



NVLAP LAB CODE 200707-0



## FCC PART 15.247

### MEASUREMENT AND TEST REPORT

For

### GREAT WELL ELECTRONIC LIMITED

Industrial Area Gangtou Chenwu Village Guanlan Road Guanlan Town Baoan  
District Shenzhen City, Gungdong, China

**FCC ID: RR7CLBLUEHOOK**

<b>This Report Concerns:</b>		<b>Equipment Type:</b>
<input checked="" type="checkbox"/> Original Report		Bluetooth Earphone
<b>Test Engineer:</b>	Andy Yan	
<b>Report No.:</b>	RSZ07070403	
<b>Test Date:</b>	2007-07-16	
<b>Report Date:</b>	2007-08-01	
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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 Laboratory 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

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

The *GREAT WELL ELECTRONIC LIMITED* 's product, model number: *CL BlueHook* or the "EUT" as referred to in this report is a *Bluetooth Earphone*, which measures approximately: 5.2 cm L x 2.5 cm W x 2.4 cm H, rated input voltage: DC 3.7V Battery.

AC/DC Adapter:

Manufacturer: GREAT WELL ELECTRONIC LIMITED

Model: GW-TR-009

Input: AC 100-240V/50-60Hz

Input Current: 0.15AC A

Output: DC 5.0V, 500mA

*\* The test data gathered are from production sample, serial number: 0707010 provided by the manufacturer, we receive the EUT on 2007-07-04.*

### Objective

This Type approval report is prepared on behalf of *GREAT WELL ELECTRONIC LIMITED* 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 Laboratory 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 Laboratory 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 Laboratory 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 Laboratory 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/ts/htdocs/210/214/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 Laboratory Corp. (Shenzhen).

### Equipment Modifications

Bay Area Compliance Laboratory Corp. (Shenzhen) has not done any modification on the EUT.

### Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
DELL	Motherboard	OWC297	CN-OWC297-70821-566-02BR	DoC
DELL	Power	NPS-250KB D	CN-0H2678-17972-56E8NBM	DoC
Seagate	Hard Disk	ST340014A	5JXK3NAD	DoC
DELL	3.5' Floppy	N/A	CN-0N8893-69802-54Q-02OZ	DoC
Lite-ON	CD-Rom	LTN-489S	N/A	DoC
Intel	Ethernet	PRO 10/100 VE	N/A	DoC
Intel	CPU	Celeron D-2533	N/A	DoC
ProMOS	Memory	V826632K24SATG-C0	0525-K1933700	DoC
DELL	PC	DELL 170L	CN-0TC670-70821-560-F4WQ	DoC

### Local Support Equipment List and Details

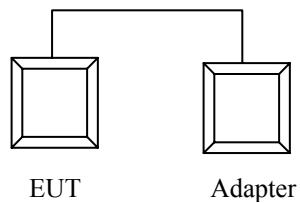
Manufacturer	Description	Model	Serial Number	FCC ID
DELL	Keyboard	SK-8110	CN07N244-71616-56I-110O	DoC
DELL	Mouse	M071KC	519046820	DoC
DELL	LCD Monitor	1505FP	Y4287-7168-574-GBSH	DoC

**External I/O Cable**

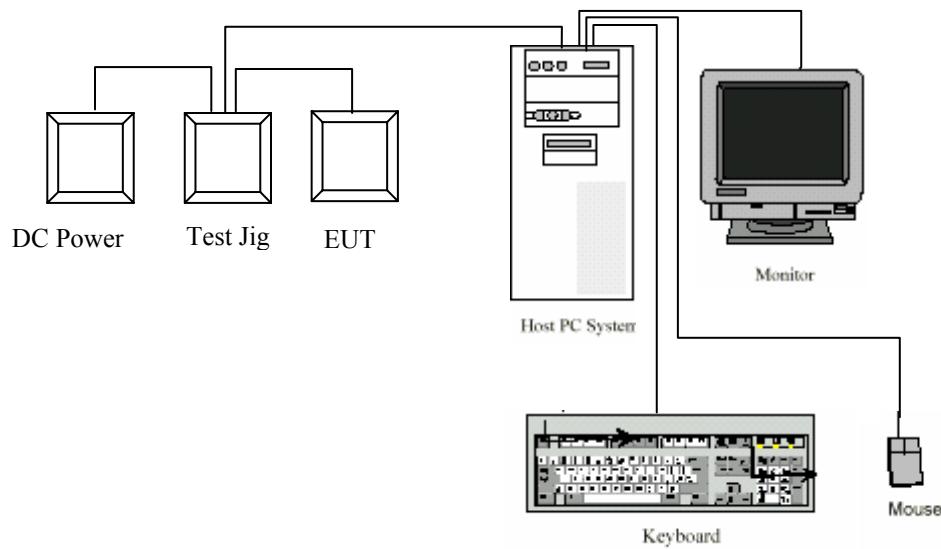
Cable Description	Length (M)	From Port	To
Shielded Detachable K/B Cable	1.5	K/B Port /Host	K/B
Shielded Detachable Mouse Cable	1.5	Mouse Port /Host	Mouse
Shielded Detachable VGA Cable	1.5	VGA Port/Host	Monitor
DC Power Cable	0.7	DC Power	Test Jig
RS232 Cable	0.5	Test Jig	EUIT

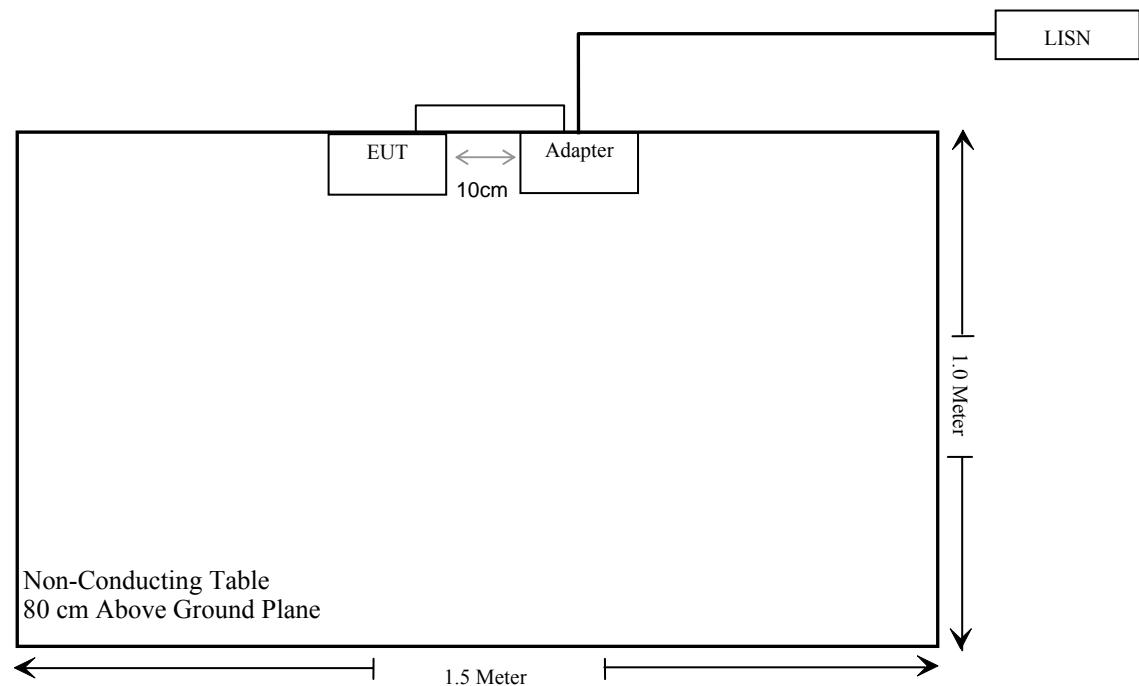
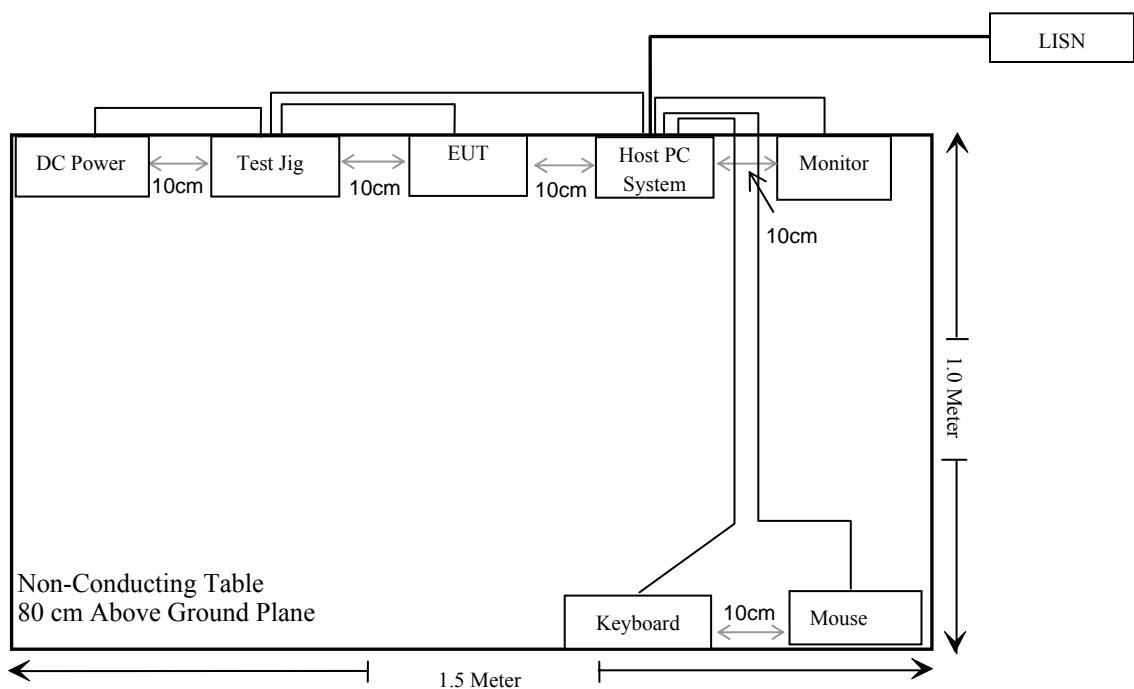
## Configuration of Test Setup

*Charging mode:*



*Transmitting mode:*



**Block Diagram of Test Setup***Charging mode:**Transmitting mode:*

**SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Result
§1.1310, §2.1093, §15.247 (i)	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.107 (a)	Conducted Emission	Compliant
§15.205	Restricted Band	Compliant
§15.109, §15.205, §15.209, §15.247(d)	Radiated Emission	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 testing	Compliant

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

According to § 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,  $f_{GHz}$  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>
<b>General Population</b>	$(60/f_{GHz}) \text{ mW}, d < 2.5 \text{ cm}$ $(120/f_{GHz}) \text{ mW}, d \geq 2.5 \text{ cm}$	$(900/f_{GHz}) \text{ mW}, d < 20 \text{ cm}$
<b>Occupational</b>	$(375/f_{GHz}) \text{ mW}, d < 2.5 \text{ cm}$ $(900/f_{GHz}) \text{ mW}, d \geq 2.5 \text{ cm}$	$(2250/f_{GHz}) \text{ mW}, d < 20 \text{ cm}$

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 3.689 mW which is lower than the low threshold. 24.58 mW ( $60/2.441\text{GHz}$ ) mW

**The SAR measurement is not required.**

## **§15.203 - ANTENNA REQUIREMENT**

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### **Standard Applicable**

According to § 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.

### **Antenna Connector Construction**

The EUT has an integral antenna, which, in accordance to the above sections, is considered sufficient to comply with the provisions of this section. Please see EUT photo for details.

**Result:** Compliant.

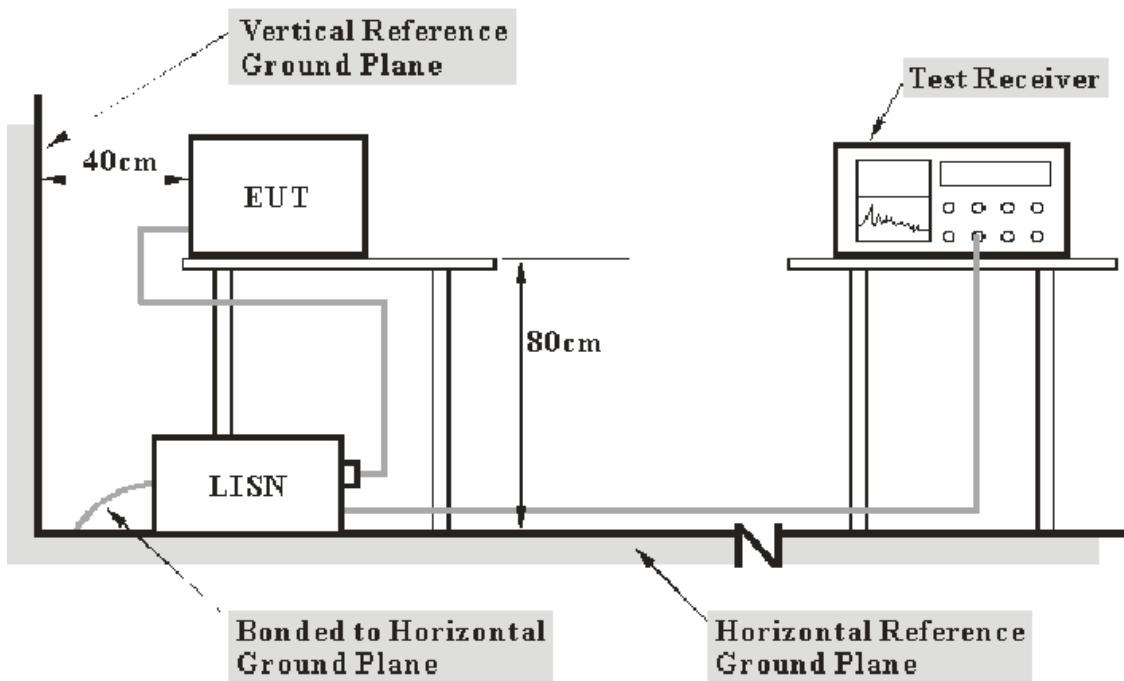
## §15.207 (a) - CONDUCTED EMISSIONS

### 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 host 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:

<u>Frequency Range</u>	<u>IF B/W</u>
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	2006-09-29	2007-09-29
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2007-03-26	2008-03-26

\* 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 host PC 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:

**9.30 dB at 0.580 MHz** in the **Neutral** conductor mode

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

Temperature:	22 °C
Relative Humidity:	55%
ATM Pressure:	100.0 kPa

*The testing was performed by Andy Yan on 2007-07-16.*

*Test Mode: Charging*

Line Conducted Emissions				FCC PART 15.207	
Frequency (MHz)	Amplitude (dB $\mu$ V)	Detector (QP/AV)	Phase (Live/Neutral)	Limit (dB $\mu$ V)	Margin (dB)
0.580	46.70	QP	Neutral	56.00	9.30
0.710	46.20	QP	Live	56.00	9.80
0.390	47.60	QP	Neutral	58.06	10.46
0.970	44.80	QP	Neutral	56.00	11.20
1.550	42.30	QP	Neutral	56.00	13.70
0.200	49.90	QP	Neutral	63.61	13.71
2.140	42.00	QP	Live	56.00	14.00
0.580	25.50	AV	Neutral	46.00	20.50
0.206	32.80	AV	Live	53.37	20.57
29.460	38.90	QP	Live	60.00	21.10
0.390	26.80	AV	Neutral	48.06	21.26
0.330	36.90	QP	Live	59.45	22.55
0.206	40.60	QP	Live	63.37	22.77
6.090	35.80	QP	Live	60.00	24.20
0.200	27.90	AV	Neutral	53.61	25.71
1.550	18.80	AV	Neutral	46.00	27.20
0.970	18.60	AV	Neutral	46.00	27.40
0.330	21.90	AV	Live	49.45	27.55
27.430	30.80	QP	Neutral	60.00	29.20
2.140	12.80	AV	Live	46.00	33.20
0.710	12.60	AV	Live	46.00	33.40
29.460	10.50	AV	Live	50.00	39.50
6.100	9.70	AV	Live	50.00	40.30
27.610	7.60	AV	Neutral	50.00	42.40

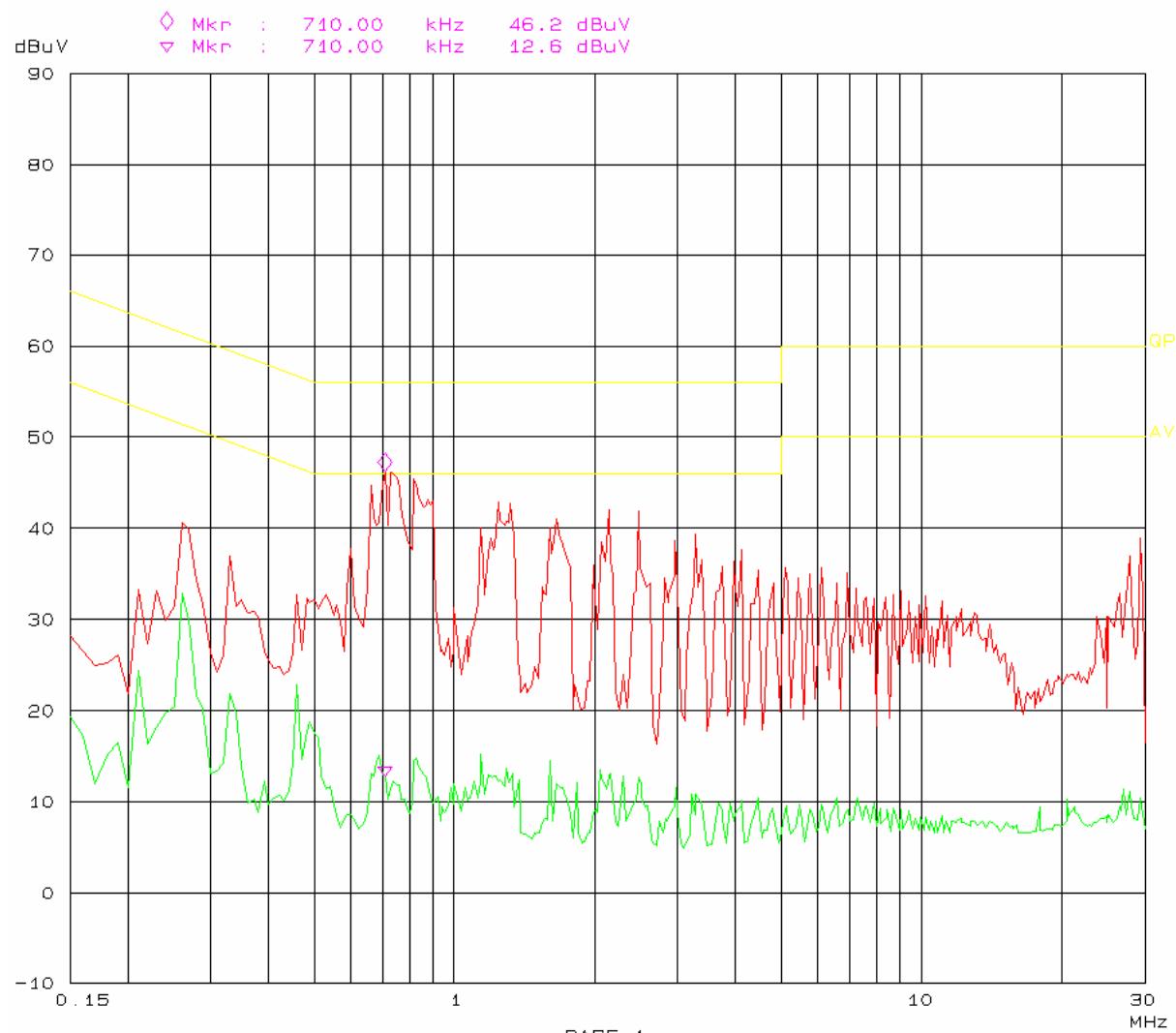
**Plot(s) of Test Data**

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

Conducted Emission Test  
FCC Part 15 B

16. Jul 07 09:32

EUT: Bluetooth Earphone M/N: CL BlueHook  
Manuf: GREAT WELL  
Op Cond: Charging  
Operator: Andy Yan  
Test Spec: AC 120V/60Hz L  
Comment: Temp: 25 Humi: 56%

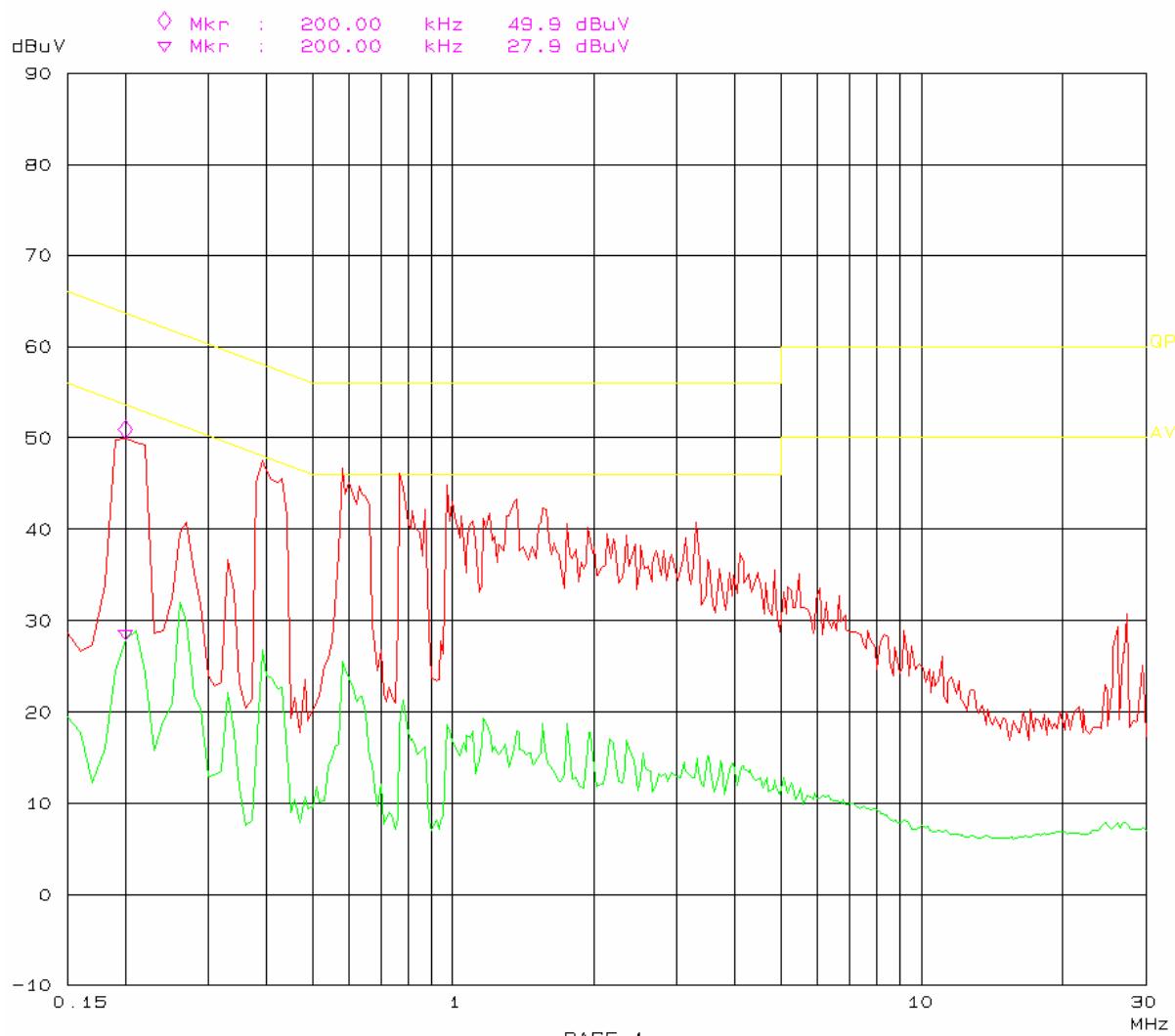


## Conducted Emission Test

16. Jul 07 08:58

## FCC Part 15 B

EUT: Bluetooth Earphone M/N: CL BlueHook  
Manuf: GREAT WELL  
Op Cond: Charging  
Operator: Andy Yan  
Test Spec: AC 120V/60Hz N  
Comment: Temp: 25 Humi: 56%



## §15.109, §15.205, §15.209, §15.247 - RADIATED EMISSIONS

### Applicable Standard

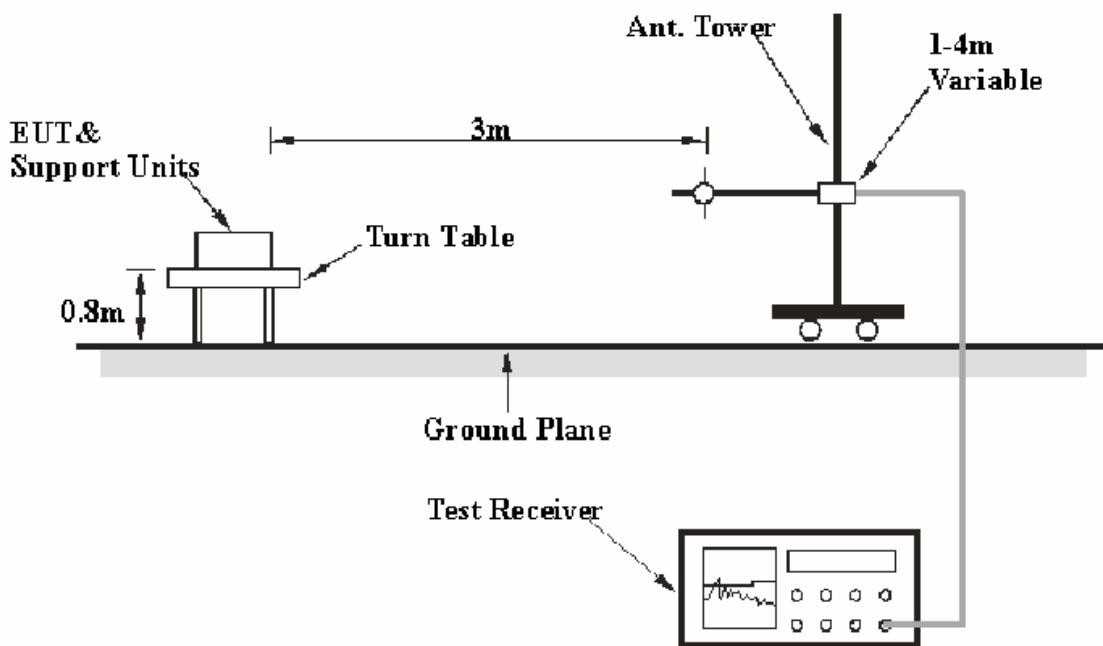
According to FCC §15.247 (d)

### 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 Laboratory 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 host 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:

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

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447D	2944A09795	2006-11-15	2007-11-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2006-09-29	2007-09-29
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2006-08-14	2007-08-14
HP	Amplifier	8449B	3008A00277	2006-09-29	2007-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2006-09-25	2007-09-25
Agilent	Spectrum Analyzer	8564E	3943A01781	2006-11-22	2007-11-22

\* **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

For the radiated emissions test, the host 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 Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

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:

$$\text{Margin} = \text{Limit} - \text{Corr. Ampl.}$$

## 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:

**Transmitting mode: 4.4 dB at 36.872725 MHz in the Vertical polarization, for 30 MHz-1000MHz**

**Transmitting mode: 14.82 dB at 4804.0 MHz in the Horizontal polarization, for above 1GHz (Low Channel)**

**Transmitting mode: 15.30 dB at 4882.0 MHz in the Horizontal polarization, for above 1GHz (Middle Channel)**

**Transmitting mode: 15.80 dB at 4960.0 MHz in the Horizontal polarization, for above 1GHz (High Channel)**

**Charging mode: 7.3 dB at 280.27085 MHz in the Horizontal polarization**

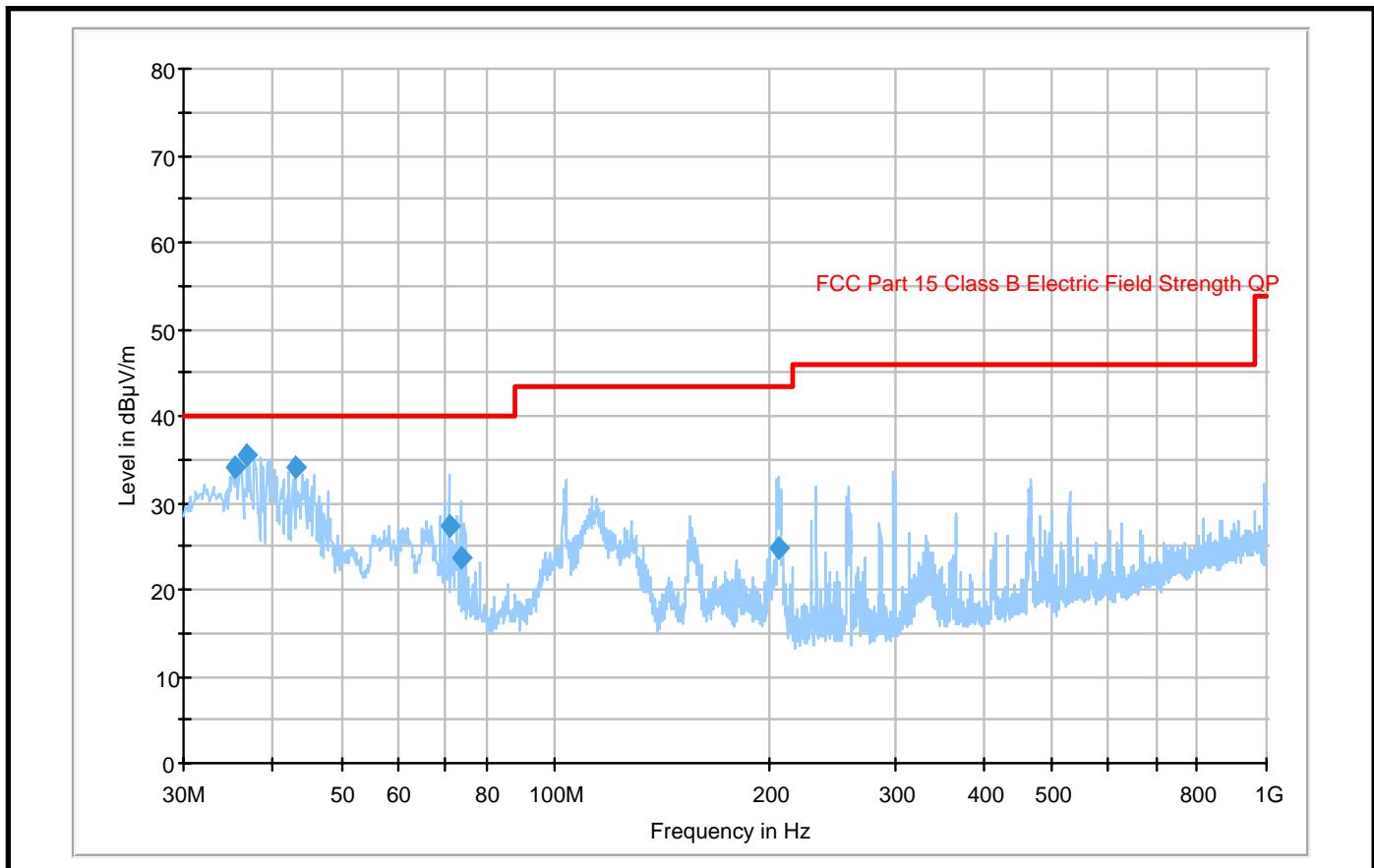
## Test Data

### Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52 %
ATM Pressure:	100.9 kPa

*The testing was performed by Andy Yan on 2007-07-16*

*Test Mode: Transmitting (30-1000MHz)*

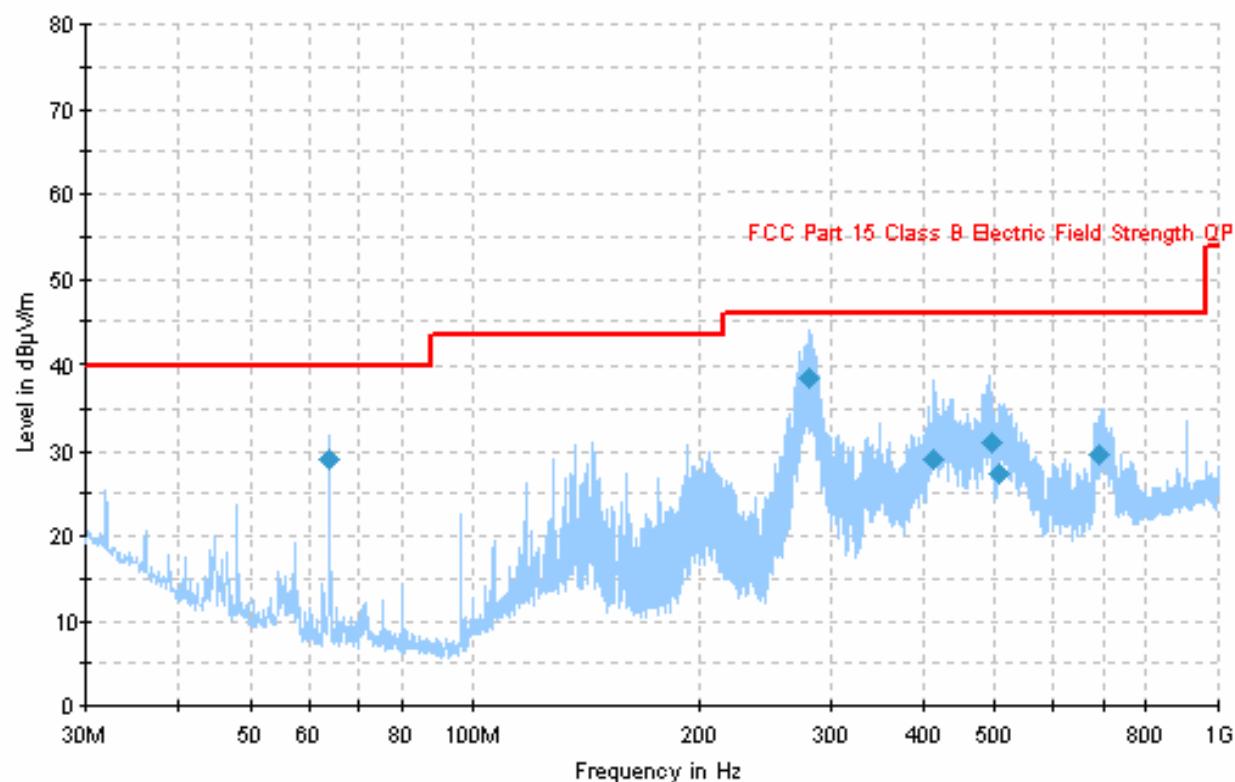


Frequency (MHz)	Quasi Peak (dB $\mu$ V/m)	Antenna Height (cm)	Polarity	Turntable Position (deg)	Corr. (dB)	Limit (dB $\mu$ V/m)	Margin (dB)
36.872725	35.6	101.0	V	14.0	-9.6	40.0	4.4
43.121775	34.2	103.0	V	193.0	-14.2	40.0	5.8
35.445050	34.1	129.0	V	262.0	-8.4	40.0	5.9
70.770975	27.2	257.0	H	255.0	-17.5	40.0	12.8
73.609725	23.8	280.0	H	254.0	-17.5	40.0	16.2
206.468025	24.7	101.0	H	271.0	-12.3	43.5	18.8

Test Mode: Transmitting (Above 1GHz)

Freq. (MHz)	Meter Reading (dBuV)	Detector PK/QP/AV	Table Direction Degree	Ant. Height (m)	Polar H / V	Antenna Factor (dB/m)	Cable Loss (dB)	Amplifier Gain (dB)	Corr. Ampl. (dBuV/m)	FCC Part 15.247/209		
										Limit (dBuV/m)	Margin (dB)	Remarks
<b>Low Channel</b>												
2402	94.51	PK	90	1	H	30.6	3.61	35.0	93.72			Fund.
2402	89.50	AV	45	1.0	H	30.6	3.61	35.0	88.71			Fund.
2402	94.11	PK	90	1.0	V	30.6	3.61	35.0	93.32			Fund.
2402	89.04	AV	45	1.0	V	30.6	3.61	35.0	88.25			Fund.
4804	31.34	AV	90	1.0	H	36.6	4.64	33.4	39.18	54	14.82	harmonic
4804	30.83	AV	90	1.0	V	35.4	4.64	33.4	37.47	54	16.53	harmonic
1601	61.51	PK	45	1.2	V	26.0	2.77	35.0	55.28	74	18.72	spurious
1601	58.82	PK	45	1.2	H	26.5	2.77	35.0	53.09	74	20.91	spurious
4804	45.02	PK	180	1.2	H	36.6	4.64	33.4	52.86	74	21.14	harmonic
4804	44.91	PK	180	1.2	V	35.4	4.64	33.4	51.55	74	22.45	harmonic
1601	35.74	AV	180	1.2	H	26.5	2.77	35.0	30.01	54	23.99	spurious
1601	36.04	AV	180	1.2	V	26.0	2.77	35.0	29.81	54	24.19	spurious
1000	37.95	AV	90	1.0	V	23.8	1.19	36.0	26.94	54	27.06	spurious
1000	57.72	PK	180	1.2	V	23.8	1.19	36.0	46.71	74	27.29	spurious
1281	52.89	PK	45	1.2	H	26.5	2.5	36.0	45.89	74	28.11	spurious
<b>Middle Channel</b>												
2441.0	93.51	PK	60	1.4	V	30.6	3.61	35.0	92.72			Fund.
2441.0	90.20	AV	152	1.3	V	30.6	3.61	35.0	89.41			Fund.
2441.0	93.77	PK	128	1.5	H	30.6	3.61	35.0	92.98			Fund.
2441.0	89.58	AV	156	1.2	H	30.6	3.61	35.0	88.79			Fund.
4882.0	30.86	AV	243	1.4	H	36.6	4.64	33.4	38.70	54	15.30	harmonic
4882.0	30.97	AV	142	1.6	V	35.4	4.64	33.4	37.61	54	16.39	harmonic
1627.8	62.99	PK	265	1.4	H	26.5	2.77	36.0	56.26	74	17.74	spurious
1627.8	59.46	PK	156	1.4	V	26.0	2.77	35.0	53.23	74	20.77	spurious
4882.0	45.22	PK	153	1.5	H	36.6	4.64	33.4	53.06	74	20.94	harmonic
4882.0	44.66	PK	234	1.8	V	35.4	4.64	33.4	51.3	74	22.70	harmonic
1627.8	35.95	AV	135	1.3	V	26.0	2.77	35.0	29.72	54	24.28	spurious
1627.8	35.63	AV	85	1.5	H	26.5	2.77	36.0	28.9	54	25.10	spurious
<b>High Channel</b>												
2480.0	92.36	PK	89	1.5	H	30.6	3.61	35.0	91.57			Fund.
2480.0	88.41	AV	65	1.5	H	30.6	3.61	35.0	87.62			Fund.
2480.0	91.75	PK	65	1.4	V	30.6	3.61	35.0	90.96			Fund.
2480.0	88.68	AV	65	1.6	V	30.6	3.61	35.0	87.89			Fund.
4960.0	30.45	AV	256	1.8	H	36.6	4.55	33.4	38.20	54	15.80	harmonic
1653.9	34.95	AV	210	1.2	V	26.0	2.77	35.0	28.72	54	25.28	spurious
1653.9	53.29	PK	128	1.5	H	26.5	2.77	35.0	47.56	74	26.44	spurious
4960.0	30.09	AV	142	1.5	V	35.4	4.55	33.4	36.64	54	17.36	harmonic
1653.9	41.18	AV	156	1.2	H	26.5	2.77	35.0	35.45	54	18.55	spurious
4960.0	45.21	PK	145	1.4	H	36.6	4.55	33.4	52.96	74	21.04	harmonic
1653.9	58.81	PK	240	1.4	V	26.0	2.77	35.0	52.58	74	21.42	spurious
4960.0	44.44	PK	142	1.4	V	35.4	4.55	33.4	50.99	74	23.01	harmonic

*Test Mode: Charging.*



Frequency (MHz)	Quasi-Peak (dB $\mu$ V/m)	Antenna Height (cm)	Polarity	Turntable Position (deg)	Corr. (dB)	Limit (dB $\mu$ V/m)	Margin (dB)
280.270850	38.7	114.0	H	77.0	-9.8	46.0	7.3
64.084625	28.9	125.0	V	77.0	-17.7	40.0	11.1
493.542700	31.1	132.0	V	0.0	-6.2	46.0	14.9
693.084200	29.6	130.0	H	355.0	-3.3	46.0	16.4
414.535325	28.9	271.0	H	221.0	-7.0	46.0	17.1
506.020575	27.3	120.0	V	354.0	-6.7	46.0	18.7

## §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	2006-09-29	2007-09-29

\* **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

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:	50 %
ATM Pressure:	100.9 kPa

*The testing was performed by Andy Yan on 2007-07-16.*

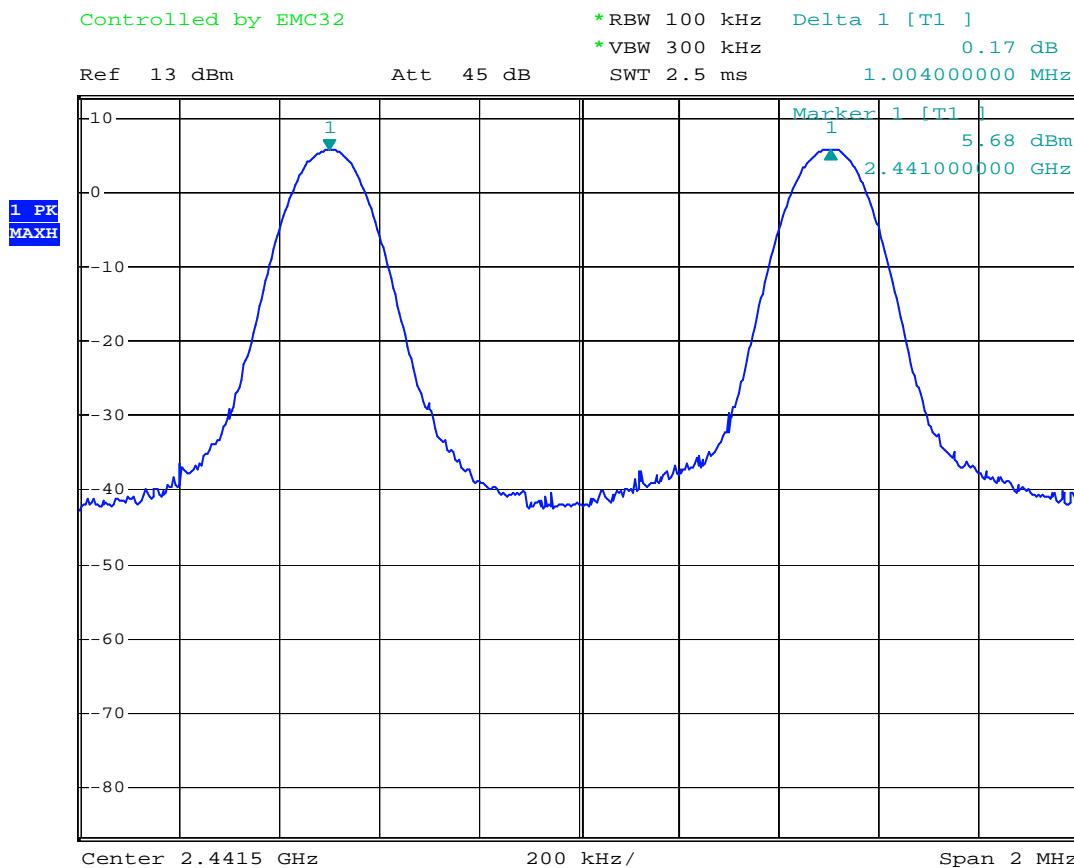
*Test mode: Transmitting*

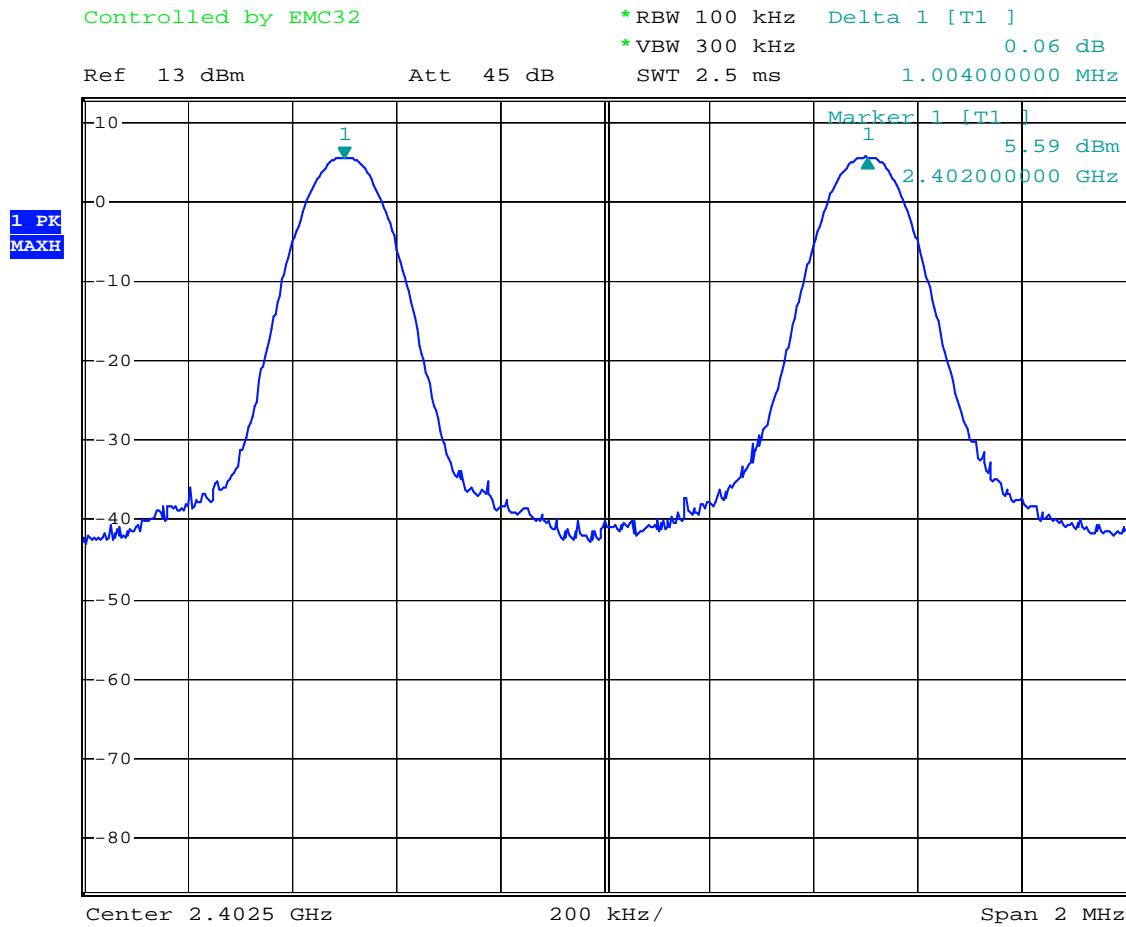
Channel	Channel Frequency (MHz)	Channel Separation (kHz)	Limit (kHz)	Result
Low Channel	2402	1004	184	Pass
Adjacency Channel	2403			
Mid Channel	2441	1004	184	Pass
Adjacency Channel	2442			
High Channel	2480	1004	184	Pass
Adjacency Channel	2479			

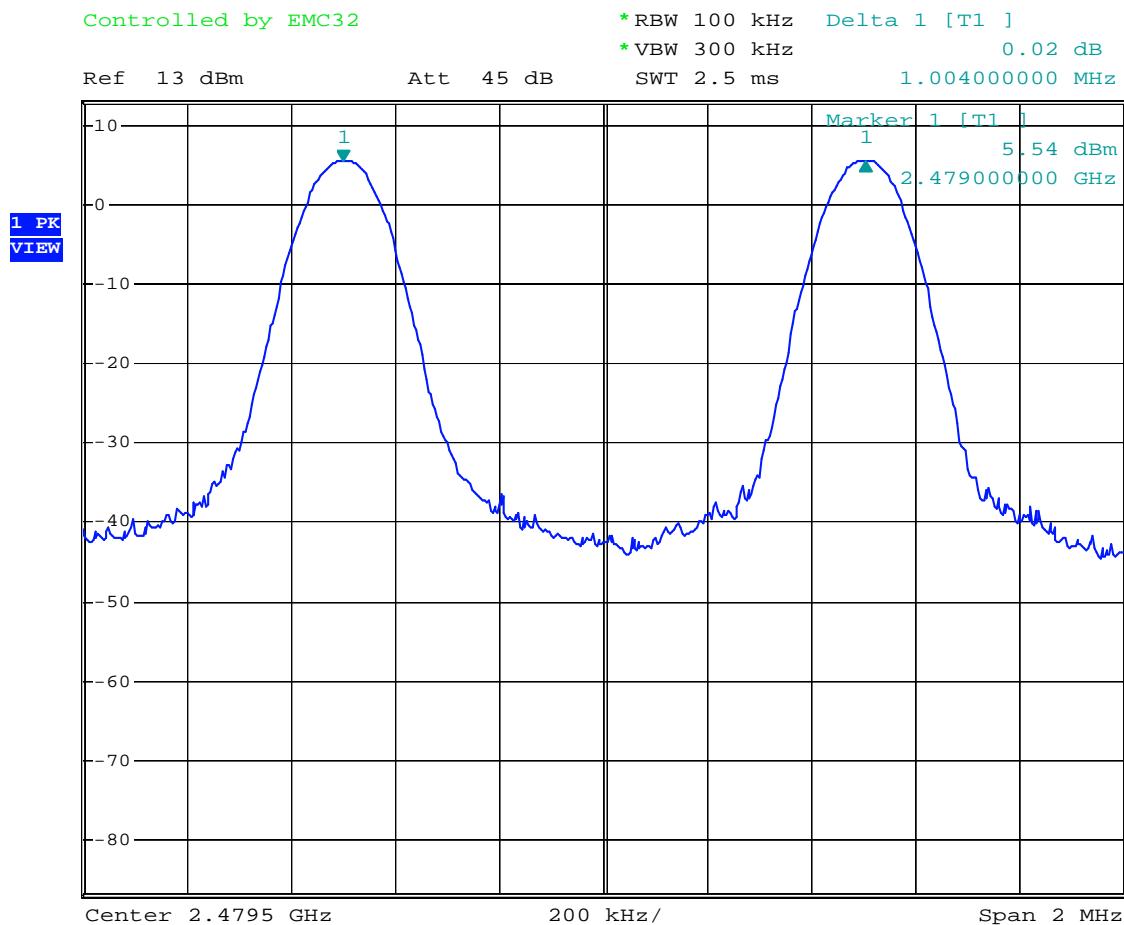
**Test Result:** Compliant.

Please refer to following plots

### Low Channel



**Middle Channel**

**High Channel**

## §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	2006-09-29	2007-09-29

\* **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

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

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1009mbar

The testing was performed by Andy Yan on 2007-07-09

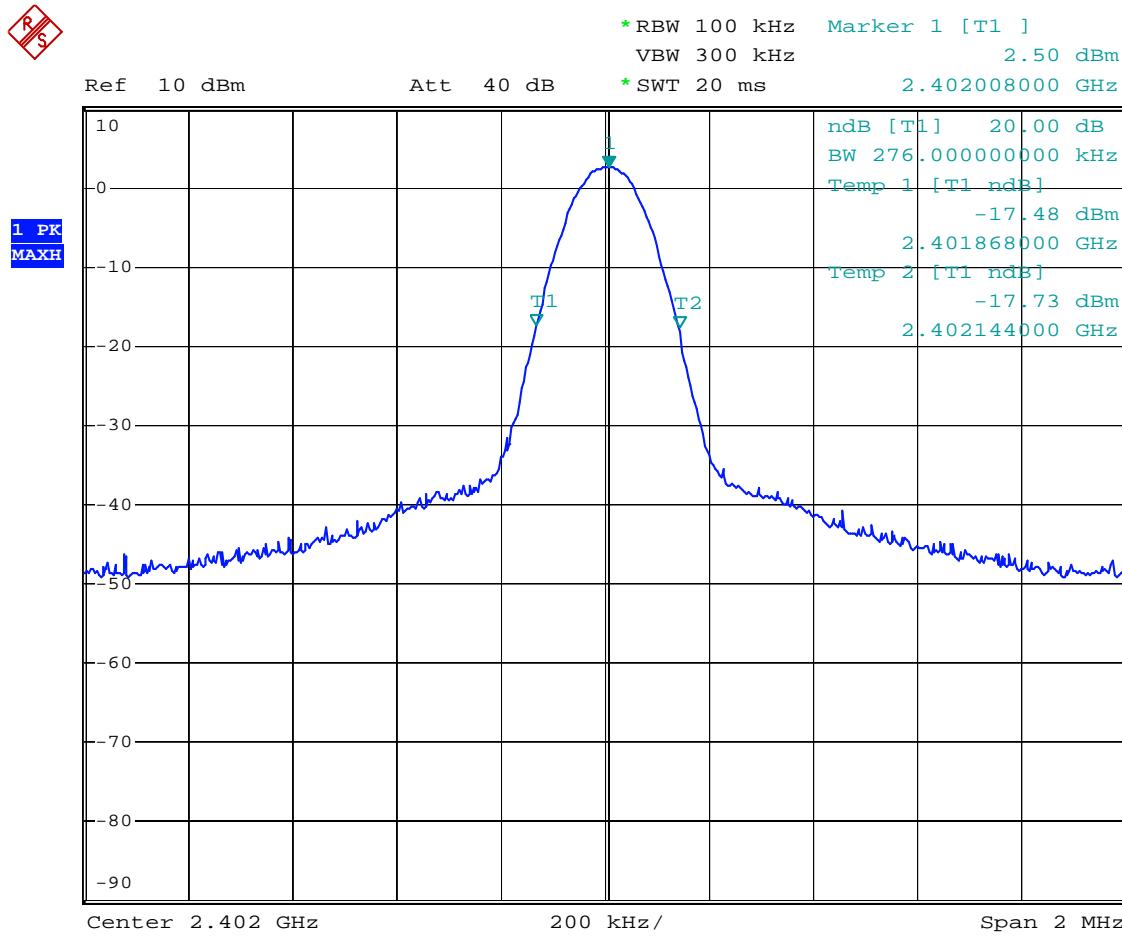
Test Mode: Transmitting

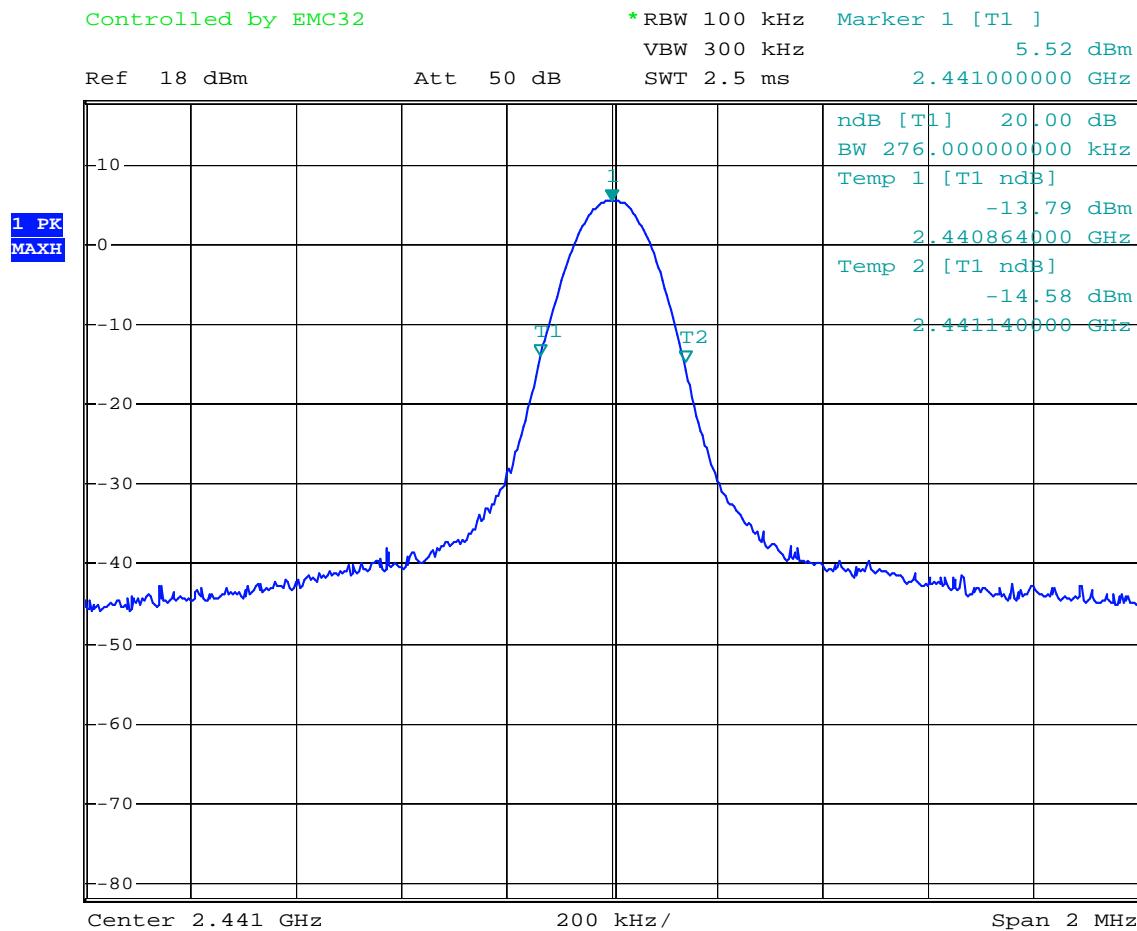
Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)
Low Channel	2402	276
Mid Channel	2441	276
High Channel	2480	276

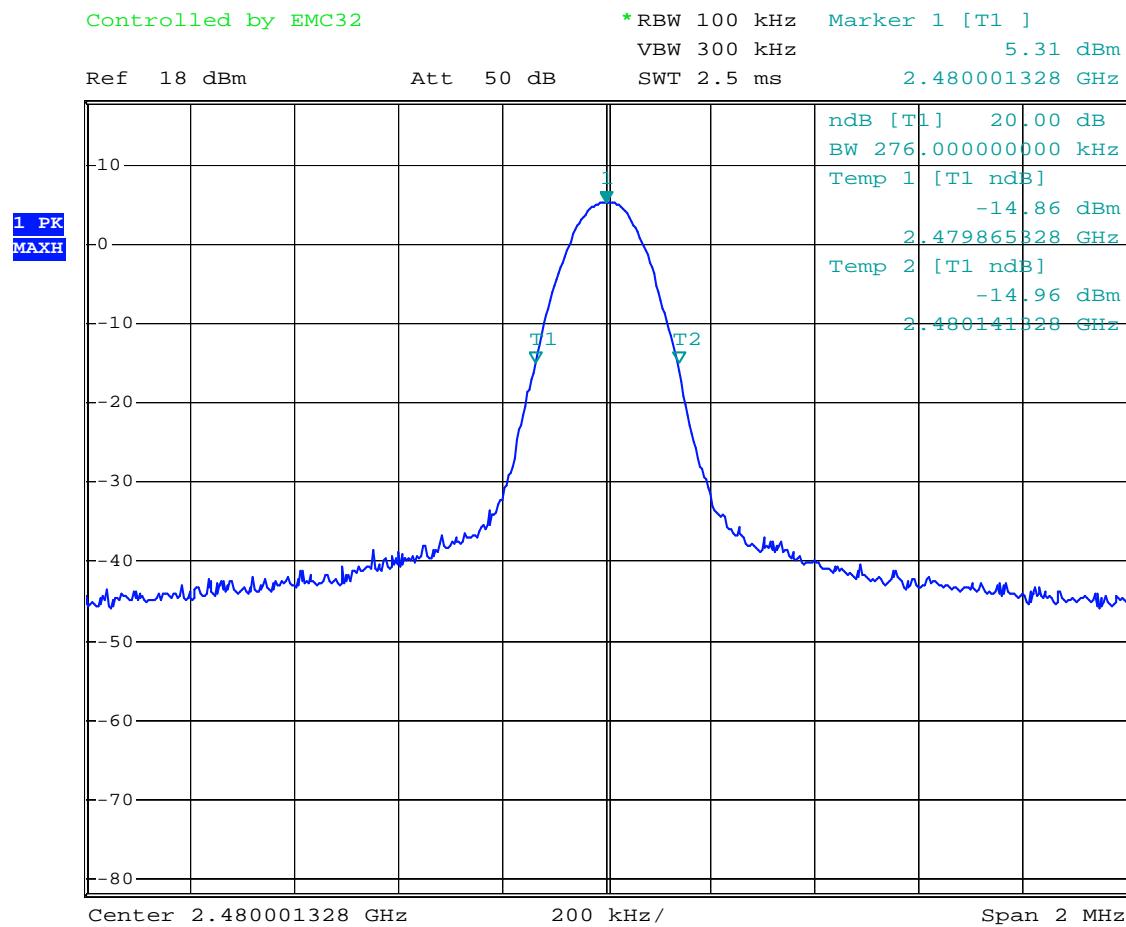
**Test Result:** Compliant.

Please refer to following plots:

### Low Channel



**Middle Channel**

**High Channel**

## §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	2006-09-29	2007-09-29

\* **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

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.

Limit

FCC Part 15, Subpart C Section 15.247

Frequency Range in 2400 to 2483.5 MHz	Quantity of Hopping Channel (CH)	Limit (CH)
2402-2480	79	>15

### Test Data

#### Environmental Conditions

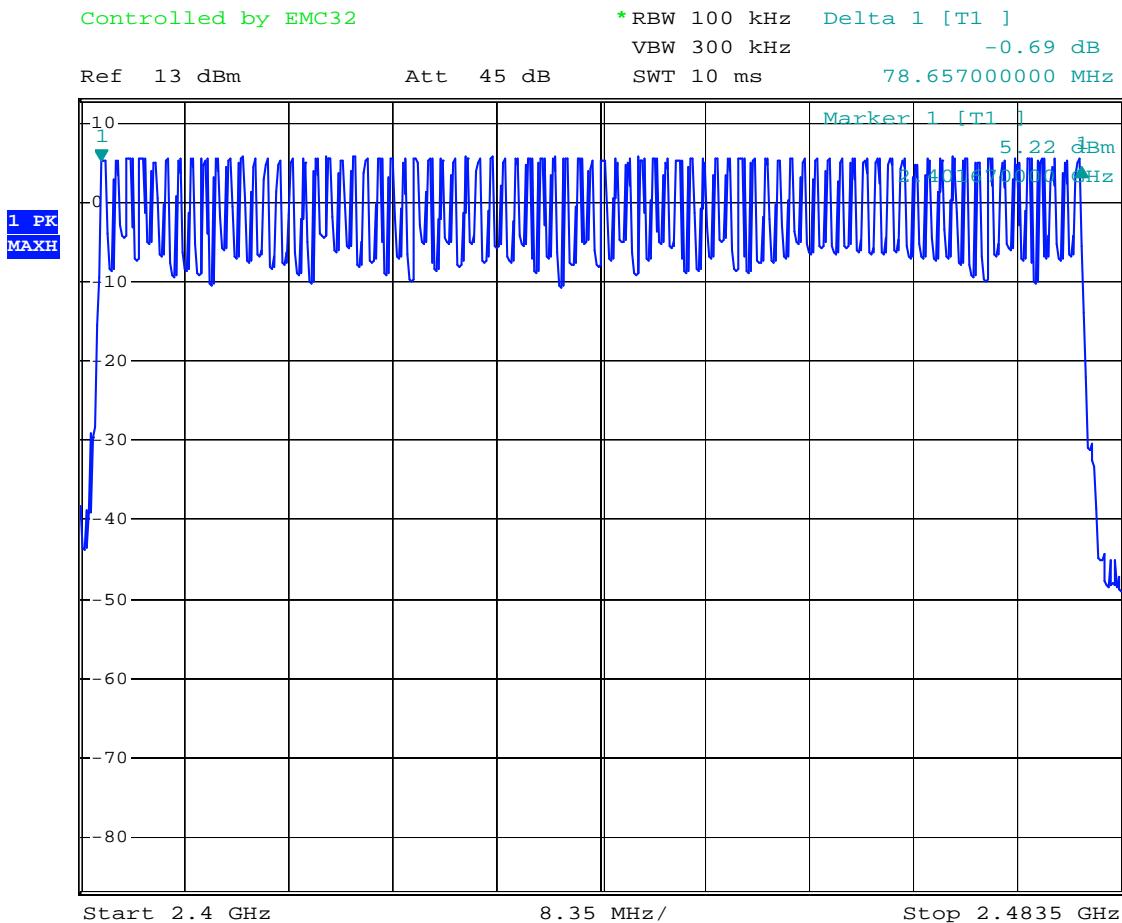
Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	100.9 kPa

The testing was performed by Andy Yan on 2007-07-16.

Test mode: Transmitting

Test Result: Compliant.

Please refer to following plot:



**§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	2006-09-29	2007-09-29

\* **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**

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:	27 °C
Relative Humidity:	50 %
ATM Pressure:	100.9 kPa

*The testing was performed by Andy Yan on 2007-07-16.*

*Test mode: Transmitting*

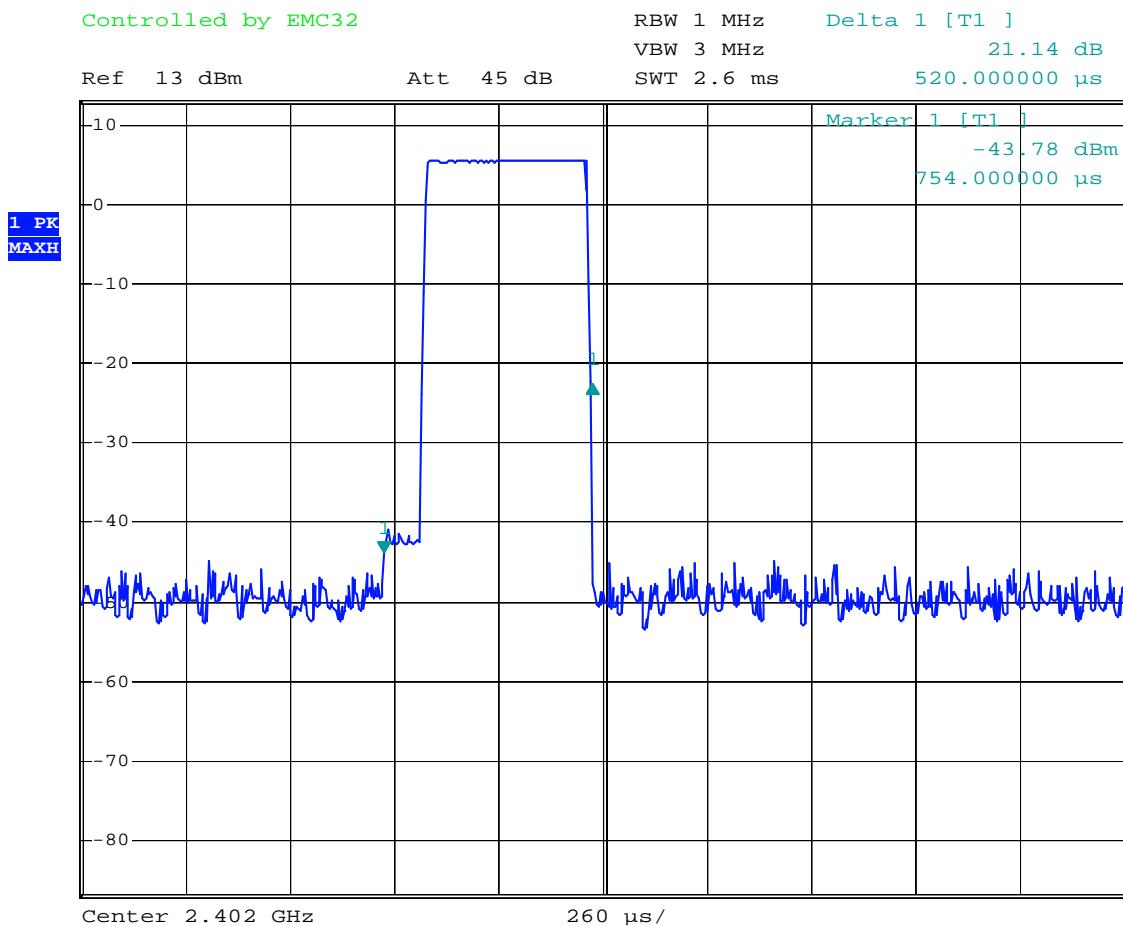
Channel	Pulse width (msec)	Dwell time (sec)	Limit (sec)	Result
<b>Low Channel</b>	0.52	0.1664	0.4	Compliant
<b>Mid Channel</b>	0.52	0.1664	0.4	Compliant
<b>High Channel</b>	0.52	0.1664	0.4	Compliant

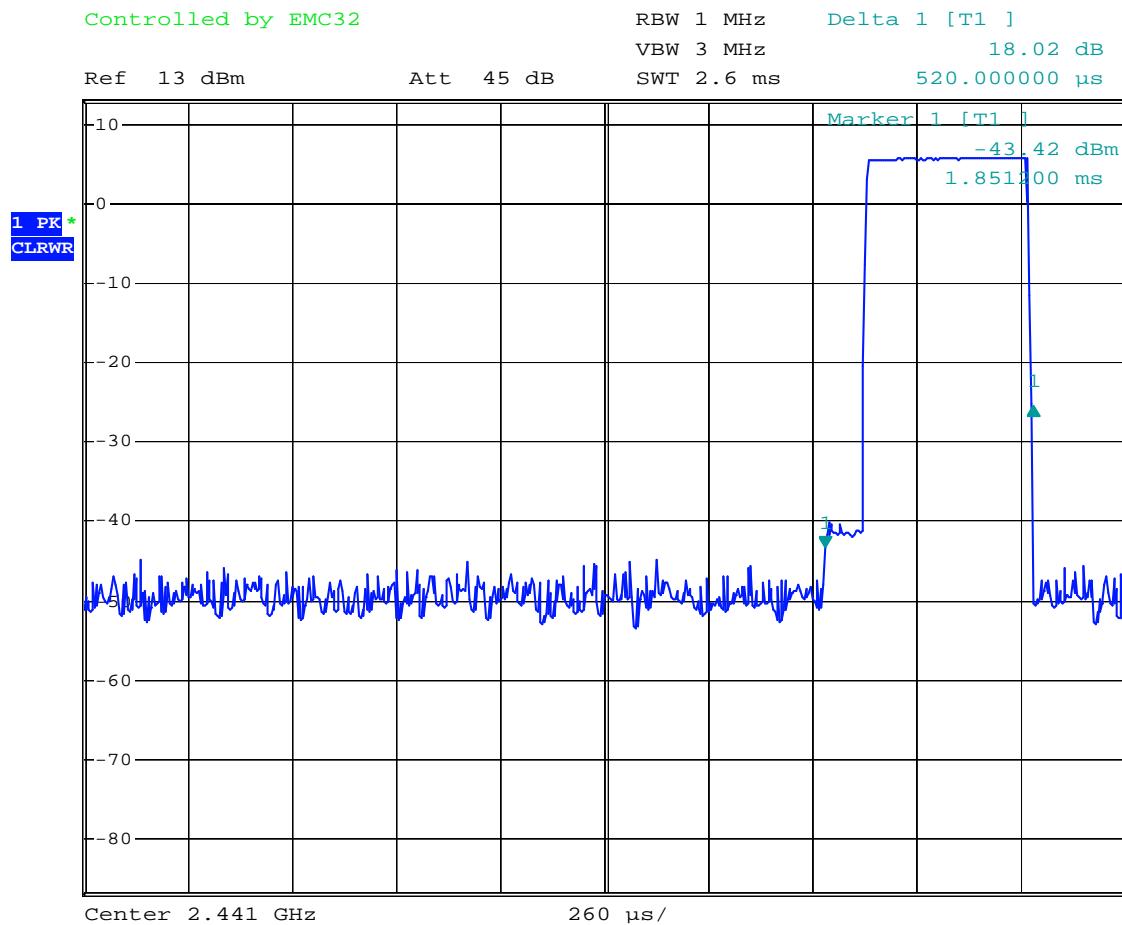
**NOTE:** Dwell time=Pulse width (ms)  $\times$  (1600  $\div$  2  $\div$  79)  $\times$ 31.6 Second

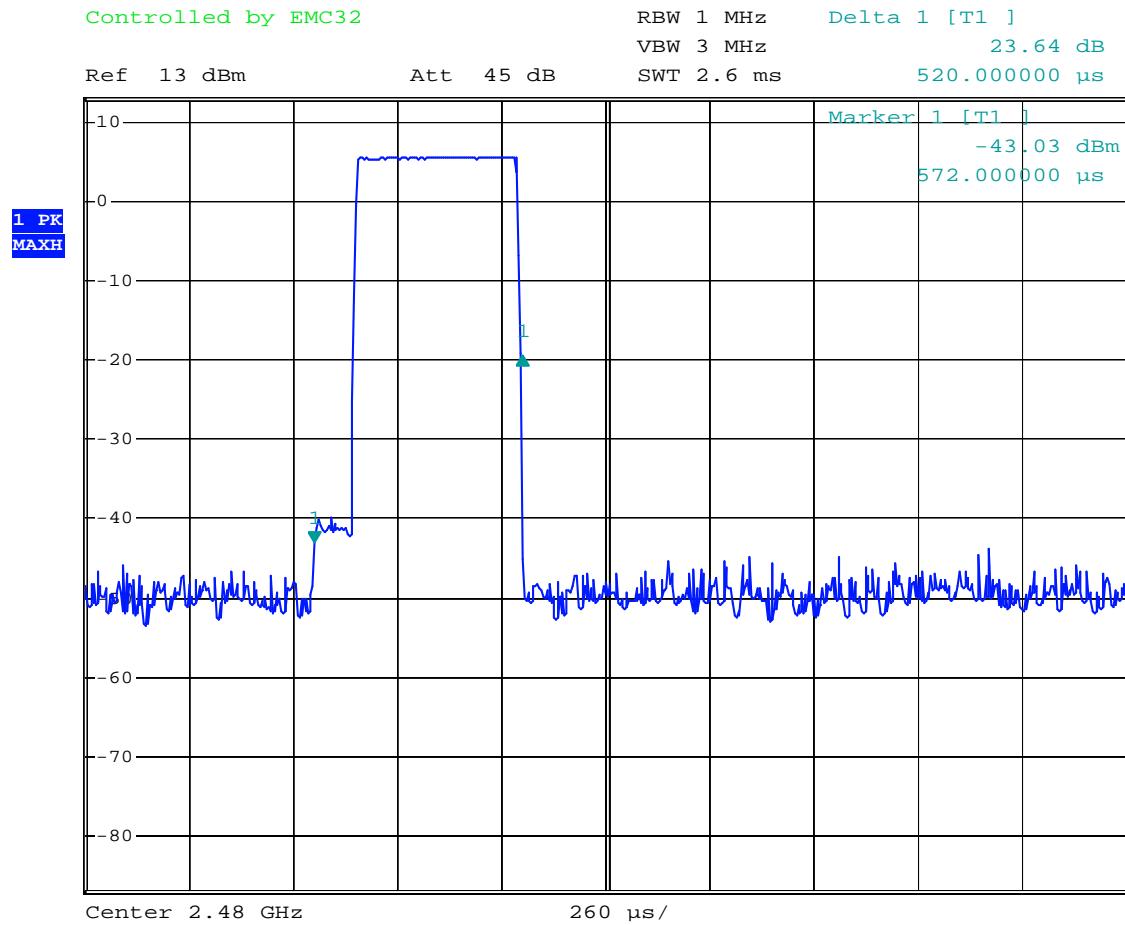
**Test Result:** Compliant.

Please refer to following plots

### Low Channel



**Middle Channel**

**High Channel**

## §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.

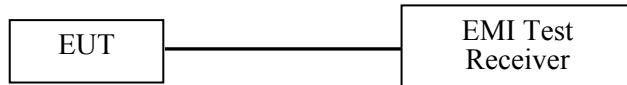
### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2006-09-29	2007-09-29

\* **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

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:	53%
ATM Pressure:	100.9 kPa

*The testing was performed by Andy Yan on 2007-07-16*

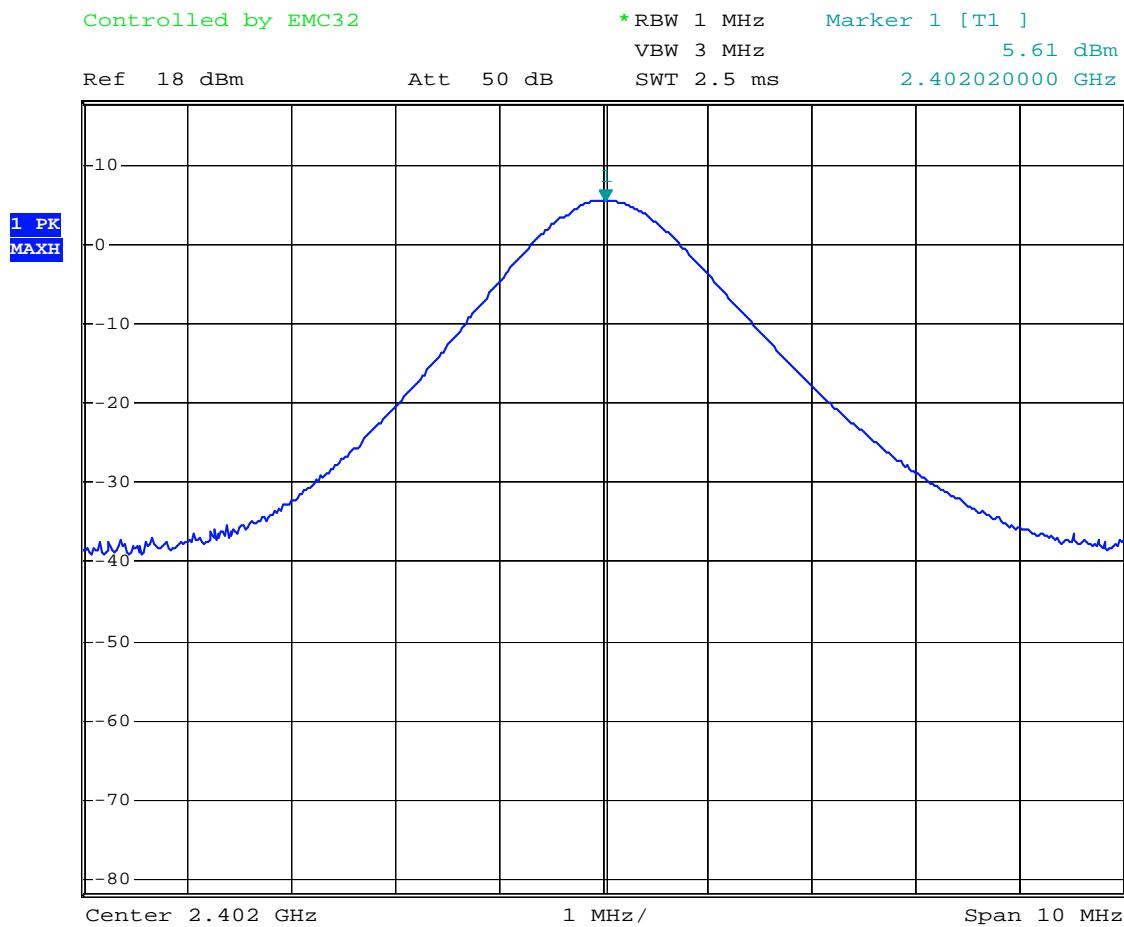
*Test Mode: Transmitting*

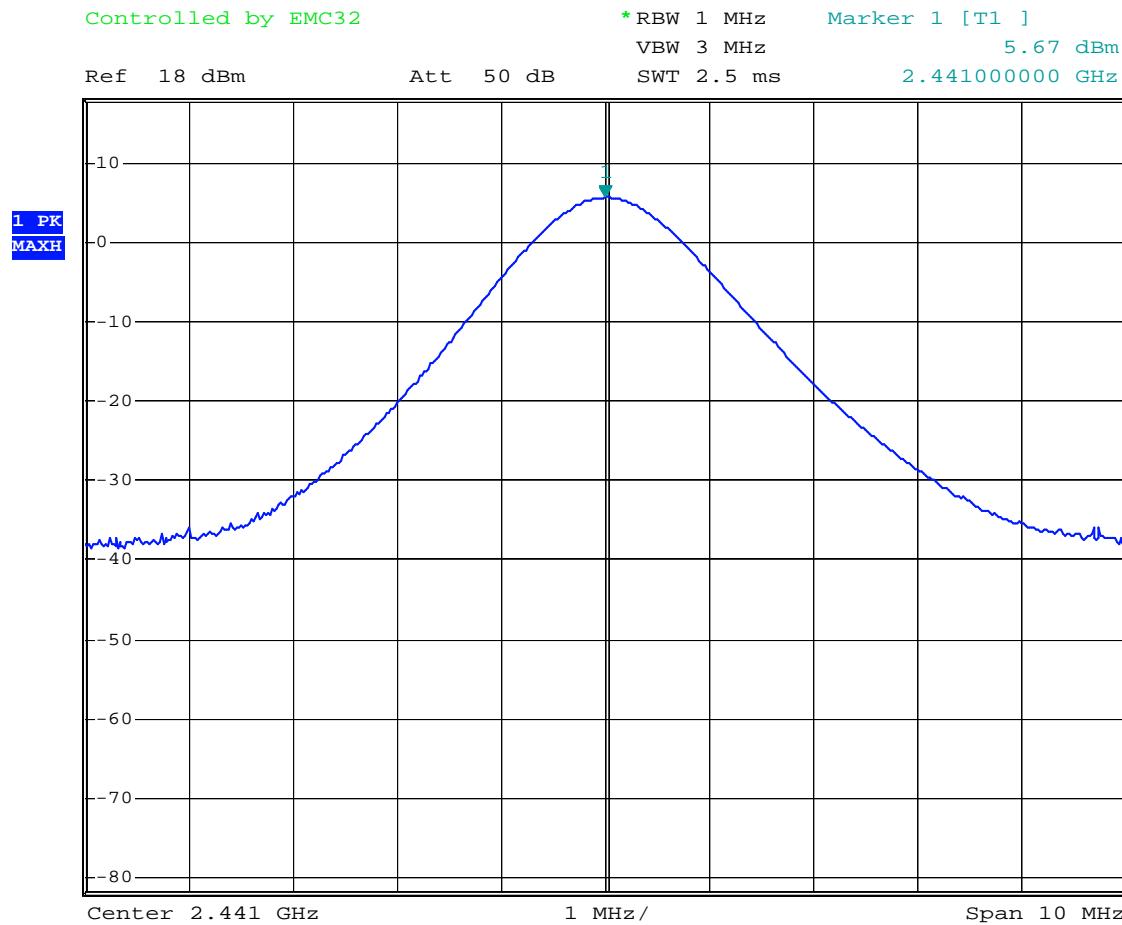
Channel	Channel Frequency (MHz)	Reading Power (dBm)	Power Output (mW)	Limit (mW)
Low Channel	2402	5.61	3.639	1000
Mid Channel	2441	5.67	3.689	1000
High Channel	2480	5.45	3.508	1000

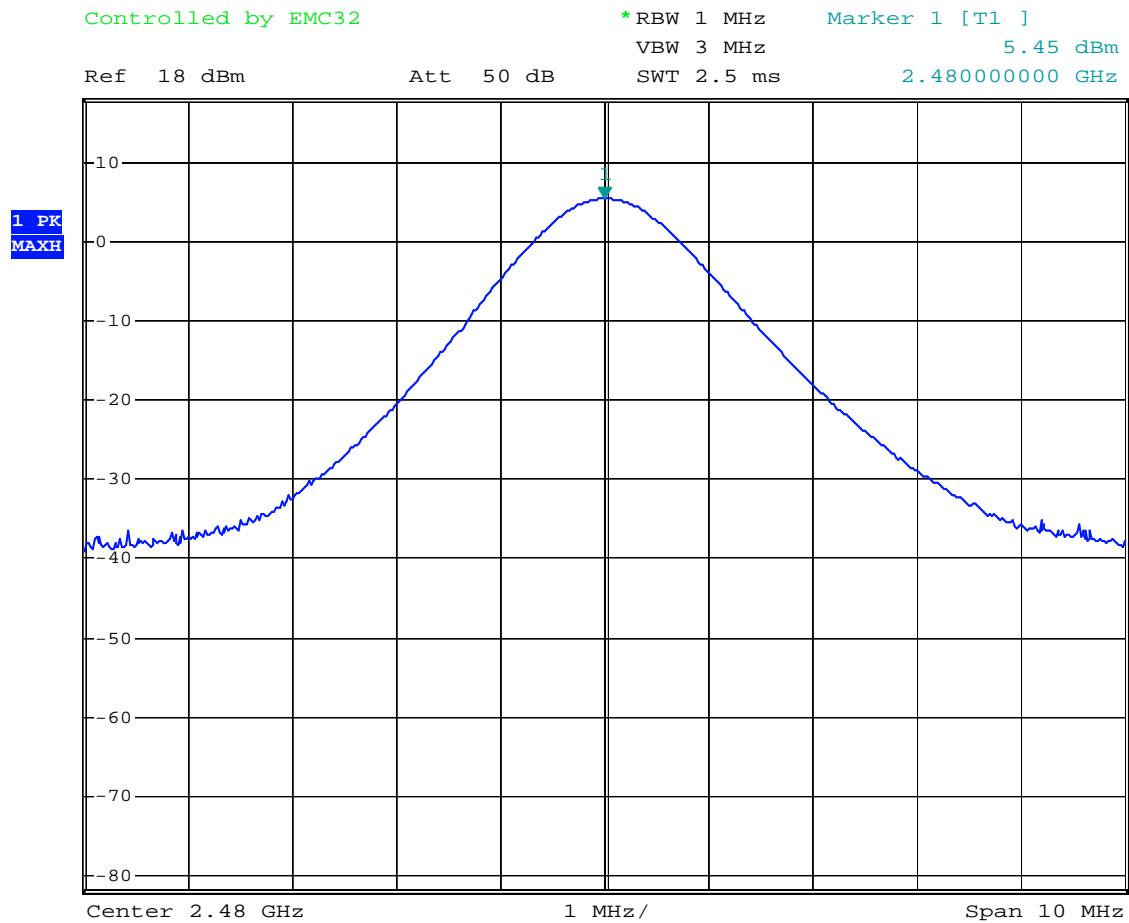
**Test Result:** Compliant.

Please refer to the following plots

### Low Channel



**Middle Channel**

**High Channel**

## §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	2006-09-29	2007-09-29

\* **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

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:	20 °C
Relative Humidity:	53 %
ATM Pressure:	100.9 kPa

The testing was performed by Andy Yan on 2007-07-16.

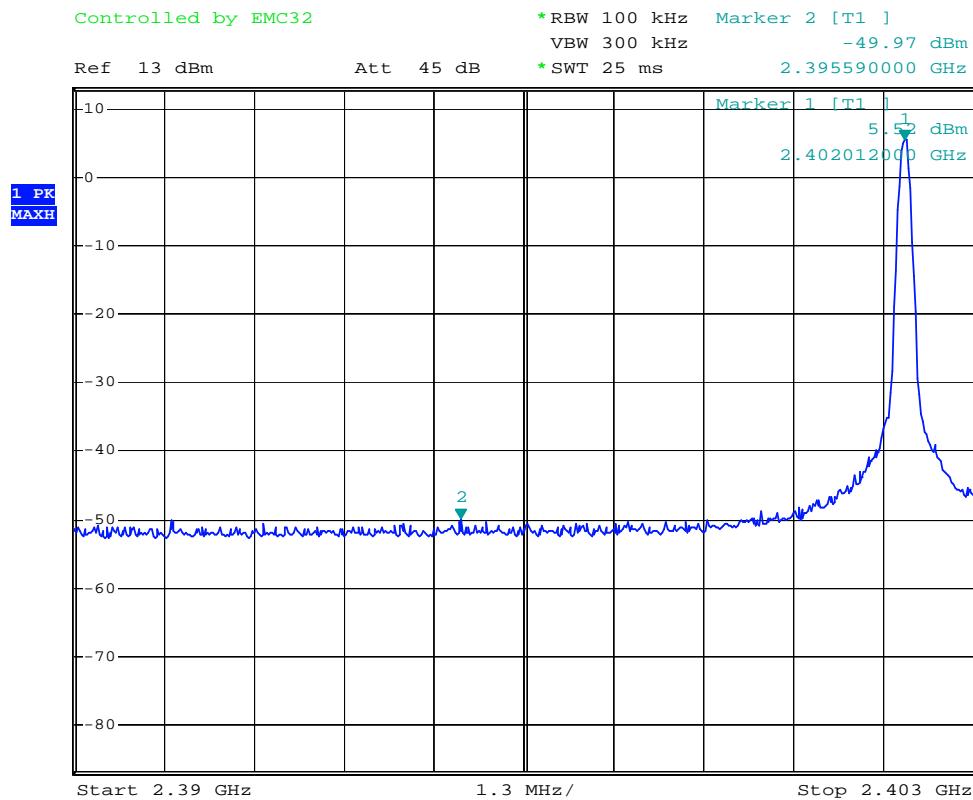
Test Mode: Transmitting

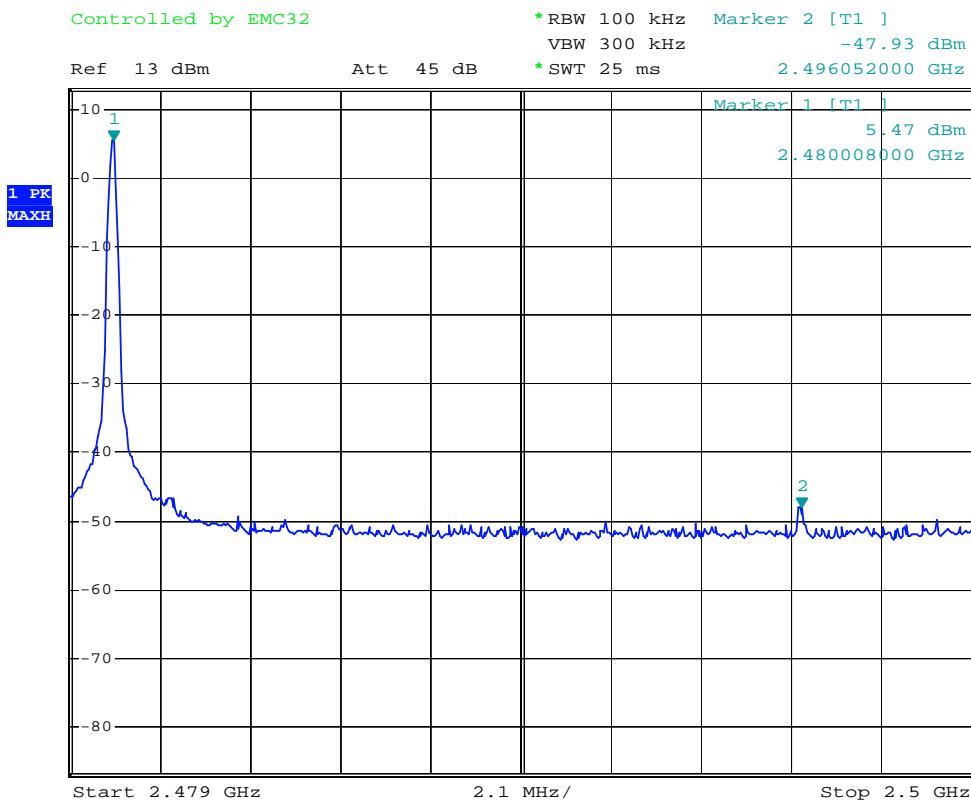
Frequency (MHz)	Band Edge (dBc)	Limit (dBc)
2399.698	55.49	20
2495.968	53.40	20

Note: Band Edge=Highest Peak-Emission level

**Test Result:** Compliant.

Please refer to the following plots





### Radiated Emissions in restricted band

Frequency (MHz)	Reading (dBuV)	Detector PK/QP/AV	Direction Degree	Ant. Height (m)	Polar H / V	Antenna Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Corrected Amp. (dBuV/m)	FCC 15.209	
										Limit (dBuV/m)	Margin (dB)
(2310 – 2390 MHz)											
2365.44	42.45	PK	180	1.2	V	30.6	3.61	35	41.66	54	12.34
2346.07	41.40	PK	180	1.2	H	30.6	3.61	35	40.61	54	13.39
2352.32	41.26	PK	90	1	V	30.6	3.61	35	40.47	54	13.53
2326.70	41.08	PK	90	1.1	H	30.6	3.61	35	40.29	54	13.71
2332.00	40.73	PK	45	1.2	V	30.6	3.61	35	39.94	54	14.06
(2483.5 – 2500 MHz)											
2489.4	40.86	PK	153	1.5	H	30.6	3.61	35	40.43	54	13.57
2497.5	41.22	PK	156	1.4	V	30.6	3.61	35	40.16	54	13.84
2485.7	40.36	PK	243	1.4	H	30.6	3.61	35	40.07	54	13.93
2493.9	40.95	PK	234	1.8	V	30.6	3.61	35	39.94	54	14.06

**Note:** Above PK spurious emission levels are below the average spurious emissions limit of 54dBuV/m, average measurements has been omitted.

**END OF REPORT**