



NVLAP LAB CODE 200707-0



FCC PART 15.247

MEASUREMENT AND TEST REPORT

For

Audex Telecom Industrial Co., Ltd.

4/F., Chuangye Center, Kangle Rd., Zhongshan Torch Hi-Tech Industrial Zone,
Zhongshan, China

FCC ID: P68STB28151898

This Report Concerns: ☒ Original Report	Equipment Type: Bluetooth Wireless stereo and Speakerphone
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Report No.: RSZ07060402	
Test Date: 2007-06-15 to 2007-06-26	
Report Date: 2007-06-26	
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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 Audex Telecom Industrial Co., Ltd.'s product, model number: STB-2815 or the "EUT" as referred to in this report is a *Bluetooth Wireless stereo and Speakerphone*, which measures approximately: 16.0 cm L x 4.0 cm W x 4.0 cm H, rated input voltage: 3.7V Battery.

** The test data gathered are from production sample, serial number: 0706011 provided by the manufacturer, we receive the EUT on 2007-04-02.*

Objective

This Type approval report is prepared on behalf of Audex Telecom Industrial 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 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>.

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-1I0O	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

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

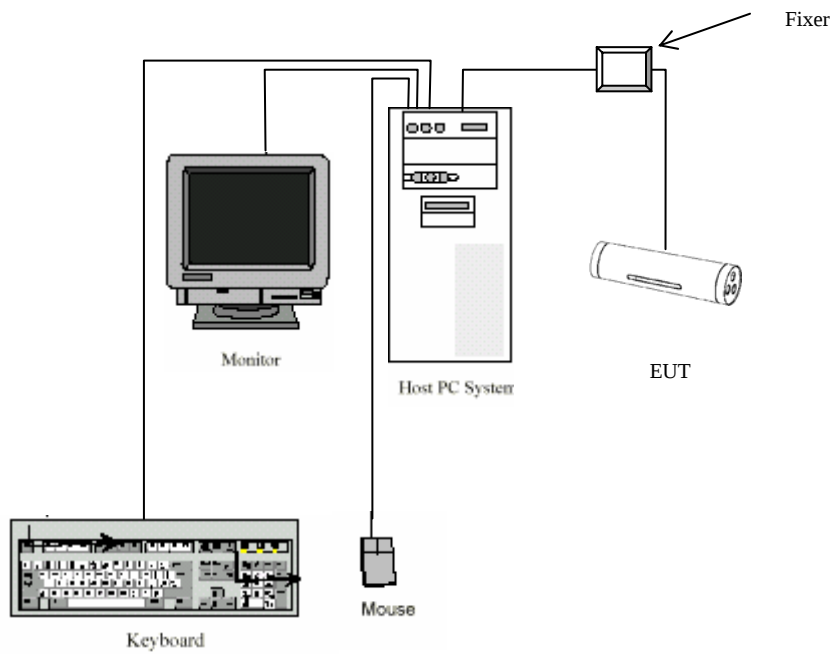
The special accessories were provided by Bay Area Compliance Laboratory Corp. (Shenzhen).

Equipment Modifications

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

Configuration of Test Setup

Test mode: Transmitting

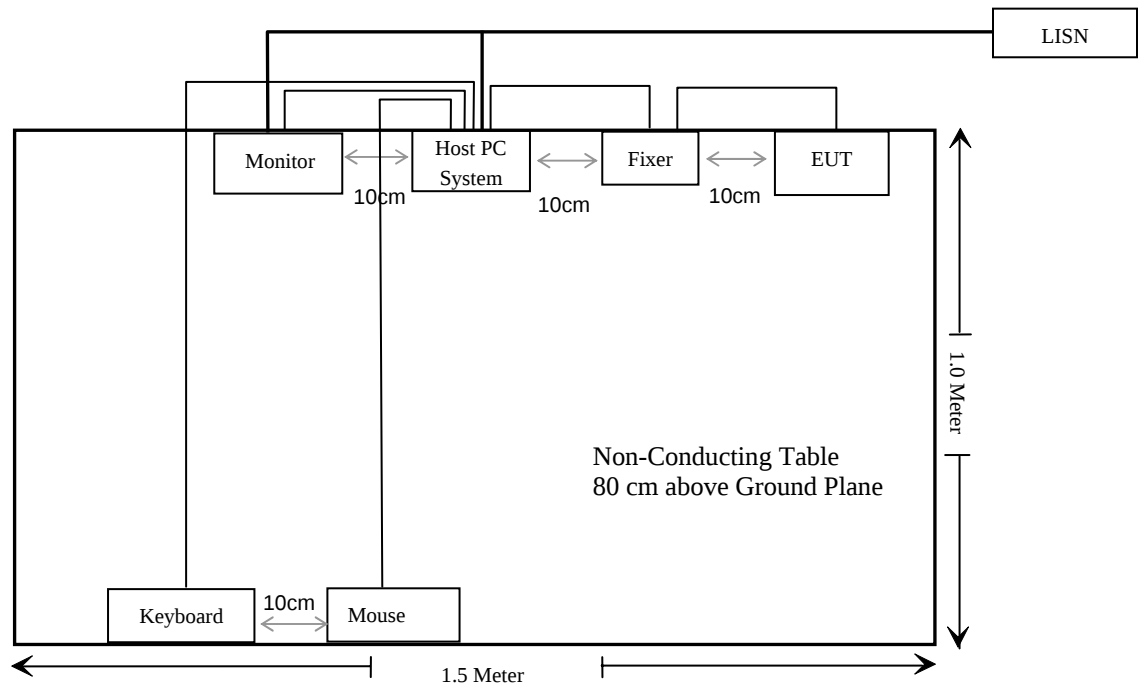


Test mode: Charging

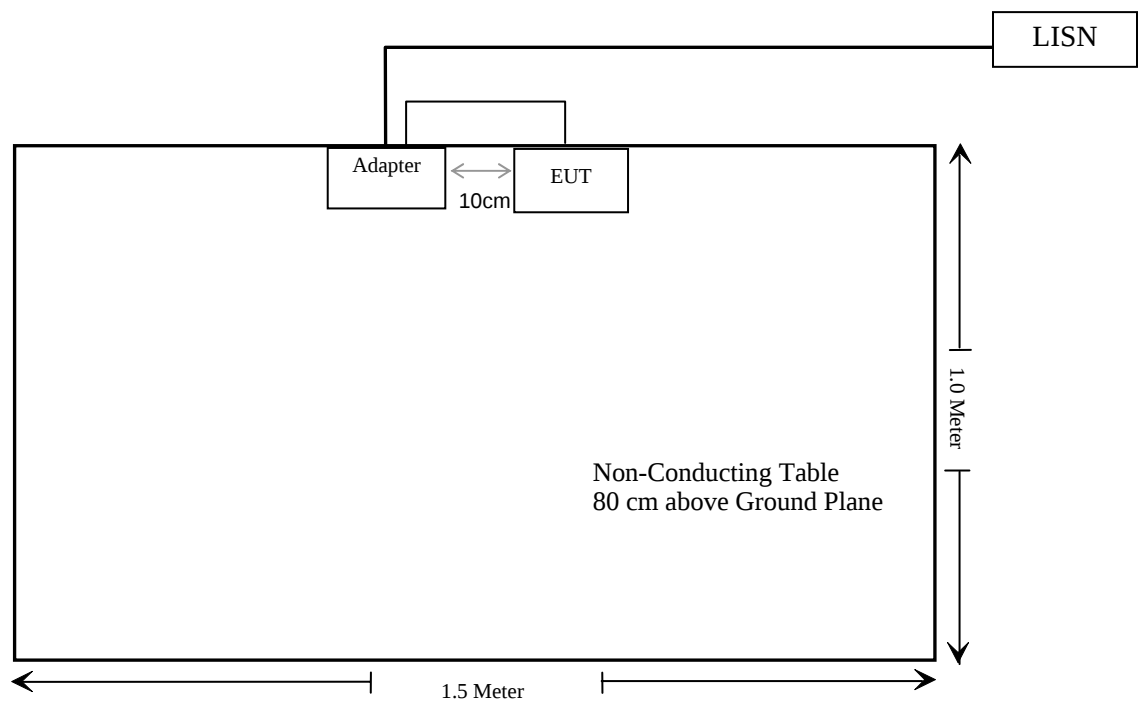


Block Diagram of Test Setup

Test mode: Transmitting



Test mode: Charging



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.107 (a)	Conducted Emission	Compliant
§15.247 (i) and §1.1307 (b) (1)	Maximun Permissible exposure (MPE)	Compliant
§15.203	Antenna Requirement	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

§15.247 (i) and §1.1307 (b) (1) - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Limit

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

Radio frequency radiation exposure was calculated based on § 1.1310 limits.

Limits for Maximum Permissible Exposure (MPE)

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

f = frequency in MHz

* = Plane-wave equivalent power density

Test Data

Prediction of MPE limit at a given distance

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

S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW) .

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally **numeric** gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Maximum peak output power at antenna input terminal: 0.05 (dBm)

Maximum peak output power at antenna input terminal: 1.01 (mW)

Prediction distance: >20 (cm)

Prediction frequency: 2402 (MHz)

Antenna Gain (typical): 3 (dBi)

Antenna Gain (typical): 2 (Numeric)

The worst case is power density at predication frequency at 20 cm: 0.0004(mW/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mW/cm²)

$$0.0004 \text{ (mW/cm}^2\text{)} < 1 \text{ (mW/cm}^2\text{)}$$

Result: Pass

§15.203 - ANTENNA REQUIREMENT

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 a component antenna, which, in accordance to the above sections, is considered sufficient to comply with the provisions of these sections. Please see EUT photo for details.

Result: Compliance.

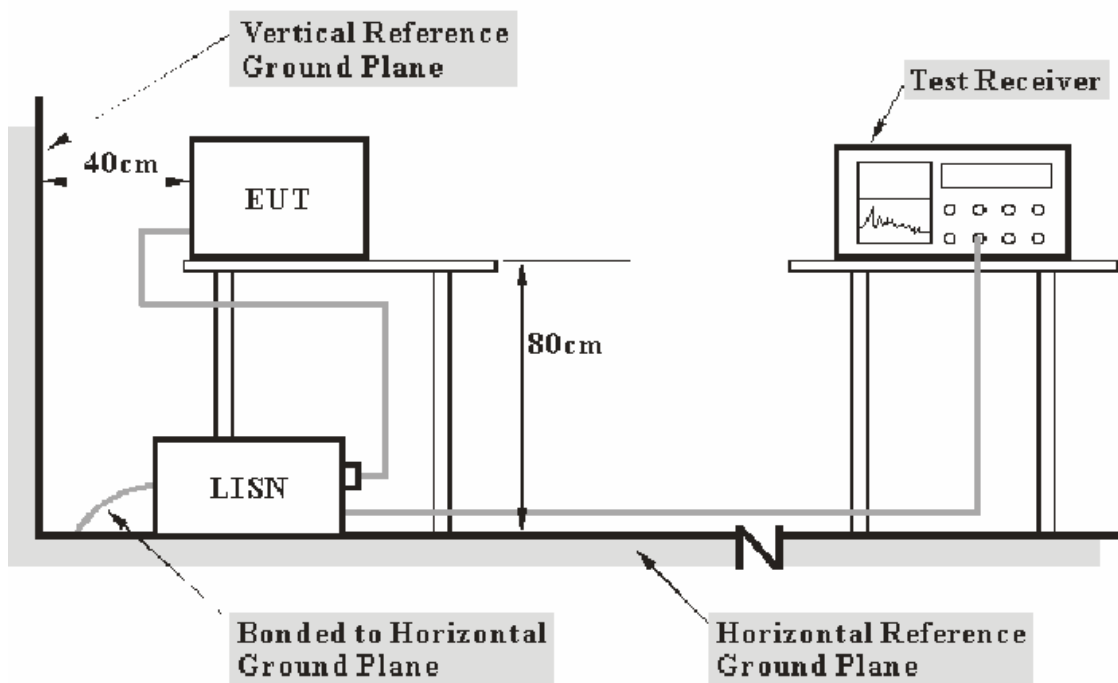
§15.207 (a) - CONDUCTED EMISSIONS

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 ± 2.4 dB.

EUT Setup



- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15 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:

<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	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 adapter 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:

11.40 dB at 27.265 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 Merry Zhao on 2007-06-26.

Test Mode: Charging

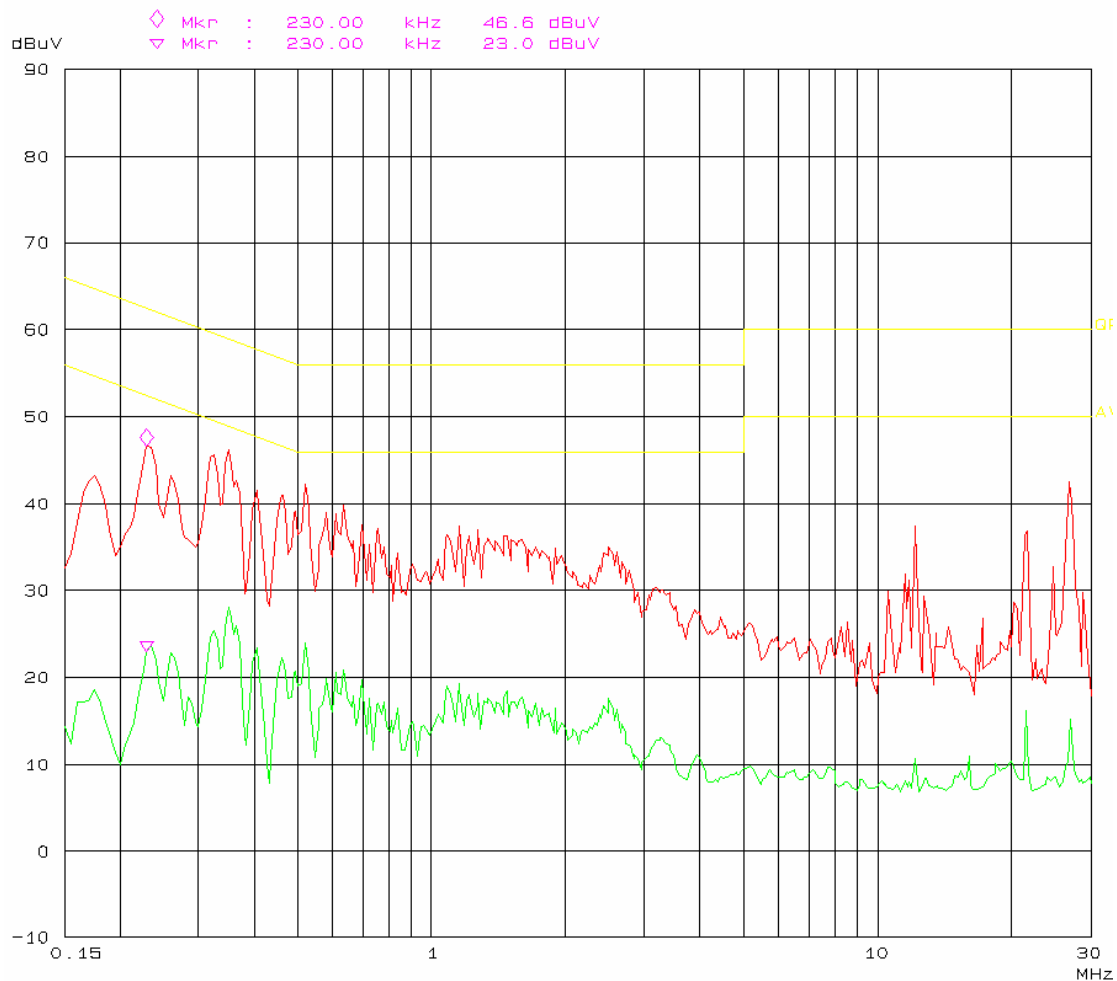
LINE CONDUCTED EMISSIONS				FCC PART 15 CLASS B	
Frequency (MHz)	Amplitude (dBμV)	Detector (QP/AV)	Phase (Live/Neutral)	Limit (dBμV)	Margin (dB)
27.265	48.60	QP	Neutral	60.00	11.40
0.350	46.20	QP	Live	58.96	12.76
0.520	42.20	QP	Live	56.00	13.80
0.230	46.60	QP	Live	62.45	15.85
0.230	46.10	QP	Neutral	62.45	16.35
26.980	42.50	QP	Live	60.00	17.50
0.400	39.50	QP	Neutral	57.85	18.35
0.635	37.00	QP	Neutral	56.00	19.00
0.350	28.10	AV	Live	48.96	20.86
2.490	35.10	QP	Live	56.00	20.90
0.520	23.90	AV	Live	46.00	22.10
12.110	37.30	QP	Live	60.00	22.70
2.490	32.50	QP	Neutral	56.00	23.50
0.405	23.90	AV	Neutral	47.75	23.85
0.632	21.10	AV	Neutral	46.00	24.90
21.620	32.70	QP	Neutral	60.00	27.30
2.490	17.60	AV	Live	46.00	28.40
2.490	17.50	AV	Neutral	46.00	28.50
0.230	23.50	AV	Neutral	52.45	28.95
0.230	23.00	AV	Live	52.45	29.45
27.120	15.20	AV	Live	50.00	34.80
27.375	11.60	AV	Neutral	50.00	38.40
12.110	10.60	AV	Live	50.00	39.40
21.680	7.30	AV	Neutral	50.00	42.70

Plot(s) of Test Data

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

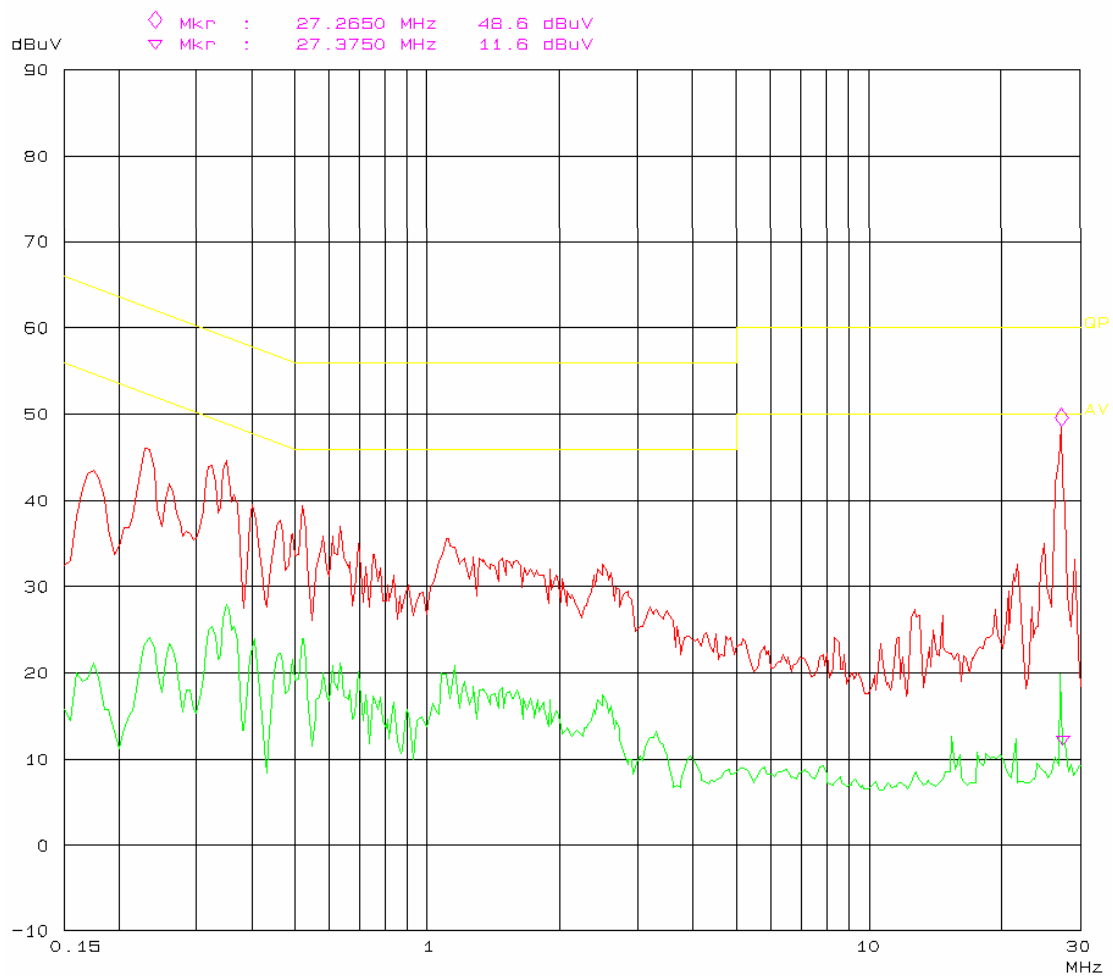
Conducted Emission Test FCC Part15

EUT: Bluetooth wireless stereo and speal
Manuf: Audex M/N: STB-2815
Op Cond: Changing
Operator: Andy
Test Spec: AC 120V/60Hz L
Comment: Temp: 25 Humi: 56%



Conducted Emission Test FCC Part15

EUT: Bluetooth wireless stereo and speal
Manuf: Audex M/N: STB-2815
Op Cond: Changing
Operator: Andy
Test Spec: AC 120V/60Hz N
Comment: Temp: 25 Humi: 56%



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

Applicable Standard

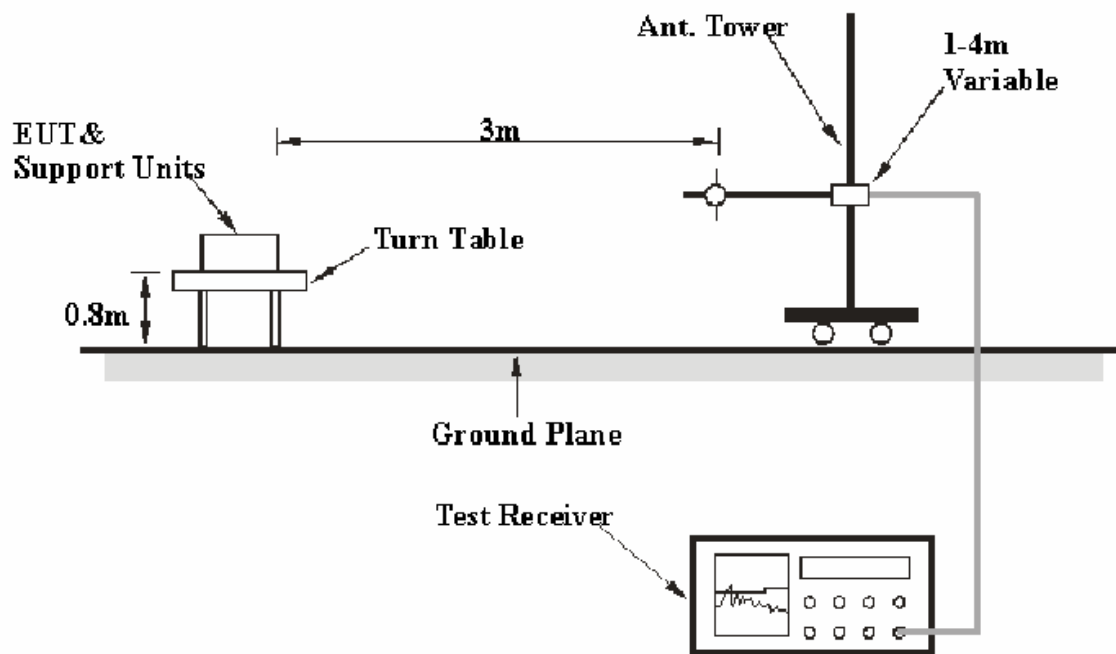
According to FCC §15.247 (d)

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 ± 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:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>
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.

All data was recorded in the PK&AV detection mode.

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: 5.7 dB at 233.093750 MHz in the Vertical polarization, for 30 MHz-1000MHz
Transmitting mode: 11.96 dB at 4804 MHz in the Horizontal polarization, for above 1GHz (Low Channel)
Transmitting mode: 11.66 dB at 4882 MHz in the Horizontal polarization, for above 1GHz (Middle Channel)
Transmitting mode: 11.50 dB at 6987.9 MHz in the Vertical polarization, for above 1GHz (High Channel)
Charging mode: 14.90 dB at 33.670175 MHz in the Vertical polarization

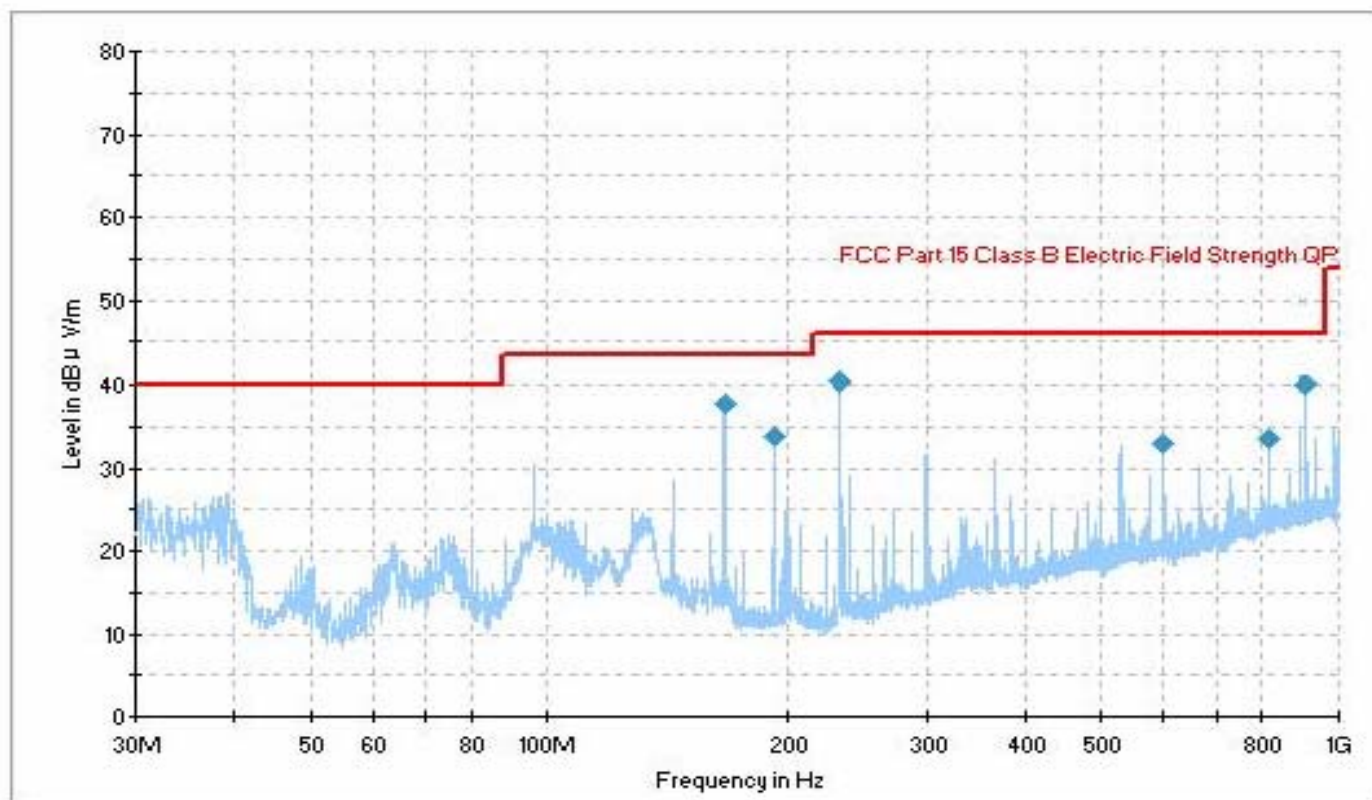
Test Data

Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	52%
ATM Pressure:	1009mbar

The testing was performed by Merry Zhao on 2007-06-15, 2007-06-26.

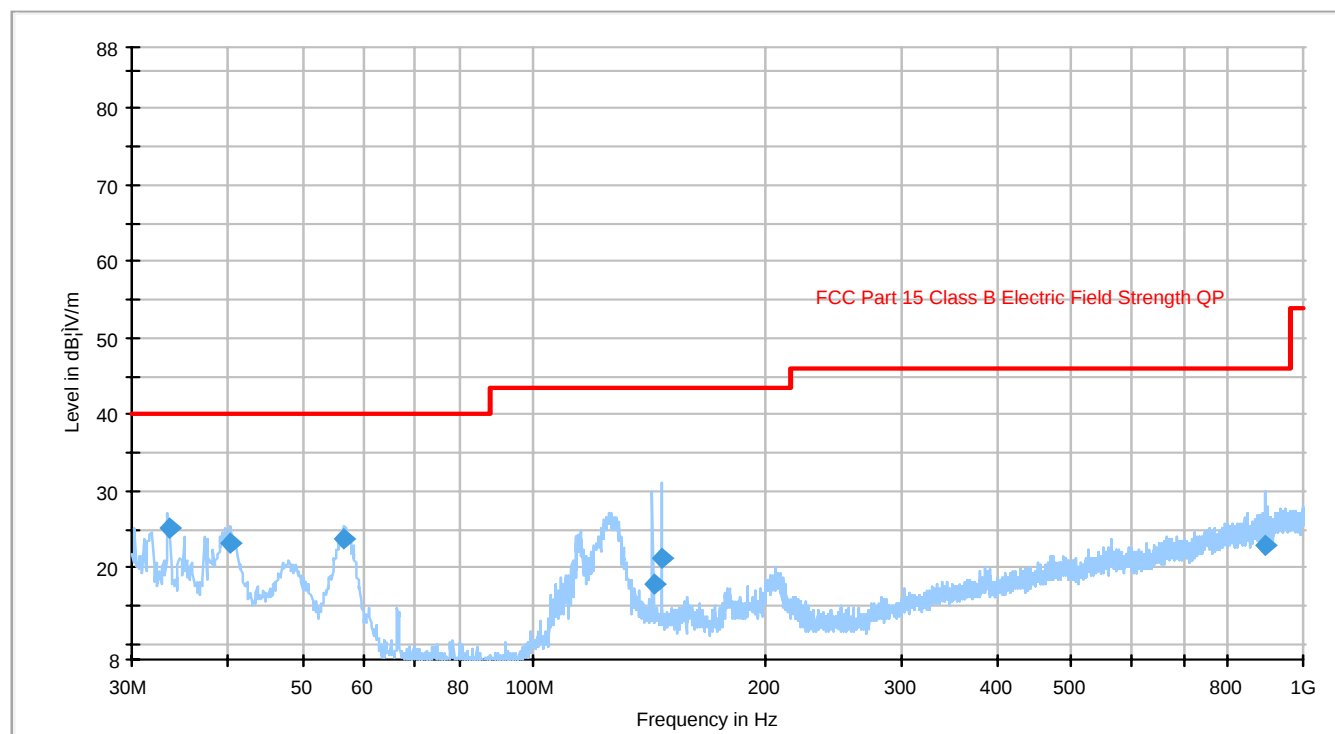
Test Mode: Transmitting (30-1000MHz)



Frequency (MHz)	Quasi Peak (dBμV/m)	Antenna Height (cm)	Polarity	Turntable Position (deg)	Corr. (dB)	Limit (dBμV/m)	Margin (dB)
233.093750	40.3	180.0	V	45.0	-12.0	46.0	5.7
166.520450	37.6	144.0	H	177.0	-12.4	43.5	5.9
906.921350	40.0	177.0	H	321.0	0.1	46.0	6.0
192.006575	33.9	149.0	H	19.0	-12.8	43.5	9.6
816.185000	33.4	272.0	H	52.0	-0.2	46.0	12.6
597.291775	33.1	102.0	V	193.0	-4.7	46.0	12.9

Test Mode: Transmitting (Above 1GHz)

Frequency (MHz)	Meter Reading (dBuV)	Detector PK/QP/AV	Direction Degree	Height (m)	Polar H / V	Antenna Factor (dB/m)	Cable Loss (dB)	Pre- Amplifier Gain (dB)	Corr. Ampl. (dBuV/m)	FCC Part 15.247/209		
										Limit (dBuV/m)	Margin (dB)	Remarks
Low Channel												
2402	83.73	PK	90	1.0	H	28.9	3.61	35.0	81.24			fundamental
2402	83.14	AV	45	1.0	H	28.9	3.61	35.0	80.65			fundamental
2402	89.83	PK	90	1.0	V	29.1	3.61	35.0	87.54			fundamenta
2402	89.14	AV	45	1.0	V	29.1	3.61	35.0	86.85			fundamental
4804	36.20	AV	90	1.0	H	34.6	4.64	33.4	42.04	54	11.96	harmonic
4804	36.07	AV	90	1.0	V	34.7	4.64	33.4	42.01	54	11.99	harmonic
4804	45.75	PK	180	1.2	V	34.7	4.64	33.4	51.69	74	22.31	harmonic
4804	45.05	PK	180	1.2	H	34.6	4.64	33.4	50.89	74	23.11	harmonic
1065	35.40	AV	180	1.2	V	23.6	1.19	36.0	24.19	54	29.81	spurious
1016	34.89	AV	180	1.2	H	23.6	1.19	36.0	23.68	54	30.32	spurious
1065	51.40	PK	45	1.2	V	23.6	1.19	36.0	40.19	74	33.81	spurious
1016	49.63	PK	45	1.2	H	23.6	1.19	36.0	38.42	74	35.58	spurious
Middle Channel												
2441	89.36	PK	60	1.4	V	29.1	3.61	35.0	87.07			fundamental
2441	88.13	AV	152	1.3	V	29.1	3.61	35.0	85.84			fundamental
2441	83.31	PK	128	1.5	H	28.9	3.61	35.0	80.82			fundamental
2441	82.62	AV	156	1.2	H	28.9	3.61	35.0	80.13			fundamental
4882	36.50	AV	243	1.4	H	34.6	4.64	33.4	42.34	54	11.66	harmonic
4882	33.6	AV	142	1.6	V	34.7	4.64	33.4	39.54	54	14.46	harmonic
4882	45.04	PK	153	1.5	H	34.6	4.64	33.4	50.88	74	23.12	harmonic
4882	44.76	PK	234	1.8	V	34.7	4.64	33.4	50.7	74	23.3	harmonic
1198.3	39.97	AV	85	1.5	H	23.6	2.5	36.0	30.07	54	23.93	spurious
1342.6	36.63	AV	135	1.3	V	23.6	2.79	36.0	27.02	54	26.98	spurious
1342.6	51.63	PK	156	1.4	V	23.6	2.79	36.0	42.02	74	31.98	spurious
1198.3	51.23	PK	265	1.4	H	23.6	2.5	36.0	41.33	74	32.67	spurious
High Channel												
2480	81.970	PK	89	1.5	H	28.9	3.61	35.0	79.48			fundamental
2480	81.220	AV	65	1.5	H	28.9	3.61	35.0	78.73			fundamental
2480	86.760	PK	65	1.4	V	30.6	3.61	35.0	85.97			fundamental
2480	86.060	AV	65	1.6	V	30.6	3.61	35.0	85.27			fundamental
6987.9	54.700	PK	240	1.4	V	37.0	4.5	33.7	62.5	74	11.50	spurious
4960	35.600	AV	142	1.5	V	35.4	4.55	33.4	42.15	54	11.85	harmonic
6537.0	54.740	PK	128	1.5	H	36.5	4.69	34.4	61.53	74	12.47	spurious
6987.9	33.620	AV	210	1.2	V	37.0	4.5	33.7	41.42	54	12.58	spurious
4960	35.000	AV	256	1.8	H	34.6	4.55	33.4	40.75	54	13.25	harmonic
6537.0	33.400	AV	156	1.2	H	36.5	4.69	34.4	40.19	54	13.81	spurious
4960	49.900	PK	142	1.4	V	35.4	4.55	33.4	56.45	74	17.55	harmonic
4960	48.600	PK	145	1.4	H	34.6	4.55	33.4	54.35	74	19.65	harmonic
1198.4	55.040	PK	324	1.3	V	23.8	2.5	36.0	45.34	74	28.66	spurious
1198.4	34.030	AV	324	1.2	V	23.8	2.5	36.0	24.33	54	29.67	spurious

Test Mode: Charging

Frequency (MHz)	Quasi Peak (dBμV/m)	Antenna Height (cm)	Polarity	Turntable Position (deg)	Corr. (dB)	Limit (dBμV/m)	Margin (dB)
33.670175	25.1	138.0	V	243.0	-10.0	40.0	14.9
56.607475	23.7	117.0	V	189.0	-19.1	40.0	16.3
40.415125	23.3	103.0	V	222.0	-13.3	40.0	16.7
146.227000	21.1	400.0	V	132.0	-13.2	43.5	22.4
893.862925	23.0	277.0	V	351.0	-0.4	46.0	23.0
142.975500	17.8	349.0	H	259.0	-12.9	43.5	25.7

§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.

Limit

FCC Part 15, Subpart C Section 15.247(a)(1). Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB Bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater

FREQUENCY RANGE (MHz)	Limit (kHz)
902-928	>25kHz or the 20dB bandwidth
2400-2483.5	>25kHz or two-thirds of the 20dB bandwidth
5725-5850	>25kHz or the 20dB bandwidth

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	1009 mbar

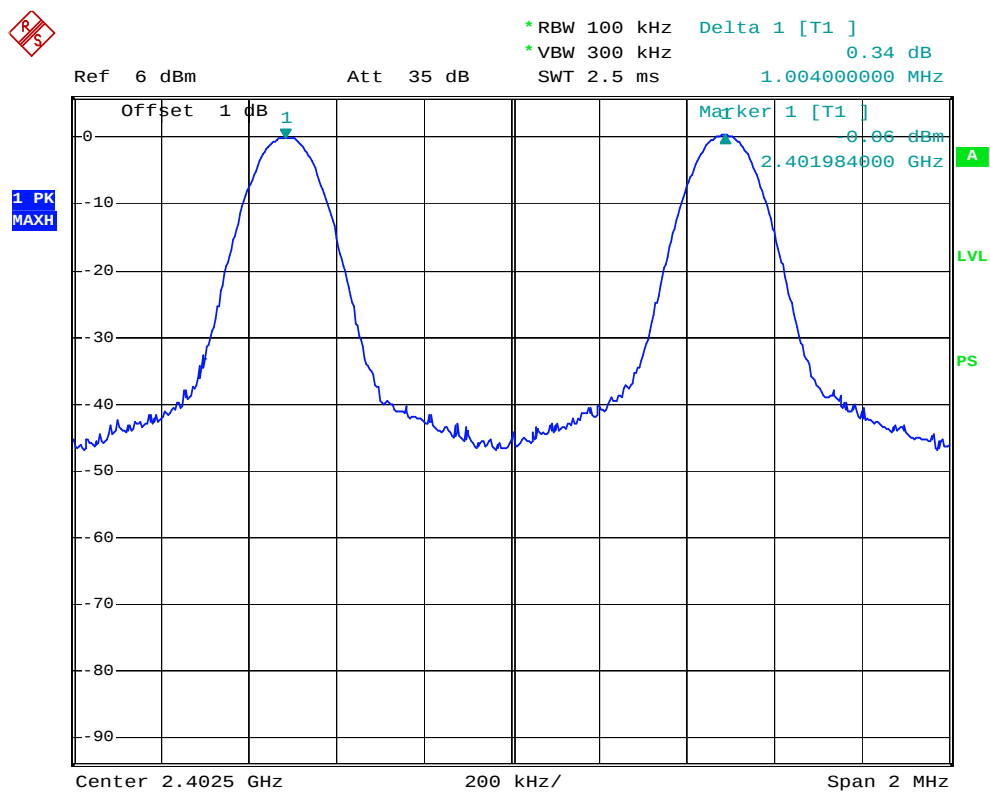
The testing was performed by Merry Zhao on 2007-06-15.

Test mode: Transmitting

Channel	Channel Frequency (MHz)	Channel Separation (kHz)	Limit (kHz)	Result
Low Channel	2402	1004	181.33	Compliance
Adjacency Channel	2403			
Mid Channel	2441	1004	181.33	Compliance
Adjacency Channel	2442			
High Channel	2480	1008	181.33	Compliance
Adjacency Channel	2479			

Test Result: Compliance. Please refer to following plots

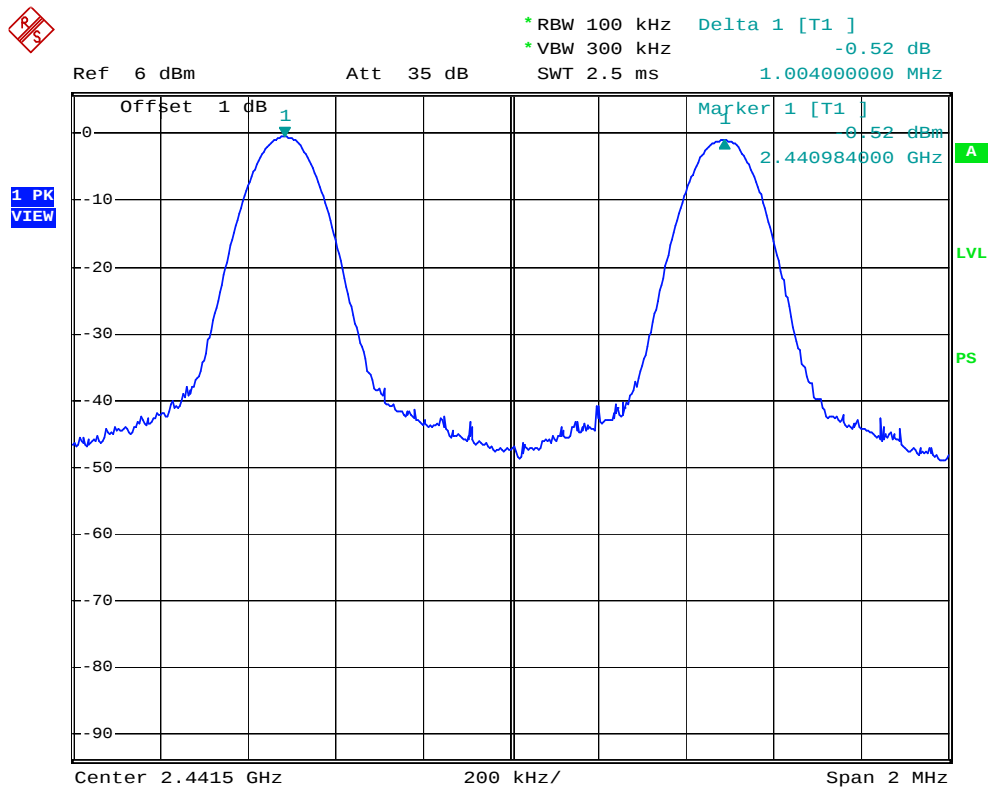
Low Channel



Audex STB-2815 channel separation, low channel

Date: 15.JUN.2007 11:39:58

Middle Channel



Audex STB-2815 channel separation, middle channel

Date: 15.JUN.2007 11:44:36

Ref 6 dBm Att 35 dB *RBW 100 kHz Delta 1 [T1] 0.02 dB
 *VBW 300 kHz 1.008000000 MHz
 SWT 2.5 ms

Offset 1 dB Marker 1 [T1] 1
 1 PK VIEW 2.47898000 GHz -2.09 dBm

Center 2.4795 GHz 200 kHz/ Span 2 MHz

Date: 15.JUN.2007 11:51:02

§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

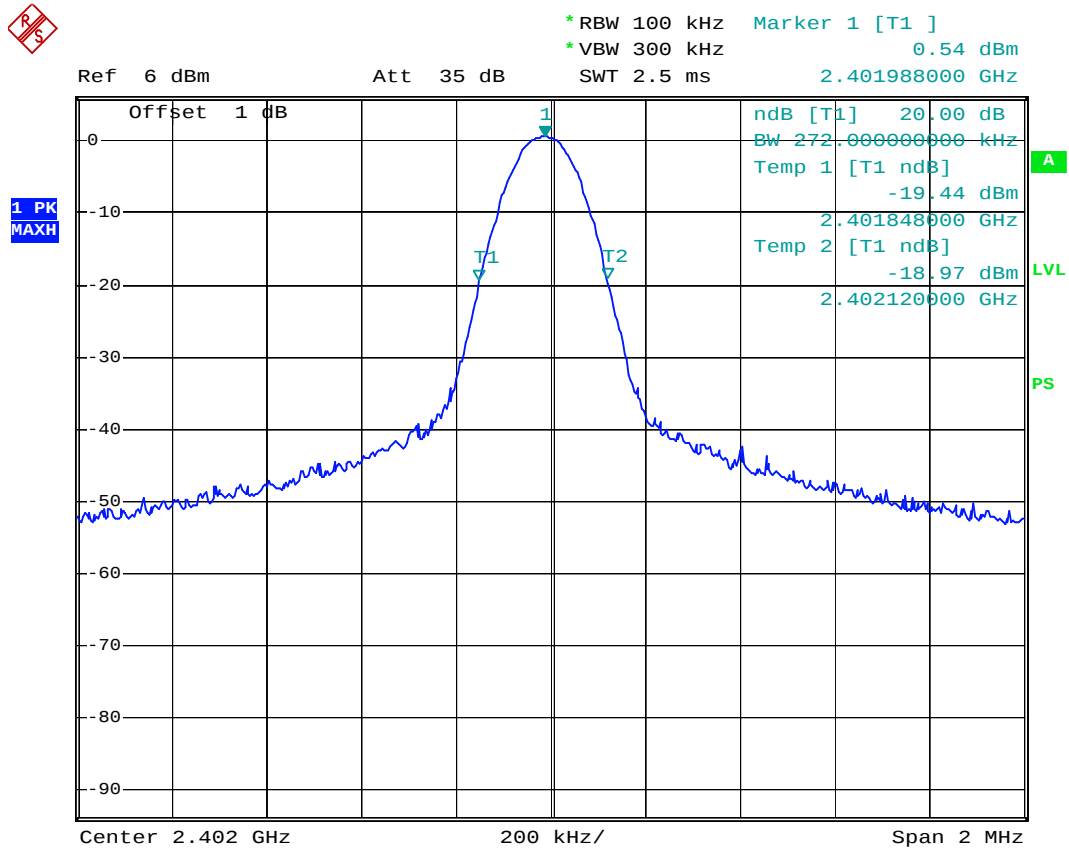
The testing was performed by Merry Zhao on 2007-06-15.

Test Mode: Transmitting

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)
Low Channel	2402	272
Mid Channel	2441	272
High Channel	2480	272

Please refer to the following plots.

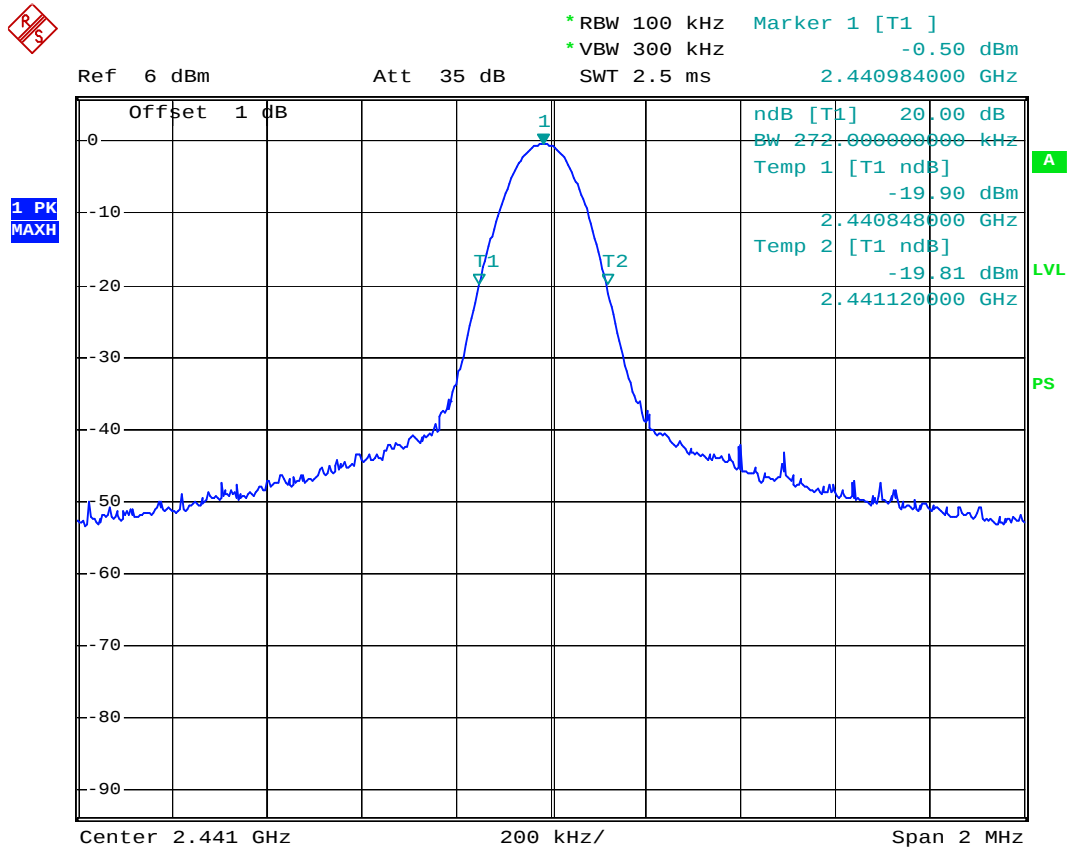
Low Channel



Audex STB-2815 20dB bandwidth, low channel

Date: 15.JUN.2007 12:43:45

Middle Channel



Audex STB-2815 20dB bandwidth, middle channel

Date: 15.JUN.2007 11:25:23

Ref 6 dBm Att 35 dB RBW 100 kHz VBW 300 kHz SWT 2.5 ms

Marker 1 [T1] -1.69 dBm 2.479988000 GHz

Offset 1 dB

1 PK MAXH

ndB [T1] 20.00 dB
BW 272.00000000 kHz
Temp 1 [T1 ndB] -21.18 dBm 2.479848000 GHz
Temp 2 [T1 ndB] -21.25 dBm 2.480120000 GHz

Center 2.48 GHz 200 kHz/ Span 2 MHz

Date: 15.JUN.2007 11:23:16

§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

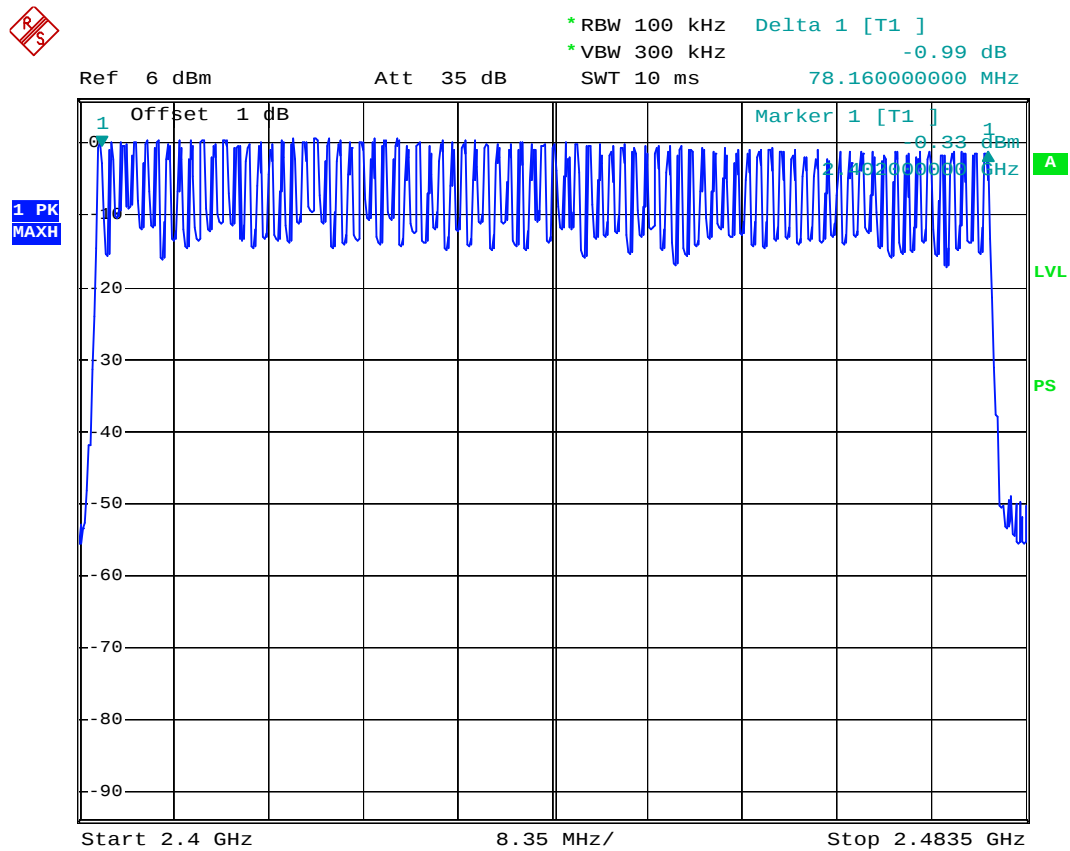
Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	1009 mbar

The testing was performed by Merry Zhao on 2007-06-15.

Test mode: Transmitting

Test Result: Compliance.

Please refer to following plot



Audex STB-2815 number of hopping channel

Date: 15.JUN.2007 12:13:24

§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.

Limit

FCC Part 15, Subpart C Section 15.247.

FREQUENCY RANGE (MHz)	LIMIT (ms)		
	20dB bandwidth <250kHz (50 Channel)	20dB bandwidth >250kHz (50 Channel)	20dB bandwidth <1 MHz (79 Channel)
902-928	N/A	N/A	N/A
2400-2483.5	N/A	N/A	31.6s
5725-5850	N/A	N/A	N/A

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:	1009 mbar

The testing was performed by Merry Zhao on 2007-06-25.

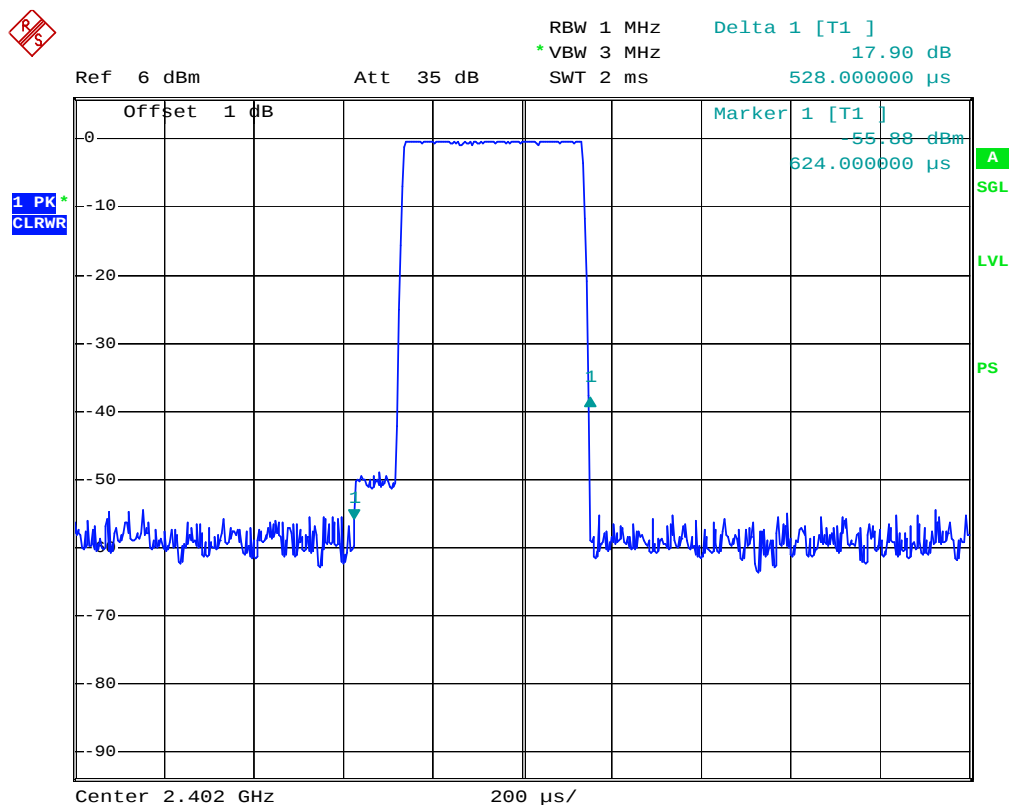
Test mode: Transmitting

Channel	Pulse width (msec)	Dwell time (sec)	Limit (sec)	Result
Low Channel	0.528	0.16896	0.4	Pass
Mid Channel	0.528	0.16896	0.4	Pass
High Channel	0.524	0.16768	0.4	Pass

NOTE: Dwell time=Pulse width (ms) × 1600 ÷ 2 ÷ 79 × 31.6 Second

Test Result: Compliance. Please refer to following plots

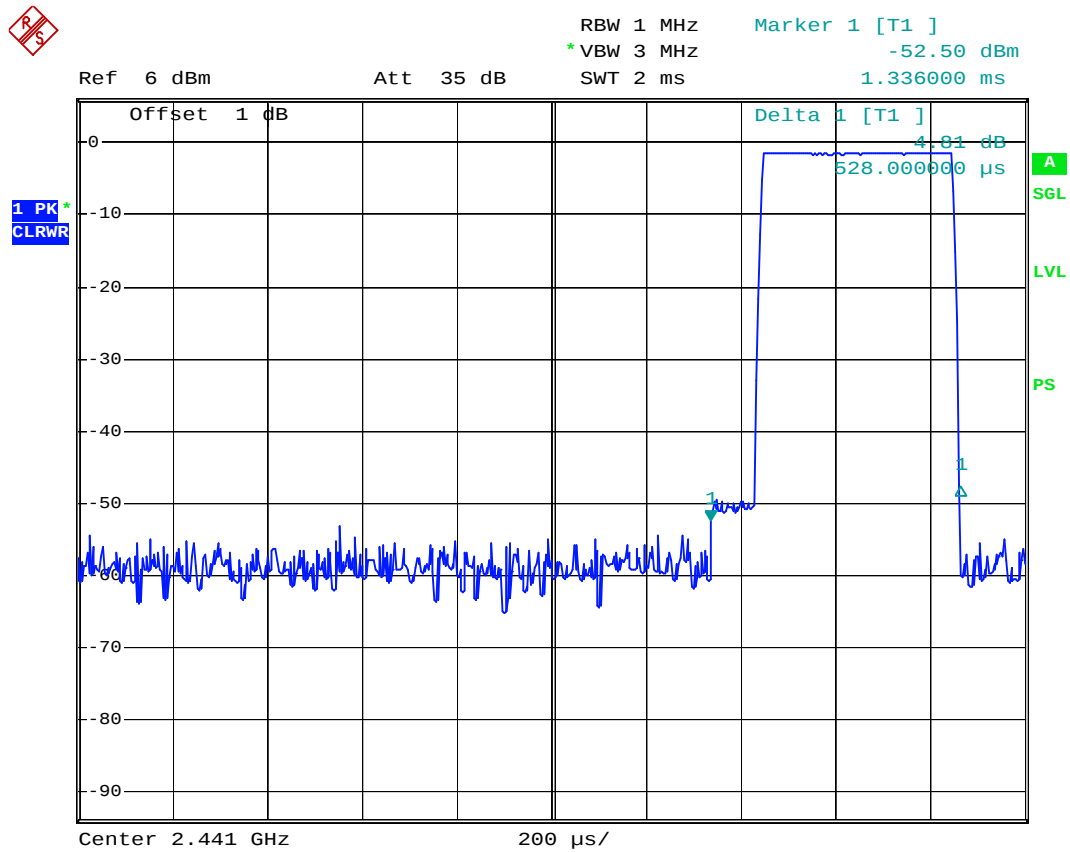
Low Channel



Audex STB-2815 dwell time, low channel

Date: 25.JUN.2007 11:10:39

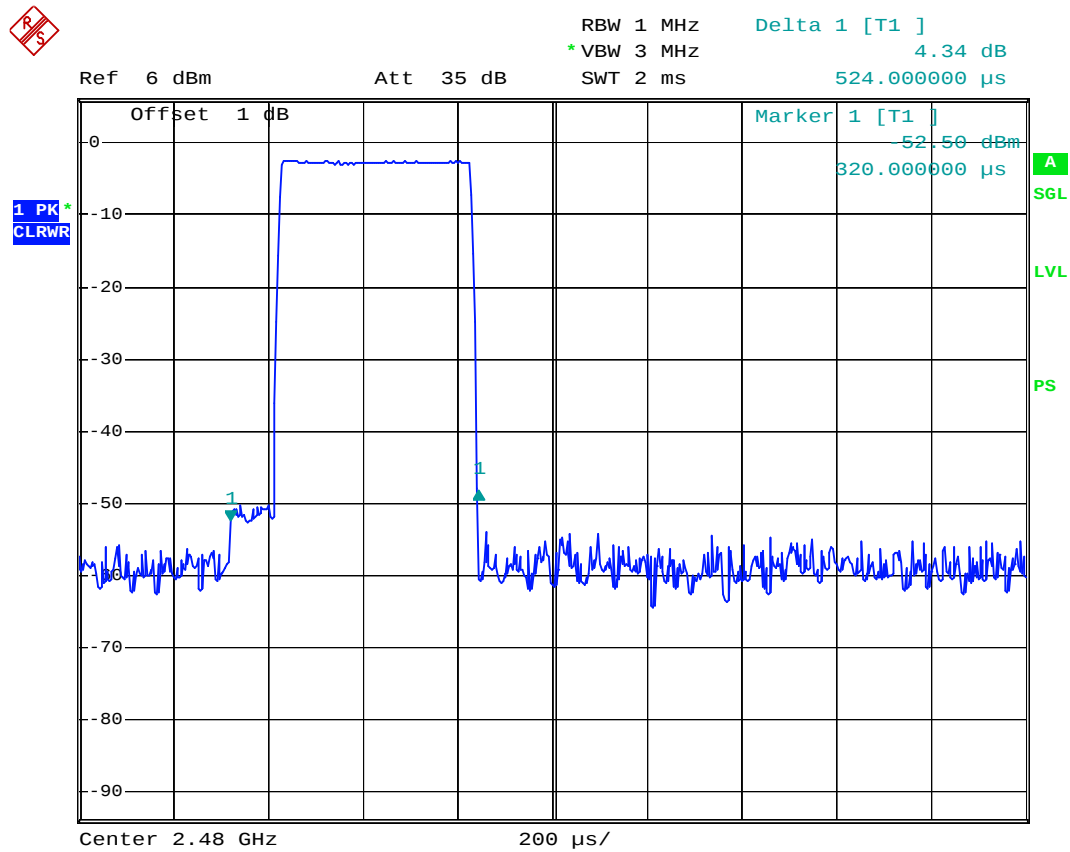
Middle Channel



Audex STB-2815 dwell time, middle channel

Date: 25.JUN.2007 11:08:41

High Channel



Audex STB-2815 dwell time, high channel

Date: 25.JUN.2007 11:13:30

§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.

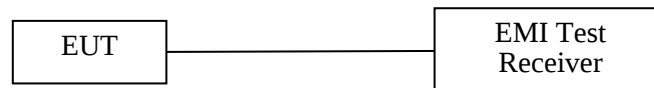
Test Equipment List and Details

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:	1009mbar

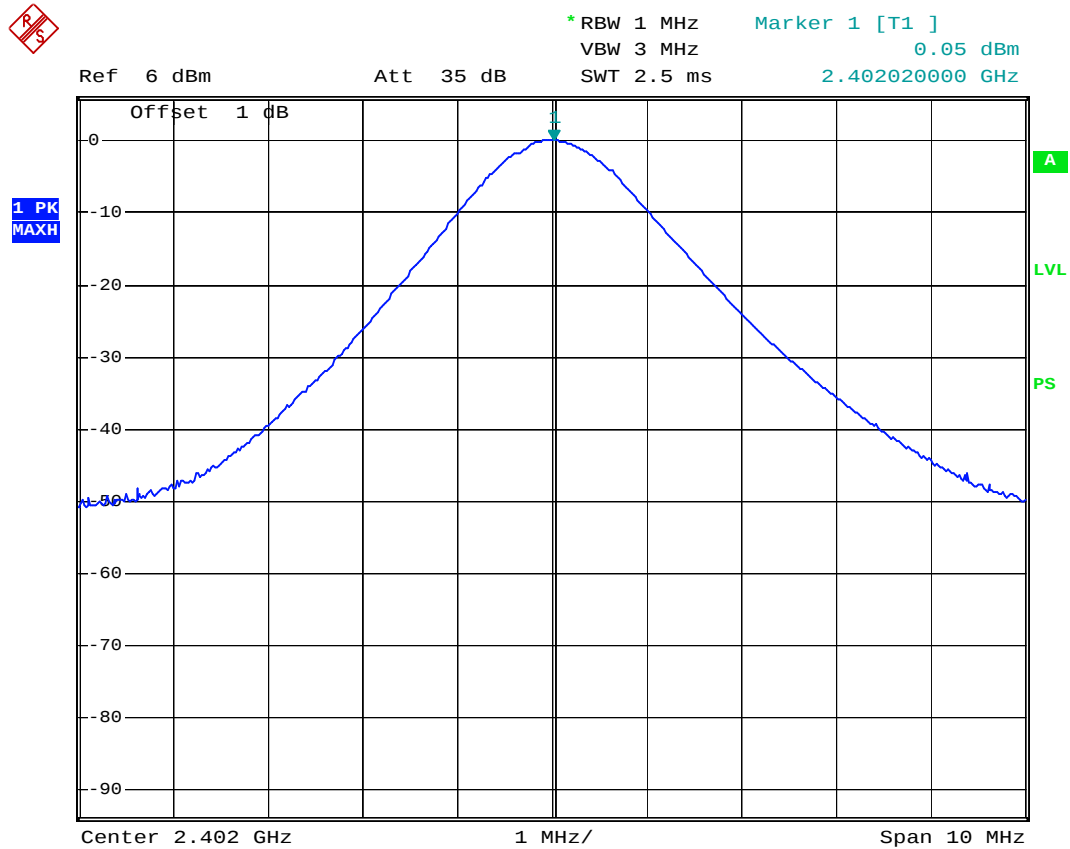
The testing was performed by Merry Zhao on 2007-06-15.

Test Mode: Transmitting

Channel	Channel Frequency (MHz)	Reading Power (dBm)	Power Output (w)	Limit (w)
Low Channel	2402	0.05	0.00101	1
Mid Channel	2441	-1.02	0.00079	1
High Channel	2480	-1.97	0.000635	1

Test Result: Compliance. Please refer to the following plots

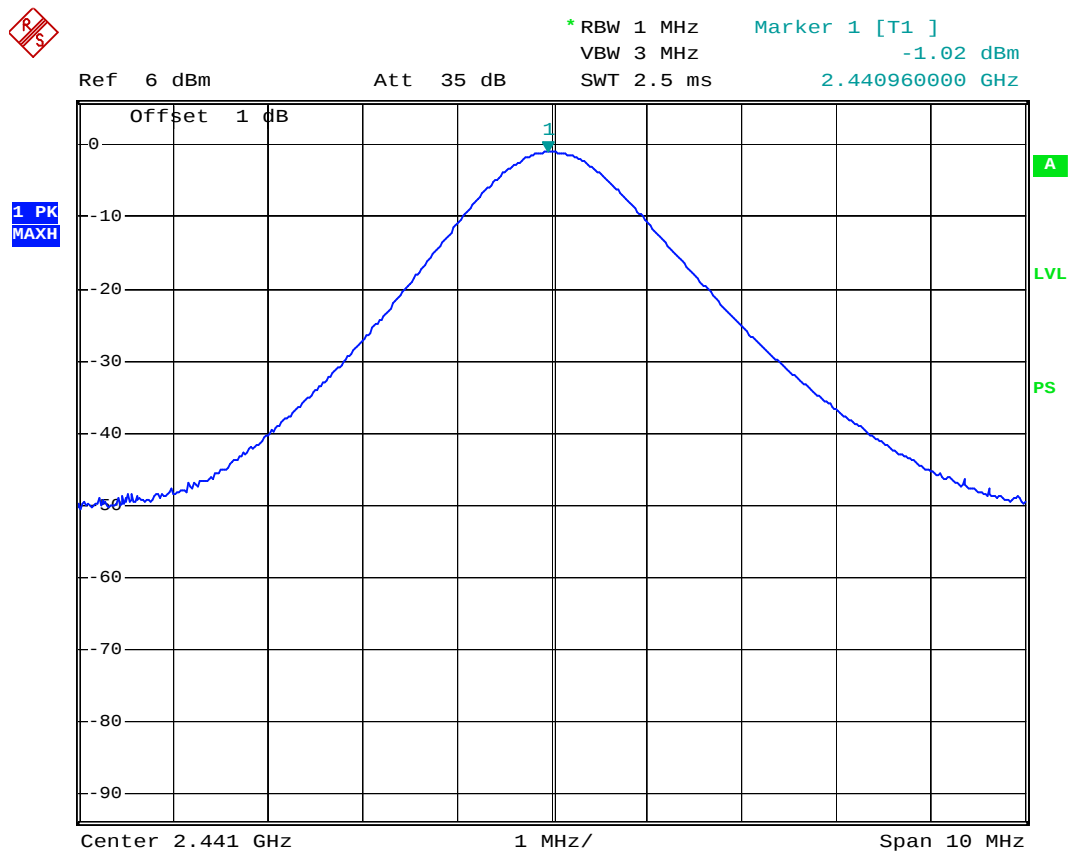
Low Channel



Audex STB-2815 peak output power, low channel

Date: 15.JUN.2007 11:18:55

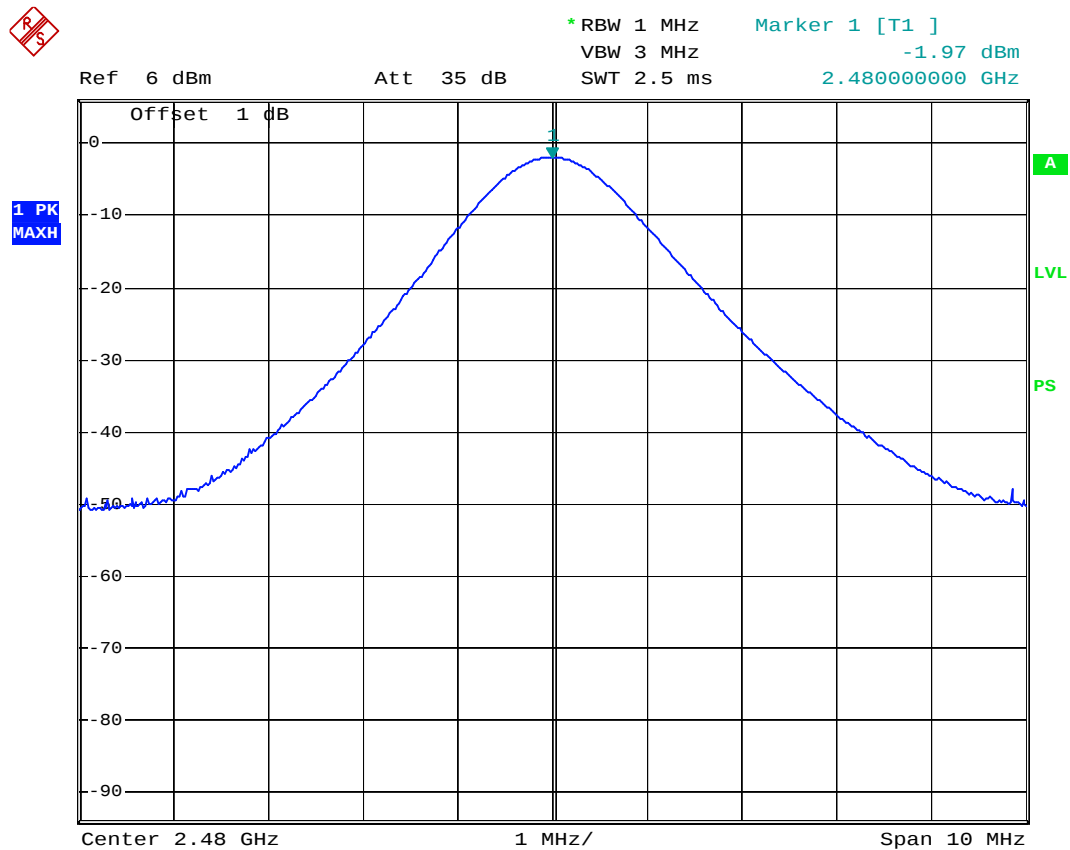
Middle Channel



Audex STB-2815 peak output power middle channel

Date: 15.JUN.2007 11:17:10

High Channel



Audex STB-2815 peak output power, high channel

Date: 15.JUN.2007 11:20:03

§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.

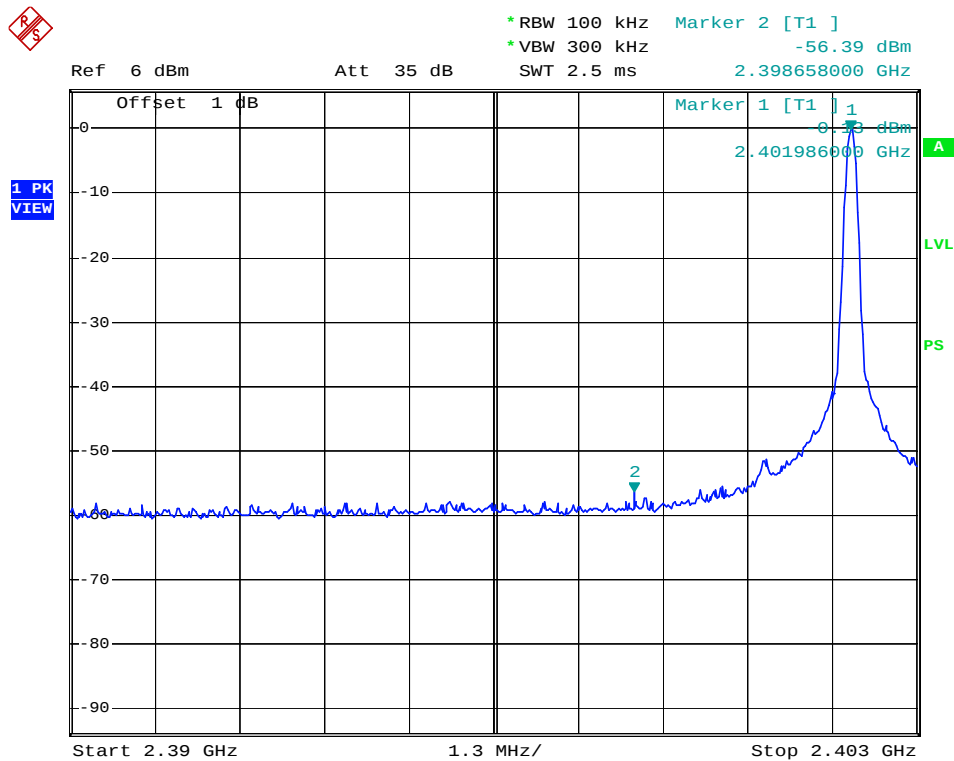
Test Data**Environmental Conditions**

Temperature:	20 °C
Relative Humidity:	53 %
ATM Pressure:	1009mbar

The testing was performed by Merry Zhao on 2007-06-15.

Test Mode: Transmitting

Test Result: Compliance. Please refer to the following plots

Lowest Channel

Audex STB-2815 out of bandedge, left

Date: 15.JUN.2007 12:07:04

