Lab Code: 200707-0

FCC PART 15.247

MEASUREMENT AND TEST REPORT

For

Cubic Transportation Systems, Inc.

5650 Kearny Mesa Road,

San Diego, CA 92111, USA

FCC ID: LVC310

Report Type:	Product Type:
Original Report	Mobile Validator (MV)

Test Engineer:	Wayne Cheng
Report Number:	RSZ11040103-15.247Wifi
Report Date:	2011-06-20
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 *Cubic Transportation Systems, Inc.*'s product, model number: *5300-10009-4 (FCC ID: LVC310)* or the "EUT" as referred to in this report is a *Mobile Validator (MV)*, which measures approximately: 20.0 cm (L) x 12.2 cm (W) x 3.5 cm (H), rated input voltage: DC 12V or DC 24V.

** All measurement and test data in this report was gathered from production sample serial number: 000000000000001 (Assigned by applicant). The EUT was received on 2011-03-02.*

Objective

This Type approval report is prepared on behalf of *Cubic Transportation Systems, Inc. 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)

FCC Part 15.225 DXX, FCC Part 15.247 DSS and FCC Part 15B JBP, submission with FCC ID: LVC310.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, 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 December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

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 an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (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 for 802.11b and 802.11g mode were tested with Channel 1, 6 and 11.

Test mode 1: Wi-Fi transmitting
Test mode 2: Wi-Fi radio transmits simultaneously with 13.56 MHz radios

EUT Exercise Software

The test was performed under:
802.11b: Data rate: 1 Mbps.
802.11g: Data rate: 6 Mbps.

Equipment Modifications

No modification was made to the unit tested.

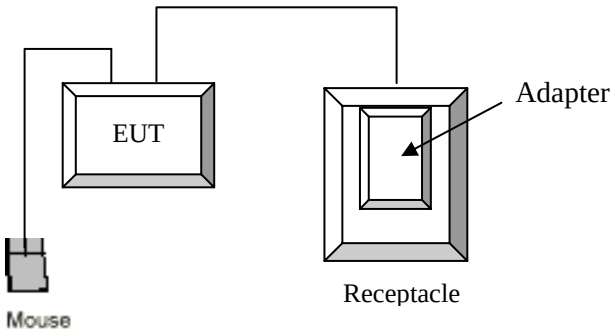
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
I.T.E	Power supply	SAW18-12.0-1500US	N/A
I.T.E	Power supply	SAW18-24.0-1500US	N/A

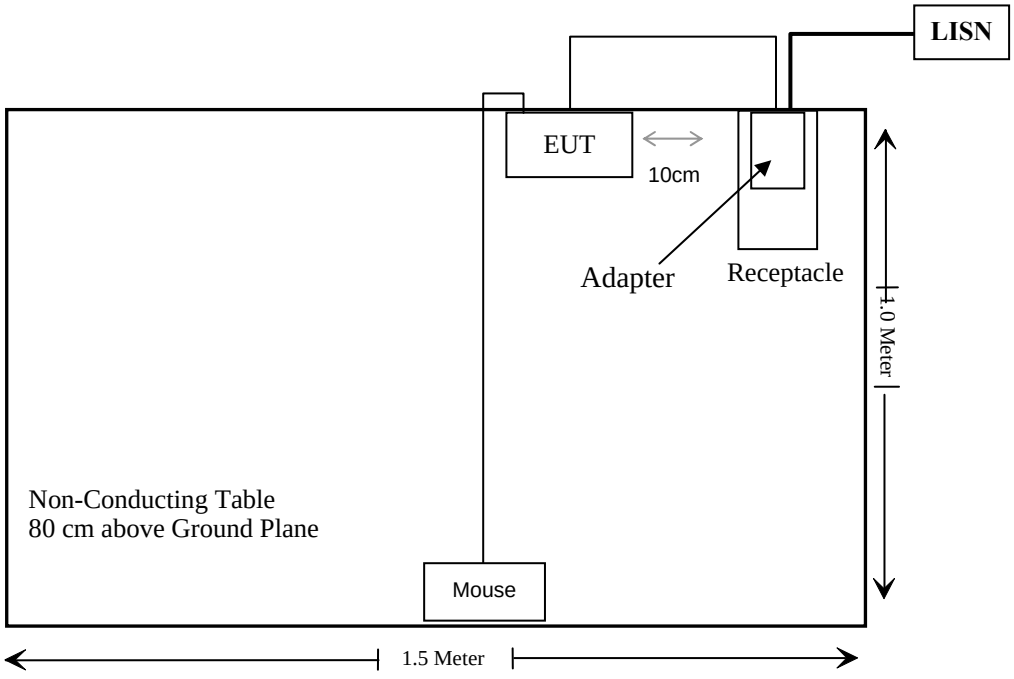
External I/O Cable

Cable Description	Length (m)	From Port	To
Unshielded Undetachable Power Cable	1.8	Adapter	LISN
Unshielded Undetachable Cable	2.0	EUT	Adapter

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §2.1091	Maximum Permissible exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a),	AC Line 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 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) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

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

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f^2)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz;
* = Plane-wave equivalent power density;

MPE Calculation

Predication of MPE limit at a given distance

$$S = PG/4\pi R^2$$

S = power density (in appropriate units, e.g. mW/cm2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Radio	**Frequency (MHz)**	**Antenna Gain**		**Conducted Power**		**Evaluation Distance (cm)**	**Power Density (mW/cm^2)**	**MPE Limit (mW/cm^2)**
		(dBi)	**(numeric)**	**(dBm)**	**(mW)**			
Wi-Fi	2412	2.6	1.8	14.87	30.69	20	0.006	1.0

The MPE calculations in the spreadsheet above demonstrates that the device meets the MPE requirement stated in FCC Part 1.1310 at the 20 cm distance required for mobile exposure conditions.

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 one Wi-Fi antenna, Chip antenna, which in accordance to section 15.203, the antenna's maximum gain is 2.6 dBi, please refer to the internal photos.

Result: Compliance.

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 (k=2, 95% level of confidence).
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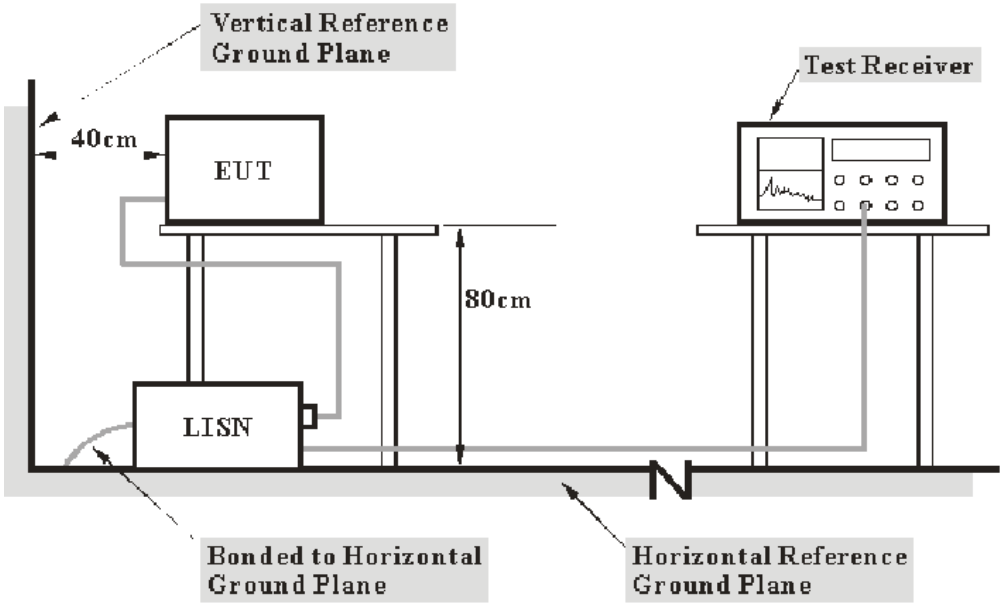
EUT Setup



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 C63.4-2009 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The 12V/24V adapters were 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	2011-03-03	2012-03-02
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2011-03-09	2012-03-08

*** 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:

14.90 dB at **1.455 MHz** in the **Line** conducted mode

Test Data

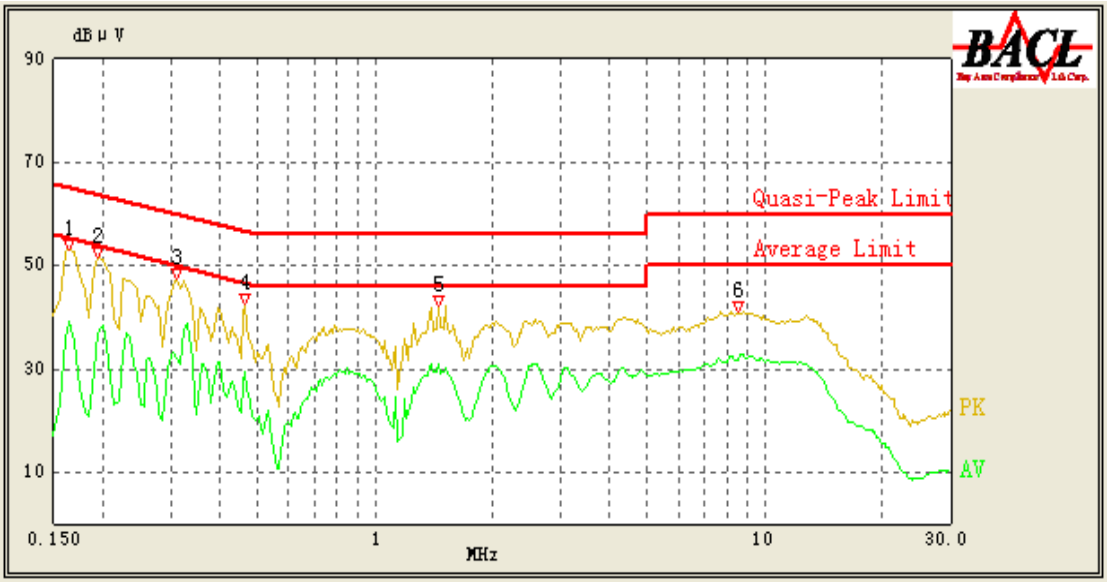
Environmental Conditions

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

The testing was performed by Wayne Cheng on 2011-03-25.

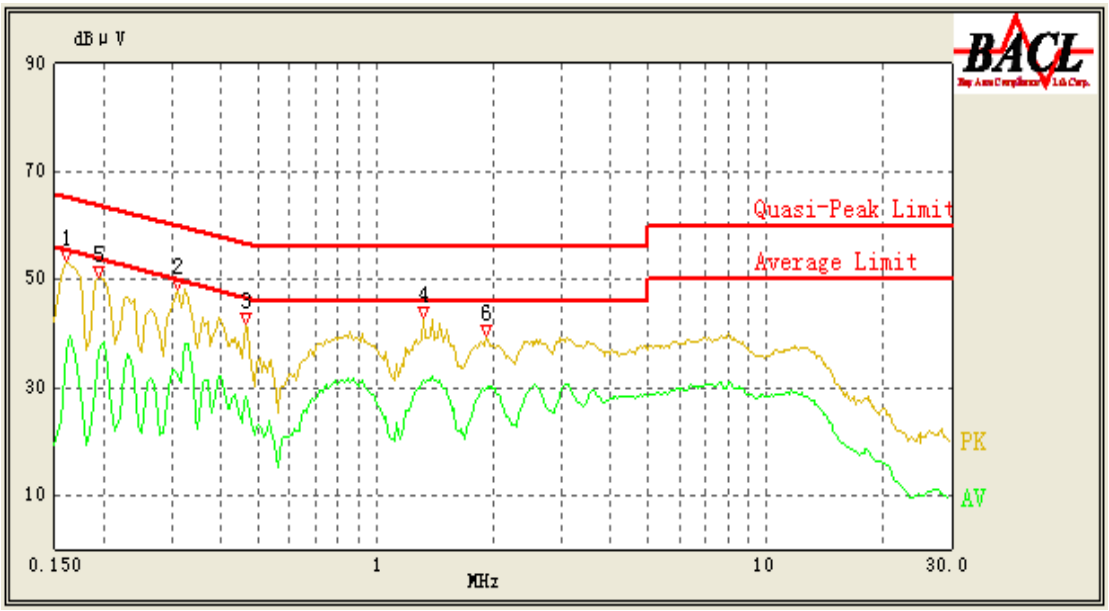
Test Mode: Transmitting

120 V, 60 Hz, Line (DC 12V adapter):



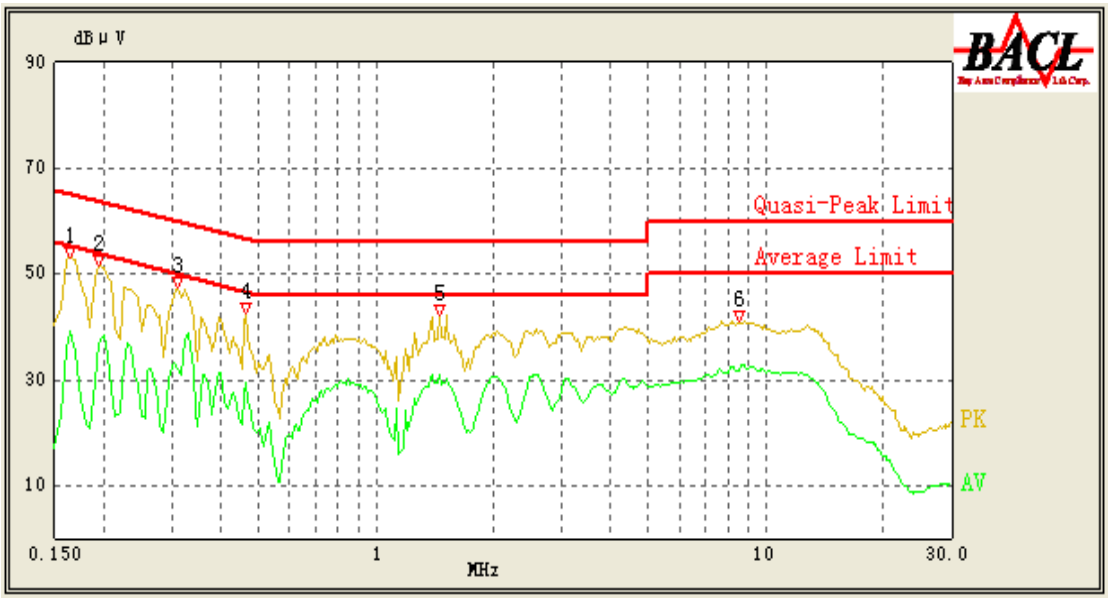
Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	**Corrected Result (dBμV)**	**Correction Factor (dB)**	**Limit (dBμV)**	**Margin (dB)**	**Detector (PK /QP/Ave.)**
0.165	49.93	10.09	65.57	15.64	QP
0.195	46.91	10.07	64.71	17.80	QP
0.195	36.76	10.07	54.71	17.95	Ave.
0.465	38.05	10.16	57.00	18.95	QP
1.460	38.17	10.15	56.00	17.83	QP
1.455	31.09	10.15	46.00	14.91	Ave.
8.515	36.24	10.10	60.00	23.76	QP
0.165	39.25	10.09	55.57	16.32	Ave.
0.465	29.55	10.16	47.00	17.45	Ave.
8.520	31.85	10.10	50.00	18.15	Ave.
0.310	42.96	10.01	61.43	18.47	QP
0.310	32.09	10.01	51.43	19.34	Ave.

120V, 60 Hz, Neutral (DC 12V adapter):



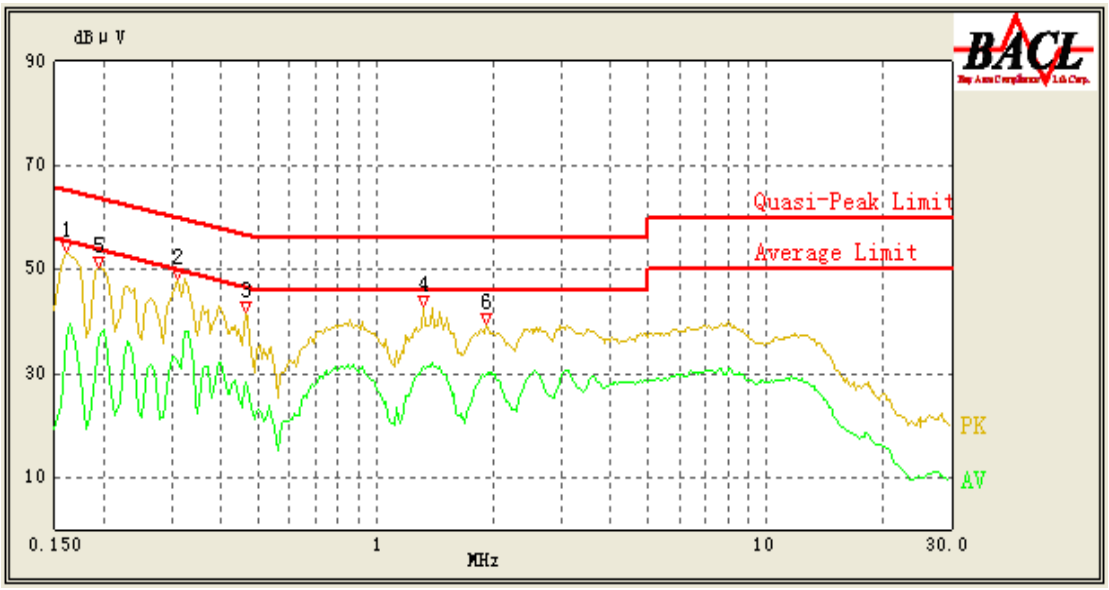
Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	**Corrected Result (dBµV)**	**Correction Factor (dB)**	**Limit (dBµV)**	**Margin (dB)**	**Detector (PK /QP/Ave.)**
0.160	49.09	10.09	65.71	16.62	QP
0.160	36.69	10.09	55.71	19.02	Ave.
0.310	42.19	10.01	61.43	19.24	QP
0.310	32.26	10.01	51.43	19.17	Ave.
0.465	38.26	10.16	57.00	18.74	QP
0.465	28.46	10.16	47.00	18.54	Ave.
1.325	37.95	10.13	56.00	18.05	QP
1.325	31.49	10.13	46.00	14.51	Ave.
0.195	47.10	10.07	64.71	17.61	QP
0.195	36.82	10.07	54.71	17.89	Ave.
1.925	35.03	10.19	56.00	20.97	QP
1.930	29.83	10.19	46.00	16.17	Ave.

120 V, 60 Hz, Line (DC 24V adapter):



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	**Corrected Result (dBµV)**	**Correction Factor (dB)**	**Limit (dBµV)**	**Margin (dB)**	**Remark (PK/QP/Ave.)**
1.455	31.10	10.15	46.00	14.90	Ave.
0.165	49.90	10.09	65.57	15.67	QP
0.165	39.25	10.09	55.57	16.32	Ave.
0.465	29.55	10.16	47.00	17.45	Ave.
0.195	46.91	10.07	64.71	17.80	QP
1.460	38.17	10.15	56.00	17.83	QP
0.195	36.76	10.07	54.71	17.95	Ave.
8.520	31.85	10.10	50.00	18.15	Ave.
0.310	42.96	10.01	61.43	18.47	QP
0.465	38.05	10.16	57.00	18.95	QP
0.310	32.09	10.01	51.43	19.34	Ave.
8.515	36.24	10.10	60.00	23.76	QP

120V, 60 Hz, Neutral (DC 24V adapter):



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	Corrected Result (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Remark (PK/QP/Ave.)
1.325	31.09	10.13	46.00	14.91	Ave.
1.930	29.83	10.19	46.00	16.17	Ave.
0.160	49.09	10.09	65.71	16.62	QP
0.195	47.10	10.07	64.71	17.61	QP
0.195	36.82	10.07	54.71	17.89	Ave.
1.325	37.95	10.13	56.00	18.05	QP
0.465	28.46	10.16	47.00	18.54	Ave.
0.465	38.26	10.16	57.00	18.74	QP
0.160	36.69	10.09	55.71	19.02	Ave.
0.310	32.26	10.01	51.43	19.17	Ave.
0.310	42.19	10.01	61.43	19.24	QP
1.925	35.03	10.19	56.00	20.97	QP

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

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

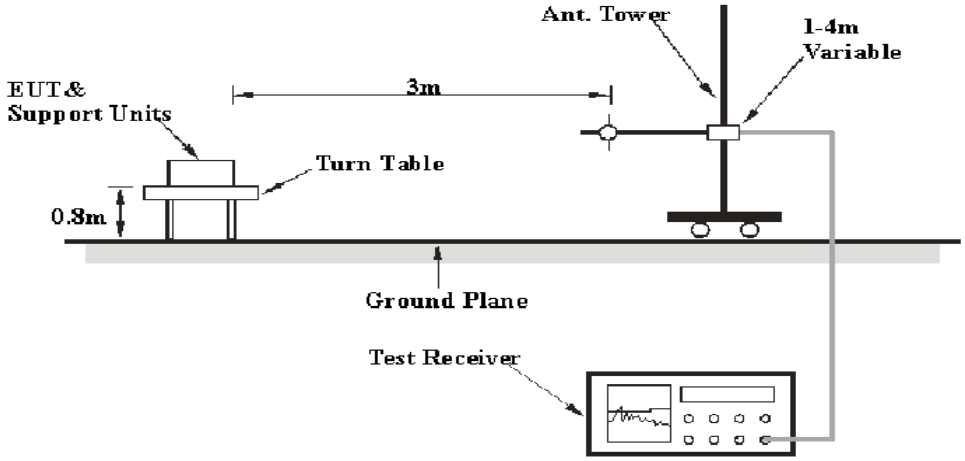
Measurement Uncertainty

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.

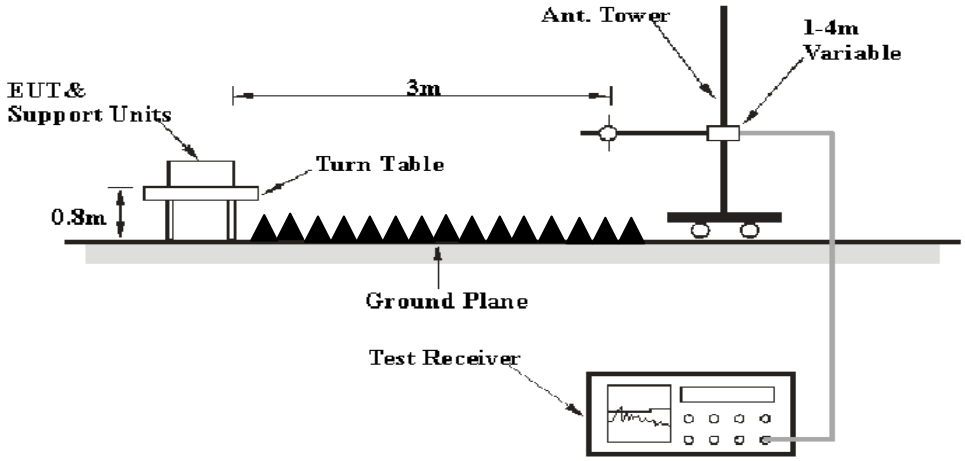
Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is ±4.0 dB(k=2, 95% level of confidence) .

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2009. 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 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***
30MHz – 1000 MHz	100 kHz	300 kHz	QP
1000 MHz – 25 GHz	1 MHz	3 MHz	PK
1000 MHz – 25 GHz	1 MHz	10 Hz	Ave

Test Procedure

For the radiated emissions test, the adapter 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 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447D	2944A09795	2010-08-02	2011-08-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2010-11-11	2011-11-10
Sunol Sciences	Broadband Antenna	AT1080	301902	2010-08-25	2011-08-25
Mini-Circuits	Amplifier	ZVA-213+	T-E27H	2011-03-08	2012-03-08
Sunol Sciences	Horn Antenna	DRH-118	A052604	2011-05-05	2012-05-04
HP	Spectrum Analyzer	8593A	51475684	2010-07-08	2011-07-07
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 Results Summary

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

Below 1 GHz:

4.1 dB at **352.564000 MHz** in the **Horizontal** polarization

Above 1 GHz:

6.58 dB at **7311.00 MHz** in the **Vertical** polarization

Test Data

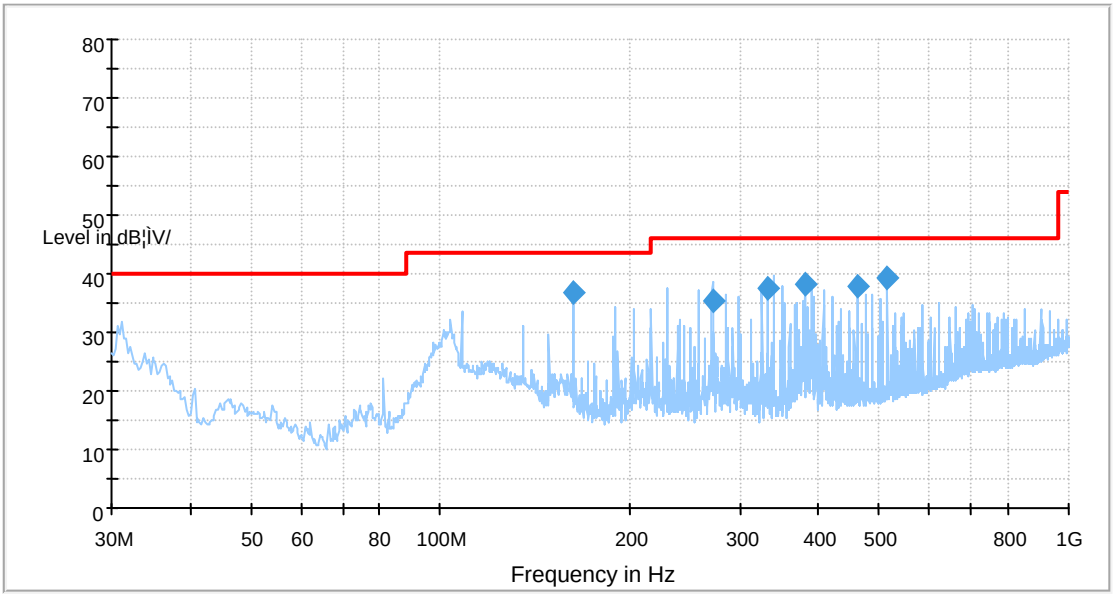
Environmental Conditions

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

The testing was performed by Wayne Cheng on 2011-03-09 to 2011-05-25.

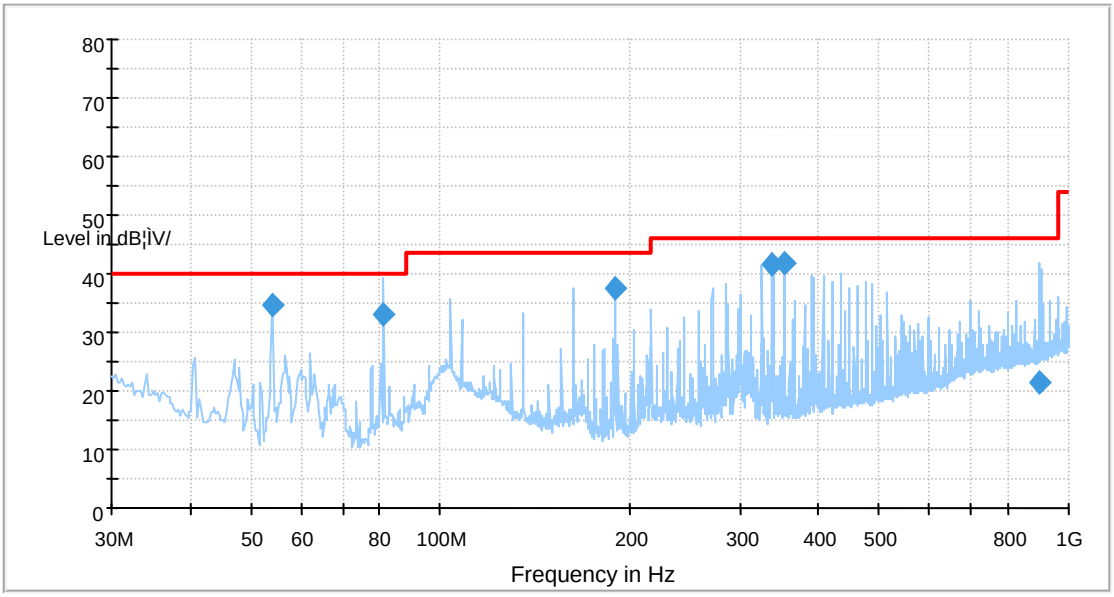
1) Below 1 GHz:

Mode 1: Wi-Fi transmitting



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (degree)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
162.730500	36.9	209.0	H	132.0	-14.5	43.5	6.6
515.485000	39.2	102.0	H	78.0	-9.2	46.0	6.8
379.685000	38.1	102.0	H	78.0	-9.8	46.0	7.9
460.922500	37.9	109.0	H	312.0	-9.4	46.0	8.1
331.427500	37.6	109.0	H	42.0	-10.1	46.0	8.4
271.287500	35.4	109.0	H	78.0	-11.7	46.0	10.6

Mode 2: Wi-Fi transmits simultaneously with 13.56 MHz radio (worse case)



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (degree)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
352.564000	41.9	102.0	H	79.0	-11.0	46.0	4.1
337.994500	41.8	104.0	H	76.0	-11.4	46.0	4.2
54.233250	34.7	104.0	V	0.0	-17.9	40.0	5.3
189.831000	37.5	102.0	V	59.0	-14.8	43.5	6.0
81.369250	33.5	103.0	V	142.0	-18.0	40.0	6.5
898.024500	21.3	373.0	H	149.0	-0.9	46.0	24.7

2) 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. (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comment
Low Channel (2412 MHz)												
7236	31.72	Ave.	190	1.3	V	37	5.2	26.6	47.32	54	6.68	harmonic
7236	31.66	Ave.	90	1.8	H	36.5	5.2	26.6	46.76	54	7.24	harmonic
4824	33.48	Ave.	180	1.7	H	32.3	4.3	26.8	43.28	54	10.72	harmonic
4824	33.27	Ave.	190	1.2	V	32.5	4.3	26.8	43.27	54	10.73	harmonic
7236	44.80	PK	190	1.3	V	37	5.2	26.6	60.4	74	13.6	harmonic
7236	43.27	PK	90	1.8	H	36.5	5.2	26.6	58.37	74	15.63	harmonic
4824	47.42	PK	190	1.2	V	32.5	4.3	26.8	57.42	74	16.58	harmonic
4824	46.81	PK	180	1.7	H	32.3	4.3	26.8	56.61	74	17.39	harmonic
Middle Channel (2437 MHz)												
7311	31.82	Ave.	360	1.4	V	37	5.2	26.6	47.42	54	6.58	harmonic
7311	31.31	Ave.	157	1.1	H	36.5	5.2	26.6	46.41	54	7.59	harmonic
4874	33.63	Ave.	180	1.2	V	32.5	4.3	26.8	43.63	54	10.37	harmonic
4874	33.42	Ave.	56	1	H	32.3	4.3	26.8	43.22	54	10.78	harmonic
7311	44.70	PK	360	1.4	V	37	5.2	26.6	60.3	74	13.7	harmonic
7311	44.63	PK	157	1	H	36.5	5.2	26.6	59.73	74	14.27	harmonic
4874	47.12	PK	180	1.2	V	32.5	4.3	26.8	57.12	74	16.88	harmonic
4874	46.72	PK	56	1.2	H	32.3	4.3	26.8	56.52	74	17.48	harmonic
High Channel (2462 MHz)												
7386	31.18	Ave.	10	1.2	V	37	5.2	26.6	46.78	54	7.22	harmonic
7386	31.29	Ave.	120	1.8	H	36.5	5.2	26.6	46.39	54	7.61	harmonic
4924	33.73	Ave.	76	1.2	V	32.5	4.3	26.8	43.73	54	10.27	harmonic
4924	33.89	Ave.	160	1.7	H	32.3	4.3	26.8	43.69	54	10.31	harmonic
7386	44.91	PK	10	1.2	V	37	5.2	26.6	60.51	74	13.49	harmonic
7386	43.84	PK	120	1.8	H	36.5	5.2	26.6	58.94	74	15.06	harmonic
4924	47.07	PK	76	1.2	V	32.5	4.3	26.8	57.07	74	16.93	harmonic
4924	46.29	PK	160	1.7	H	32.3	4.3	26.8	56.09	74	17.91	harmonic

Radiated spurious emissions in the restricted bands

Freq. (MHz)	S.A. Reading (dBµV)	Detector (PK /Ave.)	Direction Degree	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	FCC Part 15.247/205/209	
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)
2387.550	33.16	Ave.	150	1.6	H	28.5	3.0	26.8	37.86	54	16.14
2387.460	31.78	Ave.	0	1.2	V	29.0	3.0	26.8	36.98	54	17.02
2486.200	31.64	Ave.	130	1.2	V	29.0	3.0	26.8	36.84	54	17.16
2486.200	31.82	Ave.	120	1.8	H	28.5	3.0	26.8	36.52	54	17.48
2387.460	47.56	PK	0	1.2	V	29.0	3.0	26.8	52.76	74	21.24
2387.550	47.64	PK	150	1.6	H	28.5	3.0	26.8	52.34	74	21.66
2486.200	46.21	PK	130	1.2	V	29.0	3.0	26.8	51.41	74	22.59
2486.200	46.49	PK	120	1.8	H	28.5	3.0	26.8	51.19	74	22.81

802.11g Mode:

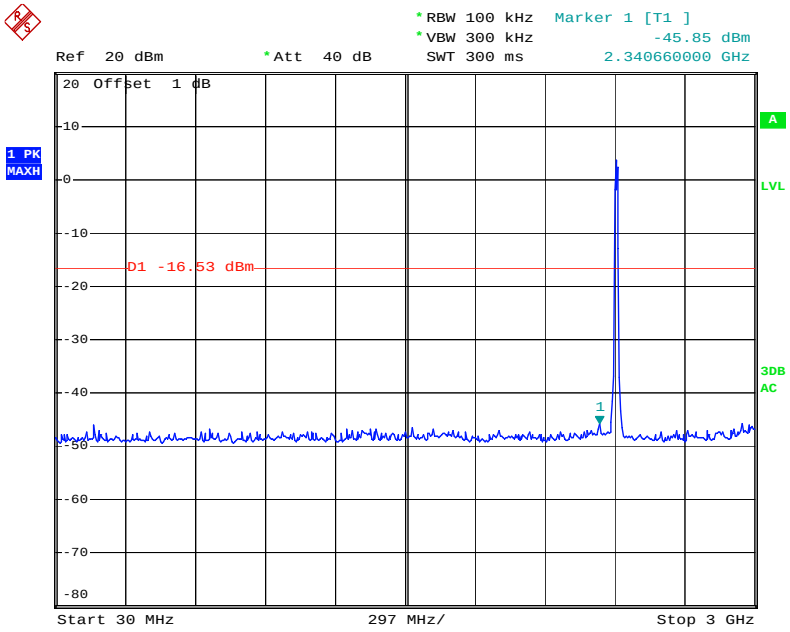
Indicated		Detector (PK/Ave.)	Table Angle Degree	Test Antenna		Correction Factor			FCC Part 15.247/15.209			
Frequency (MHz)	S.A. Reading (dBµV)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comment
Low Channel (2412 MHz)												
7236	31.11	PK	185	1.3	V	37	5.2	26.6	46.71	54	7.29	harmonic
7236	31.04	Ave.	167	1.8	H	36.5	5.2	26.6	46.14	54	7.86	harmonic
4824	33.57	PK	120	1.2	V	32.5	4.3	26.8	43.57	54	10.43	harmonic
4824	33.13	Ave.	230	1.6	H	32.3	4.3	26.8	42.93	54	11.07	harmonic
7236	43.65	PK	185	1.3	V	37	5.2	26.6	59.25	74	14.75	harmonic
7236	44.02	Ave.	167	1.8	H	36.5	5.2	26.6	59.12	74	14.88	harmonic
4824	45.49	PK	120	1.2	V	32.5	4.3	26.8	55.49	74	18.51	harmonic
4824	45.64	Ave.	230	1.6	H	32.3	4.3	26.8	55.44	74	18.56	harmonic
Middle Channel (2437 MHz)												
7311	31.10	PK	180	1.1	V	37	5.2	26.6	46.7	54	7.3	harmonic
7311	31.14	Ave.	345	1.5	H	36.5	5.2	26.6	46.24	54	7.76	harmonic
4874	32.10	PK	156	1.2	V	32.5	4.3	26.8	42.1	54	11.9	harmonic
4874	31.82	Ave.	12	1.6	H	32.3	4.3	26.8	41.62	54	12.38	harmonic
7311	44.21	PK	345	1.5	H	36.5	5.2	26.6	59.31	74	14.69	harmonic
7311	43.36	Ave.	180	1.1	V	37	5.2	26.6	58.96	74	15.04	harmonic
4874	45.29	PK	156	1.2	V	32.5	4.3	26.8	55.29	74	18.71	harmonic
4874	44.74	Ave.	12	1.6	H	32.3	4.3	26.8	54.54	74	19.46	harmonic
High Channel (2462 MHz)												
7386	31.18	PK	105	1.2	V	37	5.2	26.6	46.78	54	7.22	harmonic
7386	31.12	Ave.	110	2.0	H	36.5	5.2	26.6	46.22	54	7.78	harmonic
4924	32.00	PK	360	1.2	V	32.5	4.3	26.8	42	54	12	harmonic
4924	31.42	Ave.	120	1.7	H	32.3	4.3	26.8	41.22	54	12.78	harmonic
7386	44.30	PK	105	1.2	V	37	5.2	26.6	59.9	74	14.1	harmonic
7386	44.65	Ave.	110	2.0	H	36.5	5.2	26.6	59.75	74	14.25	harmonic
4924	46.27	PK	360	1.2	V	32.5	4.3	26.8	56.27	74	17.73	harmonic
4924	46.11	Ave.	120	1.7	H	32.3	4.3	26.8	55.91	74	18.09	harmonic

Radiated spurious emissions in the restricted bands

Freq. (MHz)	S.A. Reading (dBµV)	Detector (PK /Ave.)	Direction Degree	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	FCC Part 15.247/205/209	
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)
2389.130	33.32	PK	245	1.8	H	28.5	3.0	26.8	38.02	54	15.98
2484.600	32.35	Ave.	168	1.2	V	29.0	3.0	26.8	37.55	54	16.45
2389.130	32.28	PK	15	1.3	V	29.0	3.0	26.8	37.48	54	16.52
2484.600	32.22	Ave.	76	1.6	H	28.5	3.0	26.8	36.92	54	17.08
2389.130	47.78	PK	15	1.3	V	29.0	3.0	26.8	52.98	74	21.02
2389.130	47.86	Ave.	245	1.8	H	28.5	3.0	26.8	52.56	74	21.44
2484.600	47.15	PK	168	1.2	V	29.0	3.0	26.8	52.35	74	21.65
2484.600	46.75	Ave.	76	1.6	H	28.5	3.0	26.8	51.45	74	22.55

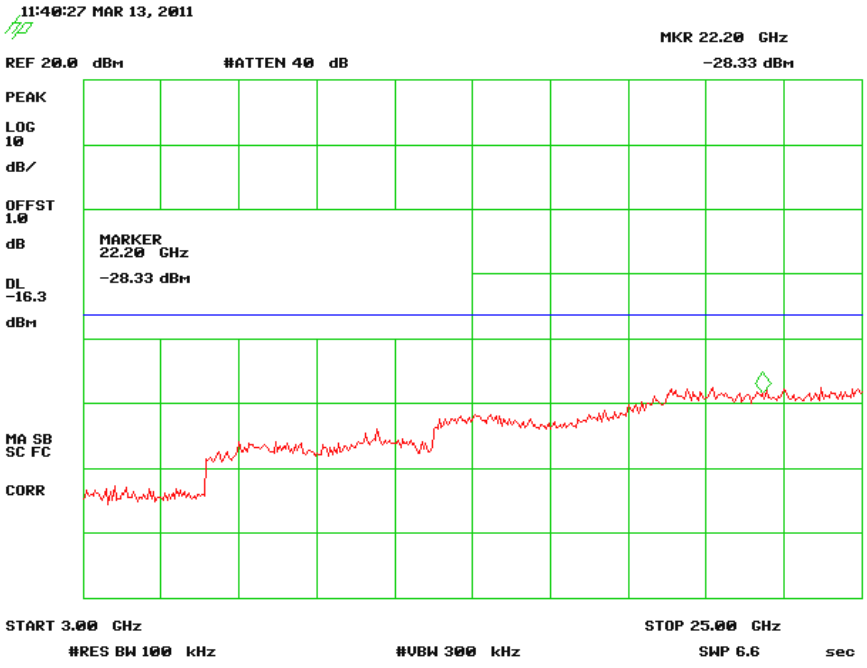
Antenna Port Conducted Spurious Emissions:

802.11b Low Channel (30 MHz-3 GHz)

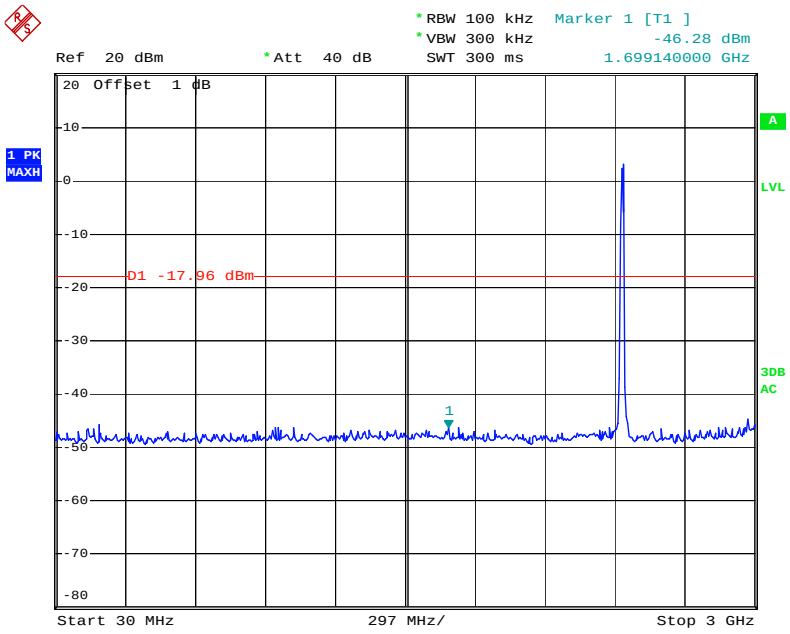


Date: 9.MAR.2011 16:53:34

802.11b Low Channel (3 GHz-25 GHz)

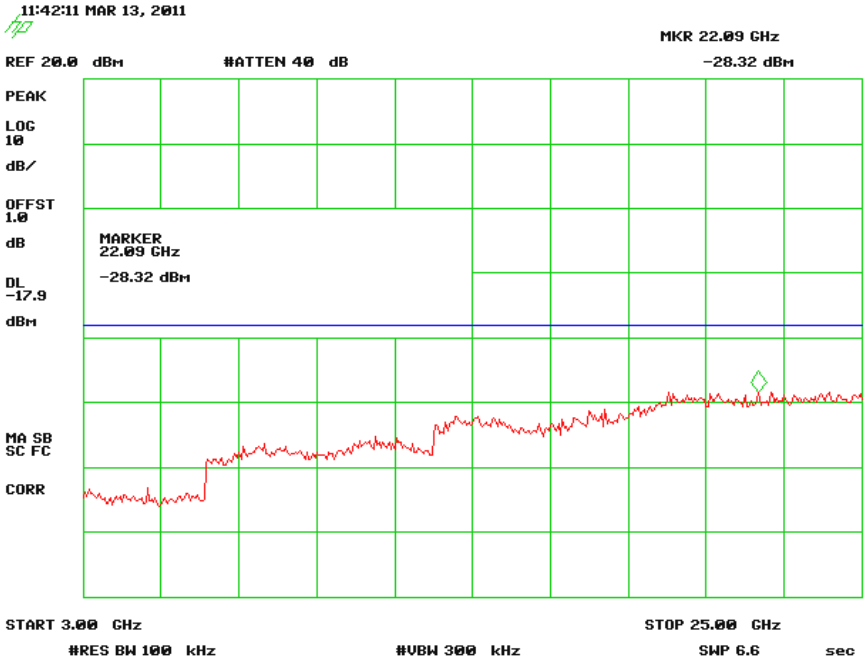


802.11b Middle Channel (30 MHz-3 GHz)

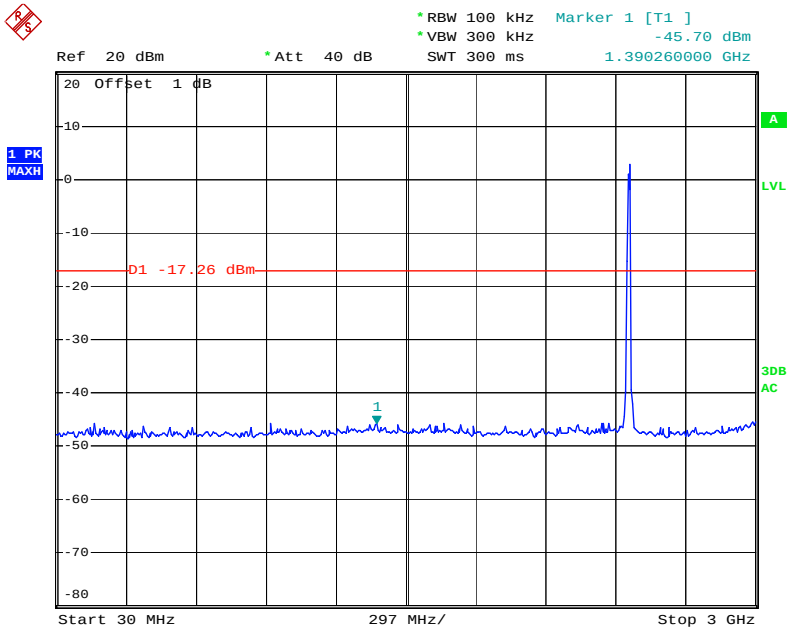


Date: 9.MAR.2011 16:52:36

802.11b Middle Channel (3 GHz-25 GHz)

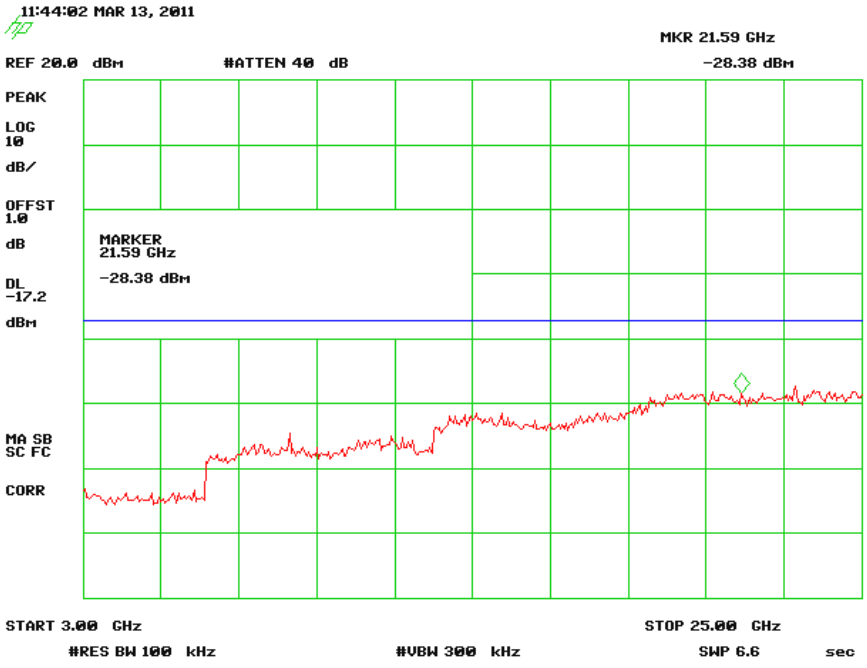


802.11b High Channel (30 MHz-3 GHz)

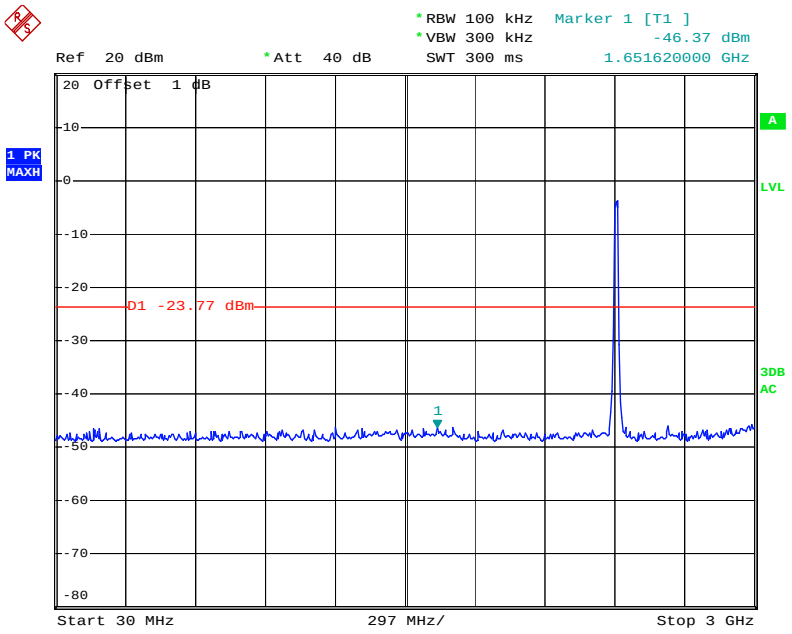


Date: 9.MAR.2011 16:51:16

802.11b High Channel (3 GHz-25 GHz)

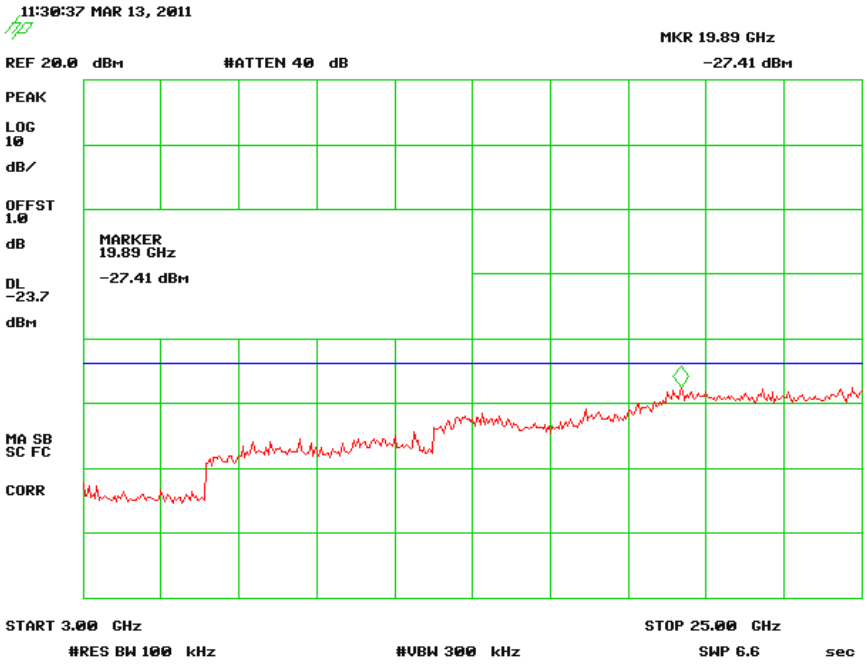


802.11g Low Channel (30 MHz-3 GHz)

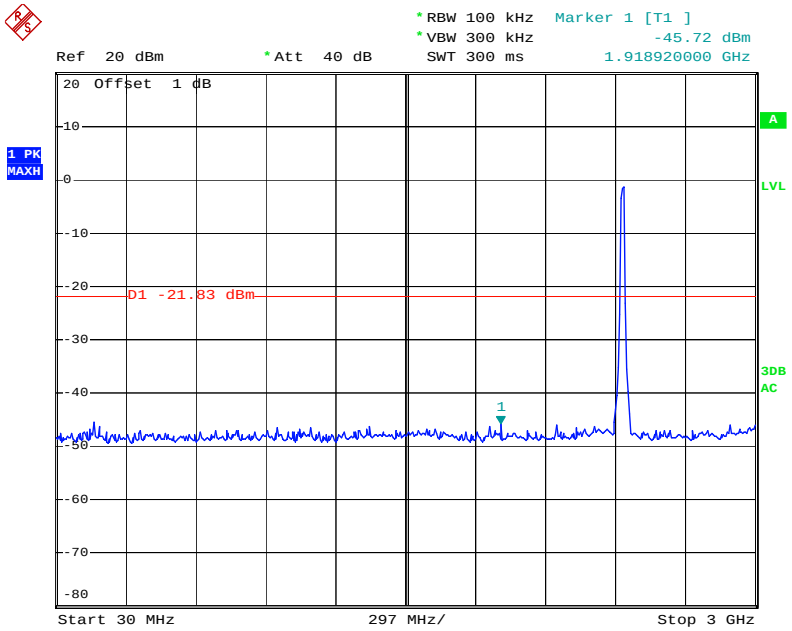


Date: 9.MAR.2011 16:56:39

802.11g Low Channel (3 GHz-25 GHz)

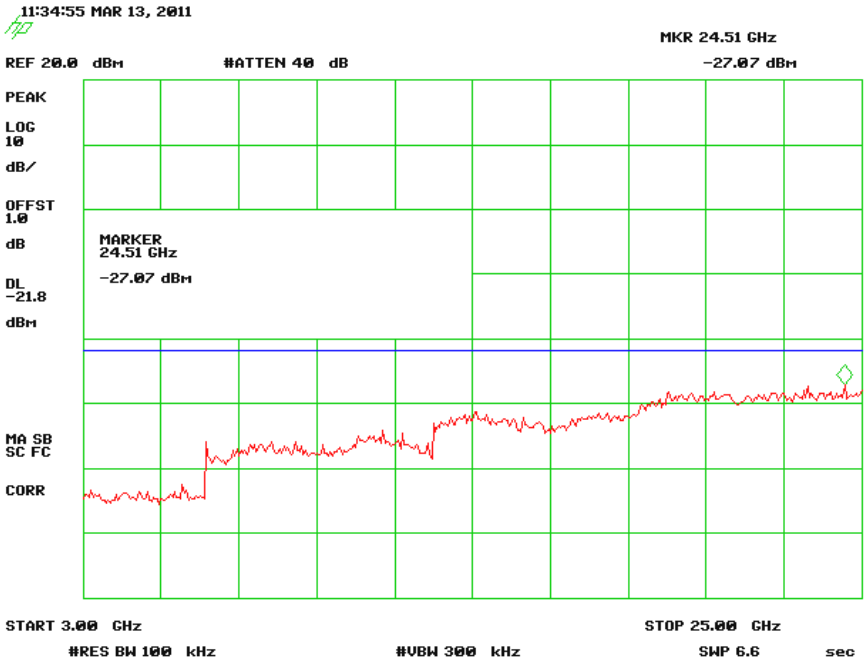


802.11g Middle Channel (30 MHz-3 GHz)

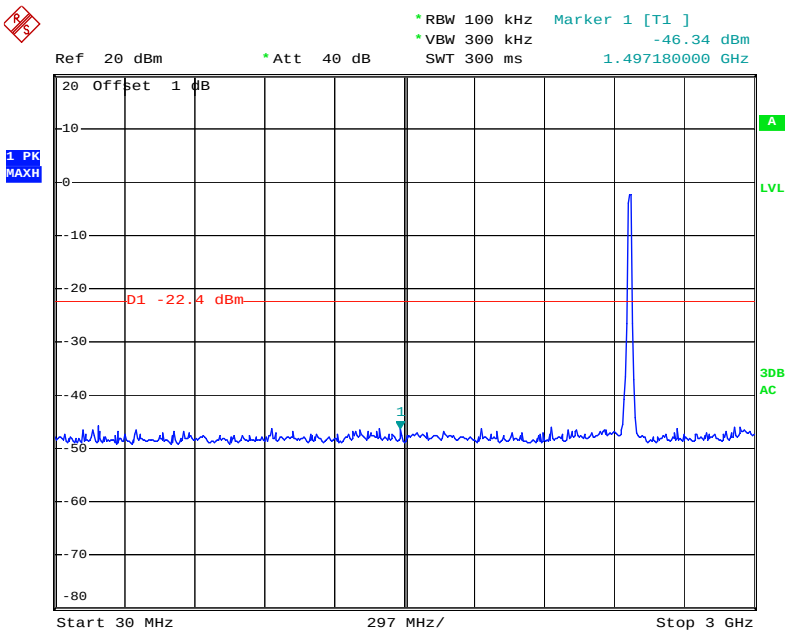


Date: 9.MAR.2011 16:58:02

802.11g Middle Channel (3 GHz-25 GHz)

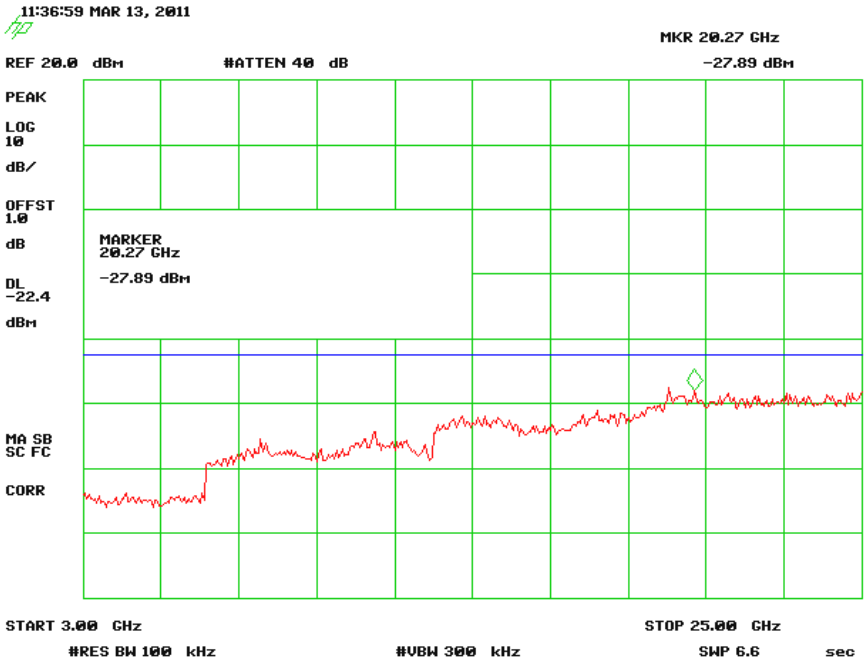


802.11g High Channel (30 MHz-3 GHz)



Date: 9.MAR.2011 16:59:50

802.11g High Channel (3 GHz-25 GHz)



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.

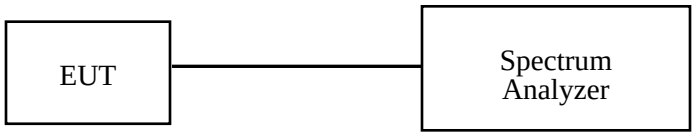
Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2010-11-11	2011-11-10

*** 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

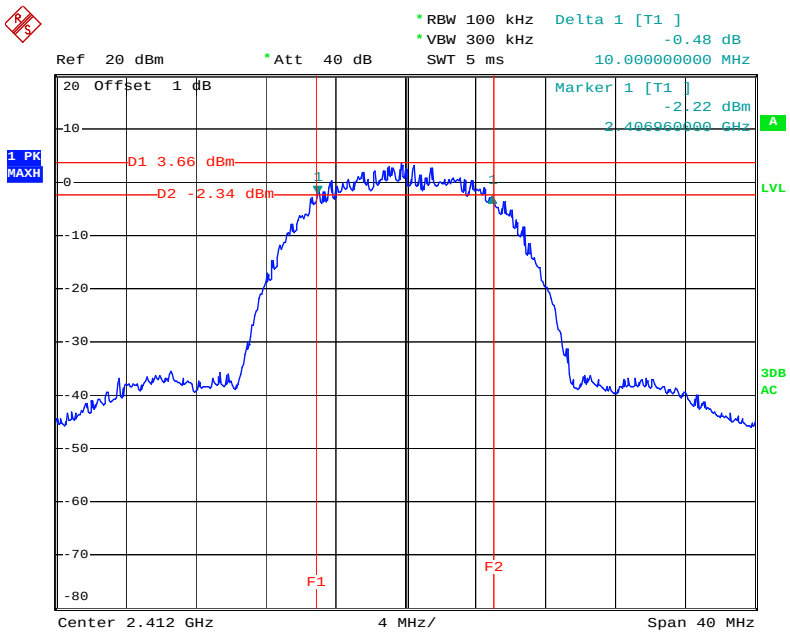
The testing was performed by Wayne Cheng on 2011-03-09.

Test Result: Pass.

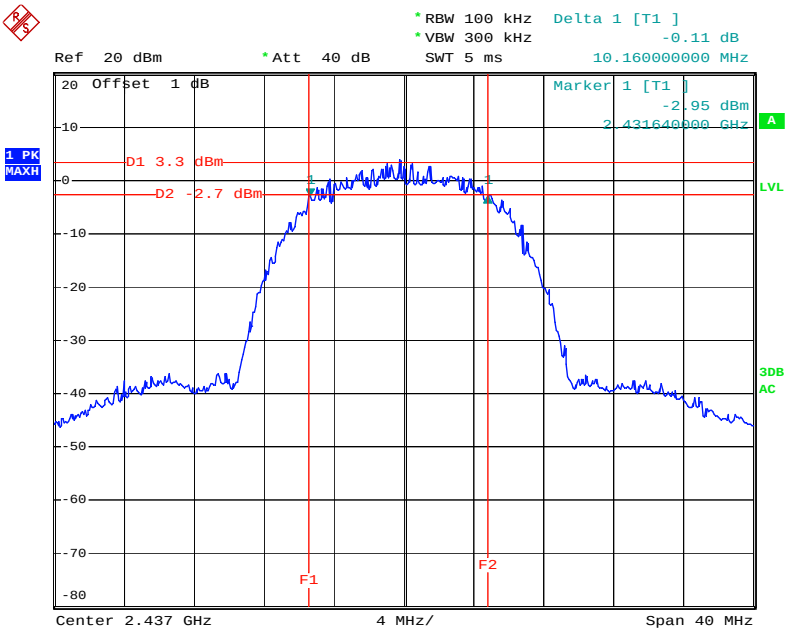
Please refer to the following tables and plots.

Channel	Frequency (MHz)	Data Rate (Mbps)	6 dB Emission Bandwidth (MHz)	Part 15.247 Limit (kHz)
802.11b mode				
Low	2412	1	10.00	> 500
Middle	2437	1	10.16	> 500
High	2462	1	9.60	> 500
802.11g mode				
Low	2412	6	16.64	> 500
Middle	2437	6	16.64	> 500
High	2462	6	16.64	> 500

802.11b Low Channel

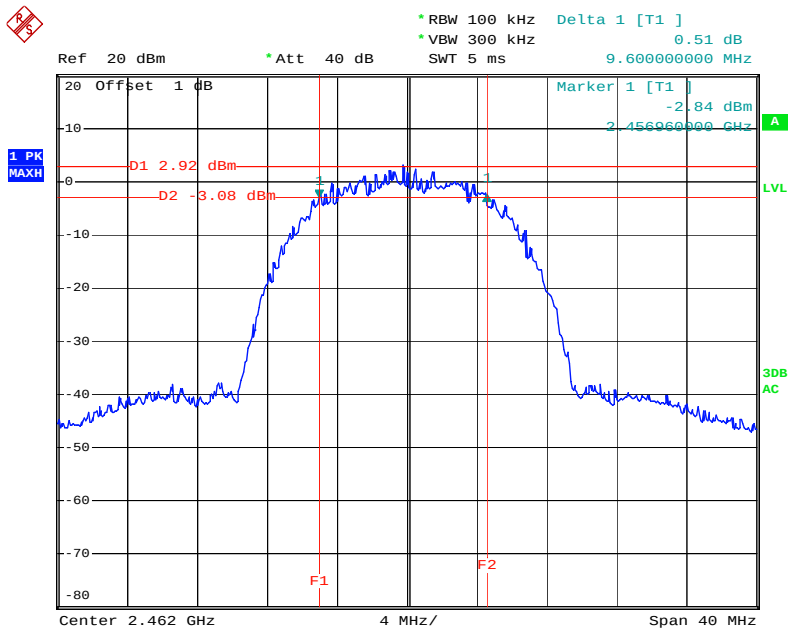


802.11b Middle Channel



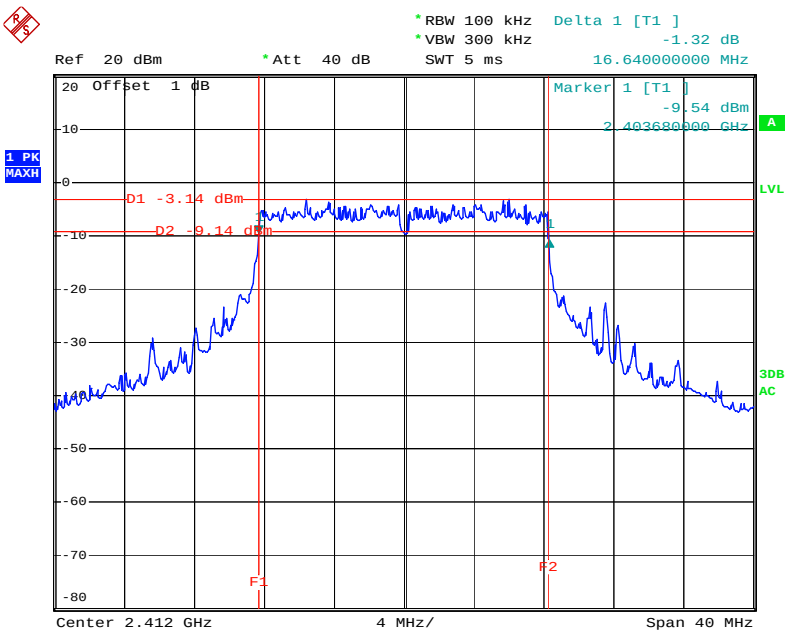
Date: 9.MAR.2011 15:14:28

802.11b High Channel



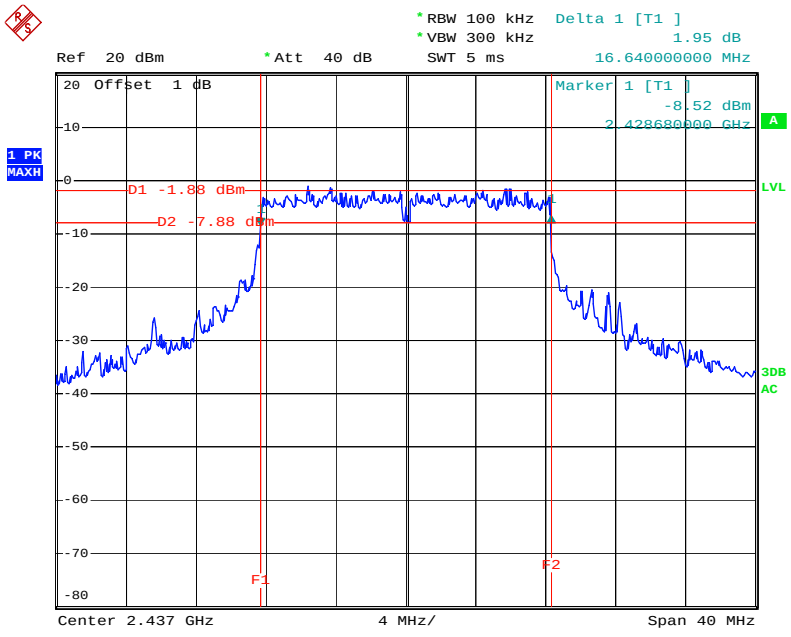
Date: 9.MAR.2011 16:27:32

802.11g Low Channel



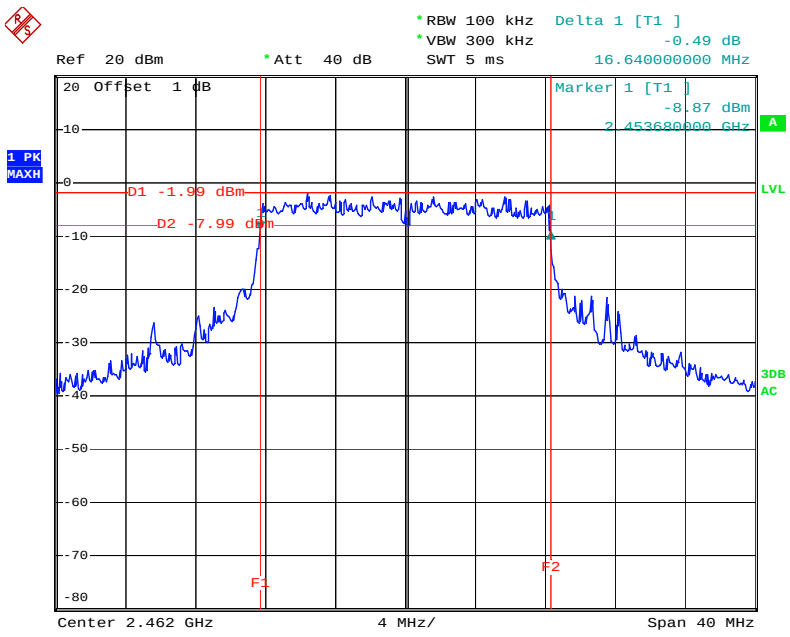
Date: 9.MAR.2011 15:50:30

802.11g Middle Channel



Date: 9.MAR.2011 15:59:28

802.11g High Channel



Date: 9.MAR.2011 16:09:31

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.

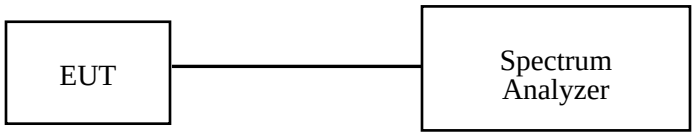
Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2010-11-11	2011-11-10

*** 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

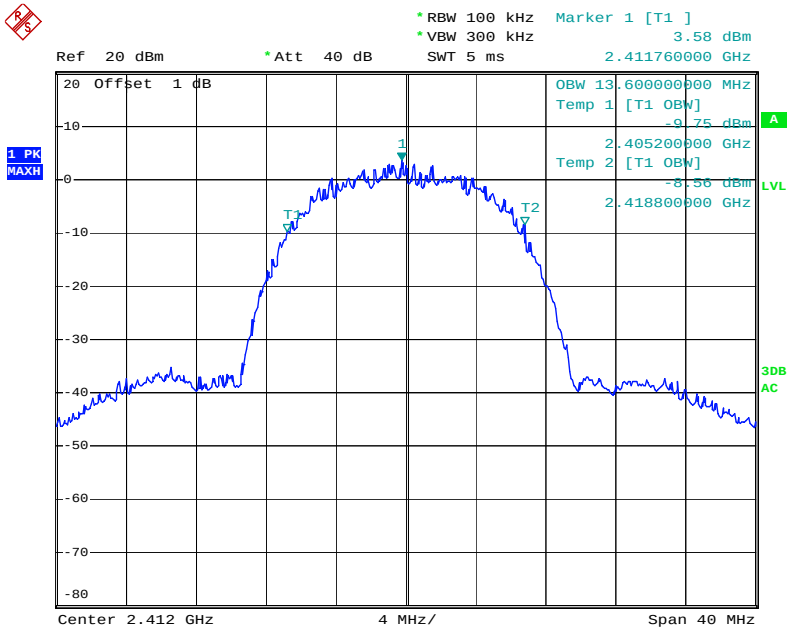
Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Wayne Cheng on 2011-03-09.

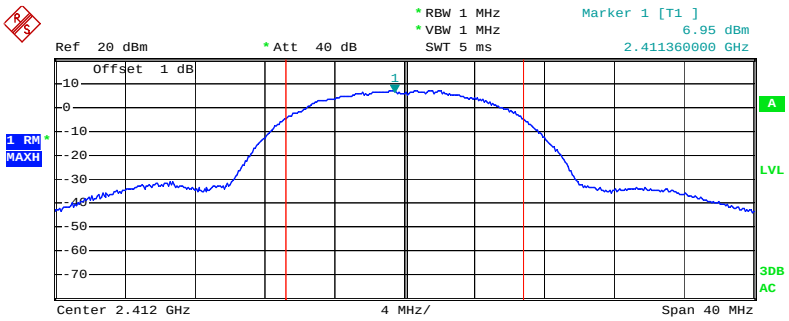
Test Mode: Transmitting

Channel	Frequency (MHz)	Data Rate (Mbps)	Conducted Output Power (dBm)	Limit (dBm)
802.11b mode				
Low	2412	1	14.87	30
Middle	2437	1	14.40	30
High	2462	1	14.25	30
802.11g mode				
Low	2412	6	11.42	30
Middle	2437	6	13.35	30
High	2462	6	12.43	30

802.11b 99% Occupied Bandwidth, Low Channel

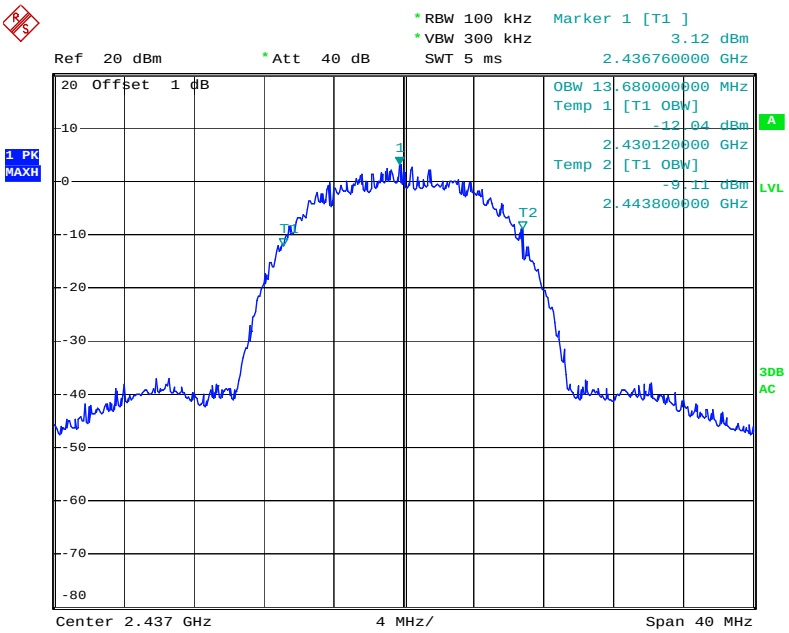


802.11b RF Output Power, Low Channel



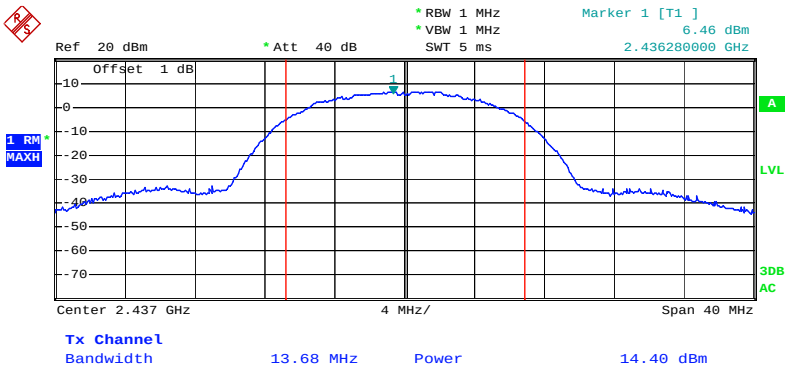
Date: 9.MAR.2011 16:20:36

802.11b 99% Occupied Bandwidth, Middle Channel



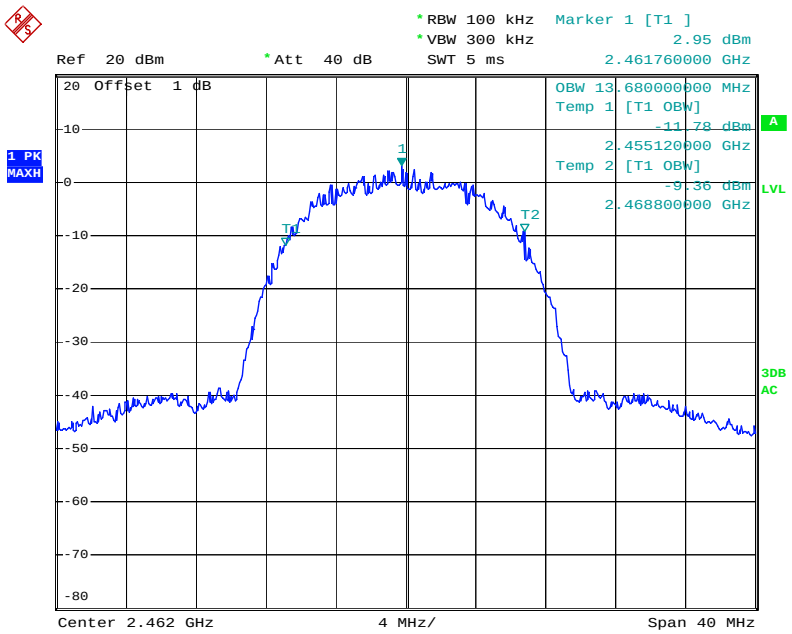
Date: 9.MAR.2011 16:24:23

802.11b RF Output Power, Middle Channel



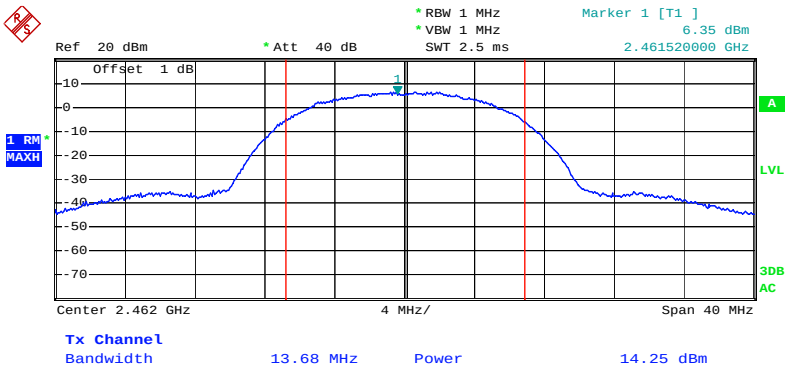
Date: 9.MAR.2011 16:25:43

802.11b 99% Occupied Bandwidth, High Channel



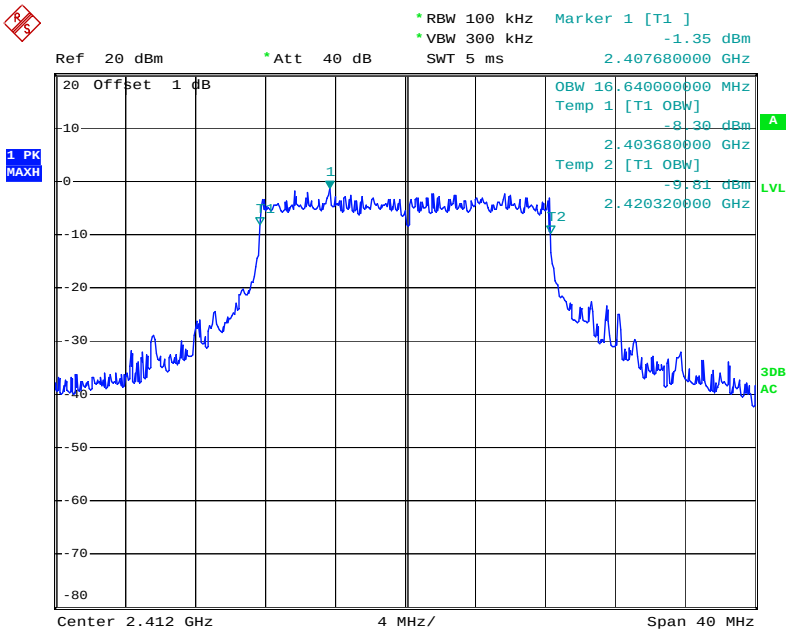
Date: 9.MAR.2011 16:28:08

802.11b RF Output Power, High Channel



Date: 9.MAR.2011 16:28:53

802.11g 99% Occupied Bandwidth, Low Channel



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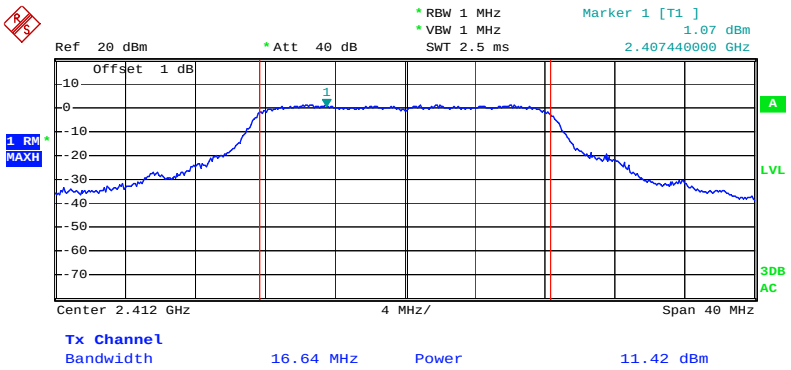
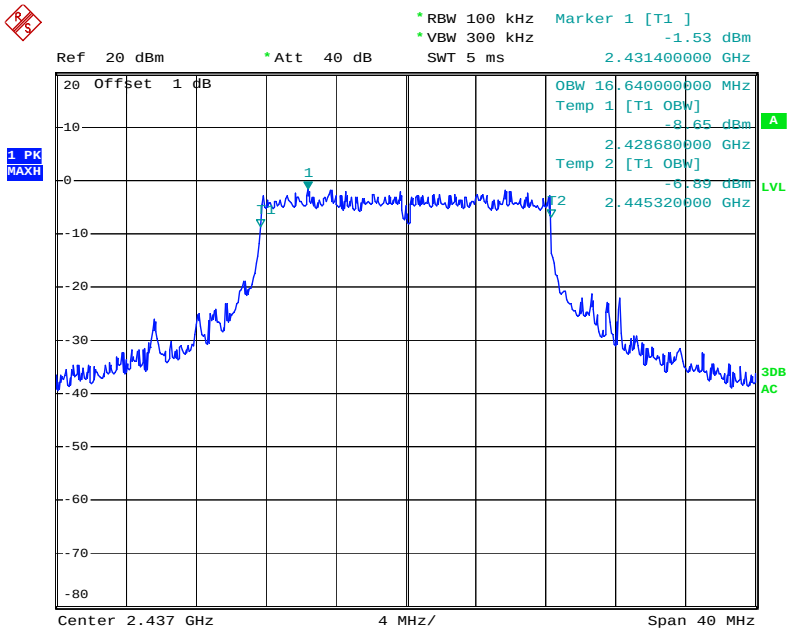
802.11g RF Output Power, Low Channel



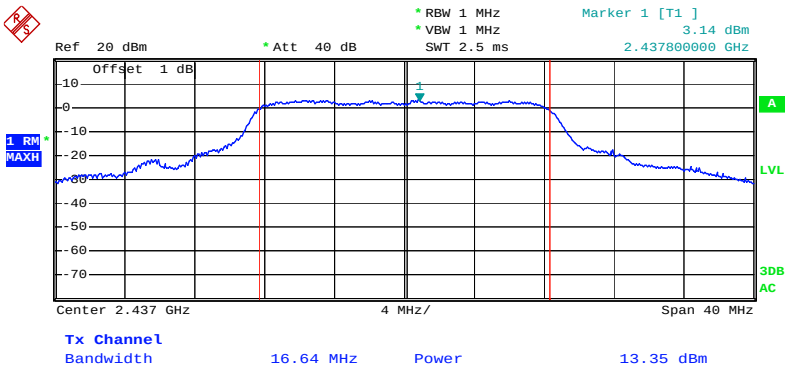
Date: 9.MAR.2011 15:47:50

802.11g 99% Occupied Bandwidth, Middle Channel



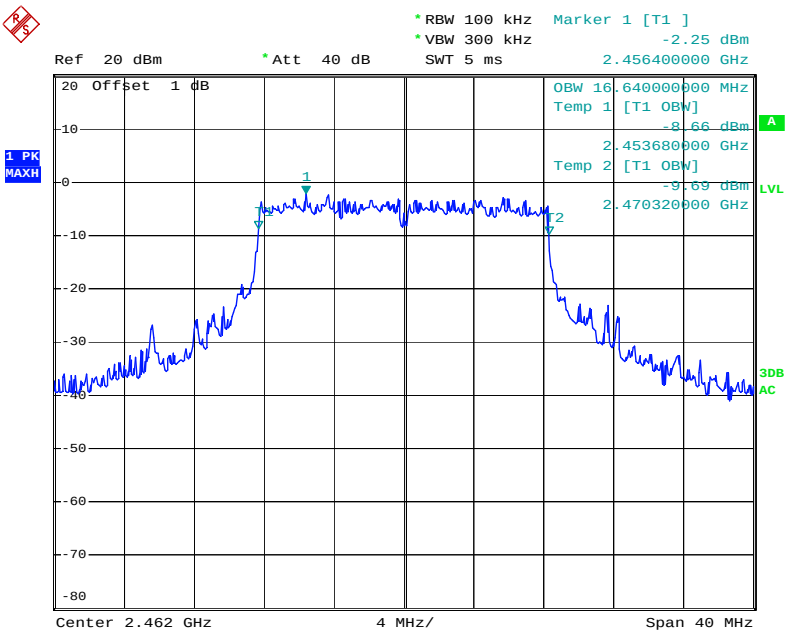
Date: 9.MAR.2011 16:34:03

802.11g RF Output Power, Middle Channel



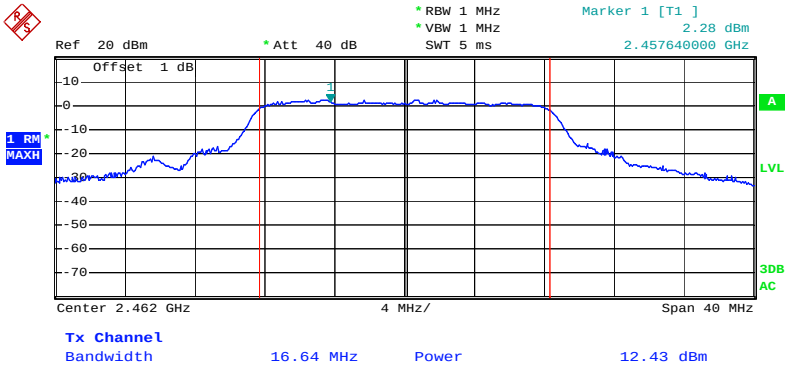
Date: 9.MAR.2011 16:01:23

802.11g 99% Occupied Bandwidth, High Channel



Date: 9.MAR.2011 16:31:58

802.11g RF Output Power, High Channel



Date: 9.MAR.2011 16:10:37

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	2010-11-11	2011-11-10

*** 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:	100.0 kPa

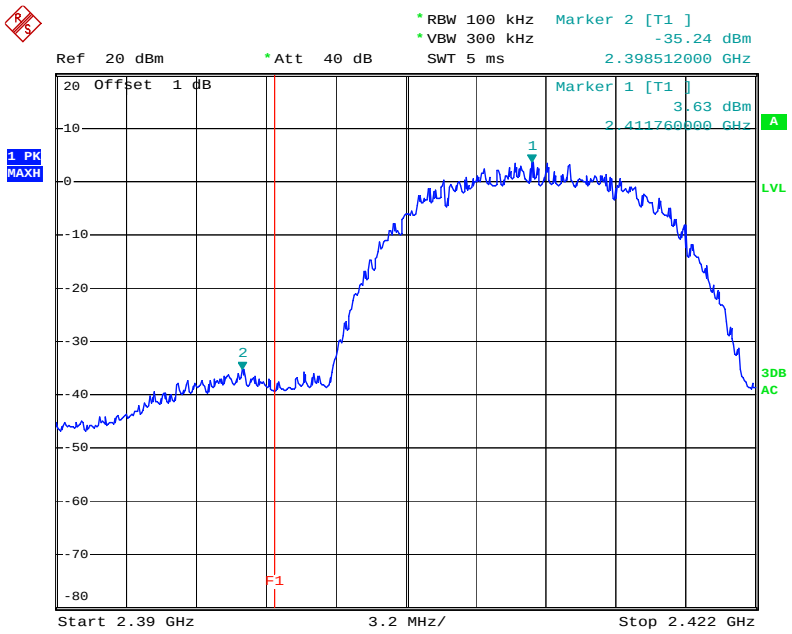
The testing was performed by Wayne Cheng on 2011-03-09.

Test Result: Compliance

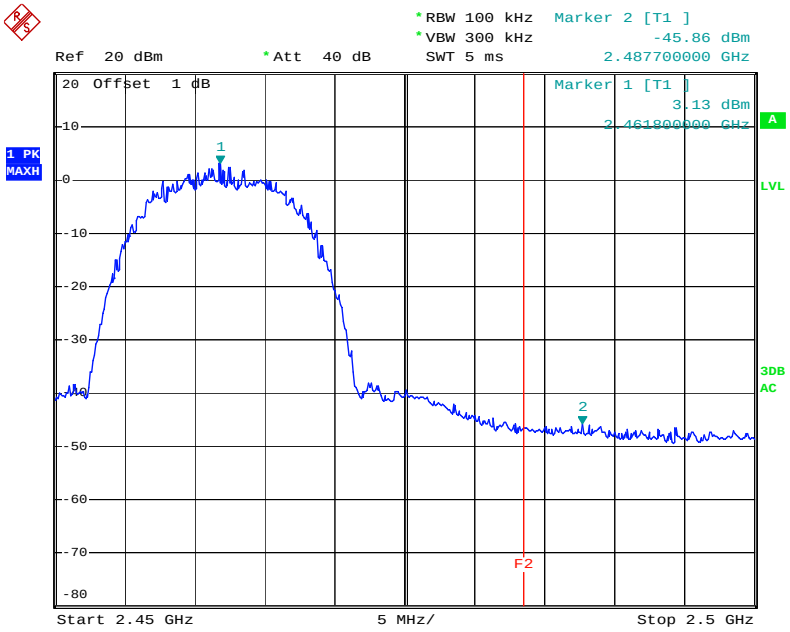
Frequency (MHz)	Delta Value (dBc)	Limit (dBc)	Result
802.11b mode			
2398.512	38.87	20	Pass
2487.700	48.99	20	Pass
802.11g mode			
2397.616	25.49	20	Pass
2483.700	38.18	20	Pass

Please refer to following plots.

802.11b: Band Edge, Left Side



802.11b: Band Edge, Right Side



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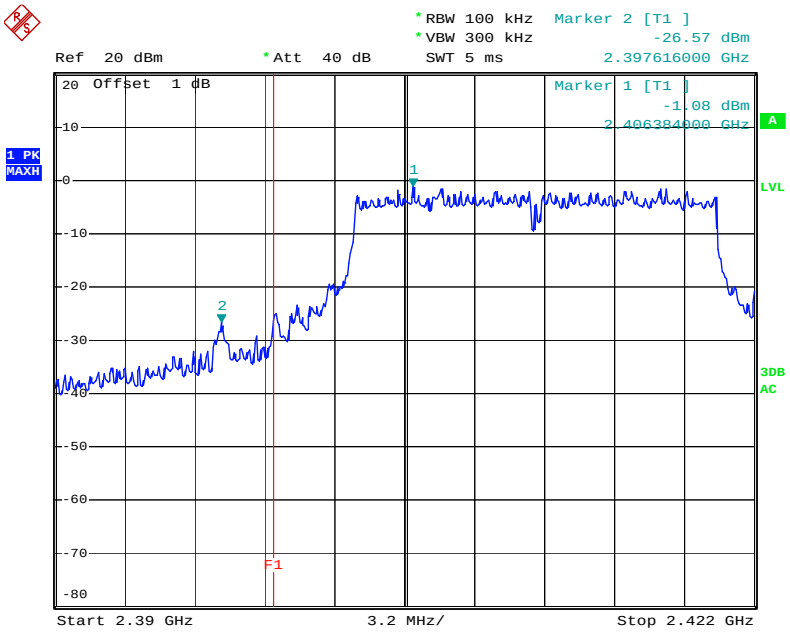
802.11g: Band Edge, Left Side



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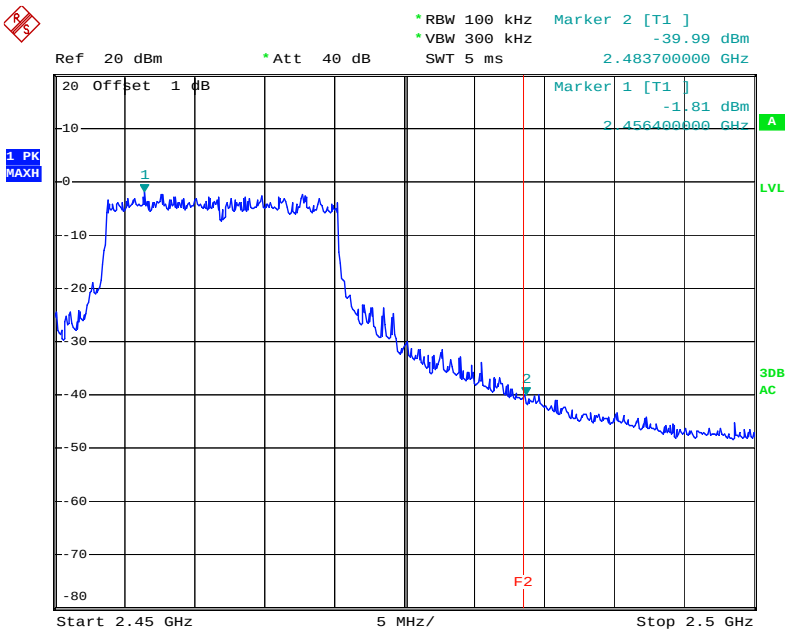
802.11g: Band Edge, Right Side



Date: 9.MAR.2011 16:40:42

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	2010-11-11	2011-11-10

*** 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:	100.0 kPa

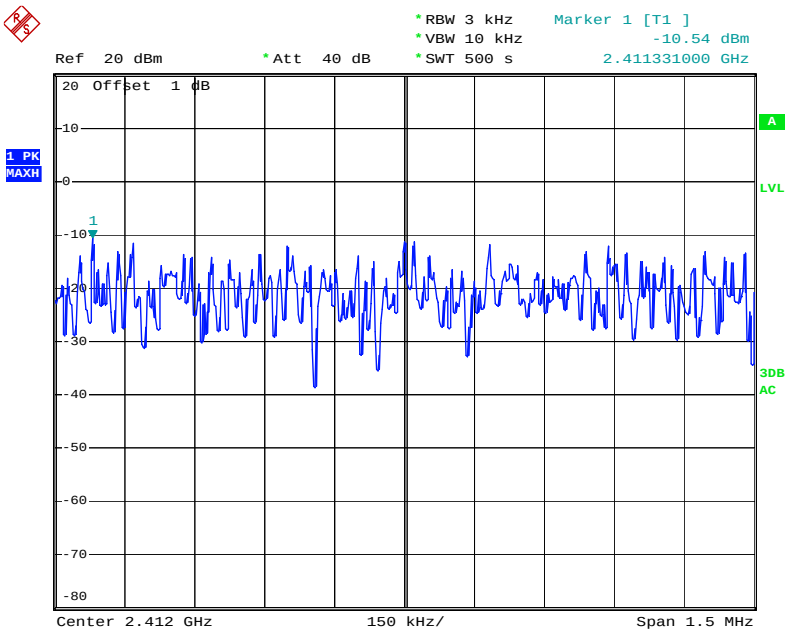
The testing was performed by Wayne Cheng on 2011-03-10.

Test Mode: Transmitting

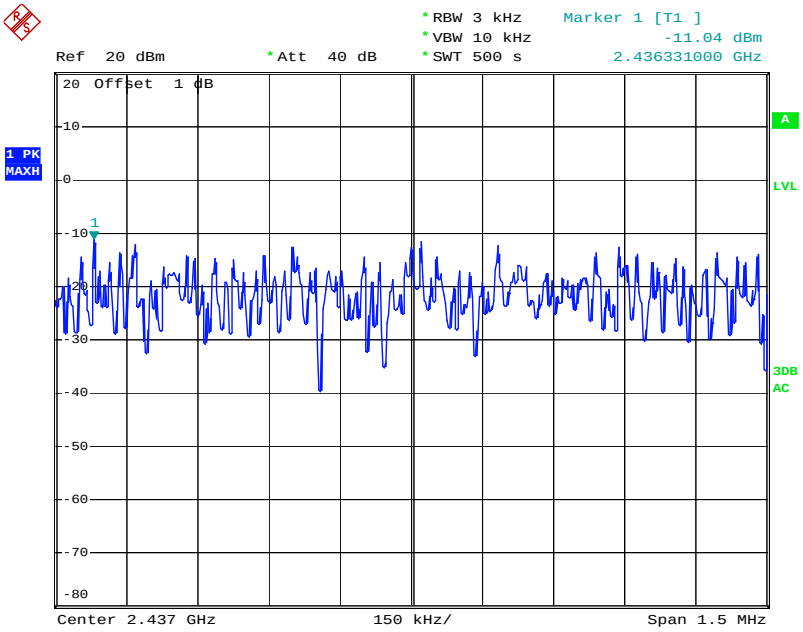
Test Result: Pass

Channel	Frequency (MHz)	Data Rate (Mbps)	Power Spectral Density (dBm)	Part 15.247 Limit (dBm)	Result
802.11b mode					
Low	2412	1	-10.54	8	Pass
Middle	2437	1	-11.04	8	Pass
High	2462	1	-11.50	8	Pass
802.11g mode					
Low	2412	6	-7.94	8	Pass
Middle	2437	6	-8.62	8	Pass
High	2462	6	-10.25	8	Pass

Power Spectral Density, 802.11b Low Channel



Power Spectral Density, 802.11b Middle Channel



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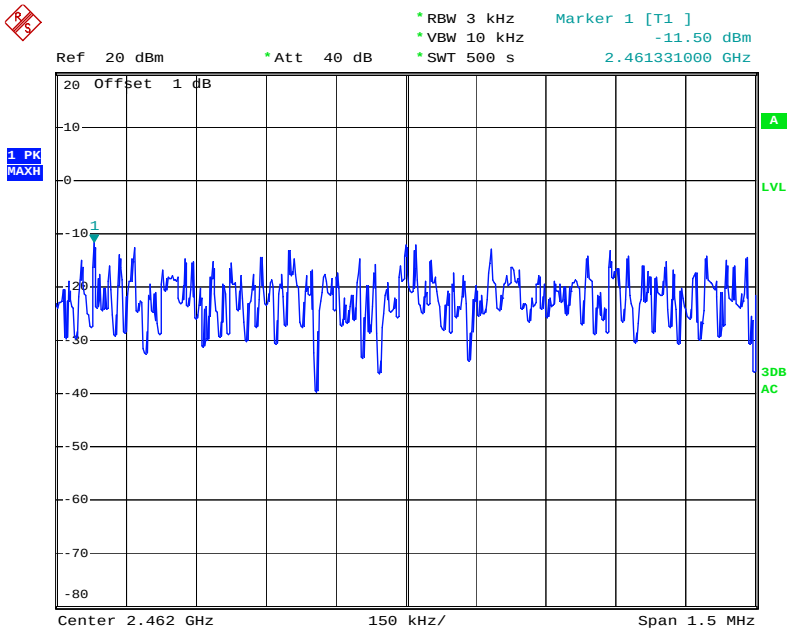
Power Spectral Density, 802.11b High Channel



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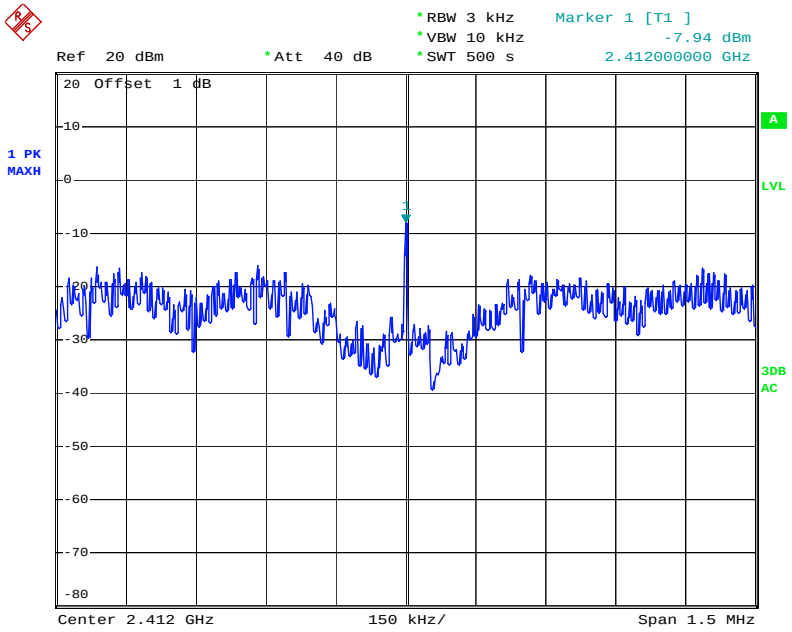
Power Spectral Density, 802.11g Low Channel



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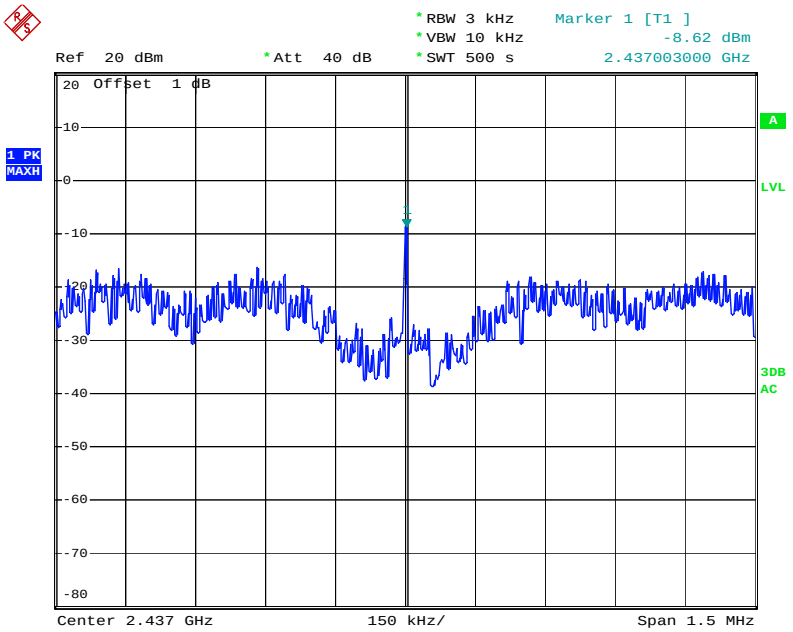
Power Spectral Density, 802.11g Middle Channel



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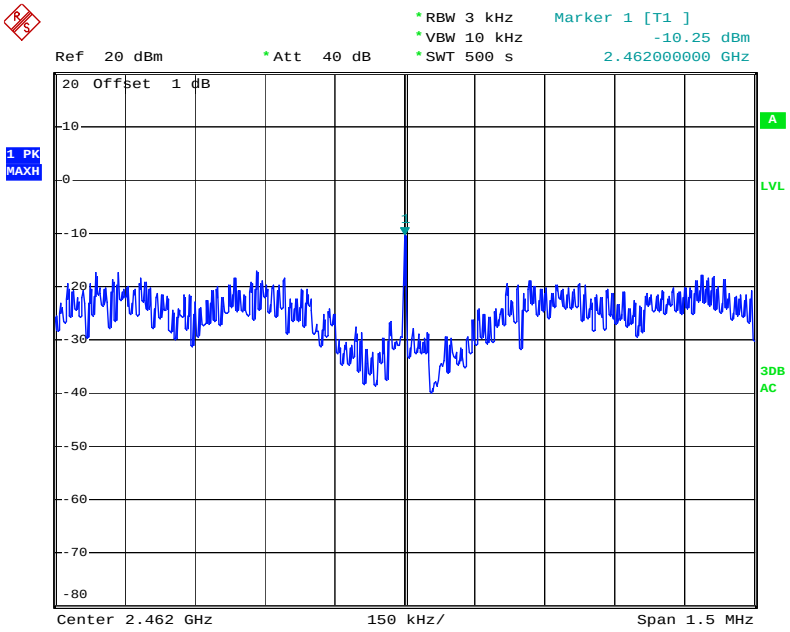
Power Spectral Density, 802.11g High Channel



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******* END OF REPORT *******