NVLAP LAB CODE 200707-0

FCC PART 15.247

MEASUREMENT AND TEST REPORT

For

Victory Concept Electronics Ltd.

4/F., CAC Tower, 165 Hoi Bun Road, Kwun Tong, Kowloon, Hong Kong

FCC ID: YMT-FR011VC101

Report Type:	**Product Type:**
Original Report	2.4GHz Digital Stereo Wireless Indoor/Outdoor Speaker System

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Report Number:	RSZ10060708-15.247 (TX)
Report Date:	2010-07-19
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TABLE OF CONTENTS

GENERAL INFORMATION **4**
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) 4
OBJECTIVE 4
RELATED SUBMITTAL(S)/GRANT(S) 4
TEST METHODOLOGY 4
TEST FACILITY 4
SYSTEM TEST CONFIGURATION **6**
DESCRIPTION OF TEST CONFIGURATION 6
EUT EXERCISE SOFTWARE 6
EQUIPMENT MODIFICATIONS 6
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS 6
EXTERNAL I/O CABLE 6
CONFIGURATION OF TEST SETUP 6
BLOCK DIAGRAM OF TEST SETUP 7
SUMMARY OF TEST RESULTS **9**
FCC §15.247 (i), §1.1307 (b)(1) & §2.1091 - RF EXPOSURE **10**
STANDARD APPLICABLE 10
TEST DATA 10
FCC §15.203 - ANTENNA REQUIREMENT **11**
APPLICABLE STANDARD 11
ANTENNA CONNECTOR CONSTRUCTION 11
FCC §15.207(a) - CONDUCTED EMISSIONS **12**
APPLICABLE STANDARD 12
MEASUREMENT UNCERTAINTY 12
EUT SETUP 12
EMI TEST RECEIVER SETUP 13
TEST EQUIPMENT LIST AND DETAILS 13
TEST PROCEDURE 13
TEST RESULTS SUMMARY 13
TEST DATA 13
FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS **18**
APPLICABLE STANDARD 18
MEASUREMENT UNCERTAINTY 18
EUT SETUP 18
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP 19
TEST EQUIPMENT LIST AND DETAILS 19
TEST PROCEDURE 19
CORRECTED AMPLITUDE & MARGIN CALCULATION 19
TEST RESULTS SUMMARY 20
TEST DATA 20
FCC §15.247(a)(1) - CHANNEL SEPARATION TEST **25**
APPLICABLE STANDARD 25
TEST EQUIPMENT LIST AND DETAILS 25
TEST PROCEDURE 25

TEST DATA 25
FCC §15.247(a)(1) – 20 dB BANDWIDTH TESTING 35
APPLICABLE STANDARD 35
TEST EQUIPMENT LIST AND DETAILS 35
TEST PROCEDURE 35
TEST DATA 35
FCC §15.247(a)(1)(iii) - QUANTITY OF HOPPING CHANNEL TEST 38
APPLICABLE STANDARD 38
TEST EQUIPMENT LIST AND DETAILS 38
TEST PROCEDURE 38
TEST DATA 38
FCC §15.247(a)(1)(iii) -TIME OF OCCUPANCY (DWELL TIME) 42
APPLICABLE STANDARD 42
TEST EQUIPMENT LIST AND DETAILS 42
TEST PROCEDURE 42
TEST DATA 42
FCC §15.247(b)(1) - PEAK OUTPUT POWER MEASUREMENT 45
APPLICABLE STANDARD 45
TEST EQUIPMENT LIST AND DETAILS 45
TEST PROCEDURE 45
TEST DATA 45
FCC §15.247(d) - BAND EDGES TESTING 48
APPLICABLE STANDARD 48
TEST EQUIPMENT LIST AND DETAILS 48
TEST PROCEDURE 48
TEST DATA 49

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Victory Concept Electronics Ltd.*'s product, model number: *FR011VC101 (FCC ID: YMT-FR011VC101)* or the "EUT" as referred to in this report is a *2.4GHz Digital Stereo wireless indoor/outdoor speaker system,* which measures approximately: 9.3 cm L x 9.3 cm W x 3.5 cm H for the transmitter part and 13.0 cm L x 13.0 cm W x 25.3 cm H for the sound box, rated input voltage: DC 9.0V adapter.

Note:** The series products, model *FR*****, "*"could be"0-9","A-Z","-" or blank, we select *FR011VC101* to test, there is no electrical change has been made to the equipment, which was explained in the attached Declaration Letter.

Adapter Information:
MODEL: KSAB0500100W1US
INPUT: 100-240V AC 50/60Hz 0.18A
OUTPUT: 5.0V 1.0A

** All measurement and test data in this report was gathered from production sample serial number: 1006016 (Assigned by BACL, Shenzhen). The EUT was received on 2010-06-07.*

Objective

This Type approval report is prepared on behalf of *Victory Concept Electronics Ltd. 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

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

EUT Exercise Software

N/A.

Equipment Modifications

No modification was made to the unit tested.

Local Support Equipment List and Details

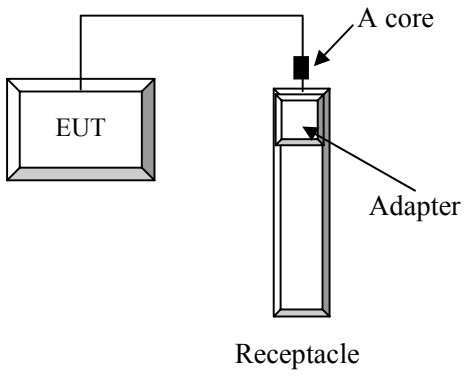
Manufacturer	Description	Model	Serial Number	FCC ID
Compaq	PC	EVON610C	N/A	N/A

External I/O Cable

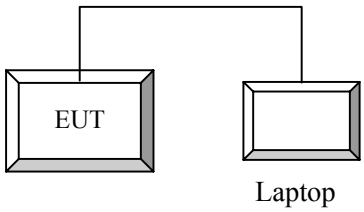
Cable Description	Length (m)	From Port	To
Unshielded Detachable Power Cabel with a Core	1.8	Adapter	EUT

Configuration of Test Setup

Operating with adapter supply:

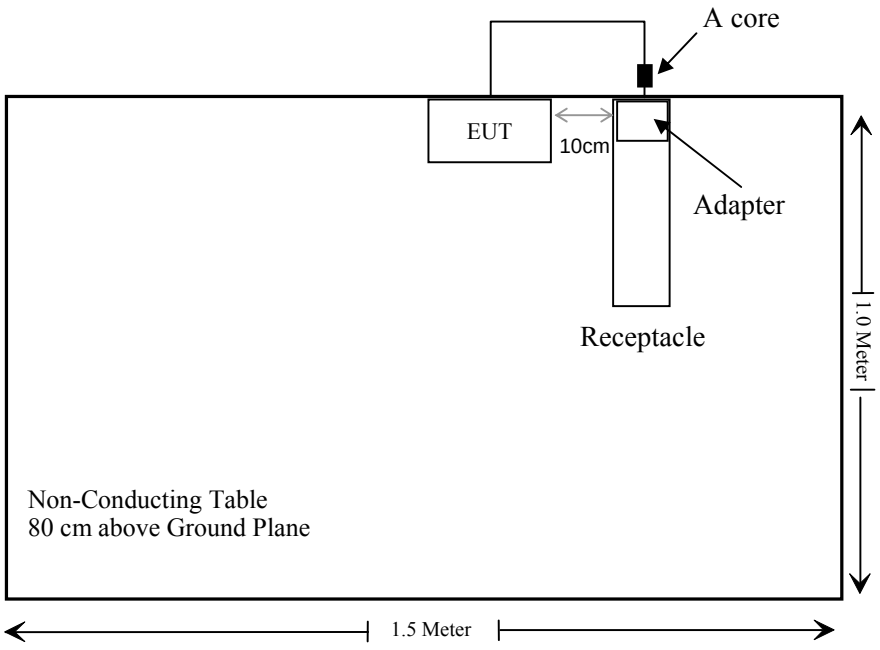


Operating with USB:

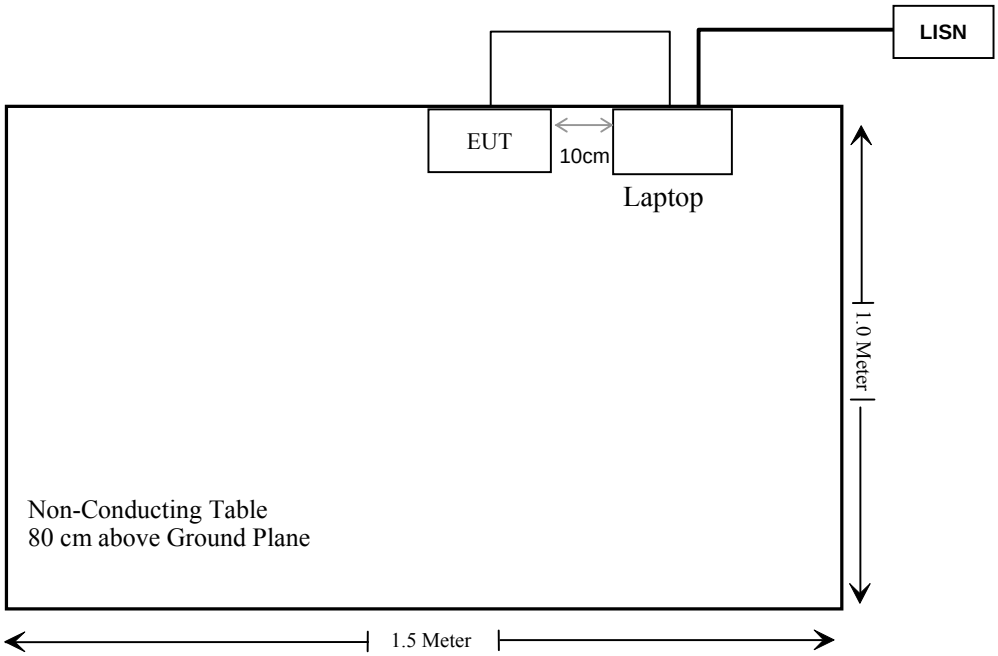


Block Diagram of Test Setup

Operating with adapter supply:



Operating with USB supply:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §2.1093	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	Conducted Emissions	Compliant
§15.205, §15.209, §15.247(d)	Radiated Emissions	Compliant*
§15.247 (a)(1)	20 dB Bandwidth	Compliant
§15.247(a)(1)	Channel Separation Test	Compliant
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliant
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliant
§15.247(b)(1)	Peak Output Power Measurement	Compliant
§15.247(d)	Band Edges	Compliant

*Within measurement uncertainty.

FCC §15.247 (i), §1.1307 (b)(1) & §2.1091 - RF EXPOSURE

Standard Applicable

According to §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.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

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

Test Data

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

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

Maximum peak output power at antenna input terminal: 13.45 (dBm)
Maximum peak output power at antenna input terminal: 22.13 (mW)
Prediction distance: >20 (cm)
Predication frequency: 2406 (MHz)
Antenna Gain (typical): 0 (dBi)
Antenna Gain (typical): 1 numeric
The worst case is power density at predication frequency at 20 cm: 0.0044 (mW/cm^2)
MPE limit for general population exposure at prediction frequency: 1 (mW/cm^2)

Result: Pass

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

Antenna Connector Construction

The EUT has an integrated antenna connect to RF board, which in accordance to section 15.203, the maximum gain is 0.0 dBi; please refer to the internal photos.

Result: Compliant.

FCC §15.207(a) - CONDUCTED EMISSIONS

Applicable Standard

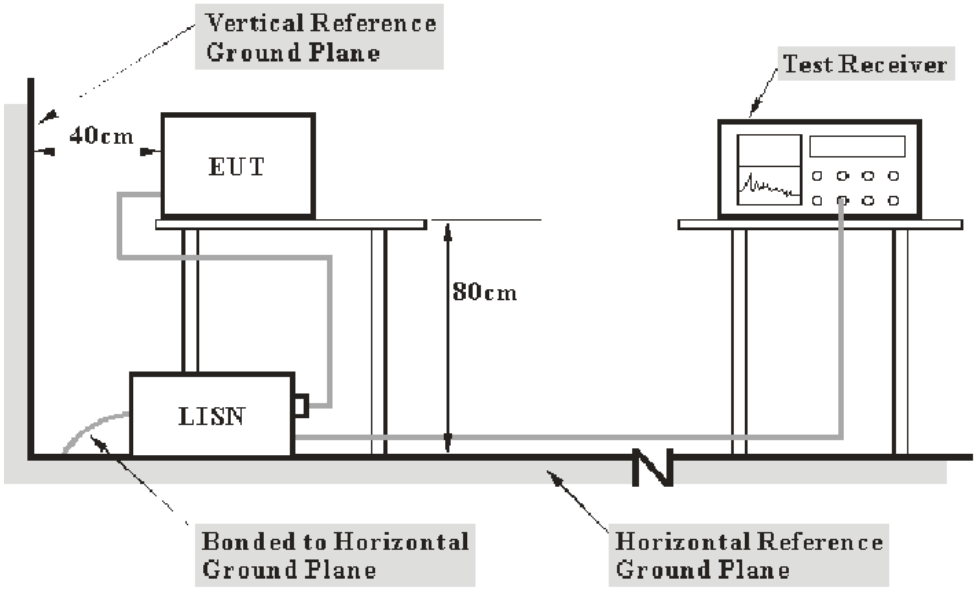
FCC §15.207

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 or PC 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:

For operating (with AC/DC adapter) mode:

14.20 dB at 4.340 MHz in the Line conductor mode
12.41 dB at 0.480 MHz in the Neutral conductor mode

For operating (via USB Port) mode:

11.32 dB at 1.600 MHz in the Line conductor mode
12.02 dB at 1.600 MHz in the Neutral conductor mode

Test Data

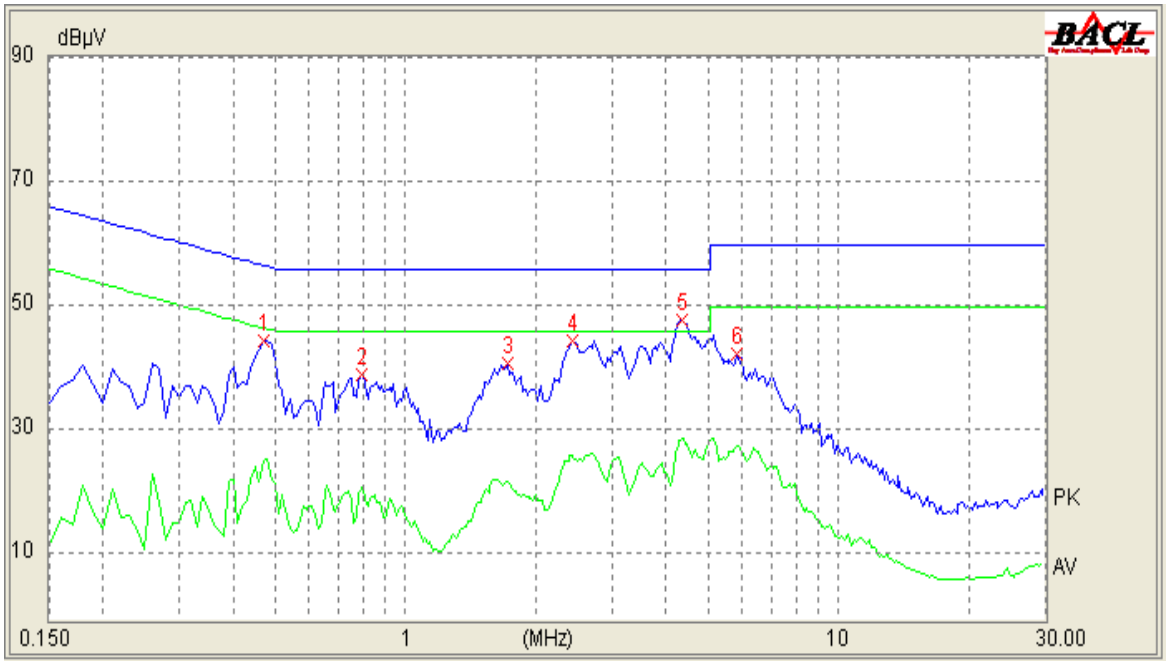
Environmental Conditions

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

The testing was performed by Wayne Cheng on 2010-06-28.

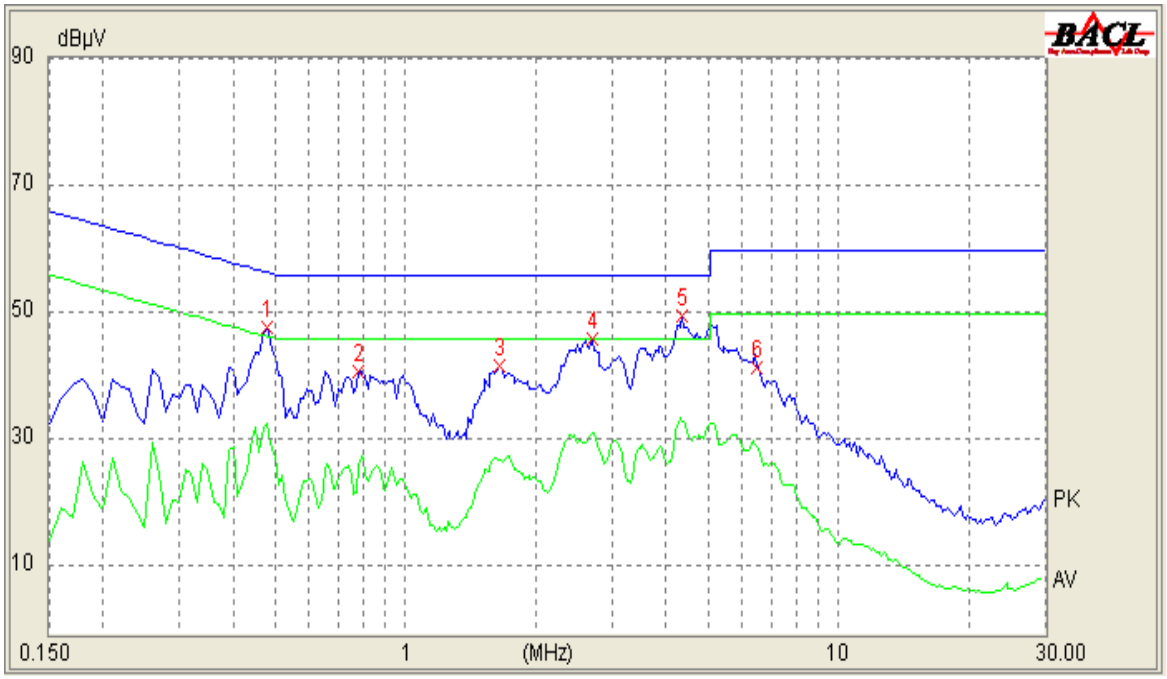
Test Mode: Operating (adapter supply)

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/AV/QP)**
4.340	10.10	41.80	56.00	14.20	QP
0.470	10.10	40.59	56.54	15.95	QP
4.380	10.10	29.06	46.00	16.94	AV
2.440	10.10	38.72	56.00	17.28	QP
2.440	10.10	26.11	46.00	19.89	AV
0.790	10.10	35.06	56.00	20.94	QP
0.470	10.10	25.46	46.54	21.08	AV
1.730	10.10	33.99	56.00	22.01	QP
5.830	10.20	27.89	50.00	22.11	AV
1.720	10.10	22.11	46.00	23.89	AV
0.790	10.10	20.84	46.00	25.16	AV
5.820	10.20	34.42	60.00	25.58	QP

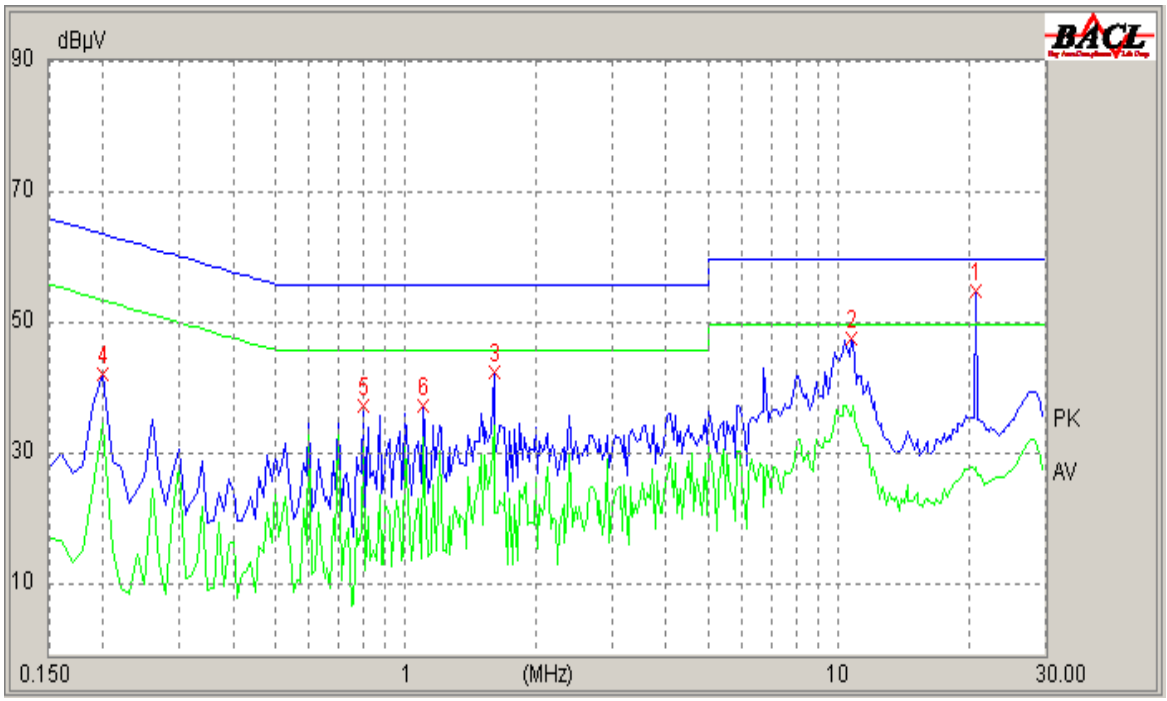
120 v/60 Hz, Neutral:



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	**Correction Factor (dB)**	**Cord. Result (dBµV)**	**Limit (dBµV)**	**Margin (dB)**	**Detector (PK/AV/QP)**
0.480	10.10	44.02	56.43	12.41	QP
4.340	10.10	33.21	46.00	12.79	AV
4.360	10.10	42.75	56.00	13.25	QP
0.480	10.10	32.99	46.43	13.44	AV
2.720	10.10	31.28	46.00	14.72	AV
2.700	10.10	39.65	56.00	16.35	QP
1.650	10.10	27.18	46.00	18.82	AV
0.780	10.10	37.04	56.00	18.96	QP
1.650	10.10	36.60	56.00	19.40	QP
0.780	10.10	26.15	46.00	19.85	AV
6.490	10.20	29.33	50.00	20.67	AV
6.490	10.20	36.02	60.00	23.98	QP

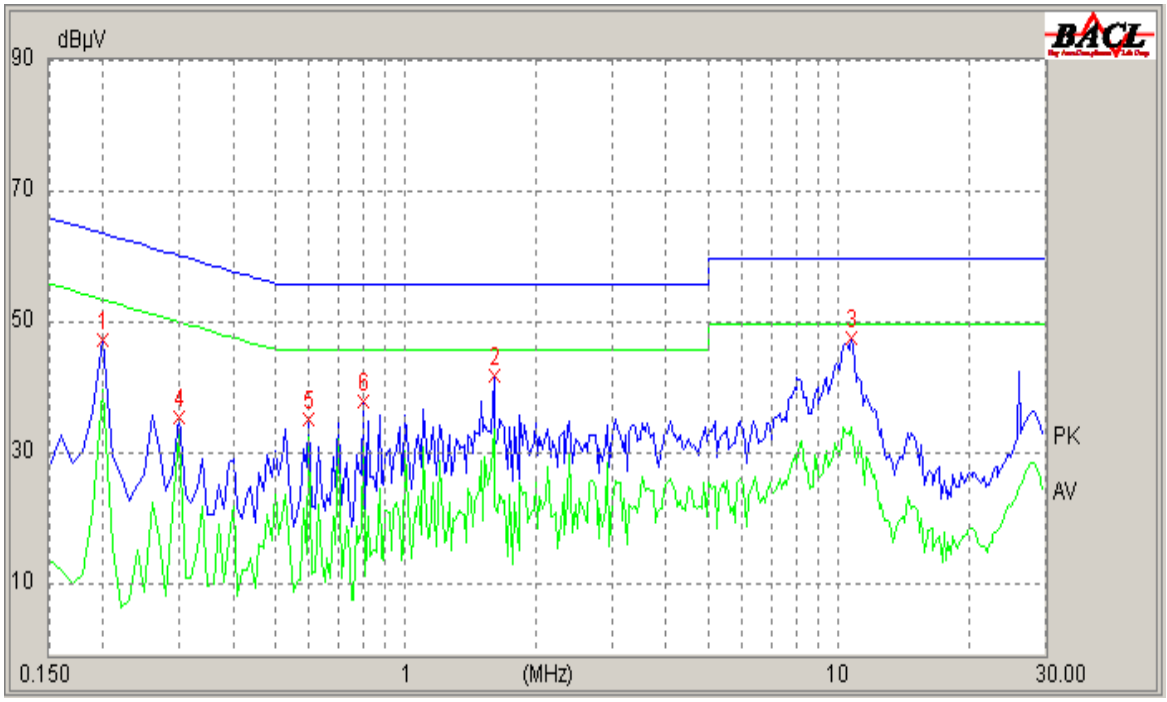
Test Mode: Operating (USB supply)

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/AV/QP)**
1.600	10.10	34.68	46.00	11.32	AV
1.100	10.10	32.85	46.00	13.15	AV
10.720	10.30	36.25	50.00	13.75	AV
0.800	10.10	32.04	46.00	13.96	AV
1.600	10.10	39.42	56.00	16.58	QP
10.720	10.30	42.24	60.00	17.76	QP
0.200	10.10	34.87	53.69	18.82	AV
0.800	10.10	35.95	56.00	20.05	QP
1.100	10.10	35.11	56.00	20.89	QP
20.740	10.30	28.22	50.00	21.78	AV
0.200	10.10	41.17	63.69	22.52	QP
20.770	10.30	21.51	60.00	38.49	QP

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/AV/QP)**
1.600	10.10	33.98	46.00	12.02	AV
0.600	10.10	32.84	46.00	13.16	AV
0.200	10.10	39.99	53.69	13.70	AV
0.800	10.10	32.15	46.00	13.85	AV
10.700	10.30	34.36	50.00	15.64	AV
0.300	10.10	33.51	50.28	16.77	AV
0.200	10.10	44.73	63.69	18.96	QP
10.750	10.30	38.76	60.00	21.24	QP
0.600	10.10	33.89	56.00	22.11	QP
1.600	10.10	32.28	56.00	23.72	QP
0.300	10.10	34.44	60.28	25.84	QP
0.800	10.10	29.66	56.00	26.34	QP

FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS

Applicable Standard

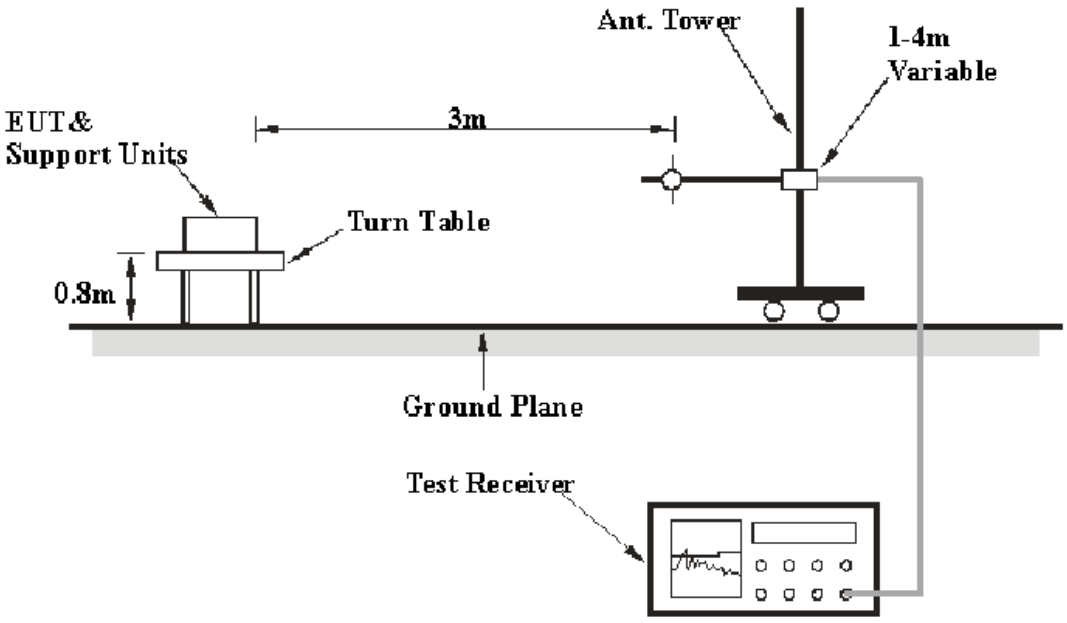
FCC §15.205; §15.209; §15.247(d)

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 or PC 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	AV

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447D	2944A09795	2009-08-02	2010-08-02
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	2009-07-08	2010-07-08

*** 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 or PC 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-1GHz and peak and Average detection modes for frequencies above 1GHz.

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 maximum 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 Part 15, Subpart C, section 15.205, 15.209 and 15.247, with the worst margin reading of:

Below 1 GHz:

3.60 dB at **270.313250 MHz** in the **Vertical** polarization (Operating with adapter supply)
5.50 dB at **269.881500 MHz** in the **Vertical** polarization (Operating with USB supply)

Above 1 GHz:

3.50 dB at **4812 MHz** in the **Horizontal** polarization (Low Channel)
3.86 dB at **4876 MHz** in the **Vertical** polarization (Middle Channel)
7.42 dB at **4944 MHz** in the **Vertical** polarization (High Channel)

Test Data

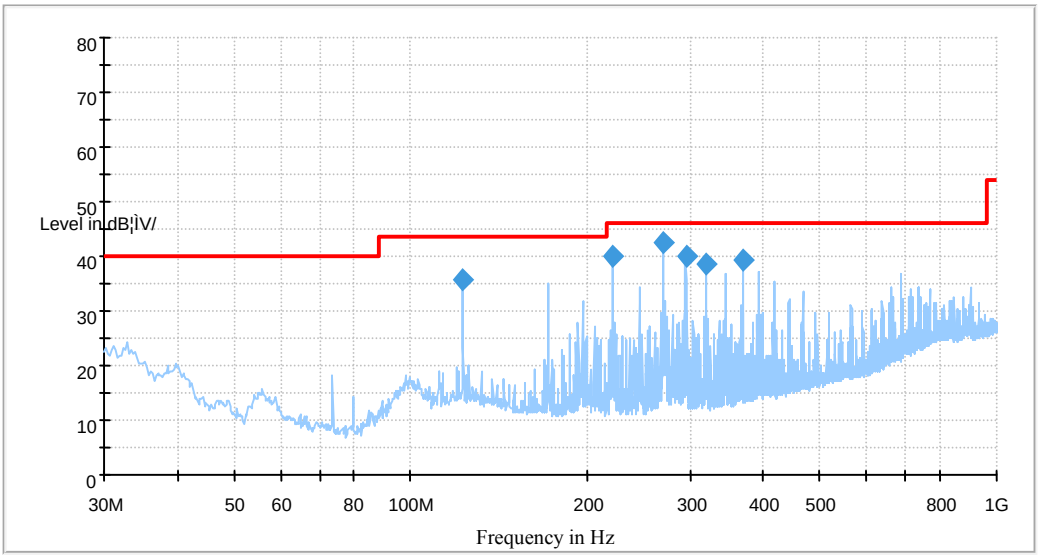
Environmental Conditions

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

** The testing was performed by Wayne Cheng on 2010-07-01.*

Test mode: Transmitting (adapter supply)

Below 1 GHz

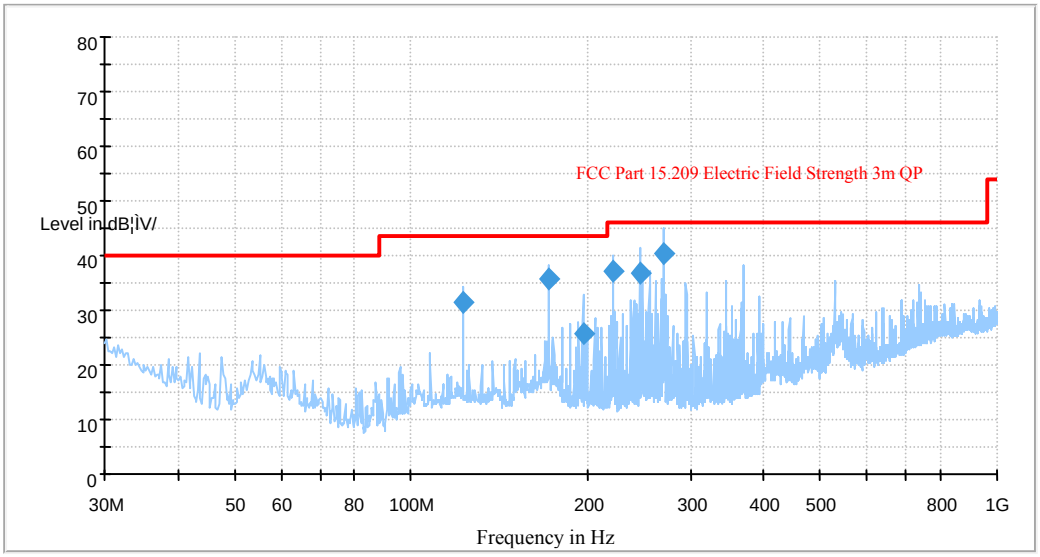


Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (degree)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
270.313250	42.4	184.0	V	177.0	-15.0	46.0	3.6*
294.893750	40.2	100.0	H	193.0	-14.5	46.0	5.8
221.178750	40.0	186.0	V	216.0	-16.4	46.0	6.0
368.618000	39.2	100.0	H	289.0	-13.0	46.0	6.8
319.480750	38.6	100.0	H	174.0	-14.1	46.0	7.4
122.874500	35.5	100.0	V	330.0	-13.7	43.5	8.0

*Within measurement uncertainty.

Test mode: Transmitting (USB supply)

Below 1 GHz



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (degree)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
269.881500	40.5	205.0	V	194.0	-15.0	5.5	46.0
172.025500	35.6	159.0	H	258.0	-15.8	7.9	43.5
221.085500	37.1	299.0	V	5.0	-16.4	8.9	46.0
246.080750	36.8	191.0	V	182.0	-15.7	9.2	46.0
123.118500	31.3	291.0	H	0.0	-13.7	12.2	43.5
196.605250	25.7	128.0	H	301.0	-14.9	17.8	43.5

Above 1 GHz (worst case)

Frequency (MHz)	S.A. Reading (dBμV/m)	Detector (PK/QP/AV)	Turntable Direction (Degree)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBμV/m)	FCC Part 15.247/209	
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)
Low Channel (2406 MHz)											
4812	41.75	AV	170	1.79	H	31.2	4.3	26.75	50.50	54	3.50*
4812	41.67	AV	270	1.50	V	31.2	4.3	26.75	50.42	54	3.58*
7218	30.67	AV	35	2.37	V	35.6	5.22	26.64	44.85	54	9.15
7218	26.85	AV	0	1.70	H	35.6	5.22	26.64	41.03	54	12.97
4812	46.33	PK	270	1.50	V	31.2	4.3	26.75	55.08	74	18.92
4812	46.31	PK	170	1.79	H	31.2	4.3	26.75	55.06	74	18.94
7218	38.99	PK	35	2.37	V	35.6	5.22	26.64	53.17	74	20.83
7218	34.68	PK	0	1.70	H	35.6	5.22	26.64	48.86	74	25.14
Middle Channel (2438 MHz)											
4876	41.02	AV	268	2.37	V	31.5	4.37	26.75	50.14	54	3.86*
4876	39.15	AV	40	1.91	H	31.5	4.37	26.75	48.27	54	5.73
7314	30.36	AV	40	2.20	V	35.5	5.09	26.64	44.31	54	9.69
7314	27.83	AV	40	1.70	H	35.5	5.09	26.64	41.78	54	12.22
4876	45.94	PK	268	2.37	V	31.5	4.37	26.75	55.06	74	18.94
4876	44.17	PK	40	1.91	H	31.5	4.37	26.75	53.29	74	20.71
7314	37.28	PK	40	2.20	V	35.5	5.09	26.64	51.23	74	22.77
7314	35.03	PK	40	1.70	H	35.5	5.09	26.64	48.98	74	25.02
High Channel (2472 MHz)											
4944	36.83	AV	100	2.5	V	32.1	4.4	26.75	46.58	54	7.42
4944	33.51	AV	17	1.92	H	32.1	4.4	26.75	43.26	54	10.74
7416	26.02	AV	20	2.43	V	35.5	5.2	26.64	40.08	54	13.92
7416	23.69	AV	10	1.46	H	35.5	5.2	26.64	37.75	54	16.25
4944	42.18	PK	100	2.5	V	32.1	4.4	26.75	51.93	74	22.07
4944	40.11	PK	17	1.92	H	32.1	4.4	26.75	49.86	74	24.14
7416	33.75	PK	20	2.43	V	35.5	5.2	26.64	47.81	74	26.19
7416	32.40	PK	10	1.46	H	35.5	5.2	26.64	46.46	74	27.54

*Within measurement uncertainty.

Restrict band spurious emission (worst case)

Frequency (MHz)	S.A. Reading (dBμV/m)	Detector (PK/QP/AV)	Turntable Direction (Degree)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBμV/m)	FCC Part 15.247/209	
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)
2311	24.36	AV	40	1.30	V	27.4	2.99	26.83	27.92	54	26.08
2311	23.90	AV	40	1.37	H	27.4	2.99	26.83	27.46	54	26.54
2488	23.30	AV	80	2.20	H	27.8	3.11	26.83	27.38	54	26.62
2488	23.26	AV	20	1.74	V	27.8	3.11	26.83	27.34	54	26.66
2488	41.93	PK	80	2.20	H	27.8	3.11	26.83	46.01	74	27.99
2311	37.26	PK	40	1.30	V	27.4	2.99	26.83	40.82	74	33.18
2311	36.79	PK	40	1.37	H	27.4	2.99	26.83	40.35	74	33.65
2488	36.05	PK	20	1.74	V	27.8	3.11	26.83	40.13	74	33.87

FCC §15.247(a)(1) - CHANNEL SEPARATION TEST

Applicable Standard

Frequency hopping systems shall have hoping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

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. Set the EUT in transmitting mode, spectrum Bandwidth was set at 100 kHz, maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another truce
3. Measure the channel separation.

Test Data

Environmental Conditions

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

** The testing was performed by Wayne Cheng on 2010-06-28.*

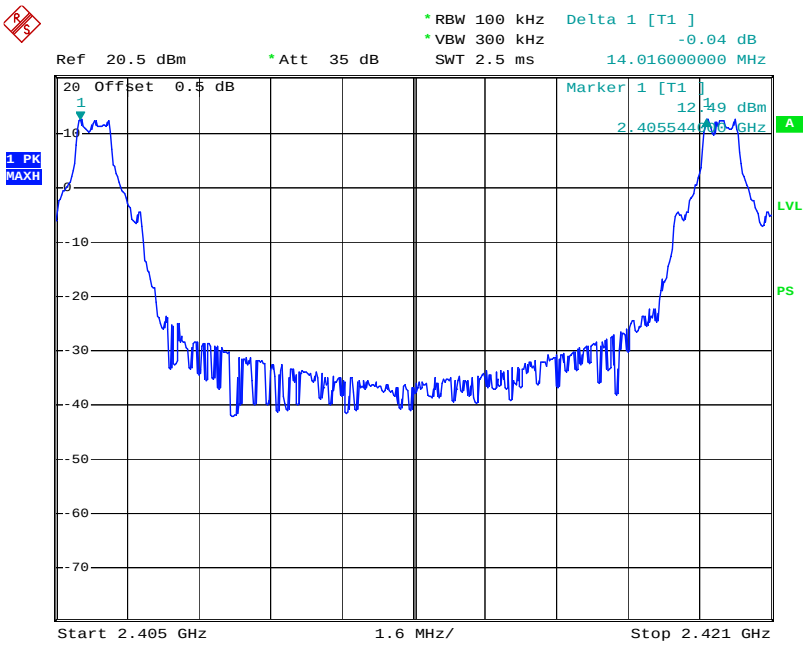
Test Result: Compliant.

Hopping Sequence	Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
1	Low Channel	2406	14.016	1.00	Pass
	Adjacent Channel	2420			
	Mid Channel - 1	2428	16.056	1.00	Pass
	Adjacent Channel	2444			
	Mid Channel - 2	2452	4.020	1.00	Pass
	Adjacent Channel	2456			
	High Channel	2470	2.000	1.00	Pass
	Adjacent Channel	2472			
2	Low Channel	2406	2.008	1.00	Pass
	Adjacent Channel	2408			
	Mid Channel	2430	8.040	1.00	Pass
	Adjacent Channel	2438			
	High Channel	2438	8.020	1.00	Pass
	Adjacent Channel	2446			
3	Low Channel	2432	8.020	1.00	Pass
	Adjacent Channel	2440			
	Mid Channel	2440	8.020	1.00	Pass
	Adjacent Channel	2448			
	High Channel	2470	2.000	1.00	Pass
	Adjacent Channel	2472			
4	Low Channel	2406	2.016	1.00	Pass
	Adjacent Channel	2408			
	Mid Channel - 1	2418	8.020	1.00	Pass
	Adjacent Channel	2426			
	Mid Channel - 2	2426	28.080	1.00	Pass
	Adjacent Channel	2454			
	Mid Channel - 3	2454	8.000	1.00	Pass
	Adjacent Channel	2462			

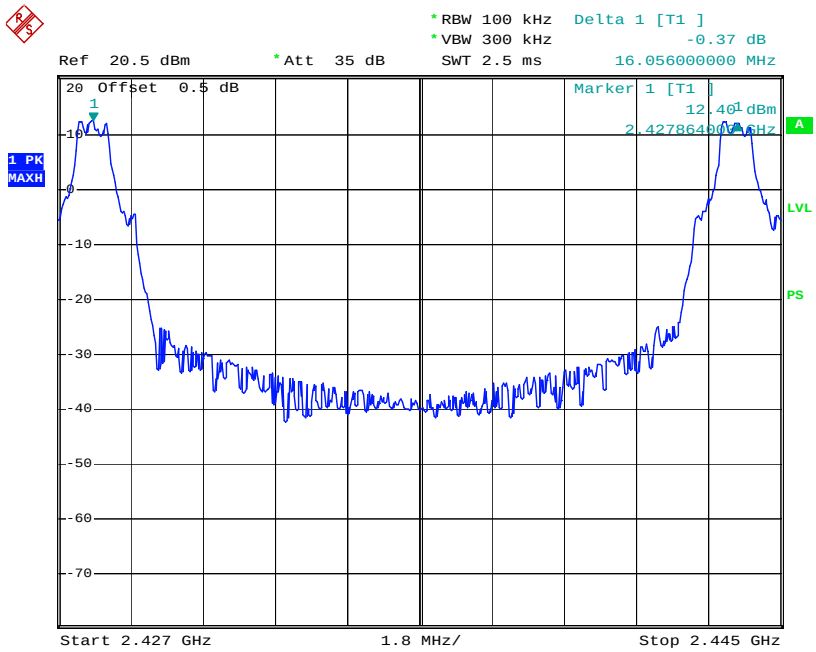
Please refer to the following plots.

Hopping Sequence 1:

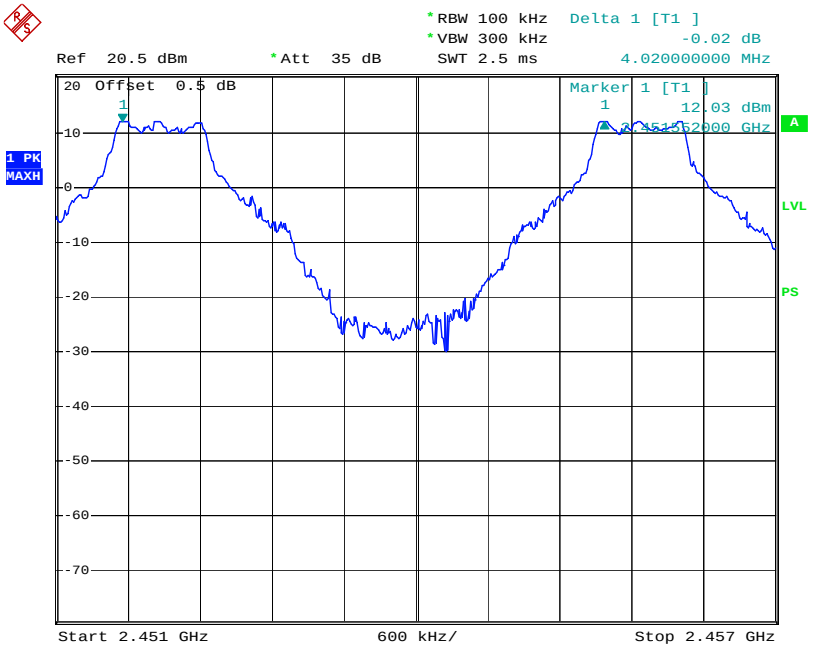
Low Channel



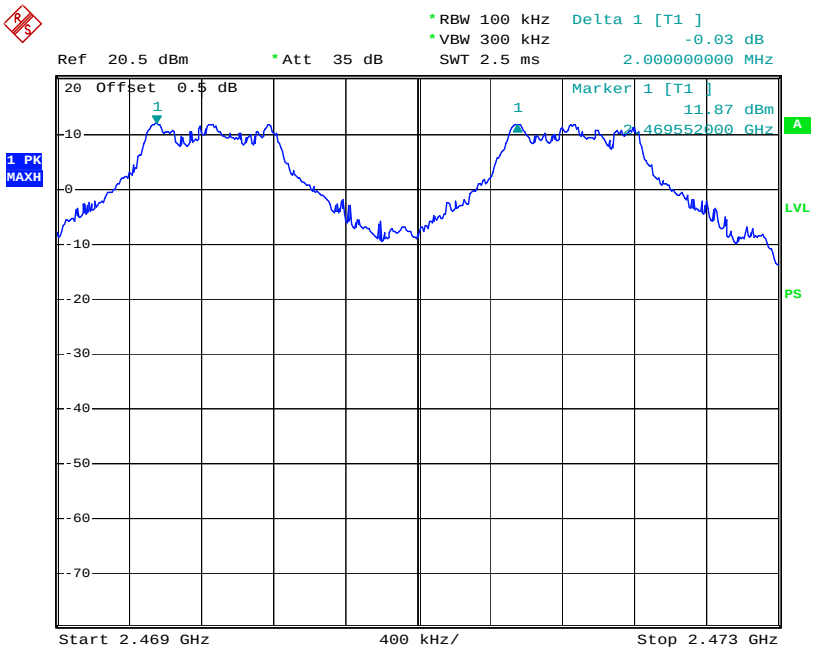
Middle Channel -1



Middle Channel -2

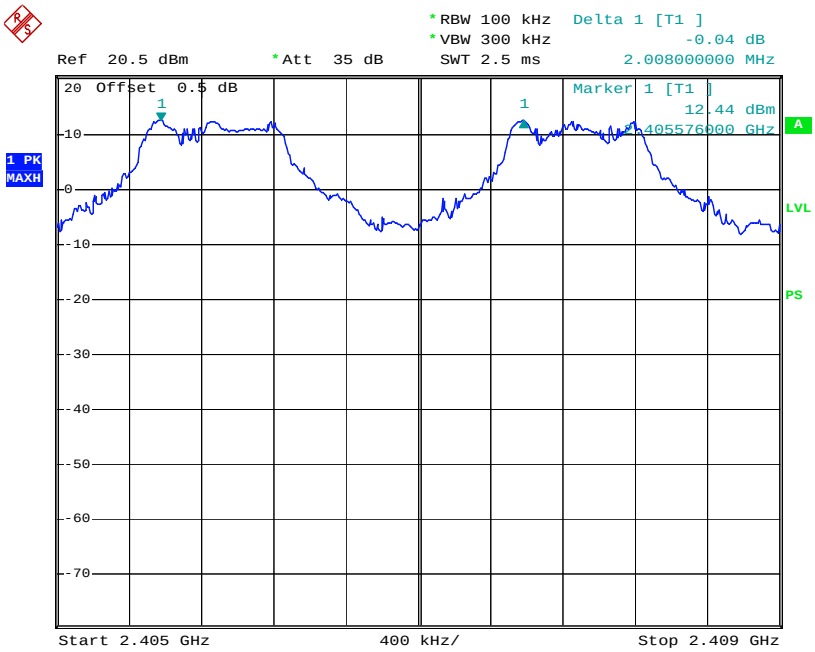


High Channel

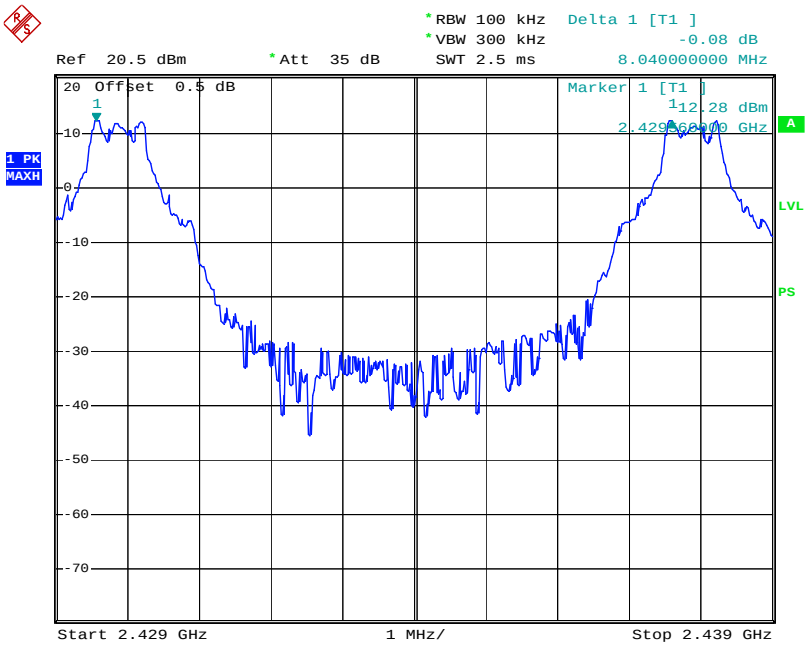


Hopping Sequence 2:

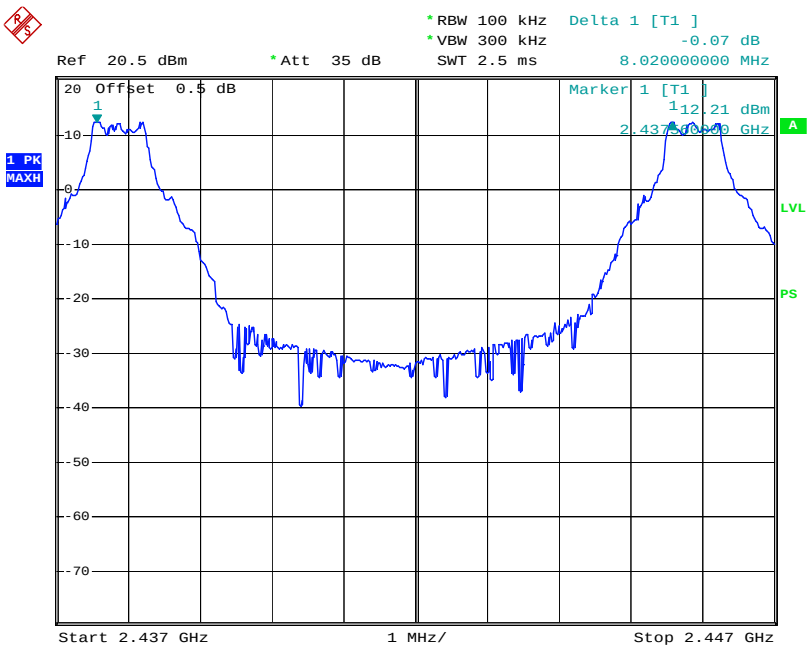
Low Channel



Middle Channel

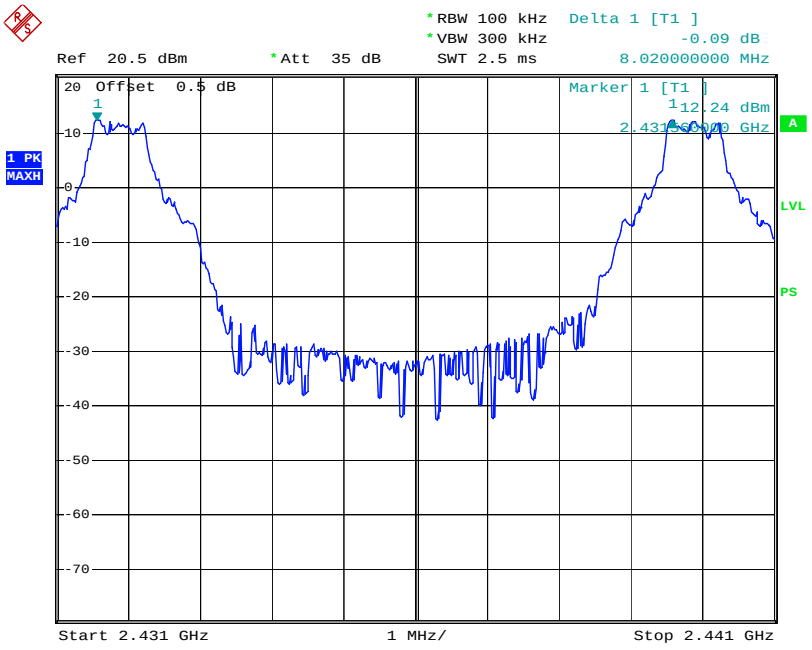


High Channel

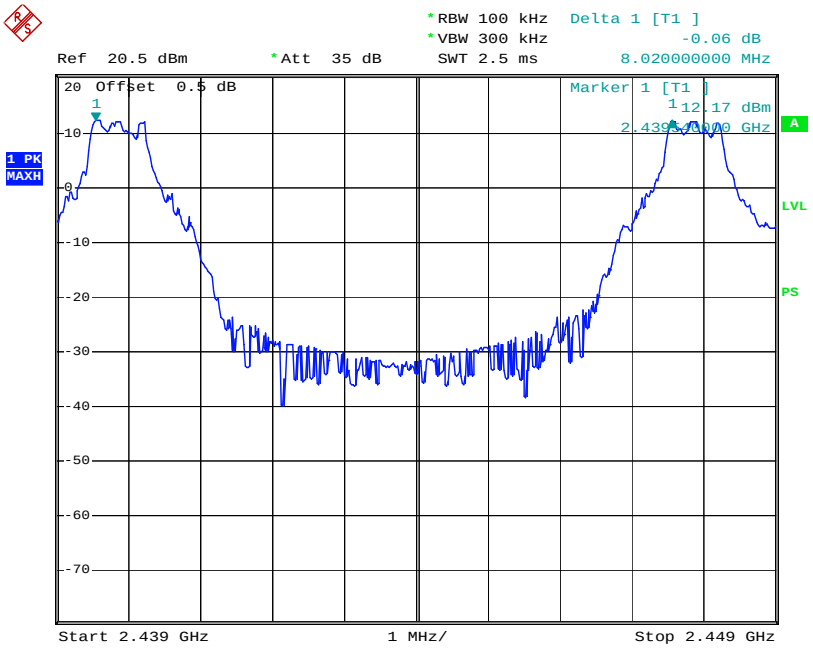


Hopping Sequence 3:

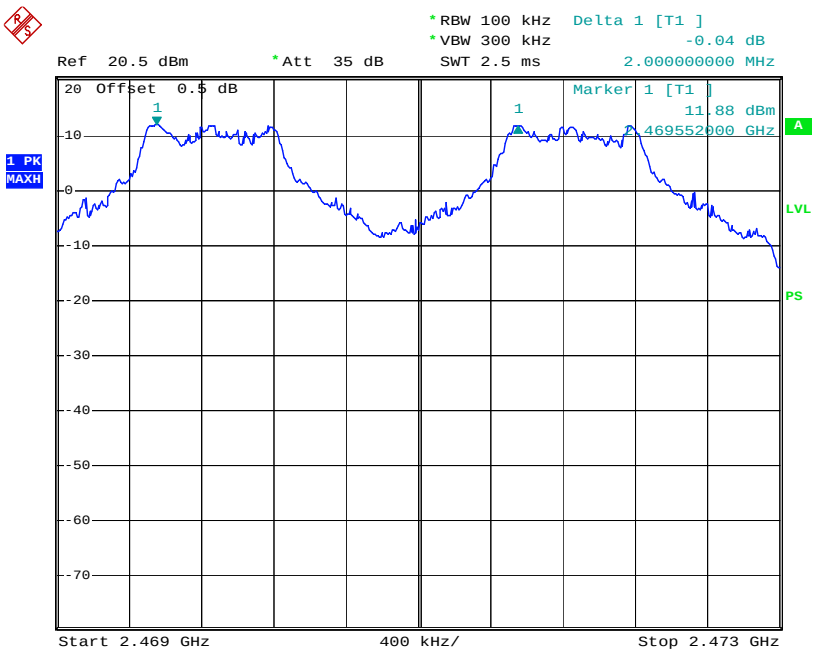
Low Channel



Middle Channel

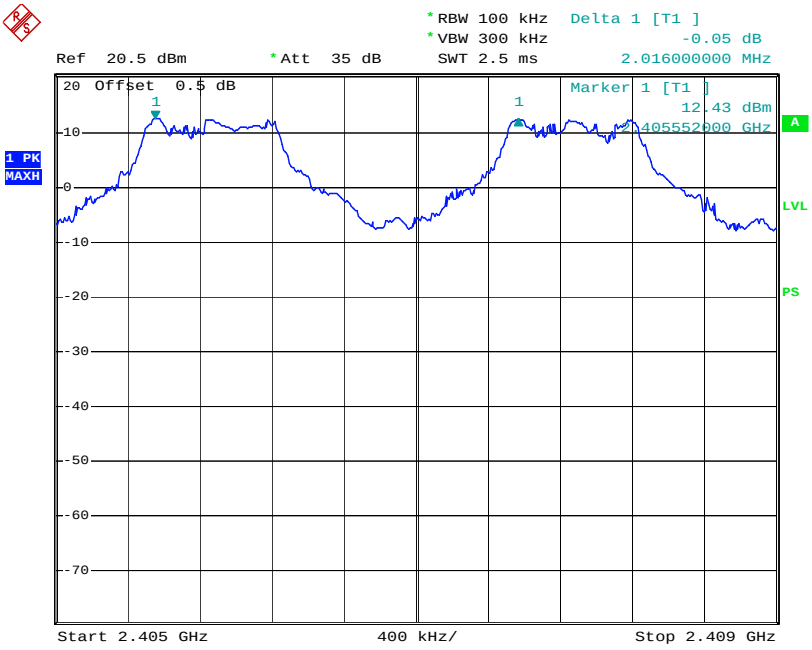


High Channel

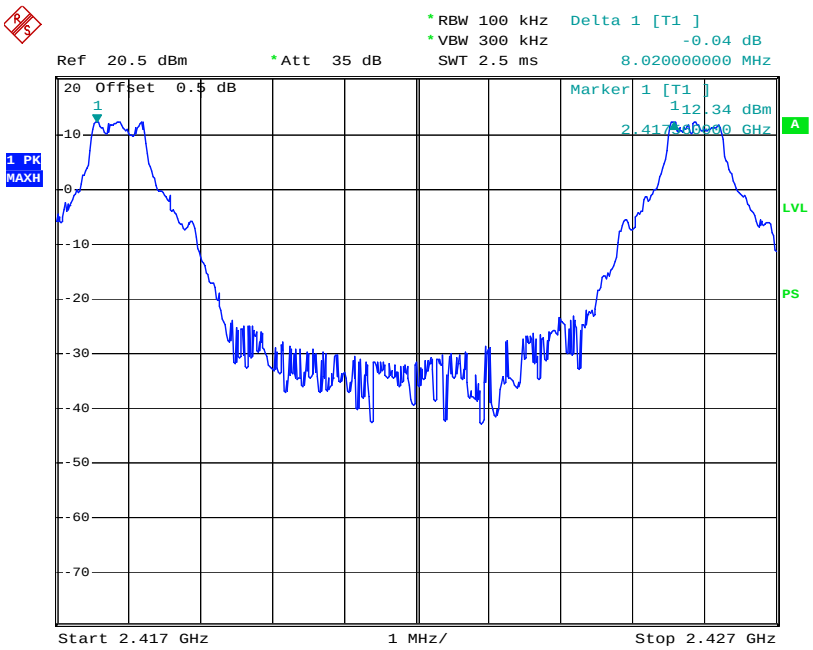


Hopping Sequence 4:

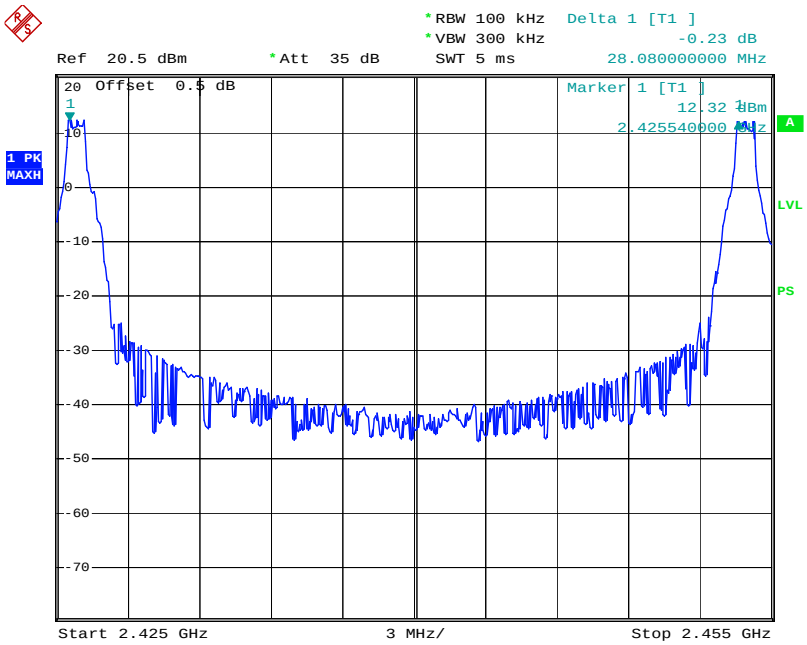
Low Channel



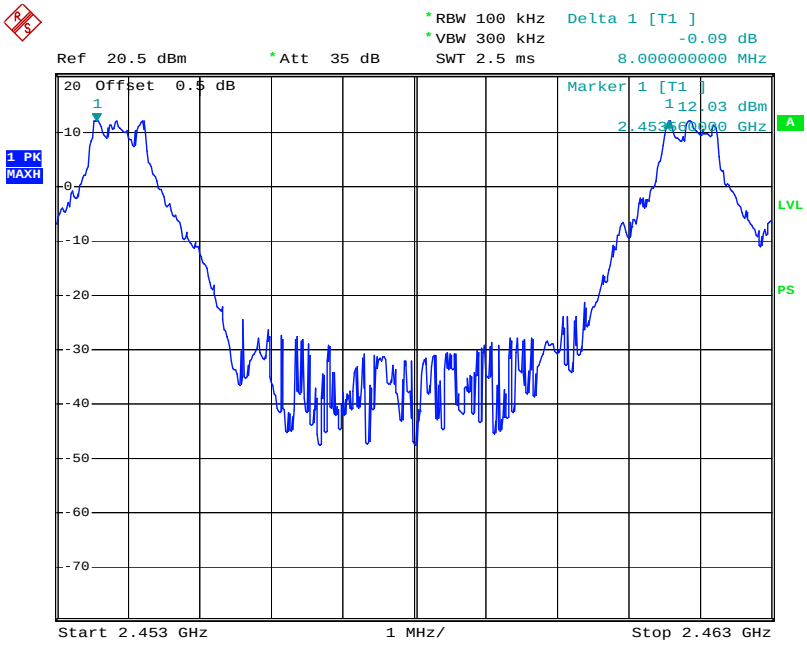
Middle Channel -1



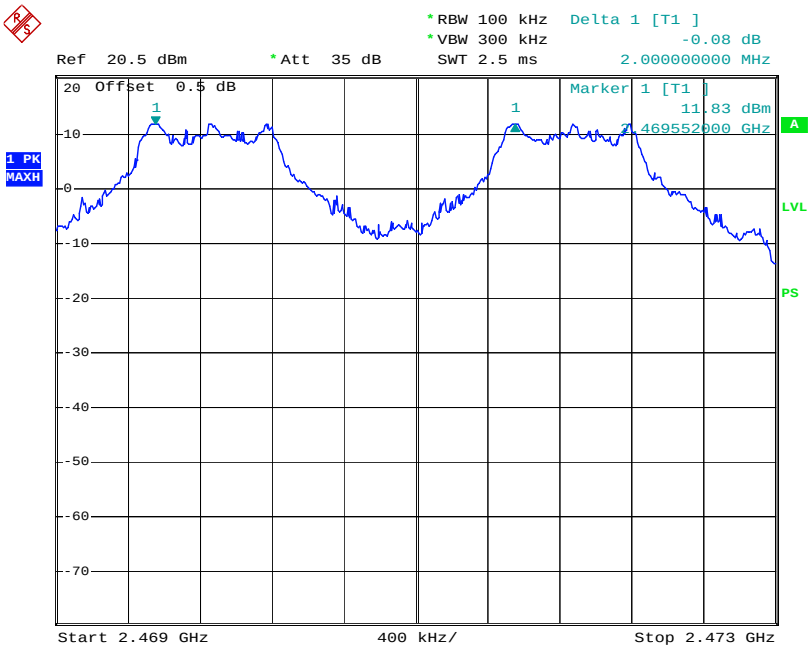
Middle Channel -2



Middle Channel -3



High Channel



FCC §15.247(a)(1) – 20 dB BANDWIDTH TESTING

Applicable Standard

Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

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 on the test table without connection to measurement instrument. Turn on the EUT. 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 20 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:	100.0 kPa

** The testing was performed by Wayne Cheng on 2010-06-28.*

Test Result: Compliant.

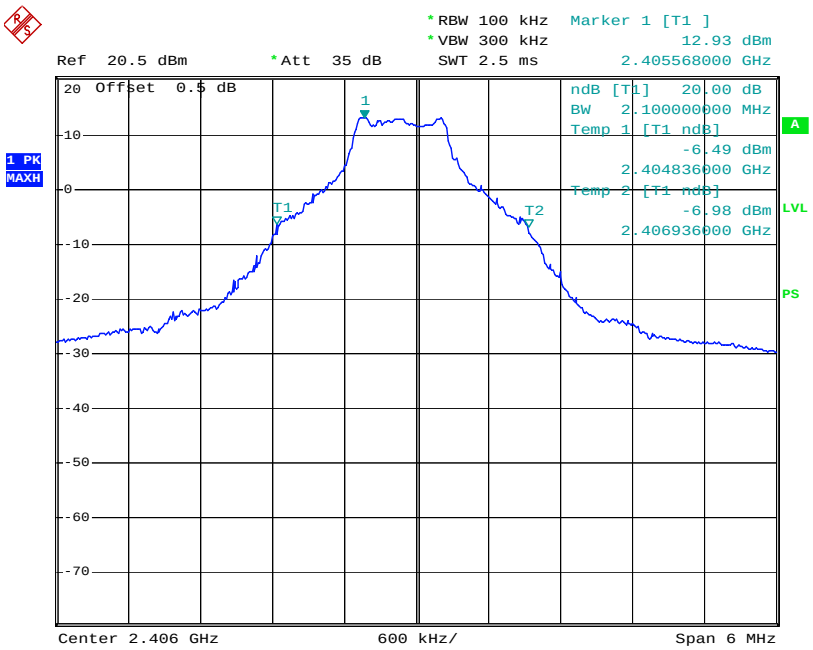
Please refer to following tables and plots

Test Mode: Transmitting

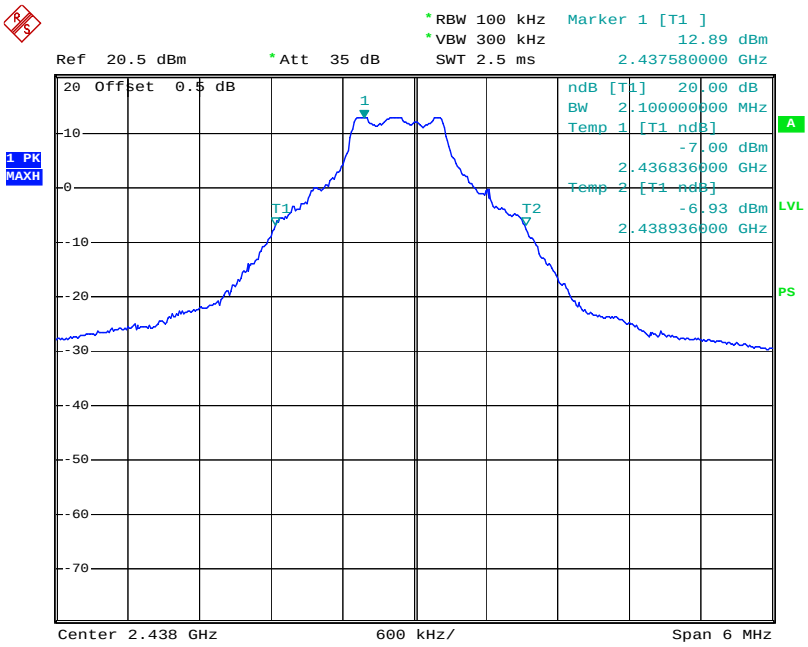
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2406	2.100
Middle	2438	2.100
High	2472	2.100

Please refer to the following plots.

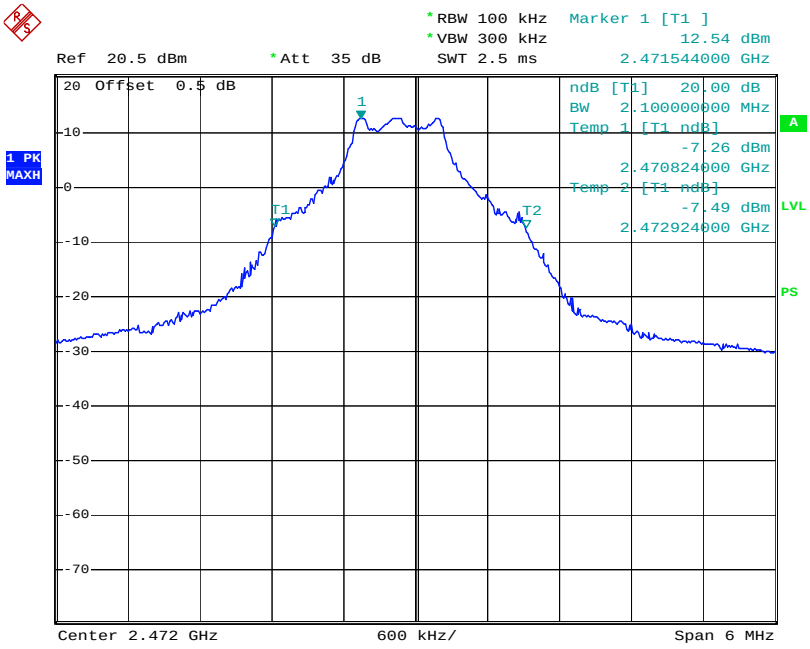
Low Channel



Middle Channel



High Channel



FCC §15.247(a)(1)(iii) - QUANTITY OF HOPPING CHANNEL TEST

Applicable Standard

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

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 (SA) using either an internal calibrator or a known signal from an external generator.
2. Set the EUT in hopping mode from first channel to last.
3. By using the Max-Hold function record the Quantity of the channel.

Test Data

Environmental Conditions

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

The testing was performed by Wayne Cheng on 2010-06-29.

Test Result: Compliant.

Please refer to following tables and plots

Test Mode: Transmitting

Hopping Sequence 1:

Frequency Range (MHz)	Number of Hopping Channel	Limit
2406-2472	15	≥ 15

Hopping Sequence 2:

Frequency Range (MHz)	Number of Hopping Channel	Limit
2406-2472	15	≥ 15

Hopping Sequence 3:

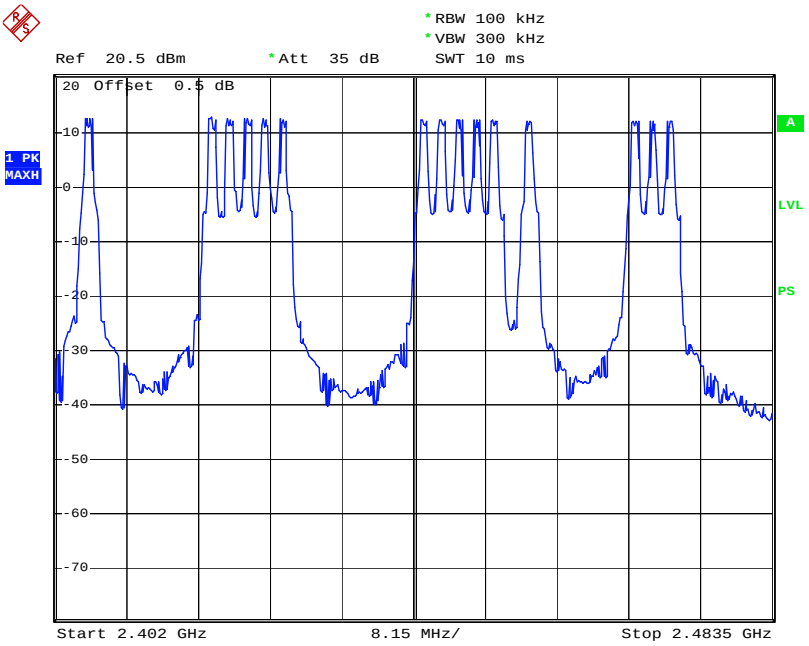
Frequency Range (MHz)	Number of Hopping Channel	Limit
2406-2472	15	≥ 15

Hopping Sequence 4:

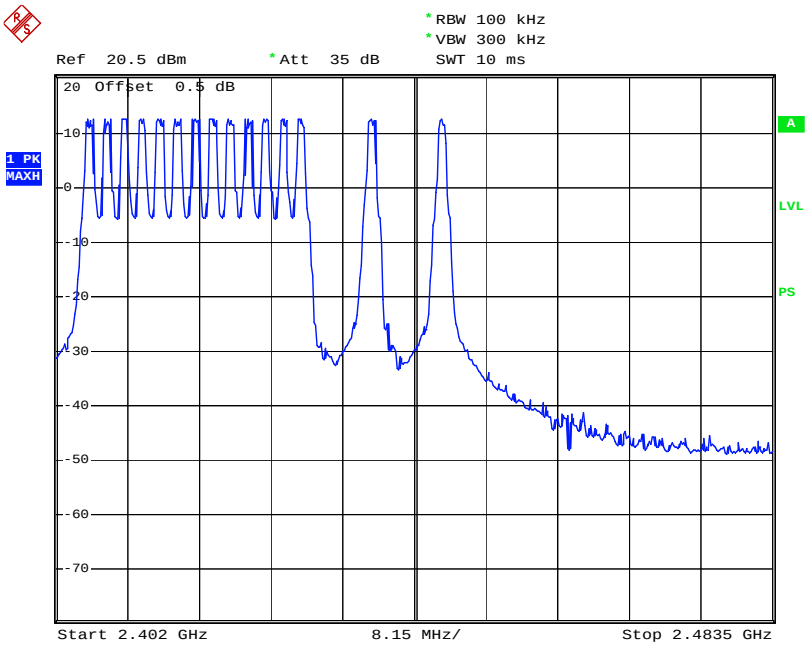
Frequency Range (MHz)	Number of Hopping Channel	Limit
2406-2472	15	≥ 15

Number of Hopping Channels

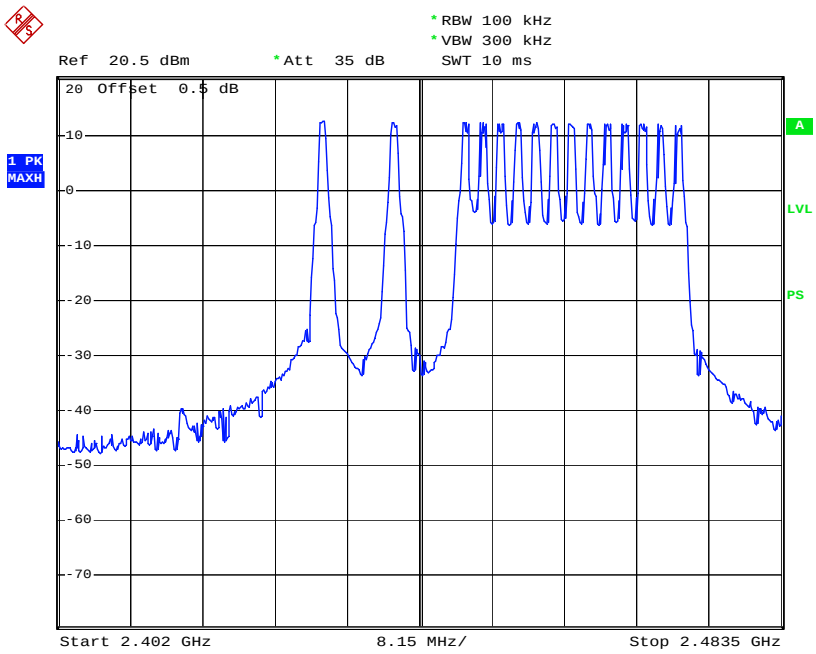
Hopping Sequence 1:



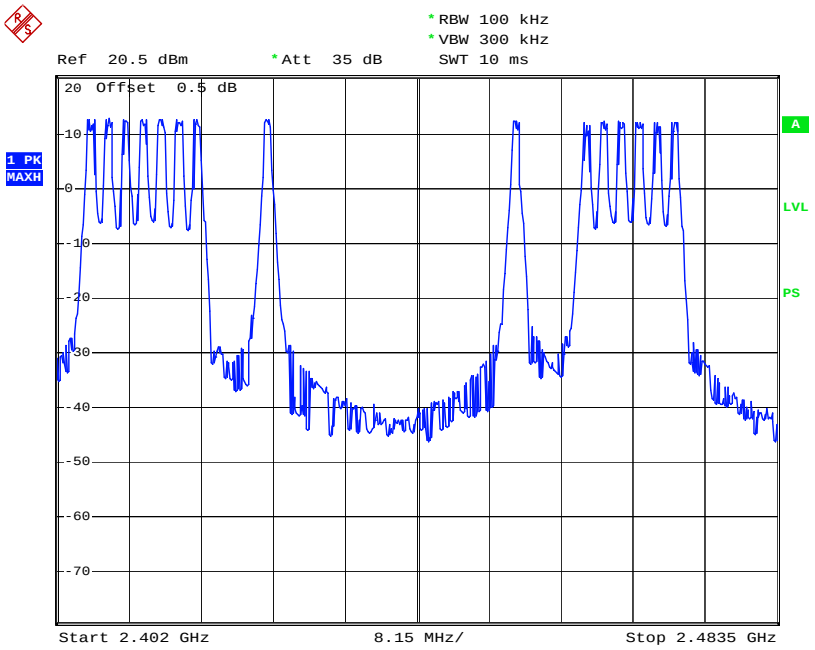
Hopping Sequence 2:



Hopping Sequence 3:



Hopping Sequence 4:



FCC §15.247(a)(1)(iii) -TIME OF OCCUPANCY (DWELL TIME)

Applicable Standard

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

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

The EUT was worked in channel hopping; Spectrum SPAN was set as 0. Sweep was set as 0.4 X channel no. (s), the quantity of pulse was get from single sweep. In addition, the time of single pulses was tested.

Dwell Time= time slot length * hope rate/ number of hopping channels * 31.6s
Hop rate=1600/s

Test Data

Environmental Conditions

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

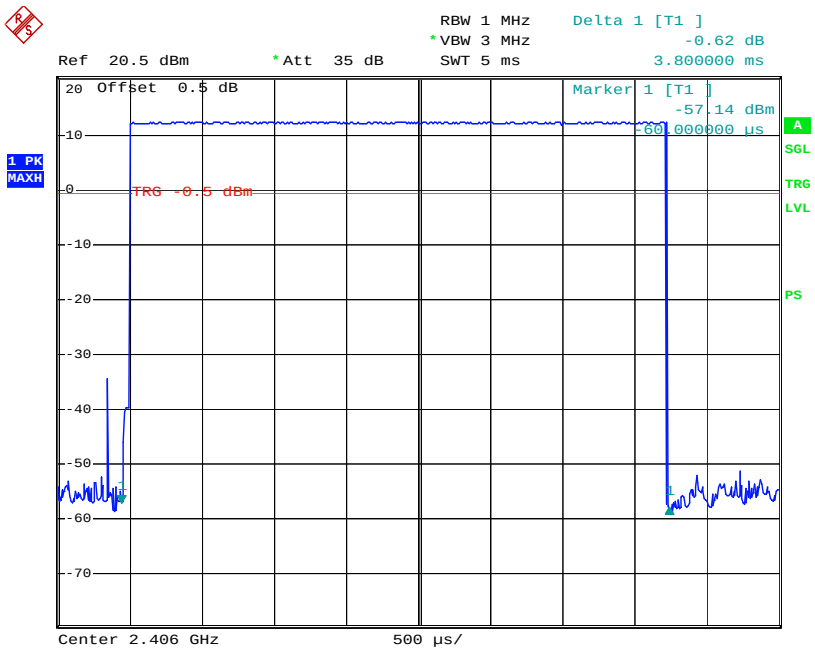
** The testing was performed by Wayne Cheng on 2010-06-29.*

Test Result: Compliant, Please refer to following tables and plots

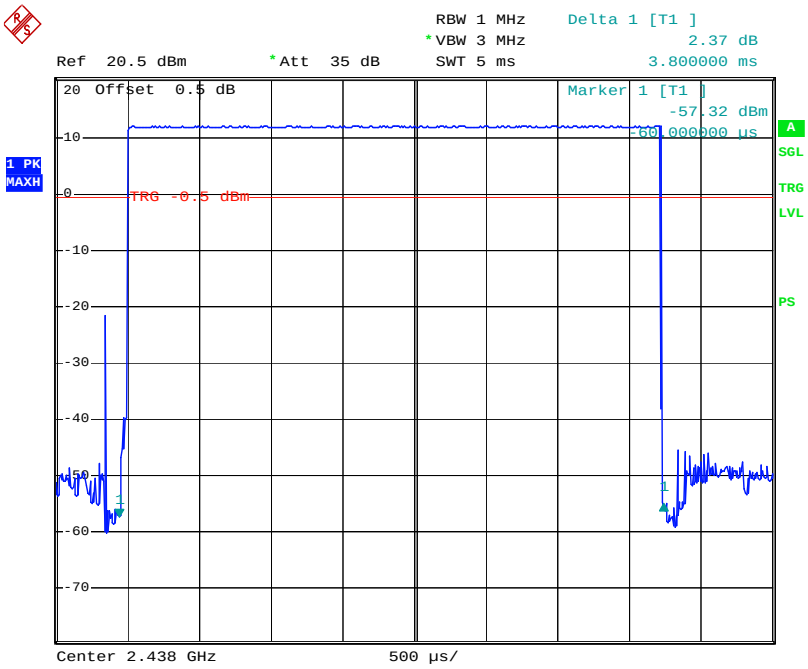
Channel	Pulse Width (ms)	Dwell Time (sec.)	Limit (sec.)	Result
Low	3.80	0.3952	0.4	Pass
Middle	3.80	0.3952	0.4	Pass
High	3.80	0.3952	0.4	Pass
Note: Dwell time=Pulse time (ms) × (1600 ÷ 15) × (15*0.4) Second				

Please refer to the following plots.

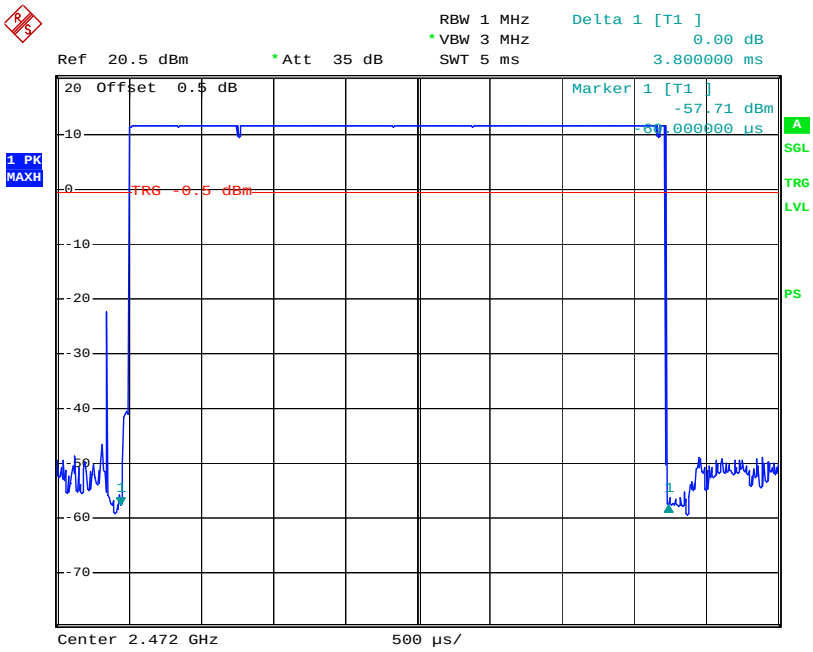
Low Channel



Middle Channel



High Channel



FCC §15.247(b)(1) - PEAK OUTPUT POWER MEASUREMENT

Applicable Standard

According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

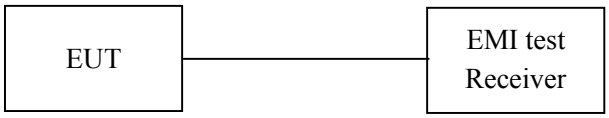
Test Equipment List and Details

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 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

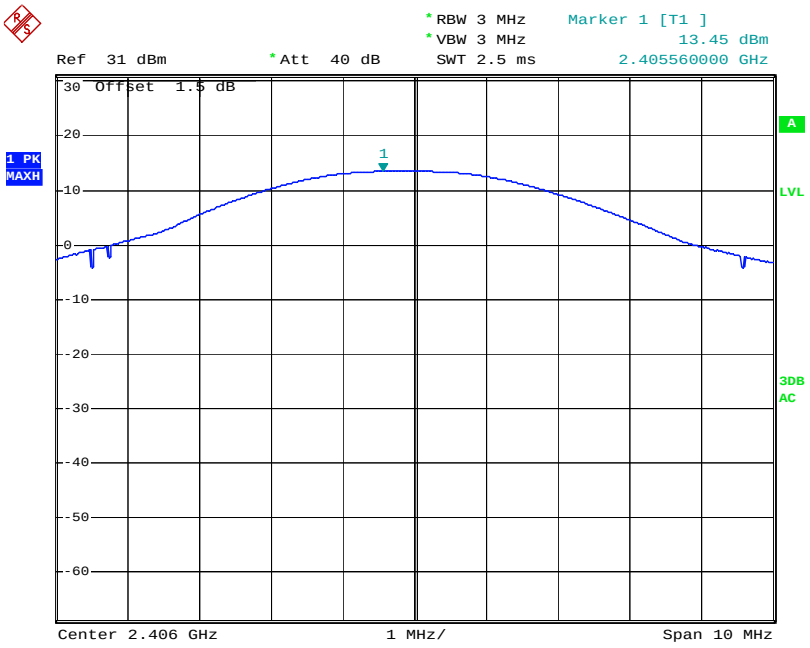
** The testing was performed by Wayne Cheng on 2010-06-30.*

Test Result: Compliant.

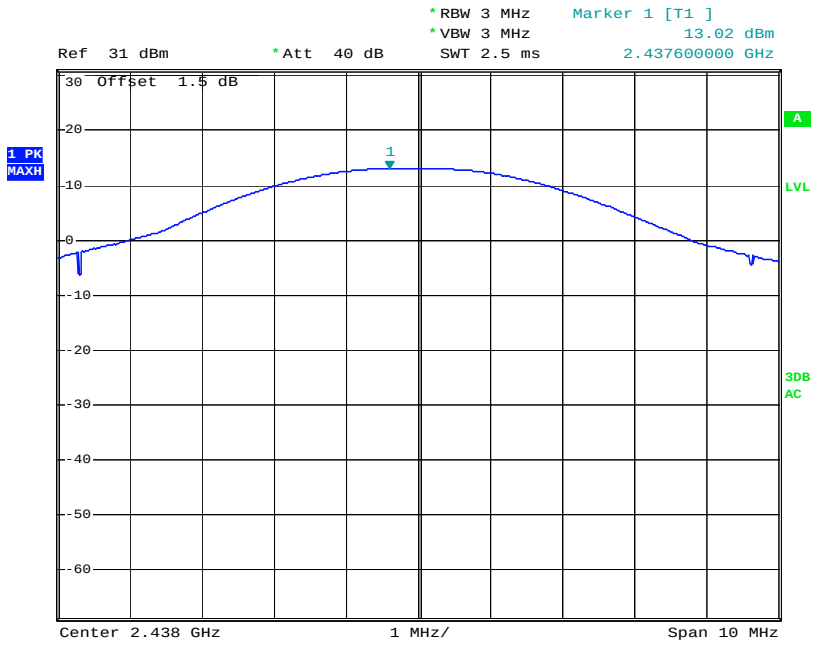
Test Mode: Transmitting

Channel	Channel Frequency (MHz)	Conducted Output Power		Limit (mW)
		(dBm)	(mW)	
Low	2406	13.45	22.13	125
Middle	2438	13.02	20.89	125
High	2472	12.62	18.28	125

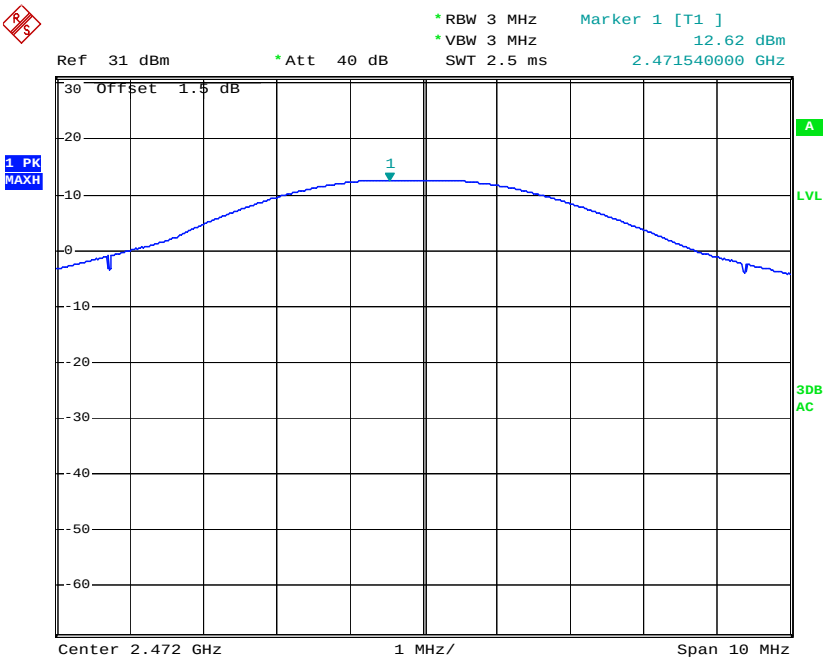
Low Channel



Middle Channel



High Channel



FCC §15.247(d) - BAND EDGES TESTING

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. Put it on the Rotated table and turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz.
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 2010-06-30.*

Test Result: Compliant

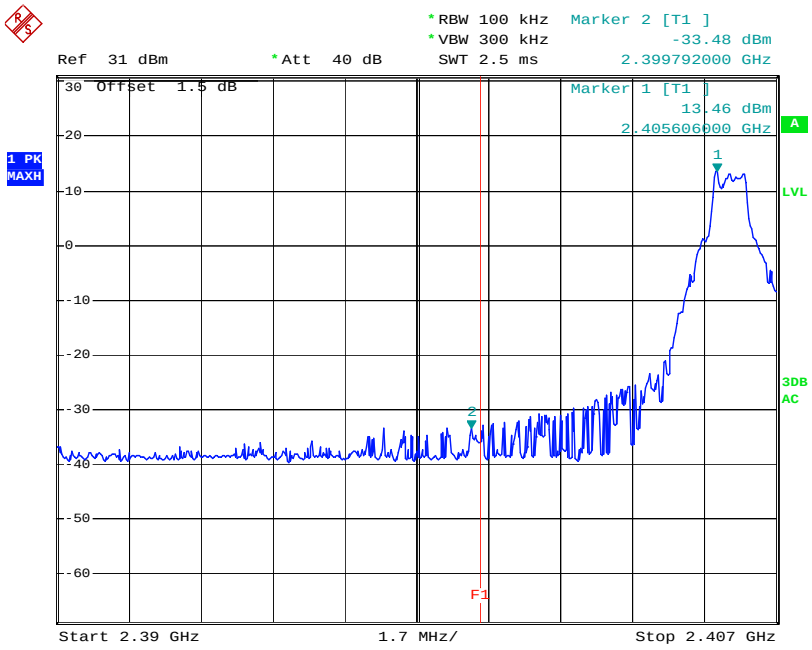
Test Mode: Transmitting

Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)
2.399792	46.94	> 20
2.484040	47.23	> 20

Note: The point fall into the stricted band was in FCC 15.209, please refer to the restrict band testing.

Please refer to follow plots (worst-case):

Band Edge: Left Side



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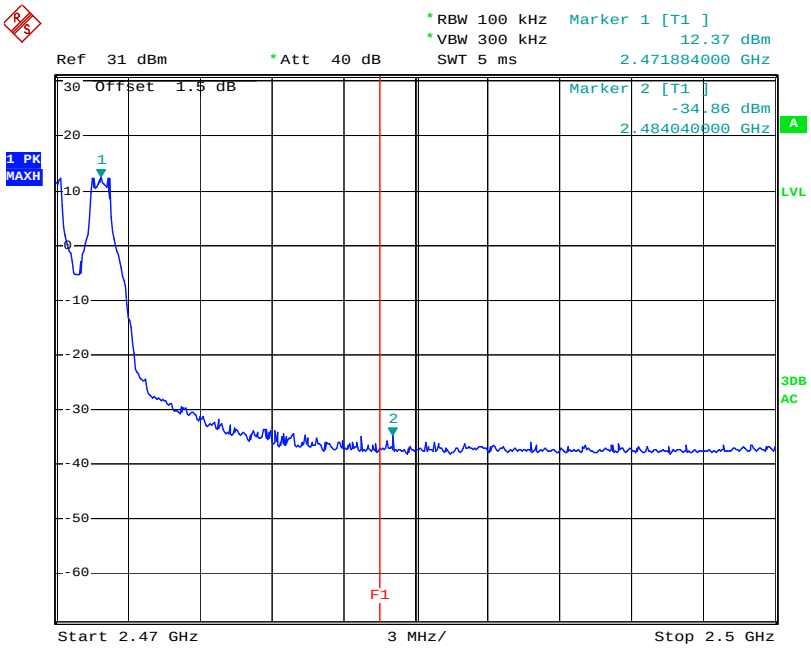
Band Edge: Right Side



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