



FCC PART 15.249

MEASUREMENT AND TEST REPORT

For

HMM Diagnostics GmbH

Friedrichstrasse 89D-69221 Dossenheim, Germany

FCC ID: Y9QH84400

Report Type: Original Report	Product Type: hFon Collect
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Report Number: <u>RSZ10120602-249</u>	
Report Date: <u>2011-03-10</u>	
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* This report contains data that are not covered by the NVLAP accreditation and are marked with an asterisk “★” (Rev.2)

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *HMM Diagnostics GmbH* 's product, model *H84400 (FCC ID: Y9QH84400)*, or the "EUT" as referred to in this report is a *hFon Collect* which measures approximately: 8.5 cm (L) x 3.2 cm (W) x 1.5 cm (H), rated input voltage: DC 3.7V battery.

** All measurement and test data in this report was gathered from production sample serial number: 1012026 (Assigned by BACL, Shenzhen). The EUT was received on 2010-12-06.*

Objective

This Type approval report is prepared on behalf of *HMM Diagnostics GmbH* in accordance with Part 2, Subpart J, and 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, 15.207, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

FCC Part 15B and Part 22H/24E submission with FCC ID: Y9QH84400

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, 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 December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

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

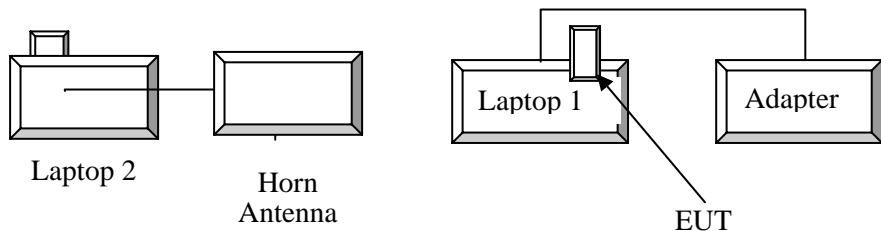
No modifications were made to the unit tested.

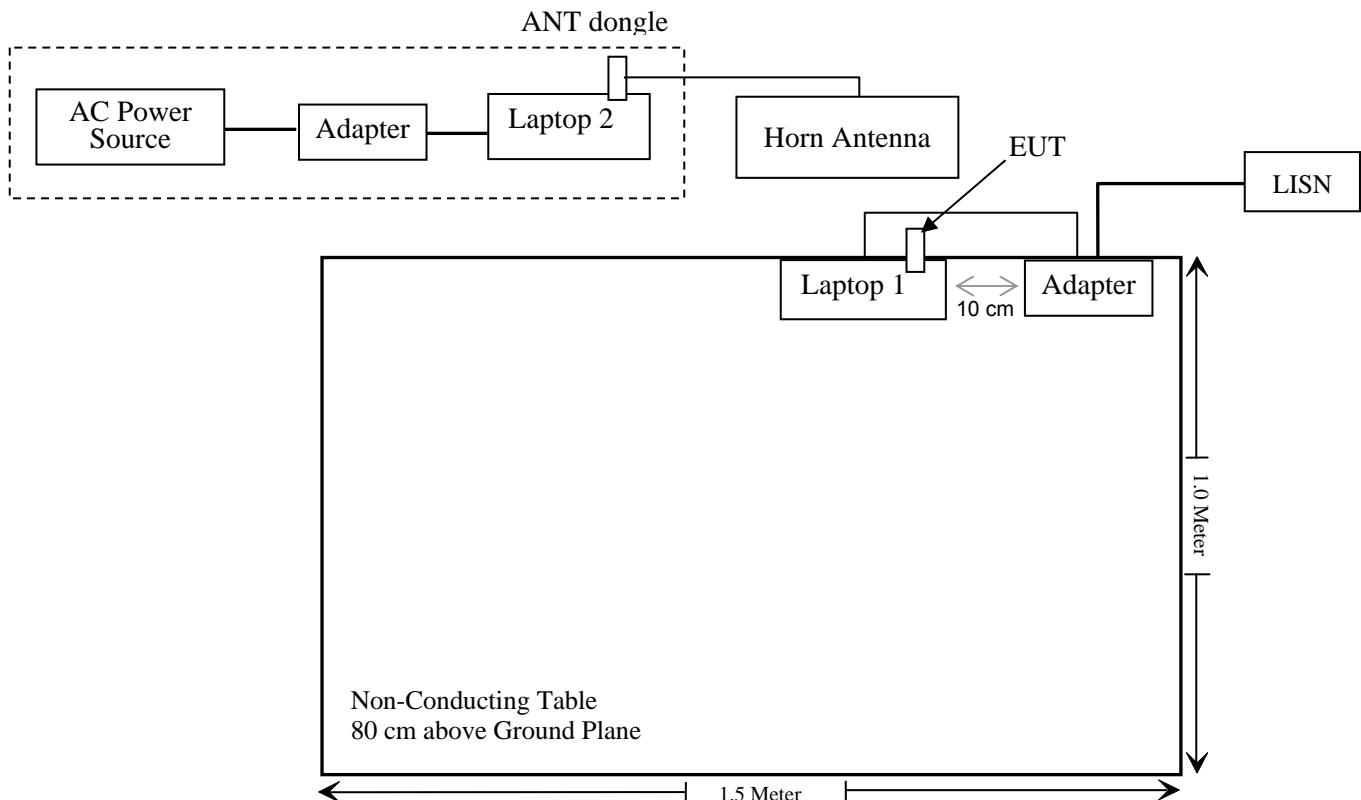
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Dell	Laptop	D260	1#	DOC
Dell	Laptop	D260	2#	DOC

Configuration of Test Setup

ANT dongle



Block Diagram of Test Setup

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conduction Emissions	Compliance
§15.205(a), §15.209(a), §15.249, §15.35	Radiated Emissions	Compliance
§15.215(c)	20dB Bandwidth	Compliance

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to FCC §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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has an integral antenna; the gain is 0 dBi; which in accordance to section 15.203 please refer to the internal photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

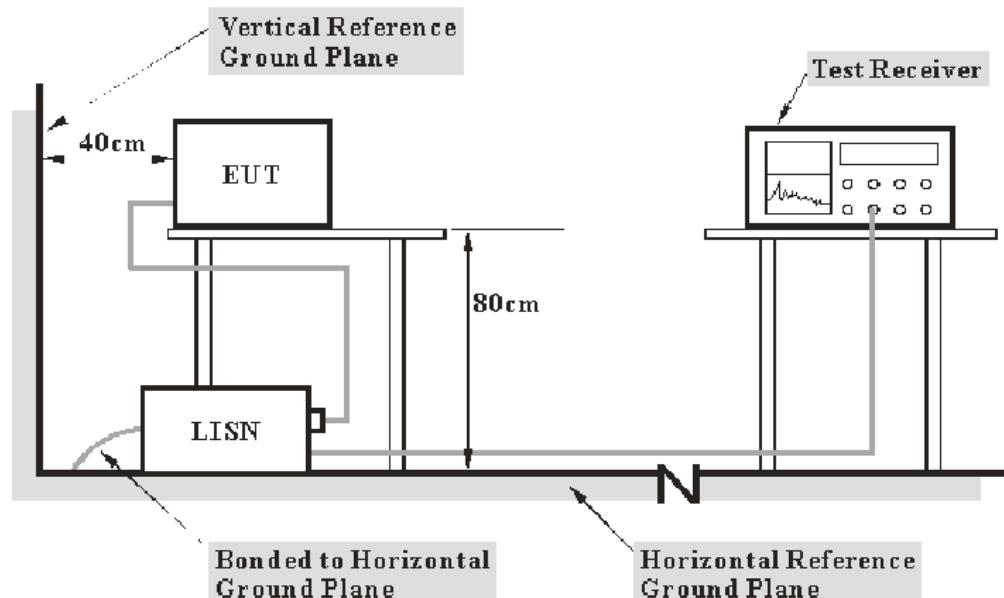
FCC §15.207

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 adapter of Laptop 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
Rohde & Schwarz	EMI Test Receiver	ESCS30	830245/006	2010-03-03	2011-03-02
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2010-03-09	2011-03-08

* **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 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:

8.62 dB at 1.005 MHz in the Line conductor mode

Test Data

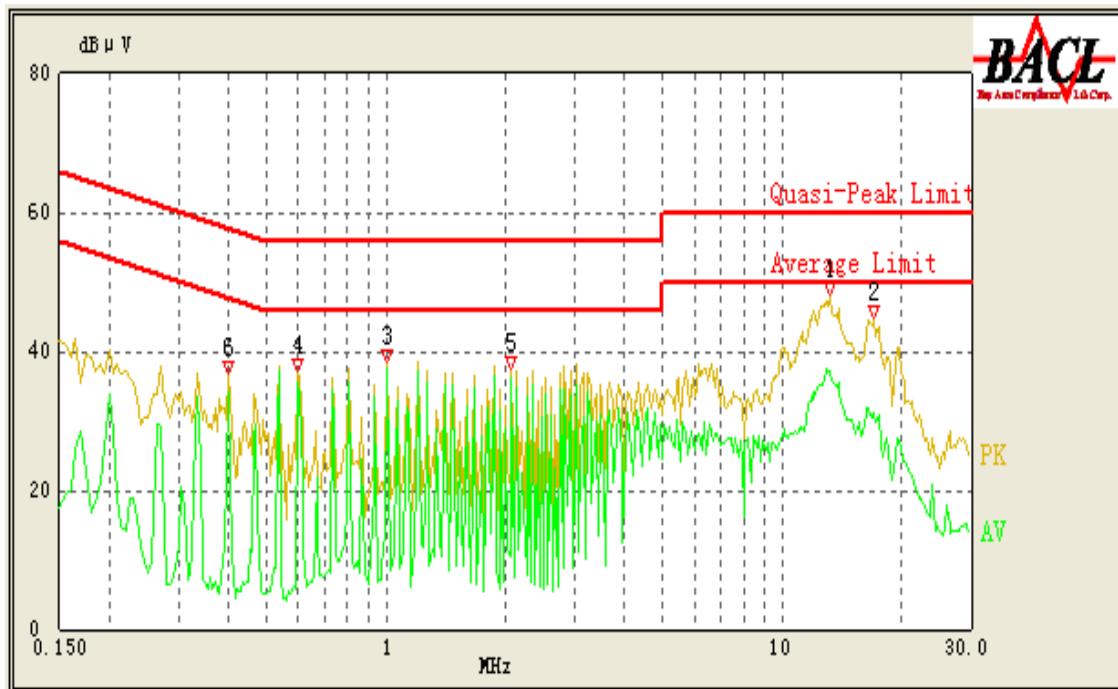
Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	48 %
ATM Pressure:	100.0 kPa

The testing was performed by Phoenix Liu on 2010-12-25.

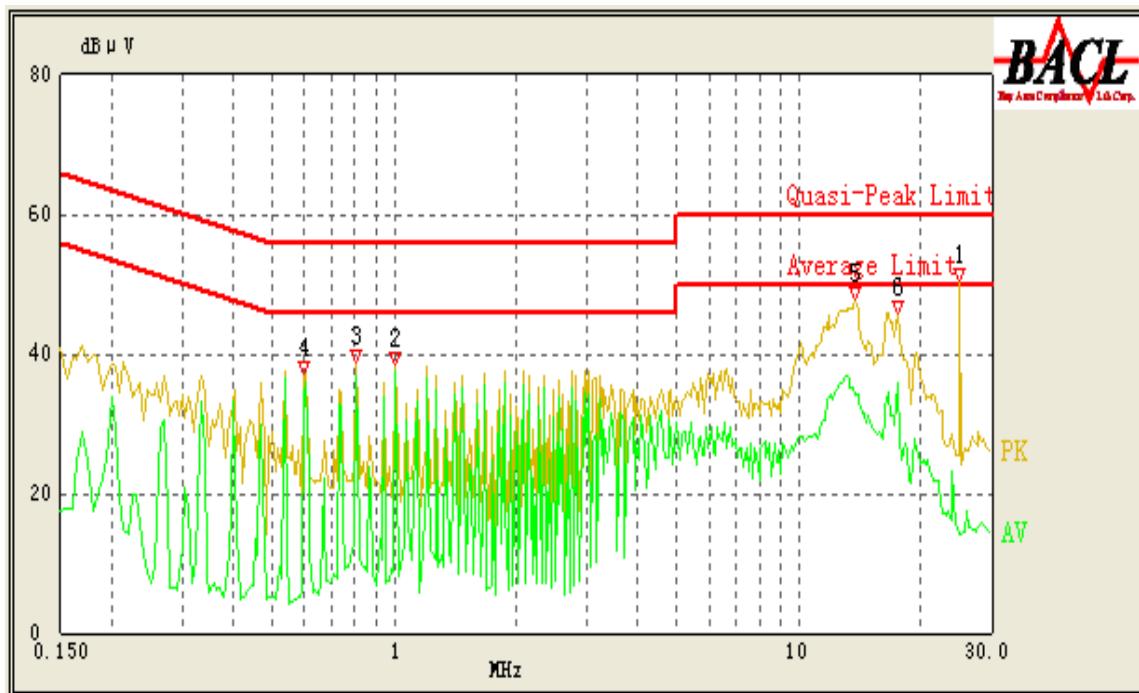
Test Mode: Charging & ANT Transmitting

120 V, 60 Hz, Line:



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	Cord. Result (dB μ V)	Correction Factor (dB)	Limit (dB μ V)	Margin (dB)	Remark (PK/QP/Ave.)
1.005	37.38	10.10	46.00	8.62	Ave
2.075	36.13	10.20	46.00	9.87	Ave
0.600	35.58	10.18	46.00	10.42	Ave
13.245	37.19	10.13	50.00	12.81	Ave
0.400	34.15	10.10	48.86	14.71	Ave
16.990	31.28	10.17	50.00	18.72	Ave
0.600	36.42	10.18	56.00	19.58	QP
13.240	40.21	10.13	60.00	19.79	QP
1.005	36.18	10.10	56.00	19.82	QP
17.070	38.56	10.17	60.00	21.44	QP
2.075	33.77	10.20	56.00	22.23	QP
0.400	35.15	10.10	58.86	23.71	QP

120V, 60 Hz, Neutral:



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	Cord. Result (dB μ V)	Correction Factor (dB)	Limit (dB μ V)	Margin (dB)	Remark (PK/QP/Ave.)
1.005	37.38	10.10	46.00	8.62	Ave
0.805	36.68	10.14	46.00	9.32	Ave
0.600	33.67	10.18	46.00	12.33	Ave
17.510	35.96	10.18	50.00	14.04	Ave
13.735	34.16	10.14	50.00	15.84	Ave
1.005	37.88	10.10	56.00	18.12	QP
0.805	36.33	10.14	56.00	19.67	QP
0.600	35.66	10.18	56.00	20.34	QP
17.510	38.93	10.18	60.00	21.07	QP
13.735	38.15	10.14	60.00	21.85	QP
24.980	14.14	10.15	50.00	35.86	Ave
24.940	17.11	10.15	60.00	42.89	QP

FCC§15.205(a), §15.209(a) & §15.249 - RADIATED EMISSIONS

Applicable Standard

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

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.

Test Equipment Setup

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

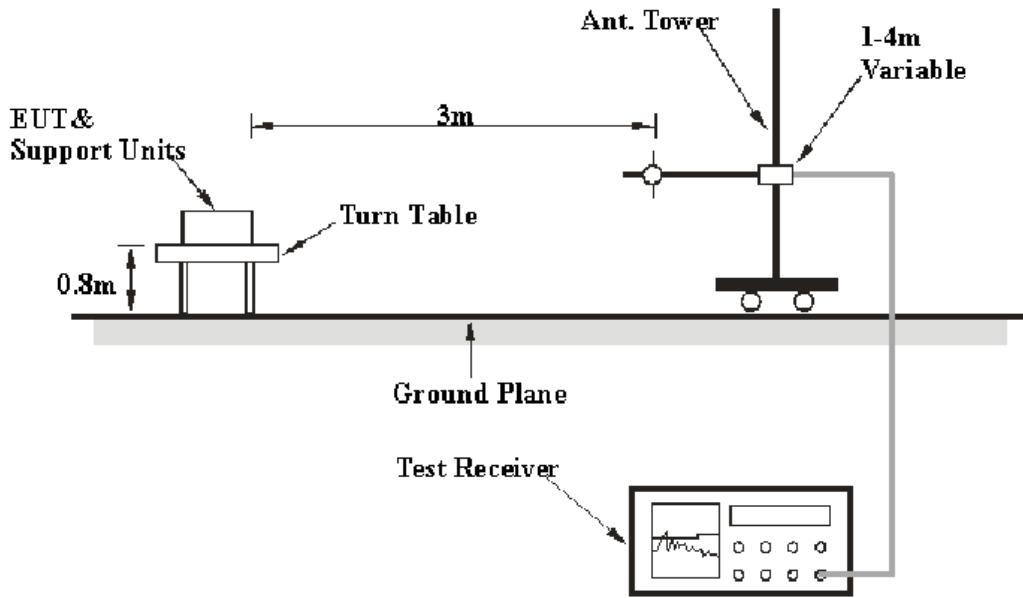
RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto

Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

EUT Setup



The radiated emission and out of band emission tests were performed in the 3 meters chamber B, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209 and FCC 15.249 limits.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2010-08-02	2011-08-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2010-11-24	2011-11-23
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2010-03-11	2011-03-11
HP	Amplifier	2VA-213+	T-E27H	2010-03-08	2011-03-07
Sunol Sciences	Horn Antenna	DRH-118	A052604	2010-05-05	2011-05-04
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2010-07-08	2011-07-07

*** 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 PC and other support equipment were connected to the AC floor outlet.

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

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

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 7 dB means the emission is 7 dB 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 & 15.249, with the worst margin reading of:

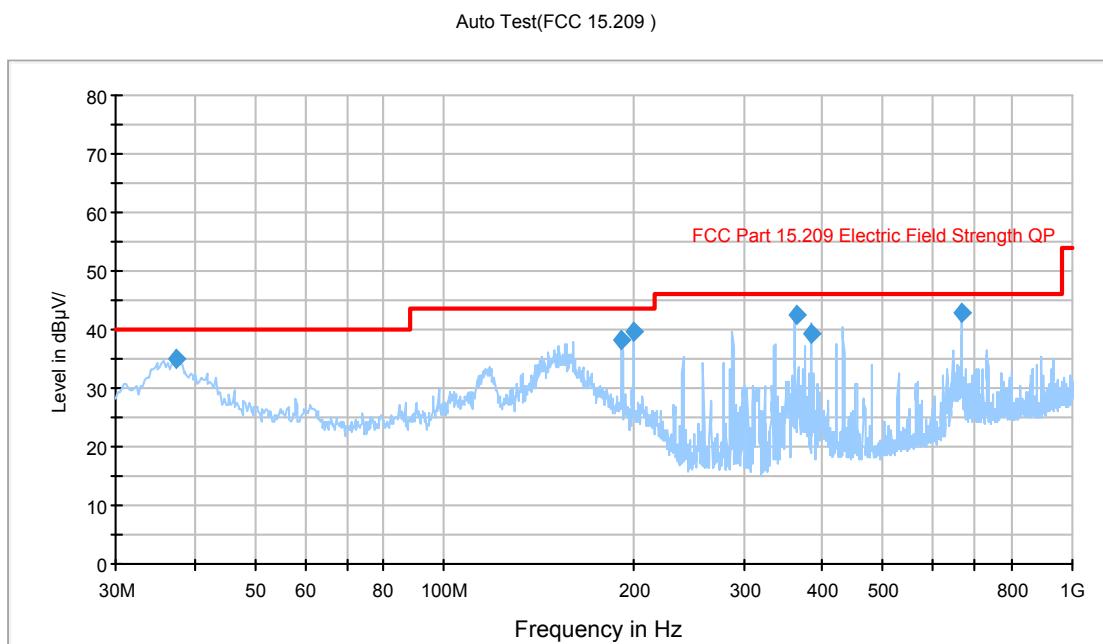
3.1 dB at 667.115750 MHz in the Vertical polarization

Test Data

Environmental Conditions

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

The testing was performed by Phoenix Liu on 2011-02-21.

30-1000 MHz:*Test Mode: Charging & ANT Transmitting*

Frequency (MHz)	Corrected Amplitude (dB μ V/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dB μ V/m)	Margin (dB)
667.115750	42.9	104.0	V	272.0	-4.2	46.0	3.1*
362.680500	42.3	103.0	H	7.0	-10.8	46.0	3.7*
200.438000	39.6	139.0	H	59.0	-14.3	43.5	3.9*
37.397000	35.0	122.0	V	135.0	-10.4	40.0	5.0
191.964500	38.3	104.0	H	76.0	-14.7	43.5	5.2
384.009750	39.2	104.0	H	212.0	-10.3	46.0	6.8

*Within measurement uncertainty.

Above 1 GHz:

Indicated		Detector (PK/Ave.)	Table Angle Degree	Test Antenna		Correction Factor			FCC 15.249		
Frequency (MHz)	S.A. Reading (dB μ V)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre- Amp. (dB)	Cord. Amp. (dB μ V/m)	Limit (dB μ V/m)	Result
CH 1 (2440 MHz)											
2440	81.35	PK	30	1.2	H	30.6	3.11	26.88	88.18	114	pass
2440	57.23	Ave	30	1.2	H	30.6	3.11	26.88	64.06	94	pass
2440	86.35	PK	210	1.5	V	30.6	3.11	26.88	93.18	114	pass
2440	60.12	Ave	205	1.5	V	30.6	3.11	26.88	66.95	94	pass
CH 2 (2441 MHz)											
2441	80.95	PK	30	1.2	H	30.6	3.11	26.88	87.78	114	pass
2441	56.85	Ave	30	1.2	H	30.6	3.11	26.88	63.68	94	pass
2441	85.05	PK	220	1.5	V	30.6	3.11	26.88	91.88	114	pass
2441	59.34	Ave	220	1.5	V	30.6	3.11	26.88	66.17	94	pass

Spurious Emission:

Indicated		Detector (PK/Ave.)	Table Angle Degree	Test Antenna		Correction Factor			FCC 15.249/Part 15.209		
Frequency (MHz)	S.A. Reading (dB μ V)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre- Amp. (dB)	Cord. Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
CH 1 (2440 MHz)											
4880	33.37	Ave	0	1.1	H	36.6	4.30	26.75	47.52	54	6.48
4880	32.00	Ave	15	1.5	V	35.4	4.30	26.75	44.95	54	9.05
4880	47.65	PK	0	1.1	H	36.6	4.30	26.75	61.80	74	12.20
4880	45.76	PK	15	1.5	V	35.4	4.30	26.75	58.71	74	15.29
1327.51	28.70	Ave	0	1.1	H	26.5	2.09	26.49	30.80	54	23.20
1327.51	26.20	Ave	15	1.5	V	26.0	2.09	26.49	27.80	54	26.20
1327.51	35.93	PK	0	1.1	V	26.0	2.09	26.49	37.53	74	36.47
1327.51	33.85	PK	15	1.5	H	26.5	2.09	26.49	35.95	74	38.05
CH 2 (2441 MHz)											
4882	32.40	Ave	10	1.2	H	36.6	4.30	26.75	46.55	54	7.45
4882	31.97	Ave	15	1.6	V	35.4	4.30	26.75	44.92	54	9.08
4882	48.27	PK	10	1.2	H	36.6	4.30	26.75	62.42	74	11.58
4882	46.26	PK	15	1.6	V	35.4	4.30	26.75	59.21	74	14.79
1342.5	28.53	Ave	10	1.2	H	26.5	2.09	26.49	30.63	54	23.37
1342.5	26.17	Ave	15	1.6	V	26	2.09	26.49	27.77	54	26.23
1342.5	36.20	PK	10	1.2	H	26.5	2.09	26.49	38.30	74	35.70
1342.5	33.40	PK	15	1.6	V	26	2.09	26.49	35.00	74	39.00

Restrict band spurious emission:

Indicated		Detector (PK/Ave)	Table Angle Degree	Test Antenna		Correction Factor			FCC Part 15.249/15.209/15.205			
Frequency (MHz)	S.A. Reading (dB μ V)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre- Amp. (dB)	Cord. Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Comment
2387.45	33.47	Ave	0	1.0	V	33.9	7.9	30.3	44.97	54	9.03	spurious
2484.89	33.53	Ave	0	1.1	H	33.9	7.9	30.9	44.43	54	9.57	spurious
2484.89	32.35	Ave	0	1.0	V	33.9	7.9	30.3	43.85	54	10.15	spurious
2387.45	31.93	Ave	0	1.1	H	33.9	7.9	30.9	42.83	54	11.17	spurious
2387.45	47.35	PK	30	1.2	V	33.9	7.9	30.3	58.85	74	15.15	spurious
2484.89	47.20	PK	10	1.1	H	33.9	7.9	30.9	58.10	74	15.90	spurious
2484.89	45.91	PK	0	1.2	V	33.9	7.9	30.3	57.41	74	16.59	spurious
2387.45	45.26	PK	20	1.2	H	33.9	7.9	30.9	56.16	74	17.84	spurious

FCC §15.215(c) – 20 dB EMISSION BANDWIDTH

Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2009-11-24	2010-11-23

* **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 indicated 20dB bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Data

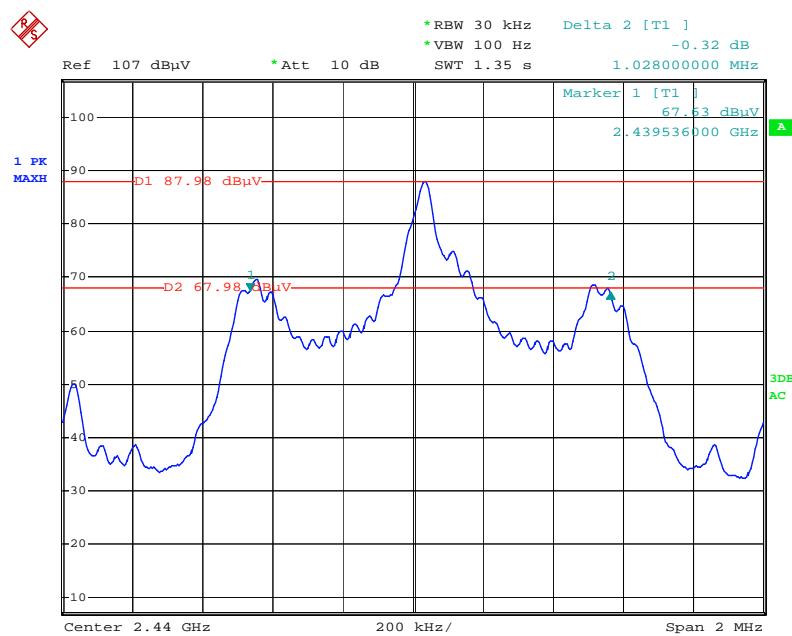
Environmental Conditions

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

*The testing was performed by Phoenix Liu on 2011-01-29

Test Mode: Transmitting

Please refer to the plot and tabular data sheet attached.



Date: 29.JAN.2011 11:03:32

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