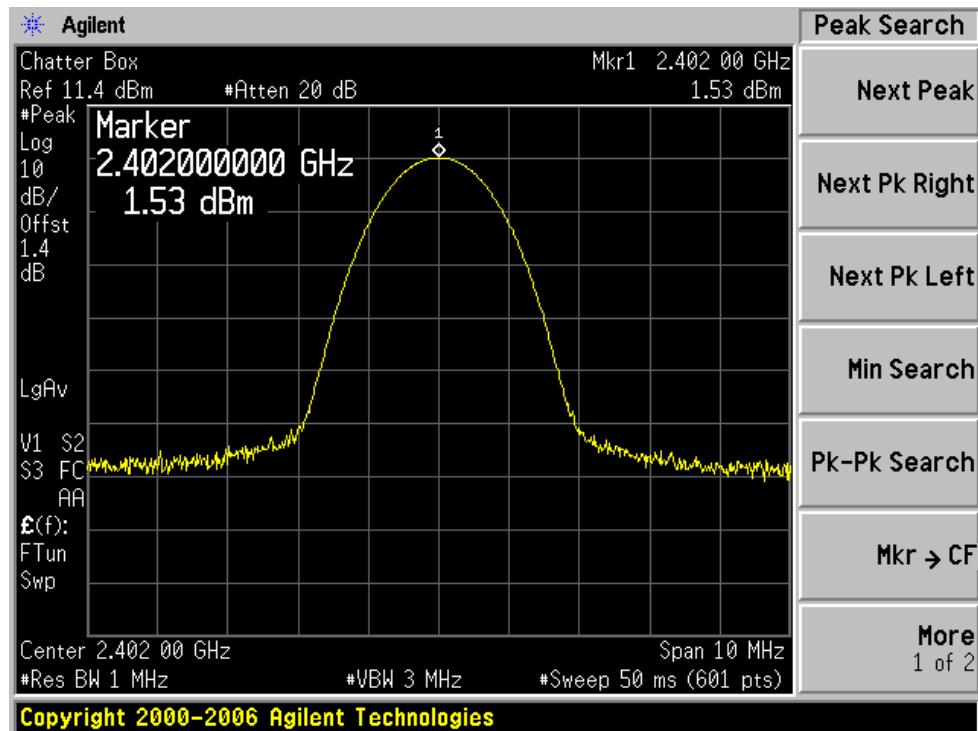
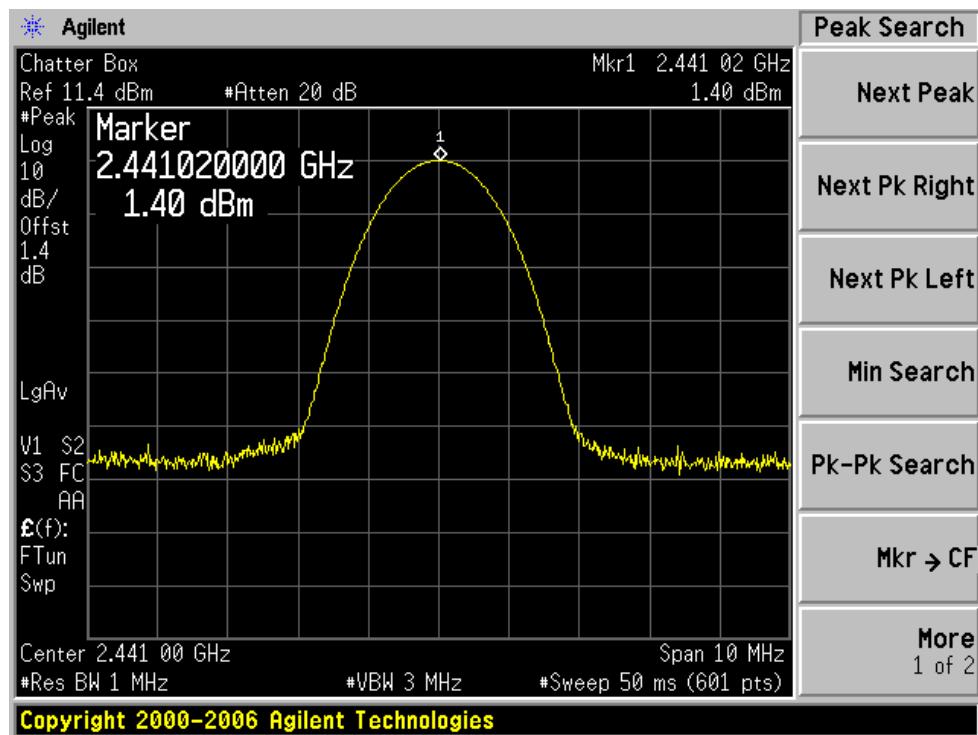
Environmental Conditions

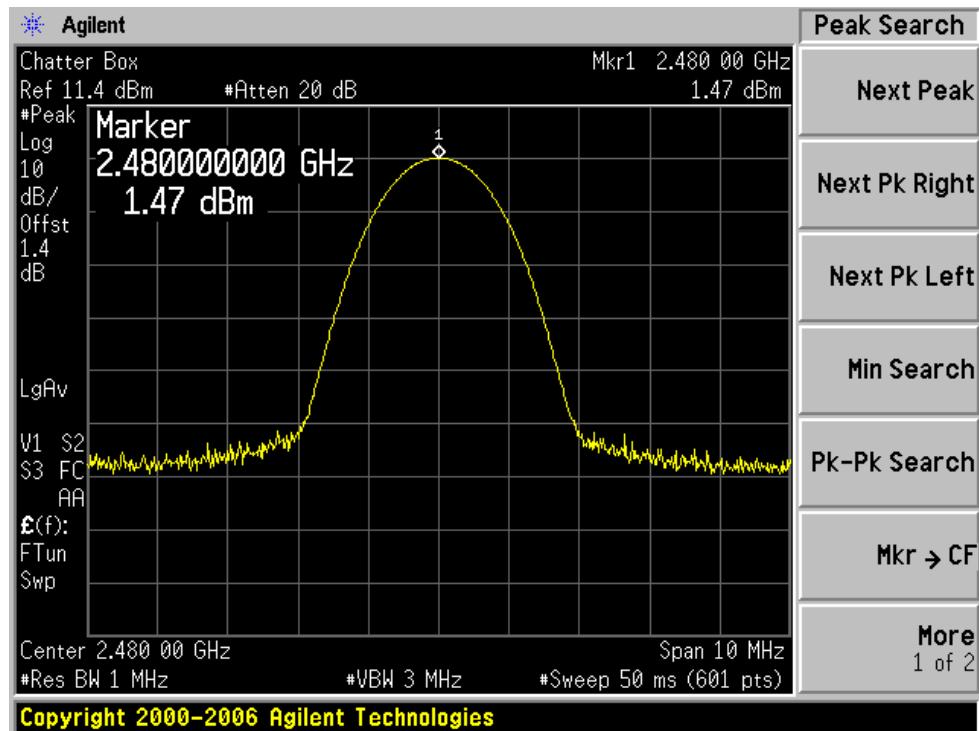
Temperature:	20 °C
Relative Humidity:	59 %
ATM Pressure:	102.0 kPa

* The testing was performed by Dan Corona on 2007-04-20- 24

Measurement Result

Channel	Frequency (MHz)	Max Peak Output Power		Limit (mw)	Result
		(dBm)	(mw)		
Low	2402.0	1.53	1.85	1000	pass
Mid	2442.0	1.40	1.46	1000	pass
High	2480.0	1.47	1.67	1000	pass

Plots of Maximum Peak Output Power**Low Channel****Middle Channel**

High Channel

§15.247 (c) - 100 kHz BANDWIDTH OF BAND EDGES

Applicable Standard

According to §15.247(c), 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 §15.209(a) is not required.

Measurement Procedure

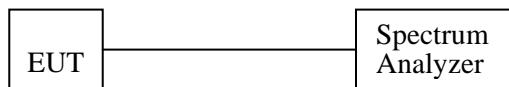
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
HP	Analyzer, Spectrum	8565EC	3946A00131	2007-01-24

* **Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Setup Diagram

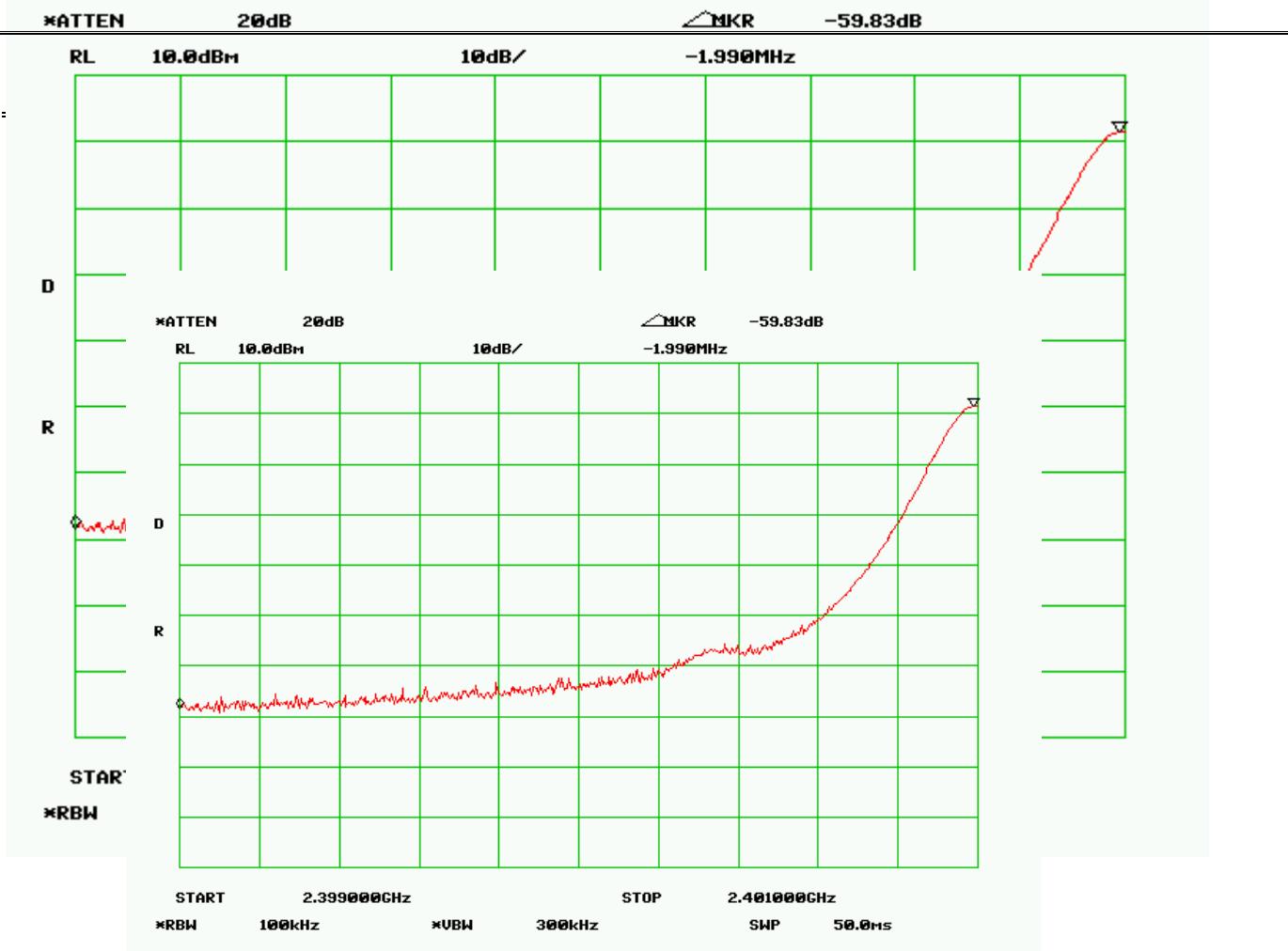


Environmental Conditions

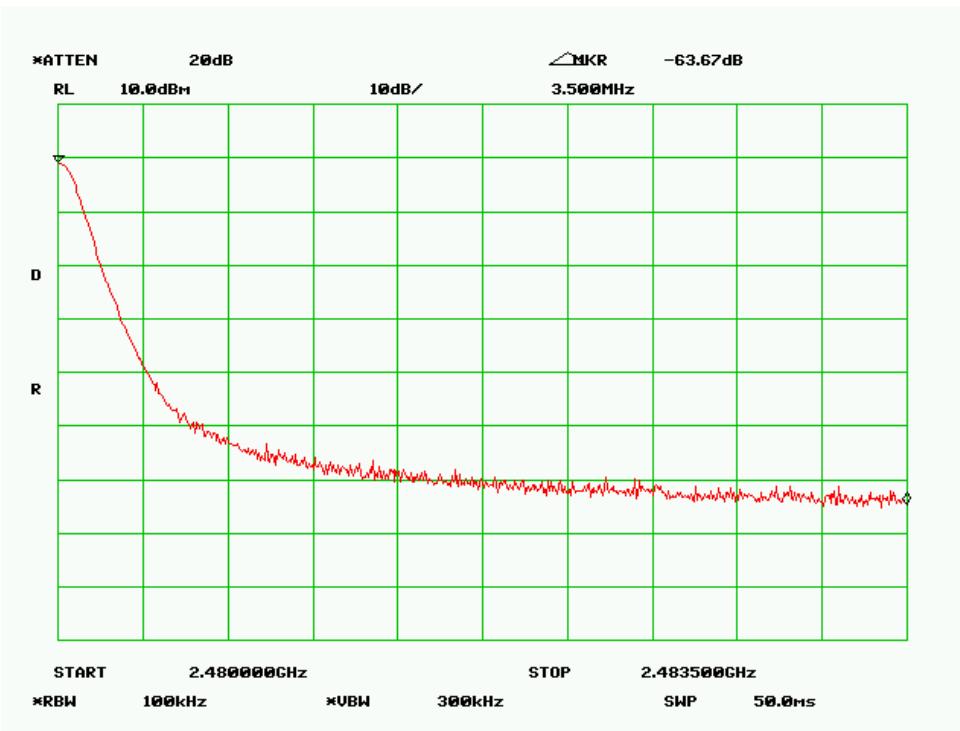
Temperature:	20 °C
Relative Humidity:	59 %
ATM Pressure:	102.0 kPa

* The testing was performed by Dan Corona on 2007-04-20- 24

Please refer to the following plots for results.



High Channel



§ 15.247 (e) (i) and § 2.1093 - RF EXPOSURE**Applicable standards**

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Since the output power of this device was so low (0.00185 Watts), it is below the TCB exclusion list (2002 July 17) low threshold and met the RF Exposure Requirement.

Result: SAR is not required for Bluetooth portion.

§2.1051 SPURIOUS EMISSIONS AT ANTENNA PORT

Applicable Standard

According to §15.209 (f) and §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit

Measurement Procedure

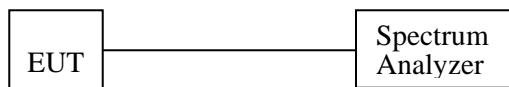
1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on a bench without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Spectrum Analyzer	E4440A	Agilent	MY44303352	2007-02-23

* **Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

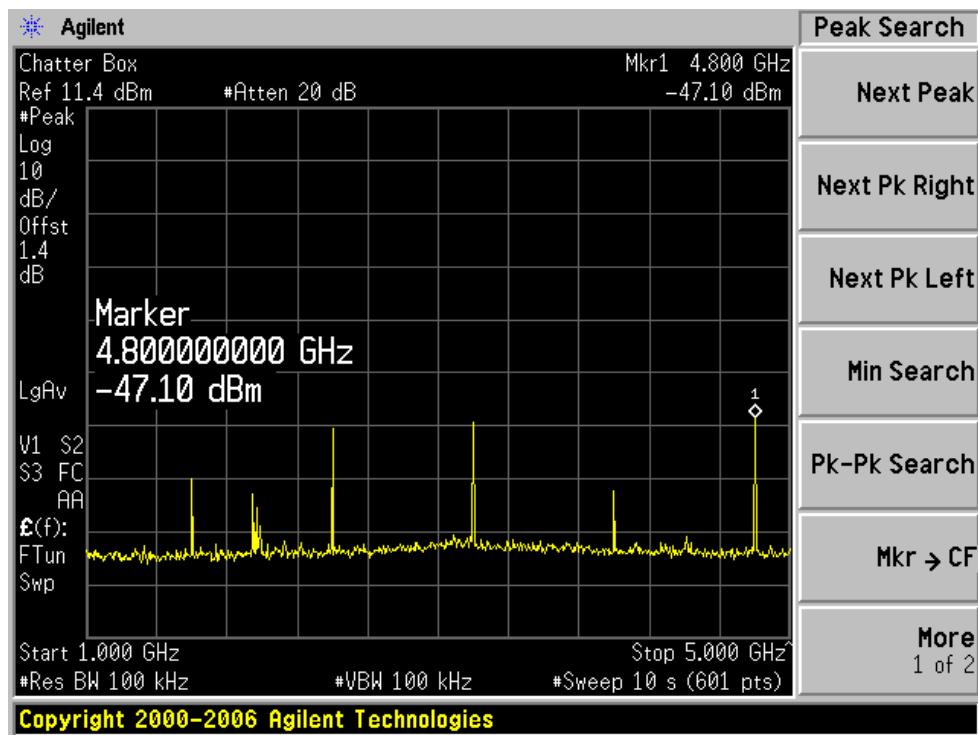
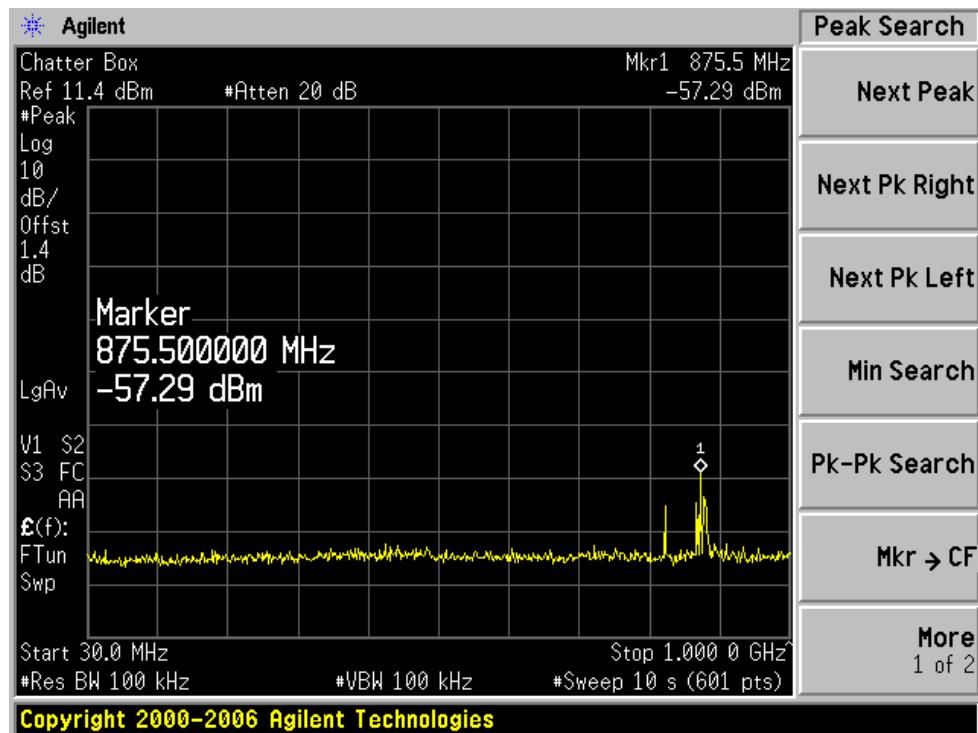
Test Setup Diagram

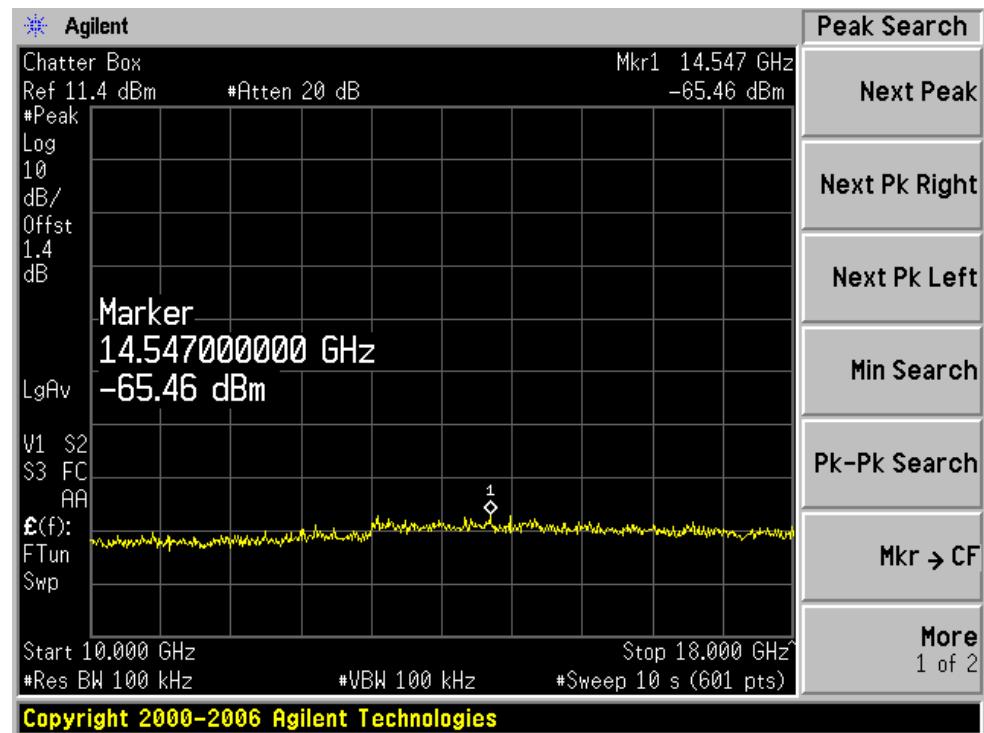
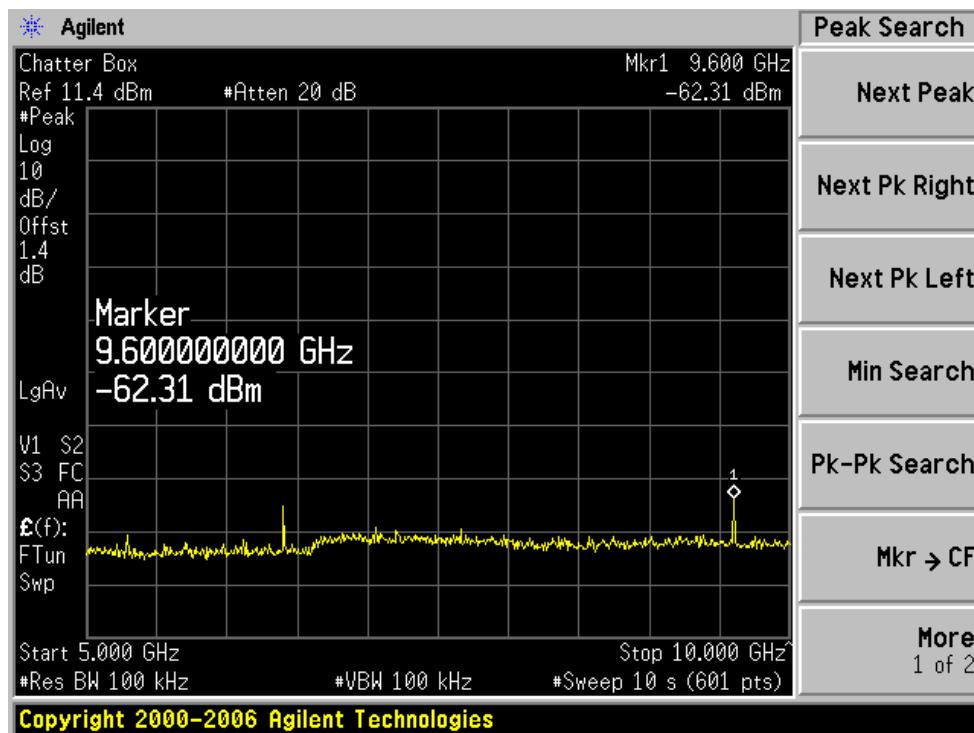


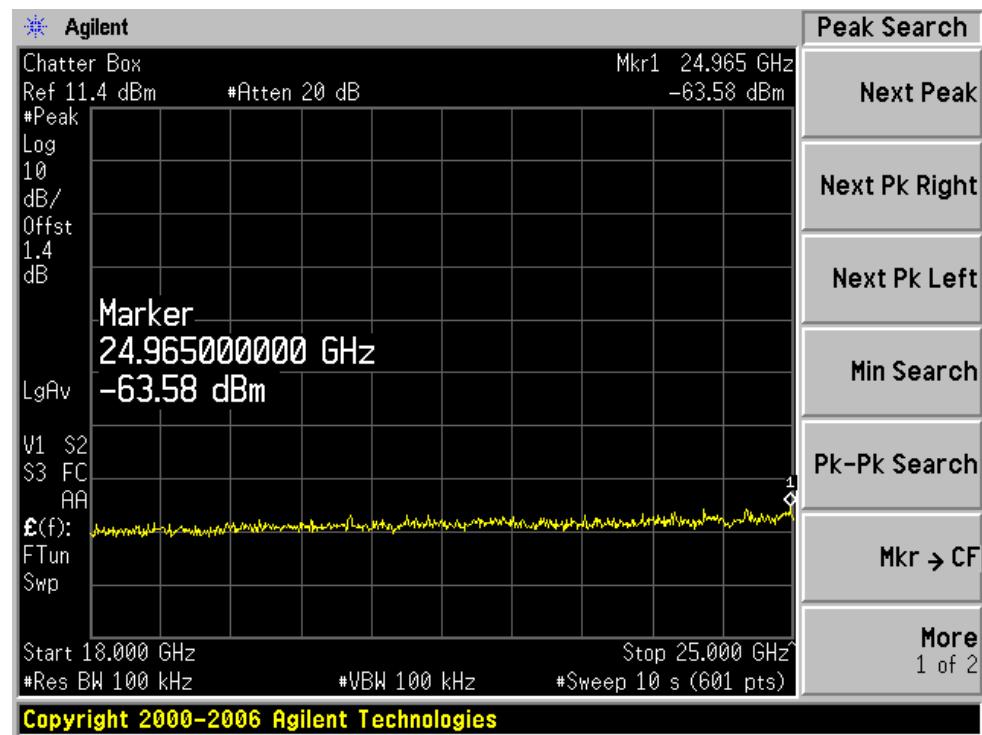
Environmental Conditions

Temperature:	20 °C
Relative Humidity:	59 %
ATM Pressure:	102.0 kPa

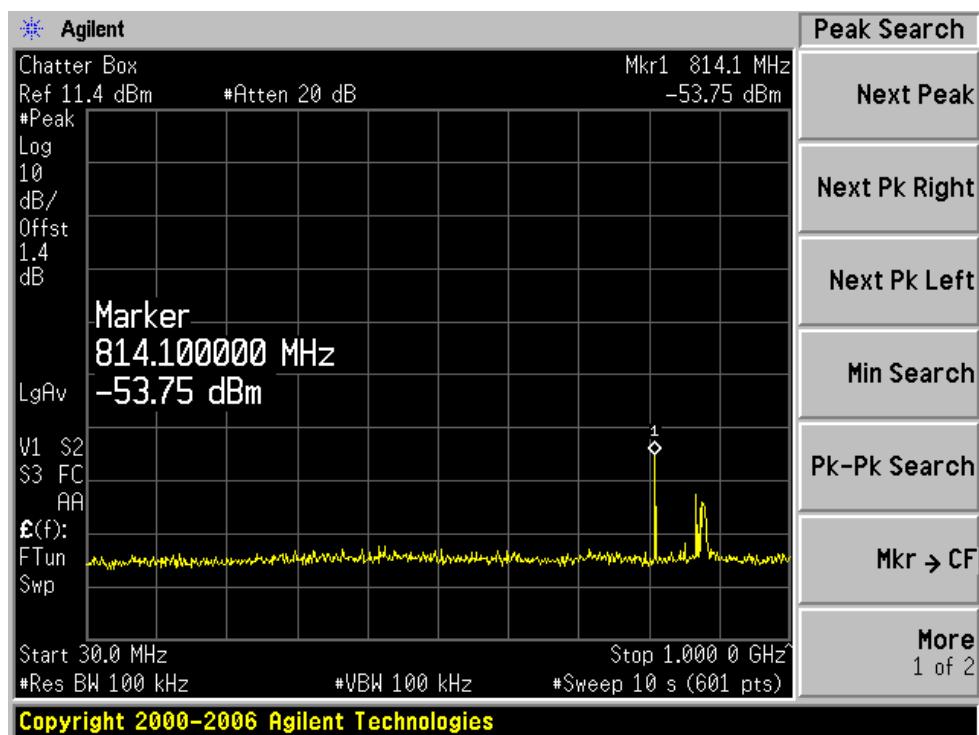
* The testing was performed by Dan Corona on 2007-04-20- 24

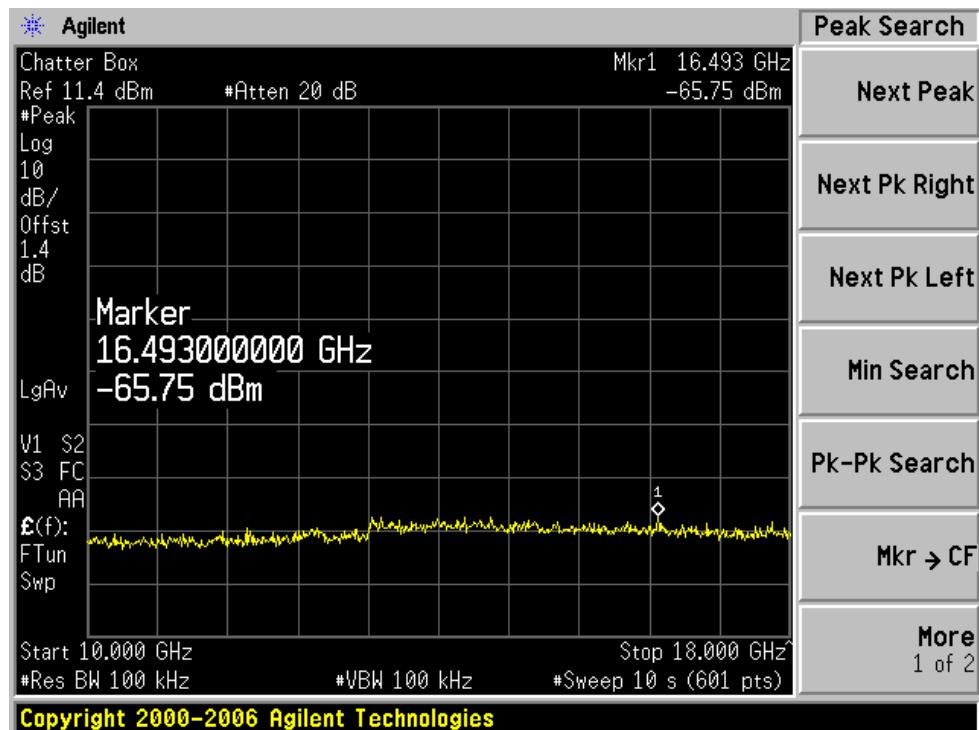
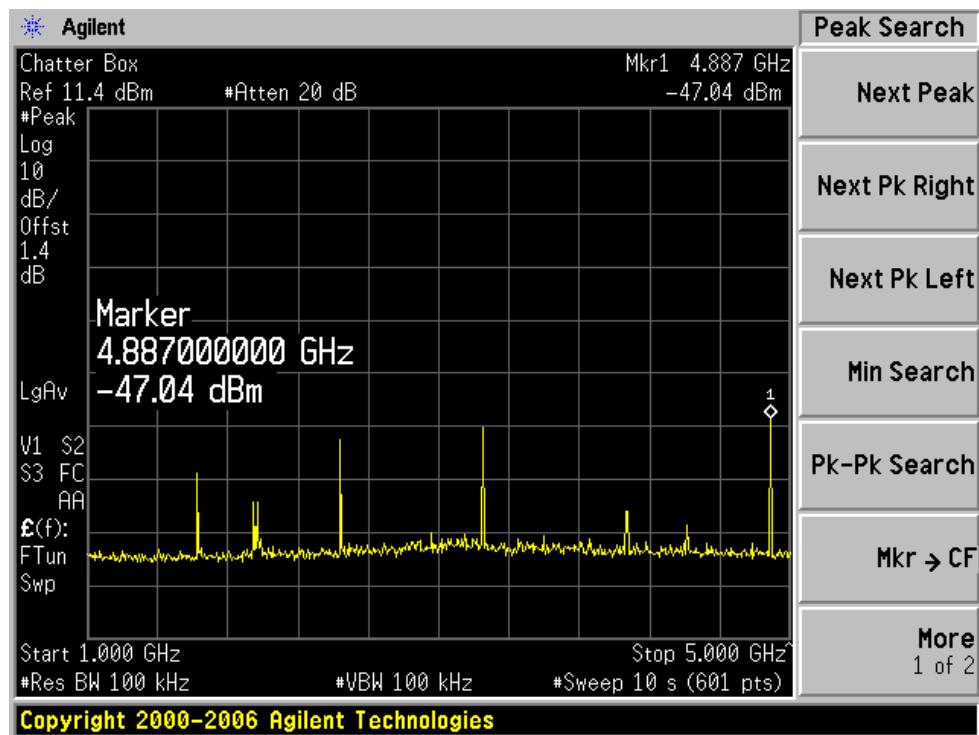
Measurement Results**Low Channel**

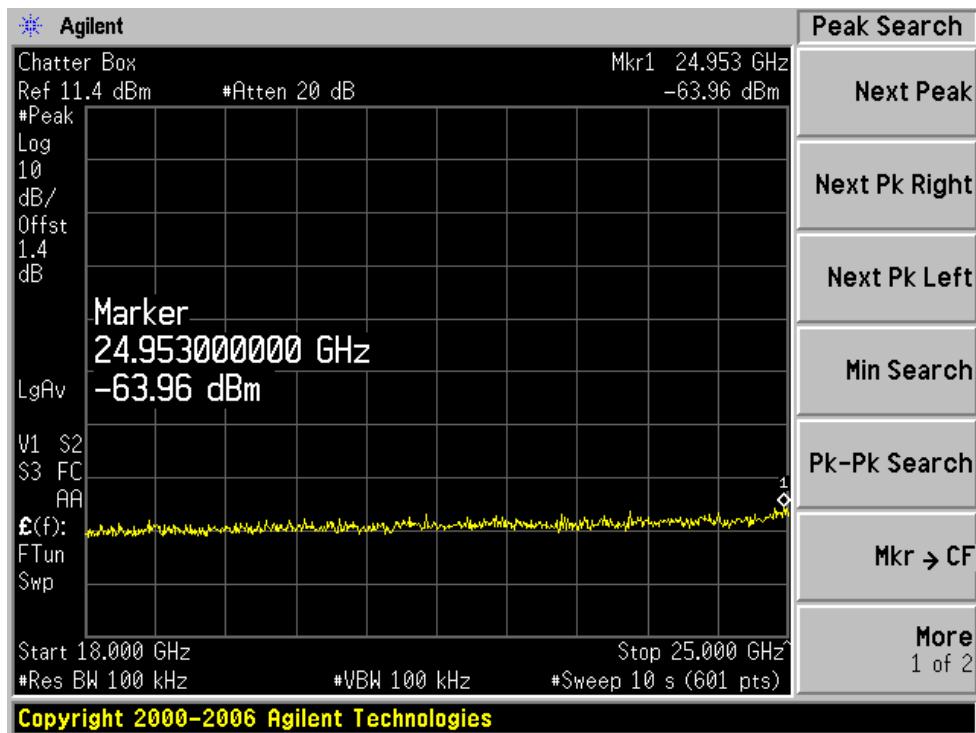
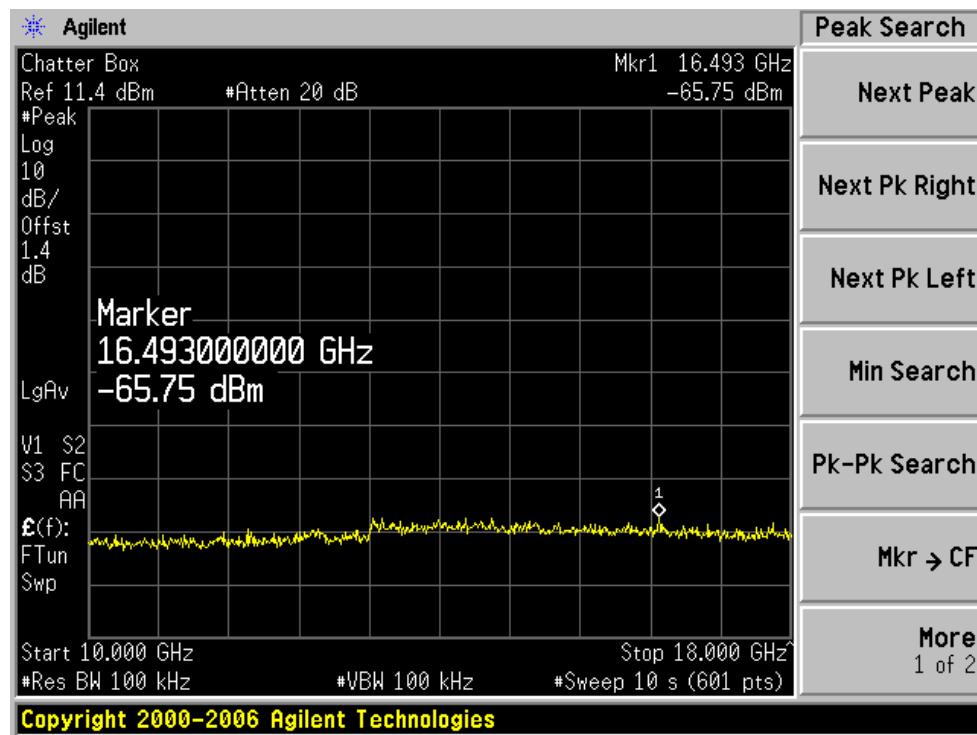




Middle Channel







High Channel