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TEST AND MEASUREMENT REPORT

For

SynapSense Corporation

2365 Iron Point Rd., Suite 100, Folsom, CA 95630, USA

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Report Type:	**Product Type:**
Original Report	2.4 GHz Wireless Transceiver

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R0901282	Original Report	2009-02-19

1 GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *SynapSense Corporation's* product, model: *99-0348-001 Rev. A* or the "EUT" as referred to in this report is a Proprietary SynapSense Wireless Mesh Network application running on 802.15.4 radio network. The EUT is a wireless, ISM band (2.4 GHz) short range device used to collect sensor information and relay it to SynapSense Wireless Networks. The EUT is powered either by Lithium Ion Batteries (4 x AA) or by AC/DC Adapter 100-240 VAC 50/60 Hz input, 24.0VDC, 4.0A output.

1.2 Mechanical Description of EUT

The *EUT*, model number: *99-0348-001 Rev. A* measures approximately 11.4 cm (L) x 6.6 cm (W) x 3.6 cm (H).

** All measurement and test data in this report was gathered from production sample serial number: B21000-2 (Assigned by BACL).*

1.3 EUT Photograph

Model: 99-0348-001 Rev. A

1.4 Objective

This type of approval report is prepared on behalf of *SynapSense Corporation.* in accordance with Part 2, Subpart J, and Part 15, Subparts A, B and C of the Federal Communication Commissions rules and IC Canada RSS 210 Issue 7 June 2007.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.249 rules and IC RSS-210 Issue 7, RSS-Gen rules.

1.5 Related Submittal(s)/Grant(s)

N/A

1.6 Test Methodology

All measurements contained in this report were conducted 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 Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.7 Test Facility

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

The 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 have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11, 1997 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 have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: C-2698 and R-2463. 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 Corp. 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.

2 SYSTEM TEST CONFIGURATION

2.1 Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

2.2 Special Accessories

N/A

2.3 Equipment Modifications

No modifications were made to the unit tested.

2.4 Configuration of Test Setup

During the test, A current sensor is connected to EUT through 2-wire.Each node has special firmware which transmits packets via RF back and forth. Packets are sent once per second. Flashing LED indicates correct packet reception. The nodes will transmit RF in 4 frequency modes. Each mode is selected by simply toggling the node on/off switch from on to off and then of course on again. The 4 modes are: High/Mid/Low/NoTx (NoTx means no RF transmitting at all or RX mode).

2.5 Local Support Equipment List

Manufacturers	Descriptions	Models	Serial Numbers
Automation Components, Inc.	Current Sensor	A/SCTA-250	-

2.6 EUT Internal Configuration Details

Manufacturers	Descriptions	Models	Serial Numbers
Synapsense Corporation	Main PCB	11-0348-001 Rev.A	-

2.7 External I/O Cabling List and Details

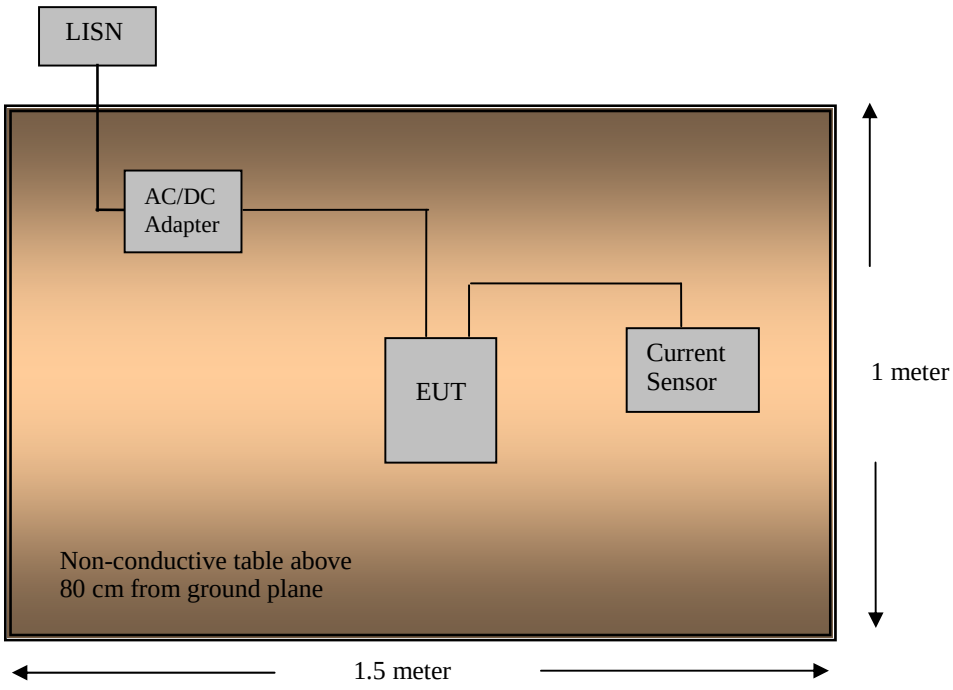
Cable Descriptions	Length (m)	From	To
2-wire	<3m	EUT	Current Sensor

2.8 EUT Power supply

Manufacturers	Descriptions	Models	Serial Numbers
CUI Inc.	Switching mode Power Supply	3A-401DN24	ETS240170UTC-P5P-SZ

2.9 Block Diagram of Test Setup

Conducted & Radiated Emission



3 SUMMARY OF TEST RESULTS

FCC Part15C & IC RSS-210/RSS-Gen Rules	Description of Tests	Results
FCC §15.203 IC RSS-Gen §7.1.4	Antenna Requirements	Compliant
FCC §15.207(a) IC RSS-Gen §7.2.2	Conduction Emissions	Compliant
FCC §15.205, §15.209, §15.249 IC RSS-210 §2.2, §A2.9	Radiated Emissions & Out of Band Emissions	Compliant
FCC §15.215 IC RSS-Gen §4.6	Occupied Bandwidth	Compliant
FCC §15.109 IC RSS-Gen §4.10, §7.2.3	Receiver Spurious Emission	Compliant

4 FCC §15.203 & IC RSS-GEN § 7.1.4 - ANTENNA REQUIREMENT

4.1 Applicable Standard

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

Per IC RSS-Gen §7.1.4, A transmitter can only be sold or operated with antennas with which it was certified. A transmitter maybe 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.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in IC RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to IC RSS-210 Annex 8 or RSS-210 Annex 9, the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to IC RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

4.2 Antenna Connector Construction

The EUT has internal omni-directional antenna printed with the antenna gain of 0dBi, which in accordance to sections FCC Part 15.203 and IC RSS-Gen §7.1.4, is considered sufficient to comply with the provisions of these sections.

In addition, the antenna is printed on the same PCB of the radio transceiver, which cannot be altered. No external antenna option is available for this unit.

Result: Compliant.

Please refer to the EUT photos.

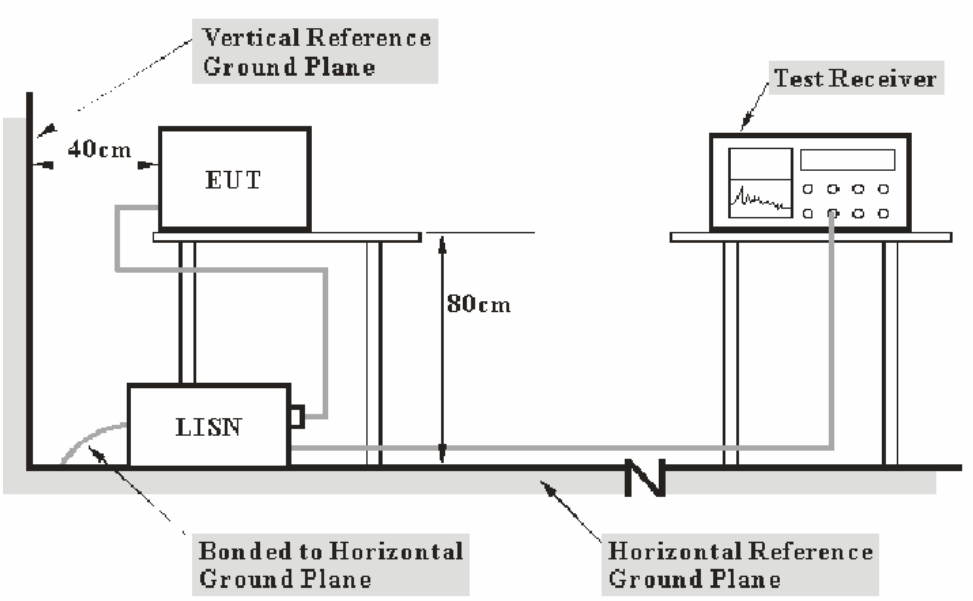
5 FCC§15.207(a) & IC RSS-GEN § 7.2.2 - CONDUCTED EMISSIONS

5.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, 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 Bay Area Compliance Laboratories Corp. (Shenzhen) is ±2.4 dB.

5.2 EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15 .207 and IC RSS-Gen §7.2.2 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The AC/DC adapter was connected to a 120 VAC/60 Hz power source.

5.3 EMI Test Receiver Setup

The test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	***IFBW***
150 kHz – 30 MHz	9 kHz

5.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.595 0K03	100044	2008-03-24
Solar Electronics Co.	Artificial-Mains Network	9252-50-R-24-N	0511213	2008-07-31

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

5.5 Test Procedure

During the conducted emission test, the EUT was connected to the outlet of the LISN.

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

All data was recorded in the Quasi-peak and average detection mode.

5.6 Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207(a) & IC RSS-Gen §7.2.2, with the worst margin reading of:

-2.72 dB at **0.371 MHz** in Line1
-2.62 dB at **0.371 MHz** in Neutral

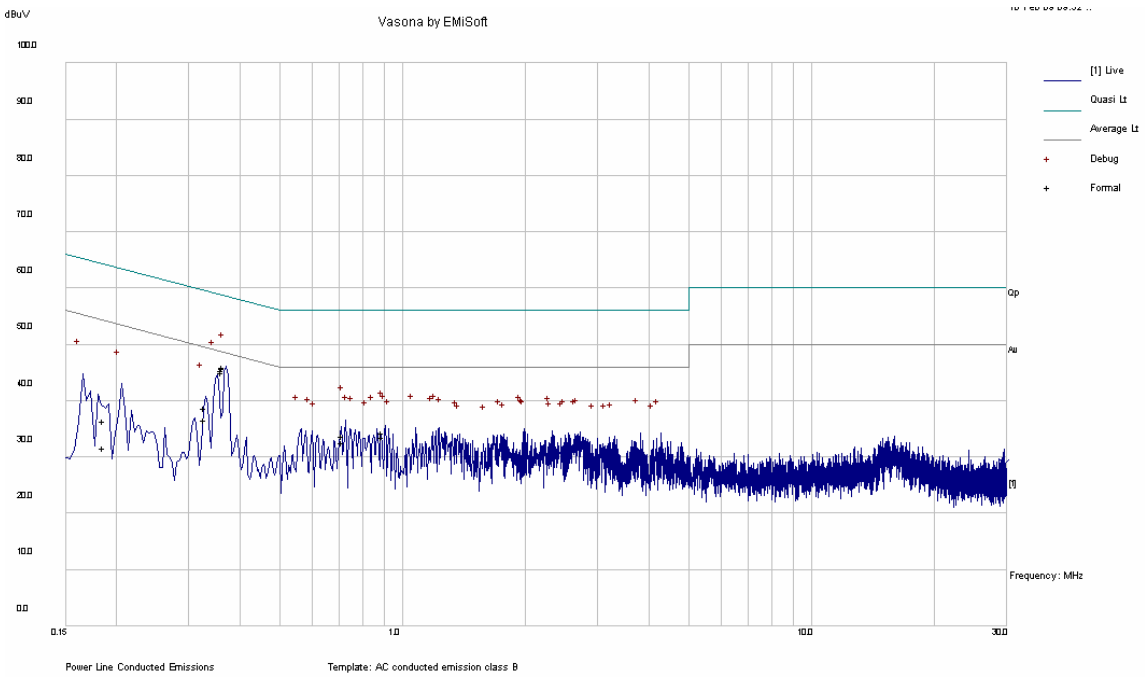
5.7 Environmental Conditions

Temperature:	18 °C
Relative Humidity:	40 %
ATM Pressure:	100.0kPa

The testing was performed by Greeman Chen on 2009-02-10.

Test Mode: Operating

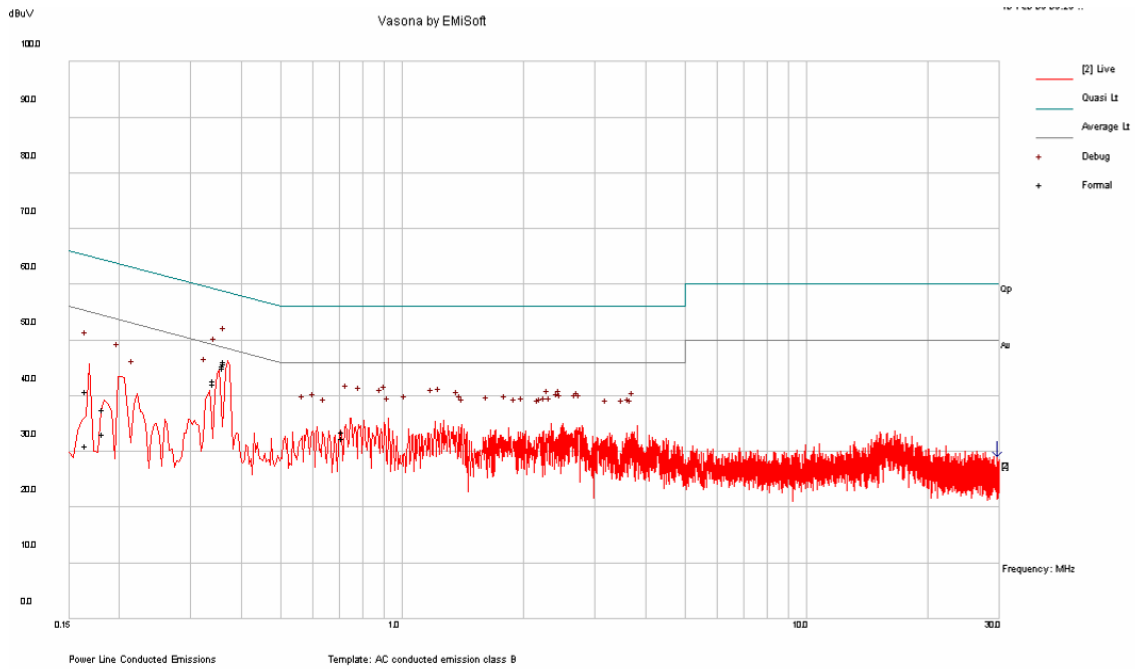
120V/60Hz Line



Measurement Results:

Frequency (MHz)	Corrected Reading (dBuV)	Measurement Type (QP/AV)	Line (Line/Neutral)	Limit (dBuV)	Margin (dB)
0.371	45.75	Ave	Line	48.47	-2.72
0.370	45.10	Ave	Line	48.51	-3.41
0.371	46.05	QP	Line	58.47	-12.43
0.907	33.47	Ave	Line	46.00	-12.53
0.335	36.56	Ave	Line	49.33	-12.78
0.370	45.42	QP	Line	58.51	-13.09
0.725	32.57	Ave	Line	46.00	-13.43
0.335	38.66	QP	Line	59.33	-20.67
0.907	34.30	QP	Line	56.00	-21.70
0.725	33.70	QP	Line	56.00	-22.30
0.189	31.58	Ave	Line	54.08	-22.50
0.189	36.48	QP	Line	64.08	-27.60

120V/60Hz Neutral



Measurement Result:

Frequency (MHz)	Corrected Reading (dBuV)	Measurement Type (QP/AV)	Line (Line/Neutral)	Limit (dBuV)	Margin (dB)
0.371	45.86	Ave	Neutral	48.48	-2.62
0.370	45.13	Ave	Neutral	48.51	-3.39
0.350	42.25	Ave	Neutral	48.97	-6.72
0.371	46.20	QP	Neutral	58.48	-12.28
0.370	45.45	QP	Neutral	58.51	-13.06
0.726	32.49	Ave	Neutral	46.00	-13.51
0.350	42.78	QP	Neutral	58.97	-16.19
0.186	33.13	Ave	Neutral	54.22	-21.09
0.726	33.60	QP	Neutral	56.00	-22.40
0.169	30.97	Ave	Neutral	55.03	-24.06
0.169	40.75	QP	Neutral	65.03	-24.28
0.186	37.63	QP	Neutral	64.22	-26.59

6 FCC §15.205, §15.209, §15.249 & IC RSS-210 §2.2, §A2.9 - RADIATED EMISSIONS & OUT OF BAND EMISSIONS

6.1 Applicable Standard

As per FCC §15.249 (a) and IC RSS-210 §A2.9 the field strength of emissions from intentional radiators measured at 3 meter within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902–928	50	500
2400–2483.5	50	500
5725–5875	50	500

As Per FCC §15.249 (d) and IC RSS-210 §A2.9 (b) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in the following table, whichever is the lesser attenuation.

Frequency (MHz)	Field Strength (microvolts/m at 3 metres)
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

6.2 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 best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. is $\pm$4.0 dB.

6.3 Test Equipment Setup

The spectrum analyzer or receiver is set as:

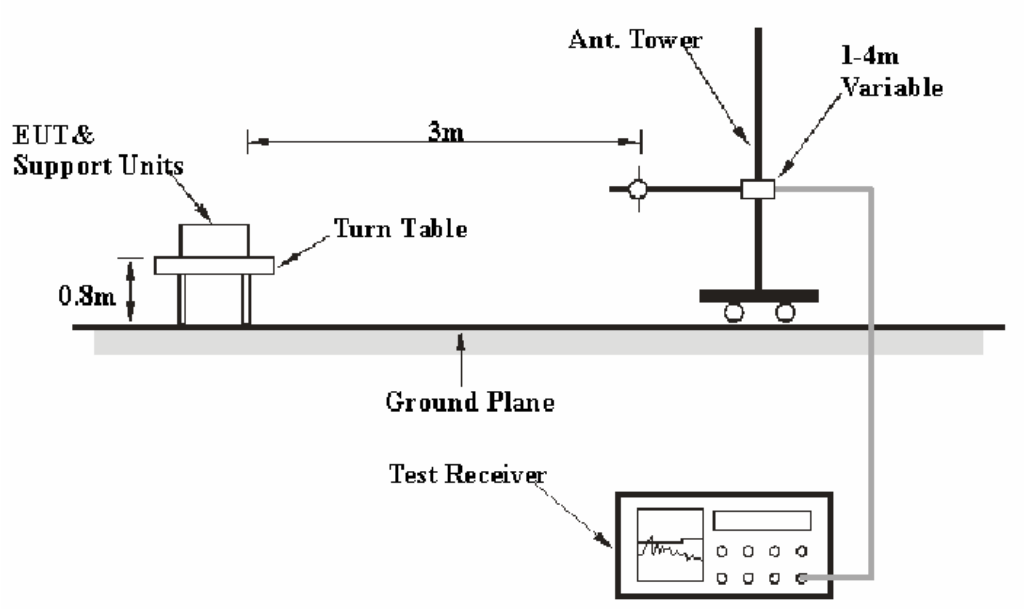
Below 1000MHz:

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

6.4 EUT Setup



The radiated emission and out of band emission tests were performed in the 3 meters chamber B, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC §15.209, §15.249 and IC RSS-210 §A2.9 limits.

6.5 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
HP	Pre-Amplifier (1 ~ 26.5 GHz)	8449B	3008A1978	2008-10-21
Sunol Science Corp	Combination Antenna	JB3 Antenna	A020106-3	2008-03-24
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100044	2008-03-24
Sunol Science Corp	System Controller	SC99V	113005-1	NA
Antenna Research Associates, Inc.	Horn Antenna	DRG-118/A	1132	2008-08-07
Agilent	Analyzer, Spectrum	E4446A	US44300386	2008-05-19
Sonoma Instrument	Pre-Amplifier (10 kHz~ 2.5 GHz)	317	260407	2008-04-29

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

6.6 Test Procedure

For the radiated emissions test, the AC/DC adapter, and all support equipment power cords was connected to the 120V 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.

6.7 Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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 limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

6.8 Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209 & 15.249 & IC RSS-210 §A2.9, the worst margin reading of:

Below 1GHz:

-7.41 dB at **37.028 MHz** in the **Vertical** polarization.

Above 1GHz:

-17.16 dB at **4810 MHz** in the **Horizontal** polarization for Low Channel.
-15.99 dB at **4890 MHz** in the **Horizontal** polarization for Middle Channel.
-13.10 dB at **4960 MHz** in the **Vertical** polarization for High Channel.

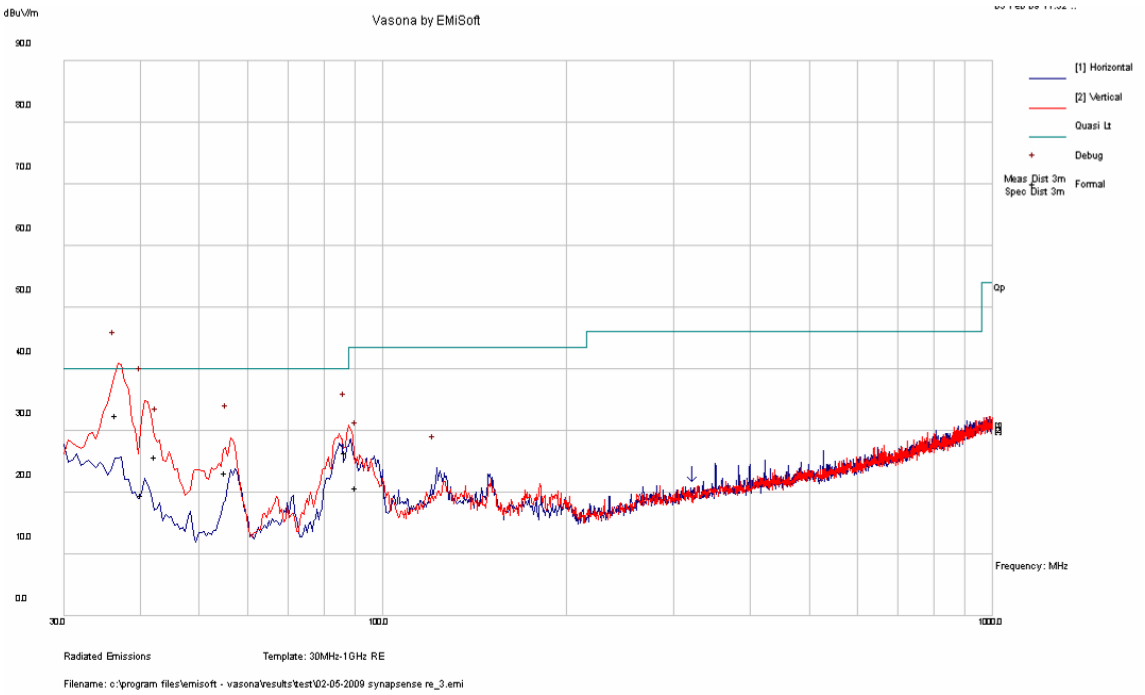
6.9 Environmental Conditions

Temperature:	20 °C
Relative Humidity:	45 %
ATM Pressure:	103.0kPa

The testing was performed by Greeman Chen on 2009-02-05.

Test Mode: Transmitting

Below 1 GHz (Worst Case):



Frequency (MHz)	Corrected Reading (dBuV/m)	Measurement Type (QP/AV)	Antenna Polarization (V/H)	Antenna Height (cm)	Table Azimuth (Degree)	Limit (dBuV/m)	Margin (dB)
37.028	32.59	QP	V	99	360	40	-7.41
40.824	19.55	QP	V	206	359	40	-20.45
87.883	26.49	QP	V	141	172	40	-13.51
56.038	23.20	QP	V	99	285	40	-16.8
42.858	25.72	QP	V	100	359	40	-14.28
91.767	20.76	QP	V	104	267	43.5	-22.74

Above 1 GHz:

Low Channel

1# Fundamental measured at 3 meters:

Frequency (MHz)	Meter Reading (dBuV)	Detector (PK/AV)	Table Azimuth (Degree)	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Amp. (dBuV/m)	FCC & IC	
				Height (m)	Polarity (H/V)	Factor (dB/m)					Limit (dBuV/m)	Margin (dB)
2405	96.83	PK	232	1	H	28.2	6.05	36.68	0	94.40	114.0	-19.57
2405	94.40	PK	169	1	V	28.2	6.05	36.68	0	91.97	114.0	-22.00
2405	96.83	PK	232	1	H	28.2	6.05	36.68	-30	64.40*	94.0	-29.57
2405	94.40	PK	169	1	V	28.2	6.05	36.68	-30	61.97*	94.0	-32.00

2# Spurious/Harmonics Emissions measured at 3 meters (Above 1 GHz)

Frequency (MHz)	Meter Reading (dBuV)	Detector (PK/AV)	Table Azimuth (Degree)	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Amp. (dBuV/m)	FCC & IC	
				Height (m)	Polarity (H/V)	Factor (dB/m)					Limit (dBuV/m)	Margin (dB)
4810	51.22	PK	197	1	H	33.1	8.86	36.34	0	56.84	74.0	-17.16
4810	50.34	PK	192	1.83	V	33.1	8.86	36.34	0	55.96	74.0	-18.04
4810	51.22	PK	197	1	H	33.1	8.86	36.34	-30	26.84*	54.0	-27.16
4810	50.34	PK	192	1.83	V	33.1	8.86	36.34	-30	25.96*	54.0	-28.04

Middle Channel

1# Fundamental measured at 3 meters:

Frequency (MHz)	Meter Reading (dBuV)	Detector (PK/AV)	Table Azimuth (Degree)	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Amp. (dBuV/m)	FCC & IC	
				Height (m)	Polarity (H/V)	Factor (dB/m)					Limit (dBuV/m)	Margin (dB)
2445	95.34	PK	231	1	H	28.5	6.1	36.65	0	93.29	114.0	-20.68
2445	93.57	PK	235	1	V	28.5	6.1	36.65	0	91.52	114.0	-22.45
2445	95.34	PK	231	1	H	28.5	6.1	36.65	-30	63.29*	94.0	-30.68
2445	93.57	PK	235	1	V	28.5	6.1	36.65	-30	61.52*	94.0	-32.45

2# Spurious/Harmonics Emissions measured at 3 meters (Above 1 GHz)

Frequency (MHz)	Meter Reading (dBuV)	Detector (PK/AV)	Table Azimuth (Degree)	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Amp. (dBuV/m)	FCC & IC	
				Height (m)	Polarity (H/V)	Factor (dB/m)					Limit (dBuV/m)	Margin (dB)
4890	52.20	PK	231	1	H	33.1	8.96	36.25	0	58.01	74.0	-15.99
4890	52.12	PK	172	1	V	33.1	8.96	36.25	0	57.93	74.0	-16.07
4890	52.20	PK	231	1	H	33.1	8.96	36.25	-30	28.01*	54.0	-25.99
4890	52.12	PK	172	1	V	33.1	8.96	36.25	-30	27.93*	54.0	-26.07

High Channel

1# Fundamental measured at 3 meters:

Frequency (MHz)	Meter Reading (dBuV)	Detector (PK/AV)	Table Azimuth (Degree)	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Amp. (dBuV/m)	FCC & IC	
				Height (m)	Polarity (H/V)	Factor (dB/m)					Limit (dBuV/m)	Margin (dB)
2480	97.27	PK	20	1	H	28.8	6.19	36.63	0	95.63	114.0	-18.34
2480	91.94	PK	85	1	V	28.8	6.19	36.63	0	90.30	114.0	-23.67
2480	97.27	PK	20	1	H	28.8	6.19	36.63	-30	65.63*	94.0	-28.34
2480	91.94	PK	85	1	V	28.8	6.19	36.63	-30	60.30*	94.0	-33.67

2# Spurious/Harmonics Emissions measured at 3 meters (Above 1 GHz)

Frequency (MHz)	Meter Reading (dBuV)	Detector (PK/AV)	Table Azimuth (Degree)	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Amp. (dBuV/m)	FCC & IC	
				Height (m)	Polarity (H/V)	Factor (dB/m)					Limit (dBuV/m)	Margin (dB)
4960	54.78	PK	187	1	V	33.1	9.27	36.25	0	60.90	74.0	-13.10
4960	51.65	PK	222	1	H	33.1	9.27	36.25	0	57.77	74.0	-16.23
4960	54.78	PK	187	1	V	33.1	9.27	36.25	-30	30.90*	54.0	-23.10
4960	51.65	PK	222	1	H	33.1	9.27	36.25	-30	27.77*	54.0	-26.23

Note: • Average Value (*) is calculated based on Peak Reading + Duty Cycle Factor
• Duty Cycle Factor (DCF) = 20 $\log_{10}$ (Ton/Tp) = 20 $\log_{10}$ (3.17ms/100 ms) = -30 dB

Out of Band Emissions:

Frequency (MHz)	Meter Reading (dBuV)	Detector (PK/AV)	Table Azimuth (Degree)	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBuV/m)	FCC & IC	
				Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBuV/m)	Margin (dB)
3200	30.18	AV	295	1.20	V	30.6	6.50	36.78	30.50	54	-23.50
3200	30.10	AV	154	1.50	H	30.6	6.50	36.78	30.42	54	-23.58
1900	30.97	AV	155	1.54	H	29.7	6.27	36.78	30.16	54	-23.84
1900	30.92	AV	300	1.24	V	29.7	6.27	36.78	30.11	54	-23.89
1900	42.54	PK	300	1.24	V	29.7	6.27	36.78	41.73	74	-32.27
3200	41.23	PK	154	1.50	H	30.6	6.50	36.78	41.55	74	-32.45
3200	41.12	PK	295	1.20	V	30.6	6.50	36.78	41.44	74	-32.56
1900	42.16	PK	155	1.54	H	29.7	6.27	36.78	41.35	74	-32.65

7 FCC §15.109 & IC RSS-GEN §4.6, §7.2.3 – RECEIVER SPURIOUS EMISSIONS

7.1 Applicable Standard

As per FCC §15.109 and IC RSS-Gen §4.6, §7.2.3, the receiver spurious limits measured at 3 meters shall be complied with the following table.

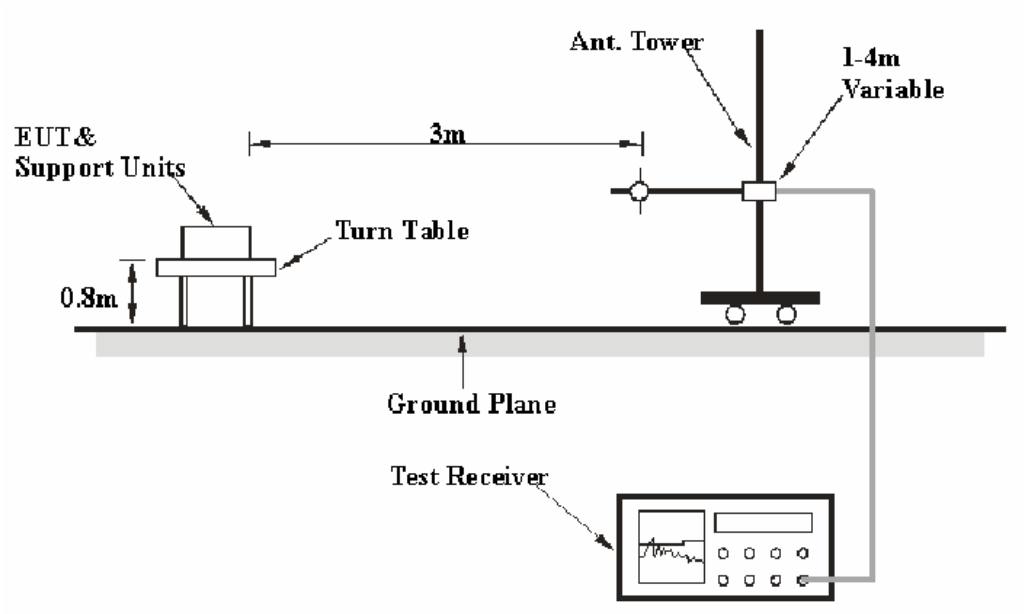
Frequency (MHz)	Field Strength (microvolts/m at 3 metres)
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

7.2 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 best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. is $\pm$4.0 dB.

7.3 EUT Setup



7.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
HP	Pre-Amplifier (1 ~ 26.5 GHz)	8449B	3008A1978	2008-10-21
Sunol Science Corp	Combination Antenna	JB3 Antenna	A020106-3	2008-03-24
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100044	2008-03-24
Sunol Science Corp	System Controller	SC99V	113005-1	NA
Antenna Research Associates, Inc.	Horn Antenna	DRG-118/A	1132	2008-08-07
Agilent	Analyzer, Spectrum	E4446A	US44300386	2008-05-19
Sonoma Instrument	Pre-Amplifier (10 kHz~ 2.5 GHz)	317	260407	2008-04-29

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

7.5 Test Procedure

For the radiated emissions test, the AC/DC adapter, and all support equipment power cords was connected to the 120V 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.

7.6 Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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 limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

7.7 Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.109 & IC RSS-Gen §7.2.3, the worst margin reading of:

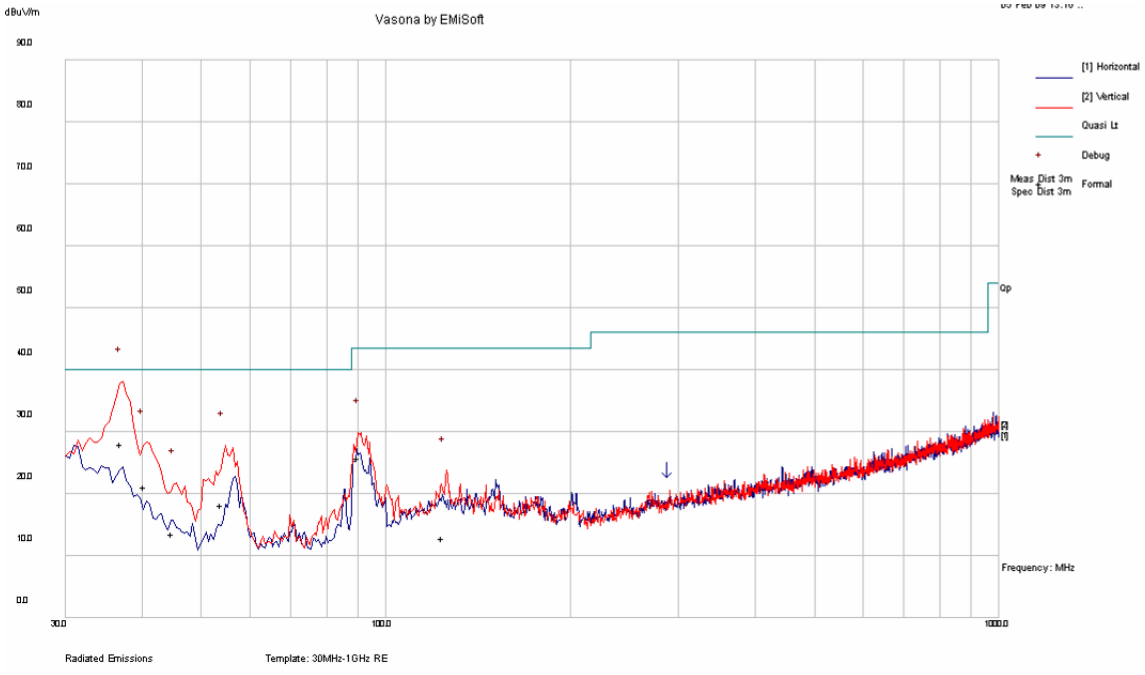
-11.91 dB at **37.476 MHz** in the **Vertical** polarization.

7.8 Environmental Conditions

Temperature:	20 °C
Relative Humidity:	45%
ATM Pressure:	103.0kPa

The testing was performed by Greeman Chen on 2009-02-05.

Test Mode: Receiving



Frequency (MHz)	Corrected Reading (dBuV/m)	Measurement Type (QP/AV)	Antenna Polarization (V/H)	Antenna Height (cm)	Table Azimuth (Degree)	Limit (dBuV/m)	Margin (dB)
37.476	28.09	QP	V	220	98	40.0	-11.91
91.269	25.73	QP	V	144	77	43.5	-17.77
40.874	21.10	QP	V	138	240	40.0	-18.90
54.627	18.27	QP	V	160	196	40.0	-21.73
45.498	13.51	QP	V	120	1	40.0	-26.49
125.380	12.85	QP	V	171	0	43.5	-30.65

Note: The Spurious emissions above 1 GHz are on the noise floor level.

8 FCC §15.215 & IC RSS-GEN §4.6 – OCCUPIED BANDWIDTH

8.1 Standard Applicable

Per FCC §15.215, 20 dB occupied bandwidth should be provided.

Per IC RSS-Gen §4.6, When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

8.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Analyzer, Spectrum	E4440A	US45303156	2008-05-31

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

8.3 Test Procedure

With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

8.4 Environmental Conditions

Temperature:	20 ° C
Relative Humidity:	45 %
ATM Pressure:	103 kPa

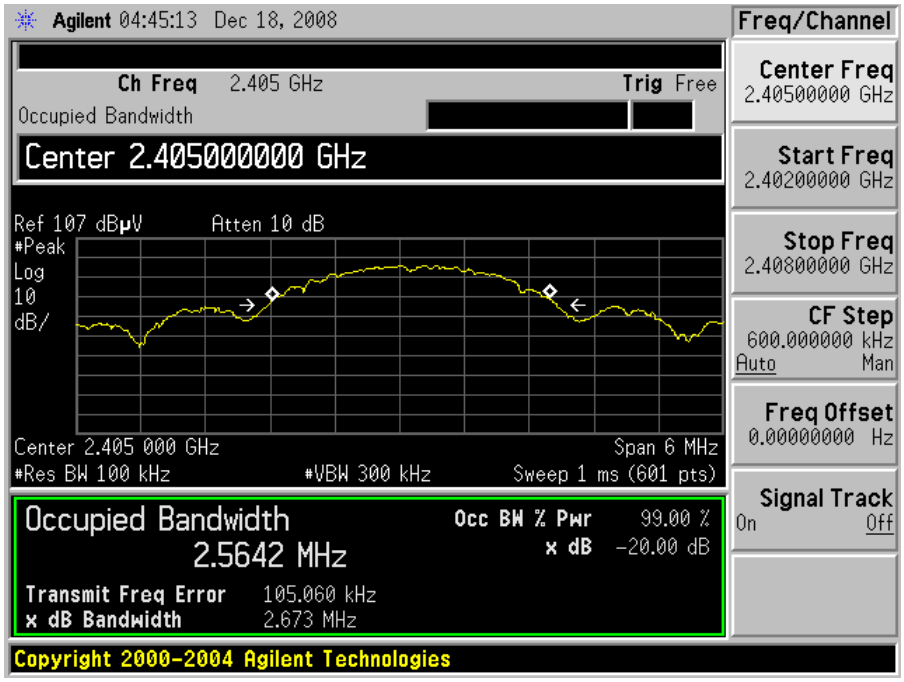
The testing was performed by Greeman Chen on 2009-02-05

Test Result:

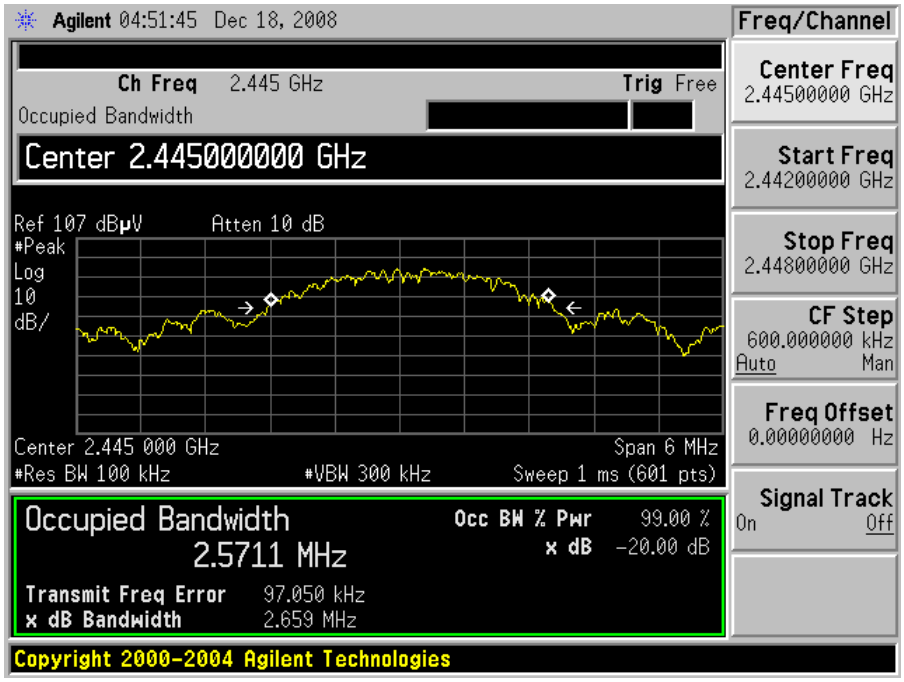
Please refer to the following table and plots.

Channel	Frequency (MHz)	20 dB Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Low	2405	2.673	2.5642
Middle	2445	2.659	2.5711
High	2480	2.671	2.5799

Low Channel



Middle Channel



High Channel