



NVLAP LAB CODE 200707-0



FCC PART 15.239

MEASUREMENT AND TEST REPORT

For

Sunitec Enterprise Co., Ltd.

10F.-1, No.200, Jingping Rd., Jhonghe City, Taipei County

FCC ID: RA8-BS002

Report Type: Original Report	Product Type: Bluetooth Stereo Headset
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Report Number: <u>RSZ08103001</u>	
Report Date: <u>2008-12-30</u>	
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* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk “*” (Rev.2)

TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY	4
TEST FACILITY	4
SYSTEM TEST CONFIGURATION.....	5
JUSTIFICATION	5
EQUIPMENT MODIFICATIONS	5
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS	5
CONFIGURATION OF TEST SETUP	5
BLOCK DIAGRAM OF TEST SETUP	6
SUMMARY OF TEST RESULTS	8
§15.203 - ANTENNA REQUIREMENT.....	9
§15.207(A) - CONDUCTED EMISSIONS.....	10
APPLICABLE STANDARD	10
MEASUREMENT UNCERTAINTY	10
EUT SETUP	10
EMI TEST RECEIVER SETUP.....	11
TEST EQUIPMENT LIST AND DETAILS.....	11
TEST PROCEDURE	11
TEST RESULTS SUMMARY.....	11
TEST DATA	12
PLOT(S) OF TEST DATA	12
§15.205, §15.209, §15.239- RADIATED EMISSIONS.....	15
MEASUREMENT UNCERTAINTY	15
EUT SETUP	15
EMI TEST RECEIVER SETUP.....	16
TEST EQUIPMENT LIST AND DETAILS.....	16
TEST PROCEDURE	16
CORRECTED AMPLITUDE & MARGIN CALCULATION	16
TEST RESULTS SUMMARY	17
TEST DATA	17
§15.239(A) – BAND EDGES.....	23
STANDARD APPLICABLE	23
TEST EQUIPMENT LIST AND DETAILS.....	23
TEST PROCEDURE	23
TEST DATA	23
§15.239(A) – EMISSION BANDWIDTH	26
STANDARD APPLICABLE	26
TEST EQUIPMENT LIST AND DETAILS.....	26
TEST PROCEDURE	26
TEST DATA	26

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Sunitec Enterprise Co., Ltd.*'s product, *FCC ID: RA8-BS002* model: *BS300A; BS300B* or the "EUT" as referred to in this report is a *Bluetooth Stereo Headset* which measures approximately 5.6 cm L x 3.3 cm W x 2.1 cm H, rated input voltage: 3.7 V rechargeable lithium-ion battery

Technical Specification:

FM Transmitter		
1	Operating Frequency Band	88.1~107.9 MHz
2	Channel Step	100KHz
3	Output power	-2dBm
4	Antenna	PCB Layout
5	Antenna Gain	0dBi

Bluetooth		
1	Bluetooth specification	V2.+EDR
2	Operating Frequency Band	2.402-2.480 GHZ
3	Output power class 2	Class 2
4	Modulation	GFSK
5	Crystal	26 MHz
6	Transmitter Power	4dBm max
7	Antenna	PCB Layout
8	Antenna Gain	0dBi
9	Bluetooth function range	10m Max.

The models *BS300A; BS300B* have the same circuit diagram and PCB layout, model *BS300B* was selected to test.

* *All measurement and test data in this report was gathered from production sample serial number: 0810068 (Assigned by BACL, Shenzhen). The EUT was received on 2008-10-16.*

Objective

This report is prepared on behalf of *Sunitec Enterprise Co., Ltd.* in accordance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209, and 15.239 rules.

Related Submittal(s)/Grant(s)

FCC ID: RA8-BS002, Part15.247 submission of Bluetooth portion.

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 radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



The current scope of accreditations can be found at
<http://ts.nist.gov/Standards/scopes/2007070.htm>

SYSTEM TEST CONFIGURATION

Justification

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

Equipment Modifications

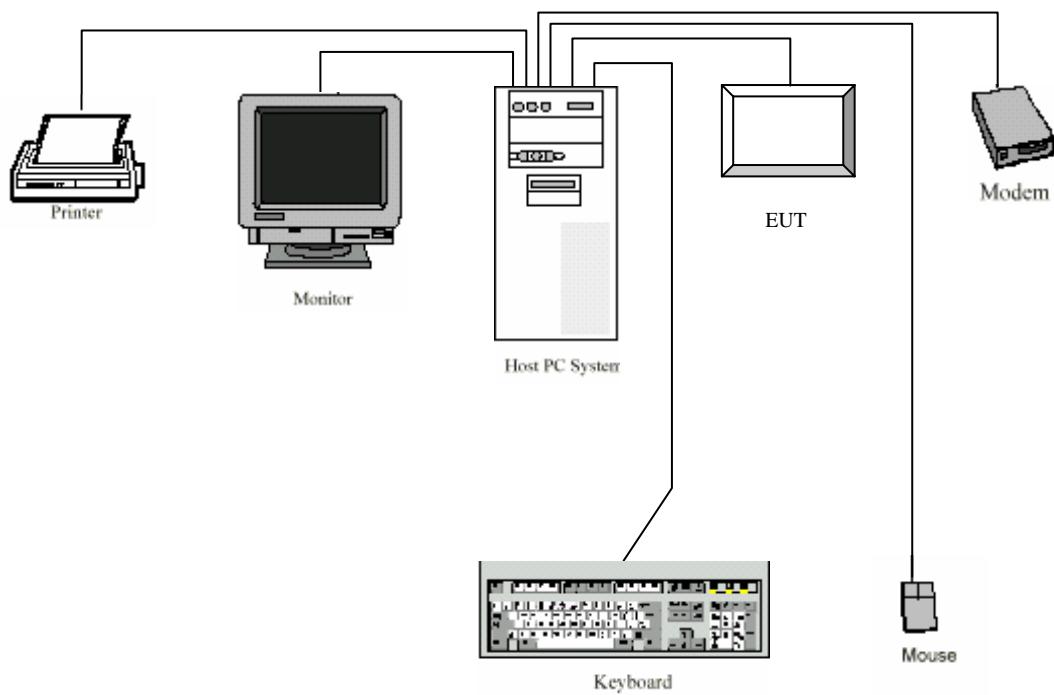
No modification was made to the unit tested.

Local Support Equipment List and Details

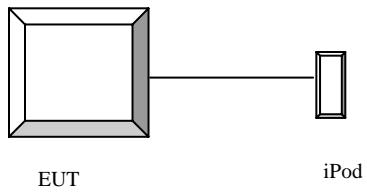
Manufacturer	Description	Model	Serial Number	FCC ID
Apple	iPod	A1137	YN-5478XKSZW	DoC

Configuration of Test Setup

Conducted Emission :

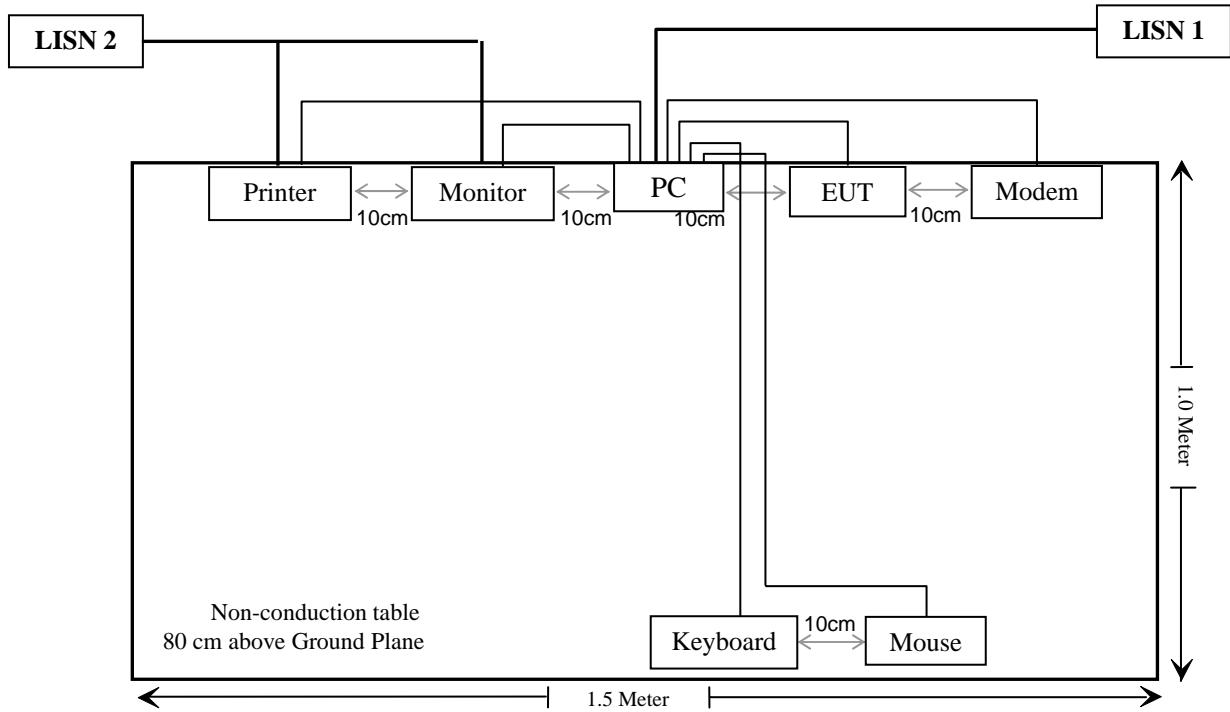


Radiated Emission:

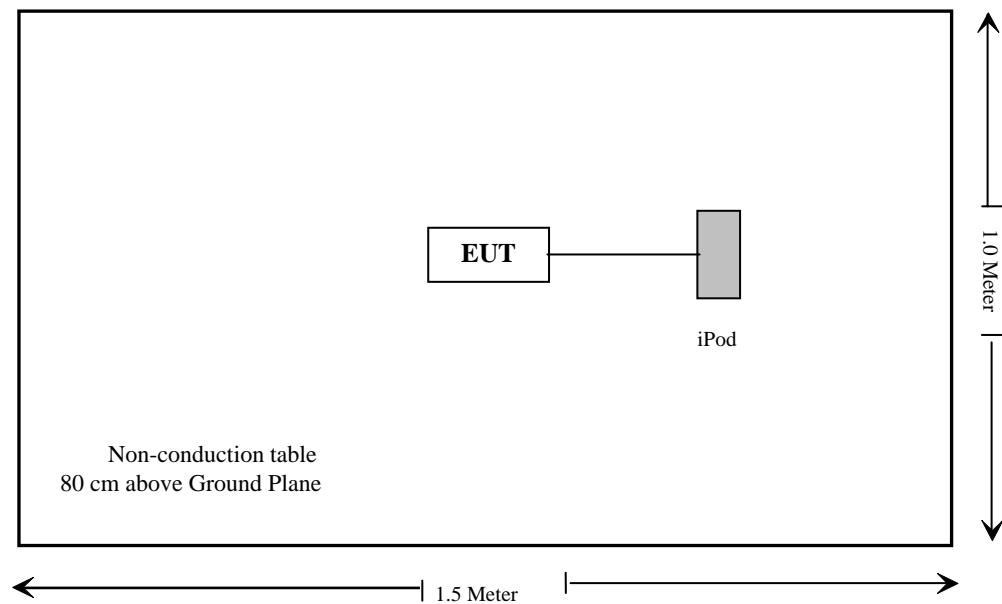


Block Diagram of Test Setup

Conducted Emission:



Radiated Emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Test Result
§15.203	Antenna Requirement	Compliant
§15.207	Conducted Emissions	Compliant
§15.205,§15.209, §15.239	Radiated Emissions	Compliant
§15.239 (a)	Band Edges	Compliant
§15.239 (a)	Emission Bandwidth	Compliant

§15.203 - ANTENNA REQUIREMENT

Applicable Standard

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.

Antenna Connector Construction

The EUT has permanently attached antenna, the maximum antenna gain is 0 dBi, which, in accordance to the above section, is considered sufficient to comply with the provision of this section, please see EUT photo for details.

Result: Compliance.

§15.207(a) - CONDUCTED EMISSIONS

Applicable Standard

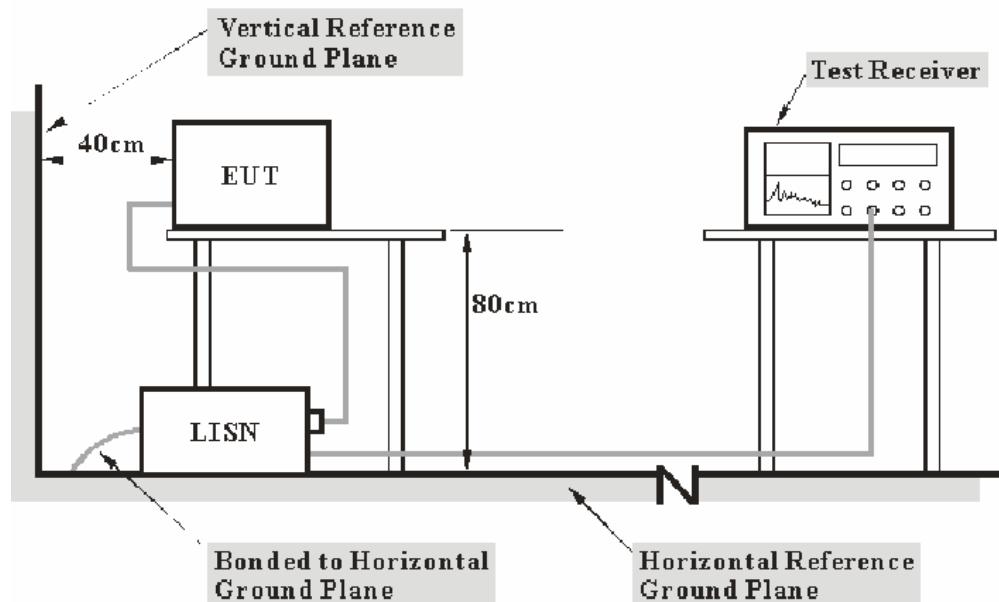
§15.207

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratory Corp. (Shenzhen) is ± 2.4 dB.

EUT Setup



Note:

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

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The 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 EUT was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Com-Power	L.I.S.N.	LI-200	12005	N/A	N/A
Com-Power	L.I.S.N.	LI-200	12208	N/A	N/A
Rohde & Schwarz	EMI Test Receiver	ESCS30	DE25330	2008-03-25	2009-03-25
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 Laboratory Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

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

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

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

15.80 dB at 0.2400 MHz in the Neutral conductor mode

Test Data

Environmental Conditions

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

* The testing was performed by Phoenix Liu on 2008-12-12.

Line Conducted Emissions				FCC Part 15.207	
Frequency (MHz)	Amplitude (dB μ V)	Detector (QP/AV)	Conductor (Line/Neutral)	Limit (dB μ V)	Margin (dB)
0.2400	36.30	AV	Neutral	52.10	15.80
0.2400	34.70	AV	Line	52.10	17.40
1.4400	25.30	AV	Neutral	46.00	20.70
7.7450	39.10	QP	Neutral	60.00	20.90
1.4400	34.30	QP	Neutral	56.00	21.70
8.3850	38.20	QP	Neutral	60.00	21.80
0.3600	26.60	AV	Line	48.73	22.13
0.2400	39.20	QP	Neutral	62.10	22.90
1.4400	22.40	AV	Line	46.00	23.60
6.2350	35.60	QP	Neutral	60.00	24.40
0.2400	37.60	QP	Line	62.10	24.50
14.9850	25.20	AV	Line	50.00	24.80
6.3550	24.80	AV	Line	50.00	25.20
1.4400	30.70	QP	Line	56.00	25.30
6.3550	34.60	QP	Line	60.00	25.40
5.7550	24.60	AV	Line	50.00	25.40
5.7550	33.80	QP	Line	60.00	26.20
14.9850	32.90	QP	Line	60.00	27.10
0.3600	31.20	QP	Line	58.73	27.53
7.6750	21.90	AV	Neutral	50.00	28.10
0.2600	33.10	QP	Neutral	61.43	28.33
6.2350	21.60	AV	Neutral	50.00	28.40
8.3850	20.70	AV	Neutral	50.00	29.30
0.2600	16.80	AV	Neutral	51.43	34.63

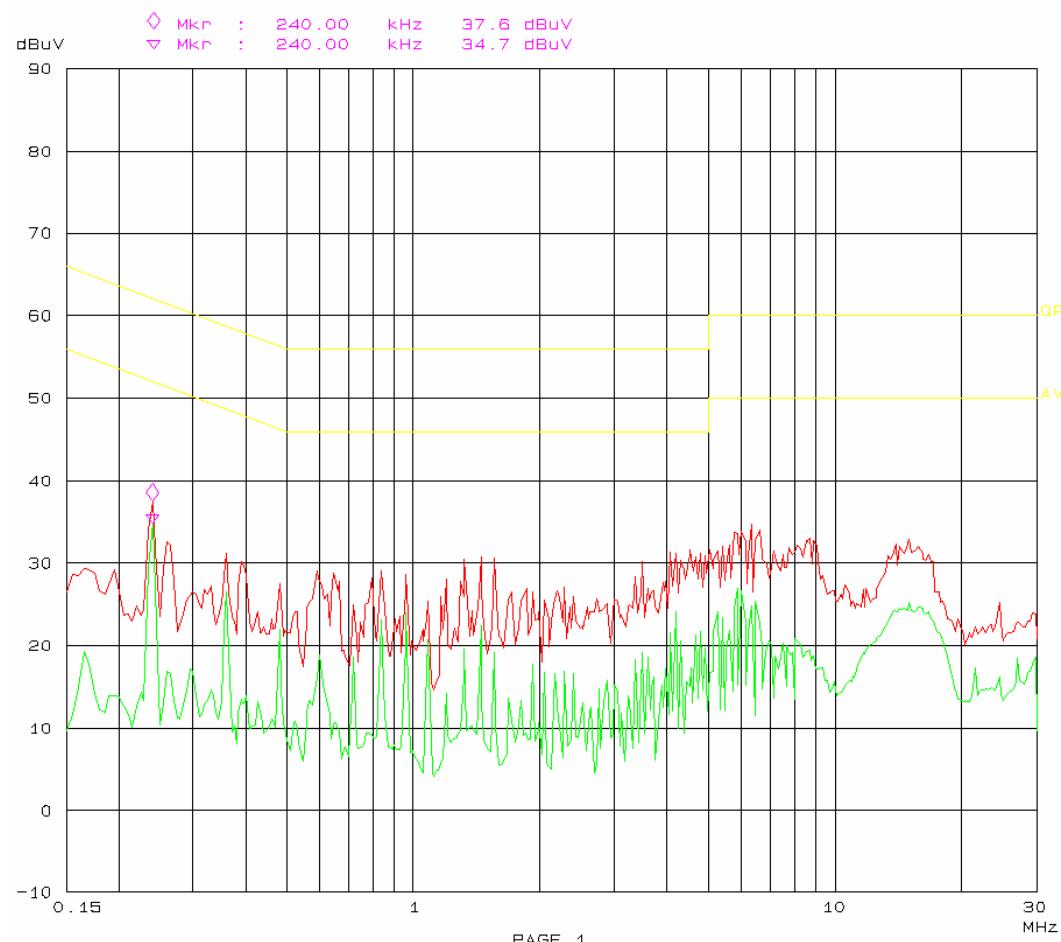
Plot(s) of Test Data

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

Conducted emission
FCC part 15

12. Dec 08 10:31

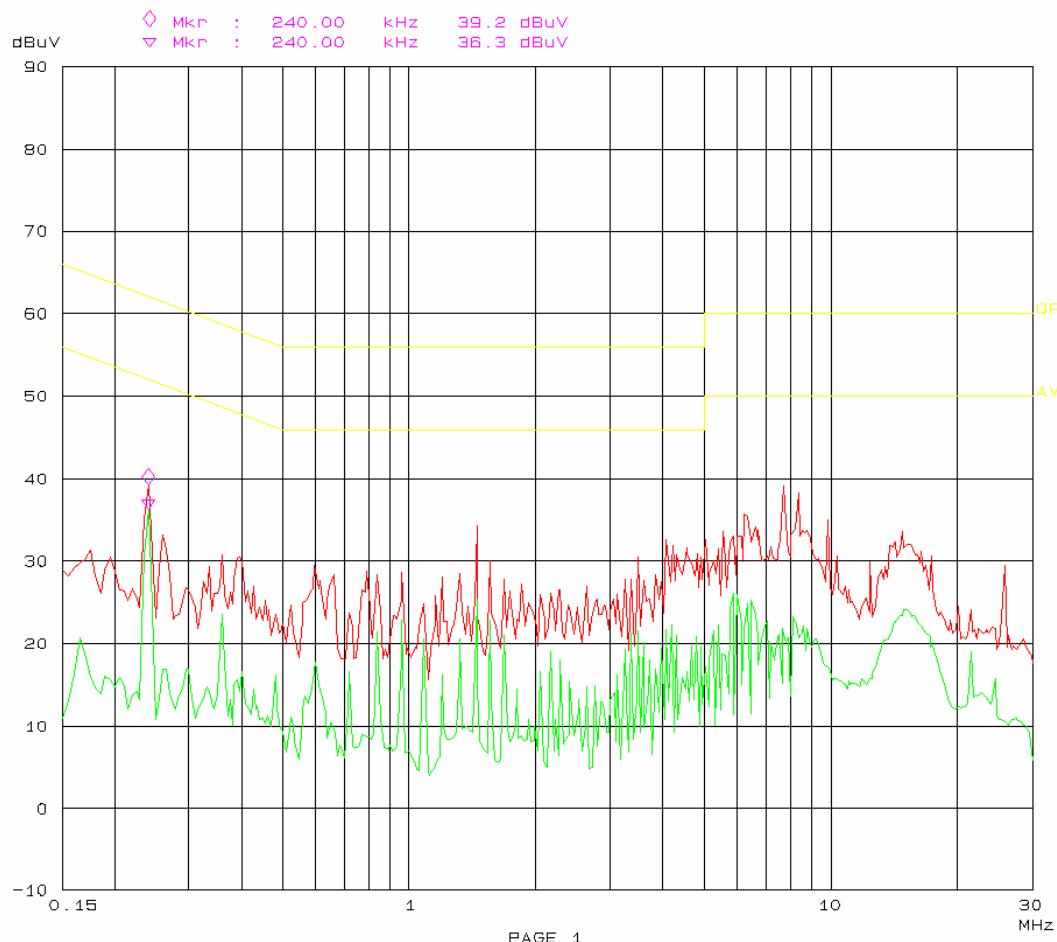
EUT: Bluetooth stereo headset M/N: BS300A
Manuf: Sunitec
Op Cond: PC charging
Operator: Phoenix
Test Spec: AC 120V/60Hz L
Comment: Temp: 25 Hum: 56%
BACL



Conducted emission
FCC part 15

12. Dec 08 11:03

EUT: Bluetooth stereo headset M/N: BS300A
Manuf: Sunitec
Op Cond: PC charging
Operator: Phoenix
Test Spec: AC 120V/60Hz N
Comment: Temp: 25 Hum: 56%
BACL



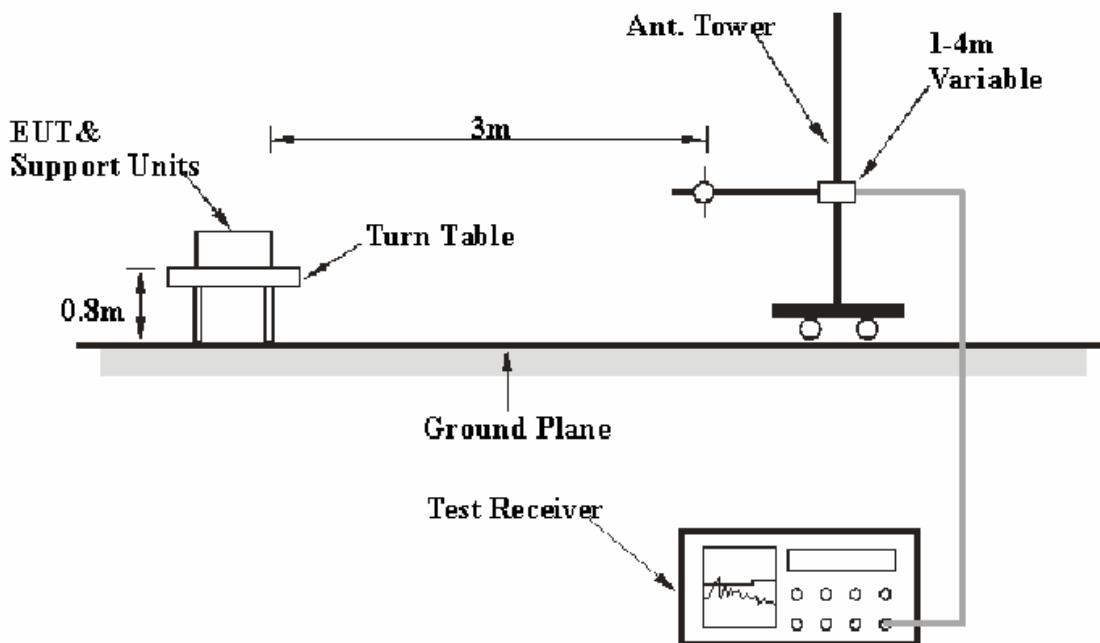
§15.205, §15.209, §15.239- RADIATED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, 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 Part 15.209 and FCC Part 15.239.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 1000 MHz.

During the radiated emission test, the EMI test receiver was set with the following configurations:

<u>Frequency Range</u>	<u>RBW</u>	<u>VBW</u>
30 – 1000 MHz	100 kHz	300 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2008-11-15	2009-11-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2008-11-07	2009-11-06
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2008-08-14	2009-08-14
HP	Amplifier	8449B	3008A00277	2008-09-29	2009-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2008-09-25	2009-09-25
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 per the NVLAP requirements, traceable to NIST.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

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:

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

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 5.8dB means the emission is 5.8dB below the limit. The equation for margin calculation is as follows:

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

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209 and 15.239, with the worst margin reading of:

Below 1GHz:

18.9 dB at **905.667000 MHz** in the **Vertical** polarization for 88.1MHz.

20.0 dB at **897.270050 MHz** in the **Vertical** polarization for 98.1MHz.

19.8 dB at **907.122500 MHz** in the **Vertical** polarization for 107.9MHz.

Above 1GHz:

25.70 dB at **1416.00 MHz** in the **Horizontal** polarization, Low Channel for 88.1MHz

26.37 dB at **1616.00 MHz** in the **Horizontal** polarization, Middle Channel for 98.1MHz

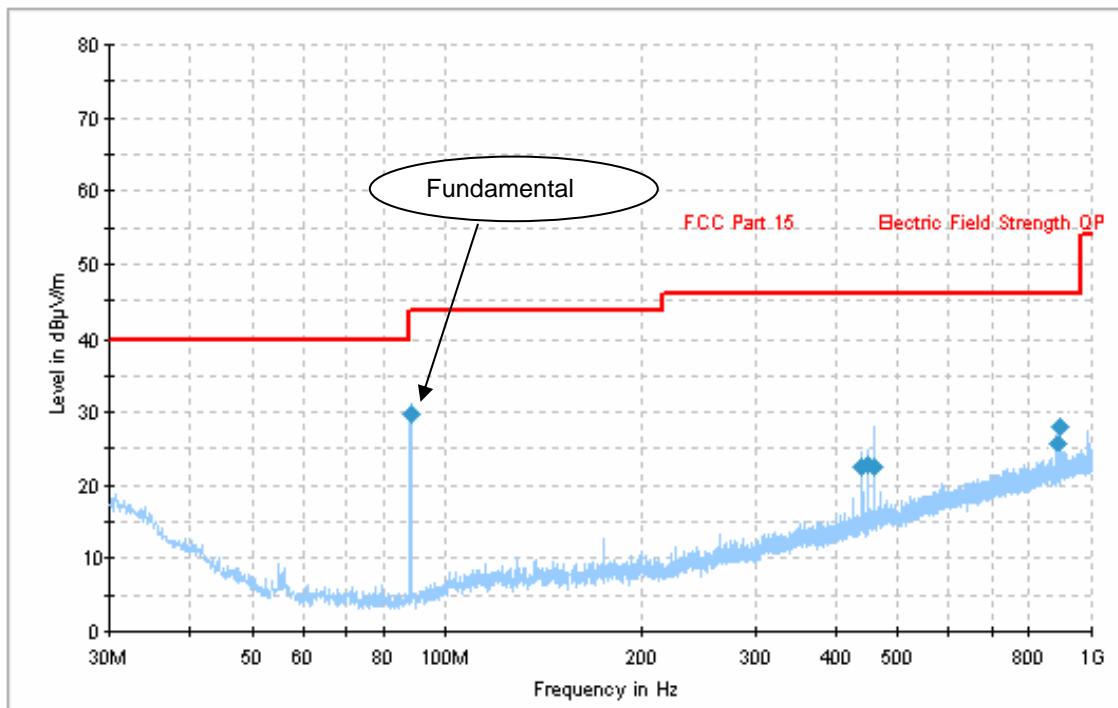
25.11 dB at **1236.00 MHz** in the **Horizontal** polarization, High Channel for 107.9MHz

Test Data

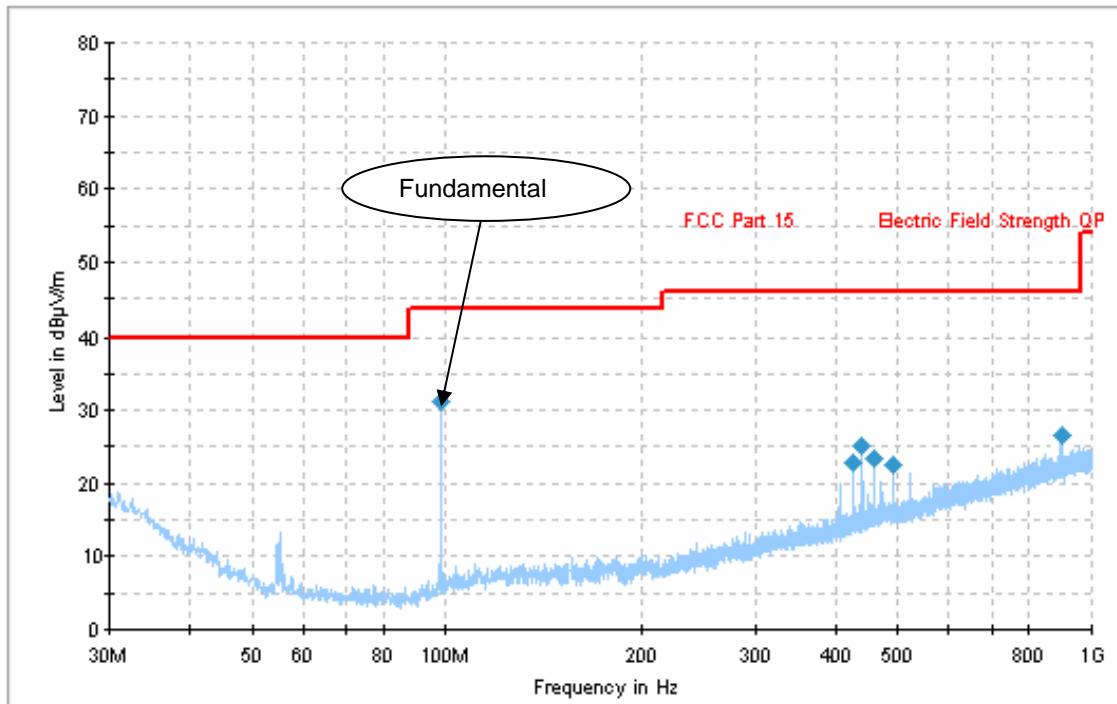
Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	56%
ATM Pressure:	100.2 kPa

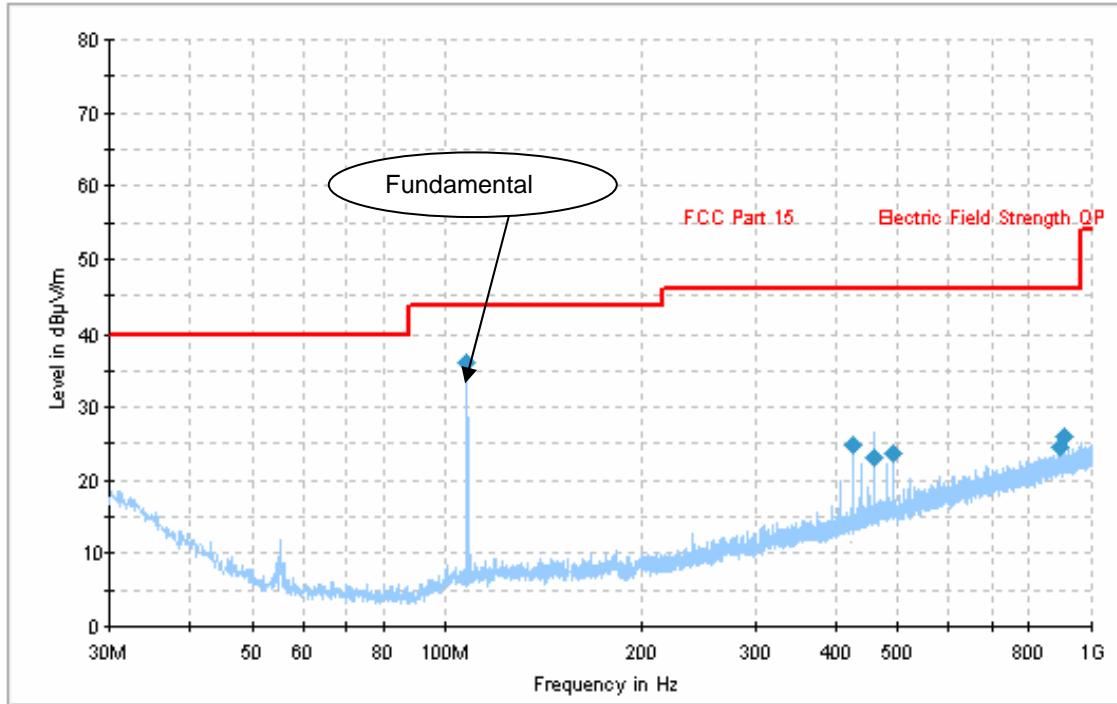
The testing was performed by Phoenix Liu on 2008-12-18.

Below 1GHz:**Low Channel (f = 88.1 MHz)**

Frequency (MHz)	Corrected Amplitude (dB μ V/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dB μ V/m)	Margin (dB)
905.667000	27.1	115.0	V	90.0	-4.6	46.0	18.9
897.191600	25.2	226.0	V	258.0	-3.9	46.0	20.8
447.948000	22.9	240.0	V	260.0	-12.4	46.0	23.1
458.632550	22.6	119.0	V	48.0	-11.2	46.0	23.4
437.278000	22.4	350.0	V	120.0	-15.6	46.0	23.6

Middle Channel (f = 98.1 MHz)

Frequency (MHz)	Corrected Amplitude (dB μ V/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dB μ V/m)	Margin (dB)
897.270050	26.0	288.0	V	319.0	-3.9	46.0	20.0
437.278750	25.1	150.0	V	95.0	-10.6	46.0	20.9
458.740000	23.3	180.5	V	115.0	-8.4	46.0	22.7
426.608750	22.7	210.0	V	120.0	-11.5	46.0	23.3
490.628750	22.6	256.0	V	320.0	-9.1	46.0	23.4

High Channel (f = 107.9 MHz)

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
907.122500	26.2	180.0	V	180.0	-10.5	46.0	19.8
426.608750	24.7	225.0	V	150.0	-5.6	46.0	21.3
490.628750	23.6	156.0	V	210.0	-11.4	46.0	22.4
458.648825	23.1	118.0	V	76.0	-11.2	46.0	22.9
894.554325	24.6	265.0	V	0.0	-3.9	46.0	27.9

Field Strength of Fundamental:

Frequency (MHz)	Meter Reading (dB μ V)	Detector (PK/AV)	Table Direction Degree	Test Antenna			Cable Loss (dB)	Pre- Amp. Gain (dB)	Cord. Amp. (dB μ V/m)	FCC Part 15.239	
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dB μ V/m)	Result
Low Channel 88.1 MHz											
88.1	62.54	PK	80	1.3	H	5.6	0.66	36.2	32.6	68	Pass
88.1	58.64	AV	60	1.2	H	5.6	0.66	36.2	28.7	48	Pass
88.1	60.34	PK	45	1.2	V	5.6	0.66	36.2	30.4	68	Pass
88.1	57.54	AV	180	1.2	V	5.6	0.66	36.2	27.6	48	Pass
Middle Channel 98.1 MHz											
98.1	60.79	PK	120	1.2	H	8.4	0.61	36.3	33.5	68	Pass
98.1	57.79	AV	122	1.6	H	8.4	0.61	36.3	30.5	48	Pass
98.1	59.89	PK	60	1.4	V	8.4	0.61	36.3	32.6	68	Pass
98.1	57.39	AV	130	1.3	V	8.4	0.61	36.3	30.1	48	Pass
High Channel 107.9 MHz											
107.9	62.96	PK	125	1.4	H	10.9	0.68	36.34	38.2	68	Pass
107.9	60.16	AV	126	1.3	H	10.9	0.68	36.34	35.4	48	Pass
107.9	61.16	PK	90	1.5	V	10.9	0.68	36.34	36.4	68	Pass
107.9	58.66	AV	126	1.2	V	10.9	0.68	36.34	33.9	48	Pass

Note: Measured at 3 meter

Above 1GHz:**Spurious Emission:**

Frequency (MHz)	Meter Reading (dB μ V)	Detector (PK/AV)	Table Direction Degree	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dB μ V/m)	FCC Part15.239/15.209		
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dB μ V/m)	Margin (dB)	Remarks
Low Channel 88.1 MHz												
1416.00	30.83	AV	190	1.3	H	26.7	5.37	34.6	28.30	54	25.70	Spurious
1084.00	30.18	AV	100	1.1	H	25.1	4.78	35	25.06	54	28.94	Spurious
1026.00	30.71	AV	100	1.1	V	23.8	4.78	35	24.29	54	29.71	Spurious
1046.00	30.65	AV	190	1.3	V	23.8	4.78	35	24.23	54	29.77	Spurious
1416.00	44.08	PK	55	1.3	H	26.7	5.37	34.6	41.55	74	32.45	Spurious
1084.00	43.43	PK	190	1.3	H	25.1	4.78	35	38.31	74	35.69	Spurious
1026.00	43.96	PK	190	1.3	V	23.8	4.78	35	37.54	74	36.46	Spurious
1046.00	43.90	PK	55	1.3	V	23.8	4.78	35	37.48	74	36.52	Spurious
Middle Channel 98.1 MHz												
1616.00	30.16	AV	145	1.4	H	26.7	5.37	34.6	27.63	54	26.37	Spurious
1032.00	30.92	AV	152	1.7	H	25.1	4.78	35	25.80	54	28.20	Spurious
1000.00	31.22	AV	253	1.5	V	23.8	4.78	35	24.80	54	29.20	Spurious
1156.00	31.00	AV	95	1.6	V	23.8	4.78	35	24.58	54	29.42	Spurious
1616.00	43.41	PK	166	1.5	H	26.7	5.37	34.6	40.88	74	33.12	Spurious
1032.00	44.17	PK	244	1.9	H	25.1	4.78	35	39.05	74	34.95	Spurious
1000.00	44.47	PK	163	1.6	V	23.8	4.78	35	38.05	74	35.95	Spurious
1156.00	44.25	PK	275	1.5	V	23.8	4.78	35	37.83	74	36.17	Spurious
High Channel 107.9 MHz												
1236.00	31.42	AV	166	1.3	H	26.7	5.37	34.6	28.89	54	25.11	Spurious
1066.00	31.86	AV	266	1.9	H	25.1	4.78	35	26.74	54	27.26	Spurious
1062.00	32.26	AV	152	1.6	V	23.8	4.78	35	25.84	54	28.16	Spurious
1444.00	31.61	AV	220	1.3	V	23.8	4.78	35	25.19	54	28.81	Spurious
1236.00	44.67	PK	138	1.6	H	26.7	5.37	34.6	42.14	74	31.86	Spurious
1066.00	45.11	PK	155	1.5	H	25.1	4.78	35	39.99	74	34.01	Spurious
1062.00	45.51	PK	152	1.5	V	23.8	4.78	35	39.09	74	34.91	Spurious
1444.00	44.86	PK	250	1.5	V	23.8	4.78	35	38.44	74	35.56	Spurious

§15.239(a) – BAND EDGES

Standard applicable

Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88–108 MHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2008-11-07	2009-11-06
HP	Amplifier	8447E	1937A01046	2008-11-15	2009-11-15
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2008-08-14	2009-08-14

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Test Procedure

With the EUT's antenna attached, the EUT's radiated emission power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

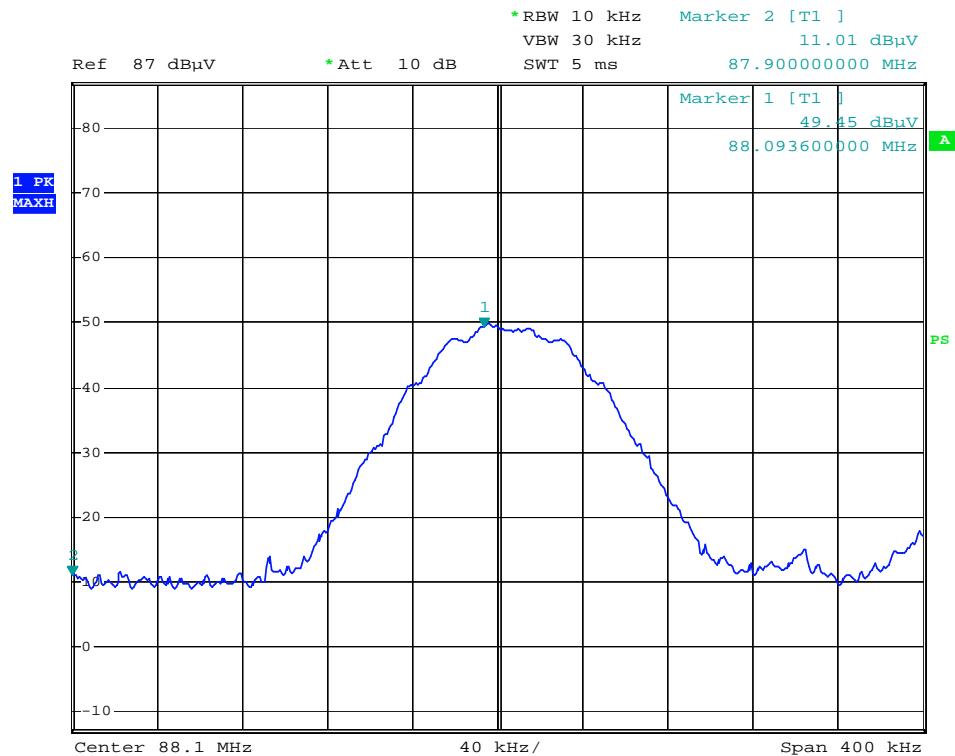
Test Data

Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	56%
ATM Pressure:	100.2kPa

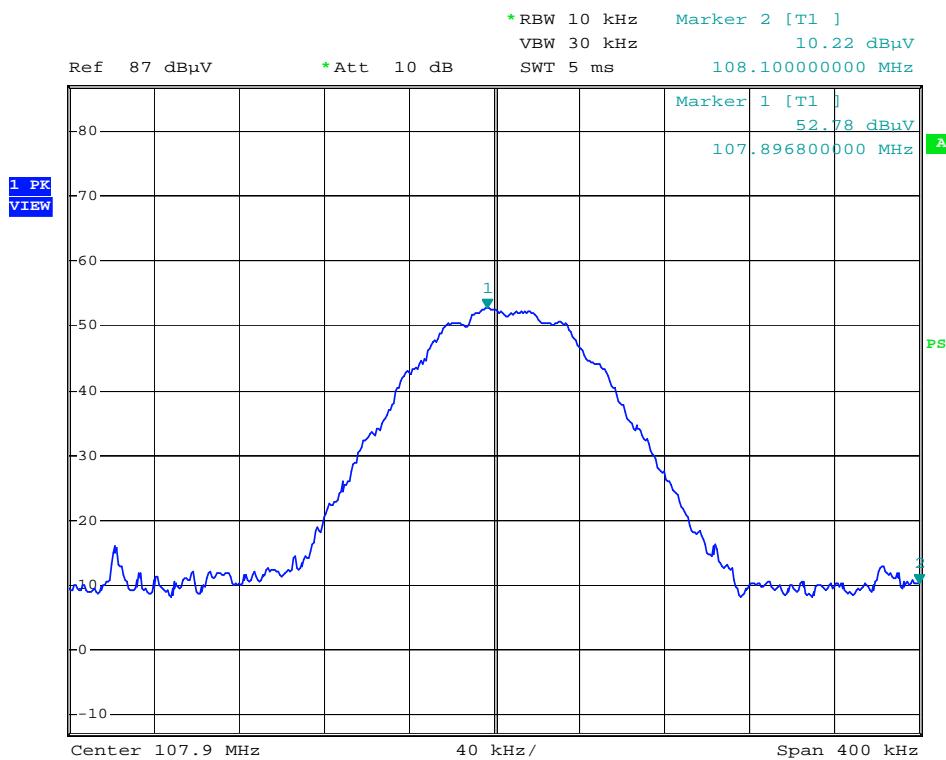
The testing was performed by Phoenix Liu on 2008-12-19.

Note: The EUT has been verified the operation range. It turns in 88 MHz to 108 MHz range.

Lowest Channel

band edge left

Date: 19.DEC.2008 13:16:18

Highest Channel

band edge right

Date: 19.DEC.2008 13:19:06

§15.239(A) – EMISSION BANDWIDTH

Standard applicable

Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88–108 MHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2008-11-07	2009-11-06
HP	Amplifier	8447E	1937A01046	2008-11-15	2009-11-15
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2008-08-14	2009-08-14

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Test Procedure

With the EUT's antenna attached, the EUT's radiated emission power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

Test Data

Environmental Conditions

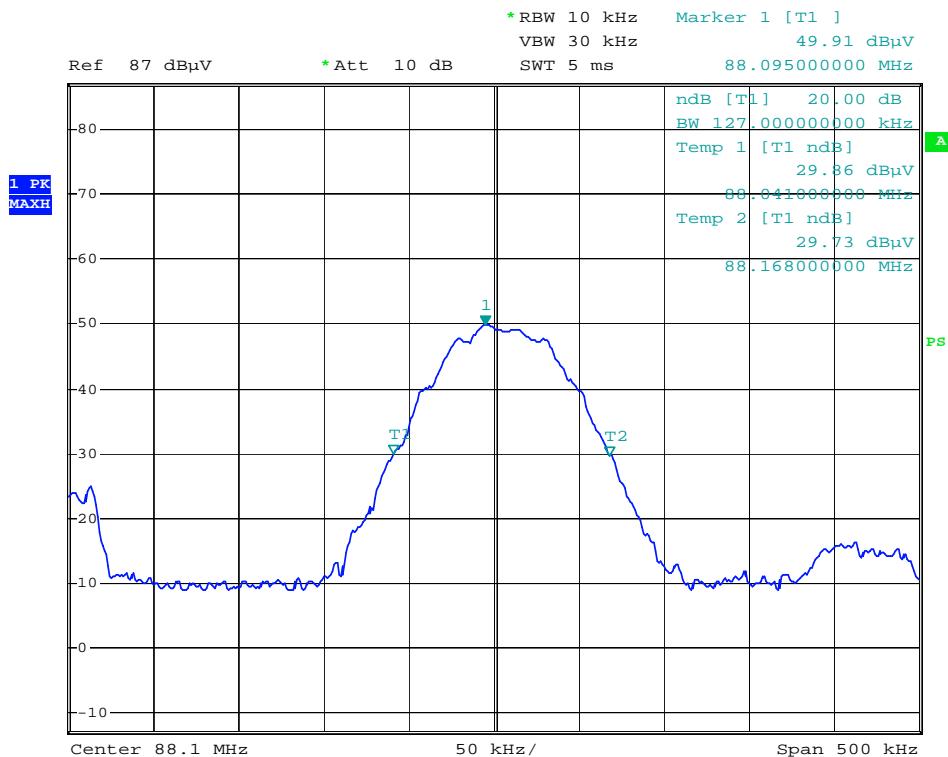
Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.2kPa

The testing was performed by Phoenix Liu on 2008-12-19.

Please refer to the following table and plots.

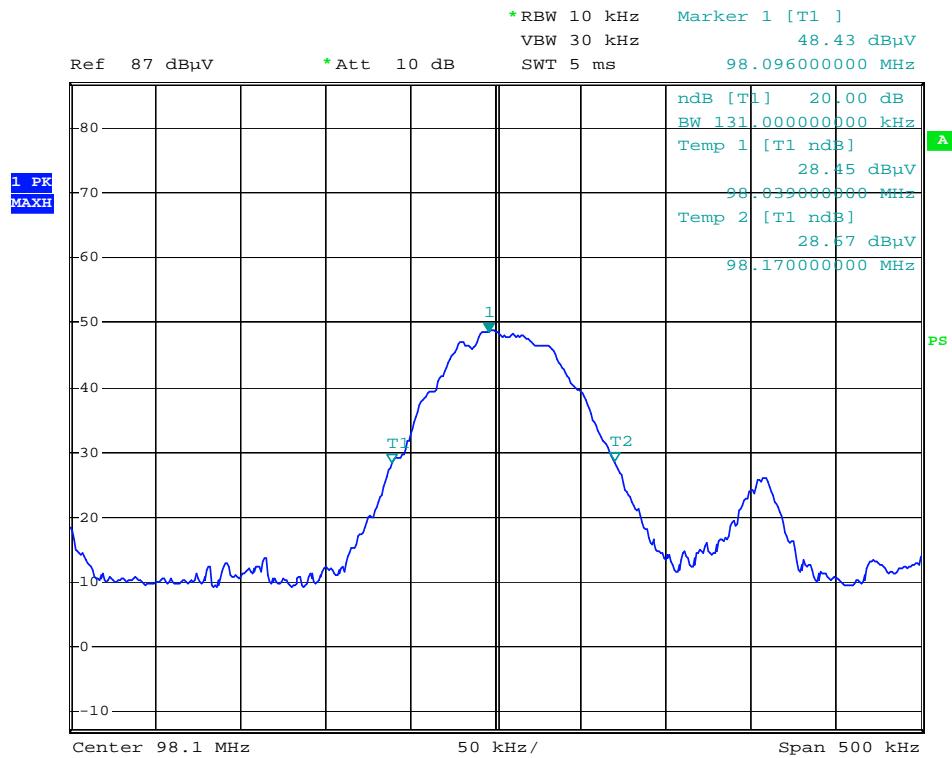
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
Low	88.1	127
Middle	98.1	131
High	107.9	130

Low Channel



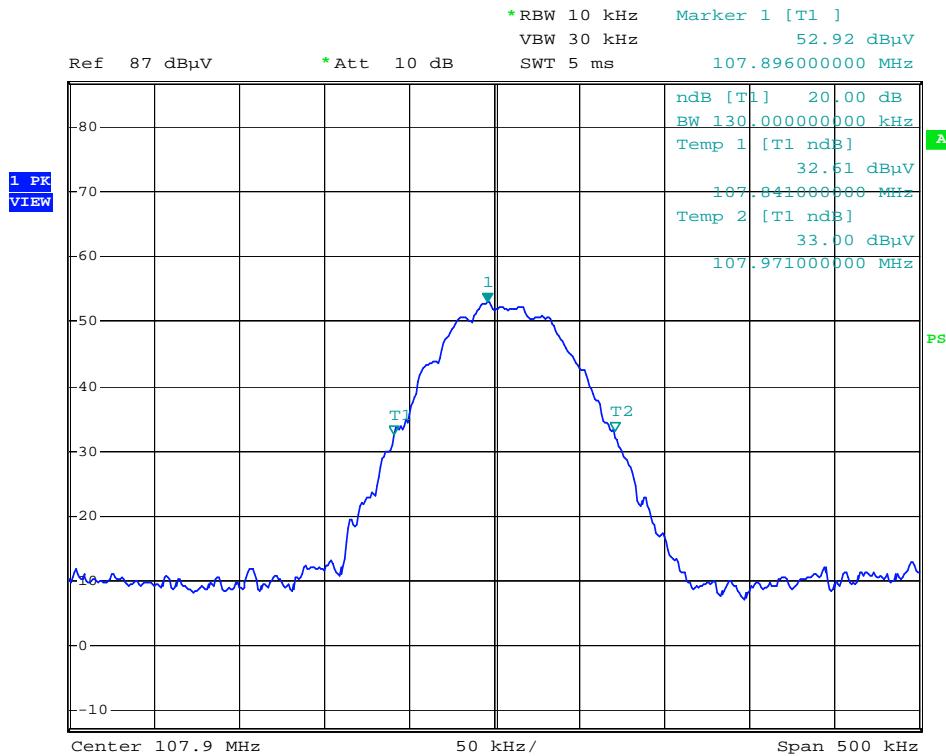
88.1

Date: 19.DEC.2008 13:15:14

Middle Channel

98.1

Date: 19.DEC.2008 13:13:05

High Channel

98.1

Date: 19.DEC.2008 13:20:53

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