



NVLAP LAB CODE 200707-0



FCC PART 15.247

MEASUREMENT AND TEST REPORT

For

Zhongshan K-mate General Electronics Co. Ltd.

3th Floor, B1 building, Fuwan Industrial Zone, Sunwen East Road,

Zhongshan, China, 528403

FCC ID: WAD-BTE001

This Report Concerns:	Equipment Type:
<input checked="" type="checkbox"/> Original Report	Bluetooth headset
Test Engineer:	Bruce Zhang <i>Bruce Zhang</i>
Report No.:	RSZ08061002
Test Date:	2008-06-16 to 2008-07-11
Report Date:	2008-07-14
Reviewed By:	EMC Manager: Green Xu <i>Green Xu</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Zhongshan K-mate General Electronics Co. Ltd.* 's product, model number: *BTE001* or the "EUT" as referred to in this report is a *Bluetooth headset*, which measures approximately: 6.1 cm L x 1.6 cm W x 2.2 cm H, rated input voltage: DC 3.7 battery.

** All measurement and test data in this report was gathered from production sample serial number: 0806021 (Assigned by BACL, Shenzhen). The EUT was received on 2008-06-10.*

Objective

This Type approval report is prepared on behalf of *Zhongshan K-mate General Electronics Co. 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, 15.209 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).



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.

Special Accessories

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

Equipment Modifications

No modification was made to the unit tested.

Host System Configuration List and Details

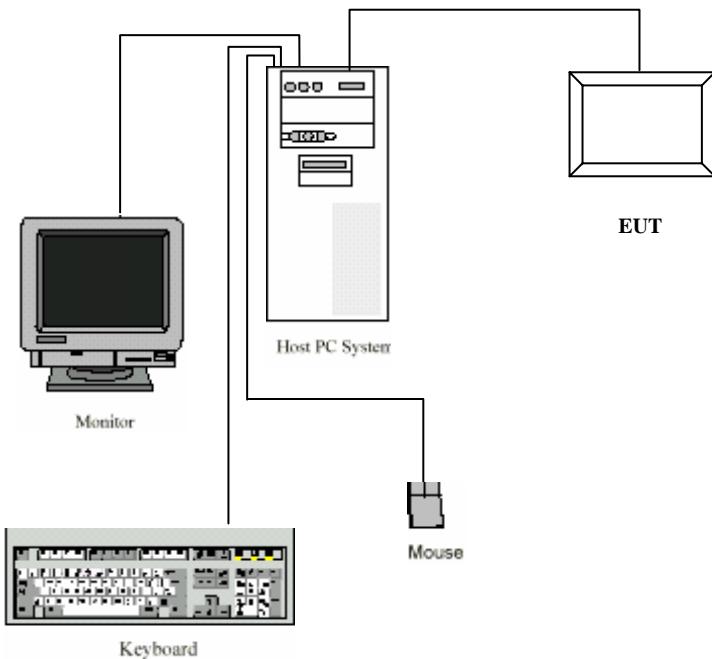
Manufacturer	Description	Model	Serial Number	FCC ID
DELL	Motherboard	OWC297	CN-OWC297-70821-564-00NI	DoC
DELL	Power	NPS-250KB D	CN-0H2678-17972-56E-80BM	DoC
Seagate	Hard Disk	ST340014A	5JXK3GXE	DoC
DELL	3.5' Floppy	N/A	CN-0N8893-69802-54Q-02P0	DoC
Lite-ON	CD-Rom	LTN-489S	N/A	DoC
Intel	Ethernet	PRO 10/100 VE	N/A	DoC
ProMOS	Memory	V826632K24SATG-C0	0525-K1933700	N/A
Intel	CPU	Celeron D-2533	N/A	N/A

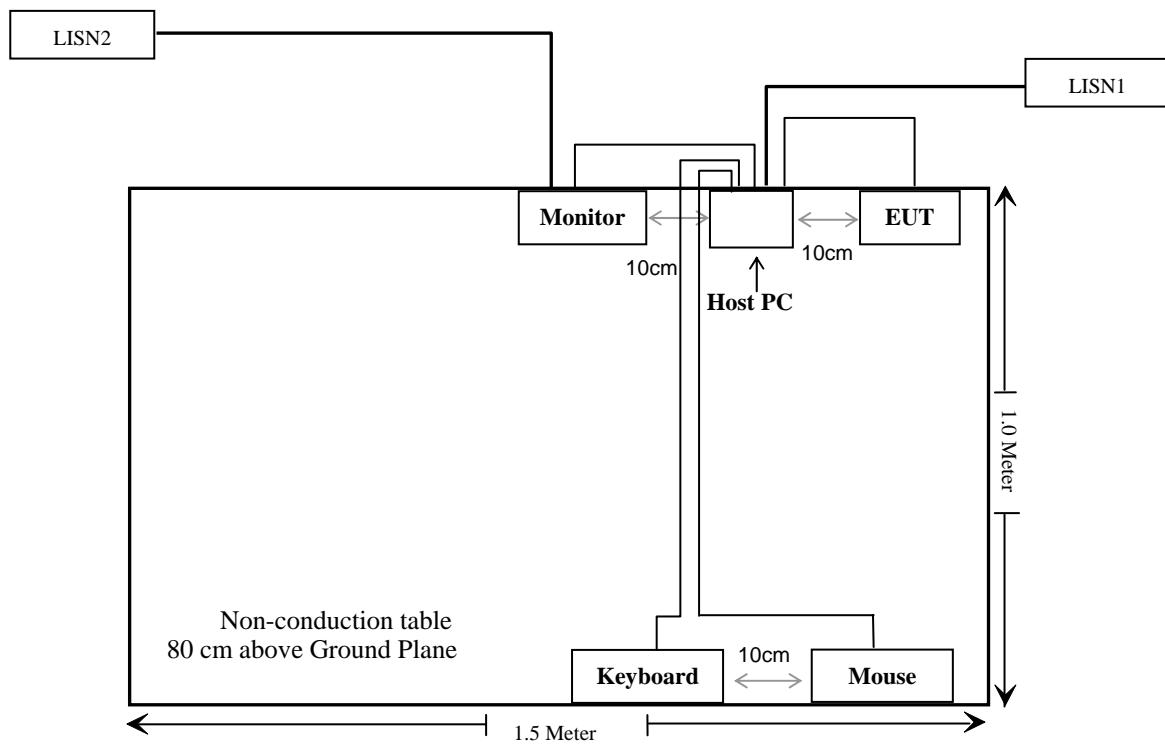
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
DELL	PC	DELL 170L	CN-0TC670-70821-560-F4Q6	DoC
DELL	Keyboard	SK-8110	CN07N244-71616-56A-1B1E	DoC
DELL	Mouse	M071KC	520027907	DoC
DELL	LCD Monitor	1505FP	Y4287-7168-571-GBSH	DoC
HP	Laser Jet5L	C3941A	JPTVOB2337	DoC
ECOM	Modem	EM-56DEV	6588D51200013	DoC

External I/O Cable

Cable Description	Length (M)	From/Port	To
Unshielded Detachable USB Cable	1.23	EUT	PC

Configuration of Test Setup

Block Diagram of Test Setup

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
CFR47 §15.203	Antenna Requirement	Compliant
CFR47 §15.207 (a)	Conducted Emissions	Compliant
CFR47 §15.205	Restricted Band	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 §15.203 - ANTENNA REQUIREMENT

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 below 2 dBi.

Result: Compliance.

Please refer to the EUT internal photos.

§1.1310 §2.1093 - 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>
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 $1.072\text{mW} < 24.58\text{mW} = (60/2.441\text{GHz}) \text{ mW}$

The SAR measurement is not necessary.

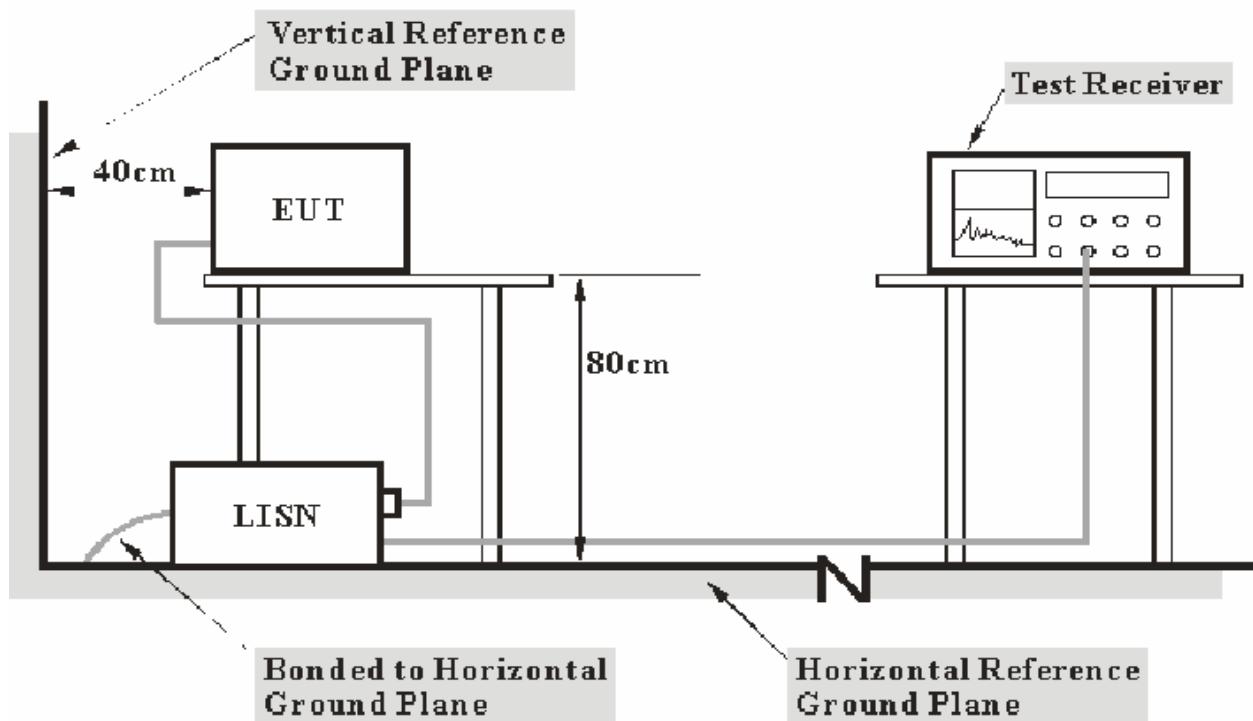
CFR47 §15.207 (a) - CONDUCTED EMISSIONS

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 Laboratories Corp. (Shenzhen) is ± 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
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2007-10-16	2008-10-16
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2008-03-25	2009-03-25

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

* **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

During the conducted emission test, the host PC 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:

14.70 dB at 17.7125 MHz in the **Hot** conductor mode.

Test Data

Environmental Conditions

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

The testing was performed by Bruce Zhang on 2008-07-08.

Test Mode: Charging

Line Conducted Emissions				FCC PART 15.207	
Frequency (MHz)	Amplitude (dB μ V)	Detector QP/AV	Conductor Hot/Neutral	Limit (dB μ V)	Margin (dB)
17.7125	35.30	AV	Hot	50.00	14.70
3.8880	29.20	AV	Hot	46.00	16.80
0.1800	36.80	AV	Neutral	54.49	17.69
0.3650	29.80	AV	Neutral	48.61	18.81
6.1920	30.40	AV	Hot	50.00	19.60
0.3050	30.30	AV	Neutral	50.11	19.81
6.7430	29.40	AV	Hot	50.00	20.60
17.7086	38.40	QP	Hot	60.00	21.60
17.7100	37.30	QP	Neutral	60.00	22.70
17.7100	26.30	AV	Neutral	50.00	23.70
6.5650	36.00	QP	Neutral	60.00	24.00
0.1810	30.40	AV	Hot	54.44	24.04
6.6250	25.70	AV	Neutral	50.00	24.30
3.8880	30.90	QP	Hot	56.00	25.10
0.3650	33.00	QP	Neutral	58.61	25.61
0.1850	38.60	QP	Neutral	64.26	25.66
15.2510	24.10	AV	Hot	50.00	25.90
0.3050	33.90	QP	Neutral	60.11	26.21
14.4100	22.60	AV	Neutral	50.00	27.40
14.3500	31.80	QP	Neutral	60.00	28.20
6.7390	30.40	QP	Hot	60.00	29.60
6.1960	29.50	QP	Hot	60.00	30.50
15.2470	26.30	QP	Hot	60.00	33.70
0.1810	27.80	QP	Hot	64.44	36.64

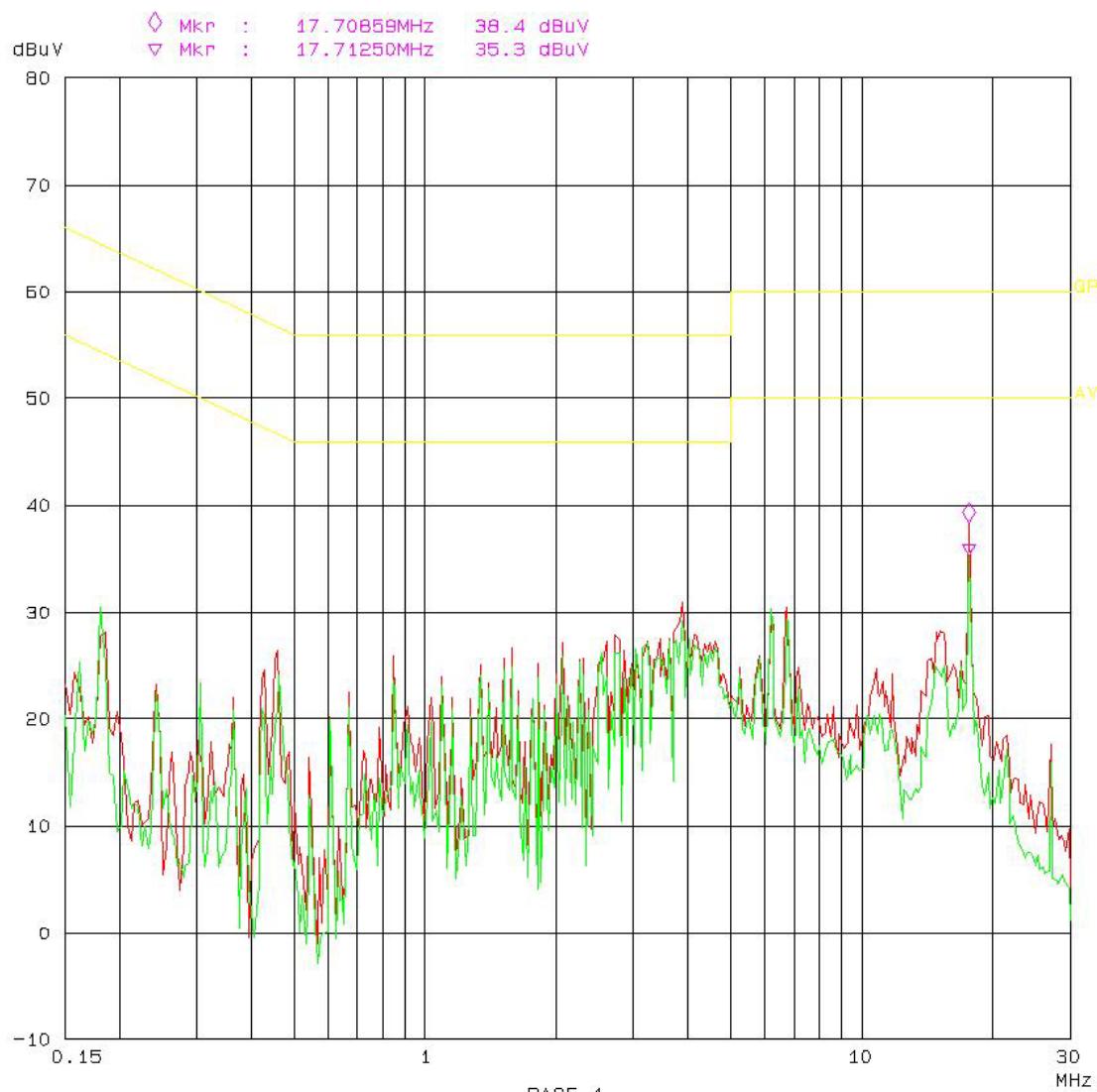
Plot(s) of Test Data

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

Conduction Emission
FCC 15 CLASS B

08. Jul 08 15:09

EUT: Bluetooth headset M/N: BTE001
Manuf: K-mate
Op Cond: Charging
Operator: Bruce
Test Spec: AC120V/60Hz Hot
Comment: Temp: 25 Hum: 56%

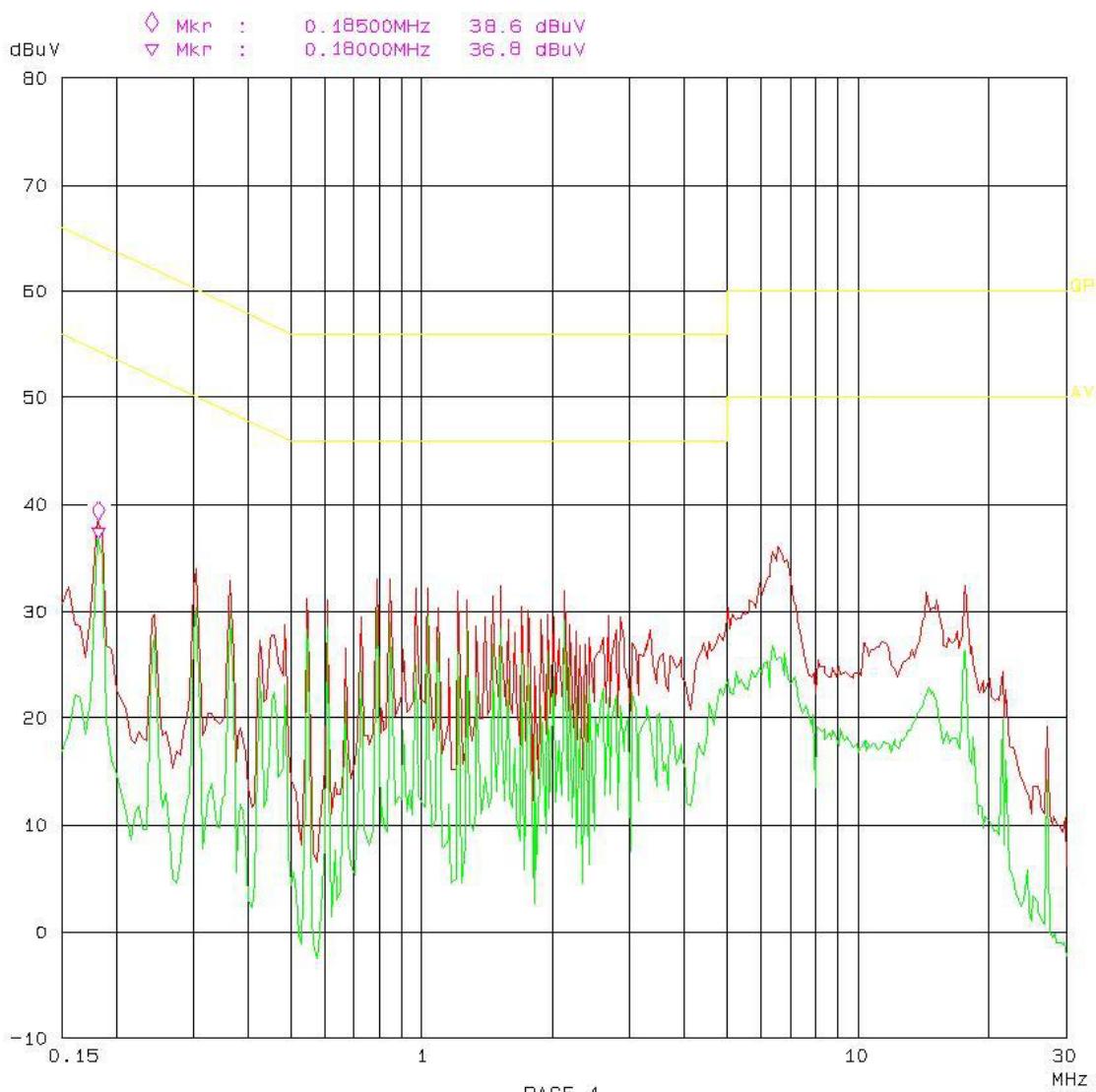


Conduction Emission

08. JUL 08 15:09

FCC 15 CLASS B

EUT: Bluetooth headset M/N: BTE001
Manuf: K-mate
Op Cond: Charging
Operator: Bruce
Test Spec: AC120V/60Hz Neutral
Comment: Temp: 25 Hum: 56%



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

Applicable Standard

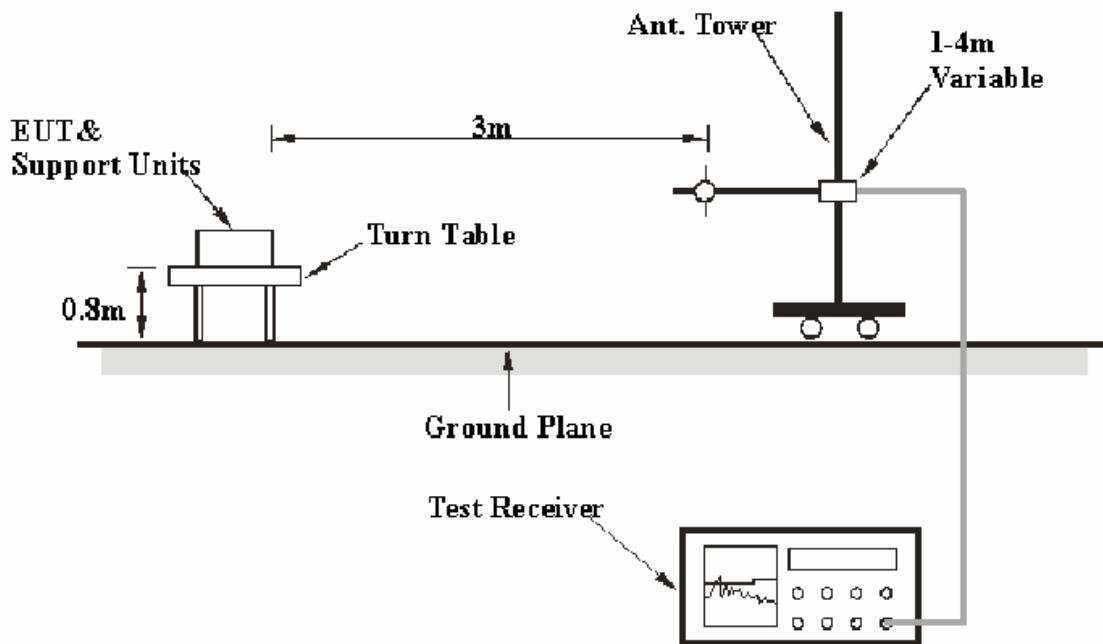
CFR47 §15.205; §15.209; §15.247 (d).

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 ± 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:

Frequency Range	RBW	Video B/W
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	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	2008-05-09	2009-05-09

* **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 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 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:

- 2.00 dB at 166.015500 MHz in the Vertical polarization, for charging Mode**
- 5.50 dB at 308.047050 MHz in the Horizontal polarization, for below 1 GHz**
- 9.0 dB at 4804 MHz in the Vertical polarization, for above 1GHz (Low Channel)**
- 6.29 dB at 4882 MHz in the Vertical polarization, for above 1GHz (Middle Channel)**
- 10.78dB at 4960 MHz in the Horizontal polarization, for above 1GHz (High Channel)**

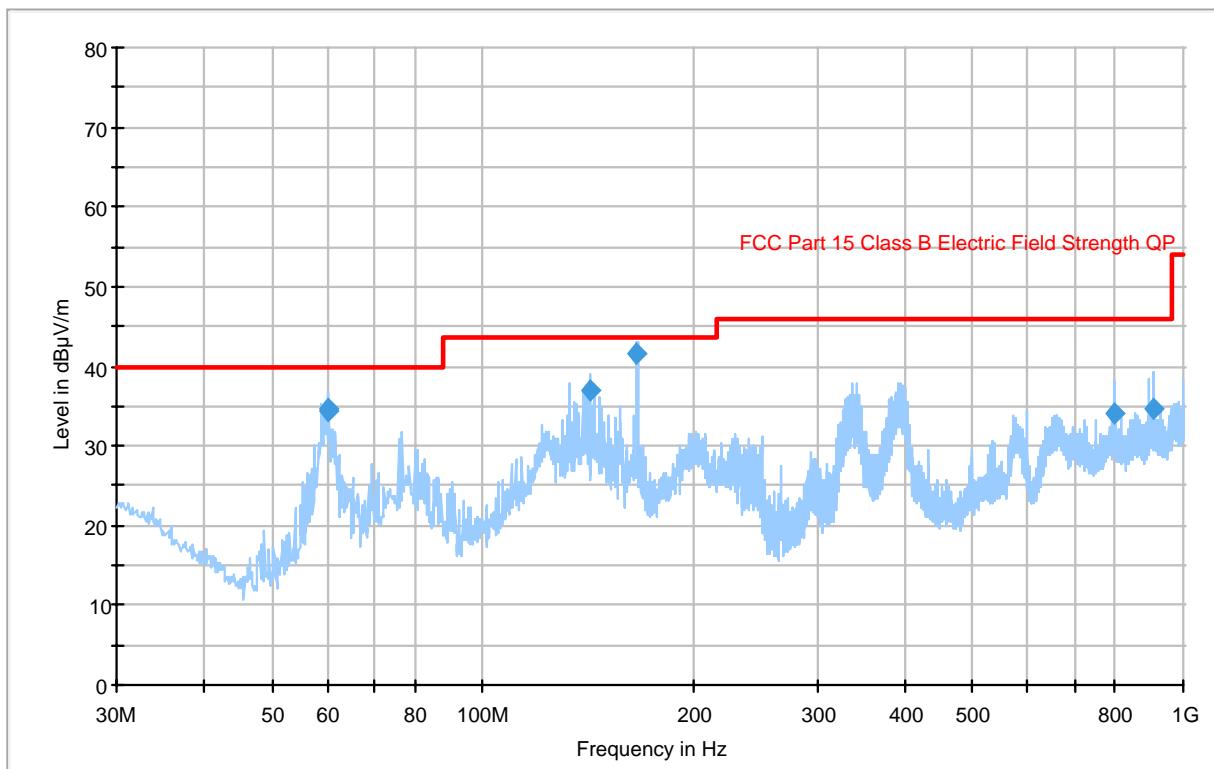
Test Data

Environmental Conditions

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

The testing was performed by Bruce Zhang on 2008-07-08.

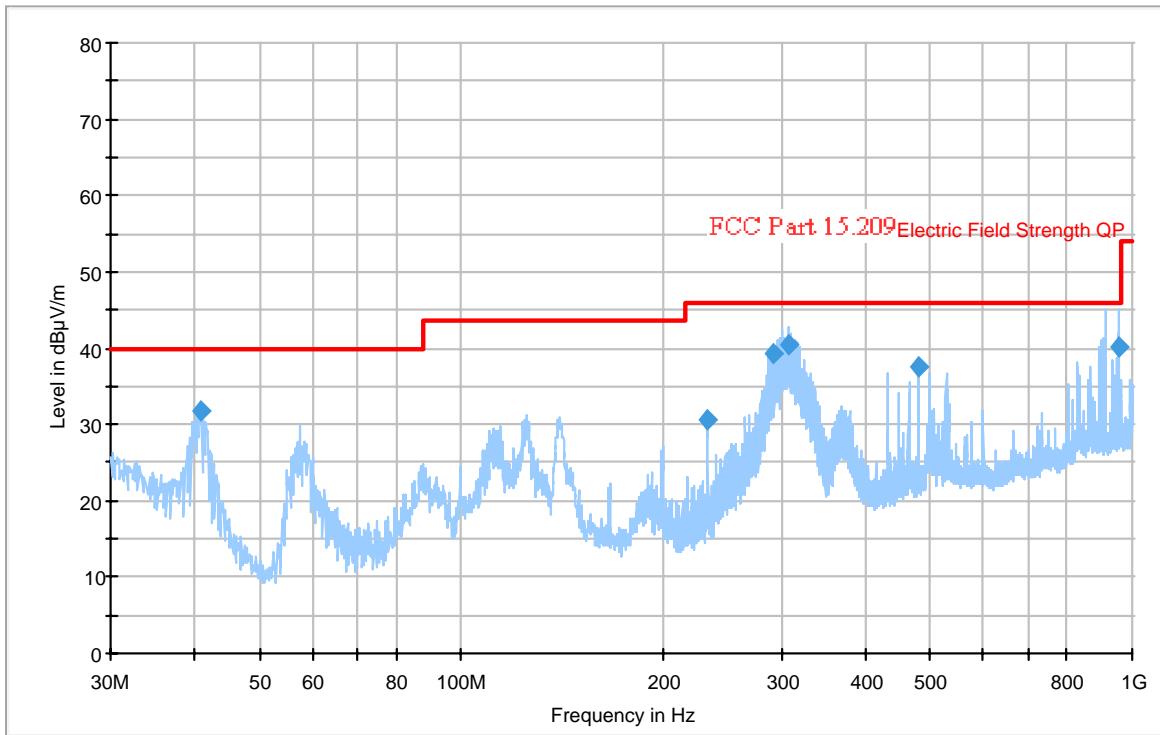
Test Mode: Charging



Frequency (MHz)	Corrected Amp. (dB μ V/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dB μ V/m)	Margin (dB)
166.015500	41.5	106.0	V	82.0	-12.1	43.5	2.0*
60.310500	34.8	401.0	H	212.0	-17.3	40.0	5.2
60.131475	34.3	106.0	V	219.0	-17.3	40.0	5.7
142.136075	37.1	105.0	V	141.0	-11.1	43.5	6.4
905.795525	34.6	138.0	H	290.0	1.2	46.0	11.6
798.011350	34.2	106.0	V	14.0	-0.3	46.0	11.8

* Within measurement uncertainty.

Test Mode: Transmitting (Below 1GHz)



Frequency (MHz)	Corrected Amp. (dB μ V/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dB μ V/m)	Margin (dB)
308.047050	40.5	102.0	H	74.0	-9.2	46.0	5.5*
955.274300	40.1	206.0	H	77.0	1.9	46.0	5.9
290.677450	39.4	102.0	H	73.0	-9.8	46.0	6.6
41.033750	31.8	401.0	V	0.0	1.2	40.0	8.2
479.958750	37.5	138.0	H	333.0	1.2	46.0	8.5
233.093750	30.7	218.0	H	76.0	1.9	46.0	15.3

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
Low Channel												
2402	86.3	PK	25	1.80	H	30.6	3.61	34	86.57			Fund.
2402	72.33	AV	35	1.80	H	30.6	3.61	34	72.54			Fund.
2402	95.39	PK	355	1.75	V	30.6	3.61	34	95.6			Fund.
2402	82.35	AV	354	1.75	V	30.6	3.61	34	82.56			Fund.
4804	38.36	AV	180	1.05	V	35.4	4.64	33.4	45.0	54	9.0	Harmonic
4804	34.75	AV	240	1.02	H	36.6	4.64	33.4	42.59	54	11.41	Harmonic
4804	52.22	PK	180	1.05	V	35.4	4.64	33.4	58.86	74	15.14	Harmonic
4804	49.63	PK	240	1.02	H	36.6	4.64	33.4	57.47	74	16.53	Harmonic
1596	40.01	AV	154	1.55	V	26.0	2.77	34.6	34.18	54	19.82	Spurious
1596	39.57	AV	225	1.40	H	26.0	2.77	34.6	33.74	54	20.26	Spurious
1596	51.60	PK	155	1.55	V	26.0	2.77	34.6	45.77	74	28.23	Spurious
1596	51.02	PK	225	1.40	H	26.0	2.77	34.6	45.19	74	28.81	Spurious
Middle Channel												
2441	85.91	PK	25	1.67	H	30.6	3.61	34	86.12			Fund.
2441	69.84	AV	25	1.67	H	30.6	3.61	34	70.05			Fund.
2441	94.35	PK	0	1.67	V	30.6	3.61	34	94.56			Fund.
2441	81.76	AV	0	1.67	V	30.6	3.61	34	81.97			Fund.
4882	39.87	AV	178	1.03	V	36.6	4.64	33.4	47.71	54	6.29	Harmonic
4882	35.41	AV	250	1.00	H	35.4	4.64	33.4	42.05	54	11.95	Harmonic
4882	53.00	PK	178	1.03	V	36.6	4.64	33.4	60.84	74	13.16	Harmonic
4882	50.93	PK	250	1.00	H	35.4	4.64	33.4	57.57	74	16.43	Harmonic
1596	36.66	AV	175	1.37	H	26.0	2.77	34.6	30.83	54	23.17	Spurious
1364	36.06	AV	130	1.07	V	26.5	2.77	34.6	30.73	54	23.27	Spurious
1364	49.02	PK	130	1.07	V	26.5	2.77	34.6	43.69	74	30.31	Spurious
1596	47.18	PK	175	1.37	H	26.0	2.77	34.6	41.35	74	32.65	Spurious
High Channel												
2480	87.35	PK	35	1.67	H	30.6	3.61	34	87.56			Fund.
2480	74.28	AV	35	1.67	H	30.6	3.61	34	74.49			Fund.
2480	94.50	PK	355	1.67	V	30.6	3.61	34	94.71			Fund.
2480	81.84	AV	355	1.67	V	30.6	3.61	34	82.05			Fund.
4960	35.47	AV	35	1.10	H	36.6	4.55	33.4	43.22	54	10.78	Harmonic
4960	36.37	AV	355	1.10	V	35.4	4.55	33.4	42.92	54	11.08	Harmonic
4960	50.52	PK	35	1.10	H	36.6	4.55	33.4	58.27	74	15.73	Harmonic
4960	51.14	PK	355	1.10	V	35.4	4.55	33.4	57.69	74	16.31	Harmonic
1596	38.35	AV	280	1.20	V	26.0	2.77	34.6	32.52	54	21.48	Spurious
1596	36.43	AV	150	115	H	26.5	2.77	34.6	31.1	54	22.9	Spurious
1596	49.71	PK	280	1.20	V	26.0	2.77	34.6	43.88	74	30.12	Spurious
1596	47.71	PK	150	1.15	H	26.5	2.77	34.6	42.38	74	31.62	Spurious

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**

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

The testing was performed by Bruce Zhang on 2008-06-16.

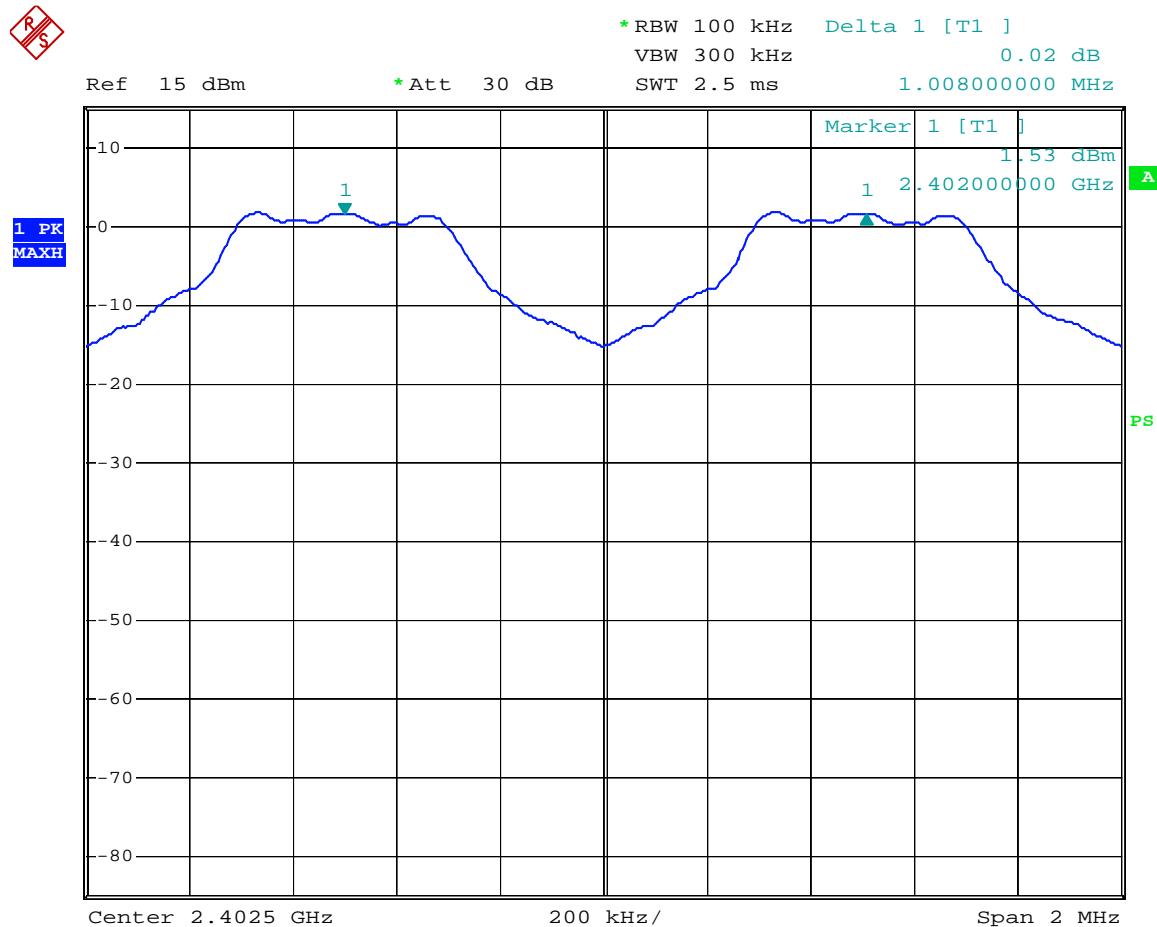
Test Mode: Transmitting

Channel	Channel Frequency (MHz)	Channel Separation (kHz)	Limit (kHz)	Result
Low Channel	2402	1008	568.0	Pass
Adjacency Channel	2403			
Middle Channel	2441	1008	565.3	Pass
Adjacency Channel	2442			
High Channel	2480	1012	568.0	Pass
Adjacency Channel	2479			

Test Result: Compliance.

Please refer to following plots

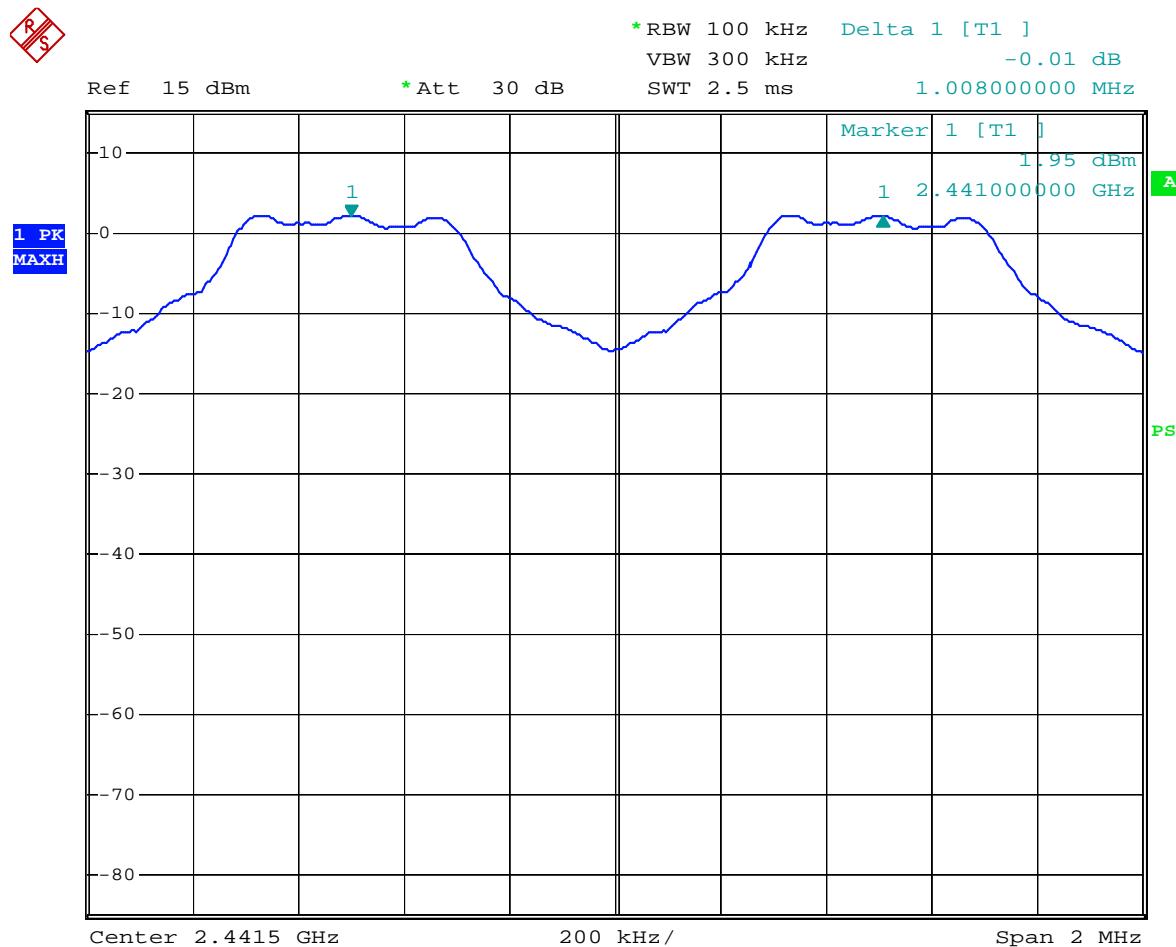
Low Channel



Channel Separation Low Channel

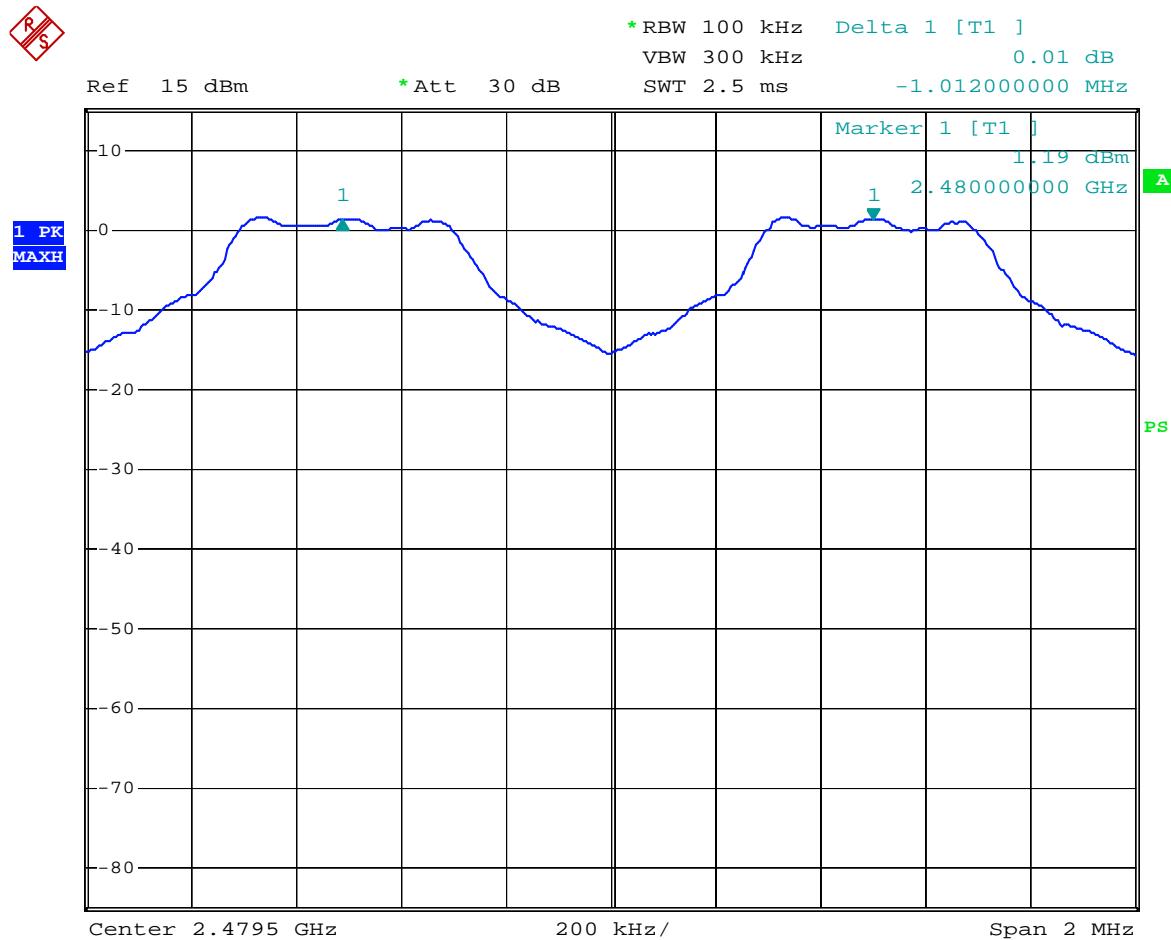
Date: 16.JUN.2008 12:58:06

Middle Channel



Channel Separation Midle Channel

Date: 16.JUN.2008 12:56:01

High Channel

Channel Separation High Channel

Date: 16.JUN.2008 12:53:39

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**

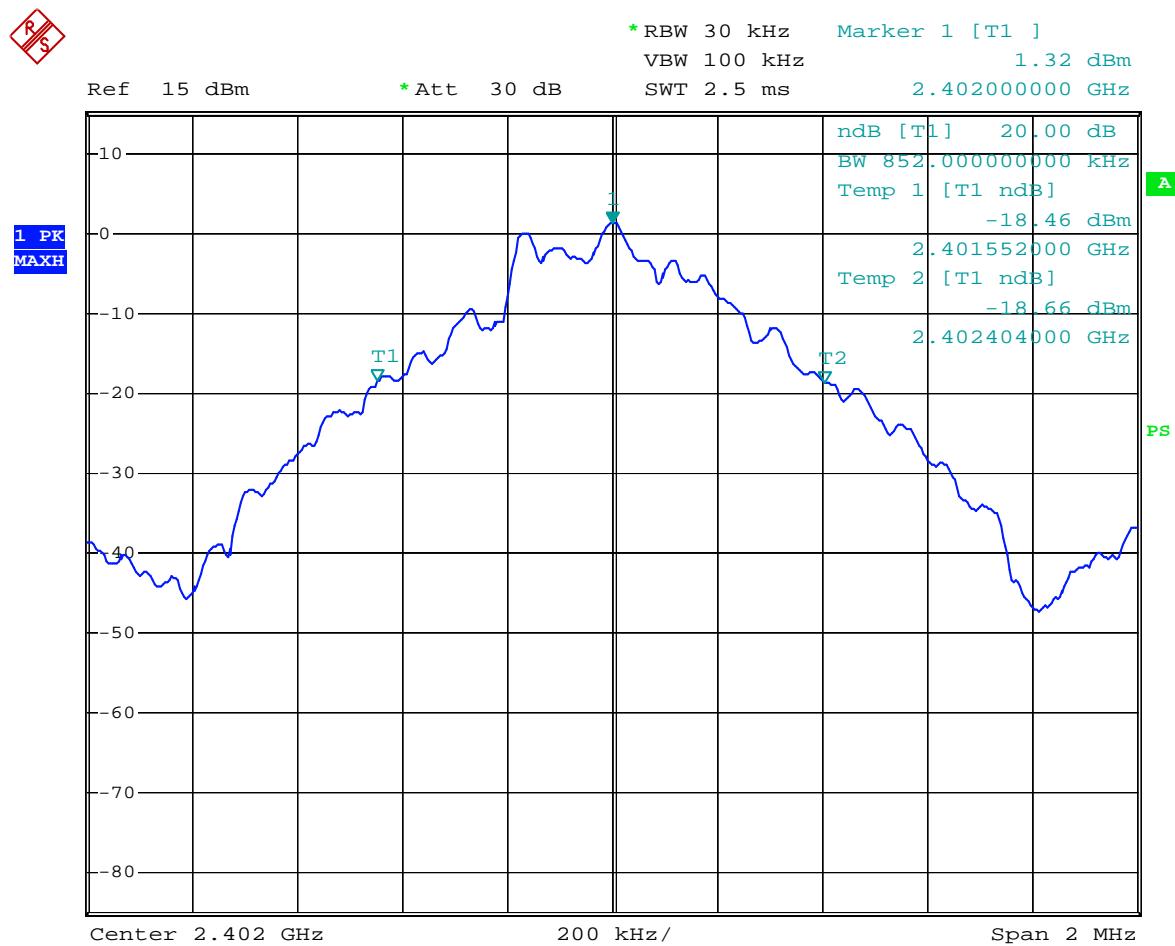
Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	100.9 kPa

The testing was performed by Bruce Zhang on 2008-06-16.

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

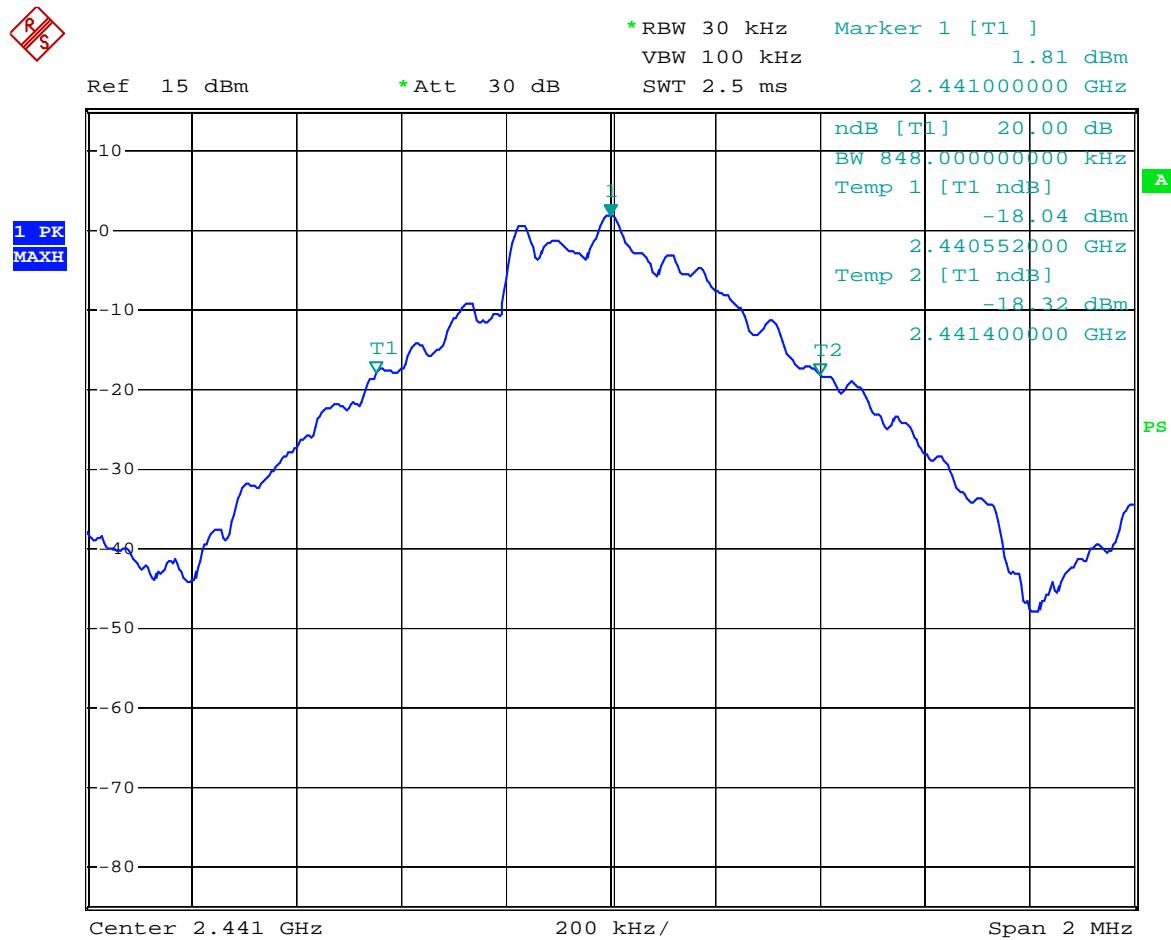
Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)
Low Channel	2402	852
Middle Channel	2441	848
High Channel	2480	852

Low Channel



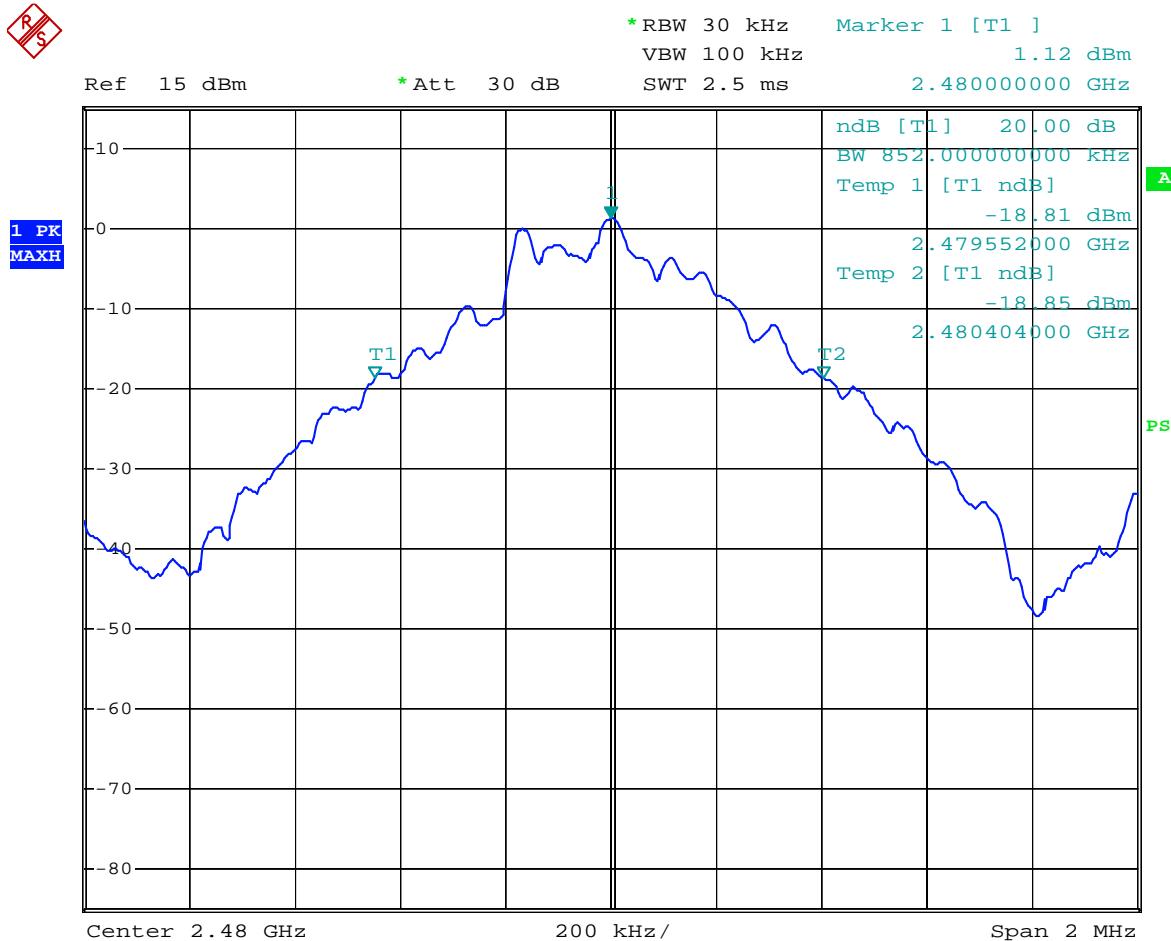
20dB Bandwidth Low channel

Date: 16.JUN.2008 12:46:41

Middle Channel

20dB Bandwidth Middle chanel

Date: 16.JUN.2008 12:48:12

High Channel

20dB Bandwidth High channel

Date: 16.JUN.2008 12:49:39

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:	50 %
ATM Pressure:	100.9 kPa

The testing was performed by Bruce Zhang on 2008-07-16.

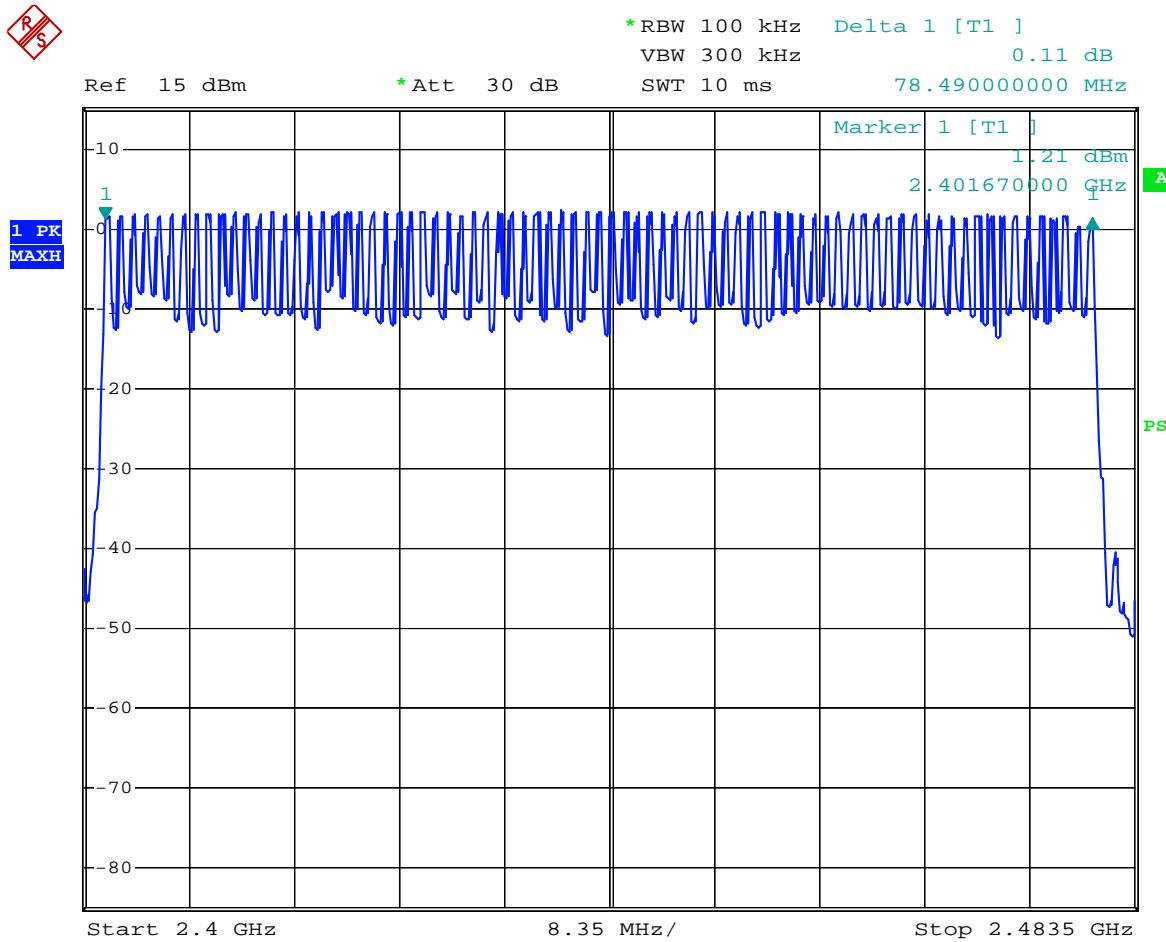
Test Mode: Transmitting

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

Test Result: Compliance.

Please refer to following plot.

Number of Hopping Channels



Chanel Quantity

Date: 16.JUN.2008 13:04:51

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 * 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 Bruce Zhang on 2008-07-16.

Test Mode: Transmitting

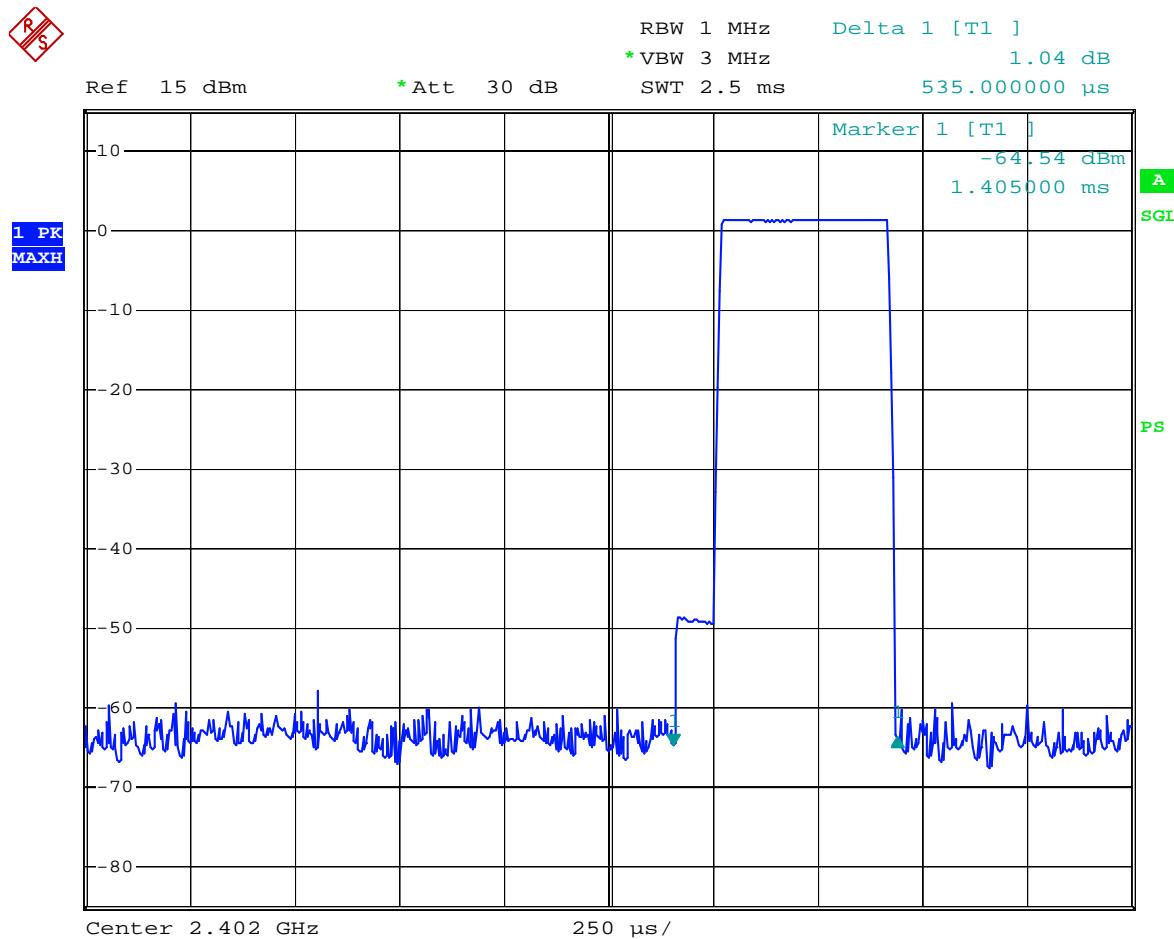
Test Result: Compliance.

Please refer to following tables and plots

DH1

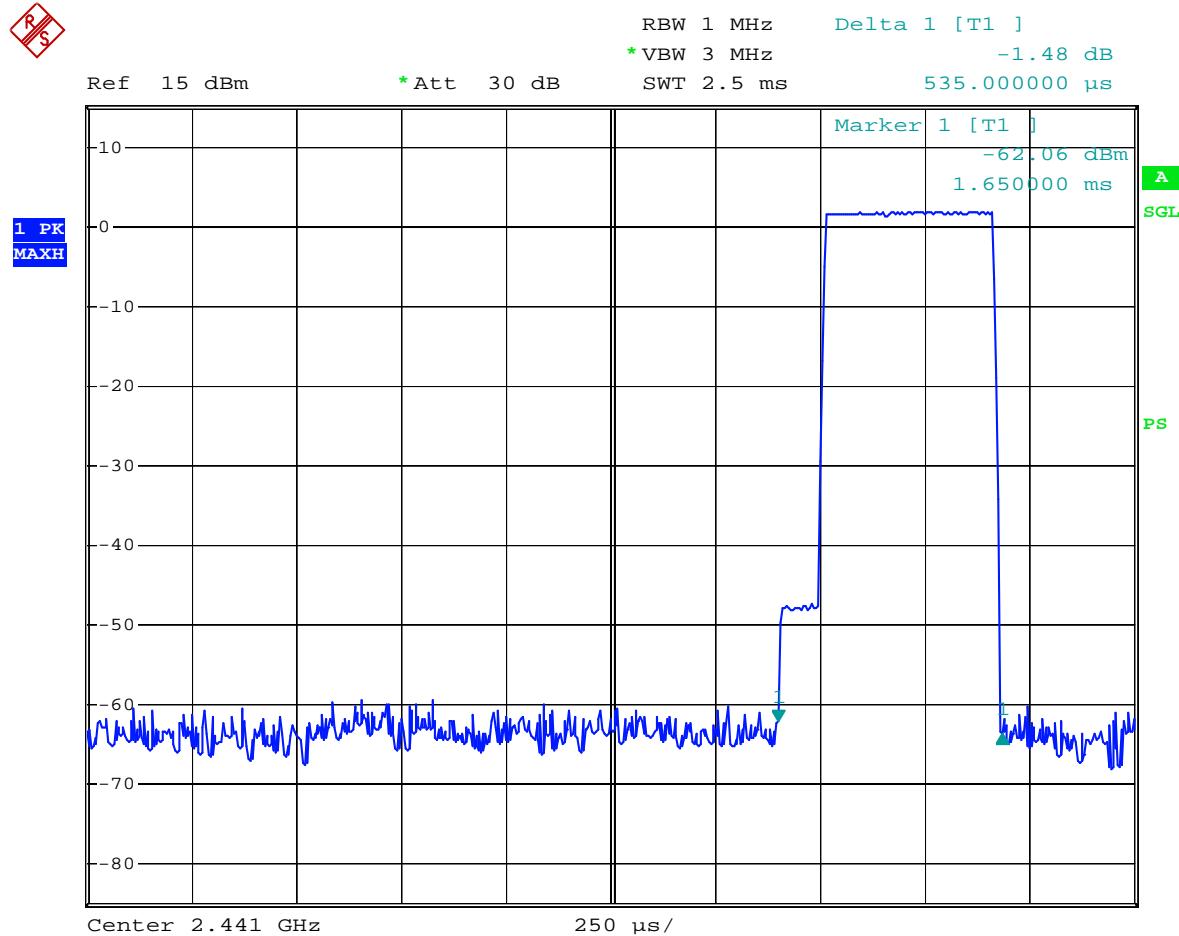
Channel	Pulse width (msec)	Dwell time (sec)	Limit (sec)	Result
Low	0.535	0.171	0.4	Pass
Middle	0.535	0.171	0.4	Pass
High	0.540	0.173	0.4	Pass

NOTE: Pulse time(1600/2/79)*31.6S*

Low Channel

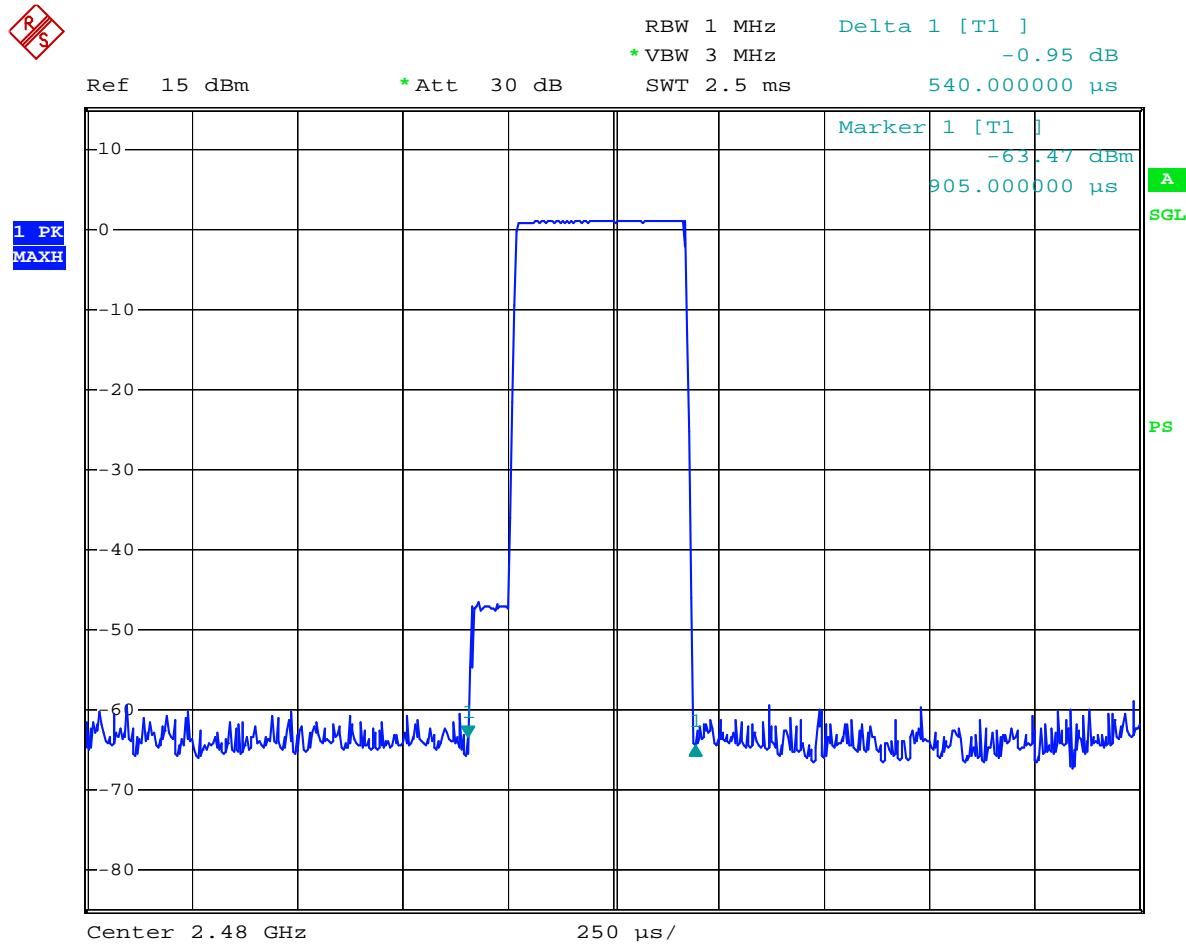
Dwell time Low Channel(DH1)

Date: 16.JUN.2008 13:17:51

Middle Channel

Dwell time Middle Channel(DH1)

Date: 16.JUN.2008 13:19:23

High Channel

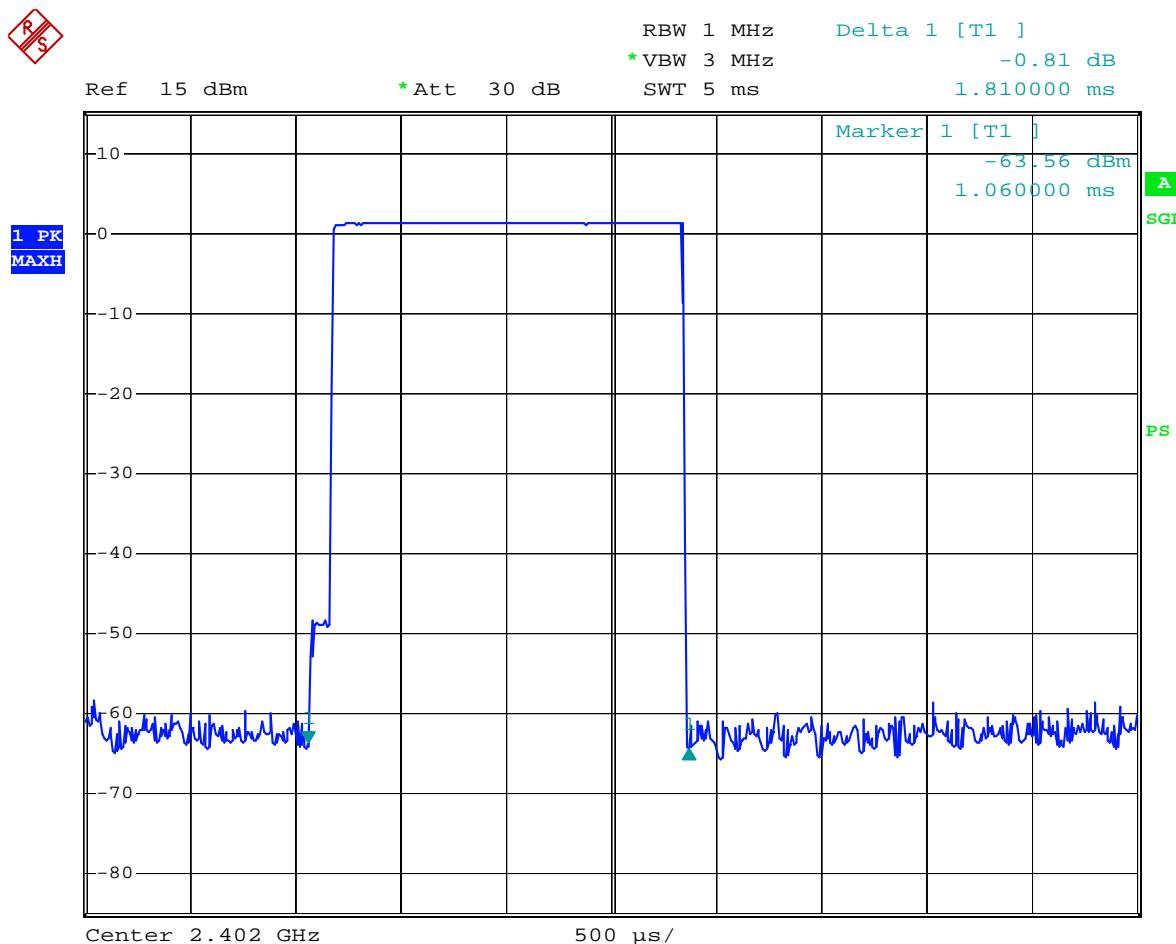
Dwell time High Channel(DH1)

Date: 16.JUN.2008 13:21:55

DH3

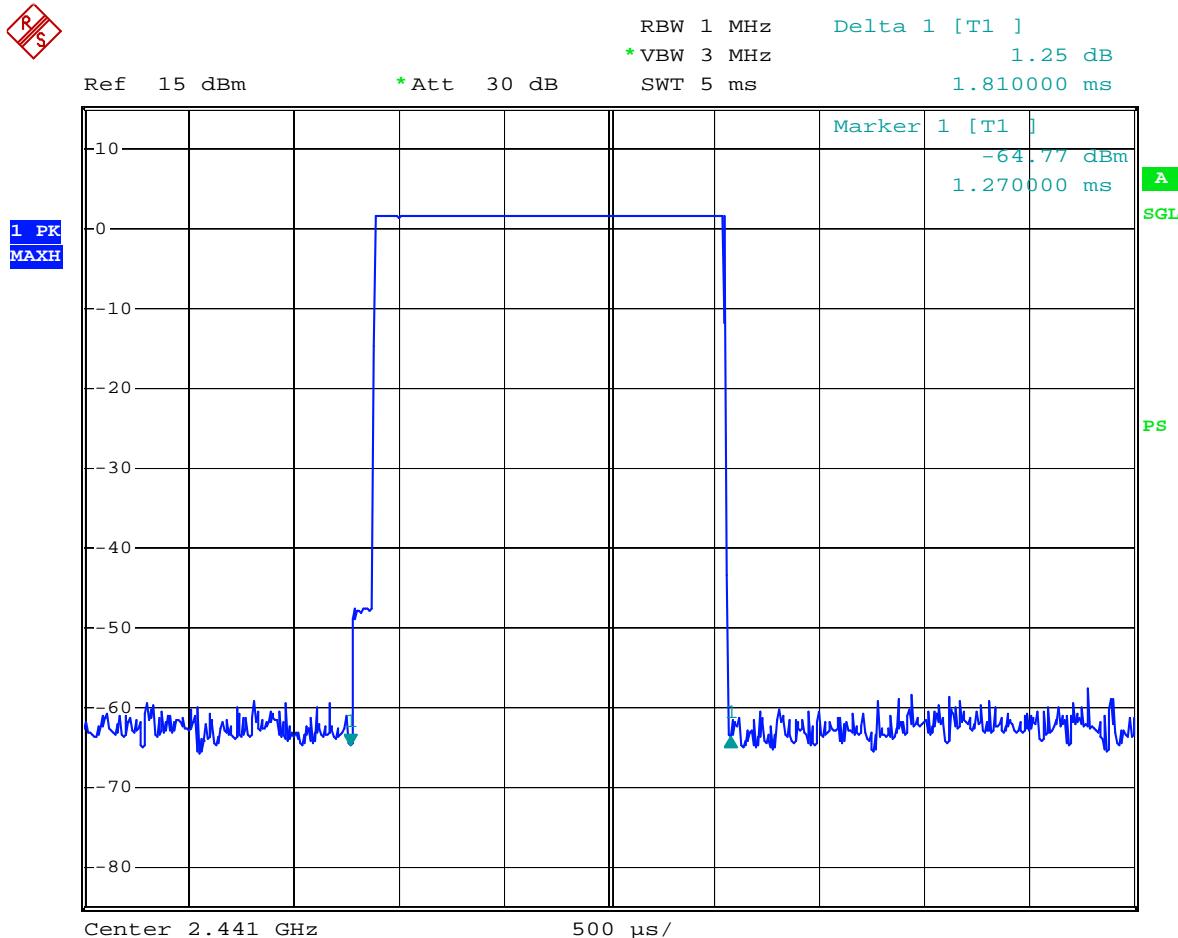
Channel	Pulse width (msec)	Dwell time (sec)	Limit (sec)	Result
Low	1.81	0.290	0.4	Pass
Middle	1.81	0.290	0.4	Pass
High	1.81	0.290	0.4	Pass

NOTE: Pulse time*(1600/2/79)*31.6S

Low Channel

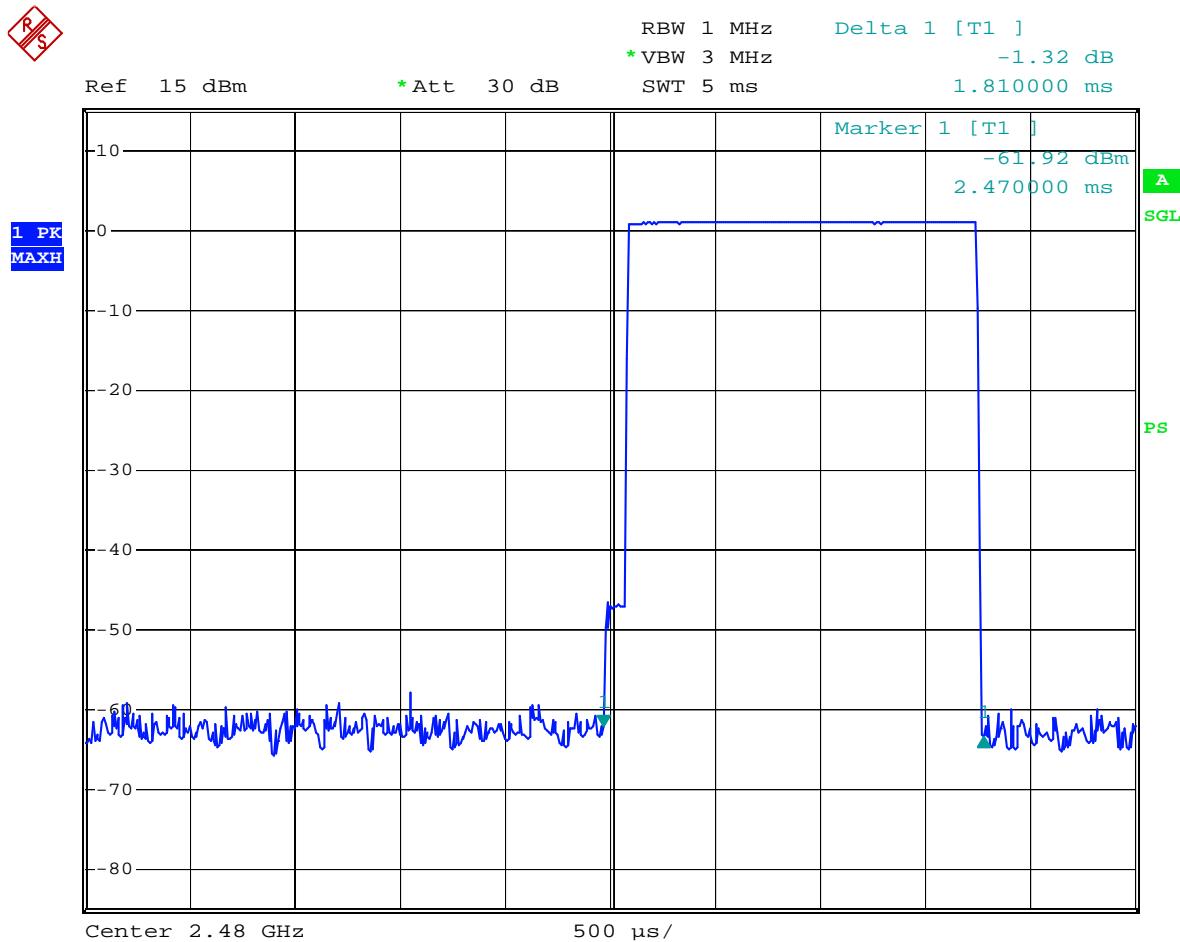
Dwell time Low Channel(DH3)

Date: 16.JUN.2008 13:33:01

Middle Channel

Dwell time Middle Channel(DH3)

Date: 16.JUN.2008 13:29:57

High Channel

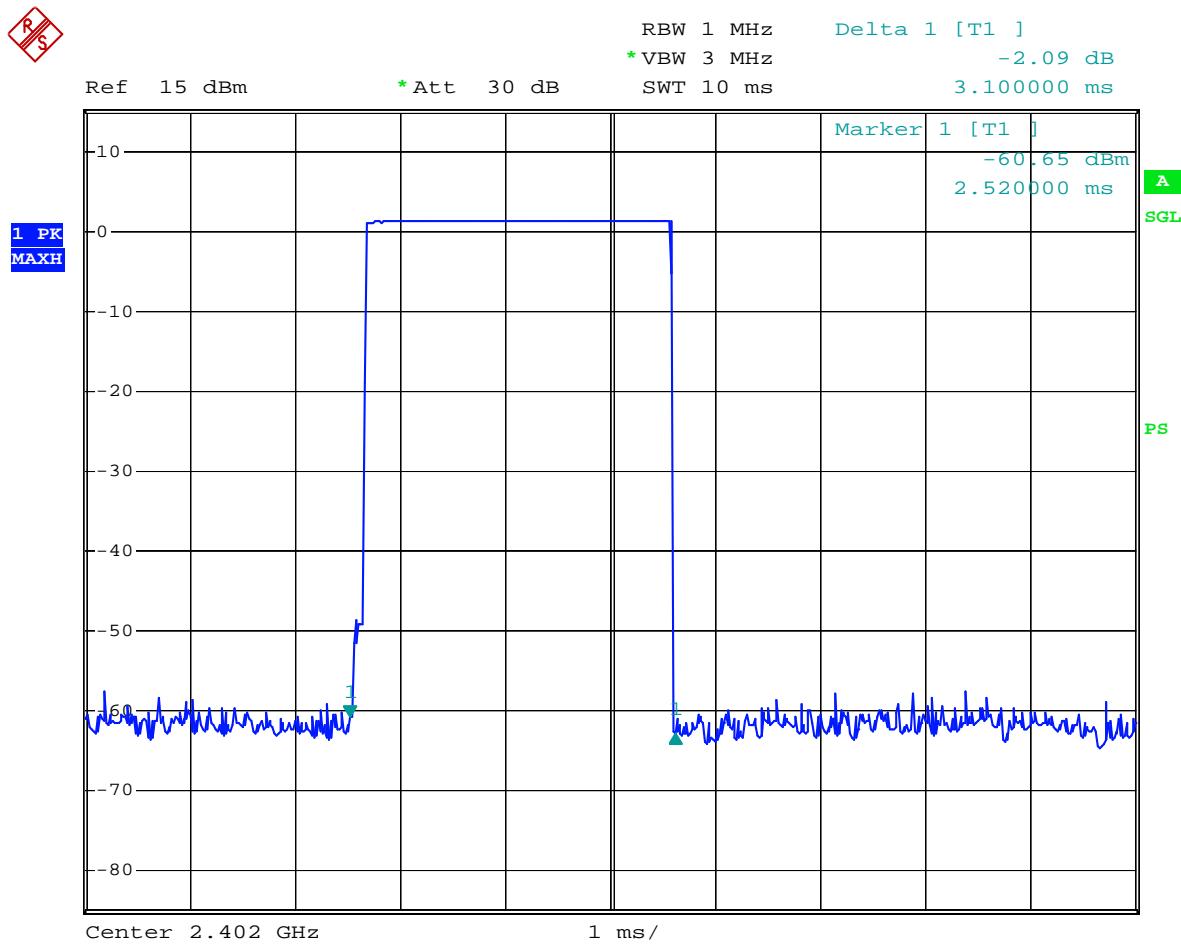
Dwell time High Channel(DH3)

Date: 16.JUN.2008 13:31:08

DH5

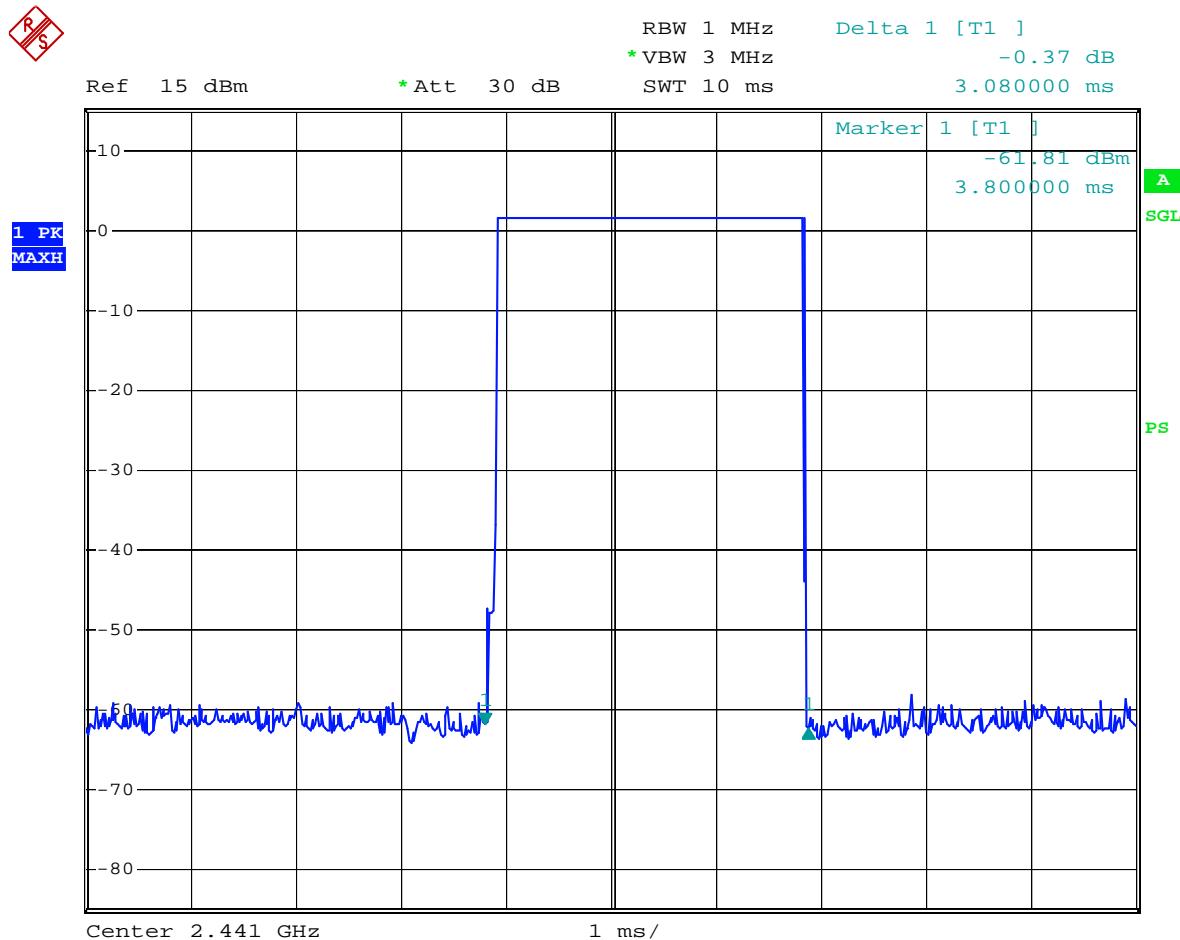
Channel	Pulse width (msec)	Dwell time (sec)	Limit (sec)	Result
Low	3.10	0.331	0.4	Pass
Middle	3.08	0.329	0.4	Pass
High	3.08	0.329	0.4	Pass

NOTE: Pulse time*(1600/2/79)*31.6S

Low Channel

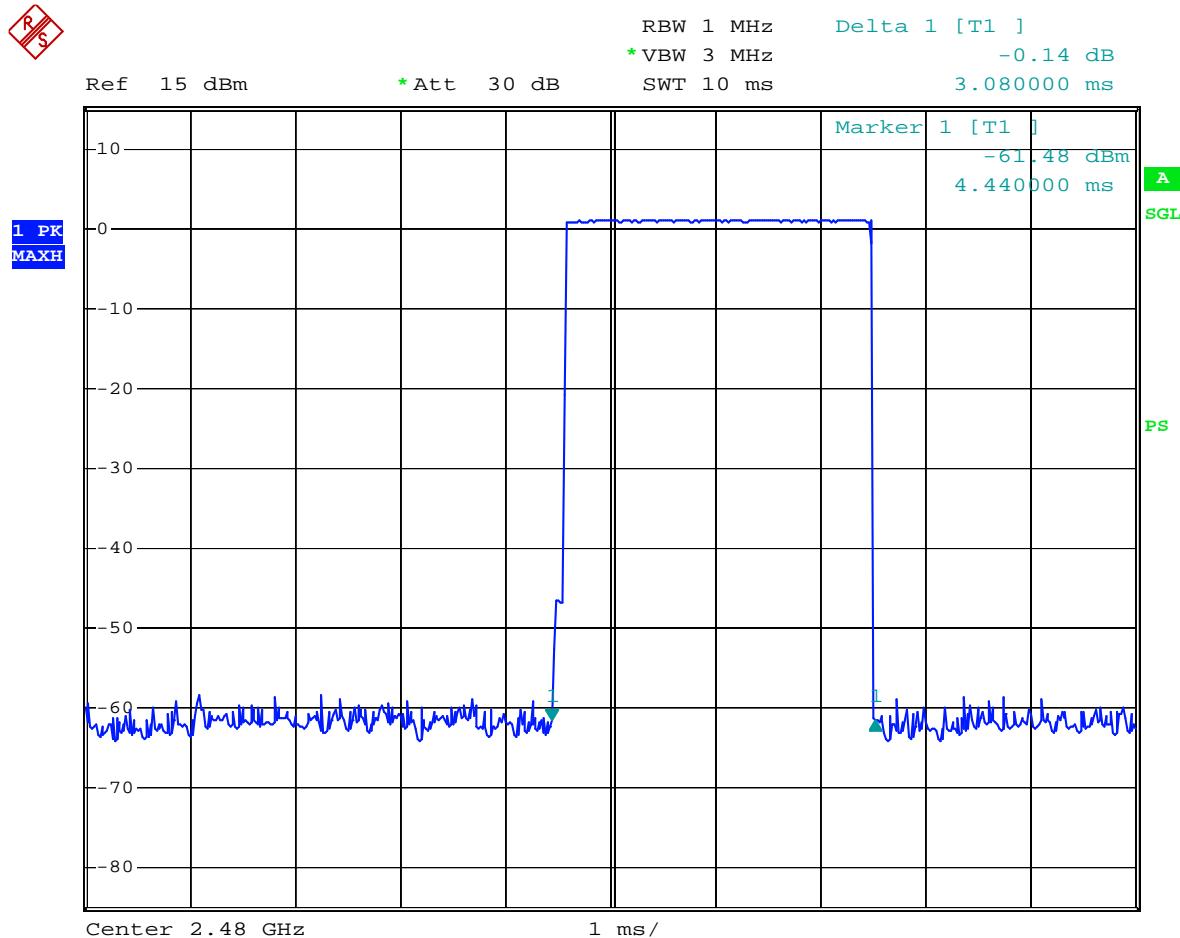
Dwell time Low Channel(DH5)

Date: 16.JUN.2008 13:36:25

Middle Channel

Dwell time Middle Channel(DH5)

Date: 16.JUN.2008 13:38:55

High Channel

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	2008-05-09	2009-05-09

* **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 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 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**

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

The testing was performed by Bruce Zhang on 2008-07-11.

Test Mode: Transmitting

Freq. (MHz)	Receiver Reading (dBuV/m)	Detector PK	Table Direction Degree	Antenna		Cable Loss (dB)	Pre- Amp. (dB)	Cord. Amp. (dBuV/m)	Transducer Factor (dB)	EIRP		Part15.247 Limit (mW)
				Height (m)	Factor (dB/m)					(dBm)	mW	
Low Channel												
2402	95.36	PK	254	1.7	30.6	3.61	34	95.57	95.27	0.30	1.072	1000
Middle Channel												
2441	94.91	PK	0	1.7	30.6	3.61	34	95.12	95.27	-0.15	0.966	1000
High Channel												
2480	94.35	PK	355	1.6	30.6	3.61	34	94.56	95.27	-0.71	0.849	1000

Note: P (dBm) = E (dB μ V/m) – 95.27

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**

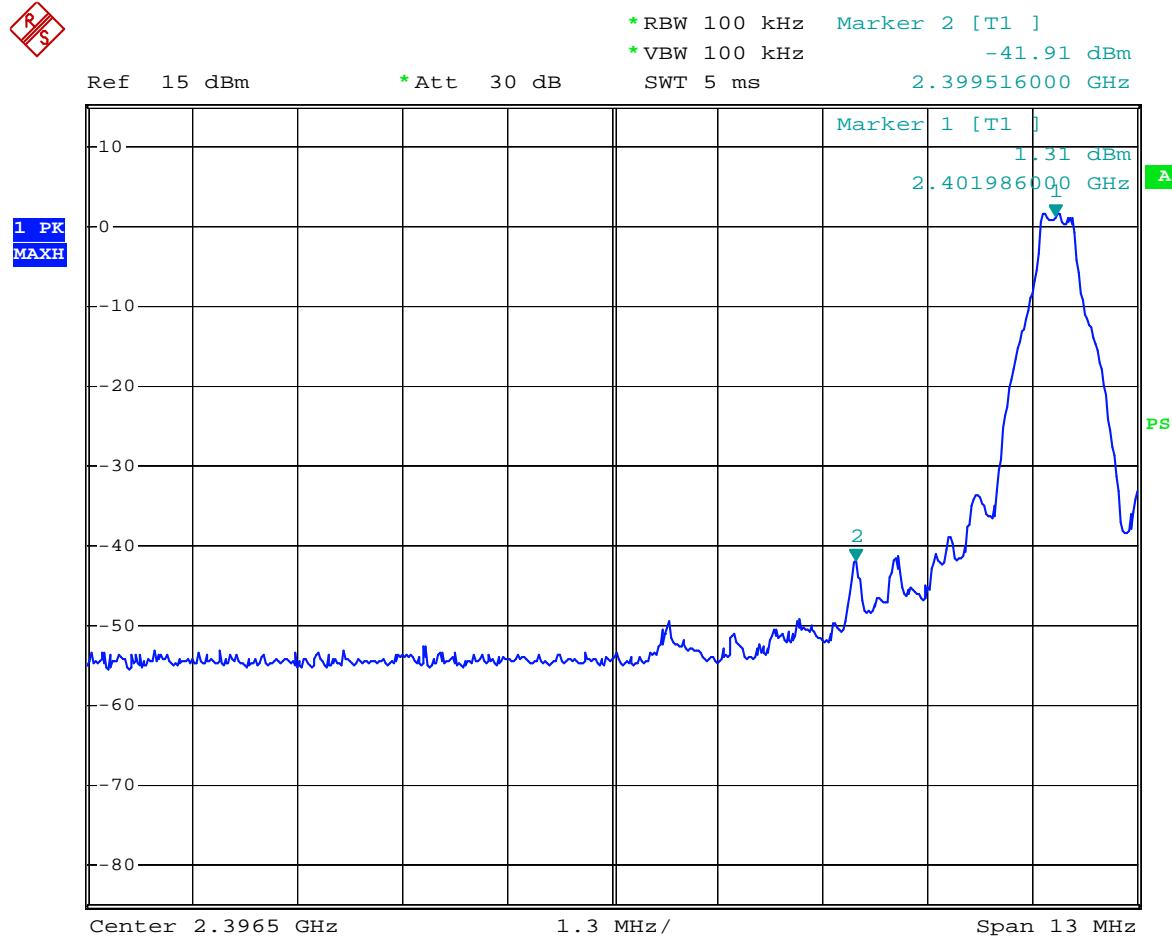
Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	100.9 kPa

The testing was performed by Bruce Zhang on 2008-06-16.

Test Mode: Transmitting

Frequency (MHz)	Delta Peak to in-band emission (dBc)	Limit (dBc)
2399.516	40.60	20
2484.502	43.78	20

Test Result: Pass

Low Band Edge

Bandedge left

Date: 16.JUN.2008 13:47:18

High Band Edge

Bandedge Right

Date: 16.JUN.2008 13:48:51

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