FCC PART 15.225
ISED RSS-210, ISSUE 9, AUGUST 2016

TEST AND MEASUREMENT REPORT

For

Intel Corporation

2200 Mission College Blvd.,

Santa Clara, CA 95054, USA

FCC ID: 2AB8ZND24
IC: 1000X-ND24

Report Type:	**Product Type:**
Original Report	Smart Watch

Prepared By:	Jose Martinez Associate Test Engineer
Report Number:	R1610053-225
Report Date:	2016-11-09
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TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1610053-225	Original	2016-11-09

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report has been compiled on behalf of *Intel Corporation.,* and their product model number: *SBF8A*, FCC ID: 2AB8ZND24, IC: 1000X-ND24 which henceforth is referred to as the EUT (Equipment under Test.) The EUT is a wearable smart watch with 802.11 b/g/n20 Wi-Fi, BT/BLE and NFC.

1.2 Mechanical Description of EUT

The EUT measures approximately 5 cm (L), 5 cm (W), 1.5 cm (H), and weighs approximately .05 kg.

The data gathered are from a typical production sample provided by the manufacturer with serial number: AEDV05HR 6350019

1.3 Objective

This report is prepared on behalf of *Intel Corporation,* in accordance with Part 2, Subpart J, and Part 18, Subparts B and C of the Federal Communication Commission's rules. The objective is to determine compliance with FCC Part 15.225.

1.4 Related Submittal(s)/Grant(s)

FCC Part 15, Subpart C, Equipment DSS with FCC ID: 2AB8ZND24, IC: 1000X-ND24
FCC Part 15, Subpart C, Equipment DTS with FCC ID: 2AB8ZND24, IC: 1000X-ND24

1.5 Test Methodology

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

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the 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.

Parameter	Measurement uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.57 dB
Power Spectral Density, conducted	±1.48dB
Unwanted Emissions, conducted	±1.57dB
All emissions, radiated	±4.0 dB
AC power line Conducted Emission	±2.0 dB
Temperature	±2 ºC
Humidity	±5 %
DC and low frequency voltages	±1.0 %
Time	±2 %
Duty Cycle	±3 %

1.7 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Appendix B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0027.

1.8 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2005 by A2LA (Test Laboratory Accreditation Certificate Number 3297.02),*** in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2005 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report..

BACL's ISO/IEC 17025:2005 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

B- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.03)*** to certify

- For the USA (Federal Communications Commission):
  - 1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
  - 2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
  - 3- All Telephone Terminal Equipment within FCC Scope C.
- For the Canada (Industry Canada):
  - 1 All Scope 1-Licence-Exempt Radio Frequency Devices;
  - 2 All Scope 2-Licensed Personal Mobile Radio Services;
  - 3 All Scope 3-Licensed General Mobile & Fixed Radio Services;
  - 4 All Scope 4-Licensed Maritime & Aviation Radio Services;
  - 5 All Scope 5-Licensed Fixed Microwave Radio Services
  - 6 All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.
- For Singapore (Info-Communications Development Authority (IDA)):
  - 1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2
  - 2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2
- For the Hong Kong Special Administrative Region:
  - 1 All Radio Equipment, per KHCA 10XX-series Specifications;
  - 2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
  - 3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.
- For Japan:
  - 1 MIC Telecommunication Business Law (Terminal Equipment):
    - All Scope A1 - Terminal Equipment for the Purpose of Calls;
    - All Scope A2 - Other Terminal Equipment
  - 2 Radio Law (Radio Equipment):
    - All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
    - All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
    - All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

C- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.01)*** to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

1 Electronics and Office Equipment:
- for Telephony (ver. 3.0)
- for Audio/Video (ver. 3.0)
- for Battery Charging Systems (ver. 1.1)
- for Set-top Boxes & Cable Boxes (ver. 4.1)
- for Televisions (ver. 6.1)
- for Computers (ver. 6.0)
- for Displays (ver. 6.0)
- for Imaging Equipment (ver. 2.0)
- for Computer Servers (ver. 2.0)

2 Commercial Food Service Equipment
- for Commercial Dishwashers (ver. 2.0)
- for Commercial Ice Machines (ver. 2.0)
- for Commercial Ovens (ver. 2.1)
- for Commercial Refrigerators and Freezers

3 Lighting Products
- For Decorative Light Strings (ver. 1.5)
- For Luminaires (including sub-components) and Lamps (ver. 1.2)
- For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
- For Integral LED Lamps (ver. 1.4)

4 Heating, Ventilation, and AC Products
- for Residential Ceiling Fans (ver. 3.0)
- for Residential Ventilating Fans (ver. 3.2)

5 Other
- For Water Coolers (ver. 3.0)

D. A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Industry Canada - IC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
  - BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
  - NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
  - Radio & Teleterminal Equipment (R&TTE) Directive 1995/5/EC
    US -EU EMC & Telecom MRA CAB
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Development Authority - IDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
  - ENERGY STAR Recognized Test Laboratory – US EPA
  - Telecommunications Certification Body (TCB) – US FCC;
- Vietnam: APEC Tel MRA -Phase I;

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.10-2013.

2.2 EUT Exercise Software

The test firmware used Android Debug Bridge command lines provided by *Intel Corporation,* the software complies with the standard requirements being tested against.

2.3 Equipment Modifications

N/A

2.4 Local Support Equipment

Manufacturer	Description	Model No.	Serial No.
Lenovo	Laptop	20332	YB04499042

2.5 EUT Internal Configuration Details

Manufacturer	Description	Model No.	Serial No.
Intel	Main Board	-	-
Dongguan Amperex Technology Limited	Battery	GB-S10-432830-020H	-

2.6 Power Supply and Line Filter

N/A

2.7 Interface Ports and Cabling

Cable Description	Length (m)	To	From
Micro USB Cable	< 1 m	Laptop	EUT
RF Cable	< 1 m	EUT	PSA

3 Summary of Test Results

Results reported relate only to the product tested.

FCC & ISED Rules	Description of Test	Results
FCC §15.207 ISED RSS-Gen §8.8	AC Line Conducted Emissions	Compliant
FCC §15.225 ISED RSS-210 Annex B 6(a)	Radiated Field Strength	Compliant
FCC §15.225(e) ISED RSS-210 Annex B 6	Frequency Tolerance	Compliant
FCC §15.215(c) ISED RSS-Gen §6.6	20 dB Emission Bandwidth	Complaint

4 FCC §15.207 & ISED RSS-Gen §8.8 - AC Line Conducted Emissions

4.1 Applicable Standards

As per FCC §15.207 and ISED RSS-Gen §8.8:

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

4.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.10-2013. The specification used was FCC §15.207 and ISED RSS-Gen §8.8.

External I/O cables were draped along the edge of the test table and bundle when necessary.
The EUT was connected to a laptop, the adaptor of laptop was connected with LISN-1 which provided 120 V/60 Hz AC power.

4.3 Test Procedure

During the conducted emission test, the power cord of the EUT host system was connected to the mains outlet of the LISN-1 and the power cord of the support equipment was connected to LISN-2.

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

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with a “QP”. Average reading is distinguished with an “Ave”.

4.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

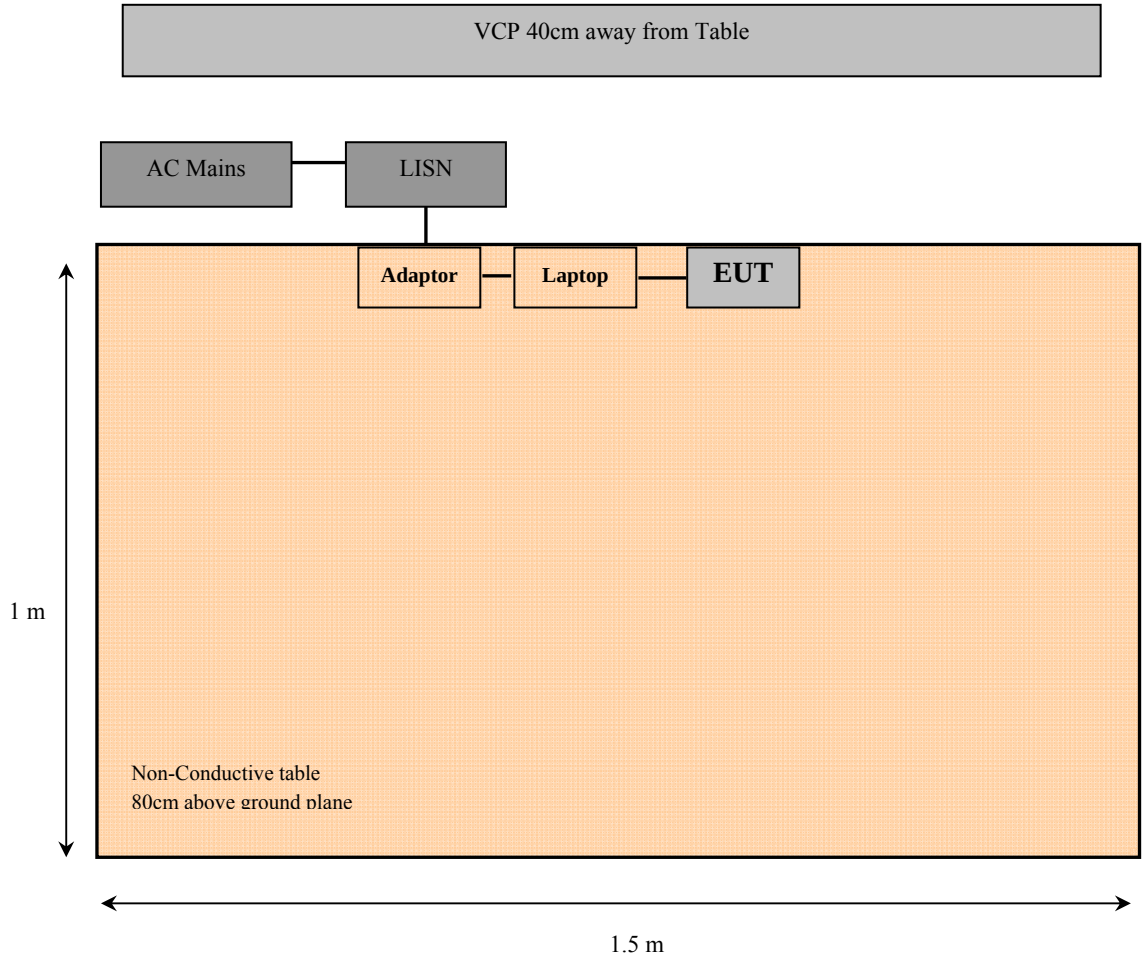
CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude – Limit

4.5 Test Setup Block Diagram



4.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100338	2016-02-04	2 years
Rohde & Schwarz	Impulse Limiter	ESH3-Z2	101964	2016-07-22	1 year
Solar Electronics Company	High Pass Filter	Type 7930-100	7930150204	2016-03-09	1 Year
Suirong	30 ft conductive emission cable	LMR 400	-	2016-03-05	1 year
FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160131	2016-04-25	1year
Vasona	Test software	V6.0 build 11	10400213	N/R	N/R

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.*

4.7 Test Environmental Conditions

Temperature:	22º C
Relative Humidity:	42%
ATM Pressure:	102 kPa

The testing was performed by Jose Martinez on 2016-11-03 in chamber 5m3.

4.8 Summary of Test Results

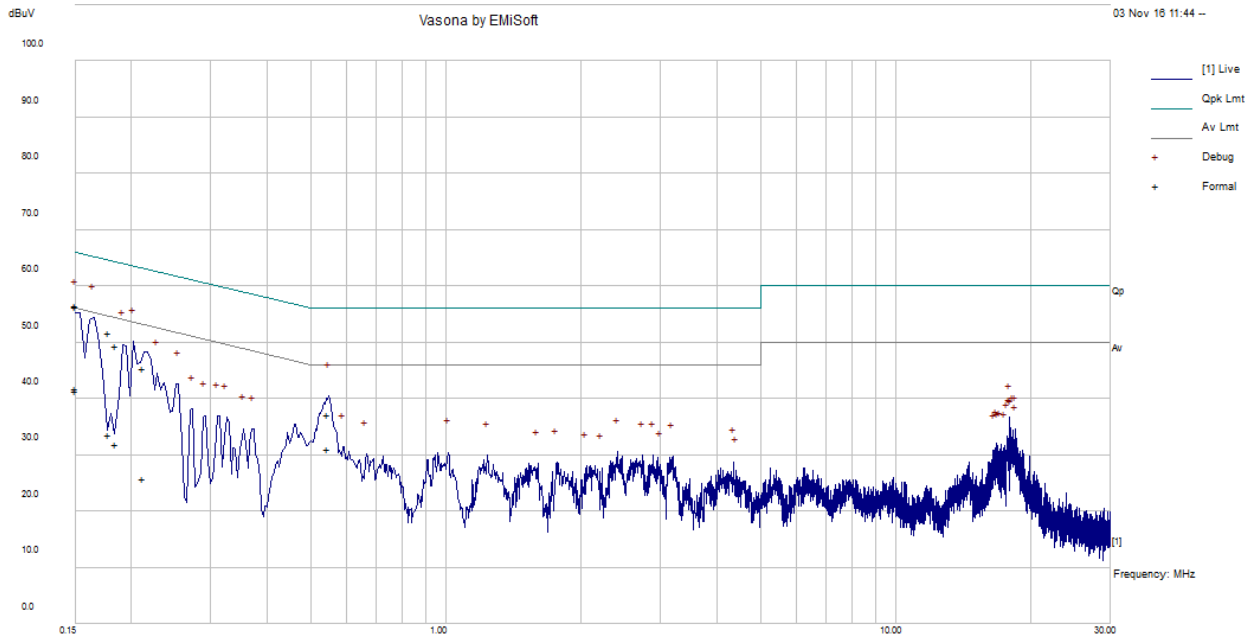
According to the data hereinafter, the EUT complied with the FCC 15C & ISED RSS-Gen standard's radiated emissions limits, and had the worst margin of:

Connection: AC/DC adapter connected to 120 V/ 60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-9.37	0.15039	Line	0.15-30
-9.49	0.150094	Neutral	0.15-30

Please refer to the following table and plots for specific test result details

4.9 Conducted Emissions Test Plots and Data

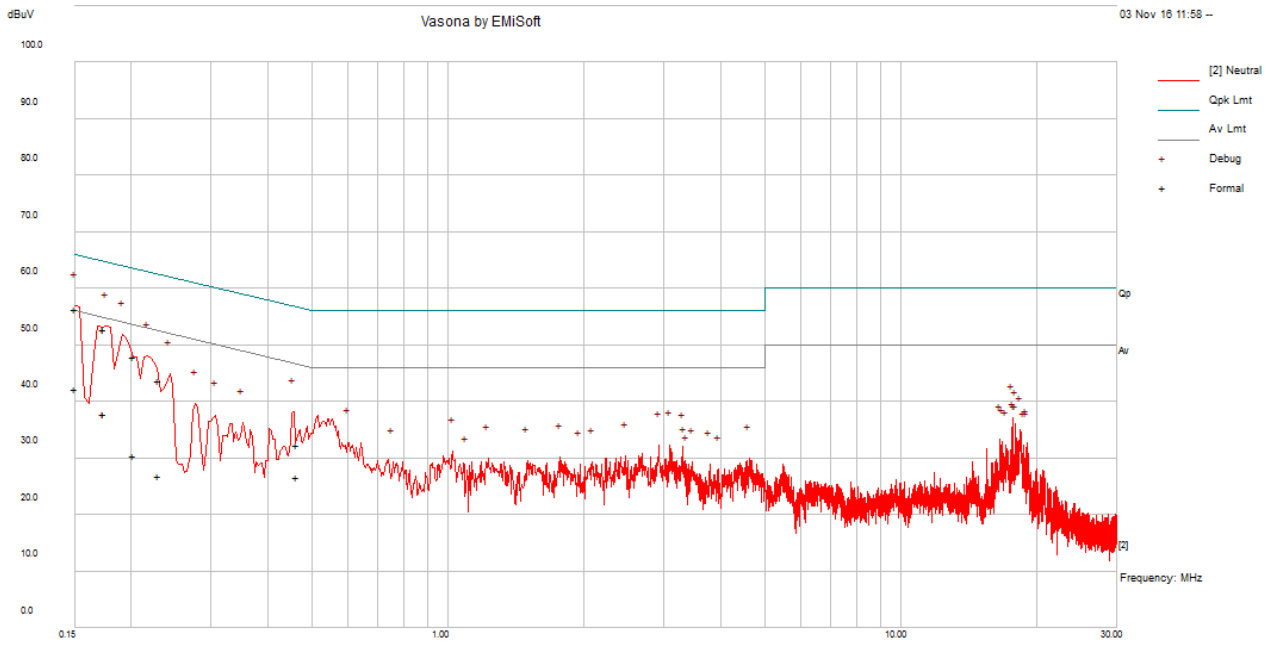
120VAC/60Hz Line



Frequency (MHz)	Cord. Reading (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.15039	56.61	Line	65.98	-9.37	QP
0.150148	56.48	Line	65.99	-9.51	QP
0.184241	49.54	Line	64.29	-14.75	QP
0.177691	51.72	Line	64.59	-12.88	QP
0.546859	37.23	Line	56	-18.77	QP
0.212252	45.42	Line	63.12	-17.69	QP

Frequency (MHz)	Cord. Reading (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.15039	41.87	Line	55.98	-14.11	Ave.
0.150148	41.59	Line	55.99	-14.4	Ave.
0.184241	32.07	Line	54.29	-22.22	Ave.
0.177691	33.75	Line	54.59	-20.84	Ave.
0.546859	31.24	Line	46	-14.76	Ave.
0.212252	25.89	Line	53.12	-27.23	Ave.

120VAC/60Hz Neutral



Frequency (MHz)	Cord. Reading (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.150094	56.5	Neutral	65.99	-9.49	QP
0.173655	52.83	Neutral	64.78	-11.96	QP
0.173731	52.87	Neutral	64.78	-11.91	QP
0.202893	47.95	Neutral	63.49	-15.54	QP
0.230022	43.78	Neutral	62.45	-18.67	QP
0.462949	32.5	Neutral	56.64	-24.13	QP

Frequency (MHz)	Cord. Reading (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.150094	42.31	Neutral	55.99	-13.68	Ave.
0.173655	37.91	Neutral	54.78	-16.87	Ave.
0.173731	38.01	Neutral	54.78	-16.77	Ave.
0.202893	30.47	Neutral	53.49	-23.02	Ave.
0.230022	26.88	Neutral	52.45	-25.57	Ave.
0.462949	26.81	Neutral	46.64	-19.83	Ave.

5 FCC §15.225, §15.209 & ISED RSS-210 Annex B 6(a) - Radiated Field Strength

5.1 Applicable Standards

As per FCC §15.225 and ISED RSS-210 Annex B 6(a) Operation within the band 13.110-14.010 MHz

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As per FCC §15.35:

The conducted and radiated emission limits shown in this part are based on the following, unless otherwise specified elsewhere in this part:

(a) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. The specifications for the measuring instrument using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Interference (CISPR) of the International Electrotechnical Commission. As an alternative to CISPR quasi-peak measurements, the responsible party, at its option, may demonstrate compliance with the emission limits using measuring

equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, as long as the same bandwidths as indicated for CISPR quasi-peak measurements are employed.

Note: For pulse modulated devices with a pulse-repetition frequency of 20 Hz or less and for which CISPR quasi-peak measurements are specified, compliance with the regulations shall be demonstrated using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, using the same measurement bandwidths that are indicated for CISPR quasi-peak measurements.

5.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.10-2013. The specification utilized was the FCC §15.225, §15.209 limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

5.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords 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.

The EUT is set 3 meter away from the testing antenna, which was fixed at around 2 meters, 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 perpendicular and parallel.

The spectrum analyzer or receiver is set as:

Below 150 kHz:

RBW = 200 Hz / VBW = 600 kHz / Sweep = Auto / Average

From 150 kHz to 30 MHz:

RBW = 9 kHz / VBW = 27 kHz / Sweep = Auto / Average

5.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude – Limit

5.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2015-06-18	2 year
Sunol Science Corp	System Controller	SC99V	011003-1	N/R	N/R
EMCO	Antenna, Loop Passive	6512	34167	2016-05-12	2 years
Suirong	30 ft conductive emission cable	LMR 400	-	2016-03-05	1 year
Sonoma Instrument	Amplifier	315	303125	2016-07-23	1year
Sunol Sciences	Antenna, Biconi-Log	JB1	A013105-3	2015-07-11	2 year
HP	Pre-Amplifier	8447D	2944A06639	2016-06-28	1 year

Statement of Traceability: BACL *attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.*

5.6 Test Environmental Conditions

Temperature:	20-25º C
Relative Humidity:	40-45 %
ATM Pressure:	101.2-103.5 kPa

The testing was performed by Jose Martinez on 2016-11-03 in 5m3.

5.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Part 15C & ISED RSS-210 standard's radiated emissions limits, and had the worst margin of:

Mode: Transmitting			
Margin (dB)	**Frequency (kHz)**	**Polarization**	**Range**
-11.159	965.15	Perpendicular	9 kHz – 1000 MHz

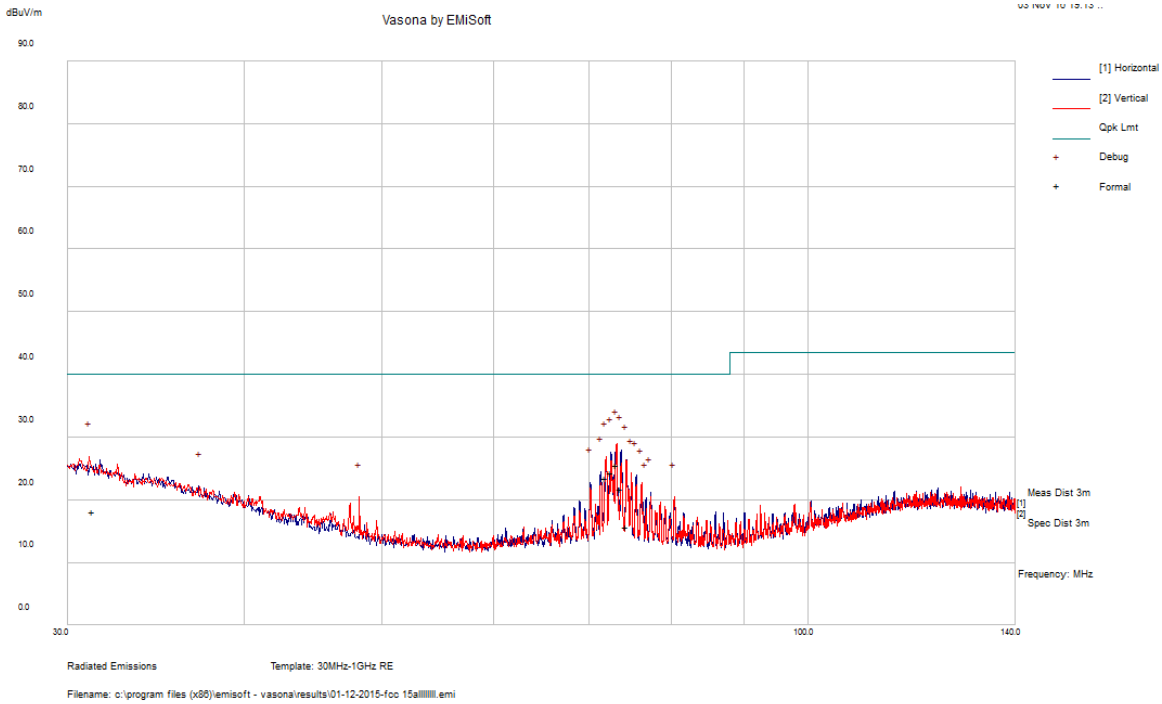
Please refer to the following table and plots for specific test result details

5.8 Radiated Field Strength Test Data and Plots

(1) 9 kHz to 30 MHz:

Frequency (kHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
13560	26.33	0	100	Perp.	34.8	0.689	23.34	38.479	123.99	-85.511	QP
13560	30.94	44	100	Parallel	34.8	0.689	23.34	43.089	123.99	-80.901	QP
13553	11.75	0	100	Perp.	34.8	0.689	23.34	23.899	90.48	-66.581	QP
13553	13.09	0	100	Parallel	34.8	0.689	23.34	25.239	90.48	-65.241	QP
13567	13.93	0	100	Perp.	34.8	0.689	23.34	26.079	90.48	-64.401	QP
13567	17.2	0	100	Parallel	34.8	0.689	23.34	29.349	90.48	-61.131	QP
13348	13.2	0	100	Perp.	34.8	0.689	23.34	25.349	80.5	-55.151	QP
13349	15.65	0	100	Parallel	34.8	0.689	23.34	27.799	80.5	-52.701	QP
13924.2	9.35	0	100	Perp.	34.8	0.689	23.34	21.499	80.5	-59.001	QP
13771.8	14.4	0	100	Parallel	34.8	0.689	23.34	26.549	80.5	-53.951	QP

(2) 30 MHz to 1 GHz:



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comments (PK/QP/Ave.)
73.2175	25.58	360	V	273	40	-14.42	QP
73.7385	21.73	290	H	17	40	-18.27	QP
72.6045	24.29	292	H	359	40	-15.71	QP
31.27575	18.1	183	V	149	40	-21.9	QP
71.979	23.48	280	V	287	40	-16.52	QP
74.44	15.7	400	V	275	40	-24.3	QP

Note: Emissions with frequencies greater than 135.6 MHz are greater than the 10th Harmonic and thus can be ignored (§15.33: Frequency Range of Radiated Measurement).

6 FCC §15.225(e) & ISED RSS-210 Annex B 6 - Frequency Tolerance

6.1 Applicable Standards

As per FCC §15.225(e) & ISEDRSS-210 Annex B 6: Operation within the band 13.110-14.010 MHz

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to + 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

6.2 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US45303156	2016-01-19	1 year
EMCO	Antenna, Loop Passive	6512	34167	2016-05-12	2 years
Suirong	30 ft conductive emission cable	LMR 400	-	2016-03-05	1 year
Fluke Corp	Multimeter, Digital	233	23790031	2016-07-13	1 year
Espec	Chamber, Humidity	ESL-4CA	18010	2016-02-24	1 year
Interpower	International Power Source	85510510	39711 Rev B	Cal. Not Required	N/A
Valhalla	Analyzer, Digital Power	2101	3-3428	2016-09-16	1 year

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.

6.3 Test Environmental Conditions

Temperature:	20-25° C
Relative Humidity:	30-32 %
ATM Pressure:	102.1-105.1 kPa

The testing was performed by Jose Martinez from 2016-11-03 at RF Site.

6.4 Test Results

Normal Voltage

Temperature °C	Operating Frequency (MHz)	Measured Frequency (MHz)	Frequency Tolerance	Limit	Result
-20	13.56	NA	NA	NA	NA
-10	13.56	13.56040064	-0.003%	±0.01%	Pass
0	13.56	13.56064103	-0.004%	±0.01%	Pass
10	13.56	13.56064103	-0.005%	±0.01%	Pass
20	13.56	13.5605609	-0.004%	±0.01%	Pass
30	13.56	13.56048077	-0.004%	±0.01%	Pass
40	13.56	13.56044997	-0.003%	±0.01%	Pass
50	13.56	13.56040064	-0.003%	±0.01%	Pass

Note: This device is battery operated. At temperature -20 °C, device does not power on.

7 FCC §15.215(c) & RSS-Gen §6.6 – 20 dB Emission Bandwidth

7.1 Applicable Standards

As per FCC §15.215(c):

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. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bands identified in that subpart. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

As per ISED RSS-Gen §6.6:

The emission bandwidth (×dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated × dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3× the resolution bandwidth.

When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured.

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3×RBW.

Note: Video averaging is not permitted.

A peak, or peak hold, may be used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold may be necessary to determine the occupied bandwidth if the device is not transmitting continuously.

The trace data points are recovered and are directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded.

The difference between the two recorded frequencies is the 99% occupied bandwidth.

7.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.4-2014. The specification utilized was the FCC §15.225, §15.209 limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

7.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US45303156	2016-01-19	1 year
Sunol Science Corp	System Controller	SC99V	011003-1	N/R	N/R
EMCO	Antenna, Loop Passive	6512	34167	2016-05-12	2 years
Suirong	30 ft conductive emission cable	LMR 400	-	2016-03-05	1 year
Sonoma Instrument	Amplifier	315	303125	2016-07-23	1year

Statement of Traceability: BACL *attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.*

7.4 Test Environmental Conditions

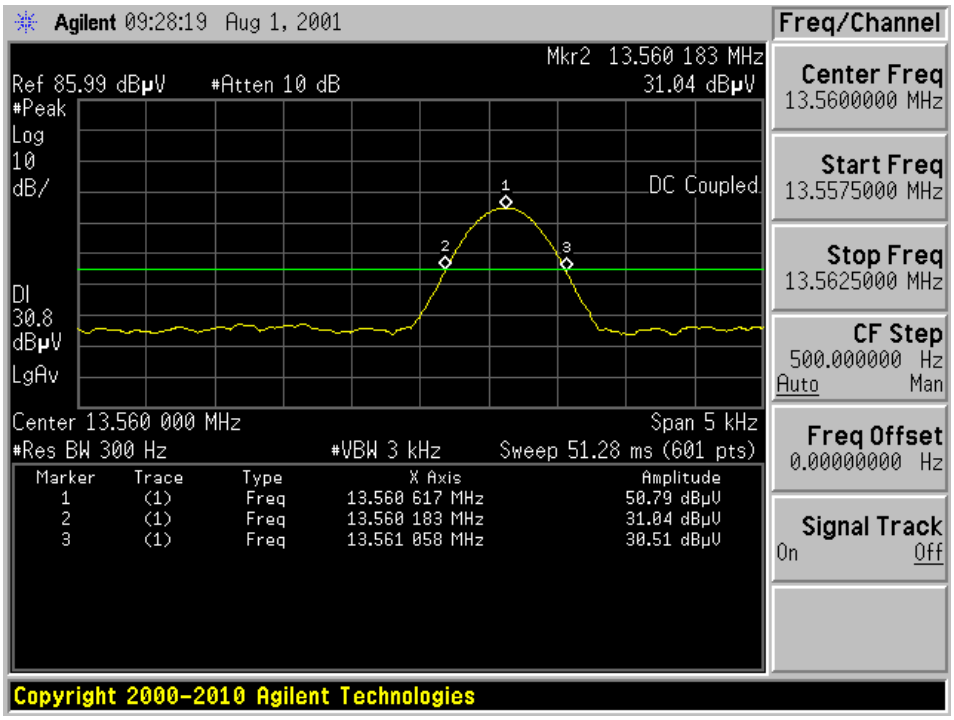
Temperature:	20-25° C
Relative Humidity:	30-32 %
ATM Pressure:	102.1-105.1 kPa

The testing was performed by Jose Martinez from 2016-11-04 at RF Site.

7.5 Test Results

Permitted Operating Frequency Range (MHz)	20 dB Emission Bandwidth (Hz)	Result
13.553-13.567	875	Compliant

20 dB Emission Bandwidth



8 Annex A (Informative) - A2LA Electrical Testing Certificate

Accredited Laboratory

A2LA has accredited

BAY AREA COMPLIANCE LABORATORIES CORP.

Sunnyvale, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of A2LA *R222 - Specific Requirements - EPA ENERGY STAR Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 30th day of August 2016.

Senior Director of Quality & Communications
For the Accreditation Council
Certificate Number 3297.02
Valid to September 30, 2018

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.