Lab Code: 200167-0

FCC PART 15.249

INDUSTRY CANADA RSS-210, ISSUE 7, JUNE 2007

MEASUREMENT AND TEST REPORT

For

Arch Rock Corporation

501 2nd St. Ste. 410
San Francisco, CA 94107-4132

FCC ID: U3SRMB3000R1
Model: LBR

Report Type: ☒ Original Report	**Product Type:** Wireless 802.15.4 Module
Test Engineer(s):	Xiao Ming Hu
Report Number:	R0801111
Testing Date(s):	2008-01-11, 2008-01-18
Report Date:	2007-02-15
Reviewed By:	Boni Baniqued, Sr. RF Test Engineer
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1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

The *Arch Rock Corporation* product, *FCC ID: U3SRMB3000R1, model: LBR* or the "EUT" as referred to this report is a 2.4 GHz Wireless 802.15.4 Module. The EUT is the incorporated into an access point for the purpose of having a representative OEM configuration thus representing the worst case it has been integrated alongside an 802.11 b/g module. It is powered by 5 VDC provided by an AC/DC adapter and is designed for home/office use with an operating distance of at least 20 cm (RFX must also be performed by the OEM integrator).

** Testing was preformed on a post production sample provided by Arch Rock Corporation with the serial number: 00173b00116c7a39*

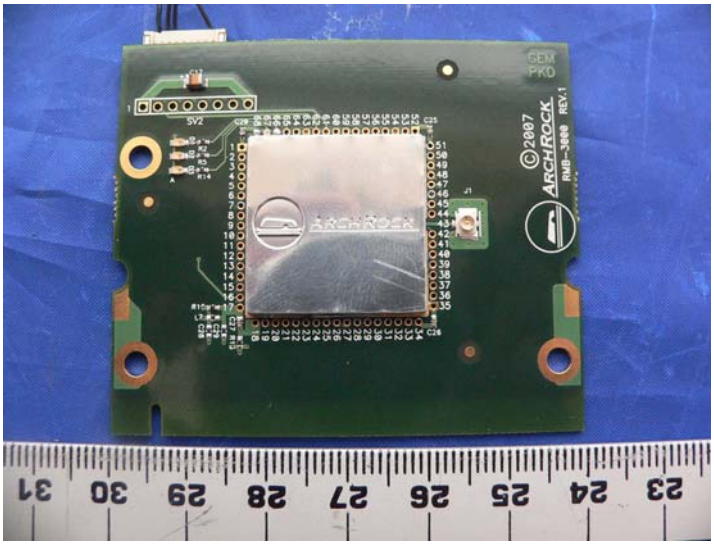
1.2 Mechanical Description of EUT

The *Arch Rock Corporation* product, *FCC ID: U3SRMB3000R1, model: LBR* is a PCB module and measures approximately 6 cm **(L)** x 6 cm **(W)** x 0.3 cm **(H).**

1.3 Antenna Description

Item Number	Model/Type	
Test Antenna	Model number:	A5-FCS-004A1
	Manufacturer:	Exceltek
	Frequency Range:	2.4-2.5 GHz / 4.9-5.3 GHz / 5.7-5.8 GHz
	Connector Type/ Maximum Gain	Reverse SMA/ 3.3 dBi
	Antenna Type/ Pattern:	Omni-directional Antenna
	Measurement:	Approximately 14 cm (L) x 1.5 cm (W)

1.4 EUT Photo



Please refer to Exhibit C for addition EUT photographs.

1.5 Objective

This report has been prepared on behalf of *Arch Rock Corporation* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules and Industry Canada RSS-210 Issue 7, June 2007. The measurements and testing recorded herein pertain to the incorporation of the 802.15.4 module and 802.11 b/g modules into this finalized product. Certification for the 802.11 g module has already been obtained in modular approval filing FCC ID: MK8CPX-05-WLM54G, thus unintentional radiated emissions testing and measurement was performed for this portion. All intentional radiated emissions testing in this report pertains to the 802.15.4 module as this part of the device does not have modular approval and incorporation herein requires full testing

The objective is to determine compliance with FCC and IC standards, rules and limits for this device including:

- Antenna Requirement
- Conducted Emissions
- Receiver Spurious Emissions
- Field Strength of Spurious Emissions
- Out of Band Emissions
- Occupied Bandwidth

1.6 Related Submittal(s)/Grant(s)

Please see original FCC certification for Compex Inc. 802.11 g module, FCC ID: MK8CPX-05-WLM54G for measurement and test results pertaining to intentional radiated emissions created thereby.

1.7 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.8 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 $\pm$2.0 for Conducted Emissions tests and $\pm$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.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.9 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test sites at BACL 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 has 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 also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission, Industry Canada, and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464, IC registration number: 3062A, and VCCI Registration Number: C-2463 and R-2698. The test site has been approved by the FCC, IC, 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/Standards/scopes/2001670.htm

2 SYSTEM TEST CONFIGURATION

2.1 Justification

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

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

2.2 EUT Exercise Software

The EUT is programmed with the following data rate settings that were used during testing:

Channel	Low	Middle	High
Frequency (MHz)	2405	2445	2480

2.3 Special Accessories

There were no special accessories were required, included, or intended for use with EUT during these tests.

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment List and Details

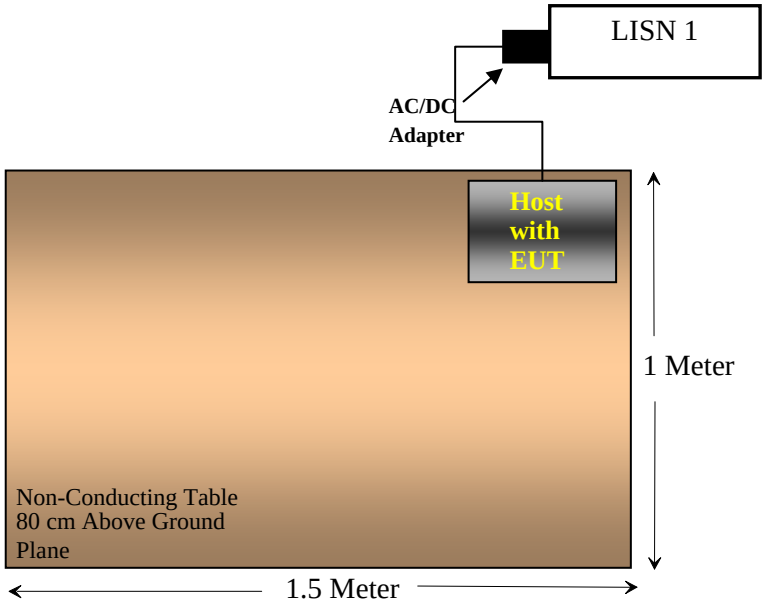
Manufacturer	Description	Model	Serial Number
Dell	Laptop	Inspiron 700M	N/A
Coby	AC/DC adapter	CA-979	NA

2.6 Interface Ports and Cabling

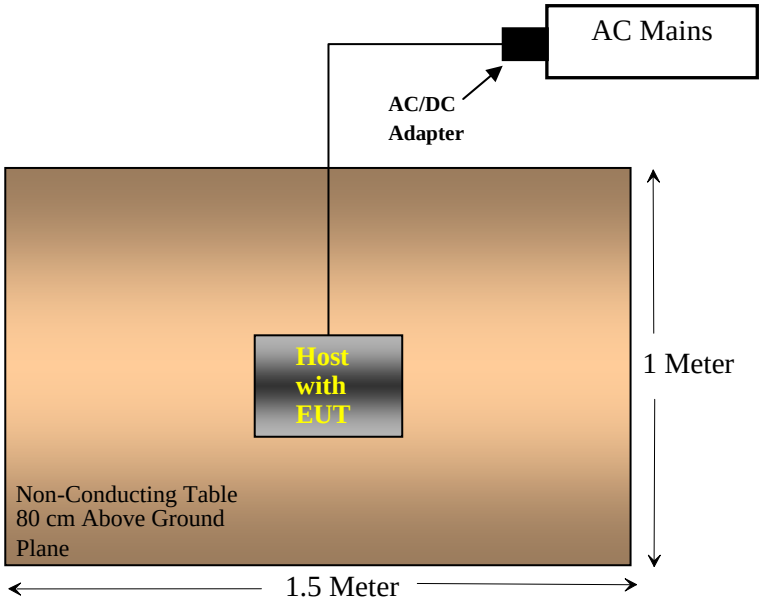
Cable Description	Length (m)	From	To
CAT 5 UTP cable	1	EUT	Laptop

2.7 Test Setup Block Diagrams

Conducted Emissions



Radiated Emissions



3 SUMMARY OF TEST RESULTS

Results reported relate only to the product tested.

FCC & RSS-210 Rules	Description of Test	Result	Note
IC RSS-Gen 5.5 & RSS-102	RF Exposure	NA	-
FCC §15.203, IC RSS-Gen §7.1.4	Antenna Requirement	Compliant	-
FCC §15.207, IC RSS-Gen §7.2.2	Conducted Emissions	Compliant	-
§15.205, §15.209 & §15.249(a), IC RSS-Gen §4.9	Field Strength of Spurious Emissions	Compliant	-
§15.249 (d), IC RSS-Gen §4.9	Out of Band Emissions	Compliant	-
IC RSS-210 A8.2, IC RSS Gen 4.6	99% Occupied Bandwidth	Compliant	-

4 IC RSS-Gen 5.5 & RSS-102 - RF EXPOSURE

4.1 Applicable Standard

According to IC RSS-102 Issue 2, November 2005 §2.5.2 exception from Routine Evaluation Limits- RF Exposure Evaluation:

RF exposure evaluation is required if the separation distance between the user and the device is greater than 20 cm, except when the device operates:

1) below 1.5 GHz and its e.i.r.p. is equal to or less than 2.5 W;
2) at or above 1.5 GHz and the e.i.r.p. of the device is equal to or less than 5 W.

RF limits for device used by the general public is provided hereinafter table:

Frequency Range (MHz)	Electric Field (V/M rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Time Averaging (min)
0.003 – 1	280	2.19	-	6
1 – 10	280 / f	2.19 / f	-	6
10 – 30	28	2.19 / f	-	6
30 – 300	28	0.073	2*	6
300 - 1500	$1.585\ f^{0.5}$	$0.0042\ f^{0.5}$	f / 150	6
1500 – 15 000	61.4	0.163	10	6
15 000 – 150 000	61.4	0.163	10	$616000 / f^{1.2}$
150 000 – 300 000	$f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000 / f^{1.2}$

Note: f is the frequency in MHz
* Power density limit applicable at frequency greater than 100 MHz.

The Power of the EUT is very low, thus the EUT is exempted to the RF Exposure Evaluation.

5 FCC §15.203, IC RSS-Gen §7.1.4 – ANTENNA REQUIREMENT

5.1 Applicable Standard

According to FCC §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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

As per IC RSS-Gen §7.1.4: Transmitter Antenna, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

5.2 Result

The EUT was tested with a representative antenna with 3.3 dBi gain. It connects to the host device via reverse SMA connector which fulfills the requirement of “unique” coupling type and it has a max gain under 6 dBi; thus it complies with the FCC and IC requirements.

☒ **Compliant** ☐ **N/A**

6 FCC §15.207, IC RSS-Gen §7.2.2 - CONDUCTED EMISSIONS

6.1 Section 15.207 & RSS-Gen 7.2.2 Conducted limits:

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.*

6.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.4 – 2003 measurement procedure. The specification used was FCC/IC consumer device limits.

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

The EUT was powered by 5 VDC provided by an AC/DC adapter connected to 120 V/60 Hz power provided by LISN-1.

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Solar Electronics	LISN	9252-R-24-BNC	511205	2007-07-07
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.595 0K03	100338	2007-04-05

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

6.4 Test Procedure

During the conducted emissions test, the power cord of the system was connected to the main 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".

6.5 Environmental Conditions

Temperature:	20 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

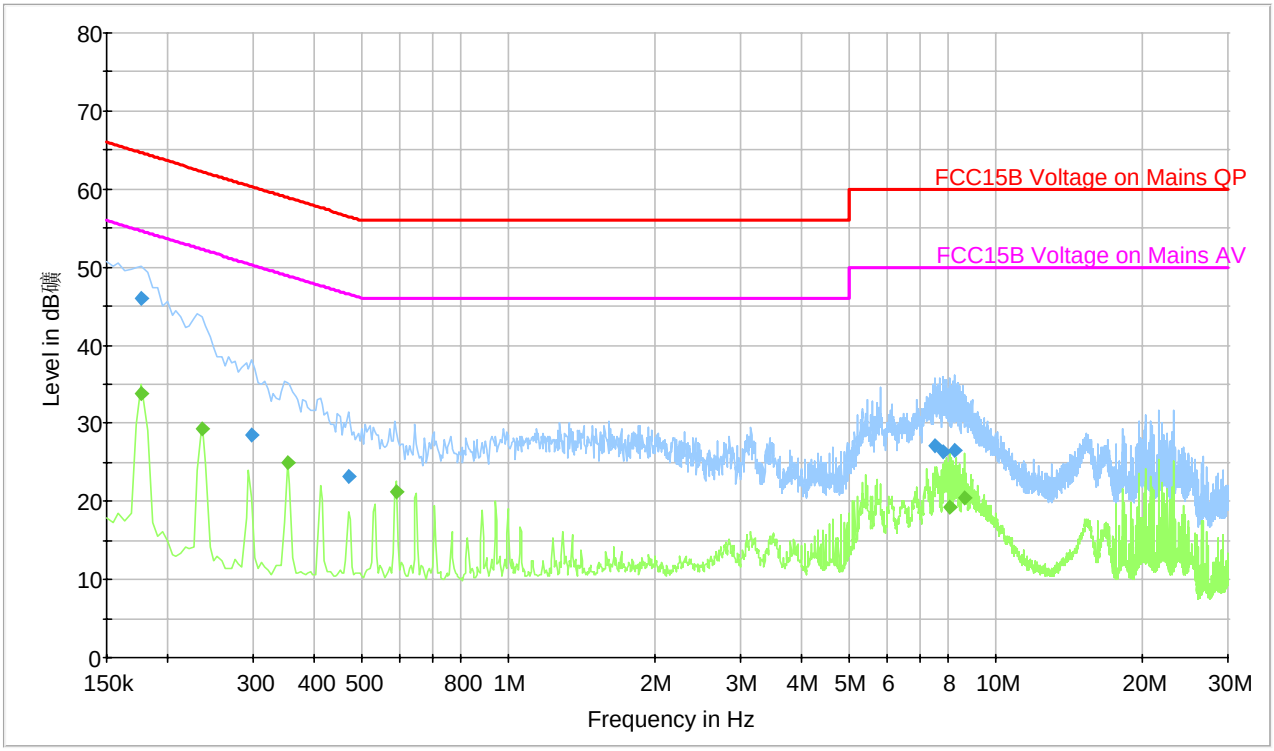
**The testing was performed by Xiao Ming Hu from 2008-01-18.*

6.6 Summary of Test Results

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

Connection: 5 VDC from AC/DC adapter connected to LISN-1			
Margin (dB)	**Frequency (MHz)**	**Conductor (Hot/Neutral)**	**Range (MHz)**
-18.7	0.177000	Hot	0.150 MHz to 30 MHz

120V/60 Hz Hot (power up on module only):



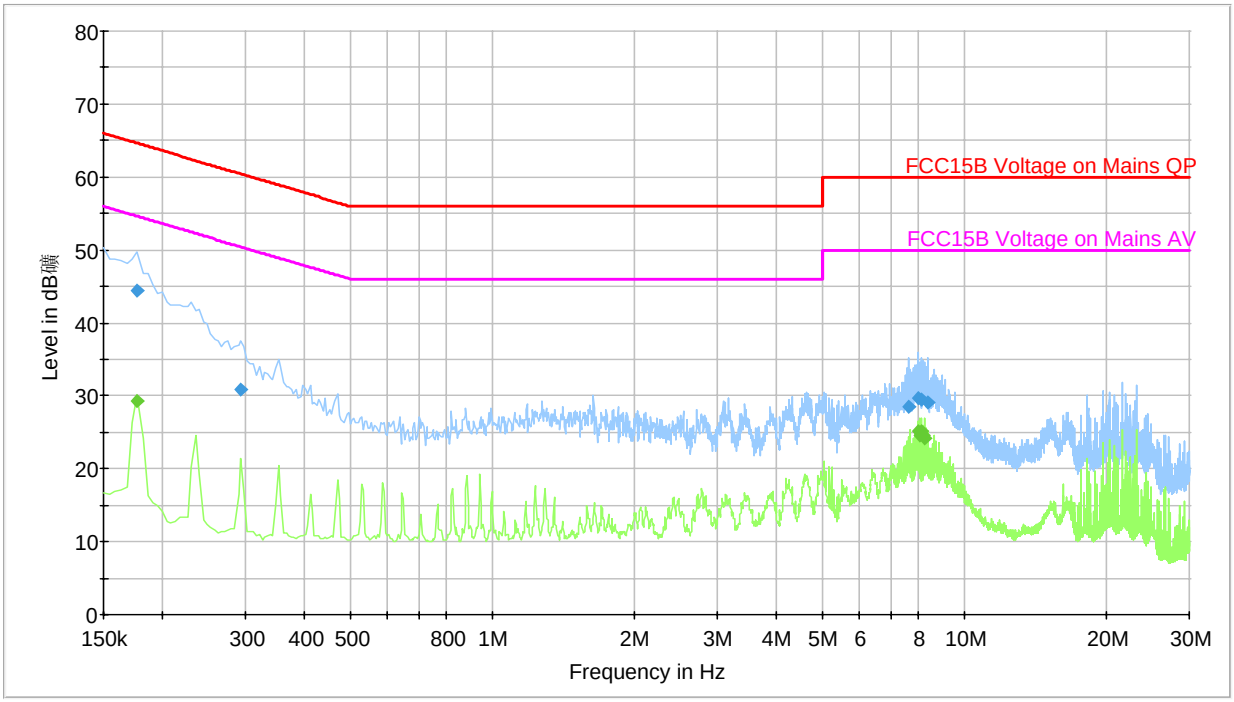
Final Measurement Quasi-Peak Detector

Frequency (MHz)	Quasi-Peak (dBµV)	Conductor (Hot/Neutral)	Limit (dBµV)	Margin (dB)
0.177000	45.9	H	64.6	-18.7
0.298500	28.6	H	60.3	-31.7
7.530000	27.2	H	60.0	-32.8
0.469500	23.1	H	56.5	-33.4
8.250000	26.5	H	60.0	-33.5
7.791000	26.4	H	60.0	-33.6

Final Measurement Average Detector

Frequency (MHz)	Average (dBµV)	Conductor (Hot/Neutral)	Limit (dBµV)	Margin (dB)
0.177000	33.8	H	54.6	-20.8
0.235500	29.3	H	52.3	-23.0
0.352500	24.9	H	48.9	-24.0
0.591000	21.3	H	46.0	-24.7
8.628000	20.4	H	50.0	-29.6
8.047500	19.3	H	50.0	-30.7

120V/60 Hz Neutral (power up on module only):



Final Measurement Quasi-Peak Detector

Frequency (MHz)	Quasi-Peak (dBµV)	Conductor (Hot/Neutral)	Limit (dBµV)	Margin (dB)
0.177000	44.4	N	64.6	-20.2
0.294000	30.8	N	60.4	-29.6
8.007000	29.6	N	60.0	-30.4
8.142000	29.5	N	60.0	-30.5
8.398500	29.1	N	60.0	-30.9
7.624500	28.6	N	60.0	-31.4

Final Measurement Average Detector

Frequency (MHz)	Average (dBµV)	Conductor (Hot/Neutral)	Limit (dBµV)	Margin (dB)
8.007000	25.3	N	50.0	-24.7
8.137500	25.1	N	50.0	-24.9
0.177000	29.3	N	54.6	-25.3
8.074500	24.5	N	50.0	-25.5
8.205000	24.5	N	50.0	-25.5
8.268000	24.2	N	50.0	-25.8

7 FCC §15.109, §15.205, §15.209 & §15.249(a), IC RSS-Gen §4.9 - SPURIOUS RADIATED EMISSIONS

7.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

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.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, 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 15.249(a) except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

IC RSS-GEN §4.9 the measurement method shall be described in the test report. The same parameter, peak power or average power, used for the transmitter output power measurement shall be used for unwanted emission measurements. The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate or carrier frequency), or from 30 MHz, whichever is the lower, to the 5th harmonic of the highest frequency generated without exceeding 40 GHz.

7.2 Test Setup

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

7.3 EUT Setup

The radiated emissions tests were performed using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15C limits.

The spacing between the peripherals was 10 centimeters.

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

7.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Sonoma Instruments	Pre amplifier	317	260407	2007-04-26
HP	Pre amplifier	8449B	3147A00400	2007-08-31
Sunol Science Corp	Combination Antenna	JB3 Antenna	A020106-3	2007-03-05
A.R.A	Antenna Horn	DRG-118/A	1132	2007-06-18
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

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

7.5 Test Procedure

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 meters away from the testing antenna, which is varied from 1-4 meters, 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
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

7.6 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 - Limit

7.7 Environmental Conditions

Temperature:	20 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

**The testing was performed by Xiao Ming Hu on 2008-01-11, 2008-01-18.*

7.8 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC and IC requirements, and had the worst margin readings of:

Unintentional Emissions, (30-1000 MHz):

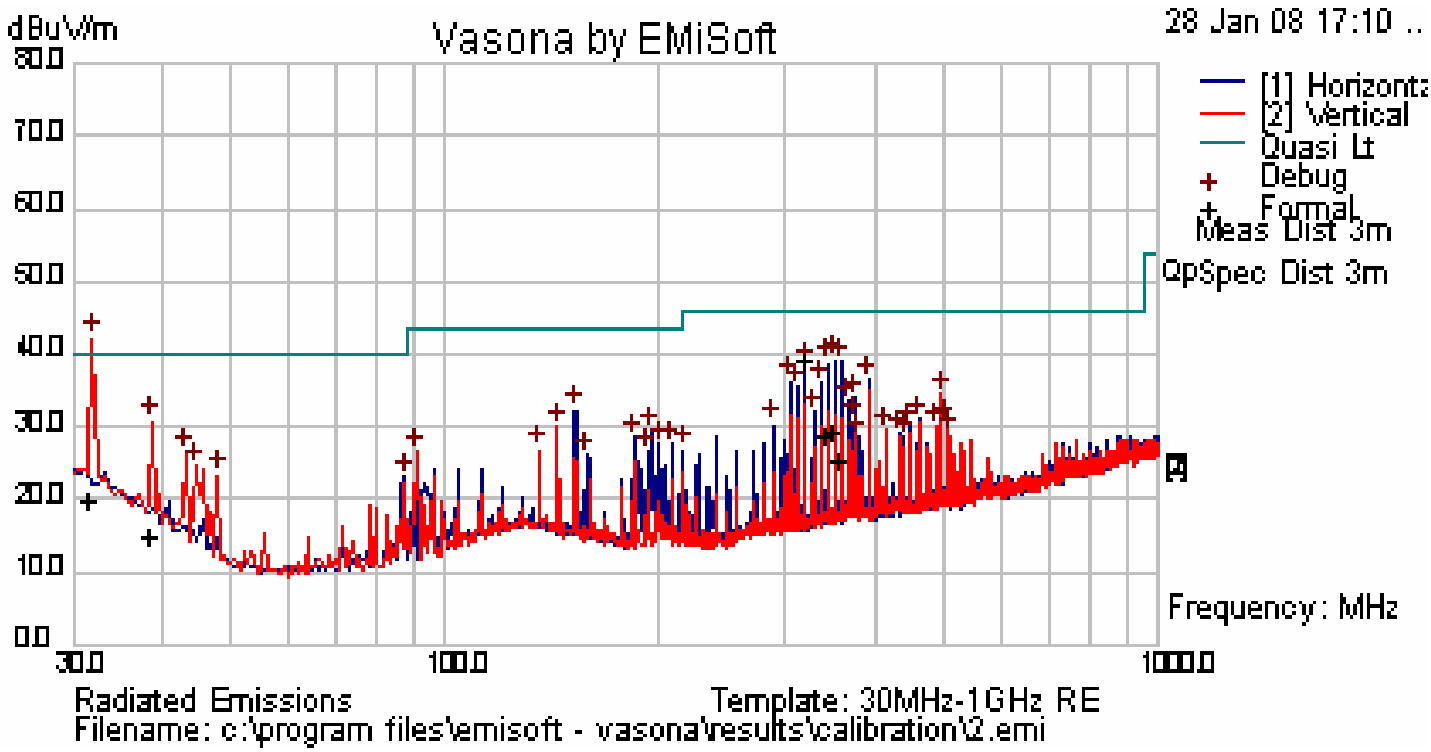
Mode: Receiving			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range (MHz)**
-8.9	319.988	Horizontal	30 MHz to 1000 MHz

Out of Band Emissions:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-5.5	4810.00	Vertical	Low, 1 MHz – 10GHz
-4.5	4890.00	Vertical	Mid, 1 MHz – 10GHz
-2.6	4960.00	Vertical	High, 1 MHz – 10GHz

7.9 Radiated Emissions Test plot & data:*

30MHz -1GHz scan



Frequency (MHz)	Quasi-Peak (dBµV/m)	Antenna Height (cm)	Correction Factor (dB)	Polarity (H/V)	Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
319.988	37.1	90	-14.8	H	223	46	-8.9
352.01	26.79	99	-14.01	H	319	46	-19.21
344.04	26.56	123	-14.2	H	396	46	-19.44
31.84	17.41	342	-9.27	V	321	40	-22.59
360.045	22.97	100	-13.79	H	373	46	-23.03
38.774	12.48	230	-14.18	V	140	40	-27.52

**Data pertains to module only as it was tested outside of enclosure. Only the module is powered up during the test.*

7.10 Radiated Spurious Emissions Test Data

2405 - 2480 MHz, Measured at 3 meters, 1 GHz – 10 GHz (module outside enclosure)

Low channel 2405 MHz

Frequency (MHz)	Receiver Reading (dBµV)	Azimuth Degrees	Ant. Height (m)	Ant. Polar. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. (dB)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
2405.00	93.2	200	2.6	H	30.2	5.1	40.1	88.3	114	-25.7	Fund/Pk
2405.00	101.6	106	1.2	V	30.2	5.1	40.1	96.7	114	-17.3	Fund/Pk
2405.00	73.9	200	2.6	H	30.2	5.1	40.1	69.0	94	-25.0	Fund/Ave
2405.00	81.3	106	1.2	V	30.2	5.1	40.1	76.4	94	-17.6	Fund/Ave
4810.00	68.2	339	1.3	V	32.8	8.0	40.5	68.5	74	-5.5	Pk
4810.00	48.0	339	1.3	V	32.8	8.0	40.5	48.3	54	-5.7	Ave
4810.00	40.5	202	2.5	H	32.8	8.0	40.5	40.8	54	-13.2	Ave
4810.00	55.1	202	2.5	H	32.8	8.0	40.5	55.3	74	-18.7	Pk

Middle channel 2445 MHz

Frequency (MHz)	Receiver Reading (dBµV)	Azimuth Degrees	Ant. Height (m)	Ant. Polar. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. (dB)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
2445.00	91.7	204	1.6	H	30.2	5.4	40.4	86.9	114	-27.1	Fund/Pk
2445.00	100.0	150	1.7	V	30.2	5.4	40.4	95.2	114	-18.8	Fund/Pk
2445.00	73.5	204	1.6	H	30.2	5.4	40.4	68.7	94	-25.3	Fund/Ave
2445.00	80.2	150	1.7	V	30.2	5.4	40.4	75.4	94	-18.7	Fund/Ave
4890.00	48.8	151	1.7	V	32.8	8.2	40.4	49.5	54	-4.5	Ave
4890.00	67.0	151	1.7	V	32.8	8.2	40.4	67.6	74	-6.4	Pk
4890.00	39.0	203	1.6	H	32.8	8.2	40.4	39.6	54	-14.4	Ave
4890.00	52.1	203	1.6	H	32.8	8.2	40.4	52.7	74	-21.3	Pk

High channel 2480 MHz

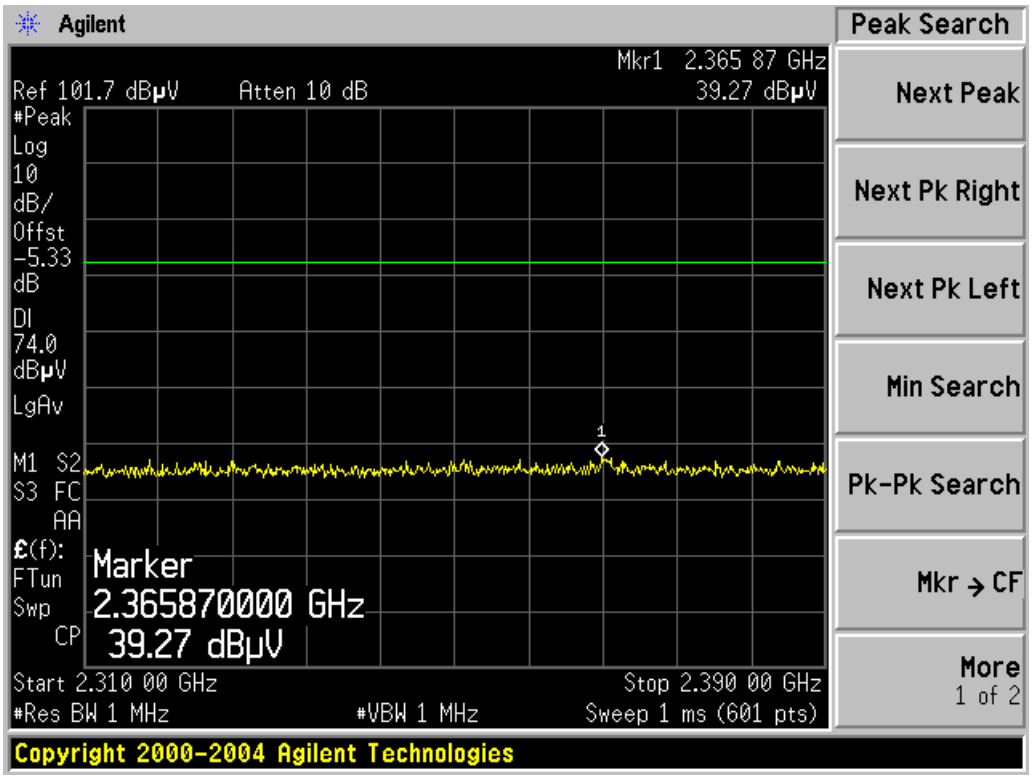
Frequency (MHz)	Receiver Reading (dBµV)	Azimuth Degrees	Ant. Height (m)	Ant. Polar. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. (dB)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
2480.00	90.1	203	1.0	H	30.2	5.8	41.0	85.1	114	-28.9	Fund/Pk
2480.00	99.9	342	1.3	V	30.2	5.8	41.0	94.8	114	-19.2	Fund/Pk
2480.00	72.9	203	1.0	H	30.2	5.8	41.0	67.8	94	-26.2	Fund/Ave
2480.00	79.2	342	1.3	V	30.2	5.8	41.0	74.1	94	-19.9	Fund/Ave
4960.00	50.5	151	1.8	V	32.8	8.3	40.2	51.4	54	-2.6	Ave
4960.00	66.4	151	1.8	V	32.8	8.3	40.2	67.3	74	-6.7	Pk
4960.00	40.9	26	1.1	H	32.8	8.3	40.2	41.8	54	-12.2	Ave
7440.00	28.1	212	1.4	V	35.3	10.3	37.5	36.2	54	-17.8	Ave
7440.00	27.1	78	1.1	H	35.3	10.3	37.5	35.2	54	-18.8	Ave
4960.00	52.9	26	1.1	H	32.8	8.3	40.2	53.8	74	-20.2	Pk
7440.00	39.9	78	1.1	H	35.3	10.3	37.5	48.0	74	-26.0	Pk
7440.00	39.9	212	1.4	V	35.3	10.3	37.5	48.0	74	-26.0	Pk

Out of Band Emissions:

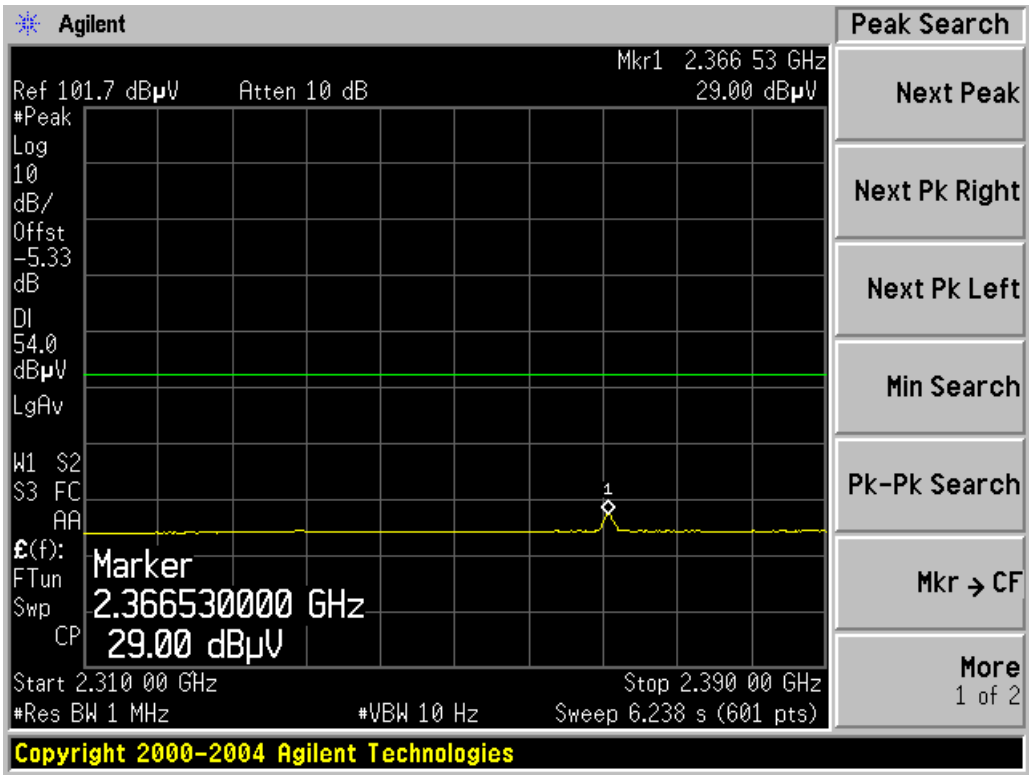
Frequency (MHz)	Reading (dBuV/m)	Correction Factor (dB)	Corrected Amplitude (dBuV/m) @3m	15.209 Limit (dBuV)	Margin (dB)
Low channel: 2405 MHz					
2400.00	51.6	-5.3	46.3	54.00	7.7
High channel: 2480 MHz					
2483.50	45.8	-5.3	40.5	54.00	13.5

Restricted Band Near Band Edge *(802.15.4 module tested outside EUT enclosure)*

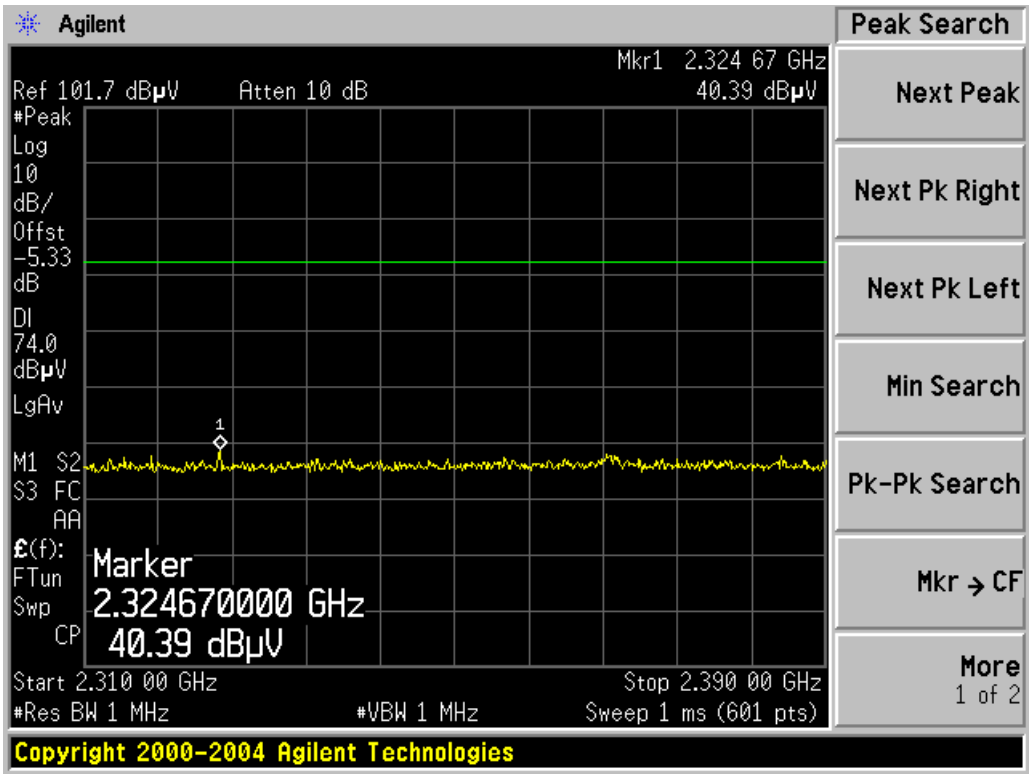
Low Channel – Peak, Horizontal



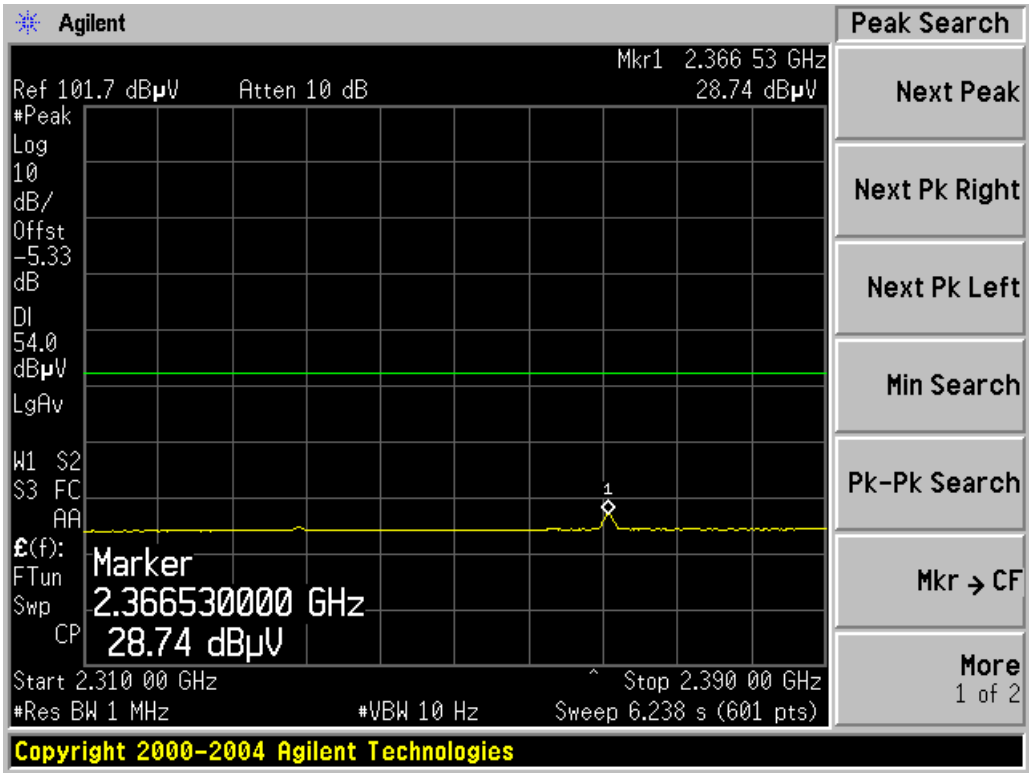
Low Channel – Average, Horizontal



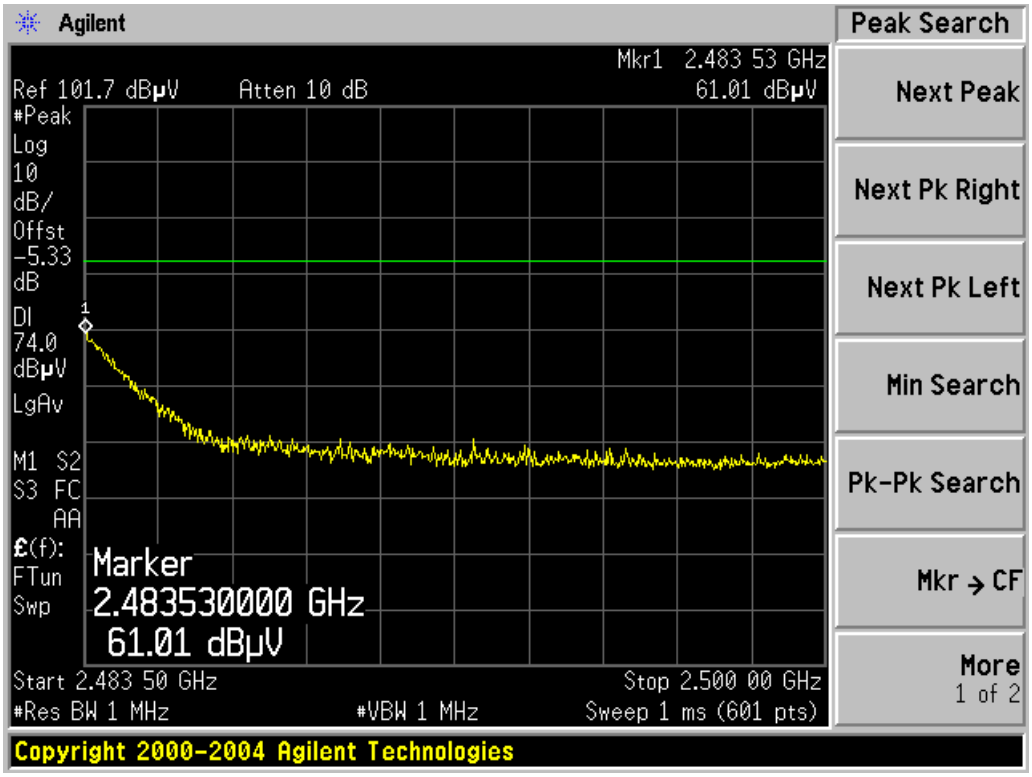
Low Channel – Peak, Vertical



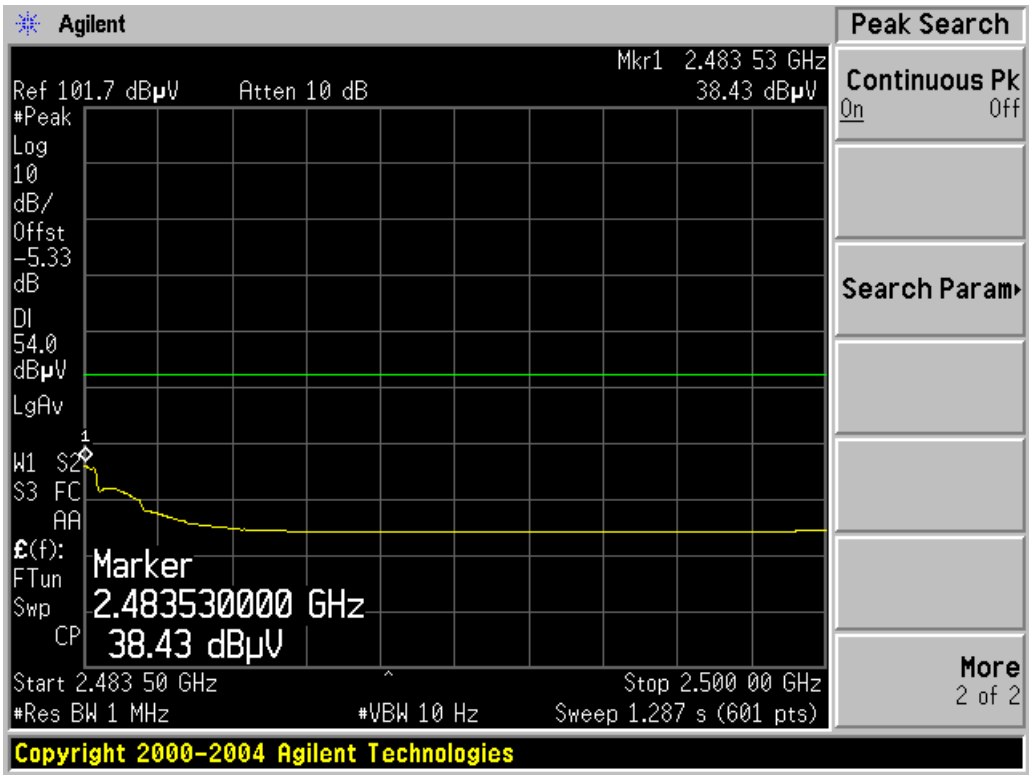
Low Channel – Average, Vertical



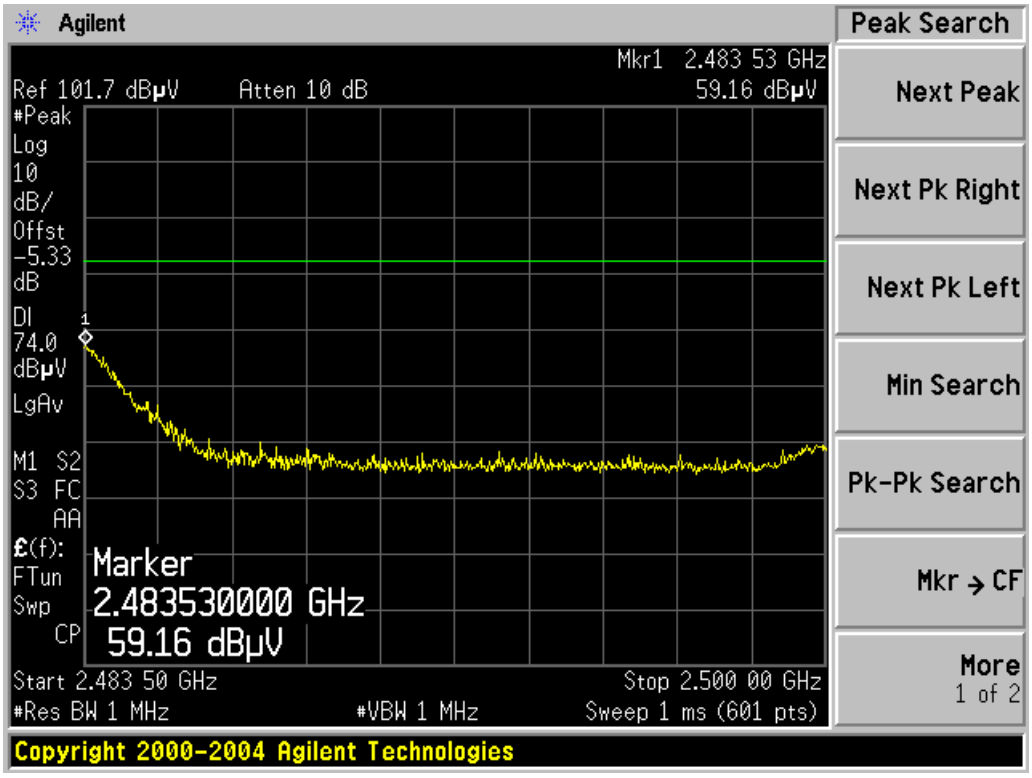
High Channel – Peak, Horizontal



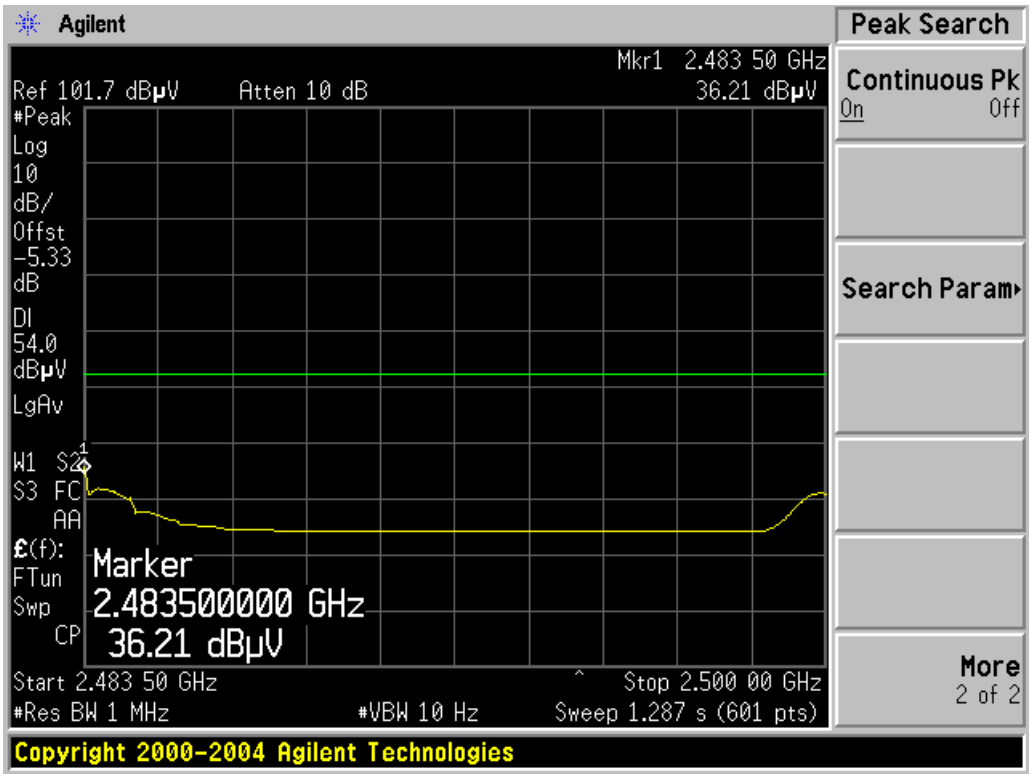
High Channel – Average, Horizontal



High Channel – Peak, Vertical



High Channel – Average, Vertical



8 RSS-210 § A8.2, RSS-Gen 4.6 – 6 dB Bandwidth & 99% Bandwidth

8.1 Applicable Standard

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

8.2 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 6 dB from the reference level. Record the frequency difference as the emissions bandwidth. (6 dB bandwidth for DTS)
4. Repeat above procedures until all frequencies measured were complete.

8.3 Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

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

8.4 Environmental Conditions

Temperature:	20 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

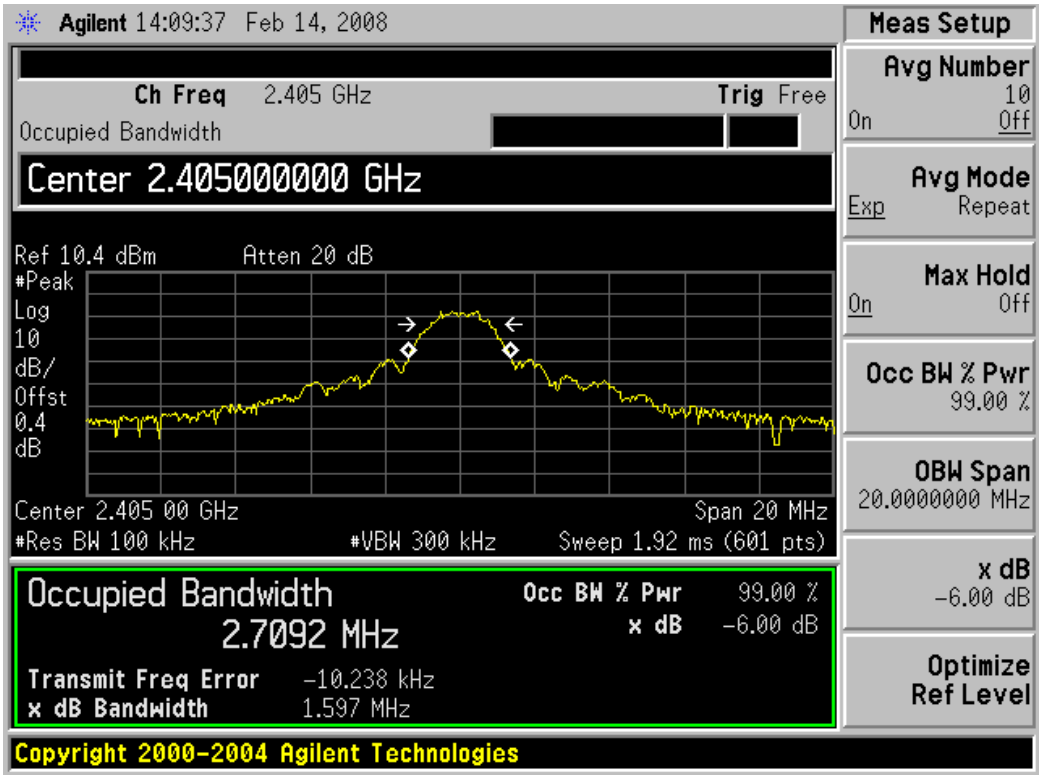
**The testing was performed by Xiao Ming Hu from 2008-01-18.*

8.5 Summary of Test Results

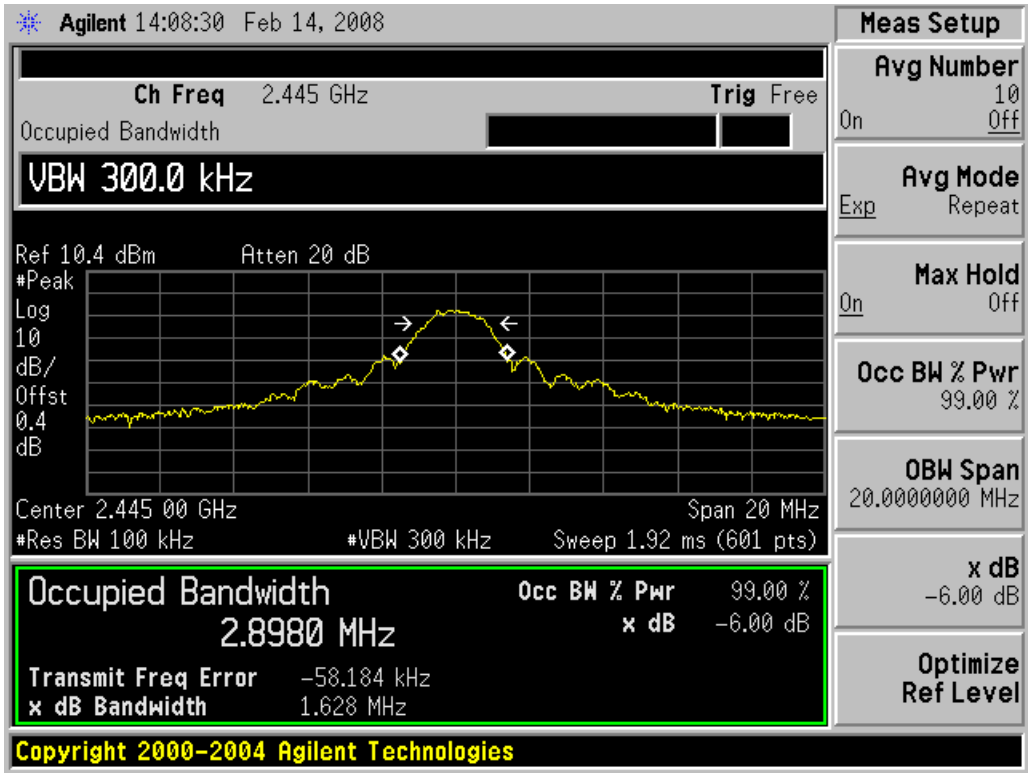
Channel	Frequency (MHz)	99% Channel Bandwidth (kHz)	6dB Channel Bandwidth (kHz)
Low	2405	2709.2	1597
Middle	2445	2898.0	1628
High	2480	2790.4	1645

Please refer to the following plots for detailed test results

Low Channel



Middle Channel



High Channel