NVLAP LAB CODE 200707-0

FCC PART 15.247

MEASUREMENT AND TEST REPORT

For

Sunway Electronics Company

Room 1710, Nan Fung Centre, 264-298 Castle Peak Road,

Tsuen Wan, N. T. Hong Kong

FCC ID: VN216379831637980

Report Type:	**Product Type:**
Original Report	E-Reader with 2.4 GHz WiFi Transceiver

Test Engineer:	Alvin Huang
Report Number:	RXM10071255
Report Date:	2010-08-23
Reviewed By:	Merry Zhao EMC Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Sunway Electronics Company's* product, model number: *1637287, 1636377 (FCC ID: VN216379831637980)* or the "EUT" as referred to in this report is a *E-Reader with 2.4 GHz WiFi Tranceiver,* which measures approximately: 23.7 cm (L) x 12.5 cm (W) x 1.5 cm (H), rated input voltage: DC 3.7 V battery or DC 5.0 V adapter.

Adapter information:
Model: HNC050150U;
Input: AC 100-240 V 50-60 Hz 0.45 A;
Output: DC 5.0 V 1.5 A

*Note: The serial product model *1637287, 1637983, 1636377, and 1637980.* We select *1637287 and 1636377* to test, and all of the models are electrically identical, only their difference is the model names, which was explained in the attached declaration letter.

All measurement and test data in this report was gathered from production sample serial number: 10071205 (Assigned by BACL, Shenzhen). The EUT was received on 2010-07-12.

Objective

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

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 15.247 rules.

Related Submittal(s)/Grant(s)

N/A

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 emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 21,

2007. 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 has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).

NVLAP LAB CODE 200707-0

The current scope of accreditations can be found at http://ts.nist.gov/Standards/scopes/2007070.htm

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For 802.11b and 802.11g mode, 11 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	/	/

EUT was tested with Channel 1, 6 and 11.

EUT Exercise Software

The test was performed under RT307X_V1.1.0.8 about power:
802.11b: TX Power level 0D, data rate: 11 Mbps.
802.11g: TX Power level 0F, data rate: 54 Mbps.

Equipment Modifications

No modification was made to the unit tested.

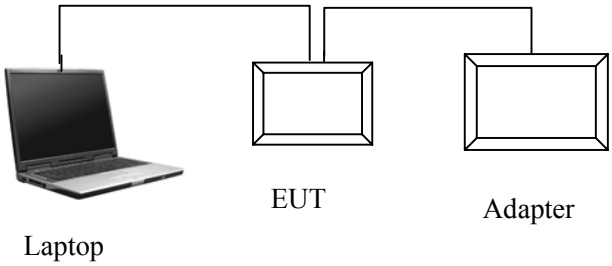
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
COM pad	Laptop	EVON610C	N/A	DoC

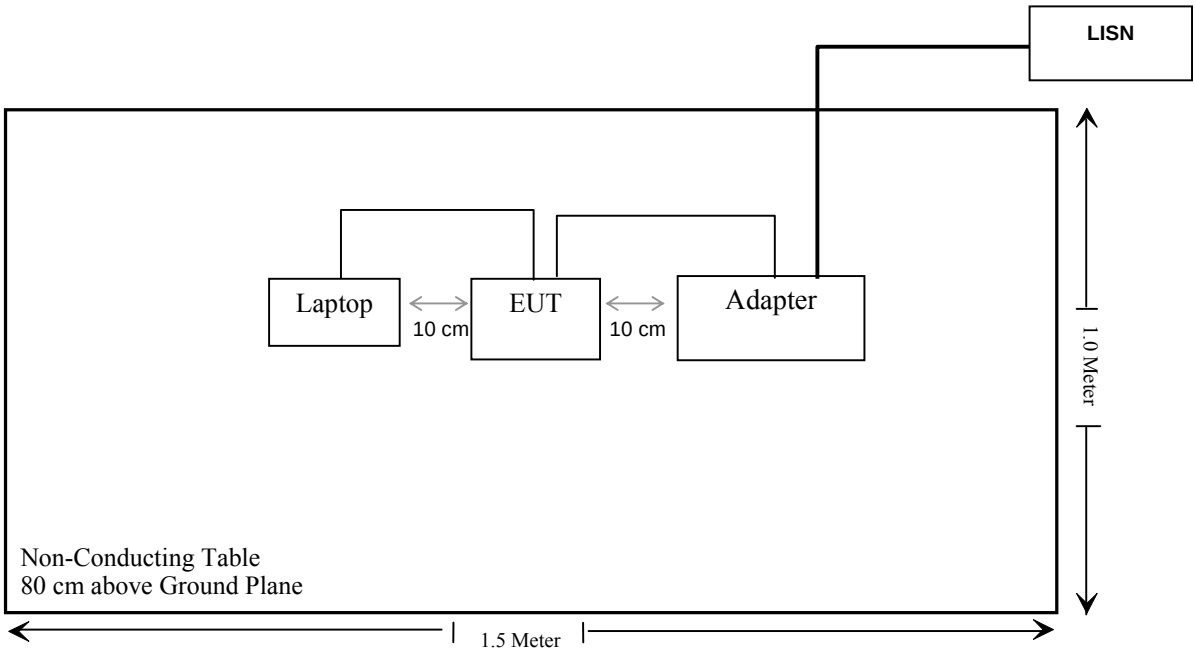
External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded Detachable DC Power Cable	1.90	Adapter	EUT

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	Conducted Emissions	Compliance
§15.247 (d)	Spurious Emissions at Antenna Port	Compliance
§15.205, §15.209, §15.247 (d)	Spurious Emissions	Compliance
§15.247 (a) (2)	6 dB Emission Bandwidth	Compliance
§15.247 (b)(3)	Maximum Peak Output Power	Compliance
§15.247 (d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247 (e)	Power Spectral Density	Compliance

FCC §15.247 (i) & §2.1093 - RF EXPOSURE

Applicable Standard

According to FCC §15.247(e) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 Mobile Portable RF Exposure v03r03, no SAR required if power is lower than the flowing threshold:

When routine evaluation is required for SAR and the output power is ≤ 60/f(GHz) mW, the test reduction and test exclusion procedures given herein, or in KDB 616217 or KDB 648474, are applicable.

A device may be used in portable exposure conditions with no restrictions on host platforms when either the source-based time-averaged output power is ≤ 60/f(GHz) mW or all measured 1-g SAR are < 0.4 W/kg.10 When SAR evaluation is required, the most conservative exposure conditions for all expected operating configurations must be tested.

Measurement Result:

Max conducted peak output power (P): 12.02 dBm
Antenna Gain: 0 dBi
EIRP = 12.02 dBm

P_{Max} = 12.02 dBm = 15.92 mW

SAR exempted threshold: $60/f_{GHz}$ = 60/2.437 = 24.62 mW

$P_{Max} < 60/f_{GHz}$

SAR evaluation can be exempted due to the maximum output power is less than the threshold.

FCC §15.203 - ANTENNA REQUIREMENT

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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT used a PCB antenna, the total gain is 0 dBi, which in accordance to section 15.203 please refer to the internal photos.

Result: Compliant.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

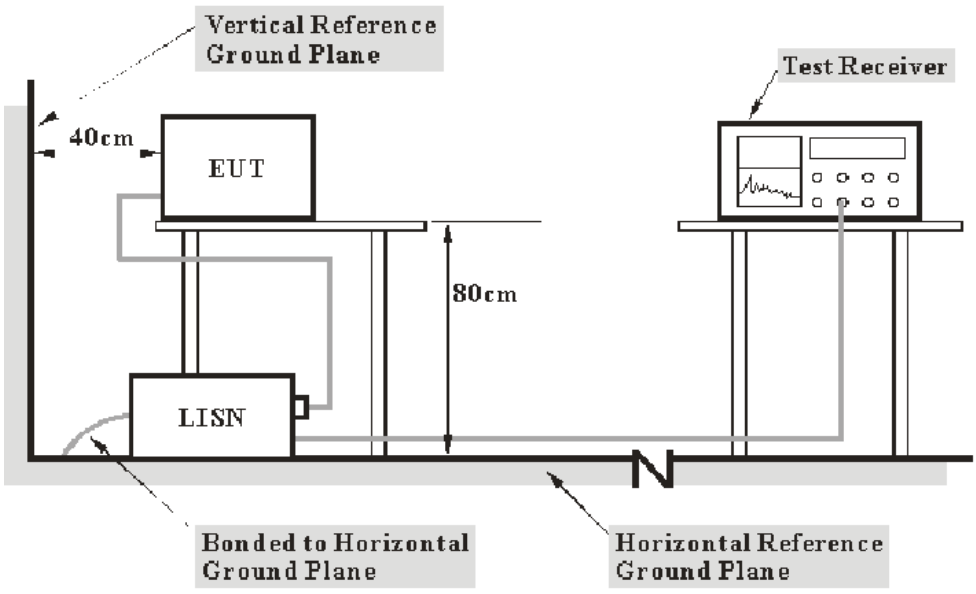
FCC §15.207

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 Laboratory Corp. (Shenzhen) is ±2.4 dB.

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 limits.

The spacing between the peripherals was 10 cm.

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

EMI Test Receiver Setup

The EMI 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	***IF B/W***
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	830245/006	2010-03-03	2011-03-02
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2010-03-09	2011-03-08

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

Test Procedure

During the conducted emission test, the adapter was connected to 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.

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

6.38 dB at **1.010 MHz** in the **Neutral** conductor mode (**Model: 1637287)**

3.99 dB at **4.750 MHz** in the **Neutral** conductor mode (**Model: 1636377)**

Test Data

Environmental Conditions

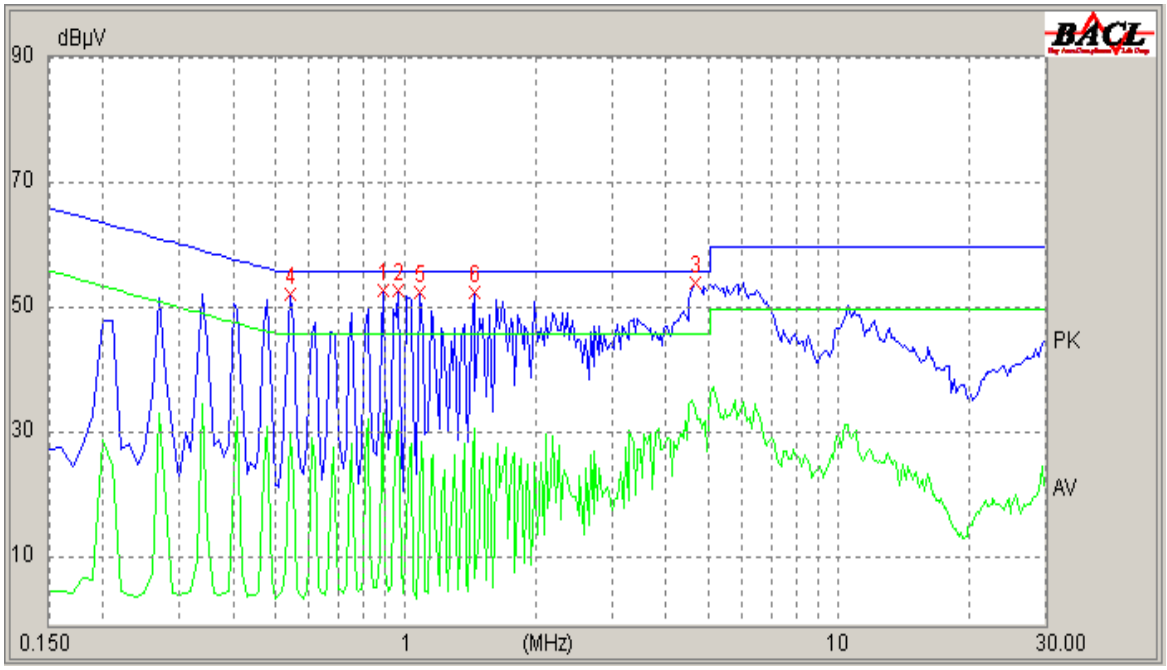
Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Alvin Huang on 2010-08-18.

Test Mode: Communication

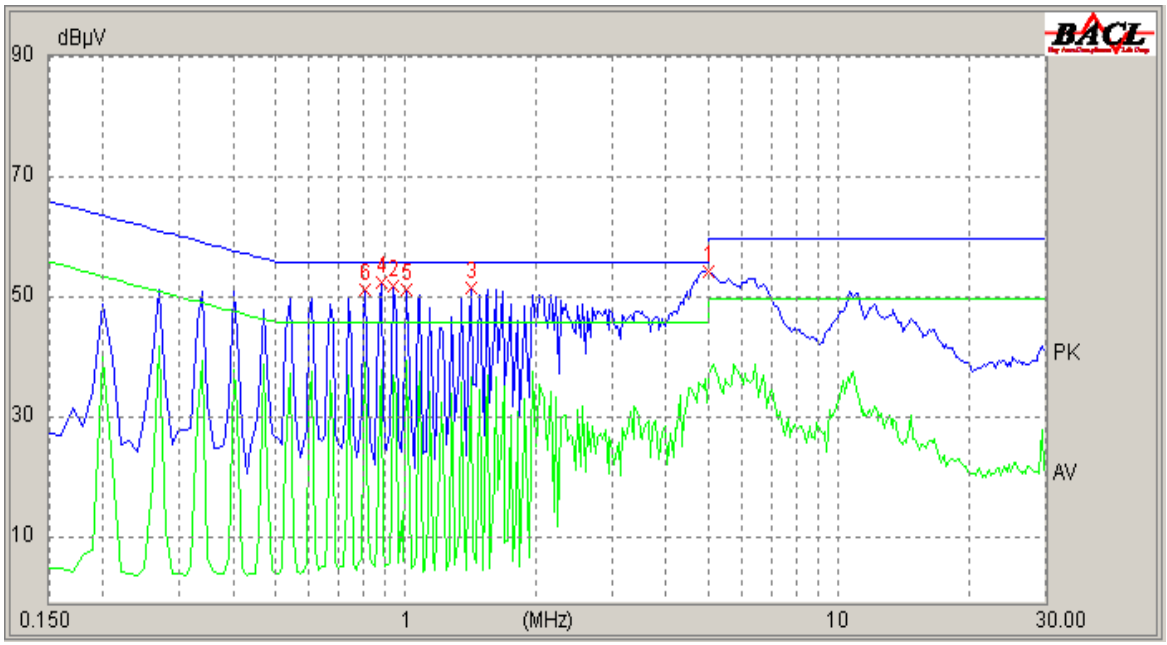
Model: 1637287

AC 120 V/60 Hz, Line



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	**Correction Factor (dB)**	**Cord. Result (dBµV)**	**Limit (dBµV)**	**Margin (dB)**	**Detector (PK/ QP /Ave)**
0.960	10.10	47.73	56.00	8.27	QP
1.440	10.10	46.90	56.00	9.10	QP
0.540	10.10	46.88	56.00	9.12	QP
1.080	10.10	46.88	56.00	9.12	QP
0.890	10.10	46.32	56.00	9.68	QP
4.660	10.10	44.44	56.00	11.56	QP
4.660	10.10	34.24	46.00	11.76	Ave
0.890	10.10	33.49	46.00	12.51	Ave
0.960	10.10	32.27	46.00	13.73	Ave
1.440	10.10	31.07	46.00	14.93	Ave
0.540	10.10	30.24	46.00	15.76	Ave
1.090	10.10	29.08	46.00	16.92	Ave

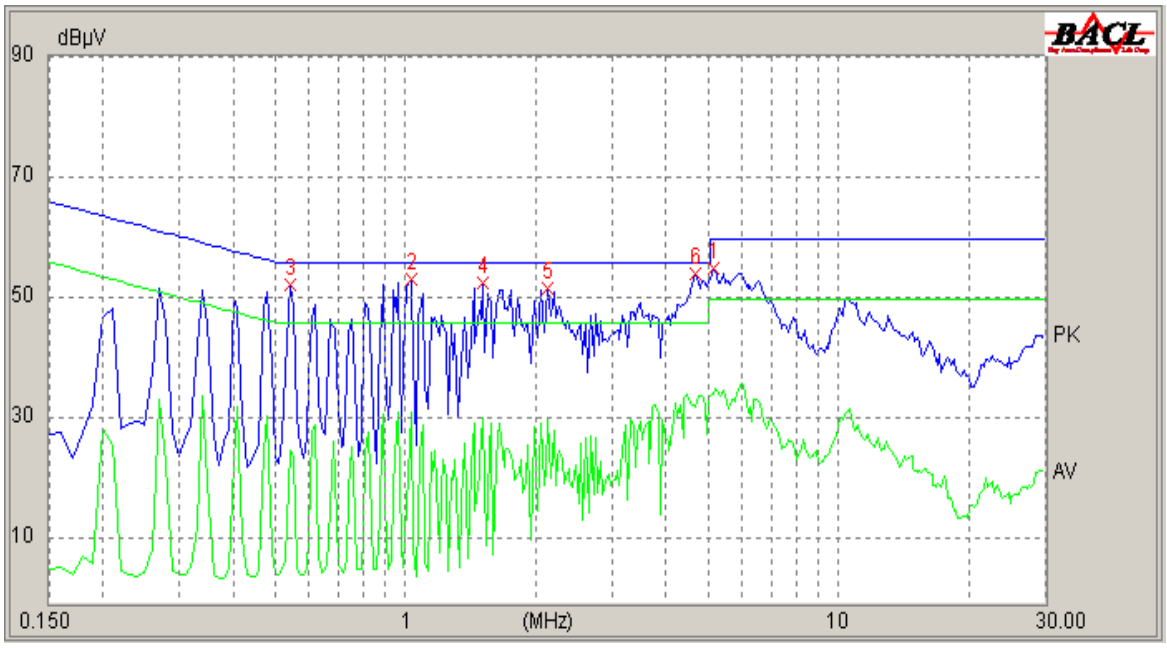
AC 120 V/60 Hz, Neutral:



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	**Correction Factor (dB)**	**Cord. Result (dBµV)**	**Limit (dBµV)**	**Margin (dB)**	**Detector (PK/ QP /Ave)**
1.010	10.10	39.62	46.00	6.38	Ave
0.810	10.10	39.46	46.00	6.54	Ave
5.010	10.20	49.19	56.00	6.81	QP
0.880	10.10	48.70	56.00	7.30	QP
0.880	10.10	38.33	46.00	7.67	Ave
5.010	10.20	37.41	46.00	8.59	Ave
0.940	10.10	37.23	46.00	8.77	Ave
1.420	10.10	36.96	46.00	9.04	Ave
0.810	10.10	46.90	56.00	9.10	QP
1.010	10.10	45.87	56.00	10.13	QP
1.420	10.10	45.43	56.00	10.57	QP
0.940	10.10	44.31	56.00	11.69	QP

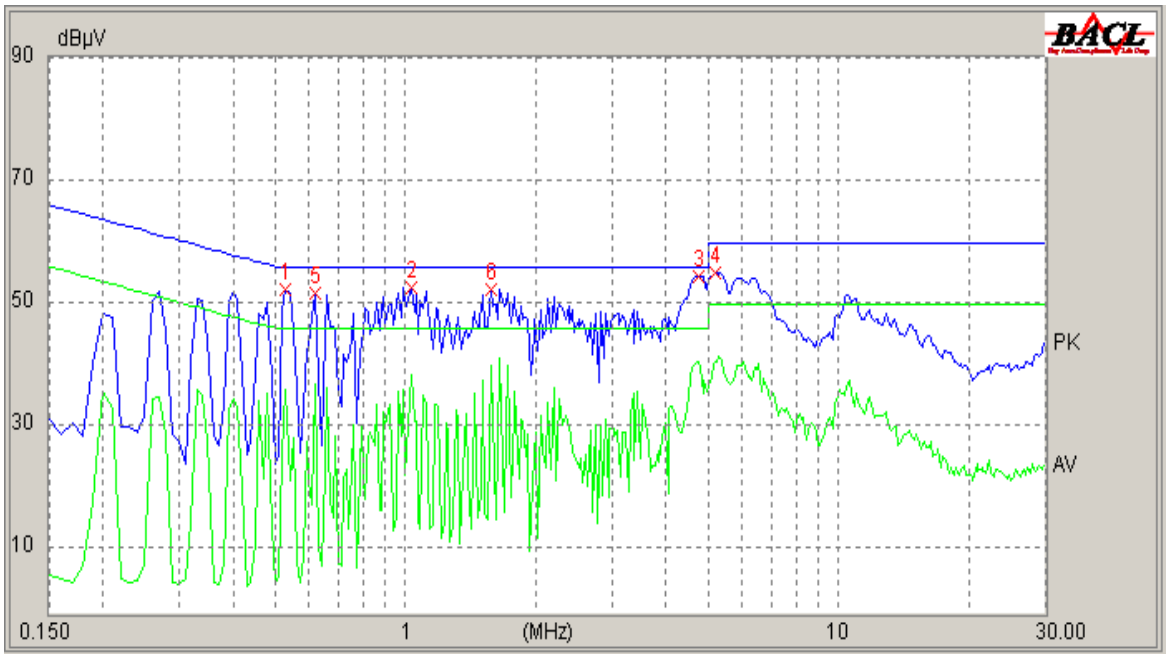
Model: 1636377

AC 120 V/60 Hz, Line



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	**Correction Factor (dB)**	**Cord. Result (dBµV)**	**Limit (dBµV)**	**Margin (dB)**	**Detector (PK/ QP /Ave)**
1.030	10.10	48.13	56.00	7.87	QP
2.130	10.10	46.20	56.00	9.80	QP
1.510	10.10	45.78	56.00	10.22	QP
4.670	10.10	44.78	56.00	11.22	QP
4.670	10.10	32.36	46.00	13.64	Ave
1.030	10.10	31.28	46.00	14.72	Ave
1.510	10.10	30.52	46.00	15.48	Ave
2.130	10.10	30.34	46.00	15.66	Ave
5.150	10.20	34.32	50.00	15.68	Ave
5.130	10.20	42.83	60.00	17.17	QP
0.540	10.10	37.54	56.00	18.46	QP
0.540	10.10	25.04	46.00	20.96	Ave

AC 120 V/60 Hz, Neutral:



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	**Correction Factor (dB)**	**Cord. Result (dBµV)**	**Limit (dBµV)**	**Margin (dB)**	**Detector (PK/ QP /Ave)**
4.750	10.10	52.01	56.00	3.99	QP
4.750	10.10	40.52	46.00	5.48	Ave
0.530	10.10	50.36	56.00	5.64	QP
1.580	10.10	40.19	46.00	5.81	Ave
1.030	10.10	50.05	56.00	5.95	QP
0.620	10.10	49.96	56.00	6.04	QP
1.580	10.10	49.57	56.00	6.43	QP
1.030	10.10	38.46	46.00	7.54	Ave
0.620	10.10	37.02	46.00	8.98	Ave
5.160	10.20	40.44	50.00	9.56	Ave
0.530	10.10	36.26	46.00	9.74	Ave
5.210	10.20	48.66	60.00	11.34	QP

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

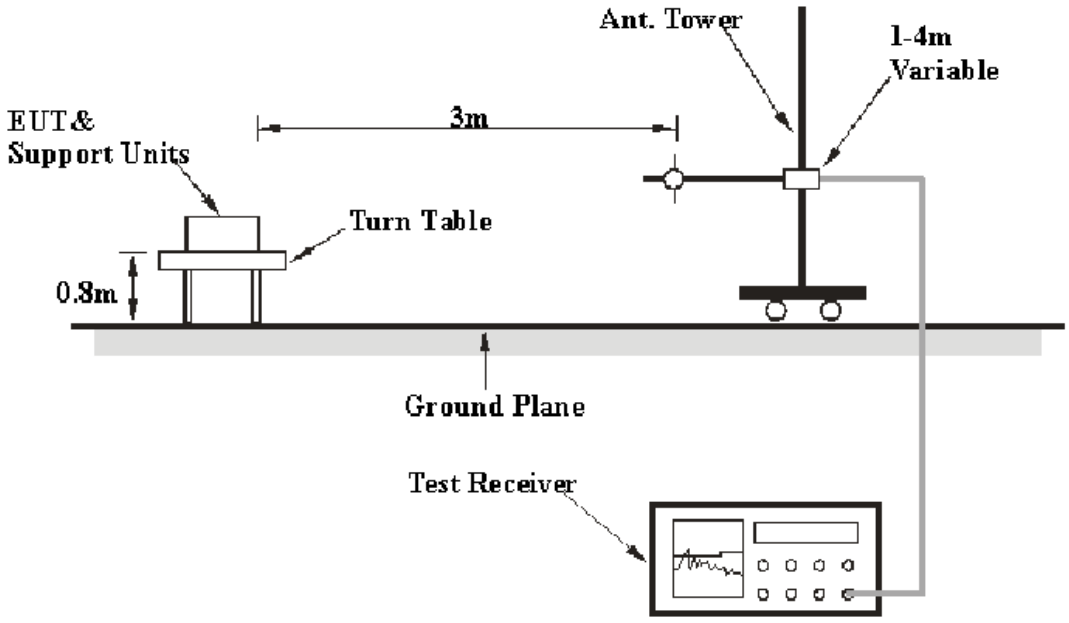
FCC §15.247 (d); §15.209; §15.205;

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. (Shenzhen) is ±4.0 dB.

EUT Setup



The radiated emission tests were performed in the 3 meters chamber B test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209, and FCC 15.247 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 spacing between the peripherals was 10 cm.

The adapter of the laptop was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	***RBW***	***Video B/W***	***Detector***
30 MHz – 1000 MHz	100 kHz	300 kHz	QP
1000 MHz – 25 GHz	1 MHz	3 MHz	PK
1000 MHz – 25 GHz	1 MHz	10 Hz	AV

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447D	2944A09795	2010-08-02	2011-08-02
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-24	2010-11-24
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2010-03-11	2011-03-11
HP	Amplifier	2VA-213+	T-E27H	2010-03-08	2011-03-08
Sunol Sciences	Horn Antenna	DRH-118	A052604	2010-05-05	2011-05-04
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2010-07-08	2011-07-08

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

Test Procedure

For the radiated emissions test, the adapter of laptop 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.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz -1 GHz and peak and Average detection modes for frequencies above 1 GHz.

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 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, and section 15.205, 15.209 and 15.247, with the worst margin reading of:

30 -1000 MHz:

7.2 dB at **33.957750 MHz** in the **Horizontal** polarization (Model: 1637287)
3.1 dB at **33.476000 MHz** in the **Horizontal** polarization (Model: 1636377)

Above 1 GHz:

802.11g (High Channel): **11.66 dB** at **4924 MHz** in the **Vertical** polarization

Test Data

Environmental Conditions

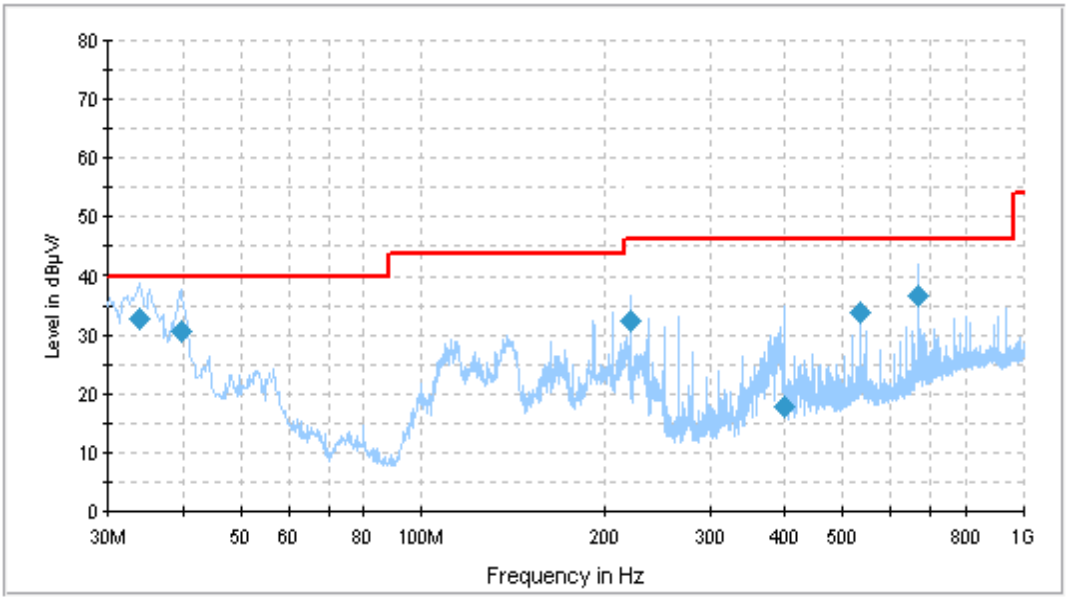
Temperature:	24 °C
Relative Humidity:	56 %
ATM Pressure:	100.0kPa

The testing was performed by Alvin Huang on 2010-08-17.

30-1000 MHz:

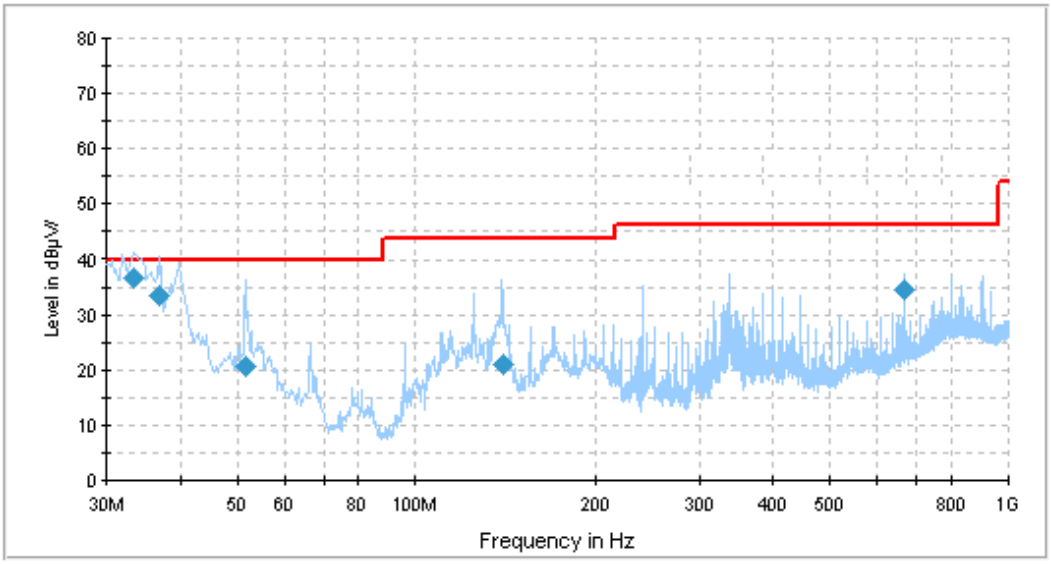
Test Mode: Transmitting (worse case)

Model: 1637287



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Test Antenna		Turntable Position (degree)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
		Height (cm)	Polarity (H/V)				
33.957750	32.8	313.0	H	0.0	-9.0	40.0	7.2
665.028750	36.8	291.0	V	277.0	-6.0	46.0	9.2
39.806500	30.7	104.0	H	276.0	-13.2	40.0	9.3
532.032750	33.9	105.0	V	0.0	-9.7	46.0	12.1
221.662500	32.5	105.0	V	179.0	-14.9	46.0	13.5
398.875000	18.0	198.0	H	195.0	-12.4	46.0	28.0

Model: 1636377



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Test Antenna		Turntable Position (degree)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
		Height (cm)	Polarity (H/V)				
33.476000	36.9	306.0	H	41.0	-8.6	40.0	3.1*
36.767750	33.6	374.0	H	8.0	-11.0	40.0	6.4
665.030250	34.7	140.0	H	205.0	-6.0	46.0	11.3
51.707750	20.7	104.0	H	242.0	-19.2	40.0	19.3
140.222750	21.1	213.0	V	26.0	-14.5	43.5	22.4

Note: The data which below 20 dB *to the limit was not recorded.*
**Within measurement uncertainty.*

Above 1 GHz:

802.11b Mode:

Indicated		Detector (PK/Ave)	Table Angle Degree	Test Antenna		Correction Factor			FCC Part 15.247/15.209			
Frequency (MHz)	S.A. Reading (dBμV)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Note
Low Channel (2412 MHz)												
4824	32.68	Ave	254	2.1	V	31.2	4.3	26.7	41.48	54	12.52	harmonic
4824	32.15	Ave	190	1.9	H	31.2	4.3	26.7	40.95	54	13.05	harmonic
4824	47.28	PK	254	2.1	V	31.2	4.3	26.7	56.08	74	17.92	harmonic
4824	45.65	PK	190	1.9	H	31.2	4.3	26.7	54.45	74	19.55	harmonic
Middle Channel (2437 MHz)												
4874	33.1	Ave	125	1.8	H	31.2	4.3	26.7	41.90	54	12.10	harmonic
4874	32.02	Ave	164	1.6	V	31.2	4.3	26.7	40.82	54	13.18	harmonic
4874	48.24	PK	125	1.8	H	31.2	4.3	26.7	57.04	74	16.96	harmonic
4874	46.21	PK	164	1.6	V	31.2	4.3	26.7	55.01	74	18.99	harmonic
High Channel (2462 MHz)												
4924	32.11	Ave	158	1.9	V	31.9	4.4	26.6	41.81	54	12.19	harmonic
4924	31.78	Ave	325	1.5	H	31.9	4.4	26.6	41.48	54	12.52	harmonic
4924	47.25	PK	158	1.9	V	31.9	4.4	26.6	56.95	74	17.05	harmonic
4924	46.79	PK	325	1.5	H	31.9	4.4	26.6	56.49	74	17.51	harmonic

Restrict band spurious emission

Indicated		Detector (PK/Ave)	Table Angle Degree	Test Antenna		Correction Factor			FCC Part 15.247/15.209			
Frequency (MHz)	S.A. Reading (dBμV)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Note
2389.4	26.24	AV	201	1.6	H	27.5	3	26.8	29.94	54	24.06	spurious
2389.4	46.21	PK	201	1.6	H	27.5	3	26.8	49.91	74	24.09	spurious
2390	25.15	AV	175	1.9	V	27.5	3	26.8	28.85	54	25.15	spurious
2496.5	43.65	PK	175	1.8	H	27.5	3.2	26.8	47.55	74	26.45	spurious
2496.5	23.64	AV	128	1.6	V	27.5	3.2	26.8	27.54	54	26.46	spurious
2496.5	23.15	AV	175	1.8	H	27.5	3.2	26.8	27.05	54	26.95	spurious
2390	42.15	PK	175	1.9	V	27.5	3	26.8	45.85	74	28.15	spurious
2496.5	40.15	PK	128	1.6	V	27.5	3.2	26.8	44.05	74	29.95	spurious

802.11g Mode:

Indicated		Detector (PK/Ave)	Table Angle Degree	Test Antenna		Correction Factor			FCC Part 15.247/15.209			
Frequency (MHz)	S.A. Reading (dBμV)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Note
Low Channel (2412 MHz)												
4824	32.75	Ave	257	1.9	V	31.2	4.3	26.7	41.55	54	12.45	harmonic
4824	51.57	PK	257	1.9	V	31.2	4.3	26.7	60.37	74	13.63	harmonic
4824	29.35	Ave	100	1.6	H	31.2	4.3	26.7	38.15	54	15.85	harmonic
4824	48.57	PK	100	1.6	H	31.2	4.3	26.7	57.37	74	16.63	harmonic
Middle Channel (2437 MHz)												
4874	31.25	Ave	360	2.1	V	31.2	4.3	26.7	40.05	54	13.95	harmonic
4874	28.31	Ave	158	1.5	H	31.2	4.3	26.7	37.11	54	16.89	harmonic
4874	48.22	PK	360	2.1	V	31.2	4.3	26.7	57.02	74	16.98	harmonic
4874	46.15	PK	158	1.5	H	31.2	4.3	26.7	54.95	74	19.05	harmonic
High Channel (2462 MHz)												
4924	32.64	Ave	250	1.8	V	31.9	4.4	26.6	42.34	54	11.66	harmonic
4924	51.25	PK	250	1.8	V	31.9	4.4	26.6	60.95	74	13.05	harmonic
4924	28.15	Ave	108	1.7	H	31.9	4.4	26.6	37.85	54	16.15	harmonic
4924	46.69	PK	108	1.7	H	31.9	4.4	26.6	56.39	74	17.61	harmonic

Restrict band spurious emission

Indicated		Detector (PK/Ave)	Table Angle Degree	Test Antenna		Correction Factor			FCC Part 15.247/15.209			
Frequency (MHz)	S.A. Reading (dBμV)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Note
2490.5	44.35	PK	125	1.6	H	27.5	3.2	26.8	48.25	74	25.75	spurious
2490.5	24.34	Ave	346	2	V	27.5	3.2	26.8	28.24	54	25.76	spurious
2390	44.2	PK	157	2.2	H	27.5	3	26.8	47.9	74	26.10	spurious
2490.5	23.05	Ave	125	1.6	H	27.5	3.2	26.8	26.95	54	27.05	spurious
2390	23.15	Ave	157	2.2	H	27.5	3	26.8	26.85	54	27.15	spurious
2390	22.75	Ave	186	1.8	V	27.5	3	26.8	26.45	54	27.55	spurious
2490.5	41.04	PK	346	2	V	27.5	3.2	26.8	44.94	74	29.06	spurious
2390	41.01	PK	186	1.8	V	27.5	3	26.8	44.71	74	29.29	spurious

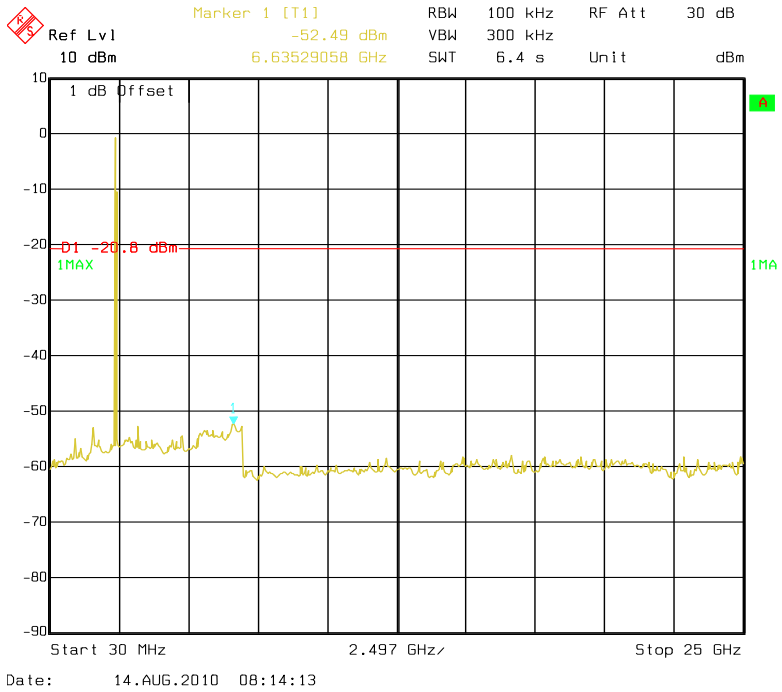
Conducted Spurious Emissions at Antenna Port

Frequency (MHz)	Delta Value (dBc)	Limit (dBc)	Ref. Plot	Result
802.11b Mode				
2412	*	20	PLOT1	PASS
2437	*	20	PLOT2	PASS
2462	*	20	PLOT3	PASS
802.11g Mode				
2412	*	20	PLOT4	PASS
2437	*	20	PLOT5	PASS
2462	*	20	PLOT6	PASS

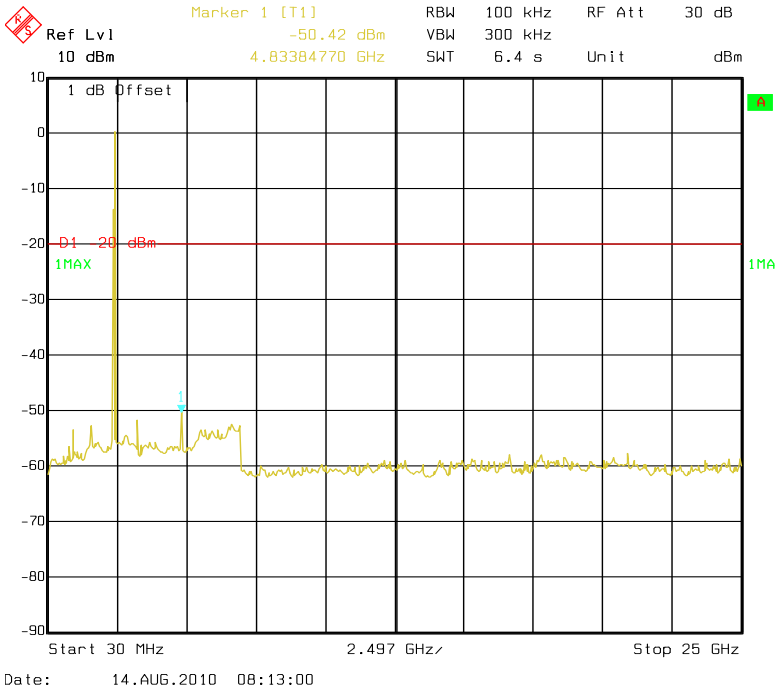
Please refer to the following plots.

802.11b:

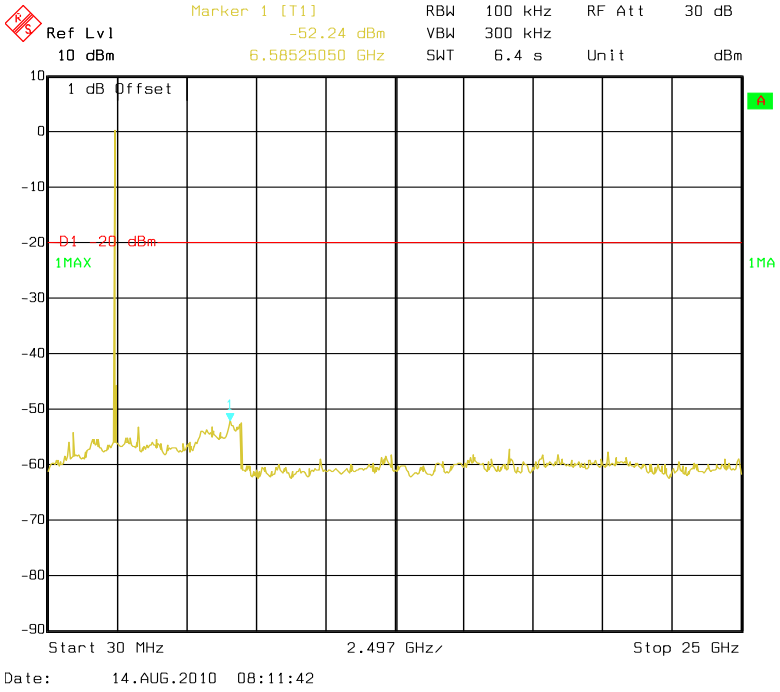
Low Channel



Middle Channel

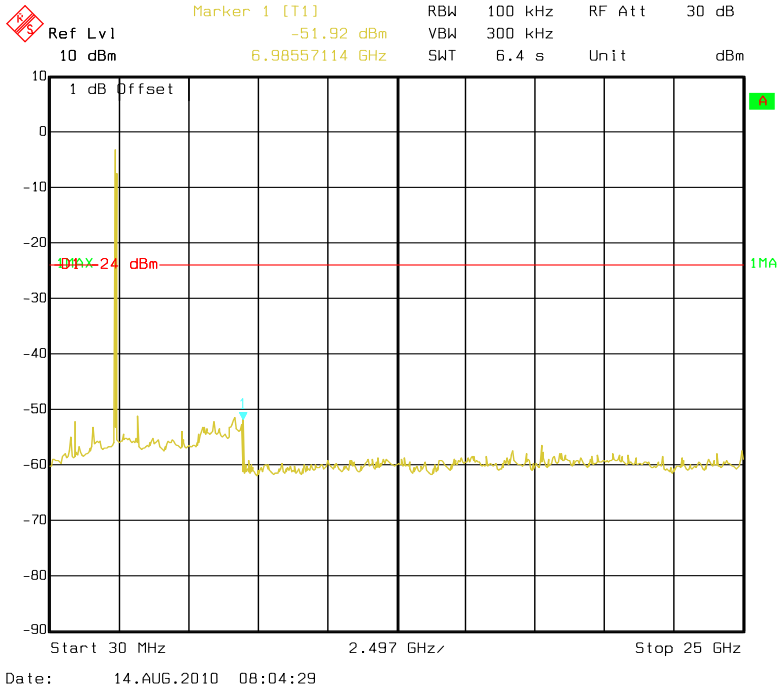


High Channel

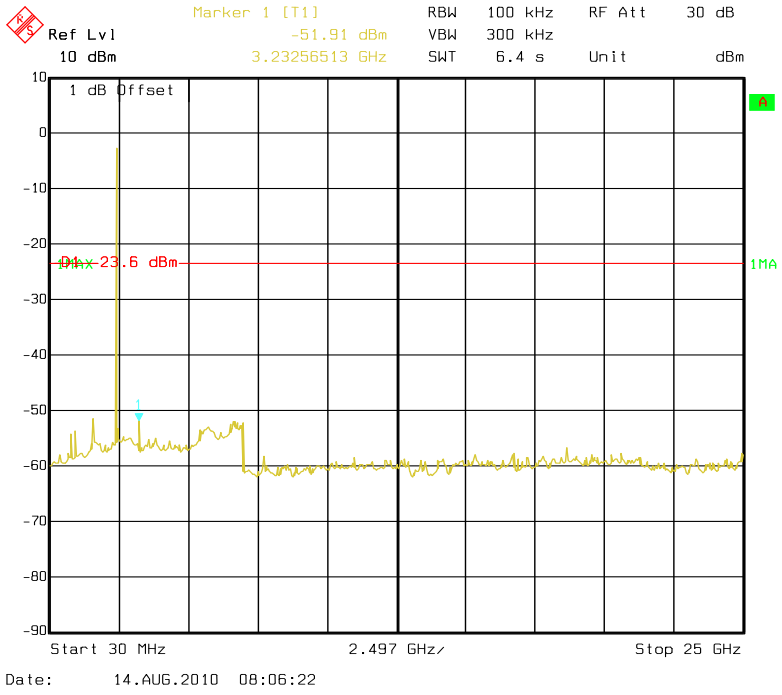


802.11g:

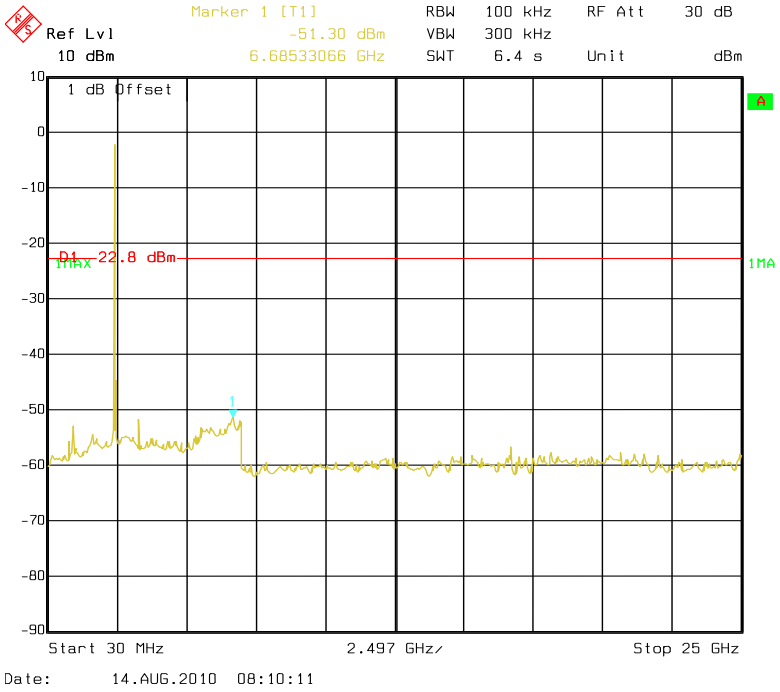
Low Channel



Middle Channel



High Channel



FCC §15.247(a) (2) – 6 dB BANDWIDTH TESTING

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.

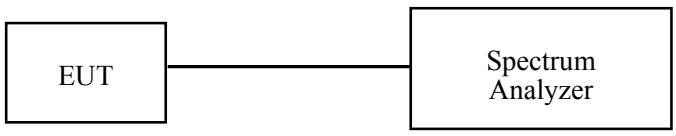
Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-24	2010-11-24

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

Test 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 emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56%
ATM Pressure:	100.0kPa

The testing was performed by Alvin Huang on 2010-08-03 and 2010-08-14.

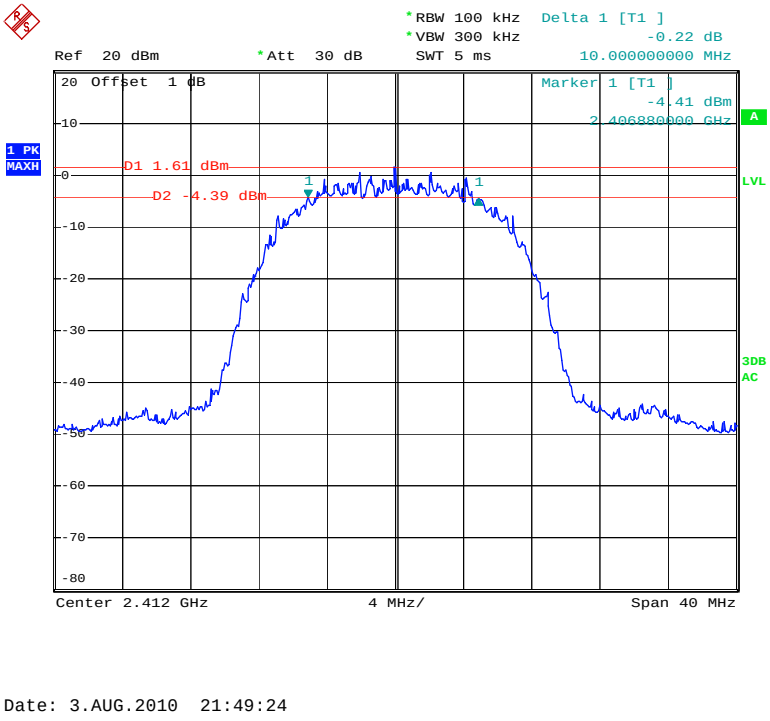
Test Result: Pass.

Please refer to the following tables and plots.

Channel	Channel Frequency (MHz)	Measured 6dB Bandwidth (MHz)	FCC Part 15.247 Limit (kHz)
802.11b Mode			
Low	2412	10.00	＞500
Middle	2437	10.48	＞500
High	2462	10.08	＞500
802.11g Mode			
Low	2412	16.56	＞500
Middle	2437	16.56	＞500
High	2462	16.56	＞500

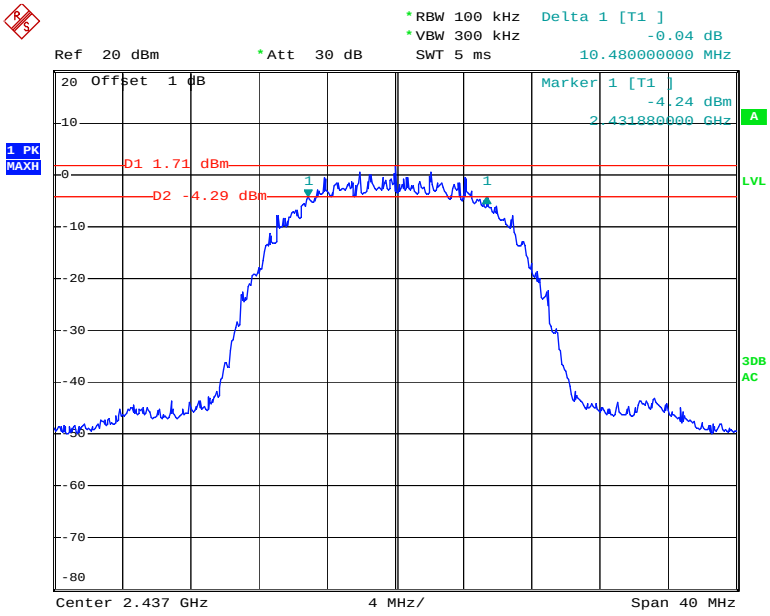
802.11b:

Low Channel



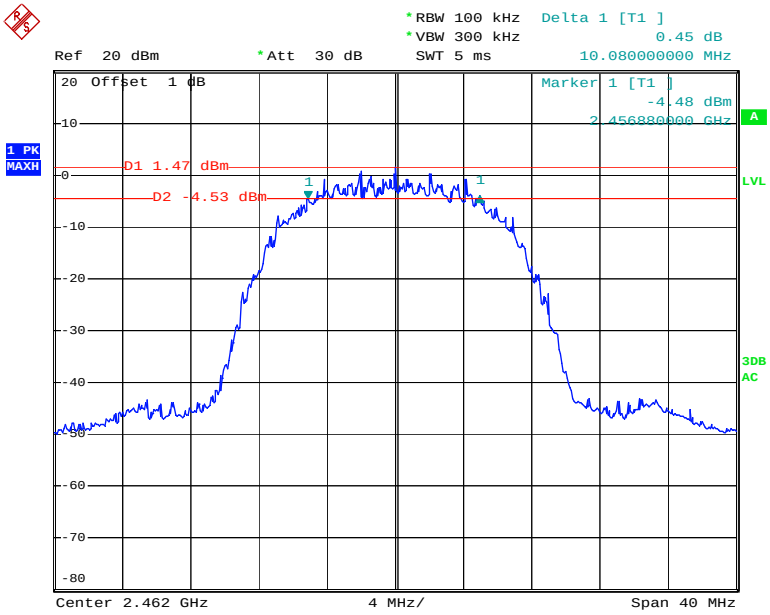
Date: 3.AUG.2010 21:49:24

Middle Channel



Date: 3.AUG.2010 21:54:02

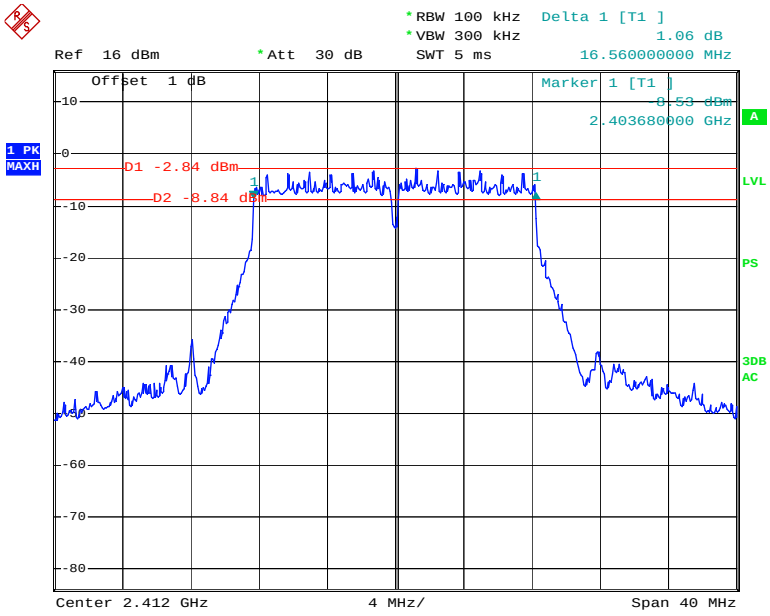
High Channel



Date: 3.AUG.2010 21:58:44

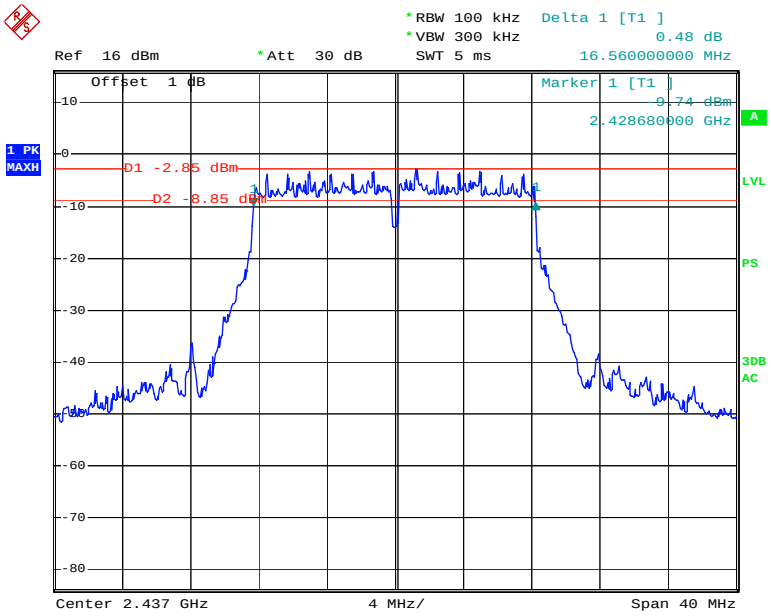
802.11g:

Low Channel



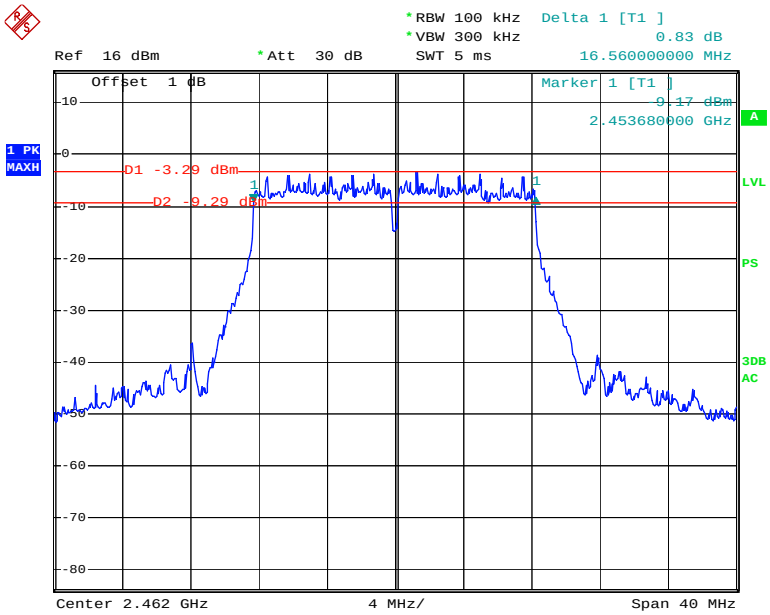
Date: 14.AUG.2010 10:50:10

Middle Channel



Date: 14.AUG.2010 10:55:04

High Channel



Date: 14.AUG.2010 10:58:22

FCC §15.247(b)(3) - MAXIMUM PEAK OUTPUT POWER

Applicable Standard

According to FCC §15.247 (b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

According to §15.247(b) (4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b) (1), (b) (2), and (b) (3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

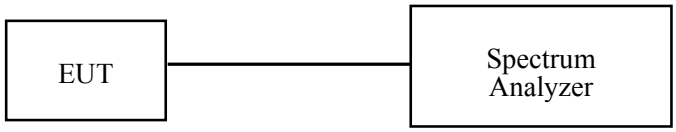
Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-24	2010-11-24

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

Test 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 an EMI Test Receiver.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0kPa

The testing was performed by Alvin Huang on 2010-08-03 and 2010-08-14.

Test Mode: Transmitting

802.11b Mode:

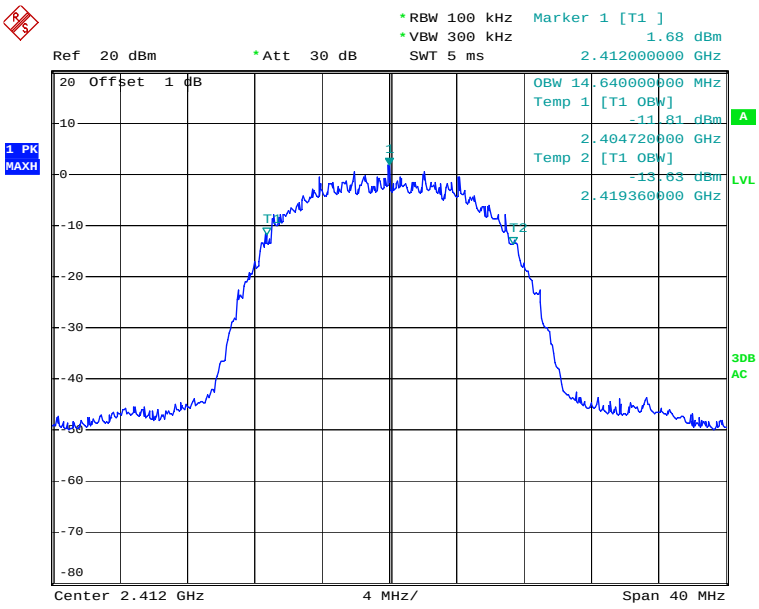
Channel	Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)
Low	2412	12.01	30
Middle	2437	12.02	30
High	2462	11.92	30

802.11g Mode:

Channel	Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)
Low	2412	9.43	30
Middle	2437	9.30	30
High	2462	9.21	30

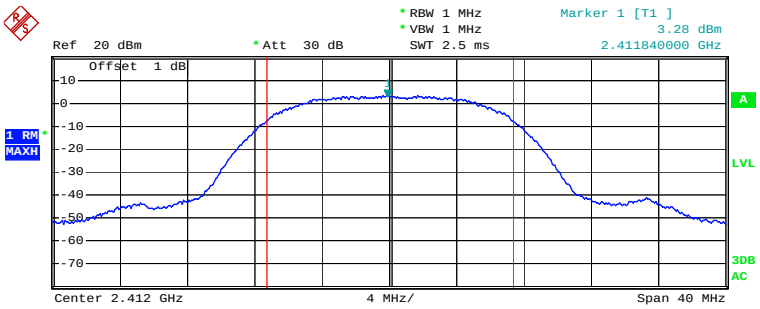
802.11b Mode:

99% Occupied Bandwidth, Low Channel



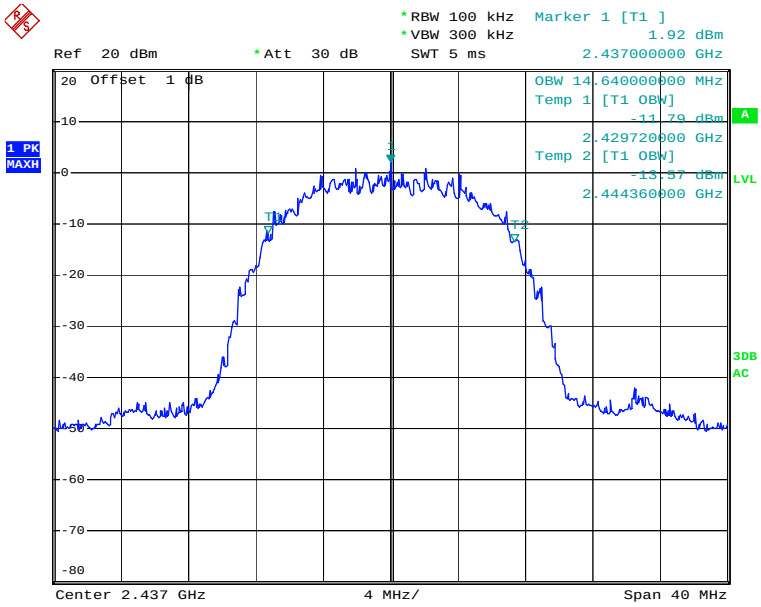
Date: 3.AUG.2010 21:46:10

RF Output Power, Low Channel



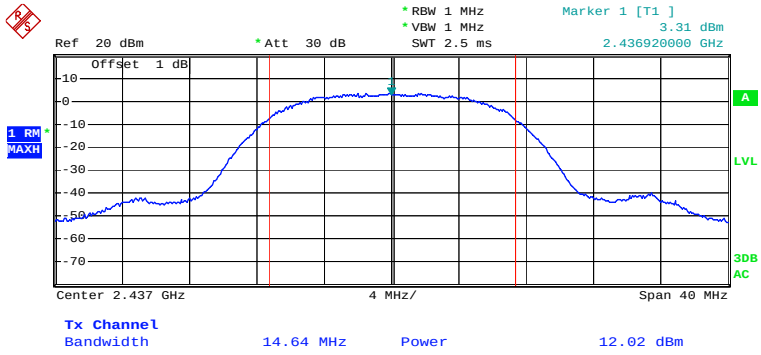
Date: 3.AUG.2010 21:47:50

99% Occupied Bandwidth, Middle Channel



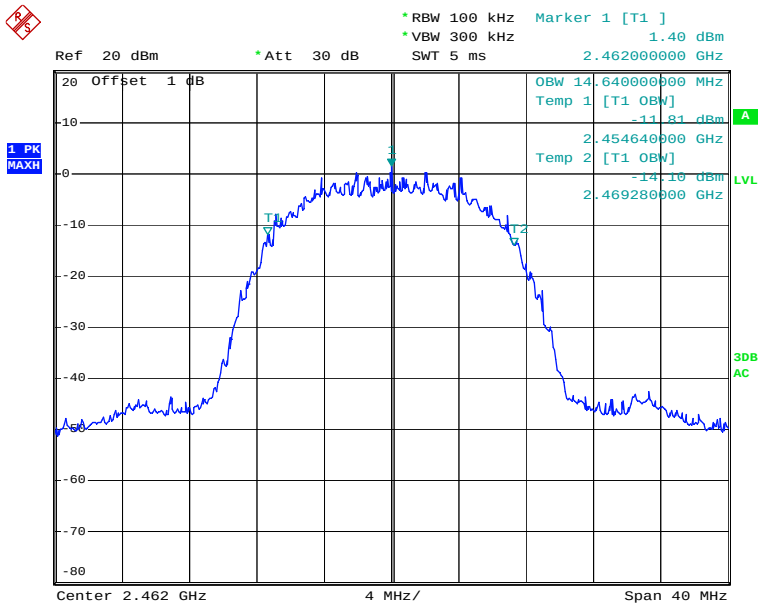
Date: 3.AUG.2010 21:52:58

RF Output Power, Middle Channel



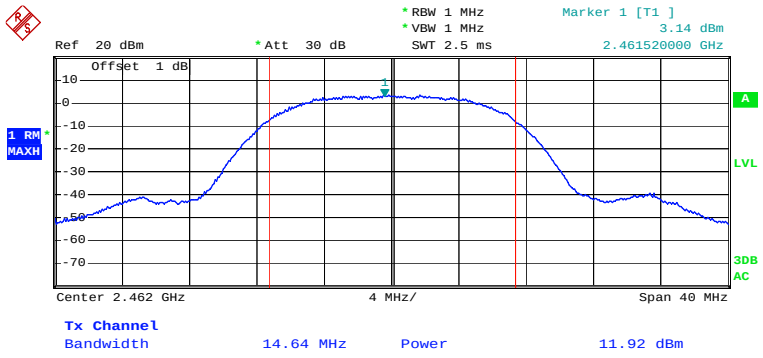
Date: 3.AUG.2010 21:55:00

99% Occupied Bandwidth, High Channel



Date: 3.AUG.2010 21:57:40

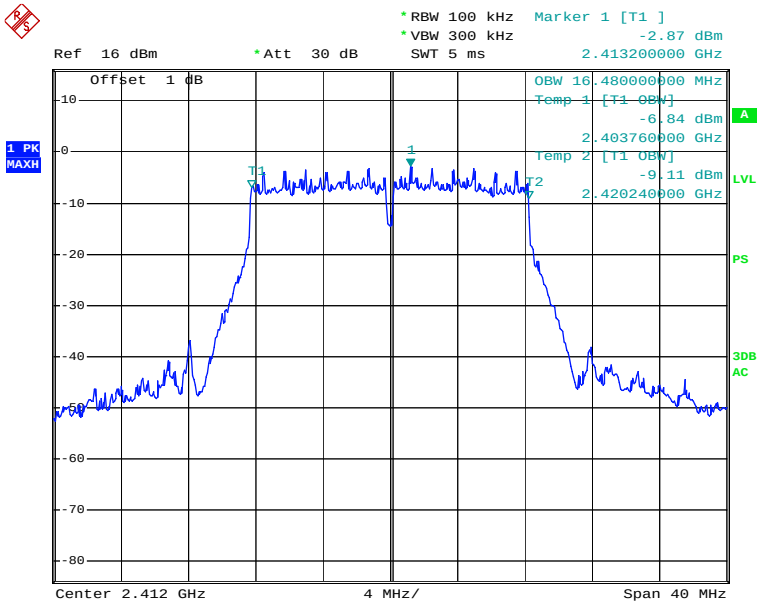
RF Output Power, High Channel



Date: 3.AUG.2010 21:57:02

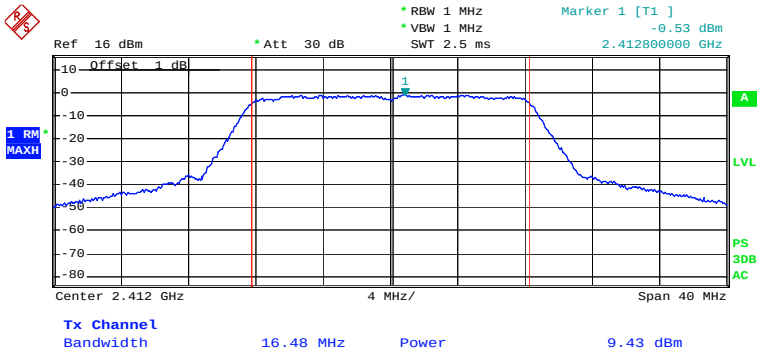
802.11g Mode:

99% Occupied Bandwidth, Low Channel



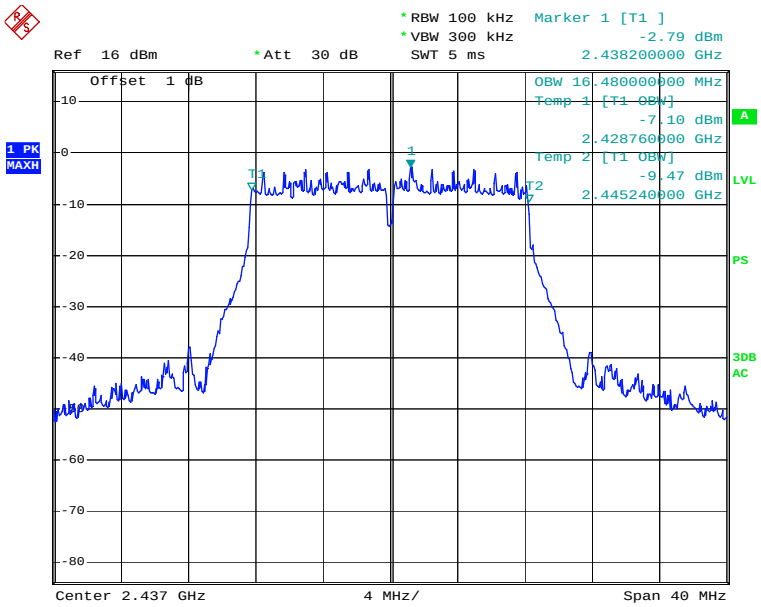
Date: 14.AUG.2010 10:46:53

RF Output Power, Low Channel



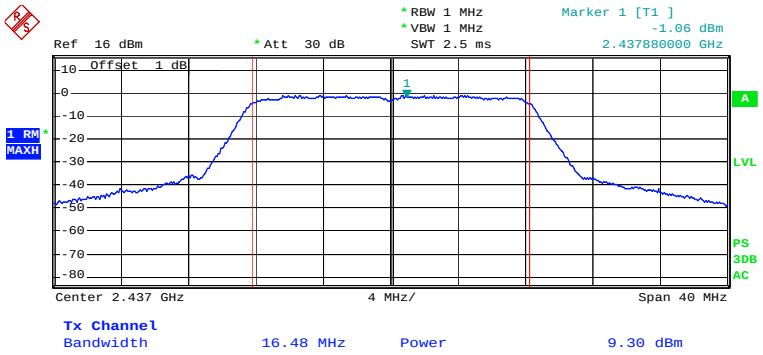
Date: 14.AUG.2010 10:51:35

99% Occupied Bandwidth, Middle Channel



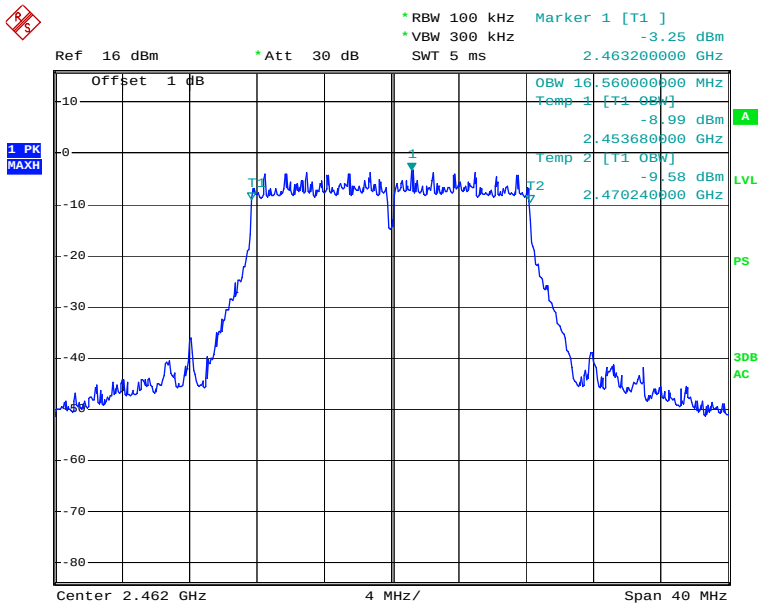
Date: 14.AUG.2010 10:54:18

RF Output Power, Middle Channel



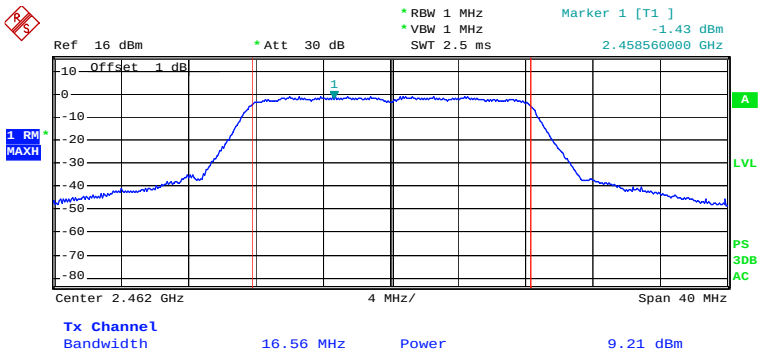
Date: 14.AUG.2010 10:55:47

99% Occupied Bandwidth, High Channel



Date: 14.AUG.2010 10:57:25

RF Output Power, High Channel



Date: 14.AUG.2010 11:10:57

FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-24	2010-11-24

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

Test 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 RBW to 1 MHz and VBW of spectrum analyzer to 1 MHz 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.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0kPa

The testing was performed by Alvin Huang on 2010-08-03 and 2010-08-14.

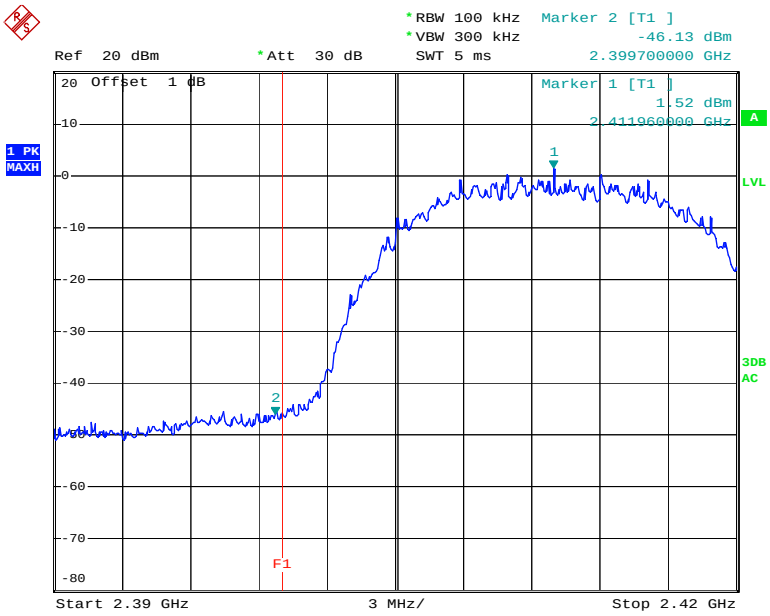
Test Result: *Compliance.*

Frequency (MHz)	Delta Value (dBc)	Limit (dBc)	Result
802.11b Mode			
2399.700	47.65	20	Pass
2485.800	49.38	20	Pass
802.11g Mode			
2398.804	38.33	20	Pass
2484.100	47.32	20	Pass

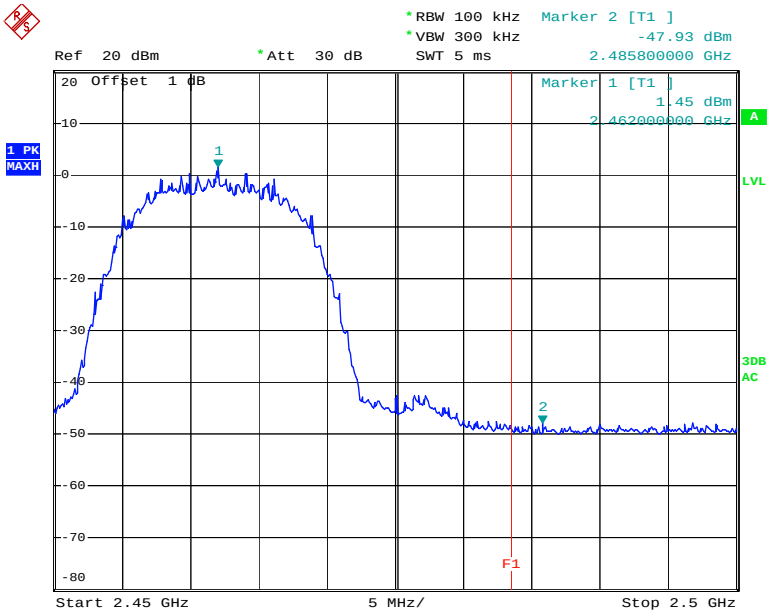
Please refer to following plots.

Band Edge, 802.11b:

Left Side



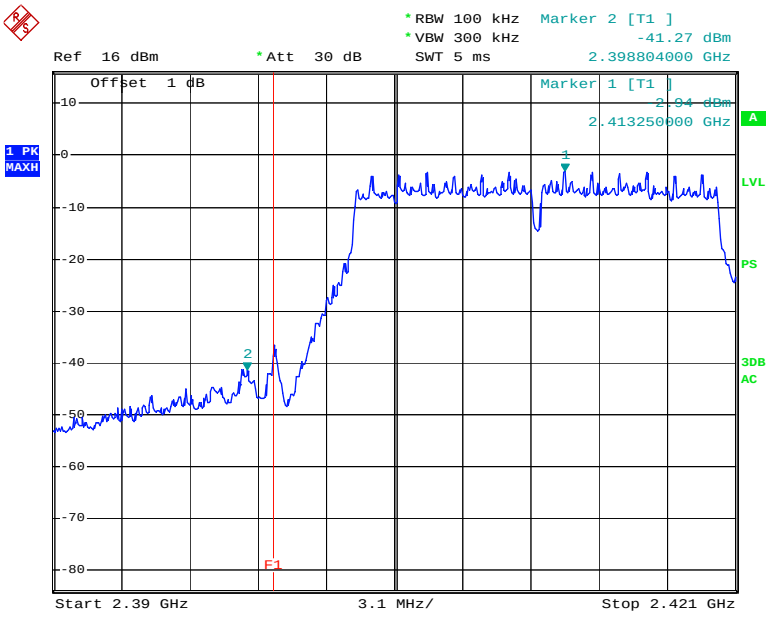
Right Side



Date: 3.AUG.2010 22:02:24

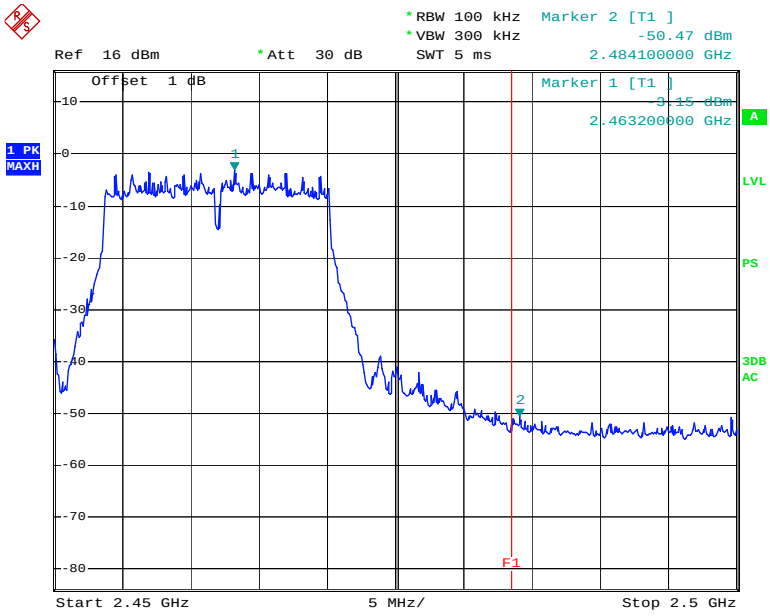
Band Edge, 802.11g:

Left Side



Date: 14.AUG.2010 10:53:20

Right Side



Date: 14.AUG.2010 11:12:23

FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

For digitally modulated systems, the 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. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-24	2010-11-24

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

Test 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.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0kPa

The testing was performed by Alvin Huang on 2010-08-03 to 2010-08-14

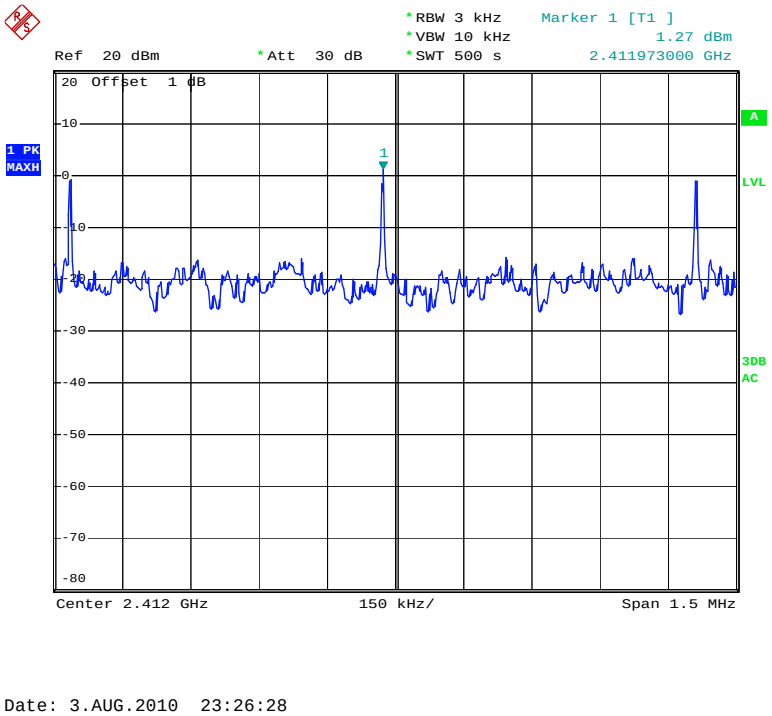
Test Mode: Transmitting

Test Result: Pass

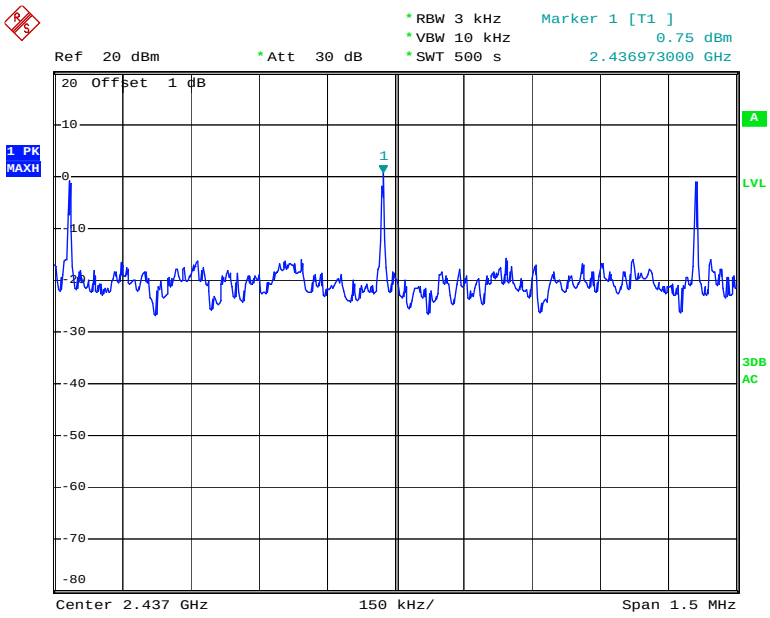
Channel	Frequency (MHz)	Power Spectal Density (dBm/3kHz)	Part 15.247 Limit (dBm/3kHz)	Result
802.11b Mode				
Low	2412	1.27	8	Pass
Middle	2437	0.75	8	Pass
High	2462	1.21	8	Pass
802.11g Mode				
Low	2412	-19.18	8	Pass
Middle	2437	-19.11	8	Pass
High	2462	-19.33	8	Pass

Power Spectral Density, 802.11b:

Low Channel

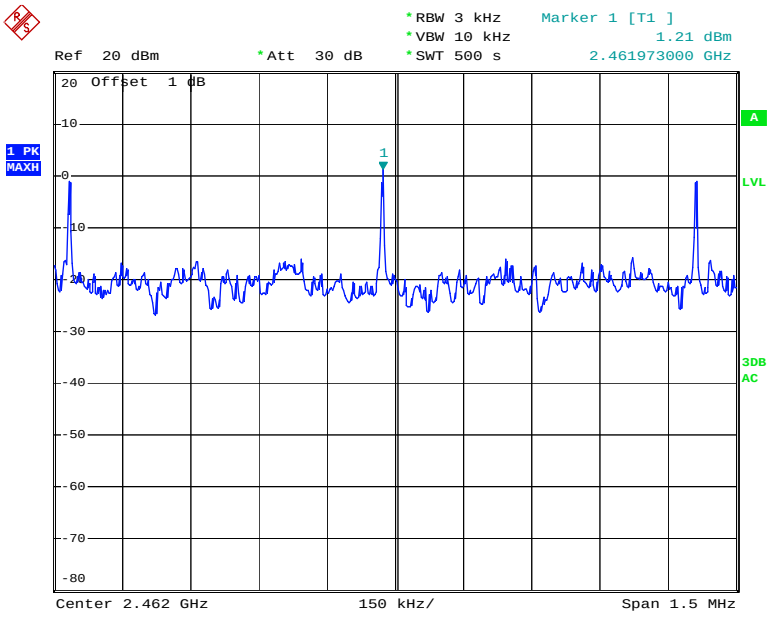


Middle Channel



Date: 3.AUG.2010 23:17:29

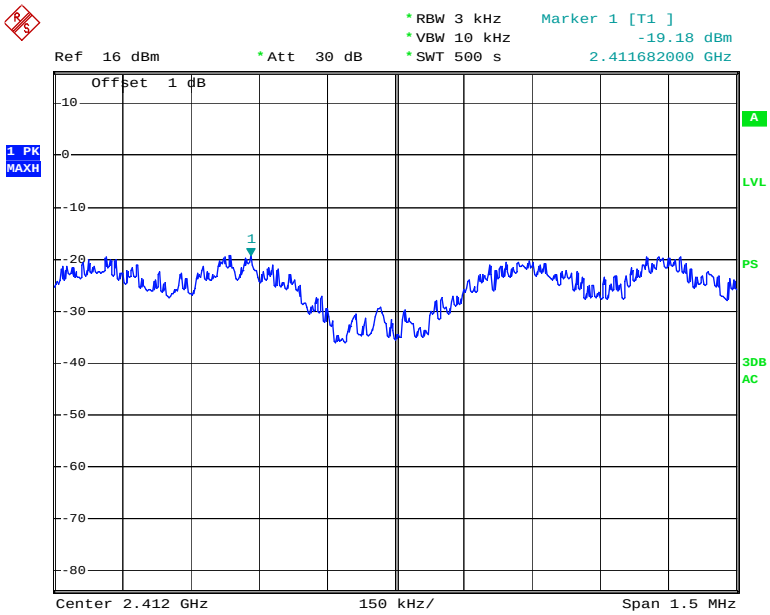
High Channel



Date: 3.AUG.2010 23:04:59

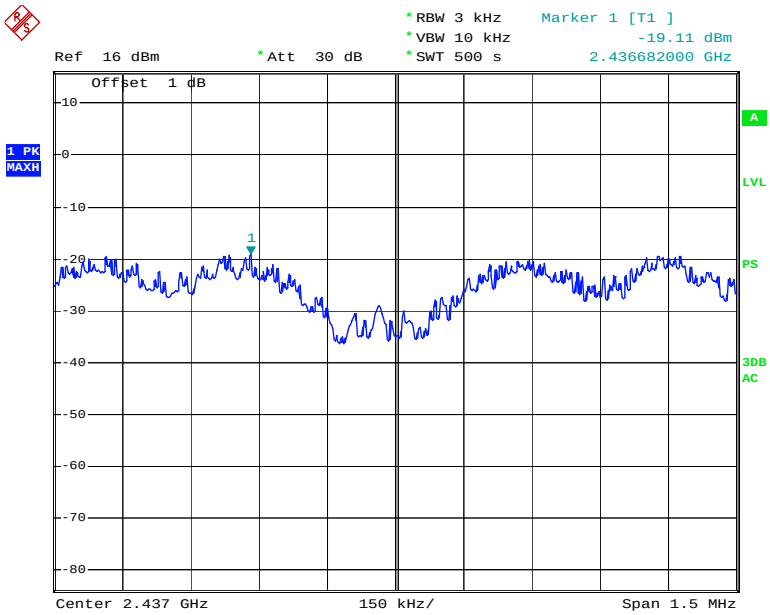
Power Spectral Density, 802.11g:

Low Channel



Date: 14.AUG.2010 11:45:06

Middle Channel



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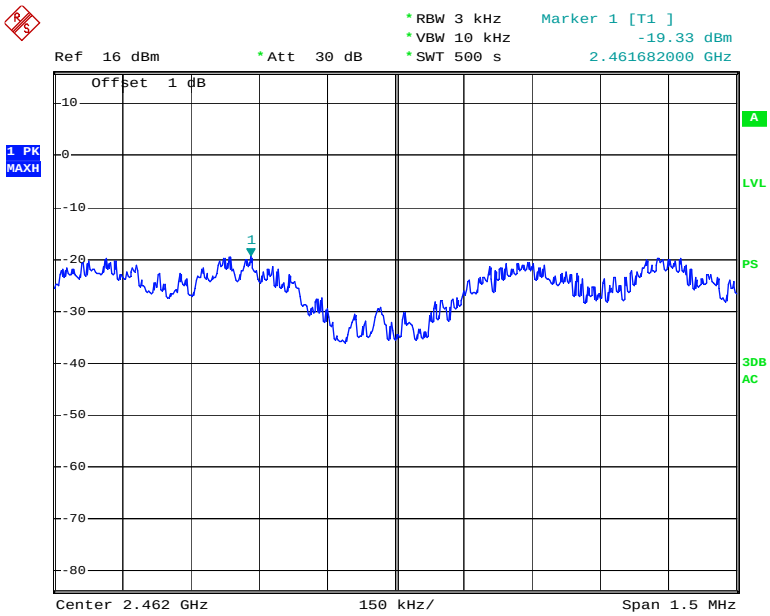
High Channel



Date: 14.AUG.2010 11:26:02

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