



NVLAP LAB CODE 200707-0



## FCC PART 15.247

### MEASUREMENT AND TEST REPORT

For

**Omni Laboratories, Inc**

246 South 5th Avenue, City of Industry, CA 91746

**FCC ID: V2QMedallion-I**

<b>This Report Concerns:</b>	<b>Equipment Type:</b>
<input checked="" type="checkbox"/> Original Report	Bluetooth Speakerphone
<b>Test Engineer:</b>	Phoenix Liu <i>Phoenix Liu</i>
<b>Report No.:</b>	RSZ08012504
<b>Test Date:</b>	2008-02-14 to 2008-02-16
<b>Report Date:</b>	2008-02-20
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**Note:** This test report is for the customer shown above and their specific product only. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Shenzhen) This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *Omni Laboratories, Inc*'s product, model number: *Medallion I* or the "EUT" as referred to in this report is a *Bluetooth Speakerphone*, which measures approximately: 7.5 cm L x 3.5 cm W x 2.0 cm H, rated input voltage: DC 3.7 V Battery.

*\* All measurement and test data in this report was gathered from production sample serial number: 0801045 (Assigned by BACL, Shenzhen). The EUT was received on 2008-01-25.*

### Objective

This Type approval report is prepared on behalf of *Omni Laboratories, 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, 15.209 and 15.247 rules.

### Related Submittal(s)/Grant(s)

No related submittal(s).

### 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 04, 2004. 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).



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.

### Special Accessories

The special accessories were provided by Bay Area Compliance Laboratories Corp. (Shenzhen).

### Equipment Modifications

No modification was made to the unit tested.

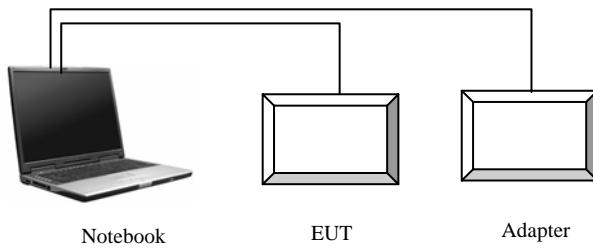
### Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Compaq	Notebook	PP2040	N/A	DoC

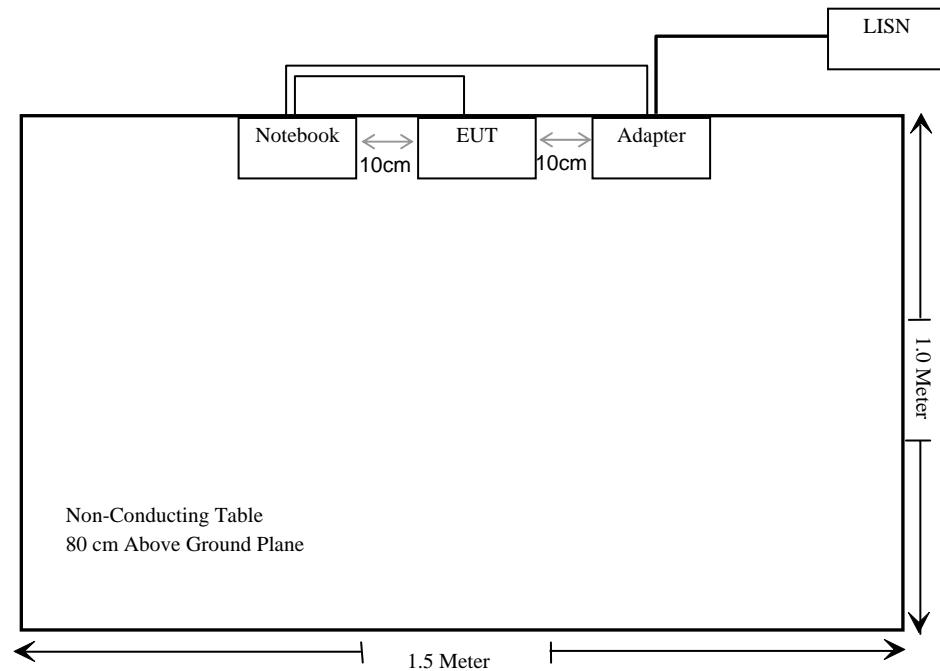
### External I/O Cable

Cable Description	Length (m)	From Port	To
Unshielded Detachable USB Cable	1.20	EUT	PC
Unshielded Detachable AC Power Cable	1.50	PC	LISN

## Configuration of Test Setup



## Block Diagram of Test Setup



## SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
CFR47 §15.247 (i), §1.1307 (b)(1)	RF exposure	Compliant
CFR47 §15.203	Antenna Requirement	Compliant
CFR47 §15.207 (a)	Conducted Emissions	Compliant
CFR47 §15.205, §15.209, §15.247(d)	Radiated Emission	Compliant
CFR47 §15.247 (a)(1)	20 dB Bandwidth	Compliant
CFR47 §15.247(a)(1)	Channel Separation Test	Compliant
CFR47 §15.247(a)(1)(iii)	Time of occupancy (Dwell Time)	Compliant
CFR47 §15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliant
CFR47 §15.247(b)(1)	Peak Output Power Measurement	Compliant
CFR47 §15.247(d)	Band edges	Compliant

**CFR47 §15.247 (i) and §1.1310 §2.1093 - RF EXPOSURE****Standard Applicable**

According to CFR47 § 1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to FCC Exclusion list, In the following table,  $f_{\text{GHz}}$  is mid-band frequency in GHz, and  $d$  is the distance to a person's body, excluding hands, wrists, feet, and ankles.

Exposure category	<u>low threshold</u>	<u>high threshold</u>
general population	$(60/f_{\text{GHz}})$ mW, $d < 2.5$ cm $(120/f_{\text{GHz}})$ mW, $d \geq 2.5$ cm	$(900/f_{\text{GHz}})$ mW, $d < 20$ cm
occupational	$(375/f_{\text{GHz}})$ mW, $d < 2.5$ cm $(900/f_{\text{GHz}})$ mW, $d \geq 2.5$ cm	$(2250/f_{\text{GHz}})$ mW, $d < 20$ cm

Routine SAR evaluation refers to that specifically required by § 2.1093, using measurements or computer simulation. When routine SAR evaluation is not required, portable transmitters with output power greater than the applicable low threshold require SAR evaluation to qualify for TCB approval.

**Measurement Result:**

This is a portable device and the Max peak output power is  $1.285 \text{ mW} < 24.58 \text{ mW} = (60/2.441 \text{ GHz}) \text{ mW}$

**The SAR measurement is not necessary.**

## **CFR47 §15.203 - ANTENNA REQUIREMENT**

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### **Standard Applicable**

According to CFr47 § 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 use of a standard antenna jack or electrical connector is prohibited.

### **Antenna Connector Construction**

The EUT has a printed antenna on PCB. The maximum gain is 0 dBi, please refer to the internal photos.

**Result:** Compliance.

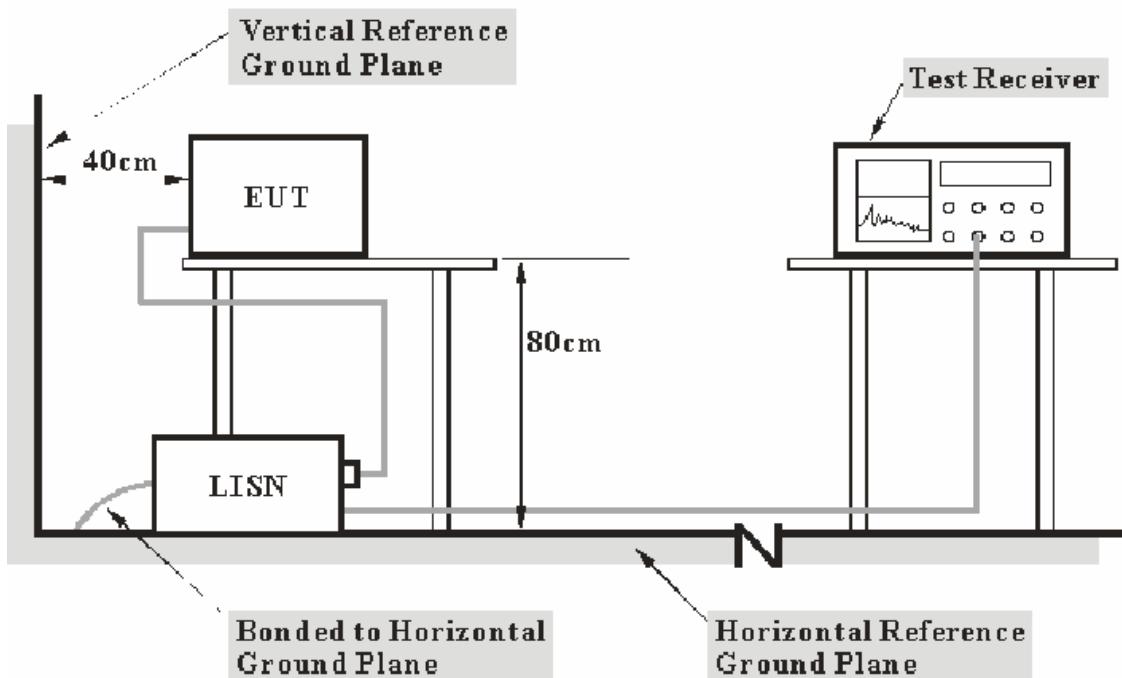
## §15.207 (a) - CONDUCTED EMISSIONS

### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are 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  $\pm 2.4$  dB.

### EUT Setup



**Note:**

1. Support units were connected to second LISN.
2. Both of LISNs (AMIN) 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 Class B 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 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:

<b><u>Frequency Range</u></b>	<b><u>IF B/W</u></b>
150 kHz – 30 MHz	9 kHz

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Com-Power	L.I.S.N.	LI-200	12005	N/A	N/A
Com-Power	L.I.S.N.	LI-200	12008	N/A	N/A
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2007-10-16	2008-10-16
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2007-03-26	2008-03-26
Rohde&Schwarz	Spectrum Analyzer	FSEM30	849720/019	2007-05-09	2008-05-09

\* Com-Power's LISN were used as the supporting equipment.

\* **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 outlet of the LISN.

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

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

## 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:

**15.80 dB at 17.635 MHz in the Neutral conductor mode**

**Test Data****Environmental Conditions**

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.0 kPa

*The testing was performed by Phoenix Liu on 2008-02-14*

*Test Mode: Charging*

Line Conducted Emissions				FCC Part 15.207	
Frequency (MHz)	Amplitude (dB $\mu$ V)	Detector (QP/AV)	Conductor (Live/Neutral)	Limit (dB $\mu$ V)	Margin (dB)
17.635	34.20	AV	Neutral	50.00	15.80
0.240	35.90	AV	Hot	52.10	16.20
0.245	35.00	AV	Neutral	51.90	16.90
17.635	39.50	QP	Neutral	60.00	20.50
0.365	28.10	AV	Neutral	48.60	20.50
1.455	23.60	AV	Hot	46.00	22.40
1.465	33.00	QP	Neutral	56.00	23.00
0.365	25.60	AV	Hot	48.60	23.00
4.845	23.00	AV	Hot	46.00	23.00
1.585	22.40	AV	Neutral	46.00	23.60
1.465	22.10	AV	Neutral	46.00	23.90
0.240	38.00	QP	Hot	62.10	24.10
4.845	31.90	QP	Hot	56.00	24.10
1.585	31.80	QP	Neutral	56.00	24.20
18.245	25.50	AV	Hot	50.00	24.50
0.245	37.10	QP	Neutral	61.90	24.80
1.455	30.50	QP	Hot	56.00	25.50
8.625	34.50	QP	Hot	60.00	25.50
21.505	24.20	AV	Neutral	50.00	25.80
0.365	31.90	QP	Neutral	58.60	26.70
18.245	32.80	QP	Hot	60.00	27.20
0.365	30.00	QP	Hot	58.60	28.60
8.595	21.00	AV	Hot	50.00	29.00
21.505	26.60	QP	Neutral	60.00	33.40

**Plot(s) of Test Data**

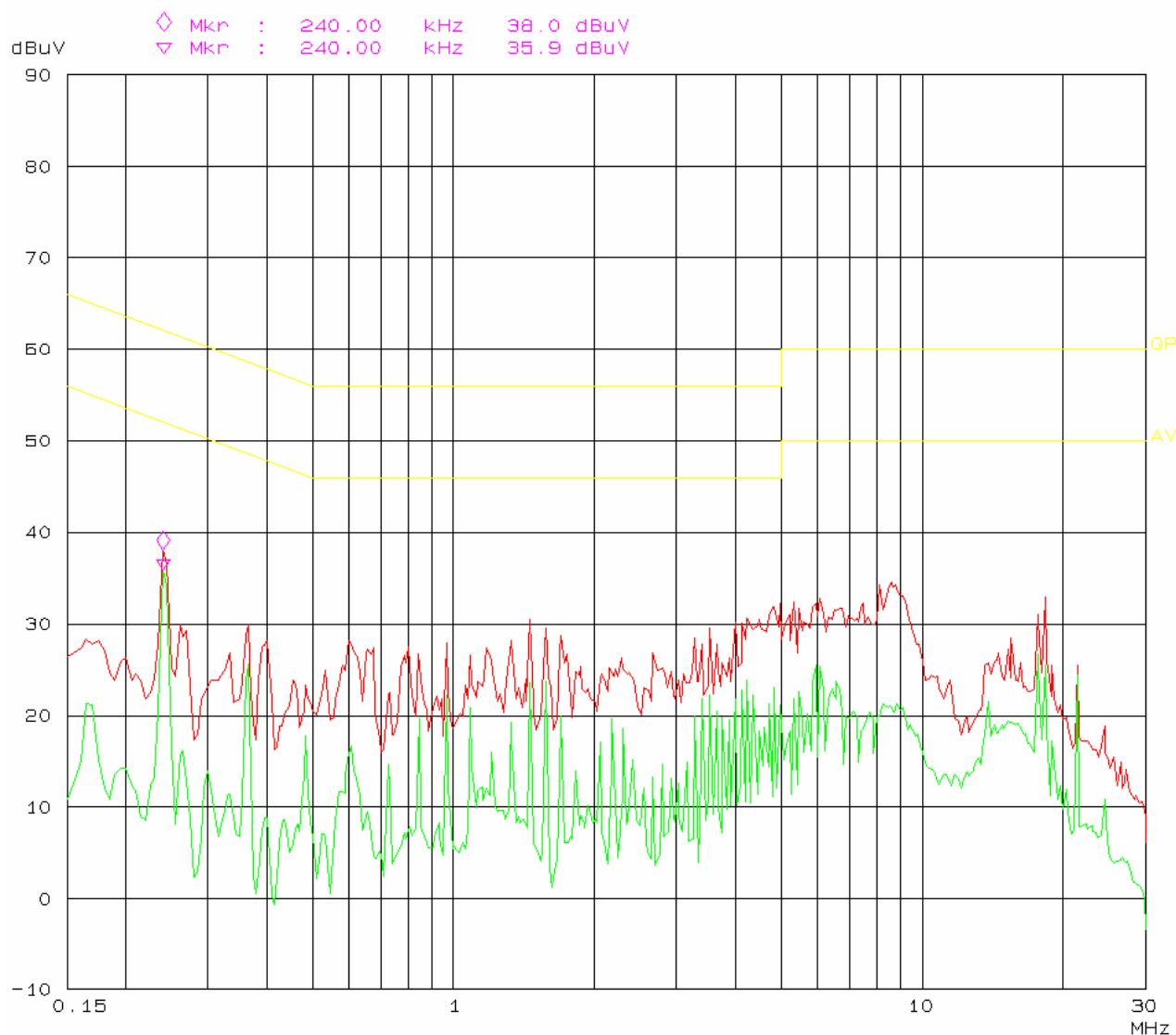
Plot(s) of Test Data is presented hereinafter as reference.

## CONDUCTED EMISSION TEST

14. Feb 08 18:23

## FCC Part 15 B

EUT: Bluetooth Speakerphone M/N: Medallion 4  
Manuf: Omni  
Op Cond: Charging  
Operator: Phoenix  
Test Spec: AC120V/60HZ H  
Comment: Temp: 25 Humi: 56%



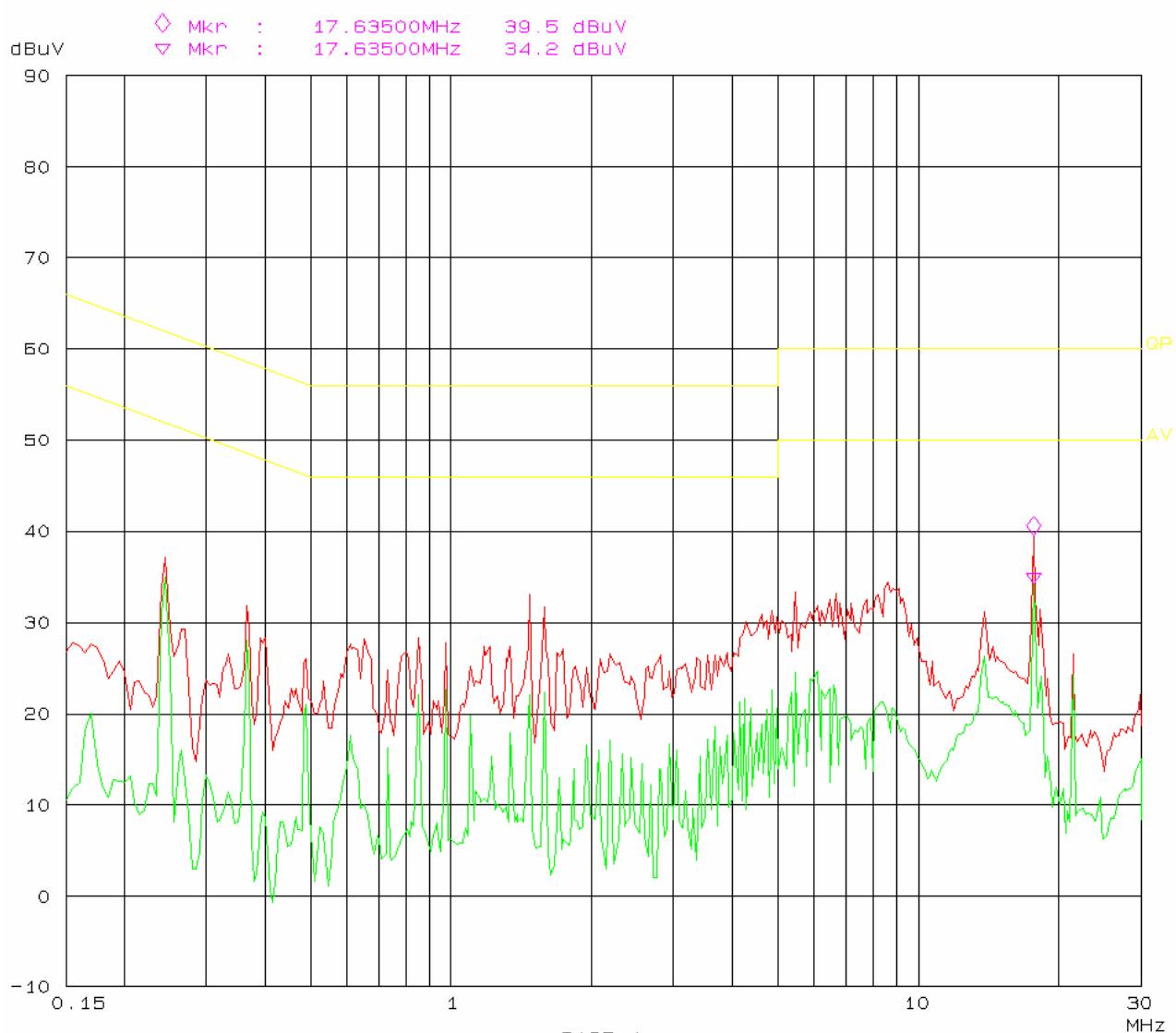
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## CONDUCTED EMISSION TEST

14. Feb 08 18:06

## FCC Part 15 B

EUT: Bluetooth Speakerphone M/N: Medallion 1  
Manuf: Omni  
Op Cond: Charging  
Operator: Phoenix  
Test Spec: AC120V/60HZ N  
Comment: Temp: 25 Humi: 56%



## CFR47 §15.205, §15.209, §15.247 - RADIATED EMISSIONS

### Applicable Standard

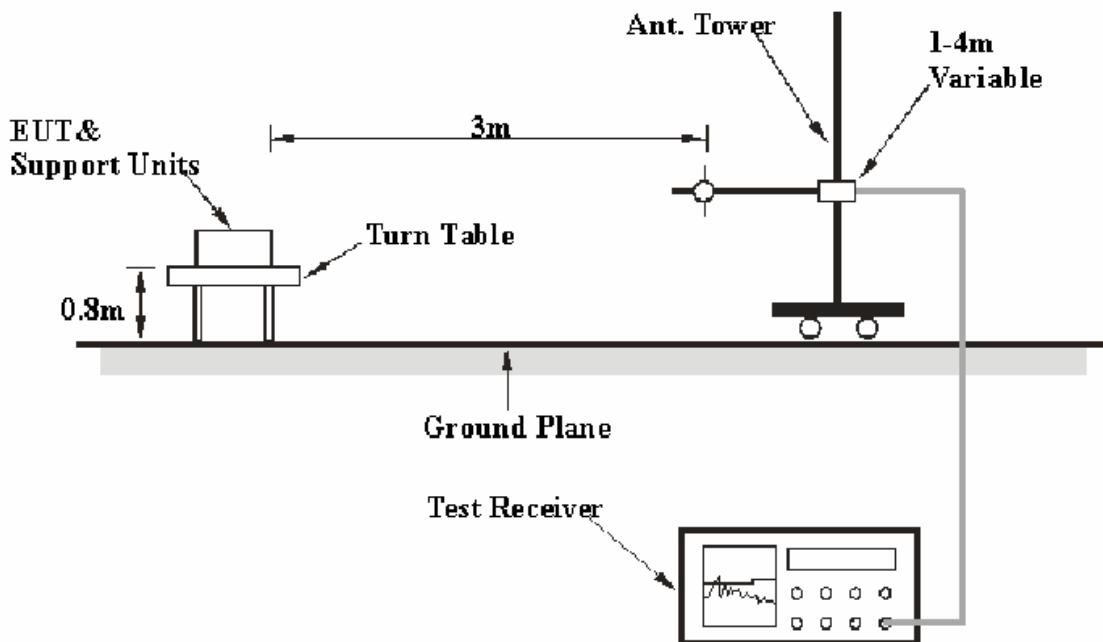
CFR47 §15.205; §15.209; §15.247 (d).

### 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  $\pm 4.0$  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 15.109, 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:

<b><u>Frequency Range</u></b>	<b><u>RBW</u></b>	<b><u>Video B/W</u></b>
30MHz – 1000 MHz	100 kHz	300 kHz
1000 MHz – 25 GHz	1 MHz	3 MHz

## Test Equipment List and Details

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
HP	Amplifier	HP8447D	2944A09795	2007-11-15	2008-11-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2007-10-16	2008-10-16
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2007-08-14	2008-08-14
HP	Amplifier	8449B	3008A00277	2007-09-29	2008-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2007-09-25	2008-09-25
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2007-05-09	2008-05-09

\* **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 notebook 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:

$$\text{Corrected Amplitude.} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.109, 15.205, 15.209, and 15.247, with the worst margin reading of:

### 30 – 1000 MHz:

**For Charging Mode:** 5.3 dB at **599.999400 MHz** in the **Vertical** polarization

**For Receiving Mode:** 5.3 dB at **599.999400 MHz** in the **Vertical** polarization

**For Transmitting Mode:** 2.4 dB at **600.021225 MHz** in the **Vertical** polarization

### Above 1 GHz:

#### For Transmitting Mode:

**4.91 dB** at **4804 MHz** in the **Horizontal** polarization (**Low Channel**)

**2.02 dB** at **4882 MHz** in the **Vertical** polarization (**Middle Channel**)

**2.43 dB** at **4960 MHz** in the **Horizontal** polarization (**High Channel**)

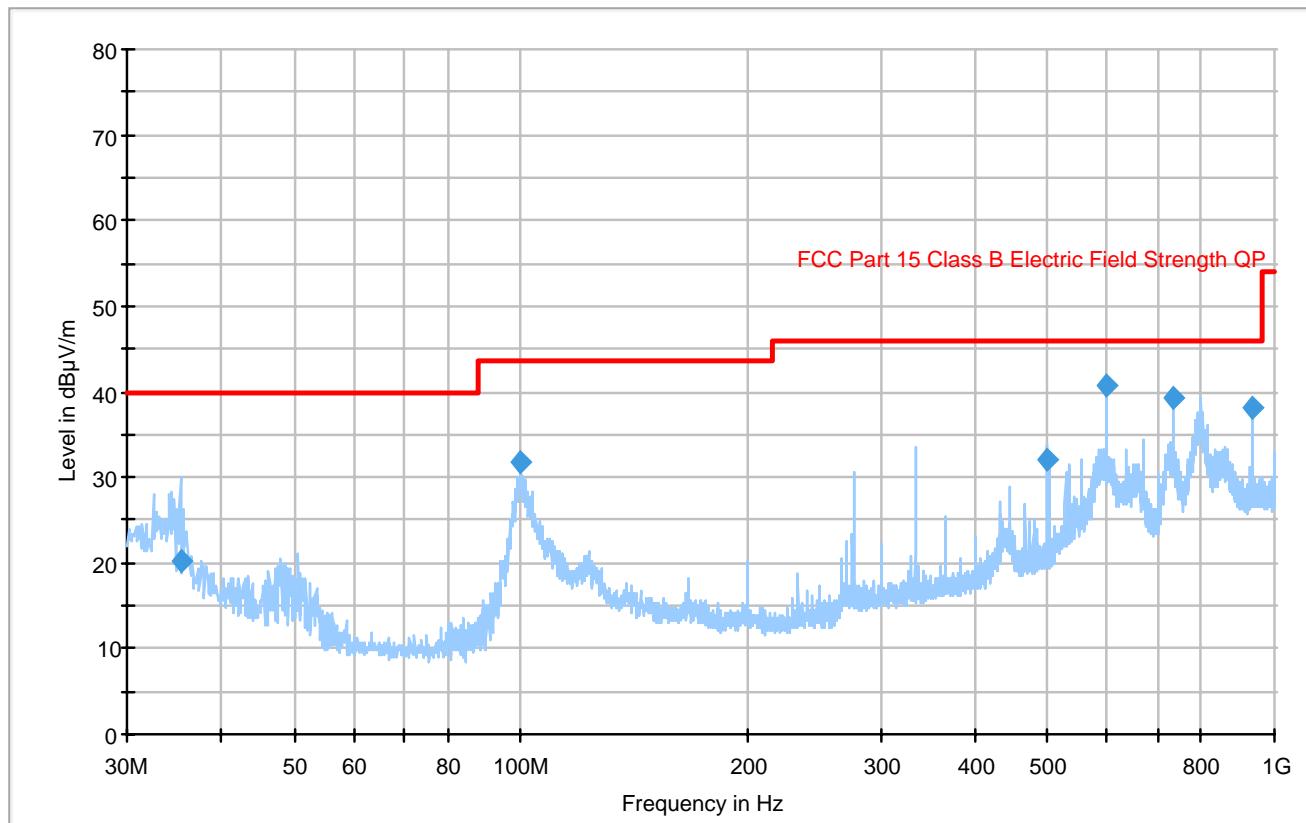
## Test Data

### Environmental Conditions

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.9 kPa

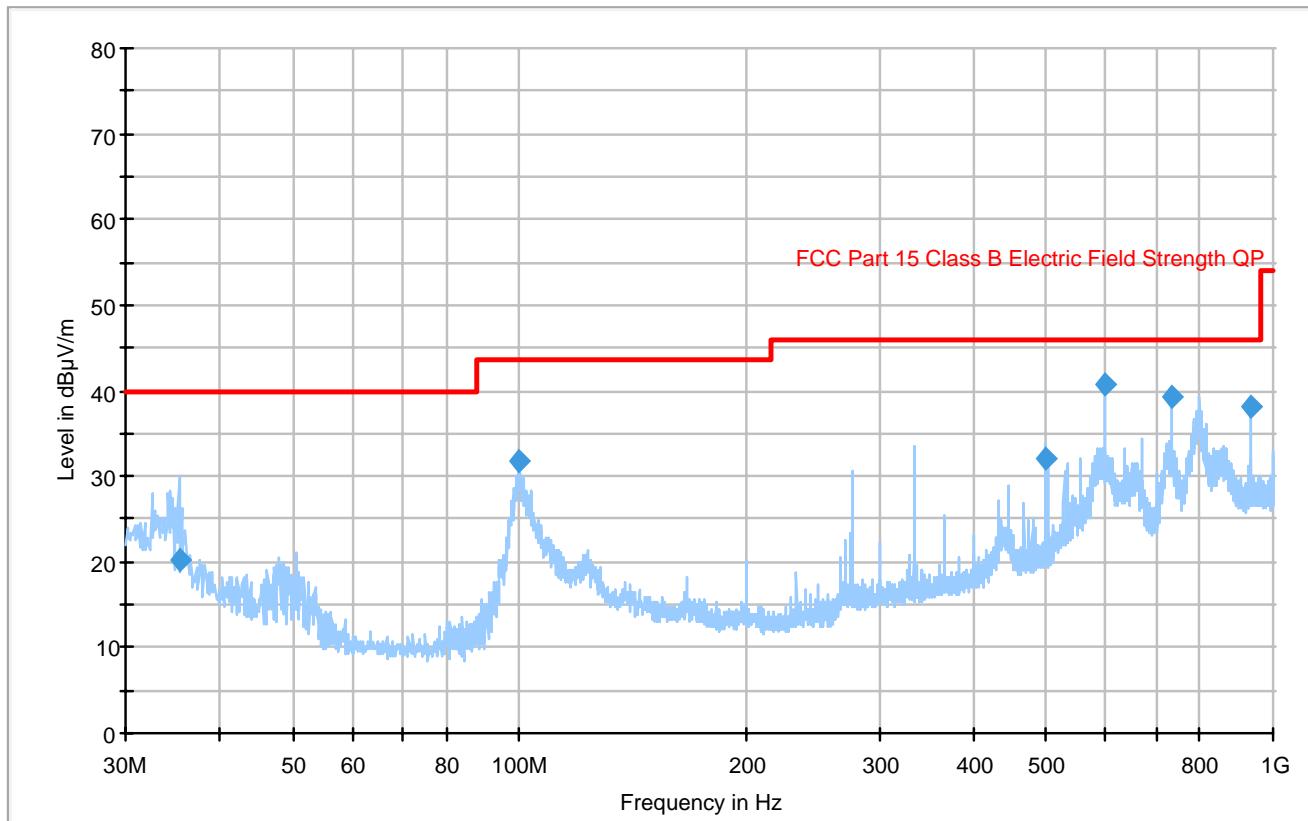
*The testing was performed by Phoenix Liu on 2008-02-14*

Test Mode: Charging (30 - 1000 MHz)



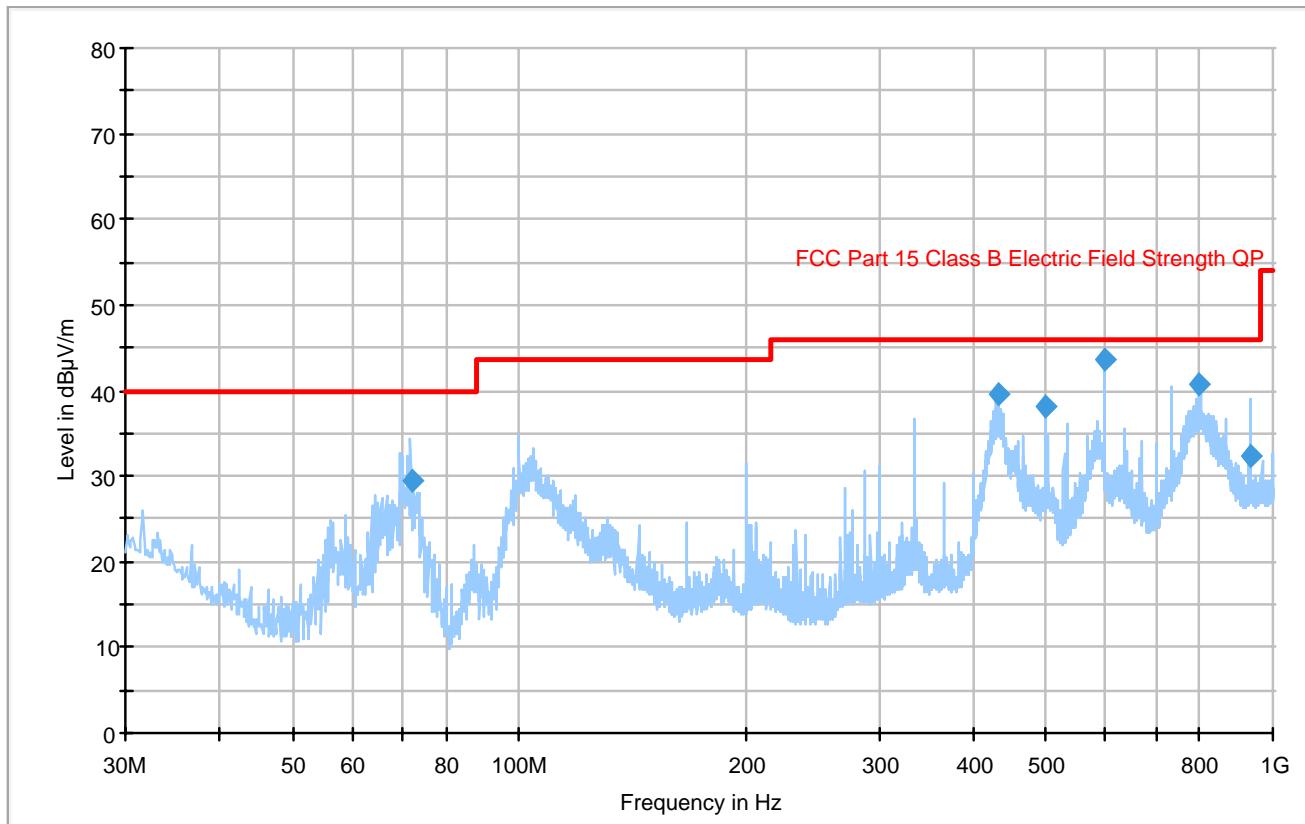
Frequency (MHz)	Corrected Amp. (dB $\mu$ V/m)	Antenna Height (cm)	Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dB $\mu$ V/m)	Margin (dB)
599.999400	40.7	105.0	V	278.0	-3.7	46.0	5.3
733.314925	39.4	200.0	H	150.0	-1.2	46.0	6.6
935.544625	38.2	106.0	V	0.0	1.8	46.0	7.8
99.998075	31.7	252.0	H	116.0	-15.7	43.5	11.8
499.977675	32.1	101.0	V	298.0	-6.3	46.0	13.9
35.364625	20.1	120.0	V	0.0	-7.7	40.0	19.9

Test Mode: Receiving (30 – 1000 MHz)



Frequency (MHz)	Corrected Amp. (dB $\mu$ V/m)	Antenna Height (cm)	Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dB $\mu$ V/m)	Margin (dB)
599.999400	40.7	105.0	V	278.0	-3.7	46.0	5.3
733.314925	39.4	200.0	H	150.0	-1.2	46.0	6.6
935.544625	38.2	106.0	V	0.0	1.8	46.0	7.8
99.998075	31.7	252.0	H	116.0	-15.7	43.5	11.8
499.977675	32.1	101.0	V	298.0	-6.3	46.0	13.9
35.364625	20.1	120.0	V	0.0	-7.7	40.0	19.9

Test Mode: Transmitting (30 – 1000 MHz)



Frequency (MHz)	Corrected Amp. (dB $\mu$ V/m)	Antenna Height (cm)	Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dB $\mu$ V/m)	Margin (dB)
600.021225	43.6	170.0	V	314.0	-3.7	46.0	2.4*
799.981800	40.8	102.0	H	203.0	-0.3	46.0	5.2
433.309375	39.4	198.0	V	86.0	-7.5	46.0	6.6
500.029125	38.2	105.0	V	268.0	-6.3	46.0	7.8
71.933125	29.6	380.0	H	328.0	-16.8	40.0	10.4
935.432250	32.4	101.0	V	0.0	1.8	46.0	13.6

## Test Mode: Transmitting (Above 1GHz)

Freq. (MHz)	Meter Reading (dBuV)	Detector PK/QP/AV	Direction Degree	Antenna			Cable Loss (dB)	Pre- Amp. Gain (dB)	Corr. Amp. (dBuV/m)	FCC Part 15.247/209		
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBuV/m)	Margin (dB)	Remarks
<b>Low Channel (2402 MHz)</b>												
4804	43.25	AV	90	1.0	H	34.6	4.64	33.4	49.09	54	4.91	Harmonic
4804	41.88	AV	90	1.0	V	34.7	4.64	33.4	47.82	54	6.18	Harmonic
1192	46.41	AV	180	1.2	V	26.0	2.77	35.0	40.18	54	13.82	Harmonic
1192	44.31	AV	180	1.2	H	26.5	2.77	35.0	38.58	54	15.42	Harmonic
4804	52.57	PK	180	1.2	H	34.6	4.64	33.4	58.41	74	15.59	Harmonic
4804	52.29	PK	180	1.2	V	34.7	4.64	33.4	58.23	74	15.77	Harmonic
1192	57.29	PK	45	1.2	V	26.0	2.77	35.0	51.06	74	22.94	Harmonic
1192	56.53	PK	45	1.2	H	26.5	2.77	35.0	50.80	74	23.20	Harmonic
<b>Middle Channel (2441 MHz)</b>												
4882	46.14	AV	243	1.4	V	34.6	4.64	33.4	51.98	54	2.02*	Harmonic
4882	43.52	AV	142	1.6	H	34.7	4.64	33.4	49.46	54	4.54	Harmonic
1092	51.42	AV	85	1.5	V	26.5	2.77	35.0	45.69	54	8.31	Harmonic
1092	49.86	AV	135	1.3	H	26.0	2.77	35.0	43.63	54	10.37	Harmonic
4882	53.60	PK	153	1.5	V	34.6	4.64	33.4	59.44	74	14.56	Harmonic
4882	51.87	PK	234	1.8	H	34.7	4.64	33.4	57.81	74	16.19	Harmonic
1092	61.24	PK	156	1.4	H	26.0	2.77	35.0	55.01	74	18.99	Harmonic
1092	60.70	PK	265	1.4	V	26.5	2.77	35.0	54.97	74	19.03	Harmonic
<b>High Channel (2480 MHz)</b>												
4960	45.82	AV	256	1.8	H	34.6	4.55	33.4	51.57	54	2.43*	Harmonic
4960	44.81	AV	142	1.5	V	34.7	4.55	33.4	50.66	54	3.34*	Harmonic
1092	50.64	AV	210	1.2	V	26.0	2.77	35.0	44.41	54	9.59	Spurious
1092	48.56	AV	156	1.2	H	26.5	2.77	35.0	42.83	54	11.17	Spurious
4960	54.23	PK	142	1.4	V	34.7	4.55	33.4	60.08	74	13.92	Harmonic
4960	53.29	PK	145	1.4	H	34.6	4.55	33.4	59.04	74	14.96	Harmonic
1092	61.70	PK	128	1.5	H	26.5	2.77	35.0	55.97	74	18.03	Spurious
1092	59.82	PK	240	1.4	V	26.0	2.77	35.0	53.59	74	20.41	Spurious

\* Within measurement uncertainty.

**CFR47 §15.247(a) (1)-CHANNEL SEPARATION TEST****Applicable Standard**

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB 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	2007-10-16	2008-10-16

\* **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**

<b>Temperature:</b>	27 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.9 kPa

*The testing was performed by Phoenix Liu on 2008-02-16.*

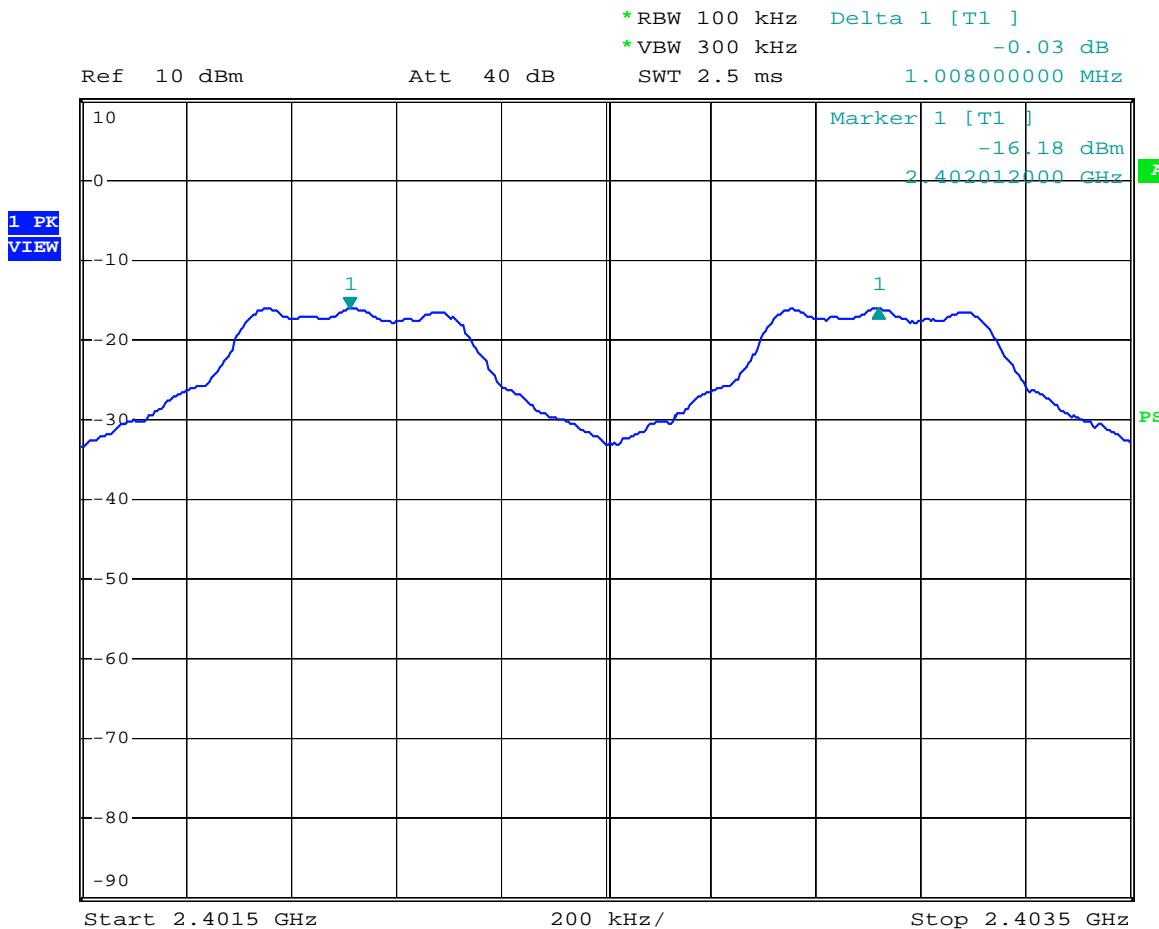
*Test Mode: Transmitting*

Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low Channel	2402	1.008	0.528	Pass
Adjacent Channel	2403			
Mid Channel	2441	1.004	0.528	Pass
Adjacent Channel	2442			
High Channel	2480	1.004	0.513	Pass
Adjacent Channel	2479			

**Test Result:** Compliance.

Please refer to following plots

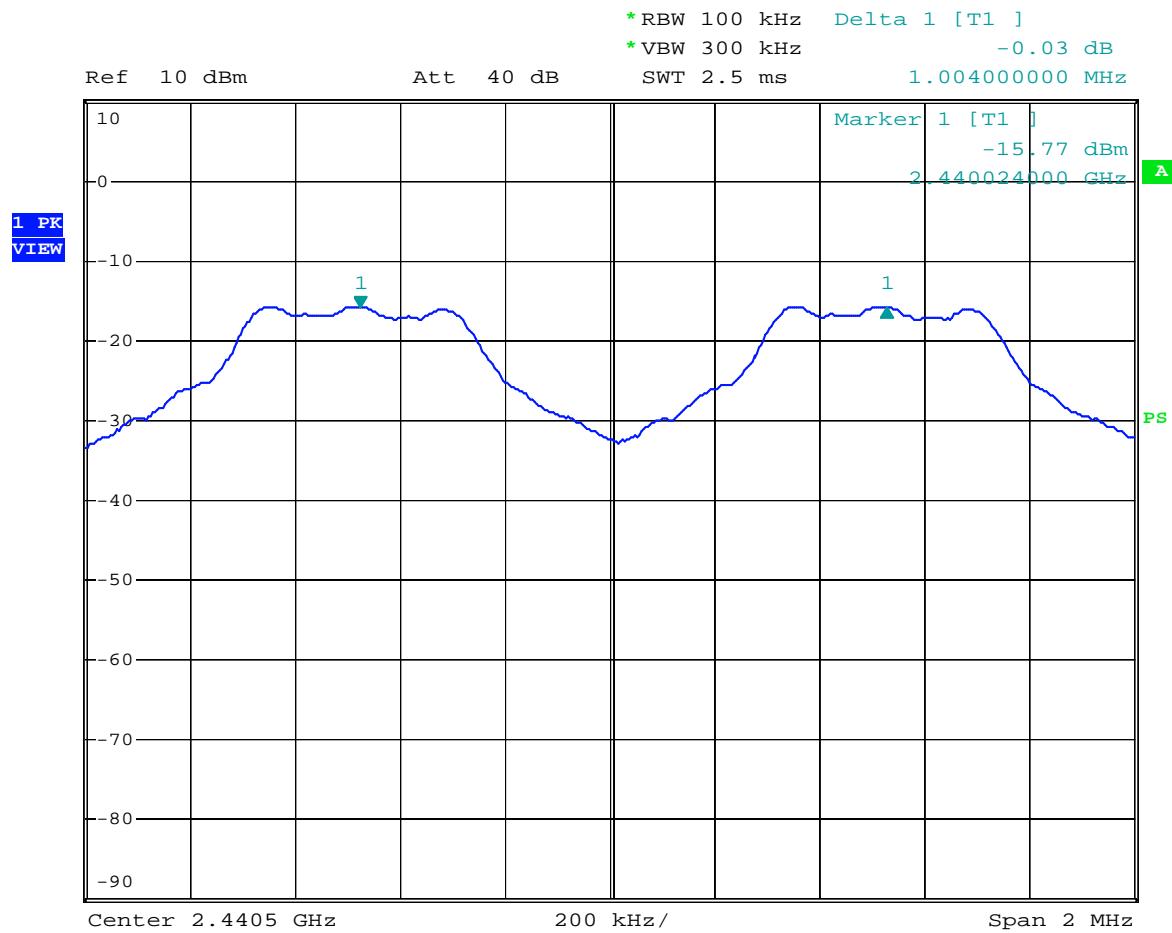
## Low Channel



channel separation low channel

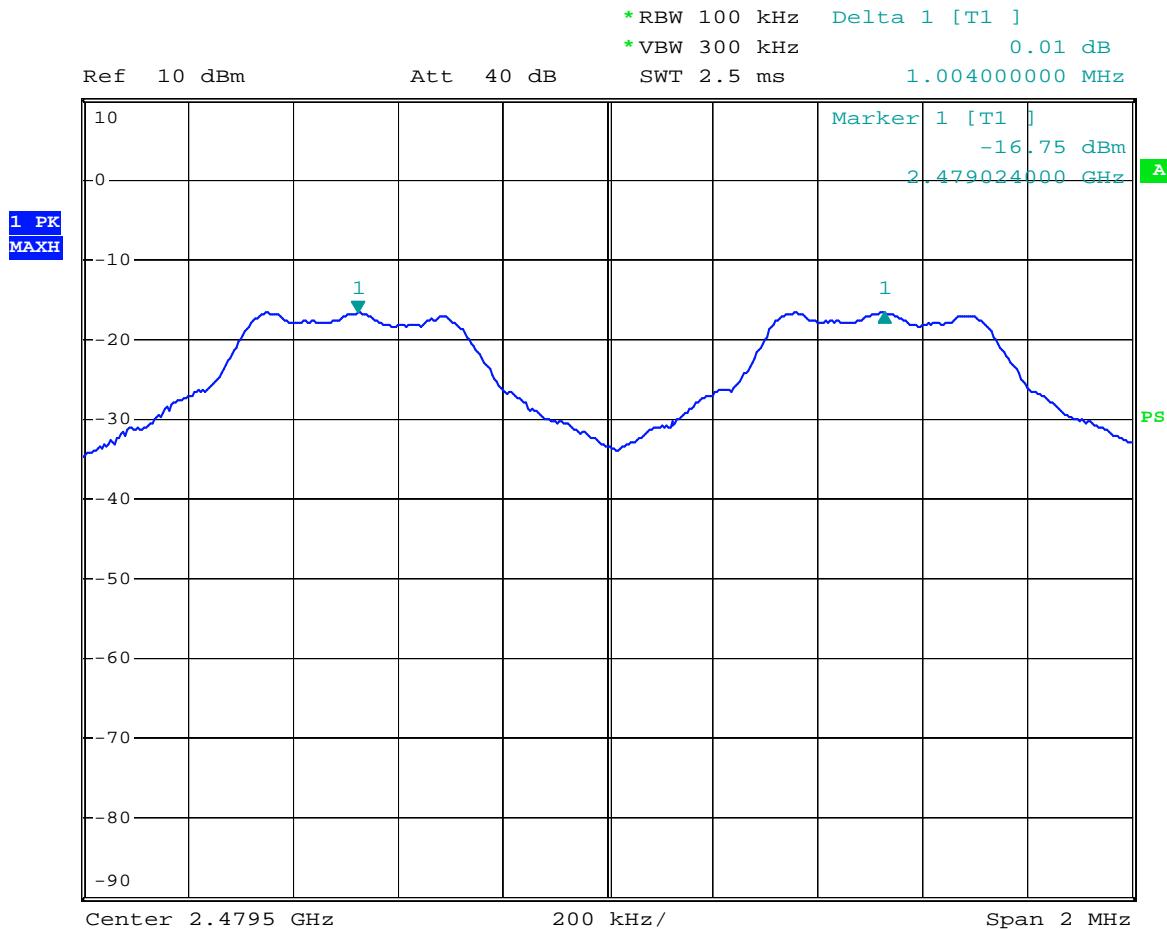
Date: 16.FEB.2008 02:45:52

## Middle Channel



channel separation middle channel

Date: 16.FEB.2008 02:48:26

**High Channel**

channel separation high channel

Date: 16.FEB.2008 02:51:29

**CFR47 §15.247(a) (1) – 20dB 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	2007-10-16	2008-10-16

\* **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 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**

<b>Temperature:</b>	27 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.9 kPa

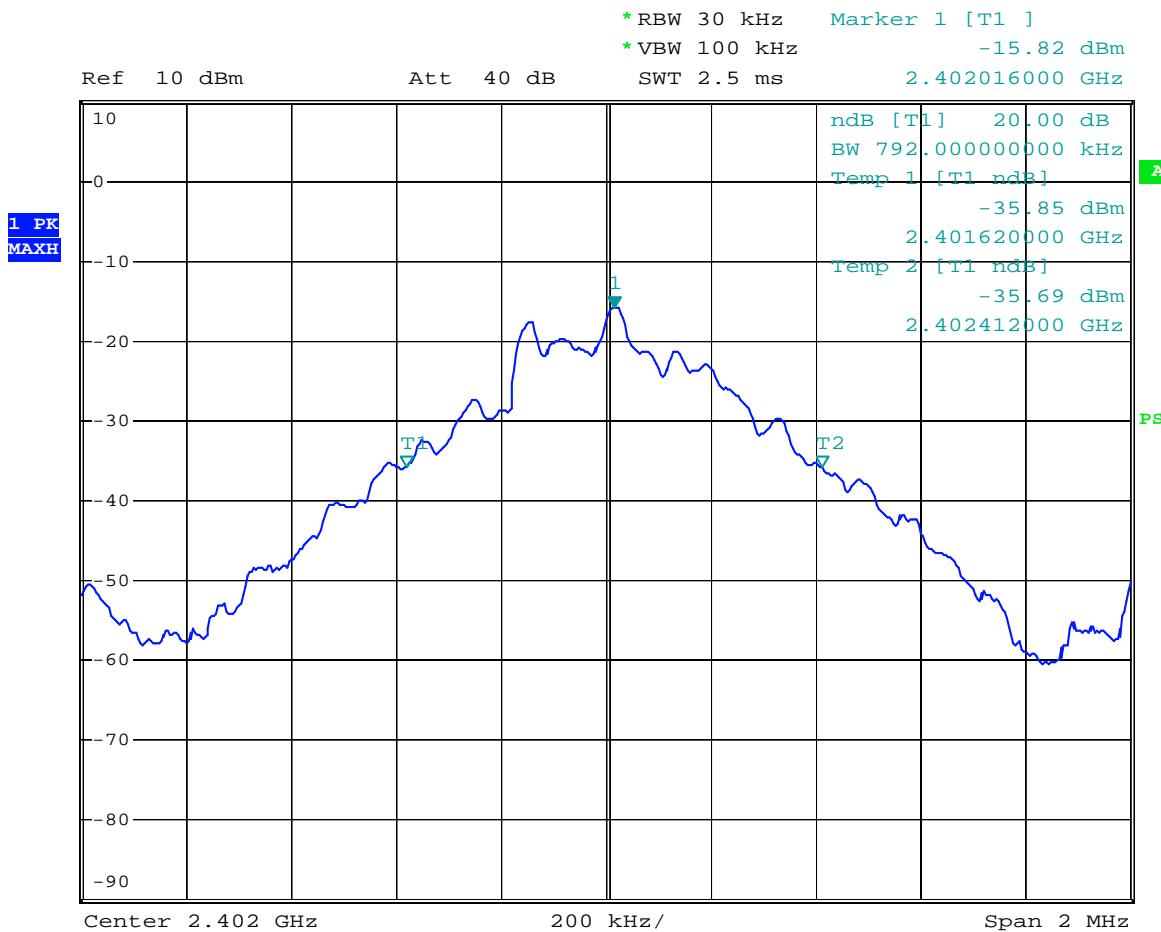
*The testing was performed by Phoenix Liu on 2008-02-16.*

**Test Result:** Please refer to the following table and plots.

*Test Mode: Transmitting*

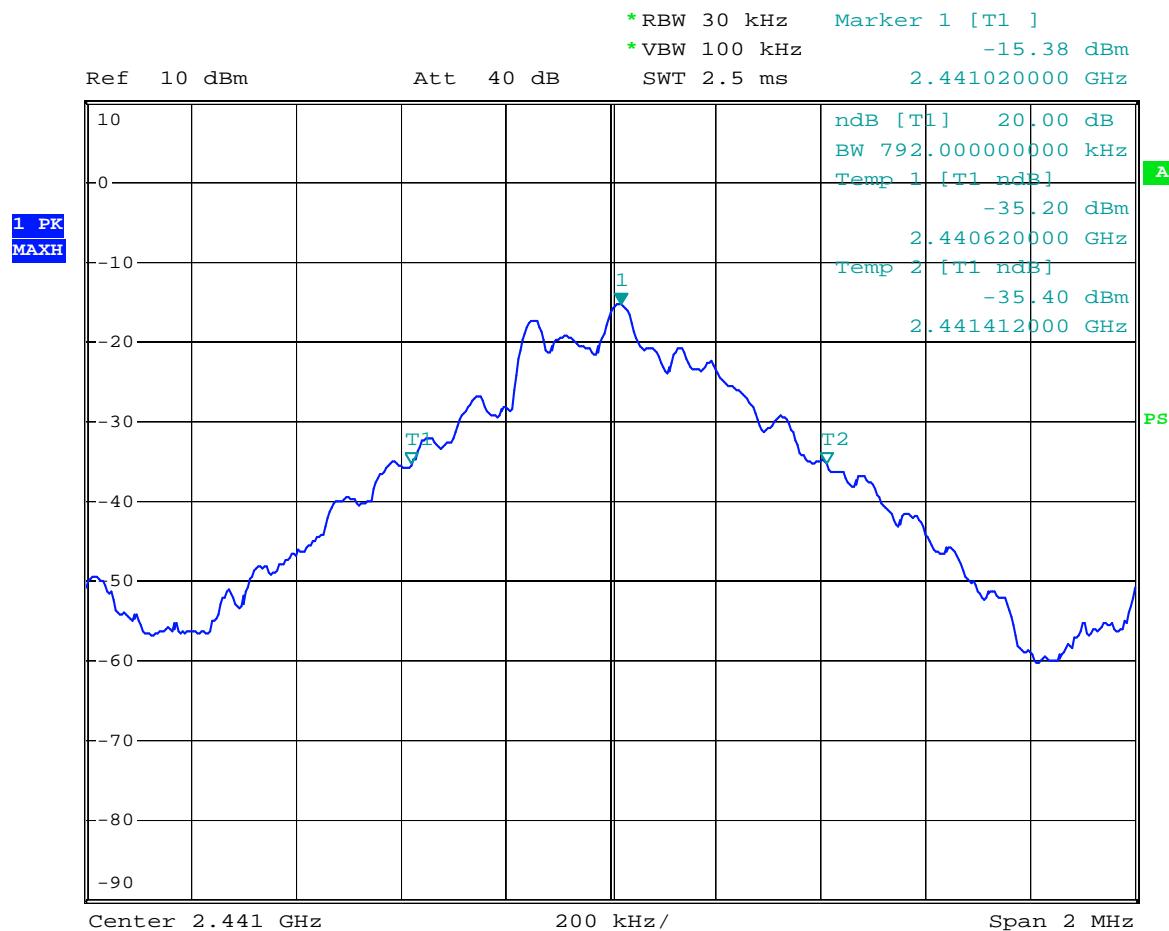
Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)
Low	2402	792
Middle	2441	792
High	2480	796

### Low Channel



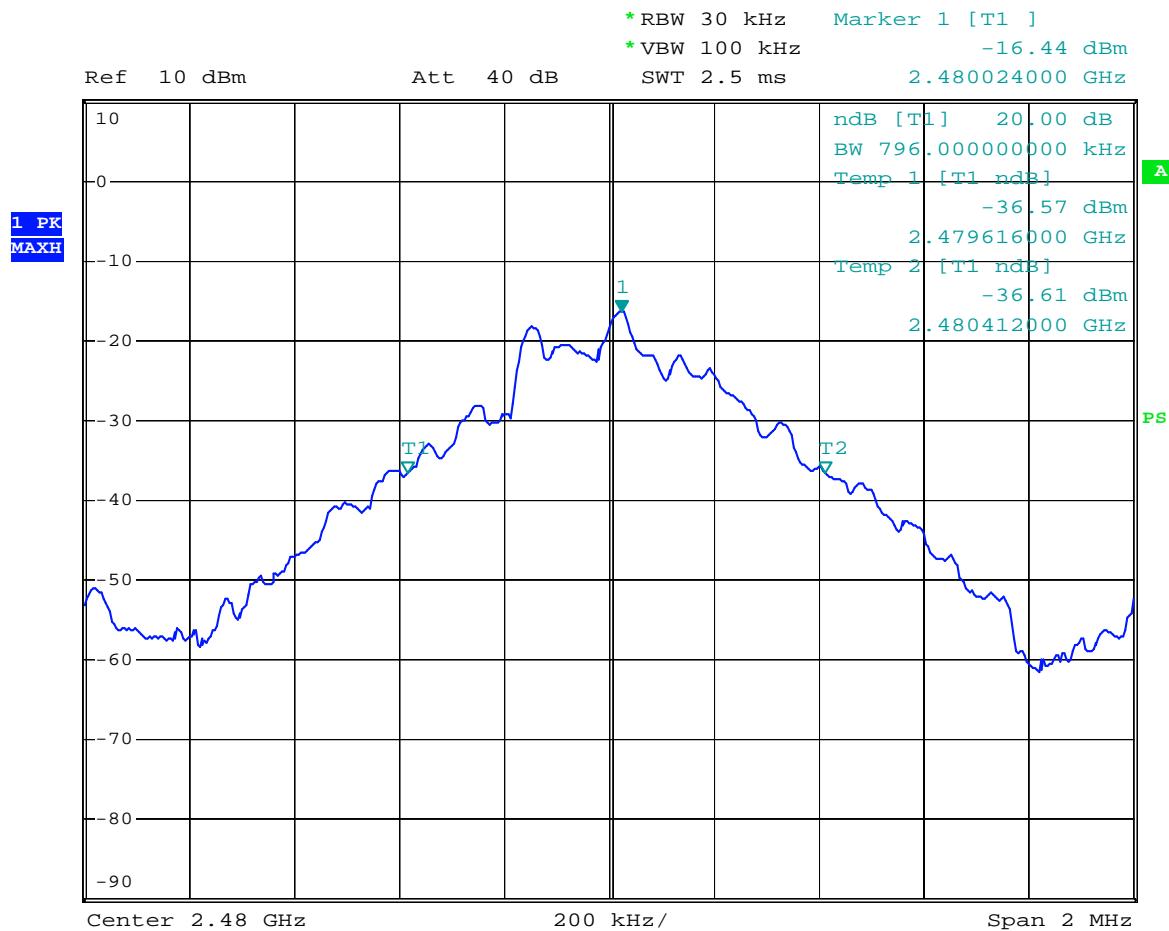
20dB bandwidth low channel

Date: 16.FEB.2008 03:10:51

**Middle Channel**

20dB bandwidth middle channel

Date: 16.FEB.2008 03:11:42

**High Channel**

20dB bandwidth high channel

Date: 16.FEB.2008 03:12:28

## CFR47 §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	2007-10-16	2008-10-16

\* **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 transmitting mode from first channel to last.
3. By using the Max-Hold function record the Quantity of the channel.

### Test Data

#### Environmental Conditions

Temperature:	27 °C
Relative Humidity:	56 %
ATM Pressure:	100.9 kPa

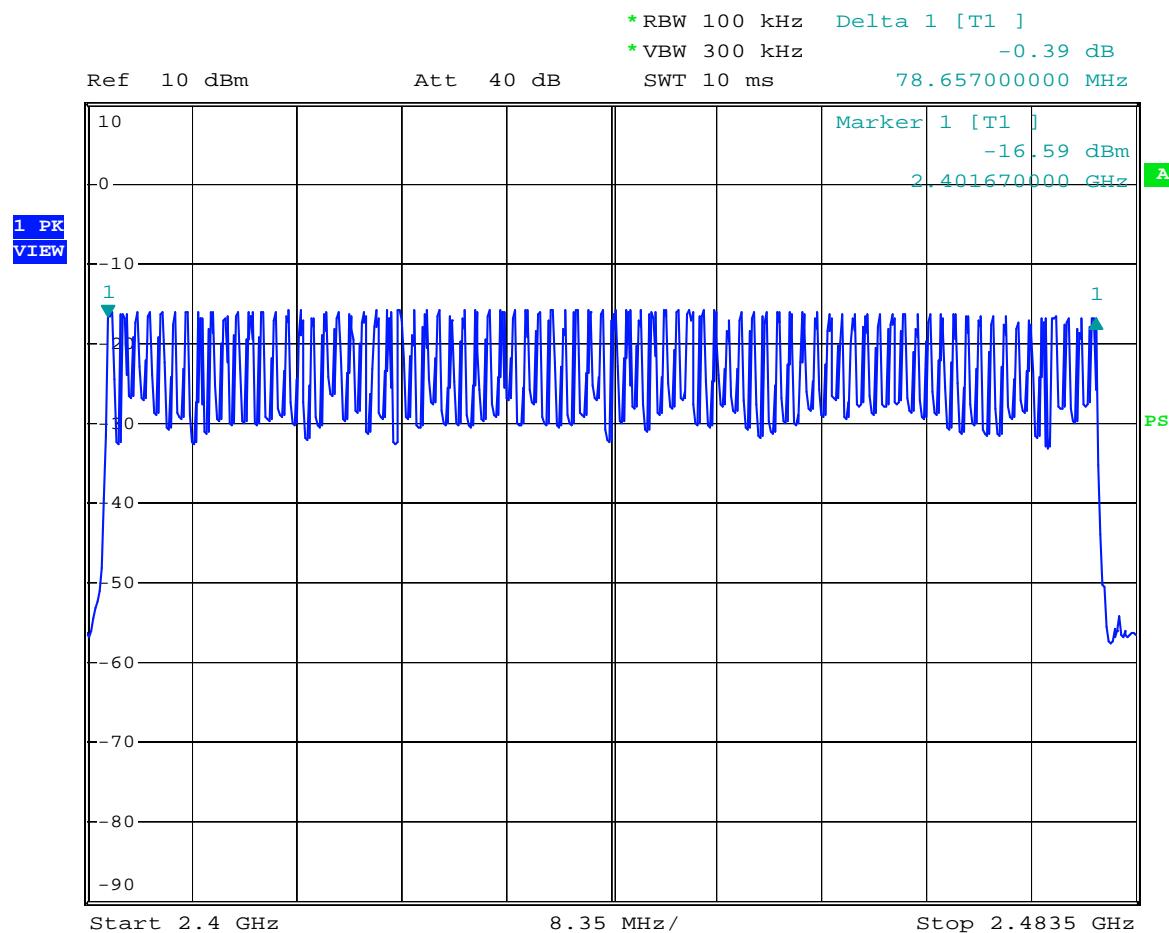
The testing was performed by Phoenix Liu on 2008-02-16.

Test Mode: Transmitting

Test Result: Compliance.

Please refer to following plot.

Frequency Range (MHz)	Number of Hopping Channel	Limit
2402-2480	79	>15

**Number of Hopping Channels**

hopping channels

Date: 16.FEB.2008 02:54:48

**CFR47 §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	2007-10-16	2008-10-16

\* **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 \* hop rate/ number of hopping channels \* 31.6s

Hop rate=1600/s

**Test Data****Environmental Conditions**

Temperature:	27 °C
Relative Humidity:	56 %
ATM Pressure:	100.9 kPa

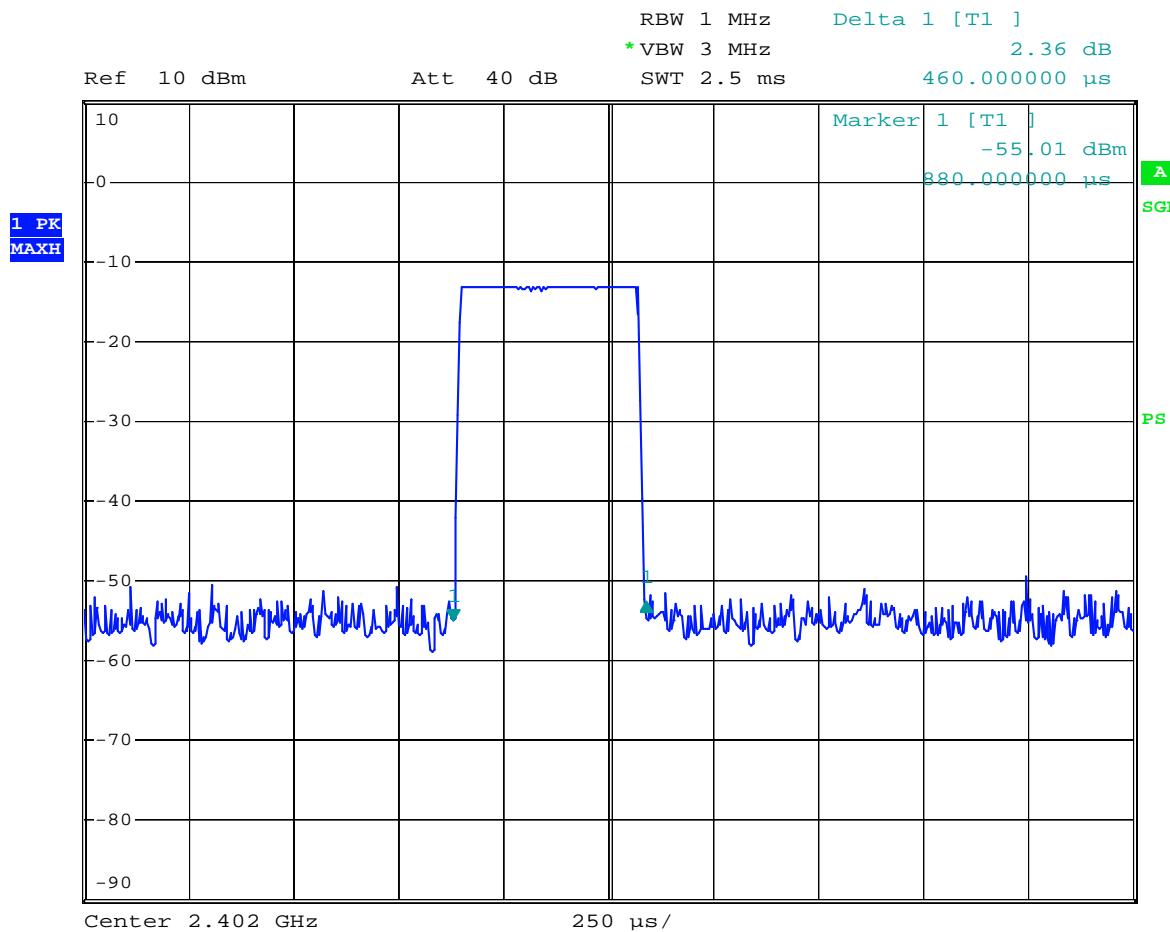
*The testing was performed by Phoenix Liu on 2008-02-16.*

*Test Mode: Transmitting*

**Test Result:** Compliance. Please refer to following tables and plots

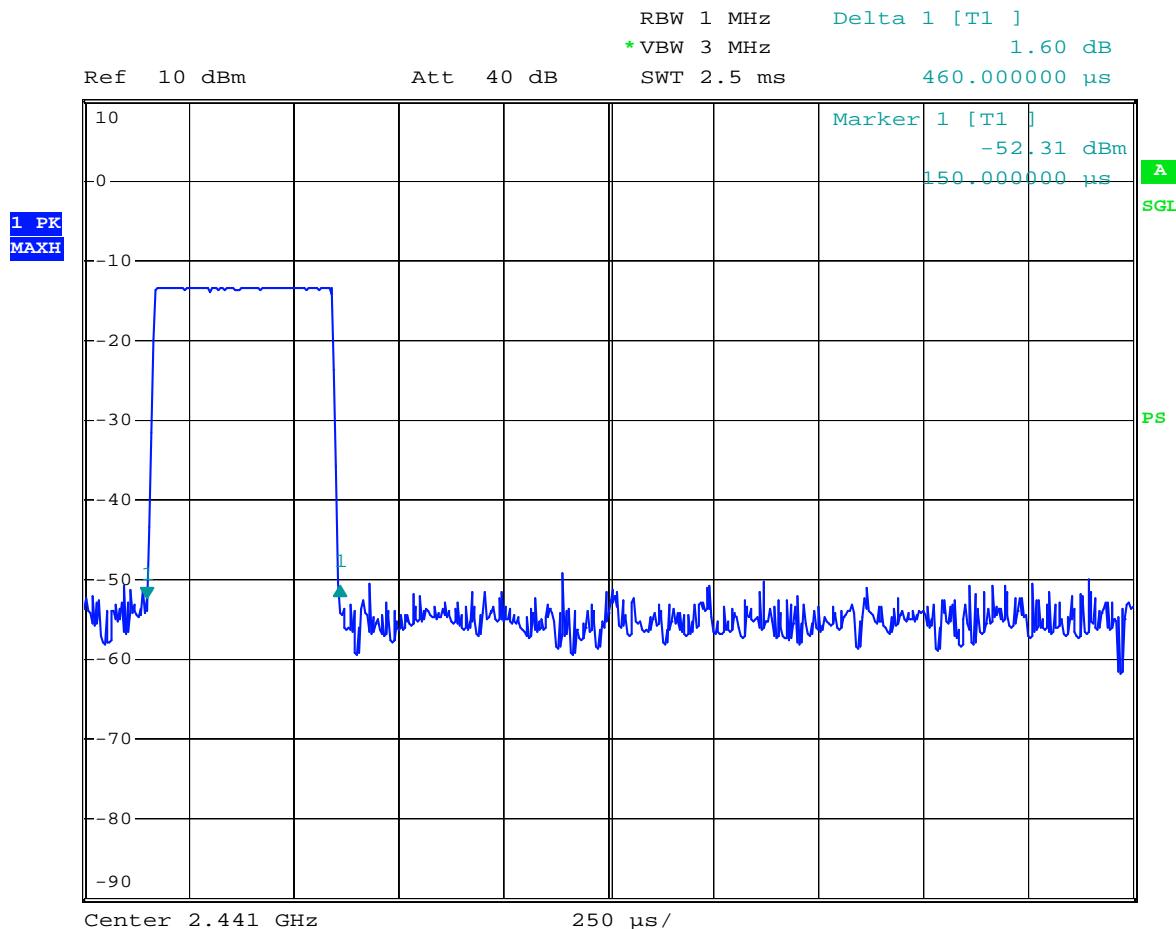
Channel	Pulse width (msec)	Dwell time (sec)	Limit (sec)	Result
Low	0.460	0.147	0.4	Pass
Middle	0.460	0.147	0.4	Pass
High	0.460	0.147	0.4	Pass

**NOTE:** Dwell time=Pulse width (ms)  $\times$  (1600  $\div$  2  $\div$  79)  $\times$  31.6 Second

**Low Channel**

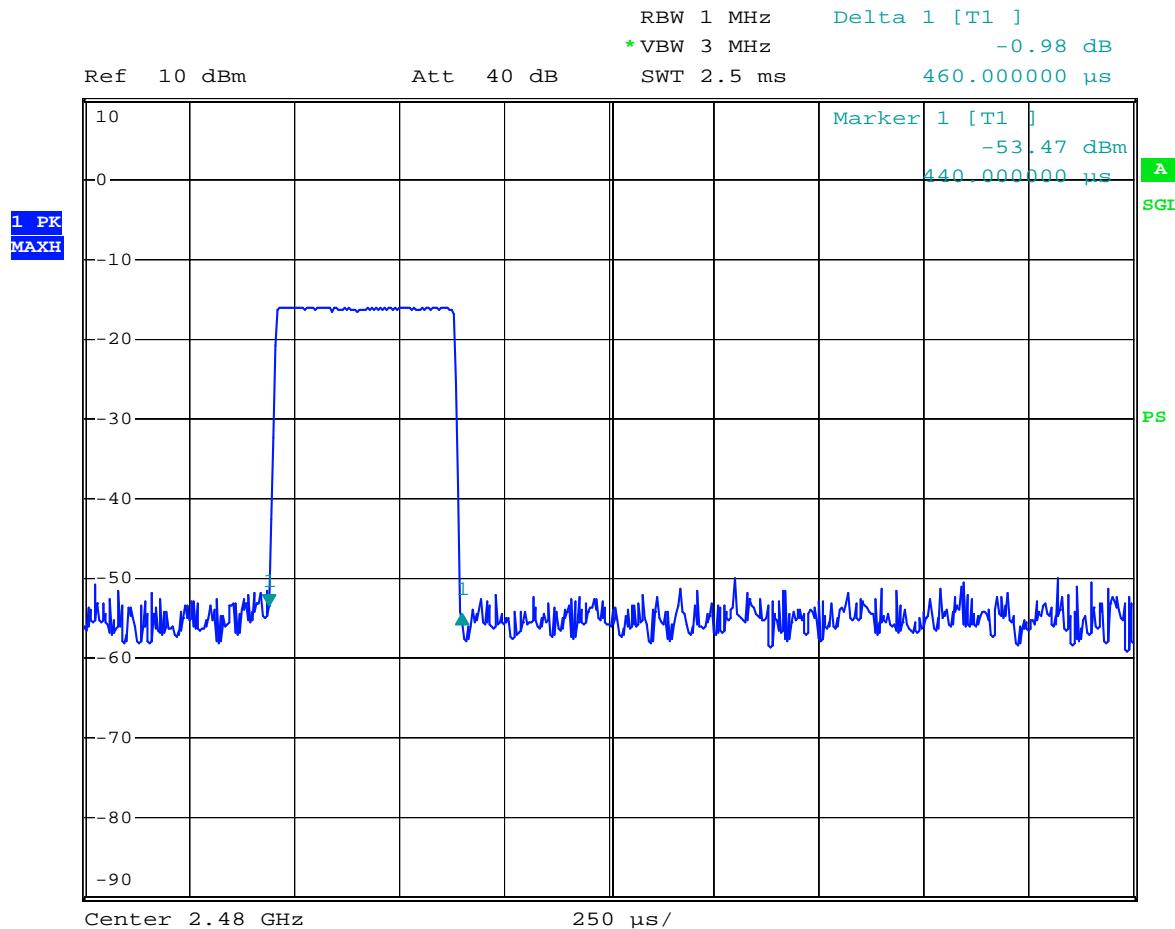
dwell time low channel

Date: 16.FEB.2008 16:46:37

**Middle Channel**

dwell time middle channel

Date: 16.FEB.2008 16:45:51

**High Channel**

dwell time high channel

Date: 16.FEB.2008 16:47:50

**CFR47 §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
HP	Amplifier	HP8447D	2944A09795	2007-11-15	2008-11-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2007-10-16	2008-10-16
HP	Amplifier	8449B	3008A00277	2007-09-29	2008-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2007-09-25	2008-09-25
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2007-05-09	2008-05-09

\* **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 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 peak detection modes.

**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:

$$\text{Corrected Amplitude.} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

**Test Data****Environmental Conditions**

<b>Temperature:</b>	27 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.9 kPa

The testing was performed by Phoenix Liu on 2008-02-16.

Test Mode: Transmitting

**Test Result:** Compliance.

Freq. (MHz)	Receiver Reading (dB $\mu$ V)	Detector PK/AV	Table Direction Degree	Test Antenna		Cable Loss (dB)	Pre- Amp. (dB)	Cord. Amp. (dB $\mu$ V/m)	Tran. Factor (dB)	EIRP		FCC 15.247 Limit (mW)
				Height (m)	Factor (dB/m)					(dBm)	(mW)	
<b>Low Channel</b>												
2402	101.72	PK	90	1.0	23.0	2.0	35	91.72	95.27	-3.55	0.442	125
<b>Middle Channel</b>												
2441	106.16	PK	128	1.5	23.1	2.1	35	96.36	95.27	1.09	1.285	125
<b>High Channel</b>												
2480	104.75	PK	65	1.4	23.2	2.2	35	95.15	95.27	-0.12	0.973	125

## CFR47 §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	2007-10-16	2008-10-16

\* **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

<b>Temperature:</b>	27 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.9 kPa

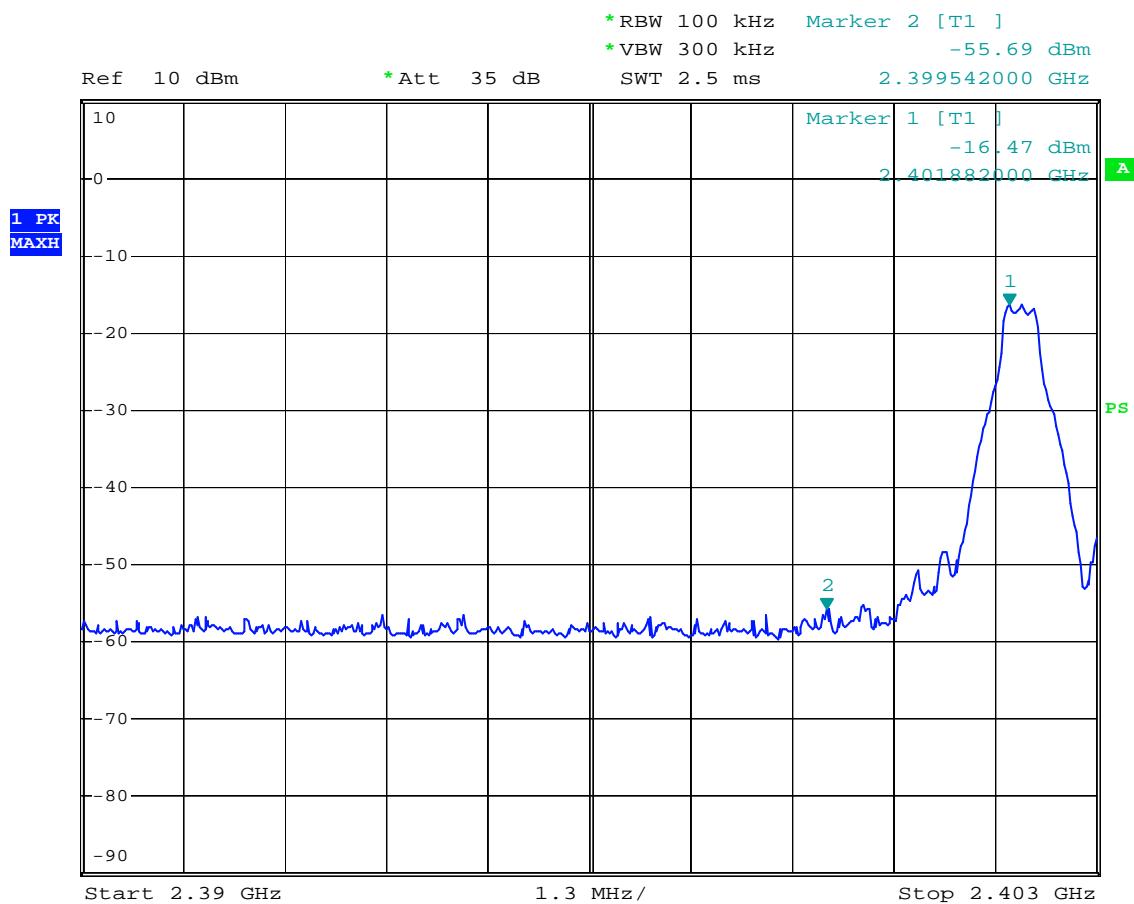
The testing was performed by Phoenix Liu on 2008-01-27.

Test Mode: Transmitting

Test Result: Pass

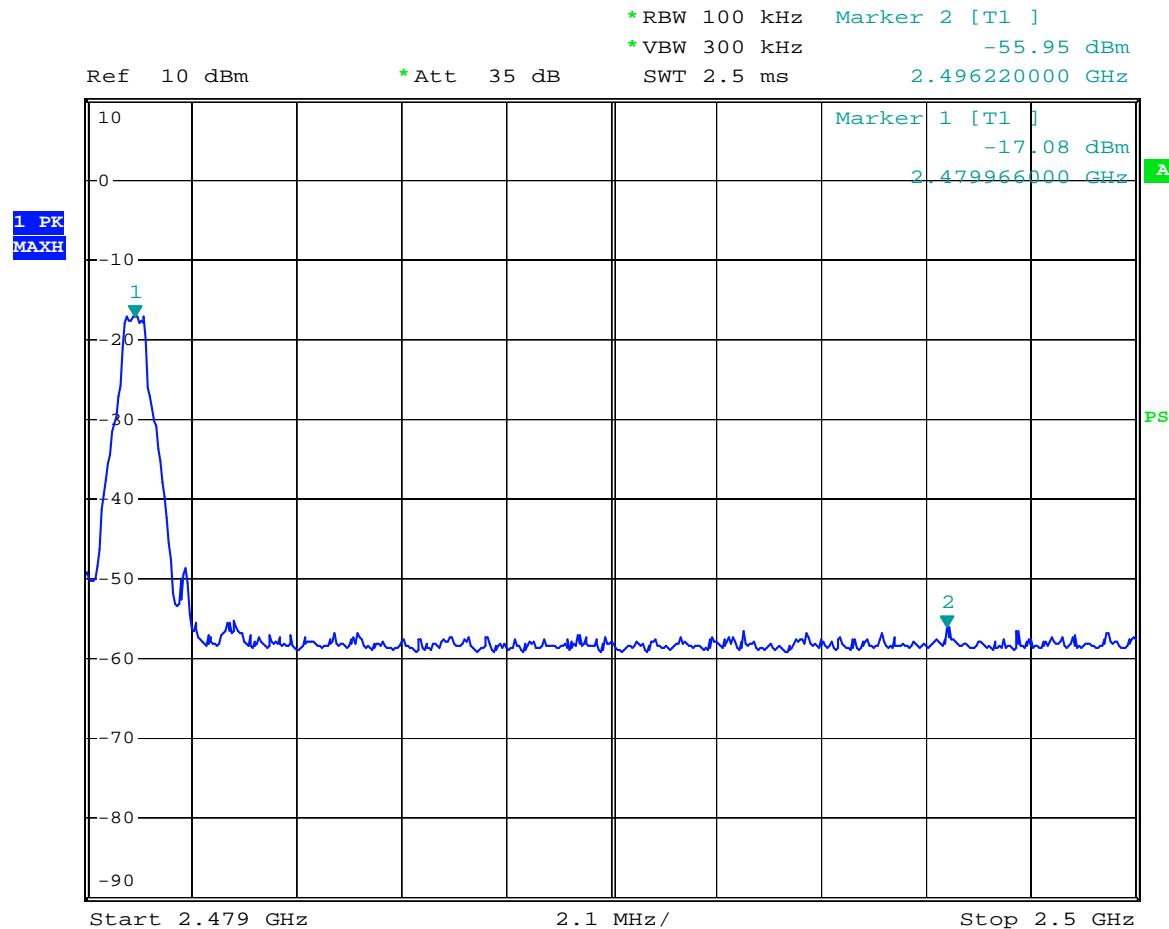
Please refer to the following plots.

Band Edge Left Side



band edge left

Date: 16.FEB.2008 03:53:06

**Band Edge Right Side**

band edge right

Date: 16.FEB.2008 03:50:39

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