FCC PART 15.247

TEST REPORT

For

Zound Industries

TORSGATAN 2, 111 23 STOCKHOLM, SWEDEN

FCC ID: 2AAGF-HELLAS

Report Type:	Product Type:
Original Report	Hellas

Test Engineer:	David Lee
Report Number:	RSZ150714002-00CA1
Report Date:	2015-09-25
Reviewed By:	Jimmy Xiao RF Engineer
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Zound Industries*'s product, model number: *Hellas (FCC ID: 2AAGF-HELLAS)* or the "EUT" in this report was a *Hellas*, which was measured approximately: 17.3 cm (L) x 18.4 cm (W) x 6.4 cm (H), rated with input voltage: DC 3.7 V Li-ion battery.

**All measurement and test data in this report was gathered from production sample serial number: 1505716 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2015-07-14.*

Objective

This report is prepared on behalf of *Zound Industries* 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, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS submissions with FCC ID: 2AAGF-HELLAS

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All 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.

Measurement uncertainty with RF radiated emission is 5.91 dB for 30MHz-1GHz.and 4.92 dB for above 1GHz, 1.95dB for conducted measurement.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on 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 October 31, 2013. 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.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was controlled by the test software.

EUT Exercise Software

CSR BlueSuite 2.5.0 software was used.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
BULL	Socket	GN-415K	5503290068073
MINGXIN	Adapter	MX12W6	N/A

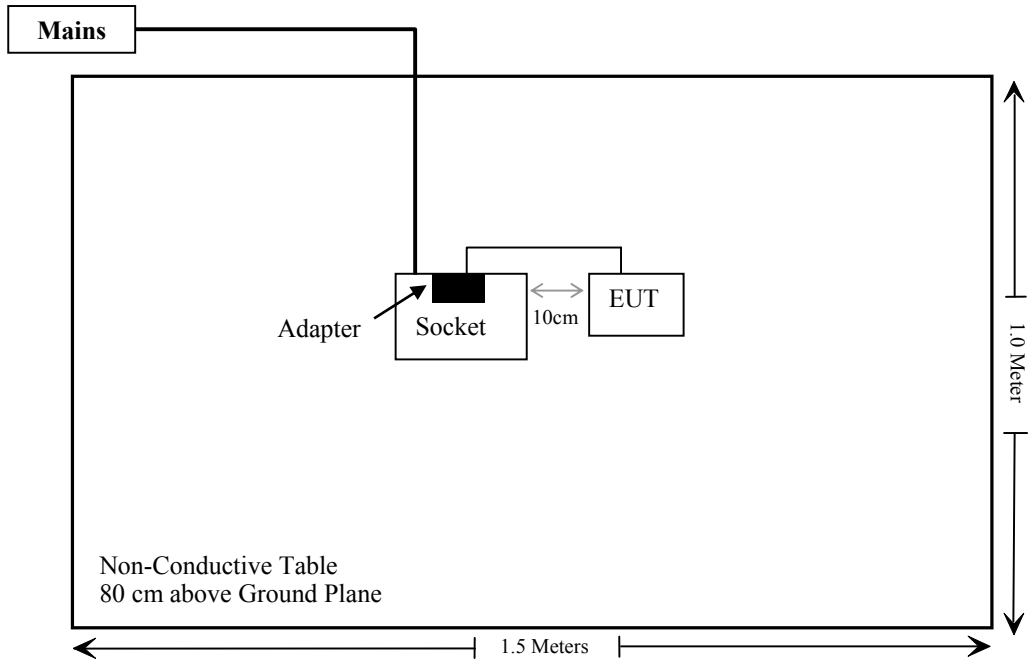
External I/O Cable

Cable Description	Length (m)	From/Port	To
Un-shielding Un-detachable AC Cable	1.0	Socket	Mains
Shielding Detachable USB Cable	1.5	Adapter	EUT

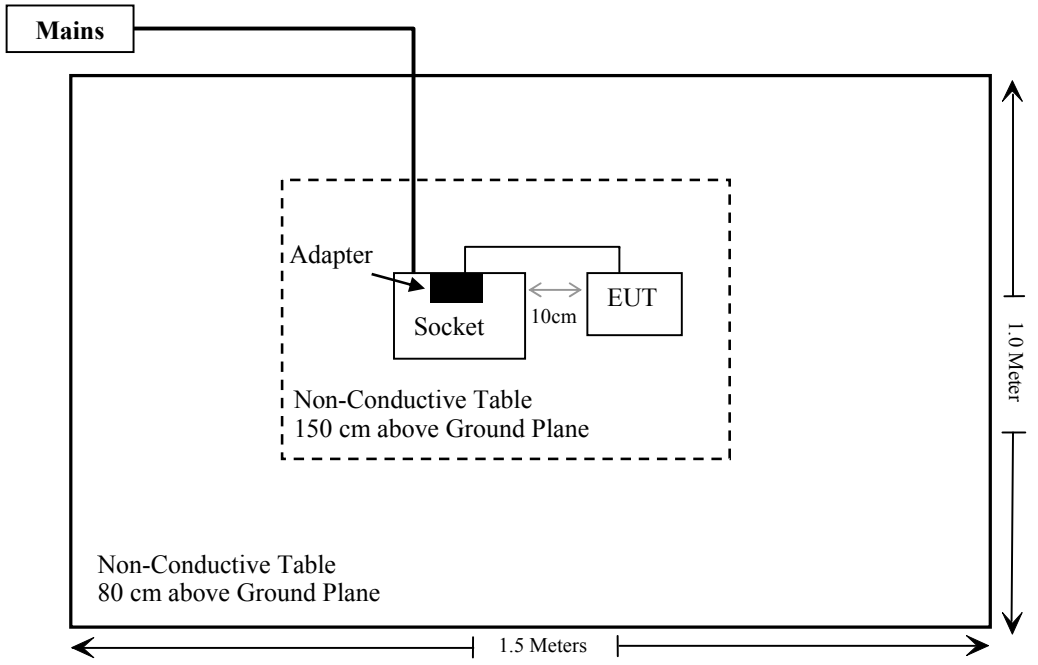
Block Diagram of Test Setup

For radiated emission

Below 1G:



Above 1G:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b) (1)& §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance*
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.247(d)	Spurious Emissions at Antenna Port	Compliance*
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance*
§15.247(b)(3)	Maximum Conducted Output Power	Compliance*
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance*
§15.247(e)	Power Spectral Density	Compliance*

Compliance*: The EUT (Model: Hellas, FCC ID: 2AAGF-HELLAS) have the same Bluetooth module as the model: Plattan ADV Wireless, FCC ID: 2AAGF-PLATTANBT. All RF characteristic have not been changed, so the test data are referred to FCC ID: 2AAGF-PLATTANBT granted on 2015-04-23, report No.: RSZ150206011-00C, which was tested by Bay Area Compliance Laboratories Corp. (Shenzhen).

FCC§15.247 (i), §1.1307 (b) (1) &§2.1093 – RF EXPOSURE

Applicable Standard

According to FCC §2.1093 and §1.1307(b) (1), 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 KDB 447498 General RF Exposure Guidance

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where
1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

For worst case:
The Max Peak Output Power: 5.96dBm=3.94mW
(3.94/5)* √2.440=1.23<3.0

Result: No SAR test is required

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

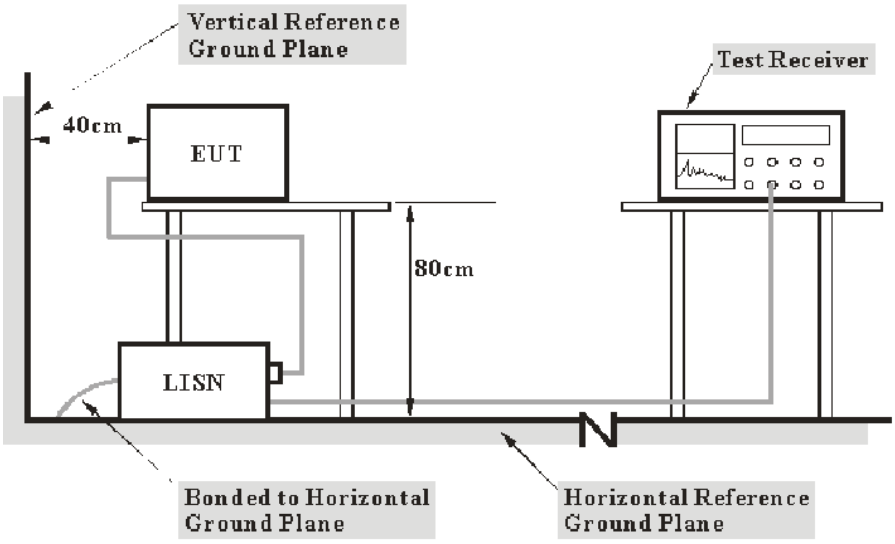
Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between LISN and receiver, LISN voltage division factor, LISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report.

Port	Expanded Measurement uncertainty
AC Mains	3.26 dB (k=2, 95% level of confidence)
CAT 3	3.70 dB (k=2, 95% level of confidence)
CAT 5	3.86 dB (k=2, 95% level of confidence)
CAT 6	4.64 dB (k=2, 95% level of confidence)

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 C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

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:

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2015-06-03	2016-06-03
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2015-06-09	2016-06-09
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2015-05-14	2016-05-14
Rohde & Schwarz	CE Test software	EMC 32	V8.53	NCR	NCR

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

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:

Margin = Limit – Corrected Amplitude

Test Results Summary

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

21.0 dB at **9.168570 MHz** and **9.189110 MHz** in the **Neutral** conducted mode

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

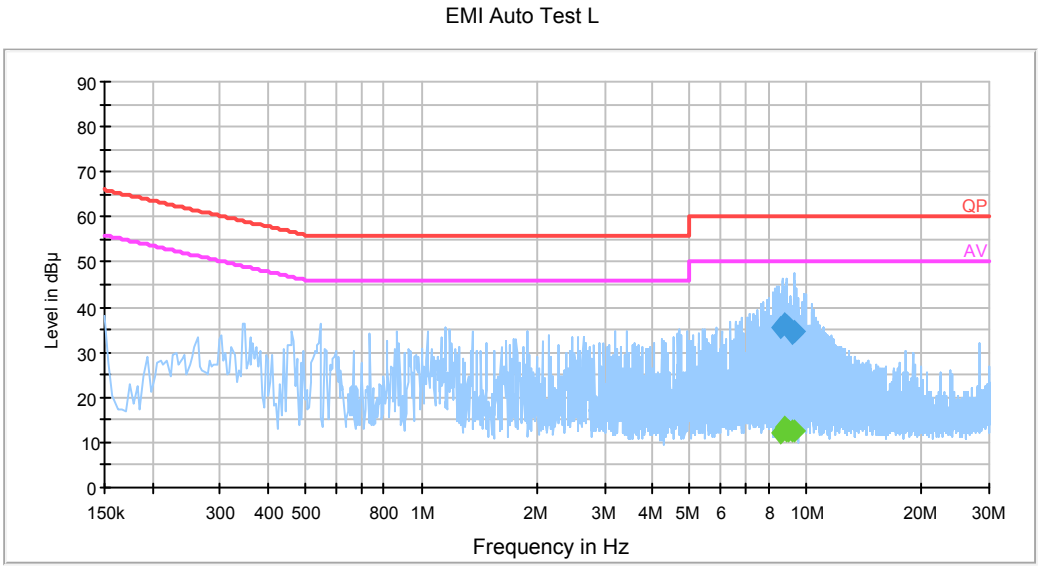
Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by David Lee on 2015-09-24.

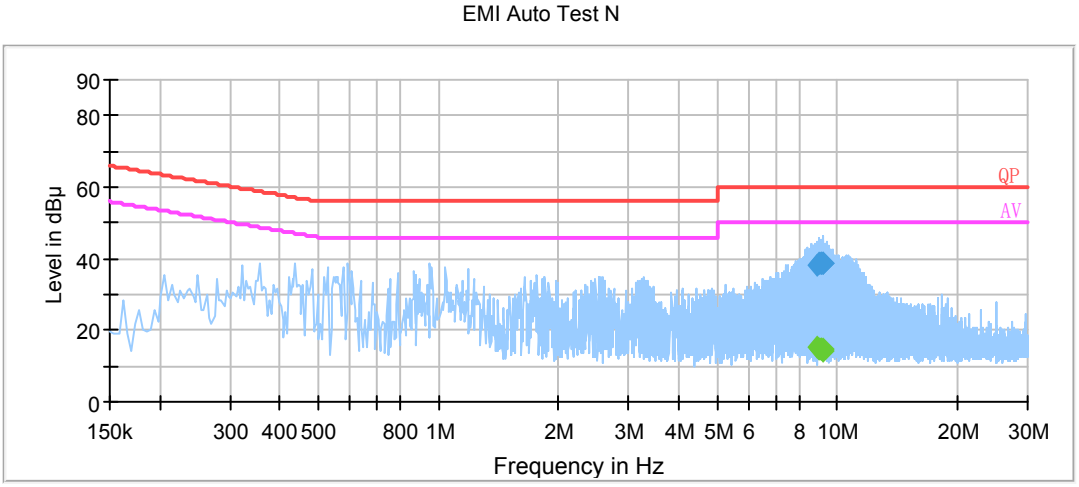
EUT operation mode: Charging & Transmitting

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
8.619950	35.3	20.1	60.0	24.7	QP
8.619950	12.3	20.1	50.0	37.7	Ave.
8.814750	36.5	20.1	60.0	23.5	QP
8.814750	13.4	20.1	50.0	36.6	Ave.
8.939690	35.8	20.1	60.0	24.2	QP
8.939690	12.6	20.1	50.0	37.4	Ave.
8.985010	35.7	20.1	60.0	24.3	QP
8.985010	12.7	20.1	50.0	37.3	Ave.
9.226710	34.3	20.1	60.0	25.7	QP
9.226710	12.5	20.1	50.0	37.5	Ave.
9.361570	34.5	20.1	60.0	25.5	QP
9.361570	12.6	20.1	50.0	37.4	Ave.

AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
8.934190	38.3	20.1	60.0	21.7	QP
8.934190	15.3	20.1	50.0	34.7	Ave.
9.027390	38.8	20.1	60.0	21.2	QP
9.027390	15.0	20.1	50.0	35.0	Ave.
9.063210	38.9	20.1	60.0	21.1	QP
9.063210	14.8	20.1	50.0	35.2	Ave.
9.101770	38.9	20.1	60.0	21.1	QP
9.101770	14.9	20.1	50.0	35.1	Ave.
9.168570	39.0	20.1	60.0	21.0	QP
9.168570	14.6	20.1	50.0	35.4	Ave.
9.189110	39.0	20.1	60.0	21.0	QP
9.189110	14.4	20.1	50.0	35.6	Ave.

Note:
1) Correction Factor =LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
2) Corrected Amplitude = Reading + Correction Factor
3) Margin = Limit – Corrected Amplitude

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

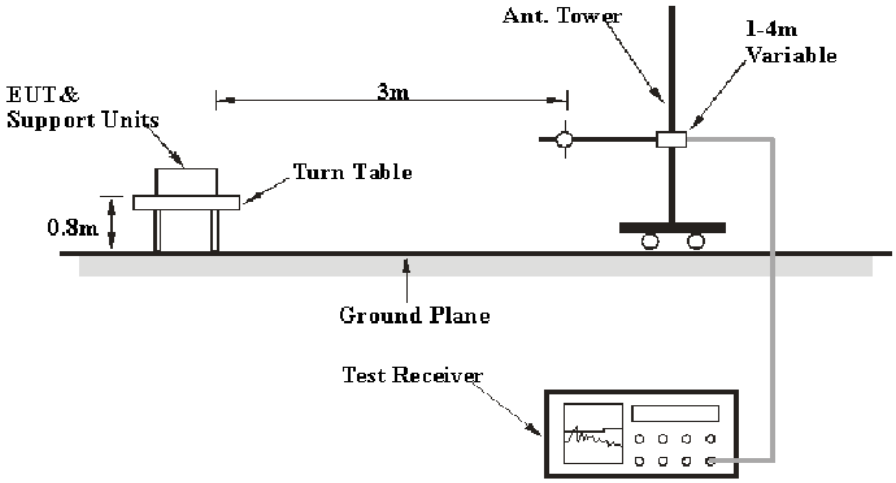
Measurement Uncertainty

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.

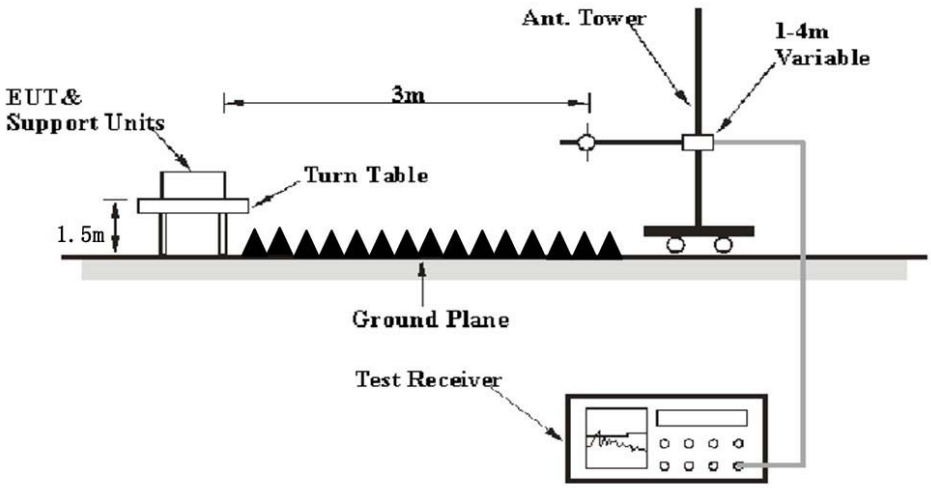
Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) is 5.91 dB for 30MHz-1GHz and 4.92 dB for above 1GHz, 1.95dB for conducted measurement at antenna port. And the uncertainty will not be taken into consideration for the test data recorded in the report

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

The adapter 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	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

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-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447E	1937A01046	2015-05-06	2016-05-06
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2014-11-03	2015-11-03
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2014-12-07	2017-12-06
Mini	Amplifier	ZVA-183-S+	5969001149	2015-04-23	2016-04-23
A.H. System	Horn Antenna	SAS-200/571	135	2013-02-11	2016-02-10
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2014-12-11	2015-12-11
the electro-Mechanics Co.	Horn Antenna	3116	9510-2270	2013-10-14	2016-10-13
TDK	Chamber	Chamber A	2#	2012-10-15	2015-10-15
TDK	Chamber	Chamber B	1#	2014-07-22	2015-07-22
DUCOMMUN	Pre-amplifier	ALN-22093530-01	991373-01	2014-08-03	2015-08-03
R&S	Auto test Software	EMC32	V9.10	NCR	NCR

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

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:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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 limit. The equation for margin calculation is as follows:

Margin = Limit – 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 15.205, 15.209 and 15.247.

8.22 dB at **9920.00 MHz** in the **Vertical** polarization for **High channel**

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	49 %
ATM Pressure:	100.1 kPa

The testing was performed by David Lee on 2015-07-21.

EUT operation mode: Charging / Transmitting

30 MHz-25 GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2402 MHz)									
174.1	33.50	QP	339	1.1	V	-14.8	18.70	43.5	24.80
2402.00	84.65	PK	139	2.1	H	4.97	89.62	/	/
2402.00	73.75	Ave.	139	2.1	H	4.97	78.72	/	/
2402.00	84.31	PK	24	2.5	V	4.97	89.28	/	/
2402.00	73.04	Ave.	24	2.5	V	4.97	78.01	/	/
2388.08	37.63	PK	60	2.1	H	4.97	42.60	74	31.40
2388.08	24.29	Ave.	60	2.1	H	4.97	29.26	54	24.74
2496.28	39.95	PK	210	1.4	H	6.29	46.24	74	27.76
2496.28	20.52	Ave.	210	1.4	H	6.29	26.81	54	27.19
4804.00	37.02	PK	163	1.6	H	16.92	53.94	74	20.06
4804.00	22.39	Ave.	163	1.6	H	16.92	39.31	54	14.69
7206.00	36.33	PK	285	1.5	H	19.08	55.41	74	18.59
7206.00	21.27	Ave.	285	1.5	H	19.08	40.35	54	13.65
9608.00	36.24	PK	153	1.9	H	22.72	58.96	74	15.04
9608.00	21.77	Ave.	153	1.9	H	22.72	44.49	54	9.51

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2440 MHz)									
174.1	33.92	QP	171	1.4	V	-14.8	19.12	43.5	24.38
2440.00	84.49	PK	186	2.2	H	4.97	89.46	/	/
2440.00	73.16	Ave.	186	2.2	H	4.97	78.13	/	/
2440.00	84.35	PK	13	1.8	V	4.97	89.32	/	/
2440.00	73.38	Ave.	13	1.8	V	4.97	78.35	/	/
2388.85	36.87	PK	329	2.0	H	4.97	41.84	74	32.16
2388.85	23.56	Ave.	329	2.0	H	4.97	28.53	54	25.47
2495.37	39.31	PK	131	1.3	H	6.29	45.60	74	28.40
2495.37	20.52	Ave.	131	1.3	H	6.29	26.81	54	27.19
4880.00	36.90	PK	250	1.3	H	16.91	53.81	74	20.19
4880.00	21.98	Ave.	250	1.3	H	16.91	38.89	54	15.11
7320.00	36.88	PK	42	1.3	V	19.40	56.28	74	17.72
7320.00	22.02	Ave.	42	1.3	V	19.40	41.42	54	12.58
9760.00	34.68	PK	320	2.1	H	23.79	58.47	74	15.53
9760.00	20.93	Ave.	320	2.1	H	23.79	44.72	54	9.28
High Channel (2480 MHz)									
174.1	34.41	QP	202	2.4	V	-14.8	19.61	43.5	23.89
2480.00	84.51	PK	308	2.4	H	6.29	90.80	/	/
2480.00	73.09	Ave.	308	2.4	H	6.29	79.38	/	/
2480.00	84.96	PK	99	1.5	V	6.29	91.25	/	/
2480.00	73.62	Ave.	99	1.5	V	6.29	79.91	/	/
2380.70	38.04	PK	306	1.2	H	4.97	43.01	74	30.99
2380.70	22.34	Ave.	306	1.2	H	4.97	27.31	54	26.69
2498.04	39.90	PK	211	1.1	H	6.29	46.19	74	27.81
2498.04	20.52	Ave.	211	1.1	H	6.29	26.81	54	27.19
4960.00	37.12	PK	35	1.0	H	17.91	55.03	74	18.97
4960.00	22.72	Ave.	35	1.0	H	17.91	40.63	54	13.37
7440.00	36.11	PK	188	2.1	H	18.34	54.45	74	19.55
7440.00	20.44	Ave.	188	2.1	H	18.34	38.78	54	15.22
9920.00	36.37	PK	33	1.9	V	23.79	60.16	74	13.84
9920.00	21.99	Ave.	33	1.9	V	23.79	45.78	54	8.22

Note:
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Limit - Corrected. Amplitude

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