Lab Code: 200167-0

FCC PART 15.247

MEASUREMENT AND TEST REPORT

For

Chatter Box USA

16918 Edwards Road
Cerritos, CA 90703, USA

FCC ID: KA9HJC-XBI
Model: XBi

Report Type: ☒ Original Report	**Product Type:** Bluetooth Intercom
Test Engineer:	James Ma
Report No.:	R0802293-247
Report Date:	2008-05-29
Reviewed By:	Boni Baniqued Sr. RF Engineer
Prepared By:	Bay Area Compliance Laboratories Corporation (BACL) 1274 Anvilwood Avenue Sunnyvale, CA 94089, USA Tel: (408) 732-9162 Fax: (408) 732 9164

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

This BACL measurement and test report has been complied on behalf of *Chatter Box* and their product, FCC ID: *KA9HJC-XBI*or the "EUT" as referred to in this report, is Bluetooth intercom that allows communication from one person to another via CDMA crystal clear technology, using either voice activation or push-to-talk. Both personals module is capable of pairing with up to two accessory devices at the same time. (ex. iPod, Mp3, satellite radio, GPS, cell phone, radar detector) SMART technology will automatically prioritize the transmission of the paired devices. The EUT can even stream music from one module to the other. Each module is also capable of being used by itself to pair accessories when unaccompanied.

** The test data gathered are from a production sample, S/N: B1732, provided by the manufacturer.*

EUT Photo

Additional photos in exhibit C

EUT Mechanical Description

The *Chatter Box* product, *model: XBi,* measures approximately 76.2 mmL x 38.1 mmW x 19 mmH and weighs approximately 75 g.

Objective

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

Related Submittal(s)/Grant(s)

N/A

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 normal (native) 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 unshielded.

Equipment Modifications

No modifications were made to the EUT.

Power Supply

Manufacturer	Description	Model	Serial Number
HP	Power Supply	6236B	2003A05705

Interface Ports and Cabling

Cable Description	Length (m)	Port/From	To
RS232 Cable	1.5	Notebook serial port	AIRLogic Test Board
Control Cable	0.5	AIRLogic Test Board	Interface PCB Connect to EUT

Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
DELL	Notebook	D620	S-0003007	None

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirements	Compliant
§15.207 (a)	Conducted Emissions	Compliant
§ 15.205	Restricted Bands	Compliant
§15.205, §15.209, & §15.247(d)	Radiated Emissions	Compliant
§15.247 (a) (1)	Channel Bandwidth	Compliant
§15.247 (a) (1)	Hopping Channel Separation	Compliant
§15.247 (a) (1) (iii)	Number of Hopping Frequencies Used	Compliant
§15.247 (a) (1) (iii)	Dwell Time	Compliant
§15.247 (b) (1)	Maximum Peak Output Power	Compliant
§ 15.247 (d)	Band Edge	Compliant
§ 2.1051	Spurious Emissions at Antenna Port	Compliant
§ 15.247 (i) & §2.1093	RF Exposure	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 µH/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 of emission (MHz)	Conducted limit (dBuV)	
	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*

EUT Setup

The conducted emissions tests were performed in the 10-meter test chamber, using the setup in accordance with ANSI C63.4-2003 measurement procedures. The specifications used were in accordance with FCC Part 15 Standard, Class B limits.

The adapter of EUT was connected to a 120 V, 60 Hz AC mains power source.

Test Procedure

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

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Solar Electronics Co.	Line Impedance Stabilization Network	9252-R-24-BNC	0511213	2007-07-30
Rohde & Schwarz	EMI Test Receiver	ESCI	100337	2008-04-21

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

Environmental Conditions

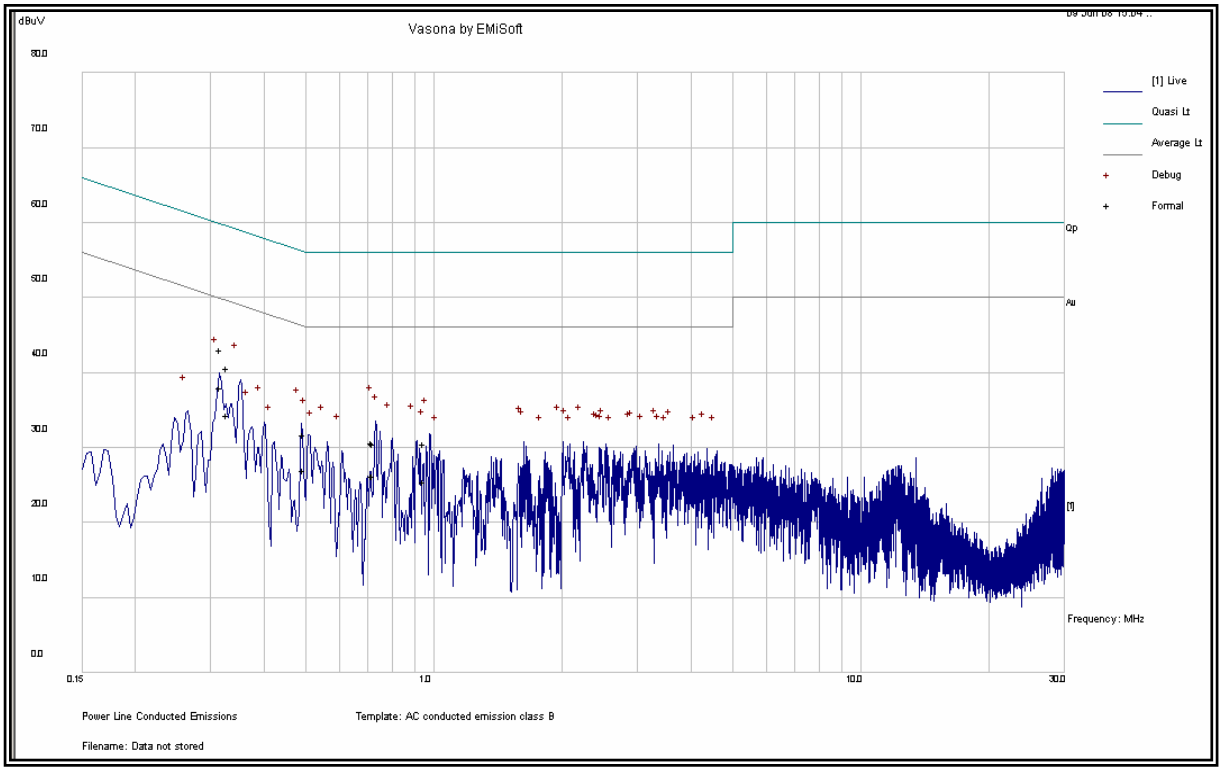
Temperature:	20°C
Relative Humidity:	30%
ATM Pressure:	1015mbar

**Testing was performed by Vang Her on 2008-06-03.*

Test Result: According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15C section 15.207 standard's Conducted emissions limits and had the worst margin of:

-16.44dB **at 0.322**MHz **in the** live **conductor,** 120V/60Hz

Conducted Emissions Test Data - Live



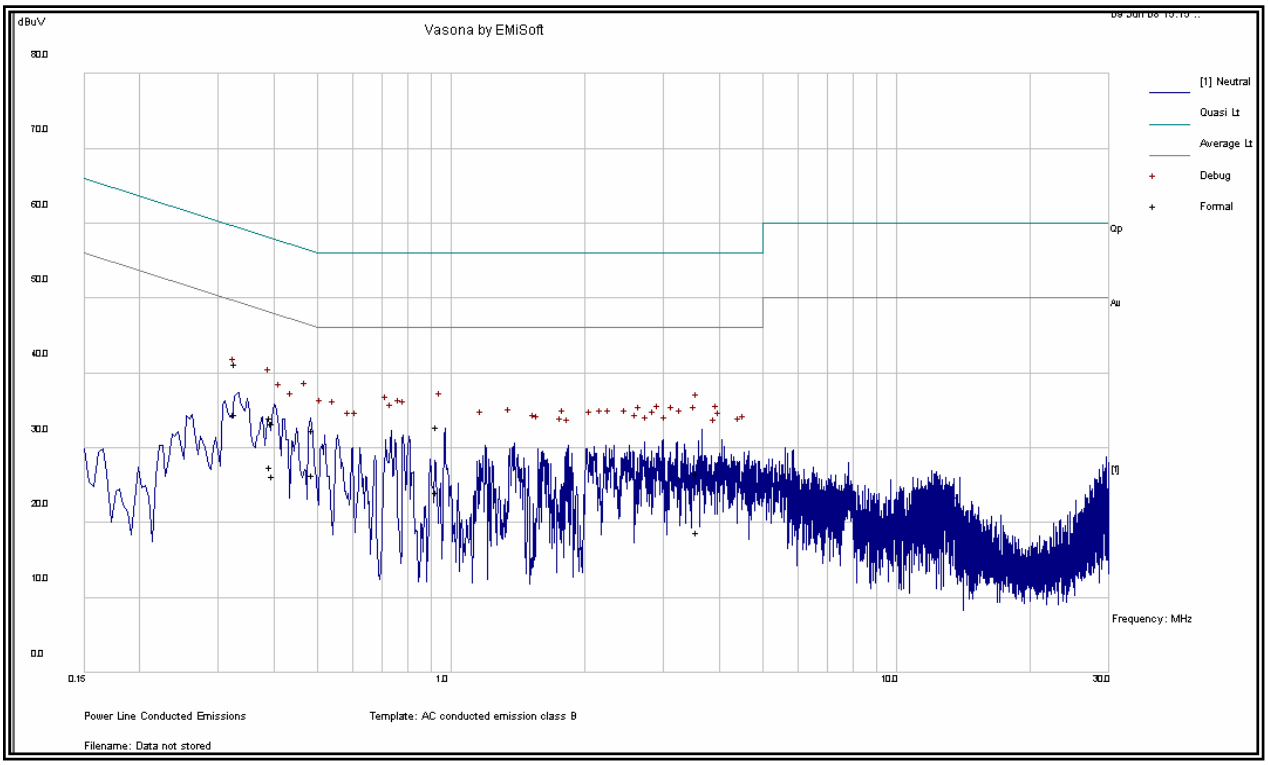
QP Measurements

Frequency (MHz)	Quasi-Peak (dBµV)	Conductor (L/N)	Limit (dBµV)	Margin (dB)
0.335	35.85	Live	59.33	-23.49
0.322	38.36	Live	59.65	-21.29
0.735	25.76	Live	56	-30.24
0.504	27.02	Live	56	-28.98
0.729	25.95	Live	56	-30.05
0.968	25.8	Live	56	-30.2

Average Measurements

Frequency (MHz)	Average (dBµV)	Line (L/N)	Limit (dBµV)	Margin (dB)
0.335	29.53	Live	49.33	-19.8
0.322	33.22	Live	49.65	-16.44
0.735	21.47	Live	46	-24.53
0.504	22.25	Live	46	-23.75
0.729	21.53	Live	46	-24.47
0.968	20.69	Live	46	-25.31

Conducted Emissions Test Data – Neutral



QP Measurements

Frequency (MHz)	Quasi-Peak (dBµV)	Conductor (L/N)	Limit (dBµV)	Margin (dB)
0.4	29.27	Neutral	57.84	-28.57
0.335	36.42	Neutral	59.33	-22.91
0.499	27.56	Neutral	56.01	-28.46
0.951	27.99	Neutral	56	-28.01
3.647	21.84	Neutral	56	-34.16
0.405	28.54	Neutral	57.74	-29.2

Average Measurements

Frequency (MHz)	Average (dBµV)	Line (L/N)	Limit (dBµV)	Margin (dB)
0.4	22.64	Neutral	47.84	-25.2
0.335	29.8	Neutral	49.33	-19.53
0.499	21.71	Neutral	46.01	-24.3
0.951	19.31	Neutral	46	-26.69
3.647	13.97	Neutral	46	-32.03
0.405	21.46	Neutral	47.74	-26.28

§15.205, §15.209 & §15.247(D) - RADIATED EMISSIONS

Applicable Standard

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

MHz	MHz	MHz	GHz
0.090 – 0.110 0.495 – 0.505 2.1735 – 2.1905 4.125 – 4.128 4.17725 – 4.17775 4.20725 – 4.20775 6.215 – 6.218 6.26775 – 6.26825 6.31175 – 6.31225 8.291 – 8.294 8.362 – 8.366 8.37625 – 8.38675 8.41425 – 8.41475 12.29 – 12.293 12.51975 – 12.52025 12.57675 – 12.57725 13.36 – 13.41	16.42 – 16.423 16.69475 – 16.69525 25.5 – 25.67 37.5 – 38.25 73 – 74.6 74.8 – 75.2 108 – 121.94 123 – 138 149.9 – 150.05 156.52475 – 156.52525 156.7 – 156.9 162.0125 –167.17 167.72 – 173.2 240 – 285 322 – 335.4 399.9 – 410 608 – 614	960 – 1240 1300 – 1427 1435 – 1626.5 1645.5 – 1646.5 1660 – 1710 1718.8 – 1722.2 2200 – 2300 2310 – 2390 2483.5 – 2500 2690 – 2900 3260 – 3267 3.332 – 3.339 3 3458 – 3 358 3.600 – 4.400	4. 5 – 5. 15 5. 35 – 5. 46 7.25 – 7.75 8.025 – 8.5 9.0 – 9.2 9.3 – 9.5 10.6 – 12.7 13.25 – 13.4 14.47 – 14.5 15.35 – 16.2 17.7 – 21.4 22.01 – 23.12 23.6 – 24.0 31.2 – 31.8 36.43 – 36.5 Above 38.6

As per FCC §15.209(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 (micro volts/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.

Test Setup

For the radiated emissions test, the EUT, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto

Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

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:

Corrected Amplitude = Indicated Reading + Antenna Factor + Cable Factor - 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:

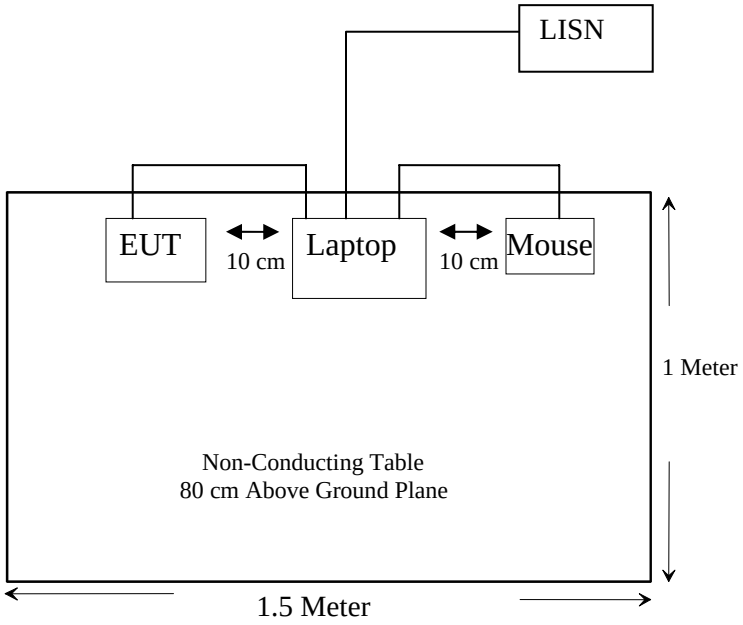
Margin = Corrected Amplitude - FCC Limit

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Ducommun Tech.	Amplifier, Pre	ALN-09173030-01	990297-01	2008-02-03
Agilent	Spectrum Analyzer	E4440A	MY44303352	2008-04-28
A. R.A	Horn Antenna	DRG-118/A	1132	2007-08-17

*** 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:	24 ° C
Relative Humidity:	65 %
ATM Pressure:	1020 mbar

**The testing was performed by James Ma on 2008-05-24.*

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:

-5.7 dB at **2402.0 MHz** in the **Vertical** polarization at **Low** Channel

-5.4 dB at **2441.0 MHz** in the **Vertical** polarization at **Middle** Channel

-7.1 dB at **2480.0 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 - With Notch filter

Run # 1: Low CH = 2402.0 MHz

Frequency (MHz)	Reading (dBuV)	Azimuth (Degrees)	Ant. Height (m)	Ant. Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comments
2402.0	93.6	200	1.7	V	28.7	6.1	36.6	91.7			Fund/Peak
2402.0	91.2	190	2.8	H	28.7	6.1	36.6	89.3			Fund/Peak
2402.0	93.3	180	1.2	V	28.7	6.1	36.6	91.4			Ave
2402.0	91.0	0	1.2	H	28.7	6.1	36.6	89.1			Ave
4804.0	45.3	270	2.4	V	32.5	8.9	37.2	49.5	74	-24.5	Peak
4804.0	44.2	180	2.3	H	32.5	8.9	37.2	48.4	74	-25.6	Peak
4804.0	44.1	270	2.4	V	32.5	8.9	37.2	48.3	54	-5.7	Ave
4804.0	44.0	180	2.3	H	32.5	8.9	37.2	48.2	54	-5.8	Ave
7206.0	30.0	90	2.0	V	36.7	10.3	35.4	41.7	74	-32.3	Peak
7206.0	29.1	180	2.0	H	36.7	10.3	35.4	40.8	74	-33.2	Peak
7206.0	28.9	180	2.0	V	36.7	10.3	35.4	40.6	54	-13.4	Ave
7206.0	28.6	90	2.0	H	36.7	10.3	35.4	40.3	54	-13.7	Ave
3200.0	48.2	90	2.0	V	29.8	7.1	37.7	47.4	74	-26.6	Peak
3200.0	47.5	180	2.0	H	29.8	7.1	37.7	46.7	74	-27.3	Peak
3200.0	47.3	180	2.0	V	29.8	7.1	37.7	46.5	54	-7.5	Ave
3200.0	47.0	90	2.0	H	29.8	7.1	37.7	46.2	54	-7.8	Ave

Run # 2: Mid CH = 2441.0 MHz

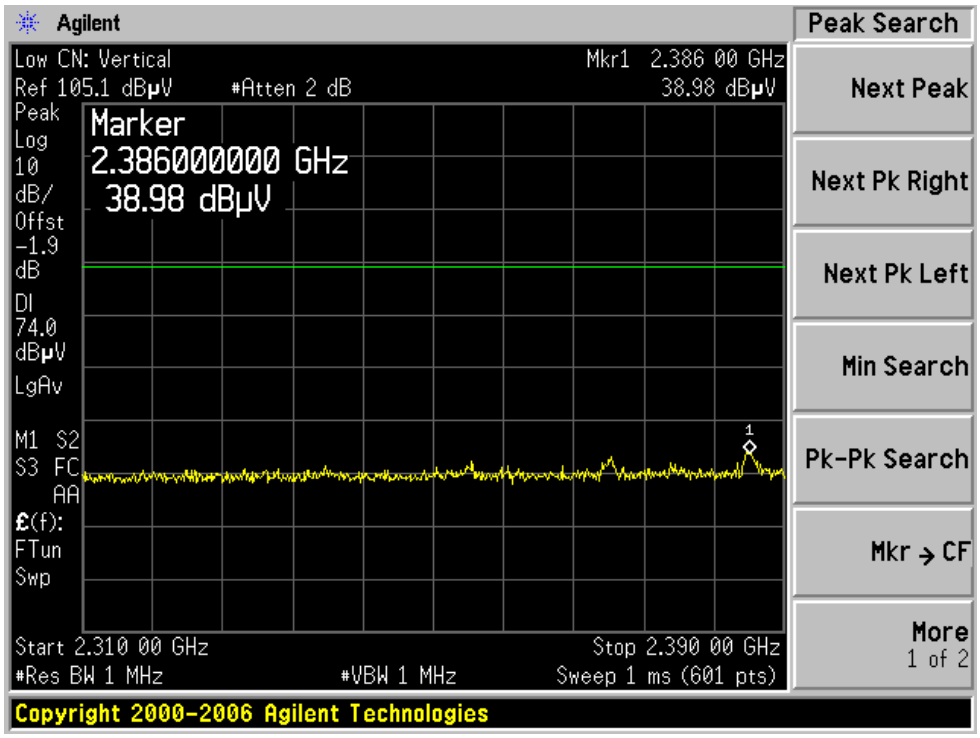
Frequency (MHz)	Reading (dBuV)	Azimuth (Degrees)	Ant. Height (m)	Ant. Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comments
2441.0	91.5	180	1.3	V	28.7	6.1	36.6	89.6			Fund/Peak
2441.0	90.6	180	1.2	H	28.7	6.1	36.6	88.7			Fund/Peak
2441.0	91.2	180	1.3	V	28.7	6.1	36.6	89.3			Ave
2441.0	90.4	180	1.2	H	28.7	6.1	36.6	88.5			Ave
4882.0	42.4	270	2.4	V	32.5	8.9	37.2	46.6	74	-27.4	Peak
4882.0	41.5	180	2.2	H	32.5	8.9	37.2	45.7	74	-28.3	Peak
4882.0	41.7	270	2.4	V	32.5	8.9	37.2	45.9	54	-8.1	Ave
4882.0	40.8	180	2.2	H	32.5	8.9	37.2	45.0	54	-9.0	Ave
7323.0	29.8	270	2.4	V	36.7	10.3	35.4	41.4	74	-32.6	Peak
7323.0	28.5	180	2.3	H	36.7	10.3	35.4	40.1	74	-33.9	Peak
7323.0	29.1	270	2.4	V	36.7	10.3	35.4	40.7	54	-13.3	Ave
7323.0	28.2	180	2.1	H	36.7	10.3	35.4	39.8	54	-14.2	Ave
3254.0	51.2	270	2.4	V	29.8	7.1	37.7	50.4	74	-23.6	Peak
3254.0	50.1	180	2.3	H	29.8	7.1	37.7	49.3	74	-24.7	Peak
3254.0	49.4	270	2.4	V	29.8	7.1	37.7	48.6	54	-5.4	Ave
3254.0	49.2	180	2.1	H	29.8	7.1	37.7	48.4	54	-5.6	Ave

Run # 3: High CH = 2480.0 MHz

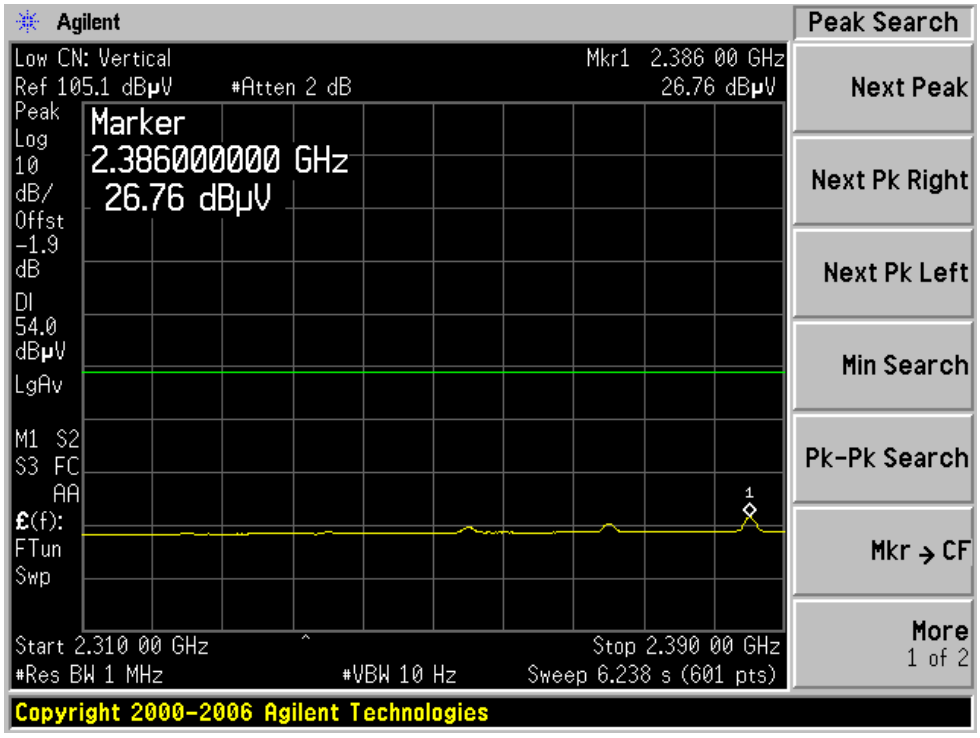
Frequency (MHz)	Reading (dBuV)	Azimuth (Degrees)	Ant. Height (m)	Ant. Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comments
2480.0	89.2	180	1.3	V	28.7	6.1	36.6	87.3			Fund/Peak
2480.0	87.8	180	1.2	H	28.7	6.1	36.6	85.9			Fund/Peak
2480.0	89.0	180	1.3	V	28.7	6.1	36.6	87.1			Ave
2480.0	87.5	180	1.2	H	28.7	6.1	36.6	85.6			Ave
4960.0	43.0	270	2.4	V	32.5	9.0	37.0	47.4	74	-26.6	Peak
4960.0	42.2	90	2.1	H	32.5	9.0	37.0	46.6	74	-27.4	Peak
4960.0	42.5	270	2.4	V	32.5	9.0	37.0	46.9	54	-7.1	Ave
4960.0	39.8	90	2.1	H	32.5	9.0	37.0	44.2	54	-9.8	Ave
7440.0	30.0	270	2.4	V	36.7	10.3	35.5	41.6	74	-32.4	Peak
7440.0	29.1	90	2.1	H	36.7	10.3	35.5	40.7	74	-33.3	Peak
7440.0	28.8	270	2.4	V	36.7	10.3	35.5	40.4	54	-13.6	Ave
7440.0	28.3	90	2.1	H	36.7	10.3	35.5	39.9	54	-14.1	Ave
3307.0	43.7	270	2.4	V	29.8	7.2	37.7	43.1	74	-30.9	Peak
3307.0	42.5	90	2.1	H	29.8	7.2	37.7	41.9	74	-32.1	Peak
3307.0	42.8	270	2.4	V	29.8	7.2	37.7	42.2	54	-11.8	Ave
3307.0	42.0	90	2.1	H	29.8	7.2	37.7	41.4	54	-12.6	Ave

Restricted Band Edge

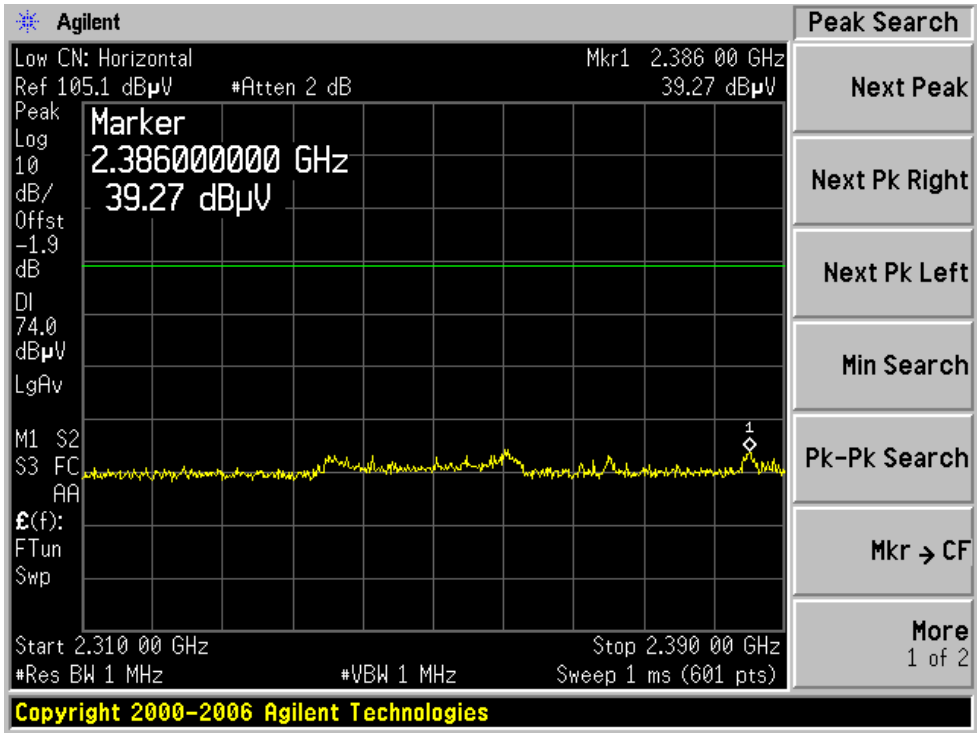
Low Channel, Peak, Vertical



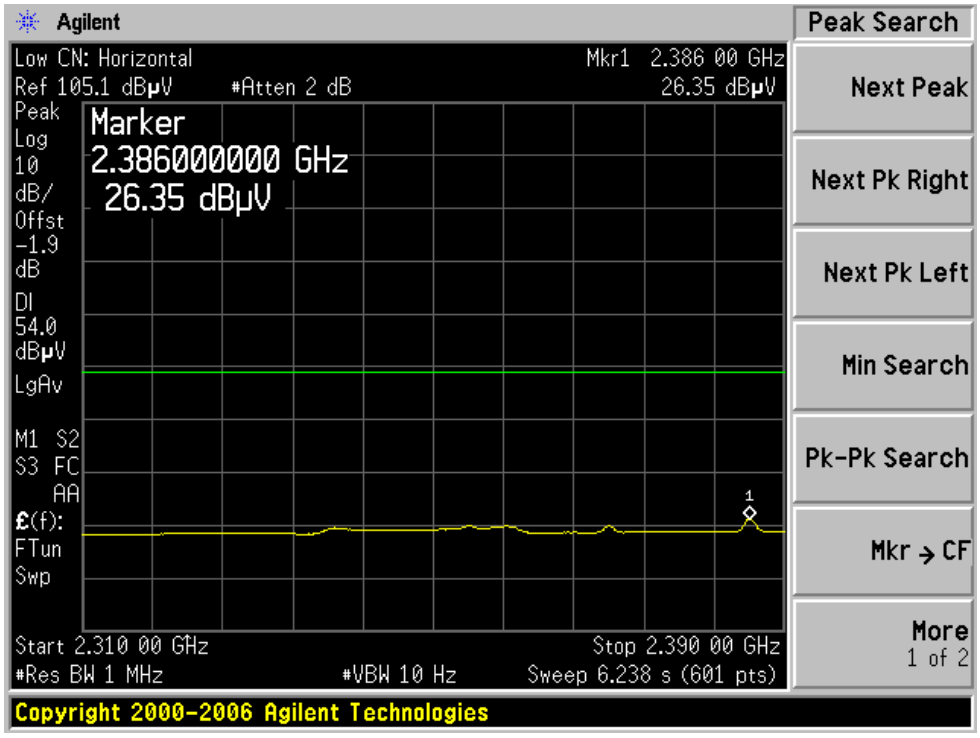
Low Channel, Average, Vertical



Low Channel, Peak, Horizontal

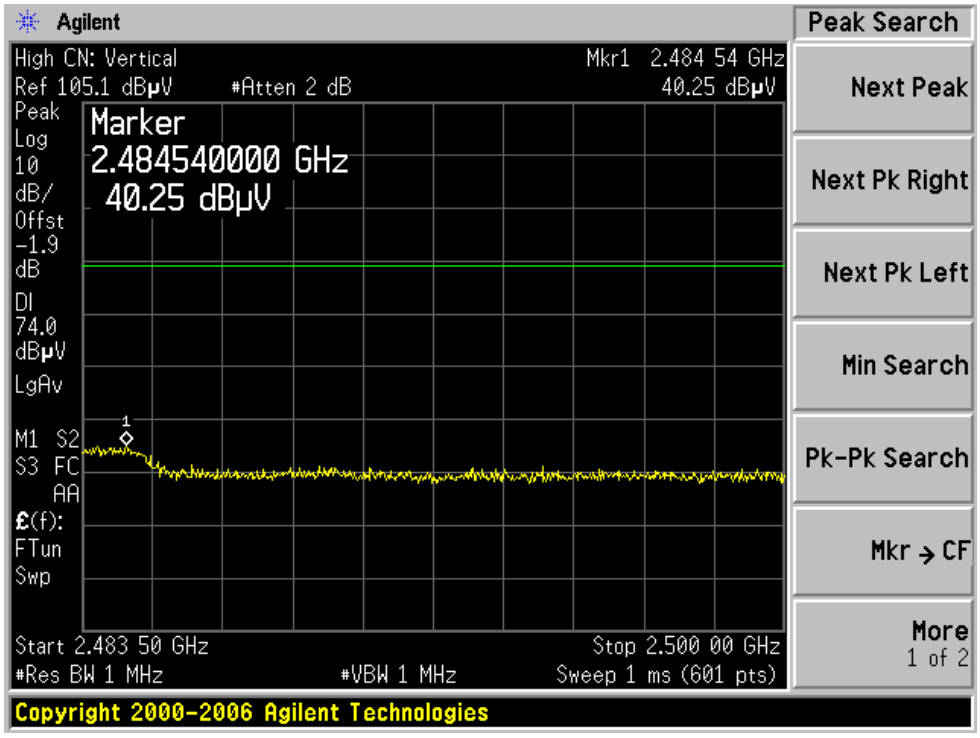


Low Channel, Average, Horizontal

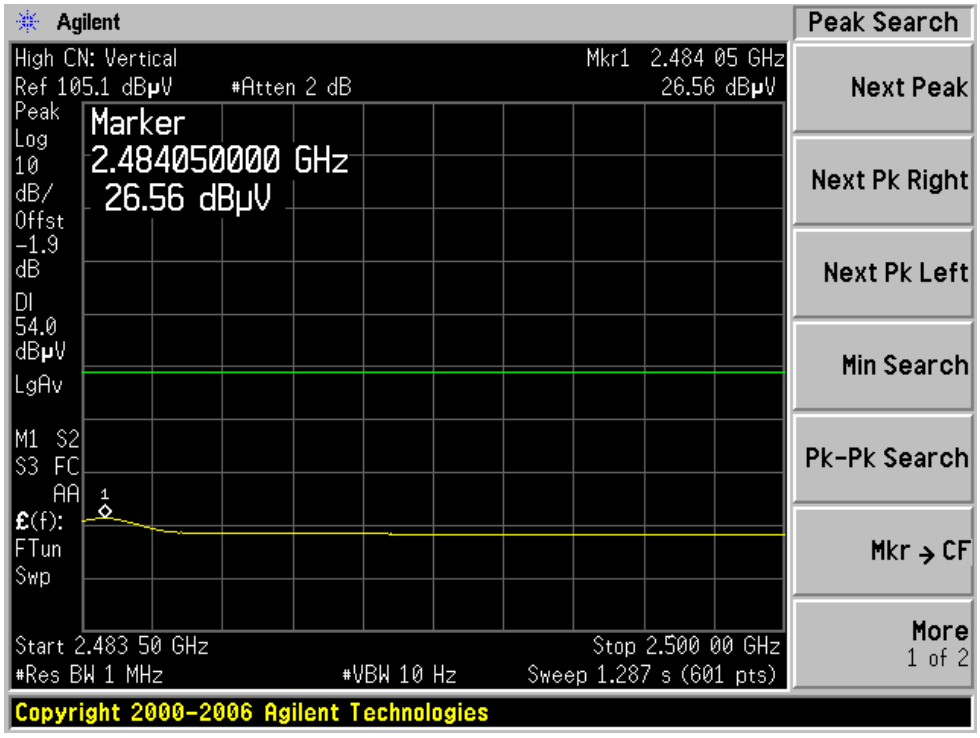


Restricted Band Edge

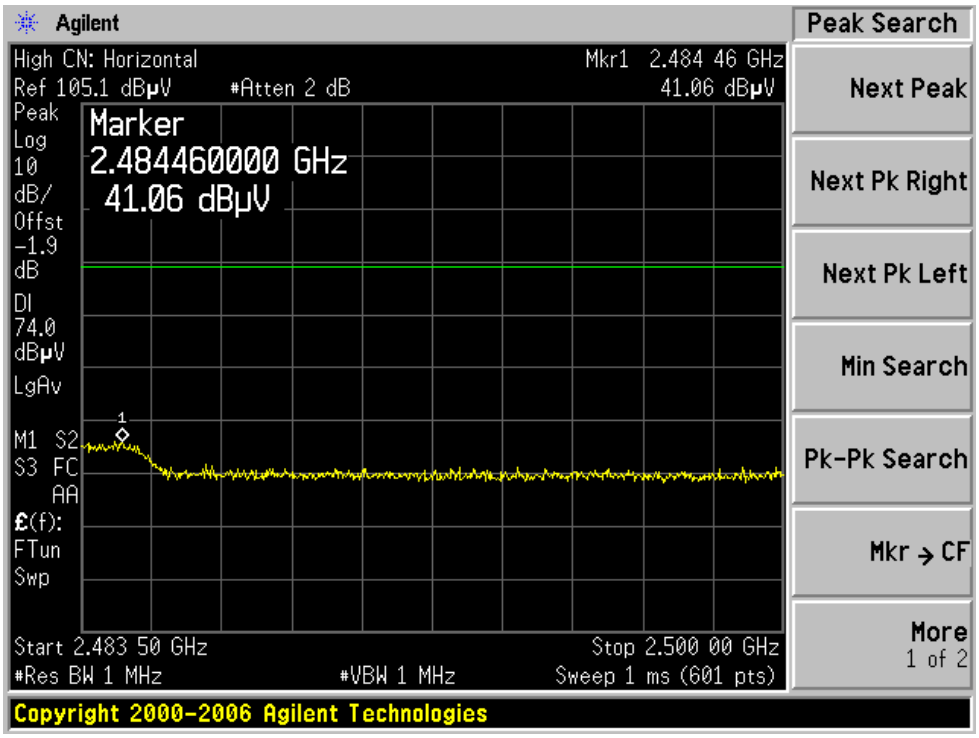
High Channel, Peak, Vertical



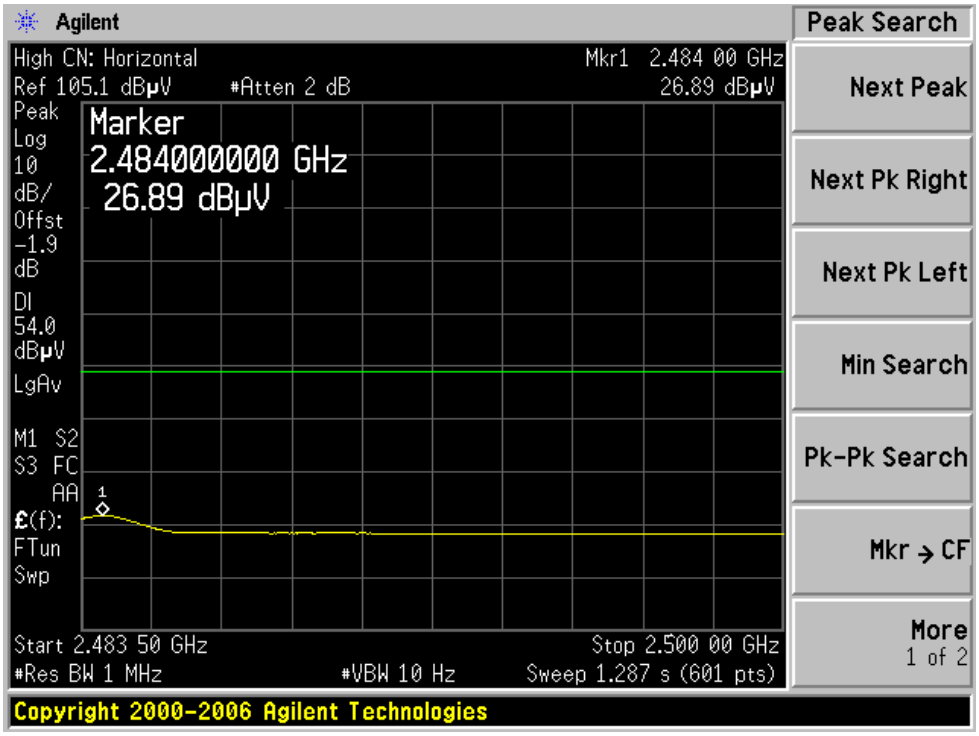
High Channel, Average, Vertical



High Channel, Peak, Horizontal



High Channel, Average, Horizontal



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

Standard Applicable

According to §15.247(a) (l), the maximum 20 dB bandwidth of the hopping channel shall be presented.

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
Agilent	Spectrum Analyzer	E4440A	MY44303352	2008-04-28

*** 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:	24 ° C
Relative Humidity:	65 %
ATM Pressure:	1020 mbar

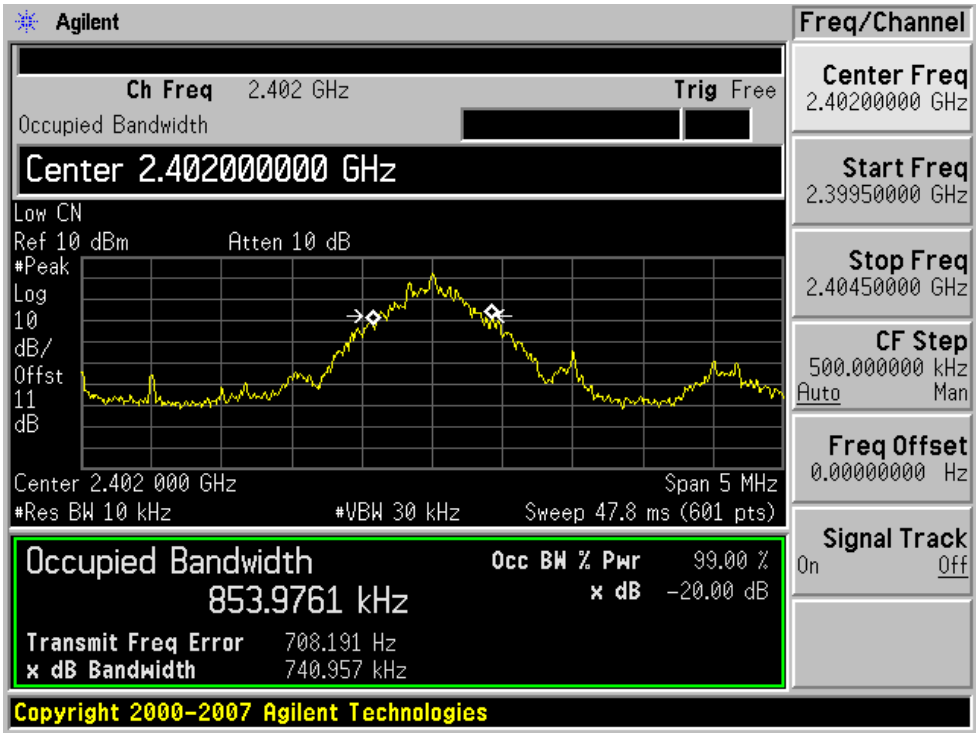
**The testing was performed by James Ma on 2008-05-26.*

Measurement Results

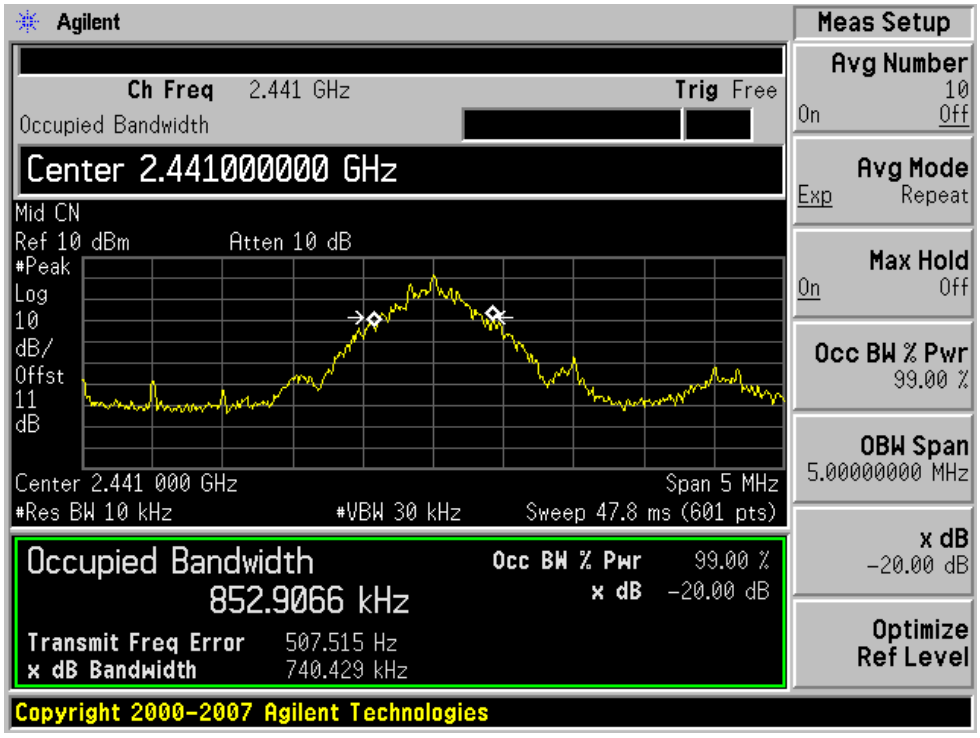
Channel	Frequency (MHz)	Channel Bandwidth (kHz)
Low	2402.0	740.957
Mid	2441.0	740.429
Low	2480.0	739.987

Please refer to the following plots.

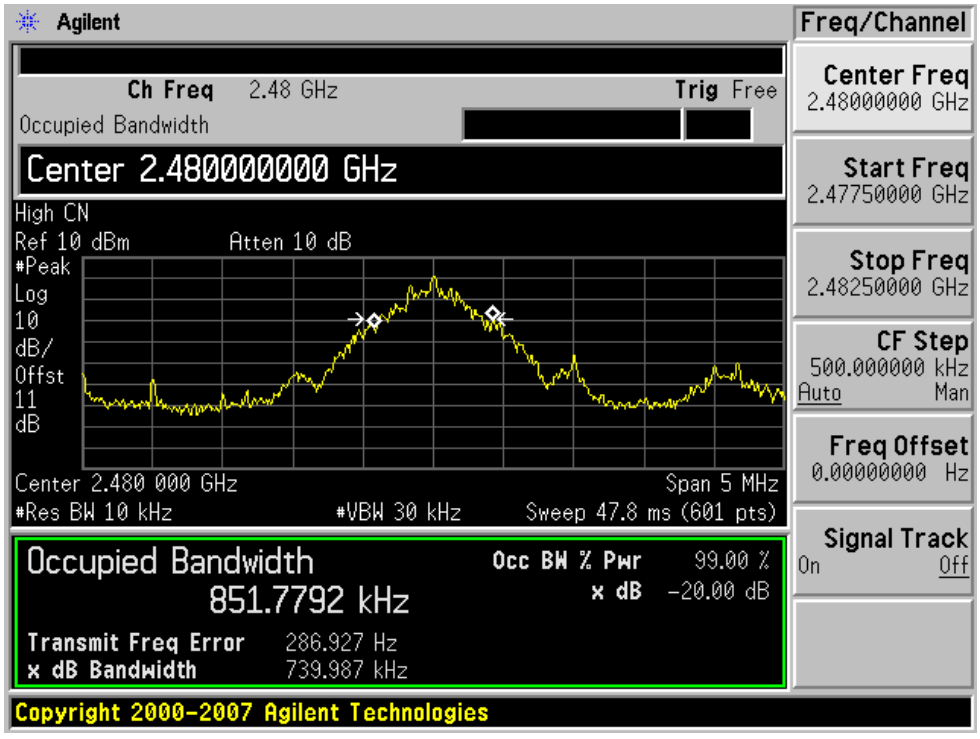
Low Channel



Middle Channel



High Channel



§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

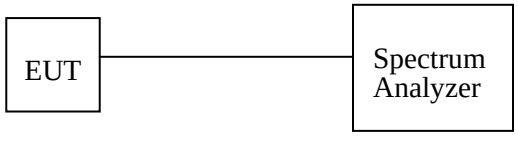
1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on a bench without connection to measurement instrument Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient 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
Agilent	Spectrum Analyzer	E4440A	MY44303352	2008-04-28

*** 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:	24 ° C
Relative Humidity:	65 %
ATM Pressure:	1020 mbar

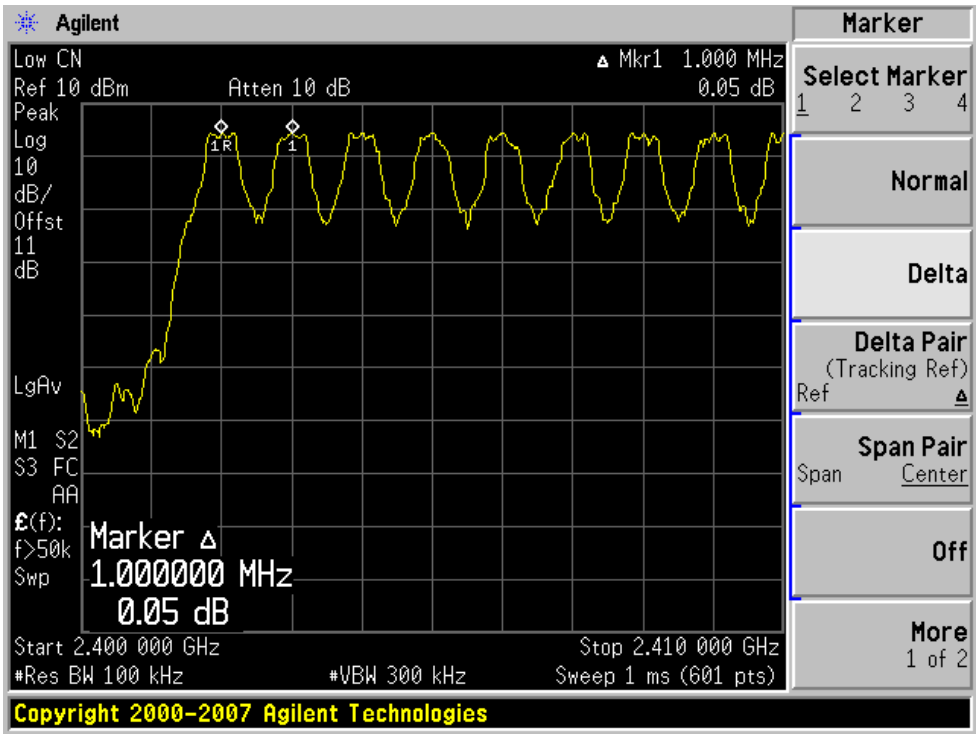
**The testing was performed by James Ma on 2008-05-26.*

Measurement Results

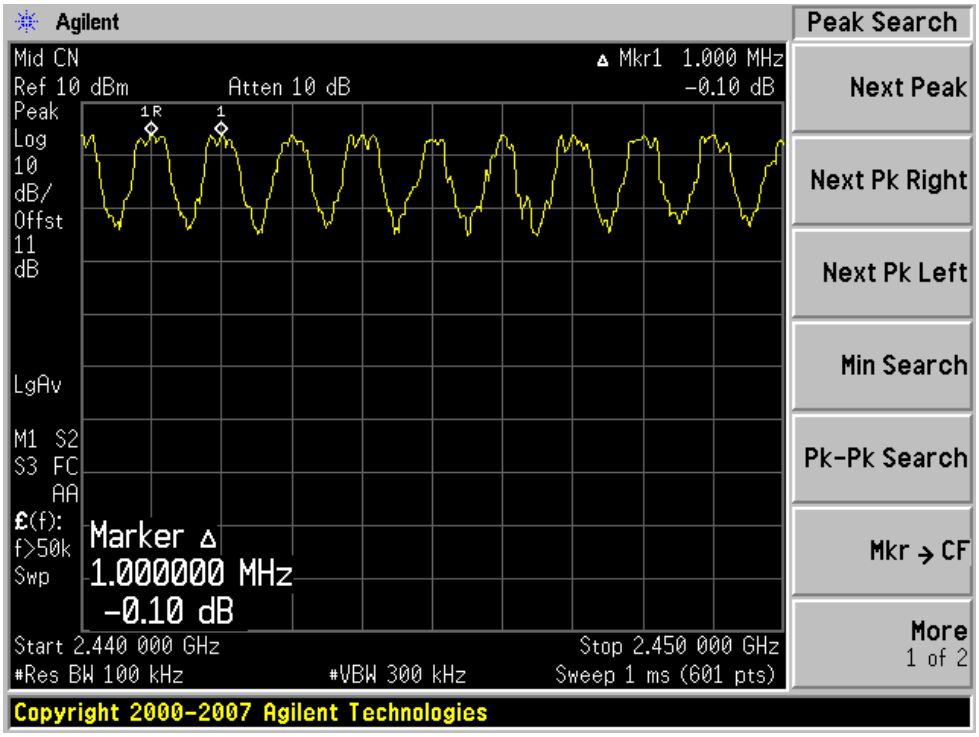
Channel	Frequency (MHz)	Channel Separation (kHz)	Limit >(kHz)
Low	2402.0	1000	740.957
Mid	2441.0	1000	740.429
High	2480.0	1000	739.987

Please refer to the following plots.

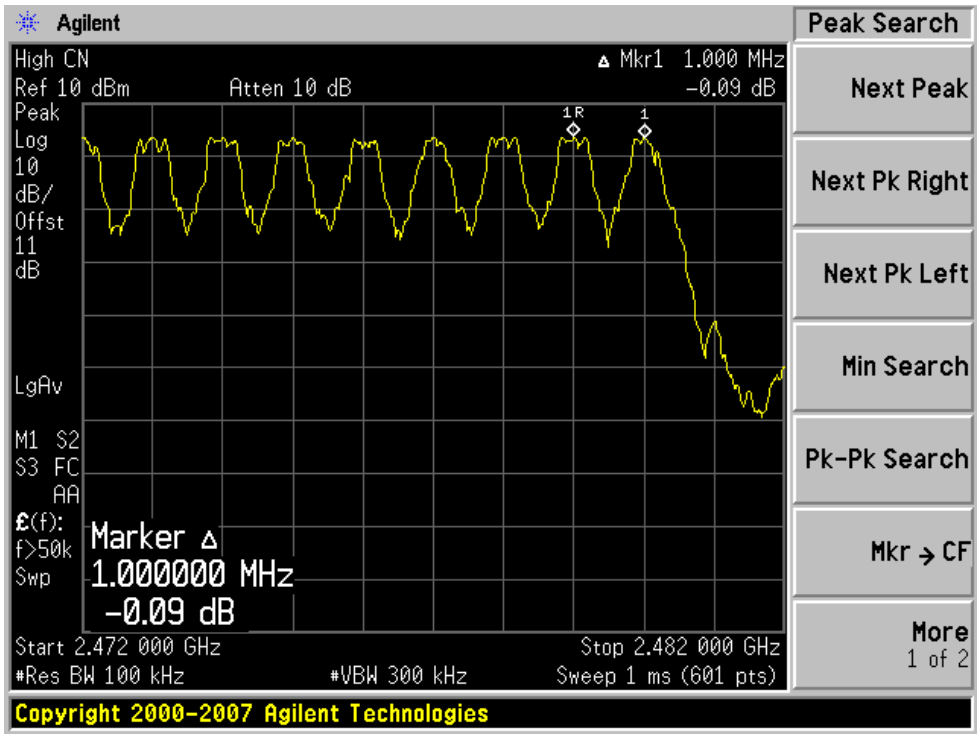
Low Channel



Middle Channel



High Channel



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

Standard Applicable

According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

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
Agilent	Spectrum Analyzer	E4440A	MY44303352	2008-04-28

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

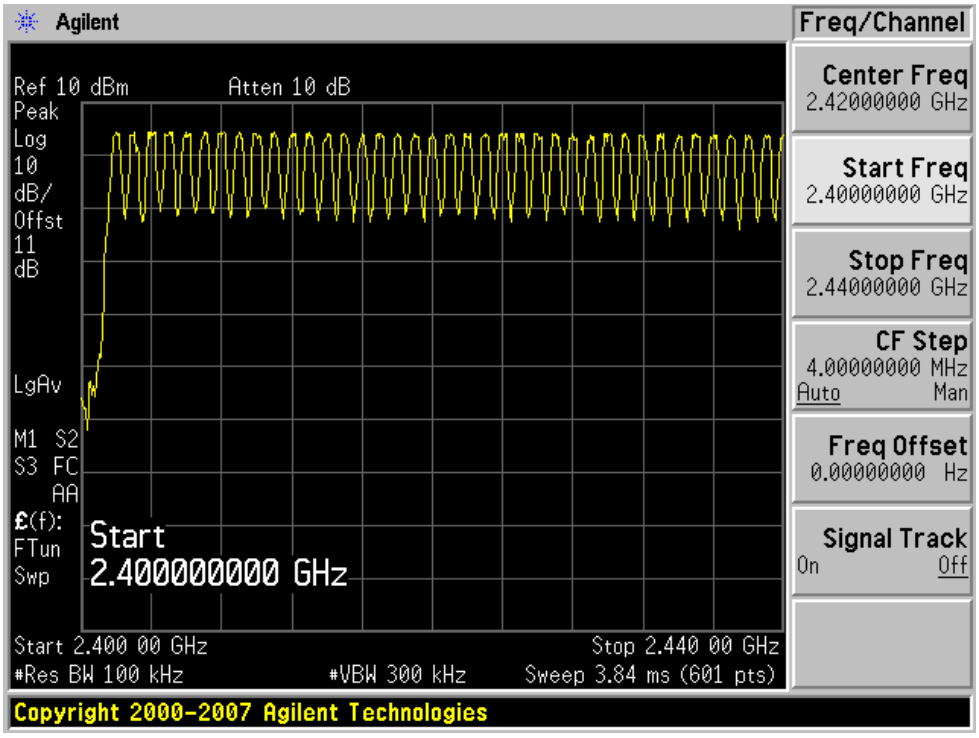
Test Setup Diagram

Environmental Conditions

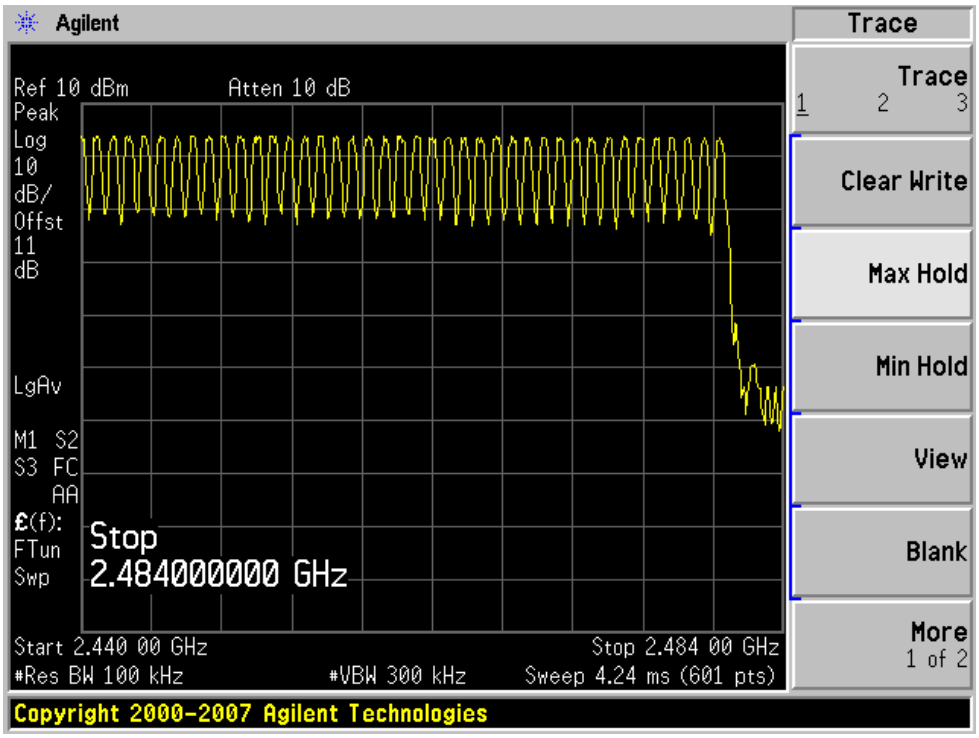
Temperature:	24 ° C
Relative Humidity:	65 %
ATM Pressure:	1020 mbar

**The testing was performed by James Ma on 2008-05-26.*

Please refer to the following plots:



Plot-1



Plot-2

§15.247(a) (1) (iii) - DWELL TIME

Standard Applicable

According to §15.247 (a)(1)(iii), 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.

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
Agilent	Spectrum Analyzer	8565EC	3946A00131	2008-03-24

*** 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:	24 ° C
Relative Humidity:	65 %
ATM Pressure:	1020 mbar

**The testing was performed by James Ma on 2008-05-27.*

Measurement Results

DH1: Packet Size = 27 byte

Channel	Pulse wide (msec)	Dwell time (sec)	Limit (sec)	Result
Low	0.540	0.1728	0.4	Pass
Mid	0.538	0.1722	0.4	Pass
High	0.538	0.1722	0.4	Pass

Note: Dwell time = Pulse time*(1600/2/79)*31.6S

DH3: Packet Size = 183 bytes

Channel	Pulse wide (msec)	Dwell time (sec)	Limit (sec)	Result
Low	1.800	0.262	0.4	Pass
Mid	1.795	0.264	0.4	Pass
High	1.795	0.264	0.4	Pass

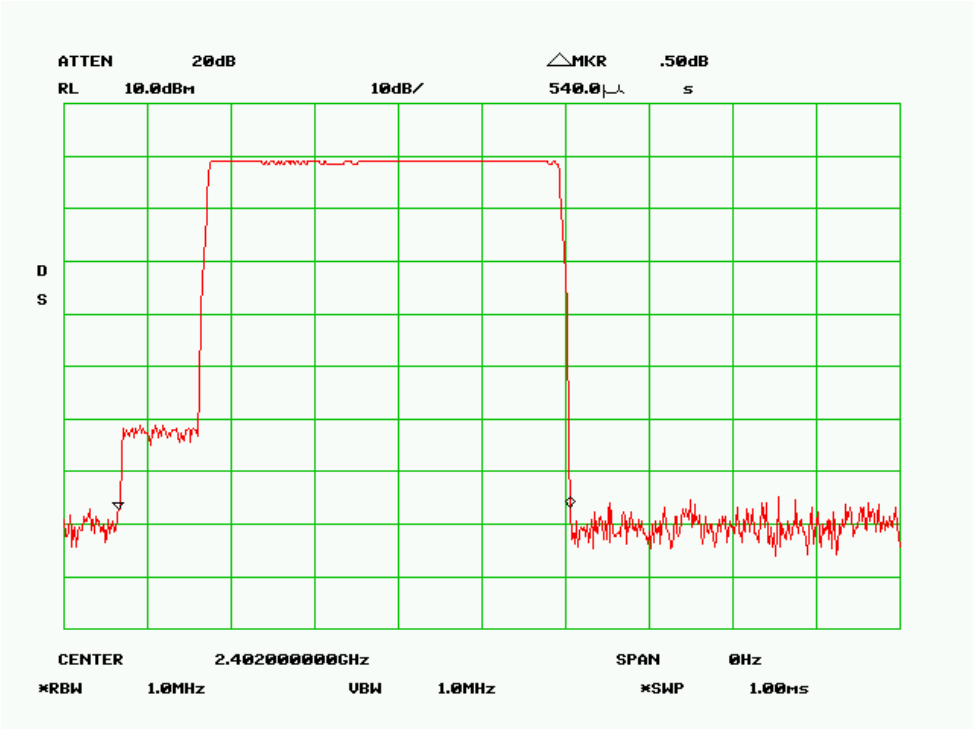
Note: Dwell time = Pulse time*(1600/4/79)*31.6S

DH3: Packet Size = 339 bytes

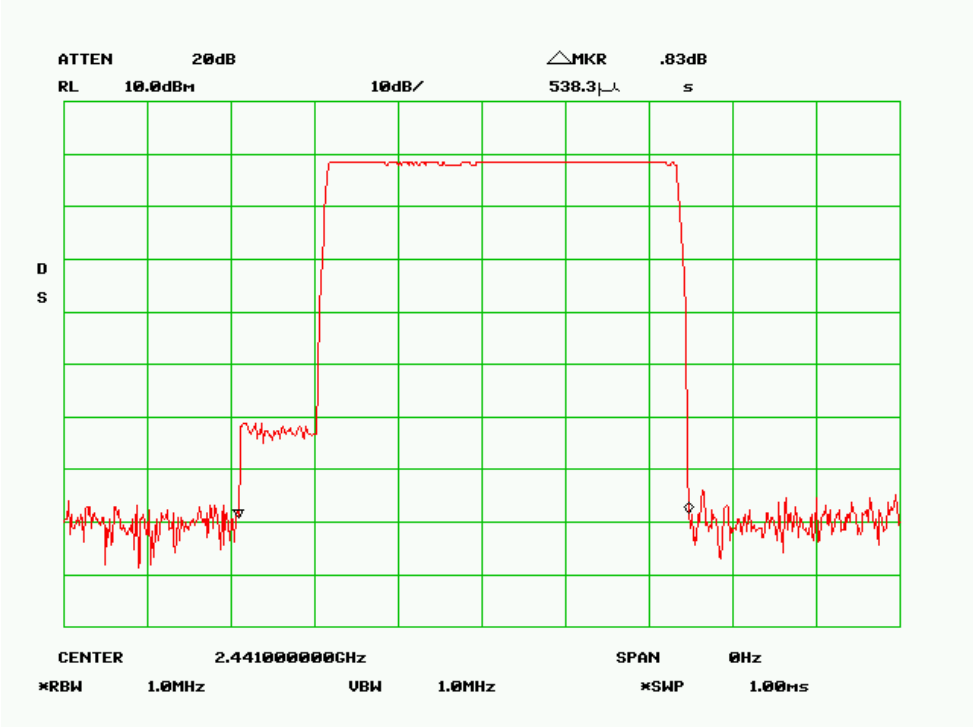
Channel	Pulse wide (msec)	Dwell time (sec)	Limit (sec)	Result
Low	3.060	0.3264	0.4	Pass
Mid	3.040	0.3243	0.4	Pass
High	3.040	0.3243	0.4	Pass

Note: Dwell time = Pulse time*(1600/6/79)*31.6S

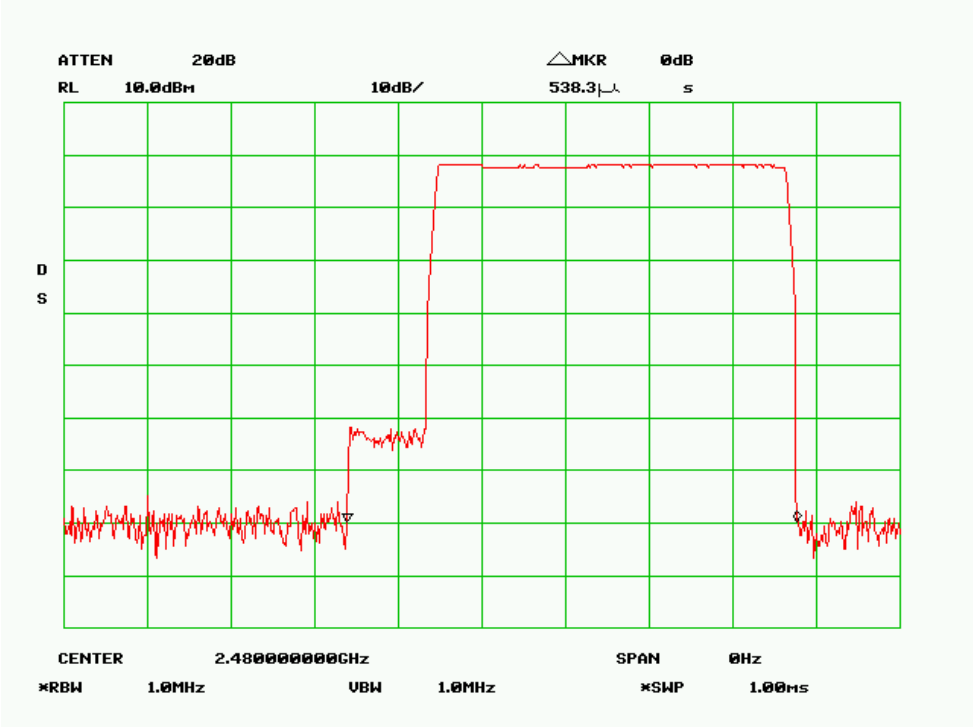
Please refer to following plots:



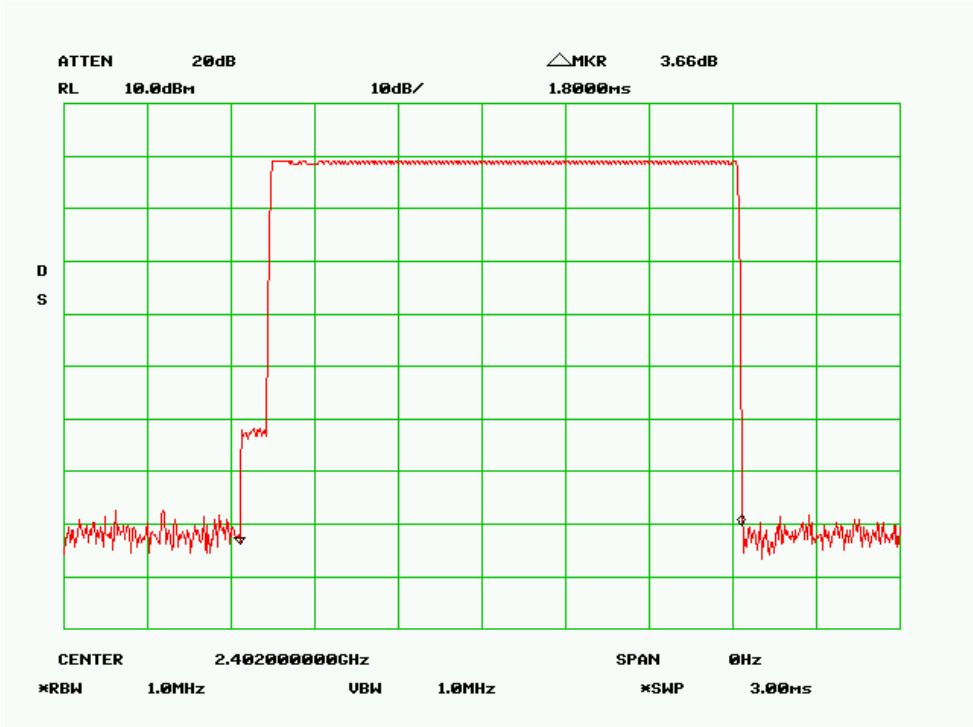
Plot 1: Pulse Width at Low Channel (DH1)



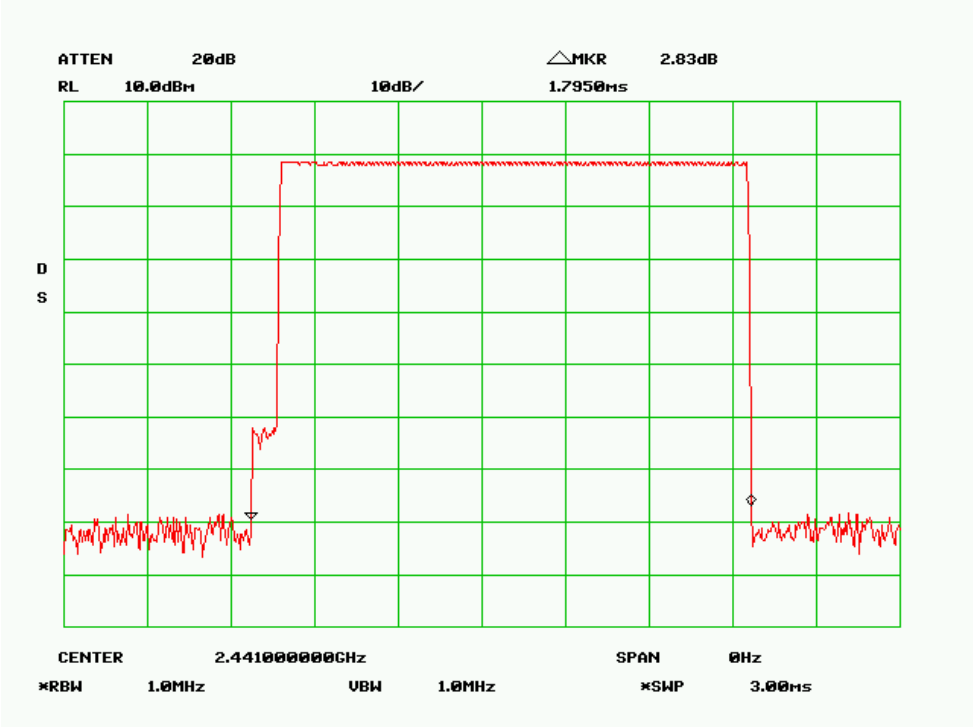
Plot 2: Pulse Width at Middle Channel (DH1)



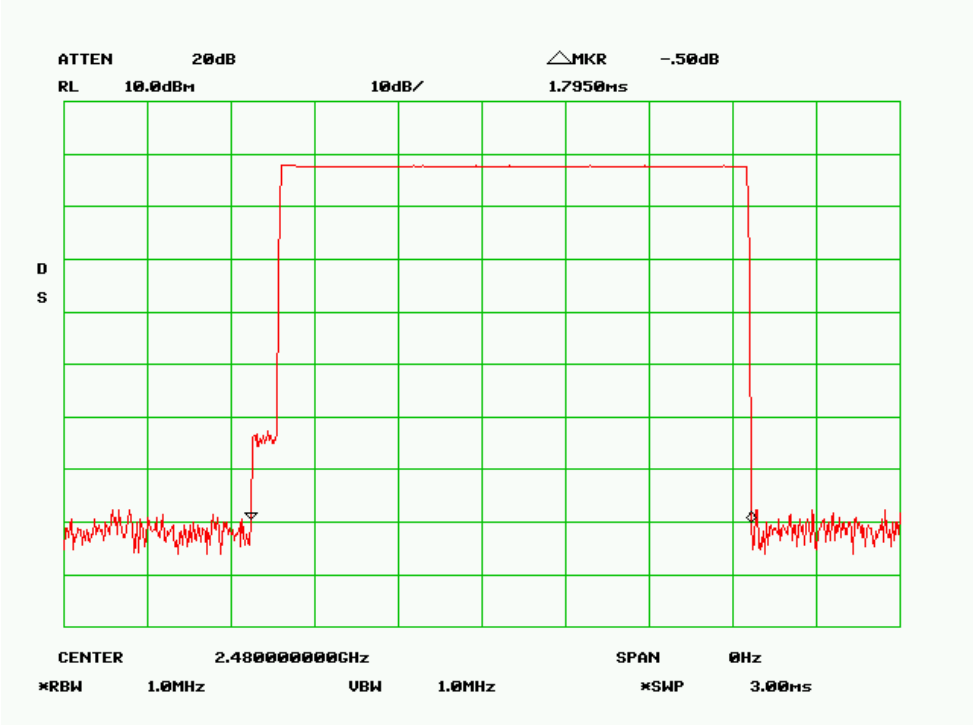
Plot 3: Pulse Width at High Channel (DH1)



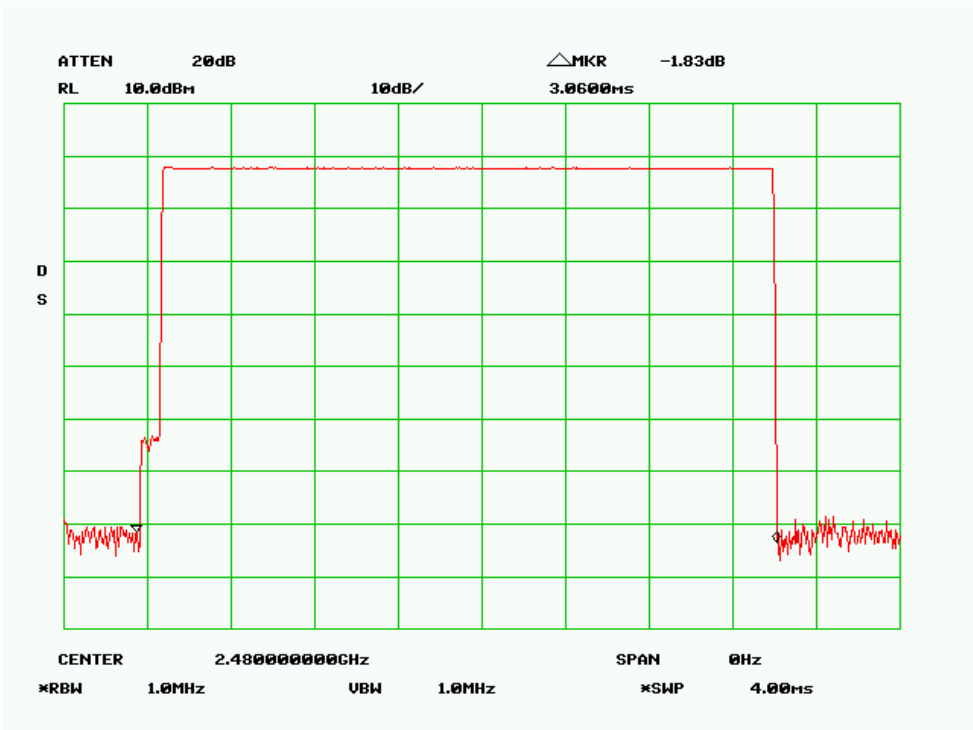
Plot 4: Pulse Width at Low Channel (DH3)



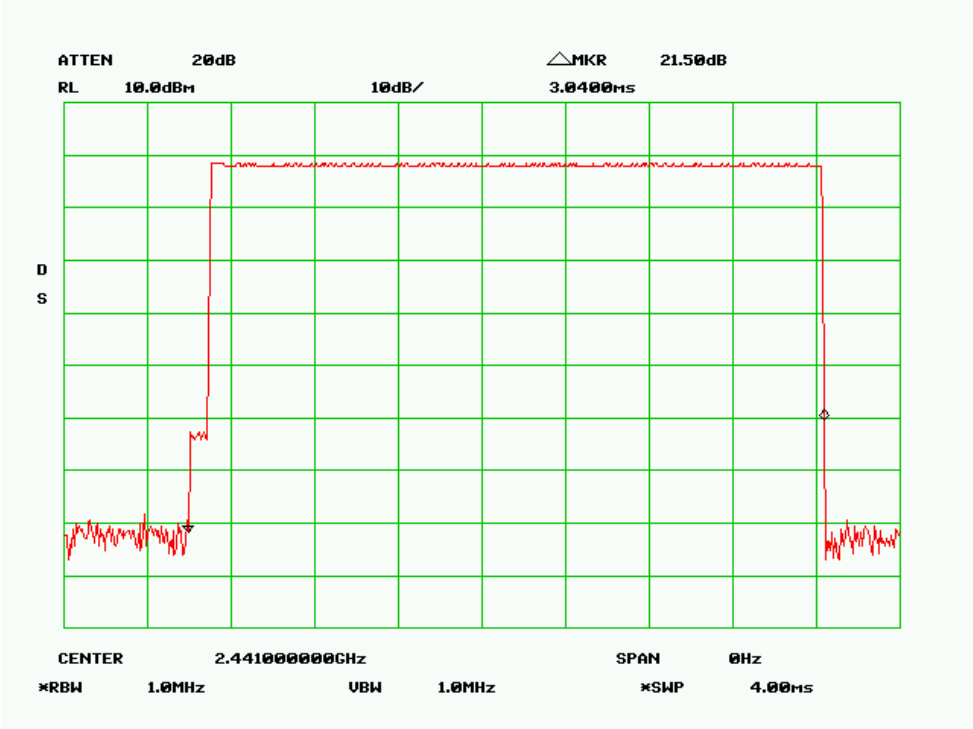
Plot 5: Pulse Width at Middle Channel (DH3)



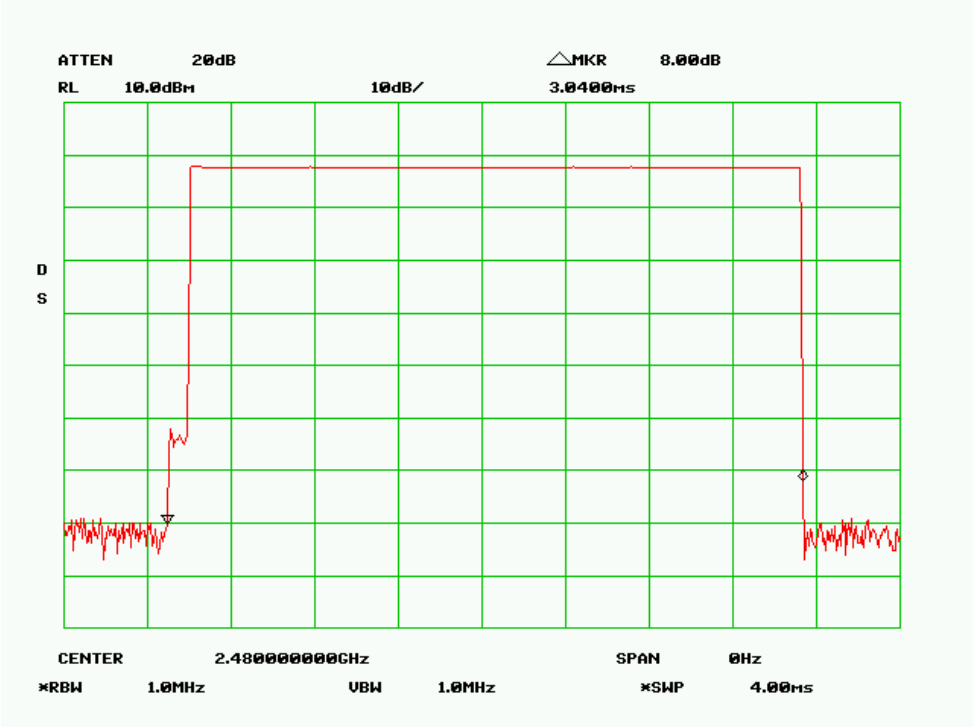
Plot 6: Pulse Width at High Channel (DH3)



Plot 7: Pulse Width at Low Channel (DH5)



Plot 8: Pulse Width at Middle Channel (DH5)



Plot 9: Pulse Width at High Channel (DH5)

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

Standard Applicable

According to §15.247(b) (1), for frequency hopping systems in the 2400-2483.5MHz band employing at least 75 hopping channels, and all direct sequence systems, the maximum peak output power of the transmitter shall not exceed 1 Watt. For all other frequency hopping system in the 2400 – 2483.5 MHz band, the maximum peak output power of the transmitter shall not exceed 0.125 Watt.

Measurement Procedure

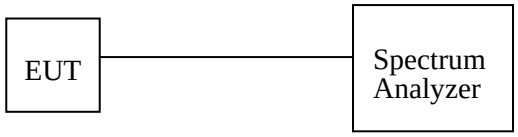
1. Place the EUT on the turntable and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Spectrum Analyzer	E4440A	MY44303352	2008-04-28

*** 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:	24 ° C
Relative Humidity:	65 %
ATM Pressure:	1020 mbar

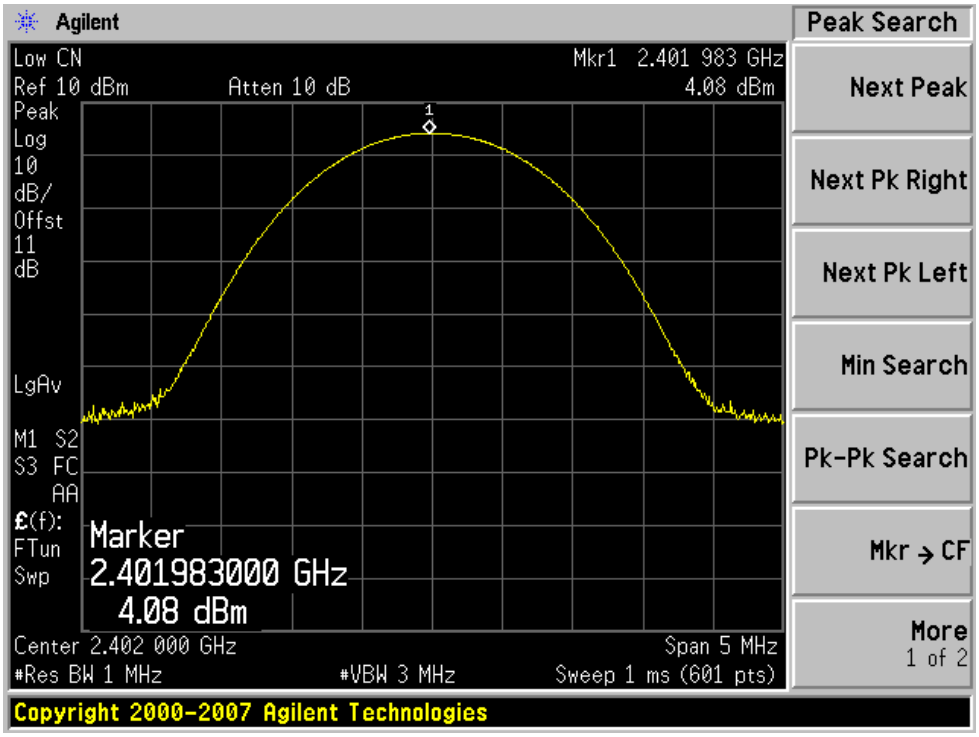
**The testing was performed by James Ma on 2008-05-27.*

Measurement Result

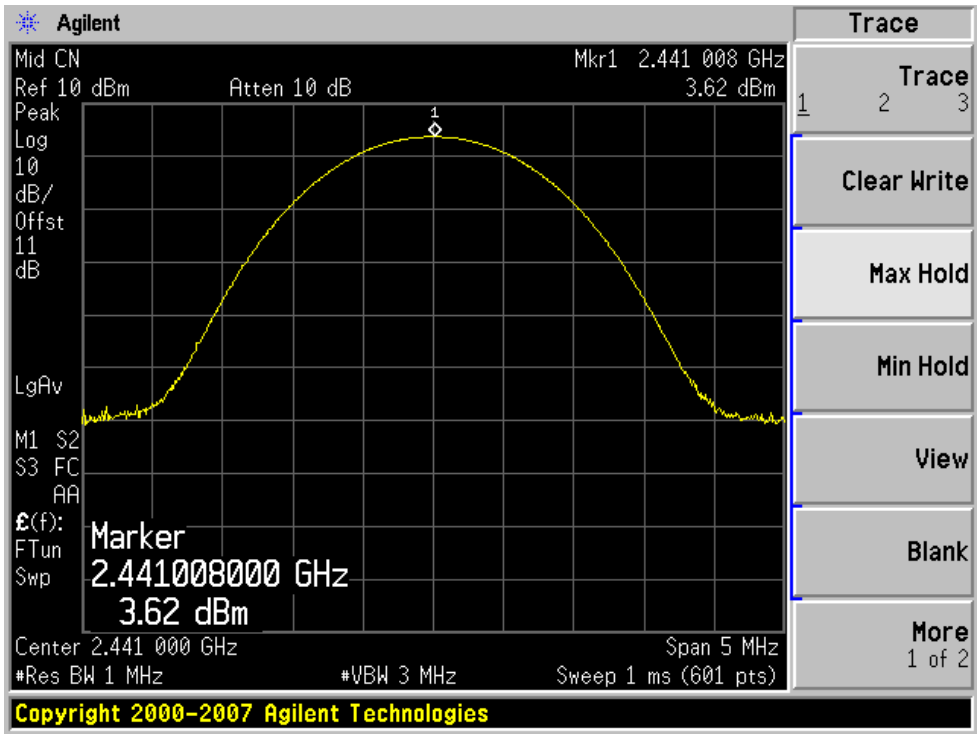
Channel	Frequency (MHz)	Max Peak Output Power		Limit (mw)	Result
		(dBm)	(mw)		
Low	2402.0	4.08	2.56	1000	Pass
Mid	2441.0	3.62	2.30	1000	Pass
High	2480.0	3.23	2.10	1000	Pass

Please see the following plots

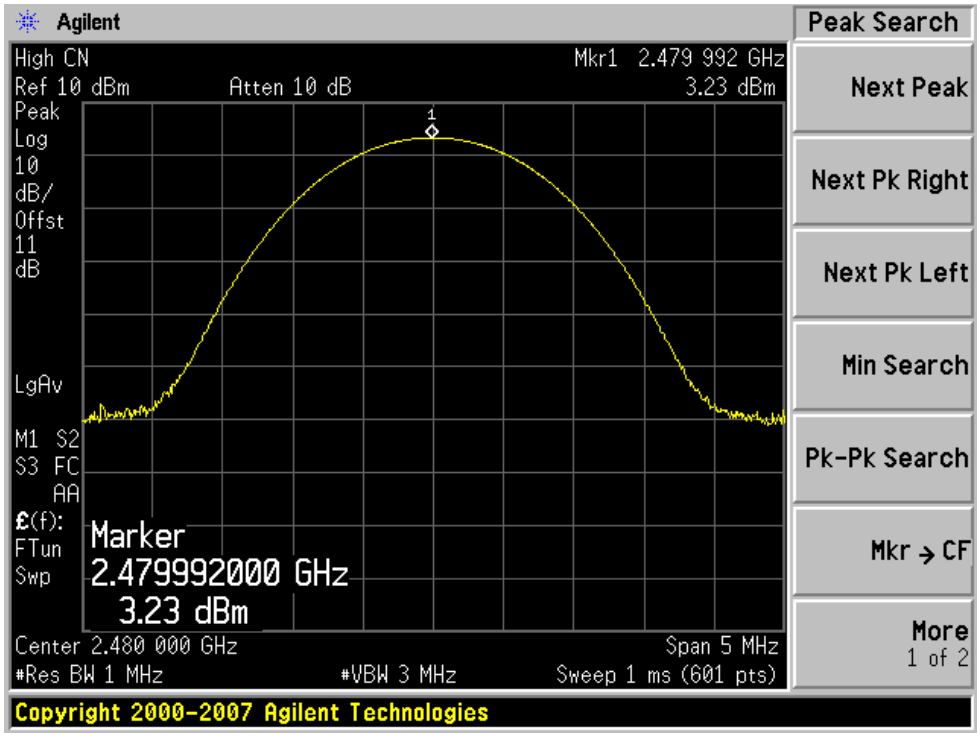
Low Channel



Middle Channel



High Channel



§15.247 (d) - 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
Agilent	Spectrum Analyzer	E4440A	MY44303352	2008-04-28

*** 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

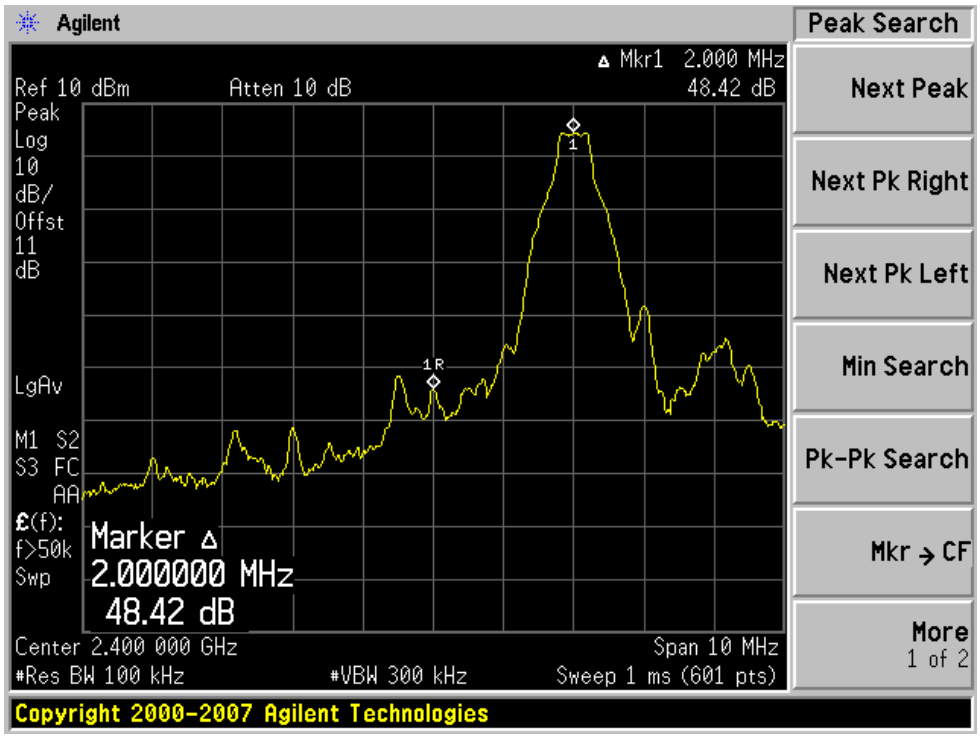
Temperature:	24 ° C
Relative Humidity:	65 %
ATM Pressure:	1020 mbar

**The testing was performed by James Ma on 2008-05-27.*

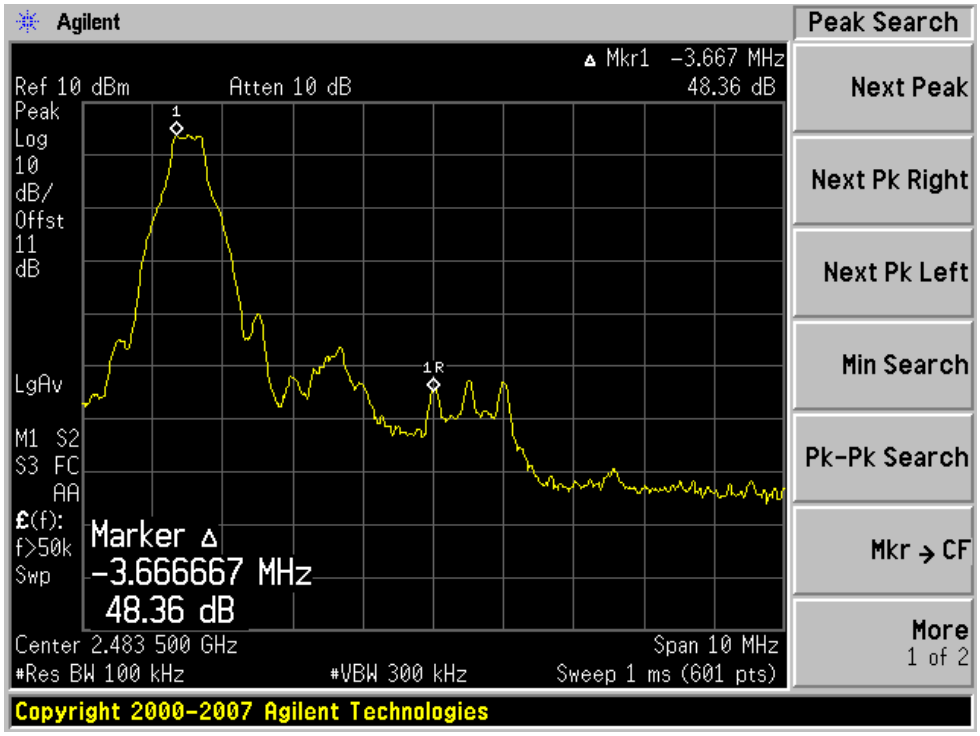
Please refer to the following plots for results.

Hopping Mode

Lowest Channel



Highest Channel



§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.

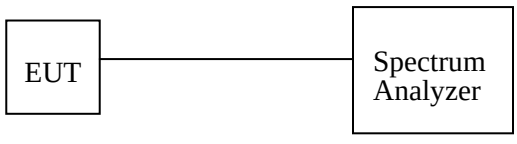
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Spectrum Analyzer	E4440A	MY44303352	2008-04-28

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

Test Setup Diagram



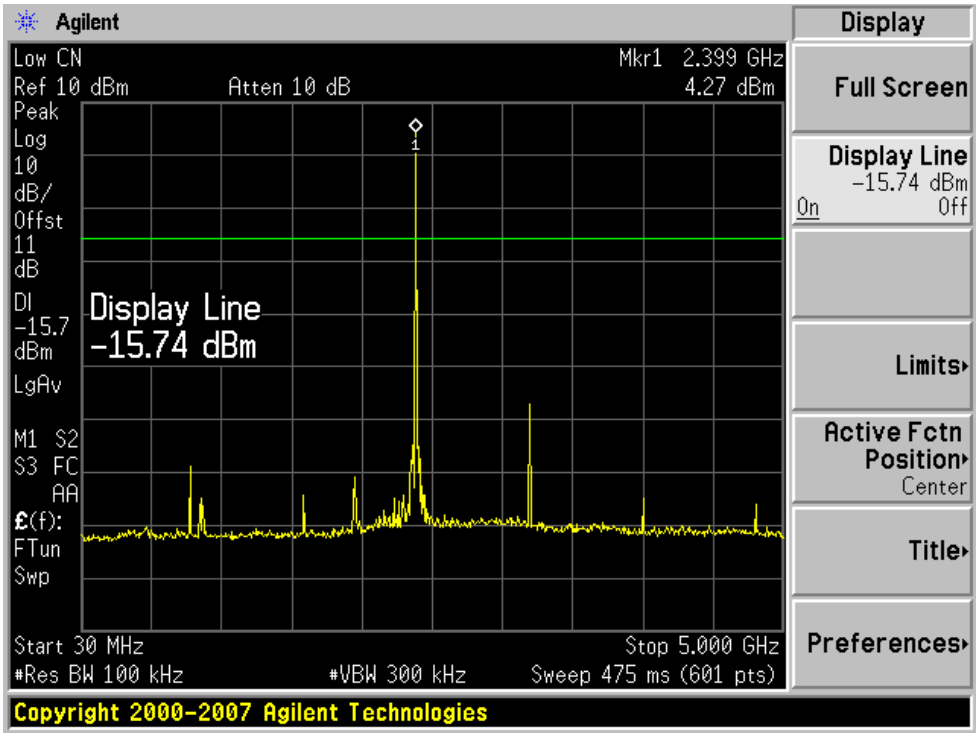
Environmental Conditions

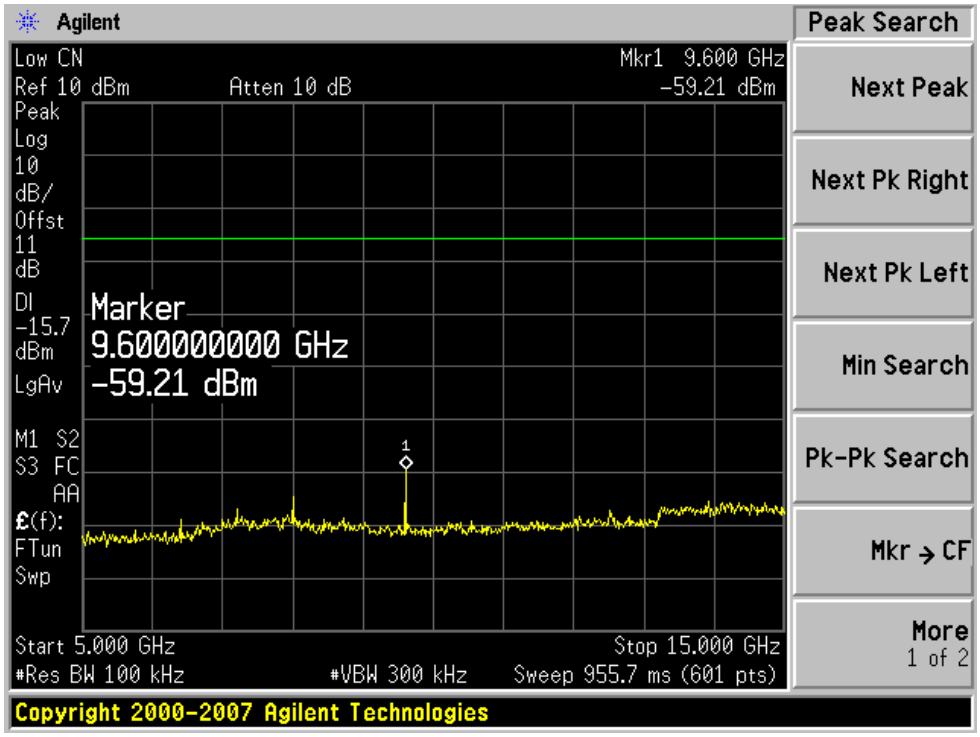
Temperature:	24 ° C
Relative Humidity:	65 %
ATM Pressure:	1020 mbar

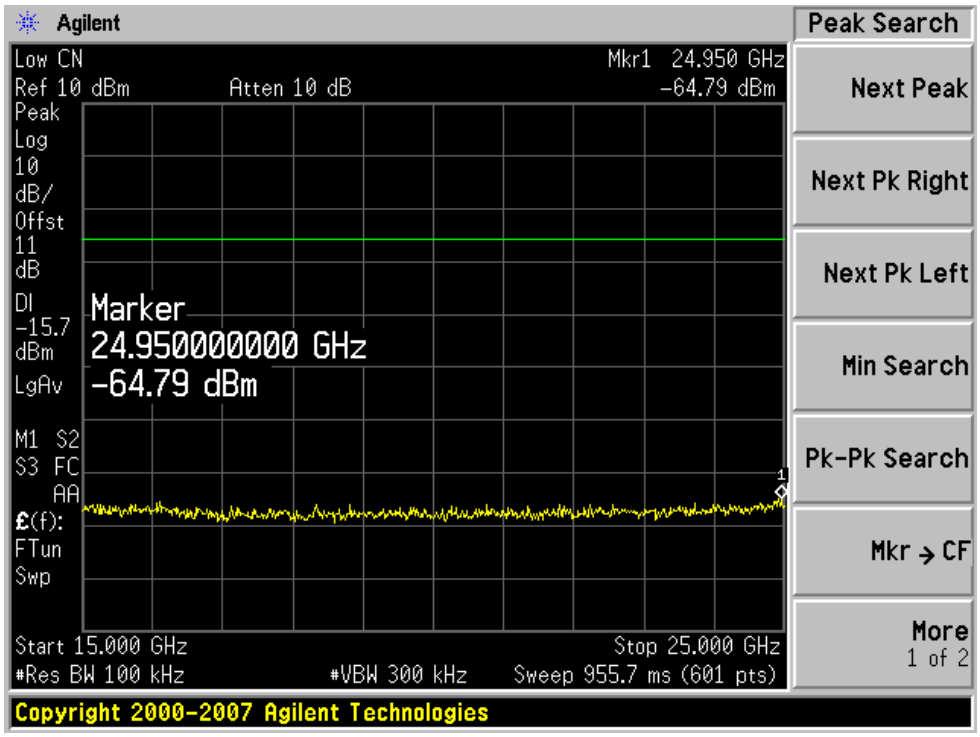
**The testing was performed by James Ma on 2008-05-27.*

Please refer to the following plots.

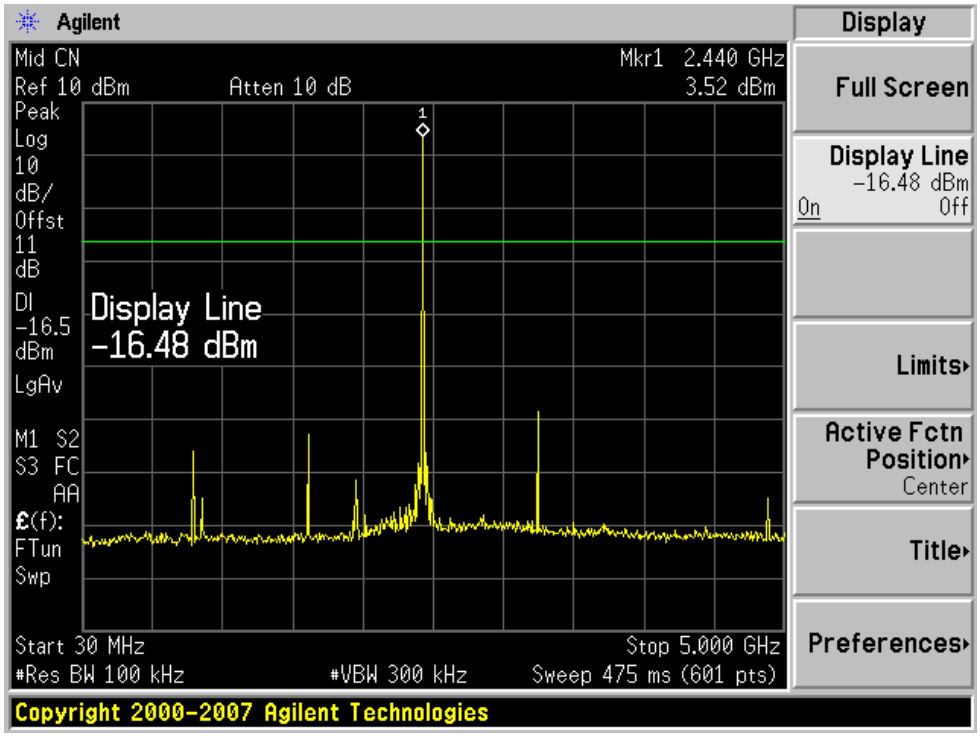
Low Channel

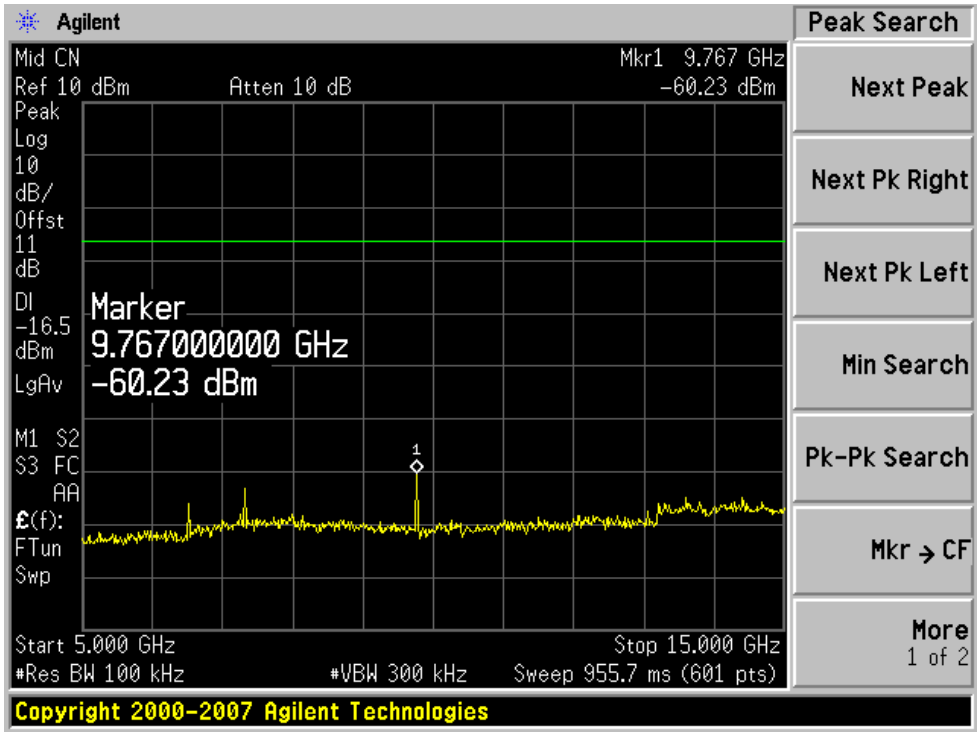


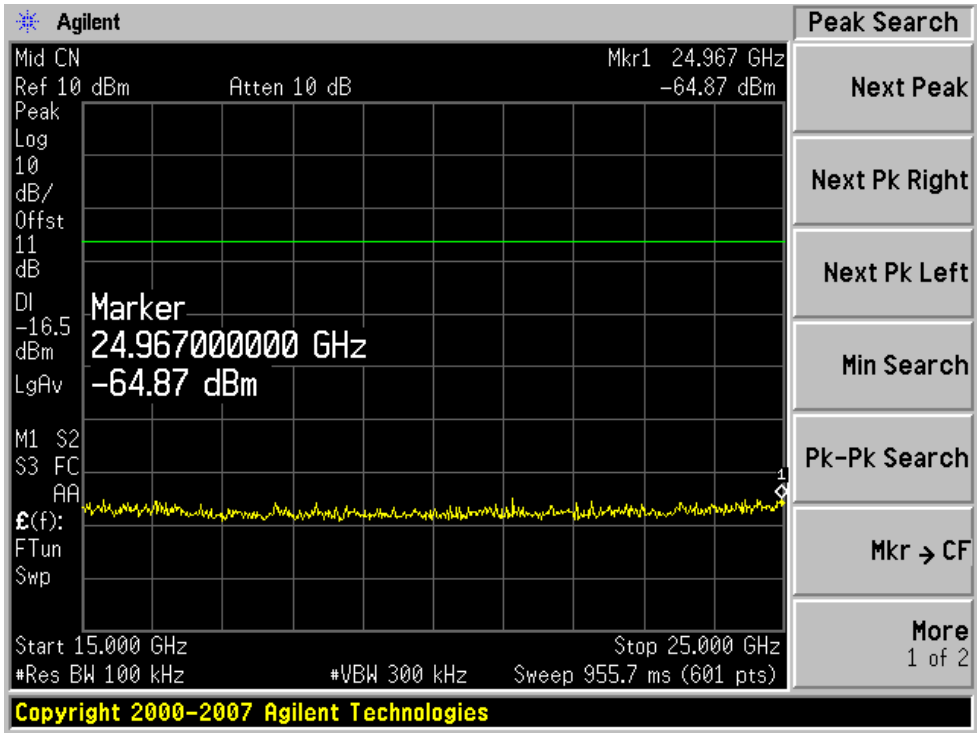

Agilent
Peak Search
Low CN
Ref 10 dBm
Atten 10 dB
Mkr1 9.600 GHz
-59.21 dBm
Peak
Log
10
dB/
Offst
11
dB
Dl
-15.7
dBm
LgAv
Marker
9.600000000 GHz
-59.21 dBm
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 5.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 955.7 ms (601 pts)
Copyright 2000-2007 Agilent Technologies


Agilent
Peak Search
Low CN
Ref 10 dBm
Atten 10 dB
Mkr1 24.950 GHz
-64.79 dBm
Peak
Log
10
dB/
Offst
11
dB
Dl
-15.7
dBm
LgAv
Marker
24.950000000 GHz
-64.79 dBm
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 955.7 ms (601 pts)
Copyright 2000-2007 Agilent Technologies

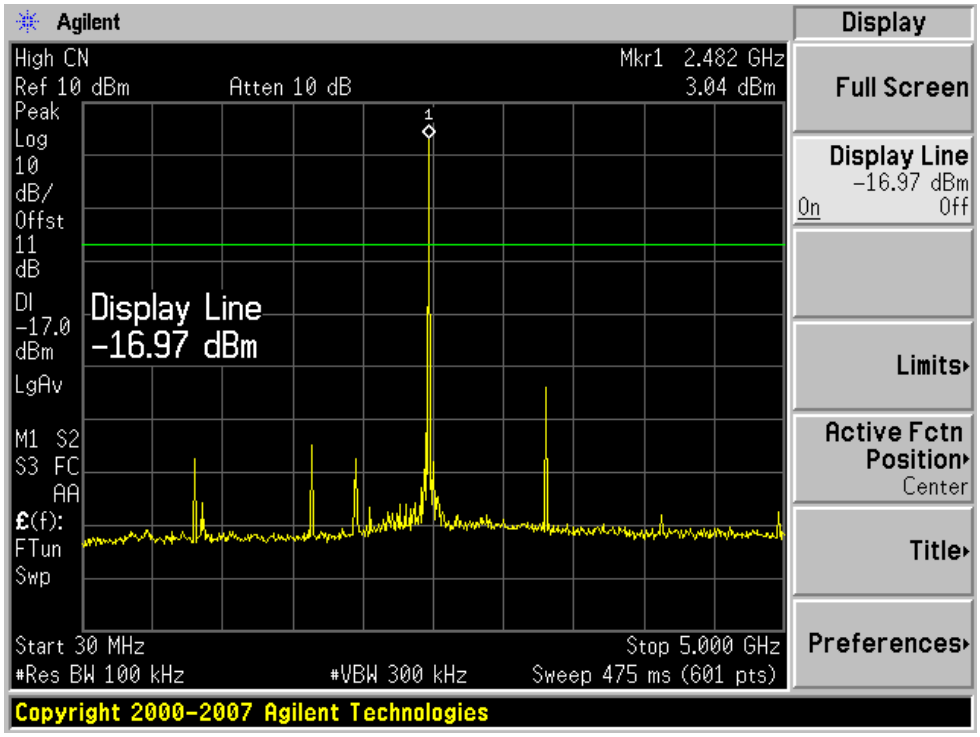
Middle Channel

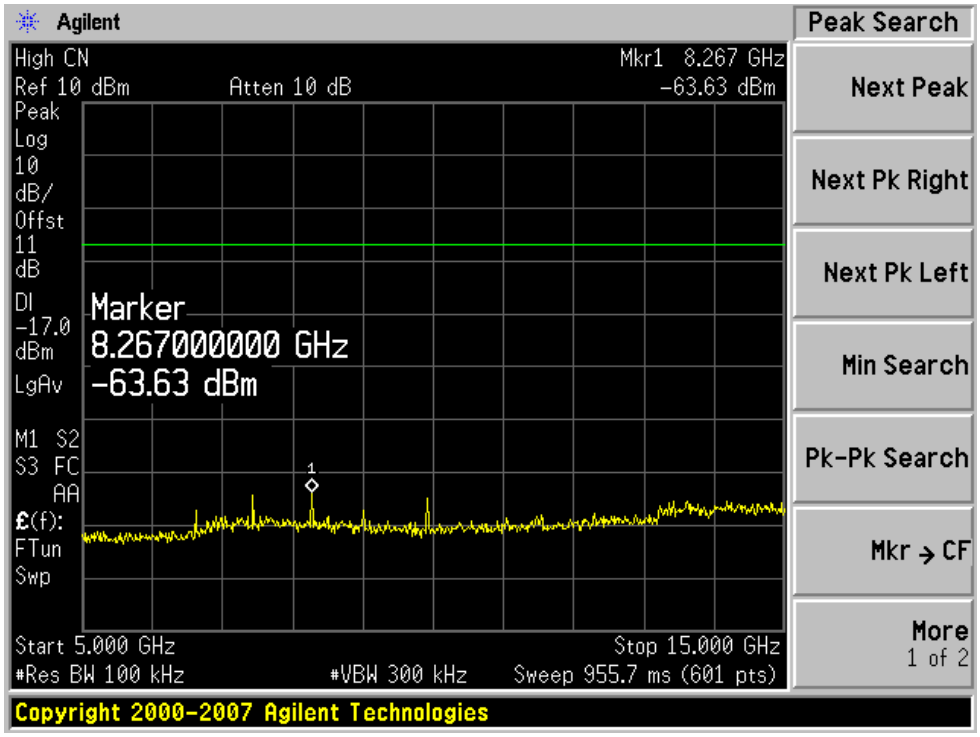


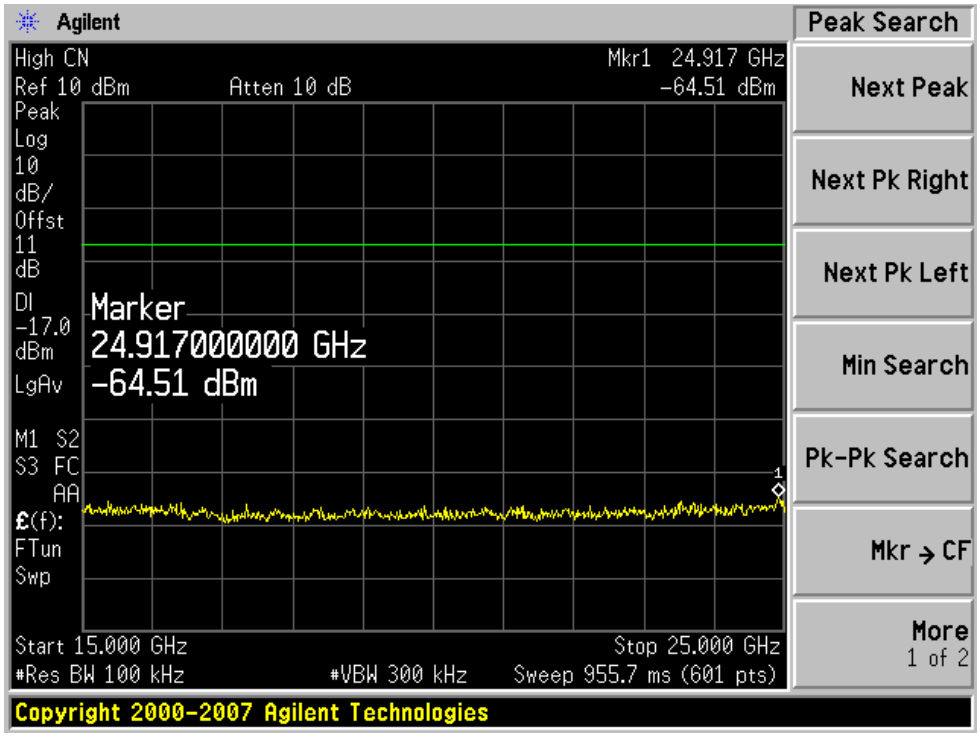




High Channel




Agilent
Peak Search
High CN
Mkr1 8.267 GHz
Ref 10 dBm
Atten 10 dB
-63.63 dBm
Peak
Log
10
dB/
Offst
11
dB
Dl
-17.0
dBm
LgAv
Marker
8.267000000 GHz
-63.63 dBm
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 5.000 GHz
Stop 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 955.7 ms (601 pts)
Copyright 2000-2007 Agilent Technologies


Agilent
Peak Search
High CN
Mkr1 24.917 GHz
Ref 10 dBm
Atten 10 dB
-64.51 dBm
Peak
Log
10
dB/
Offst
11
dB
Dl
-17.0
dBm
LgAv
Marker
24.917000000 GHz
-64.51 dBm
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 15.000 GHz
Stop 25.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 955.7 ms (601 pts)
Copyright 2000-2007 Agilent Technologies

§ 15.247 (i) & § 2.1093 - RF EXPOSURE

According to §15.247(i) and §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.

The category of EUT is General Population/Uncontrolled Exposure

According to FCC Exclusion list, In the following table, f (GHz) is mid-band frequency in GHz, and d is the distance to a person's body, excluding hands, wrists, feet, and ankles.

Exposure category	low threshold	high threshold
general population	$(60/f_{GHz})$ mW, $d < 2.5$ cm $(120/f_{GHz})$ mW, $d \geq 2.5$ cm	$(900/f_{GHz})$ mW, $d < 20$ cm
occupational	$(375/f_{GHz})$ mW, $d < 2.5$ cm $(900/f_{GHz})$ mW, $d \geq 2.5$ cm	$(2250/f_{GHz})$ mW, $d < 20$ cm

Result:

The EUT is a portable device and the Max peak output power is 2.56 mW< 24.58 = (60/2.441GHz) mW

The SAR measurement is exempt.