

FCC PART 15.247

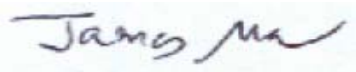
EMI MEASUREMENT AND TEST REPORT

For

Hospira, Inc.

755 Jarvis Drive
Morgan Hill, CA 95037

FCC ID: STJ-16026

This Report Concerns: ☒ Original Report	Product name: Symbiq One Channel Infusion System
Test Engineer: James Ma/	
Report No.: R0603293	
Report Date: 2006-04-13	
Reviewed By: Snell Leong	
Prepared By:	Bay Area Compliance Laboratory Corporation (BACL) 1274 Anvilwood Ave. Sunnyvale, CA 94089 Tel: (408) 732-9162 Fax: (408) 732 9164

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Hospira, Inc.* Product, *FCC ID: STJ-16026*, or the “EUT” as referred to this report is a device used in a health care facility to pump fluids into a patient in a controlled manner. The Infuser can deliver fluids, solutions, drugs, agents, nutritionals, electrolytes, blood and blood products for parenteral, enteral, intravenous, intra-arterial, subcutaneous, epidural or irrigation routes of administration. The device uses a piston pump which is powered electrically. The device operates using a force to propel the fluid through a narrow tube that determines the flow rate. The device includes means to detect fault conditions, such as air in, or blockage of, the infusion line and to activate an alarm. The Symbiq Infusion System is intended for use primarily in a hospital setting.

Approximately measurement: 170 mm L x 100 mmW x 210 mmH. The EUT operates at the frequency range of 2412– 2462MHz.

** The test data gathered are from typical production sample, serial number: 3100-016, Revision: 810-10818-ENG., provided by the manufacturer.*

EUT Photo



Additional photos in Exhibit C

Objective

This type approval report is prepared on behalf of *Hospira, Inc.* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for Output Power, Antenna Requirements, 6 dB Bandwidth, power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Spurious Emissions, Conducted and Spurious Radiated Emissions.

Related Submittal(s)/Grant(s)

No Related Submittals.

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.

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.

Test Facility

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

Test site at BACL Corp. has 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 test methods and procedures set forth in ANSI C63.4-2003& TIA/EIA-603.

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 is attached hereinafter and can also be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

SYSTEM TEST CONFIGURATION

Justification

The host system 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.

EUT Exercise Software

The software is provided by customer. The EUT exercise program used during radiated and conducted testing was designed to exercise the system components. The test software, PRISM Test Appliance, Version: 3.1.3, is runs with Windows terminal program under Windows 98/2000/ME/XP operating system. The support equipment, Laptop model: Dell Latitude No.: D610.

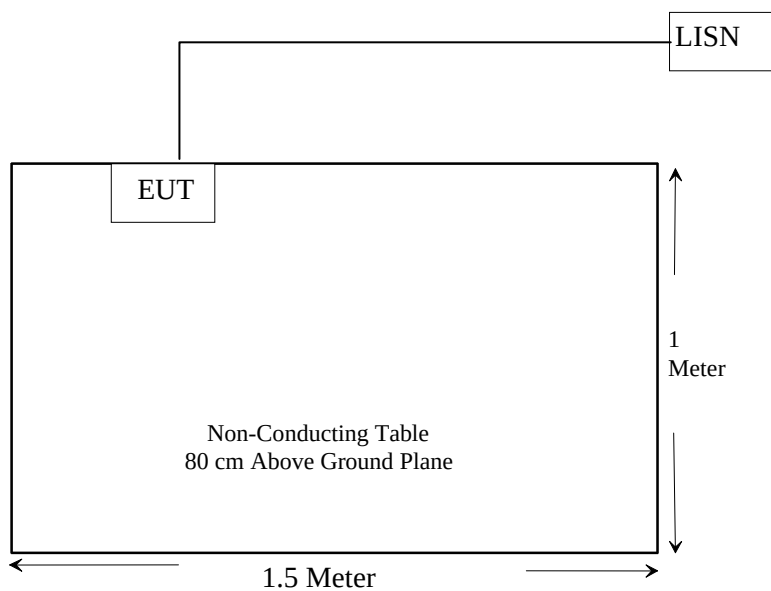
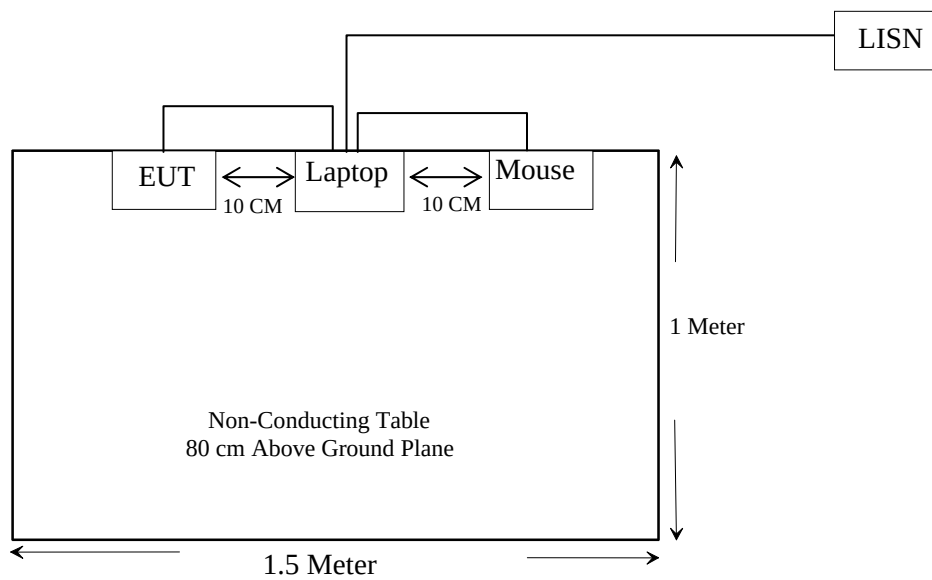
Once loaded, set the Tx channel to low, mid and high for testing.

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.

Test Setup Block Diagram**Conducted Emissions****Radiated Emissions**

SUMMARY OF TEST RESULTS

Results reported relate only to the product tested.

FCC RULES	DESCRIPTION OF TEST	RESULT
§2.1091	RF Exposure	Compliant
§15.203	Antenna Requirements	Compliant
§ 15.207 (a)	Conducted Emissions	Compliant
§2.1051 & §15.247(d)	Spurious Emissions at Antenna Terminals	Compliant
§15.205	Restricted Band	Compliant
§15.209 (a) & §15.247(d)	Radiated Emissions	Compliant*
§15.247 (a)(2)	6 dB Bandwidth	Compliant
§15.247 (b)(3)	Peak Output Power Measurement	Compliant
§ 15.247 (d)	100 kHz Bandwidth of Band Edge	Compliant
§15.247 (e)	Power Spectral Density	Compliant

*: Test data are within the measurement uncertainty.

§15.203 - ANTENNA REQUIREMENTS

Standard Applicable

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.

And according to § 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.

The antenna for this device is an integral antenna with gain of -5.0 dBi.

§15.207 (a) - CONDUCTED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are receiver, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ± 2.4 dB.

Test Setup

The measurement was performed at shield room, using the same 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 Procedure

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

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

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

Environmental Conditions

Temperature:	27° C
Relative Humidity:	78%
ATM Pressure:	1024 mbar

**The testing was performed by James Ma on 2006-03-30.*

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
R&S	Receiver, EMI Test	ESCS30	100176	2006-3-16
R&S	LISN, Artificial Mains	ESH2-Z5	871884/039	2005-11-14

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

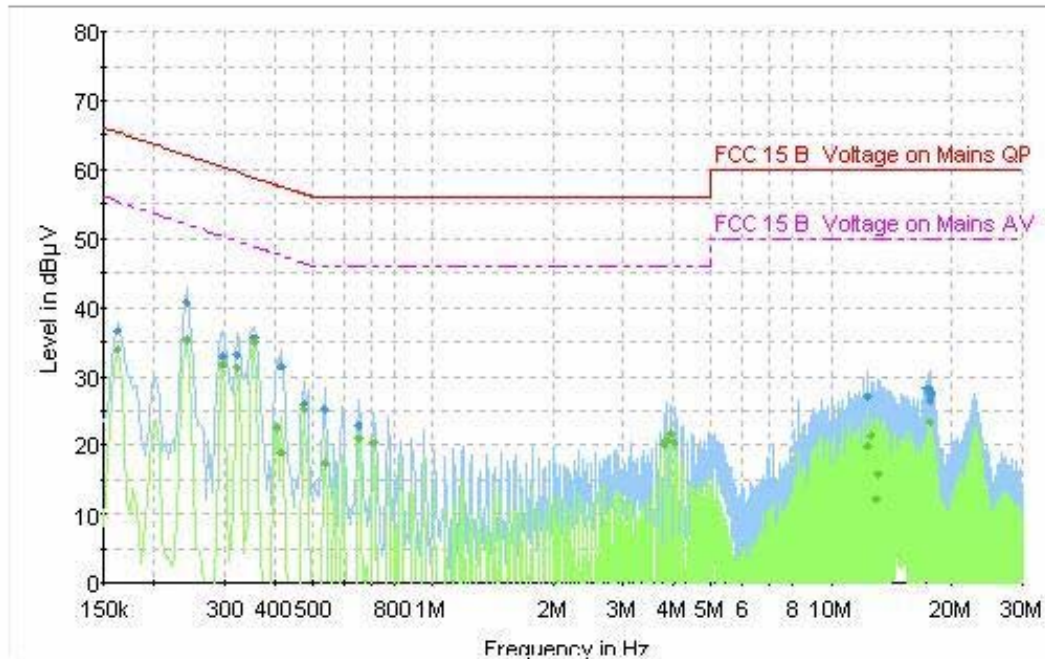
Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC Conducted limit for a Class B device, with the *worst* margin reading of:

13.4 dB at 0.358000 MHz in the Neutral conductor

Conducted Emissions Test plots and Data

Line:



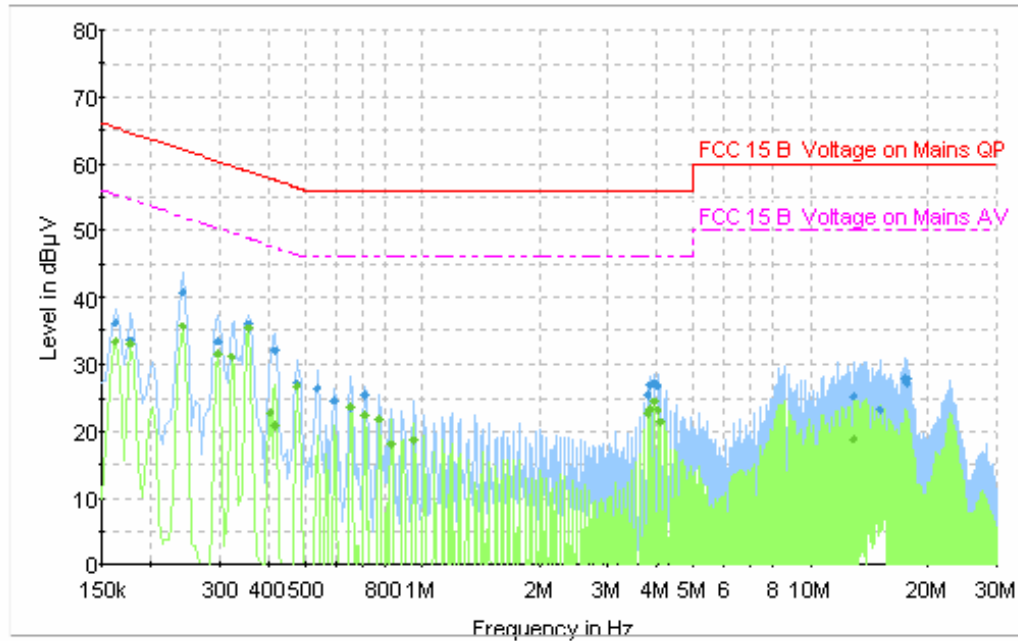
Final Measurement Detector 1 (QP)

Frequency (MHz)	QuasiPeak (dB)	Line	Margin (dB)	Limit (dB)
0.162000	36.7	L1	28.7	65.4
0.242000	40.7	L1	21.3	62.0
0.298000	32.9	L1	27.4	60.3
0.322000	33.1	L1	26.6	59.7
0.358000	35.5	L1	23.3	58.8
0.418000	31.4	L1	26.1	57.5
0.474000	26.0	L1	30.5	56.4
0.534000	25.3	L1	30.7	56.0
0.650000	22.9	L1	33.1	56.0
12.362000	27.0	L1	33.0	60.0
17.386000	28.2	L1	31.8	60.0
17.454000	28.0	L1	32.0	60.0
17.518000	28.3	L1	31.7	60.0
17.586000	26.6	L1	33.4	60.0
17.646000	28.2	L1	31.8	60.0
17.714000	27.3	L1	32.7	60.0
17.778000	27.6	L1	32.5	60.0

Final Measurement Detector 2 (AV)

Frequency (MHz)	Average (dB)	Line	Margin (dB)	Limit (dB)
0.162000	34.0	L1	21.4	55.4
0.242000	35.4	L1	16.6	52.0
0.298000	31.7	L1	18.6	50.3
0.322000	31.2	L1	18.5	49.7
0.358000	34.8	L1	14.0	48.8
0.406000	22.6	L1	25.1	47.7
0.418000	18.9	L1	28.6	47.5
0.474000	25.3	L1	21.2	46.4
0.538000	17.4	L1	28.6	46.0
0.654000	21.0	L1	25.0	46.0
0.714000	20.4	L1	25.6	46.0
3.798000	20.0	L1	26.0	46.0
3.878000	20.7	L1	25.3	46.0
3.958000	21.7	L1	24.3	46.0
4.042000	20.3	L1	25.7	46.0
12.362000	20.0	L1	30.1	50.0
12.538000	21.4	L1	28.6	50.0
12.958000	12.1	L1	37.9	50.0
13.134000	15.8	L1	34.2	50.0
17.582000	23.4	L1	26.6	50.0

Neutral:



Final Measurement Detector 1 (QP)

Frequency (MHz)	QuasiPeak (dB)	Line	Margin (dB)	Limit (dB)
0.162000	36.2	N	29.2	65.4
0.178000	33.7	N	30.9	64.6
0.242000	40.7	N	21.3	62.0
0.298000	33.5	N	26.8	60.3
0.358000	36.0	N	22.8	58.8
0.418000	32.1	N	25.4	57.5
0.474000	27.1	N	29.4	56.4
0.534000	26.3	N	29.7	56.0
0.594000	24.5	N	31.5	56.0
0.650000	23.5	N	32.5	56.0
0.714000	25.4	N	30.6	56.0
3.798000	25.5	N	30.5	56.0
3.878000	26.8	N	29.2	56.0
3.958000	27.2	N	28.8	56.0
4.042000	26.6	N	29.4	56.0
12.846000	25.3	N	34.7	60.0
15.106000	23.1	N	36.9	60.0
17.454000	27.9	N	32.1	60.0
17.646000	27.1	N	32.9	60.0
17.778000	27.8	N	32.2	60.0

Final Measurement Detector 2 (AV)

Frequency (MHz)	Average (dB)	Line	Margin (dB)	Limit (dB)
0.162000	33.5	N	21.8	55.4
0.178000	33.2	N	21.4	54.6
0.242000	35.7	N	16.3	52.0
0.298000	31.6	N	18.7	50.3
0.322000	31.1	N	18.5	49.7
0.358000	35.3	N	13.4	48.8
0.406000	22.8	N	24.9	47.7
0.418000	20.8	N	26.7	47.5
0.474000	26.7	N	19.8	46.4
0.654000	23.6	N	22.4	46.0
0.714000	22.4	N	23.6	46.0
0.774000	21.7	N	24.3	46.0
0.834000	18.0	N	28.0	46.0
0.950000	18.7	N	27.3	46.0
3.798000	22.5	N	23.5	46.0
3.878000	23.4	N	22.6	46.0
3.958000	24.4	N	21.6	46.0
4.042000	23.2	N	22.8	46.0
4.122000	21.2	N	24.8	46.0
12.846000	18.7	N	31.3	50.0

§2.1051 & §15.247(d) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Standard Applicable

Requirements: CFR 47, § 2.1051.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

Measurement Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

Environmental Conditions

Temperature:	27° C
Relative Humidity:	78%
ATM Pressure:	1024 mbar

**The testing was performed by James Ma on 2006-03-30.*

Equipment Lists

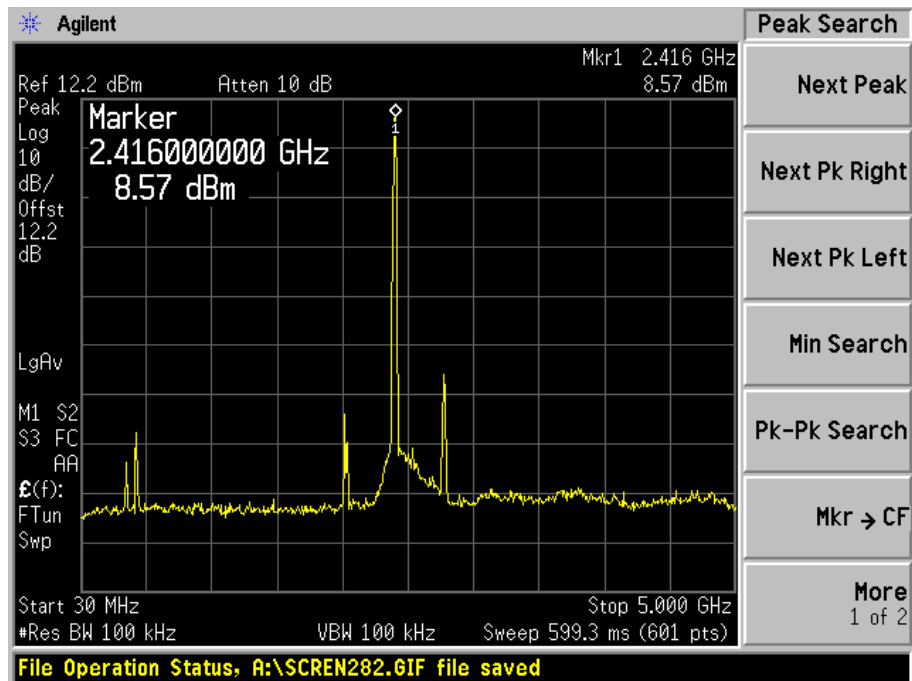
Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06

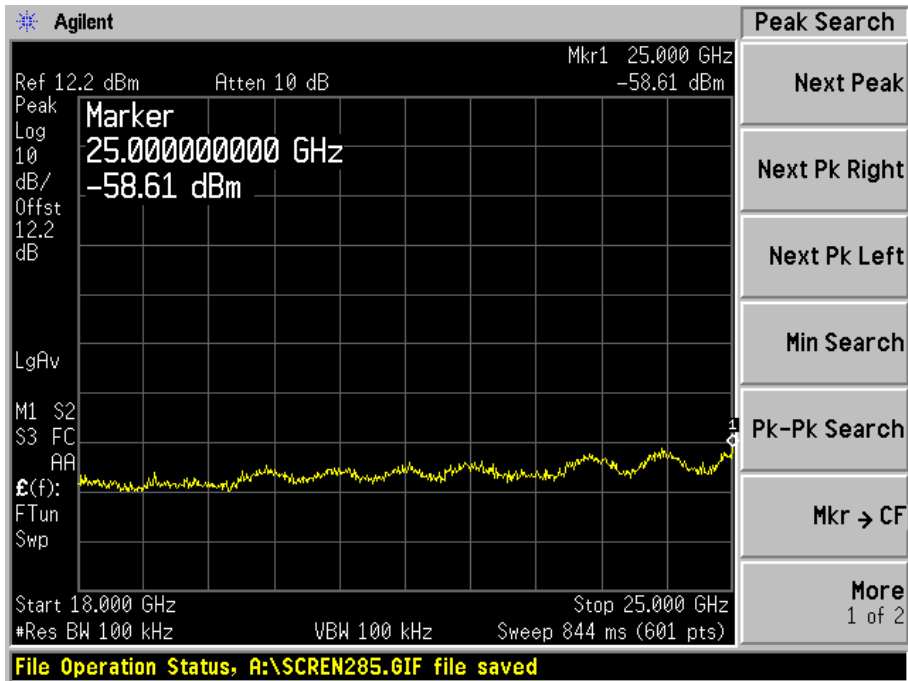
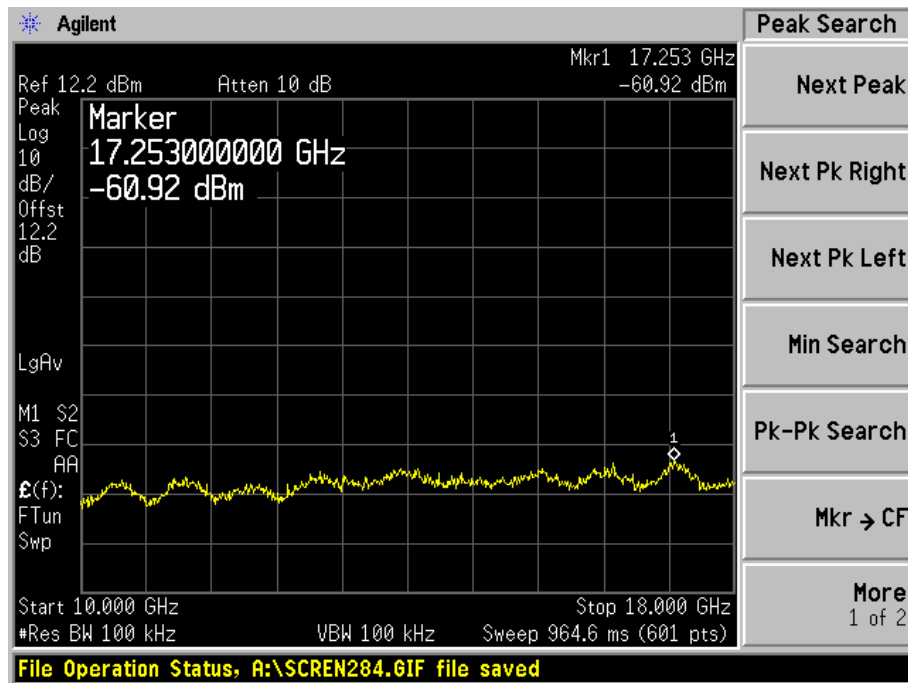
*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Measurement Result

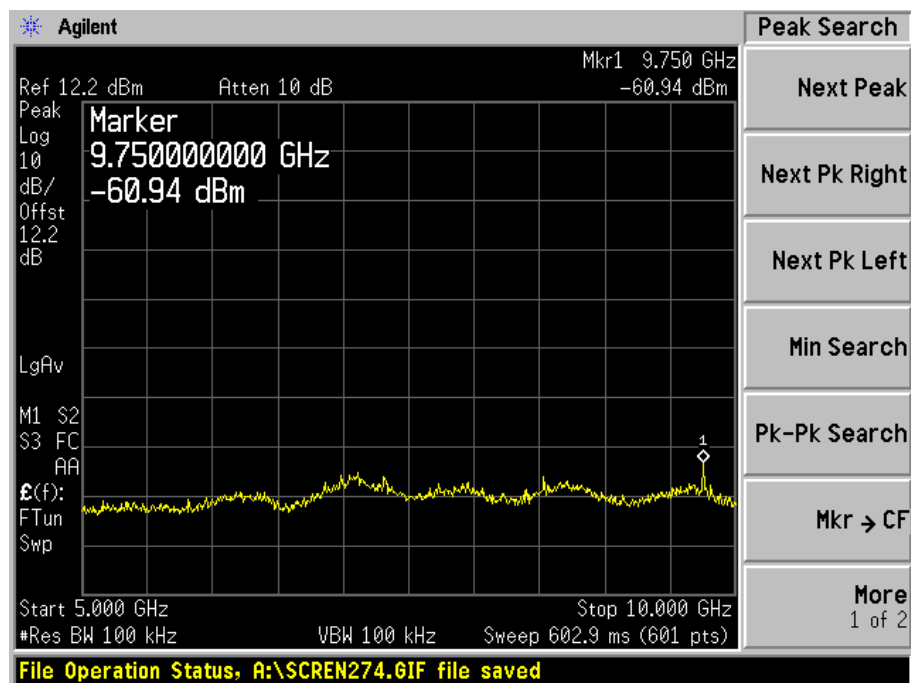
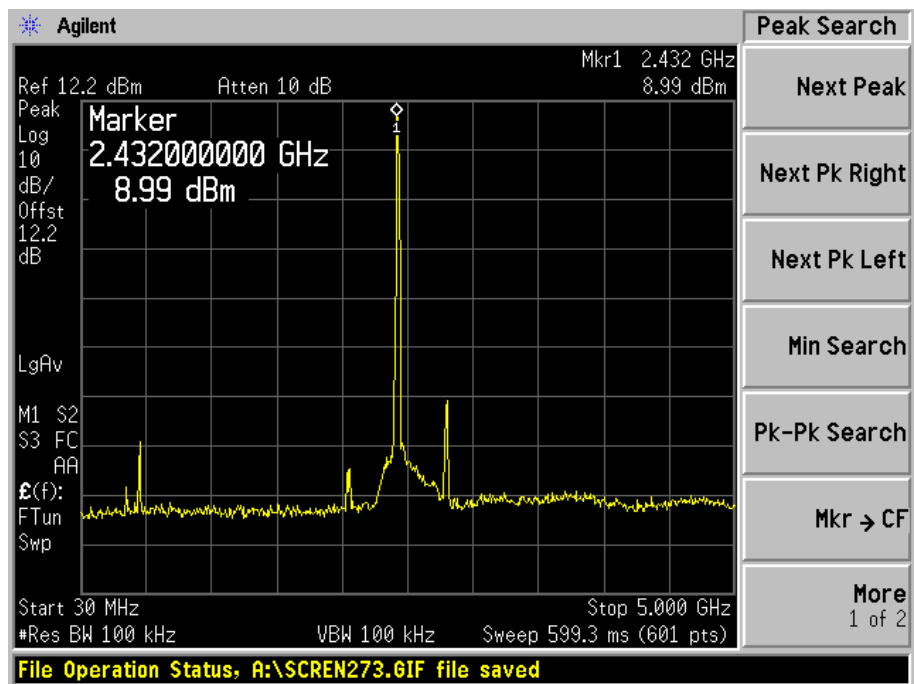
Please refer to following pages for plots of spurious emissions.

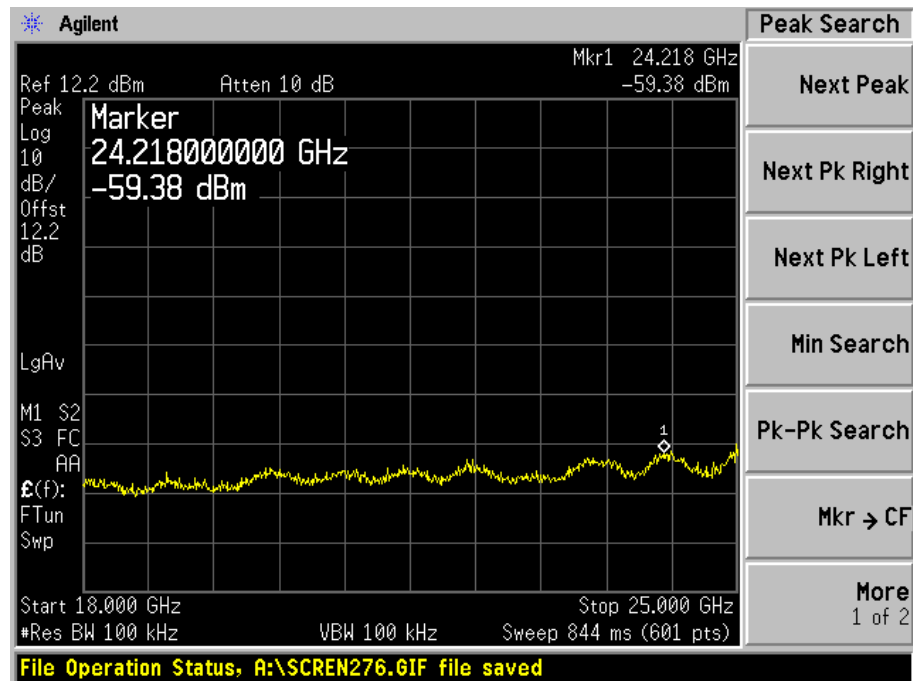
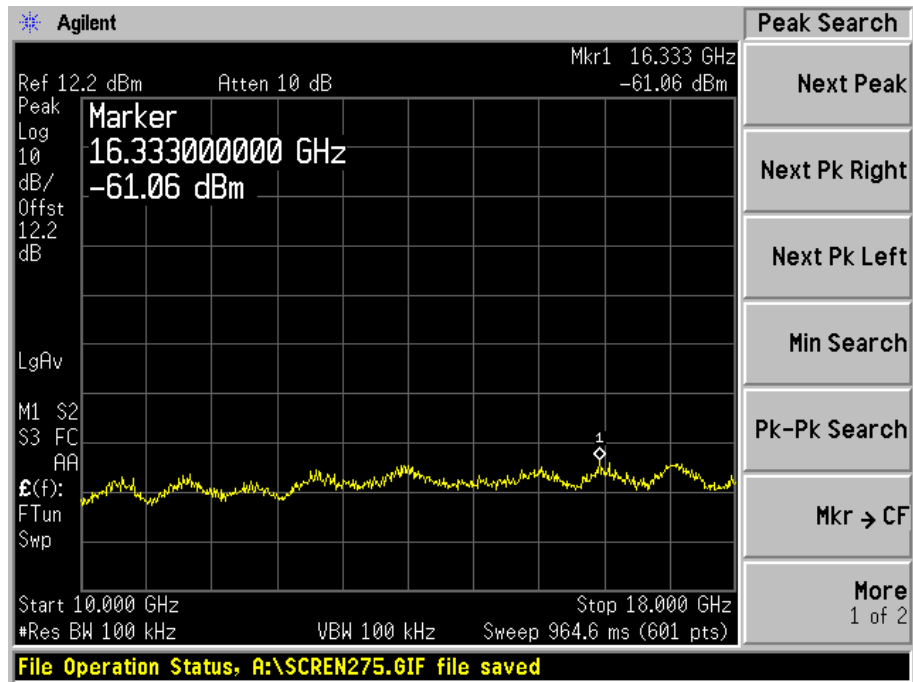
Low Channel



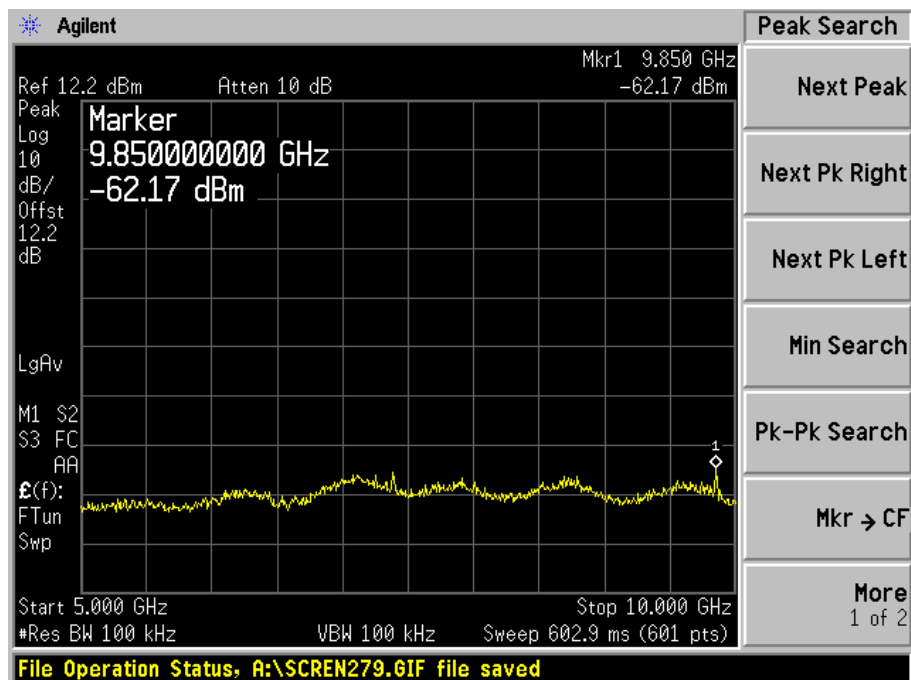
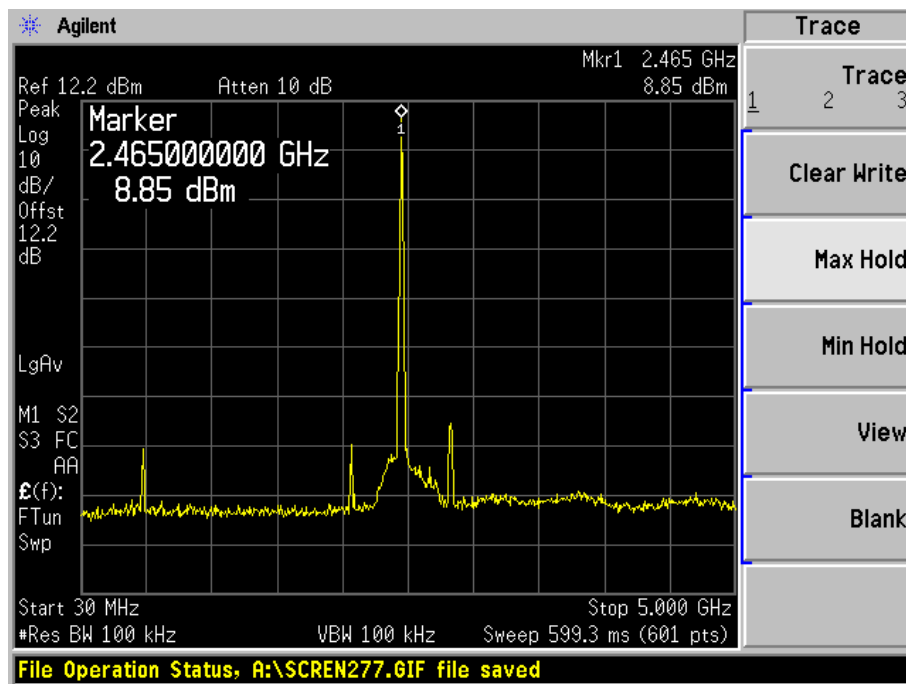


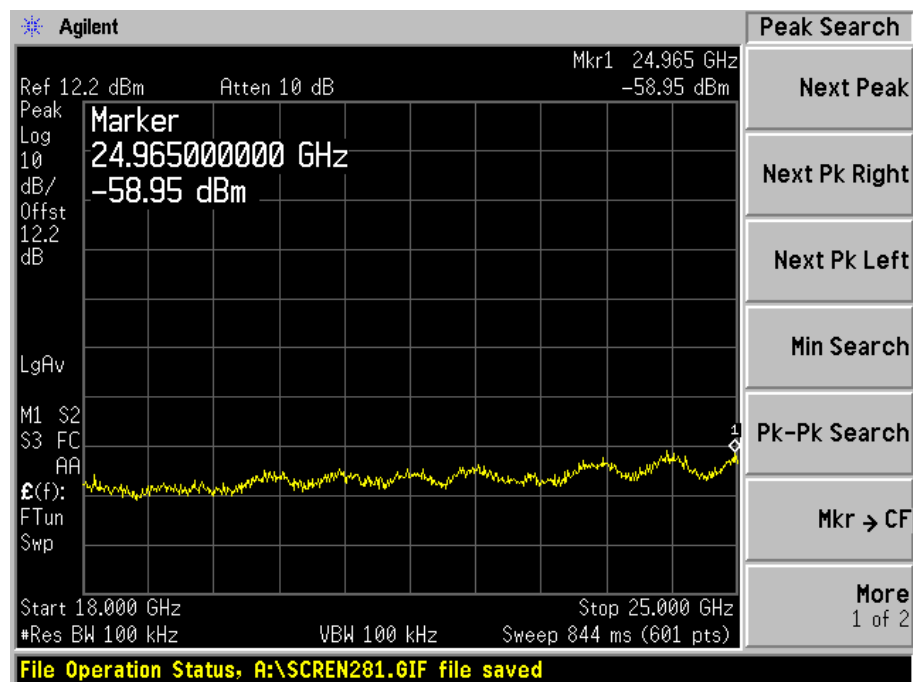
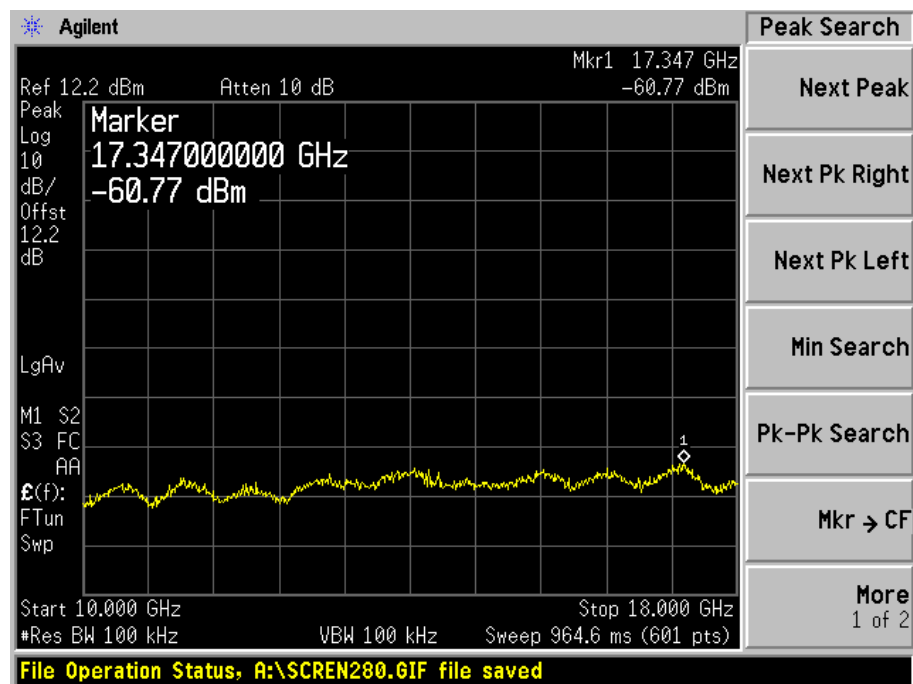
Mid Channel





High Channel





§15.205 & §15.209 & §15.247(c) - SPURIOUS RADIATED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties. 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 best estimate of the uncertainty of a radiation emissions measurement at BACL is ± 4.0 dB.

According to §15.205, except as shown 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	16.42 – 16.423	399.9 – 410	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2655 – 2900	22.01 – 23.12
8.41425 – 8.41475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975 – 12.57725	240 – 285	3345.8 – 3358	36.43 – 36.5
13.36 – 13.41	322 – 335.4	3600 – 4400	Above 38.6

Except as provided in paragraph (d) and (e), the filed 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 1000MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emissions 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.

According to §15.209, the device shall meet radiated emissions general requirements.

Except for Class A device, the filed strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emissions (MHz)	Field Strength	
	($\mu\text{V/m}$)	(dB $\mu\text{V/meter}$)
30 – 88	100	40
88 – 216	150	43.5
216 - 960	200	46
Above 960	500	54

EUT Setup

The radiated emissions tests were performed using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209 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.

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR, Section 15.33, the frequency was investigated from 30 to 25000 MHz.

During the radiated emissions test, the spectrum analyzer was set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

For Average measurement: RBW = 1MHz, VBW = 10Hz (above 1000MHz)

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.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emissions were found to be marginal (within -4 dB μV 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:

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

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 emissions are 7dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC 15.247 Limit}$$

Environmental Conditions

Temperature:	27° C
Relative Humidity:	78%
ATM Pressure:	1024 mbar

**The testing was performed by James Ma on 2006-03-30.*

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
A.R.A	Antenna, Horn	DRG-118/A	1132	2005-08-17.
Sonoma Instrument	Amplifier, Broadband (10KHz ~ 2500 MHz)	317	260407	2006-03-20
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06
HP	Pre, Amplifier (1 ~ 26.5 GHz)	8449B	3147A00400	2005-08-10
Sunol Sciences	30Mhz ~ 3 GHz Antenna	JB3	A020106-3/S006628	2006-02-14

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

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, and had the worst margin of:

802.11b:

- 0.8 dB at 7236.0000 MHz in the **Horizontal** polarization, Low Channel*
- 0.6 dB at 7311.0000 MHz in the **Horizontal** polarization, Middle Channel*
- 0.3 dB at 7386.0000 MHz in the **Horizontal** polarization, High Channel*

Unintentional Emissions:

- 1.6 dB at 608.28250MHz in the **Vertical** polarization, Unintentional Emissions*

** The test data was within the measurement of uncertainty.*

Radiated Emissions Test Result @ 3 meter**802.11b:**

For Low Channel 2412MHz, 1-25GHz

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna factor dB	Cable loss dB	Amplifier dB	Corrected Reading dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments	Testing Condition Mode/Distance
7236.0000	40.2	200	1.0	h	37.6	12.3	36.9	53.2	54	-0.8*	Ave	CW / 3
4824.0000	48.4	270	2.4	v	32.1	6.0	34.4	52.1	54	-1.9*	Ave	CW / 3
4824.0000	47.6	180	2.3	h	32.1	6.0	34.4	51.3	54	-2.7*	Ave	CW / 3
7236.0000	35.3	90	2.0	v	37.6	12.3	36.9	48.3	54	-5.7	Ave	CW / 3
2786.0000	48.4	160	1.0	v	28.7	4.8	35.6	46.3	54	-7.7	Ave	CW / 3
2786.0000	47.8	90	2.0	h	28.7	4.8	35.6	45.7	54	-8.3	Ave	CW / 3
7236.0000	50.4	200	1.0	h	37.6	12.3	36.9	63.4	74	-10.6	Peak	CW / 3
4824.0000	58.2	45	1.7	v	32.1	6.0	34.4	61.9	74	-12.1	Peak	CW / 3
4824.0000	57.3	45	1.7	h	32.1	6.0	34.4	61.0	74	-13.0	Peak	CW / 3
7236.0000	44.9	90	2.0	v	37.6	12.3	36.9	57.9	74	-16.1	Peak	CW / 3
2786.0000	58.6	160	1.0	v	28.7	4.8	35.6	56.5	74	-17.5	Peak	CW / 3
2786.0000	58.0	180	2.0	h	28.7	4.8	35.6	55.9	74	-18.1	Peak	CW / 3

For Mid Channel 2437MHz, 1-25GHz

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna factor dB	Cable loss dB	Amplifier dB	Corrected Reading dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments	Testing Condition Mode/Distance
7311.0000	40.4	180	1.0	h	37.6	12.3	36.9	53.4	54	-0.6*	Ave	CW / 3
4874.0000	45.7	35	1.5	v	32.1	6.0	34.4	49.4	54	-4.6	Ave	CW / 3
7311.0000	36.3	30	1.3	v	37.6	12.3	36.9	49.3	54	-4.7	Ave	CW / 3
4874.0000	43.8	160	2.2	h	32.1	6.0	34.4	47.5	54	-6.5	Ave	CW / 3
2812.0000	46.0	90	2.0	v	28.7	4.8	35.6	43.9	54	-10.1	Ave	CW / 3
2812.0000	45.5	180	1.2	h	28.7	4.8	35.6	43.4	54	-10.6	Ave	CW / 3
7311.0000	49.8	180	1.0	h	37.6	12.3	36.9	62.8	74	-11.2	Peak	CW / 3
4874.0000	56.2	35	1.5	v	32.1	6.0	34.4	59.9	74	-14.1	Peak	CW / 3
7311.0000	45.3	30	1.3	v	37.6	12.3	36.9	58.3	74	-15.7	Peak	CW / 3
4874.0000	54.3	160	2.2	h	32.1	6.0	34.4	58.0	74	-16.0	Peak	CW / 3
2812.0000	56.7	90	2.0	v	28.7	4.8	35.6	54.6	74	-19.4	Peak	CW / 3
2812.0000	56.6	180	1.2	h	28.7	4.8	35.6	54.5	74	-19.5	Peak	CW / 3

For High Channel 2462MHz, 1-25GHz

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Factor dB	Cable loss dB	Amplifier dB	Corrected Reading dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments	Testing Condition Mode/Distance
7386.0000	40.7	180	1.2	h	37.6	12.3	36.9	53.7	54	-0.3*	Ave	CW / 3
7386.0000	40.6	270	2.4	v	37.6	12.3	36.9	53.6	54	-0.4*	Ave	CW / 3
4924.0000	49.4	60	2.0	v	32.1	6.0	34.4	53.1	54	-0.9*	Ave	CW / 3
4924.0000	49.2	90	2.1	h	32.1	6.0	34.4	52.9	54	-1.1*	Ave	CW / 3
7386.0000	50.9	270	2.4	v	37.6	12.3	36.9	63.9	74	-10.1	Peak	CW / 3
7386.0000	50.8	180	1.2	h	37.6	12.3	36.9	63.8	74	-10.2	Peak	CW / 3
4924.0000	59.5	60	2.0	v	32.1	6.0	34.4	63.2	74	-10.8	Peak	CW / 3
4924.0000	59.2	90	2.1	h	32.1	6.0	34.4	62.9	74	-11.1	Peak	CW / 3

Unintentional Emissions @ 3 Meter

30MHz – 1GHz

Frequency MHz	Reading dBuV	Direction Degree	Polar H / V	Antenna Factor dB	Cable Loss dB	Amplifier dB	Corrected Reading dBuV/m	FCC 15B Limit dBuV/m	FCC 15B Margin dB
608.28250	34.8	274	V	280	-12.0	10	44.8	46.4	-1.6*
829.44250	34.7	222	V	105	-7.8	10	44.7	46.4	-1.7*
774.15250	34.4	225	V	108	-8.5	10	44.4	46.4	-2.0*
799.29000	33.8	214	V	119	-8.2	10	43.8	46.4	-2.6*
597.16875	33.5	274	V	202	-12.3	10	43.5	46.4	-2.9*
534.15875	30.8	281	V	218	-12.5	10	40.8	46.4	-5.6

* The test data was within the measurement of uncertainty.

§15.247(a)(2) – 6 dB BANDWIDTH

Standard Applicable

According to §15.247(a)(2), for digital modulation techniques, the minimum 6dB bandwidth shall be at least 500 kHz.

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.

Environmental Conditions

Temperature:	27° C
Relative Humidity:	78%
ATM Pressure:	1024 mbar

**The testing was performed by James Ma on 2006-03-30.*

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06

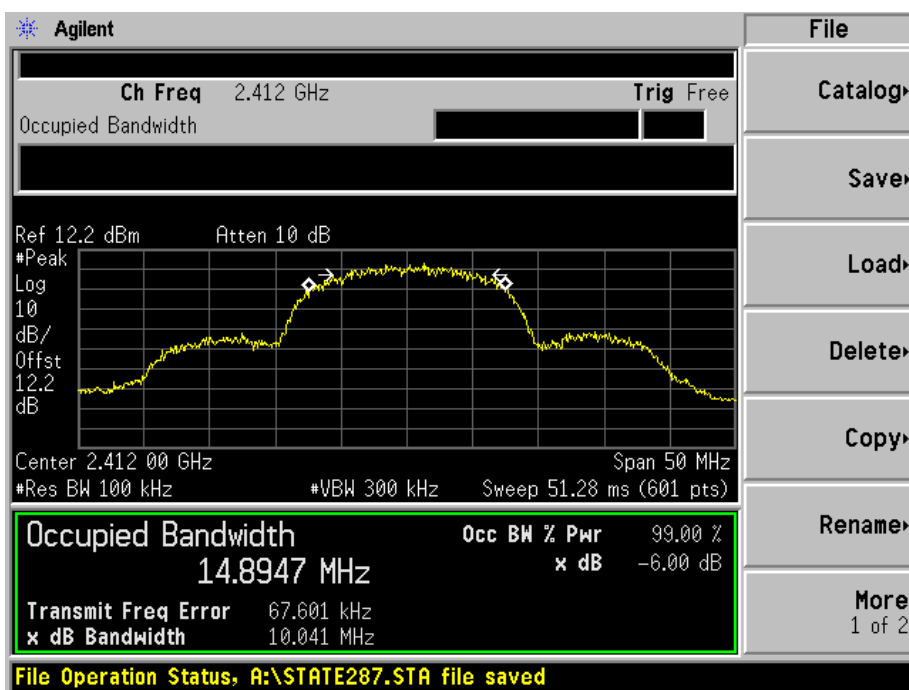
*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Measurement Result

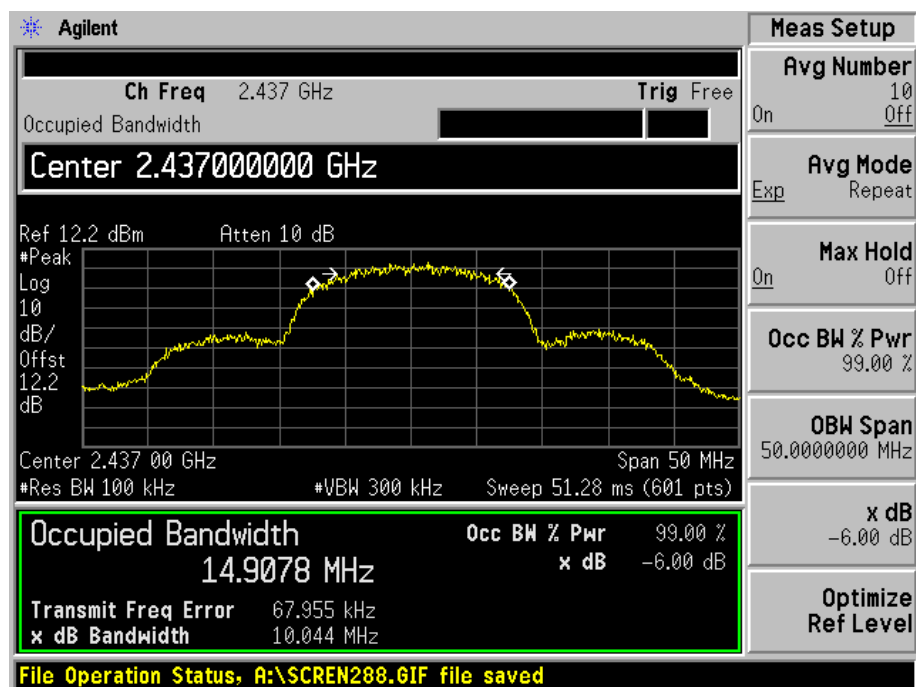
Please refer to following pages for plots of 6 dB Bandwidth.

Channel	Frequency MHz	Channel Bandwidth (MHz)	Limit KHz
Low	2412	10.04	>500
Mid	2437	10.04	>500
High	2462	10.04	>500

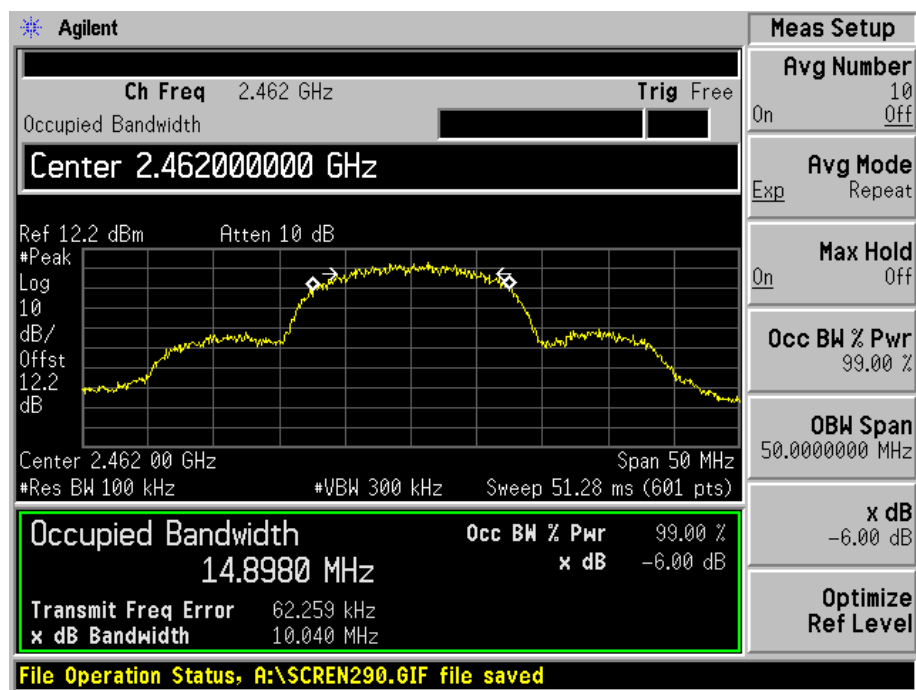
Low Channel



Middle Channel



High Channel



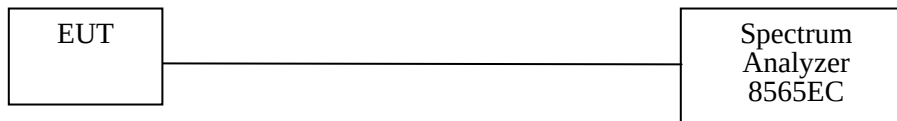
§15.247(b)(3) - PEAK OUTPUT POWER MEASUREMENT

Standard Applicable

According to §15.247(b) (3), for systems using digital modulation in 2400-2483.5 MHz: 1 Watt

Measurement Procedure

1. Place the EUT on a bench 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 a spectrum analyzer.
3. Add a correction factor to the display.



Environmental Conditions

Temperature:	27° C
Relative Humidity:	78%
ATM Pressure:	1024 mbar

**The testing was performed by James Ma on 2006-03-30.*

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06

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

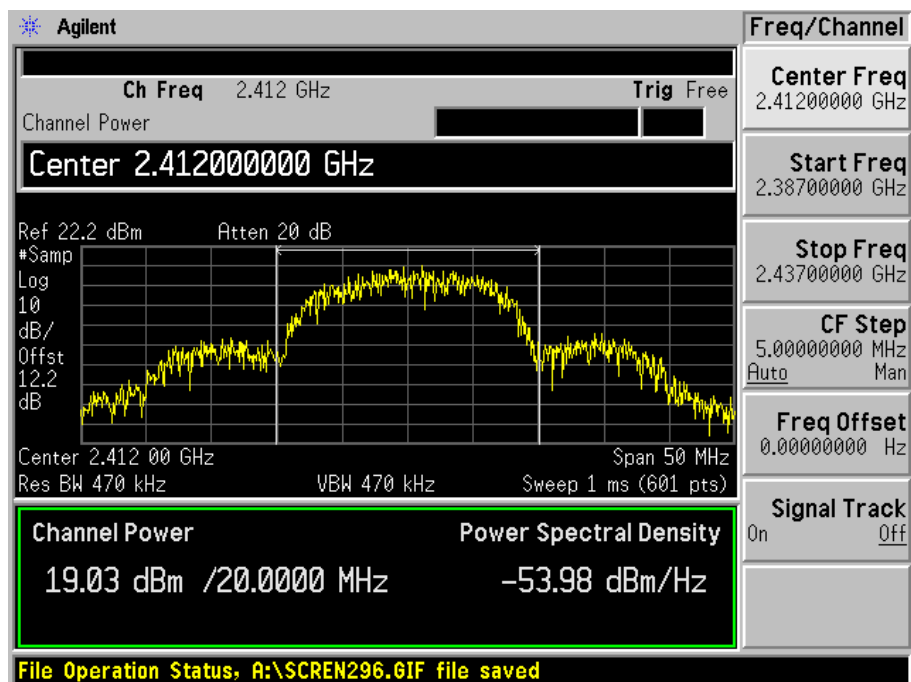
Measurement Result

RF Output Power

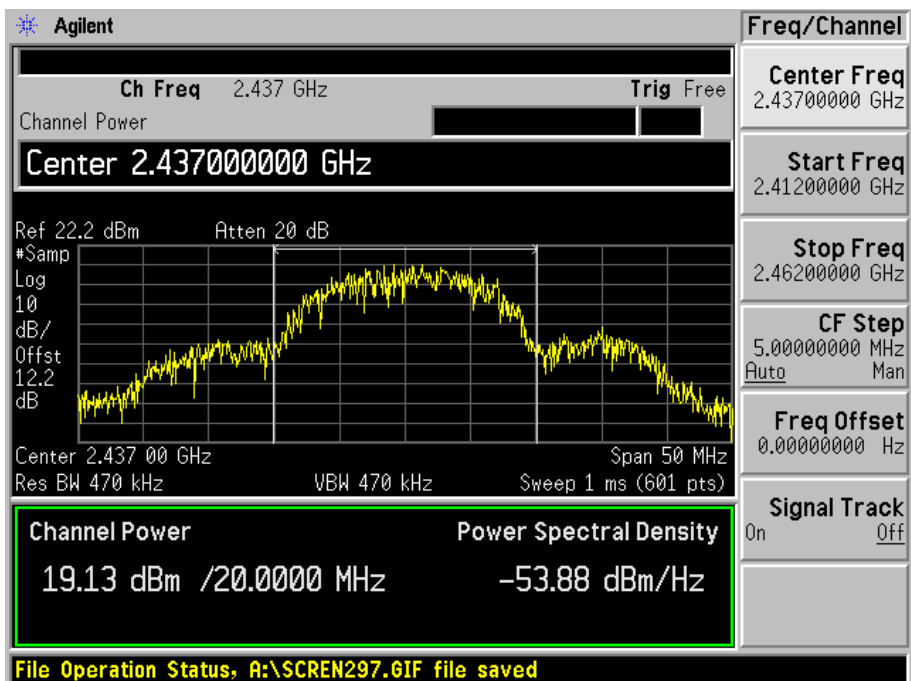
Channel	Frequency MHz	Max Peak Output Power		Limit (m Watt)	Result
		(dBm)	(m Watt)		
Low	2412	19.03	79.98	1000	Pass
Mid	2437	19.13	81.85	1000	Pass
High	2462	19.38	86.70	1000	Pass

Please refer to following pages for plots of Peak output power

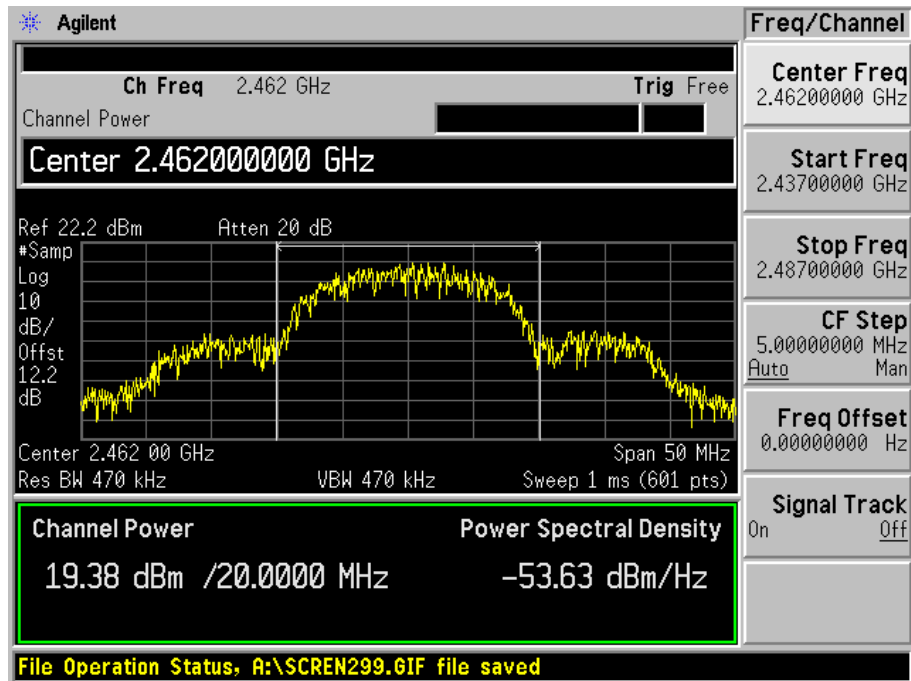
Low Channel



Middle Channel



High Channel



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

Standard Applicable

According to §15.247(d), in *any* 100 kHz bandwidth outside the frequency bands 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emissions limits specified in §15.209(a) see §15.205(c)).

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 100 kHz 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.

Environmental Conditions

Temperature:	27° C
Relative Humidity:	78%
ATM Pressure:	1024 mbar

**The testing was performed by James Ma on 2006-03-30.*

Equipment Lists

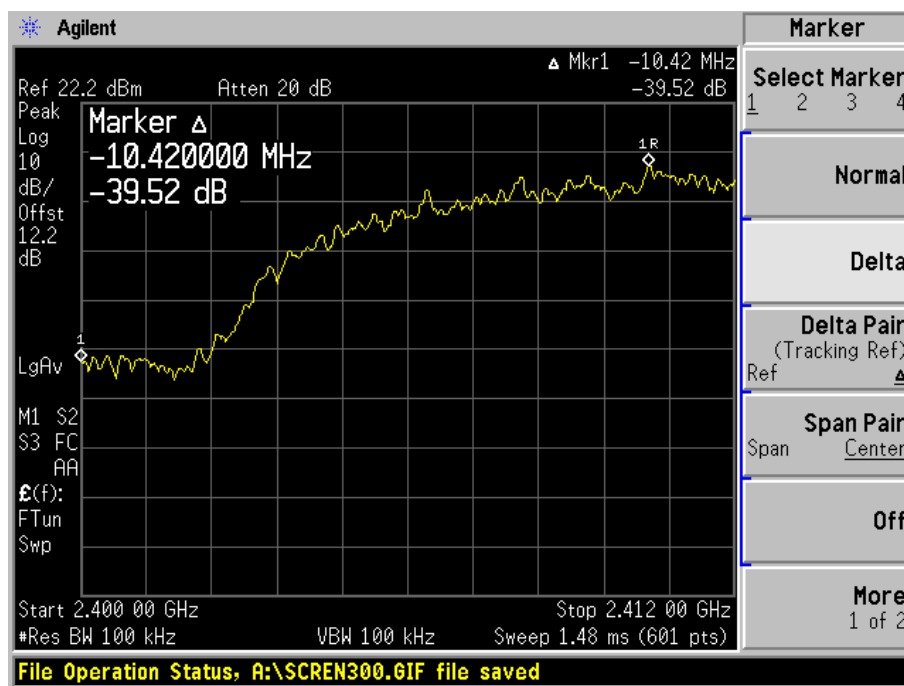
Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06

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

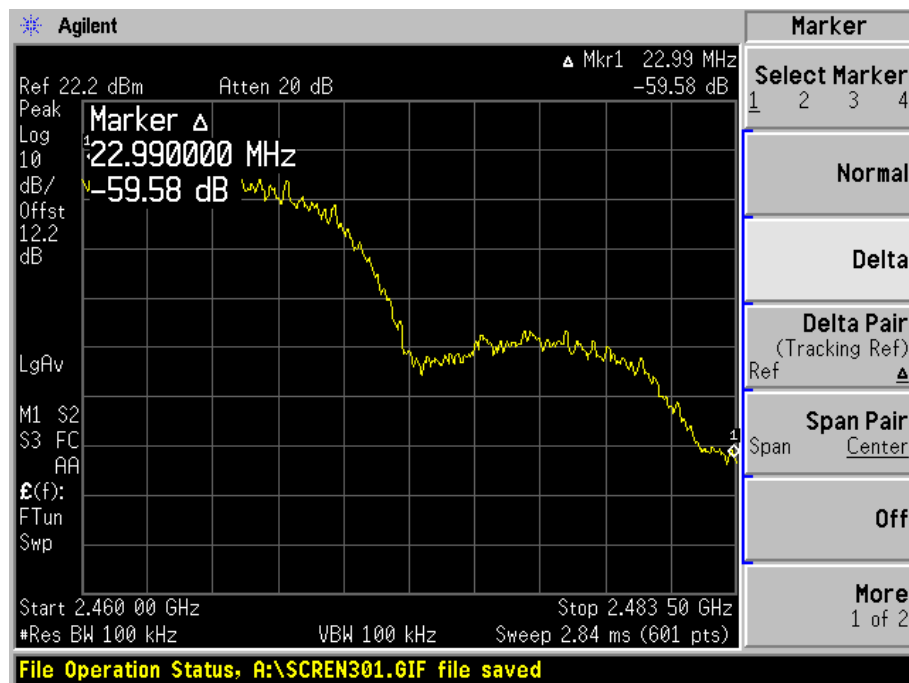
Measurement Result

Please refer to following pages for plots of band edge.

Low Channel



High Channel



§15.247(d) - POWER SPECTRAL DENSITY

Standard Applicable

According to §15.247 (d), for direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

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 1.5MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value. (DTS)
4. Repeat above procedures until all frequencies measured were complete.

Environmental Conditions

Temperature:	27° C
Relative Humidity:	78%
ATM Pressure:	1024 mbar

**The testing was performed by James Ma on 2006-03-30.*

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06

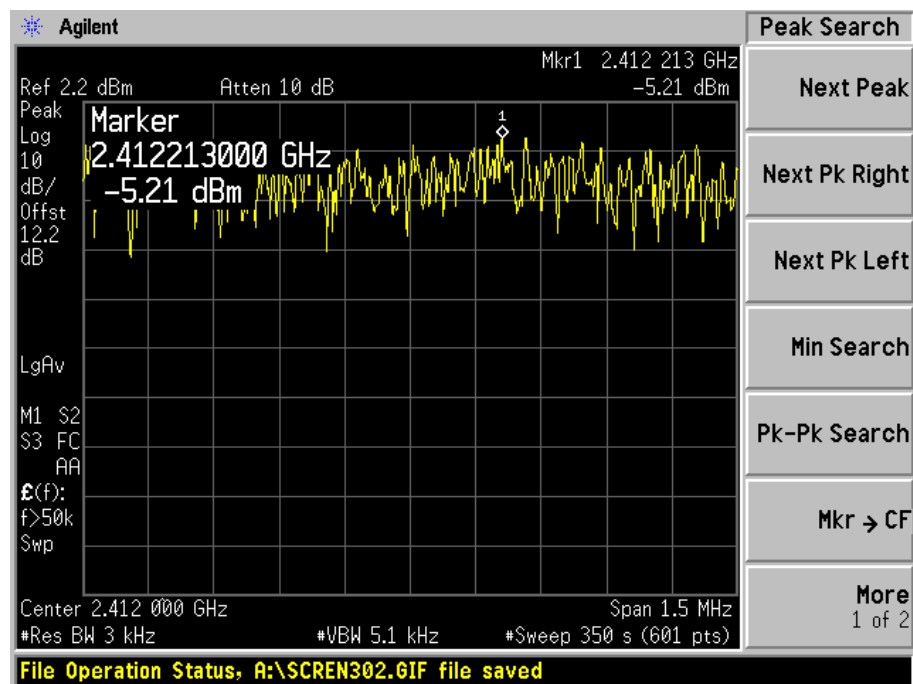
*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Measurement Result

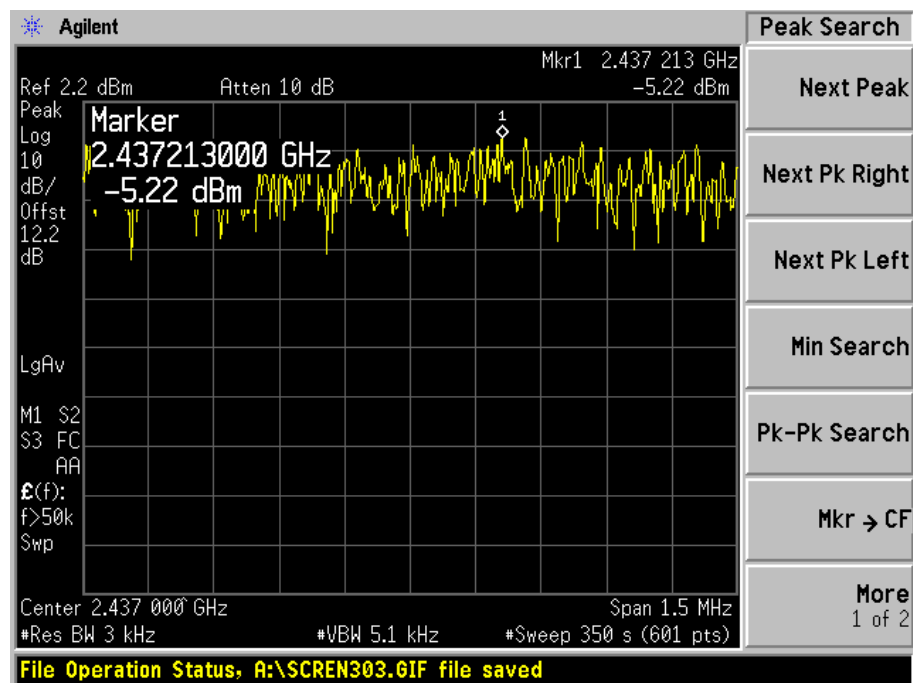
Channel	Frequency MHz	PSD dBm/kHz	Limit dBm/kHz
Low	2412	-5.21	8
Mid	2437	-5.22	8
High	2462	-4.98	8

Please refer to following pages for plots of Power Spectral Density

Low Channel



Mid. Channel



High Channel

