FCC PART 15, SUBPART C

TEST REPORT

For

Sunpower Corporation

1414 Harbour Way South, Ste. 1901,

Richmond, CA 94804, USA

FCC ID: YAW513407

Report Type:	**Product Type:**
CIIPC Report	Data Monitoring Gateway

Prepared By:	Shoaib Khan Test Engineer
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Reviewed By:	Bo Li RF Supervisor

Bay Area Compliance Laboratories Corp.
1274 Anvilwood Avenue,
Sunnyvale, CA 94089, USA
Tel: 1 (408) 732-9162
Fax: 1 (408) 732-9164

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1611032-247	Original Report	2017-02-17

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *Sunpower Corporation*, and their product model: *Sunpower PVS5c,* FCC ID: YAW513407 or the "EUT" as referred to in this report. It was a Data Monitoring Gateway. EUT has a 2.4 GHz Wi-Fi radio, 2 Zigbee modules and a certified 3G module built in. In this C2PC testing, 2 Zigbee modules and 3G module are disabled by software by the manufacturer; only Wi-Fi radio is activated.

1.2 Mechanical Description of EUT

The EUT measures approximately 30.48 cm (L) x 20.32 cm (W) x 5.08 cm (H).

The test data gathered are from typical production sample, serial number: ZT62185000441V215 assigned by Sunpower Corporation

1.3 Objective

This report is prepared on behalf of *Sunpower Corporation,* in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commission's rules.

The objective is to determine CIIPC compliance with FCC Part 15C Output Power, Antenna Requirements, Ac line conducted emissions and Radiated Spurious Emissions due to the antenna of Chain 1 was changed to external antenna.

1.4 Related Submittal(s)/Grant(s)

N/A

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 and FCC KDB 558074 D01 DTS Meas Guidance v03r05: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.

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 º C
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:
  - EMC Directive 2014/30/EC US-EU EMC & Telecom MRA CAB
  - 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 and FCC KDB 558074 D01 DTS Meas Guidance v03r05.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the average power, peak power and PPSD across all data rates bandwidths, and modulations.

2.2 EUT Exercise Software

The EUT and support equipment were pre-installed with exercising software and provided by Sunpower Corporation. The EUT software provided was BusyBox v1.22.1 built-in shell. After the EUT and support equipment were connected, the PuTTY software was used to connect and operate the EUT through BusyBox. Once in BusyBox, different commands were entered for the different modulations and channel types required. The continuously transmit and ping

2.3 Equipment Modifications

N/A

2.4 Local Support Equipment

Manufacturer/Product Type	Description	Model No.	Serial No.
Dell	Laptop	Latitude	3CKR4Q1
Dell	90W-AC Adapter	LA90PE1-01	517KCO

2.5 Interface Ports and Cabling

Cable Description	Length (m)	To	From
AC Power Cable	< 1.0	EUT	AC Power
RJ45 Cable	2.0	EUT	Laptop
SMA Cable	3.0	EUT	Antenna

3 Summary of Test Results

Results reported relate only to the product tested.

FCC Rules	Description of Test	Results
FCC §15.203	Antenna Requirement	Compliant
FCC §15.207	AC Line Conducted Emissions	Compliant
FCC §2.1091, §15.247(i)	RF Exposure	Compliant
FCC §2.1053, §15.205, §15.209, §15.247 (d)	Radiated Spurious Emissions	Compliant
FCC §15.247(b)(3)	Maximum Peak Output Power	Compliant

4 FCC §15.203 - Antenna Requirements

4.1 Applicable Standards

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 use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.2 Antenna Description

The antennas used by the EUT are uniquely coupled antennas. Antenna 1 is an external Omni-directional antenna, with a SMA cable connected. Antenna 2 is a PCB antenna with the I-PEX connector.

Antenna	Frequency Range (MHz)	Net Gain (dBi) Antenna 1 (Ext)	Gain (dBi) Antenna 2 (Int)
Wi-Fi	2412	6.0*	4.24
Wi-Fi	2422	6.0*	4.00
Wi-Fi	2437	6.0*	3.76
Wi-Fi	2452	6.0*	3.65
Wi-Fi	2462	6.0*	3.30

Note: SMA Cable loss of Antenna 1 is 2.0 dBi, nominal gain of Antenna 1 is 8.0 dBi.
Net gain of Antenna 1 = 8 - 2 = 6.0 dBi

5 FCC §15.247(i) - RF Exposure

5.1 Applicable Standards

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

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

f = frequency in MHz; * = Plane-wave equivalent power density

5.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

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

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

5.3 MPE Results

802.11g Mode, Middle Channel

Maximum peak output power at antenna input terminal (dBm):	25.60
Maximum peak output power at antenna input terminal (mW):	363.08
Prediction distance (cm):	20
Prediction frequency (MHz):	2437
Maximum Antenna Gain, typical (dBi):	8.17
Maximum Antenna Gain (numeric):	6.56
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.474
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.47 mW/cm^2 for 802.11g Mode Middle Channel. Limit is 1.0 mW/cm^2.

6 FCC §15.207 - AC Line Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207 Conducted limits:

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 (dBμV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 Note1	56 to 46 Note2
0.5-5	56	46
5-30	60	50

Note1: Decreases with the logarithm of the frequency.
Note2: A linear average detector is required

6.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.10-2013 measurement procedure. The specification used were FCC §15.207 limits.

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

The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

6.3 Test Procedure

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

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

All data was recorded in the Peak, Quasi-Peak and Average detection mode.

6.4 Corrected Amplitude & Margin Calculation

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

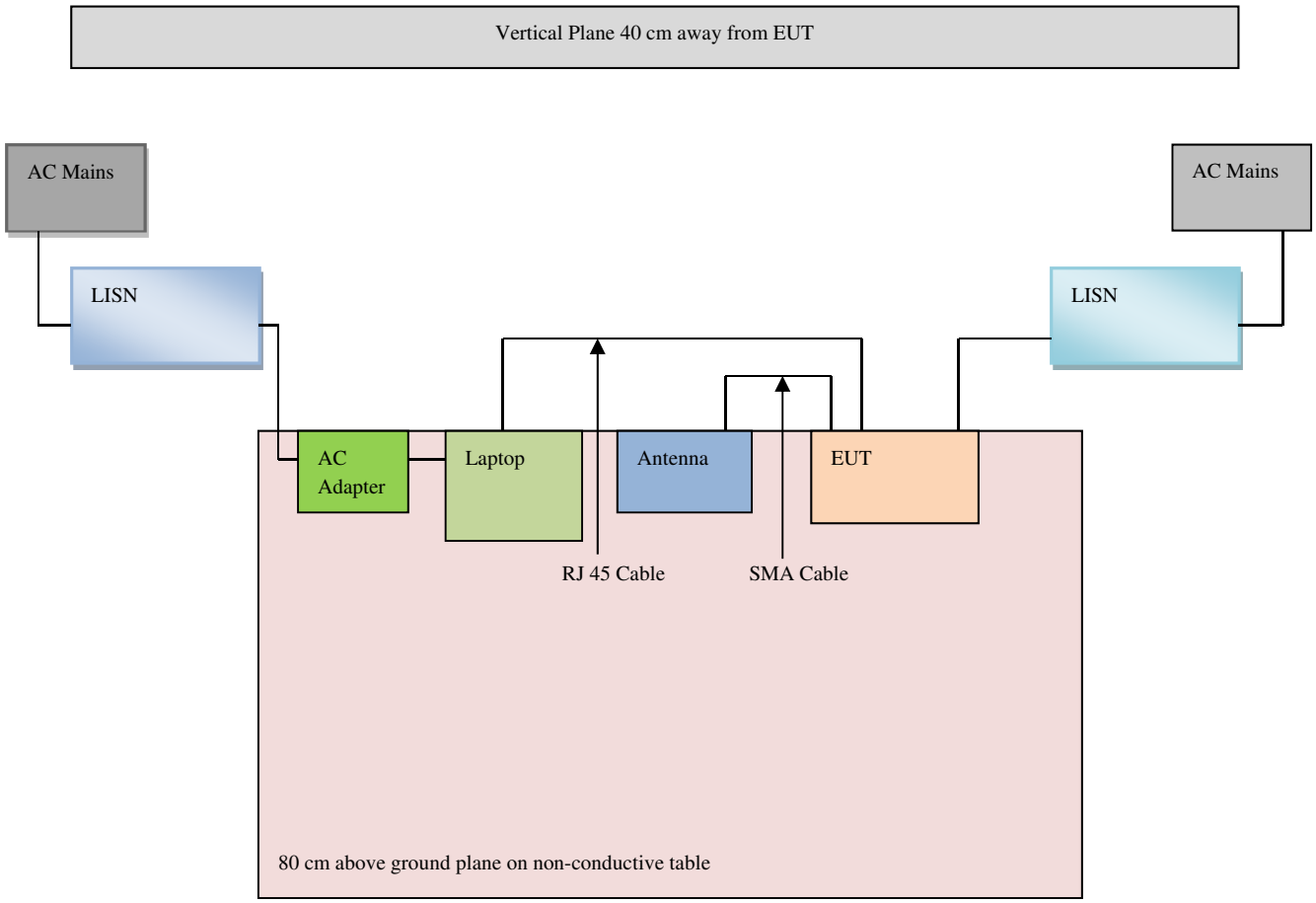
CA = Ai + CL + Atten

For example, a corrected amplitude of 46.2 dBμV = Indicated Reading (32.5 dBμV) + Cable Loss (3.7 dB) + Attenuator (10 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

6.5 Test Setup Block Diagram



6.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	Impulse Limiter	ESH3-Z2	101964	2016-07-22	1 Year
Solar Electronics Company	High Pass Filter	Type 7930-100	7930150203	2016-02-26	1 Year
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100338	2016-02-04	2 Years
Wireless Solutions	Conducted Emission Cable	LMR 400	691	2016-06-29	1 Year
FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160129	2016-04-11	1 Year
FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160130	2016-04-12	1 Year
Vasona	Test software	V6.0 build 11	10400213	N/R	N/R

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

6.7 Test Environmental Conditions

Temperature:	18º C
Relative Humidity:	44 %
ATM Pressure:	101.6 kPa

The testing was performed by Shoaib Khan on 2017-01-27 at Ground Plane Test Site.

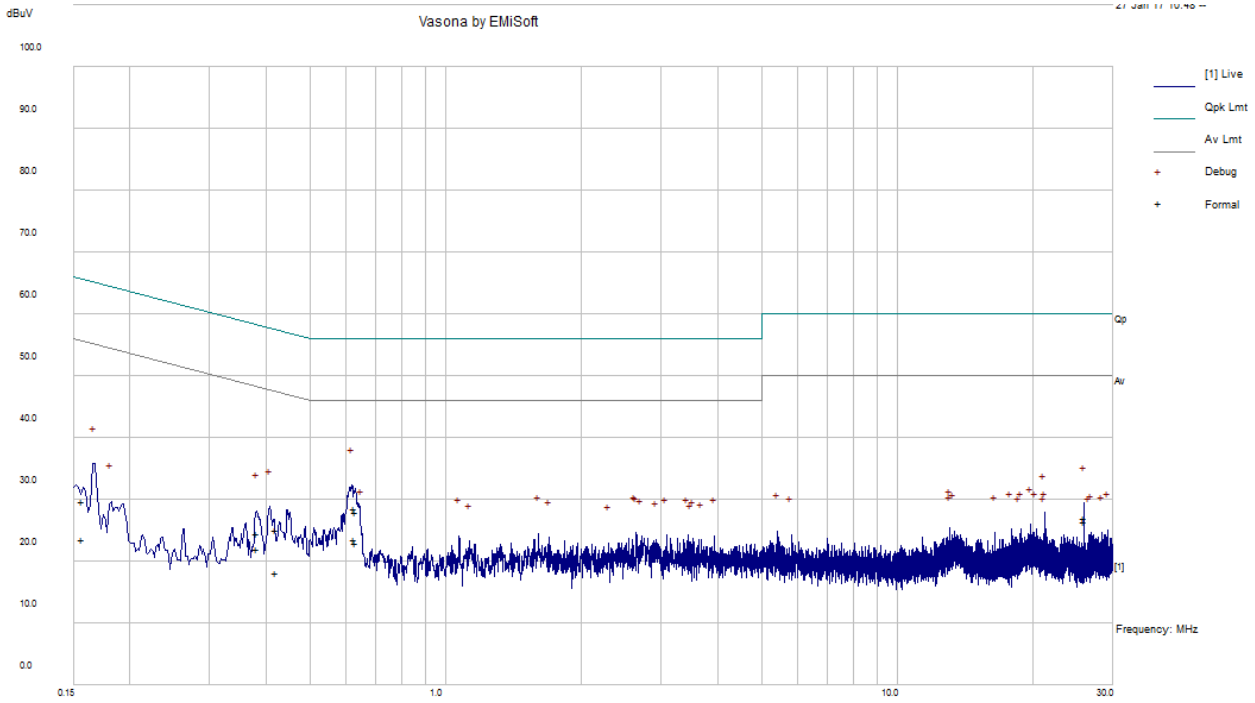
6.8 Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC 15C standard's conducted emissions limits, with the margin reading of:

Connection: AC Power Cord connected to 120 V/60 Hz, AC, Neutral Line			
Margin (dB)	**Frequency (MHz)**	**Detector**	**Range (MHz)**
-18.56	0.623412	Average	0.15-30

6.9 Conducted Emissions Test Plots and Data

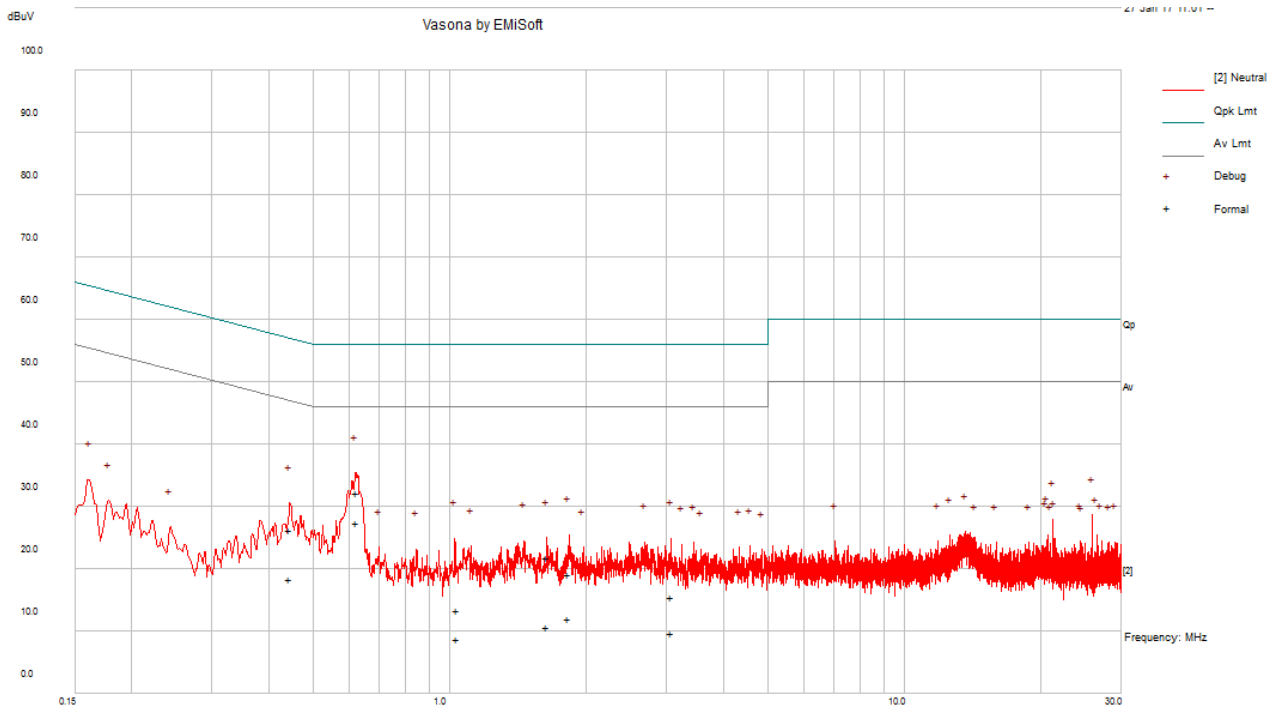
120 V AC, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector
0.63006	28.55	Live	56	-27.45	Quasi-Peak
0.632926	27.98	Live	56	-28.02	Quasi-Peak
0.420003	25.1	Live	57.45	-32.34	Quasi-Peak
25.87276	26.51	Live	60	-33.49	Quasi-Peak
0.381844	24.64	Live	58.24	-33.6	Quasi-Peak
0.15716	29.81	Live	65.61	-35.8	Quasi-Peak

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector
0.63006	23.65	Live	46	-22.35	Average
25.87276	27.12	Live	50	-22.88	Average
0.632926	23.06	Live	46	-22.94	Average
0.381844	21.97	Live	48.24	-26.27	Average
0.420003	18.29	Live	47.45	-29.16	Average
0.15716	23.63	Live	55.61	-31.98	Average

120 V AC, 60 Hz – Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.623412	32.15	Neutral	56	-23.85	Quasi-Peak
0.443957	26.36	Neutral	56.99	-30.62	Quasi-Peak
1.635256	21.8	Neutral	56	-34.2	Quasi-Peak
1.822254	19.12	Neutral	56	-36.88	Quasi-Peak
3.066263	15.51	Neutral	56	-40.49	Quasi-Peak
1.036505	13.4	Neutral	56	-42.6	Quasi-Peak

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.623412	27.44	Neutral	46	-18.56	Average
0.443957	18.43	Neutral	46.99	-28.56	Average
1.822254	12.01	Neutral	46	-33.99	Average
1.635256	10.76	Neutral	46	-35.24	Average
3.066263	9.76	Neutral	46	-36.24	Average
1.036505	8.76	Neutral	46	-37.24	Average

7 FCC §15.209 & §15.247(d) - Spurious Radiated Emissions

7.1 Applicable Standards

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As Per FCC §15.205(a), except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423		
0.495 – 0.505	16.69475 – 16.69525	960 – 1240	4. 5 – 5. 15
2.1735 – 2.1905	25.5 – 25.67	1300 – 1427	5. 35 – 5. 46
4.125 – 4.128	37.5 – 38.25	1435 – 1626.5	7.25 – 7.75
4.17725 – 4.17775	73 – 74.6	1645.5 – 1646.5	8.025 – 8.5
4.20725 – 4.20775	74.8 – 75.2	1660 – 1710	9.0 – 9.2
6.215 – 6.218	108 – 121.94	1718.8 – 1722.2	9.3 – 9.5
6.26775 – 6.26825	123 – 138	2200 – 2300	10.6 – 12.7
6.31175 – 6.31225	149.9 – 150.05	2310 – 2390	13.25 – 13.4
8.291 – 8.294	156.52475 – 156.52525	2483.5 – 2500	14.47 – 14.5
8.362 – 8.366	156.7 – 156.9	2690 – 2900	15.35 – 16.2
8.37625 – 8.38675	162.0125 –167.17	3260 – 3267	17.7 – 21.4
8.41425 – 8.41475	167.72 – 173.2	3.332 – 3.339	22.01 – 23.12
12.29 – 12.293	240 – 285	3 3458 – 3 358	23.6 – 24.0
12.51975 – 12.52025	322 – 335.4	3.600 – 4.400	31.2 – 31.8
12.57675 – 12.57725	399.9 – 410		36.43 – 36.5
13.36 – 13.41	608 – 614		Above 38.6

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 §15.247 (d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

7.2 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 used was the FCC 15 Subpart C.

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 Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords 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 was set 3 meter away from the testing antenna, which was varied from 1-4 meter, and the EUT was placed on a turntable, which was 0.8 meter and 1.5 meter above the ground plane for below and above 1000 MHz measurements, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna's polarity should be changed between horizontal and vertical.

The spectrum analyzer or receiver was set as:

Below 1000 MHz:

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

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

7.4 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

7.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100044	2015-07-23	2 Years
Agilent	PSA	E4446A	MY48250238	2016-12-16	1 Year
Sunol Sciences	Controller, System	SC104V	122303-1	Cal. Not required	Cal. Not required
Sunol Sciences	Antenna, BiConiLog	JB1	A013105-3	2015-07-11	2 Years
Keysight Technologies	RF Limiter	11867A	MY42243052	2016-01-18	2 Years
HP	Pre Amplifier	8447D	2443A04374	2016-06-28	1 year
Sunol Sciences	Antenna, Horn	DRH-118	A052704	2015-03-09	2 Year
IW	High Frequency SMA Cable	-	00687	2017-01-06	1 Year
-	SMA cable	-	C00012	Each time[1]	N/A
-	N-Type Cable	-	C00013	2016-04-28	1 Year
-	N-Type Cable	-	C00014	2016-05-28	1 Year
HP/ Agilent	Pre Amplifier	8449B OPT HO2	3008A0113	2016-05-23	1 Year
Sunol Sciences	Motor, Tower	-	-	Cal. Not required	Cal. Not required
Vasona	Test software	V6.0 build 11	10400213	N/R	N/R

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.

***Statement of Traceability*:** BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 9 June 2016) "A2LA Policy on Metrological Traceability".

7.6 Test Environmental Conditions

Temperature:	19º C
Relative Humidity:	47 %
ATM Pressure:	101.9 kPa

The testing was performed by Shoaib Khan from 2017-01-20 in 5m chamber 3.

7.7 Summary of Test Results

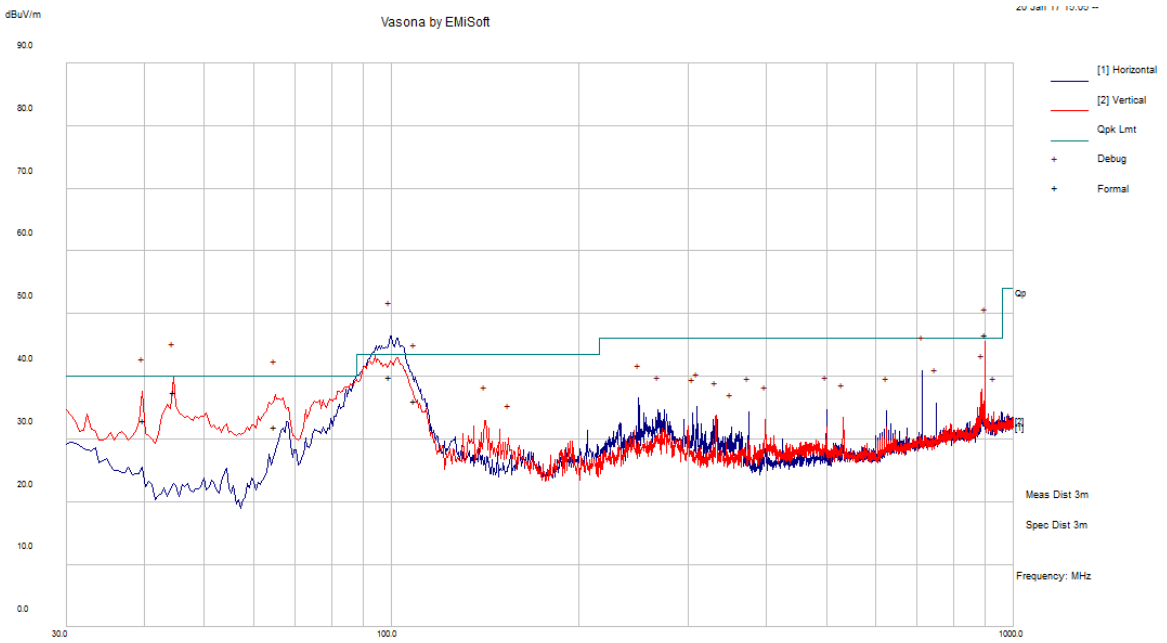
According to the data hereinafter, the EUT complied with FCC Title 47, Part 15C standard's radiated emissions limits, and had the worst margin of:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, channel**
-2.03	2330	Horizontal	802.11b Mode, Antenna Chain 1, Low CH
-2.28	2390	Horizontal	802.11b Mode, Antenna Chain 2, Low CH
-0.11	2483.5	Vertical	802.11g Mode, High CH

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

7.8 Radiated Emissions Test Results

1) 30 MHz to 1 GHz on 802.11g Mode, Mid Channel (Worst Case), Measured at 3 meters



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
899.984	44.34	116	V	250	46	-1.66	Quasi-Peak
44.69175	37.41	101	V	109	40	-2.59	Quasi-Peak
99.2995	39.95	173	H	105	43.5	-3.55	Quasi-Peak
39.95	33.05	127	V	322	40	-6.95	Quasi-Peak
108.8078	36.17	209	H	138	43.5	-7.33	Quasi-Peak
64.91325	31.88	176	V	22	40	-8.12	Quasi-Peak

2) 1–25 GHz, Measured at 3 meters

802.11b Mode, Antenna Chain 1

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz											
2412	77.78	296	145	V	29.042	5.015	0.000	111.837	-	-	Peak
2412	75.58	274	272	H	29.042	5.015	0.000	109.637	-	-	Peak
2330	30.44	227	130	V	29.042	4.900	0.000	64.383	74	-9.62	Peak
2330	29.2	279	219	H	29.042	4.900	0.000	63.143	74	-10.86	Peak
2330	17.87	227	130	V	29.042	4.900	0.000	51.813	54	-2.19	Ave
2330	18.03	279	219	H	29.042	4.900	0.000	51.973	54	-2.03	Ave
4824	57.21	238	283	V	32.472	7.531	38.564	58.649	74	-15.35	Peak
4824	49.66	304	287	H	32.472	7.531	38.564	51.099	74	-22.90	Peak
4824	50.05	238	283	V	32.472	7.531	38.564	51.489	54	-2.51	Ave
4824	42.64	297	285	H	32.472	7.531	38.564	44.079	54	-9.92	Ave
7236	47.70	0	100	V	36.692	8.536	37.907	55.021	74	-18.98	Peak
7236	47.14	0	100	H	36.692	8.536	37.907	54.461	74	-19.54	Peak
7236	35.11	0	100	V	36.692	8.536	37.907	42.431	54	-11.57	Ave
7236	35.17	0	100	H	36.692	8.536	37.907	42.491	54	-11.51	Ave
9648	47.45	0	100	V	37.837	11.719	38.292	58.714	74	-15.29	Peak
9648	47.38	0	100	H	37.837	11.719	38.292	58.644	74	-15.36	Peak
9648	35.43	0	100	V	37.837	11.719	38.292	46.694	54	-7.31	Ave
9648	35.41	0	100	H	37.837	11.719	38.292	46.674	54	-7.33	Ave
Middle Channel 2437 MHz											
2437	78.56	265	131	V	29.042	5.015	0.000	112.617	-	-	Peak
2437	76.37	275	267	H	29.042	5.015	0.000	110.427	-	-	Peak
4874	54.54	167	153	V	32.638	7.531	38.535	56.174	74	-17.83	Peak
4874	50.33	344	239	H	32.638	7.531	38.535	51.964	74	-22.04	Peak
4874	47.34	167	146	V	32.638	7.531	38.535	48.974	54	-5.03	Ave
4874	44.88	349	296	H	32.638	7.531	38.535	46.514	54	-7.49	Ave
7311	47.09	0	100	V	37.148	8.718	37.907	55.049	74	-18.95	Peak
7311	46.34	0	100	H	37.148	8.718	37.907	54.299	74	-19.70	Peak
7311	34.85	0	100	V	37.148	8.718	37.907	42.809	54	-11.19	Ave
7311	34.79	0	100	H	37.148	8.718	37.907	42.749	54	-11.25	Ave
9748	47.73	0	100	V	37.923	11.778	38.292	59.138	74	-14.86	Peak
9748	47.38	0	100	H	37.923	11.778	38.292	58.788	74	-15.21	Peak
9748	35.73	0	100	V	37.923	11.778	38.292	47.138	54	-6.86	Ave
9748	35.79	0	100	H	37.923	11.778	38.292	47.198	54	-6.80	Ave

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2462 MHz											
2462	76.71	195	100	V	29.413	5.015	0.000	111.138	-	-	Peak
2462	74.42	269	266	H	29.413	5.015	0.000	108.848	-	-	Peak
2483.5	30.67	253	165	V	29.413	5.015	0.000	65.098	74	-8.90	Peak
2483.5	28.03	228	100	H	29.413	5.015	0.000	62.458	74	-11.54	Peak
2483.5	16.83	253	165	V	29.413	5.015	0.000	51.258	54	-2.74	Ave
2483.5	15.77	0	100	H	29.413	5.015	0.000	50.198	54	-3.80	Ave
4924	52.61	165	128	V	32.985	7.063	38.535	54.051	74	-19.88	Peak
4924	49.27	340	128	H	32.985	7.063	38.535	50.782	74	-23.22	Peak
4924	44.23	165	128	V	32.985	7.063	38.535	45.671	54	-8.26	Ave
4924	39.98	340	128	H	32.985	7.063	38.535	41.492	54	-12.51	Ave
7386	47.28	0	100	V	37.139	8.718	37.890	55.247	74	-18.75	Peak
7386	47.19	0	100	H	37.139	8.718	37.890	55.157	74	-18.84	Peak
7386	34.87	0	100	V	37.139	8.718	37.890	42.837	54	-11.16	Ave
7386	34.83	0	100	H	37.139	8.718	37.890	42.797	54	-11.20	Ave
9848	48.09	0	100	V	37.985	11.388	38.292	59.170	74	-14.83	Peak
9848	47.86	0	100	H	37.985	11.388	38.292	58.940	74	-15.06	Peak
9848	35.63	0	100	V	37.985	11.388	38.292	46.710	54	-7.29	Ave
9848	35.58	0	100	H	37.985	11.388	38.292	46.660	54	-7.34	Ave

802.11b Mode, Antenna Chain 2

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz											
2412	77.88	224	126	V	29.042	5.015	0.000	111.937	-	-	Peak
2412	76.35	288	149	H	29.042	5.015	0.000	110.407	-	-	Peak
2390	29.29	270	146	V	29.042	4.900	0.000	63.233	74	-10.77	Peak
2390	28.34	202	142	H	29.042	4.900	0.000	62.283	74	-11.72	Peak
2390	17.04	254	138	V	29.042	4.900	0.000	50.983	54	-3.02	Ave
2390	17.78	200	142	H	29.042	4.900	0.000	51.723	54	-2.28	Ave
4824	55.82	242	238	V	32.472	7.531	38.564	57.259	74	-16.74	Peak
4824	51.21	210	253	H	32.472	7.531	38.564	52.649	74	-21.35	Peak
4824	48.81	242	238	V	32.472	7.531	38.564	50.249	54	-3.75	Ave
4824	43.49	249	249	H	32.472	7.531	38.564	44.929	54	-9.07	Ave
7236	47.76	0	100	V	36.692	8.536	37.907	55.081	74	-18.92	Peak
7236	46.64	0	100	H	36.692	8.536	37.907	53.961	74	-20.04	Peak
7236	34.89	0	100	V	36.692	8.536	37.907	42.211	54	-11.79	Ave
7236	34.88	0	100	H	36.692	8.536	37.907	42.201	54	-11.80	Ave
9648	46.74	0	100	V	37.837	11.719	38.292	58.004	74	-16.00	Peak
9648	46.58	0	100	H	37.837	11.719	38.292	57.844	74	-16.16	Peak
9648	35.44	0	100	V	37.837	11.719	38.292	46.704	54	-7.30	Ave
9648	35.46	0	100	H	37.837	11.719	38.292	46.724	54	-7.28	Ave
Middle Channel 2437 MHz											
2437	75.98	265	130	V	29.042	5.015	0.000	110.037	-	-	Peak
2437	73.71	276	266	H	29.042	5.015	0.000	107.767	-	-	Peak
4874	55.99	37	266	V	32.638	7.531	38.535	57.624	74	-16.38	Peak
4874	48.48	122	270	H	32.638	7.531	38.535	50.114	74	-23.89	Peak
4874	49.63	35	272	V	32.638	7.531	38.535	51.264	54	-2.74	Ave
4874	40.94	120	272	H	32.638	7.531	38.535	42.574	54	-11.43	Ave
7311	46.91	0	100	V	37.148	8.718	37.907	54.869	74	-19.13	Peak
7311	47.17	0	100	H	37.148	8.718	37.907	55.129	74	-18.87	Peak
7311	34.61	0	100	V	37.148	8.718	37.907	42.569	54	-11.43	Ave
7311	34.55	0	100	H	37.148	8.718	37.907	42.509	54	-11.49	Ave
9748	46.60	0	100	V	37.923	11.778	38.292	58.008	74	-15.99	Peak
9748	47.68	0	100	H	37.923	11.778	38.292	59.088	74	-14.91	Peak
9748	35.52	0	100	V	37.923	11.778	38.292	46.928	54	-7.07	Ave
9748	35.56	0	100	H	37.923	11.778	38.292	46.968	54	-7.03	Ave

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2462 MHz											
2462	77.66	294	156	V	29.413	5.015	0.000	112.088	-	-	Peak
2462	72.74	198	216	H	29.413	5.015	0.000	107.168	-	-	Peak
2483.5	30.92	311	174	V	29.413	5.015	0.000	65.348	74	-8.65	Peak
2483.5	28.35	236	128	H	29.413	5.015	0.000	62.778	74	-11.22	Peak
2483.5	16.84	249	175	V	29.413	5.015	0.000	51.268	54	-2.73	Ave
2483.5	15.75	202	166	H	29.413	5.015	0.000	50.178	54	-3.82	Ave
4924	50.99	131	203	V	32.985	7.063	38.535	52.431	74	-21.50	Peak
4924	48.75	248	277	H	32.985	7.063	38.535	50.262	74	-23.74	Peak
4924	46.34	201	200	V	32.985	7.063	38.535	47.781	54	-6.15	Ave
4924	41.53	230	242	H	32.985	7.063	38.535	43.042	54	-10.96	Ave
7386	46.22	0	100	V	37.139	8.718	37.890	54.187	74	-19.81	Peak
7386	47.24	0	100	H	37.139	8.718	37.890	55.207	74	-18.79	Peak
7386	34.62	0	100	V	37.139	8.718	37.890	42.587	54	-11.41	Ave
7386	34.68	0	100	H	37.139	8.718	37.890	42.647	54	-11.35	Ave
9848	49.92	0	100	V	37.985	11.388	38.292	61.000	74	-13.00	Peak
9848	47.06	0	100	H	37.985	11.388	38.292	58.140	74	-15.86	Peak
9848	35.54	0	100	V	37.985	11.388	38.292	46.620	54	-7.38	Ave
9848	35.52	0	100	H	37.985	11.388	38.292	46.600	54	-7.40	Ave

802.11g Mode, Antenna Chain 1+2

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz											
2412	79.71	297	135	V	29.042	5.015	0.000	113.767	-	-	Peak
2412	77.76	302	189	H	29.042	5.015	0.000	111.817	-	-	Peak
2390	36.12	258	100	V	29.042	4.900	0.000	70.063	74	-3.94	Peak
2390	31.05	261	151	H	29.042	4.900	0.000	64.993	74	-9.01	Peak
2390	18.99	266	152	V	29.042	4.900	0.000	52.933	54	-1.07	Ave
2390	17.89	277	152	H	29.042	4.900	0.000	51.833	54	-2.17	Ave
4824	52.23	232	276	V	32.472	7.531	38.564	53.669	74	-20.33	Peak
4824	47.88	0	100	H	32.472	7.531	38.564	49.319	74	-24.68	Peak
4824	40.38	239	256	V	32.472	7.531	38.564	41.819	54	-12.18	Ave
4824	36.49	0	100	H	32.472	7.531	38.564	37.929	54	-16.07	Ave
7236	47.07	0	100	V	36.692	8.536	37.907	54.391	74	-19.61	Peak
7236	47.15	0	100	H	36.692	8.536	37.907	54.471	74	-19.53	Peak
7236	34.85	0	100	V	36.692	8.536	37.907	42.171	54	-11.83	Ave
7236	34.89	0	100	H	36.692	8.536	37.907	42.211	54	-11.79	Ave
9648	46.82	0	100	V	37.837	11.719	38.292	58.084	74	-15.92	Peak
9648	47.02	0	100	H	37.837	11.719	38.292	58.284	74	-15.72	Peak
9648	35.30	0	100	V	37.837	11.719	38.292	46.564	54	-7.44	Ave
9648	35.39	0	100	H	37.837	11.719	38.292	46.654	54	-7.35	Ave
Middle Channel 2437 MHz											
2437	83.67	260	160	V	29.042	5.015	0.000	117.727	-	-	Peak
2437	81.67	280	179	H	29.042	5.015	0.000	115.727	-	-	Peak
4874	56.64	247	243	V	32.638	7.531	38.535	58.274	74	-15.73	Peak
4874	53.12	0	297	H	32.638	7.531	38.535	54.754	74	-19.25	Peak
4874	43.25	238	236	V	32.638	7.531	38.535	44.884	54	-9.12	Ave
4874	40.51	0	297	H	32.638	7.531	38.535	42.144	54	-11.86	Ave
7311	52.27	310	276	V	37.148	8.718	37.907	60.229	74	-13.77	Peak
7311	47.00	0	100	H	37.148	8.718	37.907	54.959	74	-19.04	Peak
7311	37.47	304	257	V	37.148	8.718	37.907	45.429	54	-8.57	Ave
7311	35.25	0	100	H	37.148	8.718	37.907	43.209	54	-10.79	Ave
9748	47.63	0	100	V	37.923	11.778	38.292	59.038	74	-14.96	Peak
9748	46.99	0	100	H	37.923	11.778	38.292	58.398	74	-15.60	Peak
9748	34.78	0	100	V	37.923	11.778	38.292	46.188	54	-7.81	Ave
9748	34.51	0	100	H	37.923	11.778	38.292	45.918	54	-8.08	Ave

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2462 MHz											
2462	79.24	229	173	V	29.413	5.015	0.000	113.668	-	-	Peak
2462	77.3	282	178	H	29.413	5.015	0.000	111.728	-	-	Peak
2483.5	36.99	278	168	V	29.413	5.015	0.000	71.418	74	-2.58	Peak
2483.5	31.11	277	169	H	29.413	5.015	0.000	65.538	74	-8.46	Peak
2483.5	19.46	247	154	V	29.413	5.015	0.000	53.888	54	-0.11	Ave
2483.5	17.41	279	256	H	29.413	5.015	0.000	51.838	54	-2.16	Ave
4924	50.22	207	141	V	32.985	7.063	38.535	51.661	74	-22.27	Peak
4924	49.03	0	100	H	32.985	7.063	38.535	50.542	74	-23.46	Peak
4924	40.15	207	141	V	32.985	7.063	38.535	41.591	54	-12.34	Ave
4924	36.78	0	100	H	32.985	7.063	38.535	38.292	54	-15.71	Ave
7386	47.18	0	100	V	37.139	8.718	37.890	55.147	74	-18.85	Peak
7386	46.86	0	100	H	37.139	8.718	37.890	54.827	74	-19.17	Peak
7386	34.80	0	100	V	37.139	8.718	37.890	42.767	54	-11.23	Ave
7386	34.83	0	100	H	37.139	8.718	37.890	42.797	54	-11.20	Ave
9848	47.00	0	100	V	37.985	11.388	38.292	58.080	74	-15.92	Peak
9848	47.44	0	100	H	37.985	11.388	38.292	58.520	74	-15.48	Peak
9848	35.47	0	100	V	37.985	11.388	38.292	46.550	54	-7.45	Ave
9848	35.44	0	100	H	37.985	11.388	38.292	46.520	54	-7.48	Ave

802.11n20, Mode Antenna Chain 1+2

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz											
2412	78.8	290	138	V	29.042	5.015	0.000	112.857	-	-	Peak
2412	77.83	303	188	H	29.042	5.015	0.000	111.887		-	Peak
2390	38.78	298	161	V	29.042	4.900	0.000	72.723	74	-1.28	Peak
2390	36.48	291	144	H	29.042	4.900	0.000	70.423	74	-3.58	Peak
2390	18.82	298	161	V	29.042	4.900	0.000	52.763	54	-1.24	Ave
2390	17.11	291	144	H	29.042	4.900	0.000	51.053	54	-2.95	Ave
4824	53.71	37	289	V	32.472	7.531	38.564	55.149	74	-18.85	Peak
4824	47.77	0	100	H	32.472	7.531	38.564	49.209	74	-24.79	Peak
4824	39.14	37	289	V	32.472	7.531	38.564	40.579	54	-13.42	Ave
4824	36.08	0	100	H	32.472	7.531	38.564	37.519	54	-16.48	Ave
7236	54.82	49	286	V	36.692	8.536	37.907	62.141	74	-11.86	Peak
7236	48.58	0	100	H	36.692	8.536	37.907	55.901	74	-18.10	Peak
7236	38.00	49	286	V	36.692	8.536	37.907	45.321	54	-8.68	Ave
7236	35.64	0	100	H	36.692	8.536	37.907	42.961	54	-11.04	Ave
9648	47.50	0	100	V	37.837	11.719	38.292	58.764	74	-15.24	Peak
9648	47.98	0	100	H	37.837	11.719	38.292	59.244	74	-14.76	Peak
9648	34.94	0	100	V	37.837	11.719	38.292	46.204	54	-7.80	Ave
9648	34.87	0	100	H	37.837	11.719	38.292	46.134	54	-7.87	Ave
Middle Channel 2437 MHz											
2437	84.32	277	159	V	29.042	5.015	0.000	118.377	-	-	Peak
2437	82.79	282	230	H	29.042	5.015	0.000	116.847	-	-	Peak
4874	54.33	248	241	V	32.638	7.531	38.535	55.964	74	-18.04	Peak
4874	49.64	0	100	H	32.638	7.531	38.535	51.274	74	-22.73	Peak
4874	38.83	248	241	V	32.638	7.531	38.535	40.464	54	-13.54	Ave
4874	35.28	0	100	H	32.638	7.531	38.535	36.914	54	-17.09	Ave
7311	47.64	0	100	V	37.148	8.718	37.907	55.599	74	-18.40	Peak
7311	47.04	0	100	H	37.148	8.718	37.907	54.999	74	-19.00	Peak
7311	34.83	0	100	V	37.148	8.718	37.907	42.789	54	-11.21	Ave
7311	34.81	0	100	H	37.148	8.718	37.907	42.769	54	-11.23	Ave
9748	48.05	0	100	V	37.923	11.778	38.292	59.458	74	-14.54	Peak
9748	47.24	0	100	H	37.923	11.778	38.292	58.648	74	-15.35	Peak
9748	35.71	0	100	V	37.923	11.778	38.292	47.118	54	-6.88	Ave
9748	35.68	0	100	H	37.923	11.778	38.292	47.088	54	-6.91	Ave

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2462 MHz											
2462	78.94	395	165	V	29.413	5.015	0.000	113.368	-	-	Peak
2462	77.14	292	224	H	29.413	5.015	0.000	111.568	-	-	Peak
2483.5	39.32	301	176	V	29.413	5.015	0.000	73.748	74	-0.25	Peak
2483.5	36.59	279	254	H	29.413	5.015	0.000	71.018	74	-2.98	Peak
2483.5	18.4	301	176	V	29.413	5.015	0.000	52.828	54	-1.17	Ave
2483.5	17.58	279	254	H	29.413	5.015	0.000	52.008	54	-1.99	Ave
4924	51.99	51	233	V	32.985	7.063	38.535	53.431	74	-20.50	Peak
4924	48.68	0	100	H	32.985	7.063	38.535	50.192	74	-23.81	Peak
4924	37.09	0	100	V	32.985	7.063	38.535	38.531	54	-15.40	Ave
4924	36.27	0	100	H	32.985	7.063	38.535	37.782	54	-16.22	Ave
7386	47.44	0	100	V	37.139	8.718	37.890	55.407	74	-18.59	Peak
7386	47.16	0	100	H	37.139	8.718	37.890	55.127	74	-18.87	Peak
7386	35.17	0	100	V	37.139	8.718	37.890	43.137	54	-10.86	Ave
7386	35.15	0	100	H	37.139	8.718	37.890	43.117	54	-10.88	Ave
9848	48.21	0	100	V	37.985	11.388	38.292	59.290	74	-14.71	Peak
9848	47.68	0	100	H	37.985	11.388	38.292	58.760	74	-15.24	Peak
9848	35.92	0	100	V	37.985	11.388	38.292	47.000	54	-7.00	Ave
9848	35.81	0	100	H	37.985	11.388	38.292	46.890	54	-7.11	Ave

802.11n40 Mode, Antenna Chain 1+2

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2422 MHz											
2422	72.93	265	133	V	29.042	5.015	0.000	106.987	-	-	Peak
2422	69.73	201	159	H	29.042	5.015	0.000	103.787	-	-	Peak
2390	33.56	200	133	V	29.042	4.900	0.000	67.503	74	-6.50	Peak
2390	32.53	202	204	H	29.042	4.900	0.000	66.473	74	-7.53	Peak
2390	17.75	200	116	V	29.042	4.900	0.000	51.693	54	-2.31	Ave
2390	16.9	211	100	H	29.042	4.900	0.000	50.843	54	-3.16	Ave
4844	49.54	0	100	V	32.472	7.531	38.564	50.979	74	-23.02	Peak
4844	48.45	0	100	H	32.472	7.531	38.564	49.889	74	-24.11	Peak
4844	36.93	0	100	V	32.472	7.531	38.564	38.369	54	-15.63	Ave
4844	36.48	0	100	H	32.472	7.531	38.564	37.919	54	-16.08	Ave
7266	47.18	0	100	V	36.692	8.536	37.907	54.501	74	-19.50	Peak
7266	47.01	0	100	H	36.692	8.536	37.907	54.331	74	-19.67	Peak
7266	34.95	0	100	V	36.692	8.536	37.907	42.271	54	-11.73	Ave
7266	34.94	0	100	H	36.692	8.536	37.907	42.261	54	-11.74	Ave
9688	46.39	0	100	V	37.837	11.719	38.292	57.654	74	-16.35	Peak
9688	46.62	0	100	H	37.837	11.719	38.292	57.884	74	-16.12	Peak
9688	34.85	0	100	V	37.837	11.719	38.292	46.114	54	-7.89	Ave
9688	34.75	0	100	H	37.837	11.719	38.292	46.014	54	-7.99	Ave
Middle Channel 2437 MHz											
2437	76.26	215	173	V	29.042	5.015	0.000	110.317	-	-	Peak
2437	71.73	215	180	H	29.042	5.015	0.000	105.787	-	-	Peak
4874	53.89	29	209	V	32.638	7.531	38.535	55.524	74	-18.48	Peak
4874	48.11	0	100	H	32.638	7.531	38.535	49.744	74	-24.26	Peak
4874	37.62	29	208	V	32.638	7.531	38.535	39.254	54	-14.75	Ave
4874	35.18	0	100	H	32.638	7.531	38.535	36.814	54	-17.19	Ave
7311	47.52	0	100	V	37.148	8.718	37.907	55.479	74	-18.52	Peak
7311	46.71	0	100	H	37.148	8.718	37.907	54.669	74	-19.33	Peak
7311	34.00	0	100	V	37.148	8.718	37.907	41.959	54	-12.04	Ave
7311	34.01	0	100	H	37.148	8.718	37.907	41.969	54	-12.03	Ave
9748	47.14	0	100	V	37.923	11.778	38.292	58.548	74	-15.45	Peak
9748	47.59	0	100	H	37.923	11.778	38.292	58.998	74	-15.00	Peak
9748	34.65	0	100	V	37.923	11.778	38.292	46.058	54	-7.94	Ave
9748	34.61	0	100	H	37.923	11.778	38.292	46.018	54	-7.98	Ave

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2452 MHz											
2452	74.1	275	173	V	29.413	5.015	0.000	108.528	-	-	Peak
2452	72.58	203	175	H	29.413	5.015	0.000	107.008	-	-	Peak
2483.5	38.17	255	100	V	29.413	5.931	0.000	73.514	74	-0.49	Peak
2483.5	34.98	208	100	H	29.413	5.931	0.000	70.324	74	-3.68	Peak
2483.5	15.99	0	100	V	29.413	5.931	0.000	51.334	54	-2.67	Ave
2483.5	15.63	0	100	H	29.413	5.931	0.000	50.974	54	-3.03	Ave
4904	52.70	29	300	V	32.985	6.903	38.535	53.981	74	-19.95	Peak
4904	48.39	0	100	H	32.985	6.903	38.535	49.742	74	-24.26	Peak
4904	38.16	29	300	V	32.985	6.903	38.535	39.441	54	-14.49	Ave
4904	35.69	0	100	H	32.985	6.903	38.535	37.042	54	-16.96	Ave
7356	46.68	0	100	V	37.139	8.558	37.890	54.487	74	-19.51	Peak
7356	46.88	0	100	H	37.139	8.558	37.890	54.687	74	-19.31	Peak
7356	33.77	0	100	V	37.139	8.558	37.890	41.577	54	-12.42	Ave
7356	33.70	0	100	H	37.139	8.558	37.890	41.507	54	-12.49	Ave
9808	47.39	0	100	V	37.985	11.228	38.292	58.310	74	-15.69	Peak
9808	47.13	0	100	H	37.985	11.228	38.292	58.050	74	-15.95	Peak
9808	34.41	0	100	V	37.985	11.228	38.292	45.330	54	-8.67	Ave
9808	34.42	0	100	H	37.985	11.228	38.292	45.340	54	-8.66	Ave

8 FCC §15.247(b) (3) - Output Power Measurement

8.1 Applicable Standards

According to FCC 15.247(b) (3) for systems using digital modulation in the 902~928 MHz, 2400~2483.5 MHz, and 5725~5850 MHz bands: 1 Watt.

8.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r05: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 9: Fundamental emission output power.

8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
ETS- Lingerin	Power Sensor	7002-006	160097	2016-12-05	24 months
-	U.FL Cable	-	-	Each time[1]	N/A
-	20 dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.

***Statement of Traceability*:** BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 9 June 2016) "A2LA Policy on Metrological Traceability".

8.4 Test Environmental Conditions

Temperature:	22º C
Relative Humidity:	45 %
ATM Pressure:	102.2 KPa

The testing was performed by Shoaib Khan on 2017-01-27 in RF site.

8.5 Test Results

Channel	Frequency (MHz)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Total Output Power (dBm)	Limit (dBm)
802.11b Mode					
1	2412	17.26	22.6	-	30
6	2437	21.07	17.05	-	30
11	2462	20.37	22.32	-	30
802.11g Mode					
1	2412	17.76	19.29	21.60	30
6	2437	21.54	23.44	25.60	30
11	2462	17.04	18.96	21.12	30
802.11n20 Mode					
1	2412	17.76	19.15	21.52	30
6	2437	21.1	23.12	25.24	30
11	2462	16.7	18.76	20.86	30
802.11n40 Mode					
3	2422	12.85	14.83	16.96	30
6	2437	16.74	18.79	20.90	30
9	2452	15.13	17.32	19.37	30

Note 1: Duty Cycle correction factor has already been added to the measurement.
Note 2: For 802.11b mode (1TX, 1RX): the EUT supports the antenna with TX and RX diversity functions. Both chain 1 and chain 2 support transmit and receive functions, but only one of them will be used at one time.
For 802.11g/n mode (2TX, 2RX): chain 1 and chain 2 could transmit/receive simultaneously.